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Level Measurement

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# Installation and Operating Instructions

## Model 650 Submersible Level Transmitter

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## Model 650 Submersible Level Transmitter



**AMETEK**<sup>®</sup>  
**DREXELBROOK**  
*An ISO 9001 Certified Company*

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# **Section 1**

# Section 1: Introduction

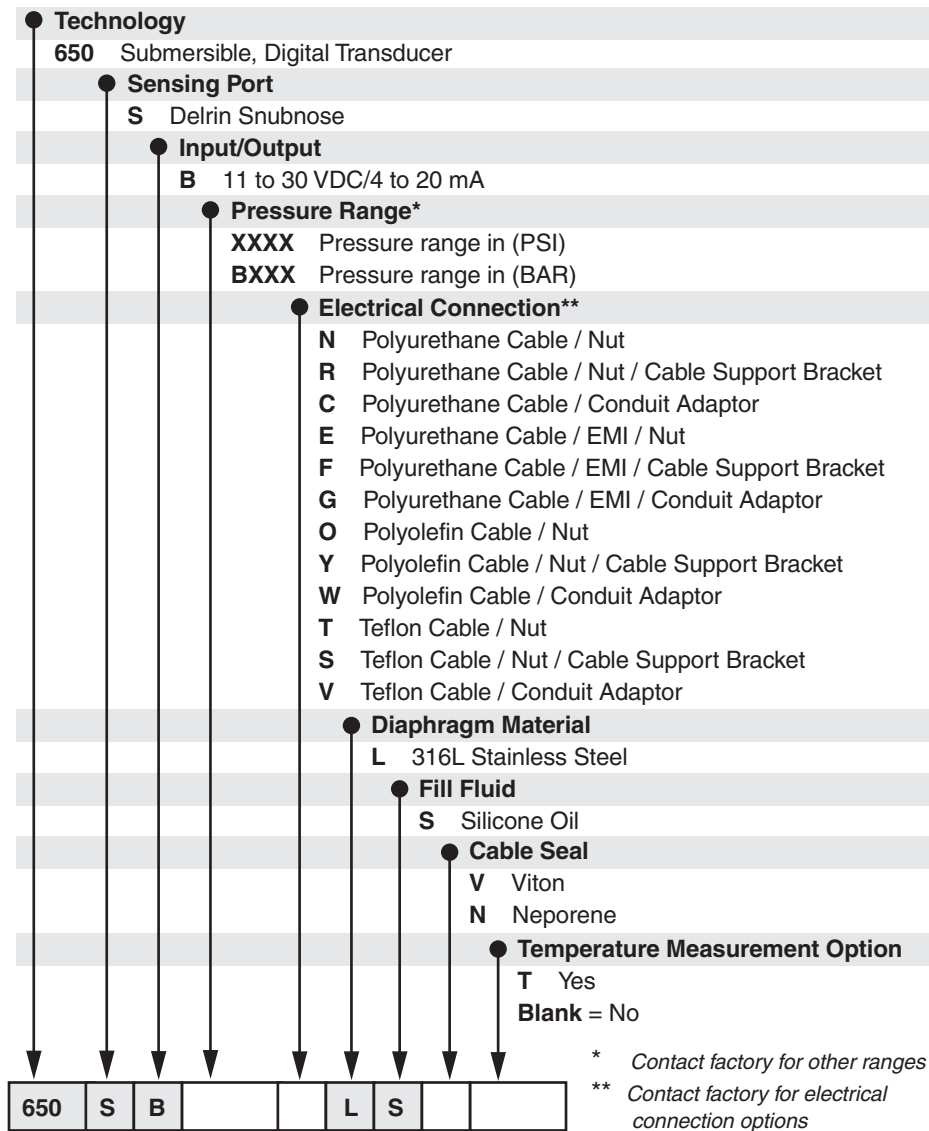
## 1.1 System Description

The Model 650 Submersible Level Transmitter is a solid state instrument designed for direct submergence in liquid for quick, accurate and reliable level measurements. The 0.69 inch diameter housing allows the unit to fit into small bore applications. The transmitter indicates the level of liquid by continuously measuring hydrostatic pressure via its sensing element, an ion implanted silicon chip consisting of a full Wheatstone bridge circuit used with a 316L stainless steel diaphragm to seal the element from corrosive fluids. It then transmits the level via a 4-20 mA output signal. All the electronics are mounted in a submersible 316 stainless steel housing protected by a removable snubnose threaded sensing port.

The electrical connection is a 3 wire, 20 gauge shielded waterproof cable which is vented at the surface end to reference atmospheric pressure. The cable support provides extra stability for longer lengths of cable or for use with agitated liquids.

# Model 650 Submersible Level Transmitter

## 1.2 Model Number



Example: To specify the Model 650 Submersible Transmitter with 11-30V Input and 4-20mA Output having to measure 15psi (34.6 ft/water) with a standard nut and polyurethane cable & electrical connection, 316ss Diaphragm, silicon oil fill, Viton grommet and 100 ft of cable: 650SB0015NLSV (100ft cable).

- 1) Cable Termination side should be located in a dry temperature stable environment.
- 2) Damage will result if submerged in frozen liquid.
- 3) A fused or current limited DC power source is recommended to prevent damage during fault conditions.
- 4) Shield is tied to case on EMI versions only
- 5) Additional pressure ranges are available, consult factory.



## Section 2: Installation

### 2.1 Safety Information



The Model 650 Transmitter is designed for use within installation Category II Environments as defined in IEC664: 1980/PD6499: -1981 and UL 873. The overall system is designed to prevent accidental shock to the operator when properly used. No design, however, can insure the safety of an instrument improperly installed or used negligently. Read this manual carefully and completely before operating the instrument. Failure to read this manual in its entirety could result in damage to the instrument or injury to the operator.

To avoid possible shock hazard install in a grounded enclosure, prevent live parts being touched and ground the sensor sheath and housing. Follow wiring diagrams and local regulations. Installations where failure of this equipment may cause personal injury, property loss, equipment damage or financial loss, backup failsafe protection must be used.

### 2.2 Unpacking & Inspection

Carefully remove the contents of the shipping carton and check each item against the packing list before destroying any packing material. If there is any shortage or damage, report it to the factory immediately.

When this transmitter is used with the AMETEK Drexelbrook CDM Controller, the transmitter Model Number is identified on the nameplate of the CDM in the section labeled “USED WITH.” This is because the CDM is calibrated with, and should be used only with a specific Submersible Transmitter. Look for a correlation between the two instruments.

### 2.3 Operational Checkout

Before installing the Model 650 Transmitter, make sure the system is operating by doing a bench check.



#### **WARNING:**

Do not connect any wires while AC Power input is applied.

For temporary connections, refer to diagrams in Wiring Section 2.3 of this manual. Connect AC power to the controller and/or with which it is to be used. Apply power and allow a five-minute warm-up.

With no pressure applied to the transmitter, the meter should display zero (or for “drawdown” the reading corresponding to the depth below ground level that the transmitter will be when installed.)

# Model 650 Submersible Level Transmitter

## 2.3 Operational Checkout (continued)



**CAUTION:** Do not simulate an increase in pressure by applying mechanical force to the sensing diaphragm of the transmitter. Excessive force will result in damage to or destruction of the transmitter.

When pressure is applied to the transmitter, the display should increase, and then return to the original reading when pressure is removed. The Transmitter can be pressurized by lowering it into water or by applying air pressure from a calibration device. To apply air pressure unscrew the snubnose and replace it with a 1/2 " NPT pressure fitting.

## 2.4 Mounting

### 2.4.1 Dimensions

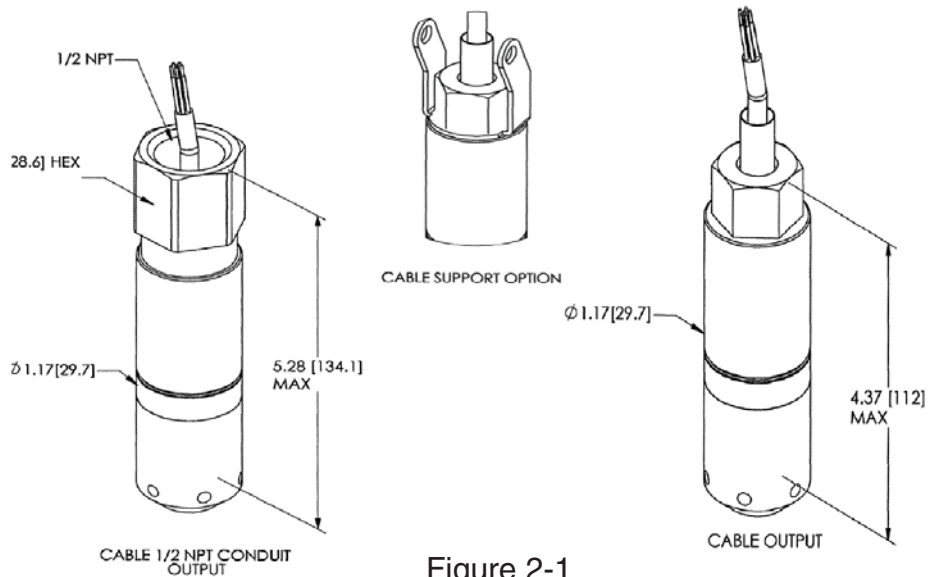


Figure 2-1  
Mounting Dimensions

### 2.4.2 Placement

The Model 650 Transmitter can be suspended in a well or tank supported only by its attached shielded electrical cable. Ensure that the opening in the well or tank cover is large enough for possible future removal of the transmitter.

Additional support can be provided when the transmitter is being used under circumstances of excess stress, such as when submerged in agitated water or when suspended with electrical cable longer than 300 ft. The cable support feature on the transmitter provides this extra strain relief.



**CAUTION:** Do not allow transmitter to remain in liquid when it freezes solid. This will apply mechanical force to the sensing diaphragm of the transmitter. Excessive force will result in transmitter damage or destruction.

### 2.4.3 Model 650 Transmitter



**CAUTION:** The cable grommet is specially installed by factory-trained personnel to assure that it remains watertight. Any adjustment or removal of the grommet may destroy the watertight feature thus exposing the transmitter to water seepage, causing an electrical short and transmitter failure. Any adjustment or removal of the cable grommet voids the warranty.



**CAUTION:** The waterproof cable should not be kinked or nicked, which will allow water to seep into the cable and short out the transmitter.



**CAUTION:** The surface end of the cable should NOT be sealed since it references the transmitter to atmospheric pressure.

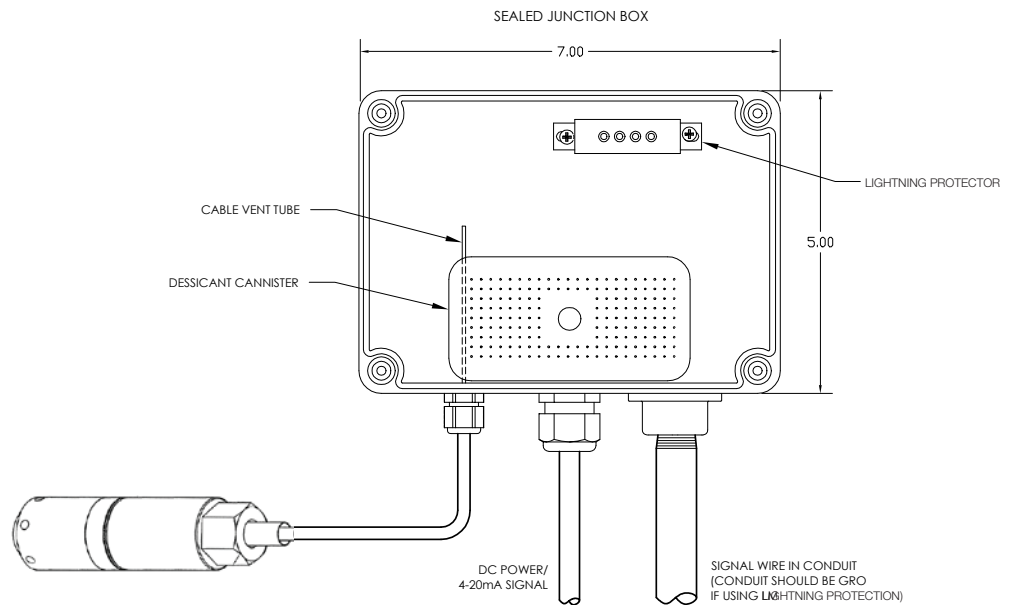


Figure 2-2  
Transmitter Installation Considerations

### 2.4.4 Provide Signal Noise Isolation

The transmitter should not be mounted close to high current switching relays or in an enclosure containing such relays. Low voltage wiring (transmitter signal wires and analog output wires) should be separated from high voltage wiring (115, 230 & 440 Vac) and should be shielded.

## Model 650 Submersible Level Transmitter

### 2.5 Wiring



#### WARNING:

Do not connect any wires while AC Power input is applied.

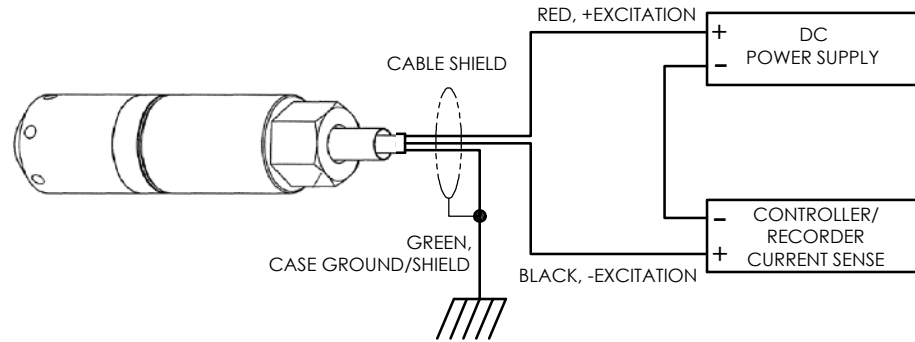


Figure 2-3  
Transmitter Wiring Identification

#### 2.5.1 Surge Protection

Surge protectors are available as an option item (see Parts & Accessories in Section 3 of this manual). It is strongly recommended to protect from secondary surges and lightning on outdoor installations. Install in accordance with the applicable drawing that is supplied with the surge protector and the following instructions:

1. Lightning protection devices should be placed as close to the instrument as possible and wired in accordance with National Electric Code in an approved watertight enclosure.
2. If the distance between the meter and transmitter, or the meter and recorder is less than 100 feet, only one protector per line may be used.
3. Use No. 10 AWG ground wire or better from protector to earth ground.
4. Provide a separate ground for each run of shielded cable or metal conduit.
5. Keep the ground wire less than 1 foot long and tie to a suitable ground rod or metal frame ground. Surge capability is only as good as the grounding method. All ground connections must be installed.
6. Install all protectors in weathertight enclosures.
7. Run signal lines shielded and away from power lines.
8. Wire according to the Electrical Code.
9. When used for an intrinsically safe installation, only one LMA912 should be installed in the hazardous location.



### 2.5.1 Surge Protection (Continued)



**CAUTION:** This or any installation can not protect against a direct lightning strike, or secondary strikes of sufficient magnitude. AMETEK cannot accept liability for damage due to lightning or secondary surges.

### 2.5.2 Lightning Protection Wiring

Here is a typical wiring arrangement to a controller/ meter. Shown here are connectors to the AMETEK Drexelbrook CDM Controller.

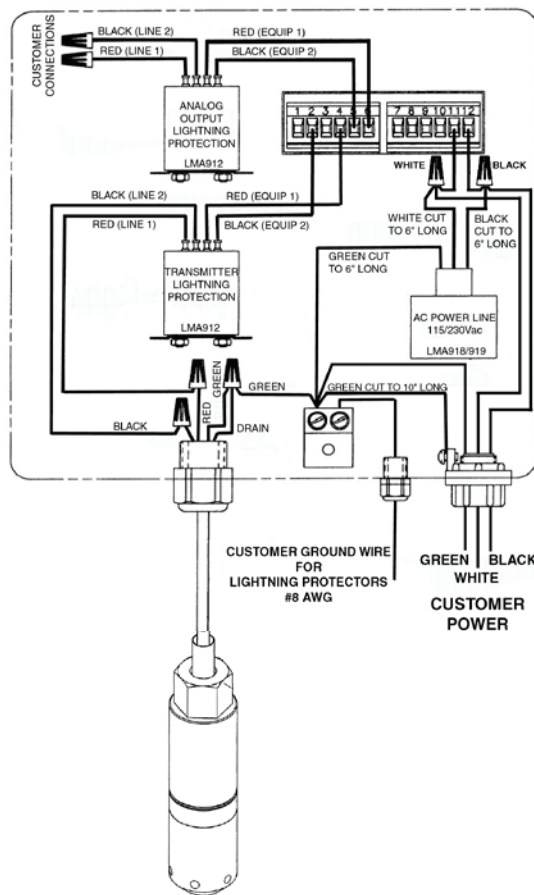


Figure 2-4  
Wiring with Lightning  
Protection Options

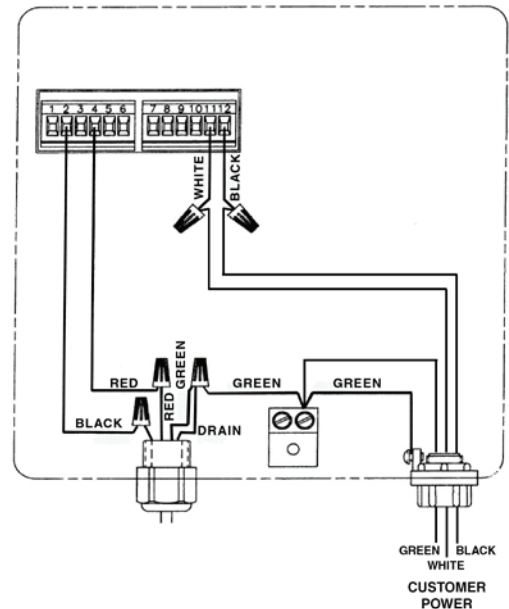


Figure 2-5  
Wiring with NO lightning  
Protection Options

## Model 650 Submersible Level Transmitter

### 2.5.3 Lightning Protection Installation Concept

1. Lightning protection devices should be placed as close to the instrument as possible.
2. If the distance between the meter and transmitter, or the meter and recorder is less than 100 ft., only 1 protector per line may be used.
3. This or any installation cannot protect against a direct lightning strike, or secondary strikes of sufficient magnitude. AMETEK Drexelbrook cannot accept responsibility for damage due to lightning or secondary surges.
4. Proper installation including grounding require detailed installation drawing. Consult factory.

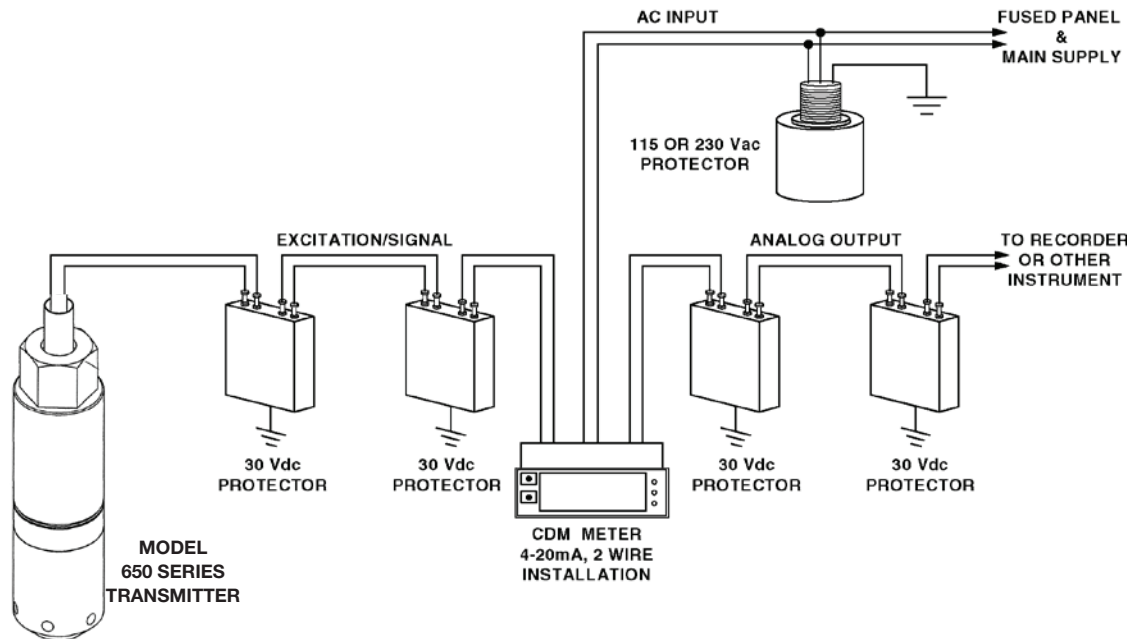


Figure 2-6  
Lightning Protection Concept

## Section 3: Accessories

### 3.1 Parts & Accessories

#### ACCESSORIES

##### **LMA 912 30 VDC SURGE/LIGHTNING PROTECTOR**

Protects the excitation and signal lines between an Ametek Model DMC Meter Controller, or other power source and indicator, and the Model 650 4-20mA output transducer.

##### **DMC Meter / Controller**

power supply (120-240VAC input), various options available, consult factory

##### **SJB-100 Termination Box**

with dessicant & seal fi ttings (LMA 912 mounting possible)

### 3.2 Ordering Parts & Accessories

When ordering replacement parts, supply the following information:

1. Part description and part number.
2. Quantity of each item required.
3. Shipping instructions and address.

Contact your local AMETEK Drexelbrook representative,  
or Mail, Telephone or Fax Orders to:

AMETEK Drexelbrook  
205 Keith Valley Road  
Horsham, PA 19044-1499  
215-674-1234; FAX: (215) 674-2731

## **Section 4**



## Section 4: Troubleshooting



### WARNING:

If the Level Measurement System is located in a hazardous environment, do not open the enclosure cover or make/break any electrical connections without first disconnecting electrical power at the source. Ensure that the wiring, electrical fittings and conduit connections conform to the electrical codes for the specific location and hazard level.

### 4.1 Problem/Cause/Checks

#### Controller/meter Display Drifting:

May be water in cable causing short circuit; look for kink or damaged cable; check for broken wires, loose or corroded connections, or obvious short circuits;



With transmitter wires disconnected, resistance between red or black lead and shield should not exceed 15 megohms.

#### Controller/meter Display Incorrect:

May be wrong transmitter connections; check wiring.

May be defective transmitter; check as above, replace transmitter.

May also be controller/meter problems, such as calibration.

### 4.2 Factory Assistance

AMETEK Drexelbrook can answer any questions about this, or any Drexelbrook instrument. Call Customer Service at:  
1-800-553-9092 (US and Canada) or  
+1 215 674-1234 (International).

If you require assistance and attempts to locate the problem have failed:

Contact your local Drexelbrook representative,



**Telephone** the Service department toll-free:

- 1-800-527-6297 (US and Canada)
- +1 215 674-1234 (International)

**FAX:** Service Department + 215-443-5117

**E-Mail:** [drexelbrook.service@ametek.com](mailto:drexelbrook.service@ametek.com)

## Model 650 Submersible Level Transmitter

### 4.2 Factory Assistance (Continued)

Please provide the following information:

- Instrument Model Number
- Sensing Element Model Number and Length
- Original Purchase Order Number
- Material being measured
- Temperature
- Pressure
- Agitation
- Brief description of the problem
- Checkout procedures that have failed

### 4.3 Field Service

Trained field servicemen are available on a time-plus-expense basis to assist in start-ups, diagnosing difficult application problems, or in-plant training of personnel. Contact the service department for further details.

## 4.4 Equipment Return

In order to provide the best service, any equipment being returned for repair or credit must be pre-approved by the factory.

In many applications, sensing elements are exposed to hazardous materials.

- **OSHA mandates** that our employees be informed and protected from hazardous chemicals.
- **Material Safety Data Sheets (MSDS)** listing the hazardous materials to which the sensing element has been exposed **MUST** accompany any repair.
- It is your responsibility to fully disclose all chemicals and **decontaminate** the sensing element.

**To obtain a return authorization (RA#)**, contact the Service department at 1-800-527-6297 (US and Canada) or + 215-674-1234 (International).

- Please provide the following information:
- Model Number of Return Equipment
- Serial Number
- Original Purchase Order Number
- Process Materials to which the equipment has been exposed.
- MSDS sheets for any hazardous materials
- Billing Address
- Shipping Address
- Purchase Order Number for Repairs
- Please include a purchase order even if the repair is under warranty. If repair is covered under warranty, you will not be charged.

Ship equipment freight prepaid to:

AMETEK-DREXELBROOK.  
205 KEITH VALLEY ROAD  
HORSHAM, PA 19044-1499  
COD shipments will not be accepted

## **Section 5**

## Section 5: Specifications

### 5.1 Model 650 Transmitter

**Feet of Water:**

0 to 2.31, 0 to 14, 0 to 35, 0 to 69, 0 to 138, 0 to 230, 0 to 345, 0 to 460, 0 to 690 feet

**Meters of Water:**

0 to 0.7, 0 to 4.2, 0 to 10.5, 0 to 21.1, 0 to 70.3, 0 to 105.4, 0 to 140.5, and 0 to 211 meters

**BAR:**

0 to 0.07, 0 to 0.4, 0 to 1, 0 to 2, 0 to 4, 0 to 7, 0 to 10, 0 to 14, and 0 to 20

**PSI:**

0 to 1, 0 to 6, 0 to 15, 0 to 30, 0 to 60, 0 to 100, 0 to 150, 0 to 200, and 0 to 300 psi

**Burst Pressure:**

3 times full scale

**Output (Please consult factory for other outputs):**

20 VDC

**Input Supply Voltage:**

11-30 VDC

**Null Offset (+1% Span):**

4 mA

**Span (+1% Span):**

16 mA

**Load Limitation:**

900  $\Omega$  max.

**Accuracy:**

(at 25°C including linearity (BFSL), hysteresis, and repeatability):  $\pm 0.2\%$  full scale typical,  $\pm 0.3\%$  full scale max; 0 to 1 psi  $\pm 1\%$  full scale max; and 0 to 6 psi  $\pm 0.5\%$  full scale max

**Stability (per year):**

<0.25% full scale; 0 to 1 psi <1% full scale; and 0 to 6 psi <0.5% full scale

**Operating Temperature Range:**

-25°C to 60°C (-13°F to 140°F), media must not freeze

**Compensated Temperature Range:**

-25°C to 60°C (-13°F to 140°F)

**Total Error Band:**

(includes temperature effects, zero, and span set):  $\pm 1\%$  full scale; 0 to 1 psi  $\pm 2.5\%$  full scale; and 0 to 6 psi  $\pm 1.5\%$  full scale

**Shock:**

30G

**Vibration:**

10G, 55 to 2000 Hz

**Wetted Material:**

316L stainless steel, cable and seal as selected below, Delrin snubnose

**Process Connection:**

1/4-18 NPT male with mounted Delrin thread protective snubnose end

**Cable Seal:**

VITON® standard; Neoprene optional

**Cable Jacket:**

Polyurethane standard; Polyurethane/EMI, Polyolefin and TEFLON® optional

**Electrical Connection:**

24 AWG, 6 conductor cable (specify length) (cable must be vented to a dry environment)

**Temperature Measurement:**

LM335AZ (blue-cathode; brown-anode) select temperature option code "T"

**Weight:**

8.9 oz. without bracket (252 g)

**Removable Snubnose:**

Delrin, prevents damage to diaphragm. Periodic cleaning may be required

**Option:**

SJB-100 junction box with desiccant; CDM Meter/Controller with housing

## TERMS AND CONDITIONS OF SALE

**GENERAL:** ALL ORDERS ARE SUBJECT TO THE FOLLOWING TERMS AND CONDITIONS. ANY ACCEPTANCE OF ANY OFFER OF BUYER FOR ANY GOODS OR SERVICES IS CONDITIONED UPON THESE TERMS AND CONDITIONS, AND SELLER OBJECTS TO ANY ADDITIONAL OR DIFFERENT TERMS PROPOSED BY BUYER IN ANY DOCUMENT, WHICH SHALL NOT BE BINDING UPON SELLER. No salesman or other party is authorized to bind the AMETEK DREXELBROOK Division of AMETEK, Inc. (hereinafter "Seller") by any agreement, warranty, statement, promise, or understanding not herein expressed, and no modifications shall be binding on Seller unless the same are in writing and signed by an executive officer of Seller or his or her duly authorized representative. Verbal orders shall not be executed until written notification has been received and acknowledged by Seller.

**QUOTATIONS:** Written quotations are valid for thirty (30) days unless otherwise stated. Verbal quotations expire the same day they are made.

**PRICES:** All prices and terms are subject to change without notice. Buyer-requested changes to its order ("Orders"), including those affecting the identity, scope and delivery of the goods or services, must be documented in writing and are subject to Seller's prior approval and adjustments in price, schedule and other affected terms and conditions. Orders requiring certified test data in excess of commercial requirements, are subject to a special charge.

**ORDER ACCEPTANCE:** All Orders are subject to final approval and acceptance by Seller at its office located at 205 Keith Valley Road, Horsham, Pennsylvania 19044.

**TERMS OF PAYMENT:** Seller's standard terms of payment for Buyers who qualify for credit are net thirty (30) days from date of invoice. All invoices must be paid in United States dollars.

**CREDIT:** Seller reserves the right at any time to revoke any credit extended to Buyer or otherwise modify terms of payment if Buyer fails to pay for any shipments when due or if in Seller's opinion there is a material adverse change in Buyer's financial condition. Seller may, at its option, cancel any accepted Order if Buyer fails to pay any invoices when due.

**DELIVERY:** Shipments are F.O.B place of manufacture ("Shipping Point") and the Buyer shall pay all freight, transportation, shipping, duties, fees, handling, insurance, storage, demurrage, or similar charges from Shipping Point. Delivery of goods to common carrier shall constitute delivery and passing of title to the Buyer, and all risk of loss or damage in transit shall be borne by Buyer. Any claims or losses for damage or destruction after such delivery shall be the responsibility of Buyer.

Seller reserves the right to make delivery in installments which shall be separately invoiced and paid for when due, without regard to subsequent deliveries. Delay in delivery of any installment shall not relieve Buyer of its obligation to accept remaining deliveries.

Acknowledged shipping dates are approximate only and based on prompt receipt of all necessary information from Buyer and Buyer's compliance with terms of payment.

**TAXES:** All sales, excise and similar taxes which Seller may be required to pay or collect with respect to the goods and/or services covered by any Order, shall be for the account of the Buyer except as otherwise provided by law or unless specifically stated otherwise by Seller in writing.

**TERMINATION AND HOLD ORDERS:** No Order may be terminated by Buyer except upon written request by Buyer and approval by Seller, and if said request is approved by Seller, under the following conditions: (1) Buyer agrees to accept delivery of all of the units completed by Seller through the workday on which Seller receives the written termination request; (2) Buyer agrees to pay to Seller all direct costs and expenses applicable to the portion of the Order that is incomplete.

### WARRANTY:

**A. Hardware:** Seller warrants its goods against defects in materials and workmanship under normal use and service for one (1) year from the date of invoice.

**B. Software and Firmware:** Unless otherwise specified, Seller warrants for a period of one (1) year from date of invoice that standard software or firmware, when used with Seller specified hardware, shall perform in accordance with Seller's published specifications. Seller makes no representation or warranty, expressed or implied, that the operation of the software or firmware shall be uninterrupted or error-free, or that functions contained therein shall meet or satisfy the Buyer's intended use or requirements.

**C. Services:** Seller warrants that services, including engineering and custom application, whether provided on a fixed cost or time and material basis, shall be performed in accordance with generally accepted industry practices.

**D. Remedies:** Seller's liability under this section is restricted to replacing, repairing, or issuing credit (at Seller's option) for any returned goods and only under the following conditions: (1) Seller must be promptly notified, in writing, as soon as possible after the defects have been noted by the Buyer, but not later than (1) year from date of invoice from Seller; (2) The defective goods are to be returned to the place of manufacture, shipping charges prepaid by the Buyer; (3) Seller's inspection shall disclose to its satisfaction that the goods were defective in materials or workmanship at the time of shipment; (4) Any warranty service (consisting of time, travel and expenses related to such services) performed other than at Seller's factory, shall be at Buyer's expense.

**E. Repaired/Reconditioned Goods:** As to out-of-warranty goods which Seller has repaired or reconditioned, Seller warrants for a period of sixty (60) days from date of its invoice only new components replaced in the most recent repair/reconditioning.

**F. Returns and Adjustments:** No goods may be returned unless authorized in advance by Seller and then only upon such conditions to which Seller may agree. Buyer must obtain an RMA (Return Material Authorization) number from Seller prior to any return shipment and such RMA number must appear on the shipping label and packing slip. Buyer shall be responsible for the returned goods until such time as Seller receives the same at its plant and for all charges for packing, inspection, shipping, transportation, or insurance associated with returned goods. In the event that credit for returned goods is granted, it shall be at the lesser of the then current prices or the original purchase price. Claims for shortage or incorrect material must be made within five (5) days after receipt of shipment.

**ALL OTHER WARRANTIES, FOR ANY OF SELLER'S GOODS OR SERVICES, WHETHER ORAL, WRITTEN, EXPRESS, IMPLIED, STATUTORY OR OTHERWISE, INCLUDING WITHOUT LIMITATION ANY IMPLIED WARRANTY OF MERCHANTABILITY OR FITNESS FOR PURPOSE ARE EXCLUDED.**

**INTELLECTUAL PROPERTY:** Seller's sale of goods or provision of related documentation or other materials to Buyer shall not transfer any intellectual property rights to Buyer unless Seller specifically agrees to do so in writing. Seller shall retain ownership of all applicable patents, trademarks, copyrights and other intellectual property rights. Buyer shall not use, copy or transfer any such items in violation of Seller's intellectual property rights or applicable law, or for any purposes other than that for which the items were furnished.

Seller shall defend any lawsuit brought against the Buyer based on a claim that the design or construction of the goods sold hereunder by Seller infringe any United States or Canadian Patent, Copyright or Mask Work Registration, provided that Buyer promptly notifies Seller of such claim in writing and further provided that, at Seller's expense, (1) Buyer gives Seller the sole right to defend or control the defense of the suit or proceeding, including settlement, and (2) Buyer provides all necessary information and assistance for that defense. In the event of a charge of infringement, Seller's obligation under the agreement shall be fulfilled if Seller, at its option and expense, either (i) settles such claim; (ii) procures for Buyer the right to continue using such goods; (iii) replaces or modifies goods to avoid infringement; or (iv) accepts the return of any infringing goods and refunds their purchase price; or (v) defends against such claim.

If Buyer furnishes specifications or designs to Seller, the obligations of Seller set forth above shall not apply to goods made by Seller using such specifications or designs, and Buyer shall defend, indemnify and hold Seller harmless against any third party claims for infringement which arise out of Seller's use of specifications or designs furnished by Buyer.

**SOFTWARE LICENSE:** If goods purchased hereunder include software ("Software"), Buyer may use the Software only as part of the goods. Buyer may not use, copy, or transfer any of the Software except as may be permitted under the applicable License Agreement provided with the goods. Buyer's right to use, copy or transfer the Software shall terminate upon termination of Buyer's right to use the goods.

**PACKAGING/WEIGHTS AND DIMENSIONS:** Buyer specified packing or marking may be subject to additional charges not otherwise included in the price of the goods. Published weights and dimensions are estimates or approximate only and are not warranted.

**FORCE MAJEURE:** Seller shall not be responsible for delays in delivery or any failure to deliver due to causes beyond Seller's control, including but not limited to the following items: acts of God, war, terrorism, mobilization, civil commotion, riots, embargoes, domestic or foreign governmental regulations or orders, governmental priorities, port congestion, acts of the Buyer, its agents or employees, fires, floods, strikes, lockouts and other labor difficulties, shortages of or inability to obtain shipping space or transportation, inability to secure fuel, supplies or power at current prices or on account of shortages thereof, or due to limitations imposed by the extent of availability of Seller's normal manufacturing facilities.

If a delay excused per the above extends for more than ninety (90) days and the parties have not agreed upon a revised basis for continuing providing the goods or services at the end of the delay, including adjustment of the price, then Buyer, upon thirty (30) days' prior written notice to Seller may terminate the Order with respect to the unexecuted portion of the goods or services, whereupon Buyer shall promptly pay Seller its reasonable termination charges upon submission of Seller's invoices thereof.

**LIMITATION OF LIABILITY:** Seller's liability for any claim of any kind, except infringement of intellectual property rights, shall not exceed the purchase price of any goods or services which give rise to the claim. **SELLER SHALL IN NO EVENT BE LIABLE FOR BUYER'S MANUFACTURING COSTS, LOST PROFITS, LOSS OF USE OF THE GOODS OR SERVICES, COST OF CAPITAL, COST OF SUBSTITUTE GOODS, FACILITIES, SERVICES OR REPLACEMENT POWER, DOWNTIME COSTS, CLAIMS OF BUYER'S CUSTOMERS FOR DAMAGES, OR OTHER SPECIAL, PROXIMATE, INCIDENTAL, INDIRECT, EXEMPLARY OR CONSEQUENTIAL DAMAGES.** Any action against Seller must be brought within eighteen (18) months after the cause of action accrues. These disclaimers and limitations of liability shall apply regardless of the form of action, whether in contract, tort or otherwise, and further shall extend to the benefit of Seller's vendors, appointed distributors and other authorized resellers as third-party beneficiaries.

**PROHIBITION FOR HAZARDOUS USE:** Goods sold hereunder generally are not intended for application in and shall not be used by Buyer in the construction or operation of a nuclear installation or in connection with the use or handling of nuclear material, or for any hazardous activity or critical application, where failure of a single component could cause substantial harm to persons or property, unless the goods have been specifically approved for such a use or application. Seller disclaims all liability for any loss or damage resulting from such unauthorized use and Buyer shall defend, indemnify and hold harmless the Seller against any such liability, whether as a result of breach of contract, warranty, tort (regardless of the degree of fault or negligence), strict liability or otherwise.

**EXPORT CONTROL:** Buyer shall comply with all export control laws and regulations of the United States, and all sales hereunder are subject to those laws and regulations. Seller shall not be named as shipper or exporter of record for any goods sold hereunder unless specifically agreed to in writing by Seller. At Seller's request, Buyer shall furnish Seller with end-use and end-user information to determine export license applicability. Buyer warrants, in accordance with U.S. Export Law, that goods sold hereunder shall not be destined for facilities or activities involving nuclear, chemical or biological weapons, or related missile delivery systems in named prohibited regions or countries.

**GOVERNING LAW:** Seller intends to comply with all laws applicable to its performance under any order. All matters relating to interpretation and effect of these terms and any authorized changes, modifications or amendments thereto shall be governed by the laws of the Commonwealth of Pennsylvania. No government contract regulations or clauses shall apply to the goods or services, this agreement, or act to bind Seller unless specifically agreed to by Seller in writing.

**NON-WAIVER BY SELLER:** Waiver by Seller of a breach of any of these terms and conditions shall not be construed as a waiver of any other breach.

**SEVERABILITY AND ENTIRE AGREEMENT:** If any provision of these terms and conditions is unenforceable, the remaining terms shall nonetheless continue in full force and effect. This writing, together with any other terms and conditions Seller specifically agrees to in writing, constitutes the entire terms and conditions of sale between Buyer and Seller and supercedes any and all prior discussions, and negotiations on its subject matter.



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