Rheonics SRV Viscosity Meter

SENSOR OPERATOR MANUAL

Inline Process Viscometer

Doc. ID: SRV-OP-2408

GLOBAL SUPPORT

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1 Before you begin

1.1 About the manual

This manual provides information for operating Rheonics SRV viscometer sensor.

This manual refers to external articles from Rheonics knowledge base, if any article link is not working, the user should refer to the main web page or contact Rheonics Support Team.

1.2 Contact

Contact the Rheonics team to help you with any inquiry.

For sales and delivery-related questions contact the Sales Team at info@rheonics.com

For installation, integration, and troubleshooting contact the Support Team at support@rheonics.com

1.3 Who should use this document?

Users of Rheonics inline SRV viscometer sensor.

1.4 Warning

The users should be trained in government and corporate safety standards that apply for their installation and use.

This installation manual is strictly for non-explosive atmospheres. If such installation is required, the user must refer to the Intrinsically Safe Installation Manual "EX-IM".

1.5 Nomenclature

Abbreviation	Full-term	Meaning
SRV	Symmetric Resonator Viscometer	Viscosity sensor
SME	Smart Module Electronics	Sensor electronics
RFQ	Request for Quotation	Ordering file

1.6 Related Documentation

You can find all product documentation on the USB storage device that was shipped with the sensor.

For more information on the sensor, refer to the following documents on Rheonics website. Contact Rheonics Support Team if you cannot find a document online.

Title	Code	Description
SRV Operator Manual	SRV-OP	SRV Sensor Operator Manual
RCP Software Manual	RCP-OM	Rheonics Software Installation and User Manual
SME Operator Manual	SME-OP	Rheonics SME Sensor Module Electronics Manual
Communication Protocol Manuals	Various	Modbus TCP, Modbus RTU, HART, Profinet, Ethernet/IP, etc.
EX installation SRV & SRD Manual	EX-IM	Installation of Intrinsically Safe Sensors Manual
SRV Datasheet	SRV-DS	Rheonics SRV Datasheet

2 General Information

2.1 Scope of Delivery

The following items are delivered with the SRV sensor:

- SRV sensor probe with protective sleeve
- Sensor cable
- Sensor electronics SME
- RCP software tool installer
- Other accessories and items as ordered

Notes:

- o The items listed may vary for your delivery and depend on the order code.
- o Customer should inspect the goods upon arrival. In case of damage or missing items, contact Rheonics Sales Team at info@rheonics.com
- o The SRV sensor probe has different variants, and the protective sleeve changes accordingly. The protective sleeve is meant to protect the probe's sensing element when stored or handled and should be removed for sensor operation.
- o Rheonics offers different sensor cable variants and lengths. Review all variants here.
- o The sensor electronics SME has different variants. The image below shows the SME-TRD. Review all variants on the electronics and communication page, here.
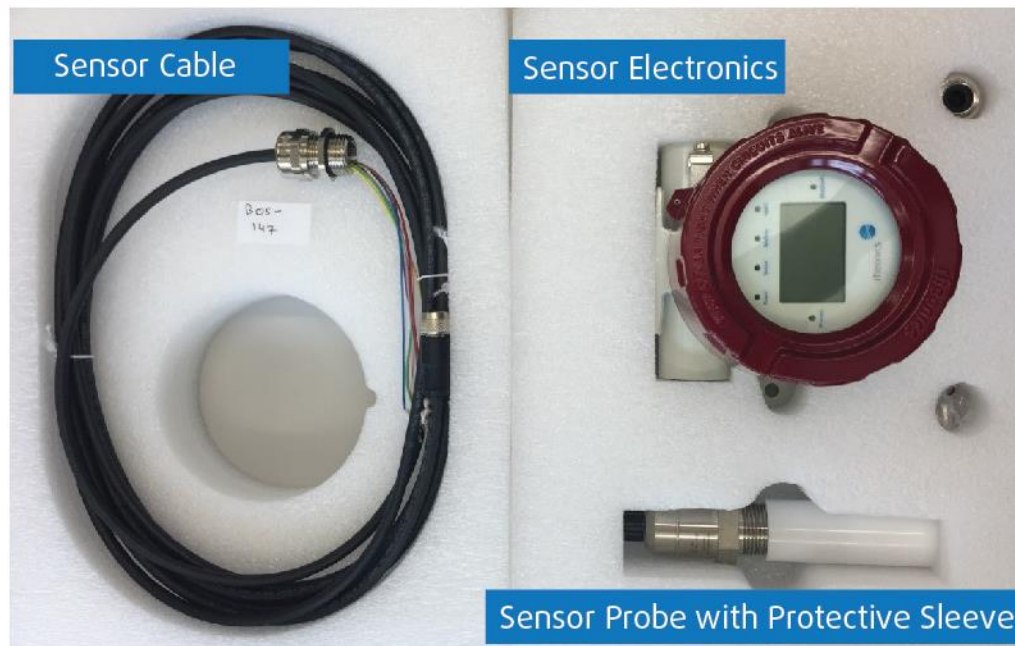

Figure 1: Example of delivery box.

2.2 About SRV Inline Viscometer

The SRV is Rheonics' wide viscosity range inline process viscometer. SRV is based on a Symmetric Torsional Resonator, which is the trademark for the patented technology underlying the sensor.

> **The SRV sensor measures the viscosity (product of dynamic viscosity and density of the fluid) and temperature of a fluid in real-time.**

The SRV operates with Newtonian and non-Newtonian fluids over a wide viscosity range. When configured, the sensor can also output related parameters such as the fluid's temperature-compensated viscosity, kinematic viscosity, dynamic viscosity, etc. The SRV allows the input of a density value, which can be set as a constant value, temperature-dependent, or coming from an external density sensor. The density value by default is set to 1 g/cc.

Rheonics SRV sensor is composed of three main parts, as shown in Figure 1Figure 2, which are the electronics (SME), sensor cable, and sensor probe.

Figure 2: SRV Sensor Unit

The SRV sensor probe is compact and light, yet robust and ready for harsh installation conditions in the industry. The probe is hermetically sealed and has no moving parts, which avoids requirements for maintenance or re-configurations during its life of service. The probe is also easy to clean and compatible with CIP (Cleaning in Place) procedures. The SRV probe has an IP rating of IP69K, only conditioned by the sensor cable IP rating which varies depending on the type of cable delivered. Modular design is one of the main advantages of Rheonics sensors like the SRV. This allows repeatable and reproducible readings if the fluid is the same even with different SRV probe variants, which can vary in design, process connection, and length.

Visit Rheonics SRV articles to learn about SRV probe variants.
Review SRV operating principle whitepaper for more information on the sensor operation.

2.3 Best practices

The following information can help you get the most from your SRV Viscometer.

- Handle the meter with care.
- Always store and transport the meter in its original packaging. The sensor probe can be stored in air but protection of the sensing element is recommended with the protective sleeve included in delivery.
- Have the RCP software installed. Refer to the *RCP Software Manual* for installation. This software helps with the initial setup of the sensor but also for monitoring, further configuration, and troubleshooting if required.
- Do not use liquids incompatible with the wetted materials of the probe, i.e. highly corrosive chemicals when the wetted material is not specified for it. Follow the support article Chemical Compatibility List. Rheonics SRV standard wetted material for the probe is 316L (1.4404), alternatively, Hastelloy C22 (2.4602) can be ordered for highly corrosive applications. Prior to use, always ensure that the sensor wetted surface is compatible with your process fluid. Material certificates are available for the sensor when requested during ordering.
- Sensor Probe should always be used only for the pressure and temperature ratings specified for the sensor. This is often specified during the ordering process. Sensor electronics should be exposed to environmental conditions within its operational envelope to avoid performance issues.
- Ensure that all piping connections conform to the local and national regulations and codes of practice.
- Laboratory tests can be conducted before the final installation in process. For non-Newtonian fluids viscosity readings can differ between different viscosity measurement technologies. This means that a laboratory or offline instrument can give different results than the SRV inline readings of viscosity. This is expected and reasons are explained by Rheonics on web page and articles. Still, users do at times test the SRV unit in controlled environments to compare, verify, and even correlate readings.
- For the SME-TRD and SME-TR, after internal wiring, properly tighten the transmitter housing cover with the inner seal correctly placed, to maintain ingress protection.
- Protect the M12 connection between the sensor cable and sensor probe from impacts. Avoid contact with fluids unless the operation is within the cable and connector ingress protection (IP) rating class.
- Prevent external machinery from colliding with the SRV sensor probe.
- For any further questions related to the SRV sensor probe, visit Rheonics Support Portal or contact Rheonics Support Team at support@rheonics.com. Make sure to explain the issue or question, share pictures of the installation or setup, and share the sensor Serial Number (S/N).

> ⚠️ ATTENTION: For intrinsically safe installations of an EX-certified SRV sensor in hazardous environment locations, the user should follow the Rheonics EX Installation and Intrinsic Safety Manual that is included with the delivery and also available online.

2.4 Serial number, probe markings, and certifications

The SRV sensor probe and electronics have specific markings on their bodies that make the parts unique and traceable. The part's identifier is the Serial Number (S/N), which may be requested by Rheonics if the client contacts the Sales or Support Team about a probe or electronics. Examples of serial numbers are shown below, as well as images of where to find them.

The sensor electronics and probe are sent in the same delivery and configured to operate together. The user should not exchange the electronics or probe with other SRV units as this can invalidate warranty, create erroneous calibration, and may create safety hazard. Check with Rheonics support teams when you need to exchange probes. Replacement probes are verified to be a drop-in replacement and may come with a configuration upgrade if necessary. For information contact the Support Team.

Example of probe S/N: B09-1194
Example of electronics S/N: 19101399
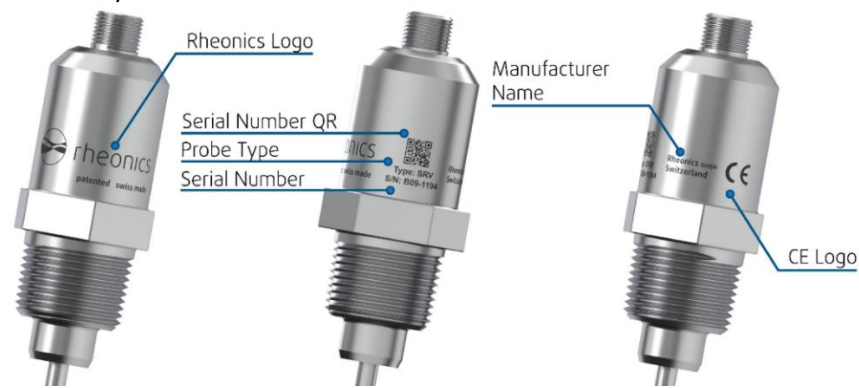
Figure 3: Sensor probe markings.

Figure 4: Sensor electronics markings.
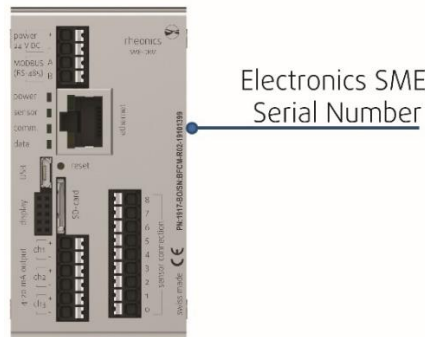
Certifications of the sensor are marked on the probe and electronics as regulations require. Certifications available for the sensor are:

- Hygienic EHEDG Certification
- Hygienic 3-A Certification
- ATEX, IECEx, JPEx, etc.
- Calibration certificate
- Material certificate
- ISO 9001 for Rheonics

Review all Rheonics certifications at https://rheonics.com/resources/certificates/.

3   Technical Specifications

3.1 Sensor Specifications

Specifications of the sensor vary depending on the sensor configuration ordered through the RFQ (Request for Quotation) by the user.

Confirm maximum temperature and pressure specifications for probe to avoid damage during operation.

Table 1: SRV general specifications

Specification		Value
Viscosity range		Specified in sensor order
Viscosity accuracy	Default	5% of actual
	Available	1% or higher
Reproducibility		Better than 0.1%
Temperature range		Specified in sensor order
Pressure range		Specified in sensor order, may be limited by process connection
Max. Flow velocity*		10 - 12 m/s
Wetted material available		Stainless Steel 316L
		Hastelloy C22
Sensor probe variants available		Flush
		Short
		Long
		Slimline
		Reactor Probe
Process Connection		Specified in sensor order (e.g. Tri Clamp, NPT, G thread, Flange, Sanitary, etc.)
Sensor probe IP Rating		IP 69K
Cable IP Rating available		IP 68, IP69, IP69K
Sensor electronics IP Rating		IP40 (SME-DRM) IP66 (SME-TRD, SME-TR)
Certificates available		Ex, ATEX, JPEx: Intrinsically safe
		EHEDG: Hygienic Certificate
		3-A: Hygienic Certificate

*For highly viscous fluid, even low flow velocities could impose very high bending force on the sensing element that can damage or break them. Installation should take this into consideration. Generally, flow parallel to sensing element will have significantly less force on the sensing element than when the flow is perpendicular to the sensing element. Sensors are also available with reinforced sensing element which can undertake higher fluid flow induced forces. Discuss your high viscosity, high flow rate applications with the application engineering team for installation validation.

3.2 Sensor Wiring

Figure 5 below shows the typical connection of the SRV sensor, including the SME electronics and the sensor probe. These devices are connected using the sensor cable included in delivery, the physical connection on the probe is with an M12 8-pin female A-coded connector.

The sensor electronics should be powered with 24V DC. Fuses are recommended to safeguard the sensor electronics.
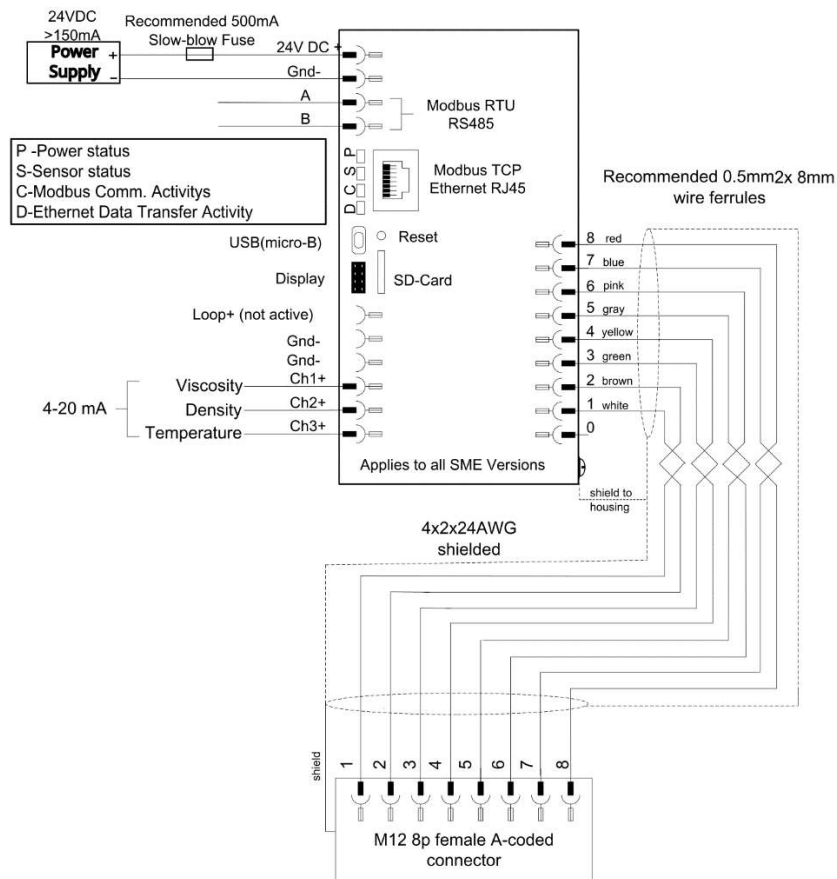
Figure 5: Rheonics sensor standard wiring.

Sensor supports multiple analog and digital communication interfaces and protocols. Refer to the communication manuals for details on each of the protocols and use. To download wiring drawings visit the Support Article: Sensor electronics (SME) - Wiring drawing.

> ⚠ ATTENTION: The sensor wiring shown above is not valid for intrinsically safe installations of an EX-certified SRV sensor in hazardous environment locations. Visit the correct manual at https://rheonics.com/resources/manuals/.

3.2.1 Connecting and disconnecting wires to the terminal blocks on SME electronics

The SME electronics has terminal blocks for the power input, sensor cable (8 wires), 4-20mA output signals (Ch1 also used for HART 2-wire communication), and Modbus RTU. Care should be taken to avoid damage through use of excessive force while connecting and disconnecting wires to the terminal blocks.

The recommended wire gauge for the SME electronics is 0.5 mm^2 or 20 AWG. All wires connected to the SME should be crimped, 8 mm diameter crimps (white ferrules) are recommended. The sensor cable needs 8 wires with the correct ferrule for installation as shown in Figure 6.
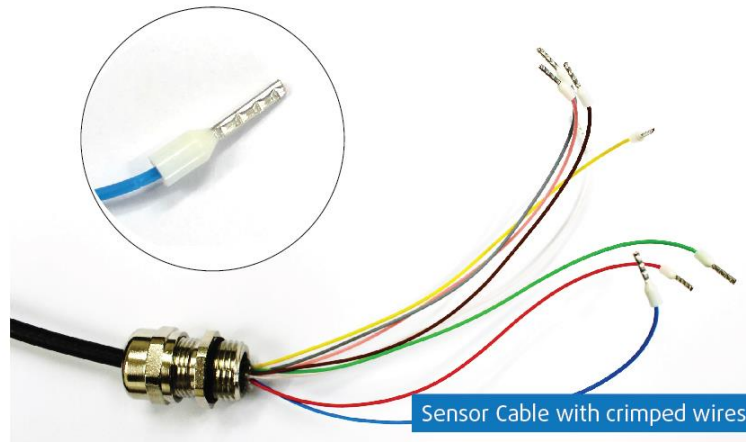

Figure 6: Sensor cable with crimped wires.

To connect wires to the SME, insert the crimped end in the correct port on the terminal block till it clicks firmly in place and cannot be pulled out when tugging on the wires (do not tug on the wires with a lot of force as that may damage the terminal block).

To disconnect the sensor wires, press the white tab for that specific port with a small flat screw driver as shown in the picture below where the user is removing wire connected to port 1. While pressing on the white part, pull out the cable connection with the other hand.
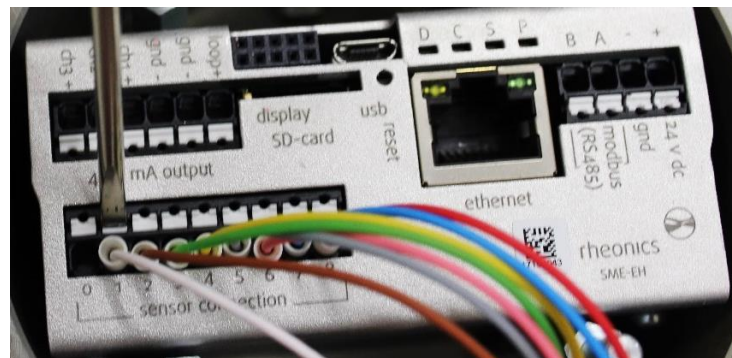

Figure 7: Disconnecting a wire from SME.

Review more on this article: Cabling best practices.

3.2.2 Connecting the sensor probe to sensor electronics

The sensor is connected to the transmitter electronics by a sensor cable. Follow the color code table below to connect the correct wires from the sensor cable to the sensor connection terminal strip on the transmitter. The leads are delivered with crimped ends; cable can be shortened if needed, but ferrules should be crimped onto the stripped ends.

Figure 8: Sensor cable connection to the sensor electronics.

Table 2: SME terminal for sensor cable wires

Wire Color	Sensor connection terminal #
Red	8
Blue	7
Pink	6
Grey	5
Yellow	4
Green	3
Brown	2
White	1
---not connected---	0

⚠ ATTENTION: The wiring color order shown in the table above is not valid for intrinsically safe installations of an EX-certified SRV sensor in hazardous environment locations. Visit the correct manual at https://rheonics.com/resources/manuals/.

3.3 Power requirements

The sensor power consumption is as follows:

- Voltage required: 24 V DC
- Voltage range acceptable: 18-36 V DC
- Current required (min): 120 mA
- Current recommended: 200 mA or higher
- Power required (maximum): 3 W
- Power recommended: at least 5 W
- Fuse (if required) rating: >500 mA Slow-blow fuse

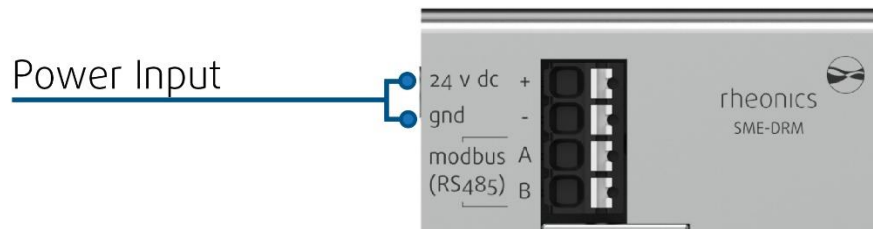Power input terminals are labeled with 24 V DC + and – GND.

Figure 9: Power terminals in SME electronics.

It is important to avoid ground loops in the setup/plant where the SME is used. Ground loops can lead to excessive currents on the ground/return wire of the SME 24 V power supply which can damage the unit.

If there is a risk of ground loops in installation, it is recommended that the SME is powered by a separate 24 V power supply with galvanic separation.

Once the SME is powered on and connected to the sensor probe with the sensor cable, the sensor will start to measure and save data. The LEDs on the SME will start blinking indicating start up.

Review SME wiring diagram at Sensor electronics (SME) – Wiring drawing.

3.4 Sensor Probe Installation Requirements

The SRV sensor probe can be installed in pipes, tanks, trays, mixers, movable objects for intermittent measurements, etc. The two main requirements for installation are the following:

i.   **Ensure the whole sensing element is in contact with the fluid of interest**
     SRV sensor probe has a sensing element that is surrounded by the sensing area highlighted in red in Figure 10. SRV sensing element and sensing area must be fully in contact with the fluid of interest, partial immersion must be avoided. This sensing element is the same across all variants of SRV probes. This allows repeatable and reproducible readings of viscosity for the same fluid and operating conditions, regardless of the probe variant (flush, short, long, slimline, reactor, etc.) or installation.

ii. **Avoid stagnation or dead zones around the sensing area**
     Any possible zone prone to deposits or the presence of other fluids different from the one of interest (e.g. accumulation of deposits, bubbles, etc.) should be avoided within the sensing area. Dead zones susceptible to fluid plugging/deposit/sedimentation are common near the installation port, tank's and pipe's wall. User should ensure that the sensing area is not within a stagnation zone, a possible solution is immersing the probe further in the fluid with a long insertion probe variant or using a flush installation.

The sensor measures what the sensing element is in contact with. Any deposit or fluid around other parts of the sensor probe, outside the sensing area, will not affect the measurements.

Contact Rheonics Support Team for recommendations on installation. Share your installation proposal and a representative will contact you.
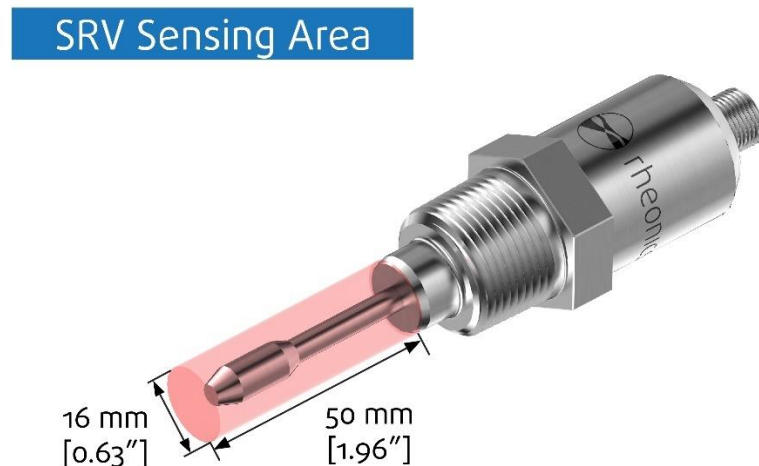

Figure 10: SRV sensing area.

Additional installation notes:

- The SRV can be installed in lines as small as DN20 using Rheonics accessories like flow cells. Review all accessories here.
- There are no requirements on the distance of the probe from external equipment or instrumentation downstream and upstream.

- Consider that a clearance of 5 mm is needed from the sensor probe tip to any external equipment or pipe wall.

- The SRV can operate in fluids with solids. Large particles can disrupt the readings (i.e., spikes in readings) when solids contact the probe. If particles are large enough to harm the sensing element, it is recommended to use filters in pipes, probe protection sleeves in vessels, or plan installation to reduce impact .
- For fluids that tend to create deposits or have fibers, a parallel to flow axis installation of the probe is recommended. A parallel installation allows the fluid to flow over the sensing element axially (along long axis of the sensing element) making the sensing element self-cleaning; any deposits on the sensing element are therefore removed or disintegrated by the fluid flow. A long insertion probe can be used to extend the sensing element further in the line.
- The SRV can operate in fluids with bubbles. It is recommended to have the bubbly or aerated fluid flowing, as static fluid can create a concentration of bubbles within the sensing area, affecting the accuracy.
- The SRV will operate in static and flowing fluids. Flow rates do not influence the sensor operation, however, flow can change the apparent viscosity of non-Newtonian fluids and this should be taken into consideration when planning installs. Generally, a consistent flow rate for non-Newtonian fluids tends to give low noise, stable readings.
- Operation of the sensor while holding the probe by hand is not recommended as any minimum movement can affect the accuracy of the readings. Sensor probe should be fixed to take accurate readings.
- External vibrations do not affect the sensor's operational performance. However, in high-vibration environments, the sensor reliability and lifetime can be compromised therefore regular checks are advised.

4 Communication Protocols

4.1 General Information

Rheonics sensors are extremely easy to integrate into user applications or projects, since the sensors have several industrial communication protocols available.

Rheonics provides extensive support resources on each communication protocol to enhance flexibility and convenience for our customers across diverse industries. **Some integration protocols come with the sensor by default, while others should be requested during sensor order**. Review all protocols at https://rheonics.com/electronics-and-communication/. For the latest communication manuals on each protocol visit https://rheonics.com/resources/manuals/.

4.2 4-20mA (C1 - Default)

Rheonics sensors have 3 channels for 4-20 mA signals, as indicated in Figure 11. The 4-20mA signals are used mostly for the simplicity of using just 2 wires to transmit the sensor readings to an external device. However, users should be aware that these analog signals are susceptible to noise and are accurate only under certain field conditions.

By default, the SRV outputs the viscosity, density, and temperature parameters through the 4-20mA ports, but these are customizable from the RCP, Rheonics Software.

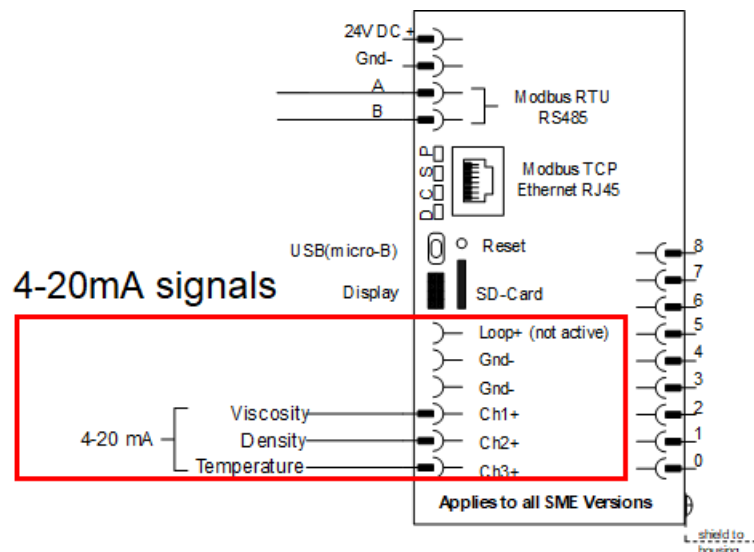Check these support articles: 4-20 mA for more information.

Figure 11. 4-20mA outputs available in the SME

4.3 Modbus RTU (C2 - Default)

Rheonics SME offers Modbus RTU over an RS485 interface. This protocol gives the user access to multiple parameters read by the sensor in real time. The data over Modbus is exchanged in the form of registers. This interface allows interoperability between devices from different manufacturers.

Modbus RTU communication is established with Rheonics sensors through two wires labeled on the sensor electronics, labels are shown in Figure 11. Check these support articles for more information on the integration and registers Modbus RTU (RS-485) and review the manual "MRTU-OP" on Rheonics resources webpage.

4.4 Serial USB (C3 - Default)

All Rheonics sensor electronics (SME) come with a standard USB port for initial configuration and data monitoring. Check these support articles for more information about communication over USB with Rheonics Sensors.

4.5 Bluetooth (C5)

Rheonics supports Bluetooth LTE 4.0 in the SME-TRD device only. By using this technology, the sensors can transmit measured data wirelessly. Rheonics provides various software for Windows, Linux, MacOS, iOS, and Android devices to connect the sensor over BLE. Contact Rheonics or visit the Support Portal for more information.

4.6 Modbus TCP (C6)

The Rheonics SME offers Modbus TCP protocol over the Ethernet interface. This protocol gives the user access to multiple registers that contain the parameters read by the sensor.
Using Modbus TCP, allows the user to connect the sensor to the Ethernet TCP IP network through an Ethernet cable with Client-Server communication. Check Rheonics support articles for more information on the integration and registers Modbus TCP (Ethernet) and review the manual "MTCP-OP" on the Rheonics resources webpage.

4.7 Ethernet/IP (C7)

All Rheonics SME variants can be ordered with Ethernet/IP. This communication protocol enables the fast delivery of extensive data from Rheonics SME sensors to external devices, like Allen-Bradley PLCs, through the SME Ethernet Port. Rheonics has extensive expertise with Ethernet/IP, hence comprehensive guidelines can be found on Rheonics Support Portal to ensure easy and effective integration. Check these support articles Ethernet/IP and review the user manual "ENIP-OP" on Rheonics resources webpage.

4.8 HART (C8)

All Rheonics SME variants can be ordered with HART. Using the HART protocol, Rheonics sensors deliver 4 parameter readings as digital data, which are PV, SV, TV, and QV. By default, the output parameters are the following:

Table 3: SRV HART Parameters

SRV default configuration	
PV	Viscosity
SV	Density
TV	Temperature
QV	Sensor Status

Check these support articles on HART and review the manual "HART-OP" on Rheonics resources webpage.

4.9 Profinet (C9)

All Rheonics SME variants can be ordered with Profinet. Using Profinet, Rheonics Sensors can transmit real-time data at 100 Mbps in full duplex communication through the SME ethernet port, resulting in improved operational performance, precision, and system integration. Check these support articles PROFINET and review the manual "PNET-OP" on Rheonics webpage.

5   RCP Software

Rheonics SRV sensor is built to be a plug-and-play instrument. This means that the operator only needs to wire the probe and the electronics using the sensor cable, following the diagram in Section 3.2, and power the sensor electronics to start measurements.

Rheonics Control Panel (RCP) is a software that allows the user to get the full potential of Rheonics sensors. The software is used for sensor configuration, measurement visualization, download of historical log files, and more. The software is included in the USB storage delivered with the sensor. If that is not the case, or you do not have the USB stick anymore, contact Rheonics Support Team and share the sensor serial number S/N to request the software.

Review the RCP Software Manual for complete instructions on installation and use. The software is included in the USB storage device delivered with the sensor.

> THE SME ELECTRONIC MUST BE CONNECTED TO THE COMPUTER WITH THE USB CABLE
>
> AND POWERED UP CORRECTLY TO ESTABLISH THE FIRST COMMUNICATION WITH THE RCP

To start using the sensor and Rheonics software, the following should be done:
1. Connect the sensor probe to the SME transmitter
2. Connect the power supply to the transmitter
3. Connect the USB cable to the transmitter electronics. Connect the other end to a free USB port on the computer.
4. Run the Rheonics Control Panel software. The software can be opened from the PC's start menu.
5. Go to the Settings tab and select the correct USB port to detect the sensor by clicking in the button "Apply". Wait for the Status LED to turn green.
6. Go to the Measurements tab to visualize the readings in real time.

Find further steps on the RCP Software Manual "RCP-OM" and on Rheonics articles at RCP – Rheonics Control Panel - Articles.

When the software is running, you will see a screen similar to the following:
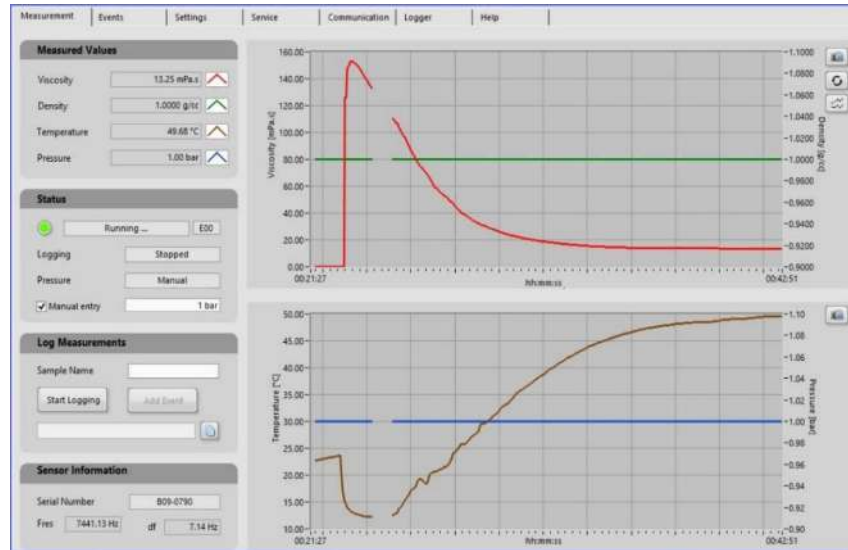
Figure 12: RCP Measurement tab.

For help with Rheonics Control Panel (RCP) and its settings, user can navigate to the Help tab within the software and access manuals or contact Rheonics Support Team at support@rheonics.com.

6 Handling the sensor

6.1 Cleaning

The sensor probe is CIP compatible, meaning it can be cleaned in-line with solvents and water as part of the customer's standard cleaning procedure. Solvents used for cleaning must be compatible with the sensor probe material.

General recommendations for cleaning are:

- Check your sensor material and ensure only chemicals compatible with the material are used. Sometimes sensors have two materials and chemicals used must therefore be compatible with both, or appropriate safeguards should be in place to ensure that cleaning chemicals do not come in contact with incompatible materials on the sensor.
- Inline cleaning is generally sufficient.
- Only remove the sensor probe from the line when needed or when dismantling the line is the standard cleaning procedure. For example, manual cleaning of adherent films from pipes and probe.
- Cleaning can be done with appropriate solvents and/or by wiping the probe with a solvent-saturated cloth or paper. Vinegar or diluted caustic soda could also be used.
- Do not let fluid solidify on the probe. If this occurs, soak probe in water for some hours to dissolve the solid.
- Under no circumstances should abrasives be used to clean the resonator since these will change its geometry and destroy its calibration.
- Never use ultrasonic cleaning methods like ultrasonic baths. They can damage the sensor.

The user can validate the SRV probe is properly cleaned using the Clean Sensor Status. This is accessible over most communication protocols or by using the RCP software. In the software, go to the Scaling tab where indicators for the cleanness of the probe and current state (in air or fluid) can be found.

Figure 13: Cleaning the sensor with solvent-saturated cloth or paper.

Review more information on cleaning instructions here.

6.2 Calibration

All Rheonics sensors are factory calibrated. Customer-specific calibration can be ordered that is NIST traceable. Rheonics sensors don't require recalibration during their lifetime, expected to be around 30 years.

However, clients may still require calibration verification for instruments used in their industry. This can be part of Quality Control (QC) for ensuring high accuracy and reliability on readings, and/or Compliance with regulations or standards governed by law, such as ISO 17025 or FDA, for food and pharmaceutical industries. These regulations designate a standardized verification of sensor operation to ensure safety, quality, and correct production.

Rheonics offers the next following verification methods::
a. **Quick verification of SRV in air**
1. Remove the SRV from process
2. Clean the SRV of residual fluid or dirt
3. Leave the SRV in the air, and verify that nothing is in contact with the sensing element
4. Verify the viscosity reading is zero. This can be checked through the SME-TRD display, RCP software, or any external integration system (e.g. PLC).

This "air check" is useful as a quick verification of the SRV calibration. The sensor does not use moving parts, so if readings in the air are zero, then the sensor is both clean and within calibration. However this is not a replacement for the formal calibration verification required by ISO or FDA guidelines.

b. **Calibration verification to NIST traceable viscosity reference in field**
This method follows Rheonics factory calibration procedure by measuring, with the SRV, a Newtonian fluid of known certified viscosity at prescribed temperatures. Then compare the SRV readings to the expected values and verify the accuracy is within the expected range.

1. Calibration setup preparation:
* Clamp the sensor probe firmly on its body to avoid movement during measurement. Do not perform a calibration by holding the probe by hand or fixing the sensor by the cable.
* Have enough space and fluid to surround the sensor sensing element (red zone in Figure 14). Have fluid level higher than the minimum level required.
* Control the temperature. To register the viscosity readings, wait for sensor to output stable temperature values.
* Mixing the fluid allows for uniform temperature. However, mixing can also cause fluid swirling, make sure this doesn't affect the immersion of the sensing element in the fluid.
2. Use a calibration reference fluid with a known viscosity and temperature. Rheonics recommends using the same or similar NIST traceable fluid used for factory calibration that is specified in the Custom Calibration Certificate.
3. Check the readings from the SRV, and wait for stable readings of temperature and viscosity.
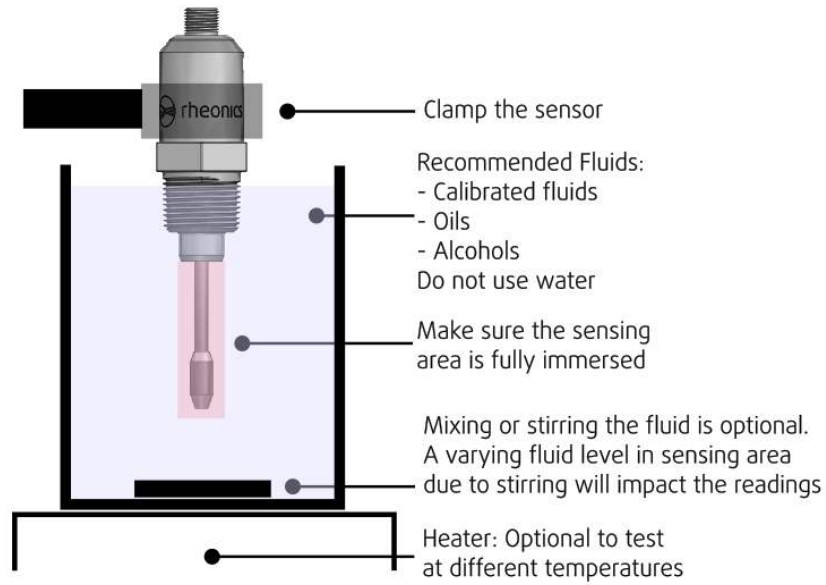4. Compare the SRV viscosity readings with the calibration reference fluid values. Calculate the error percent.

Figure 14: SRV calibration verification setup example.

Review more information on calibration here.

Rheonics offers a Calibrator device to simplify the on-site calibration procedure. Contact Rheonics Sales Team for more information.

7 Notes/Errata:

8   Revision and Approvals

Version	Nature of changes	Approvals	Date
1.0	Original version	P. Pacherrez C. Arroyo S. Kumar	08.08.2024