BATCH CONTROLLER
WITH TWO STAGE CONTROL / PULSE AND
ANALOG OUTPUT IN RELATION TO THE FLOW RATE

Features
• Large display shows preset value, running batch value and instantaneous flow rate.
• Self-learning overrun correction.
• Easy operation to enter a batch value and to control the process.
• Count-up and count-down function available.
• Selectable on-screen engineering units; volumetric or mass.
• Ability to process all types of flowmeter signals.
• 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 1 GD EEx ia IIB/IIC T4 T100°C.
  • Explosion/flame proof Ex II 2 GD EEx d IIB T5.
• 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
• Two configurable control outputs: for two-stage or one-stage control.
  • (0)4 - 20mA / 0 - 10V DC according to flow rate.
  • Scaled pulse output according to acc. total.

Signal input
Flow
• Reed-switch.
• NAMUR.
• NPN/PNP pulse.
• Sine wave (coil).
• Active pulse signals.
  • (0)4 - 20mA.
  • 0 - 10V DC.

Status
• Remote control: start.
• Remote control: pause / stop.

Applications
• For batching small up to very large quantities. Flow rate indication and / or retransmission is required. Alternative basic model: F030 and F130 or more sophisticated models: F136 and 300 series.
General information

Introduction
The F131 offers in addition to the standard functions an analog output signal in relation to the flow rate. The operator can enter a batch quantity easily or execute repeating batches. During the batch, the preset value is displayed as well as the batched (or remaining) quantity and the flow rate. The automatic self-learning overrun correction will ensure an accurate result each batch again. A wide selection of options further enhance this model's capabilities.

Display
The display has large 17mm (0.67”) and 8mm (0.31”) digits. Besides the process information, a seven digit resettable "day total" is available as well as an eleven digit non-resettable accumulated total. All are 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. All settings are safely stored in EEPROM memory in the event of sudden power failure.

Analog output signal
The flow rate 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 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 F131 as well.

Control outputs
Two outputs are available which can be configured to operate as two stage control for large batch quantities or one stage control for smaller batches, where the second output is available as a scaled pulse output. The maximum output frequency is 64Hz. The output signals can be a passive NPN, active PNP or an isolated electro-mechanical relay.

Signal input
The F131 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.

Communication
All process data and settings can be read and modified manually or through the Modbus communication link (RS232 / RS485). If desired, the batch process can even be started and stopped through communication. 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 II 1 GD 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 II 2 GD EEx d IIB T5.

Enclosures
Various types of enclosures can be selected, all ATEX approved. As standard the F131 is supplied in a 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 4X rating. Both European or U.S. cable gland entry threads are available.

Overview application F131
### Dimensions enclosures

**Aluminum & GRP panel mount enclosure**

**Aluminum & GRP field / wall mount enclosures**

### Terminal connections

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

- **Aluminum**
  - HA
  - HM
  - HO
  - HP
  - HT
  - HU

- **GRP**
  - HD
  - HE
  - HF
  - HH
  - HJ
  - HK

#### Terminal connections diagram

- Power supply options:
  - PD: 8 - 24V AC
  - PD: 8 - 24V DC
  - PD - XI: 16 - 30V DC
  - PF: 24V AC
  - PF: 24V DC
  - PM: 115 - 230V AC

- Feedback options:
  - OT: passive trans.
  - OA: active 24V DC
  - OR: mech. relay

- Start input:
  - 10 11

- Flowmeter input:
  - 9

- Analog output:
  - OT: passive trans.
  - OA: active 24V DC
  - OR: mech. relay

- Communication / backlight:
  - 26
  - 23
  - 22
  - 21

- Control and pulse output:
  - R1
  - R2

- Input loop powered options:
  - PL: input loop powered

- Internal long life Lithium battery option:
  - PB / PC: battery powered

- Communication options:
  - CI: RS485 - 4 wire
  - ZB: Backlight option

- Input options:
  - AP: 4 - 20mA
  - AA: 4 - 20mA
  - AF: 4 - 20mA
  - AU: 0 - 10V
  - AI: 4 - 20mA
  - AB: 0 - 20mA

- Output loop powered unit options:
  - PX: 8 - 30V DC

- Other options:
  - 1.18" x 1.18" x 1.18"
  - 1/4" NPT
  - M20 x 1.5
  - PG9 PG9
  - 12 mm x 1.5
  - 22 mm x 1.5
  - 30 mm x 1.5
  - 30 mm x 1.5
  - 22,50 mm
  - Ø22 x 1.5
  - Ø22 x 1.5

- Flat bottom, no holes available.

**Additional dimensions**

- HB & HC enclosures
  - 112 mm (4.65")
  - 115 mm (4.55")
  - 110 mm (4.33")

- Panel cut-out
  - 130 mm (5.12")
  - 75 mm (3.0")

- Dimensions for different enclosures:
  - 130 mm (5.12")
  - 120 mm (4.72")

- For more details, refer to the provided diagram or contact Fluidwell for specific requirements.
Typical wiring diagram F131-A-AA-CB-OA-PD

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

Typical wiring diagram F131-A-Al-CI-OR-PM

*Supply voltage: 3.2 / 8.2 / 12 / 24V DC to sensor
Hazardous area applications

The F131-XI has been ATEX approved by KEMA for use in Intrinsically Safe applications. It is approved according to II 1 GD Ex 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 control 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 F131 remains available, including two stage control, 4 - 20mA output, pulse 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 II 2 GD Ex d IIB T5 is available as well. Please contact your supplier for further details.

Configuration example IIB and IIC
F131-P-(AP)-(CT)-OT-PC-(PX)-XI - Battery powered unit

Certificate of conformity KEMA 03ATEX1074 X
Configuration example IIB and IIC - F131-P-AP-(CT)-OT-PX-XI - Output loop powered

**TERMINAL CONNECTORS**

**F100 - series**

**HAZARDOUS AREA**

**SAFE AREA**

**TERMINAL CONNECTORS**

**F100 - series**

**Modbus communication type CT: TTL**

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

**ISOLATOR:**

Uo=max 30V

Io=max 250mA

Po=max 850mW

**For example: MTL5051**

**POWER SUPPLY**

Uo=max 30V

Io=max 100mA

Po=max 750mW

**For example: MTL 5025**

**SWITCH INTERFACE**

Uo=max 30V

Io=max 100mA

Po=max 750mW

**For example: MTL 5042**

**REPEATER**

Uo=max 30V

Io=max 100mA

Po=max 750mW

**For example: MTL 5011B**

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

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

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**Control output type OT:**

- Passive transistor

  - e.g. relay or counter

**Analog output type AP:**

- Passive 4 - 20mA (output loop powered)

  - e.g. indicator

**Flowmeter input type: P pulse**

**Logic input:**

- PAUSE / STOP

  - Ci is negligibly small

- START

  - Ci is negligibly small

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**Power supply type AP:**

- Passive 4 - 20mA (output loop powered)

  - e.g. indicator

**Power supply type OT:**

- Passive transistor

  - e.g. relay or counter

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**Common ground**

**Low-pass filter**

1M

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**Note:** above values are safety values. Consult the technical specification for operational values.
Configuration example IIB and IIC - F131-A-AF-(CT)-OT-PD-XI - Power supply 16 - 30V DC

**TERMINAL CONNECTORS**

**F100 - series**

**HAZARDOUS AREA**

- **Signal**
  - Common ground

**SAFE AREA**

- **Common ground**
  - Signal

- **Main supply**
  - Power supply type PD: 16 - 30V DC (please note: PD and battery supply (type PC) is NOT allowed in IIC applications).

**TERMINAL CONNECTORS**

- **Isolator:** I.S. Certified Isolator TTL to RS232/RS422/TTL
  - For example: MTL501

**Digital Input**

- **RXD**
  - Common ground

- **TXD**
  - Common ground

**Analog Input**

- **Flowmeter input type: A**
  - (0)4 - 20mA

**Logic Input**

- **PAUSE / STOP**
  - + 3.2V low-pass filter 1M

- **START**
  - + 3.2V low-pass filter 1M

- **Control output type OT:** passive transistor
  - e.g. relay

**Power Supply**

- **e.g. MTL5025**
  - Uo=max 30V
  - Io=max 100mA
  - Po=max 750mW

- **e.g. MTL 5011B**
  - Uo=max 30V
  - Io=max 100mA
  - Po=max 750mW

**Power Supply**

- **e.g. MTL 5025**
  - Uo=max 30V
  - Io=max 100mA
  - Po=max 750mW

**Note:**

- Above values are safety values. Consult the technical specification for operational values.
- *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).
Configuration example II B - F131-AF-CT-OT-(PC)-(PD)-(PL)-XI - Power supply 16 - 30V DC, battery or loop powered

**TERMINAL CONNECTORS**

F100 - series

**HAZARDOUS AREA**

Modbus communication type CT: TTL

**SAFE AREA**

**ISOLATOR:** I.S. Certified isolator TTL to RS232 / RS422 / TTL

For example: MTL5051

**POWER SUPPLY**

For example MTL5025

**SWITCH INTERFACE**

For example MTL5011B

**POWER SUPPLY**

*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).*

Due to analog output type AF, the unit has to be powered with battery type PC, with external power supply type PD or input loop powered type PL.

Power supply type PD: 16 - 30V DC

* Note above values are safely values. Consult the technical specification for operational values.
Technical specification

**Display**

**General**

- **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**: Transflective LCD with green LED backlight. Good readings in full sunlight and darkness.

**Note ZB**: Only available for safe area applications.

**Operating temperature**

- **Operational**: -30°C to +80°C (-22°F to +178°F).
- **Intrinsically Safe**: -30°C to +70°C (-22°F to +158°F).

**Power requirements**

- **Type PB**: Long life Lithium battery - life-time depends upon settings and configuration - up to 5 years.
- **Type PC**: Intrinsically Safe long life lithium battery - life-time depends upon settings and configuration - up to 5 years.
- **Type PD**: 8 - 24V AC / DC ± 10%. Power consumption max. 0.75 Watt. Intrinsically Safe: 16 - 30V DC; power consumption max. 0.75 Watt.
- **Type PF**: 24V AC / DC ± 10%. Power consumption max. 15 Watt.
- **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%, Power consumption max. 15 Watt.
- **Type PX**: 8 - 30V DC, Power consumption max. 0.5 Watt.
- **Type ZB**: 12 - 24V DC ± 10% or type PD / PF / PM. Power consumption max. 1 Watt.

**Note PB/PC/PX**: Not available Intrinsically Safe.

**Note PF/PM**: The total consumption of the sensors and outputs may not exceed 400mA @ 24V.

**Sensor excitation**

- **Type PB/PC/PX**: 3.2V 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 / 3.2 / 8.2 / 12 / 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 A or U: the sensor supply voltage is according to the power supply voltage connected to terminal 1. Also terminal 2 offers the same voltage.
- **Type PF / PM**: 1.2 / 3.2 / 8.2 / 12 / 24V DC - max. 400mA @ 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.**: II 1 GD EEx ia IIB/IIC T4 T50°C.
- **Type XI**: Maximum ambient +70°C (158°F).
- **Explosion proof**
  - **ATEX approval ref.**: II 2 GD EEx d IIB T5.
- **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. 15 Kg.

### Environment

**Electromagnetic compatibility**


### Casing

**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 4X 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 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 HZ**: Cable entry: no holes.

### GRP wall / field mount enclosures

**General**

- **GRP wall/field mount enclosure IP67 / NEMA 4X, 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 4.

**Weight**: 600 gr.

- **Type HC**: GRP panel mount enclosure IP65 / NEMA 4, UV-resistant and flame retardant.

**Weight**: 450 gr.

### ABS wall / field mount enclosures

**General**

- **Silicone free ABS wall/field mount enclosure IP65 with EPDM and PE sealings, UV-resistant polyester keypad (old HD enclosure)**.

**Dimensions**: 130 x 114 x 71mm (5.1” x 4.5” x 2.8”) - W x H x D.

**Weight**: 450 gr.

- **Type HS**: Cable entry: no holes.
### 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 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.
- **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**
  - Resolution: 14 bit. Error $< 0.025$mA / ± 0.125% FS.
- **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.

**Logic inputs**

- **Function**
  - Two terminal inputs to start, stop and reset the batch process.
- **Type**
  - Internally pulled-up switch contact - NPN.
- **Duration**
  - Minimum pulse duration 100msec.

**Signal outputs**

- **Analog output**
  - **Function**
    - Transmitting flow rate.
  - **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 PC, 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).

**Control / pulse output**

- **Function**
  - User defined: batch process one or two stage control - scaled pulse output according the running batch or according accumulated total.
- **Frequency**
  - Max. 64Hz. Pulse length user definable between 7.8 msec up to 2 seconds.
- **Type OA**
  - Two active 24V DC transistor outputs (PNP); max. 50mA per output (requires AA + PD, PF or PM).
- **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.

### 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.

### Operator functions

- **Displayed functions**
  - • Preset value - can be entered by the operator.
  - • Batched quantity or remaining quantity.
  - • Flow rate.
  - • Total and accumulated total.
  - • Total can be reset to zero by pressing the STOP-key twice.

- **Preset / total**
  - **Digits**
    - 7 digits.
  - **Units / decimals**
    - According to selection for total.
  - **Note**
    - Can not be reset to zero.

- **Flow rate**
  - **Digits**
    - 7 digits.
  - **Units / decimals**
    - mL, L, m³, Gallons, KG, Ton, lb, bl, cf, RND, ft³, scf, Nm³, NI, igal - no unit.
  - **Note**
    - Can not be reset to zero.

### Accumulated total

- **Digits**
  - 11 digits.
- **Units / decimals**
  - According to selection for total.
- **Note**
  - Total can be reset to zero.

### Accessories

- **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.
  - **ACF10**
    - Customized Grevopal tagplates for ACF02 and ACF05, including stainless steel screws. Dimension: 95mm x 12.5mm (3.75” x 0.50”).

- **Cable gland accessories**
  - **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.
# Ordering information

**Standard configuration:** F131-P-AP-CX-EX-IX-OT-PX-TX-XX-ZX.

## Ordering information:

| Flowmeter input signal | F131 | - | - | - | C | - | EX | H | - | IX | - | O | - | P | - | TX | - | X | - | Z |
|-------------------------|------|---|---|---|---|---|----|---|---|----|---|---|---|---|---|---|----|---|---|---|---|
| A                       | (o)4 | - | 20mA input. |
| P                       | Pulse input: coil, npn, pnp, namur, reed-switch. |
| U                       | 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 | I.S. floating 4 - 20mA output - requires PC, PD or PL. |
| AI | Isolated 4 - 20mA output - requires PB, PD, PF, PL or PM. |
| AP | Passive 4 - 20mA output, loop powered unit. |
| AU | Active 0 - 10V DC output - requires OA + PD, PF or PM. |

### 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. |

### Flow equations

| EX | No flow equations. |

### Panel mount enclosures - IP65 / NEMA4

| HB | Aluminum enclosure. |
| HC | GRP enclosure. |

### GRP field / wall mount enclosures - IP67 / NEMA4X

| HD | Cable entry: no holes. |
| HE | Cable entry: 2 x Ø 16mm & 1 x Ø 20mm. |
| HF | Cable entry: 1 x Ø 22mm ("/"in"). |
| HG | Cable entry: 2 x Ø 20mm. |
| HH | Cable entry: 6 x Ø 12mm. |
| HJ | Cable entry: 3 x Ø 22mm ("/"in"). |
| HK | Flat bottom, cable entry: no holes. |

### Aluminum field / wall mount enclosures - IP67 / NEMA4X

| HA | Cable entry: 2 x PG9 + 1 x M20. |
| HM | Cable entry: 2 x M16 + 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. |
| HZ | Cable entry: no holes. |

### ABS field / wall mount enclosures

| HS | Silicone free ABS field enclosure IP65 – Cable entry: no holes (old HD enclosure). |

### Additional inputs

| IX | No additional input. |

### Outputs

| OA | Two active transistor outputs - requires AA, AB or AU and PD, PF or PM. |
| OR | Two mechanical relay outputs - requires PF or PM. |
| OT | Two passive transistor outputs - standard configuration. |

### Power supply

| PB | Lithium battery powered. |
| PC | Lithium battery powered - Intrinsically Safe. |
| PD | 8 - 24V AC/DC + sensor supply - with XI: 16 - 30V DC. |
| PF | 24V AC/DC + sensor supply. |
| PL | Input loop powered from sensor signal type "A" - requires AF or AI and OT. |
| PM | 115 - 230V AC + sensor supply. |
| PX | Basic power supply 8 - 30V DC (no real sensor supply). Unit requires external loop AP. |

### Temperature input signal

| TX | No temperature input signal. |

### Hazardous area

| XI | Intrinsically Safe. |
| XF | EExd enclosure - 3 keys. |
| 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.