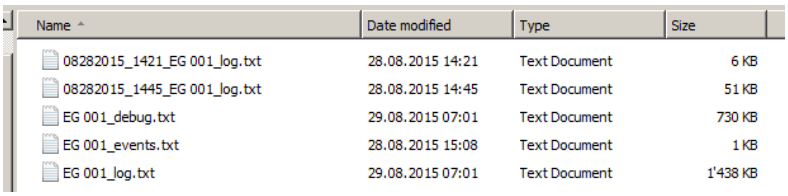
Contents

1. Rheonics Control Panel Software - Log file description

The Rheonics Control Panel Software creates the following files while logging:



Name	Date modified	Type	Size
08282015_1421_EG 001_log.txt	28.08.2015 14:21	Text Document	6 KB
08282015_1445_EG 001_log.txt	28.08.2015 14:45	Text Document	51 KB
EG 001_debug.txt	29.08.2015 07:01	Text Document	730 KB
EG 001_events.txt	28.08.2015 15:08	Text Document	1 KB
EG 001_log.txt	29.08.2015 07:01	Text Document	1'438 KB

filename_log.txt: main log file containing the measured values
filename_events.txt: user-entered events log
filename_debug.txt: logs the output stream of the electronics unit
MMDDYYYY_hhmm_xy_log.txt: software-created copy of the currently logging file.

Note: the columns in the file are separated by tab stops and space. When importing the file in excel, please select tab and space as the delimiters.

1.1. Filename_log.txt

Example of a log file –opened in excel. Note: data is separated by tabs.

	A	B	C	D	E	F	G	H	I	J	K	L	M
1	Column1	Column2	Column3	Column4	Column5	Column6	Column7	Column8	Column9	Column10	Column11	Column12	Column13
2	Start Log: 22/10/2020 12:06												
3	Sensor: SRV												
4	Serial Number: B05-0163												
5	eBox Serial Number: 19101382												
6	Sample Name: test												
7	Communication mode: USB (COM5)												
8	Operator Name: Rheonics												
9	Operator Client:												
10													
11													
12	Date	TimeStamp Abs	TimeStamp Rel [s]	Viscosity [mPa.s]	Density [g/cc]	Temperature [°K]	Pressure [bar]	Not connected	Ext. Press. [bar]	Fres [Hz]	dF [Hz]	Event [time]	Event [id]
13													
14	22-Oct.-20	12:06:29	10.2	0.0	1.000	293.8770	1.0000	NaN	nc	7480.75	1.01		
15	22-Oct.-20	12:06:39	20.2	0.0	1.000	293.8770	1.0000	NaN	nc	7480.75	0.99		
16	22-Oct.-20	12:06:49	30.2	0.0	1.000	293.8780	1.0000	NaN	nc	7480.76	1.00		
17	22-Oct.-20	12:06:59	40.3	0.0	1.000	293.8780	1.0000	NaN	nc	7480.76	1.01		
18	22-Oct.-20	12:07:09	50.4	0.0	1.000	293.8790	1.0000	NaN	nc	7480.77	1.00		
19	22-Oct.-20	12:07:19	60.5	0.0	1.000	293.8800	1.0000	NaN	nc	7480.75	1.01		
20	22-Oct.-20	12:07:29	70.6	0.0	1.000	293.8800	1.0000	NaN	nc	7480.75	1.00		
21	22-Oct.-20	12:07:40	80.6	0.0	1.000	293.8810	1.0000	NaN	nc	7480.74	1.01		
22	22-Oct.-20	12:07:50	90.7	0.0	1.000	293.8810	1.0000	NaN	nc	7480.74	1.00		
23	22-Oct.-20	12:08:00	100.7	0.0	1.000	293.8810	1.0000	NaN	nc	7480.76	1.00		
24	22-Oct.-20	12:08:10	110.7	0.0	1.000	293.8830	1.0000	NaN	nc	7480.75	1.02		
25	22-Oct.-20	12:08:20	120.8	0.0	1.000	293.8830	1.0000	NaN	nc	7480.75	1.01		
26	22-Oct.-20	12:08:30	130.8	0.0	1.000	293.8830	1.0000	NaN	nc	7480.74	1.02		
27	22-Oct.-20	12:08:40	140.8	0.0	1.000	293.8850	1.0000	NaN	nc	7480.75	0.99		
28	22-Oct.-20	12:08:50	150.9	0.0	1.000	293.8840	1.0000	NaN	nc	7480.76	1.00		

The log file filename_log.txt contains the following:

Header of measurement: Information about the measurement settings

Data heading row showing the sequence of data values:

Date: Date of measurement
Timestamp absolute: Computer time for the measurement
Timestamp relative [s]: Relative time in seconds from the start of logging
Viscosity [units]: Measured viscosity with selected units
Density [units]: Measured density
Temperature [units]: Measured temperature
Pressure [units]: Pressure (manual or read from externally connected gauge)
Object Temp or not connected: For DTCM or STCM systems, indicates the object temperature
Ext. Pressure [units]: Measured Pressure using an external sensor
Fres [Hz]: Sensor resonant frequency
dF [Hz]: Sensor damping
Event [id]: User-entered event identification name
Event [time]: Timestamp of entered Event

1.2. Importing Files in Excel

1.2.1. For excel version prior to Version 2020.

1. **Filename_log.txt**
    a. Import data 'From text'
    b. Select file type 'Delimited'
    c. Select delimiters
        i. Tab
2. **Filename_debug.txt**
    a. Import data 'From text'
    b. Select file type 'Delimited'
    c. Select delimiters
        i. Tab
        ii. Space
3. **Filename_events.txt**
    a. Import data 'From text'
    b. Select file type 'Delimited'
    c. Select delimiters
        i. Tab

1.2.2 For excel version 2020 onwards

1. **Filename_log.txt**
    a. Go to Data - > 'From Text/CSV'
    b. Click 'Load'
    c. Go to 'Query' - > 'Edit'
    d. 'Applied Steps' -> 'Source'
    e. Edit in the source query the delimiters:
        i. #(tab)
        ii. Columns = 13

    Example Query:

    =
    Csv.Document(File.Contents("D:\RCPTests\201022120616_test_log.txt"),[Delimiter="#(tab)", Columns=13, Encoding=1252, QuoteStyle=QuoteStyle.None])

2. **Filename_debug.txt**
    a. Go to Data - > 'From Text/CSV'
    b. Click 'Load'
    c. Go to 'Query' - > 'Edit'
    d. 'Applied Steps' -> 'Source'
    e. Edit in the source query the delimiters:
        i. " " [space]
        ii. Columns = 43

    Example Query:

    =
    Csv.Document(File.Contents("D:\RCPTests\201022120616_test_debug.txt"),[Delimiter=" ", Columns=43, Encoding=1252, QuoteStyle=QuoteStyle.None])

3. **Filename_events.txt**
    a. Go to Data - > 'From Text/CSV'
    b. Click 'Load'

2. SD CARD Logger files

The SMET SD card continuously logs the sensor data and other relevant information for customers and support. These files are created daily, including the date as part of the name in the format:

YYMMDD-X.txt

Where:

YY – Last two digit of the year.

MM - Two-digit Month number (00-12)

DD – Two-Digit Day of the month (00-31)

X – File type. Can have any of these values: “P”, for measurement file, “A” for sensor file, “C” for calibration file, “O” for support file.

2.1.Measurements Log File (-P)

The measurements log file contains the values of all the calculated measurement parameters from the SMET. There are 21 parameters in total and each parameter has associated four different values:

1. Scaled/calibrated value
2. Unscaled/Uncalibrated value
3. Parameter status
4. Parameter private status.

The first element of the row is the Unix timestamp at which the sample was takes.
The last two elements in the row are the sensor status and the Pressure value.
Therefore, a common measurement string is of the form:

1601819013:
;0.00;0.00;0000;0000;1.001232;1.001232;0000;0000;18.82;18.82;0000;0000;0.00;0.00;0000;0000;1.001232;1.001232;0000;0000;0.00;0.00;0000;0000;1.001232;1.001232;0000;0000;18.83;18.83;0000;0000;7526.42;7526.42;0000;0000;7526.42;7526.42;0000;0000;1.18;1.18;0000;0000;nan;nan;0001;0000;0.00;0.00;0000;0000;1.00;1.00;0000;0000;0.00;0.00;0000;0000;0.00;0.00;0000;0000;0.00;0.00;0000;0000;2.03;2.03;0000;0000;18.83;18.83;0000;0000;0.00;0.00;0200;0000;nan;nan;0003;0000;nan;nan;0003;0000;0000;1.00

1. Unix timestamp
2. Parameter 1 – Scaled Value; Unscaled Value; Parameter Status; Parameter Private Status
3. Parameter 2…
4. Parameter 21
5. Sensor Status
6. Pressure

Each parameter has a specific measurement associated with it. Table below describes the measurement/parameter assignment

Index	Parameter
0	viscosity median / 5 points
1	density median / 5 points
2	temperature median / 5 points
3	Kinematic Viscosity
4	density average / 5 points
5	V - viscosity raw
6	D - density raw
7	T - temperature raw
8	f - resonant frequency (Hz)
9	fc - compensated resonant frequency (Hz)
10	df - damping (Hz)
11	Tc - Coil temperature (°C)
12	viscosity median and last good
13	density median and last good
14	Displays of mapped value from Modbus register 512
15	Displays of mapped value from Modbus register 514
16	Displays of mapped value from Modbus register 516
17	Te – Estimated Temperature
18	Tp- Temperature from PT1000 sensor
19	Parameter calculated from scripting 0 - calc. Viscosity
20	Parameter calculated from scripting 1 - calc. Density
21	Parameter calculated from scripting 2 - concentration

Table 1. Parameters list

The parameter status can take any of the following values, or an “OR” between them.

Bit	**Hex**	Name	Comment
Bit 0	0x0001	General error	This bit is always set in case there is an issue with the parameter. It is something the general user or application programmer can use. 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 can't be calculated as the hardware returns an error.
Bit 3	0x0008	Dependent error	A parameter source for a dependent parameter is not available.
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 Example: Lack of resources
Bit 6	0x0040	Calibration Error	
Bit 7	0x0080	Further use	
Bit 8	0x0100	Parameter Calibrated	Triggered when parameter is calibrated by user

Bit 9	0x0200	Further use	
Bit 10	0x0400	Further use	
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 (depending on parameter type)
Bit 15	0x8000	Alarm upper	Above alarm limit (depending on parameter type)

Table 2 Parameter Status Description

The parameter internal status can take any of the following values OR a combination of it.

Bit	**Hex**	Name
Bit 4	0x0010	Temp Too High
Bit 5	0x0020	Temp Too Low
Bit 6	0x0040	Pressure Too High
Bit 7	0x0080	Pressure Too Low

Table 3 Parameter Internal Status

Sensor status can take any of these values OR a combination of it.

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	
Bit 4	0x0010	Temperature sensor error	The temperature sensor has error. Contact rheonics support if it persists.
Bit 5	0x0020	Sensor too hot	If temperature is above the sensor physical temperature limit.
Bit 6	0x0040	ASB communication error	
Bit 7	0x0080	Serial Changed	
Bit 8	0x0100	Status not clean	Sensor is not clean.
Bit 9	0x0200	Status in Air	Determines if sensor is in air
Bit 10 -15	Unused		

Table 4. Sensor Status

2.2.Sensor Diagnostics File (-A)

The sensor diagnostics log file contains a measurements string that is taken directly from the Sensor Board (ASB). This can be used for diagnostic purposes when there are errors on the measurements file.
Each row of the file is of the form:
Unix Timestamp: ASB String

The **ASB String** is of the form:
"B05-0330 SWV200f ESN19063258 EHW1702" T 18.973 f 7526.147949 df 1.179688 Fv 486 ph 17 I- 1 I+ 1 Q 1.0161176 fr 7526.1563 df- 7525.5693 df+ 7526.748 CR NAN E 00

Between the quotes we can find:

a. Sensor Serial Number
b. Sensor Firmware version
c. ASB serial number
d. Hardware serial number

The rest of the string is composed for a pair Tag/Measurement, described below

Tag	Description	Example
T	Temperature (°C)	25.503000
f	Resonant frequency of the sensor (Hz)	8692.042969
df	Damping (Hz)	1.139844
Fv	internal diagnostics	637
ph	internal diag.	79
I-	internal diag.	2
I+	internal diag.	2
Q	internal diag.	0.964510
fr	internal diag.	8692.023438
df-	internal diag.	8691.461914
df+	internal diag.	8692.588867
CR	internal diag.	200.00
E	Error code ASB (see the error code table below)	00

Table 5 Sensor Diagnostics Measurements

2.3.Calibration/Scaling Record (-C)

A calibration file is created ONLY when the calibration/Scaling of any of the sensor parameters is changed or modified by the users.

The calibration record is intended to display a history of the last calibrated parameters; indicating the parameter index (according to Table 1), the calibration coefficients; user, factory, and current coefficients, and calibration type; offset or slope.

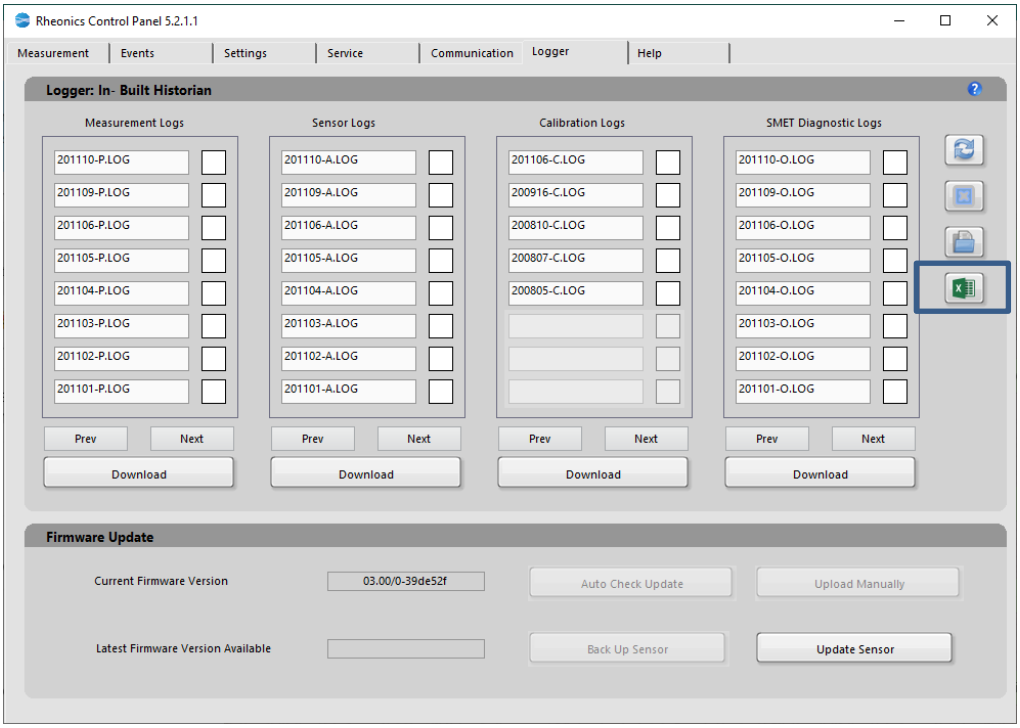
2.4.Electronics Diagnostics (-O)

The electronics diagnostics file is created at startup and reset and every 3600 seconds during operation. This file stores relevant diagnostics information oriented to rheonics support, to give a quick diagnostic of possible errors.

In case of errors with your sensor, download this file using RCP software and send to rheonics support, creating a support ticket in: https://support.rheonics.com/support/tickets/new

2. RCP Export to Excel button

RCP has a function in “Logger” tab that allows you to export files to Microsoft excel format. You can export two types of files: RCP log file, and SME Measurements Log File (-P).



For RCP log file the export button will export each column of the log file into a column in the excel file.

					Start Log: 9/11/2020 05:19							
					Sensor: SRV							
					Sensor Serial Number: B05-0163							
					SME Serial Number: 19101382							
					Sample Name: test							
					Communication mode: USB (COM5)							
					Operator Name: Rheonics							
					Operator Client:							
Date	TimeStamp Abs	TimeStamp Rel [s]	Viscosity [mPa.s]	Density [g/cc]	Temperature [°C]	RCP Pressure input [bar]	Ext. Temp. Input [°C]	Ext. Press. input [bar]	Fres [Hz]	dF [Hz]	Event [time]	Event [id]
09-Nov.-20	17:19:25	10.1	1	1	21.551	1	NaN	nc	7479.36	1		
09-Nov.-20	17:19:35	20.1	1	1	21.551	1	NaN	nc	7479.36	1		
09-Nov.-20	17:19:45	30.2	1	1	21.551	1	NaN	nc	7479.36	0.99		
09-Nov.-20	17:19:55	40.2	1	1	21.552	1	NaN	nc	7479.36	0.99		
09-Nov.-20	17:20:05	50.2	1	1	21.552	1	NaN	nc	7479.36	0.99		
09-Nov.-20	17:20:15	60.3	1	1	21.552	1	NaN	nc	7479.36	1		
09-Nov.-20	17:20:26	70.4	1	1	21.552	1	NaN	nc	7479.36	1		
09-Nov.-20	17:20:36	80.5	1	1	21.551	1	NaN	nc	7479.36	1		
09-Nov.-20	17:20:46	90.5	1	1	21.551	1	NaN	nc	7479.36	1		
09-Nov.-20	17:20:56	100.6	1	1	21.551	1	NaN	nc	7479.36	1		
09-Nov.-20	17:21:06	110.6	1	1	21.551	1	NaN	nc	7479.36	1	17:21:06	Event_1
09-Nov.-20	17:21:16	120.7	1	1	21.551	1	NaN	nc	7479.36	1		
09-Nov.-20	17:21:26	130.7	1	1	21.551	1	NaN	nc	7479.36	1		
09-Nov.-20	17:21:36	140.7	1	1	21.551	1	NaN	nc	7479.36	0.99		
09-Nov.-20	17:21:46	150.8	1	1	21.551	1	NaN	nc	7479.35	1		
09-Nov.-20	17:21:56	160.8	1	1	21.551	1	NaN	nc	7479.35	1		
09-Nov.-20	17:22:06	170.9	1	1	21.551	1	NaN	nc	7479.36	1		

For -P log files, the software will export **ONLY the NON ERROR** Scaled/Calibrated measurement parameters values (this is, sensor status value equal to zero), and the date/times of these samples. These parameters will be displayed on a column each with the corresponding name.

	A	B	C	D	E	F	G	H	I	J	
1	Date and Time [GMT +0]	Date and Time [GMT -5]	Viscosity Median [mPa.s]	Density Median [g/cc]	Temperature Median [°C]	Kinematic Viscosity	Density Average [g/cc]	Viscosity Raw [mPa.s]	Density Raw [g/cc]	Temperature Raw [g/cc]	Resonan
2	05/11/2020 00:00:04	04/11/2020 19:00:04	1	1.001232	20.68	1	1.001232	1	1.001232	20.68	
3	05/11/2020 00:00:51	04/11/2020 19:00:51	1	1.001232	20.68	1	1.001232	1	1.001232	20.68	
4	05/11/2020 00:01:41	04/11/2020 19:01:41	1	1.001232	20.68	1	1.001232	1	1.001232	20.68	
5	05/11/2020 00:02:28	04/11/2020 19:02:28	1.01	1.001232	20.68	1.01	1.001232	1.02	1.001232	20.68	
6	05/11/2020 00:03:15	04/11/2020 19:03:15	1	1.001232	20.68	1	1.001232	1	1.001232	20.68	
7	05/11/2020 00:04:06	04/11/2020 19:04:06	1	1.001232	20.68	1	1.001232	1	1.001232	20.68	
8	05/11/2020 00:04:53	04/11/2020 19:04:53	1	1.001232	20.68	1	1.001232	1	1.001232	20.68	
9	05/11/2020 00:05:43	04/11/2020 19:05:43	1	1.001232	20.68	1	1.001232	1	1.001232	20.68	
10	05/11/2020 00:06:30	04/11/2020 19:06:30	1	1.001232	20.67	1	1.001232	1	1.001232	20.67	
11	05/11/2020 00:07:17	04/11/2020 19:07:17	1	1.001232	20.67	1	1.001232	1	1.001232	20.67	