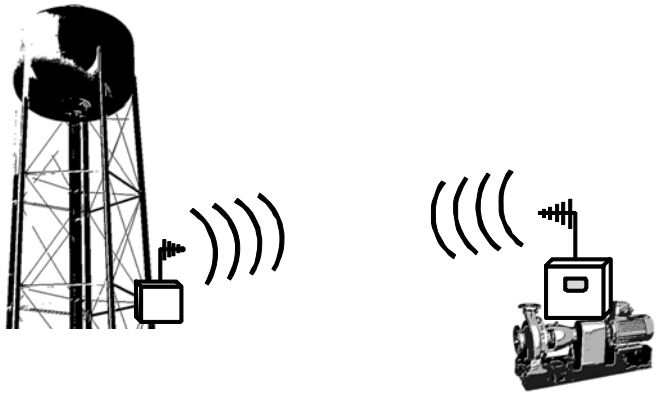
TELETRANSDUCER™
RADIO CONTROL SYSTEM



SUBMITTAL AND OPERATIONS & MAINTENANCE DOCUMENTATION

REVISION DATE: 31 AUG 2009

BY
SCADAMETRICS

A DIVISION OF NAVIONICS RESEARCH

TO WHOM IT MAY CONCERN:

RETURN OF SUBMITTAL BOOKLETS

AT LEAST ONE (1) SUBMITTAL COPIES MUST BE RETURNED IN ORDER TO PROCESS YOUR ORDER. THE RETURN OF THIS SUBMITTAL BOOKLET IS VITALLY IMPORTANT.

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EUREKA, MISSOURI 63025

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jim@scadametrics.com

INTRODUCTION

This TeleTransducer™ Submittal Document is divided into 7 sections:

A. Equipment List

B. Logical Operation

C. Warranty

D. Software License

E. Wiring Instructions

F. Operations Procedures

G. Radio Path Profile

H. Equipment Datasheets

I. Customer Questionaire

1. ENGINEER'S QUESTIONAIRE

SCADAMETRICS HAS INCLUDED AN ENGINEER'S QUESTIONAIRE ON YELLOW-COLORED PAPER. THE QUESTIONAIRE CONTAINS QUESTIONS, WHOSE ANSWERS ARE REQUIRED TO COMPLETE THE TELETRANSDUCER™ SYSTEM. PLEASE COMPLETE THE QUESTIONAIRE BEFORE RETURNING THE SUBMITTAL.

2. OPERATIONS AND MAINTENANCE DOCUMENTATION

THE ATTACHED SUBMITTAL DOCUMENT CONTAINS VITAL OPERATIONS AND MAINTENANCE PROCEDURES. THEREFORE, IT IS VITALLY IMPORTANT THAT THE CUSTOMER RETAIN THIS DOCUMENT AS THE OPERATIONS AND MAINTENANCE DOCUMENTATION.

3. OFFICIAL EQUIPMENT LIST

IN THE CHAPTERS TITLED "COMPUTERS, RTU'S & SOFTWARE", "COMMUNICATION EQUIPMENT", "SENSORS & I/O", "CABLES & CONNECTORS", AND "MISCELLANEOUS", CATALOG AND SPECIFICATION INFORMATION IS INCLUDED FOR EQUIPMENT THAT, IN SOME INSTANCES, MAY NOT BE PROVIDED WITH THIS PARTICULAR SYSTEM. THE OVERVIEW SECTION OF THIS SUBMITTAL DOCUMENT CONTAINS THE COMPLETE LIST OF EQUIPMENT THAT IS TO BE PROVIDED WITH THIS SYSTEM, REGARDLESS OF THE CONTENT OF SUBSEQUENT CHAPTERS.

4. THIRD PARTY EQUIPMENT COMPATIBILITY

IF EQUIPMENT PROVIDED BY THIRD PARTIES IS TO BE INTERCONNECTED WITH THE SCADAMETRICS TELETRANSDUCER™ SYSTEM, THEN IT IS IMPERATIVE THAT THE ELECTRICAL AND LOGICAL COMPATIBILITY OF THAT EQUIPMENT BE VERIFIED, IN ADVANCE, BY THE CUSTOMER. SCADAMETRICS WILL GLADLY PROVIDE ASSISTANCE AND GUIDANCE IN THE SELECTION OF THIRD PARTY EQUIPMENT. HOWEVER, COMPATIBILITY OF THIRD-PARTY EQUIPMENT IS ULTIMATELY THE RESPONSIBILITY OF THE CUSTOMER.

5. THIRD PARTY EQUIPMENT STARTUP

IF EQUIPMENT PROVIDED BY THIRD PARTIES IS TO BE INTERCONNECTED WITH THE SCADAMETRICS TELETRANSDUCER™ SYSTEM, THEN IT IS IMPERATIVE THAT THE THIRD PARTY EQUIPMENT BE SUCCESSFULLY STARTED UP AND VERIFIED TO BE OPERATING CORRECTLY BEFORE THE DATE OF THE TELETRANSDUCER™ SYSTEM STARTUP. SCADAMETRICS IS NOT RESPONSIBLE FOR THE STARTUP, CALIBRATION, AND PROGRAMMING OF THIRD PARTY EQUIPMENT, UNLESS AN AGREEMENT HAS BEEN MADE IN ADVANCE. DELAYS AT STARTUP DUE TO NON-OPERATIONAL THIRD-PARTY, TELETRANSDUCER™-CONNECTED EQUIPMENT MAY RESULT IN ADDITIONAL LABOR CHARGES.

PART A. EQUIPMENT LIST

PART A-1. RTU HARDWARE: PUMPING STATION

1. Programmable Logic Controller & Operator Interface

Koyo

1	x	Model DL05-DR-D, PLC System, pre-programmed w/ TeleTransducer™ Firmware
1	x	Model EA1-S3ML, 3 Inch Touch-Panel, 5-Color: Red, Green, Amber, Lime, Yellow

2. Power Supply w/ UPS Function

Meanwell

1	x	Model AD-55-A, 12VDC Power Supply

Power Sonic

1	x	Model PSH-1280F2-FR, 12V, 8.5AH Backup Battery

3. Telemetry Radio

Microwave Data Systems

1	x	Model EL805, Transnet 900, Non-Licensed Spread Spectrum Transceiver
1	x	Model EL805-DIAG, Remote Mgmt Diagnostics

4. Signal Transmission System

Telewave

1	x	Model ANT940Y10-WR, 7-Element 900 MHZ Yagi Antenna

RF Industries

1	x	Model RFW-5033-18, TNC-M to N-M, 18 Inch Jumper Cable

Andrew

1	x	LDF4-50-A “Heliax”, Coaxial Cable
2	x	L4TNM-PS, N-Male “Positive Stop” Coaxial Connector

Polyphaser

1	x	Model ISB50-LN-C2, Coaxial Surge Arrestor

5. Enclosure

Hoffman Engineering

1	x	Model A181610CHQRFG, 18”x16”x10” Fiberglass Enclosure (NEMA-4X)
1	x	Model A18P16, Back Panel

6. Circuit Protection

Eaton Cutler-Hammer

1 x Model WMS1B06,
6 Amp, 1 Pole Circuit Breaker

Superior Electric

1 x Model DIN1-15-120-1G-15
Din-Rail Mount Transient Voltage Surge Suppressor

PART A-2. RTU HARDWARE: WATER TOWER STATION

1. Pressure Transducer
   Keller America
   1 x Model Preciseline
   0.2% Accuracy, IP68-rated, Pressure Transducer

2. Power Supply w/ UPS Function
   Meanwell
   1 x Model AD-55-A, 12VDC Power Supply
   Power Sonic
   1 x Model PSH-1280F2-FR, 12V, 8.5AH,
   Backup Battery

4. Telemetry Radio
   Microwave Data Systems
   1 x Model EL805, Transnet 900,
   Non-Licensed Spread Spectrum Transceiver
   1 x Model EL805-DIAG, Remote Mgmt Diagnostics

5. Signal Transmission System
   Telewave
   1 x Model ANT940Y10-WR,
   7-Element 900 MHZ Yagi Antenna
   RF Industries
   1 x Model RFW-5033-18,
   TNC-M to N-M, 18 Inch Jumper Cable
   Andrew
   1 x LDF4-50-A “Heliax”, Coaxial Cable
   2 x L4TNM-PS,
   N-Male “Positive Stop” Coaxial Connector
   Polyphaser
   1 x Model ISB50-LN-C2,
   Coaxial Surge Arrestor

6. Enclosure
   Hoffman Engineering
   1 x Model A181610CHQRFG, 18”x16”x10”
   Fiberglass Enclosure (NEMA-4X)
   1 x Model A18P16, Back Panel

7. Circuit Protection
   Eaton Cutler-Hammer
   1 x Model WMS1B06,
   6 Amp, 1 Pole Circuit Breaker
   Superior Electric
   1 x Model DIN1-15-120-1G-15
   Din-Rail Mount Transient Voltage Surge Suppressor

PART B. LOGICAL OPERATION

The TeleTransducer™ is a two (2) station radio telemetry system used for monitoring a remote water tower and controlling one (1) or two (2) pumps in a separate pumping station.

The TeleTransducer™ consists of two (2) control enclosures, each equipped with a spread spectrum (non-licensed) telemetry radio, a power supply, battery backup, radio antenna, coaxial cable, and coaxial surge arrestor. One Enclosure is denoted as the "Pumping Station Unit", and the other is denoted as the "Water Tower Unit".

The "Pumping Station Unit" is equipped with a touch-screen display, which allows the owner to observe the tank level in the remote water tower, as well as to modify the pump ON/OFF setpoints and alarm points. The "Pumping Station Unit" is also capable of providing pump rotation to achieve even exercise of the pumps and motors.

The "Pumping Station Unit" is equipped with two (2) normally-open contacts for the control of two (2) pumps. This unit is also equipped with two (2) Form-C relay contacts for interface to an external alarm system (optionally provided by others). The alarm contacts may be normally-closed or normally open. The first alarm contact denotes a high/low tank level alarm; and the second alarm contact denotes a radio communication failure between the "Pumping Station Unit" and the "Water Tower Unit".

PART C. WARRANTY

NAVIONICS RESEARCH, INC.
LIMITED WARRANTY

1.0 GENERAL TERMS:

1.1 This Limited Warranty is extended only to the original end-user purchaser (CUSTOMER) and is not transferable.

1.2 No agent, reseller, or business partner of Navionics Research Corporation (NAVIONICS RESEARCH) is authorized to modify the terms of this Limited Warranty on behalf of NAVIONICS RESEARCH.

1.3 This Limited Warranty expressly excludes any product that has not been purchased as new from NAVIONICS RESEARCH or its authorized reseller.

1.4 This Limited Warranty is only applicable in the country or territory where the product is intended for use.

1.5 NAVIONICS RESEARCH warrants to the CUSTOMER that the products will be free from defects in workmanship and materials, under normal use and service, for ONE (1) YEAR from the date that the products are placed into operation. In cases where equipment at various locations are placed into operation at staggered dates, the warranty periods for the equipment shall be staggered to coincide with the startup dates.

1.6 NAVIONICS RESEARCH'S sole obligation under this warranty shall be, at NAVIONICS RESEARCH'S sole discretion, to repair the defective product or part with new or reconditioned parts; or to exchange the defective product or part with a new or reconditioned product or part that is the same or similar. All products or parts that are exchanged for replacement will become the property of NAVIONICS RESEARCH.

1.7 Beyond the warranty period, NAVIONICS RESEARCH warrants any replacement product or part for ONE (1) YEAR from the date the product or part is shipped to Customer.

1.8 NAVIONICS RESEARCH makes no warranty or representation that this product will work in combination with any hardware or software products provided by the CUSTOMER or third parties.

1.9 NAVIONICS RESEARCH makes no warranty or representation that the operation of the software products provided with this product will be uninterrupted or error free.

1.10 NAVIONICS RESEARCH shall not be responsible for any software or other CUSTOMER data that is installed onto TeleTransducer™ or Telemetry computer(s).

1.11 NAVIONICS RESEARCH shall not be responsible for any hardware or other components that is integrated into the TELETRANSDUCER™ System by the CUSTOMER or third parties.

2.0 OBTAINING WARRANTY SERVICE:

2.1 CUSTOMER must contact NAVIONICS RESEARCH Technical Support or authorized NAVIONICS RESEARCH Service Personnel within the applicable warranty period to obtain warranty service authorization.

2.3 To contact NAVIONICS RESEARCH Technical Support, please call (636)938-9633 or email support@wireless-telemetry.com. For up-to-date telephone numbers and/or email addresses, please see the NAVIONICS RESEARCH corporate web site at: www.wireless-telemetry.com

2.4 CUSTOMER should have the following information / items readily available when contacting NAVIONICS RESEARCH:

1. Site name and/or location experiencing the problem.
2. A description of the problem.
3. The date and time when the problem first occurred.
4. History charts/tabulations and/or data that provides insight into the problem.

3.0 WARRANTY REPLACEMENT:

3.1 In the event NAVIONICS RESEARCH Technical Support or its authorized Service Personnel determines the product or part has a malfunction or failure attributable directly to faulty workmanship and/or materials; and the product is within the ONE (1) YEAR warranty term, then NAVIONICS RESEARCH will commence a warranty repair or replacement service call.

3.2 The warranty shall cover labor costs associated with the troubleshooting, repair, and replacement of defective component(s) within the TELETRANSDUCER™ System.

3.2 Products or parts shipped to NAVIONICS RESEARCH without prior authorization will not be accepted.

3.3 CUSTOMER agrees to insure the product or assume the risk of loss or damage that may occur in transit; and to use a shipping container equivalent to the original packaging.

3.4 Responsibility for loss or damage does not transfer to NAVIONICS RESEARCH until the returned product or part is received at a designated NAVIONICS RESEARCH facility.

3.5 Once a component has been visually inspected and tested, NAVIONICS RESEARCH will, at its sole discretion, repair or replace, using new or reconditioned product or parts, to whatever extent it deems necessary to restore the product or part to operating condition.

3.6 NAVIONICS RESEARCH shall not be liable for any damages caused by delay in delivering or furnishing repaired or replaced product or part.

4.0 LIMITATIONS

4.1 THIRD-PARTY SOFTWARE: This NAVIONICS RESEARCH product may include or be bundled with third-party software unrelated to the TELETRANSDUCER™ System, the use of which is governed by separate end-user license agreements provided by third-party software vendors. This NAVIONICS RESEARCH Limited Warranty does not apply to such third-party software. For the applicable warranty refer to the end-user license agreement governing the use of such software.

4.2 DAMAGE DUE TO MISUSE, NEGLECT, NON-COMPLIANCE, AND/OR "ACTS OF GOD": To the extent permitted by applicable law, this NAVIONICS RESEARCH Limited Warranty does not apply to normal wear and tear; damage or loss of data due to interoperability with third-party software/hardware not supplied by NAVIONICS RESEARCH; alterations (by persons other than NAVIONICS RESEARCH or its designees); damage caused by operator error or non-compliance with instructions as set out in the user documentation or other accompanying documentation; damage caused by acts of nature such as lightning, storms, floods, fires, and earthquakes, etc., damage or loss of data caused by a computer virus, worm, Trojan horse, or memory content corruption; failures of the product which result from accident, abuse, misuse (including but not limited to connection to incorrect voltages, and power points); failures caused by products not supplied by NAVIONICS RESEARCH; damage caused by high voltage surges, shipping, or abnormal working conditions.

4.3 TO THE FULL EXTENT ALLOWED BY LAW, THE FOREGOING WARRANTIES AND REMEDIES ARE EXCLUSIVE AND ARE IN LIEU OF ALL OTHER WARRANTIES, TERMS, OR CONDITIONS, EXPRESS OR IMPLIED, EITHER IN FACT OR BY OPERATION OF LAW, STATUTORY OR OTHERWISE, INCLUDING WARRANTIES, TERMS, OR CONDITIONS OF MERCHANTABILITY, FITNESS FOR A PARTICULAR PURPOSE, SATISFACTORY QUALITY, CORRESPONDENCE WITH DESCRIPTION, AND NON-INFRINGEMENT, ALL OF WHICH ARE EXPRESSLY DISCLAIMED. NAVIONICS RESEARCH NEITHER ASSUMES NOR AUTHORISES ANY OTHER PERSON TO ASSUME FOR IT ANY OTHER LIABILITY IN CONNECTION WITH THE SALE, INSTALLATION, MAINTENANCE, WARRANTY, OR USE OF ITS PRODUCTS.

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5.0 DISCLAIMER:

Some countries, states, territories or provinces do not allow the exclusion or limitation of implied warranties or the limitation of incidental or consequential damages for certain products supplied to consumers, or the limitation of liability for personal injury, so the above limitations and exclusions may be limited in their application to CUSTOMER. When the implied warranties are not allowed by law to be excluded in their entirety, they will be limited to the ONE (1) YEAR duration of this written warranty. This warranty gives CUSTOMER specific legal rights, which may vary depending on local law.

6.0 GOVERNING LAW:

This Limited Warranty shall be governed by the laws of the State of Missouri, U.S.A. excluding its conflicts of laws principles and excluding the United Nations Convention on Contracts for the International Sale of Goods.

NAVIONICS RESEARCH Corporation
595 Vista Hills
Eureka, Missouri 63025
U.S.A.

PART D. SOFTWARE LICENSE

NAVIONICS RESEARCH CORPORATION SOFTWARE LICENSE AGREEMENT

1. This agreement covers licensing terms for all software and firmware that is bundled within computer memory that is a part of this TeleTransducer™ System.

2. This is an agreement between Licensor (Navionics Research Inc.) and Licensee, who is being licensed to use the Navionics Research TeleTransducer™ Software Suite.

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8. Licensee agrees to defend and indemnify Licensor and hold Licensor harmless from all claims, losses, damages, complaints, or expenses connected with or resulting from Licensee's business operations.

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12. This License Agreement is governed by the law of MISSOURI applicable to MISSOURI contracts.

13. This License Agreement is valid without Licensor's signature. It becomes effective upon the earlier of Licensee's signature or Licensee's use of the Software.

PART E. WIRING INSTRUCTIONS

"Water Tower Unit"

Enclosure: The enclosure shall be wall-mounted or pole-mounted. The enclosure is suitable for outdoor installation, but maximum equipment life will be achieved if the enclosure's summer temperature is minimized with a shelter from direct sunlight. Flange-mounting brackets are provided and taped to the inside panel door. Also, the door latching mechanism is suitable for a customer-supplied security padlock.

Power: 120VAC power shall be provided to the Unit with three (3) wires: 120VAC Line, Neutral, and Ground. The 120VAC Line wire should be connected to the device's CIRCUIT BREAKER. The Neutral wire should be connected to the device's WHITE TERMINAL. The Ground wire should be connected to the device's GREEN TERMINAL.

Antenna: The provided antenna should be installed on an outdoor pole, and aimed toward the "Pump Station Unit" antenna. An unobstructed, line-of-sight path profile is required for reliable operation. The antenna should be bonded via a 12 gauge (or greater) wire to earth ground. The pre-prepared coaxial cable shall be connected to both the antenna and the bulkhead connector on the enclosure. Both coaxial connections shall be heavily taped with 3M Super 33+ electrical tape to provide protection from moisture ingress as well as to provide additional strength.

Transducer: The provided transducer shall be installed in a below-grade, freeze-proof pit. The transducer features a ¼" NPT male hydraulic connection. The transducer's hydraulic connection should be prepared with Teflon tape to prevent leakage. The transducer's electronic wire should be protected in conduit and directed from the pit to the enclosure. Once inside the enclosure, the cable should be connected to the terminal blocks. The following wiring key should be followed:

Terminal Block	Wire Color	Function
1.	**(Drain/Shield)**	**Chassis Ground**
2.	**Black**	**12VDC**
3.	**White**	**GND**
4.	**Blue**	**RS-485-B**
5.	**Yellow**	**RS-485-A**

“Pump Station Unit”

Enclosure: The enclosure shall be wall-mounted or pole-mounted. The enclosure is suitable for outdoor installation, but maximum equipment life will be achieved if the enclosure’s summer temperature is minimized with a shelter from direct sunlight. Flange-mounting brackets are provided and taped to the inside panel door. Also, the door latching mechanism is suitable for a customer-supplied security padlock.

Power: 120VAC power shall be provided to the Unit with three (3) wires: 120VAC Line, Neutral, and Ground. The 120VAC Line wire should be connected to the device’s CIRCUIT BREAKER. The Neutral wire should be connected to the device’s WHITE TERMINAL. The Ground wire should be connected to the device’s GREEN TERMINAL.

Antenna: The provided antenna should be installed on an outdoor pole, and aimed toward the “Pump Station Unit” antenna. An unobstructed, line-of-sight path profile is required for reliable operation. The antenna should be bonded via a 12 gauge (or greater) wire to earth ground. The pre-prepared coaxial cable shall be connected to both the antenna and the bulkhead connector on the enclosure. Both coaxial connections shall be heavily taped with 3M Super 33+ electrical tape to provide protection from moisture ingress as well as to provide additional strength.

Pump And Alarm Hookup: The PLC within the enclosure provides two (2) Form-A, SPST contacts for control of one (1) or two (2) pumps. The PLC also provides two (2) FORM-C, SPDT contacts for signaling a High/Low Alarm and Radio Communication Fault.

The following wiring key should be followed:

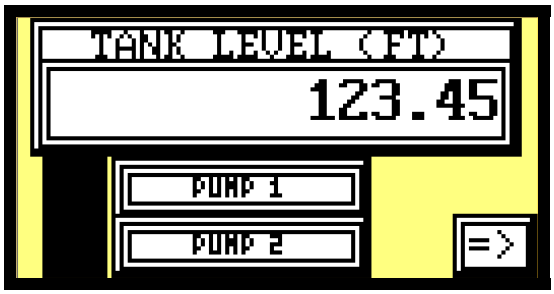
Terminal Block		Function
C-0	**----------**	**C0 Common**
NO-0	**----------**	**Energized When Comm OK**
NC-0	**----------**	**Energized When Comm NOT OK**
C-1	**----------**	**C1 Common**
NO-1	**----------**	**Energized When Pump 1 To Run**
C-2	**----------**	**C2 Common**
NO-2	**----------**	**Energized When Pump 2 To Run**
C-3	**----------**	**C3 Common**
NO-3	**----------**	**Energized When Levels OK**
NC-3	**----------**	**Energized When Levels NOT OK (Hi or Lo)**

PART F. OPERATIONS PROCEDURES

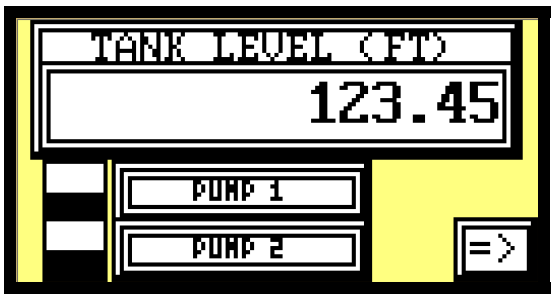
The user interface of the TeleTransducer is based upon interaction with a color LCD Touch-Screen. Nine (9) screens are provided, and navigation is performed by pressing the screen navigation button in the lower-right of each screen.

MAIN SCREEN.

The Main Screen (Screen 1) displays the Tank Level (ft) and displays the status of Pump1 and Pump 2. In the following screen example, both pumps are OFF:

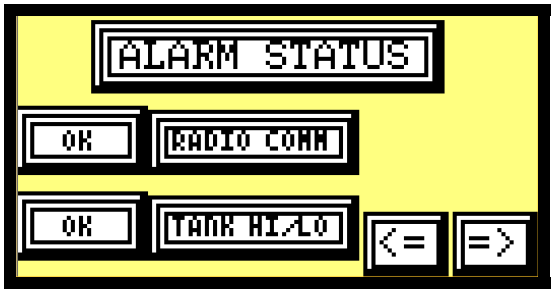


In the following screen example, both pumps are ON. Note the Pump ON Indicators (white rectangles) positioned to the left of the Pump 1 and Pump 2 text:

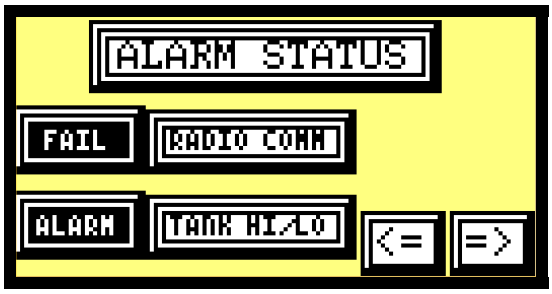


ALARM STATUS SCREEN.

The Alarm Status Screen (Screen 2) displays the status of the radio communication link and the Hi/Lo alarm status of the tank level. In the following screen example, no alarms exist:

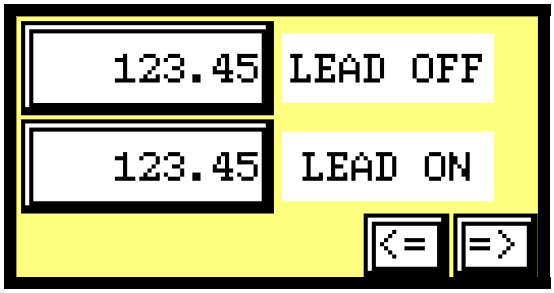


In the following screen example, both a radio communications failure and a tank level alarm exist. In the case of a communication failure, both pumps will be turned OFF and will not run automatically until radio communications are restored.



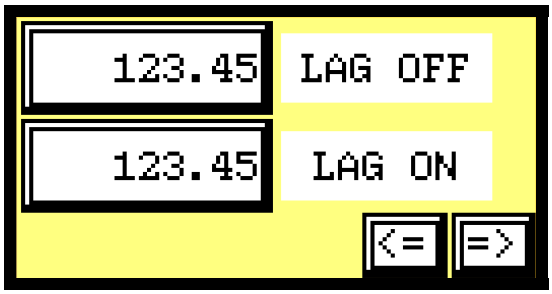
LEAD PUMP LEVEL SETTINGS.

The Lead Pump Level Settings Screen (Screen 3) displays the operator setpoints for lead pump control, and also allows the operator to change those setpoints. If a setpoint is touched on the screen, a keypad display will appear that permits the operator to modify the setpoint. The Lead Pump will turn ON when the tank level drops below "LEAD ON", and will then run until the tank level climbs above "LEAD OFF".



LAG PUMP LEVEL SETTINGS.

The Lag Pump Level Settings Screen (Screen 4) displays the operator setpoints for lead pump control, and also allows the operator to change those setpoints. If a setpoint is touched on the screen, a keypad display will appear that permits the operator to modify the setpoint. The Lag Pump will turn ON when the tank level drops below “LAG ON”, and will then run until the tank level climbs above “LAG OFF”.



HI ALARM LEVEL SETTINGS.

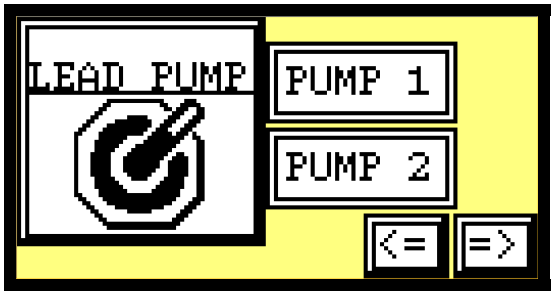
The Hi Alarm Level Settings Screen (Screen 5) displays the operator setpoints for high alarm activation, and also allows the operator to change those setpoints. If a setpoint is touched on the screen, a keypad display will appear that permits the operator to modify the setpoint. The Hi Alarm will be activated when the tank level climbs above “HI ALARM” and will persist until the tank level falls below “HI CLEAR”.

LO ALARM LEVEL SETTINGS.

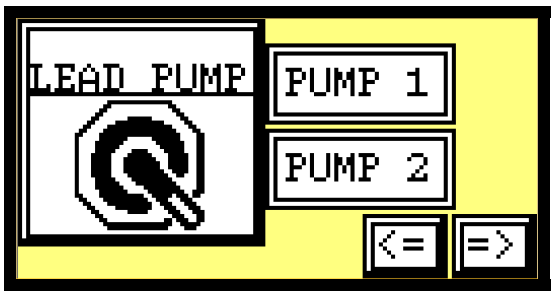
The Lo Alarm Level Settings Screen (Screen 6) displays the operator setpoints for low alarm activation, and also allows the operator to change those setpoints. If a setpoint is touched on the screen, a keypad display will appear that permits the operator to modify the setpoint. The Lo Alarm will be activated when the tank level falls below “LO ALARM” and will persist until the tank level climbs above “LO CLEAR”.

LEAD/LAG PUMP SETTINGS.

The Lead/lag Settings Screen (Screen 7) displays the operator setpoints for defining the lead and lag pump, and also allows the operator to change those setpoints. Touching the “LEAD PUMP” control will toggle the lead pump setting. In the following screen example, “Pump 1” is the Lead Pump (and therefore Pump 2 is the Lag Pump):

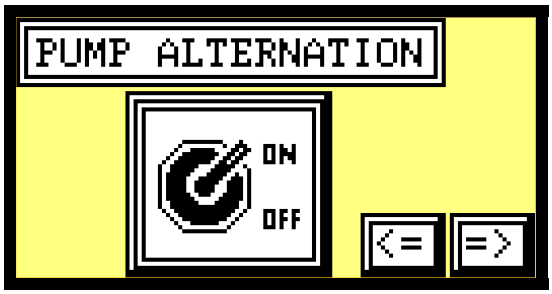


In the following screen example, “Pump 2” is the Lead Pump (and therefore Pump 1 is the Lag Pump):

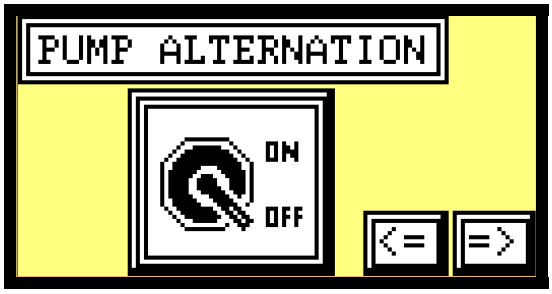


PUMP ALTERNATION SETTINGS:

The Pump Alternation Settings Screen (Screen 8) displays the operator setpoints for defining pump alternation, and also allows the operator to change those setpoints. Touching the “PUMP ALTERNATION” control will toggle the pump alternation setting. When Alternation is activated, the “Lead Pump” setting is ignored in favor of alternating lead (and lag) pumps. In the following screen example, “Alternation” is turned ON:

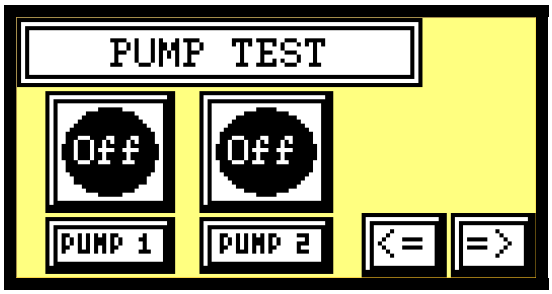


In the following screen example, “Alternation” is turned OFF:

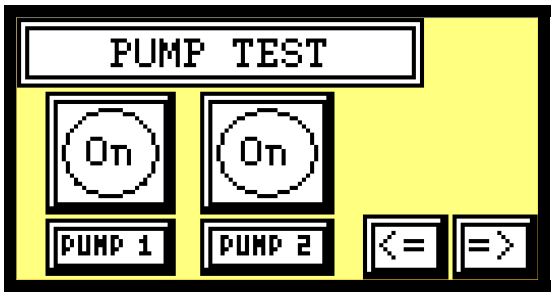


PUMP TEST SETTINGS:

The Pump Test Settings Screen (Screen 9) displays the operator setpoints for running a pump test, and also allows the operator to change those setpoints. The Pump Test is used, for example, to force a pump ON to test the hookup wiring. In the following screen example, both Pump 1 Test and Pump 2 Test are turned OFF. In this case, both pumps are in automatic mode and will run when the demanded by the setpoints:

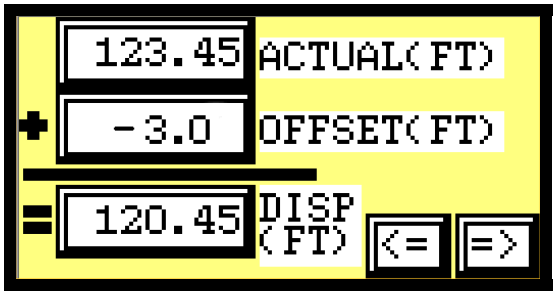


In the following screen example, both Pump 1 Test and Pump 2 Test are turned ON. In this case, both pumps are turned ON regardless of the tank level setpoints:



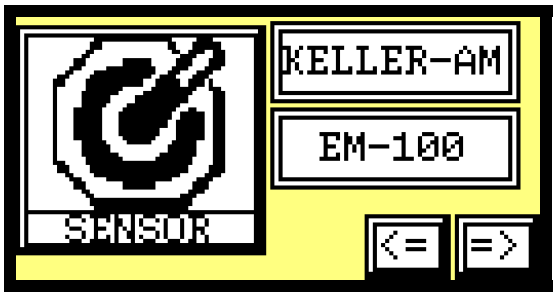
TRANSDUCER OFFSET SETTING:

In certain instances, the owner may desire to add (or subtract) an offset from the actual transducer reading. In the following example, the transducer is installed 3 feet below the base of the tank, and the owner wishes to display the tank level in feet referenced to the base of the tank:



SENSOR SETTINGS:

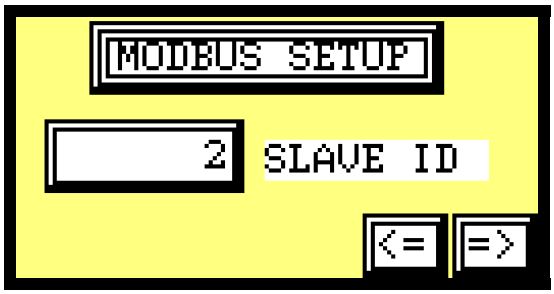
The Sensor-Type Screen (Screen 9) displays the setting for defining the sensor-type at the remote Water Tower. This setting is programmed at the factory, and should not be modified by the operator. Touching the "SENSOR" control will toggle the sensor setting. In the following screen example, "Keller America Pressure Transducer" is selected (the factory default):



In the following screen example, "EM-100 RTU" is selected:

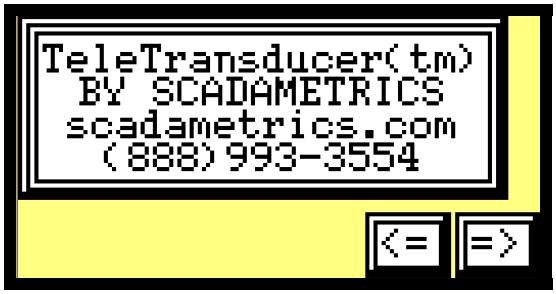
MODBUS SETUP:

The MODBUS Setup Screen (Screen 10) displays the setting for defining the MODBUS SLAVE ID of the remote sensor. This setting is programmed at the factory, and should not be modified by the operator. In the following example, the MODBUS SLAVE ID is set to '2' (the factory default):



FACTORY CONTACT INFO:

When support is required, first please contact the system integrator who sold and/or installed the TeleTransducer™ System. If additional support is required, the factory contact information is provided on the last screen (Screen 11):



PLC LED DIAGNOSTICS:

Certain diagnostic information is provided on the front panel of the PLC. For reference, the LED's have the following meanings:

Y0: PUMP-1 RELAY ON
Y1: PUMP-2 RELAY ON
Y2: TANK LOW
Y3: TANK HIGH
Y4: INTERNAL MICROPROCESSOR FAULT
Y5: COMM-OK

PART G. RADIO PATH PROFILE

If the radio path profile option was included with your order, then the attached analysis provides a point-to-point profile of the communication path between the “Water Tower Unit” and the “Pump Station Unit”. An unobstructed, clear line-of-sight path between the two (2) antennas is required for reliable operation.

PART H. EQUIPMENT DATA SHEETS

MDS TransNET 900®

902-928 MHz Frequency Hopping Spread Spectrum Transceiver

Features

- High Speed! Throughput to 115.2 Kbps
- Unparalleled Robustness
  – Forward error correction
  – CRC/ARQ, multiple re-sends
- Industrial grade – Extended -40° C to +70° C temperature range for trouble free operation in extreme environments
- Sleep Mode – Approx. 7 mA, ideal for solar power applications
- Store and Forward – with self healing networks
- Network wide diagnostics – Central network control without the need to visit sites

Applications

- SCADA
- Tested and approved to work with Schweitzer Engineering Laboratories (SEL) Mirrored Bits™
- Industrial Automation
- Process Control
- Gas and Oil Exploration, Production and Transportation
- Electric, Water and Gas Utilities

GE MDS

GE MDS...Global wireless solutions. Industrial Wireless Performance.

For more than two decades, GE MDS has been providing highly secure, industrial strength mission critical wireless communications solutions for a broad spectrum of public and private sector clients worldwide. With an installed base approaching 1,000,000 radios in 110 countries, GE MDS offers both licensed and license-free solutions with applications in SCADA, telemetry, public safety, telecommunications, and online transaction markets

Introducing MDS TransNET®

Today's SCADA/Telemetry systems require the transport of large amounts of data at ever-increasing speeds. Additionally, the need for greater packaging flexibility has redefined the "ideal" wireless platform in many applications. MDS is pleased to introduce MDS TransNET™ a flexible, high speed, compact license-free wireless solution.

Product Overview

The MDS TransNET utilizes FHSS (Frequency Hopping Spread Spectrum) in the ISM Band of 902 – 928 MHz to provide reliable long range data transportation at up to 115.2 kbps. The TransNET provides transparent data communications for nearly all SCADA/Telemetry and EFM protocols including MODBUS.

Any MDS TransNET may be configured as a repeater extension. This allows store and forward data operation to extend the operating range of the network. Multiple repeaters may exist at any level of the network preventing a single radio failure from disabling the entire network. There is no limit to the number of repeaters which may be used. This product is available for use in Class I, Division 2, Groups A, B, C & D hazardous locations.*

Why Consider an MDS TransNET Solution?

High system performance and data integrity! Robust construction, digital signal processing (DSP) technology with self-equalization, automatic CRC/ARQ and powerful forward error correction.

Flexibility and rapid installation! Quick return on investment due to plug-and-play installation. License-free radio design with the ability to communicate with any asynchronous protocol without extra software or additional programming.

Performance under the most adverse conditions! Robust design provides excellent performance in the face of interference or difficult signal paths.

Small footprint! Exceptionally small design allows installation inside RTU or PLC housing.

MDS network-wide diagnostics software simplifies tasks and reduces the cost of managing the network infrastructure by eliminating trips to the field. Provides a non-intrusive means of maintaining link and radio network performance.

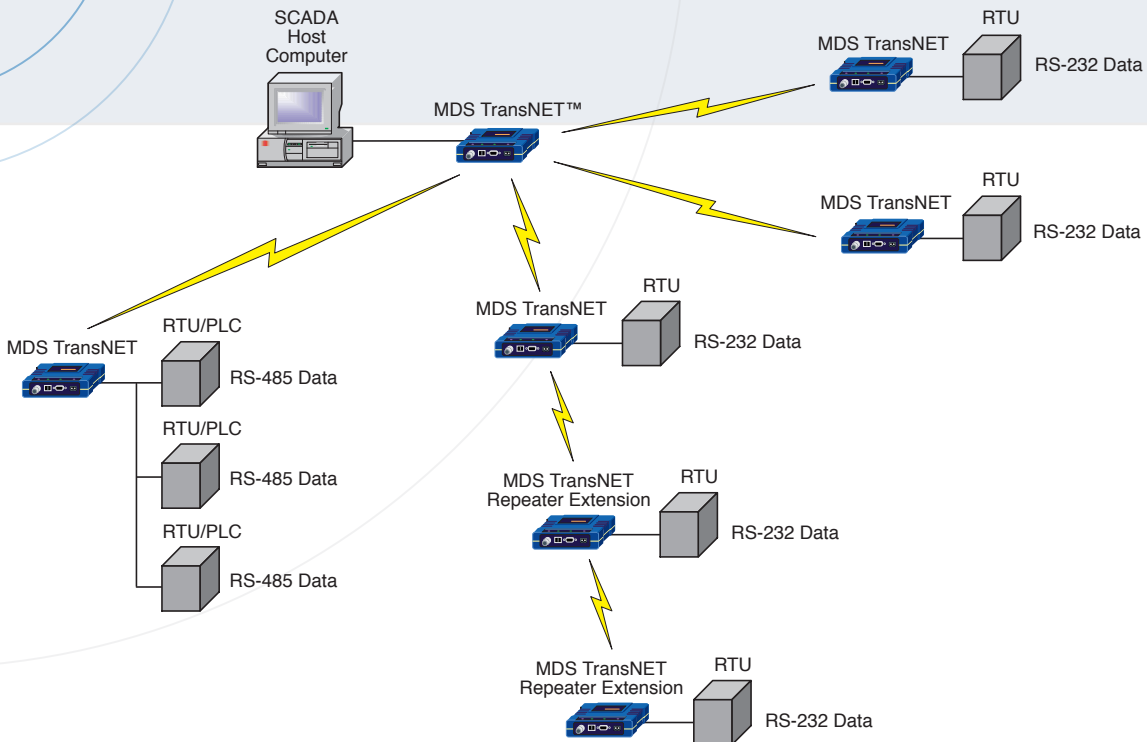
Flexible interfaces! All TransNETs come equipped with RS-232 for direct connection to most RTU/PLC's and RS-485 for multidrop environments.

Low Power Consumption! Sleep mode for extremely low power consumption requirements - typically draws 7 mA - yet still recovers quickly for fast access to your critical data.

MDS TransNET is the price/performance leader; offering flexibility and reliability for both point-to-point and point-to-multipoint requirements.

MDS TransNET 900® Radio Specifications

High Speed Flexible Transparent - Communications



Frequency Band

- 902-928 MHz ISM band

Physical and Environmental

- Dimensions: Approx. 8.9 D x 12.7 W x 2.5 H cm. (Approx. 3.5 D x 5 W x 1 H in.)
- Input Power: 6 to 30 Vdc
- Current Drain:

Mode	30 Vdc	13.8 Vdc	6 Vdc
Transmit	236 mA	510 mA	1.18 A
Receive	51 mA	100 mA	155 mA

- Sleep Mode: 7 mA typical
- Temperature Range: -40° C to +70° C
- Humidity: < 95% RH (Non-Condensing)

Transmitter

- Power Output: 1 Watt (30 dBm) at 6 Vdc to 30 Vdc, user selectable down to 100 mw (+20 dBm)
- Modulation: CPFSK

Receiver

- Sensitivity: -108 dBm (1 x 10^{-6} BER) typical
- Error Detection: CRC16; Resend on Error
- Interference Avoidance:
  - 64,000 hop patterns selected automatically via network address
  - FEC, CRC/ARQ and/or Multiple Packet Transmits
  - Excellent Strong Signal (interference) Characteristics
  - Band Segmentation for Friendly Coexistence with other services such as LMS

Data

- Interface: RS-232/RS-485 (User Selectable)
- Usable Throughput: 115.2 kbps
- Port Speeds: 1.2 to 115.2 kbps

Connectors

- Power, User, NMS: 2 Pin Phoenix, DB-9, RJ11
- RF: TNC

Operating Modes

- Point-to-Multipoint
  - Master
  - Remote
  - Repeater Extension (Store-and-Forward) – Unlimited repeaters, self healing networks

Network Management

- Diagnostics
- Centralized network control eliminates site visits
- Create store-and-forward configurations
- Compatible with other MDS Products
- MDS InSite

Agency Approvals

- FCC: Part 15 Approved
- UL/CSA: Class 1 Div. 2 approved* (UL 508, UL 1604)
- IC: Approved

** The transceiver is not acceptable as a stand-alone unit for use in the hazardous locations described above. It must either be mounted within another piece of equipment, which is certified for hazardous locations, or installed within guidelines, or conditions of approval, as set forth by the approving agencies.*

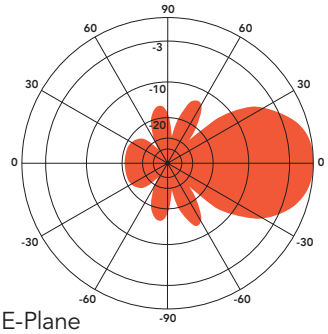
GE MDS

GE MDS
175 Science Parkway
Rochester, New York 14620, USA
Phone (585) 242-9600
Fax (585) 242-9620
www.gemds.com

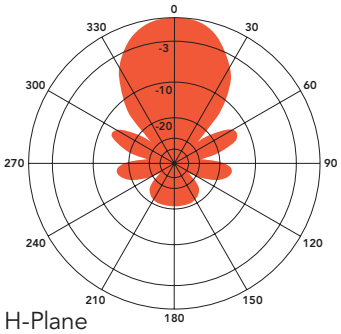
ANT940Y10-WR
YAGI ANTENNA 10 dBd

900 - 960 MHz

ANT940Y10-WR at 935 MHz



E-Plane
Gain: 10.22 dBd



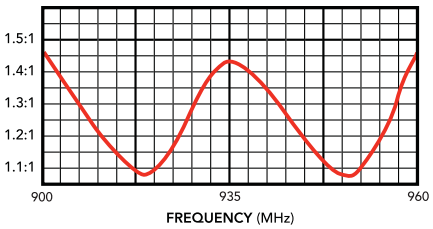
H-Plane
Gain: 10.22 dBd

The Telewave ANT940Y10-WR Yagi antenna is a high performance directional antenna, designed for point-to-point or point-to-multi-point applications. This antenna produces 10 dBd forward gain with an excellent front-to-back ratio. Solid aluminum elements with 360° welds prevent intermodulation and provide exceptional strength.

Each antenna is completely protected with our high-tech Txylan™ coating, which provides icing resistance and environmental protection from corrosive gases, ultraviolet radiation, salt spray, acid rain and wind blown abrasives such as desert sand. The feed line is protected within the boom, and the radiating element connection is completely sealed against ice and other environmental hazards with a tough, RF-transparent radome.

The ANT940Y10-WR includes a welded plate and mast clamp set. The clamp set secures the antenna to a vertical mast or tower support leg with an effective diameter between 1.5" - 2.5". For installations on angled supports, the "U" version allows mounting to virtually all angled supports up to 3.5".

TYPICAL VSWR RESPONSE



SPECIFICATIONS			
Frequency (continuous)	900-960 MHz	**Elements**	7
Gain (typ)	10 dBd	**Dimensions (L x H) in.**	24 x 11
Power rating (typ)	500 watts	**Antenna weight**	3 lb.
Impedance / VSWR	50 ohms / 1.5:1 (max)	**Shipping weight**	7 lb.
Front to back ratio (min)	20 dB	**Wind rating / with 0.5" ice**	200 / 165
Beamwidth V / H	49° / 47°	**Exposed area (flat plate equiv.)**	0.25 ft.²
Pattern / Polarization	Directional / Vertical	**Lateral thrust at 100 MPH**	7.25 lb.
Termination	N Female or 7-16 DIN (opt)	**(40 P/SF flat plate equiv.)**	

TELEWAVE, INC.®
660 Giguere Court, San Jose CA
1-800-331-3396 • 408-929-4400
www.telewave.com

TWDS-7062 Rev. 2/07

Product Specifications

LDF4-50A

LDF4-50A, HELIAX® Low Density Foam Coaxial Cable, corrugated copper, 1/2 in, black PE jacket

CHARACTERISTICS

Construction Materials

Jacket Material	PE
Outer Conductor Material	Corrugated copper
Dielectric Material	Foam PE
Flexibility	Standard
Inner Conductor Material	Copper-clad aluminum wire
Jacket Color	Black

Dimensions

Nominal Size	1/2 in
Cable Weight	0.15 lb/ft | 0.22 kg/m
Diameter Over Dielectric	12.954 mm | 0.510 in
Diameter Over Jacket	16.002 mm | 0.630 in
Inner Conductor OD	4.826 mm | 0.190 in
Outer Conductor OD	13.970 mm | 0.550 in

Electrical Specifications

Cable Impedance	50 ohm ± 1 ohm
Capacitance	23 pF/ft | 76 pF/m
dc Resistance, Inner Conductor	0.450 ohms/kft | 1.480 ohms/km
dc Resistance, Outer Conductor	0.580 ohms/kft | 1.903 ohms/km
dc Test Voltage	4000 V
Inductance	0.190 µH/m | 0.058 µH/ft
Insulation Resistance	100000 MOhm
Jacket Spark Test Voltage (rms)	8000 V
Operating Frequency Band	1 – 8800 MHz
Peak Power	40.0 kW
Pulse Reflection	0.5%
Velocity	88%

Environmental Specifications

Installation Temperature	-40 °C to +60 °C (-40 °F to +140 °F)
Operating Temperature	-55 °C to +85 °C (-67 °F to +185 °F)
Storage Temperature	-70 °C to +85 °C (-94 °F to +185 °F)

General Specifications

Brand	HELIAX®

From North America, toll free
Telephone: 1-800-255-1479
Fax: 1-800-349-5444

Outside North America
Telephone: +1-708-873-2307
Fax: +1-779-435-8579

Product Specifications

LDF4-50A

Mechanical Specifications

Bending Moment	3.8 N-m | 2.8 ft lb
Flat Plate Crush Strength	110.0 lb/in | 2.0 kg/mm
Minimum Bend Radius, Multiple Bends	127.00 mm | 5.00 in
Minimum Bend Radius, Single Bend	50.80 mm | 2.00 in
Number of Bends, minimum	15
Number of Bends, typical	50
Tensile Strength	113 kg | 250 lb

Standard Conditions

Attenuation, Ambient Temperature	20 °C | 68 °F
Average Power, Ambient Temperature	40 °C | 104 °F
Average Power, Inner Conductor Temperature	100 °C | 212 °F

Return Loss

Frequency Band	VSWR	Return Loss (dB)
806–960 MHz	1.13	24.29
1700–2000 MHz	1.13	24.29

Attenuation

Frequency (MHz)	Attenuation (dB/100 ft)	Attenuation (dB/100 m)	Average Power (kW)
0.5	0.045	0.149	40.00
1	0.064	0.211	36.11
1.5	0.079	0.259	29.46
2	0.091	0.299	25.50
10	0.205	0.672	11.35
20	0.291	0.954	7.99
30	0.357	1.172	6.51
50	0.463	1.521	5.02
88	0.619	2.031	3.76
100	0.661	2.169	3.52
108	0.688	2.256	3.38
150	0.815	2.673	2.85
174	0.88	2.887	2.64
200	0.946	3.103	2.46
300	1.169	3.835	1.99
400	1.36	4.462	1.71
450	1.447	4.749	1.61
500	1.53	5.021	1.52
512	1.55	5.085	1.50
600	1.686	5.533	1.38
700	1.831	6.009	1.27
800	1.968	6.456	1.18
824	1.999	6.56	1.16
894	2.089	6.855	1.11
960	2.171	7.124	1.07
1000	2.22	7.284	1.05
1250	2.507	8.226	0.93
1500	2.771	9.093	0.84
1700	2.97	9.744	0.78

From North America, toll free
Telephone: 1-800-255-1479
Fax: 1-800-349-5444

Outside North America
Telephone: +1-708-873-2307
Fax: +1-779-435-8579

Product Specifications

LDF4-50A

1800	3.066	10.058	0.76
2000	3.251	10.666	0.72
2100	3.341	10.961	0.70
2200	3.429	11.251	0.68
2300	3.516	11.535	0.66
2500	3.685	12.09	0.63
2700	3.849	12.627	0.60
3000	4.086	13.407	0.57
3400	4.389	14.401	0.53
4000	4.82	15.815	0.48
5000	5.489	18.01	0.42
6000	6.113	20.055	0.38
8000	7.262	23.826	0.32

Regulatory Compliance/Certifications

Agency
RoHS 2002/95/EC

Classification
Compliant

Product Specifications

L4TNM-PS

Type N Male Positive Stop™ for 1/2 in LDF4-50A cable

CHARACTERISTICS

General Specifications

Interface	N Male
Body Style	Straight
Brand	HELIAX® | Positive Stop™
Mounting Angle	Straight

Electrical Specifications

Connector Impedance	50 ohm
Operating Frequency Band	0 – 8800 MHz
3rd Order IMD Test Method	Two +43 dBm Carriers
Average Power	0.6 kW @ 900 MHz
Cable Impedance	50 ohm
dc Test Voltage	2000 V
Inner Contact Resistance	2.00 mOhm
Insertion Loss, typical	0.05 dB
Insulation Resistance, minimum	5000 MOhm
Outer Contact Resistance	0.30 mOhm
Peak Power, maximum	10.00 kW
RF Operating Voltage, maximum (vrms)	707.00 V
Shielding Effectiveness	-130 dB
3rd Order IMD	-116 dBm @ 910 MHz

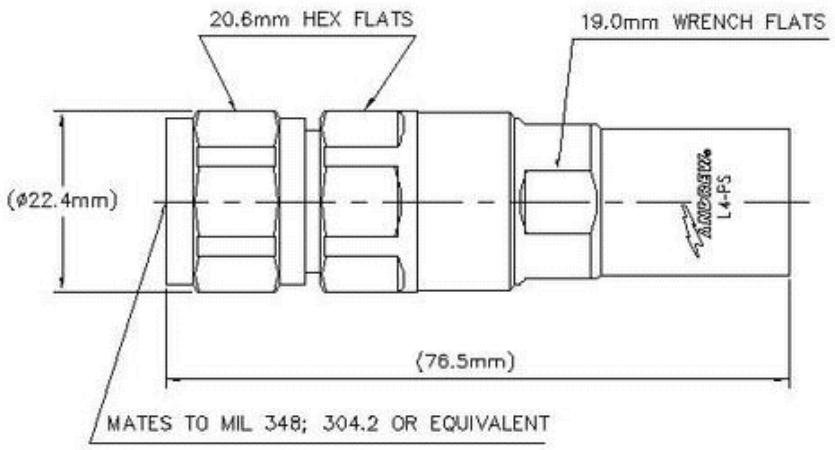
From North America, toll free
Telephone: 1-800-255-1479
Fax: 1-800-349-5444

Outside North America
Telephone: +1-708-873-2307
Fax: +1-779-435-8579

Product Specifications

L4TNM-PS

Outline Drawing



Mechanical Specifications

Outer Contact Attachment Method	Ring-flare
Attachment Durability	25 cycles
Connector Retention Tensile Force	890 N | 200 lbf
Connector Retention Torque	5 N-m | 48 in lb
Coupling Nut Proof Torque	176.26 N-m | 1560.00 in lb
Coupling Nut Retention Force	444.82 N | 100.00 lbf
Coupling Nut Retention Force Method	MIL-C-39012C-3.25, 4.6.22
Inner Contact Attachment Method	Captivated
Inner Contact Plating	Silver
Insertion Force	66.72 N | 15.00 lbf
Insertion Force Method	MIL-C-39012C-3.12, 4.6.9
Interface Durability	500 cycles
Interface Durability Method	IEC 169-16:9.5
Outer Contact Plating	Trimetal
Pressurizable	No

Dimensions

Nominal Size	1/2 in
Diameter, maximum	22.40 mm | 0.88 in
Length	78.00 mm | 3.07 in
Weight	93.00 g | 0.21 lb

Environmental Specifications

Corrosion Test Method	MIL-STD-1344A, Method 1001.1, Test Condition A
Immersion Depth	1 m
Immersion Test Mating	Unmated

From North America, toll free
Telephone: 1-800-255-1479
Fax: 1-800-349-5444

Outside North America
Telephone: +1-708-873-2307
Fax: +1-779-435-8579

Product Specifications

L4TNM-PS

Immersion Test Method	IEC 60529:2001, IP68
Mechanical Shock Test Method	MIL-STD-202, Method 213, Test Condition I
Moisture Resistance Test Method	MIL-STD-202F, Method 106F
Operating Temperature	-55 °C to +85 °C (-67 °F to +185 °F)
Storage Temperature	-55 °C to +85 °C (-67 °F to +185 °F)
Thermal Shock Test Method	MIL-STD-202F, Method 107G, Test Condition A-1, Low Temperature -55 °C
Vibration Test Method	IEC 60068-2-6
Water Jetting Test Mating	Unmated
Water Jetting Test Method	IEC 60529:2001, IP66

Standard Conditions

Attenuation, Ambient Temperature	20 °C | 68 °F
Average Power, Ambient Temperature	40 °C | 104 °F

Return Loss

Frequency Band	VSWR	Return Loss (dB)
45–1000 MHz	1.02	39.00
1010–2200 MHz	1.03	37.00
2210–3000 MHz	1.05	33.00
3010–4000 MHz	1.07	29.00
4010–6000 MHz	1.12	25.00
6010–8000 MHz	1.15	23.00

Regulatory Compliance/Certifications

Agency	Classification
RoHS 2002/95/EC	Compliant by Exemption
China RoHS SJ/T 11364-2006	Above Maximum Concentration Value (MCV)

* Footnotes

Immersion Depth	Immersion at specified depth for 24 hours
Insertion Loss, typical	0.05√freq (GHz) (not applicable for elliptical waveguide)

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Telephone: 1-800-255-1479
Fax: 1-800-349-5444

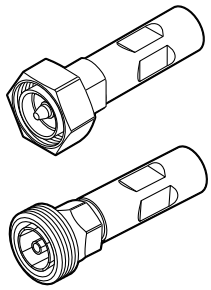
Outside North America
Telephone: +1-708-873-2307
Fax: +1-779-435-8579

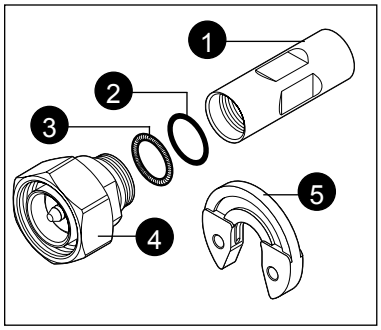
Installation Instructions

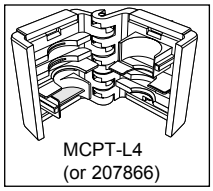
Positive Stop™ Connectors

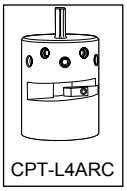
for HELIAX® LDF4-50A Coaxial Cable

Andrew Institute offers installation training.

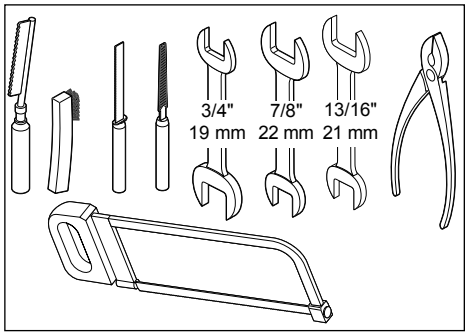




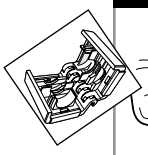


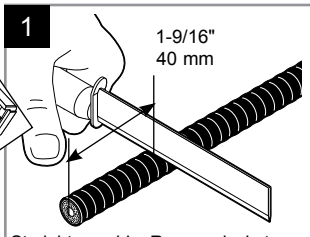


Tool	Cuts per Blade	Blade Part Number
MCPT-L4	24 (typ)	MCPT-BK4
207866	24 (typ)	209874
CPT-L4ARC	150 (typ)	CPT-BKS



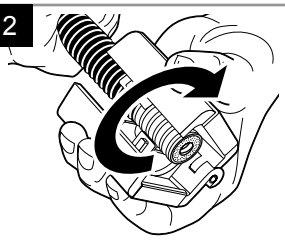
1





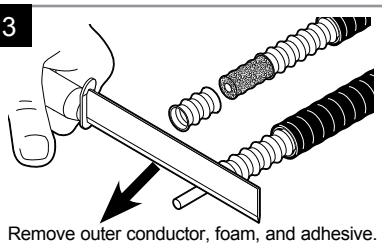
Straighten cable. Remove jacket.
Enderece el cable. Quite la funda.
Vérifiez que le câble est droit. Retirez la gaine.
Kabel geradeziehen. Mantel entfernen.
Endireite o cabo. Remova o revestimento.
将电缆拉直，剥下护皮

2



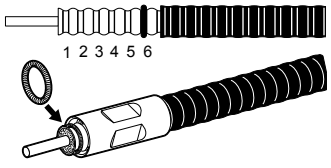
Gently spin approx. 12 times
Gire suavemente unas 12 vueltas
Tournez environ 12 fois avec précaution
Vorsichtig um ca. 12 Umdrehungen drehen
Gire cuidadosamente cerca de 12 voltas
轻轻旋转 12 次左右

3



Remove outer conductor, foam, and adhesive.
Quite el conductor externo, la espuma y el adhesivo.
Retirez le conducteur extérieur, la mousse et l'adhésif.
Außenleiter, Schaumstoff und Klebstoff entfernen.
Remova o condutor externo, a espuma e o adesivo.
除去外导管、泡沫、和粘合剂。

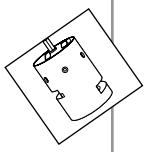
4

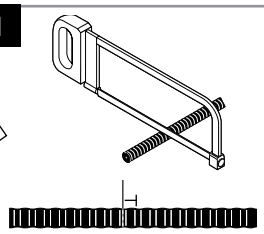


Add O-ring, body, and spring ring
Añada la junta tórica, el cuerpo y el anillo elástico
Ajoutez le joint torique, le corps et la bague élastique
O-Ring, Gehäuse und Federring anbringen
Acrescente o anel em "O", o corpo e o anel elástico
加 O 型圈加彈簧圈加接頭體

5 →

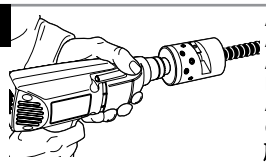
1





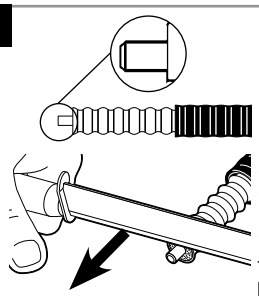
Straighten cable. Cut square.
Enderece el cable. Córtelo a escuadra.
Vérifiez que le câble est droit. Coupez à l'équerre.
Kabel geradeziehen. Im rechten Winkel einschneiden.
Endireite o cabo. Corte reto.
将电缆拉直，垂直锯入

2



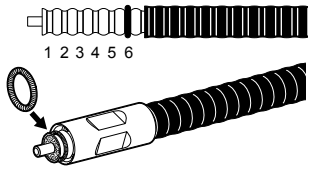
Apply pressure until tool clicks.
Aplique presión hasta que la herramienta haga clic.
Appuyez jusqu'à ce que l'outil s'enclique.
Druck aufbringen, bis Werkzeug klickt.
Aplique pressão até a ferramenta fazer um clique.
施加压力直到工具发出哒声。

3



Cut cable at top of corrugation. Remove foam and adhesive.
Corte el cable en la parte superior del corrugado Quite la espuma y el adhesivo.
Coupez le câble sur la crête de la cannelure. Enlevez la mousse et l'adhésif
Kabel im oberen Bereich der Riffelung einschneiden. Schaumstoff und Klebstoff entfernen.
Corte o cabo no topo da ondulação. Remova a espuma e o adesivo.
切除电缆波纹状的外导管顶部。
除去泡沫和粘合剂。

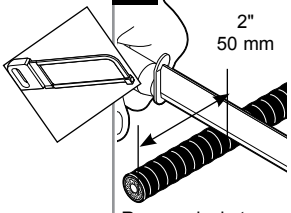
4



Add O-ring, body, and spring ring
Añada la junta tórica, el cuerpo y el anillo elástico
Ajoutez le joint torique, le corps et la bague élastique
O-Ring, Gehäuse und Federring anbringen
Acrescente o anel em "O", o corpo e o anel elástico
加 O 型圈加彈簧圈加接頭體

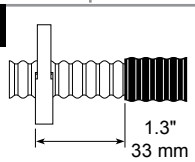
7 →

1

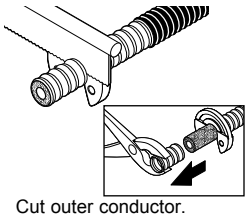


Remove jacket
Retire la envolvente
Retirez la gaine
Mantel abnehmen
Remova o revestimento
剥下护皮

2

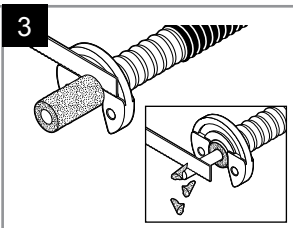


Position the saw guide as shown
Coloque la guía de sierra como se muestra
Positionnez le guide de la scie, comme illustré
Die Sägeführung wie gezeigt anordnen
Posicione o guia da serra como ilustrado
如圖所示放置鋸導。



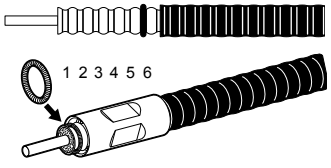
Cut outer conductor.
Cortar el conductor externo.
Coupez le conducteur extérieur.
Außenleiter zurückschneiden.
Corte o condutor externo.
切外導體

3



Remove foam and adhesive.
Retirar el material de espuma y el adhesivo.
Enlevez la mousse et l'adhésif.
Verschäumung und Klebeband entfernen.
Remova a espuma e o adesivo.
去除泡沫塑料和粘潔劑

4

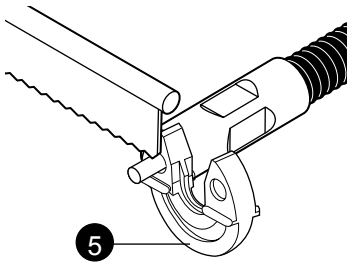


Add O-ring, body, and spring ring
Añada la junta tórica, el cuerpo y el anillo elástico
Ajoutez le joint torique, le corps et la bague élastique
O-Ring, Gehäuse und Federring anbringen
Acrescente o anel em "O", o corpo e o anel elástico
加 O 型圈加彈簧圈加接頭體

5 →

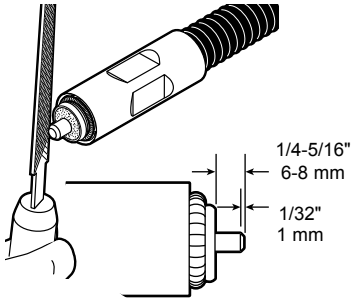
5

Trim inner conductor.
Cortar el conductor interno.
Coupez le conducteur intérieur.
Innenleiter abschneiden.
Limpe o condutor interno.
切整內心導體



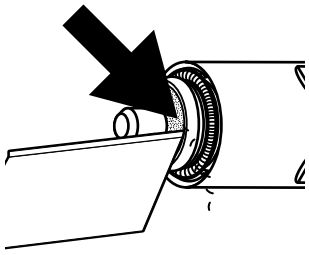
6

Taper inner conductor.
Dar forma cónica al conductor interno.
Effilez le conducteur intérieur.
Innenleiter abschrägen.
Atarraxe o condutor interno.
錐削內心導體



7

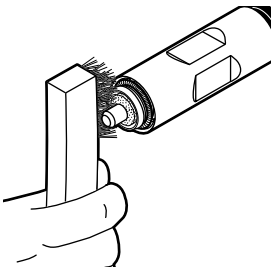
Deburr
Quitar las virutas
Ebavurez
Entgraten
Tirar as rebarbas
Sbavare
去毛刺



Inside edge, outer conductor
Borde interior, conductor externo
Bord interne, conducteur extérieur
Innenkante, Außenleiter
Borda interna, condutor externo
Bordo interno, conduttore esterno
内缘，外导体

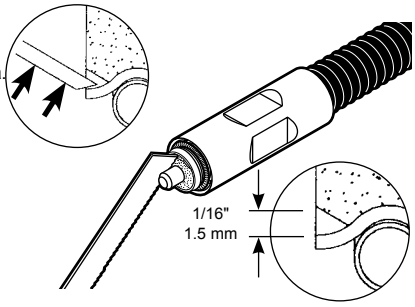
8

Remove debris.
Retirar los restos.
Enlevez les débris.
Metallspäne entfernen.
Remova os detritos.
去除殘渣

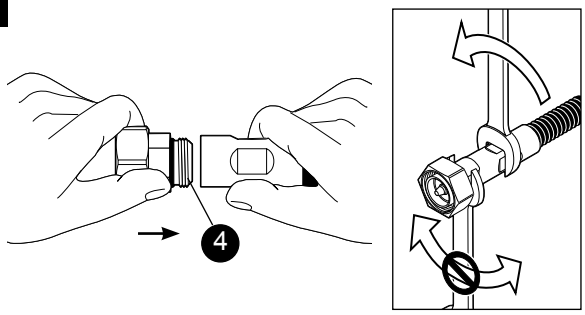


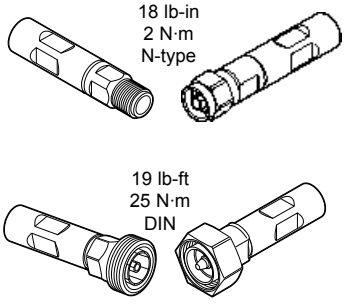
9

Compress foam.
Comprimir el material de espuma.
Comprimez la mousse.
Verschäumung zusammendrücken.
Comprima a espuma.
壓緊泡沫塑料。



10





Connector Reattachment Kit Part Number = 12PS-RK

Número de Pieza del Juego de Reinserción del Conector = 12PS-RK

Numéro de référence de trousse de rattachement de connecteur = 12PS-RK

Steckverbinder-Wiederanschließ-Set Teile-Nr. = 12PS-RK

Número de Peça do Kit para Religação de Conector = 12PS-RK

连接器再连接工具包配件号码 = 12PS-RK

	表一 有毒有害物质或元素名称及含量标识格式					
	有毒有害物质或元素					
部件名称 (Part Name)	铅 (Pb)	汞 (Hg)	镉 (Cd)	六价铬 (Cr6+)	多溴联苯 (PBB)	多溴二苯醚 (PBDE)
連接器 (Connector)	X	O	O	O	O	O
O: 表示有毒有害物质在该部件所有的均质材料中的含量均在SJ/T 11363-2006规定的限量要求以下.						
X: 表示该有毒有害物质至少在该部件的某一均质材料中的含量超出SJ/T 11363-2006规定的限量要求.						

Andrew Corporation
3 Westbrook Corporate Center, Suite 900, Westchester, Illinois U.S.A. 60154
+1 (708) 349-3300 Fax (U.S.A.): 1-800-349-5444
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STABILINE®

DIN1 Series-Transient Voltage Surge Suppressors

Parallel-Connected Design (For use in Series and Parallel Applications)

Superior Electric

Din-Rail Suppression Filter System for Instantaneous Protection

DIN1 Series Transient Voltage Surge Suppressors deliver worry-free performance with an innovative and proven technology design. All models provide surge protection against harmful transient voltages and high-frequency noise that exceed the nominal operating voltage of AC and DC critical dedicated control loads.

Ideal for protecting PLCs, fire-alarm panels, motion control systems, electric access readers, POS hardware, building management systems and other microprocessor based loads. The DIN1 Series unit is installed/connected in either Series or Parallel with the line and the equipment to be protected. The DIN1 contains no line/load sensitive components and therefore can be connected in any orientation.

DIN1 Series Transient Voltage Surge Suppressors respond reliably and repeatedly in less than 1 nanosecond. The fail-safe design incorporates thermal fuse links and TMOVs, and dual Component-Level Fusing (CLF) are standard in each DIN1 unit. All models include an LED to visually indicate that protection is active. Units weigh one pound and measure an ultra-compact 3.23" H x .89" W x 3.99" D. The 120 and 250 volt models are recognized under UL 1449 2nd Edition as TVSS, UL 1283 as Electromagnetic Filter and cUL.

For ease of installation, all DIN1 Series units are hard-wired connected via box terminals using 22 AWG - 12 AWG conductor. All DIN1 units carry a ten year unlimited free replacement warranty.

DIN1 Series Features

- *Din-Rail Mounting*
- *15kA Surge Amp Capacity Protection per Mode*
- *15A Maximum Continuous Operating Current*
- *Single Phase 24, 48, 120 and 250 VAC & VDC Models*
- *Ultra Compact, Fail-safe Design*
- *Dual Component-Level Fusing*
- *High-frequency Noise Filtering*
- *Hard-wired via Box Terminals*
- *LED Visual Protection Status*
- *10-Year Warranty*
- *UL and cUL Recognized*

DIN1 Series Benefits

- *Extends Equipment Life*
- *Increased Uptime*
- *Provides Higher System Reliability*
- *Increases Product Value*
- *Offers Low-cost Protection*
- *Reduces Maintenance Costs*
- *Provides Point-of-use Protection*
- *Eliminates System Upset*

Model Number	System Voltage/Service Configurations
DIN1-15-24-1G-15	24 VAC/VDC, 1Ø, 2-Wire, w/ground
DIN1-15-48-1G-15	48 VAC/VDC, 1Ø, 2-Wire, w/ground
DIN1-15-120-1G-15	120 VAC/VDC, 1Ø, 2-Wire, w/ground
DIN1-15-250-1G-15	250 VAC/VDC, 1Ø, 2-Wire, w/ground

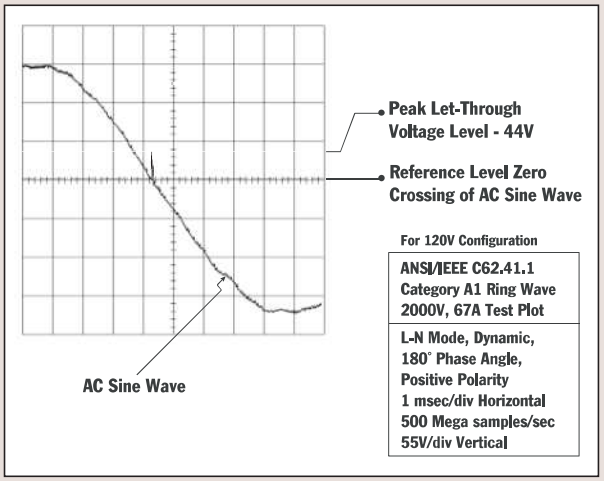
PERFORMANCE SPECIFICATIONS

Model Number	System Voltage	System Configuration	Protection Mode	(AC) MCOV	ANSI/IEEE C62.41.1-2002, C62.41.2-2002, & C62.45-2002 Measured Limited Voltage: All Models A1 Ring Wave 2kV, 67A 180° Phase Angle	All Models A3 Ring Wave 6kV, 200A 180° Phase Angle	All Models B3/C1 Combo Wave 6kV, 3kA 90° Phase Angle	UL SVR: UL 1449 2nd Edition Suppressed Voltage Ratings
DIN1-15-24-1G-15	5-30 VAC 5-38 VDC	1-Phase 2-Wire + Ground	L-N	30V	44V	83V	152V	N/A
			L-G	30V	75V	91V	173V	N/A
			N-G	30V	50V	85V	173V	N/A
DIN1-15-48-1G-15	24-50 VAC 24-65 VDC	1-Phase 2-Wire + Ground	L-N	50V	44V	115V	197V	N/A
			L-G	50V	97V	145V	225V	N/A
			N-G	50V	49V	117V	193V	N/A
DIN1-15-120-1G-15	48-150 VAC 48-200 VDC	1-Phase 2-Wire + Ground	L-N	150V	47V	127V	268V	400V
			L-G	150V	92V	239V	326V	400V
			N-G	150V	47V	128V	470V	400V
DIN1-15-250-1G-15	120-275 VAC 120-300 VDC	1-Phase 2-Wire + Ground	L-N	275V	49V	130V	512V	800V
			L-G	275V	90V	234V	616V	800V
			N-G	275V	48V	130V	960V	800V

All voltages are peak values measured from the insertion point at the phase angles referenced above using a 10 µs/div display rate and 500 MS/s sampling rate.

EMI/RFI FILTER ATTENUATION-MIL STANDARD 220B

Frequency	Attenuation
1kHz	1 dB
10kHz	5 dB
100kHz	29 dB
1MHz	32 dB
10MHz	8 dB
20MHz	9 dB
Max. attenuation	34 dB @ 495kHz



GENERAL SPECIFICATIONS

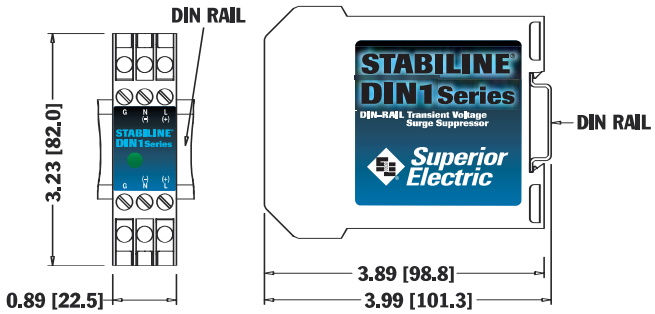
Maximum Rated Surge Current	15kA per Mode/30kA per Phase
Application	ANSI/IEEE C62.41 Location C, B & A
Design	Ultra Compact,Fail-safe Design with Dual Component-Level Fusing (CLF)
Warranty	Ten Years - Unlimited Free Replacement
Standards Compliance ***(120 & 250 volt Models)***	UL 1449 - Recognized (2nd Edition) as TVSS, UL 1283 as Electromagnetic Filter, cUL

ELECTRICAL SPECIFICATIONS

Modes of Protection	All modes. L-N, L-G & N-G
Input Frequency Range	47-64 Hz
Maximum Continuous Operating Current	15 Amps
Response Time	< 1 nanosecond
Protection Present Status	Illuminated LED Indicates Protection Active
Short Circuit Current Rating	100kAIC Short Circuit Current Rating with a 15 Amp Class T Fuse rated at 300 VAC

MECHANICAL SPECIFICATIONS

Dimensions ***H x W x D (Inches)***	3.23 x 0.89 x 3.99
H x W x D (mm)	(82.0 x 22.5 x 101.3)
Enclosure	ABS Plastic UL94-5VA
Connection	Series/In-line or Parallel; Hard-wired via Box Terminals
Minimum Wire Size	#22 AWG THHN
Maximum Wire Size	#12 AWG THNN
Mounting	Din-Rail
Temperature ***Operating & Storage***	- 40° C to 70° C (- 40° F to 160° F)
Humidity	5 - 95% Non-condensing
Weight	1 lb (0.45 kg)



All measurements in inches [mm]

The information and specifications stated in this document are subject to change without notice.

Superior Electric

383 Middle Street • Suite 105
Bristol, CT 06010 USA
www.superiorelectric.com

Telephone and Fax Numbers

Telephone:	860-585-4500
Fax:	860-582-3784
Customer Service	860-585-4500, Ext. 4750
Product Application	860-585-4500, Ext. 4755

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1-800-821-1369
1-800-787-3532, Ext. 4750
1-800-787-3532, Ext. 4755

Printed in USA F7030 11/04

dc Blocked

Model shown: IS-50NX-C0, flange mount

Model shown: IS-B50LN-C2, bulkhead mount

BROADBAND HF/VHF/UHF COAXIAL PROTECTORS

APPLICATION:

For general radio use; surface or bulkhead mountable options, NOT where transmitter combining is performed.

- Utilizes UL497B listed gas tube
- Models from 1.5MHz to 1000MHz
- Multi-strike capability
- Low strike throughput energy
- Flange mount and bulkhead mount options
- Not weather resistant
- Weatherize using WK-1 *(see page 54)*
- Aluminum enclosure
- 18-8 stainless steel hardware
- UHF nickel shell silver center, TFE
- N silver shell and gold center pin

Mil Specs: Meets 6' all angle drop test, Op to 70,000', MIL-STD-202, 170F Cond. B -65°C to 125°C, rainproof option meets many Mil specs under 202 and 810 for vibration, shock (both), fungus, etc. UHF & N connectors MIL-C-39012, QQ-S-365, QQ-B-626, QQ-C-530 and MIL-G-45204, follows MIL-STD-454J, Solder QQ-S-571 Sn62

SPECIFICATIONS:

Surge: 50kA IEC 1000-4-5 8/20µs waveform 500 Joules

Turn-on: 600Vdc ±20% 2.5ns for 2kV/ns L models
1200Vdc ±20% 7ns for 2kV/ns H models

VSWR:
-C0: 1.5 to 2MHz is 1.2 to 1 & 2 to 400MHz is 1.1 to 1
-C1: 50 to 60MHz is 1.2 to 1 & 60 to 700MHz is 1.1 to 1
-C2: 125 to 100MHz is ≤1.1 to 1 type N,
≤1.2 to 1 type F & UHF

Insertion Loss: ≤0.1dB over frequency range

Temperature: -45°C to +85°C Storage/Operating +50°C

Vibration: 1G up to 100Hz

ORDER INFORMATION: (Female)

IS-B50LU-C0 Throughput Energy: ≤10mJ* (UHF Connector/Bulkhead)
Frequency Range: 1.5MHz to 400MHz
Max. Power: HF 2kW, VHF 375W, UHF 125W

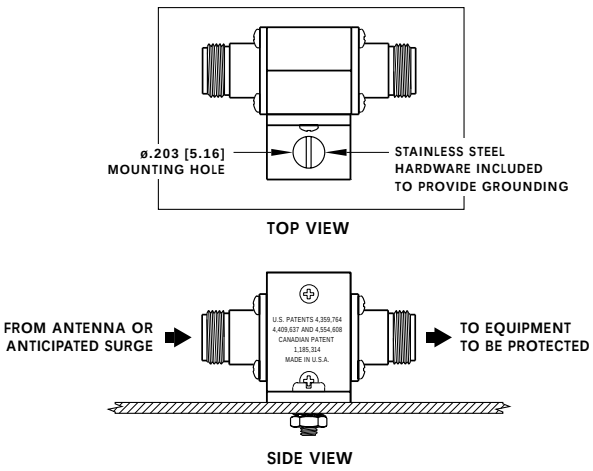
IS-B50HU-C0 Throughput Energy: ≤20mJ* (UHF Connector/Bulkhead)
Frequency Range: 1.5MHz to 400MHz
Max. Power: HF 3kW, VHF 500W, UHF 250W

IS-B50LU-C1 Throughput Energy: ≤600µJ* (UHF Connector/Bulkhead)
Frequency Range: 50MHz to 700MHz
Max. Power: VHF 375W, UHF 125W

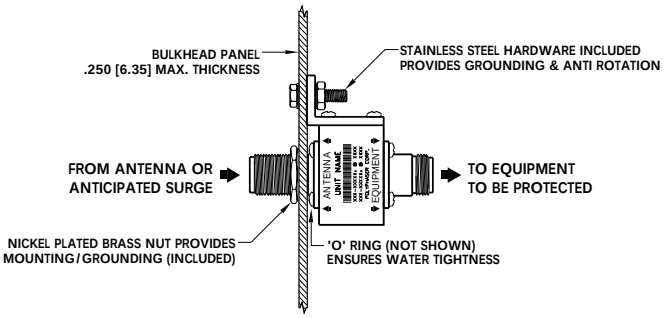
IS-B50HU-C1 Throughput Energy: ≤1mJ* (UHF Connector/Bulkhead)
Frequency Range: 50MHz to 700MHz
Max. Power: VHF 500W, UHF 250W

IS-B50LN-C0 Throughput Energy: ≤10mJ* (N Connector/Bulkhead)
Frequency Range: 1.5MHz to 400MHz
Max. Power: HF 2kW, VHF 375W, UHF 125W

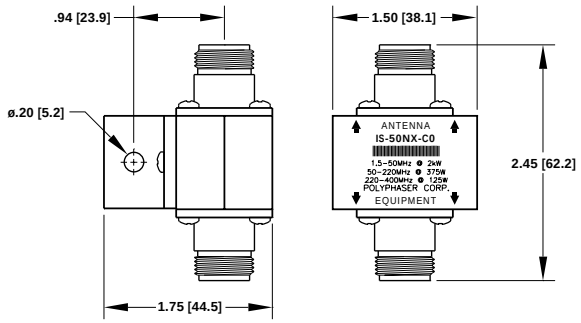
dc Blocked



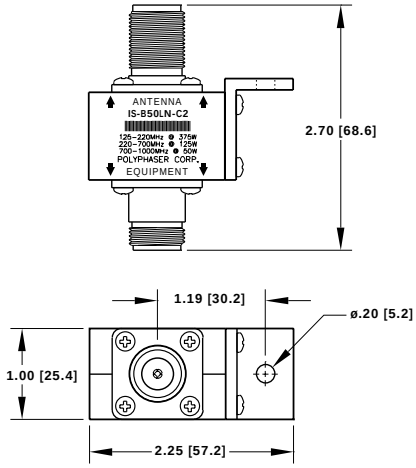
Mounting Configuration: flange mount models



Mounting Configuration: bulkhead mount models



Product Dimensions: IS-50NX-C0, flange mount



Product Dimensions: IS-B50LN-C2, bulkhead mount

IS-B50HN-C0 Throughput Energy: ≤20mJ* (N Connector / Bulkhead)
Frequency Range: 1.5MHz to 400MHz
Max. Power: HF 3kW, VHF 500W, UHF 250W

IS-B50LN-C1 Throughput Energy: ≤600µJ* (N Connector / Bulkhead)
Frequency Range: 50MHz to 700MHz
Max. Power: VHF 375W, UHF 125W

IS-B50HN-C1 Throughput Energy: ≤1mJ* (N Connector / Bulkhead)
Frequency Range: 50MHz to 700MHz
Max. Power: VHF 500W, UHF 250W

IS-B50LN-C2 Throughput Energy: ≤220µJ* (N Connector / Bulkhead)
Frequency Range: 125MHz to 1000MHz
Max. Power: VHF 375W, UHF (low) 125W
800MHz to 1GHz 50W

IS-B50HN-C2 Throughput Energy: ≤800µJ* (N Connector / Bulkhead)
Frequency Range: 125MHz to 1000MHz
Max. Power: VHF 500W, UHF (low) 250W
800MHz to 1GHz 125W

IS-50UX-C0 Throughput Energy: ≤10mJ* (UHF Connector / Surface)
Frequency Range: 1.5MHz to 400MHz
Max. Power: HF 2kW, VHF 375W, UHF 125W

IS-50UX-C1 Throughput Energy: ≤600µJ* (UHF Connector / Surface)
Frequency Range: 50MHz to 700MHz
Max. Power: VHF 375W, UHF 125W

IS-50NX-C0 Throughput Energy: ≤10mJ* (N Connector / Surface)
Frequency Range: 1.5MHz to 400MHz
Max. Power: HF 2kW, VHF 375W, UHF 125W

IS-50NX-C1 Throughput Energy: ≤600µJ* (N Connector / Surface)
Frequency Range: 50MHz to 700MHz
Max. Power: VHF 375W, UHF 125W

IS-50NX-C2 Throughput Energy: ≤220µJ* (N Connector / Surface)
Frequency Range: 125MHz to 1000MHz
Max. Power: VHF 375W, UHF (low) 125W
800MHz to 1GHz 50W

IS-75F-C1 Throughput Energy: ≤1mJ* (F Connector / Surface)
Frequency Range: 4MHz to 900MHz VSWR ≤1.2:1
Max. Power: HF 100W, VHF 100W, UHF 25W

Add suffix: ***-MA*** *for male antenna port connector*
-ME *for male equipment port connector*

**Typical*
Choose lowest throughput energy for desired frequency.
Energy based on 6kV / 3kA 8 / 20µs waveform.

KELLER AMERICA

Highly Precise Pressure Transmitters **Preciseline™**

16-bit internal digital error correction

- *Exceptional accuracy over -10 – 80ºC range*

Floating isolated piezoresistive sensor

- *Assures stability over extended intervals*

Dual (analog + RS485) outputs standard

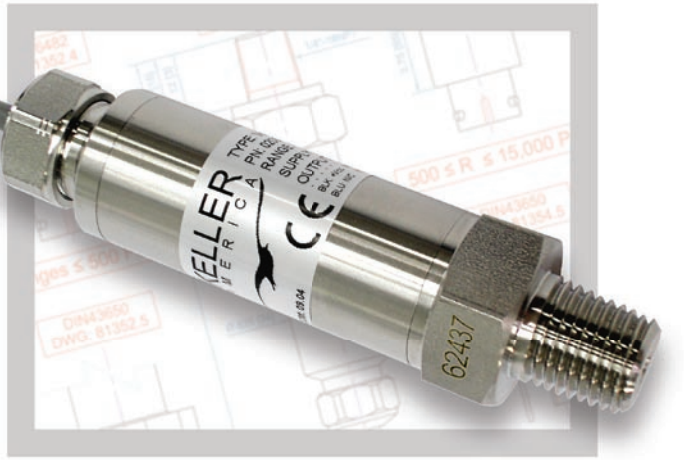
- *Simplifies interface to control as well as data collection / telemetry systems*

316L SS standard construction

- *Hastelloy C-276 optional for aggressive media*

User-programmable analog output

- *Provides maximum flexibility with minimum inventories*



The Preciseline by Keller America combines a stable, media-isolated sensor with the most advanced error correction electronics available in such a compact envelope. True 16-bit error correction, updating the analog output at 400Hz, provides real Total Error Band performance that delivers consistent results over a wide range of operating conditions. As well as the analog output, the standard Preciseline provides an RS485 interface, affording the user the ability to monitor both pressure and temperature from up to 128 transmitters on a single bus, in addition to providing a means by which the analog output may be rescaled.

Please consult the comparison chart below to determine if the Preciseline series is the best solution for your specific application. Data sheets for Econoline, Valueline, and other products are available upon request or by visiting our website, www.kelleramerica.com.

Product Comparison	**Econoline™**	**Valueline™**	**Preciseline™**
Accuracy	Static (25°C): ±1 or ±0.5% FS TC-Zero: ±0.03% FS / °C TC-Sens: ±0.03% / °C	Static (25°C): ±0.25 or ±0.1% FS TC-Zero: ±0.01% FS / °C TC-Sens: ±0.01% / °C	**±0.2 or ±0.1% FS T.E.B.***
Custom Pressure Ranges	No	Yes	**Yes**
Lowest Pressure Range	15 PSI	2 PSI	**2 PSI**
Highest Pressure Range	10,000 PSI	15,000 PSI	**15,000 PSI**
Field Rangeability	No	No	**Yes**
Analog Output	0.5 – 4.5 VDC 4 – 20 mA	0 – 5 VDC, 0 – 10 VDC 4 – 20 mA	**0 – 5 VDC, 0 – 10 VDC 4 – 20 mA**
Digital Output	N/A	N/A	**RS485**
Wetted Materials	316L SS, Fluorocarbon	316L SS, Fluorocarbon	**316L SS, Fluorocarbon**
Process Connection	¼" NPT male	¼" NPT male	**¼" NPT male**
Electrical Termination	Cable, mini-DIN	Cable, DIN43650, MIL-C-26482	**Cable, DIN43650, MIL-C-26482**
Relative cost	Lowest	Midrange	**Highest**

*see reverse, Note 6.

MADE IN U.S.A.

Keller America, Inc. is the US home for Keller AG für Druckmesstechnik of Winterthur Switzerland. With over thirty years since its inception, the firm, still under the daily direction of its founder Hans Keller, continues to lead the industry in the development of media-isolated piezoresistive pressure sensors and advanced error correction techniques. At Keller, old-world craftsmanship combines with the latest in microelectronics to produce the best price-performance value in pressure measurement available anywhere in the world.

The products described herein are assembled and tested in the US using the same components and advanced manufacturing techniques in use at the Swiss factory, insuring the uncompromised quality and rapid delivery that our customers have every right to expect.

KELLER AMERICA, INC.
813 Diligence Drive, Suite 120 ● Newport News, VA 23606 ● Toll Free (877) 2-KELLER ● Phone (757) 596-6680 ● Fax (757) 596-6659
USA: www.kelleramerica.com ● Switzerland: www.keller-druck.com

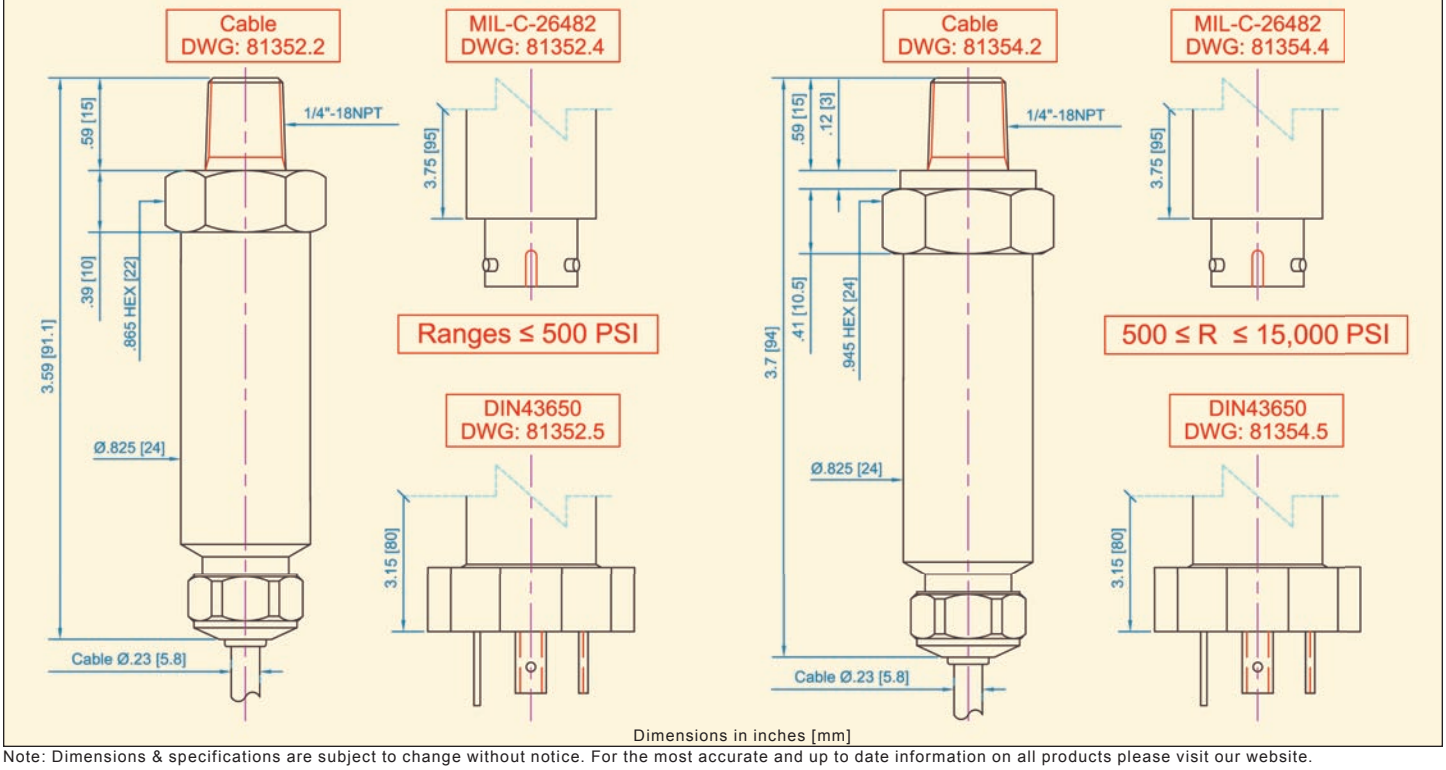
Preciseline

Specifications

Pressure units	PSIG	PSIA	PSIS[1]
Pressure Range (user specified)	Infinite from 0–2 thru 0–500	Infinite from 0–2 thru 0–500	Infinite from 0–500 thru 0–15,000
Zero Point	*Note 2*	*Note 1*	*Note 1*
Proof Pressure	Varies by range, from 10X for 1PSI to 1.1X for 15,000 PSI.		
Supply[5]	*VDC*	8 – 28	13 – 28
Output	*2 wire analog*	4 – 20 mA	
	3 wire analog	0 – 5 VDC	0 – 10 VDC
	4 wire digital	RS485	
Electrical Connection	Standard: 5ft Hytrel-jacketed shielded cable or DIN43650 connector[3] Optional: MIL-C-26482 connector[4]		

Accuracy, T.E.B.[6]	Standard: ±0.2% Optional: ±0.1%
Compensated temp. range	-10 – 80°C
Operating temp. range	-40 – 120°C
Process Connection	1/4 NPT male
Wetted materials	316L SS, Fluorocarbon
Environmental protection	IP65
CE-Conformity	EN50081-1, EN50082-2
Shock	20g (11ms)
Vibration	20g (5 – 2KHz, max. amp. ±3mm) per IEC68-2-6

Dimensions



Dimensions in inches [mm]

Note: Dimensions & specifications are subject to change without notice. For the most accurate and up to date information on all products please visit our website.

Wiring Configuration

Configuration[7,8]	Pin 1 / C / White	Pin 2 / B / Red	Pin 3 / A / Black	D / Blue	F / Yellow
2 Wire (mA)	OUT / GND		+Vcc	RS485A	RS485B
3 Wire (VDC)	GND	+OUT	+Vcc	RS485A	RS485B
4 Wire (RS485 Only)	GND		+Vcc	RS485A	RS485B

Notes:

1. PSIG = Gage; Zero-point referenced to local atmospheric pressure.
PSIA = Absolute; Zero-point set at hard vacuum.
PSIS = Sealed Gage; Zero-point set at 1 bar absolute (14.504 PSIA).

2. Zero-point can be suppressed or elevated for special applications.

3. Mating connector supplied at no extra cost. Does not support RS485.

4. At extra cost, includes mating connector.

5. Lower supply operation possible with RS485 output only. Consult factory for details.

6. TEB: Total Error Band; Includes the combined effects of non-linearity, hysteresis and non-repeatability as well as thermal dependencies, over the compensated temperature range, expressed as a percentage of the Basic Range. All intermediate ranges are realized by deranging from standard Basic Ranges of 15, 45, 150, 450, 1500, 4500, 14500 PSI.

7. Pins 1, 2 & 3 refer to the DIN style connector. A, B, C... refer to the MIL style connector, and colors refer to the wires inside the cable.

8. The drain / shield is connected to the transmitter housing. For best protection against galvanic corrosion, do not ground.

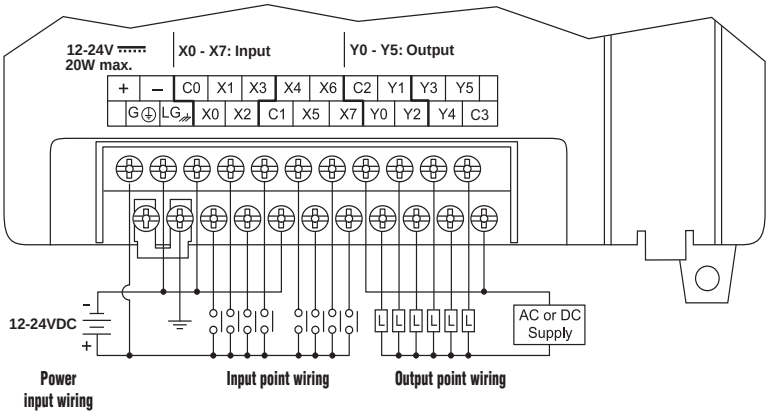
KELLER AMERICA, INC.
813 Diligence Drive, Suite 120 • Newport News, VA 23606 • Toll Free (877) 2-KELLER • Phone (757) 596-6680 • Fax (757) 596-6659
USA: www.kelleramerica.com • Switzerland: www.keller-druck.com

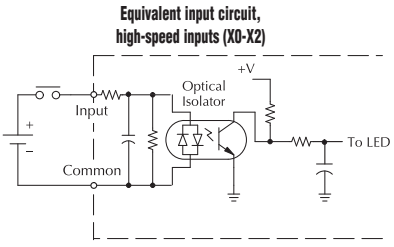
DL05 I/O Specifications

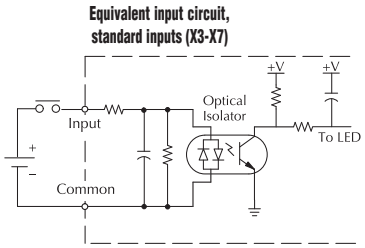
D0-05DR-D <--->

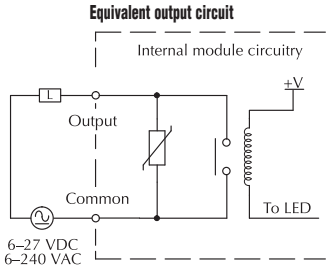
Wiring diagram and specifications

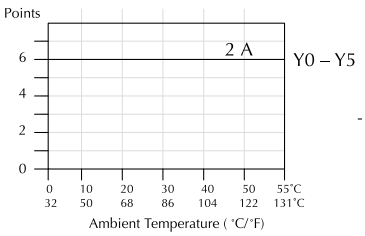
D0-05DR-D Specifications			
DC Power Supply Specifications	Voltage Range	12-24VDC 20W max.	
DC Input Specifications	Number of Input Pts.	8 (sink/source)	
	Number of Commons	2 (isolated)	
	Input Voltage Range	12-24VDC	
	Input Impedance	(X0-X2) 1.8K @ 12-24VDC (X3-X7) 2.8K @ 12-24VDC	
	On Current/ Voltage Level	>5mA/10VDC	
	OFF Current/ Voltage Level	<0.5mA/<2VDC	
	Response Time	X0-X2	X3-X7
	OFF to ON Response	<100µs	<8ms
	ON to OFF Response	<100µs	<8ms
	Fuses	None	
Relay Output Specifications	Number of Output Points	6	
	Number of Commons	2 (isolated)	
	Output Voltage Range	6-240VAC, 47-63Hz 6-27VDC	
	Maximum Voltage	264VAC,30VDC	
	Maximum Output Current	2A/point 6A/common	
	Maximum Leakage Current	0.1mA @ 246VAC	
	Smallest Recommended Load	5mA @ 5VDC	
	OFF to ON Response	<15ms	
	ON to OFF Response	<10ms	
	Status Indicators	Logic side	
	Fuses	None (external recommended)	











Typical Relay Life (Operations) at Room Temperature		
Voltage and Type of Load	Load Current 1A	2A
24 VDC Resistive	600K	270K
24 VDC Solenoid	150K	60K
110 VAC Resistive	900K	350K
110 VAC Solenoid	350K	150K
220 VAC Resistive	600K	250K
220 VAC Solenoid	200K	100K

Features at a Glance

The DL05 and DL06 micro PLCs are complete self-contained systems. The CPU, power supply, and I/O are all included inside the same housing. Option modules are available to expand the capability of each PLC family for more demanding applications. The standard features of these PLCs are extraordinary and compare favorably with larger and more expensive PLCs.

The specification tables to the right are meant for quick reference only. Detailed specifications and wiring information for each model of the DL05 and DL06 PLCs begin on page 2–33.

Program capacity

Most boolean ladder instructions require a single word of program memory. Other instructions, such as timers, counters, etc., require two or more words. Data is stored in V-memory in 16-bit registers.

Performance

The performance characteristics shown in the tables represent the amount of time required to read the inputs, solve the Relay Ladder Logic program and update the outputs.

Instructions

A complete list of instructions is available at the end of this section.

Communications

The DL05 and DL06 offer powerful communication features normally found only on more expensive PLCs.

Special features

The DC input and DC output PLCs offer high-speed counting or pulse output. Option module slots allow for discrete I/O expansion, analog I/O, or additional communication options.

DL05 CPU Specifications

System capacity

Total memory available (words)	6K
Ladder memory (words)	2,048
V-memory (words)	4,096
User V-memory	3,968
Non-volatile user V-memory	128
Battery backup	Yes[1]
Total built-in I/O	14
Inputs	8
Outputs	6
I/O expansion	Yes[1]

Performance

Contact execution (Boolean)	0.7µs
Typical scan (1K Boolean)[2]	1.5-3ms.

Instructions and diagnostics

RLL ladder style	Yes
RLLPLUS/flowchart style (Stages)	Yes/256
Run-time editing	Yes
Scan	Variable/fixed
Number of Instructions	133
Types of Instructions:	
Control relays	512
Timers	128
Counters	128
Immediate I/O	Yes
Subroutines	Yes
For/next loops	Yes
Timed interrupt	Yes
Integer math	Yes
Floating-point math	No
PID	Yes
Drum sequencers	Yes
Bit of word	Yes
ASCII print	Yes
Real-time clock/calendar	Yes[1]
Internal diagnostics	Yes
Password security	Yes
System and user error log	No

Communications

Built-in ports	Two RS-232C
Protocols supported:	
K-sequence (proprietary protocol)	Yes
DirectNet master/slave	Yes
Modbus RTU master/slave	Yes
ASCII out	Yes
Baud rate	
Port 1	9,600 baud (fixed)
Port 2	selectable 300-38,400 baud (default 9,600)

Specialty Features

Filtered inputs	Yes[3]
Interrupt input	Yes[3]
High speed counter	Yes, 5kHz[3]
Pulse output	Yes, 7kHz[3]
Pulse catch input	Yes[3]

1- These features are available with use of certain option modules. Option module specifications are located later in this section.

2- Our 1K program includes contacts, coils, and scan overhead. If you compare our products to others, make sure you include their scan overhead.

3- Input features only available on units with DC inputs and output features only available on units with DC outputs.

DL06 CPU Specifications

System capacity

Total memory available (words)	14.8K
Ladder memory (words)	7680
V-memory (words)	7616
User V-memory	7488
Non-volatile user V-memory	128
Built-in battery backup (D2-BAT-1)	Yes
Total I/O	36
Inputs	20
Outputs	16
I/O expansion	Yes1

Performance

Contact execution (Boolean)	0.6µs
Typical scan (1K Boolean)2	1-2ms.

Instructions and diagnostics

RLL ladder style	Yes
RLLPLUS/flowchart style (Stages)	Yes/1024
Run-time editing	Yes
Scan	Variable/fixed
Number of Instructions	229
Types of Instructions:	
Control relays	1024
Timers	256
Counters	128
Immediate I/O	Yes
Subroutines	Yes
For/next loops	Yes
Table functions	Yes
Timed interrupt	Yes
Integer math	Yes
Trigonometric functions	Yes
Floating-point math	Yes
PID	Yes
Drum sequencers	Yes
Bit of word	Yes
Number type conversion	Yes
ASCII in, out, print	Yes
LCD instruction	Yes
Real-time clock/calendar	Yes
Internal diagnostics	Yes
Password security	Yes
System and user error log	No

Communications

Built-in ports:	One RS-232C
	One multi-function RS232C/RS422/RS485

NOTE: RS485 is for MODBUS RTU only.

Protocols supported:	
K-sequence (proprietary protocol)	Yes
DirectNet master/slave	Yes
Modbus RTU master/slave	Yes
ASCII in/out	Yes
Baud rate	
Port 1	9,600 baud (fixed)
Port 2	selectable 300-38,400 baud (default 9,600)

Specialty Features

Filtered inputs	Yes[3]
Interrupt input	Yes[3]
High speed counter	Yes, 7kHz[3]
Pulse output	Yes, 10kHz[3]
Pulse catch input	Yes[3]

1- These features are available with use of certain option module. Option module specifications are located later in this section.

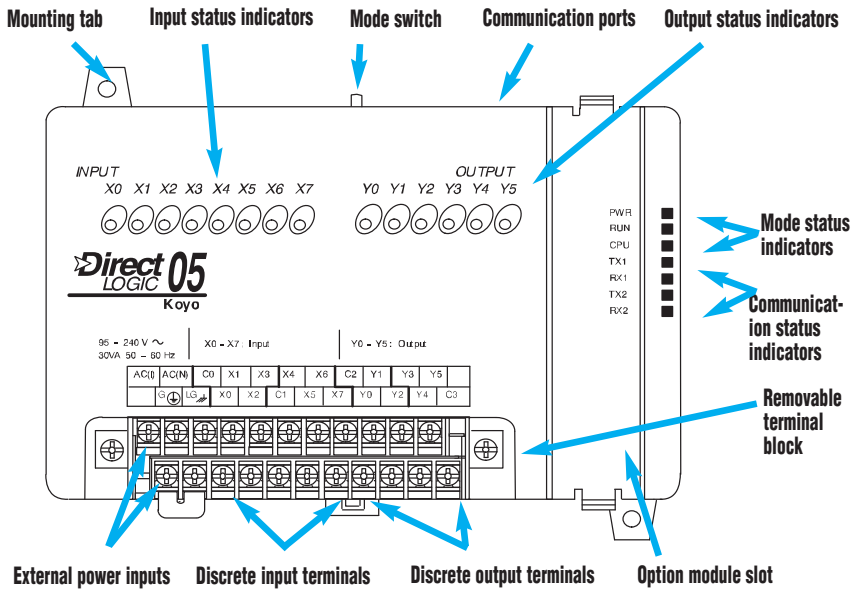
2- Our 1K program includes contacts, coils, and scan overhead. If you compare our products to others, make sure you include their scan overhead.

3- Input features only available on units with DC inputs and output features only available on units with DC outputs.

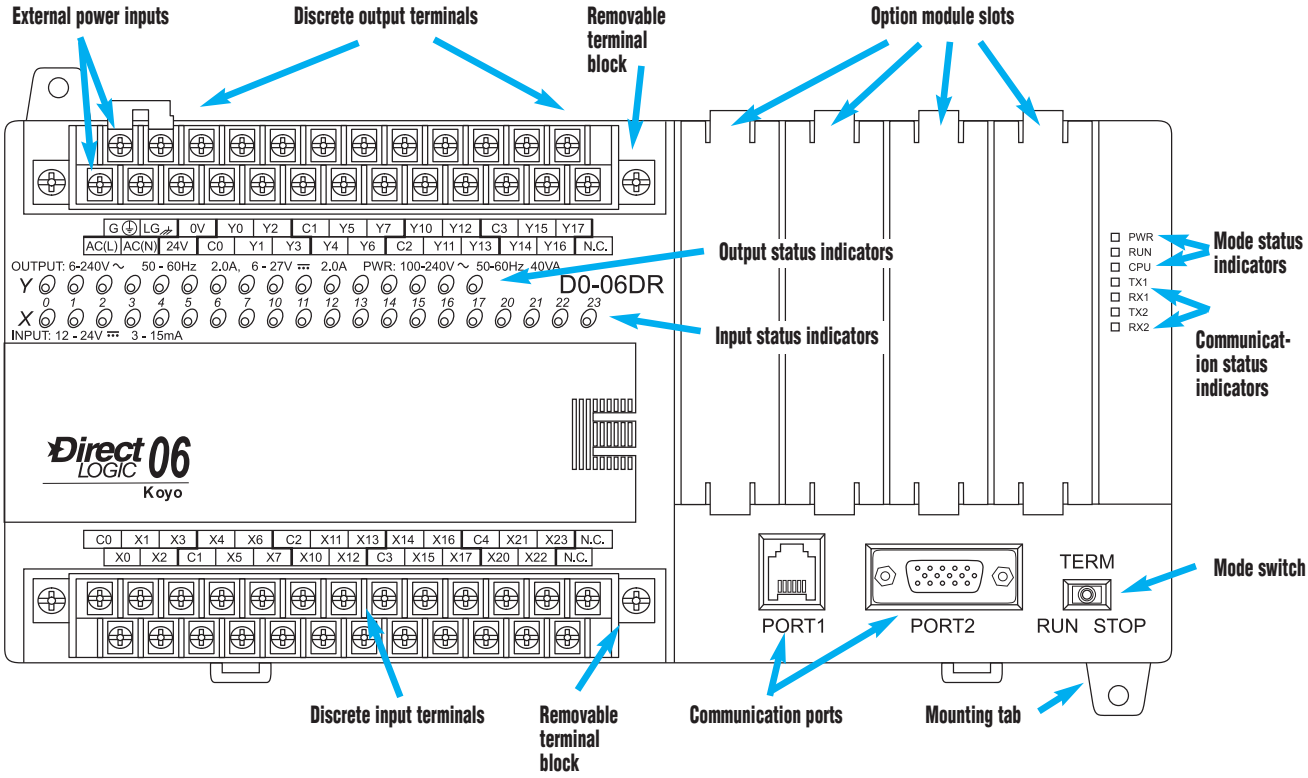
Features at a Glance

*Direct*SOFT software

The DL05 and DL06 PLCs use the same familiar *Direct*SOFT programming software that our larger PLCs use. A FREE version of *Direct*SOFT gives you all the great features of the full version, but with a 100-word PLC program download limitation. For programs larger than 100 words, the full package is required. The FREE PC-DS100 software may be sufficient to program the DL05 and DL06. If you are programming with a full package version prior to v5.0, you will need v2.4 or later for the DL05 PLCs and v4.0 or later for the DL06. We always recommend the latest version for the most robust features. See the Software section in this catalog for a complete description of *Direct*SOFT including features, part numbers of programming packages and upgrades.



Hardware features diagrams

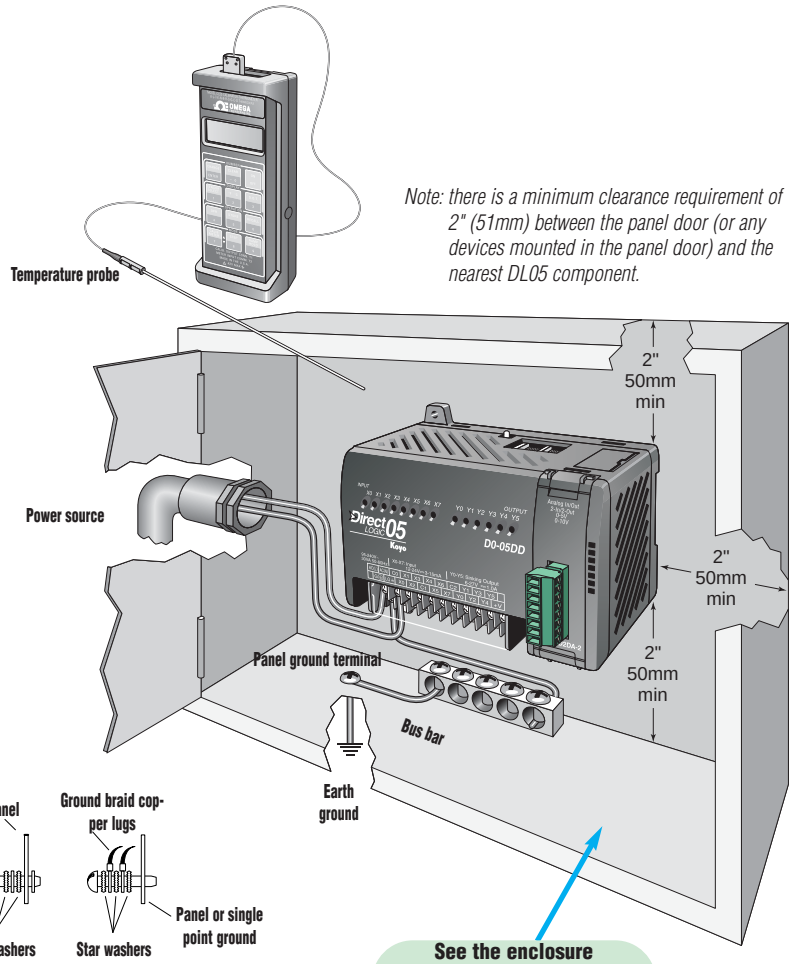


Product Dimensions and Installation

It is important to understand the installation requirements for your DL05 or DL06 system. Your knowledge of these requirements will help ensure that your system operates within its environmental and electrical limits.

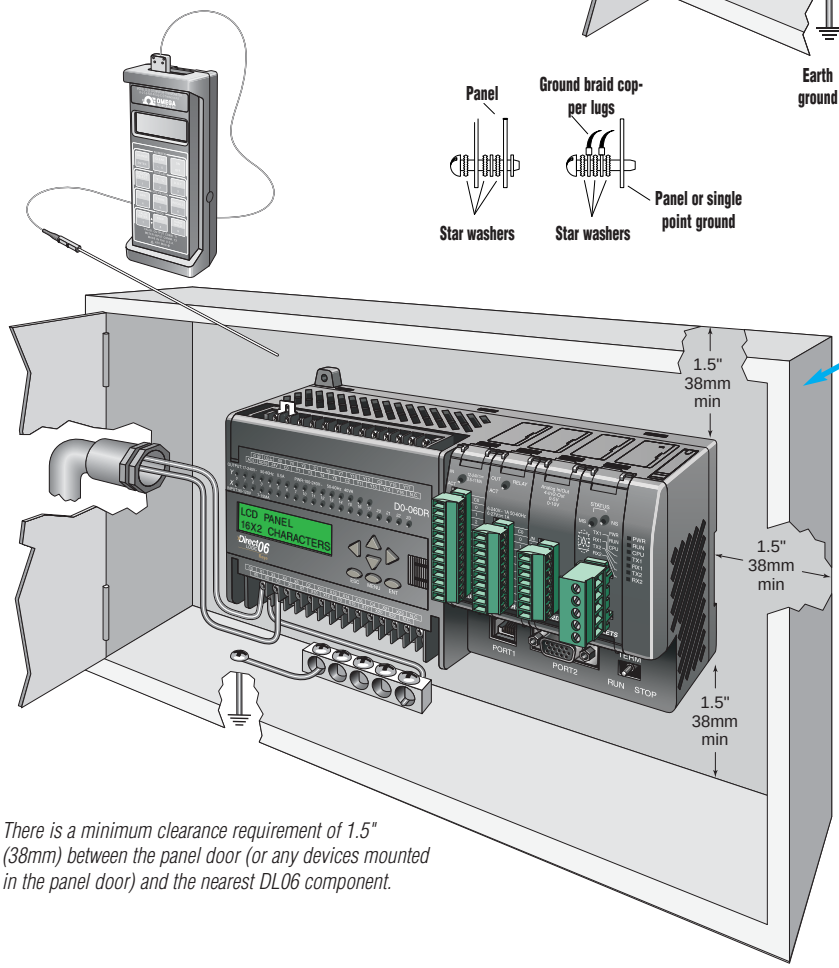
Plan for safety

This catalog should never be used as a replacement for the user manual. You can purchase, download free, or view online the user manuals for these products. The D0-USER-M is the publication for the DL05 PLCs, and the D0-06USER-M is the publication for the DL06 PLCs. The D0-OPTIONS-M is the user manual for the option modules. These user manuals contain important safety information that must be followed. The system installation should comply with all appropriate electrical codes and standards.



Note: there is a minimum clearance requirement of 2" (51mm) between the panel door (or any devices mounted in the panel door) and the nearest DL05 component.

See the enclosure section to find an enclosure that fits your application



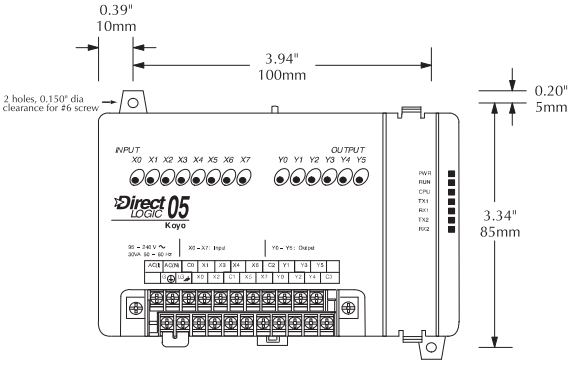
Note: There is a minimum clearance requirement of 1.5" (38mm) between the panel door (or any devices mounted in the panel door) and the nearest DL06 component.

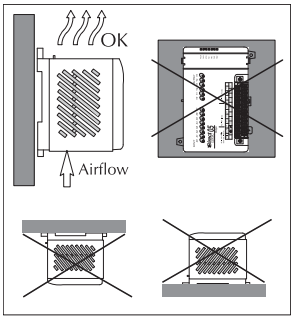
Environmental Specifications for DL05 and DL06	
Storage Temperature	-4º F-158ºF (-20ºC to 70ºC)
Ambient Operating Temperature	32ºF-131ºF (0º to 55ºC)
Ambient Humidity	5 to 95% relative humidity (non-condensing)
Vibration Resistance	MIL STD 810C Method 514.2
Shock Resistance	MIL STD 810C Method 516.2
Noise Immunity	NEMA (ICS3-304)
Atmosphere	No corrosive gases

Product Dimensions and Installation

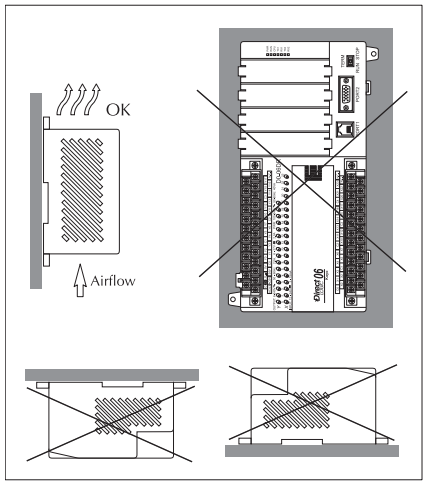
Unit dimensions and mounting orientation

DL05 and DL06 PLCs must be mounted properly to ensure ample airflow for cooling purposes. It is important to follow the unit orientation requirements and to verify that the PLC's dimensions are compatible with your application. Notice particularly the grounding requirements and the recommended cabinet clearances.

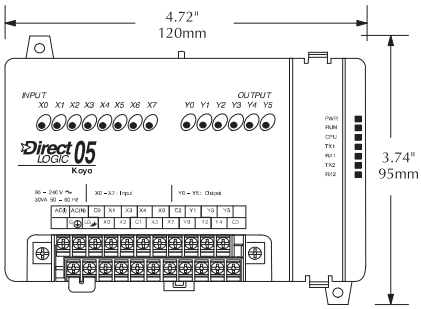


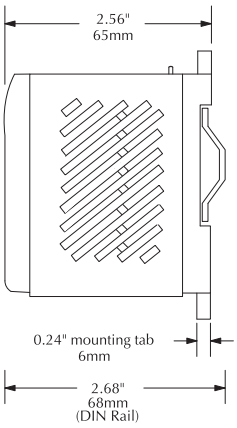


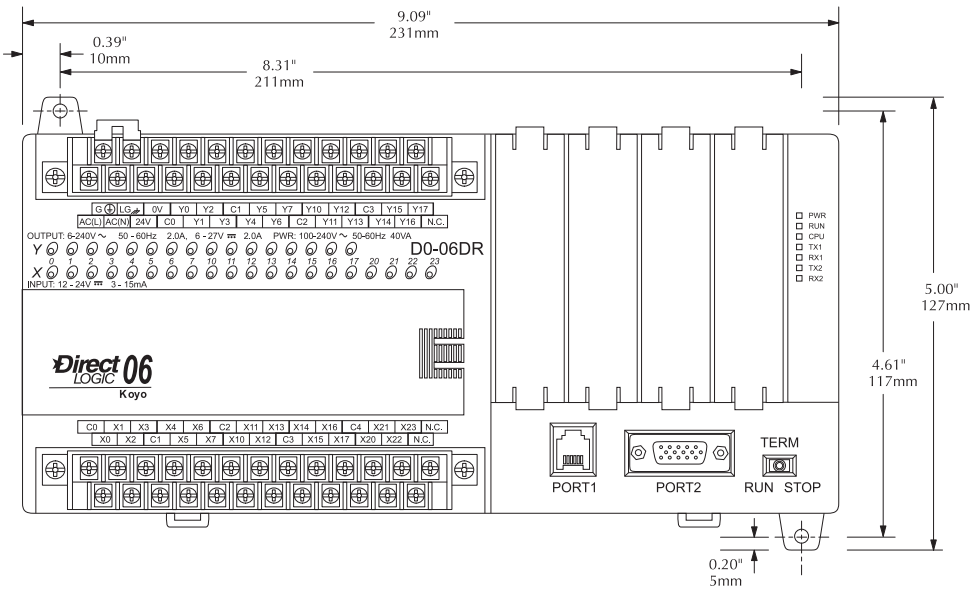
Mounting orientation

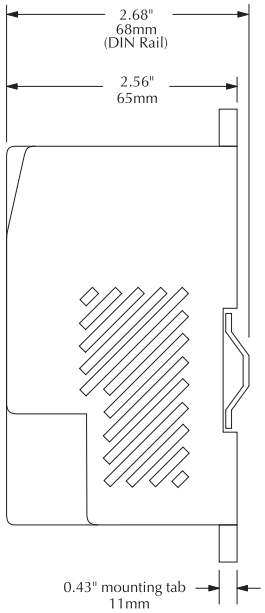


Mounting orientation









DL05/06 I/O Option Modules

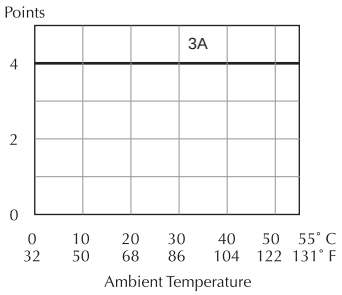
F0-04TRS <--->

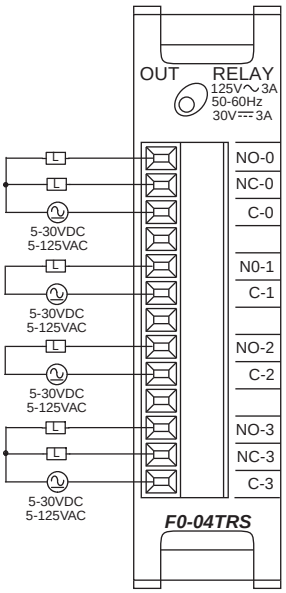
4-point relay output module

F0-04TRS Output Specifications	
Number of Outputs	4
Output Voltage Range	5-30VDC/5-125VAC
Output Type	2 - form C (SPDT) 2 - form A (SPST normally open)
Output Points Consumed	8
Peak Voltage	60VDC/220VAC
AC Frequency	47-63Hz
Maximum Current (resist.)	3A/point with no derating
Minimum Load Current	10mA @ 5V
Maximum Leakage Current	N/A
ON Voltage Drop	N/A
Maximum Inrush Current	5A
Off to On Response	≤ 5mS (typical)
On to Off Response	≤ 5mS (typical)
Status Indicators	None
Commons	4 isolated
Fuses	4, IEC 3.15A, replaceable, D2-FUSE-1
Terminal Type (Included)	Removable: D0-ACC-4
Base Power Required (5V)	250mA Max. (all points ON)

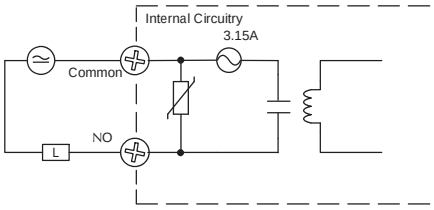
F0-04TRS Typical Relay Life at 30 Operations per Minute			
Load Type	***Rated Voltage***	***Rated Current***	***Number of Operations***
Resistive	120VAC	3A	120,000
Resistive	120VAC	1A	550,000
Resistive	24VDC	1A	>2M
Inductive: SC-E5 Motor Starter	24VDC	0.2A	>2M (see Note)
Inductive: SC-E5 Motor Starter	120VAC	0.1A operating 1.7A fault	>2M (see Note)
Note: Transient suppression must be installed with inductive loads.			

CPU	Firmware Required	DirectSOFT Required
DL05	Version 4.70 or later	Version 3.0c or later
DL06	Version 1.50 or later	Version 4.0, Build 16 or later

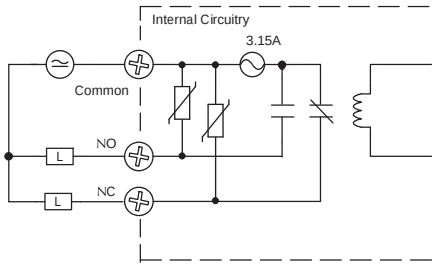




Typical Circuit



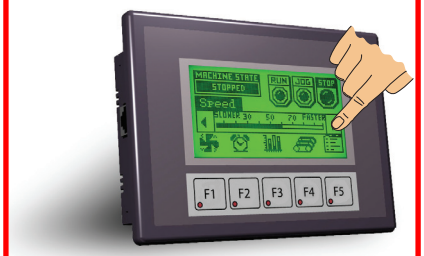
Typical Circuit



C-more 3" Micro-Graphic STN Touch Panel

This Touch Screen version of the C-more Micro-Graphic panel has a 3.1-inch STN LCD monochrome display. Model EA1-S3ML has five selectable LED-driven backlight colors: Green, Red, Amber, Yellow and Lime. It features a 128 x 64 dot display, and five user-defined function keys each with a user-defined red LED indicator. The panel can display up to 10 lines by 32 characters of static text and up to 10 lines by 21 characters of dynamic text with embedded variables and phrases mixed with graphics. It is rated NEMA 4/4X, IP-65 (when mounted correctly, for indoor use only). This Micro-Graphic panel can receive power from the serial communications port of most DirectLOGIC PLCs. An EA-MG-SP1 Serial Port with DC Power Adapter option module (RS-232/422/485) is required when using 3rd party PLCs.

Part No. EA1-S3ML



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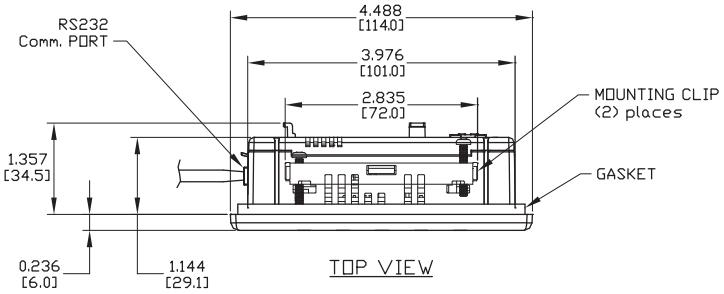
Features

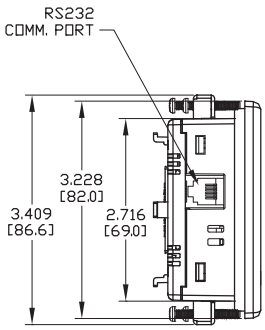
- Touch screen display
- Free downloadable programming software
- 128 x 64 Dot display with up to 10 lines by 32 characters of text and graphics
- Up to 10 lines by 21 characters of dynamic text with embedded variables and phrases mixed with graphics
- 5 programmable function keys can change with every screen. Can increment / decrement values, trigger recipes, view index of screens.
- 5-Color LED backlight for longer lifetime; Green, Red, Amber, Yellow and Lime
- 2 optional snap-on keypad bezels
- 768 KB memory
- Panel is powered from PLC comm port when using select ***Direct***LOGIC PLCs. Use optional DC power adapter and serial port modules if needed for other PLC's (RS-232/422/485)
- Built in Alarm Control setup that activates beep, backlight flash, customized alarm banner, and LED blinking
- 0 to 50 °C (32 to 122 °F) operating temperature range (IEC 60068-2-14)
- NEMA 4/4X, IP-65 compliant when mounted correctly, indoor use only
- UL, cUL & CE agency approvals
- 2-year warranty from date of purchase

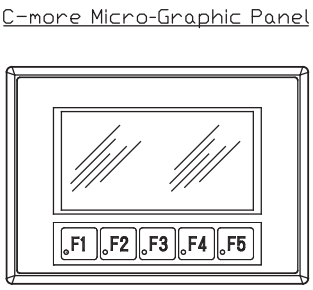
NOTE: Don't forget the optional keypad bezels, DC power adapter and serial port with DC power adapter shown in the accessories.

Dimensions

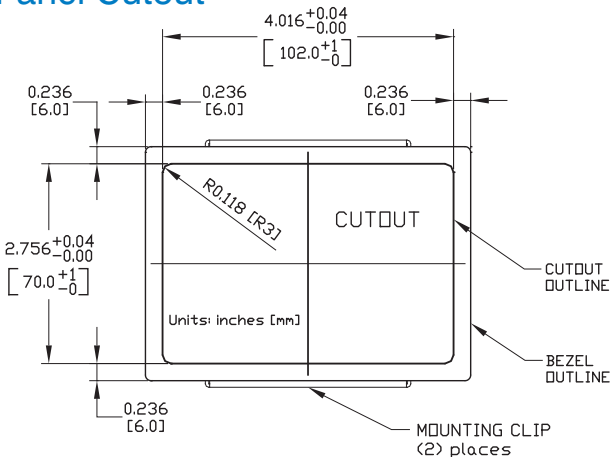


Units: inches [mm]

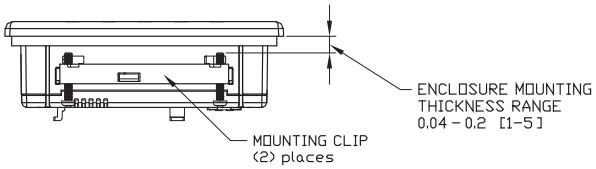




Panel Cutout



Panel Thickness



NOTE: The *C-more* 3" Micro-Graphic cutout dimensions are not equivalent to previous *AutomationDirect* text panels. The *C-more* Micro-Graphic panels will not fit in cutouts for DV-1000, EZText or Optimate panels.

C-more 3" Micro-Graphic STN Touch Panel

This Touch Screen version of the C-more Micro-Graphic panel has a 3.1-inch STN LCD monochrome display. Model EA1-S3MLW has five selectable LED-driven backlight colors: White, Pink1, Pink2, Pink3 and Red. It features a 128 x 64 dot display, and five user-defined function keys each with a user-defined red LED indicator. The panel can display up to 10 lines by 32 characters of static text and up to 10 lines by 21 characters of dynamic text with embedded variables and phrases mixed with graphics. It is rated NEMA 4/4X, IP-65 (when mounted correctly, for indoor use only). This Micro-Graphic panel can receive power from the serial communications port of most DirectLOGIC PLCs. An EA-MG-SP1 Serial Port with DC Power Adapter option module (RS-232/422/485) is required when using 3rd party PLCs.

Part No. EA1-S3MLW

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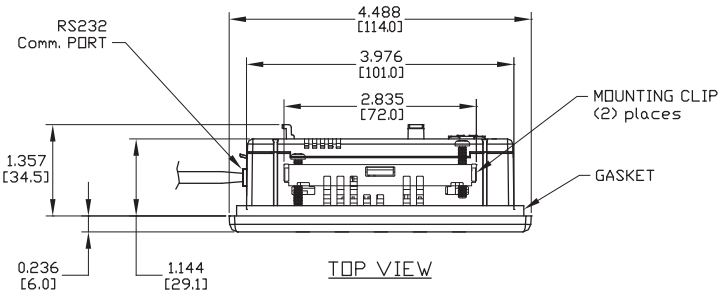
Features

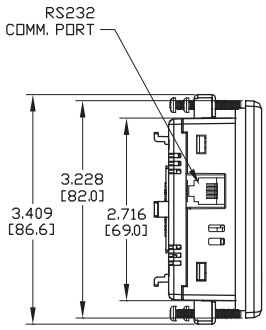
- Touch screen display
- Free downloadable programming software
- 128 x 64 Dot display with up to 10 lines by 32 characters of text and graphics
- Up to 10 lines by 21 characters of dynamic text with embedded variables and phrases mixed with graphics
- 5 programmable function keys can change with every screen. Can increment / decrement values, trigger recipes, view index of screens.
- 5-Color LED backlight for longer lifetime; White, Pink1, Pink2, Pink3 and Red
- 2 optional snap-on keypad bezels
- 768 KB memory
- Panel is powered from PLC comm port when using select ***Direct***LOGIC PLCs. Use optional DC power adapter and serial port modules if needed for other PLC's (RS-232/422/485)
- Built in Alarm Control setup that activates beep, backlight flash, customized alarm banner, and LED blinking
- 0 to 50 °C (32 to 122 °F) operating temperature range (IEC 60068-2-14)
- NEMA 4/4X, IP-65 compliant when mounted correctly, indoor use only
- UL, cUL & CE agency approvals
- 2-year warranty from date of purchase

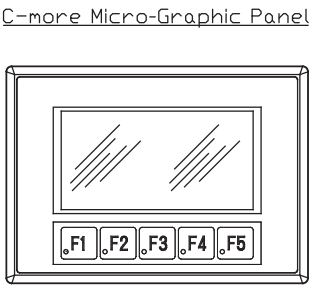
NOTE: Don't forget the optional keypad bezels, DC power adapter and serial port with DC power adapter shown in the accessories.

Dimensions

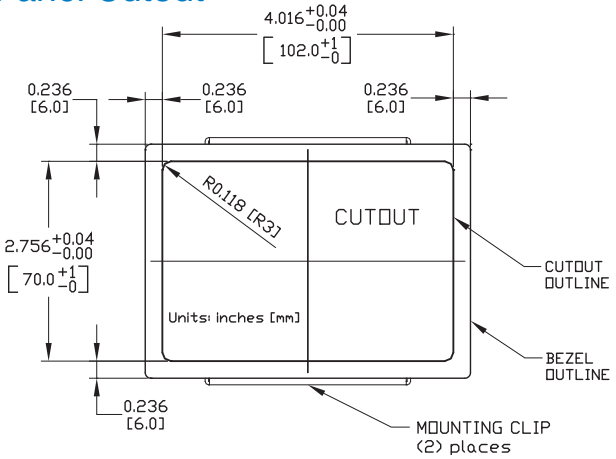


Units: inches [mm]

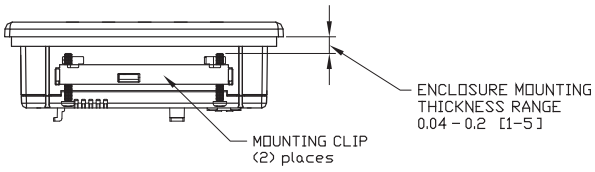




Panel Cutout



Panel Thickness



NOTE: The *C-more* 3" Micro-Graphic cutout dimensions are not equivalent to previous *AutomationDirect* text panels. The *C-more* Micro-Graphic panels will not fit in cutouts for DV-1000, EZText or Optimate panels.

C-more 3” Micro-Graphic Specifications

Specification \ Model	3” STN Micro-Graphic Panel Touch Screen	3” STN Micro-Graphic Panel Non-Touch Screen
Part Number	EA1-S3ML, EA1-S3MLW	EA1-S3ML-N, EA1-S3MLW-N
Description	128 x 64 dots LCD display, five user defined keypad function buttons, and five user defined LED’s	
Display		
• Type	3.1" STN monochrome LCD, graphical characters	
• Resolution	128 (W) x 64 (H) dots	
• Color	2 colors (normal / inverse)	
• Viewing Area Size	2.789” (W) x 1.385” (H) [70.8 mm x 35.2 mm]	
• Active Area Size	2.670” (W) x 1.259” (H) [67.8 mm x 32.0 mm]	
• Contrast	Adjusted from the panel’s built-in configuration setup menu	
• Viewing Angle	3, 9 o’clock axis –> 45 degrees 6 o’clock axis –> 45 degrees 12 o’clock axis –> 30 degrees	
Backlight		
• Type	LED	
• Color	5 user defined colors: **EA1-S3ML, EA1-S3ML-N -** Red, Green, Amber, Lime, and Yellow **EA1-S3MLW, EA1-S3MLW-N -** White, Pink1, Pink2, Pink3 and Red	
• User Replaceable	No	
Touch Screen		
• Type	Analog touch panel	N/A
• Operation	51 gram force [0.5 N] maximum	N/A
• Life	Minimum of 1,000,000 cycles	N/A
Features		
• User Memory	768 KB	
• Number of Screens	Up to 999 – limited by project memory usage	
• Beep (Internal)	Yes	
• Keypad Function Buttons	Five user defined function key buttons with the ability to customize the label. Minimum of 500,000 cycles	
• Keypad Function Button LEDs	Each function key button includes a red LED that can be user programmed.	
• Serial Communications	Built-in RJ12 serial communications port (RS-232). Optional serial communications port (RS-232, RS-485/422) when using the optional EA-MG-SP1 Serial Port with DC Power Adapter.	
• Expansion Connection	Yes – used with optional Keypad Bezels, EA-MG-BZ1 & BZ2, and EA-MG-P1 DC Power Adapter, and EA-MG-SP1 Serial Port with DC Power Adapter.	
Screen Objects		
• Functional Devices	Push Button, Switch, Indicator Button, Indicator Light, Graphic Indicator Light, Numeric Display, Numeric Entry, Inc/Dec Value, Bar Graph, Bitmap Button, Static Bitmap, Dynamic Bitmap, Recipe Button, Static Text, Lookup Text, Dynamic Text, Scroll Text, Screen Change Push Button, Screen Selector, Adjust Contrast, Function	
• Static Shapes	Lines, Rectangles, Circles and Frames	
• Displayable Fonts	Fixed fonts: 6x6, 6x8, 8x16, 16x16, 32x16, 32x32 / Windows fonts	

Micro-Graphic panel specifications continued on next page.

NOTE: Photo includes EA-MG-BZ2

C-more 3" Micro-Graphic Specifications

Specification / Model	3" STN Micro-Graphic Panel Touch Screen	3" STN Micro-Graphic Panel Non-Touch Screen
Part Number	EA1-S3ML, EA1-S3MLW	EA1-S3ML-N, EA1-S3MLW-N
Electrical		
• ***Input Voltage Range***	5.0 VDC (4.75 – 5.25 VDC)	
• ***Input Power***	Supplied through the panel's RJ12 serial communications port connection when used with any ***Direct***LOGIC PLCs having a RJ12 communication port. Can also be supplied from an external 12-24 VDC power source when using the optional EA-MG-P1 DC Power Adapter, or the optional EA-MG-SP1 Serial Port with DC Power Adapter	
• ***Power Consumption***	1.05 W @ 5 VDC (210 mA)	
• ***Recommended Fuse***	Type AGC fast acting glass fuse, 250 mA, 250 VAC, ADC p/n AGC-25 No fuse required when directly connected to a PLC or PC with recommended cable.	
• ***Maximum Inrush Current***	1 A for 500 µs	
• ***Acceptable External Power Drop Duration***	Maximum 1 ms	
Environmental		
• ***Operating Temperature***	0 to 50 °C (32 to 122 °F)	
• ***Storage Temperature***	–20 to +60 °C (–4 to +140 °F)	
• ***Humidity***	5–95% RH (non-condensing)	
• ***Environmental Air***	No corrosive gases permitted	
• ***Vibration***	IEC60068-2-6 (Test Fc), 5-9 Hz: 3.5 mm amplitude, 9-150 Hz: 1.0G, sweeping, at a rate of 1 octave/min. (±10%), 10 sweep cycles per axis on each of 3 mutually perpendicular axes	
• ***Shock***	IEC60068-2-27 (Test Ea), 15 G peak, 11 ms duration, three shocks in each direction per axis, on 3 mutually perpendicular axes (total of 18 shocks)	
• ***Noise Immunity***	NEMA ICS3-304 RFI, (145 MHz, 440 Mhz 10 W @ 10 cm) Impulse 1000 V @ 1 µs pulse	
• ***Enclosure***	NEMA 4/4X, IP-65 (When mounted correctly, for indoor use only.)	
• ***Agency Approvals***	CE (EN61131-2), UL508, CUL Canadian C22.2 No. 142-M95, UL File E157382	
Physical		
• ***Dimensions***	4.488" (W) x 3.228" (H) x 1.593" (D) [114.0 mm x 82.0 mm x 40.5 mm]	
• ***Enclosure Mounting Thickness Range***	0.04" – 0.2" [1 – 5 mm]	
• ***Mounting Clip Screw Torque Range***	21 – 28 oz-in [0.15 – 0.2 Nm]	
• ***Depth from bezel rear with options Module***	2.295" [58.3 mm]	
• ***Weight***	5.82 oz. (165 g)	

NOTE: The environmental specifications for the panels shown above are also applicable for the *C-more* Micro-Graphic accessories shown later in this section of the catalog.

NOTE: Photo includes EA-MG-BZ2

C-more Micro-Graphic Programming Software

FREE Software!

C-more Micro-Graphic Programming Software can be downloaded at no charge or a CD version may be purchased by ordering EA-MG-PGMSW. The software requires a USB port on your PC to connect to the *C-more* Micro-Graphic panel. Software Help Files are included in the download. This software programs all the *C-more* Micro-Graphic panels (does not program the *C-more* 6" through 15" touch panels).

Note: This software is used to program C-more Micro-Graphic panels only.
Part Numbers: EA1-S3ML, EA1-S3ML-N, EA1-S3MLW, EA1-S3MLW-N, EA1-S6ML, EA1-S6MLW

Note: Software and Firmware Version 1.5 or later is required with models EA1-S3MLW and EA1-S3MLW-N. Available for free download at *www.automationdirect.com*

Note: Software and Firmware Version 2.0 or later is required with models EA1-S6ML and EA1-S6MLW. Available for free download at *www.automationdirect.com.*

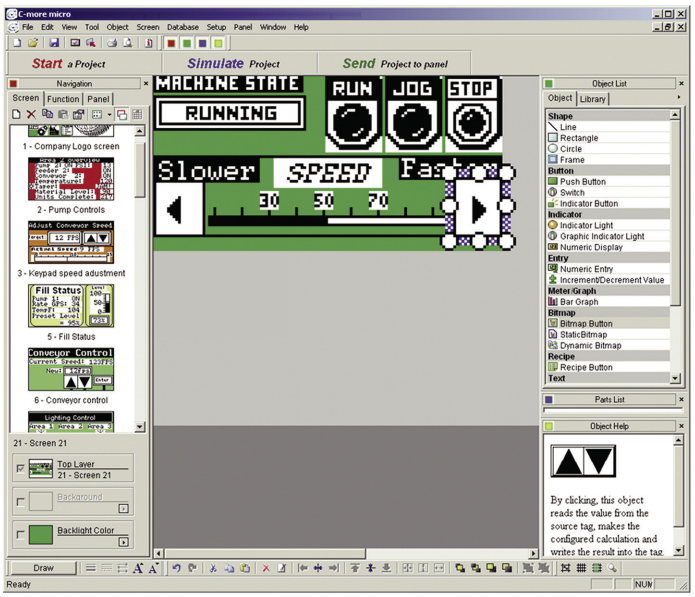
C-more Micro-Graphic Programming Software is a spin-off of its powerful sibling *C-more* Touch Panel. It offers very high end features designed to reduce your configuration time. Simply drag and drop the objects from the object list (right side of screen) onto the the screen construction area. Then configure your PLC tags and click on the objects you wish to use. Use the built-in simulator to review your work on your PC before ever downloading your project! The time saving benefits of the *C-more* configuration software could easily pay for the panel. Check out www.C-moreMicro.com to download a free version.

Built-in project simulator

- Runs your project on your PC
- Test all of your screens before downloading
- Time savings pays for the panel

Built-in user object/screen libraries

Save time by re-using your custom objects and screens.



Thumbnail project preview pane

Helps keep track of multi-screen projects.

Scrolling object selection window

Lets you find the object you want fast. Just drag and drop it on the screen.

PC requirements

Following are the minimum system requirements for running *C-more* Micro-Graphic Programming Software, EA-MG-PGMSW, on a PC:

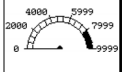
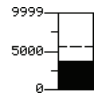
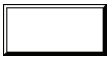
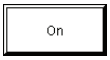
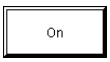
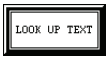
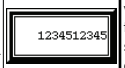
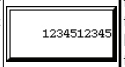
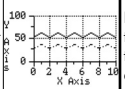
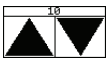
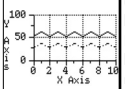
- USB port for project transfer from software to touch panel
- Personal Computer with a 333 MHz or higher processor (CPU) clock speed recommended; Intel® Pentium/Celeron family, or AMD® K6/Athlon/Duron family, or compatible processor recommended
- Keyboard and Mouse or compatible pointing device
- Super VGA color video adapter and monitor with at least 800 x 600 pixels resolution (1024 x 768 pixels recommended) 64K color minimum
- 150 MB free hard-disk space
- 128 MB free RAM (512 MB recommended)
- CD-ROM or DVD drive for installing software from the CD or internet access to download
- Operating System - Windows® XP Home / Professional Edition with Service Pack 2, Windows® 2000 with Service Pack 4 or Windows® Vista

Scrolling help window

Gives you helpful information on each object

C-more Micro-Graphic Programming Software

C-more Micro-Graphic Panel Objects

Object	Graphic	Object	Graphic
The **Line** object, just like with drawing tools, allows the user to insert a straight line drawing into a project. When a Line is inserted into a project, a window opens to allow the user to setup all available parameters for the Line object. Some of the uses for Line Objects include but are not limited to adding callouts, pointers, or indicators.		The **Analog Meter** object is used to display the current value of a Tag Name.	
The **Rectangle** object, just like with drawing tools, allows the user to insert a drawing of a Rectangle as well as other geometric shapes into a project. When this object is inserted into a project, a window opens to allow the user to setup all available parameters for the Rectangle object.		The **Bar Meter** object is used to monitor up to two assigned Tag Names continuously. This object has various appearances depending upon the relative value of the tags. The Bar Meter can be used to create digital versions of level, current, and flow meters to name a few samples, or gauges that measure speed and other measurable data.	
The **Circle** object, just like with drawing tools, allows the user to insert a drawing of a Circle or ellipse shape into a project. When this object is inserted into a project, a window opens to allow the user to setup all available parameters for the Circle object.		The **Bitmap Button** object offers the ability to use a Bitmap graphic to perform the functions of a Button. This allows users to create their own graphics and implement them within the software project. The Bitmap Button object can be used to activate or deactivate components assigned to a Discrete Tag Name. The C-more Micro-Graphic display only supports two colors, black and white.	
The **Frame** object allows the user to insert a Frame to the project that can be used to Frame other objects. Some of the uses for Frame object include but are not limited to graphically separating objects for different operations that may appear on one screen and emphasizing pushbuttons or other objects that may require more attention by the operator.		The **Static Bitmap** offers the ability to display a Bitmap graphic on any screen. The Static Bitmap does not change state. Refer to the Dynamic Bitmap Object if you require the graphic object to change state based on a Tag Value in your PLC. The dialog box for a "Static Bitmap" object allows you to "read from disk" and select a graphic file for import. Graphics must be in one of the following formats: .BMP .WMF .JPG .JPEG	
The **Pushbutton** object is available from the Button Category of the Object List window. The Pushbutton object is an electronic version of a typical Pushbutton normally found on control panels. The Pushbutton object can be used to activate or deactivate components assigned to a Discrete Tag Name.		**Recipe** objects make it easy to make a large number of tag changes with the push of a single button. Create Recipes with up to 99 entries, and multiple sets of values. Then just push a button to load an entire set of values into the group of recipe tags.	
The **Switch** object is an electronic version of a typical Switch that normally can be found on control panels. The Switch object can be used to activate or deactivate components assigned to a Discrete Tag Name.		The **Dynamic Bitmap** object offers the ability to make an object using two different Bitmap graphics that will display one graphic when the Tag is On and a different graphic when the Tag is Off. Use your own bitmap designs or use some of the bitmaps provided with the software that are located in the User Graphic Library.	
The **Indicator Button** object is available from the Button Category of the Object List window. The Indicator Button object is an electronic version of a typical Indicator Button normally found on control panels. The Indicator Button is a combination of a Pushbutton and an Indicator Light. The Indicator Button can be used to activate or deactivate components assigned to a Discrete Tag Name.		The **Static Text** object is used to display a Frame with a personalized Message. This Frame and Message can be placed on any screen and any location within the screen.	
The **Indicator Light** object is an electronic version of a typical Indicator Light normally found on industrial control panels. The Indicator Light can be configured to display the status of the assigned Discrete Tag Name.		The **Lookup Text** object is used to display a Frame with a personalized Message. This Frame and Message can be placed on any screen and any location within the screen. The object is always displayed like a sign but is configured to display only the message prompted by an assigned Tag Name. Messages are retrieved from a Message Database which is configured by the user with text defined by the user. The Lookup Text Object will scroll text up to 128 characters.	
The **Graphic Indicator Light** object is a more enhanced version of the "Indicator Light Object" that allows the user to choose more detailed graphics to display the status of a tag. This object is an electronic version of a typical Indicator Light normally found on industrial control panels. The Indicator Light can be configured to display the status of the assigned Discrete Tag Name.		The **Dynamic Text** object is used to display text that is retrieved from data stored in a Tag. The Tag Name is assigned to registers in the PLC that contain set character data. The data can be stored in the PLC in ASCII format and may include information such as machine numbers, locations, part numbers, and such. The Message can be configured to be visible (Trigger) when an associated Tag Name is On or Off. This object can be placed on any screen and any location within the screen. The Dynamic Text Object will scroll text up to 40 characters.	
The **Numeric Display** consists of a frame that displays a real-time numeric value according to the value of data received from an assigned Tag Name. The Numeric Display supports numeric Signed Decimal, Unsigned Decimal, BCD, and Floating Point data types with up to 11 digits, including decimal point. User Defined Alpha Numeric Prefix and Suffix values are also supported.		The **Scroll Text** object is available from the Text Category of the Object List window. The Scroll Text object is an electronic version of a marquee. It is similar to the Static Text Object. If the text in the object does not fit in the window, it will scroll from right to left across the window. The Scroll Text object does not require a Tag Name assignment. The Scroll Text Object has a maximum character limit of 128 characters.	
The **Numeric Entry** object is used to enter a value from your Panel to a PLC Register. This object, when selected, opens a Numeric Keypad that allows the user to enter a new value that will be written to the assigned Tag Name. The Numeric Entry supports numeric Signed Decimal, Unsigned Decimal, BCD, and Floating Point data types with up to 11 digits, including decimal points. User Defined Alpha Numeric Prefix and Suffix values are also supported.		The **Screen Change** Pushbutton object is available from the Control Category of the Object List window. The Screen Change Pushbutton object is a pushbutton that can be configured to activate another screen in the project. This object may be edited to various colors and sizes. Users can configure the button to activate the Power-Up screen, Forward Screen, Previous Screen, or any one of the project screens.	
The **Increment/Decrement Value** object is used to add or subtract a value by pressing a button on the Panel. Basically the object uses two Tags, one to read a value from and another to write a modified value to. The Increment/Decrement Value supports numeric Signed Decimal, Unsigned Decimal, BCD, and Floating Point data types with up to 11 digits, including decimal points. The Increment and decrement values are also user selectable.		The **Screen Selector** object is available from the Control Category of the Object List window. This object is an enhanced version of the Screen Change pushbutton in that it offers many more features and defaults with data from screens in the project. This helps to save time by not having to create Screen change buttons for each screen. This object may be edited to various colors and sizes.	
The **Real Time Graph** object displays the value stored in up to two PLC tags, over a history of up to 24 points each.		The **Adjust Display Contrast** object is used to allow the operator to adjust the Panel Display Contrast. The default Display setting often works in most applications, however lighting may vary based on the location of each application. In these cases the operator can use this object to make adjustments. The current display setting value will appear on the top of the button and will change as the arrow keys are pressed. This button can be modified to various sizes.	
The **Line Graph** object displays the values of up to 24 PLC address points. Up to two address arrays can be displayed.		The **Function** object is used to assign the panels function key buttons to a particular action as well as assigning the control of the LED On/Off status. When a button has been assigned as a shift button, the then F1 through F5 will become F6 through F10. The Function Object buttons will activate when the hardware button is pressed or when the object is pressed on the screen. The object size is restricted so that the keys will line up with the hardware function keys on the panel.	

C-more 3” Micro-Graphic PLC Connections

Cabling requirements

When using the built-in RJ12 serial port on the *C-more* Micro-Graphic panel to connect with the DL05, DL06, DL105, DL205, D3-350 and DL405 CPUs, your cabling choices are fairly simple.

- **DV-1000CBL — connects to DL05, DL06, DL105, DL205, D3-350 and D4-450 phone jack.**
- **D4-1000CBL — connects to all DL405 CPU 15-pin ports.**

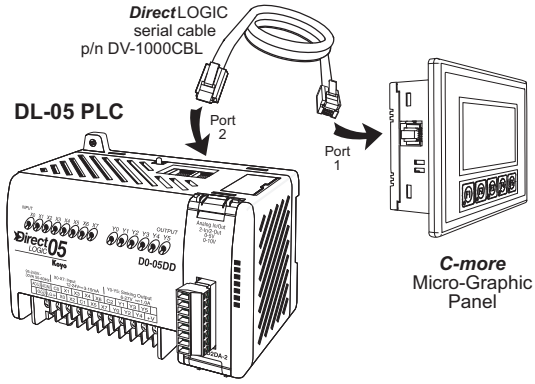
A maximum cable length of **10 feet** between the *C-more* Micro-Graphic panel and the PLC is recommended when powering the panel from the PLC.

The Serial Port with DC Power Adapter module, EA-MG-SP1, can be used if the application requires the use of RS-422 or RS-485. The serial port on the adapter, designated as port 2, can also be wired for RS-232. The use of the adapter permits greater cable length distances. See the PLC Communication Protocols & Cabling Charts in this catalog section for details on the selection of various PLCs, protocols, and connectivity.

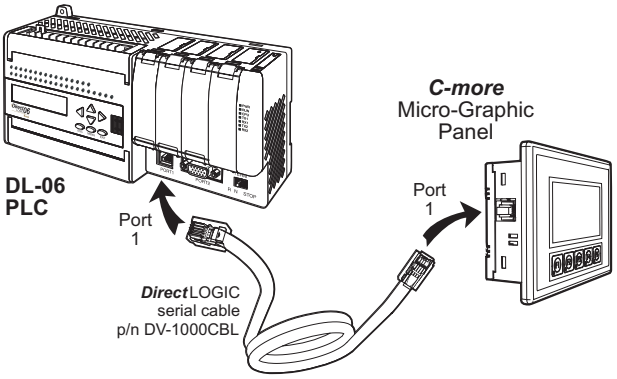
PLC Supported Protocols

- ***Direct*LOGIC K-sequence**
- ***Direct*NET**
- **Modbus (Koyo Addressing)**
- **Modbus RTU**
- **Entivity Modbus RTU**
- **Allen-Bradley DF1 Half Duplex**
- **Allen-Bradley DF1 Full Duplex**
- **Allen-Bradley PLC5 DF1**
- **Allen-Bradley DH485**
- **GE Fanuc SNPX (90/30, 90/70, Micro 90, VersaMax Micro)**
- **Omron Host Link (C200 Adapter, C500)**
- **Omron FINS Serial (CJ1, CS1)**
- **Mitsubishi Melsec FX**
- **Siemens PPI**

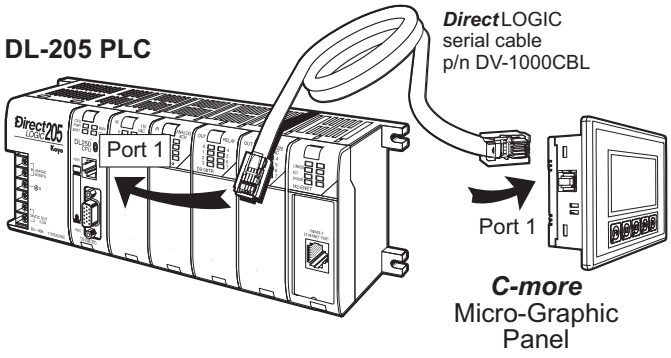
Micro-Graphic Port 1 to DL05 PLC Port 2



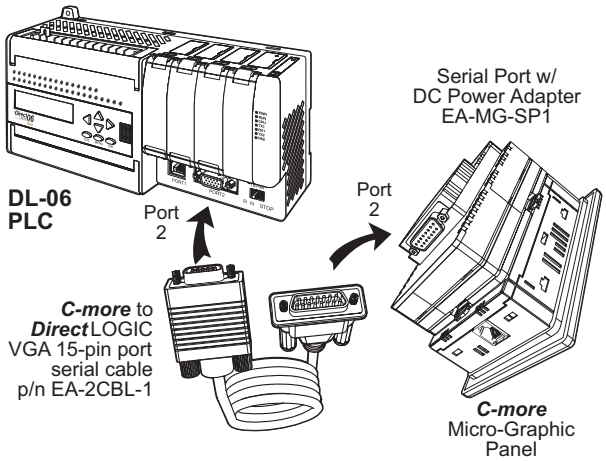
Micro-Graphic Port 1 to DL06 PLC Port 1



Micro-Graphic Port 1 to DL205 PLC Port 1



Micro-Graphic Port 2 to DL06 PLC Port 2



C-more 3" Micro-Graphic PLC Communication Protocols & Cabling Chart

PLC Compatibility & Connection Chart

PLC			C-more Micro-Graphic Panel							
			Panel to PLC Cabling Components Required for Specific Port and Protocol being used.							
			PLC Port Powered Powered with 5 VDC from the connected PLC's comm. port.		**DC Power Adapter** Powered from an external 24 VDC source using the DC Power Adapter, EA-MG-P1.		**Serial Port with DC Power Adapter** Powered from an external 24 VDC source using the Serial Port with DC Power Adapter, EA-MG-SP1.			
			Using panel's RJ12 port 1		Using panel's RJ12 port 1		Using panel's RJ12 port 1		Using adapter's serial Port 2 15-pin D-sub - female	
Family	**CPU**	**Port & Type**	Protocol(s) Supported	Components & Network Type	Protocol(s) Supported	Components & Network Type	Protocol(s) Supported	Components & Network Type	Protocol(s) Supported	Components & Network Type
***Direct*LOGIC DL05 (see D0-DCM under DL06)**	all versions	Port 1 RJ12 - 6 pin Port 2 RJ12 - 6 pin	K-sequence, *Direct*NET, Modbus RTU	DV-1000CBL RS-232	K-sequence, *Direct*NET, Modbus RTU	DV-1000CBL RS-232	K-sequence, *Direct*NET, Modbus RTU	DV-1000CBL RS-232	K-sequence, *Direct*NET, Modbus RTU	EA-2CBL RS-232
***Direct*LOGIC DL06**	all versions	Port 1 RJ12 - 6 pin	K-sequence, *Direct*NET, Modbus RTU	DV-1000CBL RS-232	K-sequence, *Direct*NET, Modbus RTU	DV-1000CBL RS-232	K-sequence, *Direct*NET, Modbus RTU	DV-1000CBL RS-232	K-sequence, *Direct*NET, Modbus RTU	EA-2CBL RS-232
		Port 2 DB15HD (female)		DV-1000CBL + FA-15HD RS-232		DV-1000CBL + FA-15HD RS-232		DV-1000CBL + FA-15HD RS-232		EA-2CBL-1 RS-232 See Note RS-422
									Modbus RTU	See Note RS-485 Modbus only
	D0-DCM	Port 1 RJ12 - 6 pin	K-sequence, *Direct*NET, Modbus RTU	DV-1000CBL RS-232	K-sequence, *Direct*NET, Modbus RTU	DV-1000CBL RS-232	K-sequence, *Direct*NET, Modbus RTU	DV-1000CBL RS-232	K-sequence, *Direct*NET, Modbus RTU	EA-2CBL RS-232
		Port 2 DB15HD (female)		DV-1000CBL + FA-15HD RS-232		DV-1000CBL + FA-15HD RS-232		DV-1000CBL + FA-15HD RS-232		EA-2CBL-1 RS-232 See Note RS-422
									Modbus RTU	See Note RS-485 Modbus only
***Direct*LOGIC DL105**	all versions	Port 1 RJ12 - 6 pin	K-sequence	DV-1000CBL RS-232	K-sequence	DV-1000CBL RS-232	K-sequence	DV-1000CBL RS-232	K-sequence	EA-2CBL RS-232
***Direct*LOGIC DL205**	D2-230	Port 1 RJ12 - 6 pin	K-sequence	DV-1000CBL RS-232	K-sequence	DV-1000CBL RS-232	K-sequence	DV-1000CBL RS-232	K-sequence	EA-2CBL RS-232
	D2-240	Port 1 RJ12 - 6 pin	K-sequence	DV-1000CBL RS-232	K-sequence	DV-1000CBL RS-232	K-sequence	DV-1000CBL RS-232	K-sequence	EA-2CBL RS-232
		Port 2 RJ12 - 6 pin	K-sequence, *Direct*NET		K-sequence, *Direct*NET		K-sequence, *Direct*NET		K-sequence, *Direct*NET	
	D2-250-1	Port 1 RJ12 - 6 pin	K-sequence, *Direct*NET, Modbus RTU	DV-1000CBL RS-232	K-sequence, *Direct*NET, Modbus RTU	DV-1000CBL RS-232	K-sequence, *Direct*NET, Modbus RTU	DV-1000CBL RS-232	K-sequence, *Direct*NET, Modbus RTU	EA-2CBL RS-232
		Port 2 DB15HD (female)		DV-1000CBL + FA-15HD RS-232		DV-1000CBL + FA-15HD RS-232		DV-1000CBL + FA-15HD RS-232		EA-2CBL-1 RS-232 See Note RS-422
	D2-260	Port 1 RJ12 - 6 pin	K-sequence, *Direct*NET, Modbus RTU	DV-1000CBL RS-232	K-sequence, *Direct*NET, Modbus RTU	DV-1000CBL RS-232	K-sequence, *Direct*NET, Modbus RTU	DV-1000CBL RS-232	K-sequence, *Direct*NET, Modbus RTU	EA-2CBL RS-232
		Port 2 DB15HD (female)		DV-1000CBL + FA-15HD RS-232		DV-1000CBL + FA-15HD RS-232		DV-1000CBL + FA-15HD RS-232		EA-2CBL-1 RS-232 See Note RS-422
									Modbus RTU	See Note RS-485 Modbus only
	D2-DCM	Port 1 DB 25 pin (female)	K-sequence, *Direct*NET, Modbus RTU	See Note RS-232	K-sequence, *Direct*NET, Modbus RTU	See Note RS-232	K-sequence, *Direct*NET, Modbus RTU	See Note RS-232	*Direct*NET	EA-4CBL-2 RS-232 See Note RS-422
	WINPLC	Port 1 RJ12 - 6 pin	Modbus RTU	DV-1000CBL RS-232	Modbus RTU	DV-1000CBL RS-232	Modbus RTU	DV-1000CBL RS-232	Modbus RTU	EA-2CBL RS-232

Note: See the *C-more* Micro-Graphic Hardware User Manual, Chapter 6: PLC Communications, for wiring diagrams that the user can use to construct their own cables. Available for download at www.automationdirect.com. PLC Compatibility & Connection Chart continued on next page.

C-more 3" Micro-Graphic PLC Communication Protocols & Cabling Chart (cont'd)

PLC Compatibility & Connection Chart

PLC			*C-more Micro-Graphic Panel*							
			Panel to PLC Cabling Components Required for Specific Port and Protocol being used.							
Family	*CPU*	*Port & Type*	**PLC Port Powered** Powered with 5 VDC from the connected PLC's comm. port.		**DC Power Adapter** Powered from an external 24 VDC source using the DC Power Adapter, EA-MG-P1.		**Serial Port with DC Power Adapter** Powered from an external 24 VDC source using the Serial Port with DC Power Adapter, EA-MG-SP1.			
			Using panel's RJ12 port 1		Using panel's RJ12 port 1		Using panel's RJ12 port 1		Using adapter's serial Port 2 15-pin D-sub - female	
			Protocol(s) Supported	Components & Network Type	Protocol(s) Supported	Components & Network Type	Protocol(s) Supported	Components & Network Type	Protocol(s) Supported	Components & Network Type
***Direct*LOGIC DL305**	D3-330 or D3-340	D3-232-DCU DB 25 pin (female)	Not Possible		***Direct*NET**	See Note RS-232	***Direct*NET**	EA-4CBL-2 RS-232	***Direct*NET**	EA-4CBL-2 RS-232
		D3-422-DCU DB 25 pin (female)	Not Possible		Not Possible		Not Possible		***Direct*NET**	See Note RS-422
	D3-340	Port 1 RJ11 - 4 pin	Not Possible		***Direct*NET**	OP-3CBL-1 RS-232	***Direct*NET**	OP-3CBL-1 RS-232	***Direct*NET**	EA-3CBL RS-232
		Port 2 RJ11 - 4 pin	Not Possible		***Direct*NET**, Modbus RTU		***Direct*NET**, Modbus RTU		***Direct*NET**, Modbus RTU	
	D3-350	Port 1 RJ12 - 6 pin	K-sequence, ***Direct*NET**	DV-1000CBL RS-232	K-sequence, ***Direct*NET**	DV-1000CBL RS-232	K-sequence, ***Direct*NET**	DV-1000CBL RS-232	K-sequence, ***Direct*NET**	EA-2CBL RS-232
		Port 2 DB 25 pin (female)	Not Possible		K-sequence, ***Direct*NET**, Modbus RTU	See Note RS-232	K-sequence, ***Direct*NET**, Modbus RTU	See Note RS-232	K-sequence, ***Direct*NET**, Modbus RTU	EA-4CBL-2 RS-232 See Note RS-422
	D3-DCM D3-350 only	Port 1 DB 25 pin (female)	K-sequence, ***Direct*NET**, Modbus RTU	See Note RS-232	K-sequence, ***Direct*NET**, Modbus RTU	See Note RS-232	K-sequence, ***Direct*NET**, Modbus RTU	See Note RS-232	***Direct*NET**	EA-4CBL-2 RS-232 See Note RS-422
***Direct*LOGIC DL405**	D4-430	Port 0 DB 15 pin (female)	K-sequence	D4-1000CBL or DV-1000CBL & FA-CABKIT RS-232	K-sequence	D4-1000CBL or DV-1000CBL & FA-CABKIT RS-232	K-sequence	D4-1000CBL or DV-1000CBL & FA-CABKIT RS-232	K-sequence	EA-4CBL-1 RS-232
		Port 1 DB 25 pin (female)	Not Possible		K-sequence, ***Direct*NET**	DV-1000CBL & FA-CABKIT RS-232	K-sequence, ***Direct*NET**	DV-1000CBL & FA-CABKIT RS-232	K-sequence, ***Direct*NET**	EA-4CBL-2 RS-232 See Note RS-422
	D4-440	Port 0 DB 15 pin (female)	K-sequence	D4-1000CBL or DV-1000CBL & FA-CABKIT RS-232	K-sequence	D4-1000CBL or DV-1000CBL & FA-CABKIT RS-232	K-sequence	D4-1000CBL or DV-1000CBL & FA-CABKIT RS-232	K-sequence	EA-4CBL-1 RS-232
		Port 1 DB 25 pin (female)	Not Possible		K-sequence, ***Direct*NET**	DV-1000CBL & FA-CABKIT RS-232	K-sequence, ***Direct*NET**	DV-1000CBL & FA-CABKIT RS-232	K-sequence, ***Direct*NET**	EA-4CBL-2 RS-232 See Note RS-422
	D4-450	Port 0 DB 15 pin (female)	K-sequence	D4-1000CBL or DV-1000CBL & FA-CABKIT RS-232	K-sequence	D4-1000CBL or DV-1000CBL & FA-CABKIT RS-232	K-sequence	D4-1000CBL or DV-1000CBL & FA-CABKIT RS-232	K-sequence	EA-4CBL-1 RS-232
		Port 1 DB 25 pin (female)	Not Possible		K-sequence, ***Direct*NET**, Modbus RTU	DV-1000CBL & FA-CABKIT RS-232	K-sequence, ***Direct*NET**, Modbus RTU	DV-1000CBL & FA-CABKIT RS-232	K-sequence, ***Direct*NET**, Modbus RTU	EA-4CBL-2 RS-232 See Note RS-422
		Port 3 DB 25 pin (female)	Not Possible		Not Possible		Not Possible		K-sequence, ***Direct*NET**, Modbus RTU	See Note RS-422
		Port 2 RJ12 - 6 pin	K-sequence, ***Direct*NET**	DV-1000CBL RS-232	K-sequence, ***Direct*NET**	DV-1000CBL RS-232	K-sequence, ***Direct*NET**	DV-1000CBL RS-232	K-sequence, ***Direct*NET**	EA-2CBL RS-232
	D4-DCM	Port 1 DB 25 pin (female)	K-sequence, ***Direct*NET**, Modbus RTU	See Note RS-232	K-sequence, ***Direct*NET**, Modbus RTU	See Note RS-232	K-sequence, ***Direct*NET**, Modbus RTU	See Note RS-232	***Direct*NET**	EA-4CBL-2 RS-232 See Note RS-422

Note: See the *C-more* Micro-Graphic Hardware User Manual, Chapter 6: PLC Communications, for wiring diagrams that the user can use to construct their own cables. Available for download at www.automationdirect.com. PLC Compatibility & Connection Chart continued on next page.

C-more 3" Micro-Graphic PLC Communication Protocols & Cabling Chart (cont'd)

PLC Compatibility & Connection Chart

PLC			*C-more Micro-Graphic Panel*							
			Panel to PLC Cabling Components Required for Specific Port and Protocol being used.							
			PLC Port Powered Powered with 5 VDC from the connected PLC's comm. port.		**DC Power Adapter** Powered from an external 24 VDC source using the DC Power Adapter, EA-MG-P1.		**Serial Port with DC Power Adapter** Powered from an external 24 VDC source using the Serial Port with DC Power Adapter, EA-MG-SP1.			
			Using panel's RJ12 port 1		Using panel's RJ12 port 1		Using panel's RJ12 port 1		Using adapter's serial Port 2 15-pin D-sub - female	
Family	***CPU***	***Port & Type***	Protocol(s) Supported	Components & Network Type	Protocol(s) Supported	Components & Network Type	Protocol(s) Supported	Components & Network Type	Protocol(s) Supported	Components & Network Type
Allen-Bradley MicroLogix	1000, 1100, 1200, 1500	8-pin mini-din port	Not Possible		Not Possible		Not Possible		DF1 Full Duplex DF1 Half Duplex	EA-MLOGIX-CBL RS-232
		RJ45 8-pin phone plug							DH485/AIC/AIC+	EA-DH485-CBL RS-232
Allen-Bradley SLC500	5/03, 5/04, 5/05	9-pin D-sub port							DF1 Full Duplex DF1 Half Duplex	EA-SLC-232-CBL RS-232
	5/01, 5/02, 5/03	RJ45 8-pin phone plug							DH485/AIC/AIC+	EA-DH485-CBL RS-232
Allen-Bradley ControlLogix	all	9-pin D-sub port							DF1 Full Duplex DF1 Half Duplex	EA-SLC-232-CBL RS-232
Allen-Bradley CompactLogix	all	9-pin D-sub port							DF1 Full Duplex DF1 Half Duplex	EA-SLC-232-CBL RS-232
Allen-Bradley FlexLogix	all	9-pin D-sub port							DF1 Full Duplex DF1 Half Duplex	EA-SLC-232-CBL RS-232
Allen-Bradley PLC5	all	25-pin D-sub port							DF1 Full Duplex	EA-PLC5–232-CBL RS-232
		RJ45 8-pin phone plug							DH485/AIC/AIC+	EA-DH485-CBL RS-232
GE	90/30, 90/70	15-pin D-sub port							SNPX	EA-90-30-CBL RS-422
	Micro 90, VersaMax Micro	RJ45 Port 1								See Note RS-232
		15-pin D-sub port Port 2								EA-90-30-CBL RS-422
Mitsubishi	Melsec FX Series	25-pin D-sub port							CPU Direct	EA-MITSU-CBL RS-422
		8-pin mini-din port								EA-MITSU-CBL-1 RS-422
Omron	C200 (Adapter), C500	25-pin D-sub port							Host Link	EA-OMRON-CBL RS-232
	CJ1, CS1, CQM1, CPM1, CPM2, C200	9-pin D-sub port							FINS	See Note RS-232
Modicon	984 CPU, Quantum 113 CPU, AEG Modicon Micro Series 110 CPU	varies							Modbus RTU	See Note RS-232
Siemens	S7-200 CPU	9-pin D-sub port 0 or 1							PPI	See Note RS-485

Note: See the *C-more* Micro-Graphic Hardware User Manual, Chapter 6: PLC Communications, for wiring diagrams that the user can use to construct their own cables. Available for download at www.automationdirect.com. Available cables with descriptions shown on the next page.

55W Single Output with Battery Charger(USP Function) AD-55 series

■ Features :

- Universal AC input / Full range
- Protections:Short circuit/Over load/Over voltage
- Battery low protections
- Cooling by free air convection
- 100% full load burn-in test
- Fixed switching frequency at 45KHz
- 2 years warranty

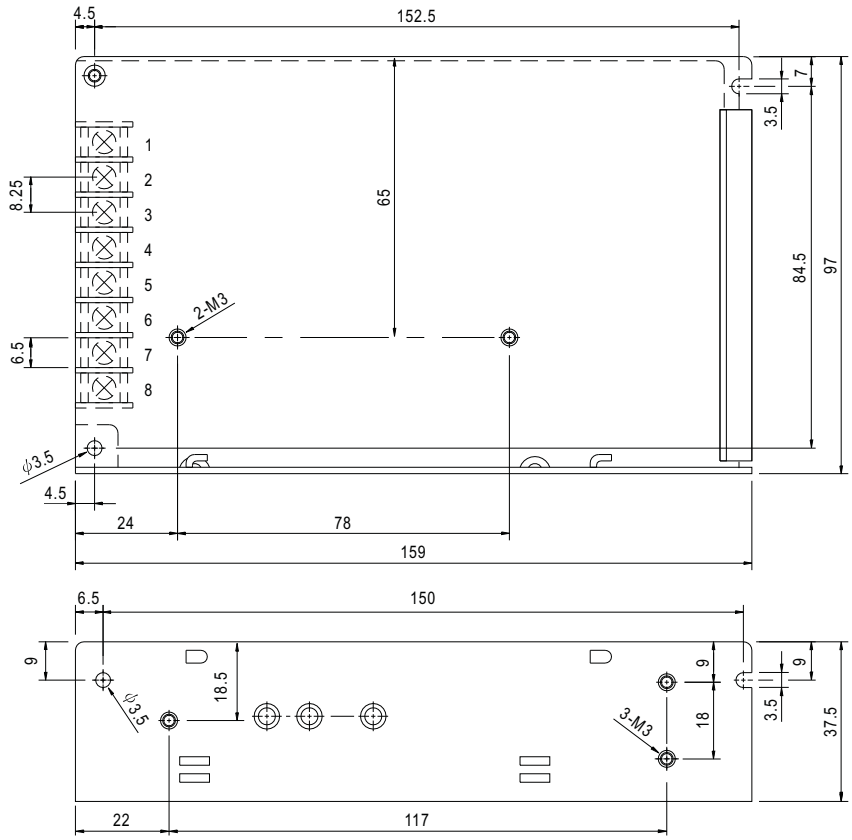
SPECIFICATION

MODEL		AD-55A		AD-55B	
OUTPUT	DC VOLTAGE	13.8V	13.4V	27.6V	26.5V
	RATED CURRENT	3.5A	0.23A	1.8A	0.16A
	CURRENT RANGE	0 ~ 4A	--------	0 ~ 2A	--------
	RATED POWER	51.38W		53.92W	
	RIPPLE & NOISE (max.) Note.2	100mVp-p	--------	100mVp-p	--------
	VOLTAGE ADJ. RANGE	CH1: 12 ~ 14.5V		CH1: 24 ~ 29V	
	VOLTAGE TOLERANCE Note.3	±1.0%	--------	±1.0%	--------
	LINE REGULATION	±0.5%	--------	±0.5%	--------
	LOAD REGULATION	±0.5%	--------	±0.5%	--------
	SETUP, RISE, HOLD TIME	800ms, 50ms, 60ms/230VAC 1600ms, 50ms, 16ms/115VAC at full load			
INPUT	VOLTAGE RANGE	88 ~ 264VAC 124 ~ 370VDC			
	FREQUENCY RANGE	47 ~ 63Hz			
	EFFICIENCY (Typ.)	71%		74%	
	AC CURRENT	1.6A/115VAC 1A/230VAC			
	INRUSH CURRENT (max.)	COLD START 20A/115VAC 40A/230VAC			
	LEAKAGE CURRENT	<1mA / 240VAC			
PROTECTION	OVER LOAD	105 ~ 150% rated output power			
		Protection type : Hiccup mode, recovers automatically after fault condition is removed			
	OVER VOLTAGE	CH1:14.49 ~ 18.63V		CH1:28.98 ~ 37.26V	
		Protection type : Hiccup mode, recovers automatically after fault condition is removed			
FUNCTION	DC ALARM SIGNAL(OPTIONAL)	AC fail CN1 PIN2			
		Battery low under charge voltage 82.5%±2% CN1 PIN1			
		Normal 0.8V max. Abnormal 5V±0.5V			
ENVIRONMENT	WORKING TEMP.	-10 ~ +60℃ (Refer to output load derating curve)			
	WORKING HUMIDITY	20 ~ 90% RH non-condensing			
	STORAGE TEMP., HUMIDITY	-20 ~ +85℃, 10 ~ 95% RH			
	TEMP. COEFFICIENT	±0.03%/℃ (0~50℃) on CH1 output			
	VIBRATION	10 ~ 500Hz, 2G 10min./1cycle, 60min. each along X, Y, Z axes			
SAFETY & EMC (Note 4)	SAFETY STANDARDS	UL1950 TUV EN60950 Approved			
	WITHSTAND VOLTAGE	I/P-O/P:3KVAC I/P-FG:1.5KVAC O/P-FG:0.5KVAC			
	ISOLATION RESISTANCE	I/P-O/P, I/P-FG, O/P-FG:100M Ohms/500VDC			
	EMI CONDUCTION & RADIATION	Compliance to EN55022 (CISPR22) Class B			
	HARMONIC CURRENT	Compliance to EN61000-3-2,-3			
	EMS IMMUNITY	Compliance to EN61000-4-2,3,4,5,6,8,11; ENV50204, EN55024,Light industry level, criteria A			
OTHERS	MTBF	304.3K hrs min. MIL-HDBK-217F (25℃)			
	DIMENSION	159*97*38mm (L*W*H)			
	PACKING	0.57Kg; 24pcs/13.7Kg/0.75CUFT			
NOTE	1. All parameters NOT specially mentioned are measured at 230VAC input, rated load and 25℃ of ambient temperature. 2. Ripple & noise are measured at 20MHz of bandwidth by using a 12" twisted pair-wire terminated with a 0.1uf & 47uf parallel capacitor. 3. Tolerance : includes set up tolerance, line regulation and load regulation. 4. The power supply is considered a component which will be installed into a final equipment. The final equipment must be re-confirmed that it still meets EMC directives.				

Component Distributors, Inc. ~ www.cdiweb.com ~ sales@cdiweb.com ~ 1-800-777-7334

■ Mechanical Specification

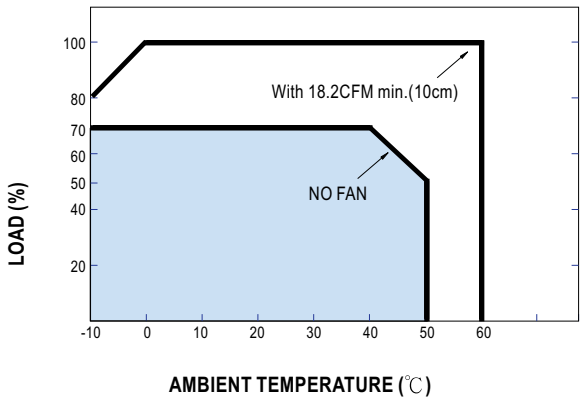
Case No. 901 Unit:mm



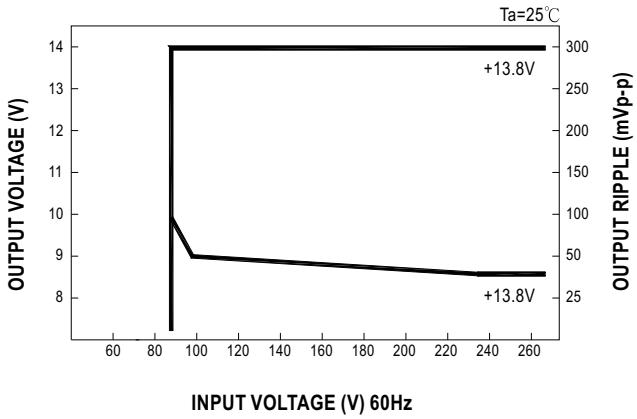
Terminal Pin. No Assignment

Pin No.	Assignment	Pin No.	Assignment	Pin No.	Assignment
1	AC/L	4	DC OUTPUT COM	7	BAT. -/COM
2	AC/N	5	DC OUTPUT +V	8	NC
3	FG ⏚	6	BAT. +		

■ Derating Curve



■ Static Characteristics (A)



Hoffman®
A Pentair Company

Fiberglass Hinged Cover Type 4X Enclosures

Application

Designed for use as a junction box or instrument housing in both indoor and outdoor settings. The enclosure is used in highly corrosive environments typically found in oil refineries, chemical processing plants, waste water treatment, marine installations, pulp and paper processing, and electroplating plants. The efficient design and simple construction create a low-cost, durable, and aesthetic enclosure.

Construction

- Molded fiberglass polyester has outstanding chemical and temperature resistance qualities and exhibits excellent weatherability and physical properties
- Fiberglass is easily punched, drilled, filed, or sawed
- Seamless foam-in-place gasket assures watertight and dust-tight seal
- Polyester mounting brackets and stainless steel attachment screws are provided with each enclosure
- Scratch-resistant GE Lexan Margard® windows are permanently bonded in place
- Molded-in-place threaded brass inserts and plated steel screws are provided for mounting optional panels and terminal block kits
- Removable hinged cover attached to body with Type 316 stainless steel hinge pin

U.S. Patent 4,917,421

- Screw cover enclosures are secured with two captivated Type 316 stainless steel slotted cross point cover screws
- Enclosures with patented quick-release latches have corrosion-resistant polyester latches located in corners that provide unobstructed access to enclosure
- Hinge pin and bail are corrosion-resistant Type 316 stainless steel
- Knockout padlock provisions included in each latch

Finish/Color

Optional steel panels are white. Optional stainless steel, aluminum, and composite panels are unpainted. Fiberglass material is light gray inside and out.

Industry Standards

UL 508A, 508 File No. E61997: Type 4, Type 4X, Type 12, and Type 13
NEMA/EEMAC Type 4, Type 4X, Type 12, and Type 13
Enclosure flammability rating per UL 508
Window flammability rating per UL 508
CSA File No. LR42186: Type 4, Type 4X, Type 12, and Type 13
IEC 60529, IP66

Accessories

See Chapter 12, General Accessories.

Panels (see table)
Threaded Panel Extenders
Quick-Release Latch Kit
Swing-Out Panel Kit
Terminal Block Kit Assembly
Ventilators

Modification Services Program

You can customize this product to your unique requirements by specifying from these options:

- Colors
- Holes and cutouts in body, doors, subpanels
- Doors
- Subpanels
- Standard accessories

For details, see Modification Services at hoffmanonline.com.
To order, contact your local Hoffman sales representative.

NOTE: For information about modifications outside the scope of the Modification Services program, contact your Hoffman sales representative.

Standard Sizes Fiberglass Hinged Solid Cover Type 4X Enclosures

Catalog Number Screw Cover	Catalog Number Quick-Release	Enclosure Size A x B x C	* Panel Catalog Number	Panel Size D x E	Mounting G x H	Overall L x W	F	J	K	O	P	Q	R	T	U
A664CHSCFG	A664CHQRFG	6.00 x 6.00 x 4.00 (152 x 152 x 102)	A6P6	4.88 x 4.88 (124 x 124)	6.94 x 4.00 (176 x 102)	6.50 x 6.50 (165 x 165)	3.45 (88)	3.25 (83)	1.00 (25)	4.25 (108)	4.25 (108)	5.64 (143)	5.12 (130)	0.12 (3)	5.64 (143)
A864CHSCFG	A864CHQRFG	8.00 x 6.00 x 4.00 (203 x 152 x 102)	A8P6	6.75 x 4.88 (171 x 124)	8.94 x 4.00 (227 x 102)	8.50 x 6.50 (216 x 165)	3.45 (88)	3.25 (83)	1.00 (25)	4.25 (108)	6.25 (159)	7.64 (194)	7.12 (181)	0.12 (3)	5.64 (143)
A1086CHSCFG	A1086CHQRFG	10.00 x 8.00 x 6.00 (254 x 203 x 152)	A10P8	8.75 x 6.88 (222 x 175)	10.94 x 6.00 (278 x 152)	10.50 x 8.50 (267 x 216)	5.45 (138)	4.94 (125)	1.31 (33)	6.25 (159)	8.25 (210)	9.61 (244)	9.12 (232)	0.12 (3)	7.61 (193)
A12106CHSCFG	A12106CHQRFG	12.00 x 10.00 x 6.00 (305 x 254 x 152)	A12P10	10.75 x 8.88 (273 x 226)	12.94 x 8.00 (329 x 203)	12.50 x 10.50 (318 x 267)	5.45 (138)	4.69 (119)	1.56 (40)	8.25 (210)	10.25 (260)	11.58 (294)	11.12 (282)	0.12 (3)	9.58 (243)
A14128CHSCFG	A14128CHQRFG	14.00 x 12.00 x 8.00 (356 x 305 x 203)	A14P12	12.75 x 10.88 (324 x 276)	14.94 x 10.00 (379 x 254)	14.55 x 12.55 (370 x 319)	7.45 (189)	6.50 (165)	1.81 (46)	10.25 (260)	12.25 (311)	13.59 (345)	13.12 (333)	0.15 (4)	11.59 (294)
A16148CHSCFG	A16148CHQRFG	16.00 x 14.00 x 8.00 (406 x 356 x 203)	A16P14	14.75 x 12.88 (375 x 327)	16.94 x 12.00 (430 x 305)	16.55 x 14.55 (420 x 370)	7.45 (189)	6.23 (158)	2.08 (53)	12.25 (311)	14.25 (362)	15.56 (395)	15.12 (384)	0.15 (4)	13.56 (344)
A181610CHSCFG	A181610CHQRFG	18.00 x 16.00 x 10.00 (457 x 406 x 254)	A18P16	16.75 x 14.88 (425 x 378)	18.94 x 14.00 (481 x 356)	18.58 x 16.58 (472 x 421)	9.45 (240)	7.66 (195)	2.66 (68)	14.25 (362)	16.25 (413)	17.53 (445)	17.12 (435)	0.16 (4)	15.53 (394)

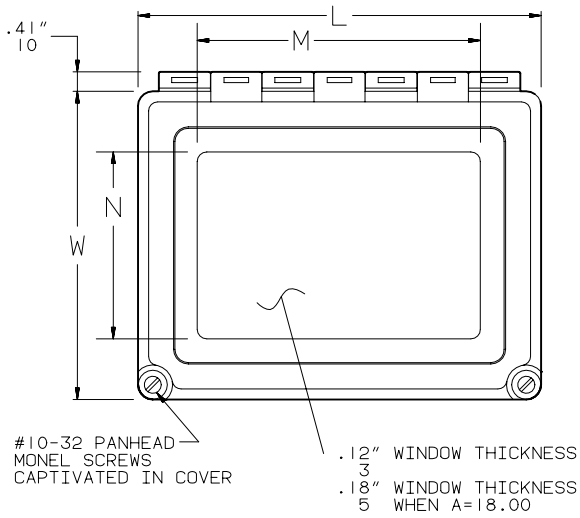
Standard Sizes Fiberglass Hinged Window Cover Type 4X Enclosures

Catalog Number Screw Cover	Catalog Number Quick-Release	Enclosure Size A x B x C	* Panel Catalog Number	Panel Size D x E	Mounting G x H	Overall L x W	F	J	K	M	N	O	P	Q	R	T	U
A664CHSCFGW	A664CHQRFGW	6.00 x 6.00 x 4.00 (152 x 152 x 102)	A6P6	4.88 x 4.88 (124 x 124)	6.94 x 4.00 (176 x 102)	6.50 x 6.50 (165 x 165)	3.45 (88)	3.25 (83)	1.00 (25)	4.25 (108)	4.25 (108)	4.25 (108)	4.25 (108)	5.64 (143)	5.12 (130)	0.12 (3)	5.64 (143)
A864CHSCFGW	A864CHQRFGW	8.00 x 6.00 x 4.00 (203 x 152 x 102)	A8P6	6.75 x 4.88 (171 x 124)	8.94 x 4.00 (227 x 102)	8.50 x 6.50 (216 x 165)	3.45 (88)	3.25 (83)	1.00 (25)	6.25 (159)	4.25 (108)	4.25 (108)	6.25 (159)	7.64 (194)	7.12 (181)	0.12 (3)	5.64 (143)
A1086CHSCFGW	A1086CHQRFGW	10.00 x 8.00 x 6.00 (254 x 203 x 152)	A10P8	8.75 x 6.88 (222 x 175)	10.94 x 6.00 (278 x 152)	10.50 x 8.50 (267 x 216)	5.45 (138)	4.94 (125)	1.31 (33)	8.25 (210)	6.25 (159)	6.25 (159)	8.25 (210)	9.61 (244)	9.12 (232)	0.12 (3)	7.61 (193)
A12106CHSCFGW	A12106CHQRFGW	12.00 x 10.00 x 6.00 (305 x 254 x 152)	A12P10	10.75 x 8.88 (273 x 226)	12.94 x 8.00 (329 x 203)	12.50 x 10.50 (318 x 267)	5.45 (138)	4.69 (119)	1.56 (40)	10.25 (260)	8.25 (210)	8.25 (210)	10.25 (260)	11.58 (294)	11.12 (282)	0.12 (3)	9.58 (243)
A14128CHSCFGW	A14128CHQRFGW	14.00 x 12.00 x 8.00 (356 x 305 x 203)	A14P12	12.75 x 10.88 (324 x 276)	14.94 x 10.00 (379 x 254)	14.55 x 12.55 (370 x 319)	7.45 (189)	6.50 (165)	1.81 (46)	12.25 (311)	10.25 (260)	10.25 (260)	12.25 (311)	13.59 (345)	13.12 (333)	0.15 (4)	11.59 (294)
A16148CHSCFGW	A16148CHQRFGW	16.00 x 14.00 x 8.00 (406 x 356 x 203)	A16P14	14.75 x 12.88 (375 x 327)	16.94 x 12.00 (430 x 305)	16.55 x 14.55 (420 x 370)	7.45 (189)	6.23 (158)	2.08 (53)	14.25 (362)	12.25 (311)	12.25 (311)	14.25 (362)	15.56 (395)	15.12 (384)	0.15 (4)	13.56 (344)
A181610CHSCFGW	A181610CHQRFGW	18.00 x 16.00 x 10.00 (457x406x254)	A18P16	16.75 x 14.88 (425 x 378)	18.94 x 14.00 (481 x 356)	18.58 x 16.58 (472 x 421)	9.45 (240)	7.66 (195)	2.66 (68)	16.25 (413)	14.25 (362)	14.25 (362)	16.25 (413)	17.53 (445)	17.12 (435)	0.16 (4)	15.53 (394)

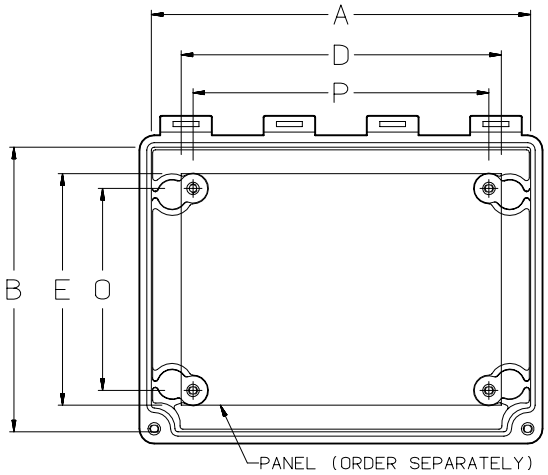
Millimeter dimensions ( ) are for reference only; do not convert metric dimensions to inch.

* Panels must be ordered separately. Optional stainless steel, aluminum, and composite material panels are also available for most sizes. See General Accessories.

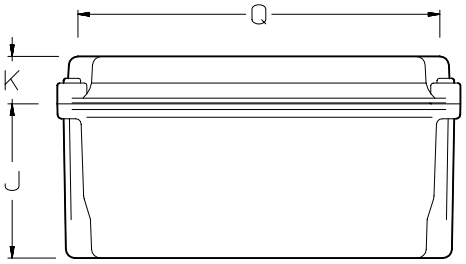
Fiberglass Hinged Cover Type 4X Enclosures



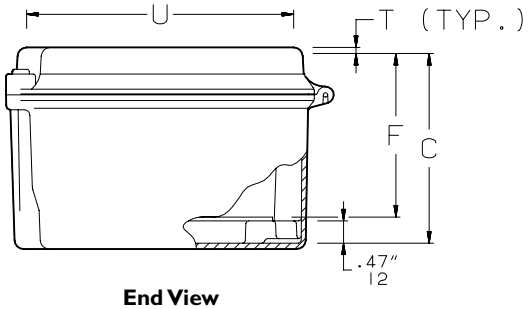
Top View



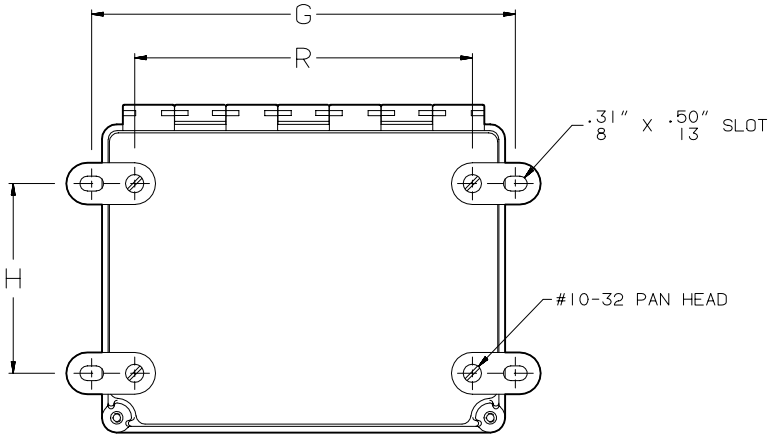
Top View with Cover Removed



Side View

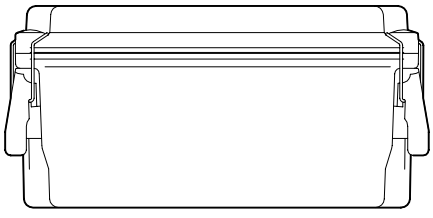


End View



Bottom View

NOTES: 1. Panel screws are #10-32 pan head.
2. Mounting brackets are .16 in. (4mm) thick.



Side View
Quick-Release Cover Enclosure

C2567

PART I. CUSTOMER QUESTIONAIRE (FILLABLE PDF)

In order to complete the processing of this order, the following data is required from the Engineer or other Water Company Official:

Official Name of the Water Company:

Federal ID Number (FEIN) of the Water Company:

Does The Water Company Pay Sales/Use Tax (Check One): ◯ YES ◯ NO
(If NO, Please attach State Sales/Use Tax Exemption Certificate.)

Phone Number of the Water Company: ( ) _____– _____

Fax Number of the Water Company: ( ) _____– _____

Operator's Name: _____

Operator's Cell Phone: ( ) _____– _____

Operator's Pager Number: ( ) _____– _____

Operator's After-Hours Phone: ( ) _____– _____

Operator's Email Address: _____

Other Relevant Phone Numbers:

Shipping Address of the Water Company (Not a PO Box):

Mailing Address of the Water Company:

Organization Type (Check One):

◯ CORP ◯ PUBLIC ENTITY ◯ LOCAL GOVT ◯ OTHER (SPECIFY)

_____

Board Meeting Schedule:

Water Tower Data:

Type (Check One): ◯ Standpipe ◯ Spheroid Pedestal ◯ Legged Tank

Capacity (Gallons): _____

Height From Ground Level To Overflow (Ft): _____

Height From Ground Level To Bottom of Bowl (Ft): _____
(if applicable)

Pump Station Data:

Number of Pumps: _____

Expected Flow Rate – 1 Pump (GPM): _____

Expected Flow Rate – 2 Pumps (GPM): _____

Expected Discharge Pressure – Pumps OFF (PSI): _____

Expected Discharge Pressure – 1 Pump ON (PSI): _____

Expected Discharge Pressure – 2 Pumps ON (PSI): _____
(if applicable)

Expected Suction Pressure – Pumps OFF (PSI): _____

Expected Suction Pressure – 1 Pump ON (PSI): _____

Expected Suction Pressure – 2 Pumps ON (PSI): _____
(if applicable)

Setpoints:

Requested “Lead Pump ON” Setpoint (Ft.): _____

Requested “Lead Pump OFF” Setpoint (Ft.): _____

Requested “Lag Pump ON” Setpoint (Ft.): _____
(if applicable)

Requested “Lag Pump OFF” Setpoint (Ft.): _____

Requested “High Alarm” Setpoint (Ft.): _____

Requested “Low Alarm” Setpoint (Ft): _____

Coaxial Cable Pre-Cut Lengths:

Water Tower (FT Coaxial Cable): _____

Pump Station (FT Coaxial Cable): _____

The Following Data To Be Filled-In By SCADAmetrics:

Water Tower (Slave) Unit Device Data:

Radio Serial Number: _____

Pressure Transducer Serial Number: _____

Pressure Transducer Span: _____

Sensor Type (Keller-Am or EM-100): _____

Modbus Slave ID: _____

Pump Station (Master) Unit Device Data:

Radio Serial Number: _____

PLC Serial Number: _____

Touch-Screen Serial Number: _____

PLC Firmware Date Stamp: _____