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 (-40°F up to 178°F).
- 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

- One control output for one-stage batching.

### Signal input

#### Flow

- Reed-switch.
- NAMUR.
- NPN/PNP pulse.
- Sine wave (coil).
- 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 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 key-board. 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 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 of smaller batchvolumes. 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.

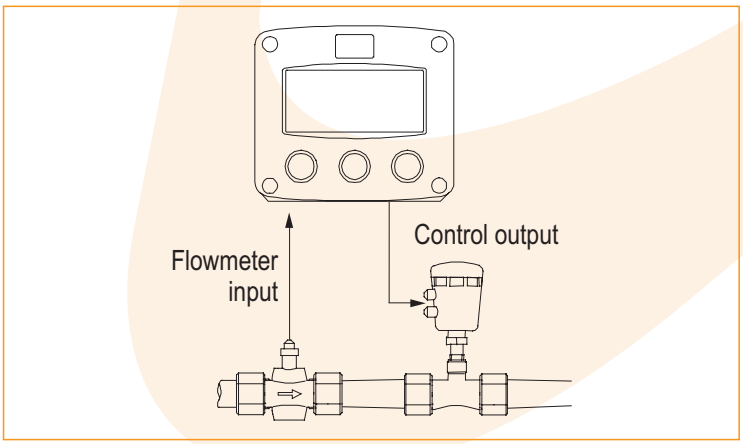
## Hazardous areas

For hazardous area applications, 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 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

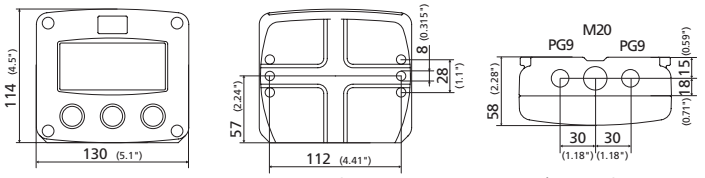


# Dimensions enclosures

## *Enclosure HA*

## *Aluminum field mount enclosure*

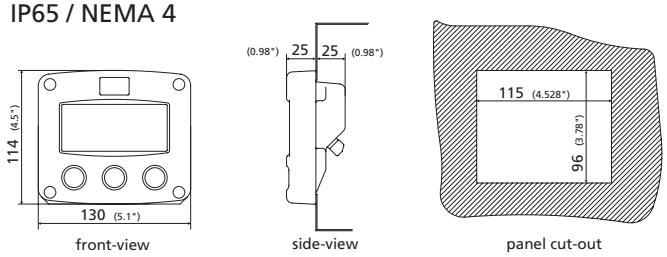
IP67 / NEMA 4X
Tapped holes: European thread




## *Enclosure HB*

## *Aluminum panel mount enclosure*

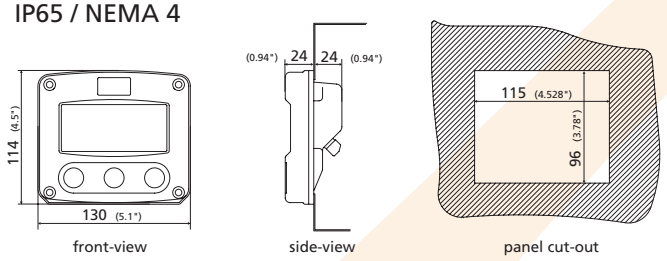
IP65 / NEMA 4




## *ENCLOSURE HC (STANDARD)*

## *ABS PANEL MOUNT ENCLOSURE*

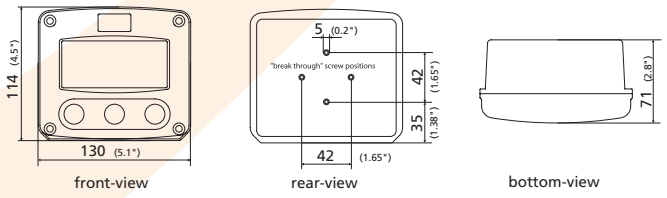
IP65 / NEMA 4




## *Enclosure HD*

## *ABS wall mount enclosure*

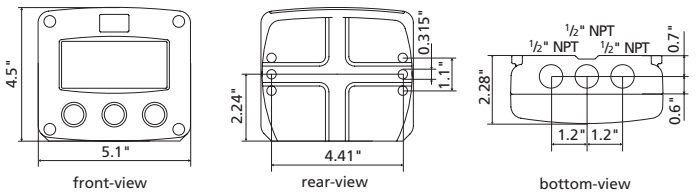
IP67 / NEMA 4X
Holes user defined



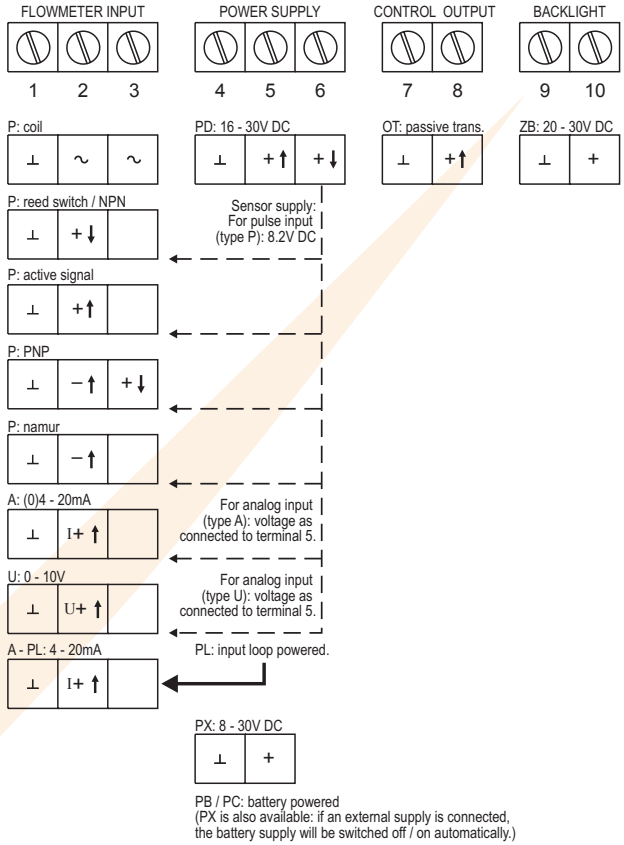

## *Enclosure HU*

## *Aluminum field mount enclosure*

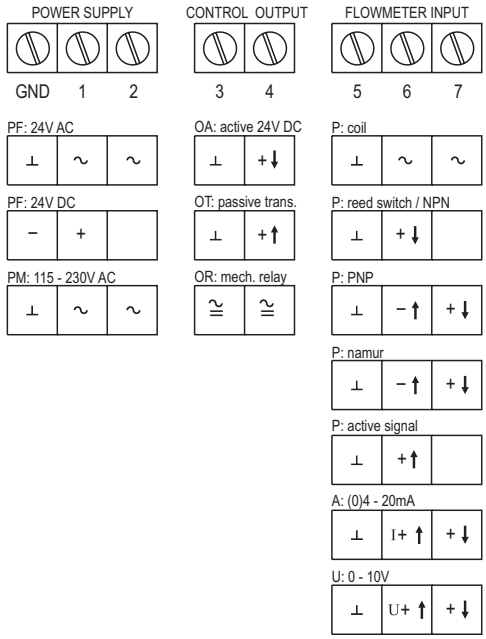
IP67 / NEMA 4X
Tapped holes: U.S. thread



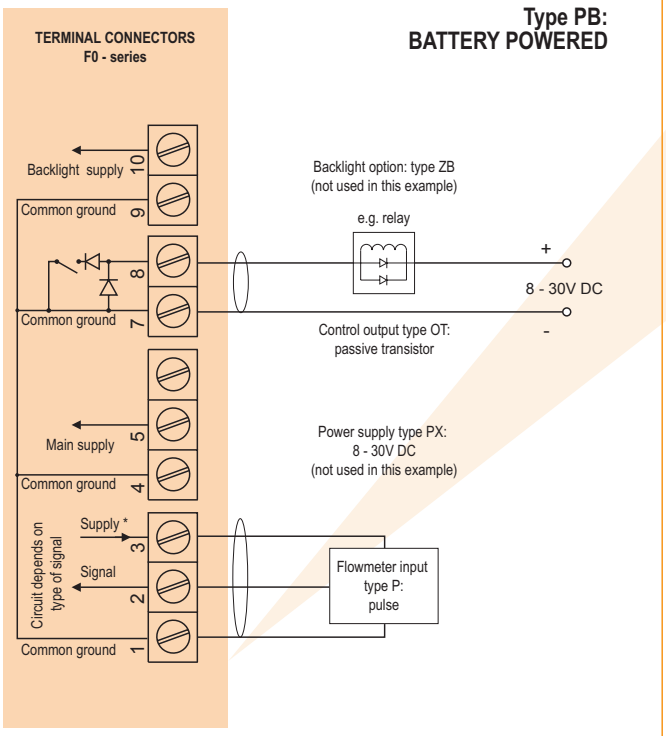

# Terminal connections power supply PB/PC - PD - PL - PX




# Terminal connections power supply PF - PM



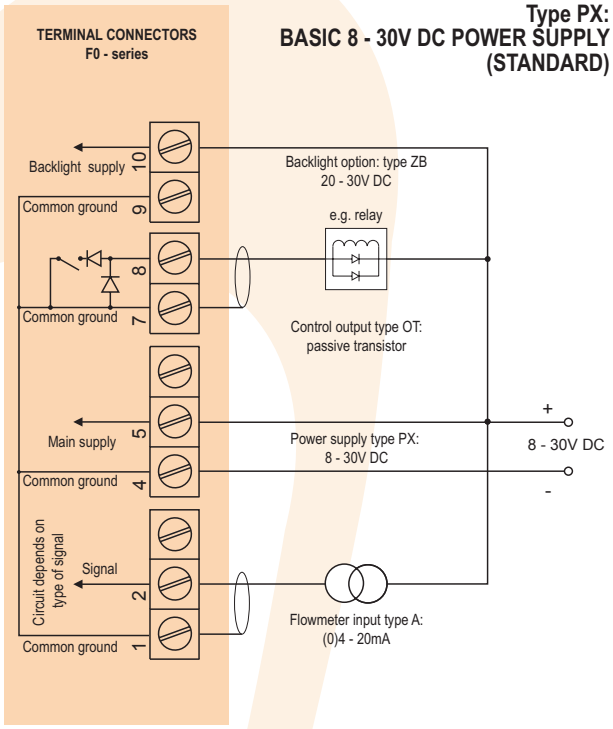
## Typical wiring diagram Fo30-P-OT-PB-(PX)-(ZB)




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

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

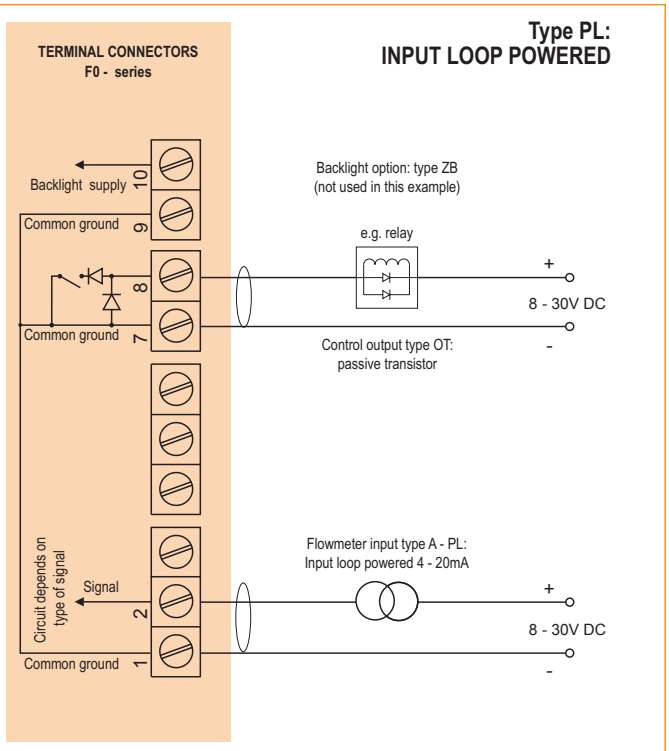
## Typical wiring diagram Fo30-A-OT-PX-ZB




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

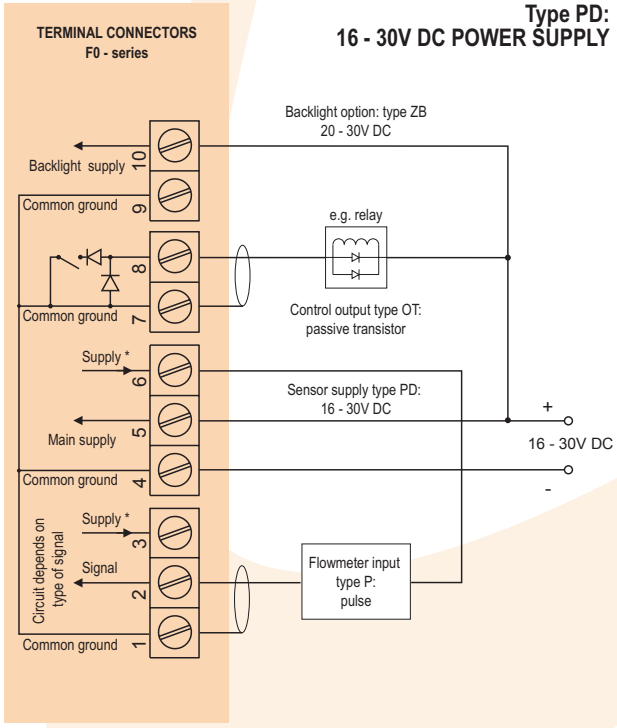
* Sensor supply voltage for analog flowmeter type A / U:
Termina 3: not available.

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




Sensor supply: sensor is externally powered.

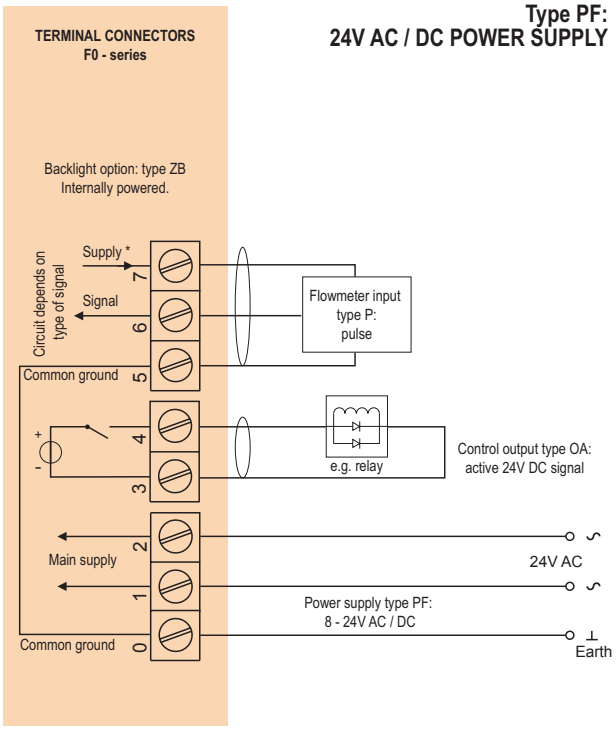
## Typical wiring diagram Fo30-P-OT-PD-ZB




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

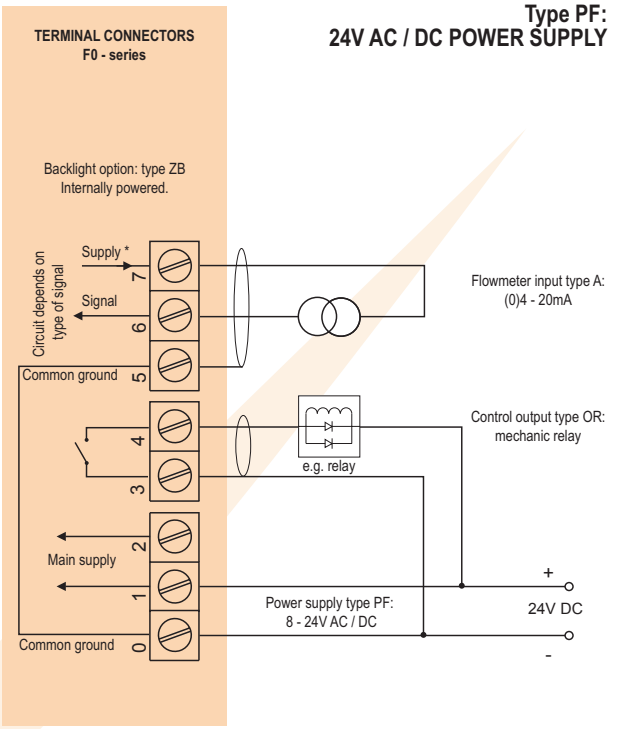
## Typical wiring diagram F030-P-OA-PF-ZB




* 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.

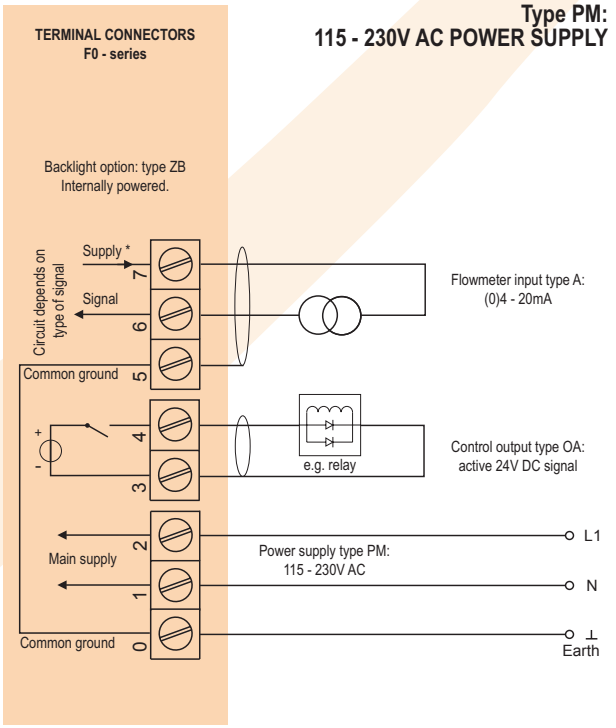
## Typical wiring diagram F030-A-OR-PF-ZB




* 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.

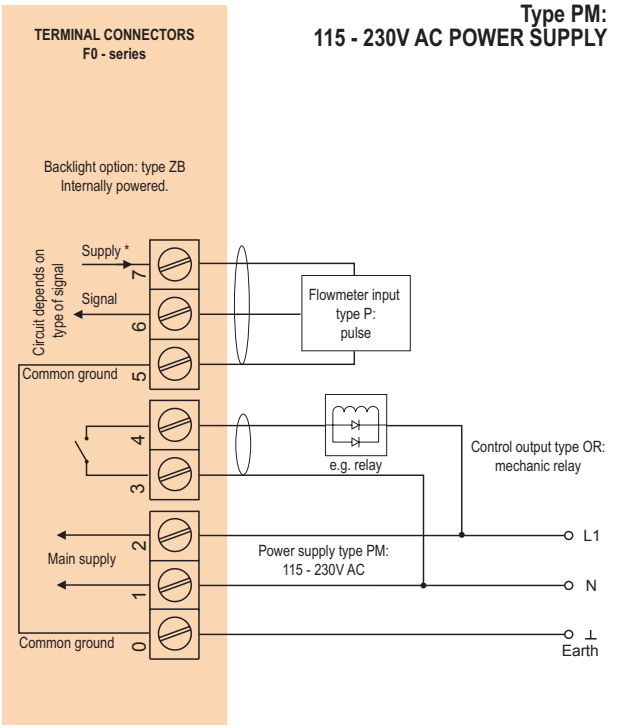
## Typical wiring diagram F030-A-OA-PM-ZB




* 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.

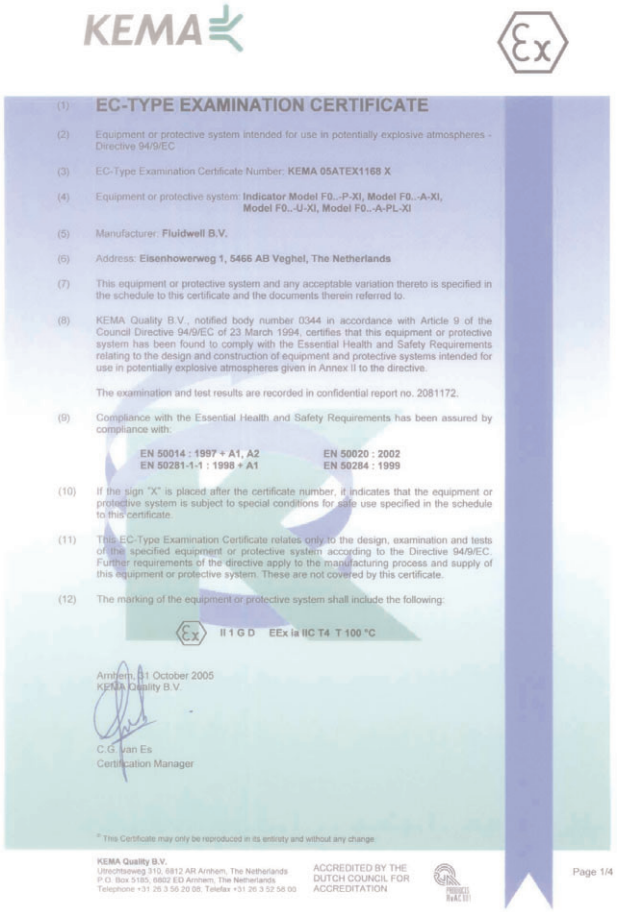
* Sensor supply voltage for analog flowmeter type A / U:
Terminal 7: 3.2 - 8.2 - 12 - 24V DC.

## Hazardous area applications

The F030-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, control output and backlight. The F030-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

EC-TYPE EXAMINATION CERTIFICATE

(1)

(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, 5465 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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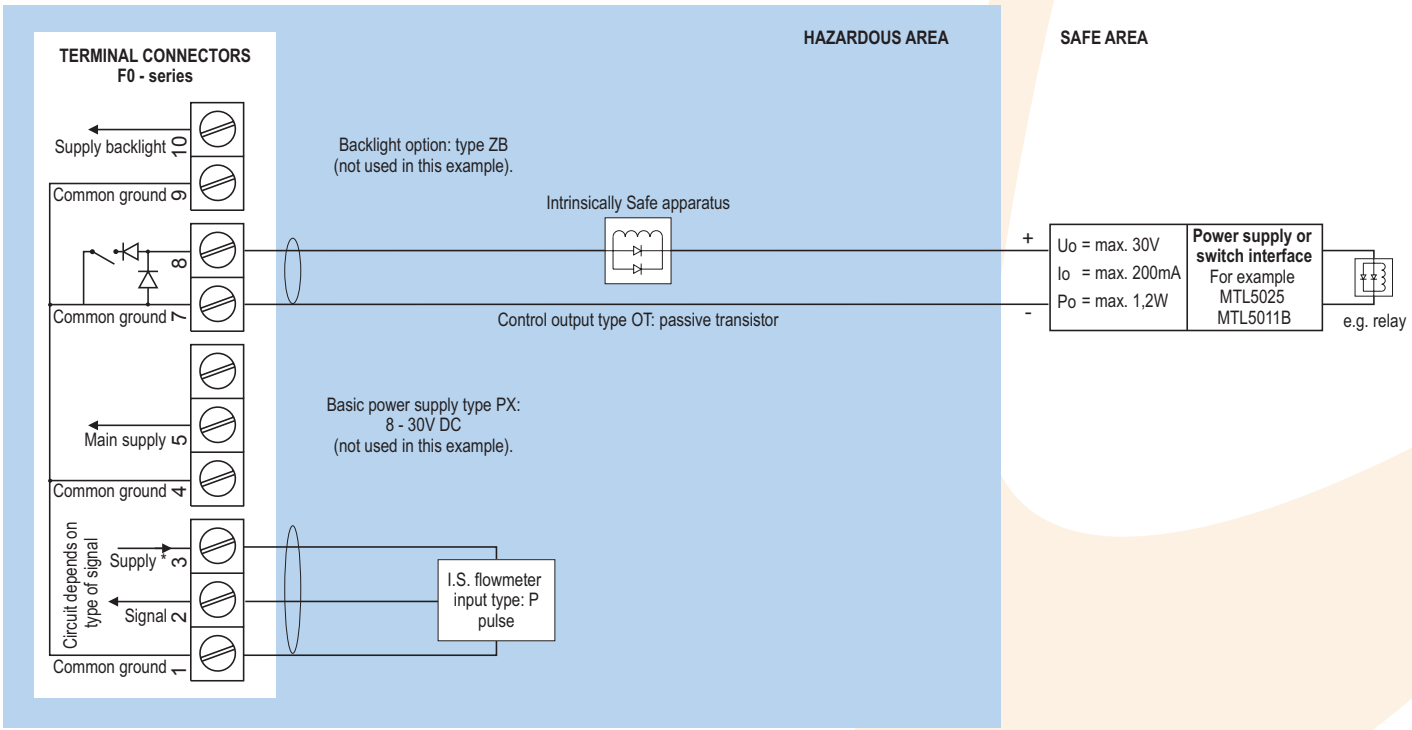
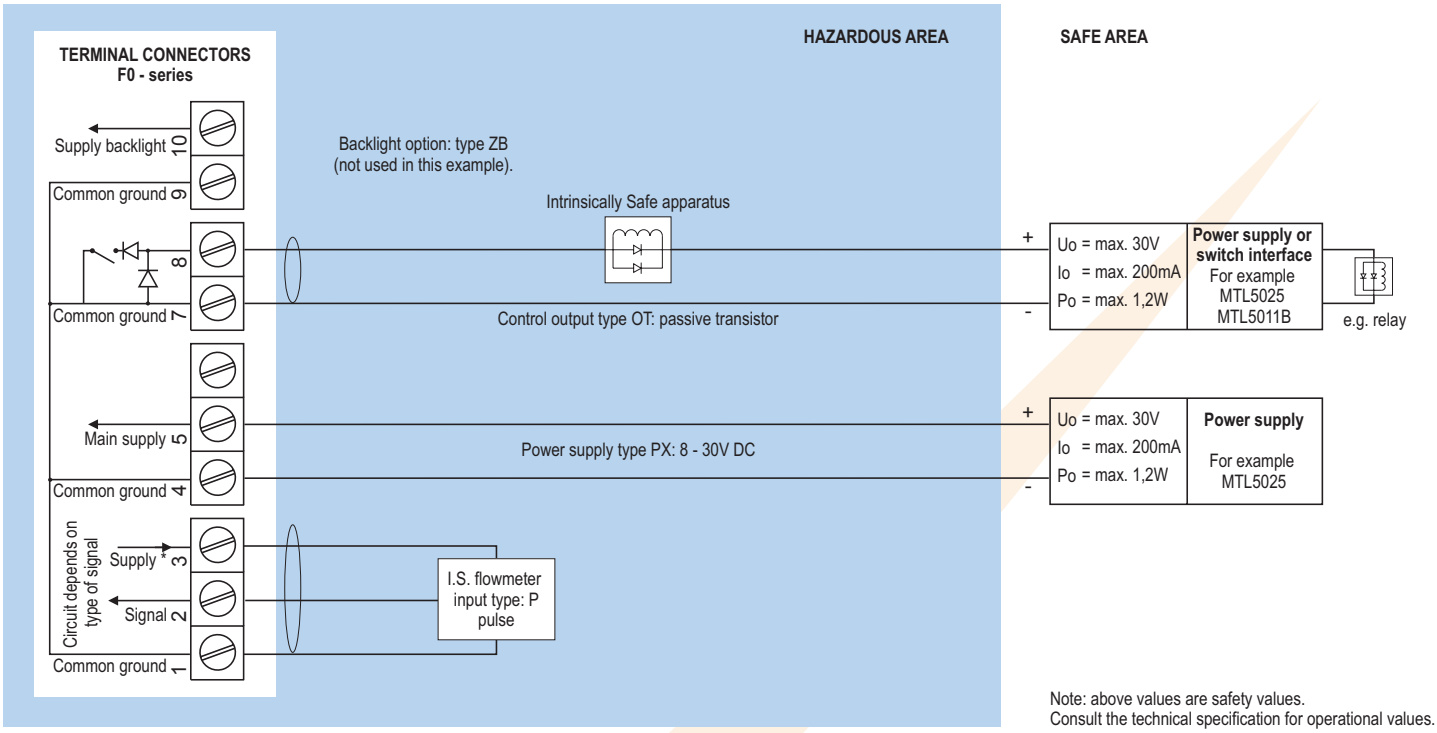
### *Configuration example IIA - IIB and IIC*
### *F030-P-OT-PC-(PX)-XI-(ZB) - Battery powered unit*



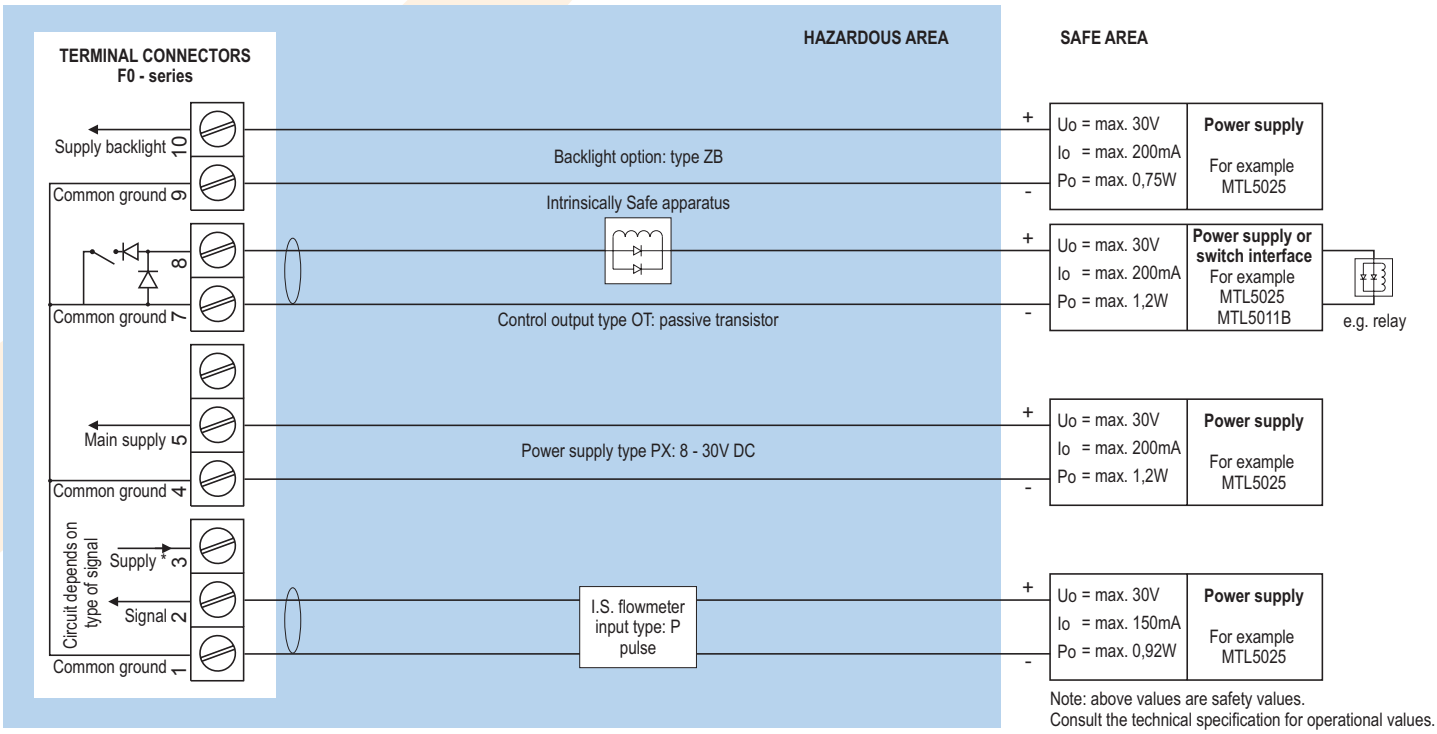

* Sensor supply voltage for pulse flowmeter type P : Terminal 3: 1.2 - 3.2V DC.
Please note: type PX may be used in combination with the battery (type PC). PX will power the unit; the battery will be disabled automatically till power is disconnected.

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



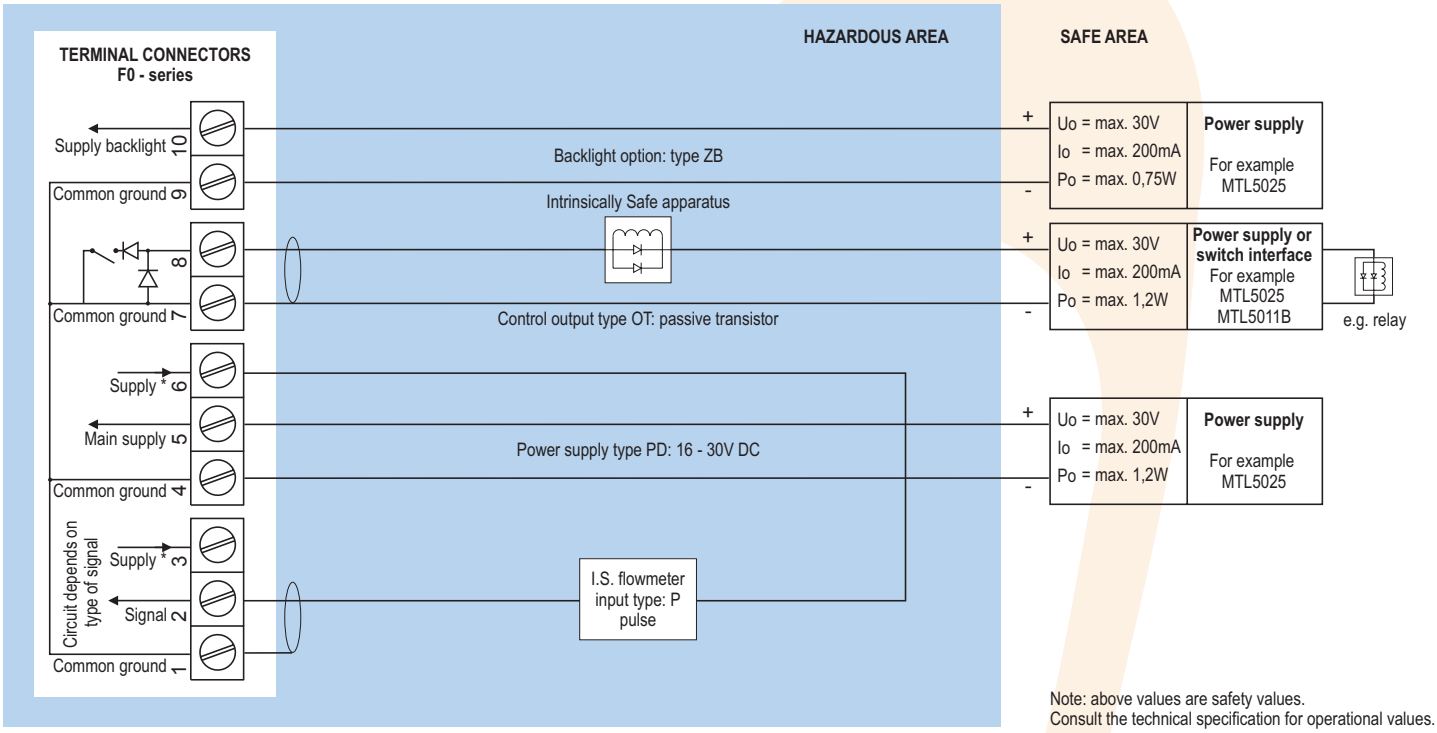

* Sensor supply voltage for pulse type P: Terminal 3: 1.2V - 3.2V DC.
Please note: type PX may be used in combination with the battery (type PC). PX will power the unit; the battery will be disabled automatically till power is disconnected.

## Configuration example IIA - IIB and IIC - F030-P-OT-PX-XI-ZB - Basic power supply 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.

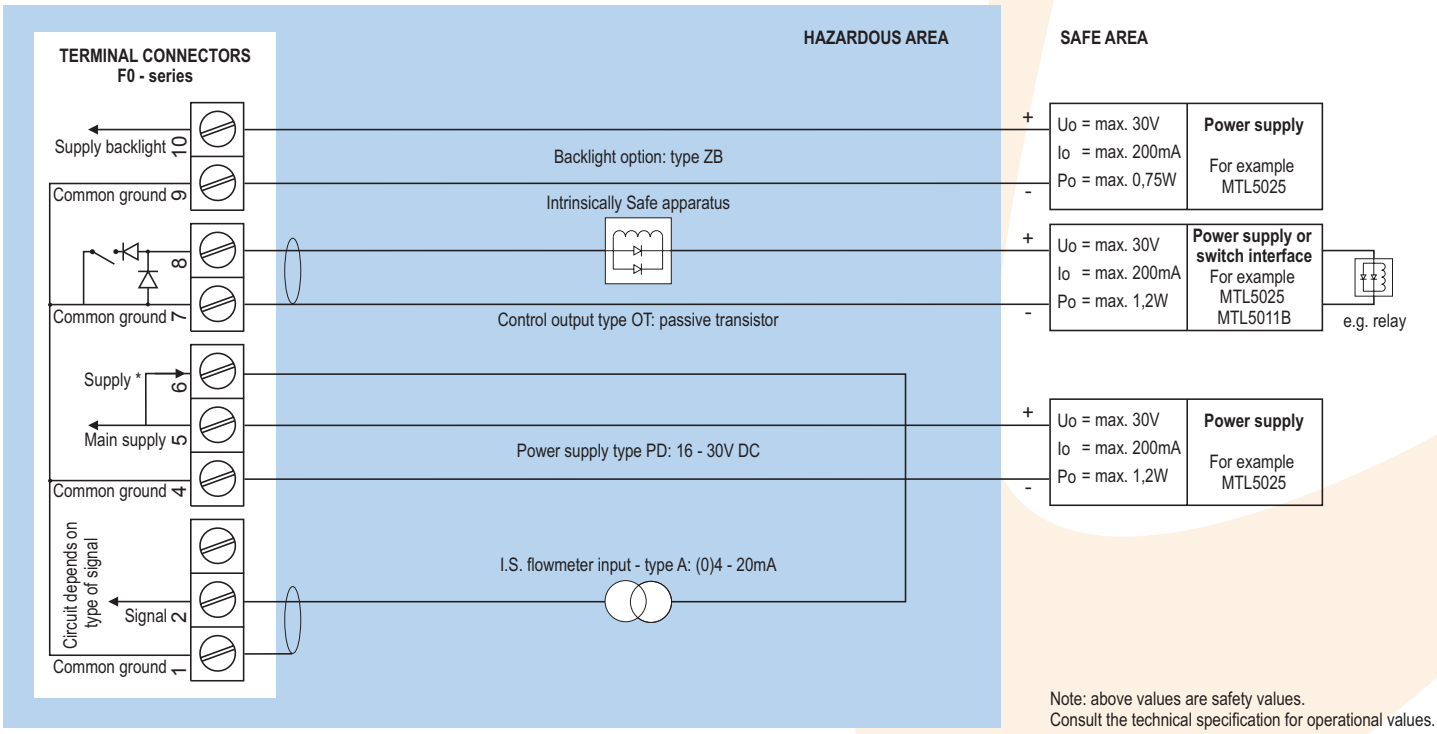
## Configuration example IIA - IIB and IIC - F030-P-OT-PD-XI-ZB - Power supply 16 - 30V DC




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.

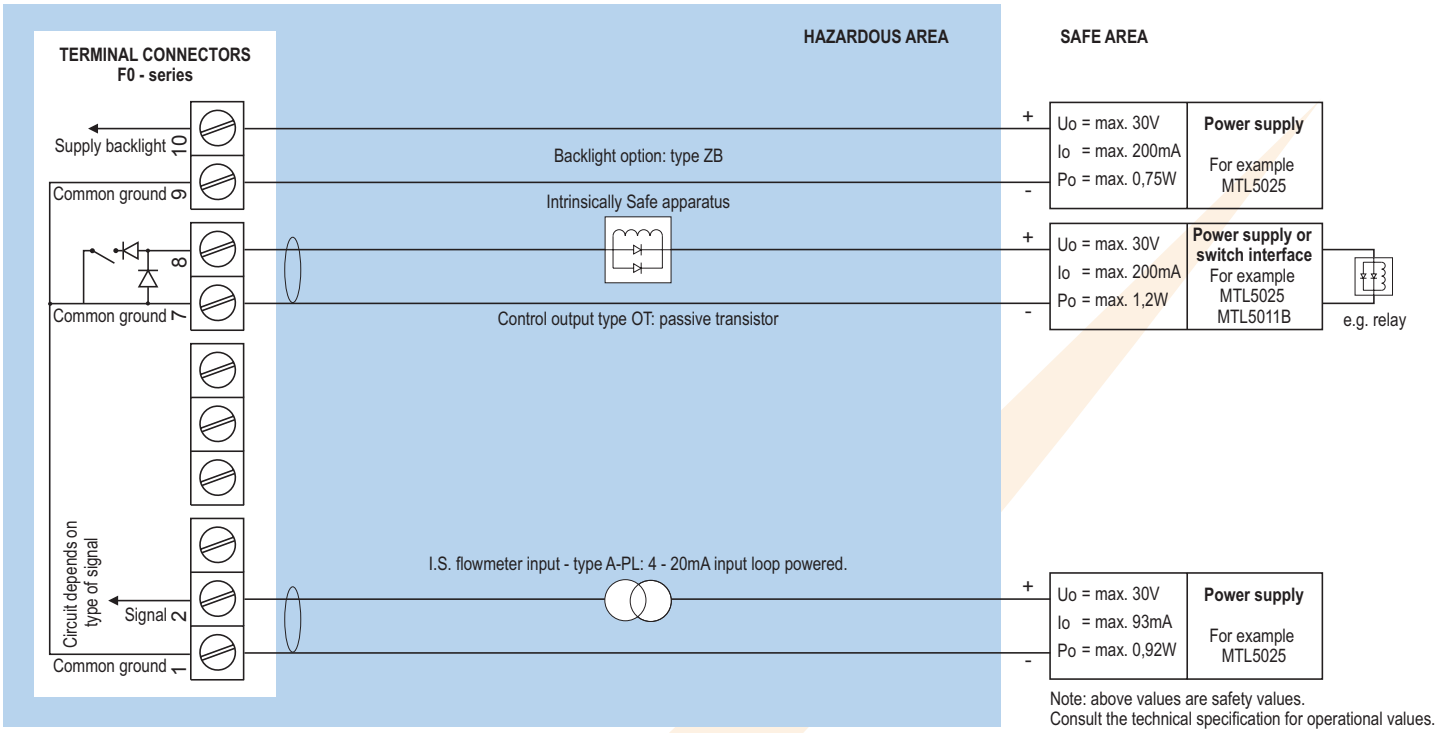
## Configuration example IIA - IIB and IIC - F030-A-OT-PD-XI-ZB - Power supply 16 - 30V DC




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

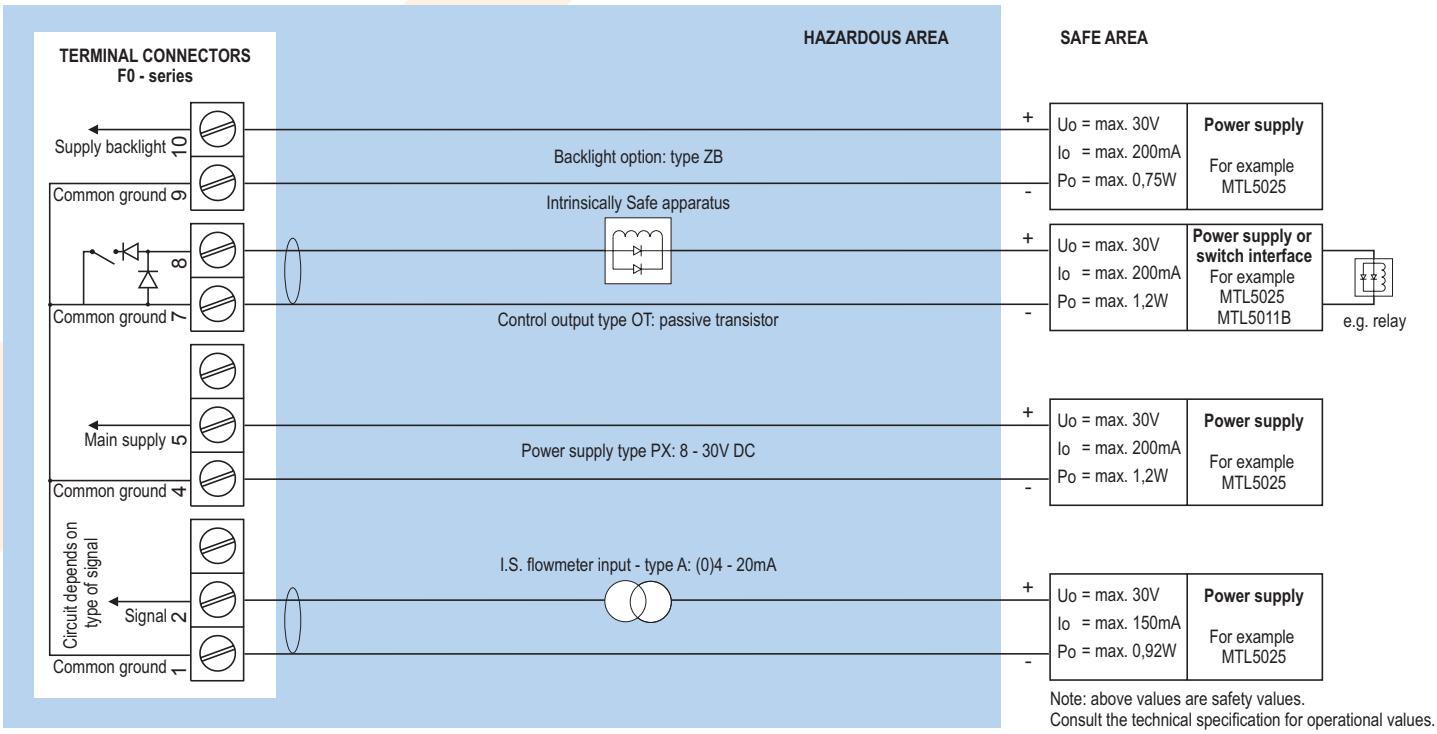
* Sensor supply voltage for analog flowmeter type A / U: Terminal 6: as input voltage terminal 5 (internally linked).
Please note: type PD may be used in combination with the battery (type PC). PD will power the unit; the battery will be disabled automatically till power is disconnected.

## Configuration example IIA - IIB and IIC - F030-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 - F030-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. |

| Operating temperature | |
|---|---|
| Standard unit | -40°C to +80°C (-40°F to +178°F). |
| Intrinsically Safe | -40°C to +70°C (-40°F to +158°F). |

| Power requirements | |
|---|---|
| Type PB | Long life Lithium battery - life-time depends upon settings and configuration - up to 5 years. |
| Type PC | Intrinsically Safe long life lithium battery - life-time depends upon settings and configuration - up to 5 years. |
| Type PD | 16 - 30V DC. Power consumption max. 1 Watt. |
| Type PF | 24V AC / DC ± 10%. Power consumption max. 15 Watt. |
| Type PL | Input loop powered from sensor signal 4 - 20mA (type A). |
| Type PM | 115 - 230V AC ± 10%. Power consumption max. 15 Watt. |
| Type PX | 8 - 30V DC. Power consumption max. 0.3 Watt. |
| Type ZB | 20 - 30V DC. Power consumption max. 1 Watt. With type PF / PM: internally powered. |
| Note PB/PF/PM | Not available Intrinsically Safe. |
| Note PF/PM | The total consumption of the sensor, active output type OA and backlight type ZB may not exceed 400mA @ 24V DC. |
| Note | For Intrinsically Safe applications, consult the safety values in the certificate. |

| Sensor excitation | |
|---|---|
| Type PB/PC/PX | 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 | Resolution: 16 bit. Error < 0.01mA / ± 0.05% FS. 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

| Control output | |
|---|---|
| Function | Control output according the batch process. |
| 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. |

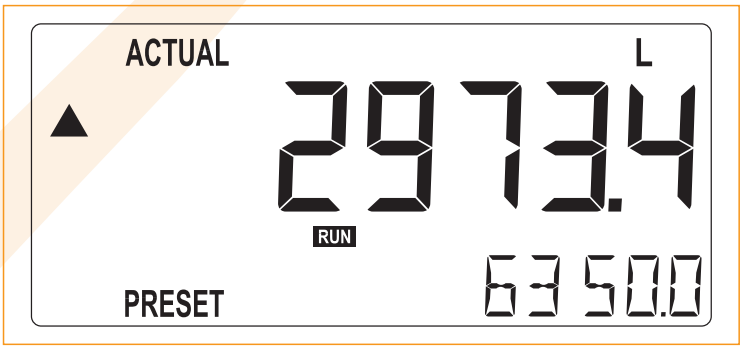
## Operational

| Operator functions | |
|---|---|
| Displayed functions | • Preset value - can be entered by the operator.<br>• Batched quantity or remaining quantity.<br>• Total and accumulated total.<br>• 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 - 30V 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 | 16 - 30V DC + sensor supply. |
| 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 - 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.

Specifications are subject to change without notice.

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