

BATCH CONTROLLER

WITH TWO STAGE CONTROL / PULSE OUTPUT



Advantages

- Robust IP67 (NEMA Type4X) field enclosure. It is so rugged, **you can even stand on it!**
- Intrinsically Safe available - ATEX and IECEx 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

- 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.
- Explosion/flame proof available.
- Full Modbus communication RS232/485/TTL.
- Loop or battery powered, 8 - 24V AC/DC or 115 - 230V AC power supply.
- Sensor supply 3 / 8.2 / 12 / 24V DC.
- No-flow monitoring.

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

- Ability to process all types of flowmeter signals: Reed-switch, NAMUR, NPN/PNP pulse, Sine wave (coil), Active pulse signals, (o)4 - 20mA.

Remote control

- Start / Pause / Stop.

Applications

- 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).
- For batching small up to very large quantities. Single or repeating batches. Alternative basic model: F030 or more sophisticated models: F131, F136 and 300-Series or the D-Series DIN panel mount indicators and controllers.

General information

Introduction

The F130 is a straight forward two-stage 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 ensures an accurate result after each batch. A wide selection of options further enhances the capabilities of this model, which includes Intrinsic Safety and full Modbus communication.

Display

The display has large 17mm (0.67") and 8mm (0.31") digits which show the batched quantity and the preset value simultaneously. On-screen engineering units are easily configured from a comprehensive menu. A seven digit resettable "day total" is available as well as an eleven digit non-resettable accumulated total. All values are backed-up in EEPROM memory every minute.

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.

Control outputs

Two outputs are available which can be configured to operate as two stage control for large batch quantities or as 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 0.001 second up to 9.999 seconds. The maximum output frequency is 500Hz. The output signals can be passive NPN, active PNP or isolated electro-mechanical relays.

Signal input

The F130 will accept most pulse and analog input signals for volumetric flow or mass flow

measurement. The analog input is available with linear and square root calculation and even as 4 - 20mA input loop powered. For remote control, two inputs are available to start, pause and stop the batch process.

No-flow

If there is a predefined time-out in the input signal, the no-flow alarm will be triggered. The F130 goes in pause-mode and the display will show: NO FLOW.

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.

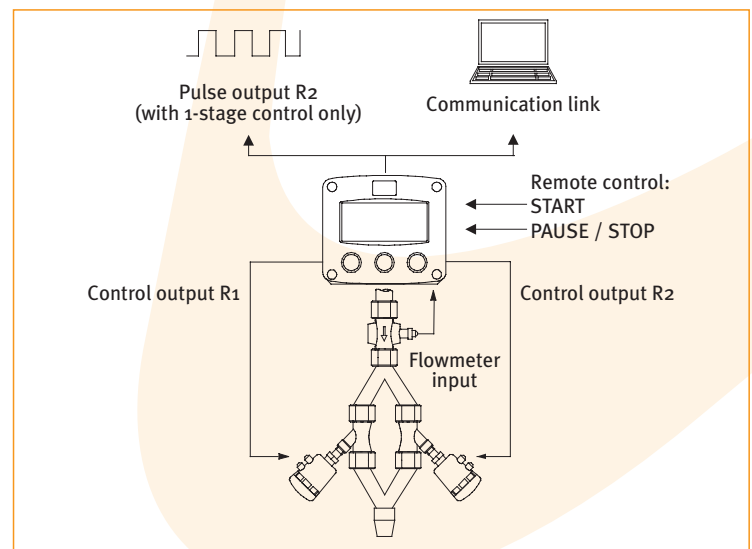
Hazardous areas

This model has been ATEX and IECEx certified 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.

Enclosures

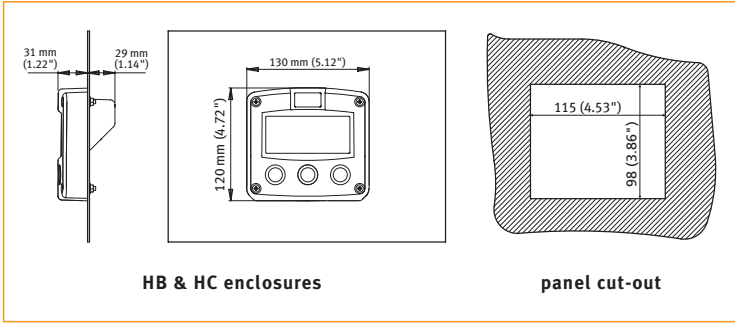
All enclosures are ATEX and IECEx approved. As standard the F130 is supplied in an GRP panel mount enclosure, which can be converted to an IP67 / NEMA Type4X GRP field mount enclosure by the addition of a back case. Most popular is our rugged aluminum field mount enclosure.

Overview application F130

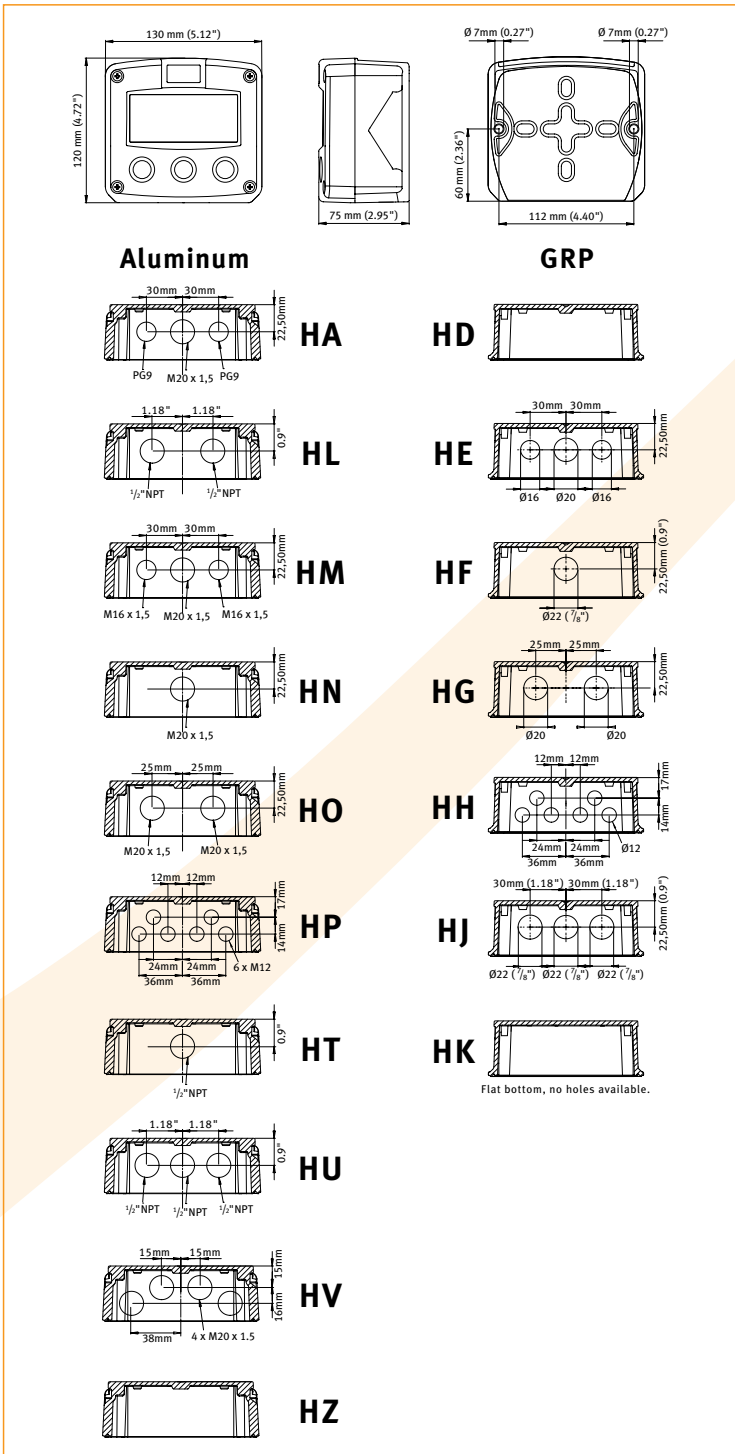


Dimensions enclosures

Aluminum & GRP panel mount enclosure



Aluminum & GRP field / wall mount enclosures

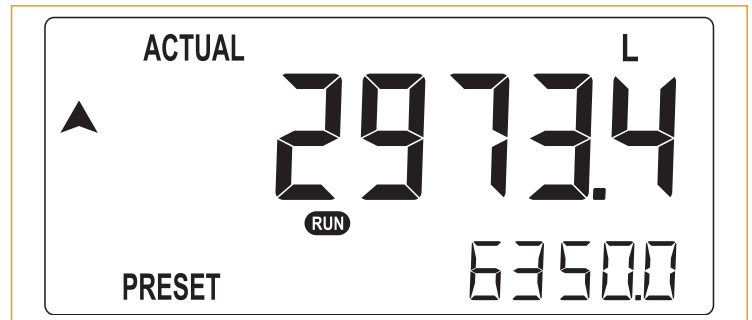


Terminal connections

Terminal No.	Signal	Notes
26	COMUNICATION	CB-RS232
27	↓ DTR +12V	CH-RS485-2 wire
28	↑ RXD	
29	↓ TXD	
30	↓ TXD	
31	↓ TXD	
20	↓	CI-RS485-4 wire
21	↓	
22	↓	
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25	↓	
15	↓	CT-TTL Intrinsically Safe
16	↑	DTR +12V
17	↓	
18	↓	
19	↓	
20	↓	
21	↓	
22	↓	
23	↓	
24	↓	
25	↓	
15	↓	R-Signal
16	↑	
17	↓	
18	↓	
19	↓	
20	↓	
21	↓	
22	↓	
23	↓	
24	↓	
25	↓	
12	↓	IR-Signal
13	↑	
14	↑	
9	↓	P-coil
10	~	
11	~	
12	~	
13	~	
14	~	
09	↓	P-resist switch / NPN
10	~	
11	~	
07	-	PX-XI 8-30V DC
08	+	
05	↓	OA-active 24VDC
06	↑	
03	↓	OA-active 24VDC
04	↑	
01	~	PD-8-24V AC
02	~	
00	~	PD-8-24V DC
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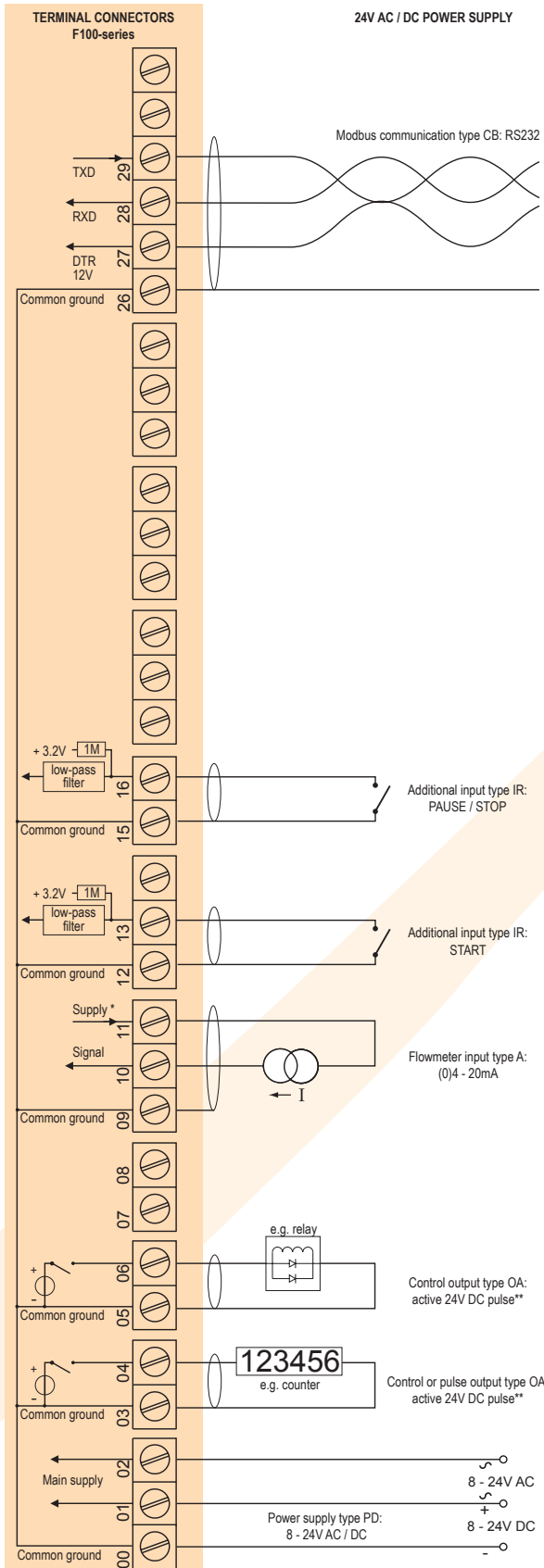
PL - input loop powered
 (terminals GND-1 - 2 are not available)

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



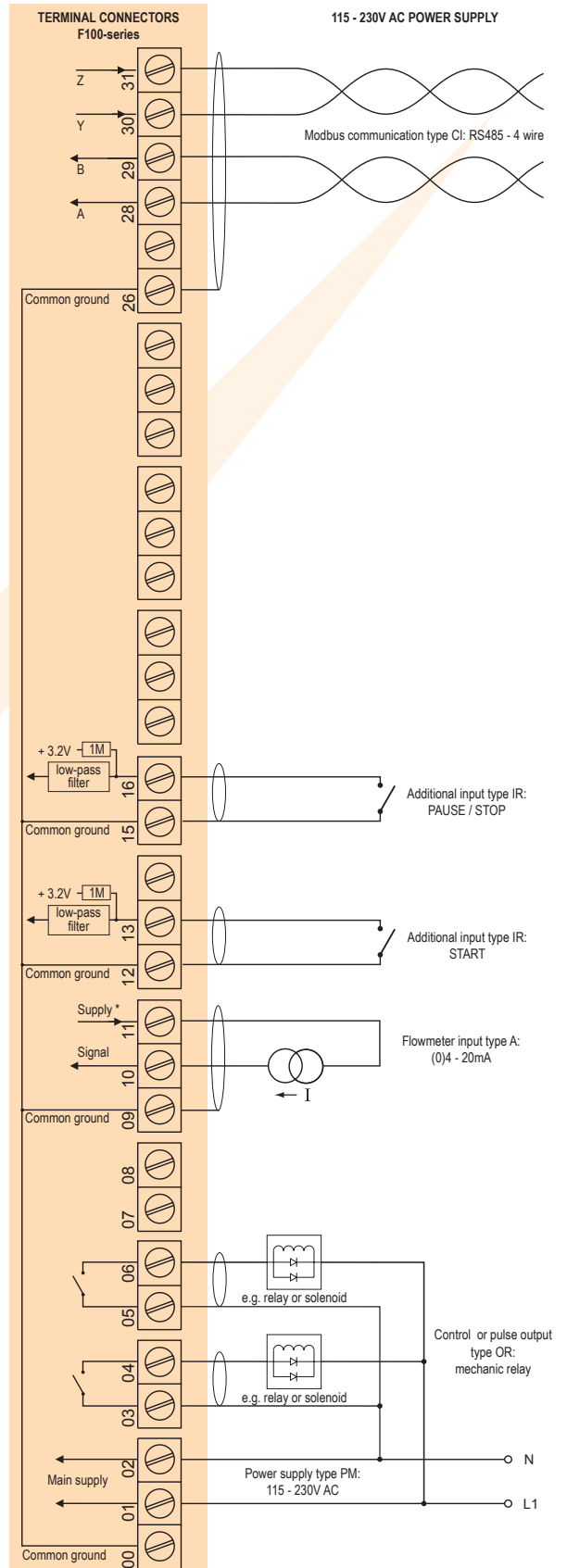
Typical wiring diagram F130-A-CB-OA-PD

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



* U_{max} sensor is 2V below U_{supply}
 U_{max} sensor: 8.2V requires 10VDC(8VAC) U_{supply}
 12V requires 14VDC(10VAC) U_{supply}
 24V requires 26VDC(18VAC) U_{supply}

** Requires min. 24V power supply



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

Hazardous area applications

The F130-XI has been certified according ATEX and IECEx by DEKRA for use in Intrinsically Safe applications with an ambient temperature of -40°C to $+70^{\circ}\text{C}$ (-40°F to $+158^{\circ}\text{F}$).

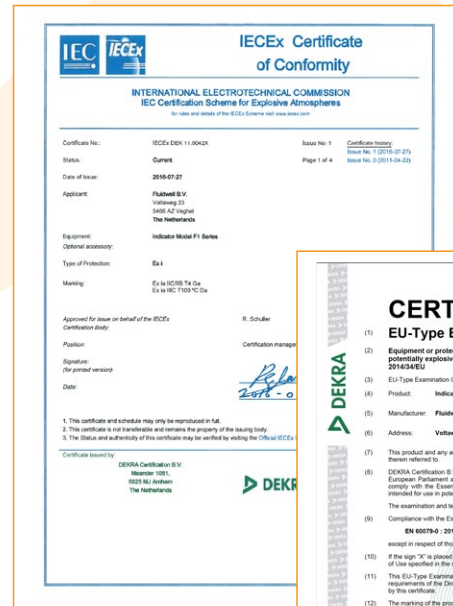
- The ATEX markings for gas and dust applications are:

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

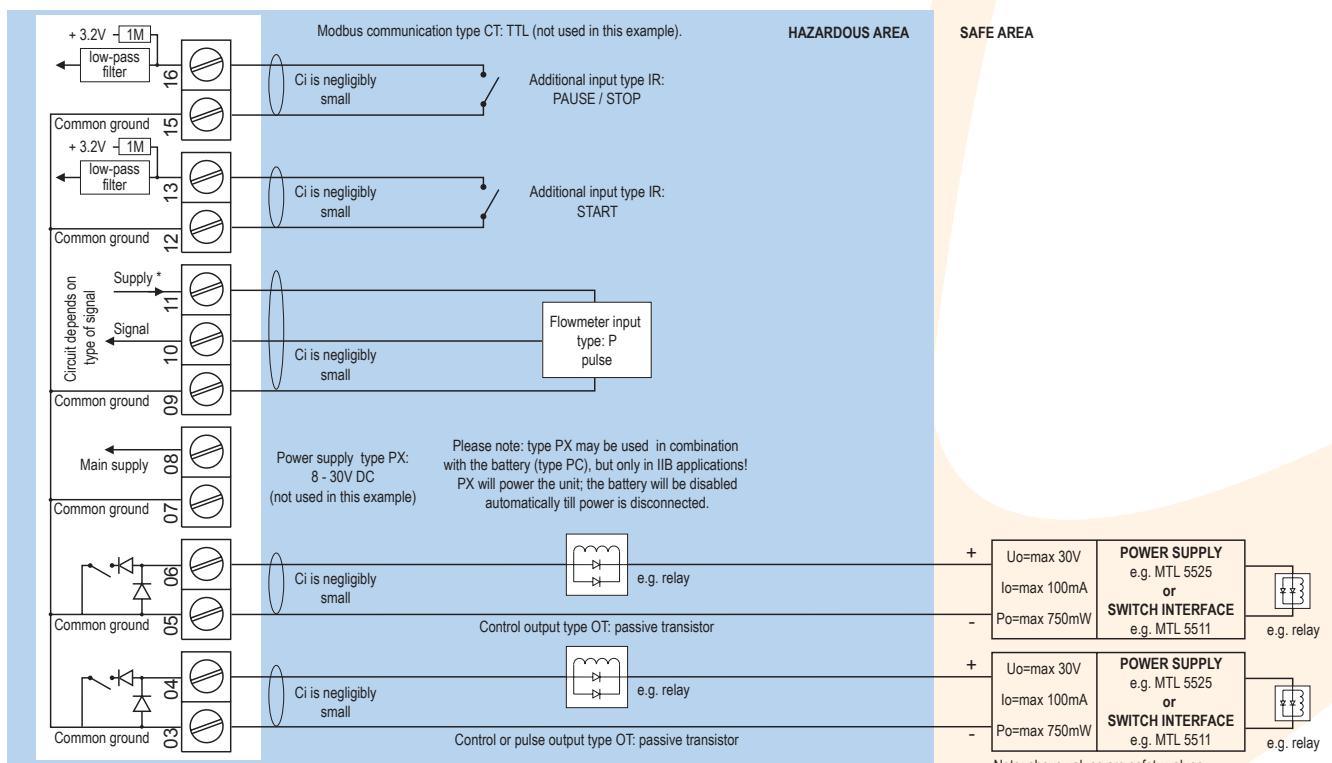
- The IECEx markings for gas and dust applications are: **Ex ia IIC/IIB T4 Ga** and **Ex ia IIIC T100 °C Da.**

Besides the I.S. power supplies for the control outputs, it is allowed to connect up to two 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 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. An ATEX approved flame proof Ex d enclosure is available as well. Please contact your supplier for further details.

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



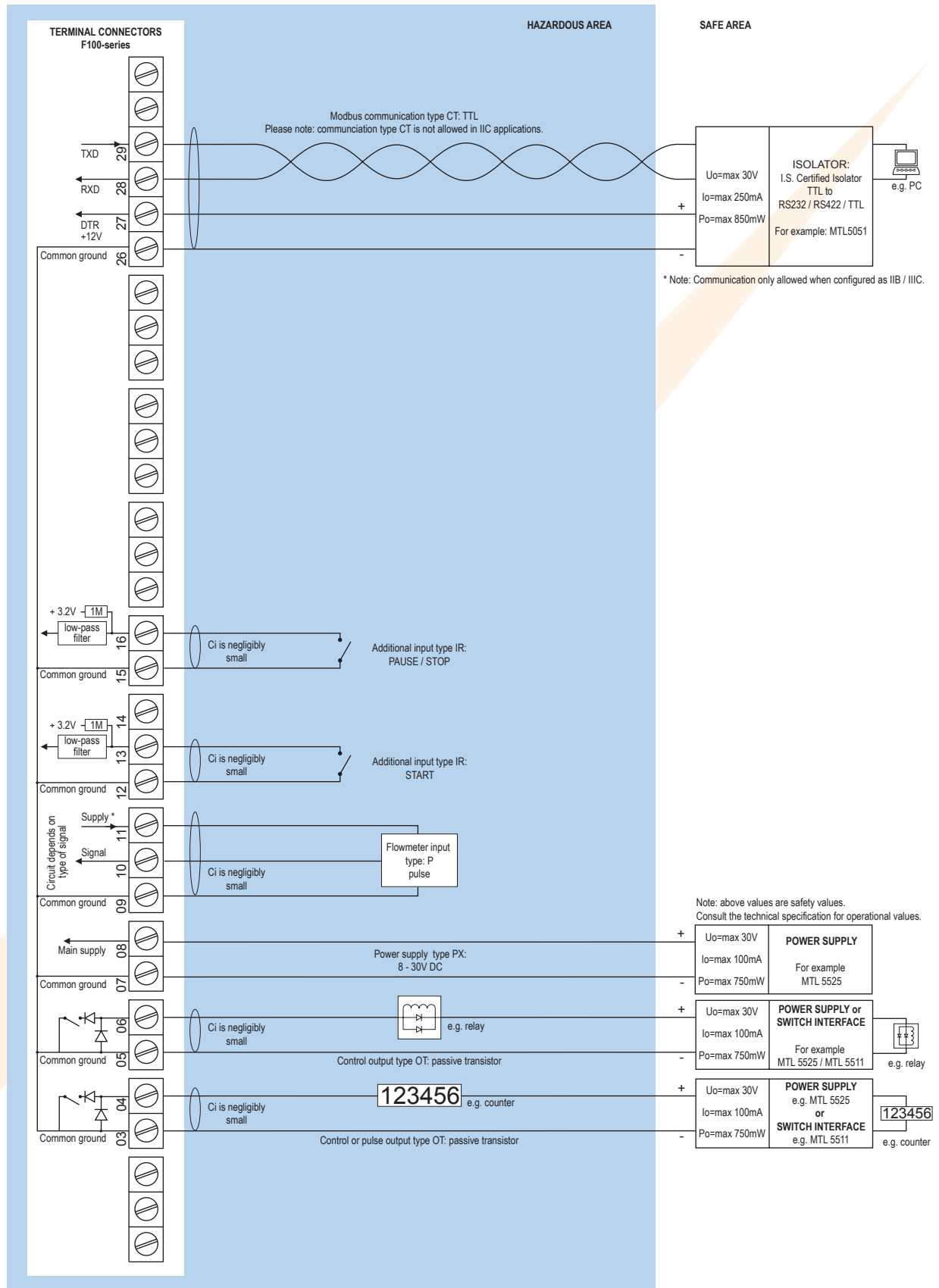
Configuration example IIB / IIIC and IIC - F130-P-OT-PC-(PX)-XI - Battery powered unit



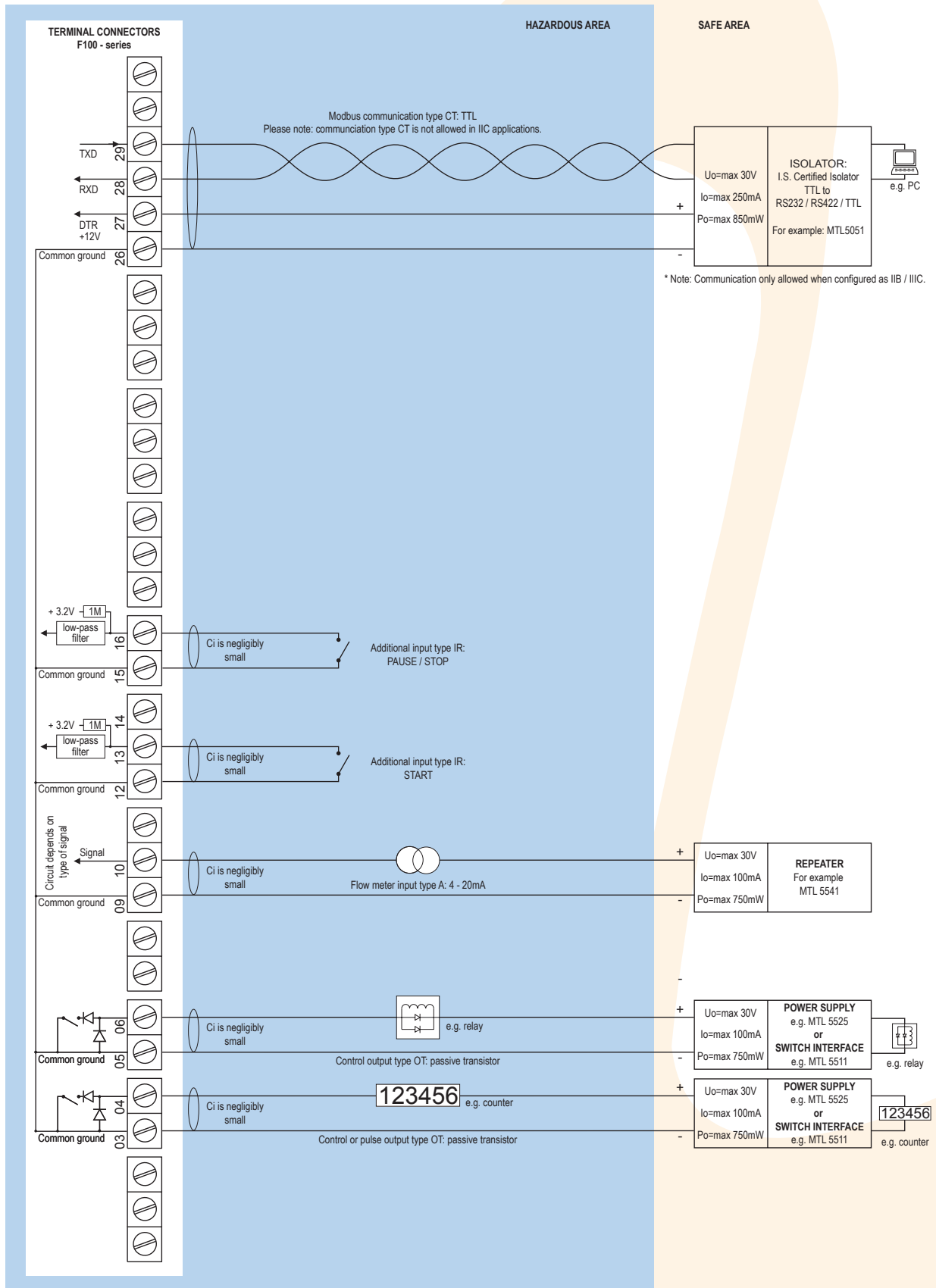
* For pulse type inputs: V_{ref}: 1.2V/3.0V available.- NO power output, available I_{supply}: <1mA.
Note: using these ref. voltages at max. load, will reduce battery life significantly.

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

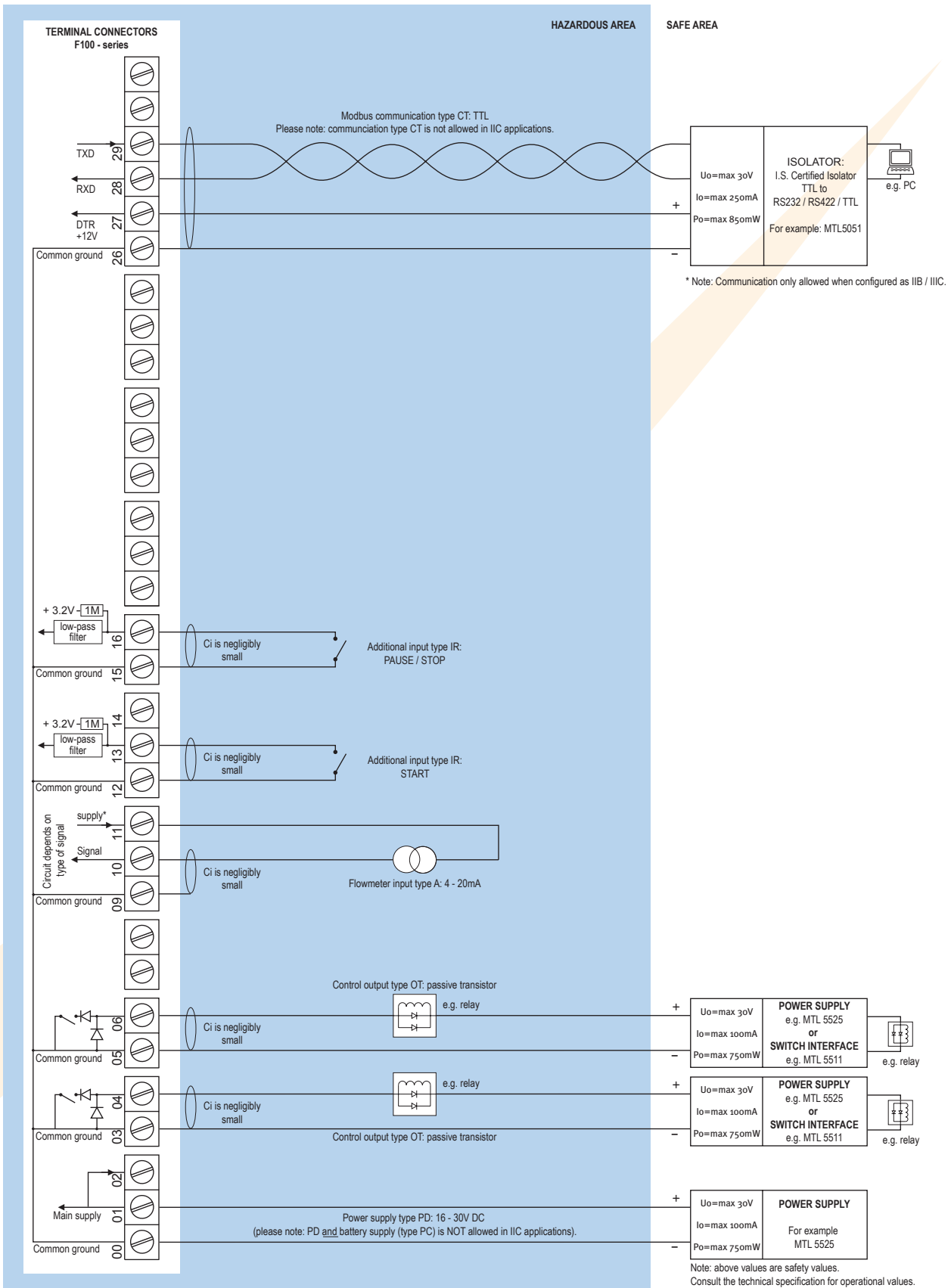
Configuration example IIB / IIIC and IIC - F130-P-(CT)-OT-(PX)-XI - Basic power requirement 8 - 30V DC



Configuration example IIB / IIIC and IIC - F130-A-(CT)-OT-PC-XI - Battery powered unit



Configuration example IIB / IIC and IIC - F130-A-(CT)-OT-PD-XI - Power requirement 16 - 30V DC



* Note power supply type PD: the supply voltage to pulse sensors is maximum 8.7V (U₀=max 8.7V I₀=max 25mA P₀=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: fast, 1sec, 3sec, 15sec, 30sec, off.
Option ZB	Transflective LCD with white LED-backlight. Good readings in full sunlight and darkness.
Note ZB	Only available for safe area applications.

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 or PX)
Type PD	8 - 24V AC / DC ± 10%. Power consumption max. 5 Watt. Intrinsically Safe: 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") - requires type OT (not Xi).
Type PM	115 - 230V AC ± 10%. Power consumption max. 15 Watt.
Type PX	8 - 30V DC. Power consumption max. 0.75 Watt.
Type ZB	12 - 30V DC ± 10%. Power consumption max. 1.5 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	3V 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 / 8.2 / 12 / 24V DC - max. 50mA @ 24V DC. U _{max} sensor is 2V below U _{supply}
Type PD-XI	1.2 / 3 / 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: 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 / 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

Enclosure

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 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: 3 x 1/2" 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 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 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.

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.

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.
IECEx certification	 Ex ia IIC/IIB T4 Ga. Ex ia IIIC T100 °C Da.
Ambient Ta	-40°C to +70°C (-40°F to +158°F).

Explosion proof (Type XF)

ATEX certification	 II 2 G / Ex d IIB T ₅ Gb. II 2 D / Ex t IIB T ₁₀₀ °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	IECEx available on request.

Signal inputs

Flowmeter

Type P	Coil / sine wave (HI: 20mVpp or LO: 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 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.
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: 14 bit. Error < 0.025mA / ± 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.
Relationship	Linear and square root calculation.
Note	For signal type A: external power to sensor is required; e.g. type PD.

Additional inputs

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

Signal outputs

Digital outputs

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. 500Hz. Pulse length user definable between 0.001 second up to 9.999 seconds.
Type OA	Two active 24V DC transistor outputs (PNP); max. 50mA per output (requires PD, PF, PM or PX). Requires min. 24V power supply.
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 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">• Preset value - can be entered by the operator.• Batched quantity or remaining quantity.• Total and accumulated total.• Total can be reset to zero by pressing the STOP-key twice.• No-flow alarm.
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Preset and 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.

Accessories

Mounting accessories

ACFo2	Stainless steel wall mounting kit.
ACFo5	Stainless steel pipe mounting kit (worm gear clamps not included).
ACFo6	Two stainless steel worm gear clamps Ø 44 - 56mm.
ACFo7	Two stainless steel worm gear clamps Ø 58 - 75mm.
ACFo8	Two stainless steel worm gear clamps Ø 77 - 95mm.
ACFo9	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.

Intrinsically Safe isolators

ACGo1	MTL5511 - One channel pulse or switch output transfer from hazardous area to safe area.
ACGo2	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).
ACGo3	MTL5541 - One channel 4 - 20mA repeater from hazardous area to safe area.
ACGo4	MTL 5051 - Bi-direction serial-data-isolator (for Modbus communication).
ACGo5	MTL5516C - Two channel pulse or switch output transfer from hazardous area to safe area.
ACGo6	MTL5513 - One channel pulse or switch output transfer from hazardous area to safe area.
ACGo7	MTL5546Y - One channel isolated driver bringing 4 - 20mA from safe area to hazardous area, HART transparent, OCD.

Ordering information

Standard configuration: F130-P-CX-HC-IR-OT-PX-XX-ZX.

Ordering information:	F130	-	-C	-H	-IX	-O	-P	-X	-Z
Flowmeter input signal									
A	⊗	(0)4 - 20mA input.							
P	⊗	Pulse input: coil, npn, pnp, namur, reed-switch.							
Communication									
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	⊗	No communication.							
Panel mount enclosures - IP65 / NEMA Type4X									
HB	⊗	Aluminum enclosure.							
HC	⊗	GRP enclosure.							
GRP field / wall mount enclosures - IP67 / NEMA Type4X									
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 / NEMA Type4X									
HA	⊗	Cable entry: 2 x PG9 + 1 x M20.							
HL	⊗	Cable entry: 2 x 1/2"NPT.							
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.							
Additional input signal									
IR	⊗	Remote control input to start, pause or stop.							
Digital output signals									
OA		Two active transistor outputs - requires PD, PF, PM or PX.							
OR		Two mechanical relay outputs - requires PF or PM.							
OT	⊗	Two passive transistor outputs - standard configuration.							
Power requirements									
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" - Requires OT (not XI).							
PM		115 - 230V AC + sensor supply.							
PX	⊗	Basic power supply 8 - 30V DC (no real sensor supply).							
Additional battery supply (optional)									
PB		Lithium battery powered - requires PD, PL or PX.							
PC	⊗	Lithium battery powered - Intrinsically Safe - requires XI, and PD or PX.							
Hazardous area									
XI	⊗	Intrinsically Safe, according ATEX and IECEx.							
XF		Ex d enclosure - 3 keys according ATEX.							
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.

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