

### **Rheonics Training Session**

Rheonics | Inline process viscosity and density monitoring

### **Rheonics DTCM**

**Rheonics DVM Thermal Control Module** 

Rheonics Winterthur, Switzerland & Sugar Land, Texas, U.S.A.

- 1. Rheonics DTCM
- 2. Hardware
- 3. Software
- 4. How to set up
- 5. How to start a run
- 6. How to finish a run
- 7. How to clean
- 8. Ordering options



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### 1. Rheonics DTCM





DTCM (DVM Thermal Control Module) is the thermal chamber that uses DVM

DVM (Density Viscosity Module) is the measuring sensor

# 1. Rheonics DTCM

- DTCM is custom designed to ensure uniform temperature distribution across DVM even when installed in a flow loop.
- DVM measure density and viscosity of small fluid volumes, static or flowing.
- DTCM uses a DVM in a controlled temperature module while monitoring and tracking parameters with DTCM HMI.



# 1. Rheonics DTCM

- DTCM eliminates the need for bulky and expensive thermal test chambers (climate chambers) for temperature control.
- It achieve 10x faster stability and uniformity compared to a typical 100L commercial thermal chamber. It enables HPHT fluid analysis with DVM in field and mobile units without compromising data integrity.





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- DVM in DTCM thermal chamber
- Temperature range: 10 °C to 150 °C
- 0.005 °C temperature stability
- 0.05 °C temperature accuracy
- Integrated temperature controller
- Ethernet, Wi-fi, RS485 ports for direct integration
- 7.5kg (16.5 lb) with DVM
- Integration with DTCM HMI





#### DVM module parts

Sensor electronics parts



DVM module inner parts



#### DVM module parts

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### 3. Software





The software that the DTCM uses is a specific version of the Rheonics Control Panel

# There you can find the Temperature Control Tab for the tests

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### 4. How to set up

a. Remove the lid of the DTCM Module



its inlet and outlet lines connected.



b. insert DVM in the DTCM. DVM already has

C. Mount the lid of the DTCM Module

d. Wire the Power cable, Sensor M12 connector, and the TCM ports. Also you can wire your necessary communication ports e. Turn on the DTCM with the power switch, and use the inlet line to fill it with your fluid.



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#### 1. Temperature control Tab

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Constant Te	mperature								Program Controls	
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omperatur	e Profile	_	-	-	-	-	-		Test State	e
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- Open the Rheonics control panel on the Sensor electronics E4.
- Go to "Temp. Control" tab

#### 2. Temperature mode configuration



The temperature control has two modes:

- Mode 1: Constant temperature.
- Mode 2: Temperature profile. You can set a time based temperature profile.

Mode 1: Constant Temperature

a. Check the "set temperature" box.

b. DTCM heats or cools the DVM to the user set temperature.

Temperature box		
Rheonics Control Panel 5.4.0.6	Help	
Constant Temperature	Program Controls	_
Select thermal control unit DTCM V Connection	Play Paus	traction
Cemperature Profile	Test State	2
Temperature ramp Auto Fill Ramp   0 °C 0 °S   0 °S 0 °S   0 °C 0 °S   0 °S 0 °S	Temp. Seipt. Temp. Oven Temp. Sensor Run Time Remaining Time Test State Idle Logging Sampling Duration # Samples Data Path:	0°C 0°C 00:00:00 00:00:00
Save Open Save As Saved profile path	Julia	

Mode 2-A: Temperature ramp – Manual fill

- a. Check the "Temperature ramp" box.
- b. Define the temperature ramp using steps box and cycles box.
- c. Enter temperature setpoint.
- d. Enter dwell time for each setpoint.



Mode 2-B: Temperature ramp – Auto fill Ramp



a. Click on the Auto Fill Ramp button.



b. Set the "start temperature", the "step" and the "end temperature" and click "OK" to create the temperature ramp.



C. A new ramp with your parameters will be created.

# 5. DTCM operation

3. Logging configuration

ogging	_
Sampling Duration	30
# Samples	10
Data Path:	

		Se Logfilenam	e Parameters	
Program Controls		Logfilename F	arameters	
Play Pause	Stop	Sensor 1	fluid	
Sensor Extra	ction	Path In	:\Users\STCM-XX-lab\Des b_2020_06_04\N190000	ktop\

4. Start button

- Configure how often the DTCM logs the data in seconds and how many samples will be taken. The data starts logging when the DTCM reaches the established temperature.
- You can change the path where data will be saved.

Once all the parameters are configured you can start the process with "Play" button. Additionally, user must define the fluid, lot and the path that the data will be storage.

Also, user can pause the DTCM operation at any temperature step using pause button.

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## 6. How to finish a run

	_	_
Program (	Controls	
Play	Pause	Stop
	[ nn ]	

To finish the run you have to click on the Stop button and the DTCM stops heating.

	2. Log files		
<b>ya</b>	190923_1656_SRVavg	1/22/2024 9	):26 AM
Ja	190923_1656_SRVtemp_log	1/22/2024 9	9:26 AM
<b>,</b>	190923_1656_SRVdebug	1/22/2024 9	9:26 AM
9	190923_1656_SRV_log	1/22/2024 9	):26 AM

Log files of your test will be in the path you chose previously.

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# 7. How to clean

Clean in Place (CIP)

- The DVM can be cleaned in place by flushing it with solvent or cleaning fluid through the inlet/outlet lines.
- In-situ cleaning is recommended when process fluid does not have a tendency to leave deposits or adhere to the sensing element.



# 7. How to clean

#### **Clean Manually**

- Once all the processes are finished, to remove the DVM from the DTCM click on the "sensor extraction" button on the Rheonics Control Panel.
- The DTCM will be heated to reach 80 °C, at this temperature remove the lid and the DV module can be removed smoothly avoiding damage.

rogram Controls		Program Controls	8
Play Paus	e Stop	Play Pau	se Stop
Sensor Ex	traction	Stop Ex	traction
lest State	0	Test State	(
Temp. Setpt.	0°C	Temp. Setpt.	80 °
Temp. Oven	0°C	Temp. Oven	0 *0
Temp. Sensor	0 °C	Temp. Sensor	0 *0
Run Time	00:00:00	Run Time	00:00:00
Remaining Time	00:00:00	Remaining Time	00:00:00
		Test State	
Test State			



## 7. How to clean

- Remove the sensing element of the DV module.
- After that, you can use a solvent in a beaker or an ultrasonic bath for 5 or 10 minutes to clean the sensing element.
- At this point, you can also change the backup ring and the O-ring seal if you need it.
- Finally, mount the DV sensing element on the module and now it is ready to be used again.

Learn how to remove and mount the DV sensing element here



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## 8. Ordering options

**DVM - Request for Quote Form** 

Configure DVM

Select the required options for DVM. Please refer to the DVM-Datasheet for more information. (\* indicates required)

Viscosity Range (select all) \*

V1 - 0.2 - 300 cP - Standard calibrated range

Viscosity Calibration (select all) \*

STD - Standard calibration

Density range (select all) \*

D1 - 0 - 1.5 g/cc - Standard range

Density Calibration (select all) \*

DCAL1 - 0.001 g/cc - Standard calibration accuracy

DCAL2 - up to 0.0001 g/cc - Customer specific calibrations - specify density range, accuracy required and operational conditions

Flectronics (select one) \*



inline process density and viscosity monitoring

You can order and see the DTCM and DVM options here

# Rheonics resources available



Science articles, Whitepapers, access to all resources of Rheonics sensors

### Rheonics Resources Library

Find DTCM

documentation and

other Rheonics

integrated solutions

### <u>Rheonics</u> <u>Support Portal</u>

Multiple electronics, mechanics, integration articles Rheonics Partner Training

**Presentation videos** 

