DATASHEET F113 - FLOWRATE MONITOR

FLOWRATE MONITOR / TOTALIZER

WITH HIGH / LOW ALARM, ANALOG AND PULSE SIGNAL OUTPUTS

Features

- Displays instantaneous flowrate, total and accumulated total.
- 4 alarm values can be entered: low-low, low, high and high-high flowrate alarm.
- Large 17mm (0.67") digit selection for flowrate or total.
- Selectable on-screen engineering units; volumetric or mass.
- Auto backup of settings and running totals.
- Operational temperature -30°C up to +80°C (-22°F up to 178°F).
- Very compact design for panel mount, wall mount or field mount applications.
- Rugged aluminum field mount enclosure IP67/NEMA4X.
- Intrinsically safe
  Ex II 1GD EEx ia IIB/IIC T4 T100°C.
- Explosion/flame proof Ex II 2G EEx d IIB T5.
- Alarm, analog and pulse signal outputs.
- Full Modbus communication RS232/485/TTL.
- Loop or battery powered, 8 - 24V AC/DC or 115 - 230V AC power supply.
- Sensor supply 3.2 - 8.2 - 12 - 24V DC.

Signal output

- Up to 4 free configurable alarm outputs.
- (0)4 - 20mA / 0 - 10V DC according to flowrate.
- Scaled pulse outputs according to accumulated total.

Signal input

Flow

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

Applications

- Liquid flow measurement where continues flowrate monitoring is important.
  Also re-transmission of the flowrate and/or totaliser functions or serial communication is required. Alternative basic model: F013.

General information

Introduction

The F113 is a versatile flowrate indicator and totalizer with continous flowrate monitoring feature. It offers the facility to set two low flowrate and two high flowrate alarm values. If desired, a delay function can be set up to allow for an incorrect flowrate for a certain period of time. Up to four outputs are available to transmit the alarm condition. A wide selection of options further enhance this models capabilities, including intrinsic safety and full Modbus communication.

Display

The display has large 17mm (0.67") and 8mm (0.31") digits which can be set to show flowrate, totals and alarm values. The alarm values can be pass-code protected. On-screen engineering units are easily configured from a comprehensive selection. The accumulated total can register 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 pass-code protected. Each setting is clearly indicated with an alphanumerical description, therefore avoiding confusing abbreviations and baffling codes. Once familiar with one F-series product, you will be able to program all models in the series without a manual. All settings are safely stored in EEPROM memory in the event of sudden power failure.

Analog output signal

The flowrate is re-transmitted with the (0)4 - 20mA or 0 - 10V DC output signal.
The output signal is updated ten 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 flowrate, 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 F113 as well.

Pulse output

The scaleable pulse output, reflects the count on the accumulated display. The pulse length is user defined and the maximum output frequency is 64Hz.

Signal input

The F113 will accept most pulse and analog input signals for flow or mass flow measurement. The input signal type can be selected by the user in the configuration menu without having to adjust any sensitive mechanical dip-switches or jumpers. The analog input versions are even available as 4-20mA input loop powered displays.

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).

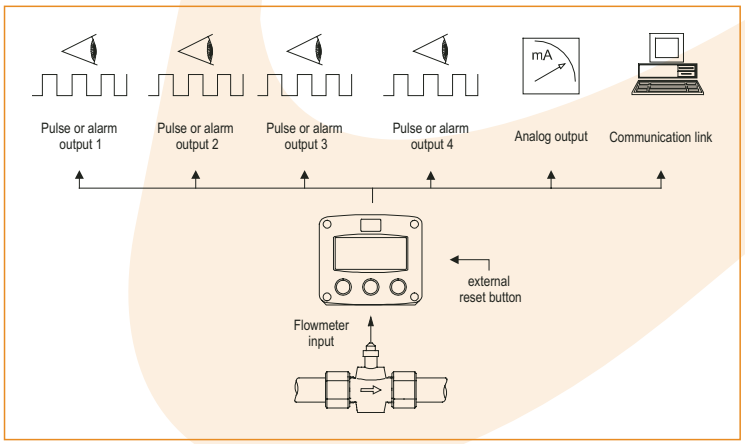
Hazardous areas

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

Enclosures

Various types of enclosures can be selected, all ATEX approved. As standard the F113 is supplied in an ABS panel mount enclosure, which can be converted to an IP67 / NEMA 4X ABS field mount enclosure by the addition of a back case. Most popular is our rugged aluminum field mount enclosure with IP67 / NEMA 4X rating. Both European or U.S. cable gland entry threads are available.

Overview application F113

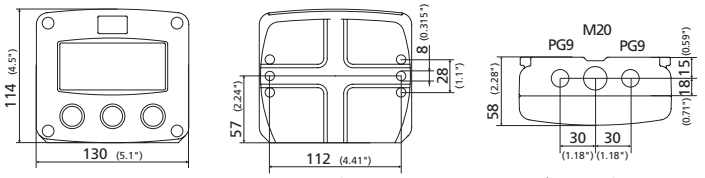


Dimensions enclosures

Enclosure HA

Aluminum field mount enclosure

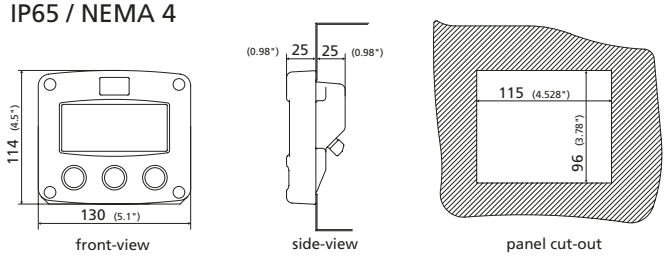
IP67 / NEMA 4X
Tapped holes: European thread



Enclosure HB

Aluminum panel mount enclosure

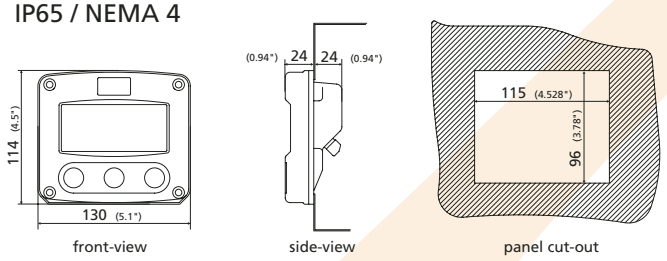
IP65 / NEMA 4



Enclosure HC (standard)

ABS panel mount enclosure

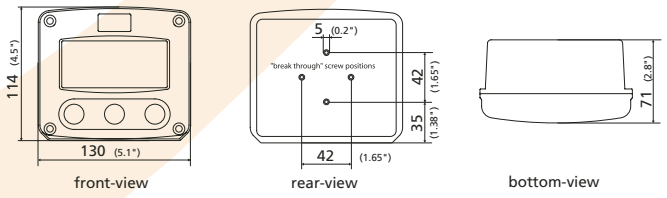
IP65 / NEMA 4



Enclosure HD

ABS wall mount enclosure

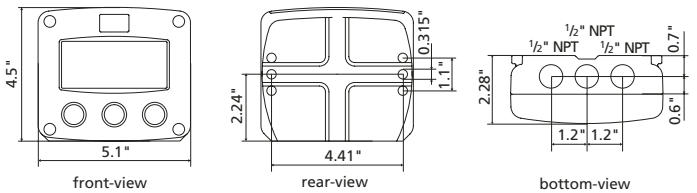
IP67 / NEMA 4X
Holes user defined



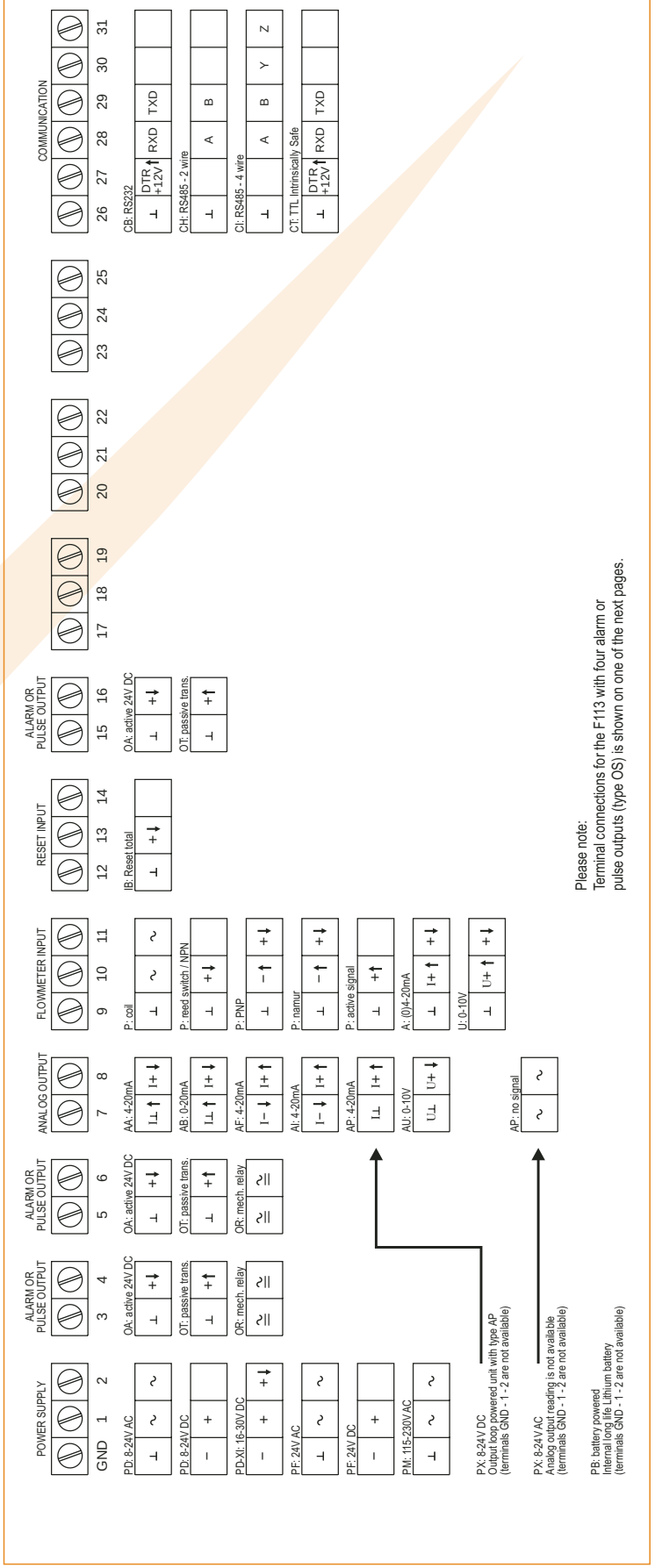
Enclosure HU

Aluminum field mount enclosure

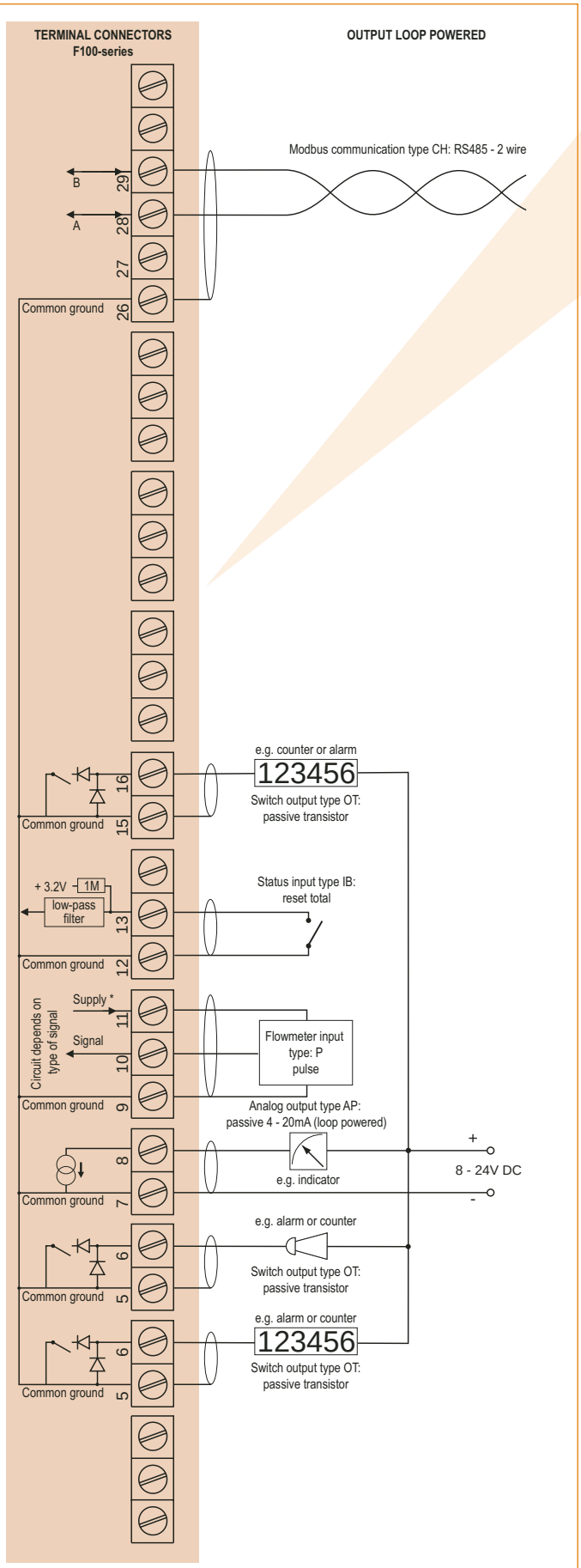
IP67 / NEMA 4X
Tapped holes: U.S. thread



Terminal connections

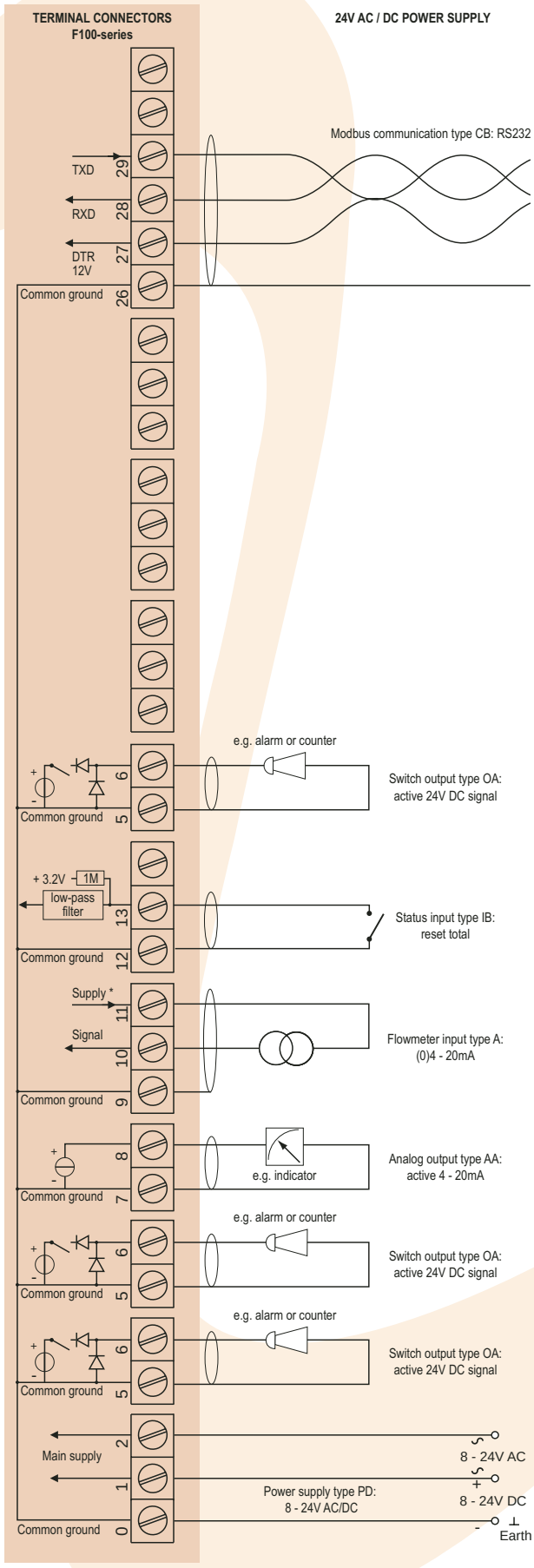


Typical wiring diagram F113-P-AP-CH-IB-OT



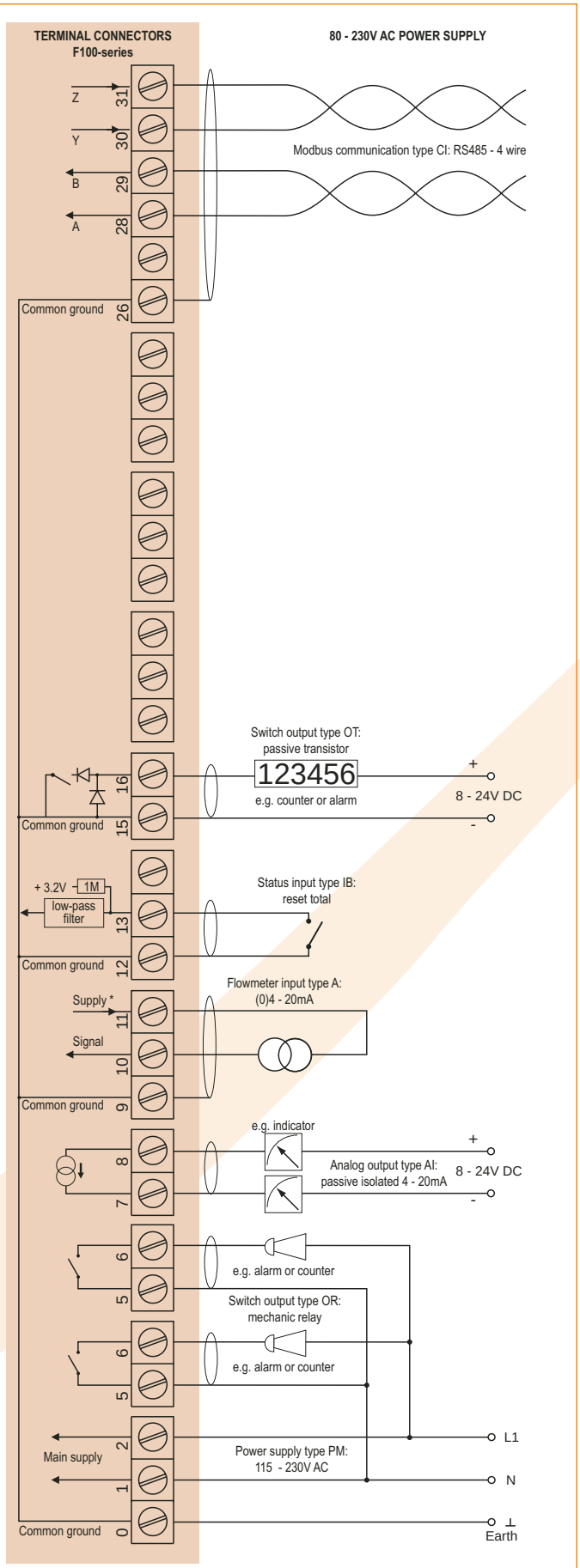
* Supply voltage: 1.2 - 3.2V DC to sensor

Typical wiring diagram F113-A-AA-CB-IB-OA-PD



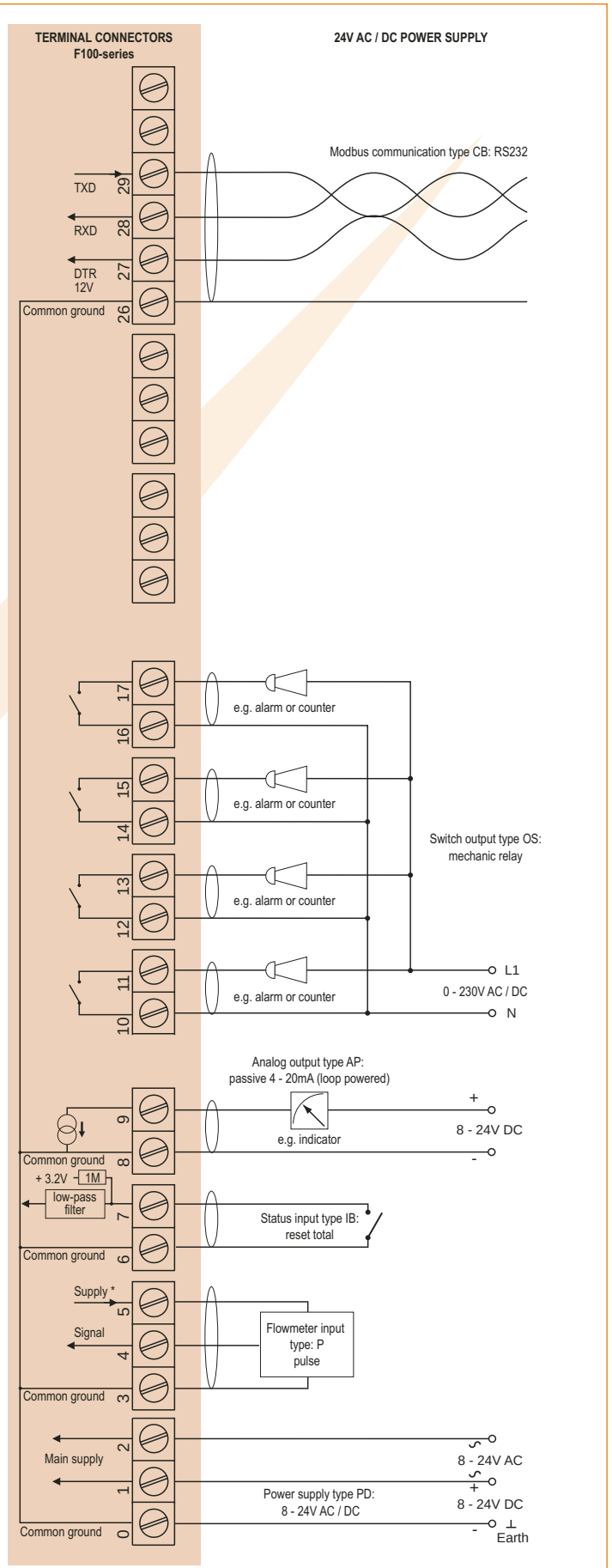
* Supply voltage: 3.2 - 8.2 - 12 - 24V DC to sensor

Typical wiring diagram F113-A-AI-CI-IB-OR-PM



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

Typical wiring diagram F113-P-AP-CB-IB-OS-PD



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

Hazardous area applications

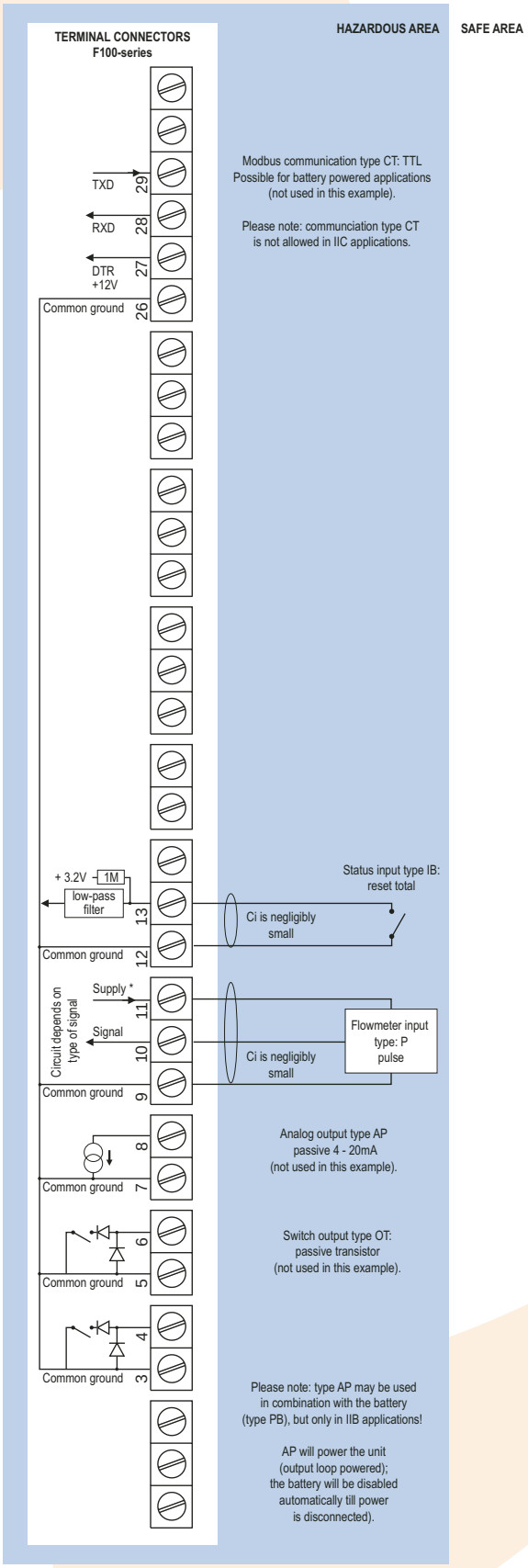
The F113-XI has been ATEX approved by KEMA for use in intrinsically safe applications. It is approved according to Ⓔx II 1GD EEx ia IIB/IIC T4 T100°C for gas and dust applications with an operational temperature range of -30°C to +70°C (-22°F to +158°F). Besides the I.S. power supplies for the two alarm / pulse outputs, it is allowed to connect up to three I.S. power supplies in IIB applications or one in IIC applications. Full functionality of the F113 remains available, including two alarm or pulse outputs and 4 - 20mA output and Modbus communication (type CT). Power supply type PD-XI offers a 8.2V sensor supply e.g. for one Namur sensor. A flame proof enclosure with rating Ⓔx II 2G EEx d IIB T5 is available as well.
Please contact your supplier for further details.

Certificate of conformity KEMA 03ATEX1074 X


KEMA

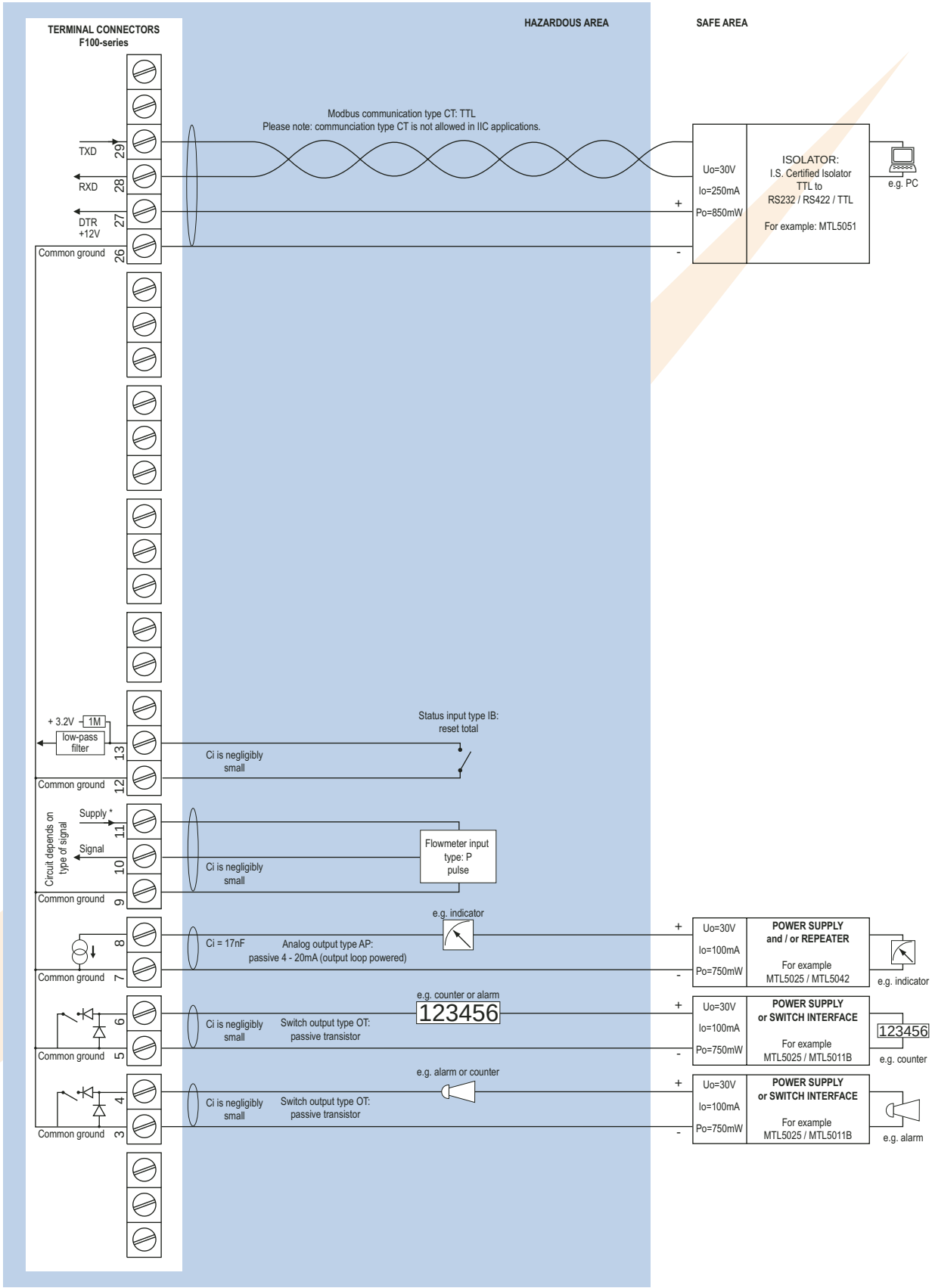
EC-TYPE EXAMINATION CERTIFICATE

Configuration example IIB and IIC
F113-P-(AP)-(CT)-IB-(OT)-PB-XI - battery powered unit



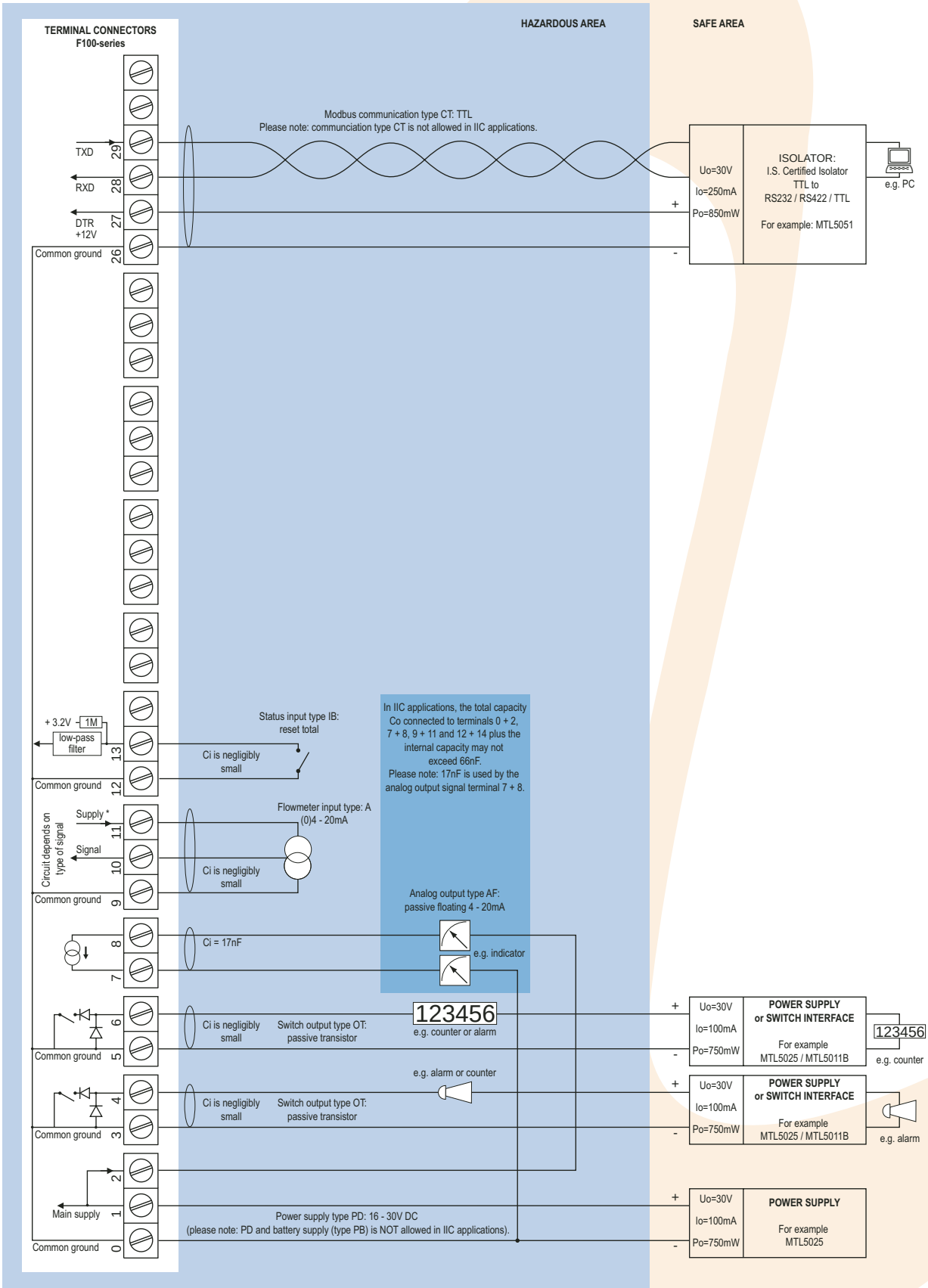
* Note sensor supply voltage: 1.2V DC for coil sensors or 3.2V DC for other pulse sensors.

Configuration example IIB and IIC - F113-P-AP-(CT)-IB-OT-XI - loop powered



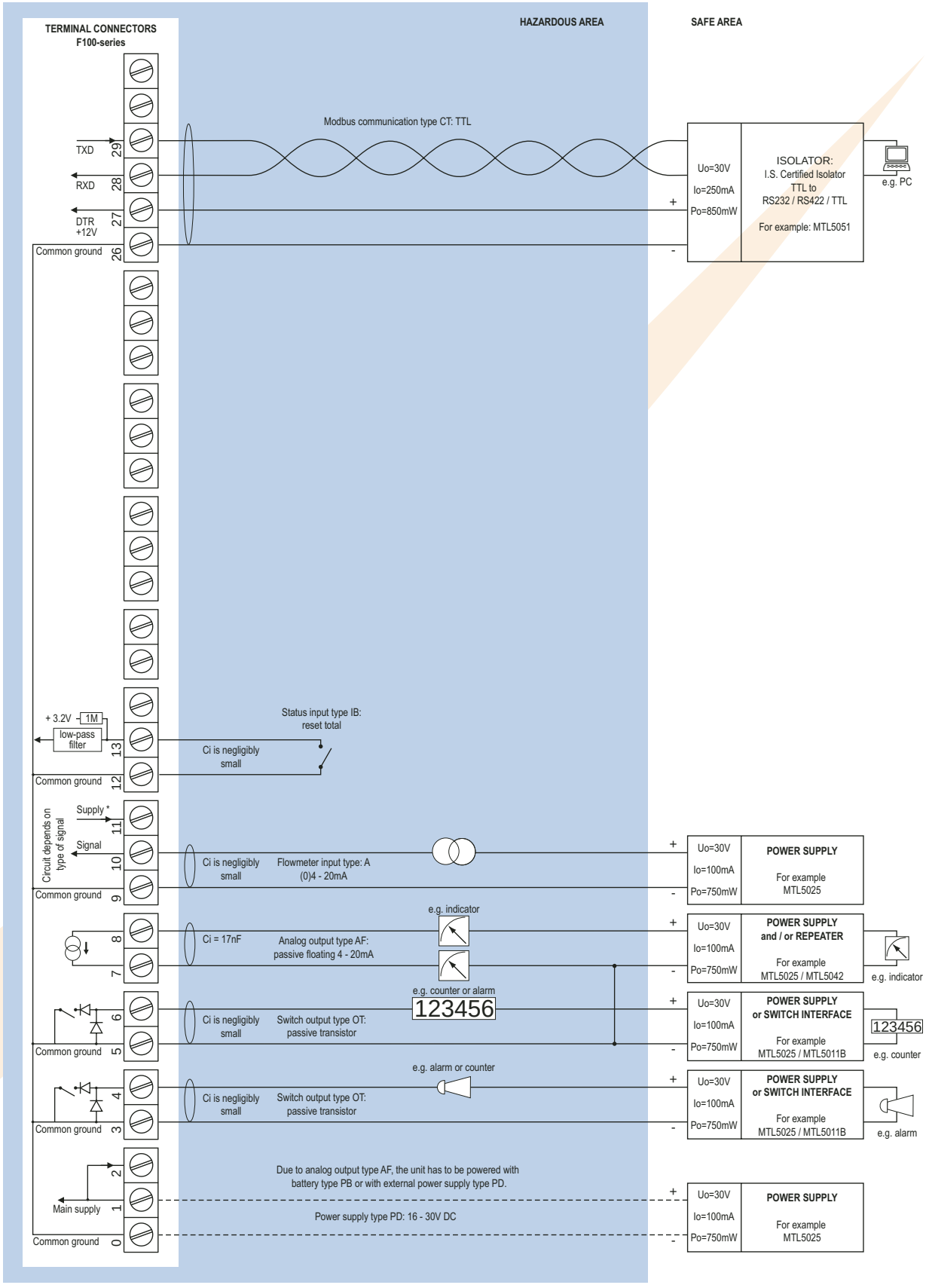
* Note sensor supply voltage: 1.2V DC for coil sensors or 3.2V DC for other pulse sensors.

Configuration example IIB and IIC - F113-A-AF-(CT)-IB-OT-PD-XI - power supply 16 - 30V DC



* Note power supply type PD: the supply voltage to the sensor is maximum 8.7V (Uo=8.7V Io=25mA Po=150mW)

Configuration example IIB - F113-A-AF-CT-IB-OT-(PB)-(PD)-XI - power supply 16 - 30V DC or battery



* Note power supply type PD: the supply voltage to the sensor is maximum 8.7V (Uo=8.7V Io=25mA Po=150mW)

Technical specification

General

Display	
Type	High intensity reflective numeric and alphanumeric LCD, UV-resistant.
Dimensions	90 x 40mm (3.5" x 1.6").
Digits	Seven 17mm (0.67") and eleven 8mm (0.31") digits. Various symbols and measuring units.
Refresh rate	User definable: 8 times/sec. - 30 secs.
Option ZB	LED-backlight - available appr. Nov. 2004.

Casing	
Window	Polycarbonate window.
Sealing	EPDM and PE.
Control keys	Three industrial micro-switch keys. UV-resistant polyester keypad.
Type HA	Die-cast aluminum field mount enclosure IP67 / NEMA 4X with 2-component UV-resistant coating.
Dimensions	130 x 114 x 58mm (5.1" x 4.5" x 2.28") - W x H x D.
Cable Entry	2 x PG9 and 1 x M20 tapped hole in the centre.
Weight	950 gr.
Type HB	Die-cast aluminum panel mount enclosure IP65 / NEMA 4 with 2-component UV-resistant coating.
Dimensions	130 x 114 x 50mm (5.1" x 4.5" x 1.97") - W x H x D.
Panel cut-out	115 x 96mm (4.53" x 3.78") LxH.
Weight	525 gr.
Type HC	ABS panel mount enclosure IP65 / NEMA 4, UV-resistant and flame retardent.
Dimensions	130 x 114 x 48mm (5.1" x 4.5" x 1.89") - W x H x D.
Panel cut-out	115 x 96mm (4.53" x 3.78") LxH.
Weight	300 gr.
Type HD	ABS wall mount enclosure IP67 / NEMA 4X, UV-resistant and flame retardent.
Dimensions	130 x 114 x 71mm (5.1" x 4.5" x 2.8") - W x H x D.
Cable Entry	None, user defined.
Weight	400 gr.
Type HU	Die-cast aluminum field mount enclosure IP67 / NEMA 4X with 2-component UV-resistant coating.
Dimensions	5.1" x 4.5" x 2.28" - W x H x D.
Cable Entry	3 x $^1/_2$" NPT tapped hole.
Weight	950 gr.

Operating temperature	
Operational	-30°C to +80°C (-22°F to +178°F).

Power requirements	
Type PB	Long life Lithium battery - life-time depends upon settings and configuration - up to 5 years.
Type PD	8 - 24V AC/DC ± 10%.
Type PD-XI	16 - 30V DC (Intrinsically Safe).
Type PF	24V AC/DC ± 10%.
Type PL	Input loop powered from sensor signal 4 - 20mA (type "A") - requires types AI or AF and OT.
Type PM	115 - 230V AC ± 10%.
Type PX	8 - 28V DC output loop powered unit with analog output signal type AP (or 8 - 24 V AC/DC if type AP will not be used).

Sensor excitation	
Type PB / PX	3.2V DC for pulse signals and 1.2V DC for coil pick-up.
Type PD	1.2 - 3.2 - 8.2 - 12 and 24V DC - max. 50mA@24V DC.
Type PD-XI	1.2 - 3.2 - 8.2V DC - max. 7mA@8.2V DC and mains power supply voltage (as connected to terminal 1).
Note	In case PD-XI and signal input type A or U, the sensor supply volage will be according to power supply as connected to terminal 1.
Type PF / PM	1.2 - 3.2 - 8.2 - 12 and 24V DC - max. 200mA@24V DC.

Terminal connections	
Type	Removable plug-in terminal strip. Wire max. 1.5mm² and 2.5mm².

Data protection	
Type	EEPROM backup of all settings. Backup of running totals every minute. Data retention at least 10 years.
Pass-code	Configuration settings can be pass-code protected.

Hazardous area	
Intrinsically safe	ATEX approval ref: ⟨Ex⟩ II 1GD EEx ia IIB/IIC T4 T100°C.
Type XI	CSA/FM pending. Maximum ambient +70°C (158°F).
Explosion proof	ATEX approval ref: ⟨Ex⟩ II 2G EEx d IIB T5.
Type XD/XF	Dimensions of enclosure: 218 x 418 x 210mm (8.58" x 16.45" x 8.38") L x H x D.
Weight	16 Kg.

Environment	
Electromagnetic compatibility	Compliant ref: EN 61326 (1997), EN 61010-1 (1993).

Signal inputs

Flowmeter	
Type P	Coil / sine wave (minimum 20mVpp or 80mVpp - sensitivity selectable), NPN/PNP, open collector, reed-switch, Namur, active pulse signals 8 - 12 and 24V DC.
Frequency	Minimum 0Hz - maximum 7kHz for total and flowrate. Maximum frequency depends on signal type and internal low-pass filter. E.g. reed switch with low-pass filter: max. frequency 120Hz.
K-Factor	0.000010 - 9,999,999 with variable decimal position.
Low-pass filter	Available for all pulse signals.
Option ZF	coil sensitivity 10mVpp.
Type A	(0)4 - 20mA. Analog input signal can be scaled to any desired range within 0 - 20mA.
Type U	0 - 10V DC. Analog input signal can be scaled to any desired range within 0 - 10V DC.
Accuracy	14 bit. Error < 0.05%. Low level cut-off programmable.
Span	0.000010 - 9,999,999 with variable decimal position.
Update time	Four times per second.
Voltage drop	Type A: 2.5V@20mA.
Load impedance	Type U: 3kΩ.
Relationship	Linear and square root calculation.
Note	For signal type A and U: external power to sensor is required; e.g. type PD.

Signal outputs

Analog output	
Function	Transmitting flowrate.
Accuracy	10 bit. Error < 0.05%. Analog output signal can be scaled to any desired range.
Update time	Ten times per second.
Type AA	Active 4 - 20mA output (requires OA + PD, PF or PM).
Type AB	Active 0 - 20mA output (requires OA + PD, PF or PM).
Type AF	Passive floating 4 - 20mA output for Intrinsically Safe applications (requires PB, PL or PD).
Type AI	Passive galvanically isolated 4 - 20mA output - also available for battery powered models (requires PB, PD, PF, PL or PM).
Type AP	passive 4 - 20mA output - not isolated. Unit will be loop powered.
Type AU	Active 0 - 10V DC output (requires OA + PD, PF or PM).

Alarm /pulse output	
Function	User defined: pulse output - low, low-low, high, high-high or all alarms output.
Type OA	Three active 24V DC transistor outputs (PNP); max. 50mA per output (requires AA + PD, PF or PM).
Type OR	Two electro-mechanical relay outputs - isolated (N.O.) - max. switch power 230V AC - 0.5A (requires PF or PM) and one transistor output OA or OT (OA in combination with AA only).
Type OS	Four electro-mechanical relay outputs - isolated N.O.); max. switch power 230V AC - 0.5A per relay (requires AP + PD).
Type OT	Three passive transistor outputs (NPN) - not isolated.
Load	Max. 50V DC - 300mA per output.
Pulse output	Max. frequency 64Hz. Pulse length user definable between 7.8 msec up to 2 seconds.

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

Operational

Operator functions	
Displayed functions	• Flowrate and / or total. • Total and accumulated total. • low-low alarm value. • low alarm value. • high alarm value. • high-high alarm value. • Total can be reset to zero by pressing the CLEAR-key twice. • Alarm values can be set (or only displayed).

Total	
Digits	7 digits.
Units	L, m3, 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.

Flowrate	
Digits	7 digits.
Units	mL, L, m3, Gallons, KG, Ton, lb, bl, cf, RND, ft3, scf, Nm3, Nl, igal - no units.
Decimals	0 - 1 - 2 or 3.
Time units	/sec - /min - /hr - /day.

Alarm values	
Digits	7 digits.
Units	According to selection for flowrate.
Decimals	According to selection for flowrate.
Time units	According to selection for flowrate.
Type of alarm	Low, high, low-low or high-high flowrate alarm. Includes delay time alarm and configurable alarm outputs.

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

Ordering information

Example (standard configuration)

F113-P-AP-CX-HC-OT-PX-XX-ZX.

Explanation standard configuration:

P: flowmeter signal: pulse; **AP**: passive 4 - 20mA analog output; **CX**: no communication; **HC**: ABS panel mount enclosure; **OT:** passive transistor output; **PX**: the unit is powered by the analog output loop, type AP: 8 - 28V DC (or AC); **XX**: Safe area; **ZX**: no options.

Ordering information:	F113 -_	-A _	-C _	-H _	-I _	-O _	-P _	-X _	-Z _
Flowmeter input signal									
A Ⓔx (0)4 - 20mA input.									
P Ⓔx Pulse input: coil, npn, pnp, namur, reed-switch.									
U Ⓔx 0 - 10V DC input.									
Analog output signal									
AA Active 4 - 20mA output - requires OA + PD, PF or PM.									
AB Active 0 - 20mA output - requires OA + PD, PF or PM.									
AF Ⓔx I.S. floating 4 - 20mA output - requires PB, PL or PD.									
AI Isolated 4 - 20mA output - requires PB, PD, PF, PL or PM.									
AP Ⓔx Passive 4 - 20mA output, loop powered unit.									
AU Active 0 - 10V DC output - requires OA + PD, PF or PM.									
Communication									
CB Communication RS232 - Modbus ASCII / RTU.									
CH Communication RS485 - 2-wire - Modbus ASCII / RTU.									
CI Communication RS485 - 4-wire - Modbus ASCII / RTU.									
CT Ⓔx Intrinsically Safe TTL - Modbus ASCII / RTU.									
CX Ⓔx No communication.									
Enclosure									
HA Ⓔx Aluminum field mount enclosure IP67 / NEMA 4X.									
HB Ⓔx Aluminum panel mount enclosure IP65 / NEMA 4.									
HC Ⓔx ABS panel mount enclosure IP65 / NEMA 4.									
HD Ⓔx ABS wall mount enclosure IP67 / NEMA 4X.									
HU Ⓔx Aluminum field mount enclosure IP67 / NEMA 4X.									
Inputs									
IB Ⓔx Terminal input to reset total.									
Outputs									
OA Three active transistor outputs - requires AA, AB or AU and PD, PF or PM.									
OR Two mechanic relay outputs + one OA or OT - requires PF or PM.									
OS Four mechanic relay outputs - requires AP + PD.									
OT Ⓔx Three passive transistor outputs - standard configuration.									
Power supply									
PB Ⓔx Lithium battery powered.									
PD Ⓔx 8 - 24V AC/DC + sensor supply - with XI: 16 - 30V DC.									
PF 24V AC/DC + sensor supply.									
PL Ⓔx Input loop powered from sensor signal type “A” - requires AF or AI and OT.									
PM 115 - 230V AC + sensor supply.									
PX Ⓔx No power supply option. Unit requires external loop AP.									
Hazardous area									
XI Ⓔx Intrinsically safe.									
XD Ⓔx EExd enclosure - 1 key.									
XF Ⓔx EExd enclosure - 3 keys.									
XX Safe area only.									
Other options									
ZB Ⓔx Backlight (available appr. Nov. 2004).									
ZF Ⓔx Coil input 10mVpp.									
ZX Ⓔx No options.									

The bold marked text contains the standard configuration.

Ⓔx Available Intrinsically Safe.

Specifications are subject to change without notice.

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