DATASHEET F040 - TEMPERATURE INDICATOR

TEMPERATURE INDICATOR

WITH VERY LARGE DIGITS

Features

- Displays actual temperature and measuring unit.
- Very large 26mm (1") digits.
- Piegraph indication: ten segments.
- Number of digits for temperature: 5½.
- Selectable on-screen engineering units: °C-°F-K.
- 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 - ATEX, IECEx and CSA approval for gas and dust applications.
- Explosion/flame proof 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

- Applications where a basic temperature measurement display is required without temperature monitoring. More sophisticated models: F043, F140 and F143.

General information

Introduction

The F040 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 enhance this models capabilities, 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 F040 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 transflective 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 F040 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 supply

Several power supply options are available to power the F040 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.

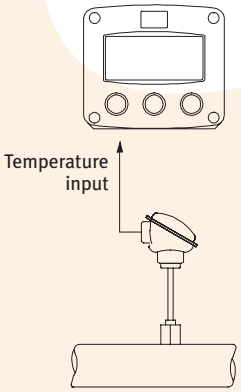
Hazardous area

For hazardous area applications, this model has been ATEX, IECEx and CSA certified Intrinsically Safe for gas and dust applications, with an allowed operational temperature of -40°C to +70°C (-40°F to +158°F). FM certification is expected to be available in 2009. A flame proof enclosure with ATEX certification offers the rating Ex II 2 GD EEx d IIB T5.

Enclosures

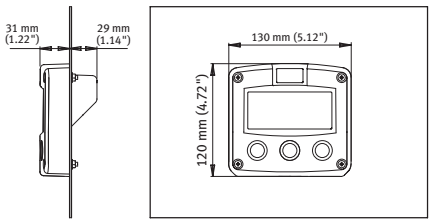
Various types of enclosures can be selected, all ATEX, IECEx and CSA approved. As standard the F040 is supplied in an GRP panel mount enclosure, which can be converted to an IP67 / NEMA 4X GRP field mount enclosure by the addition of a back case. Most popular is our rugged aluminum field mount enclosure with IP67 / NEMA 4X rating. Both European or U.S. cable gland entry threads are available.

Overview application F040

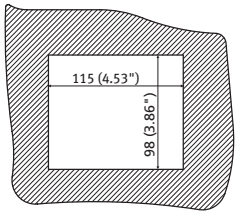


Dimensions enclosures

Aluminum & GRP panel mount enclosure

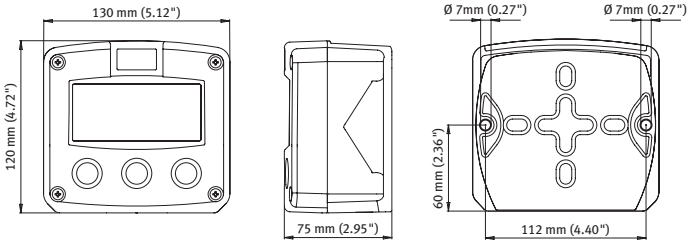


HB & HC enclosures

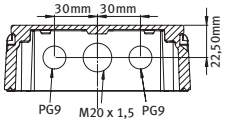


panel cut-out

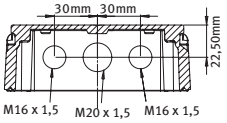
Aluminum & GRP field / wall mount enclosures



Aluminum



HA



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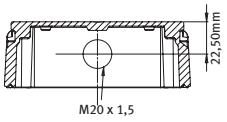
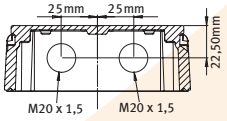


HN



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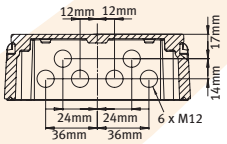

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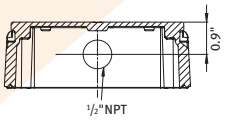

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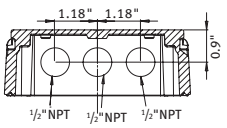
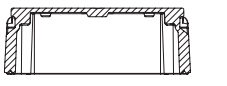
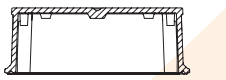


HU

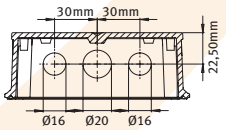


HZ

GRP



HD



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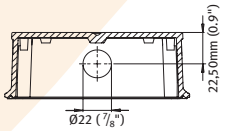

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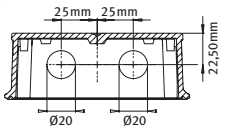

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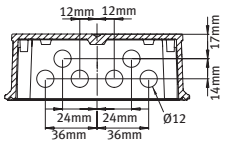

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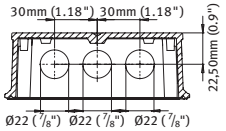

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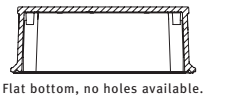
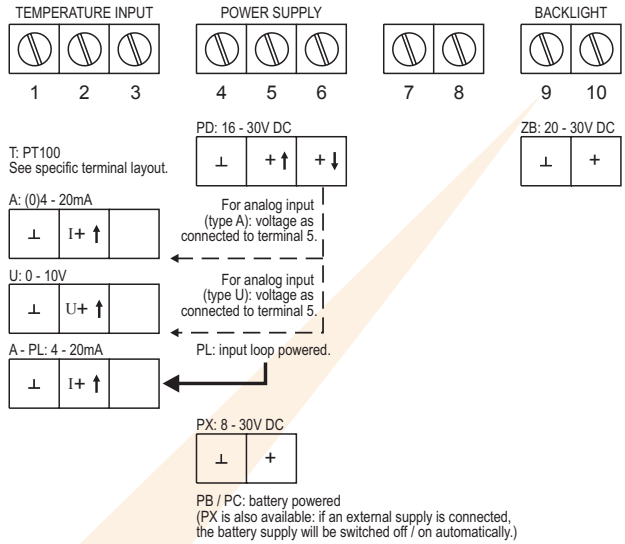


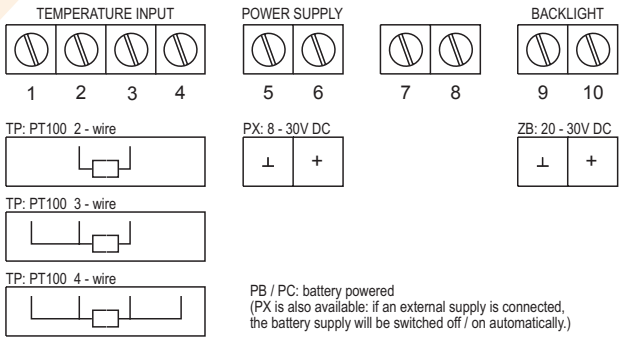
HK

Flat bottom, no holes available.

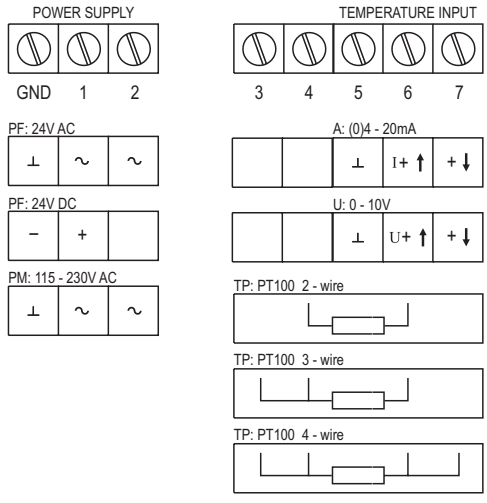
Terminal connections analog input
Power supply PB/PC - PD - PL - PX



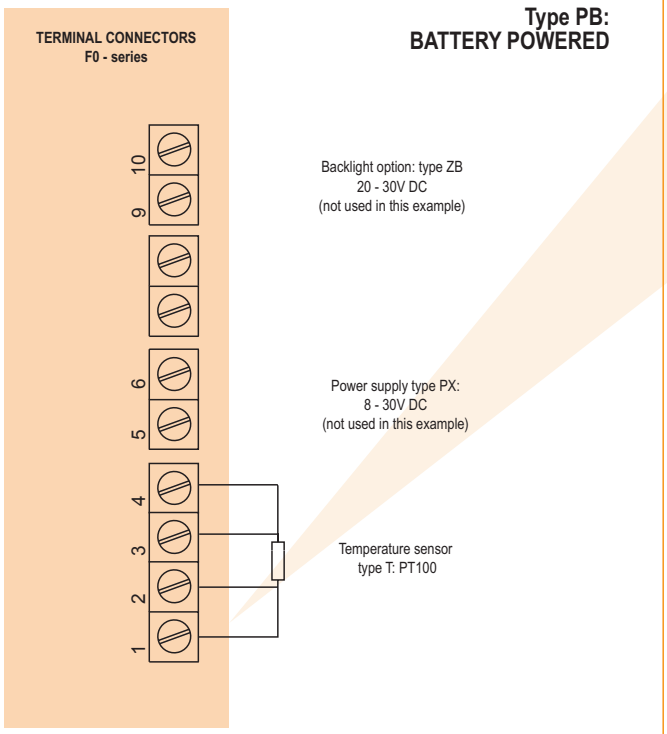
Terminal connections PT100 input
Power supply PB/PC - PX



Terminal connections analog / PT100 input
Power supply PF - PM

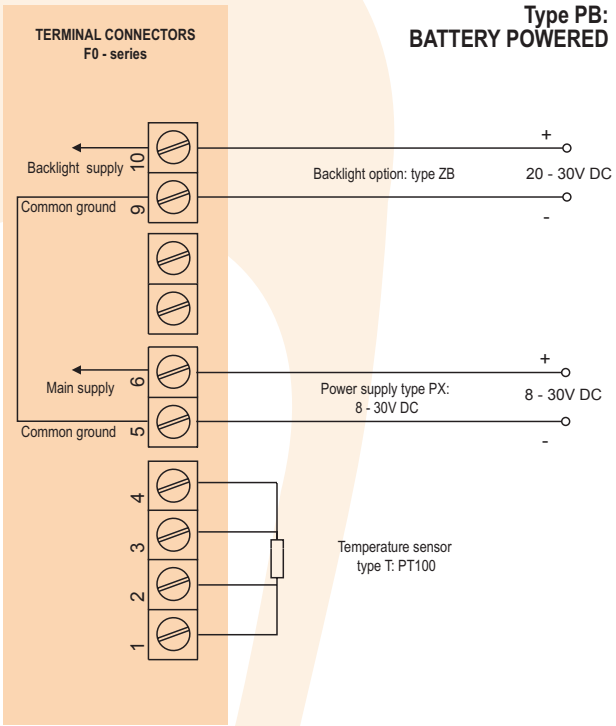


Typical wiring diagram Fo4o-T-PB



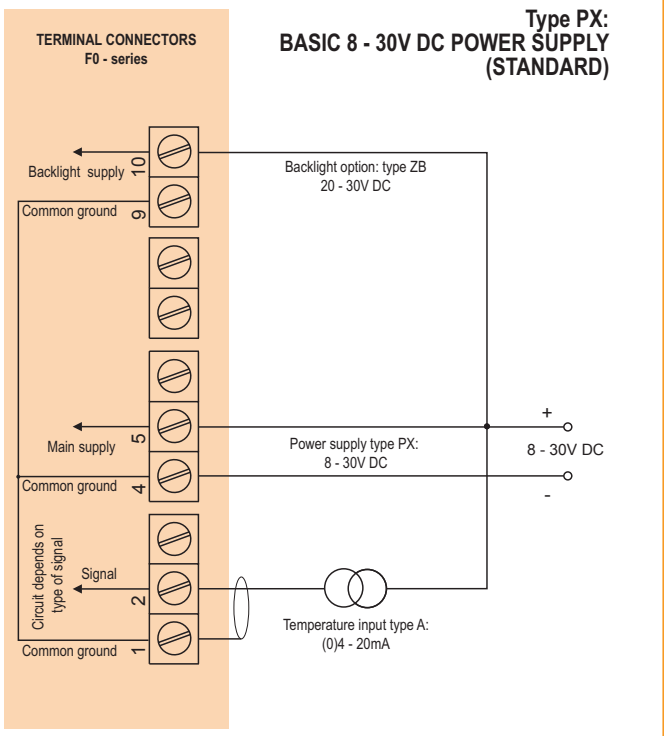
Sensor supply: not available.

Typical wiring diagram Fo4o-T-PX-ZB



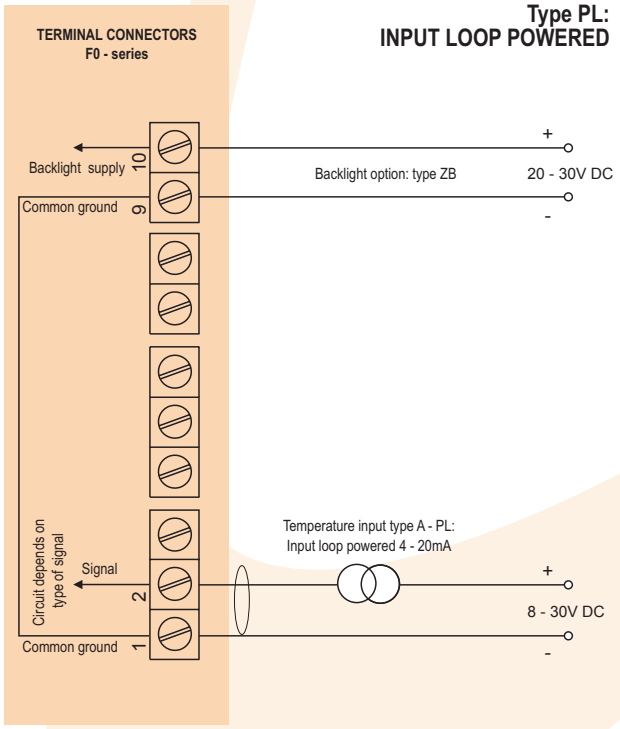
Sensor supply: not available.

Typical wiring diagram Fo4o-A-PX-ZB



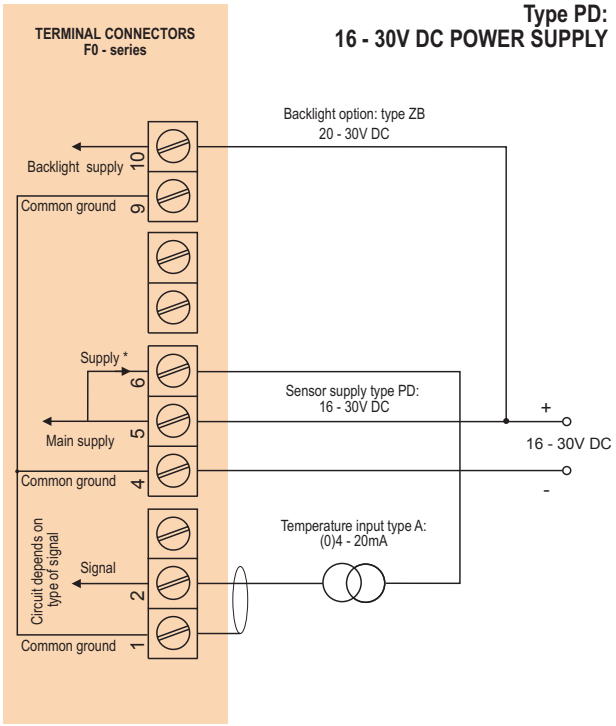
* Sensor supply voltage:
Terminal 3: not available.

Typical wiring diagram Fo4o-A-PL-ZB



Sensor supply: sensor is externally powered.

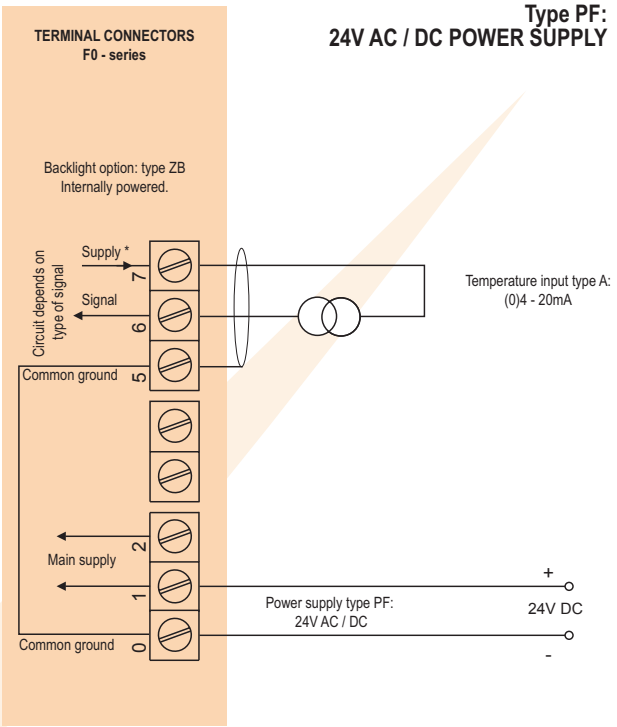
Typical wiring diagram Fo40-A-PD-ZB



* Sensor supply voltage:
Terminal 3: not available.
Terminal 6 with type PD: voltage as connected to terminal 5 (internally linked).

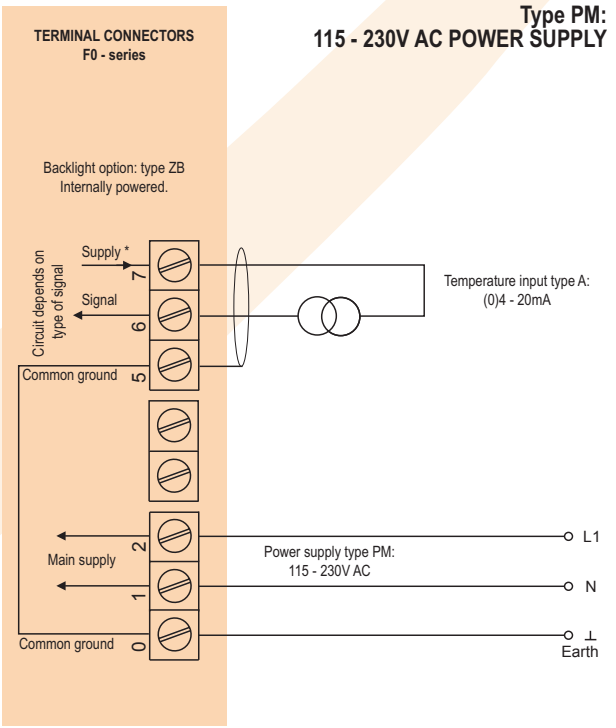
Please note:

Typical wiring diagram Fo40-A-PF-ZB



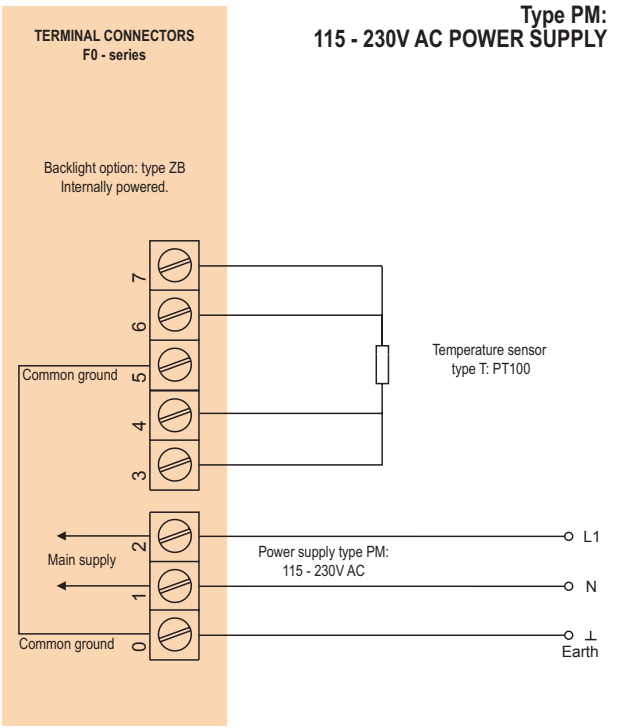
* Sensor supply voltage:
Terminal 7: 8.2 / 12 / 24V DC.

Typical wiring diagram Fo40-A-PM-ZB



* Sensor supply voltage:
Terminal 7: 8.2 / 12 / 24V DC.

Typical wiring diagram Fo40-T-PM-ZB



Sensor supply voltage: not available.

Hazardous area applications

The F040-XI has been certified according ATEX and IECEx by KEMA and according CSA c-us for use in Intrinsically Safe applications with an ambient temperature of -40°C to +70°C (-40°F to +158°F).

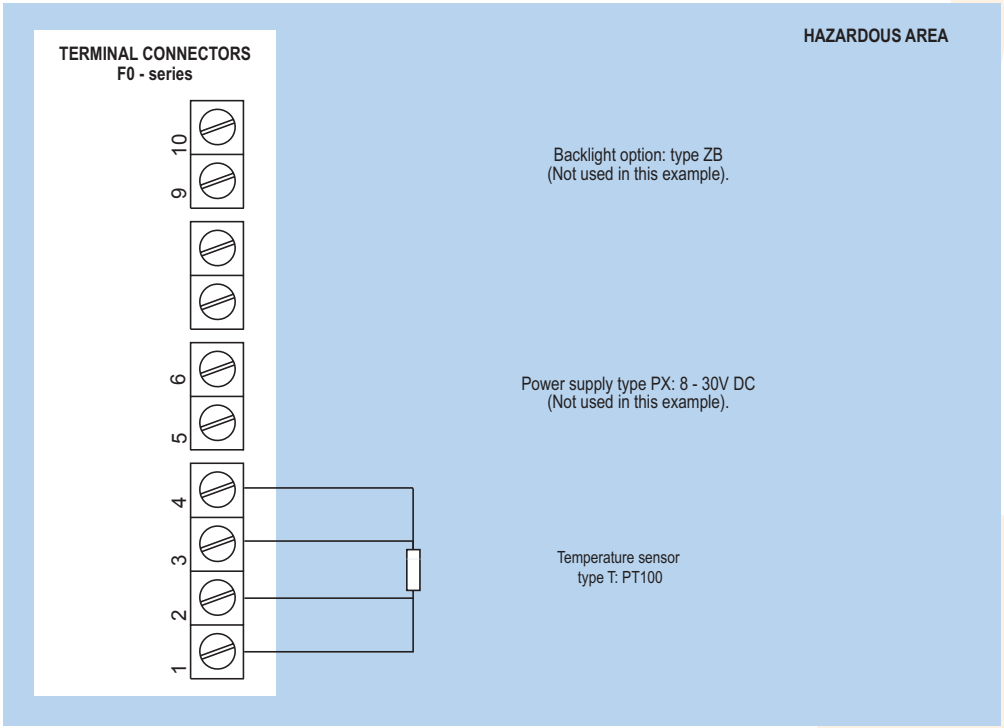
- The ATEX markings for gas and dust applications are:
  II 1 G Ex ia IIC T4
  II 1 D Ex iaD 20 IP 65/67 T 100 °C.
- The IECEx markings for gas and dust applications are: **Ga Ex ia IIC T4** and **Ex iaD 20 IP 65/67 T100 °C**.
- The CSA c-us markings are: **Class I/II/III, Division 1, Groups A, B, C, D, E, F, G, Temperature class T4** and **Class I, Zone 0, AEx ia IIC T4**.
- FM approval is expected to become available in 2009.

It is allowed to connect up to three I.S. power supplies to power the unit, sensor and back-light. The F040-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.

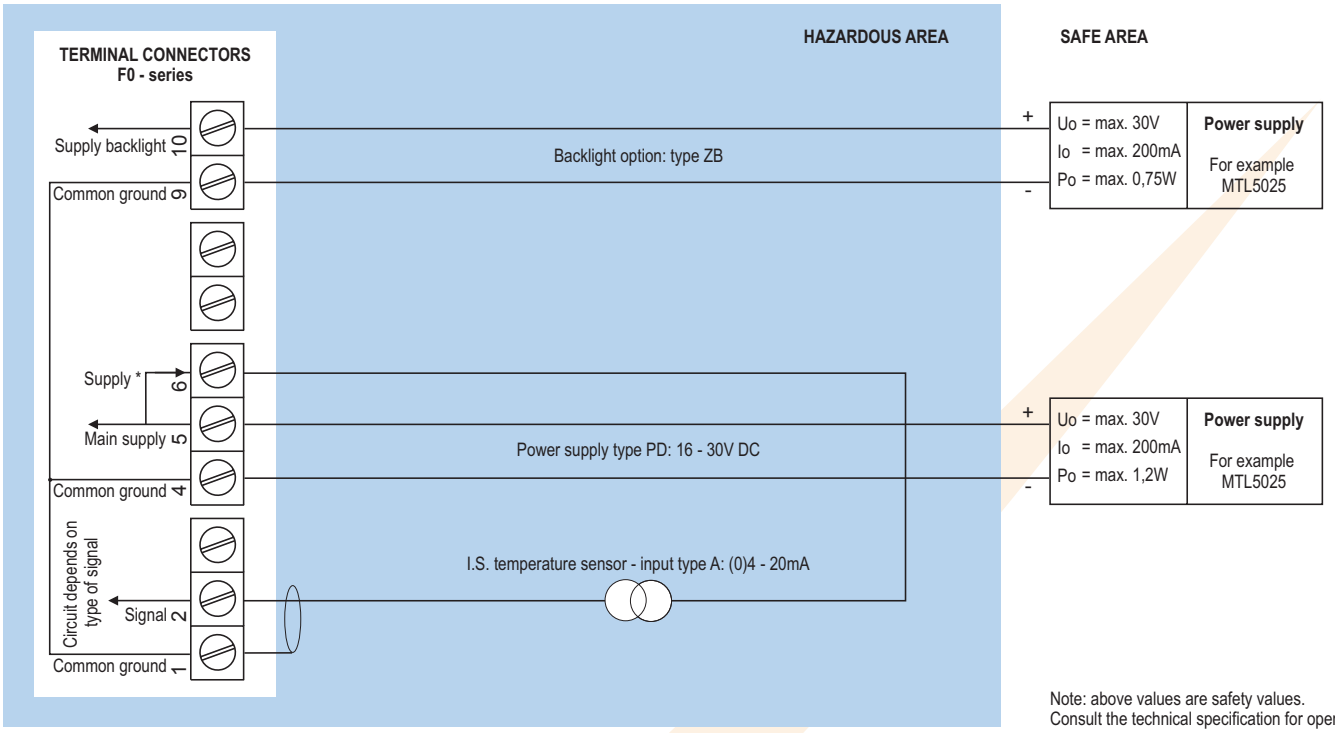
Certificate of conformity KEMA 05ATEX1168 X • IECEx KEM 08.0006X • CSA.08.2059461 X

Configuration example IIA - IIB and IIC - F040-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.

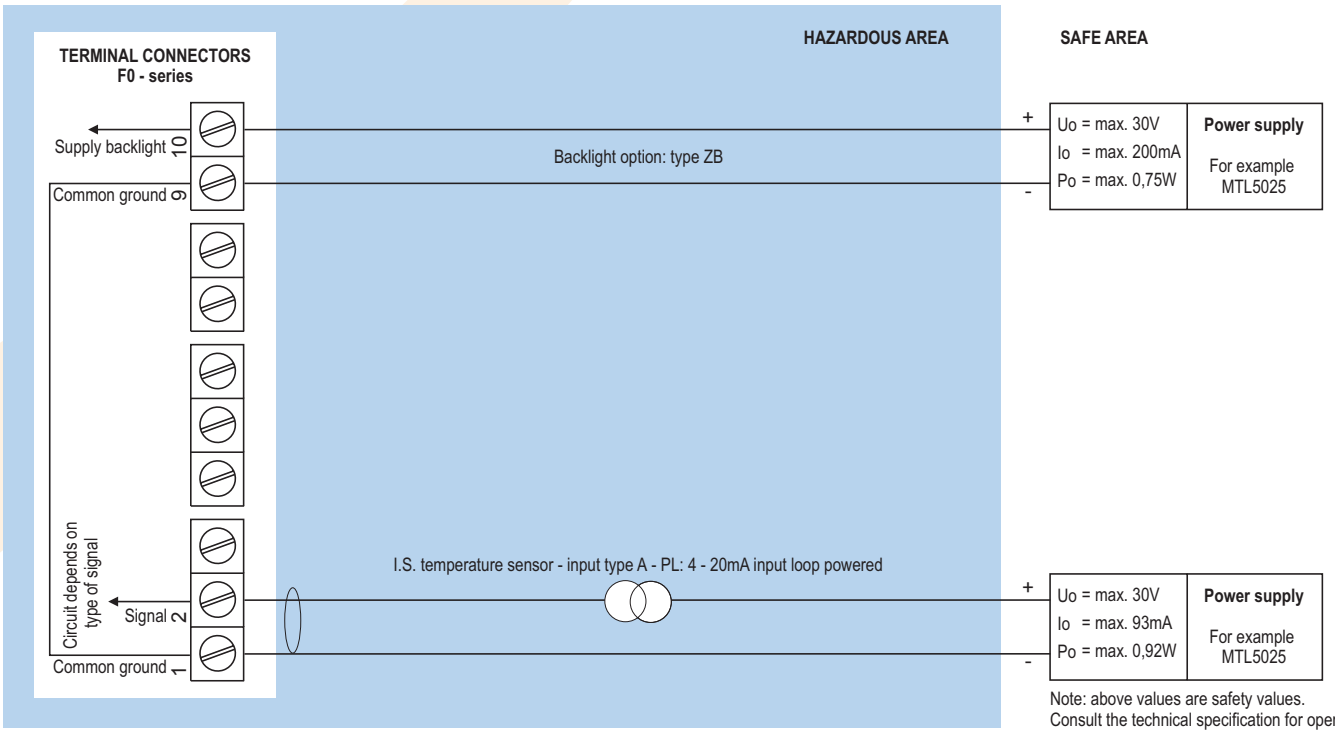
Configuration example IIA - IIB and IIC - F040-A-PD-XI-ZB - Power supply 16 - 30V DC



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

* 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.

Configuration example IIA - IIB and IIC - F040-A-PL-XI-ZB - Input loop powered



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

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	$5^1/_2$ very large 26mm (1") digits. Various symbols and measuring units.
Piegraph	Ten segments - related to the input signal.
Refresh rate	User definable: 8 times/sec. / 1 / 3 / 15 / 30 secs / off.
Option ZB	Transflective LCD with bi-color LED-backlight; green / amber. Intensitiy and color selected trough 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. 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.

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	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 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 $^1/_2$" NPT.
Type HU	Cable entry: 3 x $^1/_2$" NPT.
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 4.
Weight	600 gr.
Type HC	GRP panel mount enclosure IP65 / NEMA 4, UV-resistant and flame retardant.
Weight	450 gr.

ABS wall / field mount enclosures	
General	Silicone free ABS wall/field mount enclosure IP65 with EPDM and PE sealings. UV-resisitant polyester keypad (old HD enclosure).
Dimensions	130 x 114 x 71mm (5.1" x 4.5" x 2.8") - W x H x D.
Weight	450 gr.
Type HS	Cable entry: no holes.

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 0, AEx ia IIC T4.
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: 300 x 250 x 200mm (11.8" 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 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. 2V 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.
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).
Option ZV	Range: -200°C to +800°C (-328°F to 1472°F). Accuracy 0.5°C (0.9°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	3kΩ.
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	• Actual temperature. • Measuring unit.

Temperature	
Digits	$5^1/_2$ digits.
Units	°C, °F or K.
Decimals	Type T: 1. Type A / U: 0 - 1 - 2 - 3 - 4 or 5.

Accessories

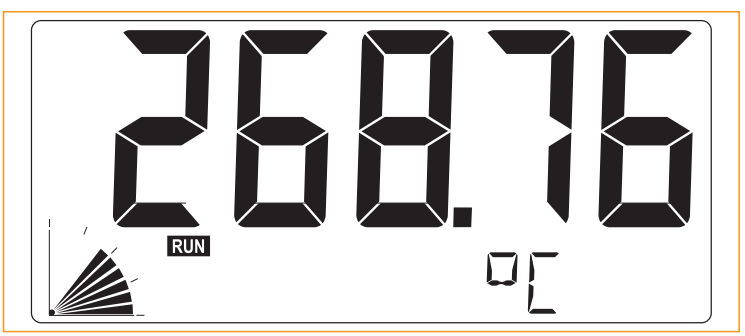
Mounting accessories	
ACF02	Stainless steel wall mounting kit.
ACF05	Stainless steel pipe mounting kit (worm gear clamps not included).
ACF06	Two stainless steel worm gear clamps Ø 44 - 56mm.
ACF07	Two stainless steel worm gear clamps Ø 58 - 75mm.
ACF08	Two stainless steel worm gear clamps Ø 77 - 95mm.
ACF09	Two stainless steel worm gear clamps Ø 106 - 138mm.
ACF10	Customized Grevopal tagplates for ACF02 and ACF05, including stainless steel screws. Dimension: 95mm x 12.5mm (3.75" x 0.50").

Cable gland accessories	
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.

Blind plug accessories	
ACF50	For HA enclosure, includes O-rings.
ACF55	For HE enclosure, includes locknuts and O-rings.
ACF56	For HF enclosure, includes locknuts and O-rings.
ACF57	For HG enclosure, includes locknuts and O-rings.
ACF58	For HH enclosure, includes locknuts and O-rings.
ACF59	For HJ enclosure, includes locknuts and O-rings.
ACF62	For HM enclosure, includes O-rings.
ACF63	For HN enclosure, includes O-rings.
ACF64	For HO enclosure, includes O-rings.
ACF65	For HP enclosure, includes O-rings.
ACF69	For HT enclosure, includes O-rings.
ACF70	For HU enclosure, includes O-rings.

Intrinsically Safe isolators accessories	
ACG02	MTL5025 - 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).
ACG03	MTL5042 - One channel 4 - 20mA repeater from hazardous area to safe area, including power supply.

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 _
Temperature sensor input signal							
A	Ex	**(0)4 - 20mA input.**					
T	Ex	PT100 input.					
U	Ex	0 - 10V DC input.					
Panel mount enclosures - IP65 / NEMA4							
HB	Ex	Aluminum enclosure.					
HC	Ex	**GRP enclosure.**					
GRP field / wall mount enclosures - IP67 / NEMA4X							
HD	Ex	Cable entry: no holes.					
HE	Ex	Cable entry: 2 x Ø 16mm & 1 x Ø 20mm.					
HF	Ex	Cable entry: 1 x Ø 22mm (7/8").					
HG	Ex	Cable entry: 2 x Ø 20mm.					
HH	Ex	Cable entry: 6 x Ø 12mm.					
HJ	Ex	Cable entry: 3 x Ø 22mm (7/8").					
HK	Ex	Flat bottom, cable entry: no holes.					
Aluminum field / wall mount enclosures - IP67 / NEMA4X							
HA	Ex	Cable entry: 2 x PG9 + 1 x M20.					
HM	Ex	Cable entry: 2 x M16 + 1 x M20.					
HN	Ex	Cable entry: 1 x M20.					
HO	Ex	Cable entry: 2 x M20.					
HP	Ex	Cable entry: 6 x M12.					
HT	Ex	Cable entry: 1 x ½"NPT.					
HU	Ex	Cable entry: 3 x ½"NPT.					
HZ	Ex	Cable entry: no holes.					
ABS field / wall mount enclosures							
HS	Ex	Silicone free ABS field enclosure IP65 – Cable entry: no holes (old HD enclosure).					
Power supply							
PB		Lithium battery powered.					
PC	Ex	Lithium battery powered - Intrinsically Safe.					
PD	Ex	16 - 30V DC + sensor supply.					
PF		24V AC / DC + sensor supply.					
PL	Ex	Input loop powered from sensor signal 4 - 20mA (type A).					
PM		115 - 230V AC + sensor supply.					
PX	Ex	**Basic power supply 8 - 30V DC (no sensor supply for type A/U sensors).**					
Hazardous area							
XI	Ex	Intrinsically Safe.					
XF		EExd enclosure - 3 keys.					
XX		**Safe area only.**					
Other options							
ZB	Ex	Backlight.					
ZV	Ex	PRTD-range -200°C / +800°C.					
ZX	Ex	**No options.**					

The bold marked text contains the standard configuration.

Ex Available Intrinsically Safe.

Specifications are subject to change without notice.

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