

INSTRUCTION MANUAL

FOR

MODEL 900GA314

SHORT-STOP PFM TRANSMITTER

Robertshaw

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INSTRUCTION MANUAL NUMBER

909GF291

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SECTION I - DESCRIPTION

1.1 GENERAL

PFM Transmitters are pulse modulated transmitters designed for use with the Level-Lance® microprocessor based instruments with the Short-Stop option. The PFM is normally mounted in an aluminum enclosure mounted on a Short-Stop probe.

The PFM is used with Models 5001, 5100 and M5008 instruments and with a Short-Stop probe to ignore coating build-up between the vessel and the probe. Used for on-off applications only.

The PFM Transmitter provides a pulse and frequency modulated CURRENT signal whose period is proportional to the capacitance at the probe connection. The period in milliseconds is approximately equal to the probe capacitance in picofarads, IE: the PFM output waveform will be approximately 100 milliseconds if the probe capacitance is 100 picofarads. This is a current waveform defined by 5 mA in the low state and 25 mA in the high state. The power to activate the circuit is supplied from the Level-Lance® instrument and is 15 VDC.

Since the PFM output is a current modulated signal, special shielding is normally not required; however, normal shielded wire or grounded metal conduit with no power lines present is recommended.

1.2 PART NUMBER IDENTIFICATION

- Probe Mounted NEMA 4 (Blue)..... 900GA314-01
- Remote Mounted NEMA 4 (Blue)..... 900GA314-02
- Probe Mounted NEMA 4X (Gray)..... 900GA314-03
- Remote Mounted NEMA 4X (Gray)..... 900GA314-04

SECTION II - SPECIFICATIONS

2.1 ENVIRONMENTAL

- Operating Temperature Range -40° F to +140° F
(-40° C to +60° C)
- Storage Temperature Range -40° F to +180° F
(-40° C to +82° C)
- Ambient Temperature Effect 0.005 pF/deg. F
(0.01 pF/deg. C)
or 0.005%/deg.F
(0.01%/deg. C)
whichever is greater

2.2 ELECTRICAL

- Supply 15 VDC supplied by Level-Lance®

2.3 PERFORMANCE

- Input Capacitance 20 pF to 6,000 pF
- Output..... Pulse modulated current
signal, 5 to 25 mA
- Linearity..... ± 0.5%
- Interconnecting Cable Standard 3 conductor
Belden #9492 or
#9364 or equivalent

2.4 ENCLOSURE

- Weathertight and Explosion Proof..... NEMA 4 or 4X,
and NEMA 7CD & 9EFG

SECTION III - INSTALLATION

3.1 GENERAL

Examine the instrument for possible shipping damages. **IMPORTANT:** If for any reason it is determined that parts should be returned to the factory, please notify the nearest Robertshaw sales representative prior to shipment. Each unit must be properly packaged to prevent damage. Robertshaw assumes no responsibility for equipment damaged in shipment due to improper packaging.

Choose the location in accordance with good instrument practice, avoiding extremes of temperature, humidity, and vibration (See SPECIFICATIONS, Section II).

3.2 PROBE MOUNTING

Robertshaw probes are purchased separately from the instruments and are available in a variety of sizes and types with numerous options for the materials of construction. Each probe should be selected for the specific application in order to ensure the best and most reliable operation of the system.

Only a Short-Stop probe may be used with the Short-Stop PFM Transmitter. The Short-Stop probe and PFM should be used when detecting levels of viscous, sticky materials that tend to cling and build up on the sensing probe. By addition of the Short-Stop circuitry and probe, the effects of this type build-up can be eliminated and reliable, accurate level detection will occur.

When installing the Short-Stop probe, the Short-Stop element of the probe must extend at least four (4) inches into the process. Therefore, if the probe is installed in a nozzle, or well, the probe must be specified with length dimensions that will ensure that this condition is met.

3.2.1 HORIZONTAL MOUNTING

Horizontally mounted rigid probes must be installed in the vessel at the desired point of level detection. Horizontally mounted probes provide the closest control (smallest deadband) in that a small level change at or near the probe will produce a large capacitance change.

On applications involving viscous liquids or materials that have a tendency to "cling" or "build up", it is recommended that a probe be mounted on a slight downward angle to permit draining of the material from the probe.

3.2.2 VERTICAL MOUNTING

Vertically mounted rigid probes should be installed in either the top or bottom of the vessel. Vertically installed Short-Stop probes allow a variation in the level detection point up and down the active portion of the probe when used with a non-conductive, low dielectric process by means of the instrument

zero adjustment. When used with a conductive, high dielectric process, Short-Stop probes are tip sensitive and do not allow adjustment up and down the probe.

3.3 INSTRUMENT MOUNTING

The PFM Transmitter is designed for mounting remotely from the control instrument up to a maximum distance of one mile. The PFM is normally mounted directly on the probe but may be mounted remotely from the probe up to a maximum distance of 15 feet. However, it is recommended to keep this distance as short as possible. Remote mounting requires a special triaxial cable which must be ordered separately and the PFM must have the remote mounting flange and plug. See Figure 3-1 mounting dimensions.

3.4 ELECTRICAL CONNECTIONS

All electrical connections should be made in accordance with Figure 3-2. **NOTE:** It is important that the PFM enclosure or probe mounted conduit outlet box be grounded to the process in some way to provide continuity for the capacitance signal. If an unlined metallic vessel is not employed it may be necessary to provide a ground rod inside the vessel.

3.4.1 INTERCONNECTING CABLE

The PFM Transmitter at the probe is connected to the control instrument by means of ordinary wires in grounded metal conduit with no power lines present. As an alternate, use shielded wires. Three conductors are required for the Short-Stop PFM. The use of color coded wire is recommended.

| |
|---|
| <p style="text-align: center;">WARNING Seal fittings must be installed in all explosion proof installations.</p> |
|---|

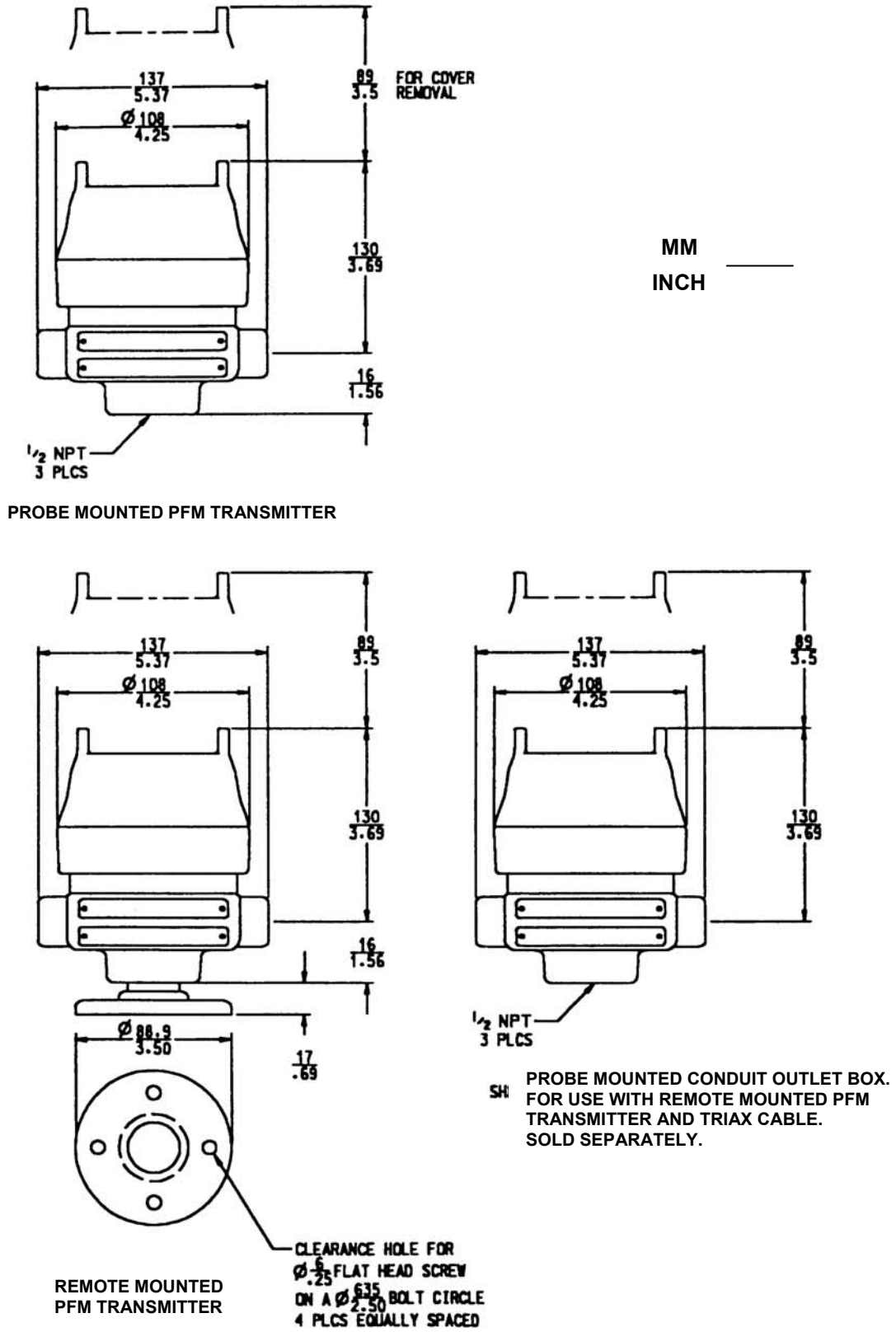


FIGURE 3-1

Mounting Dimensions

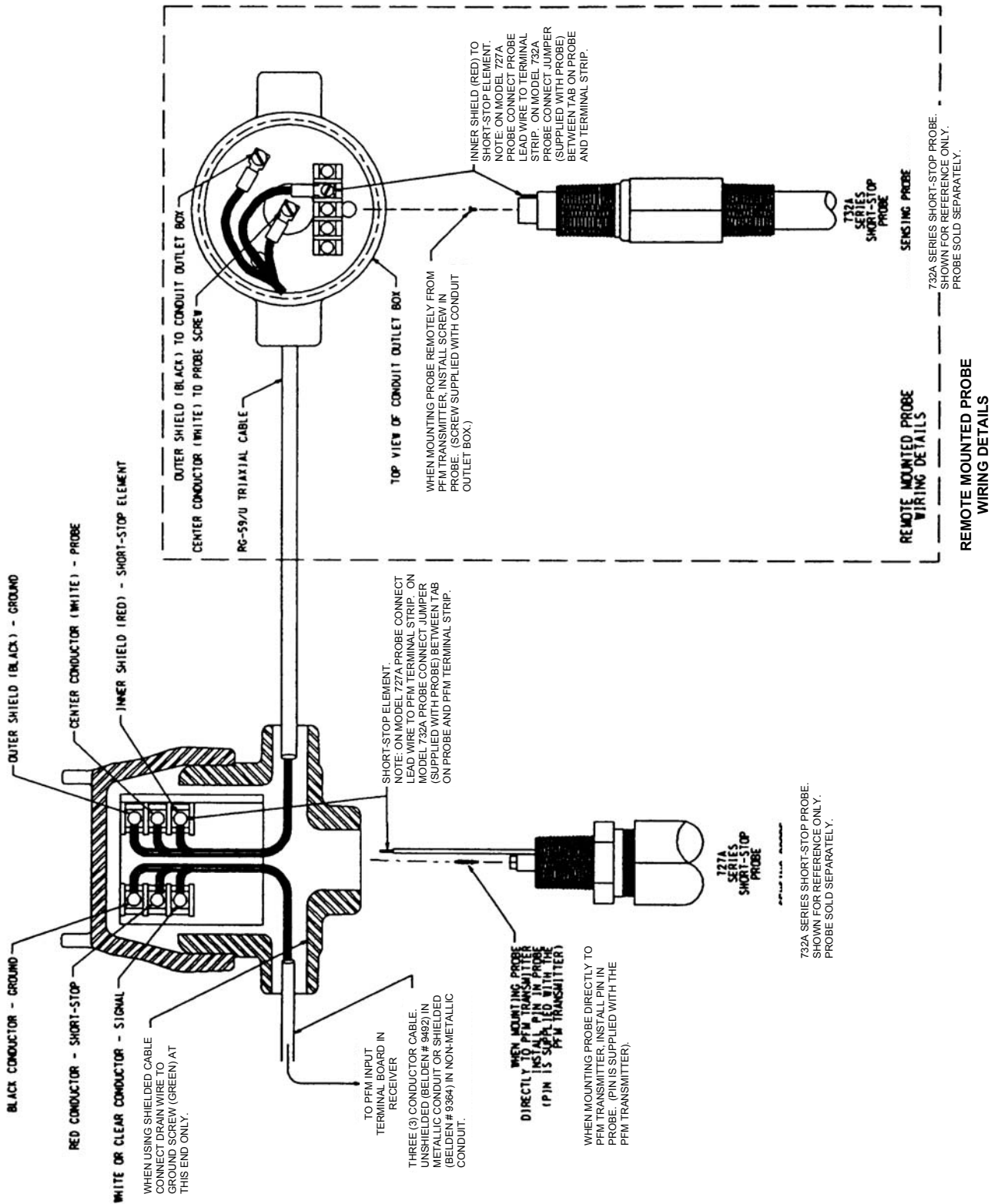


FIGURE 3-2

Electrical Connections

SECTION IV - OPERATION

4.1 DESCRIPTION

The PFM Transmitter is a capacitance to pulse modulated current output device. It is mounted in an aluminum enclosure that is normally mounted directly on a capacitance sensitive level probe.

The circuit has provisions to attenuate high voltage transients on the probe due to static and provisions to attenuate disturbances that might occur on the signal lines.

There is no calibration or adjustment required with a PFM Transmitter as all required calibration is done automatically in the control room instrument (Level-Lance®).

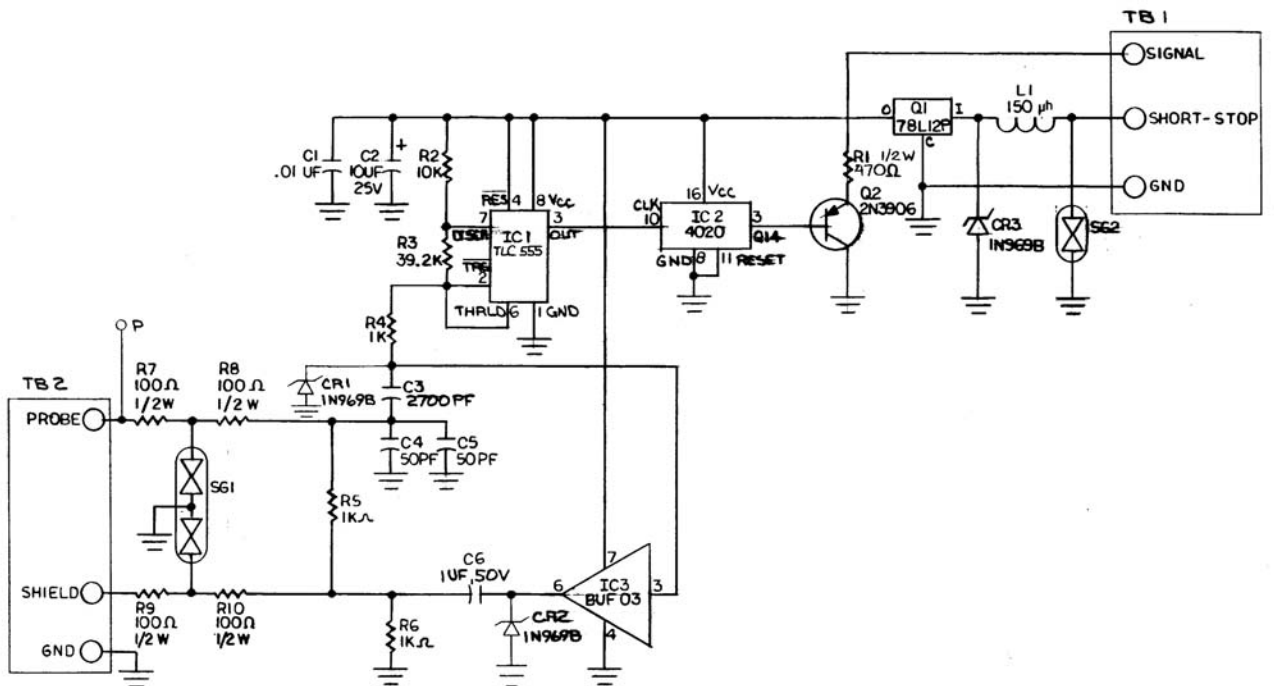


FIGURE 4-1

Electrical Schematic

SECTION V - MAINTENANCE AND TROUBLESHOOTING

5.1 GENERAL

There is no calibration required on the PFM Transmitter.

5.2 PROBE CIRCUIT ELECTRICAL CHECK

Most problems can be traced to the probe, the PFM Transmitter, or the associated wiring. When a probe circuit problem is indicated, the following procedure should help to isolate it. A Multimeter is required to perform these tests. Perform the tests in the order given.

| MEASUREMENT | READING | REMARKS |
|---|--|--|
| On receiver, voltage between GND and SIG terminals with PFM Transmitter disconnected. | 14 to 16 VDC (12 VDC for model 5001) | Normal, proceed. |
| | 0 to 13 VDC (0 to 11 VDC for model 5001) | Defective receiver. |
| | Greater than 16 VDC (Greater than 13 VDC for model 5001) | Defective receiver. |
| On receiver, voltage between GND and S/S terminals with PFM Transmitter disconnected. | 14 to 16 VDC | Normal, proceed. |
| | 0 to 13 VDC | Defective receiver. |
| | Greater than 16 VDC | Defective receiver. |
| On receiver, voltage between GND and SIG terminals with PFM Transmitter connected. | 10 to 15 VDC, may be erratic | Normal, proceed. |
| | 1 to 9 VDC | Defective PFM Transmitter or interconnection wiring reversed. |
| | 0 VDC | Interconnection wiring shorted. |
| On receiver, voltage between GND and S/S terminals with PFM Transmitter connected. | 10 to 15 VDC | Normal, proceed. |
| | 0 VDC | Connections shorted. |
| On receiver, current between the SIG terminal and its wire from the PFM Transmitter. Note: Meter is in series with (+) lead and the SIG terminal. | Approx. 4 to 25 mA, may be erratic and vary with meter used. | Normal, proceed. |
| | 0 mA | Interconnection wiring open. |
| | Steady 1 to 5 mA | Abnormal, proceed. |
| | Steady 17 to 25 mA | Abnormal, proceed. |
| Remove PFM Transmitter and measure resistance between center rod of probe and ground using highest scale on meter. Do not touch the probe or meter leads as your body resistance will change the reading. | Greater than 10 MOhm | Normal, problem is most likely defective PFM Transmitter. |
| | Less than 1 MOhm | Defective probe - shorted. |
| | 1 to 10 MOhm | Leaky probe, probably not causing a problem but possible future problem. |

5.3 SPARE PARTS

| DESCRIPTION | PART NUMBER |
|--|---------------------------------|
| ELECTRONICS ASSEMBLY Consists of printed circuit assembly and mounting bracket. | 044KX029 |
| PROBE PIN | 909GM079 |
| WIRE KIT For connecting standard (Teflon insulated) Short-Stop probe shield to transmitter. | 909GM183 |
| REMOTE MOUNTING KIT, NEMA 4 (blue) | 909GM174-02 |
| REMOTE MOUNTING KIT, NEMA 4X (gray) | 909GM174-04 |
| TRIAxIAL CABLE For connecting remote mounted transmitter to probe. | Contact factory for part number |



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