F 012 Datasheet

Your success counts

FLUIDWELL

Flow rate Indicator / Totalizer

displays flow rate and total simultaneously

Application examples: *Salty Off-Shore conditions*

Extreme cold weather at polar regions

Hot and sandy deserts

The F-Series is your first and safest choice for field mount indicators in safe and hazardous area applications. 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).

Advantages

- Robust IP67 (NEMA Type4X) 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 instantaneous flow rate, total and accumulated total.
- Large 17mm (0.67") digits for flow rate or total.
- Easy configuration with clear alphanumerical display.
- LED backlight option.
- Selectable on-screen engineering units for volumetric or mass.
- Ability to process all types of signals: Sine wave (coil), NAMUR, NPN/PNP pulse, Reed-switch, Active pulse signals, (0)4-20mA.
- Power requirements: Input loop powered, battery powered or 8 - 30V DC, 24V AC/DC and 115 - 230V AC.
- Sensor supply: 3.2 / 8.2 / 12 / 24V DC.
- Auto backup of settings and running totals.
- Explosion/flame proof available.

Introduction

The F012 is a local indicator to display the actual flow rate, 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. A wide selection of options further enhances the capabilities of this model, including Intrinsic Safety for hazardous area applications.

Display

The display has large 17mm (0.67") and 8mm (0.31") digits which can be set to show flow rate and / or totals. On-screen engineering units are easily configured from a comprehensive selection. The accumulated total can register up to 11 digits and is backed-up in EEPROM memory every minute, just as the running total. As the F012 has been designed for field mounted applications, a smart display update function has been incorporated. Related to the lower temperatures, the update frequency of the LCD is tuned automatically to achieve a readable display even at -40°C / -40°F.

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 and baffling codes. 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.

Hazardous area

For hazardous area applications, this model is ATEX, IECEx, FM and CSA certified as 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 Ex d enclosure with ATEX certification is also available.

Backlight

For those applications where readability during day and night is an issue, a white backlight is available. 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.

Power requirements

Several power supply options are available to power the F012 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 requirement option.

All info at a glance

Easy to install

Easy to program

Know one know them all!

Reliable

User-friendly

Overview application F012

The F-Series is your first and safest choice for field mount indicators in safe and hazardous area applications. 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). Flow measurement where a local flow rate indication and totalizer function is required without re-transmission functionality. Alternative basic models F010 and F011 or more advanced F013 - F014 - F016 - F110 and higher or the D-Series DIN panel mount flow rate indicators.

Flowmeter input

Signal input

The F012 accepts most pulse and analog input signals for volumetric 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 is available with linear and square root calculation and even as 4 - 20mA input loop powered.

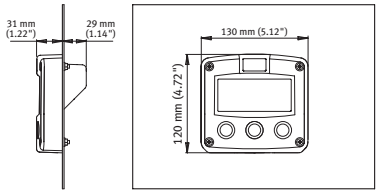
Type of signal	Resistance	Low Pass filter (LP)	Max. frequency	Max. frequency Low Pass filter (LP)	Min. amplitude P-P	Remark
NPN	100kΩ pull-up	100kΩ pull-up	6kHz Threshold 1.2V	1.2kHz		Open collector
REED	1MΩ pull-up	1MΩ pull-up	600Hz Threshold 1.2V	120Hz		
PNP	47KΩ pull-down	100KΩ pull-down	6kHz Threshold 1.2V	1.2kHz		
NAMUR	820Ω pull-down	-	4kHz	-		External power required
COIL LO	-	-		-	$90mV_{pp}$	Default sensitivity
COIL-HI	-	-	-	-	$20mV_{pp}$	Sensitive for interference!
COIL-HI (Type ZF)					$10mV_{pp}$	
COIL-HI (Type ZG)					$5mV_{pp}$	
ACTIVE 8.2V DC	3K9Ω		10kHz Threshold 4V			External power required
ACTIVE 12V DC	4KΩ		10kHz Threshold 6V			External power required
ACTIVE 24V DC	3KΩ		10kHz Threshold 12V			External power required

Enclosures

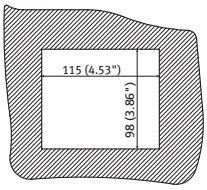
Various types of enclosures can be selected, all ATEX, IECEx, FM and CSA approved. The F012 is supplied in an GRP panel mount enclosure as standard, which can be converted to an IP67 / NEMA 4X GRP field mount enclosure by the addition of a back case. Most popular is our aluminum field mount enclosure with IP67 / NEMA 4X rating. Both European or U.S. cable gland entry threads are available.

Dimensions enclosures

Aluminum & GRP panel mount enclosure

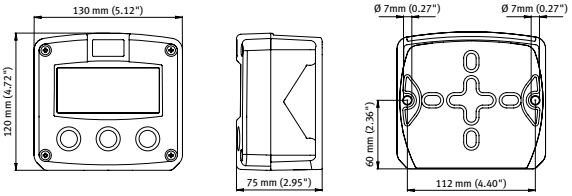


HB & HC enclosures

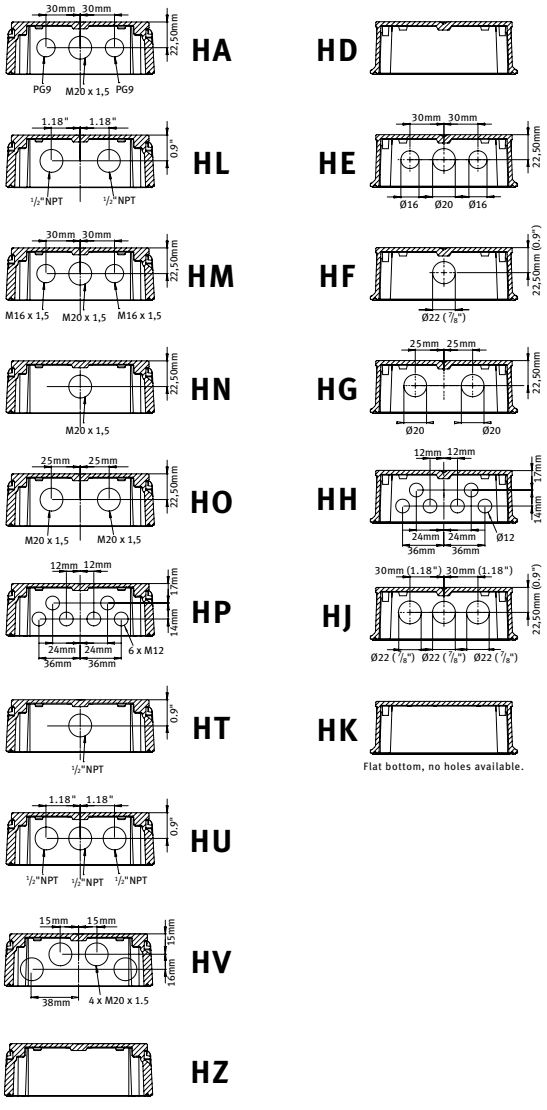


panel cut-out

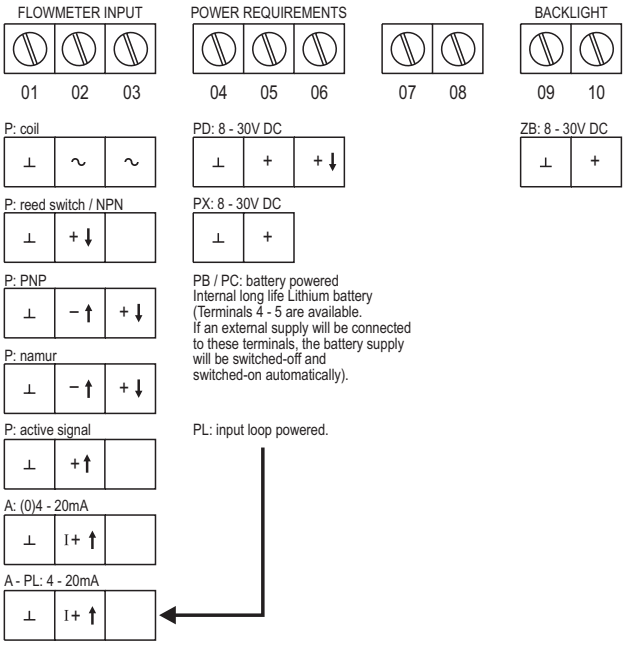
Aluminum & GRP field / wall mount enclosures



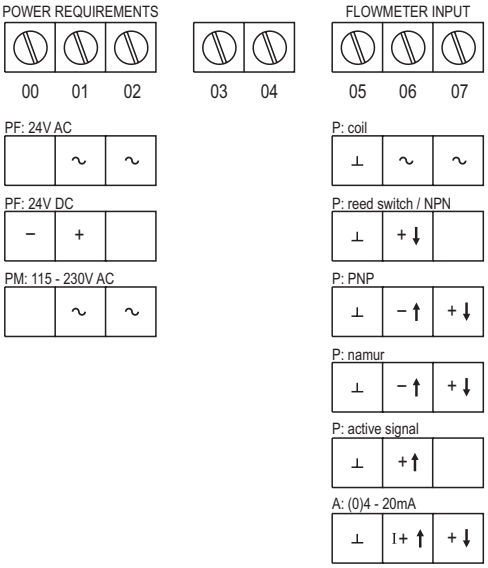
Aluminum | **GRP**



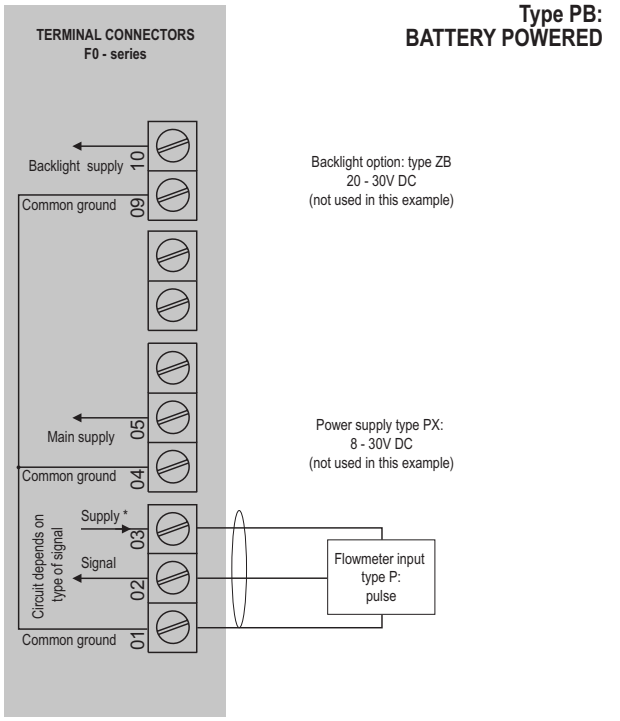
Terminal connections PB/PC - PD - PL - PX



Terminal connections PF - PM



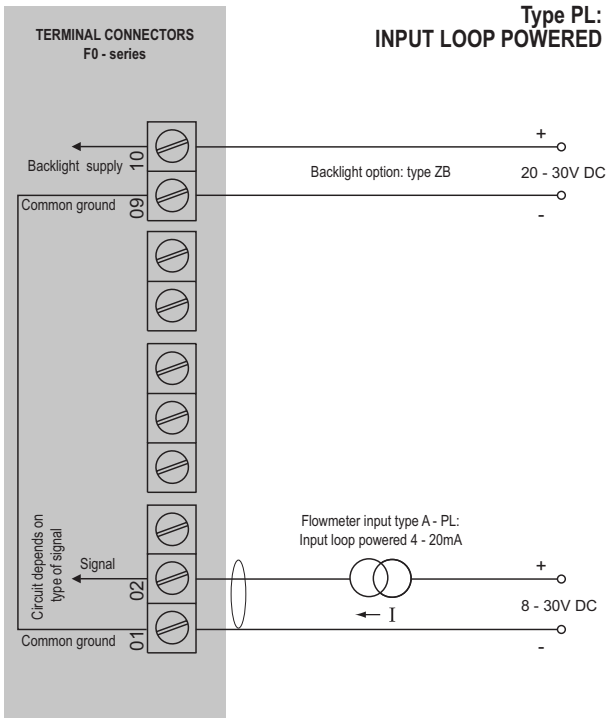
Configuration example F012-P-PB-(PX)-XX-(ZB)



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

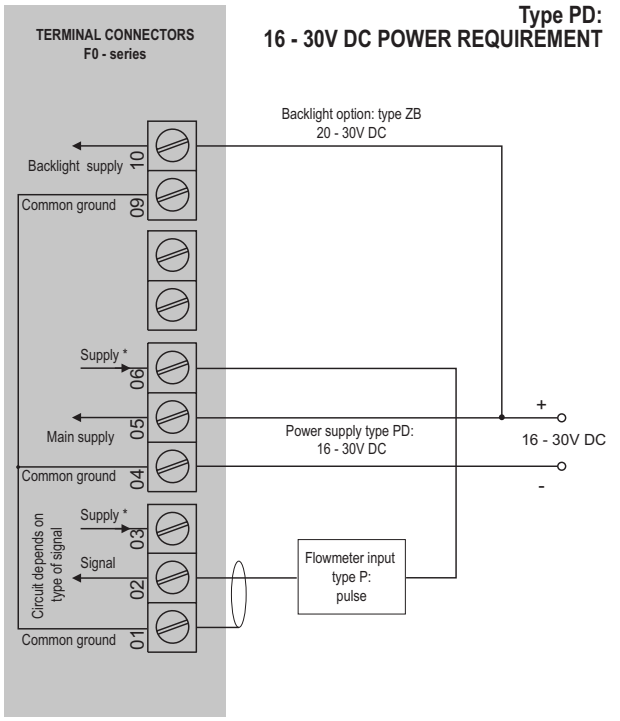
* Sensor supply voltage for analog flowmeter type A:
Terminal 3: not available.

Configuration example F012-A-PL-XX-ZB



Sensor supply: sensor is externally powered.

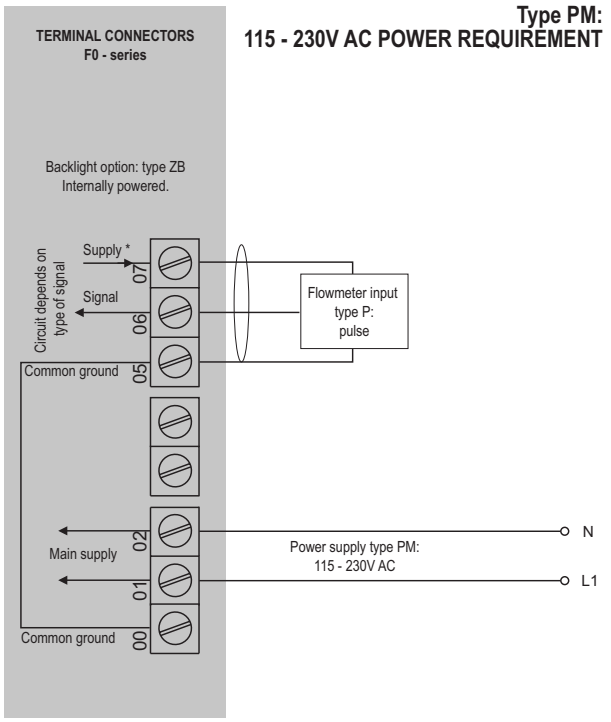
Configuration example F012-P-PD-XX-ZB



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

Configuration example F012-P-PM-XX-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:
Terminal 7: 8.2 / 12 / 24V DC.

Hazardous area applications

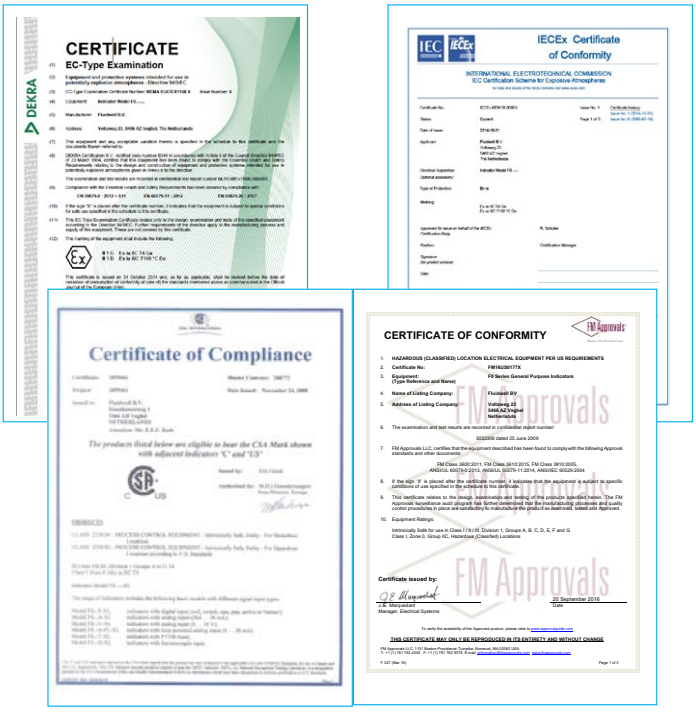
The F012-XI has been certified according to ATEX and IECEx by KEMA and according CSA c-us and FM for use in Intrinsically Safe applications with an ambient temperature of -40°C to +70°C (-40°F to +158°F).

- The ATEX markings for gas and dust applications are:
  - Gas: **II 1 G Ex ia IIC T4 Ga.**
  - Dust: **II 1 D Ex ia IIIC T100 °C Da.**
- The IECEx markings for gas and dust applications are:
  - Gas: **Ex ia IIC T4 Ga**
  - Dust: **Ex ia IIIC T100 °C Da.**
- The CSA c-us markings are:
  - **IS Class I/II/III, Division 1, Groups A to G T4.**
  - **Class 1 Zone 0 AEx ia IIC T4 Ga.**
  - **Ex ia IIC T4 Ga.**
- The FM markings are:
  - **IS, Class I, II, III, Division 1, Groups A to G T4.**
  - **Class I, Zone 0, 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 F012-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 Ex d enclosure is available as well. Please contact your supplier for further details.

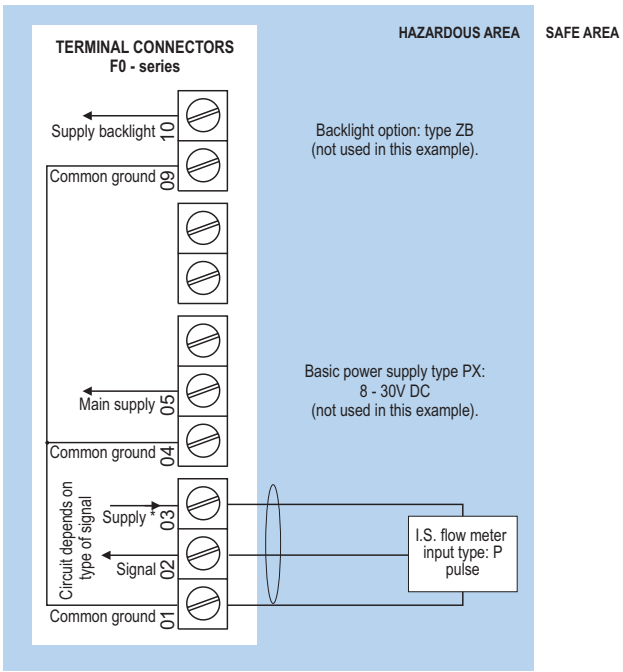
Certificate of conformity KEMA 05ATEX1168 X

• IECEx KEM 08.0006X • CSA.08.2059461 X



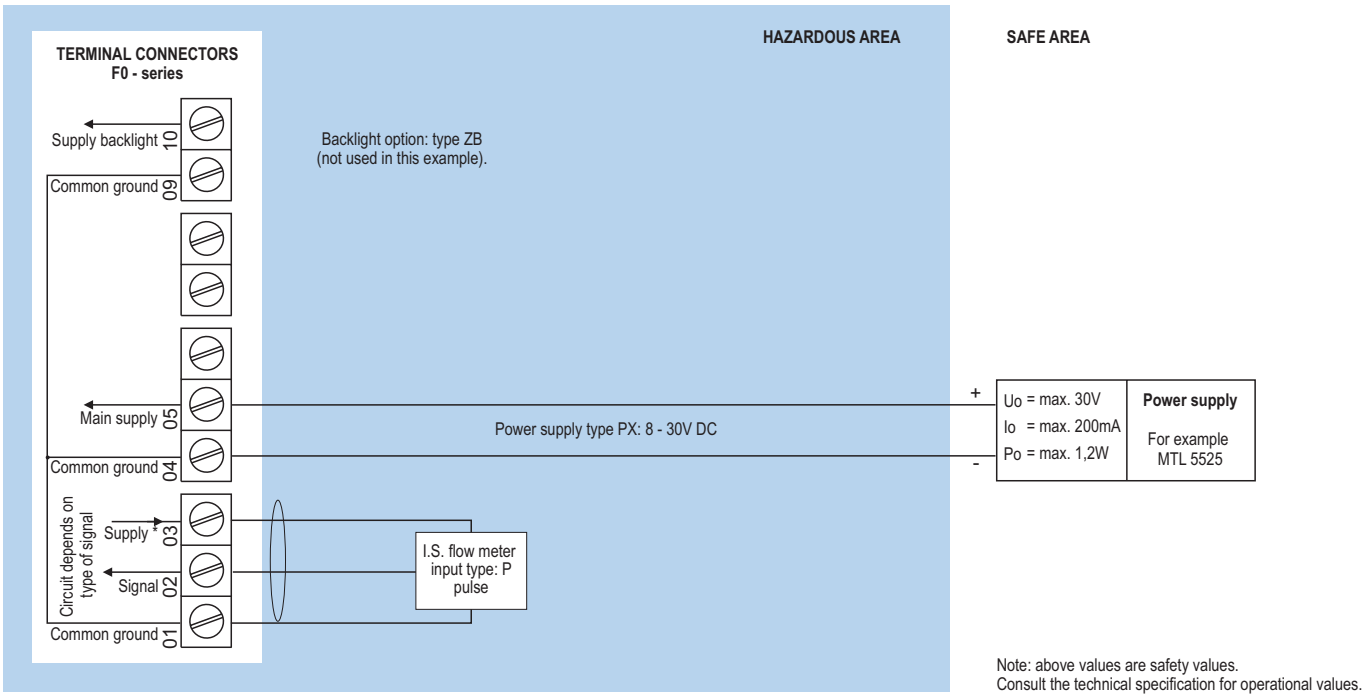
Configuration example IIA - IIIB and IIC

F012-P-PC-(PX)-XI-(ZB) - Battery powered unit



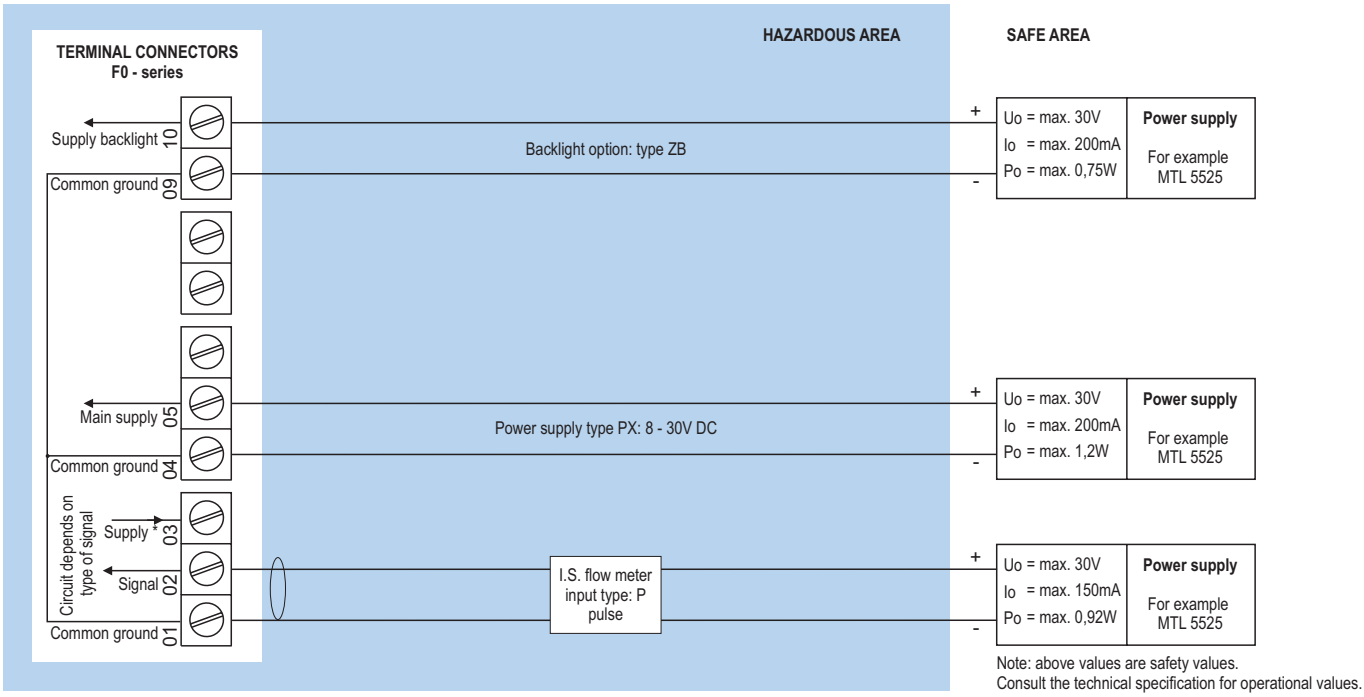
* Sensor supply voltage for pulse flowmeter type P : Terminal 3: 1.2 / 3.2V DC.
Please note: type PX may be used in combination with the battery (type PC).
PX will power the unit; the battery will be disabled automatically till power is disconnected.

Configuration example IIA - IIB and IIC - F012-P-PX-XI-(ZB) - Basic power requirement 8 - 30V DC



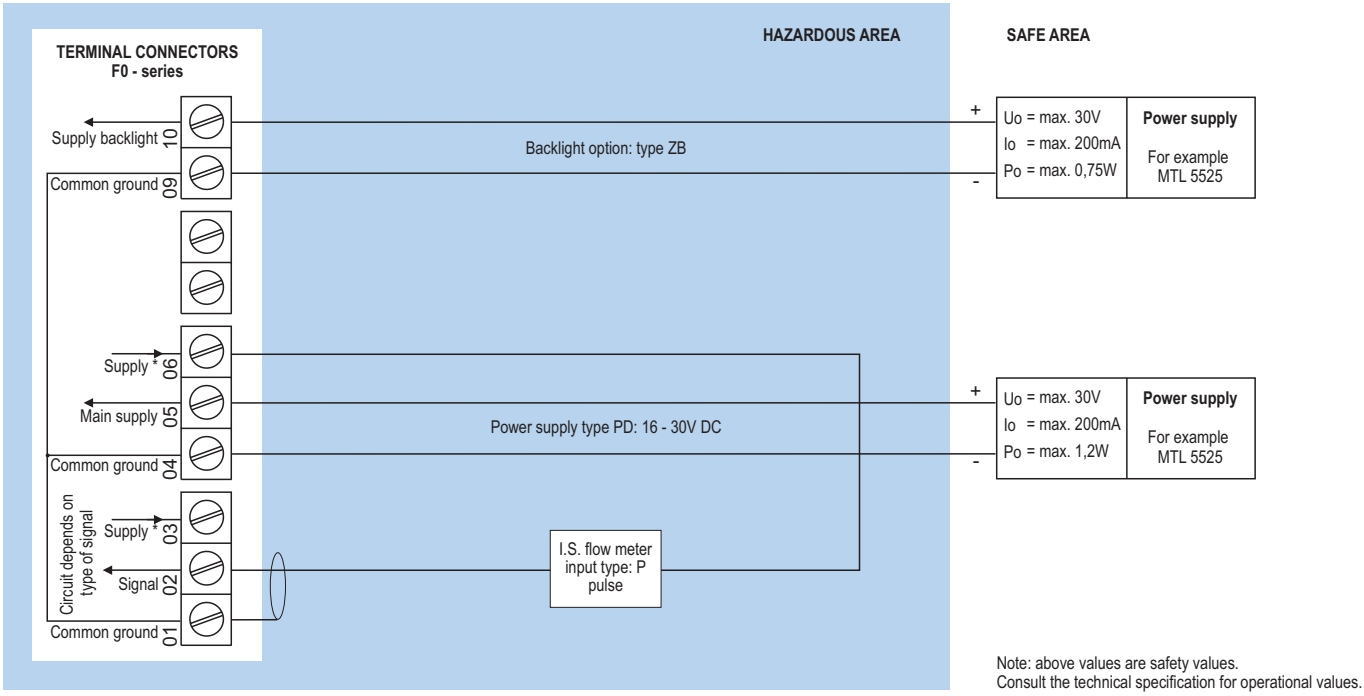
* Sensor supply voltage for pulse type P: Terminal 3: 1.2V / 3.2V DC.
Please note: type PX may be used in combination with the battery (type PC). PX will power the unit; the battery will be disabled automatically till power is disconnected.

Configuration example IIA - IIB and IIC - F012-P-PX-XI-ZB - Basic power requirement 8 - 30V DC



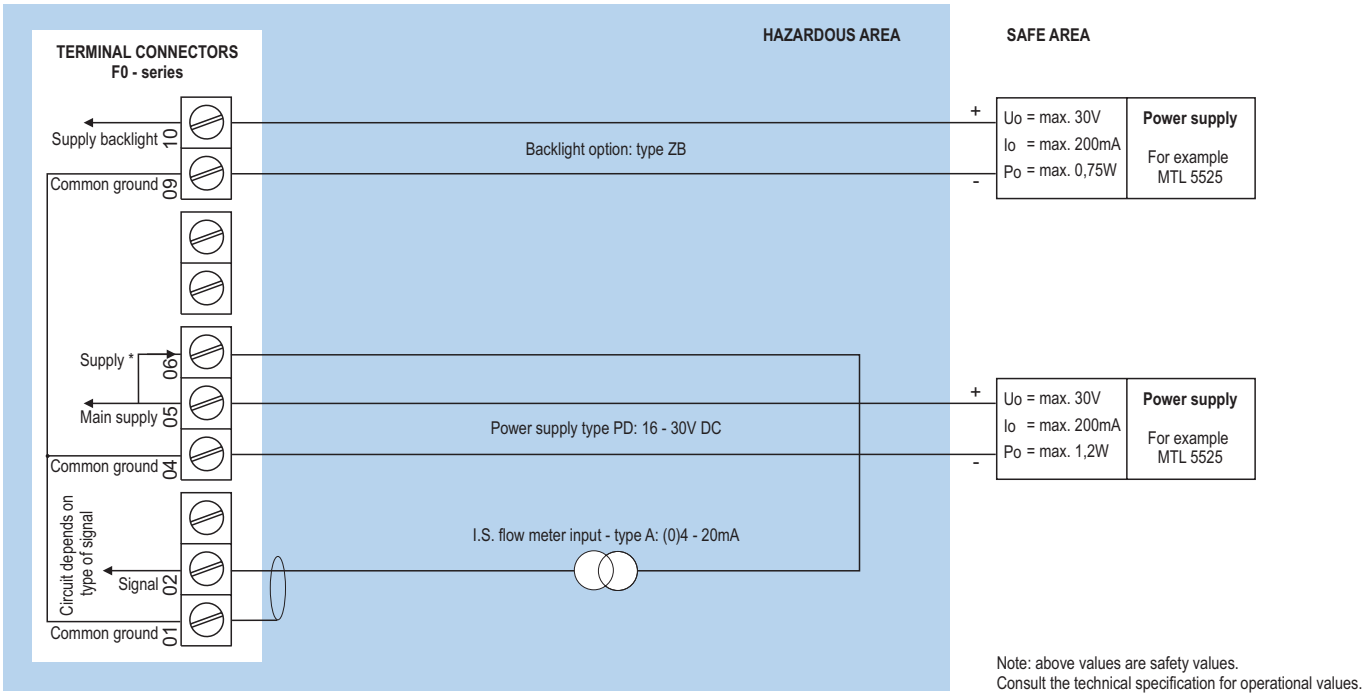
* Sensor supply voltage for pulse type P: Terminal 3: 1.2V / 3.2V DC.
Please note: type PX may be used in combination with the battery (type PC). PX will power the unit; the battery will be disabled automatically till power is disconnected.

Configuration example IIA - IIB and IIC - F012-P-PD-XI-ZB - Power requirement 16 - 30V DC



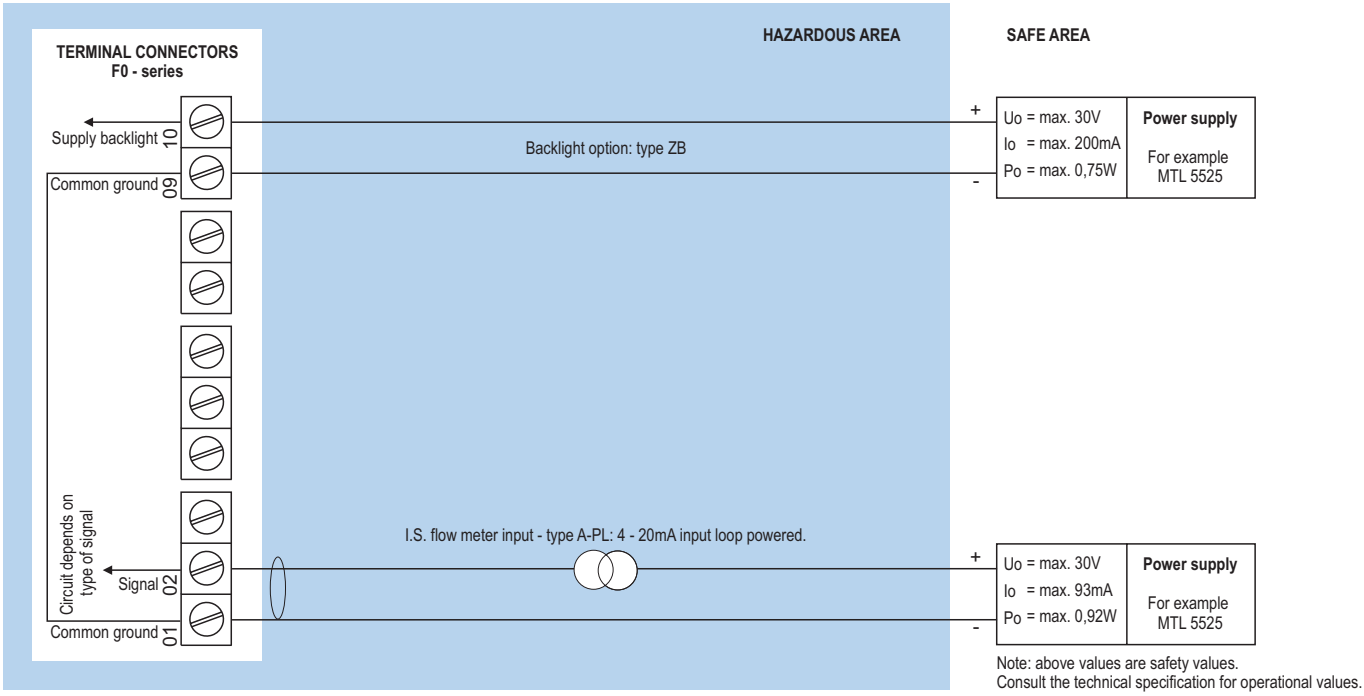
* Sensor supply voltage for pulse type P: Terminal 3: 1.2V / 3.2V DC. Terminal 6: 8.2V DC.
Please note: type PD may be used in combination with the battery (type PC). PD will power the unit; the battery will be disabled automatically till power is disconnected.

Configuration example IIA - IIB and IIC - F012-A-PD-XI-ZB - Power requirement 16 - 30V DC



* Sensor supply voltage for analog flow meter type A: 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.

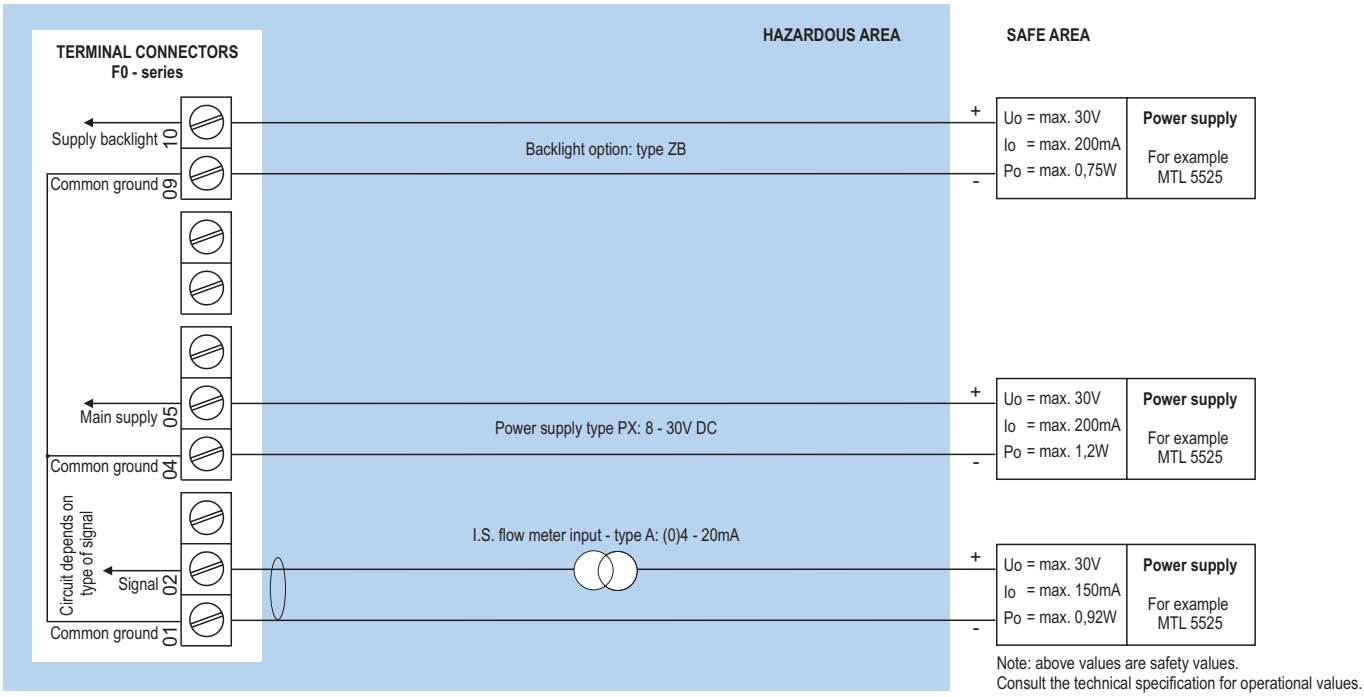
Configuration example IIA - IIB and IIC - F012-A-PL-XI-ZB - Input loop powered



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.

Configuration example IIA - IIB and IIC - F012-A-PX-XI-ZB - Basic power requirement 8 - 30V DC



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

* Sensor supply voltage for analog flow meter type A: 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.

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: fast, 1sec , 3sec, 15sec, 30sec, off.
Option ZB	Transflective LCD with white LED-backlight. Intensitiy can be adjusted in the configuration menu. 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. (requires PD, PL or PX)
Type PC	Intrinsically Safe long life lithium battery life-time depends upon settings and configuration - up to 5 years. (requires XI and PD, PL or PX)
Type PD	16 - 30V DC. power consumption max. 1W.
Type PF	24V AC / DC ± 10%. Power consumption max. 15W.
Type PL	Input loop powered from sensor signal 4 - 20mA (type "A").
Type PM	115 - 230V AC ± 10%. Power consumption max. 15W.
Type PX	8 - 30V DC. Power consumption max. 0.3W.
Type ZB	20 - 30V DC ± 10%. Power consumption max. 1W. 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 XI	For Intrinsically Safe applications, consult the safety values in the certificate.

Sensor excitation

Type PB/PC/PX	3.2V DC for pulse signals and 1.2V DC for coil pick-up.
Note PB/PC/PX	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	With pulse input: 1.2 / 3.2 / 8.2 / 12 / 24V DC - max. 400mA @ 24V DC. With analog input: 8.2 / 12 / 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.
Password	Configuration settings can be password protected.

Directives & Standards

EMC	Directive 2014/30/EU, FCC 47 CFR part 15.
Low voltage	Directive 2014/35/EU
RoHS	Directive 2011/65/EU
ATEX / IECEx	Directive 2014/34/EU, IEC 600079-0, IEC 60079-11. IP & NEMA EN 60529 & NEMA 250
FM	FM Class No. 3600, FM Class No. 3610.
CSA	CSA 22.2 No. 157-92.
IP & NEMA	EN 60529 & NEMA 250.

Enclosure

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 Type4X 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 Type4X, 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 (⅞").
Type HG	Cable entry: 2 x Ø 20mm.
Type HH	Cable entry: 6 x Ø 12mm.
Type HJ	Cable entry: 3 x Ø 22mm (⅞").
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 Type4X.
Weight	600 gr.
Type HC	GRP panel mount enclosure IP65 / NEMA Type4X, UV-resistant and flame retardant.
Weight	450 gr.

Intrinsically Safe (Type XI)

ATEX	Gas: II 1 G Ex ia IIC T4 Ga. Dust: II 1 D Ex ia IIIC T100 °C Da.
IECEx	Gas: Ex ia IIC T4 Ga. Dust: Ex ia IIIC T100 °C Da.
CSA c-us	IS Class I/II/III, Division 1, Groups A to G T4. Class 1 Zone 0 AEx ia IIC T4 Ga. Ex ia IIC T4 Ga.
FM	IS, Class I, II, III, Division 1, Groups A to G T4. Class I, Zone 0, AEx ia IIC T4
Ambient Ta	-40°C to +70°C (-40°F to +158°F).

Explosion proof (Type XF)

ATEX	II 2 G / Ex d IIB T5 Gb. II 2 D / Ex t IIIB T100 °C Db.
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.
Note XF	IECEx available on request.

Signal inputs - Flowmeter

Type P	Coil / sine wave (HI: 20mVpp or LO: 90mVpp - sensitivity selectable), NPN/PNP, open collector, reed switch, Namur, active pulse signals 8 - 12 and 24V DC.
Frequency	Minimum 0Hz - maximum 6kHz for total and flow rate. 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. Contact factory.
Accuracy	Resolution: 16 bit. Error < 0.01mA / ± 0.05% FS. Low level cut-off programmable.
Span	0.0010 - 999,999 with variable decimal position.
Update time	Four times per second.
Voltage drop	Type A: max. 1V DC @ 20mA.
Voltage drop	Type A - PL (loop powered): max. 2.6V DC @ 20mA.
Relationship	Linear and square root calculation.
Note A	For signal type A: external power to sensor is required; e.g. type PD.

Operator functions

Displayed info	• Flow rate 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, m^3, 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.

Flow rate

Digits	7 digits.
Units	mL, L, m^3, Gallons, kg, Ton, lb, bl, cf, RND, ft^3, scf, Nm^3, Nl, igal - no units.
Decimals	0 - 1 - 2 or 3.
Time units	/sec - /min - /hr - /day.

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.
ACF11	Swivel with 25° movement from center axis for direct flowmeter mounting: 1" NPT to 1/2" NPT.

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

ACG01	MTL5511 - One channel pulse or switch output transfer from hazardous area to safe area.
ACG02	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).
ACG03	MTL5541 - One channel 4 - 20mA repeater from hazardous area to safe area.
ACG04	MTL 5051 - Bi-direction serial-data-isolator (for Modbus communication).
ACG05	MTL5516C - Two channel pulse or switch output transfer from hazardous area to safe area.
ACG06	MTL5513 - One channel pulse or switch output transfer from hazardous area to safe area.
ACG07	MTL5546Y - One channel isolated driver bringing 4 - 20mA from safe area to hazardous area, HART transparent, OCD.

		Description				
Model	**F012**	**Flow rate indicator / totalizer displays flow rate and total simultaneously.**				
Input	A	(0)4 - 20mA input.	-A			
	P	**Pulse input, e.g., coil, npn, pnp, namur, reed-switch.**	**-P**			
Enclosures	HB	Aluminum panel mount enclosure.	-HB			
	HC	**GRP panel mount enclosure.**	**-HC**			
	HD	GRP field mount - Cable entry: no holes.	-HD			
	HE	GRP field mount - Cable entry: 2 x Ø 16mm & 1 x Ø 20mm.	-HE			
	HF	GRP field mount - Cable entry: 1 x Ø 22mm (⅞").	-HF			
	HG	GRP field mount - Cable entry: 2 x Ø 20mm.	-HG			
	HH	GRP field mount - Cable entry: 6 x Ø 12mm.	-HH			
	HJ	GRP field mount - Cable entry: 3 x Ø 22mm (⅞").	-HJ			
	HK	GRP field mount, flat bottom - Cable entry: no holes.	-HK			
	HA	Aluminum field mount - Cable entry: 2 x PG9 + 1 x M20.	-HA			
	HL	Aluminum field mount - Cable entry: 2 x ½"NPT.	-HL			
	HM	Aluminum field mount - Cable entry: 2 x M16 + 1 x M20.	-HM			
	HN	Aluminum field mount - Cable entry: 1 x M20.	-HN			
	HO	Aluminum field mount - Cable entry: 2 x M20.	-HO			
	HP	Aluminum field mount - Cable entry: 6 x M12.	-HP			
	HT	Aluminum field mount - Cable entry: 1 x ½"NPT.	-HT			
	HU	Aluminum field mount - Cable entry: 3 x ½"NPT.	-HU			
	HV	Aluminum field mount - Cable entry: 4 x M20.	-HV			
	HZ	Aluminum field mount - Cable entry: no holes.	-HZ			
Power	PD	16 - 30 V DC + sensor supply.	-PD			
	PF	24V AC/DC + sensor supply - requires XX.	-PF			
	PL	Input loop powered from sensor signal type "A".	-PL			
	PM	115 - 230V AC + sensor supply - requires XX.	-PM			
	PX	**Basic power supply 8 - 30V DC.**	**-PX**			
Battery	PB	Additional lithium battery powered (opt.) - requires XX and PD or PX.	-PB -P_			
	PC	Additional lithium battery powered (opt.) - Intrins. safe - requires XI and PD or PX.	-PC -P_			
Hazardous	XI	Intrinsically safe, according ATEX, IECEx, CSA c-us and FM.	-XI			
	XF	Ex d enclosure - 3 keys according ATEX.	-XF			
	XX	**Safe area only.**	**-XX**			
Options	ZB	Backlight.	-ZB			
	ZF	Coil input 10mVpp.	-ZF			
	ZG	Coil input 5mVpp.	-ZG			
	ZX	**No options.**	**-ZX**			
		F012	-_	-H_	-P_	-X_	-Z_

The **bold** marked text contains the standard configuration: F012-P-HC-PX-XX-ZX.

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Important: specifications are subject to change without notice.
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