



# LEVEL INDICATOR

WITH RUGGED ALUMINUM FIELD ENCLOSURE  
OR PANEL MOUNT ENCLOSURE



## Features

- Displays level, height and percentage filled.
- Large 17mm (0.67") digits.
- Selectable on-screen engineering units; volumetric or mass.
- Operational temperature -40°C up to +80°C (-40°F up to 178°F).
- Very compact design for panel mount, wall mount or field mount applications.
- Auto backup of all settings.
- Rugged aluminum field mount enclosure IP67/NEMA4X.
- Intrinsically Safe  
 II 1 GD EEx ia IIC T4 T100°C.
- Explosion/flame proof  II 2 GD EEx d IIB T5.
- LED backlight option.
- Loop or battery powered, 8 - 24V AC/DC or 115 - 230V AC power supply.
- Sensor supply 3.2 - 8.2 - 12 - 24V DC.

## Signal input

### Level

- (0)4 - 20mA.
- 0 - 10V DC.

## Applications

- Applications where a basic level measurement display is required without level monitoring and linearisation. More sophisticated models: F073, F077, F170 and F173.



## General information

### Introduction

The F070 is a straight forward level indicator. The measuring unit to be displayed is simply selected through an alpha-numerical configuration menu. No adhesive labels have to be put on the outside of the enclosure: a weather proof and user friendly solution!

The configuration of the Span, off-set and number of decimals is done through software functions, without any sensitive dip-switches or trimmers. A wide selection of options further enhance this models capabilities, including Intrinsic Safety for hazardous area applications.

### Display

The display has large 17mm (0.67") and 8mm (0.31") digits which can be set to show level, height and/or percentage. As the F070 has been designed for field mounted applications, a smart display update function has been incorporated. Related to the lower temperatures, the update frequency of the LCD is tuned automatically to achieve a readable display even at -40°C / -40°F.

### Backlight

For those applications where readability during day and night is an issue, a bi-color backlight is available. The background color green or amber and the intensity can be adjusted from the keyboard. The display is a transfective type, which means that a high contrast reading is guaranteed in full sunlight as well as during the night. This backlight option is also available Intrinsically Safe.

### Configuration

All configuration settings are accessed via a simple operator menu which can be pass-code protected. Each setting is clearly indicated with an alphanumerical description, therefore avoiding confusing abbreviations. All settings are safely stored in EEPROM memory in the event of sudden power failure.

### Signal input

The F070 does accept (0)4 - 20mA and 0 - 10V input signals from any type of level measurement device. Also a 4 - 20mA input loop powered model is available.

### Power supply

Several power supply options are available to power the F070 and sensor. A battery powered version with a long life lithium battery which will last up to five years. A 4-20mA input loop powered version is available as well. A real sensor supply is offered with the 24V AC/DC or 115-230V AC power supply option.

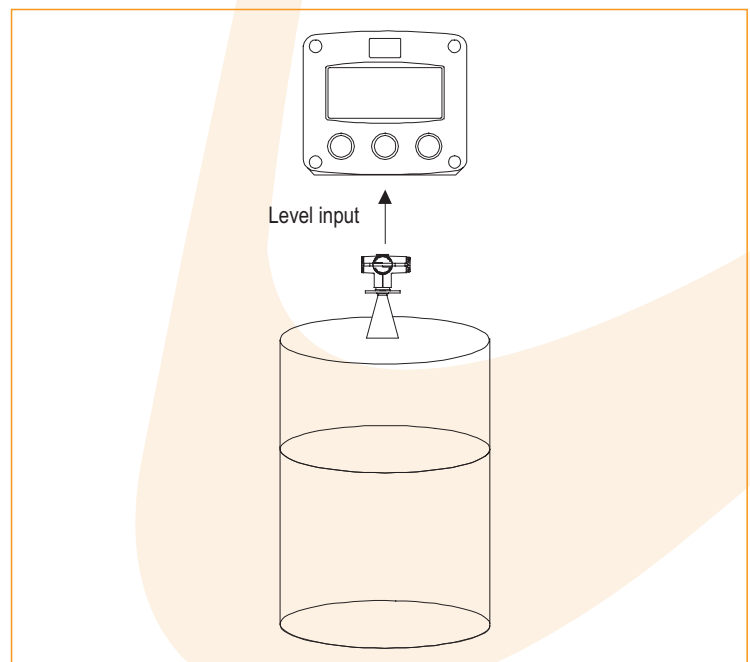
### Hazardous areas

For hazardous area applications, this model has been ATEX certified Intrinsically Safe  $\text{Ex II 1 GD EEx ia IIC T4 T100}^\circ\text{C}$  with an allowed operational temperature of -40°C to +70°C (-40°F to +158°F). IEC, CSA and FM certification is expected to be available in May 2006. A flame proof enclosure with ATEX certification offers the rating  $\text{Ex II 2 GD EEx d IIB T5}$ .

### Enclosures

Various types of enclosures can be selected, all ATEX approved. As standard the F070 is supplied in an ABS panel mount enclosure, which can be converted to an IP67 / NEMA 4X ABS field mount enclosure by the addition of a back case. Most popular is our aluminum field mount enclosure with IP67 / NEMA 4X rating. Both European or U.S. cable gland entry threads are available.

## Overview application F070

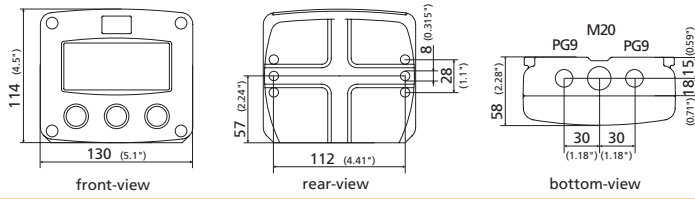


## Dimensions enclosures

### Enclosure HA

#### Aluminum field mount enclosure

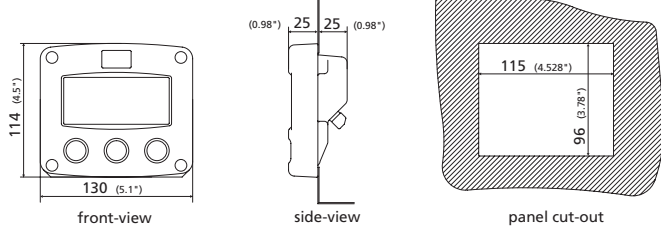
IP67 / NEMA 4X  
Tapped holes: European thread



### Enclosure HB

Aluminum panel mount enclosure

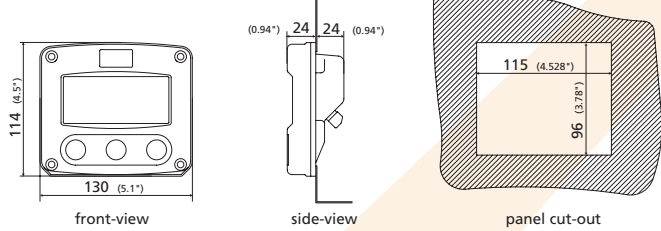
IP65 / NEMA 4



### ENCLOSURE HC (STANDARD)

#### ABS PANEL MOUNT ENCLOSURE

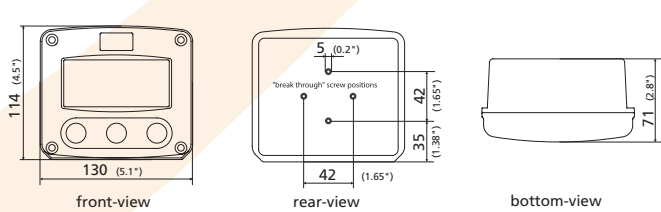
IP65 / NEMA 4



### Enclosure HD

ABS wall mount enclosure

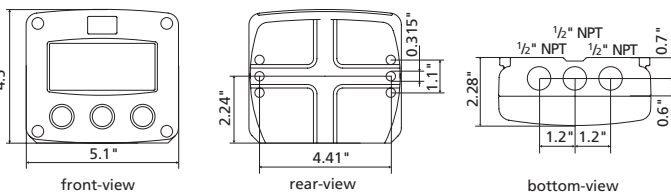
IP67 / NEMA 4X  
Holes user defined



### Enclosure HU

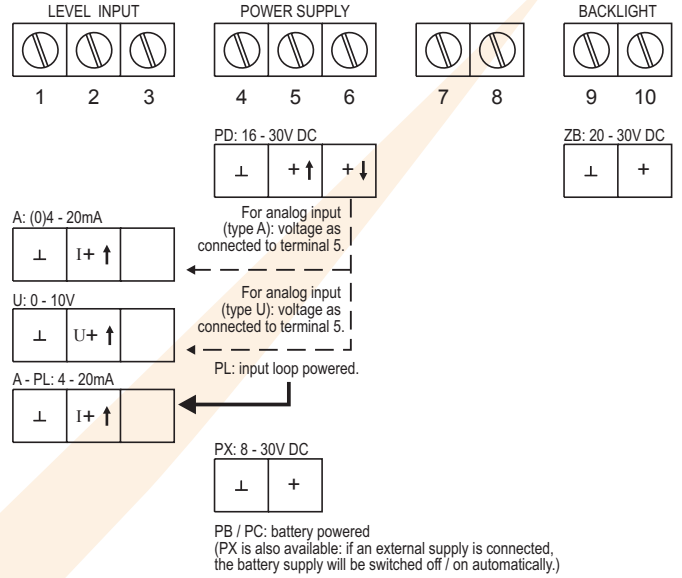
Aluminum field mount enclosure

IP67 / NEMA 4X  
Tapped holes: U.S. thread

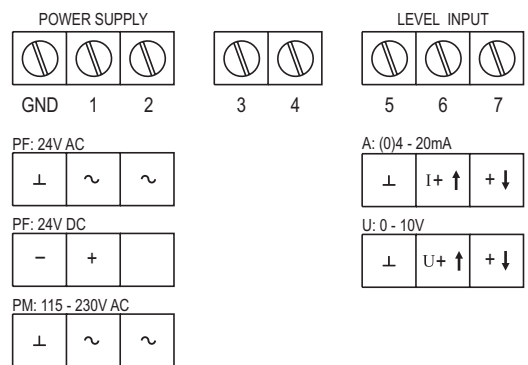


## Terminal connections power supply

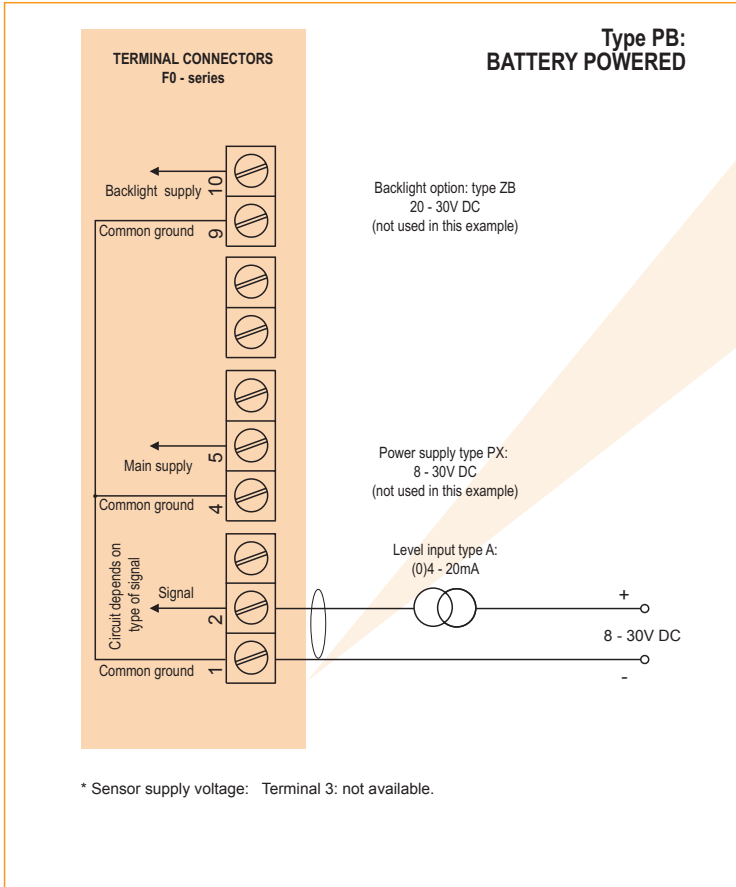
### PB/PC - PD - PL - PX



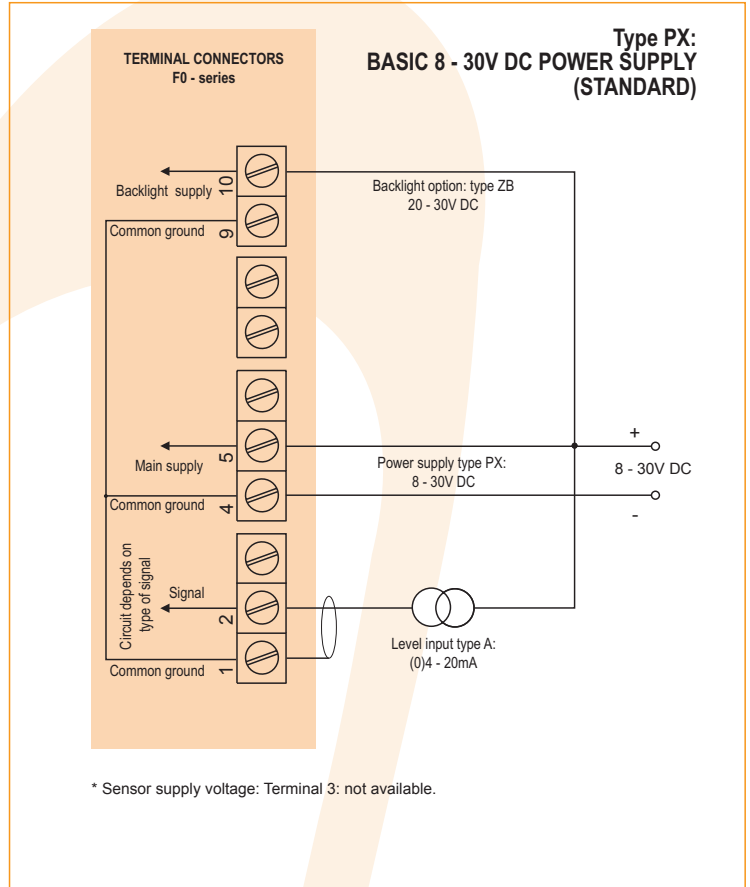
## Terminal connections power supply PF - PM



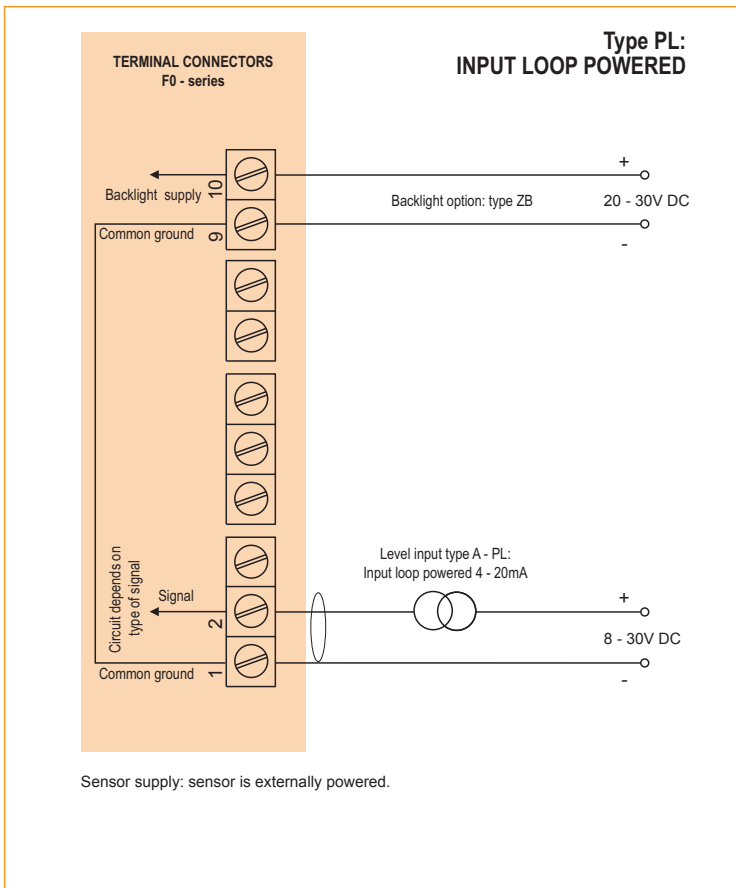
Typical wiring diagram Fo70-A-PB-(PX)



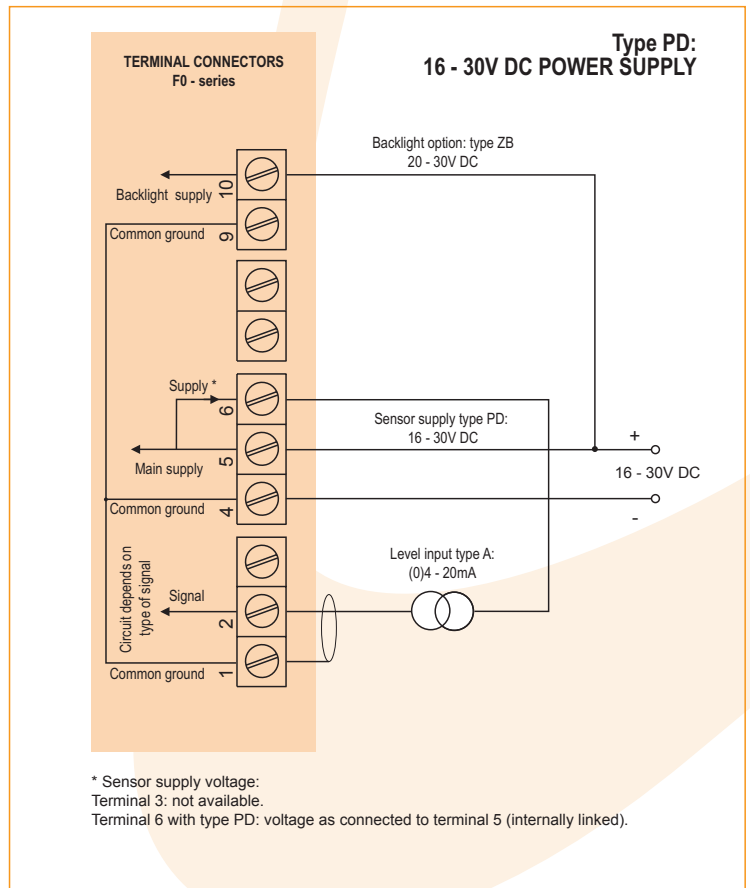
Typical wiring diagram Fo70-A-PX-ZB



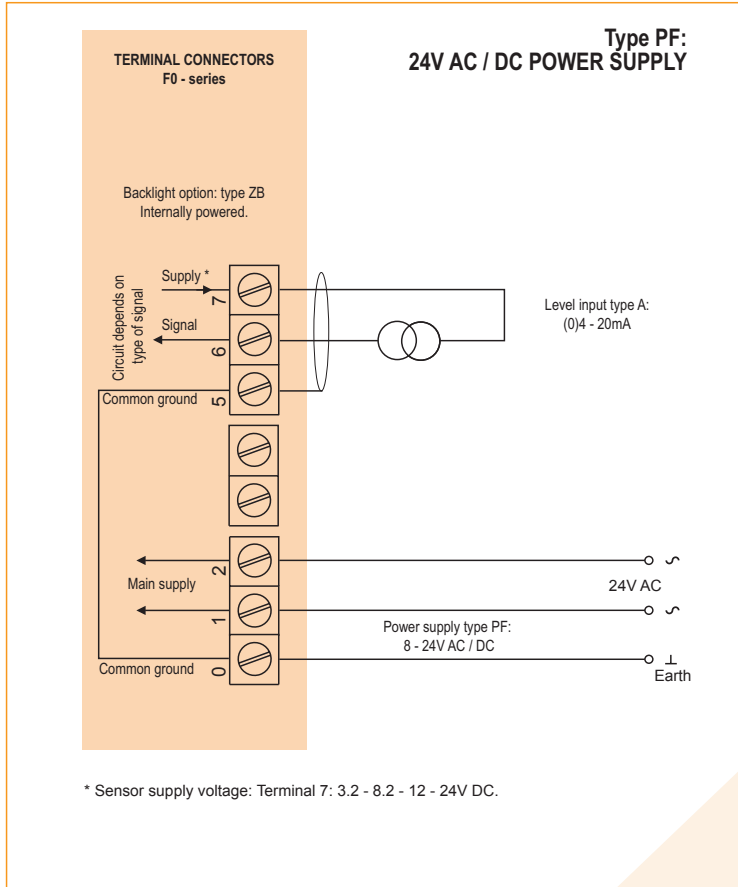
Typical wiring diagram Fo70-A-PL-ZB



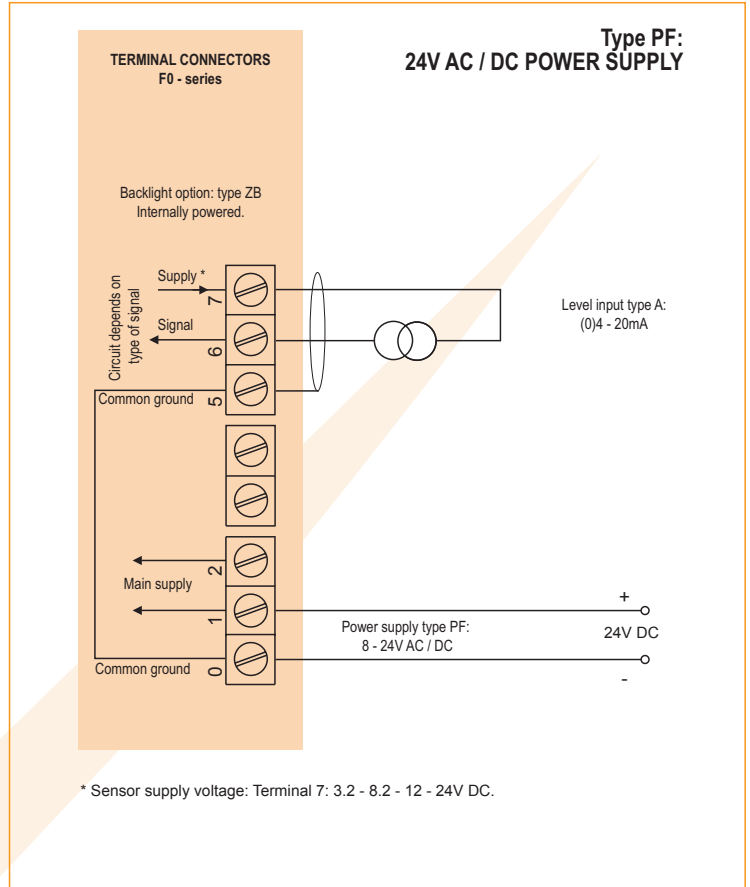
Typical wiring diagram Fo70-A-PD-ZB



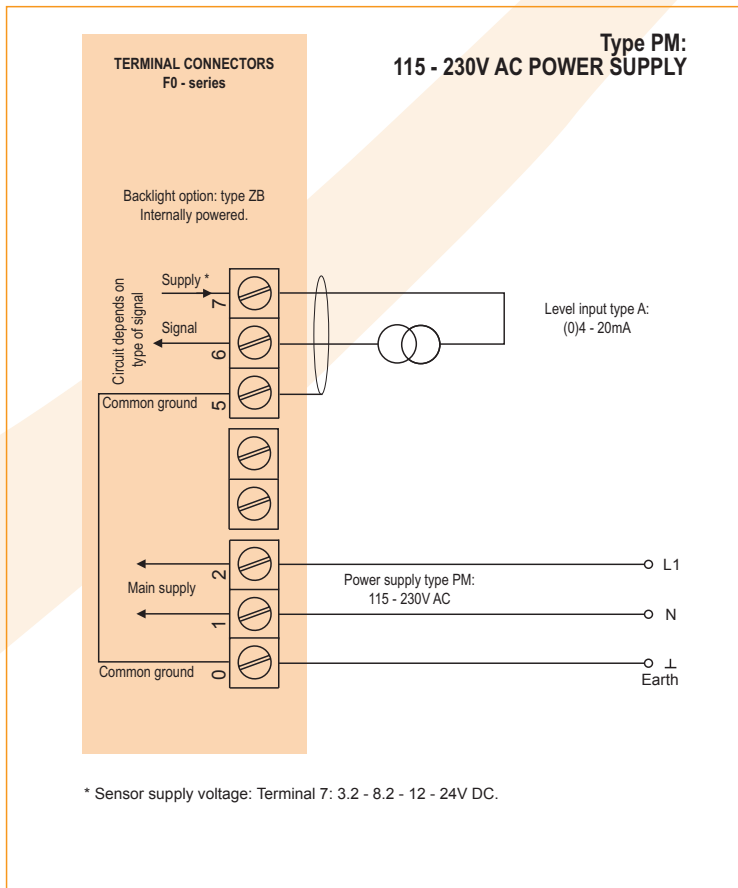
Typical wiring diagram Fo70-A-PF-ZB



Typical wiring diagram Fo70-A-PF-ZB



Typical wiring diagram Fo70-A-PM-ZB

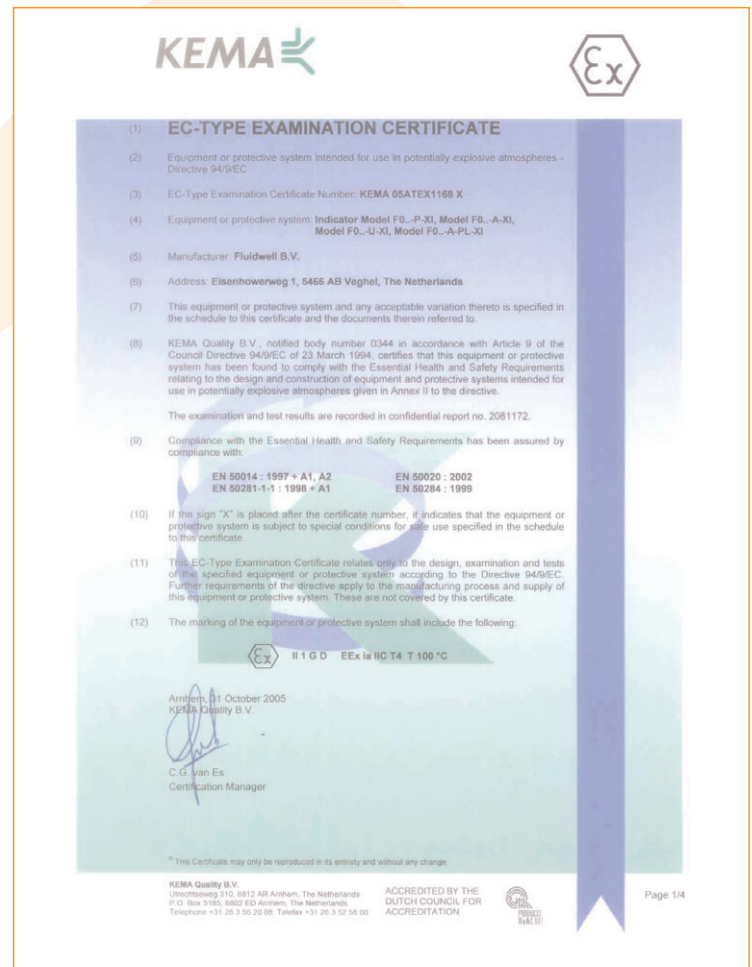


## Hazardous area applications

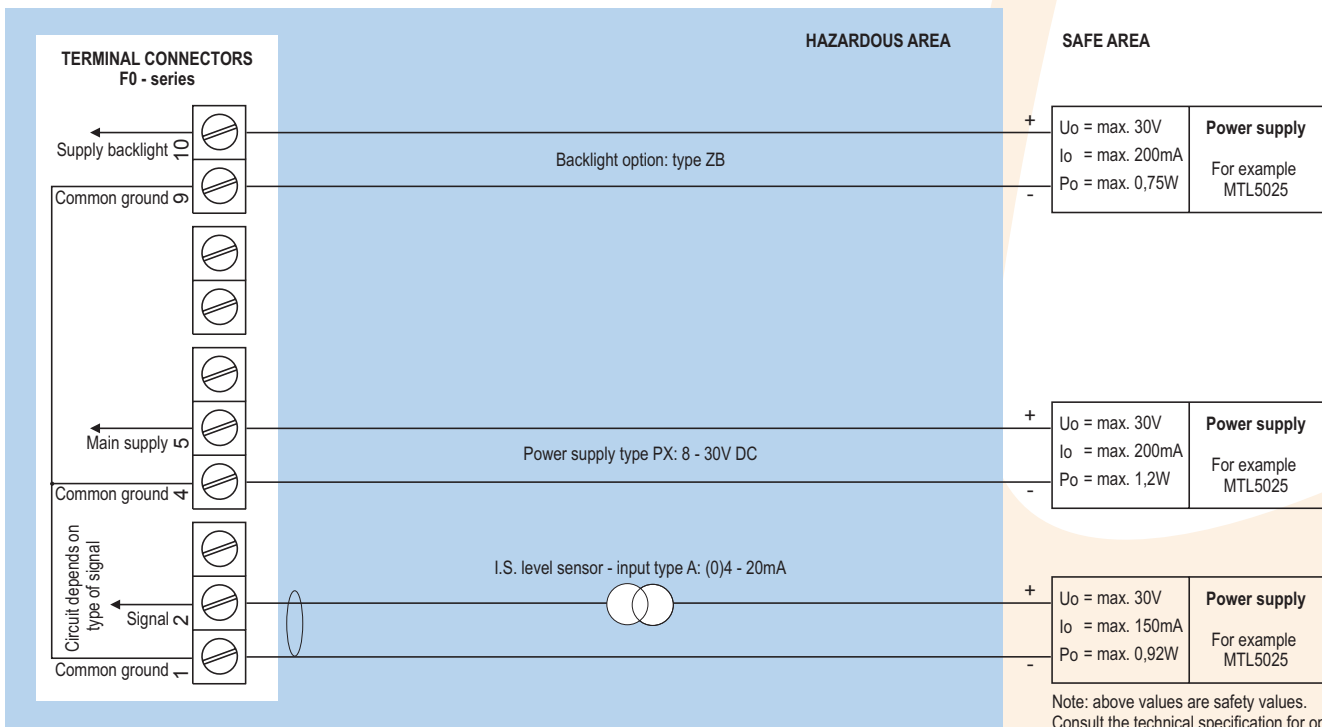
The F070-XI has been ATEX approved by KEMA for use in Intrinsically Safe applications. It is approved according to  $\text{Ex}$  II 1 GD EEx ia IIC T4 T100°C for gas and dust applications with an operational temperature range of -40°C to +70°C (-40°F to +158°F). IEC, CSA and FM approvals are expected to become available in May 2006.

It is allowed to connect up to three I.S. power supplies to power the unit, sensor and backlight. An ATEX approved flame proof enclosure with rating  $\text{Ex}$  II 2 GD EEx d IIB T5 is available as well. Please contact your supplier for further details.

## Certificate of conformity KEMA 05ATEX1168 X



### Configuration example IIA - IIB and IIC F070-A-PX-XI-ZB - Basic power supply 8 - 30V DC

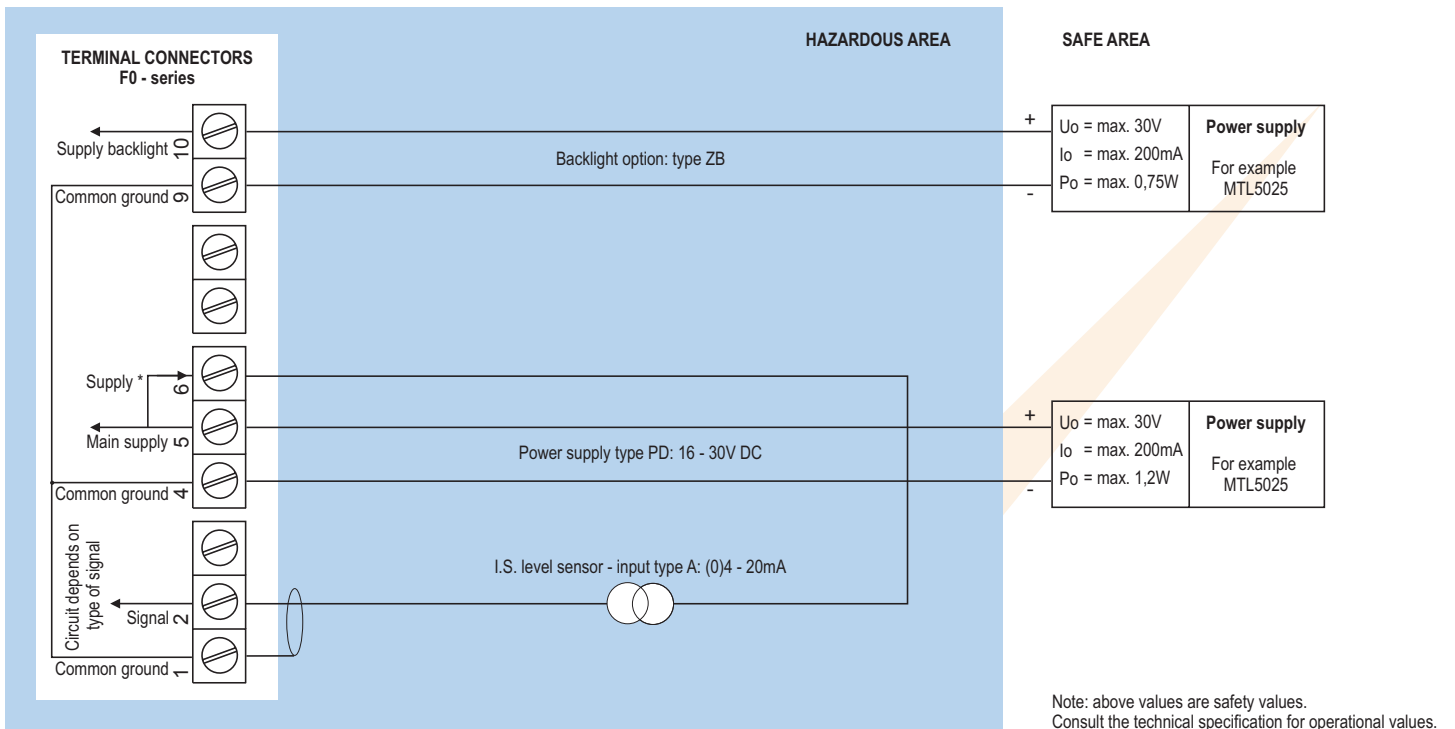


\* Sensor supply voltage for analog level sensor type A / U: not available in this example.

Please note: type PX may be used in combination with the battery (type PC). PX will power the unit; the battery will be disabled automatically till power is disconnected.

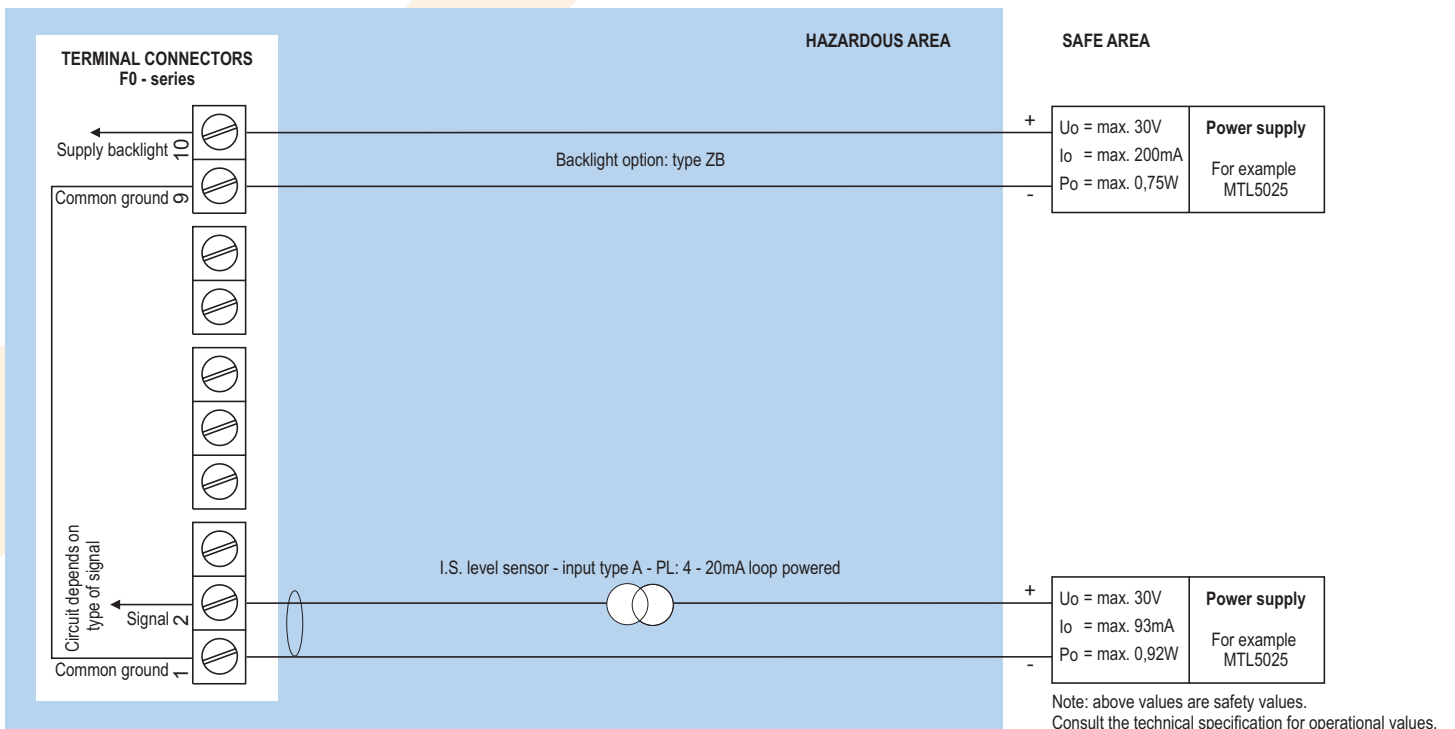
Note: above values are safety values. Consult the technical specification for operational values.

### Configuration example IIA - IIB and IIC - F070-A-PD-XI-ZB - Power supply 16 - 30V DC



\* Sensor supply voltage for analog level sensor type A / U: Terminal 6: as input voltage terminal 5 (internally linked).  
Please note: type PD may be used in combination with the battery (type PC). PD will power the unit; the battery will be disabled automatically till power is disconnected.

### Configuration example IIA - IIB and IIC - F070-A-PL-XI-ZB - Input loop powered



Sensor supply is not available: unit is input loop powered (type PL).  
Please note: type PL may be used in combination with the battery (type PC). PL will power the unit; the battery will be disabled automatically till power is disconnected.

## Technical specification

### General

#### Display

|              |  |
|--------------|--|
| Type         | High intensity reflective numeric and alphanumeric LCD, UV-resistant.  |
| Dimensions   | 90 x 40mm (3.5" x 1.6").   |
| Digits       | Seven 17mm (0.67") and eleven 8mm (0.31") digits. Various symbols and measuring units.   |
| Refresh rate | User definable: 8 times/sec. - 30 secs - off.  |
| Option ZB    | Transflective LCD with bi-color LED-backlight; green / amber. Intensity and color selected through the keyboard. Good readings in full sunlight and darkness. Also available Intrinsically Safe. |

#### Operating temperature

|                    |                                   |
|--------------------|-----------------------------------|
| Standard unit      | -40°C to +80°C (-40°F to +178°F). |
| Intrinsically Safe | -40°C to +70°C (-40°F to +158°F). |

#### Power requirements

|               |   |
|---------------|---|
| Type PB       | Long life Lithium battery - life-time depends upon settings and configuration - up to 5 years.                    |
| Type PC       | Intrinsically Safe long life lithium battery - life-time depends upon settings and configuration - up to 5 years. |
| Type PD       | 16 - 30V DC. Power consumption max. 1 Watt.   |
| Type PF       | 24V AC / DC ± 10%. Power consumption max. 15 Watt.  |
| Type PL       | Input loop powered from sensor signal 4 - 20mA (type A).  |
| Type PM       | 115 - 230V AC ± 10%. Power consumption max. 15 Watt.  |
| Type PX       | 8 - 30V DC. Power consumption max. 0.3 Watt.  |
| Type ZB       | 20 - 30V DC. Power consumption max. 1 Watt.<br>With type PF / PM: internally powered.                             |
| Note PB/PF/PM | Not available Intrinsically Safe.   |
| Note PF/PM    | The total consumption of the sensor and backlight type ZB may not exceed 400mA @ 24V DC.                          |
| Note          | For Intrinsically Safe applications, consult the safety values in the certificate.                                |

#### Sensor excitation

|               |   |
|---------------|---|
| Type PB/PC/PX | Not available.  |
| Type PD       | The sensor supply voltage will be according to power supply voltage (as connected to terminal 5). |
| Type PF / PM  | 3.2 - 8.2 - 12 and 24V DC - max. 400mA @ 24V DC.  |

#### Terminal connections

|      |  |
|------|--|
| Type | Removable plug-in terminal strip.<br>Wire max. 1.5mm <sup>2</sup> and 2.5mm <sup>2</sup> . |
|------|--|

#### Data protection

|           |  |
|-----------|--|
| Type      | EEPROM backup of all settings. Data retention at least 10 years. |
| Pass-code | Configuration settings can be pass-code protected.               |

### Casing

#### General

|              |  |
|--------------|--|
| Window       | Polycarbonate window.  |
| Sealing      | EPDM and PE.   |
| Control keys | Three industrial micro-switch keys. UV-resistant polyester keypad. |

#### Aluminum field enclosures

|            |   |
|------------|---|
| General    | Die-cast aluminum field mount enclosure IP67 / NEMA 4X with 2-component UV-resistant coating. |
| Dimensions | 130 x 114 x 58mm (5.1" x 4.5" x 2.28") - W x H x D.   |
| Weight     | 950 gr.   |
| Type HA    | Cable entry: 2 x PG9 and 1 x M20 tapped hole in the centre.                                   |
| Type HT    | Cable entry: 1 x 1/2" NPT tapped hole in the centre.  |
| Type HU    | Cable entry: 3 x 1/2" NPT tapped hole.  |
| Type HZ    | Cable entry: none, user defined.  |

#### ABS wall mount enclosures

|            |  |
|------------|--|
| General    | ABS wall mount enclosure IP67 / NEMA 4X, UV-resistant and flame retardant. |
| Dimensions | 130 x 114 x 71mm (5.1" x 4.5" x 2.8") - W x H x D.                         |
| Weight     | 400 gr.  |
| Type HD    | Cable entry: none, user defined.   |
| Type HF    | Cable entry: 1x 22mm (0.866") hole in the centre.                          |

#### Panel mount enclosures

|               |  |
|---------------|--|
| Type HB       | Die-cast aluminum panel mount enclosure IP65 / NEMA 4.                     |
| Dimensions    | 130 x 114 x 50mm (5.1" x 4.5" x 1.97") - W x H x D.                        |
| Panel cut-out | 115 x 96mm (4.53" x 3.78") L x H.  |
| Weight        | 525 gr.  |
| Type HC       | ABS panel mount enclosure IP65 / NEMA 4, UV-resistant and flame retardant. |
| Dimensions    | 130 x 114 x 48mm (5.1" x 4.5" x 1.89") - W x H x D.                        |
| Panel cut-out | 115 x 96mm (4.53" x 3.78") L x H.  |
| Weight        | 300 gr.  |



## Hazardous area

### Intrinsically Safe

|                              |   |
|------------------------------|---|
| ATEX certification           | ⊕ II 1 GD EEx ia IIC T4 T100°C  |
| CSA C-US/IECEX certification | IEC, CSA and FM approvals are expected to become available in May 2006. |
| Ambient                      | -40°C to +70°C / -40° to +158°F.  |

### Explosion proof

|                    |   |
|--------------------|---|
| ATEX certification | ⊕ II 2 GD EEx d IIB T5.   |
| Type XF            | Dimensions of enclosure: 350 x 250 x 200mm (13.7" x 9.9" x 7.9") L x H x D. |
| Weight             | Appr. 15kg.   |

### Environment

|                               |  |
|-------------------------------|--|
| Electromagnetic compatibility | Compliant ref: EN 61326 (1997), EN 61010-1 (1993). |
|-------------------------------|--|

## Signal input

### Level sensor

|                |   |
|----------------|---|
| Type A         | (0)4 - 20mA. Analog input signal can be scaled to any desired range within 0 - 20mA.  |
| Type U         | 0 - 10V DC. Analog input signal can be scaled to any desired range within 0 - 10V DC. |
| Accuracy       | Resolution: 16 bit. Error < 0.01mA / ± 0.05% FS. Low level cut-off programmable.      |
| Span           | 0.000010 / 9,999,999 with variable decimal position.                                  |
| Offset         | -999,999 / 999,999.   |
| Update time    | Four times per second.  |
| Voltage drop   | Type A: max. 2V DC @ 20mA.  |
| Voltage drop   | Type A - PL (loop powered): max. 2.6V DC @ 20mA.                                      |
| Load impedance | Type U: 3kΩ.  |
| Relationship   | Linear and square root calculation.   |
| Note           | For signal type A and U: external power to sensor is required; e.g. type PD.          |

## Operational

### Operator functions

|                     |  |
|---------------------|--|
| Displayed functions | <ul style="list-style-type: none"> <li>• Level.</li> <li>• Height or percentage (or no indication).</li> </ul> |
|---------------------|--|

### Level

|          |   |
|----------|---|
| Digits   | 7 digits.   |
| Units    | L, m <sup>3</sup> , GAL, USGAL, KG, lb, bbl, no unit. |
| Decimals | 0 - 1 - 2 or 3.                                       |

### Height

|          |  |
|----------|--|
| Digits   | 6 digits.  |
| Units    | mm, cm, m, mtr, inch, ft, mmwk, mmwc, cmwk, cmwc, mwk, mwc, inwc, ftwc, mbar, bar, psi, no unit. |
| Decimals | 0 - 1 or 2.  |

### Percentage

|          |           |
|----------|-----------|
| Digits   | 3 digits. |
| Decimals | 1.        |

## Display example - 90 x 40mm (3.5" x 1.6")



## Ordering information

Example (standard configuration)

F070-A-HC-PX-XX-ZX.

Explanation standard configuration:

**A:** level input signal: analog; **HC:** ABS panel mount enclosure; **PX:** the unit is powered with 8 - 30V DC (basic power supply); **XX:** safe area; **ZX:** no options.

| ordering information:  | F070 | - | -H | -P | -X | -Z |
|--|------|---|----|----|----|----|
| <b>Level sensor input signal</b>   |      |   |    |    |    |    |
| <b>A</b> ⓘ (o)4 - 20mA input.  |      |   |    |    |    |    |
| U ⓘ 0 - 10V DC input.  |      |   |    |    |    |    |
| <b>Enclosure</b>   |      |   |    |    |    |    |
| HA ⓘ Aluminum field mount enclosure IP67 / NEMA 4X - two holes PG9 + one hole M20. |      |   |    |    |    |    |
| HB ⓘ Aluminum panel mount enclosure IP65 / NEMA 4.                                 |      |   |    |    |    |    |
| <b>HC</b> ⓘ <b>ABS panel mount enclosure IP65 / NEMA 4.</b>                        |      |   |    |    |    |    |
| HD ⓘ ABS wall mount enclosure IP67 / NEMA 4X.                                      |      |   |    |    |    |    |
| HF ⓘ ABS wall mount enclosure IP67 / NEMA 4X - 1x hole 22mm.                       |      |   |    |    |    |    |
| HT ⓘ Aluminum field mount enclosure IP67 / NEMA 4X - one hole 1/2"NPT.             |      |   |    |    |    |    |
| HU ⓘ Aluminum field mount enclosure IP67 / NEMA 4X - three holes 1/2"NPT.          |      |   |    |    |    |    |
| HZ ⓘ Aluminum field mount enclosure IP67 / NEMA 4X - no holes.                     |      |   |    |    |    |    |
| <b>Power supply</b>  |      |   |    |    |    |    |
| PB Lithium battery powered.  |      |   |    |    |    |    |
| PC ⓘ Lithium battery powered - Intrinsically Safe.                                 |      |   |    |    |    |    |
| PD ⓘ 16 - 30V DC + sensor supply.  |      |   |    |    |    |    |
| PF 24V AC / DC + sensor supply.  |      |   |    |    |    |    |
| PL ⓘ Input loop powered from sensor signal 4 - 20mA (type A).                      |      |   |    |    |    |    |
| PM 115 - 230V AC + sensor supply.  |      |   |    |    |    |    |
| <b>PX</b> ⓘ <b>Basic power supply 8 - 30V DC (no sensor supply).</b>               |      |   |    |    |    |    |
| <b>Hazardous area</b>  |      |   |    |    |    |    |
| XI ⓘ Intrinsically Safe.   |      |   |    |    |    |    |
| XF ⓘ EExd enclosure - 3 keys.  |      |   |    |    |    |    |
| <b>XX</b> <b>Safe area only.</b>   |      |   |    |    |    |    |
| <b>Other options</b>   |      |   |    |    |    |    |
| ZB ⓘ Backlight.  |      |   |    |    |    |    |
| <b>ZX</b> ⓘ <b>No options.</b>   |      |   |    |    |    |    |

The bold marked text contains the standard configuration.

ⓘ Available Intrinsically Safe.

Specifications are subject to change without notice.

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