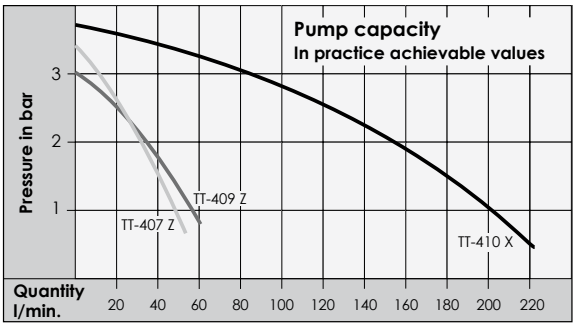
Heating- and Cooling Unit

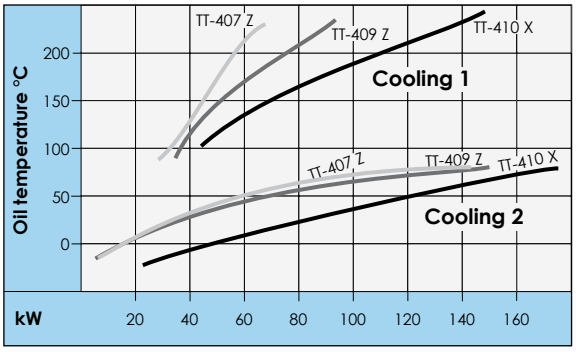
Unit for double walled vessels and reactors
Operational use from -20°C up to 240°C

TT-407 Z	**8 kW heating capacity**	**reactor volume: up to 50 litres**
TT-409 Z	**24 kW heating capacity**	**reactor volume: 50 - 150 litres**
TT-410 X	**48 kW heating capacity**	**reactor volume: 50 - 400 litres**

Features included

- Self-optimizing temperature controller with digital display of the set and actual temperature. With high precision regulation in $^{1}/_{10}$° range; can be adjusted to read °C or °F.
- Automatic temperature control – difference between set and actual temperature activates an alarm.
- Lime scale free heat exchanger.
- Digital flow indication with control of the minimum flow.
- All components in contact with water are made from corrosion resistant stainless steel.
- Heating with automatic cascade connection.
- Leak free high temperature pump with axial face. The pressure is displayed by manometer.
- Hot oil circuit with by-pass, which ensures internal circulation if valves are closed.
- No oil cracking because of special construction of the heating elements.
- Safety devices:
  - Automatic level control for dry run protection.
  - Electronic temperature limiter in the controller and separate mechanical safety thermostat.
  - Main switch, transformer and motor protection switch.
  - Horn in case of failure.
- All failures are visually indicated.





Particularities

- With regulation of pressure to adjust the pump pressure.
- Two-circuit cooling system for operations below zero degrees.
- Reversing switch for temperature controlling in the reactor. Possibility to measure the temperature in the reactor with an external temperature sensor.

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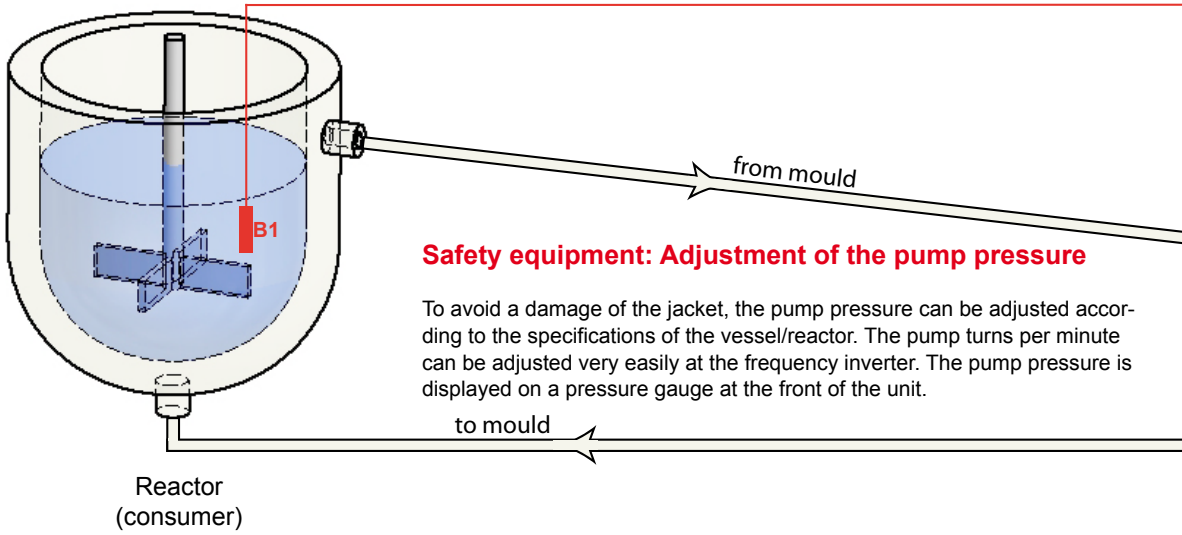
Heating and cooling units for double walled vessels and jacketed reactors

The models TT-407 Z, TT-409 Z and TT-410 X are heating and cooling units dedicated to the temperatur
These units can be operated with heat transfer liquid until a maximum temperature of +240°C.

Thanks to low-loaded heating elements and a high flow rate of the medium, cracking of the oil is impossi
The standard temperature controller is an MP-988 with three temperature probe inlets. Three different te
based on the product temperature inside the vessel or on the oil temperature inside the tank of the unit.

The units are equipped with two independent heat exchangers. In the range +80°C until +240°C, the coo
exchanger. From +80°C down, the unit switches automatically to the cooling circuit no. 2 with plate heat
achieve oil temperatures down to -20°C.



Safety equipment: Adjustment of the pump pressure

To avoid a damage of the jacket, the pump pressure can be adjusted accor-
ding to the specifications of the vessel/reactor. The pump turns per minute
can be adjusted very easily at the frequency inverter. The pump pressure is
displayed on a pressure gauge at the front of the unit.

Safety equipment: Compressed air monitoring

Compressed air must be connected so that all functions of the
units are working. The pressure of the compressed air network is
shown at the front of the unit. A pressure reduction valve installed
in the unit helps to define the amount of compressed air correctly.
The energy consumption is reduced thanks to the control of the
compressed air consumption. The pressure gauges at the front of
the unit monitor the compressed air pressure and make
adjustments easier.

Manometer pump pressu

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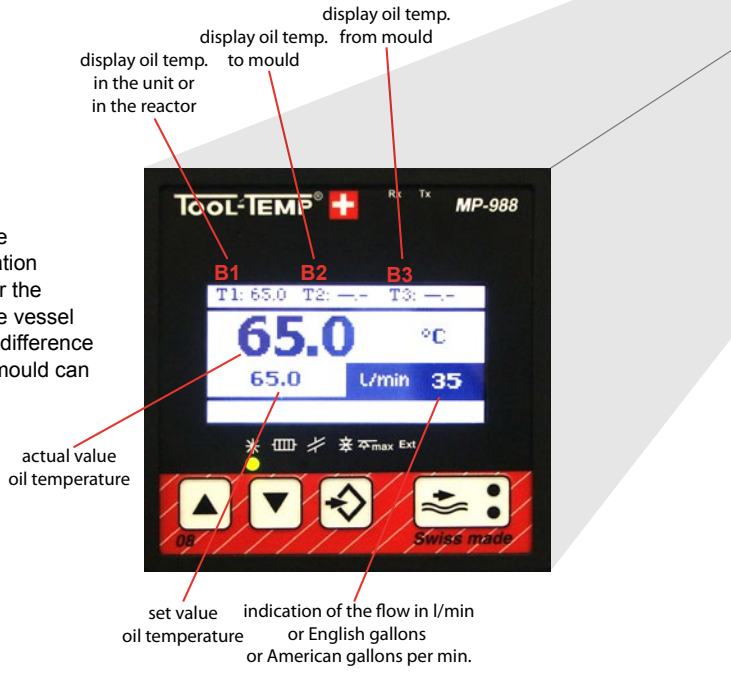
Safety equipment: Temperature monitoring

The digital temperature controller MP-988 works with three
temperature probe inlets. One probe is used for the regulation
of the medium temperature. The reference temperature for the
regulation can be the temperature of the product inside the vessel
or the oil temperature in tank of the unit. The temperature difference
between this sensor and another probe in the flow to the mould can
be measured and limited.



e regulation of double-wall vessels and reactors.

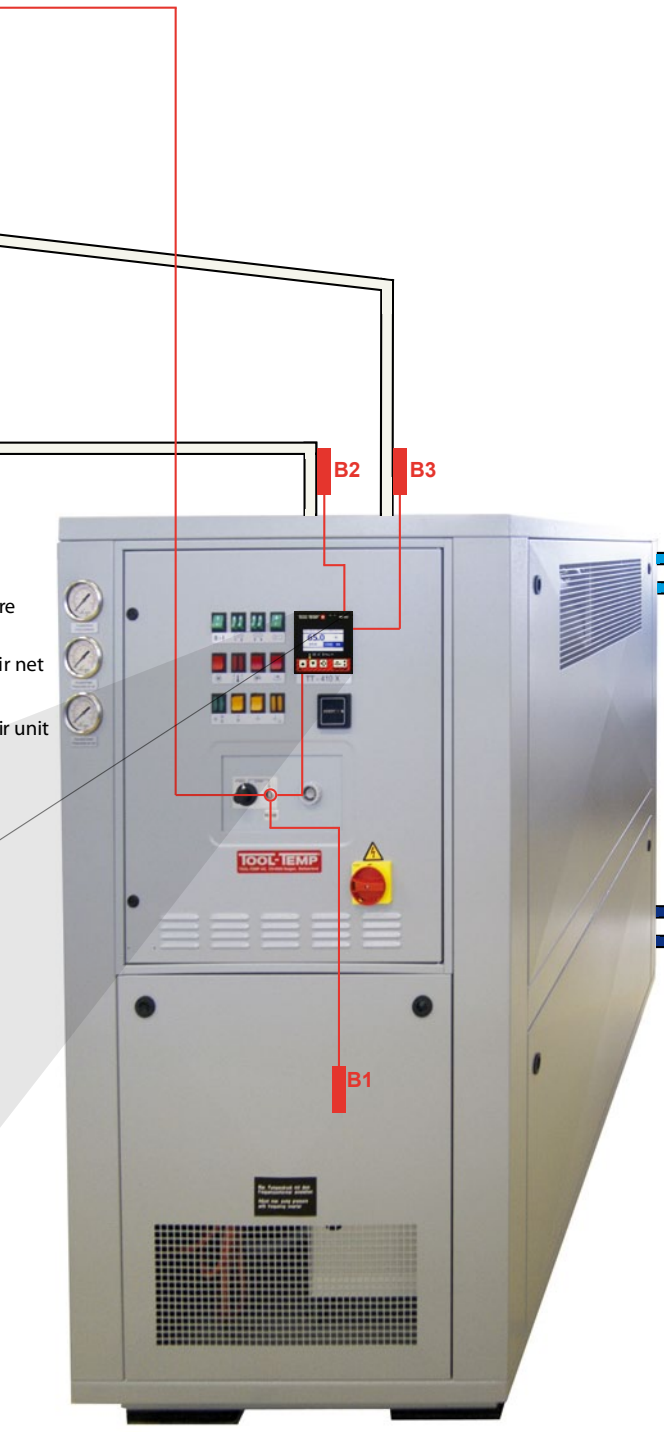
ble. Therefore the lifetime of the oil is maximised.
mperatures can be displayed. The temperature regulation can be

oling happens over the cooling circuit no. 1 with a tubular heat
exchanger. The cooling circuit no. 2 can be operated with brine to

Two independent cooling circuits make operations down to -20°C possible

The units are equipped with two cooling circuits:

- Circuit 1: Tubular heat exchanger
  Operated between +80°C - +240°C



30°C
Cooling water outlet

Cooling water inlet

- Circuit 2: Plate heat exchanger
  Operated between -20°C - +80°C
  For operations in minus temperatures, brine must be used instead of cooling water.

-25°C
Cooling water outlet brine

Cooling water inlet brine

The switching from one to the other circuit happens automatically at +80°C. The heat exchanger which is not in use anymore will be automatically emptied with compressed air. This avoids that any water remains in the heat exchangers and could provoke damages due to steaming or freezing.

Technical data:

There are 3 different models available

	TT-407 Z	TT-409 Z	TT-410 X
Temperature range	-20°C up to +240°C with heat transfer liquid		
Temperature control	self-optimizing, electronic microprocessor controller MP-988 with digital display of the set and actual value. Automatic temperature monitoring.		
Flow control	electronically, with digital display and automatic control of the minimum flow.		
Heating capacity (oil)	**8 kW**	**24 kW**	**48 kW**
Switchable in stages	3 / 5	8 / 8 / 8	8 / 8 / 16 / 16
Cooling capacity			
Cooling 1	67 kW at 230°C	93 kW at 230°C	150 kW at 230°C
Cooling 2	143 kW at 80°C	150 kW at 80°C	175 kW at 80°C
Pump capacity	motor 1,8 kW	1,8 kW	4,0 kW
Pressure mode	max. 3,5 bar max. 55 l/min	max. 3,0 bar max. 60 l/min	max. 4,0 bar max. 230 l/min
Expansion tank capacity	21 litres	46 litres	96 litres
Filling amount	11 litres	60 litres	75 litres
Expansion volume	16 litres	36 litres	75 litres
Connections			
Oil circuit	¾" BSP female thread	1" BSP female thread	flange DN32/PN16
Cooling water	¾" BSP female thread	¾" BSP female thread	1½" BSP female thread
Water-glycole	¾" BSP female thread	¾" BSP female thread	1½" BSP female thread
Air pressure	min. 5 bar		
Dimensions (L×W×H)	1‘140 × 480 × 1‘400	1‘380 × 720 × 1‘500	1‘710 × 790 × 1‘540
Weight (empty)	approx. 220 kg	approx. 340 kg	approx. 590 kg
Colour	silvergrey RAL 7001		

All possible voltages are available from 3 x 200 V to 3 x 600 V and 50/60 Hz. The units are available conform to UL/CSA specifications. For the USA market the units are equipped with NPT-thread connections and the controller is adjusted to indicate °F.

Electronic temperature controller MP-988

The electronic controller MP-988 can be operated to read °C or °F. The analog interfaces 0-5 V, 0-10 V and 4-20 mA are standard included in the controller - **without additional costs**.

The self-optimizing feature on this controller allows a very high regulating accuracy even at high temperatures and adheres to the set temperatures independently of the consumer size.

Flow control:
The indication of the flow rate is possible in litres or gallons per minute. As soon as the flow falls below a minimum, the alarm is activated.

Actual temperature (effective temperature)

Set temperature (required temperature)

Indication of the flow

Analog interfaces
- 0 - 5 V, 0 - 10 V, 4 - 20 mA

Digital interface
- on request

Temperature difference monitoring

Indication of up to three temperatures

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