

# BATCH CONTROLLER

WITH TWO STAGE CONTROL / PULSE OUTPUT



## 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.
- Ability to process all types of flowmeter signals.
- Operational temperature -30°C up to +80°C (-22°F up to 178°F).
- Very compact design for panel mount, wall mount or field mount applications.
- Rugged aluminum field mount enclosure IP67/NEMA4X.
- Intrinsically Safe  
⊕ II 1 GD EEx ia IIB/IIC T4 T100°C.
- Explosion/flame proof ⊕ 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.
- Sensor supply 3.2 - 8.2 - 12 - 24V DC.

## Signal output

- Two configurable control outputs: for two-stage or one-stage control.
- Scaled pulse output according to accumulated total (one stage control only).

## Signal input

### Flow

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

### Status

- Remote control: start.
- Remote control: pause / stop.

## Applications

- For batching small up to very large quantities. Single or repeating batches. Alternative basic model: F030 or more sophisticated models: F131, F136 and 0300 series.

## General information

### Introduction

The F130 is a straight forward Batch controller offering exactly what is required for many applications. 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 and full Modbus communication.

### 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.

### 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 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.

### Control outputs

Two outputs are available which can be configured to operate as two stage control for large batch quantities or one stage control for smaller batches. In this case, the second output is available as a scaled pulse output according to accumulated total or batch total.

The pulse output length is user defined from 0.008 second up to 2 seconds. The maximum output frequency is 64Hz.

The output signals can be a passive NPN, active PNP or isolated electro-mechanical relays.

### Signal input

The F130 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 or jumpers. For remote control, two inputs are available to start, pause and stop the batch process.

### Communication

All process data and settings can be read and modified manually or through the Modbus communication link (RS232 / RS485). If desired, the batch process can even be started and stopped through communication.

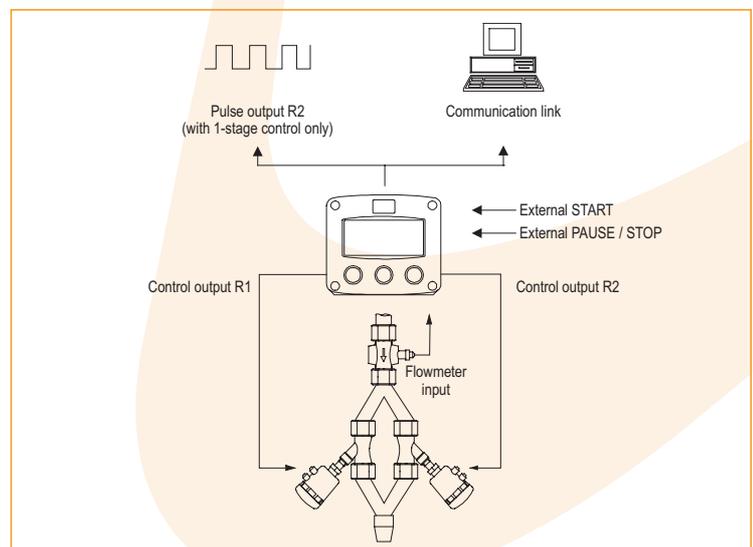
### Hazardous areas

For hazardous area applications, this model has been ATEX certified Intrinsically Safe  $\text{Ex} \text{II} 1$  GD EEx ia IIB / IIC T4 T100°C with an allowed operational temperature of -30°C to +70°C (-22°F to +158°F). A flame proof enclosure is also available with the rating  $\text{Ex} \text{II} 2$  GD EEx d IIB T5.

### Enclosures

Various types of enclosures can be selected, all ATEX approved. As standard the F130 is supplied in an ABS panel mount enclosure, which can be converted to an IP67 / NEMA 4X ABS 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.

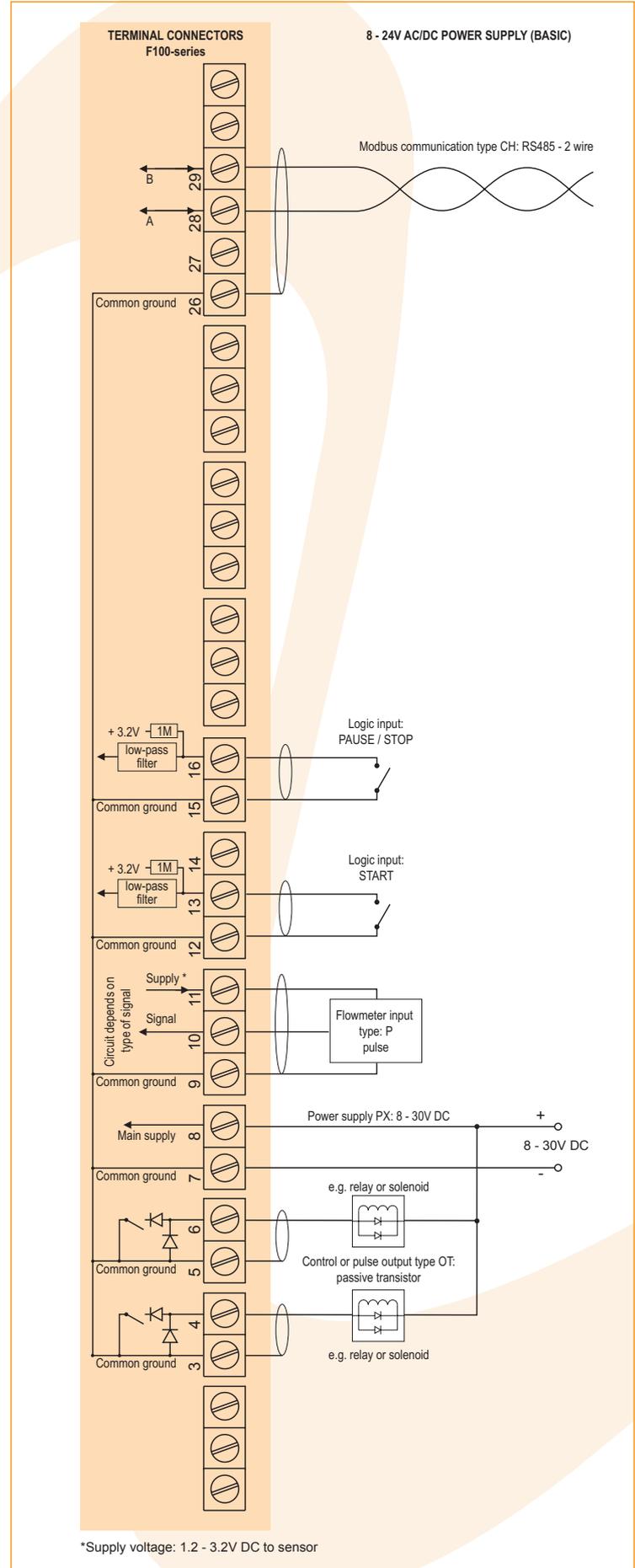
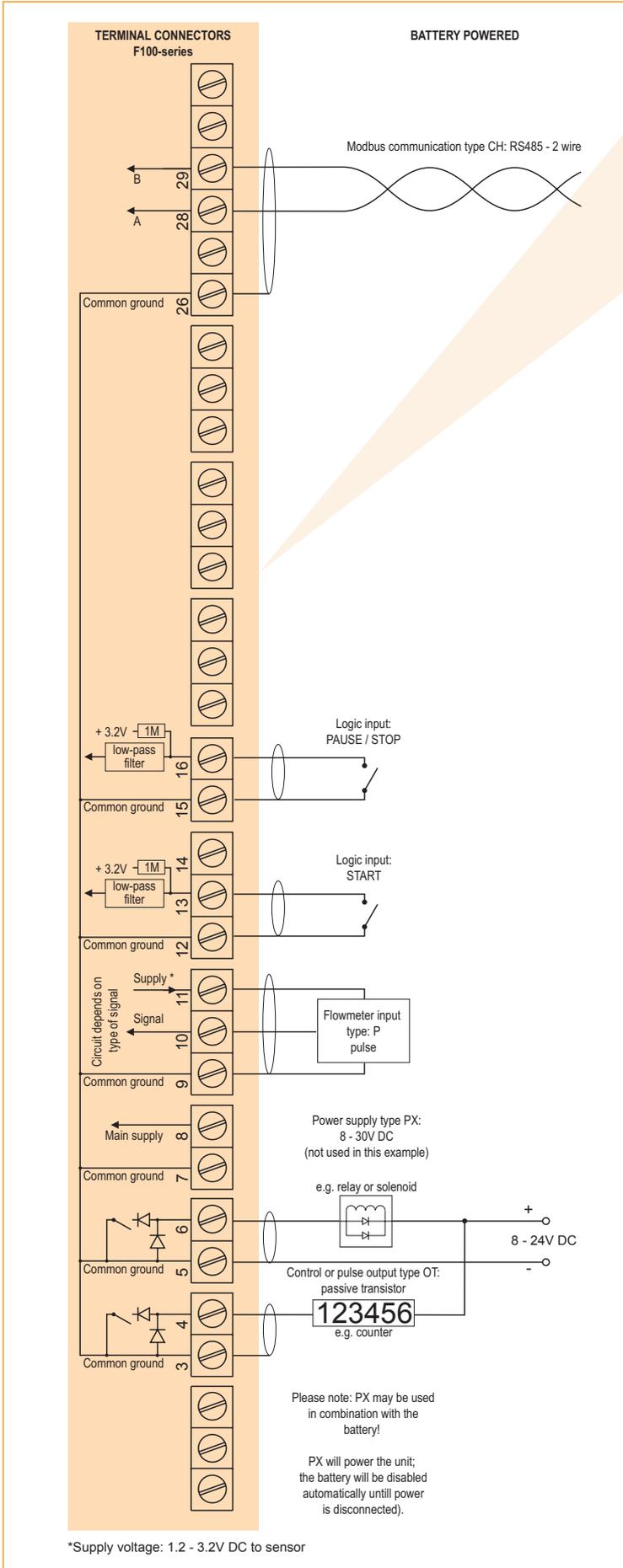
## Overview application F130



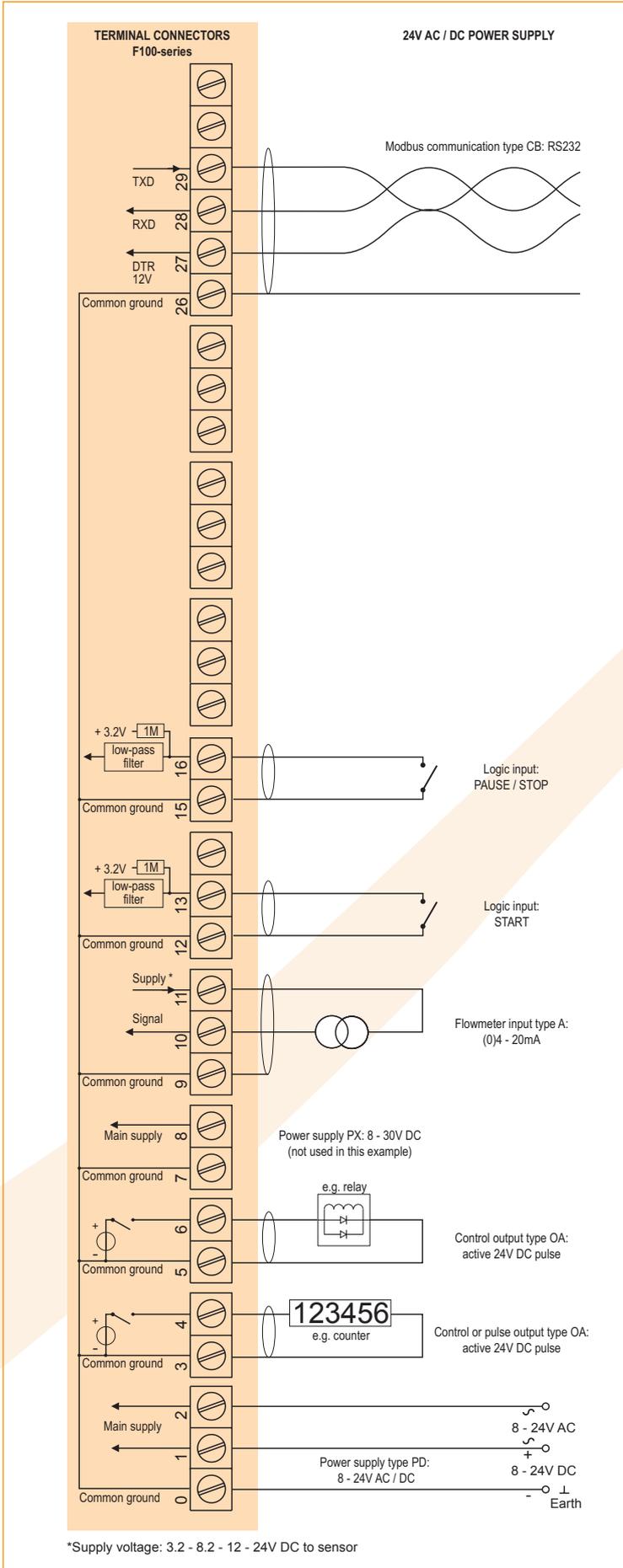


Typical wiring diagram F130-P-CH-OT-PB-(PX)

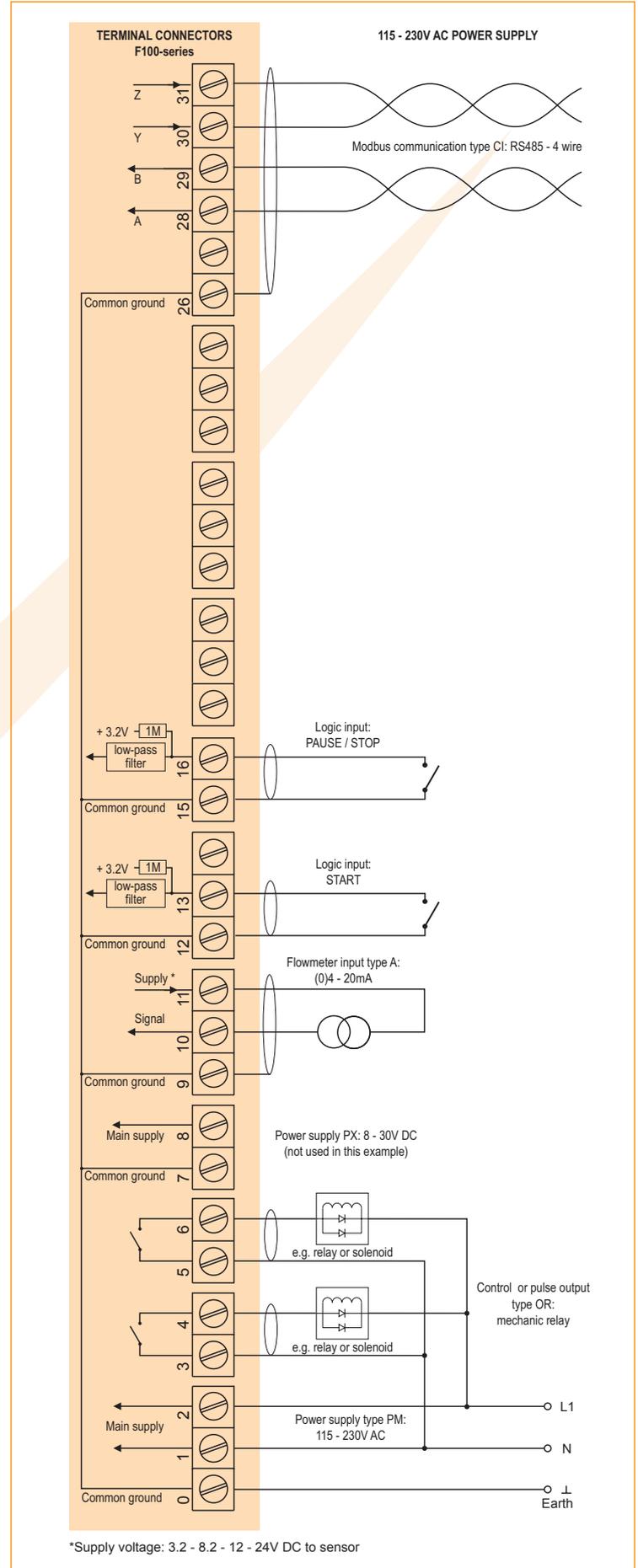
Typical wiring diagram F130-P-CH-OT-PX



Typical wiring diagram F130-A-CB-OA-PD



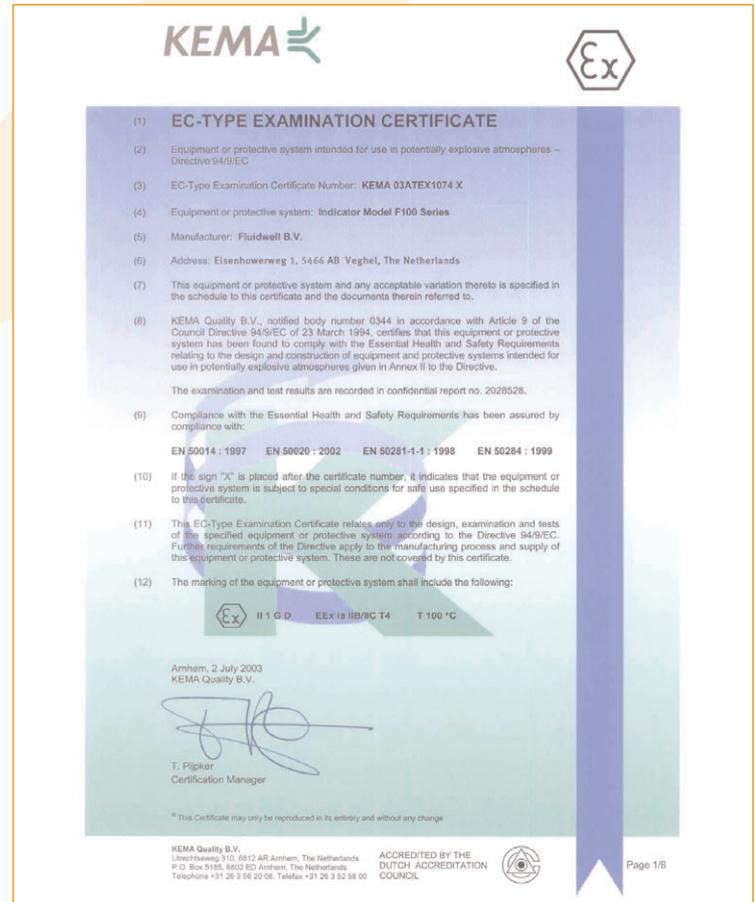
Typical wiring diagram F130-A-CI-OR-PM



## Hazardous area applications

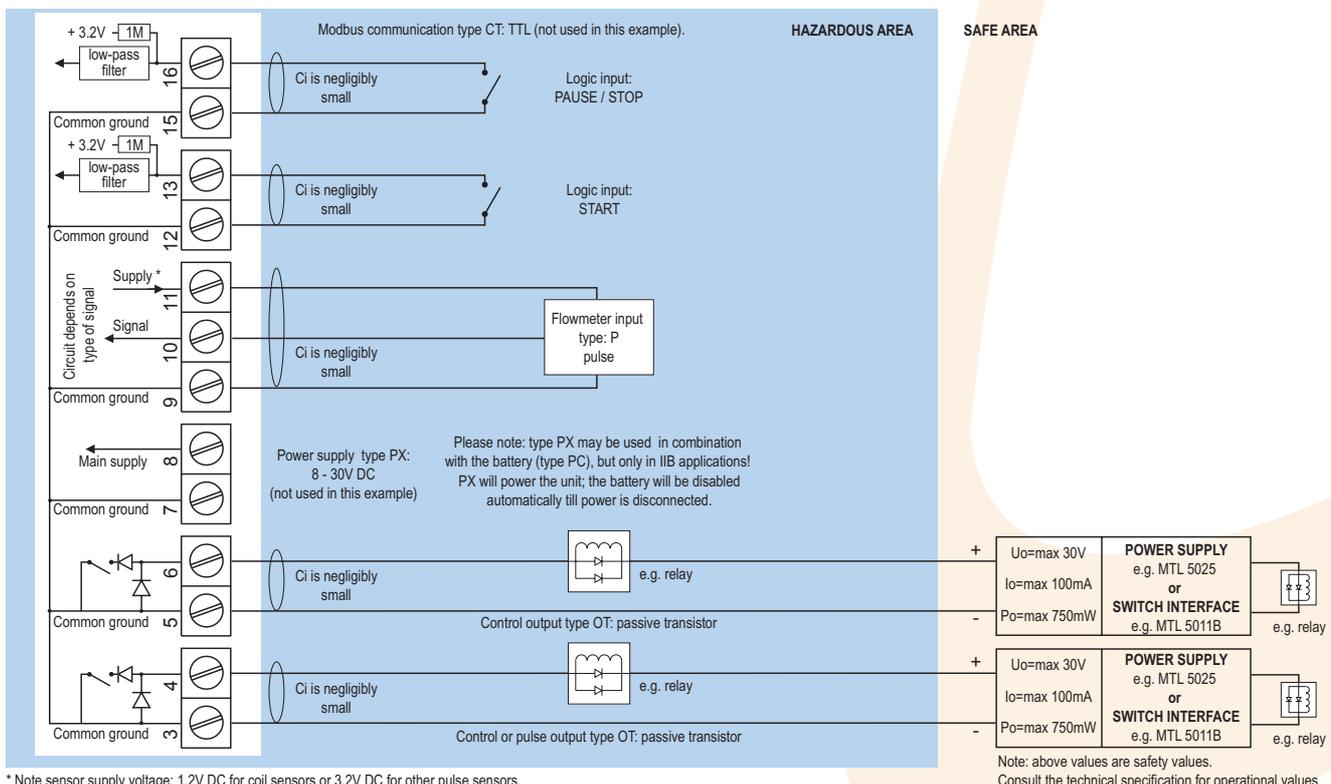
The F130-XI has been ATEX approved by KEMA for use in Intrinsically Safe applications. It is approved according to II 1 GD EEx ia IIB/IIC T4 T100°C for gas and dust applications with an operational temperature range of -30°C to +70°C (-22°F to +158°F). Besides the I.S. power supplies for the control outputs, it is allowed to connect up to two I.S. power supplies in IIB applications or one in IIC applications. Full functionality of the F130 remains available, including two stage control, pulse 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 II 2 GD EEx d IIB T5 is available as well. Please contact your supplier for further details.

## Certificate of conformity KEMA 03ATEX1074 X

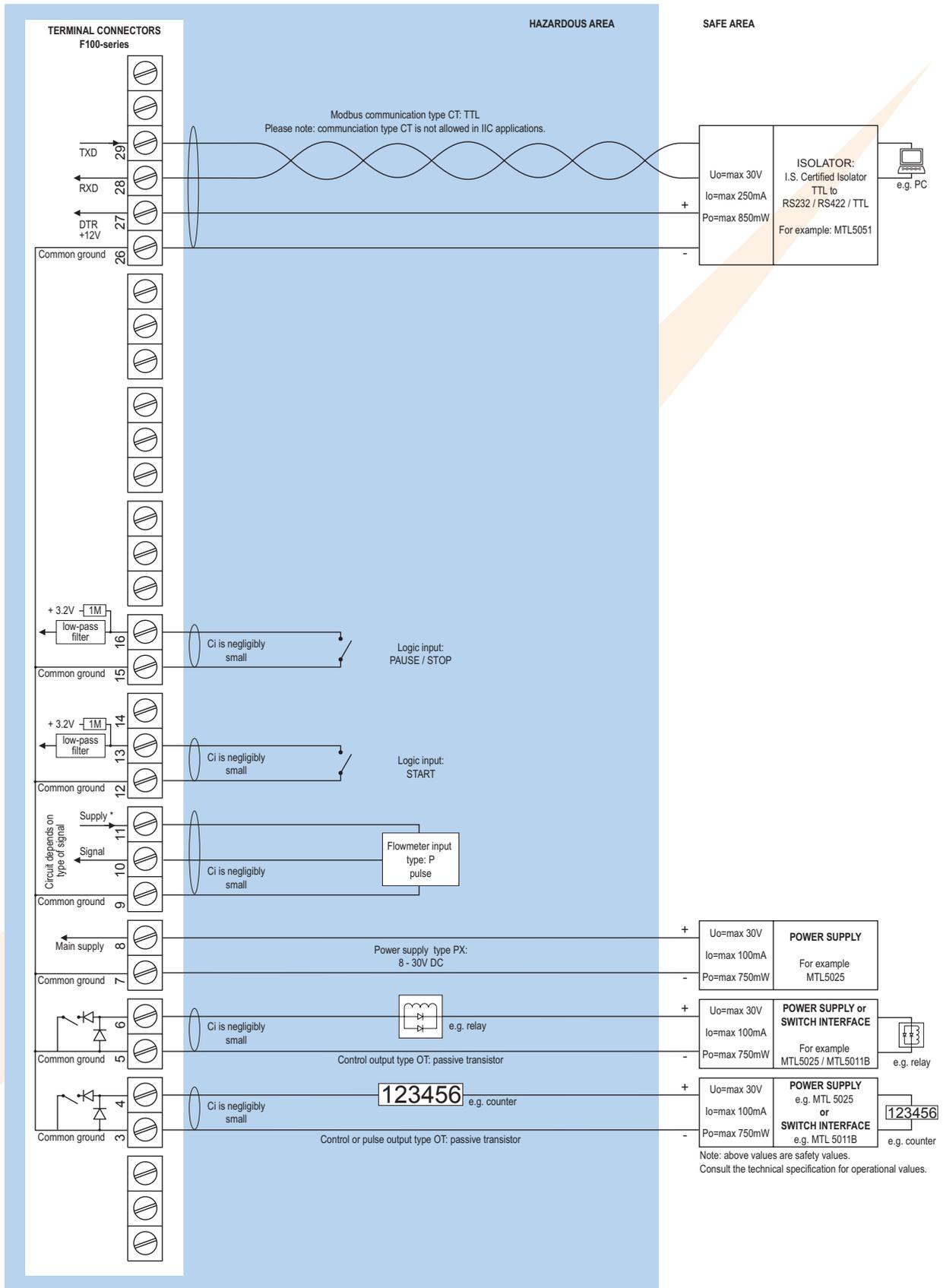


### Configuration example IIB and IIC

### F130-P-(CT)-OT-PC-(PX)-XI - Battery powered unit

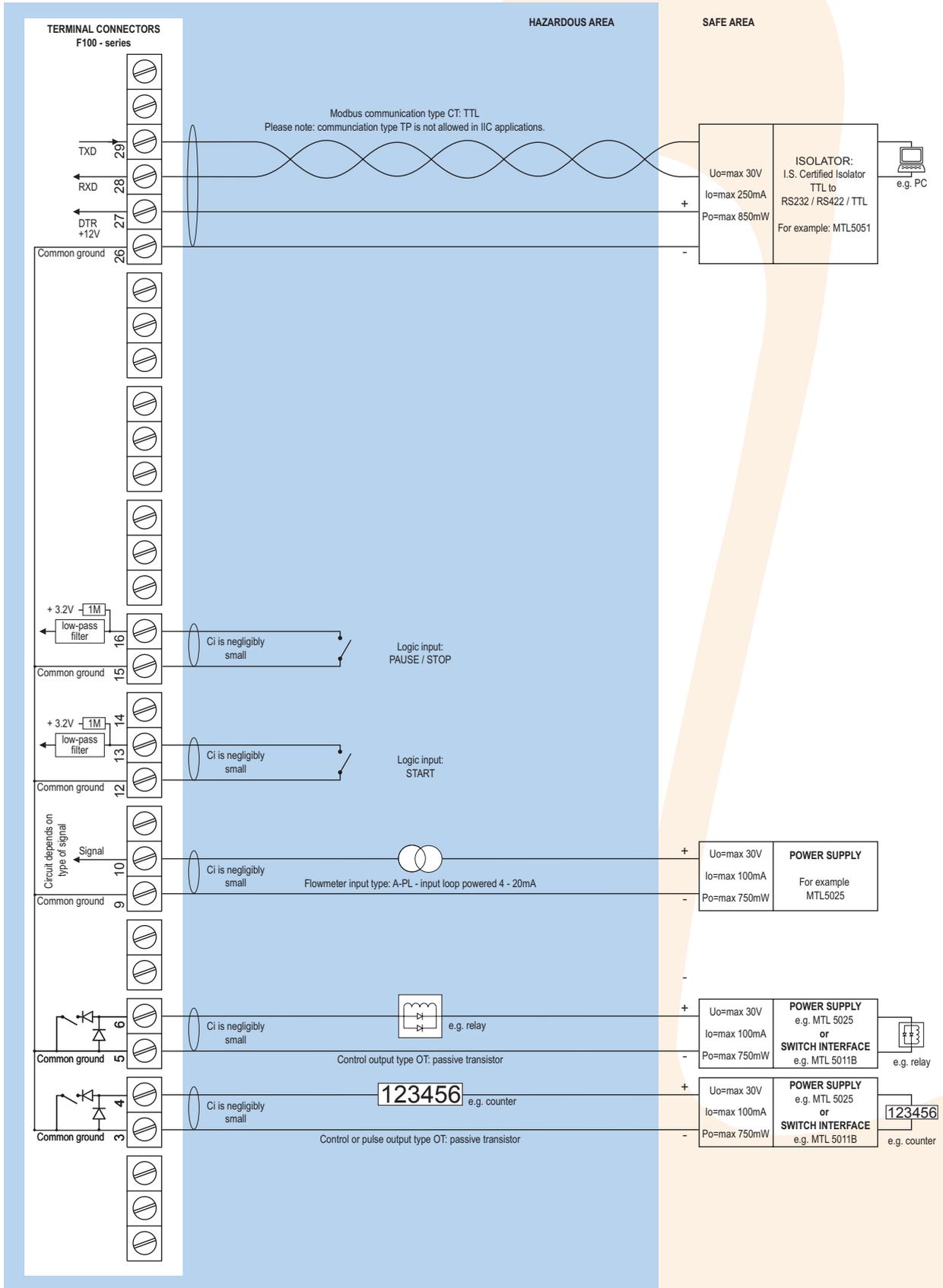


## Configuration example IIB and IIC - F130-P(CT)-OT-PX-XI - Basic power supply 8 - 30V DC

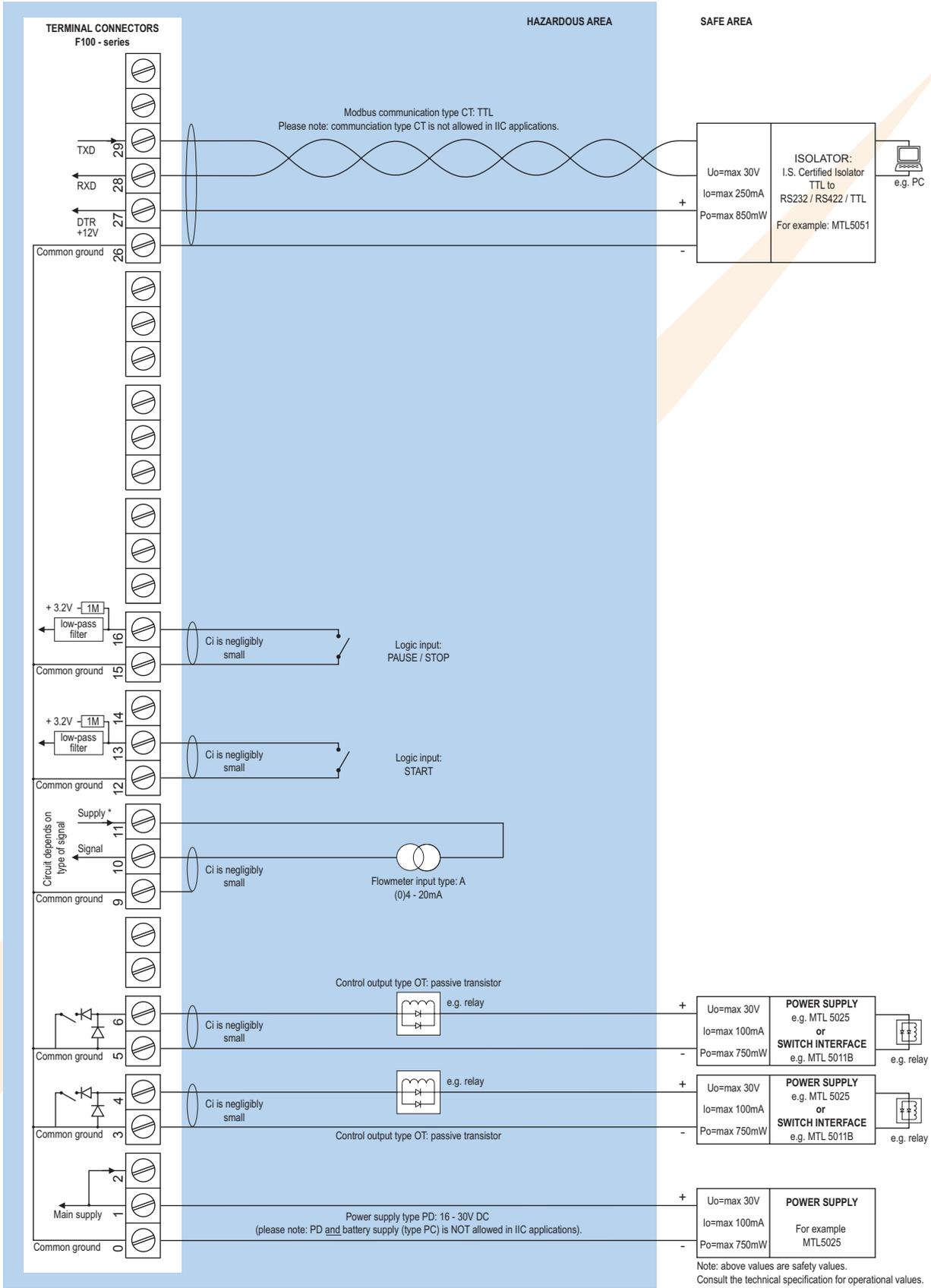


\* Note sensor supply voltage: 1.2V DC for coil sensors or 3.2V DC for other pulse sensors.

Configuration example IIB and IIC - F130-A-(CT)-OT-PL-XI - Input loop powered



Configuration example IIB and IIC - F130-A-(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) and to analog sensors as connected to terminal 1 (internally linked).

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

#### Casing

Window	Polycarbonate window.
Sealing	EPDM and PE.
Control keys	Three industrial micro-switch keys. UV-resistant polyester keypad.
Type HA	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.
Cable Entry	2 x PG9 and 1 x M20 tapped hole in the centre.
Weight	950 gr.
Type HB	Die-cast aluminum panel mount enclosure IP65 / NEMA 4 with 2-component UV-resistant coating.
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 retardant.
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.
Type HD	ABS wall mount enclosure IP67 / NEMA 4X, UV-resistant and flame retardant.
Dimensions	130 x 114 x 71mm (5.1" x 4.5" x 2.8") - W x H x D.
Cable Entry	None, user defined.
Weight	400 gr.
Type HU	Die-cast aluminum field mount enclosure IP67 / NEMA 4X with 2-component UV-resistant coating.
Dimensions	5.1" x 4.5" x 2.28" - W x H x D.
Cable Entry	3 x 1/2" NPT tapped hole.
Weight	950 gr.

#### Operating temperature

Operational	-30°C to +80°C (-22°F to +178°F).
Intrinsically Safe	-30°C to +70°C (-22°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 $\pm$ 10%. Power consumption max. 10 Watt. Intrinsically Safe: 16 - 30V DC; power consumption max. 0.75 Watt.
Type PF	24V AC / DC $\pm$ 10%. Power consumption max. 15 Watt.
Type PL	Input loop powered from sensor signal 4 - 20mA (type "A") - requires type OT.
Type PM	115 - 230V AC $\pm$ 10%. Power consumption max. 15 Watt.
Type PX	8 - 30V DC. Power consumption max. 0.5 Watt.
Type ZB	12 - 24V DC $\pm$ 10% or 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 and 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).
Note	In case PD-XI and signal A or U: the sensor supply voltage is according to the power supply voltage connected to terminal 1. Also terminal 2 offers the same voltage.
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. 1.5mm <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.

#### Hazardous area

Intrinsically Safe	ATEX approval ref.:  II 1 GD EEx ia IIB/IIC T4 T100°C.
Type XI	Maximum ambient +70°C (158°F).
Explosion proof	ATEX approval ref.:  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. 15 Kg.

#### 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.
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.
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: 14 bit. Error < 0.025mA / $\pm$ 0.125% 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: 2.5V @ 20mA.
Load impedance	Type U: 3k $\Omega$ .
Relationship	Linear and square root calculation.
Note	For signal type A and U: external power to sensor is required; e.g. type PD.

## Logic inputs

Function	Two terminal inputs to start, pause and stop the batch process.
Type	Internally pulled-up switch contact - NPN.
Duration	Minimum pulse duration 100msec.

## Signal outputs

Control / pulse output	
Function	User defined: batch process one or two stage control - scaled pulse output according the running batch or according accumulated total (one stage only).
Frequency	Max. 64Hz. Pulse length user definable between 7.8 msec up to 2 seconds.
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.
Load	Max. 50V DC - 300mA per output.

## Communication option

Function	Reading display information, reading / writing preset value and all configuration settings. Start, pause and stop batch process
Protocol	Modbus ASCII / 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>• Batched quantity or remaining quantity.</li> <li>• Total and accumulated total.</li> <li>• Total can be reset to zero by pressing the STOP-key twice.</li> </ul>
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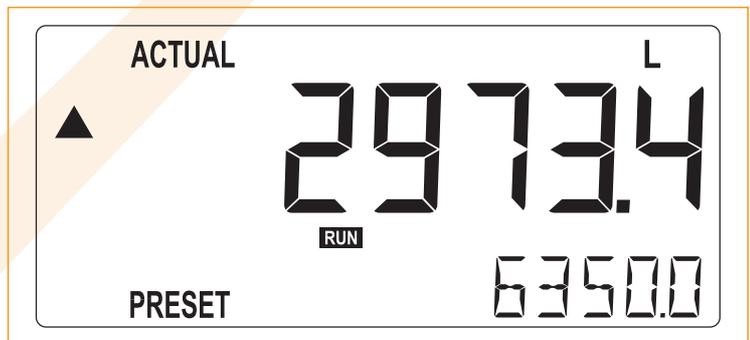
### Preset and total

Digits	7 digits.
Units	L, m <sup>3</sup> , 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)

F130-P-CX-HC-OT-PX-XX-ZX.

Explanation standard configuration:

P: flowmeter signal: pulse; CX: no communication; HC: ABS panel mount enclosure; OT: two passive transistor outputs; PX: basic power supply 8 - 30V DC; XX: safe area; ZX: no options.

Ordering information:	F130	-	-C	-H	-O	-P	-X	-Z
<b>Flowmeter input signal</b>								
A	⊗	(0)4 - 20mA input.						
P	⊗	<b>Pulse input: coil, npn, pnp, namur, reed-switch.</b>						
U	⊗	0 - 10V DC input.						
<b>Communication</b>								
CB		Communication RS232 - Modbus ASCII / RTU.						
CH		Communication RS485 - 2-wire - Modbus ASCII / RTU.						
CI		Communication RS485 - 4-wire - Modbus ASCII / RTU.						
CT	⊗	Intrinsically Safe TTL - Modbus ASCII / RTU.						
CX	⊗	<b>No communication.</b>						
<b>Enclosure</b>								
HA	⊗	Aluminum field mount enclosure IP67 / NEMA 4X.						
HB	⊗	Aluminum panel mount enclosure IP65 / NEMA 4.						
HC	⊗	<b>ABS panel mount enclosure IP65 / NEMA 4.</b>						
HD	⊗	ABS wall mount enclosure IP67 / NEMA 4X.						
HU	⊗	Aluminum field mount enclosure IP67 / NEMA 4X.						
<b>Outputs</b>								
OA		Two active transistor outputs - requires PD, PF or PM.						
OR		Two mechanic relay outputs - requires PF or PM.						
OT	⊗	<b>Two passive transistor outputs - standard configuration.</b>						
<b>Power supply</b>								
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.						
PL	⊗	Input loop powered from sensor signal type "A".						
PM		115 - 230V AC + sensor supply.						
PX	⊗	<b>Basic power supply 8 - 30V DC (no real sensor supply).</b>						
<b>Hazardous area</b>								
XI	⊗	Intrinsically Safe.						
XF	⊗	EExd enclosure - 3 keys.						
XX		<b>Safe area only.</b>						
<b>Other options</b>								
ZB		Backlight.						
ZF	⊗	Coil input 10mVpp.						
ZX	⊗	<b>No options.</b>						

The bold marked text contains the standard configuration.

⊗ Available Intrinsically Safe.

Specifications are subject to change without notice.

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