# *BINTECH*

## REMOTE LEVEL SENSING DISPLAY SYSTEM

### Installation and Commissioning Note 3

These notes describe the installation and commissioning of the Bintech fill pit display unit BI-1030 with the Bintech BI-2000 level sensor, Pretop 5343B transmitter and BI-1240 series or AIC PM4 controller/display.

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Installation Note 3
(240 Vac and dc loop powering)
Version 2.0
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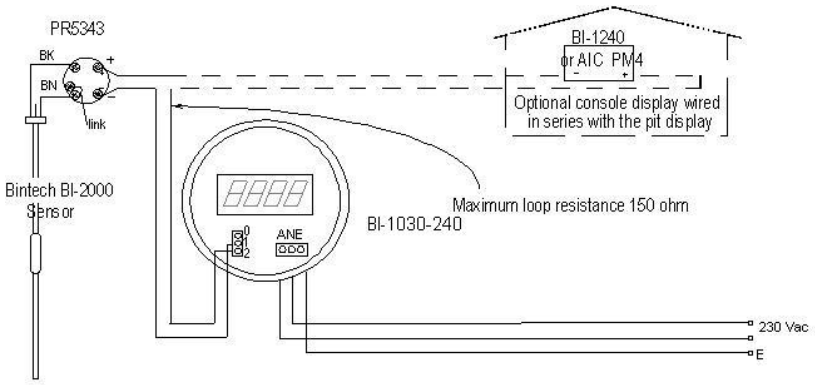
# INSTALLATION OF THE BINTECH REMOTE DISPLAY SYSTEM

## 1. INTRODUCTION

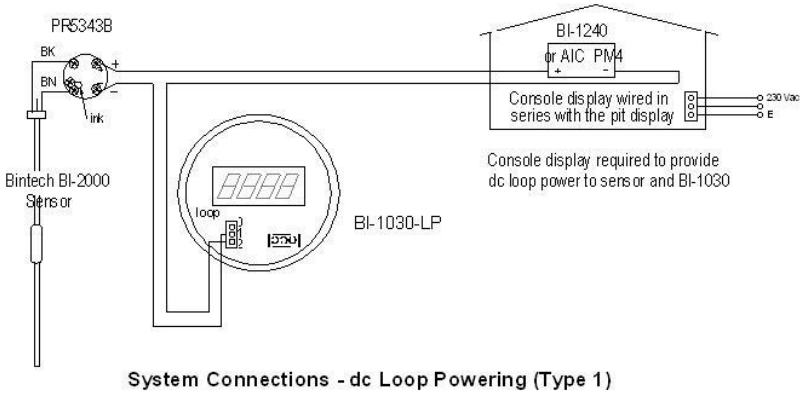
The Bintech Remote Display System enables the monitoring of the level of a remote tank. It comprises a sensor BI-2000, the external indicator BI-1030 and the internally located BI-1240 indicator. The 1030 has an illuminated (Liquid Crystal) display for operation in hazardous areas and is ideally suited for installation in the underground fill pit of LPG tank installations. The BI-1240 enables an additional indication at an internal location. The displays are driven directly from a linearised signal from the tank level transmitter. Either one or both indicators may be included in the loop. Typically one is AC powered and supplies 4-20 mA DC to the loop. The other is powered from the loop. Additional indicators may be included in series in the loop.

***If the equipment is not installed and used in accordance with these instructions then the safety protection provided by the equipment may not be achieved. All equipment must be installed in accordance with the relevant Australian Standards.***

## 2. SYSTEM CONFIGURATIONS – TYPICAL

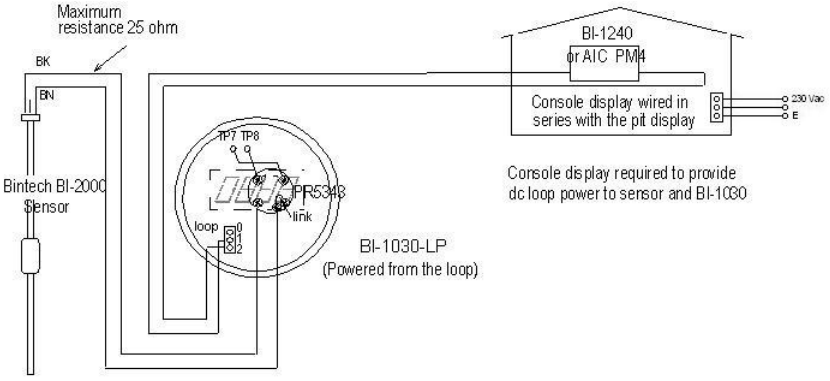



System Connections - 230 Vac Powering




System Connections - dc Loop Powering (Type 1)

## 3. INSTALLATION




System Connections - BI-1030 Loop Powered (Type 2)

### 3.1 BI-2000 Bintech Sensor

*Before installing, check bottom clamp for tightness*. The sensor should be installed with the head enclosure positioned so that the cover may be readily removed and the cable terminations accessed without fouling other equipment in the tank turret. The sealing plugs, glands and lockscrew must be tightened. Do **not** attempt to twist the head enclosure after the sensor unit has been installed.

### 3.2 BI-1030 Fill Pit Display

Before installing, confirm the operation and calibration of the display, see Connections section. The display unit can be mounted on the bracket within the pit and attached to the Emergency stop button using a ½ inch 14 NPT threaded coupling. The gland seal must meet AS2381 (or appropriate local standard) and be screwed in at least 5 threads. The 230 Vac power source (A, N & E) and the signal pair may be accessed via the cabling to the Emergency Stop. The unused threaded opening must be sealed with the blanking plug supplied. If required, the display board may be rotated in 90 degree steps - see section on Connections.

### 3.3 BI-1240s Console Display

Before installing, confirm the operation and calibration of the display, see Connections section. The display unit requires an internal (non hazardous) location. It can be surface mounted.

### 3.4 Power Supply and Wiring

| | |
|---|---|
| The BI-1030 & BI-1240 displays power requirements | 230 Vac nominal 50/60 Hz 7 VA or<br>4 to 20 mA dc loop (1030 model only) |

AC Power conductors:- at least 1 $mm^2$ and the connector to the BI-1030 & BI-1240 of 7 A rating.

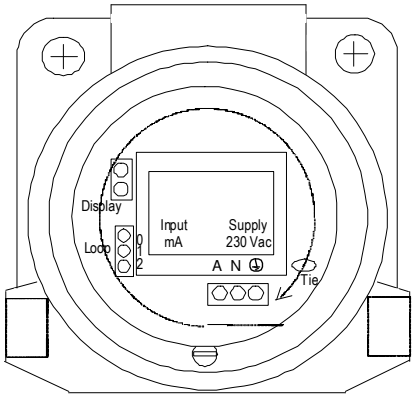
A disconnect device of maximum 2 A rating shall be fitted in the primary power supply to the display units. It should be located nearby and be readily accessible and marked as the disconnect device for this equipment. Where it is not possible to rely on the identification of the neutral line the disconnect device shall be a double pole type. Any automatic disconnect device shall operate within 30 ms. The BI-1030 is to be hardwired. The BI-1240 is to be hardwired. Wiring shall meet AS3000 and AS2381.

## 4. CONNECTIONS

### 4.1.1 BI-1030 – 230 Vac 50/60 Hz Power

***Wiring to the display unit must be installed in accordance with the relevant Australian Standards.***

1. Terminate wiring in the 1030 display unit as follows:.
2. Release the lockscrew (1/16" hex) and unscrew the cover assembly Gently lift out the transparent panel with the display board and unplug from the power board if it cannot be located safely during termination of the cables. Lift off green plugs (small 3 way and large 3 way) from the power board.
3. For either Left or Right Hand cable entry bring in the wires and make about 1 turn around the power board.
4. Terminate the 230 Vac active, neutral and earth wires on the 3 way plug. The internal earth connection to the base of the case is not normally required. A protective earth terminal is available on the exterior of the enclosure if required.
5. Fit a cable tie around the active, neutral and earth wires where they terminate in the 3 way plug.
6. Terminate the input signal loop on the 3 way plug.
7. Reconnect the twin cable from the display board to the power board.
8. Refit the display board and transparent panel. (The display board may be rotated in 90 degree steps by lifting out the display board and relocating it in the holes on the power board.)
9. Refit the cover and tighten the lockscrew.

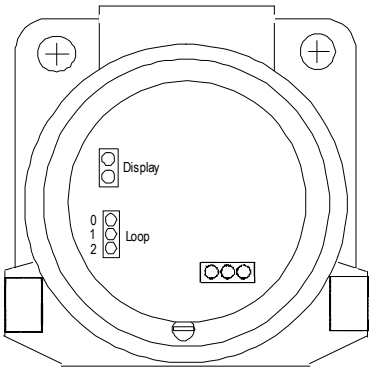



**BI-1030 - Terminations**
**(230 Vac powered)**

### 4.1.2 BI-1030 – dc Loop Power

Terminate wiring in the display unit as follows:

1. Release the lockscrew (1/16" hex) and unscrew the cover assembly.
2. Gently lift out the transparent panel with the display board and unplug from the power board if it cannot be located safely during termination of the cables.
3. Lift off green small 3 way green plug from the power board.
4. For either Left or Right Hand cable entry bring in the wires and make about 1 turn around the power board.
5. Terminate the input signal loop on the 3 way plug.
6. Reconnect the cable from the display board to the power board.
7. Refit the display board and transparent panel. (The display board may be rotated in 90 degree steps by lifting out the display board and relocating it in the holes on the power board.)
8. Refit the cover and tighten the lockscrew




**BI-1030 - Terminations**
**(dc loop powered)**

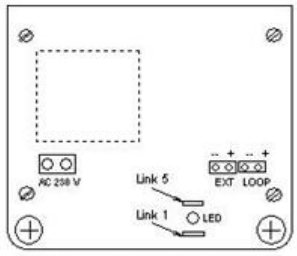
#### 4.2.1 BI-1240 series – 230 Vac 50/60 Hz Power

***Wiring to the display unit must be installed in accordance with the relevant Australian Standards.***

Mount the enclosure using the four screw holes in the base. Fit the snap caps over the heads of the mounting screws. See the separate Mounting Instructions sheet supplied with the unit for the dimensions of the mounting holes and location of cable entries.

The power and loop signal cables may enter the enclosure on any side. A gland should be fitted at the cable entry. Depending on the location a conduit may be required for the AC supply conductors. Terminate wiring in the BI-1240 display unit as follows:

1. Terminate the 230 Vac active and neutral wires on the 2 way plug. Conductor size of 1 $mm^2$ is recommended. No protective earth is required.
2. Fit a cable tie around the unsheathed power conductors.
3. The loop input circuit must be isolated from hazardous live under normal and single fault conditions. Terminate the conductors on the 2 way connector and plug it into the LOOP socket. The correct polarity is indicated when the LED operates while the system is powered up.
4. If POSTEC loop monitoring is required remove Link 5 and connect the POSTEC loop to EXT.
5. Link 1 is normally open. To increase the voltage available in the loop the LED may be bypassed by inserting Link 1.
6. Terminate alarm wires as required noting the common, normally open and normally closed contacts.

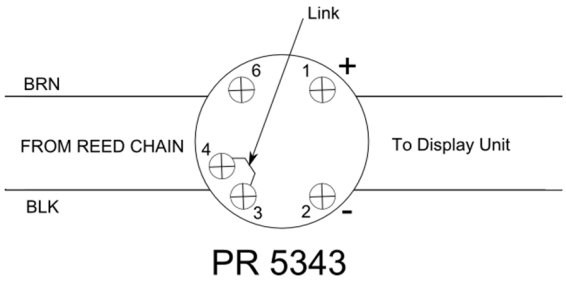


**BI-1240 - Terminations (230 Vac powered)**

Refit the cover and tighten the lockscrews.

#### 4.3 PR5343B Transmitter

The three wires from the Bintech sensor can be brought through the centre hole of the PR5343B and the Black (BK) and Brown (BN) terminated in the clamp screw plates. The pair to the display unit does **not** pass through the centre hole. Do not attempt to clamp any wires under the *heads* of the screws.



PR 5343

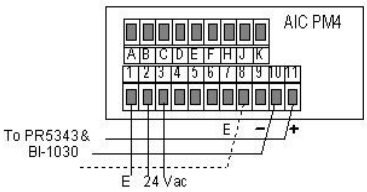
#### 4.4 Bintech Sensor

Only the Black (BK) and Brown (BN) wires are required. The Blue (BU) is not required and should be insulated off.

### 4.5 AIC PM4 Display

#### 4.5.1 Operation as Slave (Typical Option)

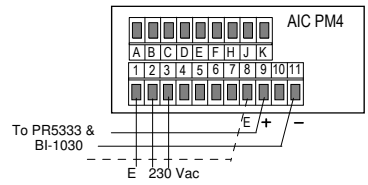
To operate a console display as the *slave* and the BI-1030 Pit Display as the *master,* terminate wires on the rear of the PM4 in series with the PR5343B and BI-1030 as shown. Refer to the AIC reference manual for further details. If a screened pair to the Bintech sensor is not used then the signal earth connection to 8 is not used




**AIC PM4 as Slave**

#### 4.5.2 Operation as Master Power Source (PM4 Providing Loop Power to BI-1030)

To operate a console display as the *master* power to the BI-1030 Pit Display, that is, the BI-1030 is loop powered, terminate wires on the rear of the PM4 in series with the PR5343B and BI-1030 as shown. AIC PM4 is 230 Vac powered. Refer to the AIC reference manual for further details for other input powering options. If a screened pair to the Bintech sensor is not used then the signal earth connection to 8 is not used.




**AIC PM4 Providing Loop Power (AIC PM4 230 Vac powered)**

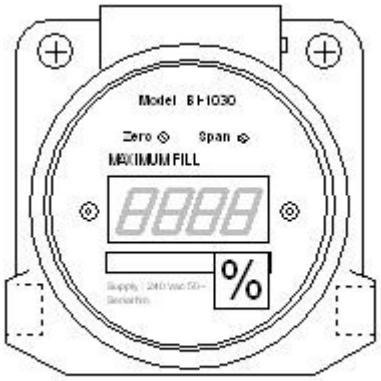
## 5. COMMISSIONING

***All items are supplied preset to the nominal operating configurations of tank volume and sensor length and no further adjustments should be necessary.*** A calibration chart is supplied with the sensor/transmitter unit for each tank. This gives the resistance of the sensor and the current through the transmitter for each position of the float. However it may be useful to measure the resistance of the Bintech sensor during the initial tank fill for future reference and possible fault finding. Also some further fine tuning of the BI-1030 fill-pit display is possible to ensure that its display is consistent with the panel mounted display on the operator's console (if used). This must be performed before it is installed in the pit. Note that as the tank sensor does not fully extend to the bottom of the tank, the display has been preset to read a minimum (non zero) value. This value can only be measured with the display disconnected from the sensor. Therefore any adjustments should only be made with a full or near full tank (at ullage). The AIC PM4 console display is factory preset without linearisation and no further adjustment is required.

### 5.1 BI-1030 and BI-1240 series

#### 5.1.1 Zero and Span Adjustments

The BI-1030 pit and BI-1240 console displays are factory preset to indicate the maximum and minimum contents of the tank. To confirm the operation of the pit display before installation and correlation of readings with the console display (if used), the pit display should be set up adjacent to the console with a pair of short leads directly connected to the BI-1240 or PM4. Because of the hazardous environment the pit display MUST NOT be adjusted when the system is powered up with LPG in the tank. The factory set-up procedure is described in Appendix C.




BI-1030 Zero and Span Adjustment

#### 5.1.2 BI-1240 Alarm Outputs Adjustments

With the BI-1240 powered up and a variable current source applied to the loop:

Adjust RV1 and RV2 with a decreasing current to set Lo alarm. LED lights when relay operates.
Adjust RV3 and RV4 with an increasing current to set Hi alarm. LED lights when relay operates.

Use the NC (normally closed) or NO (normally open) terminals with the C (common) terminal.

### 5.2 Bintech Sensor

Each Bintech BI-2000 sensor and its PR5343B transmitter are individually calibrated as a unit for correct linearisation of the display(s) and should not need any further adjustment. However for reference, Appendix B shows the approximate resistance and tank contents for a range of tank volumes. These values are derived from the original calibration process for a typical sensor, transmitter and associated display units.

With all BU, BN & BK wires disconnected from the PR5343B transmitter and extended out from the housing and pit, the resistance between BK and BN may be measured during the tank fill and the values noted against the tanker dispensing meter. The PR5343B transmitter incorporates a linearisation table that has been programmed by Bintech for each tank volume and sensor type and is *not adjustable* in the field.

## 6. MAINTENANCE

### 6.1 BI-1030

The indicator is sealed at installation and no ongoing maintenance is required apart from a regular visual inspection to confirm that there has been no moisture ingress.

### 6.2 BI-1240

The indicator is sealed at installation. There are no user serviceable parts within and no ongoing maintenance is required apart from checking that the enclosure is not damaged and using a soft cloth to remove dust from the display if necessary.

## 7. SPECIFICATIONS

### 7.1 BI-1030

| | |
|---|---|
| Enclosure: | Cast alloy case rated EEx d IIC T6 IP 66, ANZEx 07.3027 |
| Mounting: | Surface mount Two slotted 10 mm holes at 76 mm centres |
| Cable access: | Left or right entry via M20 x 1.5 opening |
| Display: | 3.5 Digit LCD 14 mm high with backlighting |
| Display Range: | Preset Maximum within the range 0.00 to 1999<br>(4 preset span ranges and 4 preset zero ranges set by links) |
| Decimal Point: | Preset 0, 0.0, 0.00 by link |
| Adjustments | Preset zero and span controls |
| Loop Current Sense: | Nominal 4 to 20 mA dc |
| Output Loop Voltage: | $\geq$ 18 V (ac powered model) |
| Accuracy: | ±0.1% of max. displayed value ±1 digit |
| Calibration: | 4 and 20 mA points at 20°C |
| Temp. Coefficient: | 0.03% / °C |
| Operating Temperature: | 0°C to 60°C |
| Power Requirements: | dc 24 Vdc loop (4 to 20 mA) (Maximum voltage drop <4.5V)<br>ac (Factory Options) 230 Vac +10%/-6% 50/60 Hz 7 VA |
| Weight: | Approx. 1.3 kg (24 Vac and dc loop powering)<br>Approx. 1.5 kg (240/110 Vac powering) |
| Compliance: | AS3260, AS2380, AS2381 and AS3548 |

### 7.2 BI-1240

| | |
|---|---|
| Enclosure: | PVC, surface mount |
| Mounting: | 4 holes in the base (115 mm x 75 mm centres) |
| Environment: | Internal (non hazardous area), 5°C to 40°C,<br>relative humidity 80% up to 31°C decreasing to 50% at 40°C<br>Altitude to 2000 m |
| Cable access: | Bottom or side entry of the enclosure |
| Display: | 3.5 Digit LCD 13 mm high |
| Display Range: | Preset Maximum within the range 0.00 to 1999 |
| Decimal Point: | Preset 0, 0.0, 0.00 by link |
| Adjustments: | Preset zero, span and alarm points |
| Loop Current Sense: | Nominal 4 to 20 mA dc (passive)<br>must NOT be connected to hazardous live |
| Output Loop Voltage: | $\geq$ 18 V (ELV) |
| Accuracy: | ±0.1% of max. displayed value ±1 digit |
| Calibration: | 4 and 20 mA points at 20°C |
| Temp. Coefficient: | 0.03% / °C |
| Power Requirements: | double insulated, no protective earth required<br>Suitable for connection to category II circuits<br>230 Vac +10%/-6% 50/60 Hz 7 VA |
| Dimensions: | H x W x D, 150 x 110 x 75 mm |
| Weight: | Approx. 0.8 kg (230/150 Vac ) |
| Compliance: | AS6101 and AS3548 |

## APPENDIX A SIGNAL CURRENTS

| STP & PINNACLE (Underground) | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **7.5 klitre** 1400 mm sensor | | | **17.4 klitre** 2500 mm sensor | | | **30.6 klitre** 2500 mm sensor | | | **43 klitre** 3050 mm sensor | | | **62 klitre** 2890 mm sensor | | |
| Current (mA) | Display (klitre) | (%) | Current (mA) | Display (klitre) | (%) | Current (mA) | Display (klitre) | (%) | Current (mA) | Display (klitre) | (%) | Current (mA) | Display (klitre) | (%) |
| 4 | 0.8 | 10 | 4 | 0.6 | 3.4 | 4 | 1.2 | 3.3 | 4 | 1.9 | 4.4 | 4 | 2.2 | 3.5 |
| *17.9* | **6.7* | *88* | *18.2* | **15.3* | *88* | *18* | **26.9* | *88* | *18* | **37.8* | *88* | *18* | **54.6* | *88* |
| 20 | 7.5 | 100 | 20 | 17.4 | 100 | 20 | 30.6 | 100 | 20 | 43 | 100 | 20 | 62 | 100 |

*Values at 88% fill.*

## APPENDIX B1 TANK VOLUMES (WITH PR5333 TRANSMITTER)

| STP & PINNACLE (Underground) | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **7.5 klitre** 1400 mm sensor | | | **17.4 klitre** 2500 mm sensor | | | **30.6 klitre** 2500 mm sensor | | | **43 klitre** 3050 mm sensor | | | **62 klitre** 2890 mm sensor | | |
| Res. (ohm) | Contents (klitre) | (%) | Res. (ohm) | Contents (klitre) | (%) | Res. (ohm) | Contents (klitre) | (%) | Res. (ohm) | Contents (klitre) | (%) | Res. (ohm) | Contents (klitre) | (%) |
| 1 | 0.8 | 10.5 | 2 | 0.6 | 3.8 | 2 | 1.2 | 4.0 | 4 | 1.9 | 4.4 | 4 | 2.2 | 3.6 |
| 128 | 1.1 | 14.0 | 260 | 1.2 | 6.8 | 260 | 2.1 | 6.8 | 278 | 3.3 | 7.6 | 311 | 4.0 | 6.6 |
| 254 | 1.3 | 17.8 | 518 | 1.8 | 10.3 | 518 | 3.2 | 10.4 | 553 | 4.8 | 11.1 | 619 | 6.2 | 10.0 |
| 381 | 1.6 | 21.9 | 775 | 2.4 | 14.1 | 775 | 4.4 | 14.3 | 828 | 6.5 | 15.1 | 926 | 8.5 | 13.9 |
| 507 | 2.0 | 28.1 | 1033 | 3.2 | 18.3 | 1033 | 5.7 | 18.6 | 1103 | 8.3 | 19.3 | 1234 | 11.1 | 18.1 |
| 634 | 2.3 | 30.4 | 1290 | 3.9 | 22.8 | 1290 | 7.1 | 23.1 | 1378 | 10.2 | 23.7 | 1541 | 13.8 | 22.6 |
| 760 | 2.6 | 35.0 | 1548 | 4.8 | 27.6 | 1548 | 8.5 | 27.7 | 1654 | 12.2 | 28.4 | 1849 | 16.7 | 27.3 |
| 887 | 3.0 | 39.6 | 1806 | 5.6 | 32.5 | 1806 | 10.0 | 32.6 | 1929 | 14.3 | 32.2 | 2156 | 19.7 | 32.2 |
| 1014 | 3.3 | 44.2 | 2064 | 6.5 | 37.5 | 2064 | 11.5 | 37.7 | 2204 | 16.4 | 38.1 | 2464 | 22.8 | 37.2 |
| 1140 | 3.7 | 48.9 | 2322 | 7.4 | 42.7 | 2322 | 13.1 | 42.8 | 2479 | 18.6 | 43.3 | 2771 | 25.9 | 42.3 |
| 1267 | 4.0 | 53.5 | 2579 | 8.3 | 47.9 | 2579 | 14.7 | 47.9 | 2754 | 20.8 | 48.4 | 3079 | 29.1 | 47.2 |
| 1393 | 4.4 | 58.2 | 2837 | 9.2 | 53.1 | 2837 | 16.3 | 53.1 | 3029 | 23.0 | 53.4 | 3386 | 32.2 | 52.6 |
| 1520 | 4.7 | 62.8 | 3095 | 10.1 | 58.3 | 3095 | 17.8 | 58.2 | 3304 | 25.2 | 58.6 | 3694 | 35.4 | 57.7 |
| 1646 | 5.1 | 67.3 | 3353 | 11.0 | 63.5 | 3353 | 19.4 | 63.3 | 3579 | 27.3 | 63.4 | 4001 | 38.5 | 62.8 |
| 1773 | 5.4 | 71.8 | 3610 | 11.9 | 68.5 | 3610 | 20.9 | 68.2 | 3854 | 29.5 | 68.6 | 4309 | 41.6 | 67.8 |
| 1899 | 5.7 | 76.1 | 3868 | 12.7 | 73.4 | 3868 | 22.4 | 73.1 | 4129 | 31.5 | 73.3 | 4618 | 44.6 | 72.7 |
| 2026 | 6.0 | 80.2 | 4126 | 13.5 | 78.1 | 4126 | 23.9 | 77.7 | 4404 | 33.5 | 77.9 | 4924 | 47.5 | 77.4 |
| 2153 | 6.3 | 84.1 | 4384 | 14.3 | 82.5 | 4384 | 25.2 | 82.2 | 4679 | 35.4 | 82.3 | 5231 | 50.2 | 81.9 |
| 2279 | 6.6 | 87.8 | 4641 | 15.0 | 86.7 | 4641 | 26.5 | 86.3 | 4955 | 37.2 | 86.5 | 5539 | 52.8 | 86.1 |
| *2327* | **6.7* | *88* | *4760* | **15.3* | *88* | *4760* | **26.9* | *88* | *5065* | **37.8* | *88* | *5688* | **53.7* | *88* |
| 2406 | 6.9 | 91.2 | 4899 | 15.7 | 90.5 | 4899 | 27.7 | 90.2 | 5230 | 38.8 | 90.2 | 5846 | 55.2 | 90.0 |
| 2532 | 7.1 | 94.3 | 5157 | 16.3 | 93.8 | 5157 | 28.7 | 93.6 | 5505 | 40.2 | 93.4 | 6154 | 57.3 | 93.4 |
| 2659 | 7.3 | 97.0 | 5415 | 16.8 | 96.7 | 5415 | 29.6 | 96.5 | 5780 | 41.4 | 96.2 | 6461 | 59.1 | 96.4 |
| 2785 | 7.4 | 99.0 | 5672 | 17.2 | 98.8 | 5672 | 30.3 | 98.8 | 6055 | 42.5 | 98.8 | 6769 | 60.5 | 98.7 |
| 2912 | 7.5 | 100 | 5930 | 17.4 | 100 | 5930 | 30.7 | 100 | 6330 | 43.0 | 100 | 7040 | 62.0 | 100 |

** Values at 88% fill.*

Note 1: Values of resistance are for *typical* sensors and measured between the BN and BK wires with the BU disconnected. Any variations in sensors are compensated by the PR5343B transmitter unit, which has been matched to the particular sensor.

Note 2: For fault finding disconnect either BK or BN. Resistance between BK and BU will usually be at least 560 ohm greater than the maximum resistance between BN and BK shown above. Resistance between BN & BK plus resistance between BN & BU should equal the resistance between BK & BU.

## APPENDIX B2 TANK VOLUMES (WITH PR5343B TRANSMITTER)

| STP & PINNACLE (Underground) | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **7.5 klitre** 1400 mm sensor | | | **17.4 klitre** 2500 mm sensor | | | **30.6 klitre** 2500 mm sensor | | | **43 klitre** 3050 mm sensor | | | **62 klitre** 2890 mm sensor | | |
| Res. (ohm) | Contents (klitre) | (%) | Res. (ohm) | Contents (klitre) | (%) | Res. (ohm) | Contents (klitre) | (%) | Res. (ohm) | Contents (klitre) | (%) | Res. (ohm) | Contents (klitre) | (%) |
| 4 | 0.8 | 10.5 | 7 | 0.6 | 3.8 | 7 | 1.2 | 4.0 | 14 | 1.9 | 4.4 | 14 | 2.2 | 3.6 |
| 457 | 1.1 | 14.0 | 929 | 1.2 | 6.8 | 929 | 2.1 | 6.8 | 993 | 3.3 | 7.6 | 1111 | 4.0 | 6.6 |
| 907 | 1.3 | 17.8 | 1850 | 1.8 | 10.3 | 1850 | 3.2 | 10.4 | 1975 | 4.8 | 11.1 | 2211 | 6.2 | 10.0 |
| 1361 | 1.6 | 21.9 | 2768 | 2.4 | 14.1 | 2768 | 4.4 | 14.3 | 2957 | 6.5 | 15.1 | 3307 | 8.5 | 13.9 |
| 1811 | 2.0 | 28.1 | 3689 | 3.2 | 18.3 | 3689 | 5.7 | 18.6 | 3939 | 8.3 | 19.3 | 4407 | 11.1 | 18.1 |
| 2264 | 2.3 | 30.4 | 4607 | 3.9 | 22.8 | 4607 | 7.1 | 23.1 | 4921 | 10.2 | 23.7 | 5504 | 13.8 | 22.6 |
| 2714 | 2.6 | 35.0 | 5529 | 4.8 | 27.6 | 5529 | 8.5 | 27.7 | 5907 | 12.2 | 28.4 | 6604 | 16.7 | 27.3 |
| 3168 | 3.0 | 39.6 | 6450 | 5.6 | 32.5 | 6450 | 10.0 | 32.6 | 6889 | 14.3 | 32.2 | 7700 | 19.7 | 32.2 |
| 3621 | 3.3 | 44.2 | 7371 | 6.5 | 37.5 | 7371 | 11.5 | 37.7 | 7871 | 16.4 | 38.1 | 8800 | 22.8 | 37.2 |
| 4071 | 3.7 | 48.9 | 8293 | 7.4 | 42.7 | 8293 | 13.1 | 42.8 | 8854 | 18.6 | 43.3 | 9896 | 25.9 | 42.3 |
| 4525 | 4.0 | 53.5 | 9211 | 8.3 | 47.9 | 9211 | 14.7 | 47.9 | 9836 | 20.8 | 48.4 | 10996 | 29.1 | 47.2 |
| 4975 | 4.4 | 58.2 | 10132 | 9.2 | 53.1 | 10132 | 16.3 | 53.1 | 10818 | 23.0 | 53.4 | 12093 | 32.2 | 52.6 |
| 5429 | 4.7 | 62.8 | 11054 | 10.1 | 58.3 | 11054 | 17.8 | 58.2 | 11800 | 25.2 | 58.6 | 13193 | 35.4 | 57.7 |
| 5879 | 5.1 | 67.3 | 11975 | 11.0 | 63.5 | 11975 | 19.4 | 63.3 | 12782 | 27.3 | 63.4 | 14289 | 38.5 | 62.8 |
| 6332 | 5.4 | 71.8 | 12893 | 11.9 | 68.5 | 12893 | 20.9 | 68.2 | 13764 | 29.5 | 68.6 | 15389 | 41.6 | 67.8 |
| 6782 | 5.7 | 76.1 | 13814 | 12.7 | 73.4 | 13814 | 22.4 | 73.1 | 14746 | 31.5 | 73.3 | 16493 | 44.6 | 72.7 |
| 7236 | 6.0 | 80.2 | 14736 | 13.5 | 78.1 | 14736 | 23.9 | 77.7 | 15729 | 33.5 | 77.9 | 17586 | 47.5 | 77.4 |
| 7689 | 6.3 | 84.1 | 15657 | 14.3 | 82.5 | 15657 | 25.2 | 82.2 | 16711 | 35.4 | 82.3 | 18682 | 50.2 | 81.9 |
| 8139 | 6.6 | 87.8 | 16575 | 15.0 | 86.7 | 16575 | 26.5 | 86.3 | 17696 | 37.2 | 86.5 | 19782 | 52.8 | 86.1 |
| 8311 | *6.7 | 88 | 16929 | *15.3 | 88 | 16929 | *26.9 | 88 | 18089 | *37.8 | 88 | 20314 | *53.7 | *88* |
| 8593 | 6.9 | 91.2 | 17496 | 15.7 | 90.5 | 17496 | 27.7 | 90.2 | 18679 | 38.8 | 90.2 | 20879 | 55.2 | 90.0 |
| 9043 | 7.1 | 94.3 | 18418 | 16.3 | 93.8 | 18418 | 28.7 | 93.6 | 19661 | 40.2 | 93.4 | 21979 | 57.3 | 93.4 |
| 9496 | 7.3 | 97.0 | 19339 | 16.8 | 96.7 | 19339 | 29.6 | 96.5 | 20643 | 41.4 | 96.2 | 23075 | 59.1 | 96.4 |
| 9946 | 7.4 | 99.0 | 20257 | 17.2 | 98.8 | 20257 | 30.3 | 98.8 | 21625 | 42.5 | 98.8 | 24175 | 60.5 | 98.7 |
| 10400 | 7.5 | 100 | 21179 | 17.4 | 100 | 21179 | 30.7 | 100 | 22607 | 43.0 | 100 | 25143 | 62.0 | 100 |

** Values at 88% fill.*

Note 1: Values of resistance are for *typical* sensors and measured between the BN and BK wires with the BU disconnected. Any variations in sensors are compensated by the PR5343B transmitter unit, which has been matched to the particular sensor.

Note 2: For fault finding disconnect either BK or BN. Resistance between BK and BU will usually be at least 560 ohm greater than the maximum resistance between BN and BK shown above. Resistance between BN & BK plus resistance between BN & BU should equal the resistance between BK & BU.

Note 3: The high resistance fine step sensor (with a maximum resistance greater than 10 kohm) requires the PR5343B transmitter.

## APPENDIX C BI-1030 & BI-1240 SERIES FACTORY SET-UP

### C1. Introduction

***The BI-1030 and BI-1240 are factory set and no user serviceable parts are inside.***

The BI-1030 & BI-1240 series factory setup and calibration process requires a known accurate current source of 4 to 20 mA to set the Zero and Span limits. The display board may need to be removed from the enclosure to access the jumper links on the board. On later BI-1030 models the zero and span adjustments are made from the underside of the display board. The location and designation of the links and adjustments are shown as follows:

### C2. Setting the SPAN

The total indication range can be set from negative 0008 to positive >1999 displayed. A decimal point selection link allows the decimal point to displayed as 1.234, 12.34, 123.4 or 1234 (no decimal point).

First set Zero display:

Set Link 2 to position A
Apply 4 mA loop current
Adjust Zero trimmer R15 for 000 display.

Next calculate the arithmetic difference between the display values for minimum (4 mA current) and maximum (20 mA current) required. This is the SPAN.

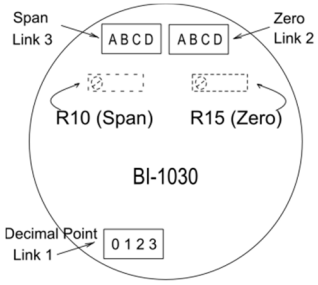
For example, if 4 mA to 20 mA is required to be displayed as 006 to 304 then the SPAN is 298 (ignoring decimal points).

SPAN is set by selection Link 3 and trim potentiometer R10. Link 3 will give the following SPAN ranges:

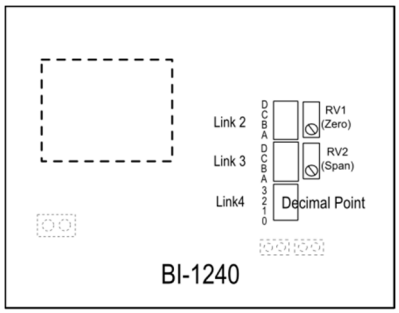
| | | | |
|---|---|---|---|
| A | 155 | to | 320 |
| B | 270 | to | 560 |
| C | 520 | to | 1090 |
| D | 990 | to | 1999 (into overange). |

For example, if the above 298 SPAN is required

Set Link 3 to position A.
Apply 20 mA loop current
Set SPAN with trimmer R10 to display 298 (not 304 at this stage).




**1030 Display Board Links (underside view)**




**1240 Display Board Links (upper side view)**

### C3. Setting the Zero point

Once having set the SPAN; set the ZERO with selection Link 2 and trim potentiometer R15 (RV1 on the BI-1240).

For span range A, Link 2 allows the following ZERO adjustment ranges:

| | | | |
|---|---|---|---|
| A | -008 | to | 200 |
| B | 175 | to | 380 |
| C | 350 | to | 540 |
| D | 500 | to | 690 |

For other SPAN ranges the ZERO range available will be multiplied by the ratio of the SPAN range A to the SPAN range selected (ie. Approximately 2x, 4x and 8x respectively).

For the above example,

Apply 4 mA loop current
Set Link 2 to position A
Adjust R15 to display 006

Apply 20 mA and check that the maximum display is correct (304 in the example). If necessary, slightly adjust R10 for the correct maximum value. Now apply 4 mA and recheck the ZERO setting by adjusting R15 slightly.

Repeat the steps as required to achieve correct end points displayed.

**C4. Setting the Decimal Point**

The decimal point selection allows displays outside the span ranges of 155 to 1999 to be displayed. Thus the minimum display of 155 can be set at 155, 15.5 or 1.55 and the maximum display will correspondingly be 1999, 199.9, 19.99 or 1.999 with the same decimal place position. This should be taken into account when calculating the required SPAN.

For example if 0.5 to 7.5 is the required display range then this is achieved by setting the decimal point to position 2 and then the display SPAN and ZERO adjustments set for 0.50 to 7.50 (50 to 750 ignoring the decimal point).

Set the decimal point with selection Link 1 (Link 4 on BI-1240). Thus in the first example above, the display reads:

| | | | |
|---|---|---|---|
| Link 1 | pos. 0 | 006 | 304 displayed (no decimal point) |
| Link 1 | pos. 1 | 00.6 | 30.4 displayed |
| Link 1 | pos. 2 | 0.06 | 3.04 displayed |
| Link 1 | pos. 3 | .006 | .304 displayed |

## APPENDIX D FAULT TESTING

**D1. Functional Description of System**

A mA current proportional to the level in the gas tank passes around the circuit to the display. This current is provided by the BI-1030 indicator unit at a nominal 24 Vdc (or if the PM4 is used to power the loop the BI-1030 is factory supplied to operate with loop power only). The tank sensor resistance varies according to the level of the float and as a result, the PR5343B transmitter adjusts the loop current. The current is linearised by the PR5343B to account for the shape of the tank and is displayed in % or kl. The BI-1240 series (or PM4 display) operates as a slave to the BI-1030 pit display using the linearised output current from the PR5343B.

**D2. Operational Checks**

Loop current check. This requires a multimeter with a low mA range. With the system powered up, select a mA range with a full scale reading greater than 20 mA and connect the meter in series in the loop at the PM4 terminals (if used). If PM4 is not used, insert the multimeter in the loop at a convenient non hazardous location. The multimeter should read in the range 4 to 20 mA.

**D3. Fault Testing**

Fault - Blank display on the PM4.
Check - Power supply to the PM4. This should be 24 Vac (or supply value as labelled).

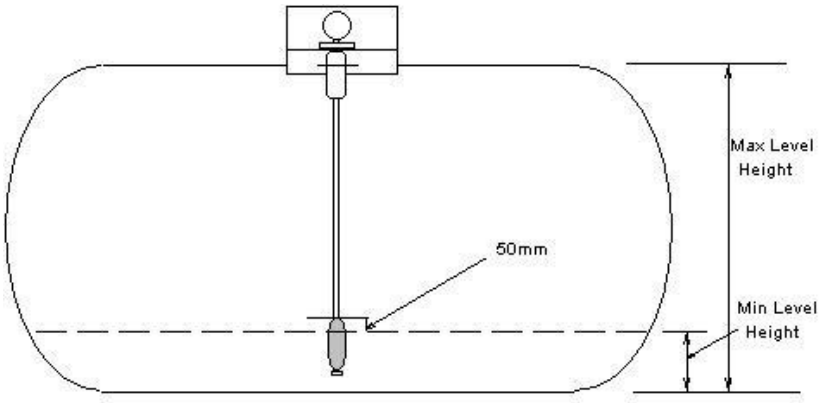
Fault - Level displayed on PM4 does not vary with tank contents.
Check - Open loop circuit.
Check - Operation of the PM4. Disconnect both legs of the transmitter loop and insert a 5 kohm variable resistance across terminals 9 and 11, (note that the transmitter loop connects to terminals 10 and 11). Minimum resistance should give the preset maximum display value on the PM4.
Check - PR5343B. Transmitter has failed if the current is constant at 4 to 6 mA or 23 mA.
Check - Operation of the tank sensor unit. Disconnect the PR5343B from the sensor and display circuit and measure between the BN & BK of the sensor directly. The resistance of the sensor should vary between the limits written on the label fixed to the sensor/transmitter enclosure or as per the values shown in Appendix B. BN is the wiper of the BU-BK potentiometer.

Fault - Blank display on the BI-1030 or BI-1240.
Check - Power supply to BI-1030 display unit. This should be 240 Vac (or supply value as labelled).
Check - Signal loop for open circuit and that the display board lead is plugged into the power board. The LCD display requires a loop current of 4 to 20 mA to operate.

Fault - Level displayed on the BI-1030 & BI-1240 (or PM4) does not vary with tank contents.
Check - PR5343B. Transmitter has failed if the current is constant at 4 to 6 mA or 23 mA.
Check - Operation of the tank sensor unit. Disconnect the PR5343B from the sensor and display circuit and measure between the BN & BK of the sensor directly. The resistance of the sensor should vary between the limits written on the label fixed to the sensor/transmitter enclosure or as per the values shown in Appendix B. BN is the wiper of the BU-BK potentiometer.
Check - Operation of ac powered BI-1030 by short circuiting the loop to the PR5343B. Current should be about 26 mA and display should read about 125% of maximum.

Fault - Levels displayed on BI-1030 and BI-1240 (orPM4) do not agree.
Check - Connect substitute BI-1030 or PM4 display. Ensure that the substitute display units have been calibrated for the correct tank volume.

**D4. Tank and Sensor Dimensions**

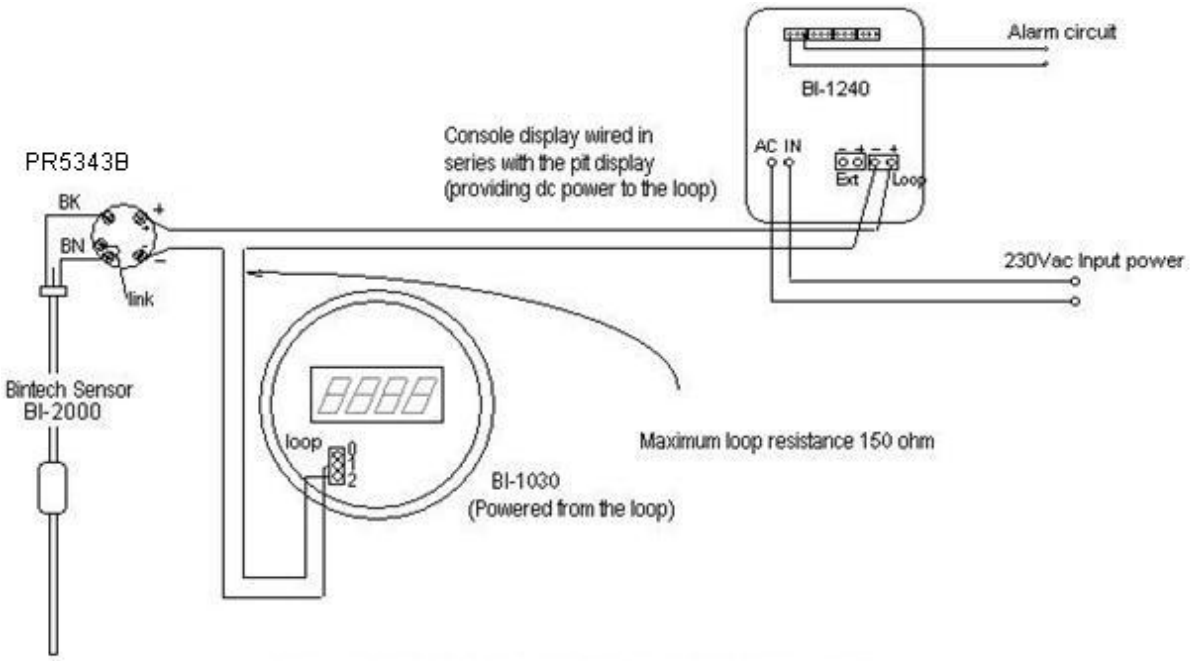



**Dimensions used in factory calibration of sensor and PR5343**

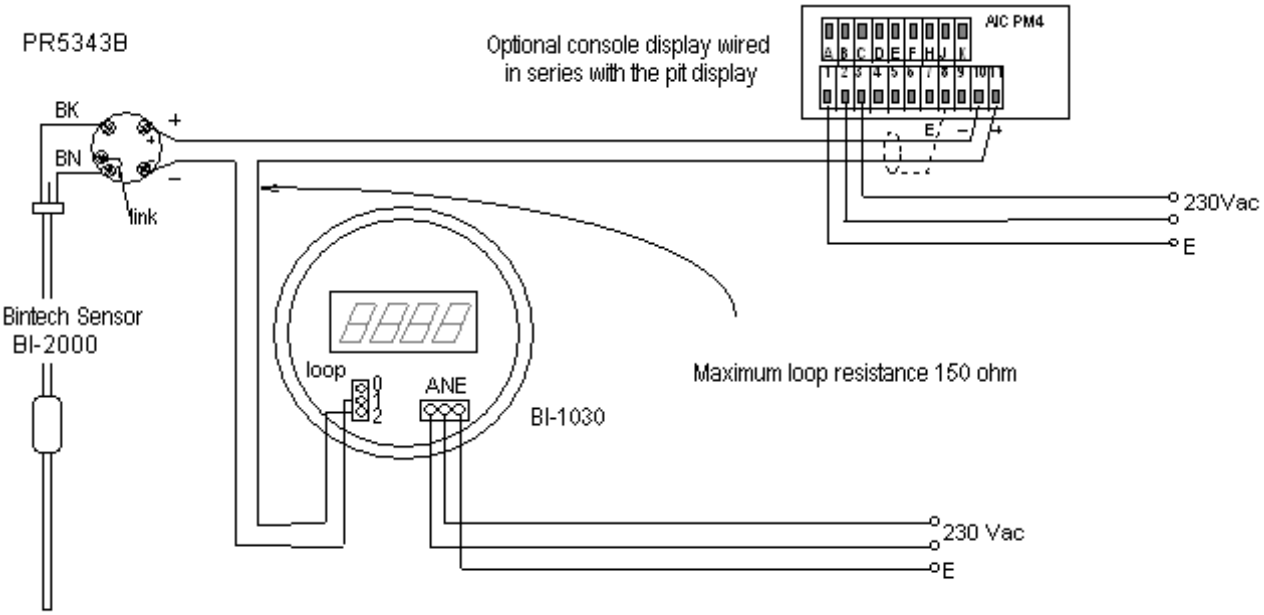
The sensor and PR5343B combination are factory programmed to produce a 4 mA loop current at the minimum level height and 20 mA at the maximum level height.

The ZTS-200 titanium float is 200 mm long and floats in the LPG with 50 mm exposed.

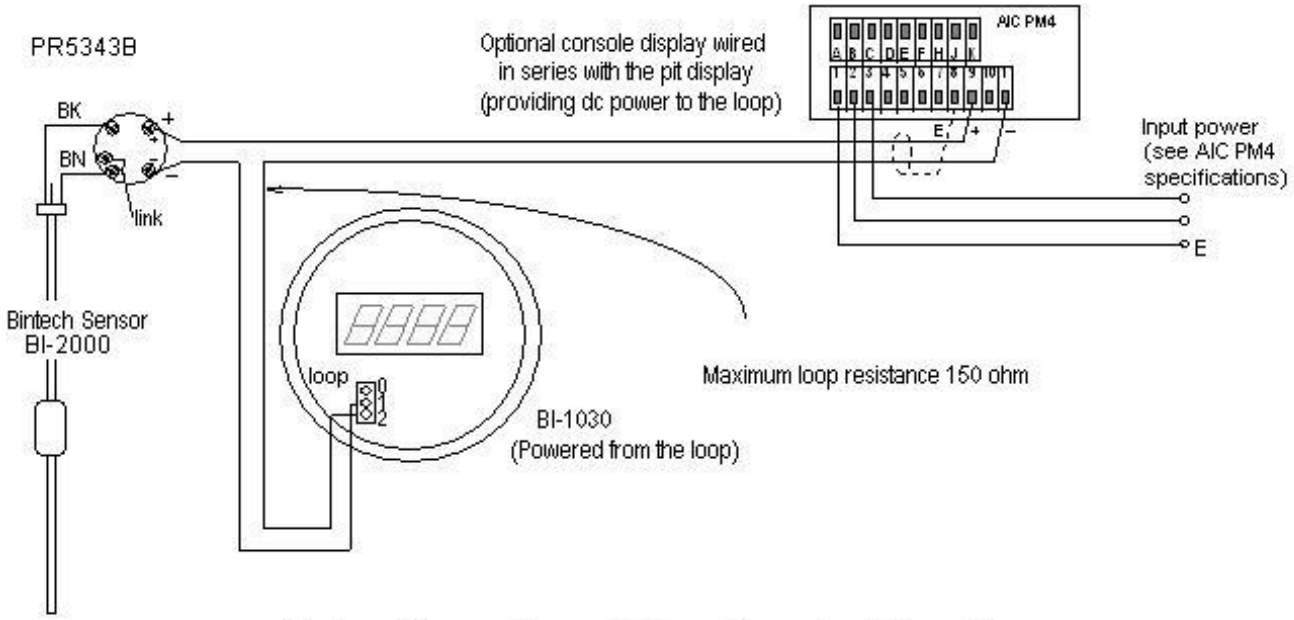
The B40/120R nitrile float is 120 mm long and floats in the LPG with 20 mm exposed.



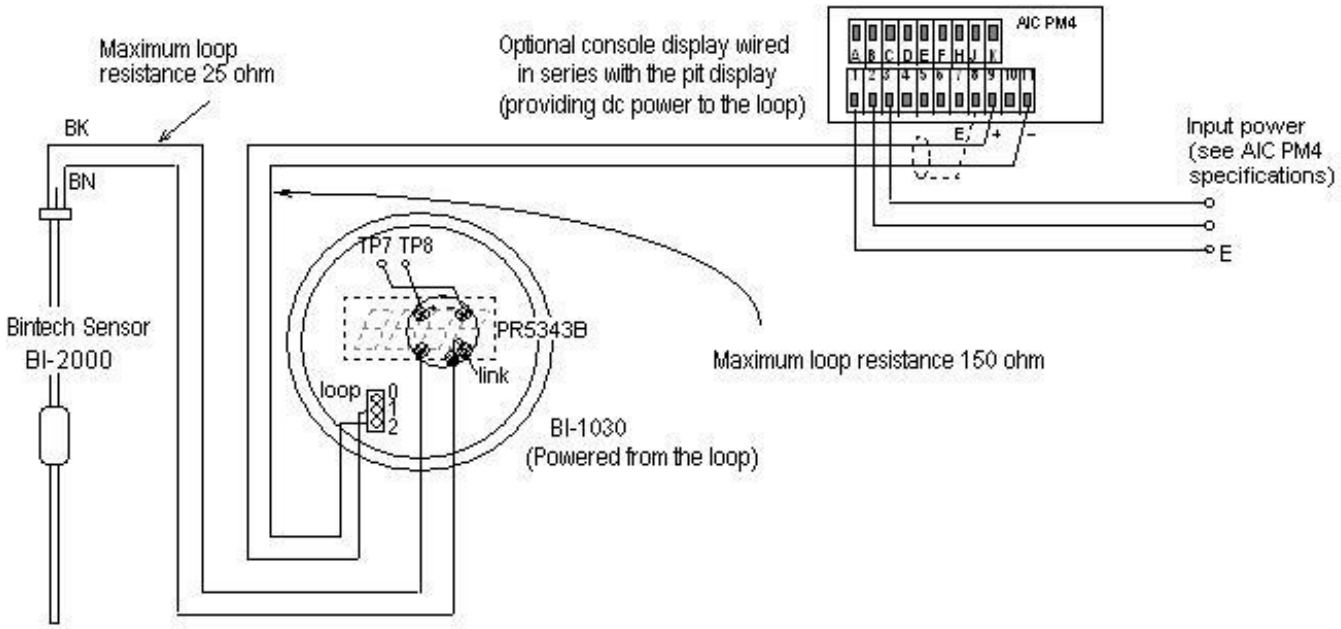

**System Connections - dc Loop Powering (Type 1)**




**System Connections - 240 Vac Powering**




**System Connections - dc Loop Powering (Type 1)**




**System Connections - BI-1030 Loop Powered (Type 2)**