GÜNTHER
HOT RUNNER TECHNOLOGY

User Manual

Regulator DPK/DPT 5-15

up Software Version P1.09f

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Warranty Conditions:

1. **Installation and implementation must be carried out by an electrician!**
2. **Please refer to chapter 6 – Installation, Start-up and Maintenance of the user manual prior to the installation of the device!**
3. **Before connecting the device to the main's power supply, check the main's voltage and the type of net (star or delta)!**

1 General

The hot runner system DPK / DPT has been built and tested according to DIN 57411 part 1 and VDE 0411 part 1 (Germany). It has left the factory in perfect condition. In order to keep your product totally operational and to guarantee safe operation, please read this instruction manual carefully and follow all hints. Before switching on, it is important to check if the local voltage is identical to that allowed by the unit. The plug may only be plugged into an earthed socket. Any disconnection of the earth cable (e.g. an extension of the cable without earth connected) can cause hazardous conditions to the unit.

Hint:
Disconnect mains before opening the unit. Refer to a qualified technician for servicing.

! ! ! ATTENTION ! ! !

This is a user manual for DPK units as well as for DPT ones. User of the DPT have to consider that these devices are *only* to use with 230V-nozzles. If the device is used to temperate low voltage-nozzles (5V or 24V) anyway, this may cause defects and will lead to the loss of guarantee. Therefore consider that all remarks about low voltage-nozzles are only of importance for DPK-user but not for DPT-user because these devices are only to use with 230V-nozzles.

Never connect a DPT to low voltage-nozzles but only to 230V-nozzles !

The DPK / DPT unit is an optimized hot runner control unit, it is very efficient and reduces costs.

Advantages for the user:

- Available in 5-, 10- or 15-zone versions according to the user's requirements.
- The DPK automatically recognizes low voltage-nozzles and 230V-hot runner elements and sets its control parameters accordingly. For DPT units this step is not important because they only work with 230V-nozzles.
- Only one DPK unit is required for mixed operation. DPTs do not work in a mixed mode.
- PID controller with variable parameters, fast heating of 5V and 24V low voltage-nozzles (DPK), careful heating of 230V-zones (DPK and DPT).
- An automatic slave mode is able to switch zones with faulty thermocouples into slave mode automatically.
- A manual slave mode can be activated for each zone
- Control operation is possible at all times, even in the event of thermocouple failure.

- As the DPK / DPT control unit is compatible with all existing GÜNTHER power units, existing power units from the 160 series can still be used.
- Because of the module construction, system upgrades are possible.

The DPK / DPT is reliable and safe, due to continuous checking and monitoring functions.

Advantages for the user:

- Continuous self-monitoring function.
- The DPK protects low voltage-nozzles from current overload.
- Identifies thermocouple failures, heat circuit disconnections and short circuits.
- Corrects polarity errors at thermocouple connections independently by logical turning of the connections.
- Turns off the power supply in case of a malfunction and signals the alarm via a potential free contact.
- Parameters and programs are saved in an EEPROM and are therefore not lost in case of a power supply failure.

The DPK / DPT is designed for easy use; this makes installation and tool change simple.

Advantages for the user:

- The DPK / DPT is especially designed for simple and easy operation.
- The multi-function keypad has an easy to use layout and because of its dust and water proof key pad, it withstands tough environments.
- The simple operator entry level prevents wrong operation.
- All zones and the set and current values for each zone are displayed simultaneously.
- The control parameters are adjustable according to the application.
- The implemented diagnosis function tests the complete system, including tools, nozzles, manifolds and the hot runner system for malfunction and is able to correct possible miswirings independently.
- Circuits, connected incorrectly, are located before the start of an operation.
- Low installation costs because of combined thermal and power connections.

The DPK / DPT has numerous special functions for optimal system utilization.

Advantages for the user:

- Power output surveillance is possible during an operation.
- Decreasing and increasing temperature for all control points by simply pressing a key.
- Reading of the effective current at low voltage.
- Several set value programs facilitate possible material or tool changes.
- If desired, a serial interface is available as connection to an injection molding machine.

2 Display and Operating Controls

The display and operating controls of the DPK / DPT are separated into the operation control panel and the parallel display. Great emphasis has been placed upon ease of use and a good layout.

2.1 Control Panel

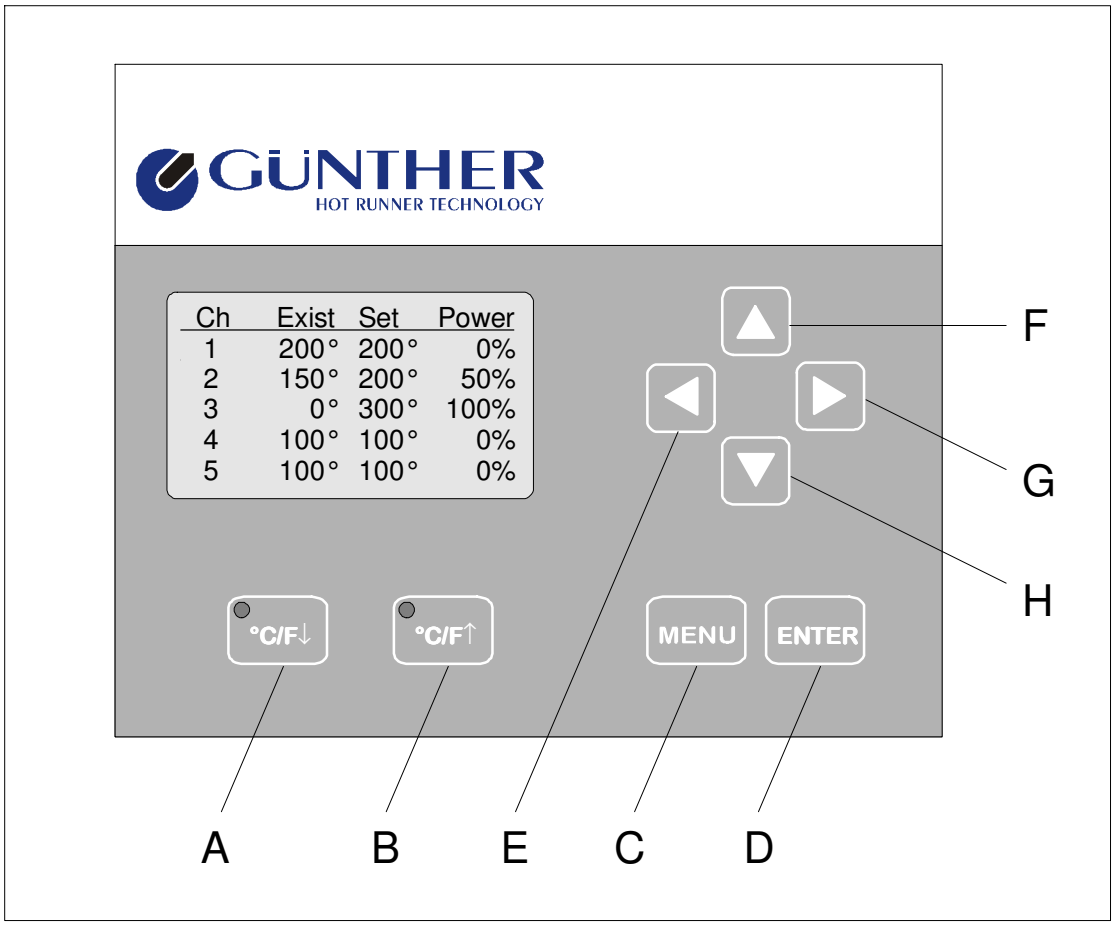


Fig. 2-1 Control panel DPK / DPT

Function Keys

A Key „°**C/F↓**“	⇒	lowering temperature in all zones
B Key „°**C/F↑**“	⇒	boosting temperature in all zones
C Key „MENU“	⇒	show menu
D Key „ENTER“	⇒	´ENTER´ key to confirm inputs, to quit program levels
E – H Keys „◀“, „▲“, „▶“, „▼“	⇒	changing & adjusting set values and parameters, cancel function

Hint:

For further details concerning keys and their functions see chapter 3.3 Operation.

2.2 Parallel Display

The parallel display consists of 15 three-digit seven-segment displays to exhibit set temperature, present temperature, temperature difference or current adjustable variables in ´%´. Three additional LEDs are located beside each indicator to display the status of the zone.
If a zone is turned off, "---" appears in the accompanying display. The percent control variable is displayed to zones which work in percentage control mode.
In addition, the temperature state is one by one displayed for each zone. If the green indicator shines behind the corresponding value, this zone has reached the programmed temperature window (ready for molding operation). If the temperature exceeds the temperature window or lags behind it, the red indicators will show.

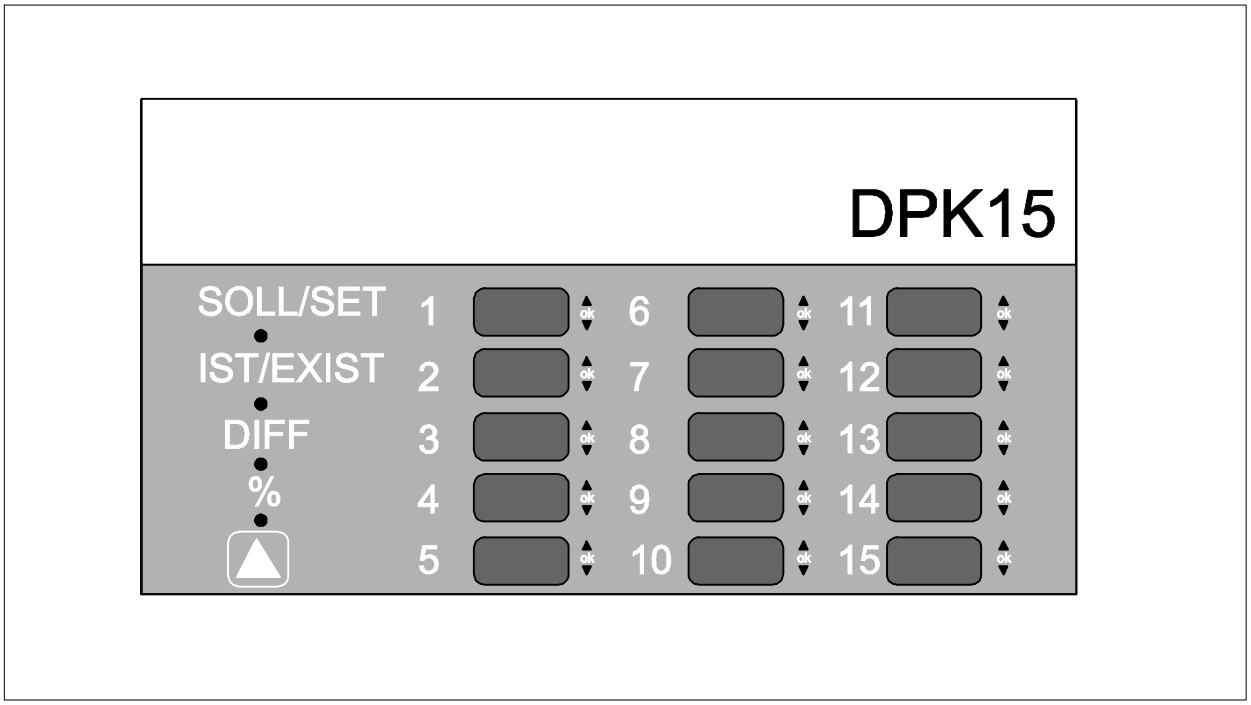


Fig. 2-2 Parallel Display DPK / DPT

Between the operating control and the parallel display the "▲" key and 4 LEDs are placed. The key is used to display set value, current value, temperature difference or the display of current in "%". The LEDs above the key show the selected display type.

3 Operating Instructions

3.1 Turning On

After the unit has been switched on, the GÜNTHER logo, the program revision number and the serial number appear on the display. When using a DPK unit, the type of the low voltage-load (5V or 24V) is asked. Moreover possibly important information are displayed. Then the unit automatically performs a system check including the heating circuits and tests whether a low voltage- or a 230V-load is connected. The display will show the table "load recognition", which is divided into the tested channel's number, the kind of load and its potential power. At the same time the respective field of the parallel display shows "---" (Test) and then the detected voltage of the load. If a load turns off due to a fault or if it is not connected, the parallel display will show "---".
During initial start-up (and/or after resetting the controller to its factory settings) the unit starts an question after switch on, in that the language for the menu can be set by keys „▲" and „▼". If this question is not operated within five seconds, English will be adjusted as current language automatically.

3.2 Multi-Channel Mode

After the adjusting of the loads, the controller is in multi-channel mode. In this mode always five zones are displayed for a short time interval.

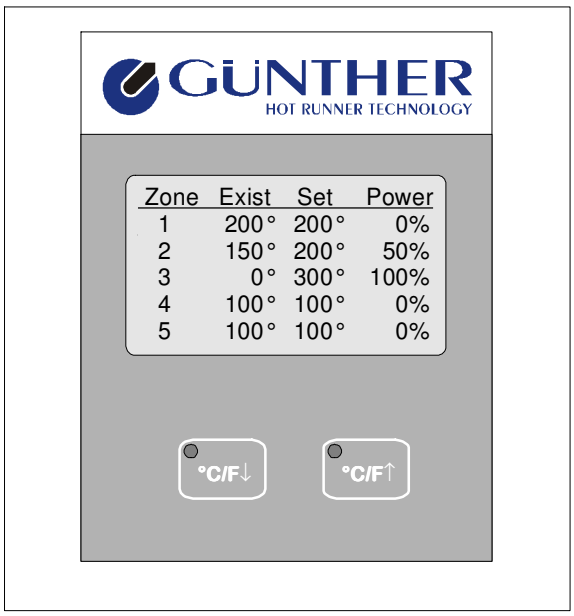


Fig. 3-1 Multi-Channel Mode

The set value and the current value in degrees centigrade or degrees fahrenheit are displayed in this mode. The control value is displayed in percent (%) for 230V-nozzles (DPK/DPT) or in ampere (A) for 24V- or 5V-nozzles (DPK).

Hint:
At the appearance of any failure the multi-channel mode will be interrupted and the failure will be visualized on the display. If several errors occur, the zone, whose error was recognized

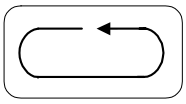
first, will be displayed. This is also valid if the display is switched from menu mode to multi-channel mode after the appearance of any failure.

3.3 Single-Channel Mode

To change from multi-channel to single-channel mode, mark a zone with keys „▲“ or „▼“. By pressing key „ ▶ “ or „Enter“ this zone is entered in single-channel mode.
In this mode all data (set value, actual value, load character, current or power consumption) of the displayed zone is shown.

Fig. 3-2 Single-Channel Mode

In single-channel mode the zone number is marked at first. By pressing key „◀ “ the display mode returns to multi-channel mode.
After two seconds the mark fades out and then it is possible to turn the display mode to the scan mode by pressing key „◀ “.
The following sign indicates the scan mode.



In this mode the zones with set and current values will be shown on the display one by one.
Zones which are switched off will be skipped.
The scan mode can be cancelled by pressing any key and restarted by pressing key „◀ “ after two seconds when the marking of the zone number faded out again.

Hint:
If a fault occurs, the scan mode will be terminated and the channel as well as its fault will be displayed. If several faults occur simultaneously, the first identified one will be shown.

3.4 Operating Mode

3.4.1 Changing Set Values

For changing the set value of a zone it has to be switched into single channel mode (see picture A). Then the set value can be marked by pressing key „▶“ and the desired set value can be adjusted by pressing keys „▲“ and „▼“. The key function is dynamic, i.e. the longer the key is pressed, the quicker the set point value changes.

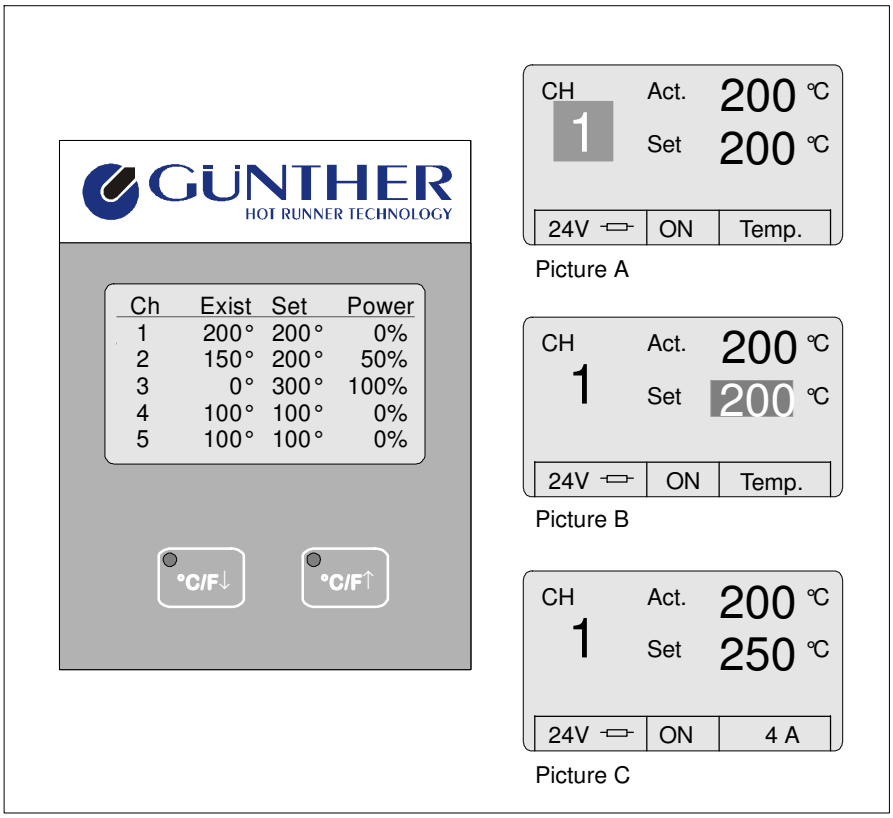


Fig. 3-3 Changing a Set Value

Indeed the controller operation works independently from the entering of a value. It is therefore not necessary to return to the scan mode. The scan mode makes exact surveillance of critical regulation positions possible.
For faster adjusting of all set values to the same value, the command “Set all channels” (see Chapter 3.5.1 Set all channels) may be used.

Value limits: The temperatures are adjustable within a range from 0 to 500°C (0 to 932°F).

As a default the excess temperature disconnection is set to 500°C. If a less safety shutdown is carried out in the parameter menu, the set value attitude of this value is also limited.

The percentage control mode is adjustable from 0% to 100%.

3.4.2 Switching Zones On and Off

If a zone is unused, it is possible to switch it off.

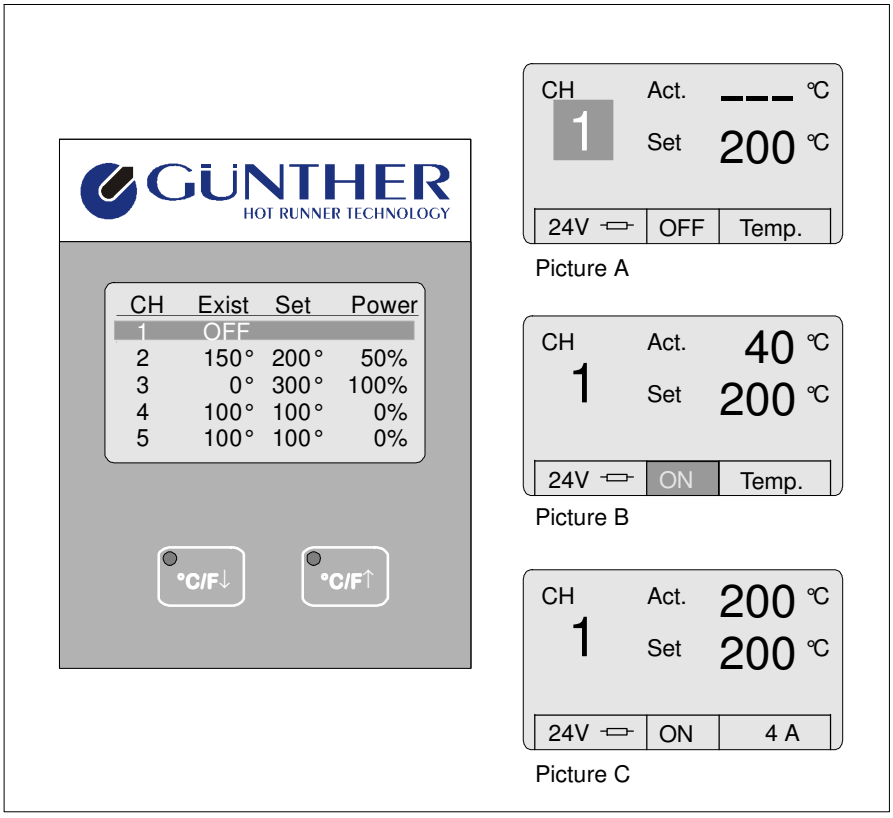


Fig. 3-4 Switching Zones On and Off

In single-channel mode move the mark to the ON/OFF-button by pressing key „▶“. Now the setting can be changed by pressing key „▲“ or „▼“.

Hint:
Zones, which are switched off, will only be displayed in multi-channel mode and are not checked on faults anymore.

3.4.3 Changing the Operating Mode „Percentage/Slave/Temperature“

In the case that a thermocouple fails to function, or for any other reason, it is possible to continue the control operation manually in slave mode or in percentage control mode. For that purpose the menu item “Power”, “Temp.” or “Slaving” are marked with key „▶“ and can then be chosen by pressing key „▲“ or „▼“.

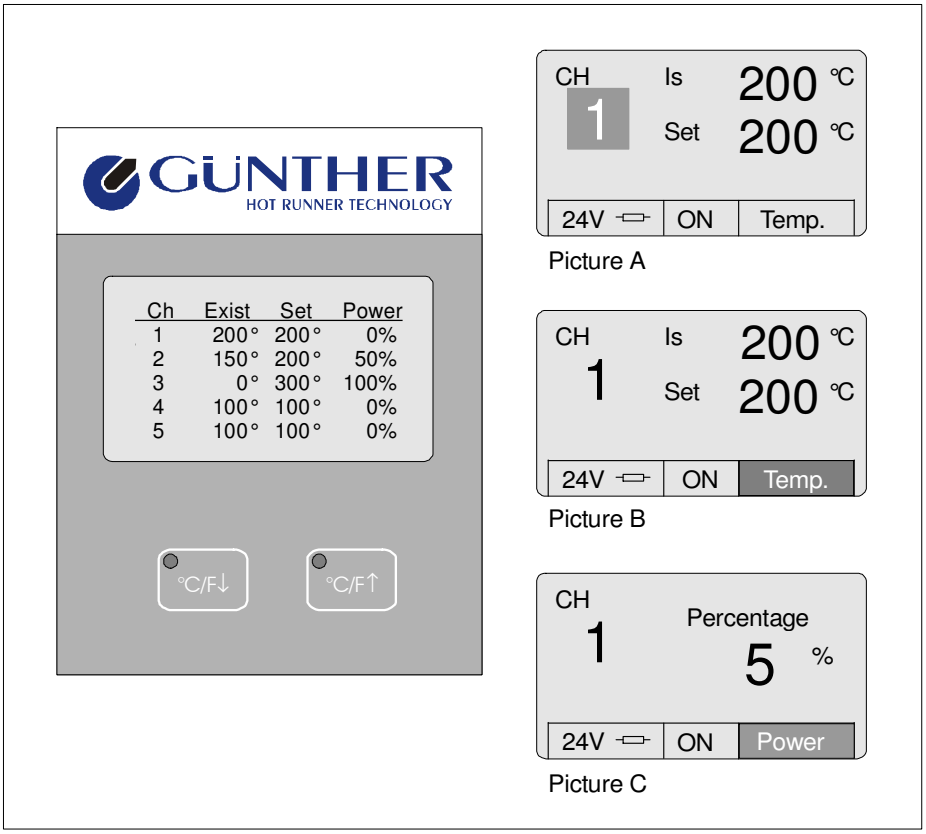


Fig. 3-5 Changing the Operating Mode

Temperature control mode

In this mode temperature control is accomplished by means of a fuzzy PID controller, which evaluates the signal of the thermocouples and adapts the corresponding power at the exit.

Slave mode

This mode of operation can be used for zones, in which an error or defect at the thermocouple has occured. Here the faulty zone is attached to a freely selectable zone and operated with the same power output as the leading zone. Please note that the leading zone and the attached zone exhibit a similar behaviour.

Percentage control mode

This mode allows to adjust a fixed power output between 0 and 100% for the selected zone.

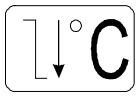
For low voltage nozzles (only valid for DPK, not for DPT) it will be:
100% is equivalent to ca. 125A (for 5V-nozzles)
100% is equivalent to ca. 25A (for 24V-nozzles)

3.4.4 Temperature Lowering / Boost

Temperature Lowering

If production stops for a longer period of time, it is advisable to lower the set temperatures without turning the unit off.

By pressing key „°**C/F↓**“ lowering temperature is activated. In multi-channel mode the display shows „T- Lowering“ + the adjusted lowering value at the left corner, in single-channel mode the following sign is displayed.

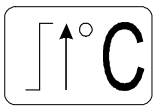


An external activation for lowering temperature is possible by connecting a closing contact at the rear side of the DPK / DPT. It is possible to connect a potential free contact to the unit with a cable which is available from GÜNTHER HOT RUNNER SYSTEMS (especially to relay output of injection molding machines).

Temperature Boost

For starting up the tools it is helpful to boost up the temperatures of all zones for a short time.

By pressing key „°**C/F↑**“ temperature boost is activated. In multi-channel mode the display shows „T-Boost“ + the adjusted rising value at the left corner, in single-channel mode the following sign is displayed.



After a preadjusted time (120sec.) temperature boosting ends automatically. It can also be ended by further activating of the key.
Normally, the manifolds are excluded from temperature boost. However, they can be integrated in the boosting function, if parameter -22- (Menu → Configuration → Parameter → -22- “boost for manifolds”) is set to “1”.

Besides, an external activation of the boosting function can be carried out. For that purpose, the external lowering function has to be deactivated, because both functions are operated via the entrance (Abs.) at the DPK/DPT’s rear.
For deactivating the external lowering function and/or for activating the external boosting function, the value for the parameter -25- (Menu → Configuration → Parameter → -25- “ext. input for boost”) has to be set to “1” in parameter menu.

Hint:

All settings can be carried out via the menu options “Temp. Lowering” and “Temp. Boost”.

3.5 Menu Mode

By pressing key „Menu“ the menu mode is activated. The main menu will be shown on the display.

Fig. 3-6 Main Menu

Use keys „▲“ and „▼“ to select and key „▶“ or „ENTER“ to confirm a menu item. If the operator does not make modifications in the main or in another menu, the display mode will be switched off after a time of 10 seconds and the display will show single- or multi-channel mode.

If a menu item is confirmed, the value may be changed by pressing keys „▲“ and „▼“. By pressing key „◀“ or „ENTER“ you will return to the menu. If the „ENTER“ key is used, the displayed value will be stored as a new set value. By using key „◀“, the value will not be stored (cancel function).

The menu structure is on the next page.

Menu structure of the DPK / DPT

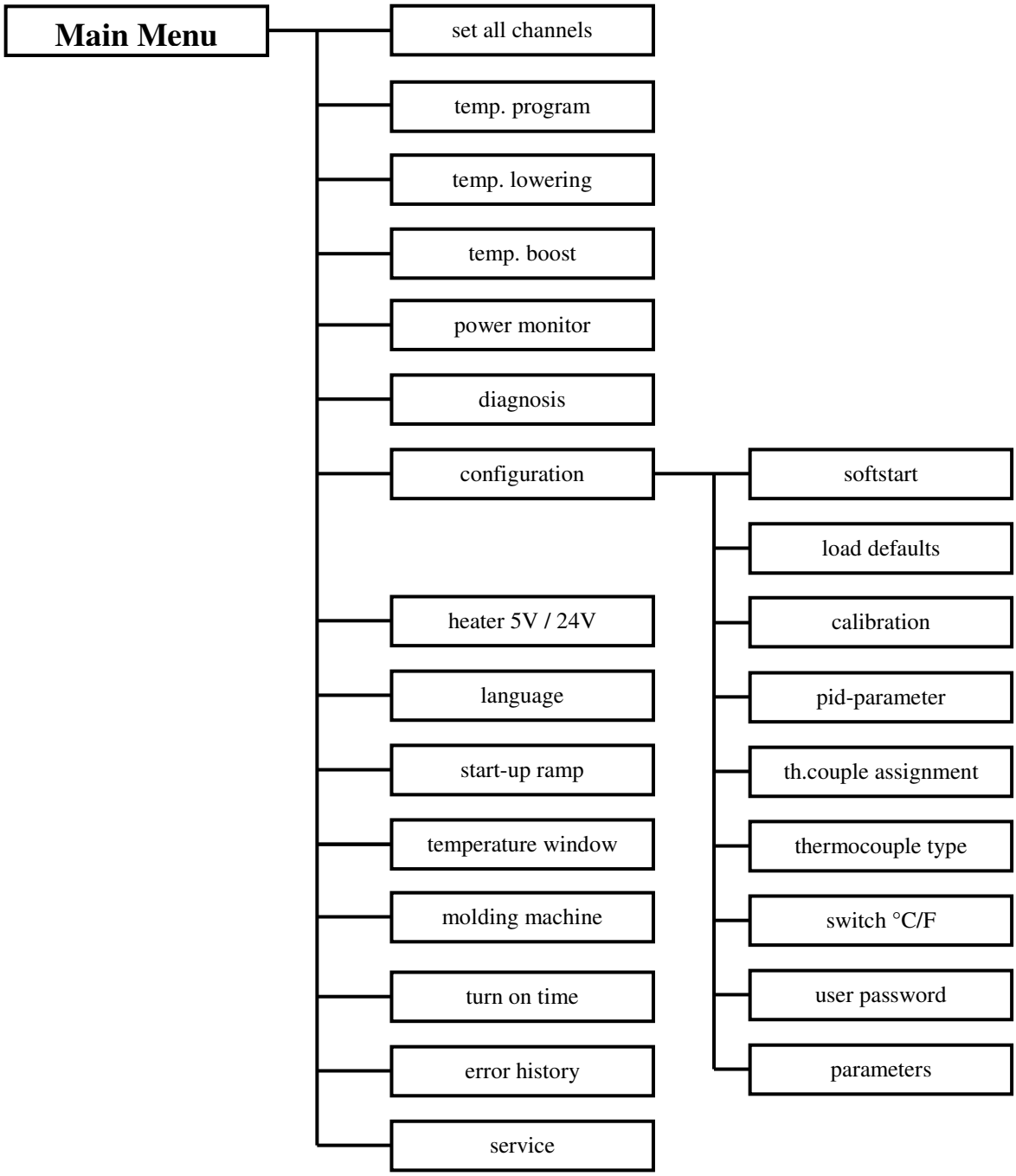


Fig. 3-7 Menu structure of the DPK / DPT

(The menu item “Heater 5V/24V” is missing in DPT units.)

3.5.1 Set all Channels

The menu „Set all channels“ enables the operator to change the set temperature or to turn on or off all zones.

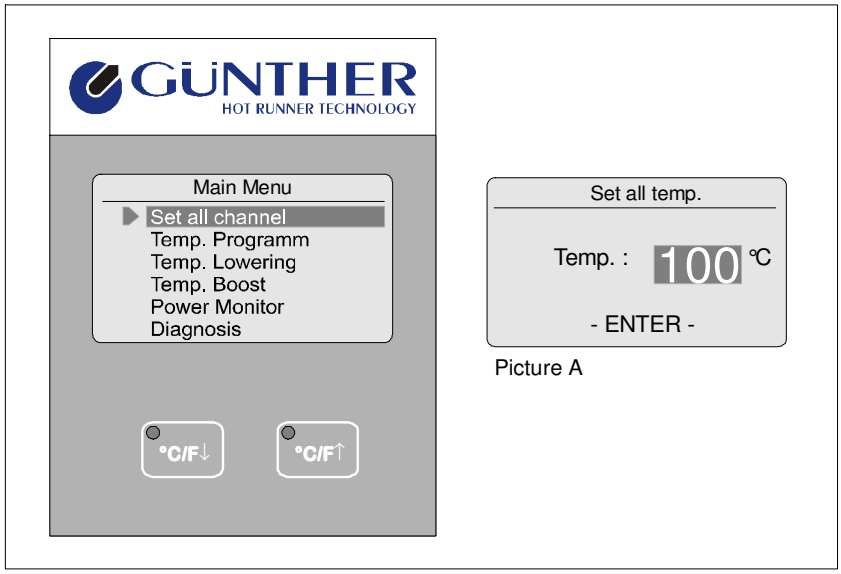


Fig. 3-8 Set all Channels

3.5.2 Temperature Program

A set value program is a preprogrammed series of set values and their corresponding operating methods which a user can change and enter into the system. They can be entered and activated solely by the menu „Temp. Program“.
If the tools or the molding compounds have been changed, it is advisable to change the program accordingly. There are four set value programs available. When the control unit is turned on, the last one of the previous used programs will be reactivated automatically. To reset all programs and parameters, select the menu item „Load Defaults“ (see chapter 3.6.2 Load Defaults).

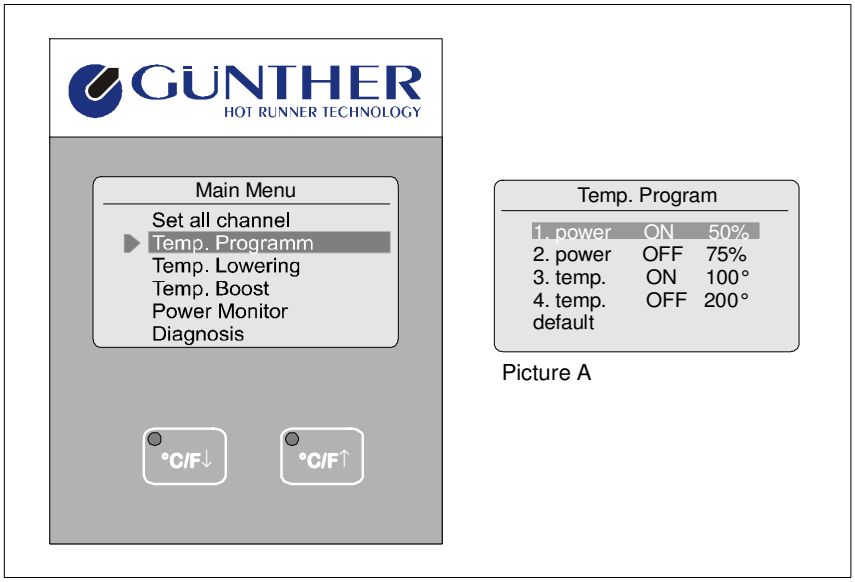


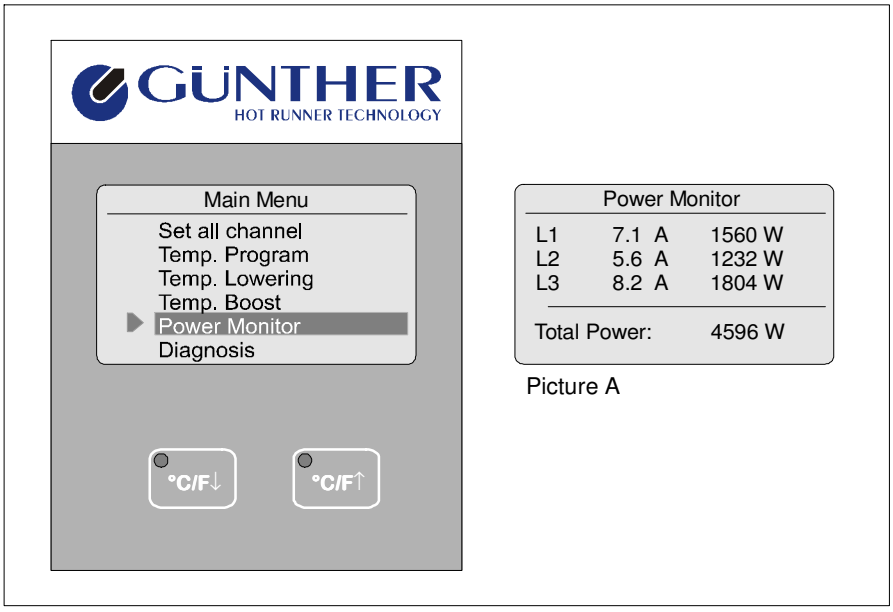
Fig. 3-9 Changing Temperature Program

3.5.3 Temperature Lowering / Boost

By the two menus „Temp. Lowering“ and „Temp. Boost“ the operator can set a temperature increase or decrease. By using key „°C/F↓“ the temperature decreases to the value which has been adjusted in the menu „Temp. Lowering“. By using key „°C/F↑“ the temperature raises to the value which has been set in the menu „Temp. Boost“.

3.5.4 Power Monitor

The menu “Power Monitor“ shows the total power consumption and the current separated for each phase at the moment.



Picture A

Fig. 3-10 Power Monitor

3.5.5 Diagnosis

Within the menu item “Diagnosis”, a check of zone assignment and wiring can be carried out.
For that purpose, all channels are first cooled down after the start of the diagnosis. Afterwards all channels are heated up separately and the reaction of the thermocouples will be established. This way possible miswirings at the thermocouples can be located and repaired, if necessary.
During the diagnosis, each zone to be tested, its kind of heater as well as the established reaction of the corresponding thermocouple are displayed in a line. At the end of the line, a short evaluation text is announced (see below). If assignment mistakes (zone → thermocouple) are recognized within the diagnosis, the user will be asked, if these mistakes should be repaired automatically at the end of the diagnosis. If the user answers with “Yes”, a logical re-connection of the circuits will be carried out and the hot runner system can be operated without any hardware modification. Otherwise the user has to repair the assignment mistakes by changes within the hardware.
If errors occur, which the system cannot debug independently, the faulty zone will be switched off.

Evaluation:

Display	Description	Debugging
wire	Assignment mistake (zone → thermocouple)	Automatic debugging
pol	Polarity of thermocouples exchanged	Automatic debugging
no sig.	Thermocouple Shortcut	Manual debugging
break	Thermocouple interrupted	Manual debugging
no load	no load / load interrupted	Manual debugging
OK	no error	

3.5.6 Configuration

By choosing the menu item "Configuration" the configuration menu will be entered. You need a password to enter this menu. In the configuration menu the operator can change the language, the PID parameter or calibrate the DPK / DPT etc.
For further information refer to **Chapter 3.6 Configuration Menu**.

3.5.7 Heater 5V/24V

In this menu item the type of the low voltage-load (5V/24V) can be set for all zones. This means the DPK is able to work in a mixed mode with 230V- and 5V-nozzles or in a mixed mode with 230V- and 24V-nozzles. A mixed mode of 5V- and 24V-nozzles is not supported!
When using DPK-units with software version 1.35 and higher, a selection-box is displayed for a short time after switch-on, and the user is able to adjust the current heater (5V/24V). If the user does not take out any adjustments, the box will fade out again after 4 seconds and the controller starts the adjustment with the last adjusted kind of heater.
This automatic search of the heater can be switched on and off in the parameter menu (Menu → Configuration → Parameter → -33- "5V/24V startup check").
DPT units miss this menu item because they are connected to 230V-nozzles only.

3.5.8 Language

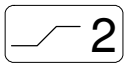
In the menu item "Language" you are able to change the language for the display and the menu. The DPK / DPT supports the following languages:

- English
- German
- French
- Portuguese
- Italian
- Dutch
- Danish

3.5.9 Start-up Ramp

In hot runner systems you will often find loads with different thermic time constants. If the time constants differ widely, a fast nozzle will reach its set value earlier than the slow manifold. This physically based heat-up delay can generate plastic defects in the nozzle, because it reaches the set value much earlier than the other nozzles. For this reason the starting mechanism ”Start-up Ramp“ is connected. This guarantees a regular warming of the different nozzles related to the set value.
The ramp function can be switched on and off in the menu item “Start-up Ramp”. Additionally it is possible to choose a zone for leading the ramp or the adjustment “auto”. Within the adjustment “auto” the DPK/DPT establishes the slowest zone in a 90-seconds-lasting testing phase independently and determines it as leading zone. Furthermore a lowering value can be adjusted for all zones (except the leading zone). Around this value the set values of all zones are lowered until the leading zone has reached its set value.
If the ramp function is switched on and the softstart is ended, it will be activated with each set value leap >50. Then the leading zone is heated to its set value. According to their percentage of the set value the other nozzles are driven up slowly to their set values, so that their heating procedure is braked essentially.
The end of the starting ramp is achieved as soon as the leading zone has reached its temperature window. Just now the individual nozzles will be decoupled from the leading mechanism and heated to their set value.
In multi channel mode the starting ramp is indicated by the text “Ramp” and by displaying the leading zone.

In single channel mode the following symbol is displayed.



The number behind the sign indicates the slowest zone (manifold).

3.5.10 Temperature Window

Within this menu item a tolerance for the existing temperature can be specified. This implies that, if the actual temperature of a zone reaches a value which lies within the set value +/- the tolerance, this zone will be declared as ready to start molding. This is shown by flashing of the corresponding zone’s green OK indicator in the parallel display. If all zones are within their tolerance sector around the set value, the DPKs/DPTs OK-exit will be set and the tool will be ready for duty.
Additionally, the message “ready for molding” is shown on the display.
Appropriate to the default values the temperature window’s value is set to +/- 10°C.

3.5.11 Molding Machine (Serial Interface)

A transmission protocol for the DPK/DPT’s COM2-interface can be adjusted in the menu item “Molding machine”. The COM2-interface is an optional extension of the control element and can be installed directly when buying the controller or subsequently. Via this interface a communication between controller and molding machine is possible, so that the controller can be operated by the molding machine.

At the moment there are transmission protocols available for Arburg-, Engel- and Krauss-Maffei interfaces (see **Chapter 5 Serial Interface**).

3.5.12 Turn on Time

The hours of operation are displayed in the menu item “Turn on Time“. They describe the time in which the DPK/DPT has been switched on (from its first operation on) and will be displayed in hours and minutes.

3.5.13 Error History

Within this menu item it is possible to see the last occurred and receipted mistakes related to the hours of operation. The meter reading of the hours of operation (from the moment of the occurred error on) is followed by the error report. The occurred fault will be distributed as a shorthand expression. The list contents the 64 last occurred faults. It is possible to leaf through the list with keys „▲“ and „▼“.

The following list shows the meanings of the different error-shorthand expressions.

Error shorthand expression	Description
`Hours:Min Thermo plug`	Contact problems at thermo plug
`Hours:Min Load plug`	Contact problems at load plug
`Hours:Min calibration`	Calibration
`Hours:Min Zxx Th pol`	Thermoelement error at zone xx: Thermoelement Exchanged
`Hours:Min Zxx Th break`	Thermoelement error at zone xx: Thermoelement Failure
`Hours:Min Zxx Th short`	Thermoelement error at zone xx: Thermoelement Shortcut
`Hours:Min Zxx Th over`	Thermoelement error at zone xx: Overtemperature
`Hours:Min Zxx Load break`	Zone xx: Load Interrupted
`Hours:Min Zxx Load short`	Zone xx: Load Shortcut
`Hours:Min Zxx Load plaus`	Zone xx: Plausibility (Logical sequence of the loads 230V-24V/5V)
`Hours:Min Zxx Th over`	Zone xx: Deviation from rule
`Hours:Min Zxx 24V-Fuse`	Zone xx: 24V-fuse defective

3.5.14 Service

This menu item is used by the manufacturer of the DPK / DPT for several settings. It has its own password. The user must not and needs not make any changes to this item.

3.6 Configuration Menu

By scrolling through the main menu, the configuration menu can be entered. A password is needed to enter this menu. In the configuration menu the operator can change the PID parameter or calibrate the DPK / DPT etc.
The password for the configuration menu is: **0099**
The entered password is only valid for 15 minutes or up to the moment when the DPK / DPT is turned off. For further changes to the configuration you need to enter it again.

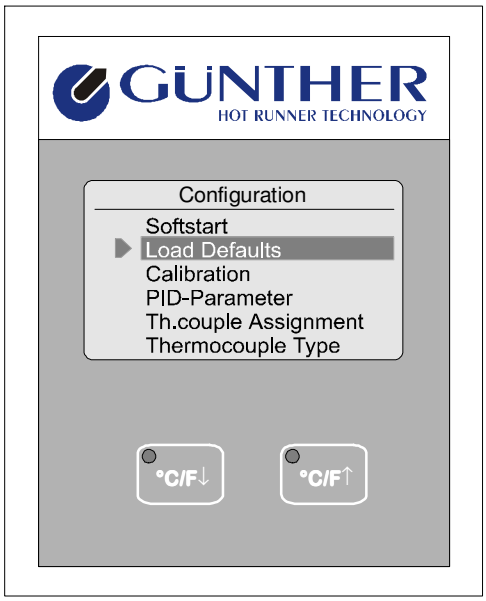


Fig. 3-11 Configuration

3.6.1 Softstart

When 230V-nozzles are connected to the system, it is necessary to employ the softstart start-up procedure to dry out the moisture that has collected in the cold heating elements. The softstart is divided into two time controlled phases. During the first phase the value of the menu softstart does increase from 0 to 50%. (The ramp time should be selected in such a manner that the DPK/DPT reaches the temperature of 105°C at the end of the ramp.) If the temperature at the end of the ramp is less than 105°C, the DPK/DPT will raise it to 105°C independently. After the DPK/DPT has reached the 105°C, the second time controlled phase of the softstart begins. Within this phase the temperature of the zones is hold to 105°C as long as the hold time is set in the menu item, so that the nozzles dry out adequately with a low thermic load. Ramp time and hold time add up to the whole time, which can be adjusted in the menu in two-minute steps. This start-up operation begins automatically, if the softstart has been activated in the menu and if the actual temperature of a 230V-nozzle remains below 80°C and the set value is over 100°C. In single channel mode the softstart is indicated by the following signs.

ramp time hold time

In multi channel mode it is indicated by the text „softstart“ and the time left. After the whole time the unit will be switched to normal operating mode. To prevent overheating of the molding material in the 5V-/24V-nozzles (only important for DPKs), the 5V-/24V-nozzles are also limited to 105°C

during softstart. The temperature lowering function is taken into consideration during softstarts, so that the DPK / DPT unit can begin to operate immediately with an instant temperature lowering.

3.6.2 Load Defaults

By selecting the menu item ”Load Defaults“ and affirming the questions with yes twice, the DPK / DPT loads up the parameters and values to the factory settings.

Attention!
All individually entered settings of the DPK / DPT (values and parameters) will be deleted.

The following table shows the default settings:

Set all Channels: (all set temperatures)	150°C		
Temperature Programs:	1. power	OFF	25%
	2. temp.	ON	20°C
	3. temp.	ON	150°C
	4. temp.	ON	200°C
Softstart:	ON		
	over all time:	10min	
	hold time:	5min	
	ramp time:	5min	
PID-Parameter: (for all zones)	nozzle (<600W):		
	P-Value:	100	
	I- Value:	9	
	D-Value:	0	
	manifold (>600W):		
	P-Value:	100	
	I-Value:	4	
	D-Value:	0	
Temperature Unit:	°C		
Temperature Window:	+/- 10°C		
Lowering Value:	50°C		
Rising Value:	20°C		
Language:	English		
Interface:	DP-Intern		
Heater 5V/24V (DPK only)**:**	24V		

3.6.3 Calibration

The sophisticated and microcontroller supported temperature module of the DPK / DPT is able to calibrate itself by using a calibration jack.

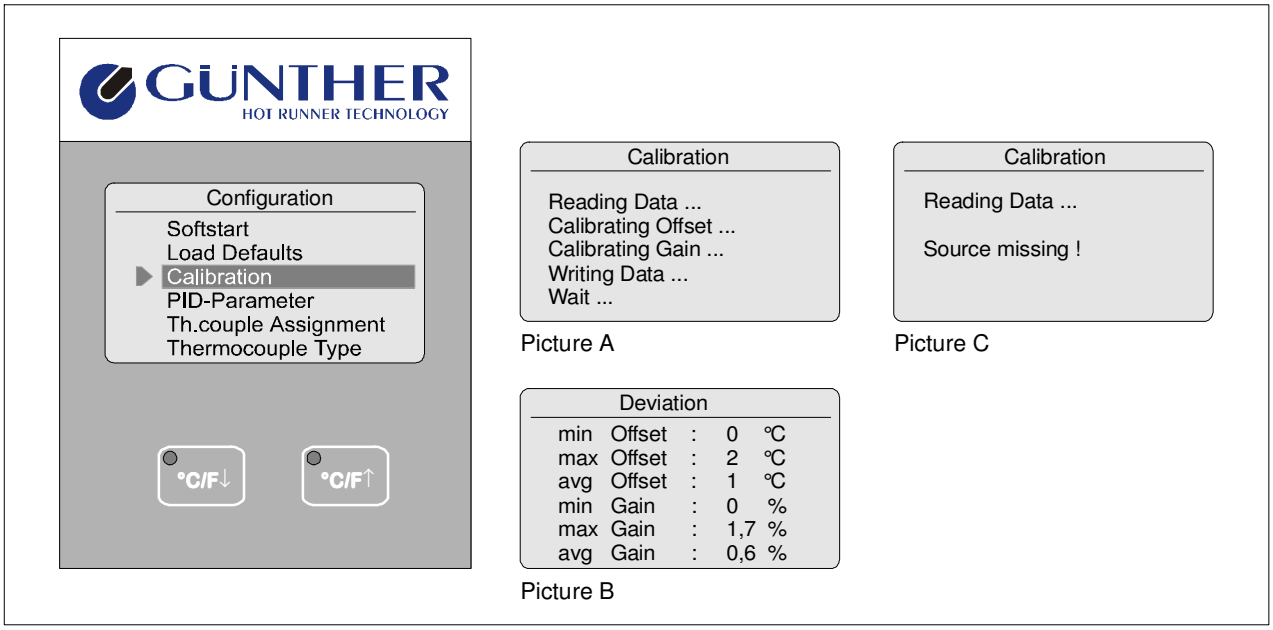


Fig. 3-12 Calibration

The calibriation jack is available from GÜNTHER HOT RUNNER SYSTEMS, without it the error message of Picture C appears on the display.

3.6.4 PID - Parameter

The operator can change the PID parameter using the menu item “Pid-Parameter“. So the operator is able to match the parameters to the controlled system. It is possible to match the several parameters independently.

3.6.5 Th.couple Assignment

Within this menu item the user is able to see and change the assignment of the thermocouples to the zones. This way it is possible to combine zones and thermocouples in any order. To avoid open regulating circuits, each thermocouple can only be assigned to one zone.
With the cursor-keys the thermocouple assignment can be adjusted. With keys „▲“ and „▼“ a zone can be selected. To change the thermocouple of this chosen zone, the number of the corresponding thermocouple has to be selected with key „▶“. By pressing key „◀“ the selection of the thermocouple’s number will be abolished and the line for the zone will be selected again. Now another zone, of which the thermocouple assignment has to be changed, can be chosen.
Then the entered values can be accepted by pressing key “ENTER”. With keys “MENU” or „◀“ the menu item can be left again without accepting the changed setting.

3.6.6 Thermocouple Type

Besides the type L thermocouples, the hot runner system also supports type J and K thermocouples. In the menu item “Thermocouple Type “ the thermocouple’s type can be adjusted for each zone (as well as for all zones).
To adjust the thermocouple’s type, one zone or even all zones are selected with keys „◄“ or „►“. Then the type can be set with keys „▲“ or „▼“. When confirming the changes with key “ENTER”, the new setting will be accepted. With key “MENU” or after repeated pressing of key „◄“, the menu item can be left without accepting the new adjustment.
If type K thermocouples have been adjusted, an infobox is displayed when switching the controller on next. This infobox shows a list of all zones with type K thermocouples. Furthermore the type K thermocouples are displayed at the left corner in single channel mode. In this mode the load’s indication switches with the thermo-type’s indication. Type J and L thermocouples are not announced separately, because they show a similar behaviour. When loading the default settings, all thermocouples will be resetted to type L.

Note:
However, the use of type K thermocouples is only supported by hot runner systems with production index D or higher. The controller’s production index is noted down on its type plate (letter behind the serial number).

3.6.7 Switching °C / F

By choosing the menu item “Switch °C/F“ it is possible to change between degrees centigrade and degrees fahrenheit.

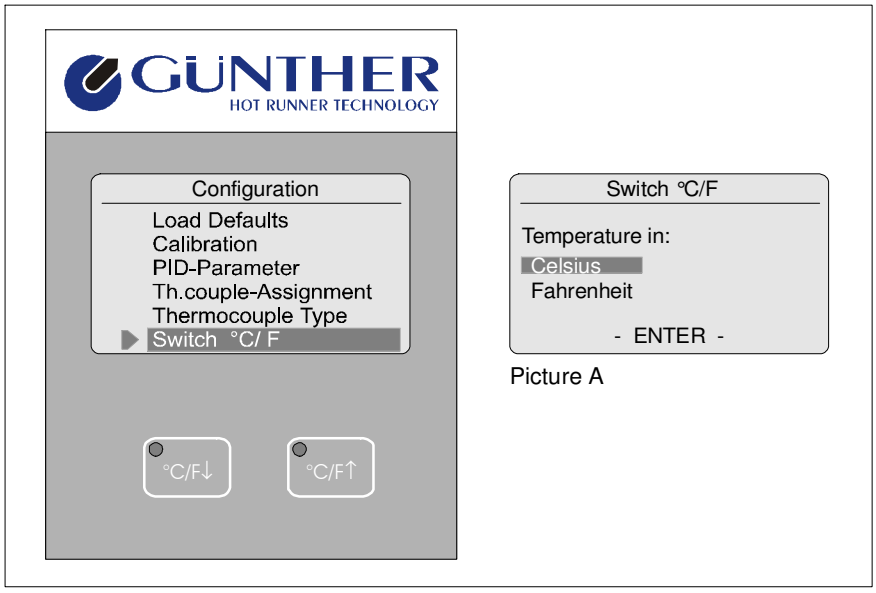


Fig. 3-13 Switching °C/°F

3.6.8 User Password

In the menu item ”User Password“ the creator of the system is able to adjust a password that must then be entered by the user to carry out changes to the set points or to the operating mode. Standardly this function is deactivated, i.e. the code is set on zero.

3.6.9 Parameter

The menu item „Parameter“ is only to be used by authorized personnel. Parameter changes can influence the function of the controller. Please take consultation with the GÜNTHER Hot Runner Systems Company, if changes at the system’s parameters seem to be necessary. This applies especially to the parameters marked grey in the following short description.

Short description of the adjustable parameters:
(Menu → Configuration → Parameter)

-1- max. temperature °C
Maximum permitted temperature.
If a zone exceeds the adjusted temperature-value, the controller will switch off the power output and display the error *“Zone xx Thermocouple: Overtemperature”*.
default: 500
min: 0
max: 500

-2- controller address
Specifies the controller’s device address.
default: 3
min: 0
max: 20

-3- diff. temp. rampe °C
Shows the temperature difference, which has to be identified on at least one manual or automatic established manifold, for activating the ramp-function.
default: 20
min: 0
max: 500

-4- lowering percent in %
Lowering value for percentage control mode.
default: 20
min: 0
max: 100

-5- boost percent in %
Boosting value for percentage control mode.
default: 10
min: 0
max: 50

-6- % load difference
Maximum permitted deviation of the zones’s heating capacity among one another.
(This parameter is not in use at the moment.)
default: 70

min: 0
max: 100

-7- temp. windows 2 °C

Tolerance window for compensating overheating.
If the set temperature has been exceeded by more than the adjusted value, the zone is switched off and the error message *"Zone xx Load: Regulating deviation"* is displayed.
default: 50
min: 0
max: 500

-8- max 5V current in A

Maximum current, on which the 5V-loads will be adjusted.
default: 125
min: 0
max: 150

-9- cooling ramp at °C

The ramp for regulated cooling of a zone begins with the set temperature plus the adjusted value.
default: 40
min: 0
max: 100

-10- heating ramp at °C

The ramp for regulated heating of a zone begins with the set temperature minus the adjustable value.
default: 30
min: 0
max: 100

-11- no load timeout sec.

Adjustable time for identifying a load interruption.
To release a load-interruption-error, a zone with a power output of > 98% has to be operated during the indicated time, without the zone's set temperature having risen. For manifolds (loads > 600W) the double testing time is applied.
default: 60
min: 0
max: 500

-12- ext. controller addr.

Address of a device connected externally (e.g. Arburg molding machine).
default: 1
min: 0
max: 20

-13- passwort customer

Password allowing the user to carry out changes in the configuration menu.
default: 99
min: 0
max: 9999

-14- passwort

Additional password for locking single functions concerning set value changes.
If „0" is set here, this password-function is deactivated.
For the first activation of this function the controller has to be restarted.
default: 0
min: 0
max: 9999

-15- display averaging

The set value is displayed as median value, which has been determined from the single set temperatures of the several zones. Within this parameter the user is able to adjust how many set temperatures should be considered for establishing the median value being displayed.
default: 10
min: 0
max: 20

-16- test 5V after 230V

Switching on / off the plausibility-function.
The plausibilty-test checks, if low voltage-loads follow 230V-loads.
default: 1
min: 0
max: 1

-17- diag. max. temp. °C

Temperature difference, to which a zone has to be heated up during the diagnosis. Only if this difference temperature has been reached during the diagnosis (within the adjusted time), the zone is accepted as OK.
default: 30
min: 0
max: 200

-18- diag. heating time sec

Time, in which the zone has to reach the difference temperature during the diagnosis.
default: 240
min: 0
max: 1200

-19- diag. output in %

Power output, with which the zone is operated during the diagnosis.
default: 40
min: 0
max: 100

-20- diag. cooling time sec

Time, used for cooling down the tools, before the actual diagnosis starts.
To avoid incorrect measurements during the diagnosis (by unintentional heating of neighbouring zones) and to guarantee a regular cooling procedure, the adjusted time is bided once again half after the checking of the single zones.
default: 60
min: 0
max: 1200

-21- low time visible (from Softwarevers. 1.33: -21- molding machine check)

If this parameter is set to „1“, a monitoring of the molding machine will be realized via the "external lowering entrance". In this case, the actual “lowering function” is however annuled.
Realization of monitoring:
If the molding machine is active and in perfect condition, it has to keep the contact for the external lowering closed. It opens this contact, if an error at the molding machine occurs. Then the controller activates the lowering function after the time which has been adjusted in the menu item “Temp. lowering (ext.)”.
This kind of lowering provides that the controller is in ready-for-molding mode.
Now the lowering key serves for putting back the external lowering. Within this setting the actual lowering-function can not be used any more.
Standstill-Monitoring:
default: 0
min: 0
max: 1

-22- boost for manifolds

If this parameter is set to „1“, the temperatures of the manifolds (load > 600W) will be risen, too, when switching on the boosting function.
default: 0
min: 0

max: 1

-23- program -3- for lower

If this function is activated („1“), temperature program 3 will be loaded and the controller will work with the values set there (when lowering is carried out).
default: 0
min: 0
max: 1

-24- program -4- for boost

If this function is activated („1“), temperature program 4 will be loaded and the controller will work with the values set there (when boosting is carried out).
default: 0
min: 0
max: 1

-25- ext. input for boost

By activating this function the „external lowering entrance“ is converted into an „external boosting entrance“. If then the contact for the external lowering is closed, the boosting function will start.
default: 0
min: 0
max: 1

-26- operating hours

The current operating hours can be seen here.
default: ---
min: 0
max:

-27- operating minutes

The current operating minutes can be seen here.
default: ---
min: 0
max:

-28- friction temperature

This parameter is used for switching on and adjusting friction monitoring.
If „0“ is set here, this function will be deactivated. For switching on monitoring, a temperature between 1°C and 10°C has to be adjusted. The adjusted temperature value is a threshold, over that the current temperature has to increase for recognizing friction (Scheer-warming). In general, an adjustment of 4°C is advisable. This ensures that no deviations disturb the friction recognition (see chapter 4.6 Friction-Recognition and Monitoring).
default: 0
min: 0
max: 10

-29- stop after OK in min

If „0“ is set here, this function will be deactivated. By setting a time between 1 and 60 min this function is activated. Then the power output of a zone is switched off automatically, if it has been into regulating mode for longer than the adjusted time.
default: 0
min: 0
max: 60

-30- RS232 interface fixed

Fixing of interface-switching to RS232.
default: 0

min: 0
max: 1

-31- autom. slave mode

Switches the automatic leading function on („1“) and off („0“). If this function is switched on, the hot runner system tries to establish a so-called slaving zone for each zone (in current and in ready-for-molding-mode). This slaving zones must show an at least similar behaviour (set value, actual value, power output) as the zone, they are assigned to. Having determined a slaving zone for a zone, the controller switches into slave mode automatically, if a thermocouple failure occurs at this zone. Then the before determined slave zone is set as leading zone.
default: 1
min: 0
max: 1

-32- supress-friction

Suppression of regulating-deviations caused by friction.
If „0“ is set here, this function will be deactivated. For activating this function a value between 1 and 3 has to be adjusted. This value is a factor for smoothing down the measured temperature value. The larger the value is chosen, the slower the regulating becomes.
default: 0
min: 0
max: 3

-33- 5V/24V startup check

When switching the controller on, this parameter activates („1“) or deactivates („0“) the questioning of the low voltage-nozzles (5V / 24V) in DPK-devices.
default: 1
min: 0
max: 1

-34- load adapter recog.

Activates („1“) or deactivates („0“) the automatic recognition of load adapters.
default: 1
min: 0
max: 1

Attention:
By loading the default values all parameters are set to their default values again.

4 Other Functions

4.1 Ready to Start Molding Operation

As soon as a zone has reached the temperature window, the corresponding zone's green OK LED switches on in parallel display. If all adjusted zones have reached their preset temperatures, a potential free relay contact will be switched on additionally. This relay contact is located on the rear side of the system and is marked with OK. In addition the text "ready for molding" appears on the display.

The OK LED and the relay output will be switched off in case of:

- a fault
- lowering
- a preset temperature outside the temperature window

4.2 Automatic Slave Mode

The automatic slave mode makes it possible that zones with defective thermocouples can go on running anyway. For that purpose, the hot runner system (in the current and in ready-for-molding-mode) tries to establish a so called slaving zone for each zone. This slaving zone must show a similar behaviour with respect to power output and set value.
If the controller has determined a slaving zone for a zone, a defective thermocouple at this zone does not lead to its switch off inevitably. Instead of switching off, the faulty zone is switched into slave mode automatically and receives the before determined slave zone as leading zone. This way the controller can go on running (nearly without any interruption).
After loading the default values, the automatic slave mode is activated. In the parameter menu it can be disabled or activated again (Menu → Configuration → Parameter → -31- autom. slave mode).

4.3 Automatic Recognition of Load Adapters

After the adjustment this function checks, if a load adapter is connected to the unit's load exit.
Load adapters serve to the adaption of for example 5-zone-tools to 10- or 15-zone-controllers. They ensure that the manifolds are wired to the controller's 16A-exits. There are three different adapters in use:

Load Adapter	Function	Wiring
5 → 10	Adaption of a **5**-zone-tool to a **10**-zone-DPK/DPT-controller	Rewiring of Zone 5 to Zone 9
5 → 15	Adaption of a **5**-zone-tool to a **15**-zone-DPK/DPT-controller	Rewiring of Zone 5 to Zone 13
10 → 15	Adaption of a **10**-zone-tool to a **15**-zone-DPK/DPT-controller	Rewiring of Zone 9 to Zone 13 Rewiring of Zone 10 to Zone 14

The different load adapters are available from GÜNTHER Hot Runner Systems Company.
The load adapter's automatic recognition can be switched off in the parameter menu (Menu → Configuration → Parameter → -34- „load adapter recog.").

4.4 Temperature Lowering / -Boosting with Temperature Program

Temp.-Lowering with Temperature Program 3

Apart from setting a fixed value for the lowering temperature, it is also possible to use temperature program 3 for lowering. This way, an individual temperature for lowering can be assigned to each zone.
For adjusting the lowering temperatures, temperature program 3 has to be activated in the menu item "Temperature Programs". Afterwards any set values can be set for all zones. These adjusted set values will later be loaded as new set values for lowering when the lowering function has been activated. After adjusting the set values, an other temperature program, in which the normal settings for the tools are carried out, is activated.
In addition the function for lowering with temperature program 3 has to be activated in the Parameter Menu (Menu → Configuration → Parameter → -23- „program -3- for lower").
Lowering can be switched on with key „°**C/F↓**" or via the external lowering-entrance.

Temp.-Boost with Temperature Program 4

To boost up temperature, a temperature program for prescribing the set values can be used, too. The adjustment of the set values for boost is carried out like those for lowering, with the exception that now temperature program 4 is used.
This function is also activated in the Parameter Menu (Menu → Configuration → Parameter → -24- „program -4- for boost"). The boosting function is switched on with key „°**C/F↑**".

4.5 Standstill – Monitoring

With the standstill's monitoring function the molding machine's impeccable function can be supervised.
The molding machine's control is carried out via the DPK/DPT's external lowering-entrance. (However, this causes, that the actual lowering function cannot be used any more.) If the molding machine works regularly, it keeps a potential-free contact, which is connected to the controller's lowering-entrance, closed. If a fault occurs at the molding machine, it will open the contact. After the time of delay, which has been set in the menu item "Temp. lowering ext.", the controller then activates the lowering function. For this kind of lowering it is necessary that the controller is in ready-for-molding-mode.
In this case, key „°**C/F↓**" is used to put back the external lowering.

4.6 Friction-Recognition and -Monitoring

Depending on the condition of the tools, this function is able to monitor the molding-process and to localize possibly plugged nozzles. It uses the physical effect of the friction-warming (Scheer-warming) to localize defective nozzles.
If plastic is pushed through a nozzle with high pressure, Scheer-warming develops. Because of the friction-energy resulting from this procedure, the temperature of the nozzle increases for a short time. If this effect is missed at a nozzle when injecting the plastic, it can be supposed that a problem (blockage) exists here.

The function can be activated in the Parameter Menu (Menu → Configuration (99) → Parameter → -28- “friction temperature”) by setting of a friction temperature. If “0” is set here, the function will be deactivated. The temperature, which is to be set here, can lie between 1°C and 10°C. The adjusted temperature value is a threshold, over that the current temperature has to increase in ready-for-molding-mode in order to recognize friction. In general, an adjustment of 4°C is advisable. This guarantees that no deviations disturb the friction recognition.
If friction recognition is activated, all nozzle-channels (zones with a load < 600W) will be checked on friction cyclically in 0,5 second intervals. Within this procedure the friction-cycle (time between the phases of injection) will be established.
While recognizing friction, the text “friction recognition” is displayed in the status line of the display. If the controller has recognized friction, it shows the friction cycle and the detected zones in the status line.
If friction has been recognized at all nozzle-channels cyclically, the OK-exit is set. The OK-exit is cancelled, if friction has not been recognized at all nozzles. Then it has to be assumed, that nozzles without friction are plugged.

4.7 Fault Report

In the event of a fault, the display will show the fault and the protection system will shut down the power. With this fault a relay contact is closed. This relay contact is located on the rear side of the system and is marked with DEF. By pressing key "ENTER", all zones except the faulty one will be switched on. The DEF relay contact will be opened as well.
During the DPK/DPT adjusting all zones, no errors (only warnings) will be displayed, because faulty zones do not start after the adjustment.
A zone which evoked a warning is switched into the off temperature mode when no load is detected and switched into the off percentage mode when no thermocouple is detected.

The following faults are possible.

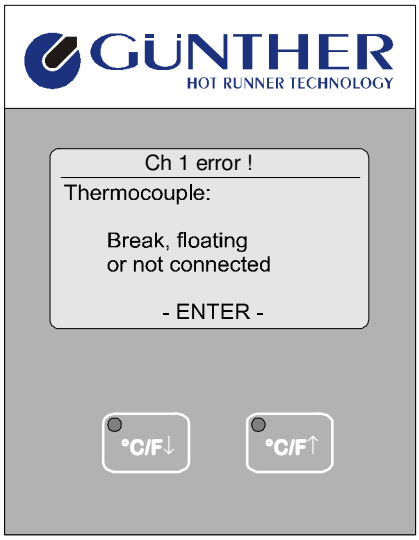


Fig. 4-1 Thermocouple Failure

Thermocouple Failure

The thermocouple of the shown zone
Please check the thermocouple and its

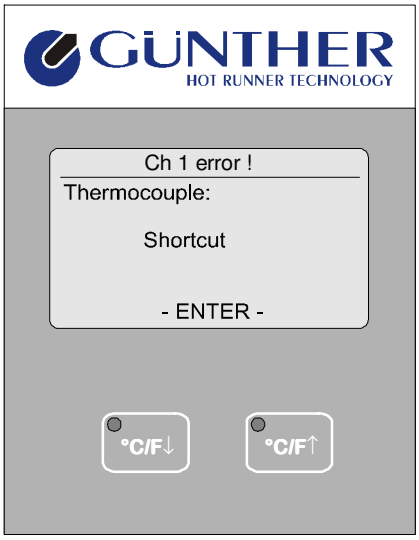


Fig. 4-2 Thermocouple Shortcut

Thermocouple Shortcut

At the shown zone there is a short circuit at the thermocouple or its connections. Please check the thermocouple and its wires.

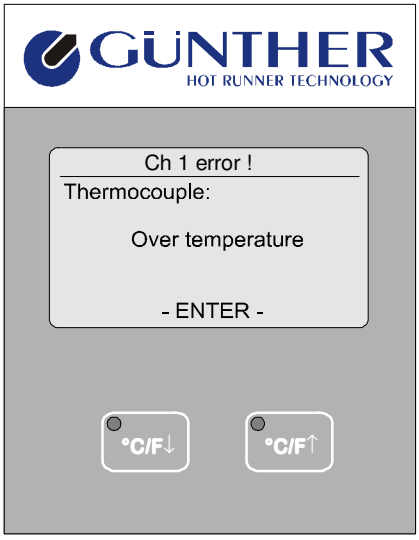
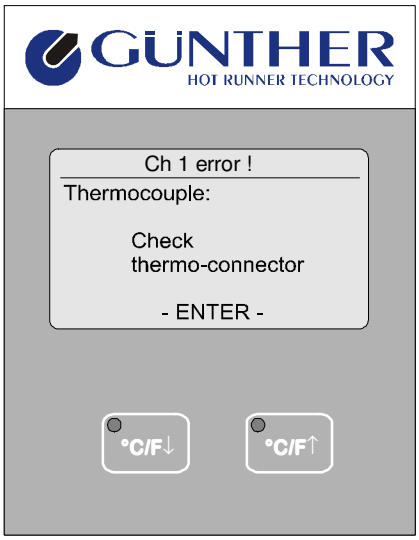


Fig. 4-3 Over Temperature

Over Temperature

The thermocouple of the shown zone detects a temperature above 500°C. Please check the thermocouple and its wires. You should also check the thermocouples of neighbouring nozzles.



Check Thermo-connector

The connector of the thermocouple at the shown zone is missing or not fixed. Please check the connections.

Fig. 4-4 Check Thermo-connector

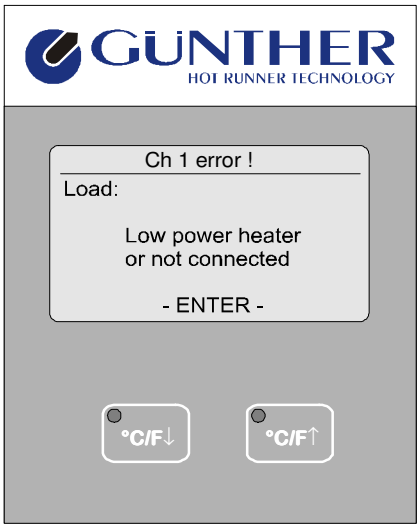


Fig. 4-5 Load Interrupted

Load Interrupted

The wires to the power module or to the nozzle of the shown zone are interrupted. Please check the load fuses and the wires.

In normal operation mode the load interruption is only detected at a percentage value of 100%. This error message can occur at the adjustage. In this case, the power of the nozzle could be too small for this application.

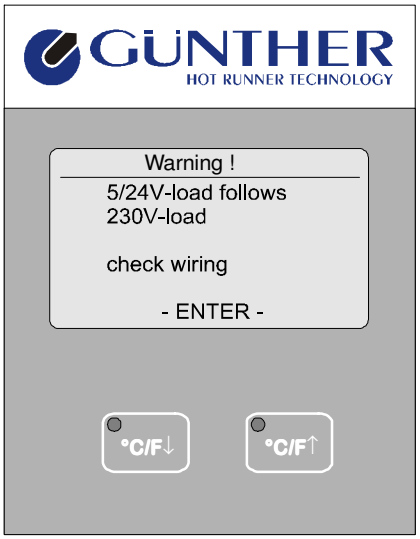
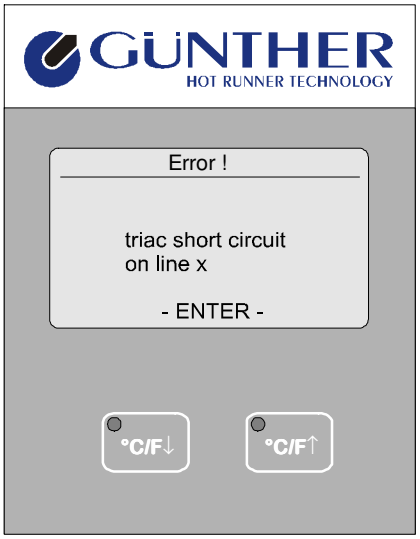


Fig. 4-6 Plausibility Error

Plausibility Error

The arrangement of the loads referring to the zone number is not in normal order. At first the low-voltage-nozzles should be connected to the low zone numbers and then the 230V-nozzles should be connected to the higher zones.
The parallel display shows the types of nozzles after the adjustment.
If this order is chosen intentionally, the operation can go on after confirming this warning.
When using a DPT unit, the order of the loads referring to the zone number is not important because there are only 230V-loads and no low-voltage-nozzles.



Damage of a Power Module

A damaged triac was detected on one of the power modules. Each phase of the power drives its own power module. So the damaged module can be determined.
Please let the damaged module be changed by an electrician or contact GÜNTHER Hot Runner Systems.
Please disconnect the line voltage before opening the device! Pay attention to the safety instructions!

Fig. 4-7 Damage of a Power Module

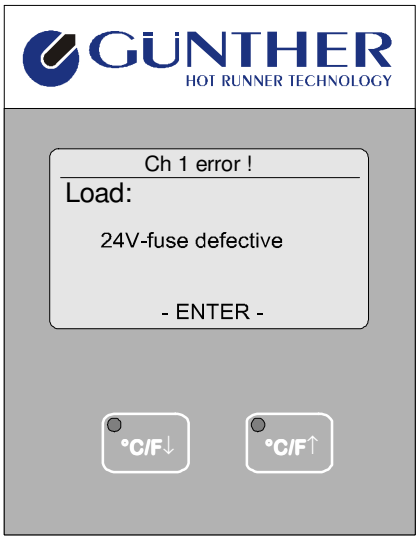


Fig. 4-8 24V-fuse defective

24V-fuse defective

On the power module (LS device) the 24V-exit circle's fuse is defective. Normally this knife edge protection fuse is located at the rear of the 24V power module.

5 Serial Interface

5.1 General Information

The DPK / DPT is equipped with one serial interface „COM1“ (see also **chapter 3.5.11 Serial Interface**). This is a standardized RS232 interface.

An optional serial interface „COM2“ is as well available as an add on kit. This second serial interface is used for connecting a DPK / DPT to a molding machine. With the interface „COM2“ it is possible to remote control and to display the information of the DPK / DPT unit via the molding machine. It enables easy quality control caused of a product data acquisition. This time there are several types of serial interfaces available. Depending on the molding machine a RS232, a RS485 or a TTY- interface is deliverable.

Which interface is needed for your molding machine, is described in the user manual of your machine. For further infomation please contact GÜNTHER HOT RUNNER SYSTEMS.
Because of several communication protocols for the different molding machines contact GÜNTHER HOT RUNNER SYSTEMS for availibility. (Please specify the type and manufacturer of your molding machine).

Please refer to the installation instructions for detailed information of installation.

The DPK / DPT with an optional serial interface gets all data from the molding machine. Any operation on the hot runner system is not necessary and for security reasons not possible. Parameter and set temperature changes will be impossible if the DPK / DPT is connected to a molding machine. This means especially the set values, the change all channels function, the temperature programs and the setting for temperature lowering and boost. A temperature lowering or boost via keys “°C/°F↓” and “°C/°F↑” is also not possible.

Hint:
If for example parameters should be changed, the connection from the DPK / DPT to the molding machine must be opened. (Disconnect the cable to the molding machine after switching off the DPK / DPT or switch off the molding machine). This causes no more data being sent to the DPK / DPT. Then the DPK / DPT notes that no interface operation is current. In this case the DPK / DPT enables any user operations after a few seconds. The DPK / DPT then works as a stand alone unit. The parameters and settings from the molding machine are stored in the DPK / DPT. This increases easy diagnosis to the hot runner system.

For the operation hints for the interface of the different molding machines please refer to your user manual.

The following interface parameters will be set if a protocol type changes:

Type	Interface Type	Parameters
Arburg	TTY 20mA	4800 Bit/s 8E1
Engel	TTY 20mA	4800 Bit/s 7E1
Krauss-Maffei	V24 / RS232	9600 Bit/s 7E2
Mannesmann-Demag	TTY 20mA	4800 Bit/s 8N1

5.2 Trouble Shooting

Hint:
If faults, which are not associated with the interface connection, occured, the DPK / DPT should be disconnected from the molding machine.

There are several red and green LEDs inside the DPK / DPT. You can watch them after opening the device. The LEDs for the connection to the molding machine are located on the display circuit (front panel). The two other LEDs on the module LR28 are for the internal communication between the operator / display panel and the regulator module.

By flickering the LEDs indicate that a data flow is current.

green / RXD Input DPK / DPT
Flickering indicates: The DPK / DPT gets data from the molding machine.

red / TXD Output DPK / DPT
Flickering indicates: The DPK / DPT sends data.

Hint:
If the DPK / DPT detects any failure, the loads will be disconnected from the power line. This error state is displayed on the DPK / DPT. If the zone which has caused this error is switched off, the error state will be confirmed. After that the other zones are switched on again.

You can get further information in **chapter 4.7 Fault Report** and **6.2.1 Initial Start-Up.**

6 Installation, Start-Up and Maintenance

6.1 Installation

6.1.1 Location

The absolute dimensions of the DPK / DPT are specified in **Appendix D**. Pay attention to guarantee a sufficient air circulation behind the DPK / DPT regulator unit (heat sinks). Ensure that a sufficient air circulation is supplied at the bottom of the DPK / DPT by an installed fan. The system must be set up on a stable and level area. The DPK / DPT has to be preserved from physical shock and vibration. For the maximum operating temperature please refer to **Appendix D**. Please take care of the other operating conditions listed in Appendix D. Protect the DPK / DPT from dust and dirt. When the device is assembled, for example in a service cabinet, a cable inlet of 120 x 90 mm should be provided.

6.1.2 Electrical Connections

The following electrical connections are required for installation:

DPK:

(Three phase CEE 32A plug) Phasedistribution:			
DPK 5	L1	Fuse 25A	L2, L3 not connected
DPK 10	L1, L2	Fuse 25A	L3 not connected
DPK 15	L1, L2, L3	Fuse 25A	

DPT:

(Three phase CEE 32A plug) Phasedistribution:			
DPT 5	L1	Fuse 25A	L2, L3 not connected
DPT 10	L1, L2	Fuse 25A	L3 not connected
DPT 15	L1, L2, L3	Fuse 25A	

Hint:
Before starting installation please check the main's voltage (star/delta). Star is the standard configuration of the delivered unit. Delta will be possible if the voltage between two phases does not exceed 200-250V. (Please refer to Appendix C.)

Thermocouple Cables

The thermocouple cable requires a 32 pin (2 x 16 pins) socket with a suitable housing. The cable assignment is listed in **Appendix A**. Parts and preassembled, prewired thermocable systems will be supplied from GÜNTHER HOT RUNNER SYSTEMS company.

Power Cables

The power cable requires a 40 pin connector plug with a suitable housing. Because of the large number of possible arrangements and the required special crimping tools, preassembled power cables manufactured by the GÜNTHER HOT RUNNER SYSTEMS company should be used.
In order to maintain a standard and for compatibility reasons the following procedures should be followed: If a combination of low-voltage- and 230V-zones is employed in DPKs (not in DPTs), the low-voltage-zones should be connected in a sequential arrangement of increasing voltages,

beginning with zone 1. After all low voltage zones have been connected, the 230V-zones can be connected to the system. For example in a 10-zone system, zones 1 to 4 are low-voltage-types and zones 5 to 10 are operating at 230V. The length of the power cable should not exceed 3 meters.

The following standard plug connections are available:

Low Voltage:

- 20 pin for power components type DL 4
- 39 pin for power components type DL 6 and DL 8
- 40 pin for power components type TS 4 - TS 12
- 40 pin for power components type LR 4 - LR 12
- For the 160/T12 respectively DL 12 one 20 pin and one 39 pin plug must be used

230V:

- 10 pin connector socket with cable for max. 5 zones (AG 5)
- 16 pin connector socket with cable for max. 8 zones (AG 8)
- 32 pin connector socket with cable for max. 15 zones (AG 16)

When ordering a power cable the following information is required:

- Number of low-voltage-zones
- Number of 230V-zones
- Type of low-voltage-connections (such as 20 pin, 39 pin or for DL4, for DL8 or DL12)
- Type of 230V-connections (10 pin, 16 pin or 32 pin) or (AG 5, AG 8, AG 16)

Hint:
To prevent connection errors between the temperature controller DPK / DPT and the power unit, the load connector of the DPK / DPT is mechanically coded. The power cables should be equipped with the same encoder system as the DPK / DPT.
This applies only in units using a star net supply (see Appendix C).
You can also order cables for connecting several low power units to a DPK / DPT (e.g. connection for 2 x DL8 or 3 x DL4 etc.)

Signal Inputs and Outputs of the DPK / DPT

Output Fault (Def.)

If a thermocouple or heating circuit failure is detected, it will be reported here. The output ´Defect´ (= fault) is a potential free normally open contact for 230V~ (max. 1A) or a protected extra low potential as specified by VDE (VDE = ´union of german electrical engineering´). The contact must be fused externally. A corresponding plug with 2,5m cable can be ordered from GÜNTHER HOT RUNNER SYSTEMS company.

Output Ready to Start Molding (OK)

As soon as the adjusted zones have reached the preset temperatures, the output „Ready to start molding operation“ is switched on. In addition a potential free relay contact „OK“ for 230V~ (max. 1A) is switched on. A corresponding plug with 2,5m cable can be ordered from GÜNTHER HOT RUNNER SYSTEMS company.

Input Lowering (Abs.)

By using a potential-free external contact, the DPK / DPT can be set to lowering.

Attention:
Never connect any voltage to this input!

Serial Interface

One serial interface (RS232) is included in each DPK / DPT.
For a connection to a molding machine a second serial interface is required. Depending on the molding machine and its protocol a RS232, RS485, RS422 or TTY- (current loop) interface is required. You can get this interface as an add on kit or from the manufacturer installed when ordering a new DPK / DPT. For further information please contact GÜNTHER HOT RUNNER SYSTEMS.

6.1.3 Additional Interface

The add on kit includes:

- 1 interface module
- 1 preassembled flatcable
- 5m interface cable 2 x 0.5mm² shielded, assembled for a connection to the molding machine Arburg, Engel or Krauss - Maffei (please note the type at your order)
- 2 pcs. spacer bolts including nut

Installation:

Attention:
Disconnect main power before opening system!

- Remove the top cover by removing the four screws on the side of the unit.
- Plug the interface into the 10 pin and 14 pin connectors on the front panel (LR27) **(take caution of the right direction!)**.
- Remove the cover panel at the rear of the DPK / DPT.
- Pull the pole connector with its flat cable through the opening of the unit and connect the D-SUB 9 pin connector by using the spacer bolts and nuts from the outside of the unit.
- Plug the flat cable into the interface module **(take caution of the direction!)**.

Attention:
Check the polarity ! Pin 1 of the PCD must correspond to pin 1 of the socket !

- Check the right jumper settings.
- Close the top cover and fix it by using the screws.
- Install the cable to the molding machine, connect it on both sides and fix the screws of the connectors.
- Setup the right protocol type in the DPK / DPT.

Interface- and Master Slave- Connections

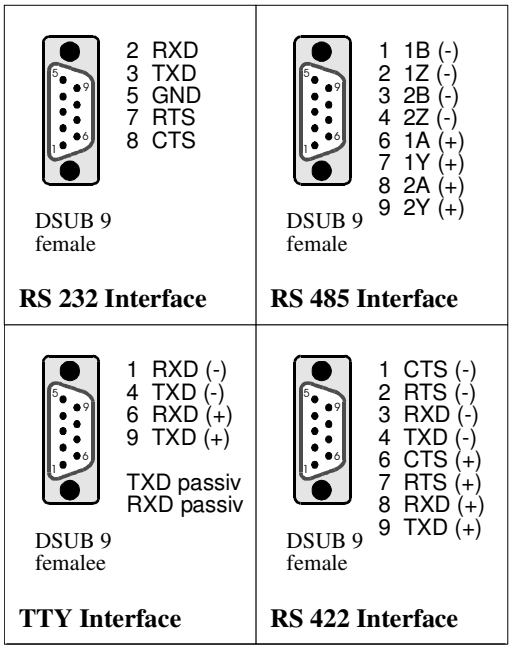


Fig. 6-1 Interface Connections of the DPK / DPT

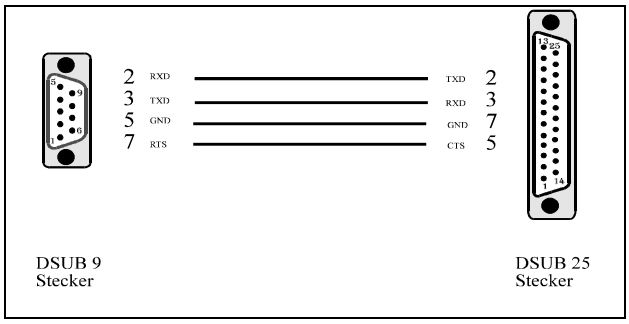


Abb. 6- 2 Wire Connection: Mannesmann Length 5,0m

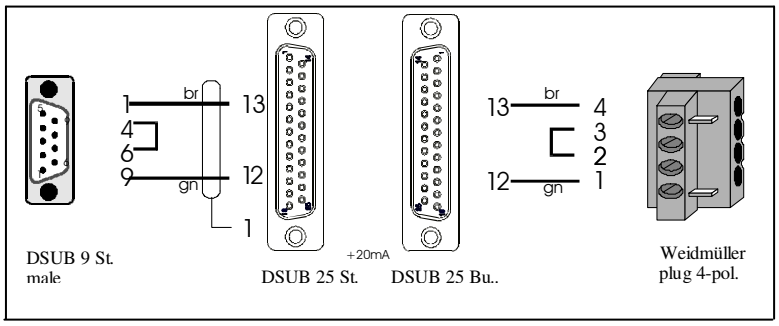


Abb. 6- 3 Wire Connection: Engel Length 4,5m

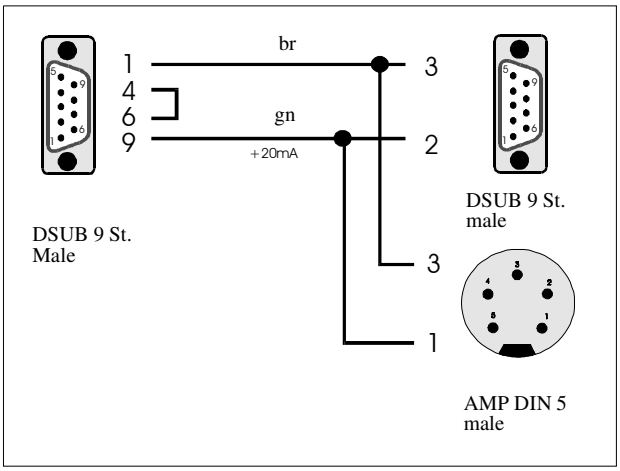


Abb. 6- 4 Wire Connection: Arburg / Selogica Krauss Maffei MC4 Length 4,5m / 0,2m

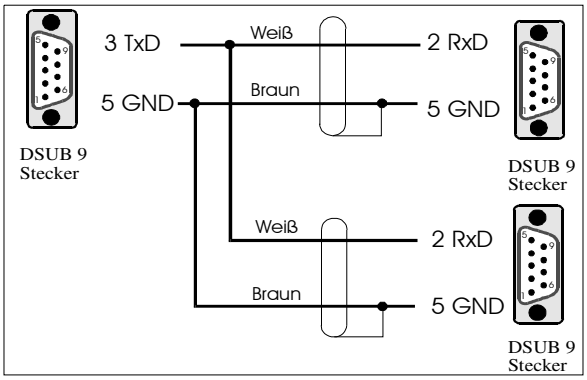


Abb. 6- 5 Interface-wire TYPE M/S-Wire-3 Length 3m

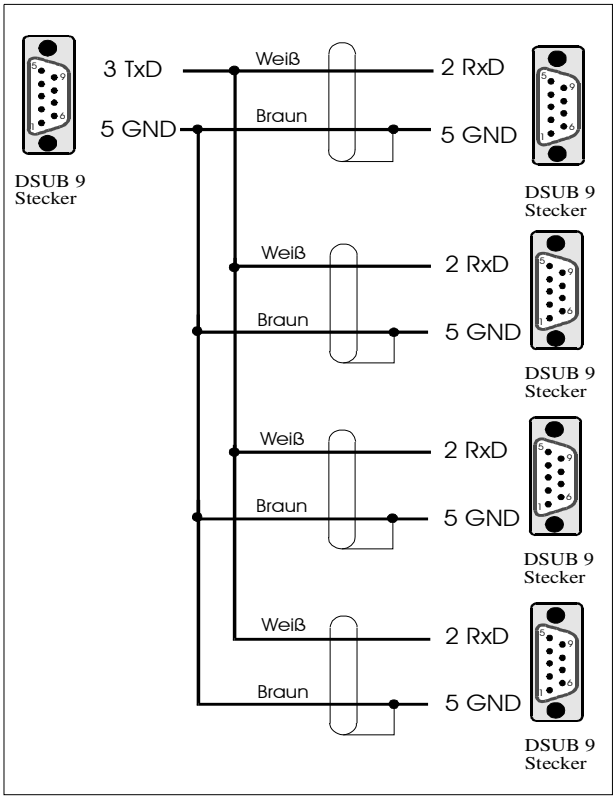


Abb. 6-6 Interface-wire TYPE M/S-Wire-5 Length 3m

Hint:
If an EPROM update is required at the same time as the interface installation is active, disconnect the molding machine from the DPK / DPT before switching it on.
At the order of an interface, please note the type of the interface!

Technical Data (Optional Interface):

Signal type	RS232 level, TTY level (20mA current loop) optional: RS485 level, RS422 level,
Dataformat	2 x asynchronous full duplex
Baudrate	max. 19.200 Baud
Cable length	max. 15m for RS232; max. 300m for TTY (cable cross section 0,4mm²); max. 1.000m for RS422 and RS485
Isolation	5kV (Input / Output)

6.2 Start-Up

6.2.1 Initial Start-Up

- Install the device refering to **Chapter 6.1 Installation.**
- Turn on the DPK / DPT. Now it shows the software version (e.g. P1.30) and begins to check the zones. Afterwards possible errors as e.g. “Load Interrupted” or “Thermocouple Failure” are displayed.
- After confirming the faults, the defective zones are switched off.
- Repair possibly occurred faults and switch on the controller again.
- If no fault has occurred or all displayed errors have been repaired, the diagnosis function should be started (see chapter 3.5.6 Diagnosis). By means of this function the assignment of zone and thermoelement can be tested.

6.2.2 Additional Information

Hint:
When working with the 230V-loads, switch off the DPK / DPT and disconnect it from the power source!

Opposite of much other regulating units for 230V, the DPK / DPT checks the loads at the power up procedure by using a current measurement. Because of that a clear statement about a load disconnection can be given.

For all zones the set value in ampere can be displayed.

To check the heater current, a clamp-amperemeter with true RMS measurement should be used. For low-voltage-nozzles (only connected to DPKs) a range of 0-150A is required. High-voltage-nozzles (connected to DPKs as well as to DPTs) require a range of 0-10A.

If there are problems with the installation of the DPK / DPT, please contact our service department for help. Please use the service form in **Appendix E** and send it to the next service department.

6.3 Maintenance

Attention!
Disconnect the main voltage and take care that there is no voltage at the DPK / DPT before opening the device!
Please follow the safety instructions!

6.3.1 EPROM Update

To install a software update, disconnect the power and thermocouple connections from the DPK / DPT. Disconnect the serial interface and the molding machine as well.
Now remove the top cover of the DPK / DPT and get the EPROM out of the module LR28. When installing the new EPROM, take care of the right direction and fit in socket of the circuit.
After that get the EPROM out of the module LR27. When installing the new EPROM, take care of the right direction and fit in socket of the circuit again.

Following this steps, close the cover of the DPK / DPT.

Attention!
Do never exchange the EPROMs!

After turning on the DPK / DPT again, it performs an update and an adjustment.
Now the DPK / DPT should work as usual.
When the DPK / DPT is turned on, the current software version is displayed in the right lower edge of the display.

6.3.2 Changing a Power Module "LR 31"

The DPK / DPT checks the thyristors of each power module at every adjustment. In case of an error the corresponding phase of the module is displayed with an error message. Because each LR31 is driven by a separate phase (zone 1-5 by L1, zone 6-10 by L2 and zone 11-15 by L3), the damaged module can be indentified easily.
For changing a power module, you have to remove the cover of the case. Mark the connecting lines of the module, which is going to be exchanged, to guarantee that the connections are not mixed up when installing the new module. Afterwards the five load connections, the neutral conductor, the phase connection and the IIC-Bus plug are detached from the power module. After removing the corresponding screws at the heat sink (rear of the housing) the power module can be pulled out at the rear of the device.
Before installing the new power module, it has to be coded corresponding to the zone assignment and its installing position by means of the jumper (see below "Coding a power module"). Now the power module can be put into the case from behind and can be arrested by means of the screws. The connecting lines are linked like in the old module. The cover is put on again and screwed up. Now the controller can be taken into operation again.

Coding of a power module:
Depending on the module there are one, two or three modules inside each DPK / DPT:

DPK 5 / DPT 5 → 1 power module in the lower installing shaft
DPK 10 / DPT 10 → 2 power modules in the lower and middle installing shaft
DPK 15 / DPT 15 → 3 power modules in the lower, middle and upper installing shaft

On the LR 31 there are two jumpers for the zone setting. The figure shows how they have to be set.

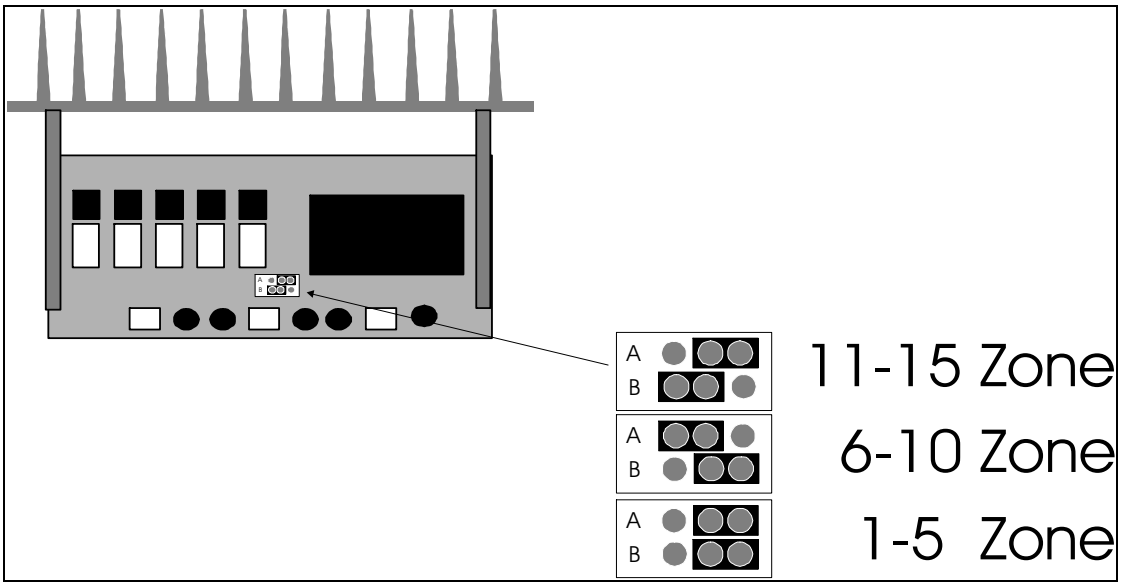


Fig. 6-7 Jumper Settings for the Power Module LR31

7 Appendix
7.1 Appendix A – Connections to the DPK / DPT

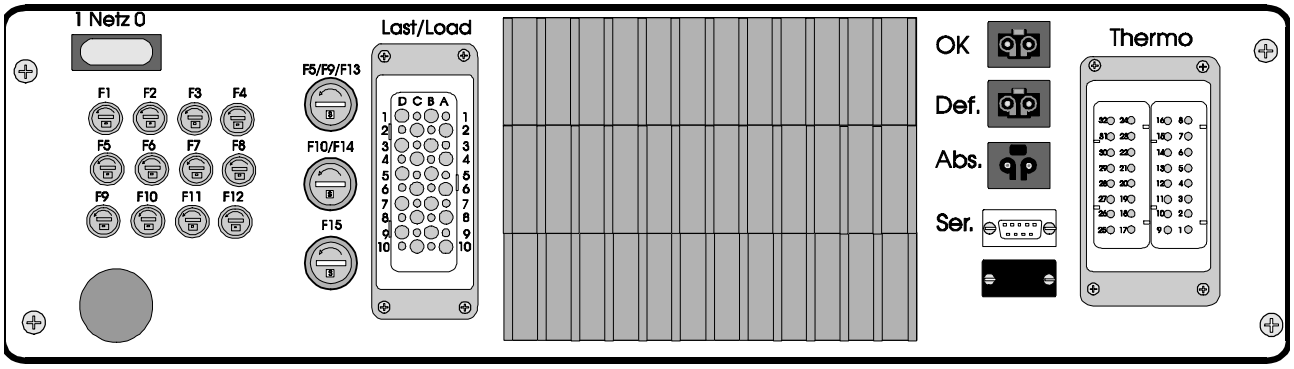


Fig. 7-1 Connections on the Rear Side of the DPK / DPT

Ser.: Serial Interface, OK: Ready to Start Molding
Def.: Fault, Abs.: Lowering external

Zone:	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
Metal / + / red	1	2	3	4	5	6	7	8	17	18	19	20	21	22	23
Constantan / - / blue	9	10	11	12	13	14	15	16	25	26	27	28	29	30	31

Fig. 7-2 Thermocouple Connector (32 pin) to the DPK / DPT

Zone:	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
External Conductor:	A1	A2	A3	A4	B1	B2	B3	B4	C1	C2	C3	C4	D1	D2	D3
Transducer:	A7	A8	A9	A10	B7	B8	B9	B10	C7	C8	C9	C10	D4	D5	D6
Transducer:	D7	D8	D9	D10	D7	D8	D9	D10	D7	D8	D9	D10	D7	D8	D9
Neutral Conductor:	A5	A5	A6	A6	B5	B5	B6	B6	C5	C5	C6	C6	A6	B6	C6

Fig. 7-3 Load Connector (40 pin) of the DPK15 / DPT15

Zone:	1	2	3	4	5	6	7	8	9	10					
External Conductor:	A1	A2	A3	A4	B1	B2	B3	B4	C1	C2					
Transducer:	A7	A8	A9	A10	B7	B8	B9	B10	C7	C8					
Transducer:	D7	D8	D9	D10	D7	D8	D9	D10	D7	D8					
Neutral Conductor:	A5	A5	A6	A6	B5	B5	B6	B6	A6	B6					

Fig. 7-4 Load Connector (40 pin) of the DPK10 / DPT10

Zone:	1	2	3	4	5										
External Conductor:	A1	A2	A3	A4	B1										
Transducer:	A7	A8	A9	A10	B7										
Transducer:	D7	D8	D9	D10	D7										
Neutral Conductor:	A5	A5	A6	A6	A6										

Fig. 7-5 Load Connector (40 pin) of the DPK5 / DPT5

Hint:
In star circuit the return cables A5, A6, B5, B6, C5 and C6 are only connected to the neutral conductor. In case of delta connection one does not mean a neutral conductor, but another external conductor (phase).
The connection position for special appliance (revision S) is different from the one shown.

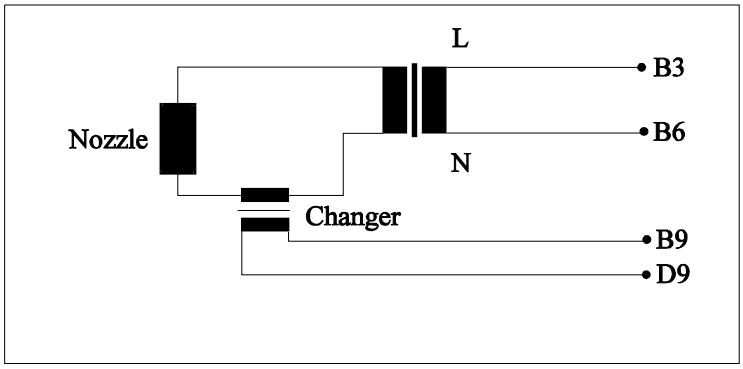


Fig. 7-6 Connection Example: Controller Runner A7 of the DPK10 / DPT10

Hint:
The load plug is different from the DPK15 / DPT15 corresponding to the appliance. Please take care of the corresponding table. (Fig. 7-3 to 7-5).

7.2 Appendix B - Fuses

Fuse Location for the DPK / DPT:
The up to 15 heating zones are fuse protected by super fast microfuses. On the DPK15 / DPT15 all of the load fuses are located on the back side of the controller.

Note that you have to switch off the controller before changing any fuse!

Hint:
Use only original fuses with the corresponding specifications. One package of original reserve fuses has been enclosed with the DPK / DPT.

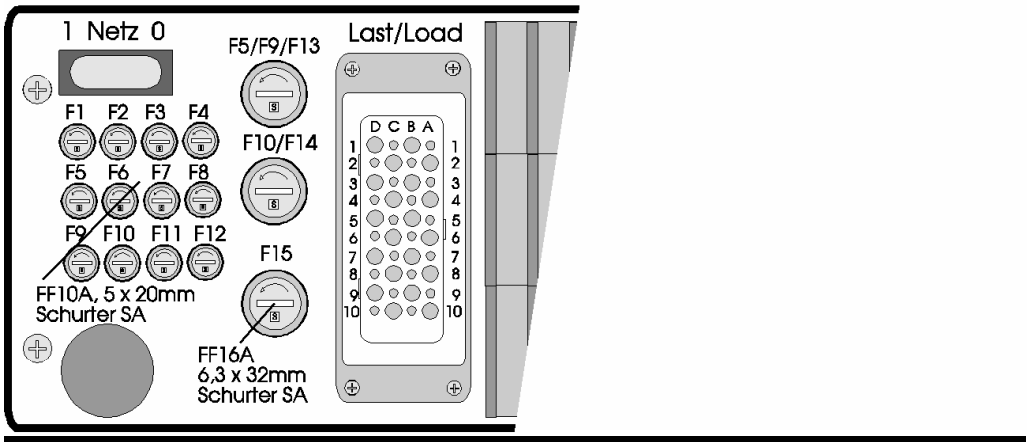


Fig. 7-7 Position of the Load Fuses of the DPK / DPT

The figure shows a part of the DPK / DPT's back plate. The 15 fuses for all heating zones are placed on the left housing side. The three 16A fuse holders are mechanically different from the 10A holders. The fuse number corresponds to the zone number.

Hint:
Please note that the DPK / DPT can be delivered as 5, 10 or 15 zone system. The lettering of both upper 16A fuses has ambiguous meanings.

The controller DPK5 / DPT5 contains four 10A-fuses for zones 1 - 4 and one 16A-fuse for zone 5.
The controller DPK10 / DPT10 contains eight 10A-fuses for zones 1 - 8 and two 16A-fuses for zones 9 and 10.
The controller DPK15 / DPT15 contains 12 10A-fuses for zones 1 - 12 and three 16A-fuses for zones 13,14 and 15.

Additionally to the heating zone fuses, the DPK / DPT contains up to four internal controller fuses. The main controller fuse for the major electronics is placed on the main board LR28 and has a nominal value of 160mA (T). Each of the power modules LR15 has a separate 160mA controller fuse.

7.3 Appendix C – Star-/Delta Operation

Attention!
Disconnect the main's voltage and take care that there is no voltage at the DPK / DPT before opening the device!
Please follow these safety instructions!

The unit DPK / DPT is prepared for a standard connection of a 400V star net supply. If a 240V delta net supply is necessary (for example USA), this can be adapted by using four screwbridges.

Disassemble the unit cover. Connect bridges as shown in the diagrams below.

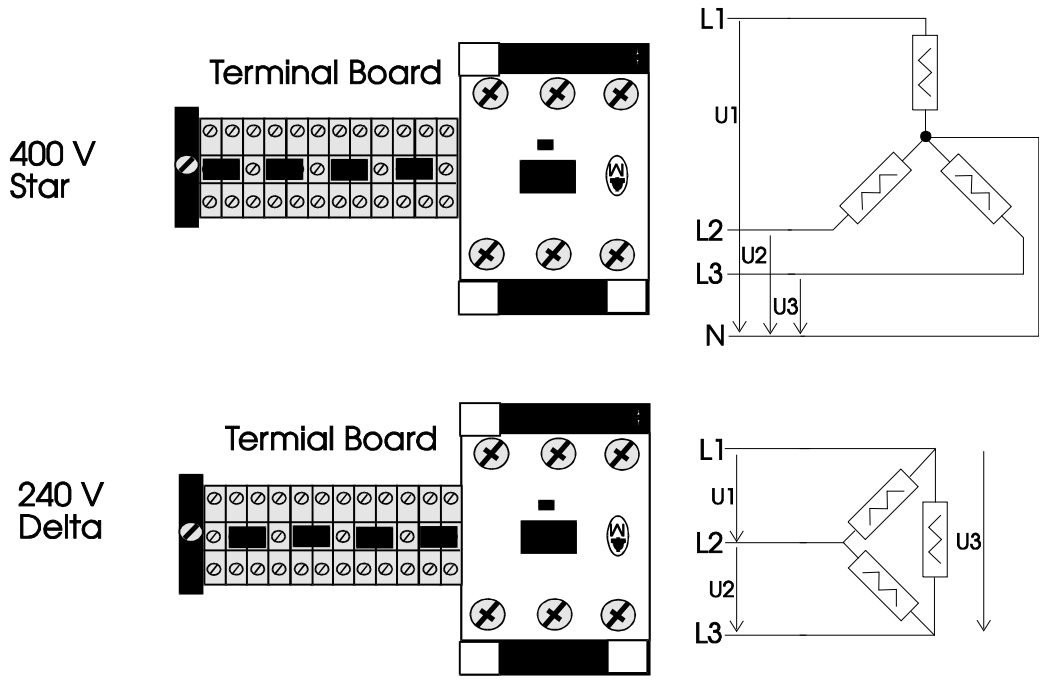


Fig. 7-8 Star- / Delta – Switch Over ***(U1=U2=U3=200V-250V !!!)***

Close the cover!

Attention !
The voltages U1, U2 and U3 must be within a range of 200V-250V!
If the unit is powered with other voltages, the warranty will expire and in some cases the unit can be damaged.
When using a delta-net supply, the cable is not compatible with the different versions. That means that the DPK5 / DPT5 should only be used with a cable intended for a five zone unit. The use of a cable designed for a 10 or 15 zone unit will lead to operation errors.

7.4 Appendix D – Technical Data

Connection Specifications:

Terminal Voltages: 200-250V AC per phase, 50 to 60Hz, typ. star connection
Star Connection: 3-phase-supply with neutral, 200-250V between phase and neutral
Delta Connection: 3-phase-supply without neutral, 200-250V between two phases

Load Connection: 10A per zone (fuse 10A super fast = FF 10A) 1 zone per phase 16A (see max. current of phase !)
phase load (5 zones per phase): max. 25A

Maximum Power:

DPK / DPT 5:	phase L1:	zone 1 - 4	= 2,3 KW	(10A) per zone
		zone 5	= 3,6 KW	(16A)
	max. overall load (CE):		= 3,6 KW	(16A)
DPK / DPT 10:	phase L1:	zone 1 - 4	= 2,3 KW	(10A) per zone
		zone 9	= 3,6 KW	(16A)
	phase L2:	zone 5 - 8	= 2,3 KW	(10A) per zone
		zone 10	= 3,6 KW	(16A)
	max. overall load (CE):		= 7,2 KW	(2x 16A)
DPK / DPT 15:	phase L1:	zone 1 - 4	= 2,3 KW	(10A) per zone
		zone 13	= 3,6 KW	(16A)
	phase L2:	zone 5 - 8	= 2,3 KW	(10A) per zone
		zone 14	= 3,6 KW	(16A)
	phase L3:	zone 9 - 12	= 2,3 KW	(10A) per zone
		zone 15	= 3,6 KW	(16A)
	max. overall load (CE):		= 10,8 KW	(3x16A)

Low voltage loads:
5V / 120A per zone using our power units
24V / 25A per zone using our power units

Load Type: ohmic and inductive ohmic loads are allowed

Thermocouple: thermoelectric couple Type L (Fe-CuNi) (electronic compensation)
thermoelectric couple Type J (Fe-CuNi) (electronic compensation)
thermoelectric couple Type K (NiCr-Ni) (electronic compensation)

Error Output: potential free contact, normally open (max. 230V/1A, unfused)

OK Output: potential free contact, normally open (max. 230V/1A, unfused)

Lowering Input: connect a potential free contact, normally open

Net Cable: 32A CEE plug (standard)

Sockets: Load connector: 40 pin Amphenol
Thermocouple connector: 32 pin Amphenol

Fuses: Triac unit:
- Microfuse FF 10A, 5 x 20mm, type Schurter SA, super fast for triacs (4 pcs. per module LR15)
- Microfuse FF 16A, 6.3 x 32mm, type Schurter SA, (1 pcs. per module separated on the back side of the device)

Ser. Interface: RS232, TTY, (RS422, RS485)
At the moment protocols are available for Arburg, Mannesmann, Krauss-Maffei and Engel. Further protocols are planned (e.g. SPI, EURO-MAP17, CAN BUS – please call us).

Regulator: PID, adjustable from the front
parameters are programmable and can be locked

Load Matching: automatic recognition of 230V- and low-voltage-loads (only DPK) with automatic adjustment of the control parameters

Output: DPK: uniform automatic parameters match by means of phase control mechanism
DPT: zero cross triac switch

Control Range: 0 to 500°C / 0 to 932°F

Set Range: 0 to 100%

Softstart: 3-phases
1. adjustable ramp on 50% of the set value
2. heat up to 105°C
3. adjustable hold time on 105°C

Starting Ramp: Equal heating of each nozzle depending on the slowest one

Lowering: adjustable 0 - 255°C / 0 - 255°F

Boost: adjustable 0 - 255°C / 0 - 255°F

Security Turn Off: adjustable 0 - 500°C / 0 - 500°F

Other Details:

Data Protection:	Data recovery after power fail, data storage lifetime at least 10 years (without battery)
Display:	Operating section: LCD graphic display 40 x 71 mm Parallel display: seven segment LED display 8mm and LEDs
Keyboard:	Front panel with integrated mechanical keys and key foil
Storage Temp.:	0 to 70°C
Operating Temp.:	0 to 35°C
Humidity:	Storage: 30% - 80%, not condensing Operation: 40% - 70%, not condensing
Protection Type:	IP 20
Dimensions:	(W, H, D) 468mm x 142mm x 345mm
Weight:	13,0 kg (28.6 lbs)
Color:	grey / blue (RAL 9018 / RAL 5015)

7.5 Appendix E - Service Form

(Addresses: see **Appendix H - Addresses**)

FAX

To:	**From:**
Company:	Company:
Phone:	Phone:
FAX:	FAX:
City:	City:
Date:	Date:
	Response partner:

☐ Please call back	☐ Ask for customer service	☐ Ask for repair	☐ Other

Service-form for control units from the Günther Hot Runner Systems company

Type of unit:
Serial number:
Program version:
Used connecting cable:
Voltage:

Net kind: ☐ Star ☐ Delta ☐ Other

5V : Zones...
24V : Zones...
230V: Zones...

If power units (5V / 24V) are used, are collective rails connected?

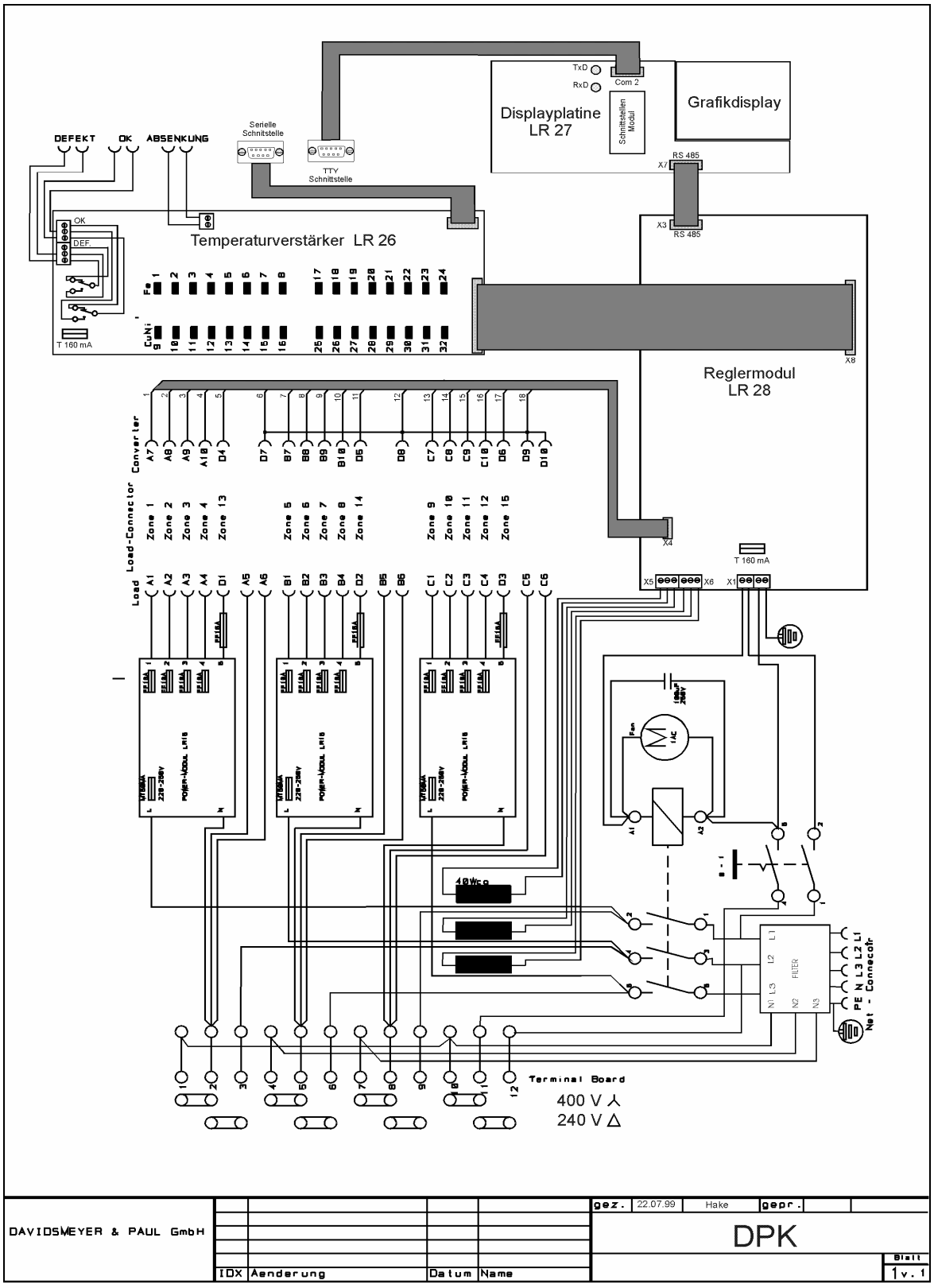
Description of previous history (initial start up, prior operation, etc.)

Problem description:

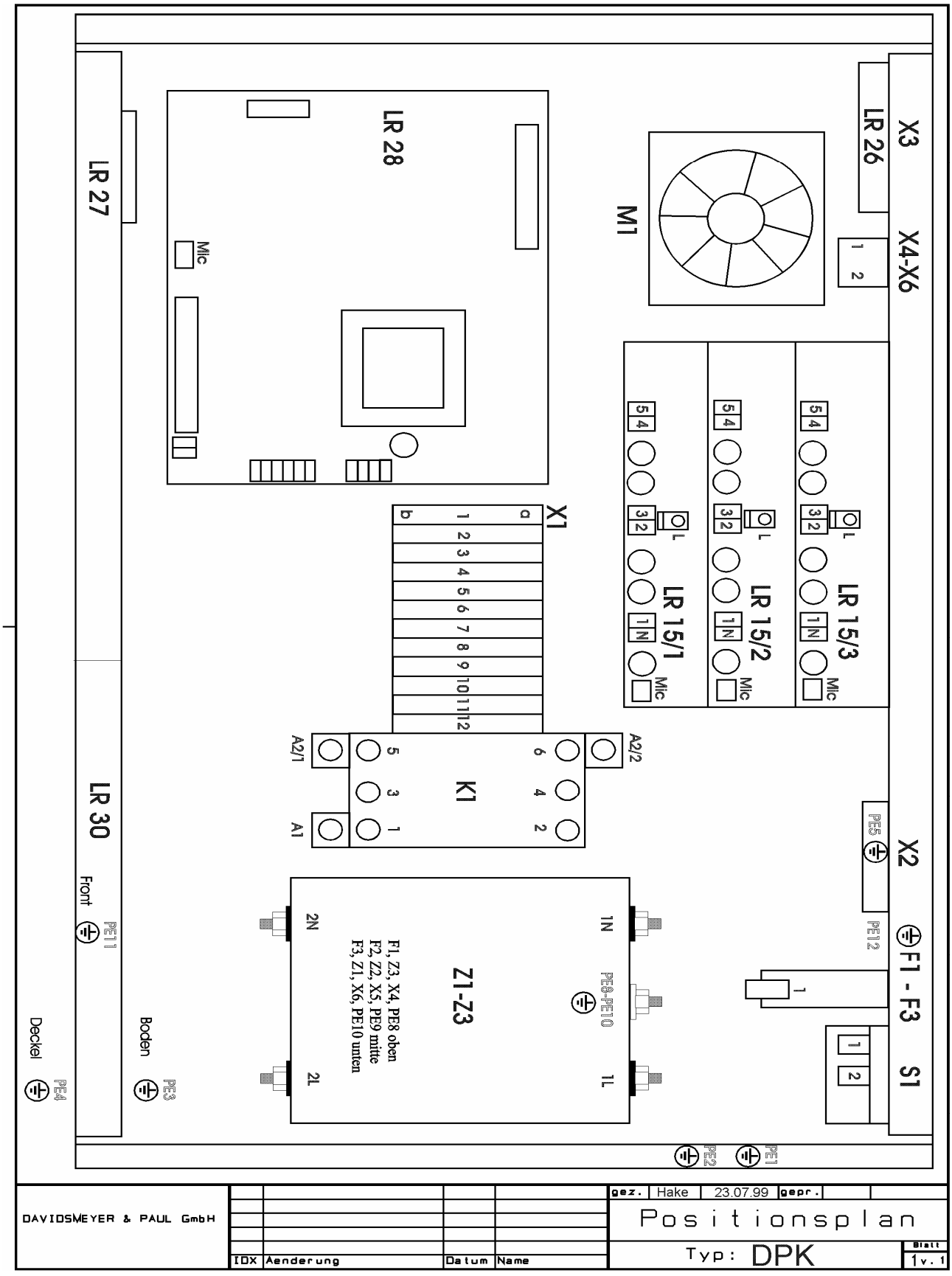
Other:

Notes:

7.6 Appendix F – Schematic



7.7 Appendix G – Position Schematic



7.8 Appendix H - Addresses

GÜNTHER Heisskanaltechnik GmbH

Industriegebiet Nord
Sachsenberger Straße 1
D-35066 Frankenberg (Eder)
Deutschland

Phone	(++ 49) 64 51 50 08 0
Telefax	(++ 49) 64 51 50 08 50
E-mail	info@guenther-heisskanal.de
Internet	www.guenther-hotrunner.com

7.9 Appendix I – EG Declaration of Conformity

For the following below listed products:

Günther-Hot Runner Controller DPK5-15 / DPT5-15

we hereby confirm that above listed products comply to all important (*) safety requirements that have been declared by the Council of Assimilation of Legal Regulations by the EC membership countries concerning electromagnetical conformity.

89/336/EWG EMV
73/23/EWG Low Voltage Requirements

To verify these products to electromagnetical conformity the following standards were referred to:

EN 50081, Part 2
EN 50082, Part 2

The above mentioned products also comply to:

DIN EN 61010, Teil 1/03.94.

DAVIDSMEYER & PAUL GmbH Elektronik
Humboldtstr. 2-4
D-50181 Bedburg

Bedburg, 01.06.2004

J. Marquardt
(Managing Director)

(*) Expressions recommended by "EMV-Rechtsvorschriften und ihre Anwendung in der Praxis", Franzis-Verlag, 1993.