DATASHEET F030 - BATCH CONTROLLER

BATCH CONTROLLER

WITH ONE STAGE CONTROL

Features

- Large display shows preset value and running batch value simultaneously.
- Self-learning overrun correction.
- Easy operation to enter a batch value and to control the process.
- Count-up and count-down function available.
- Selectable on-screen engineering units; volumetric or mass.
- Abillity to process all types of flowmeter signals.
- Operational temperature -40°C up to +80°C (-22°F up to 178°F).
- Rugged aluminum field mount enclosure IP67/NEMA4X.
- Intrinsically safe Ⓔx II 1GD EEx ia IIB/IIC T4 T100°C.
- Explosion/flame proof Ⓔx II 2G 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 output

- One control output for one-stage batching.

Signal input

Flow

- Reed-switch.
- NAMUR.
- NPN/PNP pulse.
- Coil (sine wave).
- Active pulse signals.
- (0)4 - 20mA.
- 0 - 10V DC.

Applications

- For batching small up to very large quantities. Single or repeating batches. Alternative more sophisticated models: F130 - F131, F136 and 0300 series.

General information

Introduction

The F030 is a straight forward but basic Batch Controller. The operator can enter a batch quantity easily or execute repeating batches. During the batch, the preset value is displayed as well as the batched (or remaining) quantity and the units of measurement. The automatic self-learning overrun correction will ensure an accurate result each batch again. A wide selection of options further enhance this models capabilities, including Intrinsic Safety.

Display

The display has large 17mm (0.67") and 8mm (0.31") digits which are used to display the batched quantity and the preset value simultaneously. On-screen engineering units are easily configured from a comprehensive selection. A seven digit resettable "day total" is available as well as an eleven digit non-resettable accumulated total. All are backed-up in EEPROM memory every minute. A smart display update function achieves a readable display even at -40°C / -40°F.

Backlight

For those applications where readabillity during day 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. Once familiar with one F-series product, you will be able to program all models in the series without a manual. All settings are safely stored in EEPROM memory in the event of sudden power failure.

Control output

One output is available for one stage control for smaller batches. The output signal can be a passive NPN or an active PNP transistor, or an isolated electro-mechanical relay.

Signal input

The F030 will accept most pulse and analog input signals for flow or mass flow measurement. The input signal type can be selected by the user in the configuration menu without having to adjust any sensitive mechanical dip-switches, jumpers or trimmers.The analog input version is even available as 4 - 20mA input loop powered display.

Power supply

Several power supply options are available to power the F030 and sensor. A battery powered version with a long life lithium battery which will last up to five years. For analog sensors, a 4 - 20mA 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.

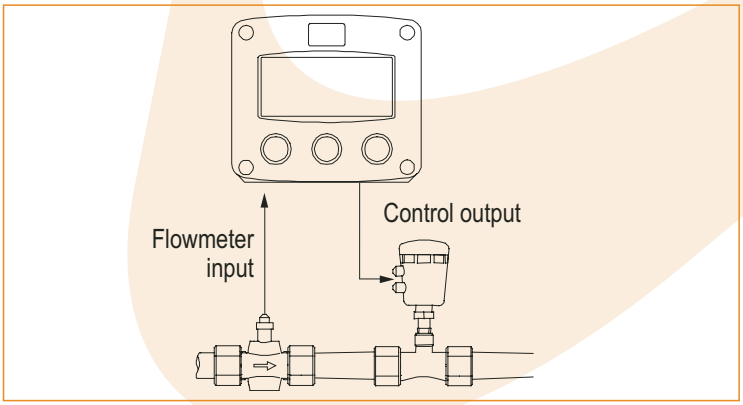
Hazardous areas

For hazardous area applications, ATEX Intrinsically Safe certification is pending according Ex II 1GD EEx ia IIB / IIC T4 T100°C with an allowed operational temperature of -40°C to +70°C (-40°F to +158°F). CSA and IEC certification is expected to be available in november 2005.
A flame proof enclosure with ATEX certification offers the rating Ex II 2G EEx d IIB T5.

Enclosures

Various types of enclosures can be selected. As standard the F030 is supplied in an ABS panel mount enclosure. 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 F030

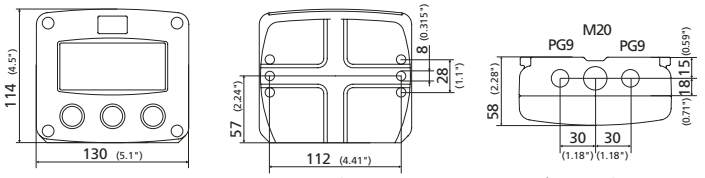


Dimensions enclosures

Enclosure HA

Aluminum field mount enclosure

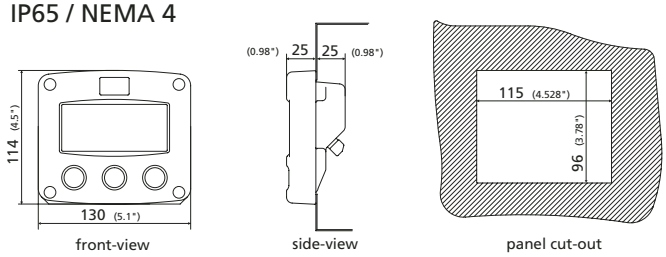
IP67 / NEMA 4X
Tapped holes: European thread



Enclosure HB

Aluminum panel mount enclosure

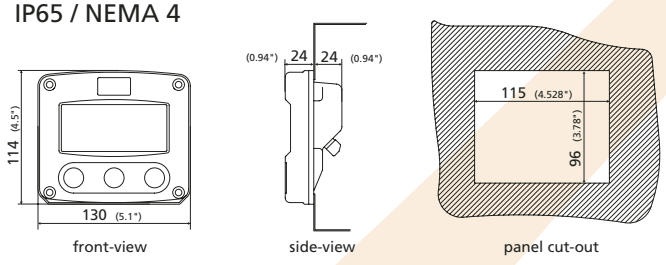
IP65 / NEMA 4



ENCLOSURE HC (STANDARD)

ABS PANEL MOUNT ENCLOSURE

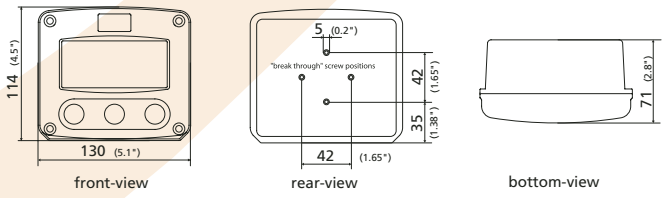
IP65 / NEMA 4



Enclosure HD

ABS wall mount enclosure

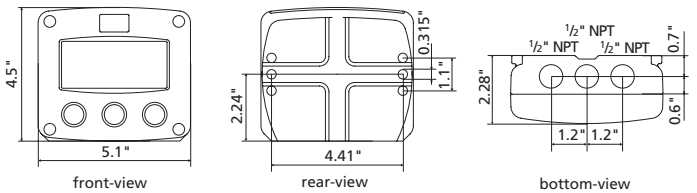
IP67 / NEMA 4X
Holes user defined



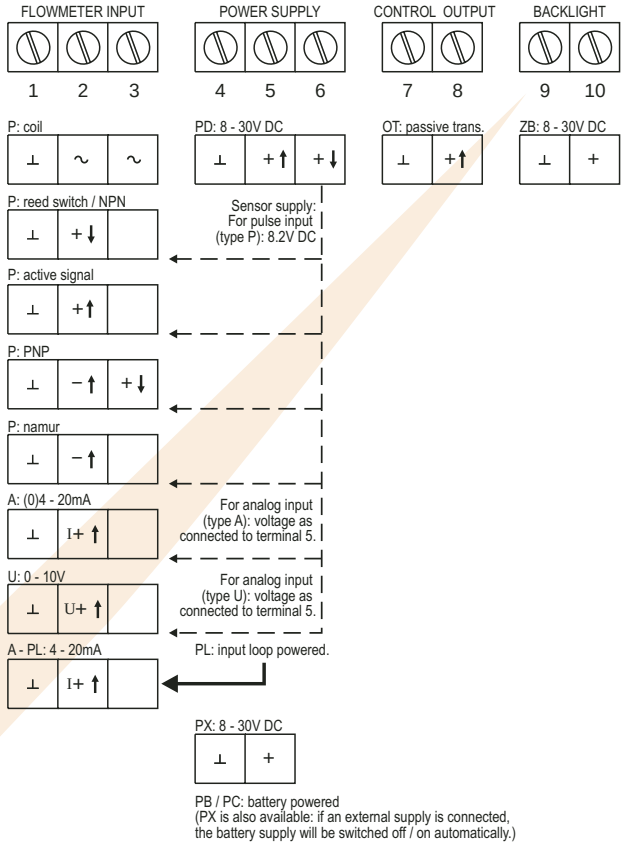
Enclosure HU

Aluminum field mount enclosure

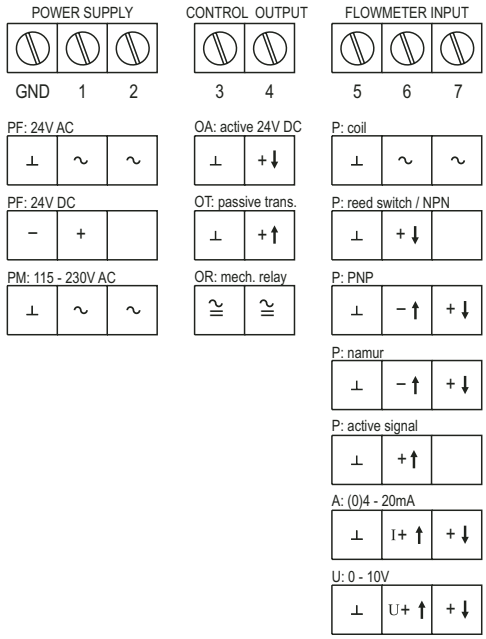
IP67 / NEMA 4X
Tapped holes: U.S. thread



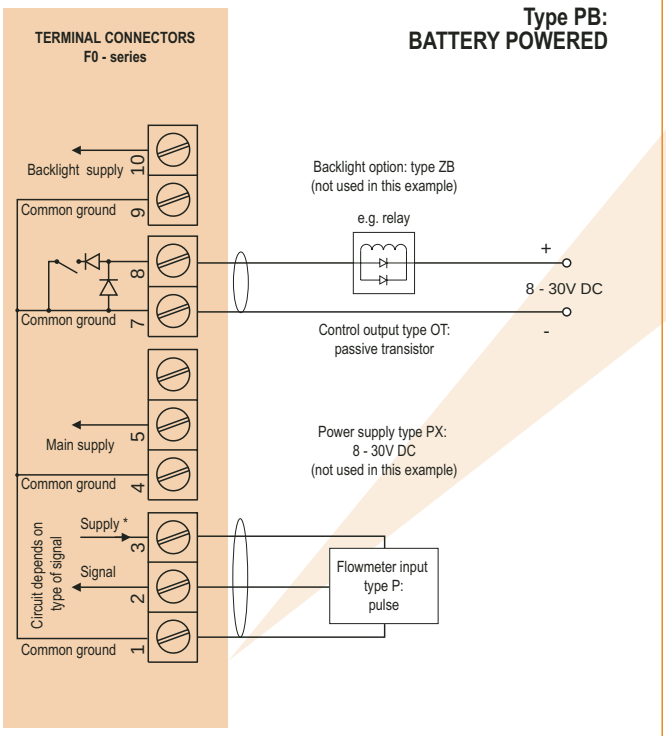
Terminal connections power supply PB/PC - PD - PL - PX



Terminal connections power supply PF - PM



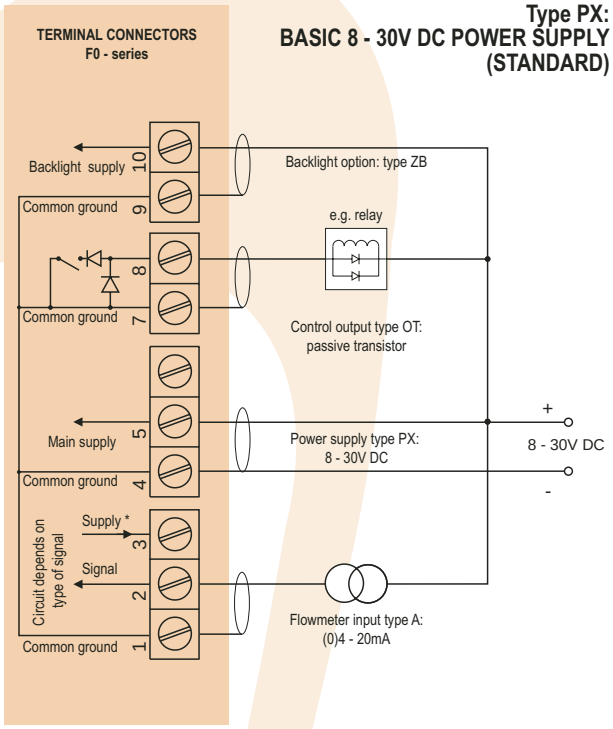
Typical wiring diagram Fo30-P-OT-PB-(PX)-(ZB)



* Sensor supply voltage for pulse flowmeter type P:
Terminal 3: 1.2 - 3.2V DC.

* Sensor supply voltage for analog flowmeter type A / U:
Terminal 3: 3.2V DC.

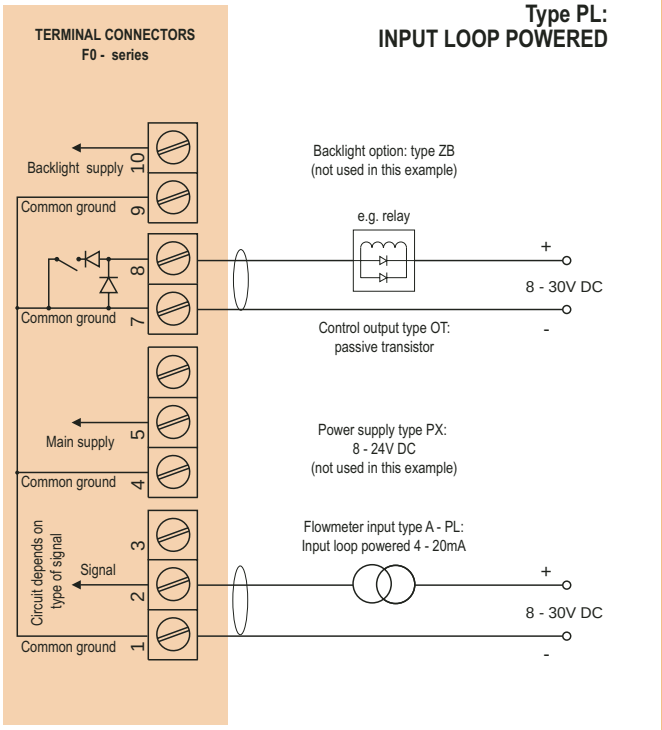
Typical wiring diagram Fo30-A-OT-PX-ZB



* Sensor supply voltage for pulse flowmeter type P:
Terminal 3: 1.2 - 3.2 V DC.

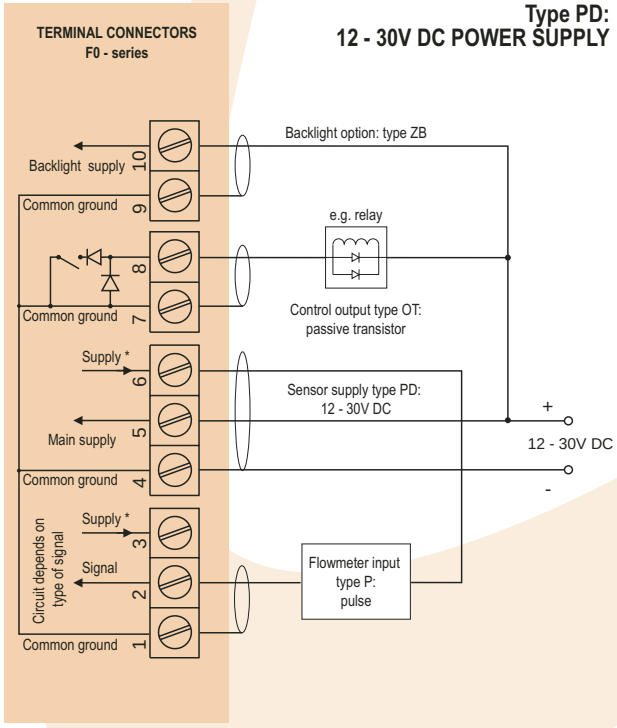
* Sensor supply voltage for analog flowmeter type A / U:
Terminal 3: 3.2 V DC.

Typical wiring diagram Fo30-A-OT-PL-(ZB)



Sensor supply: sensor is externally powered.

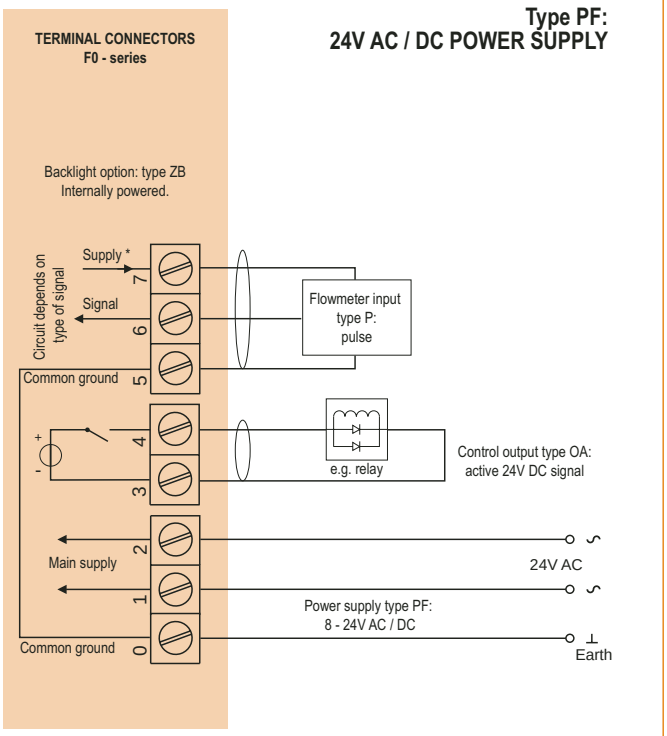
Typical wiring diagram Fo30-P-OT-PD-ZB



* Sensor supply voltage for pulse flowmeter type P:
Terminal 3: 1.2 - 3.2V DC. Terminal 6 with type PD: 8.2V DC.

* Sensor supply voltage for analog flowmeter type A / U:
Terminal 3: 3.2V DC. Terminal 6 with type PD: voltage as connected to terminal 5 (internally linked).

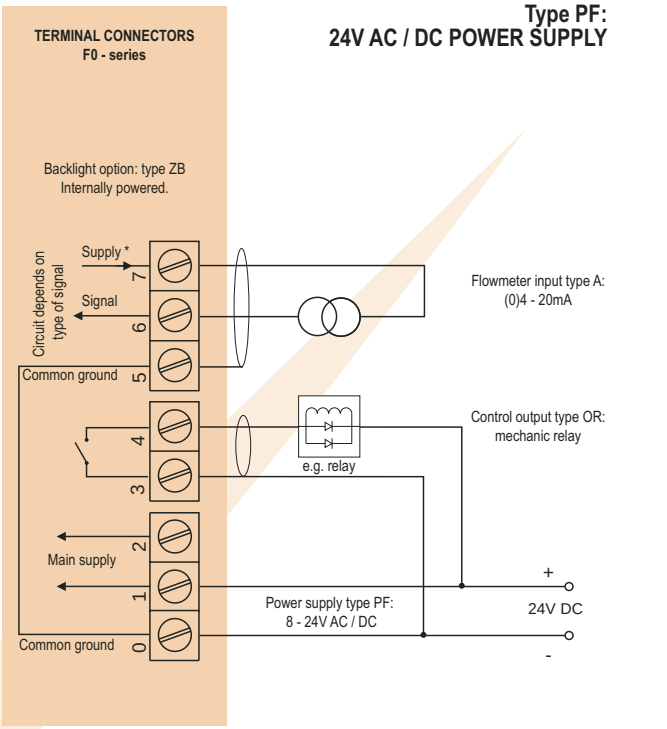
Typical wiring diagram F030-P-OA-PF-ZB



* Sensor supply voltage for pulse flowmeter type P:
Terminal 7: 1.2 - 3.2 - 8.2 - 12 - 24V DC.

* Sensor supply voltage for analog flowmeter type A / U:
Terminal 7: 3.2 - 8.2 - 12 - 24V DC.

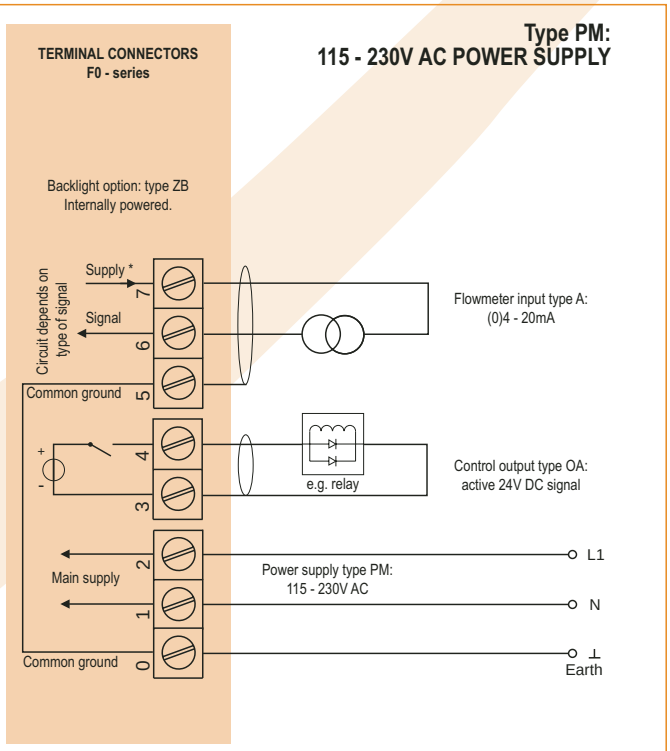
Typical wiring diagram F030-A-OR-PF-ZB



* Sensor supply voltage for pulse flowmeter type P:
Terminal 7: 1.2 - 3.2 - 8.2 - 12 - 24V DC.

* Sensor supply voltage for analog flowmeter type A / U:
Terminal 7: 3.2 - 8.2 - 12 - 24V DC.

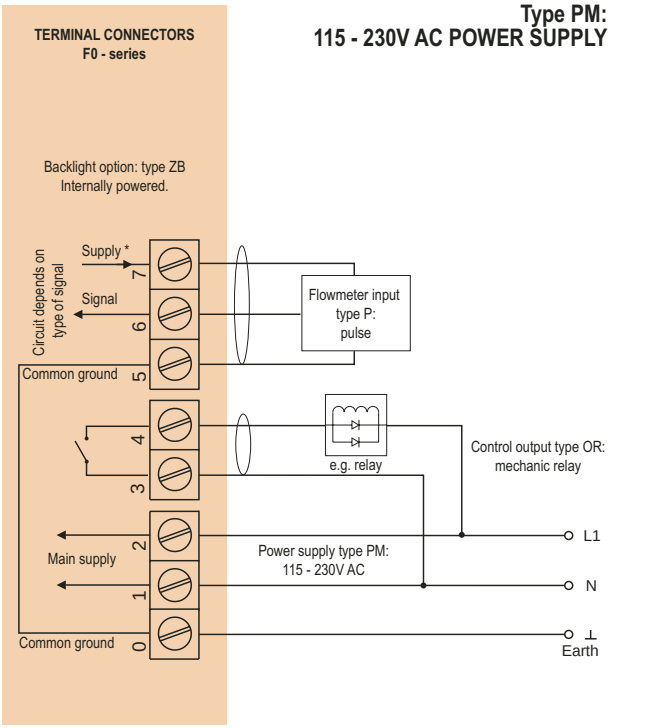
Typical wiring diagram F030-A-OA-PM-ZB



* Sensor supply voltage for pulse flowmeter type P:
Terminal 7: 1.2 - 3.2 - 8.2 - 12 - 24V DC.

* Sensor supply voltage for analog flowmeter type A / U:
Terminal 7: 3.2 - 8.2 - 12 - 24V DC.

Typical wiring diagram F030-P-OR-PM-ZB



* Sensor supply voltage for pulse flowmeter type P:
Terminal 7: 1.2 - 3.2 - 8.2 - 12 - 24V DC.

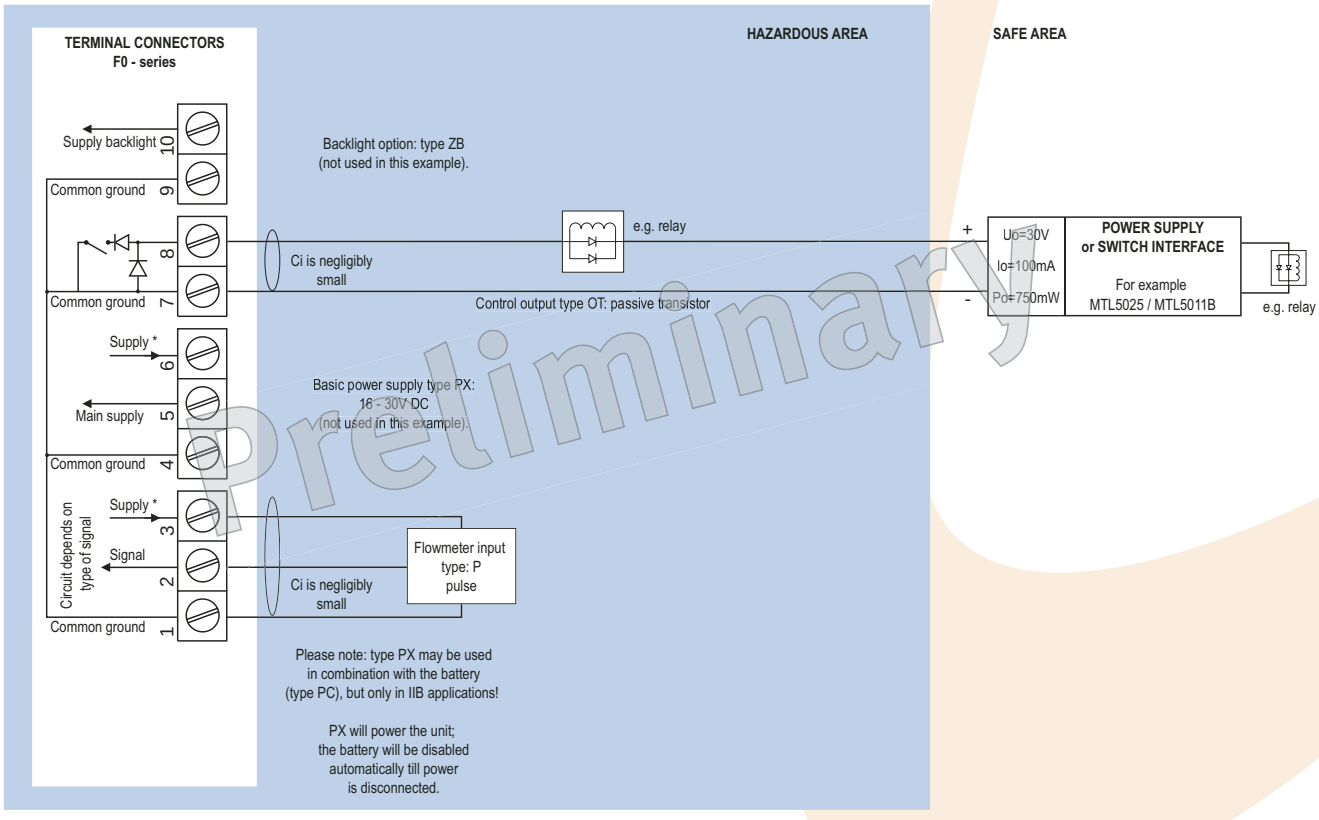
* Sensor supply voltage for analog flowmeter type A / U:
Terminal 7: 3.2 - 8.2 - 12 - 24V DC.

Hazardous area applications

ATEX certification of the F030-XI for use in Intrinsically Safe applications is pending. It is going to be approved according to Ex II 1GD EEx ia IIB/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 certification with the same ratings is expected to become available in november 2005, just as the CSA certification. The CSA (US/C) rating will be: Intrinsically Safe Class I, II, or III, Zone 0 or 1, Division 1 or 2, Group A through G (I.S.) and Non-Incendive Division 2 and Zone 2 (N.I.).
A flame proof enclosure with rating Ex II 2G EEx d IIB T5 is available as well. Please contact your supplier for further details.

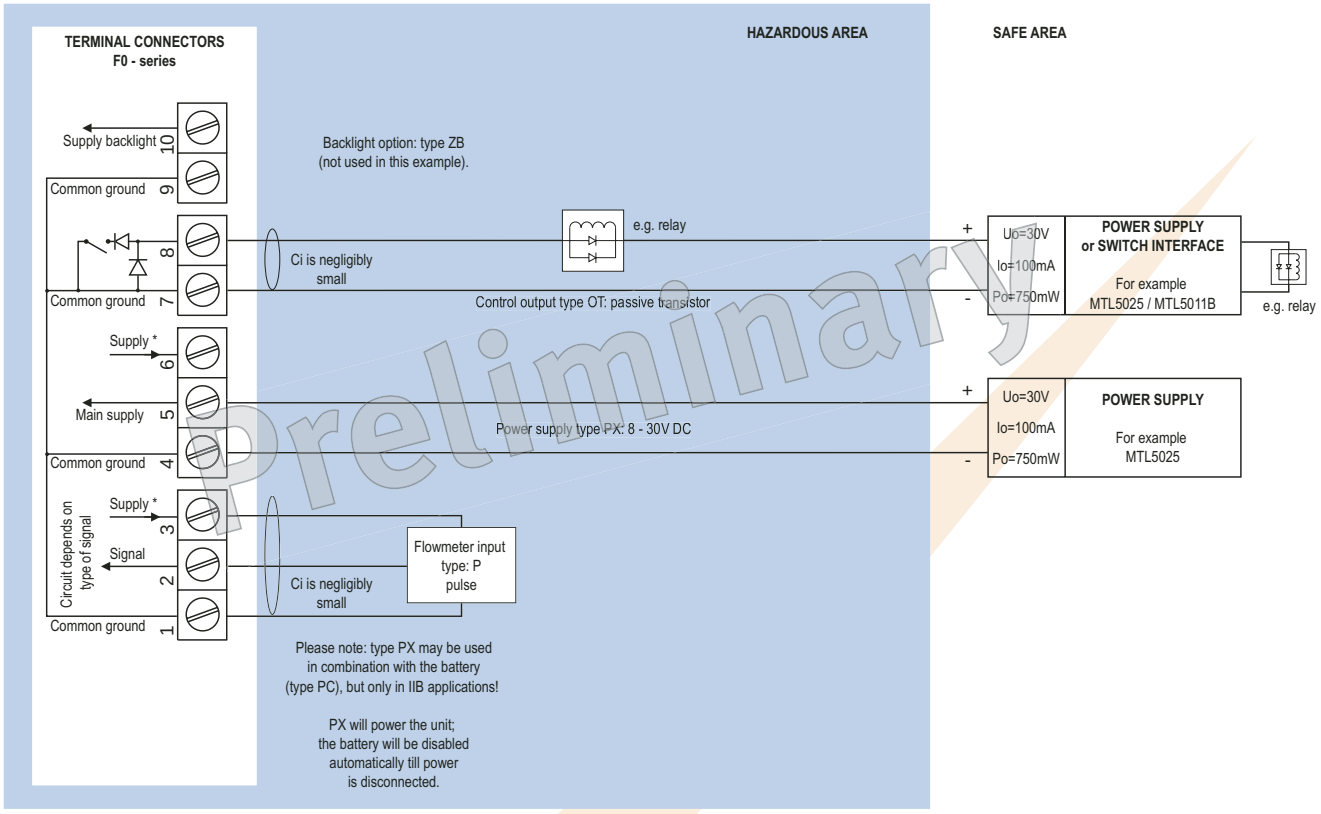
Certificate of conformity KEMA 03ATEX1074 X

Configuration example IIB and IIC
F030-P-OT-PC-(PX)-XI-(ZB) - battery powered unit



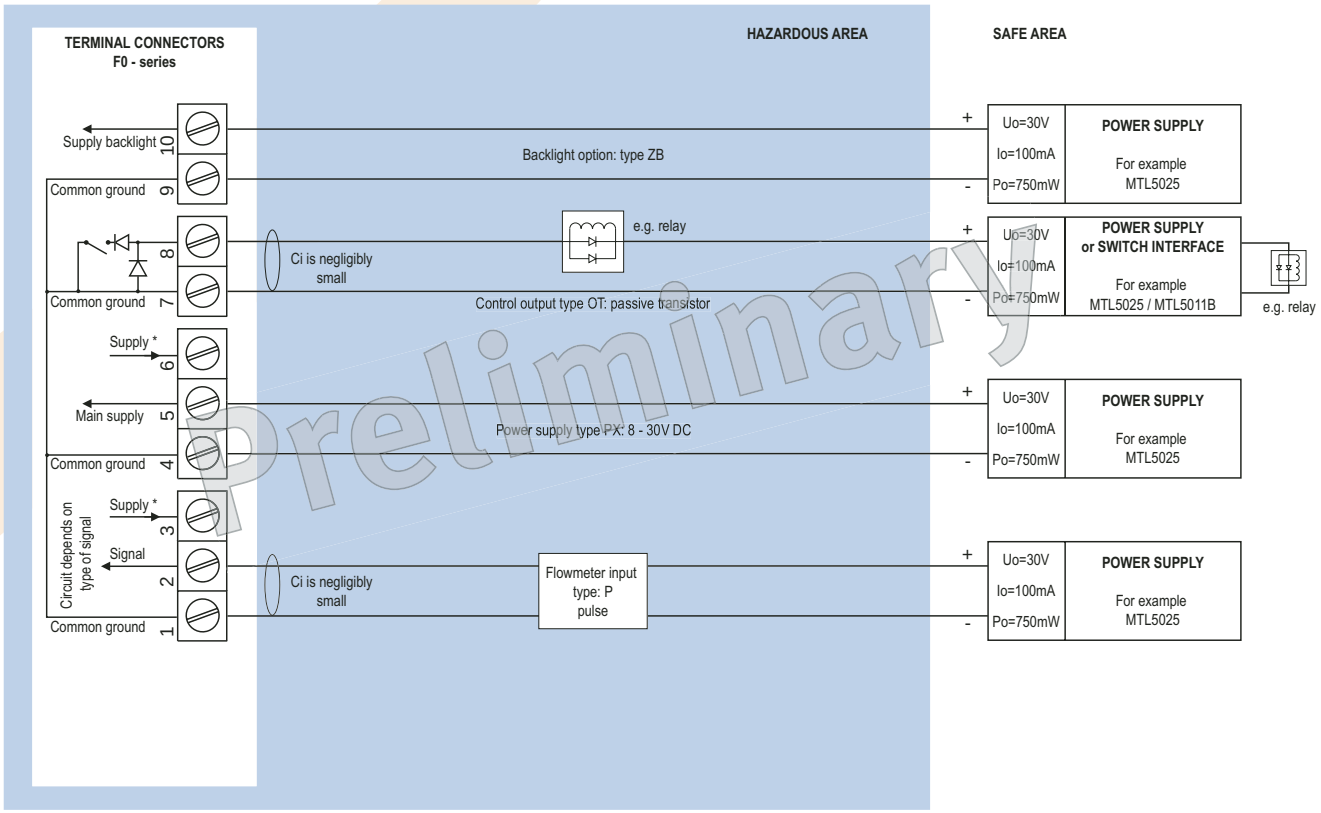
* Sensor supply voltage for pulse flowmeter type P: Terminal 3: 1.2 - 3.2V DC.
* Sensor supply voltage for analog flowmeter type A / U: Terminal 3: 3.2V DC.

Configuration example IIB and IIC - F030-P-OT-PX-XI-(ZB) - basic power supply 8 - 30V DC



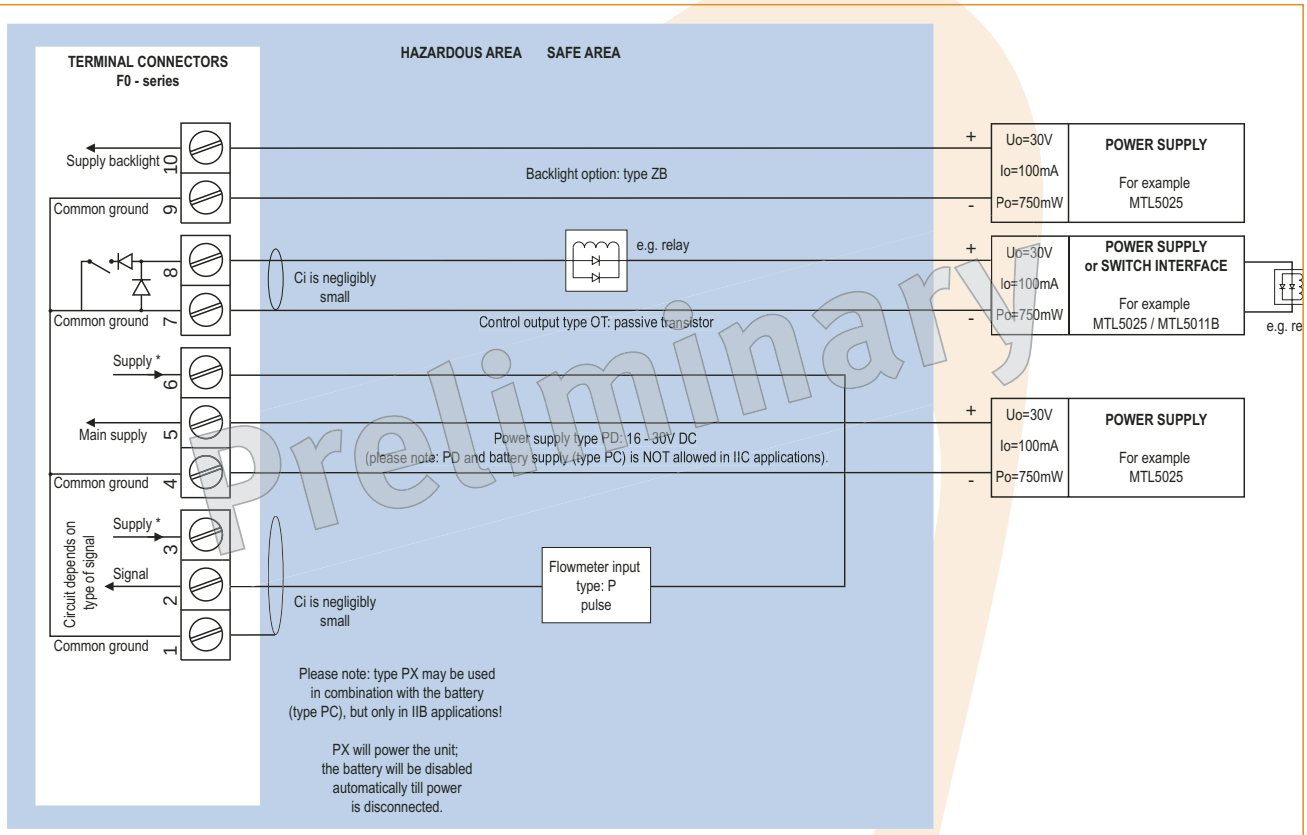
* Sensor supply voltage for pulse flowmeter type P: Terminal 3: 1.2 - 3.2V DC.
* Sensor supply voltage for analog flowmeter type A / U: Terminal 3: 3.2V DC.

Configuration example IIB and IIC - F030-P-OT-PX-XI-ZB - basic power supply 8 - 30V DC



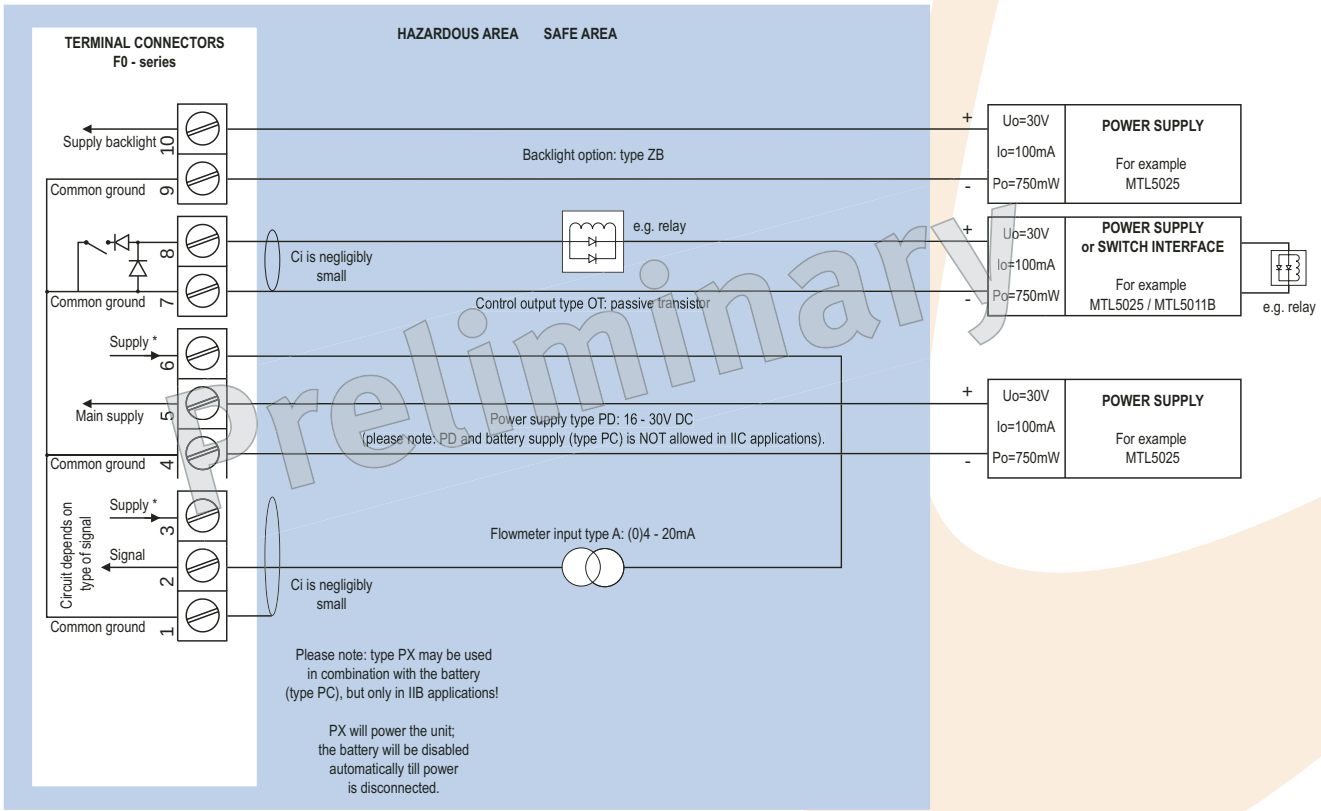
* Sensor supply voltage for pulse flowmeter type P: Terminal 3: 1.2 - 3.2V DC.
* Sensor supply voltage for analog flowmeter type A / U: Terminal 3: 3.2V DC.

Configuration example IIB and IIC - F030-P-OT-PD-XI-ZB - power supply 16 - 30V DC



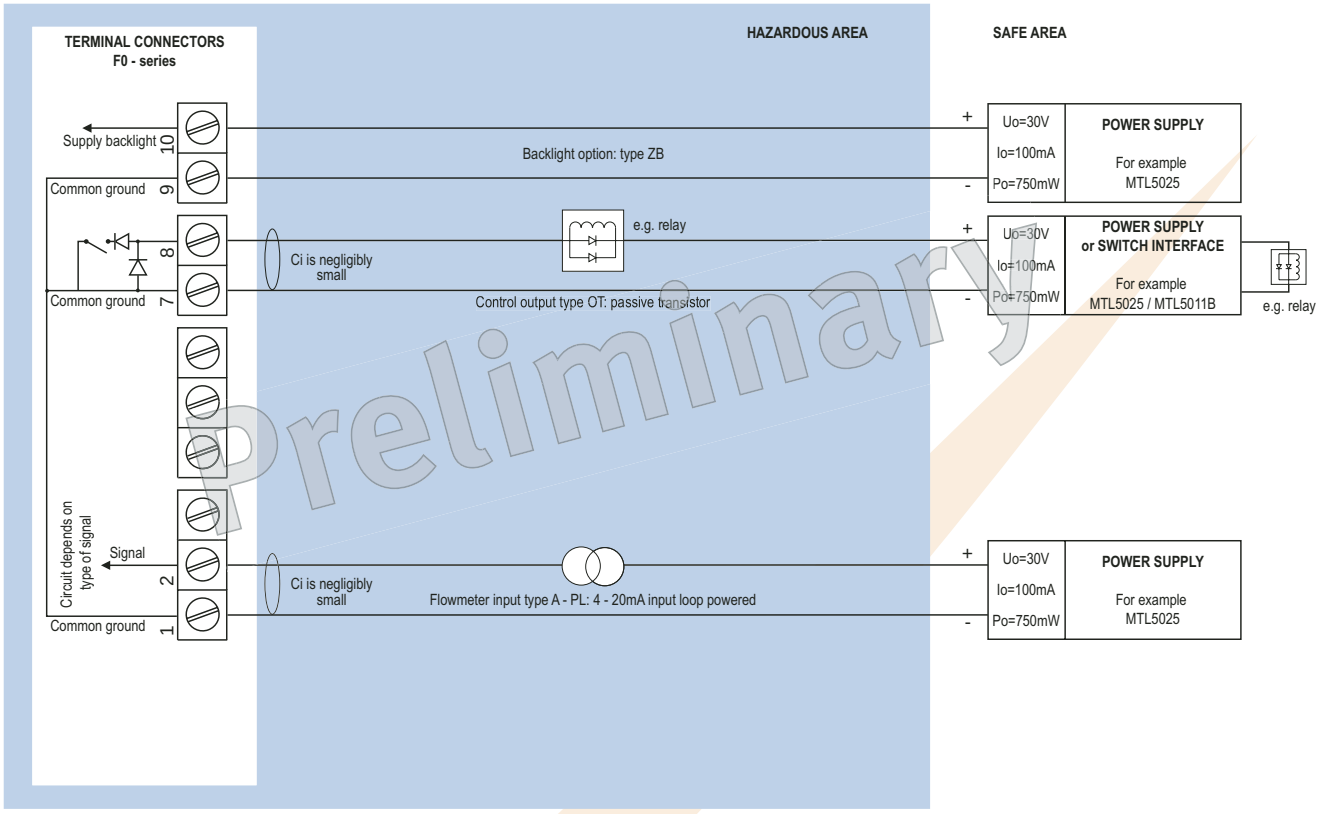
* Sensor supply voltage for pulse flowmeter type P: Terminal 3: 1.2 - 3.2V DC. Terminal 6 with type PD: 8.2V DC.
* Sensor supply voltage for analog flowmeter type A / U: Terminal 3: 3.2V DC. Terminal 6 with type PD: voltage as connected to terminal 5 (internally linked).

Configuration example IIB and IIC - F030-A-OT-PD-XI-ZB - power supply 16 - 30V DC



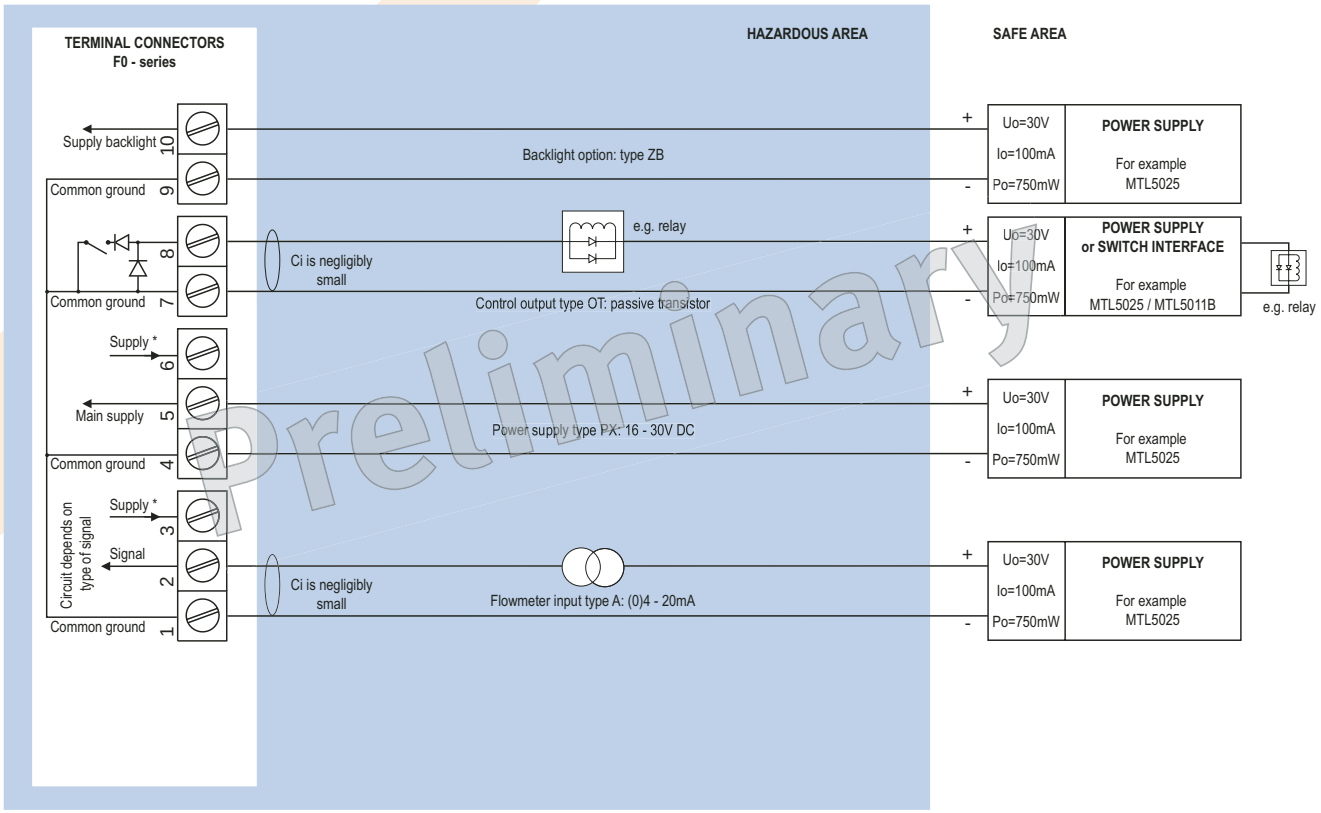
* Sensor supply voltage for pulse flowmeter type P: Terminal 3: 1.2 - 3.2V DC. Terminal 6 with type PD: 8.2V DC.
* Sensor supply voltage for analog flowmeter type A / U: Terminal 3: 3.2V DC. Terminal 6 with type PD: voltage as connected to terminal 5 (internally linked).

Configuration example IIB and IIC - F030-A-OT-PL-XI-ZB - input loop powered



* Sensor supply is not available: unit is input loop powered.

Configuration example IIB and IIC - F030-A-OT-PX-XI-ZB - basic power supply 8 - 30V DC



* Sensor supply voltage for pulse flowmeter type P: Terminal 3: 1.2 - 3.2V DC.
* Sensor supply voltage for analog flowmeter type A / U: Terminal 3: 3.2V DC.

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. 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	12 - 28V DC ± 10%. Intrinsically Safe 16 - 30V DC.
Type PF	24V AC / DC ± 10%.
Type PL	Input loop powered from sensor signal 4 - 20mA (type "A").
Type PM	115 - 230V AC ± 10%.
Type PX	8 - 28V DC ± 10% (limited sensor supply voltage).
Note	PB, PF and PM are not available Intrinsically Safe.

Sensor excitation	
Type PB/PC/PX	3.2V DC for pulse signals and 1.2V DC for coil pick-up.
Type PD	for pulse signals: 1.2 - 3.2 - 8.2V DC - max. 5mA@8.2V DC. For analog signals, the sensor supply voltage will be according to power supply voltage (as connected to terminal 5).
Type PF / PM	1.2 - 3.2 - 8.2 - 12 and 24V DC - max. 200mA@24V DC.

Terminal connections	
Type	Removable plug-in terminal strip. Wire max. 1.5mm² and 2.5mm².

Data protection	
Type	EEPROM backup of all settings. Backup of running totals every minute. 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 retardent.
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 retardent.
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 / IECEx certification	Pending.
CSA C-US certification	Pending.
Ambient	-40°C to +70°C / -40° to +158°F.

Explosion proof	
ATEX certification	⟨Ex⟩ II 2G EEx d IIB T5.
Type XF	Dimensions of enclosure: 350 x 250 x 200mm (13.78" x 9.84" x 7.87") L x H x D.
Weight	16 Kg.

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

Signal input

Flowmeter sensor	
Type P	Coil / sine wave (minimum 20mVpp or 80mVpp - sensitivity selectable), NPN/PNP, open collector, reed-switch, Namur, active pulse signals 8 - 12 and 24V DC.
Frequency	Minimum 0Hz - maximum 7kHz for total and flowrate. Maximum frequency depends on signal type and internal low-pass filter. E.g. reed switch with low-pass filter: max. frequency 120Hz.
K-Factor	0.000010 - 9,999,999 with variable decimal position.
Low-pass filter	Available for all pulse signals.
Option ZF	coil sensitivity 10mVpp.
Option ZG	coil sensitivity 5mVpp.
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	14 bit. Error < 0.05%. Low level cut-off programmable.
Span	0.000010 - 9,999,999 with variable decimal position.
Offset	0.000 - 9,999.999 units.
Update time	Four times per second.
Voltage drop	Type A: 2.6V@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.

Signal output

Control output	
Function	Control output according the batch process.
Type OA	One active 24V DC transistor output (PNP); load max. 200mA (requires PF or PM).
Type OR	One electro-mechanical relay output - isolated; max. switch power 230V AC (N.O.) - 0.5A (requires PF or PM).
Type OT	One passive transistor output (NPN) - not isolated.
Load	Max. 50V DC - 300mA per output.

Operational

Operator functions	
Displayed functions	• preset value - can be entered by the operator. • batched quantity or remaining quantity. • Total and accumulated total. • Total can be reset to zero by pressing the STOP-key twice.

Preset and total	
Digits	7 digits.
Units	L, m3, GAL, USGAL, KG, lb, bbl, no unit.
Decimals	0 - 1 - 2 or 3.
Note	Total can be reset to zero.

Accumulated total	
Digits	11 digits.
Units / decimals	According to selection for total.
Note	Can not be reset to zero.

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

Ordering information

Example (standard configuration)

F030-P-HC-OT-PX-XX-ZX.

Explanation standard configuration:

P: flowmeter signal: pulse; **HC:** ABS panel mount enclosure; **OT:** passive transistor output; **PX:** the unit is powered with 8 - 28V DC (basic power supply); **XX:** Safe area; **ZX:** no options.

ordering information:		F030 -_ -H _ -O _ -P _ -X _ -Z _
Flowmeter/Pressure/Level/Temperature/Sensor input signal		
A	Ex	(0)4 - 20mA input.
P	Ex	**Pulse input: coil, npn, pnp, namur, reed-switch.**
U	Ex	0 - 10V DC input.
Enclosure		
HA	Ex	Aluminum field mount enclosure IP67 / NEMA 4X - two holes PG9 + one hole M20.
HB	Ex	Aluminum panel mount enclosure IP65 / NEMA 4.
HC	Ex	**ABS panel mount enclosure IP65 / NEMA 4.**
HD	Ex	ABS wall mount enclosure IP67 / NEMA 4X.
HF	Ex	ABS wall mount enclosure IP67 / NEMA 4X - 1x hole 22mm.
HT	Ex	Aluminum field mount enclosure IP67 / NEMA 4X - one hole $^1/_2$"NPT.
HU	Ex	Aluminum field mount enclosure IP67 / NEMA 4X - three holes $^1/_2$"NPT.
HZ	Ex	Aluminum field mount enclosure IP67 / NEMA 4X - no holes.
Output		
OA		One active transistor output - requires PF or PM.
OR		One mechanic relay output - requires PF or PM.
OT	Ex	**One passive transistor output - standard configuration.**
Power supply		
PB		Lithium battery powered.
PC	Ex	Lithium battery powered - Intrinsically Safe.
PD	Ex	12 - 24V DC + sensor supply - with XI: 16 - 30V DC.
PF		24V AC / DC + sensor supply.
PL	Ex	Input loop powered from sensor signal type “A”.
PM		115 - 230V AC + sensor supply.
PX	Ex	**Basic power supply 8 - 28V DC (no real sensor supply).**
Hazardous area		
XI	Ex	Intrinsically safe.
XF	Ex	EExd enclosure - 3 keys.
XX		**Safe area only.**
Other options		
ZB	Ex	Backlight.
ZF	Ex	Coil input 10mVpp.
ZG	Ex	Coil input 5mVpp.
ZX	Ex	**No options.**

The bold marked text contains the standard configuration.

Ex Available Intrinsically Safe from november 2005.

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