WÖHLER

Operating manual
Manifold Refrigerant

EN

Wöhler MR 400

Best.-Nr. 25251– 2023-09-14

Content

1 General

1.1 Information on the operating instructions

These operating instructions enable you to operate the Wöhler MR 400 fitter's aid safely. Keep these operating instructions in a safe place.

The Wöhler MR 400 may only be used by qualified personnel for the intended purpose.

We accept no liability for damage resulting from failure to observe these operating instructions.

1.2 Notes in the operating instructions

WARNING!
Indicates instructions which, if not followed, may result in injury or death.

ATTENTION!
Indicates information about dangers that may result in damage to the appliance or objects.

NOTE!
Highlights tips and other useful information.

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1.3 Intended use

The Wöhler MR 400 is a digital fitter's aid for maintenance work on refrigeration systems and heat pumps. The device precisely displays the high and low pressure as well as the condensation and evaporation temperature of numerous refrigerants in real time. Two temperature sensors simultaneously and accurately determine superheating and subcooling.

1.4 Basic equipment

Device	Scope of delivery
Wöhler MR 400	Wöhler MR 400 Fitter's aid
	3 AA batteries 1.5 V
	2 temperature clamps
	Refrigerant hoses, each with ¼" SAE thread, closable with ball valve
	Transport case

1,5 V

1.5 Disposal

Electronic devices must not be disposed of in household waste, but must be disposed of in accordance with the applicable environmental regulations.

Defective batteries are considered hazardous waste and must be taken to the designated collection points for disposal.

2 General warnings

WARNING!
Danger from pressurized, hot, cold or toxic refrigerants!

Wear protective goggles and gloves.

Never use the unit in potentially explosive atmospheres.

When working on systems with refrigerants, an explosive atmosphere must be expected. All work on such systems may only be carried out by qualified personnel.

ATTENTION!
Secure the unit against falling down before pressurising it, e.g. with the suspension.

Do not operate the unit if there is damage to the housing or hoses. This applies in particular after the unit has been dropped or subjected to extraordinary mechanical stress.

Replace the hoses after dropping or mechanical stress.

ATTENTION!
Escaping refrigerant gases are extremely harmful to the environment, depending on the refrigerant. Observe the applicable environmental regulations.

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3 Specification

3.1 Measured values

Pressure

Description	Indication
Selectable units	kPa, MPa, bar, Psi, kg/cm^2 Default setting: bar
Measuring range	-1 up to 55 bar
Accuracy	± 0.5 % of the full scale value
Resolution	0.03 bar

Temperature

Description	Indication
selectable units	°C , °F
Measuring range	-40 °C to 150°C
Accuracy	± 0,5°C
Resolution	0,1°C

Refrigerant

Indication
88 refrigerants selectable in the unit R113 R114 R115 R116 R12 R123 R1233ZD R1234ZE R1234YF R124 R125 R13 R134A R14 R141b R142b R143A R152A R170 R22 R23 R236FA R245FA R290 R32 R401A R401b R401C R402A R402b R403b R404A R406A R407A R407b R407C R407d R407F R408A R409A R410A R410b R412A R413A R414A R414b R416A R417A R417C R420A R421A R421b R422A R422b R422C R422d R424A R426A R427A R428A R429A R434A R437A R438A R441A R443A R448A R449A R450A R452A R452b R453A R454A R454b R455A R458A R500 R502 R503 R507A R508A R508b R514A R600 R600A R601A R718 R744

Specification

Connections

Description	Indication
Pressure	Schrader ¼ " SAE
Temperature	6-pole temperature plug

Power supply

Description	Indication
Power supply	3 AA batteries 1.5 V
Battery life	Approx. 200 h without backlight

Housing

Description	Indication
Dimensions	8 x 113 x 68 mm
Weight	Approx. 1 kg

Environmental conditions

Description	Indication
Operating temperature	-10 to 50 °C
Storage temperature	-20 to 60 °C

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4 Structure and functions

4.1 Device parts

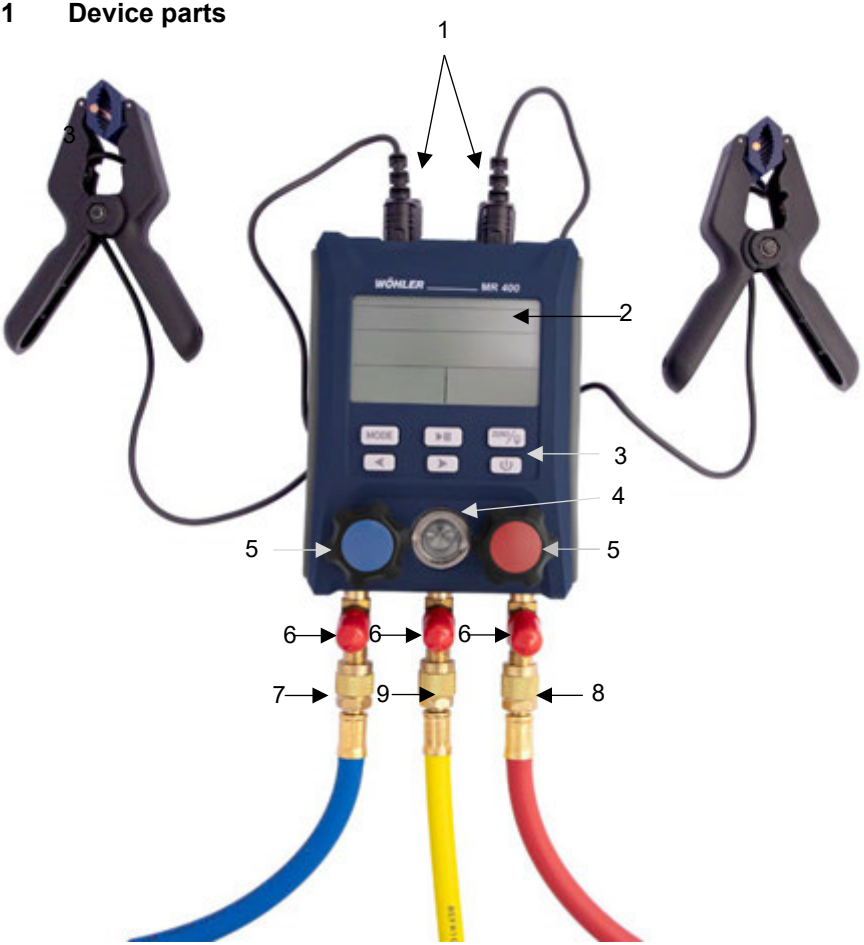
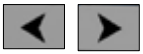
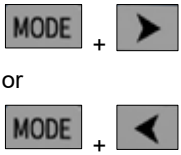


Fig. 16: Wöhler MR 400

Number	Function
1	Temperature connections
2	LC - Display
3	Operating buttons
4	Sight glass refrigerant
5	Blue: Valve setting low pressure side Red: Valve setting high pressure side Opening the valves opens the passages from the high-pressure or low-pressure side to the service connection. ☞ *NOTE!* *The pressure is measured with the valves open and closed.* • Open the valve: Turn the knob anticlockwise • Close the valve: Turn the rotary knob clockwise. ! **ATTENTION!** Always operate the two valve settings by hand only, never with pliers. Closing the knob too tightly can damage the knob or the valve.
6	3 x hose holder (1/4 " SAE) ! **ATTENTION!** If a refrigerant hose is connected to the unit but not to the system, always use the suspension to protect the hose from contamination.
7	Low pressure connection (Schrader 1/4 " SAE) Passage can be closed via valve adjustment. Centre: e.g. for refrigerant bottles or for vacuum pump
8	High pressure connection 1/4 " SAE

9	Service connection 1/4 " SAE
	Suspension on the rear of the unit
	Battery compartment on the back of the unit

4.2 Key functions

Key	Keystroke	Functions
 Power button	2 s	On
	3 s	OFF
 Mode button	Short	Switching between the submenus
	lang	Calling up the settings menu (from any menu)
 Pressure zeroing button	short	Backlight on/off
	lang	Pressure zeroing (this deletes pressure values that have already been measured)
 Start/stop button		Starting and stopping the pressure test
 Arrow keys		Refrigerant selection in the "Saturation temperature" submenu Switching between parameters in the settings menu
	Simultaneous pressing	Switch between the three measuring menus: • Pressure and temperature measurement (PT) • Vacuum measurement (VAC) • Pressure test (Hold)

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4.3 Display indication

Display	Description	Explanation
PT (Pressure, Temperature)	**Menu**	**Menu: Pressure and temperature measurement**
TL	Measured value	Measured temperature on the low pressure side
TH	Measured value	Measured temperature on the high pressure side
ΔT	Calculated value	T_H - T_L (Temp.high pressure side - Temp.low pressure side)
EV	Assigned value (refrigerant)	Refrigerant evaporating temperature
CO	Assigned value (refrigerant)	Refrigerant condensing temperature
SH	Assigned value (refrigerant)	Overheating
SC	Assigned value (refrigerant)	Hypothermia
VAC	**Menu**	**Vacuum measurement**
HH:MM	Timer	HH:MM
HOLD	**Menu**	**Pressure test (pressure drop)**
ΔP		Pc-Pi (pressure liquefaction - pressure evaporation)
SET	**Menu**	**Settings**
oFF		Automatic switch-off is deactivated
oN		Automatic switch-off is activated
►		Pressure test stopped
■		Pressure test in progress

5 Device settings

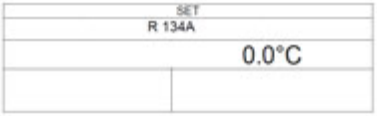

Fig. 17: Display unit settings

- To enter or exit the settings menu, press and hold the Mode button.

It does not matter which menu you are in.

SET appears at the top centre of the display.

NOTE!
If no button is pressed for 10 seconds in the settings menu, the unit automatically switches back to the previous menu.

5.1 Converting the units

5.1.1 Temperature units

Arrow keys

- In the settings menu, briefly press one of the arrow keys to switch between the units °C and °F
- To save the setting and exit the settings menu, press and hold the Mode button.

5.1.2 Pressure units

- To access the pressure units, briefly press the Mode button in the settings menu.
- Briefly press one of the arrow keys to switch between the units kPa, mPa, bar, psi and kg/m^2.
- To save the setting and exit the settings menu, press and hold the Mode button.

5.2 Automatic switch off

- In the settings menu, briefly press the Mode button twice to enter the "Automatic switch-off" settings menu.

Here you have the option of deactivating or activating the automatic switch-off after 5, 10, 15 ,30 or 60 minutes.

The default setting is 15 minutes.

- Press one of the arrow keys to switch between the different options.

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5.3 Deactivating the temperature compensation

The Wöhler MR 400 performs the pressure test temperature compensated. If required, the temperature compensation can be deactivated as follows:

Fig. 18: Display temperature compensation activated

- In the settings menu, briefly press the Mode button three times to enter the "Temperature compensation" settings menu.
- Press one of the arrow keys to deactivate (Hold OFF) or activate (Hold ON) the automatic switch-off.
- The default setting is 15 minutes.
- Press one of the arrow keys to switch between the different options.

6 Preparation for measurement

6.1 Connection of the temperature clamps

- Fold back the covers on the top of the unit and insert the temperature plugs into the corresponding sockets.

Fig. 19: Connection of the temperature clamps

6.2 Pressure zeroing

- Switch on the unit.

After 4 s, the measuring display appears in the display.

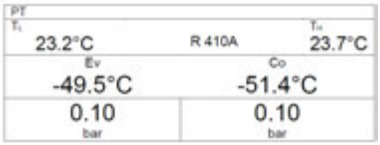

Fig. 20: Measuring display

Pressure zeroing button

- Press and hold the pressure zeroing button to zero the pressure sensor. Make sure that no additional pressure is applied to the port during pressure zeroing so that only the ambient pressure acts on the sensor.

NOTE!
It is recommended to perform a pressure zeroing before each measurement.

6.3 Hose connections

Fig. 21: Wöhler refrigerant hoses

ATTENTION!
Before each measurement, check that the refrigerant hoses are intact. Do not use any tools to connect the hoses. Screw the hoses only hand-tight.

- Close the valves on the meter with the aid of the rotary knobs, cf. Fig. 1, part 5.
- Connect the blue refrigerant hose to the low pressure side, the red refrigerant hose to the high pressure side and the yellow service hose to the centre connection.

6.4 Select refrigerant

Arrow keys

- Press the arrow keys to select the refrigerant of the system to be tested.

NOTE!
The refrigerant can only be selected in the saturation temperature submenu, which appears immediately after switching on.

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7 Measurement menus

7.1 Measuring menu PT: Pressure-temperature

7.1.1 Submenu: Saturation temperature (Ev and Co)

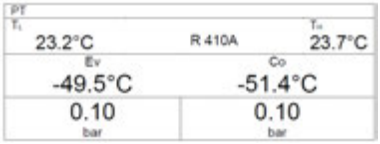


Fig. 22: Display saturation temperature submenu

After switching on, the unit always displays the saturation temperature submenu. The display shows

Line 1

Temperature low pressure side

Refrigerant (selectable here)

Temperature high pressure side

Line 2

Evaporating temperature Ev

Condensing temperature Co

Line 3

Pressure low pressure side

Pressure high pressure side

7.1.2 Submenu: Superheating and subcooling (SH and SC)

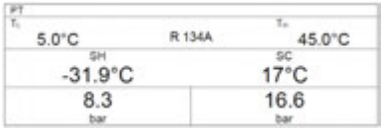


Fig. 23: Display submenu superheat and subcooling

- In the "Saturation temperature" submenu, press the Mode button to enter the "Superheat and subcooling" submenu: The display shows

Line 1

Temperature low pressure side

Refrigerant

Temperature high pressure side

Line 2

Overheating SH

Hypothermia SC

Line 3

Pressure low pressure side

Pressure high pressure side

7.1.3 Submenu: Temperature difference (Δ T)

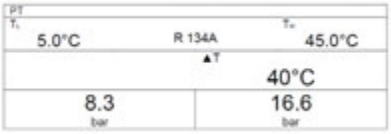


Fig. 24: Display submenu temperature difference

In the submenu "Superheat/Subcooling", press the Mode button to enter the submenu "Temperature difference". The display shows

Line 1

Temperature low pressure side

Refrigerant

Temperature high pressure side

Line 2

$\Delta T = T_H - T_L$

Line 3

Pressure low pressure side

Pressure high pressure side

7.2 Measuring menu VAC: Vacuum

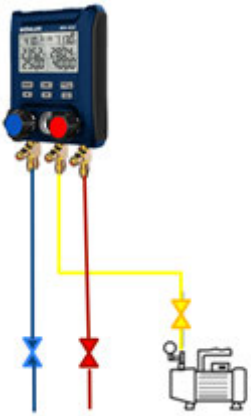
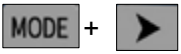


Fig. 25: Connections: Vacuum measurement

A vacuum pump is required to evacuate the system.

- Connect the coolant hoses to the system.
- Connect the unit to a vacuum pump via the yellow service hose and the centre unit connection.

The unit thus connects the vacuum pump to the system.



- In the PT measuring menu, briefly press the mode and arrow keys simultaneously.

The unit switches to the vacuum measurement menu. VAC appears at the top left of the display.

- Switch on the vacuum pump to extract air and moisture from the unit.

> *NOTE!*
> *The Wöhler MR 400 only indicates a negative pressure in the system. If the system pressure is above the ambient pressure, appears as pressure display* **- - - -** .

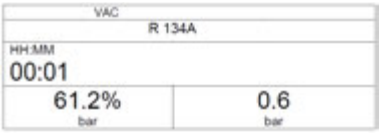


Fig. 26Display vacuum measurement

The display shows

Line 1:
Refrigerant

Line 2:
Timer: elapsed time, since start of vacuum measurement (hours:minutes)

> *NOTE!*
> *After calling up the vacuum menu, the timer basically starts counting. The colon between hours and minutes flashes.*

Line 3:

Left: Vacuum share in %

Right: current negative pressure in the system

> *NOTE!*
> *The displayed vacuum percentage is not a precise measured value, but serves only for estimation.*

7.3 Pressure test (Hold)

The unit performs a temperature-compensated pressure test. The system pressure and the ambient temperature are measured over a certain period of time. The pressure drop, i.e. the temperature-compensated differential pressure ($p_{start\ of\ measurement} - p_{end\ of\ measurement}$), which is determined over the measurement time, provides information about the tightness of the system.

NOTE!
The meter has an internal temperature sensor. If a temperature clamp is connected, the unit uses this value for temperature compensation.

The pressure test/pressure drop test is carried out on systems without refrigerant. The line is pressurised with an inert gas. The test pressure is usually 1.1 times the operating pressure specified by the manufacturer.

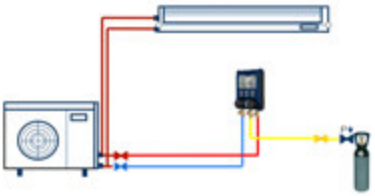
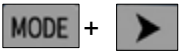


Fig. 27. Example for the connection for the pressure measurement in a split system

- Connect the coolant hoses to the pressure connections of the unit and to the system under test.
- Connect the yellow service hose to the centre connection of the unit and connect the other end to the container for the inert gas.



- In the vacuum measurement menu, briefly press the mode and arrow keys simultaneously.

The unit switches to the measuring menu for pressure testing. HOLD appears at the top left of the display.

Start/stop button

- To start the pressure test, press the start/stop button.

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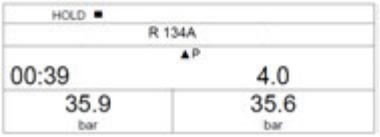

Fig. 28. Display pressure test during measurement

The display shows a■ icon next to the HOLD icon and the timer starts counting the minutes.

Line 1: Refrigerant

Line 2: left: Timer, right: differential pressure

Line 3: left: Output pressure, right: currently measured pressure

Start/stop button

- To stop the pressure drop test, press the start/stop button.

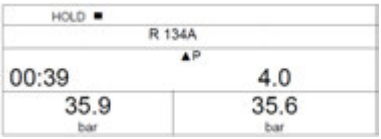

Fig. 29: Display pressure test with measurement stopped

The display shows a■ icon next to the HOLD icon and the timer starts counting the minutes.

Line 1: Refrigerant

Line 2: left: Timer =0, right: differential pressure

Line 3: left: Final pressure

8 Maintenance

8.1 Insert or change batteries

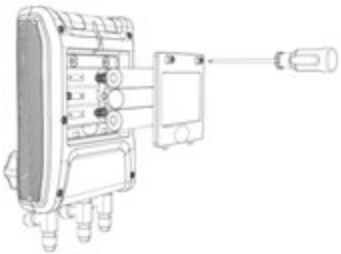

Fig. 30: Battery change

- Switch off the unit.
- Fold up the suspension on the back of the unit.
- Open the battery compartment with a Phillips screwdriver.
- Insert 3 AA Mignon 1.5 V batteries. Observe the correct polarity.

ATTENTION!
Remove the batteries if you are not going to use the unit for a longer period of time.

8.2 Coolant hoses

- Replace the hoses with new ones after mechanical stress or after the meter has fallen down.

8.3 Cleaning

- Clean the housing with a damp cloth.
- Make sure that the threaded connections are free of grease or other deposits. Clean the connections with a damp cloth if necessary.

9 Tips and help

Problem	Cause	Solution
Battery symbol flashes	Low battery voltage	Change batteries
Unit switches off	Battery empty	Change batteries
Temperature display **- - -**	Temperature clamps not connected or Temperature value is below the specification	Connect temperature clamps
Temperature display - **OL -**	Temperature value is above the specification	

10 Warranty and service

10.1 Warranty

Every Wöhler MR 400 fitter's aid is tested for all functions and only leaves our factory after a detailed quality check.

If used properly, the warranty period on the Wöhler MR 400 fitter's aid is twelve months from the date of sale. Excluded are batteries and damage to the pressure sensor caused by overloading.

The warranty does not apply if repairs and modifications have been carried out on the unit by a third party, not authorised by the manufacturer.

10.2 Service

SERVICE is very important to us. That is why we are of course also there for you after the warranty period.

- You send the meter to us, we repair it within a few days and send it to you with our parcel service.
- Immediate help is available from our technicians on the phone.

11 Declaration of conformity

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The manufacturer:

WÖHLER Technology GmbH
Wöhler-Platz 1, D-33181 Bad Wünnenberg

explains that the product:

Product name: Wöhler MR 400 Fitting aid

comply with the essential protection requirements laid down in the Council Directives on the approximation of the laws of the Member States relating to electromagnetic compatibility 2014/30/EU.

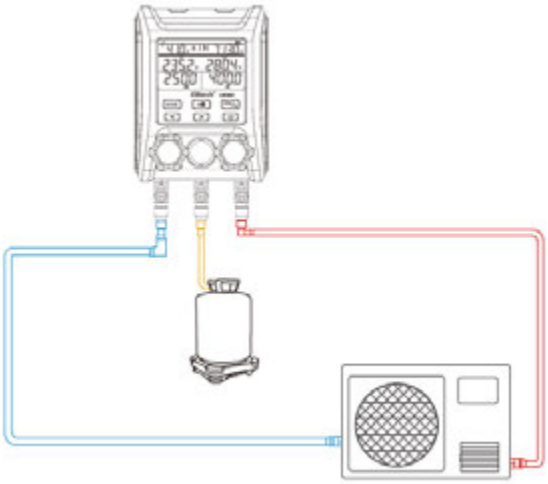
The following standards were used to assess the product with regard to electromagnetic compatibility:

EN IEC 61326-1:2021
EN IEC 61000-3-2:2019 + A1:2021
EN 61000-3-3:2013 + A1:2019 + A2:2021

Bad Wünnenberg, 31.08.2023

Johannes Lötfering, Managing Director/Managing Director

12 Quick guide



1. Vacuum seal the tubes.
2. Press the power button for 2 s to switch on the unit.

Power button

3. Press the arrow keys to select the refrigerant

Arrow keys

NOTE!
The refrigerant can only be selected in the saturation temperature submenu, which appears immediately after switching on.

4. Connect the high pressure side and the low pressure side of the unit to the system under test.
5. Connect the cable of the temperature clamps to the top of the Wöhler MR 400 and clamp the clamps onto the pipes of the system to be tested.
6. Switch on the system under test and monitor the parameters.