Your success counts



## Flow computer

with temperature compensation for corrected liquid volume



























The F-Series is your first and safest choice for field mount indicators in safe and hazardous area applications. Especially in harsh weather conditions like rain, snow, salty atmospheres and temperatures between -40°C up to +80°C (-40°F up to 176°F).

#### **Advantages**

- Robust aluminum or stainless steel 316L field enclosure (IP67 / NEMA Type4X). It is so rugged, a truck can even stand on it!
- Intrinsically Safe available ATEX and IECEx approval for gas and dust applications.
- Programming can be done by your own crew, with the sensible menu-driven structure, saving cost and irritation. Know one, know them all!
- Very diverse mounting possibilities: walls, pipes, panels or directly onto outdoor sensors!

#### **Features**

- Calculates compensated flow rate, total and accumulated total.
- Displays actual line temperature.
- 11 digit accumulated total.
- 7 digit resettable total.
- Selectable on-screen engineering units; volumetric or mass.
- Ability to process all types of signals: Sine wave (coil), NAMUR, NPN/PNP pulse, Reed-switch, Active pulse signals, PT100 - 2 or 3 wire.
- Scaled pulse output according to compensated acc. total.
- Analog output according to compensated flow rate.
- Full Modbus communication RS232/485/TTL.
- Power requirements: Loop or battery powered, 8 30V DC, 8 - 24V AC/DC or 115 - 230V AC.
- Sensor supply 3 / 8.2 / 12 / 24V DC.
- Auto backup of settings and running totals.



#### Introduction

The flowcomputer Model F126-EL has been developed to calculate corrected liquid volume at normal conditions for generic products. The corrected volumetric flow is calculated by using the thermal expansion coefficient algorithm stored in the flowcomputer. The reference temperature can be defined as desired, e.g. 15°C, 20°C or 60°F. A typical application is flow calculation of water, fuel or chemicals at base conditions.

#### **Display**

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

#### 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).



## **Pulse output**

The scaleable pulse output, reflects the count on the compensated accumulated display. The pulse width is user defined from 0.001 second up to 9.999 seconds. The maximum output frequency is 500Hz. The output signal can be passive NPN, active PNP or an isolated electro-mechanical relay.

#### Hazardous areas

This model is ATEX and IECEx certified as Intrinsically Safe for gas and dust applications, with an allowed ambient temperature of -40°C to +70°C (-40°F to +158°F).

## **Analog output signal**

The compensated flow rate is re-transmitted with the (0)4 - 20mA or 0 - 10V DC output signal. The output signal is updated eight times per second with a filter function being available to smoothen out the signal if desired. The output value is user defined in relation to the flow rate, e.g. 4mA equals to 15Nm3/Hr and 20mA equals to 2000Nm3/Hr. The output signal can be passive, active or isolated where the passive output type will loop power the F126-EL as well.



All info at a glance



Easy to install



Easy to program



Know one know them all!



Reliable

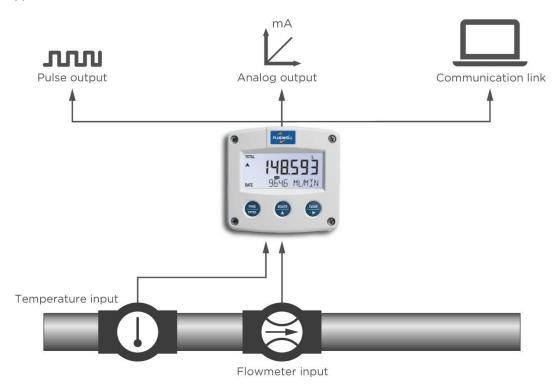


User-friendly



## **Overview application F126-EL**

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). Applications where nett flow calculation at base conditions is desired without the influence of thermal product expansion. Alternative model for explosion proof applications: E126-EL



## Signal input

The flowcomputer measures the uncorrected volumetric flow and actual line temperature. For temperature measurement, 2 or 3 wire PT100 elements can be used.

Type of signal	Resistance	Low Pass filter (LP)	Max. frequency	Max. frequency Low Pass filter (LP)	Min. amplitude P-P	Remark
NPN	100kΩ pull-up	100kΩ pull-up	6kHz Threshold 1.2V	1.2kHz		Open collector
REED	1MΩ pull-up	1MΩ pull-up	1.2kHz Threshold 1.2V	120Hz		
PNP	100KΩ pull-down	100KΩ pull-down	6kHz Threshold 1.2V	1.2kHz		
NAMUR	820Ω pull-down	-	4kHz	-		External power required
COIL LO	-	-		-	80mV <sub>pp</sub>	Default sensitivity
COIL-HI					20mV <sub>pp</sub>	Sensitive for
COIL-HI (Type ZF)	F)		-	-	10mV <sub>pp</sub>	interference!
ACTIVE 8.2V DC	3Κ9Ω		10kHz Threshold 4V			External power required
ACTIVE 12V DC	4ΚΩ		10kHz Threshold 6V			External power required
ACTIVE 24V DC	ЗКΩ		10kHz Threshold 12V			External power required

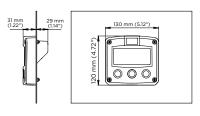


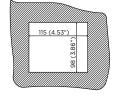
#### **Enclosures**

Various types of enclosures can be selected, all ATEX and IECEx approved. The F126-EL is supplied in an GRP panel mount enclosure as standard, which can be converted to an IP67 / NEMA Type4X GRP field mount enclosure by the addition of a back case. Most popular is our robust aluminum field mount enclosure which is also available with an extended backcover with undrilled preparation for direct meter mounting at the back side. It is so rugged, even a truck can stand on it! For the most challenging environments we have a durable high grade Stainless steel 316L enclosure. All enclosures have a IP67 / NEMA Type4X rating and EU or U.S. cable gland entry threads available.

#### **Dimensions enclosures**

#### Aluminum & GRP panel mount enclosure

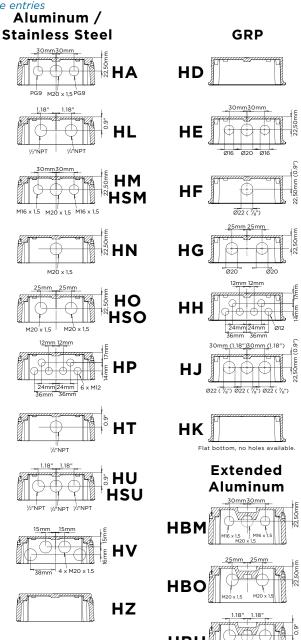




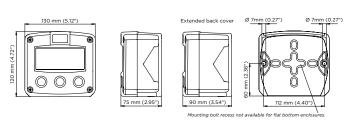
HB & HC enclosures

panel cut-out

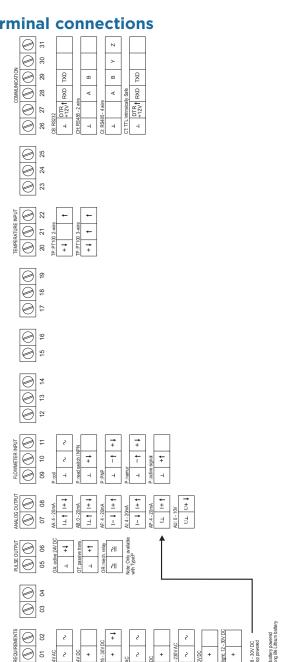
#### Cable entries



#### Aluminum, GRP & Stainless steel 316L field mount enclosures



#### **Terminal connections**



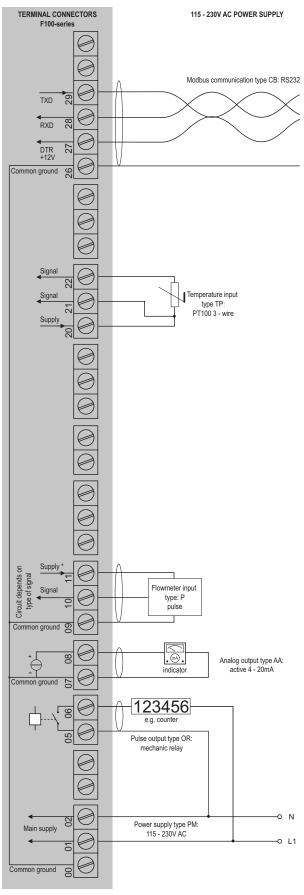


#### Configuration example F126-P-AP-CH-EL-OT-(PX)-TP-XX-ZX

# TERMINAL CONNECTORS OUTPUT LOOP POWERED Modbus communication type CH: RS485 - 2 wire Common ground & Temperature input type TP: PT100 3 - wire Flowmeter input type: P . mA. 80 8 - 30V DC indicator Analog output type AP: passive 4 - 20mA (loop powered) 123456 Pulse output type OT e.g. counter: Power supply type PX: 8 - 30V DC (not used in this example) Common ground O

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

#### Configuration example F126-P-AA-CB-EL-OR-PM-TP-XX-ZX



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



## **Hazardous area applications**

The F126-EL-XI has been certified according to 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:

Gas: II 1 G Ex ia IIB/IIC T4 Ga
Dust: II 1 D Ex ia IIIC T100 °C Da.

• The IECEx markings for gas and dust applications are:

Gas: Ex ia IIC/IIB T4 Ga
Dust: Ex ia IIIC T100 °C Da.

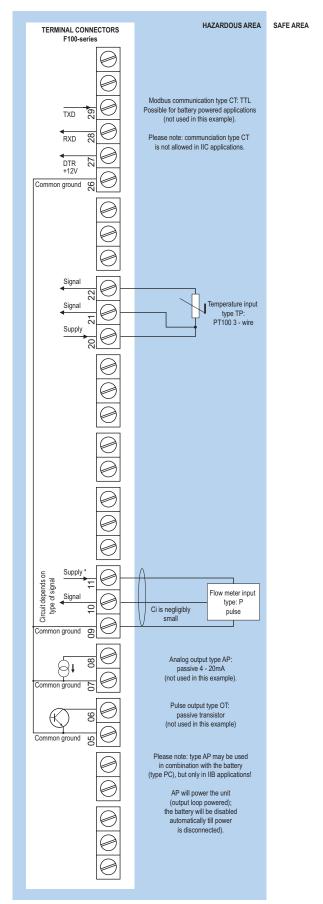
It is allowed to connect up to four barriers in IIB/IIIC applications or one barrier in IIC applications. Consult the certificate for the maximum input and output values of the circuits. Full functionality of the F126-EL remains available, including 4 - 20mA output according to the flow rate and Modbus communication (type CT). Power supply type PD-XI offers a 8.2V sensor supply e.g. for one Namur sensor and a temperature 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



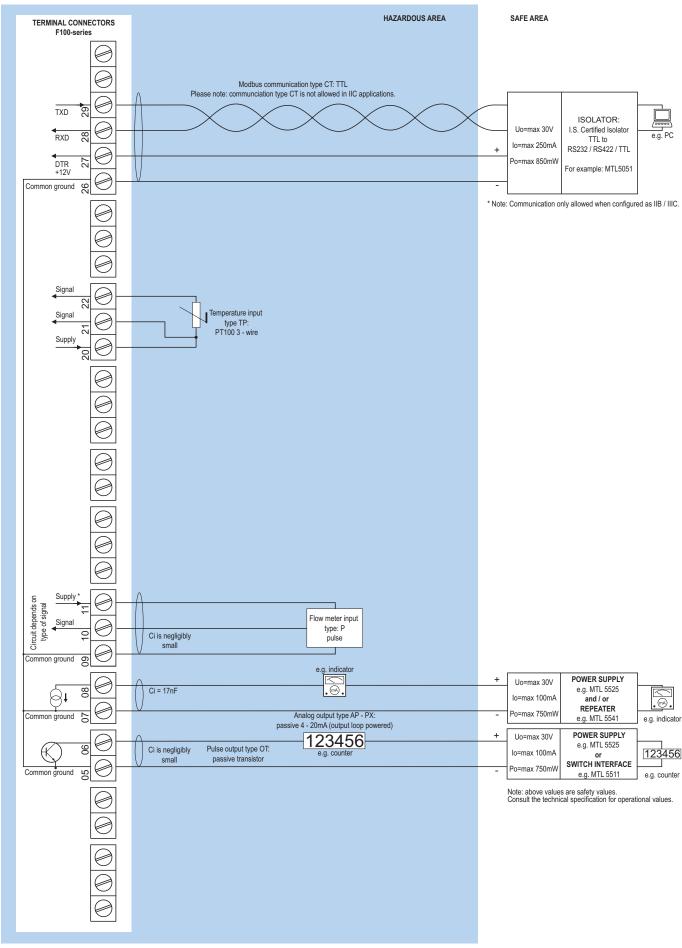
Configuration example IIB / IIIC and IIC F126-P-(AP)-(CT)-EL-(OT)-PC-TP-XI - Battery powered unit



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



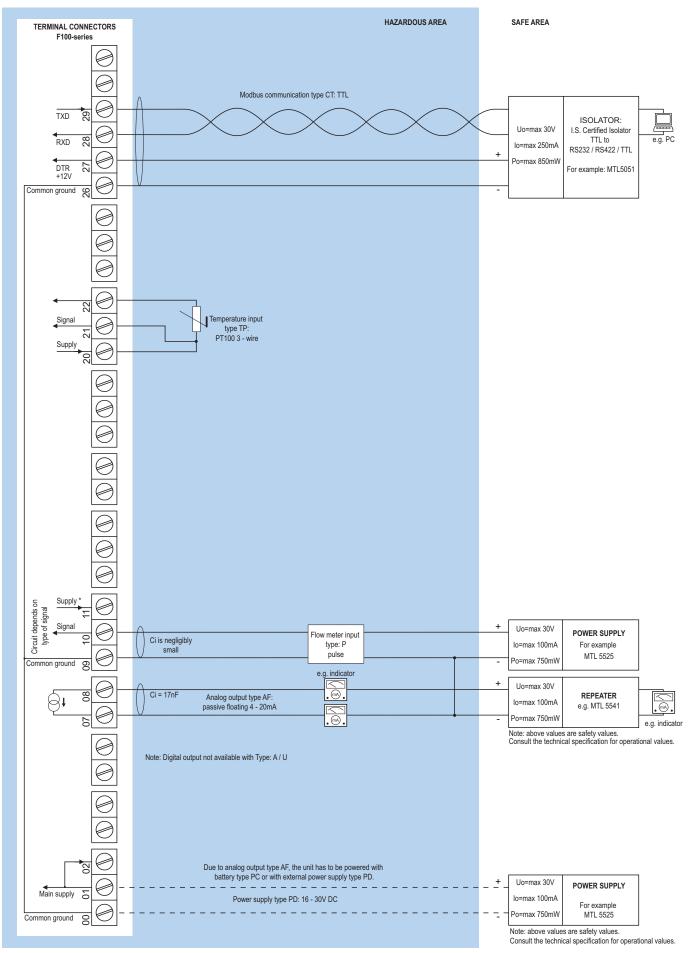
#### Configuration example IIB / IIIC and IIC - F126-P-AP-(CT)-EL-OT-(PX)-TP-XI - Output loop powered



For pulse type inputs:  $V_{nd}$ : 1.2V/3.0V available.- NO power output, available  $I_{\text{supply}}$ : <1mA. Note: using these ref. voltages at max. load, will reduce battery life significantly.



Configuration example IIB / IIIC - F126-P-AF-CT-EL-OX-(PC)-(PD)-TP-XI - Power requirement 16 - 30V DC or battery powered



<sup>\*</sup> Note power supply type PD: the supply voltage to pulse sensors is maximum 8.7V (Uo=max 8.7V lo=max 25mA Po=max 150mW) and to analog sensors as connected to terminal 1 (internally linked).



## **Display**

Туре	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.
	Intensitiy can be adjusted in the configuration
	menu. 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).

## **Terminal connections**

Туре	Removable plug-in terminal strip. Wire max.
	1.5mm <sup>2</sup> and 2.5mm <sup>2</sup> .

## **Data protection**

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

## **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

## **Intrinsically Safe (Type XI)**

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

## **Enclosure**

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

#### **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.
Туре НВ	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.

## **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 (%").
Type HG	Cable entry: 2 x Ø 20mm.
Туре НН	Cable entry: 6 x Ø 12mm.
Type HJ	Cable entry: $3 \times \emptyset$ 22mm ( $\frac{7}{8}$ ").
Type HK	Flat bottom, cable entry: no holes.

#### Aluminum wall / field mount enclosures

Aluminum W	an / neid modific enclosures
General	Die-cast aluminum wall/field mount enclosure
	IP67 / NEMA Type4X with 2-component
	UV-resistant coating.
	Extended back cover available with undrilled
	preparation for direct meter mounting.
Dimensions	130 x 120 x 75mm (5.12" x 4.72" x 2.95") - W x H x D.
	130 x 120 x 90mm (5.12" x 4.72" x 3.54") - W x H x D.
Weight	1100 gr. / extended enclosure: 1310 gr.
Туре НА	Cable entry: 2 x PG9 and 1 x M20.
Type HL	Cable entry: 2 x ½" NPT.
Type HM/HBM	Cable entry: 2 x M16 and 1 x M20.
Type HN	Cable entry: 1 x M20.
Type HO/HBO	Cable entry: 2 x M20.
Type HP	Cable entry: 6 x M12.
Type HT	Cable entry: 1 x ½" NPT.
Type HB/HBU	Cable entry: 3 x ½" NPT.
Type HV	Cable entry: 4 x M20.
Type HZ	Cable entry: no holes.

## Stainless steel 316L wall / field mount enclosures

Die-cast stainless steel 316L wall / field mount enclosure with flat bottom. IP67 / NEMA
Type4X.
130 x 120 x 75mm (5.12" x 4.72" x 2.95") - W x H x D.
2700 gr.
Cable entry: 2 x M16 + 1 x M20.
Cable entry: 2 x M20.
Cable entry: 3 x ½"NPT.



Cianal	inni	ite -	lowmeter
Sigilal	HID	aus -	lowilleter

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.
Frequency	Minimum OHz - maximum 6kHz for total and
	flow rate. Maximum frequency depends on signal
	type and internal low-pass filter. E.g. reed switch
	with low-pass filter: max. frequency 120Hz.
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 inputs - Temperature

<b>Update time</b>	One time per two seconds.	
Type TP	2 or 3 wire PT100.	
Range	-100°C to +200°C (-148°F to 392°F).	
	Accuracy 0.1°C (0.18°F).	
Option ZV	Range: -200°C to +800°C (-328°F to 1832°F).	
	Accuracy 0.5°C (0.9°F).	

## **Signal outputs - Digital output**

Function	Pulse output - transmitting compensated
	accumulated total.
Frequency	Max. 500Hz. Pulse width user definable between
	0.001 second up to 9.999 seconds.
Type OA	One active 24V DC transistor outputs (PNP);
	max. 50mA per output (requires -PD, PF, PM or
	PX).Requires min. 24V power supply
Type OR	One electro-mechanical relay output isolated
	max. switch power 230V AC (N.O.) - 0.5A per
	relay (requires PF or PM).
Type OT	One passive transistor output (NPN) - not
	isolated. Max. 50V DC - 300mA per output.

## **Signal outputs - Analog output**

Function	Transmitting compensated flow rate.
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 (requires XI + PD).
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 min. 12V power supply.

## **Signal outputs - Communication option**

Function	Reading display information, reading / writing all
	configuration settings.
Protocol	Modbus ASCII / 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.

## **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.
ACF11	Swivel with 25° movement from center axis for
	direct flowmeter mounting: 1" NPT to 1/2" NPT.

## Cable glands

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.

## **Blind plugs**

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

#### **Intrinsically Safe isolators**

intrinsical	ily Sale isolators
ACG01	MTL5511 - One channel pulse or switch output
	transfer from hazardous area to safe area.
ACG02	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).
ACG03	MTL5541 - One channel 4 - 20mA repeater from
	hazardous area to safe area.
ACG04	MTL 5051 - Bi-direction serial-data-isolator
	(for Modbus communication).
ACG05	MTL5516C - Two channel pulse or switch output
	transfer from hazardous area to safe area.
ACG06	MTL5513 - One channel pulse or switch output
	transfer from hazardous area to safe area.
ACG07	MTL5546Y - One channel isolated driver
	bringing 4 - 20mA from safe area to hazardous
	area, HART transparent, OCD.



## **Power requirements**

Туре АР	Analog output loop powered, 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 $\pm$ 10%. Power consumption max. 5W.
Type PD-XI	16 - 30V DC power consumption max. 1W.
Type PF	24V AC / DC ± 10%. Power consumption max. 15W.
Type PM	115 - 230V AC ± 10%. Power consumption max. 15W.
Type PX	8 - 30V DC. Power consumption max. 0.75W.
Type ZB	12 - 30V DC ± 10%. Power consumption max. 1.5W.
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 XI	For Intrinsically Safe applications, consult the
	safety values in the certificate.

#### Sensor excitation

Sensor excita	ILIOII	
Type PB/PC/PX	3V DC for pulse signals and 1.2V DC for coil pick-up.	
Note PB/PC/PX	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. U <sub>max</sub> sensor is 2V below U <sub>supply</sub>	
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.	

## **Operator functions**

Displayed info	<ul> <li>Compensated flow rate.</li> </ul>
	<ul> <li>Compensated total and accumulated total.</li> </ul>
	<ul> <li>Actual line temperature.</li> </ul>
	<ul> <li>Total can be reset to zero by pressing the</li> </ul>
	CLEAR-key twice.

#### **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.

## Flow rate

Digits	7 digits.
Units	mL, L, m <sup>3</sup> , Gallons, kg, Ton, lb, bl, cf, RND, ft <sup>3</sup> , scf,
	Nm³, NI, igal - no units.
Decimals	0 - 1 - 2 or 3.
Time units	/sec - /min - /hr - /day.

## Line temperature

Digits	6 digits.
Units	°C, °F or K.
Decimals	1.

## Flow equations

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