rheonics

inline process
density and viscosity
monitoring

PROFINET Field Device Specification:
Rheonics, SME

Covers sensor Types: ***SR, SRV, SRD, DVP, DVM***

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Contents

1 Before you begin

1.1 About the manual

This manual provides information on Profinet support on Rheonics devices. This document specifies all the device-specific features and documents PROFINET Protocol implementation details.

Important Instructions

This manual assumes that the following conditions apply:

- The sensor has been installed correctly and completely according to the installation
- The installation complies with all applicable safety requirements.
- The user is trained in relevant safety standards.

1.2 Purpose

This specification is designed to complement the SME Installation Manual by providing a complete, clear description of this Field Device from a PROFINET Communication perspective.

1.3 Who should use this document?

The specification is designed to be a technical reference for PROFINET End Users. This document assumes the reader is familiar with PROFINET Protocol requirements and terminology.

1.4 Warning

Before connecting the PROFINET Communicator in an explosive atmosphere, make sure instruments are installed in accordance with intrinsically safe or EX classification-specific field wiring practices. Explosions can cause serious injury or death.

1.5 Nomenclature

Abbreviation (short form)	Full-term	Meaning
SRV	Symmetric Resonator Viscometer	Viscosity sensor
SRD	Symmetric Resonator Densitometer	Density and Viscosity sensor
DVP	Density Viscosity Probe	HPHT inline probe
DVM	Density Viscosity Module	HPHT inline module
RCP	Rheonics Control Panel	Software for data acquisition and configuration
SME	Smart Module Electronics	Sensor electronics

Table 1. Defined Acronyms

1.6 Related Documentation

You can find all product documentation on the USB stick shipped with the SME and on our website at https://rheonics.com/resources

2 Which GDS file do I need?

Rheonics GDS File provides the configuration information, parameters, modules, diagnostic and vendor and device identification; to be used by the controller.

For up-to-date information, please check the page:

https://support.rheonics.com/support/solutions/articles/81000401423-profinet-gsd-file-for-rheonics-inline-viscometer-and-density-meter	

3 Product overview

The Rheonics SME provides clients PROFINET interface to get digital data on devices ordered with Profinet connectivity. This document provides guidance for field connection by an end user.

Note: If your sensor was ordered without Profinet, it is possible to upgrade it to add profinet remotely. Contact Rheonics Sales team to order.

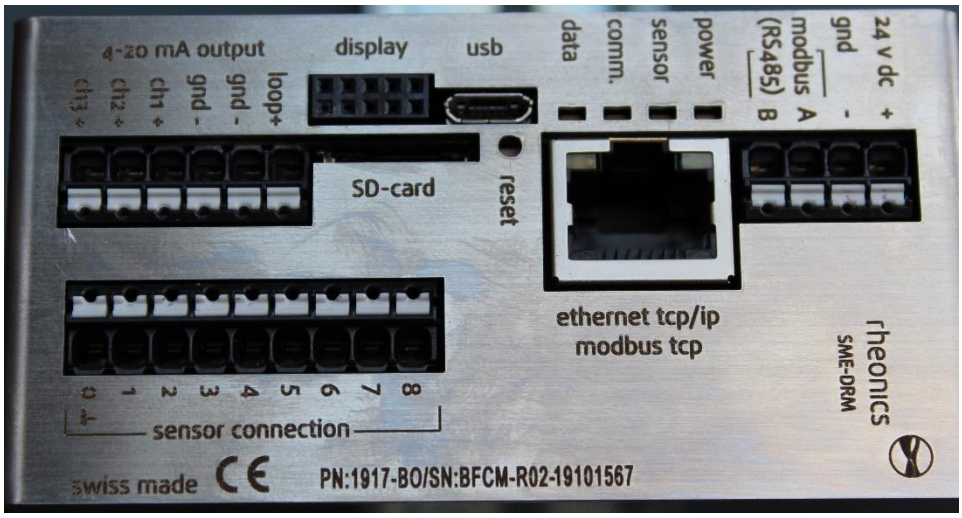


Figure 1. SME sensor electronics unit.

3.1 Process Interface

The SME is compatible with various Rheonics instruments. This includes Type: SR (SRV & SRD), Type: DV (DVP, DVM) and other instruments using the SME electronics from Rheonics.

Figure 2. Rheonics Sensor for Viscosity and density measurements.

3.2 Reference to other instruments.

Manuals and guides for digital instruments are modular. General instructions give information about the functioning and installation of instruments. Operational instructions explain the use of the digital instrument features and parameters. Fieldbus specific information explains the installation and use of the instrument on that Fieldbus network.

- SRV USER MANUAL
- SRD USER MANUAL
- DVP USER MANUAL
- DVM USER MANUAL
- SENSOR INSTALLATION MANUAL
- RHEONICS CONTROL PANEL USER MANUAL

4 Profinet Installation

4.1 Instrument overview:

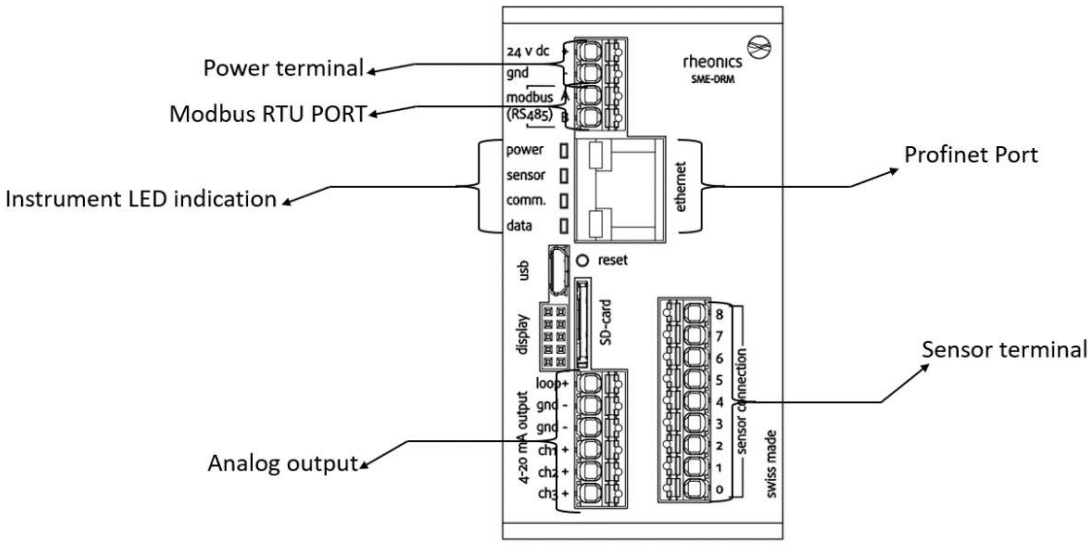
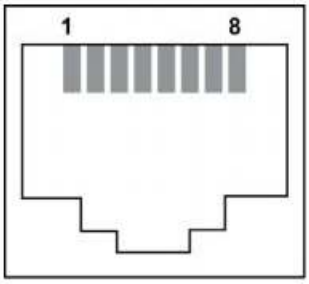


Figure 3. SME-DRM Diagram.

4.2 Ethernet PIN assignment PROFINET

RJ45 Connector	Receptacle	Pin Number	Wire Color	Description
		1	Yellow	Transmit+
		2	Orange	Transmit-
		3	White	Receive+
		4		Not Used
		5		Not Used
		6	Blue	Receive-
		7		Not Used
		8		Not Used

5 Getting started

5.1 Components Used

- Rheonics SRV, SRD, DVP or DVM w/ Firmware V03.30/0 or higher
- Siemens PLC S7-1212
- Configuration software: TIA Portal
- Software sensor: Rheonics Control Panel (RCP)
- Windows 10 64 bit
- GSDML file
- Ethernet Switch

5.2 System Connections

Connect Rheonics sensor, PLC, and PC (with RCP software installed) with an Ethernet Cable. We recommend using an Ethernet Switch.

Connect SME to the PC running RCP to configure the SME.

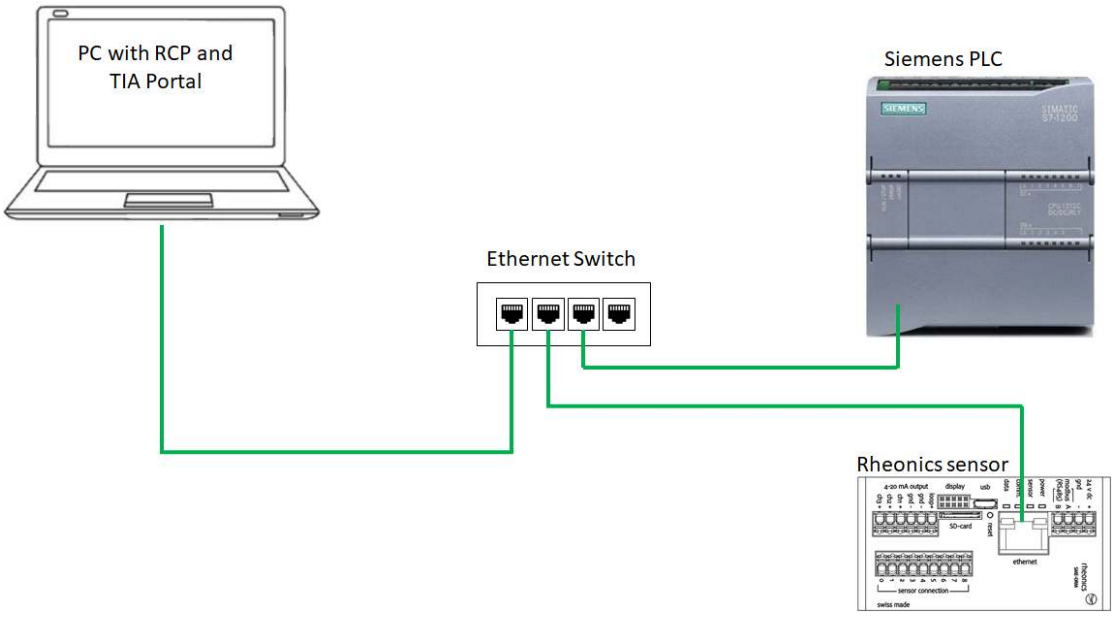


Figure 4. Communication diagram for rheonics sensor-PLC and PC.

5.3 Configure Rheonics SME

Open RCP software on the connected PC, connect to the SME using USB and configure the SME to use DHCP. Make sure it has a valid IP address. Figure 5 shows a standard configuration that can be used for the correct performance of the system.

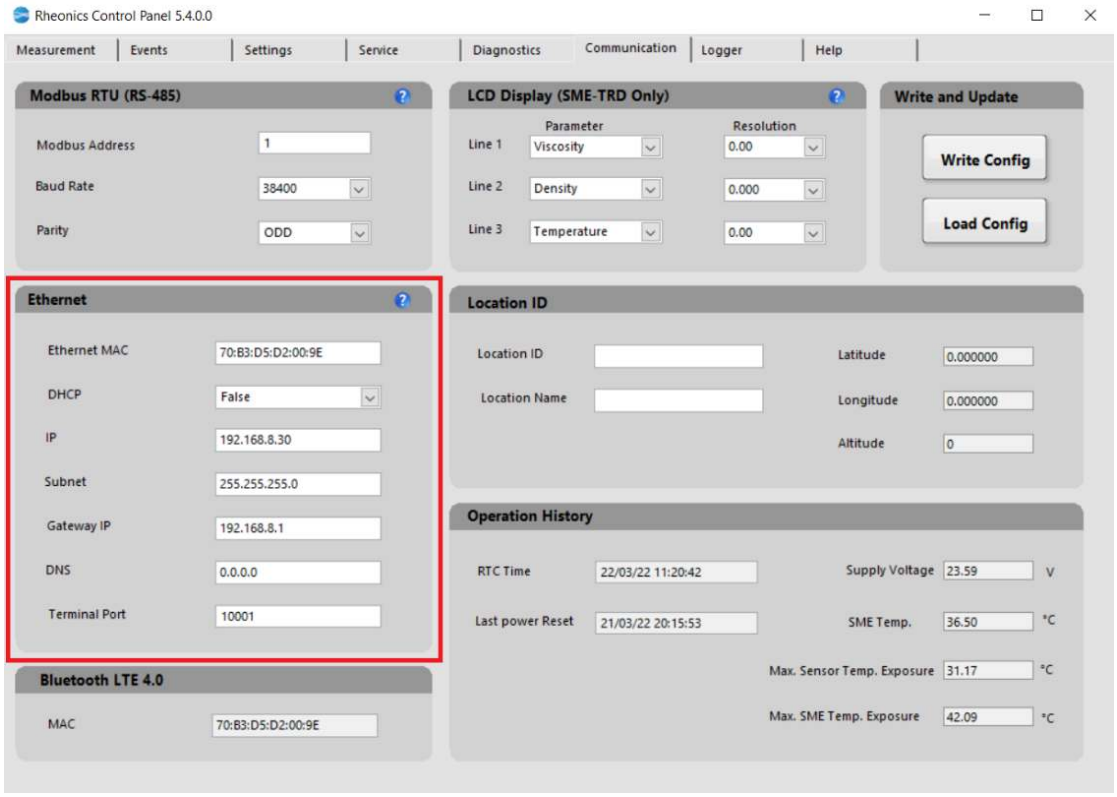


Figure 5. Configuration in RCP to use Profinet with DHCP.

5.3.1 Go to the “Comm Configure tab” in the RCP; In the Ethernet section input all the parameters.

5.3.2 Click on the “Update SMET” button to upload the new settings into the SME

5.3.3 For Static IP address go to the “Comm Configure” tab in the RCP; in the Ethernet section click the dropdown menu in DHCP and select false (This will disable DHCP function) – input the static IP address, subnet and gateway to use. Check RCP manual for detailed instructions.

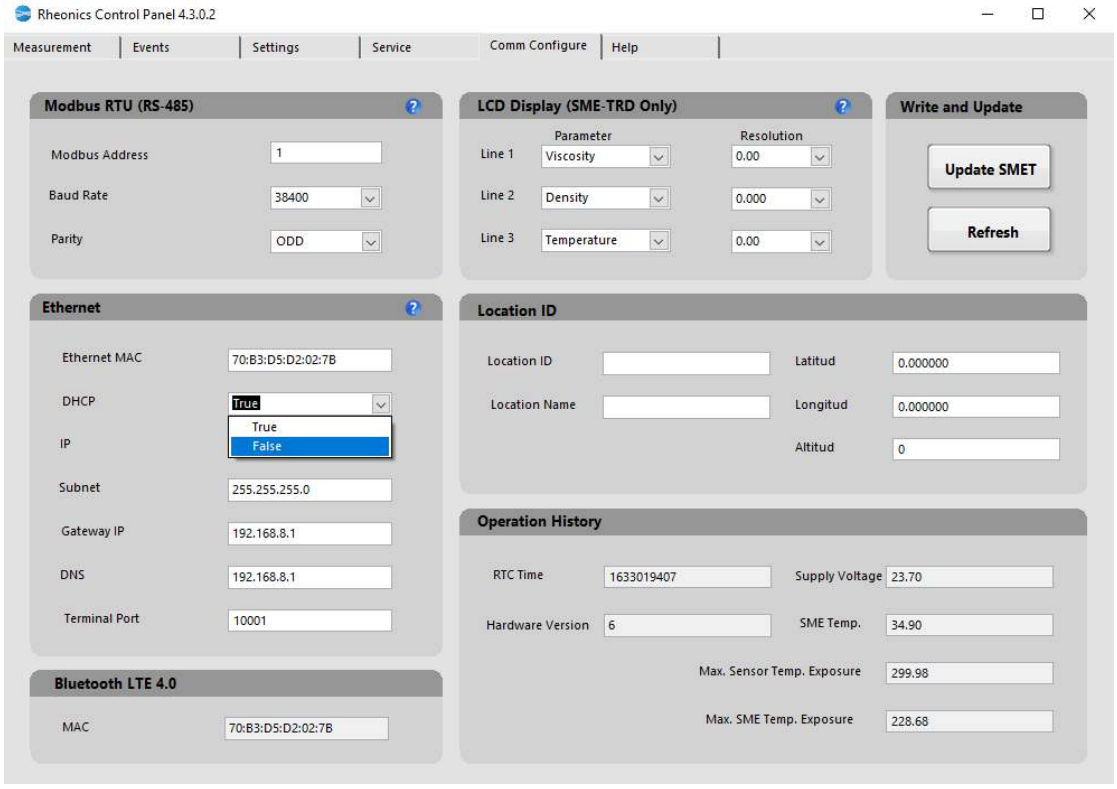


Figure 6. RCP showing Ethernet setting - Disable DHCP, this will allow use of static IP Address.

5.3.4 Fill all the parameters for the Profinet, remember to use valid values.

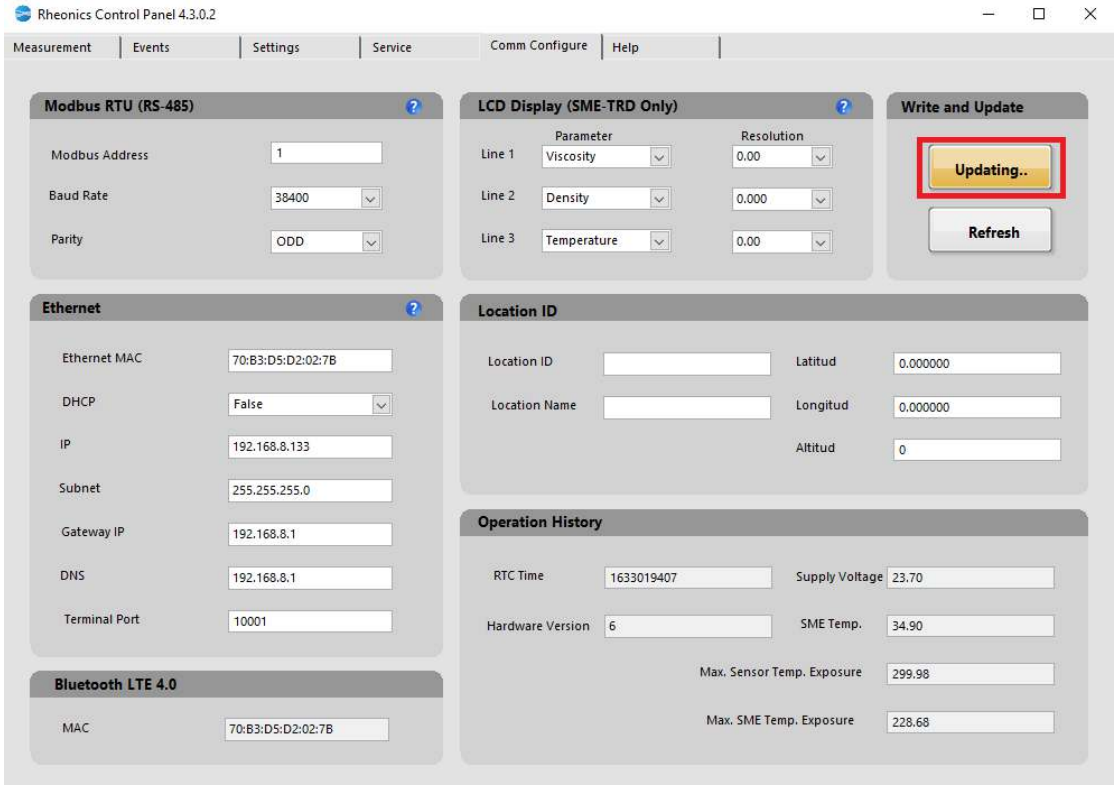


Figure 7. Update SME with Ethernet parameters.

6 Installation process

This section describes how to install the GSD file in TIA portal software.

6.1 Open a project.

6.2 Load GSD file

6.2.1 Select [Manage general station description files (GSD)] in the [Options] menu.

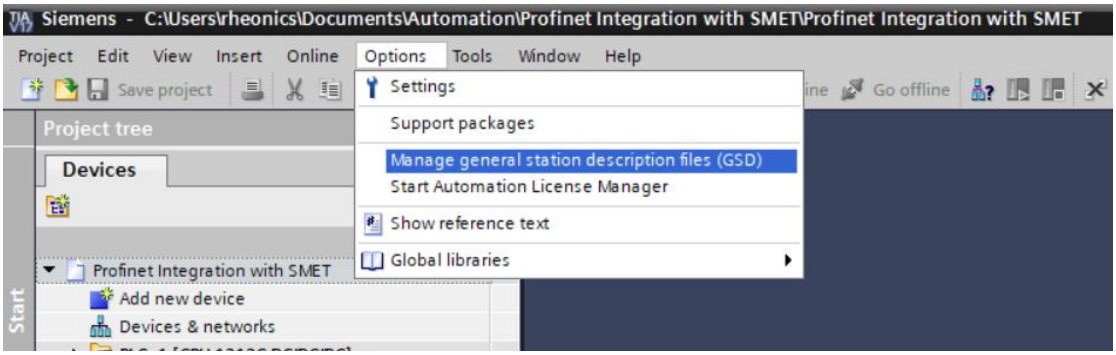


Figure 8. Screenshot of GSD file upload in TIA portal.

6.2.2 Select the file: GSDML-V2.4-Rheonics-SMET-20220321.xml, load and install this file.

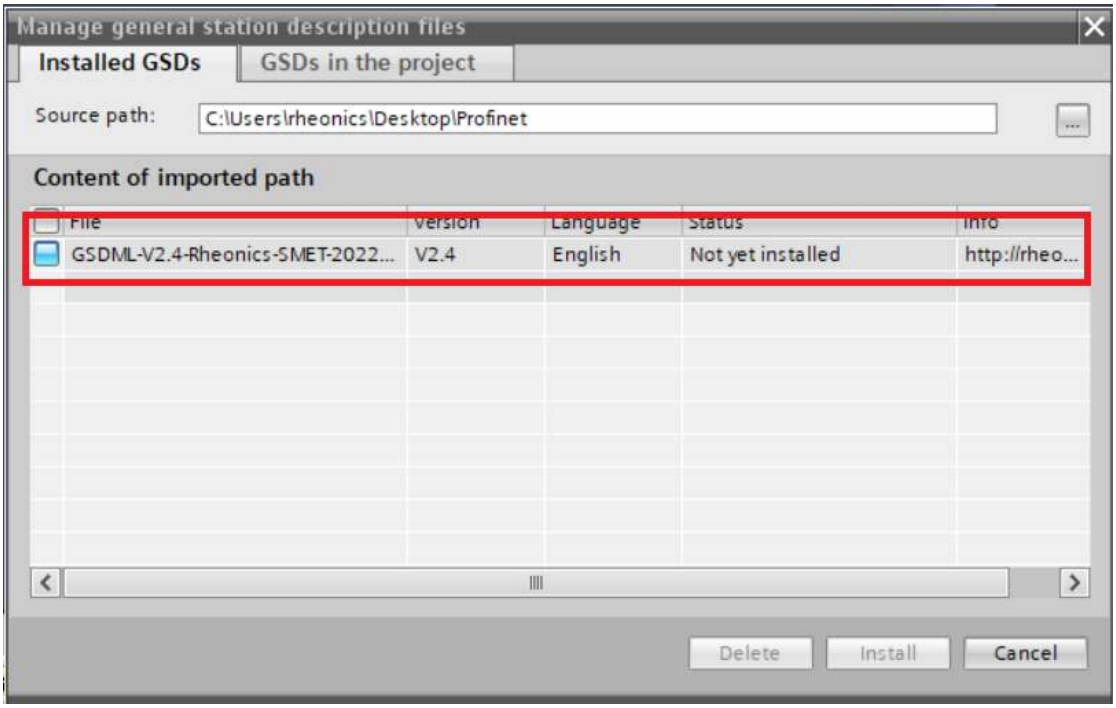


Figure 9. Adding GSDML file in TIA portal.

6.3 Rheonics sensor is now available in the hardware catalog.

6.3.1 Select device configuration.

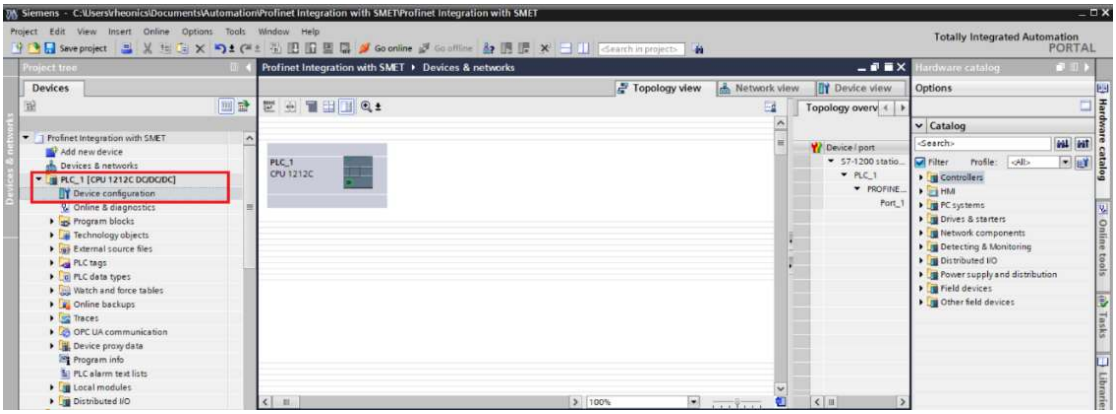


Figure 10. Select device configuration from device tree.

6.4 From the [Hardware Catalog]

6.4.1 Choose the appropriate Rheonics sensor.

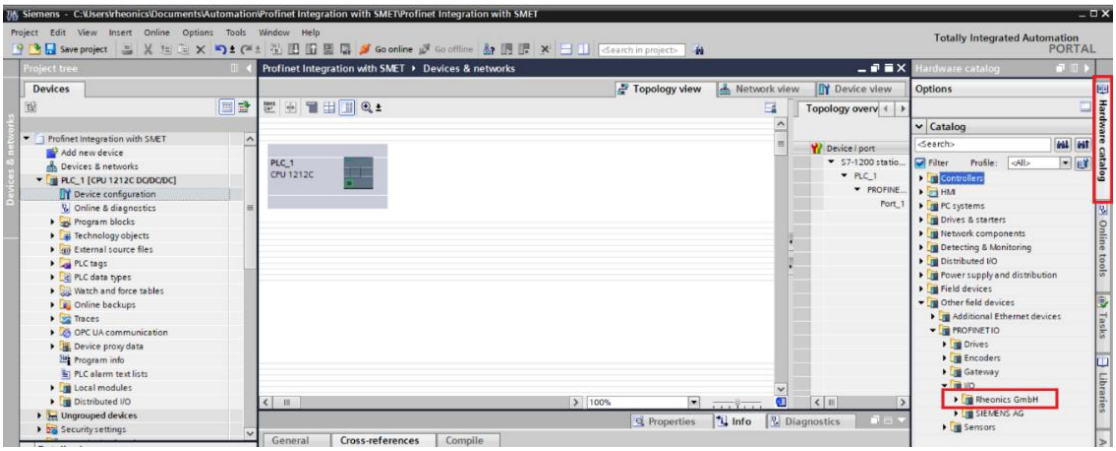


Figure 11. Selecting appropriate device from Hardware Catalog.

6.4.2 Select “Rheonics SMET” and add the device to your project.

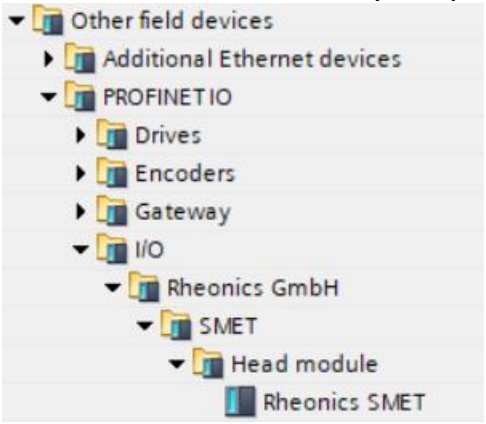


Figure 12.Rheonics SMET device in the I/O device tree.

6.5 Rheonics sensor will appear in topology view.

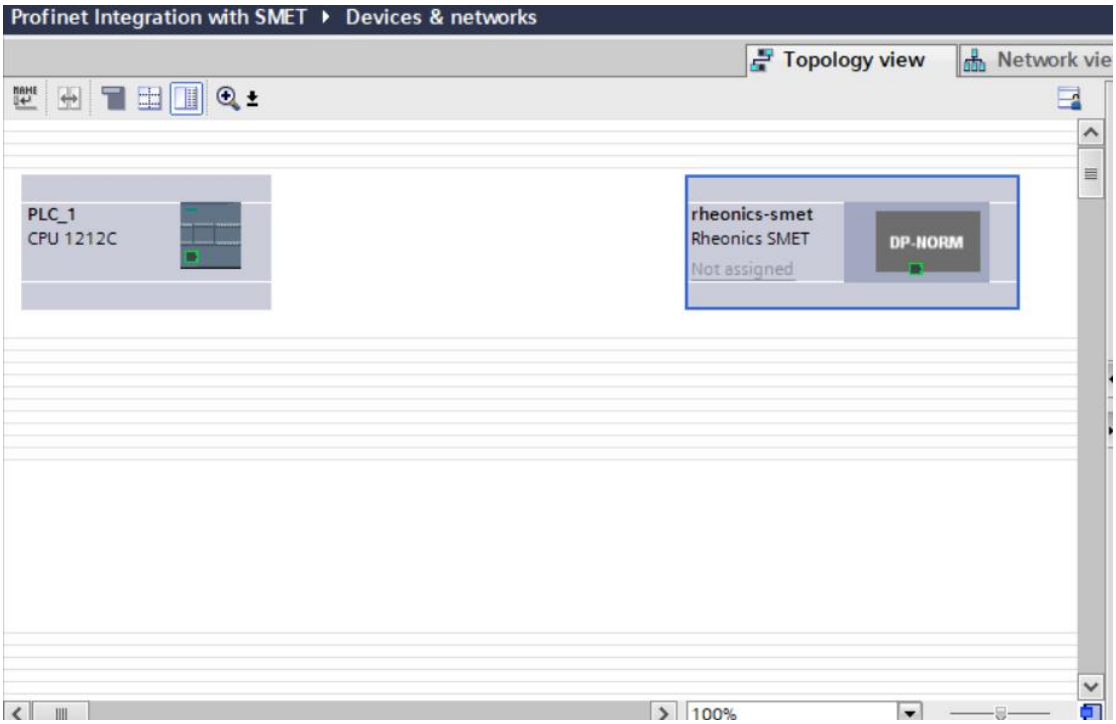


Figure 13. Rheonics sensor as it appears in Topology View.

6.6 Connect the Rheonics sensor SMET to the PLC

6.6.1 Drag & drop the connection.

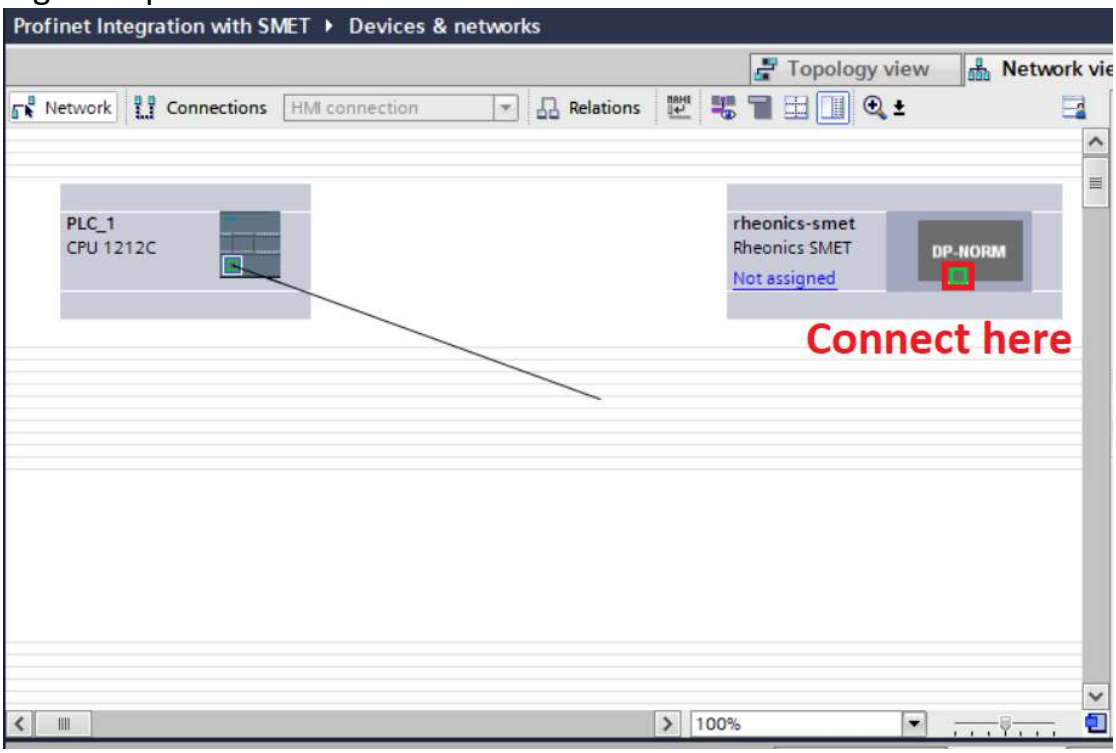


Figure 14. Screenshot showing Module Definition-Module Info.

6.7 Once PLC and SMET are connected you will find green wire that connects both PLC controller and rheonics sensor.

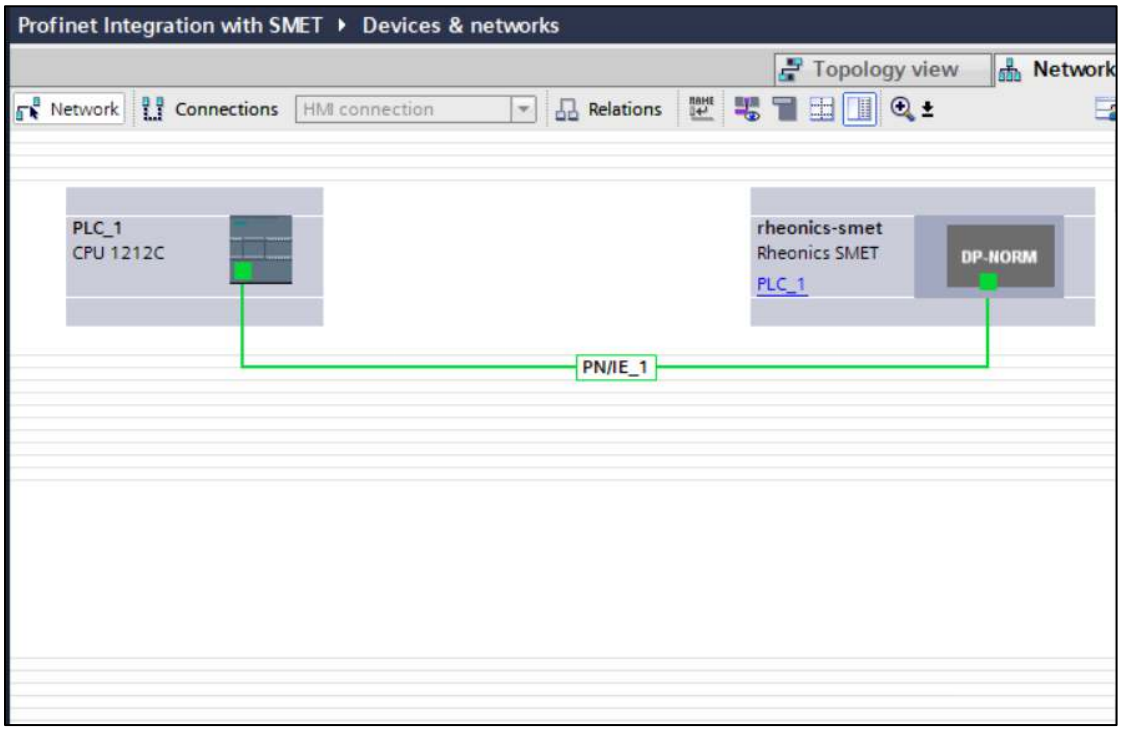


Figure 15. Establishing Profinet network by connecting Rheonics SMET to PLC in TIA portal software.

7 Device configuration settings

The Rheonics PROFINET instruments offer many different modules and parameters. To select these modules/parameters, the master configuration tooling software is used.

7.1 Rheonics device provides 2 modules “Diagnostics_1” and “Device Parameters_1”.

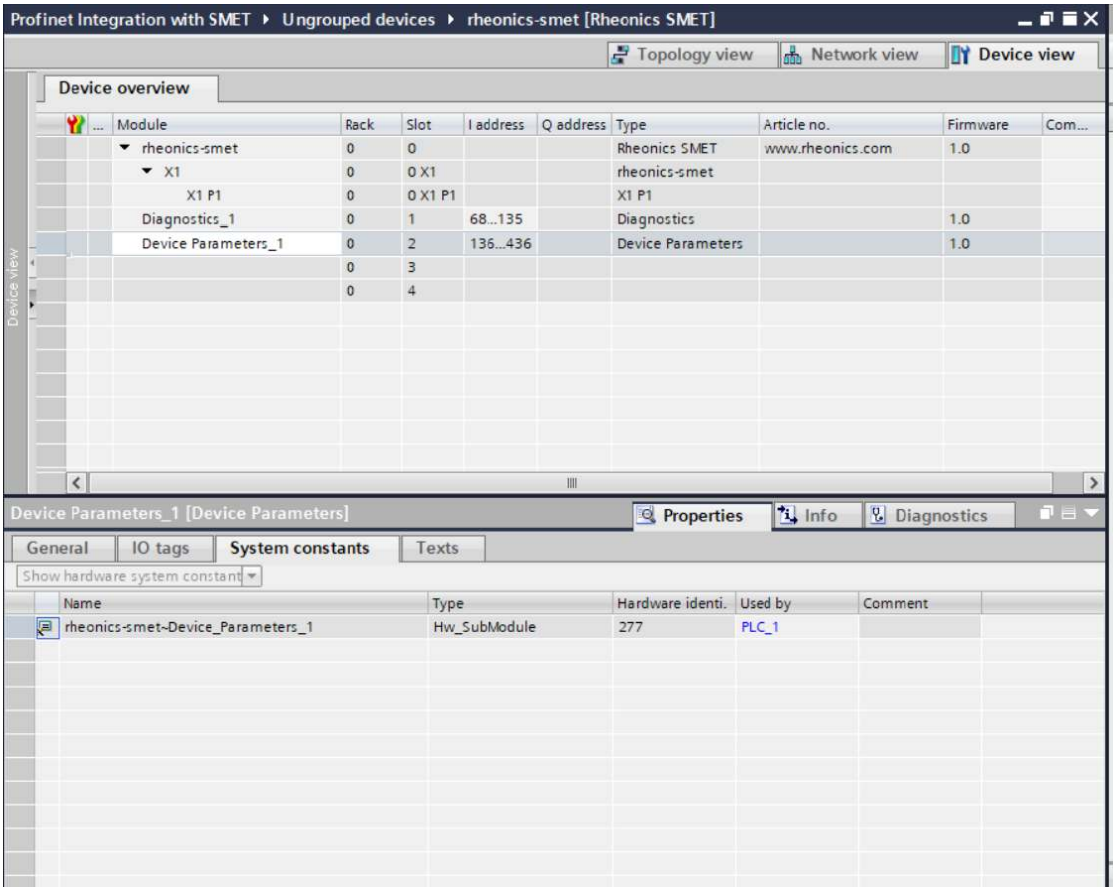


Figure 16. Device overview Controller Address.

7.2 Diagnostics_1

7.2.1 This module covers data that is useful for Rheonics support team to help customers diagnose any issues.

Diagnostics

	Name	Data type	Address	Retain	Acces...	Writa...	Visibl...	Monitor value
1	Input Volage	Real	%ID68		☑	☑	☑	23.39333
2	FV	DWord	%ID72		☑	☑	☑	16#3B02_0000
3	ph	DWord	%ID76		☑	☑	☑	16#1700_0000
4	-i	DWord	%ID80		☑	☑	☑	16#0200_0000
5	i+	DWord	%ID84		☑	☑	☑	16#0200_0000
6	q	Real	%ID88		☑	☑	☑	1.019042
7	fr	Real	%ID92		☑	☑	☑	7421.489
8	df-	Real	%ID96		☑	☑	☑	7420.38
9	df+	Real	%ID100		☑	☑	☑	7422.624
10	SW VERSION	DInt	%ID106		☑	☑	☑	825_241_907
11	ESN SM	DInt	%ID108		☑	☑	☑	825_440_307
12	<Add new>				☑	☑	☑	

Figure 17. Diagnostic module.

7.3 Device Parameters_1

This module covers the 22 parameters available for the SMET, as well the sensor status parameter.

7.3.1 Define tags in the PLC table based in the information from the GSD file.

Profinet Integration with SMET ▸ PLC_1 [CPU 1212C DC/DC/DC] ▸ PLC tags ▸ SMET_DATA [150]

Tags | User constants

SMET_DATA

	Name	Data type	Address	Retain	Acces...	Writa...	Visibl...	Comment
1	Sensor Status	USInt	%IB136		☑	☑	☑	Sensor Status
2	Parameter 0 Viscosity Median value	Real	%ID138		☑	☑	☑	
3	Parameter 0 Viscosity Median raw value	Real	%ID142		☑	☑	☑	
4	Parameter 0 Viscosity Median status	USInt	%IB146		☑	☑	☑	
5	Parameter 0 Viscosity Median private status	USInt	%IB148		☑	☑	☑	
6	Parameter 0 Viscosity Median unit	Word	%IW204		☑	☑	☑	
7	Parameter 1 density median value	Real	%ID205		☑	☑	☑	
8	Parameter 1 density median raw value	Real	%ID209		☑	☑	☑	

Figure 18. Define tag in the plc table from gsd file.

7.3.2 Go to online mode and start monitoring the parameters from the SMET

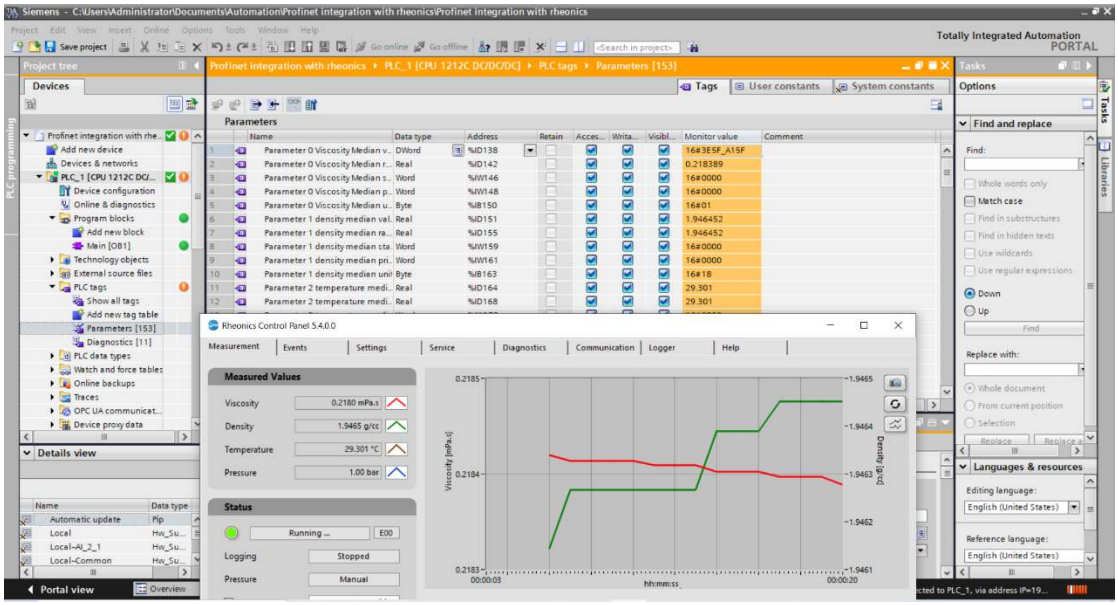


Figure 19. Data monitor from SMET showing the measured data in both the TIA portal and RCP.

8 Sensor status and parameter status

All rheonics sensors (SRV, SRD, DVP, DVM) for inline viscosity and density monitoring have inbuilt status. These status bits can be used over digital communication channels to understand when the sensor is operating correctly and when there is an issue.

8.1 Sensor Error Status

The sensor status can take any of the following values:

Bit	Hex	Name	Comment
Bit 0	0x0001	PLL frequency mismatch	The PLL frequency does not match the sensor frequency. Derived from the ASB string (E10)
Bit 1	0x0002	PLL not locked	The PLL is not locked. Derived from the ASB string (E01)
Bit 2	0x0004	PLL lock incorrect	The PLL has locked on a wrong frequency. Derived from the ASB string (E02)
Bit 3	0x0008	ASB communication error	Issues with sensor electronics
Bit 4	0x0010	Temperature sensor failed	The temperature sensor has failed. Derived from the ASB string if temperature is -273.0
Bit 5	0x0020	Sensor too hot	If temperature is above the hardcoded physical temperature limit.
Bit 6	0x0040	ASB communication error	Communication issue between two electronics board in the SME
Bit 7	0x0080	Serial Changed	
Bit 8	0x0100	Status not clean	Sensor is not clean (only SRV)
Bit 9	0x0200	Status in Air	Determines if sensor is in air
Bit 10 -15	Unused		

Table 2. Sensor error status bit code and description.

8.2 Parameter Status

The Parameter Status can take any of the following values, OR a combination of these states. For example: If there is a config error, the status value will be 0x0003

If there is a config error and an internal error, the status will take a value of 0x0023

Bit	Hex	Name	Comment
Bit 0	0x0001	General error	This bit is always set in case there is an issue with the parameter. It can be used by the general user or application programmer to alert an issue with that parameter output. For details check the other bits
Bit 1	0x0002	Config error	The parameter is not configured or there exists a configuration error.
Bit 2	0x0004	Hardware error	The parameter cannot be calculated as the hardware failed. Example: Temperature sensor has failed.
Bit 3	0x0008	Dependent error	A parameter source for a dependent parameter is not available. Example: In case of a free formula a referenced parameter is NAN.
Bit 4	0x0010	Not ready	No result is yet available. Example: No measurement has been taken yet. The algorithm requires a run-in time
Bit 5	0x0020	Internal error	Internal error - Report to Rheonics
Bit 6	0x0040	Calibration Error	Diagnostics
Bit 7	0x0080	Further use	
Bit 8	0x0100	Parameter Calibrated	Triggered when parameter has a calibration/scale factor/coefficient applied to it.
Bit 9	0x0200	Model Loaded	Active when a model has been loaded in script parameters. Only valid for parameters 19,20,21
Bit 10	0x0400	Filtering Active	Active when there is a filter loaded for that parameter
Bit 11	0x0800	Not stable	Parameter result not yet stable Example: Set for example on viscosity if sensor status is not okay.
Bit 12	0x1000	Warning lower	Below lower warning limit (if configured for parameter)
Bit 13	0x2000	Warning upper	Above upper warning limit (if configured for parameter)
Bit 14	0x4000	Alarm lower	Below alarm limit (Hardcoded depending on parameter type)
Bit 15	0x8000	Alarm upper	Above alarm limit (Hardcoded depending on parameter type)

Table 3. Parameter Status bit code and description.

8.3 How to read sensor status?

Sensor status is a WORD data type, these status bits can be used over digital communication channels to understand when the sensor is operating correctly and when there is an issue.

Parameters

	Name	Data type	Address	Retain	Acces...	Writa...	Visibl...	Monitor value
1	Sensor Status	Word	%IW136		☑	☑	☑	16#1701
2	Parameter 0 Viscosity Median v..	DWord	%ID138		☑	☑	☑	16#0000_0000
3	Parameter 0 Viscosity Median r...	Real	%ID142		☑	☑	☑	0.0
4	Parameter 0 Viscosity Median s..	Word	%IW146		☑	☑	☑	16#0000
5	Parameter 0 Viscosity Median p..	Word	%IW148		☑	☑	☑	16#0001
6	Parameter 0 Viscosity Median u..	Byte	%IB150		☑	☑	☑	16#01
7	Parameter 1 density median val.	Real	%ID151		☑	☑	☑	16#7FC0_0000
8	Parameter 1 density median ra...	Real	%ID155		☑	☑	☑	16#7FC0_0000
9	Parameter 1 density median sta.	Word	%IW159		☑	☑	☑	16#0100
10	Parameter 1 density median pri..	Word	%IW161		☑	☑	☑	16#0001
11	Parameter 1 density median unit	Byte	%IB163		☑	☑	☑	16#18

Figure 20. Sensor Status parameter table.

In the scenario described in Figure 20, Sensor Status has a value 16#1701, bytes must be swapped for the correct reading of the sensor as they should be read as 16#0117 for a little-endian format. Sensor error status is the combination from any bit from Table 2. Sensor error status bit code and description.in this scenario Error0117 is the combination (OR) of the error bits.:

Bit	H	Comments
0	0x01	The PLL frequency does not match the sensor frequency. Derived from the ASB string (E10)
1	0x02	The PLL is not locked. Derived from the ASB string (E01)
2	0x04	The PLL has locked on a wrong frequency. Derived from the ASB string (E02)
4	0x10	The temperature sensor has failed. Derived from the ASB string if temperature is -273.0
8	0x100	Sensor is not clean (SRV only)
Result	0x117	

Table 4. Sensor status bits for status 0117.

8.4 Which parameters should I read?

For each of the 22 parameters from Rheonics sensor, 5 components are provided: Scaled value, unscaled value, parameter status, private status and unit.

For up-to-date parameters information, please check the page:

https://support.rheonics.com/support/solutions/articles/81000393235-parameter-list-access-for-field-devices	

- Scaled value: This value is the scaled value after a user define scaling factor or calibration is applied. This value is same as the raw/unscaled value if the user and factory calibration coefficients are the same.
- Unscaled value: This value is the raw value as measured from the SME without applying any modification, scaling, calibration factor or filters.
- Parameter Status: Each parameter provides its own status (Refer to Parameter Status)
- Private Status: This is status is for Rheonics support and provides information about performance of the sensor.
- Unit: This is the unit for the parameter... (For up-to-date information, please check the page:

https://support.rheonics.com/support/solutions/articles/81000393237-units-translation-table-for-field-devices	

Customers normally choose Parameters 12(Viscosity Median and last good), 13(Density Median and last good), 3(Temperature Median) and sensor status for their process as they provide good information for the fluid.

For custom parameters like concentration, compensated viscosity, and density; parameters 19,20, and 21 can be used. **Contact Rheonics support for more information about mathematical models that the sensors support natively.**

9 Cyclic input data

Rheonics sensors can be used for reading data.

9.1 Diagnostics information

Name	Data Type	Comment
Input Voltage	Float32	Power source to the SME
Fv	Integer32	Diagnostics
ph	Integer32	Diagnostics
I-	Integer32	Diagnostics
I+	Integer32	Diagnostics
q	Float32	Diagnostics
fr	Float32	Diagnostics
df-	Float32	Diagnostics
df+	Float32	Diagnostics
Esn String	VisibleString	Electronics sensor serial number
SW Version	VisibleString	Firmware version

Table 5. Diagnostic table for slot 1.

9.2 Parameters

Name	Data Type	Comment
Sensor Status	Unsigned16	This parameter is Word data type. Format should be little endian.
Parameter 0 Viscosity Median value	Float32	Median of last 5 viscosity measurements
Parameter 0 Viscosity Median raw value	Float32	Median of last 5 viscosity measurement prior to applying the user calibration.
Parameter 0 Viscosity Median status	Unsigned16	Refer to Parameter Status
Parameter 0 Viscosity Median private status	Unsigned16	Diagnostics
Parameter 0 Viscosity Median unit	Unsigned8	Unit for parameter 0, refer to Table 7.
Parameter 1 density median value	Float32	Median of last 5 density measurements
Parameter 1 density median raw value	Float32	Median of last 5 density measurement prior to applying the user calibration.
Parameter 1 density median status	Unsigned16	Refer to Parameter Status
Parameter 1 density median private status	Unsigned16	Diagnostics
Parameter 1 density median unit	Unsigned 8	Unit for parameter 1, refer to Table 7.
Parameter 2 temperature median value	Float32	Median of last 5 temperature measurements
Parameter 2 temperature median raw value	Float32	Median of last 5 temperature measurement prior to applying the user calibration.
Parameter 2 temperature median status	Unsigned16	Refer to Parameter Status
Parameter 2 temperature median private status	Unsigned16	Diagnostics
Parameter 2 temperature median unit	Unsigned8	Unit for parameter 2, refer to Table 7.
Parameter 3 Kinematic Viscosity value	Float32	Calculated Kinematic Viscosity measurement
Parameter 3 Kinematic Viscosity raw value	Float32	Calculated Kinematic Viscosity measurement prior to applying the user calibration.
Parameter 3 Kinematic Viscosity status	Unsigned16	Refer to Parameter Status

Parameter 3 Kinematic Viscosity private status	Unsigned16	Diagnostics
Parameter 3 Kinematic Viscosity unit	Unsigned8	Unit for parameter 3, refer to Table 7.
Parameter 4 density average value	Float32	Average of density measurements
Parameter 4 density average raw value	Float32	Average of density measurement prior to applying the user calibration.
Parameter 4 density average status	Unsigned16	Refer to Parameter Status
Parameter 4 density average private status	Unsigned16	Diagnostics
Parameter 4 density average unit	Unsigned8	Unit for parameter 4, refer to Table 7.
Parameter 5 viscosity raw value	Float32	Instantaneous value of viscosity raw from the measurement
Parameter 5 viscosity raw raw value	Float32	Instantaneous value of viscosity raw from the measurement prior to applying the user calibration
Parameter 5 viscosity raw status	Unsigned16	Refer to Parameter Status
Parameter 5 viscosity raw private status	Unsigned16	Diagnostic
Parameter 5 viscosity raw unit	Unsigned8	Unit for parameter 5, refer to Table 7.
Parameter 6 density raw value	Float32	Instantaneous value of density raw from the measurement
Parameter 6 density raw raw value	Float32	Instantaneous value of density raw from the measurement prior to applying the user calibration
Parameter 6 density raw status	Unsigned16	Refer to Parameter Status
Parameter 6 density raw private status	Unsigned16	Diagnostic
Parameter 6 density raw unit	Unsigned8	Unit for parameter 6, refer to Table 7.
Parameter 7 temperature raw value	Float32	Instantaneous value of Temperature raw from the measurement
Parameter 7 temperature raw raw value	Float32	Instantaneous value of Temperature raw from the measurement prior to applying the user calibration
Parameter 7 temperature raw status	Unsigned16	Refer to Parameter Status
Parameter 7 temperature raw private status	Unsigned16	Diagnostic
Parameter 7 temperature raw unit	Unsigned8	Unit for parameter 7, refer to Table 7.

Parameter 8 resonant frequency (Hz) value	Float32	Instantaneous value of frequency from the measurement
Parameter 8 resonant frequency (Hz) raw value	Float32	Instantaneous value of frequency from the measurement prior to applying the user calibration
Parameter 8 resonant frequency (Hz) status	Unsigned16	Refer to Parameter Status
Parameter 8 resonant frequency (Hz) private status	Unsigned16	Diagnostic
Parameter 8 resonant frequency (Hz) unit	Unsigned8	Unit for parameter 8, refer to Table 7.
Parameter 9 compensated resonant frequency (Hz) value	Float32	Instantaneous value of compensated resonance frequency from the measurement
Parameter 9 compensated resonant frequency (Hz) raw value	Float32	Instantaneous value of compensated resonance frequency from the measurement prior to applying the user calibration
Parameter 9 compensated resonant frequency (Hz) status	Unsigned16	Refer to Parameter Status
Parameter 9 compensated resonant frequency (Hz) private status	Unsigned16	Diagnostic
Parameter 9 compensated resonant frequency (Hz) unit	Unsigned8	Unit for parameter 9, refer to Table 7.
Parameter 10 damping (Hz) value	Float32	Instantaneous value of damping from the measurement
Parameter 10 damping (Hz) raw value	Float32	Instantaneous value of damping from the measurement prior to applying the user calibration
Parameter 10 damping (Hz) status	Unsigned16	Refer to Parameter Status
Parameter 10 damping (Hz) private status	Unsigned16	Diagnostic
Parameter 10 damping (Hz) unit	Unsigned8	Unit for parameter 10, refer to Table 7.
Parameter 11 Coil temperature value	Float32	Instantaneous value of coil temperature from the measurement
Parameter 11 Coil temperature raw value	Float32	Instantaneous value of coil temperature from the measurement prior to applying the user calibration
Parameter 11 Coil temperature status	Unsigned16	Refer to Parameter Status

Parameter 11 Coil temperature private status	Unsigned16	Diagnostic
Parameter 11 Coil temperature unit	Unsigned8	Unit for parameter 11, refer to Table 7.
Parameter 12 viscosity median and last good value	Float32	This parameter provides the viscosity median measurement value and if there is any error in memory last good value is saved
Parameter 12 viscosity median and last good raw value	Float32	This parameter provides the viscosity median measurement value and if there is any error in memory last good value is saved prior to applying the user calibration
Parameter 12 viscosity median and last good status	Unsigned16	Refer to Parameter Status
Parameter 12 viscosity median and last good private status	Unsigned16	Diagnostic
Parameter 12 unit	Unsigned8	Unit for parameter 12, refer to Table 7.
Parameter 13 density median and last good value	Float32	This parameter provides the density median measurement value and if there is any error in memory last good value is saved
Parameter 13 density median and last good raw value	Float32	This parameter provides the density median measurement value and if there is any error in memory last good value is saved prior to applying the user calibration
Parameter 13 density median and last good status	Unsigned16	Refer to Parameter Status
Parameter 13 density median and last good private status	Unsigned16	Diagnostic
Parameter 13 density median and last good unit	Unsigned8	Unit for parameter 13, refer to Table 7.
Parameter 14	Float32	Displays of mapped value from Modbus register 512 value
Parameter 14 raw value	Float32	Displays of mapped value from Modbus register 512 value prior to applying the user calibration
Parameter 14 status	Unsigned16	Refer to Parameter Status
Parameter 14 private status	Unsigned16	Diagnostic

Parameter 14 unit	Unsigned8	Unit for parameter 14, refer to Table 7.
Parameter 15	Float32	Displays of mapped value from Modbus register 514 value
Parameter 15	Float32	Displays of mapped value from Modbus register 514 value prior to applying the user calibration
Parameter 15	Unsigned16	Refer to Parameter Status
Parameter 15	Unsigned16	Diagnostic
Parameter 15	Unsigned8	Unit for parameter 15, refer to Table 7.
Parameter 16	Float32	Displays of mapped value from Modbus register 516 value
Parameter 16	Float32	Displays of mapped value from Modbus register 516 value prior to applying the user calibration
Parameter 16	Unsigned16	Refer to Parameter Status
Parameter 16	Unsigned16	Diagnostic
Parameter 16	Unsigned8	Unit for parameter 16, refer to Table 7.
Parameter 17	Float32	Te - Estimated Temperature (from internal temperature Algorithm) value
Parameter 17	Float32	Te - Estimated Temperature (from internal temperature Algorithm) value prior to applying the user calibration
Parameter	Unsigned16	Refer to Parameter Status
Parameter 17	Unsigned16	Diagnostic
Parameter 17	Unsigned8	Unit for parameter 17, refer to Table 7.
Parameter 18	Float32	Tp- Temperature from PT1000 sensor present in sensor value
Parameter 18	Float32	Tp- Temperature from PT1000 sensor present in sensor value prior to applying the user calibration
Parameter 18	Unsigned16	Refer to Parameter Status

Parameter 18	Unsigned16	Diagnostic
Parameter 18	Unsigned8	Unit for parameter 18, refer to Table 7.
Parameter 19 Calculated parameter from viscosity model value	Float32	Mathematical model for viscosity from the measurement
Parameter 19 Calculated parameter from viscosity model raw value	Float32	Mathematical model for viscosity from the measurement prior to applying the user calibration
Parameter 19 Calculated parameter from viscosity model status	Unsigned16	Refer to Parameter Status
Parameter 19 Calculated parameter from viscosity model private status	Unsigned16	Diagnostic
Parameter 19 Calculated parameter from viscosity model unit	Unsigned8	Unit for parameter 19, refer to Table 7.
Parameter 20 Calculated parameter from density model value	Float32	Mathematical model for density from the measurement
Parameter 20 Calculated parameter from density model raw value	Float32	Mathematical model for density from the measurement prior to applying the user calibration
Parameter 20 Calculated parameter from density model status	Unsigned16	Refer to Parameter Status
Parameter 20 Calculated parameter from density model private status	Unsigned16	Diagnostic
Parameter 20 Calculated parameter from density model unit	Unsigned8	Unit for parameter 20, refer to Table 7.
Parameter 21 Calculated parameter from concentration model value	Float32	Mathematical model for Concentration from the measurement
Parameter 21 Calculated parameter from concentration model raw value	Float32	Mathematical model for Concentration from the measurement prior to applying the user calibration
Parameter 21 Calculated parameter from concentration model status	Unsigned16	Refer to Parameter Status
Parameter 21 Calculated parameter from	Unsigned16	Diagnostic

concentration model private status		
Parameter 21 Calculated parameter from concentration model unit	Unsigned8	Unit for parameter 21, refer to Table 7.
Parameter 22 Sensor cleanliness ratio value	Float32	Sensor status measurement
Parameter 22 Sensor cleanliness ratio raw value	Float32	Sensor status measurement prior to applying the user calibration
Parameter 22 Sensor cleanliness ratio status	Unsigned16	Refer to Parameter Status
Parameter 22 Sensor cleanliness ratio private status	Unsigned16	Diagnostic
Parameter 22 Sensor cleanliness ratio unit	Unsigned8	Unit for parameter 22, refer to Table 7.

Table 6. Parameter table.

10 Units table

Unit Index	Unit Display	Unit Index	Unit Display
0		**37**	%wt/v
1	mPa.s	**38**	%v/v
2	cP	**39**	%vol
3	Pa.s	**40**	Bar
4	Poise	**41**	psi
5	Reyn	**42**	m^3/s
6	mm^2/s	**43**	sccm
7	cSt	**44**	gpm
8	St	**45**	pH
9	m^2/s	**46**	m^3
10	in^2/s	**47**	gal
11	SUS	**48**	STP
12	VI	**49**	Tref
13	AV	**50**	n_D
14	PV	**51**	%wt
15	YP	**52**	%Vol
16	sec	**53**	mol/m^3
17	μ	**54**	alcohol
18	η	**55**	ethanol
19	ν	**56**	Hz
20	°C	**57**	rhe
21	°F	**58**	°P
22	°K		
23	$ref_{XX°Y}$		
24	g/cc		
25	Kg/m^3		
26	lb/ft^3		
27	lbm/gal		
28	lbs/gal		
29	ppg		
30	pptf		
31	$slug/ft^3$		
32	SG		
33	ρ		
34	°API		
35	°Baumé		
36	°Brix		

Table 7. Units translation table.

11 Troubleshooting

Electronics Issues	
No LED lights, display, or output signals	1. Check power supply and cabling
Viscosity is not stable	1. SRV viscosity output is compared against only dynamic viscosity of the calibration fluids. 2. Sensor is not fully in fluid.
Probe Issues	
NaN values are displayed on the RCP software or PLC	1. Check wiring from the probe to SME is correct. 2. Measure the internal resistance from the probe
Communication Issues	
No data is visible	1. Try to reset the SME and/or restart your master. 2. Check all settings are correct with RCP and controller side. 3. Verify there is no duplicated address in the network 4. Try to use the ping command to get a response from either the PLC or SME. 5. Verify that the latest version of the GDS file is installed-
Data issues	
Measured value is different from my reference standards	1. SRV viscosity output is compared against only dynamic viscosity of the calibration fluids
Wrong Unit from the data stream	1. Unit is received as HEX representation, convert to decimal
Wrong readings for each parameter	1. Verify each parameter is correctly mapped, some bytes are swapped
Sensor Status does not match any bit from the sensor status table	1. Sensor status byte is swapped

https://support.rheonics.com/support/solutions/articles/81000401486-profinet-troubleshooting	

- Contact RHEONICS support desk
  - support@rheonics.com
  - https://support.rheonics.com

https://support.rheonics.com/support/home	

12 Notes/Errata

Contact Rheonics support for customization of system settings.

Notes

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