



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 leakages 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 | Accuracy | fwa | ±10% of full scale |
| | torque | max. 10Nm | | at pipe diameters | DN25...DN100 |
| Materials | head | SS 1.4305 ø55mm | Reproducibility | fws, fwa | <2% of full scale |
| | connecting thread | SS 1.4404 | Damping | fws | fix 1s |
| | coupling part | PEEK | Hysteresis | fws | 0,2m/s |
| Temperature ranges | ambient | -20...+60°C | Temperature Drift | zero, span | < 0,02% of f. s. /K |
| | process | 0...100°C | Electr. connecting | cable entry | PG (M16x1,5) |
| | high temperature version | 0...140°C (option h) | | cable connection | 2pin. 1,5mm ² |
| | CIP-/ SIP-cleaning | up to 140°C | | supply voltage | M12-plug-in SS 1.4305 |
| Operation pressure | | max. 10bar | Output short circuit proof | fws | 18...36V DC |
| Type of protection | | IP69K | | fwa analog | p-switching* current 4-20mA / frequency 0...1kHz |
| Measurement range | | 2,5m/s ± 100% | | (burden 3...10kOhm) | 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 controlling a relay. Nevertheless, if you need a relay, we recommend our vhr.

Order Code

| Type | Process connection | Indicator | High temperature-version | electrical connection | *standard, no declaration necessary. |
|--|--------------------|--|----------------------------------|-----------------------|--|
| fws-141 | G1/2" | without* | standard* (100°C) | PG* | **indicator module (azm), with indicator and window in lid, separate order possible. |
| fwa-141 | G1/2" | kf (window in lid) azm** (indicator module) | h high temperature (up to 140°C) | M12 | |
| Order example: fws-141 / azm / h / M12 | | | | | |



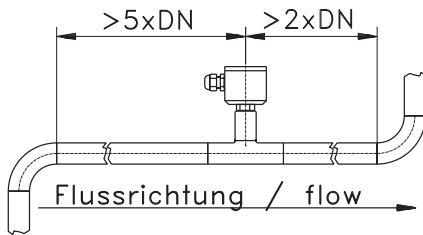
Mechanical Connection / Installation:

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

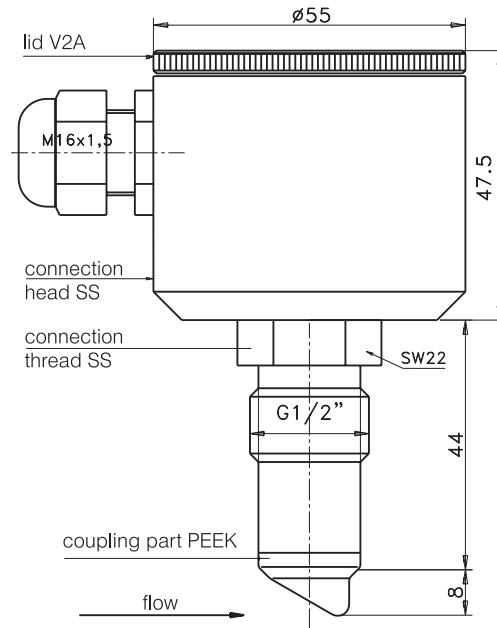
It is required that the pipe at the sensor mounting point is filled completely with liquid. Therefore, fitting in the rising pipe is recommended.

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

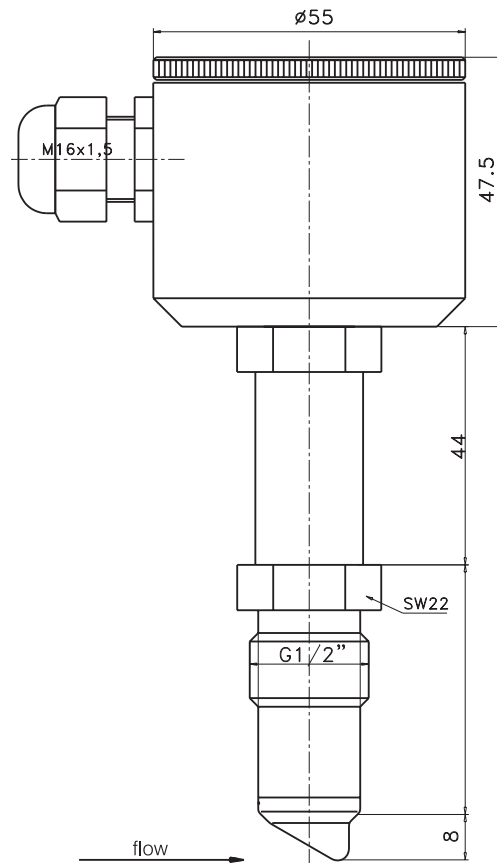
Please note: feeding 5x pipe diameter, flowing-out 2x pipe diameter.



Dimensioned Drawing fws-141, fwa-141

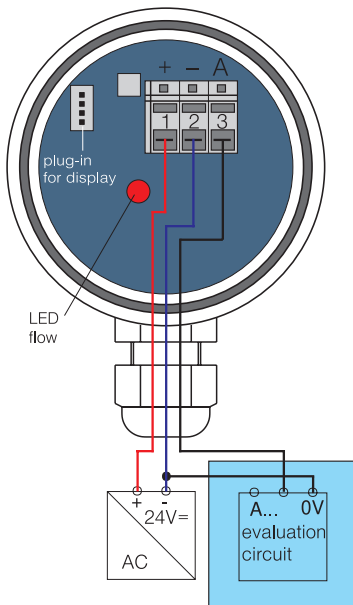


fws-141, fwa-141 with option -h



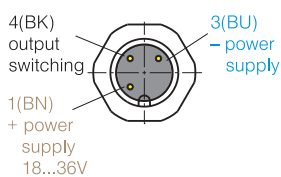
Connecting Diagram

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

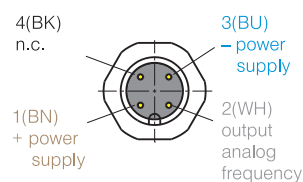


Connecting Diagram M12 Plug-in

fws-141



fwa-141



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 setpoint you 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 is 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

Conversion Table in/s to gal/min

| DN | m/s to l/min | | | | | | in/s to gal/min | | | | | | |
|---------|--------------|-------|--------|-------|-------|--------|-----------------|----------|---------|---------|---------|----------|--------|
| | 25 | 40 | 50 | 65 | 80 | 100 | 1" = 25,4 mm | 25,4 mm | 38,1 mm | 50,8 mm | 76,2 mm | 101,6 mm | |
| | DN | 1" | 1 1/2" | 2" | 3" | 4" | DN | 1" | 1 1/2" | 2" | 3" | 4" | |
| 0,1 m/s | 2,9 | 7,5 | 11,8 | 19,9 | 30,1 | 47,1 | 4,0 in/s | 0,10 m/s | 0,82 | 1,84 | 3,26 | 7,34 | 13,05 |
| 0,2 m/s | 5,9 | 15,1 | 23,6 | 39,8 | 60,3 | 94,2 | 8,0 in/s | 0,20 m/s | 1,63 | 3,67 | 6,53 | 14,68 | 26,10 |
| 0,4 m/s | 11,8 | 30,1 | 47,1 | 79,6 | 120,6 | 188,4 | 16,0 in/s | 0,41 m/s | 3,26 | 7,34 | 13,05 | 29,36 | 52,20 |
| 0,6 m/s | 17,7 | 45,2 | 70,7 | 119,4 | 180,9 | 282,6 | 24,0 in/s | 0,61 m/s | 4,89 | 11,01 | 19,58 | 44,05 | 78,30 |
| 0,8 m/s | 23,6 | 60,3 | 94,2 | 159,2 | 241,2 | 376,8 | 32,0 in/s | 0,81 m/s | 6,53 | 14,68 | 26,10 | 58,73 | 104,41 |
| 1,0 m/s | 29,4 | 75,4 | 117,8 | 199,0 | 301,4 | 471,0 | 40,0 in/s | 1,02 m/s | 8,16 | 18,35 | 32,63 | 73,41 | 130,51 |
| 1,2 m/s | 35,3 | 90,4 | 141,3 | 238,8 | 361,7 | 565,2 | 48,0 in/s | 1,22 m/s | 9,79 | 22,02 | 39,15 | 88,09 | 156,61 |
| 1,4 m/s | 41,2 | 105,5 | 164,9 | 278,6 | 422,0 | 659,4 | 56,0 in/s | 1,42 m/s | 11,42 | 25,69 | 45,68 | 102,77 | 182,71 |
| 1,6 m/s | 47,1 | 120,6 | 188,4 | 318,4 | 482,3 | 753,6 | 64,0 in/s | 1,63 m/s | 13,05 | 29,36 | 52,20 | 117,46 | 208,81 |
| 1,8 m/s | 53,0 | 135,6 | 212,0 | 358,2 | 542,6 | 847,8 | 72,0 in/s | 1,83 m/s | 14,68 | 33,03 | 58,73 | 132,14 | 234,91 |
| 2,0 m/s | 58,9 | 150,7 | 235,5 | 398,0 | 602,9 | 942,0 | 80,0 in/s | 2,03 m/s | 16,31 | 36,71 | 65,25 | 146,82 | 261,01 |
| 2,2 m/s | 64,8 | 165,8 | 259,1 | 437,8 | 663,2 | 1036,2 | 88,0 in/s | 2,24 m/s | 17,94 | 40,38 | 71,78 | 161,50 | 287,12 |
| 2,4 m/s | 70,7 | 180,9 | 282,6 | 477,6 | 723,5 | 1130,4 | 96,0 in/s | 2,44 m/s | 19,58 | 44,05 | 78,30 | 176,18 | 313,22 |
| 2,5 m/s | 73,6 | 188,4 | 294,4 | 497,5 | 753,6 | 1177,5 | 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!)

| 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!