

Manual



Helical Flow Meter (SRZ)

Operating manual version

SRZ_M_EN_170927_E004

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1. General Information

1.1. Intended use

Helical flow meters (referred to as SRZs in the rest of the document) are highly accurate measuring instruments to determine the volume flow rate of liquids in closed pipelines.

During operation of the flow meter, it must be ensured that the values for the operating parameters specified in the documentation cannot be exceeded.

The specified maximum volume flow of each flow meter must not be exceeded by more than 20%. This must be observed in particular during rinsing and cleaning processes.

It must be ensured that the materials used in the flow meter are resistant to the media to be measured or pumped.

The device is exclusively intended for the purpose defined in the operating instructions. Any other use for additional purposes or any conversion of the device without written approval from the manufacturer is deemed to constitute improper use. The manufacturer is not liable for damage resulting from this. The risk is borne solely by the operator.

NOTE

The declarations of conformity and test certificates of the approval bodies have to be observed for installation and commissioning.

1.2. Safety

1.2.1. General safety

All statements regarding safety of operation and technical data in this manual will only apply when the unit is operated correctly in accordance with this manual.

The data for Ingress Protection (IP67) will only apply if all electrical connectors are capped properly with the corresponding counterpart with the same or better IP rating. Cable glands must be populated with cables with the specified diameter and closed properly.

During operation all openings of the housing must be closed unless otherwise noted in this manual.

All connections to the load and to the supply must be made with shielded cables unless otherwise noted in this manual. This unit must be grounded.

This unit must be supplied by a safety approved power supply with outputs which comply with Safety Extra Low Voltage (SELV).

As a protection against fire in the positive supply a fuse with a current rating not higher than the current carrying capacity of the cable used is required.

The user has to adhere to the instructions for installing electrical devices and corresponding instructions.

The devices described in this manual may only be connected and operated by authorized and qualified personnel.

1.2.2. Safety instructions

NOTE

Only authorized and qualified personnel are permitted to connect, commission and operate the device. National and international installation regulations have to be observed and complied with.

1.2.3. Specific hazards

WARNING!

The use of aggressive, abrasive or contaminated measuring media and cleaning agents can cause mechanical and chemical defects. Make sure that chemical compatibility with all components in contact with the media is given. Please contact KEM Küppers Elektromechanik GmbH or one of our representatives for more information.

VOLTAGE

Shielded cables must be used for all load and electricity supply connections. The device has to be grounded. Make sure that the maximum capacity and inductivity for the corresponding voltages are not exceeded in the case of long cable runs.

The device has to be protected against electromagnetic interference (EMC).

1.3. Application

Due to the different design sizes, the SRZ series can be used in various applications such as consumption measurement, monitoring, mixing and dosing.

The use of high-quality bearings and a highly accurate measuring element ensure optimum measuring accuracy and dynamic behavior. Only high-quality materials are used for all the components, so the SRZ can also be used for the measurement of abrasive and corrosive media.

1.4. Principle and design

SRZs are volumetric flow meters based on the displacement meter operating principle:

Two cycloidal helical spindles with geometrically lapped profiles that interlock with high precision lie in a cylindrical housing. This creates enclosed measuring chambers between the spindle profiles and the wall of the housing. These transport the medium being measured.

The medium is forcibly guided and flows through the measuring chamber bores in the axial direction, causing the spindles to rotate. This process is pulsation-free with minimum leakage. A contactless frequency measuring element with a high-speed pulse wheel captures the rotational speed of the spindle pair through the housing wall. The rotational speed of the spindles is exactly proportional to the volume flow over a very wide range. Impulses per unit of volume are available for the analysis.

The calibration factor of the Helical Flow Meter describes the exact pulse rate per unit of volume. In order to determine the individual calibration factor of a flow meter, each of our meters is internally calibrated by us prior to delivery.

1.5. Evaluation

The K-factor (calibration factor) is individually determined for each SRZ, defining the exact pulse rate per liter. This K-factor is recorded in the calibration certificate supplied with every SRZ. The calibration certificate contains information you can use to configure the evaluation electronics for the SRZ, for example:

- Max. measurement error in reference to the instantaneous value
- Max./min. frequency with corresponding flow rate values
- K-factors at various measuring points
- Mean K-factor valid for the entire measurement range of the SRZ

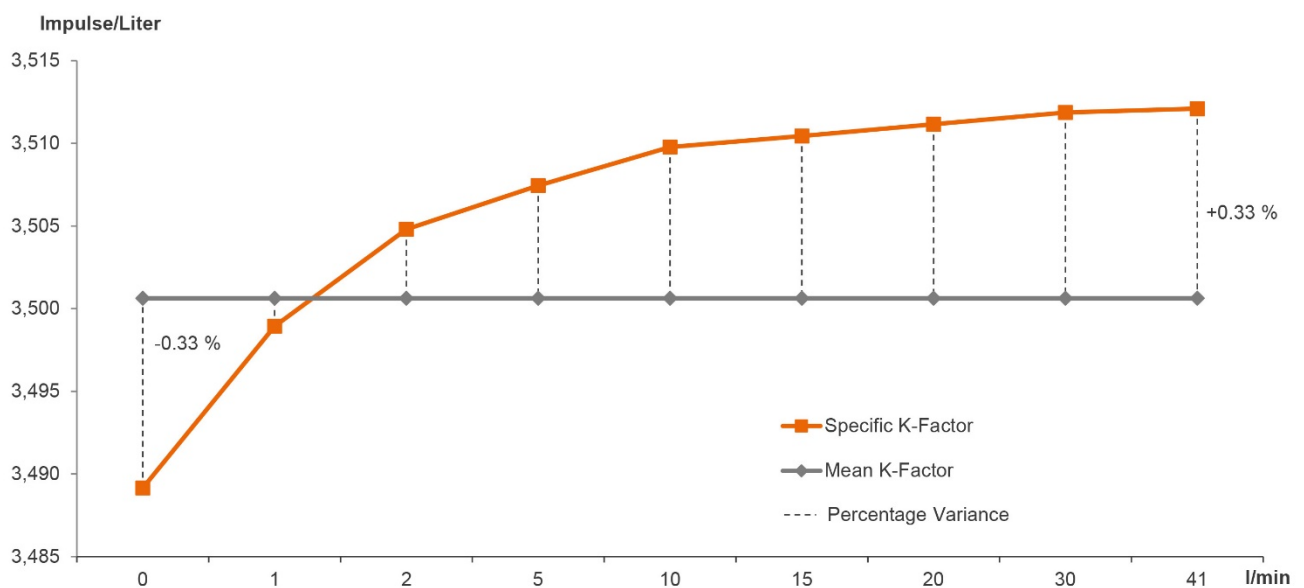
The following equation applies:

$$Q = \frac{f * 60}{K}$$

Q = volume flow rate in l/min
 f = measurement frequency in Hz
 K = specific K-factor of the SRZ in pulses/liter

Calibration protocol:

Example: SRZ 40 ST (0,4 - 40 l/min)



2. Installation

NOTE

Installation work may only be carried out by qualified personnel.

2.1. Preparation

Mechanical and electrical installations may only be carried out by authorized and qualified personnel.

Clean the pipe system before installing the SRZ. Foreign bodies in the medium can impede or even block the SRZ's measuring kit. This can corrupt the measurements.

A suitable filter must be installed in the piping in front of the SRZ to prevent dirt from entering the medium.

We recommend filters with the following mesh widths:

| | | |
|-----|------|-------------|
| SRZ | 40: | 200 microns |
| SRZ | 100: | 300 microns |
| SRZ | 400: | 300 microns |

NOTE

Do not use fiber-containing seals such as hemp or PTFE tape to seal connections to pipelines.

Please make sure that the system pressure does not exceed the permissible pressure level of the SRZ at any time. The corresponding values can be found in the respective product information.

To avoid wear and damage to the SRZ, make sure that the specified measurement range of the SRZ cannot be exceeded. Short-term exceedances of the flow rate of up to 20 % can be tolerated.

2.2. Installation of the SRZ

Install the SRZ in such a way that the medium to be measured flows in the direction of the arrow (see nameplate) through the SRZ.

NOTE

The SRZ can measure the flow rate in both directions, whereas only the flow in the direction of the arrow is calibrated. Reduced measurement accuracy has to be expected when the flow rate is measured in the opposite direction. Continuous operation with a high flow rate in the opposite direction can impair the service life of the SRZ.

The SRZ works reliably in every installation position. However, we recommend vertical installation with upwards flow direction for low flow rate or low viscosity.

2.3. Sources of interference

Magnetic fields and similar sources of interference (EMC) close to the SRZ can interfere with the evaluation electronics, and so corrupt the measurement result.

All cables connecting the evaluation electronics to other devices/controls in the periphery must be shielded, preferably with braided shielding.

To allow the evaluation electronics to tap the pulses correctly from the magnet wheel without making contact, it must be correctly screwed into the housing of the SRZ. To do this, proceed as follows:

Screw the thread of the sensor/evaluation electronics into the tapped hole provided for this purpose in the SRZ housing by hand without using force

Unscrew the sensor/evaluation electronics by a $\frac{1}{4}$ turn (90 °)

Tighten the locknut with the appropriate tool to prevent the sensor from turning more

Make sure that a corresponding counterpressure is applied to the outlet side of the SRZ at all times during the flow measurement to prevent the SRZ from "running empty". Air inclusions in the medium and SRZs that are not completely filled during the flow measurement lead to corrupt measurement results.

For applications in explosion-prone areas, the SRZ must be completely filled with the medium being measured during operation.

3. Service and Maintenance

3.1. Maintenance

In principle, spindle wheel flowmeters in standard design are maintenance-free in accordance with the above instructions. Regular recalibration is recommended to prevent damage and wear to the flow meter. This should be carried out annually or after 8000 operating hours.

When used with aggressive or abrasive media the SRZ should be checked and recalibrated even more often.

If there is no flow over a longer period, the SRZ should be emptied and cleaned. This is especially important if curing media like paints are measured.

Please make certain that the permissible flow ranges are also observed during the cleaning and flushing of the SRZ. Large, rapidly occurring pressure shocks in the medium can damage the measuring kit, among others.

For recalibration and test, please contact your nearest dealer or KEM directly.

3.2. Service

The SRZ does not contain any user serviceable parts.

In case of malfunction, please contact your nearest dealer or directly KEM.

NOTE

All warranty claims will be void if the SRZ is opened by unauthorized personnel and the inspection seal is damaged.

4. Listings

4.1. Warranty

KEM warrants material and production for a period of 18 months after installation and start up, max. 24 months from delivery date.

4.2. Technical Data

4.2.1. Sizes

| Type | Measuring Range (l/min) | K-Factor ¹ (Pulses/l) | max. Pressure (bar/psi) | Frequency ¹ (Hz) | Weight (kg) |
|---------|----------------------------|-------------------------------------|----------------------------|--------------------------------|----------------|
| SRZ 40 | 0.40 to 40 | 3,500 | 400 [5.800] | 20 to 2,350 | 6.2 |
| SRZ 100 | 1.0 to 100 | 850 | 400 [5.800] | 14 to 1,450 | 15.0 |
| SRZ 400 | 4.0 to 400 | 214 | 400 [5.800] | 14 to 1,450 | 34.0 |

4.2.2. Technical Data

Measuring Accuracy: Up to $\pm 0.1\%^2$

Repeatability: $\pm 0.05\%$ (under the same conditions)

Linearity: $\pm 0.5\%$ of actual flow (viscosity $\geq 30 \text{ mm}^2/\text{s}$)
 $\pm 0.25\%$ of actual flow (viscosity $\geq 100 \text{ mm}^2/\text{s}$)

Materials: Housing: as per DIN 1.4305 [AISI 303], 1.4404 [AISI 316L]
 Helicals: as per DIN 1.4122, 1.4435 [AISI 316L]
 Bearing: tungsten carbide or stainless steel ball bearing
 Seals: FKM, PTFE (others on request)

Medium Temperature: -40°C up to $+150^\circ\text{C}$ [-40°F up to $+302^\circ\text{F}$] (others on request)

4.3. WEEE and RoHs

The equipment described here are not subject to the WEEE directive and the corresponding national laws.

Do not dispose of EEE waste in the household waste, but hand them over to a proper disposal company.

The equipment described here fully complies with the RoHS directive.

¹ Average values for single sensors, dual pickups and higher resolution available.

² Under laboratory conditions; incl. linearization; viscosity $\geq 30 \text{ mm}^2/\text{s}$.

KEM Headquarters

Liebigstraße 5
85757 Karlsfeld
Deutschland

T. +49 8131 59391-0
F. +49 8131 92604

info@kem-kueppers.com

KEM Sales

Liebigstraße 5
85757 Karlsfeld
Deutschland

T. +49 8131 59391-100
F. +49 8131 92604

sales@kem-kueppers.com

KEM Manufacturing Center

Wetzeller Straße 22
93444 Bad Kötzing
Deutschland

T. +49 9941 9423-0
F. +49 9941 9423-23

production@kem-kueppers.com

KEM Service & Repairs

Wetzeller Straße 22
93444 Bad Kötzing
Deutschland

T. +49 9941 9423-37
F. +49 9941 9423-24

service@kem-kueppers.com

*More distributors and partners can be found at:
www.kem-kueppers.com*