

# TOTALIZER MONITOR

WITH HIGH / LOW TOTALIZER ALARM AND  
ANALOG SIGNAL OUTPUT



## Features

- The desired totalized (preset) quantity can be set by the operator
- Reset totalizer: after stop or time based.
- Totalizer monitoring: two alarm values can be set: low and high totalizer alarm.
- Alarm values can be set by the operator or being passcode protected.
- Displays total and preset value or percentage simultaneously.
- Displays clear alarm messages.
- Quadrature input to detect the flow direction.
- Operational temperature -40°C up to +80°C (-40°F up to 176°F).
- Intrinsically Safe - ATEX and IECEx approval for gas and dust applications.
- Explosion/flame proof  $\text{Ex}$  II 2 GD EEx d IIB T5.
- Full Modbus communication RS232/485/TTL.
- Loop or battery powered, 8 - 24V AC/DC or 115 - 230V AC power supply.

## Signal output

- One high and one low totalizer alarm output.
- (0)4 - 20mA / 0 - 10V DC related to the totalized quantity or the flow rate.

## Signal input

### Flow

- Reed-switch.
- NAMUR.
- NPN/ PNP pulse.
- Sine wave (coil).
- Active pulse signals.

## Applications

- Automated (production) processes where a minimum and / or a maximum dispensed quantity has to be monitored continuously.

## General information

### Introduction

The F117 has been developed for applications where the totalized quantity has to be monitored and not the flow rate. When a start-command is given, the totalizer is reset to zero. The amount of product measured from that moment is monitored continuously for high totalizer values. Monitoring for low alarm values will commence after a stop-command is given or after a pre-defined process time. The alarm values itself are entered as a percentage of the preset value and are immediately converted to a displayed quantity, also after change of the preset value. A totalizer alarm will be displayed clearly while an external device can be controlled with the alarm outputs.

### Display

The display has large 17mm (0.67") and 8mm (0.31") digits which shows the actual totalized quantity, preset value, percentage and alarm values. The alarm values can be pass-code protected. On-screen engineering units are easily configured from a comprehensive menu. The accumulated total and flow rate can be displayed after a monitoring process only.

### Configuration

All configuration settings are accessed via a simple operator menu which can be pass-code protected. Each setting is clearly indicated with an alpha-numerical 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.

### Analog output signal

The (0)4 - 20mA or 0 - 10V DC analog output value mirrors the flow rate or the measured quantity in relation to the preset value. The output signal is updated ten times per second. The output value will be e.g. 4mA after the start-command and being 20mA at reaching the preset value. The output signal can be passive, active or isolated where the passive -output type will loop power the F117 as well.

### Alarm output

Two alarm outputs are available to transmit the high or low totalizer alarm condition. The output signals can be a passive NPN, active PNP or an isolated electro-mechanical relay.

### Signal input

The F117 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. Additional inputs are available for remote control, bi-directional measurement or higher input resolution (sum function).

### Communication

All process data and settings can be read and modified manually or through the Modbus communication link (RS232 / RS485).

Full Modbus functionality remains available for the Intrinsically Safe version (TTL).

### Hazardous areas

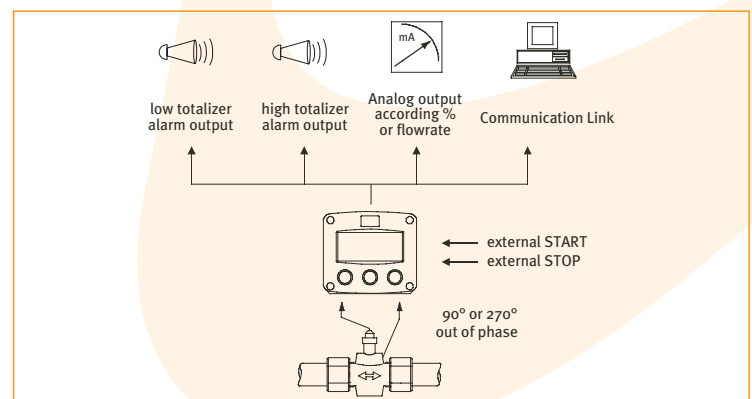
This model has been ATEX and IECEx certified Intrinsically Safe for gas and dust applications, with an allowed operational temperature of -40°C to +70°C (-40°F to +158°F).

A flame proof enclosure with ATEX certification offers the rating  $\text{Ex}$  II 2 GD EEx d IIB T5.

### Enclosures

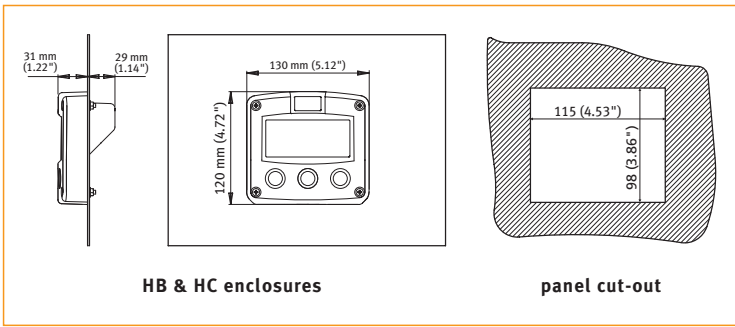
Various types of enclosures can be selected, all ATEX and IECEx approved. As standard the F117 is supplied in an GRP panel mount enclosure, which can be converted to an GRP field mount enclosure. Most popular is our rugged aluminum field mount enclosure with IP67 / NEMA 4X rating. Both European or U.S. cable gland entry threads are available.

## Overview application F117

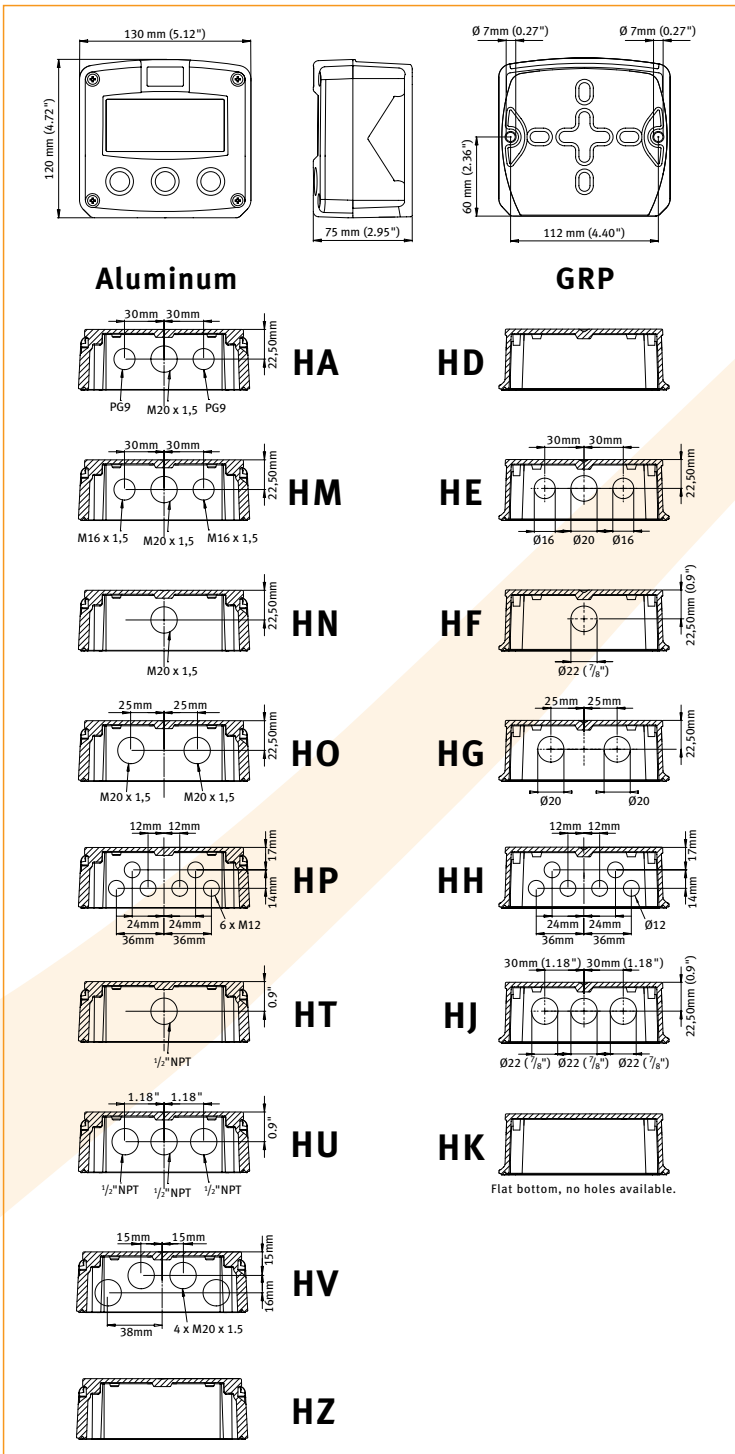


# Dimensions enclosures

## Aluminum & GRP panel mount enclosure



## Aluminum & GRP field / wall mount enclosures



# Terminal connections

31	30	29	28	27	26	COMUNICATION / BACKLIGHT	31			
						CB-RS232				
						DTR	RXD	TXD		
						+12V				
						GH-RS485 - 2 wire	A	B		
						CI-RS485 - 4 wire	A	B	Y	Z
						CT-TTL IntraSafely Safe				
						DTR	RXD	TXD		
						+12V				
						ZB-Backlight option				

(With PD / PF / PM terminals 26 / 31 are not available, backlight power supply is integrated.)

Note: configuration setting for bi-directional / sum measurement or control inputs.)

Fig. / PC: battery powered

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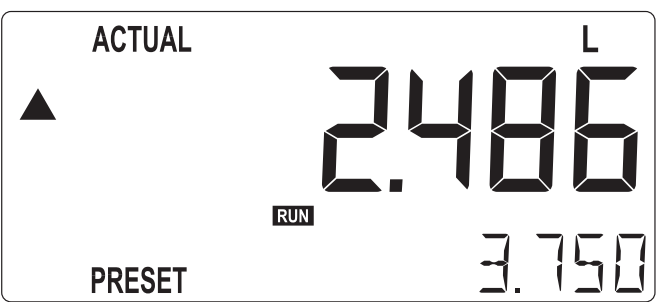
(terminates GND - 1, 2 are not available)

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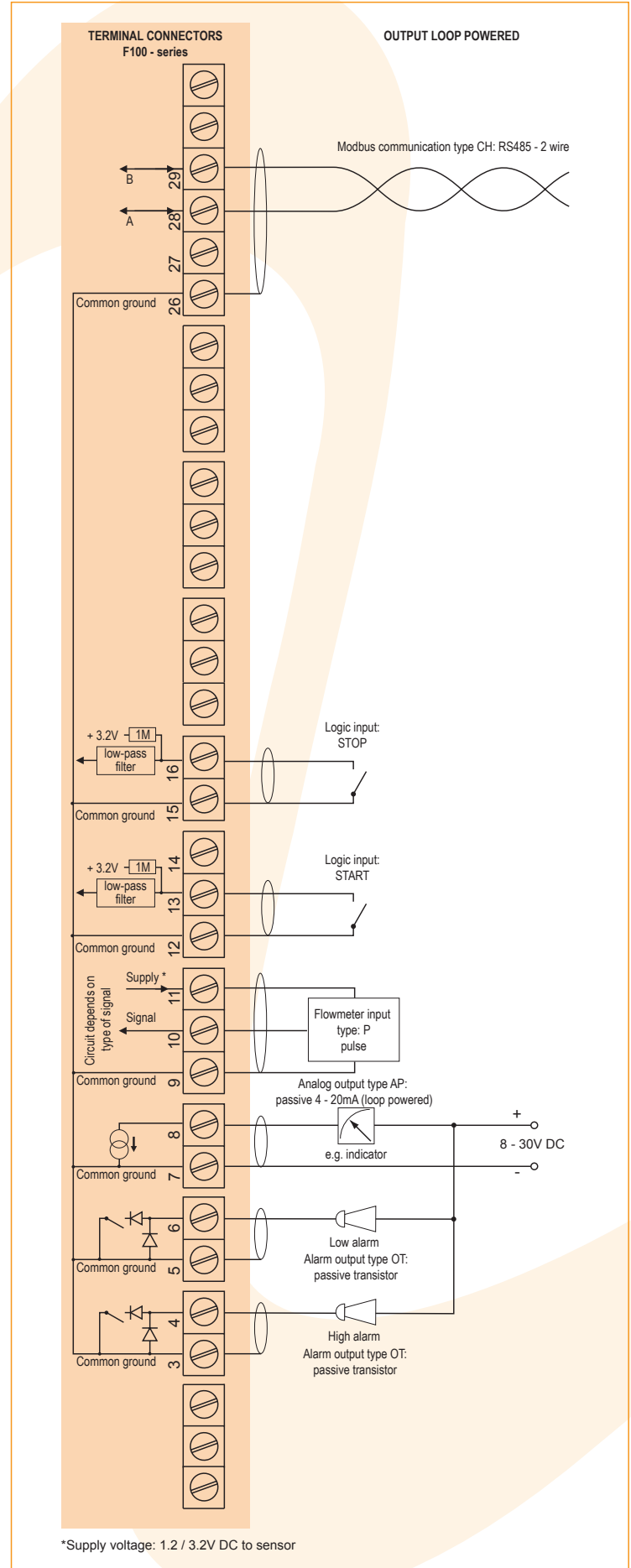
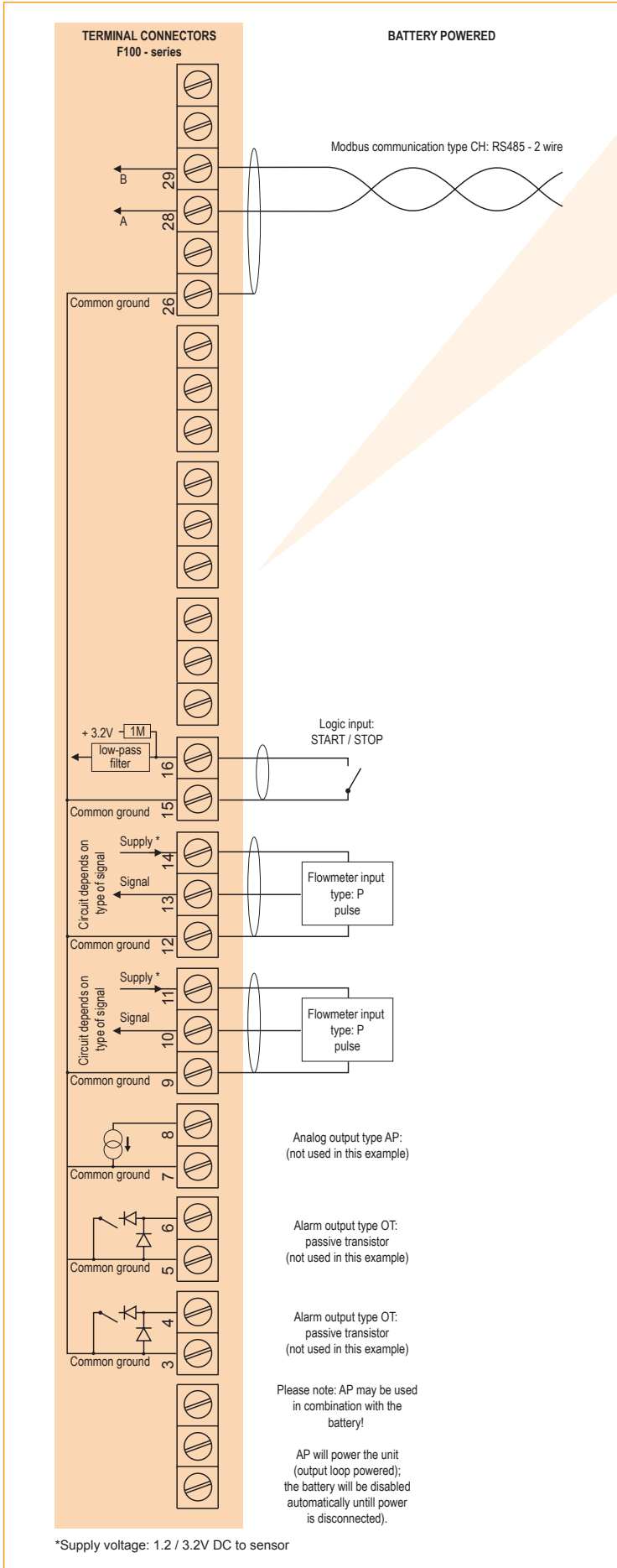
(terminates GND - 1, 2 are not available)

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



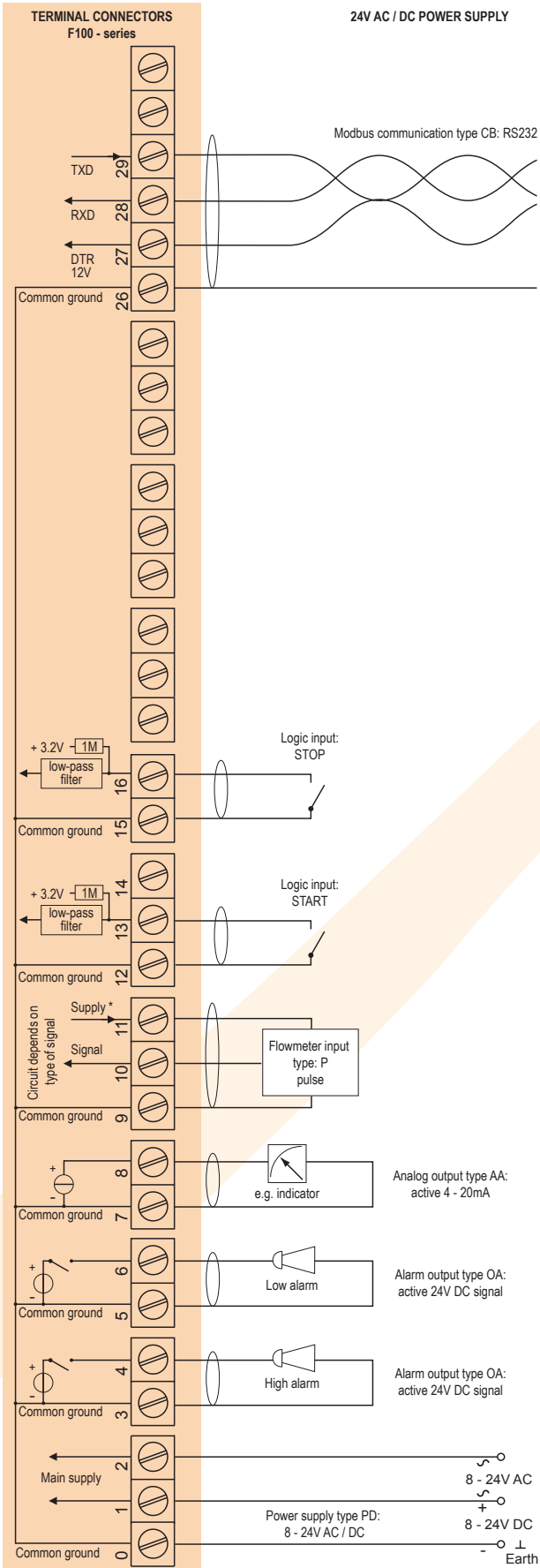
Typical wiring diagram F117-P-(AP)-CH-(OT)-PB

Typical wiring diagram F117-P-AP-CH-OT-PX

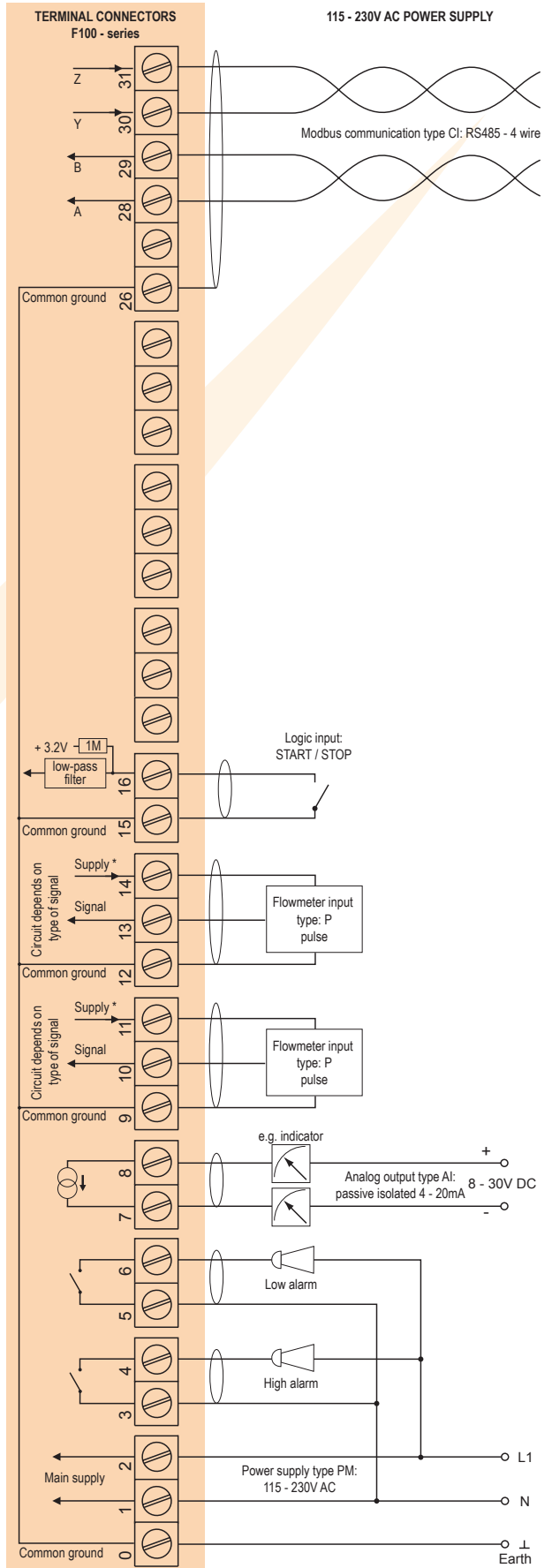


Typical wiring diagram F117-P-AA-CB-OA-PD

Typical wiring diagram F117-P-AI-CI-OR-PM



\*Supply voltage: 1.2 / 3.2 / 8.2 / 12 / 24V DC to sensor



\*Supply voltage: 1.2 / 3.2 / 8.2 / 12 / 24V DC to sensor

## Hazardous area applications

The F117-XI has been certified according ATEX and IECEx by DEKRA 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:

**II 1 G Ex ia IIB/IIC T4 Ga**  
**II 1 D Ex ia IIIC T100 C Da IP6X.**

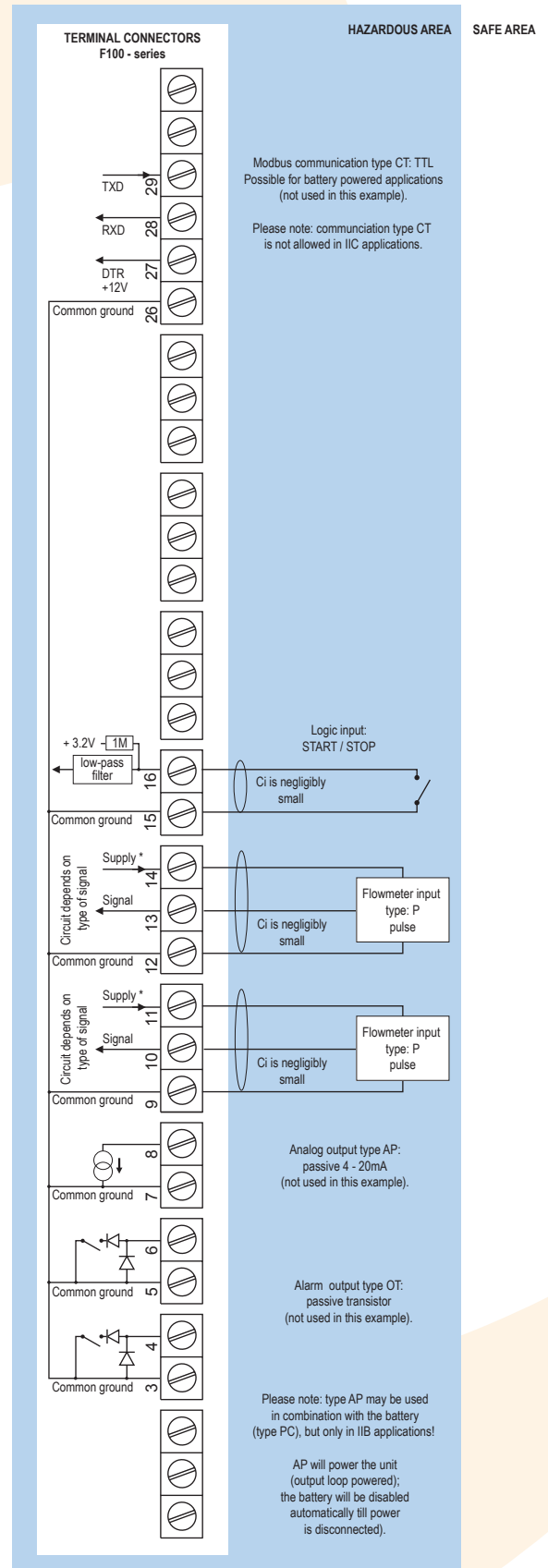
- The IECEx markings for gas and dust applications are: **Ex ia IIC/IIB T4 Ga** and **Ex ia IIIC T100 C Da IP6X.**

Besides the I.S. power supplies for the two alarm outputs, it is allowed to connect up to four I.S. power supplies in IIB/IIC applications or one in IIC applications. Consult the certificate for the maximum input and output values of the circuits. Full functionality of the F117 remains available, including two alarm and 4 - 20mA output and Modbus communication (type CT). Power supply type PD-XI offers a 8.2V sensor supply e.g. for one Namur sensor. A flame proof enclosure with rating ATEX **Ex II 2 GD EEx d IIB T5** is available as well. Please contact your supplier for further details.

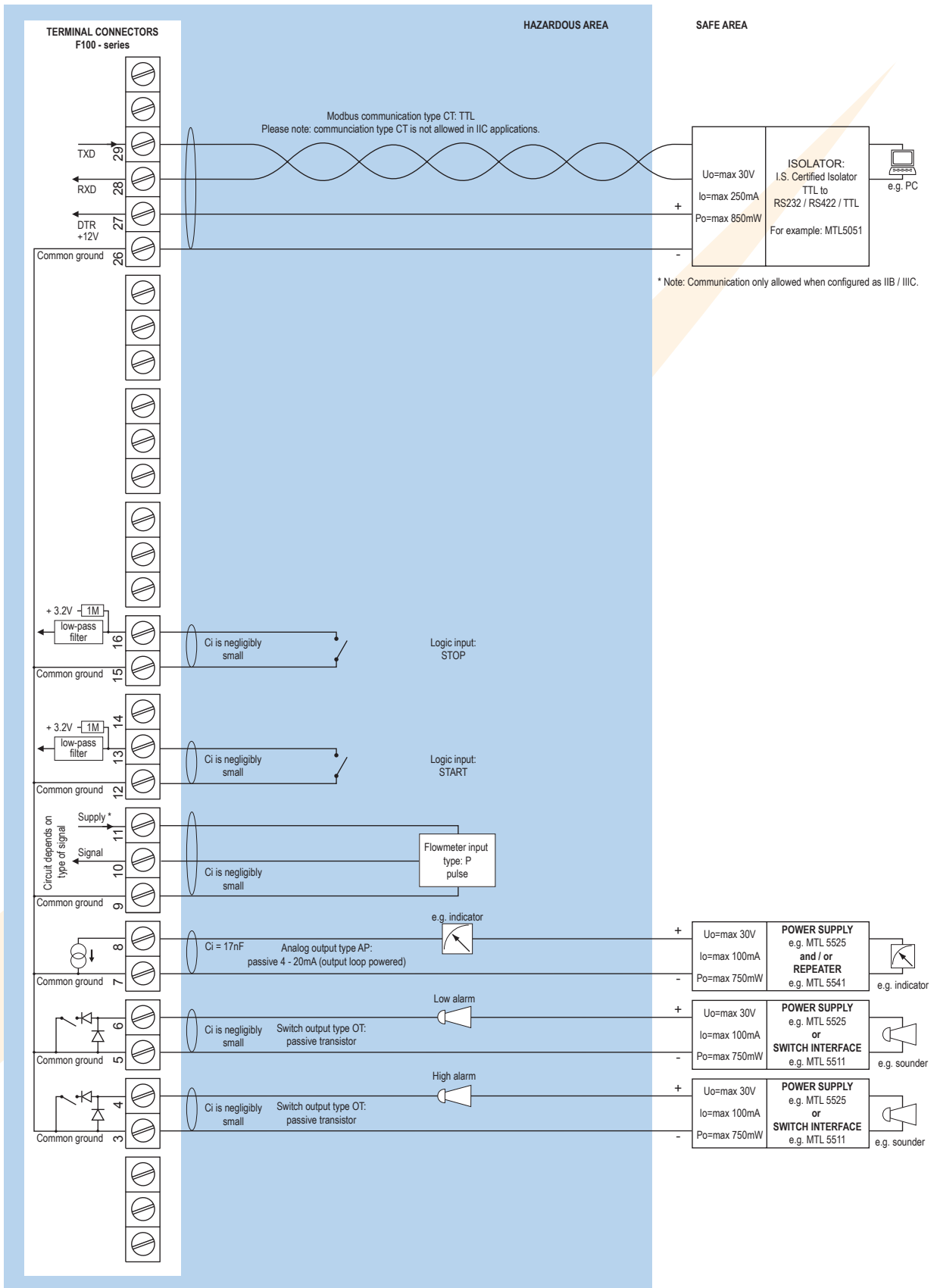
**Certificate of conformity KEMA 03ATEX1074 X**  
**• IECEx DEK 11.0042X**



## Configuration example IIB / IIC and IIC F117-P-(AP)-(CT)-(OT)-PC-XI - Battery powered unit

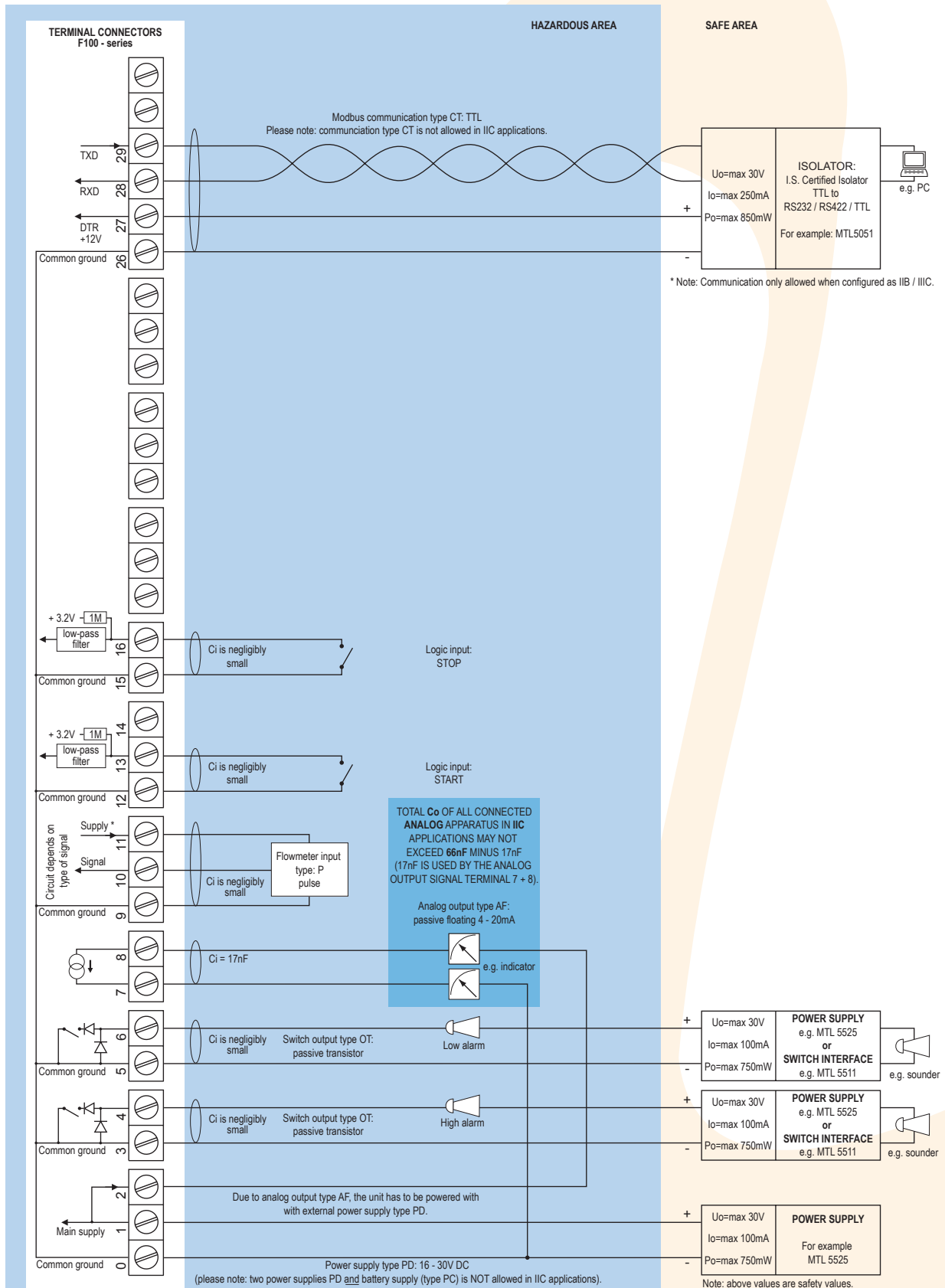


## Configuration example IIB / IIIC and IIC - F117-P-AP-(CT)-OT-PX-XI - Output loop powered



\* Note sensor supply voltage: 1.2V DC for coil sensors or 3.2V DC for other pulse sensors.

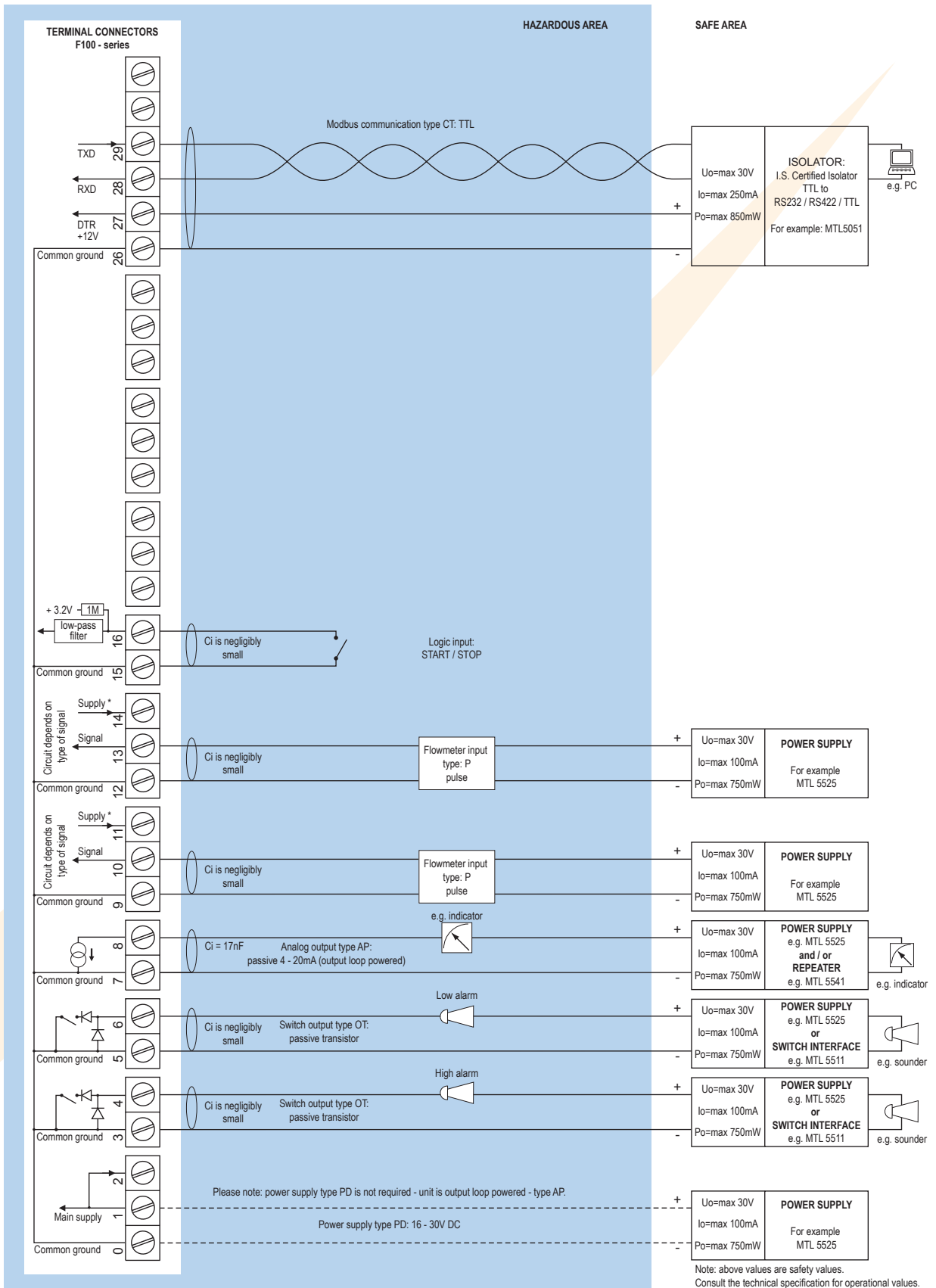
## Configuration example IIB / IIIC and IIC - F117-P-AF-(CT)-OT-PD-XI - Power supply 16 - 30V DC



\* Note power supply type PD: the supply voltage to pulse sensors is maximum 8.7V (U<sub>o</sub>=max 8.7V I<sub>o</sub>=max 25mA P<sub>o</sub>=max 150mW).



## Configuration example IIB / IIIC - F117-P-AP-CT-OT-(PD)-XI - Power supply 16 - 30V DC



\* Note power supply type PD: the supply voltage to pulse sensors is maximum 8.7V ( $U_o = \text{max } 8.7\text{V}$   $I_o = \text{max } 25\text{mA}$   $P_o = \text{max } 150\text{mW}$ ).

## 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. - 1 time/30 secs.
Option ZB	Transflective LCD with green LED backlight. Good readings in full sunlight and darkness.
Note ZB	Only available for safe area applications.

### Operating temperature

Standard unit	-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.
Type PC	Intrinsically Safe long life lithium battery - life-time depends upon settings and configuration - up to 5 years.
Type PD	8 - 24V AC / DC ± 10%. Power consumption max. 10 Watt. Intrinsically Safe: 16 - 30V DC; power consumption max. 0.75 Watt.
Type PF	24V AC / DC ± 10%. Power consumption max. 15 Watt.
Type PM	115 - 230V AC ± 10%. Power consumption max. 15 Watt.
Type PX	8 - 30V DC. Power consumption max. 0.5 Watt.
Type ZB	12 - 24V DC ± 10% or internally powered with type PD / PF / PM. Power consumption max. 1 Watt.
Note PB/PF/PM	Not available Intrinsically Safe.
Note PF/PM	The total consumption of the sensors and outputs may not exceed 400mA @ 24V.
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	1.2 / 3.2 / 8.2 / 12 / 24V DC - max. 50mA @ 24V DC.
Type PD-XI	1.2 / 3.2 / 8.2V DC - max. 7mA @ 8.2V DC and mains power supply voltage (as connected to terminal 1).
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 <sup>2</sup> and 2.5mm <sup>2</sup> .
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### 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	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 4X 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 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 1/2" NPT.
Type HU	Cable entry: 3 x 1/2" 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 4X, 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.

#### 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 4X.
Weight	600 gr.
Type HC	GRP panel mount enclosure IP65 / NEMA 4X, UV-resistant and flame retardant.
Weight	450 gr.

#### ABS wall / field mount enclosures

General	Silicone free ABS wall/field mount enclosure IP65 with EPDM and PE sealings. UV-resistant polyester keypad (old HD enclosure).
Dimensions	130 x 114 x 71mm (5.1" x 4.5" x 2.8") - W x H x D.
Weight	450 gr.
Type HS	Cable entry: no holes.

### Hazardous area

#### Intrinsically Safe (Type XI)

ATEX certification	 II 1 G Ex ia IIB/IIC T4 Ga. II 1 D Ex ia IIIC T100 °C Da IP6X.
IECEX certification	 Ex ia IIC/IIB T4 Ga. Ex ia IIIC T100 °C Da IP6X.
Ambient Ta	-40°C to +70°C (-40°F to +158°F).

### Explosion proof (Type XF)

ATEX certification	Ex II 2 GD EEx d IIB T5.
Dimensions	300 x 250 x 200mm (11.8" 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).
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### Signal inputs

#### Flowmeter

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.
Note	Two flowmeter inputs are available for bi-directional measurement or to create a higher resolution by incrementing both pulse trains (sum function). Alternatively, the second input can be used for remote control.
Frequency	Minimum 0Hz - maximum 7kHz 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.

#### Logic inputs

Function	Two inputs to start / stop the monitoring function.
Type	Internally pulled-up switch contact - NPN.
Duration	Minimum pulse duration 100msec.

### Signal outputs

#### Analog output

Function	Mirrors the flow rate or the measured quantity in relation to the preset value.
Accuracy	10 bit. Error < 0.05%. Analog output signal can be scaled to any desired range.
Update time	Ten times per second.
Type AA	Active 4 - 20mA output (requires PD, PF or PM).
Type AB	Active 0 - 20mA output (requires PD, PF or PM).
Type AF	Passive floating 4 - 20mA output for Intrinsically Safe applications (requires XI + PC or PD).
Type AI	Passive galvanically isolated 4 - 20mA output - also available for battery powered models (requires PB, PD, PF or PM).
Type AP	Passive 4 - 20mA output - not isolated. Unit will be loop powered.
Type AU	Active 0 - 10V DC output (requires PD, PF or PM).

#### Alarm output

Function	Two outputs: low and high totalizer alarm.
Type OA	Two active 24V DC transistor outputs (PNP); max. 50mA per output (requires PD, PF or PM).
Type OR	Two electro-mechanical relay outputs (N.O.) - isolated; max. switch power 230V AC - 0.5A per relay (requires PF or PM).
Type OT	Two passive transistor outputs (NPN) - not isolated. Max. 50V DC - 300mA per output.

### Communication option

Function	Reading display information, reading / writing all configuration settings.
Protocol	Modbus RTU.
Speed	1200 - 2400 - 4800 - 9600 baud.
Addressing	Maximum 255 addresses.
Type CB	RS232
Type CH	RS485 2-wire
Type CI	RS485 4-wire
Type CT	TTL Intrinsically Safe.

### Operational

#### Operator functions

Displayed functions	<ul style="list-style-type: none"><li>• Preset value - can be entered by the operator.</li><li>• Actual totalized quantity.</li><li>• Percentage: totalized quantity in relation to the preset value.</li><li>• Low total alarm value.</li><li>• High total alarm value.</li><li>• Accumulated total.</li><li>• Flow rate.</li></ul>
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#### Preset

Digits	7 digits.
Units	L, m <sup>3</sup> , GAL, USGAL, kg, lb, bbl, no unit.
Decimals	0 - 1 - 2 or 3.

#### Accumulated total

Digits	11 digits.
Units / decimals	According to selection for total.
Note	Can not be reset to zero; not displayed during process.

#### Flow rate

Digits	7 digits.
Units	mL, L, m <sup>3</sup> , Gallons, kg, Ton, lb, bl, cf, RND, ft <sup>3</sup> , scf, Nm <sup>3</sup> , NL, ical - no units.
Decimals	0 - 1 - 2 or 3.
Time units	/sec - /min - /hr - /day.
Note	Not displayed during process.

#### Alarm values

Digits	7 digits.
Units	According to selection for total / preset.
Decimals	According to selection for total / preset.
Time units	According to selection for total / preset.
Type of alarm	low and high totalizer alarm.
Note	The alarm values have to be entered as a percentage of the preset quantity. The unit will calculate and display the absolute value automatically.

#### Percentage


Digits	4 digits - 000.1 - 999.9 %.
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## Ordering information

Standard configuration: F117-P-AP-CX-EX-HC-IX-OT-PX-TX-XX-ZX.

Ordering information: F117 - \_ -A \_ -C \_ -EX -H \_ -IX -O \_ -P \_ -TX -X \_ -Z \_


### Flowmeter input signal

**P**  **Pulse input: coil, npn, pnp, namur, reed-switch.**


### Analog output signal

AA Active 4 - 20mA output - requires PD, PF or PM.

AB Active 0 - 20mA output - requires PD, PF or PM.

AF  I.S. floating 4 - 20mA output - requires XI + PC or PD.

AI Isolated 4 - 20mA output - requires PB, PD, PF or PM.

**AP**  **Passive 4 - 20mA output, loop powered unit.**


AU Active 0 - 10V DC output - requires PD, PF or PM.


### Communication

CB Communication RS232 - Modbus RTU.


CH Communication RS485 - 2-wire - Modbus RTU.

CI Communication RS485 - 4-wire - Modbus RTU.


CT  Intrinsically Safe TTL - Modbus RTU.

**CX**  **No communication.**

### Flow equations


**EX**  **No flow equations.**


### Panel mount enclosures - IP65 / NEMA4X


HB  Aluminum enclosure.


**HC**  **GRP enclosure.**


### GRP field / wall mount enclosures - IP67 / NEMA4X


HD  Cable entry: no holes.


HE  Cable entry: 2 x Ø 16mm & 1 x Ø 20mm.

HF  Cable entry: 1 x Ø 22mm (7/8").


HG  Cable entry: 2 x Ø 20mm.


HH  Cable entry: 6 x Ø 12mm.


HJ  Cable entry: 3 x Ø 22mm (7/8").


HK  Flat bottom, cable entry: no holes.


### Aluminum field / wall mount enclosures - IP67 / NEMA4X


HA  Cable entry: 2 x PG9 + 1 x M20.


HM  Cable entry: 2 x M16 + 1 x M20.


HN  Cable entry: 1 x M20.


HO  Cable entry: 2 x M20.

HP  Cable entry: 6 x M12.


HT  Cable entry: 1 x 1/2" NPT.

HU  Cable entry: 3 x 1/2" NPT.

HV  Cable entry: 4 x M20.

HZ  Cable entry: no holes.

### ABS field / wall mount enclosures - IP65

HS  Silicone free ABS field enclosure – Cable entry: no holes (old HD enclosure).


### Additional inputs

**IX**  **No additional input.**

### Outputs


OA Two active transistor outputs - requires PD, PF or PM.


OR Two mechanical relay outputs - requires PF or PM.

**OT**  **Two passive transistor outputs - standard configuration.**

### Power supply

PB Lithium battery powered.

PC  Lithium battery powered - Intrinsically Safe.

PD  8 - 24V AC/DC + sensor supply - with XI: 16 - 30V DC.

PF 24V AC/DC + sensor supply.


PM 115 - 230V AC + sensor supply.

**PX**  **Basic power supply 8 - 30V DC (no real sensor supply). Unit requires external loop AP.**

### Temperature input signal

**TX**  **No temperature input signal.**

### Hazardous area


XI  Intrinsically Safe, according ATEX and IECEx.

XF EExd enclosure - 3 keys.

**XX** **Safe area only.**

### Other options

ZB Backlight.

ZF  Coil input 10mVpp.

**ZX**  **No options.**

The bold marked text contains the standard configuration.

 Available Intrinsically Safe.

Specifications are subject to change without notice.