LEVITRONIX®

Ultrapure Fluid Handling
Integrated Flow Controller Series

BPS-iF30

Pump Pressure / Flow:

Standard: 1.5 bar / 7.4 l/min High Pressure: 2.8 bar / 3.8 l/min

Flow Control Range: 4 l/min

High Precision. No Bearings. No Contamination!

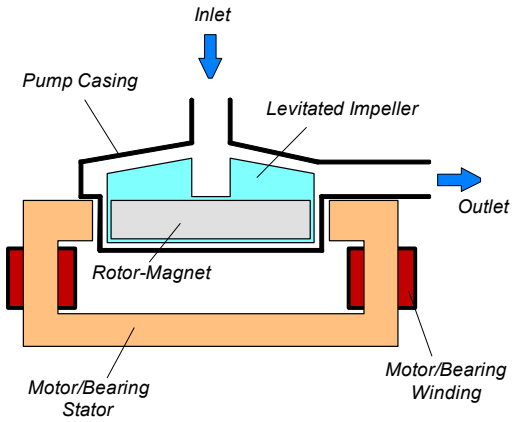


Figure 1: Schematic of the main elements of the MagLev centrifugal pump

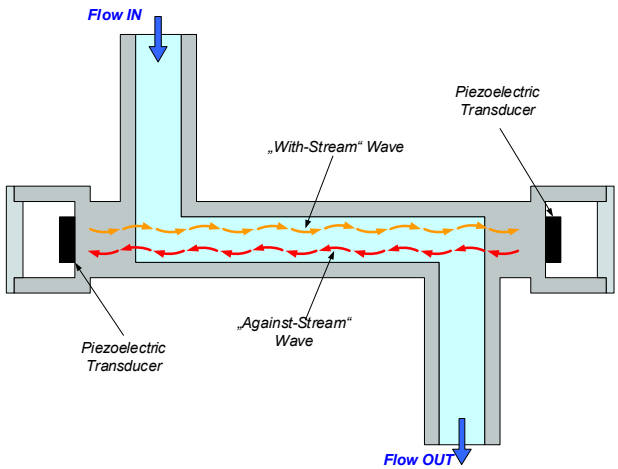


Figure 2: Operating principle ultrasonic flowmeter sensor with Z-shape (same principle with U-shape)

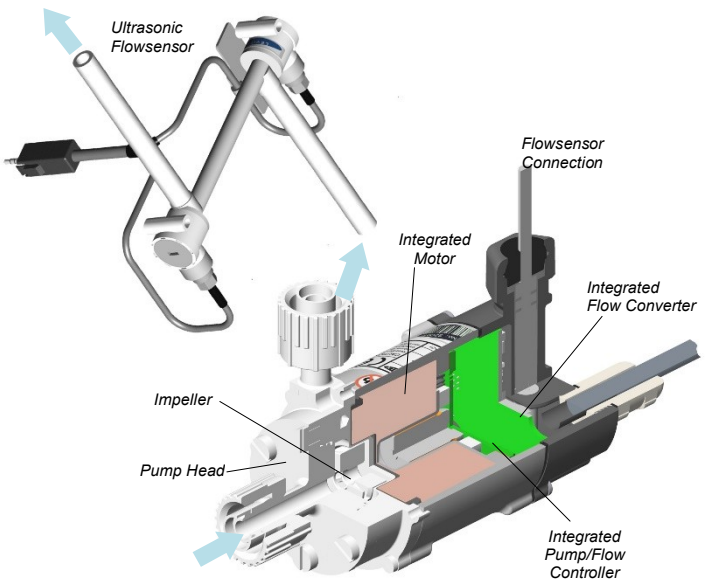


Figure 3: Integrated MagLev flow control system with ultrasonic flow sensor

INTRODUCTION

With the *BPS-iF30* flow control system *Levitronix*® combines its unique magnetic levitation pump technology with its ultrasonic flow measurement technology. The result is a highly integrated precise flow controller with an integrated pressure source.

The centrifugal pump, as a pressure source, has no bearings to wear out or seals to break down and fail. The pump impeller is suspended, contact-free, inside a casing and is driven by the magnetic field of the motor (*Figure 1*).

The flow is measured with the proven *LEVIFLOW*® ultrasonic sensor technology not invading into the fluid path (*Figure 2*).

The pump head and flow sensor are fabricated from chemical-resistant high purity fluorocarbon resins. The pump controller, motor and flow converter are integrated into the driver housing (see *Figure 3*). This reduces cabling and setup effort significantly. Fluid flow rate is precisely controlled by electronically regulating the impeller speed without pulsation.

SYSTEM BENEFITS

- High precision, dynamics and turndown ratio.
- No dependency on external pressure source.
- Extremely low particle generation due to the absence of mechanically contacting parts.
- Increased equipment uptime with lower maintenance costs by eliminating valves, bearings, rotating seals and costly rebuilds.
- Very low integration costs as no external controller is needed for flow control.
- Reduced risk of contamination due to the self-contained design with magnetic bearings and ultrasonic technology.
- Very gentle to sensitive fluids due to low-shear design.
- No narrow gaps and fissures where particles or microorganisms could be entrapped.
- Smooth, continuous flow without pressure pulsation.
- Proven pump and ultrasonic flow measurement technology.

APPLICATIONS

- Semiconductor wet processing (Cleaning, CMP etc.).
- Flip chip and advanced packaging.
- Solar cell production.
- Flat panel display manufacturing.
- Hard-disk fabrication.
- Printer ink handling.
- Pharmaceutical production.
- Plating.
- Circulation in flow batteries.

FLOW CONTROL CONCEPT

Flow control, pressure generation and flow measurement are done with one unit (see *Figure 5*). This allows realization of sophisticated flow control algorithms and optimizations to various situations. There is a linear relationship between flow and speed. The speed is precisely controlled with a high resolution over a wide pump speed range. This allows a flow control with high resolution and high turndown ratio compared to non-linear flow control with valve type flow control concepts. The highly dynamic speed controller allows fast flow step responses. As the speed is monitored and the pressure cannot increase uncontrolled at a given speed, there is no need to protect the hydraulic circuit against over-pressure situations as for example for roller pumps in tube clogging situations. The versatility the *Levitronix®* flow control systems goes far beyond the capabilities of simple flow controllers. In addition to the flow control function, the *Levitronix®* control firmware comes with several condition monitoring features to monitor the integrity of the fluid circuit. *Levitronix®* flow control systems can generate alarms for preventive filter exchange, no-flow conditions or line clogging. Dynamic Condition Trending (DCT) enables failure prediction and scheduling of preventive maintenance.

SYSTEM CONFIGURATION – "STAND-ALONE"

Figure 7 and *Figure 11* illustrate a "Plug and Play" stand-alone system with integrated user panel to set the flow manually. The driver also contains a PLC interface for remote flow control by analog and digital signals. Various accessories are available like a desktop power supply with relevant power cable and signal cables to connect to the PLC.

SYSTEM CONFIGURATION – "EASYCONNECT"

The "EasyConnect" models (see *Figure 9* and *Figure 13*) with according cable accessories are designed to realize various interface configurations with minimal setup effort. Two Fieldbus connectors allow to chain multiple flow controllers. Therefore, blending configurations as shown in *Figure 10* can be realized. The PLC interface allows not only remote control by analog/digital signals but also connections of external sensors hence enabling for example a precise flow or pressure control. The Fieldbus interface allows remote control over a PC, a User Panel or other devices with Modbus protocol.

SYSTEM CONFIGURATION – "OEM"

The "OEM" models are designed for a compact integration with one integrated hybrid cable containing all available interface signals (see *Figure 8* and *Figure 15).* Basically, all configurations of the "EasyConnect" models are possible allowing the users with integration capabilities to adapt the cable to their needs.

ATEX / IECEx SYSTEM CONFIGURATION

An ATEX / IECEx certified driver (OEM model only) together with the pump head allows installation within an ATEX Zone 2 area (see *Figure 8*). An Ex conform solution is needed for the motor cables to leave the ATEX area. One option is an ATEX certified cable sealing system as listed in *Table 5* (see *Pos. 14*).

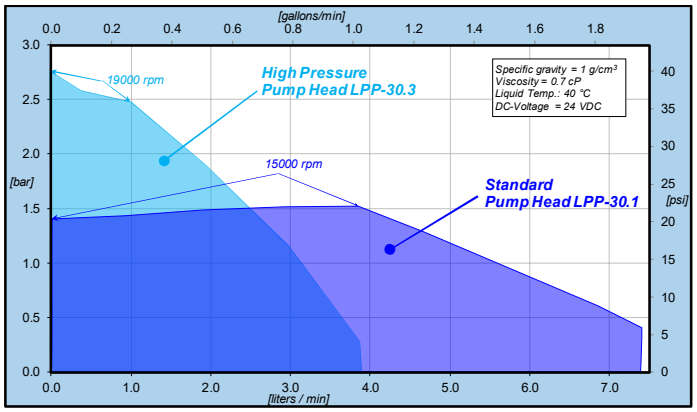


Figure 4: *Pressure/flow curves for aqueous liquids (similar to water)*

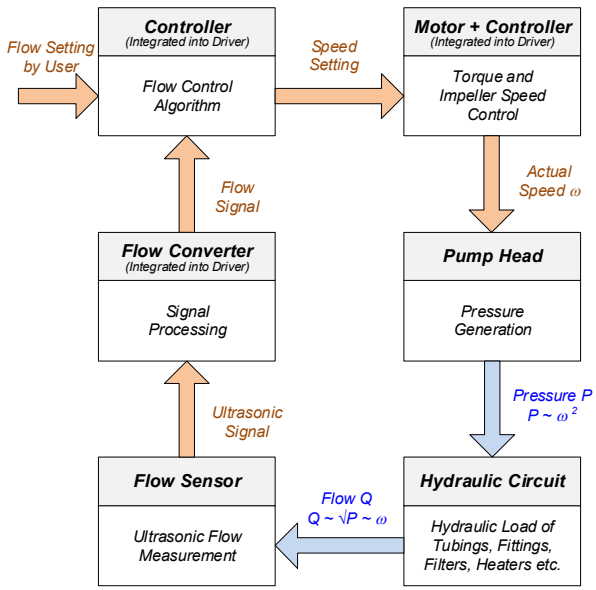


Figure 5: *Simplified block schematics of flow control with BPS-iF30*

Figure 6: *Flow control system models*

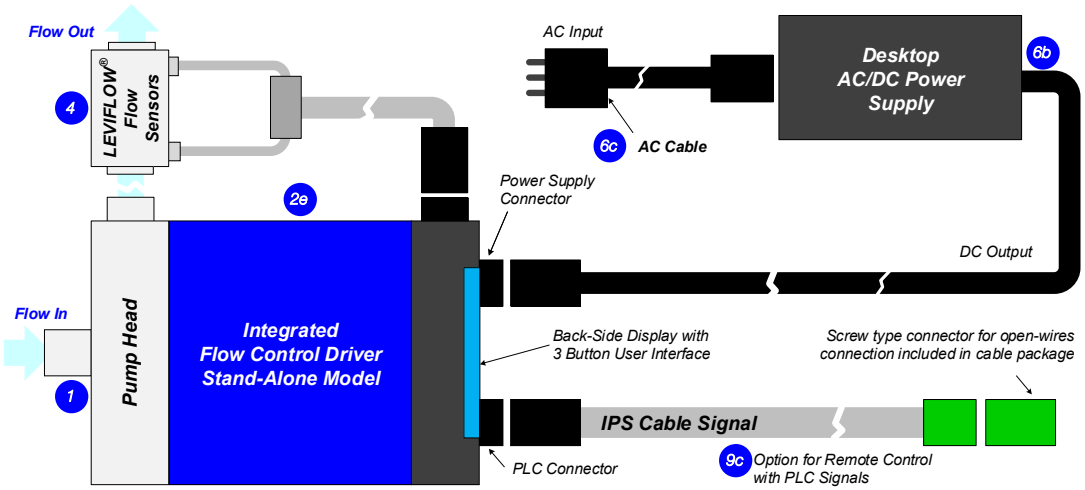


Figure 7: Standard "Stand-Alone" system configuration with main accessories
(See section "Order Information" for details to numbered components and other options)

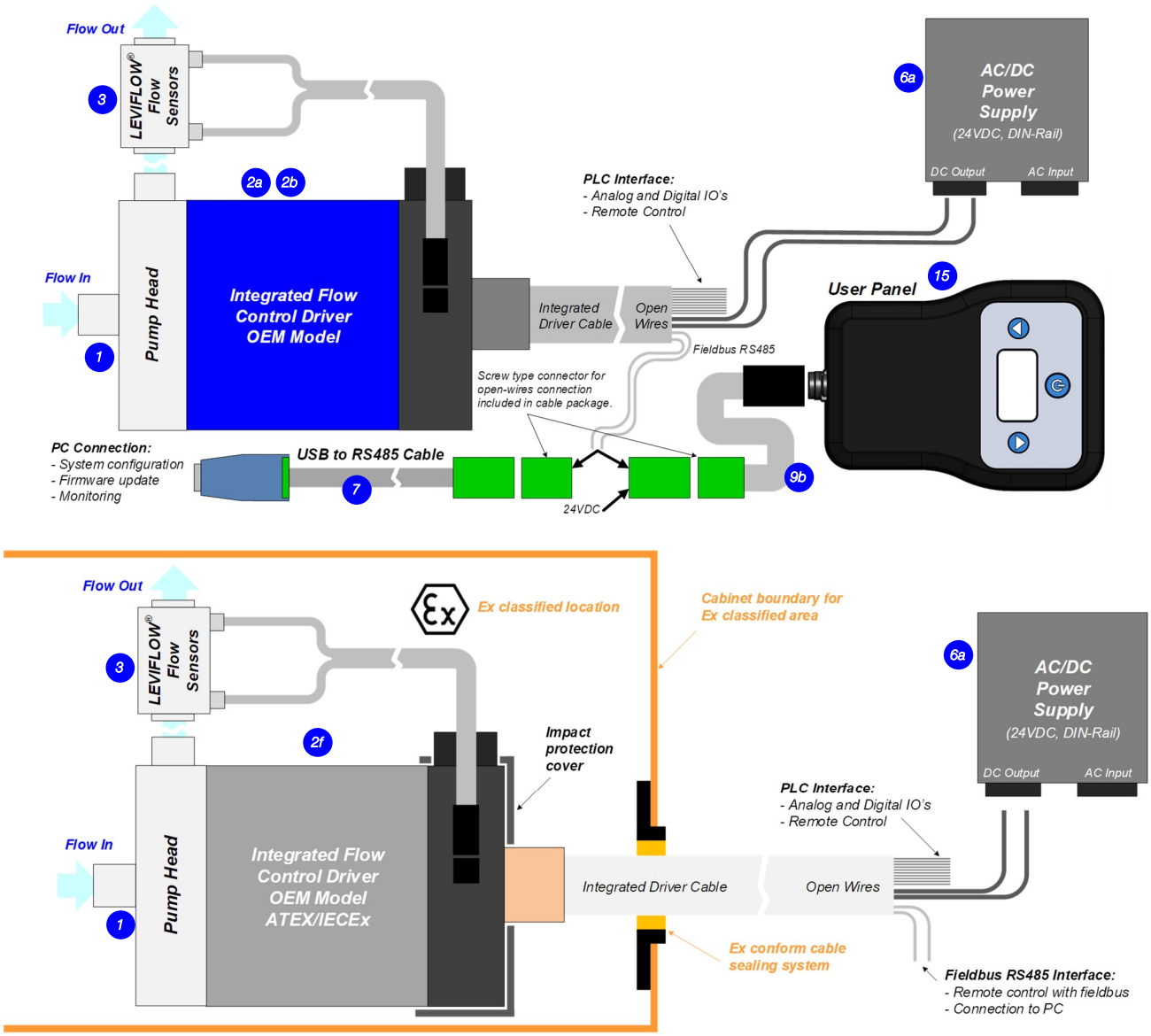


Figure 8: Standard "OEM" system configuration and ATEX/IECEx OEM system configuration
(See section "Order Information" for details to numbered components and other options)

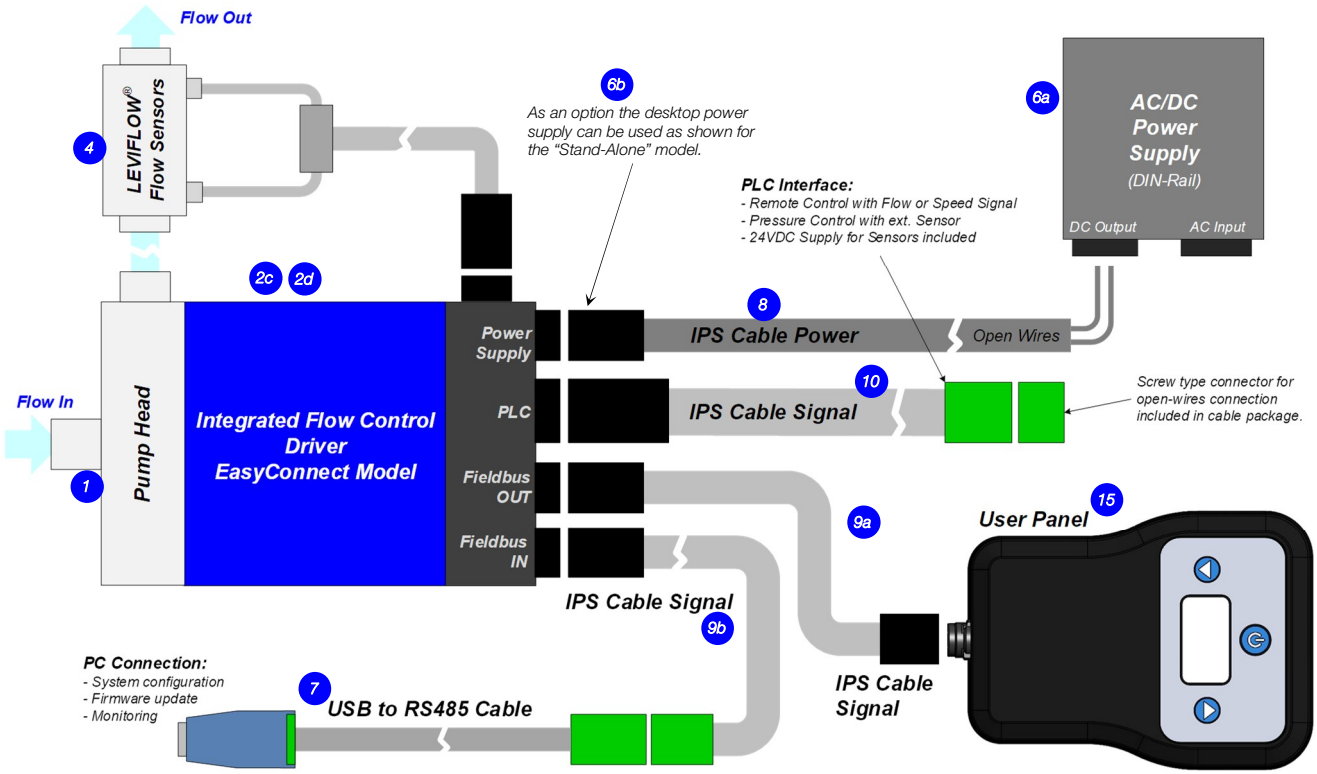


Figure 9: Standard "EasyConnect" system configuration with main accessories
(See section "Order Information" for details to numbered components and other options.)

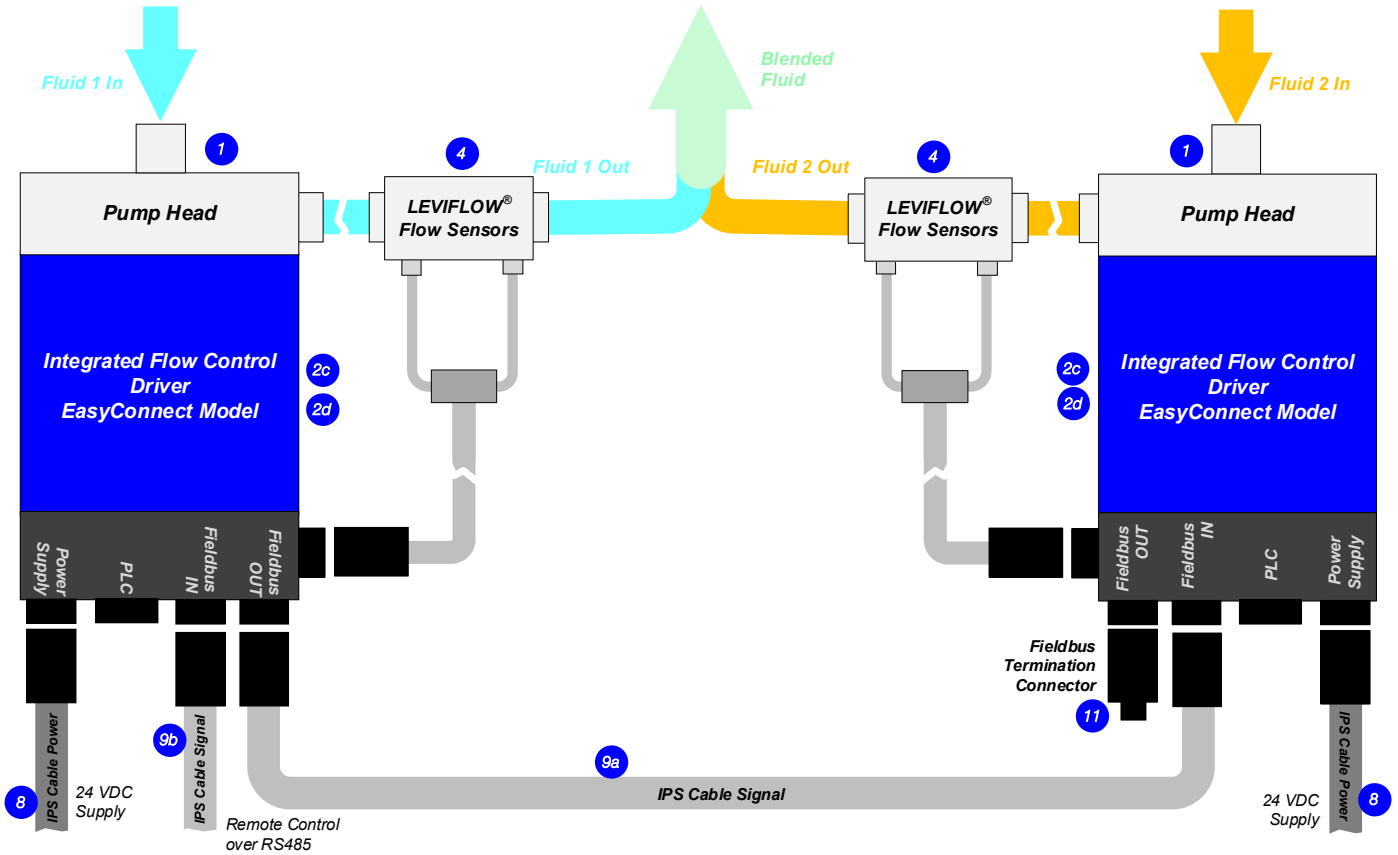


Figure 10: Multi-system configuration with "EasyConnect" models for blending applications
(See section "Order Information" for details to numbered components and other options)

Interface	PIN Name	Description	Standard Designation	Hardware Specification
Power Supply	P+	+ 24 VDC	Supply	Voltage: 24 VDC Power: 35 W
	P-	Power Input Ground / Earth		
	NC	Not connected.	--	--
PLC 6	Ain	Analog Input (Current Input)	Reference Flow	Analog current input: 4 – 20 mA (450 Ohm shunt input, no galvanic isolation)
	Ain_GND	Analog In. GND	--	Reference for Ain
	Dout	Digital Output 1	Status	Open drain, max. 24V, 100mA Reference ground is GND
	GND	Analog Ground	--	Reference for Dout
	Din1	Digital Input 1	Enable (Reset)	Galvanic separation with optocoupler 2.2 kΩ input resistance, 5-24V for active input
	Din_COM	Com. Digi. Input	--	Reference for digital input.
Flow Sensor	6 Pins	Flow Sensor	--	Compatible to *LEVIFLOW®* flow sensors *LFS-04L-F1*.
Display and Buttons	--	Display	Flow and Status Display	
	--	Up/Down	Setting Flow	--
	--	On/Off	Enable/Disable	--

Figure 11: *Interface specifications of standard "Stand-Alone" model*

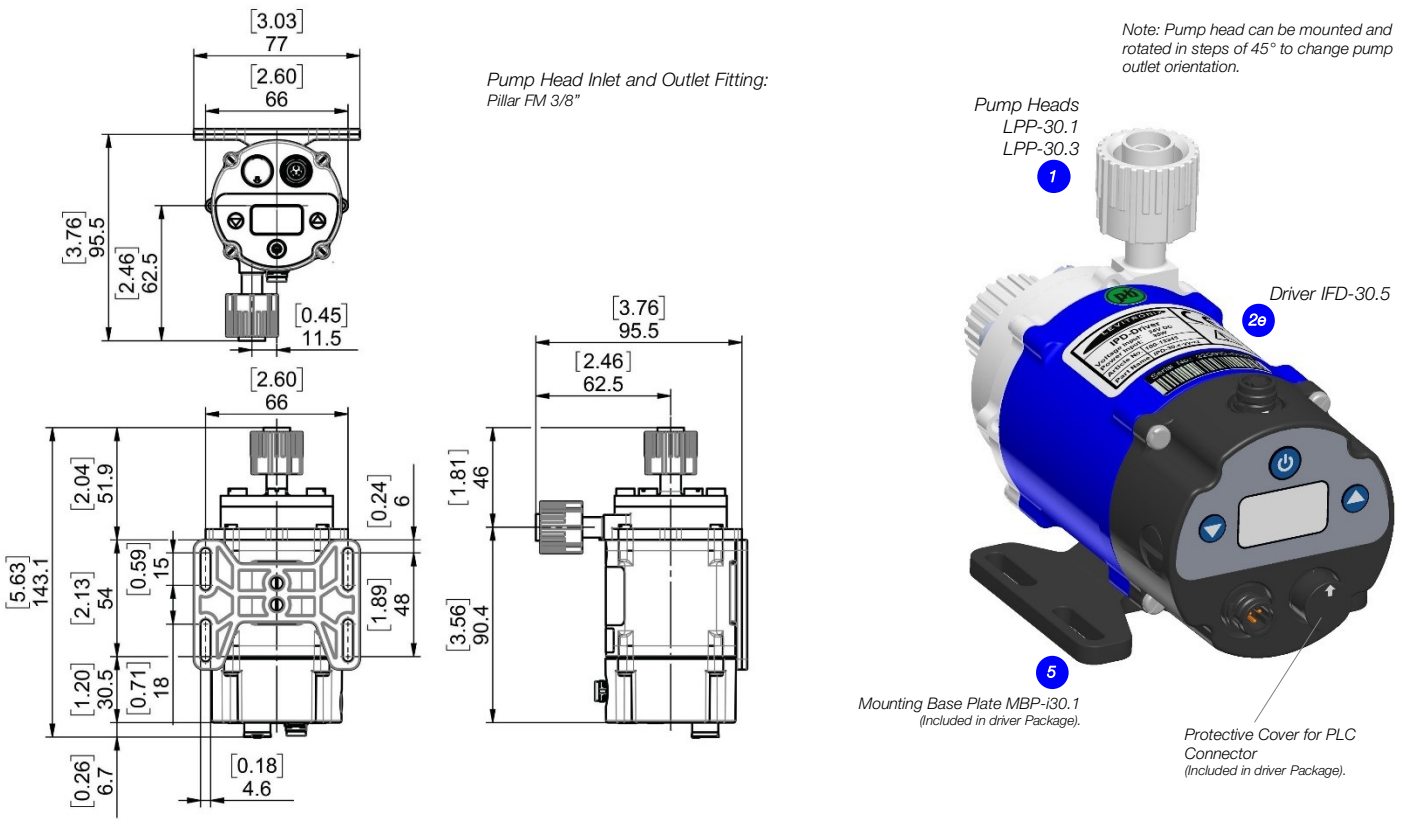
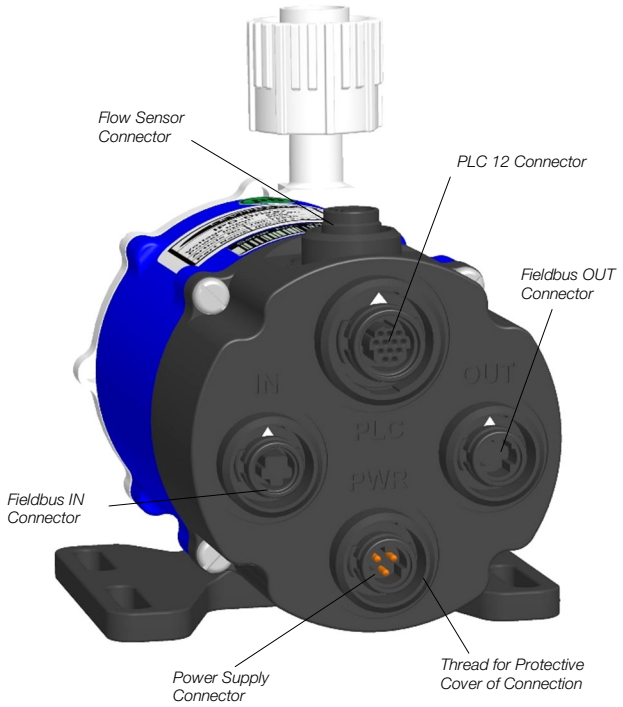


Figure 12: *Basic dimensions and description of standard "Stand-Alone" model*
Note 1: Dimensions without tolerance are for reference only.

MODEL DESCRIPTION – EASYCONNECT



Connector	PIN Name	Description	Standard Designation	Hardware Specification
Power Supply	P+	+ 24 VDC	Supply	Voltage: 24 VDC
	P-	Ground / Earth		Power: 35 W
	NC	Not connected.	--	--
PLC 12	Dout1	Digital Output 1	Status Pump	Open drain, max. 24V, 100mA
	Dout2	Digital Output 2	Status Flow Sen.	Reference ground is GND
	Din1	Digital Input 1	Enable (Reset)	Galvanic separation with optocoupler
	Din2	Digital Input 2	Zero Adjust	2.2 kΩ input resistance, 5-24V for active input
	Din_COM	Com. Digi. Input	--	Reference for digital input.
	Ain1	Analog Input 1 (Current Input)	Reference Value (Set Flow)	Analog current input: 4 – 20 mA (450 Ohm shunt input, no galvanic isolation)
	Ain2	Analog Input 2 (Voltage Input)	Free configurable	Analog voltage input: 0 – 10V (7.9 kOhm, no galvanic isolation)
	Ain_GND	Analog In. GND	--	Reference for Ain1 and Ain2
	Aout1	Analog Output (Voltage Output)	Actual Flow	0 – 10V (no galvanic isolation) GND is reference
	GND	Analog Ground	--	Reference for Aout1, Dout1, Dout2 and Pout
	Pout	Output +24VDC	Supply Output	For supply of external devices (e.g. sensors). (Current 200mA together with Pout o Fieldbus OUT)
	NC	Not connected.	--	--
Fieldbus OUT	GND	Ground	--	Reference for Pout.
	Pout	Output +24VDC	Supply Output	For supply of external devices (user panels) (Current 200mA together with Pout of PLC 12)
	RS485+	RS485 +	Fieldbus	Modbus RTU protocol
	RS485-	RS485 -		
	Internal	Internal Bus	Do not connect	Internal bus needed to connect pumps for serial pumping.
	Internal	Internal Bus	Do not connect	
Fieldbus IN	GND	Ground	--	Connected to PLC12 GND and reference for supply
	NC	Not connected.	--	--
	RS485+	RS485 +	Fieldbus	Modbus RTU protocol
	RS485-	RS485 -		
	Internal	Internal Bus	Do not connect	Internal bus needed to connect pumps for serial pumping.
	Internal	Internal Bus	Do not connect	
Flow Sensor	6 Pins	Flow Sensor	--	Compatible to *LEVIFLOW®* flow sensors *LFS-04L-F1*.

Figure 13: *Interface specifications of standard "EasyConnect" model*

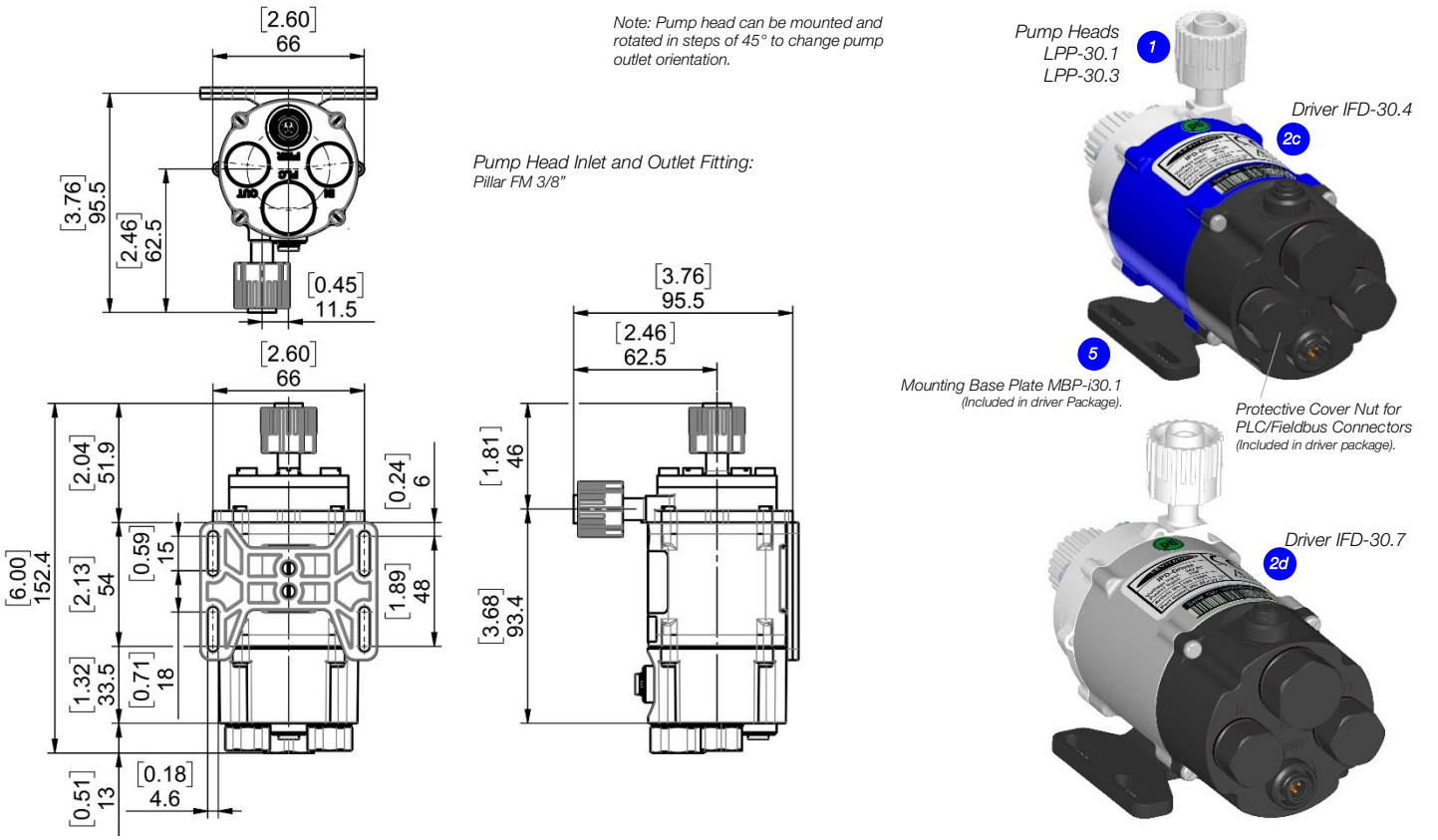
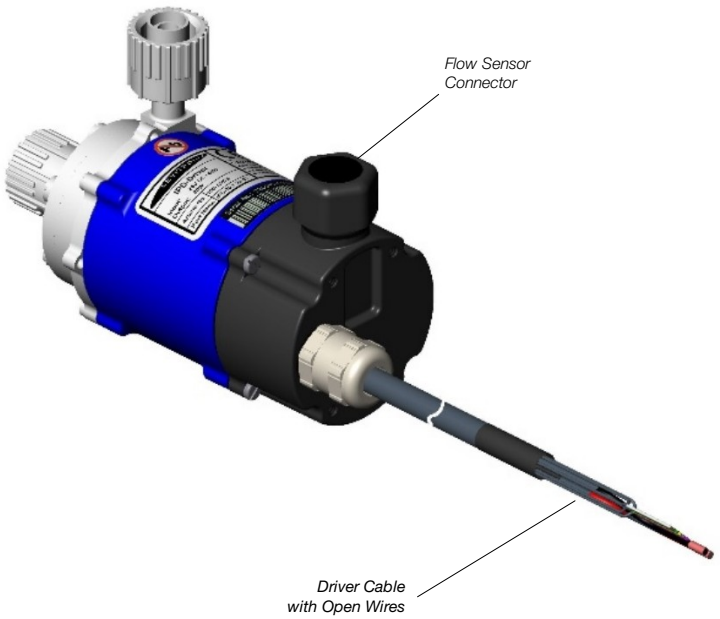


Figure 14: *Basic dimensions and description of standard "EasyConnect" model*

Note 1: Dimensions without tolerance are for reference only.



Wire Name	Description	Standard Designation	Hardware Specification
P+	+ 24 VDC	Supply	Voltage: 24 VDC
P-	Power Input Ground / Earth		P- to be connected to earth
Ain1	Analog Input 1 (Current Input)	Reference Value (Set Flow)	Analog current input: 4 – 20 mA (450 Ohm shunt input, no galvanic isolation)
Ain2	Analog Input 2 (Voltage Input)	Free Configurable	Analog voltage input: 0 – 10V (7.9 kOhm, no galvanic isolation)
Ain_GND	Analog Input, Ground	--	Reference for Ain1 and Ain2
Din1	Digital Input 1	Enable (Reset)	Galvanic separation with optocoupler
Din2	Digital Input 2	Zero Adjust	2.2 kΩ input resistance, 5-24V for active input
Din_COM	Common Digital Input	--	--
Aout1	Analog Output	Actual Flow	0 – 10V (no galvanic isolation) GND is reference
Dout1	Digital Output 1	Status Pump	Open drain, max. 24V, 100mA
Dout2	Digital Output 2	Status Flow Sens.	Reference ground is AGND
GND	Analog Ground	--	Reference for Aout1, Dout1 and Dout2
RS485+	RS485 +	Fieldbus	Modbus RTU protocol
RS485-	RS485 -		
Internal	Internal Bus	Do not connect	--
Internal	Internal Bus	Do not connect	
Shield	Shielding	Shielding	To be connected to earth (see wire P-)

Figure 15: *Interface specifications of standard "OEM" and for "OEM" ATEX / IECEx models*
Note 1: Power supply wire cross-section is 1.5 mm² and for signal wires 0.14 mm² Note 2: For more detailed description of interfaces consult user manual

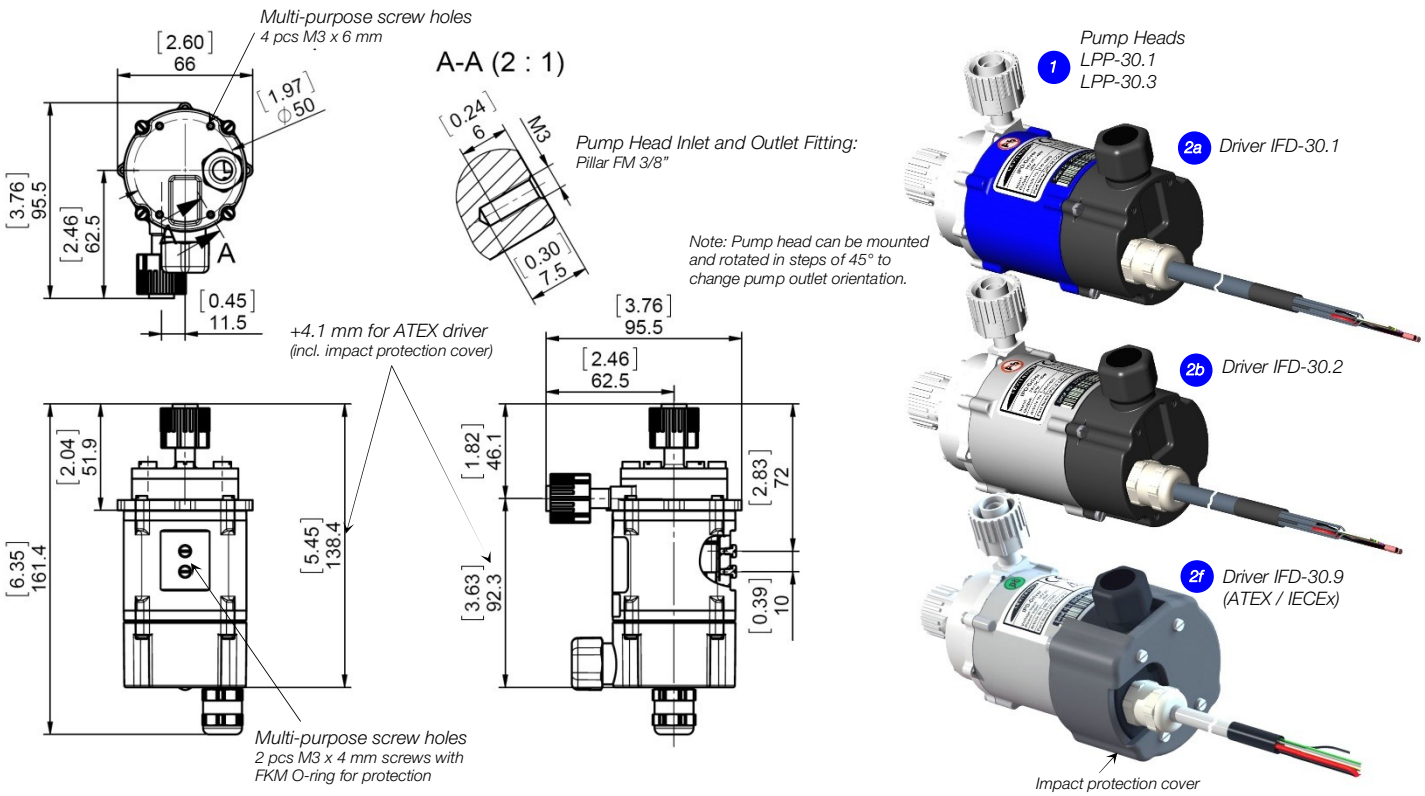


Figure 16: *Basic dimensions and description of standard "OEM" model*
Note 1: Dimensions without tolerance are for reference only.

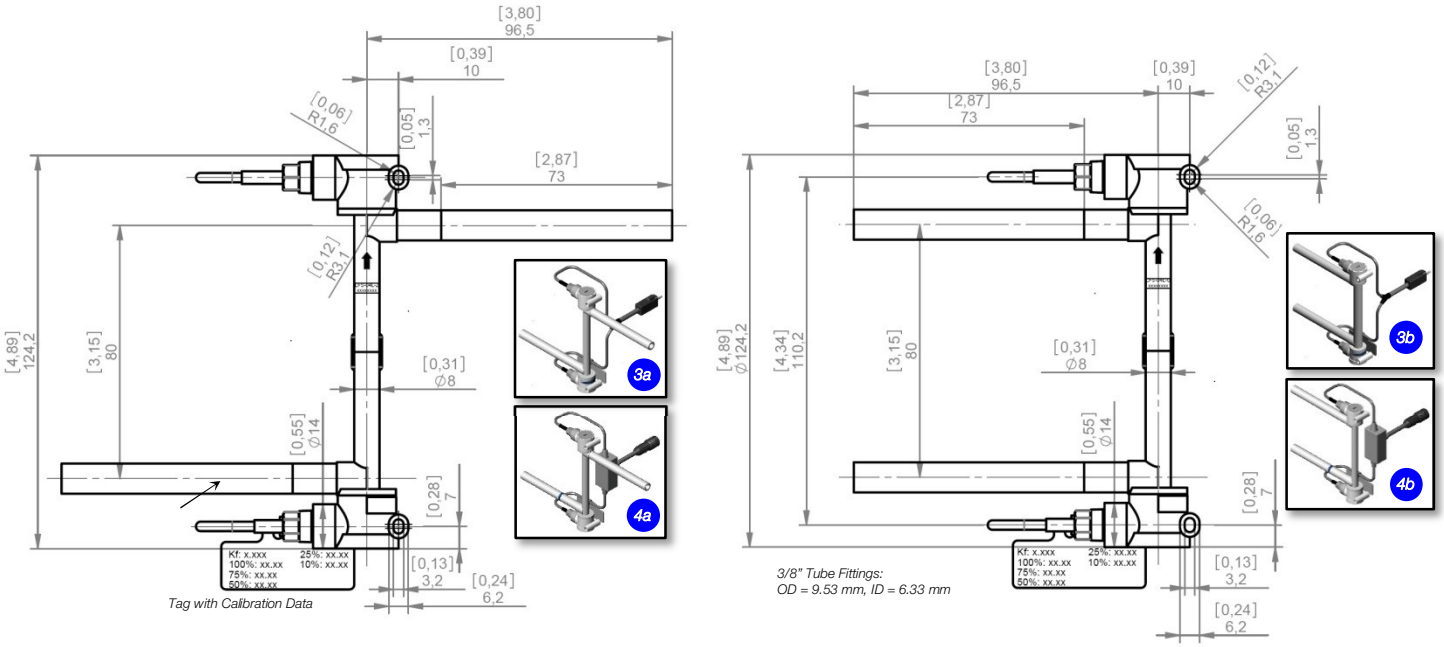


Figure 17: Dimensions of LFS-04L-F1 flow sensor (dimensions in [mm])
Note 1: Dimensions without tolerance are for reference only.

Characteristics \ Flow Controller Type	BPS-iF30 for up to 4 l/min (with LFS-04L-F1-SC1 Sensor)		
Flow Range [ml/min]	< 35		35 – 4000
Accuracy of Reading	see *Figure 18*		± 1%
Repeatability of Read.	see *Figure 18*		< 0.5%
Response Time: Step from 10 – 90% of full scale.	< 1s *Note: Value for to the specific hydraulic circuit optimized flow control parameters. Standard settings are tuned for general flow control stability and may be higher.*		
Fluid Temperature / Ambient Temperature	10 – 90 °C (50 – 194 °F)	/	0 – 40 °C (32 – 104 °F)
Maximum Fluid Pressure	0 – 0.5 MPa (0 – 5 bar, 0 – 72.5 psi)		
Sound Speed / Kinematic Viscosity	1000 – 2200 m/s	/	0.3 – 40 mm^2/s (0.3 – 40 cSt)
Wet Materials / Enclosure Classification	PFA for flow sensors and pump head	/	IP-65 for flow sensor mounted on flow control driver

Table 1: Specifications of flow controller systems BPS-iF30 (All data based on water at 20 °C)

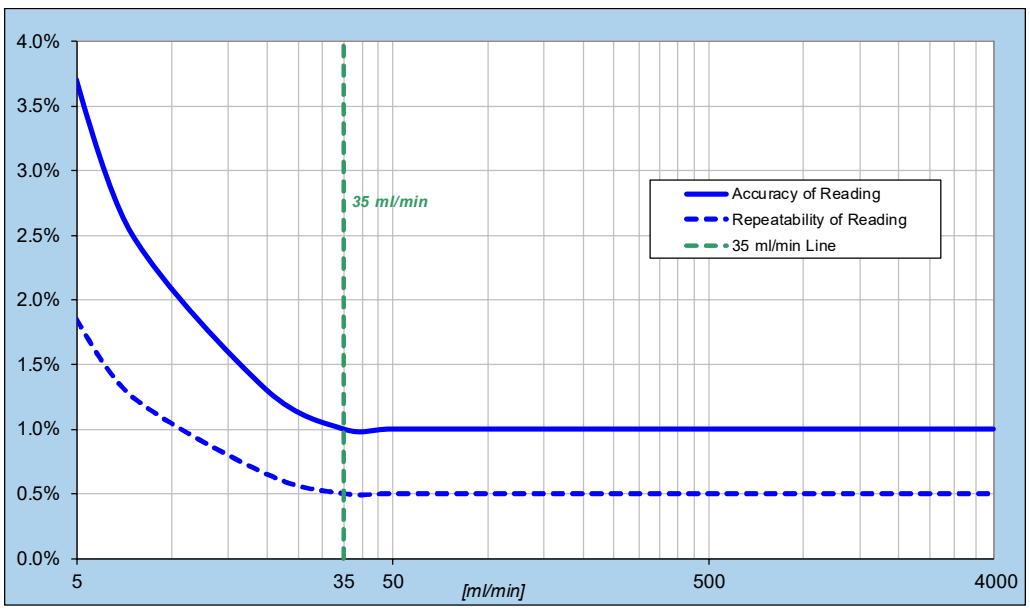


Figure 18: Accuracy and repeatability specifications of flow control system BPS-iF30 with LFS-04L-F1-SC1 flow sensors

ORDER INFORMATION

System Name	Article #	Flow Sensor	Flow Control Driver	Pump Head	Note
BPS-iF30.1-04LZSC1 / -04LUSC1	100-91027 / 100-91028	LFS-04L-Z-F1-SC1 / LFS-04L-U-F1-SC1	IFD-30.1-50-01 (Epoxy)	LPP-30.1	*OEM models* [1]
BPS-iF30.2-04LZSC1 / -04LUSC1	100-91029 / 100-91030	LFS-04L-Z-F1-SC1 / LFS-04L-U-F1-SC1	IFD-30.2-50-01 (ETFE)	LPP-30.1	
BPS-iF30.3-04LZSC1 / -04LUSC1	100-91279 / 100-91280	LFS-04L-Z-F1-SC1 / LFS-04L-U-F1-SC1	IFD-30.1-50-03 (Epoxy)	LPP-30.3	
BPS-iF30.4-04LZSC1 / -04LUSC1	100-91281 / 100-91282	LFS-04L-Z-F1-SC1 / LFS-04L-U-F1-SC1	IFD-30.2-50-03 (ETFE)	LPP-30.3	
BPS-iF30.5-04LZSC1 / -04LUSC1	100-91378 / 100-91379	LFS-04L-Z-F1-SC1 / LFS-04L-U-F1-SC1	IFD-30.9-50-01 (ETFE)	LPP-30.1	*OEM models ATEX/IECEx* [1]
BPS-iF30.6-04LZSC1 / -04LUSC1	100-91380 / 100-91381	LFS-04L-Z-F1-SC1 / LFS-04L-U-F1-SC1	IFD-30.9-50-03 (ETFE)	LPP-30.3	
BPS-iF30.7-04LZPCSC1 / -04LUPCSC1	100-91382 / 100-91383	LFS-04L-Z-PC-F1-SC1 / LFS-04L-U-PC-F1-SC1	IFD-30.4-01 (Epoxy)	LPP-30.1	*EasyConnect models* [2]
BPS-iF30.8-04LZPCSC1 / -04LUPCSC1	100-91384 / 100-91385	LFS-04L-Z-PC-F1-SC1 / LFS-04L-U-PC-F1-SC1	IFD-30.7-01 (ETFE)	LPP-30.1	
BPS-iF30.9-04LZPCSC1 / -04LUPCSC1	100-91386 / 100-91387	LFS-04L-Z-PC-F1-SC1 / LFS-04L-U-PC-F1-SC1	IFD-30.4-03 (Epoxy)	LPP-30.3	
BPS-iF30.10-04LZPCSC1 / -04LUPCSC1	100-91388 / 100-91389	LFS-04L-Z-PC-F1-SC1 / LFS-04L-U-PC-F1-SC1	IFD-30.7-03 (ETFE)	LPP-30.3	
BPS-iF30.11-04LZPCSC1 / -04LUPCSC1	100-91390 / 100-91391	LFS-04L-Z-PC-F1-SC1 / LFS-04L-U-PC-F1-SC1	IFD-30.5-01 (Epoxy)	LPP-30.1	*Stand-Alone model* [2]
BPS-iF30.12-04LZPCSC1 / -04LUPCSC1	100-91392 / 100-91393	LFS-04L-Z-PC-F1-SC1 / LFS-04L-U-PC-F1-SC1	IFD-30.5-03 (Epoxy)	LPP-30.3	

Table 2: *Standard flow control system configurations*

Note 1: Flow control driver comes delivered with flow sensor calibration parameters stored in driver if ordered as a set. *Note 2: Calibration parameters stored on flow sensor and transferred automatically to driver.*

Pos.	Component	Article Name	Article #	Characteristics	Value / Feature
1a	Pump Head	LPP-30.1 (Standard)	100-90828	Impeller / Pump Housing Sealing O-Ring / In-/Outlet Fittings	*PTFE / PTFE* *FFPM (FFKM) perfluoroelastomer / 3/8" Pillar Super 300 FM (female)*
1b		LPP-30.3 (High Press)	100-91213	Max. Flow / Max. Diff.-Pressure Max. Viscosity / Max. Liquid Temp.	*a) 7.4 lpm (2 gpm) / 1.5 bar (22 psi) b) 3.8 lpm (1gpm) / 2.8 bar (40 psi)* *10 cP / 90 °C (194 °F) Note: ATEX driver IFD-30.9 has max. 70 °C.*
2a	Integrated Flow Control Driver ("OEM Models")	IFD-30.1-50-01 (Standard)	100-10094	Voltage, Power Housing	*24 VDC ±10%, 35 W* *Epoxy (a) or ETFE (b) coated Aluminum, PP for bottom lid, IP65* [1]
2b		IFD-30.1-50-03 (High Press.)	100-10142	Cable	*PVC (a) or FEP (b) jacket, open wires, cable length 5 m*
		IFD-30.2-50-01 (Standard)	100-10099	Interfaces	*PLC and RS485 with Modbus RTU protocol (see Figure 15 for details)*
		IFD-30.2-50-03 (High Press.)	100-10143	Standard Firmware	*For Standard pump head: K1.48 For High Pressure pump head: K3.48*
2c	Integrated Flow Control Driver ("EasyConnect" Models) (MBP-i30.1 included)	IFD-30.4-01 (Standard)	100-10172	Housing	*Epoxy (c) or ETFE (d) coated Aluminum, PP for bottom lid, IP65*
		IFD-30.4-03 (High Press.)	100-10173	Interfaces	*2x Fieldbus RS485 with Modbus RTU protocol*
2d		IFD-30.7-01 (Standard)	100-10176		*PLC and power supply*
		IFD-30.7-03 (High Press.)	100-10177	Standard Firmware	*For Standard pump head: K1.48 For High Pressure pump head: K3.48*
2e	Integrated Flow Control Driver ("Stand-Alone" Model) (MBP-i30.1 included)	IFD-30.5-01 (Standard)	100-10174	Housing Interfaces	*Epoxy coated Aluminum, PP for bottom lid, IP65* *User panel with 3 user buttons, PLC and power supply*
		IFD-30.5-03 (High Pressure)	100-10175	Standard Firmware	*For Standard pump head: K1.48 For High Pressure pump head: K3.48*
2f	Integrated Flow Control Driver ATEX/IECEx ("OEM Models" only)	IFD-30.9-50-01 (ETFE, Standard)	100-10158	Housing / Cable	*ETFE coated Alu., PP, IP65*[1] / *FEP jacket, open wires, cable length 5 m*
		IFD-30.9-50-03 (ETFE, High Press.)	100-10178	ATEX / IECEx Marking	CE Ex *II 3G Ex ec h mc IIC T4 Gc* / CE Ex *II 3D Ex h tc IIIC T90°C Dc*

Table 3: *Specification of standard components* *Note 1: Designed and tested for IP-67.*

Pos.	Article Name	Article #	Shape	Flow Range	Fitting	Cable	Special Feature	Note
3a	LFS-04L-Z-F1-SC1	100-30429	Z	0 – 4 l/min	3/8"	PVC jacket 0.6 m	*Calibration for 35-4000 ml/min 1% accuracy range.*	*Sensor specific parameter for controller calibration delivered on a tag attached to the flow sensor (for "OEM" model only).*
3b	LFS-04L-U-F1-SC1	100-30427	U					
4a	LFS-04L-Z-PC-F1-SC1	100-30468	Z	0 – 4 l/min	3/8"	PVC jacket 0.6 m	*Calibration for 35-4000 ml/min 1% accuracy range.*	*Calibration parameters stored on sensor chip and automatically transferred to driver ("EasyConnect" and "Stand-Alone" models).*
4b	LFS-04L-U-PC-F1-SC1	100-30466	U					

Table 4: *Standard flow sensors*

Pos.	Component	Article Name	Article #	Characteristics	Value / Feature
5	Mounting Base Plate	MBP-i30.1	190-10313	Material / Mounting Screws	*PP + GF / 2 pieces, stainless steel FEP coated, M3 x 10 mm*
6a	AC/DC Power Supply	TPC 055-124 (Traco)	100-40014	Voltage Output / Input Basic Dimensions / Certifications	*24 VDC with 55 W / 85 – 264 VAC, 47-63 Hz* *45 x 90 x 96.5 mm (mountable on DIN rail 35 mm) / UL, CSA, CB, Semi F47*
6b	Desktop AC/DC Supply	AC/DC Power Supply VEC50US24 HR30	100-40015	Voltage Output / Input / Basic Dim. Cable Spec. / Safety Approvals	*24VDC, 50W / 90 – 264 VAC, 47-63 Hz / 116 x 52 x 31 mm, cable length 1.2m* *IEC60950-1, EN60950-1, UL/cUL60950-1*
6c	AC Mains Cables (for Desktop power supply 6b)	AMC-1.1 (2m)	190-10331	Country	*US, Canada*
		AMC-1.2 / AMC-1.3 (2.5m)	190-1033**2 / 33**	Country	*Germ., Denm., Norway, Finland, Belgium, Netherland, Sweden, Austria / Japan*
		AMC-1.4 / AMC-1.5 (2.5 m)	190-1033**4 / 35**	Country	*Switzerland / United Kingdom*
7	USB to RS485 Adaptor-TR Isolated	YN-485I-TR	100-30392	Structure/Design Purpose	*USB connector (A) with termination resistor and cable (2m) with connector pair (B and C) for external RS485 wire connection. Magnetically isolated. Cable length is 2m. Included is a USB space saver cable (D).* *Communication over fieldbus of driver with PC*
8	IPS Cable Power 3 Wires	ICP-1.1-50 (5 m)	190-10342	Cable Material / Wires Connection In / Connection Out Main Purpose	*PVC jacket / 3x 0.5 mm² (only 2 wires used, 1 is cut)* *Open wires / Circular Hirose type to driver* *Connection of power supply to "Stand-Alone" and "EasyConnect" drivers*
9a	IPS Cable Signal 6 Wires	ICS-1.1-01 (0.1 m)	190-10343	Cable Material / Wires Connection In / Connection Out Main Purpose	*PVC jacket / 6x 0.08 mm² and shielding* *Circular Hirose type / Circular Hirose type* *Fieldbus cable between "EasyConnect" drivers*
		ICS-1.1-10 (1 m)	190-10344		
		ICS-1.1-30 (3 m)	190-10345		
9b	IPS Cable Signal 6 Wires	ICS-1.2-50 (5 m)	190-10346	Cable Material / Wires Connection In / Connection Out Main Purpose ICS-1.2 / ICS-1.3	*PVC jacket / 6x 0.08 mm² and shielding* *Connector with screw type plug for open wire connection / Circular Hirose type* *Fieldbus connection to "EasyConnect" driver / To PLC of "Stand-Alone" driver.*
9c		ICS-1.3-50 (5 m)	190-10389		
10	IPS Cable Signal 12 Wires	ICS-2.1-50 (5 m)	190-10347	Cable Material / Wires Connection In / Connection Out Main Purpose	*PVC jacket / 12x 0.14 mm² and shielding* *Connector with screw type plug for open wire connection / Circular Hirose type* *General connection to PLC of "EasyConnect" drivers.*
11	Fieldbus Termination	FTC-1.1	190-10348	Materials Main Purpose	*PPS for connector housing and FPM for sealing.* *Termination of fieldbus.*
12a	Chemical Protection Connector Cover	CPC-1.1	190-10349	Main Purpose of *CPC-1.1*	*Chemical protection of driver connectors of ICP-1.x, ICS-1.x and flow sensor cables.*
12b		CPC-1.2	190-10350	Main Purpose of *CPC-1.2*	*Chemical protection of driver connectors of ICS-2.x cables.*
12c		CPC-1.5	190-10352	Main Purpose of *CPC-1.5* Materials / IP-Rating	*Chemical protection of fieldbus termination connector FTC-1.1* *PP+GF and FPM (FKM) for sealing gaskets / IP65* [1]
13a	Impeller Exchange Kit	IEK-30.1 (Standard)	100-90837	Impeller Material / Type (A) Sealing O-Ring (B)	*PTFE / (a): LPI-30.1 (b): LPI-30.4* *O-Ring FFPM (FFKM) perfluoroelastomer Dimensions: 28.3 x 1.78 mm*
13b		IEK-30.3 (High Pressure)	100-91219	Pump Housing (C) / Motor (D) Screws Exchange Tool IET-30.1 (E)	*Stainless steel PTFE coated, 6 pcs M5 x 14 mm / 4 pcs M3 x 10 mm* *POM-C*
14	ATEX Cable Sealing System	ACS-A.1 (Roxtec)	100-90292	Sleeve (A) and Gasket (B) Frame (C) and 2x Cable Module (D)	*Stainless Steel and EPDM* *Note: Lubricant (E) and measurement plates* *Roxylon (EPDM rubber)* *(F) are included.*
A-F					
15	User Panel	LUI-B.1-01	100-30448	Interface / Housing Rating Standard Firmware	*RS485 / IP65* *A3.00*
16	Water Cooling Module	WCM-i30.2 [2]	190-10486	Materials Motor Mounting Screws Cooling Flow Pressure Drop / Max. Pressure Purpose	*PTFE coated stainless steel for cooling plate (A) and mounting screws (B).* *2 x M3x10, stainless steel PTFE coated* *Min. 0.4 l/min at ≤ 20 °C. In- and outlet are NPT 1/8" x 6.7mm.* *10 mbar for 1 l/min cooling flow (for water at 20 °C) / 4 bar* *Driver cooling for higher liquid temperatures (see user manual).*

Table 5: *Specification of accessories*

Note 1: Designed and tested for IP67. *Note 2: Water cooling module is not compatible with ATEX driver IFD-30.9.*

Figure 19: Flow control system with standard main components

Figure 20: Standard accessories

LEVITRONIX® THE COMPANY

Levitronix® is the world-wide leader in magnetically levitated bearingless motor technology. *Levitronix®* was the first company to introduce bearingless motor technology to the Semiconductor, Medical and Life Science markets. The company is ISO 9001 certified. Production and quality control facilities are located in Switzerland. In addition, *Levitronix®* is committed to bring other highly innovative products like the *LEVIFLOW®* flowmeter series to the market.

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