

Your success counts

Differential Flow Computer

with temperature compensation for corrected liquid volume with pulse and analog outputs



Application examples: Salty Off-Shore conditions



Extreme cold weather at polar regions



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 $+80^{\circ}\text{C}$ (-40°F up to 176°F).

Advantages

- Robust aluminum or stainless steel 316L field enclosure (IP67 / NEMA 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 compensated differential flow rate (consumption), total and accumulated. total.
- Supply & return line: displays temp. and compensated flow rate.
- Ability to process all types of signals: Sine wave (coil), NAMUR, NPN/PNP pulse, Reed-switch, Active pulse signals. PT100 - 2 or 3 wire.
- Scaled pulse output according to differential / sum acc. total.
- Negative or decreasing total indication.
- Analog output according to compensated differential flow rate (consumption).
- Full Modbus communication RS232/485/TTL.
- Power requirements: Loop or battery powered, 8 - 30V DC, 8 - 24V AC/DC or 115 - 230V AC.
- Sensor supply 3 / 8.2 / 12 / 24V DC.
- Auto backup of settings and running totals.

Introduction

The flowcomputer Model F127 has been developed to calculate corrected differential liquid volume at normal conditions for generic products. A typical application is the measurement of fuel consumption by engines for power generators, e.g. on board ships and locomotives. The usual difficulties encountered in such applications include: pulsating flows, very low consumption readings, vibration and high ambient temperatures. These are all well catered for in the design and operation of the F127. The corrected volumetric flow in each line is calculated using the thermal expansion coefficient algorithm stored in the flowcomputer. The reference temperature can be defined as desired, e.g. 15°C, 20°C or 60°F.

Display

The display has large 17mm (0.67") and 8mm (0.31") digits which can be set to show flow rate, total and temperature. On-screen engineering units are easily configured from a comprehensive menu. The accumulated total registers up to 11 digits and is 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.



Pulse output

One scaleable pulse output, reflects the count on the compensated accumulated display. The second output is configurable as pulse, negative or decreasing total output. The pulse length is user defined and the maximum output frequency is 500Hz. The output signal can be a passive NPN, active PNP or an isolated electro-mechanical relay.

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).

Analog output signal

The calculated differential flow rate (consumption) is re-transmitted with the (0)4 - 20mA or 0 - 10V DC output signal. The output signal is updated eight times per second with a filter function being available to smoothen out the signal if desired. The output value is user defined in relation to the flow rate, e.g. 4mA equals to 15L/Hr and 20mA equals to 2000L/Hr. The output signal can be passive, active or isolated where the passive output type will loop power the F127 as well.

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.



All info at a glance



Easy to install



Easy to program



Know one know them all!



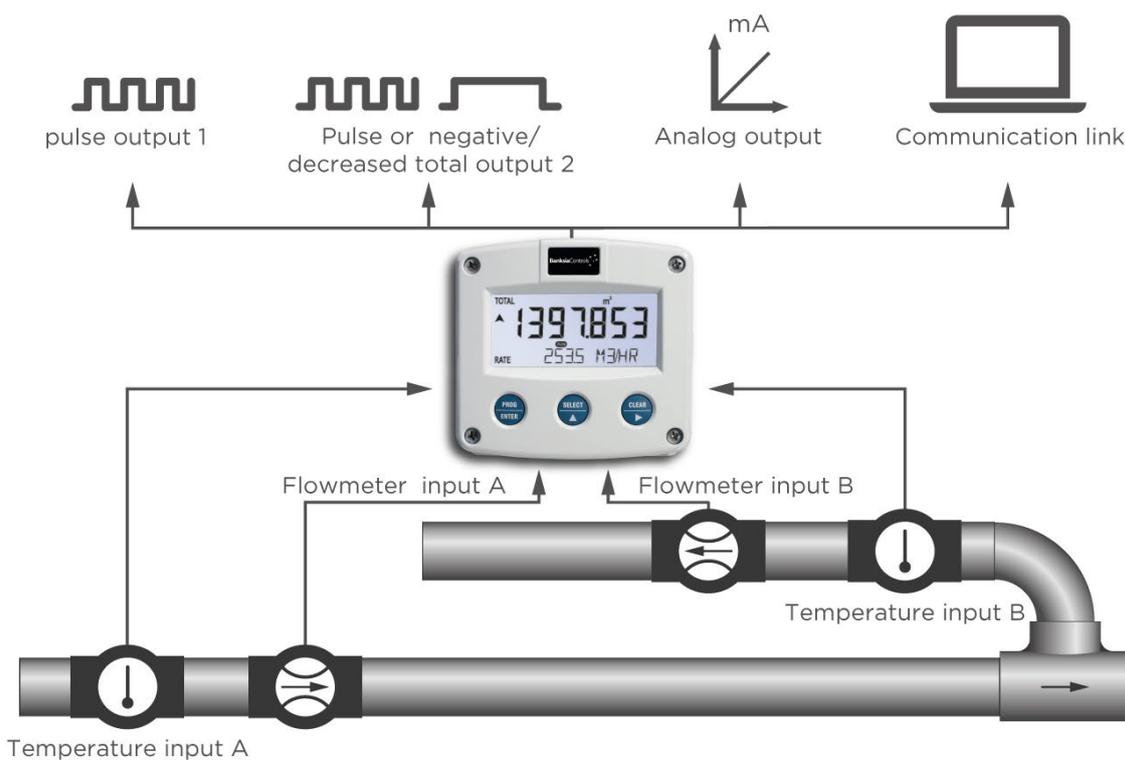
Reliable



User-friendly

Overview application F127

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). Fuel consumption calculation for diesel engines on board of ships or locomotives, generators or burners. Alternative basic model: F116.



Signal input

The flowcomputer measures the uncorrected volumetric flow and temperature in both supply and return line. The F127 will accept most pulse input signals for flow. For the temperature measurement, 2 or 3 wire PT100 elements or 4 - 20mA analog input can be used.

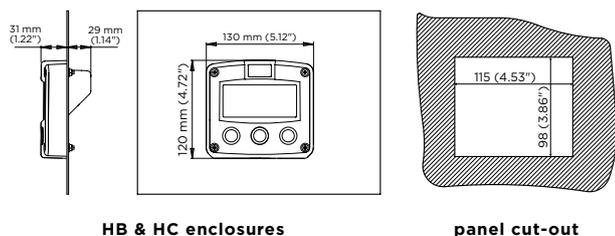
Type of signal	Resistance	Low Pass filter (LP)	Max. frequency	Max. frequency Low Pass filter (LP)	Min. amplitude p-p	Remark
NPN	100kΩ pull-up	100kΩ pull-up	6kHz Threshold 1.2V	1.2kHz		Open collector
REED	1MΩ pull-up	1MΩ pull-up	1.2kHz Threshold 1.2V	120Hz		
PNP	100KΩ pull-down	100KΩ pull-down	6kHz Threshold 1.2V	1.2kHz		
NAMUR	820Ω 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	3K9Ω		10kHz Threshold 4V			External power required
ACTIVE 12V DC	4KΩ		10kHz Threshold 6V			External power required
ACTIVE 24V DC	3KΩ		10kHz Threshold 12V			External power required

Enclosures

Various types of enclosures can be selected, all ATEX and IECEx approved. The F127 is supplied in an GRP panel mount enclosure as standard, which can be converted to an IP67 / NEMA 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 / NEMA Type4X rating and EU or U.S. cable gland entry threads available.

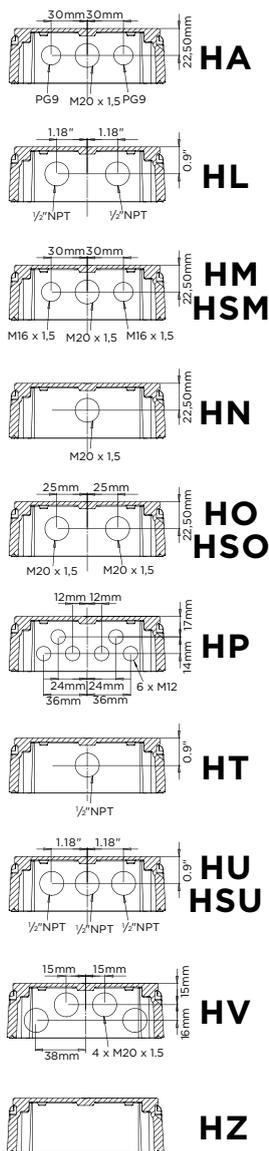
Dimensions enclosures

Aluminum & GRP panel mount enclosure

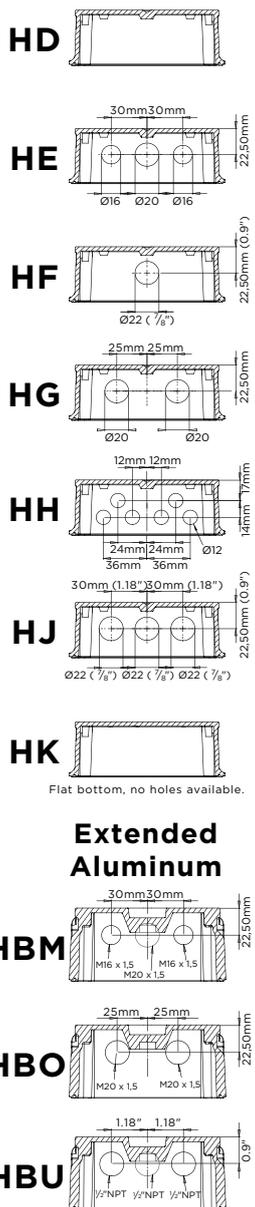


Cable entries

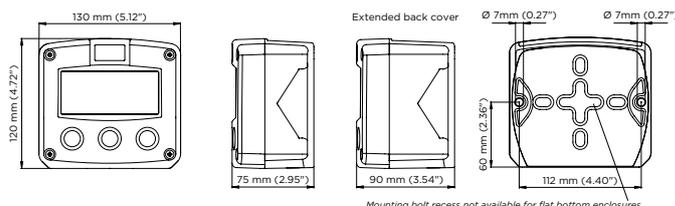
Aluminum / Stainless Steel



GRP



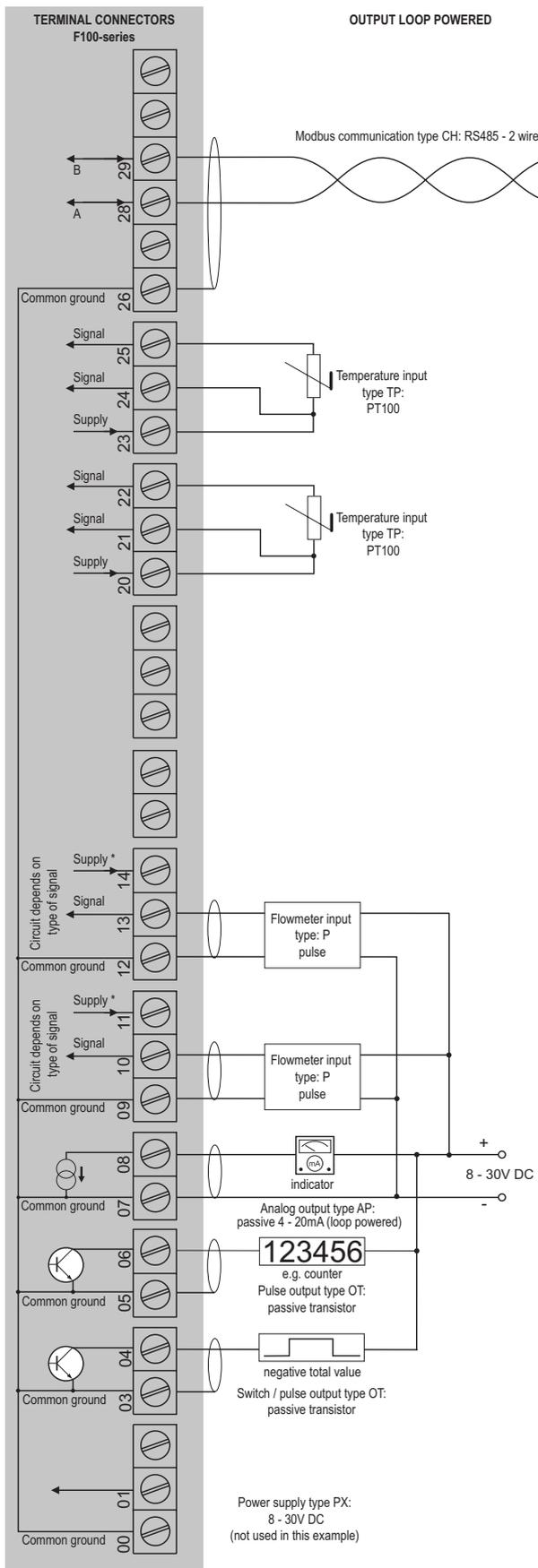
Aluminum, GRP & Stainless steel 316L field mount enclosures



Terminal connections

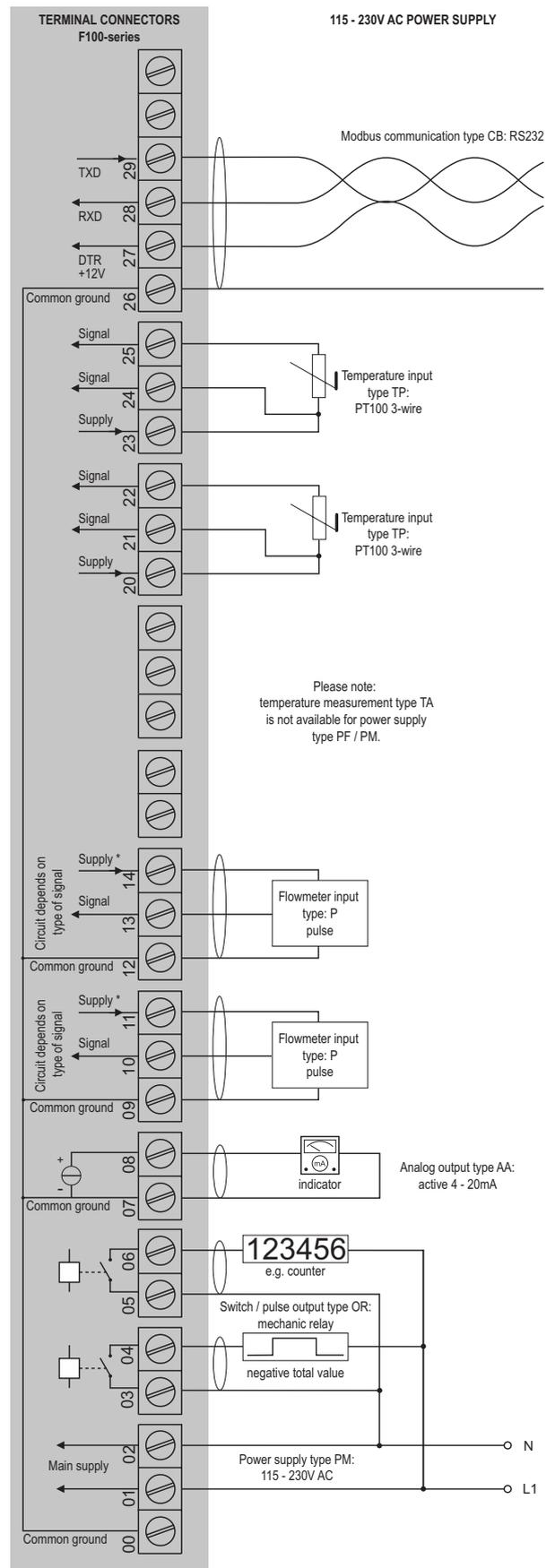
Terminal	COMMUNICATION	TEMPERATURE INPUTS (return line)	TEMPERATURE INPUTS (supply line)	FLOWMETER INPUT (return line)	FLOWMETER INPUT (supply line)	ANALOG OUTPUT	PULSE OUTPUT 1	NEGATIVE INCREASE TOTAL OR PULSE OUTPUT 2	POWER REQUIREMENTS
26	COM1 TXD	TP-PT100 2-wire	TP-PT100 2-wire	P-coil	P-coil	AI 4...20mA	OK active 24V DC	OK active 24V DC	00 01 02 ~
27	COM2 TXD	TP-PT100 3-wire	TP-PT100 3-wire	P-coil	P-coil	AI 0...20mA	OK passive 24V DC	OK mech. relay	00 01 02 +
28	COM3 TXD	TP-PT100 2-wire	TP-PT100 2-wire	P-coil	P-coil	AI 4...20mA	OK active 24V DC	OK active 24V DC	00 01 02 ~
29	COM4 TXD	TP-PT100 3-wire	TP-PT100 3-wire	P-coil	P-coil	AI 0...20mA	OK passive 24V DC	OK mech. relay	00 01 02 +
30	COM5 TXD	TP-PT100 2-wire	TP-PT100 2-wire	P-coil	P-coil	AI 4...20mA	OK active 24V DC	OK active 24V DC	00 01 02 ~
31	COM6 TXD	TP-PT100 3-wire	TP-PT100 3-wire	P-coil	P-coil	AI 0...20mA	OK passive 24V DC	OK mech. relay	00 01 02 +
32	COM7 TXD	TP-PT100 2-wire	TP-PT100 2-wire	P-coil	P-coil	AI 4...20mA	OK active 24V DC	OK active 24V DC	00 01 02 ~
33	COM8 TXD	TP-PT100 3-wire	TP-PT100 3-wire	P-coil	P-coil	AI 0...20mA	OK passive 24V DC	OK mech. relay	00 01 02 +
34	COM9 TXD	TP-PT100 2-wire	TP-PT100 2-wire	P-coil	P-coil	AI 4...20mA	OK active 24V DC	OK active 24V DC	00 01 02 ~
35	COM10 TXD	TP-PT100 3-wire	TP-PT100 3-wire	P-coil	P-coil	AI 0...20mA	OK passive 24V DC	OK mech. relay	00 01 02 +
36	COM11 TXD	TP-PT100 2-wire	TP-PT100 2-wire	P-coil	P-coil	AI 4...20mA	OK active 24V DC	OK active 24V DC	00 01 02 ~
37	COM12 TXD	TP-PT100 3-wire	TP-PT100 3-wire	P-coil	P-coil	AI 0...20mA	OK passive 24V DC	OK mech. relay	00 01 02 +
38	COM13 TXD	TP-PT100 2-wire	TP-PT100 2-wire	P-coil	P-coil	AI 4...20mA	OK active 24V DC	OK active 24V DC	00 01 02 ~
39	COM14 TXD	TP-PT100 3-wire	TP-PT100 3-wire	P-coil	P-coil	AI 0...20mA	OK passive 24V DC	OK mech. relay	00 01 02 +
40	COM15 TXD	TP-PT100 2-wire	TP-PT100 2-wire	P-coil	P-coil	AI 4...20mA	OK active 24V DC	OK active 24V DC	00 01 02 ~
41	COM16 TXD	TP-PT100 3-wire	TP-PT100 3-wire	P-coil	P-coil	AI 0...20mA	OK passive 24V DC	OK mech. relay	00 01 02 +
42	COM17 TXD	TP-PT100 2-wire	TP-PT100 2-wire	P-coil	P-coil	AI 4...20mA	OK active 24V DC	OK active 24V DC	00 01 02 ~
43	COM18 TXD	TP-PT100 3-wire	TP-PT100 3-wire	P-coil	P-coil	AI 0...20mA	OK passive 24V DC	OK mech. relay	00 01 02 +
44	COM19 TXD	TP-PT100 2-wire	TP-PT100 2-wire	P-coil	P-coil	AI 4...20mA	OK active 24V DC	OK active 24V DC	00 01 02 ~
45	COM20 TXD	TP-PT100 3-wire	TP-PT100 3-wire	P-coil	P-coil	AI 0...20mA	OK passive 24V DC	OK mech. relay	00 01 02 +
46	COM21 TXD	TP-PT100 2-wire	TP-PT100 2-wire	P-coil	P-coil	AI 4...20mA	OK active 24V DC	OK active 24V DC	00 01 02 ~
47	COM22 TXD	TP-PT100 3-wire	TP-PT100 3-wire	P-coil	P-coil	AI 0...20mA	OK passive 24V DC	OK mech. relay	00 01 02 +
48	COM23 TXD	TP-PT100 2-wire	TP-PT100 2-wire	P-coil	P-coil	AI 4...20mA	OK active 24V DC	OK active 24V DC	00 01 02 ~
49	COM24 TXD	TP-PT100 3-wire	TP-PT100 3-wire	P-coil	P-coil	AI 0...20mA	OK passive 24V DC	OK mech. relay	00 01 02 +
50	COM25 TXD	TP-PT100 2-wire	TP-PT100 2-wire	P-coil	P-coil	AI 4...20mA	OK active 24V DC	OK active 24V DC	00 01 02 ~
51	COM26 TXD	TP-PT100 3-wire	TP-PT100 3-wire	P-coil	P-coil	AI 0...20mA	OK passive 24V DC	OK mech. relay	00 01 02 +
52	COM27 TXD	TP-PT100 2-wire	TP-PT100 2-wire	P-coil	P-coil	AI 4...20mA	OK active 24V DC	OK active 24V DC	00 01 02 ~
53	COM28 TXD	TP-PT100 3-wire	TP-PT100 3-wire	P-coil	P-coil	AI 0...20mA	OK passive 24V DC	OK mech. relay	00 01 02 +
54	COM29 TXD	TP-PT100 2-wire	TP-PT100 2-wire	P-coil	P-coil	AI 4...20mA	OK active 24V DC	OK active 24V DC	00 01 02 ~
55	COM30 TXD	TP-PT100 3-wire	TP-PT100 3-wire	P-coil	P-coil	AI 0...20mA	OK passive 24V DC	OK mech. relay	00 01 02 +
56	COM31 TXD	TP-PT100 2-wire	TP-PT100 2-wire	P-coil	P-coil	AI 4...20mA	OK active 24V DC	OK active 24V DC	00 01 02 ~
57	COM32 TXD	TP-PT100 3-wire	TP-PT100 3-wire	P-coil	P-coil	AI 0...20mA	OK passive 24V DC	OK mech. relay	00 01 02 +
58	COM33 TXD	TP-PT100 2-wire	TP-PT100 2-wire	P-coil	P-coil	AI 4...20mA	OK active 24V DC	OK active 24V DC	00 01 02 ~
59	COM34 TXD	TP-PT100 3-wire	TP-PT100 3-wire	P-coil	P-coil	AI 0...20mA	OK passive 24V DC	OK mech. relay	00 01 02 +
60	COM35 TXD	TP-PT100 2-wire	TP-PT100 2-wire	P-coil	P-coil	AI 4...20mA	OK active 24V DC	OK active 24V DC	00 01 02 ~
61	COM36 TXD	TP-PT100 3-wire	TP-PT100 3-wire	P-coil	P-coil	AI 0...20mA	OK passive 24V DC	OK mech. relay	00 01 02 +
62	COM37 TXD	TP-PT100 2-wire	TP-PT100 2-wire	P-coil	P-coil	AI 4...20mA	OK active 24V DC	OK active 24V DC	00 01 02 ~
63	COM38 TXD	TP-PT100 3-wire	TP-PT100 3-wire	P-coil	P-coil	AI 0...20mA	OK passive 24V DC	OK mech. relay	00 01 02 +
64	COM39 TXD	TP-PT100 2-wire	TP-PT100 2-wire	P-coil	P-coil	AI 4...20mA	OK active 24V DC	OK active 24V DC	00 01 02 ~
65	COM40 TXD	TP-PT100 3-wire	TP-PT100 3-wire	P-coil	P-coil	AI 0...20mA	OK passive 24V DC	OK mech. relay	00 01 02 +
66	COM41 TXD	TP-PT100 2-wire	TP-PT100 2-wire	P-coil	P-coil	AI 4...20mA	OK active 24V DC	OK active 24V DC	00 01 02 ~
67	COM42 TXD	TP-PT100 3-wire	TP-PT100 3-wire	P-coil	P-coil	AI 0...20mA	OK passive 24V DC	OK mech. relay	00 01 02 +
68	COM43 TXD	TP-PT100 2-wire	TP-PT100 2-wire	P-coil	P-coil	AI 4...20mA	OK active 24V DC	OK active 24V DC	00 01 02 ~
69	COM44 TXD	TP-PT100 3-wire	TP-PT100 3-wire	P-coil	P-coil	AI 0...20mA	OK passive 24V DC	OK mech. relay	00 01 02 +
70	COM45 TXD	TP-PT100 2-wire	TP-PT100 2-wire	P-coil	P-coil	AI 4...20mA	OK active 24V DC	OK active 24V DC	00 01 02 ~
71	COM46 TXD	TP-PT100 3-wire	TP-PT100 3-wire	P-coil	P-coil	AI 0...20mA	OK passive 24V DC	OK mech. relay	00 01 02 +
72	COM47 TXD	TP-PT100 2-wire	TP-PT100 2-wire	P-coil	P-coil	AI 4...20mA	OK active 24V DC	OK active 24V DC	00 01 02 ~
73	COM48 TXD	TP-PT100 3-wire	TP-PT100 3-wire	P-coil	P-coil	AI 0...20mA	OK passive 24V DC	OK mech. relay	00 01 02 +
74	COM49 TXD	TP-PT100 2-wire	TP-PT100 2-wire	P-coil	P-coil	AI 4...20mA	OK active 24V DC	OK active 24V DC	00 01 02 ~
75	COM50 TXD	TP-PT100 3-wire	TP-PT100 3-wire	P-coil	P-coil	AI 0...20mA	OK passive 24V DC	OK mech. relay	00 01 02 +
76	COM51 TXD	TP-PT100 2-wire	TP-PT100 2-wire	P-coil	P-coil	AI 4...20mA	OK active 24V DC	OK active 24V DC	00 01 02 ~
77	COM52 TXD	TP-PT100 3-wire	TP-PT100 3-wire	P-coil	P-coil	AI 0...20mA	OK passive 24V DC	OK mech. relay	00 01 02 +
78	COM53 TXD	TP-PT100 2-wire	TP-PT100 2-wire	P-coil	P-coil	AI 4...20mA	OK active 24V DC	OK active 24V DC	00 01 02 ~
79	COM54 TXD	TP-PT100 3-wire	TP-PT100 3-wire	P-coil	P-coil	AI 0...20mA	OK passive 24V DC	OK mech. relay	00 01 02 +
80	COM55 TXD	TP-PT100 2-wire	TP-PT100 2-wire	P-coil	P-coil	AI 4...20mA	OK active 24V DC	OK active 24V DC	00 01 02 ~
81	COM56 TXD	TP-PT100 3-wire	TP-PT100 3-wire	P-coil	P-coil	AI 0...20mA	OK passive 24V DC	OK mech. relay	00 01 02 +
82	COM57 TXD	TP-PT100 2-wire	TP-PT100 2-wire	P-coil	P-coil	AI 4...20mA	OK active 24V DC	OK active 24V DC	00 01 02 ~
83	COM58 TXD	TP-PT100 3-wire	TP-PT100 3-wire	P-coil	P-coil	AI 0...20mA	OK passive 24V DC	OK mech. relay	00 01 02 +
84	COM59 TXD	TP-PT100 2-wire	TP-PT100 2-wire	P-coil	P-coil	AI 4...20mA	OK active 24V DC	OK active 24V DC	00 01 02 ~
85	COM60 TXD	TP-PT100 3-wire	TP-PT100 3-wire	P-coil	P-coil	AI 0...20mA	OK passive 24V DC	OK mech. relay	00 01 02 +
86	COM61 TXD	TP-PT100 2-wire	TP-PT100 2-wire	P-coil	P-coil	AI 4...20mA	OK active 24V DC	OK active 24V DC	00 01 02 ~
87	COM62 TXD	TP-PT100 3-wire	TP-PT100 3-wire	P-coil	P-coil	AI 0...20mA	OK passive 24V DC	OK mech. relay	00 01 02 +
88	COM63 TXD	TP-PT100 2-wire	TP-PT100 2-wire	P-coil	P-coil	AI 4...20mA	OK active 24V DC	OK active 24V DC	00 01 02 ~
89	COM64 TXD	TP-PT100 3-wire	TP-PT100 3-wire	P-coil	P-coil	AI 0...20mA	OK passive 24V DC	OK mech. relay	00 01 02 +
90	COM65 TXD	TP-PT100 2-wire	TP-PT100 2-wire	P-coil	P-coil	AI 4...20mA	OK active 24V DC	OK active 24V DC	00 01 02 ~
91	COM66 TXD	TP-PT100 3-wire	TP-PT100 3-wire	P-coil	P-coil	AI 0...20mA	OK passive 24V DC	OK mech. relay	00 01 02 +
92	COM67 TXD	TP-PT100 2-wire	TP-PT100 2-wire	P-coil	P-coil	AI 4...20mA	OK active 24V DC	OK active 24V DC	00 01 02 ~
93	COM68 TXD	TP-PT100 3-wire	TP-PT100 3-wire	P-coil	P-coil	AI 0...20mA	OK passive 24V DC	OK mech. relay	00 01 02 +
94	COM69 TXD	TP-PT100 2-wire	TP-PT100 2-wire	P-coil	P-coil	AI 4...20mA	OK active 24V DC	OK active 24V DC	00 01 02 ~
95	COM70 TXD	TP-PT100 3-wire	TP-PT100 3-wire	P-coil	P-coil	AI 0...20mA	OK passive 24V DC	OK mech. relay	00 01 02 +
96	COM71 TXD	TP-PT100 2-wire	TP-PT100 2-wire	P-coil	P-coil	AI 4...20mA	OK active 24V DC	OK active 24V DC	00 01 02 ~
97	COM72 TXD	TP-PT100 3-wire	TP-PT100 3-wire	P-coil	P-coil	AI 0...20mA	OK passive 24V DC	OK mech. relay	00 01 02 +
98	COM73 TXD	TP-PT100 2-wire	TP-PT100 2-wire	P-coil	P-coil	AI 4...20mA	OK active 24V DC	OK active 24V DC	00 01 02 ~
99	COM74 TXD	TP-PT100 3-wire	TP-PT100 3-wire	P-coil	P-coil	AI 0...20mA	OK passive 24V DC	OK mech. relay	00 01 02 +
100	COM75 TXD	TP-PT100 2-wire	TP-PT100 2-wire	P-coil	P-coil	AI 4...20mA	OK active 24V DC	OK active 24V DC	00 01 02 ~
101	COM76 TXD	TP-PT100 3-wire	TP-PT100 3-wire	P-coil	P-coil	AI 0...20mA	OK passive 24V DC	OK mech. relay	00 01 02 +
102	COM77 TXD	TP-PT100 2-wire	TP-PT100 2-wire	P-coil	P-coil	AI 4...20mA	OK active 24V DC	OK active 24V DC	00 01 02 ~
103	COM78 TXD	TP-PT100 3-wire	TP-PT100 3-wire	P-coil	P-coil	AI 0...20mA	OK passive 24V DC	OK mech. relay	00 01 02 +
104	COM79 TXD	TP-PT100 2-wire	TP-PT100 2-wire	P-coil	P-coil	AI 4...20mA	OK active 24V DC	OK active 24V DC	00 01 02 ~
105	COM80 TXD	TP-PT100 3-wire	TP-PT100 3-wire	P-coil	P-coil	AI 0...20mA	OK passive 24V DC		

Configuration example F127-P-AP-CH-EL-OT-(PX)-TP-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 F127-P-AA-CB-EL-OR-PM-TP-XX-ZX



Please note: temperature measurement type TA is not available for power supply type PF / PM.

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

Hazardous area applications

The F127-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.

- The IECEx markings for gas and dust applications are:

Ex ia IIC/IIB T4 Ga and Ex ia IIIC T100 °C Da.

It is allowed to connect up to eight I.S. power supplies in IIB/IIIC applications or one I.S. power supply in IIC applications. Consult the certificate for the maximum input and output values of the circuits. Full functionality of the F127 remains available, including 4 - 20mA output according to the flow rate and Modbus communication (type CT). Power supply type PD-XI offers a 8.2V sensor supply e.g. for two Namur sensors. An ATEX approved flame proof Ex d enclosure is available as well. Please contact your supplier for further details.

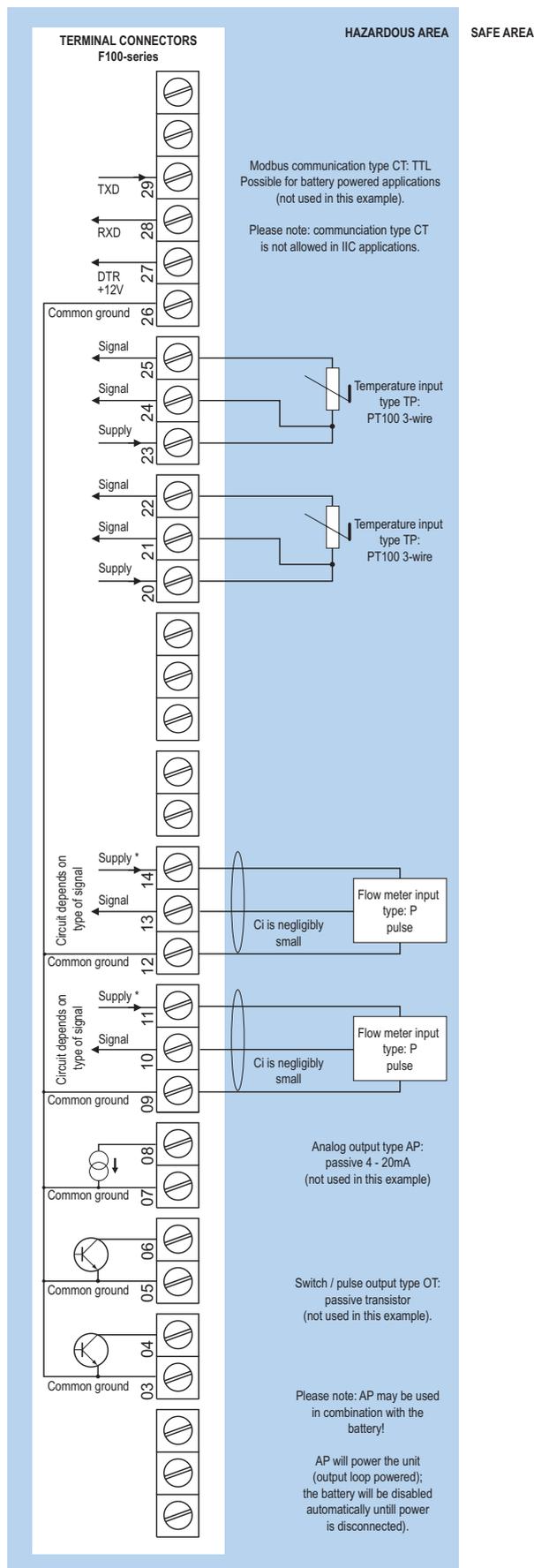
Certificate of conformity KEMA 03ATEX1074 X

- IECEx DEK 11.0042X



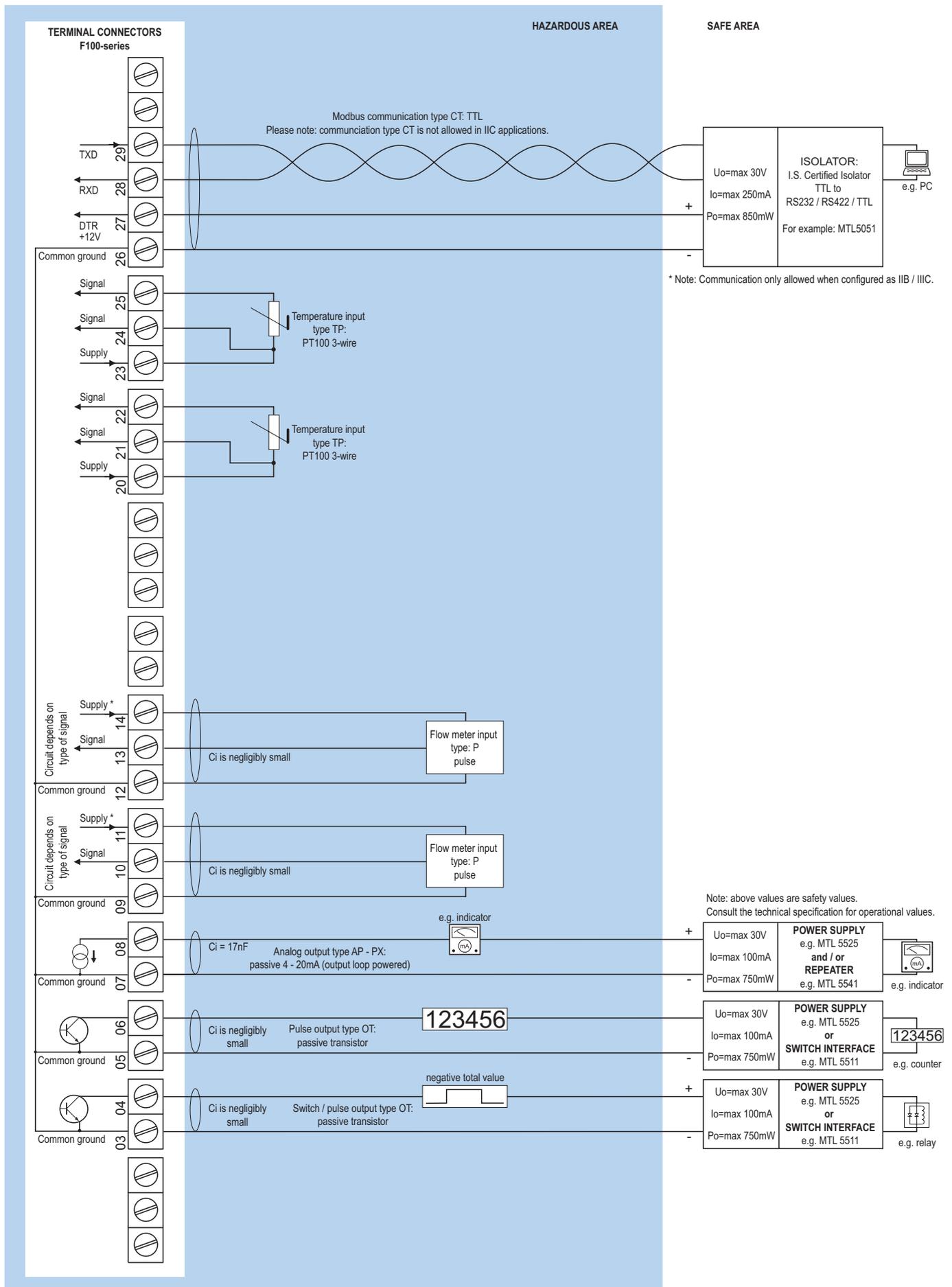
Configuration example IIB / IIIC and IIC

F127-P-(AP)-(CT)-EL-TP-(OT)-PC-XI - Battery powered unit



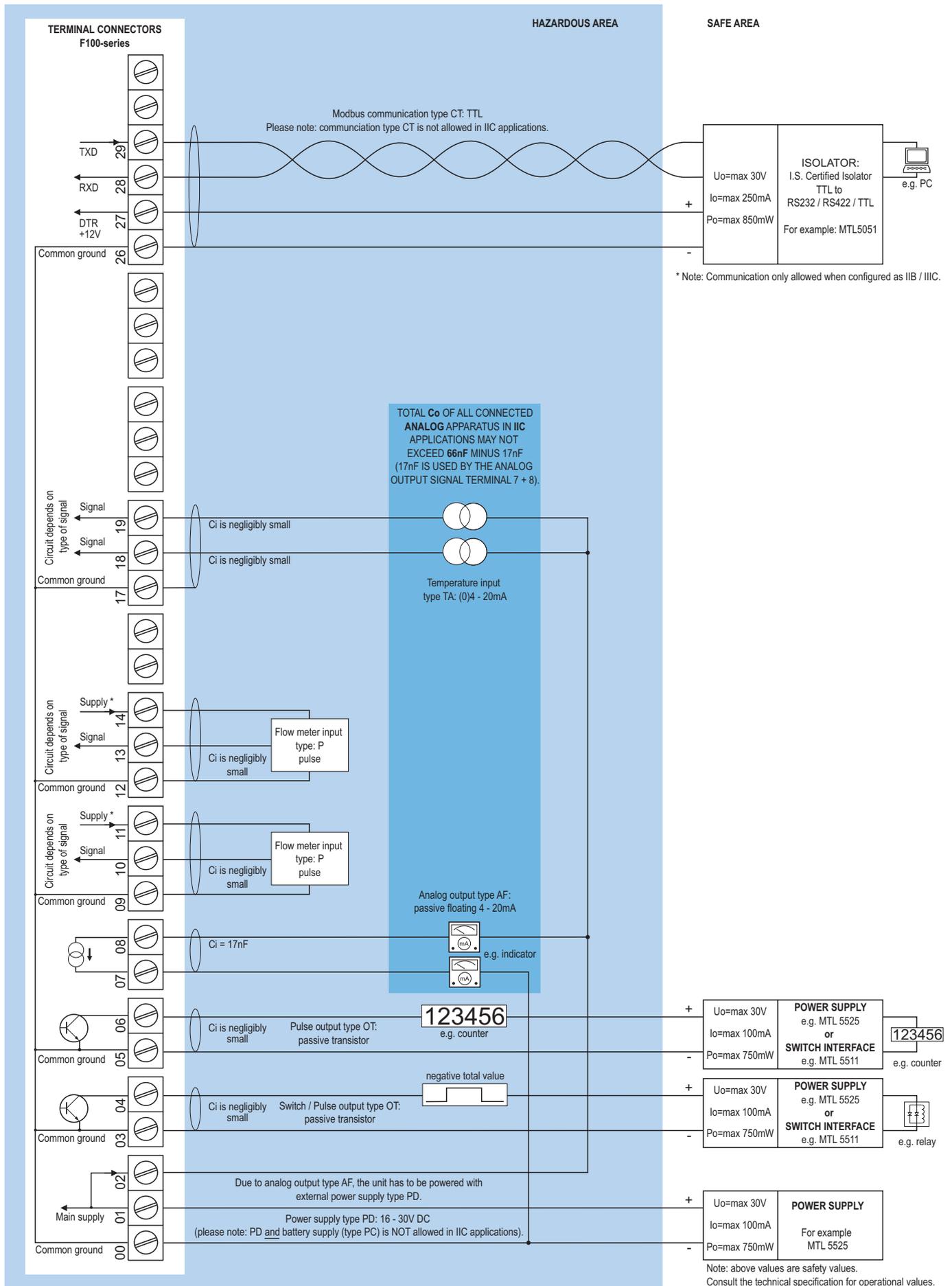
* For pulse type inputs: V_{ref} : 1.2V/3.0V available. - NO power output, available I_{supply} : <1mA. Note: using these ref. voltages at max. load, will reduce battery life significantly.

Configuration example IIB / IIIC and IIC - F127-P-AP-CT-EL-OT-(PX)-TP-XI - Output loop powered



* 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 / IIC and IIC - F127-P-AF-CT-EL-OT-PD-TA-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) and to analog sensors as connected to terminal 1 (internally linked).

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 +80°C (-40°F to +176°F).
Intrinsically Safe	-40°C to +70°C (-40°F to +158°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	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

Intrinsically Safe (Type XI)

ATEX	II 1 G Ex ia IIB/IIC T4 Ga. II 1 D Ex ia IIIC T100 °C Da.
IECEx	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	Gas: II 2 G / Ex d IIB T5 Gb. Dust: II 2 D / Ex t IIIB T100 °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 XF	IECEx available on request.

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 / NEMA Type4X.
Weight	600 gr.
Type HC	GRP panel mount enclosure IP65 / NEMA Type4X, UV-resistant and flame retardant.
Weight	450 gr.

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.

Aluminum wall / field mount enclosures

General	Die-cast aluminum wall/field mount enclosure IP67 / NEMA 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 HB/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 / NEMA 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.

Signal inputs - Temperature

Accuracy	Resolution: 14 bit. Error < 0.025mA / ± 0.125% FS. Low level cut-off programmable.
Update time	One time per two seconds.
Type TA	(0)4 - 20mA. Analog input signal can be scaled to any desired range within 0 - 20mA.
Span	0.000010 - 9,999,999 with variable decimal position.
Offset	0.00 - 99,999.99 K.
Voltage drop	2.5V @ 20mA.
Note TA	<ul style="list-style-type: none"> • Not available for PF and PM • For signal TA: power supply to temperature sensor is required; e.g. PD.
Type TP	2 or 3 wire PT100.
Range	-100°C to +200°C (-148°F to 392°F). Accuracy 0.1°C (0.18°F).
Option ZV	Range: -200°C to +800°C (-328°F to 1832°F). Accuracy 0.5°C (0.9°F).

Signal outputs - Digital output

Function	One pulse output according to differential or sum accumulated total and one configurable pulse, negative or decreasing total output.
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 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 - Analog output

Function	Transmitting compensated differential flow rate.
Accuracy	10 bit. Error < 0.05%. Analog output signal can be scaled to any desired range.
Update time	Eight times per second.
Type AA	Active 4 - 20mA output (requires PD, PF, PM or PX).
Type AB	Active 0 - 20mA output (requires PD, PF, PM or PX).
Type AF	Passive floating 4 - 20mA output (requires XI + PD).
Type AI	Passive galvanically isolated 4 - 20mA output - also available for battery powered models.
Type AP	Passive 4 - 20mA output - not isolated. Unit will be loop powered.
Type AU	Active 0 - 10V DC output. Requires min. 12V power supply.

Signal outputs - Communication option

Function	Reading display information, reading / writing all configuration settings.
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.

Mounting accessories

ACF02	Stainless steel wall mounting kit.
ACF05	Stainless steel pipe mounting kit (worm gear clamps not included).
ACF06	Two stainless steel worm gear clamps Ø 44 - 56mm.
ACF07	Two stainless steel worm gear clamps Ø 58 - 75mm.
ACF08	Two stainless steel worm gear clamps Ø 77 - 95mm.
ACF09	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.

Cable glands

ACF20	For HA enclosure, includes O-rings.
ACF25	For HE enclosure, includes locknuts and O-rings.
ACF26	For HF enclosure, includes locknuts and O-rings.
ACF27	For HG enclosure, includes locknuts and O-rings.
ACF28	For HH enclosure, includes locknuts and O-rings.
ACF29	For HJ enclosure, includes locknuts and O-rings.
ACF32	For HM enclosure, includes O-rings.
ACF33	For HN enclosure, includes O-rings.
ACF34	For HO enclosure, includes O-rings.
ACF35	For HP enclosure, includes O-rings.
ACF39	For HT enclosure, includes O-rings.
ACF40	For HU enclosure, includes O-rings.

Blind plugs

ACF50	For HA enclosure, includes O-rings.
ACF55	For HE enclosure, includes locknuts and O-rings.
ACF56	For HF enclosure, includes locknuts and O-rings.
ACF57	For HG enclosure, includes locknuts and O-rings.
ACF58	For HH enclosure, includes locknuts and O-rings.
ACF59	For HJ enclosure, includes locknuts and O-rings.
ACF62	For HM enclosure, includes O-rings.
ACF63	For HN enclosure, includes O-rings.
ACF64	For HO enclosure, includes O-rings.
ACF65	For HP enclosure, includes O-rings.
ACF69	For HT enclosure, includes O-rings.
ACF70	For HU enclosure, includes O-rings.

Power requirements

Type AP	Analog output loop powerd, 8 - 30V DC. Power consumption max 0.5 Watt.
Type PB	Long life Lithium battery - life-time depends upon settings and configuration - up to 5 years. (requires PD 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. 5W.
Type PD-XI	16 - 30V DC power consumption max. 1W.
Type PF	24V AC / DC ± 10%. Power consumption max. 15W.
Type PM	115 - 230V AC ± 10%. Power consumption max. 15W.
Type PX	8 - 30V DC. Power consumption max. 0.75W.
Type ZB	12 - 30V DC ± 10%. 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 the certificate.

Sensor excitation

Type PB/PC/PX	3V DC for pulse signals and 1.2V DC for coil pick-up.
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. Umax sensor is 2V below Usupply
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 / PM	1.2 / 3 / 8.2 / 12 / 24V DC - max. 400mA @ 24V DC.

Operator functions

Displayed info	<ul style="list-style-type: none"> • Compensated differential flow rate (consumption). • Compensated differential total and acc. total. • Supply line - Inlet temperature and comp. flow rate. • Return line - Outlet temp. and comp. flow rate. • Total can be reset to zero by pressing the CLEAR-key twice.
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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.

Flow rate

Digits	7 digits.
Units	mL, L, m ³ , Gallons, kg, Ton, lb, bl, cf, RND, ft ³ , scf, Nm ³ , NI, ical - no units.
Decimals	0 - 1 - 2 or 3.
Time units	/sec - /min - /hr - /day.

Line temperature

Digits	6 digits.
Units	°C, °F or K.
Decimals	1.

Flow equation

Type EL	Corrected liquid volume.
Formula	$Q_{normal} = Q \times (1 + \alpha (T_{normal} - T))$ <p>where α= thermal expansion coefficient.</p>
Normal temp.	Default: 273.15 K - any temperature can be set.

		Description	
Model	F127	Differential flow computer with pulse signal outputs and temperature compensation for corrected liquid volume.	
Input	P	Pulse input, e.g., coil, npn, pnp, namur.	-P
Analog output	AA	Active 4 - 20mA output - requires XX.	-AA
	AB	Active 0 - 20mA output - requires XX.	-AB
	AF	I.S. floating 4 - 20mA output - requires XI + PD.	-AF
	AI	Isolated 4 - 20mA output - requires XX.	-AI
	AP	Passive 4 - 20mA output, loop powered unit.	-AP
	AU	Active 0 - 10V DC output - requires XX.	-AU
Communication	CB	Communication RS 232 - Modbus RTU - requires XX.	-CB
	CH	Communication RS 485 - 2wire - Modbus RTU - requires XX.	-CH
	CI	Communication RS 485 - 4wire - Modbus RTU - requires XX.	-CI
	CT	Intrinsically Safe TTL - Modbus RTU - requires XI.	-CT
	CX	No communication.	-CX
Equation	EL	Corrected liquid volume.	-EL
Enclosures	HB	Aluminum panel mount enclosure.	-HB
	HC	GRP panel mount enclosure.	-HC
	HD	GRP field mount - Cable entry: no holes.	-HD
	HE	GRP field mount - Cable entry: 2 x Ø 16mm & 1 x Ø 20mm.	-HE
	HF	GRP field mount - Cable entry: 1 x Ø 22mm ($\frac{7}{8}$ ").	-HF
	HG	GRP field mount - Cable entry: 2 x Ø 20mm.	-HG
	HH	GRP field mount - Cable entry: 6 x Ø 12mm.	-HH
	HJ	GRP field mount - Cable entry: 3 x Ø 22mm ($\frac{7}{8}$ ").	-HJ
	HK	GRP field mount - Flat bottom, cable entry: no holes.	-HK
	HA	Aluminum field mount - Cable entry: 2 x PG9 + 1 x M20.	-HA
	HL	Aluminum field mount - Cable entry: 2 x $\frac{1}{2}$ "NPT.	-HL
	HM	Aluminum field mount - Cable entry: 2 x M16 + 1 x M20.	-HM
	HN	Aluminum field mount - Cable entry: 1 x M20.	-HN
	HO	Aluminum field mount - Cable entry: 2 x M20.	-HO
	HP	Aluminum field mount - Cable entry: 6 x M12.	-HP
	HT	Aluminum field mount - Cable entry: 1 x $\frac{1}{2}$ "NPT.	-HT
	HU	Aluminum field mount - Cable entry: 3 x $\frac{1}{2}$ "NPT.	-HU
	HV	Aluminum field mount - Cable entry: 4 x M20.	-HV
	HZ	Aluminum field mount - Cable entry: no holes.	-HZ
	HBM	Extended Alu. field/meter mount - Cable entry: 2 x M16 + 1 x M20.	-HBM
	HBO	Extended Alu. field/meter mount - Cable entry: 2 x M20.	-HBO
	HBU	Extended Alu. field/meter mount - Cable entry: 3 x $\frac{1}{2}$ "NPT.	-HBU
	HSM	Stainless steel 316L field mount - Cable entry: 2 x M16 + 1 x M20.	-HSM
	HSO	Stainless steel 316L field mount - Cable entry: 2 x M20.	-HSO
	HSU	Stainless steel 316L field mount - Cable entry: 3 x $\frac{1}{2}$ "NPT.	-HSU
	Digital output	OA	Two active transistor outputs- requires XX.
OR		Two mechanical relay outputs - requires XX and PF or PM.	-OR
OT		Two passive transistor outputs.	-OT
Power	PD	8 - 24V AC/DC + sensor supply - with XI: 16 - 30V DC.	-PD
	PF	24V AC/DC + sensor supply - requires XX.	-PF
	PM	115 - 230V AC + sensor supply - requires XX.	-PM
	PX	Basic power supply 8 - 30V DC.	-PX
Battery	PB	Additional lithium battery powered (optional) - requires XX and PD or PX.	-PB -P_
	PC	Additional lithium battery powered (optional) - Intrinsically safe - requires XI, and PD or PX.	-PC -P_
Temp.	TA	(0)4 - 20mA input - requires PD or PX.	-TA
	TP	PT100 temperature input.	-TP
Hazardous	XI	Intrinsically safe, according ATEX and IECEx.	-XI
	XF	Ex d enclosure - 3 keys according ATEX.	-XF
	XX	Safe area only.	-XX
Options	ZB	Backlight - requires XX.	-ZB
	ZF	Coil input 10mVpp.	-ZF
	ZV	PRTD-range -200°C / +800°C.	-ZV
	ZX	No options.	-ZX

The **bold** marked text contains the standard configuration: F127-P-AP-CX-EL-HC-OT-PX-TP-XX-ZX.

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