

# TEMPERATURE INDICATOR

WITH VERY LARGE DIGITS



## Advantages

- Robust IP67 (NEMA4X) field enclosure. It is so rugged, **you can even stand on it!**
- Intrinsically Safe available - ATEX, IECEx, FM and CSA approval for gas and dust applications.
- Programming can be done by your own crew, with the sensible menu-driven structure, saving cost and irritation. **Know one, know them all!**
- Very diverse mounting possibilities: walls, pipes, panels or directly onto outdoor sensors!

## Features

- Displays actual temperature and measuring unit.
- Very large 26mm (1") digits.
- Piegraph indication: ten segments.
- Number of digits for temperature: 5 1/2.
- Selectable on-screen engineering units: °C-°F-K.
- Auto backup of all settings.
- Explosion/flame proof  $\text{Ex}$  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 8.2 / 12 / 24V DC.

## Signal input

### Temperature

- PT100 - 2, 3 or 4 wire.
- (0)4 - 20mA.
- 0 - 10V DC.

## Applications

- The F-Series is your first and safest choice for field mount indicators. Especially in harsh weather conditions like rain, snow, salty atmospheres and temperatures between -40°C up to +80°C (-40°F up to 176°F) for safe and hazardous area applications!
- Applications where a basic temperature measurement display is required without temperature monitoring. More sophisticated models: F043, F140 and F143 or the D-Series DIN panel mount indicators.

## General information

### Introduction

The Fo40 is a straight forward temperature indicator, displaying the actual value with its measuring unit. The display is typically used as a battery powered indicator for PT100 temperature sensors but also often used with (0)4 - 20mA input signals. The measuring unit to be displayed is simply selected through an alfa-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 enhances the capabilities of this model, including Intrinsic Safety for hazardous area applications.

### Display

The display has very large 26mm (1") digits which displays the temperature and measuring unit. As the Fo40 has been designed for field mounted applications, a smart display update function has been incorporated: related to the lower ambient temperature, 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 password protected. Each setting is clearly indicated with an alphanumerical description, which avoids confusing abbreviations. All settings are safely stored in EEPROM memory in the event of sudden power failure.

### Signal input

The Fo40 does accept (0)4 - 20mA and 0 - 10V input signals from any type of temperature measurement device. Also a two, three or four wire PT100 sensor can be used. Thermocouple inputs are in preparation.

### Power requirements

Several power supply options are available to power the Fo40 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 requirement options.

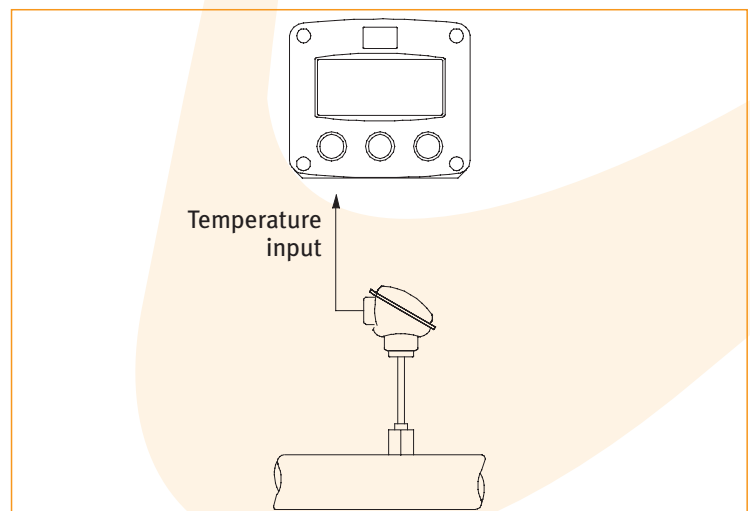
### Hazardous area

For hazardous area applications, this model has been ATEX, IECEx, FM and CSA certified Intrinsically Safe for gas and dust applications, with an allowed ambient temperature of -40°C to +70°C (-40°F to +158°F). A flame proof enclosure with ATEX certification offers the rating  $\text{Ex} \text{II} 2 \text{GD EEx d IIB T5}$ .

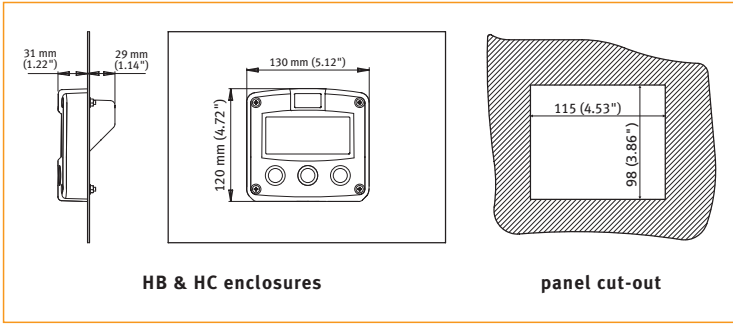
### Enclosures

Various types of enclosures can be selected, all ATEX, IECEx, FM and CSA approved. As standard the Fo40 is supplied in an GRP panel mount enclosure, which can be converted to an IP67 / NEMA 4X GRP field mount enclosure by the addition of a back case. Most popular is our rugged aluminum field mount enclosure with IP67 / NEMA 4X rating. Both European or U.S. cable gland entry threads are available.

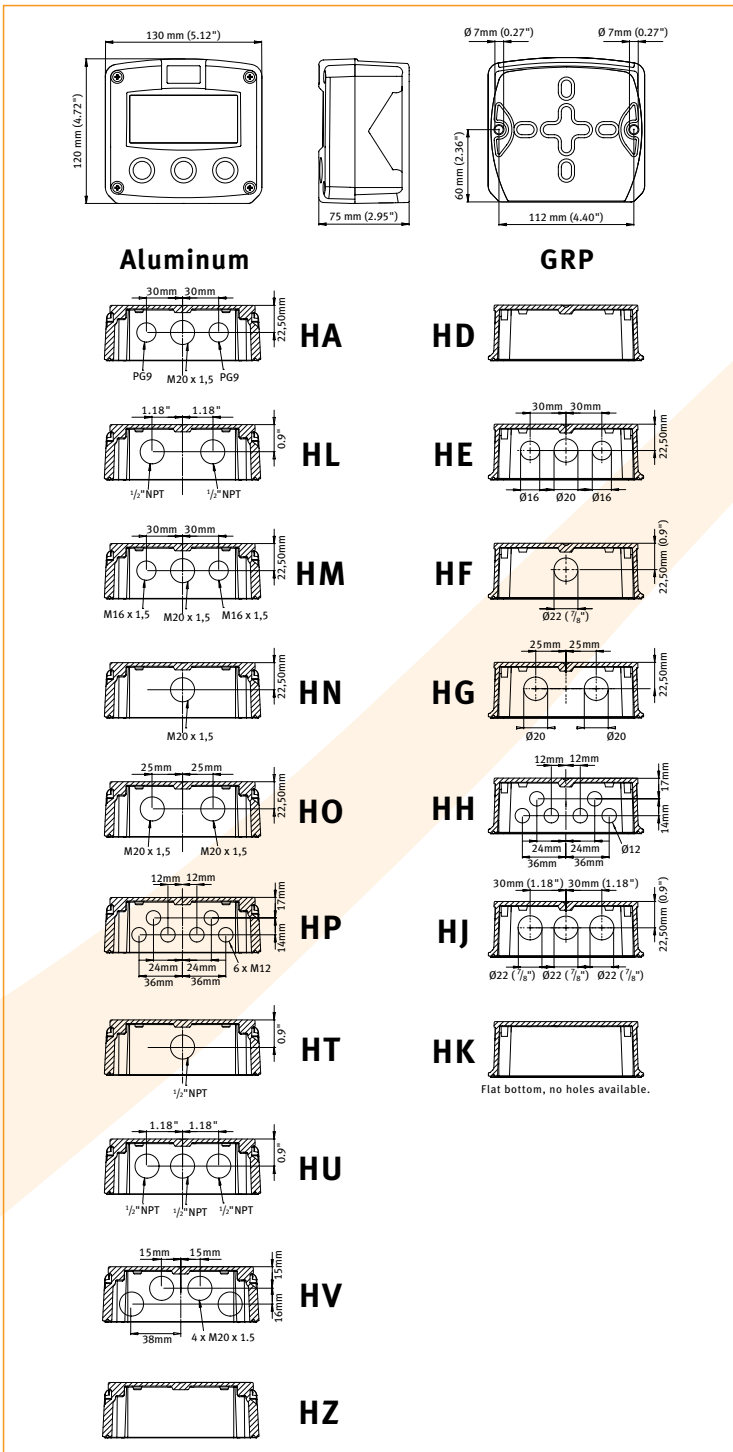
## Overview application Fo40



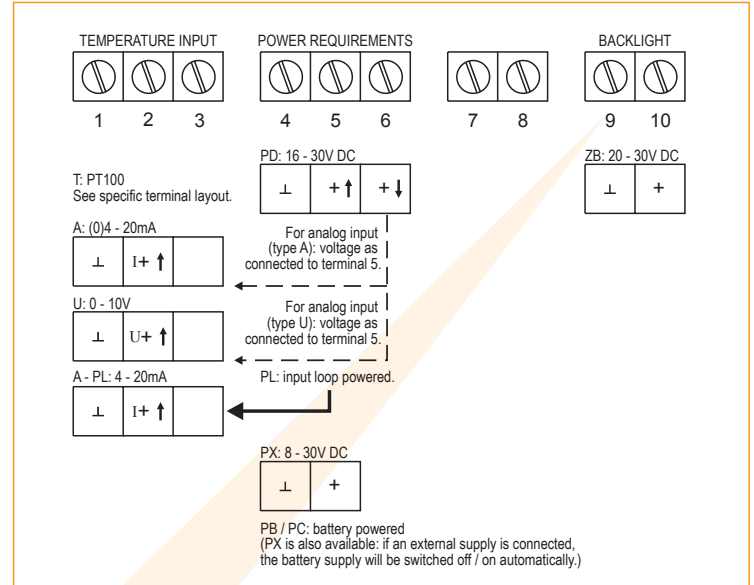
## Dimensions enclosures Aluminum & GRP panel mount enclosure



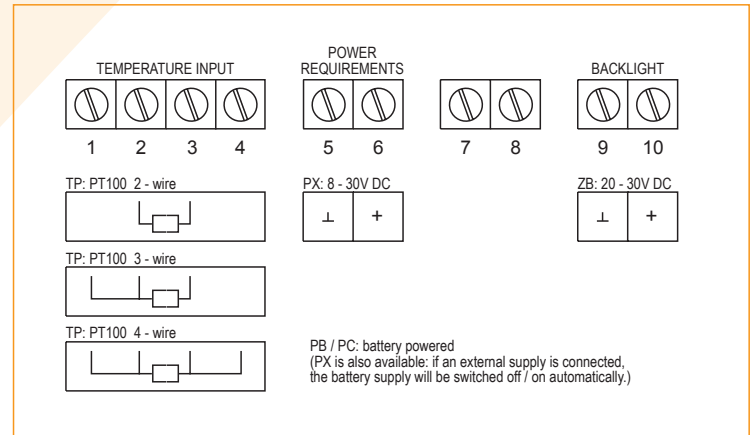
## Aluminum & GRP field / wall mount enclosures



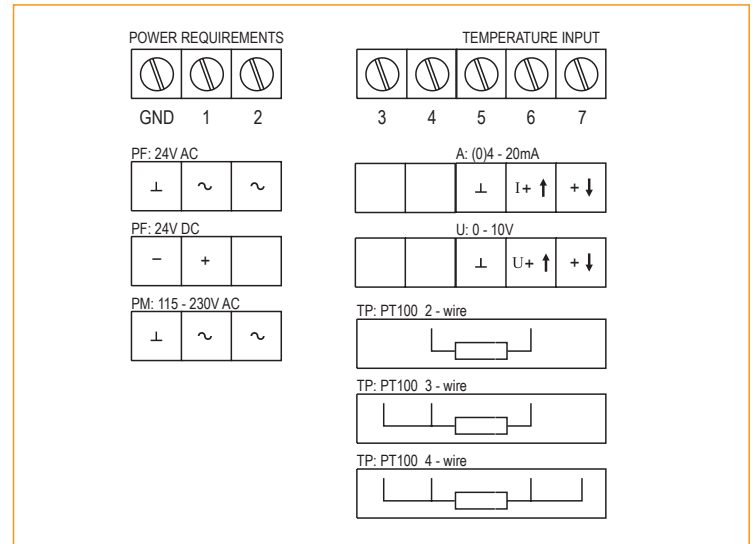
## Terminal connections analog input Power requirement PB/PC - PD - PL - PX



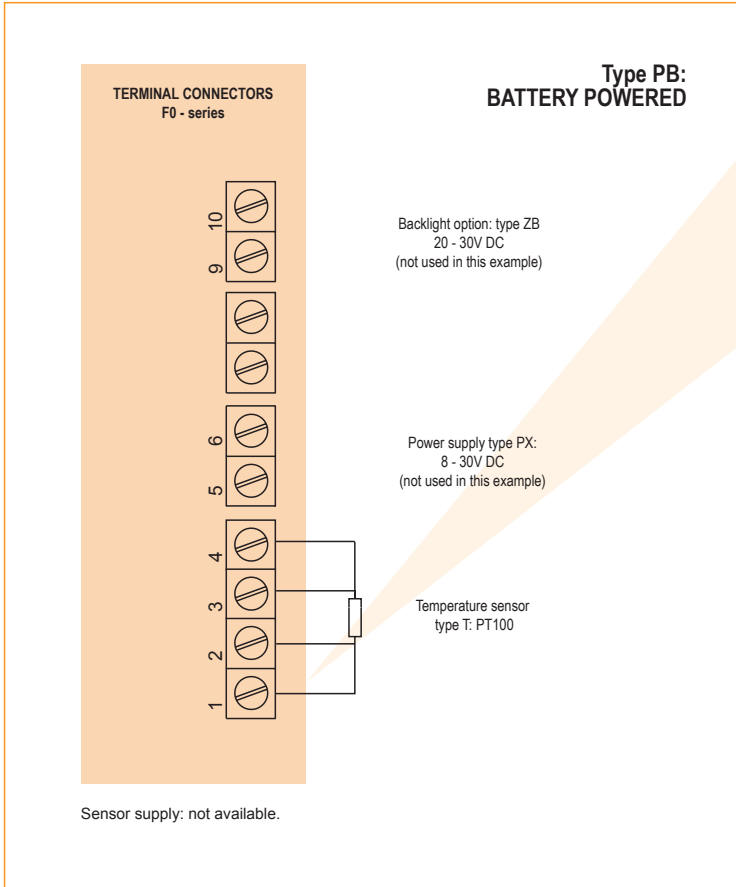
## Terminal connections PT100 input Power requirement PB/PC - PX



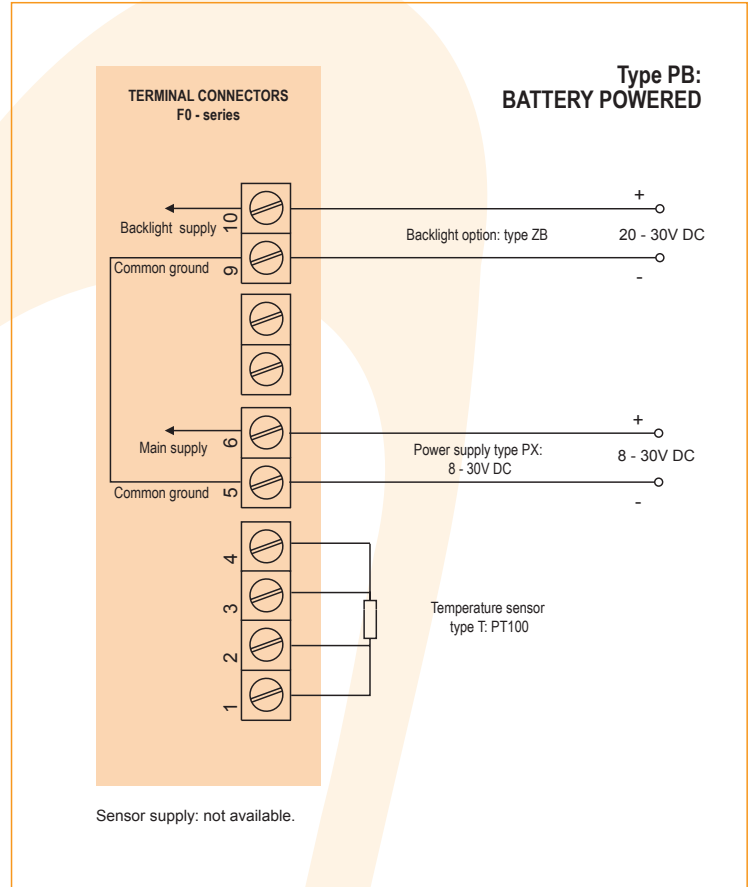
## Terminal connections analog / PT100 input Power requirement PF - PM



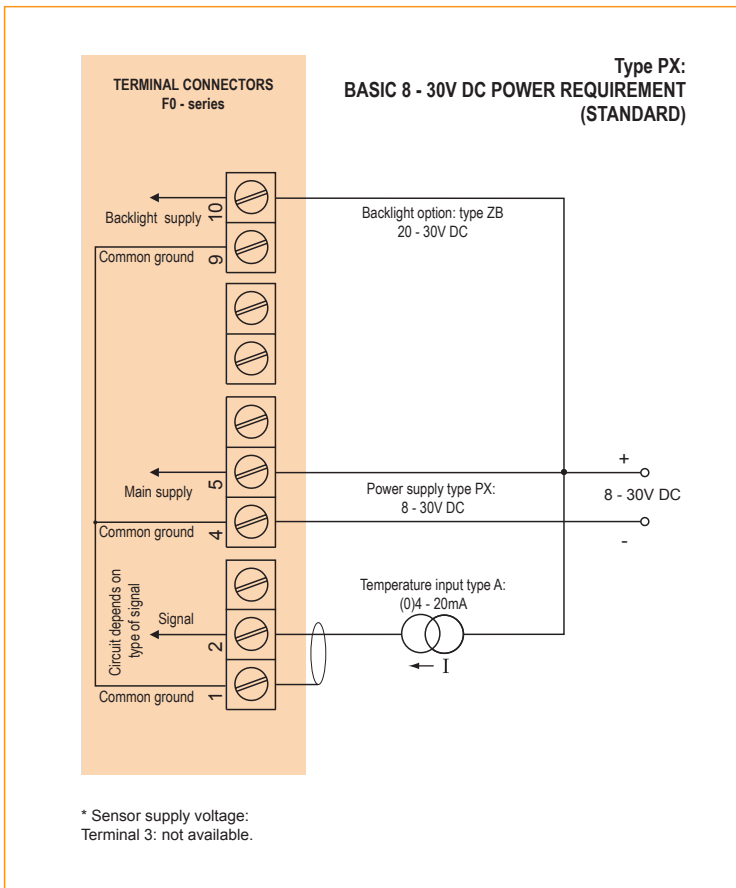
Typical wiring diagram Fo40-T-PB



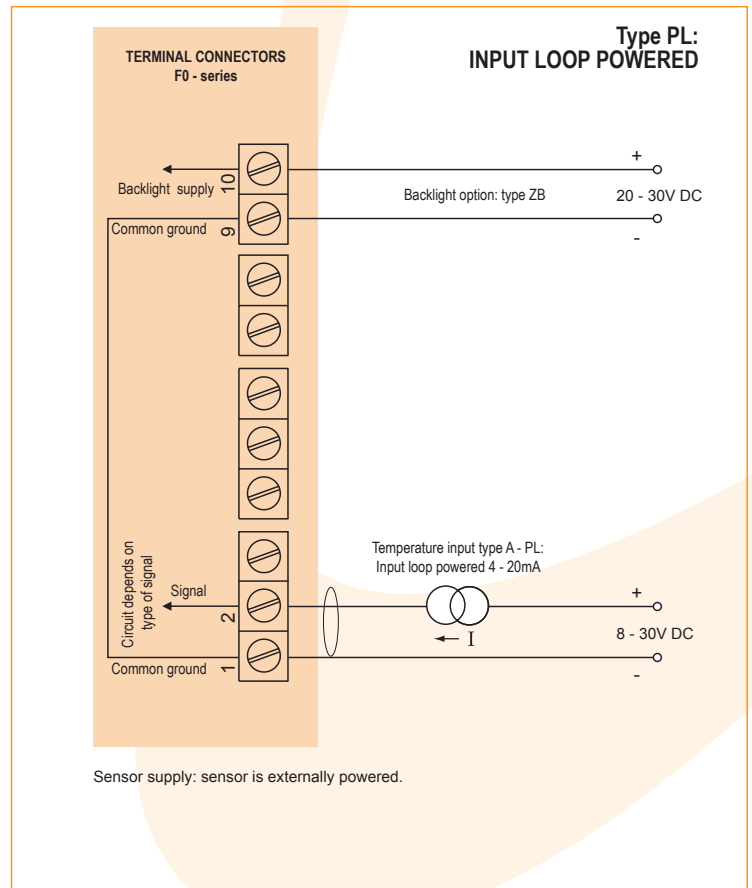
Typical wiring diagram Fo40-T-PX-ZB



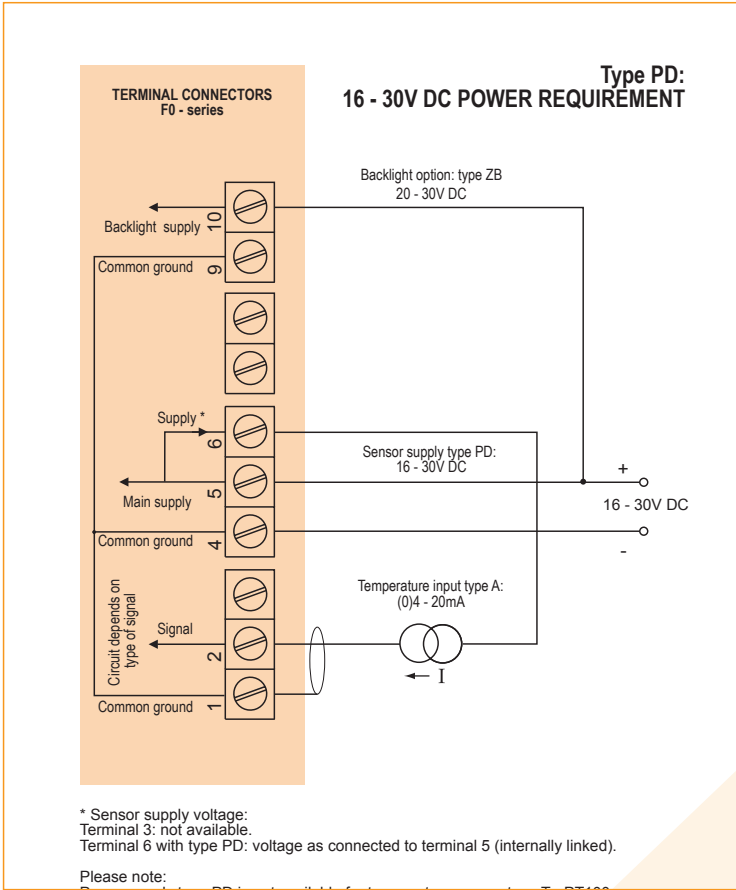
Typical wiring diagram Fo40-A-PX-ZB



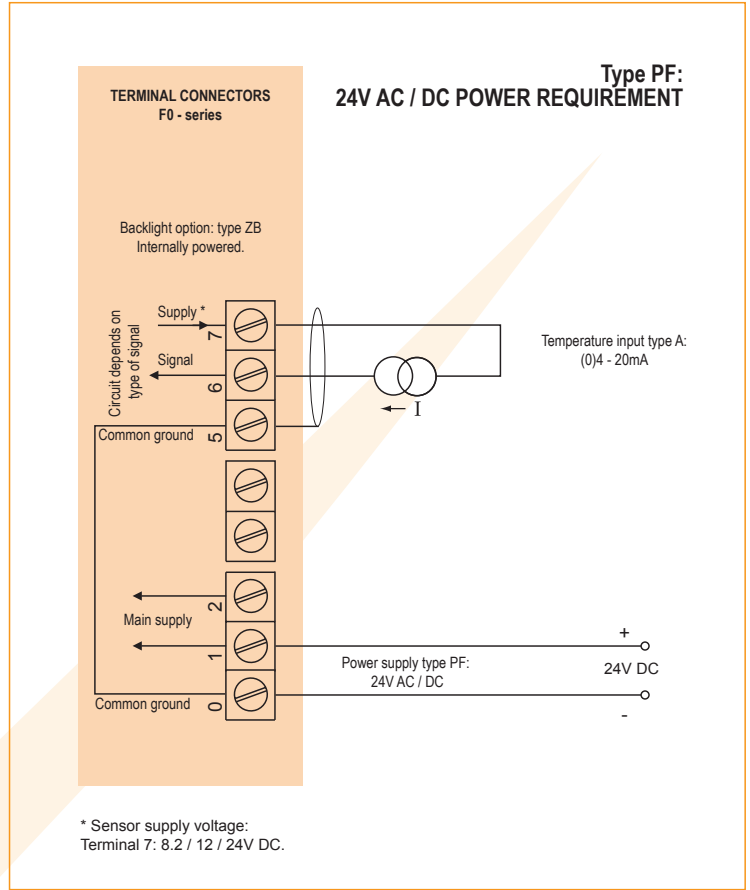
Typical wiring diagram Fo40-A-PL-ZB



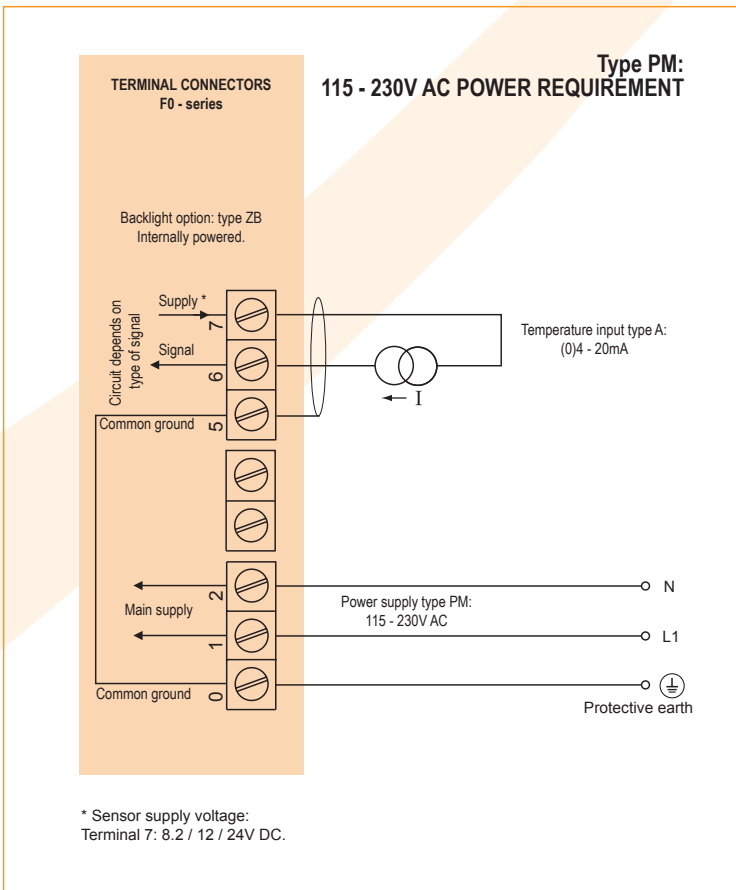
Typical wiring diagram Fo40-A-PD-ZB



Typical wiring diagram Fo40-A-PF-ZB



Typical wiring diagram Fo40-A-PM-ZB



## Hazardous area applications

The Fo40-XI has been certified according ATEX and IECEx by KEMA and according CSA c-us and FM for use in Intrinsically Safe applications with an ambient temperature of -40°C to +70°C (-40°F to +158°F).

- The ATEX markings for gas and dust applications are:

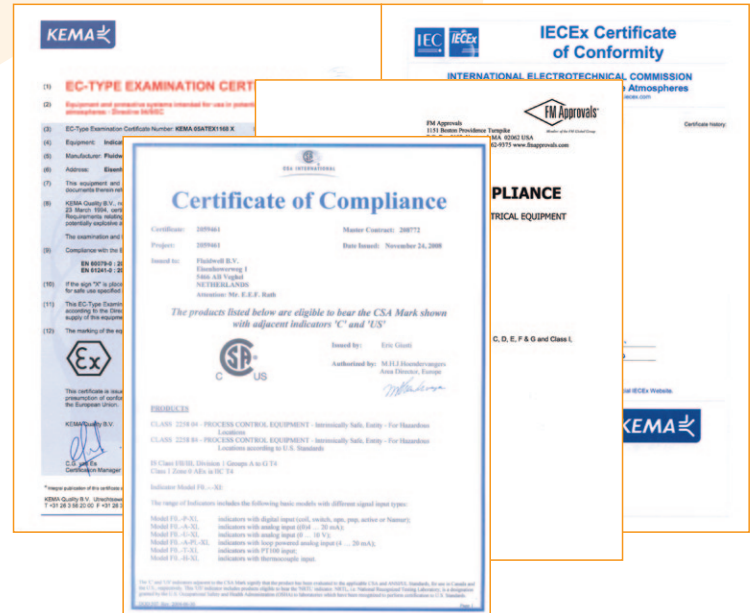
**II 1 G Ex ia IIC T4**  
**II 1 D Ex iaD 20 IP 65/67 T 100 °C.**

- The IECEx markings for gas and dust applications are: **Ga Ex ia IIC T4** and **Ex iaD 20 IP 65/67 T100 °C.**
  - The CSA c-us markings are: **Class I/II/III, Division 1, Groups A, B, C, D, E, F, G, Temperature class T4** and **Class I, Zone o, AEx ia IIC T4.**
  - The FM markings are: **Class I/II/III, Division 1, Groups A, B, C, D, E, F, G, Temperature class T4** and **Class I, Zone o, AEx ia IIC T4.**
- It is allowed to connect up to three I.S. power supplies to power the unit, sensor and backlight. Consult the certificate for the maximum input and output values of the circuits. The

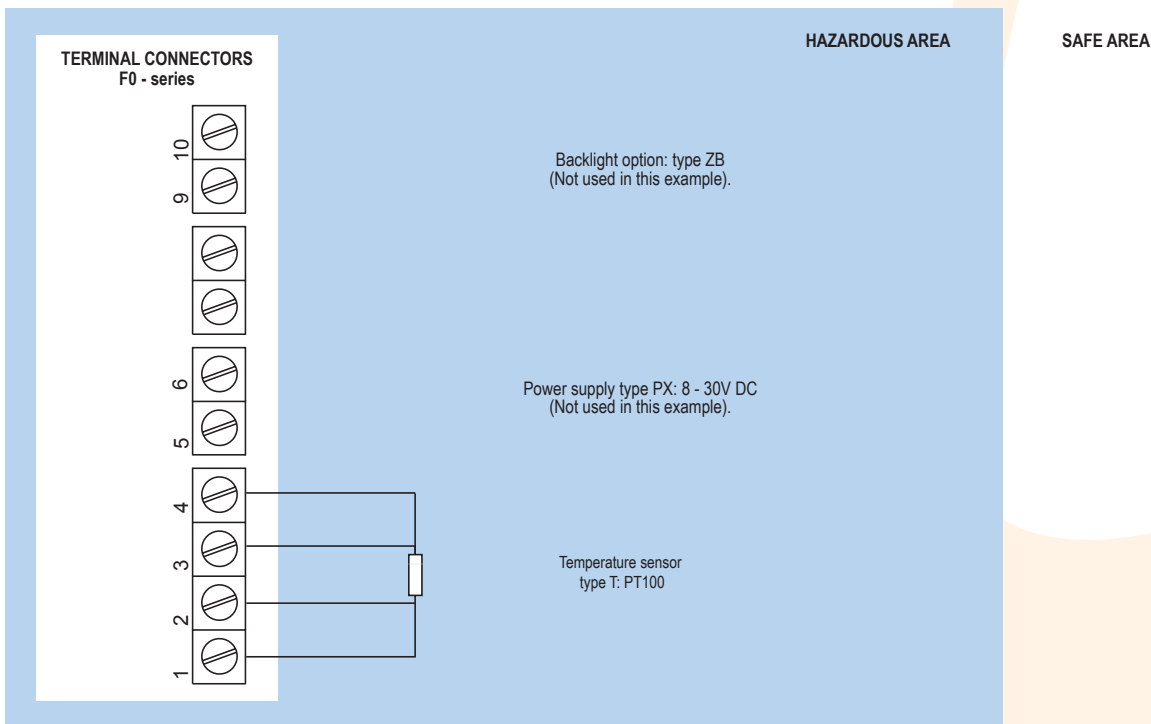
Fo40-PD-XI offers the input voltage to power an analog sensor. An ATEX approved flame proof enclosure with rating **Ex II 2 GD EEx d IIB T5** is available as well. Please contact your supplier for further details.

### Certificate of conformity KEMA 05ATEX1168 X

- IECEx KEM 08.0006X • CSA.08.2059461 X

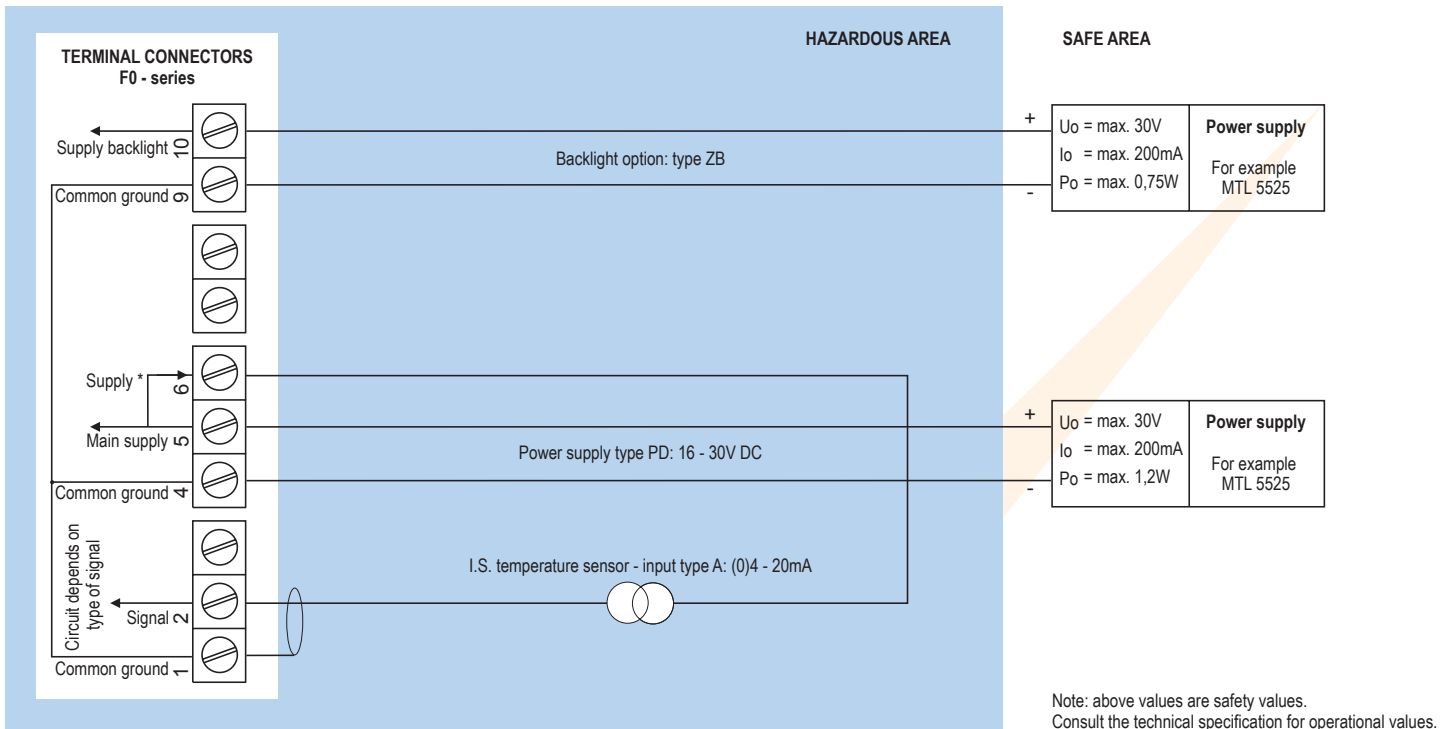


### Configuration example IIA - IIB and IIC - Fo40-T-PC-XI - Battery powered unit



\* Sensor supply voltage for analog temperature 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.

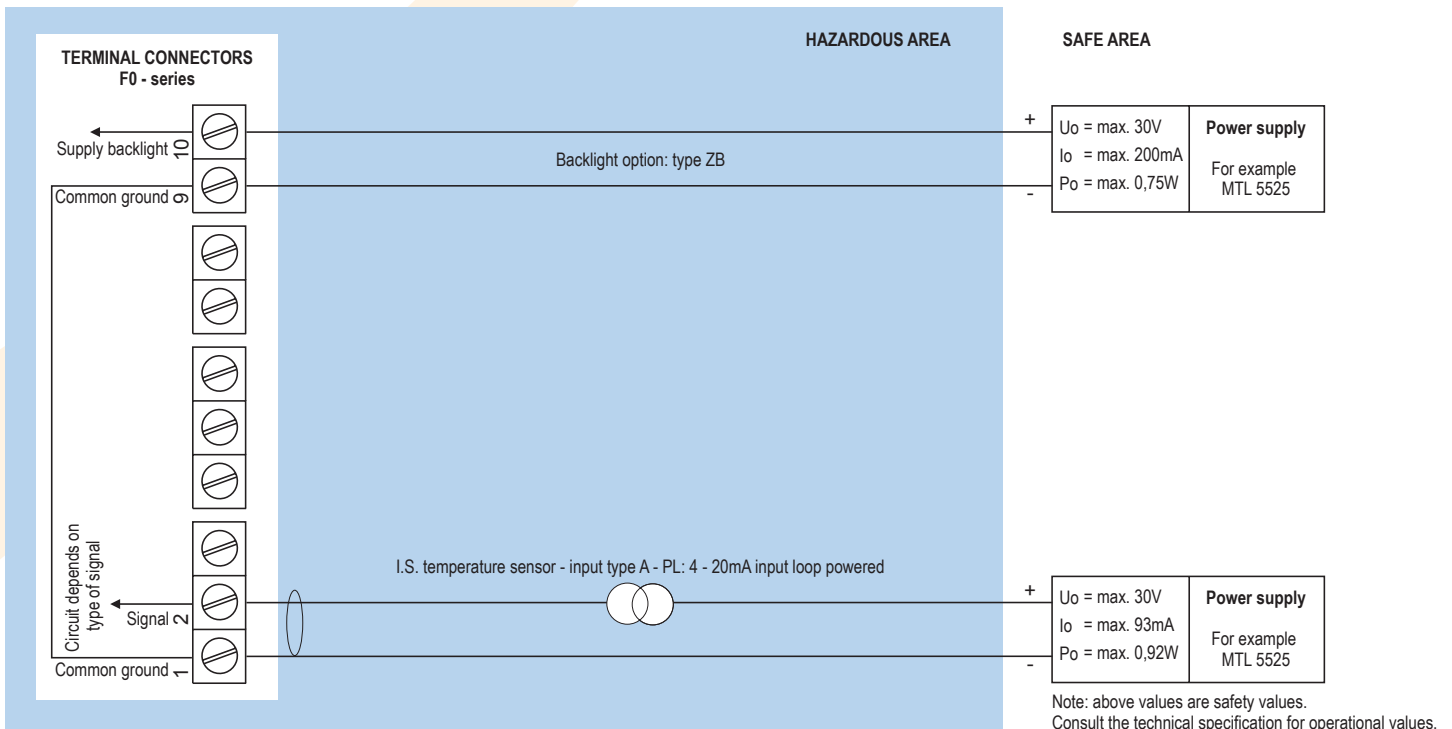
### Configuration example IIA - IIB and IIC - Fo40-A-PD-XI-ZB - Power requirement 16 - 30V DC



\* Sensor supply voltage for analog temperature 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.

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

### Configuration example IIA - IIB and IIC - Fo40-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.

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

## Technical specification

### General

Display	
Type	High intensity reflective numeric and alphanumeric LCD, UV-resistant.
Dimensions	90 x 40mm (3.5" x 1.6").
Digits	5½ very large 26mm (1") digits. Various symbols and measuring units.
Piegraph	Ten segments - related to the input signal.
Refresh rate	User definable: fast, 1sec, 3sec, 15sec, 30sec, 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.

### Ambient temperature

Safe areas	-40°C to +80°C (-40°F to +176°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. 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, just suitable for PT100 sensors.
Type PD	The sensor supply voltage will be according to power supply voltage (as connected to terminal 5).
Type PF / PM	8.2 / 12 and 24V DC - max. 400mA @ 24V DC.
Note	There is no sensor supply available for PT100 sensors.

### Terminal connections

Type	Removable plug-in terminal strip. Wire max. 1.5mm² and 2.5mm².
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### Data protection

Type	EEPROM backup of all settings. Data retention at least 10 years.
Password	Configuration settings can be password protected.

### Directives & Standards

EMC	Directive 2004/108/EC, FCC 47 CFR part 15.
Low voltage	Directive 2006/95/EC.
ATEX / IECEx	Directive 94/9/EC, IEC 60079-0, IEC 60079-11, IEC 60079-26.
FM	FM Class No. 3600, FM Class No. 3610.
CSA	CSA 22.2 No. 157-92.
IP & NEMA	EN 60529 & NEMA 250.

### Enclosure

General	
Window	Polycarbonate window.
Sealing	Silicone.
Control keys	Three industrial micro-switch keys. UV-resistant silicone keypad.

### Aluminum wall / field mount enclosures

General	Die-cast aluminum wall/field mount enclosure IP67 / NEMA 4X with 2-component UV-resistant coating.
Dimensions	130 x 120 x 75mm (5.12" x 4.72" x 2.95") - W x H x D.
Weight	1100 gr.
Type HA	Cable entry: 2 x PG9 and 1 x M20.
Type HL	Cable entry: 2 x ½" NPT.
Type HM	Cable entry: 2 x M16 and 1 x M20.
Type HN	Cable entry: 1 x M20.
Type HO	Cable entry: 2 x M20.
Type HP	Cable entry: 6 x M12.
Type HT	Cable entry: 1 x ½" NPT.
Type HU	Cable entry: 3 x ½" NPT.
Type HV	Cable entry: 4 x M20.
Type HZ	Cable entry: no holes.

### GRP wall / field mount enclosures

General	GRP wall/field mount enclosure IP67 / NEMA 4X, UV-resistant and flame retardant.
Dimensions	130 x 120 x 75mm (5.12" x 4.72" x 2.95") - W x H x D.
Weight	600 gr.
Type HD	Cable entry: no holes.
Type HE	Cable entry: 2 x Ø 16mm and 1 x Ø 20mm.
Type HF	Cable entry: 1 x Ø 22mm (7/8").
Type HG	Cable entry: 2 x Ø 20mm.
Type HH	Cable entry: 6 x Ø 12mm.
Type HJ	Cable entry: 3 x Ø 22mm (7/8").
Type HK	Flat bottom, cable entry: no holes.





### Panel mount enclosures

Dimensions	130 x 120 x 60mm (5.12" x 4.72" x 2.36") - W x H x D.
Panel cut-out	115 x 98mm (4.53" x 3.86") L x H.
Type HB	Die-cast aluminum panel mount enclosure IP65 / NEMA 4X.
Weight	600 gr.
Type HC	GRP panel mount enclosure IP65 / NEMA 4X, UV-resistant and flame retardant.
Weight	450 gr.




## Hazardous area

### Intrinsically Safe

ATEX certification	 II 1 G Ex ia IIC T4. II 1 D Ex iaD 20 IP 65 / 67 T 100 °C.
IECEX certification	 Ga Ex ia IIC T4. Ex iaD 20 IP 65 / 67 T 100 °C.
CSA c-us certification	 Intrinsically Safe for Class I/II/III, Div. 1, Groups A, B, C, D, E, F, G, Temp. class T4 and Class I, Zone o, AEx ia IIC T4.
FM certification	 Intrinsically Safe for Class I/II/III, Div. 1, Groups A, B, C, D, E, F, G, Temp. class T4 and Class I, Zone o, AEx ia IIC T4.
Ambient Ta	-40°C to +70°C (-40°F to +158°F).

### Explosion proof

ATEX certification	 II 2 GD EEx d IIB T5.
Type XF	Dimensions of enclosure: 300 x 250 x 200mm (11.8" x 9.9" x 7.9") L x H x D.
Weight	Appr. 15kg.

## Signal inputs

### Temperature

Accuracy	Resolution: 16 bit. Error < 0.01mA / ± 0.05% FS. Low level cut-off programmable.
Type A	(0)4 - 20mA. Analog input signal can be scaled to any desired range within 0 - 20mA.
Span	0.00001 - 199,999 with variable decimal position.
Offset	-99,999 / +199,999 units.
Voltage drop	Type A: max. 1V DC @ 20mA.
Voltage drop	Type A - PL (loop powered): max. 2.6V DC @ 20mA.
Update time	Four times per second.
Type T	2, 3 or 4 wire PT100 (requires PB, PC or PX).
Offset	-999.9 / +999.9 units.
Update time	Once per second.
Range	-100°C to +200°C (-148°F to 392°F). Accuracy 0.1°C (0.2°F).
Type U	0 - 10V DC. Analog input signal can be scaled to any desired range within 0 - 10V DC.
Span	0.00001 - 199,999 with variable decimal position.
Offset	-99,999 / +199,999 units.
Load impedance	3kOhm.
Update time	Four times per second.
Note	For signal A and U: power supply to temperature sensor is required; e.g. PD.

## Operational

### Operator functions

Displayed functions	<ul style="list-style-type: none"> <li>Actual temperature.</li> <li>Measuring unit.</li> </ul>
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### Temperature

Digits	5½ digits.
Units	°C, °F or K.
Decimals	Type T: 1. Type A / U: 0 - 1 - 2 - 3 - 4 or 5.

## Accessories

### Mounting accessories

ACFo2	Stainless steel wall mounting kit.
ACFo5	Stainless steel pipe mounting kit (worm gear clamps not included).
ACFo6	Two stainless steel worm gear clamps Ø 44 - 56mm.
ACFo7	Two stainless steel worm gear clamps Ø 58 - 75mm.
ACFo8	Two stainless steel worm gear clamps Ø 77 - 95mm.
ACFo9	Two stainless steel worm gear clamps Ø 106 - 138mm.
ACF10	Customized Grevopal tagplates for ACFo2 and ACFo5, including stainless steel screws. Dimension: 95mm x 12.5mm (3.75" x 0.50").

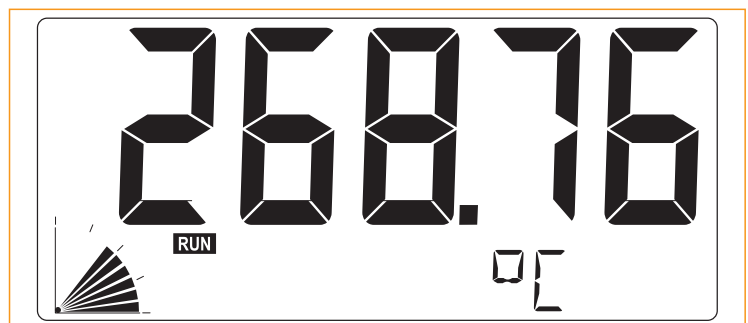
### Cable glands

ACF20	For HA enclosure, includes O-rings.
ACF25	For HE enclosure, includes locknuts and O-rings.
ACF26	For HF enclosure, includes locknuts and O-rings.
ACF27	For HG enclosure, includes locknuts and O-rings.
ACF28	For HH enclosure, includes locknuts and O-rings.
ACF29	For HJ enclosure, includes locknuts and O-rings.
ACF32	For HM enclosure, includes O-rings.
ACF33	For HN enclosure, includes O-rings.
ACF34	For HO enclosure, includes O-rings.
ACF35	For HP enclosure, includes O-rings.
ACF39	For HT enclosure, includes O-rings.
ACF40	For HU enclosure, includes O-rings.

### Intrinsically Safe isolators

ACGo1	MTL5511 - One channel pulse or switch output transfer from hazardous area to safe area.
ACGo2	MTL5525 - One channel power supply from safe area to hazardous area (e.g. to power the unit with PD or to power a switching or analog device in hazardous area).
ACGo3	MTL5541 - One channel 4 - 20mA repeater from hazardous area to safe area.
ACGo4	MTL 5051 - Bi-direction serial-data-isolator (for Modbus communication).
ACGo5	MTL5516C - Two channel pulse or switch output transfer from hazardous area to safe area.
ACGo6	MTL5513 - One channel pulse or switch output transfer from hazardous area to safe area.
ACGo7	MTL5546Y - One channel isolated driver bringing 4 - 20mA from safe area to hazardous area, HART transparent, OCD.

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



## Ordering information

Standard configuration: F040-A-HC-PX-XX-ZX.

ordering information:	F040	-	-H	-P	-X	-Z
<b>Temperature input signal</b>						
A	⊗	<b>(0)4 - 20mA input.</b>				
T	⊗	PT100 input - requires PB, PC or PX.				
U	⊗	0 - 10V DC input.				
<b>Panel mount enclosures - IP65 / NEMA4X</b>						
HB	⊗	Aluminum enclosure.				
HC	⊗	<b>GRP enclosure.</b>				
<b>GRP field / wall mount enclosures - IP67 / NEMA4X</b>						
HD	⊗	Cable entry: no holes.				
HE	⊗	Cable entry: 2 x Ø 16mm & 1 x Ø 20mm.				
HF	⊗	Cable entry: 1 x Ø 22mm (7/8").				
HG	⊗	Cable entry: 2 x Ø 20mm.				
HH	⊗	Cable entry: 6 x Ø 12mm.				
HJ	⊗	Cable entry: 3 x Ø 22mm (7/8").				
HK	⊗	Flat bottom, cable entry: no holes.				
<b>Aluminum field / wall mount enclosures - IP67 / NEMA4X</b>						
HA	⊗	Cable entry: 2 x PG9 + 1 x M20.				
HL	⊗	Cable entry: 2 x 1/2" NPT.				
HM	⊗	Cable entry: 2 x M16 + 1 x M20.				
HN	⊗	Cable entry: 1 x M20.				
HO	⊗	Cable entry: 2 x M20.				
HP	⊗	Cable entry: 6 x M12.				
HT	⊗	Cable entry: 1 x 1/2" NPT.				
HU	⊗	Cable entry: 3 x 1/2" NPT.				
HV	⊗	Cable entry: 4 x M20.				
HZ	⊗	Cable entry: no holes.				
<b>Power requirements</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.				
PX	⊗	<b>Basic power supply 8 - 30V DC (no sensor supply for type A/U sensors).</b>				
<b>Hazardous area</b>						
XI	⊗	Intrinsically Safe, according ATEX, IECEx, CSA c-us and FM.				
XF		EExd enclosure - 3 keys.				
XX		<b>Safe area only.</b>				
<b>Other options</b>						
ZB	⊗	Backlight.				
ZX	⊗	<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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