ELECTRONIC PRESSURE TRANSMITTER

INSTALLATION INSTRUCTIONS

1. MOUNT NIPPLE IN PLACE

Mount heavy wall S/S nipple as per attached LT/SAN nipple welding instructions. Keep teflon seal ring with the transmitter. Locate the transmitter and nipple on the side or top of the pipeline runs, next to flanged connections, so that inside welds can be ground and polished. Avoid locations where pulp, food or slurries can settle out and block the diaphragm face. Transmitters ordered with Ladish, DIN, or Acme fittings should be connected to mating fittings.

2. MOUNT TRANSMITTER

Mount the teflon seal ring in the nipple. Lock the transmitter in place, using pump pliers to tighten the knurled rear lock ring. Be sure to remove the diaphragm protector cap.

3. CONNECT TO TWO WIRE LOOP

Connect the transmitter 2-wire vented cable to a 24 VDC power supply. Supply voltage may vary between 10 and 40 VDC depending upon loop resistance. PMC offers a NEMA 4 clear polycarbonate junction box (PTEL-CJBPOLY) for cable and conduit connections.
JUNCTION BOXES SHOULD BE LOCATED *BELOW* THE LEVEL OF THE CONNECTED TRANSMITTER TO PREVENT MOISTURE FLOW THROUGH THE CABLE TO THE TRANSMITTER ELECTRONICS. Cables must enter terminal box on sides or top, never bottom. Make sure vent tube is not obstructed.

Where the terminal head option has been selected, field wiring is brought directly through a 1/2" NPT conduit opening to the integral terminal strip having +IN, -IN, TEST and GROUND connections. A milliammeter placed between the TEST(+) and -IN(-) terminals provides output current monitoring without disturbing field wiring. **THE TRANSMITTER SHOULD BE ALIGNED WITH OPENING DOWN (6 O'CLOCK) SO THAT CONDENSATION OR LEAKAGE WITHIN THE CONDUIT CANNOT DRAIN INTO THE TERMINAL HEAD.**

4. CALIBRATION ADJUSTMENT

A calibration chart is furnished with each PMC Electronic Transmitter for the range ordered. Range change may be accomplished by removing the cover, (depress detent pin) and adjusting the coarse span switches, fine span and zero. This is best done on the instrument shop bench, with a test cup. Use an accurate test gauge to verify loading pressures. See PT-EL calibration sheet for specific scaling information.

Should a transmitter fail to function properly return to PMC for service or repairs.

(5) CONNECT TO TWO WIRE LOOP

Connect the transmitter 2 wire vented cable to a 24 VDC power supply. PMC offers a NEMA 4 clear polycarbonate junction box (PTEL-CJBPOLY) for cable and conduit connections.
JUNCTION BOXES SHOULD BE LOCATED ***BELOW*** THE LEVEL OF THE CONNECTED TRANSMITTER TO PREVENT MOISTURE FLOW THROUGH THE CABLE TO THE TRANSMITTER ELECTRONICS. Cables must enter terminal box on sides or top, never bottom. Make sure vent tube is not obstructed.

Where the terminal head option has been selected, field wiring is brought directly through a 1/2" NPT conduit opening to the integral terminal strip having +IN, -IN, TEST and GROUND connections. A milliammeter placed between the TEST(+) and -IN(-) terminals provides output current monitoring without disturbing field wiring. **THE TRANSMITTER SHOULD BE ALIGNED WITH OPENING DOWN (6 O'CLOCK) SO THAT CONDENSATION OR LEAKAGE WITHIN THE CONDUIT CANNOT DRAIN INTO THE TERMINAL HEAD.**

(6) CALIBRATION ADJUSTMENT

A calibration chart is furnished with each PMC Miniature Electronic Transmitter for the range ordered. Range change may be accomplished by removing the cover (depress detent pin) and adjusting the coarse span switches, fine span and zero. This is best done on the instrument shop bench with a test cup. Use an accurate test gauge to verify loading pressures. See PT-EL calibration sheet for specific scaling information.

ADDITIONAL INFORMATION

- Do not use a pipe wrench on the body of the transmitter during installation. The fit between nipple and transmitter threads should be free enough to permit installation and removal by hand. Avoid excess clearance.
- DUMMY TRANSMITTERS are available in 303 stainless steel. Order Code is PT-11&1-S/S. Also available in PVC with stainless steel insert. Order code is PT-11-PVC1. The plastic PVC dummy has a service temperature limit of 120°F (50°C).
- The transmitter body O-ring may be removed with a scriber or a small screwdriver.

PT/EL CALIBRATION

Switch position setting should be selected by using the tabulated span range corresponding to the span desired. The desired span should be compared to the figures given beneath the specific sensor designation in the tables below. Reading horizontally to the right, the switch settings are given for each span range. When more than one combination of switch settings satisfies the required span, select the one with the highest range number, shown horizontally to the left.

Proceeding to fine calibration, apply zero-scale pressure to the PT/EL and adjust the Zero potentiometer to yield an output of 4.00 mA. Next, apply full-scale pressure and adjust the Span potentiometer to yield and output of 20.00 mA. Although Zero, Span, and the switches are almost totally non-interactive, one more adjustment of the Zero and Span potentiometers will provide the most precise calibration. It is acceptable for the Span potentiometer to be near, but not at, the clockwise extreme when calibration is complete because the switches can always be re-adjusted if another calibration is ever desired.

If clockwise Span does not provide enough output current, re-adjust the switches to the next lower range number in the table; if counterclockwise Span gives too much output current, re-adjust the switches to the next higher range number in the table.

Example: If the desired range is 20 " W.C. and a 42" W.C. (0.1 Bar) sensor is installed in the transmitter, use range #2 which will give you a potentiometer adjustment range from 14.25 to 22 " W.C. Range #2 (S1 on/S2 off).

COARSE SPAN CALIBRATION SETTINGS

Positive Ranges

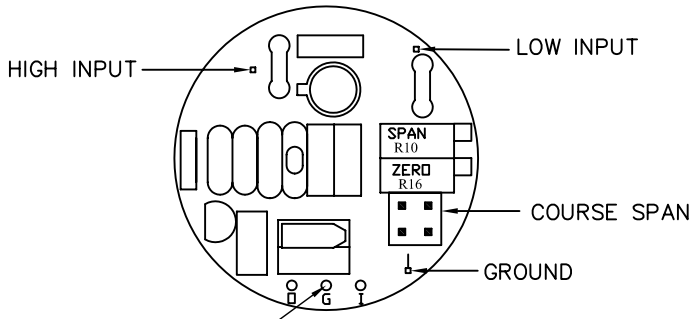
	GB07W	GB10W	GB12W	GB14W	GB16W	GB20W	GB22W	GB24W	GB28W	GB30W	Switch Positions		Pin Positions
Range No.	-10 to +10"WC	.05 Bar 21"WC	0.1 Bar 42"WC	0.2 Bar 84"WC	0.4 Bar 160" WC	1 Bar 415"WC	2 Bar 30 PSI	4 Bar 60 PSI	10 Bar 150 PSI	20 Bar 300 PSI	S1	S2	
1	1 - 2.5"	4 - 7.2"	10 -14.5"	20 - 28"	35 - 57"	86 - 138"	6 - 10.1#	12 - 20#	29 -49.5#	60-102#	Closed/ On	Closed/ On	Zero Pot Connect 2-4 
2	2.5 - 5"	7 - 11"	14.25 -22"	28 - 45"	55 - 96"	137.5 – 238"	9.6 - 17#	20.2 -34#	49.3 -84 #	100-164#	Closed/ On	Open/ Off	Zero Pot Connect 4-3 
3	5 - 7.5"	10.5 –17"	21 - 31"	45 - 65"	80 - 130"	205 - 335"	14.5 - 24#	29 - 48#	74.5 -120 #	145-243#	Open/ Off	Closed/ On	Zero Pot Connect 2-1 
4	7.5 - 10"	13.5 -21"	27 - 44"	65 - 87"	105 - 175"	260 - 435"	18.5 - 31.3#	37.5 -63 #	94.3-155 #	185-307#	Open/ Off	Open/ Off	Zero Pot Connect 1-3 

Vacuum Ranges

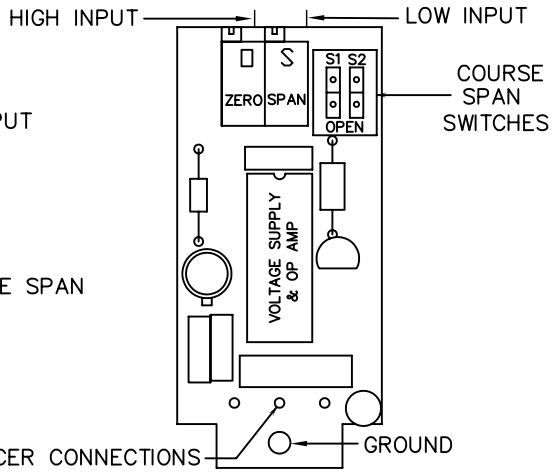
Range No.	5078 Neg. 3 PSIG	5030 15 PSIA	5031 30 PSIA	5029 50 PSIA	AB14W 84"WC ABS.	AB20W 15 PSIA	NGB82W Neg. 14 PSIG	S1	S2	
1	-0.87 to -1.38#	4.2 to 6.9#	8.4 to 13.8#	14.5 to 23.0#	20.0 to 28.0"	2.9 to 4.98#	2.94 to 4.86#	Closed/ On	Closed/ On	Zero Pot Connect 2-4 
2	-1.29 to -2.34#	6.4 to 11.7#	12.9 to 23.4#	21.5 to 39.0#	28.0 to 45.0"	4.96 to 8.58#	4.81 to 8.59#	Closed/ On	Open/ Off	Zero Pot Connect 4-3 
3	-1.80 to -3.30#	9.0 to 16.5#	18.0 to 33.0#	30.0 to 55.0#	45.0 to 65.0"	7.4 to 12.08#	8.54 to 12.72#	Open/ Off	Closed/ On	Zero Pot Connect 2-1 
4	-2.31 to -3.75#	11.5 to 18.0#	23.1 to 36.0#	38.5 to 60.0#	65.0 to 87.0"	9.38 to 15.7#	12.57 to full vacuum	Open/ Off	Open/ Off	Zero Pot Connect 1-3 

SIGNAL CONDITIONER

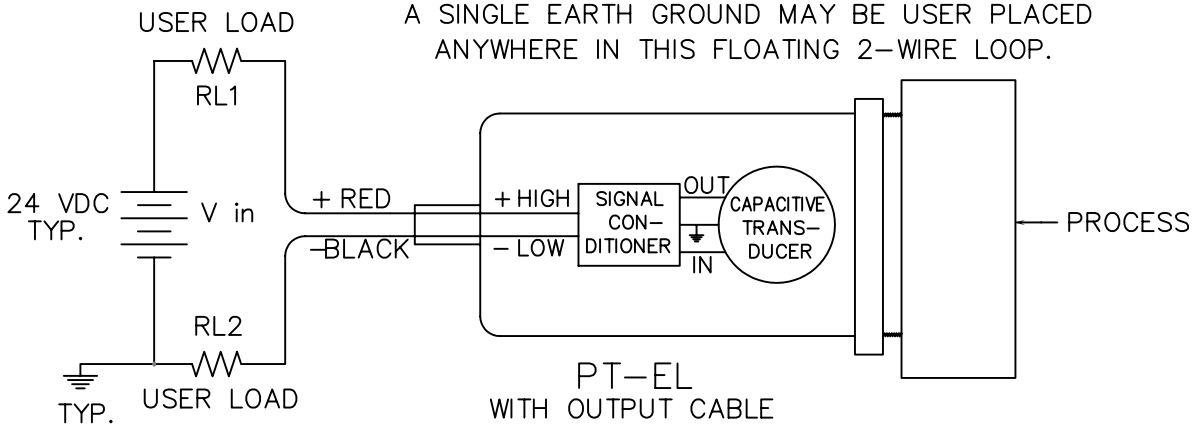
FOR MIN-PT-EL, PT-EL & P to I



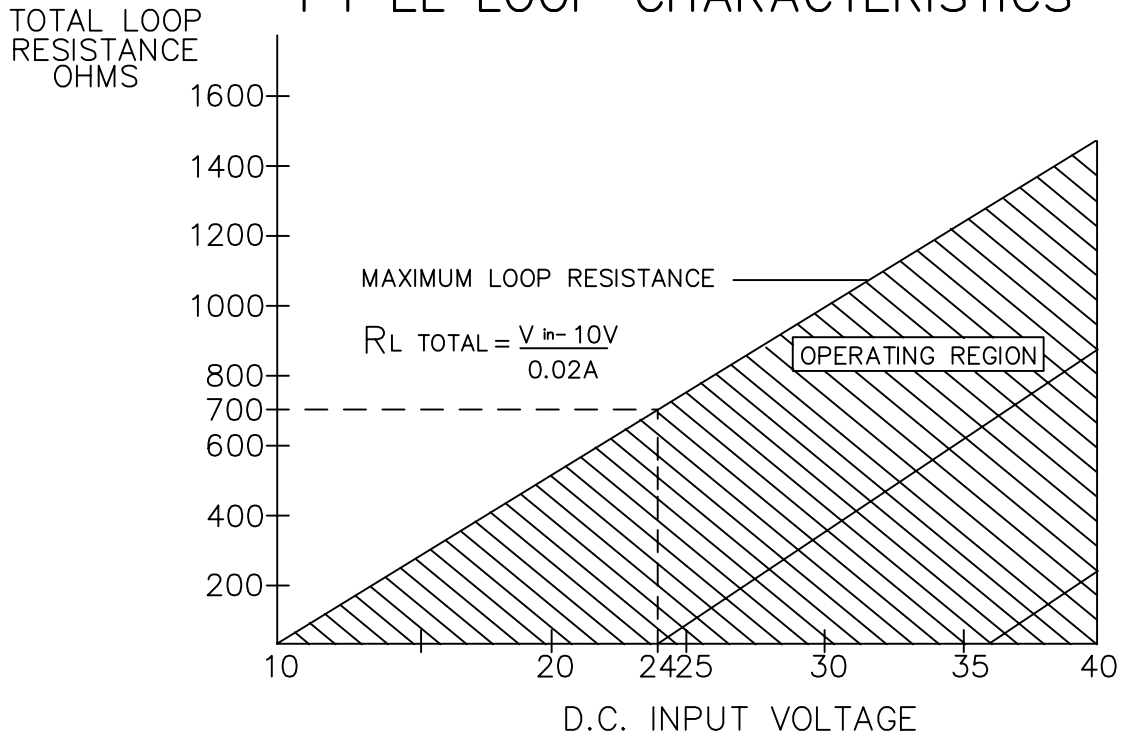
MIN-PT-EL-SLIMLINE



WIRING DIAGRAM



PT-EL LOOP CHARACTERISTICS



INSTALLATION AND OPERATING HINTS

FOR PMC ELECTRONIC TRANSMITTERS (SMT/EL, PT/EL, MIN-PT/EL & P/I)

CAUTION: Moisture and water are the big enemies of electronics. Our designs, coatings, and warning labels are aimed at protecting the electronics. Here are some examples of how water gets to the electronics.

(a) Failure to replace the cover, and lock with the detent pin (red warning label). Water leaks past the o-ring seal when the cover is not locked in place.

(b) The *Terminal Head version* is equipped with a vent fitting that permits a balance of barometric pressure to the inside of the sensor. The vent fitting stops water and moisture from entering the electronics' chamber. If water enters from the flexible conduit, or from high pressure wash-up, it is possible to short out the feed-through capacitors (RFI).

(c) The *Cable-type version:* PMC uses a special cable. The exterior jacket is extruded polyurethane. The interior includes a 26 gauge red(+) lead and a 26 gauge black(-) lead, plus a ground wire, and a vent tube. The vent tube permits a balance of barometric pressure to the inside of the sensor.

The cable-type version is now equipped with a dual 304 stainless steel cover. The dual cover forms a barrier between the electronics and cable entry. If moisture flows through the vent tube, the barrier blocks entry to the electronics' compartment.

Several major problems can arise from the vent tube. The most common are listed below.

(i) *Condensed water in the junction box*. A common problem in paper mills is, if no provision has been made to drain condensation, eventually enough water will accumulate and enter the cable vent tube. We tag the cable end and recommend that the junction box be located below the transmitter to prevent water entry.

(ii) *Collapsed or blocked vent tube.* False output signals will occur if the vent to the inside of the sensor is blocked. Avoid quick connectors that clamp the cable - they tend to collapse the vent.

(iii) *Temperature cycling in a damp atmosphere.* A typical example of this is the storage of milk in the dairy industry. Milk is normally stored at 4°C. Once a day, there is a (CP) clean in place operation that raises transmitter body and electronics to approximately 70-90°C. The temperature rise causes air in the electronics area to expand out the vent tube. After cleaning, the tank is refilled with milk at 4°C and there is an inboard flow of moist plant air that condenses on the cool interior of the electronics. Eventually, enough moisture collects and shorts out the capacitor sensor. Storage of fruit juice and beer are other examples of where this problem can arise.

(iv) *Extremely damp surroundings.* Some examples of this are head boxes and wet end suction boxes. Our recommendation is to install the cable-style transmitter with 10, 15, or 20 feet of cable connected to a junction box that is clear of the showers and high pressure wash-ups. There is less chance of shorting out the cable-style transmitter because it is completely sealed except for the vented connecting end.

(v) *Terminal Head version:* Avoid twisting the terminal head with a pipe wrench to line up with incoming conduit. Twisting the head results in substantial loss of calibration. Position the head by loosening the rear lock ring (LT-01-SAN).

Steps to take if moisture damage is suspected. Usually moisture is evident inside the cover and output is close to 0.07mA with 24 VDC applied and no load on the diaphragm. Some customers have used a hair dryer to dry out the sensor and signal conditioner. Avoid temperature above 100°C (212°F). If this step fails, return the transmitter to PMC for service.

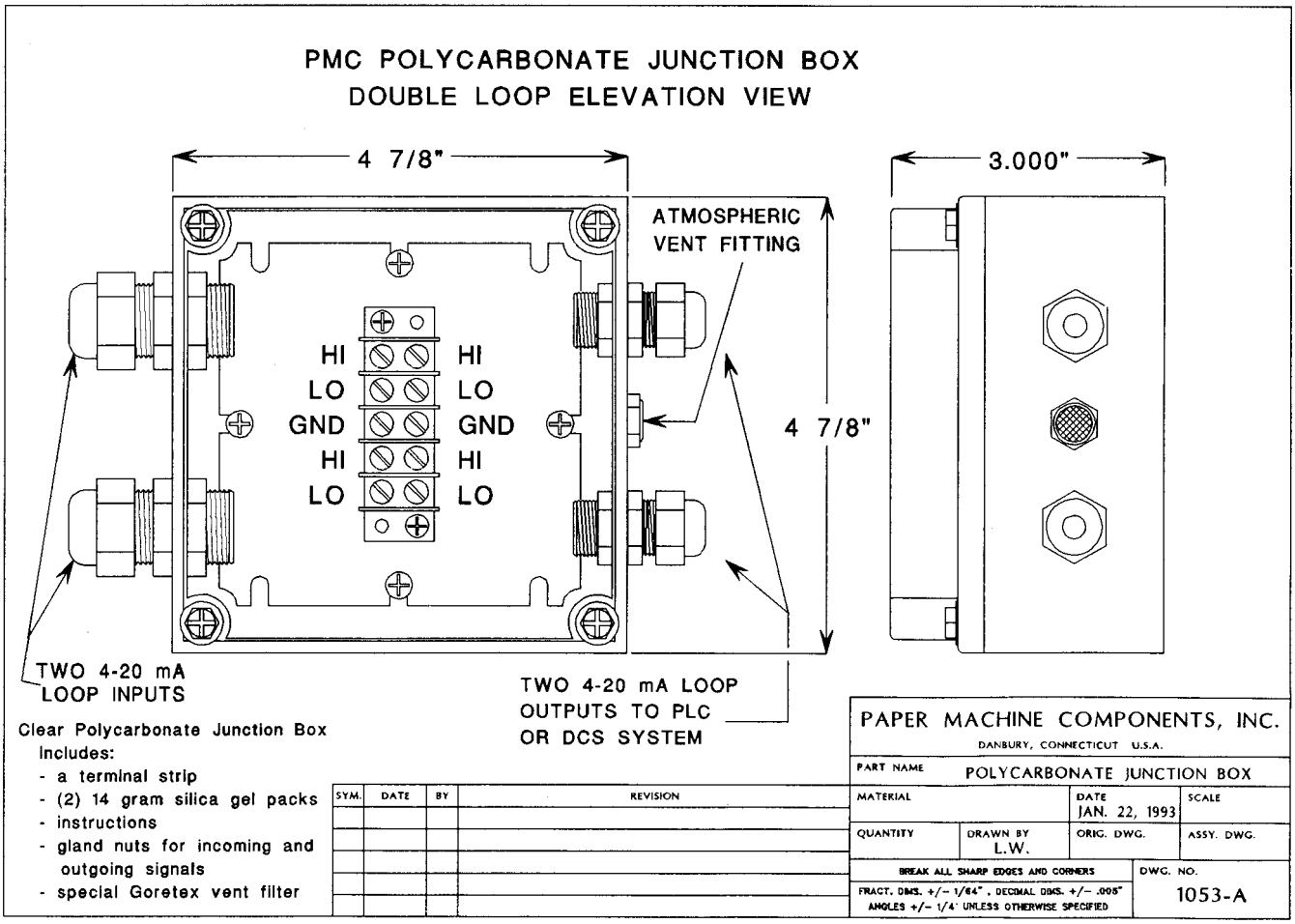
Why is a vent to the inside of the sensor necessary? Atmospheric pressure can vary from 29"Hg to 31"Hg, a shift of roughly 30"W.C.

If the transmitter range is 0-40" W.C. (1000mm), the error from barometric pressure shift could account for 75% of range, hence the need for a sensor vent to achieve accurate output signals, especially at low ranges.

PSIA Sensors (pounds per square inch absolute). The area between sensor diaphragm and body has been fully exhausted and then sealed. It is referenced to absolute vacuum and fails to present a true picture of barometric pressure changes.

PMC prefers to offer vacuum and compound sensors that are gauge type (vented to atmosphere), and set up so that output is 4mA at atmosphere and 20mA at the chosen vacuum range.

PMC's answer is to provide a clear Lexan junction box with controlled venting through a color-indicating desiccant. Again, the customer must use care to seal the outgoing signal cable, otherwise all the effort and expense is wasted. See drawing below. (Single loop also available.)



PAPER MACHINE COMPONENTS, INC.

PT-EL TERMINAL HEAD

PMC ELECTRONIC TRANSMITTER

MIRY BROOK ROAD, DANBURY, CONNECTICUT, U.S.A. 06810 ~ TEL. (203) 792-8686 FAX (203) 743-2051

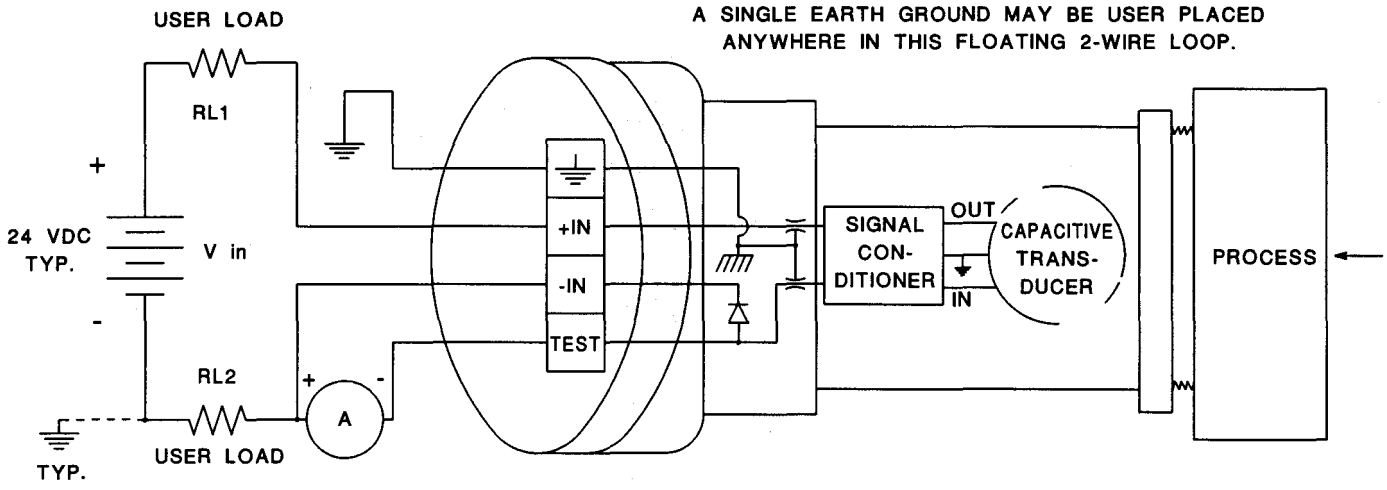
The **PMC PT-EL Terminal Head** is optionally offered in lieu of the cable interface furnished with the standard PT-EL. The Terminal Head serves as an integral junction box for the PT-EL.

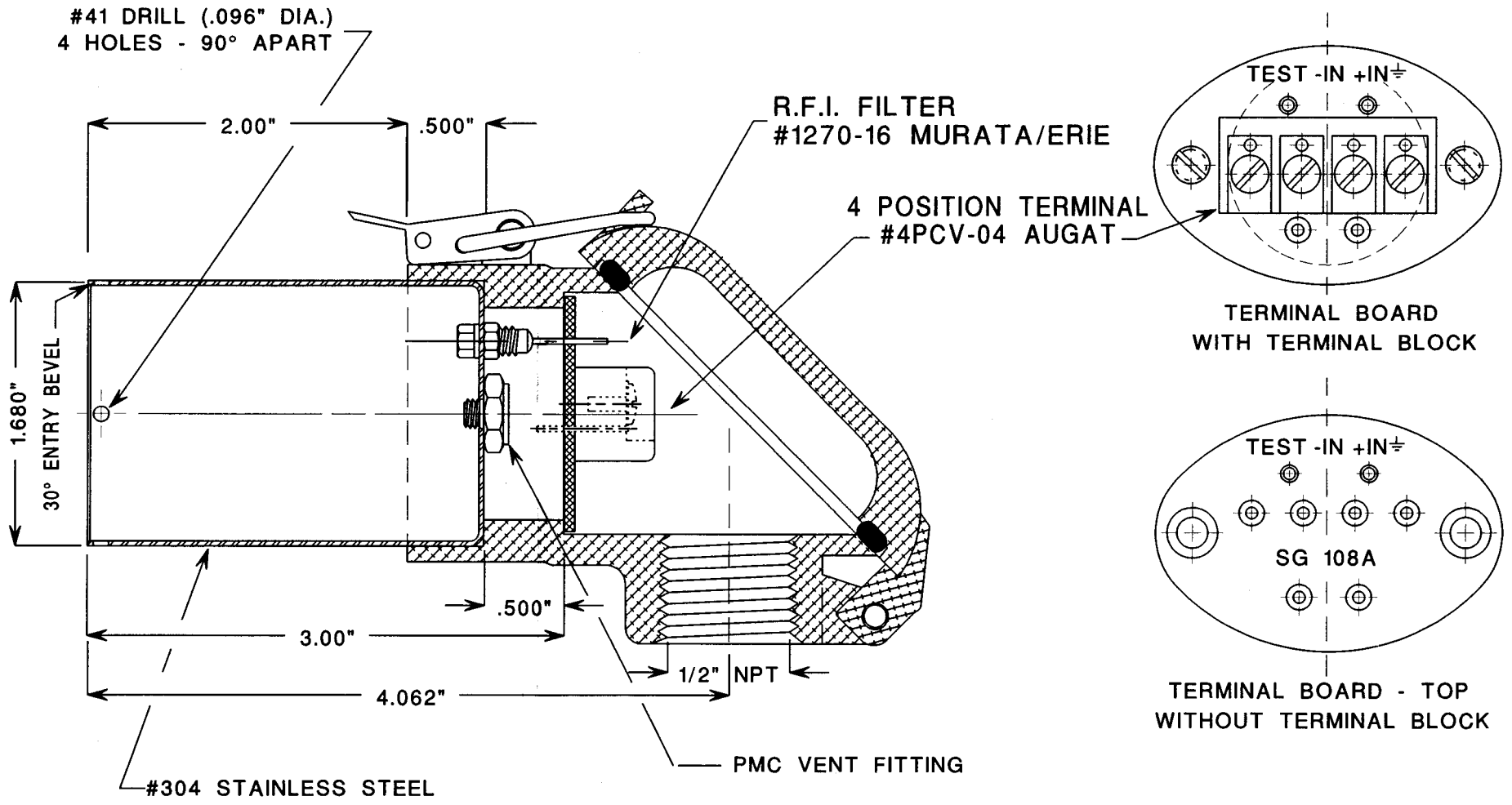
User wiring is brought to the PT-EL through a 1/2" NPT conduit entry. A four-position terminal strip with #4-32 screw clamps accepts the field wiring. The four terminals are: +IN, -IN, TEST, and EARTH GROUND. Two-wire current enters the +IN terminal and exits the -IN terminal. In-process current monitoring is possible using a milliammeter across the TEST (+lead) and -IN (-lead) terminals without disconnecting field wiring. The milliammeter should have less than 20 ohms series resistance in order to preserve measurement accuracy. The EARTH GROUND terminal is connected to the chassis of the transmitter and provides a user safety-ground connection as well as enabling the EMI/RFI immunity inherent in the terminal head design.

The Terminal Head is an aluminum die-casting with a black anodized finish. It measures 3" at its widest diameter and adds approximately 3" to the length of the PT-EL and 9 ounces to the weight. The cover, with an O-ring seal, is retained by a snap clip. There is easy access to the internal terminal strip. The entire assembly provides NEMA 4 protection and measures 6" in length.

The combination Terminal Head/Stainless Can assembly may be removed for field calibration or service by depressing the detent pin. This procedure, as with all others associated with user application of the PT-EL plus Terminal Head, is identical to that performed on the standard PT-EL.

PMC PT-EL TERMINAL HEAD WIRING DIAGRAM





SYM.	DATE	BY	REVISION
	2/27/92	R.S.	ADDED HOLE C/L DIMENSION
	6/28/94	L.W.	1-DETENT-HOLE VERSION FOR PT-EL, (4) FOR MINI-PT-EL
	7/22/99	S.N.	FLIP-TOP VERSION

PAPER MACHINE COMPONENTS

DANBURY, CONNECTICUT U.S.A.

PART NAME: PT-EL-TCAP TERMINAL HEAD ASSEMBLY

MATERIAL		DATE	SCALE
ALUMINUM & 304 S/S		JULY 22, 1999	FULL
QUANTITY	DRAWN BY: S.N.	ORIG. DWG.: 5/24/93 L.W.	ASSY. DWG.

BREAK ALL SHARP EDGES AND CORNERS

FRACT. DIMS. +/- 1/64" , DECIMAL DIMS. +/- .005"
ANGLES +/- 1/4° UNLESS OTHERWISE SPECIFIED

DWG. NO. 2451-A

PAPER MACHINE COMPONENTS, INC.

PT-EL S/S TERMINAL HEAD

PMC ELECTRONIC TRANSMITTER

MIRY BROOK ROAD, DANBURY, CONNECTICUT, U.S.A. 06810 ~ TEL. (203) 792-8686 FAX (203) 743-2051

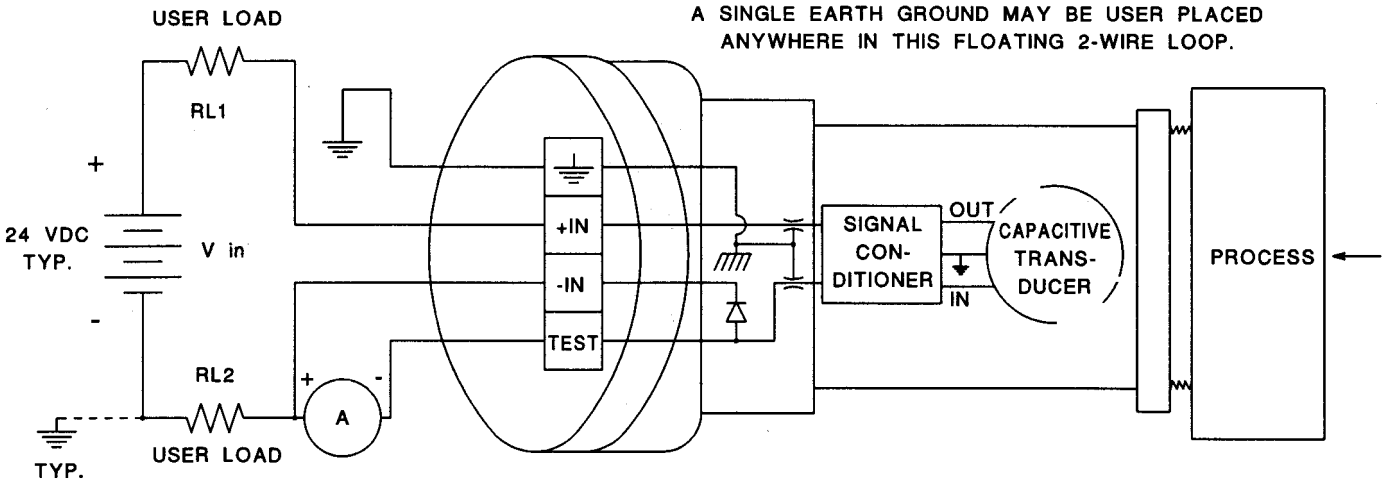
The **PMC PT-EL Stainless Steel Terminal Head** is optionally offered in lieu of the cable interface furnished with the standard PT-EL. The Terminal Head serves as an integral junction box for the PT-EL.

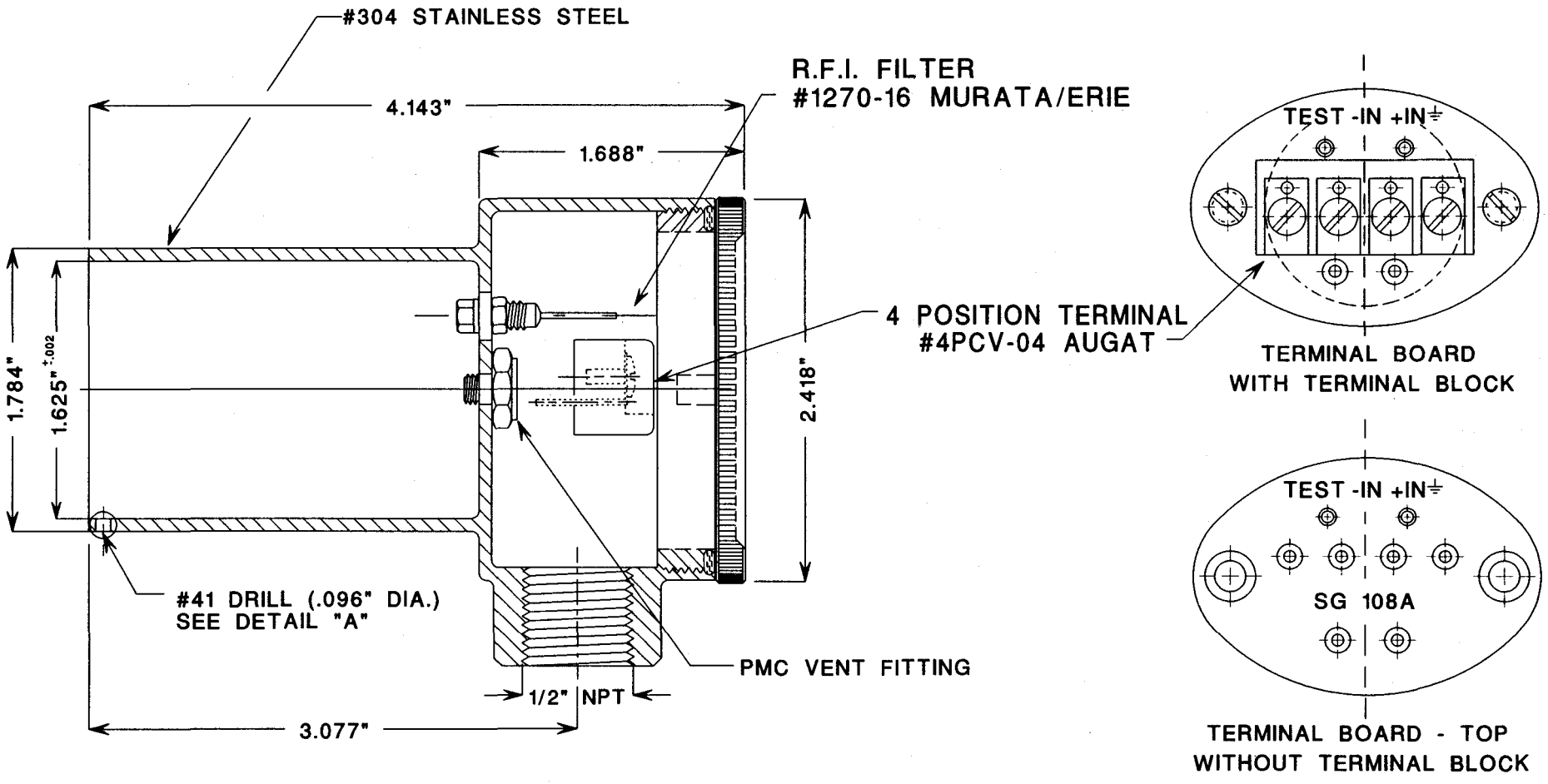
User wiring is brought to the PT-EL through a 1/2" NPT conduit entry. A four-position terminal strip with #4-32 screw clamps accepts the field wiring. The four terminals are: +IN, -IN, TEST, and EARTH GROUND. Two-wire current enters the +IN terminal and exits the -IN terminal. In-process current monitoring is possible using a milliammeter across the TEST (+lead) and -IN (-lead) terminals without disconnecting field wiring. The milliammeter should have less than 20 ohms series resistance in order to preserve measurement accuracy. The EARTH GROUND terminal is connected to the chassis of the transmitter and provides a user safety-ground connection as well as enabling the EMI/RFI immunity inherent in the terminal head design.

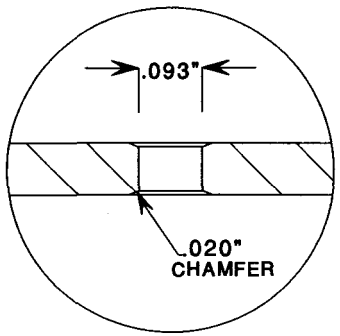
The Terminal Head is a 304 stainless steel die-casting. It measures 3" at its widest diameter and adds approximately 2" to the length of the PT-EL and 16 ounces to the weight. The cover is complete with an O-ring. There is easy access to the internal terminal strip. The entire assembly provides NEMA 4 protection and measures 5 1/4" in length.

The Stainless Steel Terminal Head assembly may be removed for field calibration or service by depressing the detent pin. This procedure, as with all others associated with user application of the PT-EL plus Terminal Head, is identical to that performed on the standard PT-EL.

PMC PT-EL TERMINAL HEAD WIRING DIAGRAM







DETAIL "A" SHOWN
10X FULL SCALE

CERTIFIED PRINT

SYM.	DATE	BY	REVISION

PAPER MACHINE COMPONENTS
DANBURY, CONNECTICUT U.S.A.

PART NAME PT-EL-SS S/S TERMINAL HD ASSY			
MATERIAL #304 S/S		DATE 05/12/00	SCALE FULL
QUANTITY	DRAWN BY S.N.	ORIG. DWG. L.W.	ASSY. DWG.
BREAK ALL SHARP EDGES AND CORNERS			DWG. NO.
FRACT. DIMS. +/- 1/64", DECIMAL DIMS. +/- .005" ANGLES +/- 1/4° UNLESS OTHERWISE SPECIFIED			2450-A

PAPER MACHINE COMPONENTS, INC.
MIRY BROOK ROAD, DANBURY, CONNECTICUT, U.S.A. 06810
Tel. (203) 792-8686 Fax (203) 743-2051

MINIATURE ELECTRONIC PRESSURE TRANSMITTER INSTALLATION & OPERATING DATA

(1) CUT HOLE FOR NIPPLE

Drill or cut a hole slightly smaller than the nipple outside diameter (1.316") in the top or side of the pipe where the transmitter is to be located. The hole should be close to a flange or opening so that the inside wall of the pipe can be cleaned up after the nipple is welded in place. File the hole so that the steel nipple fits tightly into the hole. The fit must be snug, otherwise the nipple will cock when it is welded in place. PMC offers a collapsing mandrel that helps prevent distortion of the nipple.

NOTE: Marvel* or similar nipple hole saws (1.316" O.D., 33mm) may be used with a slow speed drill (150 RPM) to cut out the proper size hole. The saw teeth should be continuously cooled and lubricated while cutting the hole with a water soluble cutting oil such as Rustlick WS-500. (*Armstrong-Blum Mfg. Company, 1441 Business Center Drive, Mt. Prospect, IL, manufacture Marvel hole saws.)

PMC offers a Hole Saw Kit (PT-HSK) which includes a ground Marvel hole saw, mandrel, drill, guide dowel, SRC speed control, cutting oil concentrate, applicator and case. Needs 1/2" electric drill.

(2) WELD NIPPLE IN PLACE

Position the nipple and transmitter with set screw installed into the hole so that the diaphragm on the transmitter is flush with the inside wall of the pipe. Mark the nipple both inside and out. On small diameter pipes (4" or less) the nipple and transmitter will protrude into the pipe due to crown of the pipe. **(The Transmitter must be removed from the nipple before welding.)** Weld the nipple in place with either Heliarc (inert gas arc process) or with arc and stabilized 316 stainless steel rods. This will prevent carbide precipitation and subsequent corrosion at the weld.

(3) GRIND NIPPLE FLUSH

Finish grind the nipple flush with the inside of the pipe. Clean up the inside edge of the nipple at the pipe end with a fine half round file. Remove all burrs but do not make any ridges or grooves on the inside nipple wall, otherwise material inside the tank will leak past the O-ring seal.

(4) INSTALL TRANSMITTER

Capsules of Dow Silicone grease (Valve Seal) are furnished with each order. Apply a thin wipe to the O-ring, diaphragm ring, edge of the nipple, and the remainder to the inside wall of the nipple at the bottom end where it connects to the pipe wall. Silicone grease is stable from -40° to 500° F and does not readily dissolve. Install the transmitter and locate with set screw. The transmitter diaphragm will be flush with the inside wall of the pipe if the nipple was properly positioned before welding. NOTE: Avoid contact with the eyes when using silicone grease.