



LABORATORY COOLING WATER MONITORING UNIT AQUASTOP® II

ROTH SELECTION

Dear customer,

thank you for having chosen this AQUASTOP® II cooling water monitor. This high quality device has been produced in the ISO 9001-certified factory Nolden Regelsysteme GmbH and was shipped to you after a thorough quality test.

- Unpack** Check the device for eventual shipping damage.
Don't connect damaged equipment!
Claim the damage with your shipping agent.
- Read** Please read carefully this operating manual before bringing the device into service.
- Connect** Wiring the device should be done by your qualified electrician following the instructions given in this manual.
- Warranty** Period is 1 year and includes all malfunctions clearly caused by material, production or design failures. Repair or replacement in this case are free of charge, you only pay the shipping cost to our factory. No further claims or requirements can be accepted, especially for consequential losses or damages.
- Service** We help you quickly and at reasonable costs. Just send us the device with repair order and precise description of the malfunction.
Carefull packaging is essential for a safe shipment!

To facilitate your orientation in this manual, you find the following symbols:



Safety advice



General information



Wiring- and installing advice



Carl Roth GmbH + Co. KG

Schoemperlenstr. 3–5, D-76185 Karlsruhe · Post office box 10 01 21, Germany

Phone: +49 (0)721/5606 - 0 · Fax: +49 (0)721/5606 - 149

info@carlroth.de · www.carlroth.com

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Cooling water monitoring unit for use in laboratories, switches off any electrical load up to 230 V AC / 3,5 kW in case of

- **Undershooting** of the chosen minimum cooling water flow:
Solenoid valve in the cooling water admission closes, connected electrical load is disconnected with all poles
- **Overshooting** of the chosen maximum temperature limit value:
Cooling water temperature is measured by means of a sensor integrated in the flow meter, alternatively, a separated Pt100 sensor placed elsewhere in the process can be monitored. Solenoid valve in the cooling water admission remains open, connected electrical load is disconnected with all poles
- Acoustical pre-warning before the final switching action
- Freely programmable alarm limit values
- Data interface RS232 for easy registering of all relevant process data



SAFETY ADVICE

1. Please read this advice carefully.
2. Keep this operation manual for use near the unit.
3. This is an electrical device driven with high voltage, please respect all relevant safety regulations. Mains voltage and every voltage greater than 42 volts is dangerous!
4. Connect to a power source following the identification plate on the device.
5. Avoid contamination of the interior with debris, liquids or sprays. Risk of short-circuit, fire or electric shock!
6. Don't place the device on hot surfaces or near radiation sources of hot parts.
7. Keep the power connection cable clear of hot parts or sharp edges.
8. Disconnect the power cable immediately, if:
 - It was damaged
 - Liquid or parts penetrated the device
 - The device was damaged by falling down or other mechanical impacts
 - You have the suspicion of any malfunction
9. The operator must be thoroughly instructed by a qualified person for the work to be carried out.
10. Intervention at the device must only be carried out by qualified staff members.
For repair, the device should be send back to our factory. Attempted self-repair causes immediate termination of the warranty period!
If spare parts are required, only parts recommended by the supplier must be used.
The use of other parts may cause damage and/or hazard for operation personnel.
11. Please respect further recommandations and warnings described in this operations manual.



AQUASTOP® II Laboratory cooling water monitoring unit	
Art. Nr.	CKY2.1
Mains voltage	230 V ± 10 %, 48...63 Hz
Electrical connection	Power cord with protective earth
Nominal rating / nominal current	3,5 kW / 15 A
Fuses	16 A MT (load) 0,5 A MT (solenoid valve) 0,2 A MT (controller)
Solenoid valve	230 V, 50 Hz, 120 mA
Cooling water flow range	2 ... 99 l/h
Flow measurement principle	inductive
Temperature sensor	NTC (integrated in the flow meter) or external Pt100 sensor
Temperature range (internal sensor)	0 ... 80 °C
Temperature range (external Pt100 sensor)	0 ... 250 °C
Alarm output	Floating contact, 1x ON, max. 230 V / 1 A
Display	7 segment LED-display in 2 lines, shows simultaneously waterflow and –temperature, can be switched over to other parameters for control or programming purpose
Signalisation of operational state and alarms:	2x LED yellow : heating / solenoid valve action 2x LED red : temperature alarm / flow alarm
Acoustical alarm	Piezo tweeter 90 db
Operation	4 keys
Insulation voltage	4000 V
Housing	PVC RAL 3000 / RAL 9002
Dimensions (W x D x H)	205 x 175 x 78 mm
Weight	1,3 kg



This unit monitors continuously the cooling water flow and cooling temperature of any critical laboratory equipment operating without surveillance and helps preventing damages caused by insufficient cooling action. It can easily be mounted on already existing installations.

Cooling water admission is controlled by a solenoid valve fitted onto a normal water tap. The combined flow meter / temperature sensor is fitted in the cooling water line downstream of the equipment to be monitored. In case the critical process temperature to be monitored must be measured elsewhere in the installation, an external Pt100 sensor can be connected. This sensor needs then to be placed directly on the spot to be surveyed. Connection of an external temperature sensor automatically disconnects the integrated temperature sensor in the flowmeter.

The heating of the installation or equipment, e.g. a bath or heating plate, can directly be fed from the socket on the backside of the AQUASTOP® II. This protects the installation against damages caused by lack of cooling water, e.g. by a leaky water hose or tube, and also in case of other unacceptable temperature increase, inside the cooling water or elsewhere in the process.

A floating contact (230 V / 1 A) is available for external alarms. AQUASTOP® II is further equipped with a RS232 serial data interface which allows easy documentation of measured values on a connected PC.

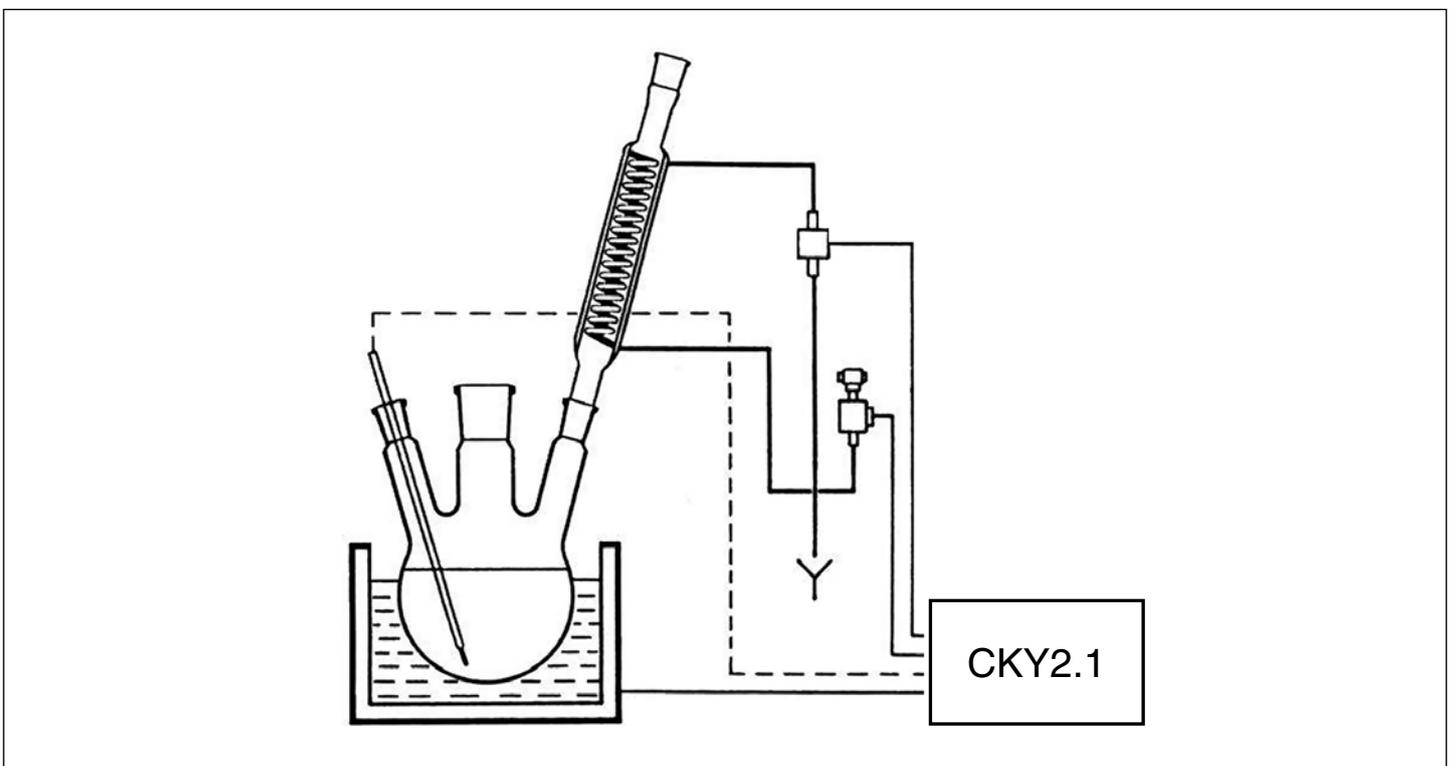


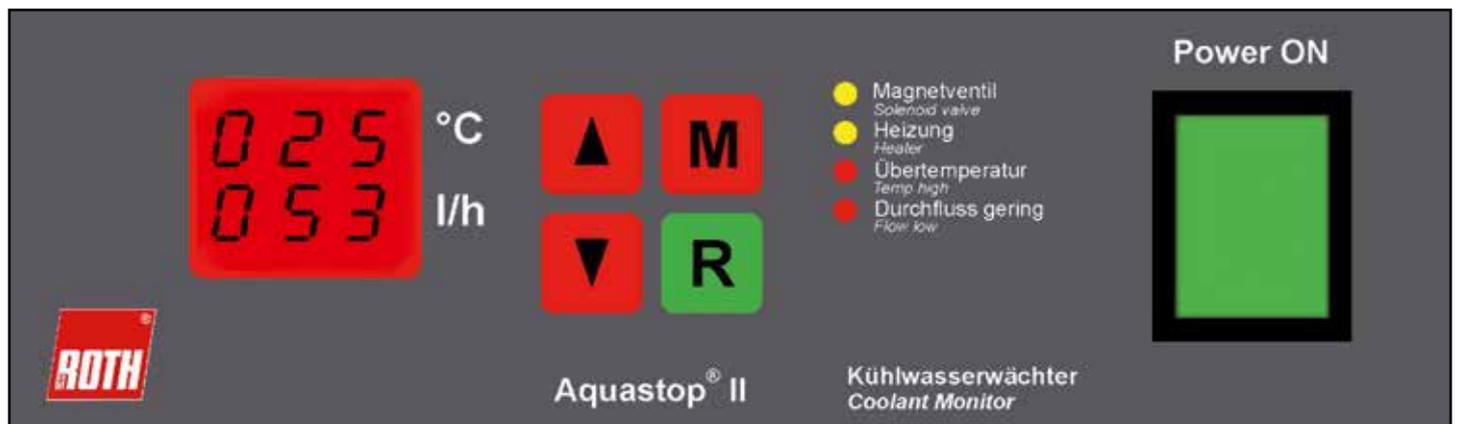
Fig.: Mounting example of the cooling water monitoring unit.



During normal operation, AQUASTOP® II works in surveillance mode. The actual temperature of the cooling water is shown in the upper part of the display. If an external temperature sensor is used (which automatically disconnects the internal temperature gauge in the flow sensor), make sure that this sensor is located at an appropriate position to measure the critical temperature in the process. The measured cooling water flow in liter per minute is shown in the lower part of the display.

If the actual temperature approaches the programmed limit value (see chapter 7.1), a pre-alarm sounds if the tolerance (see chapter 7.3) is reached. The red LED „High temperature“ flashes and an acoustical alarm sounds at the same time.

If the limit temperature is reached, the heating load is definitely switched off (yellow LED „Heating“ is extinguished), the red LED „Temp high“ lights continuously and the floating contact for external alarm is activated. The temperature indication on the display flashes also, the solenoid cooling water valve remains open to ensure the correct cooling of the installation.



The cooling water flow surveillance works in a similar manner: If the flow approaches the programmed limit value (see chapter 7.2), a pre-alarm sounds if the tolerance value (see chapter 7.4) is reached. The red LED „Flow low“ flashes, an acoustical alarm sounds at the same time. If the limit flow value is reached, the heater as well as the solenoid valve are definitely switched off (yellow LEDs „Heating“ and „Solenoid valve“ are extinguished), the red LED „Flow low“ lights continuously and the floating contact for external alarm is activated. The flow indication on the display flashes.

An acknowledgement of the pre-alarms is not necessary, as soon as the temperature or the water flow are again outside the programmed tolerance range, the pre-alarm stops.

On the contrary, the final alarm provokes a definite switching-off, which can only be recycled by pressing the green „R“-key (6). This key causes a complete initialisation of the unit, shown by a circling digit display indication. During 50 s, all alarms are inhibited, the heater as well as the solenoid valve are switched on again. If the failure is not corrected (increased water flow or adjust the alarm values), the alarms are re-engaged and act accordingly.

INSTALLATION AND WIRING

5.1 Installation

The installation site must provide easy access for the operator without hazard. Sufficient mechanical stability must be guaranteed, also secure the device from slipping on the installation surface. To ease operation and good visibility of the display, the handle can be used as a support. To adjust the position of the handle, unfasten the screws on both sides of the handle and fasten them again after adjustment.

5.2 Wiring of power supply

Before wiring the device, make sure that the main switch is in position OFF „0“. Herewith, all poles are disconnected from the mains voltage. **Before working on the device itself or on an installation connected to it, the unit must be prevented against unintentional restart.** This can be done by retracting the power cable and securing it against re-connecting.

After having finished the wiring completely, switch the device on with main switch in position ON „1“.

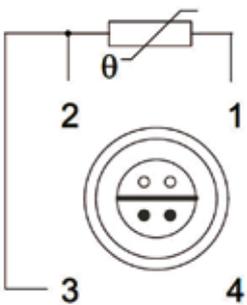
5.3 Wiring of accessories



Pin assignment of flow meter with integrated temperature sensor



Pin assignment of the alarm connector



Pin assignment of the external (alternative) Pt100 temperature sensor

5.3 Wiring of accessories



Fig.: Back AQUASTOP® II

- 1** External Pt100 temperature
- 2** Flowmeter
- 3** Floating alarm contact max. 230 V / 1 A
- 4** Serial interface RS-232
- 5** Fuse heating 16 A MT
- 6** Fuse solenoid valve 0,5 A MT
- 7** Fuse controller 0,2 A MT
- 8** Power cord
- 9** Socket solenoid valve 230 V
- 10** Socket heating 230 V, 16 A

6.1 Operating elements and keys

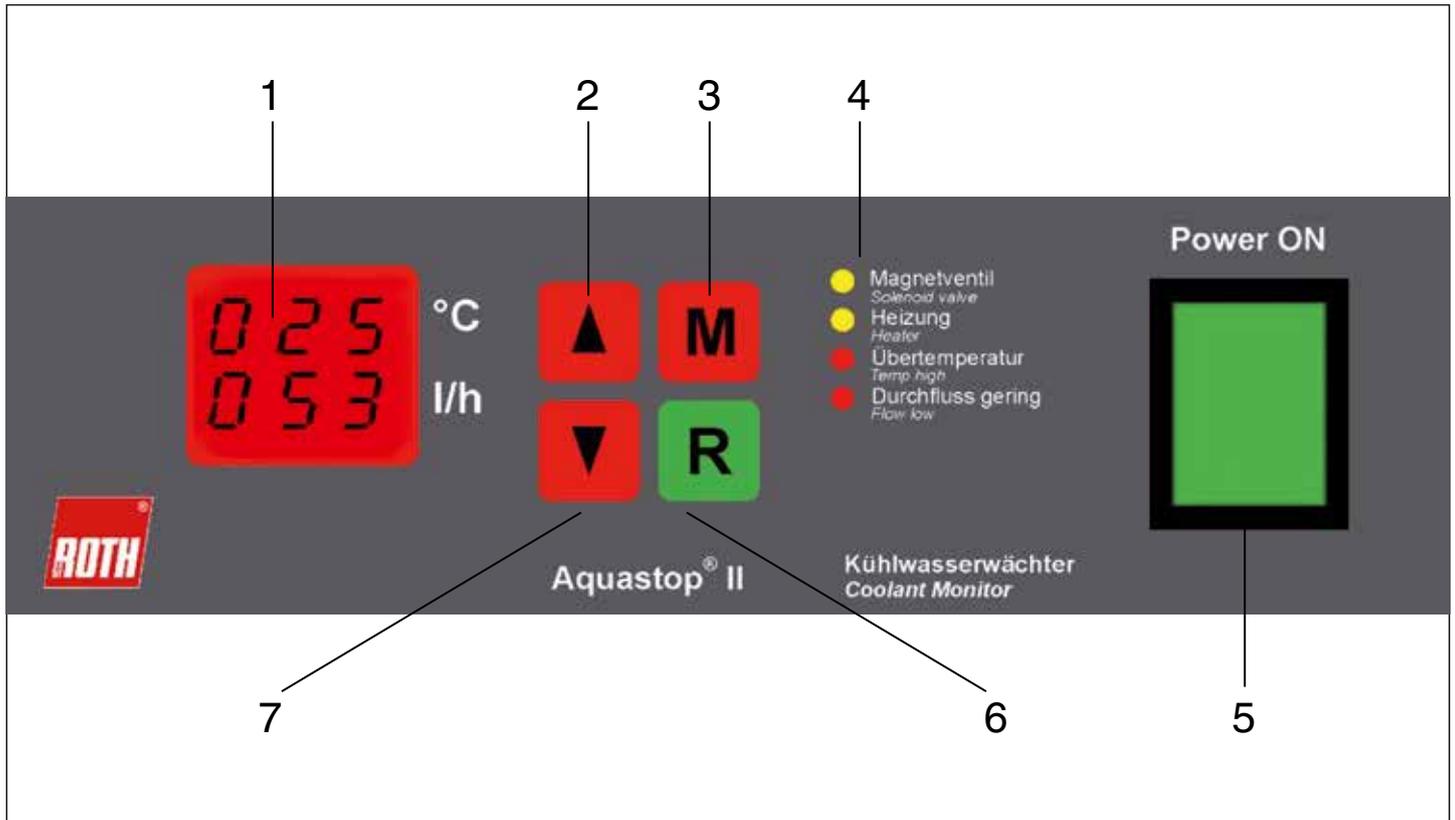


Fig.: Front AQUASTOP® II

- 1 Multi-function display
- 2 „UP“-key
- 3 „Mode“-key
- 4 LED signalisation operational state
- 5 Main switch
- 6 „Reset“-key
- 7 „DOWN“-key

6.1 Operating elements and keys

Key operational functions:



Press the UP or DOWN keys (2/7) to increase or decrease the actual value by 1 digit.



Move up or down quickly by holding the key pressed.



MODE-key, toggles the display from actual value to program mode.
Set the duration of the pre-alarm by pressing both „M“ (3) and „UP“ or „DOWN“-keys (2/7) simultaneously.



RESET (6) the surveillance algorithm to initial position. The unit then behaves as after an complete restart (Power ON).

LED signalisation:



Magnetventil
Solenoid valve

Illuminated when solenoid valve is engaged.



Heizung
Heater

Illuminated when heating is on.



Übertemperatur
Temp high

Flashes if temperature approaches the programmed limit value,
illuminated if limit value is reached.



Durchfluss gering
Flow low

Flashes if coolant flow approaches the programmed limit value,
illuminated if limit value is reached.

6.2 Start-up



Attention:

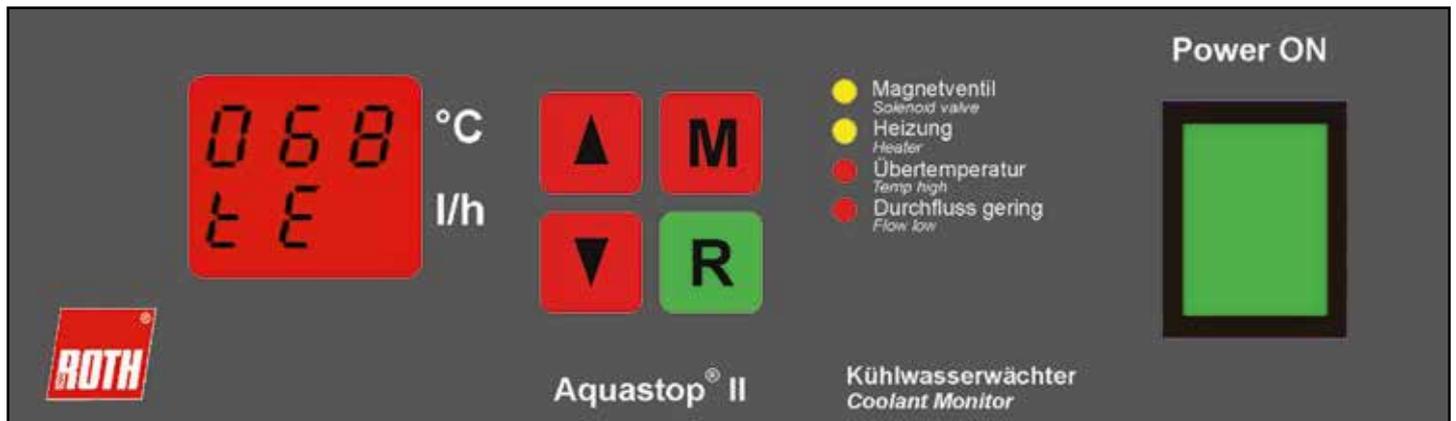
Before switching the unit on, make sure that all tubing is tightly secured and the flow meter is mounted in the right direction of the cooling water stream (see arrow).

After verification of all electrical connections, switch the coolant monitor on (5). The green light within the main power switch is now illuminated.

Open then the water tap and adjust the water flow to the desired flow value shown on the lower line of the display (1). During 50 s after the initial start-up (or after having pressed the RESET-key (6), AQUASTOP® II is re-initialized and all alarms are inhibited. This gives you enough time to fill and adjust the entire installation.

During this period, a circling digit on the display shows the initialisation phase. Occasional alarms are only indicated by flashing of the corresponding LED (4), but do not influence the connected heating and/or solenoid valve.

7.1 Temperature limit value



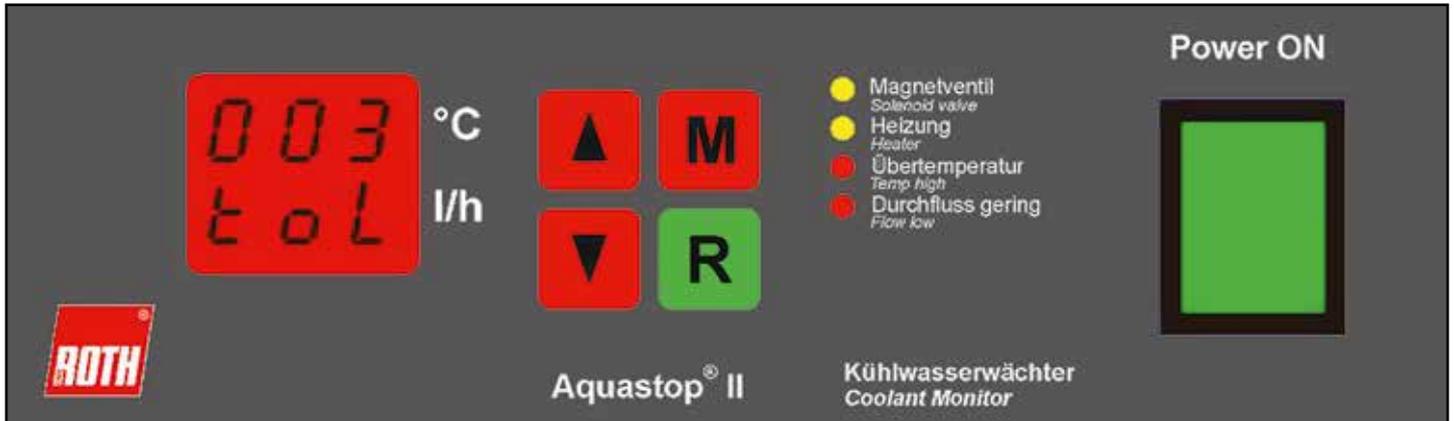
To alter the temperature limit value, press once the „M“-key (3). On the lower line of the display, „te“ is shown and the temperature limit value shown on the upper display line can now be altered with the „UP / DOWN“ keys (2/7). Maintaining the keys pressed makes increasing or decreasing the value quicker. The new limit value is automatically accepted after 20 s (back to surveillance mode). Pressing the „M“-key (3) again switches over to the next menu parameter.

7.2 Flow limit value



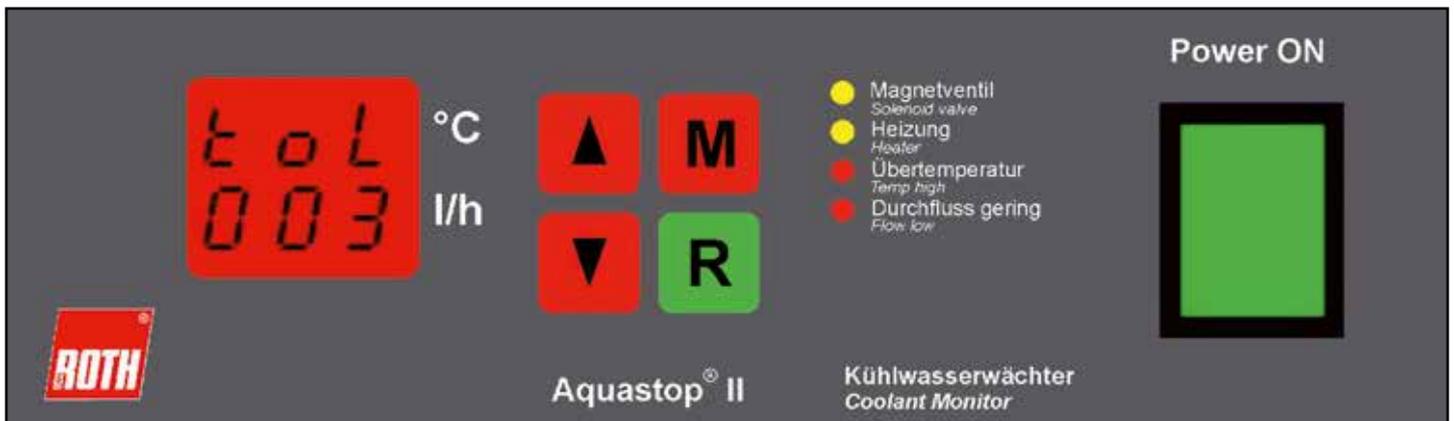
On the upper line of the display, „flo“ is shown and the flow limit value shown on the lower display line can now be altered with the „UP/DOWN“ keys (2/7). Maintaining the keys pressed makes increasing or decreasing the value quicker. The new limit value is automatically accepted after 20 s (back to surveillance mode). Pressing the „M“-key (3) again switches back to surveillance mode.

7.3 Temperature tolerance value



Starting from the normal surveillance mode, press and maintain the „UP“-key (2), then press additionally the „M“-key (3). On the lower line of the display, „tol“ is shown and the temperature tolerance value shown on the upper display line can now be altered with the „UP/DOWN“ keys (2/7). This tolerance value determines the temperature difference from the programmed limit value (see chapter 7.1), at which the acoustical pre-alarm sounds. The new tolerance value is automatically accepted after 20 s or after having pressed the „M“-key (3). The unit then switches back to surveillance mode.

7.4 Flow tolerance value



Starting from the normal surveillance mode, press and maintain the „DOWN“-key (7), then press additionally the „M“-key (3). On the upper line of the display, „tol“ is shown and the flow tolerance value shown on the lower display line can now be altered with the „UP/DOWN“ keys (2/7). This tolerance value determines the flow difference from the programmed limit value (see chapter 7.2), at which the acoustical pre-alarm sounds. The new limit value is automatically accepted after 20 s (back to surveillance mode). Pressing the „M“-key (3) again switches over to the next menu parameter.

7.5 Calibration of the flow meter



If AQUASTOP® II is delivered together with a flow meter, the unit is already adjusted with that sensor and no extra calibration is required. In case of replacement of a flow meter, a new calibration of the unit to that other sensor is needed.

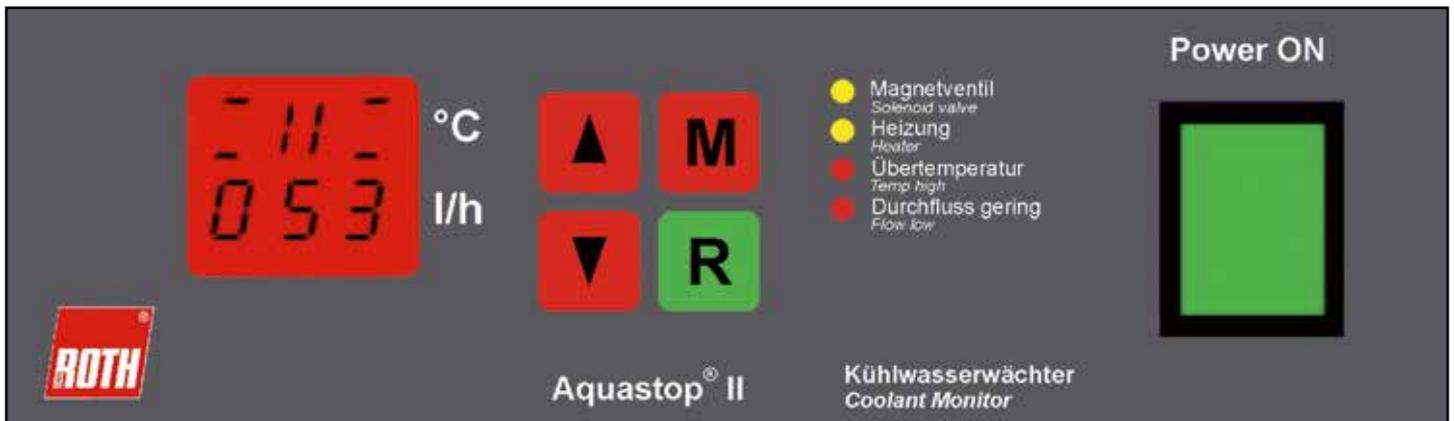
Therefore, install an additional calibrated flowmeter in the cooling water circuit downstream of the sensor to be calibrated and adjust a water flow of 90 l/min.

Starting from the normal surveillance mode, press and maintain the „DOWN“-key (7), then press additionally the „M“-key (3) **once**. Release then the „DOWN“-key (7) and press again the „M“-key (3).

In the upper display line, the calibration factor is shown, in the lower line, the word „CAL“ is shown alternating with the actual flow value. With the „UP/DOWN“-keys (2/7), you can now alter the calibration factor in 0,01 steps within a range from 0,1 up to 9,99. Modify the calibration factor until the actual flow value shown in the lower display line matches the flow value measured with the additional flow meter mounted downstream of the new sensor.

The new calibration factor is confirmed by pressing the „M“-key (3). If no confirmation takes place, the unit switches automatically back to normal surveillance mode by using the former calibration factor.

8.1 Temperature sensor failure



No signal on the temperature sensor entrance:

- Check the sensor connector
- Check the electrical wiring (might be damaged)

8.2 Flow meter failure



Wrong signal on the flow sensor entrance:

- Purge the flexible hosing (air bubbles might cause an irritation of the sensor)
- Check the flowmeter for contamination
- Check the flow (flow > 100 l/h situated out of the range of the flowmeter)

Pin assignment of the connector

1	DCD
2	RxD
3	TxD
4	DTR
5	GND
6	DSR
7	RTS
8	CTS
9	RING

Transmission parameters

To be set in accordance with the host computer.

Protocol: 9.600 baud
8 bit
No parity
1 stop bit

One line is sent every second, finished by 'Return' (CR) and 'Linefeed (LF)'.
6 values ASCII are being sent, separated by comma:

- Flow real value (3 digits, starting with zero)
- Temperature real value (3 digits, starting with zero)
- Temperature pre-alarm active (binary 0 / 1)
- Temperature main alarm active (binary 0 / 1)
- Flow pre-alarm active (binary 0 / 1)
- Flow main alarm active (binary 0 / 1)

In case of void values, the ASCII-signs «---» are sent at the place of the corresponding value.



DECLARATION OF CONFORMITY

This declaration is valid for the following products:

Model designation: Coolant monitor
Type: AQUASTOP® II

Hereby is confirmed, that these products meet in their design and accomplishment as marketed by the manufacturer and if properly used the following EU-directives:

EU-Low voltage directive 2004/108/EG
EU-Directive for electromagnetic compatibility 2006/95/EG

Applicable harmonized norms: EN 60204 Part 1
EN 61000-6-1
EN 61000-6-3

This declaration is binding for the manufacturer

NOLDEN REGELSYSTEME GMBH
Am Tonschuppen 2 · Gewerbegebiet Volmershoven
D-53347 Alfter · Germany

Hans Werner Müller,
General manager

Alfter, 01.01.2015



Global Contact:

Carl Roth GmbH + Co. KG · Schoemperlenstr. 3-5 · 76185 Karlsruhe · Germany
Phone: +49 (0)721/5606-0 · Fax: +49 (0)721/5606-149
info@carloth.de · www.carloth.com

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