



***Tempro basic C 90***  
**&**  
***Tempro primus C 90***  
**V 3.0**

**Translation of Original  
Operating Manual**

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## **1 General**

The safety of our customers is the first consideration of all technical solutions. Wittmann plastics devices are subjected to high quality requirements. Our objective is the safety of operating personnel and users.

In order to achieve this objective, several rules are necessary.

This operating manual is to be used by every person who is authorized for activities on this device.

Ensure that the operators are familiar with the operating manual and the device. Instruct all persons in the working area of the device about the indirect and direct dangers emanating from it.

The operating manual contains detailed descriptions of the unit and the components included in the scope of delivery. We reserve the right to make technical modifications to the products without prior notice.

The operating manual must only be used internally. It must not be made available to third parties. The reproduction of the content of this manual, in part or in whole, is only permitted with the explicit permission of the author.

### **1.1 Symbols highlighting instructions in the operating manual**

Safety instructions in this operating manual that must be adhered to in order to prevent personal injury are highlighted with the general warning symbol



(safety symbol according to DIN 4844-W9)

Dangers in connection with electric voltage are highlighted with the warning symbol



(safety symbol according to DIN 4844-W8)

Dangers in connection with explosion protection are highlighted with the warning



symbol

Safety instructions that must be adhered to in order to prevent damage to the device and its functions are highlighted with the warning **CAUTION**

## **1.2 Definition of Terms**

This operating manual always uses recurring terms and designations, that are explained here for better understanding:

**Device**

The term „Device“ can describe both an individual device, a tool, a machine, as well as an installation.

**Operator**

The operator is that person who operates the device at his own responsibility or when instructed to do so.

**User**

The user of a device is the person responsible for all procedures (e.g. production foreman, shop foreman, etc.). The user instructs the operators to execute a task.

**Work Instruction**

The work instruction (not to be confused with operating manual) describes the interplay between several devices, sequences or production processes. The work instruction is to be prepared by the user of the device.

**Machinist**

If several operators work on one device, then the machinist coordinates the sequences. The machinist must be nominated by the user.

**Specialist Personnel**

Persons who are qualified, based on their training, to perform work professionally are regarded as specialist personnel.

## **1.3 Safety Instructions**



Read through the operating manual carefully before setting into operation for the first time. Observe all points, ask questions if anything is unclear.



Observe the local regulations and requirements.



Compare the specifications for the energy supply of the device with the local energy supply.



Have all work on the device performed by specialist personnel.



Take note, that the device can be hot and that the danger of burning exists.



For all work on the device, wear regulation work clothes.



With the help of the operating manual, prepare a precise work instruction for the work sequence with this device. Nominate a machinist responsible for the device. The operators of the device must be at least 16 years old.



Regularly inspect all lines, hoses and screw couplings for leaks, damage and firm seating. Have defects that occur eliminated immediately.



Observe and take note of the warning signs.



In the event of malfunctions, immediately shut down the machine using the main switch.



If the device has been shut down for safety reasons or while mechanical work on the device is being completed, you must secure it against unauthorised switching on. To do this, disconnect the power supply by pulling the mains plug.



Before carrying out any work on the device, disconnect it from the power supply.



Do not undertake any modifications of any kind on the device without the written approval of the manufacturer.



Before beginning maintenance work, nominate a supervisor and notify the operating personnel responsible.



This device must not be operated if certain parts are not mounted or if the protective covers or side panels have been removed. RISK OF INJURY FROM BURNS!



Observe the safety instructions / operating manual of the connected devices.



Keep this operating manual safe, so that it is available at any time at the place where the device is operated.

#### **1.4 Notes about process safety of the device**



This device is designed exclusively for the heating of water as described in chapter 13.2 "Heat transfer fluid".



**CAUTION** The permissible storage temperature of the device is +5°C – +40°C (+41°F – 104°F)



When the device is set into operation for the first time, all electrical connections are to be checked.



Check the rotational direction of the pump.



**CAUTION** Keep a record of maintenance and repair work.



**CAUTION** Use only Wittmann original replacement parts.



To shut down the device in the event or an emergency (EMERGENCY-STOP), operate the main switch or disconnect the mains plug from the socket (if device is equipped with a socket).



In the event of a power failure, do not manipulate or disconnect the tempering medium hoses, as the entire tempering system is pressurised. RISK OF INJURY FROM BURNS!



In the event of a power failure of EMERGENCY-STOP, do not manipulate or disconnect the hoses filled with tempering medium! The entire tempering system is pressurised and the device is automatically restarted as soon as the power returns. An EMERGENCY-STOP of the machine does not automatically result in an EMERGENCY-STOP of the tempering device! RISK OF INJURY FROM BURNS!



Do not operate the device when the switch cabinet or the terminal box door is open.



Never operate the heater, if its protective covers or side panels are removed. RISK OF INJURY FROM BURNS!



Certain accessible parts at the connecting points of the device are very hot (temperature of over 70°C)! RISK OF INJURY FROM BURNS!



In the event of a control system failure that makes it impossible to control the device, immediately contact the manufacturer. Do not take any action unless instructed by the manufacturer! RISK OF INJURY FROM BURNS!

## **2 Completeness of the Delivery, Warranty**

Wittmann devices are packed with great care, in order to protect them during transport. For assembly, all packaging is to be removed.

**CAUTION** Remove the packaging and the protective foil of the devices with great care. The use of sharp objects can cause damage to the painted surfaces and the devices.

Verify the completeness of the delivery.

### **2.1 Transport Damage**

The commissioned transport organizations must ensure that the devices are delivered in an undamaged condition.



Inspect the device for visible transport damage immediately after it arrives. Report any visible transport damage to the commissioned transport organization immediately.

In the event of any transport damage, discuss a solution to rectify the damage directly with the transport organization.

### **2.2 Warranty**

For delivered products, we undertake the warranty for defects that result due to a fault in construction, the material or the workmanship for a period of 12 months after acceptance of the goods by the customer.

The defect notification must take place immediately and in writing.

We are not liable for damage occurring as a consequence of natural wear and tear, excessive loading, faulty handling, unsuitable operating materials, defective maintenance and the like.

For further details, refer to the Sales and Delivery Conditions.



**In the event of transport damage, do not return the device, but instead notify our nearest customer service center without delay.**

You will find this in chapter **Customer Service Centers**

### **3 Assembly Instructions**

The assembly and commissioning may only be undertaken by persons authorized for this purpose, in order to avoid damage to devices, equipment and persons.

These assembly instructions presume knowledge about the regulations for the prevention of accidents, working conditions, as well as safety regulations and their implementation.

These assembly instructions presume knowledge in the fields of electricity and mechanics, that have been acquired based on their training, experience and instruction.



Ensure that all persons working with and on the device have the necessary skills. Observe the safety instructions for the operation of transport and lifting gear. All assembly work must be carried out while the machine is not powered and not pressurised.

Our trained fitters are happy to assist you with this work.

#### **3.1 Transport and Preparation for Assembly**

The device and the accessories are delivered on pallets. At transport temperatures of 0°C or below, the device should be left for 1 hour in a heated room before starting it to allow it to return to room temperature.

To protect the device during transport and assembly, it is wrapped in protective foil. Remove all foil before commissioning the device.

To transport the device (packing unit) on site, use only suitable lifting and transport gear (e.g. forklift truck, pallet truck, etc.).



All transport and lifting gear must be operated by suitably qualified personnel.

To transport and lift the device, proceed as shown in the pictures below. Secure the device (packing unit) against toppling over/slipping from the forklift truck.

The transport of the device on rollers is only permitted for short distances on site.



Small pallet truck



Fork lift truck



Large pallet truck



To lift the device from the packaging use eyelet bolts according DIN 580.

### **3.2 Requirement on the Installation Location**

Location of installation .....Closed room  
Air humidity .....15% - 85%  
Height above sea level.....max. 1000 m  
Horizontal alignment .....max. deviation +/-3° (uneven floor)  
Floor .....Non-slip surface, dry, no trip hazards  
Ambient temperature.....+5°C to +40°C  
Load-bearing capacity / device.....Observe weight and dimensions

MODEL	DESIGN	Weight [kg]	Width [mm]	Height [mm]	Depth [mm]
Tempro basic C 90	Standard	31	235	660	590
Tempro primus C 90	Standard	31	235	660	590



Ensure that all parts of the machine are easily accessible for maintenance and repair. Keep the workplace clean and uncluttered!



Take into account that the device releases heat and humid air during operation.

Ensure that there is sufficient ventilation at the location of installation.



If the units are to be installed on platforms, you must provide additional safety devices (e.g. strips) to prevent the heaters from rolling off (alternatively, order rollers with locking mechanism available from Wittmann).



The device must not be operated in explosive atmospheres.

### **3.3 Electrical Connection**



Connect the device to a power supply system that conforms to the specifications on the type plate. Always adhere to the instructions and regulations of your electricity supply company. All electrical connections must be completed by an authorised specialist technician or under his/her supervision.



There is provided a main fuse (see indicated current consumption on nameplate) which interrupts the electrical energy supply to the unit in case of overload.

For safety reasons, in particular the function of the protective conductor terminal is to be checked.

Install the energy supply with an appropriate safety distance to hot parts.



Lay all cables of the device, so that no faults can occur through other electrical devices. Thereby in particular control lines and data transmission cables are to be isolated from power conducting lines.

For BASIC units, check the pump rotational direction. The unit uses a right-hand field of rotation.

The entire unit will have to be specially grounded if you work with materials that cause strong electrostatic discharges as they are conveyed.

For all work, disconnect the device from the electrical energy supply. This is the most secure protection against electrical accidents.



If work on the electrics cannot be completed, then secure the device against unintentional setting into operation.

For this purpose disconnect the power supply system by releasing the main plug from the power socket.

Check all electrical terminal- and screw connections of the load current circuit regularly for firm seating.

### **3.4 Safety Temperature Cutout of the Electric Heating**

During transport, the device can be exposed to low temperatures.

The safety temperature cutout trips at temperatures below -5°C. For troubleshooting, bring the device to room temperature and reset the safety temperature cutout of the heater concerned with the reset button.

(See chapter 7.12)

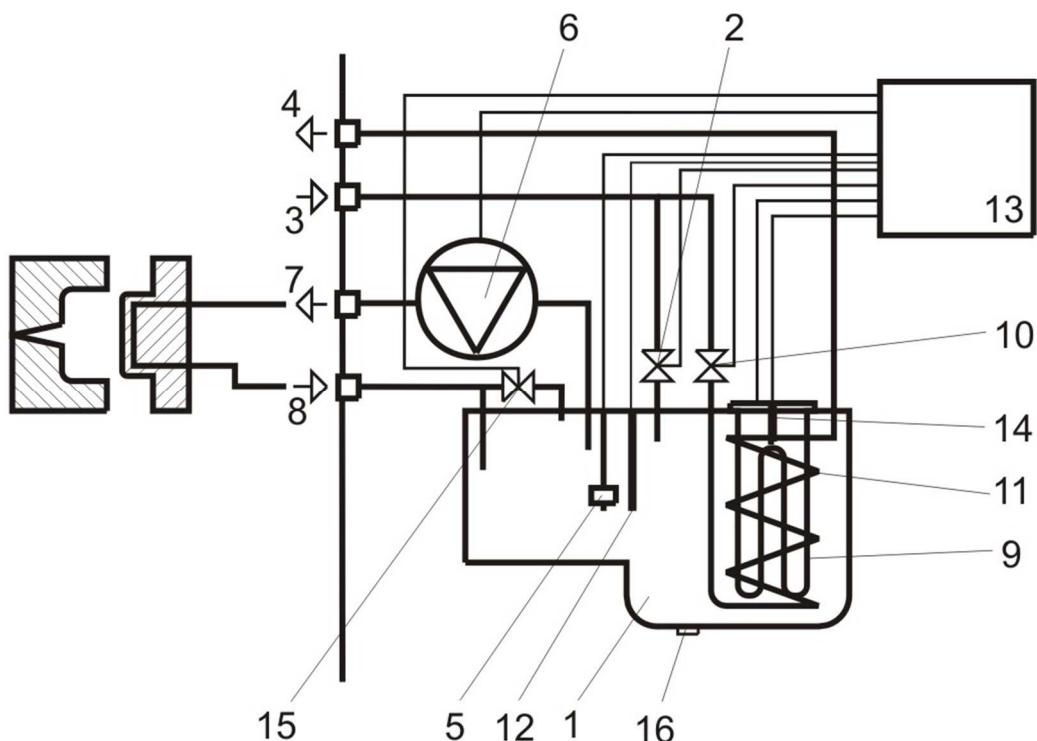
## 4 Layout and Function

The tempering devices *Tempro basic C90* and *Tempro primus C90* are used for tempering injection molding tools on injection molding machines, as well as other tempering circuits on plastics processing machines.

This temperature stabilizer of the basic / primus C90 integrates modern design, compact structure and simple handling.

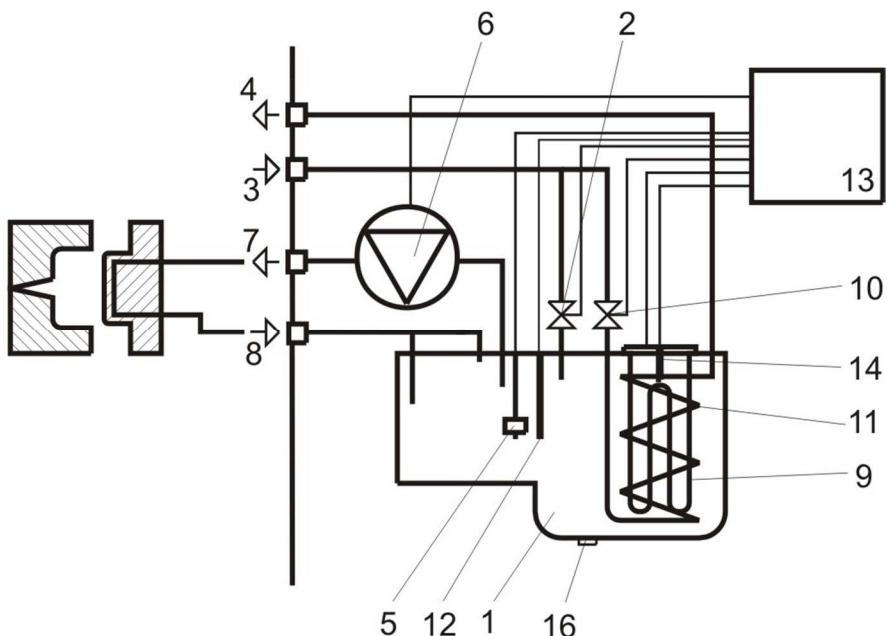
The temperature stabilizer has a temperature stabilizing circuit with a mould connection.

Diagram of temperature stabilizing circuit: **Tempro basic C 90**



Nr.	Description	Nr.	Description
1	Heat exchanger	9	Heater element
2	Filling solenoid valve	10	Cooling solenoid valve
3	Cooling-water inlet	11	Cooling coil
4	Cooling-water outlet	12	Temperature sensor
5	Level switch	13	Microprocessor controller
6	Pump	14	Safety temperature cutout
7	Mould connection-FEED	15	Ventilation valve
8	Mould connection-RETURN	16	Drain plug

Diagram of temperature stabilizing circuit: **Tempro primus C 90**



Nr.	Description	Nr.	Description
1	Heat exchanger	9	Heater element
2	Filling solenoid valve	10	Cooling solenoid valve
3	Cooling-water inlet	11	Cooling coil
4	Cooling-water outlet	12	Temperature sensor
5	Level switch	13	Microprocessor controller
6	Pump	14	Safety temperature cutout
7	Mould connection-FEED	15	
8	Mould connection-RETURN	16	Drain plug

The temperature stabilizing circuit includes a heat exchanger (1). The heat exchanger is filled with water automatically through a solenoid valve (2). (Capacity approx. 9 litres Tempro basic / primus C90).

Joint water feed for filling (2) and cooling (10) solenoid valves through coarse filter. The filling height is controlled by the level switch (5).

The temperature stabilizing medium is driven by the pump (6) in an open circuit through the mould circuit and runs back into the heat exchanger. Mould connections feed and return (7,8).

The water is heated by the heating element (9) inside the heat exchanger. When the cooling solenoid valve (10) is opened the cooling water flows through the cooling spiral (11) and cools the temperature stabilizing medium (indirect cooling).

Cooling water feed and return (3,4).

The medium temperature is monitored by the temperature sensor (12) and closely controlled by an advanced microprocessor controller (13).

The measuring accuracy is 0.1 degrees and therefore allows for a constant temperature of +/- 0,5 degrees in the injection mould.

**Please read thoroughly the following chapters which contain important information about installation, start-up, operation, and maintenance.**

## 5 Installation

With obvious transport damage, do not send the device back, instead notify the nearest customer service center immediately.

### 5.1 Cooling Water Connection



Use only suitable pressure- and temperature-resistant hoses.  
Depending on the cooling or heating cycle, high return flow temperatures of max. 95°C can occur in the drain hose!  
Fit a shut-off device (e.g. ball valve) in the incoming supply.

Water pressure (differential pressure between forward and return flow) of more than 6 bar can lead to functional faults of the cooling valve.

### 5.2 Connection of the Tool Circuits



We recommend not reducing the cross-section at the connections for the tool circuit as this could result in an increased operating pressure and excess wear of the pump! The connections to the tool should be established with hoses of minimum 13 mm in diameter that are not longer than 4 metres!



Use only suitable pressure- and temperature-resistant hoses and screwed connection couplings.

#### Minimum Pressure and Temperature Resistance of the Hoses:

Type	max. pressure (bar)	max. Temperature
Tempro basic C 90		
Tempro primus C 90	6	95°C

### 5.3 Electrical Connection



For all devices, the mains connection is to be fuse-protected externally by the user according to the power of the device (circuit-breaker + observance of the local protective measures).

Connected load:

Voltage	heating cap.	max. current	fuse
3x400V AC	max. 6 kW	10A	16A
3x480V AC	max. 9 kW	12,5A	16A

The mains connection cable (4 m) is already mounted on all stabilizers and provided with a plug (CEE 16A). (Special voltage without plug).

The wiring of the temperature stabilizer is designed for a right-hand 3-phase network.

In main switch position 1 the pump is running in pressurized operation. (Right-hand orientation)

Check: Fan wheel of pump motor is running in the arrow direction.

If this is not the case, two phases in the plug of the main connection must be interchanged.



For safety reasons, the proper function of the protective conductor terminal should be examined thoroughly.

#### **5.4 Connections on the rear side**



High temperatures (above 70°C) occur at the exposed parts at the connection locations of the stabilizer !

**RISK OF BURNS!!**

**(1) COOLING WATER – INLET**



**(2) COOLING WATER – OUTLET**

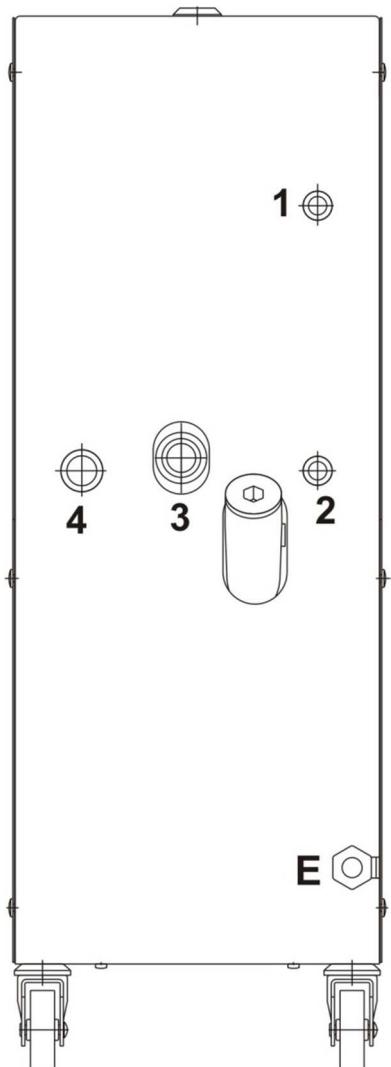


**(3) MOULD CONNECTION – FEED**



**(4) MOULD CONNECTION – RETURN**



**Tempro basic C 90 & Tempro primus C 90**

- |   |   |
|---|---|
| 1 | Cooling water – Inlet (G $\frac{1}{4}$ "")    |
| 2 | Cooling water – Outlet (G $\frac{1}{4}$ "")   |
| 3 | Mold connection – Feed (G $\frac{3}{4}$ "")   |
| 4 | Mold connection – Return (G $\frac{1}{2}$ "") |

E MAIN CONNECTION

## **6 Start up**



Before switching the stabilizer on, please read the entire Chapters **Startup** and **Operation** to avoid false operation which may cause injuries to persons and damage the stabilizer!

### **6.1 Switching the device on with the main switch**

A self-test with simultaneous activation of all displays (display test) occurs at first – the horn sounds briefly. Then, the current actual value will be displayed.

Entries are now expected.

The device is only switched on and off by way of the main switch.

### **6.2 Filling**

The stabilizer is equipped with an automatic filling and refilling system. That means that the current filling level is reported to the controller via the level monitoring and the controller then switches on the solenoid filling valve.

### **6.3 Leakage monitoring**

Excessive water loss in the forming circuit (hose loose, burst, etc.) will trigger the leakage monitoring device and the filler valve will be closed or may no longer be opened. In addition, a fault signal will be emitted (alarm contact and blinking LED  $\square$  on the display and error message E03).

**Primus C90:** (horn and blinking LED  $\square$  on display and error message E03)

The monitoring system is divided into the following steps:

<b>System-pipe pressure</b>			
▪ Initial filling time	6 min	at 4 bar approx.	ca. 20 l
▪ Refilling time (contin. filling)	30 sec	at 4 bar approx.	ca. 1.6 l
▪ Sum of refilling times	1 - 60min	(adjustable)*	

\* The total refilling time over the last 10 hours is monitored. An error message is generated, if the set time is exceeded. The totals counter can be deactivated (value "0"). The factory-set total refilling time is 10 minutes. This value can only be adjusted in the configuration menu ("con").

## **6.4 Operation mode**

### **Tempro basic C 90:**

Two temperature-controlled operating modes (pressure and suction temperature control) and the empty suction function are available.

### **Tempro primus C 90:**

Only the pressure tempering mode and the emptying by suction function are available.

#### **6.4.1 Pressurized stabilizing:**

This is the standard operation mode in which the stabilizing medium is pumped through hoses and tool channels.

#### **Main switch position 1**

#### **6.4.2 Suction temperature control:**

Here the temperature control medium is sucked through hoses and tool channels (leak stop operation )

#### **Main switch position 2**

### **Tempro primus C 90:**

This tempering mode is **NOT** available for the PRIMUS C90.

#### **6.4.3 Evacuating:**

In this operation mode, the stabilizing medium is sucked.

### **Tempro primus C 90:**

#### **Evacuating optional**

Here, the tempering medium is sucked out of the mould.

#### **Main switch position 2**

## 6.5 Procedure for exchanging tools Tempro basic C 90

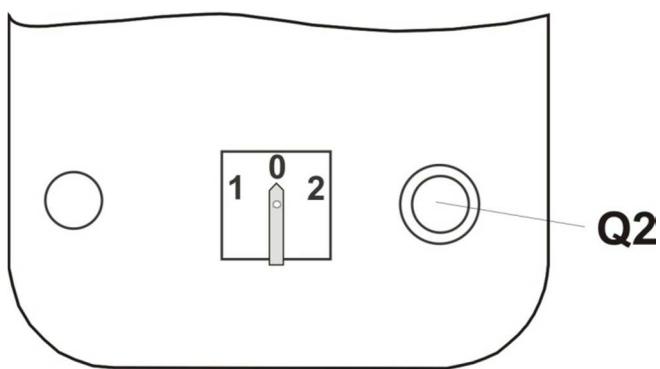
Start device with main switch position 2

Cool down device with cooling-down function button (at least below 80°C)

Hold push button Q2 on operating panel down for as long as empty suction is required

Switch off device (main switch position 0)

After tool change start device into operation and deactivate cool-down function again.



For the evacuating process, a capacity of 3 l is available in the tank. When this volume is exceeded, the stabilizing liquid enters the overflow pipe and flows out of the stabilizer!

In order to suck the mould empty, key Q2 must be kept pressed so that the vent valve remains open.

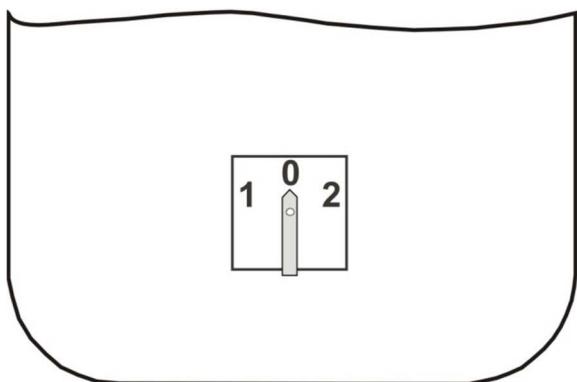
## 6.6 Procedure for exchanging tools Tempro primus C 90

Using the cooling down function key, device in pressure temperature control mode (at least below 80°C)

- Switch off device (main switch position 0)
- Start device with main switch position 2 for the duration of evacuation
- Temperature control medium is sucked from tool \*)
- Switch off device (main switch position 0)

After tool change, start device and switch cooling down function off again

\*) For the evacuating process, a capacity of 3 l is available in the tank. When this volume is exceeded, the stabilizing liquid enters the overflow pipe and flows out of the stabilizer!



## 7 Operation

The wiring of the temperature stabilizer is designed for a right-hand 3-phase network.

In main switch position 1 the pump is running in pressurized operation.  
(Right-hand orientation)

Check: Fan wheel of the pump motor is running in arrow direction. If this is not the case, two phases in the plug of the main connection must be interchanged.

The stabilizer has an operating panel with status and input display.

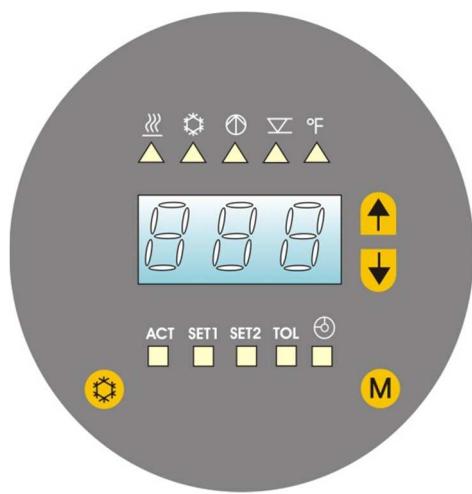
If no key is pressed for more than 25 seconds, invariably the current actual value and stabilizer status are displayed.

In most cases the "short overview" will be sufficient for operation which is very simple.

A detailed description for every single entry is given below.

In all of the following operating descriptions, those keys and displays are emphasized in the figures which are of importance for the respective functions.

### 7.1 Changing values



**In general, the following information is essential for changing values:**

Press key **M** to select and keys **↑** and **↓** to change values.

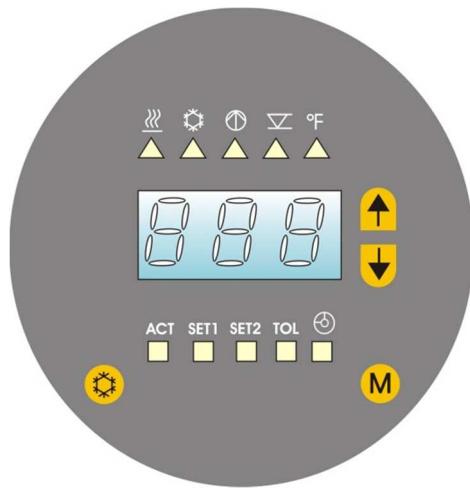
Status display .

LED **illuminated** means "function active"  
LED **flashing** means "error"

To switch the equipment "ON" and "OFF" see chapter 7.9

## 7.2 Short overview of operation and settings

### 7.2.1 Input and Displaymode



Shift input and Display - mode with key

SET 1 = Set point value change with keys or

SET 2 = Set point value change with keys or

TOL = Tolerance +/- change with keys or



operating hour counter 1 h = 1 unity



number + number x 1000 = number of operating hours

### 7.2.2 Status display

LED illuminate	LED flashing
	HEATING is active
	safety temperature limiter released
	COOLING is active
	PUMP is running
	motor protection relay released
	UNIT is filling
	Leakage (filling time exceeded)
	TEMPERATURE at Fahrenheit LED °F dark:
	all temperature at °C

### 7.3 Display of actual value and status (ACT)



As long as no entries are performed the **LED "ACT"** (Actual) is illuminated and the current actual value is displayed.

The **status LED's** signal the current operating status of the stabilizer and indicate errors in the form of flashing LED's. If no entries are performed for approx. 25 sec., the display will shift automatically to this display of actual value and status.

All of the following descriptions use this display condition as a starting point.

#### 7.3.1 Display of internal temperature

If the unit is equipped with an optional external sensor, the temperature of the internal sensor can be called up by pressing the button.

#### 7.3.2 Display of heating / cooling performance

During standard operation, the current heating or cooling performance (in %) can be called up by pressing the button. In addition, the LED for heating or cooling is on.

#### 7.3.3 Display of version number (only at ACT – Display)

Upon simultaneous actuation of both cursor keys, the version number of controller and operating software will be displayed.

### 7.4 Adjustment of set point value (SET1)



Enter the input modus for the **setpoint value 1** to be used in controlling operation by pressing the **key M** once.

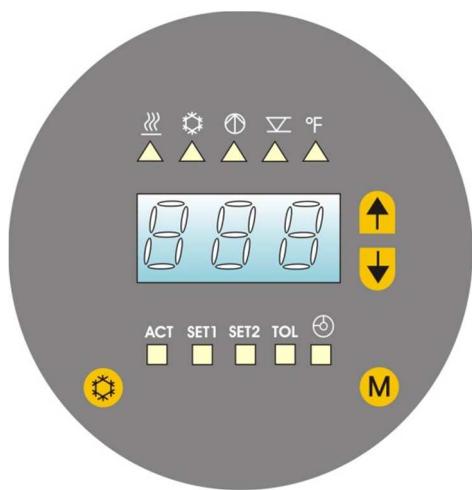
The **LED "SET1"** will be illuminated and the most recently adjusted **setpoint value** will be displayed. This **setpoint value** may be changed upwards by pressing the **key**  or downwards by pressing the **key** .

The adjustment range is 10° - 90°C. [50 – 200°F]. Upon short actuation of the keys, the setpoint value will be changed by 1°C, when keeping them pressed, the value will be increased in cycles (5x slowly, then rapidly).

For quick adjustment of the temperature, simultaneously press the buttons and . (°C: 20→60→90→20... [°F: 70→140→200→70...]).

By pressing the **key M** the selected value will be stored.

## 7.5 Adjustment of set point value for cooling down function (SET2)



Press the button **M** twice to get to the input mode for the **cooling-down function set value 2**.

The **LED "SET2"** is illuminated and the **set value** set last is displayed.

This setpoint value may be changed upwards by pressing the **key** or downwards by pressing the **key** .

The adjustment range is 10° - 90°C. [50 – 200°F].

Upon short actuation of the keys, the setpoint value will be changed by 1°C, when keeping them pressed, the value will be increased in cycles (5x slowly, then rapidly).

Simultaneously press the buttons and to set the nominal value to the default value of 40°C [100°F].

By pressing the **key M** the selected value will be stored.

## 7.6 Adjustment of tolerance limits (TOL)



By pressing the key **M** 3x you enter the input mode for the tolerance limits.

The LED „**TOL**“ will be illuminated and the most recently adjusted **tolerance value** will be displayed. This **tolerance value** may be changed upwards by pressing the **key** or downwards by pressing the **key** .

The adjustment range is 1° - 90°C. [2 – 200°F].

Upon short actuation of the keys, the **tolerance value** will be changed by 1°C, when keeping them pressed, the value will be increased in cycles (5x slowly, then rapidly).

Simultaneously press the buttons and to set the nominal value to the default value of 10°C [20°F].

By pressing the **key M** the selected value will be stored.

The **tolerance monitoring** is activated once the tolerance window has been reached for the first time or upon expiry of time t1 (can be set in the configuration menu).

This is to prevent any alarm messages during the heat-up phase  
 An alarm message will be put out only after the tolerance limits have already been exceeded or fallen short. There is an alarm message, if the set point value is not reached within 1 hour.

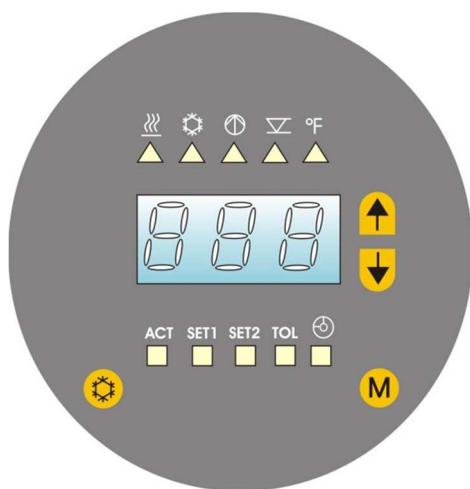
e.g.: set point value = 50°C      tolerance = 3°C

The monitoring system will be activated when 47° are reached for the first time.  
 Alarm message at 46° (and lower) or at 54° (and higher).

**The entry of tolerance limits has no influence on controlling accuracy but is used merely to monitor deviations of temperature.**

## 7.7 Display of operating hours

Standard version



By pressing the key 4x you enter the input mode for operating hours.

LED will be illuminated.

1 hour = 1 unity

number + number x 1000 = number of operating hours

The operating hour meter remains switched on while the pump is running.

It is not reset-able and will be used as guideline for any warranty claims.

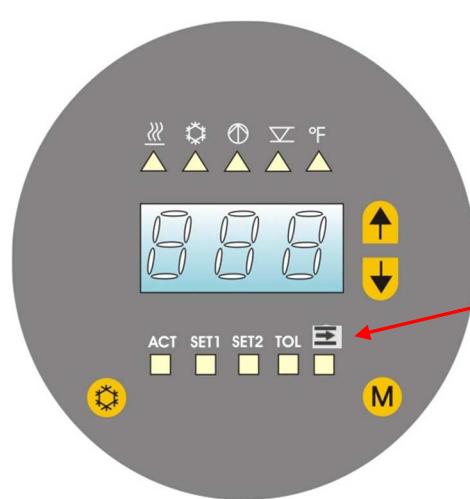
In addition, also **maintenance times** (acc. to the number of operating hours) will be indicated by the flashing (see chapter "Maintenance")

In order to reset the maintenance alarm (switch off flashing LED )  
 you must switch on the "Display of operating hours" and actuate simultaneously the and keys.

In models with optional flow rate indicator, the operating hours are shown in a separate operating hours menu („Hr“, code 101)!

## 7.8 Display of current flow rate

with Option „Flow indication“



Press the button **M** four times to call up the current flow rate in display mode.

The LED **E** is on and the calculated current flow rate is displayed.

The current pressure (total and pump pressure) can be called up by simultaneously pressing the buttons **↑** and **↓**. The temperature to be displayed can be set in the configuration menu („con“, code 120):

P.to = total pressure (feed line); P.Pu = pump pressure;

From this menu, the system automatically returns to menu 1 (except in the event of an error, when an error code is displayed).

In models with optional flow rate indicator, the operating hours are shown in a separate operating hours menu („Hr“, code 101)!

## 7.9 ON- and OFF switching of the temperature stabilizing circuit

The device is only switched off and on by way of the main switch.

## 7.10 Code Input



By pressing the key **M** 5x you enter the CODE input mode

The number **1 2 3** will be displayed.

Settings in this mode be allowed by trained operators only.

By pressing the key **M** once again, you will return to the actual value and status display (ACT).

## 7.11 Cooling down function button

Press this button to cool down to the set value (SET2).

While the cooling-down function is active the LED for set value 2 (SET2) flashes.

Once the set value 2 has been reached the pump runs and the temperature is no longer controlled.

If the cooling-down function button is pressed once more the set value 2 LED stops flashing and the temperature is again controlled to set value 1 (SET1)..

## 7.12 Error messages



If the system detects an error at a **peripheral component**, an error message (Exx) is displayed and the respective **LED flashes**.

Possible error outputs and their meaning:

- E 01 Safety temperature limiter has tripped
- E 02 Motor protection relay has tripped
- E 03 Filling time exceeded
- E 11 Sensor breakage (internal sensor)
- E 12 Sensor breakage („external sensor“ – Option)  
(not available for Primus C 90)

In the event of error messages the horn sounds (**Tempro Basic C 90**: and the alarm contact switch is switched).

These are acknowledged by pressing any key, the error message on the display stays on.

Only with option "Flow indication" (not in Primus C90):

### Messages:

- H 13 Pressure sensor defective
- H 76 Service reminder

To acknowledge a message, simultaneously press the buttons and .

**LED flashing**

Safety temperature exceeded (ref. 7.13)



Leakage (max. filling time exceeded)

**ACT**

Sensor breakage (where control is performed)

**TOL**

Beyond tolerance range

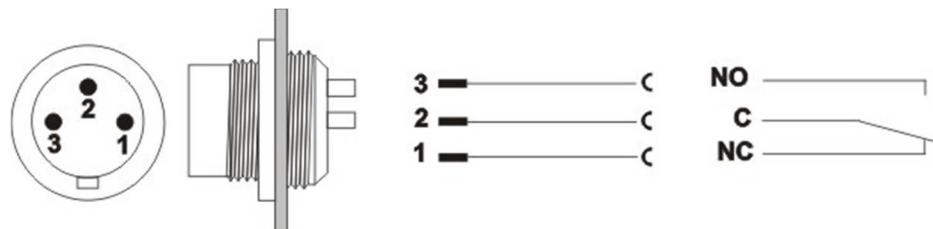


Maintenance alarm (not for Option „Flow indication“)



PUMP flashes current consumption too high (motor protection relay has tripped)

If the SET2 LED flashes this is not an error message, only the switched-on cooling-down function is indicated.

**Tempro basic C 90 error message:**

Moreover, a potential-free **alarm contact** (changeover switch) is activated which can be reset by pressing any key. (3-pole plug at stabilizer front)

Admissible contact load: 1A at 24V DC / 120V AC

**7.13 Safety temperature limiter**

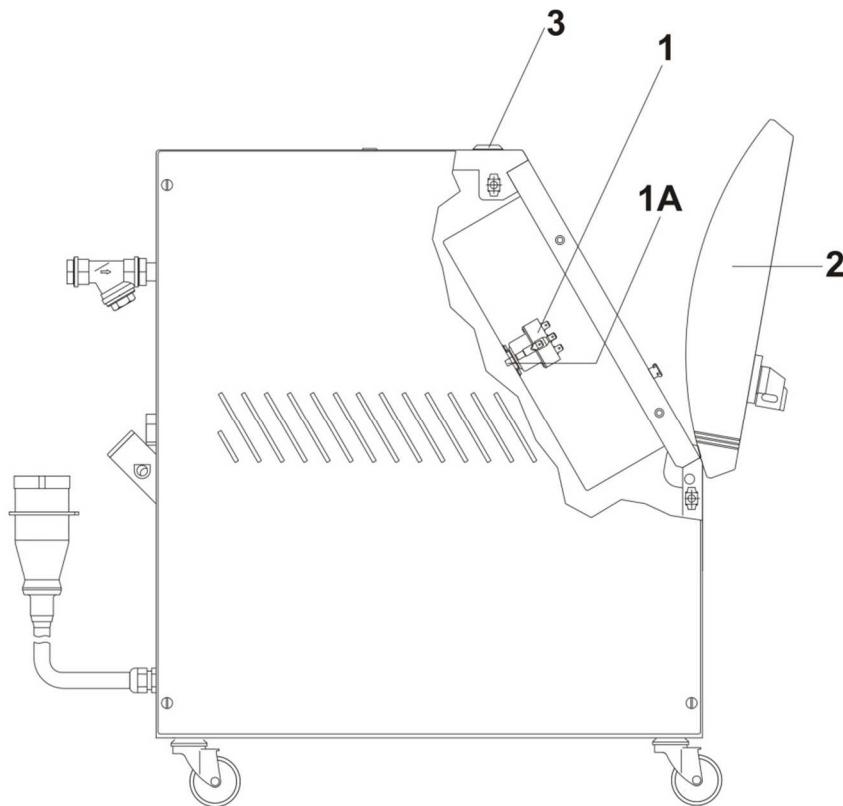
This device is equipped with a safety temperature limiter which is independent from the regulation or the control system and which switches off the control of the heating security system if the safety temperature is exceeded (max. **130°C**).

The limiter works on the principle of expansion of liquids in case of overheating



Make sure that the distributing main to the limiter is not bent or otherwise damaged when the heating element is exchanged and whenever works are carried out at the stabilizer.

Inspect the distributing main after the service jobs have been completed. At least visually, it must be in perfect condition and there must not be any worn or bent parts.



If the limiter (1) release (Led flashes), it can be reset after the stabilizer has cooled down.

Open bolt lock (3), open cover (2), remove side panel and press the reset button (1A) to the stop. The contacts snap audibly back to their initial positions.

Make sure to detect the reason for release because the limiter normally will not switch off!

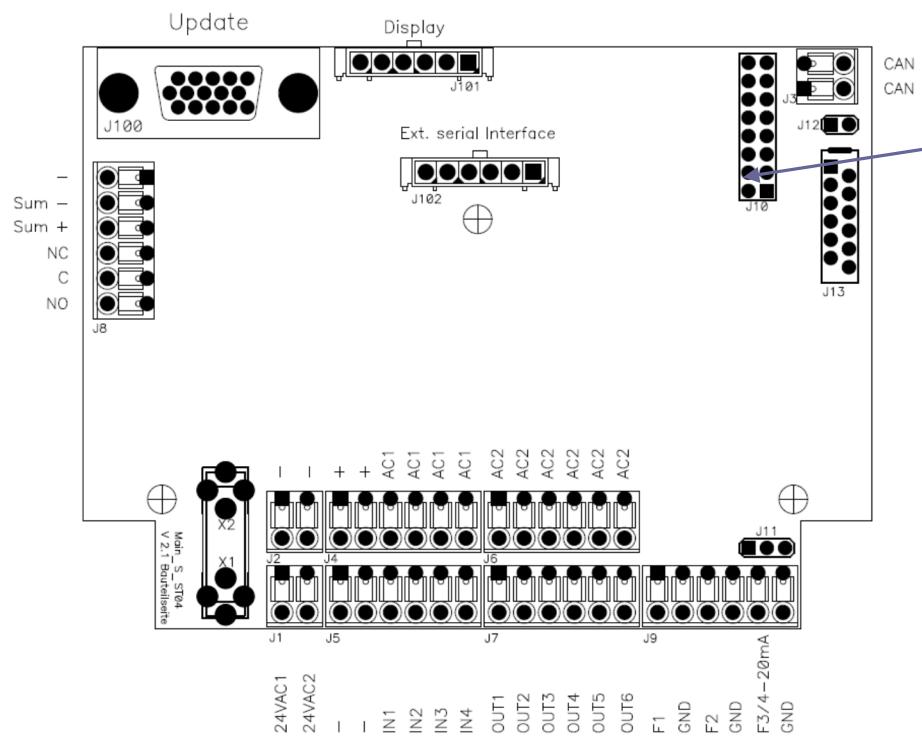
#### Possible reasons for release of safety temperature limiter

- Sensor defective
- Short circuit at heating element
- Level switch defective and/or insufficient water in tank
- Control error
- Valves defective
- Remote line of safety temperature limiter is damaged (leak)



The limiter can also be tripped at temperatures which are too low. (During storage or transport below 5°C). Allow the equipment to reach room temperature and than press the Reset button.

## 7.14 Switching to degree Fahrenheit or degree centigrade



Turn the unit off and put a jumper on the **second Pin** from below.

After that turn the unit on, go to the CONFIG menu with mode button.

Press the button so often until °C or °F appears on the display.

You can switch with the arrow keys between these two values.

Choose one of them.  
Now go out of the

CONFIG menu and turn the unit off again. Put the two jumper out and start the unit. If the Led for °F is shining then the measuring in Fahrenheit is activated.

## 7.15 Code – Menu:

### 7.15.1 Configuration menu (Code 120)

Use or : to change values

Use and : to leave configuration menu, return to code entry

Menu 120 (up to version V 2.0 of circuit board)

Key	Display	Function
5xMode	123	
3xDOWN	120	Code 120
1xMODE	con	Configuration menu
1xMODE	t1	Time until beginning of tolerance monitoring
1xMODE	60	Setting range: 10 – 100 (in Min.)
1xMODE	Fot	Overfill time
1xMODE	0	Setting range: 0 – 10 (in Sec.)
1xMODE	Fnt	Maximum filling time over the last 10 hours
1xMODE	10	Setting range: 0 - 60
1xMODE	iF	Offset for internal sensor
1xMODE	0.0	Setting range: °C: 5,5 ... -5,5; °F: 9,9 ... -9,9
1xMODE	EF	Offset for external sensor
1xMODE	0.0	Setting range: °C: 5,5 ... -5,5; °F: 9,9 ... -9,9
1xMODE	Pr	Offset for pressure sensor
1xMODE	.00	Setting range: bar: 0,99 ... -0,99; PSI: 9,9 ... -9,9
1xMODE	tE	Temperature unit

1xMODE		Key	Display	Function
<b>Only for Option "Flow indication"</b>	1xMODE	UP	°C	All temperature values at °C (pressure at bar) (flow at l/min)
		DOWN	°F	All temperature values at °F (pressure at PSI) (flow at GPM)
	1xMODE	Taste	Display	Function
		UP	P.to	total pressure (flow)
		DOWN	P.Pu	Pump pressure
	1xMODE	1c2	max. flow at	Tmax
	1xMODE	10.0	value at 1/10 l/min	
	1xMODE	1P2	pressure at max. flow	Tmax
	1xMODE	0.0	value at 1/10 bar	
	1xMODE	1P=	max. pressure at	Tmax
	1xMODE	0.0	value at 1/10 bar	
	1xMODE	1c1	max. flow at	T1
	1xMODE	10.0	value at 1 l/min	
	1xMODE	1P1	pressure at max. flow	T1
	1xMODE	0.0	value at 1/10 bar	
	1xMODE	1P-	max. pressure at	T1
	1xMODE	0.0	value at 1/10 bar	
	1xMODE	- - -	End	

\* *only with "Option Flow"*

## 7.16 Code-Menu only for Option „Flow indication“:

### 7.16.1 Operatinghour menu (Code 101)

Key	Display	Function
5xMODE	123	
22xDOWN	101	Code 101
1xMODE	Hr	Operating hour – menu
1xMODE	HzE	Hundreds- /Ten- /One – digit
1xMODE	0 - 999	HZE
1xMODE	ztt	Tens of thousands- /Thousand – digit
1xMODE	0 - 200	ZTT
1xMODE	- - -	End

### **7.16.2 Service-Menu (Code 111) display of actual pressure**

Taste	Display	Funktion
5xMODE	123	
11xDOWN	111	Code 111
1xMODE	Ser	Service-Menu
1xMODE	A.Pr	Current pressure (active pressure)
1xMODE	xx.x (xx )*	pressure at 1/10 bar (at 1 PSI )
1xMODE	P.to	total pressure (total pressure)
1xMODE	xx.x (xx )*	pressure at 1/10 bar (at 1 PSI )
1xMODE	P.Sy	System pressure (system pressure)
1xMODE	xx.x (xx )*	pressure at 1/10 bar (at 1 PSI )
1xMODE	P.Pu	Pump- (flow-) – pressure (pump pressure) . difference from "P.to" and "P.Sy"
1xMODE	xx.x (xx )*	pressure at 1/10 bar (at 1 PSI )
1xMODE	- - -	End

\* If the set temperature unit is °C, the pressure is displayed in bar; with °F, it is displayed in PSI.

### **7.17 Interface – menu (Code 130)**

Key	Display	Function																																	
5xMODE	123																																		
7xUP	130	Code 130																																	
1xMODE	SSt	COM-Menu (serial interface)																																	
1xMODE	Pro	Protocol																																	
1xMODE		<table border="1"> <thead> <tr> <th>Key</th><th>Display</th><th>Function</th></tr> </thead> <tbody> <tr> <td>UP / Down</td><td>oFF</td><td>no protocol activated</td></tr> <tr> <td></td><td>P2</td><td>P2-protocol (the only supported protocol from this device)</td></tr> </tbody> </table>	Key	Display	Function	UP / Down	oFF	no protocol activated		P2	P2-protocol (the only supported protocol from this device)																								
Key	Display	Function																																	
UP / Down	oFF	no protocol activated																																	
	P2	P2-protocol (the only supported protocol from this device)																																	
1xMODE	Hd	Hardware																																	
1xMODE		<table border="1"> <thead> <tr> <th>Key</th><th>Display</th><th>Function</th></tr> </thead> <tbody> <tr> <td>UP / Down</td><td>oFF</td><td>no interface selected</td></tr> <tr> <td></td><td>232</td><td>RS232</td></tr> <tr> <td></td><td>85.2</td><td>RS 485.2</td></tr> <tr> <td></td><td>85.4</td><td>RS 485.4</td></tr> <tr> <td></td><td>CL</td><td>20 mA – interface (current loop)</td></tr> </tbody> </table>	Key	Display	Function	UP / Down	oFF	no interface selected		232	RS232		85.2	RS 485.2		85.4	RS 485.4		CL	20 mA – interface (current loop)															
Key	Display	Function																																	
UP / Down	oFF	no interface selected																																	
	232	RS232																																	
	85.2	RS 485.2																																	
	85.4	RS 485.4																																	
	CL	20 mA – interface (current loop)																																	
1XMODE	HSt	manufacturer																																	
1xMODE		<table border="1"> <thead> <tr> <th>Key</th><th>Display</th><th>Function</th></tr> </thead> <tbody> <tr> <td>UP / Down</td><td>Arb</td><td>Arburg</td></tr> <tr> <td></td><td>BtF</td><td>Battenfeld</td></tr> <tr> <td></td><td>biL</td><td>Billion</td></tr> <tr> <td></td><td>boy</td><td>Dr.Boy</td></tr> <tr> <td></td><td>dE</td><td>Demag</td></tr> <tr> <td></td><td>Eng</td><td>Engel</td></tr> <tr> <td></td><td>Hus</td><td>Husky</td></tr> <tr> <td></td><td>AFF</td><td>Kraus Maffei</td></tr> <tr> <td></td><td>net</td><td>Netstal</td></tr> <tr> <td></td><td>tYo</td><td>Toyo</td></tr> </tbody> </table>	Key	Display	Function	UP / Down	Arb	Arburg		BtF	Battenfeld		biL	Billion		boy	Dr.Boy		dE	Demag		Eng	Engel		Hus	Husky		AFF	Kraus Maffei		net	Netstal		tYo	Toyo
Key	Display	Function																																	
UP / Down	Arb	Arburg																																	
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	Eng	Engel																																	
	Hus	Husky																																	
	AFF	Kraus Maffei																																	
	net	Netstal																																	
	tYo	Toyo																																	
1xMODE	bd	Baudrate																																	

1xMODE		Key	Display	Function
UP / Down	1.2 –	1 200 / no parity		
	1.2 E	1 200 / even parity		
	1.2 o	1 200 / odd parity		
	4.8 –	4 800 / no parity		
	4.8 E	4 800 / even parity		
	4.8 o	4 800 / odd parity		
	9.6 –	9 600 / no parity		
	9.6 E	9 600 / even parity		
	9.6 o	9 600 / odd parity		
	19. –	19 200 / no parity		
	19. E	19 200 / even parity		
	19. o	19 200 / odd parity		
1xMODE	Adr	Address		
1xMODE		Key	Display	Function
		UP / Down	0 - 90	adjusted address
1xMODE	- - -	End		

To exit the menu, simultaneously press the buttons  and !

## 8 Maintenance

Please observe the required maintenance intervals, because this is the only way of guaranteeing the proper functioning of the stabilizer and of granting the full scope of warranties according to our terms of warranty.

Maintenance may be carried out by qualified personnel only.



By take over the temperature stabilizer of the operating company, the user also takes over the responsibility of maintenance and inspection of the safety devices.

We specifically point out that the safety instructions marked **CAUTION** should be inspected as required in order to maintain the proper functioning of these stabilizers.

**CAUTION** Every 2000 operating hours the maintenance alarm will be activated and indicated by the flashing operating hours lamp. Acknowledge maintenance alarm (in mode "Display of Operating Hours") by simultaneously pressing both cursor keys.

**CAUTION** Contaminations of the circulating medium caused by oil, sand, sludge, lime deposits, chippings, etc. substantially reduce the useful life of the stabilizer. Suitable maintenance and care, and timely replacement of parts subject to wear will help ensure the reliable operation of your stabilizer.

Activity	monthly	every 3 months (1000 hrs)	every 6 months (2000 hrs)	every 12 months (4000 hrs)
Inspect conditions of hoses and hose connections 	*			
Clean filters (cold water connection)	*			
Check valve for tightness and function		*		
Decalcify heat exchanger (cooling helix)			*	
Clean valves			*	
Check screw terminals on the contactors			*	
Empty and clean tank				*
Check heating element for continuity (3-phase)				*

## **8.1 Cleaning, Notices, Storage and Disposal**

### **Cleaning**

All paneling parts of the tempering device are painted. If a non-aggressive cleaning agent is used it is possible to also optically maintain the devices in perfect condition.

### **Notices**

**CAUTION** The device must not be used as a supporting surface, since otherwise the circulation of air through the top ventilation slits will be impaired and overheating could occur.

 In addition, the device must not be used as a climbing aid, because, due to the steering rollers, it can roll away and then injuries can occur. Apart from this, the top cover is not designed for such stresses. Load-bearing capacity max. 30 kg.

### **Storage**

Before prolonged storage, carry out the following work on the device

- Drain tempering circuits
- Inspect device and rectify determined defects
- Clean with non-aggressive cleaning agent
- If possible do not store below 0°C, otherwise allow to stand for at least 1 hours at room temperature before the next commissioning.

### **Disposal**

Always dispose of the device only according to national regulations.

It is recommended to authorize a company specialized for this purpose.

## **8.2 Warranty**

We take over warranty for defects due to faulty construction, material or design for a period of 12 months as of the receipt of the goods by the customer.

Complaints must be made immediately and in writing.

We are not liable for damage caused by natural wear and tear, excessive use, faulty treatment, inappropriate resources, inadequate maintenance etc.

For further details see the Terms of Sale and Delivery.

**In case of transport damage please do not send the stabilizer back but immediately notify our nearest customer service department.**

**8.3 Maintenance schedule**

This table is to help you document and check your internal regulations.

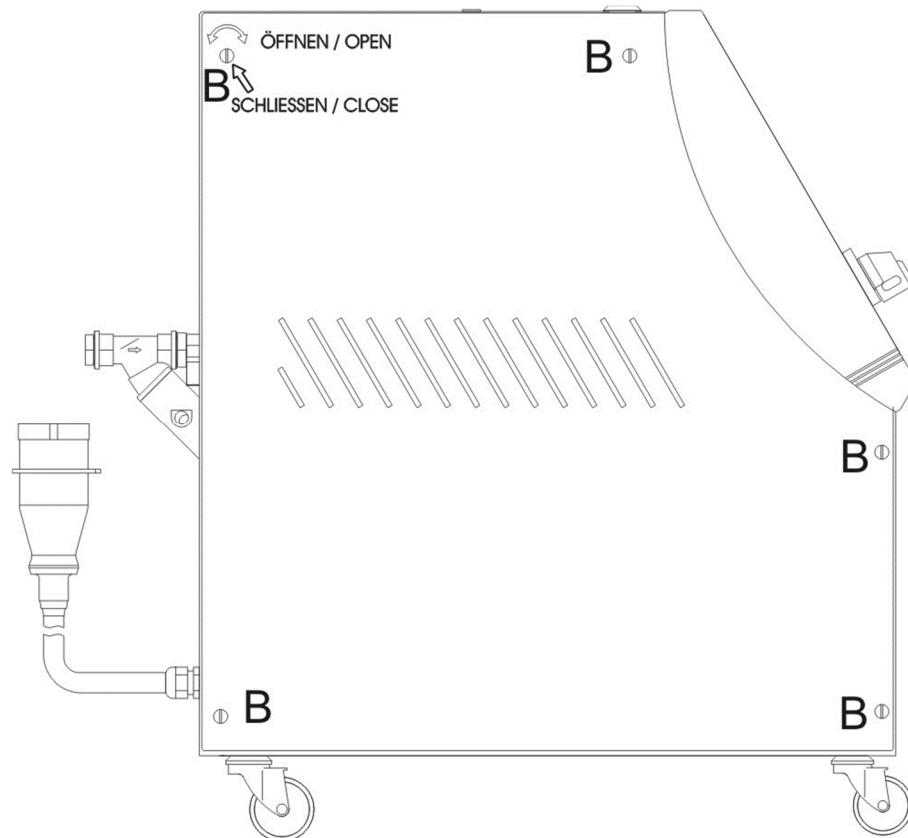
Operating hours	check and clean					other repair jobs or service	operating hours	Date	Signature
	Pump	Valves	Cooling helix	Tank	Heater element				
2000									
4000									
6000									
8000									
10000									
12000									
14000									
16000									
18000									
20000									
22000									
24000									
26000									
28000									
30000									
32000									
34000									
36000									
38000									
40000									
42000									
44000									
46000									
48000									
50000									

## 9 Repair instructions

### 9.1 Prior to opening the unit

-  Cool stabilizer down to safety temperature of approx. 40°C !
- Turn OFF by main switch
- Lock cooling water inlet
- Disconnect stabilizer from mains voltage and secure against restart of operation

### 9.2 Remove side panels



The lateral parts may be removed by using simple tools (such as a large screwdriver).

The lateral plastic shells are fixed by means of 5 snap-on attachments each (B = point of attachment))

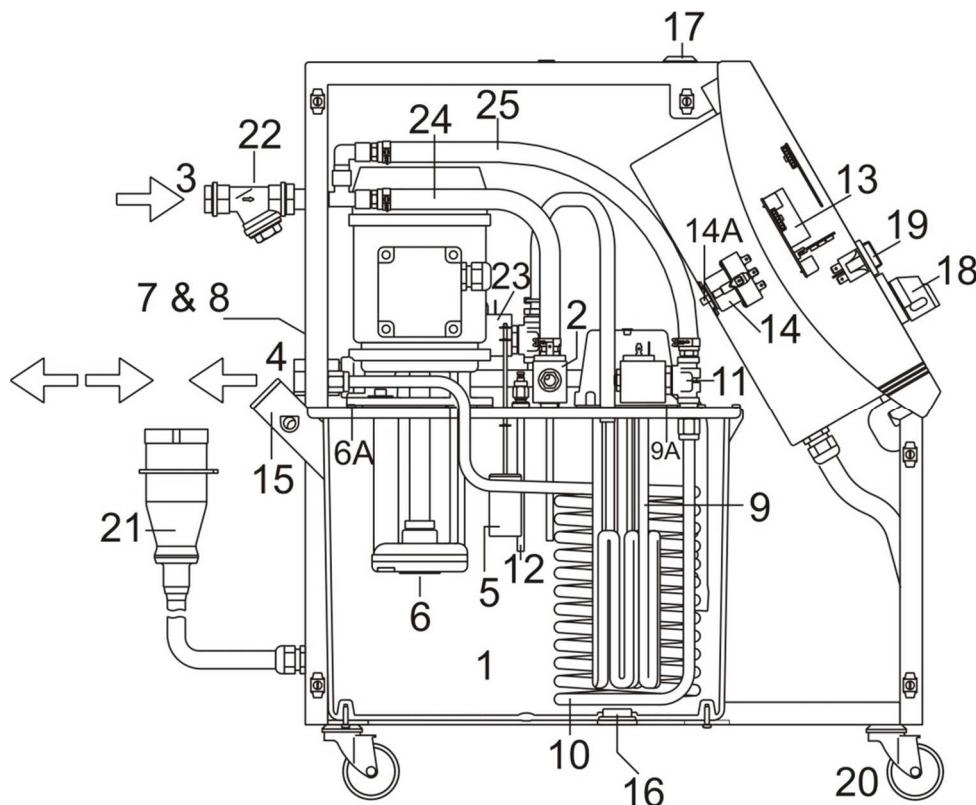
#### 9.2.1 Demount of lateral parts

- Switch OFF the device
- Unlock the spring lock by turning the attachments "B"
- Click away lateral part

#### 9.2.2 Re-assembling of lateral parts

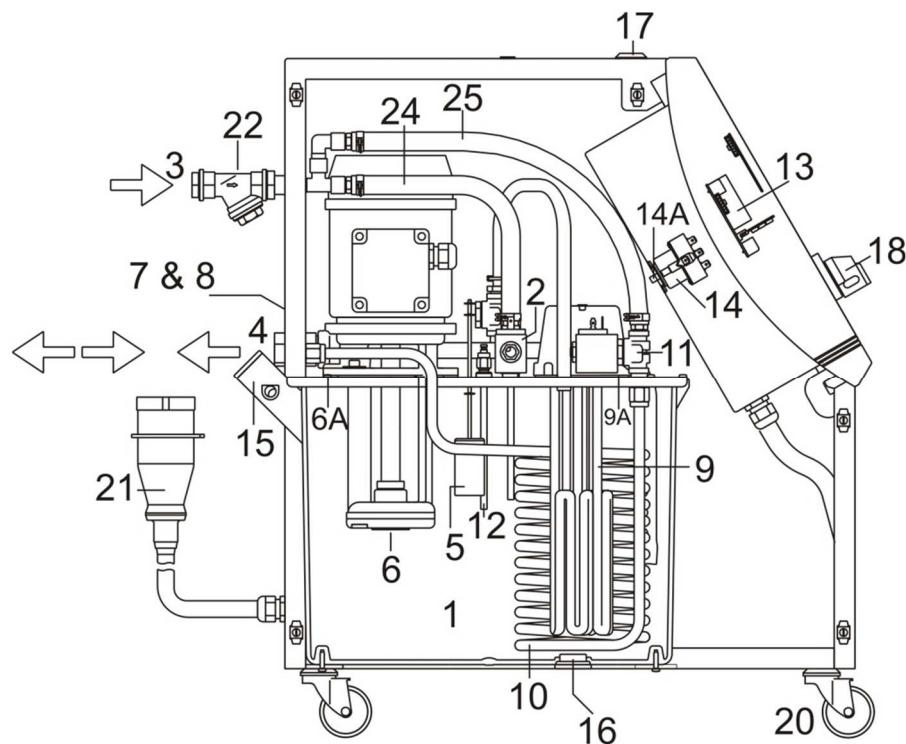
- Align side panel on the attachment points B (important: slot must be positioned vertically!) and lock with firm pressure.

### 9.3 Structure of mechanic system Tempro basic C 90



No.	Description	No.	Description
1	Heat exchanger	13	Microprocessor controller
2	Filling valve	14	Safety Temperature Limiter
3	Cooling water inlet	14A	Reset button for safety temperature limiter
4	Cooling water outlet	15	Manual filling (filling socket)
5	Level switch	16	Drain plus
6	Pump	17	Bolt lock
6A	Seal for pump	18	Main switch
7	Mould connection-feed	19	Key switch for evacuating
8	Mould connection -return	20	Guide roll
9	Heater element	21	Main connection
9A	Seal for heater element	22	Coarse filter
10	Cooling helix	23	Ventilation valve empty suction
11	Cooling valve	24	Hose cold water supply FILLING
12	Temperature sensor PT100	25	Hose cold water supply COOLING

#### **9.4 Structure of mechanic system Tempro primus C 90**



No.	Description	No.	Description
1	Heat exchanger	13	Microprocessor controller
2	Filling valve	14	Safety Temperature Limiter
3	Cooling water inlet	14A	Reset button for safety temperature limiter
4	Cooling water outlet	15	Manual filling (filling socket)
5	Level switch	16	Drain plus
6	Pump	17	Bolt lock
6A	Seal for pump	18	Main switch
7	Mould connection-feed	19	
8	Mould connection -return	20	Guide roll
9	Heater element	21	Main connection
9A	Seal for heater element	22	Coarse filter
10	Cooling helix	23	
11	Cooling valve	24	Hose cold water supply FILLING
12	Temperature sensor PT100	25	Hose cold water supply COOLING

### **9.5 Change the heater element**

- Separate stabilizer from mains voltage and secure against startup.
- Take off lateral parts
- Lift cover hood of the heating element (2x nut M6 - SW10) (SW = spanner width)
- Disconnect heating element cable
- Pull out safety temperature sensor
- Dismount heating element (2x nut M6 - SW10)
- Built in reverse order
- During each assembly and removal of the heating element it is necessary to change the seal! (will be supplied together with the stabilizer)



Slide the safety limiter sensor into the welded-on sleeve up to the stop !  
Insulating sleeves of the heating element terminals have different colours. The 3-way bridge has to be connected to 3 terminals having different colours

### **9.6 Pump exchange for Tempro basic C90:**

- Cool down the equipment to safety temperature of approx. 40°C
- Turn OFF the equipment by main switch
- Protect against re-starting
- Disconnect the water connection
- Remove the side panels
- Disconnect electrical plug-in connector
- Unloose Hexagon at the pump
- Lift out pump > Attention at the rubber gasket
- Unseal brass hexagon from the pump, clean and seal into the new pump > allow to dry for 30 minutes,
- Use, if necessary a new rubber gasket
- Built in reverse order

### **9.7 Setting the Motor Protection Relay**

The **motor protection relay** monitors the maximum pump current setting.

When this setting is exceeded, the pump relay is no longer energized and the pumping LED begins to blink on the display.

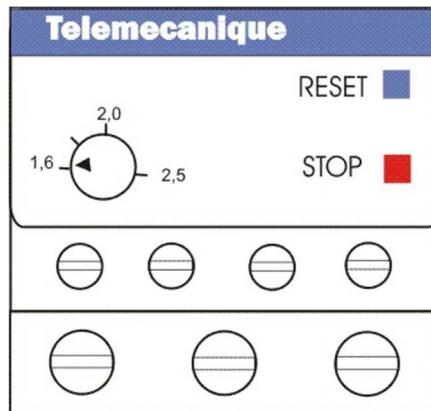
Error message E02 and horn sounds.

Pressing the reset button resets the error message.

Device must be switched ON and OFF.

### **9.7.1 Possible causes for tripping the Motor Protection Relay**

- Pump defective or stuck
- Phase missing
- Hose kinked or tool holes plugged
- Motor Protection Relay defective



The trip current should be set approximately 0.1A to 0.2A higher than what is given on the nameplate of the pump motor.

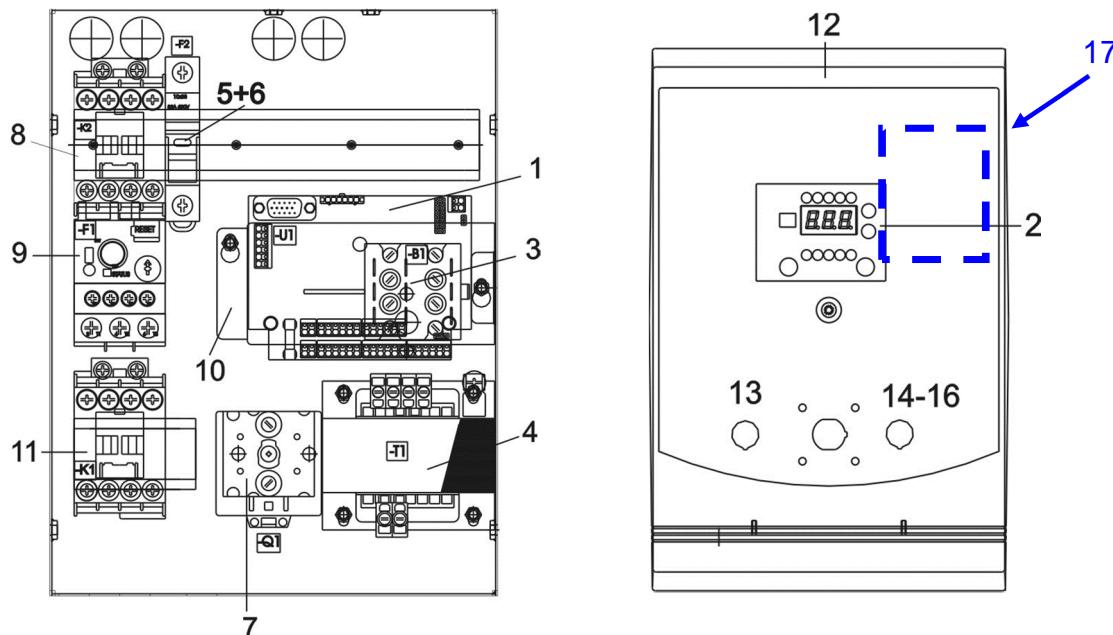
## **9.8 Structure of electric system:**

The electric system can be opened after the main switch has been switched off and the lock at the stabilizer top has been opened.



**Before opening, unplug mains plug!**

The stabilizer must be secured externally at the mains (circuit-breaker and residual-current-operated circuit breaker)



<b>Pos.</b>	<b>Art.-No.</b>	<b>Part</b>	<b>Pos.</b>	<b>Art.-No.</b>	<b>Part</b>
1	<b>EA00002175</b>	Board ST04		EW00000768	F1=Thermorelay 4,0 – 6,0 A
2	EA00001949	Board Display	10	EA00001244	Buzzer
3	EA00001197	Safety Temperature Limiter	11	EW00000721	K1=Contactor 9kW heating
4	ET00000211	Trafo 220, 400, 440, 480V /24VAC	12	T700001761	Cover Electric
5	EA00001550	F2=Fuse holder 1-pole	13	<b>T500001204</b>	Alarm cable
6	EA00000778	F2=Fuse 500V/0,5A	14	<b>EW00000512</b>	Press key button
7	EW00000793	Main switch 3x20A+knob	15	<b>EW00000513</b>	Press key splash guard
8	EW00000788	K2=Contactor 4kW pump	16	<b>EW00000514</b>	Press key cap yellow
9	EW00000590	F1=Thermorelay 1,6 – 2,5 A	17	<b>EA00002072</b>	Interface board
	EW00000591	F1=Thermorelay 2,5 – 4,0 A			

**Pos. 13, 14 – 17 not available for Tempro primus C!!**

## **9.9 The electronic system**

The board which is installed there (type „ST04“) contains the micro-processor with integrated data and program memory.

The board is the „control centre“ of the electric system and therefore is responsible for the display, operation, temperature measuring and processing, control, filling level and the triggering of pump contactor, heating contactor, valves and alarm relay.

Level monitoring, pump and over-temperature recognition and internal sensor are read in.

The pump motor is protected against overheating by built-in winding protection contacts.

Monitoring of medium subject to temperature regulation (and consequently the whole equipment) is performed through a safety temperature limiter which, in case of heating error, switches off the heating security system separating it from the mains.

This limiter works on the principle of liquid expansion (completely de-energized) and therefore grants effective protection against major damage even if the electronic system fails.

The safety temperature limiter is installed in the electric cabinet.

The sensor distance line (a very thin, spiraled, and insulated copper tube) leads from the switching part of the limiter to the sensor tube which is stuck in the protective tube welded onto the heating.

### **9.9.1 Exchange of the electronic part**

**The control board** is fitted to the mounting bracket by means of three spacers.

- Fold open electric cover
- Remove all connection wires, disconnect connector from control board
- Pull board from mounting bracket
- Replace board and **attach fault description !!!**

Installation in reverse order

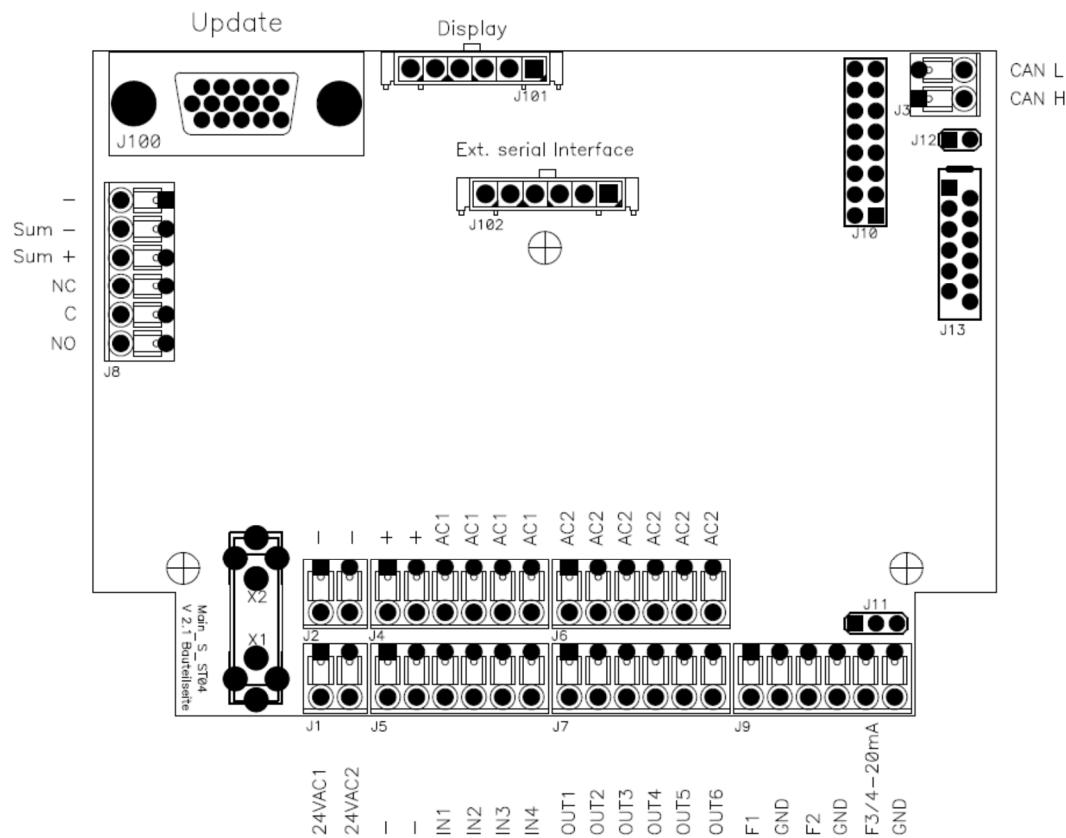
**The display board** is attached to the electric hood from the inside with three screws.

- Fold open electric cover
- Disconnect connector from display board
- Unscrew board from the electric hood and remove from the hood.
- Replace board and **attach fault description !!!**

Installation in reverse order

## 9.10 Circuit board

### 9.10.1 Plug connection of Circuit board



J1.1	24VAC1	Power Supply 24VAC	J7.6	OUT6	free output
J1.2	24VAC2	Power Supply 24VAC	J8.1	-	0VDC
J2.1 – J2.2	-	0VDC	J8.2	Sum	Buzzer (-)
J4.1 – J4.2	+	24VDC	J8.3	+	Buzzer (+) 24VDC
J4.3 – J4.6	AC1	24VAC	J8.4	NC	Alarm contact (NC)
J5.1 – J5.2	-	0VDC	J8.5	C	Alarm contact (C)
J5.3	IN1	Input Level switch	J8.6	NO	Alarm contact (NO)
J5.4	IN2	Input Safety Temperature Limiter	J9.1	F1	Internal sensor PT100
J5.5	IN3	Input motor protection relay	J9.2	GND	Internal sensor GND
J5.6	IN4	free input	J9.3	F2	external sensor PT100
J6.1 – J6.6	AC2	24VAC	J9.4	GND	external sensor GND
J7.1	OUT1	Output heating	J10		Jumper-strip
J7.2	OUT2	Output pump	J100	Update	Plug for Software Update
J7.3	OUT3	Output cooling valve (Y2)	J101		Display plug
J7.4	OUT4	Output filling valve (Y1)	J102		Serial interface
J7.5	OUT5	Output ventilation valve (Y7) <b>not for PRIMUS C90</b>	X1		Fuse 4 AT

## 10 Technical Data

### 10.1 Technical Data Tempro basic C90 and primus C90

The following values concern the technical data of standard devices of the **Tempro basic C 90** and **Tempro primus C 90** series.

Custom devices can differ in one or several points depending on the type of design.

		Tempro basic C 90	Tempro primus C 90
Heating output	kW	9	9
Pumping capacity	l/min, bar	40, 3,8	40, 3,8
Cooling water connections	Zoll	¼	¼
Tool connection – Forward	Zoll	¾	¾
Tool connection – Return	Zoll	½	½
Electrical connection	V, Hz	3 x 400, 50	
Filling quantities	l	9	9
Mold purge quantities	l	3	-----
Dimensions			
Width x	mm	235	
Height x		660	
Depth		590	
Weight unfilled	kg	31	31

## **10.2 Heat Transfer Medium**

The use of water as heat transfer medium is preferred. The filling of the tool circuits takes place automatically via the cooling water entry.

**CAUTION** To keep the soiling and calcification as little as possible, a suitable anticorrosive agent and hardness stabilizer should be used in the central water treatment.

### **Requirements and Care for the Water in Cooling Circuits and Temperature-Control Units!**

There are various requirements for the cooling water (system water) regarding water quality depending on the type of the facility to be cooled or temperature-controlled. In order to protect the system components from corrosion and deposits **Wittmann Kunststoffgeräte GmbH recommends always treating the water with a suitable agent**, for example with ST-DOS H-390 (corrosion protection with non-ferrous metal protection and hardness stabilisers).

We recommend carrying out regular water analyses in order to monitor the water quality. Furthermore the following water quality\* must be upheld depending on the installed materials, the temperatures and the procedures.

#### **Requirements in principle:**

Water Parameter	Target Value System Water	Unit
pH-value	7.5 –9.0	-
Conductivity (25°C)	< 150	mS/m
Total hardness	< 15	°d
Carbonate hardness	< 4	°d
Carbonate hardness with hardness stabilisation	< 15	°d
Chloride Cl <sup>-</sup>	< 100	mg/l
Sulphate SO <sub>4</sub> <sup>2-</sup>	< 150	mg/l
Ammonium NH <sub>4</sub> <sup>+</sup>	< 1	mg/l
Iron Fe	< 0,2	mg/l
Manganese Mn	< 0,1	mg/l

\*free of solid matter

#### **The following are also required:**

1. Systems with stainless steel (particularly for V2A steel, 1.4301)  
Chloride Cl<sup>-</sup>    Temperature < 50 °C    max. 100 mg/l  
Chloride Cl<sup>-</sup>    Temperature 50 to 90 °C    max. 50 mg/l  
Chloride Cl<sup>-</sup>    Temperature > 90 °C    max. 30 mg/l  
Chloride Cl<sup>-</sup>    Temperature > 180 °C    max. 5 mg/l

- 
2. Systems with aluminium  
pH-value > 7.0 to a maximum of 8.0
  3. Temperatures under 5 °C  
An antifreeze agent with corrosion inhibitor must be added when operating water recirculation chilling units under +5°C, e.g. ST-DOS F-190.
  4. Temperatures over 90 °C  
If the water is heated to over 90°C we recommend softening the water.  
Suitable softening systems are available at  
<http://www.schweitzer-chemie.de>.
  5. Temperatures over 160 °C  
No antifreeze agents with a mono-ethylene glycol base may be used for water temperatures over 160 °C.
  6. Temperatures over 180 °C  
If the water is heated to over 180°C we recommend desalting the water.  
Suitable reverse osmosis systems are available at  
<http://www.schweitzer-chemie.de>.
  7. The water content should be exchanged at regular intervals. The frequency of water exchange depends on the system water quality, the filter technology, the system materials used and the tool change.

**We recommend adhering to this water quality in order to protect your system components.**

**Wittmann Kunststoffgeräte GmbH does not give any warranty for damage to the system components caused by corrosion and deposits.**

## 11 Options

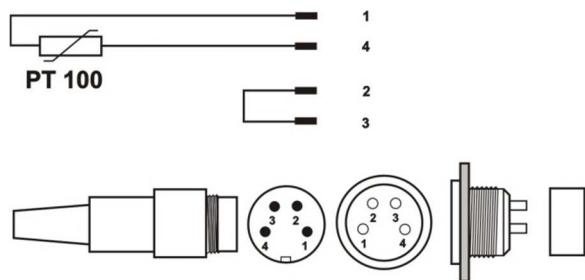
### 11.1 External sensor PT100

(only for Tempro basic C 90):

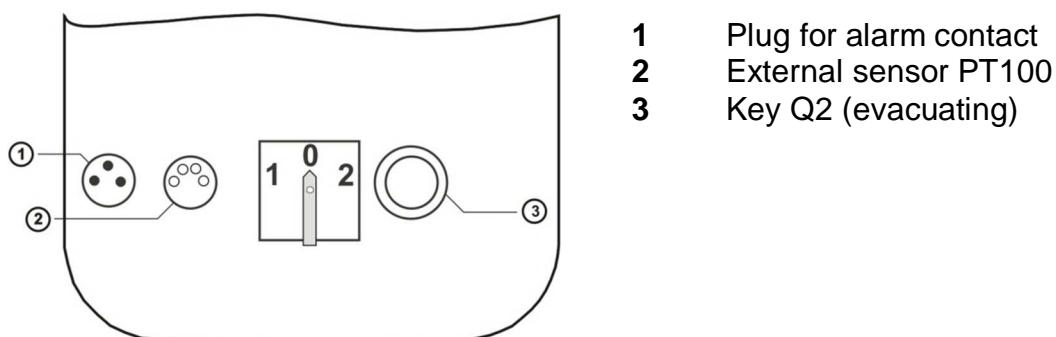
When the tool temperature is monitored by an external sensor, the sensor is connected to the 4-pole socket (PT100) in the operating panel.

**Only** when the stabilizer has been switched on will the entry for the tool sensor be queried. When a valid value is recognized, control for the external sensor is activated. When the sensor is disconnected from the socket, „Broken sensor“ will be recognized and an alarm will be reported.

The choice which sensor will be controlled is always made only when the unit is switched on with the main switch. The safety device „Temperature monitoring“ always remains active.

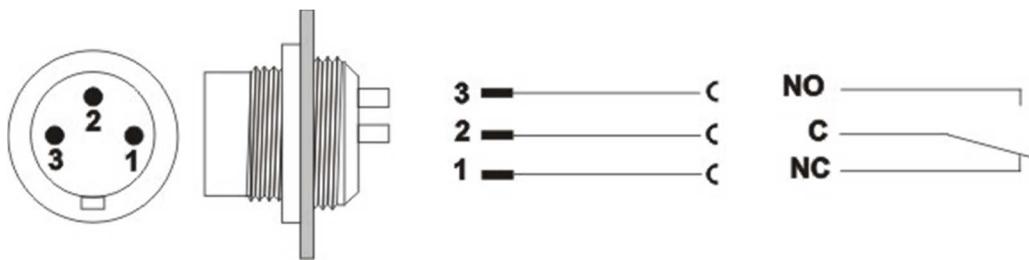


Operating panel with option PT100 installed:



### **11.1.1 Accessories**

<b>Art.-No.</b>	<b>Description</b>
T5 0000 1338	Option: BASIC external sensor PT 100
D9 0000 0494	external sensor PT 100 diam:6mm/2m with spring and bayonet plug
D9 0000 0493	external sensor PT 100 diam:6mm/4m with spring and bayonet plug



Moreover, a potential-free **alarm contact** (changeover switch) is activated which can be reset by pressing any key. (3-pole plug at stabilizer front)

Admissible contact load: 1A at 24V DC / 120V AC

### **11.2 Serial Interface:**

One interface board is required per **Tempro basic C 90**.

#### **11.2.1 Interface RS232, RS485, TTY/CL (20mA)**

T500001393

This option is installed at works, for the setting to the required interface type, refer CON-Menu – chapter Operation item 7.17

### **11.3 Analog Interface:**

#### **11.3.1 Interface Basic C / analog**

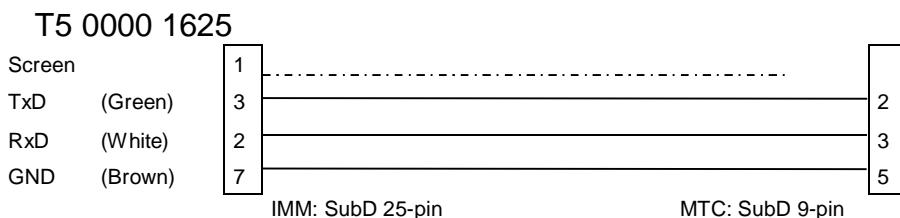
T500001553

4 – 20mA / 0 – 10V / ON-OFF/ALARM

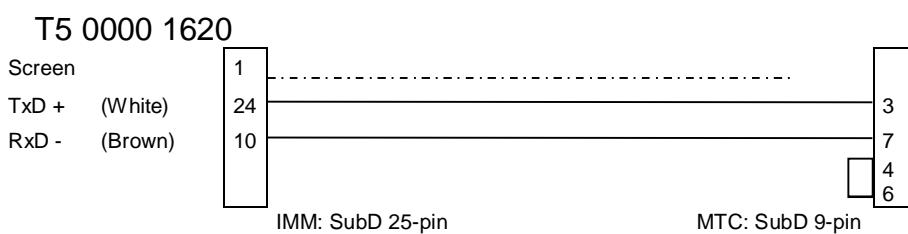
### **11.4 Interface cables**

The standard cable length is 4m, other cable lengths on request.

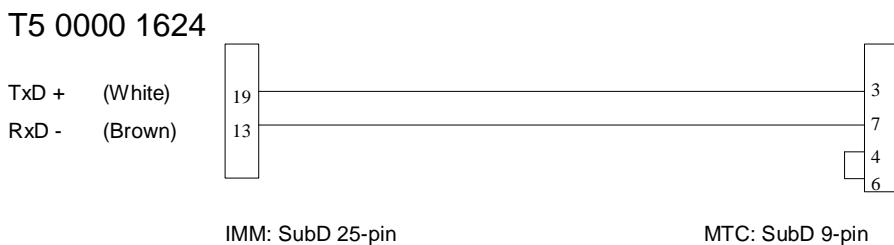
#### **11.4.1 Engel RS232**



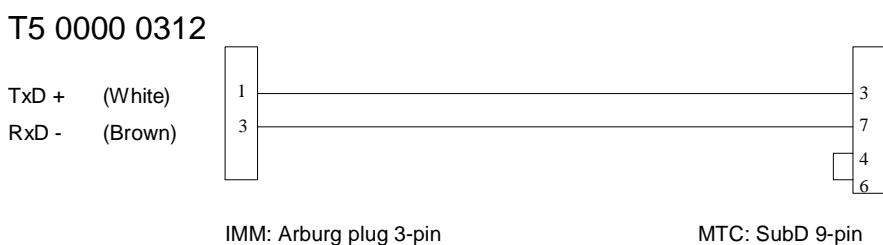
#### **11.4.2 Engel 20mA**



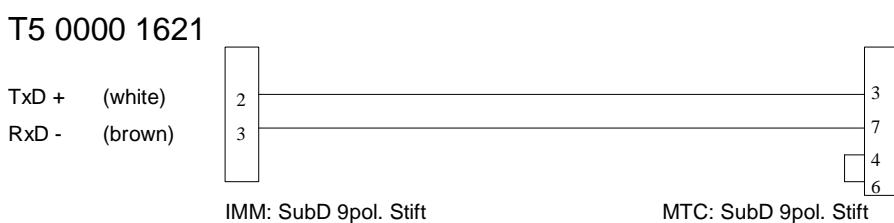
#### **11.4.3 Demag 20mA**



#### **11.4.4 Arburg 20mA (plug SubD 3 pol)**

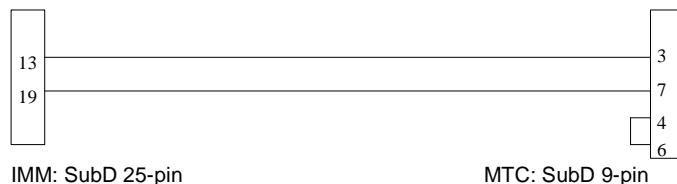


#### **11.4.5 Arburg 20mA (plug SubD 9 pol)**



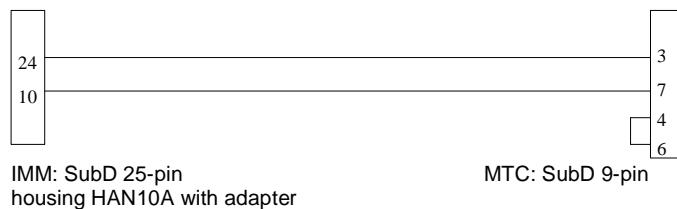
#### **11.4.6 Ferromatik 20mA**

T5 0000 1622

TxD + (White)  
RxD - (Brown)

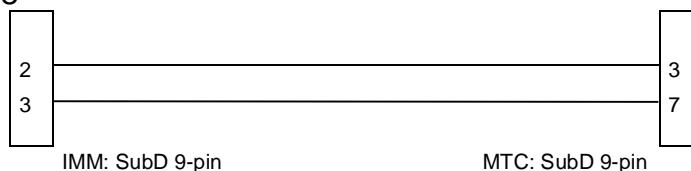
#### **11.4.7 Krauss Maffei 20mA**

T5 0000 1626

TxD + (White)  
RxD - (Brown)

#### **11.4.8 Battenfeld 20mA**

T5 0000 1618

TxD + (White)  
RxD - (Brown)

Other interfaces cables for other machine manufacturers and designs on request.

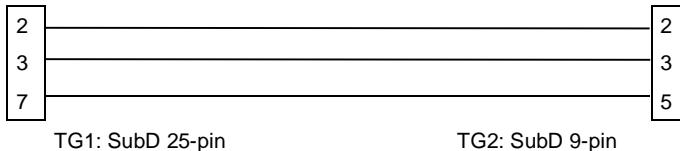
## 11.5 Connection cables

These connection cables are required for the series connection from Tempro basic C 90 to another Tempro basic C 90.

### 11.5.1 Series interfacing RS232

T5 0000 1630

TxD (Green)  
RxD (White)  
GND (Brown)



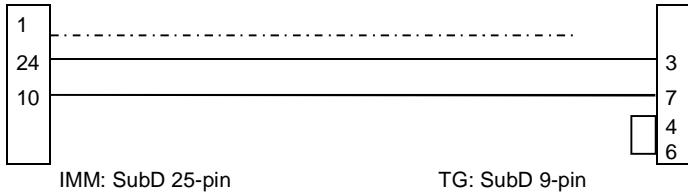
TG1: SubD 25-pin

TG2: SubD 9-pin

### 11.5.2 Series interfacing 20mA (identical with Engel 20mA)

T5 0000 1620

Screen  
TxD + (White)  
RxD - (Brown)



IMM: SubD 25-pin

TG: SubD 9-pin

## 11.6 Pressure Measurement with Flow Indication

The device series Basic C90 can be equipped with the option "Pressure measurement" and "Flow indication".

The **flow rate** is calculated from the parameters of the pump characteristics and the pump delivery pressure and displayed.

Accuracy:

P1 0,1 bar

l/min 2,0 to 8,5 l/min

(Max. flow rate at 0 bar / max. pressure at 0 l/min)

### 11.6.1 Flow rate measuring:

In this model, the flow rate is determined by measuring the system pressure and the total pressure. To do this, the user must determine various data during the calibration process and enter the respective values in the configuration menu („con“, code120).

This flow rate is then calculated based on these values and the pump pressure (difference between total and system pressure).

Procedure:

In the 140° model, the pump is stopped for 5 seconds when the nominal temperature is reached. At the end of the 5-second period, the pressure is measured and saved as the system pressure. The pump is subsequently restarted.

The current pressure is measured again 5 seconds after the pump start and saved as the total pressure. The system then determines the difference between these two measured values and save it as the pump pressure.

The current flow rate is calculated using the data (max. / min. flow rate, etc.) entered by the manufacturer in the configuration menu (code 120) and displayed in menu 5.

If no value has yet been calculated or if the pressure difference is too small (for instance because the user has not entered any parameter values in the configuration menu), no flow rate is indicated and “---” is displayed.

#### **11.6.2 Parameters for flow rate calculation:**

T1 = 30°C:

*1p1 (pT1 at Qmax)* – pressure at 30°C, valve open

*1c1 (Qmax)* – flow rate at 30°C, valve open

*1p- (pT1 at Pmax)* – pressure at closed valve

T2 = 90 / 140°C (maximum temperature of device):

*1p2 (pT2 at Qmax)* – pressure at max. temperature (90 /140°C), valve open

*1c2 (Qmax)* – flow rate at max. temperature (90 /140°C) , valve open

*1p= (pT2 at Pmax)* – pressure at closed valve

### **11.6.3 Description – Menus for flow indication:**

#### **11.6.3.1 Display – current flow value:**



(2 sec.):

From this menu – by pressing this button (for longer than 2 seconds), it is possible to reach the menus for settings for flow – tolerance monitoring (LED “ACT“ lights up in addition).

#### **Input options of values for the tolerance monitoring:**



From this menu – by pressing this button, it is possible to reach the menu for setting the setpoint for flow tolerance monitoring.

#### **Setpoint for flow – tolerance monitoring:**



	°C	°F
Min	1 l/min	0,5 GPM
Max	40 l/min	10 GPM

or

: Change of setpoint for flow – tolerance monitoring

and

: Accepting of the current flowrate value for setpoint.

: Go to menu „flow – tolerance“

#### **Tolerance value for flow – tolerance monitoring:**



	°C	°F
Min	0 l/min *	0 GPM
Max	40 l/min	10 GPM

\* 0 = no tolerance monitoring!

or

: Change of tolerance value for flow – tolerance monitoring.  
**By tolerance value = 0: tolerance monitoring is disabled!**

: Back to menu “Display of actual flow value“.

### **11.6.3.2 Procedure**

If flow – tolerance monitoring is activated (when tolerance value is unequal 0 ), the tolerance monitoring starts as soon as a flow value is known.

This value is only calculated when temperature setpoint is reached.

Until then “- - -“ is shown at the display.

As soon as actual flow rate is outside of tolerance, the error message “**H78**“ is shown at the display and LED  begins to flash.

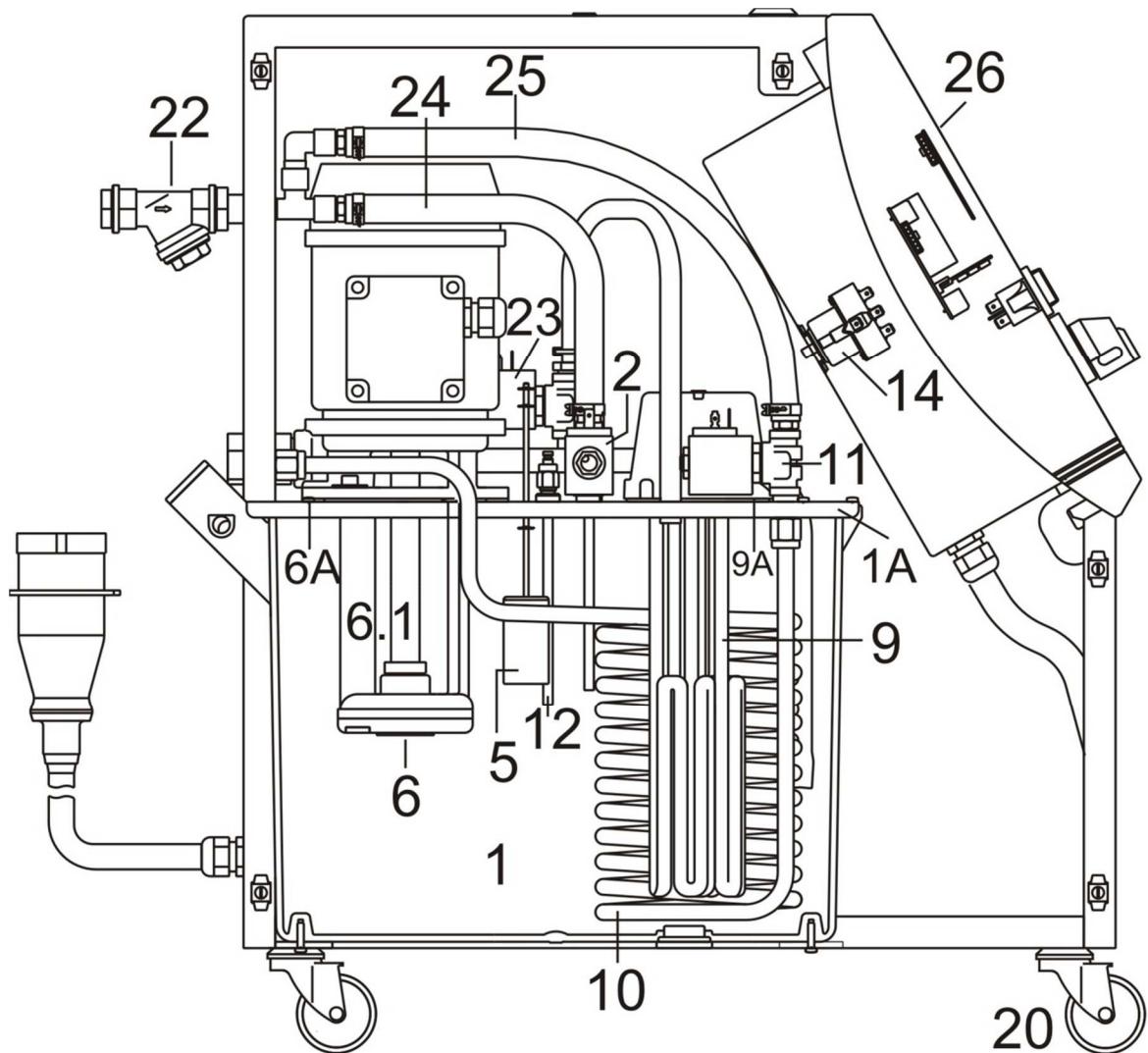
If the flow rate value is within of tolerance band again, this error message resets automatically.

If at these flow rate menus no button was pressed for more than 25 seconds, an automatically switching back to display “temperature ACT” takes place.

*From these menus, if no key was pressed for longer than 25 seconds, display jumps back to Mode 1 (ACT-temperature).*

## 12 Spare parts

### 12.1 Spare parts mechanical system Tempro basic C 90 / primus C90

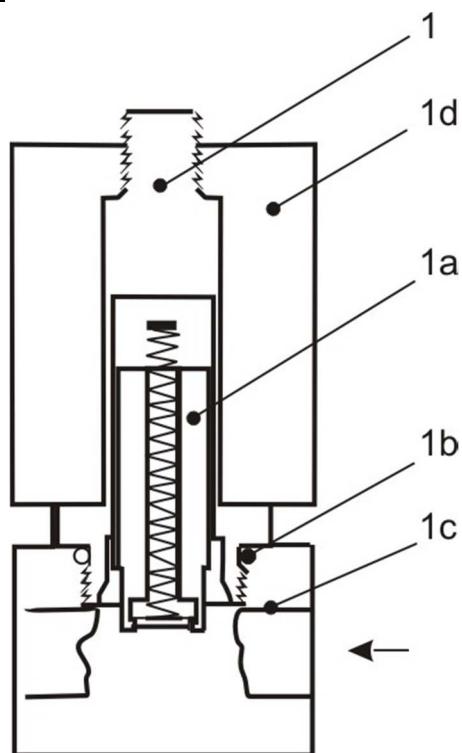


Tempro primus C 90: without 23

Pos.	Article number	Description
1	T8 0000 1205	Heat exchanger (tank) cpl. with seal & drain plug
1A	MA 0000 0631	Profile seal L=1008mm
2,11,23	HV 0000 0182	Solenoid valve filling (2) cooling (11) & venting (23) cpl.
<b>primus C 90</b>	HV 0000 0182	Solenoid valve filling (2) cooling (11) WITHOUT 23
	HV 0000 0107	Anchor cpl. (core & spring,Viton)
	HV 0000 0224	Magnet coil:24V-50HZ
5	D9 0000 0862	Level switch cpl.
6	HP 0000 0180	Immersion pump Standard (3x380- 480V)
	T7 0000 2034	Immersion pump Standard (3x220V)
	HP 0000 0184	Immersion pump enhanced (3x380- 480V)
	T7 0000 2045	Immersion pump enhanced (3x220V)
6.1	HP 0000 0110	Cap cpl. for Immersion pump Standard
	HP 0000 0111	Cap cpl. for Immersion pump enhanced
6A	T7 0000 0794	Seal pump
9	T8 0000 1430	Heater element 9kW, 480V (+ pos. 9A)
	T8 0000 1414	Heater element 9kW, 3x380V-415V (+ pos. 9A)
	T8 0000 0940	Heater element 6kW, 3x440V-480V (+ pos. 9A)
	T8 0000 1434	Heater element 6kW, 3x200V-240V (+ pos. 9A)
9A	T7 0000 1860	Seal heater element
10	D9 0000 0863	Cooling coil cpl.
12	D9 0000 0864	Temperature sensor cpl.
14	EA 0000 1197	Safety temperature limiter 130°
20	MA 0000 0507	Swivel wheel (1Stk)
22	T8 0000 0312	Coarse filter
24	T7 0000 2001	Hose cold water supply - filling, L=255
25	T7 0000 2000	Hose cold water supply – cooling, L=380
26	T7 0000 1938	Front foil BASIC C90
26	T7 0000 2071	Front foil PRIMUS C90
	T8 0000 1294	Side panel left side (front view)
	T8 0000 1295	Side panel right side ( front view)

## 12.2 Valves

### 12.2.1 Spare parts for valves



Y1

Y2

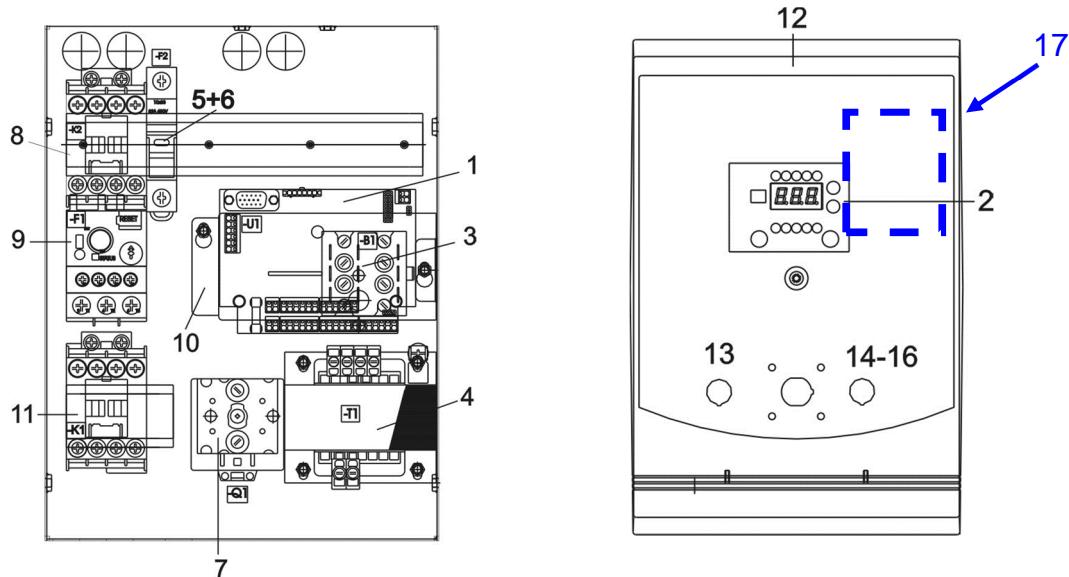
Y7 = at Tempro basic C 90

Pos	article number	Description
1	HV 0000 0182	Y1 fill valve, complete, consisting of 1a, 1c, 1d
		Y2 cooling valve, cpl. consisting of 1a, 1c, 1d
	<b>BASIC C90:</b>	Y7 ventilation valve (empty suction) consisting of 1a, 1c, 1d

#### Particular parts

1a	HV 0000 0107	Anchor (core & spring Rulon)
1c		brass component (available only as a cpl. valve HV-182)
1d	HV 0000 0224	Coil 24V 50/60Hz AC

### 12.3 Spare parts of electric system



Pos.	Art.-No.	Part	Pos.	Art.-No.	Part
1	<b>EA00002175</b>	Board ST04		EW00000768	F1=Thermorelay 4,0 – 6,0 A
2	EA00001949	Board Display	10	EA00001244	Buzzer
3	EA00001197	Safety temperature limiter	11	EW00000721	K1=Contactor 9kW Heating
4	ET00000211	Trafo 220, 400, 440, 480V /24VAC	12	T700001761	Cover electric
5	EA00001550	F2=Fuse holder 1-pole	13	<b>T500001204</b>	<b>Alarm cable</b>
6	EA00000778	F2=Fuse 500V/0,5A	14	<b>EW00000512</b>	<b>Press key Button</b>
7	EW00000793	main switch 3x20A +knob	15	<b>EW00000513</b>	<b>Press key splash guard</b>
8	EW00000788	K2=Contactor 4kW Pump	16	<b>EW00000514</b>	<b>Press key cap yellow</b>
9	EW00000590	F1=Thermorelay 1,6 – 2,5 A	17	<b>EA00002072</b>	<b>Interface board</b>
	EW00000591	F1=Thermorelay 2,5 – 4,0 A			

**Pos. 13 – 17 for Tempro primus C 90 not available !!**

## **13 Service deparments**

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## **14 Wiring diagrams**

See attached PDF-file on enclosed disk.