

TOOL-TEMP®

Manual B-0242
for temperature control unit
TT-162 E and TT-162 H
TT-162 E/A and TT-162 H/A



Identification

model	pump	heating	water	oil
TT-162 E	4 bar	12 kW	●	●
TT-162 E/A	4 bar	18 kW	●	--
TT-162 H	8 bar	12 kW	●	●
TT-162 H/A	8 bar	18 kW	●	--

ersetzt B-0116
BA 1112e V2
EL 1165/1166 d/e/f/it
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1. External connections

1.1 Fluid connections

The following minimum internal diameters are recommended:

Connections:

heating medium:	R 1/2" female thread
internal hose diameter	13 mm

cooling water:	R 3/8" male thread
internal hose diameter	10 mm

A built-in water filter with R 3/8" female thread is mounted at the cooling water inlet.

The use of pressure and temperature resistant hoses is recommended for safety (pressure-resistant up to min. 10 bar). It is important to use hoses resistant to heat transfer liquids.

Quick release couplings will give reduced flow and are not suitable when the unit is used as a leak-stopper. If the recommended tube size cannot be connected to the mould, the diameter of the mould connection has to be reduced and not the connection on the temperature control unit. In this way pressure drop can be avoided.

1.2 Power supply

Mains voltage and frequency according to the serial plate. Pay attention to the local regulations during the installation of the unit.

colours of cables:

phases	black / black / black	L1 / L2 / L3
earth	yellow/green	PE

max. power consumption: see name plate

Do not switch on until the heating medium hoses are connected.

2. Heat transfer liquid

The unit can be switched from 12 kW heating power for water operation to 6 kW heating power for oil operation (see point 4.5 and change over instruction chapter 13). The unit with 18 kW heating power is only suitable for water operation.

2.1 Water

Units with 12 kW and 18 kW heating power are for use with water as heat transfer liquid. The tank will be filled automatically via cooling water supply (in built).

Do not use heat transfer oils or heat transfer medium WTF-3 with these heating capacities because of too high thermal load (cracking of oil or decomposing of polyglycol).

2.2 Thermal oil

When using the unit with 6 kW heating power it can be operated with **mineral heat transfer oils** such as BP Transcal N, Mobiltherm 605, Shell Thermia Oil B etc. Heat transfer medium WTF-3 and polyglycol can also be used.

Attention: TOOL-TEMP does not recommend WTF-3 resp. polyglycol because this liquid corrodes lacquers and colours.

The tank has to be filled manually.

3. Installation

Ensure all hoses are connected as in point 1.1.

3.1 Filling

Automatic filling (only for water operation):

After switching on the unit the tank will be filled with water via the cooling connection to the correct level. Only after the tank has been filled, the pump will start running.

Manual filling:

Content 16 litres according to the plate at the rear of the unit. For units working with water we recommend to add an anti-corrosion agent.

Time-limited water refill:

function:

In any 12 hour period water can only be added for a maximum of 10 minutes.

In case the 10 minutes are not completely used during the 12 hours the time relay resets automatically to 10 minutes.

In case that the 10 minutes were used and more time for water refill is required during the period of 12 hours the time relay can be reset again by switching the unit off and on again (wait 5 seconds before switching the unit on again).

3.2 Pump rotation

As soon as the unit has been connected to the mains, hose connections have been made and the heat transfer liquid has been added, the direction of the pump rotation must be checked. The vacuum switch has to be set to position  bar and the direction of rotation must be clockwise as shown by the arrow on the ventilation cover.

The direction of rotation can be determined by looking through the ventilation slots. If the motor is rotating anti-clockwise invert two phases.

4. Operations

4.1 Setting of the temperature

Temperature controller

Set the desired temperature on the temperature controller. The lamp in the switch „Heating I – II“ and the red diode in the controller indicate that the operation mode is **HEATING**.

Likewise the operating mode **COOLING** is indicated by the green diode in the temperature controller.

See instructions „Temperature controller MP-694“ for details about function and setting of the controller (see chapter 11).

4.2 Change over internal / external control

Switching to the mode **INTERN** means that the temperature of the heat transfer medium is regulated in the unit. Switching to the mode **EXTERN** means that the temperature is regulated at the process. For temperature control at the process a temperature sensor must be mounted. In case the sensor is not connected the unit automatically switches over to the cooling mode and indicates sensor failure.

The type of sensor must be compatible with the unit. If a different type of sensor is used the denoted temperature will not be accurate. The built-in temperature sensor is noted on the label of the temperature controller.

4.3 Leak prevention operation

In position  bar the pump is operating under pressure and in position  VAC as a leak prevention device. The pump now sucks heat medium through the mould, the temperature control will not be changed. The unit can only reach the optimal suction if hoses with a minimum internal diameter of 13 mm are used.

Rapid connection couplings reduce the suction drastically. This is why we recommend to avoid using them.

Leak prevention operation eliminates leaks from the mould area by sucking the medium around the process. The air is automatically vented.

Attention: When using check valves the leak prevention operation is not possible.

4.4 Automatic mould drainage

This function sucks the medium from the mould and hoses. procedure:

- switch the unit off
- set the switch to position  VAC
- press the green button (automatic mould drainage) -
the heat transfer medium in the process is returned to the tank

max. recirculating volume: 4 litres

4.5 Change over of the heating power

The units are supplied with switchable heating for 12 kW for operation with water or 6 kW for operation with heat transfer oil (exception: unit with 18 kW heating capacity). The instructions are shown in chapter 13.

The change from water to oil operation has to be done very carefully. The unit and the process must be absolutely free of water. Only a few drops of water are enough to let the unit empty by explosion at the boiling point of the water.

The change from oil to water operation on the other hand does not need any special measures. Remaining oil in the water does not cause any problems.

5. Safety devices

5.1 Pump

The pump motor is fitted with an overload relay.

5.2 Heating

In the electronic controller the maximum temperature is limited at +150°C. Exceeding this temperature the heaters switch off.

The temperature of +150°C can be adjusted according to the information sheet „Programming: Temperature controller MP-694“ program step 01.

The mechanical safety thermostat is set to the maximum allowed temperature of approx. +155°C. Exceeding this temperature the unit stops and the lamp  ^{max} is lit.

As soon as the temperature falls to approx. +140°C the unit automatically switches on again.

For operation with water the safety thermostat and the controller can be adjusted to +95°C.

A second safety thermostat is monitoring the temperature of the heat transfer liquid if an external thermocouple is used. If the set medium temperature is exceeded, the lamp  ^{max} _{extern} is lit and the heating switches off. As soon as the temperature falls below the set level the heater switches on automatically.

6. Monitoring devices

6.1 Level control

The unit is equipped with two level controls :

yellow lamp on the left is lit: Preliminary warning – there is too little medium in the unit.
The unit is still working and the horn is activated.

yellow lamp on the right is lit: There are another 2 litres of medium missing.
The unit stops and the alarm is activated.
The alarm can be switched off by the switch .

6.2 Automatic temperature monitoring

As soon as the difference between the pre-set desired value and the actual value exceeds +/- 5°C the indication lamp  is lit and the fault will be indicated acoustically. When the unit is switched on the warning is suppressed until the desired value has been reached for the first time. When setting the desired value the unit must be switched off briefly so that the automatic temperature monitor is reset.

6.3 Indication of faults (audible alarm)

During normal operation the horn should be switched on. In case the level in the tank falls below the minimum level the horn will start ringing with a continuous sound. The alarm can be switched off by the  switch.

In case the unit is switched off by the overload relay or the safety thermostat the horn will start ringing with an intermittent sound. The alarm can only be switched off by switching the unit off.

7. Maintenance

7.1 Service schedule

The following may be required subject to use and environment:

- water filter	every month
- fixings (bolts and seals)	every 12 months
- pump motor (fan impeller: clean via compressed air)	every 6 months

These intervals are for standard operation. For extreme service these intervals must be shortened accordingly.

Established defects must be repaired. To guarantee safety the unit must be repaired with original spare parts only.

Attention: Before maintenance is carried out switch off mains supply.

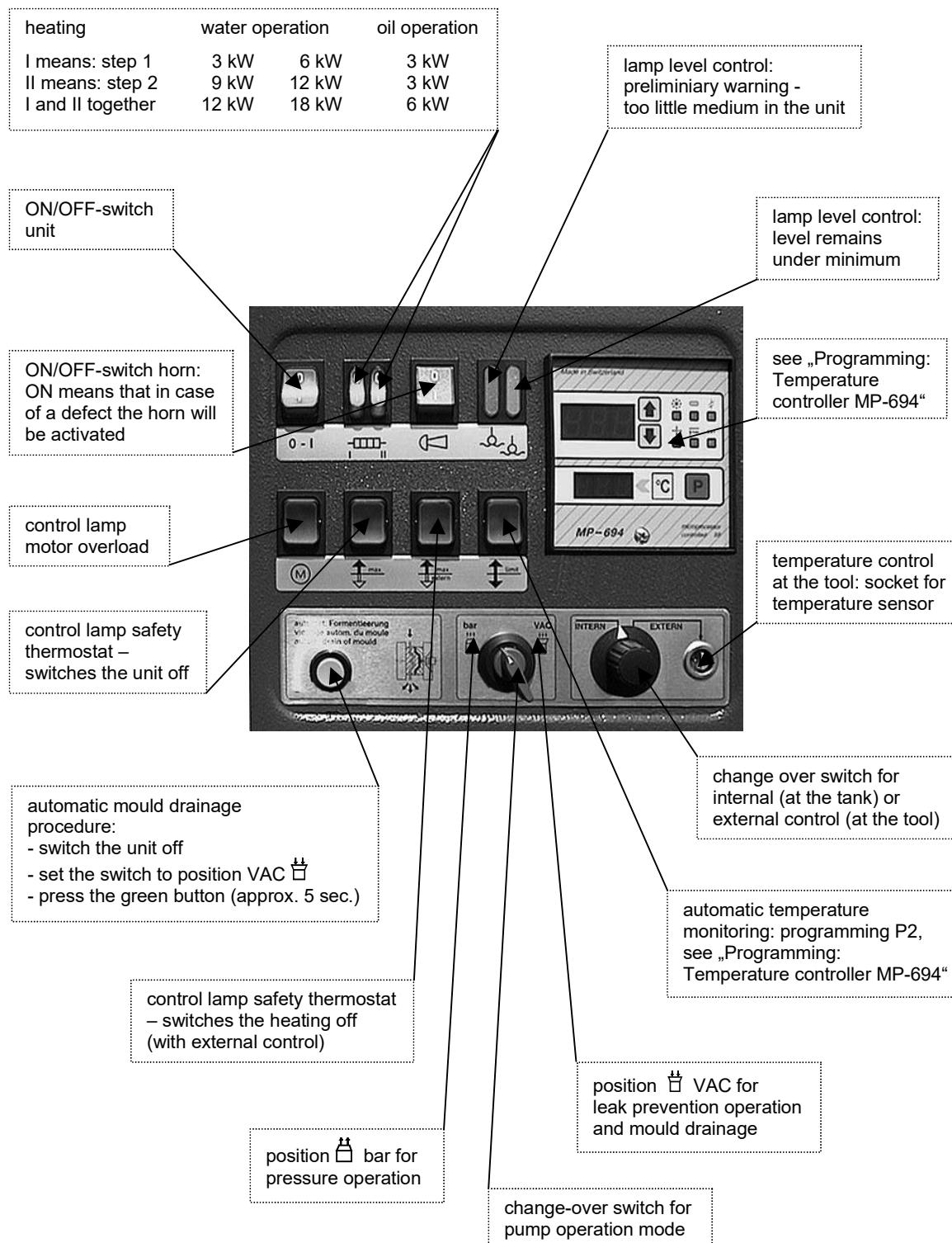
8. Faults

symptom	cause	correction
Green ON/OFF-switch  as well as all control lamps are not lit, unit does not work.	- fuse defective - possibly transformer, relay, or switch defective	- open the front door - replace the 5 x 20 mm 1 A fuse - replace defective parts
yellow lamp „level control“ is lit: left hand lamp  is lit, unit is working right hand lamp  is lit, unit is not working horn is activated: _____ and can be switched off by the horn switch 	preliminary warning <u>oil operation:</u> not enough medium in the unit. <u>water operation:</u> autom. water refill defective, not connected or time run down (time-limited water refill) <u>oil operation:</u> too little medium in the unit <u>water operation:</u> autom. water refill defective, not connected or time run down (time-limited water refill)	switch on, check the float and the electric connections <u>oil operation:</u> top up medium <u>water operation:</u> open water tap, check solenoid valve, perhaps clean water filter Switch the unit off for about 5 sec., then switch it on again. Like this the time limited refill will restart.
red motor overload relay lamp  is lit, horn is activated: ----- and can be switched off by the horn switch 	Overload relay of the pump motor has responded. possibly 2-phase running	- let the motor cool down - open the unit's front door - press the blue button of the overload relay „motor“ After the motor has cooled down the unit switches on again.
red lamp „safety thermostat“ is lit:   max. horn is activated: ----- and can be switched off by the horn switch  , unit stops running   max. extern horn is not activated, heating switches off, unit is running	max. unit temperature reached – thermostat has responded Unit is working using temperature control at the tool and the heat transfer liquid has heated up quicker than the tool.	try to establish the cause – the thermostat setting may be too low - check temperature controller - check contactors check the water circulation, mould channels and temperature sensor (safety thermostat resets itself)
red lamp „temperature monitoring“  is lit horn is activated: ----- and can be switched off by the horn switch 	difference between desired and actual temperature too big	check heating and cooling circuits

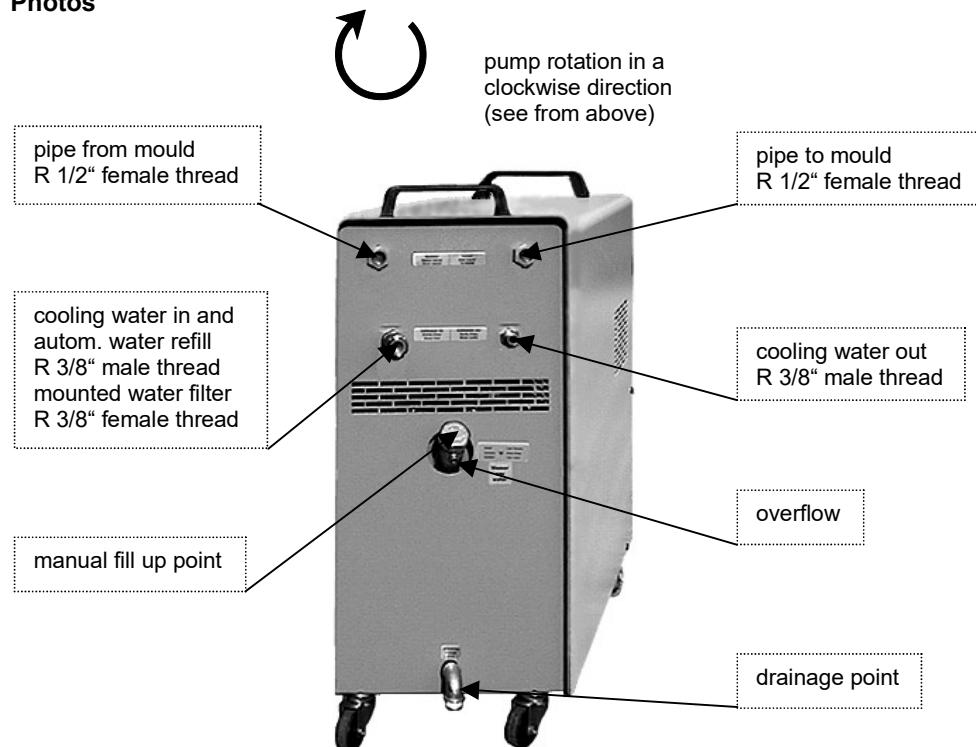
symptom	cause	correction
the nominal temperature will not be reached, heating lamp is not lit, unit works	temperature delimiter in the controller switched the heating off - perhaps temperature delimiter set too low	The maximum temperature can be set on the controller (see „Programming: Temperature controller MP-694“).
temperature has stopped rising, heating lamp is lit 	- solenoid valve of the water cooling system is not closed - perhaps solenoid valve for water cooling defective - maybe too big consumer - heating defective	- clean the solenoid valve, then check signal to valve and function - repair or replace the solenoid valve - contact the supplier - measure the resistance of the heating
unit works, heating or cooling system is not working	temperature controller defective	replace the temperature controller

Attention: Switch off the main supply prior to fault finding.

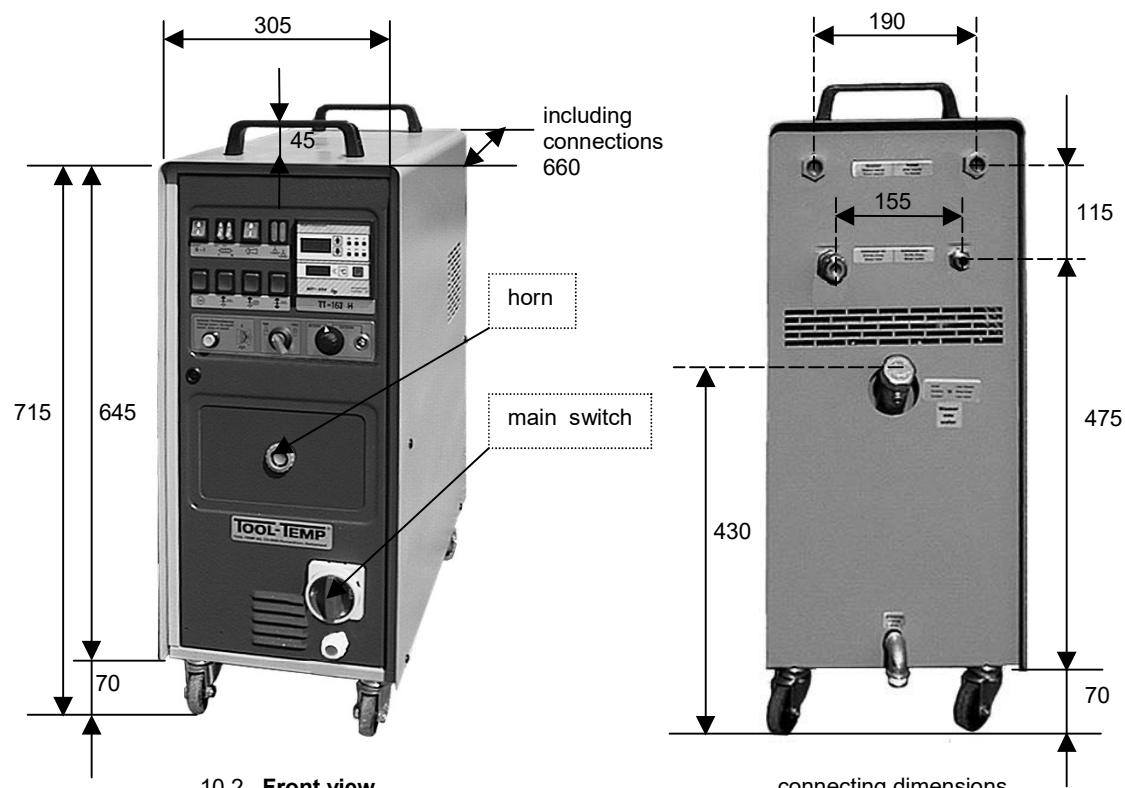
9. Control panel



10. Photos



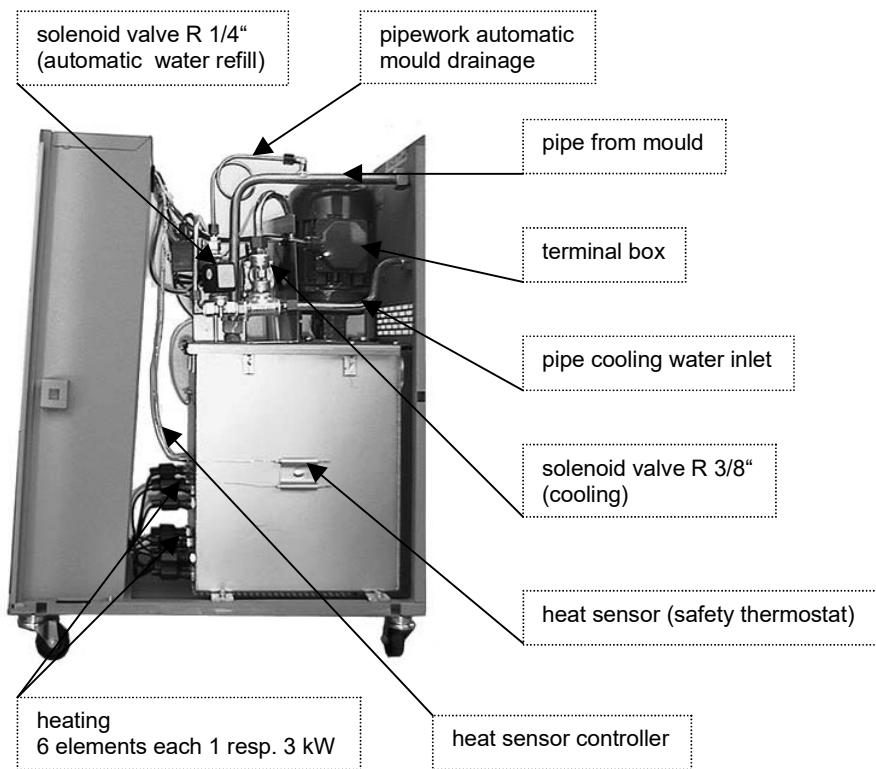
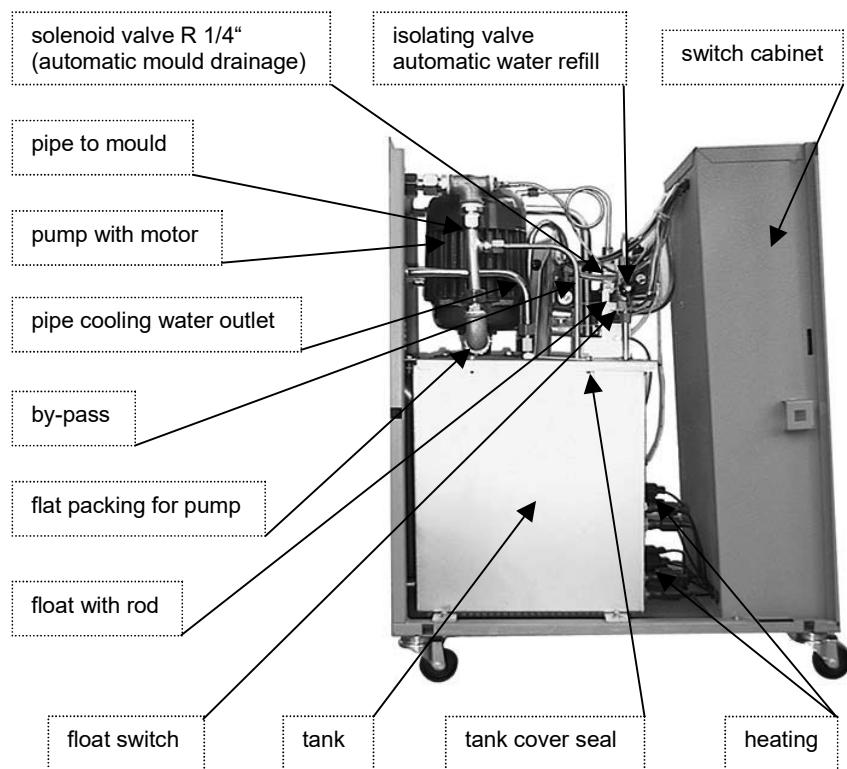
10.1 Rear view



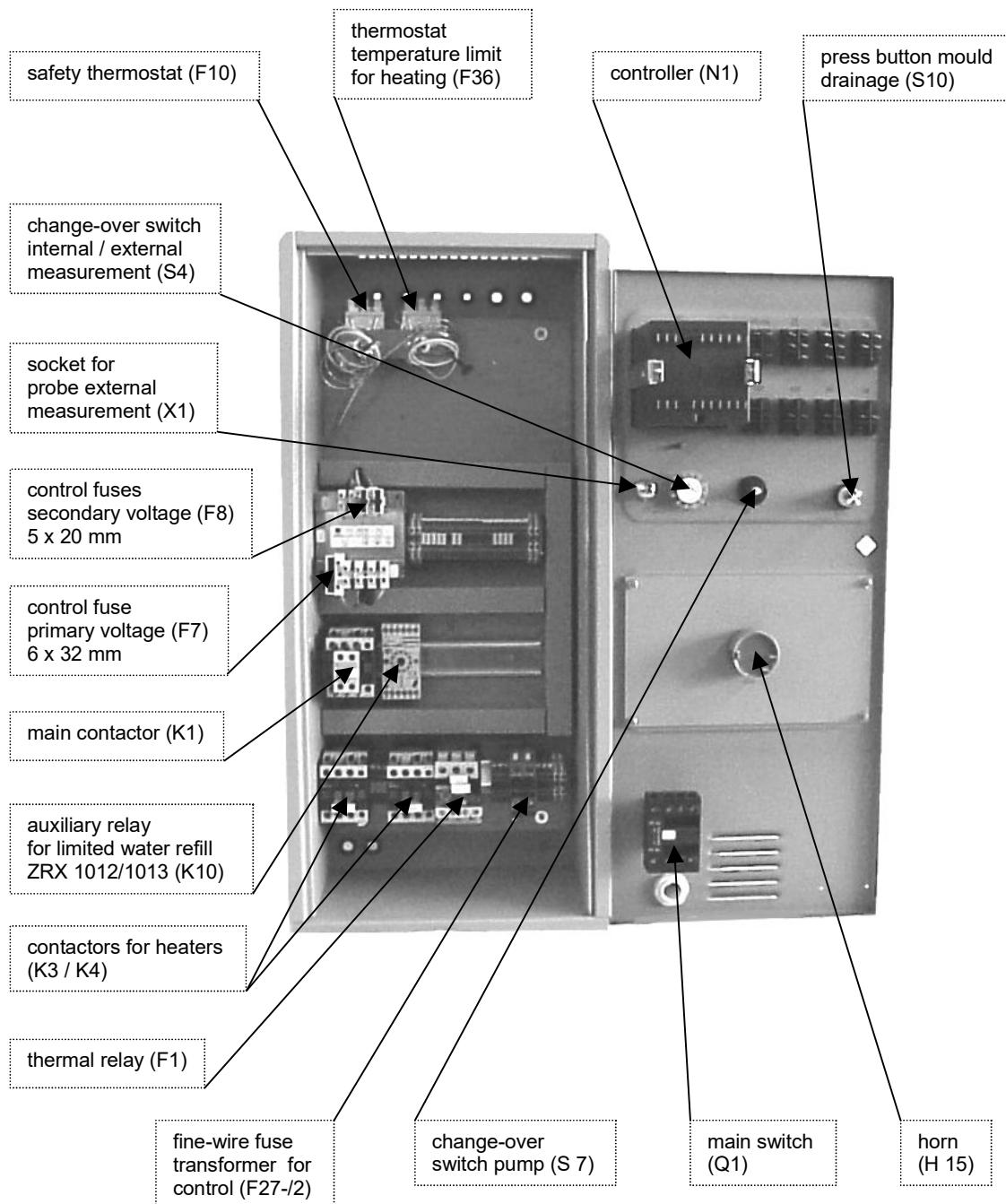
10.2 Front view

connecting dimensions

10.3 Inside view

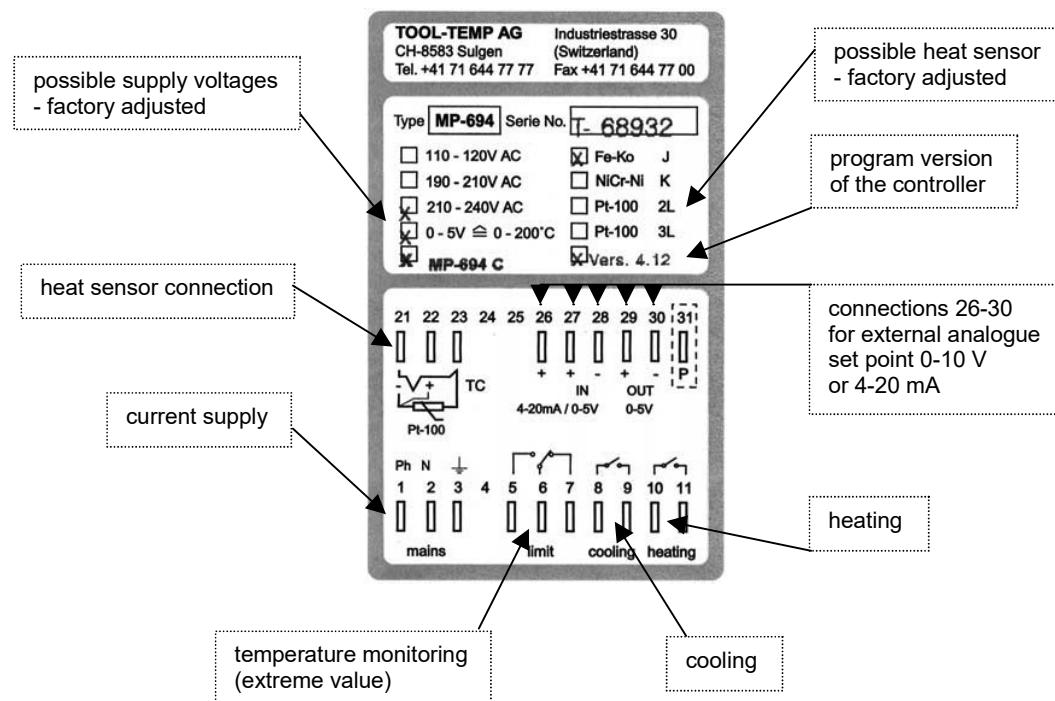
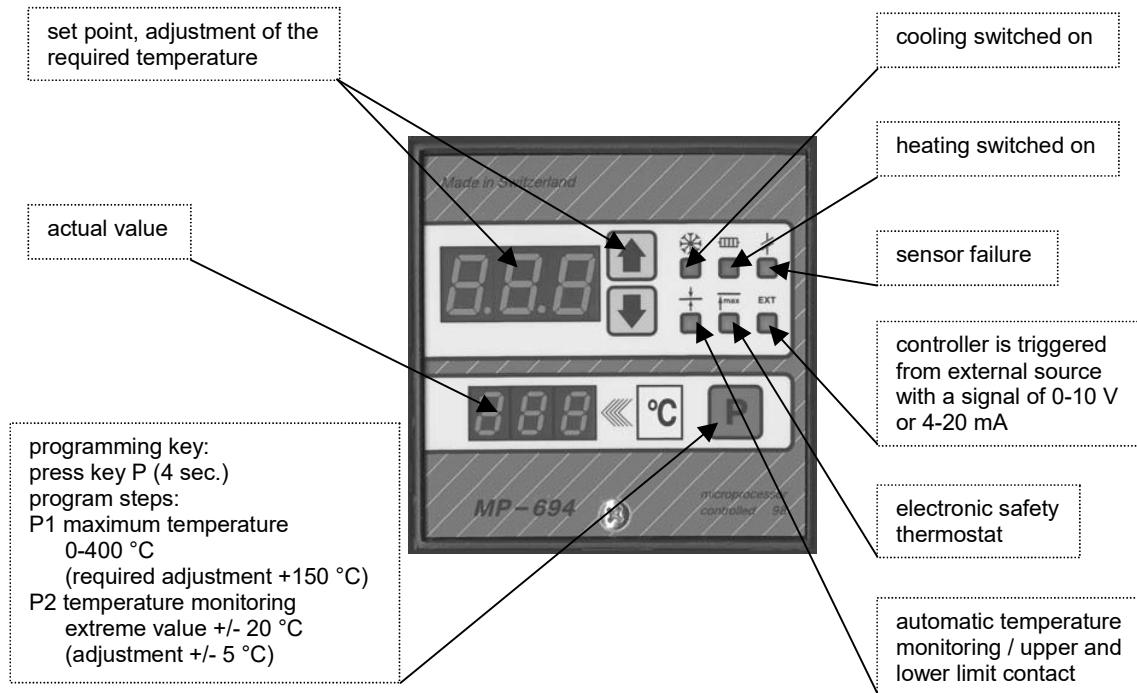


10.4 Inside view switch cabinet



Temperature controller MP-694

temperature control units



Programming: Temperature controller MP-694		Temperature control units			
Configuration summary		Indication display	factory adjustment	Programmability	Key number
Maximum temperature	-99...400		see below	PK	01
Temperature monitoring (extreme value)	+/- 0...20,0		5	PK	02
Temperature indication	Celsius	1	1	PG	20
	Fahrenheit	2			
Type of sensor	Fe-Ko J	1	1	PG	21
	NiCr-Ni K	2			
	Pt-100 2-wire	3			
	Pt-100 3-wire	4			
Intermediate resistance for Pt-100 2-wire	0...50 Ω		0	PG	22
Analogue input	unused	0		PG	23
	voltage 0 - 10 V	1	1		
	current 0 - 20 mA	2			
Starting interlock	off	0		PG	24
	on	1	1		
Adjustment range from	-99...0		-40	PG	25
Adjustment range to	0...400		400	PG	26
Temperature with 0 V analogue input	-100...0		0	PG	27
Temperature with 5 V analogue input	0...400		200	PG	28
Temperature with 0 mA analogue input	-100...0		-100	PG	29
Temperature with 20 mA analogue input	0...400		400	PG	30
Temperature with 0 V analogue output	-100...0		0	PG	31
Temperature with 5 V analogue output	0...400		200	PG	32
Heating Delta-W	● -9,9... +9,9		0		40 ●
Heating proportional band	● 0,0...20,0		12		41 ●
Cooling Delta-W	-9,9...+9,9		1.5	PG	42
Cooling Hysteresis	0,2...20,0		0.4	PG	43
Heat differential part	● 0...100		50		44 ●
Heat correction Delta-W	● 0,0...5,0		1.5		45 ●
Heat correction proportional band	● 0,0...10,0		6		46 ●
Analogue output 0 - 5 V actual value	on/off		on	F	
Alarm relay	with extreme value		always	F	
	with max. temperature		never	F	
Type of controller	heating and cooling			F	
Controlling heating	proportional/differential			F	
Switching threshold voltage input	100 mV			F	
Switching threshold current input	2 mA			F	
Auto tuning	fix programmed			F	

PK adjustable at program menu by customer

PG adjustable at program menu by TOOL-TEMP

F Fixed values not adjustable

Specific adjustment of temperature

Water units	90°C	PK	01
Water pressure units	140°C / 160°C	PK	
Universal units	150°C	PK	
Oil units	200°C / 250°C / 300°C / 360°C	PK	

Factory adjustments - explanations:

This adjustment corresponds to: (4 - 20 mA \triangleq 0 - 400°C)	-100...0		-100	PG	29
	0...400		400	PG	30
This adjustment corresponds to: (0 - 5 V \triangleq 0 - 200°C)	-100...0		0	PG	27
	0...400		200	PG	28
	-100...0		0	PG	31
	0...400		200	PG	32

MP-694 program versions	3.06 without selfoptimizing	Datum:	17.05.01
	3.07 with selfoptimizing	Visum:	KO
	3.08 with extended selfoptimizing (● removed)	Programm	MS-Excel
	3.09 Pt-100 innovations (● removed)	Sprache	englisch

12. Spare parts and pump spares

12.1 Spare parts

Bb0300000	Quick fastener	for case
Bb0300100	Quick fastener	for door switch cabinet
Ca2000500	Screwed cap	for manual fill
Db0500200	Gasket for tank cover	
Dc0100000	Castors Ø 50 mm	with hole for central fixing
De0100400	Water filter R 3/8"	
Df0200000	Solenoid valve R 3/8"	type 21 H7, for water cooling
Df0200100	Solenoid valve R 1/4"	type 21 A2, for autom. refill and drainage
Df0200600	Spare coil for solenoid valve	R 3/8" type 21 H7 and R 1/4" type 21 A2
Df0200900	Repair kit for solenoid valve	R 1/4" Typ 21 A2, consisting of: tappet
Df0200901	Repair kit for solenoid valve	R 3/8" Typ 21 H7, consisting of: membrane, spring, tappet
Fa0800000	Controller MP-694 FeKo	self-optimizing, new
Fa0800001	Controller MP-694 FeKo	self-optimizing, in exchange
Gb0100000	Contactor	32 A, LC1 D1801 P7, 220 V (3 x 380/415 V)
Gb0100400	Contactor	40 A, LC1 D2501 P7, 220 V (3 x 220 V)
Gb0101000	Contactor	50 A, LC1 D3201 P7, 220 V (3 x 220 V)
Gb0701700	Thermorelais	1,6-2,5 A LR2D 1307 (E-pump 3 x 380/415 V)
Gb0700800	Thermal relay	2,5-4,0 A LR2D 1308 (H-pump 3 x 380/415 V / E-pump 3 x 220 V)
Gb0702100	Thermal relay	5,5-8,0 A LR2D 1312 (H-pump 3 x 220 V)
Gb0705700	Relay ZRX	limited water refill
Gb0800500	Base for relay ZRX	
Gc0100600	Transformer 70 VA	415/380/220 V - 220 V, standard
Gf0101200	Capillary thermostat	80°-370°C
Gg0300000	Horn	with intermittent and continuous sound
Gi0100000	Level switch	microswitch
Gk0200200	VAC-switch	only front part with red handle
Gk0200100	VAC-switch	with 3 switching levels, complete, front and back part
Gk0300100	Indication lamp	red, 33 x 25 mm
Gk0300400	Double indication lamp	yellow, 33 x 25 mm
Gk0300600	Double switch	green, 33 x 25 mm, for heating
Gk0300700	Switch	green, 33 x 25 mm, for ON/OFF and horn
Gk0500100	Press button	green, for automatic mould drainage
Gk0600000	Switch-over temperature sensor	for external measurement
Gl0200000	Fuses, small	5 x 20 mm, 1 A (packet of 10 pieces)
Gl0200001	Fuse carrier, big	6,5 x 32 mm, for transformer
Gl0200002	Fuse carrier, small	5 x 20 mm, for transformer
Gl0200003	Fuses, big	6,5 x 32 mm, 1 A (packet of 10 pieces)
Gl0200005	Fuses	6,5 x 32 mm, 6,3 A
Gl0200006	Fuse terminals F27	WK 10mm ² 6,3 A
	Heating 3000 W	indicate voltage
Gn0700000	Socket Lemo, 2-poles	for temperature sensor
Gn0600000	Plug Lemo, 2-poles	for temperature sensor
Wa1000000	Thermocouple	internal Fe-Ko, length 1000 mm
Wa1000001	Thermocouple	internal Pt-100, length 1000 mm
Wc0200000	Heat exchanger	model TT-162 (also for TT-151R,151VAC,152VAC,160E, TT-160E/A,161E,161E/A)
Wd0100000	Float	with 4 set collars

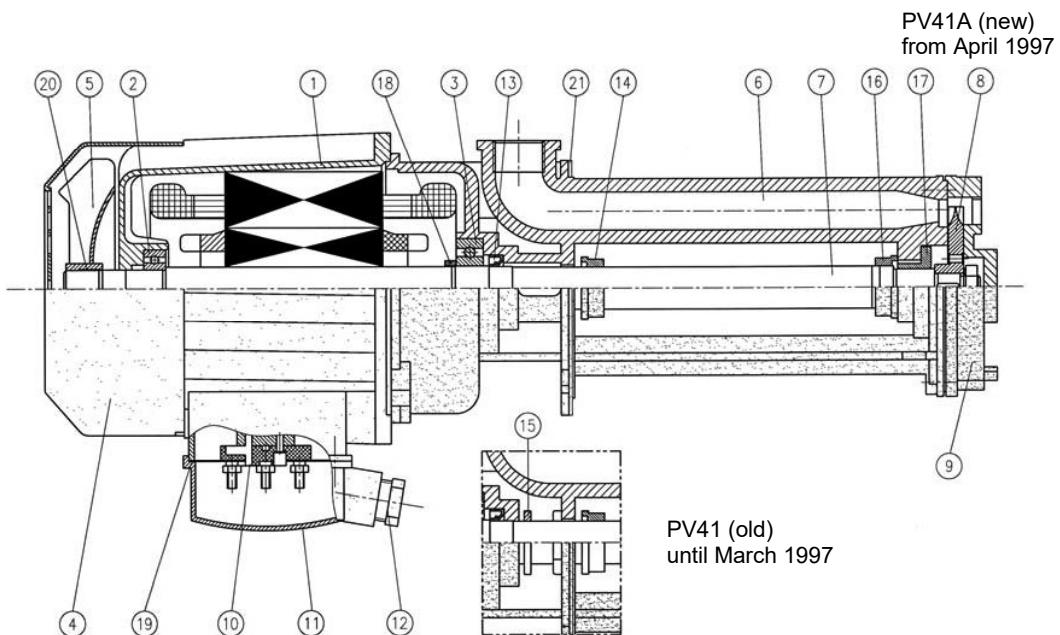
12.1 Spare parts (continuation)

Wd0200010	Pipe to mould	pump – unit outlet, including cutting ring and union nut
Wd0200011	Pipe from mould	unit inlet – tank, including cutting ring and union nut
Wd0200006	Pipe cooling water outlet	tank – rear side of unit, including cutting ring and union nut
Wd0200003	Pipe cooling water inlet	rear side of unit – solenoid valve R 3/8" incl. cutting ring and union nut
Wd0200004	Pipe cooling water inlet	solenoid valve R 3/8" – heat exchanger incl. cutting ring and union nut
Wf0100000	Insulation set	

12.2 Pump spares pump type E

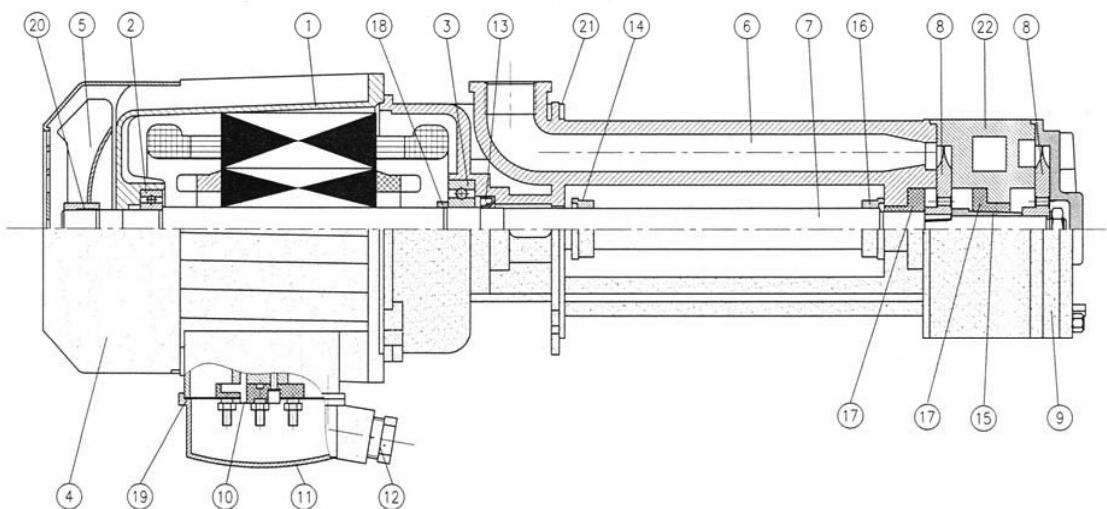
pos.	description
1	Stator
2	Ball bearing 6003-Z-C3 MP1
3	Ball bearing 6004-Z-C3 MN4
4	Fan cover
5	Fan
6	Pump support
7	Pump shaft
8	Impeller 50 Hz, Ø 71 mm
8	Impeller 60 Hz, Ø 68,5 mm
9	Pump body
10	Terminal board
11	Terminal box
12	Screw type conduit fitting
13	Shaft sealing ring
14	Splash ring
15	Splash ring
16	Splash ring
17	Flange bushing
18	Bush
19	Terminal box sealing
20	Straining ring
21	Gasket for pump flange, 100 x 130 x 1,5 mm
	Pump type E, new, indicate voltage
	Pump type E, in exchange, indicate voltage

Indicate the type of pump according to the serial plate when ordering spare parts.

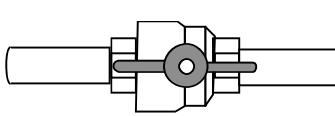
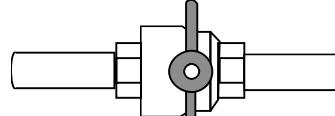
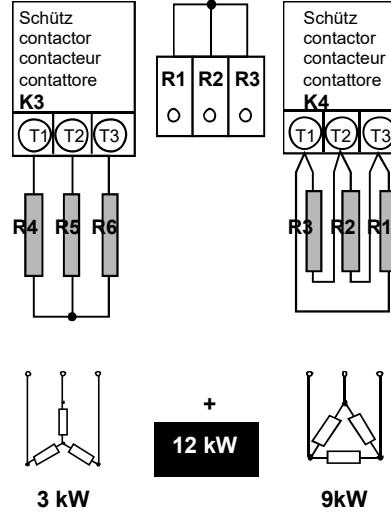
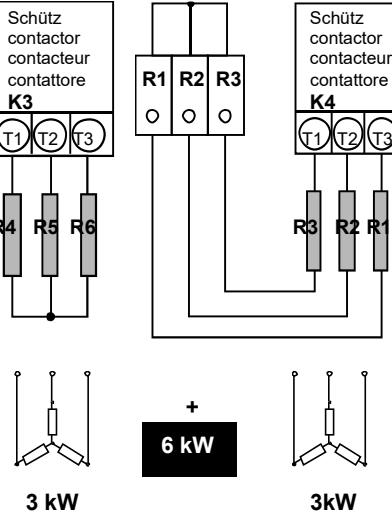
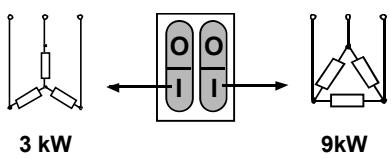
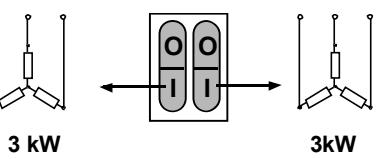


12.3 Pump spares pump type H

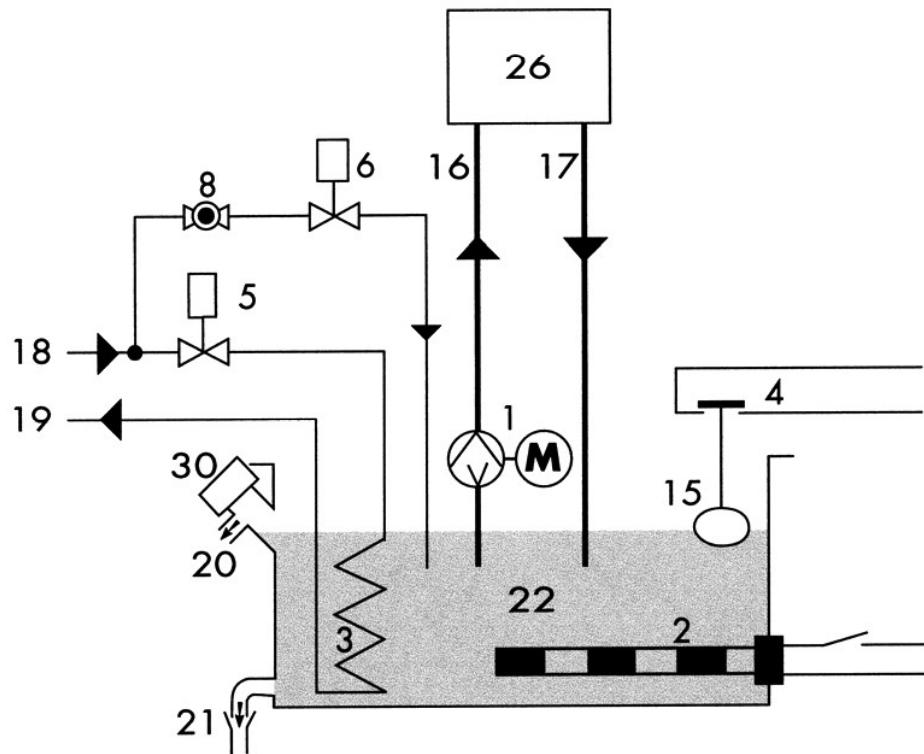
pos.	description
1	Stator
2	Ball bearing 6003-Z-C3 MP1
3	Ball bearing 6004-Z-C3 MN4
4	Fan cover
5	Fan
6	Pump support
7	Pump shaft
8	Impeller 50 Hz, Ø 71 mm
8	Impeller 60 Hz, Ø 68,5 mm
9	Pump body
10	Terminal board
11	Terminal box
12	Screw type conduit fitting
13	Shaft sealing ring
14	Splash ring
15	Distance bush
16	Splash ring
17	Flange bushing
18	Bush
19	Terminal box sealing
20	Straining ring
21	Gasket for pump flange, 100 x 130 x 1,5 mm
22	Transition piece
	Pump type H, new, indicate voltage
	Pump type H, in exchange, indicate voltage



13. Umschaltung Wasser- / Oelbetrieb
 Change-over water / oil operation
 Commutation opération à eau / à huile
 Comutazione acqua / olio

D GB F I	Wasserbetrieb For work with water Opération à eau Per acqua 12kW	Oelbetrieb For work with oil Opération à huile Per olio 6kW
Automatische Auffüllung Automatic filling Remplissage automatique Riempimento automatico - Kugelventil nach Magnetventil - Ball valve after solenoid valve - Robinet après vanne solenoïde - Valvola a sfera davanti la valvola magnetica	ein / on / en service / acceso  auf open ouvert aperto	aus / off / hors service / spento  zu closed fermé chiuso
Umschalten der Heizleistung Reverse of heating power Renverser la capacité de chauffe Commutare la capacità di riscaldamento	 3 kW 12 kW 9 kW	 3 kW 6 kW 3 kW
Stufenschaltung Change of stages Changer étages de chauffe Cambiare potenza di riscaldamento	Heizungsschalter Switch for heater Interrupteur pour chauffage Interruttore riscaldamento  3 kW 9 kW	Heizungsschalter Switch for heater Interrupteur pour chauffage Interruttore riscaldamento  3 kW 3 kW

14. Prinzipschema
Functional diagram
Schéma de principe
Schema di principio



1	Pumpe mit Motor Pump with motor Pompe avec moteur Pompa con motore	8	Kugelventil für Wasserbetrieb Ball valve for work with water Robinet pour opération à eau Valvola manuale per funzionamento acqua	20	Überlauf Overflow Trop plein Sfiato di troppo pieno
2	Heizung Heating Chaussage Resistenza	15	Schwimmer Float Flotteur Galleggiante	21	Ablauf Drainage point Vidange Scarico
3	Wärmetauscher Heat exchanger Echangeur de chaleur Scambiatore di calore	16	Vorlauf To mould Aller moule Allo stampo	22	Tank Tank Réservoir Serbatoio
4	Niveauschalter Level switch Interrupteur de niveau Interruttore del livello	17	Rücklauf From mould Retour moule Dallo stampo	26	Verbraucher Consumer Consommateur Utilizzo
5	Magnetventil Kühlung Solenoid valve cooling Electrovanne refroidissement Elettrovalvola del raffreddamento	18	Kühlwasser ein Cooling water inlet Eau de refroidissement entrée Ingresso acqua di raffreddamento	30	Einfüllstutzen Fill up point Point de remplissage Punto di riempimento
6	Magnetventil aut. Füllung Solenoid valve autom. refill Electrovanne remplissage autom. Elettrovalvola riempimento autom.	19	Kühlwasser aus Cooling water outlet Eau de refroidissement sortie Uscita acqua di raffreddamento		