# LCD Digital Display

## General Instructions

These instructions provide information for installation, electrical connection, configurations, operation, and maintenance of the LCD digital indicating display. The display consists of explosion proof die cast aluminum housing, terminal block connections for easy wiring, and an LCD digital indicating loop powered display.


### Loop Powered Direct Mount Indicator
### Option LPCX

| | | |
|---|---|---|
| **Display** | 0.6" (15.2 mm) LCD, 3½+ digits; -1999 to 2999 | |
| **Display Update Rate** | 2 updates/second | |
| **Display Orientation** | Display may be mounted at 90° increments up to 270° from default orientation. | |
| **Overrange** | Display flashes 2999 | |
| **Underrange** | Display flashes -1999 | |
| **Programming Method** | 4 Internal pushbuttons (behind glass). | |
| **Noise Filter** | Programmable HI, LO, or OFF | |
| **Recalibration** | Recalibration is recommended at least every 12 months. | |
| **Max/Min Display** | Max/Min readings reached by the process are stored until reset by the user or until power to the meter is turned off. | |
| **Non-Volatile Memory** | All programmed settings are stored in nonvolatile memory for a minimum of ten years if power is lost. | |
| **Normal Mode Rejection** | 64 dB at 50/60 Hz | |
| **Environmental** | Operating temperature range: -40 to 75°C | |
| | Storage temperature range: -40 to 75°C | |
| | Relative humidity: 0 to 90% non-condensing | |
| | Printed circuit boards are conformally coated. | |
| **Connections** | Removable screw terminals accept 12 to 22 AWG wire | |
| **Housing Certifications** | FM - CSA - ATEX | |
| | Class I Groups, A, B, C, D | Class 1, Zone 1, AEx d II C |
| | Class II Groups E, F, G | IEC Ex d II C |
| | NEMA 4X | IP68 |

*Design and specifications are subject to change without notice.*

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## Input

<table>
<tr><td>Input</td><td>4-20 mA</td></tr>
<tr><td>Accuracy</td><td>±0.05% of calibrated span ±1 count</td></tr>
<tr><td>Function</td><td>Linear (2 to 32 points) or square root</td></tr>
<tr><td>Temperature Drift</td><td>50 PPM/°C from -40 to 75°C ambient</td></tr>
<tr><td>Decimal Point</td><td>User selectable decimal point</td></tr>
<tr><td>Minimum Span</td><td>Input 1 & Input 2: 0.40 mA</td></tr>
<tr><td>Calibration Range</td><td>An Error message will appear if input 1 and input 2 signals are too close together.
<table>
<tr><td>Input Range</td><td>Minimum Span Input 1 & Input 2</td></tr>
<tr><td>4-20 mA</td><td>0.40 mA</td></tr>
</table></td></tr>
<tr><td>Maximum Voltage Drop & Equivalent Resistance</td><td>
<table>
<tr><td>Without Backlight</td><td>With Backlight</td></tr>
<tr><td>1.7 VDC @ 20 mA</td><td>4.7 VDC @ 20 mA</td></tr>
<tr><td>85 Ω @ 20 mA</td><td>235 Ω @ 20 mA</td></tr>
</table></td></tr>
<tr><td>Loop-Powered Backlight Option</td><td>Factory installed only. Powered directly from the 4-20 mA loop, no batteries required. Backlight can be enabled or disabled via alternative wiring of terminal block. The display brightness will increase as the input signal current increases.</td></tr>
<tr><td>Input Overload</td><td>Over current protection to 2 A max.</td></tr>
<tr><td>HART Transparency</td><td>The meter does not interfere with existing HART communications; it displays the 4-20 mA primary variable and it allows the HART communications to pass through without interruption. The meter is not affected if a HART communicator is connected to the loop. The meter does not display secondary HART variables.</td></tr>
</table>

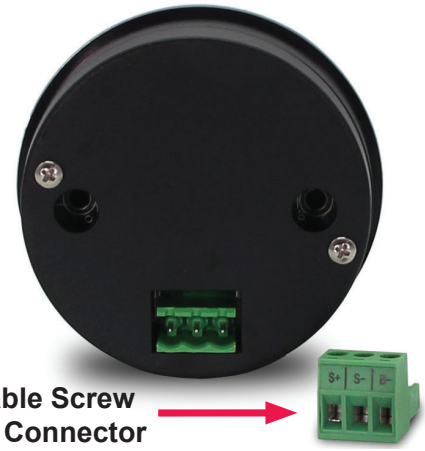
## Electonics Module

The electronics module is housed in a plastic enclosure that provides a degree of environmental protection for the electronics circuitry. The module is mounted to the enclosure with spring-loaded thumbscrews and can be oriented in 0°, 90°, 180°, or 270° increments. Connections are made to a removable screw terminal block.


Electronics Module


Back Cover & Connector

Spring-Loaded Thumbscrews




Removable Screw Terminal Connector

# Connections

To access the connectors, remove the enclosure cover and unscrew the two captive stainless steel screws. Remove the meter assembly from the enclosure. Signal connections are made to a three-terminal removable connector on the back of the meter assembly. Grounding connections are made to the two ground screws provided on the base – one internal and one external.

| | |
|---|---|
| **S+** | 4-20 mA signal input positive terminal connection |
| **S-** | 4-20 mA signal return/negative terminal connection |
| **B-** | 4-20 mA signal return/negative terminal when using the installed loop powered backlight option |

See *Figure 1* for terminal positions on the rear of the meter assembly.

**⚠ WARNINGS**

- Observe all safety regulations. Electrical wiring should be performed in accordance with all agency requirements and applicable national, state, and local codes to prevent damage to the meter and ensure personnel safety.
- Static electricity can damage sensitive components.
- Observe safe handling precautions for static-sensitive components.
- Use proper grounding procedures/codes.
- If the meter is installed in a high voltage environment and a fault or installation error occurs, high voltage may be present on any lead or terminal.


**Figure 1. PD663 Meter Assembly, Rear View**

# Wiring Diagrams

Signal input connections are made to a three-terminal connector labeled S+|S-|B-. The enclosure also provides one internal and one external earth grounding screw.

The 4-20 mA input with no backlight has a maximum voltage drop of 1.7 V and is wired as shown in *Figure 2*.

The loop-powered backlight configuration requires a total maximum voltage drop of 4.7 V. The backlight is recommended for dim lighting conditions and is enabled when wired as shown in *Figure 3*.

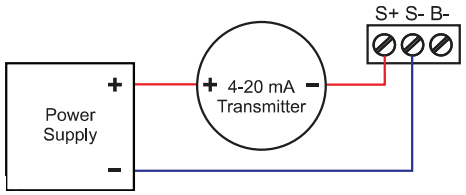



**Figure 2. PD663 Input Connections without Backlight**

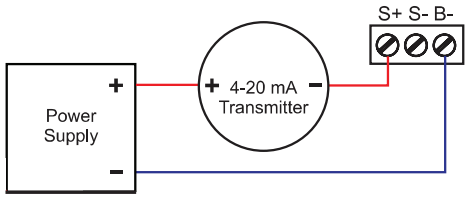



**Figure 3. PD663 Input Connections with Backlight**

# Setup and Programming

There is **no need to recalibrate** the meter for milliamps when first received from the factory.

The meter is ***factory calibrated*** for milliamps prior to shipment. The calibration equipment is traceable to NIST standards.

## Overview

There are no jumpers involved in the setup process of the meter.

Setup and programming is done through the front panel buttons.

After all connections have been completed and verified, apply power to the loop.

For *Quick User Interface Reference* go to page *11.*

## Buttons and Display


| Button/ Symbol | Description |
|---|---|
| MENU | Menu button to enter programming mode. Press and hold for 5 seconds to access the *Advanced* features of the meter. |
| ENTER | Enter button to access a menu or accept a setting. |
| RESET | Right arrow to scroll through the menus or move to the next digit or decimal position during programming. Resets the Max or Min display value when pressed while showing Max or Min value. |
| MAX | Up arrow to scroll through the menus, decimal point, or to increment the value of a digit. Displays the Max then Min display values when pressed during normal run mode. |

## Setting Numeric Values

The numeric values are set using the **Right** and **Up** arrow buttons. Press the **Right** arrow to select next digit and the **Up** arrow to increment digit. The two left-most digits on the display are set as a single digit, able to display -19 to 29.

The digit being changed blinks.

Press the **Enter** button, at any time, to accept a setting or **Menu** button to exit without saving changes.

The decimal point is set using the **Right** or **Up** arrow button in the *Setup-decimal point* menu.

## Programming the Meter

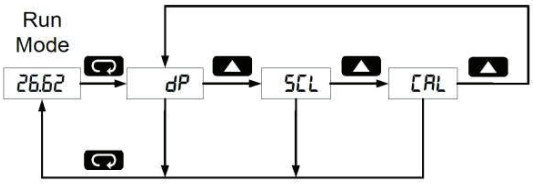
The meter may either be scaled (SCL) without applying an input or calibrated (CAL) by applying an input. The meter comes factory calibrated to NIST standards, so for initial setup, it is recommended to use the (SCL) function. The Program menu contains the Scale (SCL) and the Calibrate (CAL) menus. Process inputs may be scaled or calibrated to any display within the range of the meter.

Additional parameters, not needed for most applications, are viewed and programmed with the *Advanced Features Menu*, see page *7.*

## Main Menu

The main menu consists of the most commonly used functions: *Decimal Point Location*, *Scale*, and *Calibration*.

Press **Menu** button to enter Programming Mode then press the **Up Arrow** button to scroll through the main menu.




Press **Menu**, at any time, to exit and return to Run Mode. Changes made to settings prior to pressing **Enter** are not saved.

Changes to the settings are saved to memory only after pressing **Enter**.

The display moves to the next menu every time a setting is accepted by pressing **Enter**.

## Main Menu Display Functions & Messages

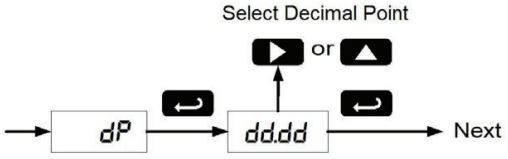
The meter displays various functions and messages during setup, programming, and operation. The following table shows the main menu functions and messages in the order they appear in the menu.

| Display | Parameter | Action/Setting |
|---|---|---|
| dP | *Decimal point* | Set decimal point |
| SCL | *Scale* | Enter the *Scale* menu |
| nPt | *Number of Points* | Set number of linearization points |
| in 1 | *Scale Input 1* | Input signal 1 value (mA) |
| d 1 | *Scale Display 1* | Scaled value for input 1 |
| in2 | *Scale Input 2* | Input signal 2 value (mA) |
| d2 | *Scale Display 2* | Scaled value for input 2 |
| CAL | *Calibrate* | Enter the *Calibrate* menu |
| nPt | *Number of Points* | Set number of linearization points |
| in 1 | *Calibrate Input 1* | Read input signal 1 |
| d 1 | *Calibrate Display 1* | Enter value for input 1 |
| in2 | *Calibrate Input 2* | Read input signal 2 |
| d2 | *Calibrate Display 2* | Enter value for input 2 |

## Setting the Decimal Point (dP)

Decimal point may be set with up to three decimal places or with no decimal point at all.

Pressing the **Right** or **Up** arrow moves the decimal point one place to the right until no decimal point is displayed, then it moves to the left most position.




## Scaling the Meter (SCL)

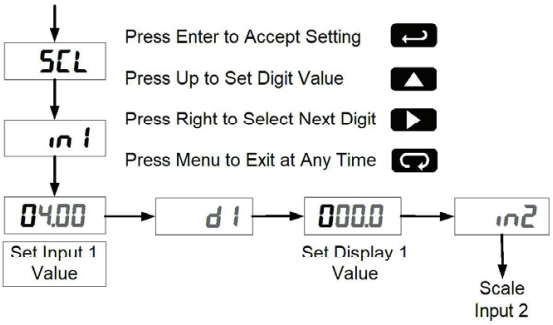
**IMPORTANT**

- The input to the meter must be at least 6 mA prior to pressing the Enter button at the completion of programming for programming parameters to be saved.

The 4-20 mA input can be scaled to display the process in engineering units.

A signal source is not needed to scale the meter; simply program the inputs and corresponding display values.

If using linear signal input conditioning, enter the number of scale points (2-32), followed by the input values and display values. If using square root signal input conditioning, the number of points input menu will not be present.




### Number of Points (nPt)

Set the number of linearization points used in the *Scale* menu. 2 to 32 points may be used. The *Scale* menu is entered after entering the number of points.

For instructions on how to program numeric values see *Setting Numeric Values*, page *5.*

### Minimum Input Span

The minimum input span is the minimum difference between input 1 and input 2 signals required to complete the calibration or scaling of the meter. The minimum span is 0.40 mA.

If the minimum span is not maintained, the meter reverts to input 2, allowing the appropriate input signals to be applied.

## Calibrating the Meter (CAL)

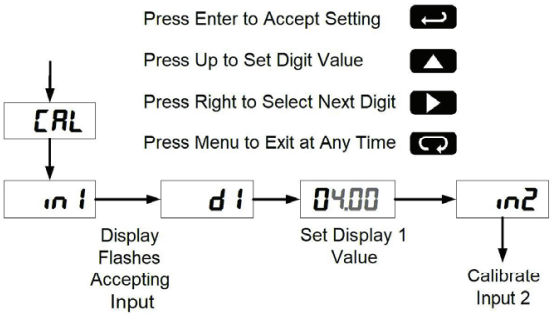
To scale the meter without a signal source refer to *Scaling the Meter* (SCL), page *6.*

**IMPORTANT**

- The input to the meter must be at least 6 mA prior to pressing the Enter button at the completion of programming for programming parameters to be saved.

The meter can be calibrated to display the process in engineering units by applying the appropriate input signal and following the calibration procedure.

The use of a calibrated signal source is strongly recommended.




Press the **Up** arrow button to scroll to the *Calibration* menu (CAL) and press **Enter**.

If using linear signal input conditioning, enter the number of calibration points (2-32).

The meter displays in 1. Apply a known signal and press **Enter**. The display will flash while accepting the signal.

When the meter displays d 1, press **Enter**. Enter a corresponding display value for the signal input, and press **Enter** to accept.

The meter displays in2. Apply a known signal and press **Enter**. The display will flash while accepting the signal.

When the meter displays d2, press **Enter**. Enter a corresponding display value for the signal input, and press **Enter** to accept.

## Re-calibrating the Internal Calibration Reference ( ICAL)

The *Internal Calibration* ( ICAL) menu, located in the *Advanced* features menu, is used to recalibrate the internal calibration reference. Recalibration is recommended at least every twelve months. Refer to *Internal Calibration* ( ICAL), page *8* for instructions.

# Advanced Features Menu

To simplify the setup process, functions not needed for most applications are located in the *Advanced* features menu. Press and hold the **Menu** button for five seconds to access the *Advanced* features menu.


## Advanced Features Menu & Display Messages

The following table shows the *Advanced* features menu functions and messages in the order they appear in the menu.

| Display | Parameter | Action/Setting |
|---|---|---|
| Fnc | *Input Function* | Set linear or square root input conditioning function |
| Lnr | *Linear* | Set linear scaling |
| Sqr | *Square Root* | Set square root input conditioning function |
| inFo | *Information* | Enter the *Information* menu |
| SFt | *Software Information* | Software release number |
| UEr | *Version* | Meter firmware version |
| C | *Calibration Temp (°C)* | Temperature at time of I-calibration (°C) |
| F | *Calibration Temp (°F)* | Temperature at time of I-calibration (°F) |
| FIL | *Filter* | Set filter function level |
| ICAL | *I-Calibration* | Internal master factory calibration |
| rSt | *Reset Defaults* | Restore factory default parameter settings |

## Signal Input Conditioning Function (Fnc)

The PD663 provides linear and square root signal input conditioning functions for inputs from linear and non-linear transmitters.

### Linear (Lnr)

Meters are set up at the factory for linear function using two-point linearization. Multi-point linearization with up to 32 points may be used. The linear function provides a display that is linear with respect to the input signal between each set of input points.

### Square Root (Sqr)

The square root function is used to linearize the signal from a differential pressure transmitter and display flow rate in engineering units.

## Information Menu ( InFo)

The *Information* menu is located in the *Advanced* features menu, to access *Advanced Features Menu* see, page 7.

It shows software identification number, version number, and calibration temperatures. To determine the software version of a meter:

Go to the *Information* menu ( InFo) and press **Enter** button.

The meter will automatically scroll through the software release number and software version. The meter temperatures at the time of last internal calibration in °C and °F are displayed for calibration troubleshooting. Pressing the **Enter**, **Right**, or **Up** buttons will progress the information display.

Following the information display, the meter will exit the *Advanced* features menu and return to run mode.

## Input Signal Filter (F IL)

The noise filter is available for unusually noisy signals that cause an unstable process variable display. The noise filter averages the input signal over a certain period. The filter level can be set to low (LO), high (HI), or off (OFF). The higher the filter setting, the longer the averaging time and so the longer the display may take to find its final value.

The filter contains a noise filter bypass feature so that while small variations in the signal will be filtered out, large, abrupt changes to the input signal are displayed immediately.

## Internal Calibration ( ICAL)

There is **no need to recalibrate** the meter for milliamps when first received from the factory. The meter is ***factory calibrated*** for milliamps prior to shipment. The calibration equipment is traceable to NIST standards.

The internal calibration allows the user to scale the meter without applying a signal. The use of a calibrated signal source is necessary to perform the internal calibration of the meter. Check calibration of the meter at least every 12 months.

**Notes:**

The signal source must have a full-scale accuracy of 0.01% or better between 4 and 20 mA in order to maintain the specified accuracy of the meter.

Allow the meter to warm up for at least 15 minutes before performing the internal calibration procedure.

The *Internal calibration* menu is part of the *Advanced* features menu.

Press and hold the **Menu** button for 5 seconds to enter the *Advanced* features menu. Press the **Up** arrow button to scroll to the *Internal Calibration* menu ( ICAL) and press **Enter**.

The meter displays 4.00 mA. Apply a 4.00 mA signal and press **Enter**. The display flashes for a moment while the meter is accepting the signal.

After the signal is accepted, the meter displays 20.00 mA. Apply a 20.00 mA signal and press **Enter**. The display flashes for a moment while the meter is accepting the signal.

### Error Message (Err)

An error message indicates that the calibration process was not successful. After the error message is displayed, the meter will revert to input 2 calibration settings. The error message might be caused by inadvertently leaving the signal at the previous level or not maintaining a 0.40 mA minimum span. Press the Menu button to cancel the current calibration process if necessary.

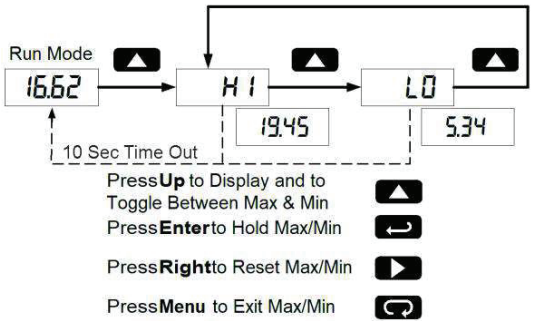
# Operation

## Front Panel Buttons Operation

| Button Symbol | Description |
|---|---|
| MENU | Press to enter or exit Programming Mode or exit Max/Min readings. |
| ENTER | Press to indefinitely display Max or Min until Menu button is pressed. |
| RESET | Press to reset Max or Min reading. |
| MAX | Press to display Max/Min readings alternately. |

## Maximum & Minimum Readings (H I & LO)

The maximum and minimum (peak & valley) readings reached by the process are stored in the meter since the last reset or power-up. The meter flashes H I or LO to differentiate between run mode and max/min display.




Press **Up** arrow button to display maximum reading since the last reset/power-up.

Press **Up** arrow again to display the minimum reading since the last reset/power-up.

Press **Enter** to continue to display the Max or Min display reading by disabling the Max/Min timeout. The meter will continue to track new Max/Min readings. Press **MENU** to exit the Max/Min reading.

If **Enter** is not pressed, the Max/Min display reading will continue to flash and time out after ten seconds. The meter will return to display the actual reading.

Press **Right** arrow button while in Max/Min Mode to reset both Max and Min. Max/Min display readings are reset to the current reading.

## Reset Meter to Factory Defaults

When the parameters have been changed in a way that is difficult to determine what's happening, it might be better to start the setup process from the factory defaults.

Instructions to load factory defaults:

Enter the *Advanced* features menu.
See *Advanced Features Menu*, page 7.

Press **Up** arrow button to display inFo menu.

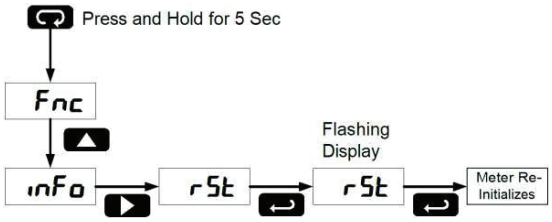
Press **Right** arrow button when inFo is shown.

Press **Enter** button when rSt is shown.

Press **Enter** again when display flashes rSt.

Note: If **Enter** is not pressed a second time within three seconds, rSt will stop flashing and the last **Enter** press cancelled.

The meter goes through an initialization sequence (same as on power-up) and loads the factory default settings.




## Factory Defaults & User Settings

The following table shows the factory setting for most of the programmable parameters on the meter. Next to the factory setting, the user may record the new setting for the particular application.

Model: _____

S/N: _____

Date: _____

| Parameter | Display | Default Setting | User Setting |
|---|---|---|---|
| Decimal point | dd.dd | 2 places | |
| Scale | SCL | | |
| Number of Points | nPt | 2 | |
| Input 1 | in 1 | 4.00 mA | |
| Display 1 | d 1 | 4.00 | |
| Input 2 | in2 | 20.00 mA | |
| Display 2 | d2 | 20.00 | |
| *Advanced Features* | | | |
| Input Conditioning Function | Fnc | Linear | |
| Filter | F iL | Off | |

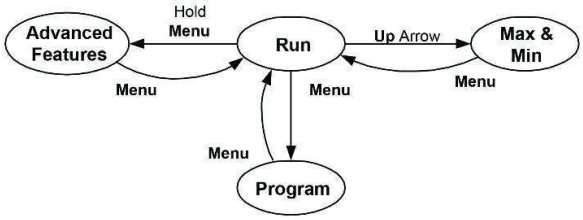
# Troubleshooting

The rugged design and the user-friendly interface of the meter should make it unusual for the installer or operator to refer to this section of the manual. If the meter is not working as expected, refer to the recommendations below.

## Troubleshooting Tips

| Symptom | Check/Action |
|---|---|
| No display or faint display | Check input signal connections.<br>Perform hard reset by shorting S+ and S- terminals. |
| Meter does not accept programming | The input to the meter must be at least 6 mA prior to pressing the Enter button at the completion of programming. |
| Rate display unsteady | Increase filter setting in *Advanced* menu. |
| Meter displays error message during calibration (Err) | Check signal connections.<br>Verify minimum input span requirements |
| Meter flashes 2999 or -1999 | Check input signal within scaled range of 2999 and -1999. |
| Display stuck flashing a number and HI or LO | Press **Menu** to exit Max/Min display readings. |
| Display response is too slow | Check filter setting to see if it can be lowered to LO or OFF. |
| If the display locks up or the meter does not respond at all | Perform hard reset by shorting S+ and S- terminals. |
| Backlight does not appear | Verify backlight is installed.<br>Check signal connections are as shown in *Figure 3. PD663 Input Connections with Backlight* on page *4*. |
| Other symptoms not described above | Call Technical Support for assistance. |

### Operational Modes



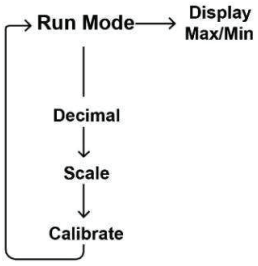

# Quick User Interface Reference

| Pushbutton | Function |
|---|---|
| **MENU** | Go to Programming Mode, leave Programming Mode and Max/Min Mode.<br>Hold for 5 seconds to enter *Advanced Features* menu directly. |
| **RIGHT** Arrow | Move to next digit or decimal point position. Reset Max/Min. |
| **UP** Arrow | Move to next selection or increment digit. Go to Max/Min Mode. |
| **ENTER** | Accept selection/value and move to next selection. |

**MAX/MIN Mode**

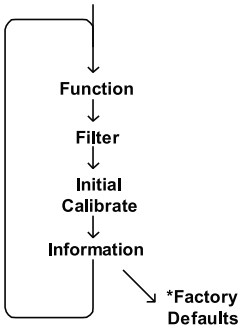
While in Run Mode, pressing **Up** Arrow will initiate MAX/MIN Mode. **Up** Arrow toggles between MAX & MIN displays, and **Right** Arrow resets the MAX/MIN to the current value. Press **Menu** or wait 10 seconds to return to Run Mode. Pressing **Enter/Ack** will disable the 10 second timeout and continuously display Max or Min.

### Main Menu



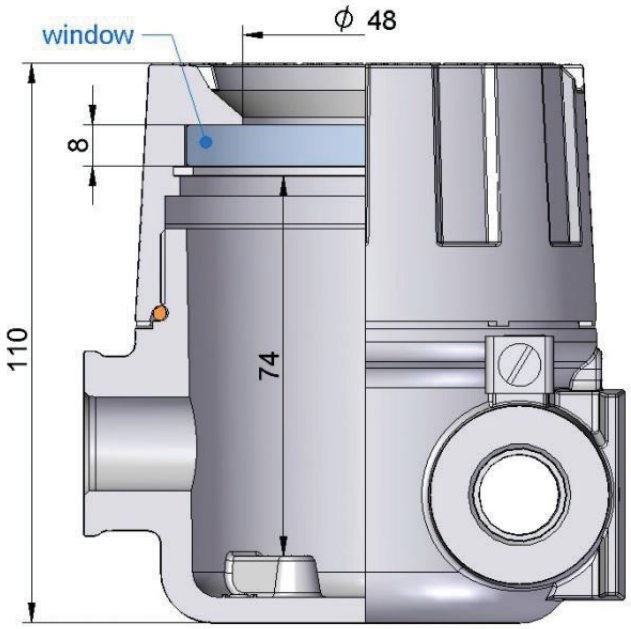

### Advanced Menu

Press & hold **Menu** for 5 seconds to access Advanced Features Menu




*Access by pressing **Right** arrow twice

## Dimensions




## Maintenance

The SSi Temperature Sensor Digital Indicating Display contains no user serviceable parts and cannot be repaired on site. If display is not functioning correctly, please contact factory for assistance.

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