June 30, 2021

SENT VIA FEDERAL EXPRESS

Ms. Pamela J. Langston Scully, P.E.
Remedial Project Manager
USEPA Region IV
Atlanta Federal Center
61 Forsyth Street, SW
Atlanta, GA 30303

RE: Operable Unit-3 Construction Completion Report Second Addendum
Anniston PCB Site; Anniston, Alabama
EPA CERCLA ID #ALD000400123; EPA RCRA ID #ALD004019048
Docket No. 1:02-cv-0749-KOB

Dear Ms. Langston Scully:

Pharmacia LLC (formerly Pharmacia Corporation) and Solutia Inc. ([Solutia], collectively, P/S) have completed Remedial Action (RA) construction activities in accordance with the Interim Record of Decision (IROD) for Operable Unit-3 (OU-3), dated September 29, 2011, and the Statement of Work (SOW) attached to the Consent Decree (CD) (Docket No. 1:02-cv-0749-KOB).

Enclosed please find two (2) hard copies and two (2) electronic copies of the above-referenced Construction Completion Report Second Addendum. This report documents the construction activities and quality assurance services provided to complete additional enhancements to OU-3 seep collection, conveyance, and treatment systems. Please do not hesitate to contact me at 256-231-8404 with any questions or comments that you may have regarding this submittal.

Sincerely,

E. Gayle Macolly
Manager, Remedial Projects
Solutia Inc.

Attachment: Operable Unit-3 Construction Completion Report Second Addendum

cc: Ms. Sonja Favors, ADEM, Land Division
Mr. Thomas Dahl, Dahl Environmental Associates

CONSTRUCTION COMPLETION REPORT SECOND ADDENDUM

OU-3 Remedial Action, Anniston PCB Site
Consent Decree Docket No. 1:02-ec-0749-KOB
Solutia Inc., Anniston, Alabama

Issued: 30 June 2021

Prepared for: Solutia Inc.
702 Clydesdale Avenue
Anniston, AL 36201

GSI ENVIRONMENTAL
GSI Environmental Inc.
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CONSTRUCTION COMPLETION REPORT
SECOND ADDENDUM

OU-3 Remedial Action, Anniston PCB Site
Consent Decree Docket No. 1:02-ec-0749-KOB
Solutia Inc., Anniston, Alabama

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ABBREVIATIONS

ADEM	Alabama Department of Environmental Management
AWWSB	Anniston Water Works & Sewer Board
CD	Consent Decree
CQA	Construction Quality Assurance
CTS	Carbon Treatment System
EPA	United States Environmental Protection Agency
EQ	Equalization
GPM	Gallons Per Minute
GSI	GSI Environmental Inc.
HDPE	High Density Polyethylene
HMI	Human Machine Interface
IROD	Interim Record of Decision
IW	Interceptor Well
O&M	Operation and Maintenance
OU	Operable Unit
OU-3	Operable Unit 3
P/S	Pharmacia LLC and Solutia Inc.
PCB	Polychlorinated Biphenyl
PFD	Process Flow Diagram
Pharmacia	Pharmacia LLC
PLC	Programmable Logic Controller
PVC	Polyvinyl Chloride
RA	Remedial Action
RCRA	Resource Conservation and Recovery Act
RD	Remedial Design
SDR	Standard Dimension Ratio
SID	State Indirect Discharge
Site	Anniston PCB Site
Solutia	Solutia Inc.
SOW	Statement of Work
SWMU	Solid Waste Management Unit
Taylor	Taylor Corporation
VFD	Variable Frequency Drive

GSI ENVIRONMENTAL

CONSTRUCTION COMPLETION REPORT
SECOND ADDENDUM

OU-3 Remedial Action, Anniston PCB Site
Consent Decree Docket No. 1:02-ec-0749-KOB
Solutia Inc., Anniston, Alabama

OWNER CERTIFICATION

I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations.

SOLUTIA INC.

E. Gayle Macolly
Manager, Remedial Projects

GSI ENVIRONMENTAL

CONSTRUCTION COMPLETION REPORT
SECOND ADDENDUM

OU-3 Remedial Action, Anniston PCB Site
Consent Decree Docket No. 1:02-ec-0749-KOB
Solutia Inc., Anniston, Alabama

ENGINEERING CERTIFICATION

GSI Environmental Inc. (GSI) was retained by Pharmacia LLC and Solutia Inc. (collectively, P/S) to provide Construction Quality Assurance (CQA) services during the implementation of certain component upgrades of the Remedial Action (RA) construction activities for Operable Unit 3 (OU-3) of the Anniston PCB Site in Anniston, Alabama. These services included the quality assurance monitoring, documentation, and/or testing of the RA components listed below:

- Installation of upgrades to Carbon Treatment System #3 (CTS#3),
- Installation of upgrades for the 3E Seep conveyance lines, and
- Installation of the Iron Treatment System (ITS)

Based on the field observations, submittal information from the contractor, field testing results, and the data presented herein, it is the professional opinion of GSI that these RA upgrade activities for OU-3 of the Anniston PCB Site were performed in conformance with applicable engineering standards and substantial intent of the original Remedial Design as referenced herein.

GSI ENVIRONMENTAL INC.

Michal Rysz, P.E., Ph.D.
Certifying Engineer

Travis McGuire, P.E.
Principal

1.0 INTRODUCTION

1.1 Overview

GSI Environmental Inc. (GSI) prepared this Construction Completion Report Second Addendum on behalf of Pharmacia LLC (formerly Pharmacia Corporation) and Solutia Inc. (Solutia) (collectively, P/S) in accordance with the Consent Decree (CD; Docket No. 1:02-cv-0749-KOB) between the U.S. Environmental Protection Agency (EPA) and P/S, entered into the U.S. District Court for the Northern District of Alabama (the Court) on April 17, 2013. The CD and the associated Statement of Work (SOW) required P/S to implement a remedial action (RA) for Operable Unit-3 (OU-3) of the Anniston Polychlorinated Biphenyl (PCB) Site (the "Site") in accordance with the Interim Record of Decision (IROD), dated September 29, 2011 (EPA, 2011). In addition to the CD and SOW, the RA upgrades described herein were implemented to enhance the performance of the conveyance and treatment system which was previously installed in accordance with the following Remedial Design (RD) documents: the Solid Waste Management Unit 1 (SWMU 1) Design Modifications submitted to the EPA on May 13, 2016 (Solutia, 2016a), the Basis of Design Memorandum submitted to EPA on June 16, 2016 (Solutia, 2016b), and the subsequent design revisions submitted to EPA on September 23, 2016 (Revision 1.0; Solutia, 2016c) and September 19, 2017 (Revision 2.0; Solutia, 2017). Previously, design drawings and technical specifications provided as Revision 2.0 of the SWMU 1 Design Modifications were used to implement the RA components described in the Construction Completion Report Addendum submitted to the EPA on July 27, 2018 (Solutia, 2018c). This report documents the additional expansion of the 3E Seep conveyance and treatment system and the upgrades installed to improve system treatment capacity.

This second addendum to the Construction Completion Report: i) provides a comprehensive summary of the remedial design related to collection and treatment of the 3E Seep; ii) summarizes RA and supplemental RA activities implemented at SWMU 1 of OU-3; and iii) details the upgrades installed at the 3E Seep conveyance and treatment system. These upgrades were identified as beneficial for improved performance of the treatment system after completion of the IROD, initial RA construction, and supplemental RA construction. Completion of the initial RA components specified in the IROD, which included installation of soil cover systems, expansion of groundwater extraction and treatment systems around the eastern and northern portions of the Site, and installation of additional perimeter fencing, were documented in the Construction Completion Report submitted to EPA on January 22, 2018 (Solutia, 2018a). The Construction Completion Report Addendum (Solutia, 2018c) documented the installation of the supplemental RA components, primarily associated with SWMU 1 of OU-3. Documentation of the supplemental RA components are included in the construction drawings (Appendix A), as they pertain to many of the system upgrades that are the focus of this report.

This report was prepared to document the upgrades to the 3E Seep conveyance and treatment system installed after the supplemental RA activities. These system improvements were installed to enhance the operational reliability and to increase the treatment system capacity. For completeness, this report also provides a discussion of the remedial design and previous RA activities associated with SWMU 1 of OU-3.

1.2 Report Organization

This Second Construction Completion Report Addendum is organized as follows:

Section 1.0 – Introduction: Introductory section with an overview and basis for submittal of the Second Construction Completion Report Addendum.

Section 2.0 – Summary of Remedial Design: Describes the selected remedy as presented in the design documents for the supplemental RA components.

Section 3.0 – Project Organization: Provides the project organizational chart and personnel involved with construction.

Section 4.0 – Remedial Action Upgrades Construction Completion: Provides a description of the construction activities and materials that were implemented to complete the upgrades to the 3E Seep conveyance and treatment system, the CQA services provided to assure proper completion of these activities, and the various construction documents and records that were maintained as part of upgrades installation.

Section 5.0 – Additional Considerations: Provides a summary of health and safety issues related to the construction effort, as well as an overview of the Operations and Maintenance (O&M) Plan for OU-3.

Section 6.0 – References: Provides a list of the references cited in this report.

2.0 SUMMARY OF REMEDIAL DESIGN

OU-3 at the Anniston PCB site includes the manufacturing facility (Facility) and two closed landfills, the West End Landfill and the South Landfill (Figure 1). The selected remedy for OU-3, as presented in the IROD, included: i) the construction of soil cover systems in select areas, ii) an expanded groundwater extraction system around the eastern and northern portions of the Facility, iii) the installation of additional perimeter fencing, and iv) implementation of additional institutional controls. The remedy was implemented in addition to previous interim measures constructed at OU-3. Through the issuance of the IROD, the EPA accepted these interim measures as final corrective measures for OU-3.

As part of the selected remedy for OU-3, a Resource Conservation and Recovery Act (RCRA) Subtitle C-compliant cap was constructed over the area occupied by the former PCB Cells (1E, 2E, and 3E; Figure 1). In February 2016, during construction of the cap, P/S observed that water from the previously noted seep area at Cell 3E was being released from beneath the recently installed landfill cover system. The impermeable cover system at the PCB Cells was designed to eliminate infiltration into the waste material and to contain material under the cap thus preventing seeps from occurring. P/S, however, re-evaluated the proposed remedial measures to address the seep area at Cell 3E as water was observed emanating from below the cover system after the cover was installed.

As the seep was observed after the impermeable cap system was in place and following several heavy precipitation events, P/S concluded that recharge to the seep area was not occurring from infiltration through the new cover system. Rather, the seep at the Cell 3E was more characteristic of an ephemeral contact seep that is sourced from surface water run-off or groundwater recharge from upgradient of the discharge location (e.g., the slopes of Coldwater Mountain south of the recently capped area). The location of the seep near the upgradient boundary of Cell 3E within the South Landfill suggests that the seep may be present due to a disruption of permeable layers or perched layers developed through the landfilling activities that have occurred in the area.

Several alternatives were developed and evaluated to address the seep on the basis that the seep is a seasonal and intermittent feature that occurs primarily during winter months following periods of high rainfall. The selected alternative consisted of a collection system (shallow collection trenches and drains) beneath the impermeable cover to capture and treat water that periodically flows from the seep area. This type of system was determined to be more reliable, effective, and less costly to construct, operate, and maintain compared to the other alternatives (Solutia, 2016b). The collection system alternative was also determined to cause less disturbance to the cap and the underlying waste material. The collection drain system consisted of the following key elements as depicted in the final design (Solutia, 2017) and shown on Figure 2:

- Upper trench and collection drain;
- Lower trench and collection drain;
- Seep collection sump (junction box);
- Conveyance piping; and
- Carbon Treatment System (CTS).

In conjunction with RA activities for the proposed seep collection and treatment system, P/S proposed modifications to the SWMU 1 groundwater extraction system and its associated components to provide treatment of recovered groundwater at a new carbon treatment system designed to accommodate flows from both the SWMU 1 South Landfill interceptor well system and the seep collection system (note that the modifications and upgrades to the SWMU 1 groundwater extraction system were outside of the scope of the RA). P/S also proposed to establish new effluent conveyance systems and connections to the sanitary sewer system owned and operated by the Anniston Water Works and Sewer Board (AWWSB) for discharge of treated effluent from carbon treatment systems at the OW-21A Corrective Action Area (CTS#1), the OW-10 Corrective Action Area (CTS#2), and SWMU 1 (CTS#3) under a State Indirect Discharge (SID) permit.

P/S submitted the original design documents for the supplemental RA components described above on May 13, 2016 (Solutia, 2016a) and provided additional information (Basis of Design Memorandum) on June 16, 2016 (Solutia, 2016b) to further support the design of the proposed system. The EPA approved the proposed design with comments on August 28, 2016 (EPA, 2016). P/S provided responses to EPA comments and provided updated design drawings and technical specifications to EPA and ADEM on September 23, 2016 (Revision 1.0; Solutia, 2016c). ADEM approved the proposed design on October 7, 2016 (ADEM, 2016). A final set of design drawings and technical specifications were provided to EPA and ADEM on September 19, 2017 (Revision 2.0; Solutia, 2017). The design drawings and technical specifications provided as Revision 2.0 of the SWMU 1 Design Modifications were used to implement the RA components between September 2017 and May 2018, as detailed in the Construction Completion Report Addendum submitted to the EPA on July 27, 2018 (Solutia, 2018c)

The operation of the 3E Seep conveyance and treatment system commenced in late 2018. Between December 2018 and March 2019, several high seep flow events occurred, which presented various operational challenges related to flow rates exceeding the maximum design treatment capacity of approximately 12 gallons per minute (gpm). During this time, the seep flow exceeded the treatment capacity of the system on various occasions, with sustained seep flow rates ranging from approximately 3 to 30 gpm for several weeks.

In addition to system capacity limitations, iron fouling of system components was identified as a major factor that further reduced the overall treatment capacity of the system. The fouling was determined to result from elevated concentrations of dissolved iron and oxidation of the seep water within the conveyance piping and CTS#3 treatment system, resulting in precipitation of iron solids and sludge within the system piping, the bag filter, and carbon vessels. An in-depth discussion of the seep water characteristics and source conceptual model is provided in the Seep Investigation Report (Solutia, 2020). Based on the performance of the system during the 2018-2019 seep flow season, various system modifications and upgrades were identified and implemented to improve the effectiveness and reliability of the remedial action. To increase the treatment capacity of the system, the following actions were completed between July 2019 and November 2020:

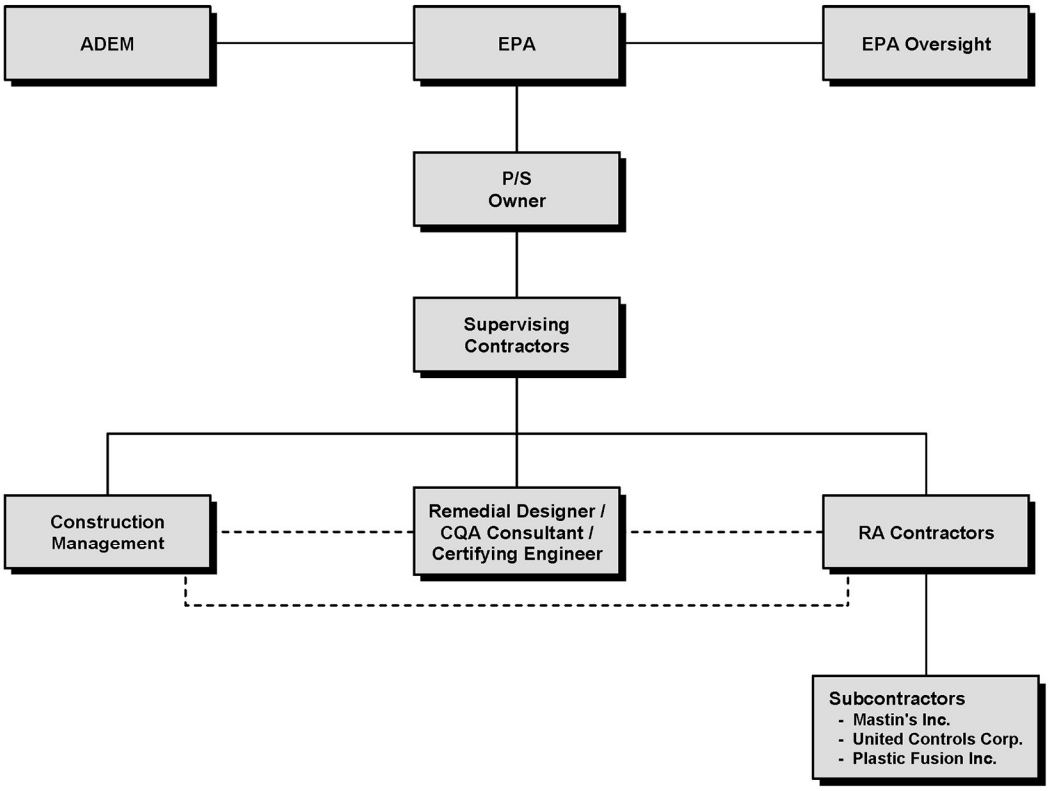
- Installation of upgrades in Carbon Treatment System #3 (CTS#3) building,
- Installation of upgrades for the 3E Seep conveyance lines, and
- Installation of the Iron Treatment System (ITS)

Section 4 provides a detailed discussion of the upgrades.

3.0 PROJECT ORGANIZATION

Exhibit 1 below provides the organizational structure for the portion of the RA construction activities described in this Construction Completion Report Addendum.

EXHIBIT 1: Organization Chart for Supplemental RA Construction Activities



Personnel involved in the design, construction, and oversight of the supplemental RA components described in this report included:

- EPA
    - Ms. Pamela Langston Scully, P.E., Remedial Project Manager
- ADEM
    - Mr. Metz Duites
- P/S, as the Owner
    - Ms. E. Gayle Macolly, Remedial Project Manager
- Supervising Contractors
    - Mr. Michael Price, appointed by P/S as the Supervising Contractor for RA Work (Genesis Project Inc.)
    - Mr. John Loper, P.E., appointed by P/S as the Supervising Contractor for RD Work (The Loper Group, Inc.)
- Construction Management
    - Mr. Joshua Threadgill (Genesis Project, Inc.)
- Design Engineer, Certifying Engineer, and CQA Consultant
    - Mr. Michal Rysz, P.E., Ph.D. Design Engineer, Certifying Engineer, and CQA Leader (GSI Environmental Inc.)
    - Mr. Travis McGuire, P.E., Design Engineer and CQA Field Member (GSI Environmental Inc.)
- RA Construction Contractor
    - Mr. Lance Taylor, (Taylor Corporation – Owner)
    - Mr. Ellis Bennett, (Taylor Corporation - Project Manager)
- RA Construction Subcontractors
    - Mastin's Inc., Electrical Contractor (as subcontractor to Taylor Corporation)
    - United Controls Corporation, Controls Contractor (as subcontractor to Taylor Corporation)

      Plastic Fusion Inc. Prefabricated Piping Contractor (as subcontractor to Taylor Corporation)

4.0 3E SEEP CONVEYANCE AND TREATMENT SYSTEM EXPANSION AND UPGRADES CONSTRUCTION COMPLETION

This section provides a description of the construction activities that were performed to complete the 3E Seep system expansion and upgrades to increase system treatment capacity and the CQA activities that were conducted during the process. The systems construction and upgrades implemented during this portion of the RA project included:

- Installation of upgrades in Carbon Treatment System #3 (CTS#3) building,
- Installation of upgrades for the 3E Seep conveyance lines, and
- Installation of the Iron Treatment System (ITS)

Construction of these components was conducted from July 2019 through November 2020. Work on the systems was generally completed chronologically in the order they are presented below, unless noted otherwise. Details of the completed construction are documented in the Construction Record Drawings provided in Appendix A. Construction photographs depicting the various stages of construction are included in Appendix B.

4.1 Carbon Treatment System #3 (CTS#3) Upgrades

The key components contained in the CTS#3 building are detailed in the Construction Completion Report Addendum (Solutia, 2018c). The components that were upgraded and/or retrofitted as part of the activities to increase the treatment capacity of the system are discussed below.

4.1.1 Piping and Flow Meter on 3E Seep Influent Line in CTS#3

The original 3E Seep influent line inside CTS#3, which empties into the EQ tank, consisted of 1-inch diameter Schedule 80 PVC piping and a 1-inch diameter flow meter. This piping transitioned directly from the 4-inch seep conveyance line located outside the CTS#3 building and presented a bottleneck in flow capacity of the system. As part of the system retrofits, the 1-inch piping inside CTS#3 between the 4” seep influent and the Equalization (EQ) tank was replaced with 2-inch diameter Schedule 80 PVC piping. A 2-inch diameter, flange mounted flow meter (Recordall Model 170) was also installed on the 2-inch piping to replace the original 1-inch meter. The influent piping was installed between 15 and 18 July 2019. The 2-inch seep flow meter was installed on 14 February 2020. All equipment specifications for the upgraded system components are included in Appendix C.

4.1.2 EQ Tank Retrofits

Aeration of seep water and subsequent precipitation of iron oxide residues contributed to the fouling of system components and reduced the overall treatment capacity of the system during the 2018-2019 seep flow season. To reduce mixing in the EQ tank, and thus additional aeration of the water in CTS#3, two 2-inch diameter steel drop pipes were installed in the EQ tank. One pipe was installed on the interceptor well (IW) influent connection. The second pipe was installed on seep influent connection (see Sheet I in Appendix A for details). The pipes are 60 inches long and extend from the top of the EQ tank to approximately 6 inches above the tank floor. During

routine operation of the system the drop pipe outlets are below the water level in the EQ tank. The drop pipes were installed between 15 and 18 July 2019.

4.1.3 Transfer Pump and Magnetic Flow Meter

The original transfer pump installed in CTS#3 was rated for an optimal flow rate of approximately 10 gpm, which was not capable of handling the peak seep flows observed in 2018-2019. As part of CTS#3 upgrades, the original pump was replaced with a Goulds Model #9SH2H52D0 pump capable of operating between 10 gpm and 90 gpm, with a duty point rating of approximately 40 gpm. The variable frequency drive (VFD) required for transfer pump control modulation was also upgraded to the Altivar ATV630 model. The system is currently configured to turn on the pump when the water level in the EQ tank reaches 28 inches (from the bottom of the tank) and turn the pump off when the water level reaches 18 inches. Both the transfer pump and the VFD components were sourced from the same manufacturers as the original equipment. The pump and VFD datasheets are presented in Appendix C.

The original 1-inch diameter piping between the pump discharge and the bag filter was replaced with 2-inch diameter Schedule 80 PVC pipe (see Sheet I in Appendix A). The original paddle wheel flow meter installed between the transfer pump and the bag filter measure the treatment system flow rates was replaced with a magnetic flow sensor (Signet 2551 Magmeter). The magnetic sensor does not contain movable parts (i.e., paddles) and is thus less prone to iron fouling than the paddle wheel type meter. The new flow sensor was integrated into the system's Programmable Logic Controller (PLC). Photos illustrating iron fouling of various original components of CTS#3, as well as replacement components are presented in Appendix B. Datasheets associated with the new magnetic flow sensor are presented in Appendix C.

4.1.4 Storage Tank Pad, Frac Tanks, and Seep Diversion Valves

A gravel pad for placement of frac tanks was constructed on the western side of CTS#3 in September 2019. The pad dimensions are approximately 50-feet x 15-feet. During the seep flow season (considered to be 15 December through 15 April), two frac tanks are placed on the pad and provide approximately 40,000 gallons of contingency storage capacity in the event peak flows exceed the effective treatment capacity of the system. During the remainder of the year, one frac tank is used and provided approximately 20,000 gallons of contingency storage.

Connection of the seep conveyance line to the frac tanks is accomplished by a 3-inch diameter hose with camlock fitting and ball valve located in a sub-grade access vault located near the southeast corner of the CTS#3 building. Access vault details are shown on Sheet P in Appendix A. The access port was installed between 15 and 18 July 2019. Ball valves within the access vault can be manually regulated to balance the flow from the seep between CTS#3 and the frac tanks. After seep flow declines below the CTS#3 treatment capacity, water diverted to the frac tanks is pumped to the equalization tank in CTS#3 using electric submersible pump where it is treated through CTS#3. The photolog presented in Appendix B documents the construction of the pad and the placement of the frac tanks near CTS#3.

4.1.5 Weather Station

A wireless weather station (Davis Instruments, Vantage Pro2) was installed in CTS#3 in February 2020 to supplement the rainfall sensing capabilities at SWMU-1. The station is solar-powered and

contains a sensor suite, including temperature, barometric pressure, wind, and rain gauge. The sensor was mounted above the north wall of CTS#3 and oriented to the south to maximize solar operation capabilities. The weather station console and data output were integrated into the PLC and Human Machine Interface (HMI) at CTS#3. Current system capabilities include rainfall data logging and alarm notifications for rainfall rates exceeding 1 inch per hour and 3.6 inches in 24 hours. If triggered, the alarms are sent via email and text messages to the system O&M personnel. Weather station specifications are presented in Appendix C.

4.1.6 New Fresh Water Connection

A new city water connection was installed northwest of CTS#3 to provide more convenient access to fresh water for use during backwashes of the two carbon vessels within CTS#3.

4.1.7 CQA Activities

CQA services provided by GSI for upgrades of CTS#3 included the following:

- Review of the materials proposed for use by the Contractor for conformance with system performance and technical specifications;
- Oversight of the installation of system upgrades;
- Oversight of hydrostatic pressure testing of the piping system within CTS#3, and
- Testing and calibration of new system components, including seep flow meter, transfer pump, and magnetic flow sensor.

System pressure testing forms are presented in Appendix D.

4.2 3E Seep Conveyance System Upgrades

The key components of the 3E Seep conveyance system are detailed in the Construction Completion Report Addendum (Solutia, 2018c). The portions of the system piping which were upgraded and/or retrofitted as part of the activities to increase the treatment capacity of the system are discussed below. A complete set of construction drawings is provided in Appendix A.

4.2.1 3E Seep Junction Box Retrofit

Aeration of seep water and subsequent precipitation of iron oxide residues contributed to the fouling of system components and reduced the overall treatment capacity of the system during the 2018-2019 seep flow season. To reduce the mixing and additional aeration of water, a 4-inch diameter high-density polyethylene (HDPE) drop pipe was installed in the junction box. The pipe was installed on the inlet from the upper collection trench and ITS, as shown on Sheet F in Appendix A. The pipe is approximately 33 inches long and extends to approximately 2 inches above the junction box floor. The drop pipe was installed between 15 and 18 July 2019.

4.2.2 3E Seep Conveyance Piping System Cleanouts Installation

The accumulation of iron oxide residues in the system piping between the seep junction box and CTS#3 during the 2018-2019 seep flow season necessitated the installation of two additional

cleanouts on the conveyance piping for access and line maintenance purposes. As shown on Sheet A in Appendix A, cleanout CO-6 was installed at station 6+00 of the seep conveyance line and cleanout CO-7 was installed near the southeast corner of CTS#3. The cleanouts were installed between 15 and 18 July 2019.

The 4-inch diameter SDR-11 HPDE pipe cleanouts were prefabricated off-site by Plastic Fusion Inc., prior to installation on the seep conveyance piping. Sheet P in Appendix A presents cleanout details. Each cleanout consisted of two access ports, one oriented in the direction of seep water flow to CTS#3 (i.e., downgradient) and second oriented in the upgradient direction. The double cleanout configuration facilitated access to the conveyance piping during line maintenance activities discussed below. Each cleanout access port contained a 4-inch SDR-11 HDPE ball valve and a stainless steel 150-pound blind flange. Isolation ball valves were installed on the seep conveyance piping in vault boxes located on either side of the cleanout assembly. Electrofusion couplings were used to connect the cleanout assembly to the seep conveyance piping. Appendix B presents a photolog of the cleanout installation.

An additional prefabricated cleanout, identified as CO-12, was installed on the 3E Seep conveyance line between the upper collection trench and the ITS building in November 2020. To prevent HDPE geomembrane liner damage, CO-12 was installed in the section of the conveyance pipe that was located above the liner, such that no components of the cleanout are installed below the geomembrane layer. The location of CO-12 is shown on Sheet C in Appendix A. Cleanout CO-12 consisted of a single access port, oriented in the upstream direction of seep flow (i.e., towards the upper collection trench) and terminated in a stainless steel blind 150-pound flange. The upstream portion of the cleanout assembly was connected to the seep conveyance line with a 4-inch diameter Hymax®2 coupling. The downstream portion of CO-12 contains an isolation valve and was connected to the conveyance pipe by an electrofusion coupling. The isolation valve was installed in a protective vault box.

4.2.3 CQA Activities

CQA services provided by GSI for upgrades of the 3E Seep conveyance piping included the following:

- Review of the materials proposed for use by the Contractor for conformance with system performance and technical specifications;
- Oversight of the installation of 3E Seep conveyance lines upgrades, and
- Oversight of hydrostatic pressure testing of the conveyance piping after installation of upgrades.

System pressure testing forms are presented in Appendix D.

4.3 Iron Treatment System (ITS) Installation

As previously discussed, excessive fouling of the bag filter (i.e., above safe system operating differential pressures) and other components significantly restricted flow capacity and thus system treatment efficiency during the 2018-2019 seep flow season. To reduce iron oxide formation and deposition in the system piping and components, an iron treatment system was designed and

constructed near the seep junction box. Construction was completed between September and November 2019. The location of the ITS is shown on Sheet C in Appendix A.

The system is housed in a slab-on-grade, cement block building located between the upper collection trench and the seep junction box. A new 240-volt, single phase alternating current power source was installed and connected to the ITS. As shown on the process flow diagram (PFD; Figure 3) and Sheet O in Appendix A, the main components of the ITS are:

- magnetic flow sensor;
- actuated flow control valve;
- metering pump and iron sequestrant reservoir;
- programmable logic controller (PLC); and
- piping, valves, instruments, electrical components, and eye wash station.

In addition, a water level transducer and conductivity probe were installed in the upper trench piping, which connects to the ITS PLC via an underground electrical cable placed within a conduit buried above the HDPE liner. System construction details and CQA activities associated with this portion of the project are described in the following sections. Equipment specifications for the system components are included in Appendix C.

4.3.1 Site Preparation

The contractor mobilized equipment and personnel to the Site the week of 23 September 2019. Initial site work consisted of shallow excavation (i.e., less than 18 inches) of the general footprint of the ITS, excavation of a shallow trench from the upper collection trench cleanout CO-8 to the ITS footprint for electrical conduit installation as detailed below, and placement of lay-flat hose for diversion of 3E seep water to CTS#3 during construction of the ITS. The photolog presented in Appendix B provides additional details of site preparation activities.

4.3.2 Construction Details

The ITS was constructed during the low/no flow seep season to eliminate the need for handling and treating seep water. ITS construction and testing were completed on 1 November 2019. The system was constructed as described below and system details are shown on Sheets C and O in Appendix A. A photolog documenting system construction is presented in Appendix B.

- *ITS Building:* the ITS building is 8-feet wide by 10-feet long with a slab-on-grade concrete floor, with a form-poured recessed trench that contains the magnetic flow meter, iron sequestrant solution dosing port, actuated flow control valve, and associated piping. The trench is approximately 27-inches wide by 110-inches long, with a 1.5-inch lip where a molded fiber grate is installed. The building is constructed with 8-inch concrete masonry unit (CMU) full blocks, with a wood frame roof and architectural shingles (Owens Corning). The building is equipped with two 5-feet wide by 7-feet tall, galvanized steel doors. The building is climate-controlled via a through-wall 110-volt heating and cooling unit. The building houses the ITS control panel, iron sequestrant solution reservoir placed on a spill control pallet, dosing pump, emergency eye wash station, electrical distribution panel, and overhead lights. The building is grounded via a copper rod installed near the seep junction

box. ITS equipment data sheets are presented in Appendix C. The main system components housed in the ITS building are:

- *ITS Control Panel*: the main components of the control panel include: i) PLC; ii) seep level setpoint indicator and controller; iii) hand-operated valve control switch; iv) seep flow indicator and setpoint controller, and v) cellular modem. The control panel integrates signals from the water level transducer and conductivity probe installed in the upper collection trench cleanout CO-8 (discussed below), and the magnetic flow element inside the ITS building, to modulate the actuated valve and iron sequestrant dosing pump rate. In addition to the local controls, remote access and control of the ITS is integrated into the CTS#3 HMI panel, as well as remote access via a computer or other compatible internet-connected device. Real-time ITS operational parameters, including upper trench water level, upper seep flow rate, and dosing rate are displayed on the remote access screen. The system also records historical data (up to 90 days) of these operational parameters. The control panel is housed in a NEMA-3R industrial control panel enclosure (SCE). Appendix B presents the photolog of the ITS system, including the control panel. Instrument and SCADA panel drawings and control panel components data sheets are presented in Appendix C.

- *Magnetic Flow Sensor/Transmitter:* the ITS iron sequestrant dosing rate, as discussed below, is controlled by the seep flow rate from the upper collection trench. The flow rate is measured with a 2-inch diameter magnetic flow sensor and transmitter combination unit (Signet 2551 Magmeter) installed in the ITS building piping inside the trench and is integrated into the ITS control panel. The flow sensor and piping were installed within the subgrade vault to maintain full pipe flow conditions per the manufacturer's guidelines.

- *Actuated Valve*: the flow of seep water through the ITS is modulated by the 2-inch diameter actuated valve (Plastomatic, EBVF Series) installed in the building trench. Modulation of the valve is controlled by the PLC and is based on the actual flow rate measured by the flow sensor and the upper collection trench water level indicated by the level transducer (see discussion below). The valve is configured in a "normally open" mode, where power failure results in opening of the valve to allow full flow through the ITS. The valve may also be set manually to "Full Open" or to "AUTO" (i.e., modulated by PLC as described above) at the ITS control panel, as well as via remote access.

- *Metering Pump and Iron Sequestrant*: A peristaltic metering pump (Stenner, SVP Series) is used to inject the iron sequestrant (AN-400TH) into a dosing port located on the seep conveyance piping inside the ITS building (see Sheet O in Appendix A for details). The metering pump is regulated by the PLC based on the actual flow rate from the upper collection trench and a preset dosing setpoint. Based on the chemical supplier's recommendation following review of the seep water geochemistry, the default AN-400TH dosing is set at 100 parts per million (ppm), however the concentration can be increased (and decreased) on the ITS control panel if the conveyance and treatment system exhibits excessive iron fouling. The

iron sequestrant is contained in a 55-gallon drum located on top of a 66-gallon spill containment pallet inside the ITS building (see Appendix B).

- *Miscellaneous ITS Components:* in addition to the above discussed major elements, the ITS building contains the following ancillary components:
  - Main power distribution panel located inside the ITS building, and safety switch/ main disconnect installed outside the building;
  - Electronic heat/cool air conditioner (GE – Model AHE08AX);
  - Wall mounted, gravity fed eyewash station (Haws – Model 7501) rated at 0.4 gpm for 15 minutes;
  - Vapor tight overhead light fixture (ETI);
  - Seep conveyance line sampling ports (2), consisting of 1-inch isolation ball valves and barbed fittings for sampling tube attachment;
  - Protective molded fiber grate (1.5-inch deep x 1.5-inch square mesh) installed over the enclosure trench (see Sheet O in Appendix A and Appendix B).

  Data sheets for the miscellaneous ITS components are provided in Appendix C.

- *Upper Trench Transducer and Conductivity Probe:* during the construction of the ITS, a submersible water level transmitter (Dwyer Series MBLT) and a conductivity probe (Warrick Series 3) were installed in the upper collection trench cleanout CO-8. The wiring from both components was installed in a ¾-inch PVC conduit pipe in the trench excavated between the cleanout and the ITS. The conduit was wrapped in detectable underground tape and the trench was backfilled with the native material after completion of installation. As shown on Sheet P in Appendix A, the water level transmitter is located at the bottom of the CO-8 pipe and is configured to indicate the water level in the upper collection trench. The actuated valve inside the ITS building is programmed to allow seep flow at the rate set on the ITS control panel until the water level reaches 18 inches above the bottom of the trench (i.e.,12-inches below the HDPE liner as shown on Sheet P in Appendix A). At trench water levels above 18 inches the actuated valve fully opens automatically and allows full flow from the upper collection trench.

  The conductivity probe was installed approximately 24 inches above the bottom of the upper collection trench (i.e., 6-inches below the HDPE liner; see Sheet P) and serves as a redundant high-water level control element to the transducer. The ITS is programmed to fully open the actuated valve if the water in the trench reaches and activates the conductivity probe.

4.3.3 CQA Activities

CQA services provided by GSI for construction of the ITS included the following:

- Review of the materials proposed for use by the Contractor for conformance with the design drawings and technical specifications;
- Oversight of key elements of system construction;
- Oversight of system performance testing and startup.

4.4 Waste Management and Disposal

Limited surface soil excavation was required for installation of the seep collection and treatment system upgrades, including cleanouts, vaults and access boxes, and the ITS. All excavated soils were clean soil cover material and therefore were used as backfill material.

4.5 Remedial Action Construction Documentation

4.5.1 Daily Reports

Contractor daily reports are provided in Appendix E. Reports include the safety topics discussed at the daily safety meetings, a summary of work completed, equipment and personnel on-Site, and materials delivered to the Site.

4.5.2 Construction Material Quantities

Appendix F provides a summary of the final construction material quantities used to complete this portion of the RA construction.

5.0 ADDITIONAL CONSIDERATIONS

5.1 Health and Safety

The contractor completed the supplemental RA construction activities described in this report with a total of 1,320 safe work hours. Together with the initial RA construction activities, the entire RA construction project was completed with a total of 48,200 safe work hours. No health and safety incidents were reported during this portion of the RA project.

5.2 Operations and Maintenance

P/S have prepared a comprehensive O&M Plan to monitor and maintain the effectiveness of the engineering controls implemented at OU-3 (Solutia, 2018b). The O&M Plan is intended to be a stand-alone reference document to be used by those responsible for the OU-3 O&M activities. The plan will be revised accordingly to include the additional components of the remedial system described in this report. The O&M Plan addresses the following major components of RA implementation:

- Responsibilities for administering the O&M activities;

- Documentation requirements for the O&M activities;
- Description of the engineered caps and cover systems installed for OU-3;
- Description of the control systems used to manage stormwater within OU-3;
- Description of the groundwater extraction systems;
- Inspection requirements for covers, surface water management systems, and corrective action systems;
- Routine maintenance and repair requirements; and
- Requirements for groundwater monitoring.

The O&M Plan also provides inspection frequencies, forms, and guidance on performing the on-going O&M activities.

The installation of the cleanouts provided additional access points to the 3E seep conveyance line for routine piping maintenance. After the installation of the cleanouts, Solutia incorporated the following O&M procedures (which are being incorporated into a revision to the OU-3 O&M Manual) to reduce the effect or iron fouling and improve the efficiency of the treatment system:

1. Treatment of the seep conveyance piping between the junction box and CTS#3 with a 5% glycolic acid solution for removal of iron deposits (this process is similar to procedures used for rehabilitation of water supply wells);

2. Washing of the seep conveyance line, consisting of high-pressure water jetting of the piping between the junction box and CTS#3, as well as the portion of line between cleanout CO-12 and the upper collection trench, and

Flushing of the piping and components inside CTS#3 and the ITS via high volume clean water flushing and capture.

6.0 REFERENCES

ADEM, 2016. Approval of OU-3 Remedial Action - SWMU 1 Design Modifications (Revision 1.0). Email from Metz Duites (ADEM) to Steve Moeller, Gayle Macolly, Pamela Scully, Austin Pierce, and Tom Huett. October 7, 2016.

EPA, 2011. Interim Record of Decision: Summary of Remedial Alternative Selection, Operable Unit 3, Anniston PCB Site. U.S Environmental Protection Agency, Region 4, Atlanta, Georgia. September 29, 2011.

EPA, 2016. Operable Unit 3 Remedial Action – SWMU 1 Design Change and Seep Capture, Anniston PCB Site. Letter from Pamela Langston Scully to E. Gayle Macolly. U.S. Environmental Protection Agency, Region 4, Atlanta, Georgia. August 28, 2016.

Solutia, 2016a. Operable Unit 3 Remedial Action – SWMU 1 Design Modifications, Anniston PCB Site. May 13, 2016.

Solutia, 2016b. Operable Unit 3 Remedial Action – Basis of Design Memorandum (SWMU 1 Design Modifications), Anniston PCB Site. June 16, 2016.

Solutia, 2016c. Operable Unit 3 Remedial Action – SWMU 1 Design Modifications (Revision 1.0), Anniston PCB Site. September 23, 2016.

Solutia, 2017. Operable Unit 3 Remedial Action – SWMU 1 Design Modifications (Revision 2.0), Anniston PCB Site. September 19, 2017.

Solutia, 2018a. Construction Completion Report - Rev 0, OU-3 Remedial Action – Anniston PCB Site. Prepared for Solutia Inc., Anniston, Alabama. Prepared by Golder Associates Inc. Atlanta, Georgia. January 22, 2018.

Solutia, 2018b. Operable Unit 3 Operations and Maintenance Plan for Remedial/Corrective Action Projects: Revision 1.0, Anniston PCB Site. July 2018.

Solutia, 2018c. Operable Unit-3 Construction Completion Report Addendum - Anniston PCB Site. Prepared for Solutia Inc., Anniston, Alabama. Prepared by GSI Inc., July 27, 2018.

Solutia, 2020. Seep Investigation Report – Anniston PCB Site. Prepared for Solutia Inc., Anniston, Alabama. Prepared by GSI Inc., 31 August 2020.

GSI Job No. G-5738
Issued: 30 June 2021

Construction Completion Addendum Report
Second Addendum
OU-3 Remedial Action

Anniston PCB Site
Anniston, Alabama

Figures

Figure 1: Site Plan

Figure 2: SWMU 1 Modifications and Supplemental Remedial Action Components

Figure 3: Process Flow Diagram 3E Seep Iron Treatment System (ITS)

LEGEND

OU-3 boundary

Unit/Area boundary

Notes

1. Approximate screened intervals: Residuum: 450 – 870 ft msl; Bedrock: 570 – 700 ft msl; Interceptor: 660 – 810 ft msl.
2. OU = Operable Unit.
3. Projected Coordinate System: NAD 1983, UTM Zone 16N (meters).
4. Background Imagery: Microsoft Bing system via ESRI's ArcGIS Online premium services (http://maps.bing.com).

Feet

0 200 400

GSI Job No.	5738
Issued:	30-Jun-2021
Revised:	
Map ID:	002_01
Drawn By:	CDM
Reviewed By:	MR
Approved By:	MR

FIGURE 1

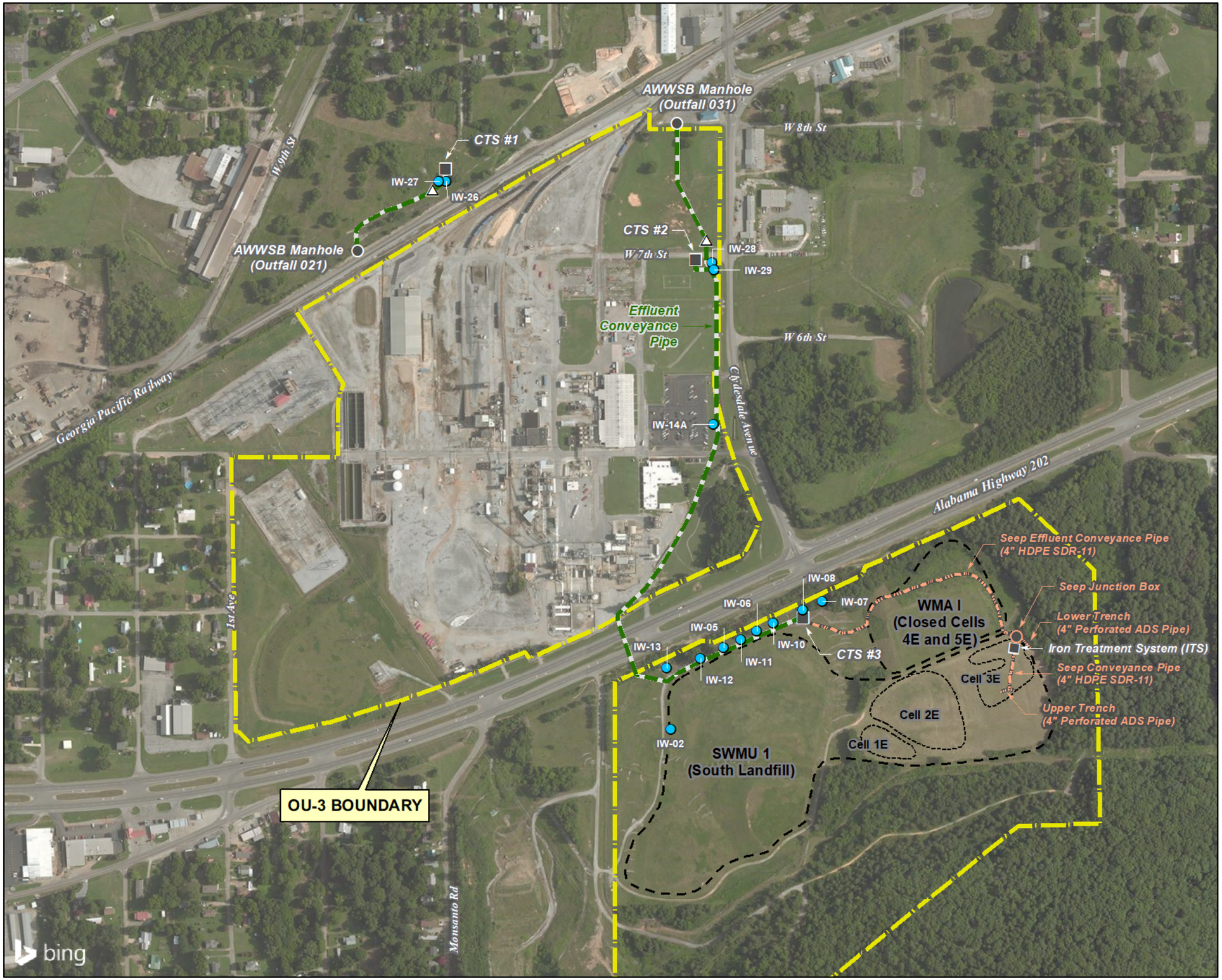
Solutia

GSI ENVIRONMENTAL

SITE PLAN

Construction Completion Report Second Addendum
OU-3 Remedial Action

Solutia Inc.
Anniston, Alabama



N

LEGEND

- Interceptor well
- 3-inch HDPE SDR-11 Pipe
- OU-3 boundary
- Unit/Area boundary
- AWWSB flow meter and sampling location

Notes

1. Approximate locations of site features shown.
2. AWWSB = Anniston Water Works & Sewer Board.
3. OU = Operable Unit.
4. CTS = Carbon Treatment System.
5. Background Imagery: Microsoft Bing system via ESRI's ArcGIS Online premium services (http://maps.bing.com).

Feet
0 200 400

Projected Coordinate System
Datum: NAD 1983
UTM: Zone 16N (meters)

Solutia

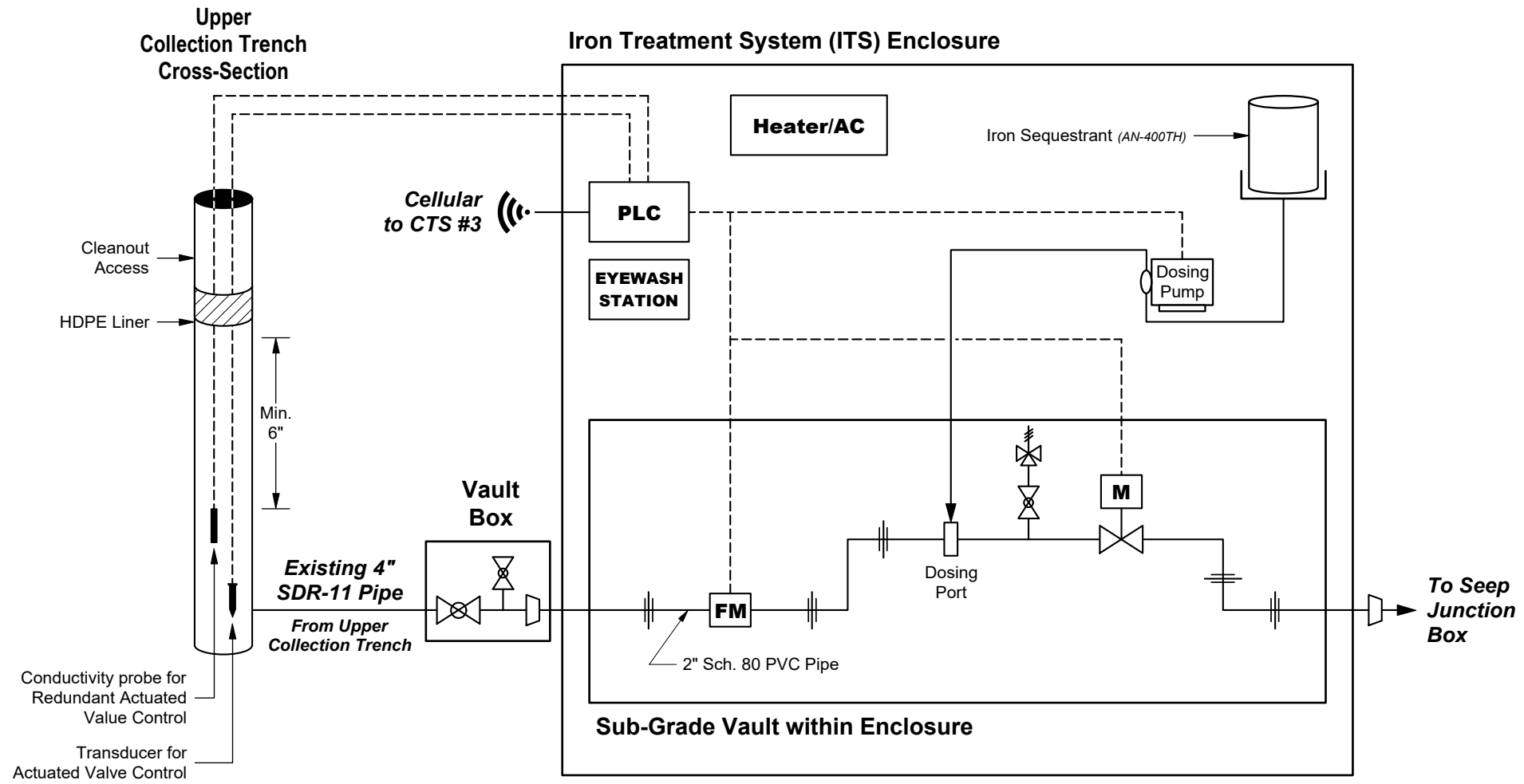
GSI ENVIRONMENTAL

SMWU-1 MODIFICATIONS AND SUPPLEMENTAL REMEDIAL ACTION COMPONENTS AND UPGRADES

Construction Completion Report Second Addendum
OU-3 Remedial Action
Solutia Inc.
Anniston, Alabama

GSI Job No.	5738	Drawn By:	CDM
Issued:	30-Jun-2021	Chk'd By:	MR
Map ID:	**002_02**	Appv'd By:	MR

FIGURE 2



LEGEND

- Ball valve
- FM — Flow meter
- M — Actuated valve
- Reducer (4" x 2")
- Union
- PLC — Programmable Logic Controller
- Drum with Secondary Containment
- Metering pump
- Vacuum valve

GSI ENVIRONMENTAL

GSI Job No.	5738	Drawn By:	CDM
Map ID:	002_03	Chk'd By:	MR
Issued:	30-Jun-2021	Aprv'd By:	MR
Scale:	Not to Scale		FIGURE 3

PROCESS FLOW DIAGRAM
3E SEEP IRON TREATMENT SYSTEM (ITS)

Construction Completion Report Second Addendum OU-3 Remedial Action

Anniston PCB Site
Anniston, Alabama

GSI Job No. G-5738
Issued: 30 June 2021

GSI ENVIRONMENTAL

Construction Completion Addendum Report
Second Addendum
OU-3 Remedial Action

Anniston PCB Site
Anniston, Alabama

Appendices

Appendix A Construction Record Drawings

Appendix B Photologs

Appendix C Supplemental RA Equipment Information

Appendix D Hydrostatic Pressure Test Forms

Appendix E Daily Construction Reports

Appendix F Construction Material Quantities

GSI Job No. G-5738
Issued: 30 June 2021

Construction Completion Addendum Report
Second Addendum
OU-3 Remedial Action

Anniston PCB Site
Anniston, Alabama

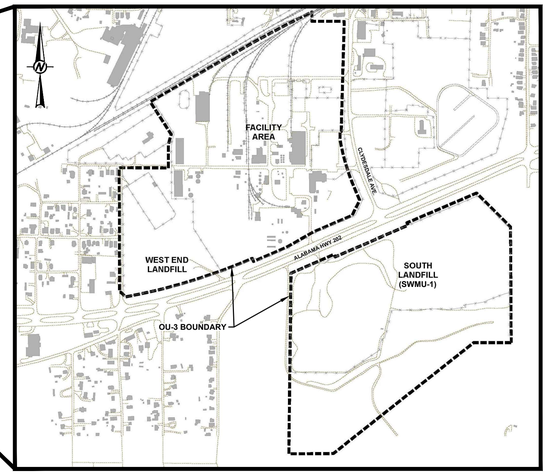
Appendix A

Construction Record Drawings

SOLUTIA INC.
OPERABLE UNIT 3 REMEDIAL ACTION
GROUNDWATER COMPONENTS
ANNISTON PCB SITE, ALABAMA

CONSTRUCTION RECORD DRAWINGS

VICINITY MAP



SITE LOCATION MAP

INDEX OF SHEETS

SHEET	REV.	DESCRIPTION
CS	0	COVER SHEET
A	0	SITE PLAN
B	0	PROFILE ALONG ROUTE
C	0	CONVEYANCE PIPE ROUTING, SEEP AREA
D	0	CONVEYANCE PIPE ROUTING, CARBON TREATMENT SYSTEM NO. 3 AREA
E	0	CONVEYANCE PIPE ROUTING, AREA A
F	0	PCB CELL 3E SEEP CONVEYANCE SYSTEM
G	0	CTS #3, PIPING AND VALVING DETAILS
H	0	PROCESS FLOW DIAGRAM
I	0	PROCESS & INSTRUMENTATION DIAGRAM
J	0	MISCELLANEOUS EROSION & SEDIMENT CONTROL DETAILS
K	0	REVISED HIGHWAY 202 CROSSING ALIGNMENT
L	0	SOUTHERN EROSION AND SEDIMENTATION CONTROL PLAN
M	0	NORTHERN EROSION AND SEDIMENTATION CONTROL PLAN
N	0	AWWSB MANHOLE TIE-INS
O	0	IRON TREATMENT SYSTEM (ITS) DETAILS
P	0	3E SEEP CONVEYANCE SYSTEM CLEANOUT DETAILS

THESE RECORD DRAWINGS HAVE BEEN PREPARED UPON INFORMATION FROM VARIOUS SOURCES. THESE SOURCES HAVE BEEN REFERENCED ON THE APPROPRIATE DRAWINGS.

OWNER
SOLUTIA INC.
702 CLYDESDALE AVE
ANNISTON, AL 36201

PLANS PREPARED BY
GSI ENVIRONMENTAL, INC.
2211 NORFOLK ST, SUITE 1000
HOUSTON, TX 77098

DESIGN ENGINEER
GSI ENVIRONMENTAL, INC.
MICHAL WLADYSLAW RYSZ
ALABAMA, P.E.
REGISTRATION NO. 37043

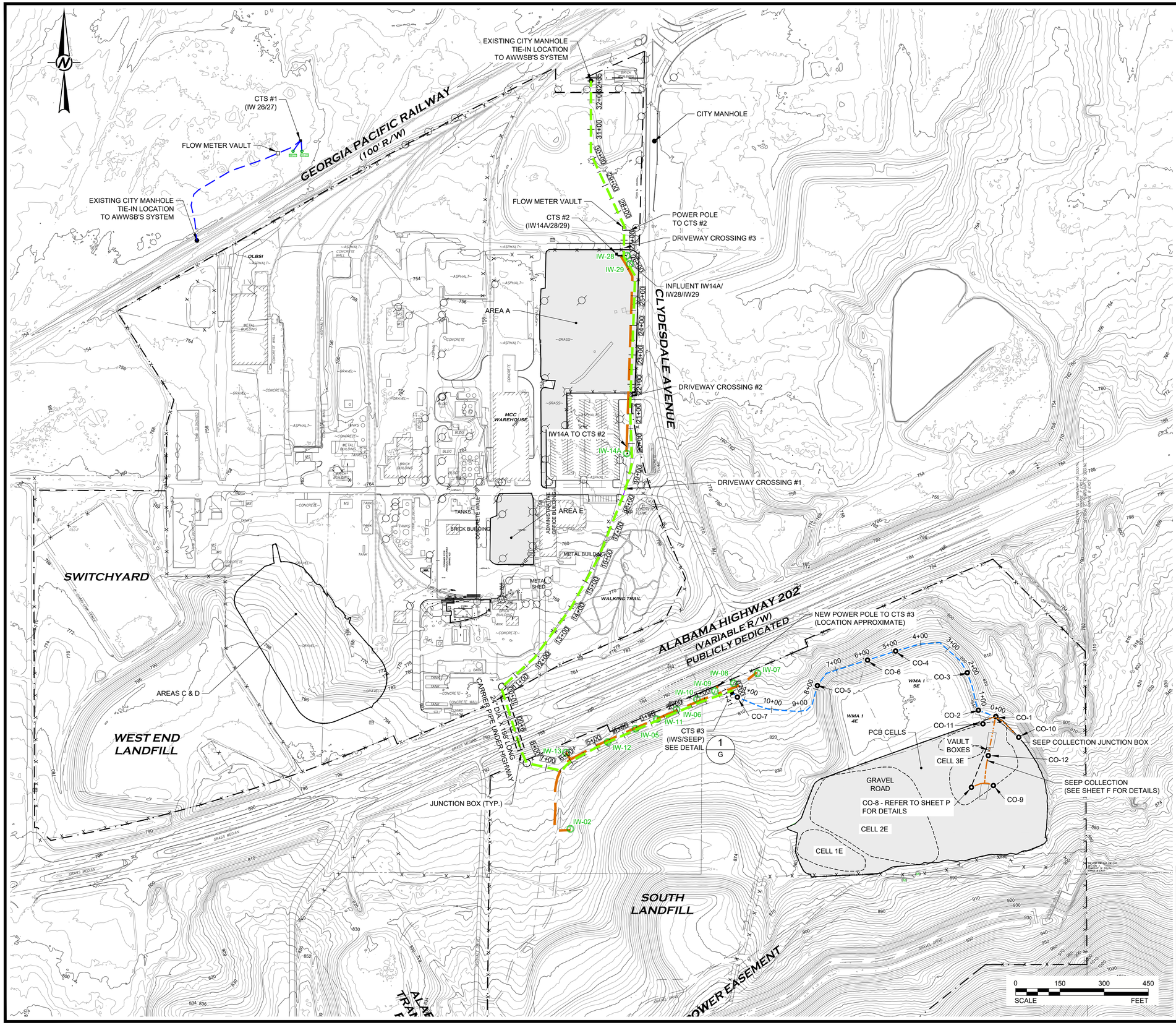
ALABAMA LICENSED No. 37043 PROFESSIONAL ENGINEER MICHAL W. RYSZ

6/30/2021

GSI ENVIRONMENTAL

1	06/30/2021	FINAL ISSUE	-	SOM	TMM	MWR

SHEET
COVER SHEET



LEGEND

- OU-3 BOUNDARY
- EXISTING CONTOURS (2 FT. INTERVAL)
- EXISTING FENCE
- PCB CELL BOUNDARY
- EDGE OF PAVEMENT / CURB
- RAILROAD
- EXISTING LIGHT AND POWER POLES
- FIRE HYDRANT
- SMWU-1 INFLUENT CONVEYANCE PIPE (2-INCH SDR11)
- SMWU-1 EFFLUENT CONVEYANCE PIPE (3-INCH SDR11)
- CTS #1 EFFLUENT CONVEYANCE PIPE (3-INCH SDR11)
- SEEP CONVEYANCE PIPE, UNDER GEOMEMBRANE
- SEEP CONVEYANCE PIPE, ABOVE GEOMEMBRANE
- SEEP EFFLUENT CONVEYANCE PIPE (4-INCH SDR11)
- CARBON TREATMENT SYSTEM (CTS)
- EXISTING INTERCEPT WELL (IW)
- EXISTING MANHOLE
- HDPE COVER SYSTEM LIMITS
- EXISTING 36-INCH HDPE PIPE
- PIPE CLEANOUT
- JUNCTION BOX

NOTES

1.) UNLESS NOTED OTHERWISE, THE CONVEYANCE PIPES ARE SINGLE WALL SDR-11 HDPE PIPES. THE INFLUENT CONVEYANCE PIPES ARE 2" DIAMETER AND THE EFFLUENT PIPES ARE 3" DIAMETER. THE CONVEYANCE LINE FROM THE SEEP JUNCTION BOX TO CTS #3 IS 4" DIAMETER.

REFERENCES

1.) TOPOGRAPHY FROM CALHOUN COUNTY (2012) AND LOWERY & ASSOCIATES LAND SURVEYING, LLC; DATED APRIL 17, 2013.

2.) "ALTA / ACSM LAND TITLE SURVEY OF: OPERABLE UNIT 3 OF THE ANNISTON PCB SITE; PREPARED FOR: SOLUTIA INC." BY LOWERY & ASSOCIATES LAND SURVEYING, LLC; DATED APRIL 17, 2013.

3.) HEADWALL SHOWN TAKEN FROM DIGITAL CAD FILE GPS DATA GOLDER.DWG DATED APRIL 2016, PROVIDED BY GENESIS PROJECT, INC.

4.) AS-BUILT OF PCB CELLS SURVEY, BY TAYLOR CORPORATION, DATED MARCH 2016.

5.) 24" DIA. BY 198' LONG STEEL CASING LOCATION AND ELEVATION INFORMATION BASED ON SURVEY INFORMATION INCLUDED IN "202 ROAD CROSSING X SECT[13199].pdf" PROVIDED BY SOLUTIA ON JULY 27, 2017.

THESE RECORD DRAWINGS HAVE BEEN PREPARED UPON INFORMATION FROM VARIOUS SOURCES. THESE SOURCES HAVE BEEN REFERENCED ON THE APPROPRIATE DRAWINGS.

ALABAMA LICENSED No. 37043 PROFESSIONAL ENGINEER MICHAEL W. RYAN

6/30/2021

REV	DATE	REVISION DESCRIPTION	DES	CADD	CHK	RVW
1	06/30/2021	FINAL ISSUE	-	SOM	TMM	MWR

PROJECT

PHARMACIA LLC / SOLUTIA INC
ANNISTON PCB SITE, ALABAMA

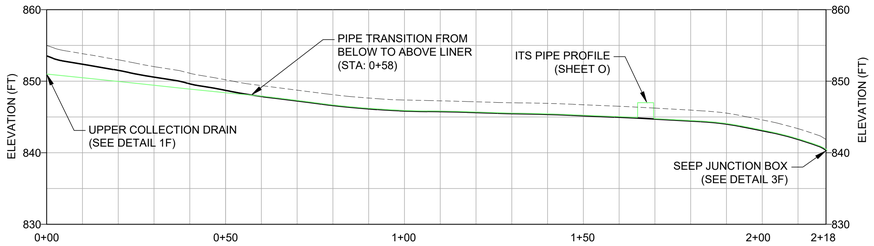
TITLE

SWMU-1 MODIFICATIONS SITE PLAN

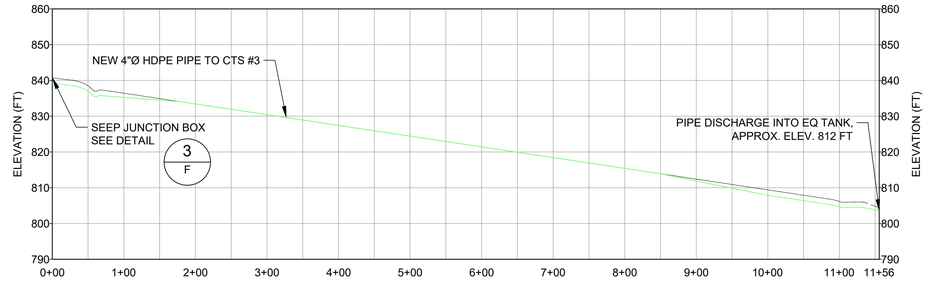
GSI ENVIRONMENTAL

Solutia

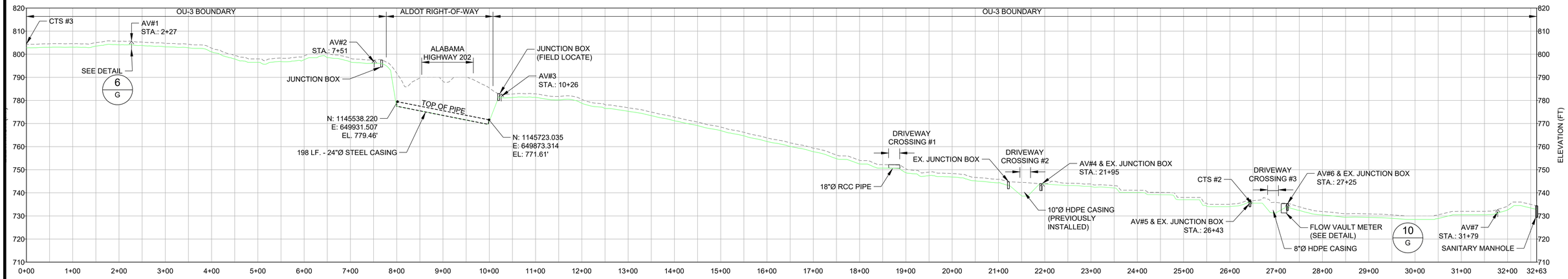
GSI JOB No.	4727
SCALE	AS SHOWN
SHEET	A



PROFILE A: 3E SEEP JUNCTION BOX INFLUENT
(FROM UPPER COLLECTION TRENCH DRAIN - CLEANOUTS NOT SHOWN)



PROFILE B: SWMU-1-INFLUENT
(CLEANOUTS NOT SHOWN)



PROFILE C: SWMU-1-EFFLUENT

LEGEND

- EXISTING GRADE
- HDPE PIPE
- LINER
- AV, ↑ COMBINATION AIR VALVE

NOTES

1.) UNLESS NOTED OTHERWISE, THE CONVEYANCE PIPES ARE SINGLE WALL SDR-11 HDPE PIPES. THE INFLUENT CONVEYANCE PIPES ARE 2"Ø AND THE EFFLUENT PIPES ARE 3"Ø. THE CONVEYANCE LINE FROM THE SEEP JUNCTION BOX TO CTS #3 IS A 4"Ø PIPE.

2.) (2) 48"Ø CONCRETE JUNCTION BOXES WITH CAST IRON COVERS ARE LOCATED AT EACH END OF THE HIGHWAY CROSSING. BOXES LOCATED OUTSIDE OF ALDOT'S RIGHT OF WAY.

REFERENCES

1.) TOPOGRAPHY FROM CALHOUN COUNTY (2012) AND LOWERY & ASSOCIATES LAND SURVEYING, LLC; DATED APRIL 17, 2013.

2.) HDPE PIPE CASINGS SHOWN TAKEN FROM DIGITAL CAD FILE AREA A PIPES_PCB CELL GPS DATA.DWG DATED APRIL 2016, PROVIDED BY GENESIS PROJECT, INC.

3.) 24" DIA. BY 198' LONG STEEL CASING LOCATION AND ELEVATION INFORMATION BASED ON SURVEY INFORMATION INCLUDED IN "202 ROAD CROSSING X SECT[13199].pdf" PROVIDED BY SOLUTIA ON JULY 27, 2017.

THESE RECORD DRAWINGS HAVE BEEN PREPARED UPON INFORMATION FROM VARIOUS SOURCES. THESE SOURCES HAVE BEEN REFERENCED ON THE APPROPRIATE DRAWINGS.

ALABAMA LICENSED No. 37043 PROFESSIONAL ENGINEER MICHAEL W. MITCHELL

6/30/2021

PROFILE A SCALES

HORIZONTAL SCALE: 0 50 100 150 FEET

VERTICAL SCALE: 0 10 20 30 FEET

5X EXAGGERATION

PROFILE B&C SCALES

HORIZONTAL SCALE: 0 100 200 300 FEET

VERTICAL SCALE: 0 20 40 60 FEET

5X EXAGGERATION

REV	DATE	REVISION DESCRIPTION	DES	CADD	CHK	RVW
1	06/30/2021	FINAL ISSUE	-	SOM	TMM	MWR

PROJECT

PHARMACIA LLC / SOLUTIA INC
ANNISTON PCB SITE, ALABAMA

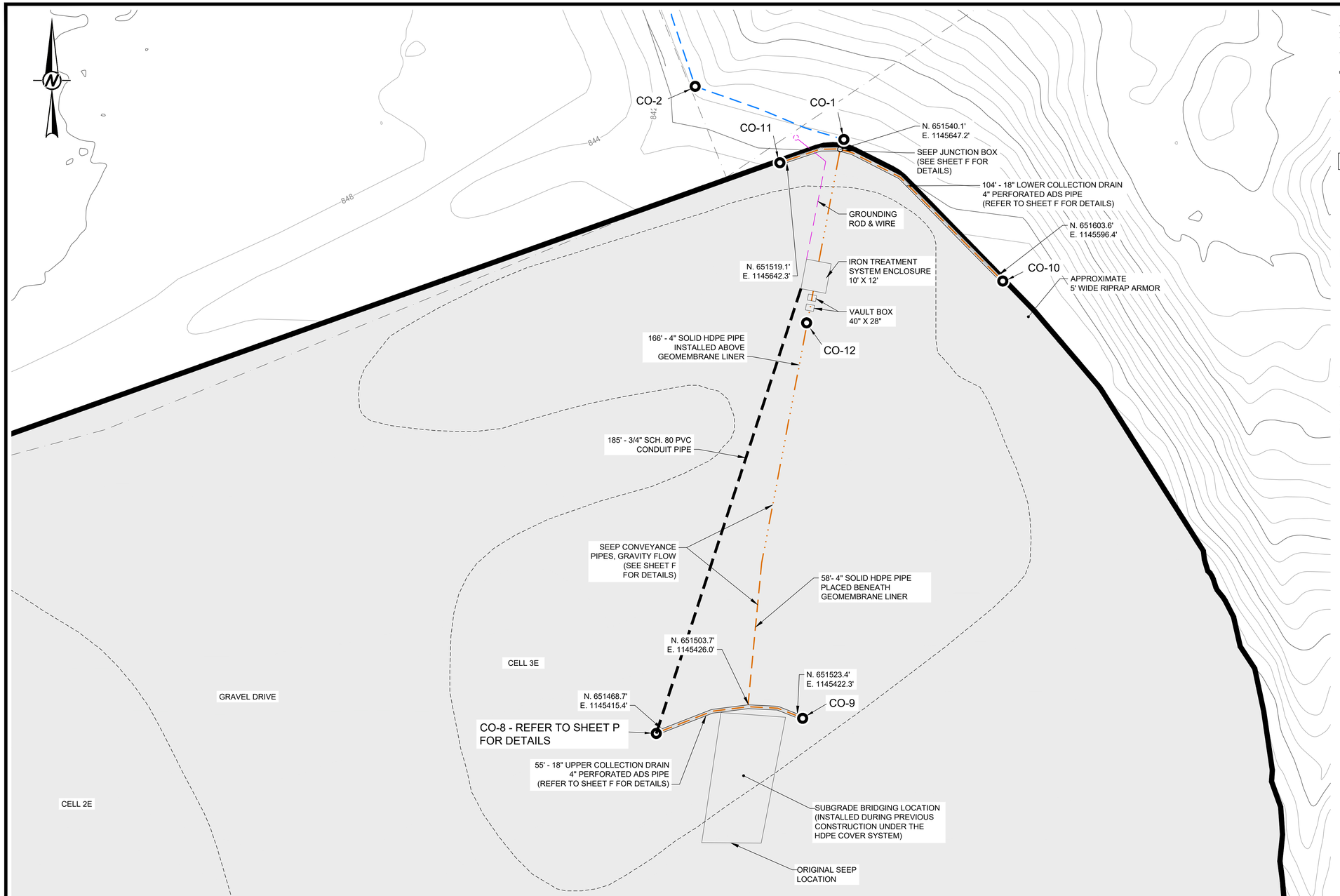
TITLE

SWMU-1 MODIFICATIONS PROFILE ALONG ROUTE

GSI ENVIRONMENTAL

Solutia

GSI JOB No.	4727
SCALE	AS SHOWN
SHEET	B



LEGEND

- EXISTING CONTOURS (2 FT. INTERVAL)
- PCB CELL BOUNDARY (CELL 3E)
- LIMITS OF HDPE COVER SYSTEM / EDGE OF RIP RAP
- SEEP CONVEYANCE PIPE, UNDER GEOMEMBRANE
- SEEP CONVEYANCE PIPE, ABOVE GEOMEMBRANE
- SEEP EFFLUENT CONVEYANCE PIPE (4-INCH SDR11)
- SEEP JUNCTION BOX
- HDPE COVER SYSTEM LIMITS
- PIPE CLEANOUT (CO)

NOTES

1.) UNLESS NOTED OTHERWISE, THE CONVEYANCE PIPES ARE SINGLE WALL SDR-11 HDPE PIPE. THE INFLUENT CONVEYANCE PIPES ARE 2"Ø AND THE EFFLUENT PIPES ARE 3"Ø. THE CONVEYANCE LINE FROM THE SEEP JUNCTION BOX TO CTS #3 IS A 4"Ø PIPE.

2.) RIP RAP NORTHEAST CORNER OF COVER SYSTEM WAS REPAIRED UPON COMPLETION OF CONSTRUCTION.

REFERENCES

1.) TOPOGRAPHY FROM CALHOUN COUNTY (2012) AND LOWERY & ASSOCIATES LAND SURVEYING, LLC; DATED APRIL 17, 2013.

2.) "ALTA / ACSM LAND TITLE SURVEY OF: OPERABLE UNIT 3 OF THE ANNISTON PCB SITE; PREPARED FOR: SOLUTIA INC." BY LOWERY & ASSOCIATES LAND SURVEYING, LLC; DATED APRIL 17, 2013.

3.) AS-BUILT OF PCB CELLS SURVEY, TAYLOR CORPORATION, DATED MARCH 2016.

THESE RECORD DRAWINGS HAVE BEEN PREPARED UPON INFORMATION FROM VARIOUS SOURCES. THESE SOURCES HAVE BEEN REFERENCED ON THE APPROPRIATE DRAWINGS.

ALABAMA LICENSED No. 37043 PROFESSIONAL ENGINEER MICHAEL W. RYSZ

6/30/2021

0 20 40 60
SCALE FEET

REV	DATE	REVISION DESCRIPTION	DES	CADD	CHK	RVW
1	06/30/2021	FINAL ISSUE	-	SOM	TMM	MWR

PROJECT

PHARMACIA LLC / SOLUTIA INC
ANNISTON PCB SITE, ALABAMA

TITLE

SWMU-1 MODIFICATIONS CONVEYANCE PIPE ROUTING SEEP AREA

GSI ENVIRONMENTAL

Solutia

GSI JOB No.	4727
SCALE	AS SHOWN
SHEET	C

ALABAMA HIGHWAY 202
(VARIABLE R/W)
PUBLICLY DEDICATED

EXISTING 4'X6' BOX CULVERT

EXISTING MANHOLE (LOCATION APPROXIMATE)

IW-09 DECOMMISSIONED

POWER POLE FOR CTS #3

2-INCH HDPE PIPE TO CTS #3

HDPE GRAVITY FLOW PIPE, SEE DETAIL

CO-5

INSET 1

CTS #3 SEE DETAIL 1/G

CO-7

SEE NOTE 1

4-INCH HDPE PIPE TO CTS #3, SEE DETAIL

ELECTRIC POWER DISCONNECT FOR IW-05, IW-06, IW-07, IW-08, IW-10, IW-11, AND IW-12

3" EFFLUENT HDPE PIPE TO AWWSB SYSTEM

EXISTING GRAVEL ROAD

ELECTRIC POWER DISCONNECT FOR IW-02 AND IW-13

SEE SHEET K FOR PIPE ROUTE AND EXISTING UTILITIES AND STRUCTURES

2" HDPE PIPE TO CTS #3

MINIMUM 24" COVER AT GRAVEL ROAD CROSSING (8" CASING INSTALLED BENEATH LIMITS OF ROADWAY)

IW 2 / IW-02

IW 13 / IW-13

IW-12 / IW 12

IW 11 / IW-11

IW 6 / IW-06

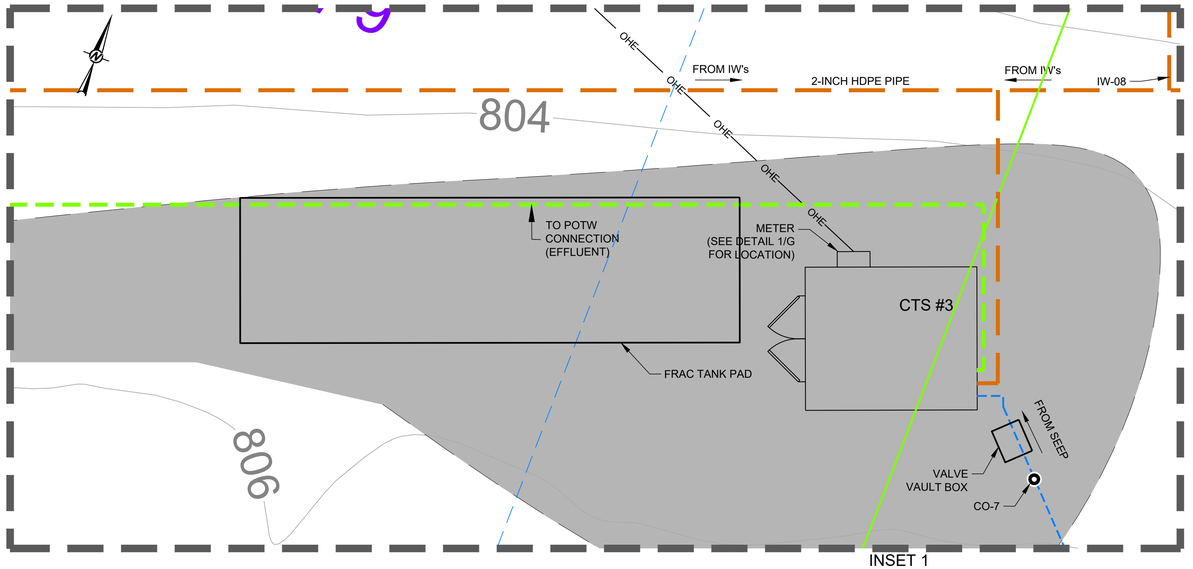
IW 5 / IW-05

IW-10 / IW10

IW-09 / IW9

IW 8 / IW-08

IW 7



INSET 1
SCALE 1" = 5'

LEGEND

- OU-3 BOUNDARY
- EXISTING CONTOURS (2 FT. INTERVAL)
- EXISTING FENCE
- EDGE OF PAVEMENT / CURB
- OVERHEAD WIRES
- SWMU-1 INFLUENT CONVEYANCE PIPE (2-INCH SDR11)
- SWMU-1 EFFLUENT CONVEYANCE PIPE (3-INCH SDR11)
- SEEP EFFLUENT CONVEYANCE PIPE (4-INCH SDR11)
- EXISTING ELECTRICAL INFRASTRUCTURE, POWER POLE
- IW-XX EXISTING ELECTRICAL INFRASTRUCTURE, PUMP CONTROL PANEL
- EXISTING INTERCEPT WELL (IW)
- NEW POWER POLE
- PIPE CLEANOUT

NOTES

1.) UNLESS NOTED OTHERWISE, THE CONVEYANCE PIPES ARE SINGLE WALL SDR-11 HDPE PIPES. THE INFLUENT CONVEYANCE PIPES ARE 2"Ø AND THE EFFLUENT PIPES ARE 3"Ø. THE CONVEYANCE LINE FROM THE SEEP JUNCTION BOX TO CTS #3 IS A 4"Ø PIPE.

REFERENCES

1.) TOPOGRAPHY FROM CALHOUN COUNTY (2012) AND LOWERY & ASSOCIATES LAND SURVEYING, LLC; DATED APRIL 17, 2013.

2.) "ALTA / ACSM LAND TITLE SURVEY OF: OPERABLE UNIT 3 OF THE ANNISTON PCB SITE; PREPARED FOR: SOLUTIA INC." BY LOWERY & ASSOCIATES LAND SURVEYING, LLC; DATED APRIL 17, 2013.

3.) EXISTING BOX CULVERT LOCATION IS APPROXIMATE, BASED ON SCANNED IMAGE OF DRAWING ENTITLED "POST-CONSTRUCTION SITE DRAINAGE PLAN - 10YR. STORM" DATED MAY 1997, BY GOLDER ASSOCIATES.

4.) HEADWALL SHOWN TAKEN FROM DIGITAL CAD FILE GPS DATA GOLDER.dwg DATED APRIL 2016, PROVIDED BY GENESIS PROJECT, INC.

5.) EXISTING ELECTRICAL INFRASTRUCTURE LOCATIONS PROVIDED BY GENESIS PROJECT INC. VIA CAD FILE IW CONTROL PANELS (SOUTH LANDFILL).DWG.

ALABAMA LICENSED PROFESSIONAL ENGINEER MICHAEL W. TRYBUS No. 37043
6/30/2021

THESE RECORD DRAWINGS HAVE BEEN PREPARED UPON INFORMATION FROM VARIOUS SOURCES. THESE SOURCES HAVE BEEN REFERENCED ON THE APPROPRIATE DRAWINGS.

0 30 60 90
SCALE FEET

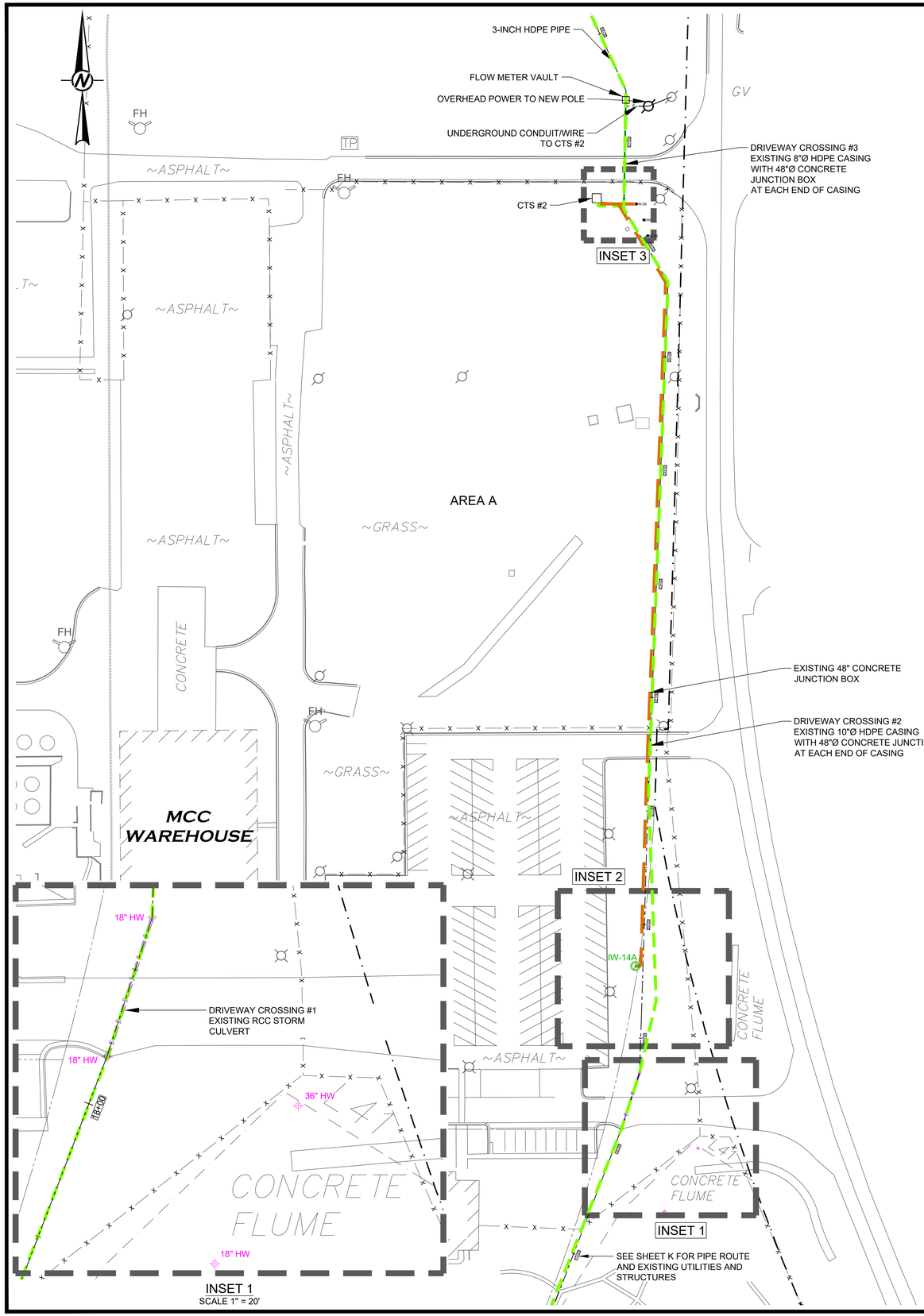
REV	DATE	REVISION DESCRIPTION	DES	CADD	CHK	RVW
1	06/30/2021	FINAL ISSUE	-	SOM	TMM	MWR

PROJECT
PHARMACIA LLC / SOLUTIA INC
ANNISTON PCB SITE, ALABAMA

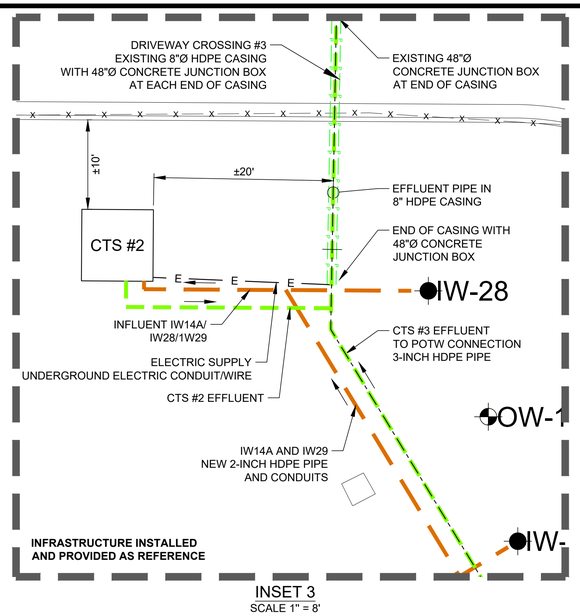
TITLE
SWMU-1 MODIFICATIONS CONVEYANCE PIPE ROUTING CARBON TREATMENT SYSTEM NO. 3 AREA

GSI ENVIRONMENTAL | Solutia

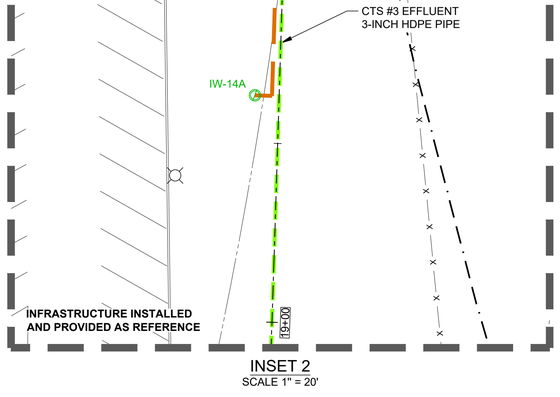
GSI JOB No.	4727
SCALE	AS SHOWN
SHEET	D



INSET 1
SCALE 1" = 20'



INSET 3
SCALE 1" = 8'



INSET 2
SCALE 1" = 20'

LEGEND

- OU-3 BOUNDARY
- EXISTING CONTOURS (2 FT. INTERVAL)
- EXISTING FENCE
- EDGE OF PAVEMENT / CURB
- LIGHT AND POWER POLES
- EXISTING INTERCEPT WELL (IW)
- CARBON TREATMENT SYSTEM (CTS)
- INTERCEPTOR WELL
- MONITORING WELL
- SWMU-1 INFLUENT CONVEYANCE PIPE (2-INCH SDR11)
- SWMU-1 EFFLUENT CONVEYANCE PIPE (3-INCH SDR11)
- 18" HEADWALL — GPS LOCATED SITE FEATURE (SEE REFERENCE 3)
- E E — UNDERGROUND ELECTRIC CONDUIT/WIRE
- P P — HDPE CASING
- P P — RCC STORM CULVERT
- POWER POLE

NOTES

1.) UNLESS NOTED OTHERWISE, THE CONVEYANCE PIPES ARE SINGLE WALL SDR-11 HDPE PIPES. THE INFLUENT CONVEYANCE PIPES ARE 2" DIAMETER AND THE EFFLUENT PIPES ARE 3" DIAMETER. THE CONVEYANCE LINE FROM THE SEEP JUNCTION BOX TO CTS #3 IS 4" DIAMETER.

REFERENCES

1.) TOPOGRAPHY FROM CALHOUN COUNTY (2012) AND LOWERY & ASSOCIATES LAND SURVEYING, LLC; DATED APRIL 17, 2013.

2.) "ALTA / ACSM LAND TITLE SURVEY OF: OPERABLE UNIT 3 OF THE ANNISTON PCB SITE; PREPARED FOR: SOLUTIA INC." BY LOWERY & ASSOCIATES LAND SURVEYING, LLC; DATED APRIL 17, 2013.

3.) PIPE CASING SHOWN TAKEN FROM DIGITAL CAD FILE AREA A PIPES_PCB CELL GPS DATA.dwg DATED APRIL 2016, PROVIDED BY GENESIS PROJECT, INC.

THESE RECORD DRAWINGS HAVE BEEN PREPARED UPON INFORMATION FROM VARIOUS SOURCES. THESE SOURCES HAVE BEEN REFERENCED ON THE APPROPRIATE DRAWINGS.

ALABAMA LICENSED No. 37043 PROFESSIONAL ENGINEER MICHAEL W. RYSZ

6/30/2021

0 20 40 60
SCALE FEET

REV	DATE	REVISION DESCRIPTION	DES	CADD	CHK	RVW
1	06/30/2021	FINAL ISSUE	-	SOM	TMM	MWR

PROJECT

PHARMACIA LLC / SOLUTIA INC
ANNISTON PCB SITE, ALABAMA

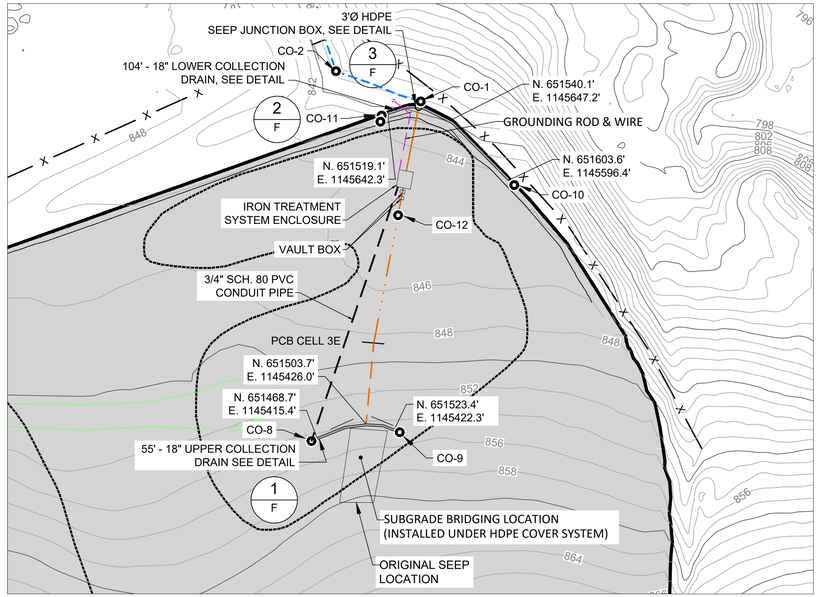
TITLE

SWMU-1 MODIFICATIONS CONVEYANCE PIPE ROUTING AREA A

GSI ENVIRONMENTAL

Solutia

FILE No.	4727
SCALE	AS SHOWN
SHEET	E



SEEPAGE COLLECTION SYSTEM

SCALE 0 50 100 150 FEET

LEGEND

- OU-3 BOUNDARY
- EXISTING CONTOURS (2 FT. INTERVAL)
- FENCE
- PCB CELL BOUNDARIES
- SEEP CONVEYANCE PIPES, UNDER GEOMEMBRANE
- SEEP CONVEYANCE PIPES, ABOVE GEOMEMBRANE
- SEEP EFFLUENT CONVEYANCE PIPE (4-INCH SDR11)
- SILT FENCE

NOTES

1. ALL GEOTEXTILE FABRIC WAS OVERLAPPED A MINIMUM OF 2' AT ADJOINING SECTIONS.

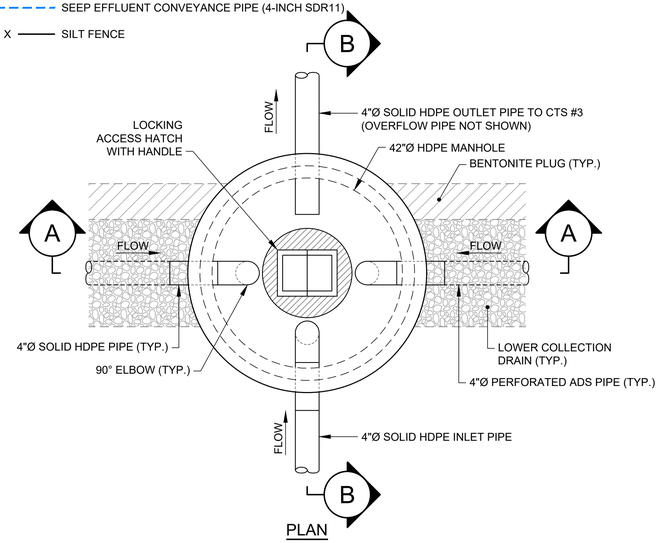
REFERENCES

1. TOPOGRAPHY FROM CALHOUN COUNTY (2012) AND LOWERY & ASSOCIATES LAND SURVEYING, LLC; DATED APRIL 17, 2013.

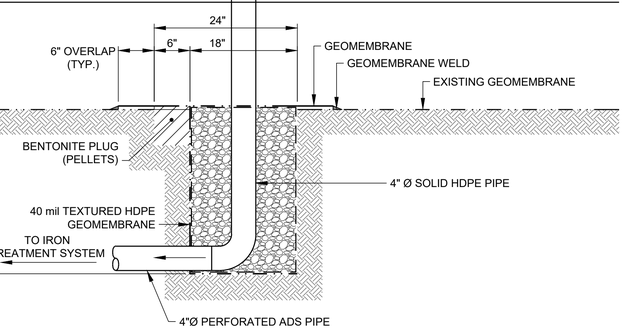
2. "ALTA / ACSM LAND TITLE SURVEY OF: OPERABLE UNIT 3 OF THE ANNISTON PCB SITE; PREPARED FOR: SOLUTIA INC." BY LOWERY & ASSOCIATES LAND SURVEYING, LLC; DATED APRIL 17, 2013.

3. AS-BUILT OF PCB CELLS SURVEY, BY TAYLOR CORPORATION, DATED MARCH 2016.

4. AS-BUILT CONVEYANCE PIPING LAYOUT PROVIDED BY TURNER SURVEYING, LLC, DATED APRIL, 16, 2008

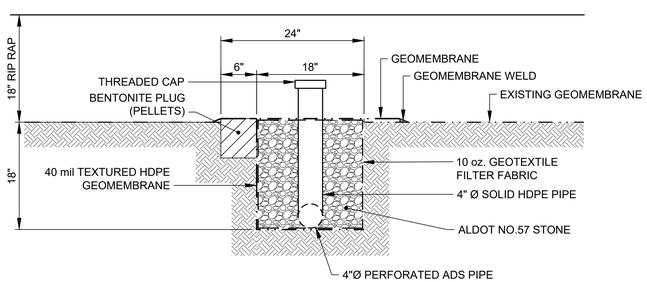


PLAN



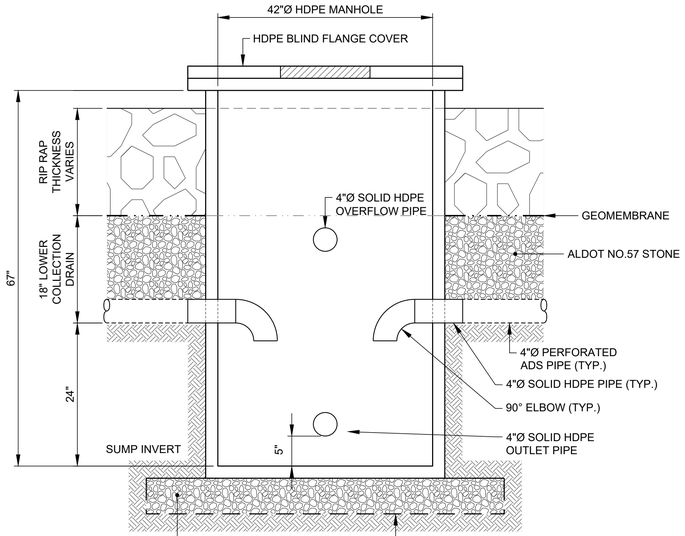
1 F UPPER COLLECTION DRAIN DETAIL

SCALE 0 1 2 3 FEET

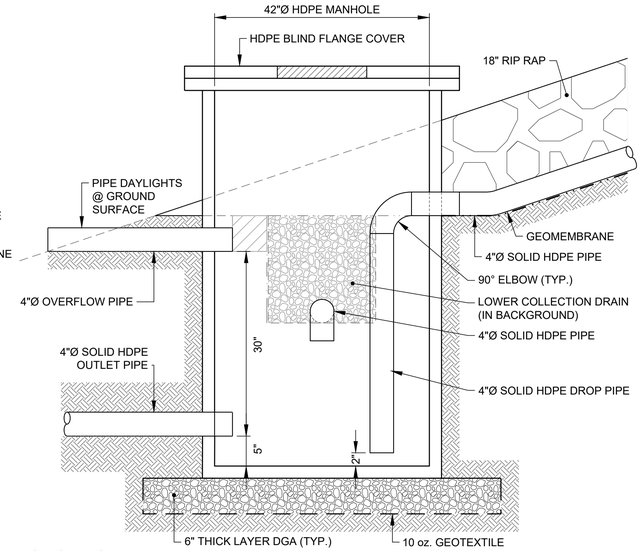


2 F LOWER COLLECTION DRAIN DETAIL

SCALE 0 1 2 3 FEET



SECTION A-A



SECTION B-B

3 F HDPE SEEP JUNCTION BOX DETAIL

THESE RECORD DRAWINGS HAVE BEEN PREPARED UPON INFORMATION FROM VARIOUS SOURCES. THESE SOURCES HAVE BEEN REFERENCED ON THE APPROPRIATE DRAWINGS.

ALABAMA LICENSED No. 37043 PROFESSIONAL ENGINEER MICHAEL W. RILEY

6/30/2021

REV	DATE	REVISION DESCRIPTION	DES	CADD	CHK	RVW
1	06/30/2021	FINAL ISSUE	-	SOM	TMM	MWR

PROJECT

PHARMACIA LLC / SOLUTIA INC
ANNISTON PCB SITE, ALABAMA

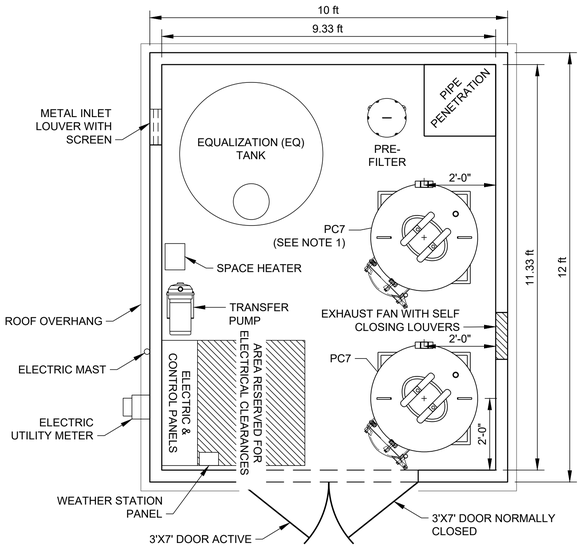
TITLE

SWMU-1 MODIFICATIONS
PCB CELL 3E SEEP
CONVEYANCE SYSTEM

GSI ENVIRONMENTAL

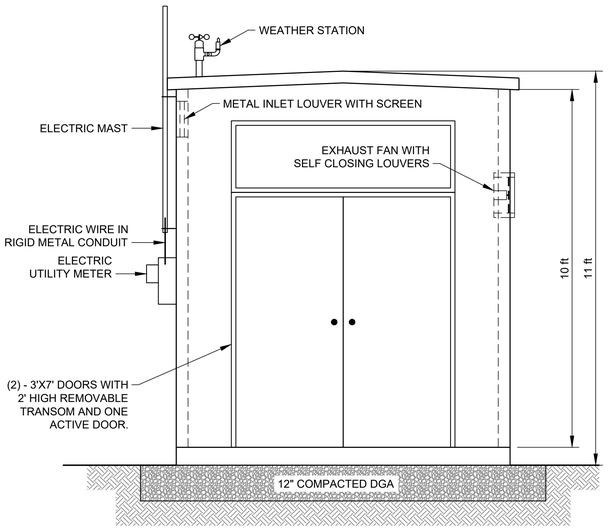
Solutia

GSI JOB No. 4727
SCALE AS SHOWN
SHEET F



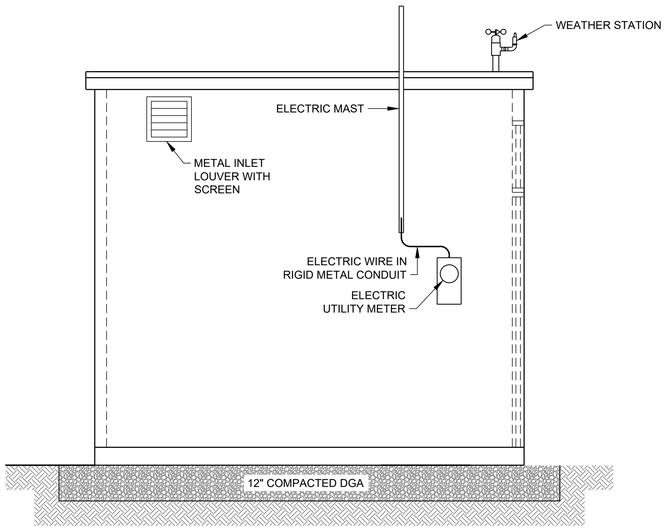
1 G CARBON TREATMENT SYSTEM NO.3 ENCLOSURE PLAN

0 2 4
1" = 2' FEET



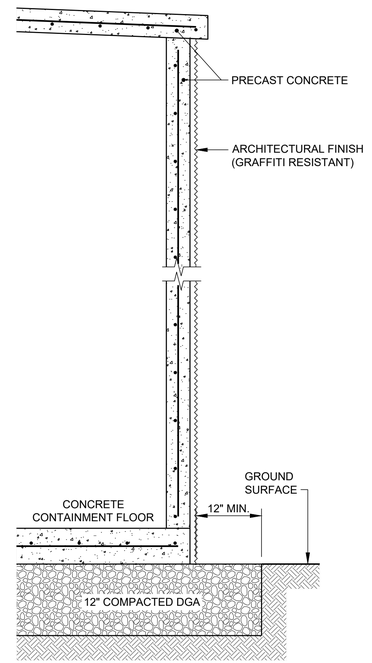
2 G CARBON TREATMENT SYSTEM NO.3 ENCLOSURE FRONT ELEVATION

0 2 4
1" = 2' FEET

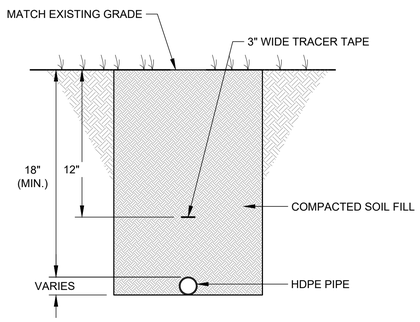


3 G CARBON TREATMENT SYSTEM NO.3 ENCLOSURE LEFT SIDE ELEVATION

0 2 4
1" = 2' FEET

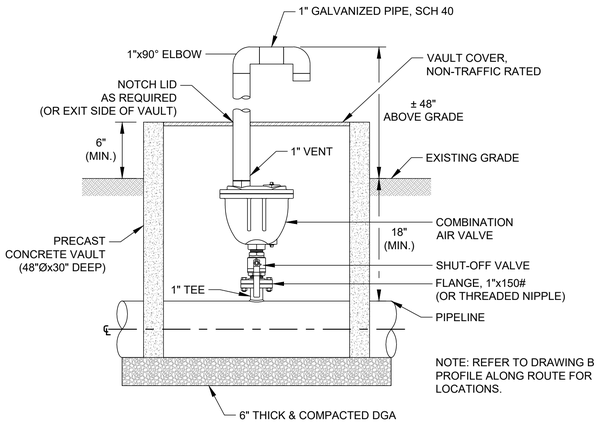


NTS 4 G CARBON TREATMENT SYSTEM NO.3 ENCLOSURE & FOUNDATION SECTION

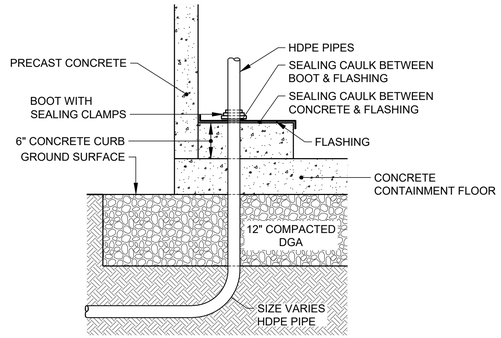


NOTES:
1.) HDPE FORCEMAIN LOCATIONS OUTSIDE OF HDPE COVER LIMITS.

NTS 5 G FORCEMAIN TRENCH



NTS 6 G COMBINATION AIR VALVE

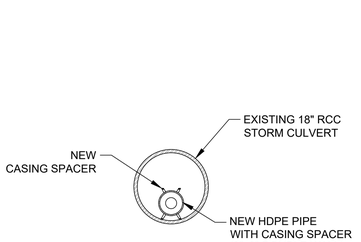


NTS 7 G CARBON TREATMENT SYSTEM NO.3 TYPICAL PIPE PENETRATION @ CONCRETE CURB

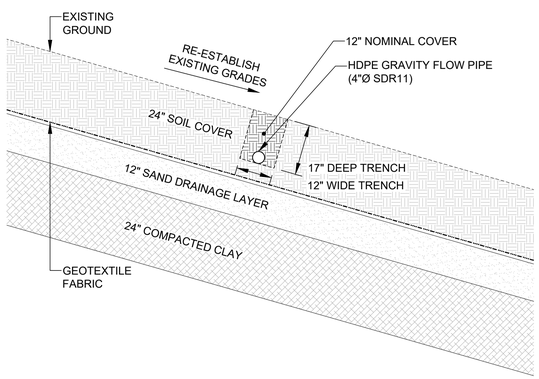
NOTES

1.) PIPING NOT SHOWN FOR CLARITY. REFER TO SHEET I FOR DETAILS.

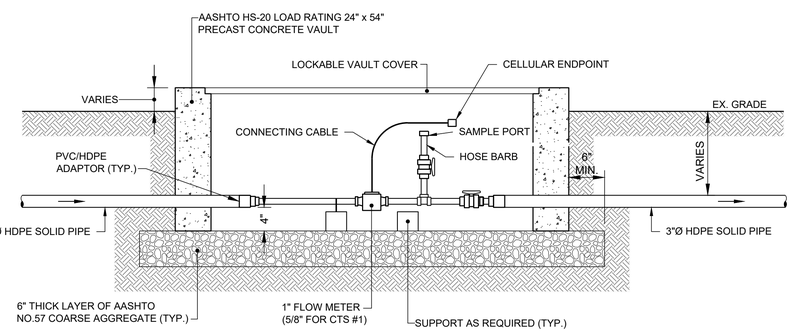
THESE RECORD DRAWINGS HAVE BEEN PREPARED UPON INFORMATION FROM VARIOUS SOURCES. THESE SOURCES HAVE BEEN REFERENCED ON THE APPROPRIATE DRAWINGS.



NTS 8 G DRIVEWAY #1 CROSSING



NTS 9 G HDPE GRAVITY FLOW PIPE DETAIL



SECTION

NTS 10 G FLOW METER VAULT

REV	DATE	REVISION DESCRIPTION	DES	CADD	CHK	RVW
1	06/30/2021	FINAL ISSUE	-	SOM	TMM	MWR

PROJECT

PHARMACIA LLC / SOLUTIA INC
ANNISTON PCB SITE, ALABAMA

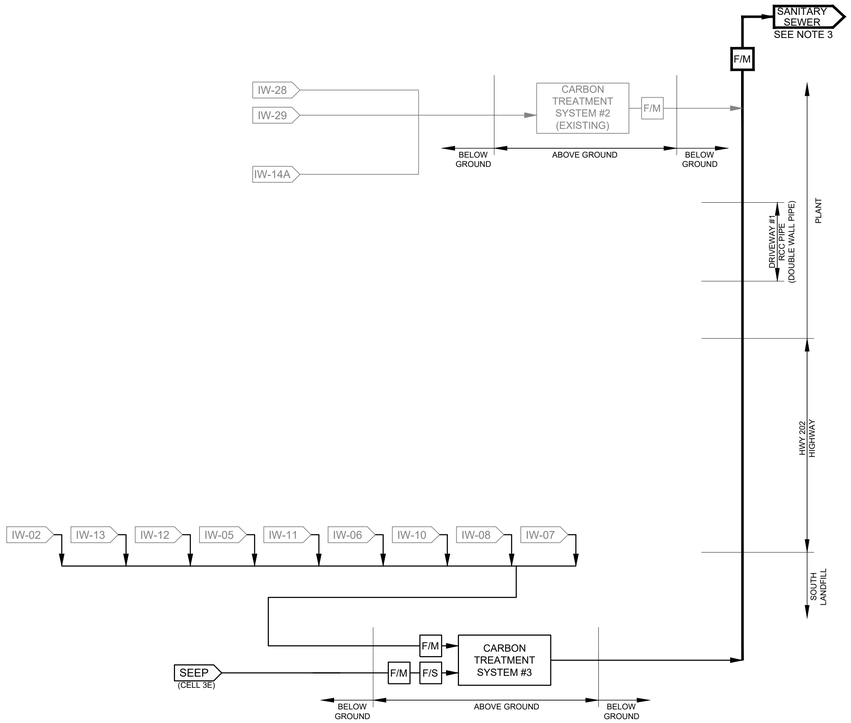
TITLE

SWMU-1 MODIFICATIONS
CTS #3, PIPING AND VALVING DETAILS

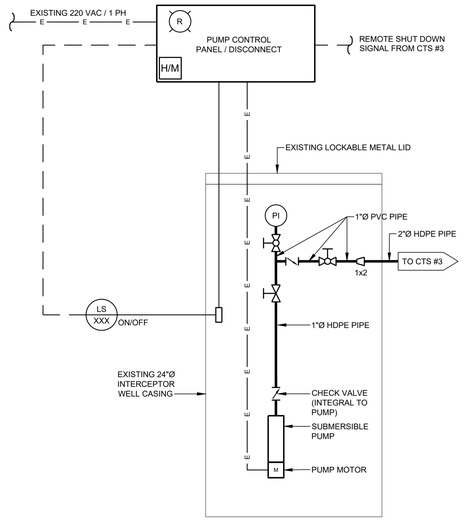
GSI ENVIRONMENTAL

Solutia

GSI JOB No.	4727
SCALE	AS SHOWN
SHEET	G



SWMU I CORRECTIVE ACTION SYSTEM



EXISTING 24"Ø INTERCEPTOR WELL
PROCESS & INSTRUMENTATION DIAGRAM

LEGEND

	CONVEYANCE LINE
	EXISTING CONVEYANCE LINE
IW-27	NEW INTERCEPTOR WELL/SEEP FLOW
IW-06	EXISTING INTERCEPTOR WELL FLOW
F/M	NEW FLOW METER
F/S	NEW FLOW SWITCH
H/M	HOUR METER
	GROUNDWATER
E E E	ELECTRIC POWER
	ELECTRIC SIGNAL
	INSTRUMENT
	BALL VALVE, UNION TYPE
	CHECK VALVE, UNION TYPE
	REDUCER
LS	LEVEL SWITCH
PI	PRESSURE INDICATOR
R	PUMP RUN LIGHT
	GATE VALVE, HAND

NOTES

1.) NEW PUMPS, CONTROLS, VALVES AND GAUGES WERE INSTALLED IN ALL ACTIVE SWMU-1 INTERCEPTOR WELLS. WATER PUMPED FROM THESE WELLS IS ROUTED TO CTS #3 FOR TREATMENT..

2.) EFFLUENT FROM CTS #3 IS CONVEYED TO AN EXISTING AWWSB MANHOLE (SEE SHEET A) FOR DISCHARGE UNDER A STATE INDIRECT DISCHARGE PERMIT.

3.) UNLESS NOTED OTHERWISE, THE CONVEYANCE PIPES ARE SINGLE WALL SDR-11 HDPE PIPES. THE INFLUENT CONVEYANCE PIPES ARE 2" DIAMETER AND THE EFFLUENT PIPES ARE 3" DIAMETER. THE CONVEYANCE LINE FROM THE SEEP JUNCTION BOX TO CTS #3 IS A 4" DIAMETER PIPE.

THESE RECORD DRAWINGS HAVE BEEN PREPARED UPON INFORMATION FROM VARIOUS SOURCES. THESE SOURCES HAVE BEEN REFERENCED ON THE APPROPRIATE DRAWINGS.

ALABAMA LICENSED No. 37043 PROFESSIONAL ENGINEER MICHAEL W. RILEY

6/30/2021

0 150 300 450
SCALE FEET

REV	DATE	REVISION DESCRIPTION	DES	CADD	CHK	RVW
1	06/30/2021	FINAL ISSUE	-	SOM	TMM	MWR

PROJECT

PHARMACIA LLC / SOLUTIA INC
ANNISTON PCB SITE, ALABAMA

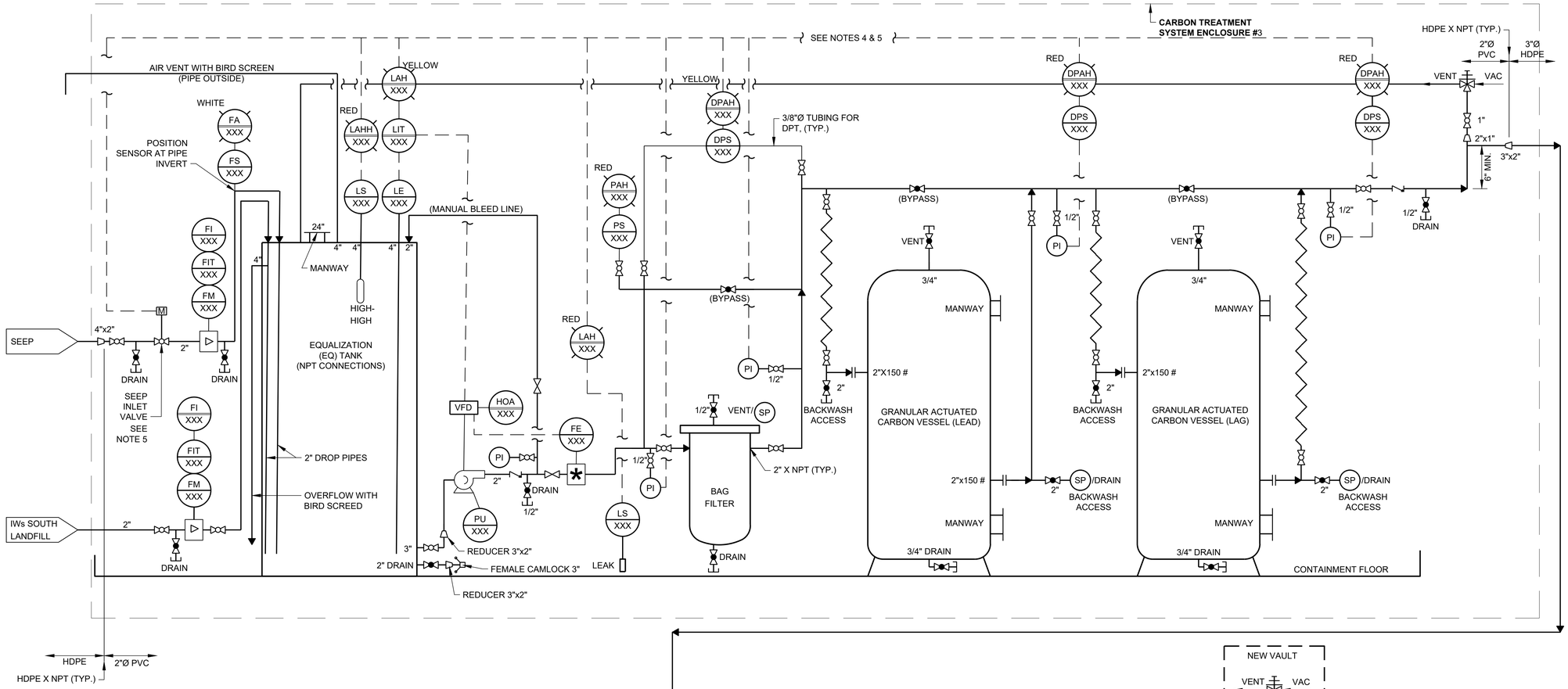
TITLE

SWMU-1 MODIFICATIONS PROCESS FLOW DIAGRAM

GSI ENVIRONMENTAL

Solutia

GSI JOB No.	4727
SCALE	AS SHOWN
SHEET	H



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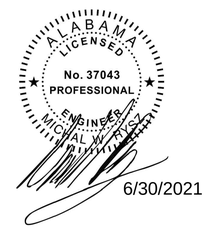


LEGEND

- CHECK VALVE
- GATE VALVE, HAND
- BALL VALVE, HAND
- BALL VALVE, HAND (NORMALLY CLOSED)
- REDUCER
- UNION
- FLANGE CONNECTION
- PLUG/CAP
- VENT VAC — VACUUM BREAK / AIR RELIEF
- PI — PRESSURE INDICATOR
- SP — SAMPLING PORT
- INSTRUMENT / CONTROL SIGNAL
- EXTRACTED IW GROUNDWATER
- FLEXIBLE CONNECTION / HOSE

- LS XXX — LEVEL SWITCH
- FS XXX — FLOW SWITCH
- FI XXX — FLOW INDICATOR (PANEL)
- LIT XXX — LEVEL INDICATOR TRANSMITTER (PANEL)
- FIT XXX — FLOW INDICATOR TRANSMITTER
- DPS XXX — DIFFERENTIAL PRESSURE SWITCH
- PS XXX — PRESSURE SWITCH
- LE XXX — LEVEL ELEMENT
- FE XXX — FLOW ELEMENT
- FM XXX — FLOW METER

- FA XXX — LEVEL ALARM, HIGH (PANEL)
- LAH XXX — LEVEL ALARM, HIGH (PANEL)
- LAHH XXX — LEVEL ALARM, HIGH-HIGH (PANEL)
- PAH XXX — PRESSURE ALARM, HIGH (PANEL)
- DPAH XXX — DIFFERENTIAL PRESSURE ALARM, HIGH (PANEL)
- HOA XXX — SWITCH, HAND/OFF/AUTO (PANEL)
- PUMP, TRANSFER
- VFD — VARIABLE FREQUENCY DRIVE
- M — ACTUATED VALVE, ELECTRICAL

NOTES

1. CARBON TREATMENT ENCLOSURE INCLUDES A HEATER TO PREVENT FREEZING.

2. THE CONCRETE CONTAINMENT FLOOR/CURB INCLUDES A LEAK SENSOR AND ALARM. THE ALARM SHALL ACTIVATE WHEN LIQUID HAS ACCUMULATED TO 50% OF THE DEPTH OF THE CURB HEIGHT.

3. UNLESS NOTED OTHERWISE, THE CONVEYANCE PIPES ARE SINGLE WALL SDR-11 HDPE PIPES. THE INFLUENT CONVEYANCE PIPES ARE 2" DIAMETER AND THE EFFLUENT PIPES ARE 3" DIAMETER. THE SEEP EFFLUENT CONVEYANCE PIPE IS 4" DIAMETER HDPE PIPE.

4. THE CONTROL SYSTEM INCLUDES NOTIFICATION TO THE PLANT'S CONTROL ROOM BASED ON THE PERFORMANCE OF THE SYSTEM AS FOLLOWS:
   - A. WARNING NOTIFICATION - A WARNING NOTIFICATION SHALL BE PROVIDED WHEN THE FOLLOWING CONDITION EXIST: HIGH DIFFERENTIAL PRESSURE ACROSS THE BAG FILTER.
   - B. ALARM NOTIFICATION - AN ALARM NOTIFICATION INDICATING THE SYSTEM HAS SHUT DOWN SHALL BE PROVIDED WHEN THE FOLLOW CONDITIONS EXIST: A TANK HIGH-HIGH LEVEL, A HIGH SYSTEM OPERATING PRESSURE, A LEAK IS DETECTED INSIDE CTS. HIGH DIFFERENTIAL PRESSURE ACROSS THE CARBON VESSEL.
   - C. WARNING AND ALARMS NOTIFICATION ARE ALSO DISPLAYED LOCALLY AT THE CONTROL PANEL INSTALLED INSIDE CTS #3.
   - D. WARNING AND ALARM NOTIFICATIONS ARE ALSO SENT BY TEXT MESSAGE AND EMAIL TO KEY OPERATIONS AND MAINTENANCE PERSONNEL.

5. SEEP INLET VALVE SHALL CLOSE IF A HIGH-HIGH LEVEL OR LEAK ALARM IS PRESENT OR SYSTEM IS SHUTDOWN.

6. SYSTEM OPERATION IS CONTROLLED BY WATER LEVEL IN THE EQUALIZATION TANK BASED ON THE FOLLOWING SET POINTS:
   - 50 INCHES: HIGH-HIGH LEVEL ALARM
   - 35 INCHES: HIGH LEVEL WARNING
   - 28 INCHES: TRANSFER PUMP ON
   - 18 INCHES: TRANSFER PUMP OFF

REV	DATE	REVISION DESCRIPTION	DES	CADD	CHK	RVW
1	06/30/2021	FINAL ISSUE	-	SOM	TMM	MWR

PROJECT

PHARMACIA LLC / SOLUTIA INC
ANNISTON PCB SITE, ALABAMA

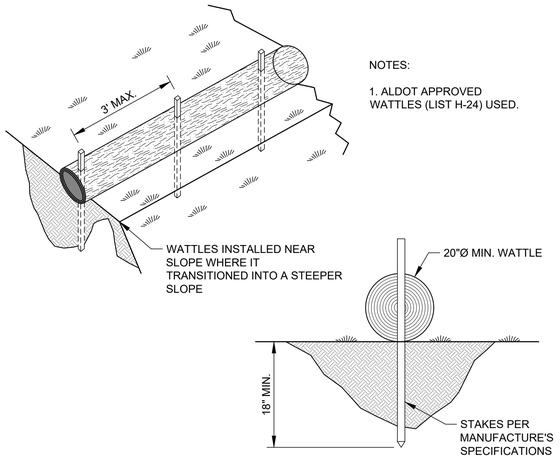
TITLE

SWMU-1 MODIFICATIONS PROCESS AND INSTRUMENTATION DIAGRAM

GSI ENVIRONMENTAL

Solutia

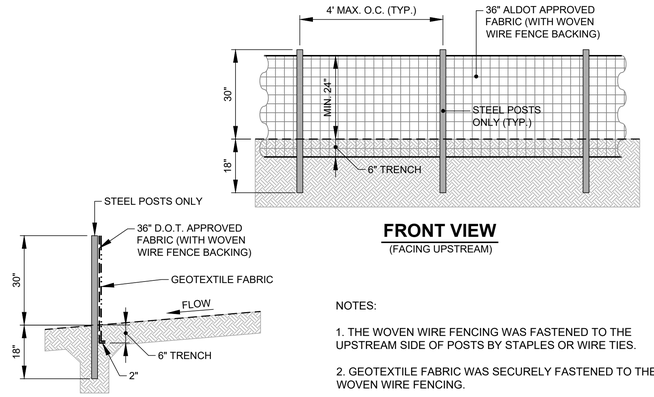
GSI JOB No.	4727
SCALE	AS SHOWN
SHEET	1



NOTES:

1. ALDOT APPROVED WATTLES (LIST H-24) USED.

NTS 1/J WATTLE



FRONT VIEW
(FACING UPSTREAM)

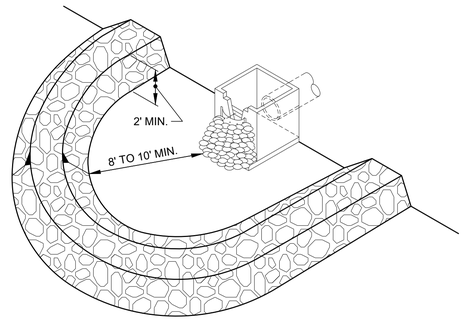
SIDE VIEW

NOTES:

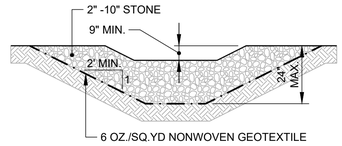
1. THE WOVEN WIRE FENCING WAS FASTENED TO THE UPSTREAM SIDE OF POSTS BY STAPLES OR WIRE TIES.

2. GEOTEXTILE FABRIC WAS SECURELY FASTENED TO THE WOVEN WIRE FENCING.

NTS 2/J TYPE A SILT FENCE



NTS 3/J FILTER RING



UPSTREAM VIEW

NTS 4/J STONE CHECK DAM

NOTES

1.) EROSION AND SEDIMENT CONTROLS INSTALLED AROUND WORK AREAS AS NECESSARY TO PREVENT SEDIMENT FROM LEAVING THE SITE. REFER TO SHEET L FOR EROSION AND SEDIMENT CONTROL PLAN.

THESE RECORD DRAWINGS HAVE BEEN PREPARED UPON INFORMATION FROM VARIOUS SOURCES. THESE SOURCES HAVE BEEN REFERENCED ON THE APPROPRIATE DRAWINGS.

ALABAMA LICENSED No. 37043 PROFESSIONAL ENGINEER MICHAEL W. RISER

6/30/2021

REV	DATE	REVISION DESCRIPTION	DES	CADD	CHK	RVW
1	06/30/2021	FINAL ISSUE	-	SOM	TMM	MWR

PROJECT

PHARMACIA LLC / SOLUTIA INC
ANNISTON PCB SITE, ALABAMA

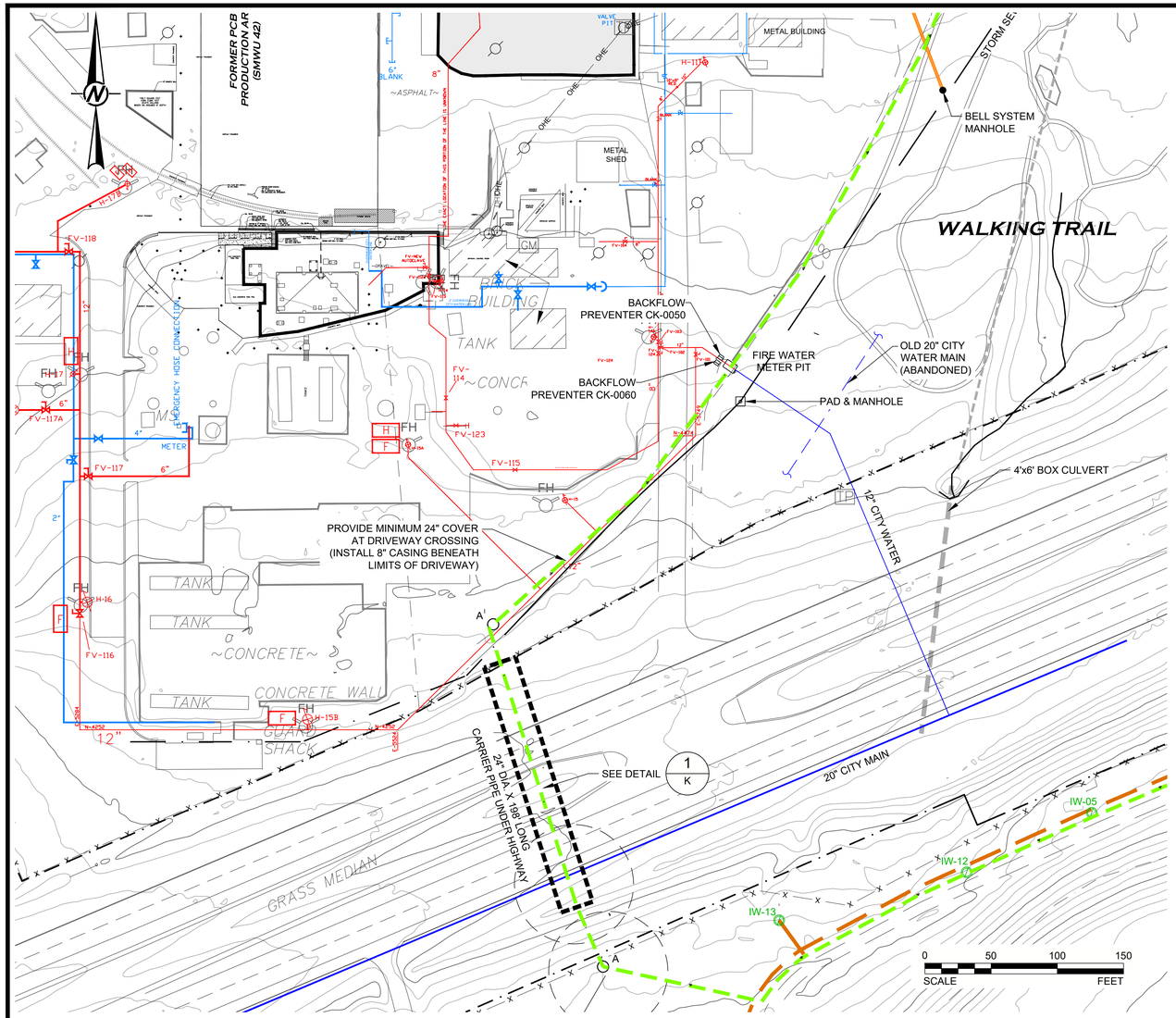
TITLE

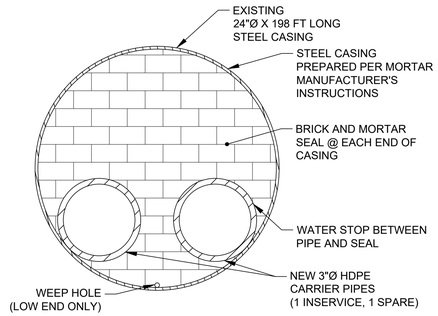
SWMU-1 MODIFICATIONS MISCELLANEOUS EROSION AND SEDIMENT CONTROL DETAILS

GSI ENVIRONMENTAL

Solutia

GSI JOB No.	4727
SCALE	AS SHOWN
SHEET	J





NTS 1/K CASING AND SEAL

LEGEND

- OU-3 BOUNDARY
- EXISTING CONTOURS (2 FT. INTERVAL)
- EXISTING FENCE
- EDGE OF PAVEMENT / CURB
- RAILROAD
- EXISTING LIGHT AND POWER POLES
- FIRE HYDRANT
- SMWU-1 INFLUENT CONVEYANCE PIPE (2-INCH SDR11)
- CTS #3 EFFLUENT CONVEYANCE PIPE (3-INCH SDR11)
- SEEP EFFLUENT CONVEYANCE PIPE (4-INCH SDR11)
- EXISTING 36-INCH HDPE PIPE
- HDPE COVER SYSTEM LIMITS
- CARBON TREATMENT SYSTEM (CTS)
- EXISTING INTERCEPT WELL (IW)
- NEW INTERCEPT WELL (IW)
- EXISTING MANHOLE
- JUNCTION BOX

NOTES

1.) THE CONTRACTOR PERFORMED A VIDEO INSPECTION OF THE 24-INCH DIAMETER STEEL CASING PRIOR TO INSTALLATION OF THE CONVEYANCE PIPES. NO DEFECTS WERE OBSERVED.

2.) THE CONTRACTOR PERFORMED HYDROSTATIC LEAK TESTING OF BOTH HDPE CONVEYANCE PIPES AT A MINIMUM PRESSURE OF 125 PSIG FOR 1 HOUR.

3.) THE CONCRETE FLUME SOUTH OF HIGHWAY 202 WAS REPAIRED TO PRE-CONSTRUCTION CONDITIONS UPON COMPLETION OF THE STEEL CASING MAINTENANCE ACTIVITIES.

4.) THIS CONSTRUCTION RECORD DRAWING WAS PREPARED BASED UPON INFORMATION FROM VARIOUS SOURCES. THESE SOURCES HAVE BEEN REFERENCED ON THE DRAWING.

REFERENCES

1.) TOPOGRAPHY FROM CALHOUN COUNTY (2012) AND LOWERY & ASSOCIATES LAND SURVEYING, LLC; DATED APRIL 17, 2013.

2.) "ALTA / ACSM LAND TITLE SURVEY OF: OPERABLE UNIT 3 OF THE ANNISTON PCB SITE; PREPARED FOR: SOLUTIA INC." BY LOWERY & ASSOCIATES LAND SURVEYING, LLC; DATED APRIL 17, 2013.

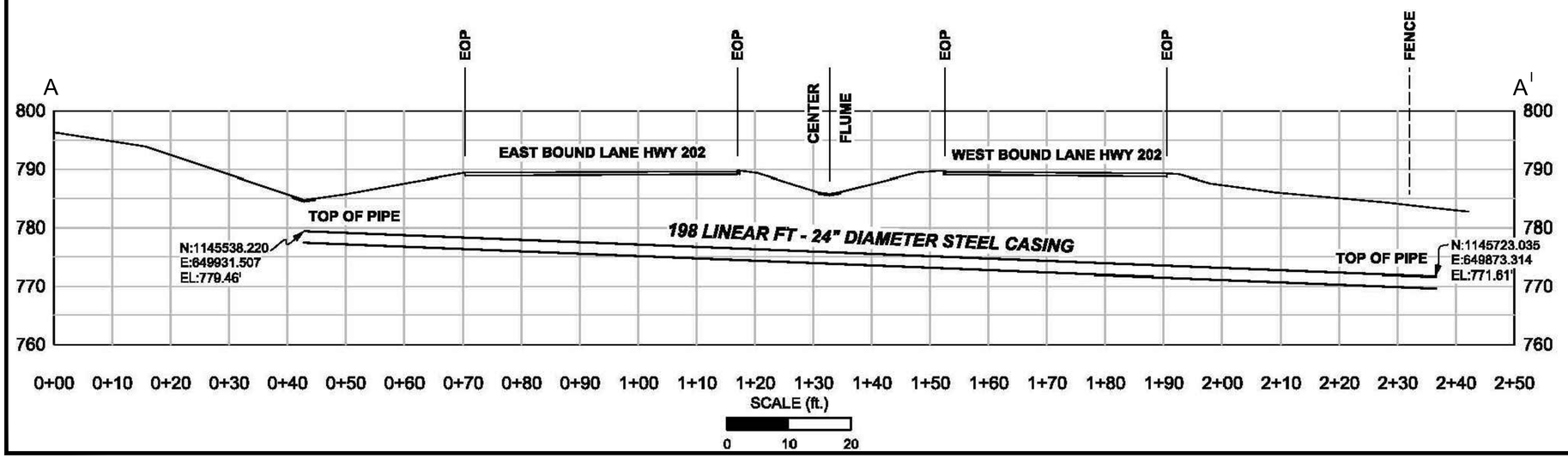
3.) HEADWALL SHOWN TAKEN FROM DIGITAL CAD FILE GPS DATA GOLDER.DWG DATED APRIL 2016, PROVIDED BY GENESIS PROJECT, INC.

4.) AS-BUILT OF PCB CELLS SURVEY, BY TAYLOR CORPORATION, DATED MARCH 2016.

5.) 24" DIA. BY 198' LONG STEEL CASING LOCATION AND ELEVATION INFORMATION BASED ON SURVEY INFORMATION INCLUDED IN "202 ROAD CROSSING X SECT [13199].pdf" PROVIDED BY SOLUTIA ON JULY 27, 2017.

6.) EXISTING UTILITY AND SITE STRUCTURES TAKEN FROM CADD FILE STUMP-3-24-25.DWG PROVIDED BY SITE ENGINEER.

THESE RECORD DRAWINGS HAVE BEEN PREPARED UPON INFORMATION FROM VARIOUS SOURCES. THESE SOURCES HAVE BEEN REFERENCED ON THE APPROPRIATE DRAWINGS.



REV	DATE	REVISION DESCRIPTION	DES	CADD	CHK	RVW
1	06/30/2021	FINAL ISSUE	-	SOM	TMM	MWR

PROJECT

PHARMACIA LLC / SOLUTIA INC
ANNISTON PCB SITE, ALABAMA

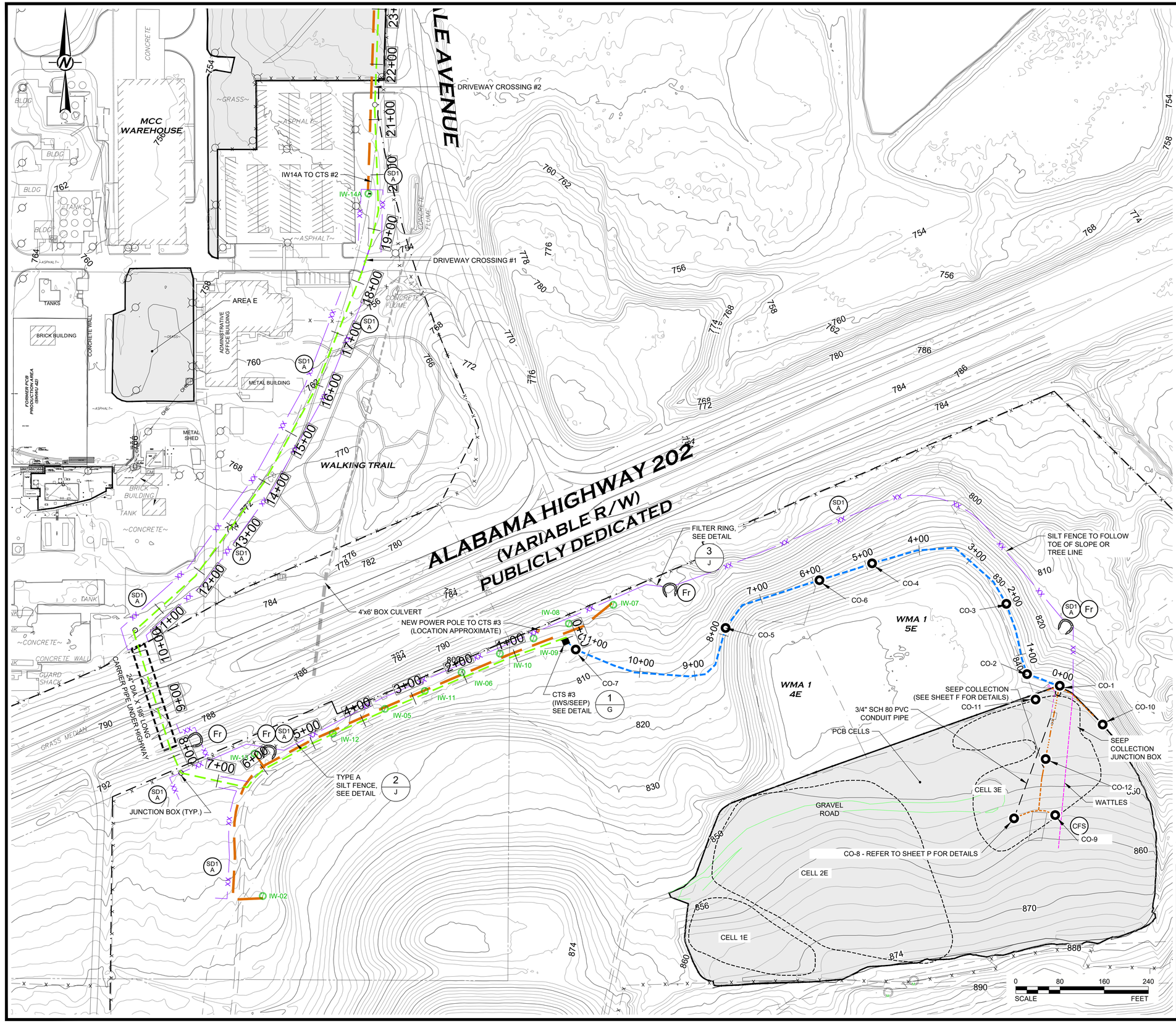
TITLE

SWMU-1 MODIFICATIONS
REVISED HIGHWAY 202 CROSSING ALIGNMENT

GSI ENVIRONMENTAL

Solutia

GSI JOB No.	4727
SCALE	AS SHOWN
SHEET	K



LEGEND

- OU-3 BOUNDARY
- EXISTING CONTOURS (2 FT. INTERVAL)
- EXISTING FENCE
- PCB CELL BOUNDARY
- EDGE OF PAVEMENT / CURB
- RAILROAD
- EXISTING LIGHT AND POWER POLES
- FH — FIRE HYDRANT
- SMWU-1 INFLUENT CONVEYANCE PIPE (2-INCH SDR11)
- CTS # 3 EFFLUENT CONVEYANCE PIPE (3-INCH SDR11)
- SEEP CONVEYANCE PIPE, UNDER GEOMEMBRANE
- SEEP CONVEYANCE PIPE, ABOVE GEOMEMBRANE
- SEEP EFFLUENT CONVEYANCE PIPE (4-INCH SDR11)
- CARBON TREATMENT SYSTEM (CTS)
- EXISTING INTERCEPT WELL (IW)
- EXISTING MANHOLE
- HDPE COVER SYSTEM LIMITS
- EXISTING 36-INCH HDPE PIPE
- PIPE CLEANOUT
- JUNCTION BOX

EROSION AND SEDIMENTATION CONTROL LEGEND

- Fr — FILTER RING
- SD1 A — XX — TYPE A SILT FENCE
- CFS — WATTLES

NOTES

1.) SEE SHEET J FOR EROSION AND SEDIMENT CONTROL DETAILS.

2.) UNLESS NOTED OTHERWISE, THE CONVEYANCE PIPES ARE SINGLE WALL SDR-11 HDPE PIPE. THE INFLUENT CONVEYANCE PIPES ARE 2" DIAMETER AND THE EFFLUENT PIPES ARE 3" Ø. THE CONVEYANCE LINE FROM THE SEEP JUNCTION BOX TO CTS #3 IS A 4"Ø PIPE.

REFERENCES

1.) TOPOGRAPHY FROM CALHOUN COUNTY (2012) AND LOWERY & ASSOCIATES LAND SURVEYING, LLC; DATED APRIL 17, 2013.

2.) "ALTA / ACSM LAND TITLE SURVEY OF: OPERABLE UNIT 3 OF THE ANNISTON PCB SITE; PREPARED FOR: SOLUTIA INC." BY LOWERY & ASSOCIATES LAND SURVEYING, LLC; DATED APRIL 17, 2013.

3.) HEADWALL SHOWN TAKEN FROM DIGITAL CAD FILE GPS DATA GOLDER.DWG DATED APRIL 2016, PROVIDED BY GENESIS PROJECT, INC.

4.) AS-BUILT OF PCB CELLS SURVEY, BY TAYLOR CORPORATION, DATED MARCH 2016.

5.) 24" DIA. BY 198' LONG STEEL CASING LOCATION AND ELEVATION INFORMATION BASED ON SURVEY INFORMATION INCLUDED IN "202 ROAD CROSSING X SECT [13199].pdf" PROVIDED BY SOLUTIA ON JULY 27, 2017.

6.) AS-BUILT CONVEYANCE PIPING LAYOUT PROVIDED BY TURNER SURVEYING, LLC, DATED APRIL 16, 2018.

THESE RECORD DRAWINGS HAVE BEEN PREPARED UPON INFORMATION FROM VARIOUS SOURCES. THESE SOURCES HAVE BEEN REFERENCED ON THE APPROPRIATE DRAWINGS.

ALABAMA LICENSED No. 37043 PROFESSIONAL ENGINEER MICHAEL W. RYAN

6/30/2021

REV	DATE	REVISION DESCRIPTION	DES	CADD	CHK	RVW
1	06/30/2021	FINAL ISSUE	-	SOM	TMM	MWR

PROJECT

PHARMACIA LLC / SOLUTIA INC
ANNISTON PCB SITE, ALABAMA

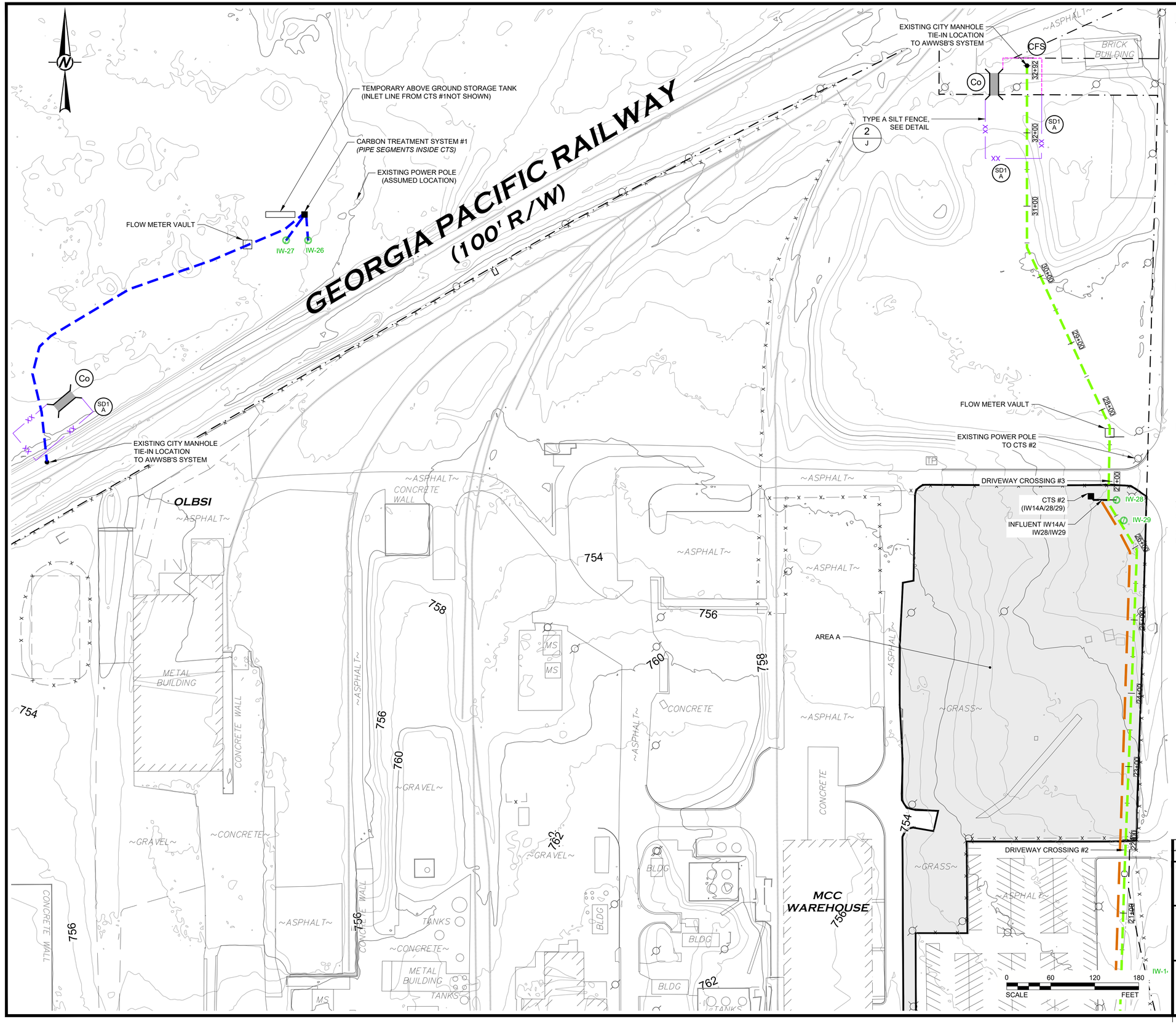
TITLE

SWMU-1 MODIFICATIONS SOUTHERN EROSION AND SEDIMENTATION CONTROL PLAN

GSI ENVIRONMENTAL

Solutia

GSI JOB No.	4727
SCALE	AS SHOWN
SHEET	L



LEGEND

- OU-3 BOUNDARY
- EXISTING CONTOURS (2 FT. INTERVAL)
- EXISTING FENCE
- PCB CELL BOUNDARY
- EDGE OF PAVEMENT / CURB
- RAILROAD
- EXISTING LIGHT AND POWER POLES
- FIRE HYDRANT
- SMWU-1 INFLUENT CONVEYANCE PIPE (2-INCH SDR11)
- CTS #2/#3 EFFLUENT CONVEYANCE PIPE (3-INCH SDR11)
- CTS #1 EFFLUENT CONVEYANCE PIPE (3-INCH SDR11)
- CARBON TREATMENT SYSTEM (CTS)
- EXISTING INTERCEPT WELL (IW)
- EXISTING MANHOLE
- HDPE COVER SYSTEM LIMITS
- PIPE CLEANOUT
- JUNCTION BOX

EROSION AND SEDIMENTATION CONTROL LEGEND

- SD1 A — XX — TYPE A SILT FENCE
- Co — CONSTRUCTION EXIT
- CFS — WATTLES

NOTES

1.) SEE SHEET J FOR EROSION AND SEDIMENT CONTROL DETAILS.

2.) UNLESS NOTED OTHERWISE, THE CONVEYANCE PIPES ARE SINGLE WALL SDR-11 HDPE PIPE. THE INFLUENT CONVEYANCE PIPES ARE 2" DIAMETER AND THE EFFLUENT PIPES ARE 3" Ø.

REFERENCES

1.) TOPOGRAPHY FROM CALHOUN COUNTY (2012) AND LOWERY & ASSOCIATES LAND SURVEYING, LLC; DATED APRIL 17, 2013.

2.) "ALTA / ACSM LAND TITLE SURVEY OF: OPERABLE UNIT 3 OF THE ANNISTON PCB SITE; PREPARED FOR: SOLUTIA INC." BY LOWERY & ASSOCIATES LAND SURVEYING, LLC; DATED APRIL 17, 2013.

THESE RECORD DRAWINGS HAVE BEEN PREPARED UPON INFORMATION FROM VARIOUS SOURCES. THESE SOURCES HAVE BEEN REFERENCED ON THE APPROPRIATE DRAWINGS.

ALABAMA LICENSED No. 37043 PROFESSIONAL ENGINEER MICHAEL W. RISER

6/30/2021

REV	DATE	REVISION DESCRIPTION	DES	CADD	CHK	RVW
1	06/30/2021	FINAL ISSUE	-	SOM	TMM	MWR

PROJECT

PHARMACIA LLC / SOLUTIA INC
ANNISTON PCB SITE, ALABAMA

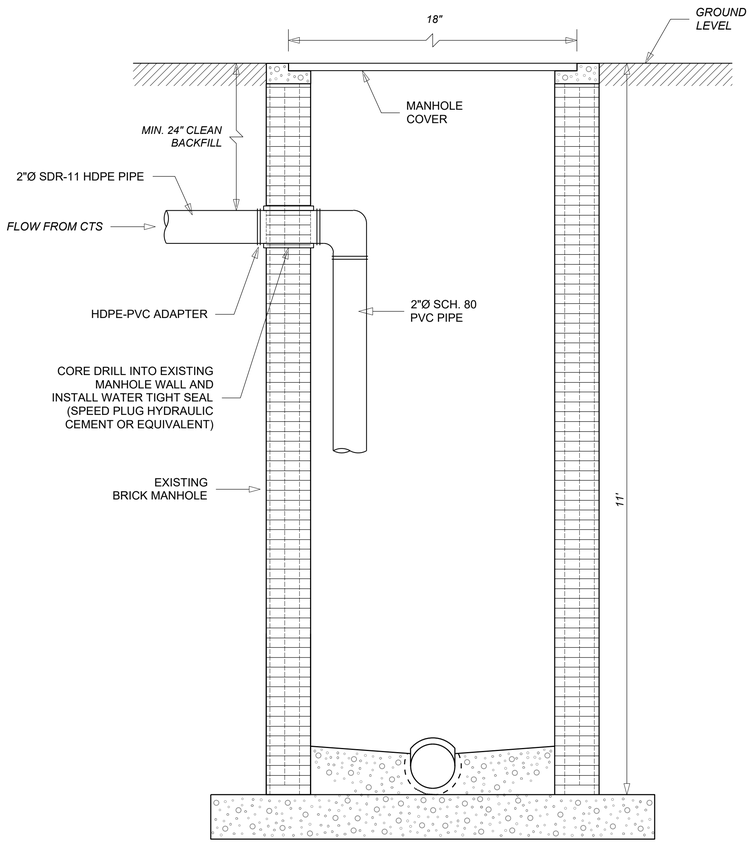
TITLE

SWMU-1 MODIFICATIONS
NORTHERN EROSION AND SEDIMENTATION CONTROL PLAN

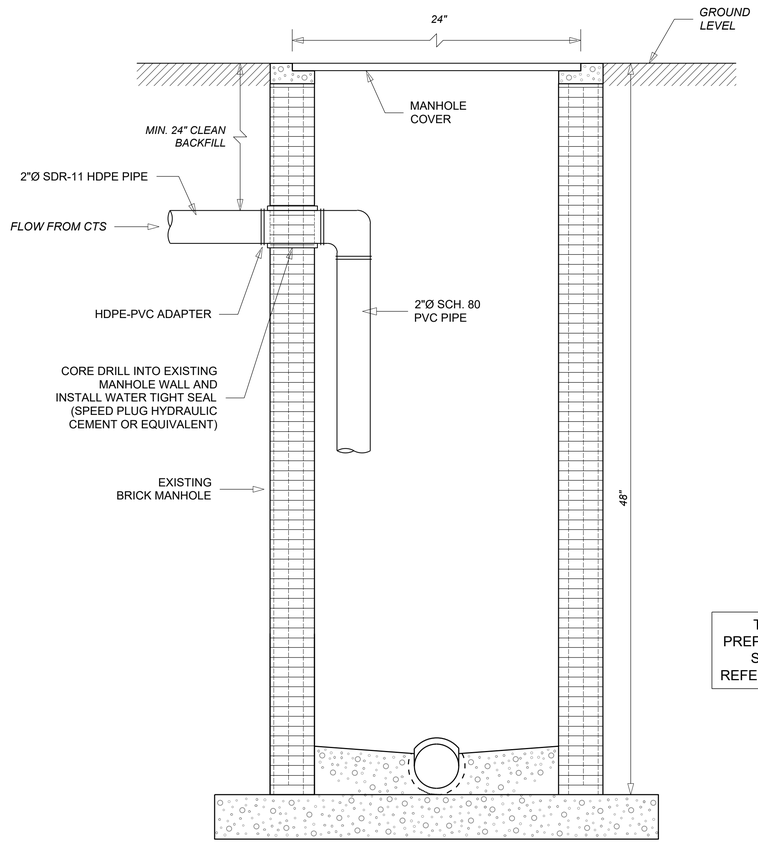
GSI ENVIRONMENTAL

Solutia

GSI JOB No.	4727
SCALE	AS SHOWN
SHEET	M



AWWSB
MANHOLE TIE-IN FOR CTS #1
N.T.S.



AWWSB
MANHOLE TIE-IN FOR CTS #2/#3
N.T.S.

THESE RECORD DRAWINGS HAVE BEEN PREPARED UPON INFORMATION FROM VARIOUS SOURCES. THESE SOURCES HAVE BEEN REFERENCED ON THE APPROPRIATE DRAWINGS.

ALABAMA LICENSED No. 37043 PROFESSIONAL ENGINEER MICHAEL W. RYAN

6/30/2021

REV	DATE	REVISION DESCRIPTION	DES	CADD	CHK	RVW
1	06/30/2021	FINAL ISSUE	-	SOM	TMM	MWR

PROJECT

PHARMACIA LLC / SOLUTIA INC
ANNISTON PCB SITE, ALABAMA

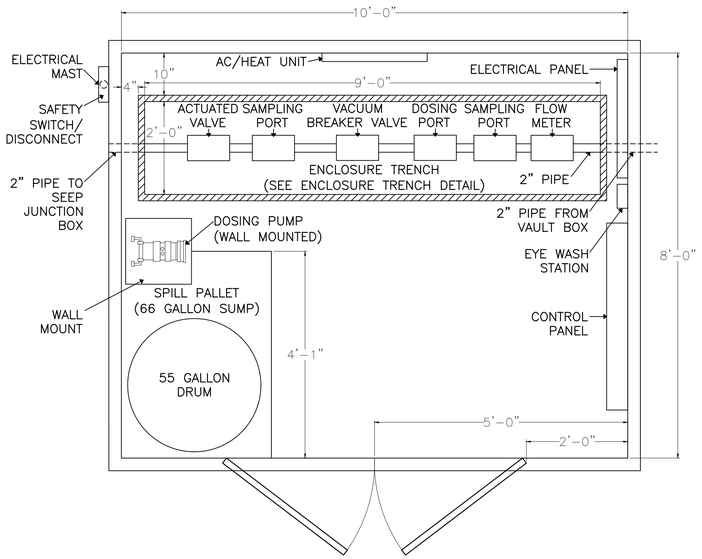
TITLE

AWWSB MANHOLE TIE-INS

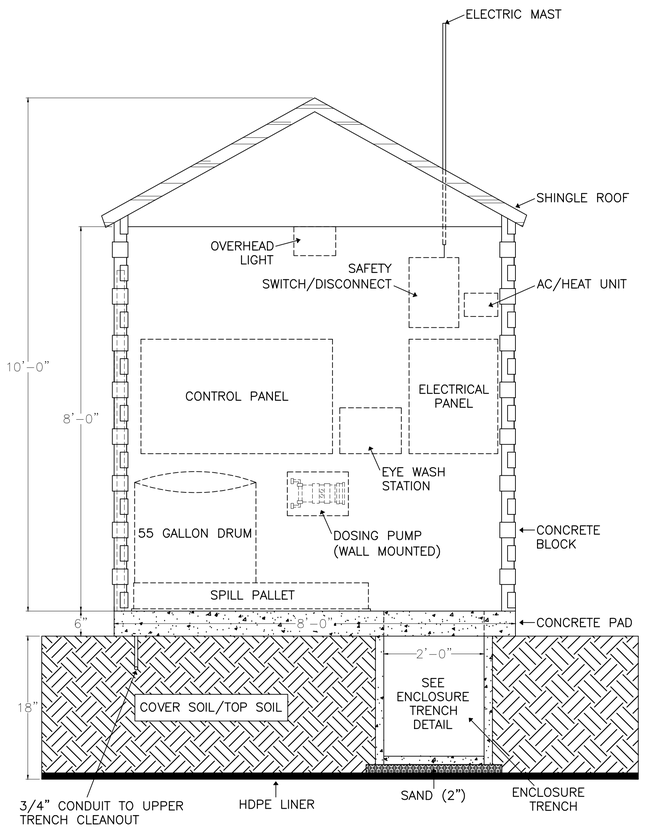
GSI ENVIRONMENTAL

Solutia

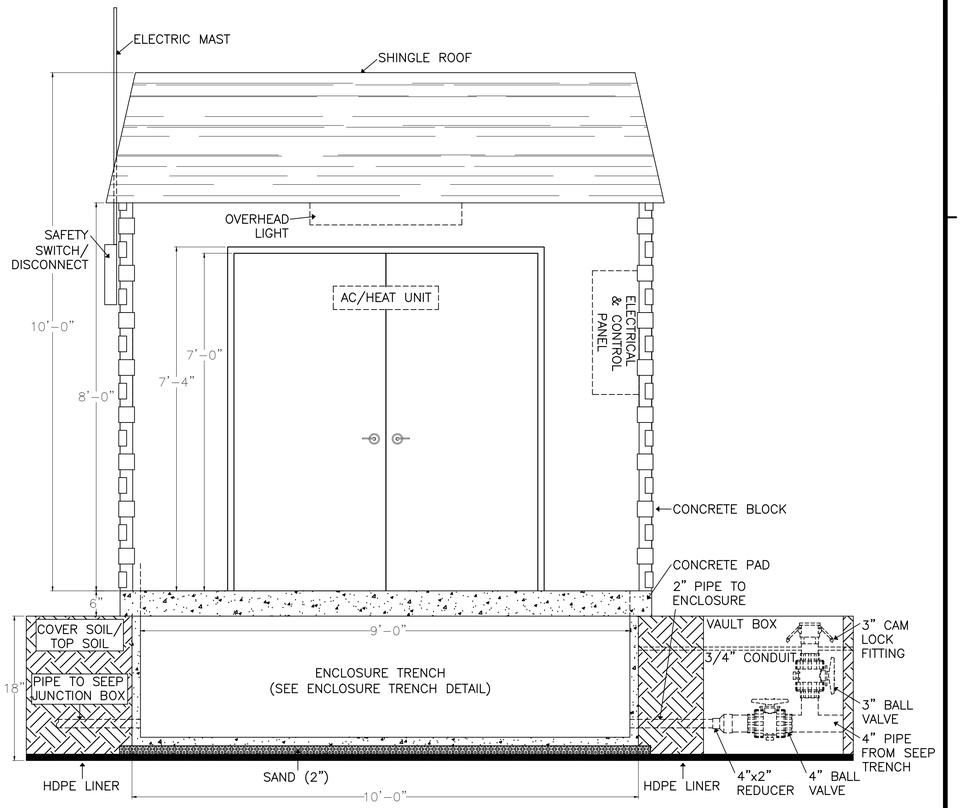
GSI JOB No.	4727
SCALE	AS SHOWN
SHEET	N



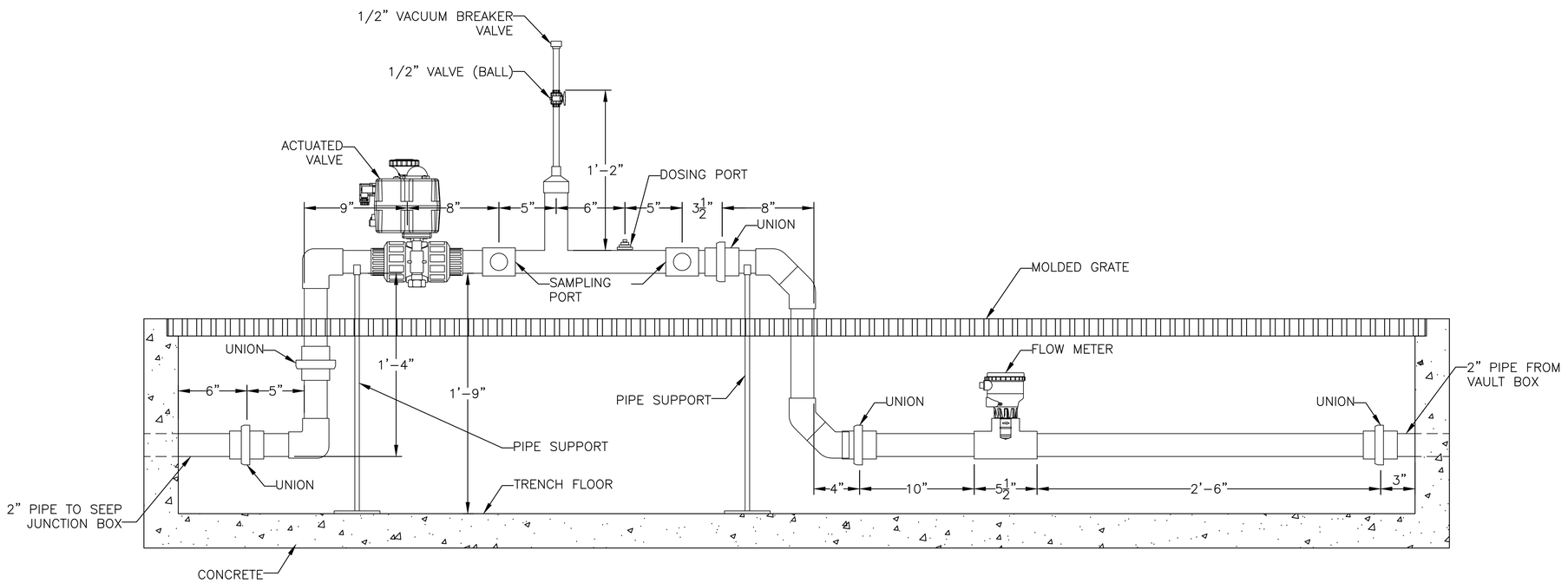
PLAN VIEW



RIGHT SIDE ELEVATION



FRONT ELEVATION



ENCLOSURE TRENCH

6/30/2021

REV	DATE	REVISION DESCRIPTION	DES	CADD	CHK	RVW
1	06/30/2021	FINAL ISSUE	-	SOM	TMM	MWR

PROJECT

PHARMACIA LLC / SOLUTIA INC
ANNISTON PCB SITE, ALABAMA

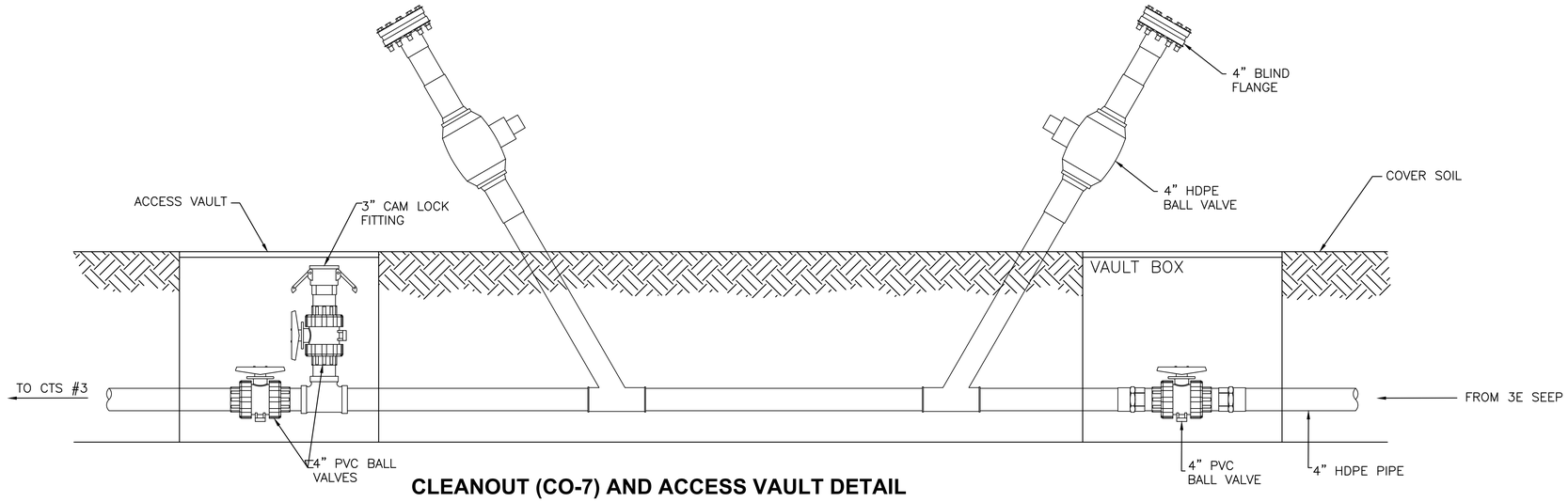
TITLE

IRON TREAMENT SYSTEM (ITS) DETAILS

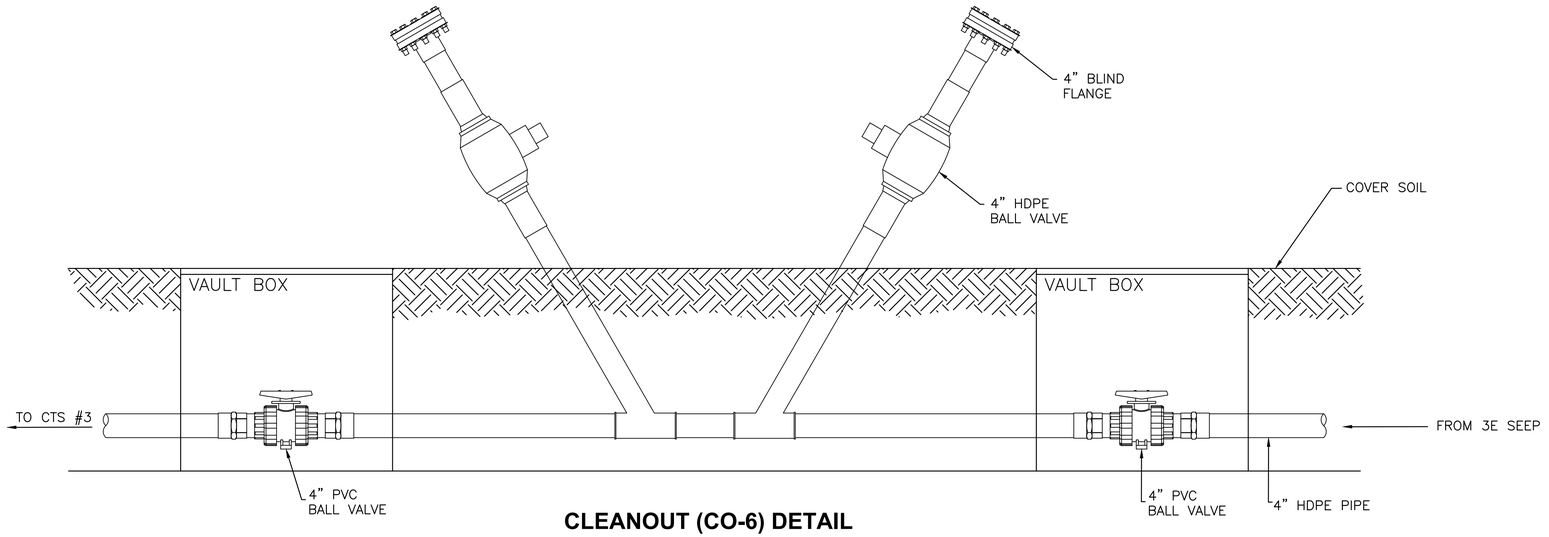
GSI ENVIRONMENTAL

Solutia

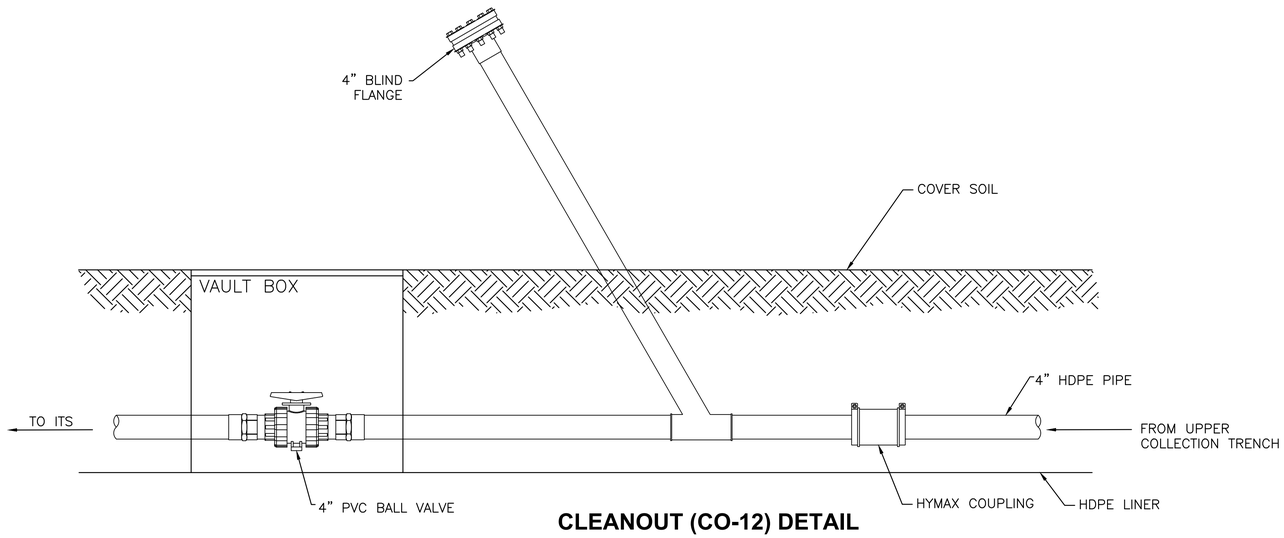
GSI JOB No.	4727
SCALE	AS SHOWN
SHEET	O



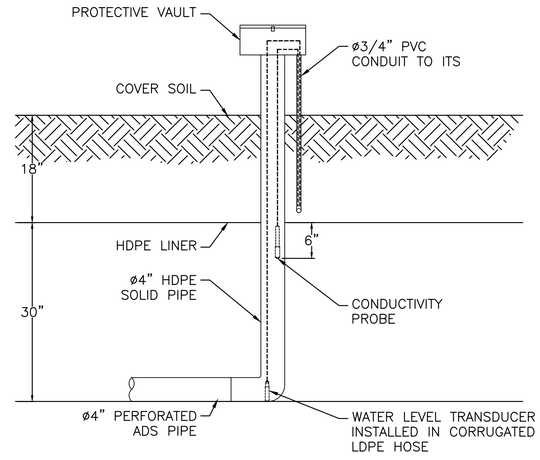
CLEANOUT (CO-7) AND ACCESS VAULT DETAIL



CLEANOUT (CO-6) DETAIL



CLEANOUT (CO-12) DETAIL



UPPER TRENCH CLEANOUT (CO-8) DETAIL

ALABAMA LICENSED No. 37043 PROFESSIONAL ENGINEER MICHAEL W. MISH

6/30/2021

REV	DATE	REVISION DESCRIPTION	DES	CADD	CHK	RVW
1	06/30/2021	FINAL ISSUE	-	SOM	TMM	MWR

PROJECT

PHARMACIA LLC / SOLUTIA INC
ANNISTON PCB SITE, ALABAMA

TITLE

3E SEEP CONVEYANCE SYSTEM CLEANOUT DETAILS

GSI ENVIRONMENTAL

Solutia

GSI JOB No.	4727
SCALE	NOT TO SCALE
SHEET	P

GSI Job No. G-5738
Issued: 30 June 2021

Construction Completion Addendum Report
Second Addendum
OU-3 Remedial Action

Anniston PCB Site
Anniston, Alabama

Appendix B

Photologs

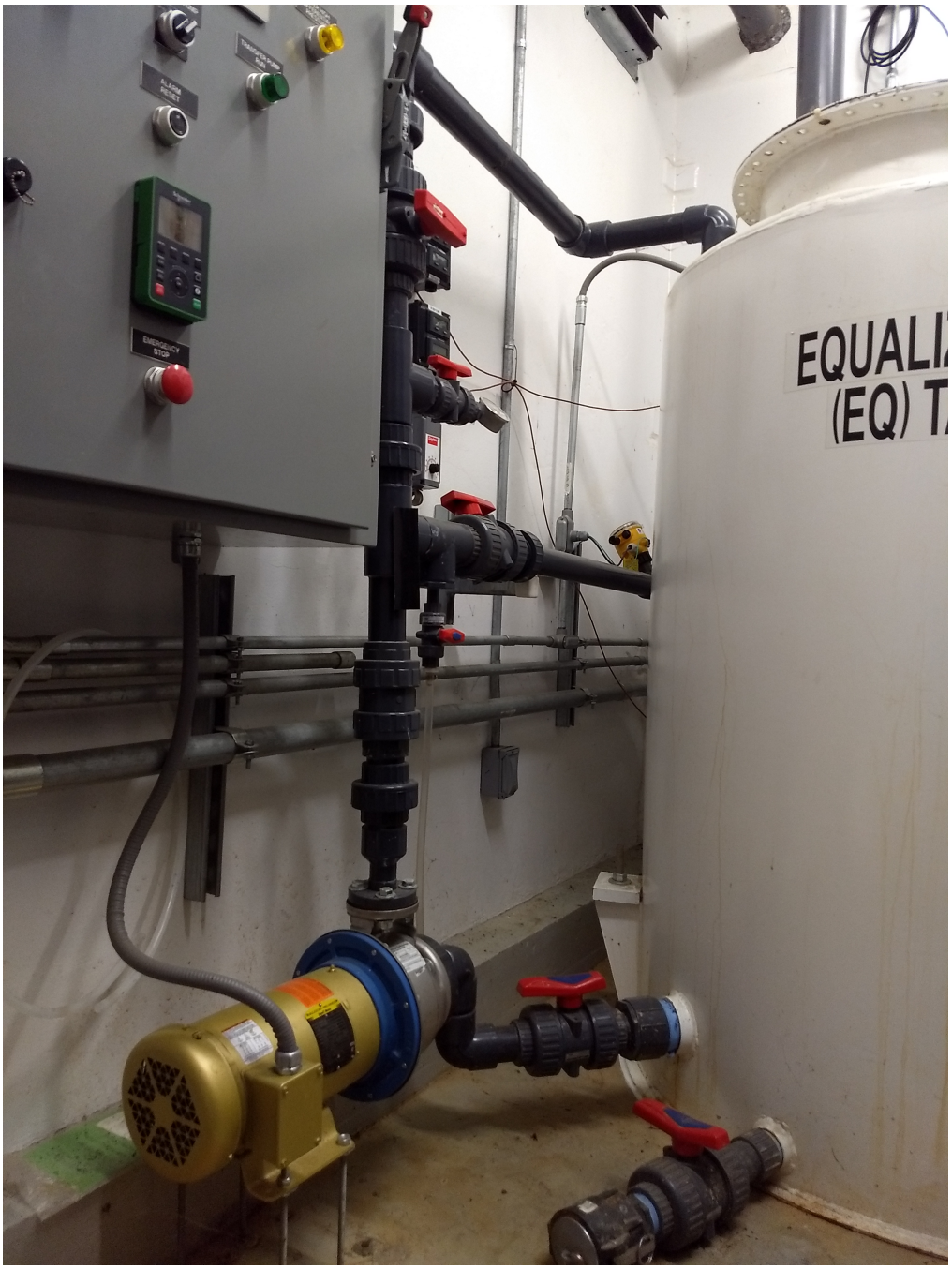
GSI ENVIRONMENTAL

SOLUTIA ANNISTON OU-3 REMEDIAL ACTION

3E Seep Conveyance and Treatment System Upgrades
(July 2019 – November 2020)

(1) Iron oxide sediment fouling of 3E Seep conveyance and treatment system components observed during the 2018-2019 seep flow. Paddle wheel flow meter (left). Filter bag (right).

(2) A 2” diameter seep influent flow meter and associated 2” piping to EQ tank installed in CTS#3 (left). EQ tank influent lines (2”) and drop pipes (2”) (right).



(3) Upsized transfer pump, 2” system piping, 2” magmeter flow element, and upgraded variable frequency drive (VFD) were installed in CTS#3 as part of system upgrades for increased flow/treatment capacity.

(4) Water storage tank pad construction west of CTS#3 (top). During high and peak 3E Seep flow season frac tanks were used for additional system storage capacity (bottom).

(5) Solar powered weather station including temperature, barometric pressure, wind and rain gauges was installed on the north side of CTS#3 to supplement rain fall measurement capabilities at OU-3.

(6) Formation of iron oxides (orange color) in 3E Seep junction box (left). Drop pipe installed on seep junction box influent from upper collection trench (right).

(7) Two prefabricated double cleanouts including isolation valves, were installed on the seep conveyance line between the seep junction box and CTS#3 building. The cleanouts provide additional access points for seep line water jetting maintenance equipment.

(8) Cleanout CO-6 and access vault installed in the vicinity of CTS#3 (left). Access vault contains a by-pass valve (vertical position – left panel) equipped with a camlock fitting for connection to frac tanks. During high & peak seep flow season valves are manually operated to balance flow between CTS#3 and frac tanks.

(9) ITS footprint shallow soil excavation above existing geomembrane (left – view towards seep junction box). Installation of seep line access and ITS bypass ports (right).

(10) ITS forms and trench excavation between ITS and upper trench cleanout CO-8 (left). Trench and conduit from upper seep trench cleanout CO-8 to ITS (right).

(11) ITS slab-on-grade foundation and trench form (top). Completed trench with ITS piping and flow modulation components (bottom).

(12) ITS building: west to east view (top); east to west view (bottom).

(13) ITS building: northeast to southwest view.

(14) ITS building trench with system equipment, including magnetic flow meter, sampling ports, actuated valve, and protective fiber grate..

(15) ITS power distribution panel, eyewash station, and control panel (top). Iron dosing reagent (AN-400TH) reservoir on a spill pallet, dosing pump, actuated valve and dosing port on ITS piping (bottom).

GSI Job No. G-5738
Issued: 30 June 2021

Construction Completion Addendum Report
Second Addendum
OU-3 Remedial Action

Anniston PCB Site
Anniston, Alabama

Appendix C

Supplemental RA Equipment Information

Appendix C.1	ITS Equipment
Appendix C.2	CTS#3 Upgrade Equipment
Appendix C.3	Piping, Valves, Mechanical Components and SDS

GSI Job No. G-5738
Issued: 30 June 2021

GSI ENVIRONMENTAL

Construction Completion Addendum Report
Second Addendum
OU-3 Remedial Action

Anniston PCB Site
Anniston, Alabama

Appendix C

Appendix C.1
ITS Equipment

Signet 2551 Magmeter Flow Sensor

Available in a variety of wetted materials and ideal for pipe sizes up to DN900 (36 in.)

The Signet 2551 Magmeter is an insertion style magnetic flow sensor that features no moving parts. The patented* sensor design is available in corrosion-resistant materials to provide long-term reliability with minimal maintenance costs. Material options include PP with stainless steel, PVDF with Hastelloy-C, or PVDF with Titanium. Utilizing the comprehensive line of Signet installation fittings, sensor alignment and insertion depth is automatic. These versatile, simple-to-install sensors deliver accurate flow measurement over a wide dynamic range in pipe sizes ranging from DN15 to DN900 (½ to 36 inches), satisfying the requirements of many diverse applications.

Signet 2551 Magmeters offer many output options of frequency/digital (S^3L) or 4 to 20 mA which are available on both the blind and display versions. The frequency or digital (S^3L) sensor output can be used with Signet's extensive line of flow instruments while the 4 to 20 mA output can be used for a direct input to PLCs, chart recorders, etc. Both the 4 to 20 mA output and digital (S^3L) sensor interface is available for long distance signal transmission. An additional benefit is the empty pipe detection which features a zero flow output when the sensors are not completely wetted. Also, the frequency output is bi-directional while the 4 to 20 mA output can be set for uni- or bi-directional flow using the display or the 3-0252 Configuration Tool which connects to PCs for programming capabilities.

In addition, the display version of the 2551 Magmeter is available with relays and features permanent and resettable totalizer values, which can be stored and seen on the display. Also, the display contains multi-languages with English, Spanish, German, French, Italian and Portuguese menu options.

Features

- **Test certificate included for -X0, -X1**
- **Patented Magmeter technology***
- **No moving parts**
- **Bi-directional flow**
- **Empty pipe detection**
- **Installs into pipe sizes DN15 to DN900 (0.5 to 36 in.)**
- **Operating range 0.05 to 10 m/s (0.15 to 33 ft/s)**
- **Accurate measurement even in dirty liquids**
- **Polypropylene and PVDF retaining nuts standard, Valox optional**
- **4 to 20 mA, digital (S^3L), frequency, relay output (Display only)**
- **No pressure drop**
- **Corrosion resistant materials; PP or PVDF with SS, Hastelloy-C, or Titanium**
- **Multi-language display menu available**

(3-2551-PX-XX version only)

Applications

- **Chemical Processing**
- **Water and Wastewater Monitoring**
- **Metal Recovery and Landfill Leachate**
- **Commercial Pools, Spas, and Aquariums**
- **HVAC**
- **Irrigation**
- **Scrubber Control**
- **Neutralization Systems**
- **Industrial Water Distribution**

* U.S. Patent No: 7,055,396 B1

Specifications

General			
Operating Range	0.05 to 10 m/s	0.15 to 33 ft/s	
Pipe Size Range	DN15 to DN900	½ in. to 36 in.	
Linearity	± 1% reading plus 0.1% of full scale		
Repeatability	±0.5% of reading @ 25 °C (77 °F)		
Minimum Conductivity	20 µS/cm		
Wetted Materials			
Sensor Body/Electrodes and Grounding Ring	-P0, -P1, -P2: PP/316L SS		
	-T0, -T1, -T2: PVDF/Titanium		
	-V0, -V1, -V2: PVDF/Hastelloy-C		
O-rings	FPM (standard) EPR (EPDM), FFPM (optional)		
Case	PBT		
Display Window	Polyamide (transparent nylon)		
Protection Rating	NEMA 4X/IP65		
Electrical			
Power Requirements	4 to 20 mA	24 VDC ±10%, regulated, 22.1 mA max.	
	Frequency	5 to 24 VDC ±10%, regulated, 15 mA max.	
	Digital (S^3L)	5 to 6.5 VDC, 15 mA max.	
Auxiliary (only required for units with relays)		9 to 24 VDC, 0.4 A max.	
Reverse Polarity and Short Circuit Protected			
Current Output 4 to 20 mA	Loop Accuracy	32 µA max. error (25 °C @ 24 VDC)	
	Isolation	Low voltage < 48 VAC/DC from electrodes and auxiliary power	
	Maximum Cable	300 m (1000 ft)	
	Error condition	22.1 mA	
	Max. Loop Resistance	300 Ω	
	Compatible with PLC, PC or similar equipment		
	4 to 20 mA load needed		
Frequency Output	Output Modes	Freq., or Mirror Relay (display version only)	
	Max. Pull-up Voltage	30 VDC	
	Max. Current Sink	50 mA, current limited	
	Maximum Cable	300 m (1000 ft)	
	Compatible with Signet Model 8550, 8900, 9900, 9900-1BC		
Digital (S^3L) Output	Serial ASCII, TTL level 9600 bps		
	Compatible with Model Signet 8900 controller		
Relay Specifications			
#1, #2 Type	Mechanical SPDT		
Rating	5 A @ 30 VDC max., 5 A @ 250 VDC max.		
#3 Type	Solid State		
	50 mA @ 30 VDC, 50 mA @ 42 VAC		
Hysteresis	User adjustable for exiting alarm condition		
Alarm On Trigger Delay	Adjustable (0 to 9999.9 sec.)		
Relay Modes	Off, Low, High, Window, and Proportional Pulse		
Relay Source	Flow Rate, Resettable Totalizer		
Error Condition	Selectable; Fail Open or Closed		
Display			
Characters		2 x 16	
Contrast		User-set in four levels	
Backlighting (only on relay versions)		Requires external 9-24 VDC, 0.4 mA max.	
Max. Temperature/Pressure Rating			
Storage Temperature		-20 °C to 70 °C	-4 °F to 158 °F
Relative Humidity		0 to 95% (non-condensing)	
Operating Temperature	Ambient	-10 °C to 70 °C	14 °F to 158 °F
	Media	0 °C to 85 °C	32 °F to 185 °F
Maximum Operating Pressure		10.3 bar @ 25 °C	150 psi @ 77 °F
		1.4 bar @ 85 °C	20 psi @ 185 °F
Shipping Weight			
	0.680 kg	1.50 lb	
Standards and Approvals			
	CE, FCC, UL, CUL, NSF (3-2551-PX-XX version only)		
	RoHS compliant, China RoHS		
	NEMA 4X / IP65 Enclosure (with cap installed)		
	Manufactured under ISO 9001 for Quality and ISO 14001 for Environmental Management and OHSAS 18001 for Occupational Health and Safety		

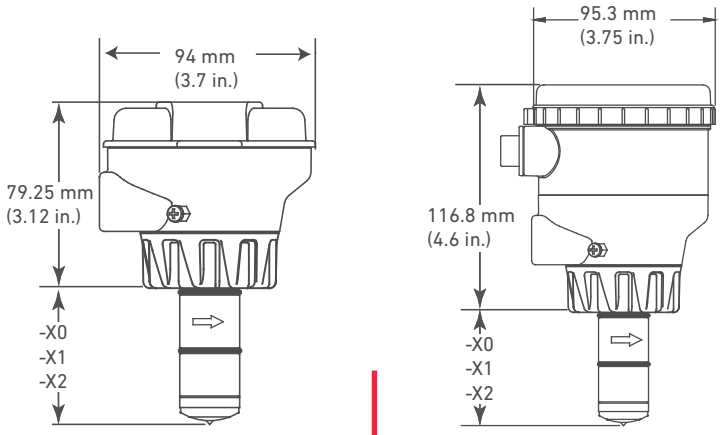
See Temperature and Pressure graphs for more information.

Dimensions

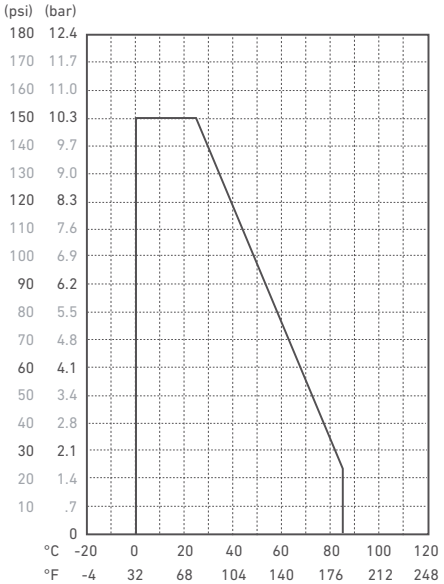
Pipe Range	
1/2 to 4 in.	-X0 = 58 mm (2.3 in.)
5 to 8 in.	-X1 = 91 mm (3.6 in.)
10 to 36 in.	-X2 = 167 mm (6.6 in.)

X = Sensor Body P, T, or V

Blind version → **Display version**



Temperature/Pressure Graphs



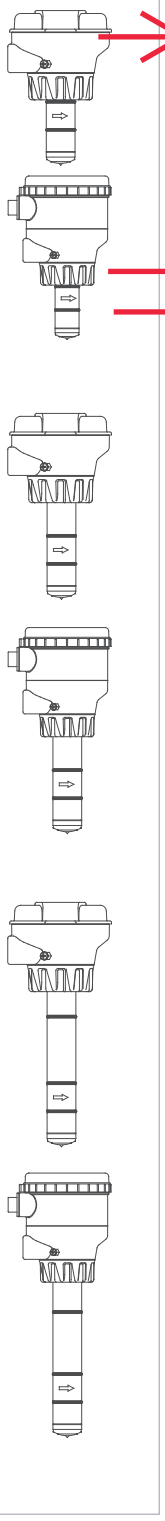
Note:
The pressure/temperature graphs are specifically for the Signet sensor. During system design the specifications of all components must be considered. In the case of a metal piping system, a plastic sensor will reduce the system specification. When using a PVDF sensor in a PVC piping system, the fitting will reduce the system specification.

Application Tips

- Note minimum process liquid conductivity requirement is 20 µs/cm
- Install sensor using standard Signet installation fittings for best results.
- Sensor is capable of retrofitting into existing 515 and 2536 fittings.

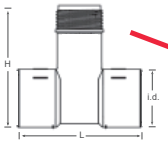
Please refer to Wiring, Installation, and Accessories sections for more information.

Ordering Information (continued)



Pipe Size	Mfr. Part No.	Code	Sensor Body
4 to 20 mA output for use with PLC, PC or similar equipment			
DN15 to DN100 (½ to 4 in.)			
No Display			
	3-2551-P0-12	**159 001 110**	Polypropylene and 316L SS
	3-2551-T0-12	**159 001 113**	PVDF and Titanium
	3-2551-V0-12	**159 001 259**	PVDF and Hastelloy-C
with Display, two SPDT relays, one solid state relay			
	3-2551-P0-22	**159 001 273**	Polypropylene and 316L SS
	3-2551-T0-22	**159 001 439**	PVDF and Titanium
	3-2551-V0-22	**159 001 275**	PVDF and Hastelloy-C
with Display			
	3-2551-P0-42	**159 001 279**	Polypropylene and 316L SS
	3-2551-T0-42	**159 001 442**	PVDF and Titanium
	3-2551-V0-42	**159 001 281**	PVDF and Hastelloy-C
DN125 to DN200 (5 to 8 in.)			
No Display			
	3-2551-P1-12	**159 001 111**	Polypropylene and 316L SS
	3-2551-T1-12	**159 001 114**	PVDF and Titanium
	3-2551-V1-12	**159 001 260**	PVDF and Hastelloy-C
with Display, two SPDT relays, one solid state relay			
	3-2551-P1-22	**159 001 274**	Polypropylene and 316L SS
	3-2551-T1-22	**159 001 440**	PVDF and Titanium
	3-2551-V1-22	**159 001 276**	PVDF and Hastelloy-C
with Display			
	3-2551-P1-42	**159 001 280**	Polypropylene and 316L SS
	3-2551-T1-42	**159 001 443**	PVDF and Titanium
	3-2551-V1-42	**159 001 282**	PVDF and Hastelloy-C
DN250 to DN900 (10 to 36 in.)			
No Display			
	3-2551-P2-12	**159 001 112**	Polypropylene and 316L SS
	3-2551-T2-12	**159 001 449**	PVDF and Titanium
	3-2551-V2-12	**159 001 451**	PVDF and Hastelloy-C
with Display, two SPDT relays, one solid state relay			
	3-2551-P2-22	**159 001 438**	Polypropylene and 316L SS
	3-2551-T2-22	**159 001 455**	PVDF and Titanium
	3-2551-V2-22	**159 001 457**	PVDF and Hastelloy-C
with Display			
	3-2551-P2-42	**159 001 441**	Polypropylene and 316L SS
	3-2551-T2-42	**159 001 461**	PVDF and Titanium
	3-2551-V2-42	**159 001 463**	PVDF and Hastelloy-C

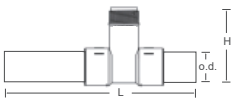
Installation Fittings



PVC-U Tees SCH 80 - Fitting Only (Available in USA/ASIA)

Part No.	Code No.	Size [in.]	Sensor Type - Flow, pH/ORP	L [in.]	H [in.]	i.d. [in.]
MPV8T005F	159 001 614	0.50	Flow -X0, pH -XX	3.75	3.50	0.85
MPV8T007F	159 001 615	0.75	Flow -X0, pH -XX	3.75	3.70	1.06
MPV8T010F	159 001 616	1.00	Flow -X0, pH -XX	4.30	4.00	1.33
MPV8T012F	159 001 617	1.25	Flow -X0, pH -XX	4.40	4.30	1.67
MPV8T015F	159 001 618	1.50	Flow -X0, pH -XX	5.00	4.60	1.91
MPV8T020F	159 001 619	2.00	Flow -X0, pH -XX	5.50	5.00	2.40

- For use with Flow: ~~P51530-X0, 3-2536-X0, 3-8510-X0, 3-8512-X0, 3-2537-XC-X0,~~ 3-2551-X0-X0-XX
- For use with pH/ORP: 3-272X-XX, 3-273X-XX
- NSF



PVC-U Tees SCH 80 - with Pipe[1] (Available in USA/ASIA)

Part No.	Code No.	Size [in.]	Sensor Type - Flow, pH/ORP	L [in.]	H [in.]	o.d. [in.]
MPV8T005	159 001 623	0.50	Flow -X0, pH -XX	14	3.50	0.84
MPV8T007	159 001 624	0.75	Flow -X0, pH -XX	14	3.70	1.05
MPV8T010	159 001 625	1.00	Flow -X0, pH -XX	17	4.00	1.32
MPV8T012	159 001 626	1.25	Flow -X0, pH -XX	20	4.30	1.66
MPV8T015	159 001 627	1.50	Flow -X0, pH -XX	24	4.60	1.90
MPV8T020	159 001 628	2.00	Flow -X0, pH -XX	26.5	5.02	2.38

- For use with Flow: P51530-X0, 3-2536-X0, 3-8510-X0, 3-8512-X0, 3-2537-XC-X0, 3-2551-X0-X0-XX
- For use with pH/ORP: 3-272X-XX, 3-273X-XX

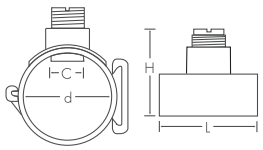
[1] Pipe lengths included with these fittings do not satisfy straight-run requirements for all installation configurations.

PVC-U Tees SCH 80 - with Pipe[1] (Available in USA/ASIA)

Part No.	Code No.	Size [in.]	Sensor Type - Flow, pH/ORP	L [in.]	H [in.]	o.d. [in.]
PV8T025	198 801 573	2.50	Flow -X0, pH -XX	24	5.4	2.88
PV8T030	198 801 416	3.00	Flow -X0, pH -XX	24	6.0	3.50
PV8T040	198 801 436	4.00	Flow -X0, pH -XX	24	7.0	4.50

- For use with Flow: P51530-X0, 3-2536-X0, 3-8510-X0, 3-8512-X0, 3-2537-XC-X0, 3-2551-X0-X0-XX
- For use with pH/ORP: 3-272X-XX, 3-273X-XX

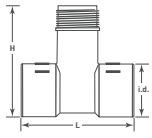
[1] Pipe lengths included with these fittings do not satisfy straight-run requirements for all installation configurations.



PVC-U Clamp-on Saddles SCH 80 (Available in USA/ASIA)

Part No.	Code No.	Size [in.]	Sensor Type - Flow, pH/ORP	L [in.]	H [in.]	d [in.]	C [in.]
PV8S020	159 000 637	2.00	Flow -X0, pH -XX	4.00	5.0	2.375	1.43
PV8S025	159 000 638	2.50	Flow -X0, pH -XX	4.75	5.4	2.875	1.43
PV8S030	198 150 577	3.00	Flow -X0, pH -XX	5.00	6.0	3.500	1.43
PV8S040	198 150 578	4.00	Flow -X0	5.00	7.1	4.500	1.43
PV8S060	198 150 579	6.00	Flow -X1	5.00	10.0	6.625	2.25
PV8S080	159 000 639	8.00	Flow -X1	5.00	11.5	8.625	2.25

- For use with Flow: P51530-X0/-X1, 3-2536-X0/-X1, 3-8510-X0/-X1, 3-8512-X0/-X1, 3-2537-XC-X0/-X1, 3-2551-X0-XX/-X1-XX
- For use with pH/ORP: 3-272X-XX, 3-273X-XX
- Mounts on PVC pipe
- C - Clearance dimension
- EPR (EPDM) O-ring
- NSF



PVC-C Tees SCH 80 - Fitting Only (Available in USA/ASIA)

Part No.	Code No.	Size [in.]	Sensor Type - Flow, pH/ORP	L [in.]	H [in.]	i.d. [in.]
MCPV8T005F	159 001 632	0.50	Flow -X0, pH -XX	3.75	3.50	0.85
MCPV8T007F	159 001 633	0.75	Flow -X0, pH -XX	3.75	3.70	1.06
MCPV8T010F	159 001 634	1.00	Flow -X0, pH -XX	4.30	4.00	1.33
MCPV8T012F	159 001 635	1.25	Flow -X0, pH -XX	4.40	4.30	1.67
MCPV8T015F	159 001 636	1.50	Flow -X0, pH -XX	5.00	4.60	1.91
MCPV8T020F	159 001 637	2.00	Flow -X0, pH -XX	5.50	5.00	2.40

- For use with Flow: P51530-X0, 3-2536-X0, 3-8510-X0, 3-8512-X0, 3-2537-XC-X0, 3-2551-X0-X0-XX
- For use with pH/ORP: 3-272X-XX, 3-273X-XX

NEW!

SERIES EBVF / TEBVF

MULTI-VOLTAGE ACTUATOR WITH FAIL-SAFE AND 4-20mA DIGITAL POSITIONER OPTIONS

STANDARD FEATURES

- Multi-voltage with auto-voltage sensing
  - 12V AC or DC
  - 24-240V AC or DC
- LED status light to indicate operational status of actuator
- Electronic over-torque protection against valve jam
- Thermostatic anti-condensation heater
- Easy-to-turn hand wheel for selectable manual override
- Large, dome style visual position indicator
- Remote position indicator
- Weatherproof anti-corrosive and UV protected glass filled polypro housing
- Easy mounting with double-D drive
- All external electrical connections via DIN plugs
- CE marked, IP67 ingress protection
- ISO 9000 manufacturer
- Fail-safe and 4-20mA or 0-10V DC digital positioner options
- Brushless, thermally protected motor

The EBVF/TEBVF features a rugged weatherproof and anti-corrosive polypro housing. A multi-color LED shows whether the actuator is operating correctly, or has tripped out either by its electronic torque limiter, or has been left in 'manual' mode. Site operators are no longer left with the 'valve or actuator' question when an actuator does not respond to a signal.

The EBVF/TEBVF is quick and easy to install, with a double-D drive, allowing fast mounting to True-Blue valves. There is no need to remove the cover to connect the EBVF/TEBVF electrically, saving installation time. Using the external DIN plugs and external wiring diagrams supplied with the actuator, installation can be pre-wired.

Protection against valve jams is provided by an electronic torque limiter, which auto-relaxes the gearbox when activated, allowing the manual override to be selected to assist in clearing the jam. The effect of condensation is eliminated by an internal thermostatic anti-condensation heater that does not require a separate independent power supply.

Standard function for the EBVF/TEBVF is power open (TEBVF left), power close (TEBVF right), stays put on power failure.

Units are available with factory installed Fail-safe (open or close) and modulating options. The modulating digital positioner offers auto-calibrating and self-resetting functions.

1384 Pompton Avenue, Cedar Grove, NJ 07009 USA (973) 256-3000 • Fax (973) 256-4745 • www.plastomatic.com

ISO9001:2015 REGISTERED COMPANY

SPECIFICATIONS				
Sizes	3/8" - 2" Valves		3" and 4"	
Actuator	EBVF2 / TEBVF6	EBVF1 / TEBVF5	EBVF4/TEBVF8	EBVF3/TEBVF7
Voltage AC (1ph) or DC)	12	24 - 240	12	24 - 240
Working Time - Sec. 0-90° (No Load) ±10%	5.5 / 11++	5.5 / 11++	16 / 16**	14 / 14**
Maximum Run Torque Nm / in./lbs.	20 / 177	20 / 177	55 / 487	55 / 487
Maximum Break Torque Nm / in./lbs.	25 / 221	25 / 221	60 / 531	60 / 531
On/Off Duty Rating %	75	75	75	75
*Modulating Duty Rating %	100	100	100	100
IP Rating - IEC 60529	IP67	IP67	IP67	IP67
Working Angle Standard	90/180	90/180	90	90
Temperature Range (F)	-4° to +158°	-4° to +158°	-4° to +158°	-4° to +158°
Motor Switch	2 x V3	2 x V3	2 x V3	2 x V3
Volt Free End of Travel Confirmation	2 x V3	2 x V3	2 x V3	2 x V3
Anti-Condensation Heater (W)	4	4	4	4
Current Full Load 12VDC	2.05A		3.23A	
24VDC		1.05A		1.44A
24V/1ph		0.85A		1.07A
110V/1ph		0.17A		0.23A
240V/1ph		0.09A		0.12A
Weight (kg) / lbs	1.8 / 4	1.8 / 4	2.0 / 4.4	2.0 / 4.4
Drive	Double-D	Double-D	Double-D	Double-D

INRUSH CURRENT IS 3X THE STATED LOAD

* Option 3 and 4 only. ** Based on 3-hole ball. ++11 seconds @ 180°

ELECTRONIC CONTROL

EBVF OPTIONAL FEATURES

MODULATING ACTUATOR (Option 3, 4, 5 & 6)

Provided via factory installed, self-calibrating digital positioner with 4-20mA or 0-10V.

FAIL-SAFE ACTUATOR (Option 2, 4, or 6)

Fail-safe achieved with the use of an industrial re-chargeable battery which is supplied with the actuator. Specify fail closed or fail open.

APPROXIMATE FLOW RATES AT 1.0 PSI (0,07 Bar) PRESSURE DROP								
Valve Sizes	1/2"	3/4"	1"	11/4"	11/2"	2"	3"	4"
2-Way Cv Factor	10	20	40	80	100	120	490	770
3-Way Cv Factor	4	8	13	38	38	39	132	200

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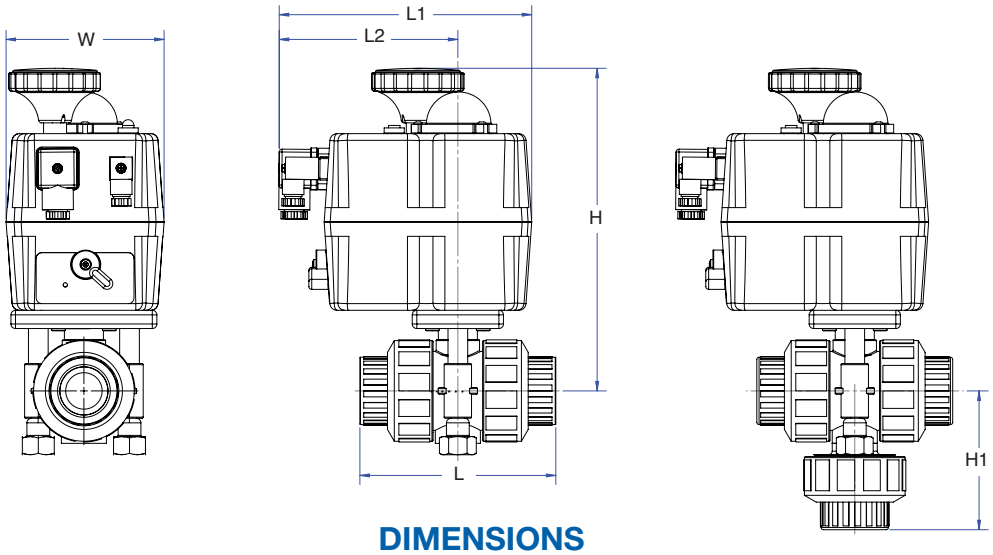

DIMENSIONS

MODEL	SIZE IN.	SIZE DN	L IN.	L MM.	L1 IN.	L1 MM.	L2 IN.	L2 MM.	H IN.	H MM.	H1 IN.	H1 MM.	W IN.	W MM.
EBVF/TEBVF-037	3/8"	16	4.13	104.8	6.97	177.0	4.89	124.2	8.16	207.3	2.75	1.2	4.34	2.0
EBVF/TEBVF-050	1/2"	20	4.13	104.8	6.97	177.0	4.89	124.2	8.16	207.3	2.75	69.9	4.34	2.0
EBVF/TEBVF-075	3/4"	25	4.75	120.7	6.97	177.0	4.89	124.2	8.59	218.2	3.25	82.6	4.34	2.0
EBVF/TEBVF-100	1"	32	5.38	136.5	6.97	177.0	4.89	124.2	8.84	224.5	3.81	96.8	4.34	2.0
EBVF/TEBVF-125	1-1/4"	40	6.70	170.2	6.97	177.0	4.89	124.2	9.32	236.7	5.00	127.0	4.34	2.0
EBVF/TEBVF-150	1-1/2"	50	6.75	171.5	6.97	177.0	4.89	124.2	8.84	236.7	5.00	127.0	4.34	2.0
EBVF/TEBVF-200	2"	63	7.90	200.7	6.97	177.0	4.89	124.2	8.84	236.7	5.56	141.2	4.34	2.0
EBVF/TEBVF-300	3"	90	10.80	274.3	6.97	177.0	4.93	125.2	14.20	360.7	8.30	210.8	4.34	2.0
EBVF/TEBVF-400	4"	110	11.50	292.1	6.97	177.0	4.93	125.2	15.00	381.0	9.90	251.5	4.34	2.0

ORDERING INFORMATION

Order by part number and specify exact chemicals, temperatures and pressures.To arrive at the proper part number, please consult diagram below.

The letters and numbers used in this part number are for example only!

EBVF/TEBVF

BASIC MODEL VALVE

EBVF
2-Way

TEBVF
3-Way

1

VALVE TYPE SIZE/VOLTAGE

1 - 2-Way, 3/8"-2", 24-240 Volts, A/C or D/C
2 - 2-Way, 3/8"-2", 12 Volts, A/C or D/C
3 - 2-Way, 2 1/2"-4", 24-240 Volts, A/C or D/C
4 - 2-Way, 2 1/2"-4", 12 Volts, A/C or D/C
5 - 3-Way, 3/8"-2", 24-240 Volts, A/C or D/C
6 - 3-Way, 3/8"-2", 12 Volts, A/C or D/C
7 - 3-Way, 3" & 4" 24-240 Volts, A/C or D/C
8 - 3-Way, 3" & 4" 12 Volts, A/C or D/C

1

OPTIONS

1 - Standard Actuator
2 - Actuator, Fail-Safe
3 - Actuator, 4-20 mA
4 - Actuator, 4-20 mA Fail-Safe
5 - Actuator, 0-10 VDC
6 - Actuator, 0-10 VDC Fail-Safe

050

VALVE SIZE

037 - 3/8"
050 - 1/2"
075 - 3/4"
100 - 1"
125 - 1 1/4"
150 - 1 1/2"
200 - 2"
300 - 3"
400 - 4"
20 - 20mm
25 - 25mm
32 - 32mm
40 - 40mm
50 - 50mm
63 - 63mm
90 - 90mm
110 - 110mm

V

SEAL MATERIAL

V FKM
EP EPDM

T

CONNECTIONS

S Socket
T NPT Threads
FL Flanges
SC Sanitary
BSP BSP Threads

PV

BODY MATERIAL

-PV PVC
-CP CPVC
-PP Natural Polypro
-PF PVDF

A

BALL OPTIONS

A – 3-Hole Ball (3-Way Only)
C – Characterized
Vent – Vented Ball

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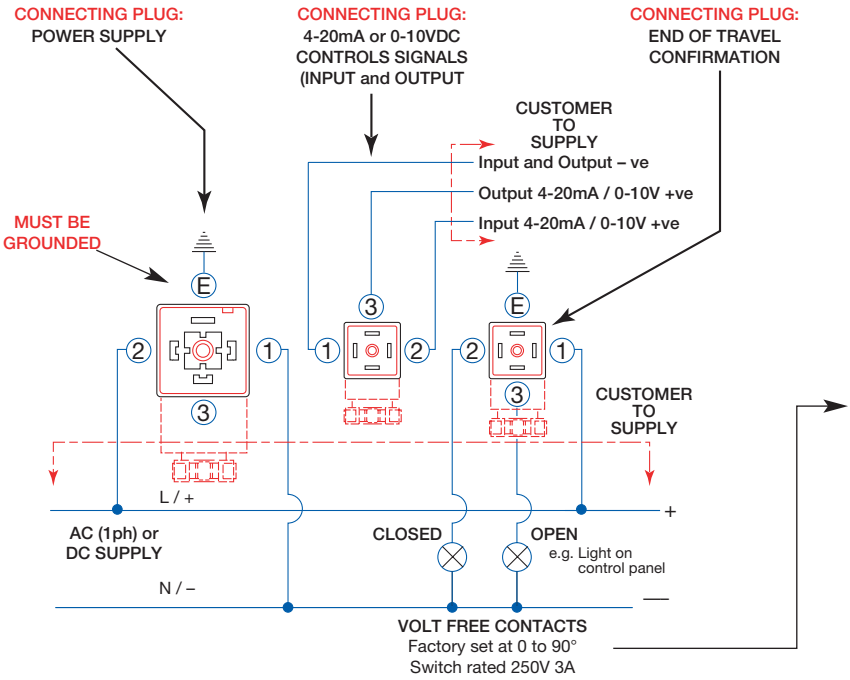
AC (1ph) or DC SUPPLY – WIRING FOR MODULATING ACTUATORS



Function: MODULATING VERSION

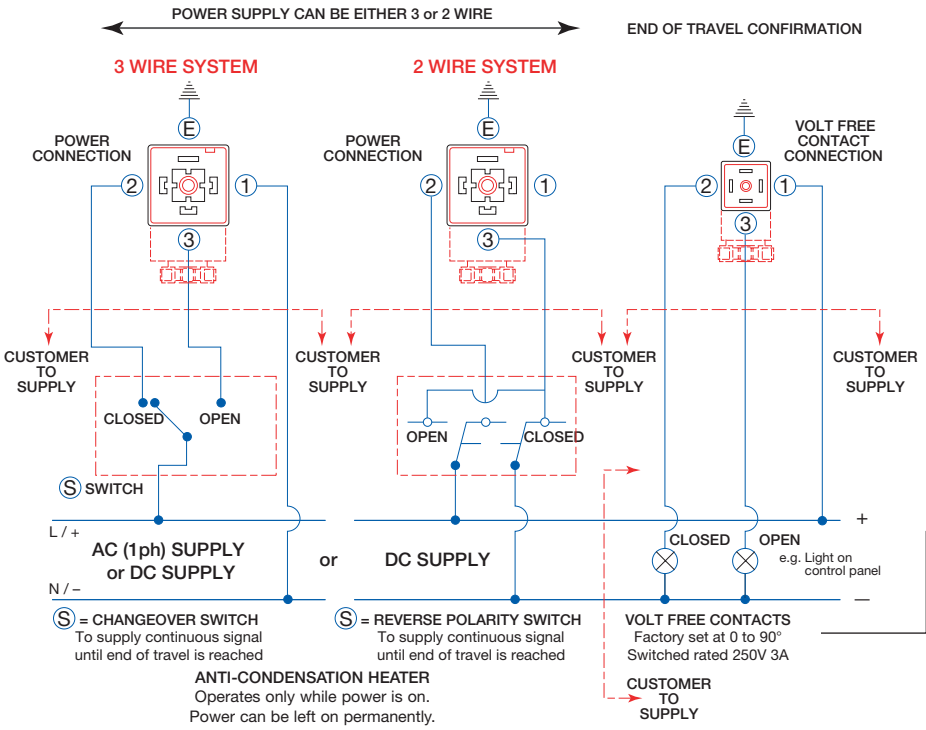
- Power open, power close – Actuator movement controlled by input signal (4-20mA or 0-10VDC)
- Standard Operation:
  4mA or 0V = Actuator Closed, 20mA or 10V = Actuator Open (can be reversed)
- Standard Operation:
  Actuator close on loss of control signal, stays put if loss on main power.
- Output signal provided as standard (in same format as supply signal)

NOTE: Wiring showing same supply as motor is only a suggestion, Read ***"Installation, Operation and Maintenance Instructions"*** before connecting.

NOTE: Fail-safe option is also available for modulating version.

⚠ Actuator power supply must be on a dedicated circuit and must be grounded.

AC (1ph) or DC SUPPLY – WIRING ON/OFF OR FAIL SAFE ACTUATORS



Function: ON/OFF VERSION

- Power open. power close
- Stays in place during power failure

Function: FAIL-SAFE VERSION

- Power open, power close –
  Trickle charges battery in either open or closed position
- Actuator sent by battery power to preset fail safe position on power failure
- Actuator returns to pre-failure position on power resumption
- Fail-safe can be either NC (normally-closed) or NO (normally-open)

NOTE: Wiring showing same supply as motor is only a suggestion, Read ***"Installation, Operation and Maintenance Instructions"*** before connecting.

⚠ Actuator power supply must be on a dedicated circuit and must be grounded.

⚠ Volt free switches are set approximately 5° ahead of the final motor stop position. Do not use the signal from the volt free switches to cut the power to the motor, otherwise the actuator will not reach the full open or full closed position. The actuator is designed to have continuously energized power.

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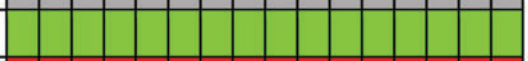
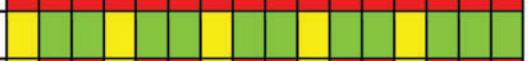
Series EBVF Status Light Functions

ON/OFF ACTUATOR	ACTUATOR OPERATIONAL STATUS (200 msec/block)
No power detected	
In position open	
In position close	
Opening	
Closing	
Torque limiter engaged, moving from close to open	
Torque limiter engaged, moving from open to close	
Actuator in MANUAL mode	
Multiple concurrent signals	
FAIL SAFE ACTUATOR	**ACTUATOR OPERATIONAL STATUS**
No power detected	
In position open	
In position close	
Opening	
Closing	
Torque limiter engaged, moving from close to open	
Torque limiter engaged, moving from open to close	
Actuator in MANUAL mode	
Multiple concurrent signals	
Actuator without power, working with the NO system. Max.3 min., led off	
Actuator without power, working with the NC system. Max.3 min., led off	
Battery protection. Danger, the battery needs recharging. Fail Safe blocked	
MODULATING ACTUATOR	**ACTUATOR OPERATIONAL STATUS**
No power detected	
Actuation feedback complete	
Opening	
Closing	
Auto adjusting configuration / reset	
Torque limiter engaged, moving from close to open	
Torque limiter engaged, moving from open to close	
Unrecognized modulation signal. Actuator stopped.	
Actuator in MANUAL mode	
Waiting for modulation signal	

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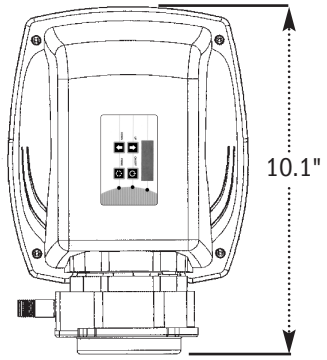
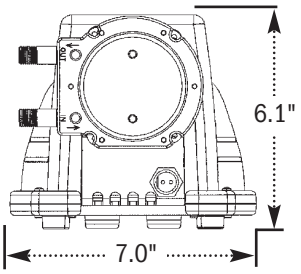
ISO9001:2015 REGISTERED COMPANY

SVP PUMP SERIES SPECIFICATIONS

STENNER PUMPS®





SHIPPING WEIGHT 10 lbs (4.5 kg)

METERING PUMP
UL LISTED
96F0

METERING PUMP
LR79585
C SP® US

IPX4
CE

THIS PUMP IS TESTED AND CERTIFIED BY WQA ACCORDING TO NSF/ANSI 61 FOR CONTACT WITH SODIUM HYPOCHLORITE AND WATER ONLY AND NSF/ANSI 372.
C USA

NOTE: Agency listings vary by model. 12VDC pumps do not carry any agency listings. Contact factory for details.

FEATURES

- 4-button keypad with up/down arrows, prime button and on/off switch
- 3-point roller design assists in anti-siphon protection
- Pump head requires no valves, allows for easy maintenance
- Self-priming against maximum working pressure foot valve not required
- Pump does not lose prime or vapor lock
- Pumps off-gassing solutions and can run dry
- Injection check valve included with models rated 100 psi (6.9 bar) maximum
- Output volume is not affected by back pressure
- Easy to change pump tube; lubrication is not required
- Pump tubes and pump heads interchange between models
- Models (Santoprene® only) tested by Water Quality Association to conform to ANSI/NSF STD 61 & 372.

This information is not intended for specific application purposes. Stenner Pump Company reserves the right to make changes to prices, products, and specifications at any time without prior notice.

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SVP PUMP SERIES SPECIFICATIONS

STENNER PUMPS®

FLOW RATE OUTPUT CONTROL
Digital keypad,
5%-100%, 1% increments, non-scalable

MAXIMUM WORKING PRESSURE
25 psi (1.7 bar), 100 psi (6.9 bar)

MAXIMUM OPERATING TEMPERATURE
125°F (52°C)

MAXIMUM SUCTION LIFT
25 ft (7.6 m) vertical lift, based on water

MOTOR TYPE 12VDC gear motor

SHAFT RPM (average maximum) 47

DUTY CYCLE Continuous

MOTOR VOLTAGE (Amp Draw)
120V 50/60Hz 1PH (1.5)
220V 50/60Hz 1PH (1.5)
230V 50/60Hz 1PH (1.5)
250V 50/60Hz 1PH (1.5)
12VDC (4.2)

POWER CORD TYPE
120V 60Hz, 220V 60Hz: SJTOW
230V 50Hz, 250V 50Hz: H05VV-F
12VDC: VW-1

POWER CORD PLUG END
120V 60Hz NEMA 5-15P
220V 60Hz NEMA 6-15P
230V 50Hz CEE7/7
250V 50Hz CEE7/7
12VDC Pigtail connection

MATERIALS OF CONSTRUCTION

All Housings Polycarbonate

Pump Tube
Santoprene®*, FDA approved or Versilon®**

Check Valve Duckbill
Santoprene®*, FDA approved or Pellethane®†

Pump Head Rollers Polyethylene

Roller Bushings Oil impregnated bronze

Suction/Discharge Tubing, Ferrules
Polyethylene, FDA approved

Tube and Injection Fittings
PVC or Polypropylene, NSF listed,

Connecting Nuts PVC, NSF listed

3/8" Adapter
PVC or Polypropylene, NSF listed

Suction Line Strainer and Cap
PVC or Polypropylene, NSF listed,
with Ceramic Weight

All Fasteners Stainless steel

Pump Head Latches Polypropylene

Leak Detect Clips, Springs, Pins Hastelloy®††

ACCESSORY KIT SHIPPED WITH EACH PUMP

3 Connecting nuts 1/4" or 3/8"
3 Ferrules 1/4" or 6 mm *Europe*
1 Injection check valve 100 psi (6.9 bar) max.
OR 1 injection fitting 25 psi (1.7 bar) max.
1 Weighted suction line strainer
1/4", 3/8" or 6 mm *Europe*
1 20' roll suction/discharge tubing
1/4" or 3/8", white or UV black
OR 6 mm white *Europe*
1 Additional pump tube
2 Additional latches
1 Manual

* Santoprene® is a registered trademark of Exxon Mobil Corporation.

** Versilon® is a registered trademark of Saint-Gobain Performance Plastics.

† Pellethane® is a registered trademark of Lubrizol Advanced Materials, Inc.

FLOW RATE OUTPUT CHART

25 psi (1.7 bar) maximum

	Model	Item Number Prefix	Pump Tube	Gallons per Day	Gallons per Hour	Ounces per Minute	Liters per Day	Liters per Hour	Milliliters per Minute
MANUAL	SVP1L1	**SVP1L1**	1	0.3 to 5.0	0.01 to 0.21	0.03 to 0.44	1.1 to 18.9	0.05 to 0.79	0.76 to 13.13
	SVP1L2	**SVP1L2**	2	0.8 to 17.0	0.03 to 0.71	0.07 to 1.51	3.0 to 64.4	0.13 to 2.68	2.08 to 44.65
	SVP1L3	**SVP1L3**	3	2.0 to 40.0	0.08 to 1.67	0.18 to 3.55	7.6 to 151.4	0.32 to 6.31	5.27 to 105.14
	SVP1L4	**SVP1L4**	4	3.0 to 60.0	0.13 to 2.50	0.27 to 5.33	11.4 to 227.1	0.48 to 9.46	7.92 to 157.71
	SVP1L5	**SVP1L5**	5	4.3 to 85.0	0.18 to 3.54	0.38 to 7.55	16.3 to 321.8	0.68 to 13.40	11.32 to 223.40
4-20MA INPUT*	SVP4L1	**SVP4L1**	1	0.3 to 5.0	0.01 to 0.21	0.03 to 0.44	1.1 to 18.9	0.05 to 0.79	0.76 to 13.13
	SVP4L2	**SVP4L2**	2	0.8 to 17.0	0.03 to 0.71	0.07 to 1.51	3.0 to 64.4	0.13 to 2.68	2.08 to 44.65
	SVP4L3	**SVP4L3**	3	2.0 to 40.0	0.08 to 1.67	0.18 to 3.55	7.6 to 151.4	0.32 to 6.31	5.27 to 105.14
	SVP4L4	**SVP4L4**	4	3.0 to 60.0	0.13 to 2.50	0.27 to 5.33	11.4 to 227.1	0.48 to 9.46	7.92 to 157.71
	SVP4L5	**SVP4L5**	5	4.3 to 85.0	0.18 to 3.54	0.38 to 7.55	16.3 to 321.8	0.68 to 13.40	11.32 to 223.40
				Approximate Outputs @ 50/60Hz					

100 psi (6.9 bar) maximum

	Model	Item Number Prefix	Pump Tube	Gallons per Day	Gallons per Hour	Ounces per Minute	Liters per Day	Liters per Hour	Milliliters per Minute
MANUAL	SVP1H1	**SVP1H1**	1	0.3 to 5.0	0.01 to 0.21	0.03 to 0.44	1.1 to 18.9	0.05 to 0.79	0.76 to 13.13
	SVP1H2	**SVP1H2**	2	0.8 to 17.0	0.03 to 0.71	0.07 to 1.51	3.0 to 64.4	0.13 to 2.68	2.08 to 44.65
	SVP1H7	**SVP1H7**	7	2.0 to 40.0	0.08 to 1.67	0.18 to 3.55	7.6 to 151.4	0.32 to 6.31	5.27 to 105.14
4-20MA INPUT*	SVP4H1	**SVP4H1**	1	0.3 to 5.0	0.01 to 0.21	0.03 to 0.44	1.1 to 18.9	0.05 to 0.79	0.76 to 13.13
	SVP4H2	**SVP4H2**	2	0.8 to 17.0	0.03 to 0.71	0.07 to 1.51	3.0 to 64.4	0.13 to 2.68	2.08 to 44.65
	SVP4H7	**SVP4H7**	7	2.0 to 40.0	0.08 to 1.67	0.18 to 3.55	7.6 to 151.4	0.32 to 6.31	5.27 to 105.14
				Approximate Outputs @ 50/60Hz					

* Input Signal Voltage/Resistance maximum 48VDC/128 ohm.

NOTE: Injection check valve included with pumps rated 100 psi (6.9 bar) maximum.

NOTICE: The information within this chart is solely intended for use as a guide. The output data is an approximation based on pumping water under a controlled testing environment. Many variables can affect the output of the pump. Stenner Pump Company recommends that all metering pumps undergo field calibration by means of analytical testing to confirm their outputs. The information contained in this flyer is not intended for specific application purposes. Stenner Pump Company reserves the right to make changes to prices, products, and specifications at any time without prior notice.

SERIES MBLT | MINIATURE SUBMERSIBLE LEVEL TRANSMITTER

FEATURES/BENEFITS

- **Slender 0.63˝ (16 mm) diameter design fits in narrow openings**
- **Constructed for years of trouble free service with welded 316 SS body and 316 SS nose cap**
- **Body top is 316 SS and tapered to prevent damage or snares when pulling the unit out of the installation**
- **Low power voltage output models are ideal for remote level monitoring with rechargeable battery and solar panel**
- **Maintenance free filter on vent tube eliminates particulate water droplets from entering the transducer**
- **Incorporates lightning and surge protection, eliminating both power supply surges and lightning ground strike transients**

Low Power Models Available

APPLICATIONS

- Ballast tanks
- Ground water monitoring
- Surface water monitoring
- Dewatering
- Down hole/Bore hole
- Remote telemetry
- Remote flood monitoring
- Narrow conduit or pipe installations
- Remediation and environmental monitoring

DESCRIPTION

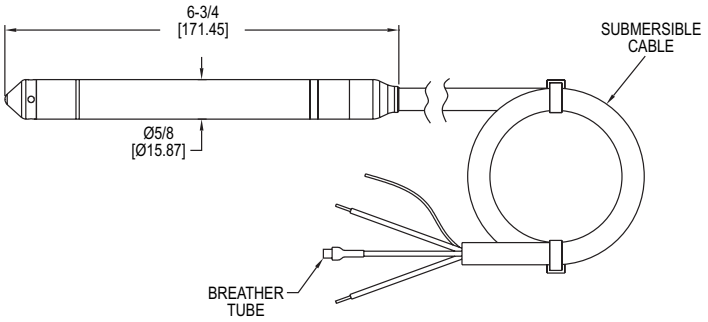
The **SERIES MBLT** Miniature Submersible Level Transmitters measure the height of liquid above the position in the tank referenced to atmospheric pressure. The transmitter consist of a piezoresistive sensing element, encased in a 0.63˝ (16 mm) diameter 316 SS housing. Voltage output units operate with 8 VDC of power.

SPECIFICATIONS

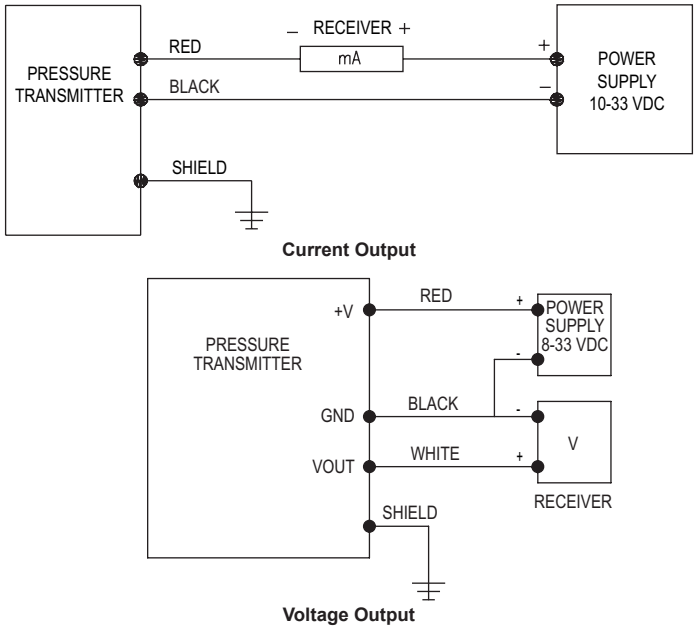
Service	Compatible liquids.
Wetted Materials	Body and nose: 316 SS; Cable: Polyether polyurethane or ETFE; Seals: Fluoroelastomer; Label: Polyolefin.
Accuracy	±0.25% or ±0.10% FS. 4.3 to 4.9 psi (10 to 11.54 in w.c.) configured ranges are ±0.30% FS accuracy.
Temperature Limits	-4 to 176°F (-20 to 80°C).
Compensated Temperature Limits	0.25%: 32 to 158°F (0 to 70°C); 0.10% FS: 32 to 140°F (0 to 60°C).
Thermal Effect	0.25%: ±0.45% FS TEB; 0.10%: ±0.30% FS TEB.
Pressure Limit	2X FS.
Power Requirements	Current Output: 10 to 33 VDC; Voltage Output: 8 to 33 VDC; 5 mA max (no load).
Output Signal	4 to 20 mA DC 2-wire or 0 to 5 V* (model depending).
Response Time	< 50 ms.
Max. Loop Resistance	1000 Ω @ 30 VDC (current output).
Voltage Output Impedance	10 Ω + 4.4 Ω / 100´ cable (voltage output).
Electrical Connections	Wire pigtail.
Mounting Connection	Suspended below point being monitored.
Electrical Protection	Surge/lightning protected per EN61000-4-5, Class 5.
Weight	Body: 0.235 lb (0.107 kg); Cable: 0.037 lb (0.009 kg) per foot.
Agency Approvals	CE.

DWYER INSTRUMENTS, INC.
T: 219-879-8000 | F: 219-872-9057 | info@dwyermail.com
800-872-9141

DIMENSIONS



WIRING DIAGRAM



HOW TO ORDER

Use the **bold** characters from the chart below to construct a product code.

MBLT	-25	C	-I	V	P	P	-25	-100	-FC

SERIES
MBLT - Miniature submersible level transmitter

CIRCUIT & BODY MATERIAL
-2S - Lightning/surge protected & 316 SS

ACCURACY
B - 0.10% FS
C - 0.25% FS

OUTPUT
-I - 4 to 20 mA
-L - 0 to 2 V
-H - 0 to 2.5 V
-T - 0 to 3 V
-F - 0 to 4 V
-V - 0 to 5 V
-O - 1 to 5 V

REFERENCE
V - Vented

OPTIONS
-FC - Factory calibration

CABLE LENGTH
-X - 10 to 2000´
-X - 3 to 650 m

RANGE VALUE
-X - 4.5 to 300 psi
10 to 693´ w.c.
3.2 to 211 m w.c.

RANGE UNITS
F - Feet of water column
M - Meters of water column
P - psi

CABLE MATERIAL
E - ETFE
P - Polyurethane

ACCESSORIES

Model	Description
A-297	Desiccant filter for vent tube. Removes humidity for protection of the sensor. Changes color to show saturation.

Important Notice: Dwyer Instruments, Inc. reserves the right to make changes to or discontinue any product or service identified in this publication without notice. Dwyer advises its customers to obtain the latest version of the relevant information to verify, before placing any orders, that the information being relied upon is current.

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800-872-9141

Series 3W – Wire Suspended Probes

- Metallic Bars
- Plastic Shield Protected
- Adaptable to Many Fittings
- Field Assembled

Series 3W probes, consisting of metallic bars within a protective plastic shield, are designed to be suspended in liquid with PVC-insulated wires. They are ideal for applications where rigid electrode rods are impractical or cumbersome, such as:

- Deep Wells
- Pump Control
- Waste Water
- Deep Tanks

7/8″ (2.22 cm) diameter x 3-3/4″ (9.52 cm) length. 3Z1A wire and 3Z1B adaptor kit required for use with 3E, 3F and 3N fittings.

Series 3W

How to Order

Select a 3W electrode, a 3Z1B adaptor and a length of 3Z1A suspension wire to form a complete suspended probe.

1. 3W Electrodes

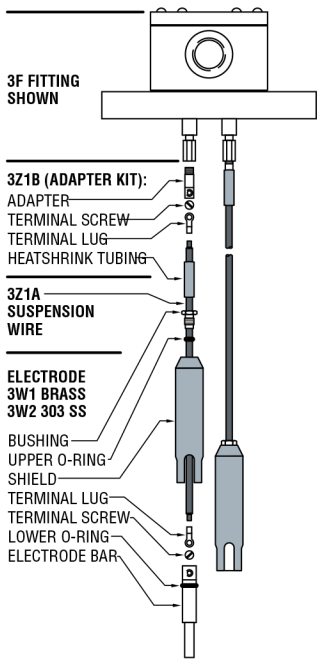
Probe Material	Part Number
Brass	3W1
316 Stainless Steel	3W2

2. 3Z1B Adaptor Kit
For use with 3E, 3F and 3N fittings.
Part Number: 3Z1B

3. 3Z1A Suspension Wire
Order in standard or custom length.

Length (Feet)	Part Number
500	3Z1A-500
1000	3Z1A-1000
5000	3Z1A-5000
Custom	3Z1A-XX Specify in one foot increments up to 5000 ft.

Components Detail



Series 3Y – Corrosion Resistant Probes

- Metallic Bars
- Corrosion Resistant
- Available in Many Materials for Various Requirements
- Adaptable for Various Fittings

Series 3Y wire suspended probes consist of metallic bars within a protective plastic shield, designed to be suspended in liquid. Series 3Y suspension wires are PVC or Teflon® insulated for use in corrosive liquid applications. 7/8″ (2.22 cm) diameter x 3-1/2″ (8.90 cm) length.

Series 3Y

Specifications

Style	Wire suspended
Tip Material	Carp. 20, Hastelloy C, 316 stainless steel
Shield Material	PVC 150°F (66°C), Teflon®

How to Order

Use the **Bold** characters from the chart below to construct a product code.

3Y X X X

Series
3Y

Shield Material
1 – PVC
3 – Teflon®

Probe Tip Material
C – 316 Stainless Steel
D – Carp. 20
F – Hastelloy C

Length of Wire
1 – 10 feet
2 – 20 feet
3 – 30 feet
etc.

Note: 3Z1B Connector is used to connect suspension wire with 3B, 3E, 3F, 3G or 3N fitting.

Applications

- General Purpose
- Wire Suspended Probes
- Corrosive Liquids, Chemicals

Saginaw Control and Engineering
95 Midland Road Saginaw, MI 48638-5770
(800) 234-6871 - Fax: (989) 799-4524
SCE@SaginawControl.com

SCE-36EL3012LPPL

Product Specifications:

Part Number: SCE-36EL3012LPPL
Description: EL LPPL Enclosure
Height: 36.00"
Width: 30.00"
Depth: 12.00"
Price Code: E3
List Price: $563.81
Catalog Page: 96
Est. Ship Weight: 115.00 lbs

Construction
- 0.075 In. carbon steel.
- Seams continously welded and ground smooth.
- Flange trough collar around all sides of door opening.
- Collar studs provided for mounting optional sub-panels.
- Mounting holes in back of enclosure for wall mounting.
- Mounting hardware, sealing washer and hole plugs included.
- Concealed hinges.
- Removable and inchangeable doors.
- Black zinc die cast keylocking/padlocking handle.
- 3-point latching mechanism.
- Black quarter turn latches as required.
- Removable print pocket.
- Pour in place oil & water resistant gasket
- Ground stud on door & body.

Application
Designed to house electrical and electronic controls, instrumentation and components in indoor or outdoor locations. For outdoor applications a drip shield is recommended.

Finish
ANSI-61 gray powder coating inside and out. Optional sub-panels are powder coated white.

Industry Standards - (IS4)
- NEMA Type 3R, 4, 12 and Type 13
- UL Listed Type 3R, 4 and 12
- CSA Type 3R, 4 and 12
- IEC 60529
- IP 66

Notes
Provision for Lifting Lugs on enclosures when Height >48" and Depth >16". The Lifting Lug assembly will be included with the enclosure bolt pack.

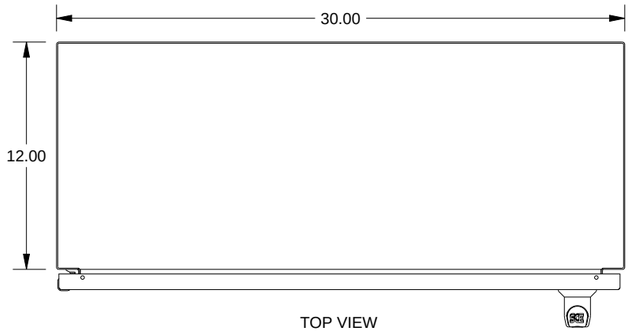
Special Instructions apply for IS3, IS4 and IS6 to maintain the environmental rating of Type 3R for these parts. Instructions are located on the enclosure door. Drip shield is required on IS3, drip shield is recommended on IS4 and IS6. Drain holes are required on all.

Optional Accessories
SCE-36P30 Subpanel, Bent
SCE-36P30GALV Subpanel, Bent Galvanized
SCE-BVK Breather Vent
SCE-DF36EL30LP Panel, Dead Front (Wall Mount)
SCE-DS30N4 Shield, Drip
SCE-ELFM30W EL Flush Mount Frame
SCE-ELFM36H EL Flush Mount Frame
SCE-ELMFK4 Foot Kit, EL Mounting (4pc.)
SCE-ELSP3 KIT, Swing-Out Panel (20 High & Up)
SCE-RD36EL30LPPL Door, Replacement

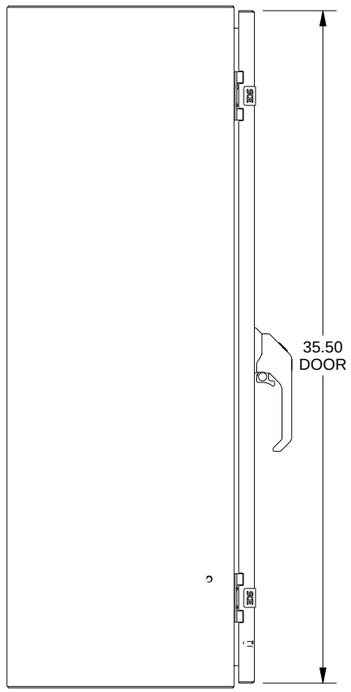
Similar Part Numbers
SCE-24EL2010LPPLEL LPPL Enclosure
SCE-24EL2410LPPLEL LPPL Enclosure
SCE-24EL2412LPPLEL LPPL Enclosure
SCE-30EL2410LPPLEL LPPL Enclosure
SCE-30EL2412LPPLEL LPPL Enclosure
SCE-30EL2416LPPLEL LPPL Enclosure
SCE-30EL3012LPPLEL LPPL Enclosure
SCE-36EL2412LPPLEL LPPL Enclosure
SCE-36EL3612LPPLEL LPPL Enclosure
SCE-42EL3612LPPLEL LPPL Enclosure

Installation Information
- Drip Shield Kit Assembly
- EL Flush Mount Frame
- Dead Front Wall Mount Installation Instructions
- Swing Panel ELSP3 for Encl. Height > 16
- Service Parts Wall Mount Enclosures

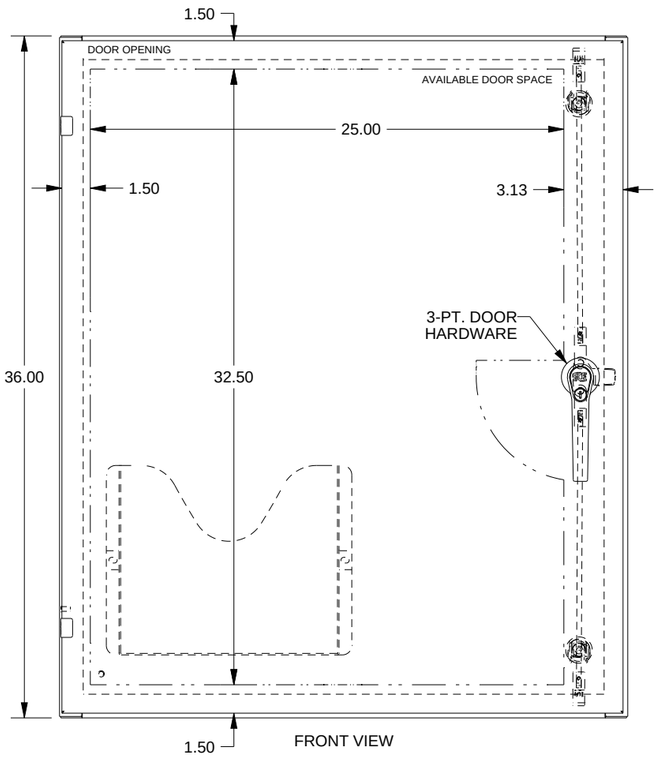
SAGINAW CONTROL & ENGINEERING
SCE-36EL3012LPPL



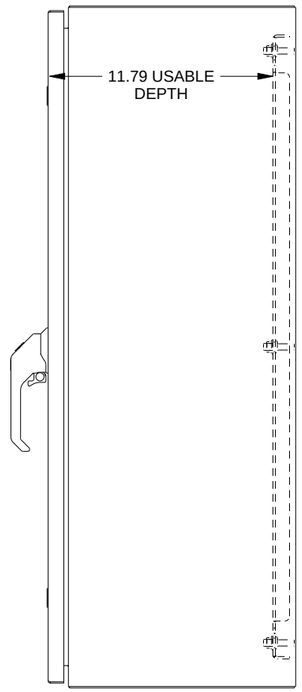
TOP VIEW



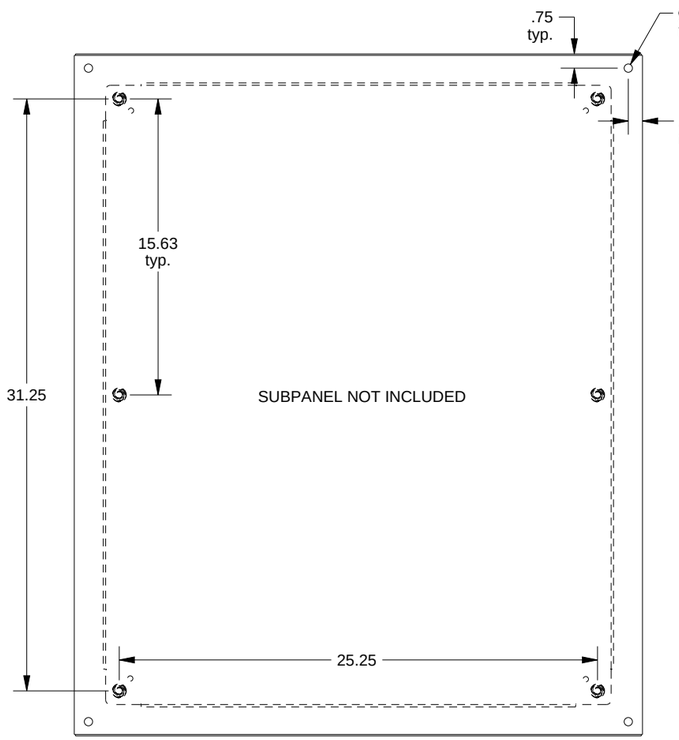
LEFT SIDE VIEW



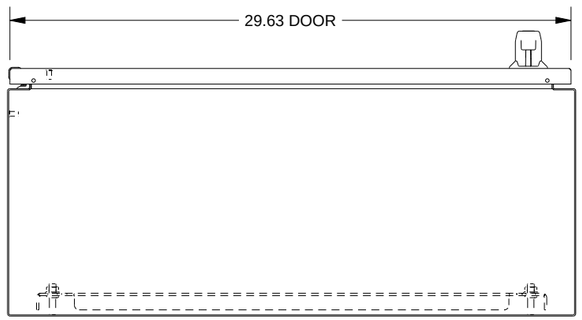
FRONT VIEW



RIGHT SIDE VIEW



EXTERNAL REAR VIEW



BOTTOM VIEW

DATA SUBJECT TO CHANGE WITHOUT NOTICE

MicroLogix 1400

Small Programmable Logic Controller

Allen-Bradley

Features and Benefits

- Expand your application capabilities with up to 7 expansion I/O modules for a maximum of 256 discrete I/O
- Up to 6 embedded 100 kHz highspeed counters (on controllers with dc inputs)
- 2 Serial ports with DF1/ DH485/ Modbus RTU/DNP3/ASCII protocol support
- Ethernet port provides you with EtherNet/IP, DNP3 over IP and Modbus TCP/IP protocol support as well as web server and email capabilities
- Built-in LCD with backlight allows you to view controller and I/O status, and provides a simple interface for messages, bit / integer monitoring and manipulation

Product Description

The Allen-Bradley® MicroLogix™ 1400 from Rockwell Automation complements the existing MicroLogix family of small programmable logic controllers. MicroLogix 1400 combines the features you demand from MicroLogix 1100, such as EtherNet/IP, online editing, and a built-in LCD, plus provides you with enhanced features, such as: higher I/O count, faster High Speed Counter/PTO and enhanced network capabilities

Take advantage of the built-in LCD with back lighting to set the Ethernet network configuration, display floating point values on a user configurable display, display OEM logos at startup and read or write any binary, integer and long file elements in the data table.

Three embedded communication ports provide you with excellent communications capabilities. MicroLogix 1400 offers an isolated RS232C/ RS485 combination port; a non-isolated RS232C port; and an RJ-45 port for 10/100 Mbps EtherNet/IP peer-to-peer messaging, DNP3 over IP and Modbus TCP/IP protocol.

Similar to the rest of the MicroLogix family, MicroLogix 1400 is programmed with RSLogix 500 programming software (Version 8.1 and above) as well as RSLogix Micro programming software.

Product Specifications

MicroLogix	1766-L32BWA	1766-L32AWA	1766-L32BXB	1766-L32BWAA	1766-L32AWAA	1766-L32BXBA
Input Power	120/240 V AC		24V DC	120/240 V AC		24V DC
Memory	non-volatile battery backed RAM					
User Program / User Data Space	10K / 10K configurable					
Data Logging / Recipe Storage	128 K (without Recipe) / up to 64 K (after subtracting Data Logging)					
Battery Back-up	Yes					
Back-up Memory Module	Yes					
Digital Inputs	(12) Fast 24VDC (8) Normal 24VDC	(20) 120VAC	(12) Fast 24VDC (8) Normal 24VDC	(12) Fast 24VDC (8) Normal 24VDC	(20) 120VAC	(12) Fast 24VDC (8) Normal 24VDC
Digital Outputs	(12) Relay	(12) Relay	(6) Relay (3) Fast DC (3) Normal DC	(12) Relay	(12) Relay	(6) Relay (3) Fast DC (3) Normal DC
Analog Inputs / Outputs	None			(4) Voltage Inputs / (2) Voltage Outputs		
Serial Ports	(1) RS232C/RS485* , (1) RS232C**					
Serial Protocols	DF1 Full Duplex, DF1 Half Duplex Master/Slave, DF1 Radio Modem, DH-485, Modbus RTU Master/Slave, ASCII, DNP 3 Slave					
Ethernet Ports	(1) 10/100 EtherNet/IP port					
Ethernet Protocols	EtherNet/IP messaging, DNP3 over IP and Modbus TCP/IP					
Trim Potentiometers	2 Digital					
High-Speed Inputs	Up to 6 channels @ 100 kHz	N/A	Up to 6 channels @ 100 kHz	Up to 6 channels @ 100 kHz	N/A	Up to 6 channels @ 100 kHz
Real Time Clock	Yes, embedded					
PID	Yes (limited by loop and stack memory)					
PWM /PTO	N/A		3 channel PTO (100kHz)\PWM (40kHz)	N/A		3 channel PTO (100kHz)\PWM (40kHz)
Embedded LCD	Yes					
Floating Point Math	Yes					
Online Editing	Yes					
Operating Temperature	-20°C...+60°C					
Storage Temperature	-40°C (or -30°C)...+85°C					

* Isolated. RS232/RS485 combo port. Same as MicroLogix 1100 Comm 0

** Non-isolated RS232. standard D-sub connector.

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Publication 1766-PP001D-EN-P – April, 2011
Supercedes Publication 1766-PP001C-EN-P October, 2010

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SDSA1175 SPDs

Square D Type 1 Surge Protective Devices

Square D™ brand Surgelogic™ SDSA1175 products are compact and affordable Surge Protective Devices (SPDs). SDSA1175 SPDs offer a simple means to bring down initial surges to manageable levels and can offer additional value in a cascaded SPD system. Their compact design allows surge suppression to be installed adjacent to power panels or directly on sensitive equipment.

SQUARE D™
by Schneider Electric

SDSA1175 SPDs
Features

Superior Performance

Square D brand Surgelogic SDSA1175 SPDs utilize high-energy suppression circuitry that can be located at any point in the electrical system. As a Type 1 rated device, they have the flexibility to be used with or without an Overcurrent Protection Device (OCPD).

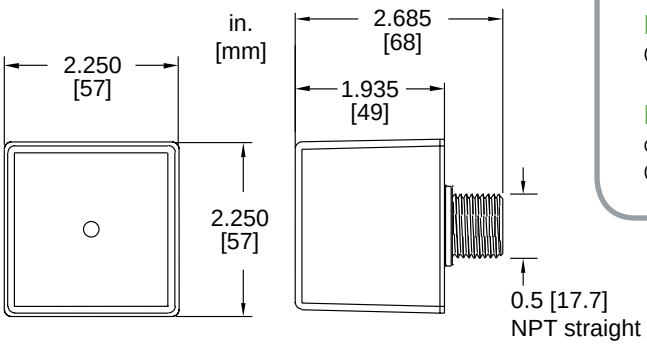
SDSA1175 SPDs provide surge suppression for equipment from severe transient activity. Each MOV is individually fused and the products carry a NEMA Type 4X rating suitable for installing indoors, outdoors, or in other harsh environments.

Easy Installation

Surgelogic SDSA1175 SPDs are some of the most versatile, yet compact devices available on the market today. This compact package can be mounted on an electrical panel, meter socket, or inside electrical control cabinets.

Warranty

The SDSA1175 and SDSA1175T warranty is 2 years.



SDSA1175 SPDs

Mechanical Description

Enclosure	Plastic
NEMA Rating	Type 4X
Connection Method	#14 AWG, Solid
Mounting Method	Close Nippled, Back Mounted
Thermal Fusing	Yes
Overcurrent Fusing	Yes
Operating Frequency	50/60 Hz
Operating Altitude	Sea Level-12,000' (3,658 m)
Storage Temperature	-40˚ F to +149˚ F (-40˚ C to +65˚ C)
Operating Temperature	-40˚ F to +149˚ F (-40˚ C to +65˚ C)

Diagnostics

Green status LED

Listings and Performance

cULus Listed to 1449 3rd edition Type 1 SPD, CSA C22.2 No. 8-M1986, C233.1-87

The SDSA1175 is a three-wire surge suppressor designed for 120/240 Vac services. Two SDSA1175 units can be installed for 208Y/120 Vac services. The SDSA1175T is a two-wire surge suppressor designed for 120 Vac services.

Voltage	Surge Current per Phase	Configuration	Model Number	MCOV	SCCR	I_n	VPR L-N	VPR L-G	VPR L-L	VPR N-G
120/240V	36kA	1 Ø, 3-wire	SDSA1175	150V L-N 300V L-L	25kA	10kA	700V	N/A	1200V	N/A
120V	36kA	1 Ø, 2-wire	SDSA1175T	150V	25kA	10kA	700V	N/A	N/A	N/A

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Schneider Electric USA, Inc. 1751 S. 4800 W., Salt Lake City, UT 84104, USA Telephone: (801)-977-9009 Fax: (801)-977-0200 www.surgelogic.com

Document Number 9990-0119A February 2011 bt

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Power storage devices - QUINT-BAT/24DC/ 3.4AH - 2866349

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Power storage device, lead AGM, VRLA technology, 24 V DC, 3.4 Ah. Connection via pin cable lug, 14 mm.

Key commercial data

Packing unit	1 pc
Weight per Piece (excluding packing)	4965.0 GRM
Custom tariff number	85072080
Country of origin	China

Technical data

Ambient conditions

Degree of protection	IP20
Ambient temperature (operation)	0 °C ... 40 °C

Input data

Nominal input voltage	24 V DC

Output data

Nominal output voltage	24 V DC
Output current	max. 25 A
Connection in parallel	Yes, for increasing the buffer period
Connection in series	No
Output fuse	25 A

General

IQ technology	No
Memory medium	battery 3.4 Ah
Shipbuilding approval	Germanischer Lloyd (EMC 2), ABS

Power storage devices - QUINT-BAT/24DC/ 3.4AH - 2866349

Classifications

ETIM

ETIM 4.0	EC000357
ETIM 5.0	EC000357

Approvals

Approvals

Approvals

GL / BSH

Ex Approvals

Approvals submitted

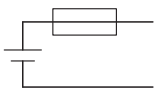
Approval details

GL

BSH

Drawings

Block diagram



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Uninterruptible power supply - TRIO-UPS/1AC/24DC/ 5 - 2866611

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Uninterruptible power supply with integrated power supply unit, 5A, in combination with MINI-BAT/24/DC/1.3 AH, QUINT-BAT/24DC 3,4AH, 7,2AH or 12 AH

Key commercial data

Packing unit	1 pc
Weight per Piece (excluding packing)	1120.0 GRM
Custom tariff number	85371091
Country of origin	China

Technical data

Dimensions

Width	60 mm
Height	130 mm
Depth	118 mm

Ambient conditions

Degree of protection	IP20
Ambient temperature (operation)	-25 °C ... 70 °C (> 55° C derating)
Ambient temperature (storage/transport)	-40 °C ... 80 °C
Max. permissible relative humidity (operation)	95 % (at 25 °C, non-condensing)
Noise immunity	EN 61000-6-2:2005

Input data

Input voltage range	85 V AC ... 264 V AC (Derating < 90 V AC: 2.5%V)
	100 V DC ... 350 V DC (UL508: 100 ... 250 V)
AC frequency range	45 Hz ... 65 Hz
Frequency range DC	0 Hz

Uninterruptible power supply - TRIO-UPS/1AC/24DC/ 5 - 2866611

Technical data

Input data

	0.95 A
	1.1 A (230 V AC)
	1.7 A
	1.8 A (120 V AC)
Inrush surge current	< 44 A (< 1.3 A^2s)
Power failure bypass	see diagram
Buffer period	20 min (5 A)
Input fuse	6.3 A (slow-blow, internal)
Choice of suitable fuses	6 A ... 16 A (Characteristics B, C, D, K)
Power factor (cos phi)	approx. 0.5
Type of protection	Transient surge protection
Protective circuit/component	Varistor

Output data

Nominal output voltage	24 V DC
Setting range of the output voltage	22.5 V DC ... 29.5 V DC (Network operation; in the buffer mode, dependent on the battery voltage of 27.9 V DC ... 19.2 V DC)
Output current	5 A (-25 °C ... 55 °C)
Derating	55 °C ... 70 °C (2.5%/K)
Connection in parallel	Yes, 2
Connection in series	No
Control deviation	< 1 % (change in load, static 10 % ... 90 %)
Residual ripple	< 10 mV_{PP}
Peak switching voltages nominal load	< 25 mV_{PP}

General

Net weight	1.1 kg
Memory medium	External, battery 1.3 Ah / 3.4 Ah / 7.2 Ah / 12 Ah
Operating mode	
Efficiency	> 88 % (230 V AC, network operation)
	> 86 % (120 V AC, network operation)
	> 86 % (Battery operation)
Insulation voltage input/output	4 kV (type test)
	2 kV (Routine test)
Protection class	I
MTBF (IEC 61709, SN 29500)	> 596285 h
Mounting position	horizontal DIN rail NS 35, EN 60715
Assembly instructions	Can be aligned: Horizontally 0 mm, vertically 50 mm

Uninterruptible power supply - TRIO-UPS/1AC/24DC/ 5 - 2866611

Technical data

General

Electromagnetic compatibility	Conformance with EMC Directive 2004/108/EC
Noise emission	EN 50081-2
Low Voltage Directive	Conformance with LV directive 2006/95/EC
Standard – Electrical equipment of machines	EN 60204
Standard - Electrical safety	EN 60950-1/VDE 0805 (SELV)
Shipbuilding approval	Germanischer Lloyd (EMC 1)
Standard – Electronic equipment for use in electrical power installations and their assembly into electrical power installations	EN 50178/VDE 0160 (PELV)
Standard – Safety extra-low voltage	EN 60950-1 (SELV)
	EN 60204 (PELV)
Standard - Safe isolation	DIN VDE 0100-410
	DIN VDE 0106-1010
Standard – Protection against electric shock	DIN 57100-410
Standard – Protection against shock currents, basic requirements for protective separation in electrical equipment	DIN VDE 0106-101
Standard – Limitation of mains harmonic currents	EN 61000-3-2
UL approvals	UL/C-UL listed UL 508
	UL/C-UL Recognized UL 60950

Connection data, input

Connection method	Screw connection
Conductor cross section solid min.	0.2 mm²
Conductor cross section solid max.	2.5 mm²
Conductor cross section stranded min.	0.2 mm²
Conductor cross section stranded max.	2.5 mm²
Conductor cross section AWG/kcmil min.	24
Conductor cross section AWG/kcmil max	12
Screw thread	M3

Connection data, output

Connection method	Screw connection
Conductor cross section solid min.	0.2 mm²
Conductor cross section solid max.	2.5 mm²
Conductor cross section stranded min.	0.2 mm²
Conductor cross section stranded max.	2.5 mm²
Conductor cross section AWG/kcmil min.	24
Conductor cross section AWG/kcmil max	12
Stripping length	8 mm

Signaling

Uninterruptible power supply - TRIO-UPS/1AC/24DC/ 5 - 2866611

Technical data

Signaling

Output voltage	+ 24 V
Status display	Green LED
Note on status display	Mains voltage OK: Green LED, static at
Conductor cross section solid min.	0.2 mm²
Conductor cross section solid max.	2.5 mm²
Conductor cross section stranded min.	0.2 mm²
Conductor cross section stranded max.	2.5 mm²
Conductor cross section AWG/kcmil min.	24
Conductor cross section AWG/kcmil max	12
Tightening torque, min	0.5 Nm
Tightening torque max	0.6 Nm
Screw thread	M3
Output name	Alarm
Output description	Transistor switching output
Maximum switching voltage	≤ 24 V
Output voltage	24 V
Continuous load current	≤ 200 mA
Status display	Alarm
Note on status display	Red LED, static at
Output name	Battery charge
Output description	Transistor switching output
Maximum switching voltage	≤ 24 V
Output voltage	24 V
Continuous load current	≤ 200 mA
Status display	Battery (battery charge) is being charged
Note on status display	Yellow LED, flashing
Output name	Battery mode
Output description	Transistor switching output
Type of signaling	LED, active switching output
Maximum switching voltage	≤ 24 V
Output voltage	24 V
Continuous load current	≤ 200 mA
Status display	Battery operation (Battery Mode)
Note on status display	LED yellow, static at

Charging process

Charge characteristic curve	I/U characteristic curve
Battery presence check/time interval	60 s

Uninterruptible power supply - TRIO-UPS/1AC/24DC/ 5 - 2866611

Technical data

Charging process

Charge current	0.2 A ... 1.5 A (Default 1.0 A)
End-of-charge voltage	25 V DC ... 30 V DC (Default 27.6 V DC)
Temperature compensation	0 mV/K ... 200 mV/K (42 mV/K by default)
Quality check of battery	4 h ... 200 h (Default 12 h)
Deep discharge protection	18 V DC ... 21 V DC (Default 19.2 V DC)
Alarm signaling threshold	18 V DC ... 30 V DC (Default 20.4 V DC)

Classifications

eCl@ss

eCl@ss 4.0	27040603
eCl@ss 4.1	27040603
eCl@ss 5.0	27040603
eCl@ss 5.1	27040603
eCl@ss 6.0	27040603
eCl@ss 7.0	27040603
eCl@ss 8.0	27040603

ETIM

ETIM 2.0	EC000382
ETIM 3.0	EC000382
ETIM 4.0	EC000382
ETIM 5.0	EC000382

UNSPSC

UNSPSC 6.01	30211510
UNSPSC 7.0901	39121011
UNSPSC 11	39121011
UNSPSC 12.01	39121011
UNSPSC 13.2	39121011

Approvals

Approvals

Approvals

UL Recognized / UL Listed / cUL Recognized / cUL Listed / GL / UL Recognized / UL Listed / cUL Recognized / cUL Listed / cULus Recognized / cULus Listed

Uninterruptible power supply - TRIO-UPS/1AC/24DC/ 5 - 2866611

Approvals

Ex Approvals

Approvals submitted

Approval details

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cUL Recognized

cUL Listed

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UL Listed

cUL Recognized

Uninterruptible power supply - TRIO-UPS/1AC/24DC/ 5 - 2866611

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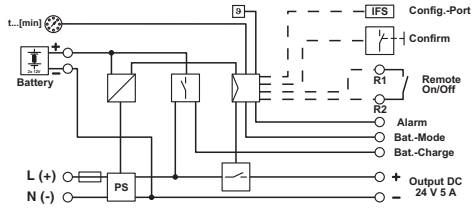
cUL Listed

cULus Recognized

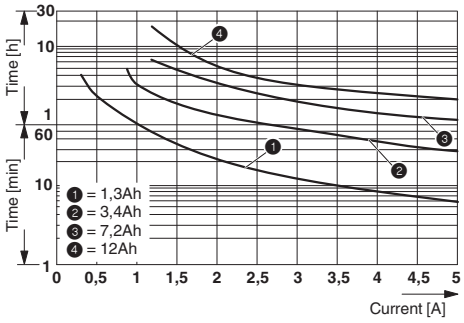
cULus Listed

Drawings

Block diagram

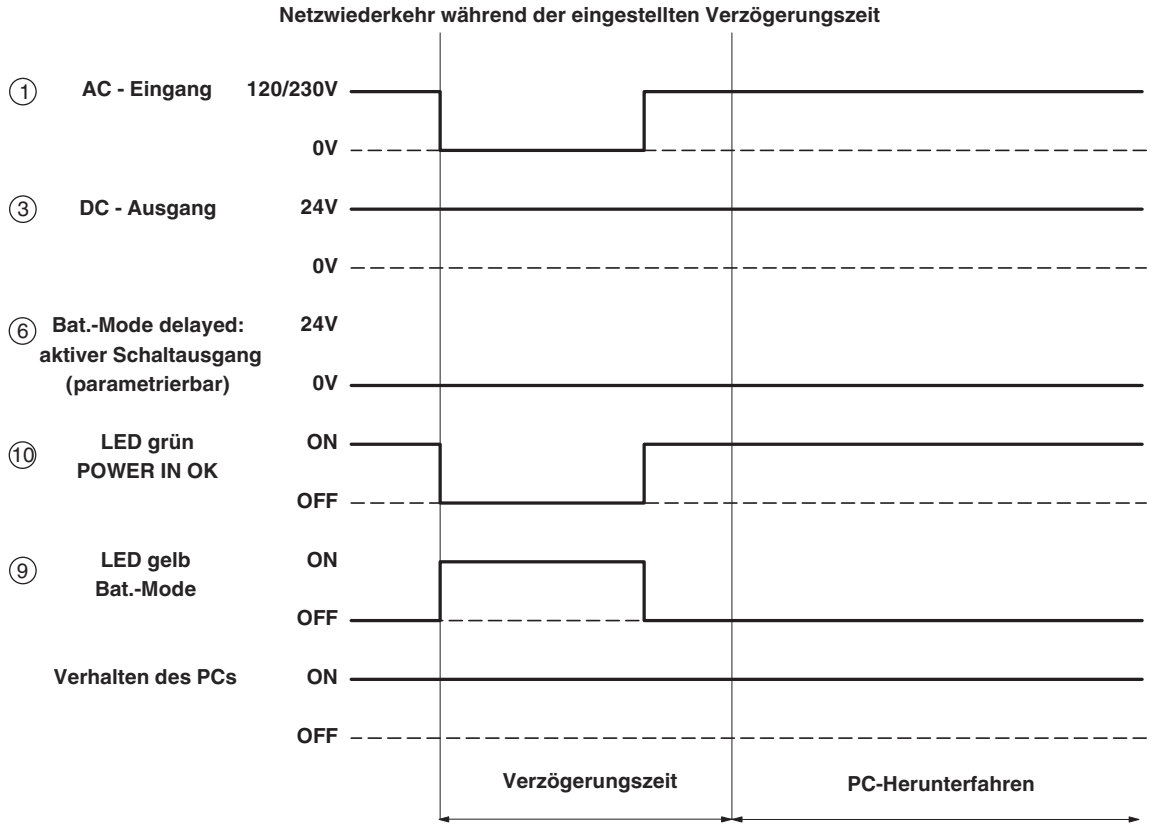


Diagram



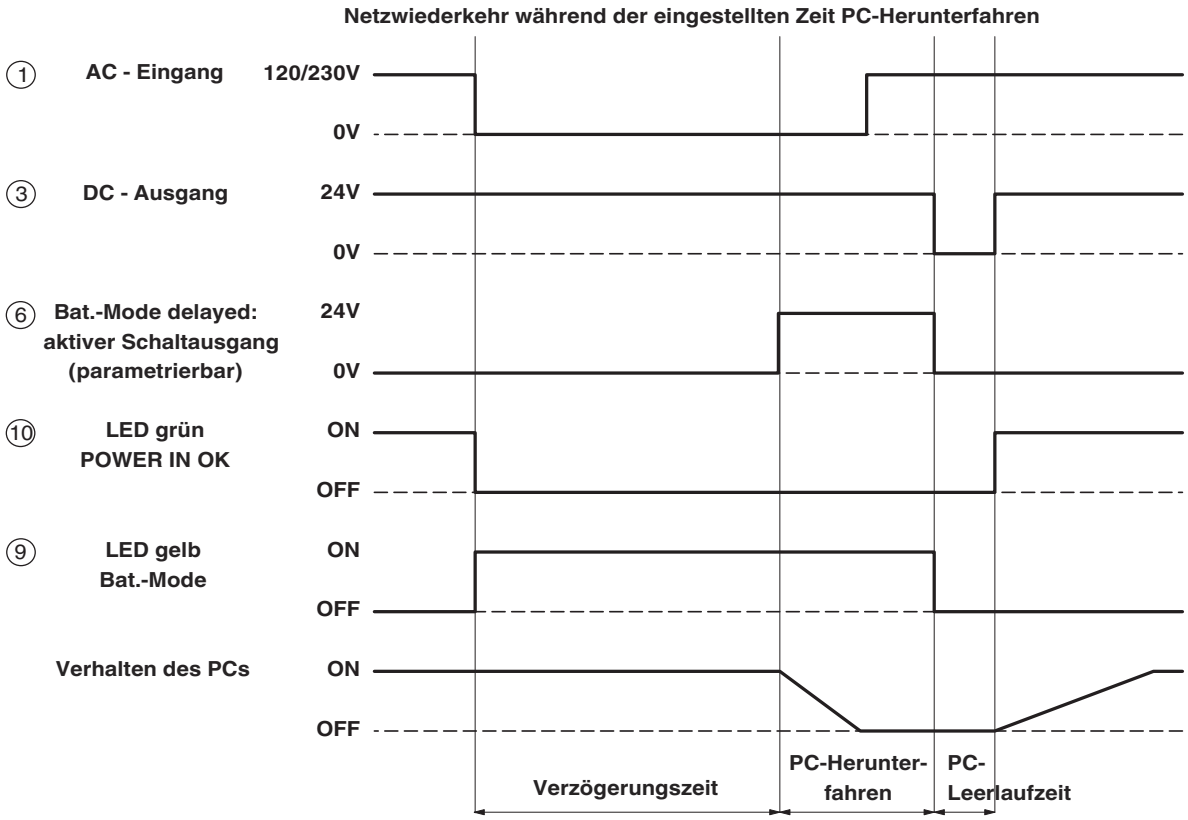
Uninterruptible power supply - TRIO-UPS/1AC/24DC/ 5 - 2866611

Diagram



Uninterruptible power supply - TRIO-UPS/1AC/24DC/ 5 - 2866611

Diagram



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FAZ Circuit Breakers

Optimum and Efficient Protection for Every Application

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Product Selection	**V4-T1-69**
Accessories	**V4-T1-75**
Technical Data and Specifications	**V4-T1-78**
Dimensions	**V4-T1-85**

FAZ Circuit Breakers

Product Overview

Optimum product quality, tested reliability and safety stand for best protection of personnel, installations and plant. Eaton's FAZ DIN rail mountable circuit breaker is designed for use in control panel applications.

Powerful offering for machine and system builders

The FAZ is available with B, C, D, K, S, and Z characteristics in accordance with UL 1077, CSA C22.2 No.235 and IEC 60947-2. These devices are CE marked.

Application Description

- Supplementary protection
- Control circuits
- Lighting
- Business equipment
- Appliances

Features

- Complete range of UL 1077 recognized DIN rail mounted miniature circuit breakers up to 63A current rating
- Standard ratings of 10 kAIC up to 277/480 Vac
- Current limiting design provides fast short-circuit interruption that reduces the let-through energy, which can damage the circuit
- Suitable for supplementary protection
- Thermal-magnetic overcurrent protection
  - Six levels of short-circuit protection, categorized by B, C, D, K, S, and Z curves
- Trip-free design—breaker can not be defeated by holding the handle in the ON position
- Captive screws cannot be lost
- Fulfill UL 1077, CSA C22.2 No.235 and also IEC 60947-2 Standard
- Field-installable shunt trip and auxiliary switch subsequent mounting
- Module width of only 17.7 mm (per pole)
- Contact position indicator (red/green)
- Easy installation on DIN rail
- Possibility for sealing the toggle in ON or OFF position

Discover These Advanced Features

Breakers install on standard DIN rail

Available in one-, two-, three-, four-pole, 1+N and 3+N models

Color-coded indicator provides breaker status for easy troubleshooting

Captive Posidrive terminal screws with finger and back-of-hand protection (IP20)

Trip-free design; breaker cannot be defeated by holding the handle in the ON position

Breaker information printed on the front of the device for quick identification

Standards and Certifications

FAZ complies with the latest national and international standards.

- UL 1077, CSA C22.2 No. 235
  - Apply to supplementary protectors intended for use as overcurrent, or overvoltage or undervoltage protection within an appliance or other electrical equipment where branch circuit protection is already provided, or is not required
- RoHS compliant
- VDE compliant
  - Devices with B, C, and D curves are VDE compliant
- CCC
  - Devices with B, C, and D curves are CCC compliant
- ABS compliant

Catalog Number Selection

FAZ C 6 / 1 SP

Breaker Family

FAZ = Supplementary protector

Trip Characteristics ①

B = 3–5X I_n
C = 5–10X I_n
D = 10–20X I_n
K = 8–12X I_n
S = 13–17X I_n
Z = 2–3X I_n

Ampere Rating

0.5 = 0.5A	**13** = 13A
1 = 1A	**15** = 15A
2 = 2A	**16** = 16A
3 = 3A	**20** = 20A
4 = 4A	**25** = 25A
5 = 5A	**30** = 30A
6 = 6A	**32** = 32A
7 = 7A	**40** = 40A
8 = 8A	**50** = 50A
10 = 10A	**63** = 63A

Number of Poles

1 = Single-pole	**4** = Single-pole
2 = Two-pole	**1N** = Single-pole + neutral
3 = Three-pole	**3N** = Three-pole + neutral

Single Package

SP = Single packaging of single-pole curve B, C and D for select amperes only
Blank = Standard packaging

Note

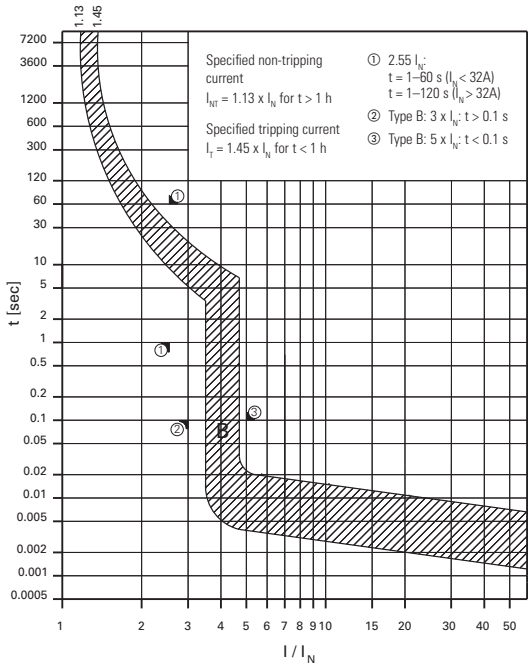
① I_n = Rated current for instantaneous trip characteristics.

Product Selection

FAZ B curve (3–5X I_n current rating)

- Designed for resistive or slightly inductive loads
- Response time of instantaneous trip: 3–5X I_n current rating
- UL recognized and CSA Certified as supplementary protectors
- For international and domestic use (conform to IEC 60947-2)
- UL file number 177451

Suitable for applications where protection against low-level short-circuit faults in control wiring is desired. Instantaneous trip is 3–5X continuous rating of device (I_n). Applications include PLC wiring, business equipment, lighting, appliances and some motors. Low magnetic trip point.



Single-Pole

Two-Pole

Three-Pole

B Curve (3–5X I_n Current Rating)—Designed for Resistive or Slightly Inductive Loads ①

Amperes	Single-Pole ② Catalog Number	Two-Pole Catalog Number	Three-Pole Catalog Number
1	FAZ-B1/1-SP	FAZ-B1/2	FAZ-B1/3
2	FAZ-B2/1-SP	FAZ-B2/2	FAZ-B2/3
3	FAZ-B3/1-SP	FAZ-B3/2	FAZ-B3/3
4	FAZ-B4/1-SP	FAZ-B4/2	FAZ-B4/3
5	FAZ-B5/1-SP	FAZ-B5/2	FAZ-B5/3
6	FAZ-B6/1-SP	FAZ-B6/2	FAZ-B6/3
7	FAZ-B7/1-SP	FAZ-B7/2	FAZ-B7/3
8	FAZ-B8/1-SP	FAZ-B8/2	FAZ-B8/3
10	FAZ-B10/1-SP	FAZ-B10/2	FAZ-B10/3
12	FAZ-B12/1-SP	FAZ-B12/2	FAZ-B12/3
13	FAZ-B13/1-SP	FAZ-B13/2	FAZ-B13/3
15	FAZ-B15/1-SP	FAZ-B15/2	FAZ-B15/3
16	FAZ-B16/1-SP	FAZ-B16/2	FAZ-B16/3
20	FAZ-B20/1-SP	FAZ-B20/2	FAZ-B20/3
25	FAZ-B25/1-SP	FAZ-B25/2	FAZ-B25/3
30	FAZ-B30/1-SP	FAZ-B30/2	FAZ-B30/3
32	FAZ-B32/1-SP	FAZ-B32/2	FAZ-B32/3
40	FAZ-B40/1-SP	FAZ-B40/2	FAZ-B40/3
50	FAZ-B50/1-SP	FAZ-B50/2	FAZ-B50/3
63	FAZ-B63/1-SP	FAZ-B63/2	FAZ-B63/3

Four-Pole

Single-Pole + Neutral

Three-Pole + Neutral

B Curve (3–5X I_n Current Rating)—Designed for Resistive or Slightly Inductive Loads, continued ①

Amperes	Four-Pole Catalog Number	Single-Pole + Neutral Catalog Number	Three-Pole + Neutral Catalog Number
1	FAZ-B1/4	FAZ-B1/1N	FAZ-B1/3N
2	FAZ-B2/4	FAZ-B2/1N	FAZ-B2/3N
3	FAZ-B3/4	FAZ-B3/1N	FAZ-B3/3N
4	FAZ-B4/4	FAZ-B4/1N	FAZ-B4/3N
5	FAZ-B5/4	FAZ-B5/1N	FAZ-B5/3N
6	FAZ-B6/4	FAZ-B6/1N	FAZ-B6/3N
7	FAZ-B7/4	FAZ-B7/1N	FAZ-B7/3N
8	FAZ-B8/4	FAZ-B8/1N	FAZ-B8/3N
10	FAZ-B10/4	FAZ-B10/1N	FAZ-B10/3N
12	FAZ-B12/4	FAZ-B12/1N	FAZ-B12/3N
13	FAZ-B13/4	FAZ-B13/1N	FAZ-B13/3N
15	FAZ-B15/4	FAZ-B15/1N	FAZ-B15/3N
16	FAZ-B16/4	FAZ-B16/1N	FAZ-B16/3N
20	FAZ-B20/4	FAZ-B20/1N	FAZ-B20/3N
25	FAZ-B25/4	FAZ-B25/1N	FAZ-B25/3N
30	FAZ-B30/4	FAZ-B30/1N	FAZ-B30/3N
32	FAZ-B32/4	FAZ-B32/1N	FAZ-B32/3N
40	FAZ-B40/4	FAZ-B40/1N	FAZ-B40/3N
50	FAZ-B50/4	FAZ-B50/1N	FAZ-B50/3N
63	FAZ-B63/4	FAZ-B63/1N	FAZ-B63/3N

Notes

① In North America, these switches are UL recognized and CSA Certified as supplementary protection devices. Per the intent of NEC (National Electrical Code), Article 240, and CEC (Canadian Electrical Code), Part 1 C22.1, supplementary breakers cannot be used as a substitute for the branch circuit protective device. They can be used to provide overcurrent protection within an appliance or other electrical equipment where branch circuit overcurrent protection is already provided, or is not required.

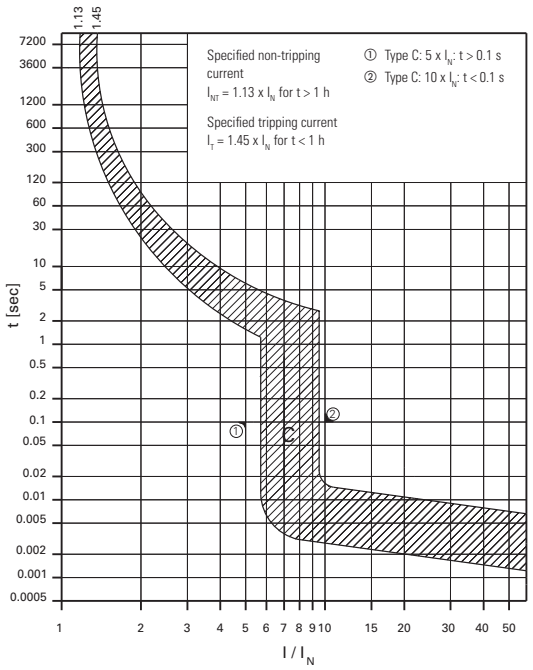
② Option for single packaging on single-pole B, C and D curves only; add suffix SP when ordering.

1

FAZ C curve (5–10X I_n current rating)

- Designed for inductive loads
- Response time of instantaneous trip: 5–10X I_n current rating
- UL recognized and CSA Certified as supplementary protectors
- For international and domestic use (conform to IEC 60947-2)
- UL file number 177451

Suitable for applications where medium levels of inrush current are expected. Instantaneous trip is 5–10X rating of device (I_n). Applications include small transformers, lighting, pilot devices, control circuits and coils. Medium magnetic trip point.



Single-Pole

Two-Pole

Three-Pole

C Curve (5–10X I_n Current Rating)—Designed Inductive Loads ①

Amperes	Single-Pole ② Catalog Number	Two-Pole Catalog Number	Three-Pole Catalog Number
0.5	FAZ-C0.5/1-SP	FAZ-C0.5/2	FAZ-C0.5/3
1	FAZ-C1/1-SP	FAZ-C1/2	FAZ-C1/3
1.6	FAZ-C1.6/1-SP	FAZ-C1.6/2	FAZ-C1.6/3
2	FAZ-C2/1-SP	FAZ-C2/2	FAZ-C2/3
3	FAZ-C3/1-SP	FAZ-C3/2	FAZ-C3/3
4	FAZ-C4/1-SP	FAZ-C4/2	FAZ-C4/3
5	FAZ-C5/1-SP	FAZ-C5/2	FAZ-C5/3
6	FAZ-C6/1-SP	FAZ-C6/2	FAZ-C6/3
7	FAZ-C7/1-SP	FAZ-C7/2	FAZ-C7/3
8	FAZ-C8/1-SP	FAZ-C8/2	FAZ-C8/3
10	FAZ-C10/1-SP	FAZ-C10/2	FAZ-C10/3
13	FAZ-C13/1-SP	FAZ-C13/2	FAZ-C13/3
15	FAZ-C15/1-SP	FAZ-C15/2	FAZ-C15/3
16	FAZ-C16/1-SP	FAZ-C16/2	FAZ-C16/3
20	FAZ-C20/1-SP	FAZ-C20/2	FAZ-C20/3
25	FAZ-C25/1-SP	FAZ-C25/2	FAZ-C25/3
30	FAZ-C30/1-SP	FAZ-C30/2	FAZ-C30/3
32	FAZ-C32/1-SP	FAZ-C32/2	FAZ-C32/3
40	FAZ-C40/1-SP	FAZ-C40/2	FAZ-C40/3
50	FAZ-C50/1-SP	FAZ-C50/2	FAZ-C50/3
63	FAZ-C63/1-SP	FAZ-C63/2	FAZ-C63/3

Four-Pole

Single-Pole + Neutral

Three-Pole + Neutral

C Curve (5–10X I_n Current Rating)—Designed Inductive Loads, continued ①

Amperes	Four-Pole Catalog Number	Single-Pole + Neutral Catalog Number	Three-Pole + Neutral Catalog Number
0.5	FAZ-C0.5/4	FAZ-C0.5/1N	FAZ-C0.5/3N
1	FAZ-C1/4	FAZ-C1/1N	FAZ-C1/3N
1.6	FAZ-C1.6/4	FAZ-C1.6/1N	FAZ-C1.6/3N
2	FAZ-C2/4	FAZ-C2/1N	FAZ-C2/3N
3	FAZ-C3/4	FAZ-C3/1N	FAZ-C3/3N
4	FAZ-C4/4	FAZ-C4/1N	FAZ-C4/3N
5	FAZ-C5/4	FAZ-C5/1N	FAZ-C5/3N
6	FAZ-C6/4	FAZ-C6/1N	FAZ-C6/3N
7	FAZ-C7/4	FAZ-C7/1N	FAZ-C7/3N
8	FAZ-C8/4	FAZ-C8/1N	FAZ-C8/3N
10	FAZ-C10/4	FAZ-C10/1N	FAZ-C10/3N
13	FAZ-C13/4	FAZ-C13/1N	FAZ-C13/3N
15	FAZ-C15/4	FAZ-C15/1N	FAZ-C15/3N
16	FAZ-C16/4	FAZ-C16/1N	FAZ-C16/3N
20	FAZ-C20/4	FAZ-C20/1N	FAZ-C20/3N
25	FAZ-C25/4	FAZ-C25/1N	FAZ-C25/3N
30	FAZ-C30/4	FAZ-C30/1N	FAZ-C30/3N
32	FAZ-C32/4	FAZ-C32/1N	FAZ-C32/3N
40	FAZ-C40/4	FAZ-C40/1N	FAZ-C40/3N
50	FAZ-C50/4	FAZ-C50/1N	FAZ-C50/3N
63	FAZ-C63/4	FAZ-C63/1N	FAZ-C63/3N

Notes

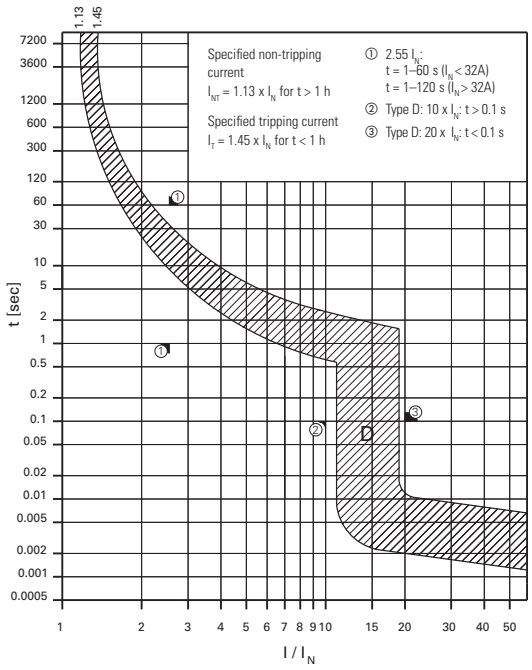
① In North America, these switches are UL recognized and CSA Certified as supplementary protection devices. Per the intent of NEC (National Electrical Code), Article 240, and CEC (Canadian Electrical Code), Part 1 C22.1, supplementary breakers cannot be used as a substitute for the branch circuit protective device. They can be used to provide overcurrent protection within an appliance or other electrical equipment where branch circuit overcurrent protection is already provided, or is not required.

② Option for single packaging on single-pole B, C and D curves only; add suffix SP when ordering.

FAZ D curve (10–20X I_n current rating)

- Designed for highly inductive loads
- Response time of instantaneous trip: 10–20X I_n current rating
- UL recognized and CSA Certified as supplementary protectors
- For international and domestic use (conform to IEC 60947-2)
- UL file number 177451

Suitable for applications where high levels of inrush current are expected. Instantaneous trip is 10–20X rating of device (I_n). The high magnetic trip point prevents nuisance tripping in high inductive applications such as motors, transformers and power supplies.



Single-Pole

Two-Pole

Three-Pole

D Curve (10–20X I_n Current Rating)—Designed for Inductive Loads ①

Amperes	Single-Pole ② Catalog Number	Two-Pole Catalog Number	Three-Pole Catalog Number
0.5	FAZ-D0.5/1-SP	FAZ-D0.5/2	FAZ-D0.5/3
1	FAZ-D1/1-SP	FAZ-D1/2	FAZ-D1/3
2	FAZ-D2/1-SP	FAZ-D2/2	FAZ-D2/3
3	FAZ-D3/1-SP	FAZ-D3/2	FAZ-D3/3
4	FAZ-D4/1-SP	FAZ-D4/2	FAZ-D4/3
5	FAZ-D5/1-SP	FAZ-D5/2	FAZ-D5/3
6	FAZ-D6/1-SP	FAZ-D6/2	FAZ-D6/3
7	FAZ-D7/1-SP	FAZ-D7/2	FAZ-D7/3
8	FAZ-D8/1-SP	FAZ-D8/2	FAZ-D8/3
10	FAZ-D10/1-SP	FAZ-D10/2	FAZ-D10/3
13	FAZ-D13/1-SP	FAZ-D13/2	FAZ-D13/3
15	FAZ-D15/1-SP	FAZ-D15/2	FAZ-D15/3
16	FAZ-D16/1-SP	FAZ-D16/2	FAZ-D16/3
20	FAZ-D20/1-SP	FAZ-D20/2	FAZ-D20/3
25	FAZ-D25/1-SP	FAZ-D25/2	FAZ-D25/3
30	FAZ-D30/1-SP	FAZ-D30/2	FAZ-D30/3
32	FAZ-D32/1-SP	FAZ-D32/2	FAZ-D32/3
40	FAZ-D40/1-SP	FAZ-D40/2	FAZ-D40/3
50 ③	FAZ-D50/1-SP	FAZ-D50/2	FAZ-D50/3
63 ③	FAZ-D63/1-SP	FAZ-D63/2	FAZ-D63/3

Four-Pole

Single-Pole + Neutral

Three-Pole + Neutral

D Curve (10–20X I_n Current Rating)—Designed for Inductive Loads, continued ①

Amperes	Four-Pole Catalog Number	Single-Pole + Neutral Catalog Number	Three-Pole + Neutral Catalog Number
0.5	FAZ-D0.5/4	FAZ-D0.5/1N	FAZ-D0.5/3N
1	FAZ-D1/4	FAZ-D1/1N	FAZ-D1/3N
2	FAZ-D2/4	FAZ-D2/1N	FAZ-D2/3N
3	FAZ-D3/4	FAZ-D3/1N	FAZ-D3/3N
4	FAZ-D4/4	FAZ-D4/1N	FAZ-D4/3N
5	FAZ-D5/4	FAZ-D5/1N	FAZ-D5/3N
6	FAZ-D6/4	FAZ-D6/1N	FAZ-D6/3N
7	FAZ-D7/4	FAZ-D7/1N	FAZ-D7/3N
8	FAZ-D8/4	FAZ-D8/1N	FAZ-D8/3N
10	FAZ-D10/4	FAZ-D10/1N	FAZ-D10/3N
13	FAZ-D13/4	FAZ-D13/1N	FAZ-D13/3N
15	FAZ-D15/4	FAZ-D15/1N	FAZ-D15/3N
16	FAZ-D16/4	FAZ-D16/1N	FAZ-D16/3N
20	FAZ-D20/4	FAZ-D20/1N	FAZ-D20/3N
25	FAZ-D25/4	FAZ-D25/1N	FAZ-D25/3N
30	FAZ-D30/4	FAZ-D30/1N	FAZ-D30/3N
32	FAZ-D32/4	FAZ-D32/1N	FAZ-D32/3N
40	FAZ-D40/4	FAZ-D40/1N	FAZ-D40/3N
50 ③	FAZ-D50/4	FAZ-D50/1N	FAZ-D50/3N
63 ③	FAZ-D63/4	FAZ-D63/1N	FAZ-D63/3N

Notes

① In North America, these switches are UL recognized and CSA Certified as supplementary protection devices. Per the intent of NEC (National Electrical Code), Article 240, and CEC (Canadian Electrical Code), Part 1 C22.1, supplementary breakers cannot be used as a substitute for the branch circuit protective device. They can be used to provide overcurrent protection within an appliance or other electrical equipment where branch circuit overcurrent protection is already provided, or is not required.

② Option for single packaging on single-pole B, C and D curves only; add suffix SP when ordering.

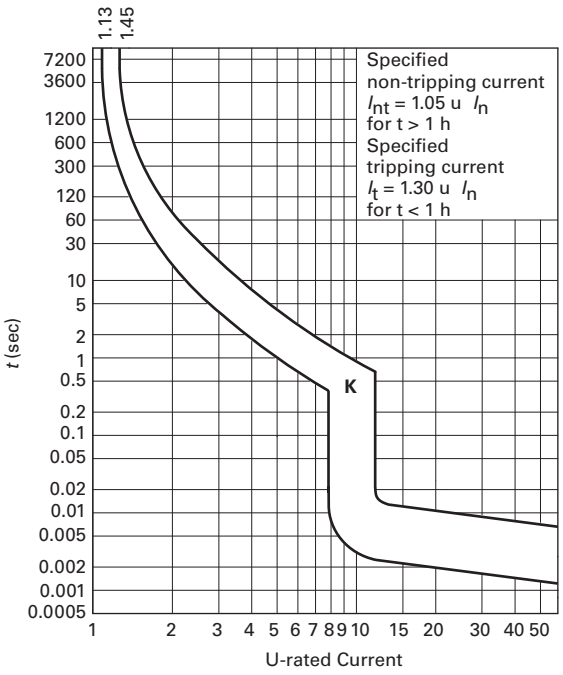
③ IEC 60947-2 only.

1

FAZ K curve (8–12X I_n current rating)

- Designed for motors, transformers and upstream electronics
- Response time of instantaneous trip: 8–12X I_n current rating
- UL recognized and CSA Certified as supplementary protectors
- For international and domestic use (conform to IEC 60947-2)
- UL file number 177451

Suitable for applications where medium levels of inrush current are expected. Instantaneous trip is 8–12X rating of device (I_n). Applications include small transformers, lighting, pilot devices, control circuits and coils. Medium magnetic trip point.



Single-Pole

Two-Pole

Three-Pole

K Curve (8–12X I_n Current Rating)—Designed for Inductive Loads ①②

Amperes	Single-Pole ③ Catalog Number	Two-Pole Catalog Number	Three-Pole Catalog Number
0.5	FAZ-K0.5/1	FAZ-K0.5/2	FAZ-K0.5/3
1	FAZ-K1/1	FAZ-K1/2	FAZ-K1/3
1.6	FAZ-K1.6/1	FAZ-K1.6/2	FAZ-K1.6/3
2	FAZ-K2/1	FAZ-K2/2	FAZ-K2/3
3	FAZ-K3/1	FAZ-K3/2	FAZ-K3/3
4	FAZ-K4/1	FAZ-K4/2	FAZ-K4/3
6	FAZ-K6/1	FAZ-K6/2	FAZ-K6/3
8	FAZ-K8/1	FAZ-K8/2	FAZ-K8/3
10	FAZ-K10/1	FAZ-K10/2	FAZ-K10/3
13	FAZ-K13/1	FAZ-K13/2	FAZ-K13/3
16	FAZ-K16/1	FAZ-K16/2	FAZ-K16/3
20	FAZ-K20/1	FAZ-K20/2	FAZ-K20/3
25	FAZ-K25/1	FAZ-K25/2	FAZ-K25/3
32	FAZ-K32/1	FAZ-K32/2	FAZ-K32/3
40	FAZ-K40/1	FAZ-K40/2	FAZ-K40/3
50	FAZ-K50/1	FAZ-K50/2	FAZ-K50/3
63	FAZ-K63/1	FAZ-K63/2	FAZ-K63/3

Four-Pole

Single-Pole + Neutral

Three-Pole + Neutral

K Curve (8–12X I_n Current Rating)—Designed for Inductive Loads, continued ①②

Amperes	Four-Pole ③ Catalog Number	Single-Pole + Neutral Catalog Number	Three-Pole + Neutral Catalog Number
0.5	FAZ-K0.5/4	FAZ-K0.5/1N	FAZ-K0.5/3N
1	FAZ-K1/4	FAZ-K1/1N	FAZ-K1/3N
1.6	FAZ-K1.6/4	FAZ-K1.6/1N	FAZ-K1.6/3N
2	FAZ-K2/4	FAZ-K2/1N	FAZ-K2/3N
3	FAZ-K3/4	FAZ-K3/1N	FAZ-K3/3N
4	FAZ-K4/4	FAZ-K4/1N	FAZ-K4/3N
6	FAZ-K6/4	FAZ-K6/1N	FAZ-K6/3N
8	FAZ-K8/4	FAZ-K8/1N	FAZ-K8/3N
10	FAZ-K10/4	FAZ-K10/1N	FAZ-K10/3N
13	FAZ-K13/4	FAZ-K13/1N	FAZ-K13/3N
16	FAZ-K16/4	FAZ-K16/1N	FAZ-K16/3N
20	FAZ-K20/4	FAZ-K20/1N	FAZ-K20/3N
25	FAZ-K25/4	FAZ-K25/1N	FAZ-K25/3N
32	FAZ-K32/4	FAZ-K32/1N	FAZ-K32/3N
40	FAZ-K40/4	FAZ-K40/1N	FAZ-K40/3N
50	FAZ-K50/4	FAZ-K50/1N	FAZ-K50/3N
63	FAZ-K63/4	FAZ-K63/1N	FAZ-K63/3N

Notes

① In North America, these switches are UL recognized and CSA Certified as supplementary protection devices. Per the intent of NEC (National Electrical Code), Article 240, and CEC (Canadian Electrical Code), Part 1 C22.1, supplementary breakers cannot be used as a substitute for the branch circuit protective device. They can be used to provide overcurrent protection within an appliance or other electrical equipment where branch circuit overcurrent protection is already provided, or is not required.

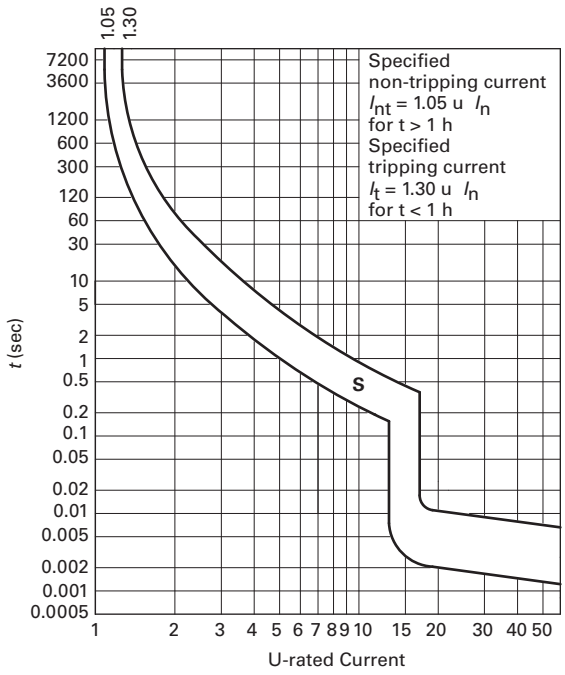
② These breakers are available by special order and may result in additional delivery time.

③ Two-piece box order, quantities of 2.

FAZ S curve (13–17X I_n current rating)

- Designed for control circuits with high inrush
- Response time of instantaneous trip: 13–17X I_n current rating
- UL recognized and CSA Certified as supplementary protectors
- For international and domestic use (conform to IEC 60947-2)
- UL file number 177451

Suitable for applications where high levels of inrush current are expected. Instantaneous trip is 13–17X rating of device (I_n). The high magnetic trip point prevents nuisance tripping in high inductive applications such as motors, transformers and power supplies.



Single-Pole

Two-Pole

S Curve (13–17X I_n Current Rating)—Designed for Inductive Loads ①②

Amperes	Single-Pole ③ Catalog Number	Two-Pole Catalog Number
1	**FAZ-S1/1**	**FAZ-S1/2**
2	**FAZ-S2/1**	**FAZ-S2/2**
3	**FAZ-S3/1**	**FAZ-S3/2**
4	**FAZ-S4/1**	**FAZ-S4/2**
6	**FAZ-S6/1**	**FAZ-S6/2**
10	**FAZ-S10/1**	**FAZ-S10/2**
16	**FAZ-S16/1**	**FAZ-S16/2**
20	**FAZ-S20/1**	**FAZ-S20/2**
25	**FAZ-S25/1**	**FAZ-S25/2**
32	**FAZ-S32/1**	**FAZ-S32/2**
40	**FAZ-S40/1**	**FAZ-S40/2**

Notes

① In North America, these switches are UL recognized and CSA Certified as supplementary protection devices. Per the intent of NEC (National Electrical Code), Article 240, and CEC (Canadian Electrical Code), Part 1 C22.1, supplementary breakers cannot be used as a substitute for the branch circuit protective device. They can be used to provide overcurrent protection within an appliance or other electrical equipment where branch circuit overcurrent protection is already provided, or is not required.

② These breakers are available by special order and may result in additional delivery time.

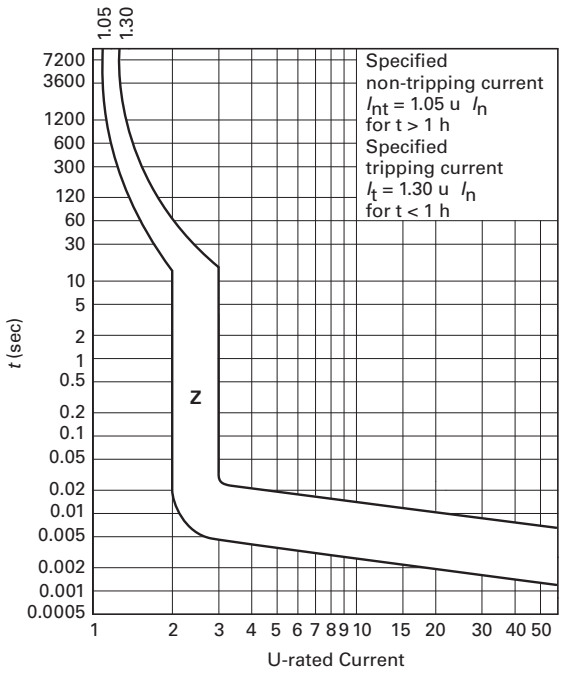
③ Two-piece box order, quantities of 2.

1

FAZ Z curve (2–3X I_n current rating)

- Designed for protection of electronic devices
- Response time of instantaneous trip: 2–3X I_n current rating
- UL recognized and CSA Certified as supplementary protectors
- For international and domestic use (conform to IEC 60947-2)

Suitable for applications where low levels of inrush current are expected. Instantaneous trip is 2–3X rating of device (I_n). Applications include small transformers, lighting, pilot devices, control circuits and coils. Medium magnetic trip point.



Single-Pole

Two-Pole

Z Curve (2–3X I_n Current Rating)—Designed for Inductive Loads ①②

Amperes	Single-Pole ③ Catalog Number	Two-Pole Catalog Number
0.5	**FAZ-Z0.5/1**	**FAZ-Z0.5/2**
1	**FAZ-Z1/1**	**FAZ-Z1/2**
1.6	**FAZ-Z1.6/1**	**FAZ-Z1.6/2**
2	**FAZ-Z2/1**	**FAZ-Z2/2**
3	**FAZ-Z3/1**	**FAZ-Z3/2**
4	**FAZ-Z4/1**	**FAZ-Z4/2**
6	**FAZ-Z6/1**	**FAZ-Z6/2**
8	**FAZ-Z8/1**	**FAZ-Z8/2**
10	**FAZ-Z10/1**	**FAZ-Z10/2**
13	**FAZ-Z13/1**	**FAZ-Z13/2**
16	**FAZ-Z16/1**	**FAZ-Z16/2**
20	**FAZ-Z20/1**	**FAZ-Z20/2**
25	**FAZ-Z25/1**	**FAZ-Z25/2**
32	**FAZ-Z32/1**	**FAZ-Z32/2**
40	**FAZ-Z40/1**	**FAZ-Z40/2**
50	**FAZ-Z50/1**	**FAZ-Z50/2**
63	**FAZ-Z63/1**	**FAZ-Z63/2**

Three-Pole

Four-Pole

Z Curve (2–3X I_n Current Rating)—Designed for Inductive Loads, continued ①②

Amperes	Three-Pole Catalog Number	Four-Pole Catalog Number
0.5	**FAZ-Z0.5/3**	**FAZ-Z0.5/4**
1	**FAZ-Z1/3**	**FAZ-Z1/4**
1.6	**FAZ-Z1.6/3**	**FAZ-Z1.6/4**
2	**FAZ-Z2/3**	**FAZ-Z2/4**
3	**FAZ-Z3/3**	**FAZ-Z3/4**
4	**FAZ-Z4/3**	**FAZ-Z4/4**
6	**FAZ-Z6/3**	**FAZ-Z6/4**
8	**FAZ-Z8/3**	**FAZ-Z8/4**
10	**FAZ-Z10/3**	**FAZ-Z10/4**
13	**FAZ-Z13/3**	**FAZ-Z13/4**
16	**FAZ-Z16/3**	**FAZ-Z16/4**
20	**FAZ-Z20/3**	**FAZ-Z20/4**
25	**FAZ-Z25/3**	**FAZ-Z25/4**
32	**FAZ-Z32/3**	**FAZ-Z32/4**
40	**FAZ-Z40/3**	**FAZ-Z40/4**
50	**FAZ-Z50/3**	**FAZ-Z50/4**
63	**FAZ-Z63/3**	**FAZ-Z63/4**

Notes

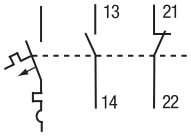
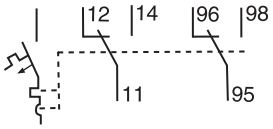
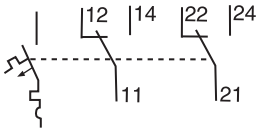
① In North America, these switches are UL recognized and CSA Certified as supplementary protection devices. Per the intent of NEC (National Electrical Code), Article 240, and CEC (Canadian Electrical Code), Part 1 C22.1, supplementary breakers cannot be used as a substitute for the branch circuit protective device. They can be used to provide overcurrent protection within an appliance or other electrical equipment where branch circuit overcurrent protection is already provided, or is not required.

② These breakers are available by special order and may result in additional delivery time.

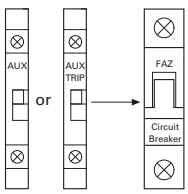
③ Two-piece box order, quantities of 2.

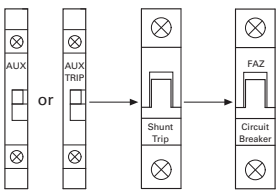
Accessories

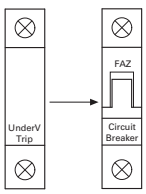
FAZ Auxiliary Contacts and Voltage Trips

	Circuit Diagram	Description	Rated Operational Voltage	Catalog Number
Standard Auxiliary Contacts				
		■ 1NO/1NC ■ Installs on left side of FAZ or shunt trip ■ Max. one per FAZ (1077) device ■ Switches when FAZ is tripped electrically or manually	230 Vac	**FAZ-XHIN11**
		■ 1 changeover contact ■ Installs on left side of FAZ or shunt trip ■ Max. one per FAZ (1077) device ■ Switches when FAZ is tripped electrically or manually	230 Vac	**FAZ-XHINW1**
Auxiliary/Trip Indicating Contact				
	 Two-pole auxiliary mode  Trip indicating mode	■ Small selector screw changes mode ■ Two Form C (changeover) contacts ■ Installs on left side of FAZ or shunt trip ■ Auxiliary contacts switch when FAZ is tripped electrically or manually ■ Trip indicating contact switches only when FAZ is tripped electrically	230 Vac	**FAZ-XAM002**
Undervoltage Trip				
		■ Prevents FAZ from operating unless voltage is present ■ Installs on left side of FAZ ■ Includes test button	115 Vac 230 Vac 400 Vac	**FAZ-XUA(115VAC)** **FAZ-XUA(230VAC)** **FAZ-XUA(400VAC)**
Shunt Trip				
		■ Allows remote trip of FAZ ■ Installs on left side of FAZ	12–110 Vac 12–60 Vdc 110–415 Vac 110–230 Vdc	**FAZ-XAA-C-12-110VAC** **FAZ-XAA-C-110-415VAC**

Allowable Combinations of Accessories

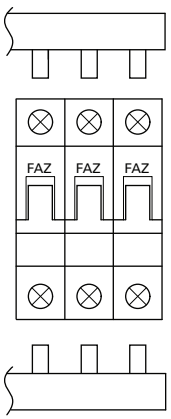


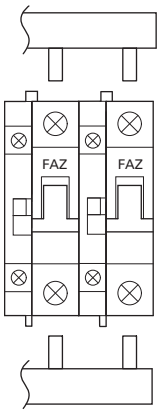




Busbar System

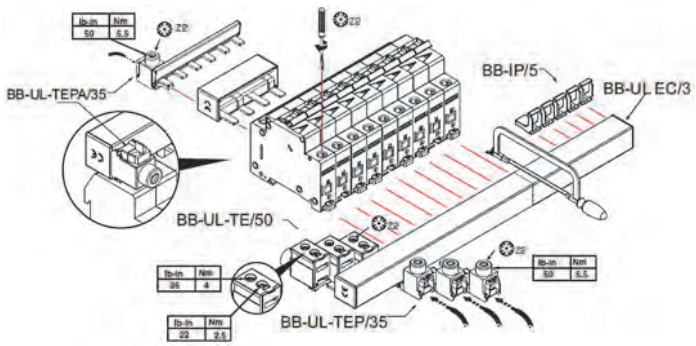
Description	Rated Operational Current	Number of Poles per Device	Number of Terminals	Catalog Number ①
Without Auxiliary Contacts				
For connecting FAZ supplementary protectors without auxiliary contacts. May be fed from line or load side.	80A	1	57	**BB-UL-18/1P-1M/57**
		2	56	**BB-UL-18/2P-2M/56**
		3	57	**BB-UL-18/3P-3M/57**
	100A	1	57	**BB-UL-25/1P-1M/57**
		2	56	**BB-UL-25/2P-2M/56**
		3	57	**BB-UL-25/3P-3M/57**
Auxiliary/Trip Indicating Contacts				
For connecting FAZ supplementary protectors with auxiliary contacts. May be fed from line or load side.	80A	1	37	**BB-UL-18/1P-1,5M/37**
		2	46	**BB-UL-18/2P+AS-2,5M/46**
		3	48	**BB-UL-18/3P+AS-3,5M/48**
	100A	1	37	**BB-UL-25/1P-1,5M/37**
		2	46	**BB-UL-25/2P+AS-2,5M/46**
		3	48	**BB-UL-25/3P+AS-3,5M/48**



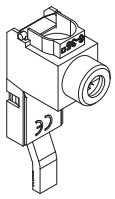


Note

① Bus may be center fed for high current capacity.



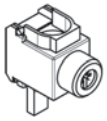
Incoming Terminal



Pin Type Incoming Supply Terminals

Description	Catalog Number
■ Accommodates conductors from 6–35 mm^2/#10–2 AWG ■ 4–5.5 Nm/35–50 lb-in ■ Two- and three-pole	BB-UL-TEP/35

Incoming Terminal

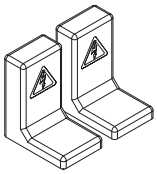


Pin Type Incoming Supply Terminals—Single-Phase Only

Description	Catalog Number
■ Accommodates conductors from 6–35 mm^2/#10–2 AWG ■ 4–5.5 Nm/35–50 lb-in	BB-UL-TEPA/35

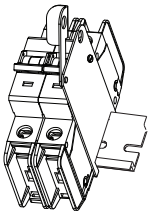
Protective Accessories

Busbar Terminal Cover



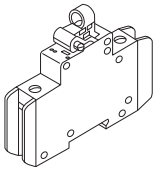
Description	Catalog Number
For covering unused terminals	BB-IP/5

Lockoff Device



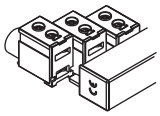
UL lockoff device	FAZPLOFF

Padlock Hasp



■ Prevents reactivation of the device during maintenance ■ Holds one padlock	Z-IS/SPE-1TE

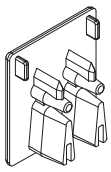
Incoming Terminal

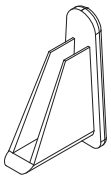


Bus Incoming Supply Terminals

Description	Catalog Number
■ 50 mm^2 ■ #14–1 AWG ■ 75 Deg wire ■ 115 A/Y, 480V UL ■ 160 A/Y 690V IEC	BB-UL-TE/50

Fork Connector





Busbar End Cap

Description	Poles	Catalog Number
■ Install after cutting busbar ■ Protects end of busbar	2 and 3	BB-EV-EC/3
	1	BB-UL-EC/1

1

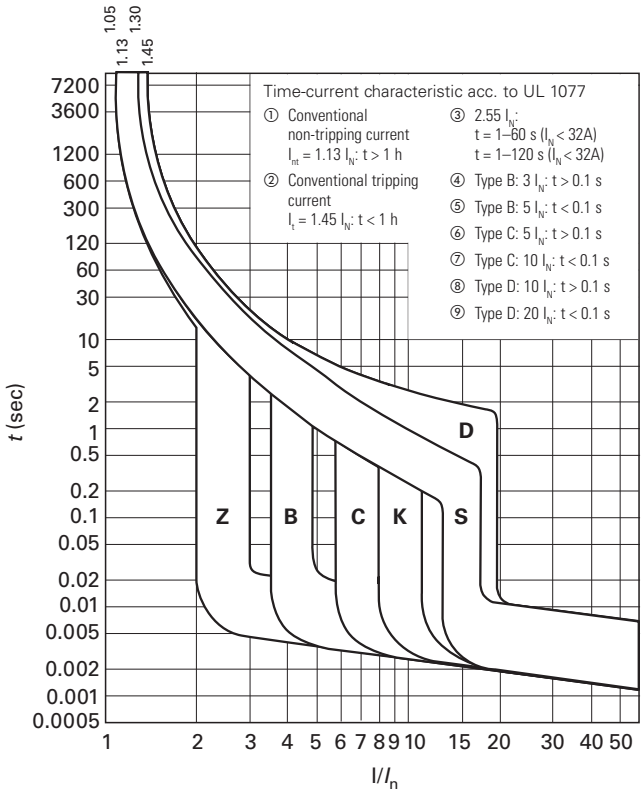
Technical Data and Specifications

Trip Curves Chart

Eaton FAZ supplementary protectors are available with six different tripping characteristics, including Type B, C, D, K, S and Z. Definitions for each trip curve are contained on the ordering pages and can be used to determine the optimal characteristic for your application. For example, low-level short-circuit faults in control wiring, such as PLCs, are best protected by devices with Type B trip characteristics (3–5X continuous rating of the device (I_n).

Even though not required by NEC or CEC for supplementary protectors, Eaton's FAZ devices are current limiting, which means that they interrupt fault currents within one half cycle. Current limiting devices offer superior protection by reducing peak let-through current and energy.

Tripping Characteristics



FAZ Miniature Circuit Breakers Technical Data

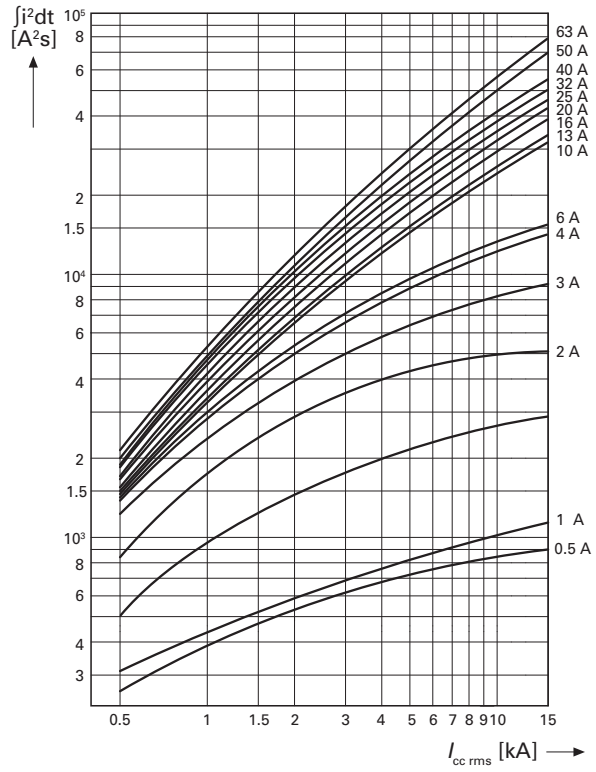
Description	B Curve	C Curve	D Curve
Electrical			
Approvals	UR (UL 1077), CSA (CSA 22.2 No. 235), CE		
Standards	IEC/EN 60947-2		
Short-circuit trip response	3–5 I_n	5–10 I_n	10–20 I_n
Supplementary Protectors—UL/CSA			
Current range	1–63A	0.5–63A	0.5–40A
Maximum voltage ratings—UL/CSA			
Single-pole, single-pole + neutral	277 Vac 48 Vdc	277 Vac 48 Vdc	277 Vac 48 Vdc
Two-, three-pole, four-pole and three-pole + neutral	480Y/277 Vac	480Y/277 Vac	480Y/277 Vac
Two poles in series	96 Vdc	96 Vdc	96 Vdc
Thermal tripping characteristics			
Single-pole	1.35 x I_n @ 40°C	1.35 x I_n @ 40°C	1.35 x I_n @ 40°C
Multi-pole	1.45 x I_n @ 40°C	1.45 x I_n @ 40°C	1.45 x I_n @ 40°C
Short-circuit ratings (at max. voltage)			
Single-pole	10 kA (5 kA for 40–63A device)	10 kA (5 kA for 40–63A device)	5 kA
Two-, three-pole	10 kA (5 kA for 40–63A device)	10 kA (5 kA for 40–63A device)	5 kA
Single-pole	10 kA @ 48 Vdc	10 kA @ 48 Vdc	10 kA @ 48 Vdc
Two poles in series	10 kA @ 96 Vdc	10 kA @ 96 Vdc	10 kA @ 96 Vdc
Miniature Circuit Breaker—IEC			
Current range	1–63A	0.5–63A	0.5–63A
Maximum voltage ratings—IEC 68898-1			
Single-pole	230 Vac	230 Vac	230 Vac
Two-, three-pole	230/400 Vac	230/400 Vac	230/400 Vac
Maximum voltage ratings—IEC 60947-2			
Single-pole	240 Vac 48 Vdc	240 Vac 48 Vdc	240 Vac 48 Vdc
Two-, three-pole	240/415 Vac	240/415 Vac	240/415 Vac
Two poles in series	96 Vdc	96 Vdc	96 Vdc
Thermal tripping characteristics			
Single-pole	> 1 hour @ 1.05 x I_n	> 1 hour @ 1.05 x I_n	> 1 hour @ 1.05 x I_n
Multi-pole	< 1 hour @ 1.3 x I_n	< 1 hour @ 1.3 x I_n	< 1 hour @ 1.3 x I_n
Interrupt ratings (at max. voltage)			
IEC 60947-2	15 kA	15 kA	15 kA (10 kA for 50 and 63A)
IEC 60898	10 kA	10 kA	10 kA (50 and 63A not available)
Operational switching capacity	7.5 kA	7.5 kA	7.5 kA
Max. backup fuse [gL/gG]	125A	125A	125A
Rated impulse withstand—U_{imp}	4000 Vac	4000 Vac	4000 Vac
Rated insulation voltage—U_i	440 Vac	440 Vac	440 Vac
Environmental/General			
Selectivity class	3	3	3
Lifespan (operations)	> 10,000 (1 operation = ON/OFF)	> 10,000 (1 operation = ON/OFF)	> 10,000 (1 operation = ON/OFF)
Shock (IEC 68-2-22)	10g–120 ms	10g–120 ms	10g–120 ms
Operating temperature range	–40 to +167°F (–40 to +75°C)	–40 to +167°F (–40 to +75°C)	–40 to +167°F (–40 to +75°C)
Shipment and short-term storage	–40 to +185°F (–40 to +85°C)	–40 to +185°F (–40 to +85°C)	–40 to +185°F (–40 to +85°C)
Housing material	Nylon	Nylon	Nylon
Mechanical			
Standard front dimension			
Device height	80 mm	80 mm	80 mm
Terminal protection	Finger and back-of-hand proof to IEC 536	Finger and back-of-hand proof to IEC 536	Finger and back-of-hand proof to IEC 536
Mounting width per pole	17.5 mm	17.5 mm	17.5 mm
Mounting	IEC/EN 60715 top-hat rail	IEC/EN 60715 top-hat rail	IEC/EN 60715 top-hat rail
Degree of protection	IP20	IP20	IP20
Terminals top and bottom	Twin-purpose terminals	Twin-purpose terminals	Twin-purpose terminals
Supply connection	Line or load side	Line or load side	Line or load side
Terminal capacity [mm^2]	1 x 25 (AWG 4–18)/2 x 10 (AWG 8–18)	1 x 25 (AWG 4–18)/2 x 10 (AWG 8–18)	1 x 25 (AWG 4–18)/2 x 10 (AWG 8–18)
Torque	2.4 Nm	2.4 Nm	2.4 Nm
Imperial torque	21 lb-in (AWG 18–12), 25 lb-in (AWG 10–8), 36 lb-in (AWG 6–4)	21 lb-in (AWG 18–12), 25 lb-in (AWG 10–8), 36 lb-in (AWG 6–4)	21 lb-in (AWG 18–12), 25 lb-in (AWG 10–8), 36 lb-in (AWG 6–4)
Thickness of busbar material	0.8–2 mm	0.8–2 mm	0.8–2 mm
Mounting position	As required	As required	As required

FAZ Miniature Circuit Breakers Technical Data, continued

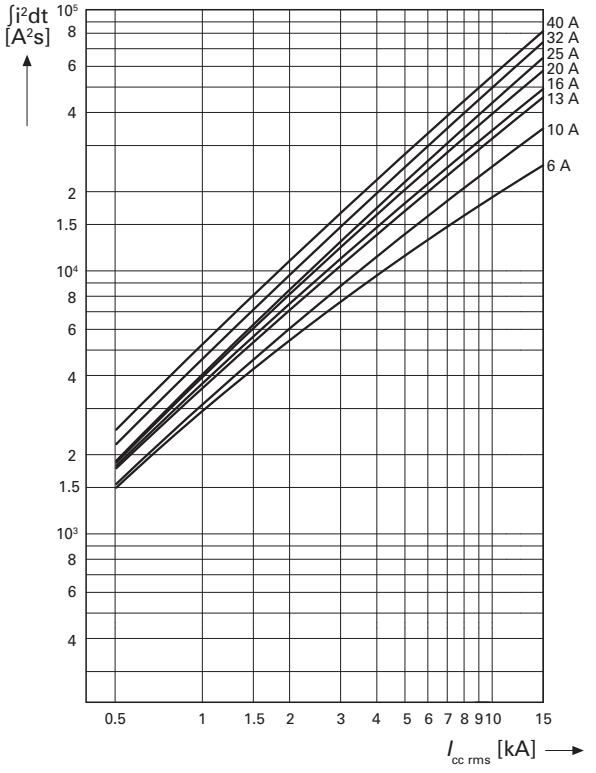
Description	K Curve	S Curve	Z Curve
Electrical			
Approvals	UR (UL 1077), CSA (CSA 22.2 No. 235), CE		
Standards	IEC/EN 60947-2, E177451, 204453		
Short-circuit trip response	8–12 I_n	13–17 I_n	2–3 I_n
Supplementary Protectors—UL/CSA			
Current range	0.5–63A	0.5–40A	1–63A
Maximum voltage ratings—UL/CSA			
Single-pole, single-pole + neutral	277 Vac 48 Vdc	277 Vac 48 Vdc	277 Vac 48 Vdc
Two-, three-, four-pole and three-pole + neutral	480Y/277 Vac	480Y/277 Vac	480Y/277 Vac
Two poles in series	96 Vdc	96 Vdc	96 Vdc
Thermal tripping characteristics			
Single-pole	1.35 x I_n @ 40°C	1.35 x I_n @ 40°C	1.35 x I_n @ 40°C
Multi-pole	1.45 x I_n @ 40°C	1.45 x I_n @ 40°C	1.45 x I_n @ 40°C
Short-circuit ratings (at max. voltage)			
Single-pole	5 kA @ 277 Vac	5 kA @ 277 Vac	5 kA @ 277 Vac
Single-pole + neutral	5 kA @ 277 Vac	5 kA @ 277 Vac	5 kA @ 277 Vac
Two-, three-, four-pole	5 kA @ 480Y/277 Vac	5 kA @ 480Y/277 Vac	5 kA @ 480Y/277 Vac
Two poles in series	—	—	—
Miniature Circuit Breaker—IEC			
Current range	0.5–63A	0.5–40A	1–63A
Maximum voltage ratings—IEC 60947-2			
Single-pole, single-pole + neutral	240 Vac	240 Vac	240 Vac
Two-, three-, four-pole, three-pole + neutral	240/415 Vac	240/415 Vac	240/415 Vac
Thermal tripping characteristics			
Single-pole	> 1 Hour @ 1.05 x I_n	> 1 Hour @ 1.05 x I_n	> 1 Hour @ 1.05 x I_n
Multi-pole	< 1 Hour @ 1.3 x I_n	< 1 Hour @ 1.3 x I_n	< 1 Hour @ 1.3 x I_n
Interrupt ratings (at max. voltage)			
IEC 60947-2	15 kA	10 kA	10 kA
Operational switching capacity	7.5 kA	7.5 kA	7.5 kA
Max. backup fuse [gL/gG]	125A	125A	125A
Rated impulse withstand—U_{imp}	4000 Vac	4000 Vac	4000 Vac
Rated insulation voltage—U_i	440 Vac	440 Vac	440 Vac
Environmental/General			
Selectivity class	3	3	3
Lifespan (operations)	> 10,000 (1 operation = ON/OFF)	> 10,000 (1 operation = ON/OFF)	> 10,000 (1 operation = ON/OFF)
Shock (IEC 68-2-22)	10g–120 ms	10g–120 ms	10g–120 ms
Operating temperature range	–40 to +167°F (–40 to +75°C)	–40 to +167°F (–40 to +75°C)	–40 to +167°F (–40 to +75°C)
Shipment and short-term storage	–40 to +185°F (–40 to +85°C)	–40 to +185°F (–40 to +85°C)	–40 to +185°F (–40 to +85°C)
Housing material	Nylon	Nylon	Nylon
Mechanical			
Standard front dimension			
Device height	80 mm	80 mm	80 mm
Terminal protection	Finger and back-of-hand proof to IEC 536	Finger and back-of-hand proof to IEC 536	Finger and back-of-hand proof to IEC 536
Mounting width per pole	17.7 mm	17.7 mm	17.7 mm
Mounting	IEC/EN 60715 top-hat rail	IEC/EN 60715 top-hat rail	IEC/EN 60715 top-hat rail
Degree of protection	IP20	IP20	IP20
Terminals top and bottom	Twin-purpose terminals	Twin-purpose terminals	Twin-purpose terminals
Supply connection	Line or load side	Line or load side	Line or load side
Terminal capacity [mm^2]	1 x 25 (AWG 4–18) / 2 x 10 (AWG 8–18)	1 x 25 (AWG 4–18) / 2 x 10 (AWG 8–18)	1 x 25 (AWG 4–18) / 2 x 10 (AWG 8–18)
Torque	2.4 Nm	2.4 Nm	2.4 Nm
Imperial torque	21 lb-in (AWG 18–12), 25 lb-in (AWG 10–8), 36 lb-in (AWG 6–4)	21 lb-in (AWG 18–12), 25 lb-in (AWG 10–8), 36 lb-in (AWG 6–4)	21 lb-in (AWG 18–12), 25 lb-in (AWG 10–8), 36 lb-in (AWG 6–4)
Thickness of busbar material	0.8–2 mm	0.8–2 mm	0.8–2 mm
Mounting position	As required	As required	As required

Let-Through Energy I^2t

Characteristic B and C

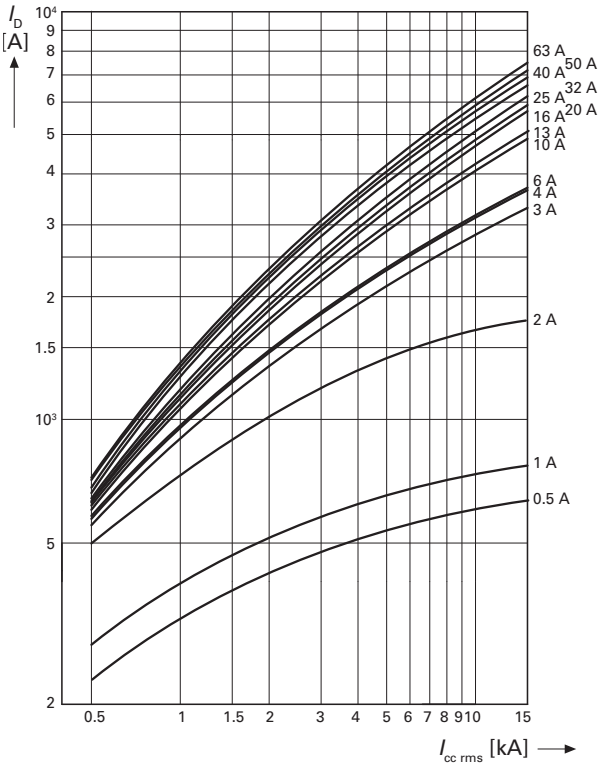


Characteristic D

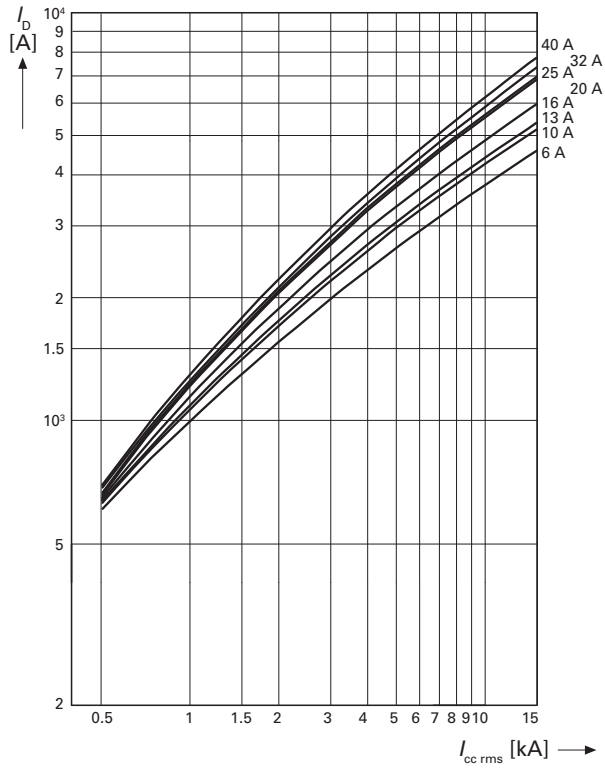


Let-Through Energy I_D

Characteristic B and C



Characteristic D



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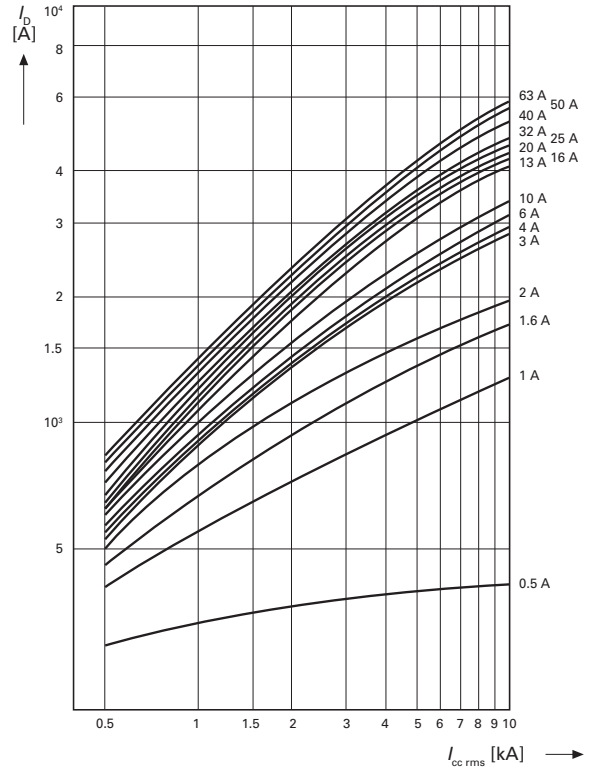
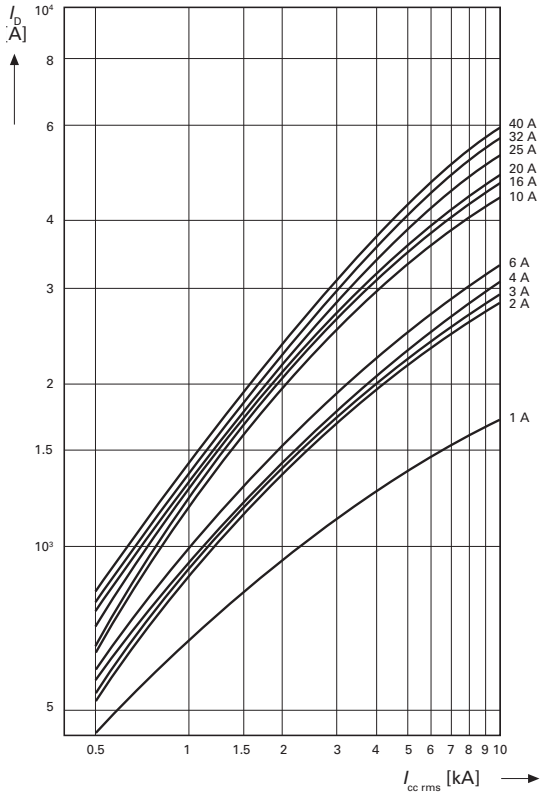
Let-Through Energy I^2t

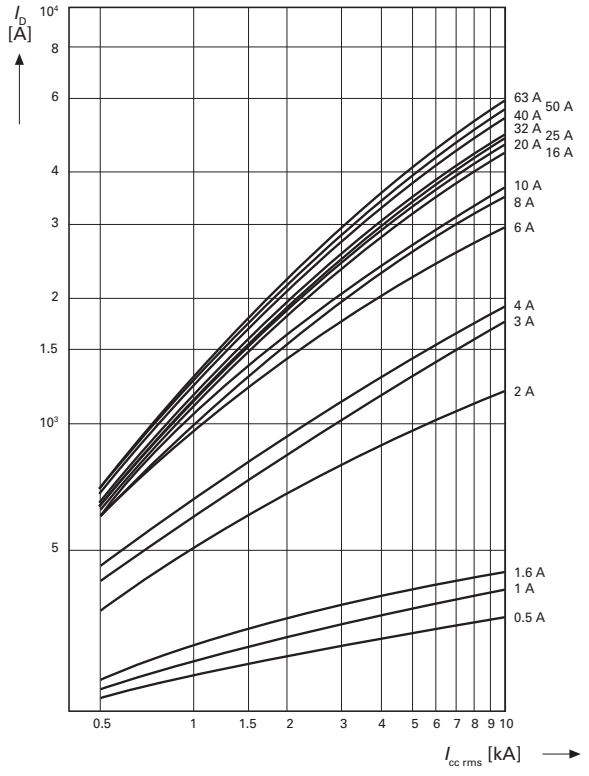
Characteristic K



Characteristic S



Characteristic Z



Influence of the Ambient Temperature on the Thermal Tripping Behavior

Corrected values of the rated current dependent on the ambient temperature

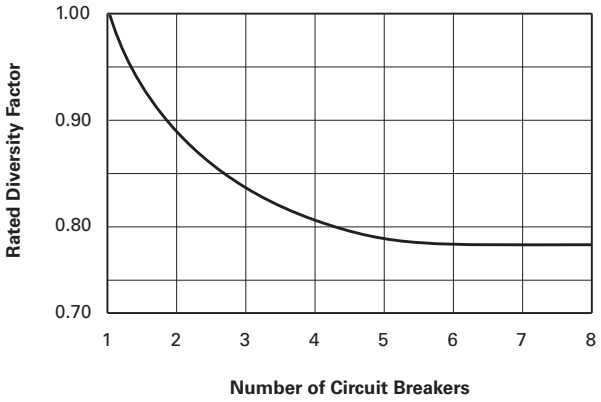
	Ambient Temperature T																
I_n (A)	–40°C	–30°C	–20°C	–10°C	0°C	10°C	20°C	30°C	35°C	40°C	45°C	50°C	55°C	60°C	65°C	70°C	75°C
0.16	0.20	0.20	0.19	0.19	0.18	0.17	0.17	0.16	0.16	0.15	0.15	0.15	0.14	0.14	0.14	0.14	0.13
0.25	0.32	0.31	0.30	0.29	0.28	0.27	0.26	0.25	0.25	0.24	0.24	0.23	0.23	0.22	0.22	0.21	0.21
0.50	0.64	0.62	0.60	0.58	0.56	0.54	0.52	0.50	0.49	0.48	0.47	0.46	0.45	0.44	0.43	0.42	0.41
0.75	0.96	0.93	0.90	0.87	0.84	0.81	0.78	0.75	0.74	0.73	0.71	0.69	0.68	0.66	0.65	0.64	0.62
1.00	1.30	1.20	1.20	1.20	1.10	1.10	1.00	1.00	0.99	0.97	0.95	0.93	0.90	0.89	0.87	0.85	0.83
1.50	1.90	1.90	1.80	1.70	1.70	1.60	1.60	1.50	1.50	1.50	1.40	1.40	1.40	1.30	1.30	1.30	1.20
1.60	2.00	2.00	1.90	1.90	1.80	1.70	1.70	1.60	1.60	1.50	1.50	1.50	1.40	1.40	1.40	1.40	1.30
2.00	2.60	2.50	2.40	2.30	2.20	2.20	2.10	2.00	2.00	1.90	1.90	1.90	1.80	1.80	1.70	1.70	1.70
2.50	3.20	3.10	3.00	2.90	2.80	2.70	2.60	2.50	2.50	2.40	2.40	2.30	2.30	2.20	2.20	2.10	2.10
3.00	3.80	3.70	3.60	3.50	3.40	3.30	3.10	3.00	3.00	2.90	2.80	2.80	2.70	2.70	2.60	2.50	2.50
3.50	4.50	4.40	4.20	4.10	3.90	3.80	3.70	3.50	3.40	3.40	3.30	3.20	3.20	3.10	3.00	3.00	2.90
4.00	5.10	5.00	4.80	4.70	4.50	4.30	4.20	4.00	3.90	3.90	3.80	3.70	3.60	3.50	3.50	3.40	3.30
5.00	6.40	6.20	6.00	5.80	5.60	5.40	5.20	5.00	4.90	4.80	4.70	4.60	4.50	4.40	4.30	4.20	4.10
6.00	7.70	7.50	7.20	7.00	6.70	6.50	6.30	6.00	5.90	5.80	5.70	5.60	5.40	5.30	5.20	5.10	5.00
7.00	9.00	8.70	8.40	8.20	7.80	7.60	7.40	7.00	6.90	6.80	6.70	6.50	6.30	6.20	6.10	6.00	5.80
8.00	10.20	9.90	9.60	9.30	9.00	8.70	8.40	8.00	7.90	7.70	7.60	7.40	7.20	7.10	6.90	6.80	6.60
10.00	13.00	12.00	12.00	12.00	11.00	11.00	10.00	10.00	9.90	9.70	9.50	9.30	9.00	8.90	8.70	8.50	8.30
12.00	15.00	15.00	14.00	14.00	13.00	13.00	13.00	12.00	12.00	12.00	11.00	11.00	11.00	11.00	10.00	10.00	10.00
13.00	17.00	16.00	16.00	15.00	15.00	14.00	14.00	13.00	13.00	13.00	12.00	12.00	12.00	12.00	11.00	11.00	11.00
15.00	19.00	19.00	18.00	17.00	17.00	16.00	16.00	15.00	15.00	15.00	14.00	14.00	14.00	13.00	13.00	13.00	12.00
16.00	20.00	20.00	19.00	19.00	18.00	17.00	17.00	16.00	16.00	15.00	15.00	15.00	14.00	14.00	14.00	14.00	13.00
20.00	26.00	25.00	24.00	23.00	22.00	22.00	21.00	20.00	20.00	19.00	19.00	19.00	18.00	18.00	17.00	17.00	17.00
25.00	32.00	31.00	30.00	29.00	28.00	27.00	26.00	25.00	25.00	24.00	24.00	23.00	23.00	22.00	22.00	21.00	21.00
32.00	41.00	40.00	38.00	37.00	36.00	35.00	33.00	32.00	32.00	31.00	30.00	30.00	29.00	28.00	28.00	27.00	26.00
35.00	45.00	43.00	41.00	41.00	38.00	38.00	36.00	35.00	35.00	34.00	33.00	32.00	32.00	32.00	30.00	29.00	29.00
40.00	51.00	50.00	48.00	47.00	45.00	43.00	42.00	40.00	39.00	39.00	38.00	37.00	36.00	35.00	35.00	34.00	33.00
50.00	64.00	62.00	60.00	58.00	56.00	54.00	52.00	50.00	49.00	48.00	47.00	46.00	45.00	44.00	43.00	42.00	41.00
63.00	81.00	78.00	76.00	73.00	71.00	68.00	66.00	63.00	62.00	61.00	60.00	58.00	57.00	56.00	55.00	53.00	52.00

Influence of the Mains Frequency

Influence of the mains frequency on the tripping behavior I_{MA} of the instantaneous release

	Mains Frequency f [Hz]						
	16 2/3	50	60	100	200	300	400
$I_{MA}(f)/I_{MA}$ (50 Hz) [%]	91	100	101	106	115	134	141

Load Carrying Capacity of Adjoining Miniature Circuit Breakers



Accessories Technical Data

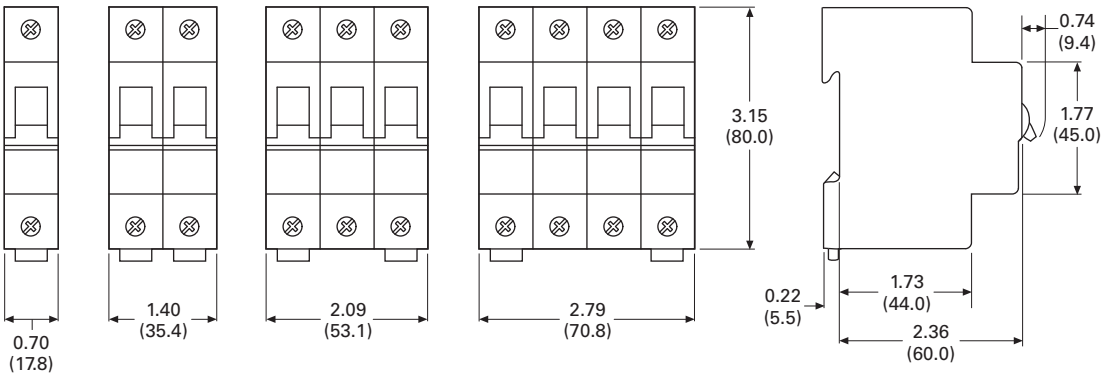
Description	FAZ-XHIN FAZ-XAM002	FAZ-XAA-C	FAZ-XUA
Electrical			
Contact function	1A + 1B 2 C/O	— —	— —
Rated operational voltage U_n	250 Vac	—	115 Vac 230 Vac 400 Vac
Voltage range	—	12–110 Vac 12–60 Vdc	—
Voltage range	—	110–415 Vac 110–230 Vdc	—
Closing threshold [x U_n]	—	—	0.8
Tripping threshold [x U_n]	—	—	0.5
Rated frequency f	50/60 Hz	50/60 Hz	50/60 Hz
General use (UL/CSA) AC—230/240 Vac DC—110/120 Vdc	 2/2A 0.5/0.5A	 — —	 — —
Pilot duty	A600/Q600	—	—
Conventional free air thermal current I_{th}	4A	—	—
Rated operational current AC-13 I_e AC-15 I_e DC-13 I_e	 3A (250 Vac) 2A (250 Vac) 0.5A (110 Vdc)	 — — —	 — — —
Rated insulation voltage U_i	250 Vac	—	—
Minimum operating voltage per contract U_{min}	5 Vdc	—	—
Rated impulse withstand voltage (1.2/50µ) U_{imp}	2.5 kV	—	—
Rated conditional short-circuit current with 6A backup fuse I_{SC}	1 kA	—	—
Max. admissible backup fuse	4A gL	—	—
Mechanical			
Standard front dimension	45 mm	45 mm	45 mm
Device height	80 mm	80 mm	80 mm
Mounting width	8.8 mm	17.6 mm	17.8 mm
Mounting	On MCB	IEC/EN 60715 top-hat rail	IEC/EN 60715 top-hat rail
Degree of protection enclosed	IP40	IP40	IP40
Terminal protection	Protection against electric shock to IEC 536	Protection against electric shock to IEC 536	Protection against electric shock to IEC 536
Terminals	Lift terminals	Twin-purpose terminals	Twin-purpose terminals
Terminal capacity Solid Flexible	 0.5–2.5 mm^2 0.5–2.5 mm^2	 1–2.5 mm^2 1–2.5 mm^2	 2 x (1–2.5) mm^2 2 x (1–2.5) mm^2
Tightening torque of terminal screws	0.8–1.0 Nm (7–9 lb-in)	2.4 Nm (21 lb-in)	0.8 Nm (7 lb-in)

Dimensions

Approximate Dimensions in Inches (mm)

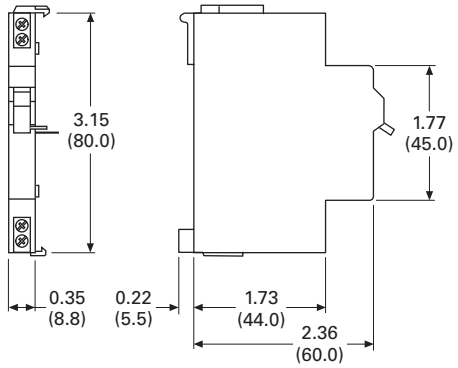
Miniature Circuit Breakers

FAZ

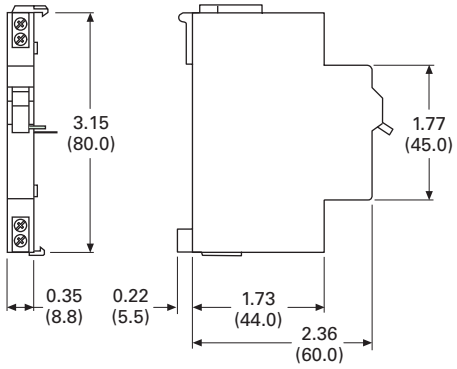


Auxiliary Contacts

FAZ-XHI11 and FAZ-XH1NW1

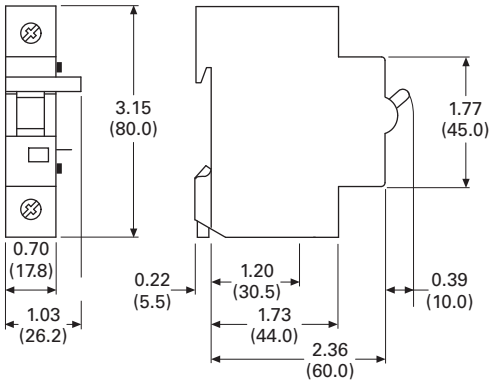


FAZ-XAM002



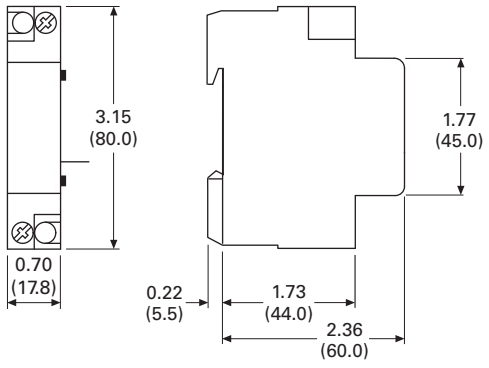
Shunt Releases

FAZ-XAA



Undervoltage Releases

FAZ-XUA



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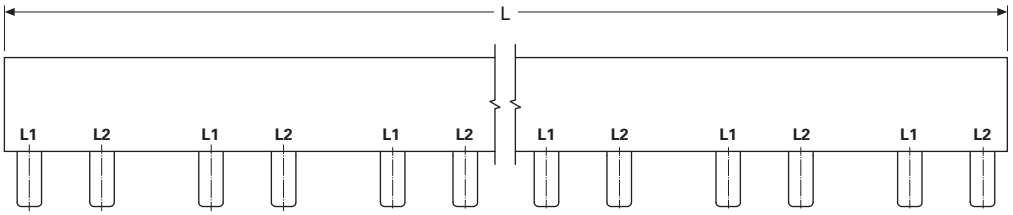
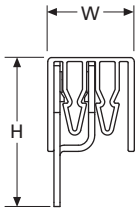
Approximate Dimensions in Inches (mm)

Busbar and Accessory Weights and Dimensions

Unit Weight (kg)	Length	Width	Height	Catalog Number
0.29	39.72 (1009.0)	0.59 (15.0)	0.59 (15.0)	**BB-UL-18/1P-1M/57**
0.64	39.02 (991.0)	0.87 (22.0)	1.46 (37.0)	**BB-UL-18/2P-2M/56**
0.83	39.72 (1009.0)	0.87 (22.0)	1.46 (37.0)	**BB-UL-18/3P-3M/57**
0.26	38.78 (985.0)	0.59 (15.0)	0.59 (15.0)	**BB-UL-18/1P-1.5M/37**
0.63	39.72 (1009.0)	0.87 (22.0)	1.46 (37.0)	**BB-UL-18/2P+AS-2.5M/46**
0.79	38.66 (982.0)	0.87 (22.0)	1.46 (37.0)	**BB-UL-18/3P+AS-3.5M/48**
0.36	39.72 (1009.0)	0.59 (15.0)	0.59 (15.0)	**BB-UL-25/1P-1M/57**
0.79	39.02 (991.0)	0.87 (22.0)	1.46 (37.0)	**BB-UL-25/2P-2M/56**
1.04	39.72 (1009.0)	0.87 (22.0)	1.46 (37.0)	**BB-UL-25/3P-3M/57**
0.31	38.78 (985.0)	0.59 (15.0)	0.59 (15.0)	**BB-UL-25/1P-1.5M/37**
0.73	39.72 (1009.0)	0.87 (22.0)	1.46 (37.0)	**BB-UL-25/2P+AS-2.5M/46**
0.97	38.66 (982.0)	0.87 (22.0)	1.46 (37.0)	**BB-UL-25/3P+AS-3.5M/48**
0.03	2.36 (60.0)	0.67 (17.0)	1.14 (29.0)	**BB-UL-TEP/35**
0.03	1.42 (36.0)	0.67 (17.0)	1.14 (29.0)	**BB-UL-TEPA/35**
0.03	1.57 (40.0)	0.71 (18.0)	1.18 (30.0)	**BB-UL-TE/50**
0.003	3.35 (85.0)	0.47 (12.0)	0.94 (24.0)	**BB-IP/5**
0.001	0.55 (14.0)	0.20 (5.0)	0.39 (10.0)	**BB-EV-EC/3**
0.001	0.94 (24.0)	0.87 (22.0)	0.39 (10.0)	**BB-UL-EC/1**





RH Series — General Purpose Midget Relays

Key features of the RH series include:

- **Compact midget size saves space**
- **High switching capacity (10A)**
- **Choice of blade or PCB style terminals**
- **Relay options include indicator light, check button, and top mounting bracket**
- **DIN rail, surface, panel, and PCB type sockets available for a wide range of mounting applications**

UL Recognized
Files No. RH1 = E66043
RH2 = E66043
RH3 = E66043
RH4 = E55996

CSA Certified
File No.LR35144

TÜV PRODUCT SERVICE File No. B020813332452

CE

Specifications

Contact Material	Silver cadmium oxide
Contact Resistance	50mΩ maximum (initial value)
Minimum Applicable Load	24V DC/30mA, 5V DC/100mA (reference value)
Operating Time	SPDT (RH1), DPDT (RH2): 20ms maximum 3PDT (RH3), 4PDT (RH4): 25ms maximum
Release Time	SPDT (RH1), DPDT (RH2): 20ms maximum 3PDT (RH3), 4PDT (RH4): 25ms maximum
Maximum Continuous Applied Voltage (AC/DC) at 20°C	110% of the rated voltage
Minimum Operating Voltage (AC/DC) at 20°C	80% of the rated voltage
Drop-Out Voltage (AC)	30% or more of the rated voltage
Drop-Out Voltage (DC)	10% or more of the rated voltage
Power Consumption	**SPDT** (RH1): DC: 0.8W AC: 1.1VA (50Hz), 1VA (60Hz) **DPDT** (RH2): DC: 0.9W AC: 1.4VA (50Hz), 1.2VA (60Hz) **3PDT** (RH3): DC: 1.5W AC: 2VA (50Hz), 1.7VA (60Hz) **4PDT** (RH4): DC: 1.5W AC: 2.5VA (50Hz), 2VA (60Hz)
Insulation Resistance	100MΩ min (measured with a 500V DC megger)
Dielectric Strength	**SPDT** (RH1) Between live and dead parts: 2,000V AC, 1 minute; Between contact circuit and operating coil: 2,000V AC, 1 minute; Between contacts of the same pole: 1,000V AC, 1 minute
	DPDT (RH2), **3PDT** (RH3), **4PDT** (RH4) Between live and dead parts: 2,000V AC, 1 minute; Between contact circuit and operating coil: 2,000V AC, 1 minute; Between contact circuits: 2,000V AC, 1 minute; Between contacts of the same pole: 1,000V AC, 1 minute
Frequency Response	1,800 operations/hour
Temperature Rise	Coil: 85°C maximum Contact: 65°C maximum
Vibration Resistance	0 to 6G (55Hz maximum)
Shock Resistance	SPDT/DPDT: 200N (approximately 20G) 3PDT/4PDT: 100N (approximately 10G)
Life Expectancy	Electrical: over 500,000 operations at 120V AC, 10A; (over 200,000 operations at 120V AC, 10A for SPDT [RH1], 3PDT [RH3], 4PDT [RH4]) Mechanical: 50,000,000 operations
Operating Temperature	–30 to +70°C
Weight	SPDT: 24g, DPDT: 37g (approximately) 3PDT: 50g, 4PDT: 74g (approximately)

Ordering Information

Order standard voltages for fastest delivery. Allow extra delivery time for non-standard voltages.

Basic Part No.	Coil Voltage:
RH2B-U	**AC110-120V**

Part Numbers

Part Numbers: RH Series with Options

Termination	Contact Configuration	Basic Part No.	Indicator Light	Check Button	Indicator Light and Check Button	Top Bracket
B (blade)	SPDT	RH1B-U	RH1B-UL	RH1B-UC	RH1B-ULC	RH1B-UT
	DPDT	RH2B-U	RH2B-UL	RH2B-UC	RH2B-ULC	RH2B-UT
	3PDT	RH3B-U	RH3B-UL	RH3B-UC	RH3B-ULC	RH3B-UT
	4PDT	RH4B-U	RH4B-UL	RH4B-UC	RH4B-ULC	RH4B-UT
V2 (PCB 0.078" [2mm] wide)	SPDT	RH1V2-U	RH1V2-UL	RH1V2-UC	RH1V2-ULC	—
	DPDT	RH2V2-U	RH2V2-UL	RH2V2-UC	RH2V2-ULC	—
	3PDT	RH3V2-U	RH3V2-UL	RH3V2-UC	RH3V2-ULC	—
	4PDT	RH4V2-U	RH4V2-UL	RH4V2-UC	RH4V2-ULC	—

Ratings

Coil Ratings

Rated Voltage		Rated Current ±15% at 20°C								Coil Resistance ±15% at 20°C			
		60Hz				50Hz							
		SPDT	DPDT	3PDT	4PDT	SPDT	DPDT	3PDT	4PDT	SPDT	DPDT	3PDT	4PDT
AC	6V	150mA	200mA	280mA	330mA	170mA	238mA	330mA	387mA	18.8Ω	9.4Ω	6.0Ω	5.4Ω
	12V	75mA	100mA	140mA	165mA	86mA	118mA	165mA	196mA	76.8Ω	39.3Ω	25.3Ω	21.2Ω
	24V	37mA	50mA	70mA	83mA	42mA	59.7mA	81mA	98mA	300Ω	153Ω	103Ω	84.5Ω
	120V*	7.5mA	11mA	14.2mA	16.5mA	8.6mA	12.9mA	16.4mA	19.5mA	7,680Ω	4,170Ω	2770Ω	2220Ω
	240V†	3.2mA	5.5mA	7.1mA	8.3mA	3.7mA	6.5mA	8.2mA	9.8mA	3,1200Ω	15,210Ω	12,100Ω	9120Ω
		SPDT	DPDT			3PDT		4PDT		SPDT	DPDT	3PDT	4PDT
DC	6V	128mA	150mA			240mA		250mA		47Ω	40Ω	25Ω	24Ω
	12V	64mA	75mA			120mA		125mA		188Ω	160Ω	100Ω	96Ω
	24V	32mA	36.9mA			60mA		62mA		750Ω	650Ω	400Ω	388Ω
	48V	18mA	18.5mA			30mA		31mA		2,660Ω	2,600Ω	1,600Ω	1550Ω
	110V‡	8mA	9.1mA			12.8mA		15mA		13,800Ω	12,100Ω	8,600Ω	7,340Ω

* *For RH2 relays = 110/120V AC.*
† *For RH2 relays = 220/240V AC.*
‡ *For RH2 relays = 100/110V DC.*

Rated Voltage		Coil Inrush				Coil Inductance							
						Energizing				De-Energizing			
		SPDT	DPDT	3PDT	4PDT	SPDT	DPDT	3PDT	4PDT	SPDT	DPDT	3PDT	4PDT
AC	6V	250mA	340mA	520mA	620mA	0.09H	0.08H	0.05H	0.05H	0.06H	0.04H	0.03H	0.02H
	12V	120mA	170mA	260mA	310mA	0.037H	0.30H	0.22H	0.18H	0.22H	0.16H	0.12H	0.10H
	24V	56mA	85mA	130mA	165mA	1.5H	1.2H	0.9H	0.73H	0.9H	0.63H	0.5H	0.36H
	120V*	12mA	16mA	26mA	33mA	37H	33H	21H	18H	22H	15H	12H	9H
	240V†	7mA	8mA	12mA	16mA	130H	130H	84H	73H	77H	62H	47H	36H
		SPDT	DPDT			3PDT		4PDT		SPDT	DPDT	3PDT	4PDT
DC	6V	N/A	N/A			N/A		N/A		N/A	N/A	N/A	N/A
	12V												
	24V												
	48V												
	110V												

* *For RH2 relays = 110/120V AC.*
† *For RH2 relays = 220/240V AC.*

Ratings con't

Contact Ratings

# of Poles	Max Contact Power		General Ratings		
	Resistive	Inductive	Voltage	Resistive	Inductive*
RH1	AC1540VA DC300W	AC990VA DC210W	AC110	10A	7A
			AC220	7A	4.5A
			DC30	10A	7A
RH2 RH3 RH4	AC1650VA DC300W	AC1100VA DC225W	AC110	10A	7.5A
			AC220	7.5A	5A
			DC30	10A	7.5A

cosø = 0.3
L/R - 7ms

UL Ratings

Voltage	Resistive			General Use			Horse Power Rating	
	RH1, RH2	RH3	RH4	RH1, RH2	RH3	RH4	RH1, RH2 RH3	
AC240V	10A	7.5A	7.5A	7A	6.5A	5A	1/3HP	
AC120V	10A	10A	10A	7A	7.5A	7.5A	1/6HP	
DC30V	10A	10A	—	7A	—	—	—	—
DC28V	10A	10A	10A	7A	—	—	—	—

TÜV Ratings

Voltage	RH1	RH2	RH3	RH4
AC240V	10A	10A	7.5A	7.5A
DC30V	10A	10A	10A	10A

CSA Ratings

Voltage	Resistive				General Use				HP Rating
	RH1	RH2	RH3	RH4	RH1	RH2	RH3	RH4	RH1, 2, 3
AC240V	10A	10A	—	7.5A	7A	7A	7A	5A	1/3HP
AC120V	10A	10A	10A	10A	7.5A	7.5A	—	7.5A	1/6HP
DC30V	10A	10A	10A	10A	7A	7.5A	—	—	—

E

Relays

Applicable Sockets

Part Numbers: Sockets

Relay	Standard DIN Rail Mount	Finger-Safe DIN Rail Mount	Surface Mount	Panel Mount	PCB Mount
RH1B	SH1B-05	SH1B-05C	—	SH1B-51	SH1B-62
RH2B	SH2B-05	SH2B-05C	SH2B-02	SH2B-51	SH2B-62
RH3B	SH3B-05	SH3B-05C	—	SH3B-51	SH3B-62
RH4B	SH4B-05	SH4B-05C		SH4B-51	SH4B-62

See Section F for details on sockets. All DIN rail mount sockets shown above can be mounted using DIN rail BNDN1000.

Spring & Clips (optional)	
Part Number	Use With
SY2S-02F1③ SFA-101① SFA-202②	SH1B-05, 05C
SY4S-51F1③ SFA-301① SFA-302②	SH1B-51, 62
SY4S-02F1③ SFA-101① SFA-202②	SH2B-05, 05C
SY4S-51F1③ SFA-301① SFA-302②	SH2B-51, 62
SH3B-05F1③ SFA-101①, -202②	SH3B-05, 05C
SY4S-51F1③ SFA-301① SFA-302②	SH3B-51, 62
SH4B-02F1③ SFA-101①, -202②	SH4B-05, 05C
SY4S-51F1③ SFA-301① SFA-302②	SH4B-51, 62

① *Top latch*
② *Side latch*
③ *Pullover spring*

Internal Circuits

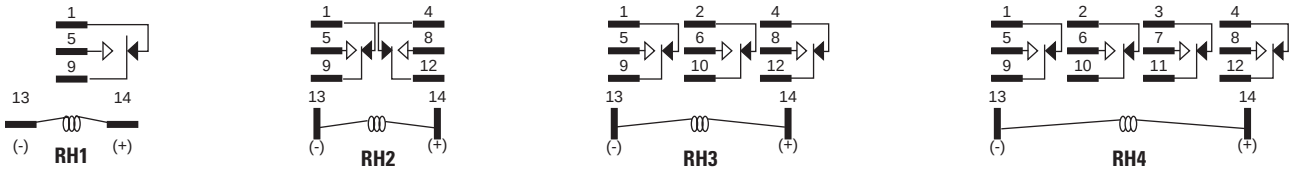
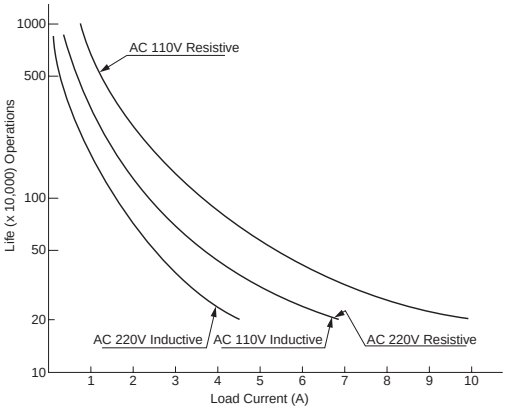
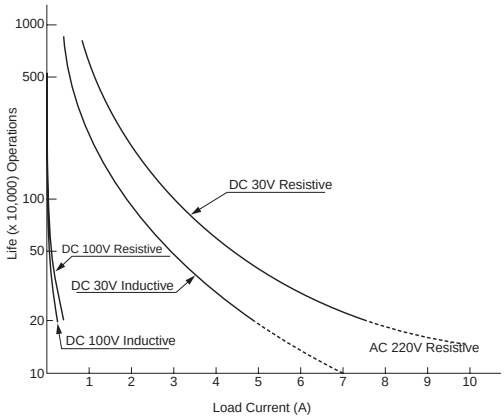


Image as viewed from bottom of relay. Refer to socket for exact wiring layout (Section F).

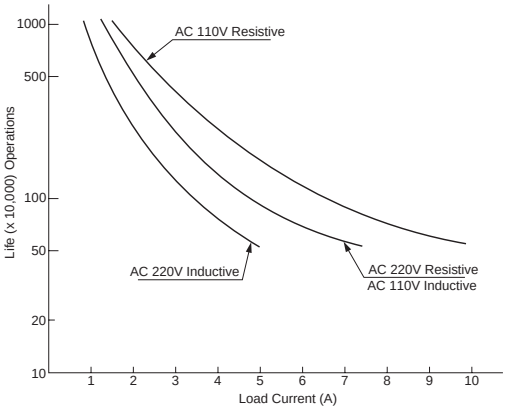
Electrical Life Curves

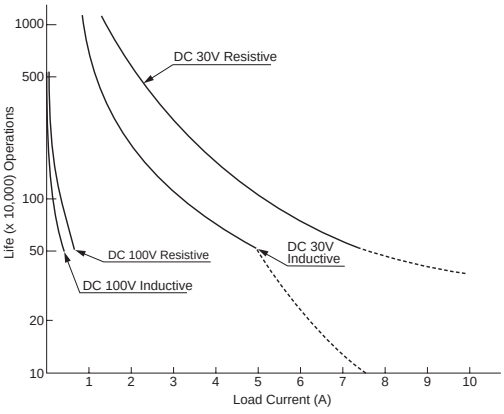
RH1



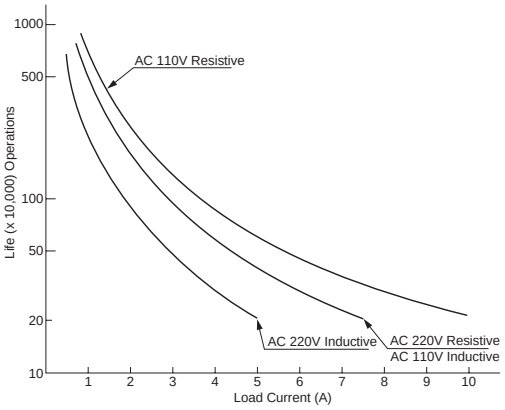


RH2

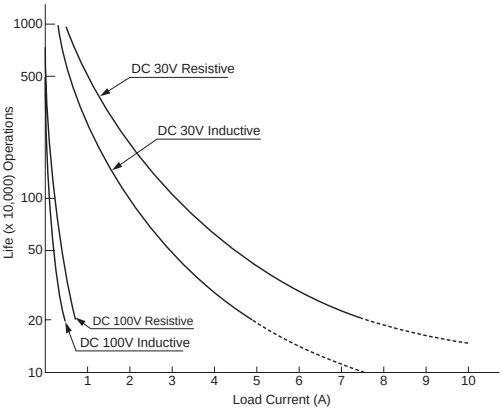




RH3

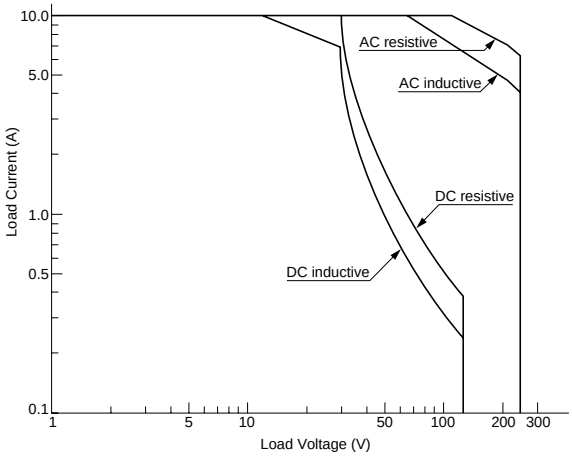


RH4

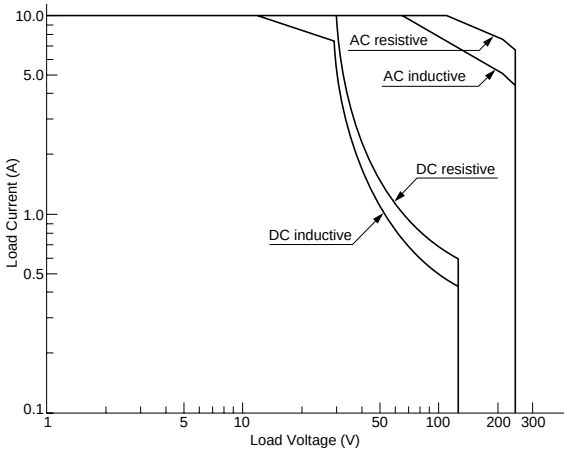


Maximum Switching Capacity

RH1



RH2/RH3/RH4

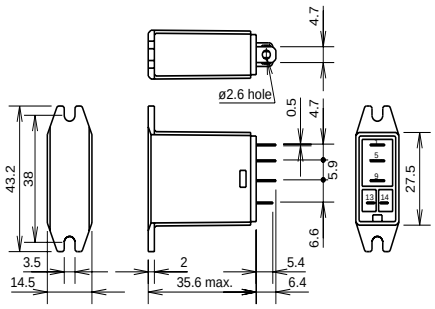


E

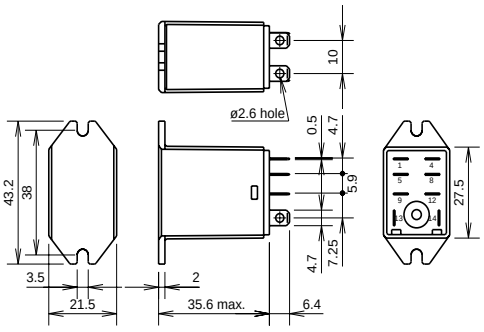
Relays

Dimensions

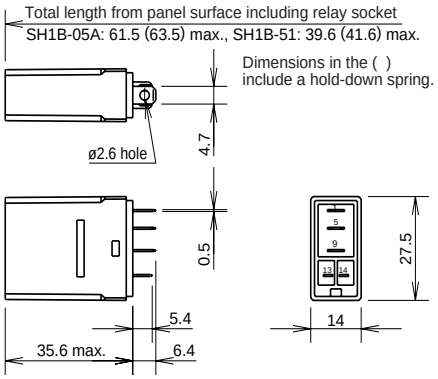
Top Bracket Mounting
Blade Terminal
RH1B-UT



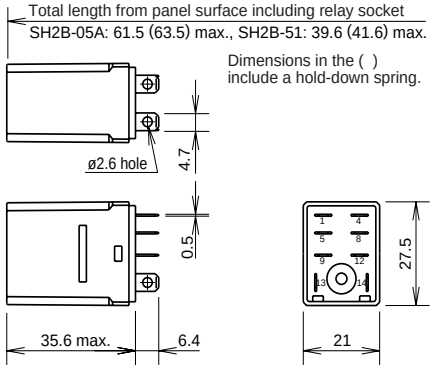
RH2B-UT



Plug-in Blade Terminal
RH1B



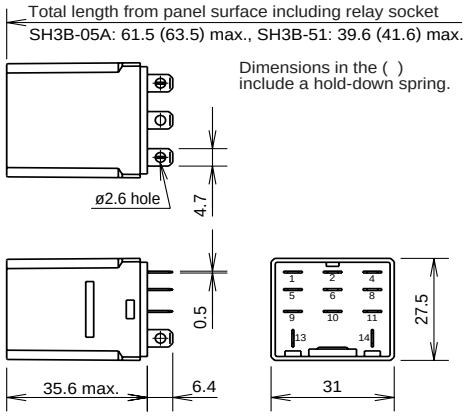
RH2B



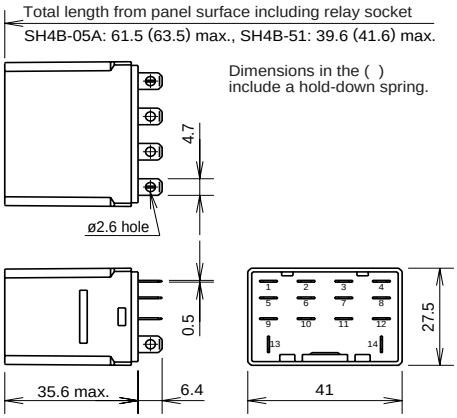
All dimensions in mm.

Dimensions con't

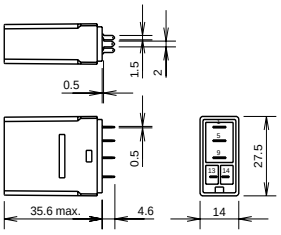
Plug-in Blade Terminal
RH3B

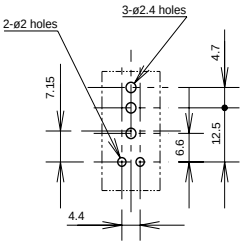


RH4B

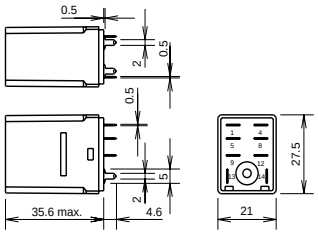


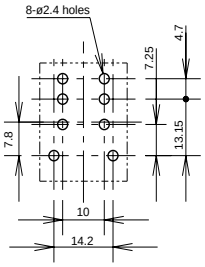
PCB Terminal
RH1V2



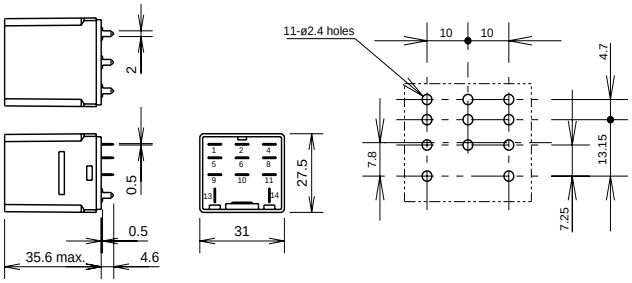


RH2V2

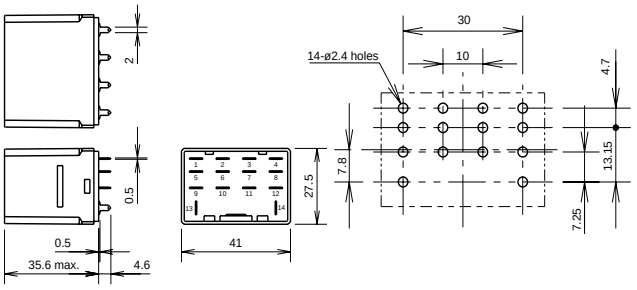




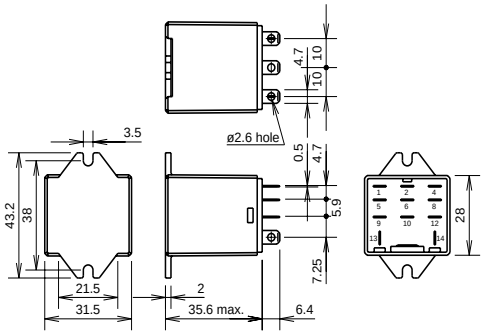
RH3V2



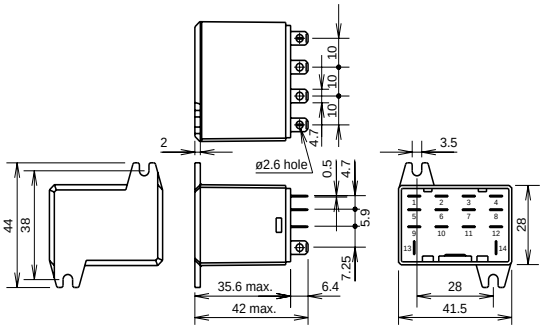
RH4V2



RH3B-UT



RH4B-UT



All dimensions in mm.

E Relays

End clamp - E/UK-NS 35 - 1202577

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End clamps, for supporting the ends of double-level and three-level terminal blocks, width: 10 mm, color: gray

Key Commercial Data

Packing unit	1 pc
Minimum order quantity	50 pc
GTIN	4 017918 017927
Weight per Piece (excluding packing)	9.512 g
Custom tariff number	85369010
Country of origin	Poland

Technical data

Dimensions

Height	32.8 mm
Length	48.6 mm
Width	9.5 mm

General

Material	PA
Color	gray

Classifications

eCl@ss

eCl@ss 4.0	27141199
eCl@ss 4.1	27141199
eCl@ss 5.0	27141135
eCl@ss 5.1	27141145

End clamp - E/UK-NS 35 - 1202577

Classifications

eCl@ss

eCl@ss 6.0	27141135
eCl@ss 7.0	27141135
eCl@ss 8.0	27141135

ETIM

ETIM 2.0	EC000761
ETIM 3.0	EC001041
ETIM 4.0	EC001041
ETIM 5.0	EC001041

UNSPSC

UNSPSC 6.01	30212109
UNSPSC 7.0901	39121708
UNSPSC 11	39121708
UNSPSC 12.01	39121708
UNSPSC 13.2	39121708

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Fuse plug - ST-SILA250-UK 4 - 0921053

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The illustration shows the version without LED/light indicator

Fuse plug, Nominal current: 6.3 A, Length: 33.1 mm, Width: 6.1 mm, Height: 45.7 mm, Color: black

Key Commercial Data

Packing unit	1 pc
GTIN	4 017918 010317
Weight per Piece (excluding packing)	5.96 g
Custom tariff number	85363010
Country of origin	Poland

Technical data

General

Note	If the fuse is defective, the downstream circuit is not off load
Color	black
Insulating material	PA
Inflammability class according to UL 94	V2

Dimensions

Width	6.1 mm
Length	33.1 mm

General

Fuse	G / 5 x 20
Insulating material group	CTI 600
Nominal current I_N	6.3 A
Nominal voltage U_N	250 V

Fuse plug - ST-SILA250-UK 4 - 0921053

Classifications

eCl@ss

eCl@ss 4.0	27141199
eCl@ss 4.1	27141199
eCl@ss 5.0	27141145
eCl@ss 5.1	27141145
eCl@ss 6.0	27141149
eCl@ss 7.0	27141149
eCl@ss 8.0	27142001

ETIM

ETIM 2.0	EC000897
ETIM 3.0	EC000897
ETIM 4.0	EC002018
ETIM 5.0	EC000036

UNSPSC

UNSPSC 6.01	30211811
UNSPSC 7.0901	39121409
UNSPSC 11	39121409
UNSPSC 12.01	39121409
UNSPSC 13.2	39121409

Approvals

Approvals

Approvals

CSA / UL Recognized / cUL Recognized / ABS / EAC / cULus Recognized

Ex Approvals

Approvals submitted

Approval details

Fuse plug - ST-SILA250-UK 4 - 0921053

Approvals

CSA

Nominal current IN	10 A
Nominal voltage UN	300 V

UL Recognized

Nominal current IN	6.3 A
Nominal voltage UN	300 V

cUL Recognized

Nominal current IN	6.3 A
Nominal voltage UN	300 V

ABS

Nominal current IN	10 A
Nominal voltage UN	300 V

EAC

cULus Recognized

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Fuse plug - ST-SILED 24-UK 4 - 0921037

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The illustration shows the version without LED/light indicator

Fuse plug, Nominal current: 6.3 A, Length: 33.1 mm, Width: 6.1 mm, Height: 45.7 mm, Color: black

Key Commercial Data

Packing unit	1 pc
GTIN	4 017918 010294
Weight per Piece (excluding packing)	5.88 g
Custom tariff number	85363010
Country of origin	Poland

Technical data

General

Note	If the fuse is defective, the downstream circuit is not off load
Color	black
Insulating material	PA
Inflammability class according to UL 94	V2

Dimensions

Width	6.1 mm
Length	33.1 mm

General

Fuse	G / 5 x 20
Insulating material group	CTI 600
Nominal current I_N	6.3 A
Nominal voltage U_N	24 V

Fuse plug - ST-SILED 24-UK 4 - 0921037

Classifications

eCl@ss

eCl@ss 4.0	27141199
eCl@ss 4.1	27141199
eCl@ss 5.0	27141145
eCl@ss 5.1	27141145
eCl@ss 6.0	27141149
eCl@ss 7.0	27141149
eCl@ss 8.0	27142001

ETIM

ETIM 2.0	EC000897
ETIM 3.0	EC000897
ETIM 4.0	EC002018
ETIM 5.0	EC000036

UNSPSC

UNSPSC 6.01	30211811
UNSPSC 7.0901	39121409
UNSPSC 11	39121409
UNSPSC 12.01	39121409
UNSPSC 13.2	39121409

Approvals

Approvals

Approvals

CSA / UL Recognized / cUL Recognized / EAC / cULus Recognized

Ex Approvals

Approvals submitted

Approval details

Fuse plug - ST-SILED 24-UK 4 - 0921037

Approvals

CSA

Nominal current IN	10 A
Nominal voltage UN	300 V

UL Recognized

Nominal current IN	6.3 A
Nominal voltage UN	300 V

cUL Recognized

Nominal current IN	6.3 A
Nominal voltage UN	300 V

EAC

cULus Recognized

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Fuse modular terminal block - UK 6,3-HESILED 24 - 3004265

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Fuse terminal block for cartridge fuse insert, cross section: 0.5 - 16 mm², AWG: 26 - 8, width: 10.2 mm, color: black

Product Features

- Versions with LED
- Large-surface labeling
- Safety lever locked in end position

Key Commercial Data

Packing unit	1 pc
GTIN	4 017918 090753
Weight per Piece (excluding packing)	35.42 g
Custom tariff number	85369085
Country of origin	Turkey

Technical data

General

Number of levels	1
Number of connections	2
Nominal cross section	16 mm²
Color	black
Insulating material	PA
Inflammability class according to UL 94	V0
Fuse	G / 6,3 x 32
Fuse type	Glass
Rated surge voltage	6 kV

Fuse modular terminal block - UK 6,3-HESILED 24 - 3004265

Technical data

General

Pollution degree	3
Surge voltage category	III
Insulating material group	I
Connection in acc. with standard	IEC 60947-7-3
Maximum load current	10 A
Nominal current I_N	10 A
Nominal voltage U_N	500 V (As a fuse terminal block)
Open side panel	nein
Number of positions	1

Dimensions

Width	10.2 mm
Length	79 mm
Height NS 35/7,5	60.5 mm
Height NS 35/15	68 mm
Height NS 32	65.5 mm

Connection data

Conductor cross section solid min.	0.5 mm²
Conductor cross section solid max.	16 mm²
Conductor cross section flexible min.	0.5 mm²
Conductor cross section flexible max.	16 mm²
Conductor cross section AWG min.	20
Conductor cross section AWG max.	6
Conductor cross section flexible, with ferrule without plastic sleeve min.	0.5 mm²
Conductor cross section flexible, with ferrule without plastic sleeve max.	10 mm²
Conductor cross section flexible, with ferrule with plastic sleeve min.	0.5 mm²
Conductor cross section flexible, with ferrule with plastic sleeve max.	10 mm²
Cross section with insertion bridge, solid max.	10 mm²
Cross section with insertion bridge, stranded max.	10 mm²
2 conductors with same cross section, solid min.	0.5 mm²
2 conductors with same cross section, solid max.	4 mm²
2 conductors with same cross section, stranded min.	0.5 mm²
2 conductors with same cross section, stranded max.	4 mm²
2 conductors with same cross section, stranded, ferrules without plastic sleeve, min.	0.5 mm²
2 conductors with same cross section, stranded, ferrules without plastic sleeve, max.	4 mm²

Fuse modular terminal block - UK 6,3-HESILED 24 - 3004265

Technical data

Connection data

2 conductors with same cross section, stranded, TWIN ferrules with plastic sleeve, min.	0.5 mm²
2 conductors with same cross section, stranded, TWIN ferrules with plastic sleeve, max.	6 mm²
Cross section with insertion bridge, solid max.	10 mm²
Cross section with insertion bridge, stranded max.	10 mm²
Connection method	Screw connection
Stripping length	12 mm
Internal cylindrical gage	B6
Screw thread	M4
Tightening torque, min	1.2 Nm
Tightening torque max	1.5 Nm

Classifications

eCl@ss

eCl@ss 4.0	27141116
eCl@ss 4.1	27141116
eCl@ss 5.0	27141116
eCl@ss 5.1	27141116
eCl@ss 6.0	27141116
eCl@ss 7.0	27141116
eCl@ss 8.0	27141116

ETIM

ETIM 2.0	EC000897
ETIM 3.0	EC000899
ETIM 4.0	EC000899
ETIM 5.0	EC000899

UNSPSC

UNSPSC 6.01	30211811
UNSPSC 7.0901	39121410
UNSPSC 11	39121410
UNSPSC 12.01	39121410
UNSPSC 13.2	39121410

Fuse modular terminal block - UK 6,3-HESILED 24 - 3004265

Approvals

Approvals

Approvals

CSA / UL Recognized / LR / GL / EAC

Ex Approvals

Approvals submitted

Approval details

CSA

mm²/AWG/kcmil	26-8
Nominal current IN	25 A
Nominal voltage UN	600 V

UL Recognized

mm²/AWG/kcmil	26-8
Nominal current IN	10 A
Nominal voltage UN	600 V

LR

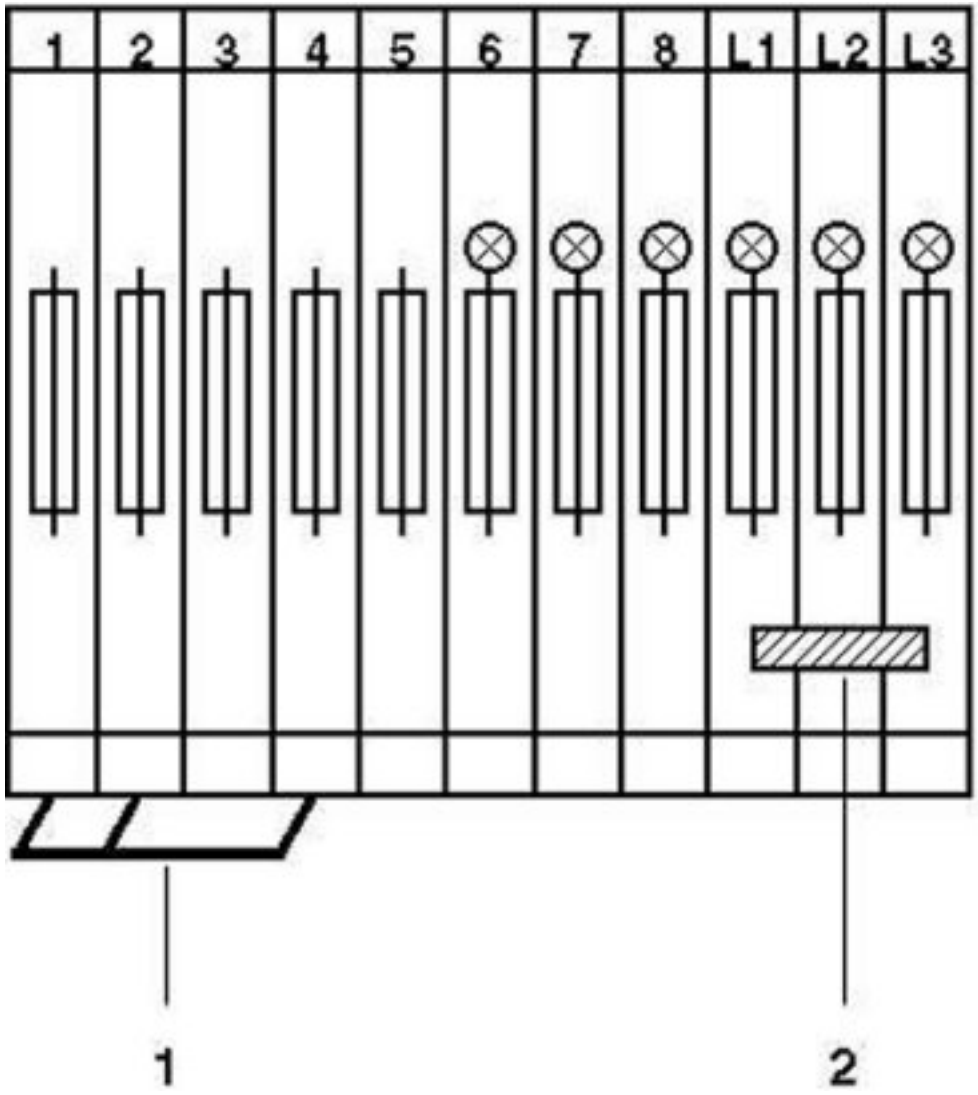
GL

EAC

Drawings

Fuse modular terminal block - UK 6,3-HESILED 24 - 3004265

Circuit diagram



1 = fixed bridge
2 = insertion bridge

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Ground modular terminal block - USLKG 6 N - 0442079

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Ground modular terminal block, Connection method: Screw connection, Number of positions: 1, Cross section: 0.2 mm² - 10 mm², AWG: 24 - 8, Width: 8.2 mm, Height: 45.8 mm, Color: green-yellow, Mounting type: NS 35/7,5, NS 35/15, NS 32

Key Commercial Data

Packing unit	1 pc
GTIN	4 017918 129316
Weight per Piece (excluding packing)	27.89 g
Custom tariff number	85369010
Country of origin	China

Technical data

General

Number of levels	1
Number of connections	2
Nominal cross section	6 mm²
Color	green-yellow
Insulating material	PA
Inflammability class according to UL 94	V0
Rated surge voltage	8 kV
Pollution degree	3
Surge voltage category	III
Insulating material group	I
Connection in acc. with standard	IEC 60947-7-2

Ground modular terminal block - USLKG 6 N - 0442079

Technical data

General

Open side panel	nein
Number of positions	1
Temperature index, insulating material (DIN EN 60216-1 (VDE 0304-21))	125 °C
Static insulating material application in cold	-60 °C

Dimensions

Width	8.2 mm
Length	42.5 mm
Height	45.8 mm
Height NS 35/7,5	47 mm
Height NS 35/15	54.5 mm
Height NS 32	52 mm

Connection data

Note	Please observe the current carrying capacity of the DIN rails.
Connection method	Screw connection
Connection in acc. with standard	IEC 60947-7-2
Conductor cross section solid min.	0.2 mm²
Conductor cross section solid max.	10 mm²
Conductor cross section AWG min.	24
Conductor cross section AWG max.	8
Conductor cross section flexible min.	0.2 mm²
Conductor cross section flexible max.	6 mm²
Min. AWG conductor cross section, flexible	24
Max. AWG conductor cross section, flexible	10
Conductor cross section flexible, with ferrule without plastic sleeve min.	0.25 mm²
Conductor cross section flexible, with ferrule without plastic sleeve max.	6 mm²
Conductor cross section flexible, with ferrule with plastic sleeve min.	0.25 mm²
Conductor cross section flexible, with ferrule with plastic sleeve max.	6 mm²
2 conductors with same cross section, solid min.	0.2 mm²
2 conductors with same cross section, solid max.	2.5 mm²
2 conductors with same cross section, stranded min.	0.2 mm²
2 conductors with same cross section, stranded max.	2.5 mm²
2 conductors with same cross section, stranded, TWIN ferrules with plastic sleeve, min.	0.5 mm²
2 conductors with same cross section, stranded, TWIN ferrules with plastic sleeve, max.	4 mm²
2 conductors with same cross section, stranded, ferrules without plastic sleeve, min.	0.25 mm²

Ground modular terminal block - USLKG 6 N - 0442079

Technical data

Connection data

2 conductors with same cross section, stranded, ferrules without plastic sleeve, max.	1.5 mm²
Connection in acc. with standard	IEC/EN 60079-7
Conductor cross section solid min.	0.2 mm²
Conductor cross section solid max.	10 mm²
Conductor cross section AWG min.	24
Conductor cross section AWG max.	8
Conductor cross section flexible min.	0.2 mm²
Conductor cross section flexible max.	6 mm²
Stripping length	10 mm
Screw thread	M4
Tightening torque, min	1.5 Nm
Tightening torque max	1.8 Nm

Classifications

eCl@ss

eCl@ss 4.0	27141118
eCl@ss 4.1	27141118
eCl@ss 5.0	27141118
eCl@ss 5.1	27141118
eCl@ss 6.0	27141141
eCl@ss 7.0	27141141
eCl@ss 8.0	27141141

ETIM

ETIM 2.0	EC000901
ETIM 3.0	EC000901
ETIM 4.0	EC000901
ETIM 5.0	EC000901

UNSPSC

UNSPSC 6.01	30211811
UNSPSC 7.0901	39121410
UNSPSC 11	39121410
UNSPSC 12.01	39121410
UNSPSC 13.2	39121410

Ground modular terminal block - USLKG 6 N - 0442079

Approvals

Approvals

Approvals

UL Recognized / KEMA-KEUR / cUL Recognized / LR / GL / BV / ABS / PRS / KR / CCA / EAC / EAC / cULus Recognized

Ex Approvals

IECEx / ATEX / EAC Ex / UL Recognized / cUL Recognized / cULus Recognized

Approvals submitted

Approval details

UL Recognized

mm²/AWG/kcmil	26-8

KEMA-KEUR

mm²/AWG/kcmil	6

cUL Recognized

mm²/AWG/kcmil	26-8

LR

GL

BV

Ground modular terminal block - USLKG 6 N - 0442079

Approvals

ABS	
mm²/AWG/kcmil	26-8

PRS

KR

CCA	
mm²/AWG/kcmil	6

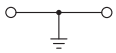
EAC

EAC

cULus Recognized

Drawings

Circuit diagram



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Extract from the online catalog

UK 6,3-HESILA 250

Order No.: 3004249

http://eshop.phoenixcontact.de/phoenix/treeViewClick.do?UID=3004249

Fuse terminal block for cartridge fuse insert, cross section: 0.5 - 16 mm², AWG: 26 - 8, width: 10.2 mm, color: black

Product notes

WEEE/RoHS-compliant since: 09/11/2006

http://www.download.phoenixcontact.com
Please note that the data given here has been taken from the online catalog. For comprehensive information and data, please refer to the user documentation. The General Terms and Conditions of Use apply to Internet downloads.

Commercial data	
GTIN (EAN)	4017918090739
sales group	A040
Pack	50 pcs.
Customs tariff	85363010
Weight/Piece	0.034648 KG
Catalog page information	Page 370 (CL-2009)

Technical data

General

Number of levels	1
Number of connections	2
Color	black
Insulating material	PA
Inflammability class acc. to UL 94	V2

Dimensions

Width	10.2 mm
Length	79 mm
Height NS 35/7,5	60.5 mm
Height NS 35/15	68 mm
Height NS 32	65 mm

Technical data

Fuse	G / 6,3 x 32
Fuse type	Glass
Rated surge voltage	6 kV
Pollution degree	3
Surge voltage category	III
Insulating material group	I
Connection in acc. with standard	IEC 60947-7-3
Nominal current I_N	10 A
Nominal voltage U_N	500 V (As a fuse terminal block)

Connection data

Conductor cross section solid min.	0.5 mm²
Conductor cross section solid max.	16 mm²
Conductor cross section stranded min.	0.5 mm²
Conductor cross section stranded max.	16 mm²
Conductor cross section AWG/kcmil min.	20
Conductor cross section AWG/kcmil max	6
Conductor cross section stranded, with ferrule without plastic sleeve min.	0.5 mm²
Conductor cross section stranded, with ferrule without plastic sleeve max.	10 mm²
Conductor cross section stranded, with ferrule with plastic sleeve min.	0.5 mm²
Conductor cross section stranded, with ferrule with plastic sleeve max.	10 mm²
2 conductors with same cross section, solid min.	0.5 mm²
2 conductors with same cross section, solid max.	4 mm²
2 conductors with same cross section, stranded min.	0.5 mm²
2 conductors with same cross section, stranded max.	4 mm²

2 conductors with same cross section, stranded, ferrules without plastic sleeve, min.	0.5 mm²
2 conductors with same cross section, stranded, ferrules without plastic sleeve, max.	4 mm²
2 conductors with same cross section, stranded, TWIN ferrules with plastic sleeve, min.	0.5 mm²
2 conductors with same cross section, stranded, TWIN ferrules with plastic sleeve, max.	6 mm²
Cross-section with insertion bridge, solid max.	10 mm²
Cross-section with insertion bridge, stranded max.	10 mm²
Type of connection	Screw connection
Stripping length	12 mm
Internal cylindrical gage	B6
Screw thread	M4
Tightening torque, min	1.2 Nm
Tightening torque max	1.5 Nm

Certificates / Approvals

Certification	ABS, CSA, GL, GOST, LR, UL

CSA

Nominal voltage U_N	600 V
Nominal current I_N	25 A
AWG/kcmil	26-8

UL

Nominal voltage U_N	600 V
Nominal current I_N	10 A
AWG/kcmil	26-8

Accessories

Item	Designation	Description
Assembly		
3022218	CLIPFIX 35	Snap-on end bracket, for 35 mm NS 35/7.5 or NS 35/15 DIN rail, can be fitted with Zack strip ZB 8 and ZB 8/27, terminal strip marker KLM 2 and KLM, width: 9.5 mm, color: gray
1201442	E/UK	End clamp, for assembly on NS 32 or NS 35/7,5 DIN rail
1201028	NS 32 AL UNPERF 2000MM	G rail 32 mm (NS 32)
1201280	NS 32 CU/120QMM UNPERF 2000MM	G-profile DIN rail, deep-drawn, material: Copper, unperforated, height 15 mm, width 32 mm, length 2 m
1201358	NS 32 CU/35QMM UNPERF 2000MM	G-profile DIN rail, material: Copper, unperforated, height 15 mm, width 32 mm, length 2 m
1201002	NS 32 PERF 2000MM	G-profile DIN rail, material: Steel, perforated, height 15 mm, width 32 mm, length 2 m
1201015	NS 32 UNPERF 2000MM	G-profile DIN rail, material: Steel, unperforated, height 15 mm, width 32 mm, length 2 m
0801762	NS 35/ 7,5 CU UNPERF 2000MM	DIN rail, material: Copper, unperforated, height 7.5 mm, width 35 mm, length: 2 m
0801733	NS 35/ 7,5 PERF 2000MM	DIN rail, material: Steel, galvanized and passivated with a thick layer, perforated, height 7.5 mm, width 35 mm, length: 2 m
0801681	NS 35/ 7,5 UNPERF 2000MM	DIN rail, material: Steel, unperforated, height 7.5 mm, width 35 mm, length: 2 m
1201756	NS 35/15 AL UNPERF 2000MM	DIN rail, deep-drawn, high profile, unperforated, 1.5 mm thick, material: Aluminum, height 15 mm, width 35 mm, length 2 m
1201895	NS 35/15 CU UNPERF 2000MM	DIN rail, material: Copper, unperforated, 1.5 mm thick, height 15 mm, width 35 mm, length: 2 m
1201730	NS 35/15 PERF 2000MM	DIN rail, material: Steel, perforated, height 15 mm, width 35 mm, length: 2 m
1201714	NS 35/15 UNPERF 2000MM	DIN rail, material: Steel, unperforated, height 15 mm, width 35 mm, length: 2 m
1201798	NS 35/15-2,3 UNPERF 2000MM	DIN rail, material: Steel, unperforated, 2.3 mm thick, height 15 mm, width 35 mm, length: 2 m
3004207	VS	Connection pin, Length: 1000 mm, Color: white
Bridges		
0203153	EB 2-10	Insertion bridge, Number of positions: 2, Color: gray
0203137	EB 10-10	Insertion bridge, Number of positions: 10, Color: gray
Marking		
1007248	SBS10:UNBEDRUCKT	Marker cards, unprinted, for individual labeling with the M-PEN, 250-section, perforated, white plastic

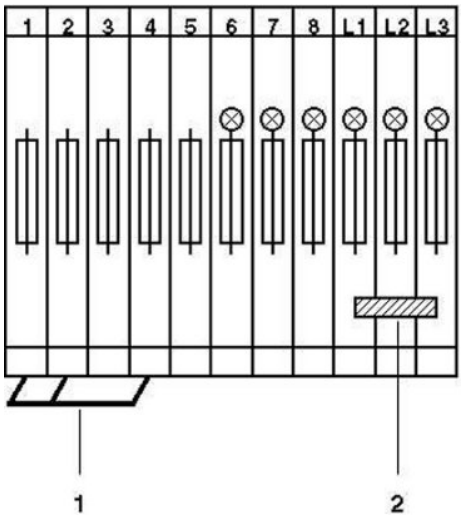
1050525	ZB10:SO/CMS	Zack strip, 10-section, divisible, special printing, marking according to customer requirements

Tools

1205066	SZS 1,0X4,0	Screwdriver, bladed, matches all screw terminal blocks with 10 mm² and 16 mm² connection cross section, blade: 1.0 x 4.0 mm

Diagrams/Drawings

Circuit diagram



1 = fixed bridge
2 = insertion bridge

Address

PHOENIX CONTACT Inc., USA
586 Fulling Mill Road
Middletown, PA 17057,USA
Phone (800) 888-7388
Fax (717) 944-1625
http://www.phoenixcon.com

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Sensor/actuator terminal block - DIKD 1,5-TG - 2774237

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Sensor/actuator terminal block, Cross section: 0.2 mm² - 4 mm², AWG: 24 - 12, Connection type: Screw connection, Width: 6.2 mm, Color: gray, Mounting type: NS 35/7,5, NS 35/15

Why buy this product

- Terminal blocks with red and green LEDs are available for optical signaling of the initiator and actuator wiring

Key Commercial Data

Packing unit	1 STK
GTIN	4 017918 126773
Weight per Piece (excluding packing)	20.15 g
Custom tariff number	85369010
Country of origin	Poland

Technical data

General

Number of levels	3
Number of connections	6
Nominal cross section	2.5 mm²
Color	gray
Insulating material	PA
Flammability rating according to UL 94	V2
Rated surge voltage	4 kV
Degree of pollution	3
Overvoltage category	III

Sensor/actuator terminal block - DIKD 1,5-TG - 2774237

Technical data

General

Insulating material group	I
Connection in acc. with standard	IEC 60947-7-1
Nominal current I_N	15 A
Maximum load current	15 A (with 4 mm² conductor cross section)
Nominal voltage U_N	250 V (the voltage is determined by the component used)
Connection in acc. with standard	IEC 60947-7-1
Nominal current I_N (upper level)	15 A
Maximum load current (upper level)	15 A (with 4 mm² conductor cross section)
Nominal voltage U_N	250 V
Open side panel	No
Shock protection test specification	DIN EN 50274 (VDE 0660-514):2002-11
Back of the hand protection	guaranteed
Finger protection	guaranteed
Result of surge voltage test	Test passed
Surge voltage test setpoint	4.8 kV
Result of power-frequency withstand voltage test	Test passed
Power frequency withstand voltage setpoint	1.5 kV
Checking the mechanical stability of terminal points (5 x conductor connection)	Test passed
Result of bending test	Test passed
Bending test rotation speed	10 rpm
Bending test turns	135
Bending test conductor cross section/weight	0.2 mm² / 0.2 kg
	2.5 mm² / 0.7 kg
	4 mm² / 0.9 kg
Tensile test result	Test passed
Conductor cross section tensile test	0.2 mm²
Tractive force setpoint	10 N
Conductor cross section tensile test	2.5 mm²
Tractive force setpoint	50 N
Conductor cross section tensile test	4 mm²
Tractive force setpoint	60 N
Result of tight fit on support	Test passed
Tight fit on carrier	NS 35
Setpoint	1 N
Result of voltage-drop test	Test passed
Requirements, voltage drop	≤ 3.2 mV

Sensor/actuator terminal block - DIKD 1,5-TG - 2774237

Technical data

General

Requirement, voltage drop 2nd level	≤ 6.4 mV
Result of temperature-rise test	Test passed
Short circuit stability result	Test passed
Conductor cross section short circuit testing	2.5 mm²
Short-time current	0.3 kA
Conductor cross section short circuit testing	4 mm²
Short-time current	0.48 kA
Result of thermal test	Test passed
Proof of thermal characteristics (needle flame) effective duration	30 s
Relative insulation material temperature index (Elec.; UL 746 B)	125 °C
Temperature index of insulation material (DIN EN 60216-1 (VDE 0304-21))	125 °C
Static insulating material application in cold	-40 °C

Dimensions

Width	6.2 mm
Length	72.5 mm
Height NS 35/7,5	54.5 mm
Height NS 35/15	62 mm

Connection data

Connection method	Screw connection
Conductor cross section solid min.	0.2 mm²
Conductor cross section solid max.	4 mm²
Conductor cross section flexible min.	0.2 mm²
Conductor cross section flexible max.	2.5 mm²
Conductor cross section AWG min.	24
Conductor cross section AWG max.	12
Conductor cross section flexible, with ferrule without plastic sleeve min.	0.25 mm²
Conductor cross section flexible, with ferrule without plastic sleeve max.	2.5 mm²
Conductor cross section flexible, with ferrule with plastic sleeve min.	0.25 mm²
Conductor cross section flexible, with ferrule with plastic sleeve max.	2.5 mm²
Cross section with insertion bridge, solid max.	4 mm²
Cross section with insertion bridge, stranded max.	2.5 mm²
2 conductors with same cross section, solid min.	0.2 mm²
2 conductors with same cross section, solid max.	1 mm²
2 conductors with same cross section, stranded min.	0.2 mm²
2 conductors with same cross section, stranded max.	1 mm²
2 conductors with same cross section, stranded, ferrules without plastic sleeve, min.	0.25 mm²

Sensor/actuator terminal block - DIKD 1,5-TG - 2774237

Technical data

Connection data

2 conductors with same cross section, stranded, ferrules without plastic sleeve, max.	1 mm²
2 conductors with same cross section, stranded, TWIN ferrules with plastic sleeve, min.	0.5 mm²
2 conductors with same cross section, stranded, TWIN ferrules with plastic sleeve, max.	1 mm²
Cross section with insertion bridge, solid max.	4 mm²
Cross section with insertion bridge, stranded max.	2.5 mm²
Stripping length	8 mm
Internal cylindrical gage	A3
Screw thread	M3
Tightening torque, min	0.5 Nm
Tightening torque max	0.6 Nm
Connection method	Screw connection
Conductor cross section solid min.	0.2 mm²
Conductor cross section solid max.	4 mm²
Conductor cross section flexible min.	0.2 mm²
Conductor cross section flexible max.	2.5 mm²
Conductor cross section AWG min.	24
Conductor cross section AWG max.	12
Conductor cross section flexible, with ferrule without plastic sleeve min.	0.25 mm²
Conductor cross section flexible, with ferrule without plastic sleeve max.	2.5 mm²
Conductor cross section flexible, with ferrule with plastic sleeve min.	0.25 mm²
Conductor cross section flexible, with ferrule with plastic sleeve max.	2.5 mm²
Cross section with insertion bridge, solid max.	4 mm²
Cross section with insertion bridge, stranded max.	2.5 mm²
2 conductors with same cross section, solid min.	0.2 mm²
2 conductors with same cross section, solid max.	1 mm²
2 conductors with same cross section, stranded min.	0.2 mm²
2 conductors with same cross section, stranded max.	1 mm²
2 conductors with same cross section, stranded, ferrules without plastic sleeve, min.	0.25 mm²
2 conductors with same cross section, stranded, ferrules without plastic sleeve, max.	1 mm²
2 conductors with same cross section, stranded, TWIN ferrules with plastic sleeve, min.	0.5 mm²
2 conductors with same cross section, stranded, TWIN ferrules with plastic sleeve, max.	1 mm²
Cross section with insertion bridge, solid max.	4 mm²

Sensor/actuator terminal block - DIKD 1,5-TG - 2774237

Technical data

Connection data

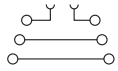
Cross section with insertion bridge, stranded max.	2.5 mm²
Stripping length	8 mm
Screw thread	M3
Tightening torque, min	0.5 Nm
Tightening torque max	0.6 Nm

Standards and Regulations

Connection in acc. with standard	CSA
	IEC 60947-7-1
	IEC 60947-7-1
Flammability rating according to UL 94	V2

Drawings

Circuit diagram



Circuit diagram

1 = fixed bridge
2 = insertion bridge
3 = partition plate

Classifications

eCl@ss

eCl@ss 4.0	27141118
eCl@ss 4.1	27141118
eCl@ss 5.0	27141118
eCl@ss 5.1	27141118
eCl@ss 6.0	27141128
eCl@ss 7.0	27141128
eCl@ss 8.0	27141128

Sensor/actuator terminal block - DIKD 1,5-TG - 2774237

Classifications

ETIM

ETIM 2.0	EC000900
ETIM 3.0	EC000900
ETIM 4.0	EC000900
ETIM 5.0	EC000900

UNSPSC

UNSPSC 6.01	30211811
UNSPSC 7.0901	39121410
UNSPSC 11	39121410
UNSPSC 12.01	39121410
UNSPSC 13.2	39121410

Approvals

Approvals

Approvals

CSA / UL Recognized / cUL Recognized / EAC / EAC / cULus Recognized

Ex Approvals

Approvals submitted

Approval details

CSA

mm²/AWG/kcmil	28-14
Nominal current IN	15 A
Nominal voltage UN	300 V

Sensor/actuator terminal block - DIKD 1,5-TG - 2774237

Approvals

UL Recognized

	B	C	D
mm²/AWG/kcmil	30-14	30-14	30-14
Nominal current IN	15 A	15 A	10 A
Nominal voltage UN	300 V	150 V	300 V

cUL Recognized

	B	C	D
mm²/AWG/kcmil	30-14	30-14	30-14
Nominal current IN	15 A	15 A	10 A
Nominal voltage UN	300 V	150 V	300 V

EAC

EAC

cULus Recognized

Accessories

Accessories

DIN rail

DIN rail perforated - NS 35/ 7,5 PERF 2000MM - 0801733

DIN rail, material: steel galvanized and passivated with a thick layer, perforated, height 7.5 mm, width 35 mm, length: 2000 mm

Sensor/actuator terminal block - DIKD 1,5-TG - 2774237

Accessories

DIN rail, unperforated - NS 35/ 7,5 UNPERF 2000MM - 0801681

DIN rail, material: Steel, unperforated, height 7.5 mm, width 35 mm, length: 2 m

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DIN rail perforated - NS 35/ 7,5 WH PERF 2000MM - 1204119

DIN rail 35 mm (NS 35)

DIN rail - NS 35/ 7,5 WH UNPERF 2000MM - 1204122

DIN rail 35 mm (NS 35)

DIN rail, unperforated - NS 35/ 7,5 AL UNPERF 2000MM - 0801704

DIN rail, unperforated, Width: 35 mm, Height: 7.5 mm, Length: 2000 mm, Color: silver

---

DIN rail perforated - NS 35/ 7,5 ZN PERF 2000MM - 1206421

DIN rail, material: Galvanized, perforated, height 7.5 mm, width 35 mm, length: 2 m

---

Sensor/actuator terminal block - DIKD 1,5-TG - 2774237

Accessories

DIN rail, unperforated - NS 35/ 7,5 ZN UNPERF 2000MM - 1206434

DIN rail, material: Galvanized, unperforated, height 7.5 mm, width 35 mm, length: 2 m

DIN rail, unperforated - NS 35/ 7,5 CU UNPERF 2000MM - 0801762

DIN rail, material: Copper, unperforated, height 7.5 mm, width 35 mm, length: 2 m

End cap - NS 35/ 7,5 CAP - 1206560

DIN rail end piece, for DIN rail NS 35/7.5

DIN rail perforated - NS 35/15 PERF 2000MM - 1201730

DIN rail, material: steel galvanized and passivated with a thick layer, perforated, height 15 mm, width 35 mm, length: 2000 mm

DIN rail, unperforated - NS 35/15 UNPERF 2000MM - 1201714

DIN rail, material: Steel, unperforated, height 15 mm, width 35 mm, length: 2 m

Sensor/actuator terminal block - DIKD 1,5-TG - 2774237

Accessories

DIN rail perforated - NS 35/15 WH PERF 2000MM - 0806602

DIN rail 35 mm (NS 35)

DIN rail - NS 35/15 WH UNPERF 2000MM - 1204135

DIN rail 35 mm (NS 35)

DIN rail, unperforated - NS 35/15 AL UNPERF 2000MM - 1201756

DIN rail, deep drawn, high profile, unperforated, 1.5 mm thick, material: aluminum, height 15 mm, width 35 mm, length 2000 mm

---

DIN rail perforated - NS 35/15 ZN PERF 2000MM - 1206599

DIN rail, material: Galvanized, perforated, height 15 mm, width 35 mm, length: 2 m

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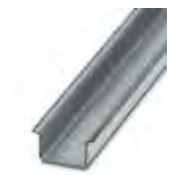
DIN rail, unperforated - NS 35/15 ZN UNPERF 2000MM - 1206586



DIN rail, material: Galvanized, unperforated, height 15 mm, width 35 mm, length: 2 m

---

Sensor/actuator terminal block - DIKD 1,5-TG - 2774237

Accessories

DIN rail, unperforated - NS 35/15 CU UNPERF 2000MM - 1201895

DIN rail, material: Copper, unperforated, 1.5 mm thick, height 15 mm, width 35 mm, length: 2 m

End cap - NS 35/15 CAP - 1206573

DIN rail end piece, for DIN rail NS 35/15

DIN rail, unperforated - NS 35/15-2,3 UNPERF 2000MM - 1201798

DIN rail, material: Steel, unperforated, 2.3 mm thick, height 15 mm, width 35 mm, length: 2 m

End block

End clamp - CLIPFIX 35 - 3022218

Quick mounting end clamp for NS 35/7,5 DIN rail or NS 35/15 DIN rail, with marking option, width: 9.5 mm, color: gray

End clamp - CLIPFIX 35-5 - 3022276

Quick mounting end clamp for NS 35/7,5 DIN rail or NS 35/15 DIN rail, with marking option, with parking option for FBS...5, FBS...6, KSS 5, KSS 6, width: 5.15 mm, color: gray

Sensor/actuator terminal block - DIKD 1,5-TG - 2774237

Accessories

End clamp - E/NS 35 N - 0800886

End clamp, width: 9.5 mm, color: gray

End clamp - E/UK - 1201442

End clamp, Width: 9.5 mm, Height: 35.3 mm, Length: 50.5 mm, Color: gray

End clamp - E/UK 1 - 1201413

End clamps, for supporting the ends of double-level and three-level terminal blocks, width: 10 mm, color: gray

Fuse

Fuse plug - ST-SILA250-UK 4 - 0921053

Fuse plug, Nominal current: 6.3 A, Length: 33.1 mm, Width: 6.1 mm, Height: 45.7 mm, Color: black

Fuse plug - ST-SILED 60-UK 4 - 0921040

Fuse plug, Nominal current: 6.3 A, Length: 33.1 mm, Width: 6.1 mm, Height: 45.7 mm, Color: black

Sensor/actuator terminal block - DIKD 1,5-TG - 2774237

Accessories

Fuse plug - ST-SILED 24-UK 4 - 0921037

Fuse plug, Nominal current: 6.3 A, Length: 33.1 mm, Width: 6.1 mm, Height: 45.7 mm, Color: black

Fuse plug - ST-SILED 12-UK 4 - 0921024

Fuse plug, Nominal current: 6.3 A, Length: 33.1 mm, Width: 6.1 mm, Height: 45.7 mm, Color: black

Insertion bridge

Insertion bridge - EB 80- DIK BU - 2715940

Insertion bridge, Pitch: 6.2 mm, Number of positions: 80, Color: blue

Insertion bridge - EB 10- DIK RD - 2716774

Insertion bridge, Pitch: 6.15 mm, Number of positions: 10, Color: red

Insertion bridge - EB 10- DIK BU - 2716680

Insertion bridge, Pitch: 6.15 mm, Number of positions: 10, Color: blue

Sensor/actuator terminal block - DIKD 1,5-TG - 2774237

Accessories

Insertion bridge - EB 80- DIK RD - 2715953

Insertion bridge, Pitch: 6.2 mm, Number of positions: 80, Color: red

Insertion bridge - EB 10- DIK GY - 2715937

Insertion bridge, Pitch: 6.15 mm, Number of positions: 10, Color: gray

Insertion bridge - EB 80- DIK WH - 2715788

Insertion bridge, Pitch: 6.15 mm, Number of positions: 80, Color: white

Labeled terminal marker

Marker card - SK 6,2/3,8:FORTL.ZAHLEN - 0804374

Marker card, Card, white, labeled, Horizontal: Consecutive numbers 1 - 10, 11 - 20, etc. up to 91 - (99)100, Mounting type: Adhesive, for terminal block width: 6.2 mm, Lettering field: 6.2 x 3.8 mm

Zack marker strip - ZB 6 CUS - 0824992

Zack marker strip, can be ordered: Strip, white, labeled according to customer specifications, Mounting type: Snap into tall marker groove, for terminal block width: 6.2 mm, Lettering field: 6.15 x 10.5 mm

Sensor/actuator terminal block - DIKD 1,5-TG - 2774237

Accessories

Zack marker strip - ZB 6,LGS:FORTL.ZAHLEN - 1051016

Zack marker strip, Strip, white, labeled, can be labeled with: Plotter, Printed horizontally: Consecutive numbers 1 - 10, 11 - 20, etc. up to 491 - 500, Mounting type: Snap into tall marker groove, for terminal block width: 6.2 mm, Lettering field: 6.15 x 10.5 mm

Zack marker strip - ZB 6,QR:FORTL.ZAHLEN - 1051029

Zack marker strip, Strip, white, labeled, can be labeled with: Plotter, Printed vertically: Consecutive numbers 1 - 10, 11 - 20, etc. up to 491 - 500, Mounting type: Snap into tall marker groove, for terminal block width: 6.2 mm, Lettering field: 6.15 x 10.5 mm

Zack marker strip - ZB 6,LGS:GLEICHE ZAHLEN - 1051032

Zack marker strip, Strip, white, labeled, can be labeled with: Plotter, Printed horizontally: Identical numbers 1 or 2, etc. up to 100, Mounting type: Snap into tall marker groove, for terminal block width: 6.2 mm, Lettering field: 6.15 x 10.5 mm

Marker for terminal blocks - ZB 6,LGS:L1-N,PE - 1051414

Marker for terminal blocks, Strip, white, labeled, can be labeled with: Plotter, Horizontal: L1, L2, L3, N, PE, L1, L2, L3, N, PE, Mounting type: Snap into tall marker groove, for terminal block width: 6.2 mm, Lettering field: 6.15 x 10.5 mm

Marker for terminal blocks - ZB 6,LGS:U-N - 1051430

Marker for terminal blocks, Strip, white, labeled, can be labeled with: Plotter, Printed horizontally: U, V, W, N, GND, U, V, W, N, GND, Mounting type: Snap into tall marker groove, for terminal block width: 6.2 mm, Lettering field: 6.15 x 10.5 mm

Sensor/actuator terminal block - DIKD 1,5-TG - 2774237

Accessories

Marker for terminal blocks - UC-TM 6 CUS - 0824589

Marker for terminal blocks, can be ordered: by sheet, white, labeled according to customer specifications, Mounting type: Snap into tall marker groove, for terminal block width: 6.2 mm, Lettering field: 5.6 x 10.5 mm

---

Marker for terminal blocks - UCT-TM 6 CUS - 0829602

Marker for terminal blocks, can be ordered: by sheet, white, labeled according to customer specifications, Mounting type: Snap into tall marker groove, for terminal block width: 6.2 mm, Lettering field: 5.6 x 10.5 mm

---

Partition plate

Partition plate - ATP-DIK 1,5 - 1413272

Partition plate, Length: 65.3 mm, Width: 2 mm, Height: 60 mm, Color: gray

---

Terminal marking

Marker card - SBS 6:UNBEDRUCKT - 1007222

Marker card, Card, white, unlabeled, can be labeled with: Plotter, Mounting type: Snap into tall marker groove, Snap into flat marker groove, for terminal block width: 6.2 mm, Lettering field: 6 x 6.1 mm

---

Zack marker strip - ZB 6:UNBEDRUCKT - 1051003

Zack marker strip, Strip, white, unlabeled, can be labeled with: Plotter, Mounting type: Snap into tall marker groove, for terminal block width: 6.2 mm, Lettering field: 6.15 x 10.5 mm

Sensor/actuator terminal block - DIKD 1,5-TG - 2774237

Accessories

Marker for terminal blocks - UC-TM 6 - 0818085

Marker for terminal blocks, Sheet, white, unlabeled, can be labeled with: BLUEMARK CLED, BLUEMARK LED, Plotter, Mounting type: Snap into tall marker groove, for terminal block width: 6.2 mm, Lettering field: 5.6 x 10.5 mm

Marker for terminal blocks - UCT-TM 6 - 0828736

Marker for terminal blocks, Sheet, white, unlabeled, can be labeled with: THERMOMARK CARD, BLUEMARK CLED, BLUEMARK LED, TOPMARK LASER, Mounting type: Snap into tall marker groove, for terminal block width: 6.2 mm, Lettering field: 5.6 x 10.5 mm

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Feed-through terminal block - UK 6 N - 3004524

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Feed-through terminal block, Connection method: Screw connection, Cross section: 0.2 mm² - 10 mm², AWG 24 - 8, Width: 8.2 mm, Color: gray, Mounting type: NS 35/7.5, NS 35/15, NS 32

Why buy this product

- All universal terminal blocks in the UK... series can also be used in the Ex e area according to IEC/EN 60079 as standard
- The corresponding EC-type examination numbers for Ex approval can be found in the technical connection data

Key commercial data

Packing unit	1
Minimum order quantity	50
Catalog page	Page 408 (CL1-2011)
GTIN	4 017918 090821
Custom tariff number	85369010
Country of origin	GERMANY

Technical data

General

Number of levels	1
Number of connections	2
Color	gray
Insulating material	PA
Inflammability class according to UL 94	V0

Dimensions

Width	8.2 mm
Length	42.5 mm
Height NS 35/7.5	47 mm
Height NS 35/15	54.5 mm
Height NS 32	52 mm

Technical data

Maximum load current	57 A (with 10 mm2 conductor cross section)

Feed-through terminal block - UK 6 N - 3004524

Technical data

Technical data

Rated surge voltage	8 kV
Pollution degree	3
Surge voltage category	III
Insulating material group	I
Connection in acc. with standard	IEC 60947-7-1
Nominal current IN	41 A
Nominal voltage UN	800 V
Open side panel	ja

Connection data

Conductor cross section solid min.	0.2 mm²
Conductor cross section solid max.	10 mm²
Conductor cross section stranded min.	0.2 mm²
Conductor cross section stranded max.	6 mm²
Conductor cross section AWG/kcmil min.	24
Conductor cross section AWG/kcmil max	8
Conductor cross section stranded, with ferrule without plastic sleeve min.	0.25 mm²
Conductor cross section stranded, with ferrule without plastic sleeve max.	6 mm²
Conductor cross section stranded, with ferrule with plastic sleeve min.	0.25 mm²
Conductor cross section stranded, with ferrule with plastic sleeve max.	6 mm²
2 conductors with same cross section, solid min.	0.2 mm²
2 conductors with same cross section, solid max.	2.5 mm²
2 conductors with same cross section, stranded min.	0.2 mm²
2 conductors with same cross section, stranded max.	2.5 mm²
2 conductors with same cross section, stranded, TWIN ferrules with plastic sleeve, min.	0.5 mm²
2 conductors with same cross section, stranded, TWIN ferrules with plastic sleeve, max.	4 mm²
2 conductors with same cross section, stranded, ferrules without plastic sleeve, min.	0.25 mm²
2 conductors with same cross section, stranded, ferrules without plastic sleeve, max.	1.5 mm²
Cross section with insertion bridge, solid max.	4 mm²
Cross section with insertion bridge, stranded max.	4 mm²
Connection method	Screw connection
Stripping length	10 mm
Internal cylindrical gage	A5
Screw thread	M4
Tightening torque, min	1.5 Nm
Tightening torque max	1.8 Nm

Feed-through terminal block - UK 6 N - 3004524

Classifications

eclass

eCl@ss 4.0	27141120
eCl@ss 4.1	27141120
eCl@ss 5.0	27141120
eCl@ss 5.1	27141120
eCl@ss 6.0	27141120
eCl@ss 7.0	27141120

etim

ETIM 2.0	EC000897
ETIM 3.0	EC000897
ETIM 4.0	EC000897

unspsc

UNSPSC 6.01	30211811
UNSPSC 7.0901	39121410
UNSPSC 11	39121410
UNSPSC 12.01	39121410
UNSPSC 13.2	39121410

Approvals

Approvals

Approvals

CSA / UL Recognized / KEMA-KEUR / cUL Recognized / GOST / LR / GL / BV / DNV / RS / ABS / PRS / KR / NK / CCA / GOST / cULus Recognized

Ex Approvals

IECEx / ATEX / FM approved / UL Recognized / cUL Recognized / GL / cULus

Approvals submitted

Approval details

CSA

mm²/AWG/kcmil	26-8
Nominal current IN	50 A
Nominal voltage UN	600 V

Feed-through terminal block - UK 6 N - 3004524

Approvals

UL Recognized

mm²/AWG/kcmil	26-8
Nominal current IN	50 A
Nominal voltage UN	600 V

KEMA-KEUR

mm²/AWG/kcmil	6
Nominal current IN	41 A
Nominal voltage UN	800 V

cUL Recognized

mm²/AWG/kcmil	26-8
Nominal current IN	50 A
Nominal voltage UN	600 V

GOST

LR

mm²/AWG/kcmil	6
Nominal current IN	41 A
Nominal voltage UN	800 V

GL

BV

DNV

RS

Feed-through terminal block - UK 6 N - 3004524

Approvals

ABS	
mm²/AWG/kcmil	28-8
Nominal current IN	50 A
Nominal voltage UN	600 V

PRS

KR

NK

CCA	
mm²/AWG/kcmil	6
Nominal voltage UN	800 V

GOST

cULus Recognized

Drawings

Circuit diagram

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Surge protection device - TT-2-PE-M-24DC - 2920641

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Modular terminal block with two-stage surge protection for one operated floating double conductor, disconnect knife on both signal paths, separate ground connection, nominal voltage: 24 V DC.

Product Features

- Versions with and without disconnect knife
- Protection of a floating double wire
- Protection of two signal wires with common reference potential
- Multi-stage modular terminal blocks with screw connection technology
- Disconnection of signal circuits by disconnect knife

Key Commercial Data

Packing unit	1 pc
Weight per Piece (excluding packing)	34.28 g
Custom tariff number	85363010
Country of origin	Germany

Technical data

Dimensions

Height	94.8 mm
Width	6.2 mm
Depth	69.1 mm

Ambient conditions

Ambient temperature (operation)	-40 °C ... 80 °C

General

Surge protection device - TT-2-PE-M-24DC - 2920641

Technical data

General

Housing material	PA 6.6
Inflammability class according to UL 94	V-0
Color	jet black RAL 9005
Mounting type	DIN rail: 35 mm
Type	Double-level terminal block with PE foot – separate PE connection
Number of positions	2
Direction of action	Line-Line & Line-Earth Ground

Protective circuit

IEC test classification	C1
	C2
	C3
	D1
Nominal voltage U_N	24 V DC
Maximum continuous voltage U_C	30 V DC
	21 V AC
Nominal current I_N	300 mA (40°C)
Operating effective current I_C at U_C	≤ 5 µA
Residual current I_{PE}	≤ 2 µA
Nominal discharge current I_n (8/20) µs (Core-Core)	5 kA
Nominal discharge current I_n (8/20) µs (Core-Earth)	5 kA
Pulse discharge current I_{imp} (10/350) µs (core-ground)	500 A
Nominal pulse current Ian (10/1000) µs (Core-Core)	30 A
Nominal pulse current Ian (10/1000) µs (Core-Earth)	100 A
Impulse discharge current (10/350)#µs, peak value I_{imp}	500 A
Output voltage limitation at 1 kV/µs (Core-Core) spike	≤ 45 V
Output voltage limitation at 1 kV/µs (Core-Earth) spike	≤ 650 V
Output voltage limitation at 1 kV/µs (Core-Core) static	≤ 45 V
Output voltage limitation at 1 kV/µs (Core-Earth) static	≤ 650 V
Residual voltage at I_n (conductor-conductor)	≤ 45 V
Residual voltage with Ian (10/1000)µs (conductor-conductor)	≤ 50 V
Voltage protection level U_p (core-core)	≤ 45 V (C1 - 500 V / 250 A)
	≤ 55 V (C2 - 10 kV/5 kA)
Response time tA (Core-Core)	≤ 1 ns
Response time tA (Core-Earth)	≤ 100 ns
Input attenuation aE, sym.	typ. 0.6 dB (≤ 500 kHz / 50 Ω)
	typ. 0.2 dB (≤ 200 kHz / 150 Ω)

Surge protection device - TT-2-PE-M-24DC - 2920641

Technical data

Protective circuit

Cut-off frequency fg (3 dB), sym. in 50 Ohm system	typ. 6 MHz
Cut-off frequency fg (3 dB), sym. in 150 Ohm system	typ. 2 MHz
Capacity (Core-Core)	< 2.5 nF
Resistance in series	3.3 Ω ±20 %
Max. required back-up fuse	315 mA (e.g. T in acc. with IEC 127-2/III)
Impulse durability (conductor-conductor)	C2 - 10 kV/5 kA
Impulse durability (conductor-ground)	C2 - 10 kV/5 kA
	D1 - 500 A

Connection data

Connection method	Screw connection
Connection type IN	Screw terminal blocks
Connection type OUT	Screw terminal blocks
Screw thread	M3
Tightening torque	0.6 Nm
Stripping length	8 mm
Conductor cross section flexible min.	0.2 mm²
Conductor cross section flexible max.	2.5 mm²
Conductor cross section solid min.	0.2 mm²
Conductor cross section solid max.	4 mm²
Conductor cross section AWG min.	24
Conductor cross section AWG max.	14

Classifications

eCl@ss

eCl@ss 4.0	27140201
eCl@ss 4.1	27130801
eCl@ss 5.0	27130801
eCl@ss 5.1	27130801
eCl@ss 6.0	27130807
eCl@ss 7.0	27130807
eCl@ss 8.0	27130807

ETIM

ETIM 2.0	EC000943
ETIM 3.0	EC000943
ETIM 4.0	EC000943

Surge protection device - TT-2-PE-M-24DC - 2920641

Classifications

ETIM

ETIM 5.0	EC000943

UNSPSC

UNSPSC 6.01	30212010
UNSPSC 7.0901	39121610
UNSPSC 11	39121610
UNSPSC 12.01	39121610
UNSPSC 13.2	39121620

Approvals

Approvals

Approvals

EAC / EAC

Ex Approvals

Approvals submitted

Approval details

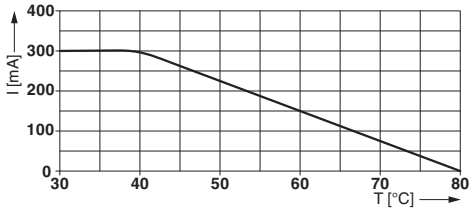
EAC

EAC

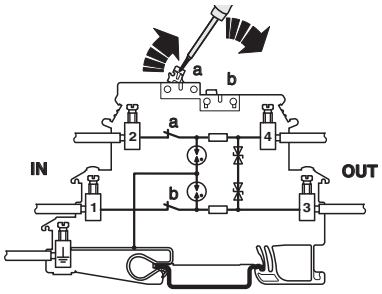
Drawings

Surge protection device - TT-2-PE-M-24DC - 2920641

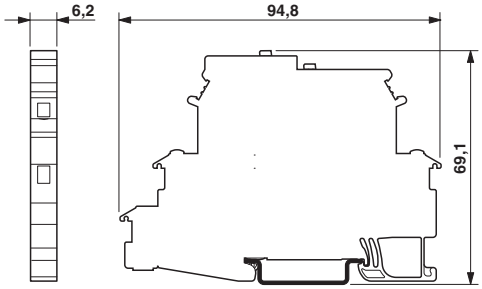
Diagram



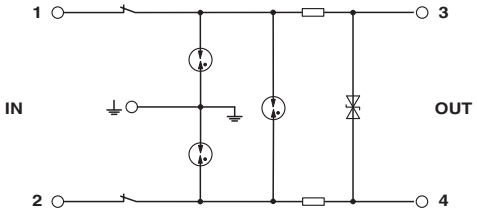
Connection diagram



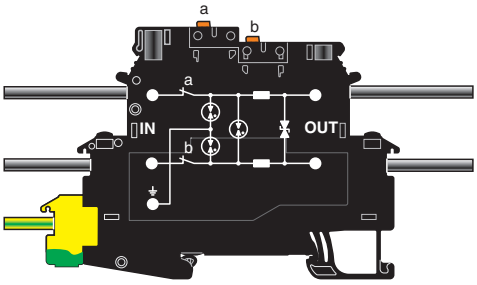
Dimensional drawing



Circuit diagram

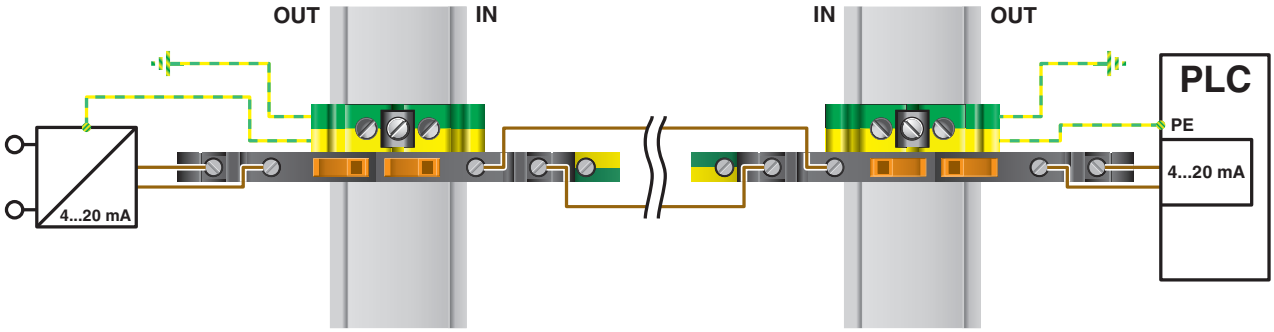


Schematic diagram



Surge protection device - TT-2-PE-M-24DC - 2920641

Application drawing



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EDS-205/208 Series

5 and 8-port entry-level unmanaged Ethernet switches

- 10/100BaseT(X) (RJ45 connector), 100BaseFX (multi-mode, SC/ST connectors)
- IEEE802.3/802.3u/802.3x support
- Broadcast storm protection
- DIN-rail mounting ability
- -10 to 60°C operating temperature range

Introduction

The EDS-205/208 series of industrial Ethernet switches are entry-level industrial 5 and 8-port Ethernet switches that support IEEE 802.3/802.3u/802.3x with 10/100M, full/half-duplex, MDI/MDIX auto-sensing RJ45 ports. The EDS-205/208 switches are rated to operate at temperatures ranging from -10 to 60°C, and are rugged enough for any harsh industrial environment. The switches can be easily installed on a DIN-rail as well as in distribution boxes. The DIN-rail mounting capability, wide operating temperature, and the IP30 housing with LED indicators make the plug-and-play EDS-205/208 switches easy to use and reliable.

Specifications

Technology

Standards:
IEEE 802.3 for 10BaseT
IEEE 802.3u for 100BaseT(X) and 100BaseFX
IEEE 802.3x for Flow Control
Processing Type: Store and Forward
Flow Control: IEEE 802.3x flow control, back pressure flow control

Switch Properties

MAC Table Size: 1 K
Packet Buffer Size: 512 kbit

Interface

Fiber Ports: 100BaseFX ports (SC/ST connector, multi-mode)
RJ45 Ports: 10/100BaseT(X) auto negotiation speed, Full/Half duplex mode, and auto MDI/MDI-X connection
LED Indicators: Power, 10/100M (TP port), 100M (fiber port)

Optical Fiber

	100BaseFX	
	Multi-mode	Single-mode
Wavelength	1300 nm	1310 nm
Max. TX	-10 dBm	0 dBm
Min. TX	-20 dBm	-5 dBm
RX Sensitivity	-32 dBm	-34 dBm
Link Budget	12 dB	29 dB
Typical Distance	5 km [a] 4 km [b]	40 km [c]
Saturation	-6 dBm	-3 dBm

a. 50/125 µm, 800 MHz*km fiber optic cable
b. 62.5/125 µm, 500 MHz*km fiber optic cable
c. 9/125 µm single-mode fiber optic cable

Power Requirements

Input Voltage:
EDS-205: 24 VDC (12 to 48 VDC), 18 to 30 VAC (47 to 63 Hz), single input
EDS-208 Series: 24 VDC (12 to 45 VDC), 18 to 30 VAC (47 to 63 Hz), single input
Input Current:
EDS-205: 0.12 A @ 24 V
EDS-208: 0.14 A @ 24 V
EDS-208-M: 0.23 A @ 24 V
Overload Current Protection: 1.1 A
Connection: 1 removable 3-contact terminal block
Reverse Polarity Protection: Present

Physical Characteristics

Housing: Plastic, IP30 protection
Dimensions:
EDS-205: 24.9 x 100 x 86.5 mm (0.98 x 3.94 x 3.41 in)
EDS-208 Series: 40 x 100 x 86.5 mm (1.57 x 3.94 x 3.41 in)
Weight:
EDS-205: 135 g
EDS-208 Series: 170 g
Installation: DIN-rail mounting

Environmental Limits

Operating Temperature: -10 to 60°C (14 to 140°F)
Storage Temperature: -40 to 85°C (-40 to 185°F)
Ambient Relative Humidity: 5 to 95% (non-condensing)

Standards and Certifications

Safety:
EDS-205: UL 508, EN 60950-1
EDS-208 Series: UL 508
EMI: FCC Part 15 Subpart B Class A, EN 55022 Class A
EMS:
EN 61000-4-2 (ESD) Level 2, EN 61000-4-3 (RS) Level 3,
EN 61000-4-4 (EFT) Level 3, EN 61000-4-5 (Surge) Level 3,
EN 61000-4-6 (CS) Level 3,
EN 61000-4-8, EN 61000-4-11
Shock: IEC 60068-2-27
Freefall: IEC 60068-2-32
Vibration: IEC 60068-2-6
Note: Please check Moxa's website for the most up-to-date certification status.

MTBF (mean time between failures)

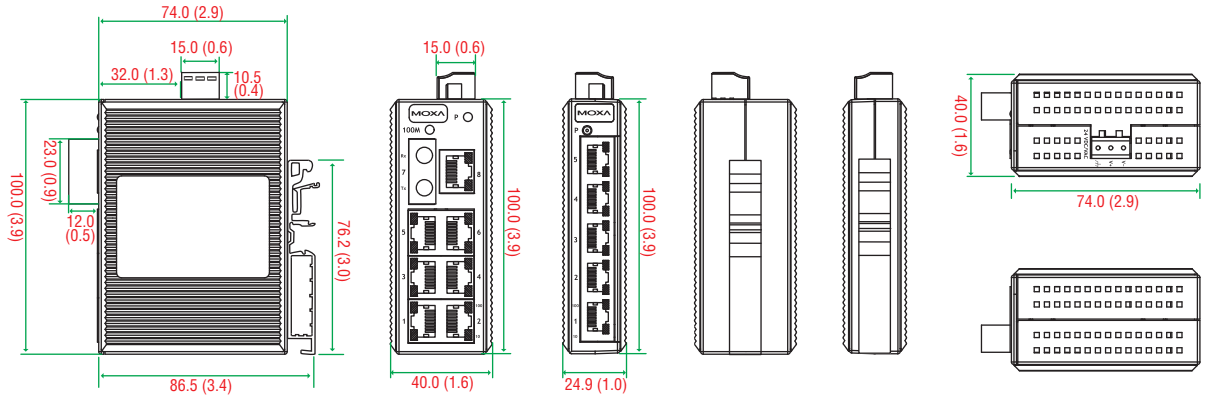
Time:
EDS-205: 3,915,945 hrs
EDS-208 Series: 7,492,000 hrs
Database: Telcordia (Bellcore), GB

Warranty

Warranty Period: 5 years
Details: See www.moxa.com/warranty

Dimensions

Unit: mm (inch)



Side View | Front View | Rear View | Top & Bottom View

Ordering Information

Available Models	Port Interface			Housing Material	Power Range
Standard Temperature (-10 to 60°C)	10/100BaseT(X)	100BaseFX			
		Multi-mode, SC Connector	Multi-mode, ST Connector		
EDS-205	5	–	–	Plastic	12 to 48 VDC
EDS-208	8	–	–	Plastic	12 to 45 VDC
EDS-208-M-SC	7	1	–	Plastic	12 to 45 VDC
EDS-208-M-ST	7	–	1	Plastic	12 to 45 VDC

Optional Accessories (can be purchased separately)

DR-4524/75-24/120-24: 45/75/120 W DIN-rail 24 VDC power supplies
MDR-40-24/60-24: 40/60 W DIN-rail 24 VDC power supplies, -20 to 70°C operating temperature
RK-4U: 4U-high 19" rack mounting kit

Package Checklist

- EDS-205 or EDS-208 switch
- Hardware installation guide (printed)
- Warranty card

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AirLink® RV50 Industrial LTE Gateway

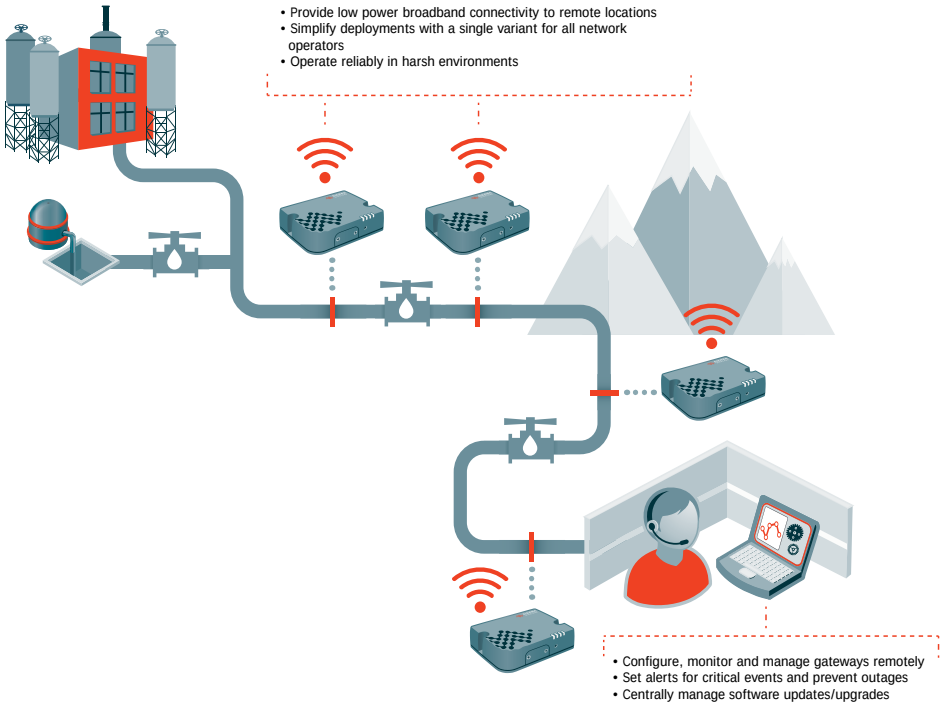
FEATURES

- LTE performance at 2G power consumption (less than 1W in idle mode)
- State-of-the-art LTE coverage spanning 21 LTE frequency bands worldwide
- Two product variants cover the globe
- Fully automatic network operator switching: just insert the SIM
- Provides network connectivity via Ethernet, Serial and USB
- Remote configuration, software update, and monitoring with cloud-based AirLink Management Service (ALMS) or on-premises with AirLink Mobility Manager (AMM)
- Dual-SIM functionality to enable automatic failover between SIMs (CANADA/EMEA/APAC)
- Meets industrial-grade certifications including Class 1 Div 2, MIL-STD-810G, IP64 ingress protection
- Supports up to 5 VPN tunnels for secure cellular communications
- Events Engine for alert reporting to third party server platforms
- Application Framework (AAF) offers real-time onboard data processing; RV50X's dual-core processor provides added performance for advanced edge computing applications.
- GPS for tracking equipment

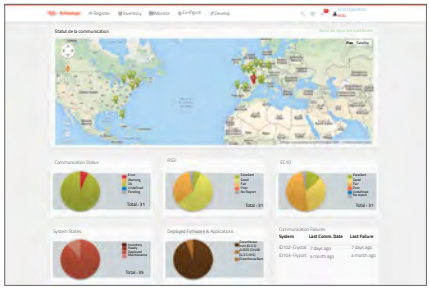
Industrial Grade, LTE-Advanced Performance, Low Power

The AirLink RV50 is the industry's lowest power and most rugged LTE gateway. Simple to install and easy to manage, this industrial-grade gateway is designed to connect critical assets and infrastructure. Ideal for energy, utilities and smart-city applications, the RV50 provides real-time remote connectivity for SCADA, distribution management systems and metering.

With the lowest power consumption available on the market, the RV50 dramatically reduces infrastructure costs when running on battery or solar power. The RV50X variant supports an extensive range of LTE bands worldwide, and its LTE-Advanced capabilities deliver up to 300 Mbps downlink speeds. For deployments in areas with limited LTE coverage, the RV50 provides fallback to 2G and 3G networks. Furthermore, the RV50 provides programmability to enable edge computing applications, using the ALEOS Application Framework (AAF).

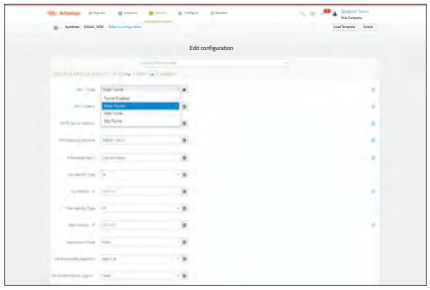


DASHBOARD

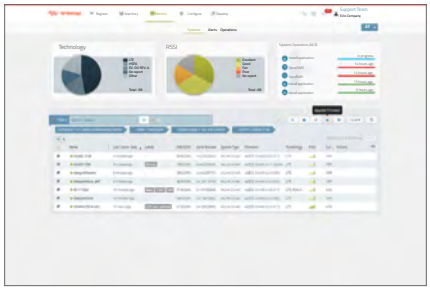


MONITOR CONNECTIVITY

SECURITY CONFIGURATION



SOFTWARE UPGRADES/UPDATES



RUGGED DESIGN FOR DEMANDING ENVIRONMENTS

The RV50 is designed to withstand harsh industrial conditions, and is capable of surviving 5 V brownouts and spikes from -600 VDC to 200 VDC.

Certified as Class I Div 2, it is ideal for hazardous environments. The die cast aluminum housing is sealed to meet IP64 for resistance to dust and water ingress.

The RV50 is tested to meet and exceed the MIL-STD-810G specification for shock, vibration, temperature and humidity. The built-in power supply protection make it suitable for harsh electrical environments such as compressors, generators, and excavators.

ULTRA-LOW POWER CONSUMPTION

The RV50 offers best-in-class power consumption combined with LTE performance, and is optimized for battery and solar applications. It is the industry's only LTE gateway with 2G power consumption, operating at 900 mW in idle mode. For 2G and 3G deployments migrating to LTE, the RV50 will work with existing power infrastructure, eliminating the need to invest in replacement solar panels or batteries. Standby Mode provides additional protection for batteries by dropping power consumption to 53 mW, and can be triggered by timers, low voltage detection or I/O.

SIMPLIFIED DEPLOYMENT

The RV50 automatically configures the radio based on the SIM, which provides versatility and simplicity when changing operator networks.

Ideal for global deployments, the RV50X provides worldwide LTE coverage with just two product variants; one for North America and EMEA, and one for Asia-Pacific.

BEST-IN-CLASS REMOTE MANAGEMENT

Network Management solutions for the RV50 allow over-the-air registration, configuration and software updates, and can be deployed either as a cloud-based service, or as a licensed software platform in the enterprise data center. Both options provide a centralized and remote view of an entire fleet and enable simplified management, control and monitoring of connected RV50s and critical infrastructure.

AirLink Management Service (ALMS) is a secure, centralized cloud-based service that remotely monitors and manages signal strength, network technology and location. ALMS provides dashboards with up-to-date views of an entire deployment, and custom alerts to monitor and report critical events, to increase efficiency and prevent downtime.

AirLink Mobility Manager (AMM) is a licensed, unified software platform which can

SIERRA WIRELESS®

BENEFITS

- Provides LTE broadband connectivity to remote locations and in harsh environments
- Ultra-low power consumption, ideal for solar or battery powered installations
- Maximizes longevity of deployed equipment and protects investments with LTE
- Improves ROI by supporting multiple network operators without additional hardware costs
- Powerful remote management solutions
- Built-in, class-leading voltage transient protection provides superior reliability and continuous operation
- Proven reliability and over 2 million AirLink routers and gateways deployed
- Industry leading warranty includes support, software updates and advance replacement

be deployed in the enterprise data center, and provides a consolidated network view of an entire fleet, using a virtual dashboard to monitor, report, manage, and troubleshoot all mobile resources as required.

INSTANT INTEGRATION

The RV50 is designed to install directly into existing infrastructure. Offering both serial and Ethernet connectivity, it can be used to connect devices like PLCs and RTUs, and transmit a wide variety of protocols like Modbus/DNP3 with ease. RV50 can also be integrated directly into existing management systems via SNMP.

INTELLIGENCE AT THE EDGE

The RV50 provides an application framework which allows customers to apply intelligence at the edge of the network. The RV50X offers a dual core processor which enhances the performance of edge applications.

SECURE INDUSTRIAL COMMUNICATIONS

The RV50 supports secure communications to multiple back-end systems by providing up to five concurrent VPN sessions. Remote authentication management allows enterprise-grade systems to manage access to devices in the field. Port filtering and trusted IP protect the devices connected to RV50s from unwanted access. Secure signing and authentication of software images offers end-to-end protection of the software upgrade process, protecting the RV50 against unwanted malware.

	RV50		RV50X	
	North America	International	North America & EMEA	Asia Pacific
LTE CATEGORY	Cat 3		Cat 6	
Peak D/L	(Up to 100 Mbps DL)		(Up to 300 Mbps DL)	
Peak U/L	(Up to 50 Mbps UL)		(Up to 50 Mbps UL)	
4G LTE Frequency Bands*	1900(B2), AWS(B4), 850(B5), 700(B13), 700(B17), 1900(B25)	2100(B1), 1800(B3), 2600(B7), 900(B8), 800(B20)	2100(B1), 1900(B2), 1800(B3), AWS(B4), 850(B5), 2600(B7), 900(B8), 700(B12), 700(B13), 800(B20), 1900(B25), 850(B26), 700(B29), TDD B41	2100(B1), 1800(B3), 850(B5), 2600(B7), 900(B8), 850(B18), 850(B19), 1500(B21), 700(B28), TDD 38, TDD 39, TDD 40, TDD 41
3G HSPA/HSPA+ Frequency Bands*	2100(B1), 1900(B2), AWS(B4), 850(B5), 900(B8)	2100(B1), 1900(B2), 850(B5), 900(B8)	2100(B1), 1900(B2), 1800(B3), AWS(B4), 850(B5), 900(B8)	2100(B1), 850(B5), 800(B6), 900(B8), 1700(B9), 850(B19),
3G TD-SCDMA Frequency Bands*				B39
2G CDMA 1XRTT/EV-DO REV 1 Frequency Bands*	2100(B1), 1900(B2), AWS(B4), 850(B5), 900(B8)			
2G EDGE/GSM/GPRS Frequency Bands*	Quad-band	Quad-band		
APPROVALS				
Regulary	FCC, IC, PTCRB	CE, RCM, GCF, R&TTE	FCC, IC, PTCRB, R&TTE, GCF, CE	RCM, JRF/JPA
Carrier	Verizon, AT&T, Sprint, T-Mobile USA, US Cellular, Rogers, Bell, Telus		Verizon, AT&T, T-Mobile USA Other Major carriers pending	Telstra

**For carrier specific band support please refer to the hardware user guide.*

SIERRA WIRELESS®

Sierra Wireless
AIRLINK RV50

	Specification
HOST INTERFACES	10/100/1000 Ethernet (RJ45)
	RS-232 serial port (DB-9)
	USB 2.0 Micro-B Connector
	3 SMA antenna connectors (primary, diversity, GPS)
	Active GPS antenna support
INPUT/OUTPUT	Configurable I/O pin on power connector • Digital Input ON Voltage: 2.7 to 36 VDC • Configurable Pull-up for dry contact input • Digital Open Collector Output > sinking 500 mA • Analog Input: 0.5-36 VDC
LAN (ETHERNET/USB)	DNS, DNS Proxy
	DHCP Server
	IP Passthrough
	VLAN
	Host Interface Watchdog
	PPPoE
SERIAL	TCP/UDP PAD Mode
	Modbus (ASCII, RTU, Variable)
	PPP
	DNP3 Interoperability
NETWORK AND ROUTING	Network Address Translation (NAT)
	Port Forwarding
	Host Port Routing
	NEMO/DMNR
	VRRP
	Reliable Static Route
	Dynamic DNS
VPN	IPsec, GRE, and OpenVPN Client
	Up to 5 concurrent tunnels
	Split Tunnel
	Dead Peer Detection (DPD)
	Multiple Subnets
EVENTS ENGINE	Custom event triggers and reports
	Configurable interface, no programming
	Event Types: Digital Input, Network Parameters, Data Usage, Timer, Power, Device Temperature and Voltage
	Report Types: RAP, SMS, Email, SNMP Trap, TCP (Binary, XML, CSV)
	Event Actions: Drive Relay Output
DIMENSIONS	119 mm x 34 mm x 85 mm (94 mm including connectors)
	4.69 in x 1.34 in x 3.35 in (3.70 in including connectors)
SECURITY	Remote Authentication (LDAP, RADIUS, TACACS+)
	DMZ
	Inbound and Outbound Port filtering
	Inbound and Outbound Trusted IP
	MAC Address Filtering
	PCI compatible
APPLICATION FRAMEWORK	ALEOS Application Framework (AAF)
	LUA Scripting Language
	Eclipse-based IDE
	Integrated with AirVantage®
	Dual-Core Processing (RV50X)

	Specification
SATELLITE NAVIGATION (GNSS)	12 Channel GPS and GLONASS Receiver
	Acquisition Time: 1 s Hot Start
	Accuracy: <2 m (50%), <5 m (90%)
	Tracking Sensitivity: -145 dBm
	Reports: NMEA 0183 V3.0, TAIP, RAP, XORA
	Multiple Redundant Servers
	Reliable Store and Forward
NETWORK MANAGEMENT	Secure network management applications available in the cloud or licensed platform in the enterprise data center
	Fleet wide firmware upgrade delivery
	Router configuration and template management
	Router staging over the air and local Ethernet connection
	Over-the-air software and radio module firmware updates
	Device Configuration Templates
	Configurable monitoring and alerting
	Remote provisioning and airtime activation (where applicable)
GATEWAY MANAGEMENT INTERFACES	ALMS
	Local web user interface
	AT Command Line Interface (Telnet/SSH/Serial)
	SMS Commands
	SNMP
MANAGEMENT SYSTEM ACCESS/SECURITY	Remote authentication (LDAP, RADIUS and TACACS+)
POWER	Input Voltage: 7 to 36 VDC
	LTE Idle Power: 900mW (75 mA @ 12VDC)
	Standby Mode Power: 53 mW (4.4 mA @ 12 VDC) triggered on low voltage, I/O or periodic timer
	Low voltage disconnect to prevent battery drain
	Built-in protection against voltage transients including 5 VDC engine cranking and +200 VDC load dump
	Ignition Sense with time delay shutdown
	Configurable features and ports to optimize power consumption
ENVIRONMENTAL	Operating Temperature: -40°C to +70°C / -40°F to +158°F
	Storage Temperature: -40°C to +85°C / -40°F to +185°F
	Humidity: 90% RH @ 60°C
	Military Spec MIL-STD-810G conformance to shock, vibration, thermal shock, and humidity
	IP64 rated ingress protection
INDUSTRY CERTIFICATIONS	Safety: IECEE Certification Bodies Scheme (CB Scheme), UL 60950
	Vehicle Usage: E-Mark (UN ECE Regulation 10.04), ISO7637-2, SAE J1455 (Shock & Vibration)
	Hazardous Environments: Class 1 Div 2
	Environmental: RoHS, REACH, WEEE
SUPPORT AND WARRANTY	3-year standard warranty
	Optional 2-year warranty extension
	Unrestricted device software upgrades
	1-day Accelerated Hardware Replacement available through participating resellers

About Sierra Wireless

Sierra Wireless is building the Internet of Things with intelligent wireless solutions that empower organizations to innovate in the connected world. We offer the industry's most comprehensive portfolio of 2G, 3G, and 4G embedded modules and gateways, seamlessly integrated with our secure cloud and connectivity services. OEMs and enterprises worldwide trust our innovative solutions to get their connected products and services to market faster.

For more information, visit www.sierrawireless.com.

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SIERRA WIRELESS®

The logical choice for value, durability and reliability

The heavy-duty HT800 Series is a family of 30.5 mm pushbutton devices that includes momentary, illuminated and mushroomhead pushbuttons, selector switches, indicating lights and push-pull units. The HT800 devices have a familiar appearance found in most industrial applications and are suitable for replacement of several other manufacturers' 30.5 mm devices.

Unlike their closest competitor, the HT800 devices are all UL® (NEMA®) Type 4X rated for resistance to corrosion. In addition, all HT800 devices are shipped complete with grounding hardware to ensure compliance with electrical installation requirements. With most competitive devices, grounding kits have to be purchased separately.

Rugged metal construction, handsome appearance, extra features and competitive prices make the HT800 Series the logical choice for OEMs and panel builders looking for value, durability and reliability.

Features

- Die-cast metal housings create robust and heavy-duty devices that can endure repetitive and heavy-handed use in industrial environments
- Anodized aluminum mounting rings are corrosion-resistant and are UL (NEMA) Type 4X rated
- Double-V gaskets and O-rings seal operators against contaminants to maintain dust-tight, watertight and oil-tight panel ratings (UL Type 4, 12 and 13 rated)
- Pilot-duty UL Type A600 rated contact blocks handle inductive loads up to 0.35 power factor (PF) compared to general-purpose ratings that have only a 0.75 PF rating
- Contact blocks have clear transparent housings to allow easy visual inspection of contacts
- Contact blocks are color coded (white for NO and black for NC) to permit easy identification and troubleshooting
- Movable contacts in contact blocks have a "reliability" ridge to ensure solid electrical contact under a variety of electrical conditions
- Logic level contact blocks have gold-plated contacts to ensure circuit integrity down to 1 mA @ 5V
- Extended height bulbs provide side illumination of illuminated pushbuttons and indicating lights
- Contact blocks mount side-by-side and are stackable; they can be mounted in left and right positions or rotated to mount in upper and lower positions. This flexibility permits correct positioning and alignment of the terminals to line up with existing wires in retrofit applications
- Bright and long-lasting LEDs are available in six colors
- Selector switches can be converted from 2-position to 3-position and vice versa by rotating the internal cams—a nice option to have on the job site
- Knob and lever assemblies can be rotated every 22.5 degrees to suit various panel layouts

EATON

Powering Business Worldwide

Product range

Momentary pushbuttons

- Flush, extended and 40 mm diameter mushroomhead type
- Black, red or green

Illuminated pushbuttons

- With or without protective guards
- Incandescent or LED
- Full voltage or transformer type
- 24V or 120V
- Red, green, amber, clear, white, yellow and blue

Indicating lights

- Standard or PresTest type
- Incandescent or LED
- Full voltage or transformer type
- 24V or 120V
- Red, green, amber, clear, white, yellow and blue

Push-pull units

- Two-position maintained
- Mushroomhead type (40 mm)
- Black, red or green

Illuminated push-pull units

- Two-position maintained
- Mushroomhead type (40 mm)
- Incandescent or LED
- Full voltage or transformer type
- 24V or 120V
- Red or green

Selector switches

- Knob or lever type
- Maintained and spring-return versions
- Two, three and four positions
- Non-illuminated
- Black

Technical specifications and data

Mechanical Ratings

Description	Specification
Frequency of Operation	
Pushbuttons	6000 operations per hour
Selector switches	3000 operations per hour
Push-pull operators	3000 operations per hour
Mechanical Endurance/Life	
Pushbuttons	10 x 106 operations 6K Ops/Hr six—NO on left and six—NC on right
Selector switches	250 x 10 three operations 3K Ops/Hr two—NO on left and two—NC on right
Push-pull operators	250 x 10 three operations 3K Ops/Hr six—NO on left and six—NC on right
Climatic Conditions	
Operating temperature	10° to 140°F (–12° to 60°C)
Storage temperature	–40° to 176°F (–40° to 80°C)
Altitude	6562 ft. (2999m)
Humidity	95% RH @ 60°C
Terminals	
Contact blocks	#6-32 posi-drive saddle damp type, 1x16 AWG to 2x15 AWG 12 in-lb max
Light units	#6-32 posi-drive saddle damp type, 1x22 AWG to 2x14 AWG 7 in-lb max

Electrical Ratings—HT800 Standard Contact Blocks, UL Rating

Description/Function	Contact Type	Catalog Number	AC	DC
Standard normally open contact	NO	HT8A	A600 ❶	P600 ❷
Standard normally closed contact	NC	HT8B	A600 ❶	P600 ❷
Normally open early make contact will make circuit before standard NO contact. DC ratings do not apply.	NOEM	HT8C	A600 ❶	———
Normally closed late break contact will open after standard NC contact. DC ratings do not apply	NCLB	HT8D	A600 ❶	———
Logic level, low voltage NO contact gold-plated contacts	NO	HT8E	5V 1 mA (minimum) 28V 500 mA (maximum)	

❶ Heavy-duty.
❷ Standard-duty.

UL A600 and P600 Ratings

	Vac 50 or 60 Hz				Vdc ❶		
Description	**120**	**240**	**480**	**600**	**125**	**250**	**600**
Make and emergency interrupting capacity (amperes)	60	30	15	12	1.1	0.55	0.2
Normal load break (amperes)	6	3	1.5	1.2	1.1	0.55	0.2
Thermal current (amperes)	10	10	10	10	5	5	5
Volt-amperes: Make and emergency interrupting capacity	7200	7200	7200	7200	138 ❷	138 ❷	138 ❷
Normal load break	720	720	720	720	138	138	138

❶ DC ratings do not apply to NOEM (Normally Open Early Make) and NCLB (Normally Closed Late Break) contact blocks HT8C and HT8D.

❷ Maximum make or break volt-amperes at 300V or less.

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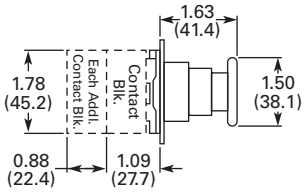
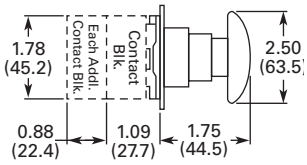
Approximate Dimensions in Inches (mm)

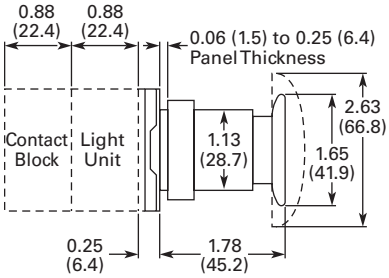
Mushroom Pushbutton



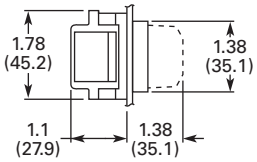
Jumbo Mushroom Pushbutton



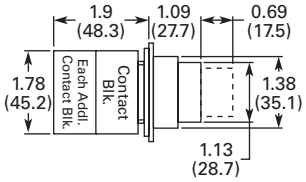
Push-Pull Switch



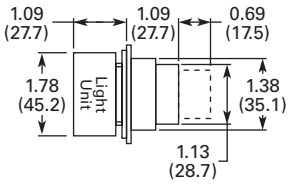
Indicating Light



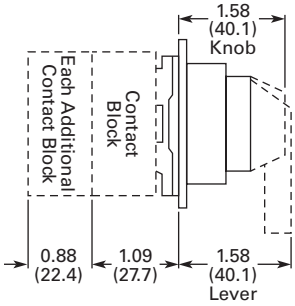
PresTest Indicating Light



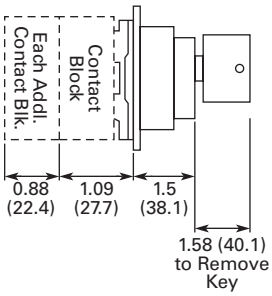
Illuminated Pushbutton



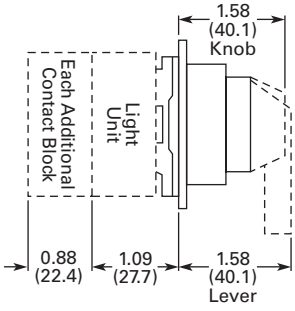
Selector Switch



Key Selector Switch



Illuminated Selector Switch



30.5 mm Watertight/Oiltight—HT800

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Product Description

The HT800 Series from Eaton's Electrical Sector is a family of 30.5 mm pushbutton devices which includes momentary, illuminated and mushroom head pushbuttons, selector switches, indicating lights and push-pull switches. The HT800 devices have a familiar appearance found in most industrial applications and are suitable for replacement of several other manufacturers' 30.5 mm pushbutton devices.

Features

- Anodized aluminum mounting rings
- Watertight double V-gasket seals
- Extended height bulbs
- Transparent housing contact blocks
- Color-coded contact blocks
- Gold-plated contacts (on low voltage contact block)
- Reliability ridge on movable contact
- Stackable screw-mounted contact blocks
- Contact blocks can be mounted in left/right or top/bottom positions
- Standard NC contact opens before NO contact closes (break before make operation)
- Bright and long lasting LED indicating lights in six colors
- Field convertible maintained selector switches—from two- to three-position and vice versa
- Field selectable knob/lever mounting positions—at any 22.5° increment

Benefits

- Corrosion resistant NEMA 4X finish
- Watertight and oiltight NEMA 4, 13 ingress protection
- Increased side illumination of indicating lights and illuminated pushbuttons
- Easy visual inspection of contact conditions
- Easily identifiable NO (white) or NC (black) contact blocks
- Gold-plated contacts suitable for logic level circuits
- Reliability ridge penetrates contamination buildup on stationary contacts
- Left/right or top/bottom mounted contact blocks allow correct positioning in retrofit applications
- All-purpose selector switches are convertible and can rotate in 22.5° increments to suit panel layouts

Standards and Certifications

- UL508 per File No. E131568
- CSA C22.2 No. 14 per File No. LR68551

Ingress Protection

- UL (NEMA) Type 1, 2, 3, 3R, 4, 4X, 12 and 13 when mounted in similarly rated enclosures

UL (NEMA) Type 3, 3R, 4, 4X, 12 and 13

Indicating Light Unit

PresTest Light Unit

Indicating Light Units, continued

Type	Volts	Lens Color	Indicating Light Catalog Number	PresTest Catalog Number
LED				
Full voltage	120 Vac/Vdc	No lens ①	**HT8HFFV**	**HT8GTFV**
		Red	**HT8HFRF7**	**HT8GTRF7**
		Green	**HT8HFGF7**	**HT8GTGF7**
		Amber	**HT8HFAF7**	**HT8GTAF7**
		Clear	**HT8HFCF7**	**HT8GTCF7**
		White	**HT8HFWF7**	**HT8GTWF7**
		Yellow	**HT8HFYF7**	**HT8GTYF7**
		Blue	**HT8HFBF7**	**HT8GTBF7**
	24 Vac/Vdc	No lens ①	**HT8HFFV**	**HT8GTFV**
		Red	**HT8HFRF3**	**HT8GTRF3**
		Green	**HT8HFGF3**	**HT8GTGF3**
		Amber	**HT8HFAF3**	**HT8GTAF3**
		Clear	**HT8HFCF3**	**HT8GTCF3**
		White	**HT8HFWF3**	**HT8GTWF3**
		Yellow	**HT8HFYF3**	**HT8GTYF3**
		Blue	**HT8HFBF3**	**HT8GTBF3**
Transformer	120 Vac 50/60 Hz	No lens ①	**HT8HBT1**	**HT8GTT1**
		Red	**HT8HBRL1**	**HT8GTRL1**
		Green	**HT8HBGL1**	**HT8GTGL1**
		Amber	**HT8HBAL1**	**HT8GTAL1**
		Clear	**HT8HBCL1**	**HT8GTCL1**
		White	**HT8HBWL1**	**HT8GTWL1**
		Yellow	**HT8HBYL1**	**HT8GTYL1**
		Blue	**HT8HBBL1**	**HT8GTBL1**

Note

① Light unit base operator without lens or bulb.

1

Selector Switch Units

UL (NEMA) Type 3, 3R, 4, 4X, 12 and 13

- Two-, three- and four-position
- Non-illuminated

Standard Knob Operator

Standard Lever Operator

Two-Position Selector Switch Units, Non-Illuminated

Contact Type	Operator Position ①		Operating Mode ②		Standard Black Knob Catalog Number	Standard Black Lever Catalog Number
No contacts	—	—	M	M	**HT8JAH3A**	**HT8JDH3A**
			S	M	**HT8JKH3A**	**HT8JLH3A**
			M	S	**HT8JNH3A**	**HT8JPH3A**
1NO	0	X	M	M	**HT8JAH3AA5**	**HT8JDH3AA5**
			S	M	**HT8JKH3AA5**	**HT8JLH3AA5**
			M	S	**HT8JNH3AA5**	**HT8JPH3AA5**
2NO	X 0	0 X	M	M	**HT8JAH3AAA5**	**HT8JDH3AAA5**
			S	M	**HT8JKH3AAA5**	**HT8JLH3AAA5**
			M	S	**HT8JNH3AAA5**	**HT8JPH3AAA5**
2NO-2NC	X 0 0 X	0 X X 0	M	M	**HT8JAH3AF1Q1**	**HT8JDH3AF1Q1**
			S	M	**HT8JKH3AF1Q1**	**HT8JLH3AF1Q1**
			M	S	**HT8JNH3AF1Q1**	**HT8JPH3AF1Q1**

Standard Knob Operator

Standard Lever Operator

Three-Position Selector Switch Units, Non-Illuminated

Contact Type	Operator Position ①			Operating Mode ②			Standard Black Knob Catalog Number	Standard Black Lever Catalog Number
No contacts	—	—	—	M	M	M	**HT8JBH1D**	**HT8JEH1D**
				S	M	M	**HT8JRH1D**	**HT8JSH1D**
				M	M	S	**HT8JUH1D**	**HT8JVH1D**
				S	M	S	**HT8JXH1D**	**HT8JYH1D**
2NO	X 0	0 0	0 X	M	M	M	**HT8JBH1DAA5**	**HT8JEH1DAA5**
				S	M	M	**HT8JRH1DAA5**	**HT8JSH1DAA5**
				M	M	S	**HT8JUH1DAA5**	**HT8JVH1DAA5**
				S	M	S	**HT8JXH1DAA5**	**HT8JYH1DAA5**
2NO-2NC ③	X 0 0	0 X 0	0 0 X	M	M	M	**HT8JBH1DF1Q1**	**HT8JEH1DF1Q1**
				S	M	M	**HT8JRH1DF1Q1**	**HT8JSH1DF1Q1**
				M	M	S	**HT8JUH1DF1Q1**	**HT8JVH1DF1Q1**
				S	M	S	**HT8JXH1DF1Q1**	**HT8JYH1DF1Q1**
2NO-2NC	X 0 0 X	0 X 0 X	0 X X 0	M	M	M	**HT8JBH1DF1Q1**	**HT8JEH1DF1Q1**
				S	M	M	**HT8JRH1DF1Q1**	**HT8JSH1DF1Q1**
				M	M	S	**HT8JUH1DF1Q1**	**HT8JVH1DF1Q1**
				S	M	S	**HT8JXH1DF1Q1**	**HT8JYH1DF1Q1**

Notes

① X = closed circuit, 0 = open circuit.

② M = Maintained, S = Momentary.

③ For 0X0, NC contacts must be wired in series—see Three-Position Selector Switch table on **Page V7-T1-310**.

SOLO Temperature Controllers 1/4 DIN

SL9696 Series

Features

- 1/4 DIN panel size
- PID with Autotune
- Thermocouple, RTD, mA, mV and voltage inputs.
- 2 event inputs
- Output #1: Relay, Voltage Pulse, Current or Linear Voltage
- Output #2: Relay or Voltage Pulse for control or Alarm output
- RS-485 communications port
- UL, CUL and CE approvals

Note: A set of mounting clips and a 249 Ω resistor are included.

Extra mounting clips are available (Part Number: SL-CLP-2, Qty: 20 per package)

Output Specifications						
Part Number	***Price***	***Input Voltage***	***Output #1***	***Output #2 / Alarm #3****	***Alarm #1***	***Alarm #2***
SL9696-RRE	$139.00	100 - 240 VAC	Relay - SPDT	Relay - SPDT	Relay - SPST	Relay - SPST
SL9696-VRE	$139.00	100 - 240 VAC	Voltage Pulse	Relay - SPDT	Relay - SPST	Relay - SPST
SL9696-CRE	$139.00	100 - 240 VAC	Current	Relay - SPDT	Relay - SPST	Relay - SPST
SL9696-LRE	$139.00	100 - 240 VAC	Linear Voltage	Relay - SPDT	Relay - SPST	Relay - SPST
SL9696-RRE-D	$139.00	24 VDC	Relay - SPDT	Relay - SPDT	Relay - SPST	Relay - SPST
SL9696-VVE	$139.00	100 - 240 VAC	Voltage Pulse	Voltage Pulse	Relay - SPST	Relay - SPST
SL9696-CVE	$139.00	100 - 240 VAC	Current	Voltage Pulse	Relay - SPST	Relay - SPST
SL9696-LVE	$139.00	100 - 240 VAC	Linear Voltage	Voltage Pulse	Relay - SPST	Relay - SPST

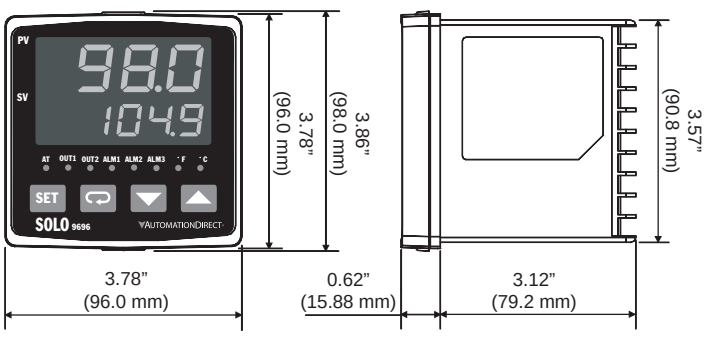
Note: Inputs are sinking, outputs are sourcing.

****Output #2 can be configured as control output #2 or as Alarm #3***

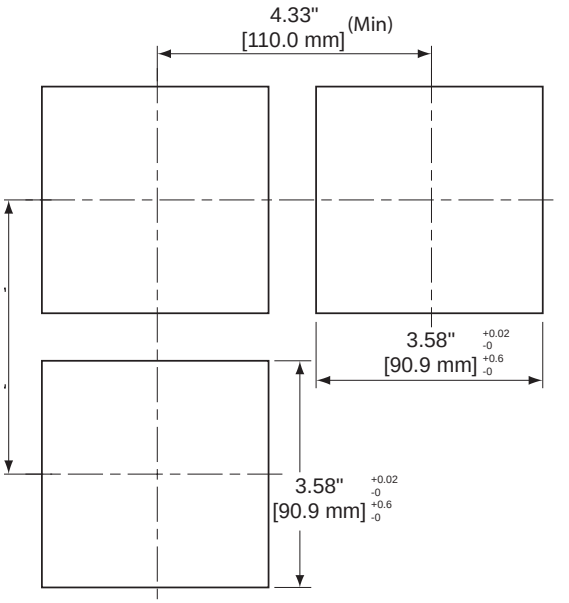
Scan or click the above QR code to be taken to the SL9696 Series Quick Start Guide

Scan or click the above QR code to be taken to the SOLO Standard Series Manual

Dimensions



Minimum Cutout and Spacing



See our website www.AutomationDirect.com for complete Engineering drawings.

SOLO Temperature Controllers

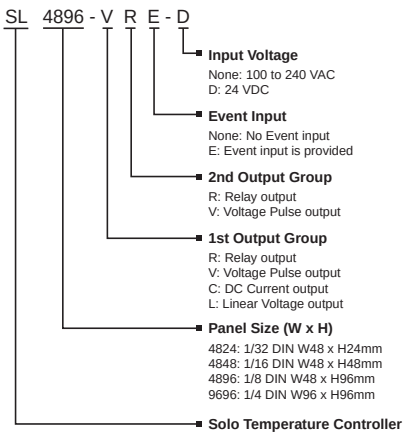
Overview

AutomationDirect's SOLO series includes single-loop dual-output temperature controllers that can control both heating and cooling simultaneously. There are four types of control modes: PID, ON/OFF, Ramp/Soak and Manual. Depending upon the model of controller, the available outputs include relay, voltage pulse, current, and linear voltage. There are up to three alarm outputs available. (The SL4824 series supports only one alarm output.) Select from seventeen alarm types in the initial setting mode. SOLO controllers can accept various types of thermocouple, RTD, or analog inputs. SOLO controllers have a built-in RS-485 interface using Modbus slave (ASCII or RTU) communication protocol.

Features

- 1/32 DIN, 1/16 DIN, 1/8 DIN, or 1/4 DIN panel size
- 2 line x 4 character 7-segment LED display for Process value (PV): Red color, and Set Point (SV): Green color
- PID control with Autotune (AT) function
- Accepts eleven types of thermocouples, two types of Pt100 RTD temperature sensors, and DC mA, mV, and Volt signals
- Selectable between°F and °C for thermocouple or RTD inputs.
- 0°C to 50 °C operating temperature range
- Up to three alarm groups, each with seventeen available alarm types.
- Four possible control output options depending on model; Relay, Voltage Pulse, Current, and Linear Voltage.
- Baud rates up to 38.4K bps.
- Thermocouple and Platinum RTD sample rates at 400 ms per scan
- Analog sample rate at 150 ms per scan
- 64 levels of Ramp / Soak control
- Two optional Event Inputs available in 1/8 DIN and 1/4 DIN sizes
- UL, CUL, and CE agency approvals

SOLO Controller Part Number Key



Specifications	
Input Power Requirements	100 to 240 VAC 50 / 60 Hz or 24 VDC
Operation Voltage Range	AC: 85 VAC to 264 VAC or DC: 21.6 VDC to 26.4 VDC
Power Consumption	5 VA Max
Memory Protection	EEPROM 4K bit, number of writes 100,000
Control Mode	PID, ON/OFF, Ramp / Soak control or Manual
Input Accuracy	Less than ± 0.2% full scale (except thermocouple R, S, & B types) Max ± 3° (thermocouple R, S, & B types)
Vibration Resistance	10 to 55 Hz, 10 m/s^2 for 10 min, each in X, Y and Z directions
Shock Resistance	Max. 300 m/s^2, 3 times in each 3 axes, 6 directions
Ambient Temperature Range	32°F to 122°F (0°C to 50°C)
Storage Temperature Range	-4°F to 149°F (-20°C to 65°C)
Altitude	2000m or less
Relative Humidity	35% to 80% (non-condensing)
RS-485 Communication	Modbus slave ASCII / RTU protocol
Transmission Speed	2400, 4800, 9600, 19.2K, 38.4K bps
IP Rating	IP65: Complete protection against dust and low pressure spraying water from all directions. (inside suitable enclosure)
Agency Approvals	UL, CUL, CE (UL file number E311366)
Pollution Degree	Degree 2 - Normally, only non-conductive pollution occurs. Temporary conductivity caused by condensation is to be expected
Input Types	
• Thermocouple*	K, J, T, E, N, R, S, B, L, U, TXK (400 ms per scan)
• Platinum RTD	3-wire Pt100, JPt100 (400 ms per scan)
• Analog	0-50 mV, 0-5V, 0-10V, 0-20 mA, 4-20 mA (sinking) (150 ms per scan)**
Control Output Options	
• Relay (R)	SL4824: SPST max. resistive load 3A @ 250 VAC SL4848: SPST max. resistive load 5A @ 250 VAC SL4896, SL9696: SPDT max. resistive load 5A @ 250 VAC SL4824: SPST max. resistive load 3A @ 30 VDC SL4848: SPST max. resistive load 5A @ 30 VDC SL4896, SL9696: SPDT max. resistive load 5A @ 30 VDC
• Voltage Pulse (V)	DC 14V Max, output current 40mA Max
• Current (C)	DC 4-20 mA output (sourcing) (Load resistance: Max 600Ω)
• Linear Voltage (L)	DC 0-10V (Load resistance Min 1KΩ)

Note: Use only ungrounded thermocouples.
****** Analog input impedance: 1.8MΩ***

SOLO Controller Selection Guide

SOLO Temperature Controller Selection Guide											
Series		**Part Number**	**Price**	**Dimensions**	**Display**	**Input Voltage**	**Control Output 1**	**Control Output 2**	**Event Inputs**	**Alarm Outputs**	**RS-485 Port**
SL4824		SL4824-RR	$97.00	W - 48mm H - 24mm D - 103mm (1/32 DIN)	Two 4-digit PV: 7mm red SV: 6mm green	100 - 240 VAC	Relay - 3A, SPST	Relay - 3A, SPST	N/A	Control Output 2 can be used as Alarm 1	Yes
		SL4824-VR	$97.00			100 - 240 VAC	Voltage Pulse				
		SL4824-CR	$97.00			100 - 240 VAC	Current				
		SL4824-LR	$97.00			100 - 240 VAC	Linear Voltage				
		SL4824-RR-D	$97.00			24 VDC	Relay - 3A, SPST				
		SL4824-VR-D	$97.00			24 VDC	Voltage Pulse				
		SL4824-CR-D	$97.00			24 VDC	Current				
SL4848		SL4848-RR	$107.00	W - 48mm H - 48mm D - 90mm (1/16 DIN)	Two 4-digit PV: 7mm red SV: 7mm green	100 - 240 VAC	Relay - 5A, SPST	Relay - 5A, SPST		Alarm 1 and Alarm 2 are 3A, SPST Relays with a shared common. Control Output 2 can be used as Alarm 3	
		SL4848-VR	$107.00			100 - 240 VAC	Voltage Pulse				
		SL4848-CR	$107.00			100 - 240 VAC	Current				
		SL4848-LR	$107.00			100 - 240 VAC	Linear Voltage				
		SL4848-RR-D	$107.00			24 VDC	Relay - 5A, SPST				
		SL4848-VR-D	$107.00			24 VDC	Voltage Pulse				
		SL4848-CR-D	$107.00			24 VDC	Current				
		SL4848-VV	$107.00			100 - 240 VAC	Voltage Pulse	Voltage Pulse		Alarm 1 and Alarm 2 are 3A, SPST Relays with a shared common.	
		SL4848-CV	$107.00			100 - 240 VAC	Current				
		SL4848-LV	$107.00			100 - 240 VAC	Linear Voltage				
SL4896		SL4896-RRE	$117.00	W - 48mm H - 96mm D - 92mm (1/8 DIN)	Two 4-digit PV: 10mm red SV: 10mm green	100 - 240 VAC	Relay - 5A, SPDT	Relay - 5A, SPDT	Event 1 / Event 2	Alarm 1 and Alarm 2 are 3A, SPST Relays. Control Output 2 can be used as Alarm 3	
		SL4896-VRE	$117.00			100 - 240 VAC	Voltage Pulse				
		SL4896-CRE	$117.00			100 - 240 VAC	Current				
		SL4896-LRE	$117.00			100 - 240 VAC	Linear Voltage				
		SL4896-RRE-D	$117.00			24 VDC	Relay - 5A, SPDT				
SL9696		SL9696-RRE	$139.00	W - 96mm H - 96mm D - 95mm (1/4 DIN)	Two 4-digit PV: 20mm red SV: 13mm green	100 - 240 VAC	Relay - 5A, SPDT				
		SL9696-VRE	$139.00			100 - 240 VAC	Voltage Pulse				
		SL9696-CRE	$139.00			100 - 240 VAC	Current				
		SL9696-LRE	$139.00			100 - 240 VAC	Linear Voltage				
		SL9696-RRE-D	$139.00			24 VDC	Relay - 5A, SPDT				
		SL9696-VVE	$139.00			100 - 240 VAC	Voltage Pulse	Voltage Pulse		Alarm 1 and Alarm 2 are 3A, SPST Relays	
		SL9696-CVE	$139.00			100 - 240 VAC	Current				
		SL9696-LVE	$139.00			100 - 240 VAC	Linear Voltage				

Notes: EVENT1 input is a normally open contact input that controls the output(s) of the controller. All controller outputs are disabled when the contact is closed. EVENT2 input is a normally open contact input that switches the control parameter group between two control parameter groups based on the state of EVENT2. If the contact is open, the primary control parameter group is used for all parameters and outputs. If the contact is closed, the secondary control parameter group is used for all parameters and outputs. Each temperature setting value has individual control parameters.

Click on the above thumbnail or go to https://www.automationdirect.com/VID-PS-0002 for a short introductory video on the SOLO Temperature Controllers.

SOLO Controller Selection Guide, continued

Available Input Types

All SOLO temperature controllers support these input types.

Thermocouple Type and Range*	
Input Temperature Sensor Type	***Temperature Range***
Thermocouple TXK type	-328 to 1472°F (-200 to 800°C)
Thermocouple U type	-328 to 932°F (-200 to 500°C)
Thermocouple L type	-328 to 1562°F (-200 to 850°C)
Thermocouple B type	212 to 3272°F (100 to 1800°C)
Thermocouple S type	32 to 3092°F (0 to 1700°C)
Thermocouple R type	32 to 3092°F (0 to 1700°C)
Thermocouple N type	-328 to 2372°F (-200 to 1300°C)
Thermocouple E type	32 to 1112°F (0 to 600°C)
Thermocouple T type	-328 to 752°F (-200 to 400°C)
Thermocouple J type	-148 to 2192°F (-100 to 1200°C)
Thermocouple K type	-328 to 2372°F (-200 to 1300°C)
Note: Use only ungrounded thermocouples.	

RTD Type and Range	
Input Temperature Sensor Type	***Temperature Range***
Platinum Resistance (Pt100)	-328 to 1112°F (-200 to 600°C)
Platinum Resistance (JPt100)	-4 to 752°F (-20 to 400°C)

Voltage Input Type and Input Range	
Voltage Input Type	***Engineering Range***
0~50mV Analog Input	-999 to 9999
0V~10V Analog Input	-999 to 9999
0V~5V Analog Input	-999 to 9999

Current Input Type and Range	
Current Input Type	***Engineering Range***
4~20mA Analog Input	-999 to 9999
0~20mA Analog Input	-999 to 9999

User Configurable Output Options	
Control Output 1	***Control Output 2***
Heating	(Alarm 1)
Cooling	(Alarm 1)
Heating	Cooling
Cooling	Heating

Mounting Clips			
Series	***Part Number***	***Pkg. Qty.***	***Price***
SL4824	SL-CLP-1	8	$12.00
SL4848	SL-CLP-2	20	$9.00
SL4896			
SL9696			

SOLO Standard Process and Temperature Controllers

Choose from 30 models (starting under $100)

SOLO® Standard Series Controllers

The powerful SOLO® Standard series of temperature process controllers take a signal from a temperature device, such as a thermocouple or RTD, or from a pressure/ flow/ level sensor, and maintain a setpoint using an output signal (relay, voltage pulse, current, or linear voltage depending on model). SOLO Standard series support four control modes: PID, ON/OFF, Ramp/Soak and Manual.

With the SOLO® Standard series, you get:

- **Precise control**
- **Flexible connectivity**
- **The right size to fit your application**
- **An unbeatable price that includes free award-winning technical support**
- **AC powered or 24VDC models**

Universal inputs

All SOLO Standard series controllers support **13 temperature input types and 5 analog input types**, and with a few simple steps from the industry's best installation documentation, and your process will be up and running in no time.

Simple pushbutton navigation programming, or download the FREE software from our Website for programming and monitoring the SOLO controllers.

Select the SOLO® Standard controller that best fits your application

SOLO brand controllers offer you outstanding features at unbeatable prices:

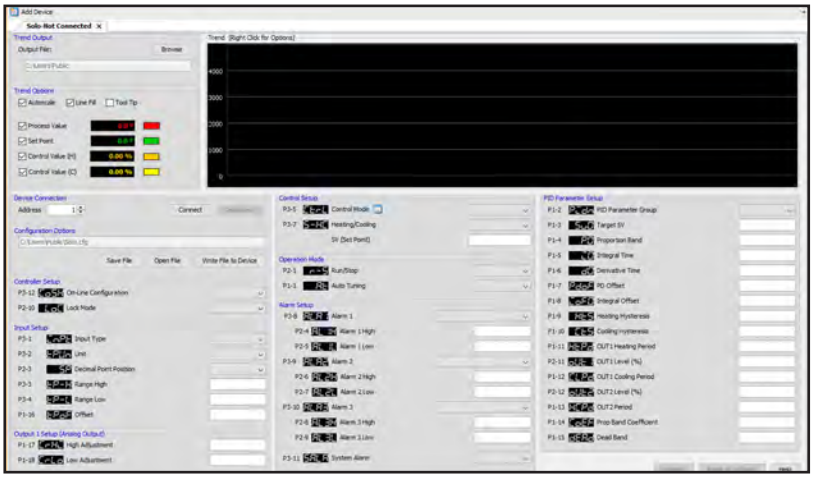
- 4 standard DIN sizes with a dual 4-digit, 7-segment displays for Process Variable and Setpoint
- Dual output control for heating and cooling
- Built-in PID with Autotuning (AT) function for fast and easy startups
- Universal inputs, including T/C, RTD, and DC voltage, are standard on all controllers, mA and mV are standard on all SL models
- Flexible control modes to fit your process include PID, On/Off and Manual for all controllers and Ramp/Soak for SL models
- IP65 environmental rating (when mounted in appropriate enclosures)

Features	1/32 DIN SL4824	1/16 DIN SL4848	1/8 DIN SL4896	1/4 DIN SL9696
Display of PV & SP	Yes	Yes	Yes	Yes
RS-485, MODBUS RTU/ASCII	Yes	Yes	Yes	Yes
Two Separate Event Inputs	No	No	Yes	Yes
Dual Outputs for Heating & Cooling Loops	Yes	Yes	Yes	Yes
Available Alarms Groups	1	3	3	3
Auto Tuning Capability	Yes	Yes	Yes	Yes
Universal Inputs (T/C, RTD, mV & mA)	Yes	Yes	Yes	Yes
	go to page PS-10	go to page PS-11	go to page PS-12	go to page PS-13

Simple Configuration and Control

FREE configuration and monitoring software

That's right, FREE! Configuration and monitoring software (SL-SOFT, Version 2.0 downloadable from our Web site) allows you to configure each controller with ease and gives you data analysis capabilities for up to 16 units simultaneously.



FREE software that's easy-to-use and intuitive, with a GUI that makes setting up the SOLO series of temperature controllers a breeze.
(Download at http://support.automationdirect.com/downloads.html)

Process control setup made easy

All units support RS-485 serial communications (up to 38.4K bps), which allows you to use the free configuration software [SL-SOFT] to configure and monitor multiple SOLO controllers using Modbus RTU or Modbus ASCII protocols. For even simpler setup, the controller can be configured manually with the user-friendly keypad on each unit.

Collect and act on data

Using RS-485 communications, the SL-SOFT utility provides the ability to monitor and log historical data, using the built-in trending graph, from up to 16 devices and save it to a file.

Connect to other hardware

The RS-485 communications of the SOLO Temperature Controller can also provide connection to any HMI, PC or PLC supporting industry-standard Modbus RTU or Modbus ASCII protocol. This allows you to collect, monitor and have your application react to data being read from the SOLO controllers.

PLC Connection

Use a PLC to collect data from the controllers and then have your program trigger events based on the values

HMI Connection

Use an operator interface to collect data and monitor your process.

PC Connection

Use a PC to configure and monitor your SOLO controllers with SL-SOFT. Use the trending graph to monitor and log historical data.

FC Series Signal Conditioners

FC-33

DC Selectable Signal Conditioner with 3-way isolation

Field configurable input and output ranges of 0-5V, 0-10 V, 0-20 mA and 4-20 mA with 1500 VDC isolation between input and output, and 1500 VDC isolation from 24 volt power and input/output. LED indicates normal operation and is used in conjunction with the calibration pushbutton for the internal calibration process.

- 3-way 1500 V isolation
- Push button calibration

FC-T1

Thermocouple/mV Isolated Signal Conditioner

Field configurable input for type J, K, E, T, R, S, B, N and C thermocouples or ±156.25 mV inputs with 1500 VDC isolation between input and the 4-20 mA output. Cold junction compensation and burnout detection. Alarm/run LED.

- 1500 V isolation
- Cold junction compensation (CJC)
- Internal diagnostics (burnout detection or calibration errors)

FC-35B

Unipolar Voltage or Current to Bipolar Voltage Signal Conditioner

Field configurable input and output, unipolar input ranges of 0-5V, 0-10 V, 0-20 mA or 4-20 mA, and bipolar output ranges of ±100 mV, ±50 mV, ±5V, ±10V, ±15V. Field calibrated with offset and span adjustments.

FC-3RLY2

Analog Input, 2-Relay, Limit Alarm

Field configurable analog to relay limit alarm powered by 24VAC/VDC and Input signal ranges of 0-15V, 0-30V or 0-20mA. Trip/Release Point programmed via DIP switches. LED's indicate operating status.

FC-ISO-D

Encoder Signal Conditioner and Optical Isolator - Differential Line Driver Output

Ideal for use with single-ended (open collector, NPN, pull-up, push-pull, totem pole) or differential line driver encoders. Three complementary inputs (A, B, Z, A-not, B-not, Z-not) are rated for 4.5-7.5 and 12-26 VDC and frequency response up to 1 MHz.

Optical isolation separates the input signals from three differential line driver outputs (A, B, Z, A-not, B-not, Z-not) rated for 5VDC.

FC-11

4-20 mA Isolated Signal Conditioner

Loop powered 4-20 mA input/output signal with 1500 VDC isolation between input and output.

- 1500 V isolation
- Loop powered

FC-R1

RTD Input Signal Conditioner

Loop powered, non-isolated, 3-wire unit converts an RTD input to a linear 4-20 mA signal. User selectable CU10, PT100 or PT1000 input.

FC-P3

Potentiometer Input, Analog Output Signal Conditioner

Field configurable input and output, input ranges of 3-wire potentiometer 0 to 100 ohms through 0 to 100 kilohms, and output ranges of 0-5V, 0-10 V, 0-20 mA or 4-20 mA. Field calibrated to 10% of potentiometer full range.

FC-B34

Bipolar Voltage to Unipolar Voltage or Current Signal Conditioner

Field configurable input and output, bipolar input ranges of ±100 mV, ±50 mV, ±5V, ±10V, ±15V, and unipolar output ranges of 0-5V, 0-10 V, 0-20 mA or 4-20 mA. Field calibrated with offset and span adjustments.

FC-3RLY4

Analog Input, 4-Relay, Limit Alarm

Field configurable analog to relay limit alarm powered by 24VAC/VDC and Input signal ranges of 0-15V, 0-30V or 0-20mA. Trip/Release Point programmed via DIP switches. LED's indicate operating status.

FC-ISO-C

Encoder Signal Conditioner and Optical Isolator - Open Collector Output

Ideal for use with single-ended (open collector, NPN, pull-up, push-pull, totem pole) or differential line driver encoders. Three complementary inputs (A, B, Z, A-not, B-not, Z-not) are rated for 4.5-7.5 and 12-26 VDC and frequency response up to 1 MHz.

Optical isolation separates the input signals from three complementary open collector outputs (A, B, Z, A-not, B-not, Z-not) rated for 5-36 VDC that can be used in single-ended configurations.

FC-33 DC Selectable Signal Conditioner

$130.00

c UL us *UL file E200031*

Overview

The FC-33 is a DIN-rail or side-mount, selectable input/output signal conditioner with 1500 VDC isolation between input and output, and 1500 VDC isolation between 24-volt power and input/output. The field configurable input/output types allow a wide ranging capability for 0-5V, 0-10V, 0-20 mA and 4-20 mA signals.

The FC-33 has built-in self-calibration, but also has OFFSET (zero) and SPAN (full scale) adjustments of the output signal. The OFFSET has an adjustment range of 0 to 25% of full scale input and the SPAN has an adjustment of 80% to 102%.

Level LED: The LED is a powerful tool when setting up the signal conditioner. During normal operation the LED will blink at a proportional rate to the selected input signal level. When performing field calibration the LED is used for indication of the internal calibration process.

CAL-Pushbutton: This pushbutton, along with various switch settings, allows you to calibrate the OFFSET and/or SPAN for your application or to restore factory default calibration.

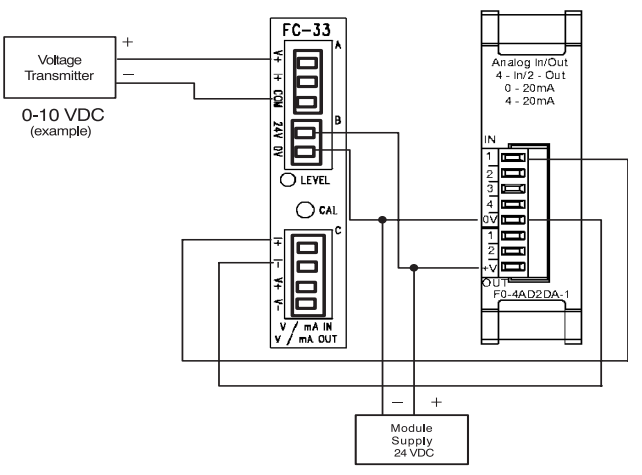
Specifications	
Input Ranges	0-5 V, 0-10 V, 0-20 mA, 4-20 mA
Input Impedance	250 Ω, ±0.1% current input 200 KΩ / 400 KΩ Voltage input
Output Ranges	0-5 V, 0-10 V, 0-20 mA, 4-20 mA
Load Impedance	2 KΩ minimum, voltage output 0 Ω minimum, current output
Maximum Load / Current	550 Ω @ 24 VDC (sink/source)
Sample Duration Time	10 mS
Filter Characteristic	-3 dB @ 3 Hz, -6 dB/octave
Linearity Error	0.05% FSO maximum
Stability	0.05% FSO maximum
Accuracy vs. Temperature	0.005%/ °C, (50ppm/°C)
Input Power	24 VDC, ±10% @ 50 mA
Recommended Fuse	0.032 mA, Series 217, current inputs
Isolation	1500 VDC input - output* 1500 VDC power - input* 1500 VDC power - output* *applied for 1 second
Maximum Inaccuracy of Output	0.05% @ 25°C, FSO maximum 0.25% @ 0-60°C, FSO maximum
Output Current	21 mA maximum (for mA output)
Approx. Field Cal. Range	0 - 25% (0 - 1.5 V / 5 V mode) 80% - 102% (4 - 5.1 V / 5 V mode)
Operating Temperature	0-60°C (32 to 140°F)
Storage Temperature	-20 to 70°C (-4 to 158°F)
Relative Humidity	5 to 90% (non-condensing)
Vibration	ML STD 810C 514.2
Shock	ML STD 810C 516.2
Noise Immunity	NEMA ICS3-304

Application

The FC-33, field configurable isolated input/output signal conditioner, is useful in eliminating ground loops and interfacing sensors to PLC analog input modules. The FC-33 has 3-way isolation; this feature solves many types of configuration problems. For example, the signal conditioner can be configured for a sinking input and a sourcing output. It also allows signal translation from current input to voltage output or voltage input to current output.

This feature would be useful in a system design with a limited type and number of channels – for example: eight channels of 0-10 VDC, seven of which are used, and one 4-20 mA input transmitter.

Typical User Wiring



Voltage Input and Current Output (example)

FC Series Accessories

FC-5MM

FC-35MM

Description

Universal terminal block replacements for the FC Series signal conditioners. Each packcage includes enough terminal blocks to replace all the terminal blocks on any FC Series signal conditioner according to the following table:

FC Series Terminal Blocks		
FC Series Model	***Terminal Block Replacement Part Number***	***Package Includes***
FC-11	FC-5MM	(2) 2-pole blocks (2) 3-pole blocks (1) 4-pole blocks
FC-33		
FC-R1		
FC-T1		
FC-ISO-C	FC-35MM	(6) 2-pole blocks (2) 3-pole blocks (2) 4-pole blocks (1) 5-pole blocks (1) 6-pole blocks (2) 8-pole blocks
FC-ISO-D		
FC-B34		
FC-35B		
FC-P3		
FC-3RLY2		
FC-3RLY4		

Note: Depending on the model, some terminal blocks in the package may be unused.

Universal Signal Conditioners				
Part No.	***Description***	***Rated Torque (N·m)***	***Weight (Lbs)***	***Price***
FC-5MM	Terminal block, replacement, 5mm. Package of 5. For use with FC Series signal conditioners.	0.5	0.1	$12.00
FC-35MM	Terminal block, replacement, 3.5mm. Package of 14. For use with FC Series signal conditioners.	0.2	0.1	$22.50

WR WINDSOR REPUBLIC DOORS

Frames, Sticks, and Mullions
2 Year Warranty

Seller warrants to Buyer that frames, sticks, and mullions manufactured by Seller shall be free of defective materials or faulty workmanship for a period of two years from date of shipment of said items by Seller.

The liability of Seller for any breach of the foregoing warranty of Seller shall not extend to dismantling, installing or reinstalling, but shall be limited to repairing or replacing said items solely at Seller's option, within a reasonable time after receipt of written notice from Buyer of said items that prove to be defective within the periods stipulated herein, provided such notice is served by Buyer within such period. Seller makes no warranty with respect to items supplied to Buyer by Seller but manufactured by others, except to the extent of any warranty given to Seller by such others. Buyer further agrees that Seller be liable for consequential damages arising from breach of any of the foregoing warranties. SELLER MAKES NO OTHER WARRANTIES, EXPRESS OR IMPLIED, INCLUDING WITHOUT LIMITATION, WARRANTIES OF FITNESS FOR ANY PARTICULAR PURPOSE OR MERCHANTABILITY, BEYOND WHAT IS CONTAINED HEREIN.

This Warranty is for Buyer's exclusive benefit and is not assignable or transferable, nor is Buyer permitted to present to its customer, or any third party, that it may rely on the Warranty. Products not stored, handled, installed, and painted in accordance with ANSI A250.8 (SDI-100) will void such warranties.

WR WINDSOR REPUBLIC DOORS

Hollow Metal Doors
Limited Lifetime Warranty

Republic warrants to the original Buyer that Republic manufactured doors shall be free of faulty welding and assembly workmanship for the ***Lifetime*** of the product.

Republic warrants to the original Buyer that Republic manufactured doors shall be free of defective materials, causing rust through and core degradation for a period of **(10) Ten years** from date of purchase.

The liability of Seller for any breach of the foregoing warranty of Seller shall not extend to dismantling, installing or reinstalling, but shall be limited to repairing or replacing said items solely at Seller's option, within a reasonable time after receipt of written notice from Buyer of said items that prove to be defective within the periods stipulated herein, provided such notice is served by Buyer within such period. Seller makes no warranty with respect to items supplied to Buyer by Seller but manufactured by others, except to the extent of any warranty given to Seller by such others. Buyer further agrees that Seller be liable for consequential damages arising from breach of any of the foregoing warranties. SELLER MAKES NO OTHER WARRANTIES, EXPRESS OR IMPLIED, INCLUDING WITHOUT LIMITATION, WARRANTIES OF FITNESS FOR ANY PARTICULAR PURPOSE OR MERCHANTABILITY, BEYOND WHAT IS CONTAINED HEREIN. PROOF OF ORIGINAL INVOICE RECEIPT REQUIRED.

This Warranty is for Buyer's exclusive benefit and is not assignable or transferable, nor is Buyer permitted to present to its customer, or any third party, that it may rely on the Warranty. Products not stored, handled, installed, and painted in accordance with ANSI A250.8 (SDI-100) will void such warranties.

WINDSOR REPUBLIC DOORS

TECHNICAL DATA SHEET No. 201

UNIVERSAL FRAMES - ME SERIES/MITERED

ME Series Mitered Frames shall be as manufactured or furnished by Windsor Republic Doors, McKenzie, Tennessee 38201.

Thickness - Made for two basic door thicknesses: 1-3/8" or 1-3/4"

Gages - 18, 16 or 14. (12 gage available with coped bolted corner connections)

Faces - 1" to 4"

Standard Rabbets - 1-3/8" (actual dimension 1-9/16"); 1-3/4" (actual dimension 1-15/16"). Rabbet dimension is 3/16" greater than the door thickness.

Stop - 5/8" standard - (3/4" available)

Closer Reinforcement - 1-3/8" x 14" x 12 gage plate; 12 gage Snap-In, or 12" long x 12 gage sleeve.

Size Availability - Maximum Size 5'0" x 10'0" Single; Maximum Size 10'0" x 10'0" Double.

Label Range - Consult Label Section. (Embossed UL Listing Marks shall be provided on all stock frames.)

Universal Standard/Heavy Weight Hinge - Frames for 1-3/4" doors shall have a 9 gage steel hinge reinforcement plate, projection welded with provisions for 4-1/2" x 4-1/2" template hinges. Hinge plate is designed to be modified to accept a heavy weight hinge by removing four projections. Frames for 1-3/8" doors shall have a 11 gage steel hinge reinforcement plate, projection welded with provisions for 3-1/2" x 3-1/2" standard weight template hinges.

Strike Prep - Frames for 1-3/4" doors shall have a 14 gage steel strike reinforcement plate, extruded and formed to the equivalent of 10 gage, projection welded with provisions for Universal ANSI A115.1 or ANSI A115.2 strike (4-7/8"). Frames for 1-3/8" doors shall have a 14 gage steel strike reinforcement plate, extruded and formed to the equivalent of 10 gage projection welded with provision for Universal ANSI A115.3 strike (2-3/4".)

Hinge Backset - 5/16"

Backbend - 7/16"

Anchors - Sill anchors are included with all ME frames (either integral or welded on sill anchor). All other anchors must be ordered separately.

Silencer Prep - 9/32" dia. holes shall be provided as standard on strike jambs and double headers, (3 per strike jamb and 2 per double head). Mutes are not supplied and must be ordered separately.

Double Heads - Double heads are undersized 1/16" (except for cased open heads, which are nominal).

Mortar Guards - Mortar guards of 26 gage steel shall be welded to each hinge and strike reinforcement plate.

Profiles - Equal Rabbet, Unequal Rabbet, Single Rabbet, Double Egress, Cased Opening.

Shipping - Frames are shipped as components, bundled as one pair of jambs (hinge & strike for single openings or 2 hinge jambs for double openings). Heads ar packaged separately.

Handing - Frames are handed.

Revised 6/05

WINDSOR REPUBLIC DOORS

TECHNICAL DATA SHEET No. 201a

ME SERIES - SPECIFICATIONS

I. ME Series Mitered Frames as manufactured by Windsor Republic Doors, McKenzie, TN 38201 have been tested or adhere to the criteria set forth by the following published standards:

A. ANSI A250.8-1998 (SDI 100) - Recommended Specifications -Standard Steel Doors & Frames; Steel Door Institute.
B. SDI 111 - Recommended Standard Details - Steel Doors & Frames.
C. SDI 112-97 - Zinc Coated Standard Steel Doors and Frames.
D. SDI 113-79 - Test Procedure and Acceptance Criteria for Acoustical Performance for Steel Door and Frame Assemblies.
E. ASTMA 366/A 366M - Standard Specification for Steel, Sheet, Carbon, and High Strength, Low Alloy, Hot Rolled and Cold Rolled, General Requirements.
F. ASTM A 568/A 568M - Standard Specification for Steel, Sheet, Carbon and High Strength, Low-Alloy, Hot Rolled and Cold Rolled, General Requirements.
G. ASTM A 569/A 569M - Standard Steel Specification for Steel, Carbon (0.15 Maximum Percent), Hot Rolled Sheet and Strip Commercial Quality.
H. ASTMA 591/A 591M - Standard Steel Specification for Steel Sheet, Electrolytic Zinc-Coated, for Light Coating Mass Applications.
I. ASTMA 653/A 653M - Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy Coated (Galvanized) by Hot Dipped Process.
J. NFPA 80 - Standard for Fire Doors and Windows.
K. A250.4 1994 - Test Procedure and Acceptance Criteria for Physical Endurance for Steel Doors and Hardware Reinforcings.

II. Frame Construction

A. Frames shall be formed from 18,16,14 or 12 gage cold-rolled, hot-rolled or galvanized steel.
B. Frames shall be either knocked-down or have corners welded and ground smooth. Corners shall have aligning tabs and slots for secure and easy interlocking of jambs to head. (12 gage frames shall have coped bolted corner connections.)
C. Frames shall be provided with 9/32" silencer preparation, (3) per strike jamb and (2) per head for double openings, for field application after finish painting.
D. Frames for 1-3/4" doors shall have 9 gage steel universal hinge tap plate, projection welded, with provisions for 4-1/2" x 4-1/2" template hinges, and 14 gage steel strike reinforcement plate, extruded and formed to the equivalent of 10 gage, projection welded, with provision for Universal ANSI A115.1 or ANSI A115.2 strike. Mortar guards of 26 gage steel shall be welded to each hinge or strike reinforcing plate.
E. Frames for 1-3/8" doors shall have 11 gage steel hinge reinforcement plates, projection welded, with provisions for 3-1/2" x 3-1/2" template hinges, and 14 gage steel strike reinforcement plate, projection welded, with provision for cylindrical ANSI A115.3 strike.
F. Reinforcement for surface closer shall be 12 gage steel. Proper reinforcement shall be provided for other hardware when required.

III. Frame Finish

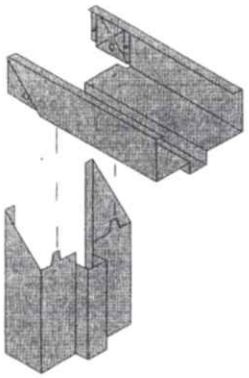
Frames will be cleaned and phosphatized with one coat of force-cured grey primer, that meets or exceeds ANSI A224.1-1990 and ASTM specification B117 for finishes. (Capable of passing 120 hour salt spray test and a 240 hour humidity test in compliance with ASTM D1735.)

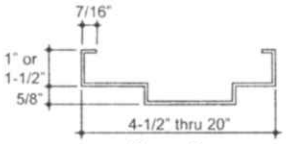
Revised 6/05

WINDSOR REPUBLIC DOORS

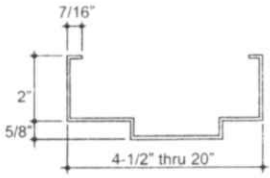
TECHNICAL DATA SHEET No. 201b

ME SERIES - FRAME CONSTRUCTION

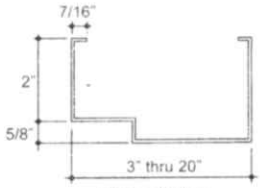




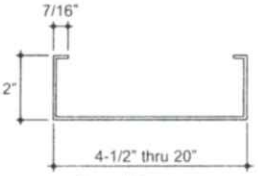
Narrow Face
(NON STOCK)



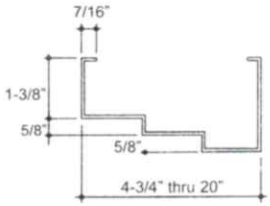
Double Rabbet
STOCK=4-3/4", 5-3/4", 6-1/4", 6-3/4", 7-3/4", 8-1/4", 8-3/4"



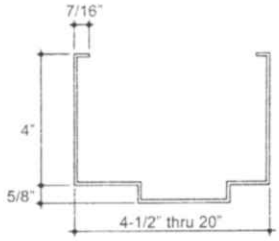
Single Rabbet
(NON STOCK)



Cased Opening
STOCK=5-3/4"



Double Egress
STOCK=5-3/4"

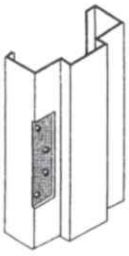


Double Rabbet
STOCK=4-3/4", 5-3/4", 6-3/4", 7-3/4", 8-3/4"

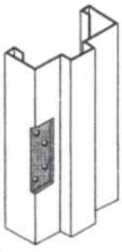
Rough Opening Required for
Butted Universal Frame
Door Width Opening + 2 Times Face Dimension + 1/2"
Door Heigth Opening + Face Dimension + 1/4"

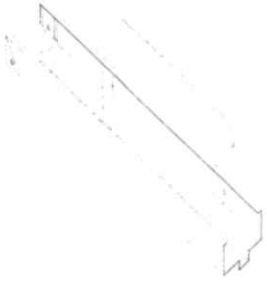
HARDWARE PREPARATION

9 gage hinge reinforcement with 4-1/2" or 5" full mortise universal hinge provision for 1-3/4" doors.

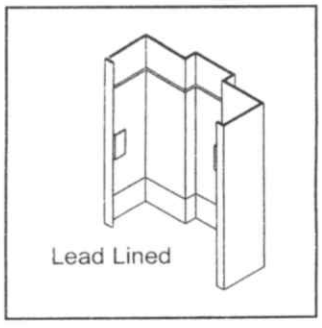


11 gage hinge reinforcement with 3-1/2" x 3-1/2" full mortise universal hinge provision for 1-3/8" doors.

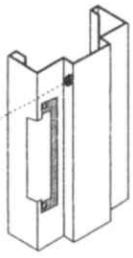




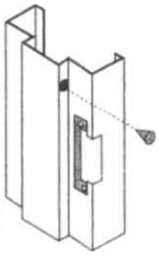
12 gage Flat Plate Closer Reinforcement (Primary option)

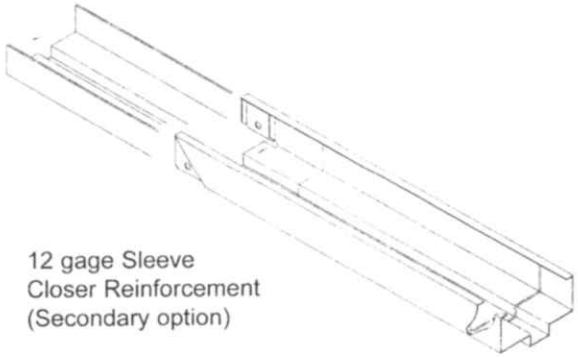


1-3/4" - 14 gage strike reinforcement with ANSI-A115.1 or ANSI A115.2 universal strike provision - 4-7/8"



1-3/8" - 14 gage strike reinforcement with ANSI-A115.3 cylindrical strike provision - 4-7/8"





12 gage Sleeve Closer Reinforcement (Secondary option)

Revised 7/06

MEMBER OF:

Windsor Republic Doors
155 Republic Drive • McKenzie, Tennessee 38201 • (731) 352-3383

NAAMM

Republic
DOORS AND FRAMES

DOORS - DP SERIES

TECHNICAL DATA SHEET No. 101

DP Series Doors as manufactured or furnished by Republic Doors and Frames, McKenzie, Tennessee 38201.

Thickness - 1-3/4"

Actual Door Size - Door undersized from nominal by 7/32" in width and 7/8" in height. Standard undercut is 3/4".

Hinge Rail & Reinforcement - Hinge edge is non-beveled with 1/4" standard hinge backset. 7 gage Universal standard / heavy weight reinforcements.

Lock Rail - Lock edge is beveled. 14 gage reinforcement for mortise lock, 16 gage for cylindrical locks are of an integral type in accordance with ANSI A115 Standards. (Beveled lock edge 1/8" in 2" standard.)

Edge Seams - Visible seam

Top Channel - Flush, 16 gage channel, projection welded at a maximum 2-1/2" on center. (Optional - Inverted)

Bottom Channel - Inverted 16 gage channel, projection welded at a maximum 2-1/2" on center.

Cores Available - Honeycomb or Polystyrene.

Face Skins - 20 gage or 18 gage, cold rolled or galvannealed steel.

Closer Reinforcement (Option) - 14 gage standard / 12 gage optional. (18" x 6")

Size Availability - Minimum 2'6" x 6'8", Maximum 4'0" x 8'0"

SDI 100 Level/Model - Level 1 Model 1 (Standard Duty, minimum 20 gage, hollow steel composite)
Level 2 Model 1 or 2 (Heavy Duty, minimum 18 gage, hollow steel composite)

Handing Design - Handed

Revised 7/15

DP SERIES - SPECIFICATIONS

Republic DOORS AND FRAMES

TECHNICAL DATA SHEET No. 101a

I. DP Series Doors as manufactured by Republic Doors and Frames, McKenzie, TN 38201 have been tested or adhere to the criteria set forth by the following published standards:

A. ANSI A250.8-1998 (SDI 100) - Recommended Specifications -Standard Steel Doors & Frames; Steel Door Institute.
B. ANSI A250.4 - Test Procedure & Acceptance Criteria for Physical Endurance for Steel Doors & Hardware Reinforcings.
C. SDI 111 - Recommended Standard Details - Steel Doors & Frames. D. SDI 112 - Zinc Coated Standard Steel Doors and Frames.
E. SDI 113 - Test Procedure and Acceptance Criteria for Acoustical Performance for Steel Door and Frame Assemblies.
F. ASTM A366/A366M - Standard Specification for Steel, Sheet, Carbon, and High Strength, Low Alloy, Hot Rolled and Cold Rolled, General Requirements.
G. ASTM A568/A568M - Standard Specification for Steel, Sheet, Carbon and High Strength, Low- Alloy, Hot Rolled and Cold Rolled, General Requirements For.
H. ASTM A569/A569M - Standard Steel Specification for Steel, Carbon (0.15 Maximum Percent), Hot Rolled Sheet and Strip Commercial Quality.
I. ASTM A591/A591M - Standard Steel Specification for Steel Sheet, Electrolytic Zinc-Coated, for Light Coating Mass Applications.
J. ASTM A653/A653M - Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy Coated (Galvanized) by Hot Dipped Process.
K. ANSI A151.1 - Performance Test for Steel Doors, Hinge, Lock and Exit Device Reinforcing.

II. Door Construction

A. Doors are either 20 or 18 gage steel. Door design is a pan and lid construction. The lid has a flattened hemmed edge that is projection welded to the pan.
B. Top Channel will be 16 gage, flush with the top of the door and will be projection welded on maximum 2-1/2" centers to each face sheet.
C. Bottom Channel will be 16 gage, inverted and will be projection welded on maximum 2-1/2" centers to each face sheet.
D. Hinge Side - Square edge design with cutouts in pan. 7 gage hinge reinforcements welded in at each cutout.
E. Lock Side - Beveled edge design. Mortise lock reinforcements are 14 gage. Cylindrical lock reinforcements are 16 gage.
F. Cores: (Per ASTM C1363)
   1. Standard - 3/4" cell honeycomb with a "U" factor of .59.
   2. Optional Cores- 1 lb. density expanded Polystyrene per with a "U" factor of .41.

III. Door Finish

Doors will be cleaned and phosphatized with one coat of force-cured grey primer applied in accordance with ANSI A224.1-1990 or ASTM specification B117 for finishes capable of passing 120 hour salt spray test and a 240 hour humidity test in compliance with ASTM D1735.

SDI Classifications:

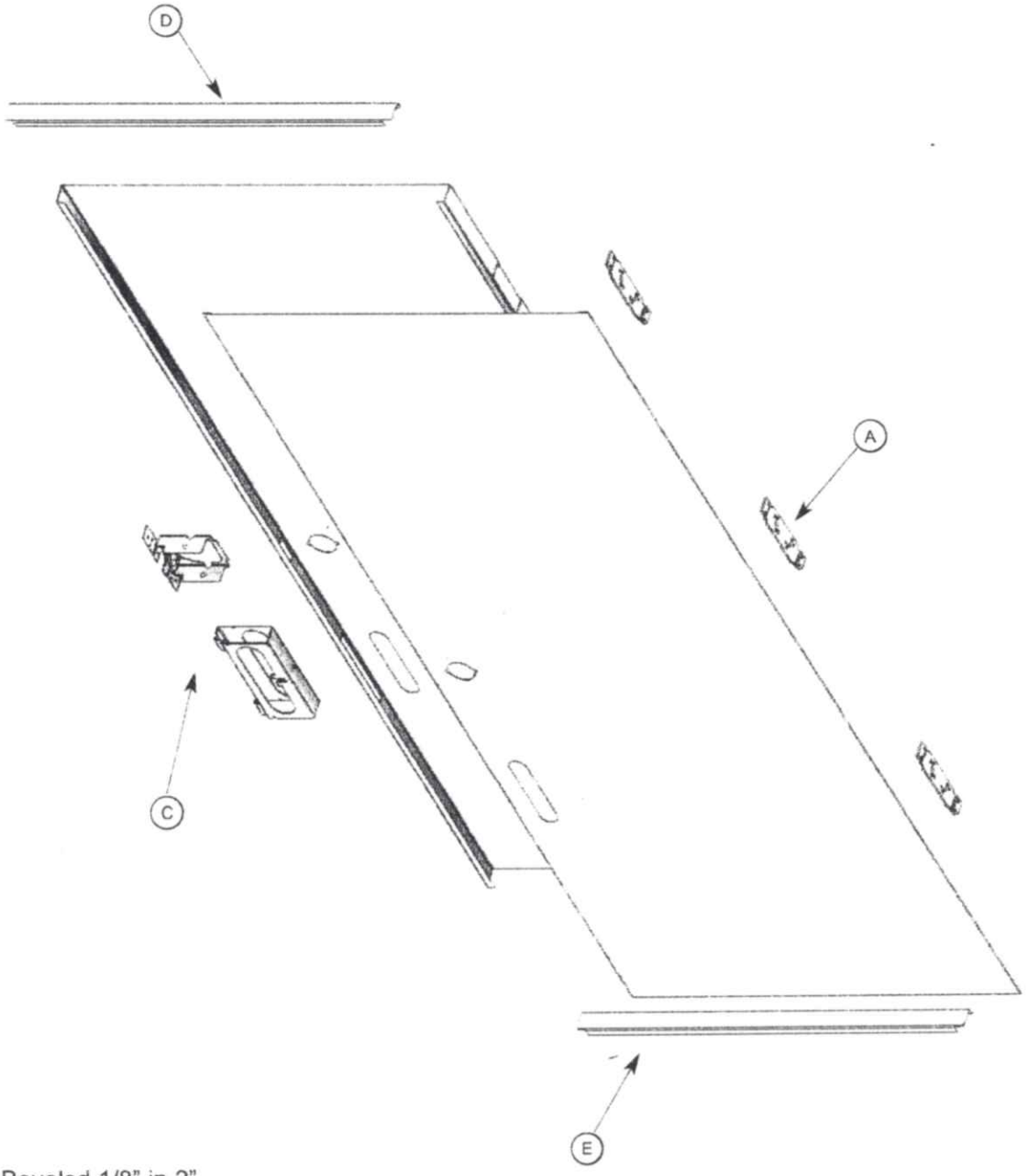
Level 1 Model 1 (Standard Duty, minimum 20 gage, hollow steel composite)
Level 2 Model 1 or 2 (Heavy Duty, minimum 18 gage, hollow steel composite)

Revised 7/15

Republic
DOORS AND FRAMES

DP SERIES - DOOR CONSTRUCTION DETAILS

TECHNICAL DATA
SHEET No. 101b



Beveled 1/8" in 2"
(lock side only)

NOTE:
See Details on
back of page.

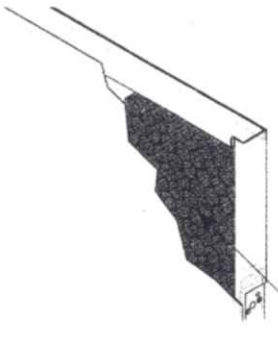
Revised 7/15

A

HINGE EDGE OF PAN

7 gage reinforcement at hinge locations

Shown: 4-1/12" hinges on 1-3/4" doors



3/4" Cell
Honeycomb Core
U Factor of .59
(Per ASTM C1363)

Other cores available
please specify.

C

LOCK EDGE OF PAN

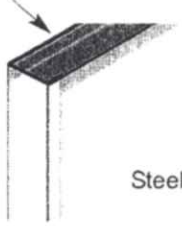
14 gage mortise lock reinforcement with provisions for Gov't Series 86 mortise lockset and ANSI A115.1 lock front (1-1/4" x 8")

16 gage steel cylindrical lock reinforcement with provisions for Gov't Series 160 or 161 cylindrical lock sets (2-3/4" backset) and ANSI A115.2 lock front (1-1/8" x 2-1/4")

D

Continuous 16 gage steel channel (standard flush)

TOP CHANNEL

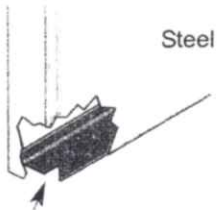


Steel Panel

14 gage closer reinforcement when requested;
12 gage optional

E

BOTTOM CHANNEL



Steel Panel

Continuous 16 gage steel channel (standard inverted)

Approximate depth 9/16"

Republic Doors and Frames

Revised 7/15

model 7501

Portable Gravity Fed Eyewash

FEATURES & BENEFITS

CONSTRUCTION

FDA approved high-density green polyethylene tank provides the light and durable construction required in a portable unit.

MOUNTING

J-shaped stainless steel wall bracket makes for a well constructed portable mount for easy removal and re-mount.

FLOW CONTROLS

Pulling down the eyewash arm will begin flushing the 9 gallon (34.1 L) portable tank at .4 gpm (1.5 L) for a full 15 minutes, which in turn will create a full patterned flushing of the eyes.

DESIGN

Tank comes complete with a wide-fill opening and threaded cap for quick inspection, cleaning, and filling. Unit also comes equipped with top and side handles making relocation simple.

OPTIONS

- ☐ Water Additive: Model 9082, 'sterile' bacteriostatic preservative for use in portable eyewash stations. One 5 oz. (148 ml) bottle will preserve 5 to 20 gallons (18.9 to 75.7 L) of potable water for up to three months. Four bottles per carton.
- ☐ Waste Container: Model 9009 is a twenty gallon (75.7 L) wastewater container constructed of tough yellow polymer resin. Unit is used to collect water during weekly testing of emergency equipment.

To see all options for this model, visit www.hawsco.com

SPECIFICATIONS

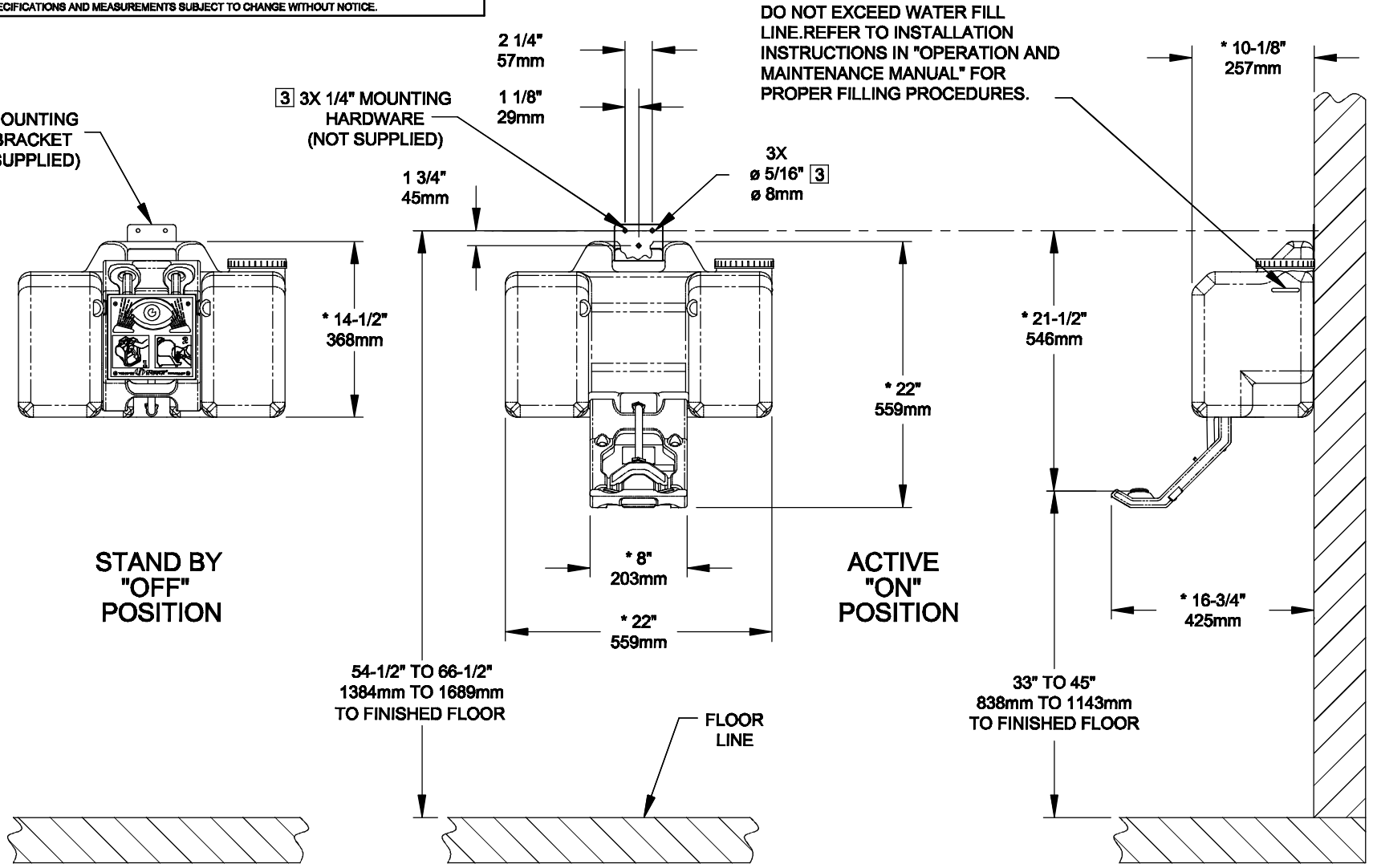
Model 7501 portable gravity operated eyewash shall include a FDA approved high-density green polyethylene 9 gallon (34.1 L) tank, ABS plastic eyewash heads with .4 gpm (1.5 L) flow rate over 15 minutes, yellow pull-down activation arm, integral handle on top, wide-fill threaded cap, sign-mounted operating instructions, and stainless steel wall bracket (unit must be hung). Additive not included - Order separately.

APPLICATIONS

Where the eyes of any person may be exposed to injurious or corrosive materials, when suitable facilities for quick flushing of the eyes needs to be provided and a continuous supply of water is not available. Although the 7501 may be installed in a wide variety of locations, it is ideal for the remote and low traffic areas where protective measures are still needed. Emergency eyewash facilities shall be in unobstructed and accessible locations that require no more than 10 seconds for the injured person to reach.Model 7501 is certified by CSA to meet the ANSI Z358.1 Standard for Emergency Eyewash and Shower Equipment.

DISCLAIMER: Continued product improvements make specifications subject to change without notice. Check www.hawsco.com for the latest product information and updates.

THIS DOCUMENT IS TRUE AND CORRECT AT TIME OF PUBLICATION. CONTINUED PRODUCT IMPROVEMENTS MAKE SPECIFICATIONS AND MEASUREMENTS SUBJECT TO CHANGE WITHOUT NOTICE.



NOTES:

1. TO COMPLY WITH ANSI Z358.1-2009 FOR EMERGENCY EYEWASH OR EYE/FACE WASH AND SHOWER EQUIPMENT:
   - UNIT SHALL BE INSTALLED IN ACCORDANCE WITH MANUFACTURER'S INSTRUCTIONS AND ACCEPTABLE PLUMBING PRACTICES.
   - EYEWASH OR EYE/FACE WASH SHALL BE POSITIONED WITH NOZZLES NOT LESS THEN 83.8 CM (33 IN.) AND NO GREATER THAN 114.3 CM (45 IN.) FROM SURFACE ON WHICH USER STANDS AND 15.3 CM (6 IN.) MINIMUM FROM WALL OR NEAREST OBSTRUCTION.
2. UNIT MUST BE LEVEL FROM FRONT TO BACK AND SIDE TO SIDE.
3. ALL THREE MOUNTING HOLES ON MOUNTING-BRACKET MUST BE USED TO PROPERLY SECURE EYEWASH UNIT TO WALL.
4. *DIMENSIONS MAY VARY ±1/2" [12.7mm].

MODEL 7501 (SHOWN)

MODEL 7501FP - WITH HEATER (SEE SHEET 2 OF 3)

Haws®
1455 KLEPPE LANE
SPARKS, NEVADA 89431
(775) 359-4712 FAX (755) 359-7424
E-MAIL: HAWS@HAWSCO.COM
WEBSITE: WWW.HAWSCO.COM

ECN NO.	REVISED PER ECN: 4742	BY: HM	MODEL(S)	PART NUMBER	0002080045.D
DRAWN: RTM	DATE: 5/19/04	CHK'D.:	7501 / 7501FP PORTABLE EYEWASH	DRAWING NO.	15153A00 REV 11
APPROVED:	DATE:		SCALE: 1:12 DRAWING TYPE: INSTALLATION SIZE: A	SHEET 1 OF 3	

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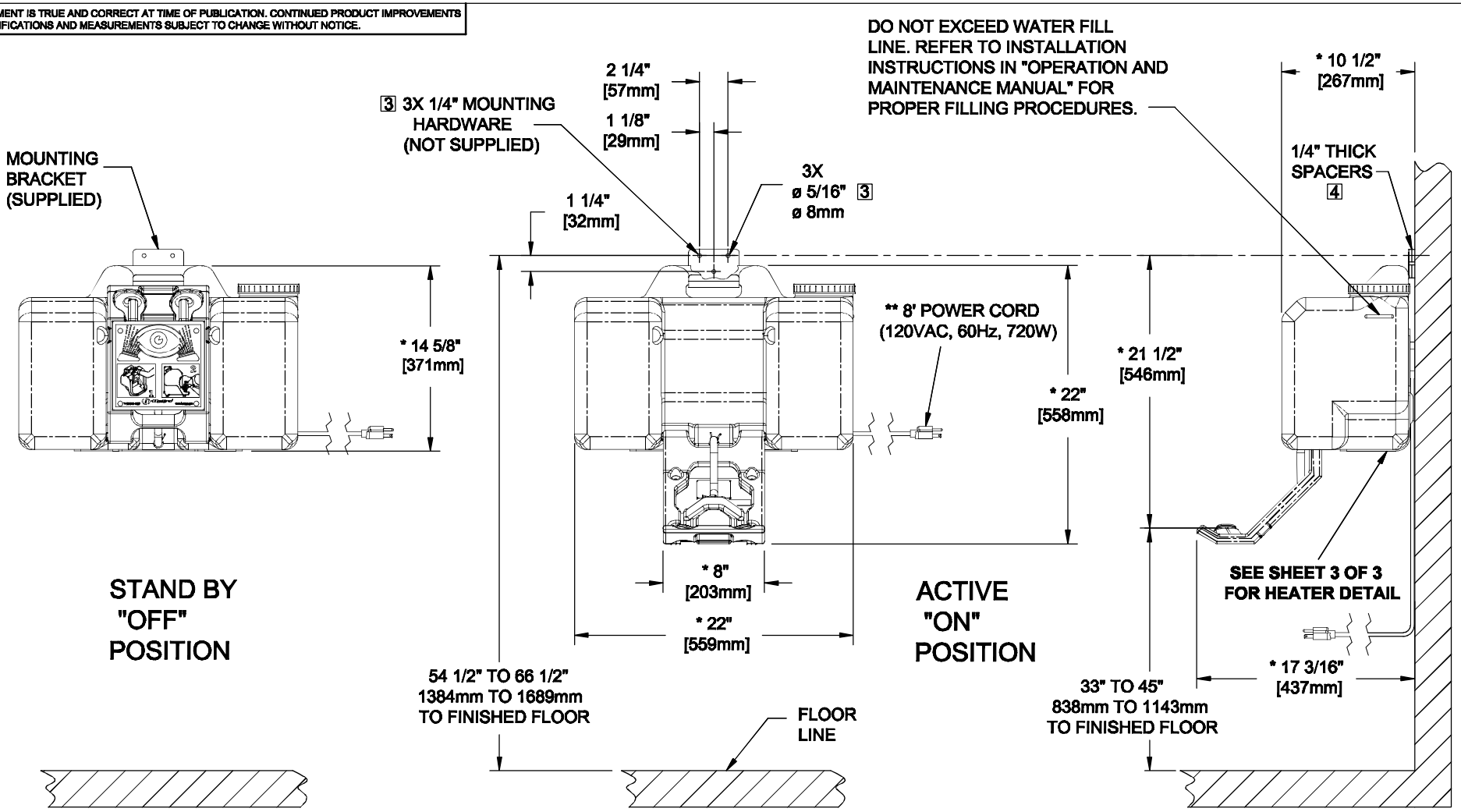

NOTES:

1. TO COMPLY WITH ANSI Z358.1-2009 FOR EMERGENCY EYEWASH OR EYE/FACE WASH AND SHOWER EQUIPMENT:
   - UNIT SHALL BE INSTALLED IN ACCORDANCE WITH MANUFACTURE'S INSTRUCTIONS AND ACCEPTABLE PLUMBING PRACTICES.
   - EYEWASH OR EYE/FACE WASH SHALL BE POSITIONED WITH NOZZLES NOT LESS THEN 83.3 CM (33 IN.) AND NO GREATER THAN 114.3 CM (45 IN.) FROM SURFACE ON WHICH USER STANDS AND 15.3 CM (6 IN.) MINIMUM FROM WALL OR NEAREST OBSTRUCTION.
2. UNIT MUST BE LEVEL FROM FRONT TO BACK AND SIDE TO SIDE.
3. ALL THREE MOUNTING HOLES ON MOUNTING-BRACKET MUST BE USED TO PROPERLY SECURE EYEWASH UNIT TO WALL.
4. LOCATE TWO 1/4" THICK SPACERS (QTY. 6 SUPPLIED) BEHIND EACH HOLE IN THE MOUNTING BRACKET AS SHOWN.
5. * DIMENSIONS MAY VARY ±1/2" [12.7mm].
6. ** **UNIT MUST BE FILLED WITH WATER BEFORE CONNECTING TO POWER SOURCE.**

(NOTES CONTINUED ON SHEET 3 OF 3)

MODEL 7501FP - WITH HEATER (SHOWN)
MODEL 7501 (SEE SHEET 1 OF 3)

Haws®
1455 KLEPPE LANE
SPARKS, NEVADA 89431
(775) 359-4712 FAX (755) 359-7424
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WEBSITE: WWW.HAWSCO.COM

ECN NO.	REVISED PER	BY:
4872	ECN: 4742	HM

DRAWN:	DATE:	CHK'D.:
P. FISCHER	04/01/13	
APPROVED:	DATE:	

MODEL(S)
7501 / 7501FP
PORTABLE EYEWASH

SCALE: 1:12	DRAWING TYPE: INSTALLATION	SIZE: A

PART NUMBER	
0002080045.D	
DRAWING NO.	REV
15153A00	11
SHEET 2 OF 3	

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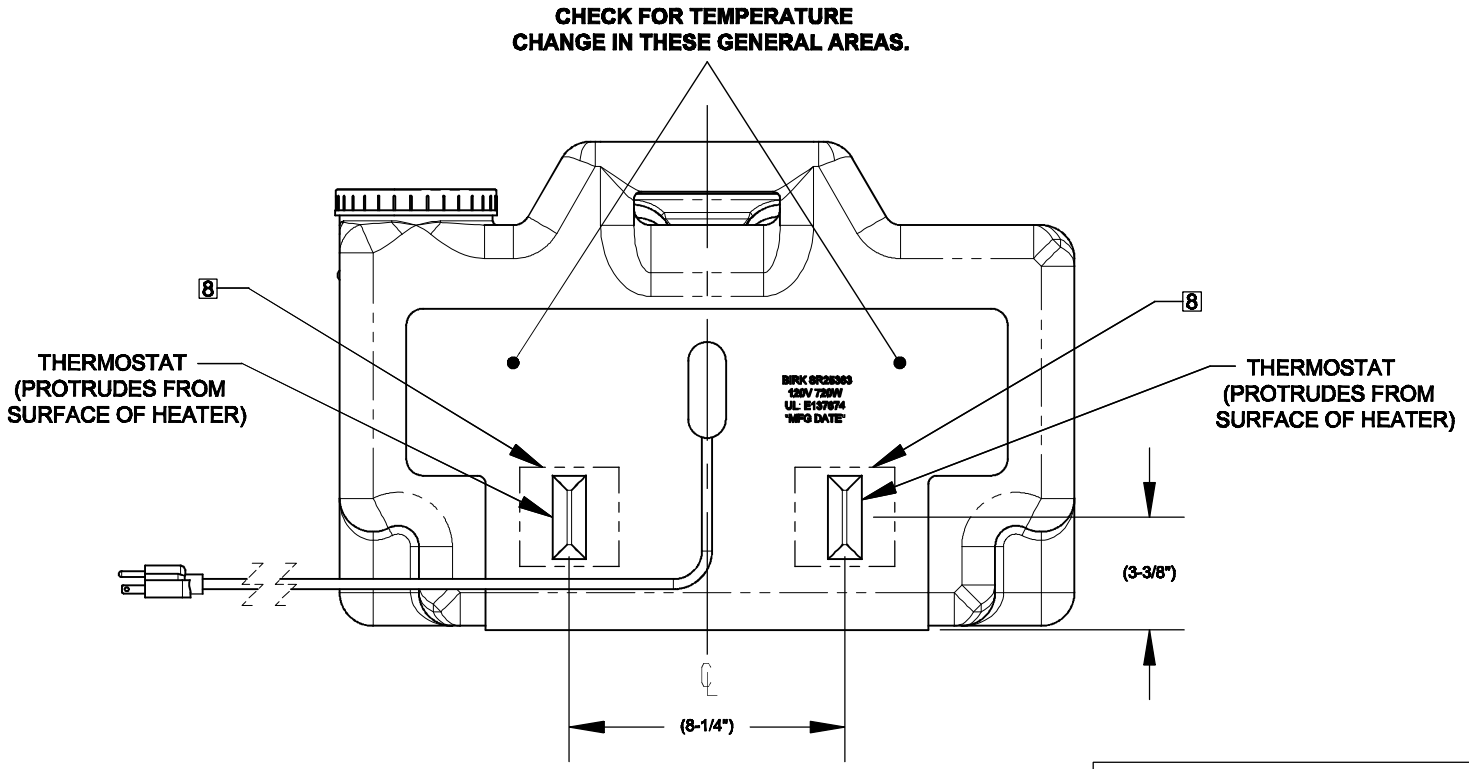
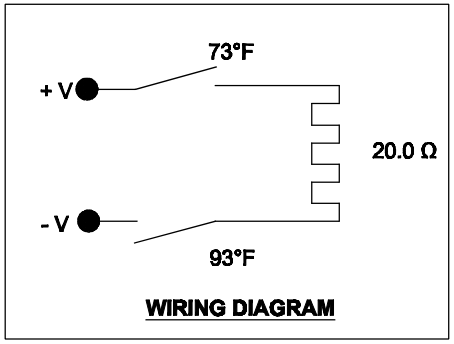


MODEL 7501FP
HEATER DETAIL



NOTES: (CONTINUED FROM SHEET 2 OF 3)

7. PRIOR TO SERVICING/CLEANING: UNPLUG POWER CORD ON UNIT FROM POWER SOURCE AND REMOVE UNIT FROM MOUNTING BRACKET.

8 EACH THERMOSTAT IS LOCATED IN THE CENTER OF A 3" X 3" NO HEAT ZONE. (SHOWN IN APPROXIMATE LOCATIONS). REFER TO OPERATIONS AND OWNERS MANUAL UNDER TROUBLESHOOTING "SECTION 7" (PAGE 4 OF 8) FOR HEATER ACTIVATION, ISSUES, AND TESTING.

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WEBSITE: WWW.HAWSCO.COM

ECN NO.	REVISED PER	BY:
4672	ECN: 4742	HM
DRAWN:	DATE:	CHK'D.:
P. FISCHER	04/01/13	
APPROVED:	DATE:	

MODEL(S)
7501 / 7501FP
PORTABLE EYEWASH

PART NUMBER 0002080045.D
DRAWING NO. 15153A00 REV 11

SCALE: 1:12 | DRAWING TYPE: INSTALLATION | SIZE: A | SHEET 3 OF 3

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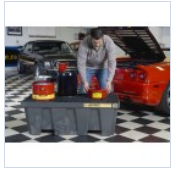
EcoPolyBlend™ Spill Control Pallet, 2 Drum, Recycled Polyethylene, Black

PHOTO (.GALLERY_PHOTO)



MODEL NO: 28623

Key Benefits

- Keep workers safe from accidental slips indoors and avoid costly hazmat cleanup costs
- EcoPolyBlend™ Black is 100% recycled polyethylene & Yellow is 30% recycled
- Complies with EPA SPCC regulations and meets fire codes

$265.00 − QTY: 1 +

ADD TO CART

Usually ships within 1 business day

MODEL NO: 28623

Key Benefits

- Keep workers safe from accidental slips indoors and avoid costly hazmat cleanup costs
- EcoPolyBlend™ Black is 100% recycled polyethylene & Yellow is 30% recycled
- Complies with EPA SPCC regulations and meets fire codes

OVERVIEW | SPECIFICATION | CUSTOMER REVIEWS

Model No.	28623
International Model No.	28623
Color	Black
Material Specifications	Recycled Polyethylene
UL Environmental Approval	Yes
Complies with NFPA Code 30	Yes
OSHA Compliance	Yes
EPA Compliance	Yes
SPCC Compliance	Yes
Percent Recycled	100
Sump Capacity - Gallons	66
Sump Capacity - liters	250
Load Bearing Capacity, lbs	2500

Product Information

Helpful Articles

Spill Containment – Is Your Workplace Prepared?

READ MORE (/NEWS/PROPER-WORKPLACE-SECONDARY-SPILL-CONTAINMENT-TIPS/)

- How to Safely Store 55-Gallon Drums Outdoors (/news/safe-outdoor-55-gallon-drum-storage/)
- 15 Tips for Outdoor Drum Storage (/news/outdoor-drum-storage-safety-tips/)

Relevant TechTALKs

- How Does SPCC Apply to Justrite Products? (/tech-talk/how-does-spcc-apply-to-justrite-products)

Load Bearing Capacity, kg	1134
Dimensions, Exterior	49" W x 18" H x 25" D
	1245mm W x 457mm H x 635mm D
Net Weight, lbs	43.1
Net Weight, kg	19.6

Questions? Contact Us

(https://www.justrite.com/contact-us)

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GE® 115 Volt Electronic Heat/Cool Room Air Conditioner

Model# AHE08AX

- Cooling or heating mode - Easily interchange the temperature mode from cooling to a heating supplement setting when the weather changes in the winter
- Energy Saver feature - Our Energy Saver mode allows the fan and compressor to shut off temporarily when the room is cool enough, saving you time and money
- Flexible cooling temperatures - Easy to use electronic controls allow you to select up to 3 different options of cooling and heating modes and up to 3 different options of fan speeds to ensure your room is cool and comfortable at all times
- Power at your fingertips - Use our fully functioning electronic remote to adjust the fan speed, temperature and mode options from anywhere in the room
- 24-hour timer - With a 24-hour timer you can program your unit to turn on or off between 1 and 24 hours
- Filter reminder light - Reminds you when the filter needs cleaning, so your unit continues to run at peak efficiency
- Easy installation - Every unit comes equipped with an EZ Mount window. This unit also include a convenient slide-out chassis
- For medium room size: 250-350 sq. ft. - Before you buy, measure the square footage of the room or rooms to be cooled. This unit is perfect for a medium room, ideally a living room or family room
- Power interruption restart - Unit automatically resumes operation at the prior temperature setting

Have more questions? Please contact 1-800-626-2005

FEATURES

Airflow (cfm) Roomside (hi/low)	270/240
Chassis Type	Slide-Out
Delay Timer	24-Hour On/Off Timer
Fan Speed Selections	3 Cooling; 3 Fan Only; 3 Heating
Filter Type	Slide-Out
Louver Style	4-Way Adjustable
Mounting Type	EZ Mount
Plug Type	Parallel/NEMA 5-15
Remote Control	Yes
Rotary Compressor	Yes
Thermostat Type	Electronic
Unit Type	Heat / Cool Unit
Vent/Air Exchange Exhaust	Top Air Discharge
Refrigerant Type	R-410A - Non-Ozone-Depleting Refrigerant
Unit Features	Selectable Thermostat on Remote
Area to Cool	251-350
Digital Time Temp Display	Yes
LCDI / AFCI power cord	Yes
Plug Capacity	115V/15A
Power Cord Length	72" Minimum
Product Type	Window
Room Air Conditioner Features	Electronic Control; Energy Saver; Heat Mode; On/Off Timer; Remote Control

GE® 115 Volt Electronic Heat/Cool Room Air Conditioner

Model# AHE08AX

APPROXIMATE DIMENSIONS (HxDxW)

- **15 7/8 in x 23 5/8 in x 22 5/8 in**

CAPACITY

- **Cooling BTUH (MAX) 8000.00 Btu**
- **Heating - Electric - BTUH - AHAM - 1R 3,800**
- **Cooling EER (BTUH / Watt) 11**
- **Dehumidification (pts./hr.) 1.30**

WARRANTY

- **Parts Warranty - Limited 1-year entire appliance**
- **Labor Warranty - Limited 1-year entire appliance**
- **Warranty Notes - See written warranty for full details**

Have more questions? Please contact 1-800-626-2005

PRODUCT DATA SHEET

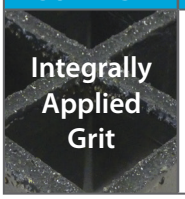
Fibergrate Composite Structures
Building the World to Last®

FIBERGRATE® MOLDED GRATING WITH CORVEX® RESIN SYSTEM

OPTIONS

DEPTH	MESH	PANEL SIZES
1"	1-1/2" x 1-1/2"	3' x 10' / 4' x 8' / 4' x 12'
1-1/2"	1-1/2" x 1-1/2"	3' x 10' / 4' x 8' / 4' x 12' / 5' x 10'

COLORS	
Dark Gray	Yellow

SURFACE	DESCRIPTION
	The optional grip top of Fibergrate® grating has a quartz grit which is integrally applied, cured and sealed onto the surface providing excellent slip resistant footing.

RESIN

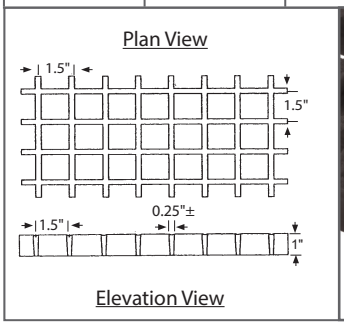
Corvex®: This newly improved isophthalic polyester resin system outperforms a number of competitive fiberglass and metal products and meets the requirements for corrosion resistance found in industrial, chemical processing and water/ wastewater applications. *This upgraded formulation has replaced IFR, CP-84 and FS-25 resins.* Flame Spread: ASTM E84 rating of 25 or less. Certifications: DNV Type Approval No. F-16856; meets the USCG requirements for general fire rating*.

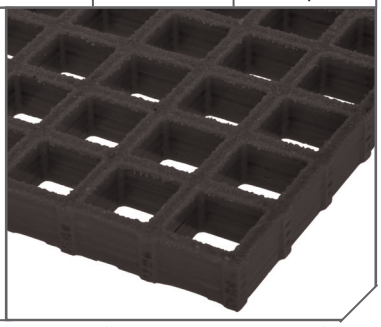
**For specific requirements and questions, please contact technical services.*

DETAILS

1" Deep x 1-1/2" Square Mesh

# of Bars/ Ft of Width	Load Bar Width	Open Area	Load Bar Centers	Approximate Weight
8	1/4"	70%	1-1/2"	2.5 psf

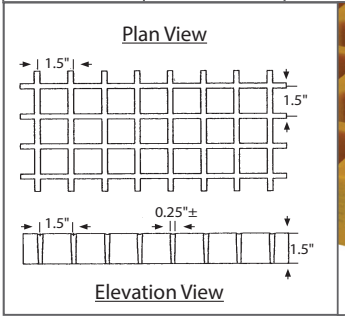


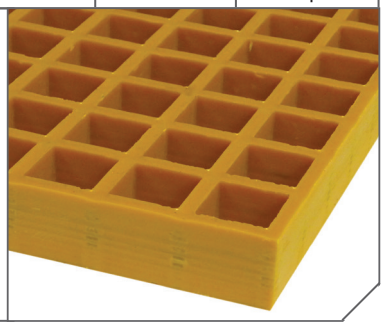


Section Properties per Ft of Width: A = 1.71 IN² I = 0.14IN⁴ S= 0.29 IN³

1-1/2" Deep x 1-1/2" Square Mesh

# of Bars/ Ft of Width	Load Bar Width	Open Area	Load Bar Centers	Approximate Weight
8	1/4"	70%	1-1/2"	3.8 psf





Section Properties per Ft of Width: A = 2.85 IN² I = 0.51 IN⁴ S= 0.65 IN³

RUBBER FEET FOR MOLDED GRATING

Specially designed rubber feet are an economical way to create a raised, ergonomic grating workmat for use around maintenance equipment, machines, lathes and in wet areas. With the rubber feet, facilities have a cost-effective solution to elevate grating needed for drainage or water flow and safe, ergonomic platforms. The feet can be utilized on all depths of molded grating from 1", 1-1/2" and 2" in any shape or configuration. The work mats can also be customized to worker resiliency preferences, just add more feet to increase the stiffness. The feet raise the grating 1/2" above the ground, and along with the open mesh, protect workers by allowing chips and fluids to fall below the standing surface eliminating slip and fall hazards.

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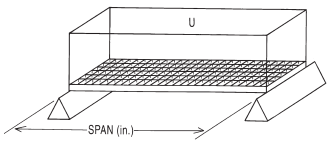
PRODUCT DATA SHEET

LOAD CHARTS

PRODUCTS: 1" Deep & 1-1/2" Deep Fibergrate® Molded Grating with 1-1/2" Square Mesh

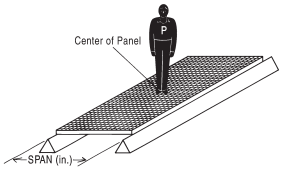
UNIFORM LOAD TABLE - DEFLECTION IN INCHES											MAX RECOM. LOAD (psf)	ULTIMATE CAPACITY (psf)
CLEAR SPAN (in)	DEPTH (in)	LOAD (psf) 50	65	100	150	200	300	500	1000	2000		
12	1"	<.01	<.01	<.01	<.01	<.01	0.02	0.04	0.08	0.16	1420	7120
	1-1/2"	<.01	<.01	<.01	<.01	<.01	0.01	0.02	0.04	0.07	3200	16000
18	1"	0.02	0.02	0.04	0.06	0.08	0.11	0.20	0.38	--	630	3170
	1-1/2"	<.01	<.01	0.01	0.02	0.03	0.04	0.07	0.14	0.28	1420	7100
24	1"	0.06	0.08	0.12	0.19	0.25	0.37	--	--	--	350	1780
	1-1/2"	0.02	0.03	0.04	0.06	0.08	0.12	0.21	0.42	--	800	4000
30	1"	0.14	0.18	0.27	0.41	--	--	--	--	--	220	1140
	1-1/2"	0.05	0.06	0.09	0.14	0.18	0.27	0.46			510	2560
36	1"	0.31	0.40	--	--	--	--	--	--	--	150	790
	1-1/2"	0.1	0.13	0.20	0.30	0.40	--	--	--	--	350	1770
42	1"	0.49	--	--	--	--	--	--	--	--	110	580
	1-1/2"	0.17	0.22	0.34	--	--	--	--	--	--	260	1300
48	1-1/2"	0.28	0.37	--	--	--	--	--	--	--	200	1000
54	1-1/2"	0.42	--	--	--	--	--	--	--	--	150	790

UNIFORM LOAD



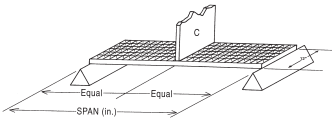
MOLDED GRATING CONCENTRATED POINT LOAD TABLES - Deflection in Inches								
CLEAR SPAN (in)	DEPTH (in)	LOAD (lb) 50	100	200	300	500	1000	2000
18	1	<.01	0.01	0.03	0.04	0.07	0.14	0.27
	1-1/2*	<.01	<.01	0.01	0.02	0.03	0.06	0.13
24	1	0.01	0.03	0.05	0.08	0.13	0.26	--
	1-1/2*	<.01	0.01	0.02	0.03	0.06	0.12	0.23
30	1	0.03	0.05	0.1	0.15	0.26	--	--
	1-1/2*	0.01	0.02	0.04	0.06	0.1	0.2	--
36	1	0.03	0.07	0.14	0.2	0.34	--	--
	1-1/2*	0.02	0.03	0.06	0.09	0.15	0.3	--
42	1	0.06	0.12	0.23	0.35	--	--	--
	1-1/2*	0.02	0.04	0.09	0.13	0.22	0.44	--
46	1	0.07	0.14	0.28	0.42	--	--	--
48	1-1/2*	0.03	0.06	0.12	0.18	0.29	--	--
54	1-1/2*	0.04	0.07	0.15	0.22	0.37	--	--
58	1-1/2*	0.04	0.08	0.17	0.25	0.42	--	--

CONCENTRATED POINT LOAD



CONCENTRATED LINE LOAD TABLE - DEFLECTION IN INCHES									MAX RECOM. LOAD (lbs/ft)	ULTIMATE CAPACITY (lbs/ft)
CLEAR SPAN (in)		LOAD (lb/ft of width) 50	100	200	300	500	1000	2000		
12	1"	<.01	0.01	0.03	0.04	0.06	0.13	--	710	3560
	1-1/2"	<.01	<.01	0.01	0.02	0.03	0.05	0.11	1600	8000
18	1"	0.02	0.04	0.08	0.12	0.20	0.41	--	470	2370
	1-1/2"	0.01	0.02	0.03	0.05	0.08	0.15	0.3	1060	5330
24	1"	0.05	0.1	0.2	0.3	0.49	--	--	350	1780
	1-1/2"	0.02	0.03	0.07	0.1	0.17	0.33	--	800	4000
30	1"	0.09	0.18	0.35	--	--	--	--	280	1420
	1-1/2"	0.03	0.06	0.12	0.18	0.29	--	--	640	3200
36	1"	0.16	0.33	--	--	--	--	--	230	1180
	1-1/2"	0.05	0.11	0.21	0.32	--	--	--	530	2660
42	1"	0.26	0.45	--	--	--	--	--	200	1010
	1-1/2"	0.08	0.16	0.32	0.47	--	--	--	450	2280
46	1"	0.32	--	--	--	--	--	--	180	900
48	1-1/2"	0.11	0.23	0.45	--	--	--	--	400	2000
54	1-1/2"	0.15	0.3	--	--	--	--	--	350	1770

CONCENTRATED LINE LOAD



Phone: 972-250-1633
Fax: 972-250-1530
www.fibergrate.com
info@fibergrate.com

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Fibergrate Composite Structures

Pool and SPA Vacuum Hose Bulk

TECHNICAL DATA

DESCRIPTION:
Utilizes high grade, corrugated
ultra-low density polyethylene
High melting temperature
Superior flexibility
Crush proof
Buoyancy

TECHNICAL SPECIFICATIONS:
Material:
Non-Toxic Low Density
Polyethylene
Color:
Blue
Operating Temp Range:
-5°F to 150°F

NOTE:
Not intended for use with potable water

APPLICATIONS:
Pool
Spa
Vacuum applications

MADE IN: China

Material Number	Inside Diameter	Outside Diameter	Wall Thickness	Roll Length	Working PSI @ 70°F	Unit Order	UPC	Pack
98596	1-1/2"	1.81"	0.155"	25'	N/A	25'	091712013433	Dispenser Spool

For Commercial & Residential

Job Name _____
Job Location _____
Engineer _____
Approval _____

Contractor _____
Approval _____
Contractor's P.O. No. _____
Representative _____

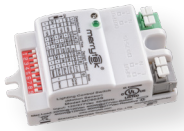
Vapor Tight

EZ Install Vapor Tight Fixtures
34w, 51w, & 56w

EZ INSTALL VAPOR TIGHTS

ETi ADVANTAGE

- ✓ Durable stainless-steel latches
- ✓ Captive hinged lens makes for quick and EZ Installation
- ✓ Suspended or ceiling mount installation, Brackets included!
- ✓ Replaceable light engines and drivers
- ✓ NSF Rated
- ✓ Upgrade options include integrated microwave motion sensor and BBU (Battery Backup Unit)



Microwave Motion Sensor

BBU

AVAILABLE MODELS

Vapor Tight Selection Guide	STANDARD LUMEN 34W 3600 Lm. 4000K	MID LUMEN 51W 5400 LM. 4000K	HIGH LUMEN 56W 7000 LM 4000K*
Base Model	54656241 VT-4-34-840-MV	54465141 VT-4-54-840-MV-D	64501141 VT-4-70-840-MV-D
Base + Microwave Sensor	54656241-I VT-4-34-840-MV-OS	54465141-I VT-4-34-840-MV-D-OS	N/A
Base + BBU	54656341 VT-4-34-840-MV-EM	N/A	N/A
Base + Sensor & BBU	54656341-I VT-4-34-840-MV-EM-OS	N/A	N/A

*Also available in 5000K

Features & Specifications

- Wide 110° beam angle
- 120-227V
- >80CRI
- 0-10V dimmable (51w and 56w)
- Temp rating -4°F - 113°F
- L70 >50,000
- 5 Year limited warranty

ETi SOLID STATE® LIGHTING INC.

North American Headquarters
720 Northgate Parkway
Wheeling, IL 60090

Customer Service
1-855-384-7754
etiorders@ETiSSL.com

Visit Us Online
www.ETiSSL.com

Vapor Tight

Project:

Part Number:

PART NUMBER GUIDE

CATEGORY		SIZE		LUMENS		CRI/CCT		VOLTAGE		DIMMING		OPTION
VT	-		-		-		-	MV	-		-	

PRODUCT/SKU DETAILS

GENERAL SPECIFICATIONS:

Voltage	120-277VAC	**Frequency**	50/60 Hz.	**CRI**	80
Power Factor	>.90	**THD**	< 20%	**Rating**	cULus Wet
Temperature	-4°F to +113°F	**Rated Life**	50,000 hrs.	**Warranty**	5 Year Limited

ORDERING GUIDE

Part #	Model #	Description	Replaces	LED Watts	Lumens	LPW	CCT
VT-4-34-840-MV	54656241	4' 34w Vapor Tight (NSF)	3 x 32w T8	34w	3,600	106	4000K
VT-4-34-840-MV-OS	54656241-I	4' 34w Vapor Tight with Motion Sensor (NSF)	3 x 32w T8	34w	3,600	106	4000K
VT-4-40-840-MV-EM	54656341	4' 40w Vapor Tight with Battery Back-Up (NSF)	3 x 32w T8	40w	3,600	90	4000K
VT-4-40-840-MV-EM-OS	54656341-I	4' 40w Vapor Tight with Battery Back-Up and Motion Sensor (NSF)	3 x 32w T8	40w	3,600	90	4000K
VT-4-54-840-MV-D	54465141	4' 51w Vapor Tight - 0-10V Dimmable (NSF)	3 x 32w T8	51w	5,400	106	4000K
VT-4-54-840-MV-D-OS	54465141-I	4' 51wVapor Tight with Motion Sensor - 0-10V Dimmable (NSF)	3 x 32w T8	51w	5,400	106	4000K
VT-4-54-850-MV-D	54465161	4' 51w Vapor Tight - 0-10V Dimmable (NSF)	3 x 32w T8	51w	5,400	106	5000K
VT-4-70-840-MV-D	64501141	4' 56w High Lumen Output Vapor Tight - 0-10V Dimmable	4 x 32w T8	56w	7,000	125	4000K
VT-4-70-850-MV-D	64501161	4' 56w High Lumen Output Vapor Tight - 0-10V Dimmable	4 x 32w T8	56w	7,000	125	5000K

PACKAGING SPECIFICATIONS

Part #	Model #	UPC	UCC	Inner Carton Dimensions	Inner Carton Weight	Shipper/Master Carton Dimensions	Shipper/Master Carton Weight
VT-4-34-840-MV	54656241	849489009599	50849489009594	50 x 4.8 x 3.4 in.	5.1 lbs.	51 x 7.4 x 5.4 in.	11.6 lbs.
VT-4-34-840-MV-OS	54656241-I	849489005089	50849489005084	50 x 4.8 x 3.4 in.	5.5 lbs.	51 x 7.4 x 5.4 in.	11.6 lbs.
VT-4-40-840-MV-EM	54656341	849489009926	50849489009921	50 x 4.8 x 3.4 in.	5.1 lbs.	51 x 7.4 x 5.4 in.	14.9 lbs.
VT-4-40-840-MV-EM-OS	54656341-I	849489001791	50849489001796	50 x 4.8 x 3.4 in.	5.5 lbs.	51 x 7.4 x 5.4 in.	14.9 lbs.
VT-4-54-840-MV-D	54465141	849489009919	50849489009914	50 x 4.8 x 3.4 in.	5.1 lbs.	51.3 x 7.7 x 5.7 in.	12.8 lbs.
VT-4-54-840-MV-D-OS	54465141-I	849489001951	50849489001956	50 x 4.8 x 3.4 in.	5.5 lbs.	51 x 7.4 x 5.4 in.	11.6 lbs.
VT-4-54-850-MV-D	54465161	849489002293	50849489002298	50 x 4.8 x 3.4 in.	5.1 lbs.	51.3 x 7.7 x 5.7 in.	12.8 lbs.
VT-4-70-840-MV-D	64501141	849489002309	50849489002304	47.6 x 5.16 x 3.86 in.	6.5 lbs.	48.3 x 10.9 x 8.3 in.	29.9 lbs.
VT-4-70-850-MV-D	64501161	849489002316	50849489002311	47.6 x 5.16 x 3.86 in.	6.5 lbs.	48.3 x 10.9 x 8.3 in.	29.9 lbs.

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OWENS CORNING®

TruDefinition® DURATION® Shingles *with Patented SureNail® Technology*

TOTAL PROTECTION ROOFING SYSTEM

TOTAL PROTECTION. TOTAL CONFIDENCE.®

SEAL. DEFEND. BREATHE.

TruDefinition® DURATION® Shingles *with Patented SureNail® Technology*

Bold contrast. Deep dimension. TruDefinition®.

TruDefinition® Duration® Shingles are specially formulated to provide great contrast and dimension to any roof. Through the use of multiple granule colors and shadowing, *TruDefinition Duration* Shingles offer a truly unique and dramatic effect. This exclusive combination of color and depth is what makes *TruDefinition Duration* Shingles like no other.

TruDefinition Duration Shingles are available in popular colors with bold, lively contrast and complementing shadow lines for greater dimension. They feature a Limited Lifetime Warranty*/‡‡ (for as long as you own your home) and a 130-MPH Wind Resistance Limited Warranty*. *TruDefinition Duration* Shingles are produced with StreakGuard™ Protection to inhibit the growth of airborne blue-green algae* that can cause unsightly dark streaks on your roof. Owens Corning provides a 10-year Algae Resistance Limited Warranty.* Beyond the outstanding curb appeal and impressive warranty coverage, they also come with the advanced performance of patented SureNail® Technology.

The SureNail® Difference—A technological breakthrough in roofing. The innovative features of Owens Corning® TruDefinition® Duration® Shingles with patented SureNail® Technology offer the following:

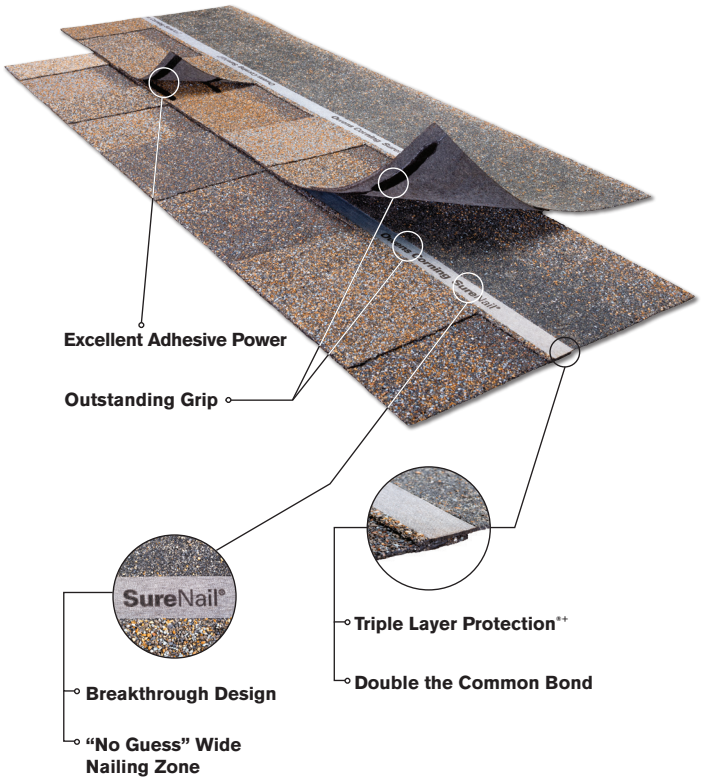
Breakthrough Design. Featuring a tough, woven engineered reinforcing fabric to deliver consistent fastening during installation.

Triple Layer Protection.® A unique "triple layer" of reinforcement occurs when the fabric overlays the common bond of the shingle laminate layers that offers excellent fastener holding power.

Oustanding Grip. Our enhanced Tru-Bond®‡ sealant grips tightly to the engineered fabric nailing strip on the shingle below.

Excellent Adhesive Power. Specially formulated, wide adhesive bands help keep shingle layers laminated together.

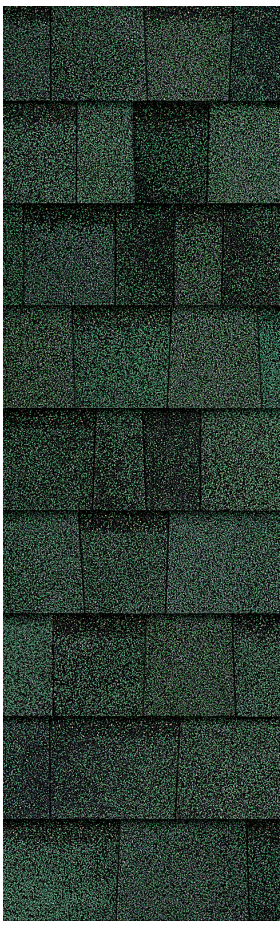
Exceptional Wind Resistance. Engineered to deliver 130-MPH* wind warranty performance with only 4 nails. Fewer nails required can mean fewer deck penetrations.



Teak† ▶

Amber†

Brownwood†

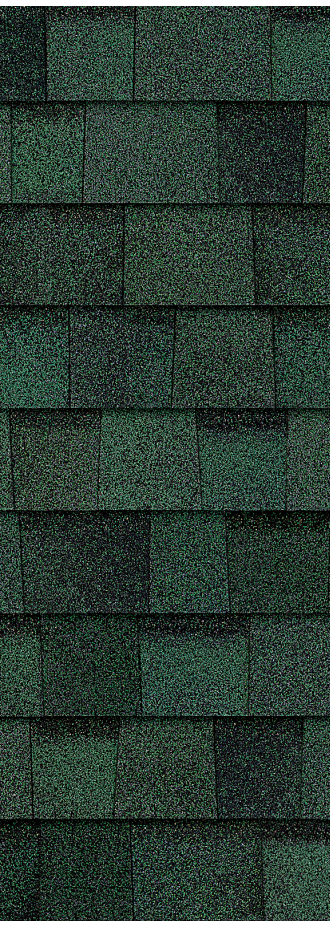


Chateau Green†

Harbor Blue†

Onyx Black†

Shasta White†



Colonial Slate†

Desert Tan†

Sierra Gray†

Teak†

Driftwood†

Estate Gray†

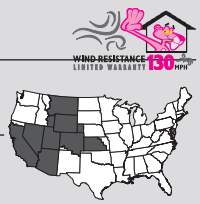
Terra Cotta†

ENERGY STAR® IS FOR ROOFS TOO

Similar to the energy-efficient appliances in your home, roofing products can help provide energy-saving qualities. Owens Corning® ENERGY STAR® qualified shingles can help reduce your heating and cooling bills when installed properly. These shingles reflect solar energy, helping to decrease the amount of heat transferred to a home's interior — and the amount of air conditioning needed to keep it comfortable. Actual savings will vary based on geographic location and individual building characteristics. Call 1-800-GET-PINK® or 1-888-STAR-YES for more information.

Product Attributes

Warranty Length*
Limited Lifetime‡‡ (for as long as you own your home)
Wind Resistance Limited Warranty*
130 MPH
Algae Resistance Limited Warranty*
10 Years
TRU PROtection® Non-Prorated Limited Warranty* Period
10 Years



Algae Resistance available in areas shown in white.

TruDefinition® Duration® Shingles Product Specifications

Size	13¼" x 39⅜"
Application Exposure	5⅝"
Shingles per Bundle	Not less than 20
Average Shingle Count per 3 Bundles	64
Average Coverage per 3 Bundles	98.4 sq. ft.

Applicable Standards and Codes

ASTM D228
ASTM D3018 (Type 1)
ASTM D3161 (Class F Wind Resistance)
ASTM D3462
ASTM D7158 (Class H Wind Resistance)
ASTM E108/UL 790 (Class A Fire Resistance)
CSA A123.5++
Florida Product Approval
ICC-ES AC438#
Miami-Dade Product Approval^^
PRI ER 1378E01
Shasta White color meets ENERGY STAR® requirements for initial solar reflectance of 0.25 and 3-year aged solar reflectance of 0.15; 2013 California Building Energy Efficiency Standards, Title 24, Part 6 requirements; rated by the Cool Roof Rating Council (CRRC).

* See actual warranty for complete details, limitations and requirements.

** *2018 Roofing Brand Awareness Study* by Owens Corning Roofing and Asphalt, LLC.

† Owens Corning Roofing strives to accurately reproduce photographs of shingles. Due to manufacturing variances, the limitations of the printing process and the variations in natural lighting, actual shingle colors and granule blends may vary from the photo. The pitch of your roof can also impact how a shingle looks on your home. We suggest that you view a roofing display or several shingles to get a better idea of the actual color. To accurately judge your shingle and color choice, we recommend that you view it on an actual roof with a pitch similar to your own roof prior to making your final selection. Color availability subject to change without notice. Ask your professional roofing contractor for samples of colors available in your area.

\+ *The amount of Triple Layer Protection® may vary on a shingle-to-shingle basis.*

++ Only on product sold in Canada.

‡ Tru-Bond is a proprietary premium weathering-grade asphalt sealant that is blended by Owens Corning Roofing and Asphalt, LLC.

‡‡ 40-Year Limited Warranty on commercial projects.

\# International Code Council Evaluation Services Acceptance Criteria for Alternative Asphalt Shingles.

Owens Corning Roofing Platinum and Preferred Contractors are independent contractors and are not affiliates of Owens Corning Roofing and Asphalt, LLC or its affiliated companies.

For patent information, please visit www.owenscorning.com/patents.

SureNail® Technology is not a guarantee of performance in all weather conditions.

SureNail® Technology is available only on Owens Corning® Duration® Series Shingles.

ENERGY STAR and the ENERGY STAR mark are registered trademarks of the U.S. Environmental Protection Agency.

^ Excludes non-Owens Corning® roofing products such as flashing, fasteners, pipe boots and wood decking.

Shingles are algae resistant to help control the growth of algae and discoloration.

^^ Applies for all areas that recognize a Miami-Dade Notice of Acceptance (NOA).

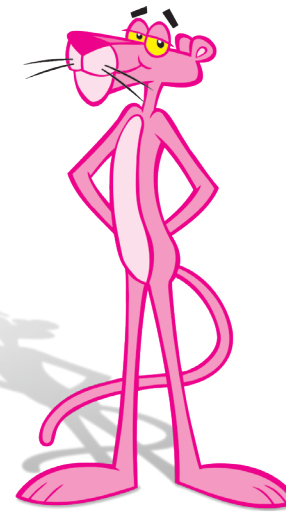
HOME SWEET HOME

Your home is your sanctuary. It's the place where you want to feel the most comfortable. Safe. Protected. But no matter how much you love your house, it seems the work is never completely done. And if purchasing a new roof is on your to-do list, it may seem like a daunting task — especially if your roof is already damaged or leaking. Since a roof plays such an important role in protecting you and your family from the elements, you realize that you can't let the damage get out of hand.

Don't worry, we know that a roof replacement project is a big, important decision. You can feel confident about choosing our roofing products — Owens Corning has been a recognized leader in the building industry for over 75 years. In fact, we're America's most trusted roofing brand.** Not only can we help you choose the right shingle and roofing system components, we can also help you select the right contractor for the job — an Owens Corning Roofing Preferred Contractor.

Together we can make this a positive experience — an opportunity, really. This is your chance to choose a roof that not only has outstanding performance, but also has exceptional beauty. So for years to come, you'll feel great every time you pull in the driveway.

Protected. Proud. Home.



Total Protection Roofing System®^

TOTAL PROTECTION SIMPLIFIED™

Owens Corning® Total Protection Roofing System®^ integrates engineered Owens Corning® components that work together to address these three primary performance areas, critical to a high-performance roof, while also making it easy to understand the importance of each. **With Owens Corning, it's easy to confidently deliver total protection, beauty and peace of mind.**

SEAL.

HELPS CREATE A WATER-PROOF BARRIER

SELF-ADHERED ICE & WATER BARRIER
SYNTHETIC UNDERLAYMENT

DEFEND.

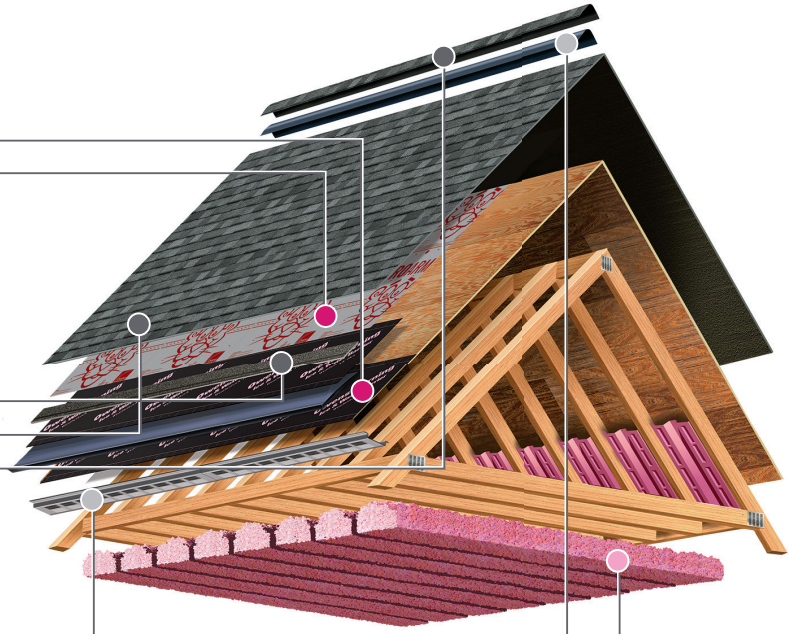
HELPS PROTECT AGAINST NATURE'S ELEMENTS

STARTER SHINGLES
LAMINATE SHINGLES
HIP & RIDGE SHINGLES

BREATHE.

FOR BALANCED ATTIC VENTILATION

INTAKE VENTS
EXHAUST VENTS



+ COMFORT.

ADD COMFORT AND ENERGY PERFORMANCE

PINK® FIBERGLAS™ BLOWN-IN ATTIC INSULATION

OWENS CORNING ROOFING AND ASPHALT, LLC
ONE OWENS CORNING PARKWAY
TOLEDO, OHIO, USA 43659

1-800-GET-PINK®
www.owenscorning.com/roofing

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(Irving)

SOLUTIA SEEP LINE MODIFICATIONS

Instrument & SCADA Panel Drawings

OCTOBER 2019

Systems Supplier:
United Controls Corporation
Huntsville, Alabama

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APPROVED:DEM

United Controls Corporation
HUNTSVILLE, AL

SEEP LINE MODIFICATIONS
SOLUTIA

PRJ. NO. 19006 | DWG. NO. Pa01 | REV. NO. 02

SYSTEMS INTEGRATION

October 22, 2019

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06	Pm02	SEEP DF
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PANEL ELECTRICAL WIRING DIAGRAMS

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SHEET	DWG	TITLE

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SEEP LINE MODIFICATIONS
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no	NORMALLY OPEN
nc	NORMALLY CLOSED
AFF	ABOVE FINISHED FLOOR
HOA	HAND – OFF – AUTO
TYP	TYPICAL
1	UNIVERSAL SINGLE TERMINAL BLOCK
FAC-1 2 3A	FUSE TERMINAL BLOCK W/DISC LEVER
3	TERMINAL BLOCK WITH UNIVERSAL FOOT
4	GROUNDING TERMINAL
	CHASSIS GROUND
	EARTH GROUND
	LIMIT SWITCH, NORMALLY OPEN
	PANASONIC ZNR 25VDC OR 130VAC
XO	2 POSITION SELECTOR SWITCH KNOB
	FLUSH ROUND PUSHBUTTON
	INTERPOSING RELAY

5	UNIVERSAL TERMINAL BLOCK UK–RETURN
6	DOUBLE LEVEL TERMINAL BLOCK
7	DOUBLE LEVEL LAMPTEST TERMINAL BLOCK
15A	CIRCUIT BREAKER
	SHIELD END
G	PUSH–TO–TEST INDICATOR LAMP
G	FIELD INSTRUMENT LIGHNING ARRESTOR
HNG ZD	ZONE DEFENDER LIGHTNING ARRESTOR
13 9 14 CR–1 1 5	1 POLE 24UDC RELAY
9 1 13 CR–1 5 14 4 12 8	2 POLE 24VDC RELAY W/ BASE

+1 4+ –2 8 5 6G	LIGHTNING ARRESTOR TERMINAL BLOCK
+ + – IN 9 OUT –	CURRENT TO CURRENT ISOLATOR
	BUZZER
	NORMALLY OPEN CONTACTS
	NORMALLY CLOSED CONTACTS
	FUSE
	TERMINAL ENDSTOP
	TERMINAL SEPARATER
1	PART INDICATOR FOR BILL OF MATERIALS
NS	INDICATES PART NOT SHOWN ON LAYOUT
HNG LPS–1 +24V 24Vgnd	LOOP POWER SUPPLY
L	LOOP POWER SOURCE

DRAWING SYMBOL LEGEND

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DRAWING SYMBOL LEGEND

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STANDARD WIRE COLORS

LINE AND LOAD CIRCUITS	BLACK (B)
AC CONTROL WIRING	RED (R)
NEUTRAL WIRING	WHITE (W)
LOW VOLTAGE DC(+)POS	RED(R)
LOW VOLTAGE DC(-)NEG	BLACK (BL)
GROUNDING	GREEN/YELLOW TRACER (G/Y)

STANDARD WIRE MARKING

SINGLE CONDUCTORS AND INDICATED CABLES

SINGLE CONDUCTORS SHALL BE IDENTIFIED AT BOTH ENDS WITH MACHINE-IMPRINTED, THERMAL RECOVERY SLEEVE LABELS. LABELS SHALL BEAR OR BE DERIVED FROM THE **ISA** TAG OF THE ASSOCIATED SIGNAL. CONDUCTORS SHORTER THAN 20cm AND ASSOCIATED WITH INTERPOSING OR RELAY LOGIC MAY BE SEQUENTIALLY NUMBERED OR LETTERED.

STANDARD CABLES

STANDARD CABLE ASSEMBLIES SHALL BE IDENTIFIED WITH A MACHINE-IMPRINTED, THERMAL RECOVERY LABEL OR WIRE-TIE FLAG LABEL SHOWING THE REFERENCE DRAWING NUMBER, SERIAL NUMBER AND DATE OF MANUFACTURE.

STANDARD WIRE SIZES

SINGLE CONDUCTORS AND INDICATED CABLES

PANEL CONDUCTORS SHALL BE SIZED IN STRICT CONFORMANCE WITH UL-508A AND NATIONAL ELECTRICAL CODE REQUIREMENTS OR PROJECT SPECIFICATIONS, WHICHEVER YIELDS THE LARGER WIRE SIZE.

CONDUCTORS SHALL BE MTW OR THHN OR AS APPROPRIATE FOR PANEL THERMAL REQUIREMENTS.

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SEEP LINE MODIFICATIONS
SOLUTIA
WIRE SIZES, COLORS AND MARKING

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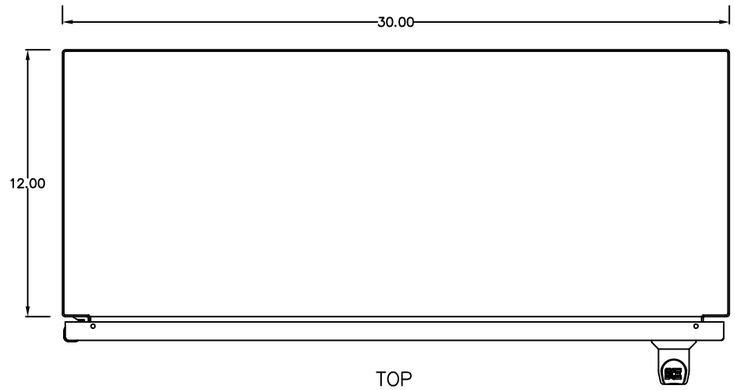
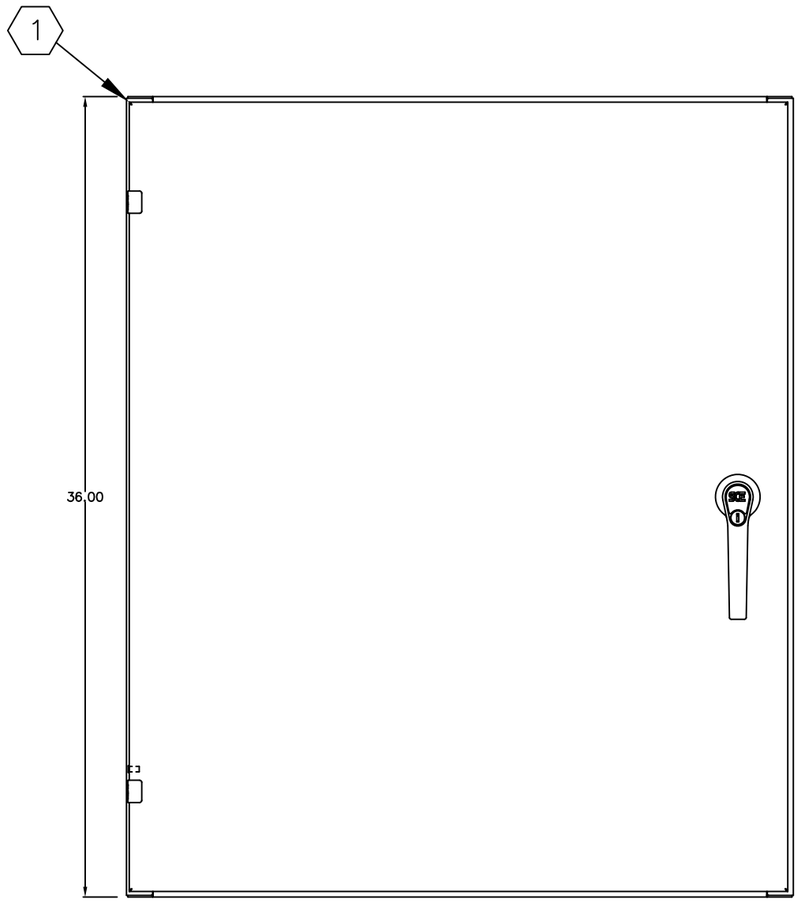
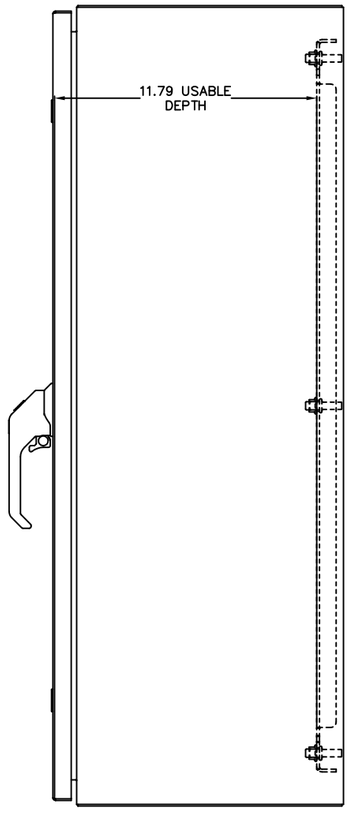


TOP
VIEW



FRONT
VIEW



RIGHT SIDE
VIEW

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SEEP Exterior

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SYSTEMS INTEGRATION

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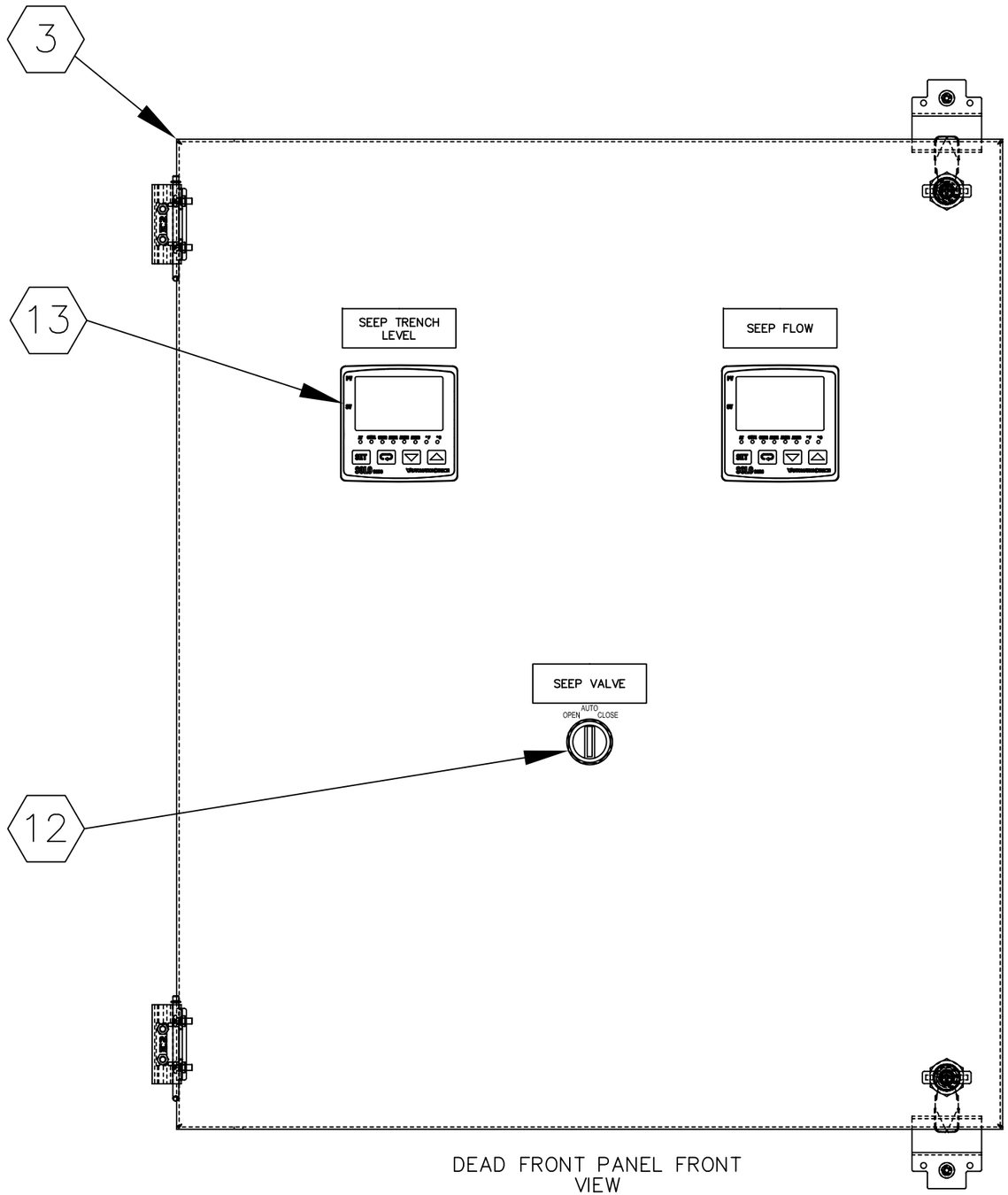

DEAD FRONT PANEL FRONT VIEW

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01	09/17/19	CONSTRUCTION	CWG
02	10/22/19	RECORD SET	CWG

REVISIONS

DESIGNED: CWG
DRAWN: CWG
APPROVED:DEM

United Controls Corporation
HUNTSVILLE, AL

SEEP LINE MODIFICATIONS
SOLUTIA
SEEP Dead Front Panel

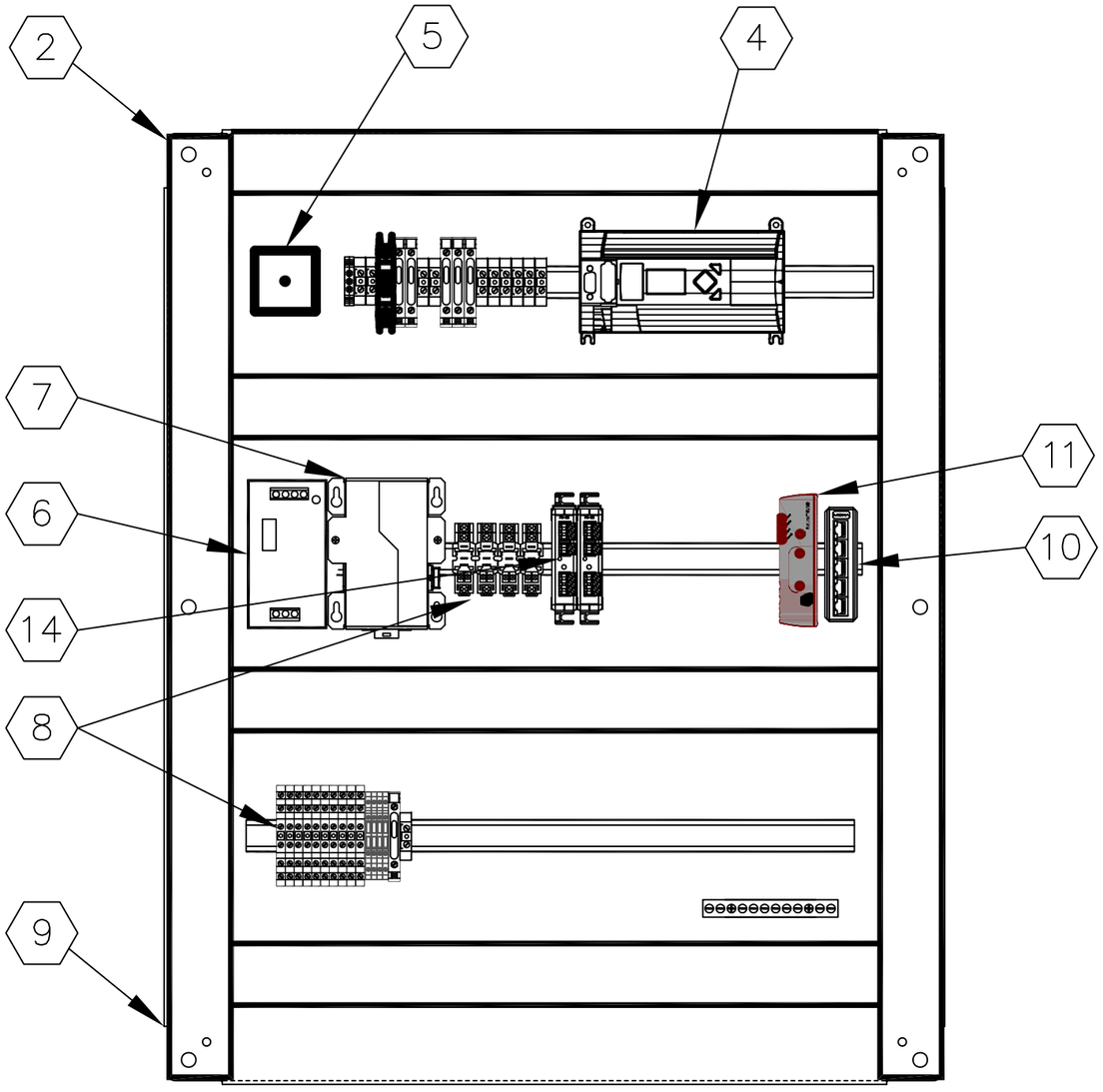
PRJ. NO. 19006
DWG. NO. Pm02
REV. NO. 02

SYSTEMS INTEGRATION

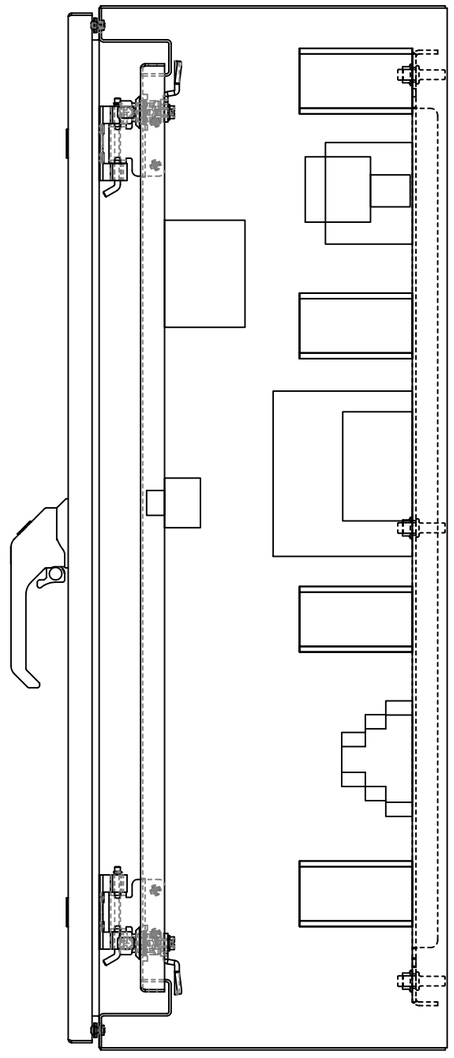
October 22, 2019

SHEET 6 OF 12

PREV NEXT



SUBPANEL FRONT VIEW



RIGHT SIDE VIEW

NO	DATE	REMARKS	BY
00	09/06/19	APPROVAL	CWG
01	09/17/19	CONSTRUCTION	CWG
02	10/22/19	RECORD SET	CWG

REVISIONS

DESIGNED: CWG
DRAWN: CWG
APPROVED:DEM

United Controls Corporation
HUNTSVILLE, AL

SEEP LINE MODIFICATIONS
SOLUTIA
SEEP Interior

PRJ. NO. 19006
DWG. NO. Pm03
REV. NO. 02

SYSTEMS INTEGRATION

October 22, 2019

SHEET 7 OF 12

PREV NEXT

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NO	DESCRIPTION	MANUFACTURER	MODEL/TYPE	QTY
1	36x30x12 PAINTED STEEL ENCLOSURE	SAGINAW	SCE-36EL3012LPPL	1
2	36x30 PANEL BACKPLATE	SAGINAW	SCE-36P30	1
3	36x30 DF PANEL KIT	SAGINAW	SCE-DF36EL30LP	1
4	MICROLOGIX PLC	ALLEN BRADLEY	1766-L32BXBA	1
5	LINE POWER SURGE PROTECTION	SCHNEIDER	SDSA1175T	1
6	24VDC POWER SUPPLY	PHOENIX CONTACT	TRIO-UPS/1AC/24DC/5	1
7	UPS BATTERY	PHOENIX CONTACT	QUINT-BAT/24DC/3.4AH	1
8	DIN RAIL AND TERMINAL BLOCKS			
	UNIVERSAL TERMINAL BLOCK	PHOENIX CONTACT	UK 6	11
	GROUNDING TERMINAL BLOCK	PHOENIX CONTACT	USLKG 6N	1
	THREE LEVEL TERMINAL BLOCK	PHOENIX CONTACT	DIKD 1,5-TG	10
	FUSE PLUG	PHOENIX CONTACT	ST-SILED 24 UK 4	6
	0.5A FUSE	BUSSMAN	GMA-500MA	6
	FUSE PLUG	PHOENIX CONTACT	ST-SILA 250 UK 4	4
	5A FUSE	BUSSMAN	GMA-5A	4
	RELAY 1P	IDEC	RH1B-ULC24DC	4
	RELAY 1P BASE	IDEC	SH1B-05	4
	ANALOG SURGE TERMINAL BLOCK	PHOENIX CONTACT	TT-2-PE-M-24DC	4
	FUSE TB w\DISCONNECT LEVER DC	PHOENIX CONTACT	UK6.3 HESILED 24	4
	FUSE TB w\DISCONNECT LEVER AC	PHOENIX CONTACT	UK6.3 HESILA 250	2
	CIRCUIT BREAKER	EATON	FAZ-C15/1	1
	GROUND BAR	SIEMENS	ECGB10	1
9	1.5X3 WIREWAY/COVER	PANDUIT	PA G1.5x3LG6/PA C1.5LG6	18'
10	ETHERNET SWITCH	MOXA	EDS-205	1
11	CELLULAR MODEM	SIERRA WIRELESS	RV50	1
12	3-POSITION SWITCH	EATON	HT8JBH1DAA5	1
13	SETPOINT CONTROLLER	SOLO	SL9696-RRE-D	2
14	SIGNAL CONDITIONER	AUTOMATION DIRECT	FC-33	2

BILL OF MATERIALS

NO	DATE	REMARKS	BY
00	09/06/19	APPROVAL	CWG
01	09/17/19	CONSTRUCTION	CWG
02	10/22/19	RECORD SET	CWG

REVISIONS

DESIGNED: CWG
DRAWN: CWG
APPROVED:DEM

United Controls Corporation
HUNTSVILLE, AL

SEEP LINE MODIFICATIONS
SOLUTIA
SEEP Bill Of Materials

PRJ. NO. 19006
DWG. NO. Pm04
REV. NO. 02

SYSTEMS INTEGRATION

October 22, 2019

SHEET 8 OF 12

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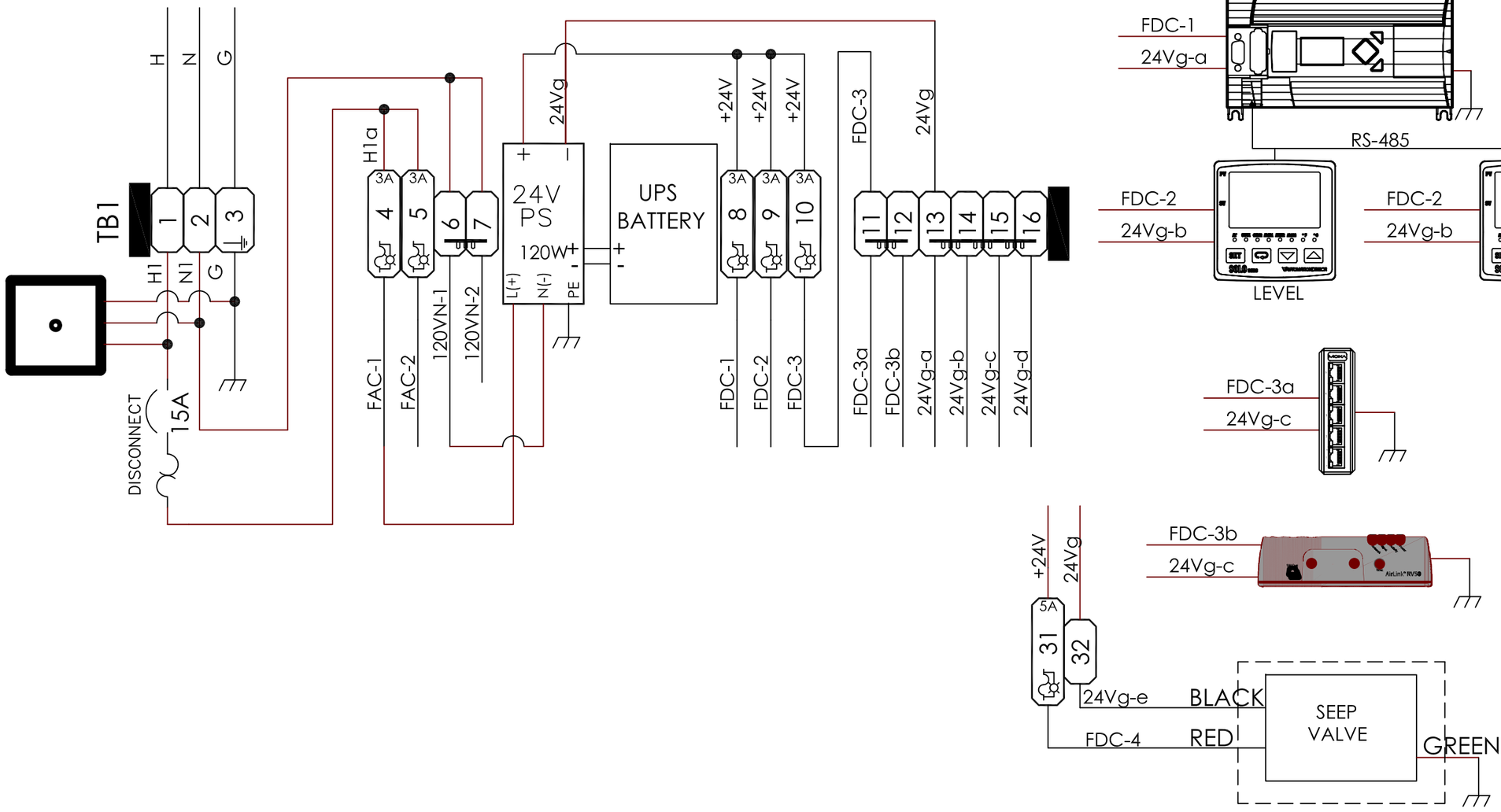

COMPLIANCE REQUIREMENTS
1. WIRING: COPPER, 90°
2. TERMINAL TORQUE: 0.6 Nm

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REVISIONS

DESIGNED: CWG
DRAWN: CWG
APPROVED:DEM

United Controls Corporation
HUNTSVILLE, AL

SEEP LINE MODIFICATIONS
SOLUTIA
SEEP Power

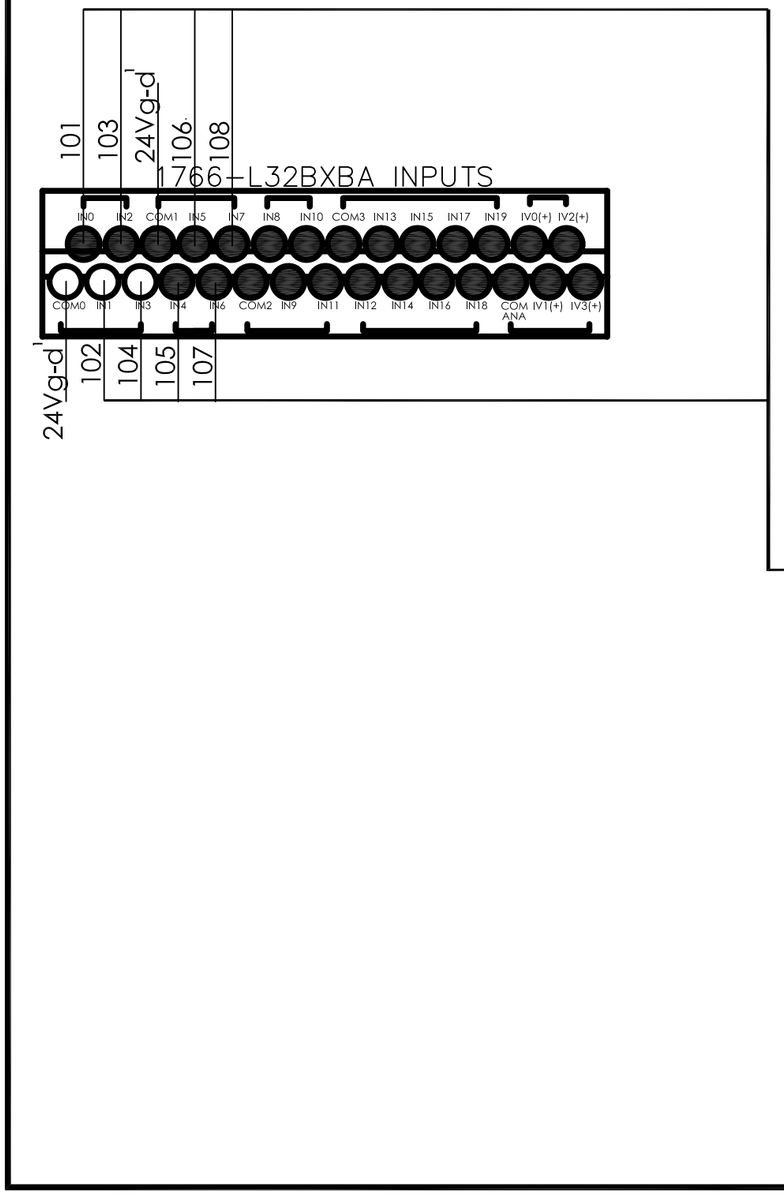
PRJ. NO. 19006
DWG. NO. Pe01
REV. NO. 02

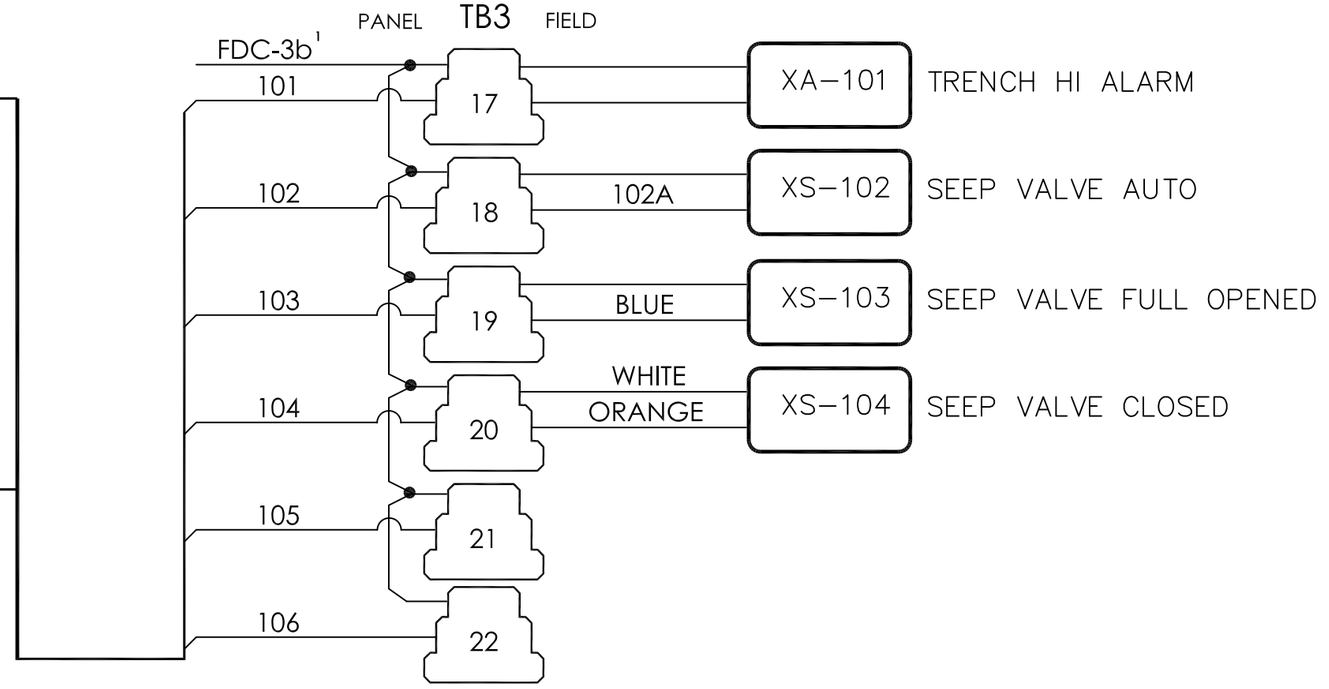
SYSTEMS INTEGRATION

October 22, 2019

SHEET 9 OF 12

PREV NEXT





1. Reference Sheet Pe01 AC and DC Power Wiring

N O T E S

COMPLIANCE REQUIREMENTS

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APPROVED: DEM

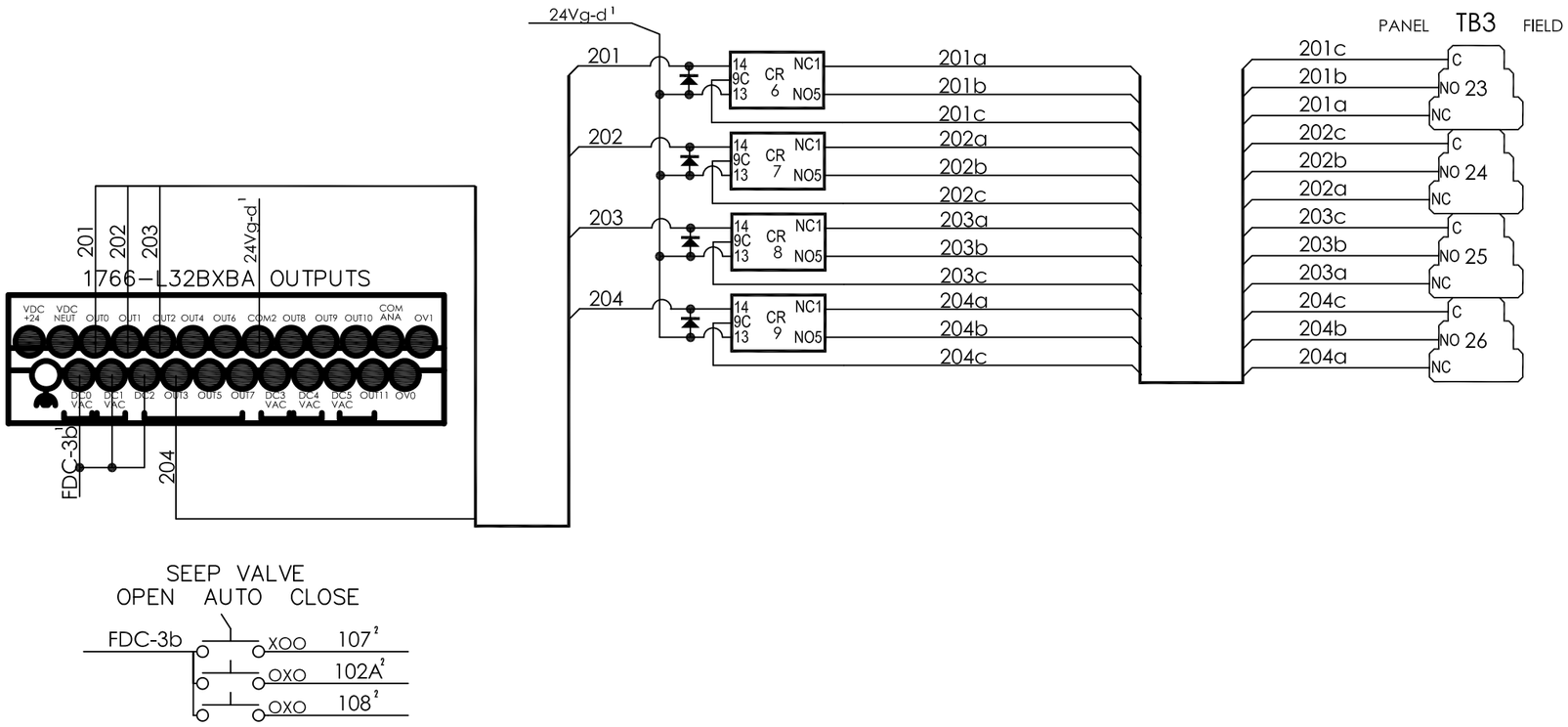
United Controls Corporation
HUNTSVILLE, AL

SEEP LINE MODIFICATIONS
SOLUTIA
SEEP DISCRETE INPUTS

PRJ. NO. 19006 | DWG. NO. Pe02 | REV. NO. 02

SYSTEMS INTEGRATION

October 22, 2019



1. Reference Sheet Pe01 AC and DC Power Wiring
2. Reference Sheet Pe02 Discrete Input Wiring

N O T E S

COMPLIANCE REQUIREMENTS

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REVISIONS

DESIGNED: CWG
DRAWN: CWG
APPROVED: DEM

United Controls Corporation
HUNTSVILLE, AL

SEEP LINE MODIFICATIONS
SOLUTIA
SEEP DISCRETE OUTPUTS

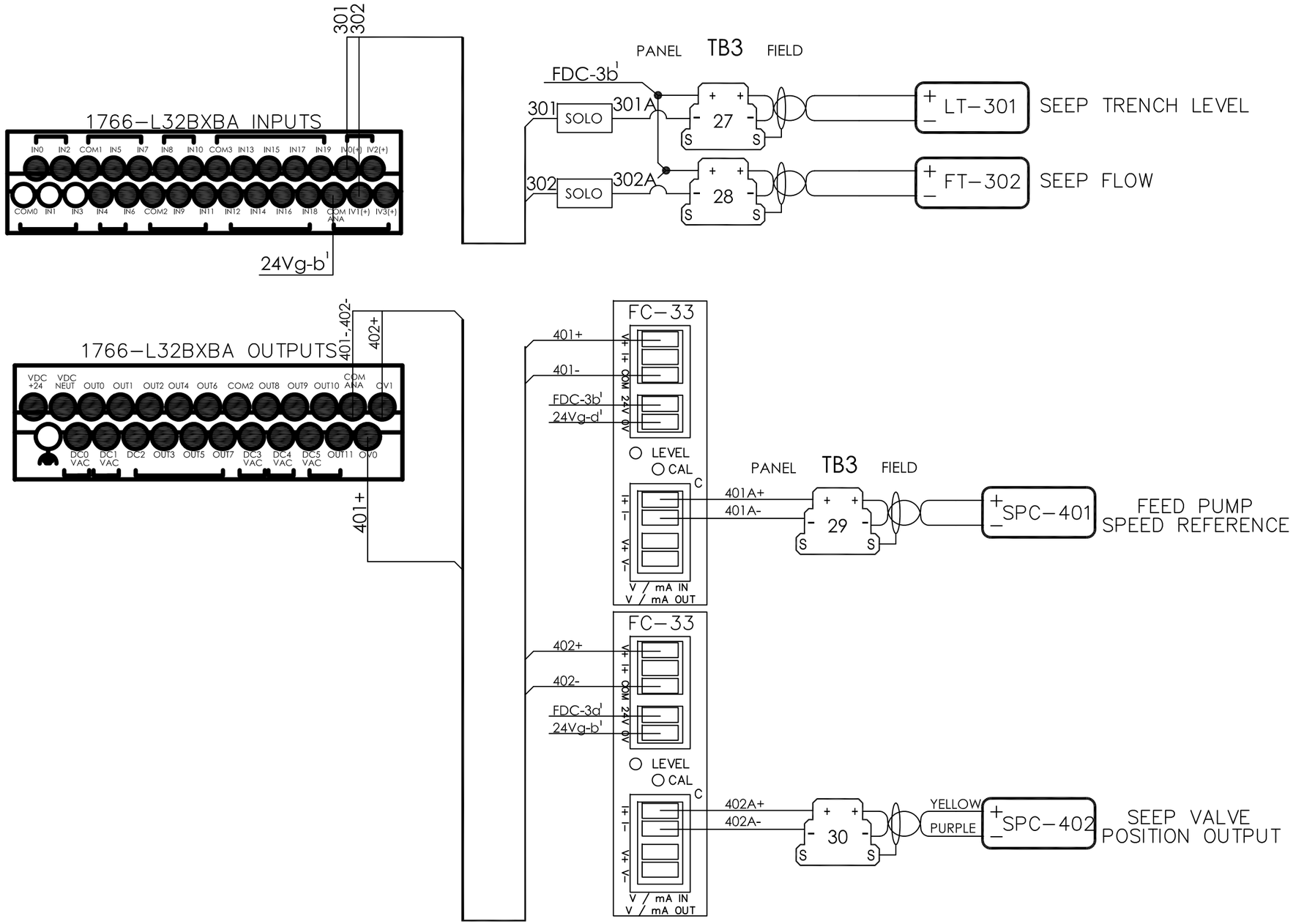
PRJ. NO. 19006 | DWG. NO. Pe03 | REV. NO. 02

SYSTEMS INTEGRATION

October 22, 2019

SHEET 11 OF 12

PREV NEXT



1. Reference Sheet Pe01 AC and DC Power Wiring

N O T E S

COMPLIANCE REQUIREMENTS

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02	10/22/19	RECORD SET	CWG

REVISIONS

DESIGNED: CWG
DRAWN: CWG
APPROVED:DEM

United Controls Corporation
HUNTSVILLE, AL

SEEP LINE MODIFICATIONS
SOLUTIA
SEEP ANALOG INPUTS\OUTPUTS

PRJ. NO. 19006 | DWG. NO. Pe04 | REV. NO. 02

SYSTEMS INTEGRATION

October 22, 2019

SHEET 12 OF 12

PREV NEXT

GSI Job No. G-5738
Issued: 30 June 2021

GSI ENVIRONMENTAL

Construction Completion Addendum Report
Second Addendum
OU-3 Remedial Action

Anniston PCB Site
Anniston, Alabama

Appendix C

Appendix C.2
CTS#3 Upgrade Equipment

Recordall®
RCDL | Mechanical Flow Meters

Recordall® Industrial Meters

Nutating Disc Meter, Bronze and Thermoplastic

DESCRIPTION

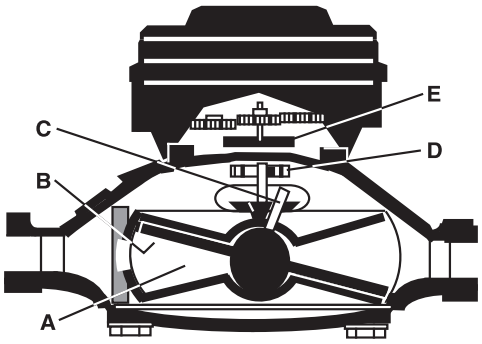
The Badger Meter Recordall (RCDL) positive displacement meters are one of the most cost effective methods in metering industrial fluids. The RCDL meter has a simple, efficient design for high accuracy and repeatability over the entire meter flow range.

Available in sizes 1/2…2 in. for flows up to 170 gpm, these meters are extremely rugged and reliable. Maintenance is seldom required, but if necessary, takes only a few minutes. All parts are designed and built of materials that meet your application requirements and provide an enduring and a trouble-free, precision flow meter.

To complement the RCDL meter line, Badger Meter offers a complete line of accessories that includes totalizers, transmitters, rate of flow indicators and batch/process controllers.

OPERATION

The metering principle, known as positive displacement, is based on the continuous filling and discharging of the measuring chamber. Controlled clearances between the disc and the chamber provide precise measurement of each volume cycle. As the disc nutates, the center spindle rotates a magnet. The movement of the magnet is sensed through the meter wall by a follower magnet or by various sensors. Each revolution of the magnet is equivalent to a fixed volume of fluid, which is converted to any engineering unit of measure for totalization, indication or process control.



Liquid flowing through the meter chamber (A) causes a disc (B) to nutate or wobble. This motion, in turn, results in the rotation of a spindle (C) and drive magnet (D). Rotation is transmitted through the wall of the meter to a second magnet (E) or varied style of sensor pickup.

LEAD-FREE MODELS AVAILABLE

The Recordall Disc Series meters meet or exceed the most recent revision of AWWA Standard C700 and are available in a lead-free bronze alloy. The meters comply with the lead-free provisions of the Safe Drinking Water Act, are certified to NSF/ANSI Standards 61 and 372 and carry the NSF-61 mark on the housing. All components of the lead-free bronze alloy meter (housing, measuring element, seals, and so on) comprise the certified system.

FEATURES

- Wide flow range
- Rugged bronze or thermoplastic housing
- Meters available up to 250° F
  (see *"Temperature Chart" on page 2*)
- Easily maintained without removing from line
- Durable components for minimal maintenance
- Wide range of compatible accessories

PERFORMANCE

- Accuracy: ± 1.5%
- Repeatability: ± 0.5%
- Pressure Range: up to 150 psi
- Temperature Range: 32…250° F

Badger Meter

IDM-DS-00113-EN-07 (January 2021)

Product Data Sheet

TEMPERATURE CHART

Meter Model	Meter Size	Housing Material	Chamber/Disc Material	Fluid	Temperature Range
M25	5/8 in. (15 mm)	lead-free bronze alloy	engineered polymer	cold liquids	32…120° F (0…49° C)
M25	3/4 in. (15 mm)	lead-free bronze alloy	engineered polymer	cold liquids	32…120° F (0…49° C)
M35	3/4 in. (20 mm)	lead-free bronze alloy	engineered polymer	cold liquids	32…120° F (0…49° C)
M55	1 in. (25 mm)	lead-free bronze alloy	engineered polymer	cold liquids	32…120° F (0…49° C)
M70	1 in. (25 mm)	lead-free bronze alloy	engineered polymer	cold liquids	32…120° F (0…49° C)
M120	1-1/2 in. (40 mm)	lead-free bronze alloy	engineered polymer	cold liquids	32…120° F (0…49° C)
M170	2 in. (50 mm)	lead-free bronze alloy	engineered polymer	cold liquids	32…120° F (0…49° C)
M25	5/8 in. (15 mm)	engineered polymer	engineered polymer	cold liquids	32…100° F (0…38° C)
M25	3/4 in. (20 mm)	engineered polymer	engineered polymer	cold liquids	32…100° F (0…38° C)
M25	5/8 in. (15 mm)	lead-free bronze alloy	LCP	high temp or chemical	32…250° F (0…121° C)
M25	3/4 in. (20 mm)	lead-free bronze alloy	LCP	high temp or chemical	32…250° F (0…121° C)
M70	1 in. (25 mm)	lead-free bronze alloy	LCP	high temp or chemical	32…250° F (0…121° C)
M120	1-1/2 in. (40 mm)	lead-free bronze alloy	LCP	chemical	32…110° F (0…43° C)

METER SPUD AND CONNECTION SIZES

Model	Size Designation in.	×	"L" Laying Length	"B" Bore Dia.	Coupling Nut and Spud Thread in.	Tailpiece Pipe Thread (NPT) (in.)
25B	5/8	×	7-1/2 in. (190 mm)	5/8 in. (15 mm)	3/4 (5/8)	1/2
	5/8 x 3/4	×	7-1/2 in. (190 mm)	5/8 in. (15 mm), 3/4 in. (20 mm)	1 (3/4)	3/4
25P	5/8	×	7-1/2 in. (190 mm)	5/8 in. (15 mm)	3/4 (5/8)	1/2
	5/8 x 3/4	×	7-1/2 in. (190 mm)	5/8 in. (15 mm), 3/4 in. (20 mm)	1 (3/4)	3/4
	3/4	×	9 in. (229 mm)	3/4 in. (20 mm)	1 (3/4)	3/4
35B	3/4	×	7-1/2 in. (190 mm)	3/4 in. (20 mm)	1 (3/4)	3/4
	3/4	×	9 in. (229 mm)	3/4 in. (20 mm)	1 (3/4)	3/4
	3/4 x 1	×	9 in. (229 mm)	3/4 in. (20 mm)	1-1/4 (1)	1
55B	1	×	10-3/4 in. (273 mm)	1 in. (25 mm)	1-1/4 (1)	1
70B	1	×	10-3/4 in. (273 mm)	1 in. (25 mm)	1-1/4 (1)	1

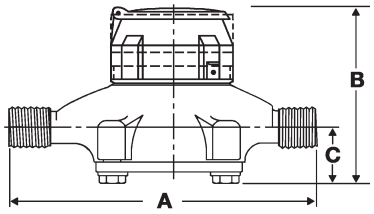
NOTE:
The engineering thread is always one thread size larger than the meter size or service pipe thread designation. Under *Coupling Nut and Spud Thread*, the size given in parentheses identifies the size to specify when ordering meter connections, such as tailpiece couplings.

MATERIALS

Model	Model 25 Polymer	Model 25 Bronze	Model 35 Bronze	Model 55 Bronze	Model 70 Bronze	Model 120 Bronze	Model 170 Bronze
Size Designation	5/8 in. 5/8 × 3/4 in. 3/4 in.	5/8 in. 5/8 × 3/4 in.	3/4 in.	1 in.	1 in.	1-1/2 in.	2 in.
Meter Housing	Engineered polymer	Lead-free bronze alloy	Lead-free bronze alloy	Lead-free bronze alloy	Lead-free bronze alloy	Lead-free bronze alloy	Lead-free bronze alloy
Housing Bottom Plates	Engineered polymer	Cast iron, lead-free bronze alloy, engineered polymer	Cast iron, lead-free bronze alloy, engineered polymer	Cast iron, lead-free bronze alloy, engineered polymer	Cast iron, lead-free bronze alloy, engineered polymer	Lead-free bronze alloy	Lead-free bronze alloy
Measuring Chamber	Engineered polymer	Engineered polymer	Engineered polymer	Engineered polymer	Engineered polymer	Engineered polymer	Engineered polymer
Disc	Engineered polymer	Engineered polymer	Engineered polymer	Engineered polymer	Engineered polymer	Engineered polymer	Engineered polymer
Trim	n/a	Stainless steel	Stainless steel	Stainless steel	Stainless steel	Stainless steel	Stainless steel
Strainer	Engineered polymer	Engineered polymer	Engineered polymer	Engineered polymer	Engineered polymer	Engineered polymer	Engineered polymer
Disc Spindle	Stainless steel	Stainless steel	Stainless steel	Engineered polymer	Stainless steel	Stainless steel	Stainless steel
Magnet	Ceramic	Ceramic	Ceramic	Ceramic	Ceramic	Ceramic	Ceramic
Magnet Spindle	Engineered polymer	Engineered polymer	Stainless steel	Engineered polymer	Engineered polymer	Engineered polymer	Engineered polymer
Register Lid and Shroud	Engineered polymer, bronze	Engineered polymer, bronze	Engineered polymer, bronze	Engineered polymer, bronze	Engineered polymer, bronze	Engineered polymer, bronze	Engineered polymer, bronze

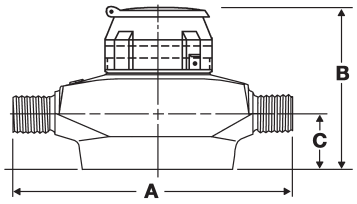
DIMENSIONS

M25, M35, M55, M70 Bronze



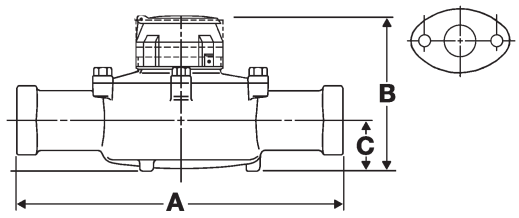
Meter Size	Model	A Laying Length	B Height w/Reg.	C Centerline Base	Width	Approx. Shipping Weight
5/8 in. (15 mm)	25	7-1/2 in. (190 mm)	4-15/16 in. (125 mm)	1-11/16 in. (42 mm)	4-1/4 in. (108 mm)	4-1/2 lb (2 kg)
5/8 in. × 3/4 in. (15 mm)		7-1/2 in. (190 mm)	4-15/16 in. (125 mm)	1-11/16 in. (42 mm)	4-1/4 in. (108 mm)	4-1/2 lb (2 kg)
3/4 in. (20 mm)	35	7-1/2 in. (190 mm)	5-1/4 in. (133 mm)	1-5/8 in. (41 mm)	5 in. (127 mm)	5-1/2 lb (2.5 kg)
3/4 in. (20 mm)		9 in. (229 mm)	5-1/4 in. (133 mm)	1-5/8 in. (41 mm)	5 in. (127 mm)	5-3/4 lb (2.6 kg)
3/4 in. × 1 in. (20 mm)		9 in. (229 mm)	5-1/4 in. (133 mm)	1-5/8 in. (41 mm)	5 in. (127 mm)	6 lb (2.7 kg)
1 in. (25 mm)	55	10-3/4 in. (273 mm)	6 in. (152 mm)	2-1/32 in. (52 mm)	6-1/4 in. (159 mm)	8-3/4 lb (3.9 kg)
1 in. (25 mm)	70	10-3/4 in. (273 mm)	6-1/2 in. (165 mm)	2-5/16 in. (59 mm)	7-3/4 in. (197 mm)	11-1/2 lb (5.2 kg)

M25 Polymer



Meter Size	Model	A Laying Length	B Height w/Reg.	C Centerline Base	Width	Approx. Shipping Weight
5/8 in. (15 mm)	25	7-1/2 in. (190 mm)	5-1/16 in. (128 mm)	1-3/4 in. (44 mm)	4-13/16 in. (122 mm)	2-1/2 lb (1 kg)
5/8 x 3/4 in. (15 mm)		7-1/2 in. (190 mm)	5-1/16 in. (128 mm)	1-3/4 in. (44 mm)	4-13/16 in. (122 mm)	2-1/2 lb (1 kg)
3/4 in. (20 mm)		9 in. (229 mm)	5-1/16 in. (128 mm)	1-3/4 in. (44 mm)	4-13/16 in. (122 mm)	3 lb (1.4 kg)

M120, M170 Bronze



Meter Size	Meter Model	A Laying Length	B Height w/Reg.	C Centerline Base	Width	Approx. Shipping Weight
1-1/2 in. (40 mm)	120 EL, Hex 120 EL, TP	12-5/8 in. (321 mm)	7 in. (178 mm)	2-3/8 in. (60 mm)	8-3/4 in. (222 mm)	19 lb (8.6 kg)
1-1/2 in. (40 mm)	120 ELL 120 ELL, TP	13 in. (330 mm)	7 in. (178 mm)	2-3/8 in. (60 mm)	8-3/4 in. (222 mm)	19 lb (8.6 kg)
2 in. (50 mm)	170 EL, Hex 170 EL, TP	15-1/4 in. (387 mm)	8 in. (203 mm)	2-7/8 in. (73 mm)	9-1/2 in. (241 mm)	30 lb (13.6 kg)
2 in. (50 mm)	170 ELL 170 ELL, TP	17 in. (432 mm)	8 in. (203 mm)	2-7/8 in. (73 mm)	9-1/2 in. (241 mm)	30 lb (13.6 kg)

EL = Elliptical ELL = Elliptical Long Hex = Hexagon, 1-1/2…11-1/2 in. NPT Thread TP=Test Plug 1 in.

SPECIFICATIONS

M25, M35, M55, M70 Bronze

Model	Model 25 Bronze	Model 25 Bronze	Model 35 Bronze	Model 55 Bronze	Model 70 Bronze
Size Designation	**5/8 in.**	**5/8 × 3/4 in.**	**3/4 in.**	**1 in.**	**1 in.**
Typical Operating Range (100% ± 1.5%)	0.5…25 gpm (0.11…5.7 m3/hr)	0.5…25 gpm (0.11…5.7 m3/hr)	0.75…35 gpm (0.17…7.9 m3/hr)	1…55 gpm (0.23…12.5 m3/hr)	1.25…70 gpm (0.28…16 m3/hr)
Maximum Continuous Operation	15 gpm (3.4 m3/hr)	15 gpm (3.4 m3/hr)	25 gpm (5.7 m3/hr)	40 gpm (9.1 m3/hr)	50 gpm (11.3 m3/hr)
Pressure Loss at Maximum Continuous Operation	3.5 psi @ 15 gpm (0.24 bar @ 3.4 m3/hr)	2.8 psi @ 15 gpm (0.19 bar @ 3.4 m3/hr)	5 psi @ 25 gpm (0.37 bar @ 5.7 m3/hr)	3.4 psi @ 40 gpm (0.23 bar @ 9.1 m3/hr)	6.5 psi @ 50 gpm (0.45 bar @ 11.3 m3/hr)
Maximum Operating Pressure	150 psi (10 bar)	150 psi (10 bar)	150 psi (10 bar)	150 psi (10 bar)	150 psi (10 bar)
Meter Connections	Available in NL bronze and engineered polymer to fit spud thread bore diameter sizes:				
	5/8 in. (DN 15 mm)	3/4 in. (DN 15 mm)	3/4 in. (DN 20 mm)	1 in. (DN 25 mm)	1 in. (DN 25 mm)

M25 Polymer

Model	Model 25 Polymer	Model 25 Polymer	Model 25 Polymer
Size Designation	**5/8 in.**	**5/8 × 3/4 in.**	**3/4 in.**
Typical Operating Range (100% ± 1.5%)	1/2…25 gpm (0.11…5.7 m3/hr)	1/2…25 gpm (0.11…5.7 m3/hr)	1/2…30 gpm (1.0…6.8 m3/hr)
Maximum Continuous Operation	15 gpm (3.4 m3/hr)	15 gpm (3.4 m3/hr)	15 gpm (3.4 m3/hr)
Pressure Loss at Maximum Continuous Operation	4.2 psi at 15 gpm (0.29 bar at 3.4 m3/hr)	2.8 psi at 15 gpm (0.19 bar at 3.4 m3/hr)	2.8 psi at 15 gpm (0.19 bar at 3.4 m3/hr)
Maximum Operating Pressure	150 psi (10 bar)	150 psi (10 bar)	150 psi (10 bar)
Meter Connections	Available in NL bronze and engineered polymer to fit spud thread bore diameter sizes:		
	5/8 in. (DN 15 mm)	3/4 in. (DN 15 mm)	3/4 in. (DN 15 mm)

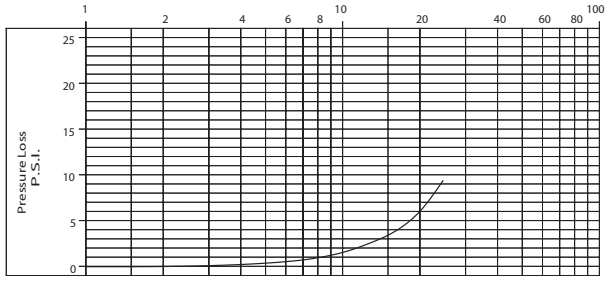
M120, M170 Bronze

Model	Model 120 Bronze	Model 170 Bronze
Size Designation	**1-1/2 in.**	**2 in.**
Typical Operating Range (100% ± 1.5%)	2.5…120 gpm (0.57…27 m3/hr)	2.5…170 gpm (0.57…39 m3/hr)
Maximum Continuous Operation	80 gpm (18 m3/hr)	100 gpm (23 m3/hr)
Pressure Loss at Maximum Continuous Operation	4.8 psi at 80 gpm (0.33 bar at 18 m3/hr)	3.3 psi at 100 gpm (0.23 bar at 23 m3/hr)
Maximum Operating Pressure	150 psi (10 bar)	150 psi (10 bar)
Meter Connections	1-1/2 in. AWWA two-bolt elliptical flange, drilled or 1-1/2…11-1/2 NPT internal pipe threads	2 in. AWWA two-bolt elliptical flange, drilled or 2…11-1/2 NPT internal pipe threads
Test Plugs	Optional 1 in. NPT test plug (TP)	Optional 1 in. NPT test plug (TP)

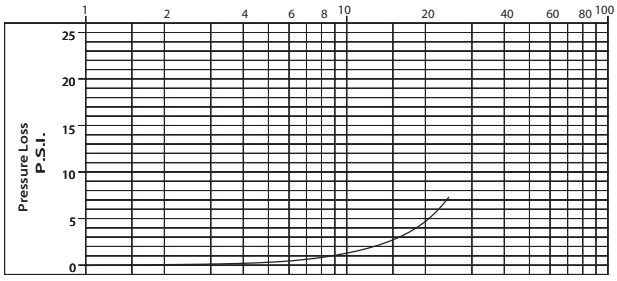
PRESSURE LOSS CHARTS

Bronze Meters, Sizes 5/8…1 inch

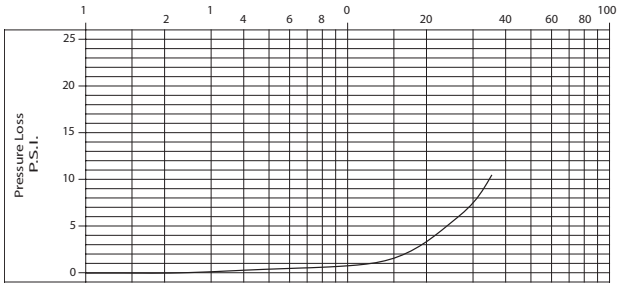
Rate of Flow in Gallons Per Minute



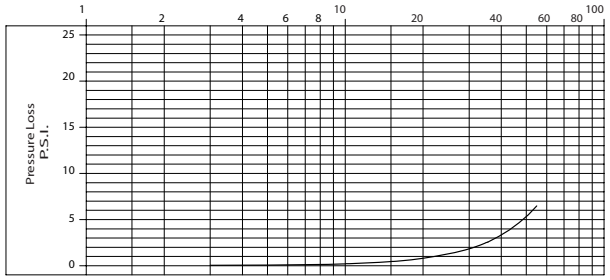
Model 25 5/8 in.



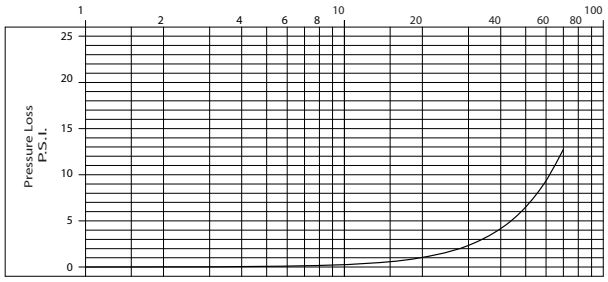
Model 25 5/8 × 3/4 in.



Model 35 3/4 in.



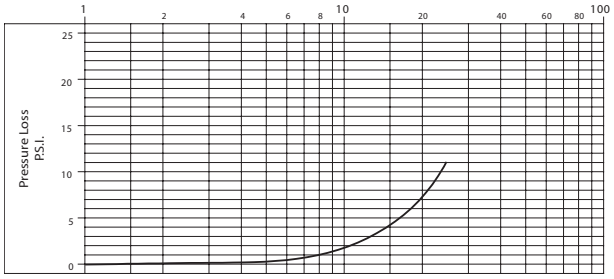
Model 55 1 in.



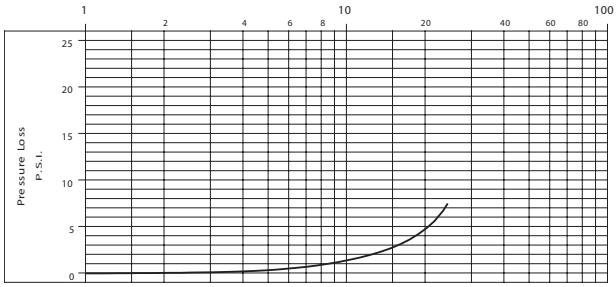
Model 70 1 in.

Polymer Meters, Sizes 5/8…3/4 inch

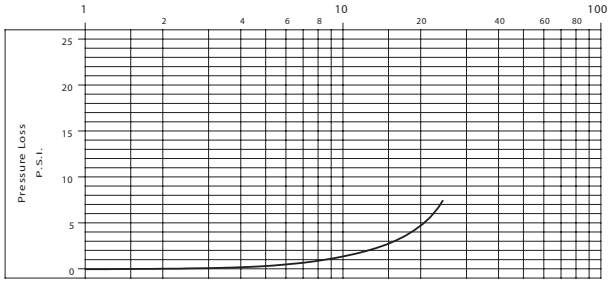
Rate of Flow in Gallons Per Minute



Model 25 Polymer 5/8 in.



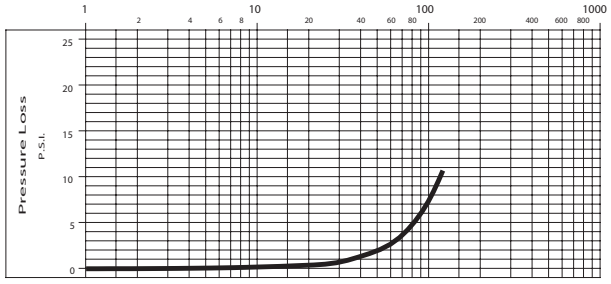
Model 25 Polymer 5/8 x 3/4 in.



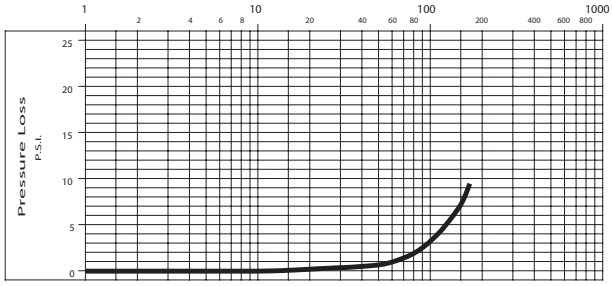
Model 25 Polymer 3/4 in.

Bronze Meters, Sizes 1-1/2 and 2 inch

Rate of Flow in Gallons Per Minute



Model 120 1-1/2 in.



Model 170 2 in.

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Control. Manage. Optimize.

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www.badgermeter.com

Legacy Document Number: ITB-072

GOULDS WATER TECHNOLOGY
a xylem brand

Submittal Data

SSH Close Coupled
End Suction Stainless Steel Pumps

MODEL : 9SH2H52D0

Hydraulic Data					Motor Data	SSH S Group	Qty.
Maximum Flow	Flow at Duty Point	Maximum TDH	TDH at Duty Point	$NPSH_R$	Voltage / Phase / Enclosure	Model	
90 US g.p.m.	40 US g.p.m.	108 ft	101 ft	6 ft	208-230V 3PH TEFC	9SH2H52D0	1

Submittal Prepared for: _____ Job: _____
Engineer: _____ Contractor: _____
Submittal Prepared by: _____ Company: _____
Submittal Date: 2019-05-20 Approved by: _____ Date: _____

Engineering Data

Pump Code: 9SH2H52D0
Pump Size: 1 x 2 - 6
Pump Max Horsepower: 3.0898 hp
Pump Horsepower at Rating Point: 2.38 hp
Pump Shut Off Head: 108 ft
Motor Speed: 3450 rpm
Max. Temperature: 212 °F
Liquid: Water, pure
Motor Code: C09742
System Input Power: 3~ 208 V
Motor Rated Horsepower: 3.00 hp
Max. Frequency:60
Electrical Enclosures:TEFC
Motor Standard: NEMA
Suction Flange Standard: ANSI
Suction Flange Rating: Class 150
Suction Size: 2" 316SS
Discharge Flange Standard:ANSI
Discharge Flange Rating: Class 150
Discharge:1" 316SS
Approximate Net Weight: 56 lb
Impeller Size: $5^3/_8$"
Impeller Construction: Closed
Impeller Type: Radial impeller
Impeller Material:
316L Stainless Steel
Sense of Rotation: Clockwise from the drive end
Shaft Seal: Carbon/Sil-Carbide/Viton

Standard Equipment / Capability:

Close coupled or frame mounted end suction pump.
All liquid handling components of AISI 316L statinless steel.
Flanged connections to mate with standard ANSI 150 lb raised face flange.
Discharge is top centerline for piping flexibility.
Close coupled version uses standard NEMA JM frame motors.
Frame mounted version uses standard NEMA T frame motors.
Uses standard John Crane Type 21 mechanical seal.
Maximum working pressures to 230 PSI
Maximum temperatures to 250 F
Enclosed impeller with replaceable wear ring for high efficiency and long pump life.

GOULDS WATER TECHNOLOGY
a xylem brand

Performance Data

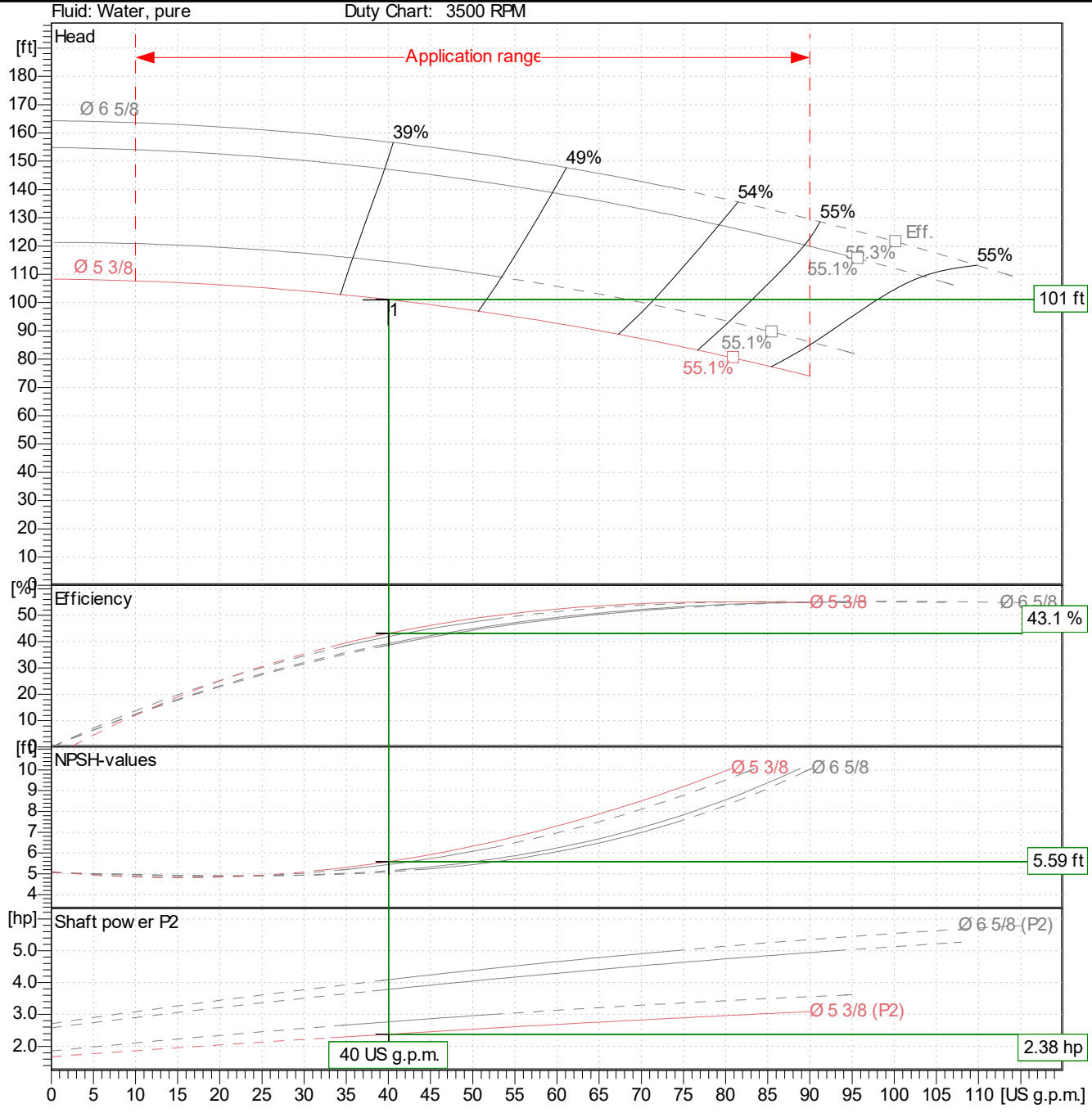
SSH Close Coupled
End Suction Stainless Steel Pumps

MODEL : 9SH2H52D0

Hydraulic Data					Motor Data	SSH S Group	Qty.
Maximum Flow	Flow at Duty Point	Maximum TDH	TDH at Duty Point	$NPSH_R$	Voltage / Phase / Enclosure	Model	
90 US g.p.m.	40 US g.p.m.	108 ft	101 ft	6 ft	208-230V 3PH TEFC	9SH2H52D0	1

Submittal Prepared for: _____ Job: _____
Engineer: _____ Contractor: _____
Submittal Prepared by: _____ Company: _____
Submittal Date: 2019-05-20 Approved by: _____ Date: _____

Fluid: Water, pure Duty Chart: 3500 RPM



Printed from data file
2019-05-20

GOULDS WATER TECHNOLOGY
a xylem brand

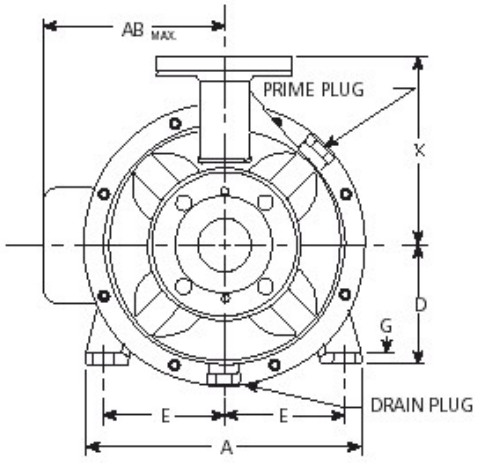
Unit Dimensions

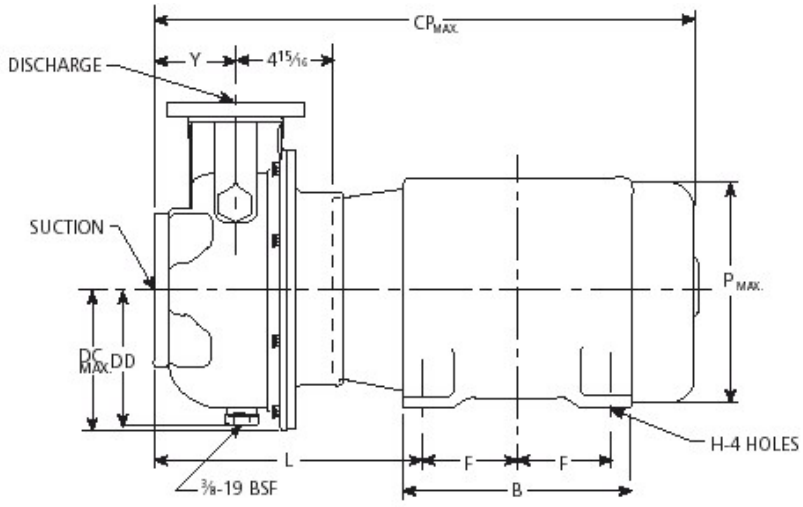
SSH Close Coupled
End Suction Stainless Steel Pumps

MODEL : 9SH2H52D0

Hydraulic Data					Motor Data	SSH S Group	Qty.
Maximum Flow	Flow at Duty Point	Maximum TDH	TDH at Duty Point	$NPSH_R$	Voltage / Phase / Enclosure	Model	
90 US g.p.m.	40 US g.p.m.	108 ft	101 ft	6 ft	208-230V 3PH TEFC	9SH2H52D0	1

Submittal Prepared for: _____ Job: _____
Engineer: _____ Contractor: _____
Submittal Prepared by: _____ Company: _____
Submittal Date: 2019-05-20 Approved by: _____ Date: _____





Dimension	Value	Dimension	Value
A	6 1/2	L	10 1/2
AB	6 7/8	P max	7 7/8
B	6 1/2	X	6 3/8
CP max	13 1/2	Y	3 1/8
D	4 1/2	Z	3 7/8
DC	5		
DD	4 3/4		
E	3 3/4		
F	2 1/4		
G	3/16		
H	7/16		

Product data sheet
Characteristics

ATV630U40M3
variable speed drive ATV630 - 4kW/5HP - 200...240V - IP21/UL type 1

Product availability : Stock - Normally stocked in distribution facility

Price* : 1,513.00 USD

Main

Range of product	Altivar Process ATV600
Product or component type	Variable speed drive
Product specific application	Process and utilities
Device short name	ATV630
Variant	Standard version
Product destination	Asynchronous motors Synchronous motors
Mounting mode	Wall mount
EMC filter	Without EMC filter
IP degree of protection	IP21 conforming to IEC 61800-5-1 IP21 conforming to IEC 60529
Degree of protection	UL type 1 UL 508C
Type of cooling	Forced convection
Supply frequency	50...60 Hz - 5...5 %
Network number of phases	3 phases
[Us] rated supply voltage	200...240 V - 15...10 %
Motor power kW	4 kW normal duty 3 kW heavy duty
Motor power hp	5 hp normal duty 4 hp heavy duty
Line current	15.1 A 200 V normal duty 12.9 A 240 V normal duty 11.7 A 200 V heavy duty 10.2 A 240 V heavy duty
Prospective line Isc	50 kA
Apparent power	5.4 kVA 240 V normal duty 4.2 kVA 240 V heavy duty
Continuous output current	18.7 A 4 kHz normal duty 13.7 A 4 kHz heavy duty

Disclaimer: This documentation is not intended as a substitute for and is not to be used for determining suitability or reliability of these products for specific user applications

Maximum transient current	20.6 A 60 s normal duty 20.6 A 60 s heavy duty
Asynchronous motor control profile	Constant torque standard Variable torque standard Optimized torque mode
Synchronous motor control profile	Permanent magnet motor Synchronous reluctance motor
Speed drive output frequency	0.1...599 Hz
Output frequency	0.0001...0.5 kHz
Nominal switching frequency	4 kHz
Switching frequency	2...12 kHz adjustable 4...12 kHz with derating factor
Safety function	STO (safe torque off) SIL 3
Discrete input logic	16 preset speeds
Communication port protocol	Ethernet Modbus serial Modbus TCP
Option card	Communication module Profibus DP V1 slot A Communication module Profinet slot A Communication module DeviceNet slot A Communication module Modbus TCP/EtherNet/IP slot A Communication module CANopen daisy chain RJ45 slot A Communication module CANopen SUB-D 9 slot A Communication module CANopen screw terminals slot A Digital and analog I/O extension module slot A/slot B Output relay extension module slot A/slot B Communication module Ethernet IP/Modbus TCP/MD-Link slot A Communication module BACnet MS/TP Communication module Ethernet Powerlink

Complementary

Output voltage	<= power supply voltage
Permissible temporary current boost	1.1 x In 60 s normal duty 1.5 x In 60 s heavy duty
Motor slip compensation	Adjustable Automatic whatever the load Can be suppressed Not available in permanent magnet motor law
Acceleration and deceleration ramps	Linear adjustable separately from 0.01...9999 s
Braking to standstill	By DC injection
Protection type	Safe torque off motor Motor phase break motor Safe torque off drive Overheating drive Short-circuit protection drive Motor phase break drive Overspeed drive Break on the control circuit drive Overvoltages on the DC bus drive Overload of output voltage drive Line supply overvoltage drive Line supply phase loss drive Line supply undervoltage drive Overcurrent between output phases and earth drive Thermal protection motor Thermal protection drive
Frequency resolution	Display unit Analog input
Electrical connection	Removable screw terminals 0.5...1.5 mm² AWG 20...AWG 16 control Screw terminal 6 mm² AWG 10 motor Screw terminal 4...6 mm² AWG 12...AWG10 line side
Connector type	RJ45 Ethernet/Modbus TCP on the remote graphic terminal RJ45 Modbus serial on the remote graphic terminal
Physical interface	2-wire RS 485 Modbus serial
Transmission frame	RTU Modbus serial

Transmission rate	10/100 Mbit/s Ethernet IP/Modbus TCP 4.8, 9.6, 19.2, 38.4 kbit/s Modbus serial
Exchange mode	Half duplex, full duplex, autonegotiation Ethernet/Modbus TCP
Data format	8 bits, configurable odd, even or no parity Modbus serial
Type of polarization	No impedance Modbus serial
Number of addresses	1...247 Modbus serial
Method of access	Slave Modbus TCP
Supply	Internal supply for reference potentiometer (1 to 10 kOhm) 10.5 V DC +/- 5 % <= 10 mA overload and short-circuit protection External supply for digital inputs 24 V DC 19...30 V <= 1.25 mA overload and short-circuit protection Internal supply for digital inputs and STO 24 V DC 21...27 V <= 200 mA overload and short-circuit protection
Local signalling	3 LEDs local diagnostic 3 LEDs dual colour embedded communication status 4 LEDs dual colour communication module status 1 LED red presence of voltage
Width	5.67 in (144 mm)
Height	13.78 in (350 mm)
Depth	7.99 in (203 mm)
Product weight	10.14 lb(US) (4.6 kg)
Analogue input number	3
Analogue input type	Software-configurable voltage AI1, AI2, AI3 0...10 V DC 30 kOhm 12 bits Software-configurable current AI1, AI2, AI3 0...20 mA/4...20 mA 250 Ohm 12 bits
Discrete input number	8
Discrete input type	Programmable DI1...DI6 24 V DC 3.5 kOhm Programmable as pulse input DI5, DI6 0...30 kHz 24 V DC Safe torque off STOA, STOB 24 V DC > 2.2 kOhm
Input compatibility	Level 1 PLC EN/IEC 61131-2 DI1...DI6 discrete input Level 1 PLC IEC 65A-68 DI5, DI6 discrete input Level 1 PLC EN/IEC 61131-2 STOA, STOB discrete input
Discrete input logic	Positive logic (source) DI1...DI6 < 5 V > 11 V Negative logic (sink) DI1...DI6 > 16 V < 10 V Positive logic (source) DI5, DI6 < 0.6 V > 2.5 V Positive logic (source) STOA, STOB < 5 V > 11 V
Analogue output number	2
Analogue output type	Software-configurable voltage AO1, AO2 0...10 V DC 470 Ohm 10 bits Software-configurable current AO1, AO2 0...20 mA 10 bits
Sampling duration	2 ms +/- 0.5 ms DI1...DI4 discrete input 5 ms +/- 1 ms DI5, DI6 discrete input 5 ms +/- 0.1 ms AI1, AI2, AI3 analog input 10 ms +/- 1 ms AO1 analog output
Accuracy	+/- 0.6 % AI1, AI2, AI3 for a temperature variation 60 °C analog input +/- 1 % AO1, AO2 for a temperature variation 60 °C analog output
Linearity error	+/- 0.15 % of maximum value analog input AI1, AI2, AI3 +/- 0.2 % analog output AO1, AO2
Relay output number	3
Relay output type	Configurable relay logic R1 fault relay NO/NC 100000 cycles Configurable relay logic R2 sequence relay NO 100000 cycles Configurable relay logic R3 sequence relay NO 100000 cycles
Refresh time	5 ms +/- 0.5 ms R1, R2, R3 relay output
Minimum switching current	5 mA 24 V DC R1, R2, R3 relay output
Maximum switching current	3 A 250 V AC resistive 1 R1, R2, R3 relay output 3 A 30 V DC resistive 1 R1, R2, R3 relay output 2 A 250 V AC inductive 0.4 7 ms R1, R2, R3 relay output 2 A 30 V DC inductive 0.4 7 ms R1, R2, R3 relay output
Isolation	Between power and control terminals
Specific application	Utility
IP degree of protection	IP21
Variable speed drive application selection	Building - HVAC compressor centrifugal Food and beverage processing other application Mining mineral and metal fan Mining mineral and metal pump

	Oil and gas fan Water and waste water other application Building - HVAC screw compressor Food and beverage processing pump Food and beverage processing fan Food and beverage processing atomization Oil and gas electro submersible pump (ESP) Oil and gas water injection pump Oil and gas jet fuel pump Oil and gas compressor for refinery Water and waste water centrifuge pump Water and waste water positive displacement pump Water and waste water electro submersible pump (ESP) Water and waste water screw pump Water and waste water lobe compressor Water and waste water screw compressor Water and waste water compressor centrifugal Water and waste water fan Water and waste water conveyor Water and waste water mixer
Motor power range AC-3	4...6 kW 200...240 V 3 phases
Motor starter type	Variable speed drive

Environment

Insulation resistance	> 1 MOhm 500 V DC for 1 minute to earth
Noise level	54.5 dB 86/188/EEC
Power dissipation in W	38 W natural convection 200 V 4 kHz 141 W forced convection 200 V 4 kHz
Volume of cooling air	10038.72 Gal/hr(US) (38 m3/h)
Operating position	Vertical +/- 10 degree
THDI	<= 48 % full load IEC 61000-3-12
Electromagnetic compatibility	Conducted radio-frequency immunity test level 3 IEC 61000-4-6 1.2/50 µs - 8/20 µs surge immunity test level 3 IEC 61000-4-5 Electrical fast transient/burst immunity test level 4 IEC 61000-4-4 Electrostatic discharge immunity test level 3 IEC 61000-4-2 Radiated radio-frequency electromagnetic field immunity test level 3 IEC 61000-4-3
Pollution degree	2 EN/IEC 61800-5-1
Vibration resistance	1.5 mm peak to peak 2...13 Hz IEC 60068-2-6 1 gn 13...200 Hz IEC 60068-2-6
Shock resistance	15 gn 11 ms IEC 60068-2-27
Relative humidity	5...95 % without condensation IEC 60068-2-3
Ambient air temperature for operation	5...122 °F (-15...50 °C) without derating 122...140 °F (50...60 °C) with derating factor
Ambient air temperature for storage	-40...158 °F (-40...70 °C)
Operating altitude	1000...4800 m with current derating 1 % per 100 m <= 3280.84 ft (1000 m) without derating
Environmental characteristic	Chemical pollution resistance class 3C3 EN/IEC 60721-3-3 Dust pollution resistance class 3S3 EN/IEC 60721-3-3
Standards	EN/IEC 61800-3 EN/IEC 61800-3 environment 1 category C2 EN/IEC 61800-3 environment 2 category C3 UL 508C EN/IEC 61800-5-1 IEC 61000-3-12 IEC 60721-3 IEC 61508 IEC 13849-1
Product certifications	ATEX INERIS ATEX zone 2/22 CSA TÜV UL REACH DNV-GL
Marking	CE

Ordering and shipping details

Category	22205 - ATV630 FRAMES 1 & 2
Discount Schedule	CP4E
GTIN	00785901968580
Nbr. of units in pkg.	1
Package weight(Lbs)	13.460000000000001
Returnability	Y
Country of origin	ID

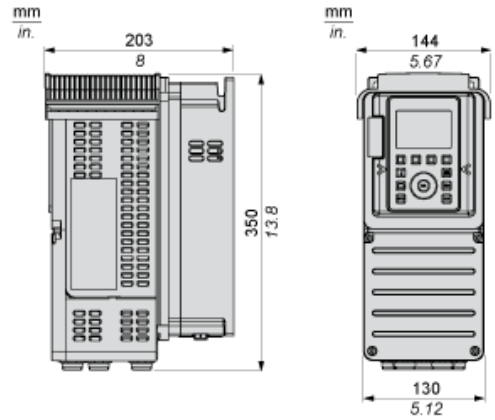
Offer Sustainability

Sustainable offer status	Green Premium product
RoHS (date code: YYWW)	Compliant - since 1444 - Schneider Electric declaration of conformity Schneider Electric declaration of conformity
REACh	Reference not containing SVHC above the threshold Reference not containing SVHC above the threshold
Product environmental profile	Available Product Environmental Profile
Product end of life instructions	Available End of Life Information
California proposition 65	WARNING: This product can expose you to chemicals including:
- - - - - - - Substance 1	Lead and lead compounds, which is known to the State of California to cause cancer and birth defects or other reproductive harm.
- - - - - - - Substance 2	Bisphenol A (BPA), which is known to the State of California to cause birth defects or other reproductive harm.
- - - - - - - More information	For more information go to www.p65warnings.ca.gov

Dimensions

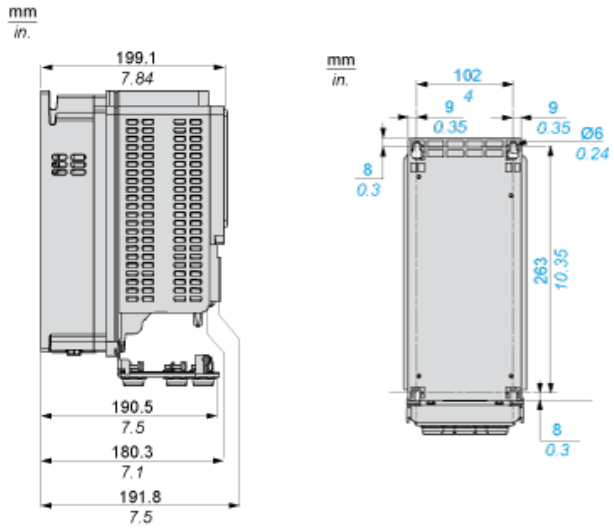
Drives with IP21 Top Cover

Right and Front Views

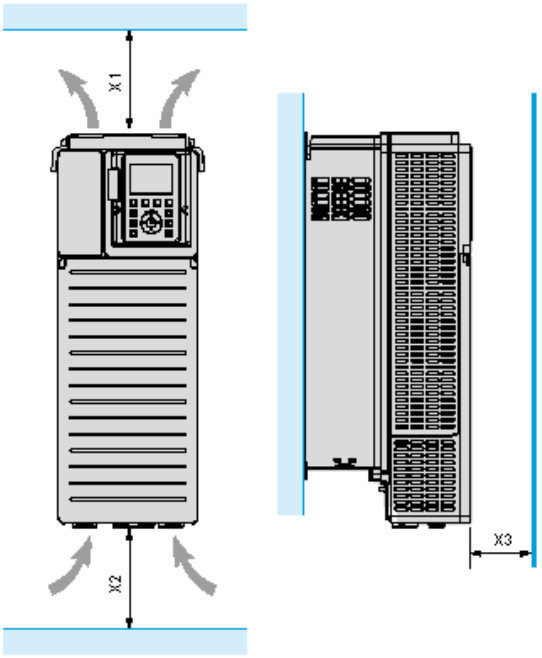


Drives Without IP21 Top Cover

Left and Rear Views



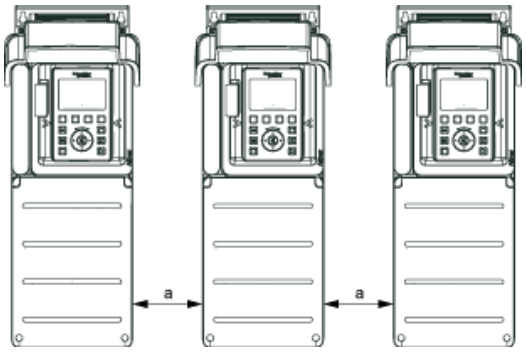
Clearances



X1	X2	X3
≥ 100 mm (3.94 in.)	≥ 100 mm (3.94 in.)	≥ 10 mm (0.39 in.)

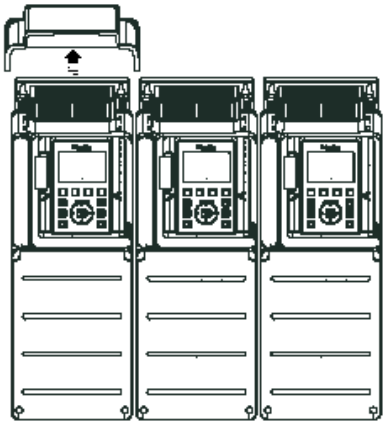
Mounting Types

Mounting Type A: Individual IP21

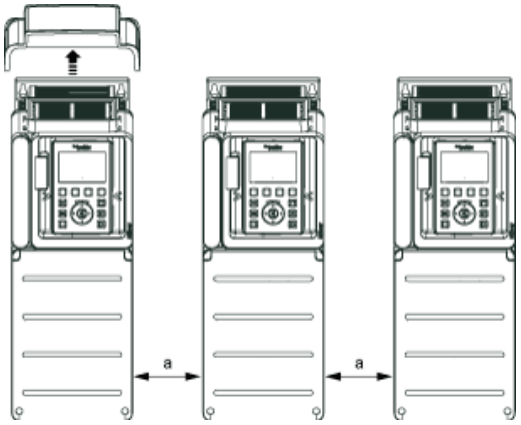


a ≥ 100 mm (3.94 in.)

Mounting Type B: Side by Side IP20



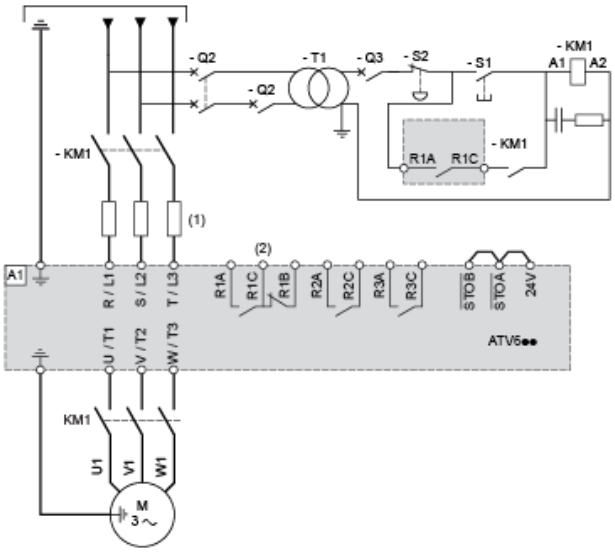
Mounting Type C: Individual IP20



a ≥ 0

Three-Phase Power Supply with Upstream Breaking via Line Contactor

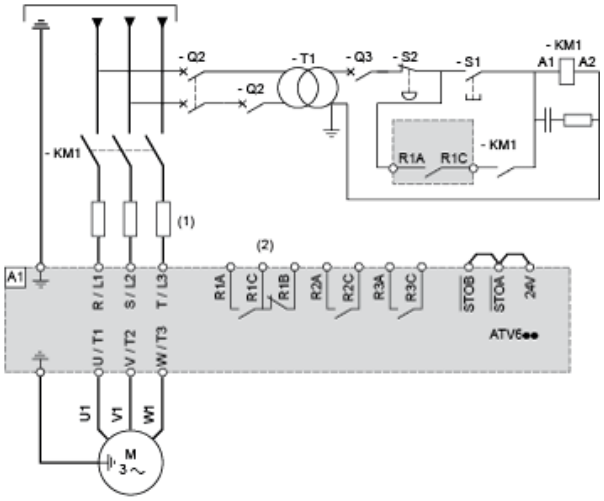
Connection diagrams conforming to standards EN 954-1 category 1 and IEC/EN 61508 capacity SIL1, stopping category 0 in accordance with standard IEC/EI



(1) Line choke if used
(2) Use relay R1 set to operating state Fault to switch Off the product once an error is detected.
A1 : Drive
KM1 : Line Contactor
Q2, Q3 : Circuit breakers
S1, S2 : Pushbuttons
T1 : Transformer for control part

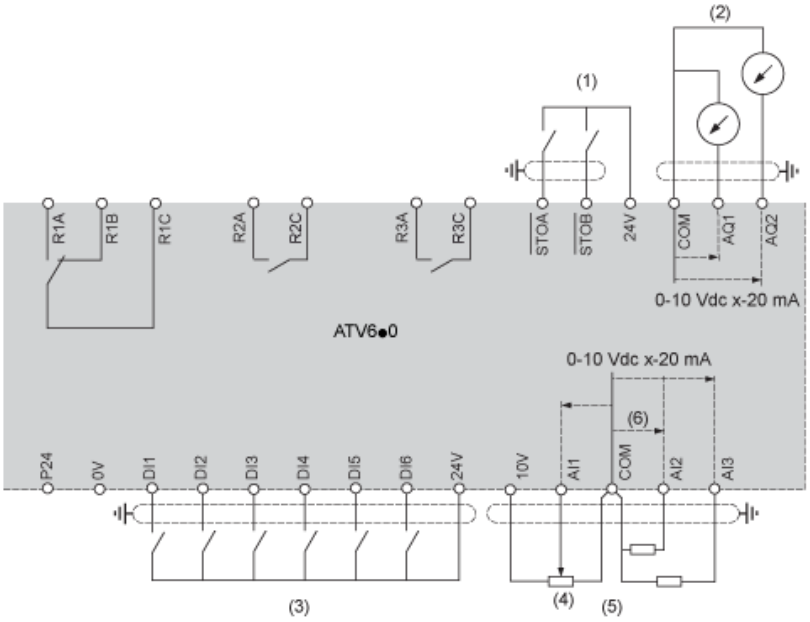
Three-Phase Power Supply with Downstream Breaking via Contactor

Connection diagrams conforming to standards EN 954-1 category 1 and IEC/EN 61508 capacity SIL1, stopping category 0 in accordance with standard IEC/EN 6



(1) Line choke if used
(2) Use relay R1 set to operating state Fault to switch Off the product once an error is detected.
A1 : Drive
KM1 : Contactor

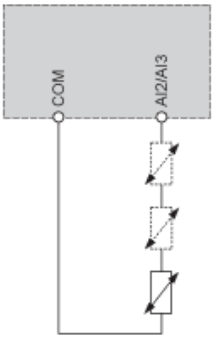
Control Block Wiring Diagram



(1) Safe Torque Off
(2) Analog Output
(3) Digital Input
(4) Reference potentiometer
(5) Analog Input
R1A, R1B, R1C Fault relay
R2A, R2C Sequence relay
R3A, R3C Sequence relay

Sensor Connection

It is possible to connect either 1 or 3 sensors on terminals AI2 or AI3.

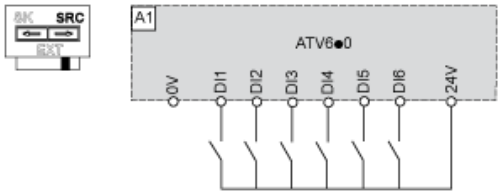


Sink / Source Switch Configuration

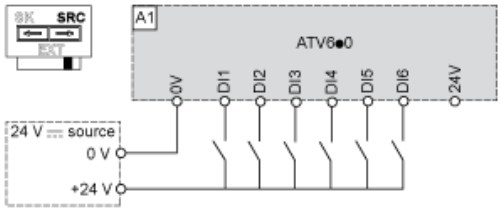
The switch is used to adapt the operation of the logic inputs to the technology of the programmable controller outputs.

- Set the switch to Source (factory setting) if using PLC outputs with PNP transistors.
- Set the switch to Ext if using PLC outputs with NPN transistors.

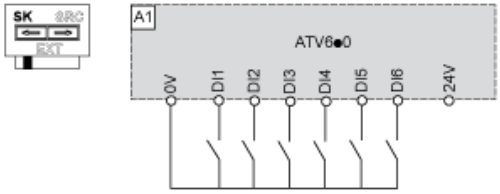
Switch Set to SRC (Source) Position Using the Output Power Supply for the Digital Inputs



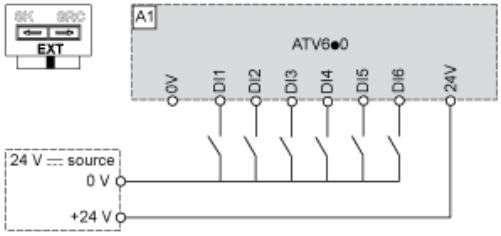
Switch Set to SRC (Source) Position and Use of an External Power Supply for the DIs



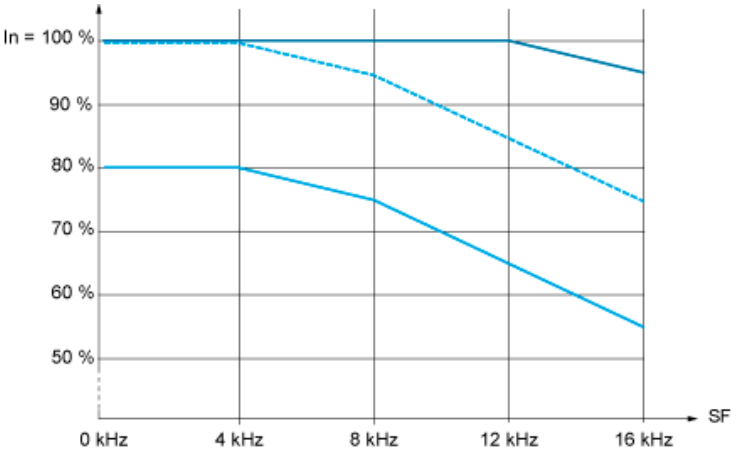
Switch Set to SK (Sink) Position Using the Output Power Supply for the Digital Inputs



Switch Set to EXT Position Using an External Power Supply for the DIs



Derating Curves



40 °C (104 °F) - Mounting type A, B and C
50 °C (122 °F) - Mounting type A, B and C
60 °C (140 °F) - Mounting type B and C
In : Nominal Drive Current
SF : Switching Frequency

Surge protection device - TT-2-PE-M-24DC - 2920641

Please be informed that the data shown in this PDF Document is generated from our Online Catalog. Please find the complete data in the user's documentation. Our General Terms of Use for Downloads are valid (http://download.phoenixcontact.com)

Modular terminal block with two-stage surge protection for one operated floating double conductor, disconnect knife on both signal paths, separate ground connection, nominal voltage: 24 V DC.

Why buy this product

- Versions with and without disconnect knife
- Protection of a floating double wire
- Protection of two signal wires with common reference potential
- Multi-stage modular terminal blocks with screw connection technology
- Disconnection of signal circuits by disconnect knife

Key commercial data

Packing unit	0
Minimum order quantity	1
Catalog page	Page 106 (TT-2011)
GTIN	4 046356 160193
Custom tariff number	85363010
Country of origin	GERMANY

Technical data

General

Housing material	PA 6.6
Inflammability class according to UL 94	V2
Color	black
Total surge current (8/20) µs	10 kA
Total surge current (10/350) µs	1 kA
Ambient temperature (operation)	-40 °C ... 80 °C
Mounting type	DIN rail: 35 mm
Design	Double-level terminal block with PE foot – separate PE connection
Number of positions	2
Degree of protection	IP20
Direction of action	Line-Line & Line-Earth Ground

Surge protection device - TT-2-PE-M-24DC - 2920641

Technical data

General

Width	6.2 mm
Height	92 mm
Depth	66.45 mm

Protective circuit

IEC category	C1
IEC category	C2
IEC category	C3
IEC category	D1
Nominal voltage UN	24 V DC
Nominal voltage UN	17 V AC
Maximum continuous operating voltage UC	30 V DC
Maximum continuous operating voltage UC	21 V AC
Maximum continuous voltage UC (wire-wire)	30 V DC
Maximum continuous voltage UC (wire-wire)	21 V AC
Nominal current IN	300 mA (40°C)
Operating effective current IC at UC	≤ 5 µA
Ground conductor current IPE	≤ 2 µA
Nominal discharge surge current In (8/20) µs (Core-Core)	5 kA
Nominal discharge surge current In (8/20) µs (Core-Earth)	5 kA
Total surge current (8/20) µs	10 kA
Max. discharge surge current Imax (8/20) µs maximum (Core-Core)	5 kA
Max. discharge surge current Imax (8/20) µs maximum (Core-Earth)	5 kA (per path)
Nominal pulse current Ian (10/1000) µs (Core-Core)	30 A
Nominal pulse current Ian (10/1000) µs (Core-Earth)	100 A (per path)
Lightning test current (10/350) µs, peak value limp	500 A (per path)
Output voltage limitation at 1 kV/µs (Core-Core) spike	≤ 45 V
Output voltage limitation at 1 kV/µs (Core-Earth) spike	≤ 650 V
Output voltage limitation at 1 kV/µs (Core-Core) static	≤ 45 V
Output voltage limitation at 1 kV/µs (Core-Earth) static	≤ 650 V
Residual voltage at In, (conductor-conductor)	≤ 45 V
Residual voltage with Ian (10/1000)µs (conductor-conductor)	≤ 50 V
Protection level UP (Core-Core)	≤ 55 V (C2 (10 kV/5 kA))
Protection level UP (Core-Core)	≤ 53 V (C1 (500 V/250 A))
Response time tA (Core-Core)	≤ 1 ns
Response time tA (Core-Earth)	≤ 100 ns
Input attenuation aE, sym.	0.6 dB (≤ 500 kHz / 50 Ω)
Input attenuation aE, sym.	0.2 dB (≤ 200 kHz / 150 Ω)
Cut-off frequency fg (3 dB), sym. in 50 Ohm system	Typ. 6 MHz
Cut-off frequency fg (3 dB), sym. in 150 Ohm system	Typ. 2 MHz
Capacity (Core-Core)	Typ. 2.5 nF
Resistance in series	3.3 Ω 20 %

Surge protection device - TT-2-PE-M-24DC - 2920641

Technical data

Protective circuit

Resistance in series	3.3 Ω
Max. required back-up fuse	315 mA (e.g. T in acc. with IEC 127-2/III)
Surge carrying capacity in acc. with IEC 61643-21 (Core-Core)	C2 (10 kV/5 kA)
Surge carrying capacity in acc. with IEC 61643-21 (Core-Earth)	C2 (10 kV/5 kA)
Surge carrying capacity in acc. with IEC 61643-21 (Core-Earth)	D1 (500 A)
Alternating current carrying capacity in acc. with IEC 61643-21 (Core-Earth)	5 A - 1 s

Connection data

Connection method	Screw connection
Connection type IN	Screw terminal blocks
Connection type OUT	Screw terminal blocks
Screw thread	M3
Tightening torque	0.8 Nm
Stripping length	8 mm
Conductor cross section stranded min.	0.2 mm²
Conductor cross section stranded max.	2.5 mm²
Conductor cross section solid min.	0.2 mm²
Conductor cross section solid max.	2.5 mm²
Conductor cross section AWG/kcmil min.	24
Conductor cross section AWG/kcmil max	14

Connection, protective circuit

Standards/regulations	IEC 61643-21

Classifications

eclass

eCl@ss 4.0	27140201
eCl@ss 4.1	27130801
eCl@ss 5.0	27130801
eCl@ss 5.1	27130801
eCl@ss 6.0	27130807
eCl@ss 7.0	27130807

etim

ETIM 2.0	EC000943
ETIM 3.0	EC000943
ETIM 4.0	EC000943

unspsc

UNSPSC 6.01	30212010
UNSPSC 7.0901	39121610
UNSPSC 11	39121610

Surge protection device - TT-2-PE-M-24DC - 2920641

Classifications

unspsc

UNSPSC 12.01	39121610
UNSPSC 13.2	39121620

Approvals

Approvals

Approvals

GOST

Ex Approvals

Approvals submitted

Approval details

GOST

Accessories

Accessories

Marking

Marker pen - B-STIFT - 1051993

Marker pen, for manual labeling of unprinted Zack strips, smear-proof and waterproof, line thickness 0.5 mm

Zack Marker strip, flat - ZBF 6:UNBEDRUCKT - 0808710

Zack Marker strip, flat, Strip, white, Unlabeled, Can be labeled with: Plotter, Mounting type: Snap into flat marker groove, For terminal block width: 6.2 mm, Lettering field: 5.15 x 6.15 mm

Surge protection device - TT-2-PE-M-24DC - 2920641

Accessories

Zack Marker strip, flat - ZBF 6/WH-100:UNBEDRUCKT - 0808736

Zack Marker strip, flat, Strip, white, Unlabeled, Can be labeled with: Plotter, Mounting type: Snap into flat marker groove, For terminal block width: 6.2 mm, Lettering field: 5.15 x 6.15 mm

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Zack Marker strip, flat - ZBF 6,LGS:FORTL.ZAHLEN - 0808749

Zack Marker strip, flat, Strip, white, Labeled, Printed horizontally: Consecutive numbers 1 - 10, 11 - 20, etc. up to 91 - 100, Mounting type: Snap into flat marker groove, For terminal block width: 6.2 mm, Lettering field: 5.15 x 6.15 mm

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Zack marker strip - ZB 6:UNBEDRUCKT - 1051003

Zack marker strip, Strip, white, Unlabeled, Can be labeled with: Plotter, Mounting type: Snap into tall marker groove, For terminal block width: 6.2 mm, Lettering field: 6.15 x 10.5 mm

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Zack marker strip - ZB 6,LGS:U-N - 1051430

Zack marker strip, Strip, white, Labeled, Can be labeled with: Plotter, Printed horizontally: U, V, W, N, GND, U, V, W, N, GND, Mounting type: Snap into tall marker groove, For terminal block width: 6.2 mm, Lettering field: 6.15 x 10.5 mm

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Zack marker strip - ZB 6,LGS:FORTL.ZAHLEN - 1051016

Zack marker strip, Strip, white, Labeled, Can be labeled with: Plotter, Printed horizontally: Consecutive numbers 1 - 10, 11 - 20, etc. up to 491 - 500, Mounting type: Snap into tall marker groove, For terminal block width: 6.2 mm, Lettering field: 6.15 x 10.5 mm

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Surge protection device - TT-2-PE-M-24DC - 2920641

Accessories

End cover - TT-D-2-PE-M-BK - 2920654

End cover for TERMITRAB TT-2-PE-M-... and TT-2/2-M-...

Additional products

End cover - TT-D-2-PE-M-BK - 2920654

End cover for TERMITRAB TT-2-PE-M-... and TT-2/2-M-...

Shield connection - SSA 3-6 - 2839295

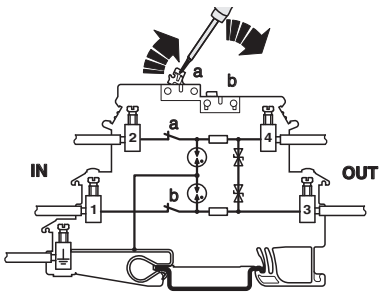
shield fast connections for conductor diameter 3 - 6 mm. Potential connection cable: 200 mm, black

Shield connection - SSA 5-10 - 2839512

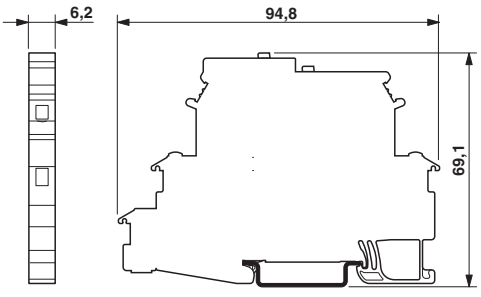
Shield fast connection for conductor diameters 5 - 10 mm. Potential connection cable: 200 mm, black

Drawings

Connection diagram

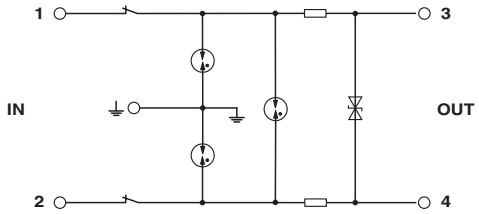


Dimensioned drawing

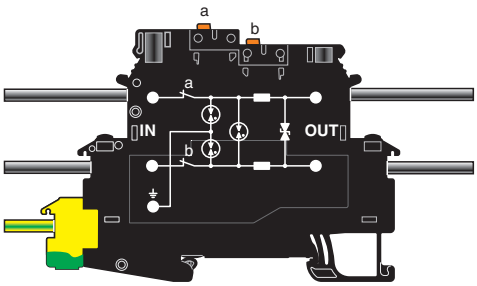


Surge protection device - TT-2-PE-M-24DC - 2920641

Circuit diagram



Schematic diagram



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Signet 2551 Magmeter Flow Sensor

Available in a variety of wetted materials and ideal for pipe sizes up to DN900 (36 in.)

The Signet 2551 Magmeter is an insertion style magnetic flow sensor that features no moving parts. The patented* sensor design is available in corrosion-resistant materials to provide long-term reliability with minimal maintenance costs. Material options include PP with stainless steel, PVDF with Hastelloy-C, or PVDF with Titanium. Utilizing the comprehensive line of Signet installation fittings, sensor alignment and insertion depth is automatic. These versatile, simple-to-install sensors deliver accurate flow measurement over a wide dynamic range in pipe sizes ranging from DN15 to DN900 (½ to 36 inches), satisfying the requirements of many diverse applications.

Signet 2551 Magmeters offer many output options of frequency/digital (S^3L) or 4 to 20 mA which are available on both the blind and display versions. The frequency or digital (S^3L) sensor output can be used with Signet's extensive line of flow instruments while the 4 to 20 mA output can be used for a direct input to PLCs, chart recorders, etc. Both the 4 to 20 mA output and digital (S^3L) sensor interface is available for long distance signal transmission. An additional benefit is the empty pipe detection which features a zero flow output when the sensors are not completely wetted. Also, the frequency output is bi-directional while the 4 to 20 mA output can be set for uni- or bi-directional flow using the display or the 3-0252 Configuration Tool which connects to PCs for programming capabilities.

In addition, the display version of the 2551 Magmeter is available with relays and features permanent and resettable totalizer values, which can be stored and seen on the display. Also, the display contains multi-languages with English, Spanish, German, French, Italian and Portuguese menu options.

Features

- **Test certificate included for -X0, -X1**
- **Patented Magmeter technology***
- **No moving parts**
- **Bi-directional flow**
- **Empty pipe detection**
- **Installs into pipe sizes DN15 to DN900 (0.5 to 36 in.)**
- **Operating range 0.05 to 10 m/s (0.15 to 33 ft/s)**
- **Accurate measurement even in dirty liquids**
- **Polypropylene and PVDF retaining nuts standard, Valox optional**
- **4 to 20 mA, digital (S^3L), frequency, relay output (Display only)**
- **No pressure drop**
- **Corrosion resistant materials; PP or PVDF with SS, Hastelloy-C, or Titanium**
- **Multi-language display menu available**

(3-2551-PX-XX version only)

Applications

- **Chemical Processing**
- **Water and Wastewater Monitoring**
- **Metal Recovery and Landfill Leachate**
- **Commercial Pools, Spas, and Aquariums**
- **HVAC**
- **Irrigation**
- **Scrubber Control**
- **Neutralization Systems**
- **Industrial Water Distribution**

* U.S. Patent No: 7,055,396 B1

Specifications

General			
Operating Range	0.05 to 10 m/s	0.15 to 33 ft/s	
Pipe Size Range	DN15 to DN900	½ in. to 36 in.	
Linearity	± 1% reading plus 0.1% of full scale		
Repeatability	±0.5% of reading @ 25 °C (77 °F)		
Minimum Conductivity	20 µS/cm		
Wetted Materials			
Sensor Body/Electrodes and Grounding Ring	-P0, -P1, -P2: PP/316L SS		
	-T0, -T1, -T2: PVDF/Titanium		
	-V0, -V1, -V2: PVDF/Hastelloy-C		
O-rings	FPM (standard) EPR (EPDM), FFPM (optional)		
Case	PBT		
Display Window	Polyamide (transparent nylon)		
Protection Rating	NEMA 4X/IP65		
Electrical			
Power Requirements	4 to 20 mA	24 VDC ±10%, regulated, 22.1 mA max.	
	Frequency	5 to 24 VDC ±10%, regulated, 15 mA max.	
	Digital (S^3L)	5 to 6.5 VDC, 15 mA max.	
Auxiliary (only required for units with relays)		9 to 24 VDC, 0.4 A max.	
Reverse Polarity and Short Circuit Protected			
Current Output 4 to 20 mA	Loop Accuracy	32 µA max. error (25 °C @ 24 VDC)	
	Isolation	Low voltage < 48 VAC/DC from electrodes and auxiliary power	
	Maximum Cable	300 m (1000 ft)	
	Error condition	22.1 mA	
	Max. Loop Resistance	300 Ω	
	Compatible with PLC, PC or similar equipment		
	4 to 20 mA load needed		
Frequency Output	Output Modes	Freq., or Mirror Relay (display version only)	
	Max. Pull-up Voltage	30 VDC	
	Max. Current Sink	50 mA, current limited	
	Maximum Cable	300 m (1000 ft)	
	Compatible with Signet Model 8550, 8900, 9900, 9900-1BC		
Digital (S^3L) Output	Serial ASCII, TTL level 9600 bps		
	Compatible with Model Signet 8900 controller		
Relay Specifications			
#1, #2 Type	Mechanical SPDT		
Rating	5 A @ 30 VDC max., 5 A @ 250 VDC max.		
#3 Type	Solid State		
	50 mA @ 30 VDC, 50 mA @ 42 VAC		
Hysteresis	User adjustable for exiting alarm condition		
Alarm On Trigger Delay	Adjustable (0 to 9999.9 sec.)		
Relay Modes	Off, Low, High, Window, and Proportional Pulse		
Relay Source	Flow Rate, Resettable Totalizer		
Error Condition	Selectable; Fail Open or Closed		
Display			
Characters		2 x 16	
Contrast		User-set in four levels	
Backlighting (only on relay versions)		Requires external 9-24 VDC, 0.4 mA max.	
Max. Temperature/Pressure Rating			
Storage Temperature		-20 °C to 70 °C	-4 °F to 158 °F
Relative Humidity		0 to 95% (non-condensing)	
Operating Temperature	Ambient	-10 °C to 70 °C	14 °F to 158 °F
	Media	0 °C to 85 °C	32 °F to 185 °F
Maximum Operating Pressure		10.3 bar @ 25 °C	150 psi @ 77 °F
		1.4 bar @ 85 °C	20 psi @ 185 °F
Shipping Weight			
	0.680 kg	1.50 lb	
Standards and Approvals			
	CE, FCC, UL, CUL, NSF (3-2551-PX-XX version only)		
	RoHS compliant, China RoHS		
	NEMA 4X / IP65 Enclosure (with cap installed)		
	Manufactured under ISO 9001 for Quality and ISO 14001 for Environmental Management and OHSAS 18001 for Occupational Health and Safety		

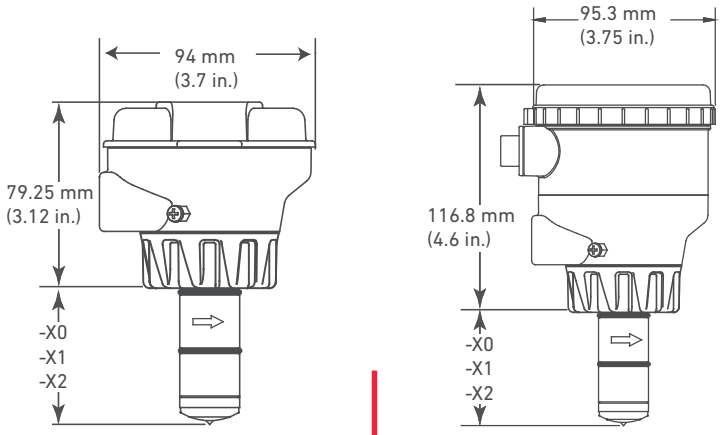
See Temperature and Pressure graphs for more information.

Dimensions

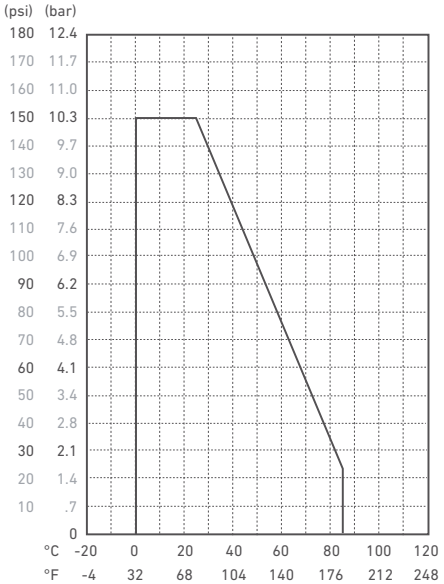
Pipe Range	
1/2 to 4 in.	-X0 = 58 mm (2.3 in.)
5 to 8 in.	-X1 = 91 mm (3.6 in.)
10 to 36 in.	-X2 = 167 mm (6.6 in.)

X = Sensor Body P, T, or V

Blind version → **Display version**



Temperature/Pressure Graphs



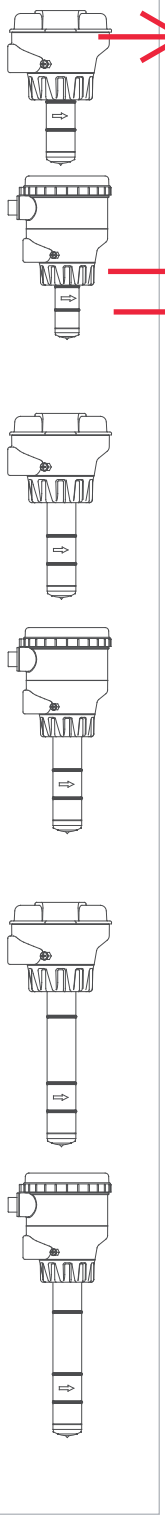
Note:
The pressure/temperature graphs are specifically for the Signet sensor. During system design the specifications of all components must be considered. In the case of a metal piping system, a plastic sensor will reduce the system specification. When using a PVDF sensor in a PVC piping system, the fitting will reduce the system specification.

Application Tips

- Note minimum process liquid conductivity requirement is 20 µs/cm
- Install sensor using standard Signet installation fittings for best results.
- Sensor is capable of retrofitting into existing 515 and 2536 fittings.

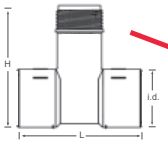
Please refer to Wiring, Installation, and Accessories sections for more information.

Ordering Information (continued)



Pipe Size	Mfr. Part No.	Code	Sensor Body
4 to 20 mA output for use with PLC, PC or similar equipment			
DN15 to DN100 (½ to 4 in.)			
No Display			
	3-2551-P0-12	**159 001 110**	Polypropylene and 316L SS
	3-2551-T0-12	**159 001 113**	PVDF and Titanium
	3-2551-V0-12	**159 001 259**	PVDF and Hastelloy-C
with Display, two SPDT relays, one solid state relay			
	3-2551-P0-22	**159 001 273**	Polypropylene and 316L SS
	3-2551-T0-22	**159 001 439**	PVDF and Titanium
	3-2551-V0-22	**159 001 275**	PVDF and Hastelloy-C
with Display			
	3-2551-P0-42	**159 001 279**	Polypropylene and 316L SS
	3-2551-T0-42	**159 001 442**	PVDF and Titanium
	3-2551-V0-42	**159 001 281**	PVDF and Hastelloy-C
DN125 to DN200 (5 to 8 in.)			
No Display			
	3-2551-P1-12	**159 001 111**	Polypropylene and 316L SS
	3-2551-T1-12	**159 001 114**	PVDF and Titanium
	3-2551-V1-12	**159 001 260**	PVDF and Hastelloy-C
with Display, two SPDT relays, one solid state relay			
	3-2551-P1-22	**159 001 274**	Polypropylene and 316L SS
	3-2551-T1-22	**159 001 440**	PVDF and Titanium
	3-2551-V1-22	**159 001 276**	PVDF and Hastelloy-C
with Display			
	3-2551-P1-42	**159 001 280**	Polypropylene and 316L SS
	3-2551-T1-42	**159 001 443**	PVDF and Titanium
	3-2551-V1-42	**159 001 282**	PVDF and Hastelloy-C
DN250 to DN900 (10 to 36 in.)			
No Display			
	3-2551-P2-12	**159 001 112**	Polypropylene and 316L SS
	3-2551-T2-12	**159 001 449**	PVDF and Titanium
	3-2551-V2-12	**159 001 451**	PVDF and Hastelloy-C
with Display, two SPDT relays, one solid state relay			
	3-2551-P2-22	**159 001 438**	Polypropylene and 316L SS
	3-2551-T2-22	**159 001 455**	PVDF and Titanium
	3-2551-V2-22	**159 001 457**	PVDF and Hastelloy-C
with Display			
	3-2551-P2-42	**159 001 441**	Polypropylene and 316L SS
	3-2551-T2-42	**159 001 461**	PVDF and Titanium
	3-2551-V2-42	**159 001 463**	PVDF and Hastelloy-C

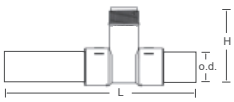
Installation Fittings



PVC-U Tees SCH 80 - Fitting Only (Available in USA/ASIA)

Part No.	Code No.	Size [in.]	Sensor Type - Flow, pH/ORP	L [in.]	H [in.]	i.d. [in.]
MPV8T005F	159 001 614	0.50	Flow -X0, pH -XX	3.75	3.50	0.85
MPV8T007F	159 001 615	0.75	Flow -X0, pH -XX	3.75	3.70	1.06
MPV8T010F	159 001 616	1.00	Flow -X0, pH -XX	4.30	4.00	1.33
MPV8T012F	159 001 617	1.25	Flow -X0, pH -XX	4.40	4.30	1.67
MPV8T015F	159 001 618	1.50	Flow -X0, pH -XX	5.00	4.60	1.91
MPV8T020F	159 001 619	2.00	Flow -X0, pH -XX	5.50	5.00	2.40

- For use with Flow: ~~P51530-X0, 3-2536-X0, 3-8510-X0, 3-8512-X0, 3-2537-XC-X0,~~ 3-2551-X0-X0-XX
- For use with pH/ORP: 3-272X-XX, 3-273X-XX
- NSF



PVC-U Tees SCH 80 - with Pipe[1] (Available in USA/ASIA)

Part No.	Code No.	Size [in.]	Sensor Type - Flow, pH/ORP	L [in.]	H [in.]	o.d. [in.]
MPV8T005	159 001 623	0.50	Flow -X0, pH -XX	14	3.50	0.84
MPV8T007	159 001 624	0.75	Flow -X0, pH -XX	14	3.70	1.05
MPV8T010	159 001 625	1.00	Flow -X0, pH -XX	17	4.00	1.32
MPV8T012	159 001 626	1.25	Flow -X0, pH -XX	20	4.30	1.66
MPV8T015	159 001 627	1.50	Flow -X0, pH -XX	24	4.60	1.90
MPV8T020	159 001 628	2.00	Flow -X0, pH -XX	26.5	5.02	2.38

- For use with Flow: P51530-X0, 3-2536-X0, 3-8510-X0, 3-8512-X0, 3-2537-XC-X0, 3-2551-X0-X0-XX
- For use with pH/ORP: 3-272X-XX, 3-273X-XX

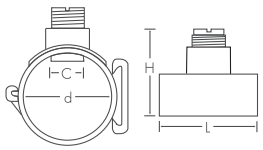
[1] Pipe lengths included with these fittings do not satisfy straight-run requirements for all installation configurations.

PVC-U Tees SCH 80 - with Pipe[1] (Available in USA/ASIA)

Part No.	Code No.	Size [in.]	Sensor Type - Flow, pH/ORP	L [in.]	H [in.]	o.d. [in.]
PV8T025	198 801 573	2.50	Flow -X0, pH -XX	24	5.4	2.88
PV8T030	198 801 416	3.00	Flow -X0, pH -XX	24	6.0	3.50
PV8T040	198 801 436	4.00	Flow -X0, pH -XX	24	7.0	4.50

- For use with Flow: P51530-X0, 3-2536-X0, 3-8510-X0, 3-8512-X0, 3-2537-XC-X0, 3-2551-X0-X0-XX
- For use with pH/ORP: 3-272X-XX, 3-273X-XX

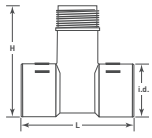
[1] Pipe lengths included with these fittings do not satisfy straight-run requirements for all installation configurations.



PVC-U Clamp-on Saddles SCH 80 (Available in USA/ASIA)

Part No.	Code No.	Size [in.]	Sensor Type - Flow, pH/ORP	L [in.]	H [in.]	d [in.]	C [in.]
PV8S020	159 000 637	2.00	Flow -X0, pH -XX	4.00	5.0	2.375	1.43
PV8S025	159 000 638	2.50	Flow -X0, pH -XX	4.75	5.4	2.875	1.43
PV8S030	198 150 577	3.00	Flow -X0, pH -XX	5.00	6.0	3.500	1.43
PV8S040	198 150 578	4.00	Flow -X0	5.00	7.1	4.500	1.43
PV8S060	198 150 579	6.00	Flow -X1	5.00	10.0	6.625	2.25
PV8S080	159 000 639	8.00	Flow -X1	5.00	11.5	8.625	2.25

- For use with Flow: P51530-X0/-X1, 3-2536-X0/-X1, 3-8510-X0/-X1, 3-8512-X0/-X1, 3-2537-XC-X0/-X1, 3-2551-X0-XX/-X1-XX
- For use with pH/ORP: 3-272X-XX, 3-273X-XX
- Mounts on PVC pipe
- C - Clearance dimension
- EPR (EPDM) O-ring
- NSF



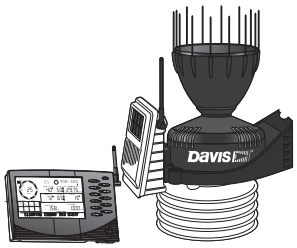
PVC-C Tees SCH 80 - Fitting Only (Available in USA/ASIA)

Part No.	Code No.	Size [in.]	Sensor Type - Flow, pH/ORP	L [in.]	H [in.]	i.d. [in.]
MCPV8T005F	159 001 632	0.50	Flow -X0, pH -XX	3.75	3.50	0.85
MCPV8T007F	159 001 633	0.75	Flow -X0, pH -XX	3.75	3.70	1.06
MCPV8T010F	159 001 634	1.00	Flow -X0, pH -XX	4.30	4.00	1.33
MCPV8T012F	159 001 635	1.25	Flow -X0, pH -XX	4.40	4.30	1.67
MCPV8T015F	159 001 636	1.50	Flow -X0, pH -XX	5.00	4.60	1.91
MCPV8T020F	159 001 637	2.00	Flow -X0, pH -XX	5.50	5.00	2.40

- For use with Flow: P51530-X0, 3-2536-X0, 3-8510-X0, 3-8512-X0, 3-2537-XC-X0, 3-2551-X0-X0-XX
- For use with pH/ORP: 3-272X-XX, 3-273X-XX

Wireless Vantage Pro2™ & Vantage Pro2™ Plus Stations

(Including Fan-Aspirated Models)



6152 6162
6153 6163

WIRELESS VANTAGE PRO2™

Vantage Pro2™ (6152, 6153) and Vantage Pro2 Plus (6162, 6163) Wireless Weather Stations include two components: the Sensor Suite which houses and manages the external sensor array, and the console which provides the user interface, data display, and calculations. The Sensor Suite and Vantage Pro2 console communicate via an FCC-certified, license-free, spread-spectrum frequency-hopping (FHSS) transmitter and receiver. User-selectable transmitter ID codes allow up to eight stations to coexist in the same geographic area. The frequency hopping spread spectrum technology provides greater communication strength over longer distances and areas of weaker reception. The Wireless Vantage Pro2 Plus weather station includes two additional sensors that are optional on the Vantage Pro2: the UV sensor and the solar radiation sensor.

The console may be powered by batteries or by the included AC-power adapter. The wireless Sensor Suite is solar powered with a battery backup. Use WeatherLink Live™ or a WeatherLink® data logger to let your weather station interface with a computer, to log weather data, and to upload weather information to the internet.

The 6152 and 6162 rely on passive shielding to reduce solar-radiation induced temperature errors in the outside temperature sensor readings. The Fan-aspirated 6153 and 6163 combine passive shielding with a solar-powered fan that draws outside air in over the temperature and humidity sensors, providing a much more accurate temperature reading than that available using passive shielding alone.

Sensor Suite

(Includes product numbers: 6152, 6153, 6162, 6163, 6322, 6323, 6327 & 6328)

Operating Temperature	-40° to +150°F (-40° to +65°C)
Non-operating Temperature	-40° to +158°F (-40° to +70°C)
Current Draw (ISS SIM only)	0.14 mA (average), 30 mA (peak) at 4 to 6 VDC
Solar Power Panel	0.5 Watts (ISS SIM), plus 0.75 Watts (Fan-Aspirated)
Battery (ISS SIM /Fan-Aspirated)	CR-123 3-Volt Lithium cell / 2 - 1.2 Volt NiMH C-cells
Battery Life (3-Volt Lithium cell)	8 months without sunlight - greater than 2 years depending on solar charging
Battery Life (NiMH C-cells, Fan-Aspirated)	Up to 2 years
Fan Aspiration Rate (Fan-Aspirated only)	
Intake Flow Rate, full sun	190 feet/min. (0.9 m/s)
Intake Flow Rate, battery only	80 feet/min. (0.4 m/s)
Sensor Chamber Flow Rate, full sun	500 feet/min. (2.5 m/s)
Sensor Chamber Flow Rate, battery only	180 feet/min. (0.9 m/s)
Connectors, Sensor	Modular RJ-11
Cable Type	4-conductor, 26 AWG
Cable Length, Anemometer	40 feet (12 m) (included) 240 feet (73 m) (maximum recommended)

Note: Maximum displayable wind decreases as the length of cable increases. At 140' (42 m) of cable, the maximum wind speed displayed is 135 mph (60 m/s); at 240' (73 m), the maximum wind speed displayed is 100 mph (34 m/s).

Wind Speed Sensor	Solid state magnetic sensor
Wind Direction Sensor	Wind vane with potentiometer
Rain Collector Type	Tipping spoon, 0.01" per tip for US versions, 0.2 mm for metric versions, 33.2 in^2 (214 cm^2) collection area
Temperature Sensor Type	PN Junction Silicon Diode
Relative Humidity Sensor Type	Film capacitor element
Housing Material	UV-resistant ABS, polypropylene

ISS Dimensions (not including anemometer or bird spikes):

Vantage Pro2 with Standard Rad Shield	14.0" x 9.4" x 14.5" (356 mm x 239 mm x 368 mm)
Vantage Pro2 with Fan-Aspirated Rad Shield	20.8" x 9.4" x 16.0" (528 mm x 239 mm x 406 mm)
Vantage Pro2 Plus with Standard Rad Shield	14.3" x 9.7" x 14.5" (363 mm x 246 mm x 368 mm)
Vantage Pro2 Plus with Fan-Aspirated Rad Shield	21.1" x 9.7" x 16.0" (536 mm x 246 mm x 406 mm)

Console

(Includes product number 6312)

Console Operating Temperature	+32° to +140°F (0° to +60°C)
Non-Operating (Storage) Temperature	+14° to +158°F (-10° to +70°C)
Current Draw	0.9 mA average, 30 mA peak, (add 120 mA for display lamps, add 0.125 mA for each optional wireless transmitter received by the console) at 4 - 6 VDC
AC Power Adapter	5 VDC, 300 mA, regulated
Batteries	3 C-cells
Battery Life	up to 9 months
Connectors	Modular RJ-11
Housing Material	UV-resistant ABS plastic
Console Display Type	LCD Transflective
Display Backlight	LEDs
Console Dimensions	
Console with antenna down (L x H x D)	10.625" x 6.125" x 1.625" (270 mm x 156 mm x 41 mm)
Console with antenna extended up (L x H x D)	10.625" x 9.625" x 1.625" (270 mm x 245 mm x 41 mm)
Display (L x H)	5.94" x 3.375" (151 mm x 86 mm)
Weight (with batteries)	1.88 lbs. (.85 kg)

Data Displayed on Console

Data display categories are listed with General first, then in alphabetical order.

General

Historical Data	Includes the past 24 values listed unless otherwise noted; all can be cleared and all totals reset
Daily Data	Includes the earliest time of occurrence of highs and lows; period begins/ends at 12:00 am
Monthly Data	Period begins/ends at 12:00 am on the first of the month
Yearly Data	Period begins/ends at 12:00 am on the first of January unless otherwise noted
Current Display Data	Current display data describes the current reading for each weather variable. In most cases, the variable lists the most recently updated reading or calculation. Some current variable displays can be adjusted so there is an offset for the reading
Current Graph Data	Current graph data appears in the right-most column in the console graph and represents the latest value within the last period on the graph; totals can be set or reset. Display intervals vary. Examples include: Instant, 15-min., and Hourly Reading; Daily, Monthly, High and Low
Graph Time Interval	1 min., 10 min., 15 min., 1 hour, 1 day, 1 month, 1 year (user-selectable, availability depends upon variable selected)
Graph Time Span	24 Intervals + Current Interval (see Graph Intervals to determine time span)
Graph Variable Span (Vertical Scale)	Automatic (varies depending upon data range); Maximum and Minimum value in range appear in ticker
Alarm Indication	Alarms sound for only 2 minutes (time alarm is always 1 minute) if operating on battery power. Alarm message is displayed in ticker as long as threshold is met or exceeded. Alarms can be silenced (but not cleared) by pressing the DONE key.
Transmission Interval	Varies with transmitter ID code from 2.25 seconds (#1=shortest), to 3 seconds (#8=longest)
Update Interval	Varies with sensor - see individual sensor specs

Barometric Pressure

Resolution and Units	0.01" Hg, 0.1 mm Hg, 0.1 hPa/mb (user-selectable)
Range	16.00" to 32.50" Hg, 410 to 820 mm Hg, 540 to 1100 hPa/mb
Elevation Range	-999' to +15,000' (-600 m to 4570 m) (Note that console screen limits entry of lower elevation to -999' when using feet as elevation unit.)
Uncorrected Reading Accuracy	±0.03" Hg (±0.8 mm Hg, ±1.0 hPa/mb) (at room temperature)
Sea-Level Reduction Equation Used	United States Method employed prior to use of current "R Factor" method
Equation Source	Smithsonian Meteorological Tables
Equation Accuracy	±0.01" Hg (±0.3 mm Hg, ±0.3 hPa/mb)
Elevation Accuracy Required	±10' (3m) to meet equation accuracy specification
Overall Accuracy	±0.03" Hg (±0.8 mm Hg, ±1.0 hPa/mb)
Trend (change in 3 hours)	Change 0.06" (2 hPa/mb,1.5 mm Hg) = Rapidly Change 0.02" (0.7hPa/mb, 0.5 mm Hg)= Slowly
Trend Indication	5 position arrow: Rising (rapidly or slowly), Steady, or Falling (rapidly or slowly)
Update Interval	1 minute or when console BAR key is pressed twice
Current Display	Instant
Current Graph Data	Instant, 15-min., and Hourly Reading; Daily, Monthly, High and Low
Historical Graph Data	15-min. and Hourly Reading; Daily, Monthly Highs and Lows
Alarms	High Threshold from Current Trend for Storm Clearing (Rising Trend Low Threshold from Current Trend for Storm Warning (Falling Trend)
Range for Rising and Falling Trend Alarms	0.01 to 0.25" Hg (0.1 to 6.4 mm Hg, 0.1 to 8.5 hPa/mb)

Clock

Resolution	1 minute
Units	Time: 12 or 24 hour format (user-selectable)
Date	US or International format (user-selectable)
Accuracy	±8 seconds/month
Adjustments	Time: Automatic Daylight Savings Time (for users in North America and Europe that observe it in AUTO mode, MANUAL setting available for all other areas) Date: Automatic Leap Year
Alarms	Once per day at set time when active

Dewpoint (calculated)

Resolution and Units	1°F or 1°C (user-selectable) °C is converted from °F rounded to the nearest 1°C
Range	-105° to +130°F (-76° to +54°C)
Accuracy	±2°F (±1°C) (typical)
Update Interval	10 to 12 seconds
Source	World Meteorological Organization (WMO)
Equation Used	WMO Equation with respect to saturation of moist air over water
Variables Used	Instant Outside Temperature and Instant Outside Relative Humidity
Current Display Data	Instant Calculation
Current Graph Data	Instant Calculation; Daily, Monthly High and Low
Historical Graph Data	Hourly Calculations; Daily, Monthly Highs and Lows
Alarms	High and Low Threshold from Instant Calculation

Evapotranspiration (calculated, requires solar radiation sensor)

Resolution and Units	0.01" or 0.1 mm (user-selectable)
Range	Daily to 32.67" (832.1 mm); Monthly & Yearly to 199.99" (1999.9 mm)
Accuracy	Greater of 0.01" (0.25 mm) or ±5%, Reference: side-by-side comparison against a CIMIS ET weather station
Update Interval	1 hour
Calculation and Source	Modified Penman Equation as implemented by CIMIS (California Irrigation Management Information System) including Net Radiation calculation
Current Display Data	Latest Hourly Total Calculation
Current Graph Data	Latest Hourly Total Calculation, Daily, Monthly, Yearly Total
Historical Graph Data	Hourly, Daily, Monthly, Yearly Totals
Alarm	High Threshold from Latest Daily Total Calculation

Forecast

Variables Used	Barometric Reading & Trend, Wind Speed & Direction, Rainfall, Temperature, Humidity, Latitude & Longitude, Time of Year
Update Interval	1 hour
Display Format	Icons on top center of display; detailed message in ticker at bottom
Variables Predicted	Sky Condition, Precipitation, Temperature Changes, Wind Direction and Speed

Heat Index (calculated)

Resolution and Units	1°F or 1°C (user-selectable) °C is converted from °F rounded to the nearest 1°C
Range	-40° to +165°F (-40° to +74°C)
Accuracy	±2°F (±1°C) (typical)
Update Interval	10 to 12 seconds
Source	United States National Weather Service (NWS)/NOAA
Formulation Used	Steadman (1979) modified by US NWS/NOAA and Davis Instruments to increase range of use
Variables Used	Instant Outside Temperature and Instant Outside Relative Humidity
Current Display Data	Instant Calculation
Current Graph Data	Instant Calculation; Daily, Monthly High
Historical Graph Data	Hourly Calculations; Daily, Monthly Highs
Alarm	High Threshold from Instant Calculation

Humidity

Inside Relative Humidity (sensor located in console)

Resolution and Units	1%
Range	1 to 100% RH
Accuracy	±2%
Update Interval	1 minute
Current Display Data	Instant (user-adjustable offset available)
Current Graph Data	Instant; Hourly Reading; Daily, Monthly High and Low
Historical Graph Data	Hourly Readings; Daily, Monthly Highs and Lows
Alarms	High and Low Threshold from Instant Reading

Outside Relative Humidity (sensor located in ISS)

Resolution and Units	1%
Range	1 to 100% RH
Accuracy	±2%
Drift	<0.25% per year
Update Interval	50 seconds to 1 minute
Current Display Data	Instant (user-adjustable offset available)
Current Graph Data	Instant; Hourly Reading; Daily, Monthly High and Low
Historical Graph Data	Hourly Readings; Daily, Monthly Highs and Lows
Alarms	High and Low Threshold from Instant Reading

Extra Outside Relative Humidity (sensor located inside Temperature/Humidity Station)

Resolution and Units	1%
Range	1 to 100% RH
Accuracy	±2%
Drift	<0.25% per year
Update Interval	50 seconds to 1 minute
Current Display Data	Instant Reading (user adjustable)
Alarms	High and Low Threshold from Instant Reading

Leaf Wetness (requires leaf wetness sensor)

Resolution	1
Range	0 to 15
Dry/Wet Threshold	User-selectable
Accuracy	±0.5
Update Interval	46 to 54 seconds
Current Graph Data	Instant Reading; Daily High and Low; Monthly High
Historical Graph Data	Hourly Readings; Daily Highs and Lows; Monthly Highs
Alarms	High and Low Thresholds from Instant Reading

Moon Phase

Console Resolution	1/8 (12.5%) of a lunar cycle, 1/4 (25%) of lighted face on console
WeatherLink Resolution	0.09% of a lunar cycle, 0.18% of lighted face maximum (depends on screen resolution)
Range	New Moon, Waxing Crescent, First Quarter, Waxing Gibbous, Full Moon, Waning Gibbous, Last Quarter, Waning Crescent
Accuracy	±38 minutes

Rainfall

Resolution and Units	0.01" or 0.2 mm (user-selectable) (1 mm at totals ≥ 2000 mm)
Daily/Storm Rainfall Range	0 to 99.99" (0 to 999.8 mm)
Monthly/Yearly/Total Rainfall Range	0 to 199.99" (0 to 6553 mm)
Accuracy	For rain rates up to 10"/hr (250 mm/hr): ±3% of total or ± one tip of the spoon (0.01"/0.2mm), whichever is greater.
Update Interval	20 to 24 seconds
Storm Determination Method	0.02" (0.4 mm) begins a storm event, 24 hours without further accumulation ends a storm event
Current Display Data	Totals for Past 15-min
Current Graph Data	Totals for Past 15-min, Past 24-hour, Daily, Monthly, Yearly (start date user-selectable) and Storm (with begin date); Umbrella is displayed when 15-minute total exceeds zero
Historical Graph Data	Totals for 15-min, Daily, Monthly, Yearly (start date user-selectable) and Storm (with begin and end dates)
Alarms	High Threshold from Latest Flash Flood (15-min. total, default is 0.50", 12.7 mm), 24-Hour Total, Storm Total,
Range for Rain Alarms	0 to 99.99" (0 to 999.7 mm)

Rain Rate

Resolution and Units	0.01" or 0.1 mm (user-selectable) (See Figure 1 on page 9)
Range	0, 0.04"/hr (1 mm/hr) to 30"/hr (0 to 762 mm/hr)
Accuracy	±5% for rain rates up to 10"/hr (250 mm/hr)
Update Interval	20 to 24 seconds
Calculation Method	Measures time between successive tips of tipping spoon. Elapsed time greater than 15 minutes or only one tip of the rain collector constitutes a rain rate of zero.
Current Display Data	Instant
Current Graph Data	Instant and 1-min. Reading; Hourly, Daily, Monthly and Yearly High
Historical Graph Data	1-min Reading; Hourly, Daily, Monthly and Yearly Highs
Alarm	High Threshold from Instant Reading

Soil Moisture (requires soil moisture sensor)

Resolution	1 cb
Range	0 to 200 cb
Update Interval	77 to 90 seconds
Current Graph Data	Instant Reading; Daily and Monthly High and Low
Historical Graph Data	Hourly Readings; Daily and Monthly Highs and Lows
Alarms	High and Low Thresholds from Instant Reading

Solar Radiation (requires solar radiation sensor)

Resolution and Units	1 W/m^2
Range	0 to 1800 W/m^2
Accuracy	±5% of full scale (Reference: Eppley PSP at 1000 W/m^2)
Drift	up to ±2% per year
Cosine Response	±3% for angle of incidence from 0° to 75°
Temperature Coefficient	-0.067% per °F (-0.12% per °C); reference temperature = 77°F (25 °C)
Update Interval	50 seconds to 1 minute (5 minutes when dark)
Current Graph Data	Instant Reading and Hourly Average; Daily, Monthly High
Historical Graph Data	Hourly Average, Daily, Monthly Highs
Alarm	High Threshold from Instant Reading

Sunrise and Sunset

Resolution	1 minute
Accuracy	±1 minute
Reference	United States Naval Observatory

Temperature

Inside Temperature (sensor located in console)

Resolution and Units	Current Data: 0.1°F or 1°F or 0.1°C or 1°C (user-selectable) °C is converted from °F rounded to the nearest 1°C Historical Data and Alarms: 1°F or 1°C (user-selectable)
Range	+32° to +140°F (0° to +60°C)
Sensor Accuracy	±0.5°F (±0.3°C)
Update Interval	1 minute
Current Display Data	Instant (user-adjustable offset available)
Current Graph Data	Instant Reading; Daily and Monthly High and Low
Historical Graph Data	Hourly Readings; Daily and Monthly Highs and Lows
Alarms	High and Low Thresholds from Instant Reading

Outside Temperature (sensor located in ISS)

Resolution and Units	Current Data: 0.1°F or 1°F or 0.1°C or 1°C (user-selectable) nominal °C is converted from °F rounded to the nearest 1°C Historical Data and Alarms: 1°F or 1°C (user-selectable)
Range	-40° to +150°F (-40° to +65°C)
Sensor Accuracy	±0.5°F (±0.3°C)
Radiation Induced Error (Passive Shield)	+4°F (2°C) at solar noon (insolation = 1040 W/m^2, avg. wind speed ≤ 2 mph (1 ms)) (reference: RM Young Model 43408 Fan-Aspirated Radiation Shield)
Radiation Induced Error (Fan-Aspirated Shield)	+0.6°F (0.3°C) at solar noon (insolation = 1040 W/m^2, avg. wind speed ≤ 2 mph (1 m/s)) (reference: RM Young Model 43408 Fan-Aspirated Radiation Shield)
Update Interval	10 to 12 seconds
Current Display Data	Instant (user-adjustable offset available)
Current Graph Data	Instant Reading; Daily, Monthly, Yearly High and Low
Historical Graph Data	Hourly Readings; Daily, Monthly, Yearly Highs and Lows
Alarms	High and Low Thresholds from Instant Reading

Extra Temperature Probes

Resolution and Units	Current Data: 1°F or 1°C (user-selectable) °C is converted from °F rounded to the nearest 1°C Historical Data and Alarms: 1°F or 1°C (user-selectable)
Range	-40° to +150°F (-40° to +65°C)
Sensor Accuracy	±1°F (±0.5°C) (typical)
Update Interval	10 to 12 seconds (77 to 90 seconds for Leaf Wetness/Temperature and Soil Moisture/Temperature Stations)
Current Display Data	Instant Reading (user-adjustable offset available)
Alarms	High and Low Thresholds from Instant Reading

Temperature Humidity Sun Wind Index (requires solar radiation sensor)

Resolution and Units	1°F or 1°C (user-selectable) °C is converted from °F rounded to the nearest 1°C
Range	-90° to +165°F (-68° to +74°C)
Accuracy	±4°F (±2°C) (typical)
Update Interval	10 to 12 seconds
Sources and Formulation Used	United States National Weather Service (NWS)/NOAA Steadman (1979) modified by US NWS/NOAA and Davis Instruments to increase range of use and allow for cold weather use
Variables Used	Instant Outside Temperature, Instant Outside Relative Humidity, 10-minute Average Wind Speed, 10-minute Average Solar Radiation
Formulation Description	Uses Heat Index as base temperature, affects of wind and solar radiation are either added or subtracted from this base to give an overall effective temperature
Current Graph Data	Instant and Hourly Calculation; Daily, Monthly High
Historical Graph Data	Hourly Calculation; Daily, Monthly Highs
Alarm	High Threshold from Instant Reading

Ultra Violet (UV) Radiation Dose (requires UV sensor)

Resolution and Units	0.1 MEDs to 19.9 MEDs; 1 MED above 19.9 MEDS
Range	0 to 199 MEDs
Accuracy	±5% of daily total
Drift	up to ±2% per year
Update Interval	50 seconds to 1 minute (5 minutes when dark)
Current Graph Data	Latest Daily Total (user resettable at any time from Current Screen)
Historical Graph Data	Hourly, Daily Totals (user reset from Current Screen does not affect these values)
Alarm	High Threshold from Daily Total
Alarm Range	0 to 19.9 MEDs

Ultra Violet (UV) Radiation Index (requires UV sensor)

Resolution and Units	0.1 Index
Range	0 to 16 Index
Accuracy	±5% of full scale (Reference: Yankee UVB-1 at UV index 10 (Extremely High))
Cosine Response	±4% FS (0° to 90° zenith angle)
Update Interval	50 seconds to 1 minute (5 minutes when dark)
Current Graph Data	Instant Reading and Hourly Average; Daily, Monthly High
Historical Graph Data	Hourly Average, Daily, Monthly Highs
Alarm	High Threshold from Instant Calculation

Wind

Wind Chill (Calculated)

Resolution and Units	1°F or 1°C (user-selectable) °C is converted from °F rounded to the nearest 1°C
Range	-110° to +135°F (-79° to +57°C)
Accuracy	±2°F (±1°C) (typical)
Update Interval	10 to 12 seconds
Source	United States National Weather Service (NWS)/NOAA
Equation Used	Osczevski (1995) (adopted by US NWS in 2001)
Variables Used	Instant Outside Temperature and 10-min. Avg. Wind Speed
Current Display Data	Instant Calculation
Current Graph Data	Instant Calculation; Hourly, Daily and Monthly Low
Historical Graph Data	Hourly, Daily and Monthly Lows
Alarm	Low Threshold from Instant Calculation

Wind Direction

Range	1 - 360°
Display Resolution	16 points (22.5°) on compass rose, 1° in numeric display
Accuracy	±3°
Update Interval	2.5 to 3 seconds
Current Display Data	Instant (user-adjustable offset available)
Current Graph Data	Instant; 10-min. Dominant; Hourly, Daily, Monthly Dominant
Historical Graph Data	Past 6 10-min. Dominants on compass rose only; Hourly, Daily, Monthly Dominants

Wind Speed

Resolution and Units	1 mph, 1 km/h, 0.4 m/s, or 1 knot (user-selectable). Measured in mph, other units are converted from mph and rounded to nearest 1 km/hr, 0.1 m/s, or 1 knot.
Range	0 to 200 mph, 0 to 173 knots, 0 to 89 m/s, 0 to 322 km/h
Update Interval	Instant Reading: 2.5 to 3 seconds, 10-minute Average: 1 minute
Accuracy	±2 mph (2 kts, 3.2 km/h, 0.9 m/s) or ±5%, whichever is greater
Maximum Cable Length	240 feet (73 m) (See note on page 1)
Current Display Data	Instant
Current Graph Data	Instant; 10-minute and Hourly Average; Hourly High; Daily, Monthly and Yearly High with Direction of High
Historical Graph Data	10-min. and Hourly Averages; Hourly Highs; Daily, Monthly and Yearly Highs with Direction of Highs
Alarms	High Thresholds from Instant Reading and 10-minute Average

Wireless Communications

Transmit/Receive Frequency Range and Power Output:

Region	Frequency Range & Power Output
USA	902 - 928 MHz FHSS, <8mW
EU	868.0 - 868.6 MHz FHSS, <8mW
Australia, Brazil	918 - 926 MHz FHSS, <8mW
New Zealand, Peru	921 - 928 MHz FHSS, <8mW
India	865 - 867 MHz FHSS, <8mW
Japan	928.15 - 929.65 MHz FHSS, <1mW
Taiwan	920 - 925 MHz FHSS, <8mW
Russia	868.7 - 869.2 MHz FHSS, <8mW

Transmitter ID codes:	8 user-selectable
License:	Low power (less than 8 mW), no license required

Range: All models except Japan

Line of Sight	up to 1000 feet (300 m)
Through Walls	200 to 400 feet (60 to 120 m)

Range: Japan models

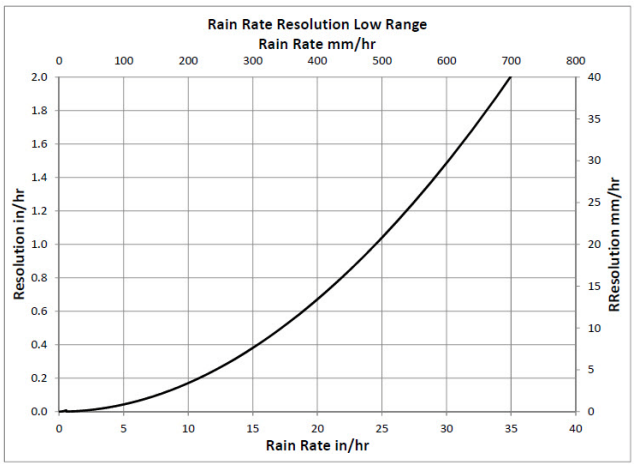
Line of Sight	up to 300 feet (100 m)
Through Walls	50 to 200 feet (15 to 60m)

Sensor Inputs

RF Filtering	RC low-pass filter on each signal line

Sensor Charts

Figure1:Rain Rate Resolution



Package Dimensions

Product #	Package Dimensions (Length x Width x Height)	Package Weight	UPC Codes
6152 6152EU 6152UK	17.50" x 10.4" x 16.0" (445 mm x 264 mm x 406 mm)	11 lbs. 13 oz. (5.4 kg)	011698 00229 0 011698 00347 1 011698 00348 8
6162 6162EU 6162UK		11 lbs. 15 oz. (5.4 kg)	011698 00306 8 011698 00307 5 001698 00308 2
6153 6153EU 6153UK	14.9 x 12.9" x 23.4" (378 mm x 327 mm x 594 mm)	16 lbs. 11 oz. (7.6 kg)	011698 00335 8 011698 00336 5 001698 00337 2
6163 6163EU 6163UK		17 lbs. 5 oz. (7.9 kg)	011698 00341 9 011698 00342 6 001698 00342 3
6322 6322OV	17.50" x 10.4" x 16.0" (445 mm x 264 mm x 406 mm)	9 lbs.. 1 oz. (4.1 kg)	011698 00776 9 011698 00778 3
6327 6327OV		11 lbs. 1 oz. (5.0 kg)	011698 00781 3 011698 00783 7
6323 6323OV	14.9" x 12.9" x 23.4" (378 mm x 327 mm x 594 mm	15 lbs. 15 oz. (7.2 kg)	011698 00779 0 011698 00780 6
6328 6328OV		16 lbs. 8 oz. (7.5 kg)	011698 00784 4 011698 00785 1
6312 6312EU 6312UK	12.6" x 9.3" x 2.5" (320 mm x 235 mm x 64 mm)	2 lbs. 10 oz. (1.2 kg)	011698 00724 0 011698 00766 0 011698 00767 7

GSI Job No. G-5738
Issued: 30 June 2021

GSI ENVIRONMENTAL

Construction Completion Addendum Report
Second Addendum
OU-3 Remedial Action

Anniston PCB Site
Anniston, Alabama

Appendix C

Appendix C.3
Piping, Valves, Mechanical Components, and SDS

HYMAX®2
JUST FLIP IT!

HYMAX®2 Flip Gasket - the Next Generation Wide-range Coupling with No-tear Gasket

sizes 1.5" - 12"
arriving 2018

HYMAX®2
JUST FLIP IT!

HYMAX introduces an innovative new coupling solution – the wide range HYMAX 2. HYMAX 2 coupling featuring a patented flip gasket that can easily flip in or out to accommodate different pipe ODs, allowing for faster and more efficient installations. HYMAX 2 has all other features of the original HYMAX: 2 top-facing bolts for faster and safer installation, dynamic pipe deflection that minimizes the risk of future pipe breaks due to temperature changes and ground shifts.

The original game-changing HYMAX, created by Krausz, has been field-proven in millions of installations in the USA. New and improved HYMAX 2 is a superior product.

* This product is protected under a registered patent.

JOIN | REPAIR | RESTRAIN

HYMAX®
Repair the past. Connect the future.
KRAUSZ is the creator of HYMAX

HYMAX® 2

Spherical Spacers -
AISI 304 Stainless Steel

Nuts & Bolts -
AISI 304 Stainless Steel Treated with Molecular Anti Galling (MAG) process

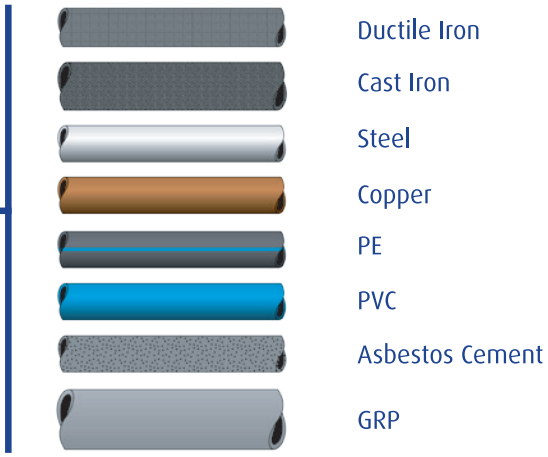
Gasket Bridge -
AISI 304 Stainless Steel

End Rings - ASTM A283/ A283M Grade C Steel

Center Ring
ASTM A53 Grade A Steel

Flip Gasket - EPDM compounded for water and sewage, meets NSF-61 and NSF-372 standards for contact with drinking water

Coating - 100% fusion bonded epoxy for enhanced corrosion protection.
Average thickness 14 mil, meets NSF-61 and NSF-372 standards


Ductile Iron
Cast Iron
Steel
Copper
PE
PVC
Asbestos Cement
GRP

HYMAX 2 WIDE RANGE COUPLING

Wide-range HYMAX 2 Coupling, used for section replacement, connects two pipes of the same or different OD pipe diameters and materials, up to 2.1″ range.

Nominal Pipe Size
1.5" - 12" available 2018

Krausz Part Number	ND (inch)	Overall Range (inch)	Range in Closed Gasket Position (Inch)	Range in Open Gasket Position (Inch)	Working Pressure (PSI)	Rated Pressure (PSI)
860-54-0108-16	4	4.25-5.63	4.25-5.00	4.92-5.63	260	390
860-54-0130-16	5	5.12-6.38	5.12-5.75	5.71-6.38	260	390
860-54-0163-16	6	6.42-7.68	6.42-7.05	7.01-7.68	260	390
860-54-0190-16	7	7.48-8.74	7.48-8.11	8.07-8.74	260	390
860-54-0217-16	8	8.54-9.84	8.54-9.17	9.13-9.84	260	390
860-54-0272-16	10	10.70-12.00	10.70-11.37	11.33-12.00	260	390
860-54-0278-16	10	10.96-12.26	10.96-11.63	11.59-12.26	260	390
860-54-0315-16	12	12.40-13.66	12.40-13.03	12.99-13.66	260	390
860-54-0334-16	12	13.15-14.41	13.15-13.78	13.74-14.41	260	390

HYMAX 2 WIDE RANGE COUPLING

The product gasket is EPDM compounded for water and sewage, meets NSF-61 and NSF-372 standards for contact with drinking water.

HYMAX 2 FLANGE ADAPTOR and FLANGE ADAPTOR LONG BODY

Wide-range HYMAX 2 Flange Adaptor connects any flanged device, such as valves, pumps and other devices, with a variety of pipe diameters and materials, up to 2.1″ range.

Nominal Pipe Size
1.5" - 12" available 2018

Krausz Part Number	ND (inch)	Flange (inch)	Overall Range (inch)	Range in Closed Gasket Position (Inch)	Range in Open Gasket Position (Inch)	Working Pressure (PSI)	Rated Pressure (PSI)
874-54-04010812	4	4	4.25-5.63	4.25-5.00	4.92-5.63	175	262
874-54-04016312	6	4	6.42-7.68	6.42-7.05	7.01-7.68	175	262
874-54-05013012	5	5	5.12-6.38	5.12-5.75	5.71-6.38	175	262
874-54-06010812	4	6	4.25-5.63	4.25-5.00	4.92-5.63	175	262
874-54-06013012	5	6	5.12-6.38	5.12-5.75	5.71-6.38	175	262
874-54-06016312	6	6	6.42-7.68	6.42-7.05	7.01-7.68	175	262
874-54-06021712	8	6	8.54-9.84	8.54-9.17	9.13-9.84	175	262
874-54-08019012	7	8	7.48-8.74	7.48-8.11	8.07-8.74	175	262
874-54-08021712	8	8	8.54-9.84	8.54-9.17	9.13-9.84	175	262
874-54-08027812	10	8	10.96-12.26	10.96-11.63	11.59-12.26	175	262
874-54-08031512	12	8	12.40-13.66	12.40-13.03	12.99-13.66	175	262
874-54-08033412	12	8	13.15-14.41	13.15-13.78	13.74-14.41	175	262
874-54-10027212	10	10	10.70-12.00	10.70-11.37	11.33-12.00	175	262
874-54-10027812	10	10	10.96-12.26	10.96-11.63	11.59-12.26	175	262
874-54-12031512	12	12	12.40-13.66	12.40-13.03	12.99-13.66	175	262
874-54-12033412	12	12	13.15-14.41	13.15-13.78	13.74-14.41	175	262
874-54-14033412	12	14	13.15-14.41	13.15-13.78	13.74-14.41	175	262

HYMAX 2 FLANGE ADAPTOR

The product gasket is EPDM compounded for water and sewage, meets NSF-61 and NSF-372 standards for contact with drinking water.

Krausz Part Number	ND (inch)	Flange (inch)	Overall Range (inch)	Range in Closed Gasket Position (Inch)	Range in Open Gasket Position (Inch)	Working Pressure (PSI)	Rated Pressure (PSI)
974-54-04010812	4	4	4.25 - 5.63	4.25 - 5.00	4.92 - 5.63	175	262
974-54-05013012	5	5	5.12 - 6.38	5.12- 5.75	5.71 - 6.38	175	262
974-54-06013012	5	6	5.12 - 6.38	5.12- 5.75	5.71 - 6.38	175	262
974-54-06016312	6	6	6.42 - 7.68	6.42 - 7.05	7.01 - 7.68	175	262
974-54-08019012	7	8	7.48 - 8.74	7.48 - 8.11	8.07 - 8.74	175	262
974-54-08021712	8	8	8.54 - 9.84	8.54 - 9.17	9.13 - 9.84	175	262
974-54-10027212	10	10	10.70 - 12.00	10.70 - 11.37	11.33 - 12.00	175	262
974-54-10027812	10	10	10.96 - 12.26	10.96 - 11.63	11.59 - 12.26	175	262
974-54-12031512	12	12	12.40 - 13.66	12.40 - 13.03	12.99 - 13.66	175	262
974-54-12033412	12	12	13.15 - 14.41	13.15 - 13.78	13.74 - 14.41	175	262

HYMAX 2 FLANGE ADAPTOR LONG BODY

The product gasket is EPDM compounded for water and sewage, meets NSF-61 and NSF-372 standards for contact with drinking water.

HYMAX 2 LONG BODY

Wide-range HYMAX 2 Long Body Coupling, used for pipe section replacement, connects two pipes of the same or different OD pipe and materials, covering a wider gap between the pipes, with up to up to 2.1" range.
Long couplings are typically used when there is uncertainty regarding the gap between the pipes.

Nominal Pipe Size
1.5" - 12" available 2018

Krausz Part Number	ND (inch)	Overall Range (inch)	Range in Closed Gasket Position (Inch)	Range in Open Gasket Position (Inch)	Working Pressure (PSI)	Rated Pressure (PSI)
862-54-0108-16	4	4.25 - 5.63	4.25 - 5.00	4.92 - 5.63	260	390
862-54-0130-16	5	5.12 - 6.38	5.12- 5.75	5.71 - 6.38	260	390
862-54-0163-16	6	6.42 - 7.68	6.42 - 7.05	7.01 - 7.68	260	390
862-54-0190-16	7	7.48 - 8.74	7.48 - 8.11	8.07 - 8.74	260	390
862-54-0217-16	8	8.54 - 9.84	8.54 - 9.17	9.13 - 9.84	260	390
862-54-0272-16	10	10.70 - 12.00	10.70 - 11.37	11.33 - 12.00	260	390
862-54-0278-16	10	10.96 - 12.26	10.96 - 11.63	11.59 - 12.26	260	390
862-54-0315-16	12	12.40 - 13.66	12.40 - 13.03	12.99 - 13.66	260	390
862-54-0334-16	12	13.15 - 14.41	13.15 - 13.78	13.74 - 14.41	260	390

HYMAX 2 LONG BODY

The product gasket is EPDM compounded for water and sewage, meets NSF-61 and NSF-372 standards for contact with drinking water.

HYMAX 2 REDUCER

Wide-range HYMAX 2 Reducer joins pipes different nominal sizes and materials. Each side has a tolerance of up to 2.1", joining pipes made of a variety of materials.

Nominal Pipe Size
1.5" - 12" available 2018

Krausz Part Number	ND (inch)	Overall Range (inch)	Range in Closed Gasket Position (inch)	Range in Open Gasket Position (inch)	Overall Range 2 (inch)	Range in Closed Gasket Position 2 (inch)	Range in Open Gasket Position 2 (inch)	Working Pressure (PSI)	Rated Pressure (PSI)
861540108013016	4 x 5	4.25-5.63	4.25-5.00	4.92-5.63	5.12-6.38	5.12-5.75	5.71-6.38	260	390
861540108016316	4 x 6	4.25-5.63	4.25-5.00	4.92-5.63	6.42-7.68	6.42-7.05	7.01-7.68	260	390
861540130016316	5 x 6	5.12-6.38	5.12-5.75	5.71-6.38	6.42-7.68	6.42-7.05	7.01-7.68	260	390
861540163019016	6 x 7	6.42-7.68	6.42-7.05	7.01-7.68	7.48-8.74	7.48-8.11	8.07-8.74	260	390
861540163021716	6 x 8	6.42-7.68	6.42-7.05	7.01-7.68	8.54-9.84	8.54-9.17	9.13-9.84	260	390
861540190021716	7 x 8	7.48-8.74	7.48-8.11	8.07-8.74	8.54-9.84	8.54-9.17	9.13-9.84	260	390
861540217027216	8 x 10	8.54-9.84	8.54-9.17	9.13-9.84	10.70-12.00	10.70-11.37	11.33-12.00	260	390
861540217031516	8 x 12	8.54-9.84	8.54-9.17	9.13-9.84	12.40-13.66	12.40-13.03	12.99-13.66	260	390
861540272027816	10 x 10	10.70-12.00	10.70-11.37	11.33-12.00	10.96-12.26	10.96-11.63	11.59-12.26	260	390
861540272031516	10 x 12	10.70-12.00	10.70-11.37	11.33-12.00	12.40-13.66	12.40-13.03	12.99-13.66	260	390
861540278031516	10 x 12	10.96-12.26	10.96-11.63	11.59-12.26	12.40-13.66	12.40-13.03	12.99-13.66	260	390
861540278033416	10 x 12	10.96-12.26	10.96-11.63	11.59-12.26	13.15-14.41	13.15-13.78	13.74-14.41	260	390
861540315033416	12 x 12	12.40-13.66	12.40-13.03	12.99-13.66	13.15-14.41	13.15-13.78	13.74-14.41	260	390

HYMAX 2 REDUCER

The product gasket is EPDM compounded for water and sewage, meets NSF-61 and NSF-372 standards for contact with drinking water.

HYMAX 2 THREADED OUTLET

HYMAX 2 Threaded Outlet provides effective outlet solutions for a wide variety of piping types and diameters, joining pipes made of the same or different materials, and with varying diameters of up to 2.1".

Nominal Pipe Size
1.5" - 12" available 2018

Krausz Part Number	ND (inch)	Overall Range (inch)	Range in Closed Gasket Position (Inch)	Range in Open Gasket Position (Inch)	Working Pressure (PSI)	Rated Pressure (PSI)
865-54-XX108-16	4	4.25-5.63	4.25-5.00	4.92-5.63	260	390
865-54-XX163-16	6	6.42-7.68	6.42-7.05	7.01-7.68	260	390
865-54-XX217-16	8	8.54-9.84	8.54-9.17	9.13-9.84	260	390
865-54-XX272-16	10	10.70-12.00	10.70-11.37	11.33-12.00	260	390
865-54-XX278-16	10	10.96-12.26	10.96-11.63	11.59-12.26	260	390
865-54-XX315-16	12	12.40-13.66	12.40-13.03	12.99-13.66	260	390
865-54-XX334-16	12	13.15-14.41	13.15-13.78	13.74-14.41	260	390

HYMAX 2 THREADED OUTLET

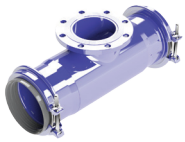
The product gasket is EPDM compounded for water and sewage, meets NSF-61 and NSF-372 standards for contact with drinking water.

For example 865-54-XX163-16 may be:

Krausz Part Number	ND (inch)	Outlet (inch)	Outlet L1 (inch)
865-54-01163-16	6	1	2.38
865-54-05163-16	6	1.5	3.12
865-54-02163-16	6	2	3.38
865-54-03163-16	6	3	4.25
865-54-04163-16	6	4	4.75

HYMAX 2 FLANGE OUTLET

HYMAX 2 Flange Outlet provides effective outlet solutions for a wide variety of piping types and diameters, joining pipes made of the same or different materials, and with varying diameters ofmup to 2.1".



Nominal Pipe Size
4"-12" Made To Order

HYMAX 2 ELBOWS

Wide-range HYMAX 2 Elbows join two pipes of the same or different diameters and materials, available in 45° and 90° angles.

Nominal Pipe Size
2" - 12" available 2018

HYMAX 2 45° Elbow

Krausz Part Number	ND (inch)	Overall Range (inch)	Range in Closed Gasket Position (Inch)	Range in Open Gasket Position (Inch)	Working Pressure (PSI)	Rated Pressure (PSI)
869-54-45108-16	4	4.25-5.63	4.25-5.00	4.92-5.63	260	390
869-54-45130-16	5	5.12-6.38	5.12-5.75	5.71-6.38	260	390
869-54-45163-16	6	6.42-7.68	6.42-7.05	7.01-7.68	260	390
869-54-45190-16	7	7.48-8.74	7.48-8.11	8.07-8.74	260	390
869-54-45217-16	8	8.54-9.84	8.54-9.17	9.13-9.84	260	390
869-54-45272-16	10	10.70-12.00	10.70-11.37	11.33-12.00	260	390
869-54-45278-16	10	10.96-12.26	10.96-11.63	11.59-12.26	260	390
869-54-45315-16	12	12.40-13.66	12.40-13.03	12.99-13.66	260	390
869-54-45334-16	12	13.15-14.41	13.15-13.78	13.74-14.41	260	390

HYMAX 2 45° ELBOW

The product gasket is EPDM compounded for water and sewage, meets NSF-61 and NSF-372 standards for contact with drinking water.

HYMAX 2 90° Elbow

Krausz Part Number	ND (inch)	Overall Range (inch)	Range in Closed Gasket Position (Inch)	Range in Open Gasket Position (Inch)	Working Pressure (PSI)	Rated Pressure (PSI)
869-54-90108-16	4	4.25-5.63	4.25-5.00	4.92-5.63	260	390
869-54-90130-16	5	5.12-6.38	5.12-5.75	5.71-6.38	260	390
869-54-90163-16	6	6.42-7.68	6.42-7.05	7.01-7.68	260	390
869-54-90190-16	7	7.48-8.74	7.48-8.11	8.07-8.74	260	390
869-54-90217-16	8	8.54-9.84	8.54-9.17	9.13-9.84	260	390
869-54-90272-16	10	10.70-12.00	10.70-11.37	11.33-12.00	260	390
869-54-90278-16	10	10.96-12.26	10.96-11.63	11.59-12.26	260	390
869-54-90315-16	12	12.40-13.66	12.40-13.03	12.99-13.66	260	390
869-54-90334-16	12	13.15-14.41	13.15-13.78	13.74-14.41	260	390

HYMAX 2 90° ELBOW

The product gasket is EPDM compounded for water and sewage, meets NSF-61 and NSF-372 standards for contact with drinking water.

HYMAX 2 CATHODIC

Wide-range HYMAX 2 Coupling with cathodic anti-corrosion protection feature connects two pipes of the same or different diameters and materials.

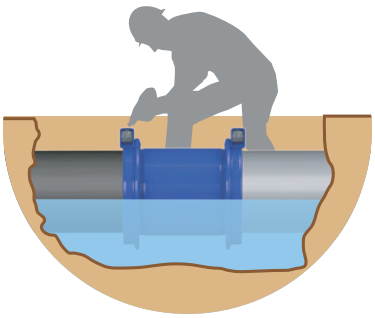
Nominal Pipe Size
1.5″ - 12″ available 2018

Krausz Part Number	ND (inch)	Overall Range (inch)	Range in Closed Gasket Position (Inch)	Range in Open Gasket Position (Inch)	Working Pressure (PSI)	Rated Pressure (PSI)
888-54-0108-16C 888-54-0108-16	4	4.25 - 5.63	4.25 - 5.00	4.92 - 5.63	260	390
888-54-0130-16	5	5.12 - 6.38	5.1 2- 5.75	5.71 - 6.38	260	390
888-54-0163-16	6	6.42 - 7.68	6.42 - 7.05	7.01 - 7.68	260	390
888-54-0190-16	7	7.48 - 8.74	7.48 - 8.11	8.07 - 8.74	260	390
888-54-0217-16	8	8.54 - 9.84	8.54 - 9.17	9.13 - 9.84	260	390
888-54-0272-16	10	10.70 - 12.00	10.70 - 11.37	11.33 - 12.00	260	390
888-54-0278-16	10	10.96 - 12.26	10.96 - 11.63	11.59 - 12.26	260	390
888-54-0315-16	12	12.40 - 13.66	12.40 - 13.03	12.99 - 13.66	260	390
888-54-0334-16	12	13.15 - 14.41	13.15 - 13.78	13.74 - 14.41	260	390

HYMAX 2 CATHODIC

The product gasket is EPDM compounded for water and sewage, meets NSF-61 and NSF-372 standards for contact with drinking water.

HYMAX® 2 Features

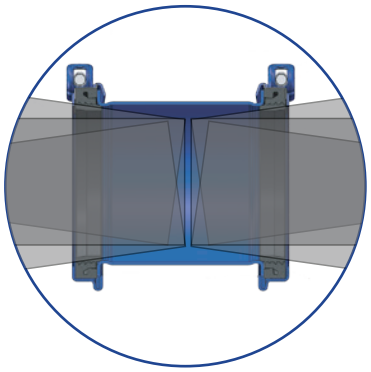


Fast and easy installation

- Lightweight construction enables fast and easy installation, with minimum manpower, reducing time in the ditch and improving worker safety.
- Unique top-facing bolts enable easy installation access.
- Ready-to-use, stab-on design eliminates the need for extensive under-pipe digging and work.

Multiple applications

- All products accommodate a variety of pipe materials: ductile iron, cast iron, steel, copper, PE, PVC, AC and GRP.
- One single product can connect pipes of two different materials, allowing transition capability of up to 1.3".

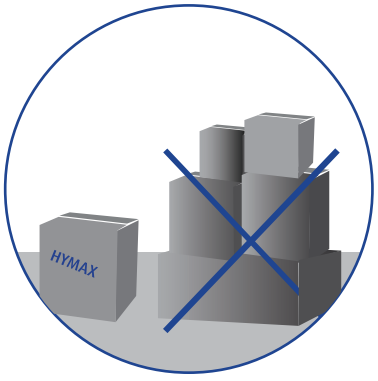


Flexible connection

- Allows for up to 4° angular deflection on each end, during installation as well as for misaligned pipes.
- Absorbs post-installation dynamic pipe deflection of up to 4° on each end, reducing the risk of damage and cracking due to ground shifts and temperature changes.
- Adapts to out-of-round pipe shape (up to 0.31"), for optimum fit on both ends.

High durability

- High-quality sealing solution – patented hydraulically-assisted gasket features two-stage sealing: mechanical sealing that is effective under vacuum or non-pressure; and self-inflated gasket using water pressure.
- Fusion-bonded epoxy coating enables an insulated product and prevents corrosion.
- Nuts, bolts and other components are made of stainless steel.
- Innovative radial closing design and sealing systems eliminate installation errors.
- Advanced Molecular Anti-Galling (MAG) unique dry treatment process on nuts and bolts, based on embedded zinc, prevents galling and enables repeated bolt tightening; it also eliminates the need for grease, preventing dust and dirt build-up.
- One-piece design delivers fortified strength and enhanced flexibility.



Cost-saving

- HYMAX 2 products suit a wide range of pipe diameters, replacing the need to use dedicated products and thus reducing inventory costs and saving shelf space.
- Fast and easy installation saves time and money.

HYMAX® 2 Product information

1. HYMAX 2 meets or exceeds all specifications of AWWA Standard C219, NSF-61 and NSF-372.
2. Center Ring: ASTM A53 Grade A Steel.
3. End ring: ASTM A283/A283M Grade C Steel.
4. Gaskets: EPDM compounded for water and sewage, meet NSF-61 and NSF-372 standards for contact with drinking water.
5. Nuts and bolts: AISI 304 Stainless Steel. Rolled thread and Molecular Anti Galling (MAG) treatment.
6. Bridge: AISI 304 Stainless Steel.
7. Coating: 100% fusion bonded epoxy for enhanced corrosion protection. Average thickness 14 mil, meets NSF-61 and NSF-372 standards.
8. Deflection up to 4° per side.
9. Working temperature:
   EPDM: -20ºF up to +125ºF.
10. Working pressure: 260 psi

* Data may vary according to product type and size. For product specification sheet please Call your Krausz dealer.

Flip Gasket allows
adjusting to pipe diameter

90 YEARS OF INNOVATIVE PIPE JOIN AND REPAIR SOLUTIONS

For 90 years, Krausz, the creator of HYMAX, has developed and manufactured market-leading products for the repair and connection of different pipe types in the potable water and sewage markets.
We have a solid reputation selling a wide variety of innovative, easy-to-use, durable products that save time and reduce inventory.

KRAUSZ USA
331 SW 57TH AVENUE, OCALA,
FLORIDA 34474

TEL: 855-457-2879 OR 855-4KRAUSZ
FAX: 352-304-5787

INFO@KRAUSZUSA.COM
WWW.KRAUSZUSA.COM

JOIN | REPAIR | RESTRAIN

KRAUSZ is the creator of HYMAX

BR0056 REV B

Georg Fischer Central Plastics LLC
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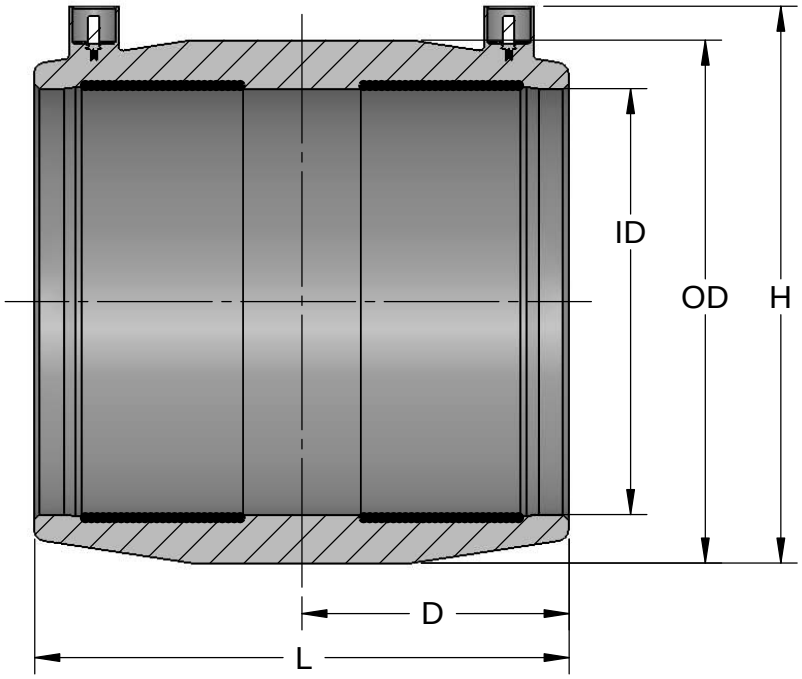
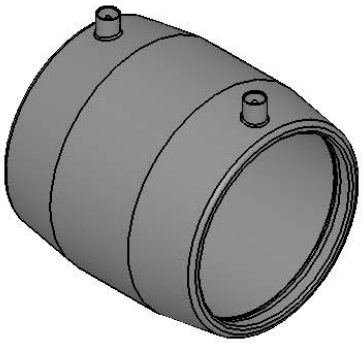




NOMINAL SIZE	INSIDE DIA. (NOMINAL) I.D.	OUTSIDE DIA. (NOMINAL) O.D.	STAB DEPTH (NOMINAL) "D"	OVERALL HEIGHT (NOMINAL) "H"	OVERALL LENGTH (NOMINAL) "L"
2 IPS	2.408	3.16	2.09	3.82	4.31
	61.15 mm	80.3 mm	53.1 mm	97.0 mm	109.5 mm
***2 IPS CONDUIT	2.410	2.81	2.09	3.55	4.32
	61.21 mm	71.4 mm	53.1 mm	90.0 mm	109.7 mm
***2 1/2 CONDUIT	2.925	3.50	2.06	4.17	4.25
	74.30 mm	88.9 mm	52.3 mm	105.9 mm	108.0 mm
3 IPS	3.545	4.54	2.72	5.18	5.59
	90.04 mm	115.3 mm	69.1 mm	131.6 mm	142.0 mm
4 IPS	4.528	5.57	3.00	6.51	6.14
	115.00 mm	141.5 mm	76.2 mm	165.4 mm	156.0 mm
5 IPS	5.536	6.93	3.54	7.56	7.17
140mm	140.60 mm	176.0 mm	89.9 mm	192.0 mm	182.1 mm
6 IPS	6.661	8.17	4.10	8.70	8.35
	169.18 mm	207.5 mm	104.1 mm	221.0 mm	212.1 mm
7 IPS	7.195	8.74	4.09	8.937	8.19
	182.75 mm	222.0 mm	104.0 mm	227.0 mm	208.0 mm
8 IPS	8.675	10.63	4.70	11.20	9.48
	220.34 mm	270.0 mm	119.4 mm	284.5 mm	240.8 mm
10 IPS	10.784	13.25	5.00	13.41	10.50
	273.90 mm	336.6 mm	127.0 mm	340.6 mm	266.7 mm
12 IPS	12.768	15.70	5.50	15.84	11.50
	324.29 mm	398.8 mm	139.7 mm	402.3 mm	292.1 mm

*** NON PRESSURE RATED

PRODUCT SPECIFICATION

ELECTROFUSION COUPLINGS
PE2406 / PE2708 MDPE
YELLOW

FAMILY:	ELECTROFUSION
PRODUCT:	COUPLING
TYPE:	SPECIFICATION
DOC:	PS-001
REV:	5
FILE:	EF CPLG-PE2406/PE2708
DATE:	11/5/2007
PAGES:	2

SCOPE:

This document describes the standard specifications and features related to Central Plastics' PE2406 / PE2708 Electrofusion Couplings and Electrofusion Reducer Couplings for pressure piping systems.

SIZES:

1/2" CTS through 2" CTS.
1/2" IPS through 12" IPS.

REQUIREMENTS:

ASTM D2513	Specification for Thermoplastic Gas Pressure Pipe, Tubing, and Fittings
ASTM D3350	Specification for Polyethylene Plastic Pipes and Fittings Materials
ASTM F1055	Specification for Electrofusion Type Polyethylene Fittings for OD Controlled PE Pipe and Fittings

REFERENCE DOCUMENTS:

ASTM F1290	Standard for Electrofusion Joining Polyolefin Pipe and Fittings
PPI TR-19	Thermoplastics Piping for the Transport of Chemicals
PPI TR-31	Underground Installation of Polyolefin Pipe

CERTIFICATIONS/LISTINGS:

CSA B137.4 — Polyethylene Piping Systems for Gas Service

MATERIALS:

PE Resin: INEOS (formerly Solvay) K38-20-160 yellow pre-blended medium density virgin resin. Recognized by the Plastic Pipe Institute as having a PE2406 / PE2708 rating with a Hydrostatic Design Basis of 1250 psi @ 73°F. This resin has a cell classification of 234373E* in accordance with ASTM D3350.

*Note: Cell Classification using previous editions of ASTM D3350 was 234363E.

Heating Wire: Copper, nickel or alloy.

Terminal Pins: Machined or die swaged 70/30 brass or nickel-plated carbon steel.

Resistor: Metal film type. ±1% Tolerance.

TEST METHODS:

ASTM D1598 — Time-to-Failure of Plastic Pipe Under Constant Internal Pressure.
Must exceed 170 hours in 80°C bath @ 670psi Hoop Stress, or
Must exceed 1000 hours in 80°C bath @ 580psi Hoop Stress, or
Must exceed 1000 hours in 23°C bath @ 1600psi Hoop Stress.
(All methods are considered equivalent)

ASTM D1599 — Short-Term Hydraulic Pressure Failure of Plastics Pipe, Tubing, and Fittings.
Uniform pressurization until failure between 60 and 70 seconds from start of test. Must result in ductile failure at a pressure great enough to create a 2520psi Hoop Stress.

ASTM D638 — Tensile Strength Test
Test at a pull rate of 0.20 inches per minute. Test should result in a minimum of 25% elongation in the pipe without separation of the pipe from the coupling.

ASTM F1055 Joint Integrity Test

Crush Test a sectioned assembly until the walls of the pipe meet. Should result in less than 15% separation of the fusion length, or

Fusion Evaluation Test (FET) a sectioned assembly 90° in both directions four times each without separation along the bond line. Minor separation at the outer limits of the fusion heat source may be seen.

ASTM F1055 Evaluation for Voids

Voids in the fusion interface are acceptable only if they are round or elliptical in shape, with no sharp corners. Individual voids cannot exceed 10% of the fusion zone with the combined sizes of multiple voids not exceeding 20%

FEATURES:

40 Volt System. Installation temperature range from -10°F to 120°F. Suitable for use on pipe range from SDR 17 or lower. Can be supplied with an integral identification resistor which can be recognized by all Central Plastics' Processors to set the proper fusion time. All Central Plastics' Electrofusion Couplings are supplied with an ISO compliant 24 bit barcode to facilitate use with other brands of processors. Can be supplied CSA B137.4 listed in most sizes. Manufactured in the United States.

PRESSURE RATING:

Central Plastics PE2406 / PE2708 Electrofusion Couplings are pressure rated to 125 psig for natural gas @73°F. Pressure ratings are subject to de-rating depending on ambient temperatures.

PRESSURE TESTING:

Pressure testing can be conducted in accordance with the recommendations of the pipe manufacturer, or as described in ASTM F2164 *STANDARD PRACTICE FOR FIELD LEAK TESTING OF POLYETHYLENE (PE) PRESSURE PIPING SYSTEMS USING HYDROSTATIC PRESSURE,* typically 1.5 x's the rated working pressure not exceeding 8 hours in duration for a single test.

MAXIMUM OPERATING TEMPERATURE:

The maximium operating temperature of PE2406 / PE2708 Electrofusion Couplings is 140°F. Pressure de-rating factors should be considered when operating systems above the 73°F stated pressure rating, to maintain the 50 year substantiated long-term hydrostatic strength of the polyethylene material.

STORAGE/SHELF LIFE:

Yellow medium density polyethylene resin contains a stablization pack which provides some degree of protection from UV effects. Even so, it is recommended that fittings which are stored for extended periods (two years or greater) be stored indoors in their original packaging. Fittings stored indoors in their original packaging have virtually unlimited shelf-life.

CHEMICAL RESISTANCE:

Polyethylene generally exhibits strong resistence to many chemical compounds. Known chemical resistence characteristics at specified temperatures can be found in PPI Technical Report TR-19.

INSTALLATION:

These fittings are compatible for electrofusion with pipe or fittings manufactured from like or similar resin. Please refer to Central Plastics' Electrofusion Installation Procedures Manual for proper installation instructions. Central Plastics strongly recommends that electrofusion fittings be installed only by persons that have received training from an authorized instructor, and have a strong working knowledge of polyethylene and heat fusion, and have qualified electrofusion joints through destructive testing. Persons responsible for the joining of polyethylene pipes by fusion methods must qualify according to the requirements of Title 49 Code of Federal Regulations, Section 192.285.

Note: This Specification supercedes all previous Product Specifications and is subject to change without notice.

Approved By:

Jeff Wright
Technical Services Manager

Data sheet

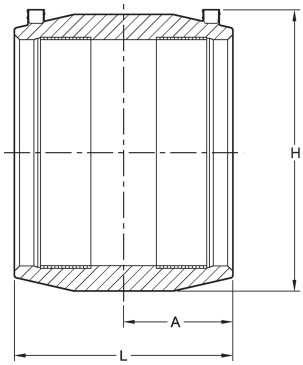
valid from: 3/1/21

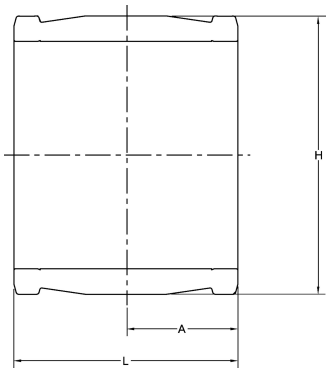
FM ELECTROFUSION: Coupling
PE4710
IPS, Class 250

- Approval: ASTM D2513
- Approval: ASTM F1055
- Approval: AWWA C906
- Approval: FM 1613
- Approval: NSF-61

FM APPROVED

Size (inch)	GF Code	weight (lb)	H (inch)	L (inch)	A (inch)	Box Qty
4	**360 000 936**	1.7	6.51	6.14	3.00	10
6	**360 000 939**	4.5	8.70	8.35	4.10	8
8	**360 000 944**	8.5	12.99	11.59	5.80	4
10	**360 000 903**	15.2	13.04	10.40	5.20	1
12	**360 000 906**	23.9	15.84	11.40	5.70	1
14	**360 000 909**	35.2	17.24	12.13	6.06	1
16	**360 000 913**	47.1	19.65	13.54	6.77	1
18	**360 000 917**	65.6	22.13	14.96	7.48	1
20	**360 000 924**	91.0	24.57	16.46	8.23	1
24	**360 000 930**	177.0	30.59	19.50	9.75	1





The technical data are not binding. They neither constitute expressly warranted characteristics nor guaranteed properties nor a guaranteed durability. They are subject to modification. Our General Terms of Sale apply.

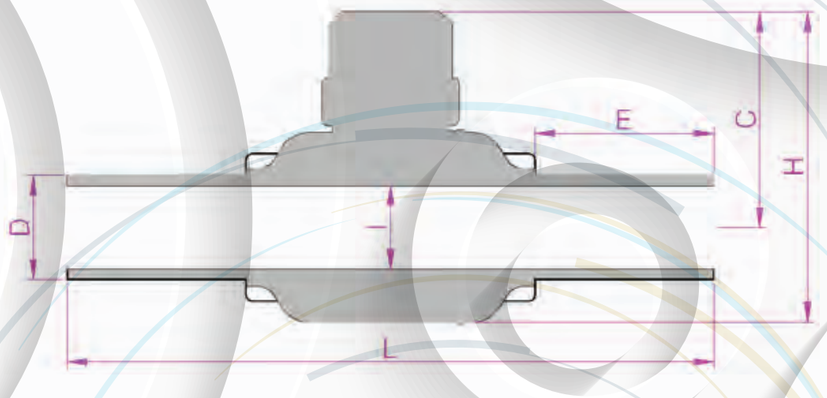
Georg Fischer Piping Systems Ltd, Postfach, CH-8201 Schaffhausen/Switzerland
Phone +41 -(0)52-631 1111
e-mail: info.ps@georgfischer.com
Internet: http://www.gfps.com

IntegriFuse Poly Ball Valves

IntegriFuse Poly Ball Valves are offered in sizes from ¾" to 4". Our full port black valves are approved for both gas and water applications. All valves are equipped with a 1/4 turn 2" square operating nut.

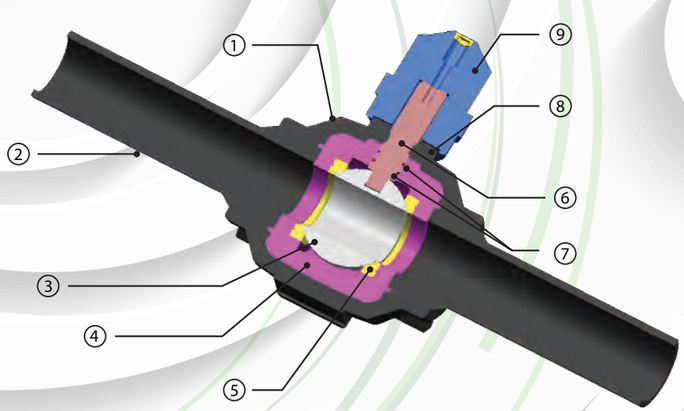
Poly Ball Valves with 2" Operating Nut - IPS - SDR 11

Nominal Size	Port	SDR	D	MinW/T	L	H	C	I	E	CV	Weight
¾" IPS	Full	11	1.050"	.095	11.50"	5.12"	3.70"	1.06"	3.62"	32	1.1 lbs.
1" IPS	Full	11	1.315"	.119	11.50"	5.12"	3.70"	1.06"	3.62"	50	1.1 lbs.
1 ¼" IPS	Full	11	1.660"	.151	11.50"	5.12"	3.70"	1.06"	3.62"	79	1.1 lbs.
1 ½" IPS	Full	11	1.900"	.173	11.81"	5.51"	3.78"	1.26"	3.15"	104	1.7 lbs.
2" IPS	Full	11	2.375"	.216	19.53"	9.65"	7.01"	1.77"	6.69"	164	4.6 lbs.
3" IPS	Full	11	3.500"	.318	21.18"	11.81"	8.50"	2.52"	6.69"	375	8.8 lbs.
4" IPS	Full	11	4.500"	.409	24.02"	14.92"	10.39"	3.58"	6.69"	591	18.7 lbs.



Poly Ball Valves - Features

No.	Component	Material	Features
1	Body	Polyethylene	PE3408/PE4710/PE100
2	End	Polyethylene	PE3408/PE4710/PE100
3	Ball	Polypropylene	Excellent Strength & Thermal Resistance
4	Retainer	Polypropylene	Positive seal under any condition. Retains seat under high differential pressure
5	Ball Seat	Nitrile (NBR) or EPDM	Reliable sealing from –20° F to 140° F
6	Stem	Stainless Steel	Excellent durability & strength
7	Stem Seal	Nitrile (NBR) or EPDM	Redundant sealing with multiple O-rings
8	Weather Seal	Nitrile (NBR) or EPDM	Protects from ground water and dirt
9	Operating Nut	Polypropylene	1/4 turn 2 inch (50mm) square



Full Port

EPDM

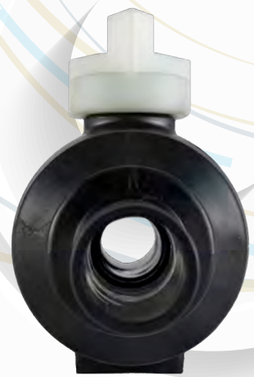
Certified to NSF / ANSI 61, AWWA C901 / 906 Requirements

Most commonly used in potable water applications

–IPS Sizes–

SDR 11

¾" to 4"



Full Port

Nitrile(NBR)

Meets ASME 16.40 Requirements

Most commonly used in Gas, Industrial, Landfill, Golf Courses, and other non-potable water applications

–IPS Sizes–

SDR 11

¾" to 4"

Poly Ball Valve Specifications

IntegriFuse fittings are manufactured from 0% recycled materials with black high density bimodal polyethylene copolymer designed for use in, but not limited to, potable water, golf courses, natural gas, industrial, landfill, oil & gas, and mining applications.

Valves meet NSF/ANSI 61, AWWA C901/906, ASTM-D2513, ASTM D3261 and ASME16.40 requirements

IntegriFuse™

Integrity Fusion Products, Inc.

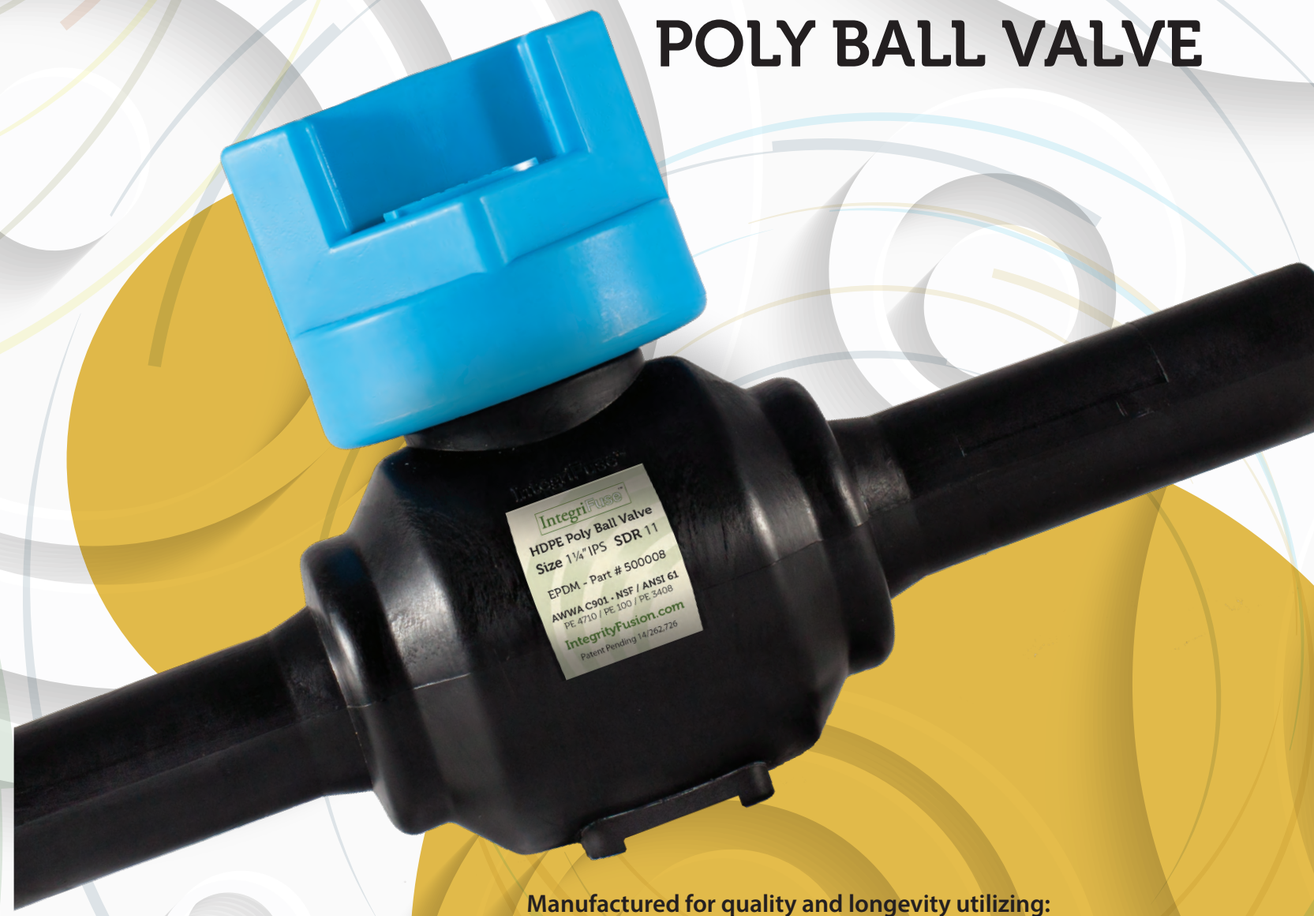
POLY BALL VALVE

Item	Operating Feature
Designed/Tested	Valves meet ASTM D 2513 requirements and ISO 9001.
Materials	PE4710/PE100 Black SDR 11 rated @ 100 PSI for gas & 200 PSI for water
Temperature	From –20˚ F to 140˚ F (-20° C to 60° C)
Bore	Full Port
Pipe Connection	Butt Fusion
Valve Boxes	IntegriFuse valves are supported by all the leading valve box manufacturers

Hydrostatic Strength Test

TEMP: 74° F	TEMP 100° F	TEMP: 176° F
1000 Hours	1000 Hours	170 Hours
265 PSI	214 PSI	136 PSI

Physical Properties	Metric	English	Comments
Density	.959 g/cm3	0.0346 lb/in	Black: ASTM D4883
Environmental Stress Crack Resistance	>= 5000 hour	>= 5000 hour	Condition C; ASTM D1693
Carbon Black Loading	2.30%	2.30%	ASTM D1603
	8.00 g/10 min	8.00 g/10 min	
Melt Flow	@Load 21.6 kg, Temperature 190 °C	@Load 47.6 lb, Temperature 374 °F	ASTM D1238
Mechanical Properties	**Metric**	**English**	**Comments**
PENT	>= 10000 hour	>= 10000 hour	Notched Tensile; ASTM F1473
Hardness, Shore D	66.0	66.0	ASTM D2240
Tensile Strength at Break	37.9 MPa	5500 PSI	2 in/min; ASTM D638
Tensile Strength Yield	24.99 MPa	3625 PSI	2 in/min; ASTM D638
Elongation at Break	>= 600%	>= 600%	2 in/min; ASTM D638
Flexural Modulus	1.03 GPa	150 KSI	2% Secant-Method; ASTM D790
Izod Impact, Notched	4.81 J/cm	9.00 ft-lb/in	ASTM D256
Hydrostatic Design Basis	6.89 MPa	1000 PSI	At 60 °C; ASTM D2837
	11.0 MPa	1600 PSI	Room Temp; ASTM D2837
Thermal Properties	**Metric**	**English**	**Comments**
Vicat Softening Point	126 °C	259 °F	ASTM D1525
Brittleness Temperature	= -118 °C	<= -180 °F	ASTM D746
Decomposition Temperature	>= 220 °C	>= 428 °F	Thermal Stability; ASTM D2513
Descriptive Properties	**Metric**	**English**	**Comments**
Cell Classification		445574C	ASTM D3350
Process		Injection Molding	



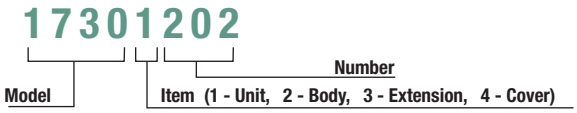
Manufactured for quality and longevity utilizing:

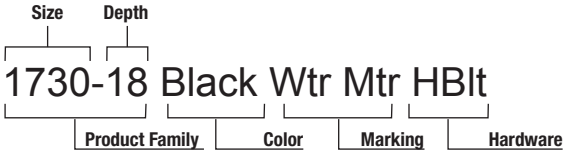
- Polyethylene body
- Nitrile (HNBR) or EPDM seats
- Polypropylene ball and Op Nut
- Stainless steel stems
- ¼ turn 2" operating nut
- All valves are Full Port
- Available in ¾" to 4" SDR 11
- NSF/ANSI 61, AWWA C901/906 & ASME 16.40 approved

Integrity Fusion Products, Inc.
270 Parkade Court, Peachtree City, GA 30269
P: 1 888 770 6330 or 770 632 7530 | F: 770 632 7540 | E: Info@IntegrityFusion.com

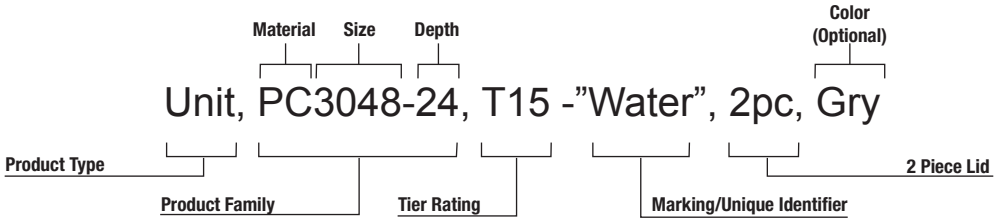
UNDERSTANDING OUR PRODUCT GUIDE

CARSON PRODUCTS: SKU FORMAT AND DESCRIPTION FORMAT





OLDCASTLE POLYMER* & SYNERTECH: DESCRIPTION FORMAT



CARSON ABBREVIATIONS

Abbreviation	Description	Refers to:
HP	HDPE Body Polymer Ring & Cover	Product Material
HPC	Plastic Body Polymer Concrete Cover	
HLPC	Plastic Body Light Weight Polymer Concrete Cover	
PC	Polymer Concrete	
PPC	Polymer Concrete Body Polymer Concrete Cover	
PSC	Polymer Concrete Body Steel Cover	
Blk	Black	Product Color
Blk-Grn	Black Body Green Cover	
Grn	Green	
Gry	Gray	
Pur	Purple	
Tan	Tan	
Blank	Blank	Marking
Elec	Electric	
ICV	Irrigation Control Valve	
Swr	Sewer	
Wtr	Water	
Wtr Mtr	Water Meter	
RW	Reclaimed Water	
RWDND ES	Reclaimed Water Do Not Drink English & Spanish	

Abbreviation	Description	Refers to:
CHBlt	Captive Hex Bolt	Hardware Type
CLPnta	Captive Large Penta Bolt	
Cpnta	Captive Penta Bolt	
Dlock	Dallas Lock	
Flck	Fargo Lock	
FtnNut	Floating Nut	
HBlt	Hex Bolt	
Hnut	Hex Nut	
Bnut	Brass Nut	
LBlt	L Bolt	
Lpnta	Large Penta Bolt	
CI T Cover	Cast Iron T Cover	Cover Type/Options
Cast Iron Rdr	Cast Iron Reader	
Flsh Cvr	Flush Cover	
Plastic Rdr	Plastic Reader	
Plt Mkr	Plate Marker	
Rnd Plt	Round Plate	
T Cov	T Cover	
EMS	E Marker	
TRH	Touch Read Hole	
MsHl	Mouse Hole	

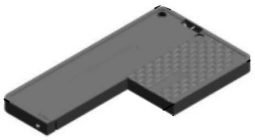
OLDCASTLE POLYMER* ABBREVIATIONS

Abbreviation	Description	Refers to:
D	Drop In Lid	Lids
T	Bolt Down Lid	
FW	Flared Wall Body	Bodies
SW	Straight Wall Body	

formerly H-Series™

CARSON 1730

LIGHT DUTY
PEDESTRIAN / GREENBELT



HDPE
17" X 30"

Rating	Part #	Desc 1	Desc 2	Color	Depth	Item Weight	Pallet Qty	Design Load	Quick Ship
Unit - 1730 Spec Grade									
Ped	17301065	1730-12 Green Prsr Swr HBlt	0 MsHl Flsh Cover	Green	12	29.4	16	300 lb/ft2	
Ped	17301078	1730-12 Green Water HBlt	0 MsHl Flsh Cover	Green	12	29.3	16	300 lb/ft2	
Ped	17301090	1730-12 Purple RWDNDES HBlt	0 MsHl FCvr Cast Iron Reader	Purple	12	30.7	16	300 lb/ft2	
Ped	17301204	1730-12 Black Wtr Mtr HBlt	0 MsHl FCvr Cast Iron Reader	Black	12	31.4	16	300 lb/ft2	
Ped	17301207	1730-12 Black Wtr Mtr LBlt	0 MsHl FCvr Plastic Reader	Black	12	29.8	16	300 lb/ft2	
Ped	17301273	1730-12 Black Wtr Mtr	0 MsHl Flsh Cover	Black	12	29.9	16	300 lb/ft2	
Ped	17301274	1730-12 Black Wtr Mtr	0 MsHl FCvr Cast Iron Reader	Black	12	31.4	16	300 lb/ft2	
Ped	17301322	1730-12 Black Wtr Mtr	0 MsHl FCvr Plastic Reader	Black	12	29.8	16	300 lb/ft2	
Ped	17301044	1730-15 Black Water HBlt	0 MsHl Flsh Cover	Black	15	34.4	16	300 lb/ft2	
Ped	17301111	1730-15 Green Blank LBlt	0 MsHl T Cover	Green	15	34.3	16	300 lb/ft2	
Ped	17301043	1730-18 Black Water LBlt	0 MsHl Flsh Cover	Black	18	37.3	16	300 lb/ft2	
Ped	17301066	1730-18 Green Prsr Swr HBlt	0 MsHl Flsh Cover	Green	18	37.2	16	300 lb/ft2	
Ped	17301145	1730-18 Green Sewer HBlt	0 MsHl Flsh Cover	Green	18	37.3	16	300 lb/ft2	
Ped	17301202	1730-18 Black Wtr Mtr HBlt	0 MsHl FCvr Cast Iron Reader	Black	18	39.3	16	300 lb/ft2	
Ped	17301203	1730-18 Black Wtr Mtr LBlt	0 MsHl FCvr Plastic Reader	Black	18	37.6	16	300 lb/ft2	
Ped	17301205	1730-18 Black Wtr Mtr HBlt	0 MsHl FCvr Plastic Reader	Black	18	37.6	16	300 lb/ft2	
Ped	17301230	1730-18 Black Wtr Mtr	0 MsHl Flsh Cover	Black	18	37.3	16	300 lb/ft2	
Ped	17301277	1730-18 Black Wtr Mtr	0 MsHl FCvr Cast Iron Reader	Black	18	39.3	16	300 lb/ft2	
Ped	17301235	1730-24 Blk-Grn Blank	4x EzLck T Cover	Blk-Grn	24	64.1	6	300 lb/ft2	
Ped	17301239	1730-24 Black Wtr Mtr HBlt	0 MsHl Flsh Cover	Black	24	62.0	6	300 lb/ft2	
Ped	17301240	1730-24 Black Wtr Mtr HBlt	0 MsHl FCvr Plastic Reader	Black	24	62.4	6	300 lb/ft2	
Ped	17301241	1730-24 Black Wtr Mtr HBlt	0 MsHl FCvr Cast Iron Reader	Black	24	64.0	6	300 lb/ft2	
Ped	17301369	1730-24 Blk-Grn Blank	6x EzLck TCvr 2pc Plug	Blk-Grn	24	63.6	6	300 lb/ft2	
Body - 1730 Spec Grade									
Ped	17302001	1730-12 Body Green 0 MsHl	-	Green	12	19.0	16	300 lb/ft2	
Ped	17302014	1730-12 Body Black 0 MsHl	-	Black	12	19.0	16	300 lb/ft2	
Ped	17302002	1730-15 Body Green 0 MsHl	-	Green	15	24.0	16	300 lb/ft2	
Ped	17302015	1730-15 Body Black 0 MsHl	-	Black	15	24.0	16	300 lb/ft2	
Ped	17302004	1730-18 Body Green 0 MsHl	-	Green	18	26.9	16	300 lb/ft2	
Ped	17302013	1730-18 Body Black 0 MsHl	-	Black	18	26.9	16	300 lb/ft2	
Ped	17302051	1730-24 Body Black 0 MsHl	2x Loc-Kit Clip	Black	24	51.6	6	300 lb/ft2	
Ped	17302053	1730-24 Body Black 0 MsHl	4x Loc-Kit Clip	Black	24	51.6	6	300 lb/ft2	
Lid - 1730 Spec Grade									
Ped	17304157	1730 Flsh Cover Black Wtr Mtr	Plastic Reader	Black	-	10.8	60	300 lb/ft2	
Ped	17304158	1730 Flsh Cover Black Wtr Mtr	Cast Iron Reader	Black	-	12.4	60	300 lb/ft2	
Ped	17304160	1730 Flsh Cover Black Wtr Mtr	-	Black	-	10.4	60	300 lb/ft2	

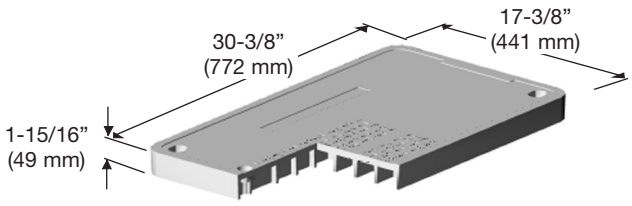
*Products are rated by the lowest component rating. A tier 15 cover with a tier 22 body is rated tier 15. A tier 22 cover with a tier 22 body is rated tier 22.

CARSON
SPECIFIED AND PREFERRED WORLDWIDE

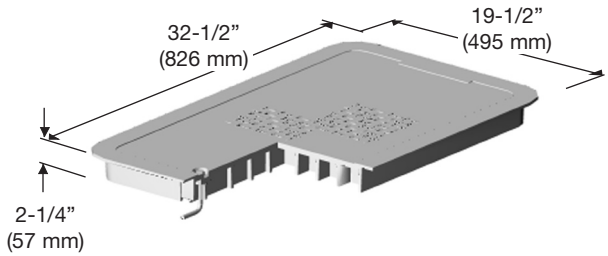
Pomona, California
Toll-Free: 800.735.5566
Phone: 909.634.3020
Fax: 800.827.7111

L Series 1730-18

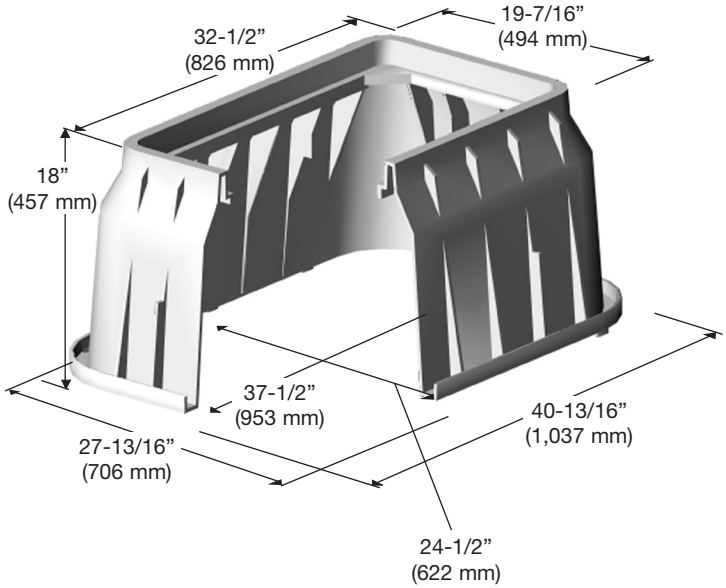
Light Duty



Flush Cover
Material: HDPE
Weight: 10.0 lbs.
Model: 1730-3B
Option: ABS



T-Cover
Material: HDPE
Weight: 10.0 lbs.
Model: 1730-4B Bolt Down
1730-4L Captive L-Bolt Lock



Body
Material: HDPE
Weight: 26.0 lbs.
Model: 1730-18

Colors Available
Green, Gray or Black

Note: For use in non-vehicular traffic situations only. We do not recommend installation in concrete or asphalt. Weights and dimensions may vary slightly.

Revision Date 4/2003

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L Series 1730-18

Light Duty

Static Vertical Load Rating
(Design Load; Test Load)

- ASTM C857 – A-0.3, 300 lbf/ft^2; Report Ultimate
- SCTE – Light Duty, Pedestrian; 3,000 lbf

Shipping Configuration

- Unit, 16 assemblies, = 92.5 cu. ft., 717.0 lbs.

Note: For use in non-vehicular traffic situations only. We do not recommend installation in concrete or asphalt. Weights and dimensions may vary slightly.

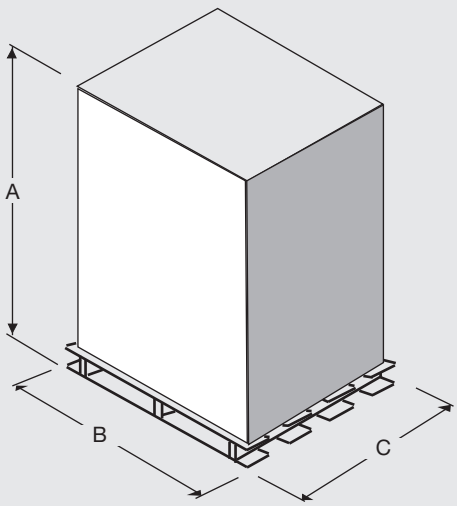
Oldcastle Precast®
Enclosure Solutions

Pomona, California
Toll-Free: 800.735.5566
Phone: 909.634.3020
Fax: 800.827.7111

Material Property	ASTM Test Method	Typical Value[1]
Type, Class, Category	D 1248	III, A, 3
Density, g/cm^3	D 1505	0.950 min., not to exceed 0.965
Tensile Strength, at break, psi	D 638	3,000 to 4,400
Elongation, at break, %	D 638	400
Tensile Impact, ft-lb/in^2	D 1822	27
Flexural Modulus, psi	D 790	120,000 min., not to exceed 240,000
Low Temperature Brittleness, F50, at ^{o}C	D 746	<-76
Hardness, Shore D	D 2240	66
Deflection Temperature, at 66 psi, ^{o}F	D 648	150^o min., not to exceed 200^o
Electrical Dielectric Strength, V/mil	D 149	400 min., not to exceed 600
Molded Product[2]		
Chemical Resistance	D 543	Very Resistant
Water Absorption	D 570	Less than 1% weight change

[1]The values listed for physical property measurements are nominal values only. Certain physical property measurements are subject to variations consistent with the test methods and are within a generally accepted range for such values.
[2]Test reports available on request.

Shipping Information



UNIT

Dim.	Description	Value
A	Height	80”
B	Length	40”
C	Width	48”

Units: 16 per pallet
Weight: 616 lbs. per pallet

FLUSH COVER

Dim.	Description	Value
A	Height	66”
B	Length	40”
C	Width	48”

Units: 120 per pallet
Weight: 1,240 lbs. per pallet

T-COVER

Dim.	Description	Value
A	Height	73”
B	Length	40”
C	Width	48”

Units: 120 per pallet
Weight: 1,240 lbs. per pallet

BODY

Dim.	Description	Value
A	Height	80”
B	Length	40”
C	Width	48”

Units: 16 per pallet
Weight: 456 lbs. per pallet

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All information contained in this brochure was current at the time of printing. Because of Oldcastle Precast's policy of ongoing research and development, the Company reserves the right to discontinue or update product information without notice.

SOUTHERN co. inc.
PIPE & SUPPLY

Solutia
Anniston, Alabama

Material Submittal Information

southernpipe.com

5091 Jug Factory Road Tuscaloosa, AL 35405 205-861-2300

CHARLOTTE
PIPE AND FOUNDRY COMPANY

SUBMITTAL FOR CHARLOTTE PIPE®
PVC SCHEDULE 80 PRESSURE PIPE AND FITTING SYSTEM

Date: _____

Job Name: _____ Location: _____

Engineer: _____ Contractor: _____

Scope:

This specification covers PVC Schedule 80 pipe and fittings for pressure applications. This system is intended for pressure applications where the operating temperature will not exceed 140° F.

Specification:

Pipe and fittings shall be manufactured from virgin rigid PVC (polyvinyl chloride) vinyl compounds with a cell class of 12454 as identified in ASTM D 1784.

PVC Schedule 80 pipe shall be Iron Pipe Size (IPS) conforming to ASTM D 1785. Injection molded PVC Schedule 80 fittings shall conform to ASTM D 2467. PVC Schedule 80 threaded fittings shall conform to ASTM D 2464. Pipe and fittings shall be manufactured as a system and be the product of one manufacturer. All pipe and fittings shall be manufactured in the United States. Pipe and fittings shall conform to NSF International Standard 61 or the health effects portion of NSF Standard 14.

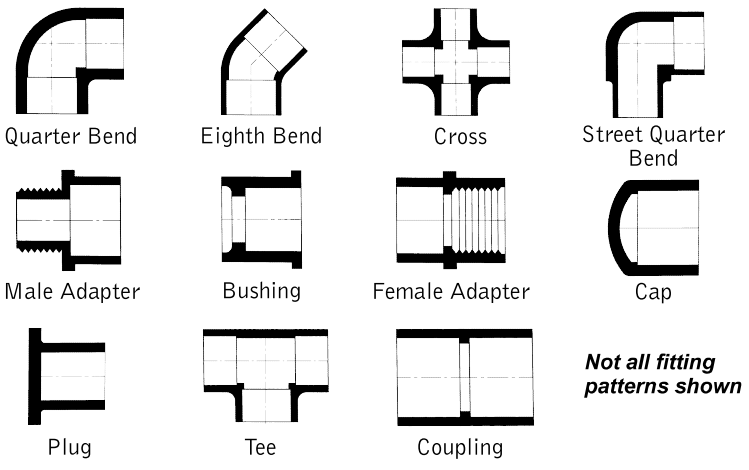
Installation:

Installation shall comply with the latest installation instructions published by Charlotte Pipe and Foundry and shall conform to all applicable plumbing, fire, and building code requirements. Buried pipe shall be installed in accordance with ASTM F 1668 and ASTM D 2774. Solvent cement joints shall be made in a two-step process with a primer meeting ASTM F 656 and a medium- or heavy-bodied solvent cement conforming to ASTM D 2564. The system shall be protected from chemical agents, fire-stopping materials, thread sealant, plasticized-vinyl products or other aggressive chemical agents not compatible with PVC compounds. The system shall be hydrostatically tested after installation. **WARNING!** Never test with or transport/store compressed air or gas in PVC pipe or fittings. Doing so can result in explosive failures and cause severe injury or death.

Referenced Standards:

ASTM D 1784: Rigid Vinyl Compounds
ASTM D 1785: PVC Plastic Pipe, Schedule 80
ASTM D 2464 or D 2467: PVC Threaded Fittings, Schedule 80
ASTM D 2467: PVC Socket Fittings, Schedule 80
ASTM D 2564: Solvent Cements for PVC Pipe and Fittings
ASTM D 2774: Underground Installation of Thermoplastic Pressure Piping
ASTM F 1668: Procedures for Buried Plastic Pipe
NSF Standard 14: Plastic Piping Components & Related Materials
NSF Standard 61: Drinking Water System Components–Health Effects

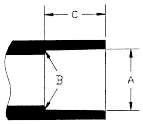
MADE IN U.S.A.



Not all fitting patterns shown

Van Stone Flange

Schedule 80
Tapered Socket Dimensions



PVC SCHEDULE 80 - ASTM D 2467

Nominal Size	Schedule 80 and Schedule 40 Socket Diameter Entrance A	Bottom B	Tolerance	Schedule 80 Socket Length C (Minimum)	Schedule 40 Socket Length C (Minimum)
½	0.848	0.836	±0.004	0.875	0.688
¾	1.058	1.046	±0.004	1.000	0.719
1	1.325	1.310	±0.005	1.125	0.875
1¼	1.670	1.655	±0.005	1.250	0.938
1½	1.912	1.894	±0.006	1.375	1.094
2	2.387	2.369	±0.006	1.500	1.156
2½	2.889	2.868	±0.007	1.750	1.750
3	3.516	3.492	±0.008	1.875	1.875
4	4.518	4.491	±0.009	2.250	2.000
6	6.647	6.614	±0.011	3.000	3.000
8	8.655	8.610	±0.015	4.000	4.000
10	10.780	10.735	±0.015	5.000	5.000
12	12.780	12.735	±0.015	6.000	6.000

PIPE REFERENCE GUIDE

Product	Sizes Available																
	¼	⅜	½	¾	1	1¼	1½	2	2½	3	4	5	6	8	10	12	14	16
PVC Schedule 80	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•

Charlotte Pipe and Foundry Company • P.O. Box 35430 Charlotte, NC 28235 • (800) 438-6091 • www.charlottepipe.com

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VXE Series Ball Valves

Submittal Datasheet

< STANDARDS >

ASTM D1784
ASTM D2466
ASTM D2467
ASTM F439
ASTM D2464
ASTM F437
ASTM D1498

ANSI B1.20.1

Certified to NSF/ANSI 61-G

The IPEX EasyFit VXE Series True Union Ball Valves represent the latest innovation in thermoplastic ball valve manufacturing technology. Developed in collaboration with Giugiaro Design, the VXE Series replaces the well received VX Series with new and cutting edge features and is designed for industrial, general purpose and O.E.M. applications. This valve features an ultra-compact double block design, and full port bi-directional operation. The true union design allows the valve to be easily removed from the piping system and be fully serviced. A threaded seat stop carrier provides improved seal integrity under tough service conditions while the EasyFit multifunction handle doubles as a tool for ball seat adjustment, and for tightening union nuts precisely.

VXE ball valves are part of our complete system of IPEX pipe, valves, and fittings, engineered and manufactured to our strict quality, performance, and dimensional standards.

VALVE AVAILABILITY

BODY MATERIAL	PVC, ~~CPVC~~
SIZE RANGE	4"
Pressure	232 psi
SEATS	Teflon® (PTFE)
SEALS	~~EPDM or~~ FPM
END CONNECTIONS	Socket (IPS), Threaded (FNPT), Flanged (ANSI150)

* 4" with venturied ends

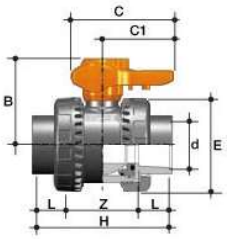
ipexna.com
Toll Free: 866 473-9462

IPEX
Committed to Excellence

VXE Series Ball Valves

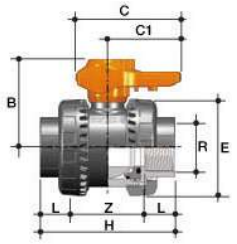
Product Data Sheet

Dimensions



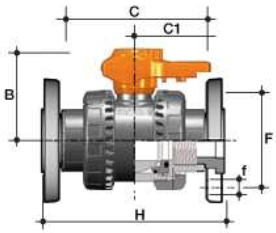
VXE IPS Socket (inches)

Size	d	L	Z	H	E	B	C	C1
1/2	0.84	0.89	2.01	3.78	2.13	1.93	2.52	0.79
3/4	1.05	1.00	2.13	4.13	2.48	2.44	3.07	0.91
1	1.32	1.13	2.34	4.61	2.83	2.80	3.43	1.06
1-1/4	1.66	1.26	2.83	5.35	3.35	3.23	4.02	1.18
1-1/2	1.90	1.38	3.03	5.79	3.94	3.62	4.29	1.30
2	2.38	1.50	3.84	6.85	4.65	4.33	5.24	1.54



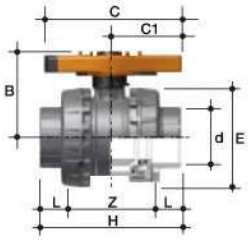
VXE NPT Female (inches)

Size	R	L	Z	H	E	B	C	C1
1/2	1/2-NPT	0.70	2.14	3.54	2.13	1.93	2.52	0.79
3/4	3/4-NPT	0.71	2.24	3.66	2.48	2.44	3.07	0.91
1	1-NPT	0.89	2.55	4.33	2.83	2.80	3.43	1.06
1-1/4	1-1/4-NPT	0.99	3.02	5.00	3.35	3.23	4.02	1.18
1-1/2	1-1/2-NPT	0.97	3.21	5.16	3.94	3.62	4.29	1.30
2	2-NPT	1.17	4.01	6.34	4.65	4.33	5.24	1.54



VXE ANSI Flanged (inches)

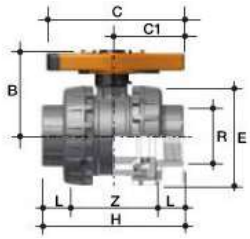
Size	No of Holes	f	F	H	B	C	C1
1/2	4	5/8	2-3/8	5.59	1.93	2.52	0.79
3/4	4	5/8	2-3/4	6.07	2.44	3.07	0.91
1	4	5/8	3-1/8	6.74	2.80	3.43	1.06
1-1/4	4	5/8	3-1/2	7.54	3.23	4.02	1.18
1-1/2	4	5/8	3-7/8	8.29	3.62	4.29	1.30
2	4	3/4	4-3/4	9.60	4.33	5.24	1.54



VXE IPS Socket (inches)

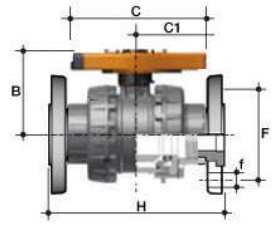
Size	d	L	Z	H	E	B	C	C1
2-1/2	2.875	1.75	4.80	8.31	6.18	5.59	8.43	4.53
3	3.5	1.89	5.98	9.76	6.85	5.95	9.41	4.96
4	4.5	2.26	6.61	11.14	8.35	6.87	10.63	5.71
*6	6.625	3.03	18.56	24.62	8.35	6.87	10.63	5.71

* 6" VXE is a 4" with venturied ends



VXE NPT Female (inches)

Size	R	L	Z	H	E	B	C	C1
2-1/2	2-1/2-NPT	1.31	5.69	8.31	6.18	5.59	8.43	4.53
3	3-NPT	1.40	6.97	9.76	6.85	5.95	9.41	4.96
4	4-NPT	1.48	8.18	11.14	8.35	6.87	10.63	5.71



VXE ANSI Flanged (inches)

Size	No of Holes	f	F	H	B	C	C1
2-1/2	4	3/4	5-1/2	10.93	1.93	2.52	0.79
3	4	3/4	6	12.22	2.44	3.07	0.91
4	8	3/4	7-1/2	13.93	2.80	3.43	1.06
*6	8	7/8	9-1/2	27.48	3.23	4.02	1.18

Note: Flanged connections are assembled at the factory. Due to manufacturing constraints dimension H may not be exactly as shown. The dimensions provided are approximate and should not be used to create precise layouts.

United Poly Systems

Manufacturers of HDPE pipe

Your Industry Connection for Resource Protection

United Poly Systems, LLC was established by Jim Massengale and Bert Bridges to produce High Density Polyethylene (HDPE) pipe. With over 40 years of combined industry experience, the founders capitalize on their vast experience as well as their extensive relationships with customers and vendors to drive United Poly Systems' success.

As of 2019, Industrial Opportunity Partners (IOP) has acquired United Poly Systems. Operations of United Poly Systems will continue expanding under a partnership that includes the founders and UPS management team.

United Poly Systems produces pipe with diameters from ¾" to 26" IPS and 4" to 24" DIPS for use in a number of industries. HDPE pipe is used by a variety of markets including **telecommunications, power utility, electrical, and oil&gas**. The market for HDPE pipe continues to expand as initiatives to improve and expand infrastructure are implemented.

Located in Springfield Missouri and Albuquerque New Mexico, United Poly Systems is able to serve the Midwest, South Central US, and Western US markets.

We also have a wide selection of HDPE products ready to ship today.

Visit **UnitedPolySystems.com** today!

United Poly Systems manufactures High Density Polyethylene Pipe (HDPE) for a variety of infrastructure applications. Our product offering is commonly used in the Telecommunications, Power Utility, Electrical, CATV, Sewer, Potable Water and Oil/ Gas collection industries.

We offer our conduit in **any color**, **smooth or ribbed**, **with or without a pull tape** pre-installed, and **pre-lubricated**. We will customize your order to your needs, regardless of size, color, or footage that you may need.

United Poly Systems has an onsite laboratory to ensure we are using the best raw materials available and give you the peace of mind in knowing the finished product you receive is of the highest quality. We are conveniently located in **Springfield Missouri** and **Albuquerque New Mexico** with a very competitive freight advantage to service much of the United States. As a small business, we are very accessible to our customers and put the utmost time and effort into assuring your needs are met in every way. Please give us a call today for an unmatched customer experience.

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IPS Size	Avg. OD	SDR / PSI	7 / 335	7.3 / 320	9 / 250	11 / 200	13.5 / 160	15.5 / 139	17 / 130	19 / 110	21 / 100	26 / 80	32.5 / 65
3/4	1.05	Min Wall	0.150	–	0.117	0.095	0.078	–	–	–	–	–	–
		Avg ID	0.732	–	0.802	0.849	0.885	–	–	–	–	–	–
		Weight p/ft	0.180	–	0.150	0.120	0.100	–	–	–	–	–	–
1	1.315	Min Wall	0.188	0.180	0.146	0.120	0.097	–	–	–	–	–	–
		Avg ID	0.916	0.933	1.005	1.061	1.109	–	–	–	–	–	–
		Weight p/ft	0.288	0.278	0.230	0.200	0.160	–	–	–	–	–	–
1 1/4	1.66	Min Wall	0.237	0.227	0.184	0.151	0.123	0.107	0.107	–	–	–	–
		Avg ID	0.157	1.178	1.292	1.358	1.414	1.446	1.465	–	–	–	–
		Weight p/ft	0.459	0.442	0.370	0.310	0.250	0.224	0.206	–	–	–	–
1 1/2	1.90	Min Wall	0.271	0.260	0.211	0.173	0.141	0.123	0.112	–	–	–	–
		Avg ID	1.325	1.348	1.478	1.554	1.618	1.654	1.676	–	–	–	–
		Weight p/ft	0.600	0.580	0.480	0.400	0.330	0.295	0.270	–	–	–	–
2	2.375	Min Wall	0.339	0.325	0.264	0.213	0.176	0.153	0.140	0.125	0.113	–	–
		Avg ID	1.656	1.685	1.815	1.917	2.002	2.069	2.078	2.110	2.135	–	–
		Weight p/ft	0.939	0.906	0.760	0.640	0.530	0.458	0.430	0.390	0.350	–	–
2 1/2	2.875	Min Wall	0.411	0.394	0.319	0.262	0.213	0.213	0.169	–	–	–	–
		Avg ID	2.004	2.040	2.198	2.351	2.449	2.424	2.516	–	–	–	–
		Weight p/ft	1.377	1.329	1.109	0.930	0.764	0.771	0.622	–	–	–	–
3	3.50	Min Wall	0.500	0.479	0.389	0.318	0.259	0.226	0.206	0.184	0.167	0.135	0.1076
		Avg ID	2.44	2.484	2.675	2.826	2.951	3.048	3.063	3.110	3.146	3.214	3.285
		Weight p/ft	2.040	1.968	1.660	1.390	1.150	0.997	0.932	0.840	0.770	0.63	0.494
4	4.50	Min Wall	0.643	0.616	0.500	0.409	0.333	0.290	0.265	0.237	0.214	0.173	0.138
		Avg ID	3.137	3.193	3.440	3.633	3.794	3.920	3.938	3.998	4.046	4.133	4.207
		Weight p/ft	3.372	3.253	2.740	2.290	1.900	1.645	1.514	1.390	1.260	1.03	0.83

IPS Size	Avg. OD	SDR / PSI	7 / 335	7.3 / 320	9 / 250	11 / 200	13.5 / 160	15.5 / 139	17 / 130	19 / 110	21 / 100	26 / 80	32.5 / 65
5	5.563	Min Wall	0.795	0.762	0.618	0.506	0.412	0.359	0.327	0.293	0.265	0.214	0.171
		Avg ID	3.878	3.947	4.253	4.490	4.690	4.844	4.870	4.942	5.001	5.109	5.20
		Weight p/ft	5.170	4.975	4.180	3.510	2.910	2.517	2.352	2.120	1.930	1.57	1.27
6	6.625	Min Wall	0.946	0.908	0.736	0.602	0.491	0.427	0.390	0.349	0.315	0.255	0.204
		Avg ID	4.619	4.701	5.065	5.349	5.584	5.771	5.798	5.885	5.957	6.084	6.193
		Weight p/ft	7.330	7.059	5.930	4.970	4.130	3.566	3.340	3.010	2.730	2.23	1.781
7	7.125	Min Wall	–	–	–	–	–	–	0.419	0.375	0.339	0.274	0.219
		Avg ID	–	–	–	–	–	–	6.236	6.330	6.406	6.544	6.660
		Weight p/ft	–	–	–	–	–	–	3.821	3.442	3.128	2.553	2.057
8	8.625	Min Wall	1.232	1.182	0.958	0.784	0.639	0.556	0.507	0.454	0.411	0.332	0.265
		Avg ID	6.013	6.120	6.593	6.963	7.271	7.445	7.549	7.663	7.754	7.922	8.062
		Weight p/ft	12.385	11.963	9.988	8.359	6.939	6.100	5.597	5.044	4.591	3.744	3.012
10	10.75	Min Wall	1.536	1.473	1.194	0.977	0.796	0.694	0.632	0.566	0.512	0.413	0.331
		Avg ID	7.494	7.628	8.218	8.678	9.062	9.280	9.409	9.551	9.665	9.873	10.049
		Weight p/ft	19.245	18.581	15.515	12.983	10.774	9.490	8.695	7.838	7.128	5.805	4.689
12	12.75	Min Wall	1.821	1.747	1.417	1.159	0.944	0.823	0.750	0.671	0.607	0.490	0.392
		Avg ID	8.889	9.047	9.747	10.293	10.748	11.006	11.160	11.327	11.463	11.710	11.918
		Weight p/ft	27.062	26.138	21.837	18.267	15.155	13.348	12.238	11.021	10.023	8.169	6.587
14	14.00	Min Wall	2.000	1.918	1.556	1.273	1.037	0.903	0.824	0.737	0.667	0.538	0.431
		Avg ID	9.760	9.934	10.702	11.302	11.801	12.085	12.254	12.438	12.587	12.858	13.087
		Weight p/ft	32.635	31.511	26.329	22.030	18.279	16.082	14.763	13.292	12.093	9.848	7.952
16	16.00	Min Wall	2.286	2.192	1.778	1.455	1.185	1.032	0.941	0.842	0.762	0.615	0.492
		Avg ID	11.154	11.353	12.231	12.916	13.487	13.812	14.005	14.215	14.385	14.695	14.956
		Weight p/ft	42.629	41.157	34.384	28.777	23.872	21.005	19.269	17.355	15.789	12.866	10.375

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SCH 40 & SCH 80

IPS Size	Avg OD		SCH 40	SCH 80
¾	1.050	Min Wall	0.113	0.154
		Avg ID	0.804	0.0722
		Weight p/ft	0.215	0.188
1	1.315	Min Wall	0.133	0.179
		Avg ID	0.804	0.936
		Weight p/ft	0.145	0.277
1 1/4	1.660	Min Wall	0.140	0.191
		Avg ID	1.360	1.255
		Weight p/ft	0.291	0.383
1 1/2	1.900	Min Wall	0.145	0.200
		Avg ID	1.59	1.476
		Weight p/ft	0.349	0.465
2	2.375	Min Wall	0.154	0.218
		Avg ID	2.047	1.913
		Weight p/ft	0.469	0.644
2 1/2	2.875	Min Wall	0.203	0.276
		Avg ID	2.445	2.290
		Weight p/ft	0.744	0.982
3	3.500	Min Wall	0.216	0.300
		Avg ID	3.042	2.864
		Weight p/ft	0.973	1.315
4*	4.500	Min Wall	0.237	0.337
		Avg ID	3.998	3.786
		Weight p/ft	1.387	1.923
5*	5.563	Min Wall	0.258	0.375
		Avg ID	5.016	4.768
		Weight p/ft	1.882	2.668
6*	6.625	Min Wall	0.280	0.432
		Avg ID	6.031	5.709
		Weight p/ft	2.443	3.669

*****Note: 4"sch 40, 5" sch 40 & 6" sch 40 & sch80 are NON COILABLE items due to thin walls*****

DIPS Size	Avg. OD	SDR / PSI	7 / 335	9 / 250	11 / 200	13.5 / 160	17 / 130	21 / 100	26 / 80	32.5 / 65
4	4.80	Min Wall	.686	.533	.436	.356	.282	.229	.185	.148
		Avg ID	3.346	3.67	3.876	4.045	.4202	4.315	4.408	4.487
		Weight p/ft	3.87	3.13	2.62	2.18	1.76	1.44	1.18	.95
6	6.90	Min Wall	.986	.767	.627	.511	.406	.329	.265	.212
		Avg ID	4.81	5.274	5.571	5.817	6.039	6.203	6.338	6.45
		Weight p/ft	8	6.47	5.42	4.5	3.64	2.98	2.43	1.96
8	9.05	Min Wall	1.293	1.006	.823	.67	.532	.431	.348	.278
		Avg ID	6.309	6.917	7.305	7.63	7.922	8.136	8.312	8.46
		Weight p/ft	13.76	11.13	9.32	7.75	6.26	5.13	4.19	3.38
10	11.10	Min Wall	1.586	1.233	1.009	.822	.653	.529	.427	.342
		Avg ID	7.738	8.486	8.961	9.357	9.716	9.97	10.19	10.37
		Weight p/ft	20.7	16.74	14.03	11.66	9.42	7.72	56.3	65.08
12	13.20	Min Wall	1.886	1.467	1.2	.978	.776	.629	.508	.405
		Avg ID	9.202	10.09	10.65	11.12	11.55	11.86	12.12	12.33
		Weight p/ft	29.27	23.67	19.84	16.48	13.32	10.92	8.91	7.19
14	15.30	Min Wall	2.186	1.7	1.391	1.133	.9	.729	.588	.471
		Avg ID	10.66	11.69	12.35	12.89	13.39	13.75	14.05	14.30
		Weight p/ft	69.33	631.8	26.65	22.15	17.89	14.67	11.97	29.66
16	17.40	Min Wall	2.486	1.933	1.582	1.289	1.024	.829	.669	.535
		Avg ID	12.13	13.30	14.04	14.66	15.22	15.64	15.98	16.26
		Weight p/ft	50.87	41.13	34.47	28.64	23.14	18.97	15.48	12.49

Large Diameter Size/Class

IPS

IPS Size	Avg. OD	SDR / PSI	7 / 335	7.3 / 320	9 / 250	11 / 200	13.5 / 160	15.5 / 139	17 / 130	19 / 110	21 / 100	26 / 80	32.5 / 65
18	18	Min Wall	2.571	2.466	2.00	1.636	1.333	1.161	1.059	0.947	0.857	0.692	0.554
		Avg ID	12.549	12.77	13.76	14.532	15.174	15.54	15.755	15.992	16.183	16.533	16.826
		Weight p/ft	53.947	52.085	43.513	36.411	30.217	26.59	24.391	21.967	19.981	16.293	13.139
20	20	Min Wall	2.857	2.739	2.222	1.818	1.482	1.290	1.177	1.053	0.952	0.769	0.615
		Avg ID	13.943	14.19	15.289	16.146	16.86	17.26	17.507	17.768	17.982	18.37	18.696
		Weight p/ft	66.602	64.302	53.719	44.951	37.305	32.827	30.113	27.12	24.667	20.115	16.221
22	22	Min Wall	3.1429	_	2.444	2.00	1.629	–	1.294	1.158	1.048	0.846	0.677
		Avg ID	15.337	_	15.337	17.76	18.544	–	19.257	19.545	19.778	20.206	20.565
		Weight p/ft	80.588	_	65.001	54.391	45.14	–	36.437	32.816	29.847	24.339	19.627
24	24	Min Wall	3.429	3.288	2.667	2.182	1.778	1.548	1.412	1.263	1.143	0.923	0.739
		Avg ID	16.732	17.03	18.346	19.374	20.231	20.72	21.007	21.322	21.577	22.043	22.435
		Weight p/ft	95.906	92.595	77.356	64.73	53.719	47.271	43.362	39.053	35.521	28.966	23.358
26	26	Min Wall	_	_	2.889	2.364	1.926	1.677	1.529	_	1.238	1.000	0.800
		Avg ID	_	_	19.876	20.989	21.917	22.444	22.758	_	23.375	23.88	24.304
		Weight p/ft	_	_	92.535	77.44	64.261	56.532	51.856	_	42.486	34.648	27.940

DIPS

DIPS Size	Avg. OD	SDR / PSI	7 / 335	7.3 / 320	9 / 250	11 / 200	13.5 / 160	15.5 / 139	17 / 130	19 / 110	21 / 100	26 / 80	32.5 / 65
18	19.5	Min Wall	2.786	2.671	2.167	1.773	1.444	1.258	1.147	1.026	0.929	0.750	0.600
		Avg ID	13.594	13.837	14.907	15.742	16.438	16.833	17.068	17.324	17.531	17.910	18.228
		Weight p/ft	63.318	61.123	51.074	42.738	35.453	31.205	28.625	25.774	23.460	19.122	15.420
20	21.6	Min Wall	3.086	2.959	2.400	1.964	1.600	1.394	1.271	1.137	1.029	0.831	0.665
		Avg ID	15.058	15.327	16.512	17.437	18.208	18.646	18.906	19.190	19.419	19.839	20.191
		Weight p/ft	77.690	75.004	62.659	52.440	43.513	38.301	35.134	31.637	28.783	23.469	18.931
24	25.8	Min Wall	3.686	3.534	2.867	2.345	1.911	1.665	1.518	1.358	1.229	0.992	0.794
		Avg ID	17.986	18.307	19.723	20.828	21.748	22.271	22.583	22.921	23.195	23.696	24.117
		Weight p/ft	112.970	109.056	91.123	76.229	63.270	55.693	51.086	46.002	41.852	34.107	27.517

UNITED POLY SYSTEMS

C O N D U I T

Applications include:

Telecom, Energy, DOT, Etc.

Installation:

Existing Conduit, Plow, Direct Burial,
HDD (Horizontal Directional Drilling)

- Product may be striped for a number of different indicators
- Product is manufactured in IPS (iron pipe size) and DIPS (ductile iron pipe size 4" and up). Product available in ¾" to 16" diameters
- The material requirements for PE conduit shall be classified in accordance with ASTM Standard D 3350 "Standard Specification for Polyethylene Plastic Pipe and Fittings Materials". ASTM D 3350 defines important physical properties of HDPE materials into ranges, or cell classes, so that each property can be defined within a range that is appropriate for the application.
- For HDPE conduit according to ASTM F 2160, the High Density Polyethylene material is defined as noted below:

Property	Range or Minimum Requirement	Units	Cell Class	Test Method
Density	0.941-0.955	g/cc	3	ASTM D 792 or 1505
Melt Index [a]	<0.25-0.40	g/10 minutes	3or4	ASTM D 1238
Flexural Modulus	110,000-160,000	Psi	4or5	ASTM D 790
Tensile Strength	3000-4000	Psi	4or5	ASTM D 638
Environmental Stress Crack Resistance [b]	F20>192	Hours (condition C)	3or4	ASTM D 1693
HDB	Not Defined		0,1,2,3,or 4	ASTM D2837

*Nominal values are to be used as guidelines only; this is not a product specification and does not indicate minimum or maximum values.

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Print line

The duct product shall be sequentially marked and identified along its outer length in contrasting color. The print interval shall be every two feet and shall include the following:

MANUFACTURER'S NAME: United Poly Systems

PRODUCT SIZE/SDR

PRODUCTION CODE (Date, Location, Period)

SPECIFICATION

LENGTH OF CONDUIT (in feet) on reel

Optional custom print lines are available and may include customer name, project name, application etc.

Minimum Order Quantities

Minimum order quantities are as follows:

Size (in)	*Color*	*Minimum (ft)*
¾"	Any	2500
1"	Any	2500
1 ¼"	Orange or Black	2000
1 ¼"	Other	3000
1 ½"	Orange or Black	1500
1 ½"	Other	2500
2"	Orange or Black	1000
2"	Other	2000
2 ½"	Orange or Black	2500
2 ½"	Other	5000
3"	Orange or Black	1000
3"	Other	2000
4"	Orange or Black	500
4"	Other	750
	Ducts larger than 4"diameter offered in black or w/stripes only	
5"		1000
6"		900
8"		560
10"		560
12"		480
14"		560
16"		480

Reel Dimensions

Standard dimensions for United Poly Systems reels are as follows:

All reels come in a standard 48" width unless otherwise requested by customer. Standard common reel diameters are 48", 66", 72", 83" 96", 102", 114" and 120".

Segmented reels are also available in 2-way, 3-way or 4-way configurations. United Poly Systems does not currently parallel wrap duct.

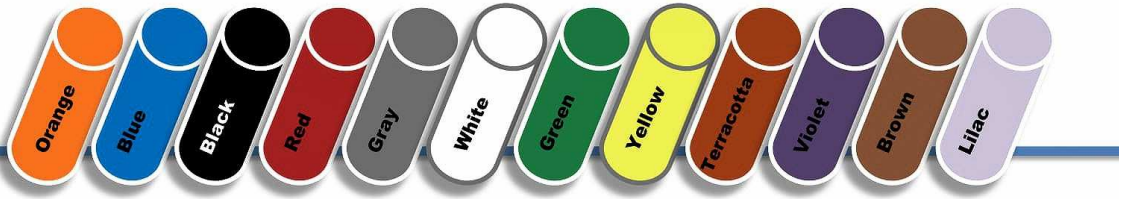
¾" and 1" size ducts are wrapped to a preferred diameter reel size of 48", 66" or 72".

6" duct is offered on 450' 120" reels or in coils of 500'

United Poly Systems will not coil 4" schedule 40 HDPE pipe due to the potential for compromise of product integrity.

Options

- Straight longitudinal internal ribbing is available for all pipes 2" and below.
  - ***UNIFORM STRAIGHT INTERNAL RIBS SPANNING THE LENGTH OF THE PIPE***
- Optional custom print lines are available and may include customer name, project name, application, lightning bolt etc.
- Pull tape is offered in a number of tensile strengths. United Poly Systems standard pull tape is an 1130# strength, while other options include strengths from 200# to 2500#.
- Segmented reels are available in 2-way, 3-way or 4-way configurations. United Poly Systems does not currently parallel wrap duct.
- A number of colors and stripes are offered to customize the product to the customer's needs. United Poly Systems offers orange, blue, black, red, gray, white, green, yellow, terracotta, violet, brown, lilac, and custom colors upon customer's request.



Custom colors available upon request

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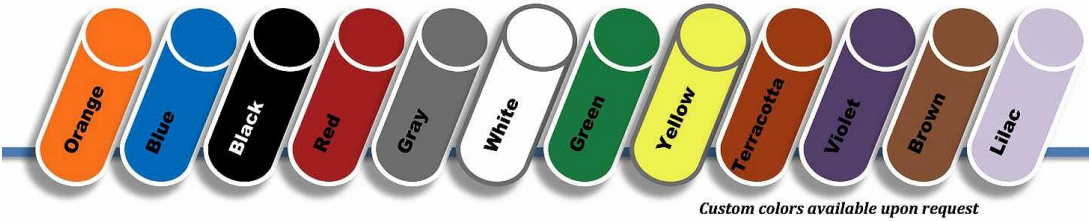
Coil Sizes

Standard coil lengths are as follows:

Size (in)	Standard Coil Footages (ft)	Quantity per pallet	Coil ID(in)	Coil Width (in)
¾"	500 - 1000	8	30	10 - 20
1"	500 - 1000	7 - 5	30	11 - 20
1 ¼"	500 - 1000	5 - 3	30	16 - 29.5
1 ½"	500 - 1000	8 - 6	51 - 51	13.5 - 16
2"	500 - 1000 - 1500 - 2000	7 - 4 - 3 - 3	51 - 51 - 51 - 51	14 - 22.5 - 28 - 32
3"	500 - 1000	4 - 2	69.5 - 69.5	23.5 - 45
4"	500 - 600 - 800	3 - 2 - 2 - 2	69.5 - 70 - 69.5	31 - 48 - 49
5"	500	2	84	50
6"	450	2	84	50

Internal Ribbing

United Poly Systems is proud to offer HDPE duct with longitudinal internal ribbing for ¾" to 2" diameters. Ribbed duct offers a way to maximize the distance cable may be pulled and jetted into conduit. The internal ribs help to reduce the coefficient of friction within that particular pipe. Air may flow more readily around the cable and contact with the wall of the duct is reduced thereby reducing friction and simplifying instillation. Inside ribbed duct is available up to 6' diameter conduit. Ribbed conduit is offered on segmented reels with or without any of our pre-installed pull tape options and can be manufactured in any solid color or striping.



Custom colors available upon request

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UNITED POLY SYSTEMS

C O N D U I T
S T I C K P I P E

Applications include:

Telecom, Energy, DOT, Etc.

Installation:

Existing Conduit, Plow, Direct Burial, HDD

(Horizontal Directional Drilling)

- Product may be striped for different indicators
- Product is manufactured in IPS (iron pipe size) and DIPS (ductile iron pipe size 4" and up). Product available in ¾" to 16" diameters
- The material requirements for PE conduit shall be classified in accordance with ASTM Standard D 3350 "Standard Specification for Polyethylene Plastic Pipe and Fittings Materials". ASTM D 3350 defines important physical properties of HDPE materials into ranges, or cell classes, so that each property can be defined within a range that is appropriate for the application.
- For HDPE conduit according to ASTM F 2160, the High Density Polyethylene material is defined as noted below:

Property	Range or Minimum Requirement	Units	Cell Class	Test Method
Density	0.941-0.955	g/cc	3	ASTM D 792 or 1505
Melt Index [a]	<0.25-0.40	g/10 minutes	3or4	ASTM D 1238
Flexural Modulus	110,000-160,000	Psi	4or5	ASTM D 790
Tensile Strength	3000-4000	Psi	4or5	ASTM D 638
Environmental Stress Crack Resistance [b]	F20>192	Hours (condition C)	3or4	ASTM D 1693
HDB	Not Defined		0,1,2,3,or 4	ASTM D2837

*Nominal values are to be used as guidelines only; this is not a product specification and does not indicate minimum or maximum values.

Print line

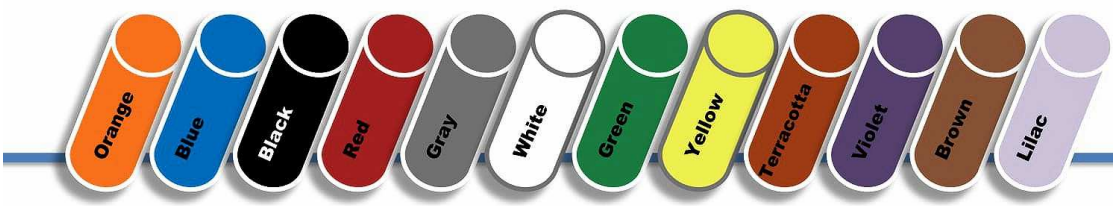
The duct product shall be sequentially marked and identified along its outer length in contrasting color. The print interval shall be every two feet and shall include the following:

- MANUFACTURER'S NAME: United Poly Systems
- PRODUCT SIZE/SDR:
- PRODUCTION CODE (Date, Location, Period)
- SPECIFICATION: Color Code - Resin Code
- LENGTH OF CONDUIT: Sequential footage markings

Optional custom print lines are available and may include customer name, project name, application etc.

Options

- Pipe available in 20 foot - 40 foot - 50' joints
    - Custom lengths may be available if achievable in production
- Optional custom print lines are available and may include customer name, project name, application, lightning bolt etc.
- Pull tape is offered in several tensile strengths. United Poly Systems standard pull tape is an 1130# strength, while other options include strengths from 200# to 2500#.
- A number of colors and stripes are offered to customize the product to the customer's needs. United Poly Systems offers orange, blue, black, red, gray, white, green, yellow, terracotta, violet, brown, lilac, and custom colors upon customer's request.



UNITED POLY SYSTEMS

L I S T E D C O N D U I T

Applications include:

Power Utility, Telecom, Energy, DOT, Etc.

Installation:

Existing Conduit, Plow, Direct Burial, HDD

(Horizontal Directional Drilling)

Manufactured to Comply with UL 651A Standards

- Product may be colored/striped for different indicators
- Product is manufactured in IPS (iron pipe size). Product available in ¾" to 4" diameters.
- The material requirements for PE conduit shall be classified in accordance with ASTM Standard D 3350 "Standard Specification for Polyethylene Plastic Pipe and Fittings Materials". ASTM D 3350 defines important physical properties of HDPE materials into ranges, or cell classes, so that each property can be defined within a range that is appropriate for the application. tested and listed by NSF international to assure compliance with UL 651A.
- For HDPE conduit according to ASTM F 2160, the High Density Polyethylene material is defined as noted below:

Property	Range or Minimum Requirement	Units	Cell Class	Test Method
Density	0.941-0.955	g/cc	3	ASTM D 792 or 1505
Melt Index [a]	<0.25-0.40	g/10 minutes	3or4	ASTM D 1238
Flexural Modulus	110,000-160,000	Psi	4or5	ASTM D 790
Tensile Strength	3000-4000	Psi	4or5	ASTM D 638
Environmental Stress Crack Resistance [b]	F20>192	Hours (condition C)	3or4	ASTM D 1693
HDB	Not Defined		0,1,2,3,or 4	ASTM D2837

*Nominal values are to be used as guidelines only; this is not a product specification and does not indicate minimum or maximum values.

Print line

The duct product shall be sequentially marked and identified along its outer length in contrasting color. The print interval shall be every two feet and shall include the following:

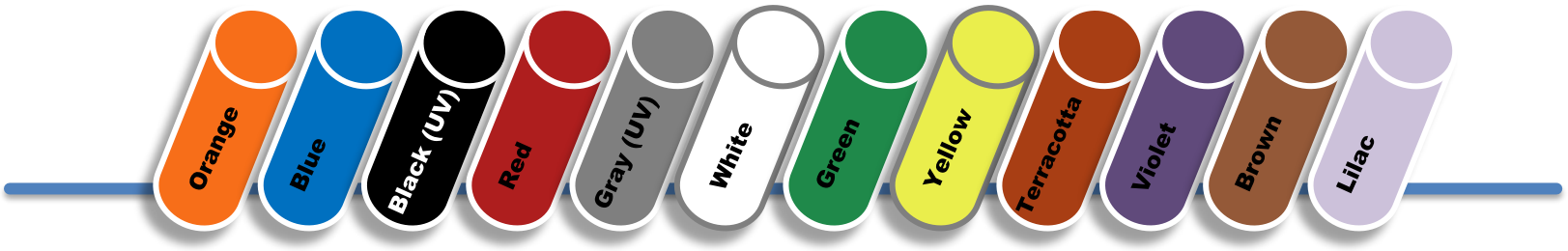
- MANUFACTURER'S NAME: United Poly Systems
- PRODUCT SIZE/SDR:
- PRODUCTION CODE (Date, Location, Period)
- SPECIFICATION: Color Code - Resin Code
- LENGTH OF CONDUIT: Sequential footage markings

Optional custom print lines are available and may include customer name, project name, application etc.

HDPE - UNITED POLY SYSTEMS - 1" - IPS - SCH40 - NSF® ELECTRICAL UL 651A 3-03-19 A2 MO. LOT 3-03-19 A2 MO

Options

- Optional custom print lines are available and may include customer name, project name, application, lightning bolt etc.
- Pull tape is offered in several tensile strengths. United Poly Systems standard pull tape is an 1130# strength, while other options include strengths from 200# to 2500#.
- A number of colors and stripes are offered to customize the product to the customer's needs. United Poly Systems offers orange, blue, black, red, gray, white, green, yellow, terracotta, violet, brown, lilac, and custom colors upon customer's request.



Notes

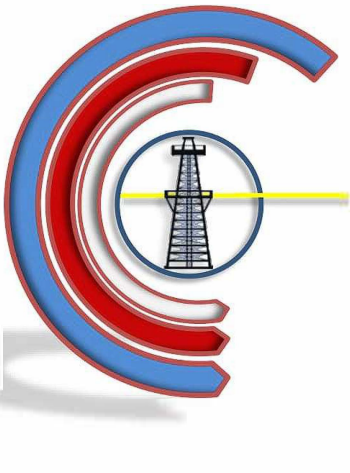
¬ Ovality of 2 inch and smaller conduit shall not exceed 7% off the coil. Coiled conduit larger than 2 inch through 3 inch IPS shall not exceed 10%. Ovality in coiled 4 inch and greater diameter conduit and casing is largely a packaging condition where greater than 15% ovality shall be corrected in the field by processing the roundable conduit through re-rounding and straightening equipment during installation. Straight lengths of conduit shall have ovality of 5% or less.
PPI. *HDPE Solid Wall Conduit Model Specification Power and Communications Conduit and Casing*. Tech. no. MS-5. 2008.

¬ HDPE conduit will ovalize when it is coiled, and after a period of time,will set into the coiled state. A residual curve is normal for all coiled HDPE duct products. Since larger duct is coiled into a relatively tighter bending radius, residual curvature and ovality is greater for larger diameters. Some couplers may be affected by ovalized duct, along with installations where cable-fill ratios reach near capacity, or where larger diameter cables are being placed. Residual curvature and ovality may be corrected in the field by running the entire coil through rerounding and straightening equipment during installation.

¬ **Schedule 40 HDPE conduit through 3" has a wall thickness greater than SDR 15.5. Schedule *40 HDPE conduits in diameters above 3" and Schedule 80 in 6" have wall thickness ranges that are less than SDR 15.5. United Poly Systems will not offer these sizes in continuous coils to preserve pipe integrity and limit ovality*.**

UNITED POLY SYSTEMS

D2513 OIL & GAS GATHERING



Applications:

United Poly Systems Pressure Pipe is used in oil and gas piping systems (D2513), water transfer, etc.

- Product may be manufactured with yellow line print for identification:

- Product is manufactured in IPS (iron pipe size) and DIPS (ductile iron pipe size 4" and up).
- The material requirements for PE pressure pipe shall meet or exceed ASTM Standard D 3350 requirements.

PE4710 Typical Physical Properties

*nominal values

Property	Typical Value	Units	Test Method
Density with minimum 2% carbon black	.960	g/cc	ASTM D 792 or 1505
High Load Melt Index	8.5	g/10 minutes	ASTM D 1238
Melt Index	0.08	g/10 minutes	ASTM D 1238
Flexural Modulus	110,000<160,000	Psi	ASTM D 790
Tensile Strength @ yield (2 in/min)	3600	Psi	ASTM D 638
Tensile Elongation @ Break	740%	%	ASTM D 638
Thermal expansion	1.0 x 10-4	in/in/°F	ASTM D 696
HDB 73.4° F (23°C)	1600	Psi	ASTM D 2837
HDB 140° F (60°C)	1000	Psi	ASTM D 2837
PENT	>500	Hrs	ASTM F1473
Brittleness Temperature	<-103°F (-75°C)	°F	ASTM D 746
Cell Classification	445574C(black only)		ASTM D 3350

***Nominal values are to be used as guidelines only; this is not a product specification and does not indicate minimum or maximum values.**

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UNITED POLY SYSTEMS

W A T E R L I N E

Applications include:

- Municipal and Industrial
- Potable water - NSF
- Sewer Line - AWWA/F714
- Force Main Sewer- AWWA/F714
- Slip Lining/Pipe Bursting
- Etc.

- Product may be striped for different indicators:
  Blue stripe - Water or Potable
  Green stripe - Sewer
  Purple stripe - Reclaim Water
- IPS/DIPS-Gray Pipe with or without stripe also offered for slip lining, pipe bursting, etc. (Gray Pipe Cell Classification 445574E)
- Product is manufactured in IPS (iron pipe size) and DIPS (ductile iron pipe size 4" and up).
- United Poly Systems Pressure Pipe is used in oil and gas piping systems (D2513), industrial & mining, force main sewer (AWWA/F714), potable water (NSF), & landfill.
- The material requirements for PE pressure pipe shall meet or exceed ASTM Standard D 3350 requirements. Materials produced for water application shall meet or exceed ASTM D3035.

PE4710 Typical Physical Properties

*nominal values

Property	Typical Value	Units	Test Method
Density with minimum 2% carbon black	.960	g/cc	ASTM D 792 or 1505
High Load Melt Index	8.5	g/10 minutes	ASTM D 1238
Melt Index	0.08	g/10 minutes	ASTM D 1238
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Cell Classification	445574C(black only)		ASTM D 3350

*Nominal values are to be used as guidelines only; this is not a product specification and does not indicate minimum or maximum values.

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* Revised 9/15/2016

UNITED POLY SYSTEMS

MINING & INDUSTRIAL

Applications:

United Poly Systems Pressure Pipe is used in industrial & mining applications.

- Tailings Transportation
- Dust Suppression
- Mine Dewatering
- Pit Dewatering
- Depressurization
- Odor Control
- Solution Mining
- Heap Leaching
- Process Water
- Process Slurry
- Water Transportation

- Manufactured from ¾" through 24"
- Dual striping available for SDR indication (8" through 24")
- Product is manufactured in IPS (iron pipe size) and DIPS (ductile iron pipe size 4" and up).
- The material requirements for PE pressure pipe shall meet or exceed ASTM Standard D 3350 requirements.

PE4710 Typical Physical Properties

*nominal values

Property	Typical Value	Units	Test Method
Density with minimum 2% carbon black	.960	g/cc	ASTM D 792 or 1505
High Load Melt Index	8.5	g/10 minutes	ASTM D 1238
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Cell Classification	445574C(black only)		ASTM D 3350

***Nominal values are to be used as guidelines only; this is not a product specification and does not indicate minimum or maximum values.**

Stripe Color to Identify SDR

	Brown	White	Red	Gold	Gray	Orange	Blue	Purple	Green	Pink
SDR	6	7	9	11	13.5	15.5	17	21	26	32.5

United Poly Systems

UNITED POLY SYSTEMS

M I C R O D U C T

Microduct Fiber Pathway

Advantages of Microduct Technology over Traditional Cabling Outlays

- Microduct products are easily and quickly installed in direct buried applications using minimally invasive micro-trenching equipment.
- Microduct pathways offer superior mechanical and environmental protection for lightweight microfiber optical cables, which can be easily, installed using various air blowing techniques, or traditional cable pulling and/or pushing methods.
- Microduct pathway systems offer telecom carriers increased flexibility due to the ease at which service laterals and drops can be reconfigured and installed as customer demand increases.
- Small diameter microduct products are offered in a wide variety of configurations. This gives carriers the option to install microduct pathways into existing occupied conduits.
- Microducts help to future proof carrier networks as additional fiber cables can be placed at a later time as the demand for additional capacity increases. Furthermore, whether for additional capacity or for general replacement, fiber optic cables are easily removed and replaced with high density, higher fiber count cables.
- Riser rated microduct products provide safe, flexible, lightweight, durable and easy to-install pathways to deploy bare fiber and microfiber cables inside a multi-dwelling unit (MDU) and commercial building.

Who are our customers?

Microduct Fiber Pathway provides a versatile and scalable network of HDPE microducts. This pathway is ideal for telecommunication providers, FTTH solutions, hospitals, utility and energy providers, transportation, entertainment, government facilities, corporate complexes, university campuses, military site applications and anywhere high speed communications are needed.

Utility Companies
System monitoring and controlling, and networked data communication.

Broadband Network
FTTH (Fiber To The Home) and FTTX (Fiber To The X = multiple destinations) providers using optical fiber to provide high speed service to end subscribers.

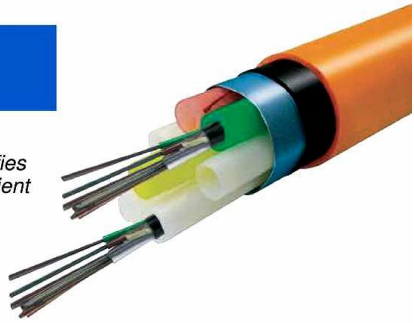
Hospital
Secure the entire hospital network to stay current with advances in data-intensive medical technology and limits staff and patient disruptions.

Campus
Adapts communication technologies to the tools of education in campus environments plus allows for interaction between outside organizations nationally and abroad for greater cooperation.

Developers
Helps with fiber installations to the home so that developers can provide high speed internet service to their customers while allowing for upgrades.

Government
Fiber moves, adds and changes are made quickly and enable segmented and secure networks in the same mircoduct configuration.

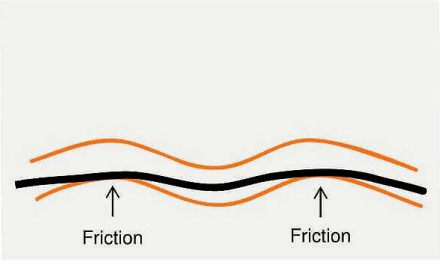
Micoduct Fiber Pathway



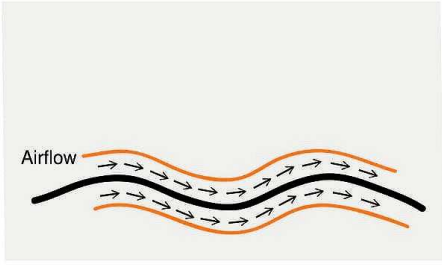
Microduct fiber pathways provide a permanent installation that satisfies your immediate fiber communication requirements and leaves sufficient pathway for future expansions. Any moves, adds or changes in the fiber network are quickly accommodated utilizing the fiber pathway and accessories.

Rapid, safe and smooth installation with air blowing methods

ABC installations are done by an air blowing technique that reduces the risk of damage to the fiber cable, accelerates installation time and increases the installation distance.



Pulling



Blowing

Microduct Selection Guidelines

Select the proper size microduct by using the Microduct Selection Guidelines table.

Fiber Counts Installed	1-12C	24-72C	96-144C	216-288C
OD of Cable	1.0-2.0mm	3.2-5.8mm	6.8 - 8.0mm	8.4-9.2mm
Microduct Tube Size (ID)	3.5mm	8mm	10mm	12mm

Conventional Cable & Micro Cable Comparison

Cable's OD varies depending on cable brand.

	Weight (kg/km)		Max. Outer Diameter (mm)	
Fiber Counts	Conventional Cable	Micro Cable	Conventional Cable	Micro Cable
24,38,72	110	30	11	5.8
96	208	40	14	6.8
144	257	50	16	7.8
216	342	65	18	8.4
288	342	90	18	9.2

Various Applications

If you have an under utilized conduit?

Direct install DI microduct can increase the fiber pathways available for your communication network in your existing conduit. Direct install microduct provides the needed pathway for current fiber cable requirements while allowing for the ease of future fiber moves, adds or changes.

Planning or designing new fiber networks?

Direct bury DB microduct is available in 5/3.5, 8/6,10/8 &12/10 mm sizes for rapid installation that satisfies both conduit and pathway in one simple installation. This cost effective solution provides for today's needs and allows for future rapid expansion.

Do you want to limit traffic disruptions?

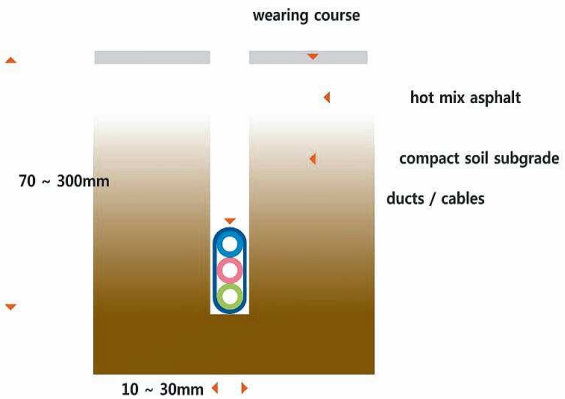
A pronounced benefit of micro trenching is that the process results in minimal traffic disruption, time and material savings and provides higher bandwidth to their customers.

Numerous styles & sizes available:

Direct Bury, Direct Install, Thick Walled Flat Duct, LSZH, Riser, and Aerial in mm sizes 5/3.5, 8/6, 10/8 & 12/10 & Thick Walled 7/3.5,10/6,12/8, 14/10, 16/12, 18/14, & larger size & custom configurations on request

Micro Trenching

- 70-300 mm depth/10-30 mm width
- By dedicated equipment
- Wet cut with Diamond tipped wheel
- Backfill with grout or hot/cold asphalt
- Fast and inexpensive as well



DB(Direct Bury)

- Silicone coated ducts
- Available Water Blocking tape (Aluminum or Fabric) installed
- Two Layer of Sheath
- Available Tracer Wire, Ripcords installed

The outer sheath is rugged High Density Poly Ethylene HDPE providing excellent protection from the physical environment. An Aluminum or non-metalic layer is added to provide additional strength whichresults in crush and impact resistance

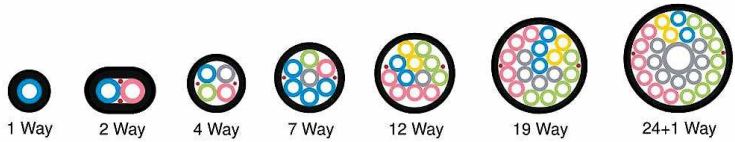
Primary Duct Dimensions OD/ID (mm)	Outside Dimensions H x W (mm)						
	1 Way	2 Way	4 Way	7 Way	12 Way	19 Way	24+1 Way
5/3.5mm	12.4	12.4X17.4	19.5	22.4	28.3	32.3	37.9
8/6mm	15.4	15.4X23.4	28.1	32.8	41.2	48.8	56.01
10/8mm	17.4	17.4X27.4	32.9	38.8			
12/10mm	19.4	19.4X31.4	37.8	44.8			

DI(Direct Install)

- Silicone coated ducts
- Available Water Blocking tape (Aluminum or Fabric) installed
- Available Tracer Wire, Ripcords installed

The microducts are surrounded by a layer of moisture-barrier metallic or non-metallic tape and a flexible sheath of black HDPE. DI ducts can be installed in pre-existing pipes or sub-ducts.

Primary Duct Dimensions OD/ID (mm)	Outside Dimensions H x W (mm)						
	1 Way	2 Way	4 Way	7 Way	12 Way	19 Way	24+1 Way
5/3.5mm	8.4	8.4 X13.4	15.5	18.4	23.7	27.7	33.3
8/6mm	11.4	11.4X19.4	23.1	27.8	36.2	43.8	51.01
10/8mm	13.4	13.4X23.4	27.9	33.8			
12/10mm	15.4	15.4X27.4	32.8	39.8			

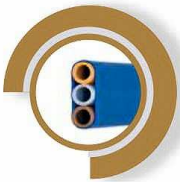


TW(Thick Wall)

Thick Walled Microduct is designed for direct burial. Its superior blowing characteristics and sufficient thickness of the sub duct Walls often results in no additional protective ducts required.
Thick walled microducts can be branched off easily and the primary tube can be directly buried as a single microduct. All TW duct are silicone coated. Available Tracer Wire, Ripcords installed

Primary Duct Dimensions OD/ID (mm)	Outside Dimensions H x W (mm)								
	1 Way	3 Way	4 Way	5 Way	6 Way	7 Way	12 Way	19 Way	24+1Way
7/3.5mm	9	15.1X16	16.9X16	15.1X16	19.5X21.1	21.1X23	27.2X30	33.2X37	43.6
10/6mm	12	20.7X22	22X22	27.4X28.2	27X29.3	29.3X32	42X37.98	52X46.64	
12/8mm	14	24.4X26	26X26	24.4X38.0	32X34.8	34.8X38			
14/10mm	16	28.1X30	30X30	28.1X44	37X40.2	40.2X44.0			

Flat Duct & Link Duct



Flat duct and Link duct with thick wall is perfectly suitable for micro trenching with proper narrow width and shallow depth. All Flat duct are silicone coated. Large duct size is availalbe with folded type or linked type

*** Configurations for flat & linked type can be customized.**

OD/ID	2 Way		3 Way		4 Way		5 Way		6 Way		7 Way	
7/3.5mm	F		F		F		F		F		F	
10/6mm	F		F		F		F		F		F	
12/8mm	F	L	F	L	F	L	F	L	F	L	F	L
14/10mm	F	L	F	L	F	L	F	L	F	L	F	L
16/12mm	F	L	F	L	F	L	F	L	F	L	F	L
18/14mm	F	L	F	L	F	L	F	L	F	L	F	L
20/16mm	L		L		L		L		L		L	

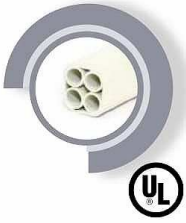
Flat

Link

4 way customized configuration

12 way customized configuration

Indoor Application



LSZH, UL 2024 Riserr rated for indoor microduct installations that are placed in the building raceway.

Primary Duct Dimensions OD/ID (mm)	Outside Dimensions H x W (mm)						
	1 Way	2 Way	4 Way	7 Way	12 Way	19 Way	24+1 Way
5/3.5mm	7.4	7.4X12.4	12.4 X14.5	16.1X17.4	20.4X22.4	26.1X26.7	32.0X32.0
8/6mm	10.4	10.4X18.4	18.4X21.4	24.3X26.4	34.4X31.18	42.4X38.11	49.61X48.63
10/8mm	12.4	12.4X22.4	22.4X22.4	29.7X32.4			
12/10mm	15.4	15.4X27.4	32.8	39.8			

1 Way 2 Way 4 Way 7 Way 12 Way 19 Way 24+1 Way

Aerial

Aerial Microduct has been developed to facilitate the use of optical fiber subscriber drop cable. All Aerial duct are silicone coated.

High UV resistance for outdoor use

- Metal strength member and metal-free versions available

Custom microduct configurations and colors available upon request.

SAFE PULL POUNDS

		Safe Pull, lbs				
Size	**SDR**	9	11	13.5	17	80
IPS						
1.25		983	822	682	551	
1.5		1287	1077	894	722	
2		2012	1683	1397	1128	
3		4369	3656	3034	2449	4135
4		7222	6043	5015	4048	6050
5		11122	9315	7730	6234	8375
6		15653	13098	10870	8774	11530
8		26531	22200	18424	14872	
10		41214	34487	28621	23103	
12		57977	48513	40262	32499	
14		69902	58492	48543	39184	
16		91300	76398	63403	51179	
DIPS						
4		8217	6876	5706	4606	
6		16980	14208	11791	9518	
8		29210	24442	20285	16374	
10		43924	36770	30515	24632	
12		62141	51998	43154	34834	
14		83486	69859	57977	46799	
16		107977	90353	74984	60527	

Reel Return Program

United Poly Systems

Credit of **$1 per** diameter **inch** for **usable, undamaged reels less the freight** will be given upon their return to United Poly Systems plant-

5201 Hawking Drive SE
Albuquerque, NM 87106
Steve Price- 505.967.1158
OR
4707 E Kearney St
Springfield MO 65803
Ron Boileau - 417.554.1550

Suggested Conditions for optimizing space:

- It is not necessary to return nuts and bolts.
- Reels should be stacked and banded for safe transporting. Rings (flanges) must be stacked on wood supports for unloading (do not stack directly on top of truck trailer)
- Cross arms (staves), should be palletized.
- Individual Component Credits:

STAVES	FLANGES
$2.55 credit per each	$11.22 credit per each - 48"
44.5" stave across all sizes	$20.22 credit per each - 66"
	$23.22 credit per each - 72"
$2.25 credit per each	$24.46 credit per each - 83"
43" stave across all sizes	$37.80 credit per each - 96"
	$38.25 credit per each - 102"

Truckload Quantities

IPS Size	SDR	LENGTH	PER BNDL	T/L BNDL	T/L PCS	T/L FT	WEIGHT	
1.25	11	40	159	16	2544	101,760	31545	
1.25	11	50	159	16	2544	127,200	39432	
2	11	40	98	12	1176	47,040	29,823	
2	11	50	98	12	1176	28,800	37,279	
3	11	40	50	14	700	28,000	38,528	
3	11	50	50	14	700	35,000	48,160	
4	7	40	29	12	348	13,920	46,911	
4	7	50	29	9	261	13,050	43,978	
4	9	40	29	12	348	13,920	37,834	
4	9	50	29	11	319	15,950	43,352	
4	11	40	29	14	406	16,240	36,946	
4	11	50	29	14	406	20,300	46,183	
4	17	50	29	14	406	20,300	33,718	
5		50	38	8	304	15,200	Check SDR wt	
6	7	40	13	11	143	5,720	41,784	
6	7	50	13	9	117	5,850	43,319	
6	9	40	13	14	182	7,280	42,893	
6	9	50	13	12	156	7,800	45,957	
6	11	40	26	8	208	8,320	40,826	
6	11	50	26	7	182	9,100	44,653	
6	17	40	26	8	208	8,320	27,348	
6	17	50	26	8	208	10,400	34,185	
8	7	40	9	10	90	3,600	44,568	
8	7	50	9	8	72	3,600	44,568	
8	9	40	9	12	108	4,320	43,139	
8	9	50	9	10	90	4,500	45,225	
8	11	40	14	8	112	4,480	37,256	
8	11	50	14	8	112	5,600	46,570	
8	17	40	14	8	112	4,480	24,958	
8	17	50	14	8	112	5,600	31,198	
10	7	40	5 & 4	6 & 6	54	2,160	41,536	
10	7	50	5 & 4	5 & 5	45	2,250	43,267	
10	9	40	5 & 4	8 & 8	72	2,880	44,668	
SIZE	SDR	LENGTH	PER BUNDLE	T/L BNDL	T/L PCS	T/L FT	WEIGHT	
10	9	50	5 & 4	6 & 6	54	2,700	41,877	
10	11	40	4 TO 5	8 & 8	72	2,880	37,210	
10	11	50	4 TO 5	8 & 8	72	3,600	46,512	
10	17	40	4 TO 5	8 & 8	72	2,880	24,924	
10	17	50	4 TO 5	8 & 8	72	3,600	31,154	
12	7	40	4	11	44	1,760	47,625	
12	7	50	4	8	32	1,600	43,296	
12	9	40	4	13	52	2,080	45,385	
12	9	50	4	10	40	2,000	43,640	
12	11	40	4	14	56	2,240	40,741	
12	11	50	4	13	52	2,600	47,242	Tell weight
12	17	40	4	14	56	2,240	27,261	
12	17	50	4	14	56	2,800	34,076	
14	7	40	3 TO 4	5 & 5	35	1,400	45,668	
14	7	50	3 TO 4	4 & 4	28	1,400	45,668	
14	9	40	3 TO 4	6 & 6	42	1,680	44,200	
14	9	50	3 TO 4	5 & 5	35	1,750	46,042	
14	11	40	3 TO 4	6 & 6	42	1,680	36,994	
14	11	50	3 TO 4	5 & 6	42	2,100	46,242	
14	17	40	3 TO 4	6 & 6	42	1,680	24,780	
14	17	50	3 TO 4	6 & 6	42	2,100	30,975	

16	7	40	3	9	27	1,080	46,018	
16	7	50	3	7	21	1,050	44,740	
16	9	40	3	10	30	1,200	41,244	
16	9	50	3	9	27	1,350	46,399	
16	11	40	3	10	30	1,200	34,512	
16	11	50	3	10	30	1,500	43,485	
16	17	40	3	10	30	1,200	23,112	
16	17	50	3	10	30	1,500	28,890	

Reel Size	# per load	Equip. for load	Column5
48"	24 reels	48x102 flat or step 14 chains	
66"	18 reels	48x102 flat or step 11 chains	
72"	16 reels	48x102 flat or step 10 chains	
82"	14 reels	48x102 flat or step 9 chains	
96"	12 reels	48x102 flat or step 8 chains	
102"	12 reels	48x102 flat 8 chains no bulkhead	
114"	8 reel	48x102 step only 6 chains this leaves room on the upper for 2 8 1/2' reels	
120"	8 reel	48x102 step only 6 chains this leaves room on the upper for 2 8 1/2' reels	

DIPS Truck Loads

DIPS size	Joints per bundle	T/L Bundles	T/L pieces	102 wide	T/L feet	Weight	
4x11x40	29	12	348	No	13,920	36,331	
4x11x50	29	12	348	No	17,400	45,414	
6x11x40	26	6	156	YES	6,240	33,259	
6x11x50	26	6	156	YES	7,800	41,574	
8X11X40	14	6	84	NO	3,360	30,844	
8x11x50	14	6	84	NO	4,200	38,556	
10x11x40	5&4	7&7	63	YES	2,520	34,776	
10x11x50	5&4	7&7	63	YES	3,150	43,470	
12x11x40	3&4	6&6	42	NO	1,680	32,793	
12x11x50	3&4	6&6	42	NO	2,100	40,992	
14x11x40	3	12	36	NO	1,440	37,756	
14x11x50	3	12	36	NO	1,800	47,196	

			COILS 5/7/2015					
Size	SDR	feet	Qty per pallet	pallet per truck	coils load	feet per truck	Equipment needed	
3/4	any	500	8	22	176	88,000	48x102 flat 11 straps	
1	any	500	7	22	154	77,000	48x102 flat 11 straps	
1	any	1000	5	22	110	110,000	48x102 flat 11 straps	
1.25	any	500	5	22	110	55,000	48x102 flat 14 straps	
1.25	any	1000	3	22	66	66,000	48x102 flat 14 straps	
1.5	any	500	8 per bundle	7 bundle	56	28000'	48x102 flat 14 straps	
1.5	any	1000	6 per bundle	7 bundle	42	42000'	48x102 flat 14 straps	
2	any	500	7 per bundle	7 bundle	49	24,500	48x102 flat 14 straps	
2	any	1000	4 per bundle	7 bundle	28	28000'	48x102 flat 14 straps	
2	any	1500	3 per bundle	7 bundle	21	31,500	48x102 flat 14 straps	
2	any	2000	3 per bundle	7 bundle	21	42,000	48x102 flat 14 straps	
3	any	500	4 per bundle	6 bundle	24	12,000	48x102 flat 12 straps	
3	any	1000	2 per bundle	6 bundle	12	12,000	48x102 flat 12 straps	
3	any	1300	2 per bundle	6 bundle	12	15,600	48x102 flat no bulkhead 12 straps	
4	any	500	3 per bunndle	6 bundle	18	9,000	48x102 flat 12 straps	
4	any	600	2 per bundle	6 bundle	12	7,200	48x102 flat 12 straps	
4	any	750	2 per bundle	6 bundle	12	9,000	48x102 flat 12 straps	
4	any	766	2 per bundle	6 bundle	12	9,192	48x102 flat 12 straps	
4	any	800	2 per bundle	6 bundle	12	9600'	48x102 flat no bulkhead 12 straps	
6	any	500	2 per bundle	4 bundle	8	4,000	48x102 step only 12 straps	

De-Ratings

• Hydrocarbon gases of lower molecular weight, such as methane and hydrogen sulfide – Studies and long-term experience show that the resultant long-term strength is at least equal to that established when using water or air as a test fluid. Therefore, no de-rating is required.

• Vapors generated by liquefied petroleum gases (LPG) – These vapors contain hydrocarbon gases of somewhat greater molecular weight, gases which because of their "plasticizing" or, "solvating" effect on PE tend to somewhat reduce PE's long term hydrostatic strength. To offset this possible reduction, the PR or PC for water is de-rated by the application of a factor of 0.80 or smaller.

• Common hydrocarbons in the liquid state, such as those in LPG and fuel gas condensates, in crude oil, in fuel oil, in gasoline, in diesels fuels and in kerosene – Because exposure to these liquids results in a larger "solvating" effect, the practice is either to de-rate PE pipe to a greater extent than for vapors or, if this de-rating is impractical, to use an alternate material. For crude oil application a de-rating factor of 0.50 is typically used.

• Aromatic hydrocarbons – Because aromatic hydrocarbons, such as benzene and toluene, have a much greater "solvating" effect, the use of PE should be avoided.

TABLE A.2

Temperature Compensating Multipliers for Converting a Base Temperature HDS or PR to HDS or PR for Another Temperature Between 40 and 100°F (4 and 38°C)

Maximum Sustained Temperature, °F (°C) [1]	Multiplier [2,3]
40 (4)	1.25
50 (10)	1.17
60 (15)	1.10
73 (23)	1.00
80 (27)	0.94
90 (32)	0.86
100 (38)	0.78

(1) Temporary and relatively minor increases in temperature beyond a sustained temperature have little effect on the long-term strength of a PE pipe material and thus, can be ignored.

(2) The multipliers in this table apply to a PE pipe that is made from a material having at least, an established hydrostatic design stress (HDS) for water, for 73°F (23°C). This HDS is designated by the last two numerals in the PE's standard designation code (e.g., the last two digits in PE4710 designate that the HDS for water, for 73°F (23°C), is 1,000psi – See Introduction and Chapter 5 for a more complete explanation.)

(3) For a temperature of interest that falls within any pair of listed temperatures the reader may apply an interpolation process to determine the appropriate multiplier.

TABLE 1-2

PE Pipe Environmental Application Factors (A_F)*

Pipe Environment	Environmental Application Factor (A_F) at 73°F (23°C)
Water: Aqueous solutions of salts, acids and bases; Sewage; Wastewater; Alcohols; Glycols (anti-freeze solutions)	1.0
Nitrogen; Carbon dioxide; Methane; Hydrogen sulfide; Non-Federally regulated applications involving dry natural gas or other non-reactive gases	1.0
Fluids such as solvating/permeating chemicals in pipe or soil (typically hydrocarbons) in 2% or greater concentration, natural or other fuel-gas liquids condensates, crude oil, fuel oil, gasoline, diesel, kerosene, hydrocarbon fuels, wet gas gathering, multiphase oilfield fluids, LVP liquid hydrocarbons, oilfield water containing >2% hydrocarbons.	0.5

* Certain codes and standards include prohibitions and/or strength reduction factors relating to the presence of certain constituents in the fluid being transported. In a code controlled application the designer must ensure compliance with all code requirements.

The De-ratings explained and listed above for Hydrocarbons and Temperature are drawn from the Plastic Pipe Institute handbook: chapters 3 and 6.

United Poly Systems

unitedpolysystems.com

SAFETY DATA SHEET

Creation Date 21-May-2012 **Revision Date** 21-Dec-2020 **Revision Number** 8

SECTION 1: IDENTIFICATION OF THE SUBSTANCE/MIXTURE AND OF THE COMPANY/UNDERTAKING

1.1. Product identifier

Product Description: Glycolic acid, 70% in water
Cat No. : **411030000; 411030010; 411030250; 411032500**
Synonyms Hydroxyacetic acid

Unique Formula Identifier (UFI) **HH7K-Q1M1-9X0P-DJ7X**

1.2. Relevant identified uses of the substance or mixture and uses advised against

Recommended Use Laboratory chemicals.
Uses advised against No Information available

1.3. Details of the supplier of the safety data sheet

Company

UK entity/business name
Fisher Scientific UK
Bishop Meadow Road, Loughborough,
Leicestershire LE11 5RG, United Kingdom

EU entity/business name
Acros Organics BVBA
Janssen Pharmaceuticalaan 3a
2440 Geel, Belgium

E-mail address begel.sdsdesk@thermofisher.com

1.4. Emergency telephone number

For information **US** call: 001-800-ACROS-01 / **Europe** call: +32 14 57 52 11
Emergency Number **US:**001-201-796-7100 / **Europe:** +32 14 57 52 99
CHEMTREC Tel. No.**US:**001-800-424-9300 / **Europe:**001-703-527-3887

Poison Centre - Emergency information services

Ireland : National Poisons Information Centre (NPIC) -
01 809 2166 (8am-10pm, 7 days a week)
Malta : +356 2395 2000
Cyprus : +357 2240 5611

SECTION 2: HAZARDS IDENTIFICATION

2.1. Classification of the substance or mixture

CLP Classification - Regulation (EC) No 1272/2008

Physical hazards

Based on available data, the classification criteria are not met

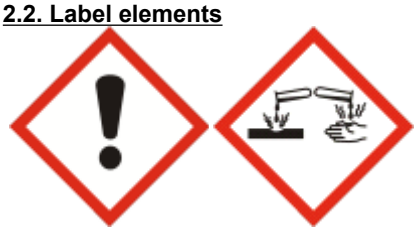
Health hazards

Acute Inhalation Toxicity - Vapors	Category 4 (H332)
Skin Corrosion/Irritation	Category 1 B (H314)
Serious Eye Damage/Eye Irritation	Category 1 (H318)

Environmental hazards
Based on available data, the classification criteria are not met

Full text of Hazard Statements: see section 16

2.2. Label elements



Signal Word **Danger**

Hazard Statements
H332 - Harmful if inhaled
H314 - Causes severe skin burns and eye damage

Precautionary Statements
P304 + P340 - IF INHALED: Remove victim to fresh air and keep at rest in a position comfortable for breathing
P280 - Wear protective gloves/protective clothing/eye protection/face protection
P301 + P330 + P331 - IF SWALLOWED: Rinse mouth. Do NOT induce vomiting
P305 + P351 + P338 - IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing
P310 - Immediately call a POISON CENTER or doctor/physician
P303 + P361 + P353 - IF ON SKIN (or hair): Take off immediately all contaminated clothing. Rinse skin with water or shower

2.3. Other hazards

SECTION 3: COMPOSITION/INFORMATION ON INGREDIENTS

3.2. Mixtures

Component	CAS-No	EC-No.	Weight %	CLP Classification - Regulation (EC) No 1272/2008
Hydroxyacetic acid	79-14-1	EEC No. 201-180-5	70-72	Skin Corr. 1B (H314) Eye Dam. 1 (H318) Acute Tox. 4 (H332)
Water	7732-18-5	231-791-2	28-30	-
Formic acid	64-18-6	200-579-1	<1	Flam. Liq. 3 (H226) Acute Tox. 4 (H302) Skin Corr. 1A (H314) Eye Dam. 1 (H318) Acute Tox. 3 (H331)

				EUH071
Acetic acid, methoxy-	625-45-6	EEC No. 210-894-6	<0.3	Acute Tox. 4 (H302) Skin Corr. 1B (H314) Eye Dam. 1 (H318) Repr. 1B (H360FD) STOT SE 3 (H335)

Component	Specific concentration limits (SCL's)	M-Factor	Component notes
Formic acid	Skin Corr. 1A :: C>=90% Skin Corr. 1B :: 10%<=C<90% Skin Irrit. 2 :: 2%<=C<10% Eye Irrit. 2 :: 2%<=C<10%	-	-
Acetic acid, methoxy-	STOT SE 3 :: C>=5%	-	-

Full text of Hazard Statements: see section 16

SECTION 4: FIRST AID MEASURES

4.1. Description of first aid measures

General Advice Show this safety data sheet to the doctor in attendance. Immediate medical attention is required.

Eye Contact Rinse immediately with plenty of water, also under the eyelids, for at least 15 minutes. Immediate medical attention is required.

Skin Contact Wash off immediately with plenty of water for at least 15 minutes. Remove and wash contaminated clothing and gloves, including the inside, before re-use. Call a physician immediately.

Ingestion Do NOT induce vomiting. Clean mouth with water. Never give anything by mouth to an unconscious person. Call a physician immediately.

Inhalation If not breathing, give artificial respiration. Remove from exposure, lie down. Do not use mouth-to-mouth method if victim ingested or inhaled the substance; give artificial respiration with the aid of a pocket mask equipped with a one-way valve or other proper respiratory medical device. Call a physician immediately.

Self-Protection of the First Aider Ensure that medical personnel are aware of the material(s) involved, take precautions to protect themselves and prevent spread of contamination.

4.2. Most important symptoms and effects, both acute and delayed

Causes burns by all exposure routes. Product is a corrosive material. Use of gastric lavage or emesis is contraindicated. Possible perforation of stomach or esophagus should be investigated: Ingestion causes severe swelling, severe damage to the delicate tissue and danger of perforation

4.3. Indication of any immediate medical attention and special treatment needed

Notes to Physician Treat symptomatically.

SECTION 5: FIREFIGHTING MEASURES

5.1. Extinguishing media

Suitable Extinguishing Media
CO_2, dry chemical, dry sand, alcohol-resistant foam.

Extinguishing media which must not be used for safety reasons
No information available.

5.2. Special hazards arising from the substance or mixture

Thermal decomposition can lead to release of irritating gases and vapors. The product causes burns of eyes, skin and mucous membranes.

Hazardous Combustion Products
Carbon monoxide (CO), Carbon dioxide (CO_2).

5.3. Advice for firefighters

As in any fire, wear self-contained breathing apparatus pressure-demand, MSHA/NIOSH (approved or equivalent) and full protective gear. Thermal decomposition can lead to release of irritating gases and vapors.

SECTION 6: ACCIDENTAL RELEASE MEASURES

6.1. Personal precautions, protective equipment and emergency procedures

Use personal protective equipment as required. Ensure adequate ventilation. Evacuate personnel to safe areas. Keep people away from and upwind of spill/leak.

6.2. Environmental precautions

Should not be released into the environment.

6.3. Methods and material for containment and cleaning up

Soak up with inert absorbent material. Keep in suitable, closed containers for disposal.

6.4. Reference to other sections

Refer to protective measures listed in Sections 8 and 13.

SECTION 7: HANDLING AND STORAGE

7.1. Precautions for safe handling

Wear personal protective equipment/face protection. Do not get in eyes, on skin, or on clothing. Use only under a chemical fume hood. Do not breathe mist/vapors/spray. Do not ingest. If swallowed then seek immediate medical assistance.

Hygiene Measures
Handle in accordance with good industrial hygiene and safety practice. Keep away from food, drink and animal feeding stuffs. Do not eat, drink or smoke when using this product. Remove and wash contaminated clothing and gloves, including the inside, before re-use. Wash hands before breaks and after work.

7.2. Conditions for safe storage, including any incompatibilities

Corrosives area. Keep containers tightly closed in a dry, cool and well-ventilated place.

Technical Rules for Hazardous Substances (TRGS) 510 Storage Class (LGK) (Germany) Class 8A

7.3. Specific end use(s)

Use in laboratories

SECTION 8: EXPOSURE CONTROLS/PERSONAL PROTECTION

8.1. Control parameters

Exposure limits
List source(s): **EU** - Commission Directive (EU) 2019/1831 of 24 October 2019 establishing a fifth list of indicative occupational exposure limit values pursuant to Council Directive 98/24/EC and amending Commission Directive 2000/39/EC **UK** - EH40/2005 Work Exposure Limits, Third edition. Published 2018. **IRE -** 2018 Code of Practice for the Chemical Agents Regulations, Schedule 1. Published by the Health and Safety Authority

Component	The United Kingdom	European Union	Ireland
Formic acid	STEL: 15 ppm 15 min STEL: 28.8 mg/m³ 15 min TWA: 5 ppm 8 hr TWA: 9.6 mg/m³ 8 hr	TWA: 5 ppm 8 hr TWA: 9 mg/m³ 8 hr	TWA: 5 ppm 8 hr. TWA: 9 mg/m³ 8 hr. STEL: 15 ppm 15 min STEL: 27 mg/m³ 15 min

Biological limit values
This product, as supplied, does not contain any hazardous materials with biological limits established by the region specific regulatory bodies

Monitoring methods
BS EN 14042:2003 Title Identifier: Workplace atmospheres. Guide for the application and use of procedures for the assessment of exposure to chemical and biological agents.

Derived No Effect Level (DNEL) No information available

Route of exposure	Acute effects (local)	Acute effects (systemic)	Chronic effects (local)	Chronic effects (systemic)
Oral				
Dermal				
Inhalation				

Predicted No Effect Concentration (PNEC) No information available.

8.2. Exposure controls

Engineering Measures
Ensure adequate ventilation, especially in confined areas. Ensure that eyewash stations and safety showers are close to the workstation location.
Wherever possible, engineering control measures such as the isolation or enclosure of the process, the introduction of process or equipment changes to minimise release or contact, and the use of properly designed ventilation systems, should be adopted to control hazardous materials at source

Personal protective equipment

Eye Protection Goggles (European standard - EN 166)

Hand Protection Protective gloves

Glove material	Breakthrough time	Glove thickness	EU standard	Glove comments
Natural rubber Butyl rubber Nitrile rubber Neoprene	See manufacturers recommendations		EN 374	(minimum requirement)

PVC	-

Skin and body protection Long sleeved clothing

Inspect gloves before use.
Please observe the instructions regarding permeability and breakthrough time which are provided by the supplier of the gloves. (Refer to manufacturer/supplier for information)
Ensure gloves are suitable for the task: Chemical compatability, Dexterity, Operational conditions, User susceptibility, e.g. sensitisation effects, also take into consideration the specific local conditions under which the product is used, such as the danger of cuts, abrasion.
Remove gloves with care avoiding skin contamination.

Respiratory Protection When workers are facing concentrations above the exposure limit they must use appropriate certified respirators.
To protect the wearer, respiratory protective equipment must be the correct fit and be used and maintained properly

Large scale/emergency use Use a NIOSH/MSHA or European Standard EN 136 approved respirator if exposure limits are exceeded or if irritation or other symptoms are experienced
Recommended Filter type: Particulates filter conforming to EN 143 Acid gases filter Type E Yellow conforming to EN14387

Small scale/Laboratory use Use a NIOSH/MSHA or European Standard EN 149:2001 approved respirator if exposure limits are exceeded or if irritation or other symptoms are experienced.
Recommended half mask:- Valve filtering: EN405; or; Half mask: EN140; plus filter, EN 141; Particle filtering: EN149:2001
When RPE is used a face piece Fit Test should be conducted

Environmental exposure controls No information available.

SECTION 9: PHYSICAL AND CHEMICAL PROPERTIES

9.1. Information on basic physical and chemical properties

Physical State	Liquid	
Appearance	Yellow	
Odor	sweet	
Odor Threshold	No data available	
Melting Point/Range	10 °C / 50 °F	
Softening Point	No data available	
Boiling Point/Range	113 °C / 235.4 °F	
Flammability (liquid)	No data available	
Flammability (solid,gas)	Not applicable	Liquid
Explosion Limits	No data available	
Flash Point	No information available	**Method -** No information available
Autoignition Temperature	No data available	
Decomposition Temperature	No data available	
pH	No information available	
Viscosity	11.28 mPa.s at 16 °C	
Water Solubility	Soluble	
Solubility in other solvents	No information available	

Partition Coefficient (n-octanol/water)

Component	**log Pow**
Hydroxyacetic acid	-1.11
Formic acid	-0.54

Vapor Pressure	No information available	
Density / Specific Gravity	1.270	
Bulk Density	Not applicable	Liquid

Vapor Density	No information available	(Air = 1.0)
Particle characteristics	Not applicable (liquid)	

9.2. Other information

SECTION 10: STABILITY AND REACTIVITY

10.1. Reactivity

None known, based on information available

10.2. Chemical stability

Stable under normal conditions.

10.3. Possibility of hazardous reactions

Hazardous Polymerization	Hazardous polymerization does not occur.
Hazardous Reactions	None under normal processing.

10.4. Conditions to avoid

Incompatible products.

10.5. Incompatible materials

Strong bases. Sulfides. Cyanides. Metals. Reducing Agent.

10.6. Hazardous decomposition products

Carbon monoxide (CO). Carbon dioxide (CO_2).

SECTION 11: TOXICOLOGICAL INFORMATION

11.1. Information on hazard classes as defined in Regulation (EC) No 1272/2008

Product Information

(a) acute toxicity;

Oral	Based on available data, the classification criteria are not met
Dermal	No data available
Inhalation	Category 4

Toxicology data for the components

Component	LD50 Oral	LD50 Dermal	LC50 Inhalation
Hydroxyacetic acid	1950 mg/kg (Rat) 2040 mg/kg (Rat)	-	7.7 mg/L (Rat) 4h 3.6 mg/L (Rat) 4h
Water	-	-	-
Formic acid	730 mg/kg (Rat)	-	15 g/m³ (Rat) 15 min

(b) skin corrosion/irritation; B Category 1

(c) serious eye damage/irritation; Category 1

(d) respiratory or skin sensitization;

Respiratory	No data available
Skin	No data available

(e) germ cell mutagenicity; No data available

(f) carcinogenicity; No data available

There are no known carcinogenic chemicals in this product

(g) reproductive toxicity; No data available

(h) STOT-single exposure; No data available

(i) STOT-repeated exposure; No data available

Target Organs No information available.

(j) aspiration hazard; No data available

Other Adverse Effects The toxicological properties have not been fully investigated.

Symptoms / effects,both acute and delayed Product is a corrosive material. Use of gastric lavage or emesis is contraindicated. Possible perforation of stomach or esophagus should be investigated. Ingestion causes severe swelling, severe damage to the delicate tissue and danger of perforation.

11.2. Information on other hazards

Endocrine Disrupting Properties Assess endocrine disrupting properties for human health. This product does not contain any known or suspected endocrine disruptors.

SECTION 12: ECOLOGICAL INFORMATION

12.1. Toxicity

Ecotoxicity effects .

Component	Freshwater Fish	Water Flea	Freshwater Algae
Hydroxyacetic acid	LC50: > 5000 mg/L, 96h static (Brachydanio rerio)		
Formic acid	Leuciscus idus: LC50 = 46-100 mg/L/96h	EC50 = 34 mg/L/48h	EC50 = 25 mg/L/96h

Component	Microtox	M-Factor
Formic acid	EC50 = 46.7 mg/L/17h	

12.2. Persistence and degradability Readily biodegradable

Persistence Soluble in water, Persistence is unlikely, based on information available.

12.3. Bioaccumulative potential Bioaccumulation is unlikely

Component	log Pow	Bioconcentration factor (BCF)
Hydroxyacetic acid	-1.11	No data available
Formic acid	-0.54	0.22

12.4. Mobility in soil The product is water soluble, and may spread in water systems . Will likely be mobile in the environment due to its water solubility. Highly mobile in soils

12.5. Results of PBT and vPvB assessment No data available for assessment.

12.6. Endocrine disrupting properties

Endocrine Disruptor Information This product does not contain any known or suspected endocrine disruptors

12.7. Other adverse effects

Persistent Organic Pollutant This product does not contain any known or suspected substance

Ozone Depletion Potential This product does not contain any known or suspected substance

SECTION 13: DISPOSAL CONSIDERATIONS

13.1. Waste treatment methods

Waste from Residues/Unused Products Waste is classified as hazardous. Dispose of in accordance with the European Directives on waste and hazardous waste. Dispose of in accordance with local regulations.

Contaminated Packaging Dispose of this container to hazardous or special waste collection point.

European Waste Catalogue (EWC) According to the European Waste Catalog, Waste Codes are not product specific, but application specific.

Other Information Waste codes should be assigned by the user based on the application for which the product was used. Do not empty into drains. Do not flush to sewer. Large amounts will affect pH and harm aquatic organisms. Solutions with low pH-value must be neutralized before discharge.

SECTION 14: TRANSPORT INFORMATION

IMDG/IMO

14.1. UN number	UN3265
14.2. UN proper shipping name	Corrosive liquid, acidic, organic, n.o.s
Technical Shipping Name	Glycolic acid
14.3. Transport hazard class(es)	8
14.4. Packing group	II

ADR

14.1. UN number	UN3265
14.2. UN proper shipping name	Corrosive liquid, acidic, organic, n.o.s
Technical Shipping Name	Glycolic acid
14.3. Transport hazard class(es)	8
14.4. Packing group	II

IATA

14.1. UN number	UN3265
14.2. UN proper shipping name	Corrosive liquid, acidic, organic, n.o.s
Technical Shipping Name	Glycolic acid
14.3. Transport hazard class(es)	8
14.4. Packing group	II

14.5. Environmental hazards No hazards identified

14.6. Special precautions for user No special precautions required

14.7. Maritime transport in bulk according to IMO instruments Not applicable, packaged goods

SECTION 15: REGULATORY INFORMATION

15.1. Safety, health and environmental regulations/legislation specific for the substance or mixture

International Inventories
X = listed, Europe (EINECS/ELINCS/NLP), U.S.A. (TSCA), Canada (DSL/NDSL), Philippines (PICCS), China (IECSC), Japan (ENCS), Australia (AICS), Korea (ECL).

Component	EINECS	ELINCS	NLP	TSCA	DSL	NDSL	PICCS	ENCS	IECSC	AICS	KECL
Hydroxyacetic acid	201-180-5	-		X	X	-	X	X	X	X	KE-20315
Water	231-791-2	-		X	X	-	X	X	X	X	KE-35400
Formic acid	200-579-1	-		X	X	-	X	X	X	X	X
Acetic acid, methoxy-	210-894-6	-		X	-	X	X	X	X	X	KE-23198

Component	REACH (1907/2006) - Annex XIV - Substances Subject to Authorization	REACH (1907/2006) - Annex XVII - Restrictions on Certain Dangerous Substances	REACH Regulation (EC 1907/2006) article 59 - Candidate List of Substances of Very High Concern (SVHC)
Acetic acid, methoxy-		Use restricted. See item 30. (see *http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=CELEX:32006R1907:EN:NOT* for restriction details)	SVHC Candidate list - Toxic for reproduction (Article 57 c)

Regulation (EC) No 649/2012 of the European Parliament and of the Council of 4 July 2012 concerning the export and import of dangerous chemicals
Not applicable

National Regulations

WGK Classification Water endangering class = 1 (self classification)

Component	Germany - Water Classification (VwVwS)	Germany - TA-Luft Class
Hydroxyacetic acid	WGK1	
Formic acid	WGK 1	Class I : 20 mg/m³ (Massenkonzentration)
Acetic acid, methoxy-	WGK2	Class I : 20 mg/m³ (Massenkonzentration)

UK - Take note of Control of Substances Hazardous to Health Regulations (COSHH) 2002 and 2005 Amendment
Take note of Directive 94/33/EC on the protection of young people at work
Take note of Dir 92/85/EC on the protection of pregnant and breastfeeding women at work

15.2. Chemical safety assessment

Chemical Safety Assessment/Reports (CSA/CSR) are not required for mixtures

SECTION 16: OTHER INFORMATION

Full text of H-Statements referred to under sections 2 and 3
H332 - Harmful if inhaled

H314 - Causes severe skin burns and eye damage
H318 - Causes serious eye damage
H360FD - May damage fertility. May damage the unborn child
H226 - Flammable liquid and vapor
H302 - Harmful if swallowed
H331 - Toxic if inhaled
EUH071 - Corrosive to the respiratory tract

Legend

CAS - Chemical Abstracts Service
EINECS/ELINCS - European Inventory of Existing Commercial Chemical Substances/EU List of Notified Chemical Substances
PICCS - Philippines Inventory of Chemicals and Chemical Substances
IECSC - Chinese Inventory of Existing Chemical Substances
KECL - Korean Existing and Evaluated Chemical Substances
TSCA - United States Toxic Substances Control Act Section 8(b) Inventory
DSL/NDSL - Canadian Domestic Substances List/Non-Domestic Substances List
ENCS - Japanese Existing and New Chemical Substances
AICS - Australian Inventory of Chemical Substances
NZIoC - New Zealand Inventory of Chemicals

WEL - Workplace Exposure Limit
ACGIH - American Conference of Governmental Industrial Hygienists
DNEL - Derived No Effect Level
RPE - Respiratory Protective Equipment
LC50 - Lethal Concentration 50%
NOEC - No Observed Effect Concentration
PBT - Persistent, Bioaccumulative, Toxic
TWA - Time Weighted Average
IARC - International Agency for Research on Cancer
Predicted No Effect Concentration (PNEC)
LD50 - Lethal Dose 50%
EC50 - Effective Concentration 50%
POW - Partition coefficient Octanol:Water
vPvB - very Persistent, very Bioaccumulative

ADR - European Agreement Concerning the International Carriage of Dangerous Goods by Road
IMO/IMDG - International Maritime Organization/International Maritime Dangerous Goods Code
OECD - Organisation for Economic Co-operation and Development
BCF - Bioconcentration factor
ICAO/IATA - International Civil Aviation Organization/International Air Transport Association
MARPOL - International Convention for the Prevention of Pollution from Ships
ATE - Acute Toxicity Estimate
VOC (volatile organic compound)

Key literature references and sources for data
https://echa.europa.eu/information-on-chemicals
Suppliers safety data sheet, Chemadvisor - LOLI, Merck index, RTECS

Classification and procedure used to derive the classification for mixtures according to Regulation (EC) 1272/2008 [CLP]:

Physical hazards	On basis of test data
Health Hazards	Calculation method
Environmental hazards	Calculation method

Training Advice
Chemical hazard awareness training, incorporating labelling, Safety Data Sheets (SDS), Personal Protective Equipment (PPE) and hygiene.
Use of personal protective equipment, covering appropriate selection, compatibility, breakthrough thresholds, care, maintenance, fit and standards.
First aid for chemical exposure, including the use of eye wash and safety showers.

Creation Date	21-May-2012
Revision Date	21-Dec-2020
Revision Summary	Update to CLP Format.

This safety data sheet complies with the requirements of Regulation (EC) No. 1907/2006 COMMISSION REGULATION (EU) 2020/878 amending Annex II to Regulation (EC) No 1907/2006

Disclaimer

The information provided in this Safety Data Sheet is correct to the best of our knowledge, information and belief at the date of its publication. The information given is designed only as a guidance for safe handling, use, processing, storage, transportation, disposal and release and is not to be considered a warranty or quality specification. The information relates only to the specific material designated and may not be valid for such material used in combination with any other materials or in any process, unless specified in the text

End of Safety Data Sheet

1. CHEMICAL IDENTIFICATION

Product Name:.....AN-400TH.
Recommended Use..... Water Treatment Antiscalent, Descaler, Iron Sulfide Dissolver
Restrictions on Use..... Not Determined
Emergency Number:.....Infotrac 1-800-535-5053
Customer Service Hotline..... 281-286-7562 (8 AM to 5 PM CST)

Supplier of SDS:

Analytix Technologies LLC
PO Box 590466
Houston TX 77259-0466
Tel: (281) 286-7562
Web: www.analytixtechnoloies.com
Email: analytix@earthlink.net

2. HAZARD IDENTIFICATION

This material is hazardous under the criteria of the Federal OSHA Hazard Communication Standard 29CFR 1910.1200.

GHS Hazard Classification:

- Skin Sensitization — Category 1
- Serious eye damage — Category 1
- Acute Toxicity - Oral — Category 4
- Reproductive toxicity — Category 1B

GHS Label Elements:

Hazard Pictogram

Signal Word: Danger

Hazard Statement:

- H315 Causes skin irritation.
- H317 May cause an allergic skin irritation
- H318 Causes serious eye damage.
- H302 Harmful if swallowed.
- H361 Suspected of damaging fertility or the unborn child.

Prevention:

- P261 Avoid breathing dust/ fume/ gas/ mist/ vapors/ spray.
- P271 Use only outdoors or in a well-ventilated area.
- P272 Contaminated work clothing must not be allowed out of the workplace.
- P280 Wear eye protection/ face protection.
- P280 Wear protective gloves.
- P281 Use personal protective equipment as required..

2. HAZARD IDENTIFICATION (continued)

Response:

- P302 + P352 IF ON SKIN: Wash with plenty of soap and water.
- P304 + P340 IF INHALED: Remove victim to fresh air and keep at rest in a position comfortable for breathing.
- P305 + P351 + P338 IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing.
- P308 + P313 IF exposed or concerned: Get medical advice/ attention.
- P310 Immediately call a POISON CENTER or doctor/ physician.
- P333 + P313 If skin irritation or rash occurs: Get medical advice/ attention.
- P363 Wash contaminated clothing before reuse.

Storage: Store locked up.
Disposal: Dispose of contents / container in accordance with local / regional / national / international regulations.

3. COMPOSITION / INFORMATION ON INGREDIENTS

Aqueous mixture of water treatment chemicals

Chemical Name	CAS No.	GHS Classification
Tetrakis (Hydroxymethyl) Phosphonium Sulphate Sulphate	55566-30-8	H315, H318, H317, H361
1-Hydroxyethylidene-1,1-diphosphonic acid	2809-21-4	H302,H315,H318
Water	7732-18-5	None

Specific chemical identity and/or percentages of composition have been withheld as a trade

4. FIRST AID MEASURES

Eyes: Immediately flush with water for at least 15 minutes, lifting the upper and lower eyelids intermittently. See a Medical doctor or ophthalmologist immediately.

Skin: Immediate first aid is not likely to be required. Wash with plenty of soap and water for 15 – 20 minutes. Get medical attention if irritation occurs and persists.

Ingestion: Immediate first aid is not likely to be required. Rinse mouth with water. Dilute by giving 2 glasses of water. Do not induce vomiting. Never give anything by mouth to an unconscious person. Contact a physician for advice.

Inhalation: Immediate first aid is not likely to be required. Remove to fresh air. If breathing difficulty or discomfort occurs and persists, contact a medical doctor.

NOTES TO MEDICAL DOCTOR: The product is corrosive to the eyes and is expected to be irritating to skin and the mucous membranes of the respiratory and gastrointestinal tracts. Treatment is controlled removal of exposure with symptomatic and supportive care.

5. FIRE FIGHTING MEASURES

SUITABLE EXTINGUISHING MEDIA: Alcohol resistant foam, CO2, dry powder, water fog

UNSUITABLE EXTINGUISHING MEDIA: Water jet

SPECIAL FIRE FIGHTING PROCEDURES Wear self-contained breathing apparatus with a full face piece operated in the positive pressure demand mode when fighting fires.

HAZARDOUS DECOMPOSITION: CO, CO2, P2O5, phosphines

6. ACCIDENTAL RELEASE MEASURES

PROTECTIVE PRECAUTIONS AND EMERGENCY PROCEDURES Keep unnecessary personnel away.
Wear appropriate protective equipment and clothing during clean-up. Do not breather mist or vapors. Ensure adequate ventilation

CONTAINMENT PROCEDURE Prevent further leakage or spillage if safe to do so. Contain spills to prevent migration and entry into waterway.

CLEANUP PROCEDURE Contain large spills with dikes and transfer material to appropriate containers for reclamation or disposal. Absorb remaining material or small spills with inert material and then place in a chemical waste container.

7. HANDLING AND STORAGE

Handling – Avoid contact with eyes, skin and clothing. Avoid breathing vapor or mist and use approved splash goggles and vapor respirator fitted with approved organic cartridge if vaporization or misting occurs. Use with adequate ventilation.

Storage: Store at > 32 °F, away from nitrites, sulfites and alkaline materials. Do not store in mild steel, carbon steel or Aluminum. Suitable materials are: glass lining; PVC; polypropylene; polyethylene and glass-reinforced plastics. Keep containers tightly closed when not in use and when in transit.

Storage Class: 8B (non-combustible corrosive substances)

8. EXPOSURE CONTROLS/PERSONAL PROTECTION EQUIPMENT

Control Parameters:

Active Ingredients	CAS #	Source		
		OSHA	ACGIH	NIOSH
Tetrakis (Hydroxymethyl) Phosphonium Sulphate	55566-30-8	NE	2 mg/m3	NE
1-Hydroxyethylidene-1,1-diphosphonic acid	2809-21-4	NE	NE	NE

NE: No Limit Established

Exposure Controls:

Respiratory: Avoid breathing vapor or mist. Use approved respiratory protection equipment when airborne exposure is excessive. If used, full face piece replaces the need for face shield and/or chemical goggles. Consult the respirator manufacturer to determine the appropriate type of equipment for a given application. Observe respirator use limitations specified by the manufacturer.

Eyes: Wear chemical goggles. Have eye wash facilities immediately available at any location where eye contact can occur.

Skin: Although this product does not present a significant skin concern, minimize skin contamination by following good industrial practice. Wash thoroughly after handling. Although this product does not present a significant skin concern, minimize skin contamination by following good industrial practice. Wearing protective gloves is recommended. Consult the glove/clothing manufacturer to determine the appropriate type glove/clothing for a given application.

Engineering Controls: Provide natural or mechanical ventilation to minimize exposure. If practical, use local exhaust ventilation at sources of air contamination such as processing equipment.

Other Work Practices Use good personal hygiene practices. Wash hands before eating, drinking, smoking or using toilet. Promptly remove soiled clothing and wash thoroughly before reuse.

9. PHYSICAL AND CHEMICAL PROPERTIES

Appearance:	Clear to Pale Yellow Liquid
Upper/Lower Flammability Or Explosive Limits:	Not Determined
Odor:	Mild
Vapor Pressure:	17.5 Mm Hg @ 20°c
Odor Threshold:	Not Determined
Vapor Density:	Not Determined
pH (1% solution):	> 2.8
Specific Gravity:	1.10 – 1.20
Melting Point/Freezing Point:	< 0 °C
Solubility(in water):	Completely Soluble
Initial Boiling Point And Boiling Range:	101°C To 103°C
Flash Point:	Not Determined
Evaporation Rate:	Not Determined
Flammability (Solid,Gas):	Not Determined
Partition Coefficient: N-Octanol/Water:	Not Determined
Auto-Ignition Temperature:	Not Determined
Decomposition Temperature:	Not Determined
Viscosity:	Not Determined

Note: The above physical data are typical values. They should not be construed as specification for the product.

10. STABILITY AND REACTIVITY

REACTIVITY: Reacts with strong bases and oxidizing agents
STABILITY: Stable under normal conditions
CONDITIONS TO AVOID: Contact with strong bases, strong oxidizers, extreme temperatures
INCOMPATIBILITY: No further relevant information available
HAZARDOUS DECOMPOSITION: CO, CO2, P2O5, phosphines
HAZARDOUS POLYMERIZATION: Will not occur.

11. TOXICOLOGICAL INFORMATION

This is a blended product. No data on the neat product is available. The following data is available for the active components, which have been diluted to make this product.

Likely Routes of Exposure: Eyes, Skin and Ingestion
Potential Health effects:

Eyes: Can cause eye burns. Injury may be permanent
Skin: Can cause skin irritation
Inhalation: No Data Available for the mixture
Ingestion: Harmful if swallowed

Acute Toxicity:

Tetrakis (Hydroxymethyl) Phosphonium Sulphate, data for 20% active product:

Dermal LD_{50}	> 5000 mg/kg (rat)
Oral LD_{50}	> 730 mg/kg (rat)
Inhalation LC_{50}	5.46 mg/L/4H (rat)

1-Hydroxyethylidene-1,1-diphosphonic acid, published data for 60% active product:
Oral LD_{50} ……> 2400 mg/kg (rat)
Dermal LD_{50}……> 7940 mg/kg (rabbit)

Acute Effects from Overexposure- The product is corrosive to the eyes and is irritating to the mucous membranes of the respiratory and gastrointestinal tracts.

Carcinogenicity - Not listed with IARC, NTP, OSHA, ACGIH

12. ECOLOGICAL INFORMATION

This is a blended product. No ecological information on the neat product is available. The following data is available for the active components, which have been diluted to make this product.

Data for 75% Active Tetrakis(Hydroxymethyl)Phosphonium Sulphate:

Rainbow trout (Oncorhynchus mykiss), 96 Hour LC50 Static:.....119 mg/l
Daphnia magna (Water Flea), 48 Hour EC50:..... 19.4 mg/l
Bluegill Sunfish (Lepomis Macrochirus) 96 Hour LC50.....93.0 mg/l
Green Algae (Pseudokirchneriella subcapitata), 96 Hour EC50: ..... 0.2 mg/l

Chemical Fate Information:

This component is not expected to bioaccumulate. It is readily biodegradable under aerobic and anaerobic conditions in a sediment-water system. It has been shown to degrade rapidly once diluted to sub-ppm concentrations and forms trishydroxymethyl phosphine oxide which is classified as nontoxic.

Data for 60% active 1-Hydroxyethylidene-1,1-diphosphonic acid:

Algae	(Selenastrum Capricornutum), 96 Hour EC50:		3.0	mg/l
	NOEC:.....		1.3	mg/l
Fish	Bluegill Sunfish (Lepomis macrochirus), 96 Hour LC50	>	800	mg/l
	NOEC:.....		529	mg/l
	Rainbow Trout (Salmo gairdneri), 96 Hour LC50:.....	>	350	mg/l
	NOEC:..... Sheephead Minnow, 96 Hour		151	mg/l
	LC50:.....	>	2100	mg/l
	NOEC:.....		104	mg/l
	Channel Catfish, 96 Hour, 96 Hour LC50.....	>	650	mg/l
	NOEC:.....		529	mg/l
Invertebrates	Daphnia magna, 48 Hour EC50:	>	500	mg/l
	NOEC:.....		400	mg/l
	Grass Shrimp (Palaemonetes Pugio), 96 Hour EC50:.....	>	1700	mg/l
	NOEC:.....		104	mg/l

This component has low avian toxicity, is slightly toxic to oysters and is practically non-toxic to fish and invertebrates. Algal growth inhibition is due to ability of the product to complex materials and not to toxicity per se.

Chemical Fate Information – This product has slow to intermediate biodegradation classification, and is not expected to bioaccumulate.

13. DISPOSAL CONSIDERATION

Waste Classification:

Chemical additions, processing or otherwise altering this material any make the waste management information presented in this MSDS incomplete, inaccurate or otherwise inappropriate. Please be advised that state and local requirements for waste disposal may be more restrictive or otherwise different from federal laws and regulations. Consult state and local regulations regarding the proper disposal of this material.
US EPA guidelines for the classification determination are listed in 40 CFR Parts 261.3.

Disposal Method:

Absorb spillage onto sand or other absorbent material and dispose of as solid waste as per local regulations (e.g. incineration). Preferred method for disposal of surplus product can be incineration or other thermal method.

If the product was supplied in a single use container, care should be taken to dispose of the container in a responsible manner and in accordance with applicable regulations. Label precautions should be followed for any residual material in the container. Whenever possible, our company encourages recycling of empty containers.

14. TRANSPORT INFORMATION

U.S. DOT (Department of Transportation):
Proper Shipping Name – Not Regulated
Other Shipping Information – DOT Marking – Not applicable
Hazardous Substance/RQ – Not applicable
49 STCC Number – Not applicable
Keep container tightly closed. Protect against physical damage.

15. REGULATORY INFORMATION

OSHA Hazard Communication Standard:

This product is a "Hazardous Chemical" as defined by the OSHA Hazard Communication Standard, 29 CFR 1910.1200.

UNITED STATES
SARA TITLE 3 (Superfund Amendments and Reauthorization Act) – Not listed
Section 302 Extremely Hazardous Substances (40 CFR 355) – Not listed
Section 311 Hazard Category (40 CFR 370) – Immediate (Acute) Health Hazard
Section 312 Threshold Planning Quantity (40 CFR 370) – Not Required
Section 313 Reportable Ingredients (40 CFR 372) – Listed

CERCLA (Comprehensive Environmental Response Compensation and Liability Act) (40 CFR 302.4)-Not listed.

TSCA (Toxic Substance Control Act) (40 CFR 710) – Listed

16. OTHER INFORMATION

Suggested HMIS Ratings -	Health - 3	Flammability - 0	Reactivity - 1	Protection - D
NFPA Rating	Health - 3	Flammability - 0	Reactivity - 1	Special - None

HMIS Rating notes - Protection D = Face Shield or Splash Proof Safety Goggles, Gloves, Apron

Date Prepared: 9-28-2015

The information contained herein is to the best of our knowledge and belief, accurate, but any recommendations or suggestions made are without warranty or guarantee of results, expressed or implied. We therefore, assume no liability for loss or damage incurred by following these suggestions. Any determination of fitness for a particular purpose is the buyer's responsibility. Analytix Technologies urges persons receiving this information to make their own determination as to the information's suitability and completeness for their particular application. Analytix Technologies' only obligation will be to replace such quantity of product proved to be defective. User assumes all risks and liability whatsoever in connection with the suitability of the product for the users intended application. Analytix Technologies shall not be responsible in tort, contract or under any theory for any loss or damage, incidental or consequential, arising out of the use of or the inability to use the products.

1. CHEMICAL IDENTIFICATION

Product Name	AN-450FG
Recommended Use	Water Treatment Antiscalent, Descaler
Restrictions on Use	Not Determined
Emergency Number	Infotrac 1-800-535-5053
Customer Service Hotline	281-286-7562 (8 AM to 5 PM CST)

Supplier of SDS:

Analytix Technologies LLC
PO Box 590466
Houston TX 77259-0466
Tel: (281) 286-7562
Web: www.analytixtechnoloies.com
Email: analytix@earthlink.net

2. HAZARD IDENTIFICATION

Hazard classification

GHS Classification:

Acute Toxicity, Oral (Category 5)

Acute Toxicity, Inhalation (Category 5)

Specific Target Organ Toxicity (Repeated Exposure) (Category 2)

Signal Word: WARNING

Pictograms: Acute Toxicity, Health Hazard

Hazard Statements:

H303	: May be harmful if swallowed
H333	: May be harmful is inhaled
H373	: May cause damage to bone and kidneys through prolonged or repeated oral exposure

Precautionary Statements:

P260	: Do not breathe vapors
P264	: Wash contact area thoroughly after handling
P280	: Wear protective gloves/protective clothing/eye protection/face protection.
P303 + P361 +P353	: IF ON SKIN or hair: Remove/Take off immediately all contaminated clothing. Rinse skin with water/ shower
P305 + P351 + P338	: IF IN EYES: rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing.
P301 + P330 + P331	: IF SWALLOWED: Rinse mouth. Do NOT induce vomiting
P304 + P340 + P310	: IF INHALED: Remove person to fresh air and keep in position comfortable for breathing
P312	: Call a POISON CENTER or doctor/physician if feeling unwell
P403 + P235	: Store in a well-ventilated place. Keep cool.
P273 + P405	: Avoid release to the environment. Store Locked Up.
P501	: Dispose of contents/container in accordance with local/state/federal regulations.

Other hazards: no data available

3. COMPOSITION / INFORMATION ON INGREDIENTS

Mixture of water treatment chemicals

Chemical Name	CAS No.	GHS Classification
Sodium Polycarboxylate	Not Hazardous	None
Water	7732-18-5	None

Specific chemical identity and/or percentages of composition have been withheld as a trade secret

4. FIRST AID MEASURES

Eyes: Immediately flush with water for at least 15 minutes, lifting the upper and lower eyelids intermittently. See a medical doctor or ophthalmologist immediately.

Skin: Immediate first aid is not likely to be required. Wash with plenty of soap and water. Get medical attention if irritation occurs and persists.

Ingestion: Immediate first aid is not likely to be required. Rinse mouth with water. Dilute by giving 2 glasses of water. Do not induce vomiting. Never give anything by mouth to an unconscious person. A physician can be contacted for advice.

Inhalation: Immediate first aid is not likely to be required. Remove to fresh air. If breathing difficulty or discomfort occurs and persists, contact a medical doctor.

NOTES TO MEDICAL DOCTOR: Treatment is controlled removal of exposure with symptomatic and supportive care.

5. FIRE FIGHTING MEASURES

SUITABLE EXTINGUISHING MEDIA: alcohol resistant foam, CO_2, powder, water spray

UNSUITABLE EXTINGUISHING MEDIA: Water jet

SPECIAL FIRE FIGHTING PROCEDURES Wear self-contained breathing apparatus with a full face piece operated in the positive pressure demand mode when fighting fires.

HAZARDOUS DECOMPOSITION: CO, CO_2

6. ACCIDENTAL RELEASE MEASURES

PROTECTIVE PRECAUTIONS AND EMERGENCY PROCEDURES Keep unnecessary personnel away.
Wear appropriate protective equipment and clothing during clean-up. Do not breather mist or vapors. Ensure adequate ventilation

CONTAINMENT PROCEDURE Prevent further leakage or spillage if safe to do so. Contain spills to prevent migration and entry into waterway.

CLEANUP PROCEDURE Contain large spills with dikes and transfer material to appropriate containers for reclamation or disposal. Absorb remaining material or small spills with inert material and then place in a chemical waste container.

7. HANDLING AND STORAGE

Handling – Avoid contact with eyes, skin and clothing. Avoid breathing vapor or mist and use approved splash goggles and vapor respirator fitted with approved organic cartridge if vaporization or misting occurs. Use with adequate ventilation.

Storage: Store at > 32 °F. Stir well before use. Keep containers tightly closed when not in use and when in transit.

8. EXPOSURE CONTROLS/PERSONAL PROTECTION EQUIPMENT

Control Parameters: No specific occupational exposure limit have been established.

Exposure Controls:

Eye Protection: Wear Face Shield or chemical splash goggles meeting ANSI Z87.1 or approved equivalent.
Hand & Body Protection: Minimize skin contact by wearing protective PVC or Neoprene gloves, overalls or apron is also recommended.
Respiratory Protection: None required under normal handling and transfer conditions. An approved respiratory protection program meeting OSHA 1910.134 and ANSI Z88.2 requirements or equivalent must be followed whenever workplace conditions warrant use of a respirator. Where vapors or mist may occur, wear a properly fitted NIOSH-approved or equivalent half-mask, air-purifying respirator fitted with NIOSH-approved organic vapor cartridges.

Engineering Controls: Facilities storing or utilizing this material should be equipped with adequate ventilation, eyewash and shower facility.

9. PHYSICAL AND CHEMICAL PROPERTIES

Appearance:	Pale Amber Clear Liquid
Upper/Lower Flammability Or Explosive Limits:	Not Determined
Odor:	Mild
Vapor Pressure:	17.5 Mm Hg @ 20^0c
Odor Threshold:	Not Determined
Vapor Density:	Not Determined
pH (1% solution):	4.0 – 5.0
Specific Gravity:	1.10 - 1.20
Melting Point/Freezing Point:	$< 0^0$ C
Solubility(in water):	Completely Soluble
Initial Boiling Point And Boiling Range:	101^0C To 103^0C
Flash Point:	Not Determined
Evaporation Rate:	Not Determined
Flammability (Solid, Gas):	Not Determined
Partition Coefficient: N-Octanol/Water:	Not Determined
Auto-Ignition Temperature:	Not Determined
Decomposition Temperature:	Not Determined
Viscosity:	50 – 350 cps

Note: The above physical data are typical values. They should not be construed as specification for the product.

10. STABILITY AND REACTIVITY

REACTIVITY : No Data Available
STABILITY: Stable under normal conditions
CONDITIONS TO AVOID: No Data Available
INCOMPATIBILITY: There are no known materials which are incompatible with this product
HAZARDOUS DECOMPOSITION: CO, CO2
HAZARDOUS POLYMERIZATION: Will not occur.

11. TOXICOLOGICAL INFORMATION

Acute Toxicity:
Dermal LD_{50}……..> 5000 mg/kg (rabbit)
Oral LD_{50} ……..,> 5000 mg/kg (rat)
Inhalation……data not available

Skin corrosion/irritation : No skin irritation
Serious eye damage/eye irritation: slight irritation
Sensitization: Product test data not available.
Specific Target Organ Systemic Toxicity (Single Exposure): Product test data not available.
Specific Target Organ Systemic Toxicity (Repeated Exposure): Product test data not available.
Carcinogenicity: Product test data not available.
Teratogenicity: Product test data not available.
Reproductive toxicity: Product test data not available.
Mutagenicity: Product test data not available.
Aspiration Hazard: Product test data not available.

12. ECOLOGICAL INFORMATION

Toxicity data for a compositionally similar material are as follows:

Rainbow trout (Salmo gairdneri) 96 Hour LC50:…….	>	1,000 mg/L
Daphnia magna 24 hr EC50 :……..	>	320 mg/L
Brown shrimp, 96 Hour LC50:……..	>	10,000 mg/L
Zebra fish, 96 Hour LC50:…….	>	1,000 mg/L

* LC50: Lethal Concentration to 50 % of the test organism. ** NOEC: No Observed Effect Concentration
* EC50: Effective Concentration with some effect in 50% of the test organism,

13. DISPOSAL CONSIDERATION

Disposal Method: For small spills, neutralize with lime or soda ash and flush away with plenty of water.
For large spillage absorb spillage onto sand or other absorbent material and dispose of as solid waste as per local regulations (e.g. incineration). Surplus product can be incinerated.

If the product was supplied in a single use container, care should be taken to dispose of the container in a responsible manner and in accordance with applicable regulations. Label precautions should be followed for any residual material in the container. Whenever possible, our company encourages recycling of containers.

14. TRANSPORT INFORMATION

U.S. DOT (Department of Transportation): Nonregulated

Other Shipping Information – DOT Marking – Not applicable
Hazardous Substance/RQ – Not applicable
49 STCC Number – Not applicable

Keep container tightly closed. Protect against physical damage.

15. REGULATORY INFORMATION

Following information pertains to each active component in the product, when applicable.
UNITED STATES
SARA TITLE 3 (Superfund Amendments and Reauthorization Act) – Not listed
Section 302 Extremely Hazardous Substances (40 CFR 355) – Not listed
Section 311 Hazard Category (40 CFR 370) – Not Hazardous _Delayed Chronic Health Hazard
Section 312 Threshold Planning Quantity (40 CFR 370) – 10,000 lbs
Section 313 Reportable Ingredients (40 CFR 372) – Not listed

CERCLA (Comprehensive Environmental Response Compensation and Liability Act) (40 CFR 302.4)-Not listed.

TSCA (Toxic Substance Control Act) (40 CFR 710) – All components are in compliance with TSCA

16. OTHER INFORMATION

Suggested HMIS Ratings -	Health - 1	Flammability - 0	Reactivity - 0	Protection - B
NFPA Rating	Health - 1	Flammability - 0	Reactivity - 0	Special - None

HMIS Rating notes - Protection B = Splash Proof Goggles, Gloves

Date Prepared: 9-10-2015
Date Revised: 2-10-2016 (added hazard warning data, section 2)

The information contained herein is to the best of our knowledge and belief, accurate, but any recommendations or suggestions made are without warranty or guarantee of results, expressed or implied. We therefore, assume no liability for loss or damage incurred by following these suggestions. Any determination of fitness for a particular purpose is the buyer's responsibility. Analytix Technologies urges persons receiving this information to make their own determination as to the information's suitability and completeness for their particular application. Analytix Technologies' only obligation will be to replace such quantity of product proved to be defective. User assumes all risks and liability whatsoever in connection with the suitability of the product for the users intended application. Analytix Technologies shall not be responsible in tort, contract or under any theory for any loss or damage, incidental or consequential, arising out of the use of or the inability to use the products.

SAFETY DATA SHEET

Issuing Date 05-June-2015 **Revision Date** 28-June-2019 **Revision Number** 5

The supplier identified below generated this SDS using the UL SDS template. UL did not test, certify, or approve the substance described in this SDS, and all information in this SDS was provided by the supplier or was reproduced from publically available regulatory data sources. UL makes no representations or warranties regarding the completeness or accuracy of the information in this SDS and disclaims all liability in connection with the use of this information or the substance described in this SDS. The layout, appearance and format of this SDS is © 2014 UL LLC. All rights reserved.

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1. IDENTIFICATION OF THE SUBSTANCE/PREPARATION AND OF THE COMPANY/UNDERTAKING

Product identifier

Haws 9082 Brand
Eyewash Station Additive
Concentrate (8oz green bottle)

Other means of identification

Synonyms	None
National Drug Code (NDC)	**66051-236-80**

Recommended use of the chemical and restrictions on use

Recommended Use	Medicinal products
Uses advised against	No information available

Details of the supplier of the safety data sheet

Supplier Name	NIAGARA PHARMACEUTICALS INC.
Supplier Address	60 INNOVATION DRIVE FLAMBOROUGH ON L9H7P3 CANADA
Supplier Phone Number	Phone:905-690-6277 Fax:905-690-6281
Supplier Email	rjames@niagarapharmaceuticals.com

Emergency telephone number

Company Emergency Phone Number	905-708-7962

2. HAZARDS IDENTIFICATION

Classification

This product is not considered hazardous by the 2012 OSHA Hazard Communication Standard (29 CFR 1910.1200).

GHS Label elements, including precautionary statements

Precautionary Statements - Prevention
Product is a concentrate. Use as directed on the label for dilution with water. Do not use as the concentrate

Precautionary Statements - Response

Eyes
IF IN EYES USED AS A CONCENTATE: Rinse with water for several minutes. Remove contact lens if present and easy to do. Continue rinsing immediately. Call a Poison Center or doctor/physician.

Precautionary Statements - Storage
None

Precautionary Statements - Disposal
None

Hazards not otherwise classified (HNOC)

Not applicable

Unknown Toxicity
0% of the mixture consists of ingredient(s) of unknown toxicity

Other information

Toxic to aquatic life

Interactions with Other Chemicals
No information available.

3. COMPOSITION/INFORMATION ON INGREDIENTS

.

Chemical Name	CAS No	Weight-%	Trade Secret
Propylene Glycol	57-55-6	7-13	*
Chlorhexidine Gluconate	18472-51-0	3-7	*

*The exact percentage (concentration) of composition has been withheld as a trade secret

4. FIRST AID MEASURES

First aid measures

General advice Immediate medical attention is required **if used as a concentrate.**

Eye contact	**Product is to be diluted and used as per label instructions only**. If used as a concentrate, rinse immediately with plenty of water and also under the eyelids for at least 15 minutes. Keep eyes wide open while rinsing. Do not rub the affected area. Seek immediate medical attention/advice.
Skin contact	If used as a concentrate, wash off immediately with soap and plenty of water for at least 15 minutes. Get medical attention if irritation develops and persists.
Inhalation	No information available
Ingestion	Rinse mouth immediately and drink plenty of water. Never give anything by mouth to an unconscious person.DO NOT induce vomiting. Call a physician

Most important symptoms and effects, both acute and delayed

Most Important Symptoms and Effects	No information available.

Indication of any immediate medical attention and special treatment needed

Notes to Physician	Treat symptomatically.

5. FIRE-FIGHTING MEASURES

Suitable Extinguishing Media
Use extinguishing measures that are appropriate to local circumstances and the surrounding environment.

Unsuitable extinguishing media
No information available

Specific hazards arising from the chemical
No information available

Hazardous Combustion Products
Carbon oxides

Explosion Data

Sensitivity to Mechanical Impact	No.
Sensitivity to Static Discharge	No.

Protective equipment and precautions for firefighters
As in any fire, wear self-contained breathing apparatus pressure-demand, MSHA/NIOSH (approved or equivalent) and full protective gear.

6. ACCIDENTAL RELEASE MEASURES

Personal precautions, protective equipment and emergency procedures

Personal precautions As a concentrate, avoid contact with skin, eyes or clothing.

Environmental precautions

Environmental precautions Refer to protective measures listed in Sections 7 and 8. Prevent further leakage or spillage.

Methods and material for containment and cleaning up

Methods for containment Prevent further leakage or spillage if safe to do so.

Methods for cleaning up Soak up with inert absorbent material.

7. HANDLING AND STORAGE

Precautions for safe handling

Handling Handle in accordance with good industrial hygiene and safety practice.

Conditions for safe storage, including any incompatibilities

Storage Keep containers tightly closed in a dry, cool and well-ventilated place. Store locked up. Keep out of reach of children.

Incompatible Products Strong oxidizing agents. Strong acids. Strong bases.

8. EXPOSURE CONTROLS/PERSONAL PROTECTION

Control parameters

Exposure Guidelines This product, as supplied does not contain any hazardous materials with occupational exposure limits established by the region specific regulatory bodies.

Appropriate engineering controls

Engineering Measures	Showers Eyewash stations Ventilation systems

Individual protection measures, such as personal protective equipment

Eye/face protection	No protective equipment is needed under normal use conditions
Skin and body protection	No protective equipment is needed under normal use conditions
Respiratory protection	No protective equipment is needed under normal use conditions.
Hygiene Measures	Handle in accordance with good industrial hygiene and safety practice.

9. PHYSICAL AND CHEMICAL PROPERTIES

Physical and Chemical Properties

Physical state	Liquid		
Appearance	Clear to light yellow	**Odor**	Odorless
Color	No information available	**Odor Threshold**	No information available

Property	**Values**	**Remarks Method**
pH	6.3	None known
Melting / freezing point	No data available	None known
Boiling point / boiling range	No data available	None known
Flash Point	No data available	None known
Evaporation Rate	No data available	None known
Flammability (solid, gas)	No data available	None known
Flammability Limit in Air		
Upper flammability limit	No data available	
Lower flammability limit	No data available	
Vapor pressure	No data available	None known
Vapor density	No data available	None known
Specific Gravity	1	None known
Water Solubility	Completely soluble	None known
Solubility in other solvents	No data available	None known
Partition coefficient: n-octanol/water	No data available	None known
Autoignition temperature	No data available	None known
Decomposition temperature	No data available	None known
Kinematic viscosity	No data available	None known
Dynamic viscosity	No data available	None known
Explosive properties	No data available	
Oxidizing properties	No data available	

Other Information

Softening Point	No data available
VOC Content (%)	No data available
Particle Size	No data available
Particle Size Distribution	

10. STABILITY AND REACTIVITY

Reactivity

No data available.

Chemical stability
Stable under recommended storage conditions.
Possibility of Hazardous Reactions
None under normal processing.
Hazardous Polymerization
Hazardous polymerization does not occur.

Conditions to avoid
None known based on information supplied.
Incompatible materials
Strong oxidizing agents. Strong acids. Strong bases.
Hazardous Decomposition Products
None known

11. TOXICOLOGICAL INFORMATION

Information on likely routes of exposure

Product Information .

Inhalation Specific test data for the substance or mixture is not available.

Eye contact Specific test data for the substance or mixture is not available.

Skin contact Specific test data for the substance or mixture is not available.

Ingestion Specific test data for the substance or mixture is not available. Ingestion may cause irritation to the mucous membranes. Ingestion may cause gastrointestinal irritation, nausea, vomiting and diarrhea.

Component Information

Chemical Name	Oral LD50	Dermal LD50	Inhalation LC50
Propylene Glycol 57-55-6	= 20000 mg/kg (Rat)	= 20800 mg/kg (Rabbit)	-

Information on toxicological effects

Symptoms No information available.

Delayed and immediate effects as well as chronic effects from short and long-term exposure

Sensitization No information available.

Mutagenic Effects No information available.

Carcinogenicity Contains no ingredient listed as a carcinogen.

Reproductive toxicity No information available

STOT - single exposure No information available.

STOT - repeated exposure No information available.

Chronic Toxicity No known effect based on information supplied.

Target Organ Effects No information available

Aspiration Hazard No information available.

Numerical measures of toxicity Product Information

The following values are calculated based on chapter 3.1 of the GHS document
Not applicable

12. ECOLOGICAL INFORMATION

Ecotoxicity
Toxic to aquatic organisms

Chemical Name	Toxicity to Algae	Toxicity to Fish	Toxicity to Microorganisms	Daphnia Magna (Water Flea)
Propylene Glycol 57-55-6	96h EC50: = 19000 mg/L (Pseudokirchneriella subcapitata)	96h LC50: = 51600 mg/L (Oncorhynchus mykiss) 96h LC50 : 41-47 m L/L (Oncorhynchus mykiss) 96h LC50 =51400 mg/L (Pimephales promelas) 96h LC50 = 710 mg/L (Pimephales promelas))	EC50 = 710 mg/L 30 min	24h EC50 > 10000 mg/L 48h EC50 > 1000 mg/L

Persistence and Degradability
No information available.

Bioaccumulation
No information available.

Other adverse effects
No information available.

13. DISPOSAL CONSIDERATIONS

Waste treatment methods

Disposal methods This material, as supplied, is not a hazardous waste according to Federal regulations (40 CFR 261). This material could become a hazardous waste if it is mixed with or otherwise comes in contact with a hazardous waste, if chemical additions are made to this material, or if the material is processed or otherwise altered. Consult 40 CFR 261 to determine whether the altered material is a hazardous waste. Consult the appropriate state, regional, or local regulations for additional requirements.

Contaminated Packaging Dispose of contents/containers in accordance with local regulations.

California Hazardous Waste Codes 561

14. TRANSPORT INFORMATION

DOT	NOT REGULATED
Proper Shipping Name	NON REGULATED
Hazard Class	N/A
TDG	Not regulated
MEX	Not regulated
ICAO	Not regulated
IATA	Not regulated
Proper Shipping Name	NON REGULATED
Hazard Class	N/A
IMDG/IMO	Not regulated
Hazard Class	N/A
Marine Pollutant	Product is a marine pollutant according to criteria set by IMDG/IMO
RID	Not regulated
ADR	Not regulated
ADN	Not regulated

15. REGULATORY INFORMATION

International Inventories

TSCA	Complies
DSL	All components are listed either on the DSL or NDSL.

TSCA - United States Toxic Substances Control Act Section 8(b) Inventory
DSL/NDSL - Canadian Domestic Substances List/Non-Domestic Substances List

US Federal Regulations

SARA 313
Section 313 of Title III of the Superfund Amendments and Reauthorization Act of 1986 (SARA). This product does not contain any chemicals which are subject to the reporting requirements of the Act and Title 40 of the Code of Federal Regulations, Part 372

SARA 311/312 Hazard Categories

Acute Health Hazard	No
Chronic Health Hazard	No
Fire Hazard	No
Sudden release of pressure hazard	No
Reactive Hazard	No

CWA (Clean Water Act)
This product does not contain any substances regulated as pollutants pursuant to the Clean Water Act (40 CFR 122.21 and 40 CFR 122.42)

CERCLA
This material, as supplied, does not contain any substances regulated as hazardous substances under the Comprehensive Environmental Response Compensation and Liability Act (CERCLA) (40 CFR 302) or the Superfund Amendments and Reauthorization Act (SARA) (40 CFR 355). There may be specific reporting requirements at the local, regional, or state level pertaining to releases of this material

US State Regulations

California Proposition 65
This product does not contain any Proposition 65 chemicals.

U.S. State Right-to-Know Regulations

.

Chemical Name	New Jersey	Massachusetts	Pennsylvania	Rhode Island	Illinois
Propylene Glycol 1330-43-4	X		X		

International Regulations

Canada
WHMIS Hazard Class
Not determined

16. OTHER INFORMATION

NFPA	**Health Hazards**	0	**Flammability**	0	**Instability**	0	**Physical and Chemical Hazards** -
HMIS	**Health Hazards**	**0**	**Flammability**	0	**Physical Hazard**	0	**Personal Protection** X

Prepared By Niagara Pharmaceuticals Inc.
60 Innovation Drive.
Flamborough,ON,L9H7P3
905-690-6277
Revision Date 28-June -2019
Revision Note SDS for Haws

Disclaimer
The information provided in this Safety Data Sheet is correct to the best of our knowledge, information and belief at the date of its publication. The information given is designed only as a guidance for safe handling, use, processing, storage, transportation, disposal and release and is not to be considered a warranty or quality specification. The information relates only to the specific material designated and may not be valid for such material used in combination

with any other materials or in any process, unless specified in the text

End of Safety Data Sheet

GSI Job No. G-5738
Issued: 30 June 2021

GSI ENVIRONMENTAL

Construction Completion Addendum Report
Second Addendum
OU-3 Remedial Action

Anniston PCB Site
Anniston, Alabama

Appendix D

Hydrostatic Pressure Test Forms

GSI ENVIRONMENTAL

PRESSURE TEST REPORT FORM

PROJECT INFORMATION

Project Name:	SOLUTIA ANNISTON	Project Location:	Anniston AL
Client:	SOLUTIA	GSI Job. No:	5095-106

SYSTEM INFORMATION

Pipe Diameter:	4"	Length of Line:	~ 1125 ft
Pipe Material:	HDPE (SDR-11)	Other:	

TEST INFORMATION

Type of Test: ☒ Hydrostatic STACK/EXFILTRATION ☐ Pneumatic

Test Standard(s):	ASTM,	Test Fluid:	WATER
Design Working Pressure:	Gravity	Required Test Pressure:	STACK/EXFILTRATION

TEST RESULTS

Test Start Date:	7/17/19	Test End Date:	7/17/19
Test Start Time:	11:35	Test End Time:	12:35
Test Pressure (Start):	39.5" (WATER ELEVATION FROM JUNCTION BOX LID)	Test Pressure (End):	39.5"

Test Results: ☒ Pass ☐ Fail

Corrective Actions Taken if Test Failed:

- test conducted after installation of cleanouts on seep compliance line

NR

Remarks:

TEST CERTIFICATION

Technician Performing Test:		Engineer Witnessing Test:	
Name:	Dean Dupree	Name:	Michael Ryst
Company:	Taylor Corp.	Company:	GSI Environmental, Inc.
Date:	7-17-19	Date:	7/17/19
Signature	Dean Dupree	Signature	

GSI ENVIRONMENTAL

PRESSURE TEST REPORT FORM

PROJECT INFORMATION

Project Name:	Solutia Anniston	Project Location:	Anniston AL
Client:	Solutia	GSI Job. No:	5095-106

SYSTEM INFORMATION

Pipe Diameter:	2"	Length of Line:	~20ft
Pipe Material:	Sch. 80 PVC	Other:	—

TEST INFORMATION

Type of Test:	[X] Hydrostatic	[ ] Pneumatic	
Test Standard(s):	ASTM	Test Fluid:	WATER
Design Working Pressure:	50 psi	Required Test Pressure:	75 psi

TEST RESULTS

Test Start Date:	7/18/19	Test End Date:	7/18/19
Test Start Time:	1:39	Test End Time:	2:39
Test Pressure (Start):	78 psi	Test Pressure (End):	78 psi

Test Results: [X] Pass [ ] Fail

Corrective Actions Taken if Test Failed:

N/A

Remarks:

- segment from EQ tank to bag filter vessel (2")

TEST CERTIFICATION

Technician Performing Test:		Engineer Witnessing Test:	
Name:	Deon Dupree	Name:	Michael Lyst
Company:	Taylor Corp	Company:	GSI Environmental, Inc.
Date:	7-18-19	Date:	7/18/19
Signature	Deon Dupree	Signature	

GSI Job No. G-5738
Issued: 30 June 2021

Construction Completion Addendum Report
Second Addendum
OU-3 Remedial Action

Anniston PCB Site
Anniston, Alabama

Appendix E

Daily Construction Reports

Taylor Corporation — Construction Daily Work Report

Project Number/Name:	Seep and CTS 3 Modifications
Foreman:	Deon Dupree
Date:	7-12-19

Description of Work Being Done Today:
Employees that were not up to date with badges went through orientation. After orientation we installed male adaptor to overflow and ran hose down to CTS 3. We also installed drop pipe in seep box

EQUIPMENT	HOURS	EQUIPMENT	HOURS
Small Tools	8		
Skid ster	8		
Foreman Truck	8		

Labor

NAME	OCCUPATION	START TIME:	STOP TIME:
Deon Dupree	Foreman	7:00 am	3:00 pm
Jeremiah McLeroy	laborer	7:00 am	3:00 pm
Thomas Chapman	laborer	7:00 am	3:00 pm
Mitch Long	laborer	7:00 am	3:00 pm
"	"	"	"

Notes:

Weather Reports:

Taylor Corporation

Construction Daily Work Report

Project Number/Name:	Seep and GTS 3 modifications
Foreman:	Deon Dupree
Date:	7-15-19

Description of Work Being Done Today:

Locate and dug up existing line, installed both clean outs and backfilled over clean out

EQUIPMENT	HOURS	EQUIPMENT	HOURS
Small Tools	10.5 hrs		
Excavator	10.5 hrs		
Skid steer	10.5 hrs		
Foreman Truck	10.75 hrs		

Labor

NAME	OCCUPATION	START TIME:	STOP TIME:
Deon Dupree	Foreman	6:30 am	5:45 pm
Jeremiah McLeroy	laborer	6:30 am	5:00 pm
Thomas Chapman	laborer	6:30 am	5:00 pm
Mitch Long	laborer	6:30 am	5:00 pm

Notes:

Weather Reports:

Taylor Corporation — Construction Daily Work Report

Project Number/Name:	Seep and CTS 3 Modifications
Foreman:	Deon Dupree
Date:	7-16-19

Description of Work Being Done Today:

Finished plumbing out the 4x3 Tee. Filled upper seep box to begin bleeding air off the line for test. Checked all existing cleanouts for leaks. Pumped out EQ Tank, removed old pump, installed new pump Installed 2" Valve on EQ Tank

EQUIPMENT	HOURS	EQUIPMENT	HOURS
Small Tools	10.5		
Skid Steer	10.5		
Foreman Truck	10.5		

Labor

NAME	OCCUPATION	START TIME:	STOP TIME:
Deon Dupree	Foreman	6:30	5:00
Jeremiah McLeroy	laborer	6:30	5:00
Thomas Chapman	laborer	6:30	5:00
Mitch Long	laborer	6:30	5:00
"	"	"	"

Notes:

Weather Reports:

Taylor Corporation — Construction Daily Work Report

Project Number/Name:	Seep and CTS 3 Modifications
Foreman:	Deon Dupree
Date:	7-17-19

Description of Work Being Done Today:

Plumbed out CTS 3 building. Finished Backfilling around lower Clean outs, Cleaned up old pipe and plastic

EQUIPMENT	HOURS	EQUIPMENT	HOURS
Small Tools	10		
Skid steer	10		
Foreman Truck	10		

Labor

NAME	OCCUPATION	START TIME:	STOP TIME:
Deon Dupree	Foreman	6:30	4:30
Jeremiah McLeroy	laborer	6:30	4:30
Thomas Chapman	laborer	6:30	4:30
Mitch Long	laborer	6:30	4:30

Notes:

Weather Reports:

Taylor Corporation — Construction Daily Work Report

Project Number/Name:	Serp and [redacted] CTS 3 Modifications
Foreman:	Deon Dupree
Date:	7-18-19

Description of Work Being Done Today:

Grassed and Mulched disturbed Areas. leak Check and pressure Tested inside of CTS-3. Cleaned inside of CTS 3. Brought left over fittings and pipe to shop

EQUIPMENT	HOURS	EQUIPMENT	HOURS
Small Tools	~~[illegible]~~ 9.5		
Skid Steer	~~[illegible]~~ 9.5		
Foreman Truck	~~[illegible]~~ 9.5		

Labor

NAME	OCCUPATION	START TIME:	STOP TIME:
Deon Dupree	Foreman	6:30 am	4:00 pm
Jeremiah McLeroy	laborer	6:30 am	4:00 pm
Thomas Chapman	laborer	6:30 am	4:00 pm
Mitch Long	laborer	6:30 am	4:00 pm
"	" "	"	"

Notes:

Chris Gray was on site to modify Control Panel

Weather Reports:

Taylor Corporation

Construction Daily Work Report

Project Number/Name:	Eastman Seep Treatment Facility
Foreman:	Matt Owen
Date:	9-25-19

Description of Work Being Done Today:

Installed Frac Tank Pad

EQUIPMENT	HOURS	EQUIPMENT	HOURS
Plate Tamp	8		
Skidsteer	8		

Labor

NAME	OCCUPATION	START TIME:	STOP TIME:
Matt Owens	Foreman	6:30	4:00
Tresvant Hunter	Laborer	6:30	4:00

Weather Reports:

Sunny; Hot

Taylor Corporation

Construction Daily Work Report

Project Number/Name:	Eastman Soap Treatment Facility
Foreman:	Matt Owens
Date:	9-26-19

Description of Work Being Done Today:

Uncovered 4" Soap Line on PCB Cells. Removed brush from ~~[illegible]~~ around power pole that transformer is on

EQUIPMENT	HOURS	EQUIPMENT	HOURS
Skid steer	8		
Excavator	8		

Labor

NAME	OCCUPATION	START TIME:	STOP TIME:
Matt Owens	8	6:30	2:30
Tresvant ~~[illegible]~~ Hunter	8	6:30	2:30

Weather Reports:

Sunny

Solutia OU-3 Remediation Action

Construction Daily Work Report

Day # _____

Project Number/Name:	Solutia. Cts3
Safety Meeting Topic:	
Date:	9-27-19. Friday

Activities/ Deliveries

Specific task working and or accomplished today:

Put in 4" valve and a 3" valve,3x3 tee and a quick connect on one end of the poly line and run 3" hoses to seep m.h. Just electro fused threaded nipple on the other end used 2-4" electro fuse couplings. Set meter box over the valves and reduced down comeing out of it to 2". Got everything we needed for solutia shut down for Monday

EQUIPMENT	HOURS	EQUIPMENT	HOURS
78 track hoe			
V10 skid steer			
V12 skid steer			
31 dozer			

LABOR

NAME	OCCUPATION	START TIME:	STOP TIME:	HOURS
Randy		6:30	1:00	
Kevin Hightower		Off		
Cedrick		6:30	4:00	
			Total Crew Hours for Today:	
			Total Crew Hours Cumulative:	

Details of Hauling/ Weight ticket # and tons

TRUCK	WEIGHT TICKET # / TONS	LOAD COUNT	ORIGIN	DESTINATION

Weather Report

Solutia OU-3 Remediation Action

Construction Daily Work Report

Day # _____

Project Number/Name:	Solutia. Cts3
Safety Meeting Topic:	
Date:	10-2-19. Wednesday

Activities/ Deliveries

Specific task working and or accomplished today:

Dug out 190' trench for a conduit to be Layed inside it. Removed topsoil around building for a pad to be poured on and graded 57 stone on it. Went and washed out a flow meter in cts3 with water and acid.

EQUIPMENT	HOURS	EQUIPMENT	HOURS
78 track hoe			
V10 skid steer			
V12 skid steer			
31 dozer			

LABOR

NAME	OCCUPATION	START TIME:	STOP TIME:	HOURS
Randy		6:30	4:00	
Kevin Hightower		6:30	4:00	
Cedrick		6:30	4:00	
			Total Crew Hours for Today:	
			Total Crew Hours Cumulative:	

Details of Hauling/ Weight ticket # and tons

TRUCK	WEIGHT TICKET # / TONS	LOAD COUNT	ORIGIN	DESTINATION

Weather Report

Solutia OU-3 Remediation Action

Construction Daily Work Report

Day # _____

Project Number/Name:	Solutia cts3
Safety Meeting Topic:	
Date:	10-3-19. Thursday

Activities/ Deliveries

Specific task working and or accomplished today:

Backfilled ditch line some where they laid the conduit. Dug ditch line for the ground cable and backfilled it. Went and got the water truck and got fitting hooked up to flush the lower section of the seep to the m.h. Flushed 1-water truck full and had to empty 4 loads into the plant

EQUIPMENT	HOURS	EQUIPMENT	HOURS
78 track hoe			
V10 skid steer			
V12 skid steer			
31 dozer			

LABOR

NAME	OCCUPATION	START TIME:	STOP TIME:	HOURS
Randy		6:30	4:00	
Kevin Hightower		6:30	4:00	
Cedrick		6:30	4:00	
			Total Crew Hours for Today:	
			Total Crew Hours Cumulative:	

Details of Hauling/ Weight ticket # and tons

TRUCK	WEIGHT TICKET # / TONS	LOAD COUNT	ORIGIN	DESTINATION

Weather Report

Solutia OU-3 Remediation Action

Construction Daily Work Report

Day # _____

Project Number/Name:	Solutia cts3
Safety Meeting Topic:	
Date:	10-4-19. Friday

Activities/ Deliveries

Specific task working and or accomplished today:
Helped Turner Form and Pour Pad and Trench for Seep Building.

EQUIPMENT	HOURS	EQUIPMENT	HOURS
78 track hoe			
V10 skid steer			
V12 skid steer			
31 dozer			

LABOR

NAME	OCCUPATION	START TIME:	STOP TIME:	HOURS
Randy		6:00	4:00	
Kevin Hightower		6:00	4:00	
Cedrick		6:00	4:00	
			Total Crew Hours for Today:	
			Total Crew Hours Cumulative:	

Details of Hauling/ Weight ticket # and tons

TRUCK	WEIGHT TICKET # / TONS	LOAD COUNT	ORIGIN	DESTINATION

Weather Report

Solutia OU-3 Remediation Action

Construction Daily Work Report

Day # _____

Project Number/Name:	Solutia cts3
Safety Meeting Topic:	
Date:	10-7-19. Monday

Activities/ Deliveries

Specific task working and or accomplished today:

Flushed off the upper seep from clean out to the new building.(1 truck per clean out). Turner installed blocked on building.

EQUIPMENT	HOURS	EQUIPMENT	HOURS
78 track hoe			
V10 skid steer			
V12 skid steer			
31 dozer			

LABOR

NAME	OCCUPATION	START TIME:	STOP TIME:	HOURS
Randy		6:30	4:00	
Kevin Hightower		6:30	4:00	
Cedrick		6:30	4:00	
			Total Crew Hours for Today:	
			Total Crew Hours Cumulative:	

Details of Hauling/ Weight ticket # and tons

TRUCK	WEIGHT TICKET # / TONS	LOAD COUNT	ORIGIN	DESTINATION

Weather Report

Solutia OU-3 Remediation Action

Construction Daily Work Report

Day # _____

Project Number/Name:	Solutia cts3
Safety Meeting Topic:	
Date:	10-8-19. Tuesday

Activities/ Deliveries

Specific task working and or accomplished today:

Ran 2" pipe inside the building on both ends. Used 15' of 2" pipe,4-2"45,4x2" reducer. Waterplugged inside and out of the sleeve on both ends. Backfilled ditch line. Put 2 loads of base down at toe of the slope so that bucket truck could make it up the slope. Turner moved scaffolding to inside of the building and started putting in the roof on the building. Closed off 3 rd at the depot and moved barrels around

EQUIPMENT	HOURS	EQUIPMENT	HOURS
78 track hoe			
V10 skid steer			
V12 skid steer			
31 dozer			

LABOR

NAME	OCCUPATION	START TIME:	STOP TIME:	HOURS
Randy		6:30	4:30	1.5 at depot
Kevin Hightower		6:30	4:30	1.5 at depot
Cedrick		6:30	4:30	1.5 at depot
Turner	3guys	6:30	2:30	
			Total Crew Hours for Today:	
			Total Crew Hours Cumulative:	

Details of Hauling/ Weight ticket # and tons

TRUCK	WEIGHT TICKET # / TONS	LOAD COUNT	ORIGIN	DESTINATION

Weather Report

Solutia OU-3 Remediation Action

Construction Daily Work Report

Day # 16

Project Number/Name:	Solutia. Seep Building
Safety Meeting Topic:	
Date:	10-9-2019. Wedensday

Activities/ Deliveries

Specific task working and or accomplished today:
Backfilled around building. Turner continued working on roof and installing shingles.

EQUIPMENT	HOURS	EQUIPMENT	HOURS
78 track hoe			
V10 skid steer			
V12 skid steer			

LABOR

NAME	OCCUPATION	START TIME:	STOP TIME:	HOURS
Deon Dupree		6:30	4:30	
Kevin Hightower		6:30	4:30	
Cedrick		6:30	4:30	
Turner	3 guys	6:30	2:30	
			Total Crew Hours for Today:	
			Total Crew Hours Cumulative:	

Details of Hauling/ Weight ticket # and tons

TRUCK	WEIGHT TICKET # / TONS	LOAD COUNT	ORIGIN	DESTINATION

Weather Report

Sunny & Warm

Solutia OU-3 Remediation Action

Construction Daily Work Report

Day # _____

Project Number/Name:	Solutia. Seep Building
Safety Meeting Topic:	
Date:	10-10-2019. Thursday

Activities/ Deliveries

Specific task working and or accomplished today:

Grassed around building and up the ditch line. Cleaned up construction debris, and took them to shop. Mastins was installing metal receiver on roof and disconnect box in preparation for power poles to be installed.

EQUIPMENT	HOURS	EQUIPMENT	HOURS
78 track hoe			
V10 skid steer			
V12 skid steer			

LABOR

NAME	OCCUPATION	START TIME:	STOP TIME:	HOURS
Deon Dupree		6:30	4:30	
Kevin Hightower		6:30	4:30	
Cedrick		6:30	4:30	
Mastins	2 guys	6:30	2:30	
			Total Crew Hours for Today:	
			Total Crew Hours Cumulative:	

Details of Hauling/ Weight ticket # and tons

TRUCK	WEIGHT TICKET # / TONS	LOAD COUNT	ORIGIN	DESTINATION

Weather Report

Sunny & Warm

Solutia OU-3 Remediation Action

Construction Daily Work Report

Day # _____

Project Number/Name:	Solutia. Seep Building
Safety Meeting Topic:	
Date:	10-11-2019. Friday

Activities/ Deliveries

Specific task working and or accomplished today:

Mastins installed poles and strung wire for new overhead poles. We helped decon their equipment, and provided support as needed.

EQUIPMENT	HOURS	EQUIPMENT	HOURS
78 track hoe			
V10 skid steer			
V12 skid steer			

LABOR

NAME	OCCUPATION	START TIME:	STOP TIME:	HOURS
Deon Dupree		6:30	4:30	
Kevin Hightower		6:30	4:30	
Cedrick		6:30	4:30	
			Total Crew Hours for Today:	
			Total Crew Hours Cumulative:	

Details of Hauling/ Weight ticket # and tons

TRUCK	WEIGHT TICKET # / TONS	LOAD COUNT	ORIGIN	DESTINATION

Weather Report

Sunny & Warm

Taylor Corporation

Construction Daily Work Report

Project Number/Name:	Solutia Seep Treatment Building
Foreman:	Deon Dupree
Date:	10-14-19

Description of Work Being Done Today:

Plummed inside of building

EQUIPMENT	HOURS	EQUIPMENT	HOURS

Labor

NAME	OCCUPATION	START TIME:	STOP TIME:
Deon Dupree		630	4
Tommy Chapman		630	4

Notes:

Weather Reports:

Taylor Corporation

Construction Daily Work Report

Project Number/Name:	Solutia Seep Treatment Building
Foreman:	Deon Dupree
Date:	10-15-19

Description of Work Being Done Today:
Pick up hydro seeder ¾ water truck from the track took to Solutia for solution wash

EQUIPMENT	HOURS	EQUIPMENT	HOURS

Labor

NAME	OCCUPATION	START TIME:	STOP TIME:
Deon Dupree		630	4
Tommy Chapman		630	4
...	...	...	...

Notes:

Weather Reports:

Taylor Corporation

Construction Daily Work Report

Project Number/Name:	Solutia Seep Treatment Building
Foreman:	Deon Dupree
Date:	10-16-19

Description of Work Being Done Today:

Picked up grates for ~~house~~ building and put them in

EQUIPMENT	HOURS	EQUIPMENT	HOURS

Labor

NAME	OCCUPATION	START TIME:	STOP TIME:
Deon Dupree		630	430
Tommy Chapman		630	430

Notes:

Weather Reports:

Taylor Corporation

Construction Daily Work Report

Project Number/Name:	Solutia Seep Treatment Building
Foreman:	Deon Dupree
Date:	10-17-19

Description of Work Being Done Today:

got all fittings and couplings need to do acid wash and clean out on the line

EQUIPMENT	HOURS	EQUIPMENT	HOURS

Labor

NAME	OCCUPATION	START TIME:	STOP TIME:
Deon Dupree		630	4
Tommy Chapman		630	4

Notes:

Weather Reports:

Taylor Corporation

Construction Daily Work Report

Project Number/Name:	Solutia Seep Treatment Building
Foreman:	Deon Dupree
Date:	10-18-19

Description of Work Being Done Today:

Seeded hayed cleaned up and put gravel around building

EQUIPMENT	HOURS	EQUIPMENT	HOURS

Labor

NAME	OCCUPATION	START TIME:	STOP TIME:
Deon Dupree		6 30	4
Tommy Chapman		6 30	4

Notes:

Weather Reports:

Taylor Corporation

Construction Daily Work Report

Project Number/Name:	Solutia Seep Treatment Building
Foreman:	Deon Dupree
Date:	10-21-19

Description of Work Being Done Today:

Helped with inside of building start up

EQUIPMENT	HOURS	EQUIPMENT	HOURS

Labor

NAME	OCCUPATION	START TIME:	STOP TIME:
Deon Dupree		6:30	4
Tommy Chapman		6:30	4

Notes:

Weather Reports:

Taylor Corporation

Construction Daily Work Report

Project Number/Name:	Solutia Seep Treatment Building
Foreman:	Deon Dupree
Date:	10-22-19

Description of Work Being Done Today:

Prepped acid water and filled it into the line done 24hr soaking run 1 load of water through truck finish seeding and Hay

EQUIPMENT	HOURS	EQUIPMENT	HOURS

Labor

NAME	OCCUPATION	START TIME:	STOP TIME:
Deon Dupree		630	4
Tommy Chapman		630	4

Notes:

Weather Reports:

Taylor Corporation

Construction Daily Work Report

Project Number/Name:	Solutia Seep Treatment Building
Foreman:	Deon Dupree
Date:	10-23-19

Description of Work Being Done Today:

empty line into the tanks with rocks and flushed water into the line

(1 truck load of water)

EQUIPMENT	HOURS	EQUIPMENT	HOURS

Labor

NAME	OCCUPATION	START TIME:	STOP TIME:
Deon Dupree		6 30	4
Tommy Chapman		6 30	4

Notes:

Weather Reports:

Taylor Corporation

Construction Daily Work Report

Project Number/Name:	Solutia Seep Treatment Building
Foreman:	Deon Dupree
Date:	10-24-19

Description of Work Being Done Today:

Moved water wagon to Shop Matt picked up the hydro seeder moved Job trailer to Shop got it and truck cleaned out

EQUIPMENT	HOURS	EQUIPMENT	HOURS

Labor

NAME	OCCUPATION	START TIME:	STOP TIME:
Deon Dupree		6:30	4
Tommy Chapman		6:30	4

Notes:

Weather Reports:

Solutia OU-3 Remediation Action

Construction Daily Work Report

Day # _____

Project Number/Name:	Solutia. CTS 3
Safety Meeting Topic:	Ladder Safety & pinch points
Date:	2-14-20. Friday

Activities/ Deliveries

Specific task working and or accomplished today:

Hooked up hoses to frac tank, replaced the 1" flowmeter with the 2" flowmeter. Had to replace the surrounding fittings to make the tie in.

EQUIPMENT	HOURS	EQUIPMENT	HOURS
Small Tools			
Tool Trailer			
F-150			

LABOR

NAME	OCCUPATION	START TIME:	STOP TIME:	HOURS
Jeremy Brown		6:30	4:30	
Tommy Chapman		6:30	4:30	
Jamie Stripland		6:30	4:30	
Deon Dupree		6:30	4:30	
			Total Crew Hours for Today:	
			Total Crew Hours Cumulative:	

Details of Hauling/ Weight ticket # and tons

TRUCK	WEIGHT TICKET # / TONS	LOAD COUNT	ORIGIN	DESTINATION

Weather Report

Solutia OU-3 Remediation Action

Construction Daily Work Report

Day # _____

Project Number/Name:	Solutia. Flushing lines at PCB cell
Safety Meeting Topic:	
Date:	11-17-20. Tuesday

Activities/ Deliveries

Specific task working and or accomplished today:

Installed 4" y for clean out and installed 4" valve. Used electro fuse coupling on one end and had to use a Hymax coupling on the other where it still had water. Then filled the gravity line that runs to the eq tank with acid and water.

EQUIPMENT	HOURS	EQUIPMENT	HOURS
78 track hoe			
V10 skid steer			
V12 skid steer			
31 dozer			

LABOR

NAME	OCCUPATION	START TIME:	STOP TIME:	HOURS
Randy		6:30	5:30	
Kevin Hightower		6:30	5:30	
Carson Stone		0:00		
Cedrick		6:30	5:30	
			Total Crew Hours for Today:	
			Total Crew Hours Cumulative:	

Details of Hauling/ Weight ticket # and tons

TRUCK	WEIGHT TICKET # / TONS	LOAD COUNT	ORIGIN	DESTINATION

Weather Report

Solutia OU-3 Remediation Action

Construction Daily Work Report

Day # _____

Project Number/Name:	Solutia. Flushing lines
Safety Meeting Topic:	
Date:	11-18-20. Wednesday

Activities/ Deliveries

Specific task working and or accomplished today:

Flushed out line at lower building into the eq tank and pumped into a tot. Flushed lines out at the upper building into the seep m.h and pumped into a tot. Then at 3 started flushing out the line that we had the acid in into tots and had to add water to get all the lines flushed out. Fixed 1/4" line inside upper building that was broke.

EQUIPMENT	HOURS	EQUIPMENT	HOURS
78 track hoe			
V10 skid steer			
V12 skid steer			
31 dozer			

LABOR

NAME	OCCUPATION	START TIME:	STOP TIME:	HOURS
Randy		6:30	5:00	
Kevin Hightower		6:30	5:00	
Carson Stone		6:30	5:00	
Chris Richmond		6:30	5:00	
			Total Crew Hours for Today:	
			Total Crew Hours Cumulative:	

Details of Hauling/ Weight ticket # and tons

TRUCK	WEIGHT TICKET # / TONS	LOAD COUNT	ORIGIN	DESTINATION

Weather Report

Solutia OU-3 Remediation Action

Construction Daily Work Report

Day # _____

Project Number/Name:	Solutia. Flushing line and 1902
Safety Meeting Topic:	11-20-20 Friday
Date:	~~11-19-20. Thursday~~

Activities/ Deliveries

Specific task working and or accomplished today:

Picked up tools and equipment. Took water truck to the office. Took the hydro seeder back to Lincoln. Moved tots closer to the building so they could be pumped out. Took mini hoe and skid steer to the front gate. I went to Birmingham to get site level and went to treatment plant and worked.

EQUIPMENT	HOURS	EQUIPMENT	HOURS
78 track hoe			
V10 skid steer			
V12 skid steer			
31 dozer			

LABOR

NAME	OCCUPATION	START TIME:	STOP TIME:	HOURS
Randy		6:30	4:00	
Kevin Hightower		6:30	4:00	
Carson Stone		6:30	5:00	
Chris Richmond		6:30	4:00	
			Total Crew Hours for Today:	
			Total Crew Hours Cumulative:	

Details of Hauling/ Weight ticket # and tons

TRUCK	WEIGHT TICKET # / TONS	LOAD COUNT	ORIGIN	DESTINATION

Weather Report

GSI Job No. G-5738
Issued: 30 June 2021

GSI ENVIRONMENTAL

Construction Completion Addendum Report
Second Addendum
OU-3 Remedial Action

Anniston PCB Site
Anniston, Alabama

Appendix F

Construction Material Quantities

ITEM NO	DESCRIPTION	UNIT	QUANTITY
1	Mobilization/Demobilization	LS	1
2	2" seep influent to CTS#3 flow meter	EA	1
3	CTS#3 transfer pump	EA	1
4	Variable frequency drive (VFD)	EA	1
5	Surge protection device	EA	1
6	2" magnetic flow meter	EA	2
7	Waether station	EA	1
8	2" Sch. 80 PVC pipe	LF	20
9	2" Sch. 40 SS EQ tank drop pipes	LF	10
10	4" HDPE seep junction box drop pipe	LF	3
11	Prefabricated double cleanout: ▪Two 4" HDPE ball valves ▪Two 4" blind flanges	EA	2
12	Prefabricated single cleanout: ▪One 4" blind flange	EA	1
13	4" PVC ball valves	EA	6
14	3" PVC ball valve	EA	2
15	3" camlock fitting	EA	2
16	HDPE access vaults	EA	6
17	4" Hymax fitting	EA	1
18	CMU block	EA	350
19	Concrete	CY	4
20	3/4" x 4' x 8' plywood	EA	6
21	Roof shingles	SF	150
22	Double door (7' x 3') and Frame	EA	1
23	2" actuated valve	EA	1
24	4-20 mA peristaltic metering pump	EA	1
25	Spill containment pallet (66-gallon)	EA	1
26	Fiber grate (1.5" D x1.5" mesh)	SF	22
27	Submersible level trasmitter	EA	1
28	Conductivity probe	EA	1
29	Eyewash station	EA	1
30	Heat/cool air conditioner	EA	1
31	Vapor tight light fixture	EA	1