Temperature control unit DPT6-24 – instruction manual

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1 Warranty conditions

1.1 Reminders

Warranty conditions

1. Installation and commissioning must be performed by certified electrician!
2. Before installation, please read the "Quick start guide" (see page 9) of this manual!
3. Before making connecting to the grid, voltage and grid type (star or delta) must be checked!

The temperature control unit DPT24 has been constructed and tested according to DIN EN 61010-1 VDE 0411-1:2011-07 and left the factory in a proper safety condition.
In order to maintain this condition and to ensure safe operation, please read this manual carefully and follow all hints.

Before switching on, it must be ensured that the local voltage is complimentary to that allowed by the unit.
The main plug must be inserted into a socket with grounding contact.
Any interruption of the protective earthing conductor (e.g. any extension cord without PE conductor) is not allowed and can result in danger to the device and/or its operators.

Warning – Danger to life
Prior to any intervention, the device is to be powered off completely by pulling the mains plug in addition to flipping the switch.
Any intervention is reserved to be carried out by a certified electrician only.

2 General information

2.1 General

This manual applies to firmware version 1.4.0 and later

The DPT24 is a self-optimizing hot runner system temperature control device; it boosts productivity and lowers operational costs. Continuous self-supervision and user feedback ensure safe operation of the DPT24.

CONTROL FEATURES

- Fuzzy-PID control mode with variable parameters
- Friction detection
- Leak detection
- Control multiple heaters with one temperature probe (slave zone mode)
- Fixed output power mode even during sensor outage

COMFORT FEATURES

- Capacitive touch screen
- User interface supports tapping and swipe gestures
- Stain-resistant interface avoiding hardware-buttons
- Modular design enables upgrade at any time

SAFETY FEATURES

- Slow zone preheat to mitigate destructive effects of condensate in mold nozzles
- Automatic detection of sensor failure, circuit disruption and shorts
- Automatic cut-off of erroneous heaters, with display feedback
- Settings storage protected against power failure

This controller is available in four different configuration levels, as DPT6, DPT12, DPT18 and DPT24 with 6 to up to 24 channels, respectively.
The different levels are integrated into the same enclosure model and only differ in rear-sided connectors, incidentally in maximum power consumption.

In this manual we describe the maximum configuration level, DPT24.
While the included pictures are from the german language setting, the interface's language can be set very easily (see page 60). The look and feel does not depend on the display language.

Up to 5 DPT devices can arbitrarily be combined to form a single master/slave system capable of controlling up to 120 heating elements individually.

3 Quick start guide

3.1 Installation

3.1.1 Placement

The DPT24 controller must be placed on safe ground and must not be exposed to neither vibration nor shocks. For the maximum ambient temperature please refer to the technical data in the appendix (see page 81). The remaining operational values listed there are also to be considered. Please provide dust protection for the DPT24.

3.1.2 Electrical connection

Warning – Danger to life
Test on the mains connection must only be carried out by an electrician.

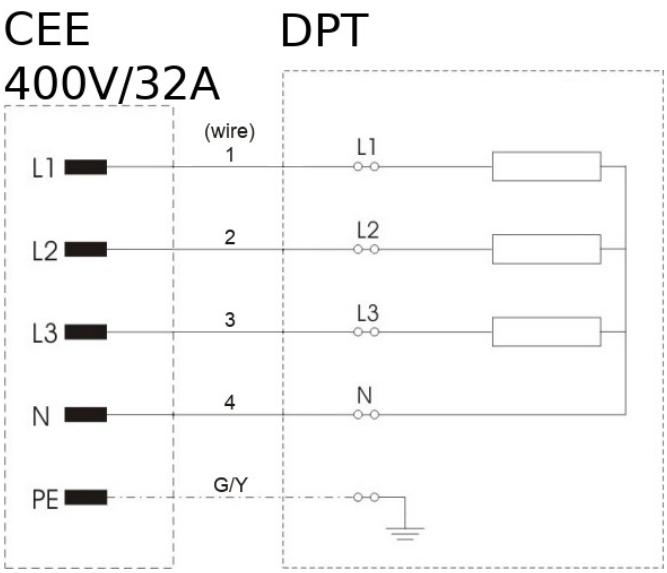
The DPT24 has a CEE 32A connector. For regulation-compliant operation, a suitable connection with three-phase current must be provided in the electric installation.

Phases L1, L2 and L3 must each be fused with 32A.

CONNECTION TO "STAR" MAINS CONFIGURATION (3-PHASE SYSTEM WITH NEUTRAL CONDUCTOR)

1. Test: An alternating voltage of 400V must be measured between any two phases (L1-L2, L2-L3, L3-L1) using a voltage meter.
2. Test: With a voltage meter, an alternating voltage of 230V must be measured between one phase and the neutral conductor (L1-N, L2-N, L3-N).
3. Test: The connection must be designed for a load of up to 32A per phase.
4. In factory state, the DPT24 is already prepared for star mains connection. It may now be operated.

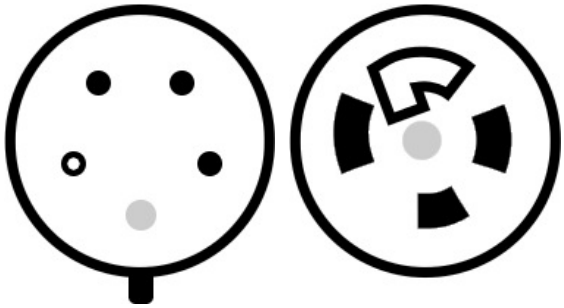
NEMA L21-30 is only approved for american mains up to 208V phase-to-phase voltage. If byour voltage is higher, please consider using an L22 plug.



1 Fig.: Connection to mains with neutral conductor

Recommended mains connectors

Europe: CEE 32A/400V
USA: NEMA L21-30

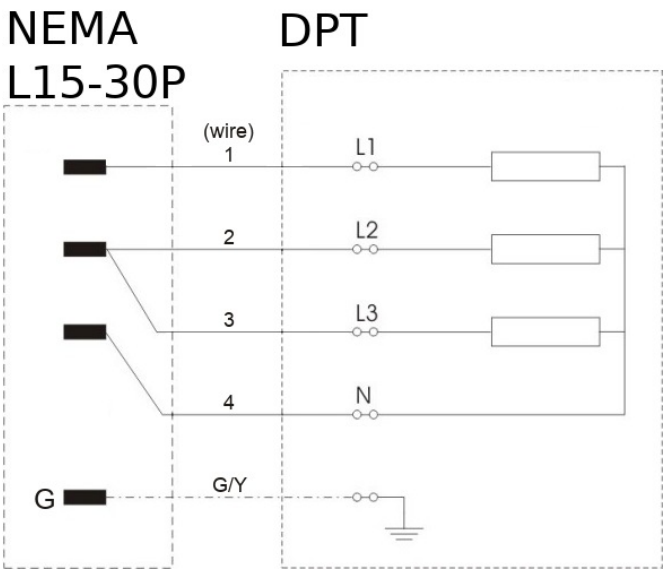


White: neutral, Grey: protective earth

CONNECTION TO "DELTA" MAINS CONFIGURATION (3-PHASE SYSTEM WITH NEUTRAL CONDUCTOR)

1. Test: An alternating voltage of 200-250V must be measured between any two phases (L1-L2, L2-L3, L3-L1) using a voltage meter.
2. Test: A neutral conductor N is not connected or no voltage may be measured between any phase and the neutral conductor (L1-N, L2-N, L3-N).
3. Test: The connection must be designed for a load of up to 32A per phase.
4. Reconfigure the mains connection as shown in the figure.

> In delta configuration, voltages U1, U2 and U3 (between phases) must be in range of 200V-250V! Operation at any other voltages may harm the device and leads to warranty void!



2 Fig.: Connection to mains without neutral conductor

Recommended mains connectors

USA: NEMA L15-30
Korea: NEMA L14-30

Grey: protective earth / bonding

3.1.3 Signal connections

The respective pin assignments are shown in the appendix of this document (see page 76).

THERMOCOUPLES	For a thermocouple connection, two 24-pin HAN-E sockets with corresponding housings are required.
HEATING CIRCUITS	For a load circuit connection, two 24-pin HAN-E plugs with corresponding housings are required. Every load is then connected using two 16A spring-loaded contacts.

1 Tab.: Signal connections

Suitable cables can be assembled without special tools.
Both the individual parts and pre-assembled cables can be purchased via the Günther Company.

STANDBY/OK	Once all control circuits have reached their operating temperature, this is indicated by output "OK". If all heating circuit temperatures are within an adjustable temperature window around their set point value, the potential-free relay contact "OK" is switched on. It can handle a maximum of 230V~/1A. Via the "Standby" input, the DPT24 controller can be switched to lowering by means of an external potential-free relay contact. **Attention** The inputs must not be supplied with external voltage under any circumstances!

A suitable connector plug with a 2.5m cable can be obtained from the Günther Company.

COM1 (SERIAL)	Master/Slave interface. Allows the connection of up to 5 DPT24 devices.
COM2 (SERIAL)	An interface is required for hooking up an injection molding machine to the DPT24. Depending on which injection molding machine protocol is required, an RS232 or TTY (current loop) interface must be retrofitted or requested when ordering the DPT24. Details can be obtained from the Günther Company on request.

3.2 Start-up

Prior to use, connect the DPT24 to your injection molding system. The bare minimum is to connect the temperature sensors and the heater elements to be used.
Connect these as described before.

To switch on the DPE16, flip the mains switch on the front side. This should light up the 7" LCD touch panel, providing you with our user interface in attractive coloration. Operation is intuitively based on swiping gestures and touching of the displayed buttons.

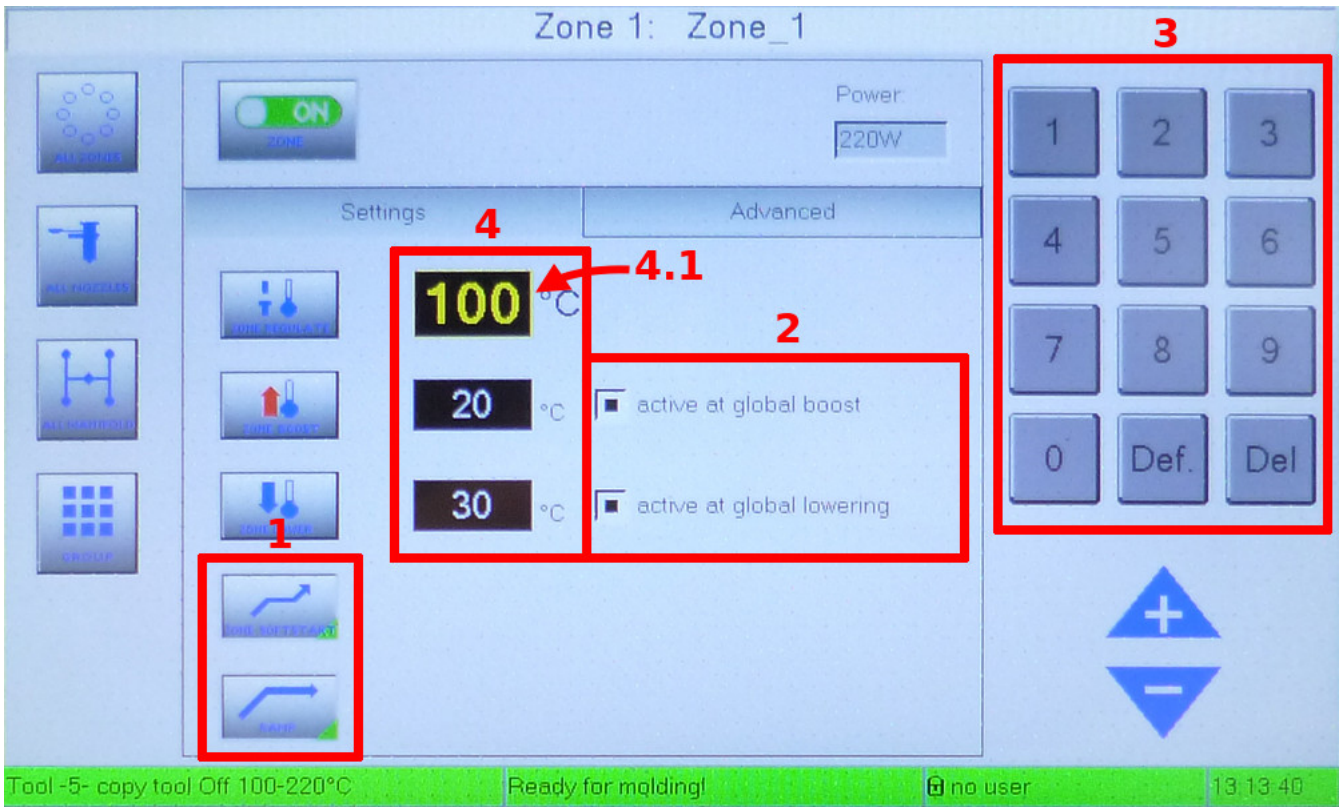
Once the DPT24 is switched on:

1. On each startup, please ensure the right number of heating zones is displayed (24 in the DPT24 version).
2. On each startup, the DPT24 checks all load circuits with power adjustment, consisting of
    a. A short-cirtcuit test to detect incorrectly connected thermocouples or similar – incorrectly wired load circuits are automatically put out of operation.
    b. Determination of the connected load output of all faultless zones (approx. 10 seconds).
    c. Zones with an output of 600 Watt or more are automatically classified as manifolds, the rest are assumed to be heating nozzles.
    d. If nozzles heat up by at least 10°C after 1 second of full load, they are treated as fast (BlueFlow compatible) nozzle heaters.
3. After first startup, please setup the DPT's internal clock module. This enables time-controlled startup of the heating process and correct dating of system logs.

4 Features

4.1 User Interface

4.1.1 Standard UI



3 Fig.: User interface

The user interface is shown on a display with capacitive touch interaction. The screen reacts to inputs like a typical smartphone display, direct skin contact or a special input stylus is required.

1 – SWITCHES, 2 – CHECKBOXES

Switches and checkboxes may be activated or deactivated using a single fingertap.
Switches are marked with a green corner when active, checkboxes receive a black square.

3 – BUTTONS

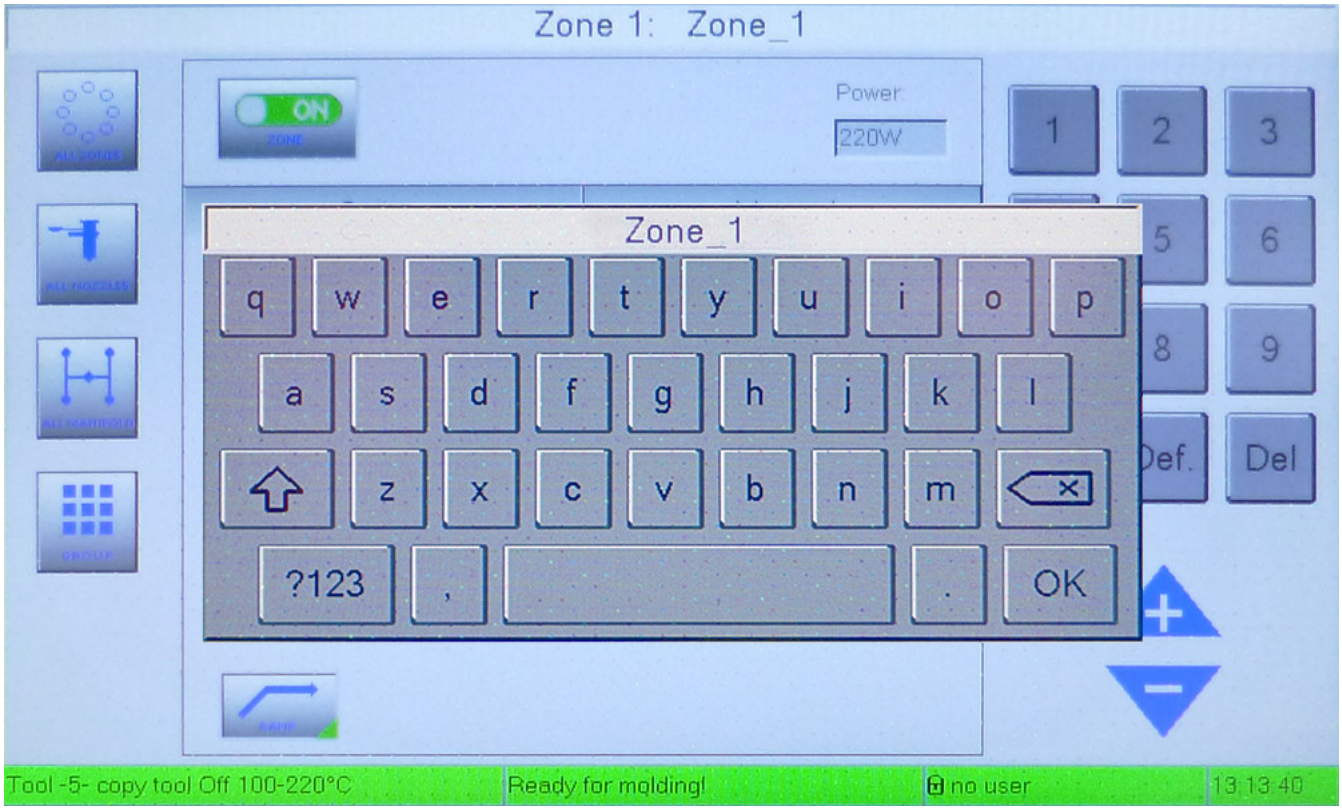
Buttons are very much like switches, but with a one-shot effect. If you tap a button for the second time, it is not deactivated but rather triggered again.

4 – NUMERICAL INPUT BOXES

To select a numerical input box, you tap on it. The selected input box is highlighted with yellow text (see label 4.1) and can then be modified using the number pad (see label 3).

Using the button "Del" you can reset the currently selected value to its respective minimum, "Def." on the other hand resets it to its hard-coded default.
Alternatively, you can use the arrow keys "+" and "-" in the bottom right of the screen to increase or decrease the value of the selected input field by a fixed amount. Holding down an arrow key lets the value step up or down until release.

4.1.2 onScreen-Keyboard

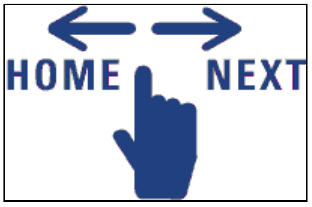


4 Fig.: onScreen-Keyboard

The onScreen-Keyboard appears whenever a string value (e.g. the user's name) gets selected. It is a full keyboard in standard QWERTY layout.

In the top row of the keyboard, the current input value is displayed.
In the lower left corner there are shift keys for upper-case and special letters. The lower right corner includes a backspace button and an OK-Button to enter the current value.

4.1.3 Swipe gestures



Navigating sub-menus is done using swiping gestures. To perform a swipe to the left e.g., put your finger to a preferably empty part of the screen on the right side, then swipe left.
If not noted otherwise, the swipe gestures have following effect:

TO THE LEFT	Back to the main view
TO THE RIGHT	Back one step (to the previous view)
DOWNWARD/ UPWARD	Next/previous item (e.g. selecting a status field)

4.2 Special features

4.2.1 Temperature reduction (Lower)

During production breaks, it is usually advisable to lower target temperatures without switching off the control unit completely.
When a heating zone receives the "Lower" signal, its temperature or power is reduced according to the individual zone settings.

When the "LOWER" global button is pressed on the main screen or when the external digital "Lower" input is switched, besaid "Lower" signal is sent to the heating zones that have set the "active at global lowering" option.

In order to reach operating temperature more quickly after short production breaks, it is recommended not to activate this option for manifold heaters.

4.2.2 Temperature increase (Boost)

When adjusting a tool or opening cavities, it can be helpful to raise target temperatures temporarily. For this purpose, there is a "Boost" signal to which the heating zones also react according to their individual settings.

When the "BOOST" global button is pressed on the main screen, the boost signal is sent to all heating zones that have the "active at global boost" option set.

By default, the global boost is limited to 2 minutes, after which the affected zones return to their usual target temperatures. That time limit can be changed in the parameter settings.

4.2.3 Zone soft start

In order to counteract problems due to condensation moisture, the DPT24 has a soft-start routine to gently evaporate any moisture present in the cold heating elements of the tool.
The soft-start function is divided into two phases:

1. Phase (output ramp):
   The heating zones are slowly preheated to a temperature of 105°C within the "ramp time" with an output power of 0-40%.
2. Phase (drying):
   For the duration of the "hold time", the heating zones intended for drying are kept at a temperature of 105°C.
3. After completing the second soft start phase, or in case of manual abort (see function switches (see page 23)), the tool proceeds to heat up to the target temperature.

If the soft start function is activated, the tool checks whether at least one zone is colder than 80°C on startup and whenever another zone is switched on.
In that case, a "soft start" is carried out for the entire tool.

For slow zones (i.e. manifolds, heated connection elements) it can be useful to switch off the soft start and heat to target temperature directly.

Both "ramp time" and "hold time" can be changed via the Softstart/Ramp submenu (see page 51).

4.2.4 Temperature ramp

To protect heating zones with small thermal mass (i.e. injection nozzles) from overheating, the DPT24 has a heating ramp routine.

It is used to adjust the tool tuning for larger temperature differences.

If the ramp is active, the DPT does not target the selected heating zones directly to operating temperature, but first establishes a reduced temperature (default: by 20°C) for as long as the slower heating zones (e.g. distributors) are brought up to temperature.
Due to large thermal inertia, connection elements are usually not prone to overheat and are adjusted without heating ramp.

The ramp function can be configured for automatic and manual mode via the main menu.

In automatic mode, you can set a leading zone (or have it selected automatically) and set the lowering temperature.
The "leading zone" is the zone which must have reached its target temperature first, while the remaining zones are kept at the target temperature reduced by the "lowering temperature" in the meantime.
In principle, every zone can be utilized as the leading zone; however, in most cases the slowest zone is the most useful candidate here.

The current control zone is named in the device status bar and its power output is displayed - e.g. "70%" if 105°C of 150°C target temperature is currently reached there.

In manual mode, only a manual rise rate can be configured.
The zones do not follow a certain guide zone, but are trimmed to a certain heating speed in ramp mode.

The options described here can be changed via the Softstart/Ramp submenu (see page 51).

4.2.5 Leakage detection

If an injection nozzle leaks, it comes into contact with an increased amount of material.
This increases the power consumption of the nozzle by usually more than 20%, as experience has shown.

The electrical power output of the nozzles is constantly monitored. In the parameters submenu (see page 67) you can set the increase needed to trigger leakage detection, with respect to the average power output.

4.2.6 Friction monitoring

Friction against the injected material increases the temperature of a nozzle – a process known as "shear heating". In contrast to the longer-term percentage change in power consumption typical for leakages, friction leads to a short temperature peak of usually less than 10°C at the measurement location.

The DPT24 measures the current nozzle temperature accurately enough to detect this shear heat as a proxy for material flow. Time between temperature peaks is averaged, and if one is overdue, the friction monitoring system raises a warning but continues heating. Material flow might then be interrupted by a frozenor otherwise jammed injection nozzle.

The threshold values for triggering the friction monitoring can be set in the parameters submenu (see page 67).

4.2.7 Tool change detection

On completed power adjustment after controller boot-up, the device compares the wired up loads to the previously known configuration.

If a major difference is measured, the DPT assumes that the connected injection mold has been changed. The user is then presented a dialog. When dismissed, the tools submenu (see page 38) is entered, to load or newly create a tool preset.

4.3 Zone Operation modes

4.3.1 Zone regulate mode

In Zone regulate mode, the DPT keeps the heating zone at a specific target temperature.

- A functional temperature sensor is required.
- Zone regulate mode is required for leakage detection and friction monitoring:
- Leakage detection works by detecting a reduced device efficiency – the power consumption, however, only varies during normal operation.
- Friction can only be detected by measuring a temperature increase, however only the zone regulate mode is temperature dependent.

4.3.2 Zone fixed power mode

In Zone fixed power mode, the controller supplies the heating zone with a certain (percentage) input power.

- The zone temperature is displayed if possible, but ignored for control purposes.
- The functions for Lowering or Boosting zone temperature are replaced by Lowering or Boosting the input power.

Zones in fixed power mode are treated as if on target temperature.

4.3.3 Zone slave mode

In Zone slave mode, the DPT subordinates a zone to an individually selectable master zone.

- The entire control is taken over (according to percentage power) by the selected control zone.
- This means that no separate increase/decrease is possible.

Zones in slave mode are

- marked blue.
- treated as if on target temperature.

5 Main view

In main view, the DPT24 displays a column of function keys on the left side of the screen and the status area with the individual heating zone panels.

5 Fig.: Status display on the main screen of the DPT24

Using the function switches on the left side of the touch LCD you can control all heating zones simultaneously, as listed on the next page. To access the main menu, tap the "Menu" button in the lower left corner.

5.1 Function switches

	"ON/OFF" button this will turn the entire tool on or off.
	"BOOST" button This button starts the BOOST routine for all connected heating zones as described earlier (see page 18). By default, the routine's duration is set to 2min.
	"LOWER" button This button starts or interrupts the LOWERING routine for all heating zones as described earlier (see page 18).
	"SOFTSTART" button This button interrupts the running soft-start routine as described earlier (see page 18). (Displayed only while soft-start is in effect)

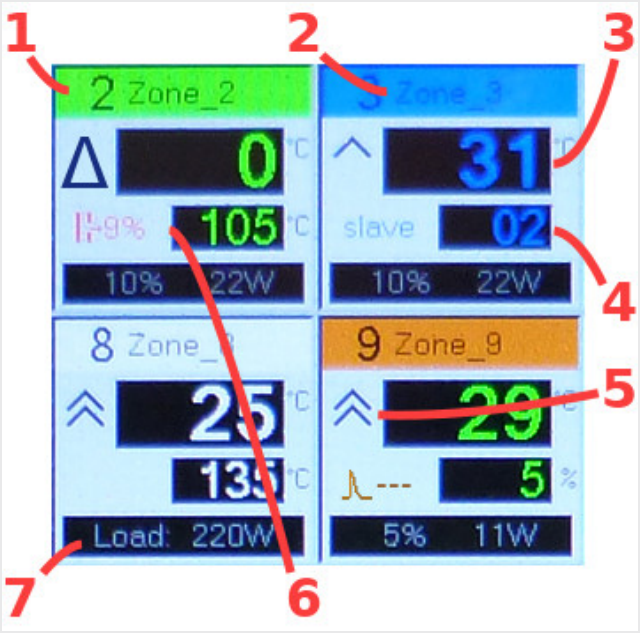
2 Tab.: Function buttons in the main view

5.2 Heating zone panels

The panels' color enables you with an immediate overview of the status of all heating zones.
Every big number displays a currently measured live temperature, below that, a smaller number shows the target temperature.
An additional level indicator for any zone helps to distinguish at first glance if that zone is at target temperature (green), too hot (red) or too cold (yellow).

A notification area may show additional information regarding zone status.

Finally, a status bar displays the current power output in %, and (alternating) the current amperage in A or power in W.
If any error is detected in a zone, an error code is displayed in the status bar, which can be looked up in the appendix (see page 83).



1. Zone index
2. Zone name
3. Live value (absolute or delta-temperature)
4. Target value (temperature/power percentage/ master zone)
5. Load type
6. Notification area
7. Status bar

3 Fig.: Status areas of the heating zones on the main screen of the DPT24

5.2.1 Color code

GREEN	Heating zone is operational, within an configured tolerance window around target temperature.
YELLOW	Heating zone temperature is too low (or temperature reduction (see page 18) is in effect).
RED	Heating zone temperature is too high (or temperature increase (see page 18) is in effect).
ORANGE	Heating zone is in zone fixed power mode (see page 21).
BLUE	Heating zone is in zone slave mode (see page 21).
WHITE	Heating zone is turned off.

4 Tab.: Color code of zone panels

5.2.2 Load types

	**Nozzle** default control parameters
	**Fast Nozzle** quick control response: Low thermal mass with powerful heating, e.g. 'BlueFlow' nozzles
	**Connection Element** very slow control response: Big thermal mass with relatively weak heating
	**Manifold** slow control response: Big thermal mass with powerful heating

5 Tab.: Symbols for load types

5.2.3 Notification area

Additional notifications regarding the heating zone status are displayed here, for instance:

PIPE SYMBOL AND PERCENTAGE

"  XX%" signals that the leakage detector is active for this zone. The displayed percentage is the currently measured average zone power consumption. If the output power exceeds a configurable threshold above the current average, a warning message is displayed.

PEAK SYMBOL AND DEGREE VALUE

"  XX°" signals that this zone is watched by the friction monitoring system. If the temperature briefly surpasses the configured threshold, the device will detect that as friction heating by injected plastics.

SLAVE

The text "slave" marks any zone in zone slave mode (see page 21).

5.2.4 Delta mode

You can switch any status panel to delta mode by double tapping on it.

Delta mode is indicated with a delta symbol (triangle) instead of the load type indicator. See figure above (see page 23) at zone № 9.
Instead of its current temperature, the zone then displays the momentary difference to its target temperature.
At a target temperature of 200°C and a currently measured temperature of 189°C, "-11°C" should be displayed in delta mode.

Another double tap ends delta mode.

5.2.5 Zone configuration view

By single-tapping a status panel, you enter the configuration view of the associated heating zone. If you want to set several zones at once, touch them in the order as follows:

Ascending selection is inclusive, descending selection is not.

Example: Tapping on "2", then "10" opens the configuration view for all zones 2, 3, 4, ..., up to 10.
Tapping on "10", then "2" only opens the configuration view for zone 2 and zone 10.

5.3 Status bar

The status bar consists of four text display fields.

1. The tool display shows the currently active tool and its index.
2. The notification display shows recent messages from the DPT system.
3. The user display shows the currently logged in user.
4. The time display shows the current time in 24h format. It also indicates if the data logger is running.

Like the status panels, the Status bar is color-coded.

GREEN	Tool is ready for operation, all zones are within their respective tolerance windows.
YELLOW	Tool is being heated.
RED	Tool temperature is too high / Global boost (see page 18) is active.
BLUE	Global lower (see page 18) is active.
WHITE	Tool is turned off.

6 Tab.: The status bar

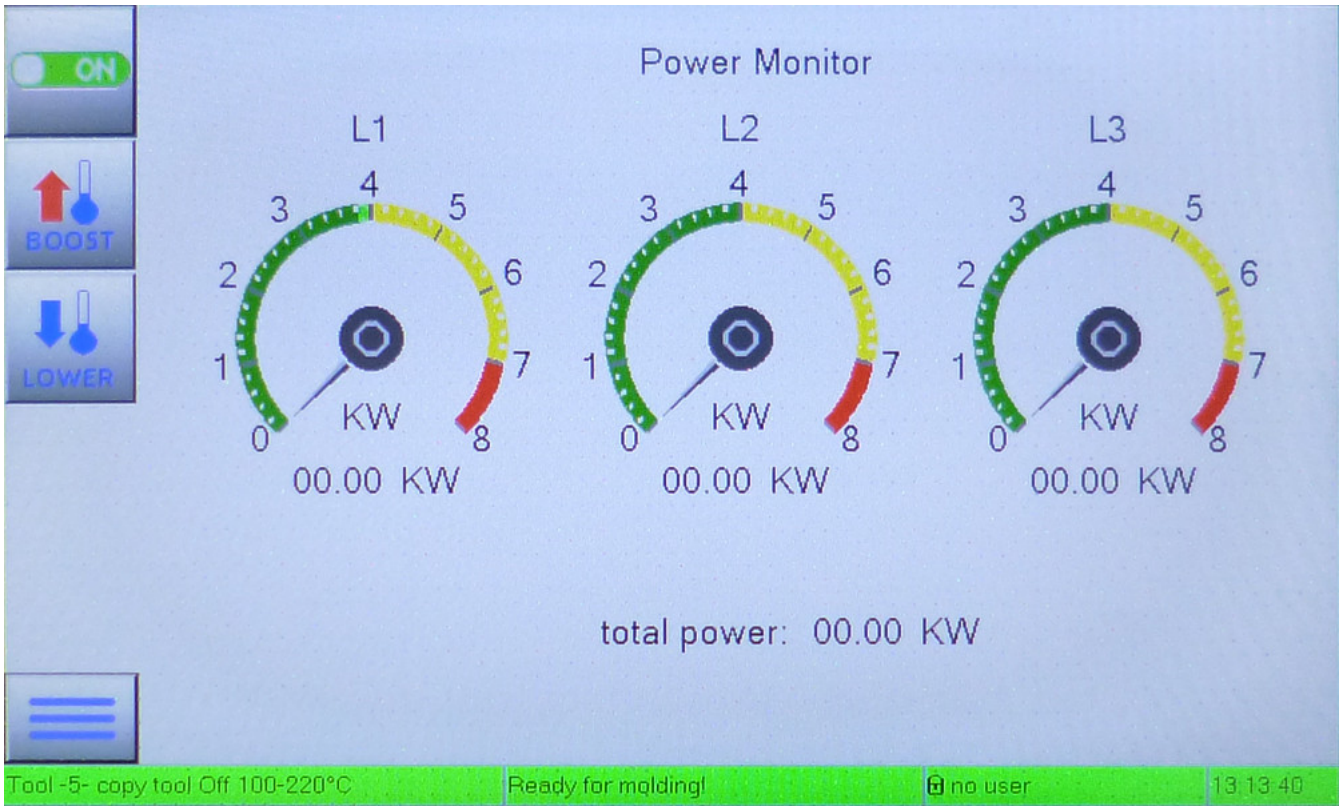
Special messages (notification field):

CONDITION	MESSAGE
Global boost signal	Boost is activ for xx:xx min.
Global lower signal	Lowering is activ!
active soft start routine (see page 18)	Softstart → ramp: xx:xx min
active ramp routine (see page 19)	Ramp: leading zone - xx → xx%

5.4 Power monitor

From the main view, you reach the power monitor with a swiping gesture to the right.

This monitor provides a live graphical insight into the input power consumption per phase L1, L2, L3.

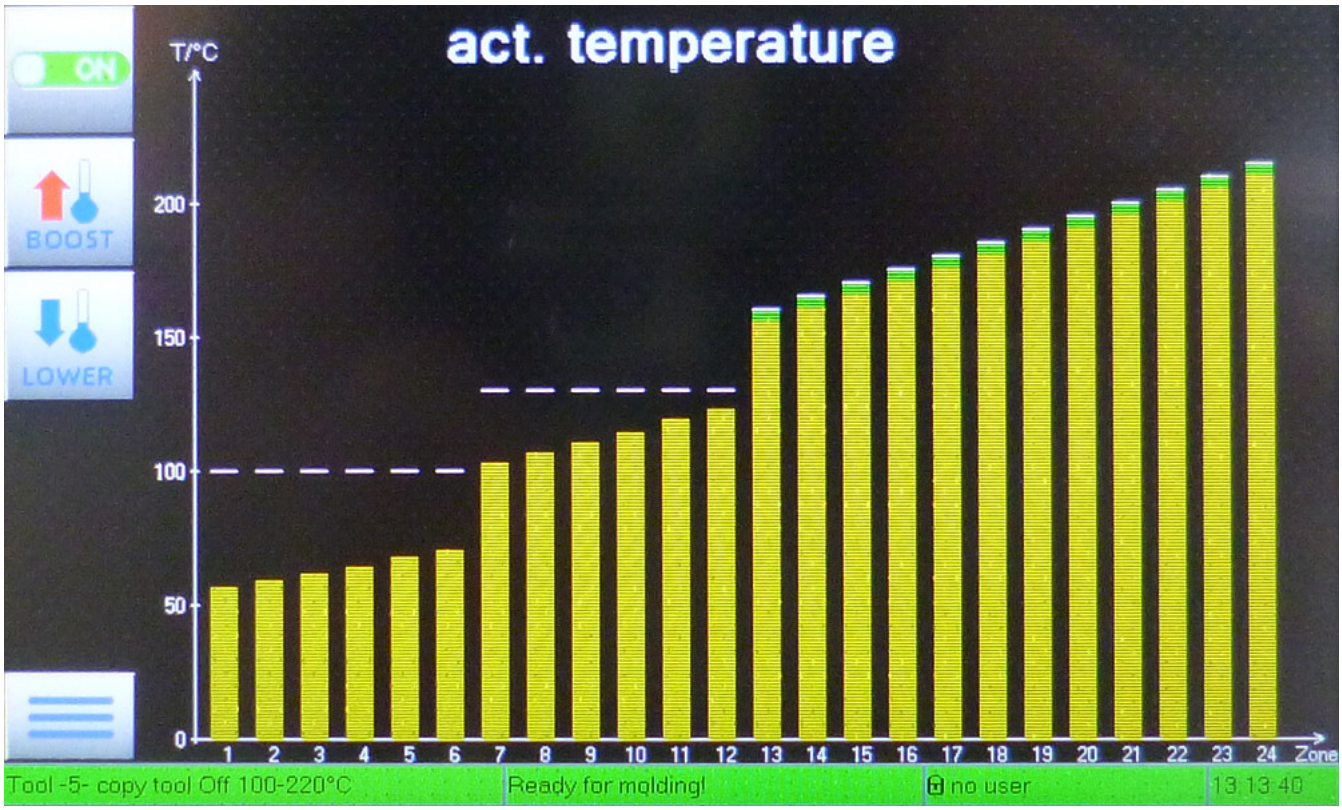


6 Fig.: Performance monitor of DPT24

Performing swipe gestures up- or downwards, you can choose between power (KW) and current (A) display.
Another gesture to the right takes you to the zone overview.

5.5 Zone overview

Here, the currently measured temperature of all connected thermocouples is graphically displayed as a bar graph.



7 Fig.: Temperature overview of DPT24

Performing swipe gestures up- or downwards, you can choose between temperature (°C/°F), power percentage (%) current (A) and power output (W) display per zone.
Another gesture to the right takes you back to the main view.

TEMPERATURE DISPLAY

The thin white lines demark each zone target temperature.
Where the bars intersect with tolerance windows, they are colored green. Where tolerance windows are exceeded, the bars are colored red.

POWER PERCENTAGE DISPLAY

The thin white lines are only present for injection nozzles and demark the current average of each power output percentage.
Additional red lines demark the leakage detection threshold. Confer the heat zones status panel (see page 23) resp. the settings from the parameters submenu (see page 67).

AMPERAGE/POWER OUTPUT DISPLAY

No additional markers in this view.

6 Zone settings

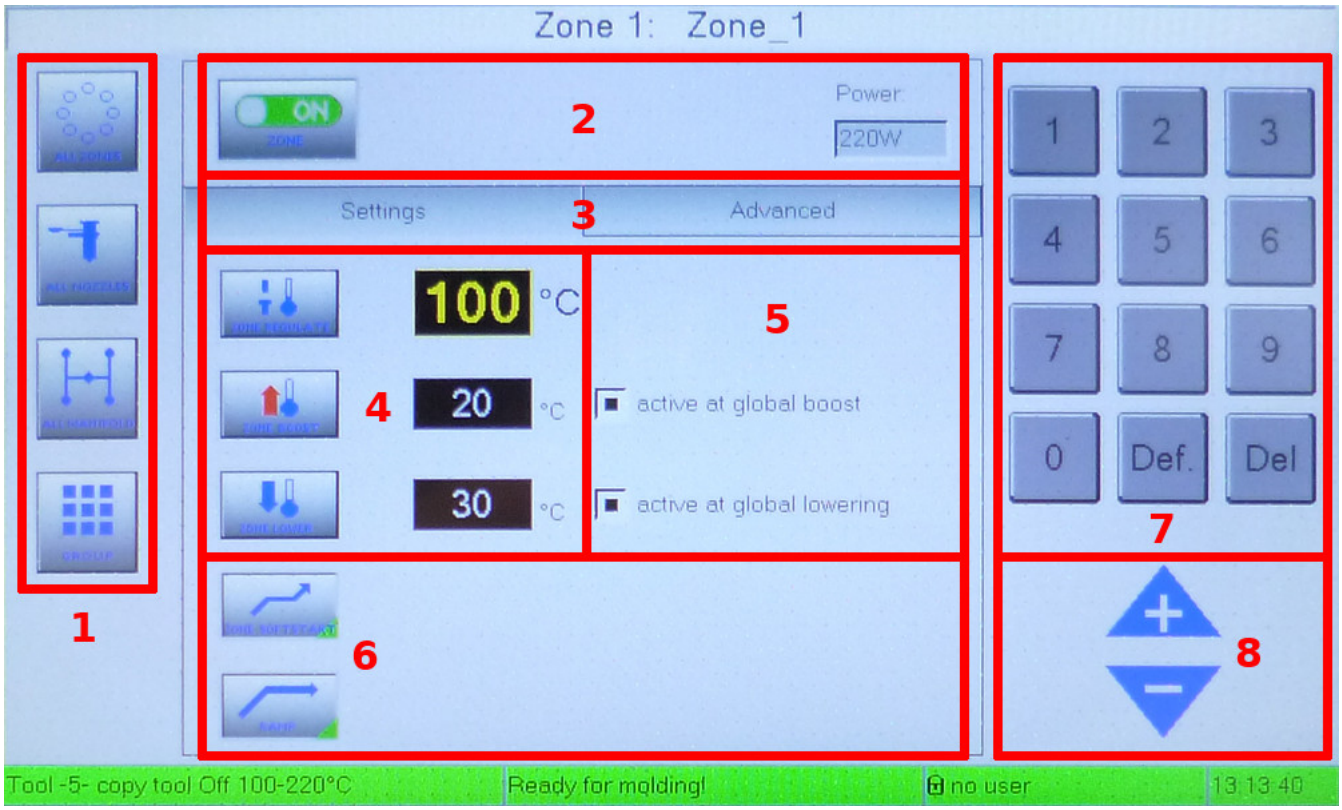
Once you have selected an arbitrary number of heating zones for configuration using the main view, the zone settings page is displayed after 2 seconds.

6.1 Page layout

In the heading you can see which heating zones are configured.
If only one zone is selected, a keyboard can be displayed by tapping on the heading and the name of the zone can be changed.

You can select the next zone by wiping UP or DOWN across the screen. This cancels a possibly active multi-selection!

The groups in following figure are referenced on the subsequent pages.



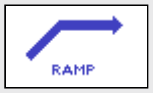
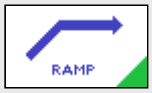
8 Fig.: Settings page for heating zones


Zone 1: Zone_1
ON
ZONE
Power
220W
Settings
Advanced
Load Type
Nozzle
con. Element
fast Nozzle
Manifold
9
Control parameter
Kp: 100
Ki: 9
Kd: 0
10
friction detection
11
no Group
12
1
2
3
4
5
6
7
8
9
0
Def.
Del
Tool -5- copy tool Off 100-220°C
Ready for molding!
no user
13:13:40

6.2 Explanation

NO.	INACTIVE	ACTIVE	EXPLANATION
1	GROUP SELECTION ANY CHANGES AFFECT ALL SELECTED ZONES (LISTED IN THE PAGE HEADING)		
			"ALL ZONES" selects all correctly discovered heating zones.
			"ALL NOZZLES" selects all heating zones rated as injection nozzles.
			"ALL MANIFOLD" selects all heating zones rated as manifolds (i.e. material distribution circuits).
			"GROUP" selects all heating zones belonging to the same group.
2	BASE CONFIGURATION		
			"ON"/"OFF" activates or deactivates all currently selected heating zones.
	Power:		Here, the measured maximum power consumption of the first selected zone is displayed.
3	SETTINGS LEVEL		
	Settings/Advanced		Switch between basic and advanced settings

4	ZONE OPERATION MODE	
	In *Zone regulate mode*	"ZONE REGULATE" indicates that the first selected zone is using zone regulate mode (see page 21). Tapping the button brings all selected zones into zone power mode. The connected number input alters the target temperature for all selected zones. "ZONE BOOST" sends a Boost signal to all selected zones, "ZONE LOWER" dispatches a Lower signal. The respective number inputs change the offsets for boosting resp. lowering the target temperature.
		
		
		
	In *Zone power mode*	"ZONE POWER" indicates that the first selected zone is using zone power mode (see page 21). Tapping the button brings all selected zones into zone slave mode. The connected number input alters the power output percentage for all selected zones. "ZONE BOOST" sends a Boost signal to all selected zones, "ZONE LOWER" dispatches a Lower signal. The respective number inputs change the offsets for boosting resp. lowering the power output percentage (% of maximum ouput power).
		
		
		
	In *Zone Slave mode*	"ZONE SLAVE" indicates that the first selected zone is using zone slave mode (see page 21). Tapping the button brings all selected zones back into zone regulate mode. The connected number input alters the master zone for all selected zones.
		
5	AUTOMATION SETTINGS	
	active at global boost	If these option boxes are active, the selected heating zones react to the global function switches (see page 23) BOOST and/or LOWER. Unavailable in *Zone slave mode*.
	active at global lowering	

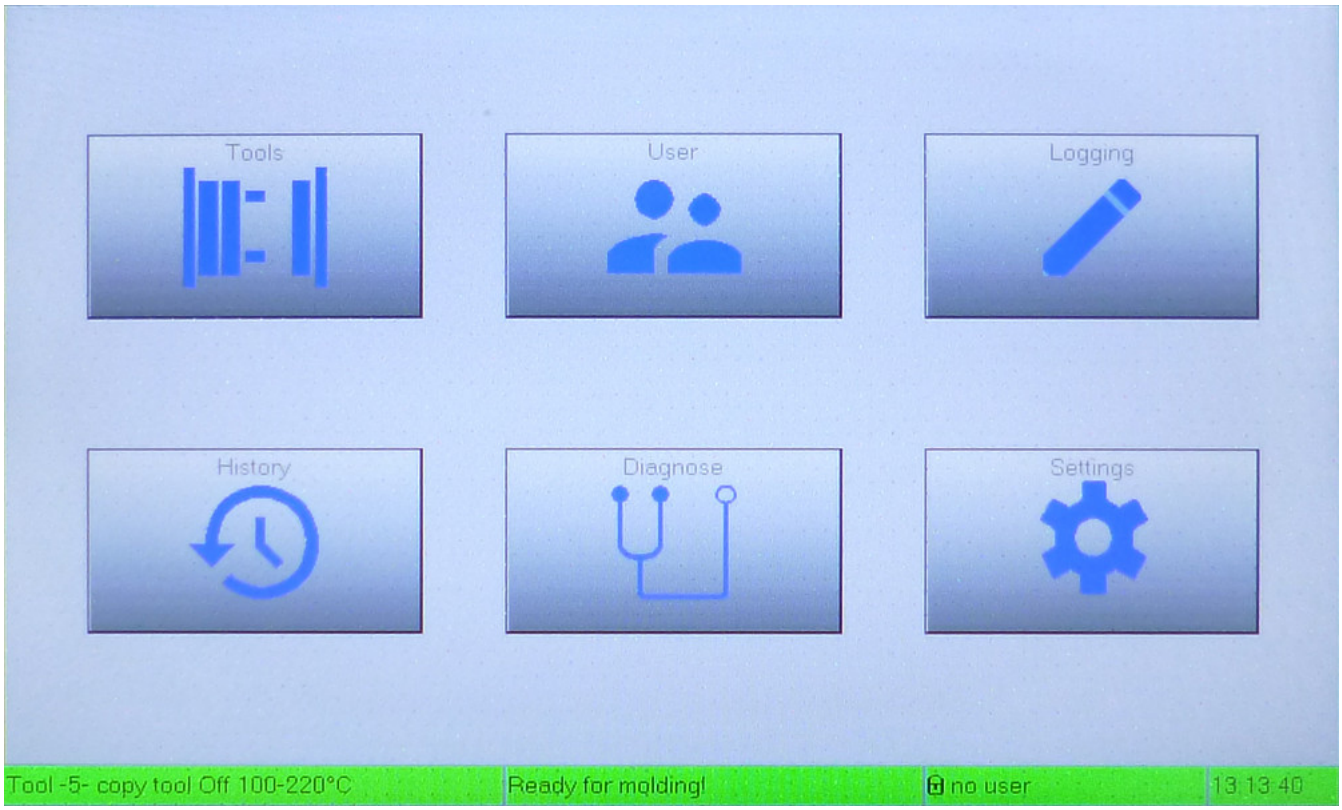
6	CONTROLLER SETTINGS		
			The soft start routine (see page 18) only considers zones where this setting is active. Unavailable in *Zone slave mode*.
			The temperature ramp routine (see page 19) only considers zones where this setting is active. Unavailable in *Zone slave mode*.
7	NUMBER PAD		
	This is to enter values into number input fields.		
8	STEP BUTTONS		
	This is for incrementing or decrementing active numeric values.		
9	LOAD TYPE		
	This is for changing the load type of the zone. Changes automatically affect the zone's controller parameters. **Controller parameters** If a zone's parameters had been manually changed, that previous user input will be kept. The user will be alerted to review the zone's controller parameters.		
	Nozzle	standard loads	
	Fast Nozzle	quickly reacting loads, e.g. BlueFlow nozzles	
	Connection Element	large thermal masses with less than 600W heating power	
	Manifold	large thermal masses with more than 600W heating power	

10	PID CONTROLLER PARAMETERS	
	These inputs directly change the internal controller parameters known as P, I and D, thus directly influence the controller algorithm. Wrong settings will corrupt zone stability! Only available in *Zone regulate mode*.	
11	FRICTION	
	friction detection	Friction detection and monitoring is only active for zones with this option set. Only available in *Zone regulate mode*.
10	GROUP SETTINGS	
		The button "ZONE GROUP" assigns the next of 9 prepared group IDs to the currently active zones. Each group ID can be assigned a name using the text input next to this button. Zones with the same group ID can be selected using the switch "GROUP" on the left screen side (No. 1 in this table).

7 Main menu

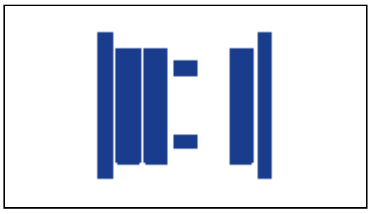
For device configuration, the DPT24 has a builtin main menu, which you can reach by tapping the Menu button on the bottom left of the main view (see page 22).

Various settings are restricted to certain users. Depending on your user level of Supervisor, Administrator, Tool setter or normal User, you can access and/or change different parts of the DPT24 device configuration.

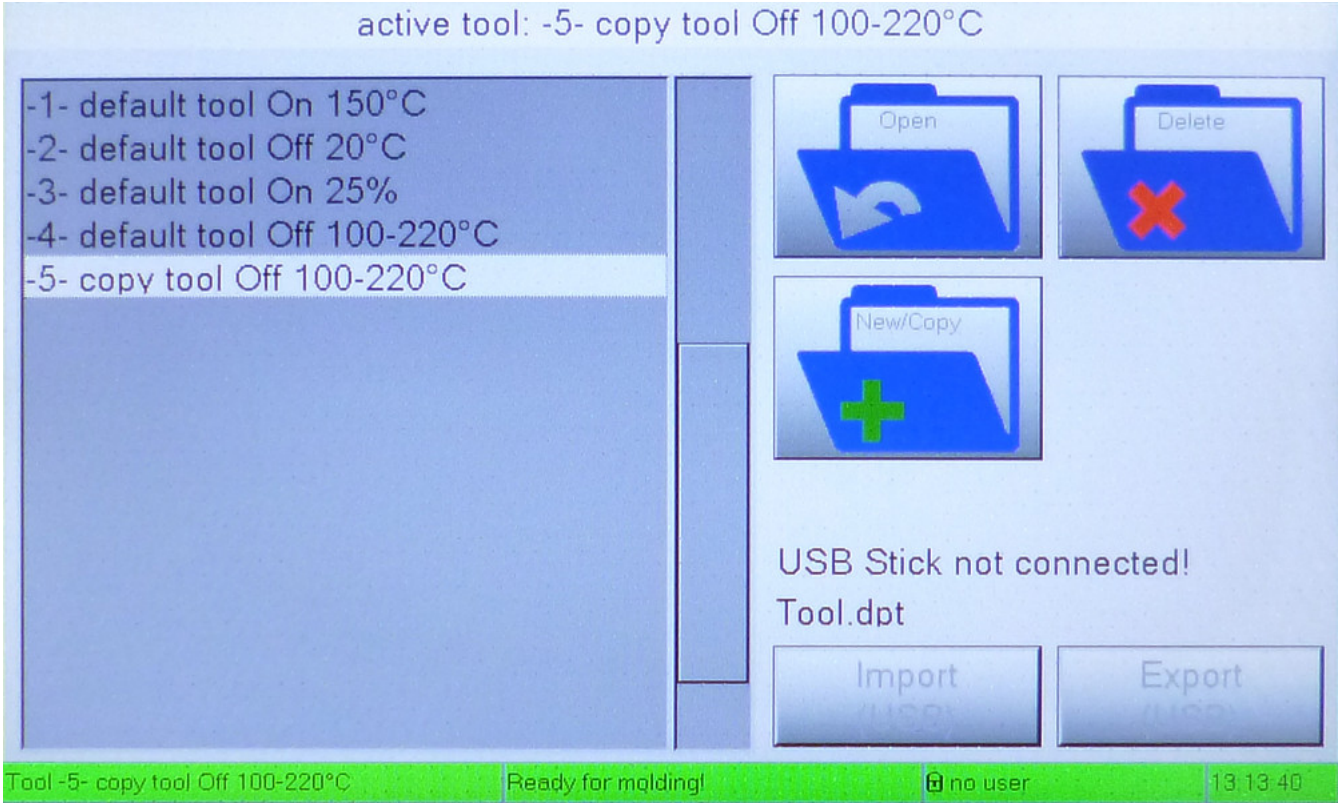


9 Fig.: Main menu

7.1 Tools



Up to 60 different tool presets may be created. A tool preset contains all heating zone settings as well as all settings from the parameters submenu (see page 67). These tool presets are retained inside the DPT24 and protected against power failure.



10 Fig.: Selecting from up to 60 stored tool presets

Four presets are default templates and cannot be altered. To use, copy one and extend it to your needs. Copying a tool preset adopts all of its settings/parameters except for the PID controller parameters. These are set to default values according to the detected heating zone class.
To create or load a new tool preset, the currently active tool must be switched off. A helping prompt will be displayed if necessary.

You can export and import tool sets to and from a connected USB stick. This enables you to backup and distribute tool recipes for devices and facilities. It also facilitates restore in case of DPT replacement.

Export (USB):

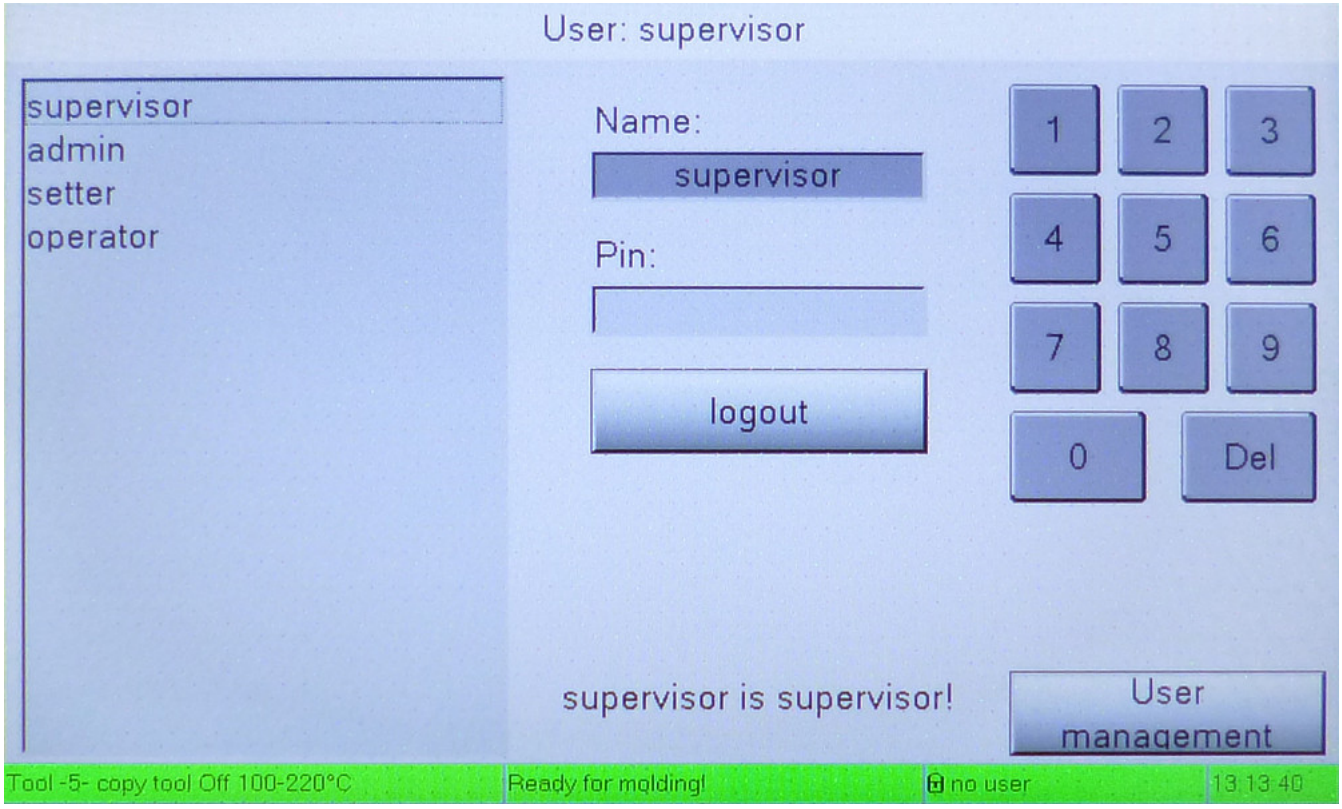
The selected tool will be exported as "Tool.dpt" into the USB stick's root directory.

Import (USB):

If a "Tool.dpt" file is present in the USB stick's root directory, the "Import" button will be enabled. On use, that file will be imported and appended to the current tool list.

7.2 Users

In the user submenu you can authenticate as a user of the DPT. Each user has a user name, a PIN and an associated role.
Depending on your role, certain device settings or menus may be prohibited.



11 Fig.: Submenu "User"

In the factory default, there are four preconfigred users; one for each user role/level:

USER NAME	ROLE NAME	PIN	DESCRIPTION
operator	User	(none)	Switch the controller on and off, change options without influence on the controller e.g.: activate global boost, set display language ...
setter	Einrichter	99	additionally: Setup and alter individual heating zone settings
administrator	Administrator	5008	additionally: Change all system parameters
supervisor	Supervisor	(secret)	additionally: Administer user accounts

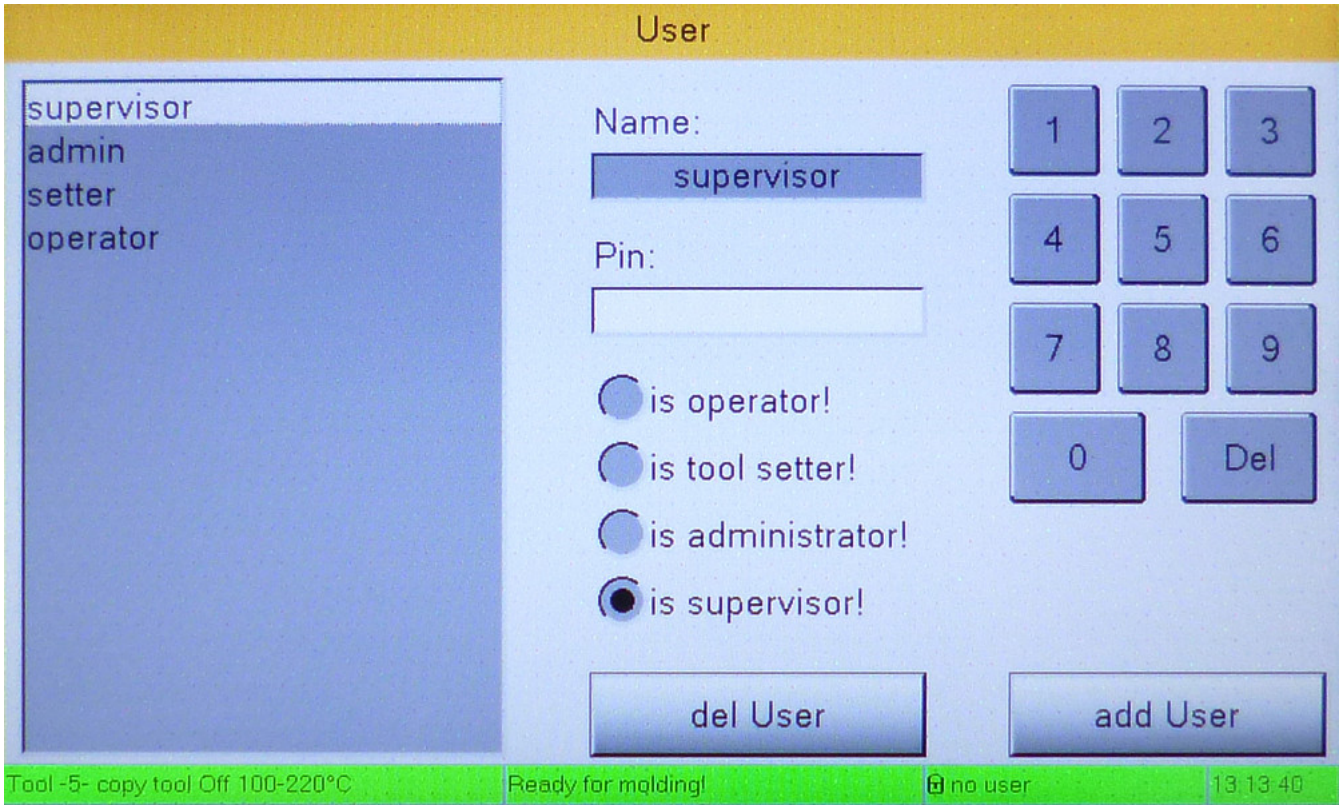
7 Tab.: User roles

Log in by tapping your username in the list on the left side of the screen; then use the number keypad on the right side to enter your PIN.

To learn the default PIN of the Supervisor user, please contact the support of Günther Company!
If logged in as a supervisor, the button "user management" in the lower right corner is activated.

7.2.1 User management

The User management submenu enables the DPT to be used by individual users with different permission levels.



12 Fig.: Submenu "User management"

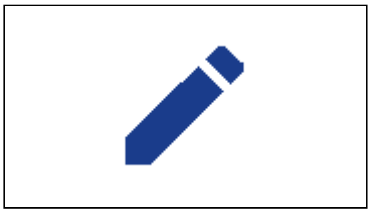
To create a new user, tap the "New user" button. Using the onScreen keyboard, provide a user name with up to 20 characters in length, then confirm the input using "OK".

You can load up settings for an existing user by tapping the corresponding user name in the user list. You may then modify the current user's settings:

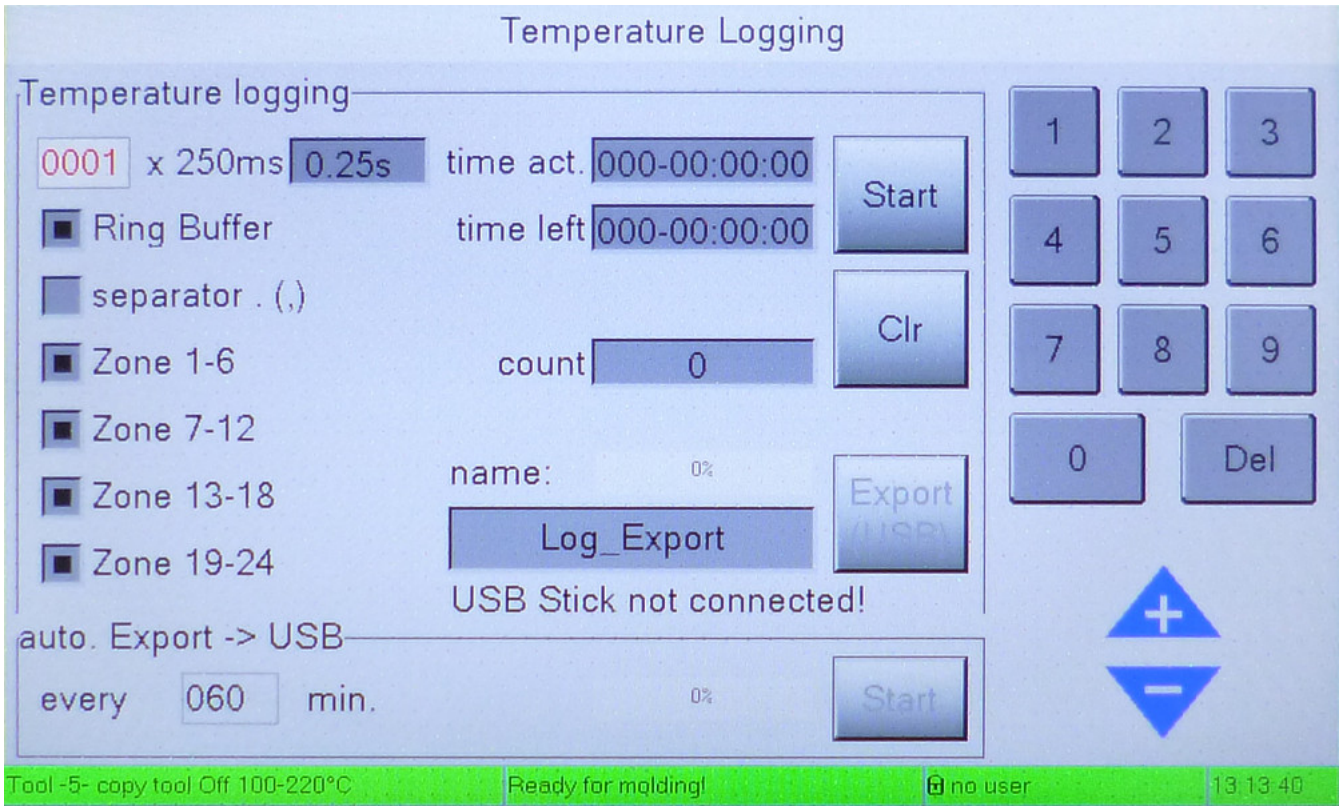
- change user name by tapping the "Name" text field
- change permission level by selecting the desired option below the "Pin" field
- change or delete the Pin at any time using the numeric keypad on the right

To delete the currently selected user, simply push the button "delete user".

7.3 Logging



This menu is used to setup automatic system logging.



13 Fig.: Submenu "Logging"

The DPT24 controller has a builtin data logger which records the current measurements of all heating zones and automatically pushes them onto a USB storage. The USB port is located on the device's front and supports USB drives with a capacity of up to 32GB.
Under "name" you can enter a filename as which the recorded measurement data of the data logger will be stored on the stick.

On the left screen side, there are settings determining form and content of besaid log file:

SETTING	EFFECT
(XXXX) x 250ms	Time interval between data sampling points: Every XXXX time steps, a data sample is acquired (time step = 250ms)
Ring Buffer	Action on internal memory overflow: Stop logging (option inactive) or overwrite old Datasets (option active)
separator . (,)	Number format: 123,4 (option inactive) or 123.4 (option active)
Zone X-Y	Content selector: If active, the data of zones X-Y is included in the logging memory and the exported files.

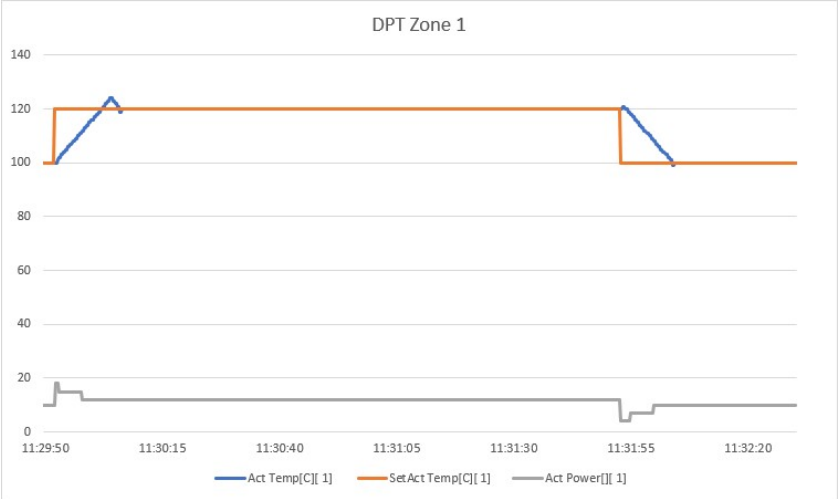
8 Tab.: Settings for logging

Instead of only including the current temperatures (measured and targeted), the entire states of the selected heating zones are recorded, plus some metadata of the device. By default, one data sample is created every 0.25 seconds.

The log file is saved in CSV format using the semicolon (;) as cell separator.

By tapping the uppermost button "Start", you start sampling data into the device-internal log memory. Once active, the "Stop" button will appear instead, with which logging may be terminated.
The button "Clr" will clear the internal log memory, while "Export (USB)" will write out the current log memory content to a new CSV file on a connected USB storage device. That new file will be named as set under "name".
In the group "auto. Export USB" there are options for chronically repeated writeout of that log memory.

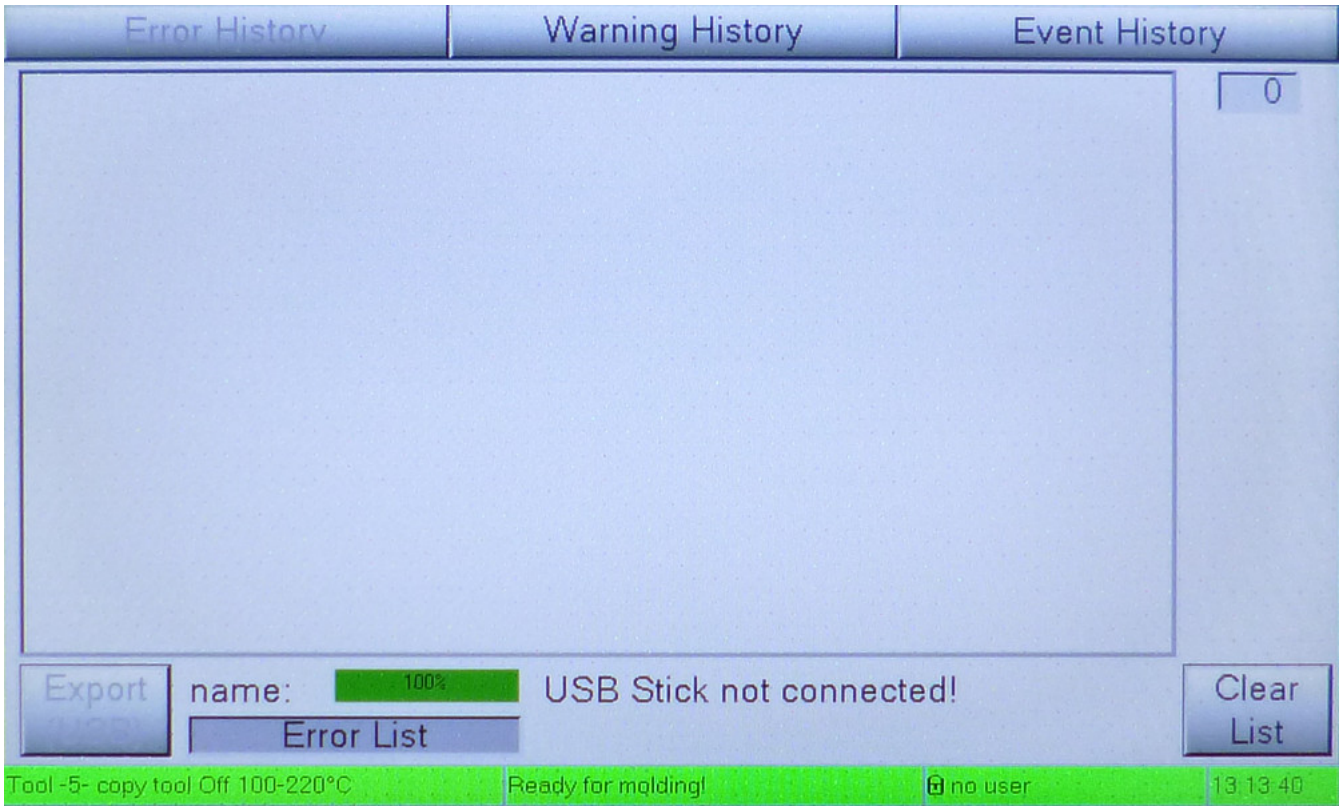
Files saved in this CSV format can easily be imported into spreadsheets such as Microsoft Excel, thus enabling easy generation of diagrams, if necessary.



14 Fig.: Example diagram using Excel, shows a global boost with default settings

7.4 History

Whenever configuration changes, general system messages or errors are emitted, they are listed in the History submenu chronologically.



15 Fig.: Submenu "History"

In case of malfunctions, short descriptive messages show their type and scope.
Additionally, user input and activities such as target value modification are also recorded.

TAB	DESCRIPTION	MAX. SIZE
List of Errors	Shows errors with corresponding error codes and timestamps	1024
List of Warnings	Shows warnings with corresponding warning codes and timestamps	1024
List of Events	Shows setting changes with corresponding numerical codes, timestamps, previous and new values	1024

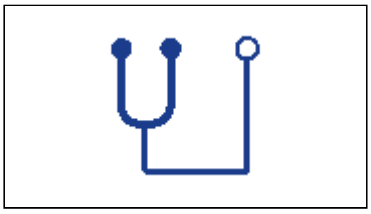
9 Tab.: Tabs in History submenu

Each of these lists can be exported individually to a USB storage device as a CSV file.

CSV files can be opened and evaluated as a text file using a simple editor or as a spreadsheet using a program such as Microsoft Excel.

A more detailed breakdown of the error codes and possible problem solutions are described in the appendix (see page 83).

7.5 Diagnose



The self-diagnostic program is able to easily detect wrongly wired or defective equipment such as thermocouples or heating elements.

Please note that the DPT must output power to the connected heaters for diagnostic purposes.
Thus, please double-check any equipment connected to the load circuits at the female connectors before starting any diagnostic routine!

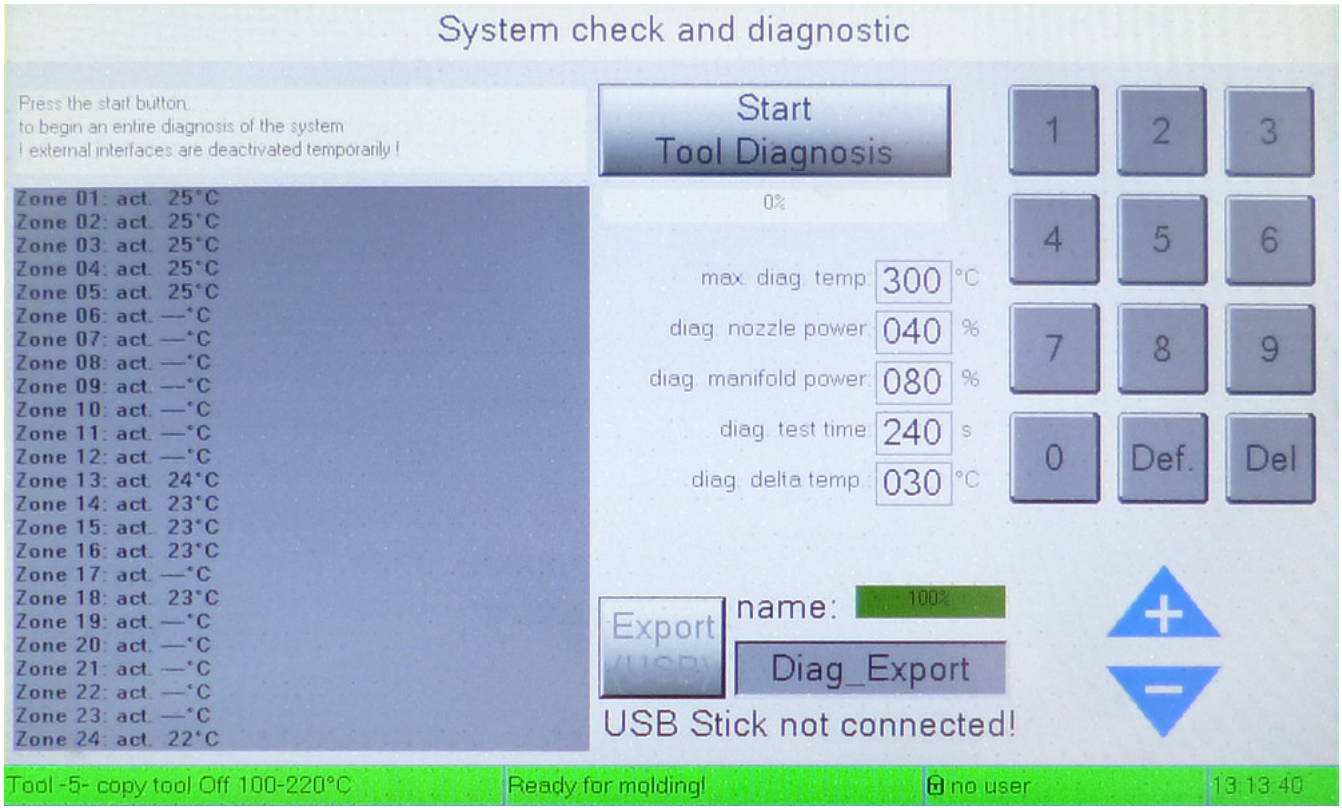
During self-test, the DPT will power up all connected heaters one by one, then try to detect the corresponding temperature spike.

While testing, a progress bar will show the overall progress of the routine, while the currently tested zones are highlighted in the list on the left. Operational zones will get demarked "OK", while faulty zones will be displayed with an attached (clear text) error message.

Resulting from the self-diagnosis, the user receives a report about all connected heater elements and thermocouples.
As usual, this report may then be saved to a USB disk.

For the diagnosis routine, there are additional settings listed below.

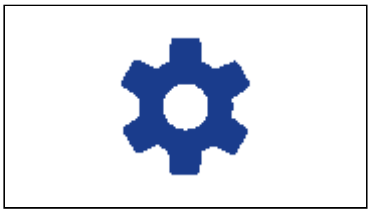
Caution: Incorrect settings may impair a successful diagnostic run!



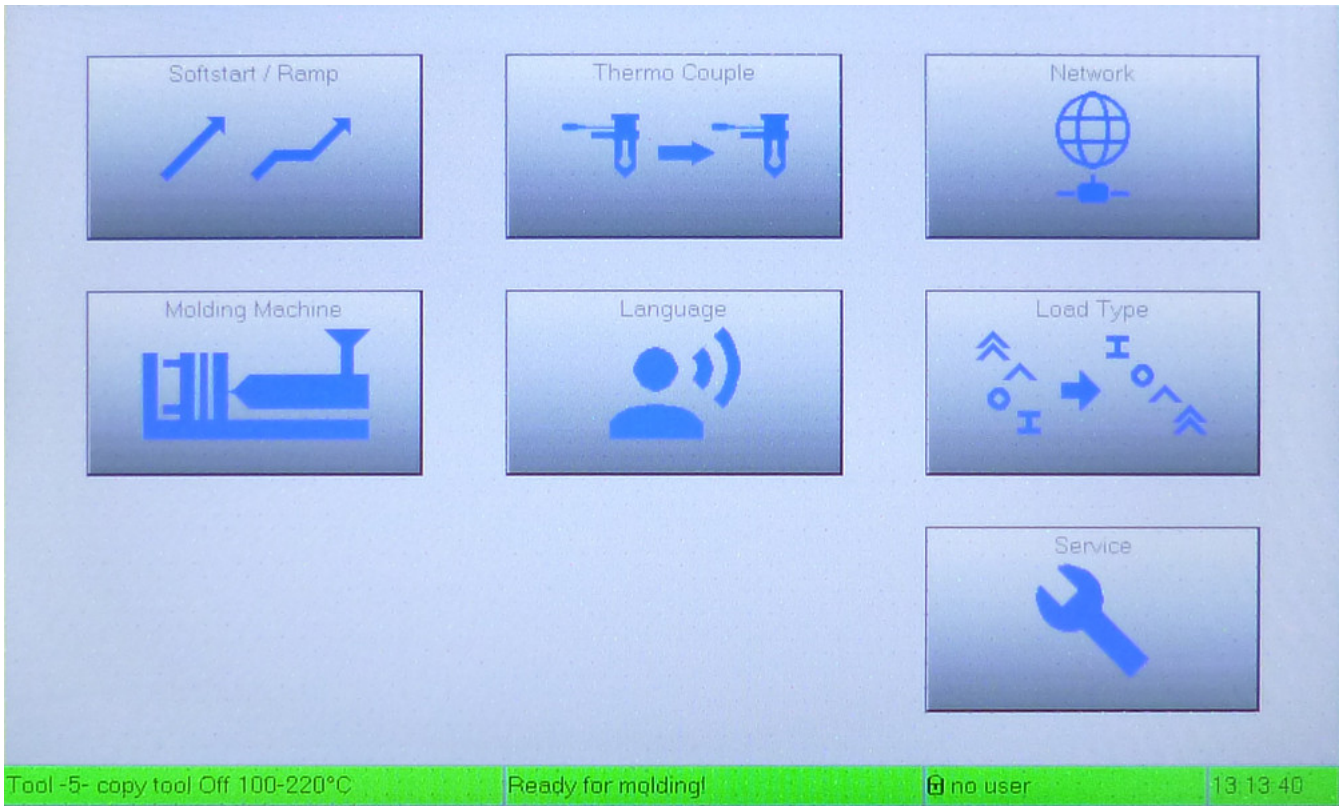
16 Fig/Tab.: Submenu "Diagnose"

SETTING	DEFAULT	EFFECT
max. diag. temp	300°C	maximum temperature suitable while diagnose running
diag. nozzle power	40%	maximum percentage of power output for a nozzle in diagnosis
diag. manifold power	80%	maximum percentage of power output for a manifold in diagnosis
diag. test time	240s	maximum time spent per tested heating zone
diag. delta temp	30°C	minimum temperature rise to consider a zone operational

7.6 Settings

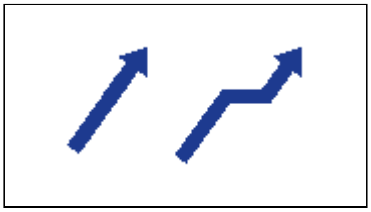


This submenu houses toll-specific options in additional submenus.

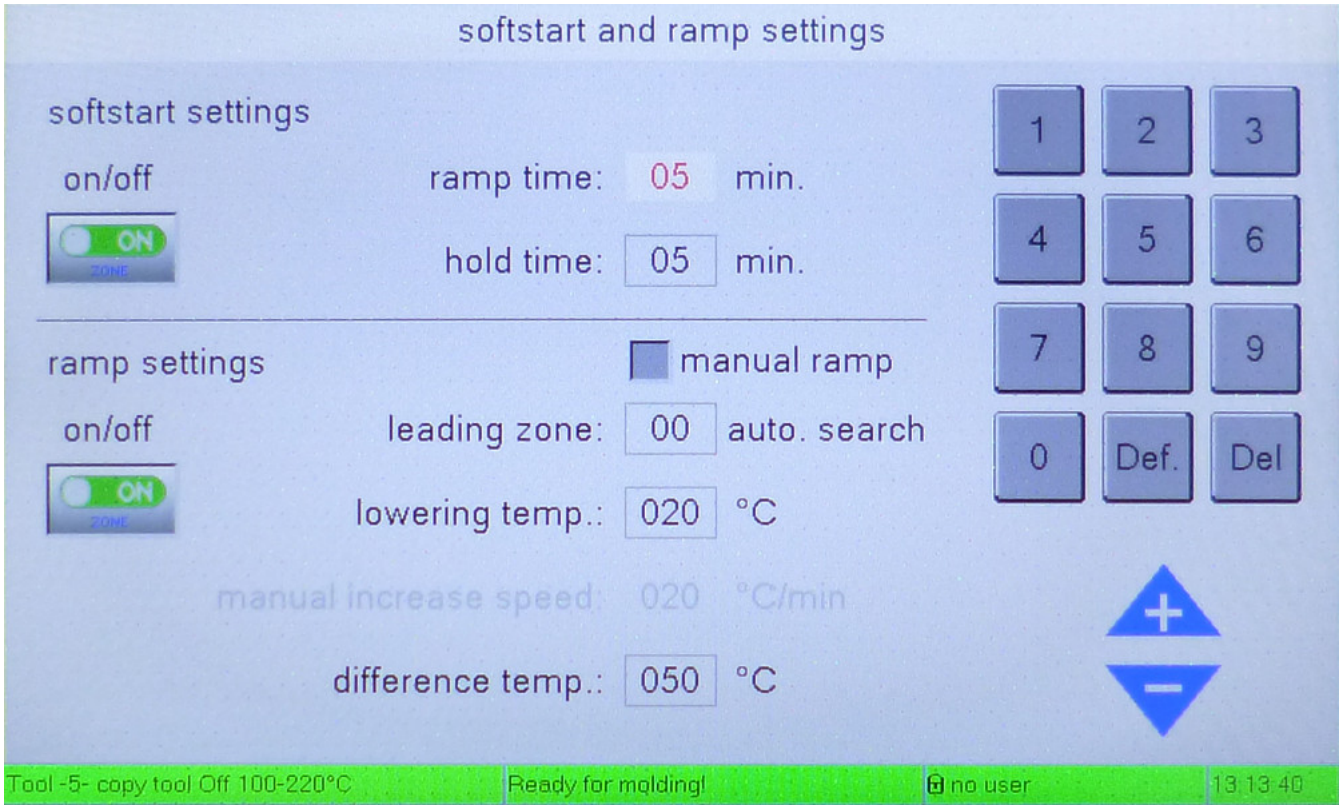


17 Fig.: Submenu "Settings"

7.6.1 Softstart / Ramp



In this submenu, you can alter the general parameters for the softstart and ramp functions applicable to all zones.



18 Fig.: Settings menu "Softstart / Ramp"

SOFTSTART SETTINGS

The upper on/off switch enables and disables the softstart routine entirely for the currently active tool.
Softstart procedure is suitable to prevent moisture-related damege to the tool.

Using the inputs "ramp time" and "hold time", you can adjust the relevant parameters for this routine (see page 18).

RAMP SETTINGS

You can enable or disable using the heating ramp for the currently active tool with the lower on/off switch.
Its relevant parameters are also documented in the features chapter (see page 19).

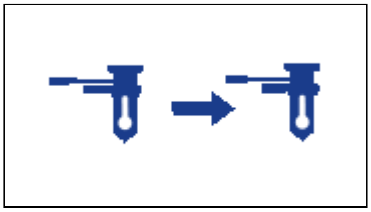
The option "manual ramp" switches between automatic and manual ramp behaviors.

If disabled (= "automatic behavior"), the settings "leading zone" and "lowering temp" get available. Setting "0" as the leading zone causes "auto. search" to be displayed. The controller will then detect and select the slowest connected zone with each heating-up.

If manual ramp is enabled (= "manual behavior"), instead the setting "manual increase speed" will be set active.

In either case, the "difference temp." can be set. This is the threshold difference between current and target temperature, above which the temperature ramp will be utilized.

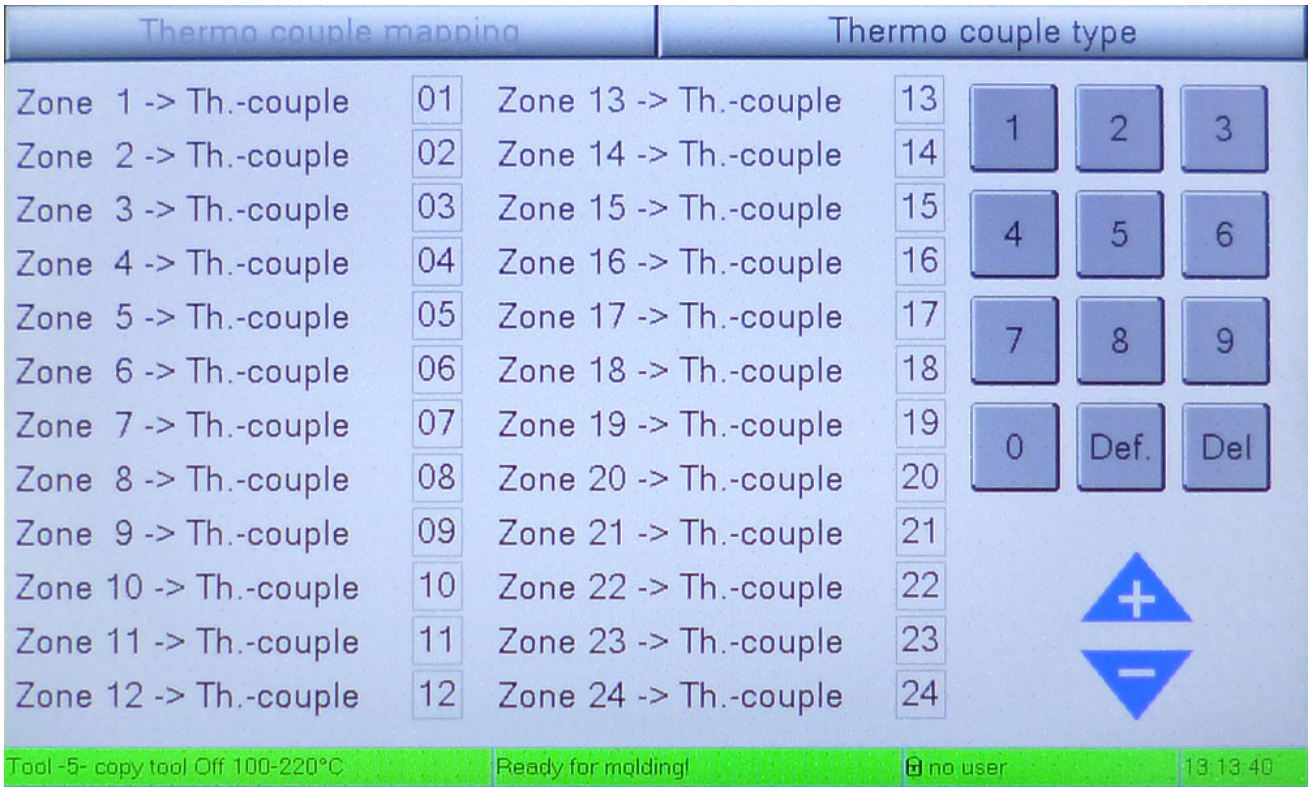
7.6.2 Thermo Couple



This submenu enables manual linking between load circuits and thermocouples. Also, thermocouple types can be selected using the second menu tab.

Incorrect settings may lead to permanent damage to the tool!

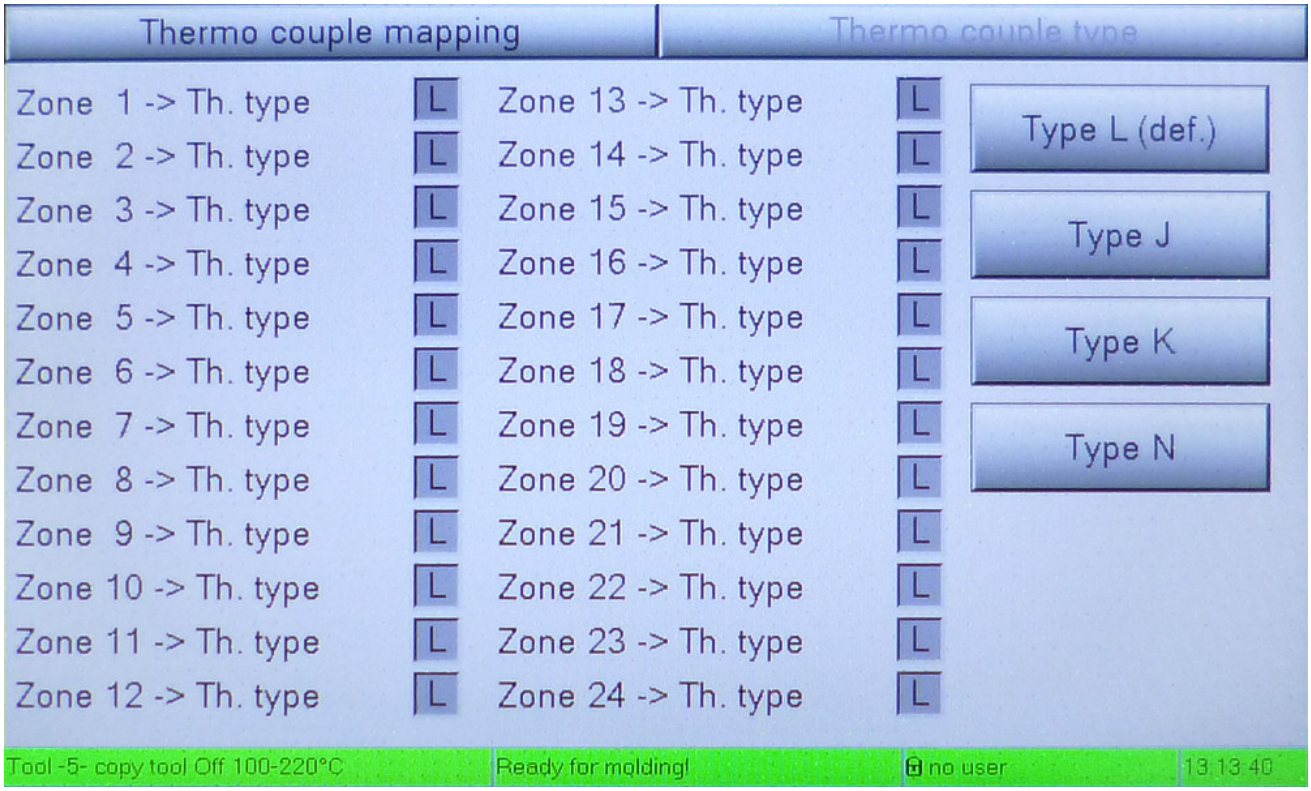
THERMO COUPLE MAPPING



19 Fig.: Settings menu "Thermo couple mapping"

In this menu you can arbitrarily map the load circuits to thermocouples. It is supported to map different heating zones to the same thermocouple. The thermocouple configured here is used to measure the current temperature of the herein configured corresponding zone.

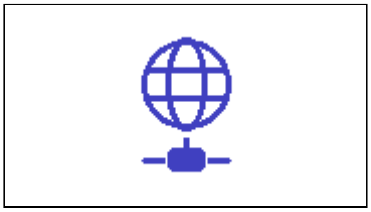
THERMO COUPLE TYPE



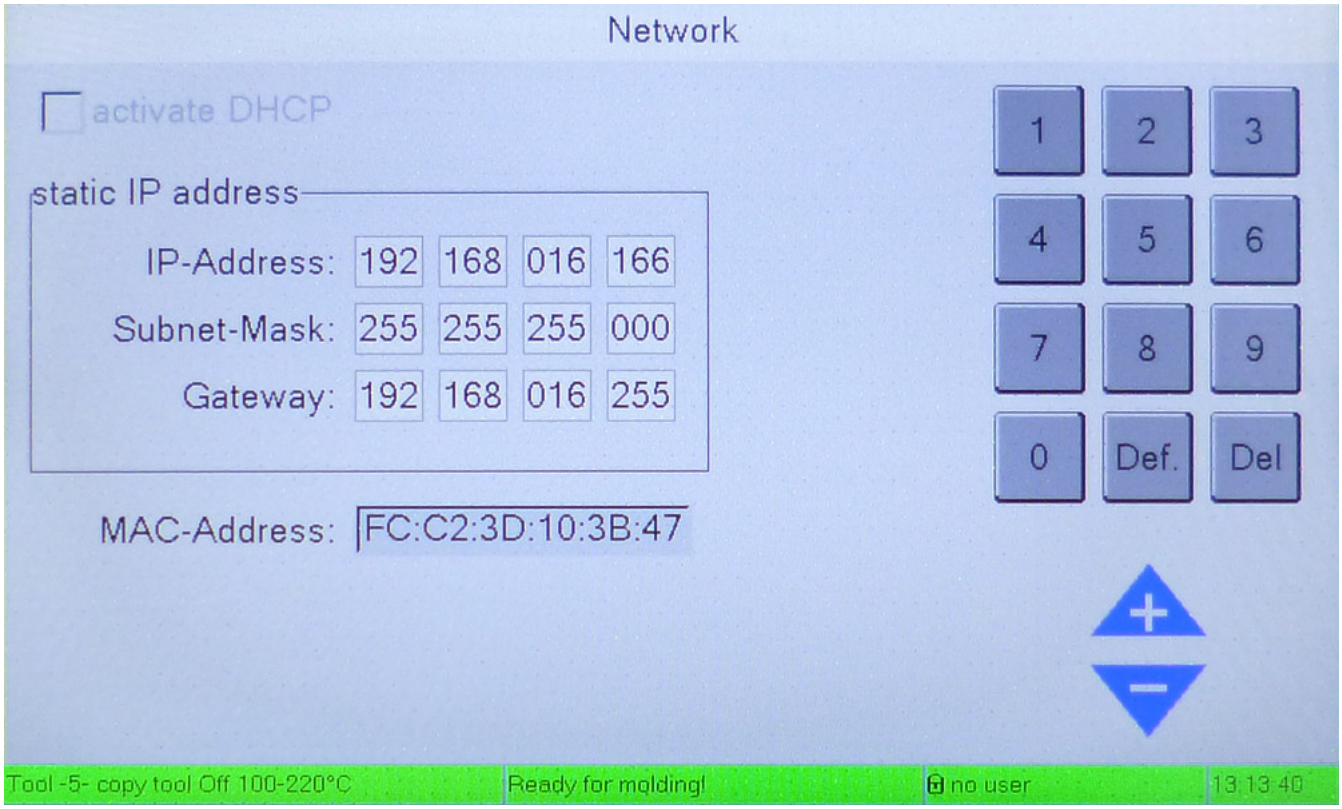
20 Fig.: Settings menu "Thermo couple type"

In this menu tab you can assign one type to any installed thermocouple. Hardware by the Günther Company usually includes thermocouples of type L – other manufacturers however might integrate L, J, K or N type sensors, which can be accounted for using this menu.

7.6.3 Network



In this settings menu reside the options regarding the network connection of the DPT.



21 Fig.: Settings menu "Network"

Currently, the DPT supports access via Modbus/TCP, an industry standard interface using TCP with port 502.

The DPT's Modbus/TCP server is explicitly engineered for compatibility with the ComoNeo device class by Kistler.
According to its accompanying manual, your ComoNeo needs to be configured to connect to your DPT. Usually, this requires for a machine running a web browser (PC, Tablet or similar) to be connected to the same network.

The actual pairing will be carried out fully automated as soon as both devices are configured correctly. If successful, a flashing blue dot will appear in the DPT's status bar.

For network connectivity, the DPT provides an RJ45 Ethernet-connector on its rear. Make sure this is properly connected to your local network.
Furthermore, you need to adjust this submenu's settings to suit your local network.

IP-ADDRESS

The option "activate DHCP" is currently unimplemented.
If the option is enabled, the DPT will automatically configure itself to suit the local network using a DHCP server.

Otherwise, the settings below "static IP address" are in effect:

SETTING	DEFAULT	EFFECT
IP-Address	192.168.16.165	Address used to reach the DPT in the local network
Subnet-Mask	255.255.255.0	Local network section which the DPT is allowed to use
Gateway	192.168.16.1	Address of device providing routes to outside network sections

10 Tab.: Settings in the section "static IP address"

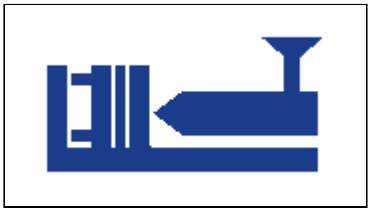
This settings triplet may be familiar from any desktop PC – the "Gateway" setting is currently included only to not break convention and may be put to use in future extensions.
For troubleshooting, please consult your local network administrator resp. your IT department first – however, don't hesitate to contact the Günther Company support.

MAC-ADDRESS

The DPT's MAC address is fixed and can't be changed via configuration.

No unique MAC address.
This warning indicates that parts of this application are emulated because you are running an outdated hardware revision. Operation of multiple such device in the same network segment is unsupported.
To permanently solve this issue, contact the Günther Company support for a hardware upgrade.

7.6.4 Molding Machine



There is a serial interface extension COM2, which is used to junction the DPT24 to an injection molding machine. Target temperatures may then be set directly by means of the connected machine, while the current values will be returned to it. As of now, protocols for Arburg-, Engel- and Kistler-devices are supported.

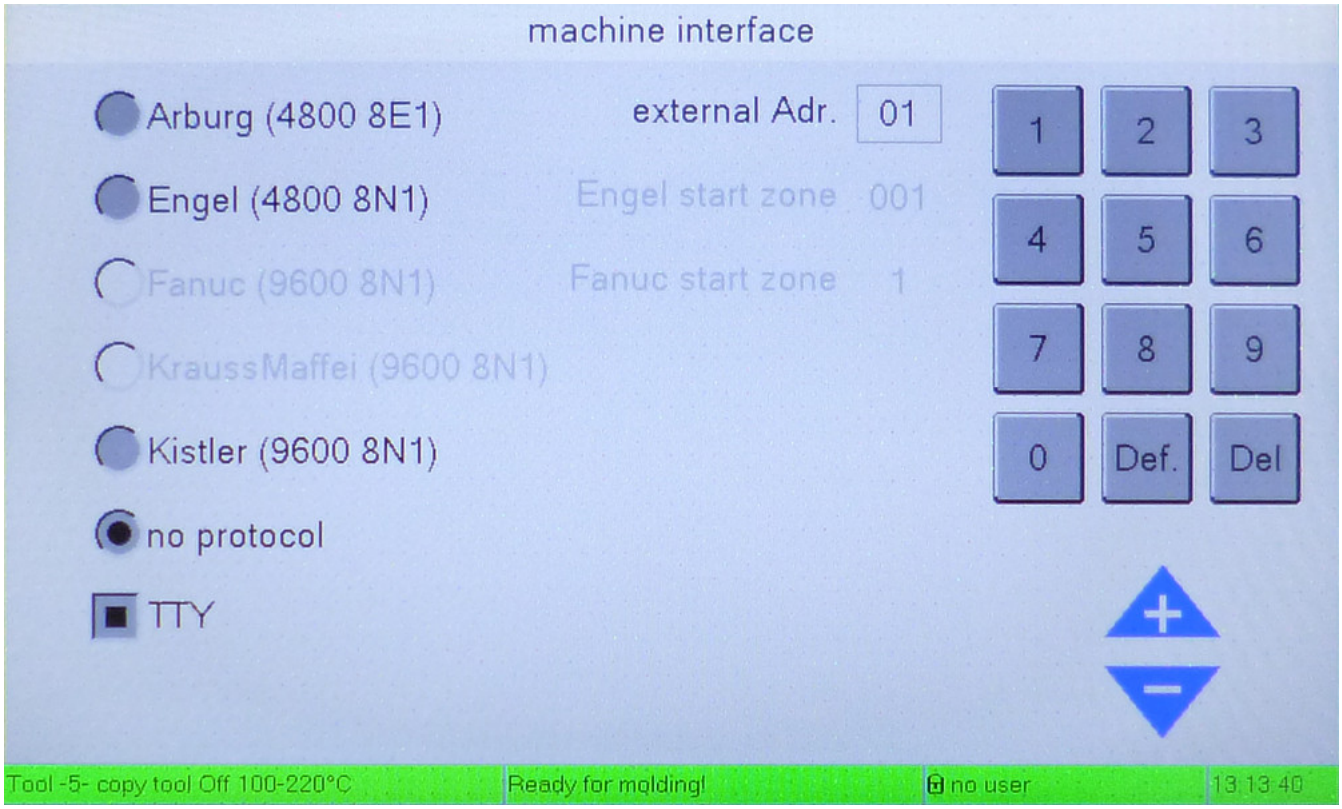
To use any of the molding machine interfaces, a serial interface extension module must be present and installed into the DPT24 device.
Please consider before ordering a DPT and state if the module should be installed. More info available via Günther Company support.

PROTOCOLS

Arburg
When active, the user must specify the device adress ("external Adr.") with which the molding machine can communicate with the DPT24.

Engel
When active, the user must supply a number ("Engel start zone") that the first DPT zone should be mapped to in the molding machine's address space. The last zone in Engel address mapping will automatically be determined by the DPT's type (DPT6, 12, 18, 24).

Kistler
When active, the user must supply the value 3 as "external Adr.", as arranged with the Kistler Company



22 Fig.: Settings menu "Molding Machine"

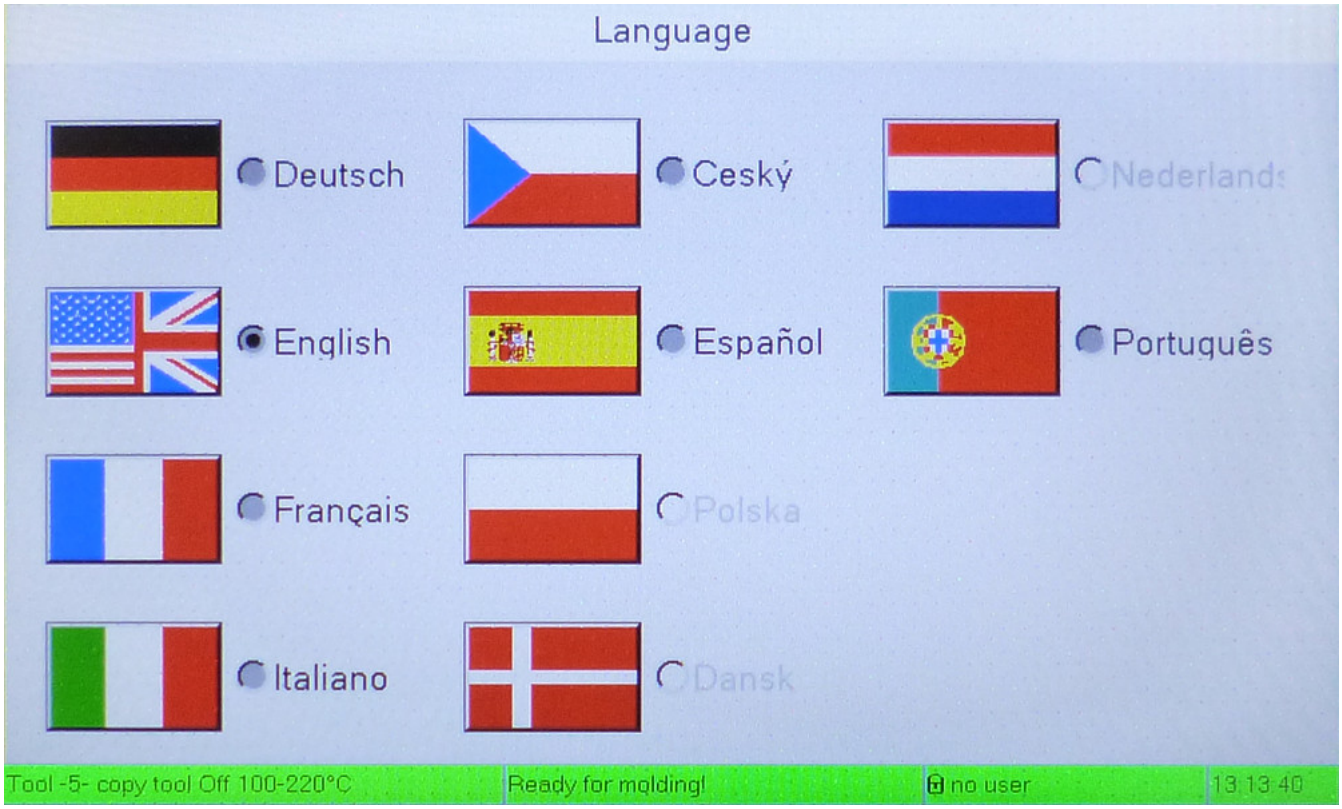
Subsequent interface parameters will be set on DPT24 side for each of the protocols:

TYPE	INTERFACE TYPE	PARAMETERS
Arburg	TTY 20mA	4800 Baud 8E1
Engel	TTY 20mA	4800 Baud 7E1
Krauss-Maffei	V24 / RS232	9600 Baud 7E2
Fanuc MODBUS	RS252	9600 Baud 8N1
DPINTERN, Priamus, Kistler	RS252	9600 Baud 8N1

11 Tab.: Interface parameters

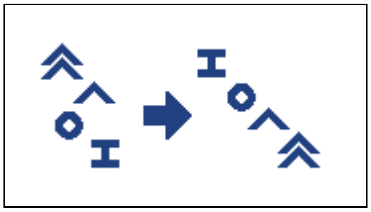
7.6.5 Language

In this menu, you can change the display- and output language of the DPT24.



23 Fig.: Settings menu "Language"

7.6.6 Load Type



In this menu, you can change the load type of each zone.

The DPT is aware of four different load types.

LOAD TYPE	DESCRIPTION
Fast Nozzles	quickly reacting loads, e.g. BlueFlow nozzles
Nozzles	standard loads
Connection Elements	large thermal masses with less than 600W heating power
Manifolds	large thermal masses with more than 600W heating power

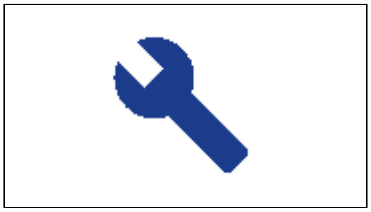
12 Tab.: Load Types

24 Fig.: Settings menu "Load Type"

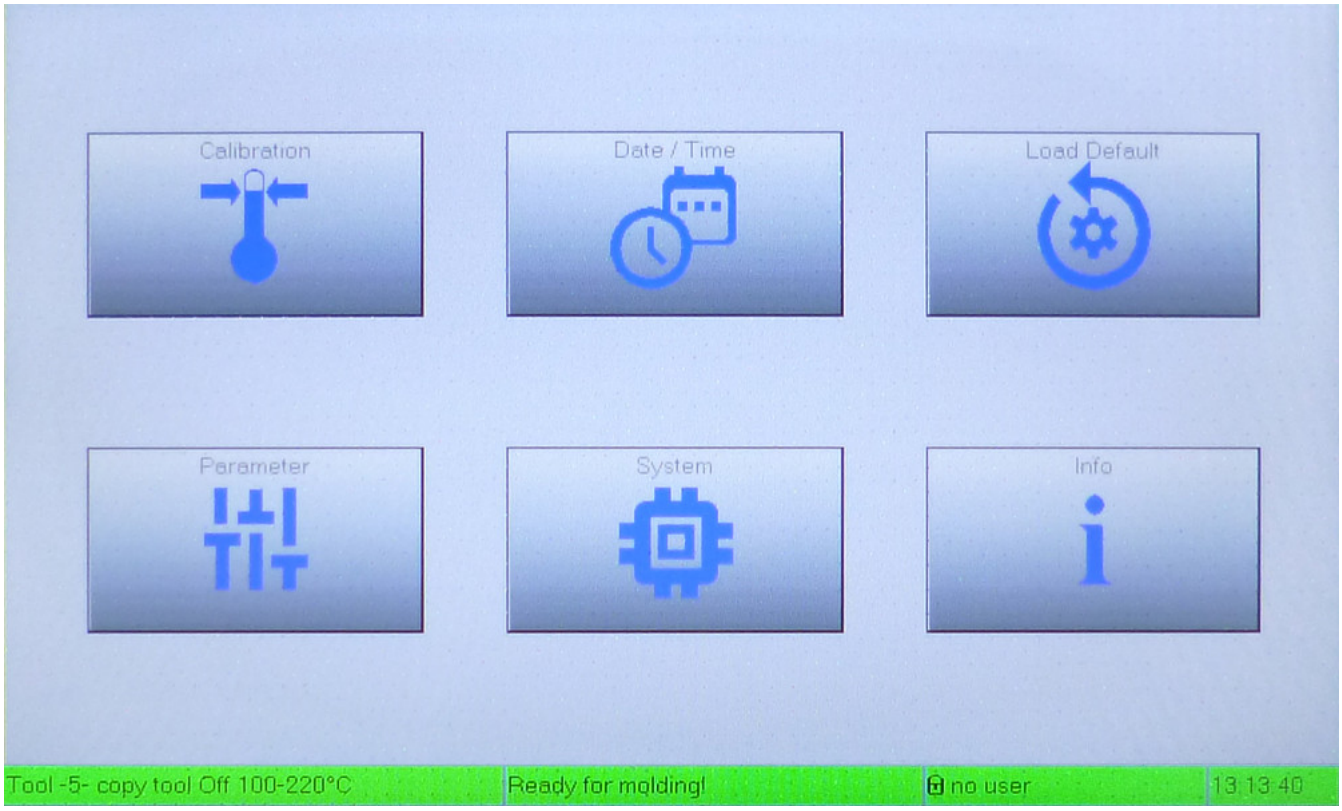
You can select the load type for each zone in this screen. Touch one cell to select it and apply changes using the buttons on the right side. Changes automatically affect the zone's controller parameters.

Controller parameters
If a zone's parameters had been manually changed, that previous user input will be kept. The user will be alerted to review the zone's controller parameters.

7.6.7 Service

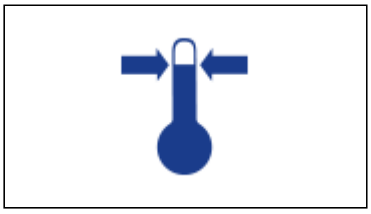


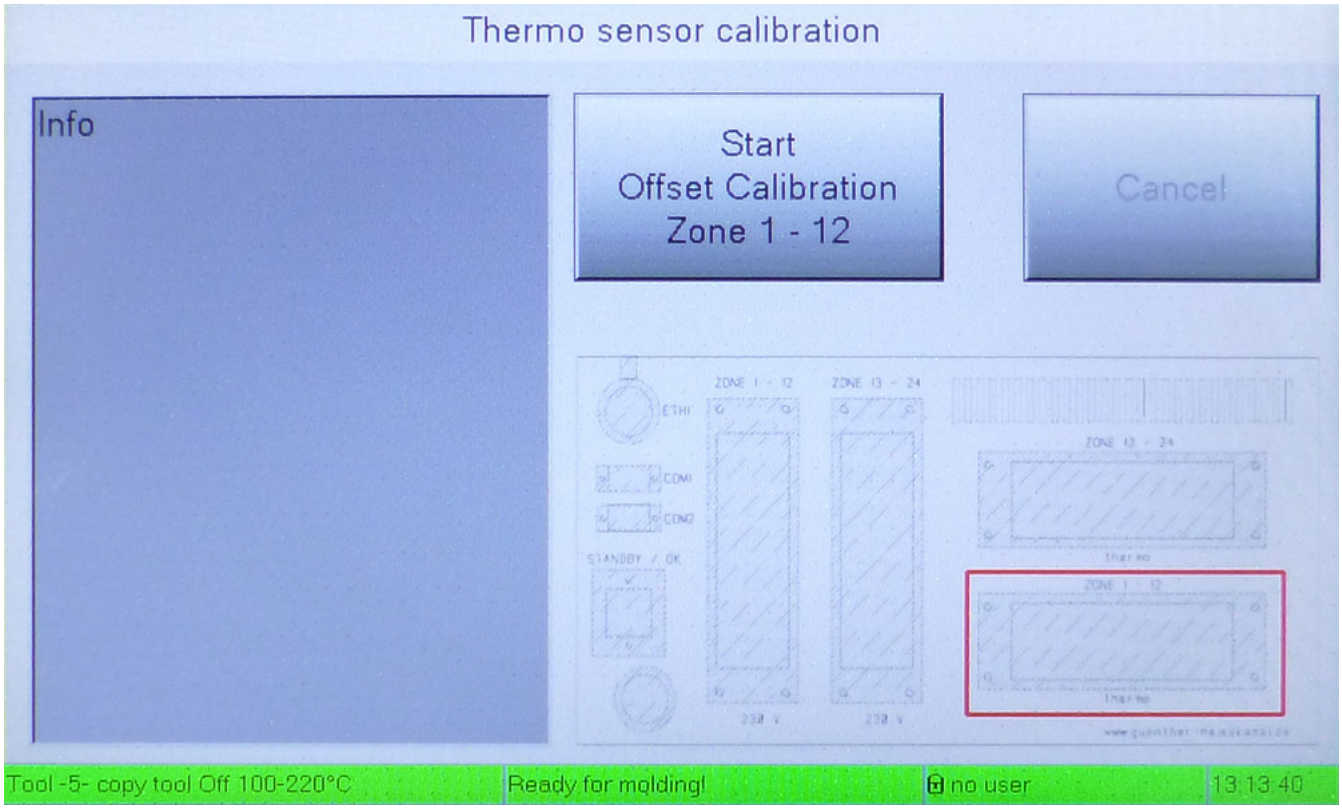
This submenu houses device-specific options in additional submenus.



25 Fig.: Settings menu "Service"

Calibration





26 Fig.: Service menu "Calibration"

Your new DPT24's temperature signal processing curcuits have been calibrated for during manufacturing. However, we recommend refreshing the calibration every 2 years.

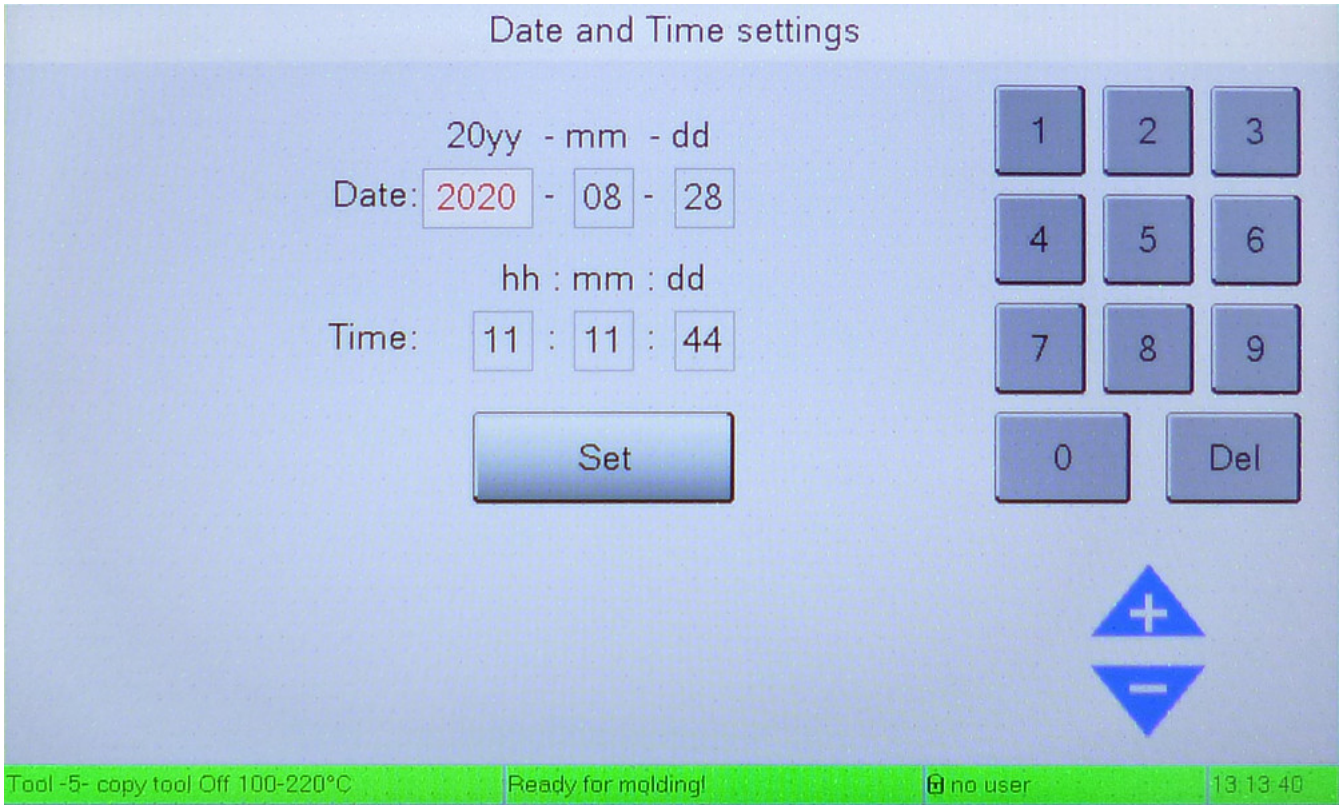
Calibration is performed by setting the temperature probes to two known states: One step must be performed at the "zero point" (= 25°C), the other should be done in "operating state" (= 325°C). Once calibrated successfully, the remaining measurement error can be expected to be less than ± 1°C.

Any certified electrician may perform the calibration. The accessory "DPCALIB 12" is recommended for most reliable calibration. It can be obtained from the Günther Company. Contact Günther Company support to learn about factory calibration service and your ideal solution.

Date / Time

The DPT24 controller has a builtin battery backed real-time clock to date-stamp the system logs both in the Logging and History submenus.
Setting the correct date and time is crucial for using the time-controlled preheating function, or if you plan on graphing exported data over real time.

> **Please note**
> For whichever reason you might have, it is discouraged to set the year to near 2100, as it will wrap around to 2000 in current firmware versions.



27 Fig.: Service menu "Date / Time"

Load Default

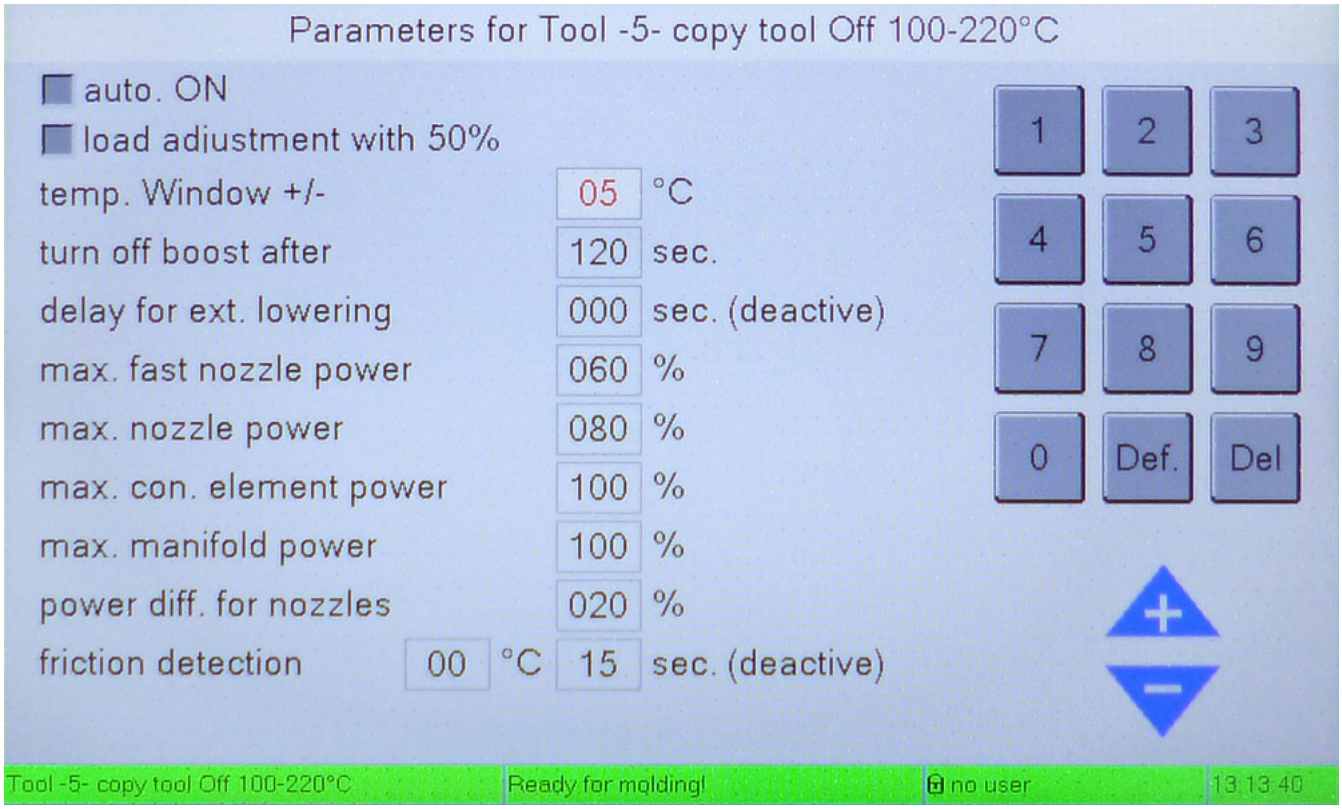
By tapping "Load Default", all system parameters are reset to their default values, and the currently loaded tool setting is replaced with the preset from slot 1.

The PID-controller parameters of the current tool are reset to match the most recently detected load circuits – according to presets for manifolds, nozzles and fast-nozzles.

All system settings will be lost and the current tool is overwritten!

Parameter

In this menu, you can adjust more tool-scoped parameters, applying to all heatingzones.



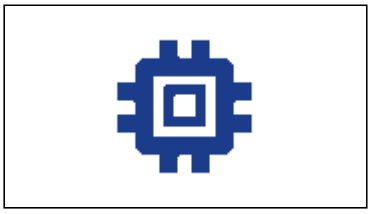
28 Fig.: Service menu "Parameter"

SETTING	DEFAULT	EFFECT
auto. ON	ON	The DPT24 always starts up using the most recently used tool settings. If this box is checked, the DPT will start in the same state as when powered off. The DPT24 will start heating on boot-up if and only if this option is set. If not checked, the DPT will start up in off-state – to start the heating process, you have to manually switch on the tool using the ON/OFF function switch (see page 23).
Temp. Window +/-	5°C	With this setting, you define the temperature window around the target temperature, within which the DPT signals readiness for injection and switches on the OK signal (see page 77). ⓘ This temperature window must account for temperature rise due to friction. Thus, it must be greater than the threshold configured for friction detection!
turn off boost after	120s	Here you configure the length of a global "BOOST" routine. Refer to the previous documentation for the BOOST-routine (see page 18) and the main view's function switches (see page 23). If set to 0s, the global boost is unconfined and continues until manually deactivated by the user.
delay for ext. lowering	0s	You can insert a delay before starting a global temperature reduction using the external LOWERING-input. The reduction will then only start after this delay has passed. For molding machines, this function is also known as downtime detection. With a delay, the machine can spin down for a shorter timespan without the hot-runner cooling down. If however a downtime lasts for longer, the hot-runner temperature is then automatically lowered to preserve injection material.
max. fast nozzle power	60%	Here you can configure the maximum power output for fast "BlueFlow" nozzle heaters. This ensures gentle heating for BlueFlow-enabled injection nozzles.
max. nozzle power	80%	Here you can configure the maximum power output for regular nozzle heaters.
max. con. element power	100%	Here you can configure the maximum power output for connection element heaters.

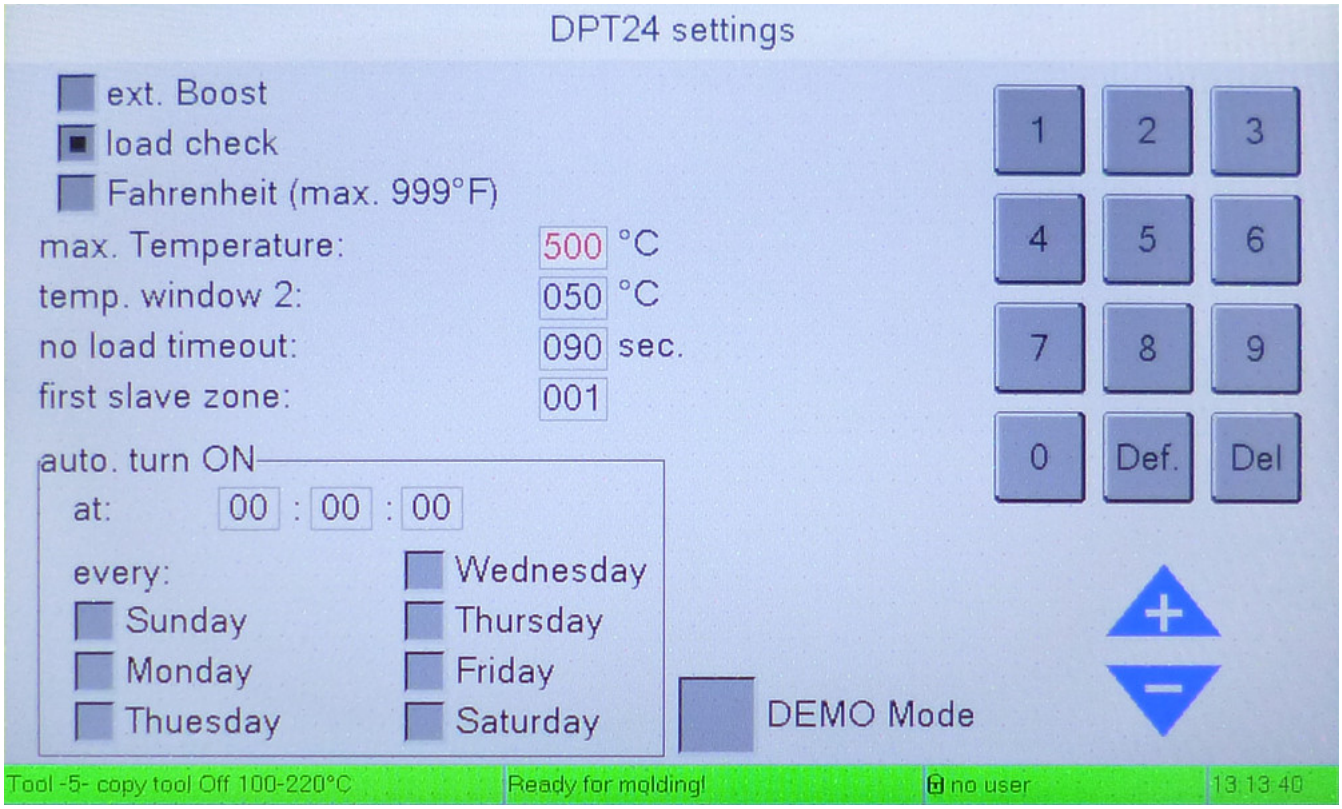
SETTING	DEFAULT	EFFECT
max. manifold power	100%	Here you can configure the maximum power output for manifold heaters. The power limits for different heating zone types also set an upper bound for the device power consumption
power diff. for nozzles	20%	This is to set a maximum deviation for power consumption deviation before triggering the leakage detection. Also confer the leakage detection (see page 20) documentation. If the current power consumption differs from the average by more than the configured percentage, a leakage error message is emitted for that channel. If set to 0%, the automatic leakage detection is disabled for the entire tool.
friction detection	0°C 15s	With these parameters you control the friction detection of the DPT24. Also confer the friction detection (see page 20) documentation. A temperature rise by at least this value is assumed to be due to friction. If no temperature peak is measured in a heating zone with enabled friction detection, the DPT will switch off the OK signal (see page 77). If the temperature is set to 0°C, friction detection is disabled for the entire tool.

13 Tab.: Settings in the tool parameters menu

System



In this submenu you can adjust tool-independent, system- and hardware-specific settings.



29 Fig.: Service menu "System"

SETTING	DEFAULT	EFFECT
ext. Boost	OFF	With this option you can change the role of the rear "STANDBY" input. By default, closing the STANDBY circuit triggers a global temperature lowering. If this option is enabled, a global boost is triggered instead. Then, it is affected by the length of a BOOST-routine as per the "parameters" menu (see page 67).
load check	ON	With this option, you en-/disable probing for wrongly connected thermocouples in the load circuits. Detecting wiring errors may protect thermocouples from destruction by overload. Faulty heating zones are prohibited from switching on to protect wrongly connected accessories. If you are trying to drive loads with huge power consumption (e.g. manifolds with 3.500W), these might be probed as wiring errors. In that case, disable this function.
Fahrenheit (max. 999°F)	OFF	This option switches the DPT24 into Fahrenheit mode. All temperatures are then displayed in °F instead of °C. **Caution** This option directly affects the available value domain! In default mode you can input values of 0..700°C. In Fahrenheit mode you can input values of 0..999°F, this is -18..537°C.
max. Temperature	500°C	This is the upper limit for all target temperatures inside the DPT.
temp. window 2	50°C	This temperature describes the failsafe temperature window, outside of which the DPT will emit an error "Control deviation".
no load timeout	90s	Load interruptions are usually caused by worn-out load circuit fuses. Detection is done if the measured temperature does not rise despite full output power. Here you can adjust the maximum probe time for this monitoring.
first slave zone	1	This setting only applies to devices in Master-Slave operation (see page 74). You can hereby set the displayed index of the first heating zone of this device to create a fully consecutively numbered system.

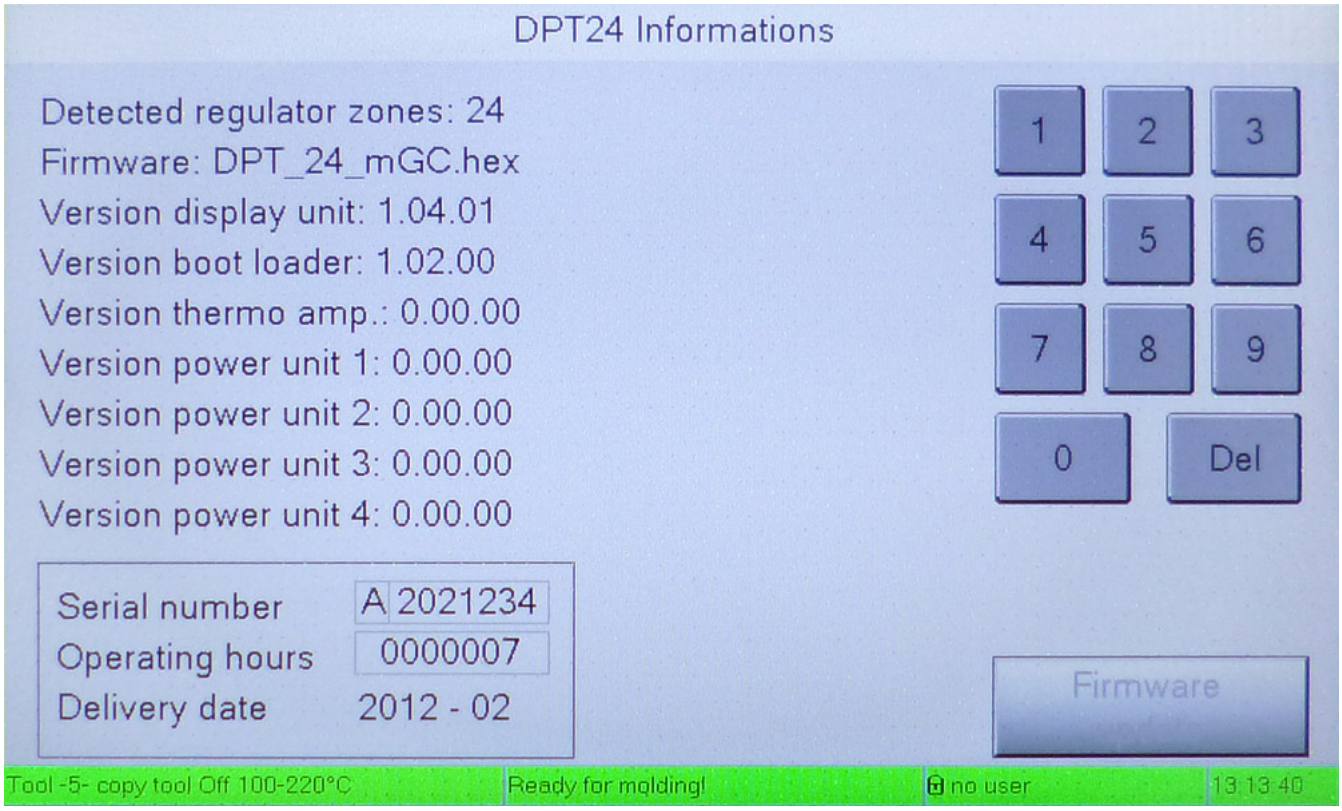
SETTING	DEFAULT	EFFECT
auto. turn ON	OFF	This is the time-controlled preheating function. You can use it to automatically start the heating process without human interaction – if used optimally, you can start working right away. Set the desired time and days of the week to start heating before production starts. Relies on the internal Date / Time to be set correctly! Automatic preheat will not work if the mains switch is off!
DEMO Mode (no Load)	OFF	For a dry-run/demonstration mode, set this option. If so, the relay switches to isolate phases L1-L3 from the output stages.

14 Tab.: System settings

Info

The screen behind "Info" contains information about your hardware and firmware setup most relevant when requesting Günther Company technical support.

Specific firmware versions of the installed modules, your device serial number and/or the date of its first delivery will help provide you with the best service information.



30 Fig.: Service menu "Info"

8 DPT remote interfaces

8.1 Master/Slave operation

The DPT24 supports Master/Slave operation. One Master device can control up to 4 Slave devices. Combining multiple DPT24 devices of different configuration levels is supported without restriction. In Master/Slave operation, the DPT controller can therefore control up to 120 zones – so very large tools can be heated.

A special cable is required for Master/Slave operation, which can be obtained from the Günther Company. There are cables to join up to 3 devices (M/S-cable-3) or up to 5 devices (M/S-cable-5).

For installation, the devices are joined together via the COM1 interface using a Master/Slave cable. The connector labeled "Master" is plugged into the DPT that should control the other devices. Subordinated DPT devices should receive connectors labeled "Slave". Unused Slave connectors on the cable may remain free.
Master/Slave operation is automatically detected by the individual DPT units – the cable's design lets devices detect automatically if they are supposed to work as Master or Slave.

Use of the heating ramp (see page 19) in master/slave mode is slightly different, as the DPT24 does not support the automatic detection of the slowest zone as the leading zone for heating circuits connected to slave devices.
In order for the entire tool to be heated using the slowest zone, that zone must be connected to the master device.
During the heating process, the slave devices indicate operating mode in the status bar as "M/S Softstart".

Target temperatures can be set individually for each zone on its responsible controller. If the group "ALL ZONES" is selected on the Master DPT (in the zone settings screen (see page 31)), target temperatures are passed through to all Slave devices.

The function buttons in main view are only enabled on the Master device and switching the whole Master/Slave system on/off or trigger a global temperature boost/lowering also for the Slaves.

To enhance overview over the system, the first zone number displayed on each Slave device can be altered in the "System" service menu (see page 70). This increases the first zone number on the Slave device to the number set here.
If, for example, a DPT24 is operated as a Slave to a DPT6 Master, it is advisable to set this start number to 7 such that the slave displays the heating zones with numbers 7-30.

8.2 Control by molding machine

With the optional serial interface COM2 installed, the DPT24 is equipped for operation as Slave to an injection molding machine. The interface enables both the operation and status display of the DPT24 directly through the injection molding machine. Thus, the interface facilitates quality control via external production data acquisition.

Depending on the injection molding machine, an RS232, RS485 or TTY interface can be retrofitted. Consult the manual of your injection molding machine manual to learn which interface you need; our protocol table in the description of the settings menu "molding machine" (see page 58) may also have a hint.
As communication protocols are inconsistent among molding machine manufacturers, please call the Günther Company for support whether the interface protocol for your injection molding machine can be made available.

Please have the manufacturer and exact type designation of your injection molding machine ready!

Since the DPT24 in interface operation is supplied by the injection molding machine with all necessary data, manual operation of the control unit is limited. Although parameters and tool settings can be entered, they may be overwritten by the (Master) molding machine. This applies to, but is not limited to target temperatures, activation status of zones, and temperature boosting and lowering.

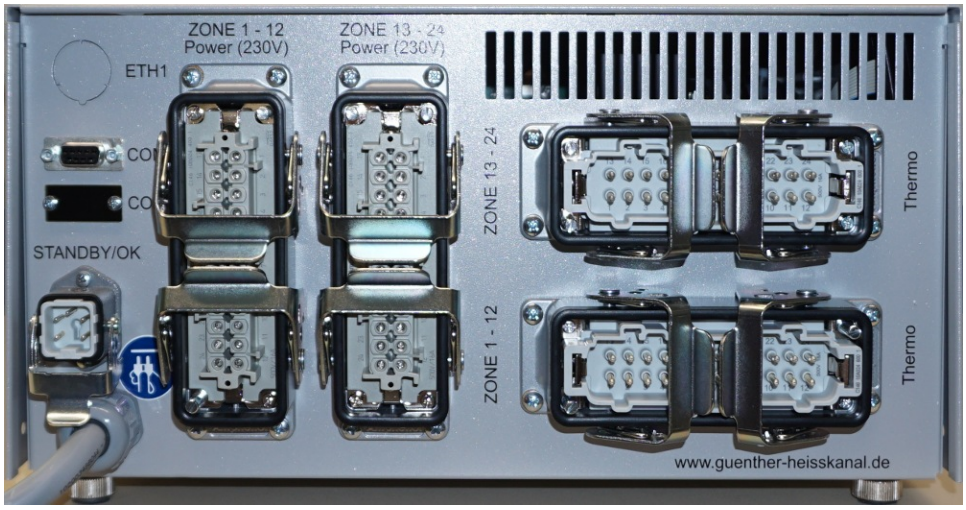
8.2.1 Connection setup for molding machine

Proceed as follows:

1. Choose the correct interface protocol options in settings menu "molding machine" (see page 58)
2. Join the DPT to the injection molding machine using the interface cable, secure plugs on both sides using their screws

9 Appendix

9.1 Appendix A – Pin Assignment



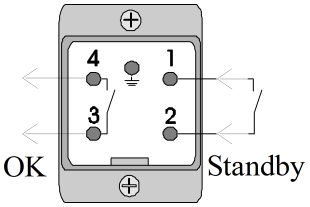
31 Fig.: Rear view of DPT24

9.1.1 Signal connectors

Standby/OK

STANDBY	Input external boost/lowering
OK	Output "ready for injection"

15 Tab.: Pin-out "Standby/OK" Connector



32 Fig.: Pin-out "Standby/OK" Connector

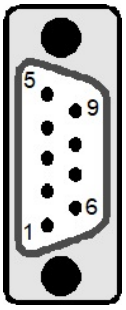
Ethernet interface

If requested, we will integrate the ethernet interface ETH1, which adds network support to the DPT24. Using Modbus/TCP and (upcoming) OPC UA, you can then leverage industry standard protocols.

Serial interfaces

COM1	Master/Slave interface (see page 74)
COM2 (OPTIONAL)	Molding machine interface (see page 74)

16 Tab.: Assignment COM interfaces

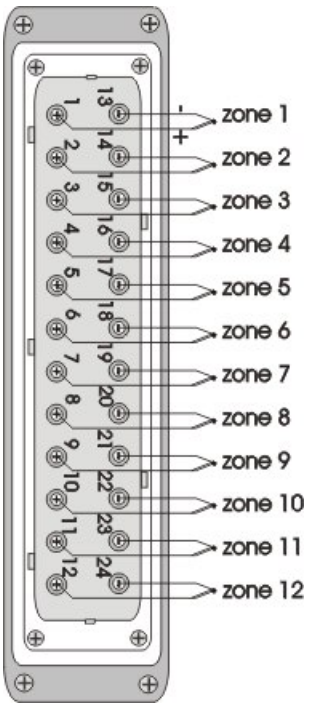


33 Fig.: D-SUB 9 receptacles COM1, COM2

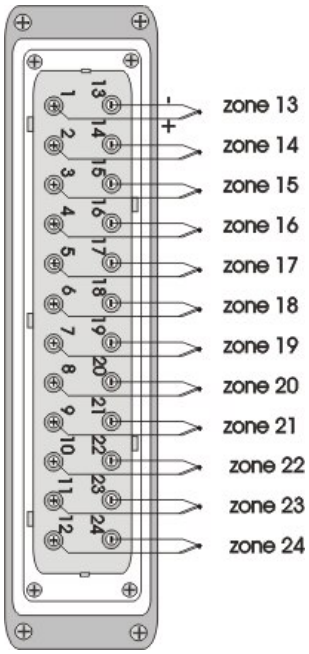
9.1.2 Measuring connectors (horizontal, for thermocouples)

ZONE		⊕ ANODE IRON, RED	⊖ CATHODE CONSTANTAN, BLUE
1	13	1	13
2	14	2	14
3	15	3	15
4	16	4	16
5	17	5	17
6	18	6	18
7	19	7	19
8	20	8	20
9	21	9	21
10	22	10	22
11	23	11	23
12	24	12	24

17 Tab.: Pin-out Thermocouple connector



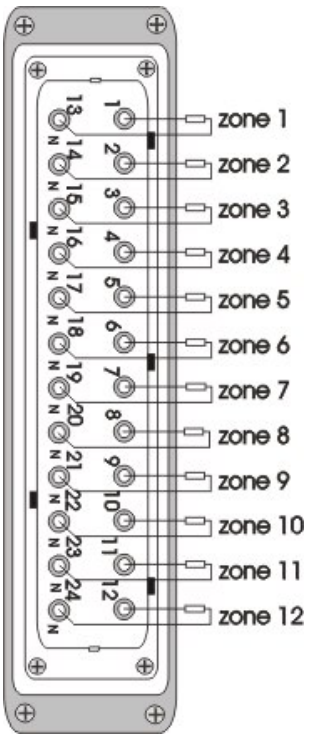
34 Fig.: Pin-out 24-pole HAN-E plugs



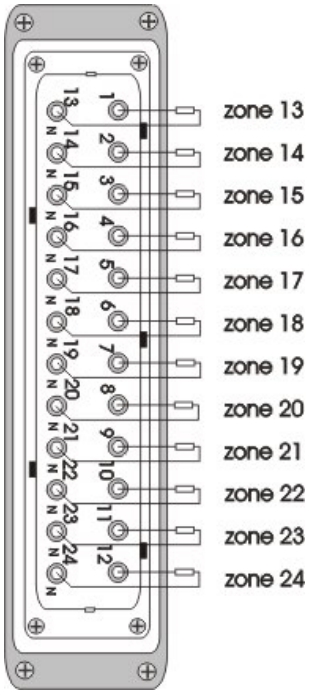
9.1.3 Load Connectors (vertical, for heating circuits)

ZONE		PHASE	NEUTRAL
1	13	1	13
2	14	2	14
3	15	3	15
4	16	4	16
5	17	5	17
6	18	6	18
7	19	7	19
8	20	8	20
9	21	9	21
10	22	10	22
11	23	11	23
12	24	12	24

18 Tab.: Pin-out for load circuits



35 Fig.: Pin-out 24-pole HAN-ES sockets



9.2 Appendix B – Fuses

The triac outputs for the up to 24 heating circuits are fused separately by means of superfast-acting microfuses placed on the side
walls of the DPT24.

36 Fig.: Side view of a DPT with fuse holders

This figure of the DPT24 side view shows the fuse labels corresponding to the respective heating zone number.

Please only replace broken fuses with type "Schurter 16A FF (superfast)". You should have received a set of genuine spare fuses with your DPT24.

In addition to the heating circuit fuses, the control circuit is also fused inside the device. This fuse is located on the DIN rail and is of type 5x20mm, slow-blowing, 2A.

9.3 Appendix C – Technical Data

INPUT VOLTAGE	200-250VAC per phase, 50 to 60Hz, typ. star mains configuration "Star" mains: 3-phase mains, neutral conductor, 200-250VAC L to N "Delta" mains: 3-phase mains, no neutral conductor, 200-250VAC between L
WATTAGE	Up to 16A per channel (via fast-acting fuses "FF 16A") Up to 32A per phase Phase L1: Channels 1 - 6, 19 - 24 Phase L2: Channels 7 - 12 Phase L3: Channels 13 - 18
MAXIMUM POWER CONSUMPTION	Maximum total load (CE) of the devices: • DPT6: 7.3KW (1x32A) • DPT12: 14.5KW (2x32A) • DPT18,24: 22KW (3x32A)
LOAD TYPE	Solely suitable for resistive load
THERMOCOUPLES	Thermocouples type L (Fe-CuNi) (electronically compensated) Thermocouples type J (Fe-CuNi) (electronically compensated) Thermocouples type K (NiCr-Ni) (electronically compensated) Thermocouples type N (NiCrSi-NiSi) (electronically compensated)
OK SIGNAL OUTPUT	Floating closing contact output (max. 230V/1A, unfused)
LOWERING SIGNAL INPUT	Connect a floating closing contact
MAINS CONNECTOR	32A CEE Plug (prepared for "star" mains)
HOT RUNNNER CONNECTORS	Load connector: 2 x 24 pol. HAN-E female plug Measure connector: 2 x 24 pol. HAN-E male plug
FUSES	Load connector fuses: FF 16A, 6.3 x 32mm, type "Schurter SA", Control circuit fuses: T 2A, 5 x 20 mm.
SERIAL INTERFACE	RS232, TTY, (RS422, RS485) Protocols available for Arburg, Mannesmann, Krauss- Maffei and Engel. Others in preparation (e.g. SPI, EURO-MAP17, CAN BUS – please inquire).
OUTPUT	Continuous, via pulse group control

CONTROL DOMAIN	Adjustible 0 - 700°C / 0 - 999°F
TEMPERATURE LOWERING	Adjustible 0 - 200°C / 0 - 360°F
TEMPERATURE BOOST	Adjustible 0 - 100°C / 0 - 180°F
SAFETY SHUTDOWN	Adjustible 0 - 700°C / 0 - 999°F
PERSISTENT DATA MEMORY	Protected against power failure, data retention > 10 years
STORAGE CONDITIONS	Temp. 0–70°C, humidity 30–80%rh non-condensing
OPERATING CONDITIONS	Temp. 0–40°C, humidity 40–70%rh non-condensing
PROTECTION CLASS	IP 20
DIMENSIONS (W X H X D)	362mm x 180mm x 330mm
WEIGHT	approx. 16,0 kg
ENCLOSURE COLOR	Aluminum / Ultramarine / Gray (RAL 9006 / RAL 5002)

19 Tab.: Technical Datasheet DPT

9.4 Appendix D – List of numeric codes in submenu "History"

9.4.1 List of Errors

CODE	ERROR NAME	ERROR DESCRIPTION	POSSIBLE TROUBLESHOOT
#100	ERROR_GLOBAL	General error	
#101	ERROR_LD_NOLOAD	Heating circuit: Zone X not found (X: Any Zone number)	Check wiring of besaid Zone electrically, check heating element. Check appendix for pin-out diagrams.
#102	ERROR_LD_SHORT	Heating circuit: Zone X short detected (Short: Resistance below 18 Ohm)	
#103	ERROR_LD_BREAK	Heating circuit: Zone X break detected	
#104	ERROR_LD_LEAK	Suspected leakage at nozzle of Zone X	Check nozzle of besaid Zone optically.
#105	ERROR_TH_BREAK	Thermocouple: Zone X break detected	Check wiring of besaid thermocouple electrically.
#106	ERROR_TH_SHORT	Thermocouple: Zone X short detected	
#107	ERROR_TH_EXCH	Thermocouple: Zone X swap with other zone detected	Check wiring of besaid thermocouple optically.
#108	ERROR_TH_REVERSED	Thermocouple: Zone X wiring error detected	
#109	ERROR_REG_DEV	Controller: Abnormal deviation at Zone X	Check thermocouple and heater of besaid Zone optically. If error persists, check electrically.
#110	ERROR_REG_POWERLIMIT	Controller: Limiting power at Zone X	Check heater element of besaid Zone. Check settings for load limitation.

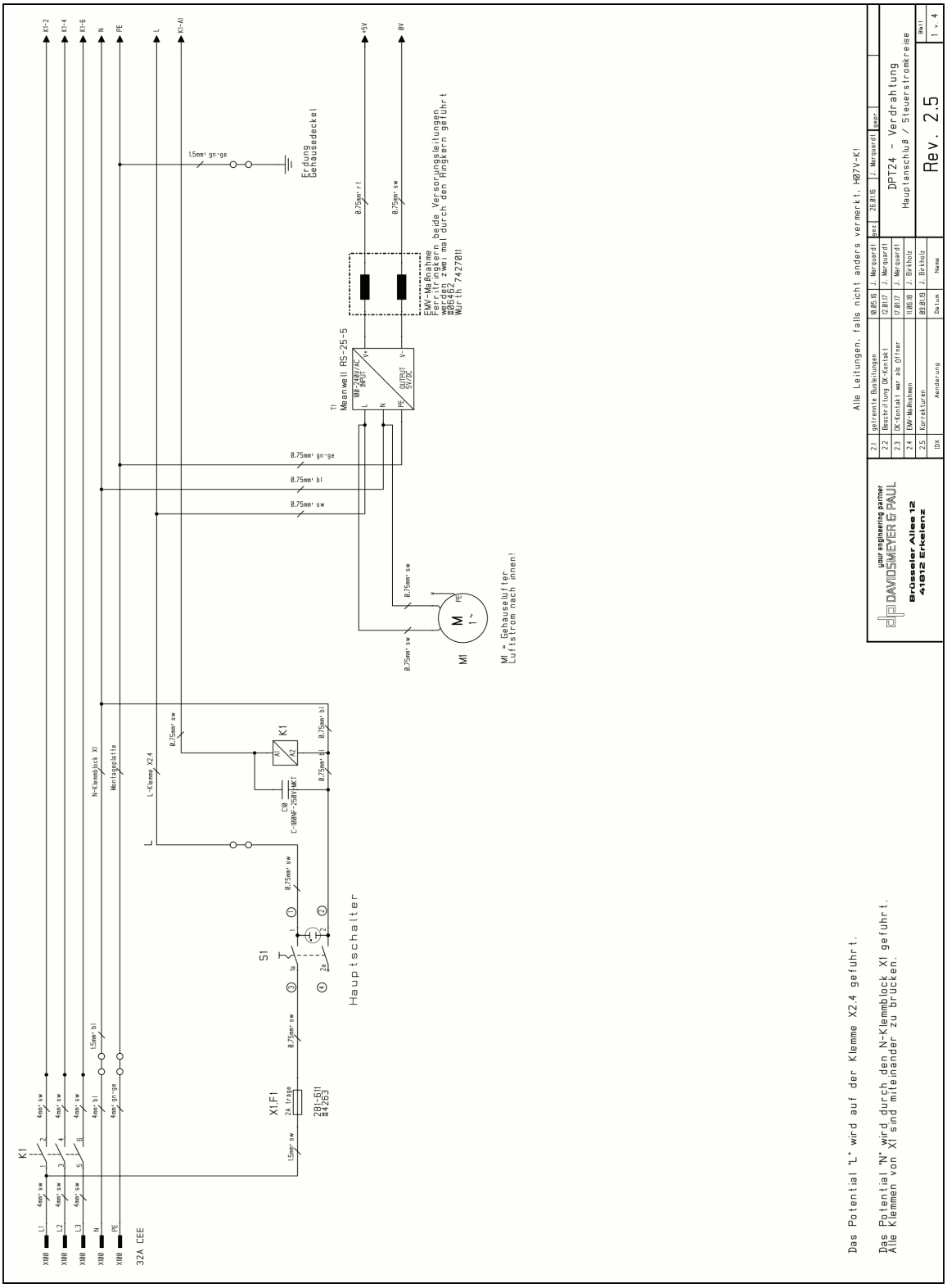
#111	ERROR_PHASE_L1	Mains: Phase 1 not found	Check your mains and the DPT-mains connection and cable. Certified electrician only!
#112	ERROR_PHASE_L2	Mains: Phase 2 not found	
#113	ERROR_PHASE_L3	Mains: Phase 3 not found	
#114	ERROR_TH_CON_1	Measurement connector 1 not found	Check rear connections and connectors on your tool optically.
#115	ERROR_TH_CON_2	Measurement connector 2 not found	
#116	ERROR_LD_CON_1	Load connector 1 not found	
#117	ERROR_LD_CON_2	Load connector 2 not found	
#118	ERROR_UART_INT	Internal communication fault: Serial interface to thermo board (LR56) or output board (LR52) broken	Check the DPT interior (Ribbon interconnector cables) If error persists, contact Günther Company support.
#119	ERROR_UART_EXT	External communication fault: Serial interface to molding machine broken	Check interior and exterior connections at interface COM2 optically.
#120	ERROR_USB	USB communication fault	Check connected USB device optically. The DPT24 supports connecting sticks of up to 32GB via USB 2.0
#121	ERROR_I2C	I²C communication fault: Internal interface to TFT/Touch Controller broken	Check the DPT interior (flat flex cable on front). If error persists, contact Günther Company support.

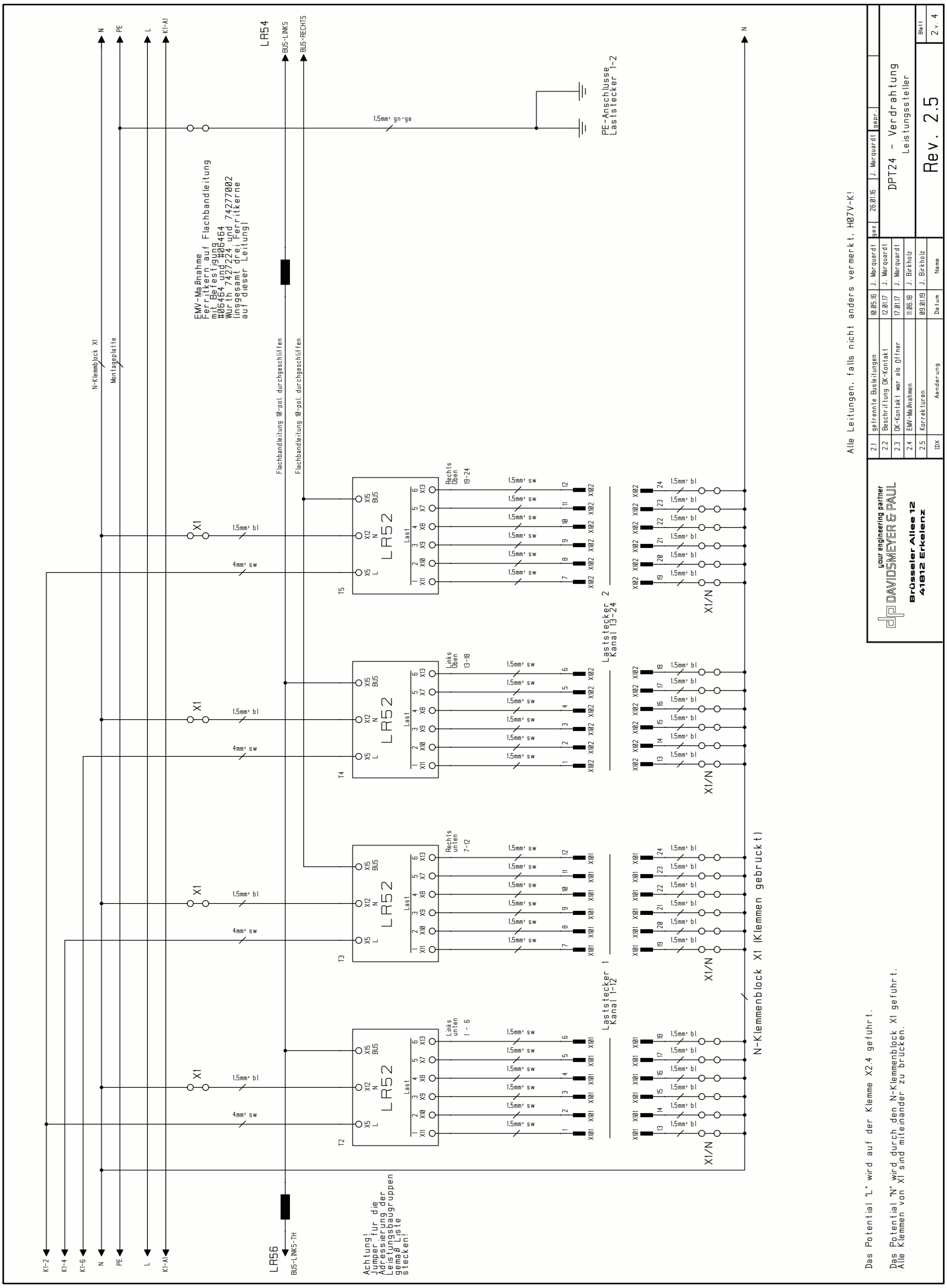
#122	ERROR_ETH	Ethernet (LAN) communication fault	Contact Günther Company support.
#123	ERROR_MEM	Memory communication fault	
#124	ERROR_WDT	Watchdog Reset detected	
#125	ERROR_UART_MS	MasterSlave communication fault	Check interior and exterior connections at interface COM1 optically.
#126	ERROR_TOOL_CHANGE	New tool detected (Heating loads have changed)	None. The automatic load adjustment will solve this.
#127	ERROR_FRICTION	Friction detection fault	Check load data, find besaid Zone. Check injection molding channel If false positive, you may want to disable friction detection for that Zone.
#214	ERROR_REG_FRICTIONDET	Friction detection fault	Check injection molding channel

9.4.2 List of Warnings

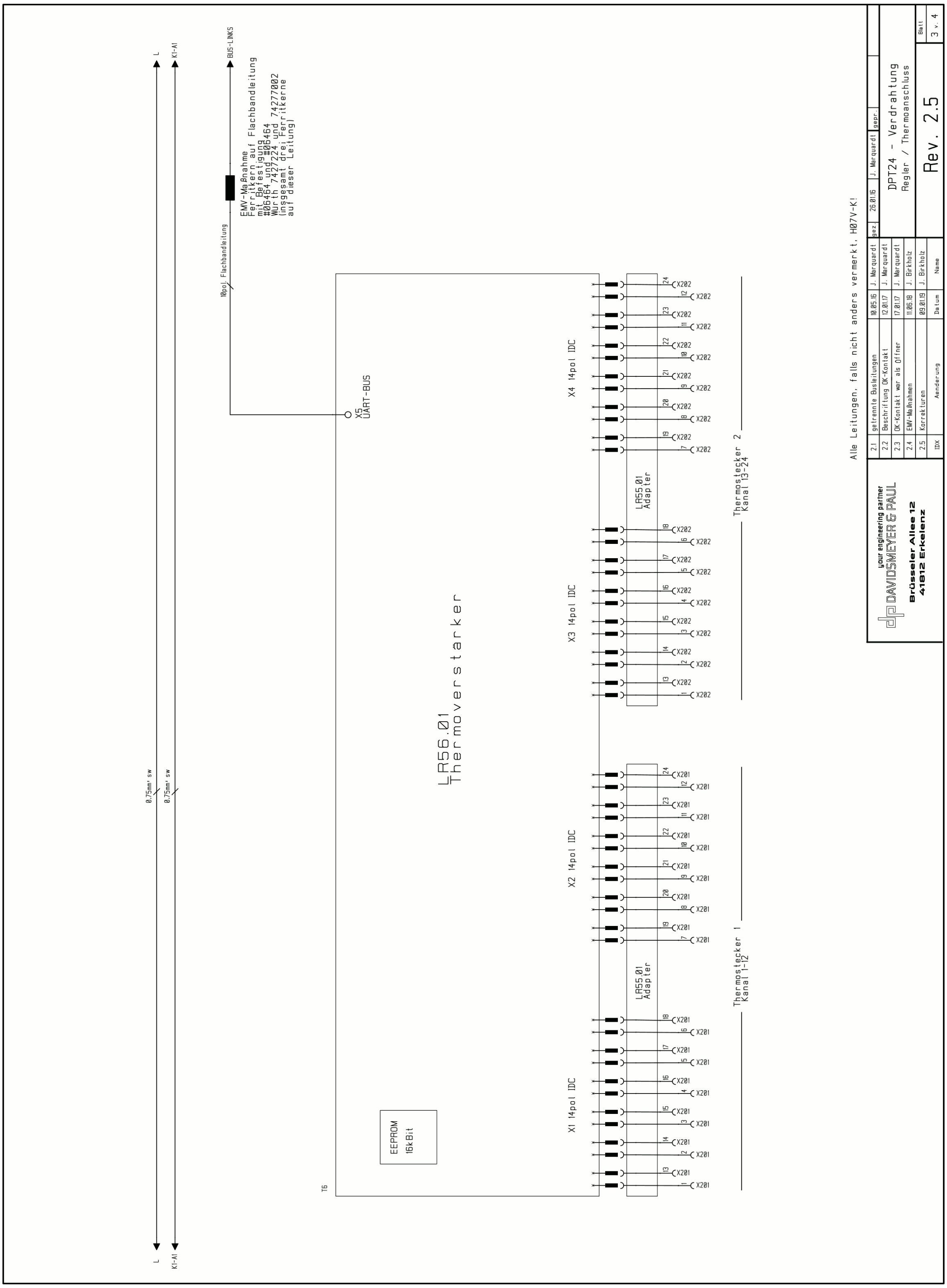
CODE	WARNING NAME	WARNING DESCRIPTION	POSSIBLE TROUBLESHOOT
#228	WARNING_OVER_TEMP	Warning: Zone temperature too high	Check controller parameters (lower the P-value if necessary)
#229	WARNING_RTC	Real-Time-Clock Error	Battery (CR2032) empty, try replacing.
#230	WARNING_SQI_READPARA	Error reading Flash, loaded defaults	Restart the device. If error persists, contact Günther Company support.

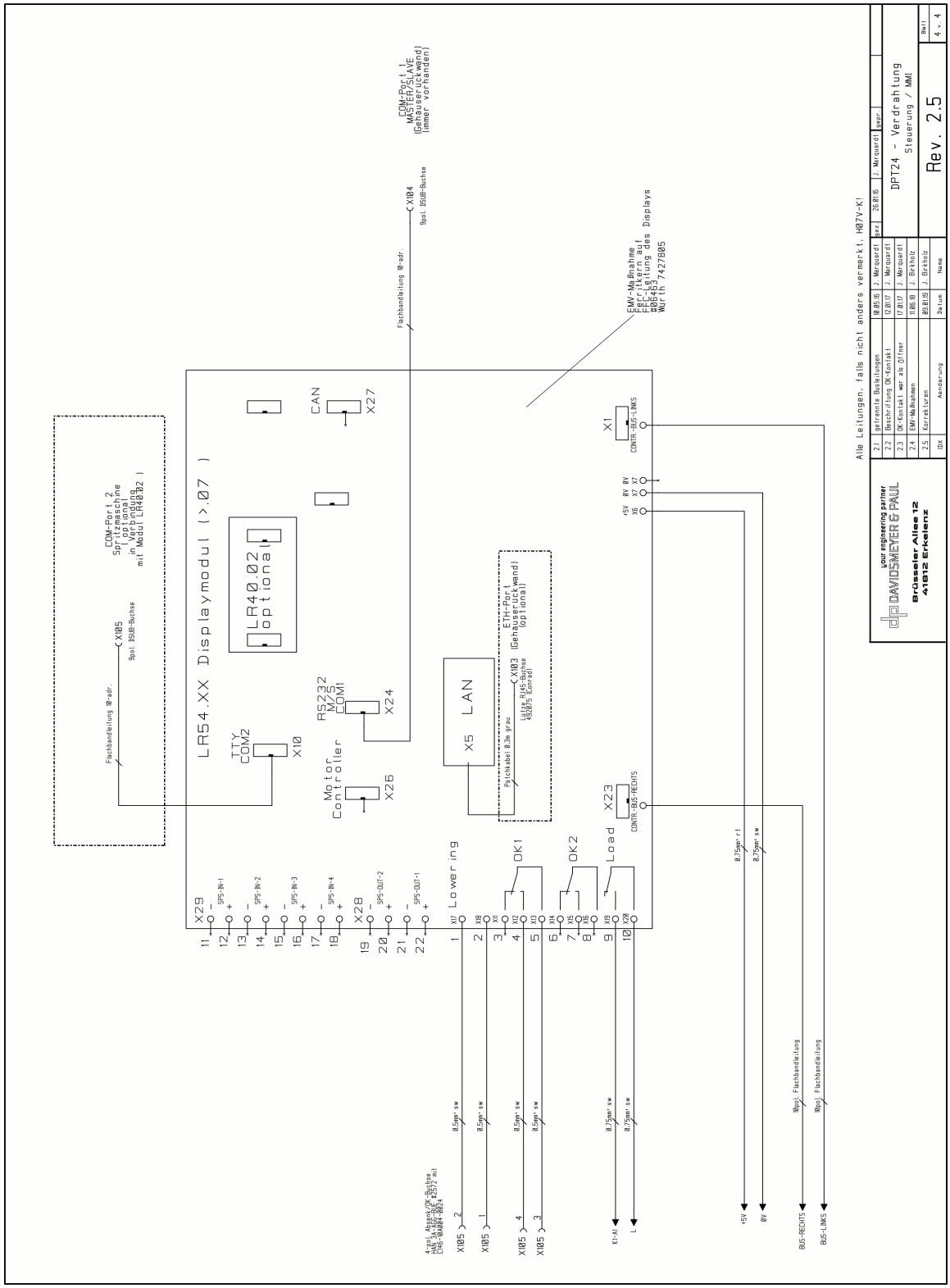
9.5 Appendix E – Wiring Diagrams





DPT24 - Verdrahtung
Leistungssteller
Rev. 2.5
Brüsseler Allee 12
41812 Erkelenz
Alle Leitungen, falls nicht anders vermerkt, H07V-K!
Das Potential "L" wird auf der Klemme X2.4 geführt.
Das Potential "N" wird durch den N-Klemmenblock X1 geführt.
Alle Klemmen von X1 sind miteinander zu brücken.
N-Klemmenblock X1 (Klemmen gebrückt)
PE-Anschlüsse
Laststecker 1-2
Laststecker 1
Kanal 1-12
Laststecker 2
Kanal 13-24
LR52
LR54
LR56


LR56.01 Thermoverstarker
X1 14pol IDC
X2 14pol IDC
X3 14pol IDC
X4 14pol IDC
LR55.01 Adapter
LR55.01 Adapter
Thermostecker 1 Kanal 1-12
Thermostecker 2 Kanal 13-24
X5 UART-BUS
EEPROM 16kBit
BUS-LINKS
Alle Leitungen, falls nicht anders vermerkt, H07V-K!
DPT24 - Verdrahtung
Regler / Thermoanschluss
Rev. 2.5
your engineering partner DAVIDSMEYER & PAUL
Brüsseler Allee 12
41812 Erkelenz


LR54.XX Displaymodul (>.07)
LR40.02 optional
TTY COM2
X10
Motor Controller
RS232 RMS COM1
X24
X26
CAN
X27
X5 LAN
X29
X28
X23
X1
Lowering
OK1
OK2
Load
CONTR-BUS-LINKS
CONTR-BUS-RECHTS
COM-Port 2 Spritzmaschine (optional) in Verbindung mit Modul LR40.02)
X105 9pol. DSUB-Buchse
Flachbandleitung 10-adr.
COM-Port 1 MASTER/SLAVE (Gehäuserückwand) (immer vorhanden)
X104 9pol. DSUB-Buchse
ETH-Port (Gehäuserückwand) (optional)
X103 (Gehäuserückwand)
Patchkabel 0,3m grau
EMV-Maßnahme Ferritkern auf Leitung des Displays Fa. Würth 7427805
Alle Leitungen, falls nicht anders vermerkt, H07V-K!
DPT24 - Verdrahtung Steuerung / MMI
Rev. 2.5
Your engineering partner:
DAVIDSMEYER & PAUL
Brösseler Allee 12
41812 Erkelenz

9.6 Appendix F – Declaration Of Conformity: EG

For the products referred to as

Günther Temperature control unit, type DPT6, DPT12, DPT18, DPT24

we hereby confirm that the products conform with the prime safety requirements stipulated in the following directives of the EU Council for harmonization of the legal regulation of the member states.

2014/30/EU	Electromagnetic compatibility
2014/35/EU	Low voltage directive

The following harmonized standards have been applied to assess the products with regard to electromagnetic compatibility:

EN 61000-6-2	Immunity for industrial areas
EN 61000-6-4	Interface emission for industrial areas
EN 61000-4-2:2009	Immunity to discharge of static fields
EN 61000-4-4:2013	Immunity against fast transient (burst)
EN 61000-4-5:2014	Immunity to impulse voltages (surge)

DAVIDSMEYER & PAUL GmbH Elektronik

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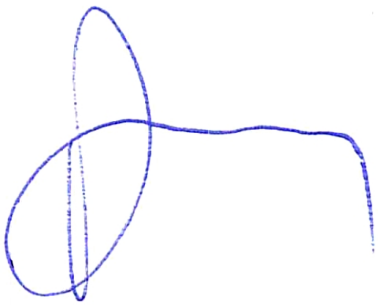
Erkelenz, 08.02.2016



Dr. Thomas Paul
(CEO)