

7 Service and repair

This chapter contains information on troubleshooting and correction should an error occur during operation.

Repairs to the equipment may only be performed by Bühler authorised personnel.

Please contact our Service Department with any questions:

Tel.: +49 (0) 2102-498955 or your agent

For more information on your custom maintenance and startup services, please visit: <https://www.buehler-technologies.com/service>

If the device is not functioning properly after correcting any malfunctions and switching on the power, it must be inspected by the manufacturer. Please send the equipment inside suitable packaging to:

Bühler Technologies GmbH – BZL

Halle A1 – Aircompark

Halskestr. 24

40880 Ratingen

Germany

Any device with a potential leak must not be sent. Please contact our service team for more information.

For devices for H_2/O_2 applications, seal the gas and condensate path or return it without any parts in contact with the medium.

Please also attach the completed and signed RMA decontamination statement to the packaging. We will otherwise be unable to process your repair order.

You can find the form in the appendix of these instructions, or simply request it by e-mailing:

service@buehler-technologies.com

7.1 Carrying out maintenance, repair and modification work

For all work on the device, the general instructions in the Safety instructions chapter must be observed!

When performing any work on the device, it is recommended to ensure a minimum room of 3.5 m³ or employ other safety measures to avoid any potential ignition sources.

For sample gas coolers with stainless steel heat exchangers for **O₂ applications (suffix -O₂)**, there are special requirements for avoiding contamination when performing maintenance, repairs or modifications:

- Use only cleaned and undamaged tools. We recommend cleaning with a lint-free cleaning cloth, ideally pre-soaked with a mixture of isopropanol and demineralised water for residue-free degreasing.
- Use only cleaned, genuine spare parts (see chapter Spare Parts and Spare parts and accessories for cooler with -H₂/-O₂ heat exchanger).
- Do not use any parts whose original packaging is damaged.
- The use of compressed air is only permitted if it meets at least class 2 according to ISO 8573-1:2010.

DANGER



Electrical voltage

Electrocution hazard.

- a) Disconnect the device from power supply.
- b) Make sure that the equipment cannot be reconnected to mains unintentionally.
- c) The device must be opened by trained staff only.
- d) Regard correct mains voltage.



DANGER



Toxic, corrosive gas/condensate

Sample gas/condensate may be hazardous to health.

- a) If necessary, ensure a safe gas/condensate discharge.
- b) Always disconnect the gas supply when performing maintenance or repairs.
- c) Protect yourself from toxic/corrosive gasses/condensate when performing maintenance. Wear suitable protective equipment.
- d) Do not allow condensate to drip into the housing.



WARNING**Flammable substances**

The device is filled with flammable refrigerant R600a.

- a) Careful handling and specific choice of installation location and operating conditions. The recommended minimum room must be observed, or other safety measures must be taken.
- b) Do not damage the refrigeration circuit. In the event of damage:
 - ⇒ Keep away from open flames or sources of ignition.
 - ⇒ Ventilate the room for several minutes.
 - ⇒ Switch off the device.
 - ⇒ Contact the manufacturer for repair.
 - ⇒ Do not discharge refrigerant into drains or rooms where there are open flames or sources of ignition.

CAUTION**Health hazard if the heat exchanger leaks**

The heat exchanger is charged with glycol-based coolant.

In the event of a heat exchanger leak:

- a) Avoid contact with the skin and eyes.
- b) In the event of a leak, do not restart the cooler under any circumstances. The cooler must be repaired by the manufacturer.

CAUTION**Hot surface**

Risk of burns

The housing can be up to 60 °C during operation.
Allow the unit to cool down before working on it.

7.1.1 Opening the housing

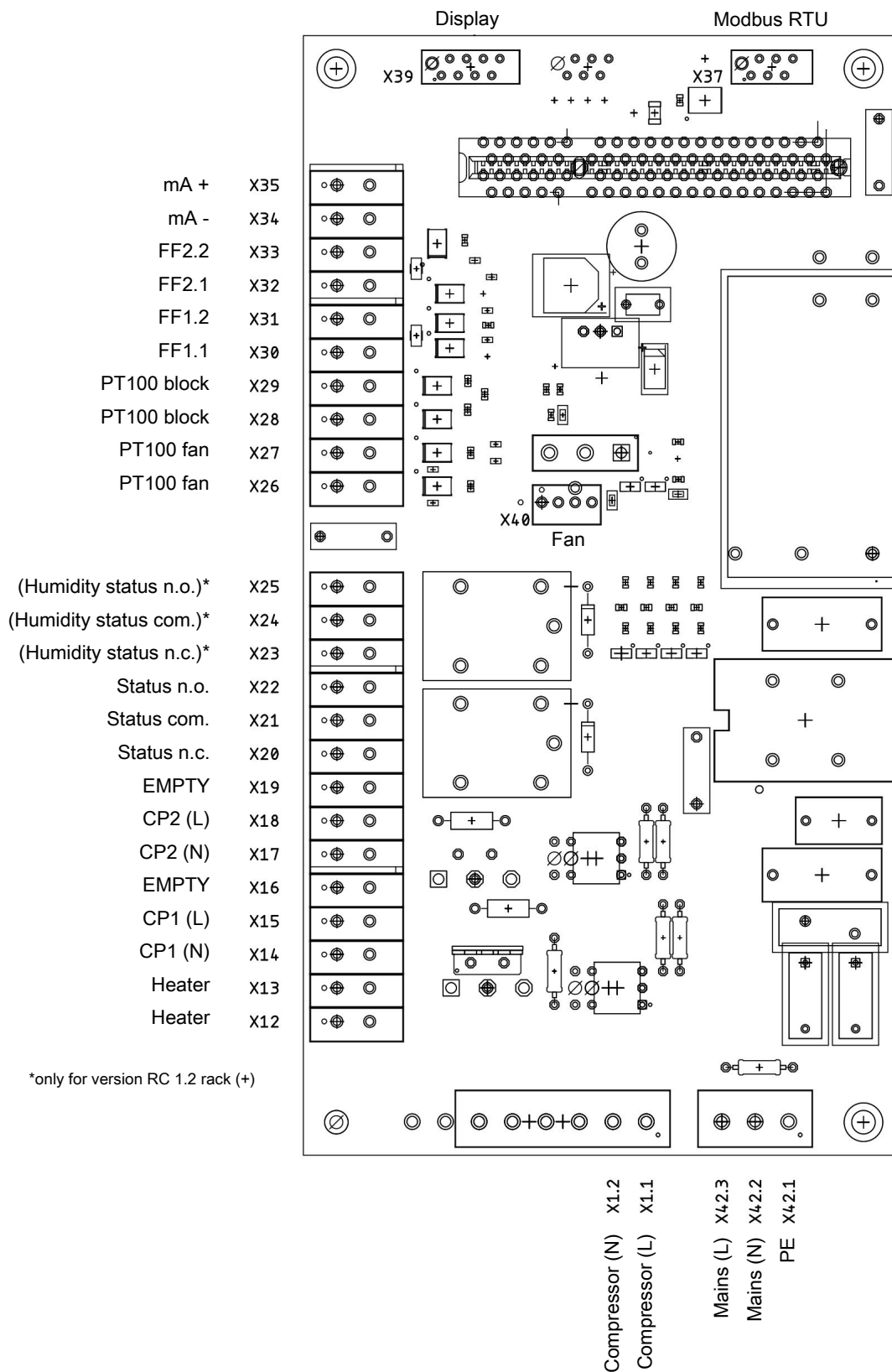
- Shut off the gas supply.
- Switch off the device and disconnect the mains and status plug (disconnect all poles).
- Disconnect the gas connection (only when dismantling the cover).
- The fastening screws for the front panel are located underneath the device. The fastening screws for the cover are located on the top and at the rear.
- Remove the front panel by pulling the lower end slightly forward and releasing the hooked connection at the top (Caution: The front panel contains cable connections from the display module and, optionally, from the condensate pump).
- To close the cover, reassemble the device in the reverse order.

7.1.2 Replacing the fan

- Open the device as described in the chapter [Opening the housing](#) [> page 35].
- Unplug the connector from the controller board.
- Loosen the four fastening screws of the fan.
- Replace the fan and reassemble the device in the reverse order.

7.1.3 Replacing the controller board

- Open the device as described in the chapter Opening the housing.
- The controller board can be removed either directly or together with the drawer. To remove the drawer, loosen the side screw from the outside and the two nuts at the bottom (inside).
- Remove all cables, see terminal diagram:



- Loosen the nuts at the corners of the board.
- Replace the board and reassemble the device in the reverse order.

7.1.4 Replacing the MCP2 microcontroller board

- Open the device as described in the chapter [Opening the housing](#) [> page 35].
- Remove the MCP2 board from the control board.
- Attach the new board.
- Reassemble the device in the reverse order.

7.1.5 Replacing the MCD400 display module

- Open the device as described in the chapter [Opening the housing](#) [> page 35].
- Disconnect the flat cable from the display.
- Press out the snap-in frame, if necessary compress the clips, and remove the old display module.
- Insert the new display module and press it flush with the housing.
- Reassemble the device in the reverse order.

7.1.6 Cleaning and removal of the heat exchanger

Heat exchangers only need to be replaced or serviced if they are blocked or damaged. If they are clogged, we recommend checking whether this can be avoided in the future by using a filter.

For applications with high-purity oxygen or hydrogen, cleaning in accordance with common application-specific standards or the use of an original replacement heat exchanger is recommended.

To clean or remove the heat exchanger, carry out the following steps:

- Shut off the gas supply.
- Switch off device and disconnect all plugs (e.g. status output connector, supply input, etc.).
- Disconnect gas connections and condensate drain.
- Pull the heat exchanger up and out.
- Clean cleaning nest (hole inside the cooler block), as the heat exchangers are installed with silicone grease.
- Flush the heat exchanger until all contaminants have been removed. Recommendation: Start against the direction of the gas flow.
- Coat the cooled outer surface of the heat exchanger with silicone grease.
- Insert the heat exchanger back into the cooling nest with a rotating motion.
- Reconnect the gas supply and condensate drain. The gas inlet is marked red.
- Restore power/gas supply and wait until the device is ready for operation.
- Open the gas supply.

7.1.7 Replacing the peristaltic condensate pump (optional)

- Shut off the gas supply.
- Switch off the device and disconnect the mains plug.
- Remove the front panel from the cooler.
- Loosen the screws on the underside of the mounting bracket.
- Replace the condensate pump.
- Establish the earth connection.
- Push the hoses onto the hose connectors and ensure they are leak-tight. The pumping direction is indicated on the housing.
- Reassemble the device in the reverse order.

7.1.8 Replacement of the hose for the peristaltic condensate pump (optional)

- Shut off the gas supply.
- Use the “Peristaltic Pump” device option and switch off the pump via the menu or switch off the device.
- Disconnect supply and discharge tube on peristaltic pump (**observe safety notes (especially about condensate)!**).
- Loosen, but do not remove, the centre-knurled nut. Flip down the screw.
- Pull cover up and off.
- Unplug external connections and remove hose.
- Replace hose (Bühler spare part) and install peristaltic pump in reverse order.
- Restore the power and gas supply.

7.1.9 Replacing the filter element (option)

CAUTION



Gas leakage

The filter should not be dismantled under pressure.
Don't use damaged parts again.

- Shut off the gas supply.
- Pull the bracket while holding the filter glass in place.
- Whilst holding the filter head, move the glass back and forth and carefully remove downward.
- Remove the filter element and insert a new one.
- Check for leaks and replace, if necessary.
- Refit the glass while simultaneously holding the filter head and gently moving it back and forth, attach the bracket and ensure it is securely seated.
- Restore the gas supply.

NOTICE! Observe legal regulations when disposing of filter elements.

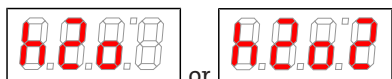
7.1.10 Drying of the moisture detector (option)

The moisture detector must be dried if moisture enters.

- Close the gas supply.
- Switch off and unplug the device.
- Loosen the swivel nut for the moisture detector connection line and disconnect the line.
- Unscrew the moisture detector counter-clockwise and remove.
- Dry moisture detector.
- Reinsert the moisture detector and carefully tighten the screw connection.
- Connect the connection line and tighten the swivel nut.
- Restore the power and gas supply.

7.1.11 Calibration of the moisture detector (option)

- When replacing the moisture detectors, they must be recalibrated.
- Be sure dry gas flows through the cooler.
- Select cooler menu and confirm.



- Select menu item moisture detector.



- The display shows (Reset).
- Confirm the display to calibrate the moisture detectors.

For a detailed overview of menu navigation, refer to chapter "Operation and Control".

7.2 Troubleshooting

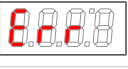
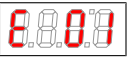
Problem/malfunction	Possible cause	Action
Condensate inside the gas output	– Condensate trap full	– Empty condensate trap
	– Valve inside the automatic condensate drain may be stuck	– Flush in both directions
	– Cooler overload	– Observe limit parameters
	– Hose contaminated or blocked	– Flush in both directions, replace hose for condensate pumps if necessary
Reduced gas flow rate	– Gas circuit clogged	– Remove and clean heat exchanger – if necessary, replace filter element
	– Condensate output iced over	– Send in device
Excess temperature	– Operating point not yet reached	– Wait (max. 20 min)
	– Cooling capacity too low, although the cooler is operating	– Ensure ventilation slots are not covered (heat build-up)
		– Operation outside specification (especially ambient temperature)
	– Flow rate too high / Dew point too high / Gas temperature too high	– Observe limit parameters / Install pre-separator if necessary
	– Built-in fan not operating	– Check and replace if necessary
Temperature low	– Faulty refrigerant circuit. Warning! Observe safety instructions	– Contact service
	– Controller failure	– Send in cooler
No cooling	– Compressor does not start	– Compressor (PTC) not sufficiently cooled down. Wait 5 minutes and try again.
	– Increased current consumption of the compressor due to faulty start	
Modbus communication fault	– Bus connection fault	– Check electrical connections
	– Line termination fault	– Check bus line
	– Check bus configuration	– Check/reset configurator

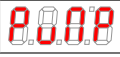
7.2.1 Error Messages in the Display

If an error occurs, the display will read "Err". Press the "▲" button to show the error number(s).

Error messages will appear until the unit has been restarted or the error is cleared using the "Func" button. It can only be cleared if the cause for the error has been corrected.

Causes / Action: The following is a list of the most common causes and actions for the respective error. If the actions listed do not resolve the problem, please contact Service.

Problem/malfunction	Possible cause	Action
No display	– No voltage – Loose connecting cable – Display failure	– Check the supply cable – Check connections
 D1.02 (permanent)	(The software version for the display will appear). – Not communicating with the controller	– Check connections
 Error	– An error has occurred	– Read the error number as described above
 Error 01	– Controller malfunction	– Clear error (temporary fault) – Disconnect from power for approx. 5 s – Contact service
 Error 03	– Microcontroller fault / MCP2	– Contact service
 Error 04	– EEPROM error	– Contact service
 Error 06	Motor speed signal faulty – Fan connector not connected – Fan blocked	– Check whether the fan is blocked – Check the fan connector contact on the controller board
 Error 22	– Moisture detector 1 cable break	– Check moisture detector line – Check moisture detector
 Error 32	– Moisture detector 2 cable break	– Check moisture detector line – Check moisture detector
 Error 40	– General error temperature sensor 1	– Possible sensor failure
 Error 41	– Low temperature/short-circuit temperature sensor 1	– Check temperature sensor connection
 Error 42	– High temperature/short-circuit temperature sensor 1	– Check temperature sensor connection
 Error 43	– Measurement fluctuation temperature sensor 1	– Check temperature sensor connection
 Error 51	– Low temperature / short-circuit temperature sensor fan control	– Check temperature sensor connection
 Error 52	– Low temperature / cable break temperature sensor fan control	– Check temperature sensor connection
 Error 53	– Measurement fluctuation temperature sensor fan control	– Check temperature sensor connection

Status text	Possible cause	Action
 H2o.1	– Moisture alarm moisture detector 1	– Dry – Check condensate trap
 H2o.2	– Moisture alarm moisture detector 2	– Dry – Check condensate trap
 init	– Initialisation phase	– Wait
 PuMP	– Pumps deactivated	– Reactive pumps via menu
 (Flashing)	– Excess/low temperature	– see chapter "Troubleshooting"

7.3 Spare Parts

Please also specify the model and serial number when ordering parts.

Upgrade and expansion parts can be found in our catalog.

Available spare parts:

Item no.	Description
9100100007	MCD400 display module
9100030265	Modbus RTU interface module
9144050079	Connecting cable controller board display module
9144051038	Modbus RTU interface module connecting cable
9100130380	Microcontroller board MCP2.2
9100130385	Controller board 10 W 115-230 V
9124040101	Fan 24 V
90214702	Silicone grease 1.5 ml
4011000	Flow adapter type G, PVDF G1/4
40110001	Flow adapter type NPT, PVDF NPT 1/4"
4011005	Flow adapter type G, stainless steel, G1/4
40110051	Flow adapter type NPT, stainless steel, NPT 1/4"
4111100	Moisture detector FF-3-N, without cable
9144050081	Moisture detector connection cable, 300 mm
9144050086	Moisture detector connection cable, 520 mm
44920035012	Hose for condensate pump, Tygon (Norprene), angled hose nipple
44920035016	Hose for condensate pump, Tygon (Norprene), angled hose nipple and screw connection (metric)
44920035017	Hose for condensate pump, Tygon (Norprene), angled hose connector and imperial threaded fitting

7.3.1 Spare Parts and Accessories

Item no.	Description
41020050	Filter element F2-L; unit 2 count (for type RC 1.1)
41030050	Filter element F2; unit 5 count (for type RC 1.2+)
9144050143	Modbus RTU connection cable 2 m
9144050144	Modbus RTU connection cable 5 m
4410001	Automatic condensate drain 11 LD V 38
4410004	Automatic condensate drain AK 20, PVDF
4410005	Condensate trap GL 1; glass, 0.4 l
4410019	Condensate trap GL 2; glass, 1 L
459600026	Adapter plate EGK 1/2 to RC 1.1 and RC 1.2+
see data sheet 410001	Fine mesh filter AGF-PV-30
see data sheet 450020	Peristaltic condensate pumps CPsingle, CPdouble

7.3.2 Spare parts and accessories for cooler with -H2/-O2 heat exchanger

Item no.	Description
4410001 (see data sheet 450005)	Automatic condensate drain 11 LD V 38 ¹⁾
4410001-O2 (see data sheet 450005)	Automatic condensate drain 11 LD V 38 optimised for oxygen
see data sheet 400016	Stainless steel pipe fittings for high-purity oxygen applications

¹⁾ For use with high hydrogen concentrations max. 1.5 bar overpressure.