Ultrasonic Flow Monitor

Application

- monitoring of flows in pipes (0,1... 2,5m/s)
- turbidity limit of monitoring is 1NTU, particle size: >50µm
- measuring of flow velocities and flow volume

Application Examples

- flow monitoring, set point free programmable
- monitoring of pumps, filters, etc., dry-run protection
- monitoring of cooling loops, valves
- measuring of leckages with 2x **fwa-141** and evaluation device **pem-dd**
- evaluation of batch processes

measurable media	not measurable
drinking water	beer, coke
juice	gases
milk	VE-water
emulsions	media after
CIP-media	ultrafilters

Hygienic Design / Process Connection

- by using the Negele weld-in sleeve **EMZ-132** or the build-in system **EHG-.../ 1/2"** a front-flush, flow optimized, hygienic and easy cleanable measurement point will be achieved (3A-certificate, EHEDG)
- CIP-/ SIP-cleaning up to 140°C
- product contacting materials FDA compatible
- sensor completely made of SS, sensor tip PEEK material
- other connections: TriClamp, diary flange, DRD, Varivent, APV-Inline, BioControl

Features

- ultrasonic Doppler principle
- not influenced by temperature fluctuations and conductivity
- very short reaction time
- high accuracy up to 140°C
- **fws-141** with free programmable set point
- **fwa-141** with analog or frequency output (switchable)
- indicator switching output with LED

Options / Accessories

- integrated indicator module **azm** with window in lid
- electrical connection with M12 plug-in
- cable ex factory for M12 plug-in

fws-141/M12
fwa-141/M12
with hygienic weld-in sleeve
EMS-132

EHG-.../ 1/2"

azm

Attention: Use only Negele weld-in systems to ensure a save function of the measurement point!

Specification

Process Connection	thread	G1/2" sensor, comb. with Negele weld-in sleeves
	torque	max. 10Nm
Materials	head	SS 1.4305 ø55mm
	connecting thread	SS 1.4404
	coupling part	PEEK
Temperature ranges	ambient	-20...+60°C
	process	0...100°C
	high temperature version	0...140°C (option h)
	CIP-/ SIP-cleaning	up to 140°C
Operation pressure		max. 10bar
Type of protection		IP69K
Measurement range		2,5m/s ≙ 100%

Accuracy	**fwa** at pipe diameters	±10% of full scale DN25...DN100
Reproducibility	**fws, fwa**	<2% of full scale
Damping	**fws**	fix 1s
Hysteresis	**fws**	0,2m/s
Temperature Drift	zero, span	< 0,02% of f. s. /K
Electr. connecting	cable entry	PG (M16x1,5)
		2pin. 1,5mm²
	cable connection	M12-plug-in SS 1.4305
	supply voltage	18...36V DC
Output short circuit proof	**fws**	p-switching*
	fwa analog (burden 3...10kOhm)	current 4-20mA / frequency 0...1kHz square-pulse 18VDC

Reference conditions: Calibration medium is water with ambient temperature; turbidity >1NTU; particle size >50µm.
***Attention:** The output depends on load (25mA max.) and is generally not suitable for direct controling a relay. Nevertheless, if you need a relay, we recommend our **vhr**.

Order Code

Type	Process connection	Indicator	High temperature-version	electrical connection
fws-141	G1/2"	without*	standard* (100°C)	PG*
fwa-141	G1/2"	kf (window in lid)	h high temperature (up to 140°C)	M12
		azm** (indicator module)		

Order example: **fws-141 / azm / h / M12**

*standard, no declaration necessary.
indicator module (azm**), with indicator and window in lid, separate order possible.

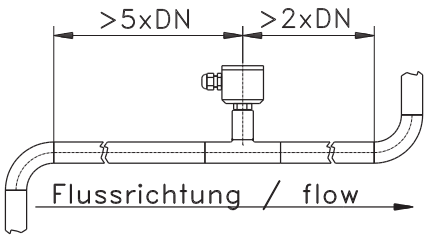
Mechanical Connection / Installation:

Attention: The cable entry has to point **against the flow** direction. Please notice the marking on the sleeve.

It is required that the pipe at the sensor mounting point is filled completely with liquid. Therefore, fitting in the rising pipe is recommended.

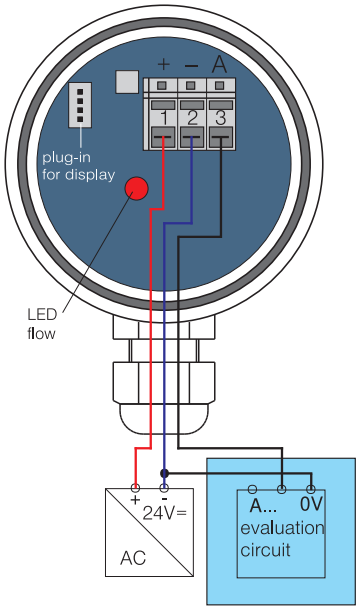
Due to the measurement principle it is not possible to use more than one **fwa-** or **fws-141** in one pipe.

Please note: feeding 5x pipe diameter, flowing-out 2x pipe diameter.



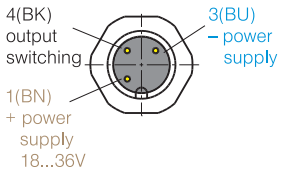
Connecting Diagram

PIN 1: + power supply
PIN 2: - power supply
PIN 3: output
- switching (**fws-141**)
- analog 4-20mA (**fwa-141**)
- frequency 0-1kHz (**fwa-141**)

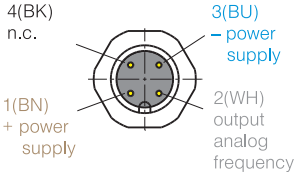


Connecting Diagram M12 Plug-in

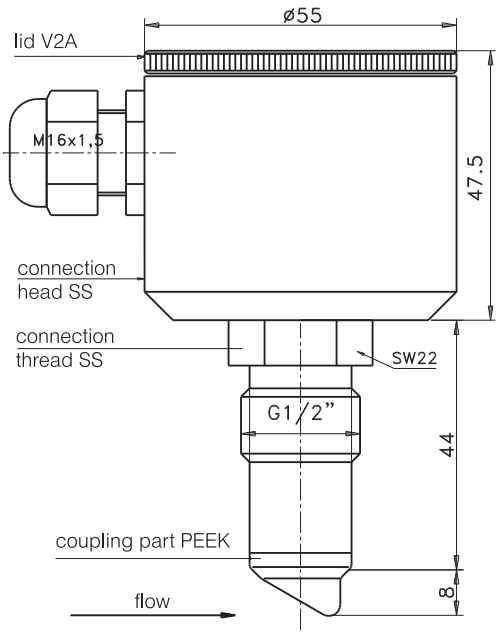
fws-141



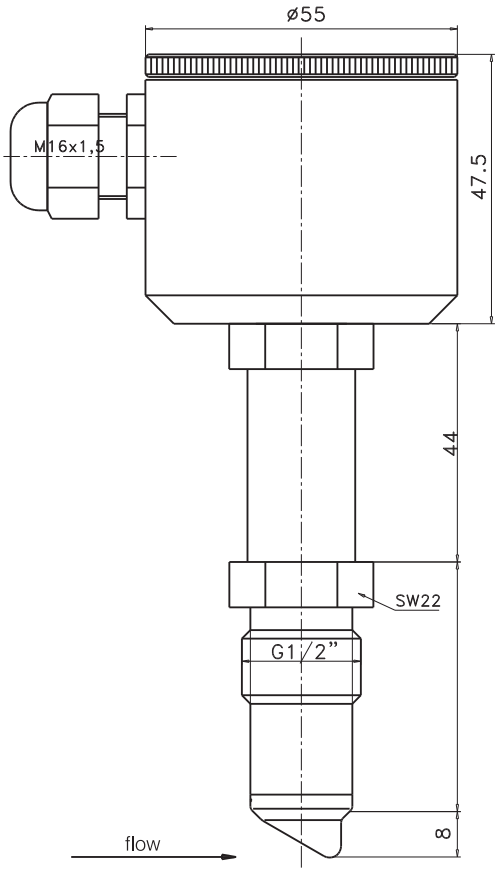
fwa-141



Dimensioned Drawing fws-141, fwa-141



fws-141, fwa-141 with option -h



Adjustment of flow monitor

1. fws without indicator module azm

1.1 Teach-In of a setpoint

- install and connect fws (look at fig. electrical connection)
- set flow velocity you need in the pipe
- push button for 3s, until the LED doesn't flash. Setpoint will be stored
- if the setpoint will be achieved, the LED turns on, the output switches to "active"

2. fws with indicator module azm-55

2.1 Teach-In of a setpoint

- install and connect fws (look at fig. electrical connection)
- indicator shows the actual measurement value in %
- set flow velocity you need in the pipe
- push 2x button shortly, indicator shows " tEAC " and after 3s " Stor "
- store the setpoint with button pushing for 3s. Indicator shows the actual measurement value in %
- if the setpoint will be achieved, the LED turns on, the output switches to "active"

2.2 Manual setting of setpoint

- connect fws (look at fig. electrical connection)
- indicator shows the actual measurement value in % of full measurement range
- push button shortly, indicator shows " HAnd ", after 3s " Stor "
- push button for 3s, adjustment mode is selected
- indicator shows P and the setpoint
- with short pushing the button the setpoint will be incremented in steps of 2%
- if the setpointyou need will be achieved, wait, until indicator shows " Stor "
- store the setpoint with button pushing 3s. Indicator shows the actual measurement value in %
- now, the setpoint is stored, the device can be installed

3. fwa with / without indicator module azm

The device ist programmed for output mode "A" (analog output 4-20mA). No further adjustments are to do.
If you want to switch to output mode "F" (frequency output 1kHz) do following:

- push button for 3s, frequency output is selected. The indicator shows " F ", the LED is flashing

set back to analog output:

- push button for 3s, the indicator shows " A ". The analog output mode is selected, the LED is inactive

Conversion Table m/s to l/min

DN	25	40	50	65	80	100
0,1 m/s	2,9	7,5	11,8	19,9	30,1	47,1
0,2 m/s	5,9	15,1	23,6	39,8	60,3	94,2
0,4 m/s	11,8	30,1	47,1	79,6	120,6	188,4
0,6 m/s	17,7	45,2	70,7	119,4	180,9	282,6
0,8 m/s	23,6	60,3	94,2	159,2	241,2	376,8
1,0 m/s	29,4	75,4	117,8	199,0	301,4	471,0
1,2 m/s	35,3	90,4	141,3	238,8	361,7	565,2
1,4 m/s	41,2	105,5	164,9	278,6	422,0	659,4
1,6 m/s	47,1	120,6	188,4	318,4	482,3	753,6
1,8 m/s	53,0	135,6	212,0	358,2	542,6	847,8
2,0 m/s	58,9	150,7	235,5	398,0	602,9	942,0
2,2 m/s	64,8	165,8	259,1	437,8	663,2	1036,2
2,4 m/s	70,7	180,9	282,6	477,6	723,5	1130,4
2,5 m/s	73,6	188,4	294,4	497,5	753,6	1177,5

Conversion Table in/s to gal/min

DN	1" = 25,4 mm	25,4 mm 1"	38,1 mm 11/2"	50,8 mm 2"	76,2 mm 3"	101,6 mm 4"
4,0 in/s	0,10 m/s	0,82	1,84	3,26	7,34	13,05
8,0 in/s	0,20 m/s	1,63	3,67	6,53	14,68	26,10
16,0 in/s	0,41 m/s	3,26	7,34	13,05	29,36	52,20
24,0 in/s	0,61 m/s	4,89	11,01	19,58	44,05	78,30
32,0 in/s	0,81 m/s	6,53	14,68	26,10	58,73	104,41
40,0 in/s	1,02 m/s	8,16	18,35	32,63	73,41	130,51
48,0 in/s	1,22 m/s	9,79	22,02	39,15	88,09	156,61
56,0 in/s	1,42 m/s	11,42	25,69	45,68	102,77	182,71
64,0 in/s	1,63 m/s	13,05	29,36	52,20	117,46	208,81
72,0 in/s	1,83 m/s	14,68	33,03	58,73	132,14	234,91
80,0 in/s	2,03 m/s	16,31	36,71	65,25	146,82	261,01
88,0 in/s	2,24 m/s	17,94	40,38	71,78	161,50	287,12
96,0 in/s	2,44 m/s	19,58	44,05	78,30	176,18	313,22
100,0 in/s	2,54 m/s	20,39	45,88	81,57	183,53	326,27

Overview of Deliverable Process Connections (Basic device and adapters order separately!)

fws-141 fwa-141 with Adapter

Process Connection	Build-in system EHG (DIN 11850 series 2)	Negele weld-in sleeve*	TriClamp*	Varivent-Inline*	DRD* (press ring optional deliverable)	APV-Inline*	Bio Control*
Size							
DN25	EHG-25/1/2"	EMS-132	AMC-132/ 1"-1,5"	AMV-132/25	-	-	-
DN40	EHG-40/1/2"	EMS-132	AMC-132/ 1"-1,5"	AMV-132/40	-	AMA-132	AMB-50/1/2" AMB-65/1/2"
DN50	EHG-50/1/2"	EMS-132	AMC-132/2"	AMV-132/40	AMK-132/50	AMA-132	AMB-50/1/2" AMB-65/1/2"
DN65	EHG-65/1/2"	EMS-132	AMC-132/3"	AMV-132/40	-	AMA-132	AMB-50/1/2" AMB-65/1/2"
DN80	EHG-80/1/2"	EMS-132	AMC-132/80	AMV-132/40	-	AMA-132	AMB-50/1/2" AMB-65/1/2"
DN100	EHG-100/1/2"	EMS-132	AMC-132/4"	AMV-132/40	-	AMA-132	AMB-50/1/2" AMB-65/1/2"

Order example: **Varivent DN50:** **AMV-132 / 40**

***Attention:** To get a sure function we recommend a sensor installation into the **EHG**-system. By using other process connections labeled with * it is necessary to have a laminar flow without turbulences at the PEEK coupling part!

All data subject to change and error excluded