

## Differential Flow Computer

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



**Application examples:** Salty Off-Shore conditions



**Application examples:** Extreme cold weather at polar regions



**Application examples:** 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°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.

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.

Communication

All process data and settings can be read and modified manually or through the Modbus communication link (RS232 / RS485). Full Modbus functionality remains available for the Intrinsically Safe version (TTL).

Hazardous areas

This model 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!



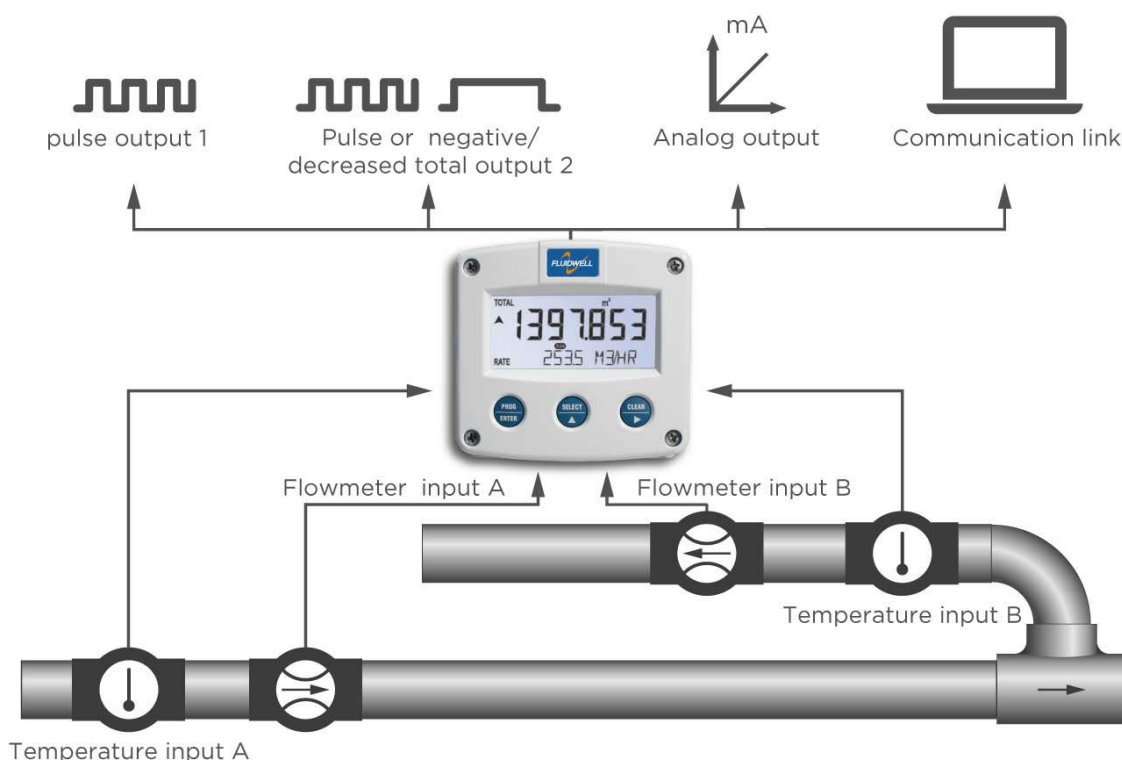
Reliable



User-friendly

## Overview application 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.

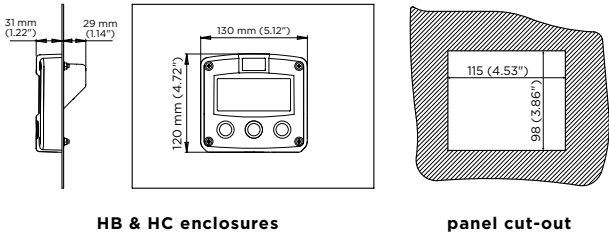
Type of signal	Resistance	Low Pass filter (LP)	Max. frequency	Max. frequency Low Pass filter (LP)	Min. amplitude p-p	Remark
NPN	100kΩ pull-up	100kΩ pull-up	6kHz Threshold 1.2V	1.2kHz		Open collector
REED	1MΩ pull-up	1MΩ pull-up	1.2kHz Threshold 1.2V	120Hz		
PNP	100KΩ pull-down	100KΩ pull-down	6kHz Threshold 1.2V	1.2kHz		
NAMUR	820Ω pull-down	-	4kHz	-		External power required
COIL LO	-	-		-	80mV <sub>pp</sub>	Default sensitivity
COIL-HI	-	-		-	20mV <sub>pp</sub>	Sensitive for interference!
COIL-HI (Type ZF)	-	-		-	10mV <sub>pp</sub>	
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

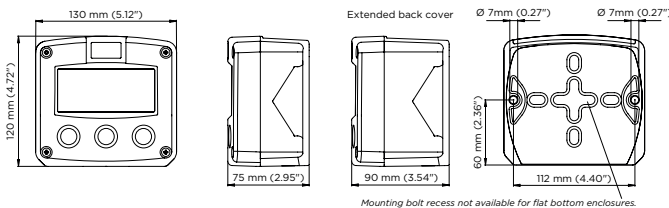
Various types of enclosures can be selected, all ATEX and IECEx approved. The F127 is supplied in an GRP panel mount enclosure as standard, which can be converted to an IP67 / NEMA Type4X GRP field mount enclosure by the addition of a back case. Most popular is our robust aluminum field mount enclosure 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



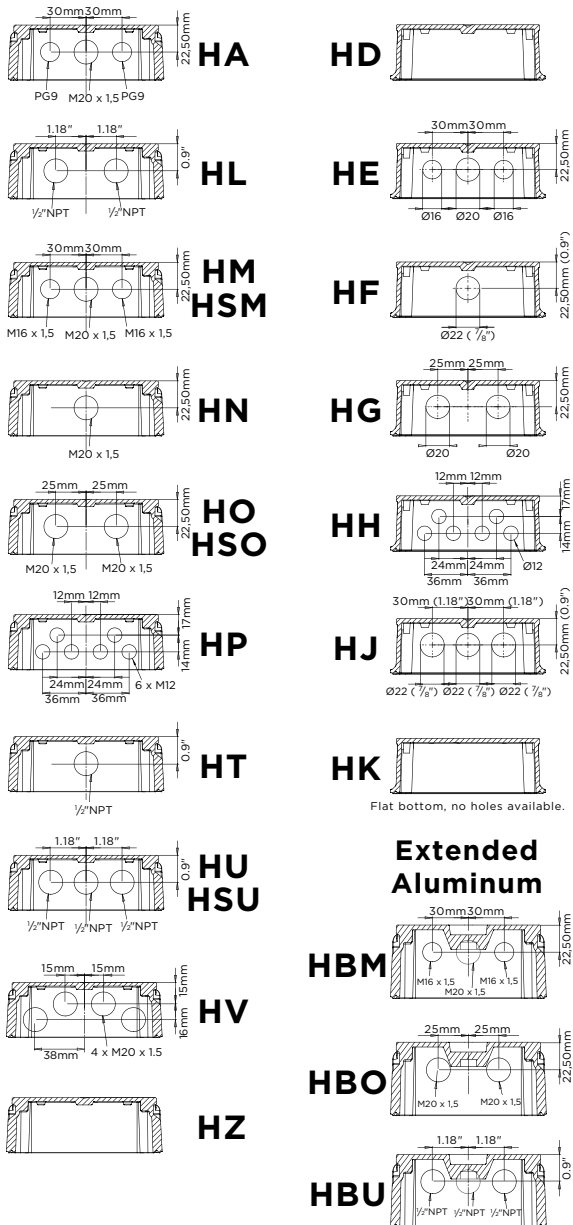
Aluminum, GRP & Stainless steel 316L field mount enclosures



Cable entries

Aluminum / Stainless Steel

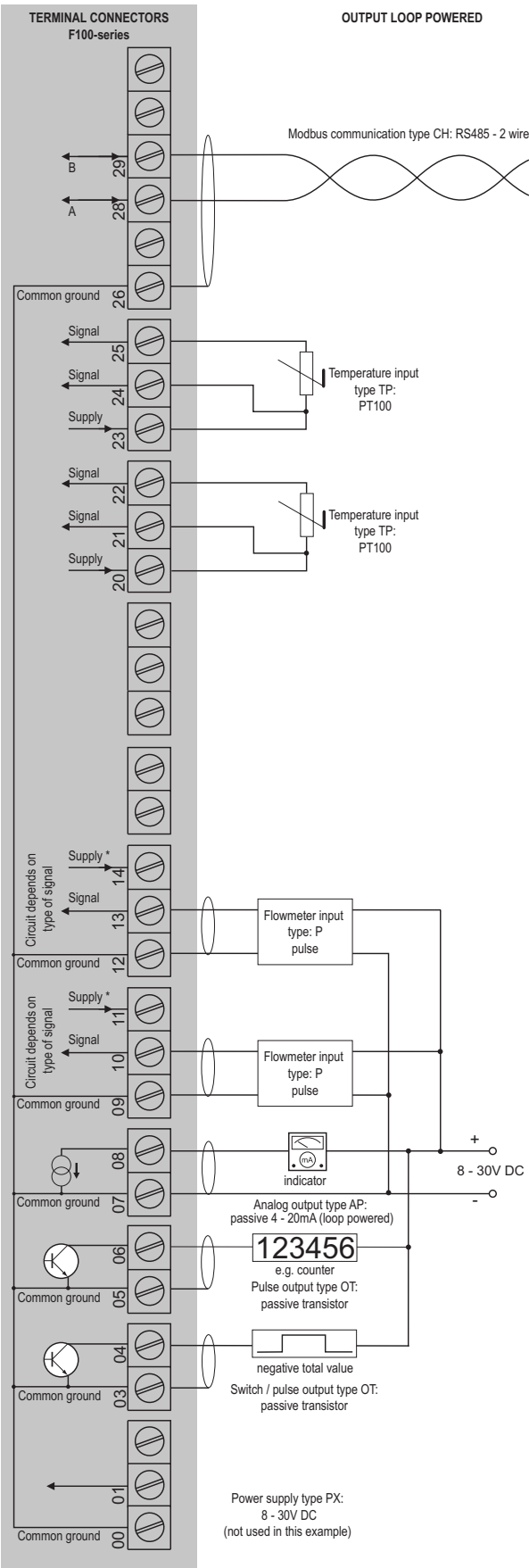
GRP



Terminal connections

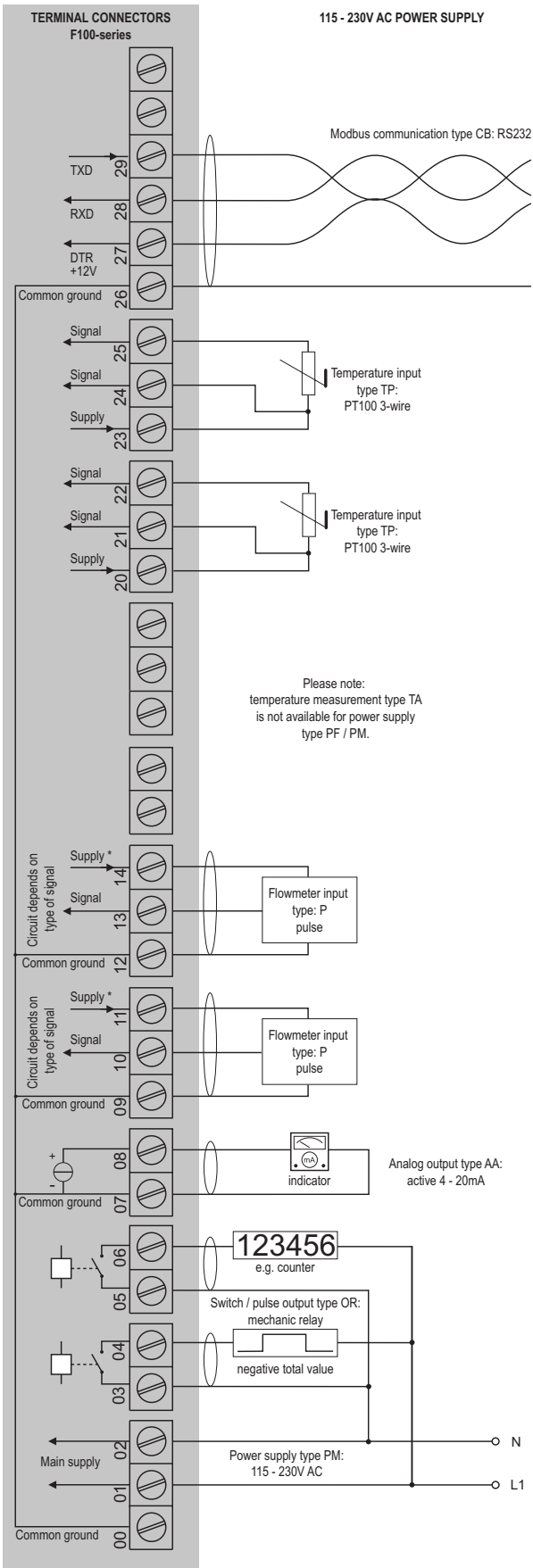
COMMUNICATION	31	30	29	28	27	26	25	24	23	22	21	20	19	18	17	16	15	14	13	12	11	10	09	08	07	06	05	04	03	02	01	00
COMMUNICATION	TXD	TXD	TXD	TXD	TXD	TXD	TXD	TXD	TXD	TXD	TXD	TXD	TXD	TXD	TXD	TXD	TXD	TXD	TXD	TXD	TXD	TXD	TXD	TXD	TXD	TXD	TXD	TXD	TXD	TXD	TXD	TXD
TEMPERATURE INPUTS																																
TEMPERATURE INPUTS																																
FLOWMETER INPUT																																
FLOWMETER INPUT																																
ANALOG OUTPUT																																
PULSE OUTPUT (I)																																
NEGATIVE (DECREASE TOTAL OR PULSE OUTPUT RZ)																																
POWER REQUIREMENTS																																

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



\*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). 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 T<sub>200</sub> 100 °C Da.**

- The IECEx markings for gas and dust applications are:

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

Dust: **Ex ia IIIC T<sub>200</sub> 100 °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/IECEx approved flame proof Ex d enclosure is available as well. Please contact your supplier for further details.

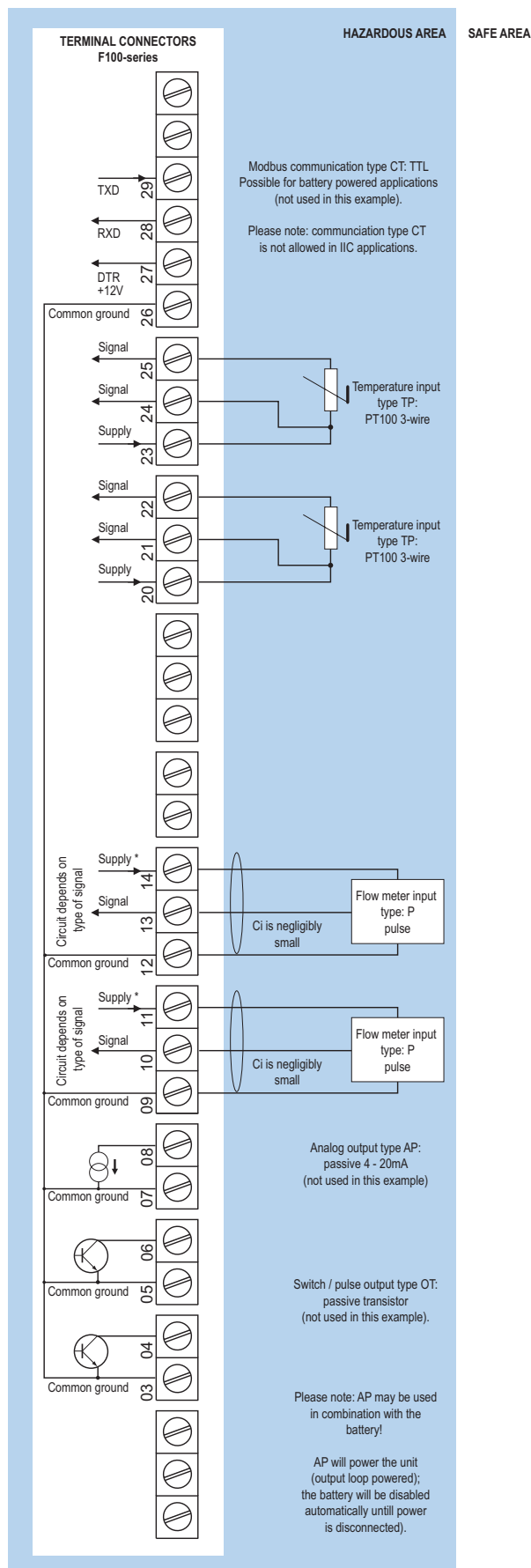
### Certificate of conformity KEMA 03ATEX1074 X

- IECEx DEK 11.0042X



### Configuration example IIB / IIIC and IIC

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



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

**TERMINAL CONNECTORS F100-series**

**HAZARDOUS AREA**

**SAFE AREA**

Modbus communication type CT: TTL  
Please note: communication type CT is not allowed in IIC applications.

TXD 29  
RXD 28  
DTR +12V 27  
Common ground 26

Signal 25  
Signal 24  
Supply 23

Signal 22  
Signal 21  
Supply 20

Supply\* 14  
Signal 13  
Common ground 12

Supply\* 11  
Signal 10  
Common ground 09

Signal 08  
Common ground 07

Signal 06  
Common ground 05

Signal 04  
Common ground 03

Temperature input type TP: PT100 3-wire

Temperature input type TP: PT100 3-wire

Flow meter input type: P pulse

Ci is negligibly small

Flow meter input type: P pulse

Ci is negligibly small

Analog output type AP - PX: passive 4 - 20mA (output loop powered)  
Ci = 17nF

Pulse output type OT: passive transistor  
Ci is negligibly small

Switch / pulse output type OT: passive transistor  
Ci is negligibly small

negative total value

ISOLATOR: I.S. Certified Isolator TTL to RS232 / RS422 / TTL  
For example: MTL5051

Uo=max 30V  
Io=max 250mA  
Po=max 850mW

\* Note: Communication only allowed when configured as IIB / IIC.

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

POWER SUPPLY e.g. MTL 5525 and / or REPEATER e.g. MTL 5541

Uo=max 30V  
Io=max 100mA  
Po=max 750mW

POWER SUPPLY e.g. MTL 5525 or SWITCH INTERFACE e.g. MTL 5511

Uo=max 30V  
Io=max 100mA  
Po=max 750mW

123456

123456

e.g. indicator

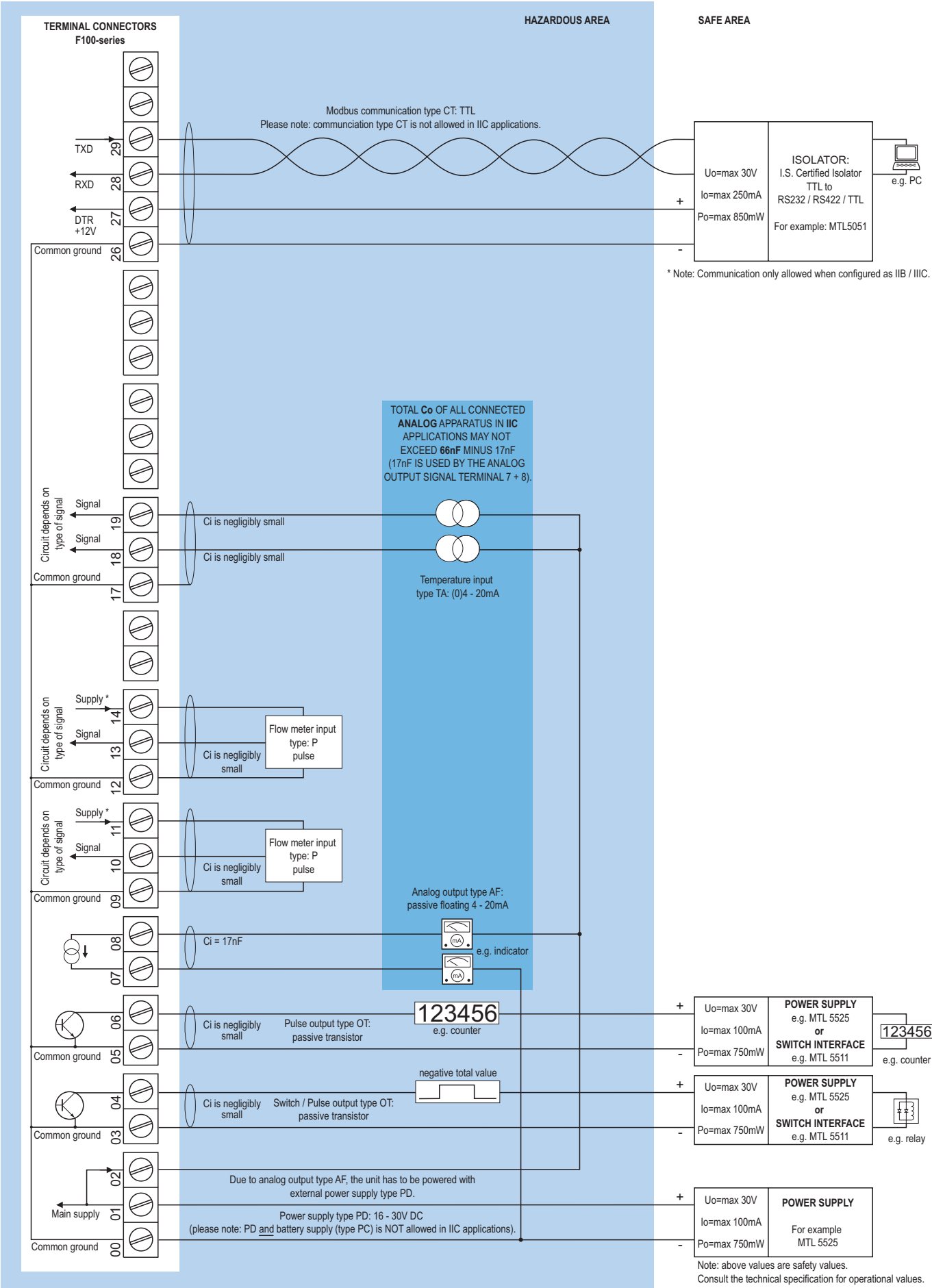
e.g. indicator

e.g. counter

e.g. relay

- 7 -

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 (Uo=max 8.7V Io=max 25mA Po=max 150mW) and to analog sensors as connected to terminal 1 (internally linked).



## Display

<b>Type</b>	High intensity reflective numeric and alphanumeric LCD, UV-resistant.
<b>Dimensions</b>	90 x 40mm (3.5" x 1.6").
<b>Digits</b>	Seven 17mm (0.67") and eleven 8mm (0.31") digits. Various symbols and measuring units.
<b>Refresh rate</b>	User definable: fast, 1sec, 3sec, 15sec, 30sec, off.
<b>Option ZB</b>	Transflective LCD with white LED-backlight. Intensity can be adjusted in the configuration menu. Good readings in full sunlight and darkness.
<b>Note ZB</b>	Only available for safe area applications.

## Ambient temperature

<b>Safe areas</b>	-40°C to +80°C (-40°F to +176°F).
<b>Intrinsically Safe</b>	-40°C to +70°C (-40°F to +158°F).
<b>Dust, zone 20</b>	-40°C to +50°C (-40°F to +122°F).

## Terminal connections

<b>Type</b>	Removable plug-in terminal strip. Wire max. 1.5mm <sup>2</sup> and 2.5mm <sup>2</sup> .
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## Data protection

<b>Type</b>	EEPROM backup of all settings. Backup of running totals every minute. Data retention at least 10 years.
<b>Password</b>	Configuration settings can be password protected.

## Directives & Standards

<b>EMC</b>	Directive 2014/30/EU, FCC 47 CFR part 15.
<b>Low voltage</b>	Directive 2014/35/EU
<b>RoHS</b>	Directive 2011/65/EU
<b>ATEX / IECEx</b>	Directive 2014/34/EU, IEC 600079-0, IEC 60079-11.
<b>IP &amp; NEMA</b>	EN 60529 & NEMA 250

## Intrinsically Safe (Type XI)

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

## Explosion proof (Type XF)

<b>ATEX/IECEx</b>	Gas: II 2 G Ex db IIB+H2 T5 Gb. Dust: II 2 D Ex tb IIIC T80°C.
<b>Protection</b>	IP66
<b>Type XF</b>	Dimensions of enclosure: 300 x 250 x 200mm (11.8" x 9.9" x 7.9") L x H x D.
<b>Weight</b>	Appr. 15kg.

## Enclosure

<b>Window</b>	Polycarbonate window.
<b>Sealing</b>	Silicone.
<b>Control keys</b>	Three industrial micro-switch keys. UV-resistant silicone keypad.

## Panel mount enclosures

<b>Dimensions</b>	130 x 120 x 60mm (5.12" x 4.72" x 2.36") - W x H x D.
<b>Panel cut-out</b>	115 x 98mm (4.53" x 3.86") L x H.
<b>Type HB</b>	Die-cast aluminum panel mount enclosure IP65 / NEMA Type4X.
<b>Weight</b>	600 gr.
<b>Type HC</b>	GRP panel mount enclosure IP65 / NEMA Type4X, UV-resistant and flame retardant.
<b>Weight</b>	450 gr.
<b>Type HSB</b>	Die-cast stainless steel 316L IP67 / NEMA Type4X.
<b>Weight</b>	1150gr.

## GRP wall / field mount enclosures

<b>General</b>	GRP wall/field mount enclosure IP67 / NEMA Type4X, UV-resistant and flame retardant.
<b>Dimensions</b>	130 x 120 x 75mm (5.12" x 4.72" x 2.95") - W x H x D.
<b>Weight</b>	600 gr.
<b>Type HD</b>	Cable entry: no holes.
<b>Type HE</b>	Cable entry: 2 x Ø 16mm and 1 x Ø 20mm.
<b>Type HF</b>	Cable entry: 1 x Ø 22mm (7/8").
<b>Type HG</b>	Cable entry: 2 x Ø 20mm.
<b>Type HH</b>	Cable entry: 6 x Ø 12mm.
<b>Type HJ</b>	Cable entry: 3 x Ø 22mm (7/8").
<b>Type HK</b>	Flat bottom, cable entry: no holes.

## Aluminum wall / field mount enclosures

<b>General</b>	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.
<b>Dimensions</b>	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.
<b>Weight</b>	1100 gr. / extended enclosure: 1310 gr.
<b>Type HA</b>	Cable entry: 2 x PG9 and 1 x M20.
<b>Type HL</b>	Cable entry: 2 x 1/2" NPT.
<b>Type HM/HBM</b>	Cable entry: 2 x M16 and 1 x M20.
<b>Type HN</b>	Cable entry: 1 x M20.
<b>Type HO/HBO</b>	Cable entry: 2 x M20.
<b>Type HP</b>	Cable entry: 6 x M12.
<b>Type HT</b>	Cable entry: 1 x 1/2" NPT.
<b>Type HU/HBU</b>	Cable entry: 3 x 1/2" NPT.
<b>Type HV</b>	Cable entry: 4 x M20.
<b>Type HZ</b>	Cable entry: no holes.

## Stainless steel 316L wall / field mount enclosures

<b>General</b>	Die-cast stainless steel 316L wall / field mount enclosure with flat bottom. IP67 / NEMA Type4X.
<b>Dimensions</b>	130 x 120 x 75mm (5.12" x 4.72" x 2.95") - W x H x D.
<b>Weight</b>	2700 gr.
<b>Type HSM</b>	Cable entry: 2 x M16 + 1 x M20.
<b>Type HSO</b>	Cable entry: 2 x M20.
<b>Type HSU</b>	Cable entry: 3 x 1/2"NPT.

## Signal inputs - Flowmeter

<b>Type P</b>	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.
<b>Frequency</b>	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.
<b>K-Factor</b>	0.000010 - 9,999,999 with variable decimal position.
<b>Low-pass filter</b>	Available for all pulse signals.
<b>Option ZF</b>	coil sensitivity 10mVpp.

## Signal inputs - Temperature

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

## Signal outputs - Digital output

<b>Function</b>	One pulse output according to differential or sum accumulated total and one configurable pulse, negative or decreasing total output.
<b>Frequency</b>	Max. 500Hz. Pulse length user definable between 0.001 second up to 9.999 seconds.
<b>Type OA</b>	Two active 24V DC transistor outputs (PNP); max. 50mA per output (requires -PD, PF, PM or PX). Requires min. 24V power supply
<b>Type OR</b>	Two electro-mechanical relay outputs isolated max. switch power 230V AC (N.O.) - 0.5A per relay (requires PF or PM).
<b>Type OT</b>	Two passive transistor outputs (NPN) - not isolated. Max. 50V DC - 300mA per output.

## Signal outputs - Analog output

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

## Signal outputs - Communication option

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

## Mounting accessories

<b>ACF02</b>	Stainless steel wall mounting kit.
<b>ACF05</b>	Stainless steel pipe mounting kit (worm gear clamps not included).
<b>ACF06</b>	Two stainless steel worm gear clamps Ø 44 - 56mm.
<b>ACF07</b>	Two stainless steel worm gear clamps Ø 58 - 75mm.
<b>ACF08</b>	Two stainless steel worm gear clamps Ø 77 - 95mm.
<b>ACF09</b>	Two stainless steel worm gear clamps Ø 106 - 138mm.
<b>ACF11</b>	Swivel with 25° movement from center axis for direct flowmeter mounting: 1" NPT to 1/2" NPT.

## Cable glands

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

## Blind plugs

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

## Power requirements

<b>Type AP</b>	Analog output loop powerd, 8 - 30V DC. Power consumption max 0.5 Watt.
<b>Type PB</b>	Long life Lithium battery - life-time depends upon settings and configuration - up to 5 years. (requires PD or PX)
<b>Type PC</b>	Intrinsically Safe long life lithium battery life-time depends upon settings and configuration - up to 5 years. (requires XI and PD or PX)
<b>Type PD</b>	8 - 24V AC / DC $\pm$ 10%. Power consumption max. 5W.
<b>Type PD-XI</b>	16 - 30V DC power consumption max. 1W.
<b>Type PF</b>	24V AC / DC $\pm$ 10%. Power consumption max. 15W.
<b>Type PM</b>	115 - 230V AC $\pm$ 10%. Power consumption max. 15W.
<b>Type PX</b>	8 - 30V DC. Power consumption max. 0.75W.
<b>Type ZB</b>	12 - 30V DC $\pm$ 10%. Power consumption max. 1.5W.
<b>Note PB/PF/PM</b>	Not available Intrinsically Safe.
<b>Note PF/PM</b>	The total consumption of the sensors and outputs may not exceed 400mA @ 24V.
<b>Note XI</b>	For Intrinsically Safe applications, consult the safety values in the certificate.

## Sensor excitation

<b>Type PB/PC/PX</b>	3V DC for pulse signals and 1.2V DC for coil pick-up.
<b>Note PB/PC/PX</b>	This is not a real sensor supply. Only suitable for sensors with a very low power consumption like coils (sine wave) and reed-switches.
<b>Type PD</b>	1.2 / 3 / 8.2 / 12 / 24V DC - max. 50mA @ 24V DC. Umax sensor is 2V below Usupply
<b>Type PD-XI</b>	1.2 / 3 / 8.2V DC - max. 7mA @ 8.2V DC and mains power supply voltage (as connected to terminal 1).
<b>Type PF / PM</b>	1.2 / 3 / 8.2 / 12 / 24V DC - max. 400mA @ 24V DC.

## Operator functions

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

<b>Digits</b>	7 digits.
<b>Units</b>	L, m <sup>3</sup> , GAL, USGAL, kg, lb, bbl, no unit.
<b>Decimals</b>	0 - 1 - 2 or 3.
<b>Note</b>	Total can be reset to zero.

## Accumulated total

<b>Digits</b>	11 digits.
<b>Units / decimals</b>	According to selection for total.
<b>Note</b>	Can not be reset to zero.

## Flow rate

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

## Line temperature

<b>Digits</b>	6 digits.
<b>Units</b>	°C, °F or K.
<b>Decimals</b>	1.

## Flow equation

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

	Description	
Model	<b>F127</b>	<b>Differential flow computer with pulse signal outputs and temperature compensation for corrected liquid volume.</b>
Input	<b>P</b>	<b>Pulse input, e.g., coil, npn, pnp, namur.</b>
Analog output	AA	Active 4 - 20mA output - requires XX.
	AB	Active 0 - 20mA output - requires XX.
	AF	I.S. floating 4 - 20mA output - requires XI + PD.
	AI	Isolated 4 - 20mA output - requires XX.
	<b>AP</b>	<b>Passive 4 - 20mA output, loop powered unit.</b>
	AU	Active 0 - 10V DC output - requires XX.
Communication	CB	Communication RS 232 - Modbus RTU - requires XX.
	CH	Communication RS 485 - 2wire - Modbus RTU - requires XX.
	CI	Communication RS 485 - 4wire - Modbus RTU - requires XX.
	CT	Intrinsically Safe TTL - Modbus RTU - requires XI.
	<b>CX</b>	<b>No communication.</b>
Equation	<b>EL</b>	<b>Corrected liquid volume.</b>
Enclosures	HB	Aluminum panel mount enclosure.
	<b>HC</b>	<b>GRP panel mount enclosure.</b>
	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.
	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.
Digital output	OA	Two active transistor outputs- requires XX.
	OR	Two mechanical relay outputs - requires XX and PF or PM.
	<b>OT</b>	<b>Two passive transistor outputs.</b>
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.
	<b>PX</b>	<b>Basic power supply 8 - 30V DC.</b>
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.
Temp.	TA	(O)4 - 20mA input - requires PD or PX.
	<b>TP</b>	<b>PT100 temperature input.</b>
Hazardous	XI	Intrinsically safe, according ATEX and IECEx.
	XF	Ex d enclosure - 3 keys according ATEX and IECEx.
	<b>XX</b>	<b>Safe area only.</b>
Options	ZB	Backlight - requires XX.
	ZF	Coil input 10mVpp.
	ZV	PRTD-range -200°C / +800°C.
	<b>ZX</b>	<b>No options.</b>

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