UFM 800 W, C and UFM 800 W Hot Tapping

Ultrasonic flowmeter for water and wastewater
...with weld-in sensors for metal pipelines
...with built-on or built-in sensors for open channels
UFM 800 W, C
and UFM 800 W Hot Tapping

Ultrasonic flowmeter
for water and wastewater
... with weld-in sensors for metal pipelines
... with built-on or built-in sensors for open channels

Efficient flow measurement and volume counting of all types of water and wastewater in closed pipelines or in open channels and raceways.

Advantages
- No constriction of the pipe cross-section
- No additional pressure drop
- Electrical conductivity, pressure, density, etc. have no effect on measurements
- Easy to install from the outside or the inside
- No maintenance requirement
- Low power consumption
- Low operating costs

UFC 030 F signal converter
- Large local LC display and push buttons
- Digital signal processing
- Easy to operate
- Current, pulse, frequency and status outputs
- Low power consumption

UFM 800 W
Ultrasonic flowmeters with
UFS 800 W sensors for measuring the volumetric flowrate in metal pipelines. The sensors are welded to the outside of the pipelines.

UFM 800 C
Ultrasonic flowmeter with UFS 800 C sensors for measuring flow velocity in open channels. The sensors can be installed or mounted from the inside or outside of the channel.

UFM 800 W Hot Tapping
Hot Tapping technology allows retrofitting on to existing pipelines without interrupting the process.

UFM 800 W Hot Tapping ultrasonic flowmeters are designed for volumetric flow measurement and counting in closed pipelines with inside diameters of DN 500 – DN 5000.

UFM 800 W Hot Tapping flowmeters are suitable for all sectors of the water and wastewater industry. The UFM 800 W is the device of choice in many other industrial sectors.
## UFM 800 Systems

**UFM 800 W**

**UFM 800 W Hot Tapping**

for measuring process liquids in metal pipelines

DN 500–5000 / 20”–200”

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**UFM 800 C**

for measuring process liquids in open channels

Width: 400–8000 mm

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### Versions

<table>
<thead>
<tr>
<th>Sensors</th>
<th>UFM 800 W</th>
<th>UFM 800 C</th>
</tr>
</thead>
<tbody>
<tr>
<td>Single-beam measurement</td>
<td>2 x UFS 800 W</td>
<td>2 x UFS 800 C</td>
</tr>
<tr>
<td>Double-beam measurement</td>
<td>4 x UFS 800 W (option)</td>
<td>-</td>
</tr>
<tr>
<td>Triple-beam measurement</td>
<td>6 x UFS 800 W (option)</td>
<td>-</td>
</tr>
<tr>
<td>Signal converter</td>
<td>UFC 030 F</td>
<td>UFC 030 F</td>
</tr>
</tbody>
</table>

### Application/Measurement

- Actual volume flowrate
- Actual volume total
- Flow direction
- Transit time measurement
- Actual volume flowrate
- Flow direction

### Measuring accuracies

<table>
<thead>
<tr>
<th>Error: single-beam</th>
<th>&lt;= 1% of measured value</th>
<th>typical values, dependent upon application</th>
</tr>
</thead>
<tbody>
<tr>
<td>Error: double-beam</td>
<td>&lt;= 0.7% of measured value</td>
<td>± 5% of measured value</td>
</tr>
<tr>
<td>Error: triple-beam</td>
<td>&lt;= 0.5% of measured value</td>
<td>-</td>
</tr>
<tr>
<td>Repeatability</td>
<td>± 0.2% of measured value</td>
<td>± 0.2% of measured value</td>
</tr>
</tbody>
</table>

### Flow velocity

- 0.5 – 20 m/s; 1.5 – 60 ft/s
- 0.5 – 20 m/s; 1.5 – 60 ft/s
# Technical data

## Sensors

<table>
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<td>Triple-beam measurement</td>
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<td>-</td>
</tr>
<tr>
<td></td>
<td>replaceable at operating pressure</td>
<td>-</td>
</tr>
</tbody>
</table>

## Application data

| Mounting location          | installation in metal pipelines               | Installation in open channels,                |
|                           | sensors welded outside pipelines             | Mounted from the outside or the inside       |
|                           | DN ≤ 1000 / ≤ 40”                             | by KROHNE technicians with laser alignment   |
|                           | acoustic alignment (water only)              | set                                          |
|                           | DN > 1000 / > 40”                             |                                               |
| Sensor alignment           | DN ≤ 1000 / ≤ 40”                             |                                               |
|                           | acoustic alignment (water only)              |                                               |
|                           | DN > 1000 / > 40”                             |                                               |
|                           | by KROHNE technicians using laser alignment   |                                               |
|                           | set                                          |                                               |

## Operating data

| Process temperature       | - 50 to +180°C / - 58 to +356°F               | - 25 to +120°C / - 13 to +248°F              |
| Pressure                  | max. 40 bar / max. 580 psig                   | max. 10 bar / max. 150 psig                 |
| Ambient temperature       | - 25 to +60°C / - 13 to +140°F                | - 25 to +60°C / - 13 to +140°F              |
| Storage temperature       | - 40 to +65°C / - 40 to +149°F                | - 40 to +65°C / - 40 to +149°F              |
| (electronics)             |                                               |                                               |

## Protection category

| Standard                  | IP 65 equivalent to NEMA 4 and 4X            | IP 65 equivalent to NEMA 4 and 4C            |
|                          | IP 67, IP 68 equivalent to NEMA 6            | IP 67, IP 68 equivalent to NEMA 6            |
| Optional                 |                                               |                                               |

## Material

| Sensor                    | stainless steel 1.4404 equivalent to SS 316 L| stainless steel 1.4301 or SS 304, Pyrex and Viton |
|                          | stainless steel 1.4301 equivalent to SS 304  | others on request                             |
|                          | others on request                             |                                               |

Ex-approval: ATEX

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The responsibility as to the suitability, intended use and corrosion-resistance of the materials used in their construction rests solely with the purchaser.
Dimensions and weights

UFC 030F signal converters
Weight: approx. 4.2 kg (9.3 lb)

UFS 800 W sensors

UFS 800 C sensors
**UFM 800**

**UFC 030 F Signal converters**

**Versions**
- Standard: UFC 030 F with HART® communication protocol
- Option: UFC 030 F with PROFIBUS-PA communication protocol

**Full-scale range**
- Flow velocity: 0.5 – 20 m/s or 1.5 – 60 ft/s
- Units for volume: m³, US Gallons and others

**Measurements available**
- Continuous measurement of momentary volume flow rate and actual volume total
- Flow direction (forward or reverse)
- Velocity of Sound (VOS)
- Signal strength
- Self diagnostics

**Bidirectional measurement**
- Direction identified via status, pulse or current outputs

**Low flow cut-off**
- Cut-off active value 1-19%
- Cut-off de-active value 2-20% (set in increments of 1%)

**Time constant**
- 0.025 - 99 seconds, set in increments of 0.01, 0.1 or 1.0 seconds

**Galvanic isolation**
- All inputs and outputs are galvanically isolated from the power supply, but not from each other

**Power supply**
- AC: 100 – 240 V / 48 – 63 Hz / +10% / -15%
- DC/AC (low voltage):
  - DC: 24 V / 18 – 35 V
  - AC: 24 V / 48 – 63 Hz / -10% / +15%

**Power consumption**
- AC: approx. 10 VA
- DC: approx. 10 W

**Current output**
- Function:
  - Continuous measurement of actual volume flow rate
  - Flow direction indication (forwards and reverse)
  - Velocity of Sound (VOS)
  - Transducer signal amplification

**Settings**
- for Q = 0%: 0 - 16 mA
- for Q = 100%: 4 - 20 mA (set in increments of 1 mA (limit 20 - 22 mA)

**Connection**
- Active mode: using internal power supply 24 V DC
- Current sink, load ≤ 680 ohm
- Passive mode: external voltage ≤ 18 ... 24 V DC, load ≤ 680 ohm

**Pulse / Frequency / Status output**
**Function**

**Pulse output:** pulse per volumetric unit (m³, barrels, liters, US gallons or user defined volume unit per hour, minute, second or user defined time unit)
- Actual volume

**Frequency output**
- Continuous measurement of actual volume flow rate
- Velocity Of Sound (VOS)
- Transducer signal gain (dB)

**Status output**
- Diagnostics alarm path errors, totalizer overrun, all errors, analog input
- Flow direction indication (forwards and reverse)
- Alarm trip point (high and low) based on actual volume flow rate

**Settings**

**Pulse output**
- Pulse/unit (max. 2000 Hz) (example 1000 pulses/barrel) pulse duty cycle 25, 50, 100, 200, or 500 ms for frequency < 10 Hz

**Frequency output**
- 0 to 2 000 Hz (example Q₀% - 0 Hz, Q₁₀₀% - 1000 Hz) at 100% of scale value, fmax - 2 kHz

**Status output**
- Voltage output = Uout
  - Low: Uout < 5 V (off)
  - High: Uout > 15 V (on)
- Max. Uout = 24 VDC

**Connection**

**Pulse, frequency and status output:**
- Active mode connection to electronic counters using internal power supply 24 V DC / I ≤ 50 mA
- Passive mode connection to electronic (EC) or electromechanical counters (EMC) external voltage, ≤ 19 - 32 VDC / I ≤ 150 mA

**Control input**

**Function**
- Reset totalizer
- Acknowledge errors
- Force outputs to zero

**Setting**
- On or Off

**Connection**
- Input voltage (Uin)
  - Low: Uin < 5 V (off)
  - High: Uin > 15 V (on)
  - Max.: Uin-max = 32 V

**Local display**

- 3-field backlit LCD
- 1st line 8 character 7 segment numeral and sign display and symbols for key acknowledgement
- 2nd line 10 character, 14 segment text display
- 3rd line 5 markers to identify display in measuring mode

**Function**
- Actual volume flow rate in m³, barrels, liters, US gallons or user defined volume unit per hour, minute, second, or user defined time unit
- Actual volume total in m³, barrels, liters, US gallons or user defined volume unit (positive, negative, and sum totals), minimum 1 year overflow time
- Velocity of sound in m/s or ft/s
- Errors (flashing display and error code)
- Signal strength (in dB)

**Language**
- English, German or French

**Housing**
- Die-cast aluminium (exterior polyurethane coated)

**Signal cable**
- Diameter: 11 mm (0.43 inch)
- Length: Standard 5 m (15 ft), Optional 10 m (30 ft), 15 m (45 ft), 20 m (65 ft), 25 m (80 ft), 30 m (100 ft), > 30 m (> 100 ft) on request
UFM 800 W for pipelines

**UFM 800 W**

**Mounting location and installation**

- Position the UFM 800 W in the pipeline such that the measuring tube is completely filled with the process liquid at all times, even at “zero” flow velocity. Make sure that the measuring beam is approximately horizontal.
- Installation and alignment of UFS 800 W ultrasonic sensors can be completed by KROHNE technicians.
- Install UFC 500 F signal converter in the vicinity of the measuring point (UFS 800 W sensors).
- **Gas content**
  The gas content in the process liquid must not exceed a maximum of 0.2% by volume at flowing conditions.

**Please note:**
Even in liquids that are virtually gas-free, large quantities of gas may form if the liquid is allowed to expand before reaching the measuring point, e.g. downstream of partially closed valves or small pump outlets.

**Inlet and outlet runs**

<table>
<thead>
<tr>
<th>Inlet</th>
<th>Single-beam</th>
<th>Double-beam</th>
</tr>
</thead>
<tbody>
<tr>
<td>Inlet</td>
<td>20 x DN</td>
<td>10 x DN</td>
</tr>
</tbody>
</table>
| Outlet| 5 x DN      | 10 x DN     | (DN = meter size, pipe diameter)

UFM 800 C for open channels

**UFM 800 C**

**Mounting location and installation,**

- **Inlet run:** 10 x B
- **Outlet run:** 5 x B
  
  (B = width of channel)
- Sensors can be installed either from the inside or the outside of the channel.
- Sensors aligned by KROHNE technicians are precisely set using laser alignment.
**Electrical connection, UFC 030 F**

- **Power supply, power consumption and load rating** of outputs: see “Technical data” (page 6+7)
- **Current and pulse outputs (I + P)** are **galvanically isolated** from all input and output circuits, when used in passive mode.
- Use the supplied signal cables (coaxial), length 5 m / 16 ft (or optionally longer) for the electrical connection between sensors and signal converter.
- Ambient temperature must be from -25 to +60°C (–13 to +140°F), therefore do not cover signal converter with heat-insulating materials, and do not expose to strong sunlight or other heat sources.
- Avoid intensive vibration.

**Connection diagram examples**

### Current output

**Active**

![Current output diagram](Dia1.png)

\[ R_i \leq 680 \text{ Ohm} \]

**Passive**

![Passive current output diagram](Dia2.png)

For supply: \[ U = 15 – 24 \text{Vdc}, I \leq 22 \text{mA} \]

### Pulse output

**Active**

![Pulse output diagram](Dia3.png)

\[ R_1 > = 470 \text{ Ohm}, \]

\[ R_2 = \frac{U \times R_1}{(V_+ - U)} \]

**Passive**

![Passive pulse output diagram](Dia4.png)

For supply: \[ U \leq 32 \text{Vdc}, \geq 24 \text{Vac} \]

### Digital / Control input

**Active**

![Digital control input diagram](Dia5.png)

For supply: \[ U = 15 – 30 \text{Vdc}, I \geq 1.5 \text{mA} \]

**Passive**

![Passive digital control input diagram](Dia6.png)
Installing a UFS 800 W sensor with Hot Tapping

1. **Weld socket to the pipeline**
2. **Fit the valve and close it**
3. **Mount the hot tapping drill, open the valve**
4. **Cut a hole in the pipe wall**
5. **Withdraw cutter incl. the cut-out**
6. **Close valve and remove the hot tapping drill**
7. **Mount carrier with sensor on the valve**
8. **Open valve, position and align ultrasonic sensor**