/D/O/L/D/

Operating Instructions DMP 48 AS / DMP 48 AW

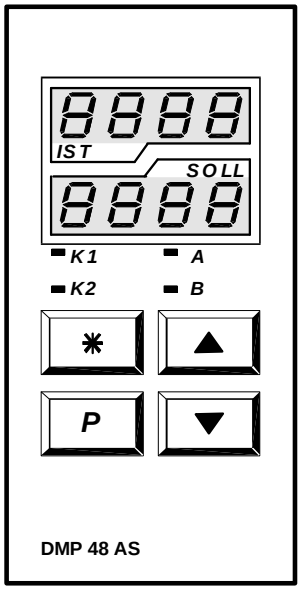
Single-channel controller

Two-point controller
Continuous-action controller
with one limit-value contact

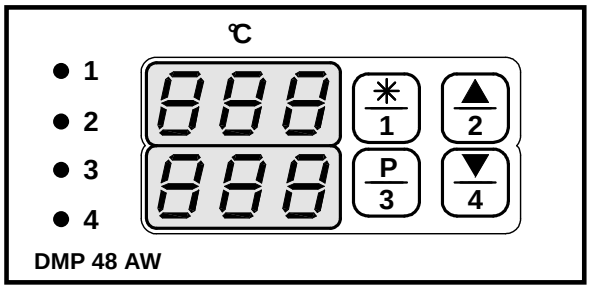
Program versions:

033A0	**033A3**	**033A6**
033A1	**033A4**	**033A7**
033A2	**033A5**	**033A8**

DMP 48 AS



DMP 48 AW



Subject to technical changes

Before connecting the regulator it is essential to read this Manual carefully and follow the instructions.

Contents

1. Installing the controller:

1.1 Terminal connection diagram:

This connection diagram shows maximum terminal assignment for the controller when all connection possibilities are used. The appropriate terminal assignment (depending of the type of controller used) can be found in the accompanying connection diagram.

Connection diagram number according to identification plate: ASP 675XXX

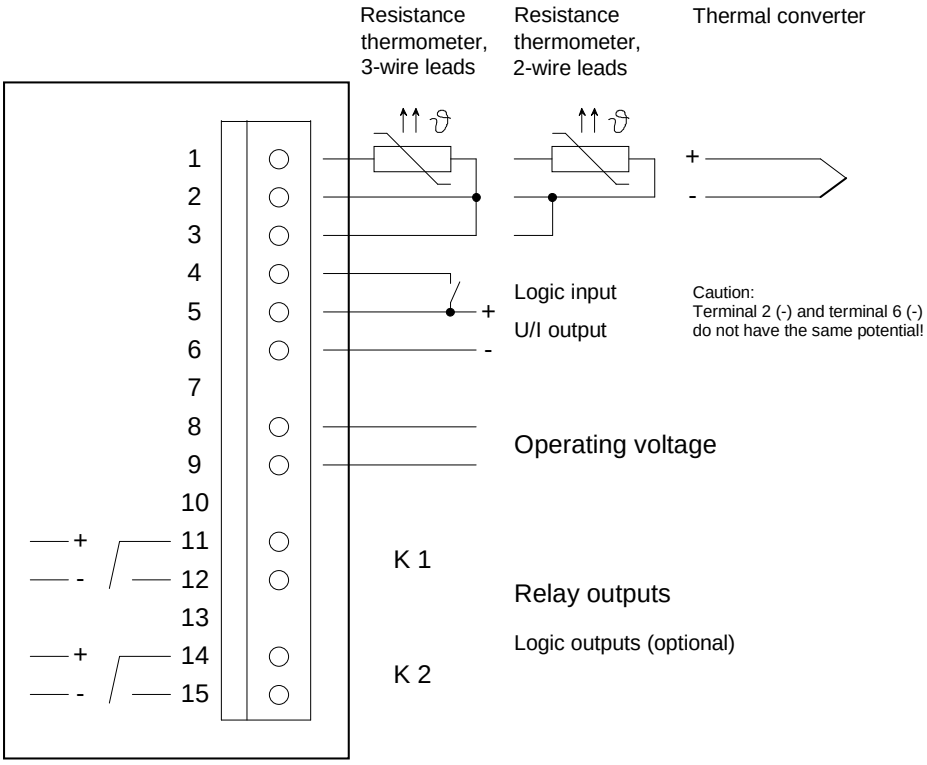


Figure 1: DMP 48 AS / AW connection diagram

1.2 Identification plate:

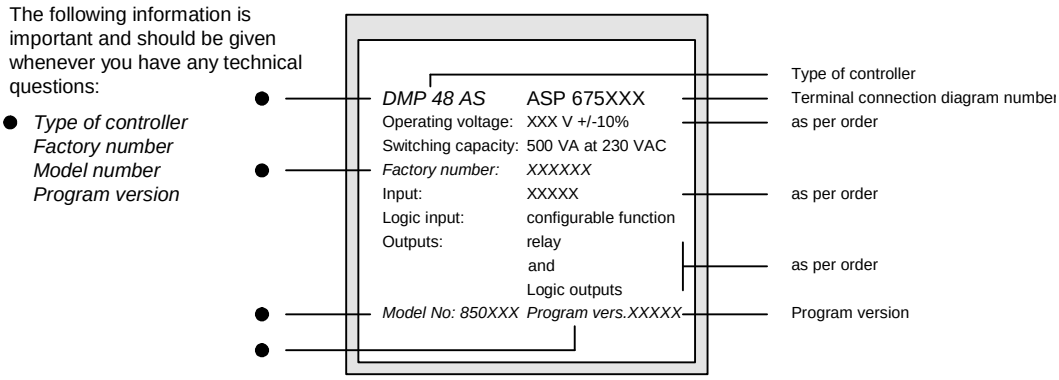


Figure 2: DMP 48 AS / AW identification plate

1.3 Please note during installation:

External safety monitoring should be provided.

Before connecting or starting up the DMP 48 AS / AW controller it is absolutely necessary to make sure that supply voltage corresponds to the nominal voltage given on the identification plate.

Electrical connections must be made according to the accompanying connection diagram and the regulations of the local energy supply company must be observed.

The unit must be protected from dampness (especially condensation) and heavy soiling in order to prevent malfunctioning.

The DMP 48 AS / AW controller must be equipped with an RC network filter to reduce the effects of interference from the power supply network.

An additional external filter must be switched into the controller's power feed or other appropriate measures taken to prevent malfunction in the event of power supply faults.

Sensor lines must be shielded. Unshielded sensor lines can lead to malfunctions.

Controller and inductive loads, as well as sensor lines and load lines must be arranged in such a way that they cannot cause any interference to each other.

Down-stream contractor relays must be equipped with RC suppressor circuits as per manufacturer's instructions. Failure to use suppressor circuits could lead to the occurrence of short, high voltage peaks, which in turn can cause malfunctioning and excessive wear on contactors.

The equalizing line must extend all the way to the controller supply terminals.

Ambient temperature must lie within the range between 0...+50°C.

All pre-set parameters must be checked during initial start-up and adapted to local conditions (systems)!

1.4 Mechanical Data:

Protection class:	VDE 0631
Insulation group:	C as per DIN VDE 0110 b
Type of protection:	As per DIN VDE 0470 (replaces DIN 40 050) EN 60 529 / IEC 529 Front panel: IP 50 (optionally: IP 54 with the proper mounting and a suitable sealing ring) Housing: IP 30 IP 20
Housing:	Pull-out housing for mounting control panel with a B fastener as per DIN 43 835 (M 4 screw clamp)
Material:	PPO, glass-fiber reinforced (Noryl GFN2SE1) self-extinguishing, non-dripping fire protection class UL 94 V1
Front panel dimensions:	96 x 48 mm DIN 43 700
Control panel cutout:	$92^{+0.8}$ x $45^{+0.6}$ mm
Recess depth:	approx. 125 mm including screwed plug connector
Terminal connections:	Screwed socket strips nominal cross section 2.5 mm^2
Weight:	approx. 420 g

Ambient conditions:	Operating temperature range:	0...+50℃
	Storage temperature range:	-30...+70℃
	Climatic utilization category:	as per DIN 40 040, corresponding to 75% relative humidity without moisture condensation

2. Technical data, inputs:

2.1 Analog inputs:

Input as per identification plate or sensor ID:

- Pt 100 three-wire lead
- Fe-CuNi thermal converter, Type L
- Ni Cr-Ni thermal converter, Type K.

Sensor ID:

Sensor:	Sensor ID:	ID according to ordering key:	Max. display range:	Max. setpoint range:	Program version:
Pt 100	P 1	P 1	-69...149℃	-50...100℃	033A0
Pt 100	P 2	P 2	-69...249℃	-50...200℃	033A1
Pt 100	P 3	P 3	-69...349℃	-50...300℃	033A2
Pt 100	P 4	P 4	-69...699℃	-50...600℃	033A3
Pt 100	P 5	P 5	-169...149℃	-150...100℃	033A4
Fe-CuNi Type L	tL1	L 1	-24...499℃	0...450℃	033A5
Fe-CuNi Type L	tL2	L 2	-24...899℃	0...850℃	033A6
Ni Cr-Ni Type K	tn1	K 1	-24...649℃	0...600℃	033A7
Ni Cr-Ni Type K	tn2	K 2	-24...1299℃	0...1200℃	033A8

(See Information Level, Section 8.7, for instructions on querying sensor ID).

2.1.1 Technical Data, inputs:

Pt 100:	Sensor current:	constant 1 mADC
	Calibration precision:	≤ 0,15 % F.S.
	Linearity error:	≤ 0,1% F.S.
	Temperature drift characteristics:	≤ 100 ppm/K
	Equipped with sensor breakage cutoff and short circuit fuse	
Pt 100 three-wire lead:	Automatic line resistance compensation via software (maximum permissible line resistance: 50 Ω per lead)	
Pt 100 two-wire lead:	Line resistance correction (line compensation) of max. 9 Ω possible via software (external bridge clamps 2-3),	
Thermal converter:	Calibration precision:	≤ 0.15% F.S.
	Linearity error:	≤ 0.15% F.S.
	Temperature drift characteristics (without reference point compensation):	≤ 80 ppm/K
	Effect of line resistance:	≤ 2µV/Ω

Reference point compensation
Error recognition using a controller reference point > 70°C
Sensor breakage cutoff

General:

Measurement cycle:		1 sec
Resolution:		≥ 12 bit
RC and diode protection circuit for each input		
Measuring-circuit monitoring:	Error shown on display	
Protective circuits:	Hardware watchdog and power-fail	
Data backup:	EPROM, semiconductor storage, Hardware-protected calibrated values	

2.1.2 Error-handling at input:

If the input signal leaves the maximum display range (for sensor ID) this is recognized as an error, evaluated, and shown on the display (error message "Er 1")

2.2 Digital inputs:

Logic input via potential-free contact, with configurable function

Contact: / Function:	Contact open	Contact closed
Setpoint switchover	Enter value for setpoint 1	Enter value for setpoint 2
Stop function	-	Control contact K 1 deactivated
Programming block	Programming function block	Programming function release

3. Control response:

3.1 Controller function:

Control response is configurable:

- Two-point response for heating or cooling, with adjustable hysteresis
- Two-point response for heating or cooling with PDPID – control characteristic and self-optimization algorithm
- Continuous-action control response for heating and cooling with PDPID – control characteristic and self-optimization algorithm
- Three-point response with adjustable hysteresis
- Three-point response with one-sided PDPID – control characteristic and self-optimization algorithm

3.1.1 Two-point controller:

Relay output K 1: Switching function configurable: Control contact or limit comparator

Relay output K 2:	Switching function configurable:	Limit-value contact (with adjustable hysteresis) and limit comparator
Options:	Logic output in place of relay output K 1 or K 2, actual-value output.	

3.1.2 Continuous-action controller:

Output 1:	Characteristic curve configurable (heating or cooling): Control output (relay output K 1 eliminated)	
Relay output K 2:	Switching function configurable:	Limit-value contact (with adjustable hysteresis) or limit comparator
Option:	Logic output in place of relay output K 2	

3.1.3 Three-point response:

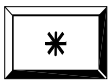
Three-point response is configurable:

Relay output K 1 heating, relay output K 2 cooling,
Relay output K 1 cooling, relay output K 2 heating,

Options:	Logic output in place of relay output K 1 or K 2 , actual-value output.

3.2 Actuator function:

Reconfiguration of the "Aut" parameter makes it possible to use the unit as an actuator (actuator mode: parameter "Aut" set to OFF on the configuration level)

The  key can be used to switch smoothly back and forth between the controller functions (automatic function) and the actuator (manual function).

The manipulated variable (%) set on the operator or setpoint entry level is relative to the cycle time (with relay output) or to output deviation (with continuous-action output).

The currently activated function is stored in the EE-PROM. When the unit is powered up it is in the state of the function last stored.

Display:

Display: / Function:	Upper 7-segment display	Lower 7-segment display
Controller	current actual value	setpoint
Actuator	current actual value	alternation between " -y- " / manipulated variable

4. Outputs:

Outputs as per identification plate and accompanying terminal connection diagram:

4.1 Potential-free relay contacts, make contact:

Contact load: ≤ 250V AC, ≤ 8 A resistive load
at 500 VA typically 10^6 switching cycles

4.2 Logic output (optional):

Logic outputs for activating solid-state relays,
(in place of relay outputs K 1 or K 2):
Open collector, not galvanically separated, short-circuit-proof,
typically: 0/10 VDC, maximum: 20 mA.

4.3 Analog output:

Analog output as per order and identification plate

Two-point controller:	actual-value output (optional):	range limits configurable
Continuous-action controller:	Control output:	characteristic curve (heating or cooling) configurable
Current output:	output value configurable:	0...20 mA 4...20 mA
Voltage output:	output value as per order:	0...1 VDC 0...2 VDC 0...5 VDC

4.3.1 Technical data, analog output:

Current and voltage output:	resolution:	8 Bit
Current output:	load:	≤ 250 Ω
Voltage output (short-circuit-proof):	internal resistance Ri:	≤ 250 Ω

Note: Any current output present but not needed must have a terminating resistor of ≤ 250 Ω or a bridge (terminals 5-6).

4.4 Output responses in cases of error:

Output response in cases of sensor error:

- Relay or logic outputs: Outputs assume the state defined on the configuration level.
- Analog output: (continuous-action controller, actual-value output):
  output U: 0...1VDC, 0...2VDC, 0...5VDC: output signal: 0 VDC

output I:	0...20 mA	output signal:	0 mA
output I:	4...20 mA	output signal:	0 mA

Incorrect actual-value response due to sensor error or response exceeding the set range:

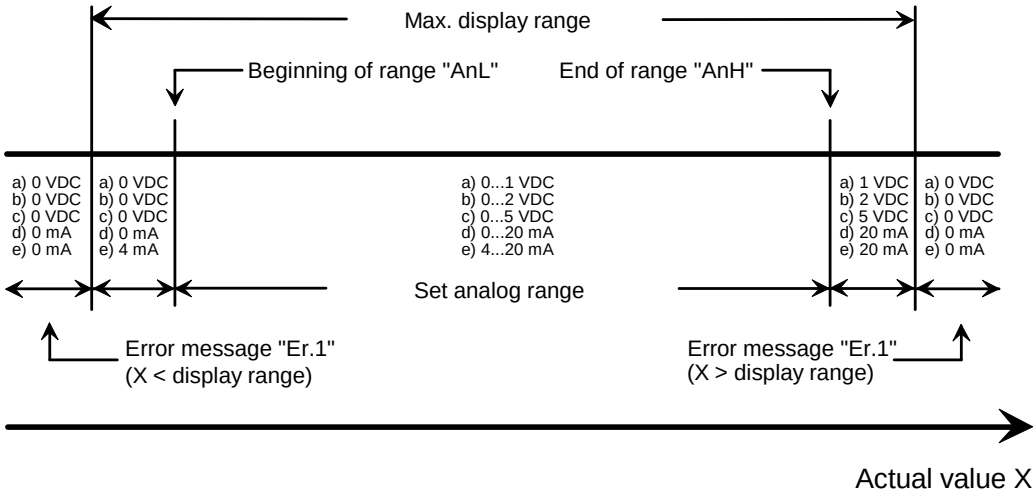


Figure 3: Actual-value response in cases of error

5. Auxiliary power:

Auxiliary power (operating voltage) as per identification plate:

Standard:	230 VAC (±10%), 48...62 Hz,
Power consumption, depending on model:	≤ 4 VA,

Not affected by voltage fluctuations within the defined range

6. Display:

- Actual-value and setpoint display: resolution adjustable
- Setpoint display: display range adjustable.

General information:

Powering up:
When power is turned on the following displays appear:
- On the upper 7-segment display: the parameter "P.nr".
- On the lower 7-segment display: the current program number "X.X".

After approx. 5 sec. the controller switches to normal operating mode.
Outputs are inactive during a cold start.

6.1 Upper 7-segment display

shows:

- the actual value

- parameter designation in entry mode

6.2 Lower 7-segment display

shows:

- setpoint
- parameter value in entry mode
- alternation between " -y- " / manipulated variable when actuator function is activated (manual function)
- alternation between setpoint (auxiliary setpoint) / "Opt" during the self-optimization procedure.

6.3 LED's 3mm:

LED:	K 1	(1)	yellow	lights up when output K 1 is active
LED:	K 2	(2)	yellow	lights up when output K 2 is active
LED:	A	(3)	yellow	lights up when continuous-action controller is functioning
LED:	B	(4)	yellow	lights up when value for "setpoint 2" is entered

7. Explanations of symbols:

Display:	Meaning:
"P.nr"	Current program number
"SP.1"	Setpoint 1
"SP.2"	Setpoint 2
" -y- "	Manipulated actuator value
"Cod"	Code entry
"Con"	Enter configuration level
"Cor"	Line compensation or zero-point offset
"rA.H"	Set upper limit of setpoint range
"rA.L"	Set lower limit of setpoint range
"Co.1"	Configuration, relay contact K 1
"Co.2"	Configuration, relay contact K 2
"Fd.1"	fault on control output K 1
"Fd.2"	fault on control output K 2
"rES"	Display resolution
"Aut"	Configuration of automatic function
"Co.u"	Configuration of setpoint setting
"Co.A"	Configuration of analog input
"An.H"	Setting of upper measuring range limit for actual-value output
"An.L"	Setting of lower measuring range limit for actual-value output
"Co.L"	Configuration of logic input
"3-P"	Configuration of three-point response
"uSr"	Enter setpoint entry level
"PAr"	Enter parameterization level
"Pb.1"	Proportional band, control contact K 1
"ti.1"	Reset time, control contact K 1
"td.1"	Derivative action time, control contact K 1
"CY.1"	Cycle time, control contact K 1
"HY.1"	Switching hysteresis, control contact K 1

"bd.1"	Symmetrical. spreading, limit comparator K 1
"LA.2"	Absolute setpoint value, limit-value contact K 2
"Lr.2"	Relative setpoint value, limit-value contact K 2
"bd.2"	Symmetrical. spreading, limit comparator K 2
"HY.2"	Switching hysteresis, limit-value contact K 2
"noP"	Relay contact K 2 deactivated
"tun"	Enter self-optimization level
"HLP"	Correcting setpoint
"OPt"	Self-optimization activated
"inF"	Enter information level
"SEn"	Sensor ID
"Er.1"	Sensor error message
"Er.9"	System error message

8. Operation:

The operating structure of the DMP 48 AS / AW controller includes six separate levels:

Setting the setpoint (depending on configuration):

- via the **operator level**.
- via the **setpoint entry level** (by entering a code).
- the **configuration level**, where line compensation, range limits, control functions, switching functions of the limit-value contact, and error allocations are defined.
- the **parameterization level**, which contains all parameters for adjusting the controller to the control loop.
- the **self-optimization level** for setting the correcting setpoint and for starting or aborting self-optimization.
- the **information leve**l for querying current program number and sensor ID.

8.1 Setting parameters on the various levels:

current value:	**+1**
after approx. 3 sec.:	**+10**
after approx. 6 sec.:	**+100**

current value:	**-1**
after approx. 3 sec.:	**-10**
after approx. 6 sec.:	**-100**

display value is accepted

The program returns to normal operating mode after the last parameter has been confirmed.

If no key is pressed within 20 seconds, the program automatically returns to normal operating mode without accepting any value that has been changed.

After confirming an incorrect code number: Do not press any key for approx. 20 seconds. Wait for program to return to normal operating mode. Enter new code.

8.2 The various levels:

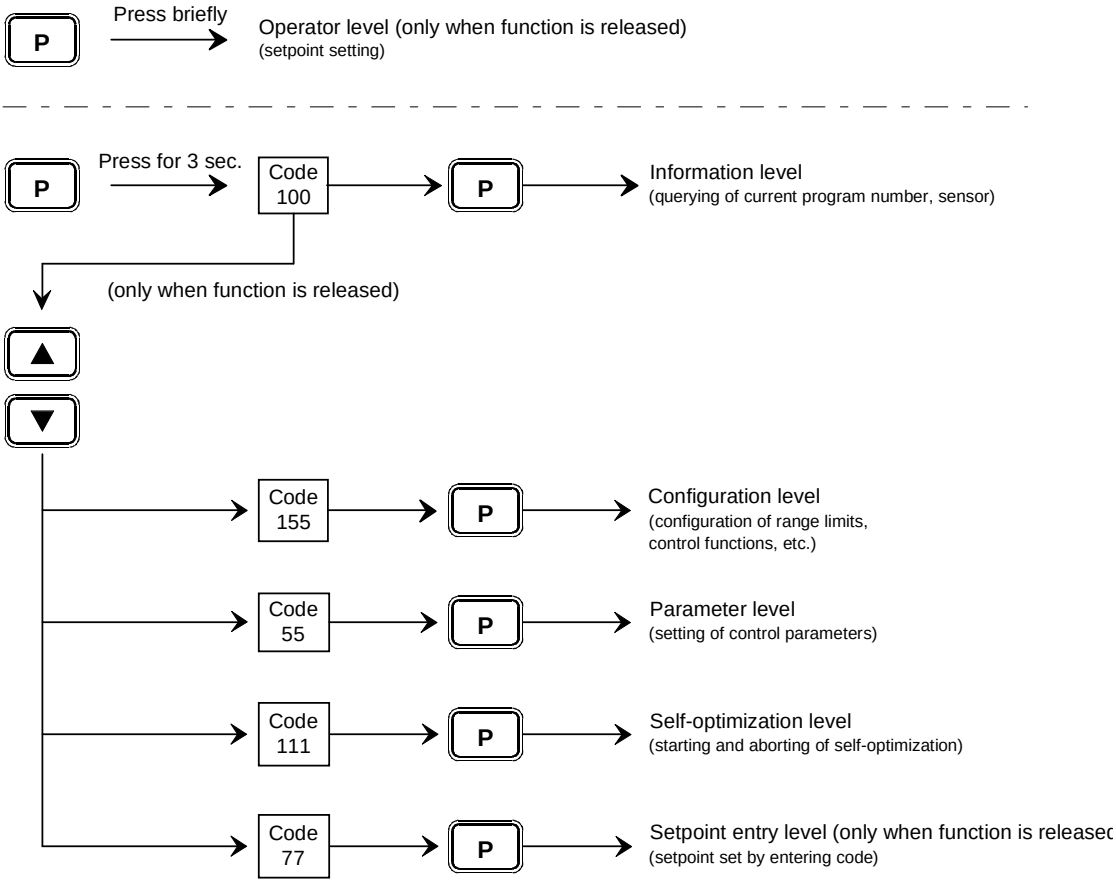


Figure 4: The various levels

8.3 Setting the setpoint:

How the setpoint is set depends on configuration (parameter ”Co.u” on the configuration level). The setpoint can be set on the:

- operator level (factory configuration)
- setpoint entry level (setting made by entering a code number).

8.3.1 Setting the setpoint via the operator level:

P Press key briefly to jump to the operator level

Display:	Parameter:	Range:	Factory setting:
"SP.1"	Setpoint 1	"rA.L...rA.H"	0.0℃
"SP.2"	Setpoint 2 (appears only for configuration "Co.L" = 01)	"rA.L...rA.H"	0.0℃

" y "	Setpoint manipulated variable (appears only for configuration "Aut" = OFF)	0.0...100%	0.0%

P Display value is accepted

When configuring parameter ”Co.u” = on (setting setpoint via setpoint entry level) it is not possible to jump to the operator level.

8.3.2 Setting the setpoint level via the setpoint entry level:

P Press for approx. 3 sec. to get display: **" Cod "**

100

▲ ▼ Enter code: **77**

P Confirm code: Display: **" uSr "**

P Jump to setpoint entry level.

Display:	Parameter:	Range:	Factory setting:
"SP.1"	Setpoint 1	"rA.L...rA.H"	0.0℃
"SP.2"	Setpoint 2 (appears only for configuration "Co.L" = 01)	"rA.L...rA.H"	0.0℃
" y "	Setpoint manipulated variable (appears only for configuration "Aut" = OFF)	0.0...100%	0.0%

P Displayed value is accepted

When configuring parameter ”Co.u” = OFF (setting setpoint via operator level) it is not possible to jump to the setpoint entry level.

8.4 The configuration level:

P Press for approx. 3 sec. to get display: **" Cod "**

100

▲ ▼ Enter code: **155**

P Confirm code: Display: **" Con "**

Jump to configuration level.

Display:	Parameter:	Range:	Factory setting:
"Cor"	Line compensation and zero-point offset	-25...25.0℃	0.0℃
"rA.H"	Set upper limit of setpoint range (end of setpoint range)	max. set-point range by sensor ID (Section 2.1)	max. set-point range by sensor ID (Section 2.1)
"rA.L"	Set lower limit of setpoint range (beginning of setpoint range) Note: With configuration "rA.H" = "rA.L" it is not possible to set the setpoint on the operator level. With configuration "rA.H" < "rA.L" the keys ▲ or ▼ can be used to switch back and forth between the set values	max. set-point range by sensor ID (Section 2.1)	0.0℃
"Co.1"	Configuration of control output or limit comparator K 1 Two-point controller / three-point response: 01: Cooling controller with hysteresis setting towards plus 02: Cooling controller with PID feedback 03: Limit comparator closed in goodband (hysteresis fix at 0.5 K) 04: Heating controller with adjustable hysteresis towards minus 05: Heating controller with PID feedback 06: Limit comparator open in goodband (hysteresis fix at 0.5 K) Continuous-action controller: (parameter "Co.A" = 03 or 04, relay contact K 1 deactivated). 02: rising characteristic with PID "cooling" feedback 05: falling characteristic with PID "heating" feedback	01...06	05

"Co.2"	Configuration of limit-value contact K 2 00: Relay deactivated (no function) 01: Absolute limit value of make contact relative to rising temperature 02: Limit value travels with setpoint, make contact relative to rising temp. 03: Limit comparator closed in goodband (hysteresis fix at 0.5 K) 04: Absolute limit value, break contact referenced to rising temperature 05: Limit value travels with setpoint, break contact relative to rising temp. 06: Limit comparator open in goodband (hysteresis fix at 0.5 K)	00...06	00
"Fd.1" "Fd.2"	Error allocation, outputs K 1; K 2 Output K 1 Output K 2 on: Output active in the event of error OFF: Output inactive in the event of error	on...OFF	 OFF OFF
"rES"	Display resolution 00: resolution 0.1K 01: resolution 1K	00...01	00
"Aut"	Automatic function on: Automatic function mode activated (controller) OFF: Automatic function mode deactivated (actuator). The  key can be used to switch from automatic function mode (controller) to manual function mode (actuator).	on...OFF	on
"Co.u"	Setting of setpoint via setpoint entry level on: Setting of setpoint via setpoint entry level activated OFF: Setting of setpoint via setpoint entry level deactivated (setpoint set via operator level).	on...OFF	OFF
"Co.A"	Analog output: Analog output of actual value (optional): 00: Analog output deactivated 01: Voltage/current output: 0...1 VDC, 0...2 VDC, 0...5 VDC or 0...20 mA 02: Current output: 4...20 mA Continuous-action controller: (parameter "Co.A" = 03 or 04), configure the desired control function (parameter "Co.1" = 02 or 05), (relay contact K 1 is deactivated): 03: Voltage/current output: 0...1 VDC, 0...2 VDC, 0...5 VDC or 0...20 mA 04: Current output: 4...20 mA	00...04	00
"An.H"	Analog output of actual value High-end value of measuring range limit	max. display range dependent on sensor ID (Section 2.1)	end of set-point range dependent on sensor ID (Section 2.1)

"An.L"	Analog output of actual value Low-end value of measuring range limit	max. display range dependent on sensor ID (Section 2.1)	0.0℃
"Co.L"	Configuration of logic input 00: Logic input deactivated 01: Changing setpoint selection contact open: setpoint 1 contact closed: setpoint 2 02: Stop function (not in effect with continuous-action control output!) Contact closed: control contact K 1 deactivated and setpoint display goes dark (lower display) 03: Programming block Contact closed: programming function released Contact open: programming function blocked (jump to configuration, parameterization, setpoint entry and self-optimization levels blocked).	00...03	00
"3-P"	Three-point response on: Three-point response activated OFF: Three-point response deactivated Configuring three-point response e.g.: heating K 1: "Co.1" = 04 or 05, cooling K 2: "Co.2" = 02 cooling K 1: "Co.1" = 01 or 02, heating K 2: "Co.2" = 05 spreading (parameter ”Lr.2”) toward plus or setting towards minus.	on...OFF	OFF

Important: After any change of configuration or reconfiguration of outputs K 1 and K 2 (parameters "Co.1" and "Co.2") the corresponding parameters on the parameterization must be set and adapted to the directly controlled member.

After any change of configuration or reconfiguration of the setpoint range (parameters "rA.H" and "rA.L") the setpoint settings on the operator level, and the setpoint entry level must be checked and adapted to the setpoint range.

8.4.1 Switching response of the K 2 limit-value contact:

Switching function relative to rising actual value

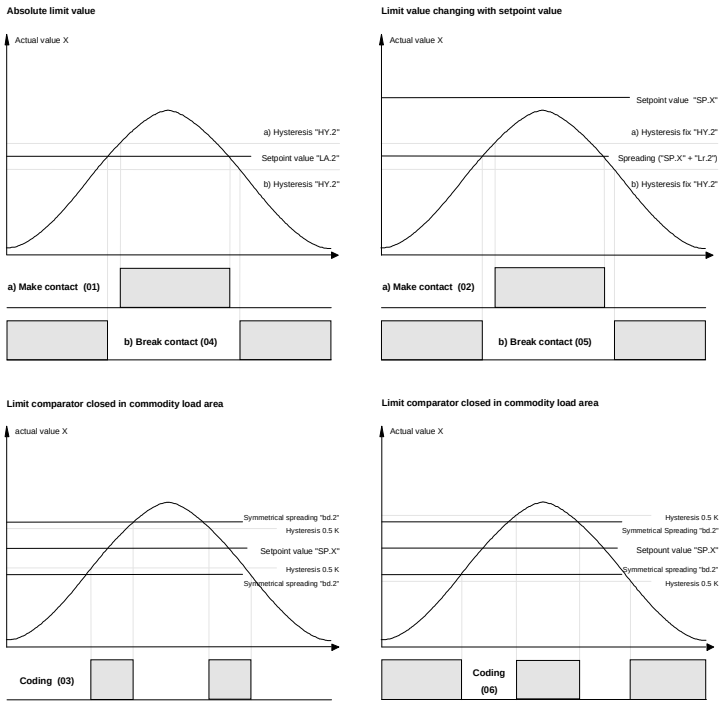


Figure 5: Switching response of the K 2 limit-value contact

8.5 The parameterization level:

Setting control parameters:

P	Press for approx. 3 sec.	to get display:	**" Cod "**
			100
▲ ▼	Enter code:		**55**
P	Confirm code:	Display:	**" PAr "**
P	Jump to parameterization level.		

Depending on the configuration of the outputs (configuration level) only those parameters are accessible which are needed for the specific function.

Display:	Parameter:	Range:	Factory setting:
"Pb.1"	Proportional band, control contact K 1 (Xp = 0.1...200% relative to setpoint range according to sensor ID, Section 2.1)	0.1...200% "Co.1" = 02, **05**	**5.0%**

"ti.1 "	Reset time, control output K 1 (adjustment zero = time 0)	0...999 sec. "Co.1" = 02, **05**	**250 sec.**
"td.1"	Derivative action time, control output K 1 (adjustment zero = time 0)	0...500 sec. "Co.1" = 02, **05**	**50 sec.**
"CY.1"	Cycle time, control output K 1	1...200 sec. "Co.1" = 02, **05**	**30 sec.**
"HY.1"	Hysteresis, control output K 1	0.1...5% of set-point range limit dependent on sensor ID "Co.1" = 01, 04	1.0 K
"bd.1"	Symmetrical spreading, limit comparator K 1 (hysteresis fix at 0.5 K)	0.1...99.9 K "Co.1" = 03, 06	5.0 K
"LA.2"	Absolute setpoint, limit-value contact K 2	max. display range dependent on sensor ID "Co.2" = 01, 04	0.0 °C
"Lr.2"	Spreading, limit-value contact K 2 traveling with setpoint	-99...99.9 K "Co.2" = 02, 05	0.0 K
"bd.2"	Symmetrical spreading, limit comparator K 2 (hysteresis fix at 0.5 K)	0.1...99.9 K "Co.2" = 03, 06	5.0 K
"HY.2"	Hysteresis, limit contact K 2	0.1...20% of set-point range limit dependent on sensor ID "Co.2" = 01, 04	1.0 K

8.6 The self-optimization level:

The DMP 48 AS / AW controller is equipped with an optimization routine for the automatic adaptation of the controller to the controlled system.

The optimization algorithm is based on modified Ziegler-Nicols rules, according to which the characteristic data of the system are calculated after an oscillation test in a closed-loop control circuit.

These characteristic data (particularly period and amplitude of oscillation) form the basis for calculating specific parameters.

Depending on the control function (heating controller or cooling controller), parameters are calculated for either the heating or the cooling side.

Starting and aborting optimization:

Optimization can be started or aborted on the self-optimization level (only when function is released).

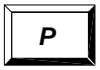
Optimization optimizes for heating or cooling (heating controller or cooling controller, depending on configuration).

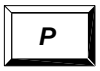
Press for approx. 3 sec. to get display: **" Cod "**

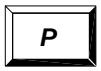
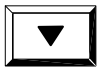
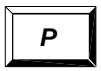
100



Enter code: **111**


Confirm code: Display: **" tun "**


Jump to self-optimization level.

Display:	Parameter:	Range:	Factory setting:
"HLP"	Correcting setpoint (see formula) 70...100 % for heating 100...130 % for cooling	70...130 %	90 %
"Opt" "on"	 **Start** self-optimization  Confirm		"OFF"
"Opt" "OFF"	 **Abort** self-optimization  Confirm		

For optimization the algorithm uses a correcting setpoint which is spread by the value set for the setpoint (parameter "HLP").
This correcting setpoint prevents temperature peaks occurring above the setpoint during optimization from damaging the controlled commodity. The optimization difference must be adjusted to the specific application.

$$\text{Corr. setpoint (}\ ^{\circ}\text{C)} = \frac{\text{Setpoint (}\ ^{\circ}\text{C)} \cdot \text{Parameter "HLP" (\%)}}{100\ (\%)}$$

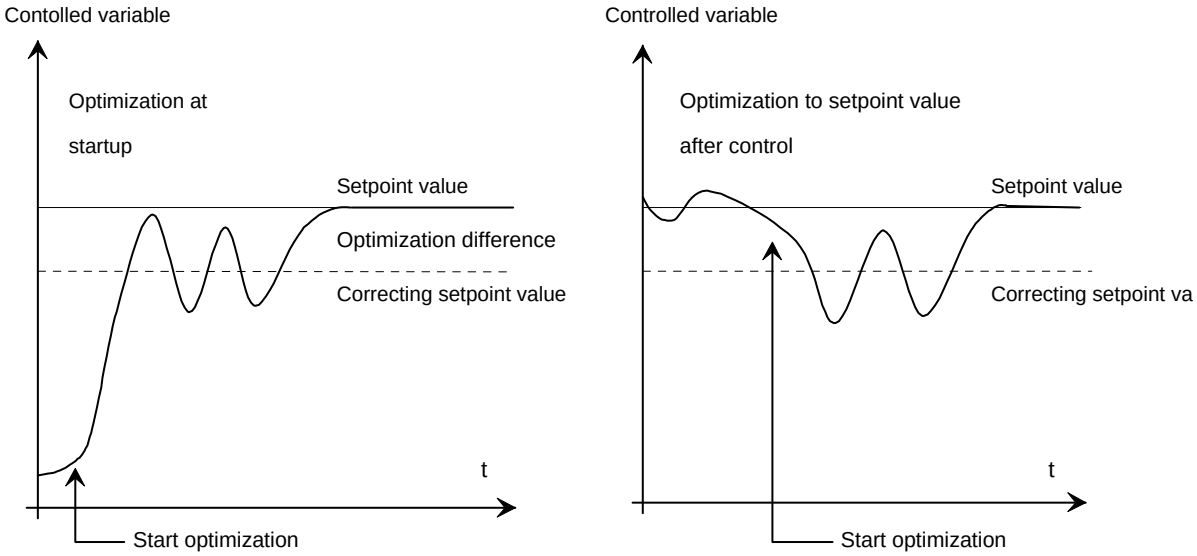
During the optimization process the controller works with a P-regulating characteristic curve (Xp = 0,1%). Setpoint (correcting setpoint) / "OPt" are appear alternately on the display as a visual check.

To calculate parameters the controller requires two oscillations, after which it brings the control variable in line with the setpoint.

After completion of the optimization process only the current setpoint appears in the lower display. The calculated parameters are stored in the power-outage-proof EE-PROM, from where they can be retrieved at any time and modified manually.

Self-optimization is aborted during any interruption of power supply.

Example of heating optimization



Example of cooling optimization

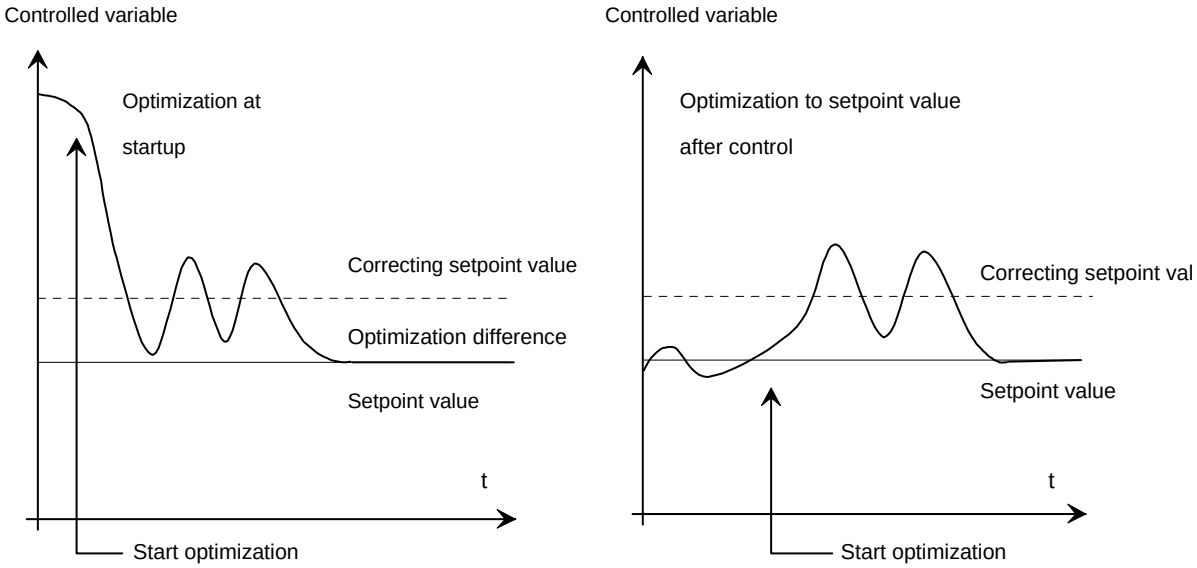


Figure 6: Self-optimization examples

8.6.1 Monitoring the optimization process:

The diagrams show possible incorrect settings with suggestions as to how to correct them.

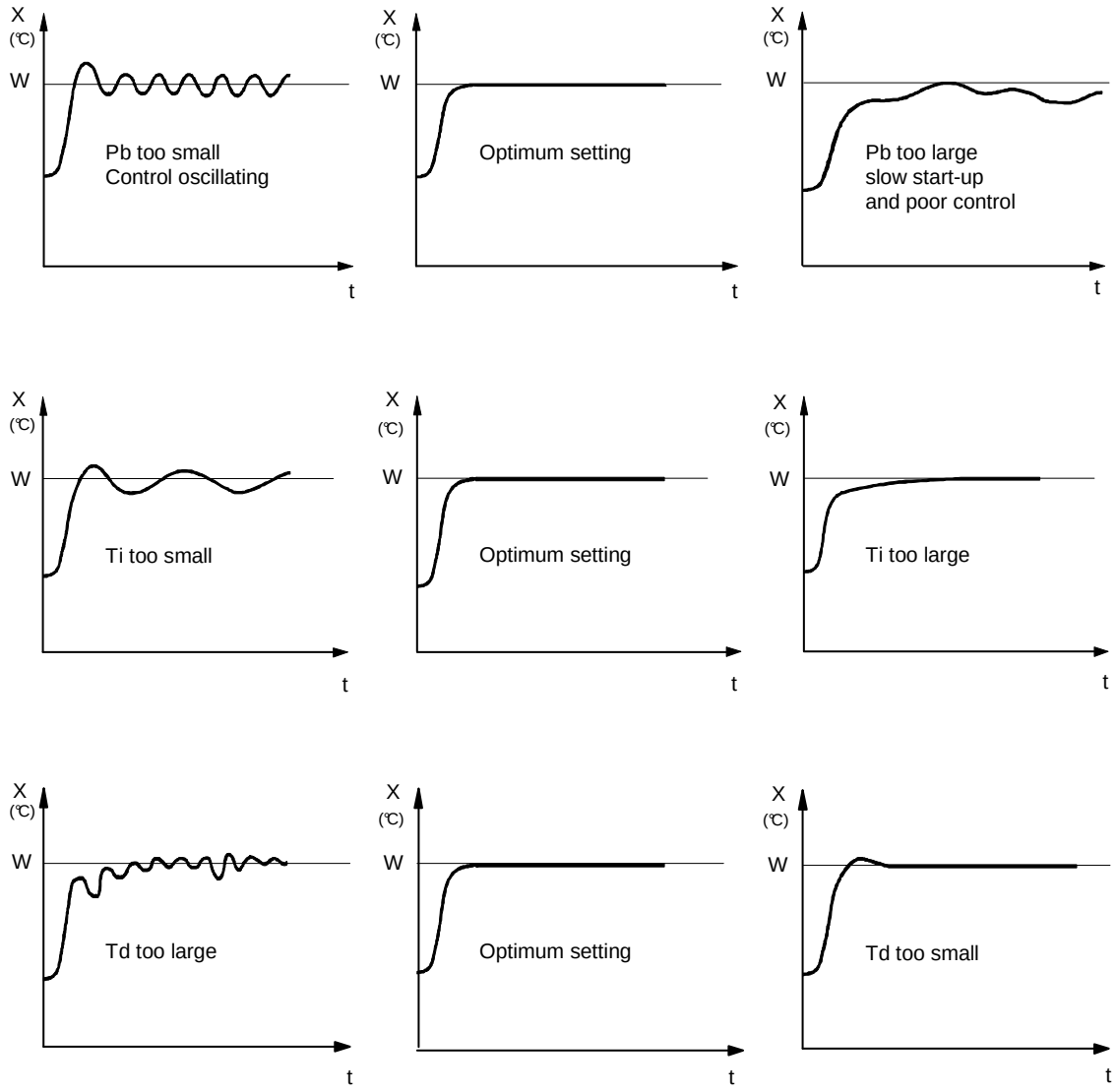


Figure 7: Incorrect settings of the feedback parameters

8.7 The information level:

P	Press for approx. 3 sec.	to get display: **" Cod "** **100**
P	Display:	**" inF "**
P	Jump to information level	

Display:	**Parameter:**
"Pnr"	Current program number
"SEn"	Sensor ID as in table

Sensor ID:

Sensor ID:	ID by ordering key:	Sensor:	Max. display range:	Max. setpoint range:	Display:
P 1	P 1	Pt 100	-69...149℃	-50...100℃	3 digits
P 2	P 2	Pt 100	-69...249℃	-50...200℃	3 digits
P 3	P 3	Pt 100	-69...349℃	-50...300℃	3 digits
P 4	P 4	Pt 100	-69...699℃	-50...600℃	3 digits
P 5	P 5	Pt 100	-169...149℃	-150...100℃	4 digits
tL1	L 1	Fe-CuNi Type L	-24...499℃	0...450℃	3 digi ts
tL2	L 2	Fe-CuNi Type L	-24...899℃	0...850℃	3 digi ts
tn1	K 1	Ni Cr-Ni Type K	-24...649℃	0...600℃	3 dig its
tn2	K 2	Ni Cr-Ni Type K	-24...1299℃	0...1200℃	4 d igits

9. Line compensation, zero-point offset:

9.1 Line compensation:

Line compensation is required only with resistance thermometers in two-wire technology. Line resistance can be counterbalanced with the "Cor" parameter (configuration level).

Proceed as follows to generate line compensation:

1. Connect a 100 Ω resistor to the end of the sensor line (corresponds to 0℃).
2. Read off the actual value from the display.
3. Jump to the configuration level.
4. Correct line resistance (display in ℃) with the "Cor" parameter.

Example:
1. Displayed actual value: +3.0℃
2. "Cor" value to be set on the configuration level: -3.0℃
3. Confirm the set value with the P key.
   Return to operating mode
4. Display of actual value: 0.0℃
5. Remove 100 Ω resistor from end of line.

9.2 Zero-point offset:

The "Cor" parameter can also be used for zero-point offset (offset value) towards plus or minus (as in the above example).

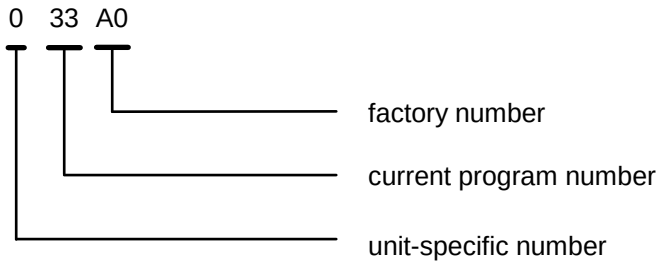
10. Error messages:

10.1 Error messages (display):

Error display:	Cause:	Remedy / Explanation:
Er. 1	Pt 100 input: Sensor short circuit or Lower range limit exceeded, Sensor breakage or Upper range limit exceeded.	Check sensor
Er. 1	Thermal converter input: Sensor breakage or Upper range limit exceeded, Sensor poles reversed or Upper range limit, exceeded Ambient temperature of controller > 70℃.	Check sensor Check ambient temperature of controller
Er. 9	System error	Switch unit off/on

11. Program version:

Current program version:



- Version 032: Status: 26.01.95 Basic version: Single-channel controller (two-point controller, continuous-action controller) with analog output and logic input.
- Version 033: Status: 14.02.95 Logic input function expanded: Programming block, sensor ID changed.

12. Immunity:

The immunity of the unit was tested with the following interference simulators manufactured by the Schaffner Company (Switzerland).

- NSG 222A: Interference pulses with broadband spectrum, short build-up time and low energy

Test values:	pulse amplitude	± 2500 V
	Rise time:	5 nsec.
	Symmetrical and asymmetric feed	

- NSG 225A: Interference pulse package with broad interference spectrum

Test values:	Stage 3:	2000 V
	Repetition frequency:	5 kHz

- NSG 203A: Testing after power outages

Test values:	at 100% supply voltage dip:	50 msec.
	Repetition frequency:	1 Hz.