

VALVE POSITION INDICATOR

VPI FOR HYDRAULIC SYSTEMS



Advantages

- Robust IP67 (NEMA Type4X) field enclosure. It is so rugged, **you can even stand on it!**
- Intrinsically Safe available - ATEX and IECEx approval for gas and dust applications.
- Programming can be done by your own crew, with the sensible menu-driven structure, saving cost and irritation. **Know one, know them all!**
- Very diverse mounting possibilities: walls, pipes, panels or directly onto outdoor sensors!

Features

- Valve position calculated through bi-directional flow measurement.
- Displays the position as 0 - 100%, the moved volume and "open / closed" texts.
- Modbus link for remote monitoring.
- Re-calibration feature.
- Service counter displays the nr. of full strokes.
- Quadrature input to detect direction of flow.
- Explosion/flame proof available.
- Full Modbus communication RS232/485/TTL.
- Output loop or battery powered, 8 - 24V AC/DC or 115 - 230V AC power supply.
- Sensor supply 3 / 8.2 / 12 / 24V DC.
- LED backlight option.

Signal output

- (0)4 - 20mA / 0 - 10V DC mirrors the position of the valve.
- Scaled pulse output according to the bi-directional accumulated total
- The directional switch output is switched as soon as the pulse output reflects a "negative" quantity.

Signal input

Flow

- Reed-switch.
- NAMUR.
- NPN/PNP pulse.
- Sine wave (coil).
- Active pulse signals.

Applications

- The F-Series is your first and safest choice for field mount indicators in safe and hazardous area applications. Especially in harsh weather conditions like rain, snow, salty atmospheres and temperatures between -40°C up to +80°C (-40°F up to 176°F).
- Valve position indication and monitoring in hydraulic systems. For example as valve position indicator VPI for ballast tanks in ships. For DIN panel mount indicators, check our [D-Series](#).

General information

Introduction

The F195 has been developed for the valve position indication and monitoring in hydraulic systems. By using a bi-directional flow meter to measure the volume displaced by the actuator, an accurate position of the system is calculated. The usual difficulties encountered in such applications include: very low flows, vibration, thermal expansion of the oil and high ambient temperatures. These are all well catered for in the design and operation of the F195. A wide range of options further enhances the capabilities of this model, including Intrinsic Safety for hazardous area applications and full Modbus communication.

Display

The display has large 17mm (0.67") and 8mm (0.31") digits which can be set to show the position as a percentage as well as with the text "open" and "closed" for the minimum and maximum positions. On-screen engineering units are easily configured from a comprehensive menu.

Configuration

All configuration settings are accessed via a simple operator menu which can be password protected. Each setting is clearly indicated with an alpha-numerical 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 and totals are safely stored in EEPROM memory in the event of sudden power failure.

Analog output signal

The (0)4 - 20mA or 0 - 10V DC output signal mirrors the percentage displayed which can be used to transmit the valve position. The output signal is updated eight times per second. The output signal can be passive, active or isolated where the passive output type will loop power the F195.

Pulse output

Scaled pulse output according to the bi-directional accumulated total (e.g. a pulse every 3.25 gallons). The pulse length is user defined from 0.001 second up to 9.999 seconds. The maximum output frequency is 500Hz. The directional switch output is switched as soon as the pulse output reflects a "negative" quantity. The output signal can be a passive NPN, active PNP or an isolated electro-mechanical relay.

Signal input

The F195 accepts most pulse input signals for volumetric flow or mass flow measurement. To detect the position of the valve, it is required to offer two signals 90° or 270° out of phase. The input signal types can be selected for both inputs in the configuration menu without having to adjust any sensitive mechanical dip-switches or jumpers. Different types of sensors are allowed for both inputs.

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).

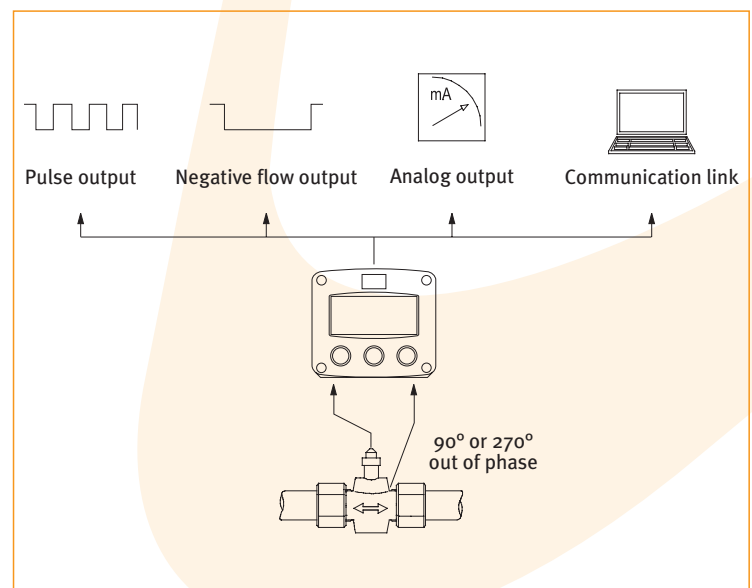
Hazardous areas

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

Enclosures

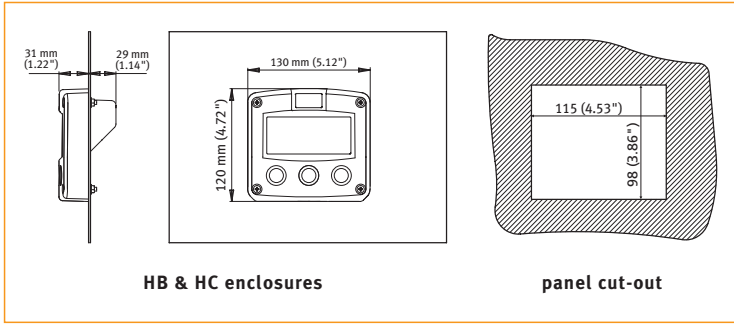
Various types of enclosures can be selected, all ATEX and IECEx approved. As standard the F195 is supplied in an GRP panel mount enclosure, which can be converted to an GRP field mount enclosure. Most popular is our rugged aluminum field mount enclosure with IP67 / NEMA Type4X rating. Both European or U.S. cable gland entry threads are available.

Overview application F195

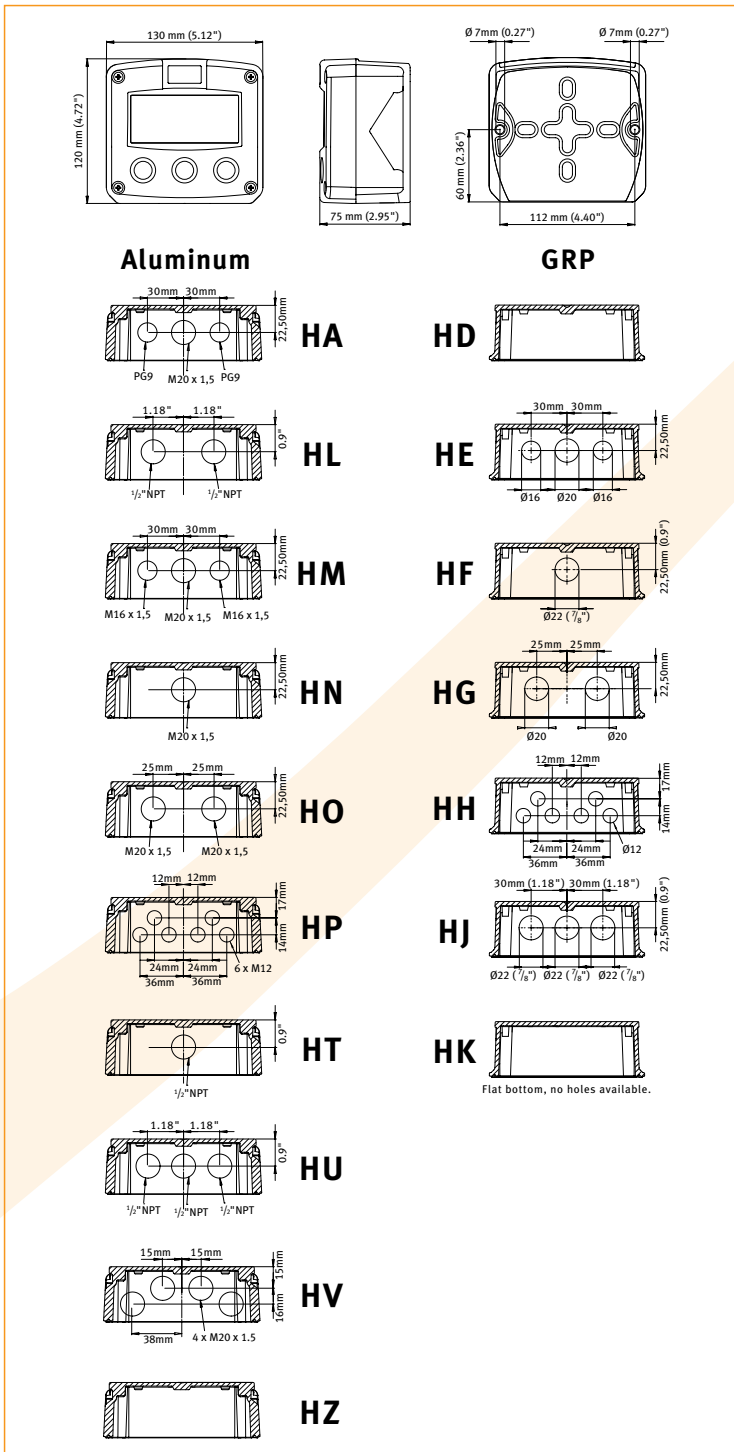


Dimensions enclosures

Aluminum & GRP panel mount enclosure



Aluminum & GRP field / wall mount enclosures



Terminal connections

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COMMUNICATION
 CB: RS232
 DTR +12V RXD TXD
 CH: RS485-2 wire
 A B
 CL: RS485-4 wire
 A B Y Z
 CT: TTL Infrared Safe
 DTR +12V RXD TXD

FLOWMETER INPUT B
 P: coil
 P: need switch / NPN
 P: PNP
 P: normal
 P: active signal

FLOWMETER INPUT A
 P: coil
 P: need switch / NPN
 P: PNP
 P: normal
 P: active signal

ANALOG OUTPUT
 AI: 4...20mA
 AI: 0...20mA
 AI: 4...20mA
 AI: 4...20mA
 AI: 0...10V
 U: L U: +

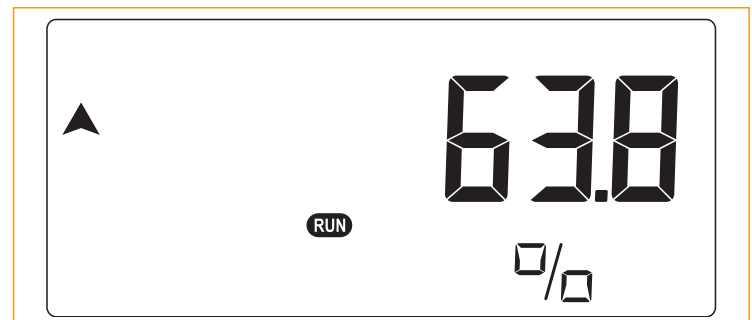
PULSE OUTPUT 1
 OA: active ZV DC
 OT: passive trans.
 OR: mech. relay

NEGATIVE TOTAL OUTPUT 2
 OA: active ZV DC
 OT: passive trans.
 OR: mech. relay

POWER REQUIREMENTS
 PD: 8...24V AC
 PD: 8...24V DC
 PD: 16...30V DC
 PF: 24V AC
 PF: 24V DC
 PM: 115...230V AC
 PK: 8...30V DC
 ZB: Backlight, 12...24V DC

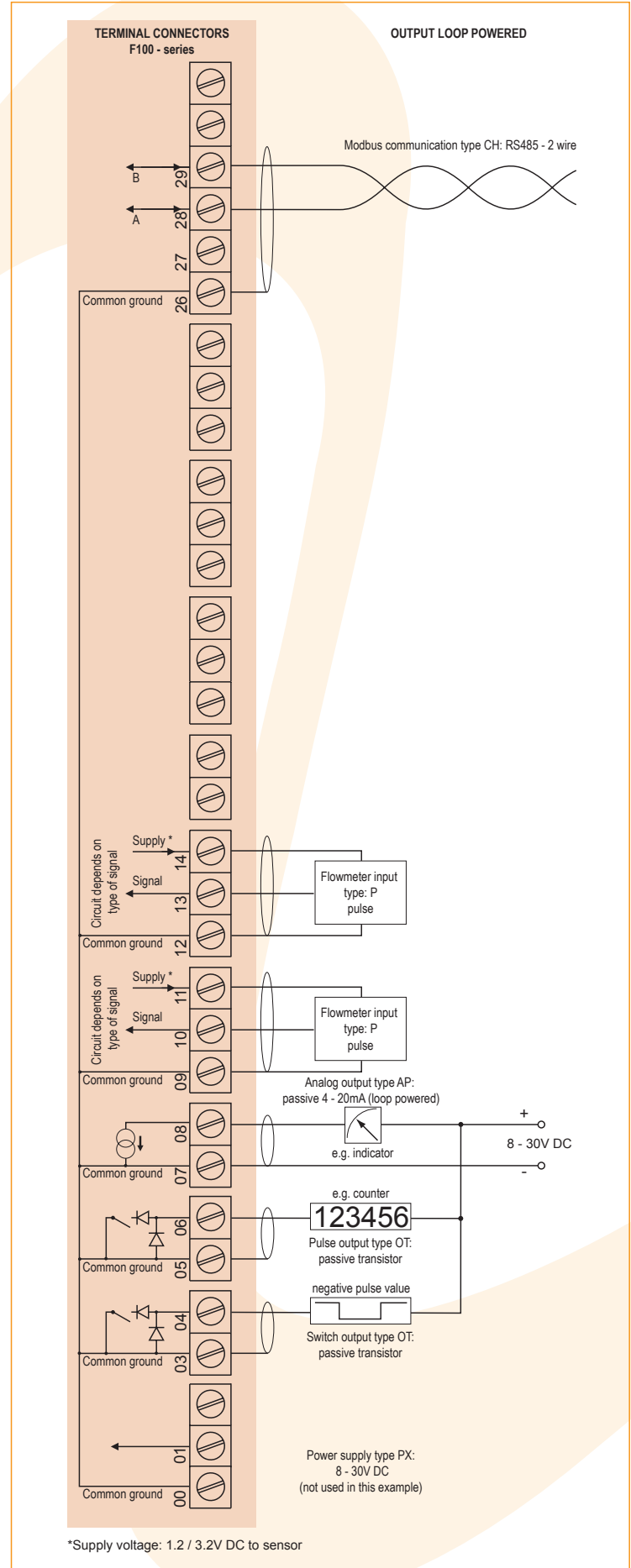
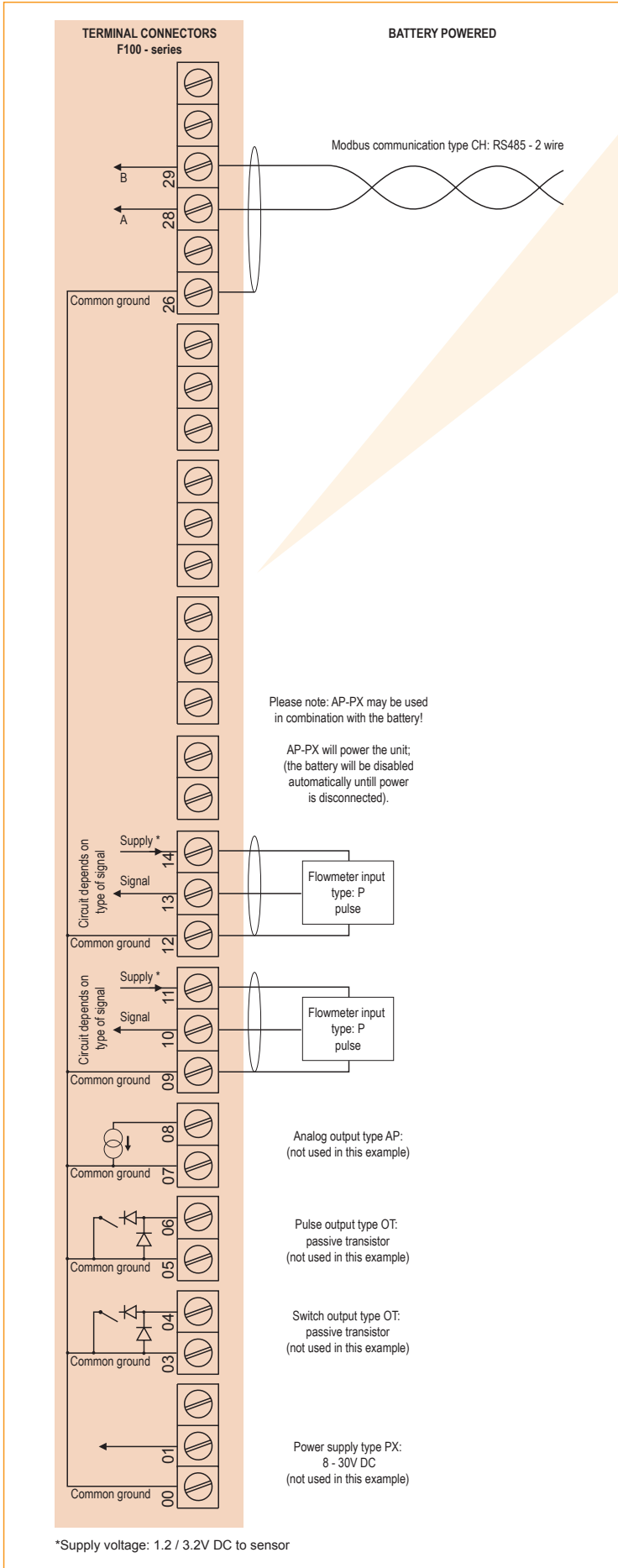
AP: 5...30V DC
 Output temp. Powered
 PB: / FC battery powered
 Internal long life Lithium battery

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



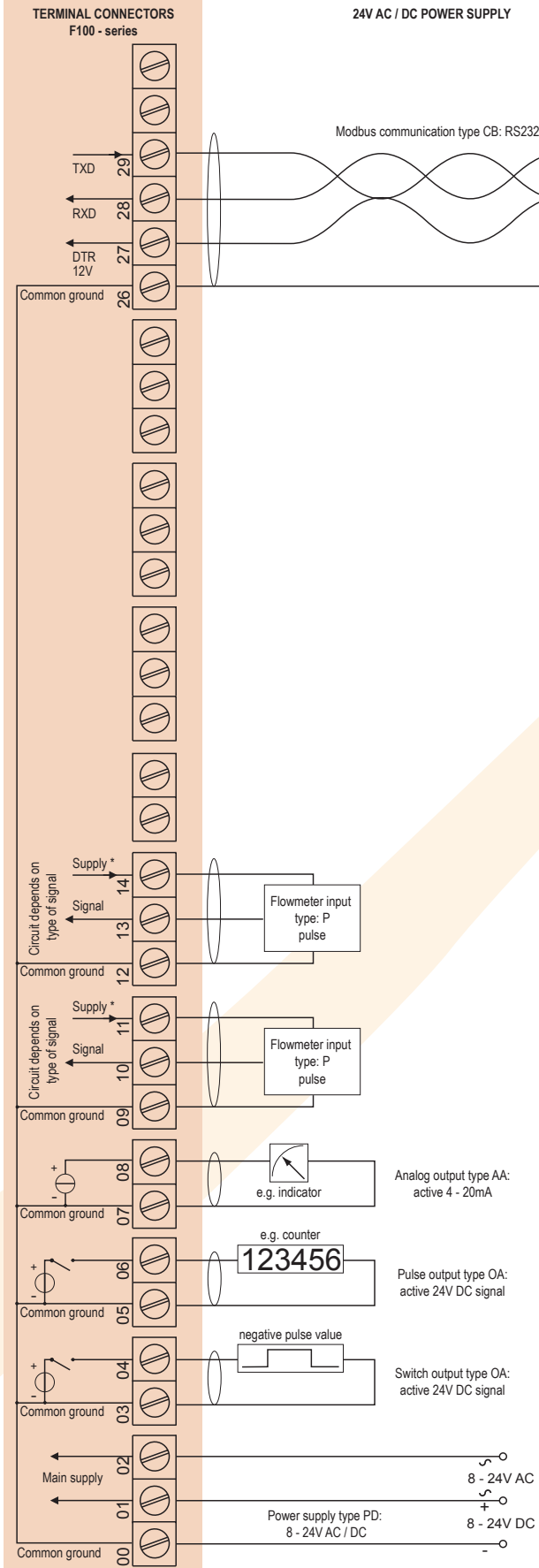
Typical wiring diagram F195-P-(AP)-CH-(OT)-PB-(PX)

Typical wiring diagram F195-P-AP-CH-OT-PX

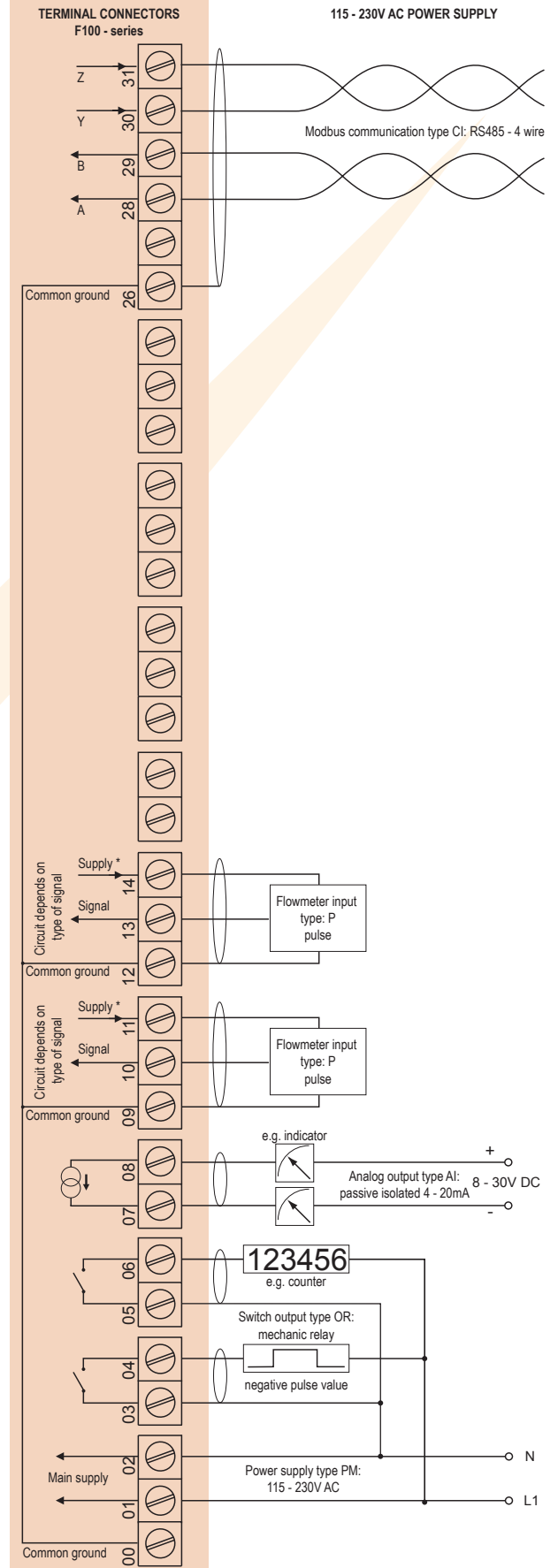


Typical wiring diagram F195-P-AA-CB-OA-PD

Typical wiring diagram F195-P-AI-CI-OR-PM



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



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

Hazardous area applications

The F195-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.**

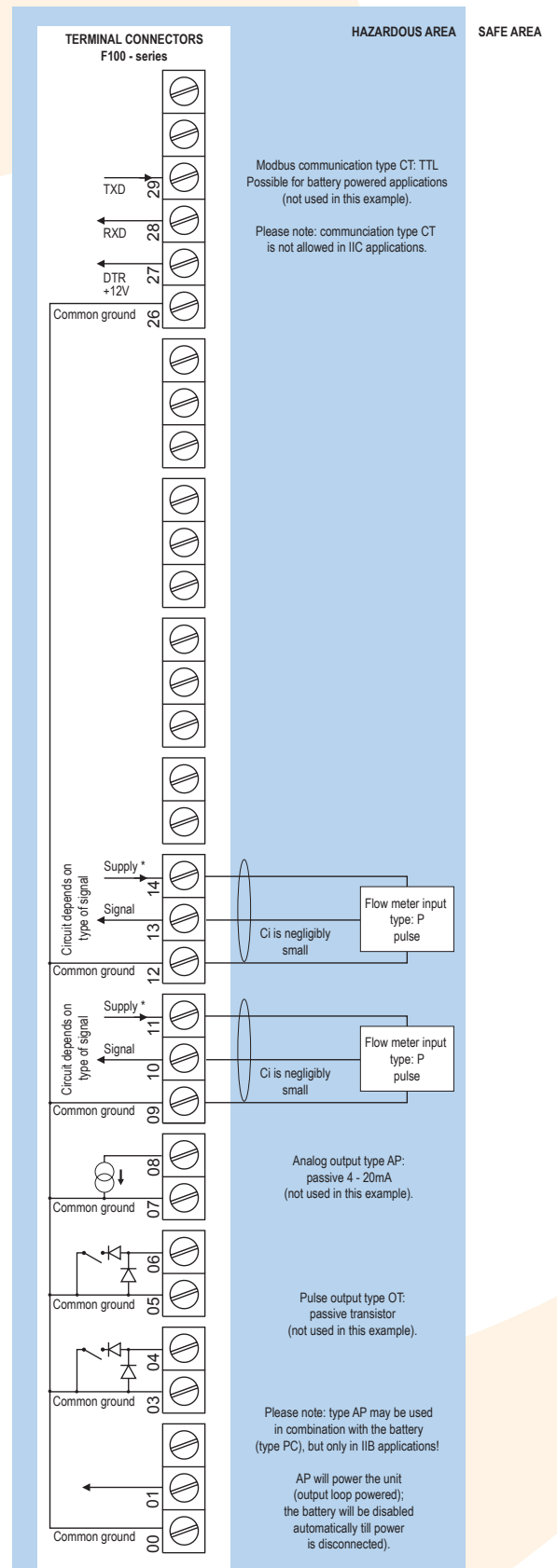
Besides the two I.S. power supply for the pulse and flow-direction outputs, it is allowed to connect up to four I.S. power supplies in IIB/IIC applications or one in IIC applications. Consult the certificate for the maximum input and output values of the circuits. Full functionality of the F195 remains available, including 4 - 20mA output, pulse and flow-direction outputs and Modbus communication (type CT). Power supply type PD-XI offers a 8.2V sensor supply e.g. for one Namur sensor. An ATEX approved flame proof Ex d enclosure is available as well. Please contact your supplier for further details.

Certificate of conformity KEMA 03ATEX1074 X

• IECEx DEK 11.0042X

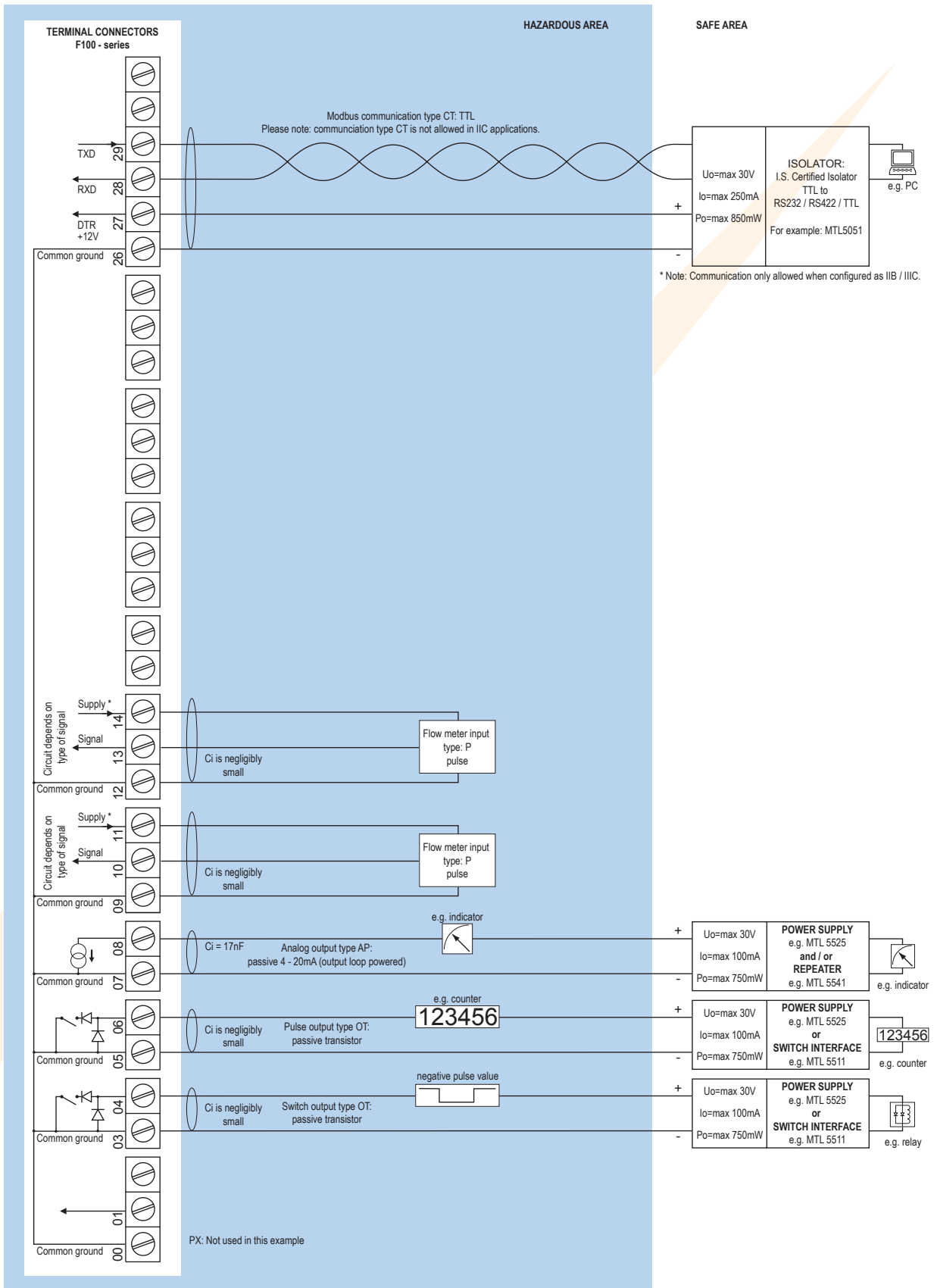


Configuration example IIB / IIC and IIC F195-P-(AP)-(CT)-(OT)-PC-XI - Battery powered unit



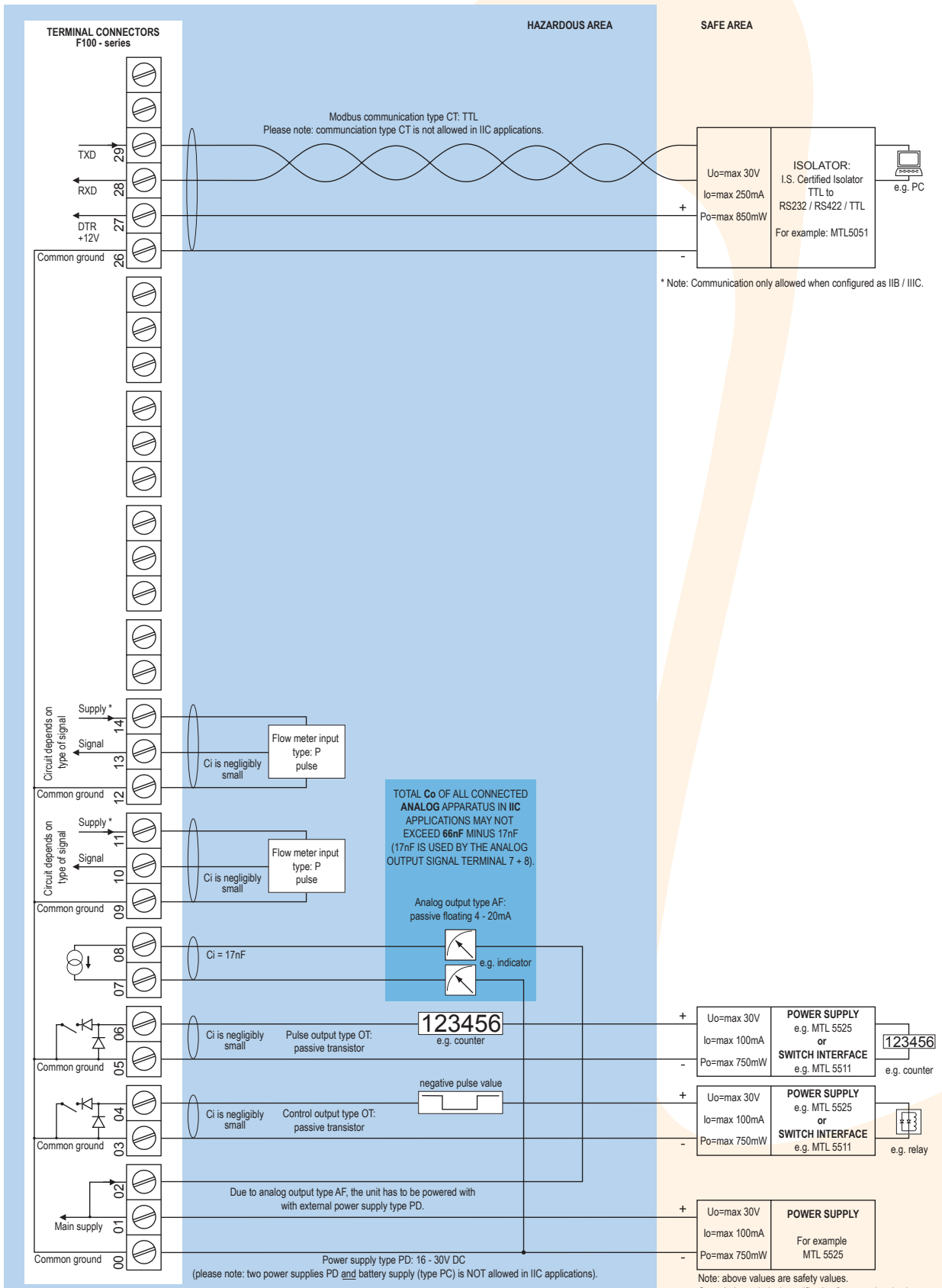
* Note sensor supply voltage: 1.2V DC for coil sensors or 3.2V DC for other pulse sensors.

Configuration example IIB / IIIC and IIC - F195-P-AP-(CT)-OT-(PX)-XI - Output loop powered



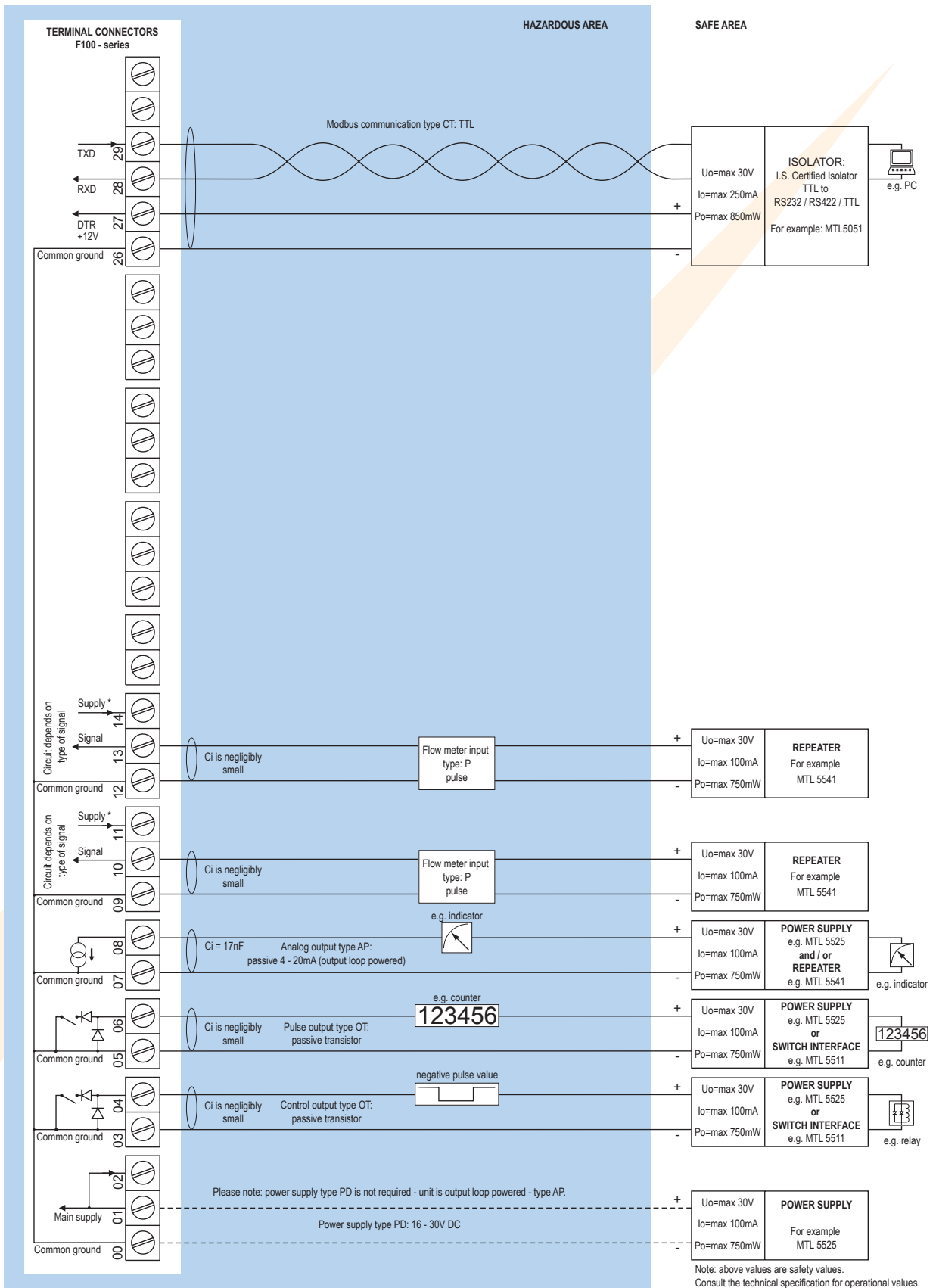
* Note sensor supply voltage: 1.2V DC for coil sensors or 3.2V DC for other pulse sensors.

Configuration example IIB / IIIC and IIC - F195-P-AF-(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) and to analog sensors as connected to terminal 1 (internally linked).

Configuration example IIB / IIIC - F195-P-AP-CT-OT-(PD)-XI - Power requirement 16 - 30V DC



* Note power supply type PD: the supply voltage to pulse sensors is maximum 8.7V ($U_o = \max 8.7V$ $I_o = \max 25mA$ $P_o = \max 150mW$) and to analog sensors as connected to terminal 1 (internally linked).

Technical specification

General

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

Ambient temperature

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

Power requirements

| | |
|---------------|--|
| Type 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. 10 Watt. Intrinsically Safe: 16 - 30V DC; power consumption max. 0.75 Watt. |
| Type PF | 24V AC / DC ± 10%. Power consumption max. 15 Watt. |
| Type PM | 115 - 230V AC ± 10%. Power consumption max. 15 Watt. |
| Type PX | 8 - 30V DC. Power consumption max. 0.5 Watt. |
| Type ZB | 12 - 24V DC ± 10%. Power consumption max. 1 Watt. |
| Note PB/PF/PM | Not available Intrinsically Safe. |
| Note PF/PM | The total consumption of the sensors and outputs may not exceed 400mA @ 24V. |
| Note | For Intrinsically Safe applications, consult the safety values in the certificate. |

Sensor excitation

| | |
|---------------|---|
| Type PB/PC/PX | 3V DC for pulse signals and 1.2V DC for coil pick-up. |
| Note | This is not a real sensor supply. Only suitable for sensors with a very low power consumption like coils (sine wave) and reed-switches. |
| Type PD | 1.2 / 3 / 8.2 / 12 / 24V DC - max. 50mA @ 24V DC. |
| 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. |

Terminal connections

| | |
|------|---|
| Type | Removable plug-in terminal strip. Wire max. 1.5mm ² and 2.5mm ² . |
|------|---|

Data protection

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

Directives & Standards

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

Enclosure

| General | |
|--------------|---|
| Window | Polycarbonate window. |
| Sealing | Silicone. |
| Control keys | Three industrial micro-switch keys. UV-resistant silicone keypad. |

Aluminum wall / field mount enclosures

| | |
|------------|--|
| General | Die-cast aluminum wall/field mount enclosure IP67 / NEMA Type4X with 2-component UV-resistant coating. |
| Dimensions | 130 x 120 x 75mm (5.12" x 4.72" x 2.95") - W x H x D. |
| Weight | 1100 gr. |
| Type HA | Cable entry: 2 x PG9 and 1 x M20. |
| Type HL | Cable entry: 3 x 1/2" NPT. |
| Type HM | Cable entry: 2 x M16 and 1 x M20. |
| Type HN | Cable entry: 1 x M20. |
| Type HO | Cable entry: 2 x M20. |
| Type HP | Cable entry: 6 x M12. |
| Type HT | Cable entry: 1 x 1/2" NPT. |
| Type HU | Cable entry: 3 x 1/2" NPT. |
| Type HV | Cable entry: 4 x M20. |
| Type HZ | Cable entry: no holes. |

GRP wall / field mount enclosures

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

Panel mount enclosures


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

Hazardous area

Intrinsically Safe (Type XI)

| | |
|---------------------|--|
| ATEX certification |  II 1 G Ex ia IIB/IIC T4 Ga. II 1 D Ex ia IIIC T100 °C Da. |
| IECEX certification |  Ex ia IIC/IIB T4 Ga. Ex ia IIIC T100 °C Da. |
| Ambient Ta | -40°C to +70°C (-40°F to +158°F). |

Explosion proof (Type XF)

| | |
|--------------------|--|
| ATEX certification |  II 2 G / Ex d IIB T5 Gb. 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 | IECEX available on request. |

Signal inputs

Flow meter

| | |
|-----------------|---|
| 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. |
| Note | Different sensor types can be used for both inputs. |
| Frequency | Minimum 0Hz - maximum 7kHz for total and flow rate. Maximum frequency depends on signal type and internal low-pass filter. E.g. reed switch with low-pass filter: max. frequency 120Hz. |
| K-Factor | 0.000010 - 9,999,999 with variable decimal position. |
| Low-pass filter | Available for all pulse signals. |
| Option ZF | coil sensitivity 10mVpp. |

Signal outputs

Analog output

| | |
|-------------|--|
| Function | Transmitting the valve position / displayed percentage. |
| 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 for Intrinsically Safe applications (requires XI + PD or PX). |
| 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 PD, PF, PM or PX). |

Digital outputs

| | |
|-----------|---|
| Function | transmitting accumulated total and count-down indication accumulated total. |
| 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). |
| Type OR | Two electro-mechanical relay outputs (N.O.) - isolated; max. switch power 230V AC - 0.5A per relay (requires PF or PM). |
| Type OT | Two passive transistor outputs (NPN) - not isolated. Max. 50V DC - 300mA per output. |
| Note | Output 2 is switched in case a negative acc. total is transmitted. |

Communication option

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

Operational

Operator functions

| | |
|---------------------|---|
| Displayed functions | <ul style="list-style-type: none"> Percentage / open / close and total. Total and/or flow rate. |
|---------------------|---|

Percentage

| | |
|--------|---|
| Digits | 3 1/2 digits with one decimal position. |
|--------|---|

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. |

Flow rate

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

Accessories

Mounting accessories

| | |
|-------|--|
| ACFo2 | Stainless steel wall mounting kit. |
| ACFo5 | Stainless steel pipe mounting kit (worm gear clamps not included). |
| ACFo6 | Two stainless steel worm gear clamps Ø 44 - 56mm. |
| ACFo7 | Two stainless steel worm gear clamps Ø 58 - 75mm. |
| ACFo8 | Two stainless steel worm gear clamps Ø 77 - 95mm. |
| ACFo9 | Two stainless steel worm gear clamps Ø 106 - 138mm. |
| ACF11 | Swivel with 25° movement from center axis for direct flowmeter mounting: 1" NPT to 1/2" NPT. |

Intrinsically Safe isolators

| | |
|-------|--|
| ACGo1 | MTL5511 - One channel pulse or switch output transfer from hazardous area to safe area. |
| ACGo2 | MTL5525 - One channel power supply from safe area to hazardous area (e.g. to power the unit with PD or to power a switching or analog device in hazardous area). |
| ACGo3 | MTL5541 - One channel 4 - 20mA repeater from hazardous area to safe area. |
| ACGo4 | MTL 5051 - Bi-direction serial-data-isolator (for Modbus communication). |
| ACGo5 | MTL5516C - Two channel pulse or switch output transfer from hazardous area to safe area. |
| ACGo6 | MTL5513 - One channel pulse or switch output transfer from hazardous area to safe area. |
| ACGo7 | MTL5546Y - One channel isolated driver bringing 4 - 20mA from safe area to hazardous area, HART transparent, OCD. |


Ordering information

Standard configuration: F195-P-AP-CX-HC-OT-PX-XX-ZX.

Ordering information:

F195 -P -A -C -H -O -P -X -Z


Flow meter input signal

P  **Pulse input: coil, npn, pnp, namur, reed-switch.**


Analog output signal

AA Active 4 - 20mA output - requires PD, PF, PM or PX.

AB Active 0 - 20mA output - requires PD, PF, PM or PX.

AF  I.S. floating 4 - 20mA output - requires XI + PD or PX.

AI Isolated 4 - 20mA output.

AP  **Passive 4 - 20mA output, loop powered unit.**

AU Active 0 - 10V DC output - requires PD, PF, PM or PX.

Communication

CB Communication RS232 - Modbus RTU.


CH Communication RS485 - 2-wire - Modbus RTU.

CI Communication RS485 - 4-wire - Modbus RTU.

CT  Intrinsically Safe TTL - Modbus RTU.


CX  **No communication.**


Panel mount enclosures - IP65 / NEMA Type4X


HB  Aluminum enclosure.


HC  **GRP enclosure.**


GRP field / wall mount enclosures - IP67 / NEMA Type4X


HD  Cable entry: no holes.


HE  Cable entry: 2 x Ø 16mm & 1 x Ø 20mm.

HF  Cable entry: 1 x Ø 22mm (7/8").


HG  Cable entry: 2 x Ø 20mm.


HH  Cable entry: 6 x Ø 12mm.


HJ  Cable entry: 3 x Ø 22mm (7/8").


HK  Flat bottom, cable entry: no holes.


Aluminum field / wall mount enclosures - IP67 / NEMA Type4X


HA  Cable entry: 2 x PG9 flow rate 1 x M20.


HL  Cable entry: 2 x 1/2" NPT.


HM  Cable entry: 2 x M16 flow rate 1 x M20.


HN  Cable entry: 1 x M20.


HO  Cable entry: 2 x M20.

HP  Cable entry: 6 x M12.

HT  Cable entry: 1 x 1/2" NPT.

HU  Cable entry: 3 x 1/2" NPT.


HV  Cable entry: 4 x M20.

HZ  Cable entry: no holes.

Digital output signals

OA Two active transistor outputs - requires PD, PF, PM or PX.

OR Two mechanical relay outputs - requires PF or PM.


OT  **Two passive transistor outputs - standard configuration.**

Power requirements

PD  8 - 24V AC/DC + sensor supply - with XI: 16 - 30V DC.


PF 24V AC/DC + sensor supply.

PM 115 - 230V AC + sensor supply.


PX  **Basic power supply 8 - 30V DC (no real sensor supply).**

Additional battery supply (optional)

PB Lithium battery powered - requires PD or PX.

PC  Lithium battery powered - Intrinsically Safe - requires XI, and PD or PX.

Hazardous area


XI  Intrinsically Safe, according ATEX and IECEx.


XF Ex d enclosure - 3 keys according ATEX.

XX **Safe area only.**

Other options

ZB Backlight.

ZF  Coil input 10mVpp.

ZX  **No options.**

The bold marked text contains the standard configuration.

 Available Intrinsically Safe.

Specifications are subject to change without notice.



Quality
ISO 9001

www.dekra-seal.com

Fluidwell bv

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