

TACHOMETER MONITOR

DISPLAYS ENGINE SPEED AND RUNNING HOURS WITH ALARM OUTPUT



Advantages

- Robust IP67 (NEMA Type4X) field enclosure. It is so rugged, **you can even stand on it!**
- Intrinsically Safe available - ATEX, IECEx, FM and CSA 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

- Displays engine speed and running hours simultaneously.
- Various alarm values can be entered: low / high engine speed alarm and total running hours alarm.
- Large 17mm (0.67") digits for engine speed or running hours.
- Auto backup of settings and running hours.
- Easy configuration with clear alphanumerical display.
- LED backlight option.
- 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

- One free configurable alarm output.

Signal input

Tachometer sensor

- Ability to process all types of tachometer signals: 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).
- Tachometer applications where monitoring of the engine speed and running hours is important and both need to be displayed and registered.

General information

Introduction

The F093 is a local indicator to monitor the tachometer engine speed with running hours simultaneously. The running hours can be reset to zero by pressing the CLEAR button twice. The eleven digit accumulated running hours however can not be reset to zero. A wide selection of options further enhances the capabilities of this model, including Intrinsic Safety for hazardous area applications.

Display

The display has large 17mm (0.67") and 8mm (0.31") digits which can be set to show engine speed (RPM) and running hours. On-screen engineering units are easily configured from a comprehensive selection. The accumulated running hours can register up to 11 digits and is backed-up in EEPROM memory every minute, just as the running hours. Related to the lower temperatures, the update frequency of the LCD is tuned automatically to achieve a readable display even at -40°C / -40°F.

Backlight

The white backlight in combination with the F093 offers a unique feature: in case of an engine speed alarm, the backlight can be set to be red or flashing red. The intensity can be adjusted from the keyboard. The display is a transfective type, which means that a high contrast reading is guaranteed in full sunlight as well as during the night. This backlight option is also available Intrinsically Safe.

Configuration

All configuration settings are accessed via a simple operator menu which can be password protected. Each setting is clearly indicated with an alphanumeric 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.

Alarm output

One alarm output is available to transmit the engine speed alarm or total running hours alarm. The engine speed alarm can be set to switch for a low, high or both alarms! The output signal can be a passive NPN, active PNP or an isolated electro-mechanical relay.

Signal input

The F093 accepts most pulse input signals from tachometers. The input signal type can be selected by the user in the configuration menu without having to adjust any sensitive mechanical dip-switches, jumpers or trimmers.

Power requirement

Several power supply options are available to power the F093 and sensor. Most popular is our battery powered version with a long life lithium battery which will last up to five years. A real sensor supply is offered with the 24V AC/DC or 115 - 230V AC power requirement option.

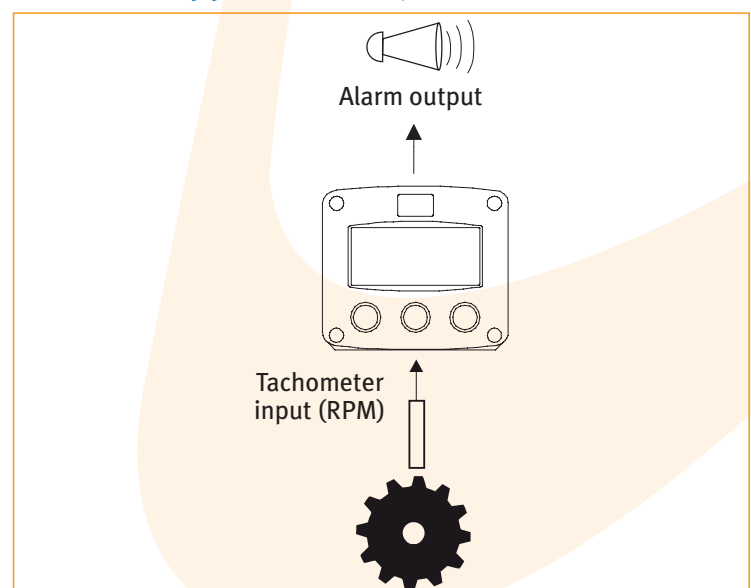
Hazardous area

For hazardous area applications, this model has been ATEX, IECEx, FM and CSA 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.

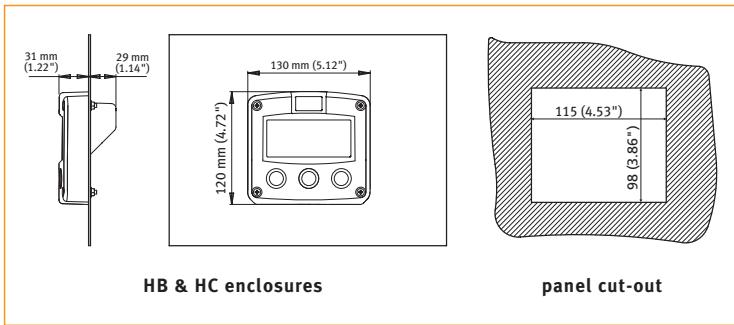
Enclosures

Various types of enclosures can be selected, all ATEX, IECEx, FM and CSA approved. As standard the F093 is supplied in an GRP panel mount enclosure, which can be converted to an IP67 / NEMA Type4X GRP field mount enclosure by the addition of a back case. Most popular is our aluminum field mount enclosure with IP67 / NEMA Type4X rating. Both European or U.S. cable gland entry threads are available.

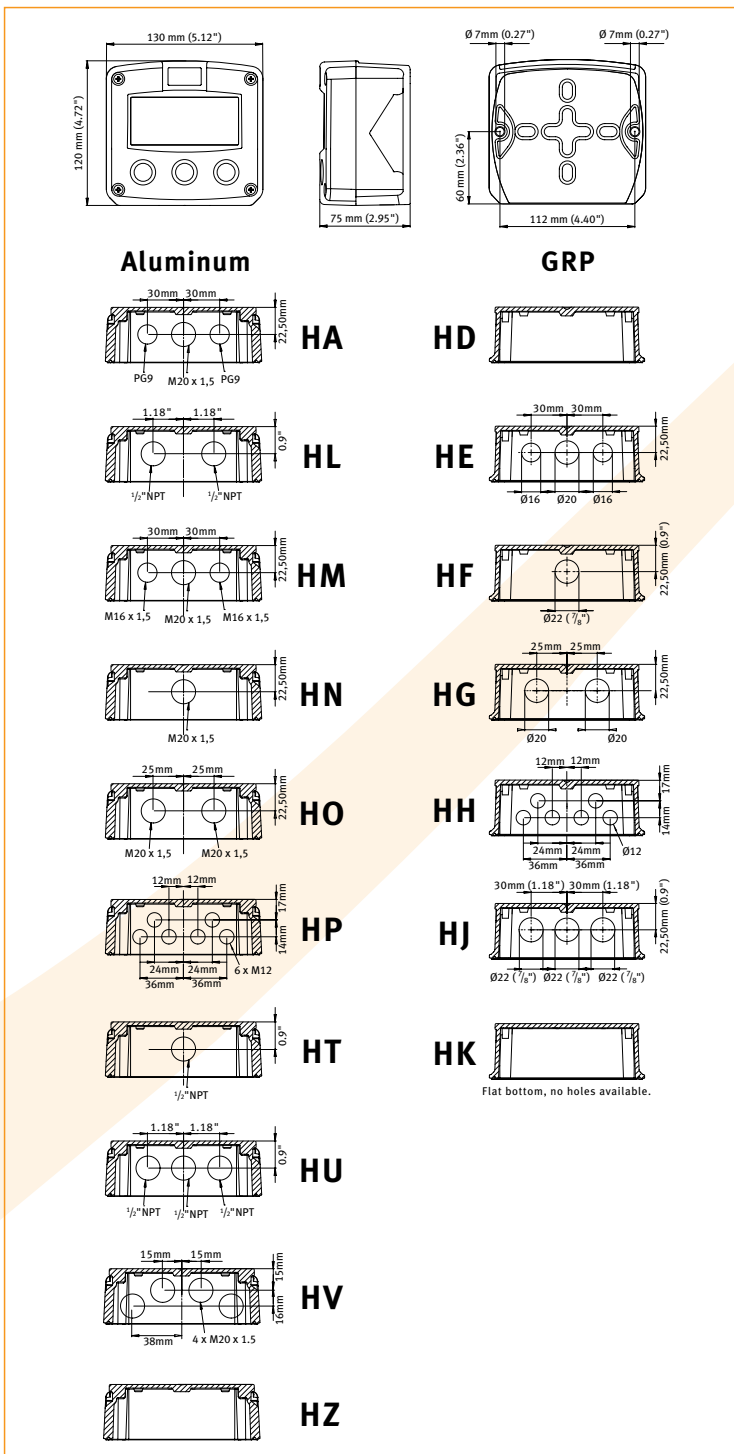
Overview application F093



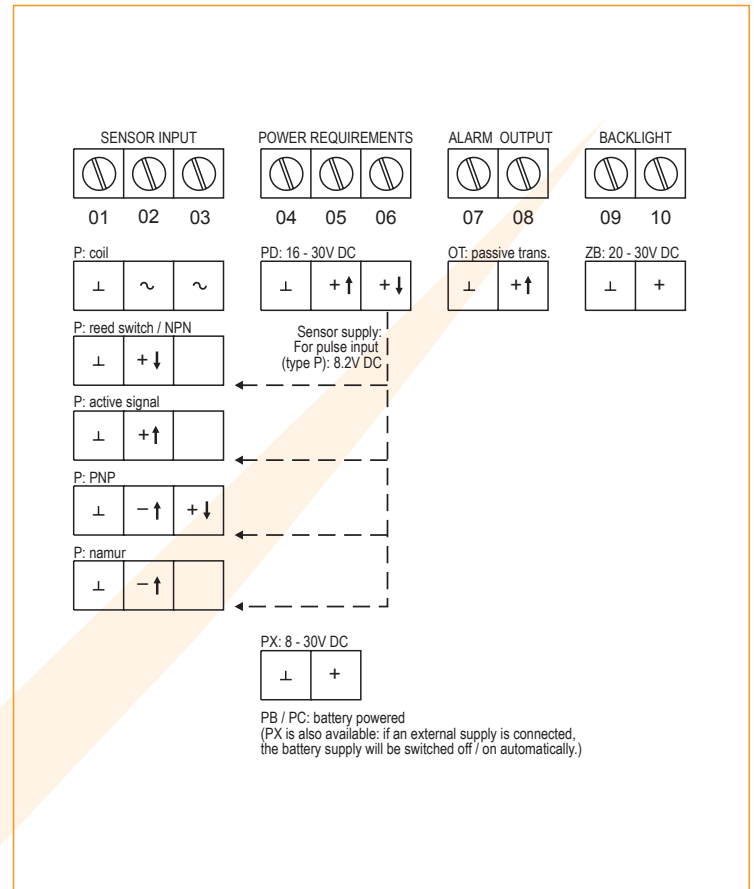
Dimensions enclosures Aluminum & GRP panel mount enclosure



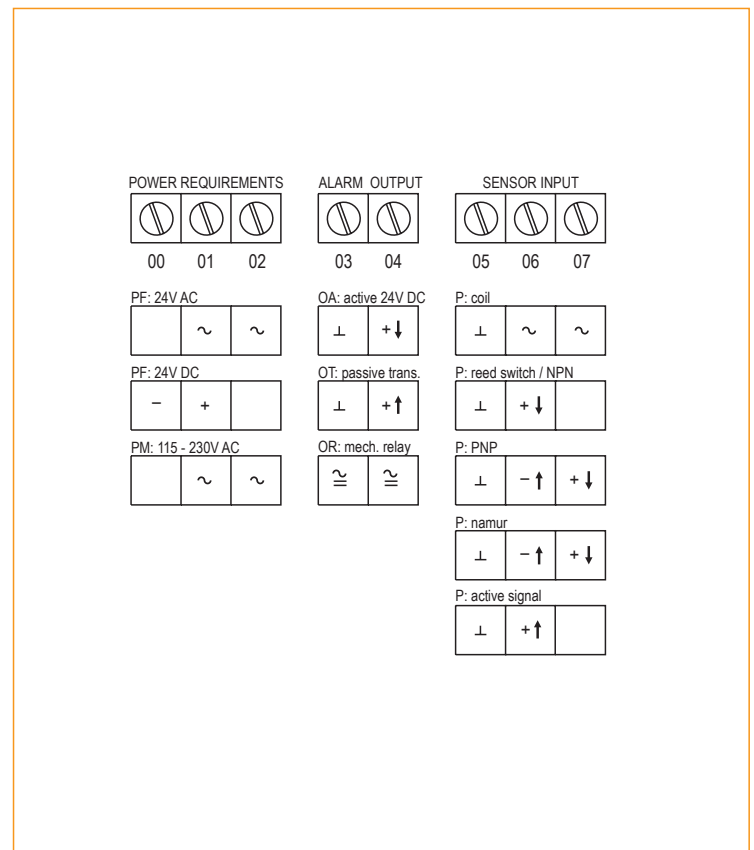
Aluminum & GRP field / wall mount enclosures



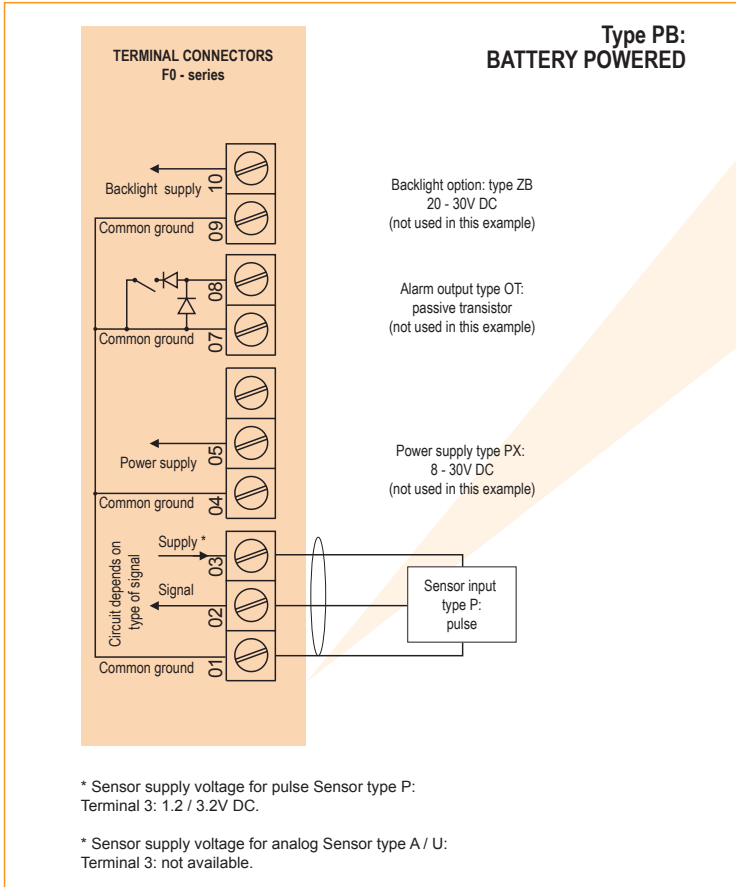
Terminal connections PB/PC - PD - PL - PX



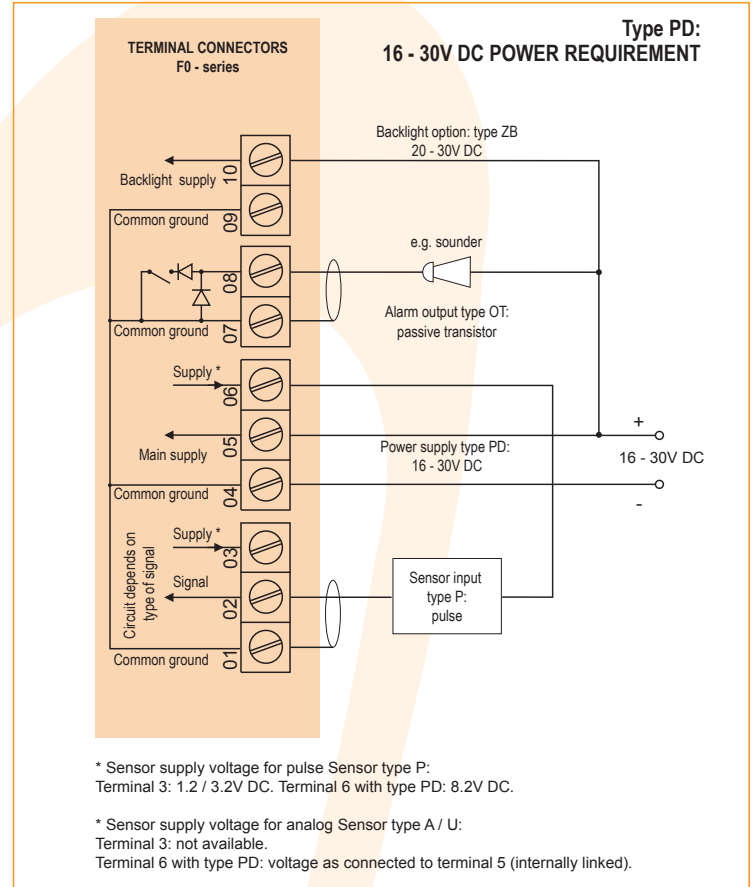
Terminal connections PF - PM



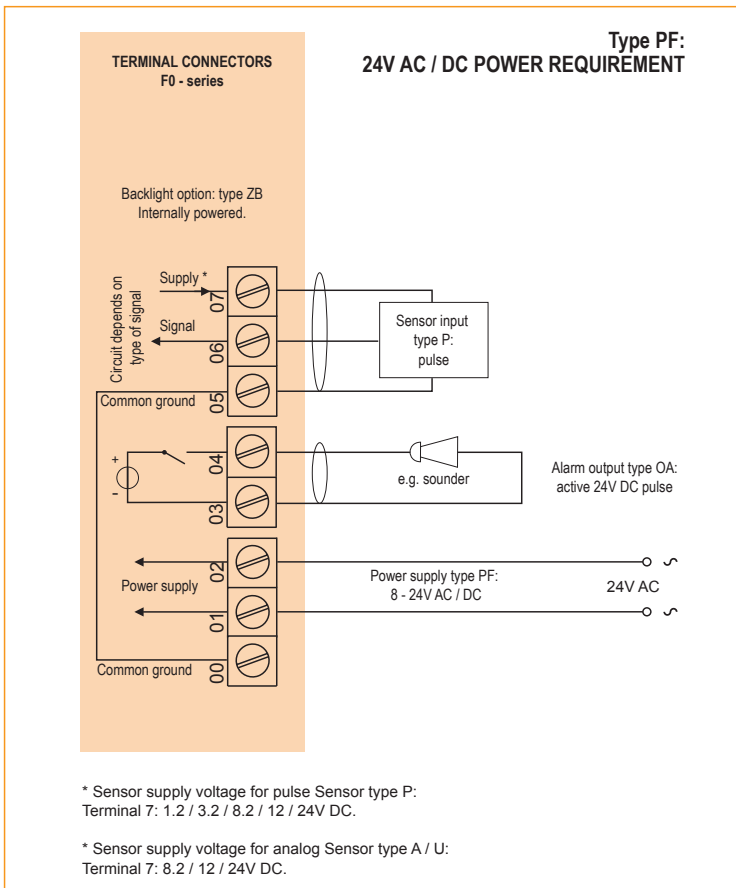
Typical wiring diagram F093-P-(OT)-PB-(PX)-(ZB)



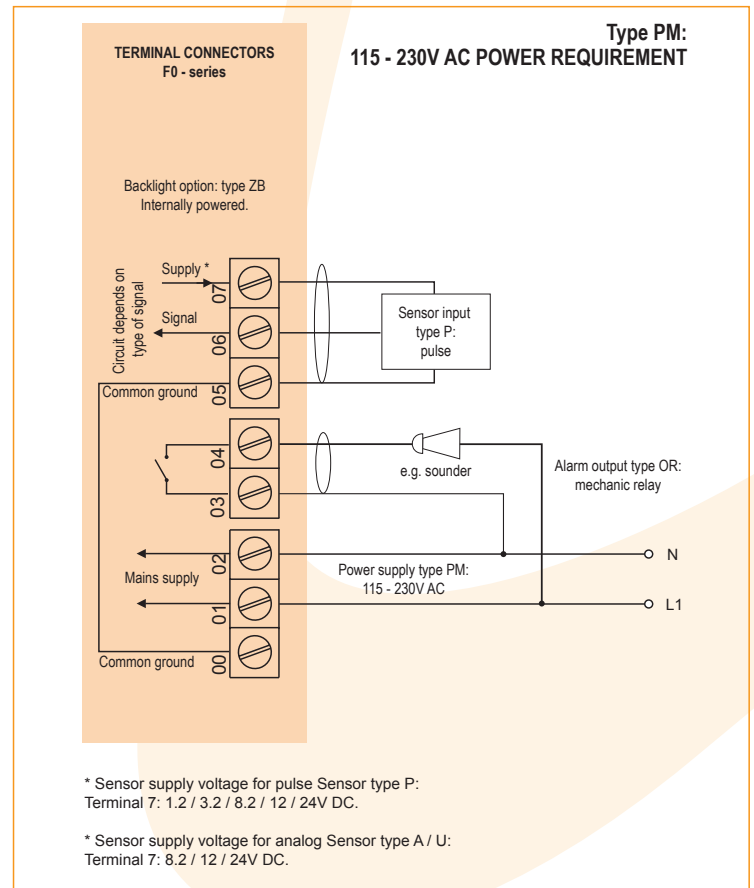
Typical wiring diagram F093-P-OT-PD-ZB



Typical wiring diagram F093-P-OA-PF-ZB



Typical wiring diagram F093-P-OR-PM-ZB



Hazardous area applications

The F093-XI has been certified according ATEX and IECEx by KEMA and according CSA c-us and FM 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 IIC T4 Ga
II 1 D Ex ia IIIC T100 °C Da.

- The IECEx markings for gas and dust applications are: **Ex ia IIC T4 Ga** and **Ex ia IIIC T100 °C Da.**

- The CSA c-us markings are: **Class I/II/III, Division 1, Groups A, B, C, D, E, F, G, Temperature class T4 and Class I, Zone o, AEx ia IIC T4.**

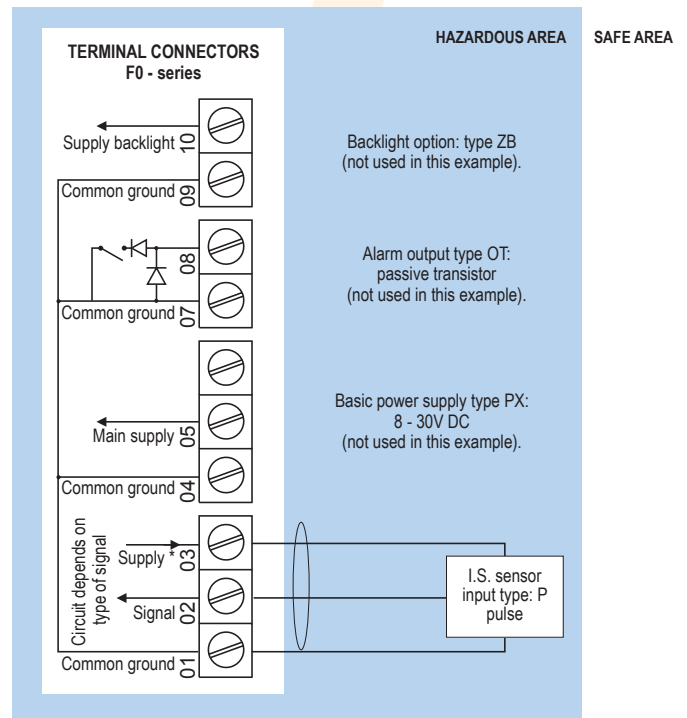
- The FM markings are: **Class I/II/III, Division 1, Groups A, B, C, D, E, F, G, Temperature class T4 and Class I, Zone o, AEx ia IIC T4.**

It is allowed to connect up to three I.S. power supplies to power the unit, sensor and back-light. Consult the certificate for the maximum input and output values of the circuits. The F093-PD-XI offers a 8.2V DC sensor supply to power e.g. a 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 05ATEX1168 X
• IECEx KEM 08.0006X • CSA.08.2059461 X

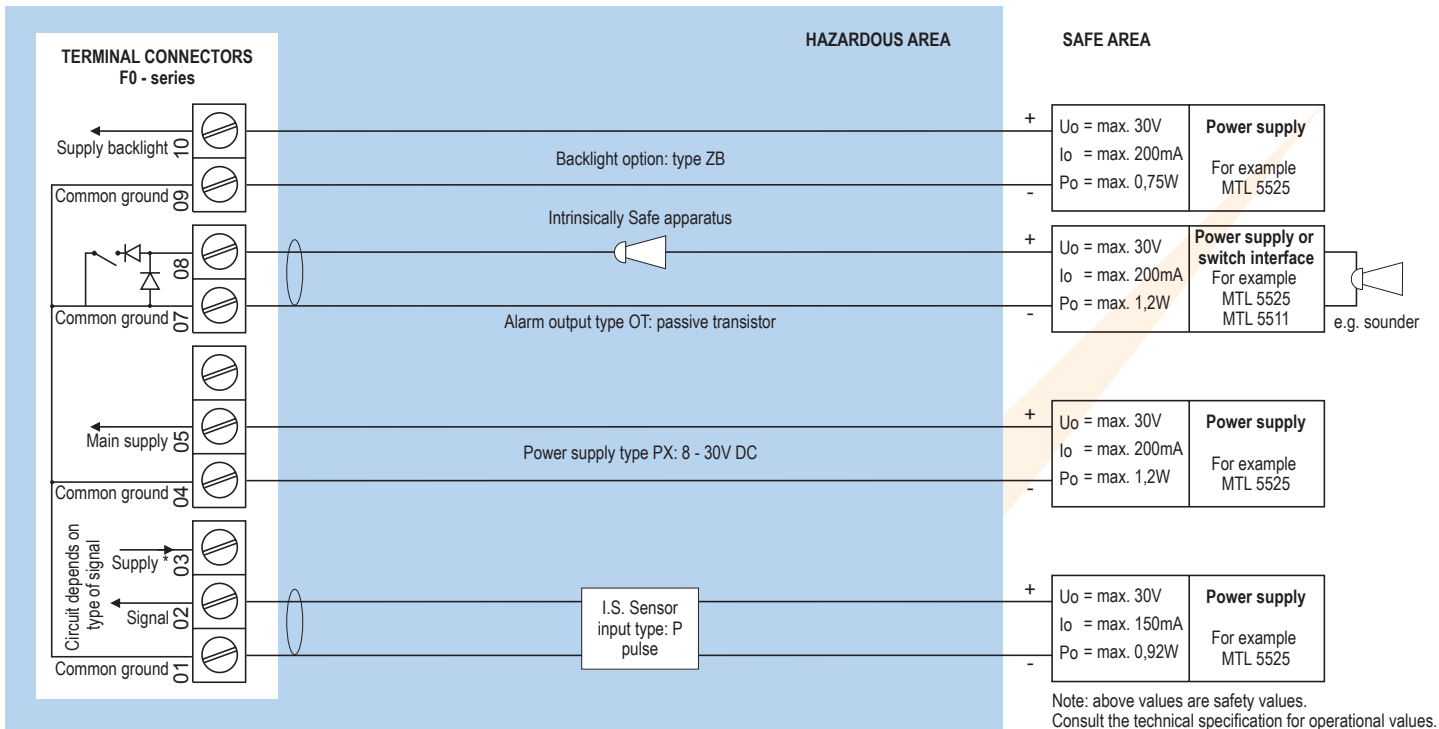


Configuration example IIA - IIB and IIC F093-P-PC-(PX)-XI-(ZB) - Battery powered unit



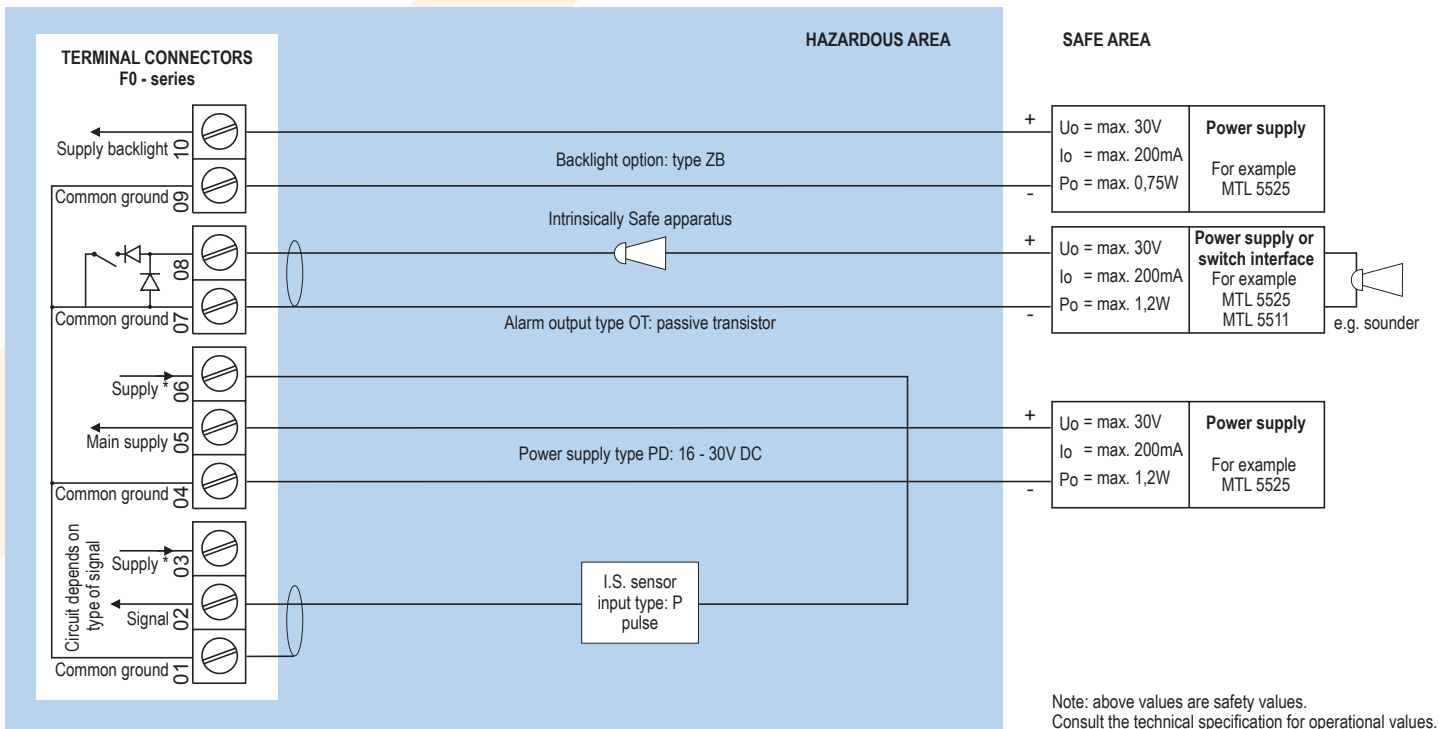
* Sensor supply voltage for pulse flow meter type P : Terminal 3: 1.2 / 3.2V DC.
Please note: type PX may be used in combination with the battery (type PC).
PX will power the unit; the battery will be disabled automatically till power is disconnected.

Configuration example IIA - IIB and IIC - F093-P-OT-PX-XI-ZB - Basic power requirement 8 - 30V DC



* Sensor supply voltage for pulse type P: Terminal 3: 1.2V / 3.2V DC.
Please note: type PX may be used in combination with the battery (type PC). PX will power the unit; the battery will be disabled automatically till power is disconnected.

Configuration example IIA - IIB and IIC - F093-P-PD-XI-ZB - Power requirement 16 - 30V DC



* Sensor supply voltage for pulse type P: Terminal 3: 1.2V / 3.2V DC. Terminal 6: 8.2V DC.
Please note: type PD may be used in combination with the battery (type PC). PD will power the unit; the battery will be disabled automatically till power is disconnected.

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. Red (flashing) backlight during alarm conditions. Intensity and alarm response selected through the keyboard. Also available Intrinsically Safe.

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 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	16 - 30V DC. Power consumption max. 1 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. 0.3 Watt.
Type ZB	20 - 30V DC. Power consumption max. 1 Watt. With type PF / PM: internally powered.
Note PB/PF/PM	Not available Intrinsically Safe.
Note PF/PM	The total consumption of the sensor and backlight type ZB may not exceed 400mA @ 24V DC.
Note	For Intrinsically Safe applications, consult the safety values in the certificate.

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	for pulse signals: 1.2 / 3.2 / 8.2V DC - max. 5mA@8.2V DC.
Type PF / PM	With pulse input: 1.2 / 3.2 / 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 .
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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 60079-0, IEC 60079-11, IEC 60079-26.
FM	FM Class No. 3600, FM Class No. 3610.
CSA	CSA 22.2 No. 157-92.
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: 2 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

ATEX certification	 II 1 G Ex ia IIC T4 Ga. II 1 D Ex ia IIIC T100 °C Da.
IECEx certification	 Ex ia IIC T4 Ga. Ex ia IIIC T100 °C Da.
CSA c-us certification	 Intrinsically Safe for Class I/II/III, Div. 1, Groups A, B, C, D, E, F, G, Temp. class T4 and Class I, Zone o, AEx ia IIC T4.
FM certification	 Intrinsically Safe for Class I/II/III, Div. 1, Groups A, B, C, D, E, F, G, Temp. class T4 and Class I, Zone o, AEx ia IIC T4.
Ambient Ta	-40°C to +70°C (-40°F to +158°F).

Explosion proof

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 input

Sensor	
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 0Hz - maximum 7kHz for total and 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.
Option ZG	coil sensitivity 5mVpp.

Signal output

Digital output	
Function	User defined: low/high or both engine speed alarms or running total hours alarm.
Type OA	One active 24V DC transistor output (PNP); load max. 400mA (requires PF or PM).
Type OR	One electro-mechanical relay output - isolated; max. switch power 230V AC (N.O.) - 0.5A (requires PF or PM).
Type OT	One passive transistor output (NPN) - not isolated. Max. 50V DC - 300mA per output.

Operational

Operator functions	
Displayed functions	<ul style="list-style-type: none"> • Engine speed and / or running hours. • Running hours and accumulated running hours. • Running hours can be reset to zero by pressing the CLEAR-key twice. • Alarm values for engine speed. • Alarm values can be set (or only displayed).

Running hours	
Digits	7 digits.
Units	HOURS.
Decimals	0 - 1.
Note	Total can be reset to zero.

Accumulated running hours	
Digits	11 digits.
Units / decimals	According to selection for running hours.
Note	Can not be reset to zero.

Engine speed	
Digits	7 digits.
Units	RPM.
Decimals	0 - 1.

Alarm values	
Digits	7 digits.
Units	According to selection for engine speed/running hrs.
Decimals	According to selection for engine speed/running hrs.
Time units	According to selection for engine speed/running hrs.
Type of alarm	Low / high engine speed alarm or total running hours alarm. Includes alarm delay time and configurable alarm output.

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.

Example configurable display information 90 x 40mm (3.5" x 1.6")



Auto toggle




Ordering information


Standard configuration: F093-P-HC-OT-PX-XX-ZX.

ordering information: F093 -P -H -O -P -X -Z

Sensor input signal


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


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 + 1 x M20.


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


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.


HV  Cable entry: 4 x M20.

HZ  Cable entry: no holes.

Digital output signal

OA One active transistor output - requires PF or PM.

OR One mechanical relay output - requires PF or PM.


OT  **One passive transistor output - standard configuration.**

Power requirements

PD  16 - 30V DC + sensor supply.

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, IECEx, CSA c-us and FM.


XF Ex d enclosure - 3 keys according ATEX.


XX **Safe area only.**

Other options

ZB  Backlight.

ZF  Coil input 10mVpp.

ZG  Coil input 5mVpp.

ZX  **No options.**

The bold marked text contains the standard configuration.

 Available Intrinsically Safe.

Specifications are subject to change without notice.



Fluidwell bv
P.O. Box 6
5460 AA - Veghel - The Netherlands
Telephone: +31 (0)413 343 786
Telefax: +31 (0)413 363 443
email: displays@fluidwell.com
Internet: www.fluidwell.com

