FELLER ENGINEERING GmbH

MCS®r
Manual

This manual includes:
1) Operation -R-
2) Configuration -X-

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Safety hint

Before connection to the supply net the ratio of the 3 lines has to be checked against the settings of the controller. **MCS®r** will be delivered for star / Y- or triangle-net referring to the customer's demand.

It does not predict of dangerous voltage at the outputs
to switch off all outputs or single zones!
The referring plugs or the complete MCS®r unit have to be disconnected
from the supply net before maintenance of the connected heaters!
Disconnect the MCS®r unit from the supply net before open!

Contents

Technical data and detailed descriptions are to find in the additional manual
MCS® Configuration.
For Operation see manual MCS®control.

1 Survey of the units

The units of the series **MCS®r** are available in 64-, 96- or 128-zone-housings with rolls.
There is **MCS®control** or **MCS®control-lite** required for the operation.

MCS®rXXX
Height depends on number of zones

MCS®control
Monitor for operation

1.1 Safety hints

The **MCS®r** units have to be connected to the specified supply net. The local and the general rules have to be observed for the installation and operation.
The units have to be wired and commissioned by authorised persons.
Maker and vendor of the unit are not liable for direct and indirect damage or loss due to wrong handling.

It does not predict of dangerous voltage at the outputs
to switch off all outputs or single zones!
The referring plugs or the complete MCS®r unit has to be disconnected
from the supply net before maintenance of the connected heaters!
Disconnect the MCS®r unit from the supply net before open!

1.2 Type label

The type label is to find on the right hand side of the controller. It indicates the type with the number of zones, the data for the electrical connection and maker's information.

MCS®r128		Year: 01/2008
Serial No.:		10 000
Supply Net:	[ ] Y 230/400VAC	[ ]50Hz
Max. 3x63A	[ ] ▲ 220VAC	[ ]60Hz
Sensor: Fe-CuNi	Protection IP20	
Made in Germany		CE

1.3 Features and functions

All units include the same functions which are described in the following:

- LED-stripe for permanent signalling
  The LED-stripe indicates 3 status of supervision to see from far away.
- Control loop identification by classification
  The controller differences inert from very fast zones by itself.
- Softstart for hot-runners
  Cold zones will be heated carefully.
- Combined heating
  All zones will wait for the slowest channel to heat up conformal.
- Boost-function
  Increase of temperatures of groups or single zones for settable time.
- Standby-function
  Decrease of temperature to a settable value.
- Auto-Power-function
  This zone will change to manual mode in case of broken sensor.
- 8 groups of zones
  Individual groups may be collected for collective changes and settings.
- Current measuring and supervision
  The heater currents are measured for each zone and may be supervised.
- Leakage current supervision with fast dry-out
  In case of leakage current the setpoint of all zones might be reduced to 100°C/212°F.
- Monitor-zones
  Individual zones can be used just for indication and supervision.
- Supervision of output rate against entered values.
  Prevention against unnoticed alteration by long-time wearout.
- Net-voltage protection for the sensor inputs
  High voltage at the sensor inputs will blast the referring fuses.
- Puls-package or phasecut control
  The outputs may be controlled in both ways or in a mix of these.
- Sensor control
  Broken sensor or reversal polarity will be detected and indicated.
- Fuse control
  A blasted heater fuse will be detected and indicate by LED.
- Triac supervision
  A defective triac will be detected and indicated by LED.
- Control quality
  The control quality may be observed for each zone during the process.
- PLUS-unit
  Several controllers operate as a single unit via CAN-bus interface.
- Diagnosis
  All zones can be checked by an diagnosis program.
- Sequential heating
  Selections of zones may be heated and cooled in sequences one after another.

2 Operation

The operation requires by the monitor **MCS®control**.

2.1 LED-stripe

A front LED-stripe signals three possible sates of supervision. The changes happen synchronous with the dry alarm-contacts (see alarm-contacts). The reaction may be delayed if required (see AL-parameter). The indications of the zones will never be delayed.

Green / yellow / red

Green = OK / flashes during classification
Yellow = Warning
Red = Alarm

2.2 Outputs ON/OFF

To be activated by **MCS®control** or at the front of the unit.

2 seconds

The ON/OFF key enables or disables all outputs. The status ON will be indicated by the green LED. The outputs have to be switched ON after each start.
Plug in or out should only happen, when outputs are disabled!
To enable outputs may be disabled by the digital input No.5 (see Dip-switch).
Leakage current >300mA inhibit to switch ON!
(see parameter 32)

Disabled outputs are not without voltage!

2.3 Groups

To operate via groups, these have to be defined by the monitor before.
It simplifies all further settings and operation to define and configure the groups before. This enables to separate nozzles from manifolds or different components from another. The real advantage is the common operation.
All settings are available for groups in the same way as single zones: setpoints, operation mode, parameters, boost, standby.
The assembly of groups has to be set by the monitor.

2.3.1 Sequential heating

Parameter 12 enables heating sequences that follow one another. A sequence consists of one or multiple zones. Before a sequences starts heating the previous one must have reached a difference of –10K below the setpoints.
The order of the sequences is always started from 8 and finishes at 1. The settings for these sequences should be entered after the selection of groups, as the selection might be taken over. (see parameter 12)

2.3.2 Sequential cooling off

The condition to cool off is the setting of parameter 12 for the combined heating resp. the activation of sequential heating.
The cooling off always starts with the highest assignment. Thus, the last heated zones will cool off first.
The OFF-key starts the cooling sequence. The referring LED flashes. Analogical with the heating the zones will only cool off, if the complete previous selection has reached the low

temperature limit (COL-parameter). The LED-stripe flashes yellow until the last zone has reached this value. All outputs are disabled, when the green ON/OFF-LED dies. By a further activation of the OFF-key (2 seconds) the sequential cooling off will stop and all the outputs are disabled directly.

2.4 Operation modes

The operation mode has to be changed by the monitor.
Each zone may run reduced operation mode by parameter 9.

- The zone is used for simple temperature indication (monitor), if no outputs are available or no heater is connected.
- This is a special mode of a zone without installed inputs or without sensors (manual Power-mode).
  But a connected sensor enables a control-mode, which requires a confirmation of the output rate after change to manual mode. (see Auto-Power **AP**).

2.4.1 Control mode

The control mode is the standard operation. Heaters will reach the required temperature, if the setpoint was entered.

In case of Auto-Power function
the zone changes immediately to manual mode.

In case of group-operation the indication of the total display changes to setpoint by itself.
This is not possible in manual mode or Auto-Power without sensor.

2.4.2 Manual mode (Power)

Manual mode will run the referring heaters without controlling the temperature. This may help in case of broken sensors.
The change to the manual mode proposes the last value that was used for the manual mode (Parameter 16).
If there is still a sensor connected, the temperature supervisions **L**, **H**, **HH** as well as the deviations **dL** und **dH** are still active.
The system-parameter **PC** may adjust constant rates to constant power output within fluctuating net voltage.

This is not possible for Monitor-zones.

2.4.3 OFF

The zone will be turned off without losing the settings.
If there is still a sensor connected, the temperature and triac supervisions **-H-** , **HH** as well as **-S-** are still active, when the setpoints are > 0°.

2.5 Boost

When outputs are switched ON, the Boost-key at the ***MCS®control*** increases the temperature of the selected zone or group for a short time.
The referring setpoint and the time have to be set by the settings at ***MCS®control***.

2.6 Standby

When outputs are switched ON, the Standby-key sets all setpoints to a lower setpoint. Standby will also be finished by this key.
The referring setpoint has to be set by the settings at ***MCS®control***.

2.7 Settings

All parameter settings are available by the monitor.

2.7.1 Alarms and reasons

When the LED-stripe changes to yellow or red, the of the referring zone indicates the type of alarm. The indicator for the actual value as well as the total display show the alarm alternating with the value.

Conversion °C - °F
The time for conversation of all programs and parameters may amount some minutes during the start after the change.

Sensor-failure
This sensor has a failure. In case of mixed polarity the main relay will trip at –15°C/5°F and can only restart after OFF/ON.

Temperatures too low, < -15°C/5°F are indicated like display overflow.

→ **Reason:**

- Temperature <-15°C/5°F?
- Polarity +/- of the thermocouple mixed up at the terminal points?

Broken sensor
There is no input signal from the sensor.

→ **Reason:**

- Sensor connected?
- Sensor wiring OK?
- Sensor plugs OK?
- Check the NSS-fuses inside the unit
- No Auto-Power function, AP=0

HH-Alarm
This actual value is above the **HH**-parameter. All outputs get switched off. The controller will go on heating only after restart when the actual value has decreased the **HH**-parameter.
→ Not for monitor-zones!

→ **Reason:**

- Setpoint too close to the **HH**-value?
- Heating from external?
- Triac defective?

H-Alarm
This actual value is above the **H**-alarm (parameter 2).All outputs get switched off until the actual value decreases below the **H**-alarm.

→ **Reason:**

- Alarm limit too close to the setpoint?
- Heating from external?
- Triac defective?

red

Current-alarm ITr
Current flows without any output rate (0%).

→ **Reason:**

- Triac defective, it is permanent closed!

Depending on the setting of the system parameter **SSr** the alarm-contact changes and the main relay turns OFF together with all heaters. The controller will be ready after restart and replace of the triac

red

Current-alarm IFu
No current while output rate >0%.

→ **Reason:**

- Fuse defective?
- Cable or connectors defective?
- Heater defective?
- Triac defective, not closing?

red

Current-alarm IF2
(only with option for 2nd internal fuse per zone)
In case of shorted circuit against PE with a blasted fuse there may a current heat up the zone. This is only possible at 3-line power supply without neutral wire. Such current will be detected directly with the turn on and will trip the main relay.

→ **Reason:**

- External fuse blasted?
- Shorted circuit against PE?
- Cables or connectors defective?
- Heater defective?

red

U-Alarm
No line-voltage for these zones detected.
See parameter L1-L3, or F1-F3

→ **Ursache:**

- Net supply interrupted?
- Internal upstream fuse blasted?
  MCS®2-16: 3 fuses on the controlboard
  MCS®20-128: 6 fuses in the terminal bloc

red

L-Alarm
This actual value is below the **Lo**-alarm.
(see parameter 1)

→ **Reason:**

- Alarm limit too close to the setpoint?
- Heating power sufficient?
- Heater defective?
- Sensor without contact to this zone?
- Defective output board in the unit?
- Sensor polarity mixed?

(red) yellow

LC-Alarm
The line of this zone has a leakage current, it might dry out at 100°C.
The reaction depends on settings the **LCL** parameter.

→ **Reason:**

- The heater must dry out to avoid damages.
- Isolation between heater and PE defective?

I-Alarm
The current is out of supervision tolerance.

→ **Reason:**

- Heater defective or partial failed?
- Nominal current (parameter 20) correct?
- Tolerance (parameter 21) too small?

dY-Alarm
Deviation of the output rate-supervision is out of tolerance.

→ **Reason:**

- Defective hotrunner system?
- Aging of the heaters?
- Values of output rate (parameter 18) not correct?
- Tolerances too small (parameter 19)?

negative temperature deviation dL
This actual value is below the deviation alarm (parameter 3).

→ **Reason:**

- Heating power sufficient?
- Heater defective?
- Classification passed?
- Sensor without contact to this zone?
- Defective output board in the unit?
- deviation alarm (Parameter 3) too small?

positive temperature deviation dH
This actual value is above the deviation alarm (parameter 3).

→ **Reason:**

- Increase deviation alarm (Parameter 3)
- Classification passed?

Plus-unit without complete connection CAN-Err
This indication has to be confirmed at the master of a PLUS-unit, after it is rebuilt completely.
There is no power output during this indication.
An alarm-confirmation (see above) is required after solving.

→ **Reason:**

- CAN-Bus disconnected?
- CAN-Bus missing the termination plug?
- One controller turned OFF?
- Assembly of the PLUS-unit was changed?

2.8 Zone-supervision

2.8.1 Classification

After switching ON the outputs, the controller runs a classification. The results overwrite the settings for P, I and D-, even manual settings if the classification differs from the last one.

The procedure will be indicated by the flashing green LED-stripe. It may need up to 90seconds for inert big components.

The classification may be disabled by the **CL**-parameter, to save special settings of the **P**, **I** and **D** parameters.
The range for the start of the classification procedure is 350°C/662°F but at least 30°C/86°F below the setpoint.

2.8.2 Softstart during heating-up

The advise for hotrunner systems is a slow heating-up at low temperatures with low output rates. The ***MCS®r*** controllers are fit with a special softstart routine. This allows a smooth but efficient heating up. The function can be disabled by zone parameter 11.

2.8.3 Leakage current supervision

The supervision of leakage current registers leakage current from a specified value (LC-parameter). As soon as the measuring exceeds this value the actual temperature value alternates with the indication **LC**.
The indication disappears only 10seconds after falling below the limit.

After plugging or unplugging of heater connectors
LC may appear for a very short moment.

If the setpoints are above 100°C the controller will dry out the hotrunner referring to the setting of the LCL-parameter. The controller will keep the zones at 100°C/212°F until the LC disappears and the possible humidity has vaporised. (see **LCL**-parameter)

2.8.4 Combined heating-up

The combined heating shall avoid a thermal asymmetric load due to slower and faster zones. Synchronous heating of all zones takes care of the tool and prevents of mechanical tension and early worn out.
All zones will be restricted in a certain temperature difference among each other (**Ct**-parameter) for synchronous heating. Only the slowest zone will run by maximum rate. The others will be limited to go ahead with the preset temperature difference. The controller is looking for the coldest zone during heat up (see **SC**-parameter).

The **SC**-parameter indicates „0“ if no combined heating is active.
During the active stage the number of the slowest channel / coldest zone will be indicated here.

The combined heating is working even during sequential heating. Fuse supervision
The fuse supervision detects blown fuses. There is no current, when the controller sets the referring output.
Defective heaters or wiring will result in the same indication.

2.8.5 Fuse-supervision

The fuse supervision indicates blasted fuses, as there is no current when it is required.
Defective heaters or wires may result in the same failure indication.

2.8.6 Sensor supervision

The controller detects missing or broken sensors. The actual value will be set to „-E-" or „-S-". This zone may go on by the Auto-Power with restricted function.
Mixed polarity decreases the indication down to „-EE" and switches the controller off until restart.

2.8.7 Triac supervision

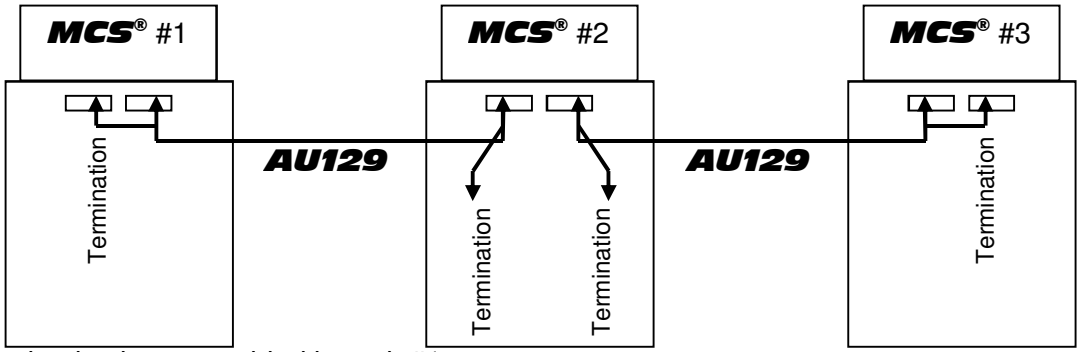
The triac supervision detects defective triacs, as there is a current, without the controller has set the referring output.

2.8.8 Output rate-supervision

The supervision of the output rate helps to detect non regular conditions in the heater system. After activation the actual mean rate (parameter 17) will be compared to an individual nominal setting for the output rate (parameter 18). In case of deviations greater than the tolerance (parameter 19) the controller will indicate **dY** for the referring zone.
The setting "0" and the period of heating-up (no mean values available) disable the supervision.

3 PLUS-unit

A PLUS-unit consists of multiple controllers which may be collected to one unit by a CAN-Bus interface. The connection happens by the interface cable **AU129** with termination plugs at both ends.
The proper function of the CAN-Bus requires the occupation of both plugs at the rear side of the controllers. The cable has to be connected directly and the remaining plug must be covered by a further cable or by the termination plug. This is part of each end of the cable **AU129**.



The operation is always enabled by unit #1 = master.
Examples with 3 controllers:

MCS®		n 1	n 2
Zone	**10**	**60**	**30**
CAN-address	**1**	**2..31**	**3..32**
e.g.	**1**	**2**	**3**
e.g.	**1**	**3**	**5**
e.g.	**1**	**10**	**20**
e.g.	**1**	**31**	**32**

The CAN-address 1 activates the master. The connected controllers “slaves” need a different increased CAN-address from 2 to 32.
Functions as groups, sequential combined heating, warning and alarm, parameters or Auto-Power are available at a PLUS-unit in the same way as at a single unit.

3.1 General settings of the PLUS-unit

The CAN-address has to be set before the connection with another unit. Therefore the CAN-BUS-cable may be disconnected or the other units have to be turned off. For the first-time settings the **MCS®control** has be connected to each single unit separately.
After setting the CAN-address the controllers must get restarted. The available number of zones has to be confirmed.

3.2 Start of the PLUS-unit

After all controllers are connected and turned on the total number of zones has to be confirmed at the master. The slaves indicate only its number of zones and the slave-No. This No. results from the hierarchy of the CAN-addresses and fixes the sequence of the slaves.

3.3 Separation of the PLUS-unit

After one or more controllers of this PLUS-unit have been disconnected or turned off, the system has to be confirmed at the master, when it is completed.

3.4 How to change the PLUS-unit

A change of the PLUS-unit results from

- Change of the total of zones
- Change of the number of controllers
- Change of the sequence of the slaves
- Any change of address at the slaves.

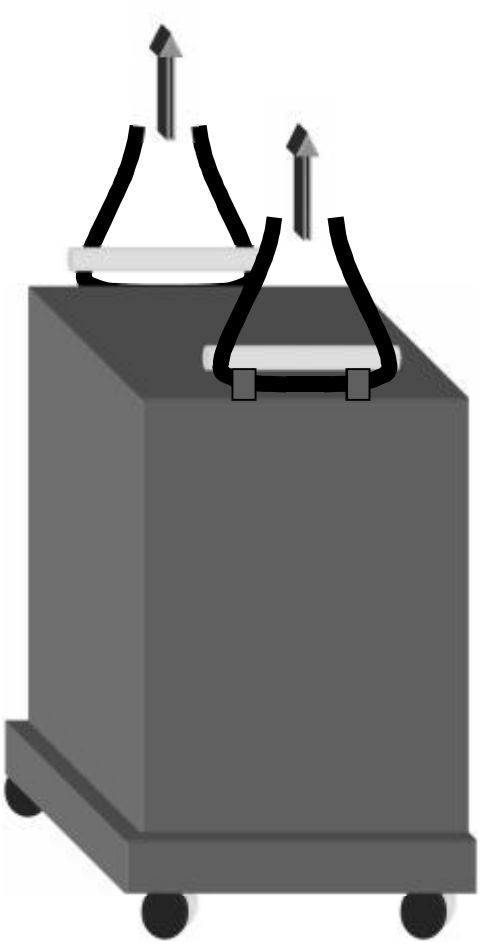
The following start is equal to the start of a new PLUS-unit.

3.5 Hint to the PLUS-unit

All changes of the constellation of a PLUS-unit will automatically delete the settings for the Alternative Channel Auto-Power **AP=4** to avoid wrong constellations.
The digital inputs are only available via the master for all controllers.

4 Transport MCS®r

The handles at each side may be used as shown in the drawing to lift the controller with appropriate ropes.



5 Declaration of EC-Conformity

referring to the following EC standards:
EC-Standard Electromagnetic Tolerance 2004/108/EG
EC-Standard Electrical Appliance 2006/95/EG

Maker:

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Herewith we declare by signature, that the following described product confirm to the above mentioned EC standards referring design, production and distribution.

Further applied standards, as far as applicable:
EN 60204 part 1 (Electrical equipment for machinery),
EN 61000-6-1 (EMC immunity), EN 61000-6-3 (EMC radiation)

Product:

Multi-Channel-System temperature controllers MCS® -series

Product name:

MCS®xxx
MCS®control

Year of first CE-sign: 1996

Rödermark, January 29, 2010

Quality supervisor

Registergericht Offenbach HRB 31367, Geschäftsführer: Dieter Skedzun

6 Headword-index

Details referring settings and parameters
are to find in the 2nd part
MCS® CONFIGURATION .

FELLER ENGINEERING GmbH

MCS®

Configuration

Additional Manual

	Zone-Parameters
1	L-Alarm
2	H-Alarm
3	Dev-Alarm
4	P-Gap
5	tn (Integral-part)
6	tv (Differential part)
7	Classification
8	Operation mode
9	Monitoring channel
10	Alternative channel
11	Softstart
12	Combined heating
13	Ramp up
14	Ramp down
15	Output rate maximun
16	Output rate nominal
17	Output rate mean
18	Output rate mean nominal
19	Output rate mean tolerance
20	Current nominal
21	Current tolerance
22	Diagnosis time
23	Offset temperature
24	Zero cross / phase control
25	Boost-Offset
26	Standby temperature
27	Auto-Adaption
28	Dead Time
31	No. of group
32	Leakage current
33	Friction Tolerance

(4sec)	System-Parameters
SC	Slowest channel
Pro	Program
diA	Diagnosis program
b-t	Boost-time
FrC	Friction Control
AL	Alarm delay
Adr	Address RS485
bAu	Factor baud-rate „1“
bA2	Factor baud rate „2“
CAn	CAN-Bus-Address
Ct	Combined heating
AP	Auto-Power
H H	HH-Alarm
CL	Classification
LC	Leakage current limit
LCL	Leakage current supervision
SSr	Triac supervision
FAH	Unit of temperature
brA	Brake
StP	Standard parameters
IC	ID Code
IL	ID Level
PC	Power-Control
tP1	Protocol type RS485 „1“
tP2	Protocol type RS485 „2“
LAn	National language
tEt	Thermocouple Type
COL	Cooling Limit
L1	Voltage line 1…
Fr1	Frequency line 1…
	a.s.o.

Safety hint (see also MCS® - Configuration)

Before connecting to the supply net, the voltage of the 3 lines have to match to the setting of the controller. **MCS®** will be delivered for star - or delta-net referring to customer's demand.

It does not predict of dangerous voltage at the outputs to switch off all outputs or single zones!
The referring plugs or the complete **MCS®** unit have to be disconnected from the supply net before maintenance of the connected heaters!
Disconnect the **MCS®** unit from the supply net before open!

Contents

Pages X-

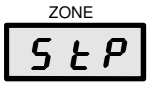
1 Application

This configuration manual bases on the total description of the referring manual **MCS®** or **MCS®control** for the monitor.
All representations for the variations with key-display and the monitor **MCS®control** are included.

2 Parameters

The default settings of the parameters are well sufficient for general control requirements. Customer's individual setpoints, alarm limits, operation modes a.s.o. have to be set referring to the task.

2.1 Reset to standard-parameters



A reset to default settings can be activated by the system parameter **StP**.

Reloading standard parameters overwrites all settings by the default values.

The LED-stripe is flashing during this procedure.

PLUS-units have to be separated for reset.

MCS®control provides a button on the screen „System Parameters".

2.2 Date and time

See System parameters \ Date-Parameter 2.5.32

MCS®control provides a sub-menu after double click on the digital clock.

2.3 Select Language

MCS®control provides referring buttons on the screen „Settings".

2.4 Password – IC

The controller is protected against unauthorised settings by the identification code "IC". The default code "22" unlocks the settings. This code may be changed from 0…999 by the IC-parameter.
The code will be retrieved by **IC?** has to be set and confirmed to unlock.
There are 3 levels to lock the unit. These are available by setting the **IL**-parameter.

1 = total locking: no settings possible without code
2 = partial locking: available are ON, setpoints, output rates, boost, standby, change of operation mode, change of programs and setting for **AC?**.
3 = no locking: all settings are available.

MCS®control opens a menu to enter the password, when required.

2.5 System parameters

These parameters may be used for operation of the ***MCS®*** unit. The settings refer to all zones.
The entry will be opened by the parameter-key.


>4 seconds

Pressing the parameter-key for 4seconds opens the entry to the system parameters.
This passes the zone-parameters.
Further parameters will be reached by the down-key.

CHANNEL


MCS®control provides a table with system parameters on the screen „Settings“.

2.5.1 SC-parameter (Slowest channel)

CHANNEL

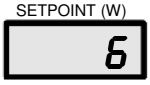

This parameter indicates the slowest channel / zone during combined heating.
(see **Ct**-parameter)

Indication: 0...128

Slowest Channel	Representation at **MCS®control**

2.5.2 Pro-parameter (Program)

CHANNEL


SETPOINT (W)



The **Pro**-parameter selects one of the 6 programs. Change of the program changes the setpoints and zone-parameters of all zones.
Setpoints and parameters have to be set in the activated program and will be stored directly. They are always available with the referring program.
The program is not enabled as long as the number flashes in the display.

➔ ID-Level: 1
Input limits: 1... 6
Default value: 1

Program No.	Representation at **MCS®control**

2.5.3 Diagnosis program

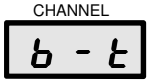
ZONE


The diagnosis program will be started by the setting of „1“ in this parameter.
The selection of zone or group will follow before the diagnosis starts.
(see diagnosis program)

➔ ID-Level: 2
Input limits: 0...1
Default value: 0

Separate screen	Representation at **MCS®control**

2.5.4 B-t-parameter (Boost-time)

CHANNEL


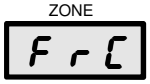
This parameter sets the time for the increase of temperature.
The value of temperature has to be set in parameter 25.
The boost mode has to be started by the boost-key.

➔ ID-Level: 2
Input limits: 0...600 s
Default value: 60 s

Boost-Time	Representation at **MCS®control**

2.5.5 FrC- parameter (Friction Control)

ZONE



➔ ID-Level: 2
Input limits: 0...30 s
Default value: 0

The groupwise friction control will be enabled by a setting the period for all zones (parameter 33 >0). This time limits the supervision within one injection cycle.

- 0s: without supervision
- 1…30s: supervision period for the group

Friction Control

Representation at **MCS®control**

2.5.6 AL-parameter (Alarm delay)

CHANNEL

➔ ID-Level: 2
Input limits: 0...60 s
Default value: 0 s

When an alarm occurs at a zone, the activation of the LED-stripe and the relay contacts may be delayed for a certain time. The setting of „0“activates the alarms immediately without delay. Other values in seconds cause a delay time.

Alarm Delay	Representation at **MCS®control**

2.5.7 Address-parameter (Address)

CHANNEL

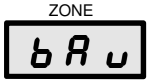
➔ ID-Level: 2
Input limits: 1...32
Default value: 1

An interface RS485 is part of the basic equipment of the **MCS®** units. Up to 32 units may be controlled together via the bus. To communicate with the units it is necessary to define an address for each unit.
Take care, that two units will never get the same address. Otherwise an undisturbed communication will not be possible.
A PLUS-unit sets all following addresses by the master. For operation with the monitor **MCS®control** the first address has to be „1“.

RS485 Address	Representation at **MCS®control**

2.5.8 bAu-parameter (Baud-rate 1)

ZONE

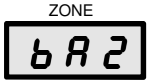


➔ ID-Level: 2
Input limits: 1...5
Default value: 2

This parameter sets the baud-rate for transmission via rear-side interface RS485-1.
1 = 9.600 baud
2 = 19.200 baud
3 = 38.400 baud
4 = 57.600 baud
5 = 115.200 baud
For operation of older **MCS®** controllers the transmission has to be set to 1 for 9.600 baud.

2.5.9 bA2-Parameter (Baud-rate 2)

ZONE



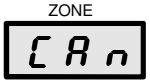
This parameter sets the baud-rate for transmission via processor interface RS485-2.
1 = 9.600 baud
2 = 19.200 baud
3 = 38.400 baud
4 = 57.600 baud
5 = 115.200 baud
For operation of older MCS® controllers the transmission has to be set to 1 for 9.600 baud.

➔ ID-Level: 2
Input limits: 1...5
Default value: 2

RS485-baudrate — Representation at MCS®control

2.5.10 CAn-parameter (CAN-Bus address)

ZONE



To enable a CAN-Bus interface for several controllers for a PLUS-unit different addresses have to be set here.

- 0: The CAN-interface is disabled to avoid interferences by open sockets.
- 1: This controller is the master with operation for all linked controllers.
- 2-32: These controllers will be indicated as slave (n) 1-31 in a PLUS-unit.

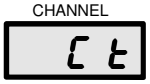
See also PLUS-unit.

➔ ID-Level: 2
Input limits: 0...32
Default value: 0

CAN Address	Representation at MCS®control

2.5.11 Ct-parameter (Combined heating)

CHANNEL



The maximum temperature difference to the slowest zone may be defined here for the combined heating.
The combined heating may be switched off for each zone separately by parameter 13.

➔ ID-Level: 2
Input limits: 1°C/32°F ...100°C/180°F
Default value: 25°C/45°F

See combined heating

Combined Heating CT-Gap	Representation at MCS®control

2.5.12 AP-parameter (Auto-Power)

CHANNEL

The AP-parameter disposes the selection of output rate, when the manual mode is activated by a broken sensor.

- **AP=0: output rate = 0%**, when the sensor is broken. The zone remains in control mode and switches the outputs off.
- **AP=1: output rate = mean output rate**, when the sensor is broken. This zone changes to manual mode. The mean output rate (parameter 17) will be indicated. This proposal has to be confirmed by the Enter-key. This indication asks for the output rate, if no mean rate (parameter 17) has been calculated before.
- **AP= 2: output rate = mean rate** (parameter 17), like AP=1 without confirmation by the Enter-key.
- **AP=3: output rate = preset rate** (parameter 16), without confirmation by the Enter-key.

➔ ID-Level: 2
Input limits: 0...4
Default value: 0

- **AP=4: output rate = alternative-%**, offers the input of a similar zone, which will run this zone synchronously. The flashing indication “AC?” asks for the input of the alternative channel / zone. The input will be stored in parameter 10 and will be used for the next time without asking.
  It is possible, that several zones are linked to the same alternative zone.

Auto-Power	Representation at MCS®control

For AP = 2, 3 and 4 (when the AC was preset) the zone changes directly to manual mode, when the sensor is broken. The confirmation by the operator is not required.
When the sensor has been returned, the operation mode has to be changed to the control mode.
AP = 1, 2 and 3 offer a constant output rate.

ATTENTION

We strictly point out that the temperature is **not** controlled, when the sensor is broken! When a constant output rate is set, external conditions may change the actual temperature of the zone. The manual mode is defined for emergency operation to keep the process temporary running. The defective sensor should be replaced as soon as possible.

2.5.13 HH-parameter (HH-Alarm)

CHANNEL

➔ ID-Level:	2
Input limits:	1...600°C / 999°F
Default value:	500°C / 932°F

The **HH**-parameter (**HH**-alarm) sets the upper temperature limit of the unit. Overriding of this temperature activates the **HH**-alarm. **HH** appears in the display and the main relay switches off. All outputs will turn off. The controller may go on heating only after restart when the actual value has decreased the **HH**-parameter.
If the **HH**-parameter should be set below any setpoint, so will these setpoints increase with the **HH**-value.
➔ Input limit 800°C/999°F for sensor type „K“ (see **tEt**)

HH-Temperature	Representation at MCS®control

2.5.14 CL-parameter (Classification)

CHANNEL

➔ ID-Level:	2
Input limits:	0, 1, (2)
Default value:	1 = ON

This parameter selects the classification. The classification will be passed directly after the start and creates new settings for **P**, **I** and **D**. Even manual settings may get lost when the conditions have changed meanwhile.
To save special settings, the classification must be switched off = “0”.
“2” will reset previous results and start a new classification routine. The setting will directly return to “1”.

Classification	Representation at MCS®control

2.5.15 LC-parameter (Leakage current limit)

CHANNEL

The limit for indication of leakage current has to be set here. It will be measured by the sum per line..

After plugging or unplugging of heater connectors LC may appear for a very short moment!

➔ ID-Level: 2
Input limits: 10..300mA
Default value: 120mA

MCS®2-16	Provide measuring and supervision per zone.
MCS®20-128	Provide measuring and supervision per line.

LC Limit	Representation at **MCS®control**

2.5.16 LCL-parameter (Leakage current supervision)

CHANNEL

The reaction in case of leakage current may be selected by this parameter.

- 0 = disabled, no measuring
- 1 = indicates **LC** by warning
- 2 = indicates **LC** by alarm
- 3 = indicates **LC** by warning and dries all zones at 100°C/212°F.
- 4 = indicates **LC** by alarm and dries all zones at 100°C/212°F.
- 5 = indicates **LC** by warning and dries only this zone at 100°C/212°F.
- 6 = indicates **LC** by alarm and dries only this zone at 100°C/212°F.

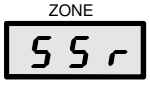
Dry out will only be activated during heat-up below 100°C/212°F.

➔ ID-Level: 2
Input limits: 0...6
Default value: 3

LC Supervision	Representation at **MCS®control**

2.5.17 SSR-parameter

ZONE



This parameter selects the way of triac supervision.

- 0 = Disabled, no supervision
- 1 = indicates **SSr** by alarm
- 2 = indicates **SSr** by alarm and turns the main relay off All outputs will turn off. The controller may go on heating only after restart after the triac was changed.

➔ ID-Level: 2
Input limits: 0...2
Default value: 2

TRIAC Supervision	Representation at **MCS®control**

2.5.18 FAH-parameter (Fahrenheit-indication)

CHANNEL

This parameter indicates the setting for °F of the unit.

- 0: °C
- 1: °F

(see DIP-switch)

Indication: 0, 1

PROCESS VALUE (X)

☼ °F

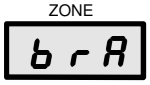
☼ °C

An LED beside the actual value (here 229) indicates always the type of temperature measuring.

Unit of Temperature	Representation at MCS®control

2.5.19 Brake-parameter (Overheat-brake)

ZONE



This parameter sets an additional brake for aggressive control loops. In spite of fast answers to disturbances the brake will prevent overheating during heat up.

- 1 = Disabled, no brake
- 2...20 = Brake factor

➔ ID-Level: 2
Input limits: 1...20
Default value: 2

Brake	Representation at MCS®control

2.5.20 StP-parameter (Standard parameters)

CHANNEL

A reset of all settings can be started by this parameter.

- 1 = Reload the standard parameters

StP is only available by the code.

Reloading standard parameters overwrites all settings by the default values.

➔ ID-Level: 4
Input limits: 0, 1
Default value: 0

The procedure may need some minutes for all zones, programs and parameters.

Screen for Settings	Representation at MCS®control

PLUS-units have to be separated for reset.

2.5.21 IC-Parameter (ID code)

CHANNEL

A new password will be set here. This password has to be entered when asked to unlock the unit. After the setting of a new password, the unit will be unlocked.
A three-digit entry-code (ID-Code) will be set here. This code unlocks the controller.
IC is only available by the code.

➔ ID-Level: 4
Input limits: 0...999
Default value: 22

Screen for Settings	Representation at MCS®control

2.5.22 IL-parameter (ID level)

CHANNEL

The IL-parameter disposes of the level of lock, which inhibits the input of settings.

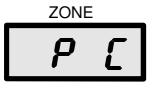
- 1: Only setpoints and operation mode are unlocked.
- 2: All parameters are locked
- 3: No locking, except level 4

IL is only available by the code.

➔ ID-Level: 4
Input limits: 1...3
Default value: 2

Screen for Settings	Representation at MCS®control

2.5.23 PC-parameter (Power control)



The **PC**-parameter activates the reference-voltage for the balance of the power in manual mode. Constant output rates will be adjusted to constant power output in case of fluctuating net voltage.

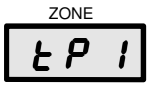
➔ ID-Level: 2
Input limits: 0, 1
Default value: 0
Indication e.g.: 226 [VAC]

- 0: No settings
- 1: Detection of the reference-voltage followed by the indication of the value.

A new reference-voltage may be detected by repetition of the setting „1“.

Power control	Representation at MCS®control

2.5.24 tP1-parameter (Protocol-type 1)



The parameter **tP1** defines the type of protocol fort he rear-side interface RS485-1.

- 0: FE3 for MCS®control, Visual-Fecon, Para-con
- 1: Euromap 17

➔ ID-Level: 4
Inputs limits: 0…1
Default value: 0

The reset at MCS®r might be possible only by DIP-switch 4 (happens at each Start in position ON).

Separate menu:	Representation at MCS®control

2.5.25 tP2-parameter (Protocol-type 2)

The parameter **tP2** defines the type of protocol fort he processor interface RS485-2.

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

➔ ID-Level: 4
Inputs limits: 0…1
Default value: 0

The reset at MCS®r might be possible only by DIP-switch 4 (happens at each Start in position ON).

Separate menu	Representation at MCS®control

2.5.26 LAn-parameter (Language)

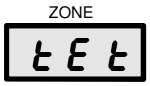
The parameter **LAn** defines the language, which has to be indicated at master controllers with data-wheel in a PLUS-unit.

- 0: German
- 1: English
- 2: Italian
- 3: Slovakian

➔ ID-Level: 4
Einstellgrenzen: 0...3
Standardwert: 0

Language MCS®	Representation at MCS®control

2.5.27 tEt- parameter (Type of thermocouple)



The **tEt** parameter sets the type of required thermocouple for all zones of the **MCS®** controller.

- 0: Fe/CuNi type J
- 1: Ni/CrNi type K with temperature range max. 800°C parameter HH, P1, P2 max. 800°C

➔ ID-Level: 2
Input limits: 0, 1
Default value: 0

Type of Thermocouple J/K	Representation at **MCS®control**

2.5.28 Bri- parameter (Bridge) only for Touchscreen Systems

The **Bri** parameter defines the master for the operation of PLUS units. This has to be selected among 4" Touchscreen at the controller and the external **MCS®control**.

➔ ID-Level: 2
Input limits: 0, 1
Default value: 0

- 0: all functions for all poeratin devices, but 4" Touchscreen only for this **MCS®**
- 1: PLUS-Unit with 4" Touchscreen at **MCS®** without external **MCS®control (Lite)**

Touch for MCS® PLUS	Representation at **MCS®control**

2.5.29 COL- parameter (Cooling off limit)

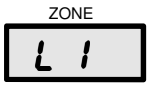
The **COL**- Parameter enables the sequential cooling and sets the lower limit for cooling off. Only after reaching this temperature the next sequence will start cooling off. When all zones have reached this level the outputs will get disabled.

➔ ID-Level: 2
Input limits: 0...200°C
Default value: 0

- 0°C: without sequential cooling
- 1..200°C: low limit for cooling off

Cooling Off Level	Representation at **MCS®control**

2.5.30 L1-3-parameter (Line-voltage)



These parameters indicate the actual voltage of the referring lines.

- 1: Line 1 for zones 1, 4, 7...
- 2: Line 2 for zones 2, 5, 8...
- 3: Line 3 for zones 3, 5, 9...

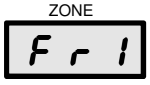
Failed line-voltage will indicate **-U-** for these zones.

➔ Only indication [VAC]

L1 Voltage	Representation at **MCS®control**

Not available at **MCS®2-16**.

2.5.31 Fr1-3-parameter (Line-frequency)



These parameters indicate the actual net frequency of the referring lines.

- 1: Line 1 for zones 1, 4, 7...
- 2: Line 2 for zones 2, 5, 8...
- 3: Line 3 for zones 3, 5, 9...

Failed frequency will indicate **-U-** for these zones.

➔ Only indication [Hz (cps)]

L1 Frequency	Representation at **MCS®control**

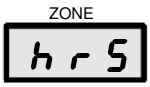
2.5.32 Date-parameter (Date and Time)

day

The actual date and time may be indicated and set by these 5 parameters.
The settings are only required for additional options.

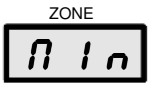
month

year



hours

Hours will be set in 24h mode.



minutes

2.6 Zone parameters

Each zone has a set of 32 parameters. Selection and setting of parameters as below:

Parameters can be reached by the parameter-key. In the parameter-level the zone number and the parameter number are indicated with additional dots.

The keys beside the zone number select the zone or the parameter.

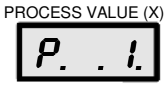
The keys beside the setpoint set the value for the parameter.

The selected number of the parameter (here 2) appears in the lower display.

The touch on the parameter-key or any other on the left leaves the parameter level.

The functions of the different parameters are explained in the following.

2.6.1 PARAMETER 1: L-Alarm



The referring zone will indicate Lo-alarm, when the temperature falls below the value of parameter 1. This will be indicated by flashing „-**L**-“alternating with the actual value. At the same time the alarm-contact switches.

➔ ID-Level: 2
Input limits: 0...600°C
32..999°F
➔ Input limit 800°C/999°F for sensor type „K“ (see **tEt**)
Default value: 0°C

L-Alarm	Representation at MCS®control

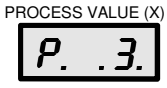
2.6.2 PARAMETER 2: H-Alarm

➔ ID-Level: 2
Input limits: 1...600°C
32..999°F
Default value:
400°C/752°F

The referring zone will indicate H-alarm, when the temperature reaches the value of parameter 2. This will be indicated by „**-H-**“alternating with the actual value.
The alarm-contact switches and the main relay turns all heaters off. After decrease of the temperature the outputs will be powered again.
➔ Input limit 800°C/999°F for sensor type „K“ (see **tEt**)

H-Alarm	Representation at MCS®control

2.6.3 PARAMETER 3: Deviation

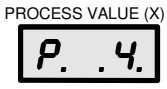


➔ ID-Level: 2
Input limits: 1...600K
Default value: 15K

As soon as an actual value will deviate for more than the value of this parameter, the referring zone will indicate deviation. This will be indicated by flashing „**dL**“ or „**dH**“ alternating with the actual value. At the same time the Warning-contact switches.

DEV-Alarm	Representation at MCS®control

2.6.4 PARAMETER 4: P-gap for heating

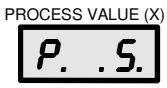


➔ ID-Level: 2
Input limits: 0...100%
Default value: 5%

Parameter 4 allows to adjust the proportional gap of the control loop *in percent*.
That means, that a pure P-controller slowly decreases the output rate proportionally. When the actual value = the setpoint the rate will be reduced to 0%.
for xp =0: **P**-gap is disabled
Settings of this parameter will be adapted after classification.

P-Gap	Representation at MCS®control

2.6.5 PARAMETER 5: I-gap for heating

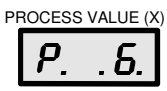


➔ ID-Level: 2
Input limits: 0...999s
Default value: 80,0s

Parameter 5 allows to adjust the integral gap of the controller in seconds. This component of the controller increases or decreases the output rate with the defined speed according to a possible deviation.
for tn = 0: **I**-gap is disabled
Settings of this parameter will be adapted after classification.

I-Part	Representation at MCS®control

2.6.6 PARAMETER 6: D-gap for heating



➔ ID-Level: 2
Input limits: 0...999s
Default value: 16,0s

Parameter 6 allows to adjust the differential gap of the controller. This component of the controller ‘brakes’ the output rate for the stored time, if the actual value approaches the setpoint with too high speed.
for tv = 0: **D**-gap is disabled
Settings of this parameter will be adapted after classification.

D-Part	Representation at MCS®control

2.6.7 PARAMETER 7: Classification of the zone

PROCESS VALUE (X)

The type of classification will be indicated by this parameter. Settings are not possible.

Indication: 0..9

Classification	Representation at MCS®control

2.6.8 PARAMETER 8: Operation mode of the zone

PROCESS VALUE (X)

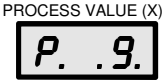
➔ ID-Level: 1
Input limits: 0...2
Default value: 0

The 3 operation modes are to set by this parameter or by the referring key in the front.
0 = OFF
1 = Manual mode
2 = Control mode

Operation Mode	Representation at MCS®control

2.6.9 PARAMETER 9: Monitoring channel

PROCESS VALUE (X)



➔ ID-Level: 2
Input limits: 0..2
Default value: 0

This parameter enables to select a zone for controller purpose or for simple indication. A Monitor-zone will be accepted from the group. Monitor-zones can be used for supervision by the settings of parameters 1-3.
Deviations are only available when the setpoint >0°C/32°F.

- 0: controller
- 1: monitor-zones will be used for simple indication, when no outputs are available or no heater is connected.
- 2: Manual power mode for this zone, when no inputs are available at the controller.
  However a sensor will enable a control mode without confirmation after change to manual mod (see Auto-Power **AP**).
- The cursor-LED flashes in the total display when a monitor zone is selected.

Monitoring Channel	Representation at MCS®control

2.6.10 PARAMETER 10: Alternative channel

PROCESS VALUE (X)

➔ ID-Level: 2
Input limits: 0...128
Default value: 0

This parameter enables to select an alternative channel for the Auto-Power mode **AP=4**.
The number of the referring zone will be set here after **AC?**. It is available for the next case of a broken sensor.

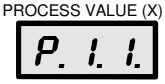
- 0 or this zone: no preset
- 1…128: this zone delivers the output rate in case of a broken sensor.

The input limit for PLUS-units is the total number of zones. In case of changes of variations of the PLUS- unit, this parameter will be reset to “0”.

Alternative Channel	Representation at MCS®control

2.6.11 PARAMETER 11: Softstart

PROCESS VALUE (X)



➔ ID-Level: 2
Input limits: 0...3
Default value: 1

The unit is provided with a softstart - routine for smooth heating. This may be enabled or disabled here.

- 0: this zone without softstart
- 1: this zone with softstart

A quickstart with occasional overheating is available for tasks with very inert control loops

- 2: this zone without softstart, with quickstart
- 3: this zone with softstart and quickstart

Softstart	Representation at MCS®control

2.6.12 PARAMETER 12: Combined heating

PROCESS VALUE (X)

➔ ID-Level: 2
Input limits: 0...8
Default value: 1

The unit is provided with a sequential combined heating function. This zone may be set to a sequence or disabled from the combined heating.

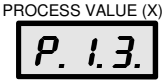
- 0: this zone is not combined
- 1..8: this zone is combined

The sequences will be heated from 8 to 1 one after another. The preferred heated zones have to be set to higher numbers.

Combined Heating	Representation at MCS®control

2.6.13 PARAMETER 13: Ramp up

PROCESS VALUE (X)



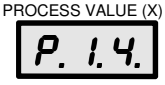
➔ ID-Level: 2
Input limits: 0...[1°/10s]
Default value: 0

A consistent slow heating following a ramp, can be activated here. The function may be reached only, if the installed heater power is sufficient.
The combined heating is not active in this case.

Ramp Up	Representation at MCS®control

2.6.14 PARAMETER 14: Ramp down

PROCESS VALUE (X)



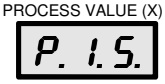
➔ ID-Level: 2
Input limits: 0...[1°/10s]
Default value: 0

A consistent slow cooling following a ramp can be activated here. The function may be reached only, if the installed cooling system is sufficient.

Ramp Down	Representation at MCS®control

2.6.15 PARAMETER 15: Output rate maximum

PROCESS VALUE (X)



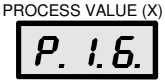
➔ ID-Level: 2
Input limits: 0...100 %
Default value: 100 %

This parameter limits the maximum output rate of the heaters.

Output Rate Maximum	Representation at MCS®control

2.6.16 PARAMETER 16: Output rate nominal

PROCESS VALUE (X)



The output rate for Auto-Power function (AP-parameter=3) must be set here. This parameter does not influence the controlled mode.

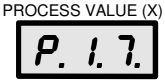
➔ ID-Level: 2
Input limits: 0...100 %
Default value: 0 %

If this zone has already operated in manual mode, the output rate was set here for proposal for the next change to manual mode.

Output Rate Nominal	Representation at MCS®control

2.6.17 PARAMETER 17: Output rate mean

PROCESS VALUE (X)



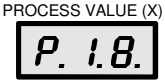
This parameter will define itself during **normal control mode**. It stores the long period average of the output rate during the control mode.
The value will be set only 2 min after controlling within the tolerance range (parameter 3).

Indication: 0..100%
0% after start

Output Rate Mean	Representation at MCS®control

2.6.18 PARAMETER 18: Output rate mean nominal

PROCESS VALUE (X)



This nominal setting will be compared to the actual mean rate (parameter 17). Deviations will be indicated by **dy**

- 0: no output rate-supervision
- > 0: this value will get supervised.

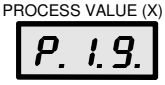
➔ ID-Level: 2
Input limits: 0..100%
Default value: 0

(see output rate-supervision)

Output Rate Mean Nom.	Representation at MCS®control

2.6.19 PARAMETER 19: Output rate mean tolerance

PROCESS VALUE (X)



The tolerance for the output rate deviation (parameter 18) has to be set here. Within the tolerance range no warning **dY** will be indicated.

➔ ID-Level: 2
Input limits: 0..100%
Default value: 100

(see parameter 18)

Output Rate Mean Tol.	Representation at MCS®control

2.6.20 PARAMETER 20: Current nominal

PROCESS VALUE (X)

The nominal value of the current of this heater may be set here for supervision of the tolerance range of parameter 21.

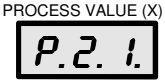
➔ ID-Level: 2
Input limits: 0,0..25,0A
Default value: 0,0A

- 0: no heater current supervision
- > 0: this value will get supervised.

Current Nominal	Representation at MCS®control

2.6.21 PARAMETER 21: Current tolerance

PROCESS VALUE (X)



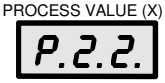
The tolerance for supervision of heater current (parameter 20) has to be set here. The current will be supervised by the tolerance range of parameter 21.

➔ ID-Level: 2
Input limits: 0,0..16,0A
Default value: 0,5A

Current Tolerance	Representation at MCS®control

2.6.22 PARAMETER 22: Diagnosis time

PROCESS VALUE (X)



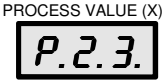
Independent of the internal determined value the duration of the diagnosis may be set here to the heat up for 5K/ 9°F.

➔ ID-Level: 2
Input limits: 0..999s
Default value: 0s

Diagnosis Time	Representation at MCS®control

2.6.23 PARAMETER 23: Offset Temperature

PROCESS VALUE (X)



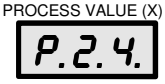
This parameter enables to shift the temperature indication of this zone. The actual temperature and the setpoint will be calculated with the referring offset against the real temperature.

➔ ID-Level: 2
Input limits: 0
Default value: 0

Offset Temperature	Representation at MCS®control

2.6.24 PARAMETER 24: Zero cross / phase control

PROCESS VALUE (X)



The output may be controlled by pulspackets or phasecut or a dynamic mix of both. The selections are:

- 0: Pulspackets
- 1: Phasecut
- 2: Mixed

➔ ID-Level: 2
Input limits: 0...2
Default value: 0

Zero Cross/Phase-Control	Representation at MCS®control

2.6.25 PARAMETER 25: Boost offset

PROCESS VALUE (X)

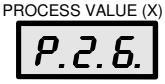
The increase of temperature during the boost-stage has to be set here by relative values.

➔ ID-Level: 2
Input limits: 0...50K
Default value: 0K

Boost Offset	Representation at MCS®control

2.6.26 PARAMETER 26: Standby temperature

PROCESS VALUE (X)



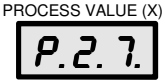
The decrease temperature for standby has to be set here by absolute values.

➔ ID-Level: 2
Input limits: 0...300°C
32..573°F
Default value: 0°C/32°F

Standby Temperature	Representation at MCS®control

2.6.27 PARAMETER 27: Auto-adaption

PROCESS VALUE (X)



Für diese Zone kann während der Beheizung eine Anpassung der Regelparameter ausgewählt werden.

- 0: without parameter adaption
- 1: adaption of P-value during heat up
- 2: adaption of P, I, D-values during heat up

➔ ID-Level: 2
Input limits: 0...2
Default value: 2

Auto-Adaption	Representation at MCS®control

2.6.28 PARAMETER 28: Dead Time

PROCESS VALUE (X)

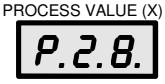
Control loops with extreme dead time (delay between heating impuls and reaction of T/C) may be prepared for this zone by this setting [per seconds].

➔ ID-Level: 2
Input limits: 0...999s
Default value: 0s

Dead Time	Representation at MCS®control

2.6.29 PARAMETER 29-30: Reserve

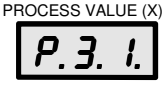
PROCESS VALUE (X)



Without function

2.6.30 PARAMETER 31: Group Number

PROCESS VALUE (X)



This parameter assembles this zone to a group. The referring number of the group has to be set here. Groups may be set collectively.

➔ ID-Level: 2
Input limits: 0...8
Default value: 0

(see groups)

Group	Representation at MCS®control Group settings will directly overwrite this parameter in the controller MCS®.

2.6.31 PARAMETER 32: Leakage current

PROCESS VALUE (X)

The actual sum of the leakage current of the referring line will be indicated here.

Indication: 0...mA

Leakage Current	Representation at MCS®control

2.6.32 PARAMETER 33: Friction tolerance

PROCESS VALUE (X)

➔ ID-Level: 2
Einstellgrenzen: 0..30 %
Standardwert: 0%

This parameter enables the friction control. The setting represents the minimum drop of output rate. The setting has to be defined between safe recognition and non-recognition.

- 0%: No supervision
- >0%: Minimum drop of output rate

Distance for Friction	Representation at MCS®control

3 Configuration of the unit

3.1 Commissioning

The description for commissioning of the unit is anticipated here. If the below listed steps will be carried out in the described sequence, a failsafe function of the **MCS®** unit is guaranteed. For better understanding of the different functions we recommend to reed this manual.

3.1.1 Dip-switch

There is a 8-fold DIP-switch on the processor module AT202.

Switch	Position	Function
1	OFF = °C ON = °F	Here the temperature indication may be set from °C to °F. The conversion of all programs and parameters needs some minutes after restart.
2	OFF ON	The logic of the digital input No. 5 may get inverted here. • Passive: The outputs of the controller will be disabled by a 24VDC signal. • Activ: The outputs of the controller depend on the enable by a 24VDC signal. With disabled outputs the controller cannot get started by the menu-key. A temporary disable does not generally reset this start.
3	OFF	No other position for standard use.
4	OFF ON	Special function to reset the typ of protocol to FE3 at **MCS®r** without display: • Default position without function • Reset of parameter **tP1** and **tP2** to „0“ with the start of the unit. Should return to the default position after use. Operation monitors **MCS®control** can only be used via FE3-protocol!
5	OFF ON	Default setting for compact units Setting for **MCS®C** with external main-relay

The controller has to be turned off before extraction of the module as well as before change.

3.1.2 Jumper

There is a bloc of 2x5 jumpers on the processor module AT202. The default settings are marked.

Jumper	Position	Function
1-2	1 = REP NC 2 = REP NO	Warn-contact failsafe, OK = closed Warn-contact for lamp/horn, OK = open
3-4	3 = AL NC 4 = AL NO	Alarm-contact failsafe, OK = closed Alarm-contact for lamp/horn, OK = open
5-6	5 = Gn-Lo 6 = Gn-Hi	Green LED-stripe damped. Green LED-stripe bright.
7-8	7 = Ye-Lo 9 = Ye-Hi	Yellow LED-stripe damped. Yellow LED-stripe bright.
9-10	9 = Rd-Lo 10 = Rd-Hi	Red LED-stripe damped. Red LED-stripe bright.

The controller has to be turned off before extraction of the module as well as before change.

3.1.3 Connection

- Check the supply net conditions. The terminals inside the controller have to be linked either for star/Y-net with neutral (3x400VAC + N + PE) or for Delta-net (3x230VAC + PE). The referring specification will be delivered with the unit.
- Connection of all heater and sensor cables.
- A signaller may be connected by the alarm/warning-contact of the unit
  ATTENTION! Take care of the maximum load of the contacts (see technical data).
- Connection of external digital signals and interface for computer control, if required.
- Connection to the 3phase supply net.

The pin assignment has to be taken from the table inside the controller.

3.1.4 Heat-up

- Turn ON the unit.
- Set setpoints.
- Switch the outputs ON.
- After classification the zones drive to the setpoint temperature. The relevant features like softstart, combined heating, leakage current supervision and dry out are enabled. These functions may be disabled.

3.1.5 Finalisation

- Define password and identification level. To inhibit unauthorised operation the password (**IC**-parameter) may be changed. For this reason the level of identification (**IL**-Parameter) may be changed.

4 Technology

4.1 Cable carrier

At the rear side of the display of units greater than **MCS®36** there are 2 cable holders to pull out. These are provided for the supply cable.

4.2 Document case

On top of units greater than **MCS®36** there is a document case below the cover. This may be used for a notebook. There is a cable entry in the rear wall.

4.3 Power fuses

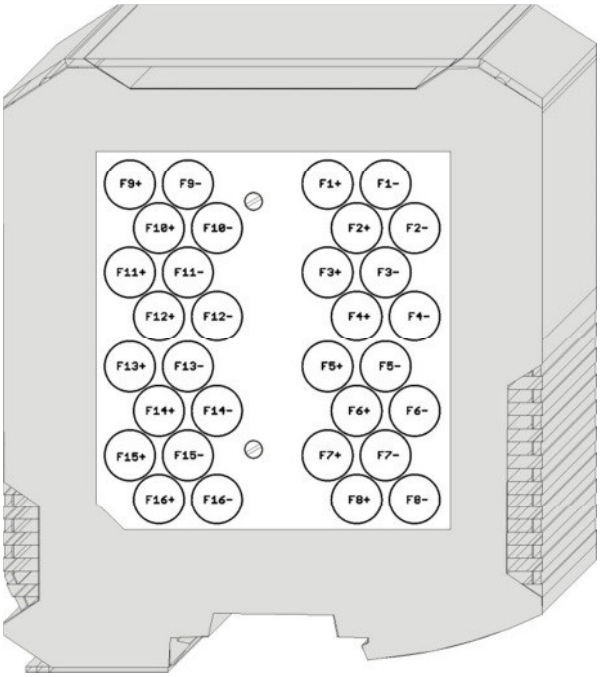
The fuses for the outputs are to find on both sides of the units. The fuses must comply to the quality FF. The strength of the fuses may vary referring to the fitting.
The standard is **16AgRL**.

4.3.1 Internal additional fuses (2nd fuse)

Controllers, that are powered from a net supply with 3 lines without Neutral, are available with additional fuses inside the unit. This avoids uncontrolled heating just in case that the 2nd wire for the heaters are shorted to PE. In case over overload only the external superfast fuses will blast.
To change the internal fuses, the controller has to get switched off and disconnected from the power supply before opening.

4.4 Protection against net-voltage

The units of the **MCS®**-series are fitted with a fuse module to protect against net-voltage (NSS-module). These modules protect the sensitive electronics for the sensor-inputs against unacceptable high voltage. Such voltage may occur by mixed wiring or by defective heaters. As soon as a voltage higher than 6V is put to the inputs of the NSS-module, the internal fast fuses will blow. The voltage will be contacted to the ground. The controller will indicate a broken sensor for this zone.
Replacing the fuses reactivates the referring zone. The fuses are special types which are plugged at the input module. The user may change these by himself.
The referring zone will be healthy after replacement of the fuses. These are special fuses, which are plugged on the specially designed NSS-module. The user may replace by his own. There are spare fuses inside the original **MCS®** unit.



To change the fuses of the referring module **AT200** the front connectors have to be plugged out. Then the module may be released. The cover at the side shows the position of the different fuses. After lift off the cover the fuses may get changed.
The cover has to be tightened before replacing the module.

Controllers **MCS®2**...**MCS®16** with maximum 16 zones are fit with a compact controlboard. The fuses are to find below a transparent labelled cover.

4.5 Rear side

At the rear side of the controllers there are the connectors for sensors and heaters, the supply for an operation monitor **MCS®control**, the data interface, the digital inputs 2 sockets for an optional signaller (top) and the dry contacts (bottom).

4.5.1 Digital inputs

The unit is fitted with 8 digital inputs. These may be used for remote change of the programs 1...6. A short impulse (min. 100 ms) at the digital input activates the referring program. A continuous signal at the digital input inhibits the change of programs by the keys or via interface. (For assignment of the 15-pin plug see below)

Via Digit-in Standby the controller may be set to standby mode. This stage will be finished by a program-signal or the referring key.

Via Digit-in On/Off all outputs are disabled for the duration of the signal. The powered input *): (see below for the logic of the signals depending on DIP-switch 2 = ON)

- disables all outputs.
- disables the start key for ON.
- erases the LED near the start key.

With the end of the signal the previous status returns.

The inputs are compatible to PLC-voltage of 13..30 VDC at a typical consumption of ca. 8,5 mA.

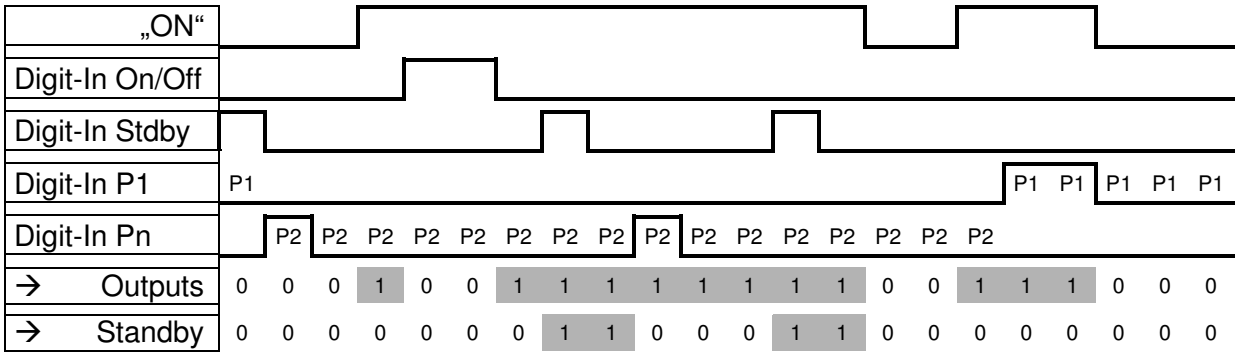
Digital-In plug

Contact	Function		
1	Program No.1	Digit-In P1	+ 24VDC
2	Program No.3	Digit-In P3	+ 24VDC
3	Disable / Enable outputs *)	Digit-In On/Off	+ 24VDC
4	Standby / no Standby *)	Digit-In Standby	+ 24VDC
5			
6-8			0V

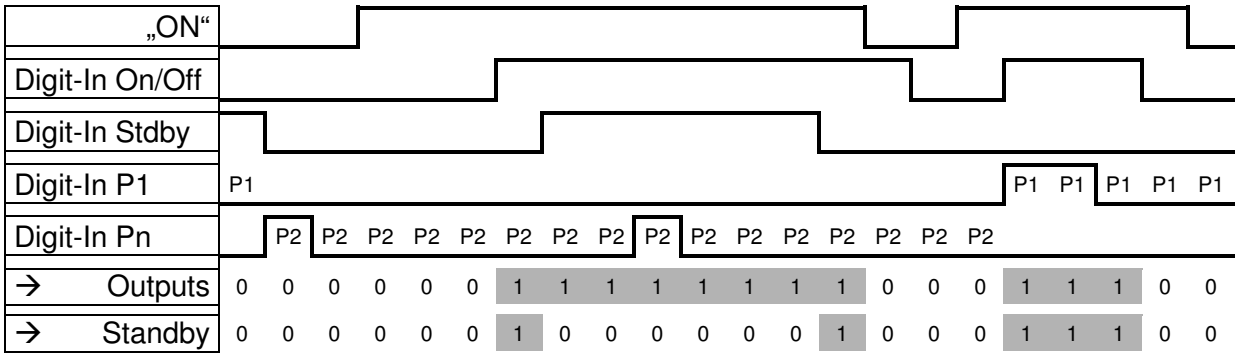
9	Program No.2	Digit-In P2	+ 24VDC
10	Program No.4	Digit-In P4	+ 24VDC
11	Program No.5	Digit-In P5	+ 24VDC
12	Program No.6	Digit-In P6	+ 24VDC
13-15			0V

*) may be inverted by DIP-switch 2

Logic of the signals at DIP-switch 2 = OFF
In this position the controller may be used without external enable On/Off.



Logic of the signals at DIP-switch 2 = ON
In this position the remote operation will be failsafe. There is no output without enable by On/Off. For normal operation without standby there are 2 signals required.



4.5.2 Warning- and alarm-contacts

The **MCS®** units are fitted with 2 alarm-contacts. The dry contacts for warning and alarm are available via socket at the rear side.
The function may be inverted (see jumper).
The control voltage 230VAC is also available at this socket for the supply of external signallers. The voltage may be switched by the dry contacts.

Warning-contact
The warning-contact sets a warning, which informs the operator that the process is disturbed. An immediate action of the operator is not absolutely necessary.
The dry contact is available at pin 1 and pin 3 of the socket at the rear side. The contact is normally closed (NC).
The contact will be activated together with the yellow LED-stripe with one of the following warnings:

- broken sensor (only if **AP**-parameter = 1, 2, 3,4)
- positive temperature deviation
- negative temperature deviation
- current deviation

- leakage current depending on the setting
- deviation of output supervision
- separation of PLUS-units.

Alarm-contact
The alarm-contact sets a main alarm, which requires the action of the operator. This dry contact is available at pin 4 and pin 5 of the socket at the rear side. The contact is normally closed (NC).
The alarm-contact will be activated together with the red LED-stripe with one of the following alarms:

- broken sensor (only if **AP**-parameter = 0)
- shorted sensor
- Triac-supervision alarm
- leakage current alarm
- absolute high temperature (**H**-alarm)
- absolute low temperature (**L**-alarm)
- overriding of the **HH**-parameter (**HH**-alarm)
- leakage current depending on the setting
- separation of PLUS-units.

Warning- alarm-contact socket

Contact	Function	Not powered
1.+3.	Warning-contact	NC
4.+5.	Alarm-contact	NC
6.	Output power	230VAC/4A
7.		N

Function
see jumper

4.5.3 Interface socket

Contact	Function	
2	RS 485	B/+
3	RS 485	A/-

Hint of interface address

If several controllers **MCS®** are connected to a single monitor **MCS®control**, the addressing (see **Adr**-Parameter) has to start by “1” and must be numbered consecutive.

The Baud-rate for the data transmission has to be adapted by the **bAu**-Parameter, if necessary.

4.5.4 Signal-light socket

Contact	Function	
1	Warning (yellow)	230VAC
2	Alarm (red)	230VAC
3		N

This socket is designed for an external signal light to be activated together with the functions of the LED-stripe.

4.5.5 Power supply socket

Contact	Function

1	N
2	L
PE	PE

This socket is designed for the net supply of a monitor **MCS® control**.

4.5.6 Pin assignment

The connectors for sensors and heaters are to find at the rear side of the controller. Referring to the specification the connectors may be wired separated or mixed.

The referring contact list is to find inside of each unit.

This should be kept there for copies, if required.

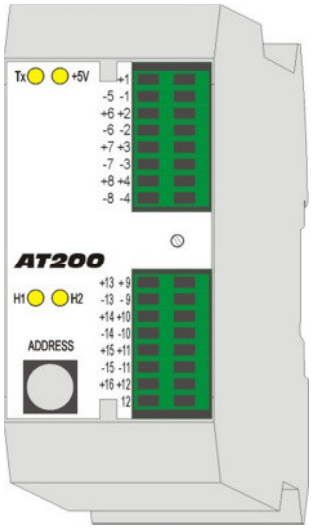
4.6 Controllers

The controllers inside the units are differently designed. Depending on the number of zones **MCS®** operates a system of one single or multiple processors.

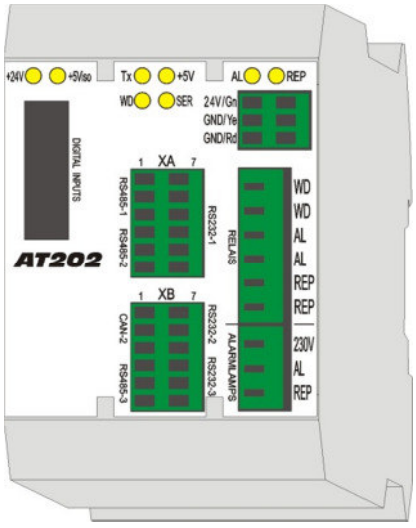
4.6.1 MCS®20 - 128

The processor modules are mounted inside the unit onto a rail that includes the interface connection. The LED in front indicates the status, e.g.

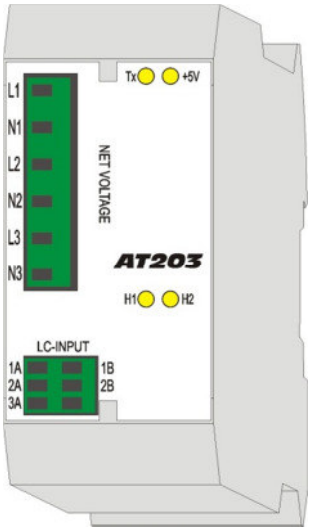
TX flashing – function of the interface
+5V – supply voltage



Input module
with sensor fuses



Processor module
with jumpers and DIP-switches
oat the side



Voltage module

The input modules **AT200** have to be set to previous address in case of exchange.

4.6.2 MCS®2 - 20

The compact internal board includes all functions of greater **MCS®**. The jumpers and DIP-switches are to find on this board bearing the same functions.
These units may be opened by the cover after loosening the 2 screws below the display frame.

5 Technical data

Control voltage:		3x190-400VAC, N, PE /
	Selectable	3x110-230VAC, PE
	Tolerance	+ / - 10%
Power consumption:	Without output	max. 70 W
Net-fuses:	Control voltage electronics	1 x 0,8A medium inert (5 x 20mm)
	Control voltage internal	1 x 4A medium inert (6,3 x 32 mm)
	power outputs	each 16A gRL (6,3 x 32 mm)
	internal additional fuses	each 16A inert (6,3 x 32 mm)
Thermocouple-inputs:	Fe-CuNi type J	0..700°C/999°F
	programmable for Ni-CrNi type K	
	Temperature deviation by cable-resistors	Depending on length and wire diameter
	Temperature compensation	internal
	Accuracy	±0,25 K
	Temperature actualisation	4x128 / second
Controller-outputs	bistable, electrical isolated	
	per zone	1x heating, 230V contact
	Reaction of controller	10ms at 50Hz
	Current per zone	max. 16A (standard)
	Attention: Take care of the max.	*load of the supply cables!*
	Minimum load	100W
Collective alarm outputs	Functions:	1 x alarm-contact 1 x warning-contact
(Relay-contacts)	max. voltage	250V AC
	max. current	4A at cosφ = 1 2A at cosφ = 0,5
Control routines	PI, PD or PID with control-parameters to set for all zones separately	
Data memory (EEPROM)	Data storage	min. 10 years
Serial interface	isolated	
	RS485, Protocol	FE3-Bus version 3.03
	CAN-Bus	
Ambient conditions:	Operation temperature	0..50°C/32..122°F
	Protection	IP 20
	Surface temperature of the unit	max. 55°C/131°F
	Storage temperature	-25..+75 °C/-13..167°F
	Humidity	< 95% rel. humidity, no dew-drop
Connectors “Han A”:	Pollution degree 2	Light pollution of the contact-inserts
Weight:	MCS® 8 / 16	12 / 16 kg
	MCS® 32	25 kg
	MCS® 64 / 96 / 128	75/ 90 / 110 kg
Dimensions WxHxD:	MCS® 8 / 16	24 / 40 x 21 x 37 cm
	MCS® 32	45 x 28 x 43 cm
	MCS® 64 / 96 / 128	50 x 80 / 100 / 120 x 50 cm
	MCS®rxxx	Reduced height 8cm

Wiring diagram is enclosed with the unit.

5.1 Hints to EMC (Electro magnetic compatibility)

Interference transmissions:
The unit is relieved according to **EN 55011** /**B** (interference transmissions).

Level of acceptance:
VDE 0839 Part 10

Reliability class	**Z2**
Ambient class	**S2, I4, E3**

Suppression:
VDE 0843 Part I 2,3,4
IEC 801 Part 2,4,5

Ambient class	**3**
Degree of strength	**3, with external filter 4**

5.2 Power supply

The **MCS®** controllers may be supplied by a 220/230V Delta-net, if necessary. For that purpose the links at the terminal strip inside the units have to be moved to another position. The drawing with the correct positions is to find with the technical documents.
MCS® Standardgeräte sind bezüglich der Netzversorgung umrüstbar. Jedem Regelgerät wird ein Dokument mit dem Auslieferungszustand mitgeliefert. Dies beschreibt auch die erforderliche Umrüstung.
Controllers, that are powered from a, are available with additional fuses inside the unit.
Special **MCS®** controllers are fit only for the operation at 3x220/230V net supply without Neutral. These units are to bale to get switched for 3x 400V with Neutral-wire. That is why neither the referring terminals nor the description belong to these controllers.

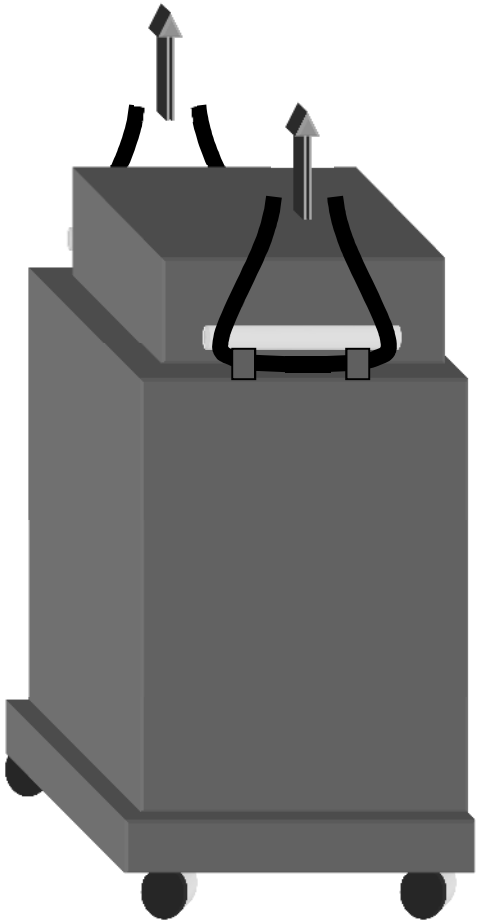
5.2.1 Safety hint

The supply from a Delta net without neutral wire „N“has to comply with the local regulations for the installation of electrical equipment.
MCS® controllers are basically fit with one fuse to protect against short in the load circuit and against short of one line to PE.
In option, there is an additional fuse per zone inside the unit to protect for Delta supply even the 2nd line against short to PE. Retrofitting is possible.

The parameters for H and HH alarm limits should be generally adjusted to the production requirements, to prevent faulty heating.

6 Transport (from MCS®36)

The handles at each side may be used as shown in the drawing to lift the controller with appropriate ropes.



7 Declaration of EC-Conformity

referring to the following EC standards:

EC-Standard Electromagnetic Tolerance 2004/108/EG
EC-Standard Electrical Appliance 2006/95/EG

Maker:

FELLER ENGINEERING GmbH

CARL-ZEISS-STR. 14
63322 RÖDERMARK/GERMANY
TEL.: +49(6074)8949-0
FAX: +49(6074)8949-49
www.fellereng.de

Herewith we declare by signature, that the following described product confirm to the above mentioned EC standards referring design, production and distribution.

Further applied standards, as far as applicable:

EN 60204 part 1 (Electrical equipment for machinery),
EN 61000-6-1 (EMC immunity), EN 61000-6-3 (EMC radiation)

Product:

Multi-Channel-System temperature controllers MCS® -series

Product name:

MCS®xxx
MCS®control

Year of first CE-sign: 1996

Rödermark, May 23, 2013

Quality supervisor

Registergericht Offenbach HRB 31367, Geschäftsführer: Dieter Skedzun

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