Measure

Control

Automate

MCS® - Functions and Parameter Setting

Simply convincing

FELLER ENGINEERING GmbH

Content

1 Basic settings

1.1 Access rights

Description

System parameter IC: Password

The control unit is protected against unauthorised settings by a password = identification code "IC".

Release is given by code "22".

Passwords

Level 1	0000
Level 2	0022
Level 3	2222

System parameter IL: User level

The IL parameter determines the degree of locking at which the device is locked against input.

1= Only setpoints and operating modes are free.

2= All parameters are locked.
Partial lock: ON/OFF, setpoints, output rates, boost, standby, operating mode change, program change are free.

3= No lock, except for level 4

IL is always accessible via the code only.

Parameter

System parameter		Settings
IC	ID Code	0…999, standard value = 22
IL	ID Level	1…3, standard value=2

1.2 Fahrenheit Display

Description

This parameter shows the temperature unit in which the display and operation of the control unit takes place.

- 0: °C
- 1: °F

Parameter

System parameter		**Display**
FAH	Fahrenheit Display	0, 1

1.3 Thermocouple type

Description	**System parameter tEt**	
	The tEt parameter specifies the type of the thermocouples used for the entire MCS® control unit.	
Parameter	**System parameter**	Settings
	tEt Thermocouple type	0: Fe/CuNi type J 1: Ni/CrNi type K with temperature range max. 800 °C

2 Control behavior

2.1 Control parameters P I D

Description

We call automatic determination of the control parameters P I D classification.

PID parameters
When classifying zones, the controller will send a defined heating impulse to each zone to automatically determine the heating behaviour, e.g. of the nozzles or the manifold. The controller determines the matching control parameters for P, I and D and saves them in parameters 4, 5, and 6.
The process can be recognised by the additionally flashing green LED band and may take up to 90 s in idle, large objects.

Classification of the zone
The parameter 07 can be used to read the classification of the zone as a number.

Activating and deactivating classification
To get special settings of the P, I and D parameters for each case, the classification can be switched off with the system parameter CL = "0". Input "2" will delete the results of the existing classification. New classification at the next start is mandatory.

The standard setting is 1 = ON

Parameter

Zone parameters		**Settings**
4	P-Band	0…100%, standard value=5%
5	Tn adjustment time	0…999s; standard value= 80 s
6	Tv provision time	0…999s; standard value= 16s
7	Classification of the zone	(read only, value cannot be changed)
System parameters		
CL	Classification	OFF = 0 ON = 1 Delete current classification = 2; Standard value = 1 = ON

2.2 Suppression of Overshoots

Description	**Brake** At aggressive control circuits, the parameter brake can reduce overshooting when heating up.	
Parameter	**System parameters**	**Settings**
	brA Brake	1 = deactivated Setting range: 1...20 Standard value: 2

2.3 Maximum output rate

Description	**Maximum output rate** This parameter limits the maximum output power of the heating via the output rate.	
Parameter	**Zone parameters**	**Settings**
	15 Maximum output rate	0…100% Standard value: 100%

2.4 Pulse mode / phase-fired control

Description

Pulse mode and phase-fired control are two different ways of controlling heating.

Pulse mode

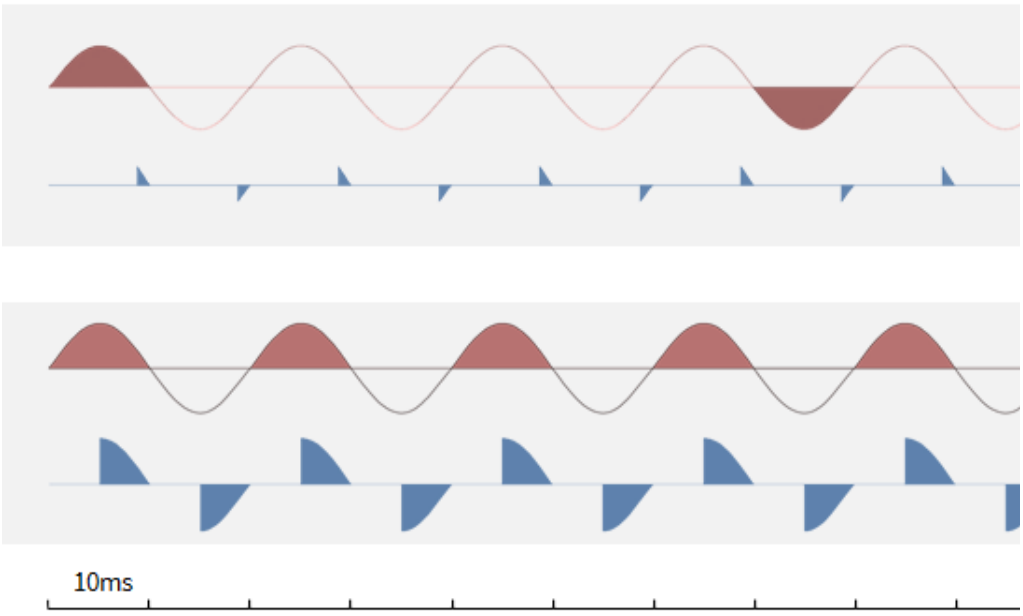
The outputs are controlled by complete half-waves that are output at different intervals according to the output rate.

Phase-fired control

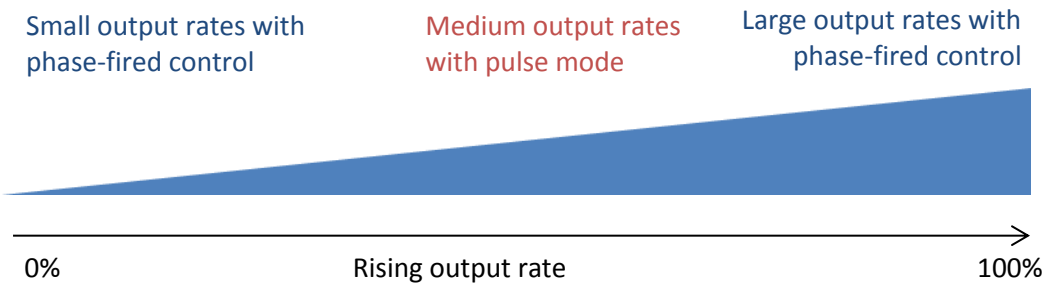
Here, the sine half-waves are cut off according to the output rate before the zero-crossing point. The voltage impulses are output in the 10 ms grid.

At a smaller output rate, the control supplies a better control behaviour via the phase-fired control. The voltage impulses are small and rapidly emitted in a 10 ms grid.

At a higher output rate, pulse mode produces the better control behaviour. The voltage switches at the zero-crossing point, which, among other things, reduces the wear on the heater.



When setting "Mixed", a combination of both operating modes will become active that combines the described benefits.
(starting at devices with 20 zones)



Parameter	**Zone parameters**	Settings
24	Pulse mode / phase-fired control (starting at devices with 20 zones)	The outputs can be controlled in pulse packages, phase-fired control or mixed. 0: Pulse packages 1: Phase-fired control 2: Mixed Standard Value = 0

2.5 Auto-Adaptation

Description	For this zone, adaptation of the control parameters can be chosen during heating. • 0: without parameter adjustment • 1: Adjustment of the P-component during heating • 2: Adjustment of the P, I, D values during heating • 3: Adjustment of the P, I, D is constantly executed	
Parameter	**Zone parameters**	**Settings**
	27 Auto-Adaptation	Setting limits: 0…3 Standard value: 2

2.6 Dead time

Description	Control circuits with extreme dead times (delay between heating control and sensor reaction) can be prepared with this specification [in seconds] for this zone.	
Parameter	**Zone parameters**	**Settings**
	28 Dead time	Setting limits: 0..999 s Standard value: 0 s

3 Heating

3.1 Gentle heating

Description	**Soft start = gentle heating** All zones are gently heated separately of each other to max. 100 °C, independently of a higher target temperature set. Up to a temperature of 50 °C, each zone is heated with a max. output rate of 50%. From 50 – 100 °C, the output rate is determined based on the present temperature, i.e. from 60 °C onwards the output rate is 60%, etc. After 100 °C are reached, the soft-start is complete and the zone can heat up at full output. Soft start is already pre-set ex works.	
Parameter	**Zone parameters**	**Settings**
	11 Soft start	0: Without soft start 1: This zone with soft start Standard value: 1

3.2 Group heating

Description	**Slow heating with consideration of the slowest zone** This is to prevent the complete tool, manifold and nozzles from being heated up with thermal dysbalances. All zones are heated up so that they must only have a specific temperature difference from each other (system parameter Ct = Max temperature difference of the group). The slowest zone works at the maximum output rate and the other zones will be limited in their output rate so that they must only advance by the set temperature difference. The parameter 12 defines the assignment of a zone to the "Group".	
Parameter	**Zone parameters**	**Settings**
	12 Group heating	0: This zone without group 1..8: Zone/group in group heating. Higher values are heated up first. Standard Value = 1

	System parameters		Settings
	Ct	Max temperature difference of the group	Can be set from 1° … 100° Standard value: 25°

Example

Zones 1 to 6 are to be heated together. The temperature difference during this heating process is to be 20 °C at most. Zones 7 and 8 are not to be part of the heating group.

Settings:

Zone 1 to zone 6: Parameter 12 = 1
Zone 7 and zone 8: Parameter 12 = 0
System parameter Ct = 20

3.3 Sequential heating / cooling

Description

Group heating/cooling sequential

To avoid tensions when heating a hot runner, some HK manufacturers require that individual zones for different function parts be heated separately in the tool.

The heating process starts with the zones/groups that have the highest set value at the parameter 12 = group heating (max. 8). This is followed by the zones with the lower values.

A group or zone will start its heating phase only when the preceding group or zone has reached 10 °C below the setpoint.

If no zones or groups are summarised for parameter composite heating, all zones will start without delay without the function sequential heating.

Sequential cooling works according to the same laws as heating, but in the reverse order.

Cooling limit

The parameter COL specifies from when onwards the next zone is to follow in cooling - the controller activates sequential cooling and specifies the bottom temperature limit. When this temperature is reached, the next sequence will be cooled. When all zones have reached this temperature, the outputs will be deactivated.

	Zone parameters		Settings
Parameter	12	Group heating	0: This zone without group 1..8: This zone in group heating

System parameters		Settings
Ct	Max temperature difference of the group	Can be set from 1° … 100° Standard value: 25°
COL	Cooling limit	0 °C: without sequential cooling 1..200 °C: Bottom limit of cooling

Example

Zone 1 is to be heated first; then zones 2,3,4 are heated together. Only then should zone 5 be heated.

Settings of the parameter 12 "Group heating"
Zone 1→ 3 Zone 2,3,4, → 2 Zone 5→1

3.4 Ramp

Description

Ramp

The ramp function "Ramp up" permits slow and even heating of chosen zones. The function can only be ensured when there is a sufficient heating output. The function group heating must be switched off when selecting the ramp function.

The ramp function "Cooling ramp" permits slow and even cooling of chosen zones. The function can only be ensured when there is a sufficient cooling.

The setting limit of the ramp function is 0...[1°/10 s]

Parameter

Zone parameters		Settings
13	Ramp up	Setting limits: 0 … [1°/10 sec) Standard value: 0
14	Ramp down	Setting limits: 0 … [1°/10 sec) Standard value: 0

4 Hot runner monitoring

4.1 Temperature monitoring

Description

Supervision of the zones to under- or overtemperature

Limit for undertemperature: L-Alarm
If the actual value is below this value, this will be used as an alarm.
The LED-strip will light up red.

Limit for overtemperature: H-Alarm:
If the actual value is above this value, all outputs are switched off until the actual value drops below the H-Alarm again.
The LED-strip will light up red.

Negative temperature deviation: dL-alarm
The actual value is below the lower tolerance band.
The LED-strip will light up yellow. The outputs will NOT switch off.

Positive temperature deviation: dH-alarm
The actual value is above the upper tolerance band.
The LED-strip will light up yellow. The outputs will NOT switch off.

Maximum upper temperature limit of all zones: HH-Alarm
The HH-parameter specifies the upper temperature limit of the device. When the HH value is exceeded, an alarm is generated and the main contactor will switch off.
The LED-strip will light up red.

Parameter

Zone parameters		**Settings**
1	L-Alarm	0…600 °C (800 °C at NiCrNi as a thermocouple) standard value: 0 °C
2	H-Alarm	0…600 °C (800 °C at NiCrNi as a thermocouple) standard value: 400°C
3	dL / dH-Alarm	1…600°, standard value: 15°C
System parameters		
HH	HH-Alarm	0…600 °C (800 °C at NiCrNi as a thermocouple) standard value: 500°C

Example

The setpoint is 200°C.

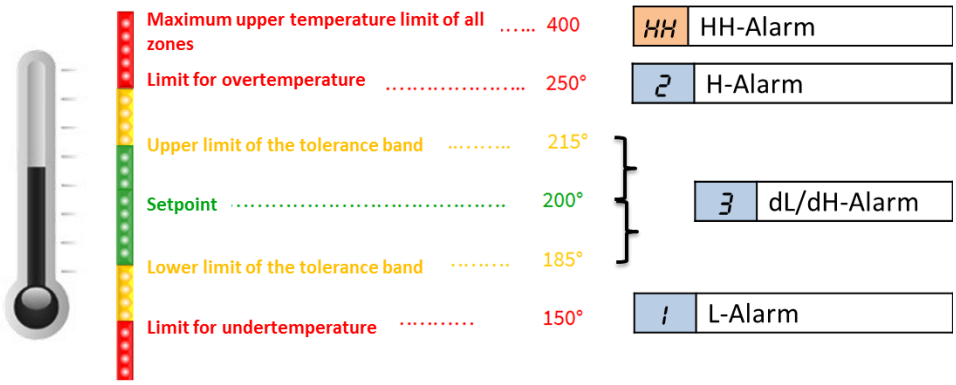
A tolerance band of 15°C is defined above and below the setpoint.
If the actual value exceeds or falls below these limits, a warning will be issued.
The LED-strip will light up yellow.

If the actual value is above 250°C, all outputs are switched off until the actual value drops below this value again. The LED-strip will light up red.

If the actual value falls below 150°C, an alarm will be issued and the LED-strip will light up red.

The upper temperature limit of all zones will be set to 400°C.

The settings are as follows:



Parameter

Zone parameters		Settings
1	L-Alarm	150°C
2	H-Alarm	250°C
3	dL / dH-Alarm	15°C
System parameters		
HH	HH-Alarm	400°C

4.2 Sensor monitoring

Description

Behaviour at sensor break with the parameter AP Auto Power

At a sensor break, automatic switching to four alternative control options is present. Selection of the alternative control options can be set via the AP parameter (Auto Power-Parameter).

AP=0: Output rate = 0%.
The zone remains in Controll Mode and must be switched manually to manual mode.

AP=1: Output rate = medium output rate.
The zone is automatically switched to manual mode. The output rate will be queried. The medium output rate can be assumed or a new value must be entered manually.

AP= 2: Output rate = medium output rate as AP=1, but without confirmation query

AP=3: Nominal output rate.
The zone with sensor break automatically switches to manual mode and applies the nominal output rate to be specified in parameter 16.

AP=4: Output rate = output rate of an alternative zone.
The zone takes over the output rate of an adjacent zone or zone with the same properties and is synchronously switched with this zone.
The alternative zone is specified in parameter 10.

At AP=3: Nominal value -output rate

The output rate to be used in the Auto-Power function AP=3 is specified in parameter 16.

At AP=4: Alternative zone

Parameter 10 specifies the zone that delivers the output rate at sensor break.

Parameter

Zone parameters		Settings
10	Alternative zone	0…128, standard value=0
16	Nominal value - output rate	0…100%, standard value=0%

System parameters		Settings
AP	Auto Power	0…4 (see above) Standard value: 0

Example

Zone 1 is to continue to work with the output rate of zone 2 at sensor break.

Settings:

Zone 1, parameter 10 = 2
System parameter AP = 4

4.3 Output rate monitoring

Description

The output rate monitoring serves to recognise irregularities in heating, e.g. at a leaking spray nozzle from which liquid plastic may leak (plug formation).

When the controller is in steady state and the process is stable the controller generates internally an average output level.

This average output level can be monitored for deviations (plus / minus).

17 Average output rate

This parameter is determined during the normal control mode.

18 Output rate monitoring average

The individual value to be entered is compared to the current average (parameter 17) and reported with dY at deviations.

19 Output rate monitoring tolerance

The tolerance for the deviation of the parameter 18 as compared to the average output rate is entered here. No dY is reported within the tolerance.

Parameter

Zone parameters		Settings
17	Average output rate	Is determined by the controller
18	Output rate monitoring average	0…100% Standard value: 0
19	Output rate monitoring tolerance	0…100% Standard value: 100%

Method

Step 1:
System boot. Let the system work at the setpoint for approximately 10 min. The determined value is shown in the zone parameters no. 17.

Step 2:
Enter this value as a kind of monitoring at the "output level setpoint" in zone parameters No. 18.

Step 3:
Enter in zones Parameter No. 19 the desired tolerance (alarm value) as absolute % value.

Example: 50% is the output level to be monitored, desired alarm at 45% and 55%, means the value "5" is to be entered in parameter No. 19.

In deviation to the predetermined tolerance value (+/-) the controller triggers an alarm (yellow) which is shown as "dY" in the display of the corresponding zone.

4.4 Leakage Current monitoring

Description

The leakage current monitoring reliably records leakage currents outside of a specified tolerance limit.

Leakage currents usually occur at first activation and heating up of the tool when moisture or insulation weaknesses may lead to currents flowing in the tool towards the ground (comparable to the function of an FI switch).

The outflowing current is recorded in the device. To dry out or remove errors, the tool is heated at max. 100 °C until the moisture has evaporated and the leakage current has dropped below the tolerance limit.

If the leakage current monitoring function trips during control mode, the tool and the controller must be inspected.

LC Leakage current limit

This parameter is used to enter the trigger threshold for the leakage current monitor.

LCL Leakage current monitor

The type of leakage current monitor can be selected with this parameter.

- 0 = deactivated, no measurements
- 1 = reports LC as a warning
- 2 = reports LC as an alarm
- 3 = reports LC as a warning and dries all zones at 100 °C.
- 4 = reports LC as an alarm and dries all zones at 100 °C.
- 5 = reports LC as a warning and dries only this zone at 100 °C.
- 6 = reports LC as an alarm and dries only this zone at 100 °C.

Drying is only initiated when the zones are below 100 °C in heating to a setpoint of >100 °C.

Parameter

System parameters		Settings
LC	Leakage current limit	10…300 mA, standard value=120 mA
LCL	Leakage current monitor	0…6, standard value=3

4.5 Heating current monitoring

Description

Nominal current

In parameter 20, a nominal current for the zones can be entered. The current measurement monitors this value with the tolerance purs. to parameter 21.

- 0.0: no heating current monitor
- > 0: this value is monitored.

Current tolerance

Parameter 21 specifies the tolerance for the heating current monitor. The current measurement monitors the value of parameter 20 at this tolerance.

Parameter

Zone parameters		Settings
20	Nominal current	0.0…25.0A, standard value=0.0A
21	Current tolerance	0.0…16.0A, standard value=0.5A

4.6 Triac monitoring

Description

Each zone has a dedicated Triac monitor (Triac = electronic power switch that directly controls the heating circuits), in order to determine possible control interruptions of a zone, e.g. nozzle heating.

A defective Triac is determined when a current flows without control of the outputs.

If a current flows, an error message Itr is displayed for this zone.

SSr Triac monitoring

This parameter selects the type of Triac monitoring.

- 0 = deactivated, no monitoring
- 1 = reports SSr as an alarm
- 2 = reports SSr as an alarm and switches off the main contactor

This switches off all heating. Only a restart will permit operating the controller again after the triac has been replaced.

Parameter

System parameters		Settings
SSr	Triac monitor	0…2 Standard value: 2

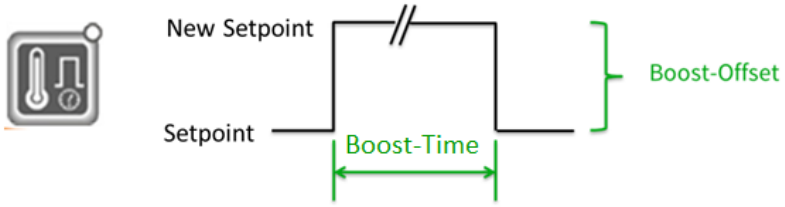
5 Special functions

5.1 Temperature raise BOOST

Description

Boost
By execution of the boost function, the temperature at specific zones or groups is raised by a fixed value - the boost offset - for a specific time (system parameter boost time).
The target is to balance out present temperature deficits.

The control takes place via the "boost button"



Parameter

Zone parameters		Settings
25	Boost offset	0…50K, standard value=0K
System parameters		
b-t	Boost time	0…600 s, standard value=60 s

5.2 Temperature lowering STANDBY

Description

Standby
The standby function is recommended to protect the tools and to reduce energy costs during downtimes.
The standby temperature can be specified according to the materials used here.
The control takes place via the "standby button".

Parameter

Zone parameters		Settings
26	Standby temperature	0…300 °C Standard value=0 °C

5.3 Communication

Description

The MCS® devices are equipped with an RS485 interface by default. Up to 32 devices can be managed together at the bus here.

Adr Device address in bus mode

To trigger the devices, it is necessary to assign each device a dedicated address. It must be observed that the same address is not assigned to two connected devices. Interference-free communication is thus not possible.

A PLUS unit automatically sets all subsequent addresses based on the master.

bAu Baud rate RS485-1

This parameter sets the baud rate for the transfer on the rear wall interface RS485-1.
1 = 9,600 Baud
2 = 19,200 Baud
3 = 38,400 Baud
4 = 57,600 Baud
5 = 115,200 Baud

bA2 Baud rate RS485-2

This parameter sets the baud rate for the transfer on the processor interface RS485-2.
1 = 9,600 Baud
2 = 19,200 Baud
3 = 38,400 Baud
4 = 57,600 Baud
5 = 115,200 Baud

tP1 Protocol type RS485-1

The tP1 parameter specifies the protocol type for the rear wall interface RS485-1.

- 0: FE3 for MCS®control, Visual-Fecon, Paracon
- 1: Euromap17

tP1 Protocol type RS485-2

The tP2 parameter specifies the protocol type for the processor wall interface RS485-2.

- 0: FE3 for MCS®control, Visual-Fecon, Paracon
- 1: Euromap17

Parameter	System parameters		Settings
	Adr	Address	1…32, standard value=1
	bAu	Baud rate RS485-1	1…5, standard value=2 (19,200 Baud)
	bA2	Baud rate RS485-2	1…5, standard value=2 (19,200 Baud)
	tP1	Protocol type for RS485-1	0 / 1, standard value=0 (FE3-protocol)
	tP2	Protocol type for RS485-2	0 / 1, standard value=0 (FE3-protocol)

5.4 Linking Controllers: PLUS unit

Description

Several controllers can be connected into a PLUS unit. The PLUS unit works virtually like one controller.

System parameter CAn

For the CAN-Bus connection of several controllers into a PLUS unit, different addresses must be entered here.

- 0: The CAN interface is deactivated to avoid interferences via open sockets.
- 1: This controller is the master for operation of all connected devices.
- 2-32: These controllers are displayed in a PLUS- unit as a slave (n) 1-31.

Parameter	System parameters		Settings
	CAn	CAN address	0…32, standard value=0

5.5 Diagnosis

Description

To test the sensor and heating, the MCS® device contains a diagnosis program. This program must be used particularly after initial installation or after mounting work.

As described below, the program must be chosen, the zones must be chosen and started. The zones can be reviewed either individually in groups or all in one routine. The process takes place without operation.

The diagnosis program recognises:

- Sensor heating or plug swap
- Sensor polarity
- Sensor short-circuit.

Since this function also monitors the proper functioning of the heating (a specific temperature increase must be implemented within a specific period), it is also

sensible to start the diagnosis program if irregularities occur in standard operation.

The duration of the diagnosis is determined by the program but can also be specified for extreme heating circuits in parameter 22 for heating by 5°.

Selected zones are not reviewed
- if the setpoint = 0,
- if no sensor is evident,
- if the zone has been switched OFF.

All zones, also outside of the selection, with a temperature sensor are monitored during diagnosis.

Diagnosis is started by setting the system parameter d 1A to 1.

Parameter	**Zone parameters**	Settings
	22 Diagnosis time	
	System parameters	
	d 1A Diagnosis start	

5.6 Monitor Zone

Description

This parameter permits using one zone for display only.

A monitor zone is removed from a group.

Monitor zones can be used for temperature monitoring as well with the parameters 1 – 3. (see chapter Zone Monitoring – Temperature Monitoring)

- 0: Controller Zone
- 1: Monitor zone, the zone is used as a pure temperature display when no outputs are present or no heating is connected.
- 2: Adjustment drive for this zone for which there are no inputs available at the controller or no sensors.

The cursor- LED flashes in the total display when selecting a monitor zone.

Parameter	**Zone parameters**	**Settings**
	9 Monitor Zone	0, 1, 2 Standard setting: 0

5.7 Standard parameter

Description	**System parameter StP** This parameter can be used to trip a reset of all settings to the factory condition. 1 = Loading standard parameters StP is always only accessible via the code. Loading of the standard parameters overwrites all input and resets the device to the basic position.	
Parameter	**System parameters**	Settings
	StP Standard parameter	0, 1 Standard value: 0

5.8 Offset Temperature

Description	**Offset Temperature** With this parameter, the temperature display for this zone can be adjusted. The current temperature and setpoint are treated as compared to the actual temperature and the set offset.	
Parameter	**Zone parameters**	Settings
	22 Offset Temperature	-99 / 100 K, standard value=0 K

5.9 Program

Description	The Pro-parameter serves to select one of the 6 programs. By switching the program, new setpoints and zone parameters are specified for all zones. Setpoints and parameters are set in the respective program and are available again without separate saving under this program. While the program has not yet been accepted, i.e. the program number flashes in the controller display, it is also not activated.	
Parameter	**System parameters**	Settings
	Pro Offset Temperature	1…6 Standard value: 1

6 Parameters "read only"

Parameter	Zone parameters		Display
	07	Classification of the zone	This parameter 07 can be used to read classification of this zone as a number. Display: 0…9
	08	Operating mode	The selected operating mode is saved here.
	17	Average output rate	This parameter is determined during the normal control mode. The average long-time output rate is recorded here during control mode. An entry will only be made 2 min after control in the tolerance range. Display: 0…100%
	32	Fault current	The current total fault current of the respective phase can be read here. Display: 0…mA
	System parameters		**Display**
	SC	Slowest zone	This parameter shows the current group heating with indication of the coldest zone. Display: 0…128
	L1	Phase voltage	These parameters display the current voltage of the respective phase. • 1: Phase 1 for zones 1, 4, 7... • 2: Phase 2 for zones 2, 5, 8... • 3: Phase 3 for zones 3, 5, 9... Missing phase voltage is displayed in the zones with -U-.
	Fr1	Phase frequency	These parameters display the current mains frequency of the respective phase. • 1: Phase 1 for zones 1, 4, 7... • 2: Phase 2 for zones 2, 5, 8... • 3: Phase 3 for zones 3, 5, 9... Missing frequency is displayed in the zones with -U-.

7 Overview Functions and Parameters

7.1 Zone parameters

	Zone parameters	Short description
1	L-Alarm	Lower temperature limit
2	H-Alarm	Upper temperature limit
3	dL/dH-Alarm	Permitted tolerance range of the actual temperature
4	P-Band	P - Parameter of the PID controller
5	Tn adjustment time	I - Parameter of the PID controller
6	Tv provision time	D - Parameter of the PID controller
7	Classification of the zone (read only)	The classification found is saved here.
8	Operating mode of the zone (read only)	The set operating mode is saved here.
9	Monitor Zone	The zone has a pure monitoring function
10	Alternative zone	Output rate specification at sensor break recognition
11	Soft start	Gentle heating by output rate limitation
12	Group heating	Shared slow heating of zones
13	Ramp up	Time increase of the target temperature
14	Ramp down	Time decrease of the target temperature
15	Maximum output rate	Output rate limitation to maximum value
16	Nominal value output rate	Output rate specification at sensor break recognition
17	Average output rate (read only)	The average output rate is saved here.
18	Output rate monitoring average	Comparison value with parameter 17 to be specified
19	Output rate monitoring tolerance	Permitted tolerance range for (18)-(17)
20	Nominal current	Nominal current of a zone to be monitored
21	Current tolerance	Tolerance of the current monitoring
22	Diagnosis time	Optional: Diagnosis time for heating up by 5 °C
23	Offset Temperature	Adjustment of the temperature display
24	Pulse package / phase-fired control	Control options of the outputs
25	Boost offset	Short-term raising of the temperature by x °C
26	Standby temperature	Lowering of the temperature to a specific value
27	Auto-Adaptation	Adjustment of the control parameters
31	Group number	Assignment of the zone to a group
32	Fault current (read only)	Total current of the respective phase
33	Friction tolerance	Activation of the friction control

7.2 System parameters

	System parameters	Short description
SC	Slowest zone (read only)	The slowest zone when heating is saved here
Pro	Program	Selection of one of 6 programs
diA	Diagnosis program	Start of the diagnosis
b-t	Boost time	Time of temperature increase for BOOST
FrC	Friction control	Friction monitoring
AL	Alarm delay	Possibility of debouncing alarms by delay
Adr	Address RS485	Address of the device
bAu	Factor Baud rate "1"	Baud rate of the RS485-interface #1
bA2	Factor Baud rate "2"	Baud rate of the RS485-interface #2
CAn	CAN-bus address	Address of the device when networking the controllers
Ct	Combined heating	Maximum temperature deviation of the group heating
AP	Auto Power	Behavior of the controller at sensor break
HH	HH Alarm	Maximum upper temperature limit for all zones
CL	Classification	Switching the classification on and off
LC	Leakage current limit	Trigger threshold of the leakage current monitor
LCL	Leakage current monitor	Type of leakage current monitor
SSr	Triac monitor	Setting the Triac monitor
FAH	Fahrenheit Display	Display of the temperature value
brA	Brake	Suppression of overshoots
StP	Standard parameter	Resetting the parameters to factory settings
IC	ID Code	Password
IL	ID Level	User level
PC	Power Control	Constant power output at mains voltage fluctuations
tP1	Protocol type RS485 "1"	Protocol type on the RS485-interface #1
tP2	Protocol type RS485 "2"	Protocol type on the RS485-interface #2
tEt	Thermocouple type	Type of connected thermocouples
COL	Cooling limit	Temperature limit at sequential cooling
L1	Voltage phase 1…	Display only: Voltage of the respective phase
Fr1	Frequency phase 1…	Display only: Frequency of the respective phase