

Your success counts

Flow rate Indicator / Totalizer

with linearization and pulse signal output



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 $+80^{\circ}\text{C}$ (-40°F up to 176°F).

Advantages

- Robust aluminum or stainless steel 316L field enclosure (IP67 / NEMA Type4X). It is so rugged, a truck 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

- Eight point linearization of the flowcurve - with interpolation.
- 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.
- Scaled pulse output according to linearized accumulated total.
- Power requirements: 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 F016 is a local indicator with linearization to display the actual flow rate, total and non-resettable accumulated total. In addition to the average K-Factor or Span, eight linearization points can be entered with their frequencies or values. The unit will interpolate between these points greatly enhancing accuracy in any flowrange. Even for very low frequency applications is catered. This linearization affects all displayed information as well as the pulse output. A wide selection of options further enhances the capabilities of this model, including Intrinsic Safety.

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.

Display

The display has large 17mm (0.67") and 8mm (0.31") digits which can be set to show flow rate and totals. On-screen engineering units are easily configured from a comprehensive menu. The accumulated total can register up to 11 digits and is backed-up in EEPROM memory every minute, just as the running total. A smart display update function achieves 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. 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.



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 transfective type, which means that a high contrast reading is guaranteed in full sunlight as well as during the night. This backlight option is also available Intrinsically Safe.

Pulse output

The scaleable pulse output reflects the count on the accumulated display. The pulse width 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 or an active PNP transistor, or an isolated electro-mechanical relay.

Power requirements

Several power supply options are available to power the F016 and sensor. Most popular is our battery powered version with a long life lithium battery which will last up to five years. 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!



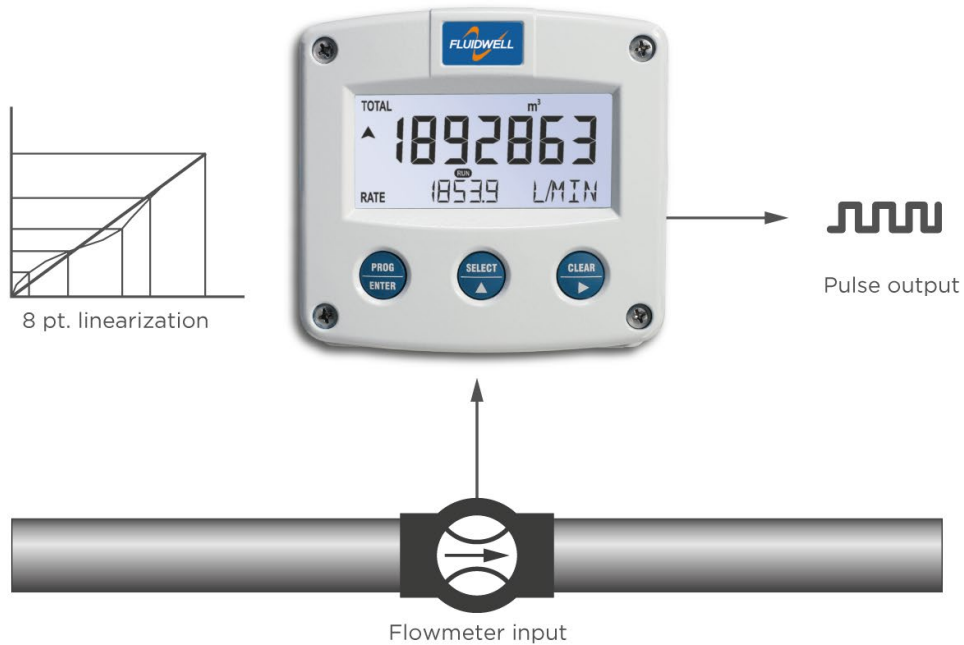
Reliable



User-friendly

Overview application F016

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). Liquid flow measurement with mechanical flowmeters where a precise calculation over the full measurement range is required. Also retransmission of the totalizer function is desired. Alternative more advanced models: F112 - F118 or the D-Series DIN panel mount flow rate indicators.



Signal input

The F016 accepts most pulse 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.

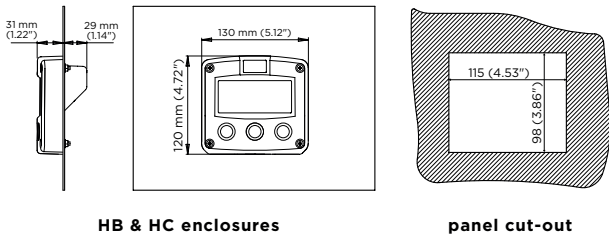
Type of signal	Resistance	Low Pass filter (LP)	Max. frequency	Max. frequency Low Pass filter (LP)	Min. amplitude p-p	Remark
NPN	100kΩ pull-up	100kΩ pull-up	6kHz Threshold 1.2V	1.2kHz		Open collector
REED	1MΩ pull-up	1MΩ pull-up	600Hz Threshold 1.2V	120Hz		
PNP	47KΩ pull-down	100KΩ pull-down	6kHz Threshold 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

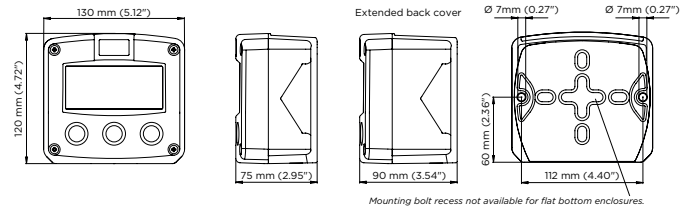
Various types of enclosures can be selected, all ATEX, IECEx, FM and CSA approved. The F016 is supplied in an GRP panel mount enclosure as standard, which can be converted to an IP67 / NEMA 4X GRP field mount enclosure by the addition of a back case. Most popular is our robust aluminum field mount enclosure which is also available with an extended backcover with undrilled preparation for direct meter mounting at the back side. It is so rugged, even a truck can stand on it! For the most challenging environments we have a durable high grade Stainless steel 316L enclosure. All enclosures have a IP67 / NEMA Type4X rating and EU or U.S. cable gland entry threads available.

Dimensions enclosures

Aluminum & GRP panel mount enclosure

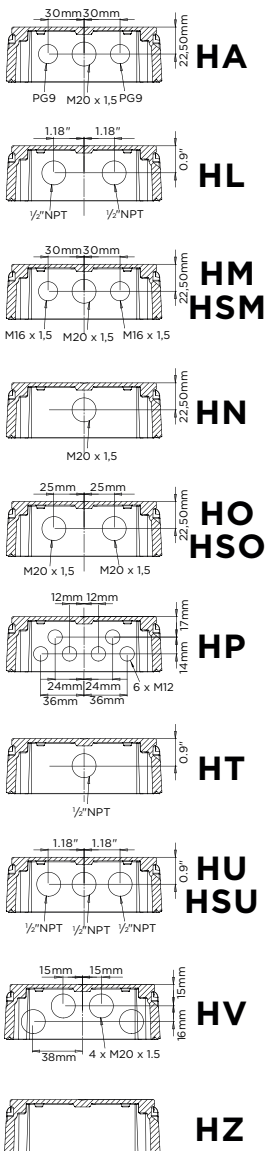


Aluminum, GRP & Stainless steel 316L field mount enclosures

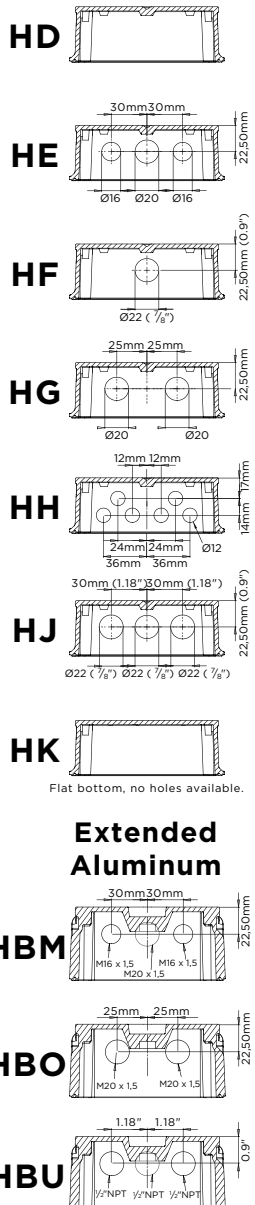


Cable entries

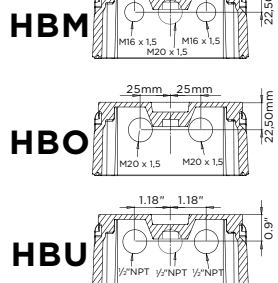
Aluminum / Stainless Steel



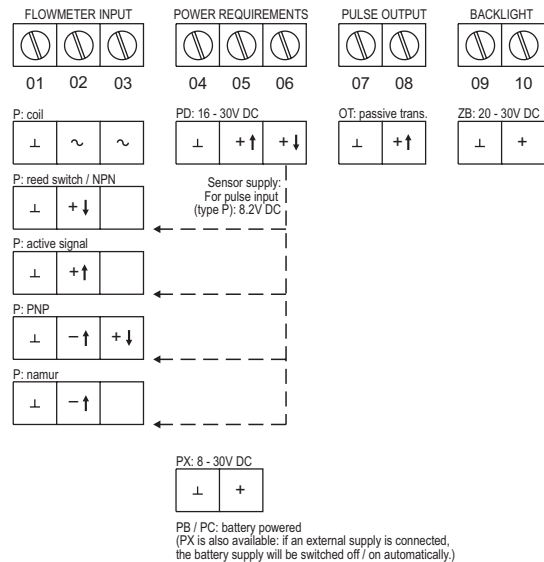
GRP



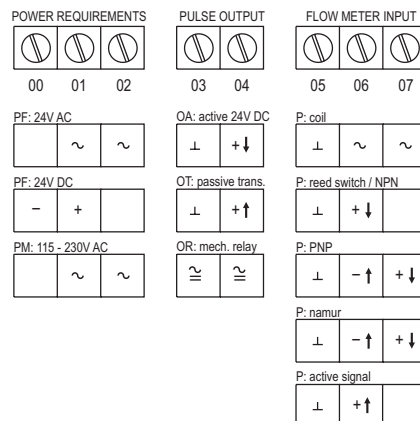
Extended Aluminum



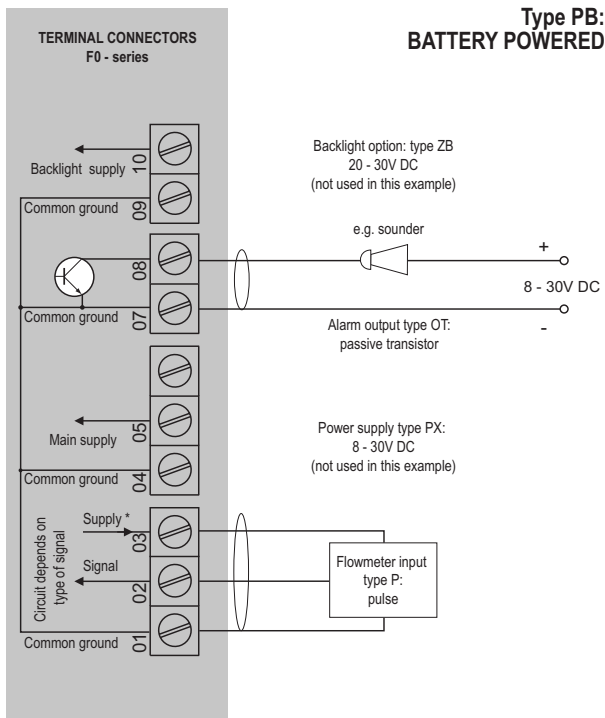
Terminal connections PB/PC - PD - PX



Terminal connections PF - PM

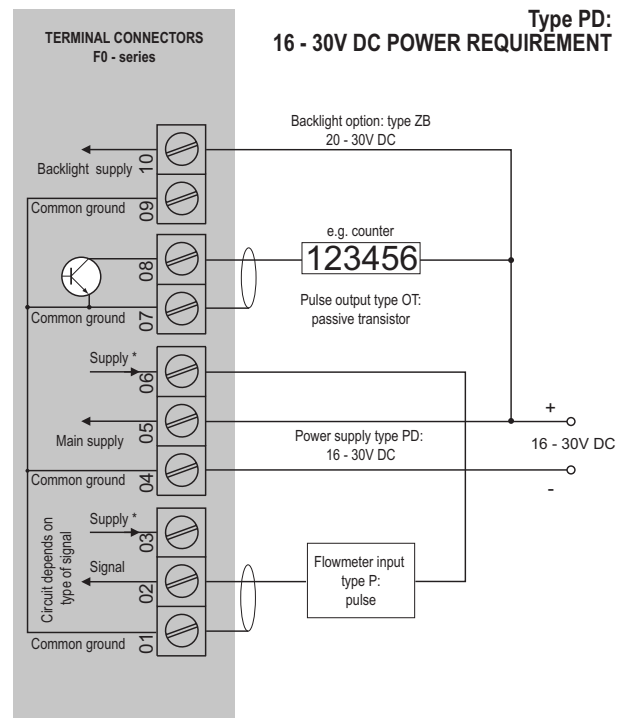


Configuration example F016-P-OT-PB-(PX)-XX-(ZB)



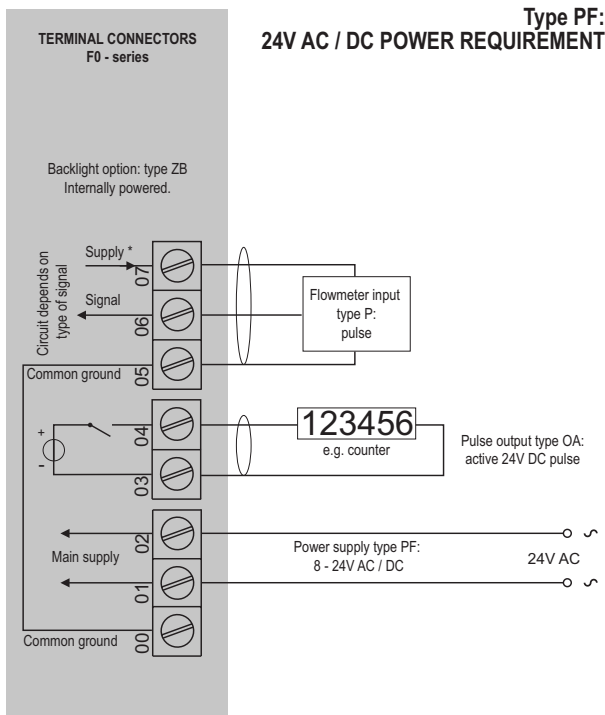
* Sensor supply voltage for pulse flowmeter type P:
Terminal 3: 1.2 / 3.2V DC.

Configuration example F016-P-OT-PD-XX-ZB



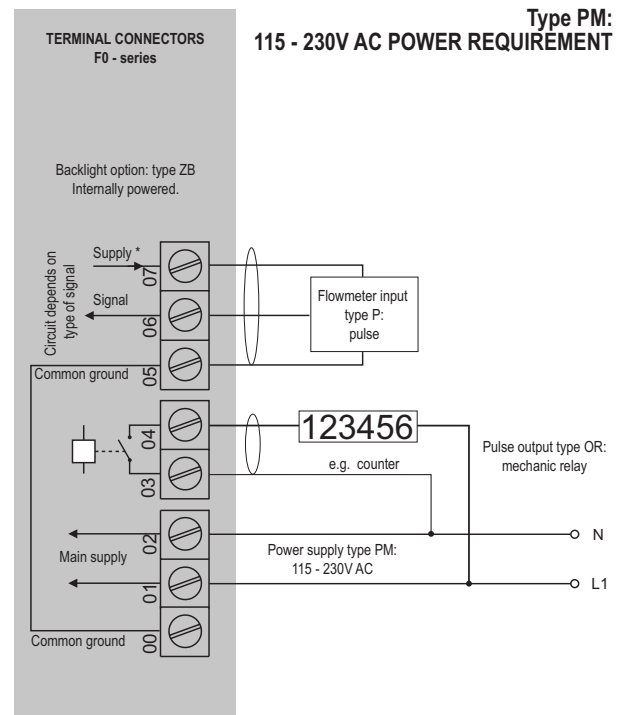
* Sensor supply voltage for pulse flowmeter type P:
Terminal 3: 1.2 / 3.2V DC. Terminal 6 with type PD: 8.2V DC.

Configuration example F016-P-OA-PF-XX-ZB



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

Configuration example F016-P-OR-PM-XX-ZB



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

Hazardous area applications

The F016-XI has been certified according to ATEX and IECEx by KEMA and according to 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:

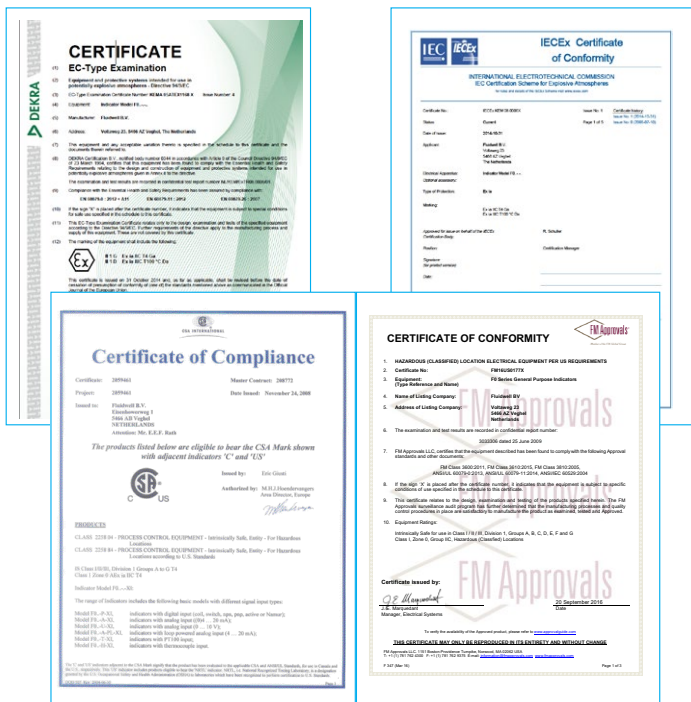
IS, Class I, II, III, Division 1, Groups A to G T4.

Class 1, 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 F016-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.

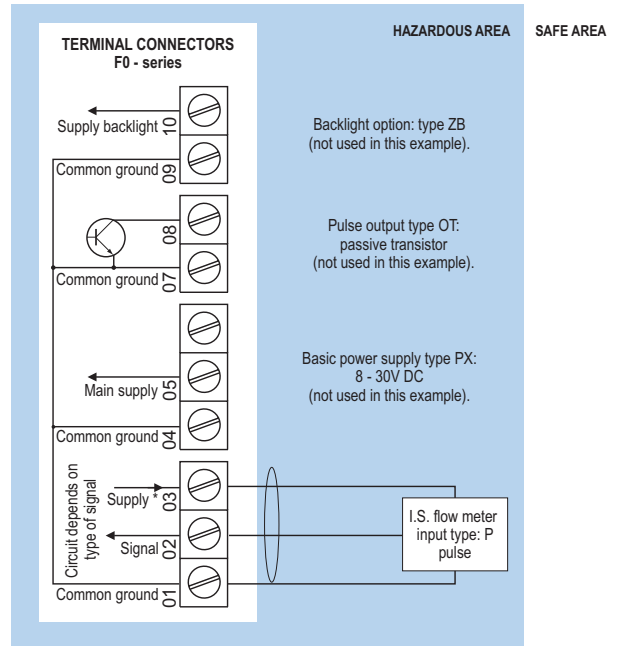
Certificate of conformity KEMA 05ATEX1168 X

- IECEx KEM 08.0006X • CSA.08.2059461 X



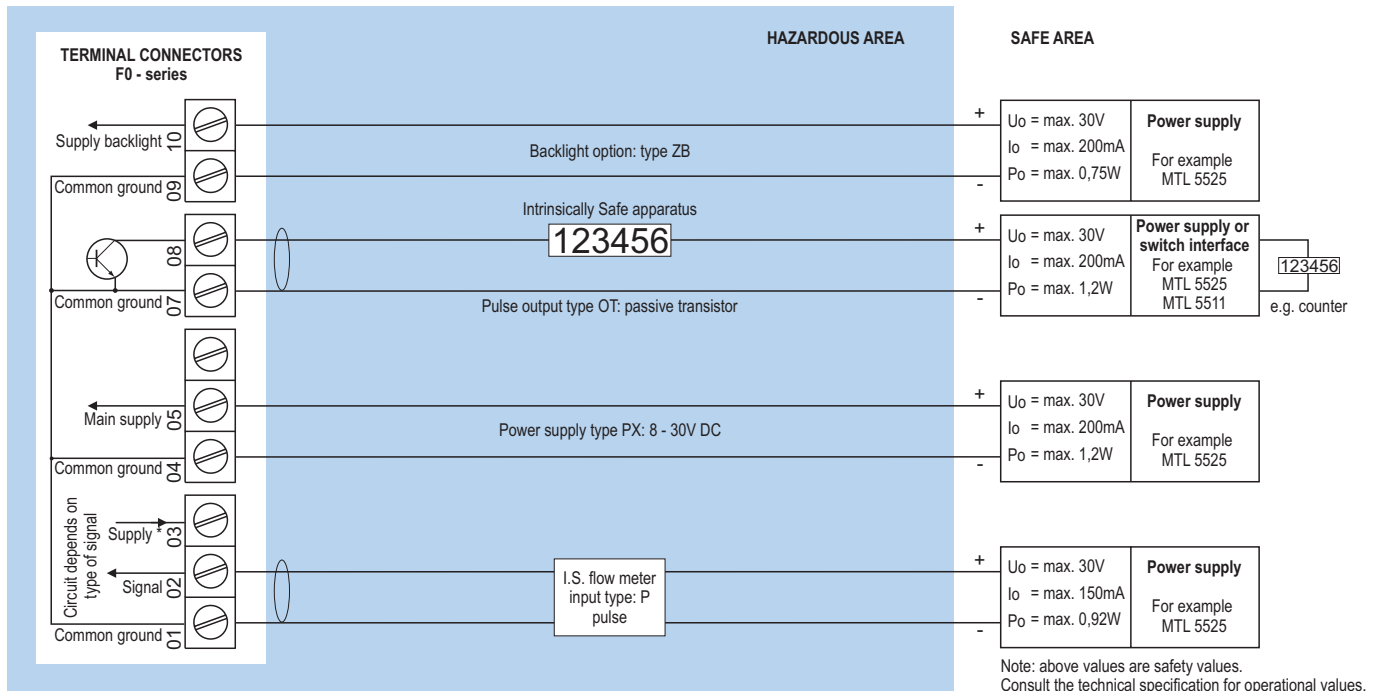
Configuration example IIA - IIIB and IIC

F016-P-(OT)-PC-(PX)-XI-(ZB) - Battery powered unit



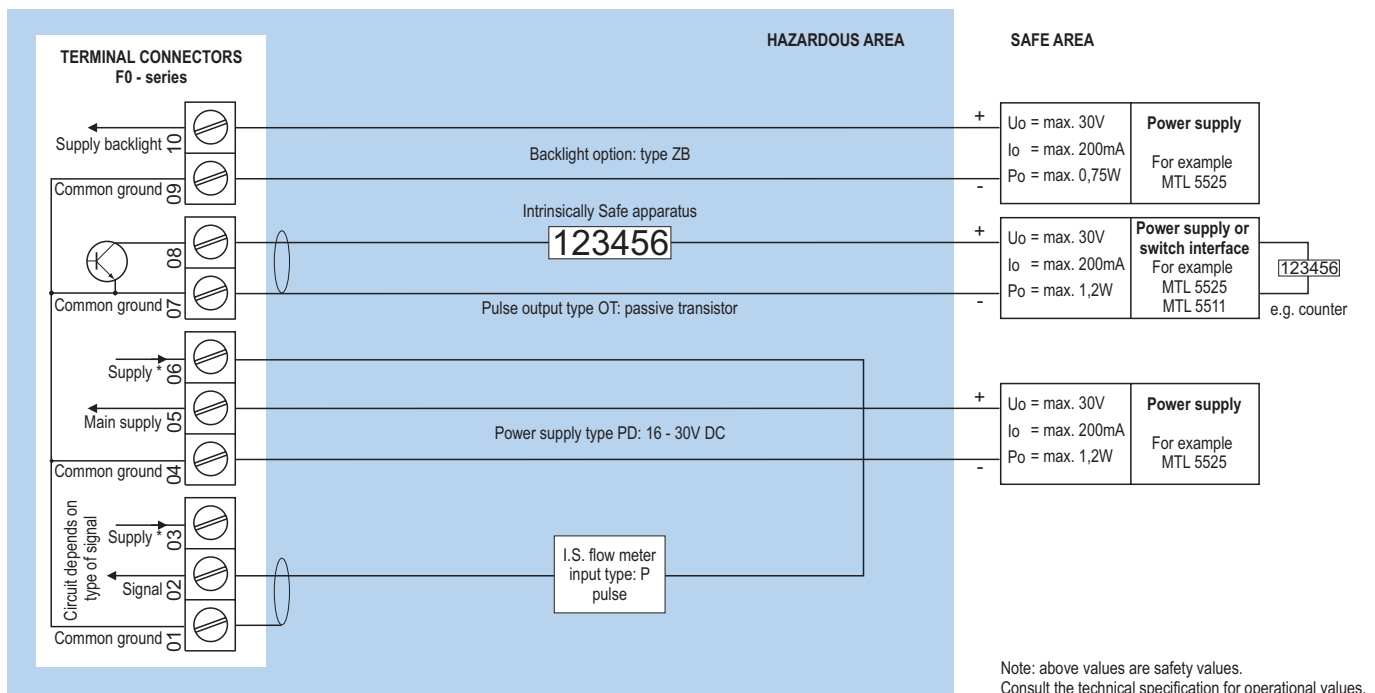
* Sensor supply voltage for pulse flow meter type P : Terminal 3: 1.2 / 3.2V DC. Please note: type PX may be used in combination with the battery (type PC). PX will power the unit; the battery will be disabled automatically till power is disconnected.

Configuration example IIA - IIB and IIC - F016-P-OT-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 - F016-P-OT-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.

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. Intensity 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 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 or PX)
Type PD	16 - 30V DC. power consumption max. 1W.
Type PF	24V AC / DC ± 10%. Power consumption max. 15W.
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, active output type OA 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 PF / PM	1.2 / 3.2 / 8.2 / 12 / 24V DC - max. 400mA @ 24V DC.

Terminal connections

Type	Removable plug-in terminal strip. Wire max. 1.5mm ² and 2.5mm ²
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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.

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.

Enclosure

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

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.

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 (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.

Aluminum wall / field mount enclosures

General	Die-cast aluminum wall/field mount enclosure IP67 / NEMA Type4X with 2-component UV-resistant coating. Extended back cover available with undrilled preparation for direct meter mounting.
Dimensions	130 x 120 x 75mm (5.12" x 4.72" x 2.95") - W x H x D. 130 x 120 x 90mm (5.12" x 4.72" x 3.54") - W x H x D.
Weight	1100 gr. / extended enclosure: 1310 gr.
Type HA	Cable entry: 2 x PG9 and 1 x M20.
Type HL	Cable entry: 2 x 1/2" NPT.
Type HM/HBM	Cable entry: 2 x M16 and 1 x M20.
Type HN	Cable entry: 1 x M20.
Type HO/HBO	Cable entry: 2 x M20.
Type HP	Cable entry: 6 x M12.
Type HT	Cable entry: 1 x 1/2" NPT.
Type HB/HBU	Cable entry: 3 x 1/2" NPT.
Type HV	Cable entry: 4 x M20.
Type HZ	Cable entry: no holes.
Note	The extended back covers HBM/HBO/HBU, require type XX

Stainless steel 316L wall / field mount enclosures

General	Die-cast stainless steel 316L wall / field mount enclosure with flat bottom. IP67 / NEMA Type4X.
Dimensions	130 x 120 x 75mm (5.12" x 4.72" x 2.95") - W x H x D.
Weight	2700 gr.
Type HSM	Cable entry: 2 x M16 + 1 x M20.
Type HSO	Cable entry: 2 x M20.
Type HSU	Cable entry: 3 x 1/2" NPT.

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.

Signal output - Digital output

Function	Pulse output - transmitting accumulated total.
Frequency	Max. 500Hz. Pulse width 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. Max. 50V DC - 300mA per output.

Operator functions

Displayed info	<ul style="list-style-type: none"> • Linearized flow rate and / or total. • Linearized total and accumulated total. • Total can be reset to zero by pressing the CLEAR-key twice.
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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 , NI, igal - no units.
Decimals	0 - 1 - 2 or 3.
Time units	/sec - /min - /hr - /day.

		Description
Model	F016	Flow rate indicator / totalizer with linearization and pulse signal output.
Input	P	Pulse input, e.g., coil, npn, pnp, namur.
Enclosures	HB	Aluminum panel mount enclosure.
	HC	GRP panel mount enclosure.
	HD	GRP field mount - Cable entry: no holes.
	HE	GRP field mount - Cable entry: 2 x Ø 16mm & 1 x Ø 20mm.
	HF	GRP field mount - Cable entry: 1 x Ø 22mm (7/8").
	HG	GRP field mount - Cable entry: 2 x Ø 20mm.
	HH	GRP field mount - Cable entry: 6 x Ø 12mm.
	HJ	GRP field mount - Cable entry: 3 x Ø 22mm (7/8").
	HK	GRP field mount, flat bottom - Cable entry: no holes.
	HA	Aluminum field mount - Cable entry: 2 x PG9 + 1 x M20.
	HL	Aluminum field mount - Cable entry: 2 x 1/2"NPT.
	HM	Aluminum field mount - Cable entry: 2 x M16 + 1 x M20.
	HN	Aluminum field mount - Cable entry: 1 x M20.
	HO	Aluminum field mount - Cable entry: 2 x M20.
	HP	Aluminum field mount - Cable entry: 6 x M12.
	HT	Aluminum field mount - Cable entry: 1 x 1/2"NPT.
	HU	Aluminum field mount - Cable entry: 3 x 1/2"NPT.
	HV	Aluminum field mount - Cable entry: 4 x M20.
	HZ	Aluminum field mount - Cable entry: no holes.
	HBM	Extended Alu. field/meter mount - Cable entry: 2 x M16 + 1 x M20 - req. XX.
	HBO	Extended Alu. field/meter mount - Cable entry: 2 x M20 - requires XX.
	HBU	Extended Alu. field/meter mount - Cable entry: 3 x 1/2"NPT - req. XX.
	HSM	Stainless steel 316L field mount - Cable entry: 2 x M16 + 1 x M20.
	HSO	Stainless steel 316L field mount - Cable entry: 2 x M20.
	HSU	Stainless steel 316L field mount - Cable entry: 3 x 1/2"NPT.
	Digital output	OA
OR		One mechanical relay output - requires XX and PF or PM.
OT		One passive transistor output.
Power	PD	16 - 30 V DC + sensor supply.
	PF	24V AC/DC + sensor supply - requires XX.
	PM	115 - 230V AC + sensor supply - requires XX.
	PX	Basic power supply 8 - 30V DC.
Battery	PB	Additional lithium battery powered (opt.) - requires XX and PD or PX.
	PC	Additional lithium battery powered (opt.) - Intrins. safe - requires XI and PD or PX.
Hazardous	XI	Intrinsically safe, according ATEX, IECEx, CSA c-us and FM.
	XF	Ex d enclosure - 3 keys according ATEX.
	XX	Safe area only.
Options	ZB	Backlight.
	ZF	Coil input 10mVpp.
	ZG	Coil input 5mVpp.
	ZX	No options.

The **bold** marked text contains the standard configuration: F016-P-HC-OT-PX-XX-ZX.