User Manual

Personal Synthesis Workstation

OptiMax 1001

METTLER TOLEDO

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1 Introduction

The METTLER TOLEDO OptiMax™ 1001 is a reactor system for performing synthesis with a 250-mL, a 500-mL, or a 1000-mL glass reactor. The instrument is operated via the touchscreen.

- The reactor can be heated or cooled and its content stirred and refluxed.
- A Pt100 sensor measures the temperature of the reactor content for monitoring, temperature control and data capture.
- The integrated pH measurement system, when equipped with the appropriate electrode allows you to measure the pH value of the reactor content.
- You can export the acquired data to another program for further processing.

Please also read the Operating Instructions for the full scope of functionalities of the device. The Operating Instructions can be found on the USB stick.

1.1 Scope of Delivery

The following items are included in the OptiMax 1001™ thermostat set:

Order number		Description	Quantity
		OptiMax 1001 thermostat	1
51161883		TFT touchscreen 7″, 1 m cable	1
11132570		Protective cover for touchscreen	1
30260369		Safeguard button	1
51191125		PVC hose, soft, for reflux condenser, 5 m	1
51161187		PVC industrial hose for coolant, 15 bar, 2.5 m	2
51192239		PVC industrial hose for purge gas, 18 bar, 2 m	1
51161186		PVC hose for purge gas, 2 m	1
51191373		Y-piece for gas tubing	4

51191916		Reducing connector for purge gas tubing	3
51190324		Quick connect coupling for purge gas inlet	5
51192126		Hose clamp for PVC tube	4
51191915		Flow indicator for coolant	1
51191914		Knurled screw, M6 x 10 mm	4
51162860		Reactor block plug for bottom drain valve opening	1
51192209		O-ring for 51162860 plug, Ø 50.39 mm x 3.53 mm	1
51161782		Bubble counter	1
51161603		Magnetic bubble counter holder	1

51162886		Accessories holder set	1
51192208		Glass adapter ST19/26-GL14	2
51190317		Screw cap GL14, with aperture	2
51103947		Silicone rubber sealing ring for screw cap GL14, aperture 6 mm	2
51191945		Purge gas regulation valve	1
51161099		Lab bar, 600 mm x 14 mm	4
51162690		Overhead stirrer drive complete	1
		User Manual	1

If an item is missing, please contact your local support team.

1.2 Check on arrival

Check the following conditions once the package has arrived:

- The package is in good condition.
- The content shows no signs of damage (e.g. broken covers, scratches etc.)
- The content is complete (see [Scope of Delivery Page 3]).

If one condition is not fulfilled, please contact your local support.

2 Safety Information

This thermostat has been tested for the intended purposes described in this document. However, this does not absolve you from the responsibility of performing your own tests of the product supplied by us regarding its suitability for the methods and purposes you intend to use it for. You should therefore observe the following safety measures.

We, Mettler-Toledo GmbH, accept no liability whatsoever if you do not observe the following rules and safety notes for safe operation of the thermostat.

2.1 Definition of signal warnings and symbols

Safety notes are marked with signal words and warning symbols. These show safety issues and warnings. Ignoring the safety notes may lead to personal injury, damage to the instrument, malfunctions and false results.

WARNING A hazardous situation with medium risk, possibly resulting in death or severe injury if not avoided.

CAUTION A hazardous situation with low risk, resulting in minor or moderate injury if not avoided.

NOTICE A hazardous situation with low risk, resulting in damage to the instrument, other material damage, malfunctions and erroneous results, or loss of data.

Note (no symbol)
for useful information about the product.

Meaning of safety symbols

	Electrical Hazard		Explosion		Burns / Hot Surface
	Rotating parts		Heavy load		General note

2.2 Intended use

The METTLER TOLEDO OptiMax™ 1001 is a reactor system for performing synthesis with reactor volumes up to 1000 mL.

The device is designed to be used in a laboratory environment and operated in a fume hood. All users should be trained to work in a laboratory and with this device.

Always operate and use your device in accordance with the instructions contained in this manual; use it only together with equipment specified in this documentation.

Any other type of use and operation beyond the limits of these technical specifications without the written consent from Mettler-Toledo GmbH is considered as not intended.

2.3 Product-specific safety

⚠ WARNING

Risk of electric shock

1 Make sure to plug the power cable supplied into a power supply outlet that is grounded. A technical fault could otherwise result in serious injury or death.

2 Only use the METTLER TOLEDO power supply cable and AC power adapter designed for your instrument.

⚠ WARNING

Power failure

A power failure can lead to explosion with possibly fatal consequences.

– Implement appropriate measures like an uninterruptible power supply (UPS).

⚠ WARNING

Risk of explosion with critical reactions

Performing critical reactions could lead to explosions.

– Perform a safety analysis before starting an experiment with high hazardous potential for example by using a Differential Scanning Calorimeter.

⚠ WARNING

Electrostatic discharges through stirring the reaction mass

The following conditions can form electrostatic charge:

- High flow rates (high stirrer speed) of nonpolar liquids with a high resistivity (>10^8 Ohmmeter).
- Two-phase systems with suspended solids (e.g. after crystallization processes in nonconductive solvents or immiscible liquids.)

– Work under an inert gas (nitrogen or argon).

⚠ WARNING

Risk of explosion due to damaged reactors

Explosion of a reactor could cause serious injury.

– Check the reactor before each use for damage (scratches, formation of cracks).

⚠ CAUTION

Hot parts when working above 50 °C

Touching hot parts can cause burns.

– Do not touch the cover plate of the device, the fixing ring, the reactor covers, attachments of the reactor or the overhead stirrer if you work above 50 °C.

⚠ CAUTION

Rotating parts of stirrer

Rotating parts of a running stirrer may lead to injuries.

1 Do not touch rotating parts of a stirrer.

2 Do not wear loose clothing and make sure jewellery and long hair do not get entangled in the stirrer.

⚠ CAUTION

Risk of injury due to heavy load

You can injure yourself by carrying the instrument alone.

– Never try to carry the instrument alone. At least two people are needed to carry the instrument.

NOTICE

Wrong coolant used

High chloride concentration or some additives in the coolant can lead to corrosion of the thermostat.

1 Do not use solutions of NaCl, $CaCl_2$ or DW-Therm.

2 Check compatibility with the wetted parts of the coolant system.

NOTICE

Wrong connection or disconnection of cables

A wrong connection or disconnection of cables during operation could lead to instrument damage.

1 Before switching the device on, connect the cables of stirrers and sensors to their respective inputs and outputs.

2 Do not disconnect the cables while the instrument is operating.

NOTICE

Condensation of atmospheric moisture

The condensation of atmospheric moisture can cause corrosion of the instrument.

1 Always purge the instrument when it is in use. This removes any condensation that has formed.

2 Purge it with dry air, nitrogen or argon.

NOTICE

Thermal shock

Glass parts of the instrument or the reactor could get damaged.

– Do not pour cold liquids into hot glassware and vice versa.

NOTICE

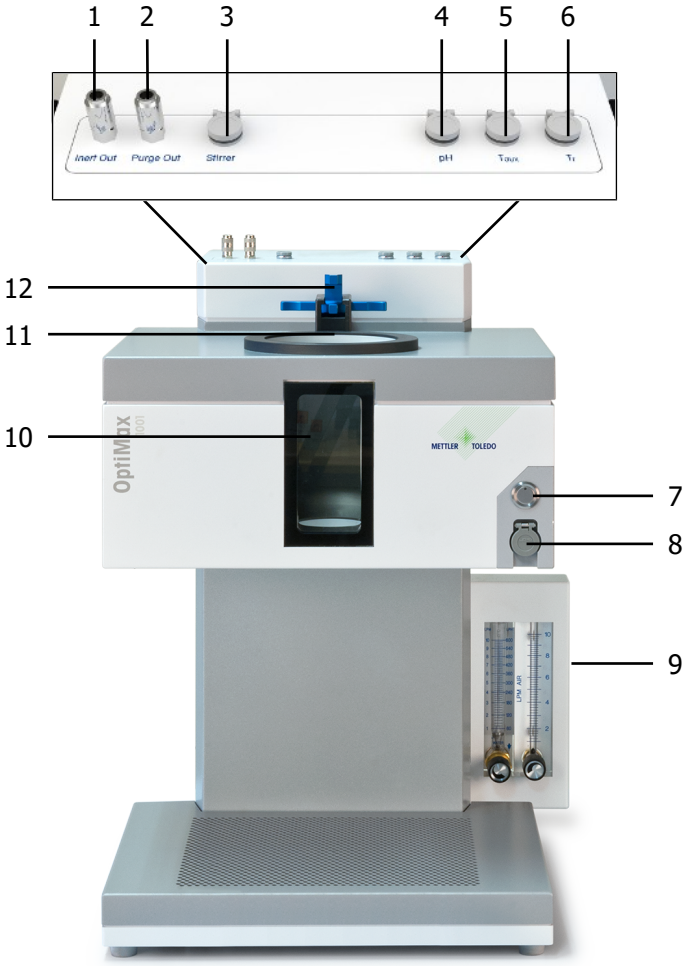
Risk of reactor breakage when sealed hermetically

Hermetical sealing could lead to pressure build-up when using gas or when the reactor is heated.

– Make sure venting is always possible.

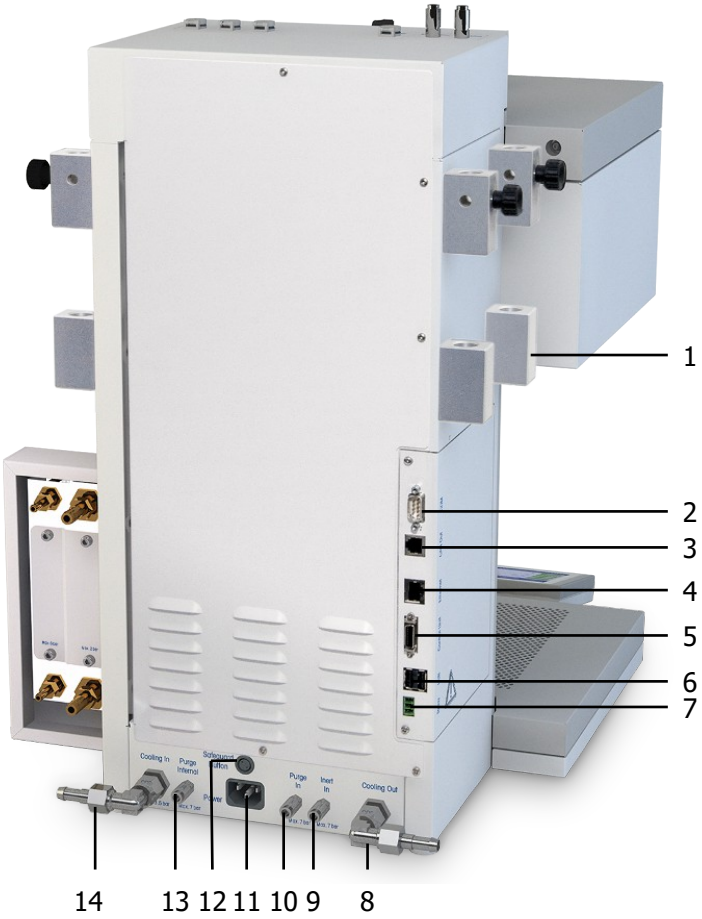
3 Overview

Front view



1	Inert out connection	**2**	Purge out connection
3	Stirrer connection	**4**	pH connection
5	T_{aux} connection	**6**	Tr connection
7	Power Button	**8**	USB
9	Flow indicators	**10**	Reactor window (with back- and frontlight)
11	Opening for reactors	**12**	Locking device

Back view



1	Holder for lab bars	**2**	RS232
3	Ethernet	**4**	CAN out
5	Control unit (Touchscreen) connection	**6**	USB (2x)
7	Safety relay	**8**	Coolant out
9	Inert in connection	**10**	Purge in connection
11	Power supply	**12**	Safeguard button connection
13	Purge internal connection	**14**	Coolant in

4 Installation

4.1 Installation requirements

- The device should be installed in a fume hood.
- Make sure there is enough space (about 10 cm) between the ventilation slots at the back side of the instrument and any other object or the wall.
- Make sure you install the device in accordance with the [technical data Page 28].

Site requirements

The instrument has been developed for indoor operation in a well-ventilated area. Avoid the following environmental influences:

- Conditions outside of the ambient conditions specified in the technical data
- Powerful vibrations
- Direct sunlight
- Corrosive gas atmosphere
- Explosive atmosphere of gases, steam, fog, dust and flammable dust
- Powerful electric or magnetic fields

4.2 Unpacking and transporting device

⚠ CAUTION

Risk of injury due to heavy load

You can injure yourself by carrying the instrument alone.

– Never try to carry the instrument alone. At least two people are needed to carry the instrument.

Unpack the device

1 Grip the device under the base plate.
2 Lift the device up and out of the foam packing material.
3 Place the device on the lab bench.

Transport the device

1 Unplug the power adapter.
2 Disconnect the device properly from the cooling media.
3 Grip the device under the base plate.

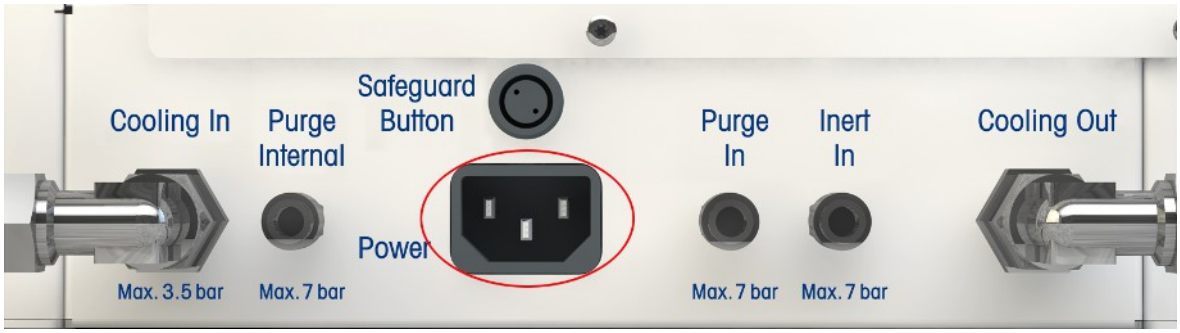
4.3 Connecting power to the device

⚠ WARNING

Risk of electric shock

1 Make sure to plug the power cable supplied into a power supply outlet that is grounded. A technical fault could otherwise result in serious injury or death.
2 Only use the METTLER TOLEDO power supply cable and AC power adapter designed for your instrument.

1 The power supply connection is on the back side of the device.

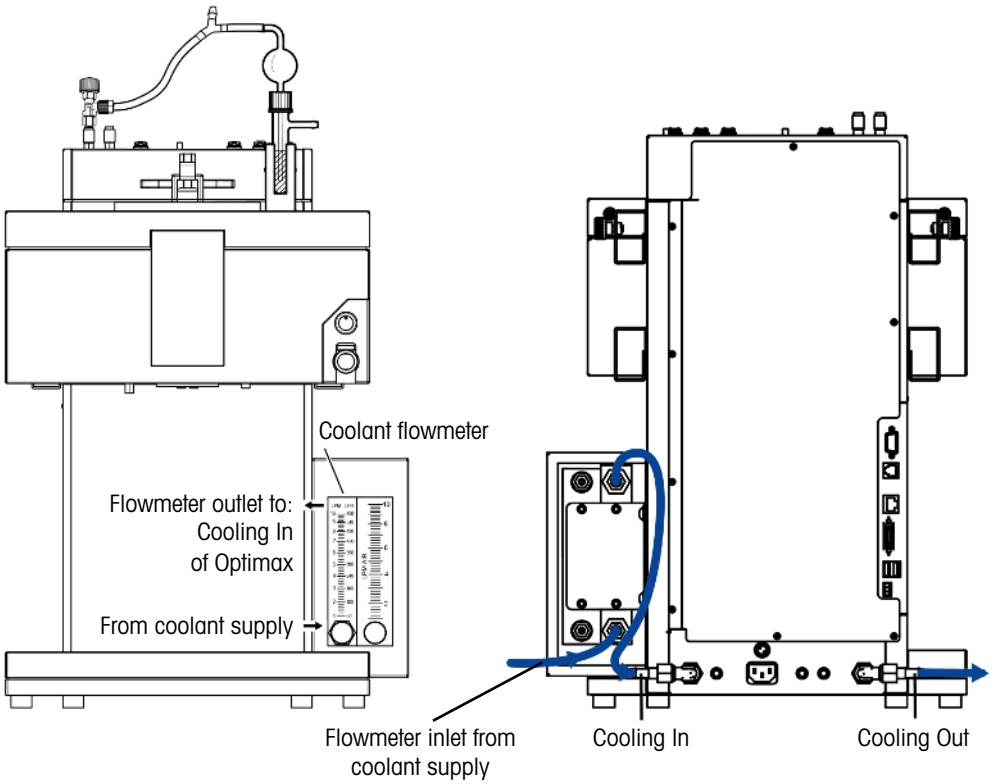


2 Connect the instrument to the power supply using the included country-specific cable.

3 Insert the plug of the power cable into a grounded power outlet that is easily accessible.

4.4 Connecting water cooling

The installation via the flowmeter requires three pieces of tubing, in the box you will find two. You can cut away a piece of appropriate length (it has to cover the connection from the flowmeter to the cooling in on the back side of the instrument) from one of the two delivered tubes.



1 Push one piece of the PVC industrial hose (51161187) over the cooling inlet of the coolant flowmeter.
2 Secure it with a hose clamp.
3 Connect the other end to the coolant supply.
4 Connect the cut piece to the coolant flowmeter outlet and secure with hose clamp.
5 Connect the other end to the **Cooling In** of the device and secure with hose clamp.
6 Push the second piece of the PVC tube over the elbow coupling of the **Cooling Out** on the back side of the instrument.
7 Secure it with a hose clamp.
8 Connect the other end to the waste water system.

4.5 Connecting cryostat cooling

NOTICE

Damage of Flowmeter

The flowmeter is not resistant to any liquids other than water! Do not use it with other coolants.

NOTICE

Risk of device malfunctioning

When using silicone oil as coolant adding the antistatic additive is required. It is recommended to renew the antistatic additive after a year.

– Ensure sufficient purging of the cryostat with dry nitrogen (check also instructions on purging of cryostat manufacturer).

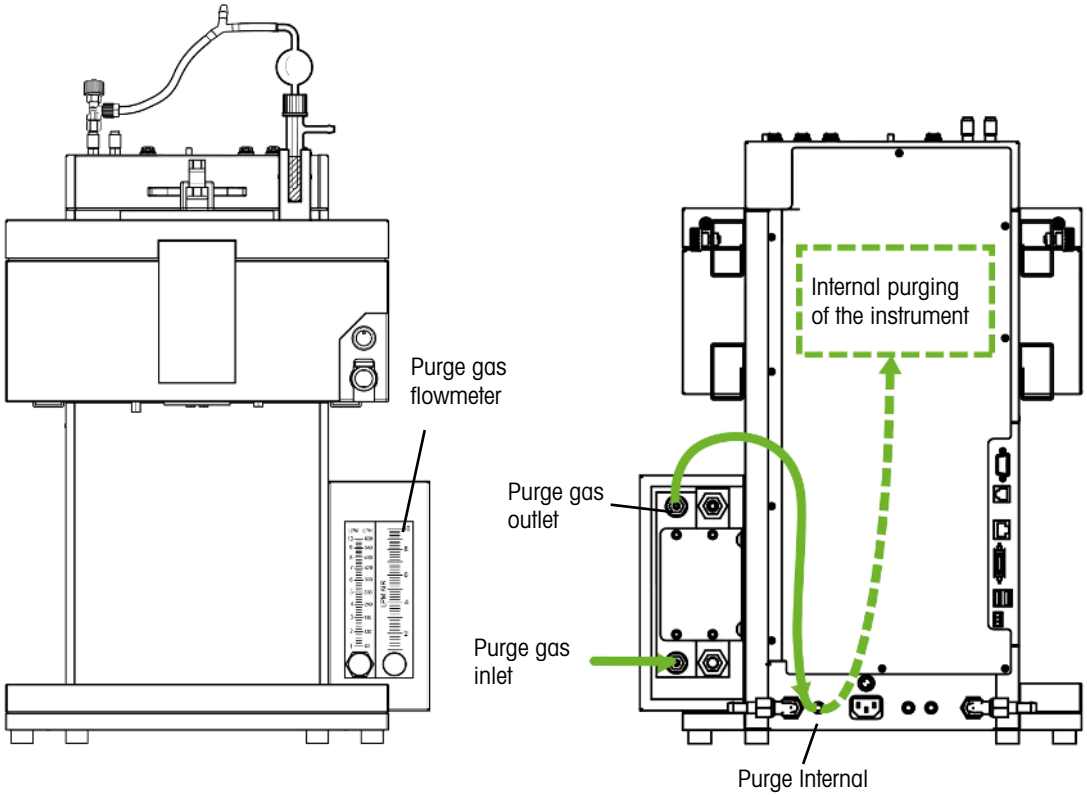
Do not use the flowmeter with the cryostat in order to have full capacity.

The instrument needs a constant flow of the cooling medium.

1 Screw the insulated connection tube over the **Cooling In** on the back of the instrument.
2 Use a wrench to tighten the connection to the instrument.
3 Screw the second insulated connection tube over the **Cooling Out** on the back of the instrument.
4 Use a wrench to tighten the connection to the instrument.

4.6 Connecting instrument purge gas

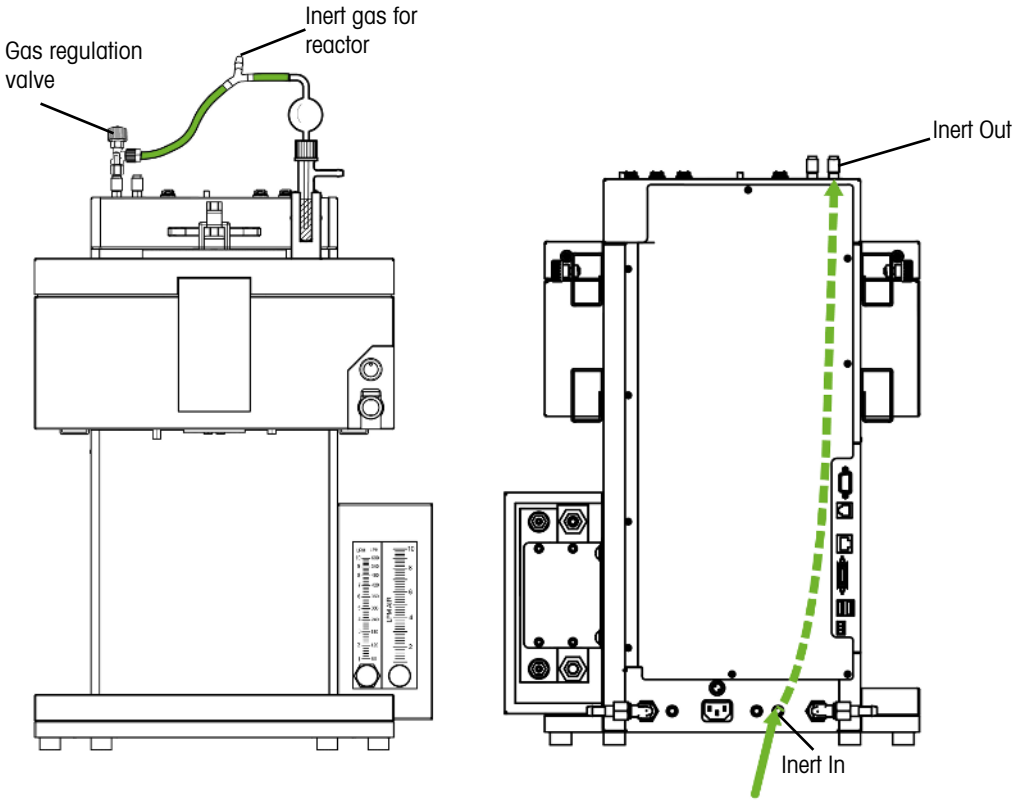
To prevent corrosion by condensed atmospheric moisture in the instrument, the instrument must be purged with a dry gas, e.g. dry air, dry nitrogen or dry argon.



1 Push one piece of PVC industrial hose for purge gas (51192239, ø 4/10 mm) on the purge gas Inlet of the purge gas flowmeter.
2 Secure it with a hose clamp.
3 Connect the other end to the purge gas supply.
4 Push a second piece of PVC industrial hose for purge gas over the purge gas outlet of the flowmeter.
5 Secure it with a hose clamp.
6 Push the other end of the second piece over the **Purge Internal** quick connect coupling connection on the back side of the device.
7 Secure it with a hose clamp.

4.7 Purging the reactor with inert gas

To perform reactions under nitrogen (or any other inert gas) you have to install the purge tubing according to the following instructions:



1 Install a quick connect coupling (51190324, ø 4/6 mm, red) with the PVC tube (51161186) on the **Inert In** connector on the back side of the instrument and secure it with a hose clamp.

2 Connect the other end of the PVC tube to the gas supply.

3 Install a quick connect coupling on the **Inert Out** connector on top of the instrument and push a piece of the PVC tube over the quick connect coupling.

4 Integrate a bubble counter with a gas regulation valve (51161802, optional available as set) and the Y-piece (51191373) into the tubing as shown in the drawing. Proceed, depending on the type of the used reactor. (The use of the Y-piece guarantees an uncritical pressure for the reactor while the gas flow can be monitored with the bubble counter).

5 Always leave a small opening in the reactor to allow a flow of the purge gas.

4.8 Connecting touchscreen to OptiMax

NOTICE

Touchscreen connection / disconnection

The instrument may be seriously damaged if the touchscreen is connected or disconnected when the instrument is switched on.

– Do only connect or disconnect the touchscreen when the instrument is switched off.

1 The touchscreen connection is on the back side of the instrument (see picture).

2 Connect the touchscreen cable to the socket.

3 Position the touchscreen so that it is always readable.

4.9 Connecting safeguard button to OptiMax

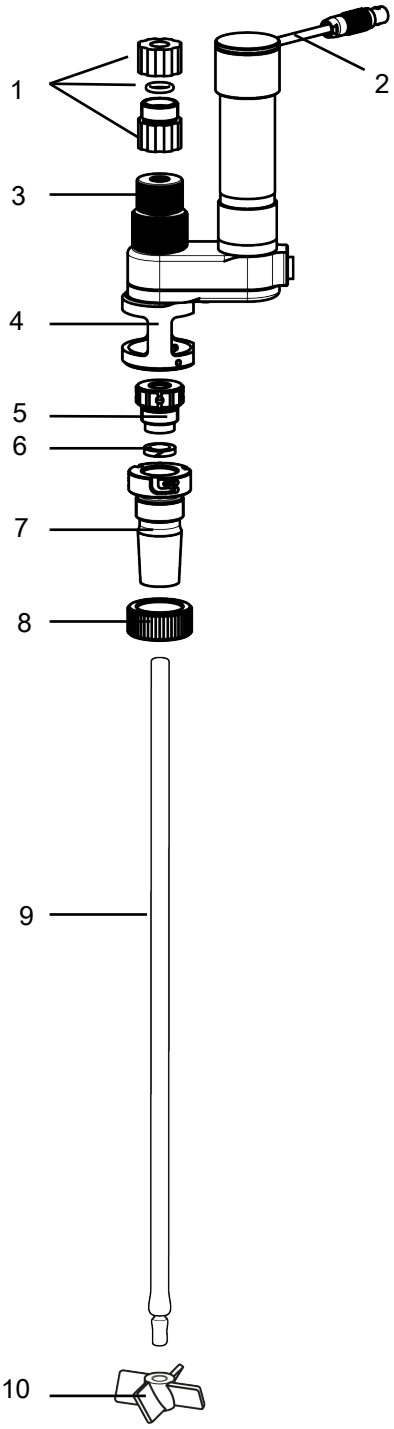
– Connect the safeguard button to the **Safeguard button** connector on the rear side of the instrument.

4.10 Assembling the Stirrer

Step 1 and 2 are not needed when the device is installed for the first time as the adapter part comes already assembled.

The assembly of the stirrer adapter (30451755) into the stirrer housing can be a bit tight in the beginning and will improve over time.

1 Install the PTFE cord (**6**) in the adapter (**7**).
2 Reinstall the pressure screw (**5**) and lightly tighten.
3 Screw the pitched-blade element (**10**) onto the stirrer shaft (**9**).
4 Push the stirrer shaft (**9**) from below through the central opening of the reactor cover.
5 Push the adapter loosening nut (**8**) over the stirrer shaft (**9**) and screw to the adapter (**7**).
6 Insert the adapter (**7**) into the central opening of the cover.



7 Push the stirrer shaft (**9**) through the hole in the stirrer assembly.
8 Tighten the pressure screw (**5**). Increasing the tightness will minimize solvent loss (or retention of vacuum).
9 Align the slits in the adapter (**7**) with the pins of the lower housing (**4**).

10 Turn the stirrer adapter (**7**) until you hear a click and the adapter is locked in the lower aluminum housing (**4**).

11 If necessary adapt the height of the stirrer shaft and the pitched-blade element with the reactor for an applicable immersion depth.

12 Fix the stirrer shaft by tightening the chuck (**3**) and secure it with the locking device (**1**) on top of the chuck (**3**). (The locking device prevents the stirrer shaft from falling into the reactor in case the chuck is loosened carelessly or by mistake).

13 Connect the stirrer cable (**2**) to the connector on top of the instrument housing.

To change the immersion depth of the stirrer shaft:

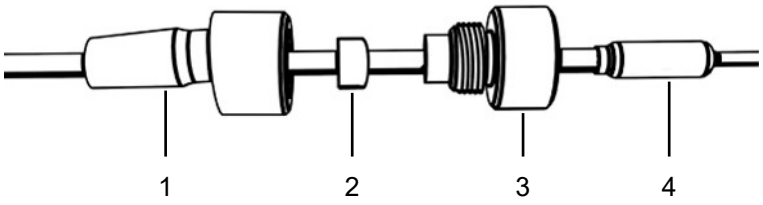
1 Release the chuck (**3**) while holding the stirrer shaft.

2 Release the locking device (**1**) and adapt the immersion depth.

3 Tighten the chuck (**3**) and secure it with the locking device (**1**).

4.11 Installing a Tr sensor

Note The Tr sensor must be immersed in the reaction solution to a depth of at least 1.5 cm to give correct measurement values.



1 Unscrew the pressing screw (**3**) from the adapter and push it over the sensor (**1**).

2 Push the sealing ring (**2**) over the Tr sensor with the round side pointing to the screw (**3**).

3 Push the lower part of the adapter (**1**) over the Tr sensor.

4 Screw the adapter (**1** & **3**) lightly together.

5 Install the Tr sensor (**4**) on the reactor cover (in an appropriate port).

6 Connect the Tr sensor to the Tr connection on the instrument.

7 Check that the Tr sensor does not touch the stirrer blade or other inserts.

4.12 Installing a 1000 mL two-piece reactor

Before you place the reactor in the thermostat, we recommend that you install the Tr sensor and other inserts in order to check their distance from the stirrer or the bottom of the reactor. We also recommend that you add the reagents and solvent for the starting volume and possibly check the fill level of the first fill.

1 Push the glass stirrer or the stirrer shaft with anchor or pitched-blade element through the central opening of the reactor cover before you place the cover onto the reactor.

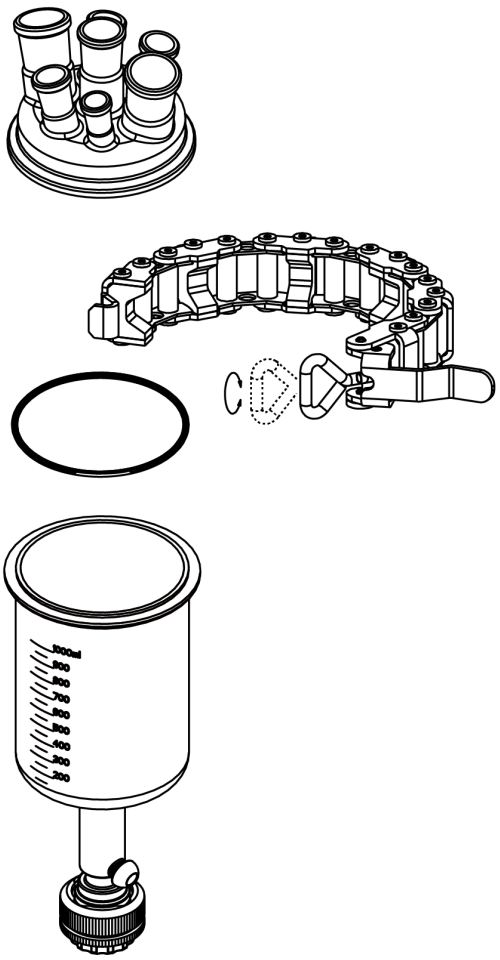
2 Connect the stirrer shaft to the stirrer motor.

3 Fix the reactor holder (51162782) to one of the lab bars and place the reactor in the reactor holder.

4 Place the O-Ring on the cover rim and place the cover on the reactor.

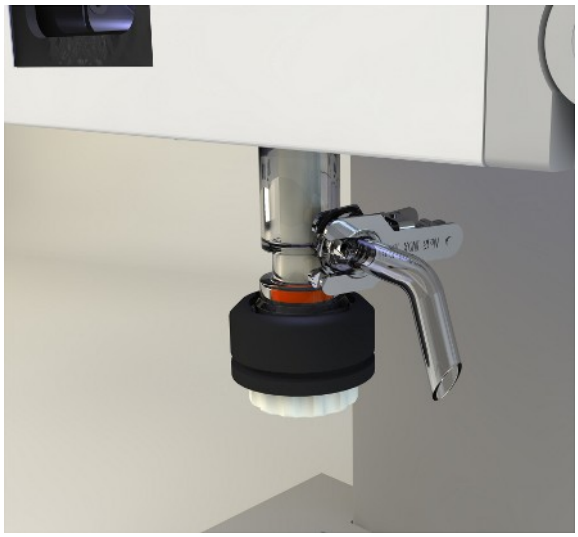
5 Place the clamp chain carefully around the cover and the reactor flanges.

6 Screw the hook in or out so that the buckle can be easily closed (with one finger).



7 Remove the assembled reactor from the reactor holder and insert it into the thermostat.

8 Attach the drain union (51162685) to the bottom drain valve and fasten it with the pinch clamp.



4.13 Turn on Device

- Power is connected.
- Cooling is connected and running.
- Purging of instrument is connected and running.
- Touchscreen is connected

– Press the ON/OFF button on the front side of the instrument.

➡ You should hear an audible click and the LED illuminates.

➡ The touchscreen shows a splash screen during start up phase.

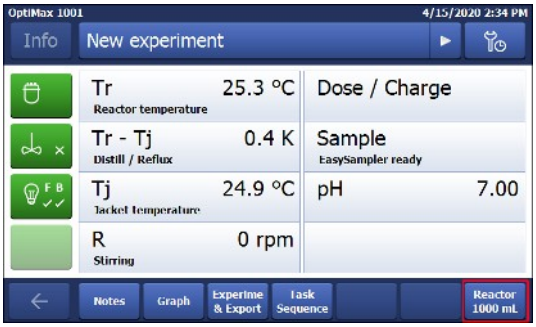
➡ You can use the device as soon as the mainscreen appears.

5 Operation

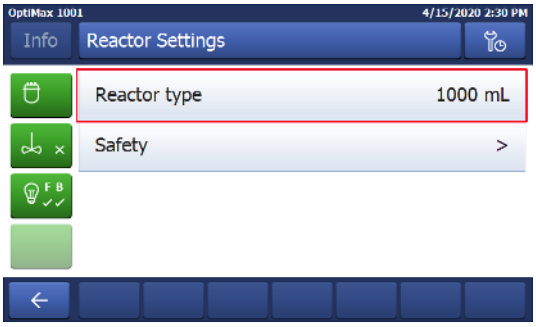
5.1 Select Reactor type

1 Tap the icon Reactor 1000 mL.

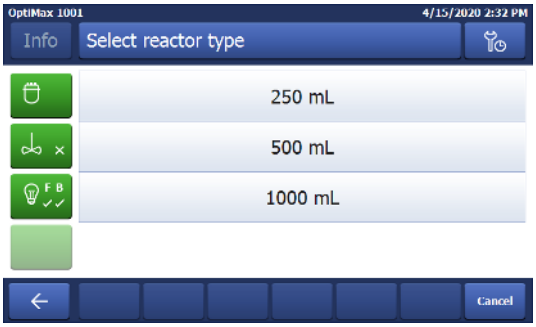
2 Tap the **Reactor type** field.



3 Select the reactor type that is installed.



➡ Make sure the safety settings for the reactor are still within the range.

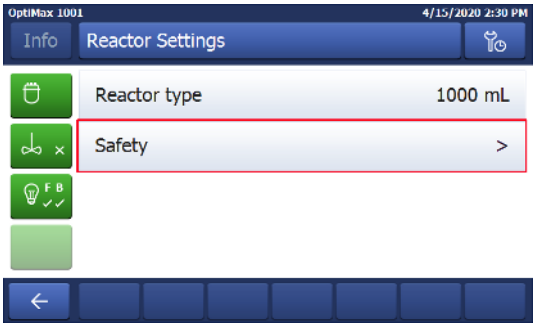


5.2 Change safety settings

1 Tap the Reactor button.

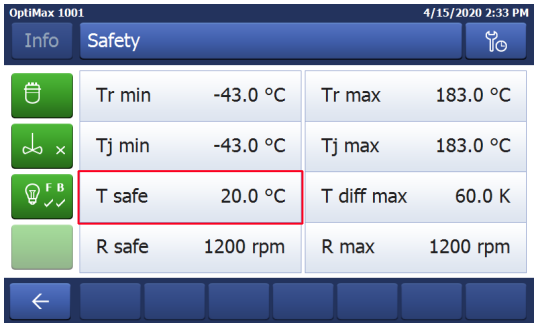
2 Tap on the **Safety** field.

3 Change the necessary parameters according to your experiment and setup.



5.2.1 Change safety temperature (T safe)

1 Tap on **T safe**.



2 Enter a value for **T safe** that is valid for your experiment.

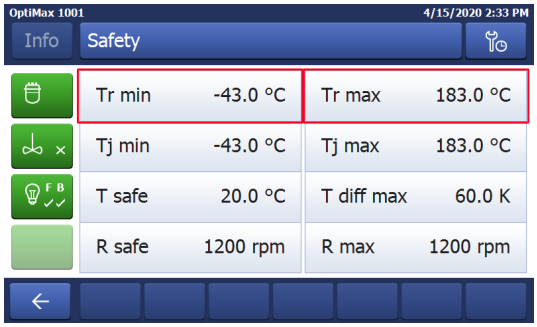
3 Tap **OK**.

5.2.2 Change reaction temperature limits (Tr)

1 Tap on **Tr max** or / and **Tr min**.

2 Enter a value for **Tr max** and **Tr min** that is valid for your experiment.

3 Tap **OK**.

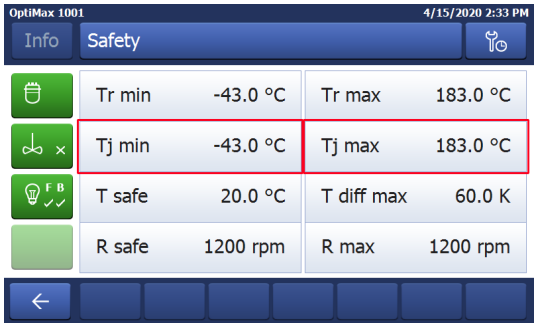


5.2.3 Change range of jacket temperature (Tj)

1 Tap on **Tj min** or / and **Tj max**.

2 Enter a value for **Tj min** and **Tj max** that is valid for your experiment.

3 Tap **OK**.



5.2.4 Change T diff max

1 Tap on **T diff max**.

2 Enter a value for **T diff max** that is valid for your experiment.

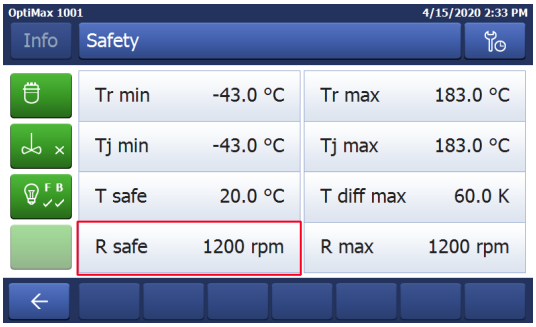
3 Tap **OK**.

5.2.5 Change Rsafe

1 Tap on **Rsafe**.

2 Enter a value for **Rsafe** that is valid for your experiment.

3 Tap **OK**.

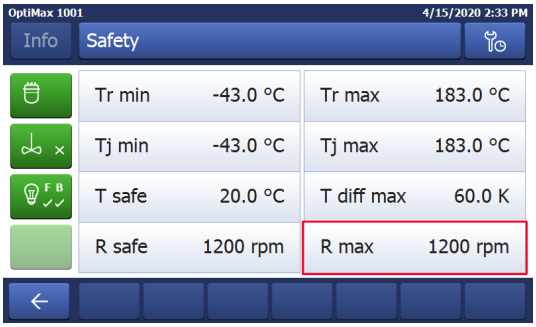


5.2.6 Change Rmax

1 Tap on **Rmax**.

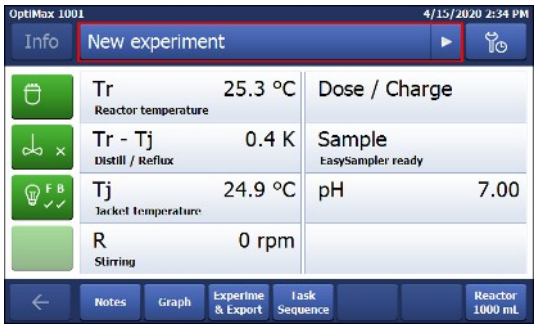
2 Enter a value for **Rmax** that is valid for your experiments.

3 Tap **OK**.



5.3 Start an experiment

1 Tap the experiment button on the main screen.
2 Enter an **experiment name**.
3 Tap **Start** to start the experiment.
➡ All tasks that are executed will be saved under the experiment and available for export.

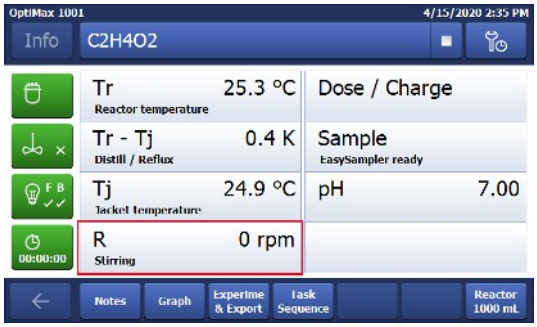


5.4 Change stirrer speed

Note The value cannot be higher than the safety limit value.

- A stirrer is connected.

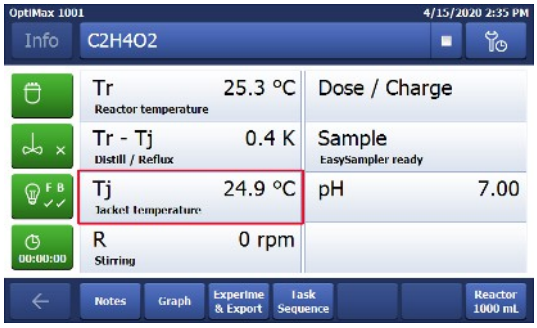
1 Tap on the **R** field.
2 Enter the desired value.
3 Tap **Start**.
➡ The stirrer will immediately start stirring.



5.5 Change Tj

Note The value cannot be higher than the safety limit value.

1 Tap the **Tj** value field on the main screen.
2 Enter the end temperature for **Tj**.
3 Tap **Start** to initiate the task.
➡ The task will start immediately.

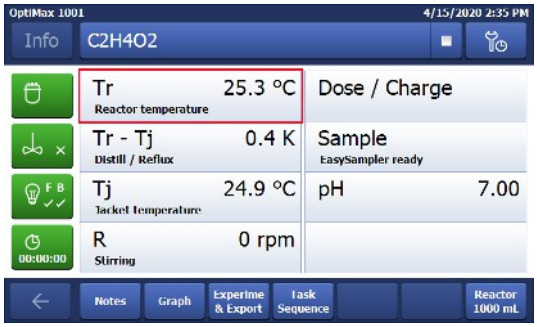


5.6 Change Tr

Note The value cannot be higher than the safety limit value.

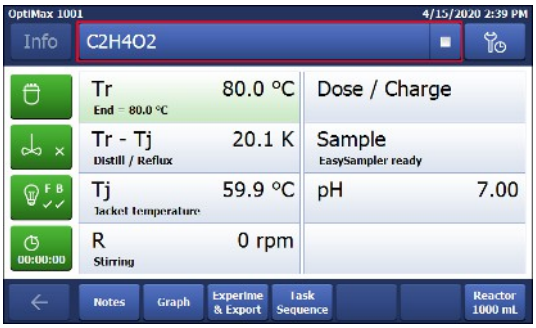
- A Tr sensor is connected to the thermostat.

1 Tap the **Tr** value field on the main screen.
2 Enter the end temperature for Tr.
3 Tap **Start** to initiate the task.



5.7 End an experiment

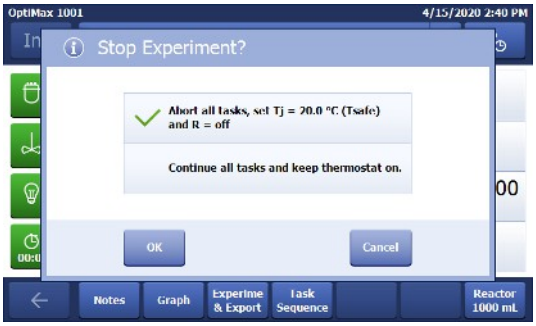
1 Tap on the Stop button on the mainscreen.



2 Select your preferred option for experiment end conditions.

3 Tap **OK**.

➡ Your experiment is stored on the device and can be exported.



6 Maintenance

A troubleshooting chapter is available in the Operating Instructions.

Maintenance tasks have to be performed in accordance with the instructions given in this chapter. After performing any maintenance tasks, it should be ensured that the device still meets all safety requirements.

6.1 Update Firmware

The latest firmware versions and instructions for installation are available on the following website:

https://community.autochem.mt.com/?q=software

6.2 Checking the Reactor

To check the reactor vessel for possible damage (scratches and cracks), it must be empty, clean, dry and open. Small hairline cracks can be detected by refraction using an additional light source (focused, not dispersed light).

6.3 Cleaning the Instrument

⚠ CAUTION

Hot instrument parts

Touching hot parts of the instrument can result in burnings.

– Do not clean the instrument before all parts have reached room temperature.

NOTICE

Damage to the device due to incompatible cleaning agents

Inappropriate cleaning agents could damage the housing of the device.

1 Use the described cleaning agent.

2 Should you use other cleaning agents, ensure that they are compatible with the housing material.

The housing of the instrument is not watertight (i.e. splash proof). We therefore recommend that you clean it with a damp cloth using ethanol.

If you have questions about the compatibility of cleaning agents, contact your authorized METTLER TOLEDO dealer or service representative.

6.4 Disposal

In conformance with the European Directive 2012/19/EU on Waste Electrical and Electronic Equipment (WEEE) this device may not be disposed of in domestic waste. This also applies to countries outside the EU, per their specific requirements.

Please dispose of this product in accordance with local regulations at the collecting point specified for electrical and electronic equipment. If you have any questions, please contact the responsible authority or the distributor from which you purchased this device. Should this device be passed on to other parties, the content of this regulation must also be related.

7 Technical Data

Certifications regarding this product can be found at https://www.mt.com/us/en/home/search/compliance.html/

The product name of your device is the model number.

Directives, standards and REACH regulation

SVHC candidate substances according to REACH (Article 33)

Material	CAS No.
Decamethylcyclopentasiloxane	541-02-6
Dodecamethylcyclohexasiloxane	540-97-6
Octamethylcyclotetrasiloxane	556-67-2
Lead	7439-92-1

United States of America

This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

- Reorient or relocate the receiving antenna. —Increase the separation between the equipment and receiver.
- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
- Consult the dealer or an experienced radio/TV technician for help.

Changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.

Power supply

AC power adapter rating	Line voltage	100...240 VAC
	Input frequency	50/60 Hz
	Mains supply voltage fluctuations	Up to ± 10 % of the nominal voltage
Instrument rating	Power consumption	Max. 1290 VA

Connections

USB	Support of USB 2.0
Electrical connectors	RS232, USB, CAN, Ethernet, Safety Relay, Safeguard button and touchscreen
Cable length	Limited to 3 m for RS232, USB, CAN, Ethernet, Safety Relay, Safeguard button and touchscreen
Safety Relay	30 VDC / 1 A
CAN	Max. 2 A

Ambient Conditions

Humidity	Max. relative humidity 80 % for temperatures up to 31 °C decreasing linearly to 50 % relative humidity at 40 °C, non-condensing
Altitude	Up to 2000 m
Overvoltage category	II
Pollution degree	2
Ambient temperature	5 °C...40 °C
Usage	For indoor use only

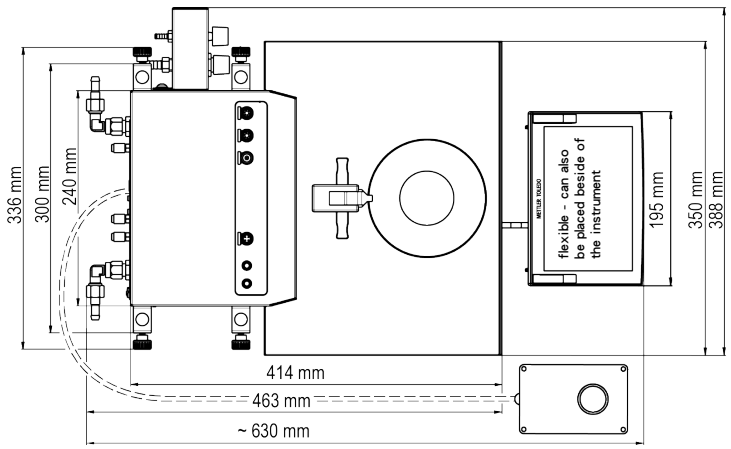
Materials

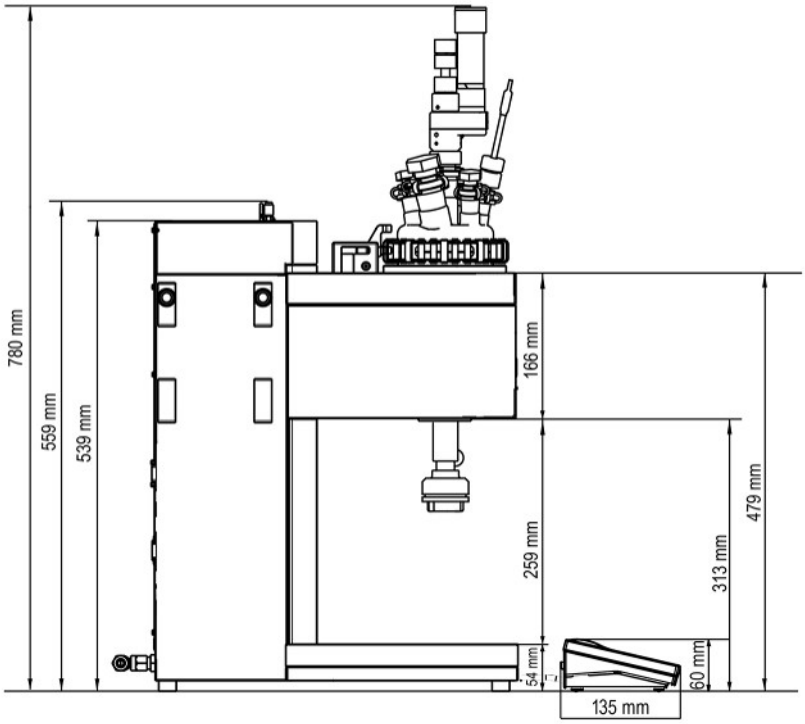
Cover plate	Stainless steel coated with PFA/FEP
Housing material	Powder-Coated stainless steel
Connectors for purge gas	Stainless steel, nickel-plated brass
Purge gas lines	PVC, FEP, PP, PVDF, PTFE, aluminium, nickel-plated brass
Coolant tubing	PVC, PVDF, copper
Flowmeters	Stainless steel, acrylic, HDPE
Holder for lab bars	Aluminium
LEMO connectors for Tr sensor and overhead stirrer	Chrome-plated brass with protection cap in PSU
Reactor window	Borosilicate glass 3.3
Receptacles for reactors	Anodized aluminum
Fixing rings of thermostats	PTFE C25
Anti twist protection	PEEK HPV and aluminium
USB connector	Stainless steel with protection cap in PSU
On/Off switch	Stainless steel
Stirrershaft, -blade	Borosilicate glass 3.3 or Hastelloy® C-22, PTFE
Overhead stirrer	PTFE, PEEK, aluminum, steel
Tr sensor	Borosilicate glass or Hastelloy® C-22
Reactors	Borosilicate glass 3.3 and PTFE
Touchscreen	PA 12, aluminum
Protective cover for Touchscreen	Barex®

Device

Weight incl. touchscreen	35 kg

Dimensions





7.1 Thermostat

Temperatures

Range	Tj: -40 °C to 180 °C* Tr: -40 °C to 180 °C* Tc: -40 °C to 60 °C * The temperature range of Tr / Tj is depending on the temperature of the coolant and the cooling power of the used external cooling system.
Resolution	Tj: 0.1 K Tr: 0.1 K
Maximum permissible errors	±1.0 K for the whole range, for Tr and Tj sensor
Data recording interval	Every 2 seconds

7.2 Reactors

	1000 mL reactor	**500 mL reactor**	**250 mL reactor**
Pressure	0.05 bar to ambient pressure		
Nominal volume (2-piece reactors)	1310 mL	830 mL	370 mL
Nominal volume (1-piece reactor	1150 mL	700 mL	400 mL
Working volume (with Tr sensor)	150 - 1000 mL	80 - 500 mL	60 - 250 mL

Min. working volumes for reactors equipped with standard Hastelloy temperature sensor and immersion depth of 1.5 cm:

Reactor type	**Stirrer Blade**	**Min. working volume 1000 mL reactor**	**Min. working volume 500 mL reactor**	**Min. working volume 250 mL**
Two piece	Pitched blade	150 mL	80 mL	60 mL
Two piece	Anchor	320 mL	140 mL	80 mL

One piece	Half-moon	320 mL	120 mL	80 mL

7.3 Stirrer

Operating mode	Control to constant value or ramp
Speed range	30…1200 rpm
Torque	Max 153 mNm (for continuous operation)
Lifespan	1000…3000 hours of continuous operation

7.4 Purge gas

Purge gas housing (Purge Internal)	Max. inlet pressure	0-7 bar*
	Min. gas flow	0-3 L/min
Inert gas reactor (Inert in)	Max. inlet pressure	0-7 bar*
	Min. gas flow	as needed (controlled with the bubbler)
Stirrer (Purge In)		as inert

* The inlet pressure is limited to 6 bar if the purge gas is connected to the device over the rotameter.

To protect your product's future:
METTLER TOLEDO Service assures the quality, measuring accuracy and preservation of value of this product for years to come.

Please request full details about our attractive terms of service.

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