

Batch Controller

with two stage control / pulse output



Application examples: Extreme cold weather regions



For custom single or repeating similar batches



Hot and sandy deserts

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 +70°C (-40°F up to 158°F).

Advantages

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

- Displays preset and running batch value simultaneously.
- Self-learning overrun correction.
- Easy to enter a batch value and to control the process.
- Count-up and count-down function available.
- No-flow monitoring.
- Selectable on-screen engineering units; volumetric or mass.
- Ability to process all types of signals: Sine wave (coil), NAMUR, NPN/PNP pulse, Reed-switch and Active pulse signals.
- Remote control input: Start / Pause / Stop.
- Two configurable control outputs: for two-stage control or one-stage control with scaled pulse output according to acc. total.
- Full Modbus communication RS232/485/TTL.
- Power requirements: Battery powered, 8 - 30V DC, 8 - 24V AC/DC or 115 - 230V AC.
- Sensor supply 3 / 8.2 / 12 / 24V DC.

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.

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.

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.

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.



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.

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 is ATEX and IECEx certified as Intrinsically Safe for gas applications with an allowed ambient temperature of -40°C to +70°C (-40°F to +158°F) and dust applications with an allowed ambient temperature of -40°C to +50°C (-40°F to +122°F). A flame proof Ex d enclosure with ATEX/IECEx certification is also available.



All info at a glance



Easy to install



Easy to program



Know one know them all!



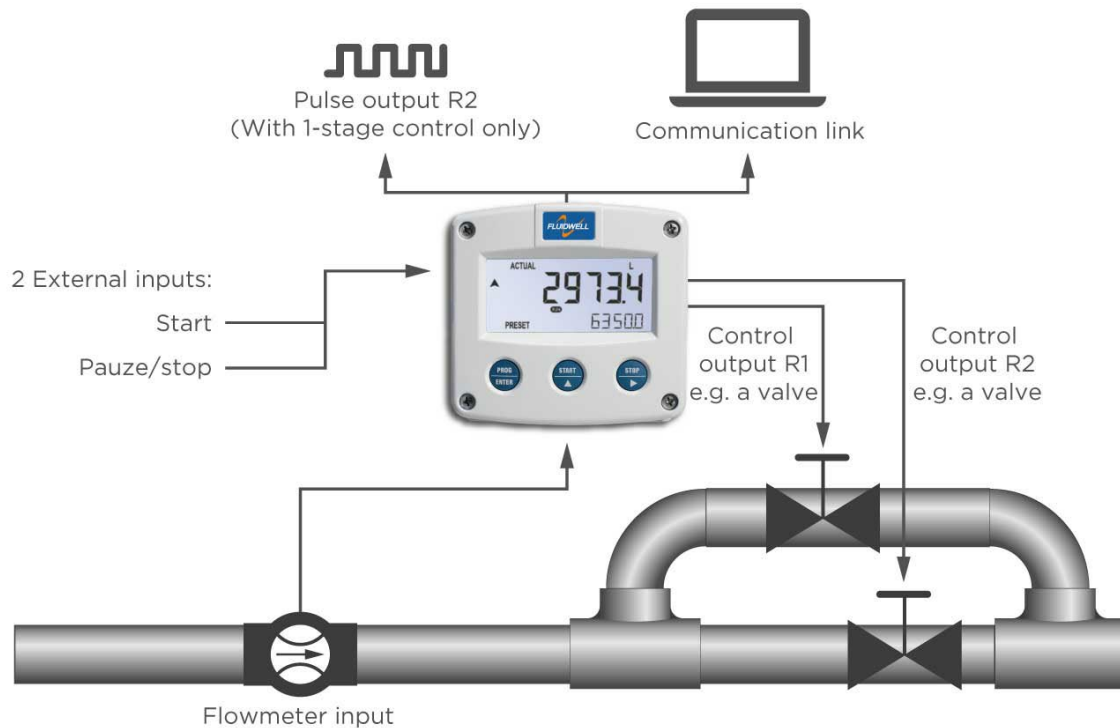
Reliable



User-friendly

Overview application F130

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 +70°C (-40°F up to 158°F). For batching small up to very large quantities. Single or repeating batches. Alternative basic model: F030 or more sophisticated models: F131, F136 or the N-Series DIN panel mount batch controllers with numerical keypad.



Signal input

The F130 will accept most pulse and analog input signals for volumetric flow or mass flow measurement. For remote control, two inputs are available to start, pause and stop the batch process.

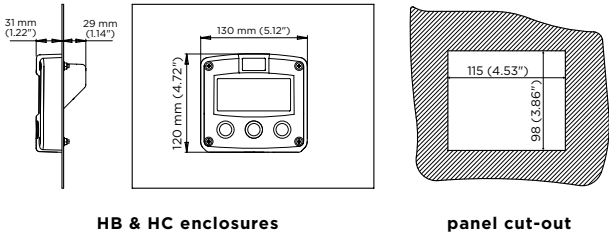
Type of signal	Resistance	Low Pass filter (LP)	Max. frequency	Max. frequency Low Pass filter (LP)	Min. amplitude P-P	Remark
NPN	100k Ω pull-up	100k Ω pull-up	6kHz Threshold 1.2V	1.2kHz		Open collector
REED	1M Ω pull-up	1M Ω pull-up	1.2kHz Threshold 1.2V	120Hz		
PNP	100K Ω pull-down	100K Ω pull-down	6kHz Threshold 1.2V	1.2kHz		
NAMUR	820 Ω pull-down	-	4kHz	-		External power required
COIL LO	-	-		-	80mV _{pp}	Default sensitivity
COIL-HI	-	-		-	20mV _{pp}	Sensitive for interference!
COIL-HI (Type ZF)	-	-		-	10mV _{pp}	
ACTIVE 8.2V DC	3K9 Ω		10kHz Threshold 4V			External power required
ACTIVE 12V DC	4K Ω		10kHz Threshold 6V			External power required
ACTIVE 24V DC	3K Ω		10kHz Threshold 12V			External power required

Enclosures

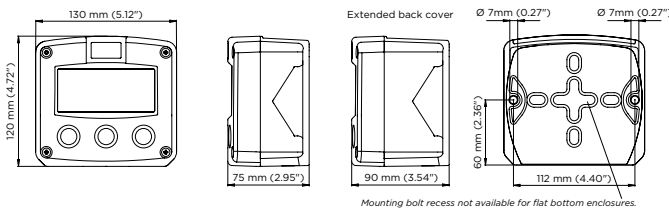
Various types of enclosures can be selected, all ATEX and IECEx approved. The F130 is supplied in an GRP panel mount enclosure as standard, which can be converted to an IP67 / Type4X GRP field mount enclosure by the addition of a back case. Most popular is our robust aluminum field mount enclosure which 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 / Type4X rating and EU or U.S. cable gland entry threads available.

Dimensions enclosures

Aluminum & GRP panel mount enclosure



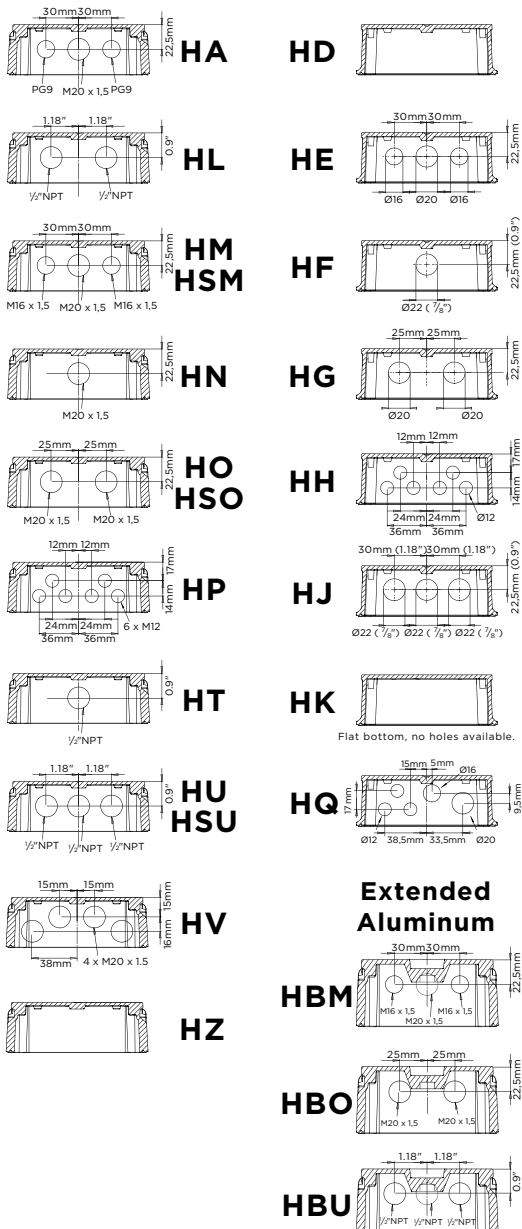
Aluminum, GRP & Stainless steel 316L field mount enclosures



Cable entries

Aluminum / Stainless Steel

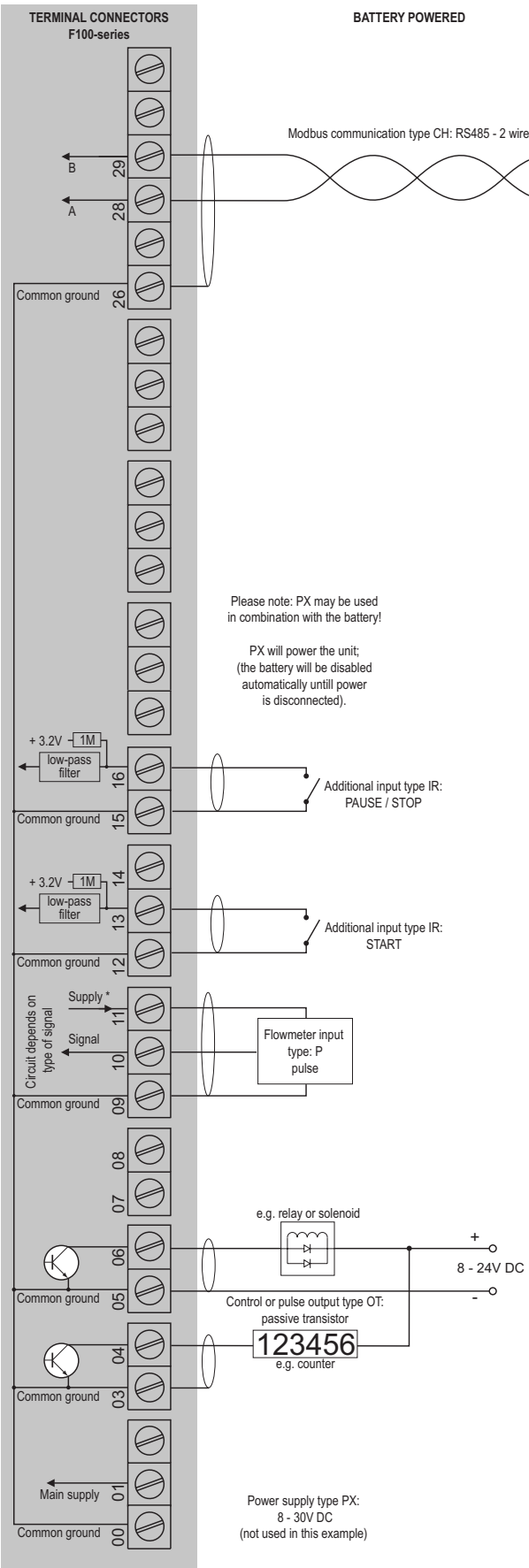
GRP



Terminal connections

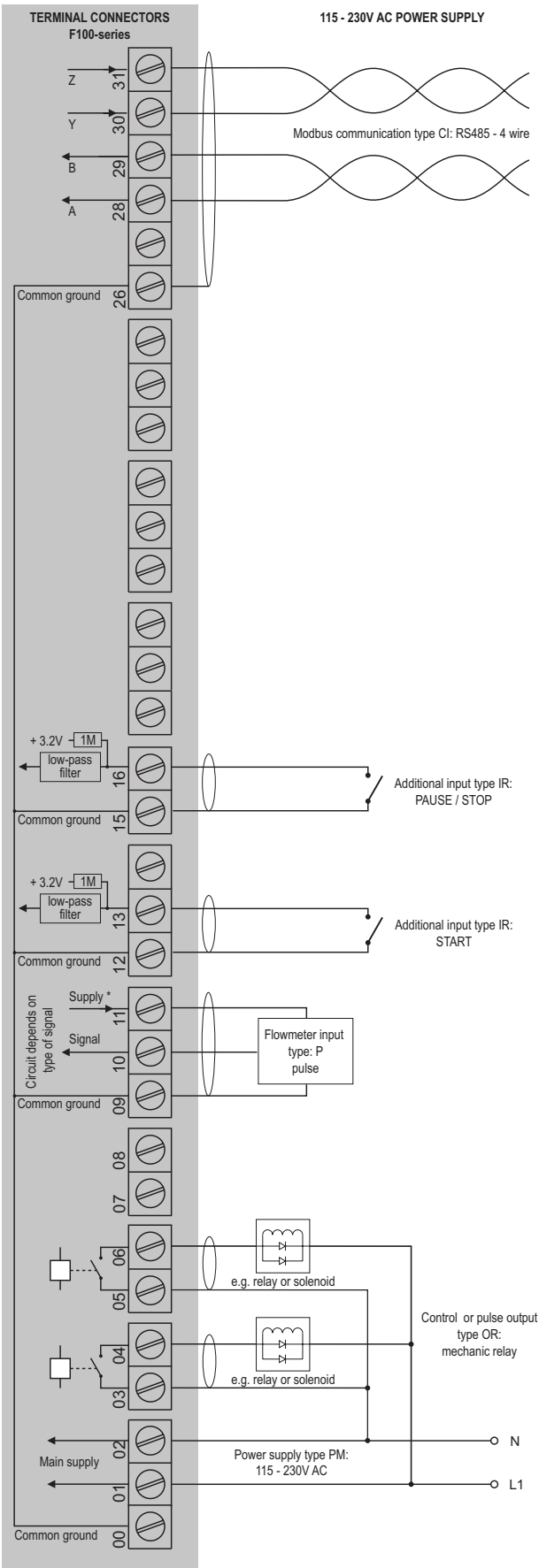
COMMUNICATION	26	27	28	29	30	31
CB RS322	DTX +12V	RXD	TXD			
CH RS485 - 2 wire	⬇	A	B			
CL RS485 - 4 wire	⬇	A	B	Y	Z	
CT TTL Intrinsically Safe	DTX +12V	RXD	TXD			
	⬇					
ADDITIONAL INPUT	17	18	19	20	21	22
ADDITIONAL INPUT	12	13	14	15	16	
IR Start input	⬇	+	+			
IR Stop input	⬇				+	+
FLOWMETER INPUT	09	10	11			
P coil	⬇	~	~			
P need action / NPN	⬇	+	+			
P PNP	⬇	-	+	+		
P tamper	⬇	-	+	+		
P active signal	⬇	-	+	+		
	⬇					
POWER REQUIREMENT	00	01	02			
PD 0 - 24V AC	~	~	~			
PD 0 - 24V DC	-	+	+			
PD-XL 18 - 30V DC	-	+	+			
CONTROL / PULSE OUTPUT / F2	03	04	05	06		
OA active 24V DC	⬇	+	+	+		
OT passive trans.	⬇	+	+	+		
OR mech. relay	≡	≡	≡	≡		
POWER REQUIREMENT	00	01	02			
PF 0 - 24V AC	~	~	~			
PF 0 - 24V DC	-	+	+			
PF 24V AC	~	~	~			
PF 24V DC	-	+	+			

Configuration example F130-P-CH-OT-PX-XX-ZX



* 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.

Configuration example F130-P-CI-OR-PM-XX-ZX



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

Hazardous area applications

The F130-XI has been certified according to 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). For equipment category Dust, zone 20 (1 D / EPL Da), the maximum ambient temperature is limited to 50°C (+122°F) and a maximum dust layer thickness of 200mm.

- The ATEX markings for gas and dust applications are:

Gas: **II 1 G Ex ia IIB/IIC T4 Ga.**

Dust: **II 1 D Ex ia IIIC T₂₀₀ 100 °C Da.**

- The IECEx markings for gas and dust applications are:

Gas: **Ex ia IIC/IIB T4 Ga.**

Dust: **Ex ia IIIC T₂₀₀ 100 °C Da.**

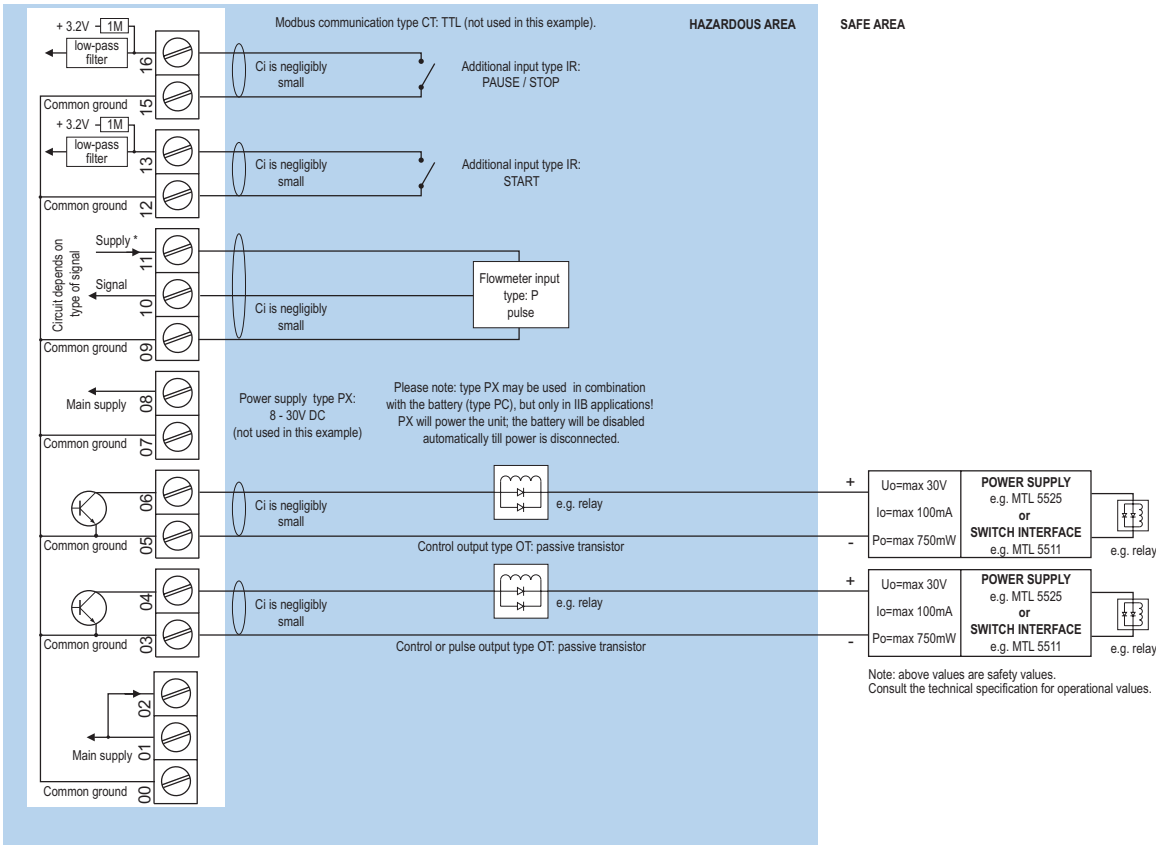
Besides the I.S. power supplies for the control outputs, it is allowed to connect up to two I.S. power supplies in IIB/IIC applications. Consult the certificate for the maximum input and output values of the circuits. Full functionality of the F130 remains available, including two stage control, pulse 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/IECEx 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

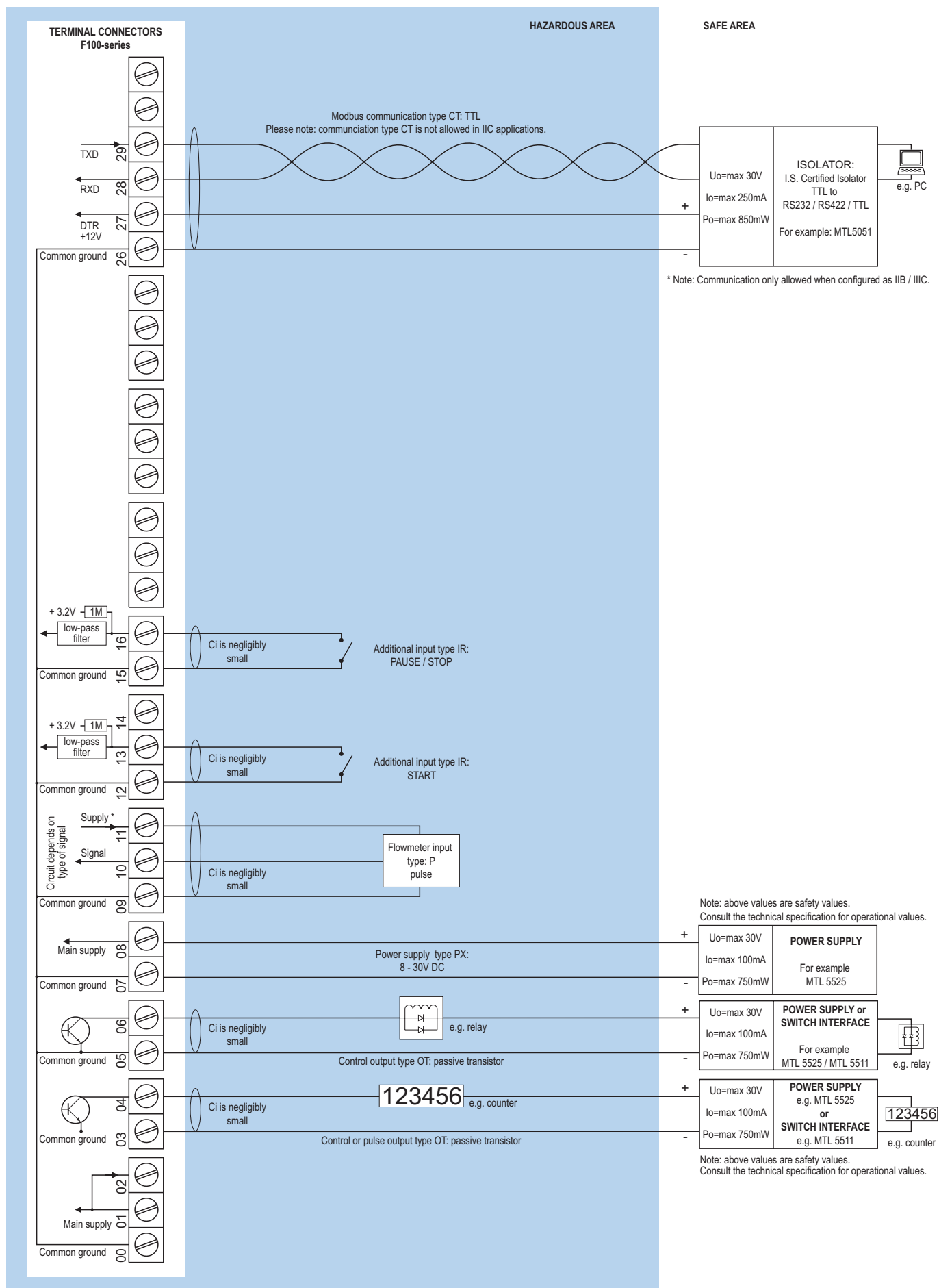


Configuration example IIB / IIIC and IIC - F130-P-OT-PC-(PX)-XI - Battery powered unit



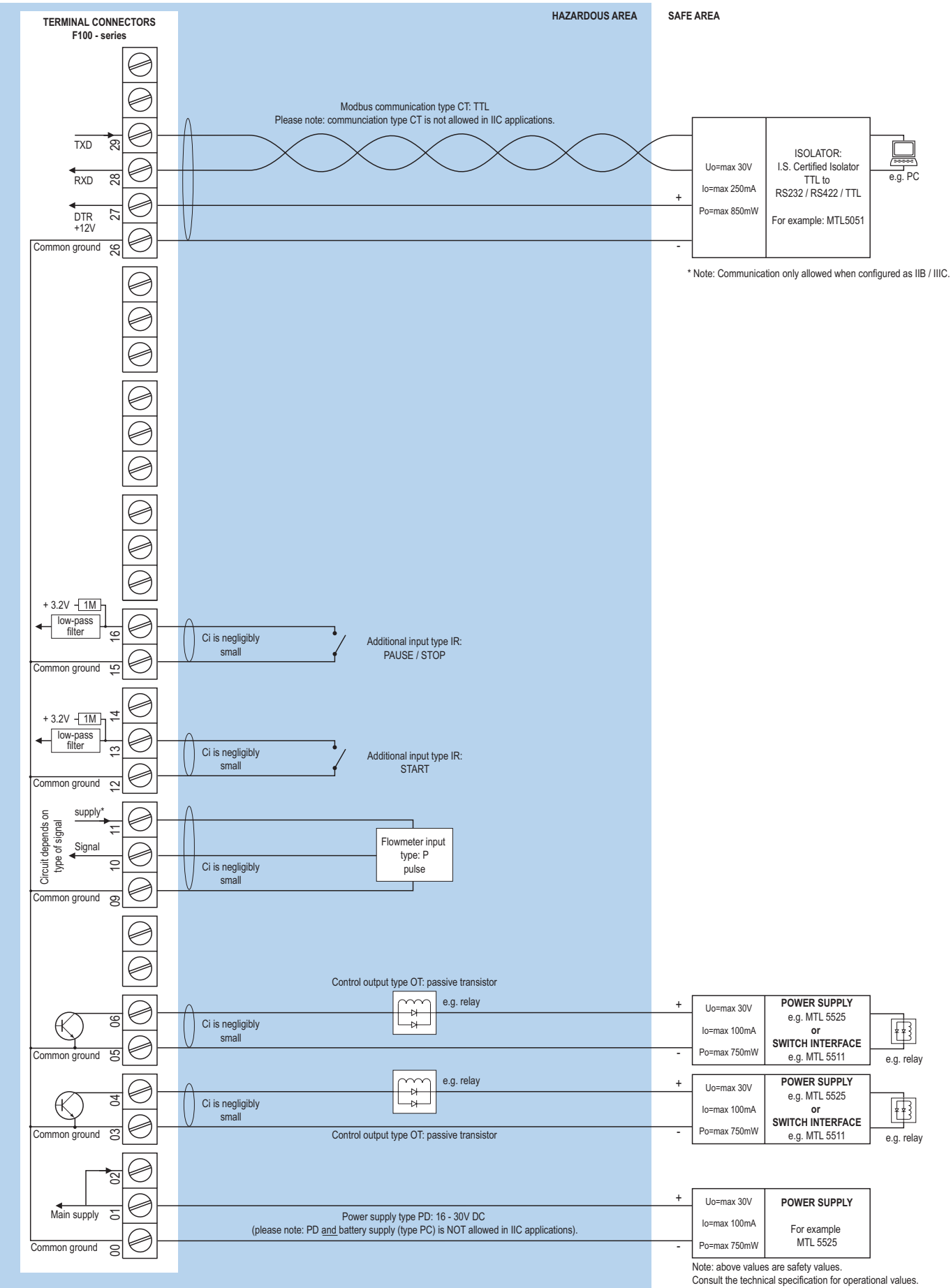
* For pulse type inputs: V_{ref}: 1.2V/3.0V available.- NO power output, available I_{supply}: <1mA.
Note: using these ref. voltages at max. load will reduce battery life significantly

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



* 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 IIC applications: Only one power supply is allowed in IIC applications.

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



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

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.
Note ZB	Only available for safe area applications.

Ambient temperature

Safe areas	-40°C to +70°C (-40°F to +158°F).
Intrinsically Safe	-40°C to +70°C (-40°F to +158°F).
Dust, zone 20	-40°C to +50°C (-40°F to +122°F).

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	EN 61326-1, FCC 47 CFR part 15.
Low voltage	EN/IEC 61010-1, CSA C22.2 No.61010-1, UL61010-1
ATEX (Type XI)	EN IEC 600079-0, EN 60079-11.
IECEX (Type XI)	IEC 600079-0, IEC 60079-11.
RoHS	EN 50581, IEC 63000
IP & NEMA	EN 60529, ANSI/IEC 60529, NEMA 250

Intrinsically Safe (Type XI)

ATEX	Gas: II 1 G Ex ia IIB/IIC T4 Ga. Dust: II 1 D Ex ia IIIC T ₂₀₀ 100 °C Da.
IECEX	Gas: Ex ia IIC/IIB T4 Ga. Dust: Ex ia IIIC T ₂₀₀ 100 °C Da.
Ambient Ta	-40°C to +70°C (-40°F to +158°F).
Dust, zone 20	-40°C to +50°C (-40°F to +122°F).

Explosion proof (Type XF)

ATEX/IECEX	Gas: II 2 G Ex db IIB+H2 T5 Gb. Dust: II 2 D Ex tb IIIC T80°C.
Protection	IP66
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.

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 / Type4X.
Weight	600 gr.
Type HC	GRP panel mount enclosure IP65 / Type4X, UV-resistant and flame retardant.
Weight	450 gr.
Type HSB	Die-cast stainless steel 316L IP67 / Type4X.
Weight	1150gr.

GRP wall / field mount enclosures

General	GRP wall/field mount enclosure IP67 / 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.
Type HQ	Cable entry: 1 x Ø 20mm, 1 x Ø 16mm & 3 x Ø 12mm.

Aluminum wall / field mount enclosures

General	Die-cast aluminum wall/field mount enclosure IP67 / 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 HU/HBU	Cable entry: 3 x 1/2" NPT.
Type HV	Cable entry: 4 x M20.
Type HZ	Cable entry: no holes.

Stainless steel 316L wall / field mount enclosures

General	Die-cast stainless steel 316L wall / field mount enclosure with flat bottom. IP67 / 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: 80mVpp - 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.

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 output

Function	User defined: batch process one or two stage control - scaled pulse output according the running batch or according accumulated total.
Frequency	Max. 500Hz. Pulse width 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 min. 24V power supply
Type OR	Two electro-mechanical relay outputs isolated max. switch power 230V AC (N.O.) - 0.5A per relay (requires PF or PM).
Type OT	Two passive transistor outputs (NPN) - not isolated. Max. 50V DC - 300mA per output.

Signal outputs - 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.

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, PL or PX)
Type PD	8 - 24V AC / 8 - 30V DC. Power consumption max. 5W.
Type PD-XI	6 - 30V DC; powerconsumption max. 1W.
Type PD-ZB:	10 - 24V AC / 12 - 30V DC; Power consumption max. 5W.
Type PF	15 - 24V AC / 20 - 30V DC. Power consumption max. 15W.
Type PM	115 - 230V AC. Power consumption max. 15W.
Type PX	8 - 30V DC. Power consumption max. 0.75W.
Type PX-ZB:	12 - 30V DC; Power consumption max. 1.5W.
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 XI	For Intrinsically Safe applications, consult the safety values in Annex 1 of the certificate.

Sensor excitation

Type PB/PC	3V DC for pulse signals and 1.2V DC for coil pick-up - max. 0,1mA.
Type PX	3V DC for pulse signals and 1.2V DC for coil pick-up - max. 1mA.
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 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).
Type PF	1.2 / 3 / 8.2 / 12 / 24V DC max. 50mA @ 8.2/12/24V DC.
Type PM	1.2 / 3 / 8.2 / 12 / 24V DC max. 50mA @ 8.2/12V DC or 400mA @ 24V DC.

Operator functions

Displayed info	• Preset value - can be entered by the operator. • Batched quantity or remaining quantity. • Total and accumulated total • No-flow alarm. • Total can be reset to zero by pressing the STOP-key twice.
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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.

	Description	
Model	F130	Batch controller with two stage control / pulse output.
Input	P	Pulse input, e.g., coil, npn, pnp, namur, reed-switch.
Communication	CB	Communication RS 232 - Modbus ASCII / RTU - requires XX.
	CH	Communication RS 485 - 2wire - Modbus ASCII / RTU - requires XX.
	CI	Communication RS 485 - 4wire - Modbus ASCII / RTU - requires XX.
	CT	Intrinsically Safe TTL - Modbus ASCII / RTU - requires XI.
	CX	No communication.
Enclosures	HB	Aluminum panel mount enclosure.
	HC	GRP panel mount enclosure.
	HSB	Stainless steel 316L 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 ($\frac{7}{8}$ ").
	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 ($\frac{7}{8}$ ").
	HK	GRP field mount - Flat bottom, cable entry: no holes.
	HQ	GRP field mount - Cable entry: 1 x Ø 20mm, 1 x Ø 16mm & 3 x Ø 12mm.
	HA	Aluminum field mount - Cable entry: 2 x PG9 + 1 x M20.
	HL	Aluminum field mount - Cable entry: 2 x $\frac{1}{2}$ "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 $\frac{1}{2}$ "NPT.
	HU	Aluminum field mount - Cable entry: 3 x $\frac{1}{2}$ "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.
	HBO	Extended Alu. field/meter mount - Cable entry: 2 x M20.
	HBU	Extended Alu. field/meter mount - Cable entry: 3 x $\frac{1}{2}$ "NPT.
	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 $\frac{1}{2}$ "NPT.
Additional	IR	Remote control input to start, pause or stop.
Digital output	OA	Two active transistor outputs- requires XX.
	OR	Two mechanical relay outputs - requires XX and PF or PM.
	OT	Two passive transistor outputs.
Power	PD	8 - 24V AC/DC + sensor supply - with XI: 16 - 30V DC.
	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 (optional) - requires XX and PD or PX.
	PC	Additional lithium battery powered (optional) - Intrinsically safe - requires XI, and PD or PX.
Hazardous	XI	Intrinsically safe, according ATEX and IECEx.
	XF	Ex d enclosure - 3 keys according ATEX and IECEx.
	XX	Safe area only, according CE / UKCA.
Options	ZB	Backlight - requires XX.
	ZF	Coil input 10mVpp.
	ZX	No options.

The **bold** marked text contains the standard configuration: F130-P-CX-HC-IR-OT-PX-XX-ZX.