DATASHEET F136 - BATCH CONTROLLER

BATCH CONTROLLER

WITH TWO STAGE CONTROL AND 4 - 20mA OUTPUT IN RELATION TO THE BATCH POCESS.

Features

- Large display shows preset value, running batch value and instantaneous flowrate.
- The analog output value reflects the course of the batch process; fourteen different profiles can be selected.
- Self-learning overrun correction.
- Easy operation to enter a batch value and to control the process.
- Count-up and count-down function available.
- Abillity 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 Ⓔx II 1GD EEx ia IIB/IIC T4 T100°C.
- Explosion/flame proof Ⓔx II 2G 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 the batch process.
- Scaled pulse output according to acc. total.

Signal input

Flow

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

Status

- Remote control: start.
- Remote control: pause / stop.

Applications

- For batch applications where retransmission of the course of the proces is required. Alternative basic model: F030, F130 and F131 or more sophisticated models: 0300 series.

General information

Introduction

The F136 offers in addition to the standard functions an analog output signal in relation to the batch proces. This to transmit the course of the process.
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. The automatic self-learning overrun correction will ensure an accurat result each batch again.

Display

The display has large 17mm (0.67") and 8mm (0.31") digits. Besides the proces 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 (0)4 - 20mA or 0 - 10V DC output signal is related to the batch process. For example, a 4mA will be generated when START has been pressed and this value will increase smootly to 18.7mA when the overrun correction closes the valve. The end value will be 20mA when the batch is finished. Fourteen different profiles are available to re-transmit the course of the process (see section profiles). The output signal can be passive, active or isolated where the passive output type will loop power the F136 as well.

Pulse output

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 output signals can be a passive NPN, active PNP or an isolated electro-mechanical relay.

Signal input

The F136 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).

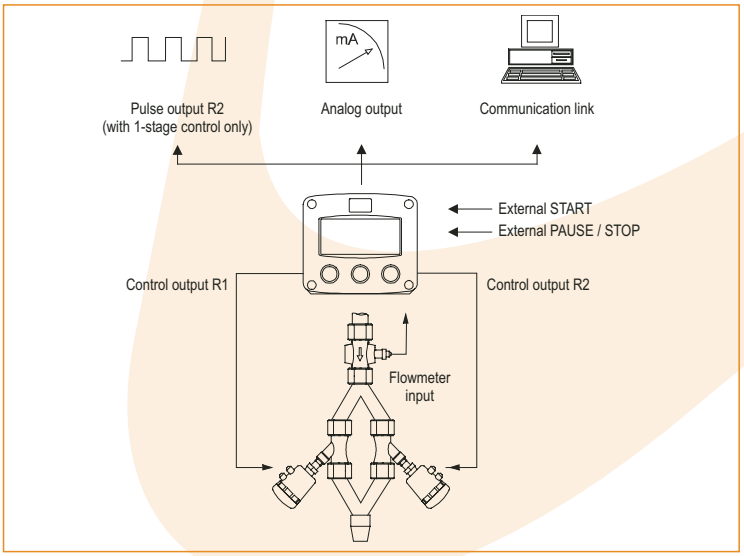
Hazardous areas

For hazardous area applications, this model has been ATEX certified intrinsically safe ⟨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 F136 is supplied in an ABS panel mount enclosure, which can be converted to an 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 F136

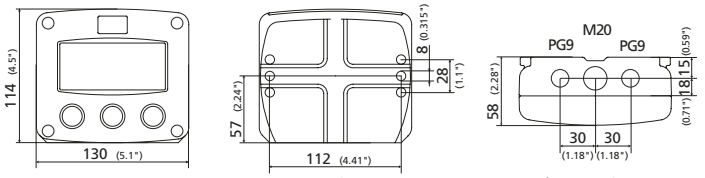


Dimensions enclosures

Enclosure HA

Aluminum field mount enclosure

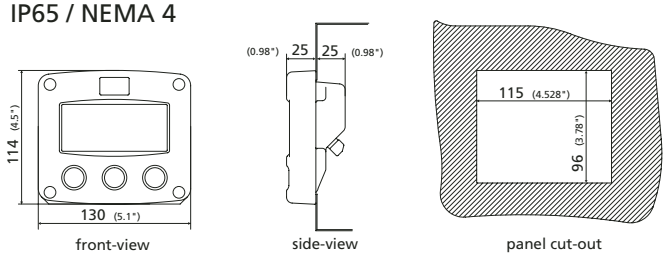
IP67 / NEMA 4X
Tapped holes: European thread



Enclosure HB

Aluminum panel mount enclosure

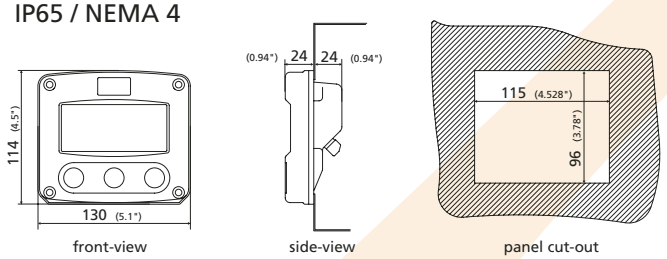
IP65 / NEMA 4



ENCLOSURE HC (STANDARD)

ABS PANEL MOUNT ENCLOSURE

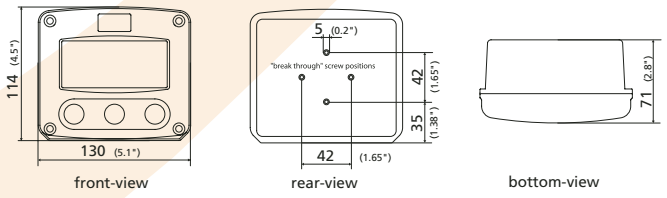
IP65 / NEMA 4



Enclosure HD

ABS wall mount enclosure

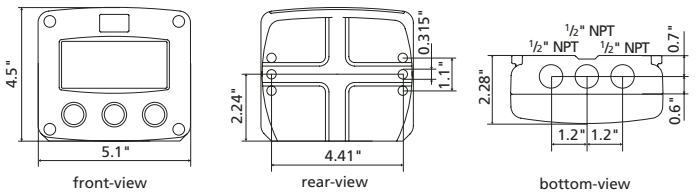
IP67 / NEMA 4X
Holes user defined



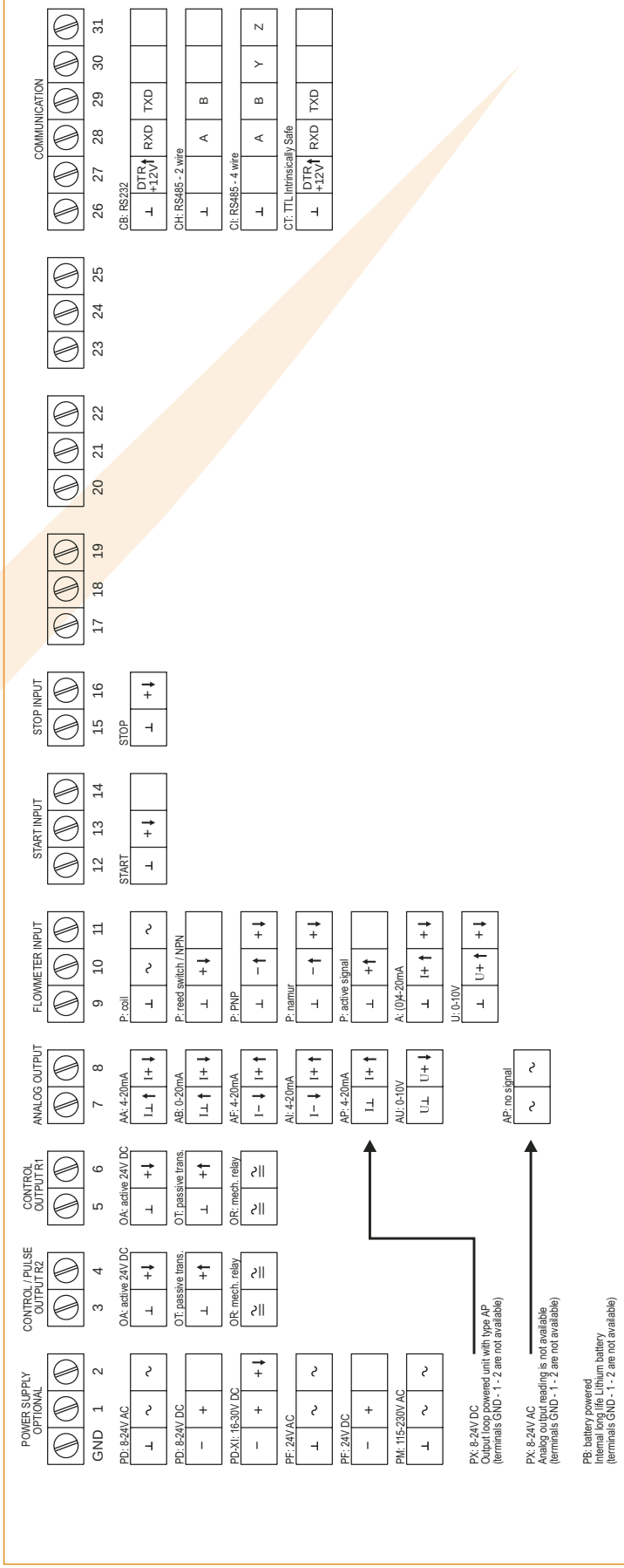
Enclosure HU

Aluminum field mount enclosure

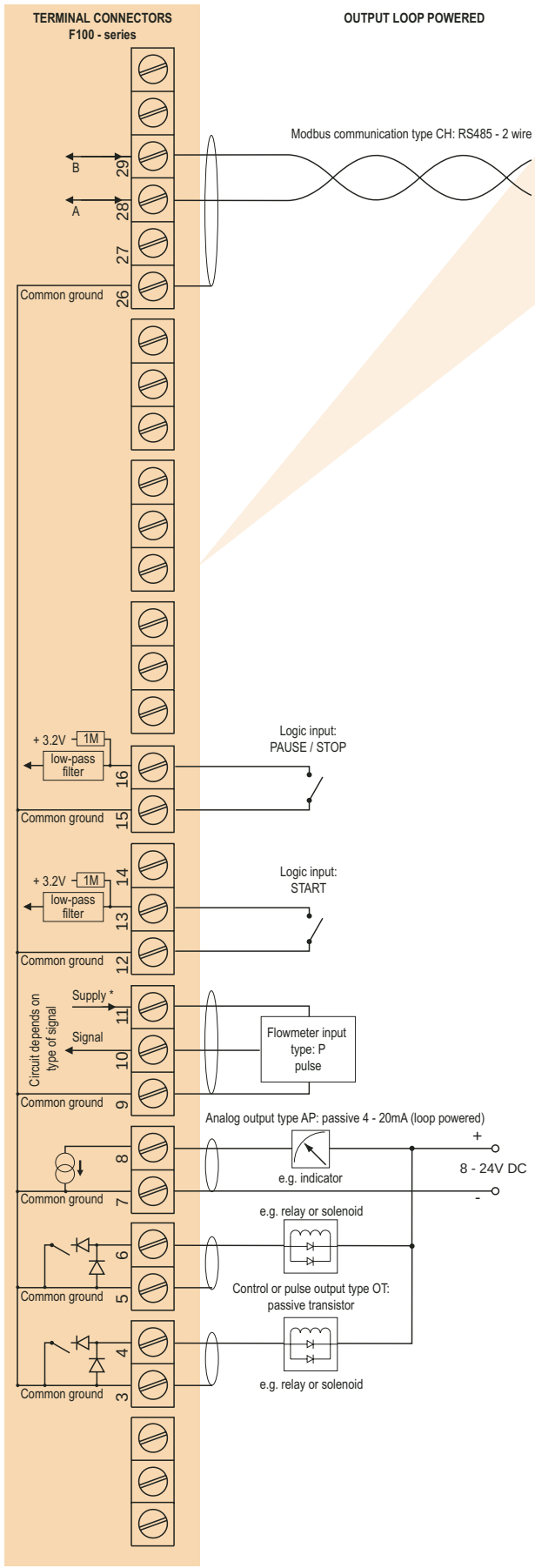
IP67 / NEMA 4X
Tapped holes: U.S. thread



Terminal connections

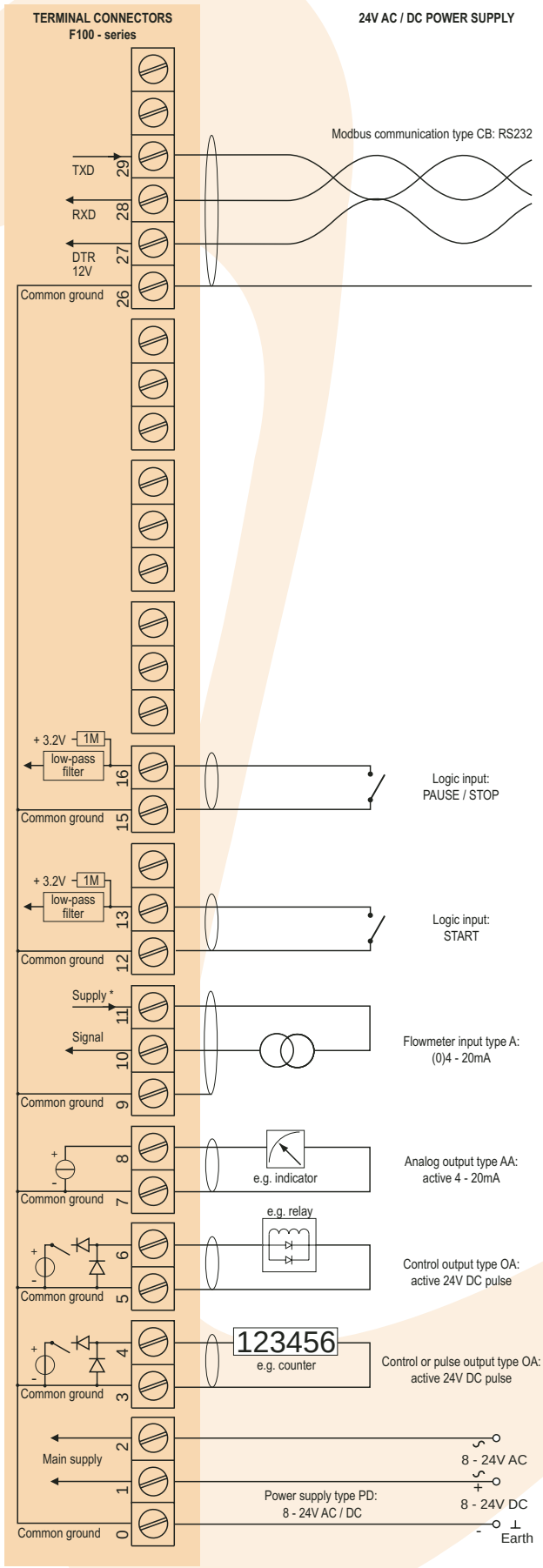


Typical wiring diagram F136-P-AP-CH-OT



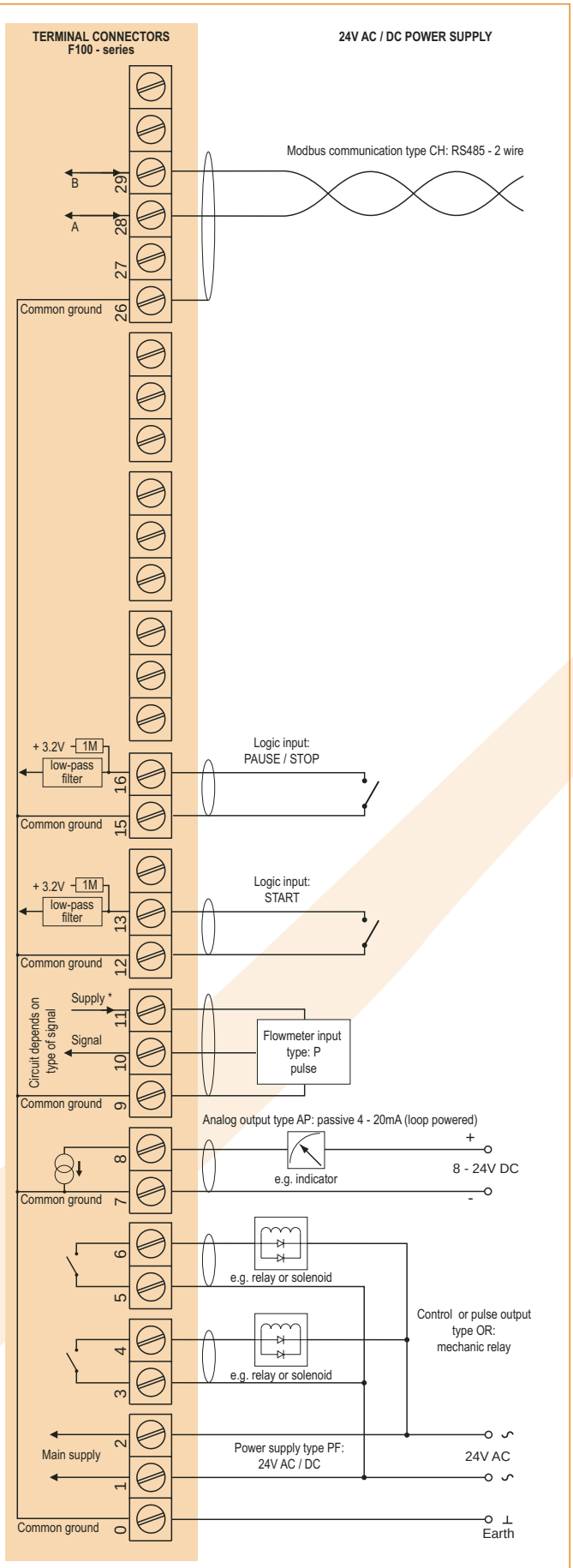
*Supply voltage: 1.2 - 3.2V DC to sensor

Typical wiring diagram F136-A-AA-CB-OA-PD



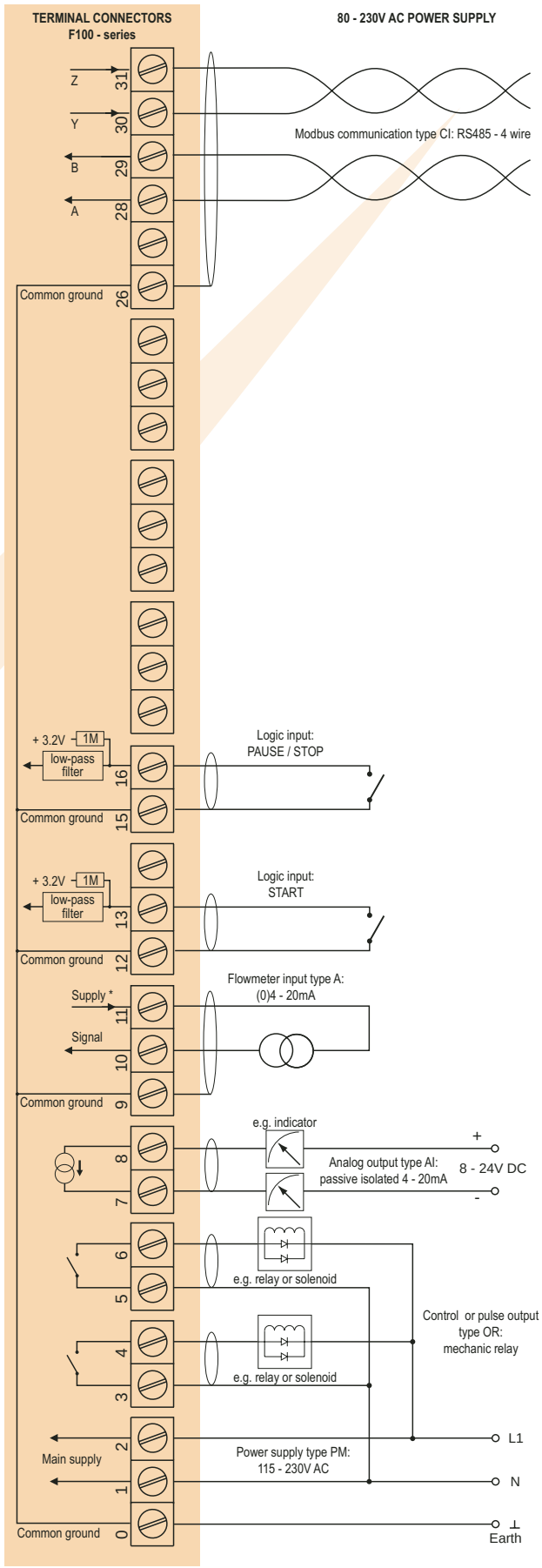
*Supply voltage: 3.2 - 8.2 - 12 - 24V DC to sensor

Typical wiring diagram F136-P-AP-CH-OR-PF



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

Typical wiring diagram F136-A-AI-CI-OR-PM



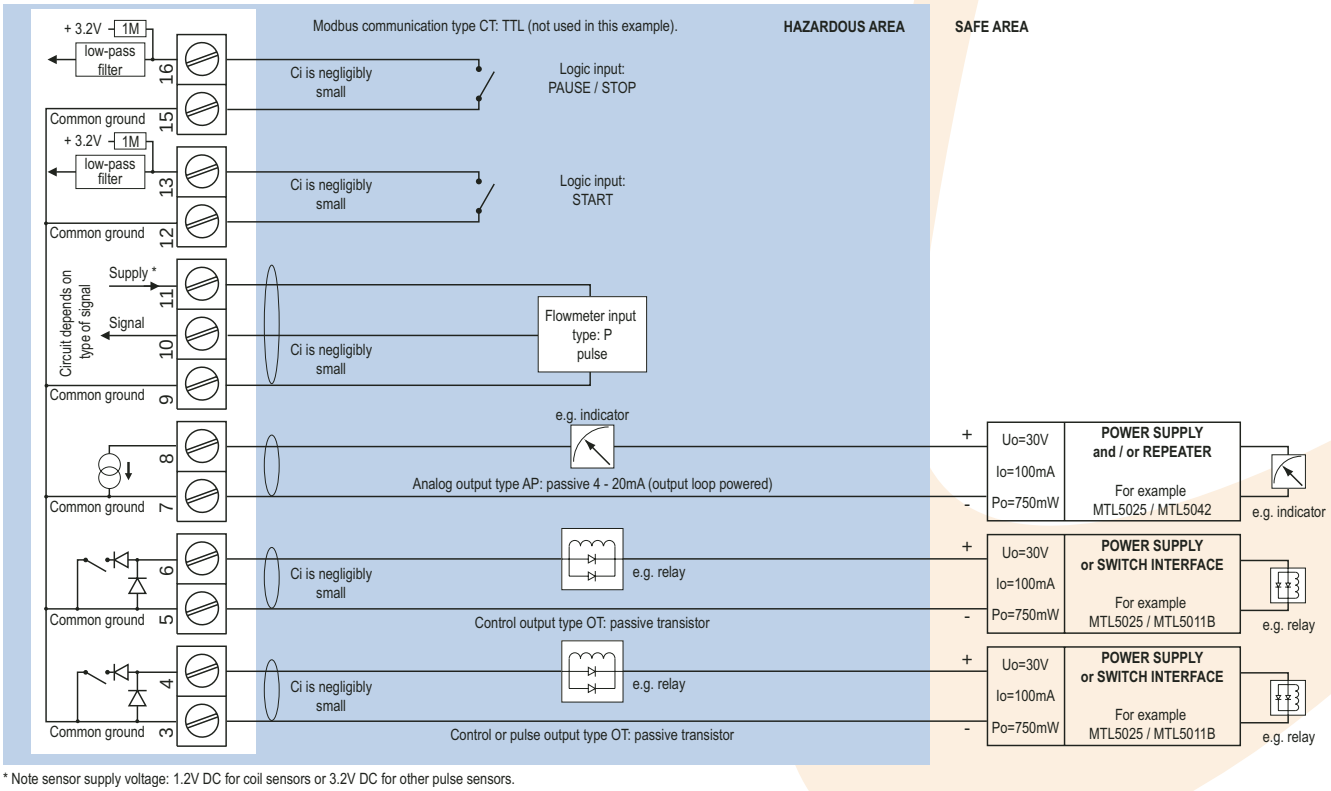
*Supply voltage: 3.2 - 8.2 - 12 - 24V DC to sensor

Hazardous area applications

The F136-XI has been ATEX approved by KEMA for use in intrinsically safe applications. It is approved according to Ex 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 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 F136 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 Ex II 2G EEx d IIB T5 is available as well. Please contact your supplier for further details.

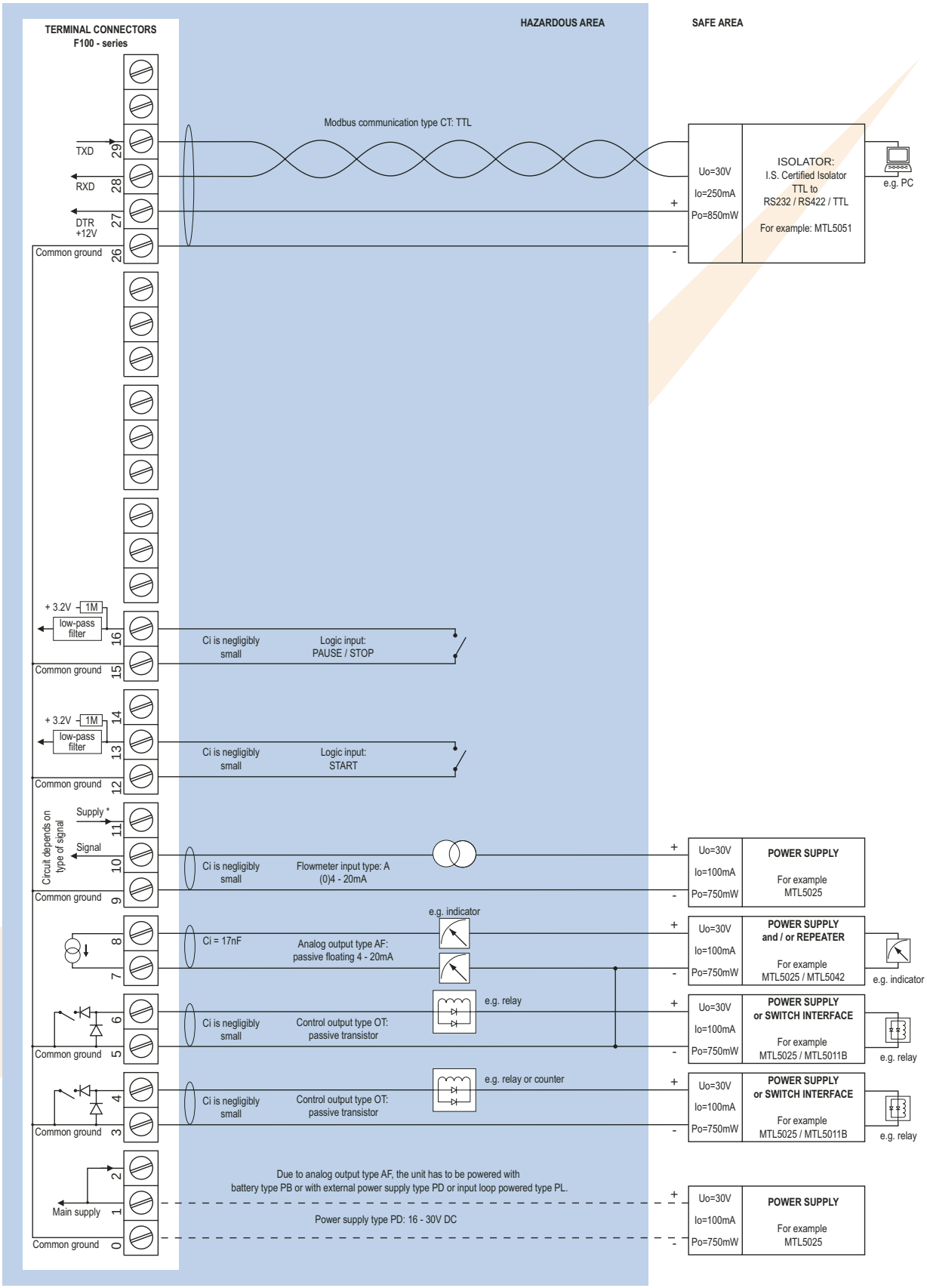
Certificate of conformity KEMA 03ATEX1074 X

Configuration example IIB and IIC
F136-P-AP-(CT)-OT-XI - output loop powered unit



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

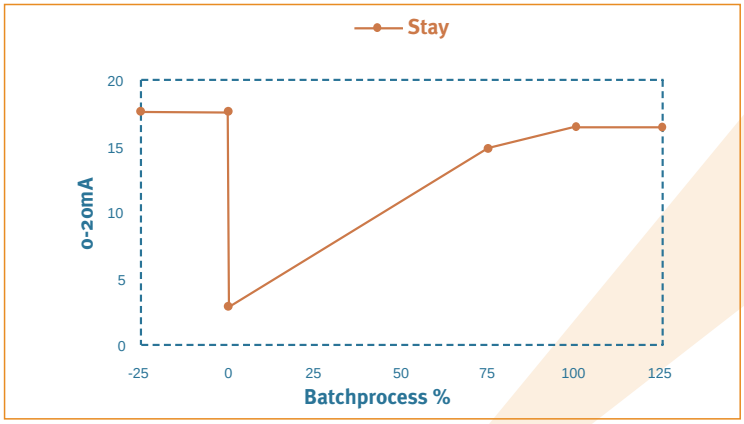
Configuration example IIB - F136-A-AF-CT-OT-(PB)-(PD)-(PL)-XI

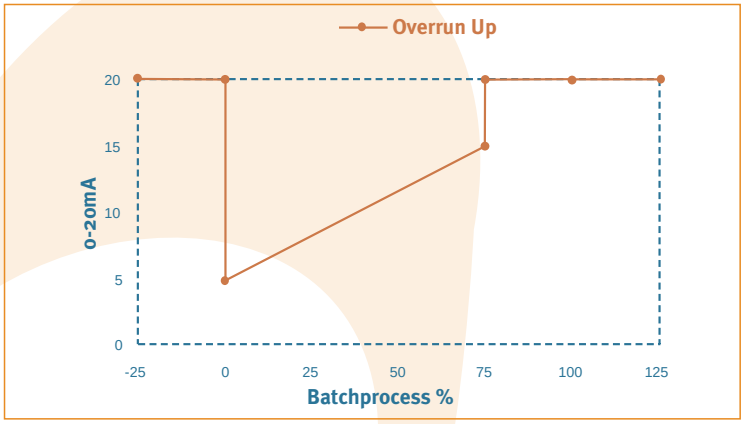


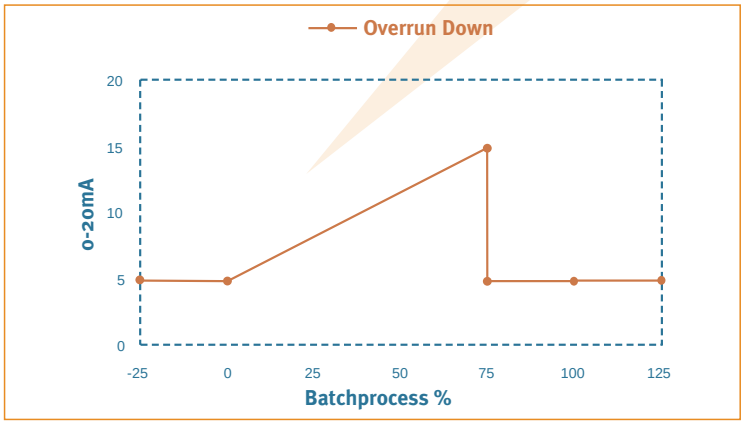
* Note power supply type PD: the supply voltage to the sensor is maximum 8.7V (Uo=8.7V Io=25mA Po=150mW)

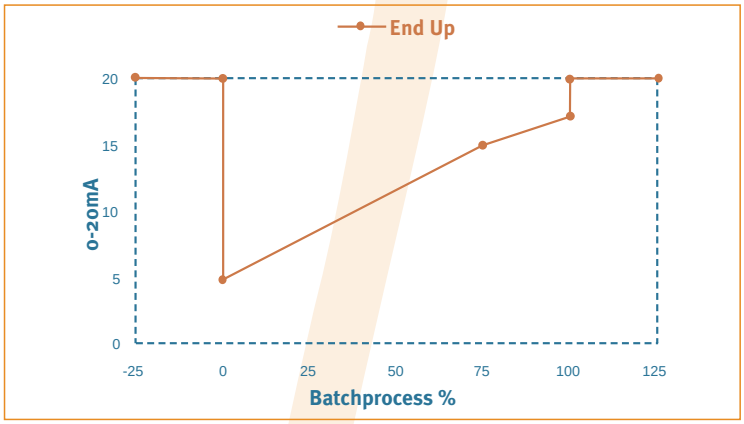
Profiles increasing output

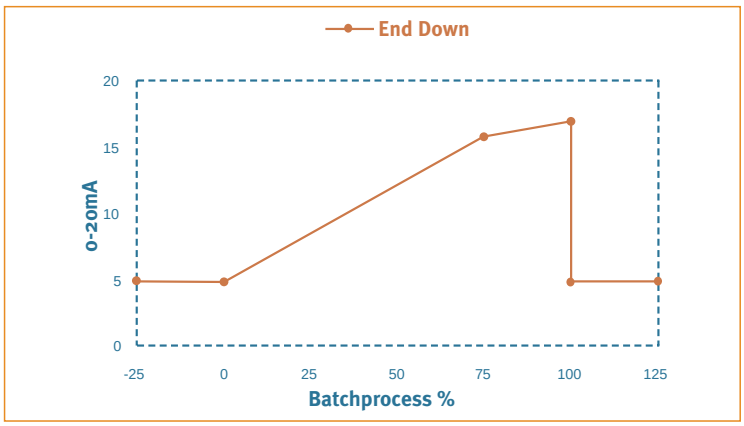
Selectable profiles analog output signal:

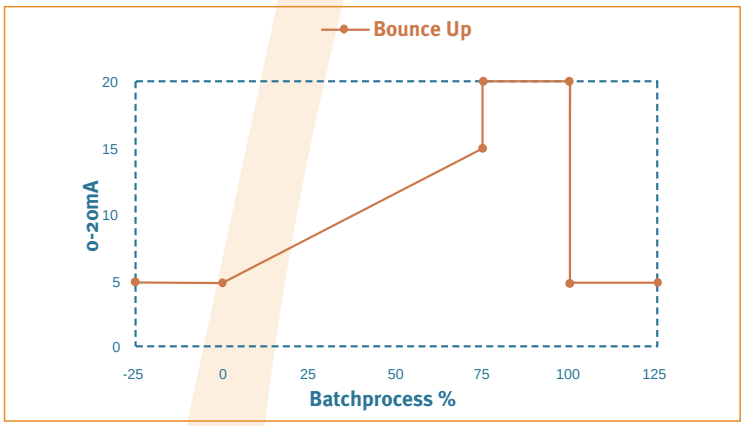


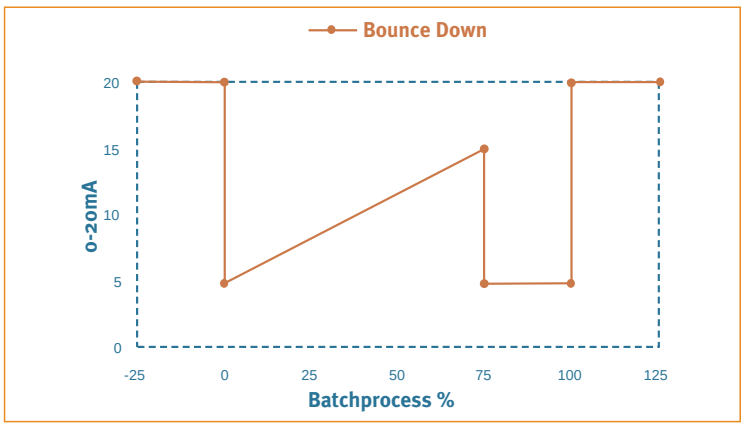








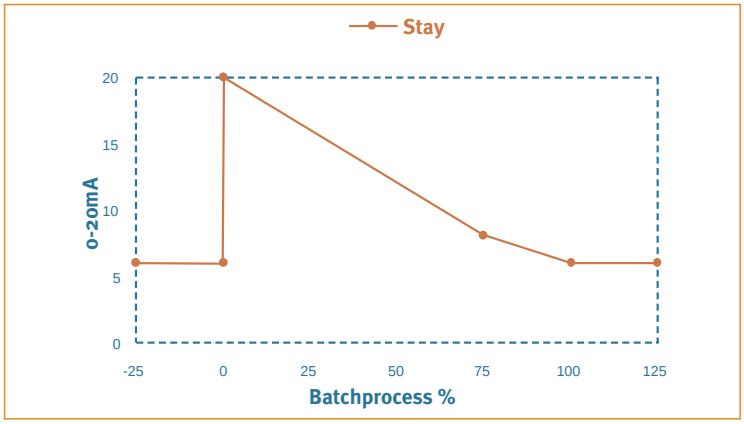


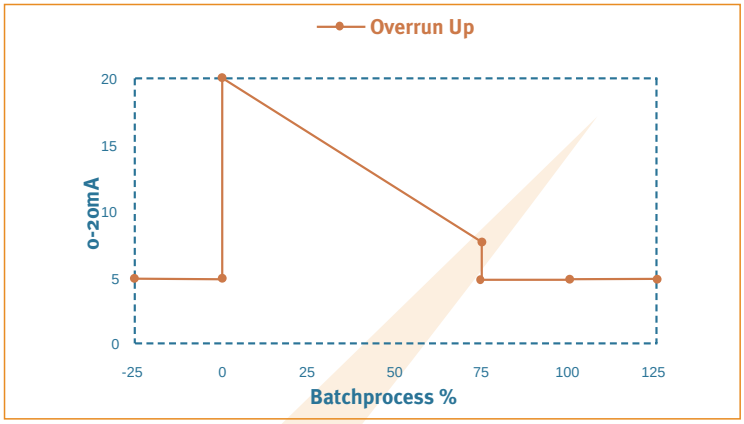


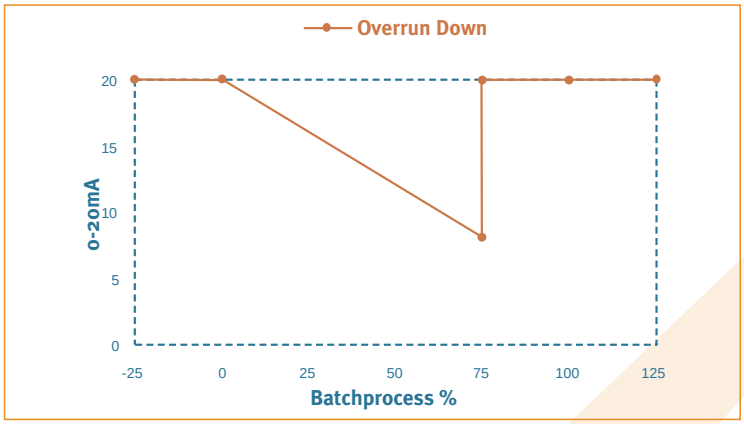
-25%: Situation before a next batch start.
0%: The moment after START has been pressed.
75%: Valve will be closed due to the overrun correction.
100%: End of overrun-time which is end-of-batch.
125% Situation after end-of-batch.

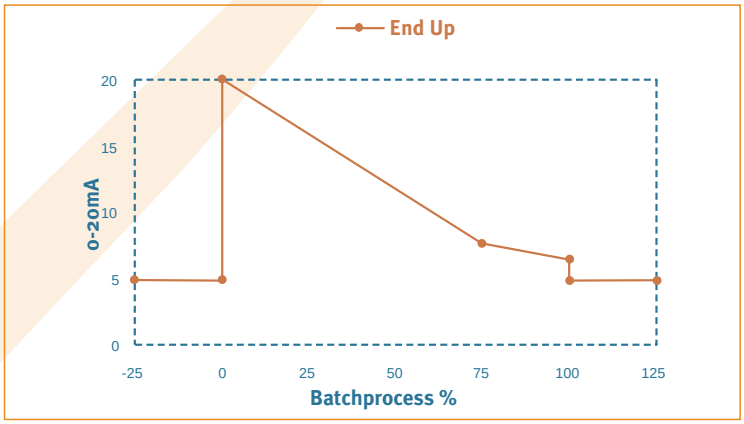
Profiles decreasing output

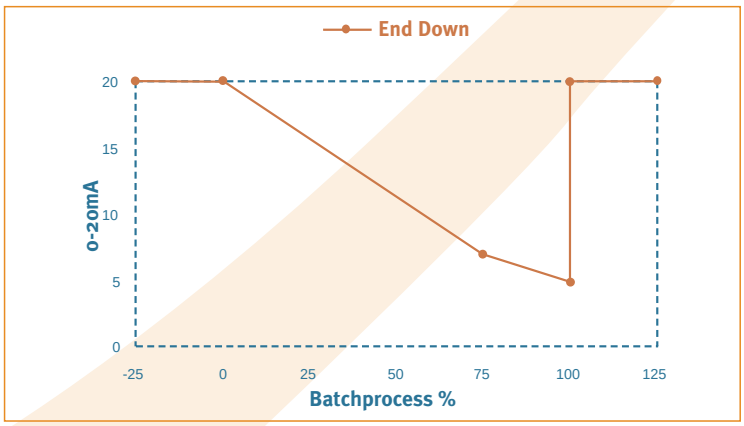
Selectable profiles analog output signal:

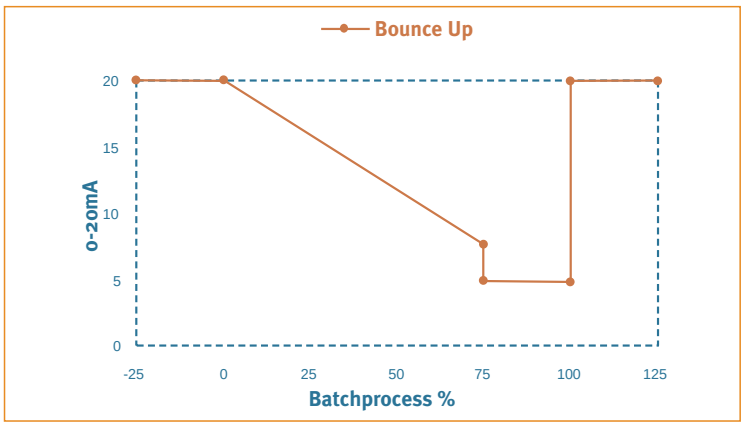


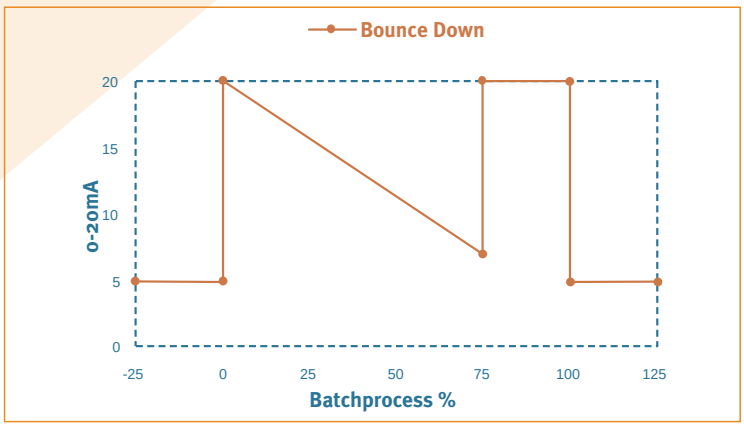












-25%: Situation before a next batch start.
0%: The moment after START has been pressed.
75%: Valve will be closed due to the overrun correction.
100%: End of overrun-time which is end-of-batch.
125% Situation after end-of-batch.

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. Jan. 2005.

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") L x H.
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") L x H.
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).
Type PF / PM	1.2 - 3.2 - 8.2 - 12 and 24V DC - max. 200mA@24V DC.
Type PD	3.2 - 8.2 - 12 and 24V DC - max. 50mA@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 Type XI	ATEX approval ref: ⟨Ex⟩ II 1GD EEx ia IIB/IIC T4 T100°C. CSA/FM pending. Maximum ambient +70°C (158°F).
Explosion proof Type XD/XF	ATEX approval ref: ⟨Ex⟩ II 2G EEx d IIB T5. 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.
Offset	-999,999 - +999,999 units.
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 process situation.
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).

Control / pulse output	
Function	User defined: batch process one or two stage control - scaled pulse output according the running batch or according accumulated total.
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.
Load	Max. 50V DC - 300mA per output.
Pulse output	Max. frequency 64Hz. Pulse length user definable between 7.8msec up to 2 seconds.
Note	Intrinsically Safe applications: only two transistor outputs type OT available.

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 RTU.
Speed	1200 - 2400 - 4800 - 9600 baud.
Addressing	Maximum 255 addresses.

Operational

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

Preset / 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.

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

Ordering information

Example (standard configuration)

F136-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**: two passive transistor outputs; **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:		F136 -_	-A _	-C _	-H _	-O _	-P _	-X _	-Z _
Flowmeter input signal									
A	Ex	(0)4 - 20mA input.							
P	Ex	**Pulse input: coil, npn, pnp, namur, reed-switch.**							
U	Ex	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	Ex	I.S. floating 4 - 20mA output - requires PB, PL or PD.							
AI		Isolated 4 - 20mA output - requires PB, PD, PF, PL or PM.							
AP	Ex	**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 - 2wire - Modbus RTU.							
CI		Communication RS485 - 4 wire - Modbus RTU.							
CT	Ex	Intrinsically Safe TTL - Modbus RTU.							
CX	Ex	**No communication.**							
Enclosure									
HA	Ex	Aluminum field mount enclosure IP67 / NEMA 4X.							
HB	Ex	Aluminum panel mount enclosure IP65 / NEMA 4.							
HC	Ex	**ABS panel mount enclosure IP65 / NEMA 4.**							
HD	Ex	ABS wall mount enclosure IP67 / NEMA 4X.							
HU	Ex	Aluminum field mount enclosure IP67 / NEMA 4X.							
Outputs									
OA		Two active transistor outputs - requires AA, AB or AU and PD, PF or PM.							
OR		Two mechanic relay outputs - requires PF or PM.							
OT	Ex	**Two passive transistor outputs - standard configuration.**							
Power supply									
PB	Ex	Lithium battery powered.							
PD	Ex	8 - 24V AC/DC + sensor supply - with XI: 16 - 30V DC.							
PF		24V AC/DC + sensor supply.							
PL	Ex	Input loop powered from sensor signal type “A” - requires AI or AF and OT.							
PM		115 - 230V AC + sensor supply.							
PX	Ex	**No power supply option. Unit requires external loop AP.**							
Hazardous area									
XI	Ex	Intrinsically safe.							
XD	Ex	EExd enclosure - 1 key.							
XF	Ex	EExd enclosure - 3 keys.							
XX		**Safe area only.**							
Other options									
ZB	Ex	Backlight (available appr. Jan. 2005).							
ZF	Ex	Coil input 10mVpp.							
ZX	Ex	**No options.**							

The bold marked text contains the standard configuration.

Ex Available Intrinsically Safe.

Specifications are subject to change without notice.

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