DATASHEET F014 - FLOWRATE INDICATOR / TOTALIZER

FLOWRATE INDICATOR / TOTALIZER

WITH PULSE SIGNAL OUTPUT

Features

- Displays instantaneous flowrate, total and accumulated total.
- Large 17mm (0.67") digit selection for flowrate or total.
- Scaled pulse signal output according accumulated total.
- Abillity to process all types of flowmeter signals.
- Auto backup of settings and running totals.
- 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.
- Rugged aluminum field mount enclosure IP67/NEMA4X.
- Intrinsically Safe
  Ex II 1 GD EEx ia IIC T4 T100°C.
- 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 3.2 - 8.2 - 12 - 24V DC.

Signal output

- Scaled pulse output according to accumulated total.

Signal input

Flow

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

Applications

- Flow measurement where re-transmission of the totaliser function is required.
  Alternative basic models: F010 - F011 - F012 - F013 or more advanced F016, F110 and higher.

General information

Introduction

The F014 is a local indicator to display the actual flowrate, total and accumulated total. The total can be reset to zero by pressing the CLEAR button twice. The eleven digit accumulated total however can not be reset to zero. Related to the acculmulated total, a scaled pulse is generated for re-transmitting the count on the display.
A wide selection of options further enhance this models capabilities.

Display

The display has large 17mm segments which can be set to show total or flowrate. On-screen engineering units are easily configured from a comprehensive selection, whilst different units for flowrate and total can be displayed simultaneously. The accumulated total can register up to 11 digits and is backed-up in EEPROM memory where it is regularly updated.

Backlight

For those applications where readabillity 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. 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.

Pulse output

The scaleable pulse output reflects the count on the accumulated display. The pulse length is user defined from 0.001 second up to 10 seconds. The maximum output frequency is 500Hz.
The output signal can be a passive NPN, active PNP or an isolated electro-mechanical relay.

Signal input

The F014 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 F014 and sensor. Most popular is our 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.

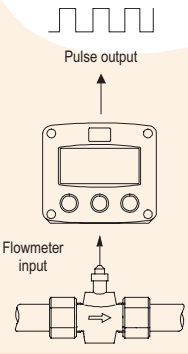
Hazardous areas

For hazardous area applications, this model has been ATEX certified Intrinsically Safe Ex II 1 GD EEx ia IIC T4 T100°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 Ex II 2 GD EEx d IIB T5.

Enclosures

Various types of enclosures can be selected, all ATEX approved. As standard the F014 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 Fo14

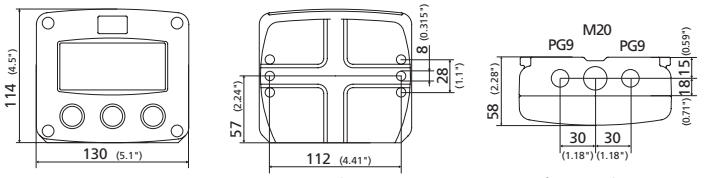


Dimensions enclosures

Enclosure HA

Aluminum field mount enclosure

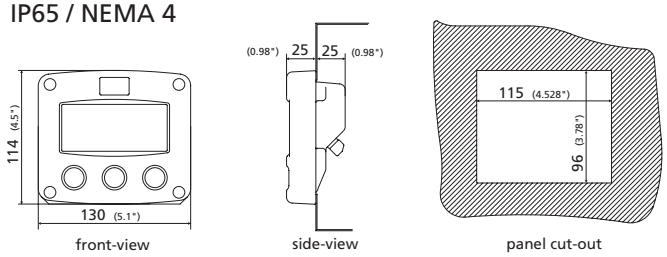
IP67 / NEMA 4X
Tapped holes: European thread



Enclosure HB

Aluminum panel mount enclosure

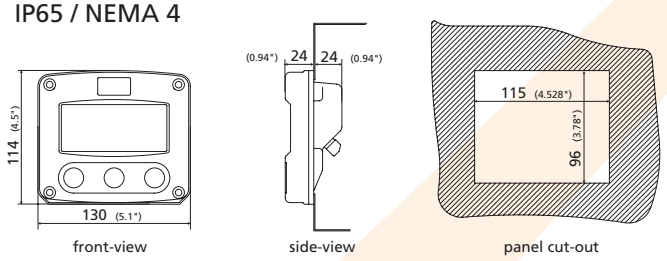
IP65 / NEMA 4



ENCLOSURE HC (STANDARD)

ABS PANEL MOUNT ENCLOSURE

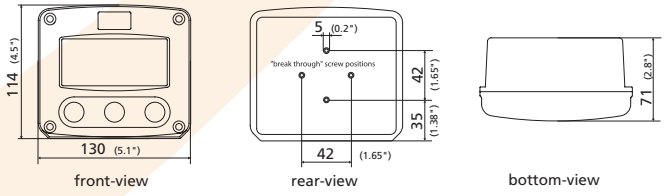
IP65 / NEMA 4



Enclosure HD

ABS wall mount enclosure

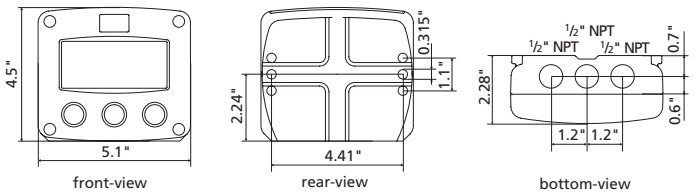
IP67 / NEMA 4X
Holes user defined



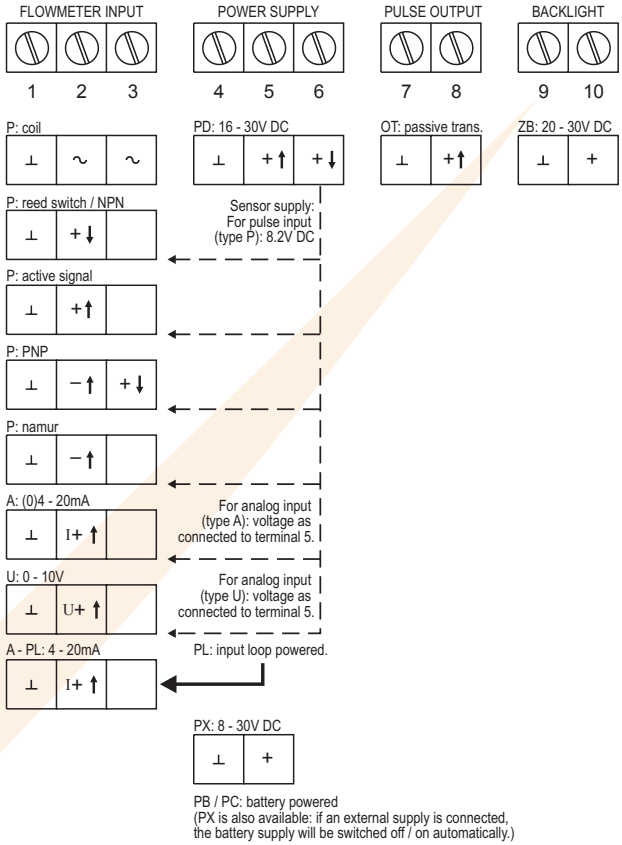
Enclosure HU

Aluminum field mount enclosure

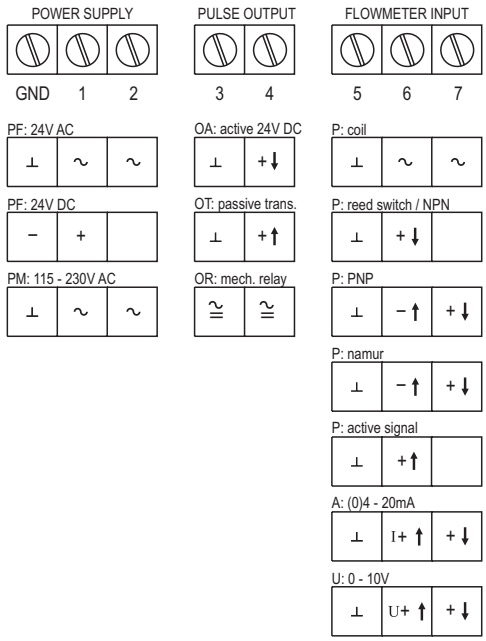
IP67 / NEMA 4X
Tapped holes: U.S. thread



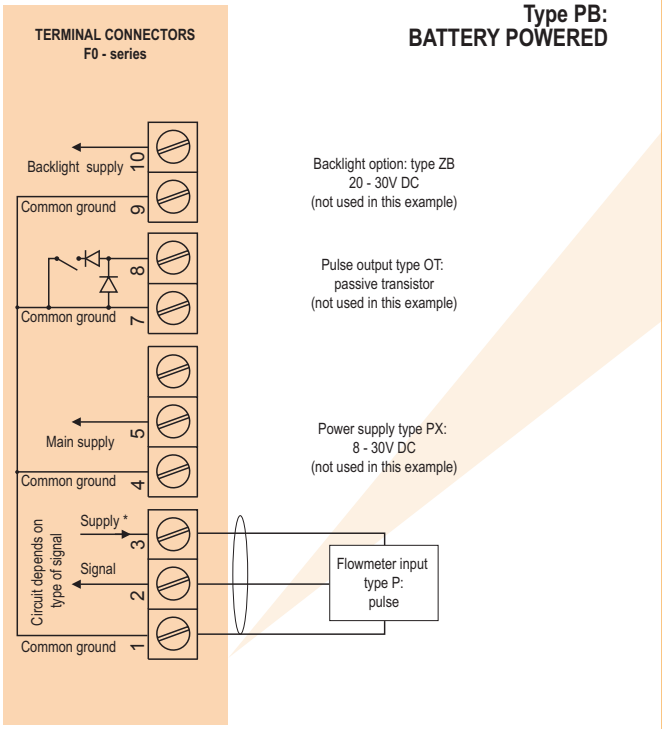
Terminal connections power supply PB/PC - PD - PL - PX



Terminal connections power supply PF - PM



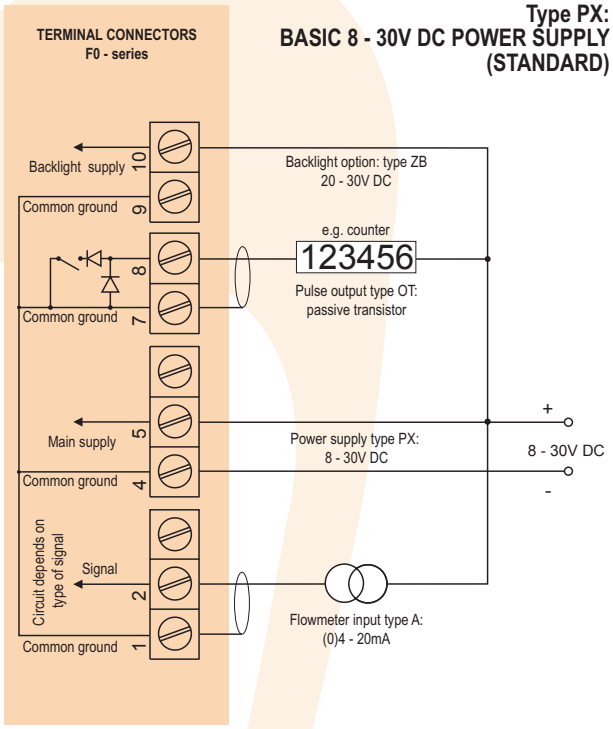
Typical wiring diagram Fo14-P-(OT)-PB-(PX)-(ZB)



* 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: not available.

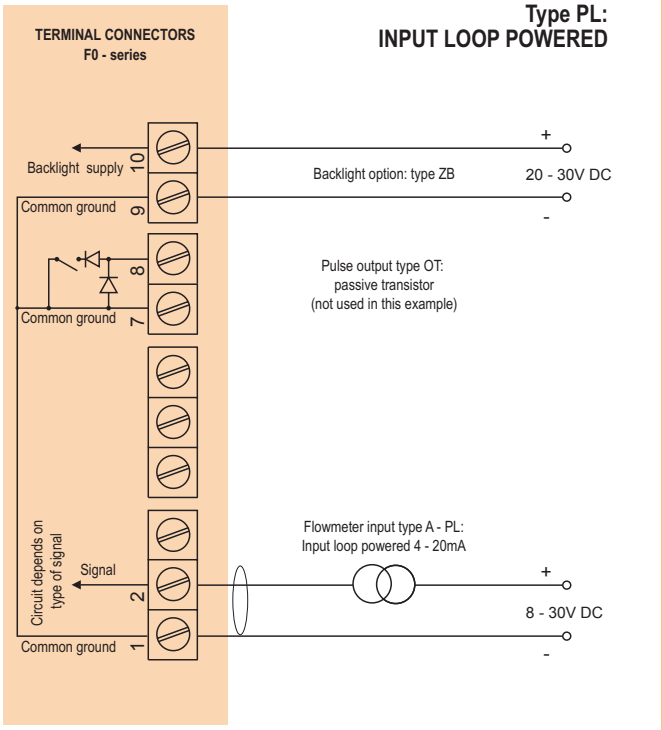
Typical wiring diagram Fo14-A-OT-PX-ZB



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

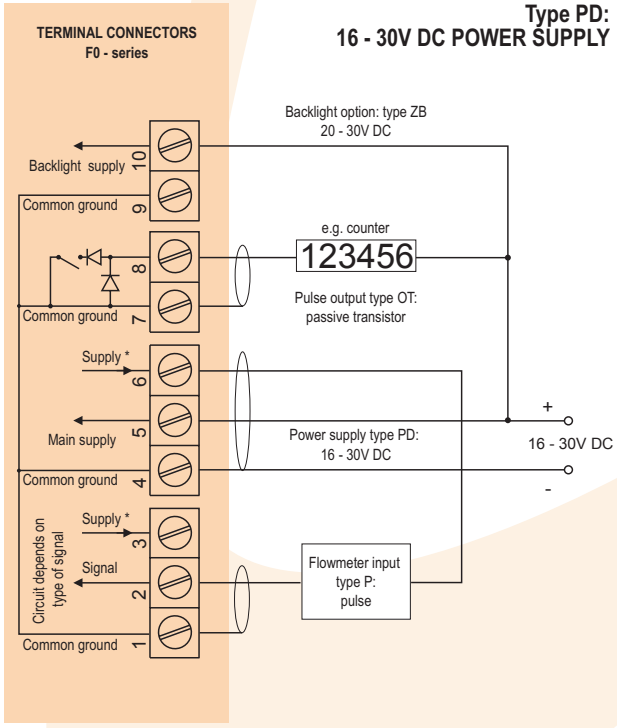
* Sensor supply voltage for analog flowmeter type A / U:
Terminal 3: not available.

Typical wiring diagram Fo14-A-(OT)-PL-ZB



Sensor supply: sensor is externally powered.

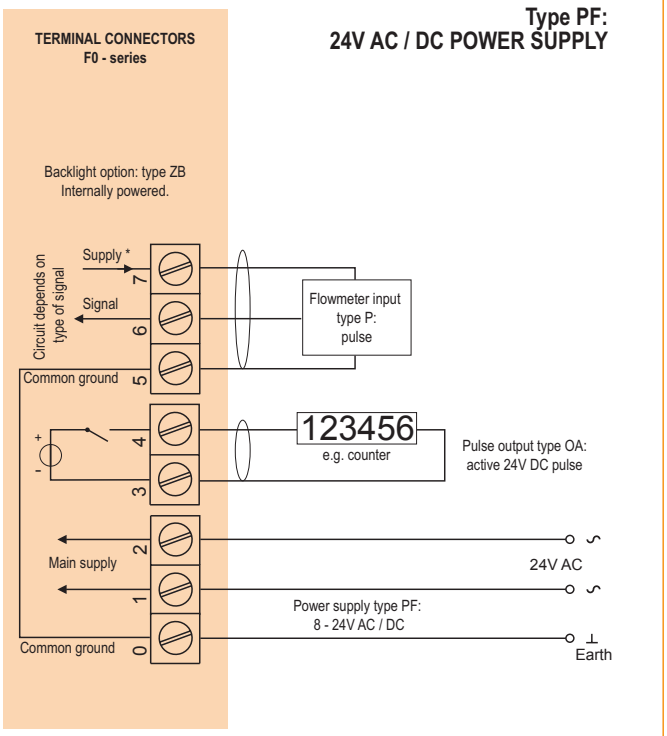
Typical wiring diagram Fo14-P-OT-PD-ZB



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

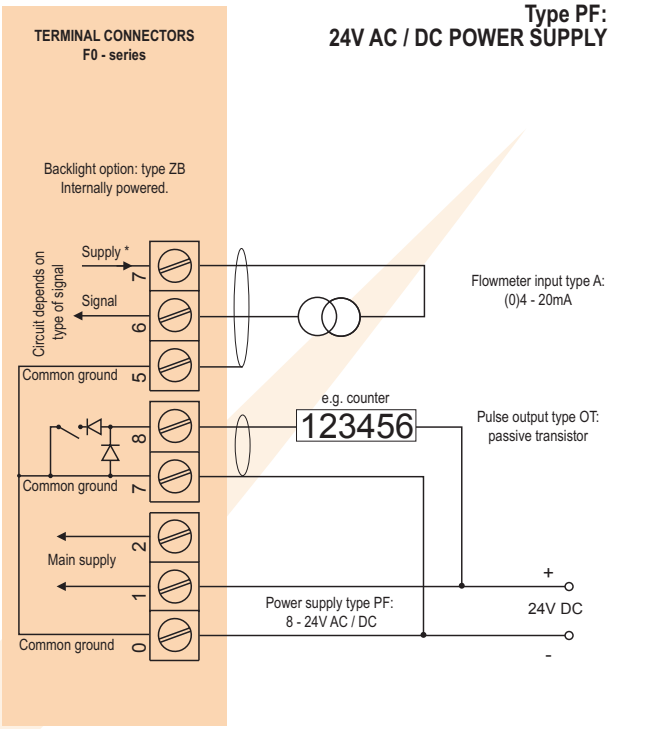
Typical wiring diagram Fo14-P-OA-PF-ZB



* 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.

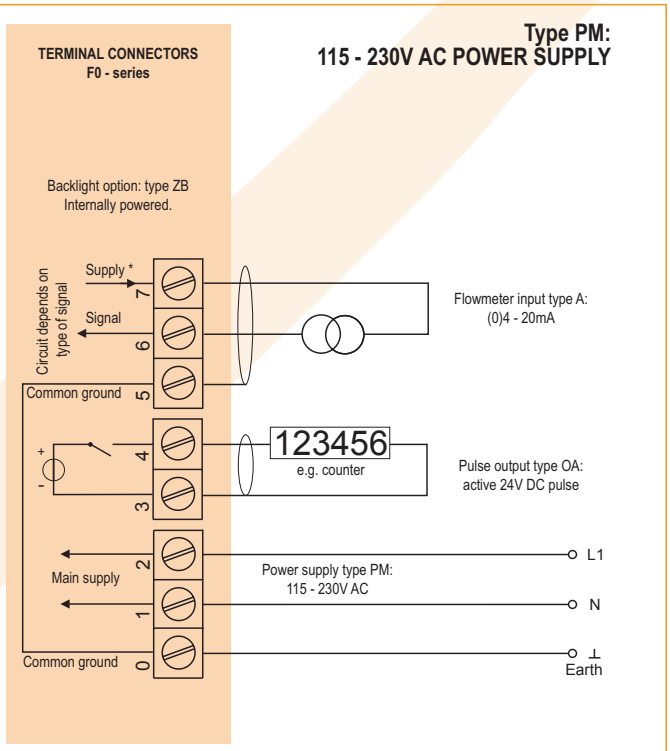
Typical wiring diagram Fo14-A-OT-PF-ZB



* 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.

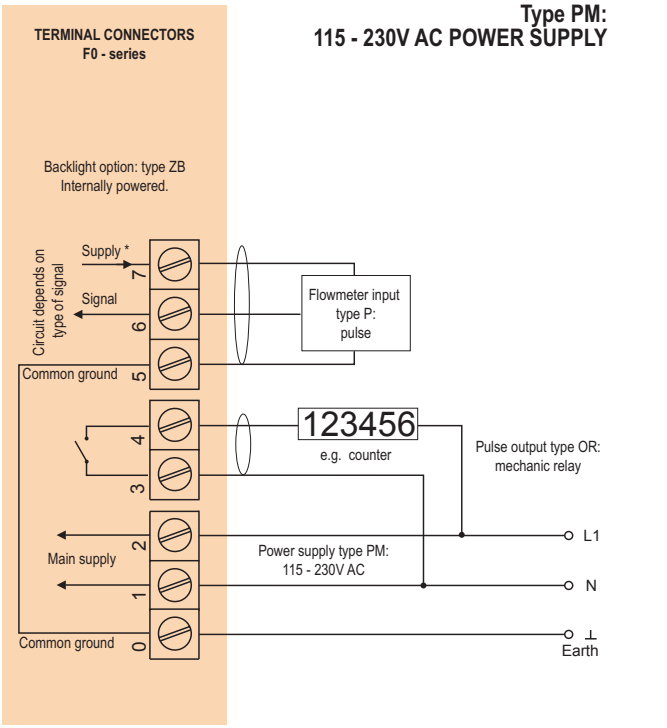
Typical wiring diagram Fo14-A-OA-PM-ZB



* 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 Fo14-P-OR-PM-ZB



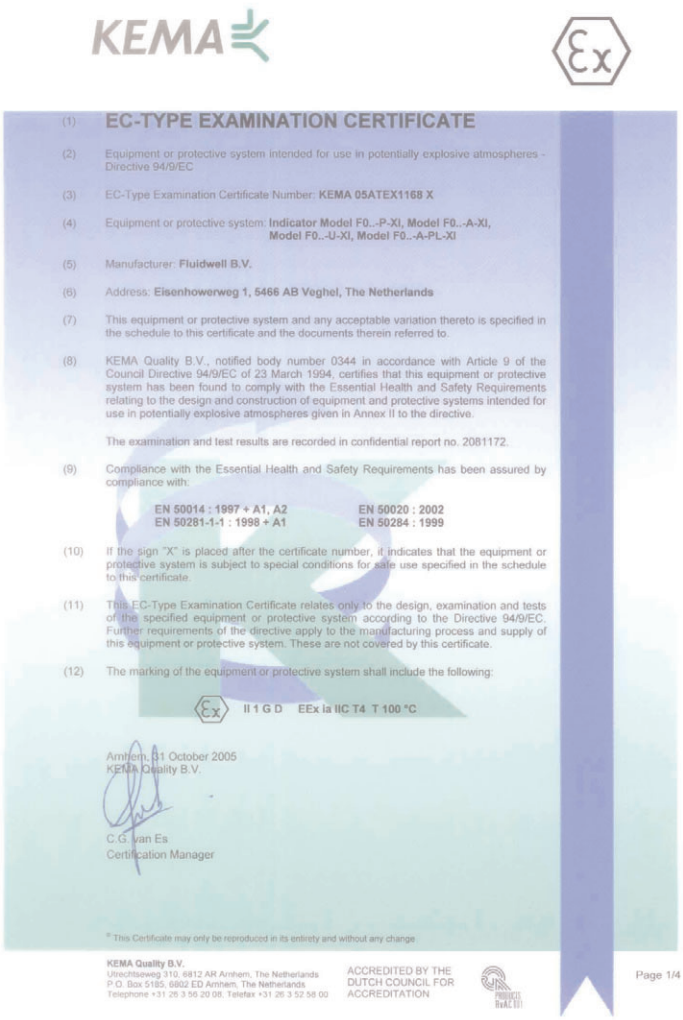
* Sensor supply voltage for pulse flowmeter type P:
Terminal 7: 1.2 - 3.2 - 8.2 - 12 - 24V DC.

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

Hazardous area applications

The F014-XI has been ATEX approved by KEMA for use in Intrinsically Safe applications. It is approved according to ⟨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 four I.S. power supplies to power the unit, sensor, pulse output and backlight. The F014-PD-XI offers a 8.2V DC sensor supply to power e.g. a Namur sensor or 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



KEMA

(1) EC-TYPE EXAMINATION CERTIFICATE

(2) Equipment or protective system intended for use in potentially explosive atmospheres - Directive 94/9/EC

(3) EC-Type Examination Certificate Number: **KEMA 05ATEX1168 X**

(4) Equipment or protective system: **Indicator Model F0..-P-XI, Model F0..-A-XI, Model F0..-U-XI, Model F0..-A-PL-XI**

(5) Manufacturer: **Fluidwell B.V.**

(6) Address: **Eisenhowerweg 1, 5466 AB Veghel, The Netherlands**

(7) This equipment or protective system and any acceptable variation thereto is specified in the schedule to this certificate and the documents therein referred to.

(8) KEMA Quality B.V., notified body number 0344 in accordance with Article 9 of the Council Directive 94/9/EC of 23 March 1994, certifies that this equipment or protective system has been found to comply with the Essential Health and Safety Requirements relating to the design and construction of equipment and protective systems intended for use in potentially explosive atmospheres given in Annex II to the directive.

The examination and test results are recorded in confidential report no. 2081172.

(9) Compliance with the Essential Health and Safety Requirements has been assured by compliance with:

EN 50014 : 1997 + A1, A2 — EN 50020 : 2002
EN 50281-1-1 : 1998 + A1 — EN 50284 : 1999

(10) If the sign "X" is placed after the certificate number, it indicates that the equipment or protective system is subject to special conditions for safe use specified in the schedule to this certificate.

(11) This EC-Type Examination Certificate relates only to the design, examination and tests of the specified equipment or protective system according to the Directive 94/9/EC. Further requirements of the directive apply to the manufacturing process and supply of this equipment or protective system. These are not covered by this certificate.

(12) The marking of the equipment or protective system shall include the following:

⟨Ex⟩ II 1 G D EEx ia IIC T4 T 100 °C

Arnhem, 31 October 2005
KEMA Quality B.V.

C.G. van Es
Certification Manager

* This Certificate may only be reproduced in its entirety and without any change

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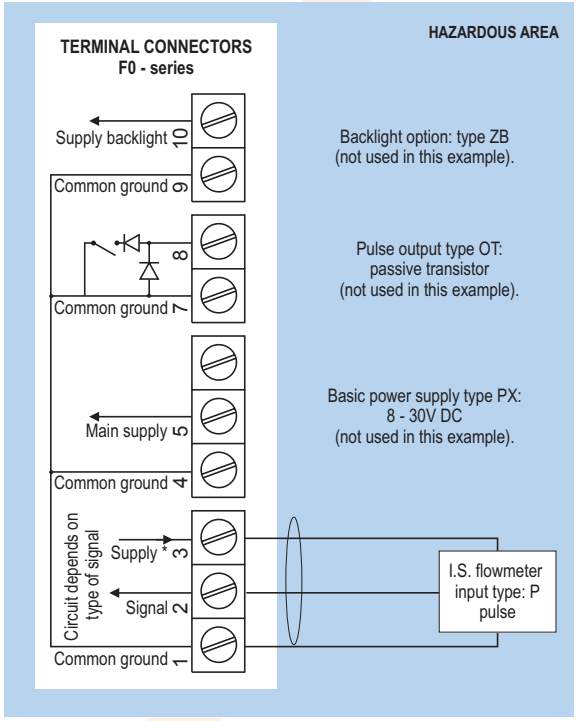
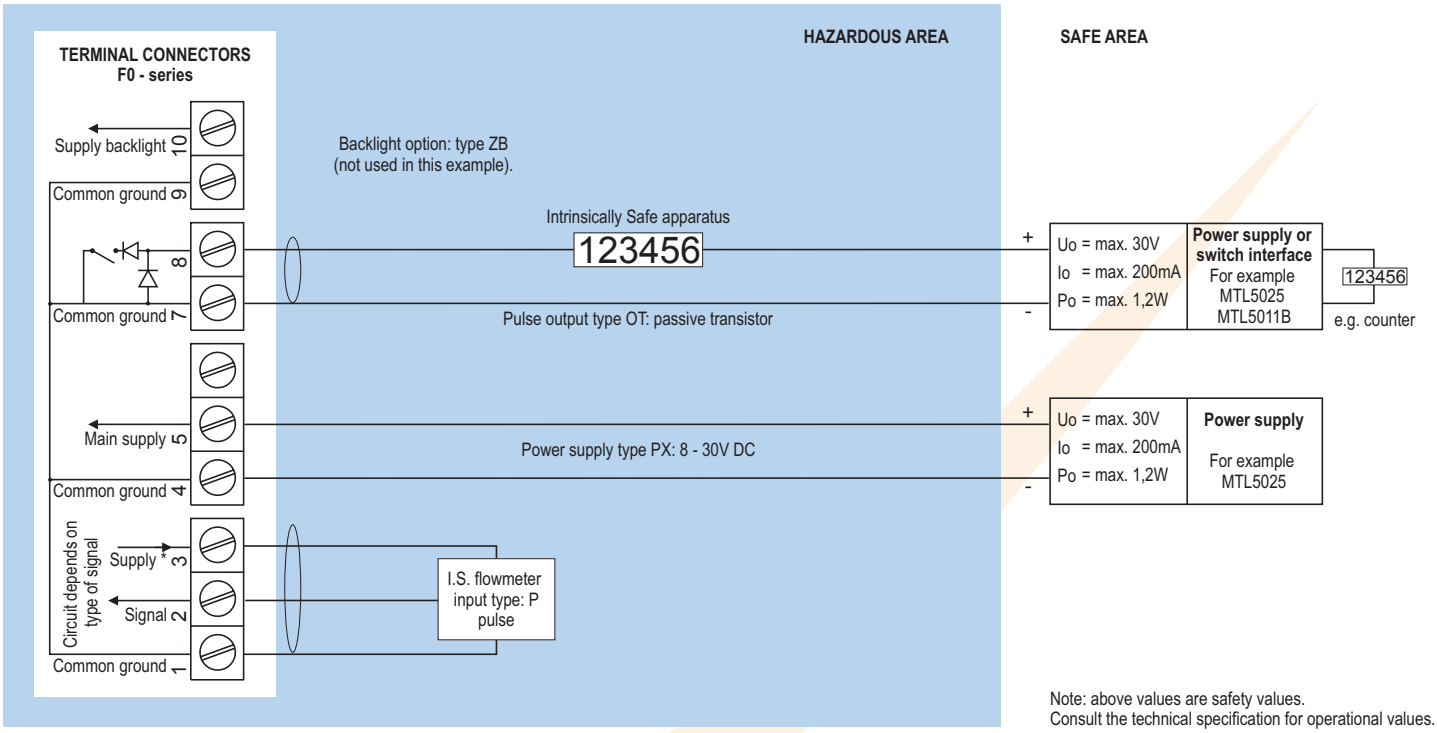
Configuration example IIA - IIB and IIC
Fo14-P-(OT)-PC-(PX)-XI-(ZB) - Battery powered unit



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

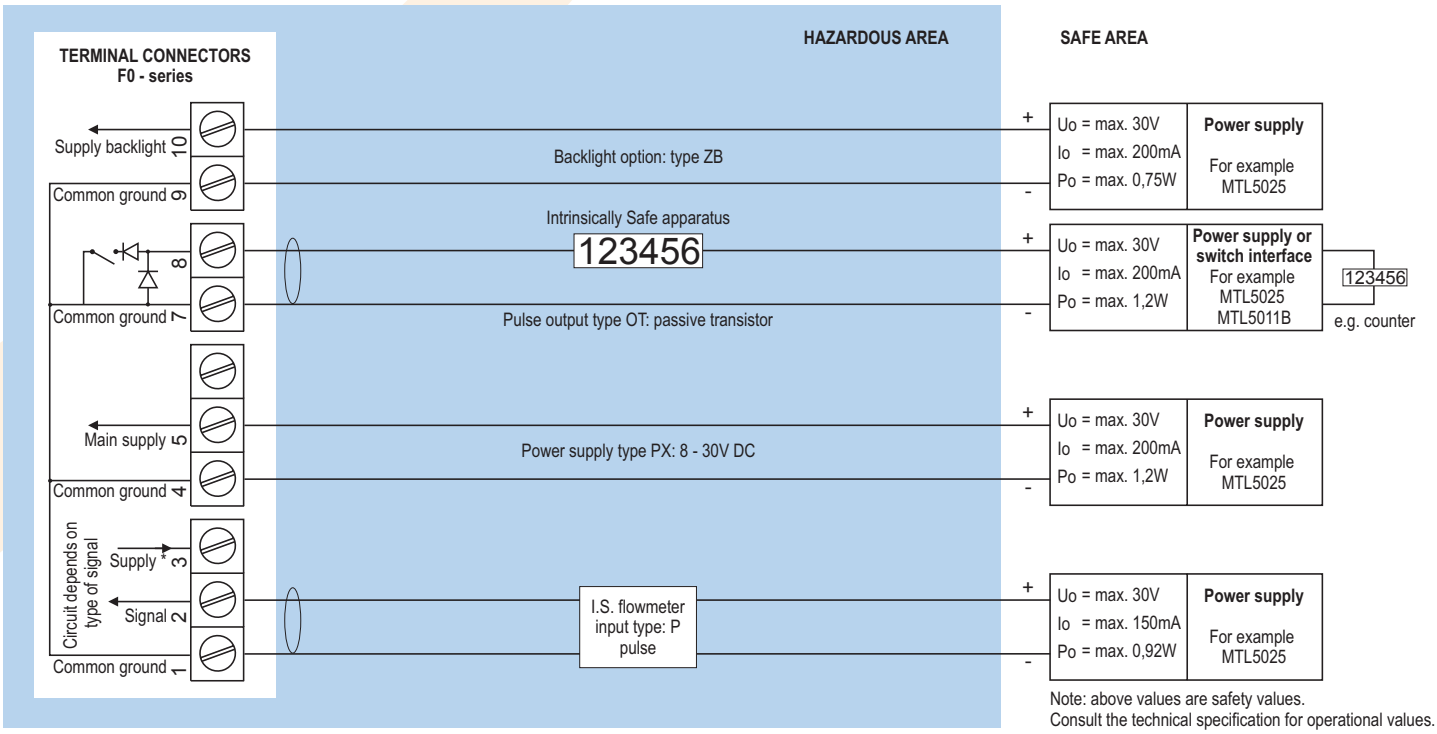
Configuration example IIA - IIB and IIC - F014-P-OT-PX-XI-(ZB) - Basic power supply 8 - 30V DC



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

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

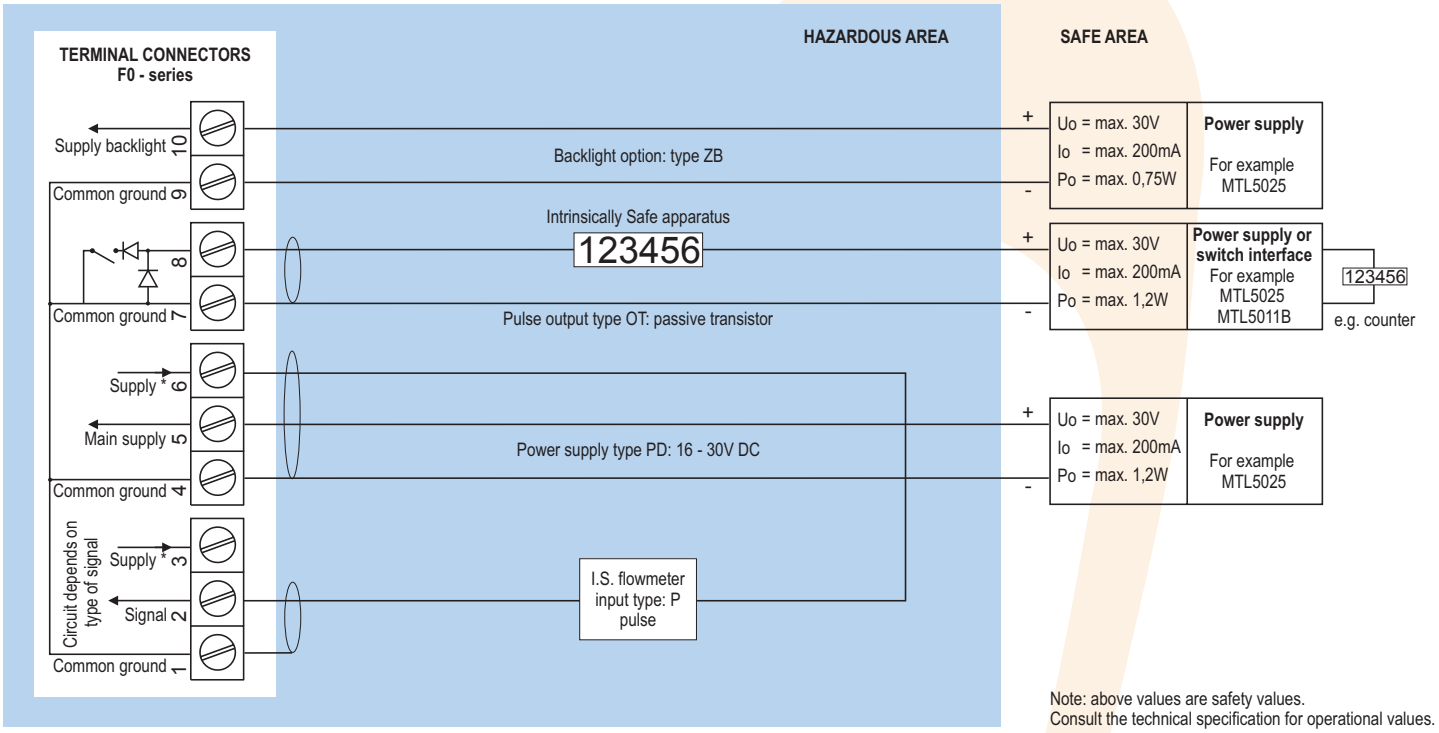
Configuration example IIA - IIB and IIC - F014-P-OT-PX-XI-ZB - Basic power supply 8 - 30V DC



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

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

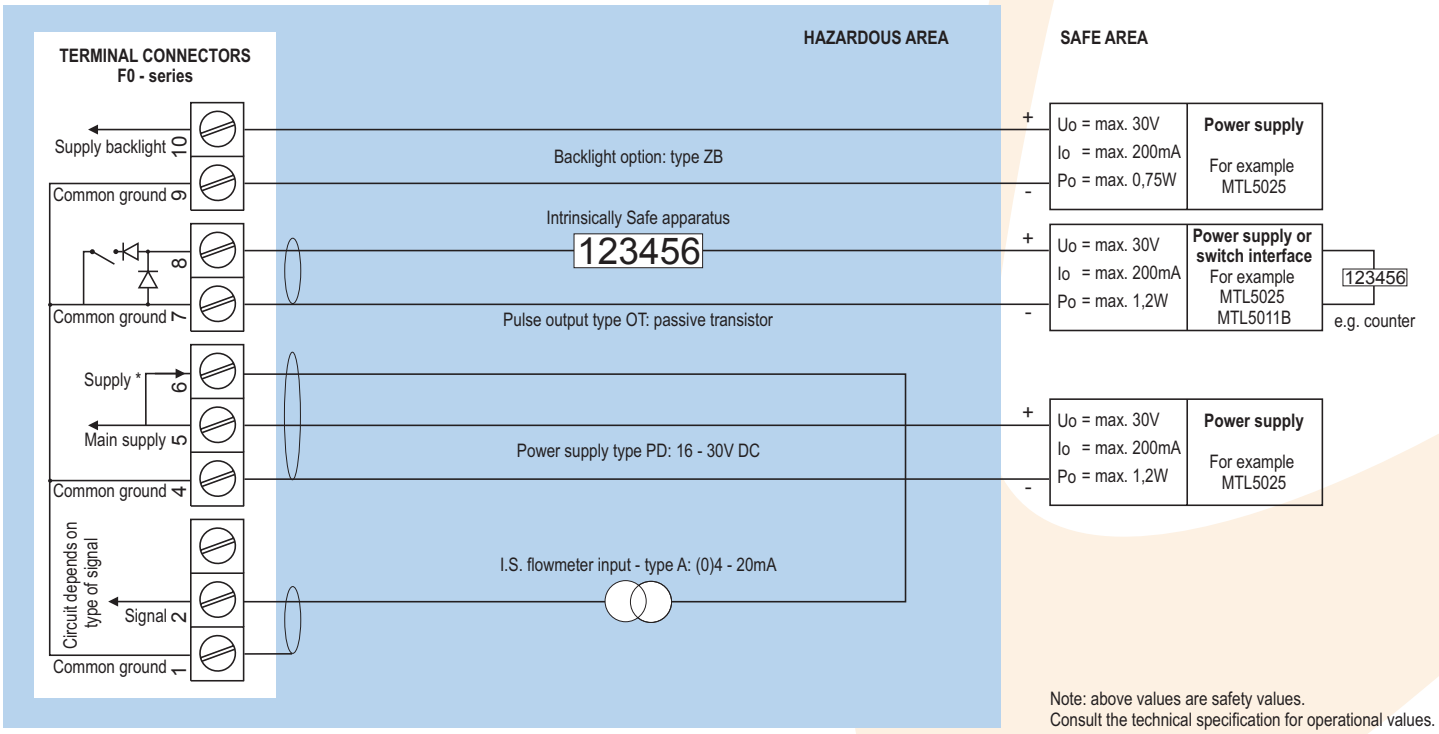
Configuration example IIA - IIB and IIC - F014-P-OT-PD-XI-ZB - Power supply 16 - 30V DC



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

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

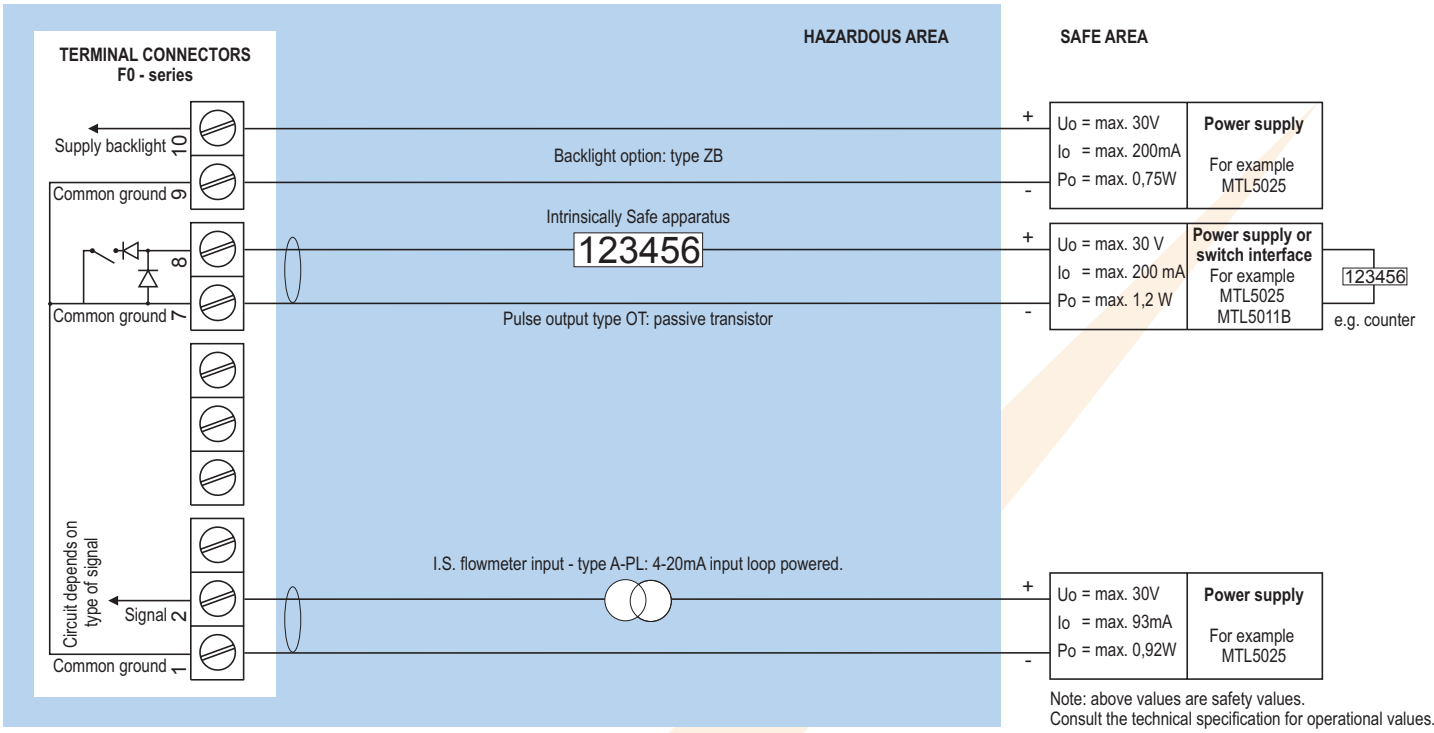
Configuration example IIA - IIB and IIC - F014-A-OT-PD-XI-ZB - Power supply 16 - 30V DC



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

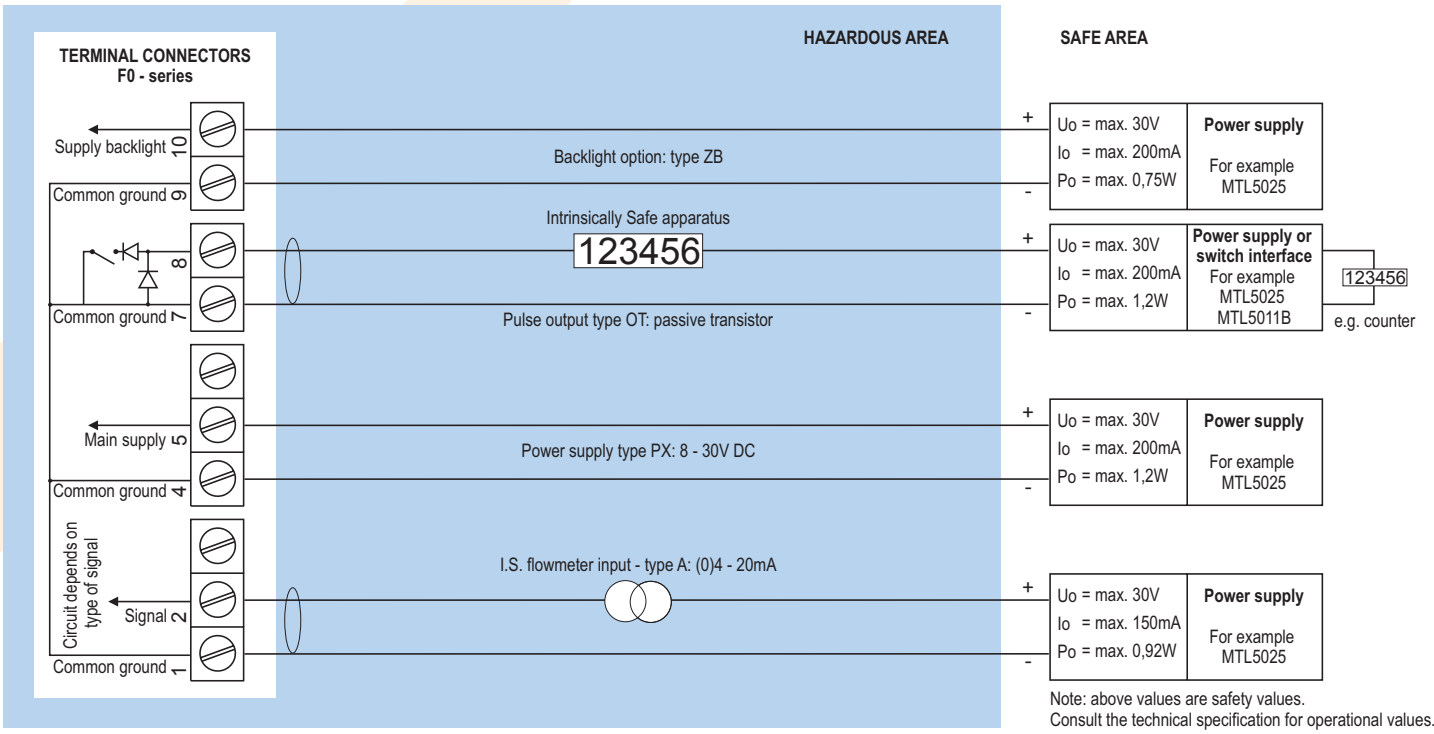
* Sensor supply voltage for analog flowmeter type A / U: Terminal 6: as input voltage terminal 5 (internally linked).
Please note: type PD may be used in combination with the battery (type PC). PD will power the unit; the battery will be disabled automatically till power is disconnected.

Configuration example IIA - IIB and IIC - F014-A-OT-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.

Configuration example IIA - IIB and IIC - F014-A-OT-PX-XI-ZB - Basic power supply 8 - 30V DC



* Sensor supply voltage for analog flowmeter 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.

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.
Power requirements	20 - 30V DC. Power consumption max. 30mA.
Note	With type PF / PM: internally powered.

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. 25mA @ 24V DC.
Type PF	24V AC / DC ± 10%. Power consumption max. 400mA @ 24V rms.
Type PL	Input loop powered from sensor signal 4 - 20mA (type A).
Type PM	115 - 230V AC ± 10%. Power consumption max. 70mA @ 230V AC.
Type PX	8 - 30V DC. Power consumption max. 20mA @ 24V DC.
Note	PB, PF and PM are not available Intrinsically Safe.
Note PF / PM	The total consumption of the sensor, active output type OA and backlight type ZB may not exceed 400mA @ 24V DC.

Sensor excitation	
Type PB/PC/PX	3.2V DC for pulse signals and 1.2V DC for coil pick-up.
Note	This is not a real sensor supply. Only suitable for sensors with a very low power consumption like coils (sine wave) and reed-switches.
Type PD	for pulse signals: 1.2 - 3.2 - 8.2V DC - max. 5mA@8.2V DC. For analog signals, the sensor supply voltage is according to the power supply voltage connected.
Type PF / PM	1.2 - 3.2 - 8.2 - 12 and 24V DC - max. 400mA @ 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 certification	Ⓔx 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	Ⓔx 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

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.
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.

Signal output

Pulse output	
Function	Pulse output - transmitting accumulated total.
Frequency	Max. 500Hz. Pulse length user definable between 1msec up to 10 seconds.
Type OA	One active 24V DC transistor output (PNP); load max. 400mA (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	• Flowrate and / or total. • Total and accumulated total. • Total can be reset to zero by pressing the CLEAR-key twice.

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.

Flowrate	
Digits	7 digits.
Units	mL, L, m³, Gallons, KG, Ton, lb, bl, cf, RND, ft³, scf, Nm³, Nl, igal - no units.
Decimals	0 - 1 - 2 or 3.
Time units	/sec - /min - /hr - /day.

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

Ordering information

Example (standard configuration)

F014-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 - 30V DC (basic power supply); **XX:** safe area; **ZX:** no options.

ordering information:		F014 -_ -H _ -O _ -P _ -X _ -Z _
Flowmeter 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	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 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.