MicroniK 200

R7426A,B,C
TEMPERATURE CONTROLLER

INSTALLATION & START-UP INSTRUCTIONS

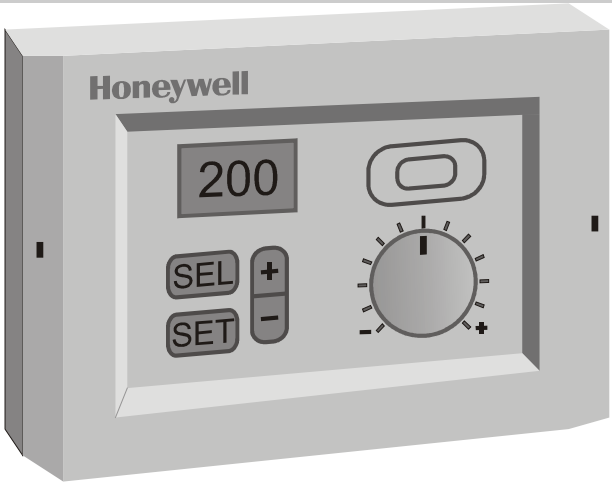


Fig. 1. Temperature Controller

GENERAL

This document provides instructions and procedures for installing and starting up the Micronik 200 R7426A,B,C controllers. No special tools are required for mounting and installation. The user interface and LC display allows accurate and easy parameter setting and output adjustment.

BEFORE INSTALLATION NOTE

- **Visually inspect equipment for shipping damage. Report any damage to the appropriate Honeywell representative.**
- **Refer to job drawings for specific installation information and mounting location.**
- **Verify the controllers will be adequately separated from the main power supply, relays or other equipment which can possibly generate electro-magnetic interference.**
- **Verify that the ambient temperature and the humidity at the controllers will not exceed 0...50 °C (0...122 °F) and 5 to 95% rh.**
- **Use shielded wiring in areas with high EMI.**
- **All wiring should be separated from power lines by at least 150 mm (6”).**
- **Do not install controllers near frequency converters or other high-frequency sources.**

MOUNTING

The controllers can be mounted in an electric cabinet or an other suitable enclosure. They are suitable for back panel, DIN rail, wall or front panel mounting with an additional available front panel mounting frame. The mounting sequence of each is illustrated in the mounting instruction sheet EN1B-0205GE51 supplied with the controllers. Dimensions and panel cut-out are shown in section "Dimensions and Mounting" on page 2.

If the compensation sensor signal (T3) is received from another controller (parallel connection of compensation sensor inputs), the jumper W303 must be cut before mounting the controller (see Fig. 3 on page 3). This disconnects the sensor from the internal power supply.

DIMENSIONS AND MOUNTING

All dimensions in mm.

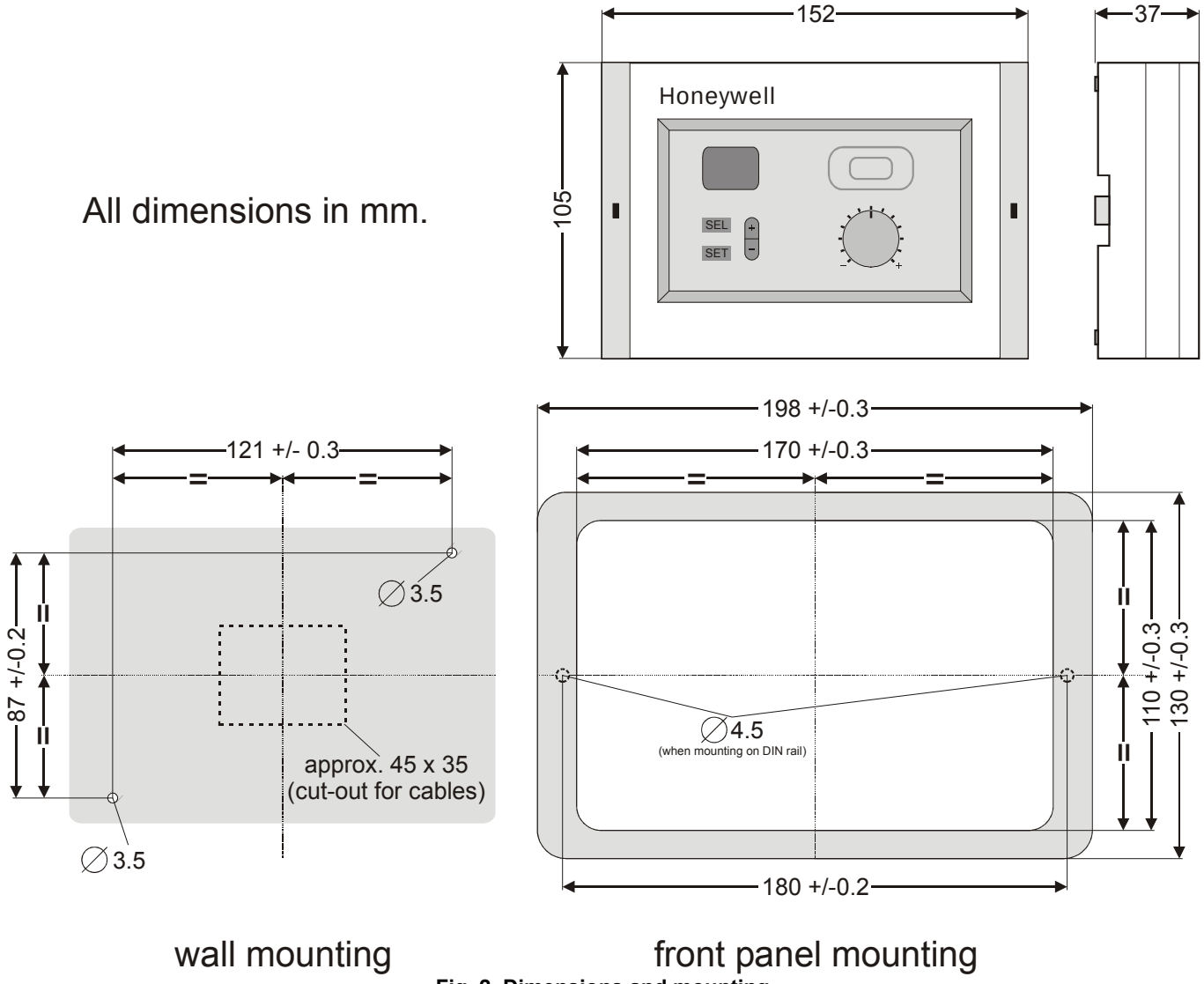


Fig. 2. Dimensions and mounting

WIRING

Screwless type, spring-loaded terminals are provided on the controllers for panel and field wiring. These terminals are suitable for solid conductors as well as tinned or with multi-core cable end, stranded wires up to 1.5 mm^2. To make a termination, push the wire into the terminal or insert a small screwdriver from the front of the controller into the spring-release hole and insert the wire. Check for proper connection by short pull on the wire.

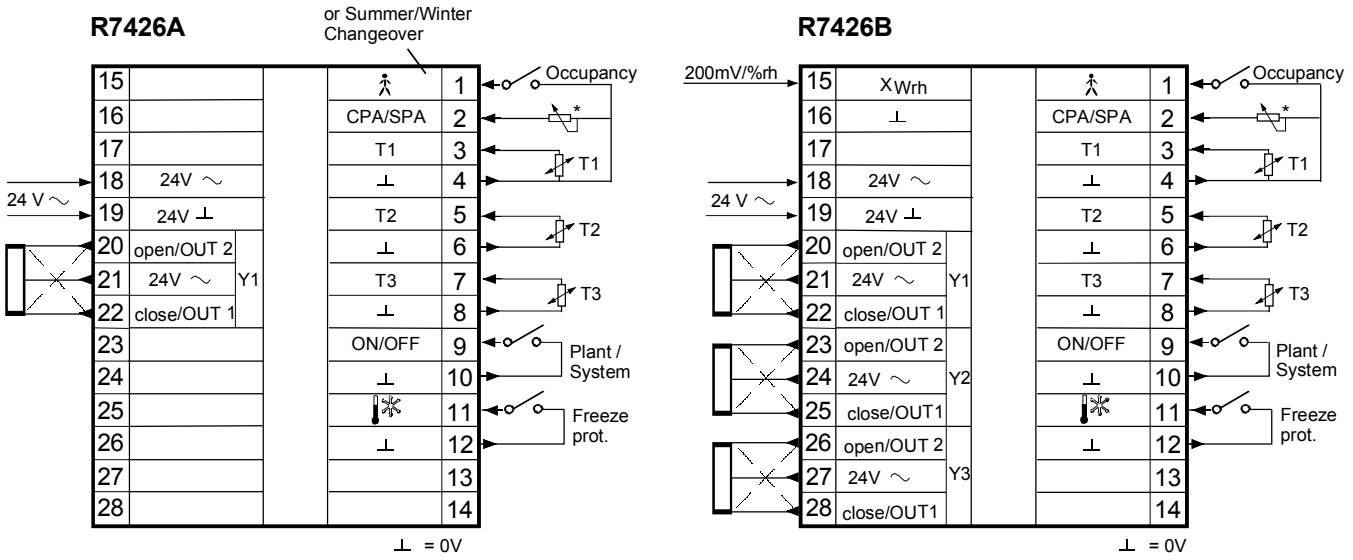
Wiring should be done only according to the actual job wiring diagrams or wiring diagrams shown in Fig. 3. All wiring must conform to applicable codes, ordinances, and regulations. The maximum allowed wiring length per wire size are shown in Table 1.

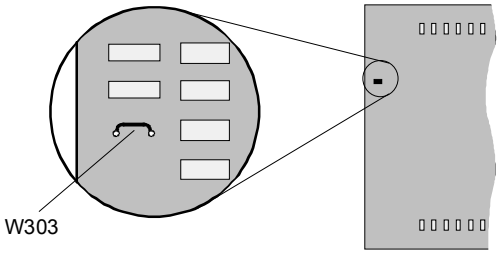
Table 1. Wire dimensions

Wiring run	Type of wires	Length max.	
		1.0 mm^2	1.5 mm^2
From controller to all input and output devices	local standard (normally unshielded)	100 m	150 m

POWER SUPPLY AND GROUNDING

1. Refer to job drawings and verify correct supply voltage to transformer (230 Vac) and controller (24 Vac).
2. Connect line power conductors to transformer primary. Line power must be supplied from a breaker panel with dedicated controller circuit. Do not turn the line power on until all wiring has been checked against job drawings.
3. Connect transformers 24 Vac secondary to the controller terminals 18 and 19. Connect one conductor to terminal marked 24 V~ and the other to terminal marked 24 V⊥. If controllers are interconnected all terminals 19 must be connected to the same potential 24 V⊥ level.





Jumper[1)]	State	Description
W303[2)]	closed open	T3 supplied by this controller T3 supplied from another controller

1) Default jumper position = closed
2) Cut (open) jumper W303 only if the T3 input is fed from another controller (parallel connection, max. 6 devices). This disconnects the T3 input from the internal power supply.

Wiring Run Controller to CPA/SPA Potentiometer *			
R7426A,B,C	**T7412B1016**	**T7412B1057/1008 T7512C1030/1006**	**T7412B1024 T7412B1040**
Terminal 2	Terminal 4	Terminal 4	Terminal 4
Terminal 4	Terminal 5	Terminal 6	Terminal 5+6

⚠ CAUTION

- **Outputs are not isolated from power supply**
- **Observe correct phasing with 24 Vac power supply**

Fig. 3. Wiring diagram and jumper coding

CONTROL / CONFIGURATION PARAMETERS

The controller includes two groups of settings (A and B) for control and configuration parameters that are automatically selected during programming. For **R7426A** and parameter **Ctrltyp** = Lo or **R7426B,C**, setting A is selected. For **R7426A** and parameter **Ctrltyp** = Hi, setting B is selected.

Table 2. Control and Configuration Parameter

Control Parameter		Setting A			Setting B					Actual value
No.	**Name**	**Lo**	**Hi**	**Default**	**Lo**	**Hi**	**Default**	**Resolut.**	**Unit**	
P.01	W1	0	50	21	0	130	70	0.5	°C	
P.02	Wlim	5	30	16	30	130	90	1	°C	
P.03	Wcomp	-5	40	20	-5	40	20	1	°C	
P.04	Wi	-350	+350	0	-350	+350	0	2	%	
P.05	Su	-100	+100	0	-100	+100	0	1	%	
P.06	Wcas	OFF, 0	50	OFF	OFF, 0	130	OFF	0.5	°C	
P.07	Rcas	0	40	10	0	40	10	0.5	K	
P.08	Xp1	1	40	2	1	40	10	0.5	K	
P.09	Xp2	1	40	10	1	40	10	0.5	K	
P.10	Xpc[1)]	OFF, 1	40	3	n.n.	n.n.	n.n.	0.5	K	
P.11	Xph[1)]	1	40	6	n.n.	n.n.	n.n.	0.5	K	
P.12	tr1[2)]	OFF, 20 sec	20 min	OFF	OFF, 20 sec	20 min	OFF	10/0.5	sec/min	
P.13	tr2[2)]	OFF, 20 sec	20 min	OFF	OFF, 20 sec	20 min	OFF	10/0.5	sec/min	
P.14	MINPOS[1)]	0	50	20	n.n.	n.n.	n.n.	1	%	
P.15	Ystart	-20	+20	0	-20	+20	0	0.5	K	
P.16	OFFS	0	10	2	0	30	20	0.5	K	
P.17	T1Cal	-10	+10	0	-10	+10	0	0.1	K	
P.18	T2Cal	-10	+10	0	-10	+10	0	0.1	K	
P.19	T3Cal	-10	+10	0	-10	+10	0	0.1	K	
P.20	RetOffs[1)]	OFF, 0	5	OFF	n.n.	n.n.	n.n.	0.1	K	
P.21	RuntimeY1	6	180	60	6	180	60	1	sec	
P.22	RuntimeY3[1)]	6	180	60	n.n.	n.n.	n.n.	1	sec	
P.23	RuntimeY2[1)]	6	180	60	n.n.	n.n.	n.n.	1	sec	

Config. Parameter		Values	Setting A	Setting B	Actual value
No.	**Name**				
C.01	DIR/REVY1	Dir, Rev, Cho (Cho is available only on R7426A)	Dir	Dir	
C.02	DIR/REVY3[1)]	Dir, Rev	Dir	n.n.	
C.03	DIR/REVY2[1)]	Dir, Rev	Dir	n.n.	
C.04	Ctrltyp[3)]	Lo = 0...50°C, Hi = 0...130°C	Lo	Hi	
C.05	CPATYP	0 = internal, 1= ±5 K (953...1053Ω), 2 = ±5 K (0...100kΩ), 3 = 15…30 °C (10...20kΩ)	0	0	
C.06	YRange[1)]	0 = 2…10 Vdc , 1 = 0…10 Vdc	1	n.n.	
C.07	Startup[1)]	ON, OFF	OFF	n.n.	
C.08	Y1Mode	0= float., 1=2-stage ON/OFF, 2=3-stage ON/OFF, 3=pwm, 4=unconfig.	4	4	
C.09	Y3Mode[1)]	0= float., 1=2-stage ON/OFF, 2=3-stage ON/OFF, 3=pwm, 4=unconfig.	4	n.n.	
C.10	Y2Mode[1)]	0 = float., 1= 2-stage ON/OFF, 2 = unconfigured	2	n.n.	
C.11	YMode[1)]	0 = individual, 1 = 6H or 6C, 2 = 4H+C individual, H = Heating 3 = 4C+H individual, 4= 2Pos D, 5 = 15H+C individualC = Cooling	0	n.n.	
C.12	T2ext	0 = T2 installed, 1 = T1 signal used for T2	0	0	
C.13	LimTyp	0 = Low, 1 = High	0	1	
C.14	Senstyp	0 = Auto detection, 1 = NTC sensor type	0	0	

NOTES

[1)] Parameters are always accessible via user interface but are not needed (n.n.) for applications with controller R7426A

[2)] for tr > 2 min resolution = 0.5 min; for tr < 2 min resolution = 10 sec

[3)] Factory preset is Lo. The actual value Hi or Lo will not be changed during reset to default parameter.

CONFIGURATION SETTINGS

The controllers R7426A,B are supplied with unconfigured outputs to avoid damage of installed final control devices by supply of unallowed output signals if the controller power supply is turned on.

All configuration parameters have to be set to select the correct control functions as required for the job application and to start control operation and synchronization of the final control devices.

Direct - Reverse Action Dir/Revx, x = Y1, Y2 or Y3 (C.01...C.03)

In the case of the R7426A, the output action of Y1 must be reversed for heating control.

In the case of the R7426B,C, the output action of Y1 must be reversed if the output controls an energy recovery system instead of mixed air dampers.

In the case of R7426A,B controllers with 3-position floating output, it is sometimes necessary to exchange the wiring connections open-close (OUT2-OUT1) in order to ensure correct opening and closed direction of the valve or damper. The necessity of doing this depends upon whether the output controls a 2-way or 3-way valve or upon the direction the damper shaft moves to open the damper (cw or ccw).

On actuators equipped with electronic positioning, the correct direction in accordance to the analog output signal 0/2 Vdc = 0% and 10 Vdc = 100% must be set by the direction selector switch or plug (see Specification Data sheets of actuators).

For outputs Y2 and Y3 on the R7426B,C controllers, this can be performed by setting the configuration parameter **Dir/Rev** to Rev instead of exchanging the wiring or selection on the actuator.

If the configuration parameter **Dir/RevY1** = Cho, the output Y1 is reversed in action depending on the occupancy input (summer/winter changeover function).

Operating Range Selection Ctrltyp (C.04)

The R7426A controller provides two operating ranges which can be selected by the configuration parameter **Ctrltyp** (Lo = 0...50°C, Hi = 0...130°C).

Depending on this parameter setting, the setpoint ranges for the main temperature (**W1**), limit temperature ($\mathbf{W_{lim}}$) and submaster temperature ($\mathbf{W_{cas}}$) are selected for air temperature applications (**Ctrltyp** = Lo) or for water temperature applications (**Ctrltyp** = Hi).

Changing the configuration parameter **Ctrltyp** value from Hi- to Lo control range or vice versa causes the controller to change all parameter values to default, depending on the selected **Ctrltyp** value.

For a direct parameter reset by the user refer to section "Resetting Parameter Values to Default Values" on page 12.

Control Point / Setpoint Adjustment CPATYP (C.05)

The control point or setpoint can be adjusted via the internal or external potentiometer connected to the CPA/SPA input. The potentiometer type is selected by the configuration parameter **CPATYP** (see Table 3).

Table 3. Selection of CPA/SPA Type

CPATYP	CPA / SPA range	Sensor type
CPATYP 0	CPA: ±5 K	internal
CPATYP 1 (953...1053Ω)	CPA: ±5 K	T7412B1016 (Pt 1000)
CPATYP 2 (0...100kΩ)	CPA: ±5 K	T7412B1057 (Pt 1000) T7412C1030 (Pt 1000) T7412B1008 (NTC 20kΩ) T7412C1006 (NTC 20kΩ)
CPATYP 3 (10...20kΩ)	SPA: 15...30 °C	T7412B1024 (BALCO 500) T7412B1040 (Pt 1000)

Output Control Range Selection YRange (C.06)

The configuration parameter **YRange** is available only on the R7426C controller and is required to select the output control range (0...100%) to either 2...10Vdc (**YRange** = 0) or 0...10Vdc (**YRange** = 1).

The selected control range is common to all outputs.

Enabling Start-up Routine (C.07)

A start-up routine is provided to prevent start-up problems for the R7426B,C controllers (three-output controllers). This routine can be enabled by setting the configuration parameter **Startup** to ON.

Individual Output Function Selection YxMode, x = 1, 2 or 3 (C.08...C.10)

The R7426A,B controllers provide a choice of output signals suitable for operating a range of final control devices according to the configuration parameter **YxMode** (x = 1, 2 or 3) (see Table 4).

Each output can be configured separately by the configuration parameter **YxMode** (x = 1, 2, or 3).

Table 4. Individual Output Function Selection

Output Function	YMode	YxMode	R7426
Valve or damper actuators (floating mode)	0	= 0 (x = 1, 2, or 3)	A,B
2-stage ON/OFF sequence control	0	= 1 (x = 1, 2, or 3)	A,B
3-stage binary ON/OFF sequence control	0	= 2 (x = 1 or 3)	A,B
Electric heat current valve (pwm output)	0	= 3 (x = 1 or 3)	A,B
unconfigured	n.a.	= 2 (x = 2) = 4 (x = 1 or 3)	A,B

Multistage ON/OFF Function YMode (C.11)

In the case of the R7426B controller with three floating outputs, several ON/OFF sequence control functions can be selected by the configuration parameter **YMode** (see Table 5).

In the case of the R7426B,C controller, the output Y1 can be configured for two-position damper control by setting the configuration parameter **YMode** to 4.

Table 5. Multistage Selection

Output Function	YMode	Provided by output	Function of Y2	R7426
6-stage ON/OFF sequence control	1	Y1,Y2,Y3	n.a.	B
4-stage ON/OFF sequence control heating	2	Y1,Y3	floating or 2-stage cooling	B
4-stage ON/OFF sequence control cooling	3	Y1,Y3	floating or 2-stage heating	B
15-stage binary coded ON/OFF sequence control H.	5	Y1,Y3	floating or 2-stage cooling	B
Two-position damper control	4	Y1	Y2 and Y3 individual	B,C

Supply of Temperature Signal T2 T2ext (C.12)

The configuration parameter **T2ext** must be set to 1 if sensor T1 is used also for high or low limit control. This inter-connects the T1 and T2 input internally and the sensor must be connected only to the T1 input.

Limit Type LimTyp (C.13)

The configuration parameter **LimTyp** allows the selection of high or low limit control. High limit control is performed if configuration parameter **LimTyp** = 1 and low limit control is performed if configuration parameter **LimTyp** = 0.

Sensor Type Senstyp (C.14)

Three different sensor types can be used with the controller (see Table 6).

Table 6. Sensor types

Automatic ID of sensor type	Temperature range	Characteristics
Pt 1000	-30....+130 °C	1000Ω at 0 °C
BALCO 500	-30....+130 °C	500Ω at 23.3 °C
NTC 20kΩ	-30....+85 °C / -30....+130 °C[1)]	20kΩ at 25 °C

[1)] NTC sensor is detected automatically if, during power-up, the sensor temperature is within -30....+85 °C and the configuration parameter Senstyp = 0.
NTC sensor is selected manually if the configuration parameter Senstyp is set to 1.

Automatic identification of sensor type is selected if the configuration parameter **Senstyp** = 0 (default). After power up reset the controller detects automatically the type of sensor, which is connected to the main temperature input T1. For a correct auto detection, it is necessary that the measured temperature is in the specified range (see Table 6). The same type of sensor must be used for all temperature inputs (T1, T2 and T3).

PARAMETER SETTINGS AND ADJUSTMENT

Main Setpoint W1 (P.01)

The main setpoint W is either set by the control parameter **W1** or by the external setpoint potentiometer if the configuration paramter **CPATYP** = 3.

High/Low Limit Setpoint W_{lim} (P.02)

For high or low limit control, the control parameter $\mathbf{W_{lim}}$ is used as setpoint.
During limit control, the throttling range **Xp2** and reset time **tr2** are active.
Limit control will be active only if the T2 temperature signal (control parameter **T2ext** = 0) is available or, alternatively, if the sensor T1 (control parameter **T2ext** = 1) is used also for limit control.
For cascade control the limit setpoint $\mathbf{W_{lim}}$ determines the control point at which the submaster setpoint ($\mathbf{W_{cas}}$) maintains the limit value and is not shifted anymore by the master control loop.
High or low limit control is in accordance with the configuration parameter **LimTyp** (C.13).

Submaster Setpoint W_{cas} (P.06)

The R7426A,B,C controllers provide cascade control which uses two control loops, master and submaster to maintain the master setpoint (CTRP1).

This adjustment sets the control point of the submaster control loop, discharge temperature (T2), at zero room temperature deviation. If the room temperature deviates, the submaster setpoint $\mathbf{W_{cas}}$ is automatically altered.

Cascade control is disabled if the submaster setpoint $\mathbf{W_{cas}}$ is set to OFF.

Reset Span Adjustment R_{cas} (P.07)

The reset span adjustment $\mathbf{R_{cas}}$ determines the degrees of reset effect in degrees Kelvin, the submaster setpoint $\mathbf{W_{cas}}$ is altered if the temperature (T1) deviates by 50% of the throttling range **Xp1**.

Throttling Range Xp1/Xp2 (P.08 / P09)

Proportional band (throttling range X_p) adjustment determines the temperature change, required at the main sensor (T1) and limit or cascade sensor (T2) to operate the output device from full open (100%) to full closed (0%) or vice versa.

Xp1 is the throttling range for the main control loop, **Xp2** is used if limitation or cascade control (submaster control loop) is active (see Table 7).

Table 7. Throttling range and reset time reference

Application	Sens.	Xp 1	Xp 2	Xp c	Xp h	tr1	tr2
R7426A Controller							
Main temperature control	T1	x				x	
High or low limit temperature control	T2		x				x
Cascade control							
Master	T1	x				x	
Submaster	T2		x				x
R7426B,C Controller							
Main temp. sequence control							
Mixed air damper	T1	x					
Energy recovery	T1	x					
Heating	T1				x	x	
Cooling	T1			x		x	
R7426B,C Controller							
Temperature cascade Sequence control							
Master	T1	x				x	
Submaster							
- Mixed air dampers	T2		x				
- Energy recovery	T2		x				
- Heating	T2				x		x
- Cooling	T2			x			x

Throttling Range Xpc/Xph (P.10 / P11)

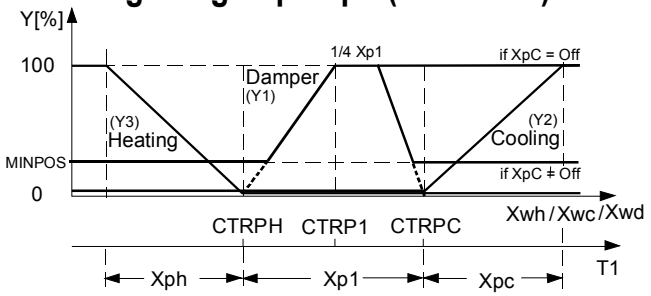


Fig. 4. Temperature Sequence Control with Heating, Mixed Air Damper and Cooling Valve

The control parameters **Xpc** and **Xph** are available only on R7426B,C controllers and are used to set the cooling and heating throttling ranges for the following applications

- Temperature sequence control with heating, mixed air dampers, and cooling (see Fig. 4 and Table 7)
- Temperature cascade control with heating, mixed air dampers, and cooling (see Table 7)

In applications without cooling, the throttling range **Xpc** must be set to OFF if 100% fresh air supply at actual temperature above the control point is required (outdoor and return air dampers fully open).

Setting Guidelines for Proportional Band of Proportional (P) / + Integral (P+I) Control

To estimate the proportional band (throttling range X_p) for stable control under all different load conditions the control or correcting range X_h of the heating or cooling coil must be known. This is the maximum air temperature increase produced by the heating coil or decrease of a cooling coil if the control valve is fully open.

The proportional band X_p for discharge air control can be calculated using the following rule-of-thumb formula:

$$X_p = \frac{X_h}{5}$$

For room temperature control, the following rule-of-thumb formula can be used:

$$X_p = \frac{X_h}{10} \text{ or } \frac{\Delta t_{max}\text{discharge air}}{10}$$

The Δt_{max} (X_h) of the discharge air for mixed air damper control is the max. difference between outdoor air (OA) temperature and return air (RA) temperature.

$$X_h = \vartheta_{RA} - \vartheta_{OAmin}$$

The often specified accuracy for room control of ±1 (X_p = 2 K) allows a discharge air alteration of 20 °C.

In P+I control, the same proportional band can be used as for P control. The following rule-of-thumb formulae are used for P+I control:

- Discharge air control $X_p = \frac{X_h}{4...5}$
- Room control $X_p = \frac{X_h}{8...10}$ *or* $\frac{\Delta t_{max}\text{discharge air}}{8 \ldots 10}$

Reset Time tr1 / tr2 (P.12 / P13)

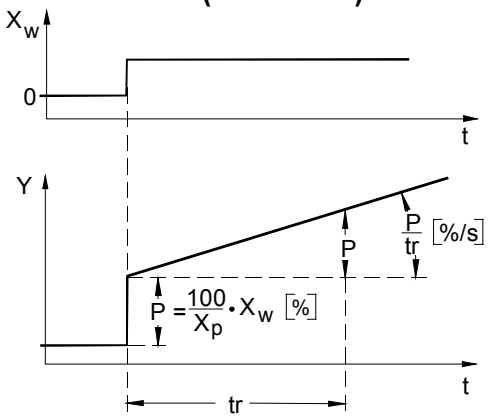


Fig. 5. Step change response of P+I control

In the case of combined action including proportional and integral components (P+I control), the reset time (tr) is defined as the required time after which the integral part is equal to the change due to the proportional action for a predetermined step change in the input variable. See Fig. 5.

The control parameter **tr1** sets the reset time of the P+I main temperature control loop. For limit or submaster cascade control, the control parameter **tr2** sets the reset time of these control loops, e.g. discharge temperature T2 (see Table 7). If only proportional control is required, parameter tr must be set to OFF.

Setting Guidelines for Reset Time of Proportional + Integral (P+I) Control

The reset time **tr** should be adjusted to 2...3 times of the response time T_u , which is the time interval between the beginning of a sustained disturbance (e.g. rapid step change

of valve position) and the instant when the resulting change in the output signal reaches a specified fraction of its final steady-state value, either before overshoot or in the absence of overshoot.

The response time T_u in discharge air control is normally in the range of 0.1 to 0.6 min, which allows adjustments of the reset time tr in a range of 0.2 to 2 min.

In room control, the response time T_u is in the range of 0.5 to 5 min, which results in a setting of 1 to 15 min.

Start Point Y_{start} (P.15)

This control parameter is available only on the single-output controller R7426A and on the R7426B controller, if the three 3-position floating outputs are configured for 6-stage ON/OFF sequence control.

The start point determines the midrange shift of the output Y1 from the calculated control point.

The start point is calibrated in K and is the offset (plus or minus) from the set values or calculated control points at which the output Y1 is at 50%. Normally (and especially in P+I control), the start point should be set at zero. A change is required only in specific applications where an asymmetrical arrangement results in improved control performance, e.g. if for heat up of a large space in the morning a high heat capacity is needed and for normal control the valve must be opened by only a small amount.

Compensation Changeover Point W_{comp} (P.03)

The control parameter **W_{comp}** defines the start point of summer or winter compensation. Above the compensation changeover point (**W_{comp}**) summer compensation and below **W_{comp}** winter compensation is performed.

Summer/ Winter Compensation Authority Su / Wi (P.04 / P.05)

These authority settings determine the reset effect (OAT_{Comp}) the compensation sensor (T3) has on the main setpoint **W1** in percentages. Outside temperature reset in summer and winter time are commonly used applications.

To calculate winter and summer authority, the throttling range must be considered to be in proportional-only control according to Table 8.

Table 8. Calculation of summer/winter compensation

Control schedule	Room temp. (T1)	Outdoor air temp. ($T3/T_{comp}$)	Throttling range (X_P)
Winter	20 °C	20 °C	2 °C
	22 °C	-15 °C	2 °C
	Aut Wi = $\frac{\Delta T1 + X_p}{\Delta t \text{ Outside Air}} \cdot 100\% = \frac{(22 - 20) + 2}{35} \cdot 100\% \approx 12\%$		
Summer	20 °C	20 °C	2 °C
	26 °C	35 °C	2 °C
	Aut Su = $\frac{\Delta T1 - X_p}{\Delta t \text{ Outside Air}} \cdot 100\% = \frac{(26 - 20) - 2}{15} \cdot 100\% \approx 27\%$		
Compensation change-over at +20 °C outdoor air temperature			
NOTE	With P+I control $X_p = 0$		

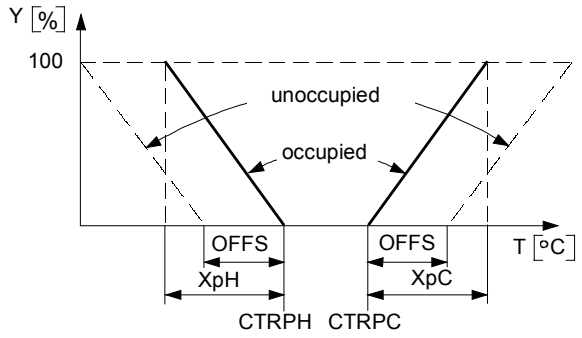
Occupied/Unoccupied Function OFFS (P.16)

A potential-free contact can be used between terminals 1 and 4 to switch the controller between occupied (contact closed) or unoccupied (contact open) mode.

In occupied mode the temperature set point **W1** is used for the control point calculation. In unoccupied mode the **OFFS** parameter value is added (cooling) to or subtracted (heating) from the calculated control point.

On the R7426A controller the parameter **Dir/RevY1** must be set to Dir or Rev (≠ Cho) to match the required heating or cooling application.

If the configuration parameter **Dir/RevY1** is set to Cho (summer/winter changeover) the parameter **OFFS** is not considered.



In sequence applications of heating and cooling the **OFFS** parameter value is added to the control point for cooling (**CTRPC**) and subtracted from the control point for heating (**CTRPH**) as shown in the diagram below.

The control point calculation and the reference to the applications is shown in Table 9.

Table 9. Control point reference and calculation

Application	CTRP1	CTRP2	CTRPC	CTRPH
Main Temperature Control	x[2]			
Limit Control		x[3]		
Cascade Control (Submaster)		x[4]		
Temperature Sequence Control[1]	x[5]		x[6]	x[7]
Temperature Cascade (Subm.) Sequence Control [1]		x[8]	x[9]	x[10]
Economizer Modes Mixed Air Dampers Energy Recovery System		 x x		

[1] Control with Heating, Mixed Air Dampers or Energy Recovery and Cooling

[2] CTRP1 = W1 + XOFFS + CPA + OAT_{Comp}

[3] CTRP2 = W_{lim}

[4] CTRP2 = W_{cas} + XOFFS - R_{cas}•0.5 + YMaster•R_{cas} /100

XOFFS = -OFFS for heating control if Dir/RevY1 = Rev

XOFFS = +OFFS for cooling control if Dir/RevY1 = Dir

[5] CTRP1 = W1 + CPA + OAT_{Comp}

[6] CTRPC = W1 + OFFS + CPA + OAT_{Comp} + Xp1•0.5

[7] CTRPH = W1 - OFFS + CPA + OAT_{Comp} - Xp1•0.5

[8] CTRP2 = W_{cas} - R_{cas}•0.5 + YMaster•R_{cas} /100

[9] CTRPC = CTRP2[8] + OFFS + Xp2•0.5

[10] CTRPH = CTRP2[8] - OFFS - Xp2•0.5

For occupied function OFFS = 0.

OAT_{Comp} = Compensation Reset Effect

Calibration of Temperature Sensors T1CAL, T2CAL or T3CAL (P.17...P.19)

The controllers include a calibration setting and are factory calibrated. In case of an offset as a result of long wiring lengths the temperature sensor inputs (T1, T2 and T3) can be adjusted separately by the control parameters **T1CAL**, **T2CAL** and **T3CAL**.

Return Air Offset RetOffs (P.20)

The control parameter **RetOffs** is available only on R7426B,C controllers and is used to activate economizer mode (**RetOffs** ≠ OFF) for mixed air damper or energy recovery system control.

If the main temperature sensor (T1) is installed in the exhaust air the control parameter **RetOffs** should be set to 0. In applications with the main sensor installed in the room and with a constant offset between room and exhaust air conditions, this offset value can be adjusted within 0...5 K by the control parameter **RetOffs.** This will be added to the actual measured room temperature value to simulate exhaust air conditions.

The economizer mode is disabled, if the value of the control parameter **RetOffs** is programmed to OFF or, if no outdoor air temperature sensor is connected.

Minimum Position MINPOS (P.14)

The control parameter adjustment **MINPOS** is available on R7426B,C controllers only and determines the minimum open position to which an outdoor air damper actuator can be driven from the controller. In mixed air damper applications it maintains the minimum outdoor air damper setting, even though the temperature input condition calls for a fully closed position.

Minimum position is overridden by the external plant/system **ON/OFF** input for plant/system shut off and the damper is driven into the fully closed position at OFF condition together with the heating and cooling valve actuators.

Runtimex, x = Y1, Y2 or Y3 (P.21...P.23)

The control parameters **Runtimex** (x = Y1, Y2 or Y3) are available only on R7426A, B controllers.
For three-position floating control of actuators, the controller converts the deviation signal to a proportional output pulse which drives the actuators depending on the **Runtimex** (x = Y1, Y2 or Y3) parameter value.

An automatic synchronization function ensures correct positioning of the actuators. The run time for synchronization is derived by control parameter **Runtimex** (x = Y1, Y2 or Y3) multiplied by 1.25.

By selection of the output Y1 or Y3 to pwm mode the pulse width modulated output is suitable for driving electric heat current valves and is controlled from the heating signal. The interval and total cycle time is set by the control parameter **RuntimeY1** or **RuntimeY3**.

OPERATING OVERVIEW

Display and Operation Elements

The MicroniK 200 user interface is shown in Fig. 6.

Changing Operating Modes

Fig. 7 shows the five operating modes. After power-up the controller version is displayed and the controller enters the standard display mode (Fig. 8). In this mode selected input or output values as well as the controller status can be displayed.

Pushing the **+** and **-** button simultaneously for approximately 3 sec the controller leaves the standard display mode and enters the parameter/configuration selection mode (Fig. 9). This mode is used for application configuration and to select parameters for adjustment.

Pushing the **SET** button the controller accepts the selected parameter or configuration no. and enters the adjustment mode (Fig. 10), which is used to adjust configuration / parameter values. After adjustment, the controller returns to selection mode by pushing the **SET** or **SEL** button.

Pushing the **SEL** button changes from parameter / configuration selection mode to standard display mode.

Pushing the **SET**- and **SEL** button simultaneously for approx. 3 sec the controller leaves the standard display mode and enters the output data selection mode (Fig. 11).

Pushing the **SET** button accepts the selected output data no.

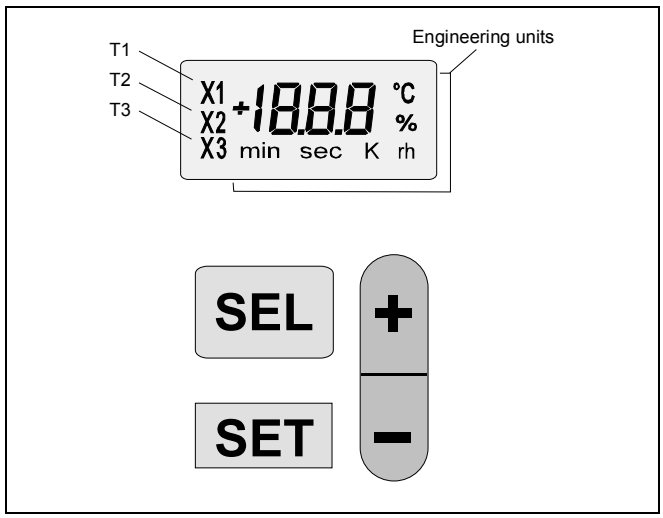


Fig. 6. User Interface

and enters the output adjustment mode (Fig. 12). This mode is used for manual override adjustment of output values. After output value adjustment, the controller returns to output selection mode by pushing the **SET** or **SEL** button.

Time-Out

After approx. 10 min of inactivity (no button has been pressed: time-out), each mode returns automatically to standard display mode. Inputs that have not been confirmed by the **SET** button are ignored by the controller and old parameter values will be retained.

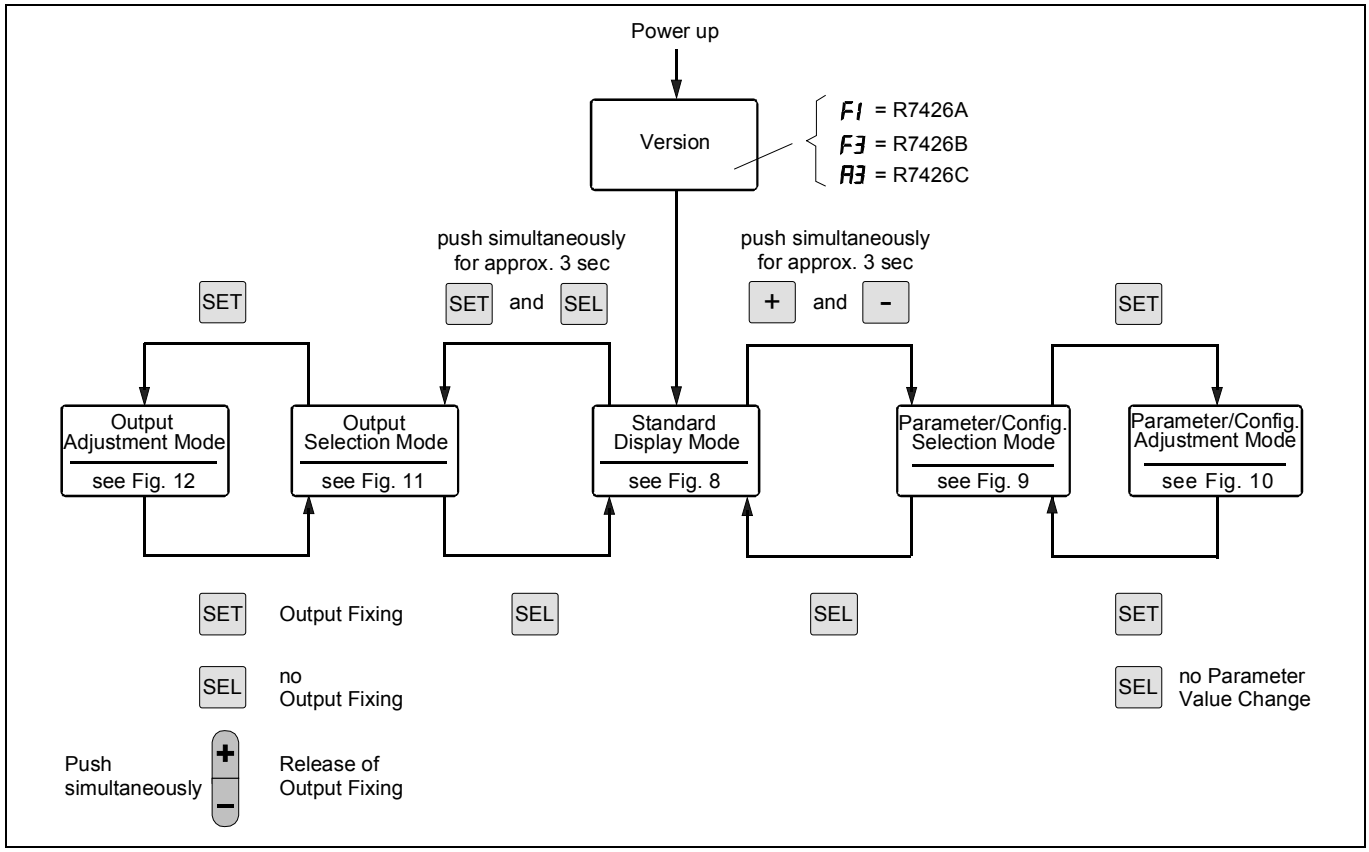


Fig. 7. Operating overview

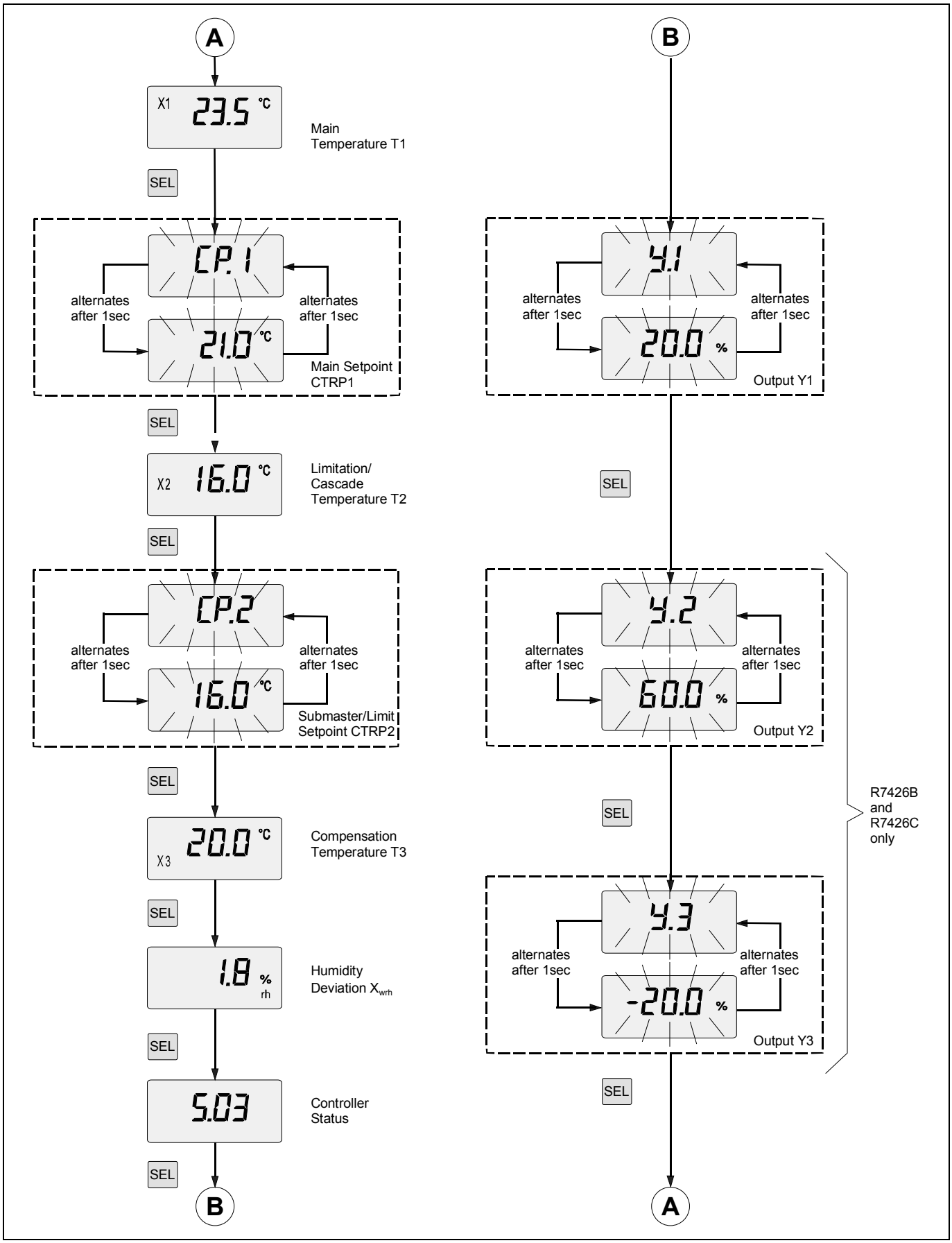


Fig. 8. Standard display mode

Displaying Actual Values

In the standard display mode one of ten actual values can be selected (Fig. 8). Pushing the **SEL** button toggles between the ten actual values.
The output signal value is displayed as 0...100% value in correspondence with the nominal control range.

The status of controller and control point calculation is displayed as a number leading by the letter ***S***. For description, see the following table:

Status	Display
Synchronization in Process	S.01
Start Up	S.02
Plant/System ON and Occupied	S.03
Plant/System ON and Unoccupied	S.04
Plant/System OFF	S.05
Freeze Protection Operation	S.06

Selecting Parameters

The parameter/configuration selection mode is used to select control and configuration parameters (see Fig. 9) for adjustment.
Pushing the **+** or **-** button scrolls through the parameter list:

- pushing one time: single step
- pushing without release: automatically scroll
- after 3 sec pushing without release: fast automatically scroll

Adjusting Configuration and Parameter Values

The adjustment mode is used to adjust configuration and parameter values (see Fig. 10). In this mode the display alternates between the selected parameter no. and its value. Pushing the **+** or **-** button increments or decrements the value of the selected parameter. Parameter ranges are shown in Table 2.

Pushing the **SET** button accepts the parameter value and returns to parameter/configuration selection mode. Pushing the **SEL** button retains the old parameter value.

Resetting Parameter Values to Default Values

Pushing simultaneously the **+** or **-** button during the power up resets all control parameters to defaults (see Table 2*)*. Default programming is indicated by a display of ***def***.

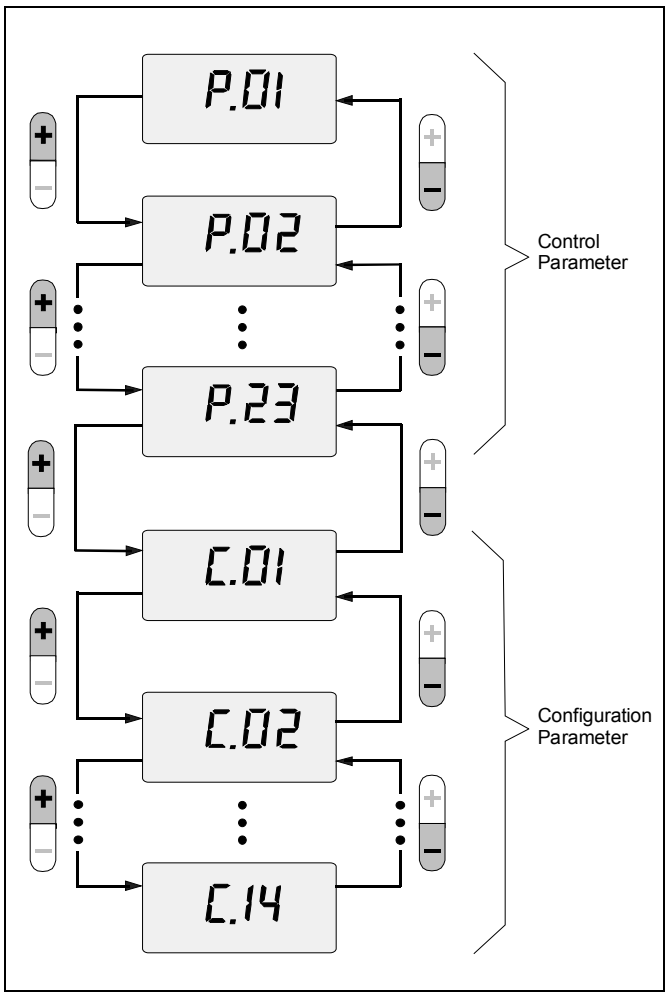


Fig. 9. Parameter/configuration selection mode

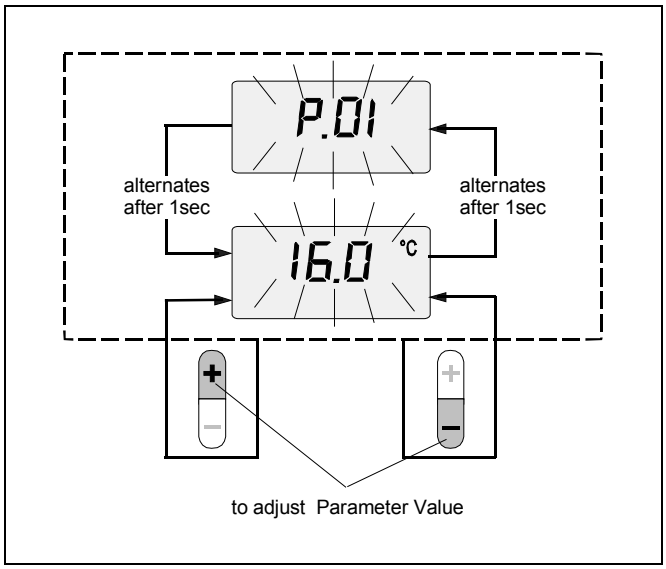


Fig. 10. Parameter/configuration adjustment mode

Selecting Output Values

The output selection mode is used to select the output (see Fig. 11) for manual override adjustment. An activated manual override is indicated by a displayed ***F*** (fixed).
Pushing the **+** or **-** button scrolls through the output list.

Manually Overriding Output Values

The output adjustment mode is used for manual override adjustment of output values (see Fig. 12). In this mode the display alternates between the selected output no. and the actual output.

Pushing the **+** or **-** button increments or decrements the value of the selected output for manual override purpose. The output values are displayed as 0...100% value in correspondence with the nominal control range.

To return to output selection mode, three options are available:

- Pushing the **SET**-button after adjustment activates the manual override (fixing) of output value.
- Pushing the **SEL**-button, causes that the output value is still determined by the control loop (no fixing).
- To release the manual override (fixed) of the output, select the output, enter output adjustment mode and push the **+** and **-** button simultaneously.

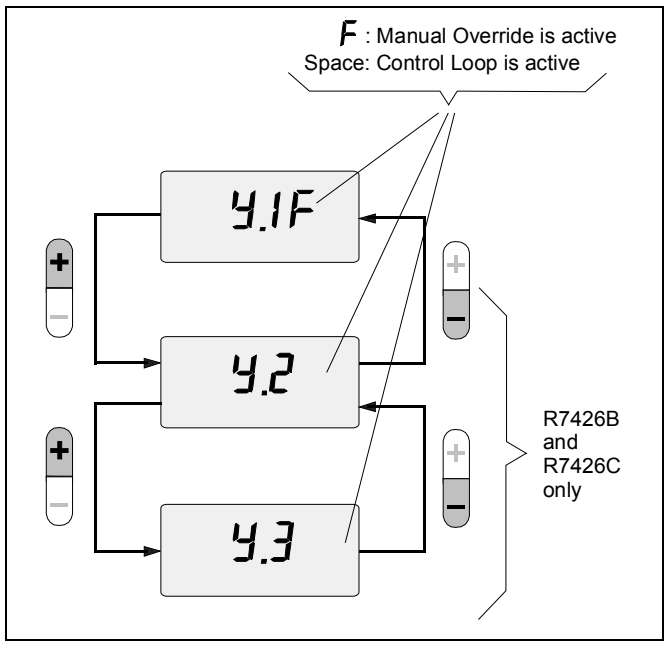


Fig. 11. Output selection mode

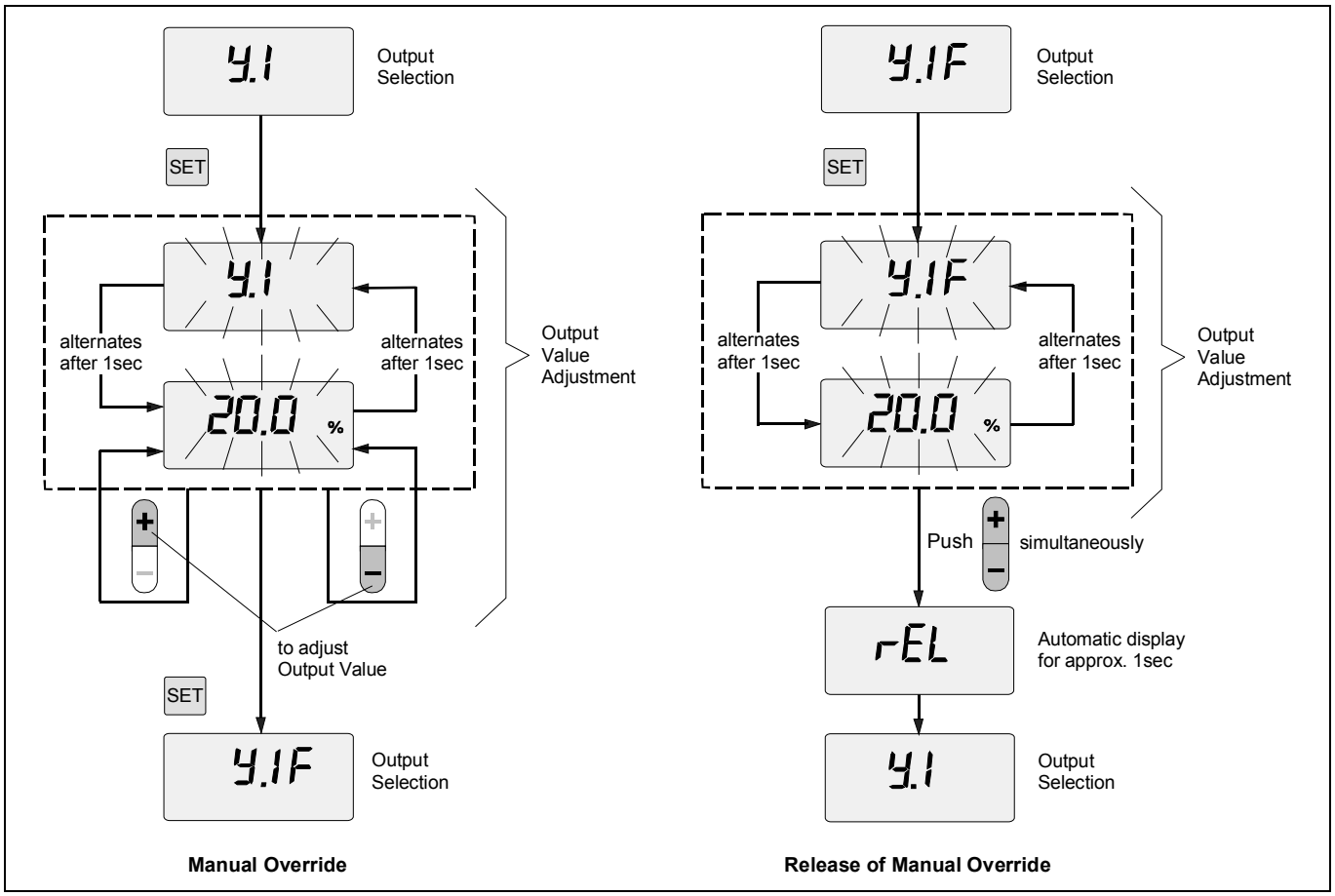


Fig. 12. Output value adjustment for manual override

Interpreting Error Messages (error handling)

Different analog input errors can be identified by the controller. The defective analog input (T1, T2, T3 or X_{wrh}) will be displayed in the standard display mode (see Fig. 13) after the corresponding value is selected.

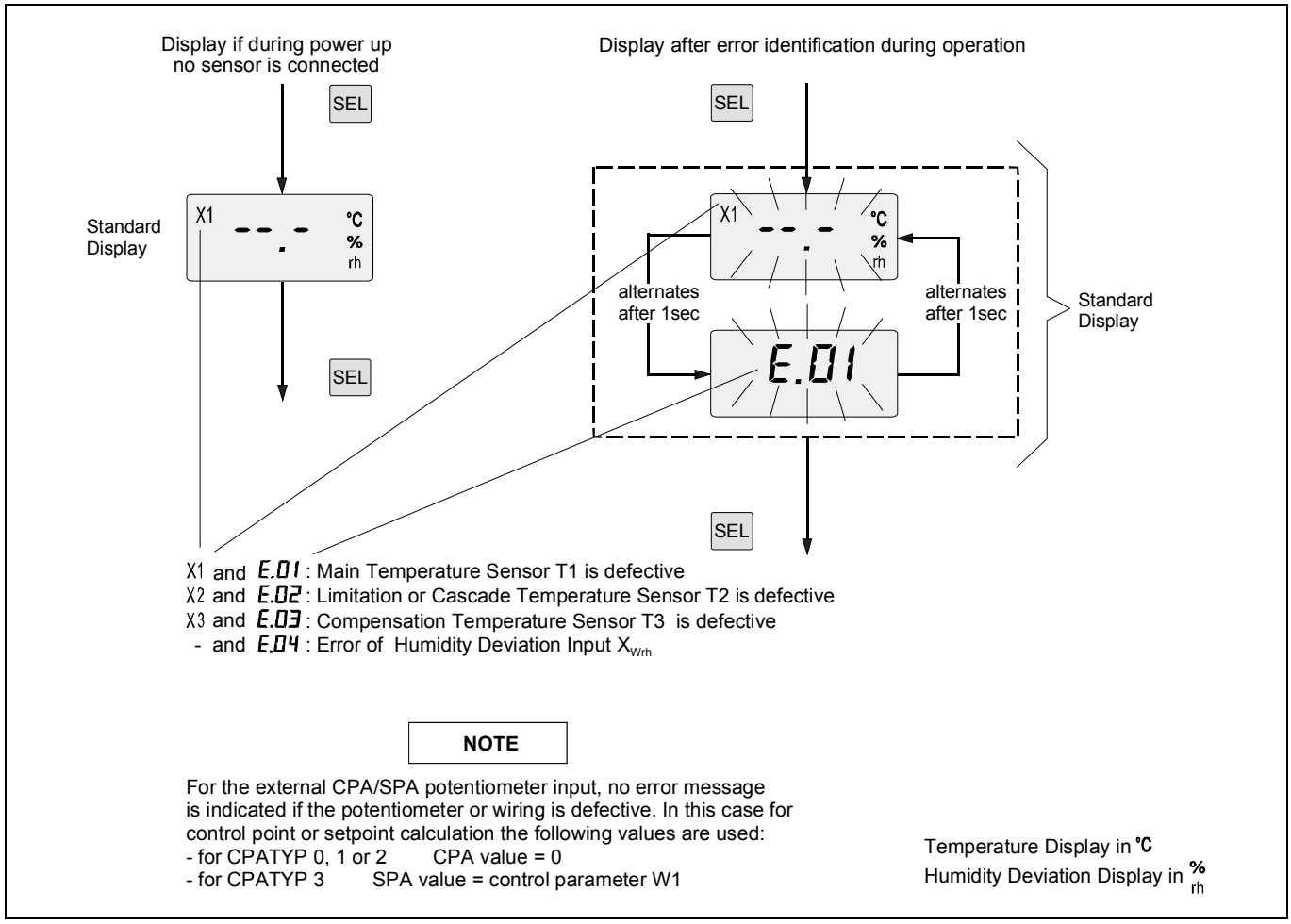


Fig. 13. Error handling

Adjustment Example

This example (Fig. 14) describes the adjustment of the compensation changeover point $\mathbf{W_{comp}}$ (P03).

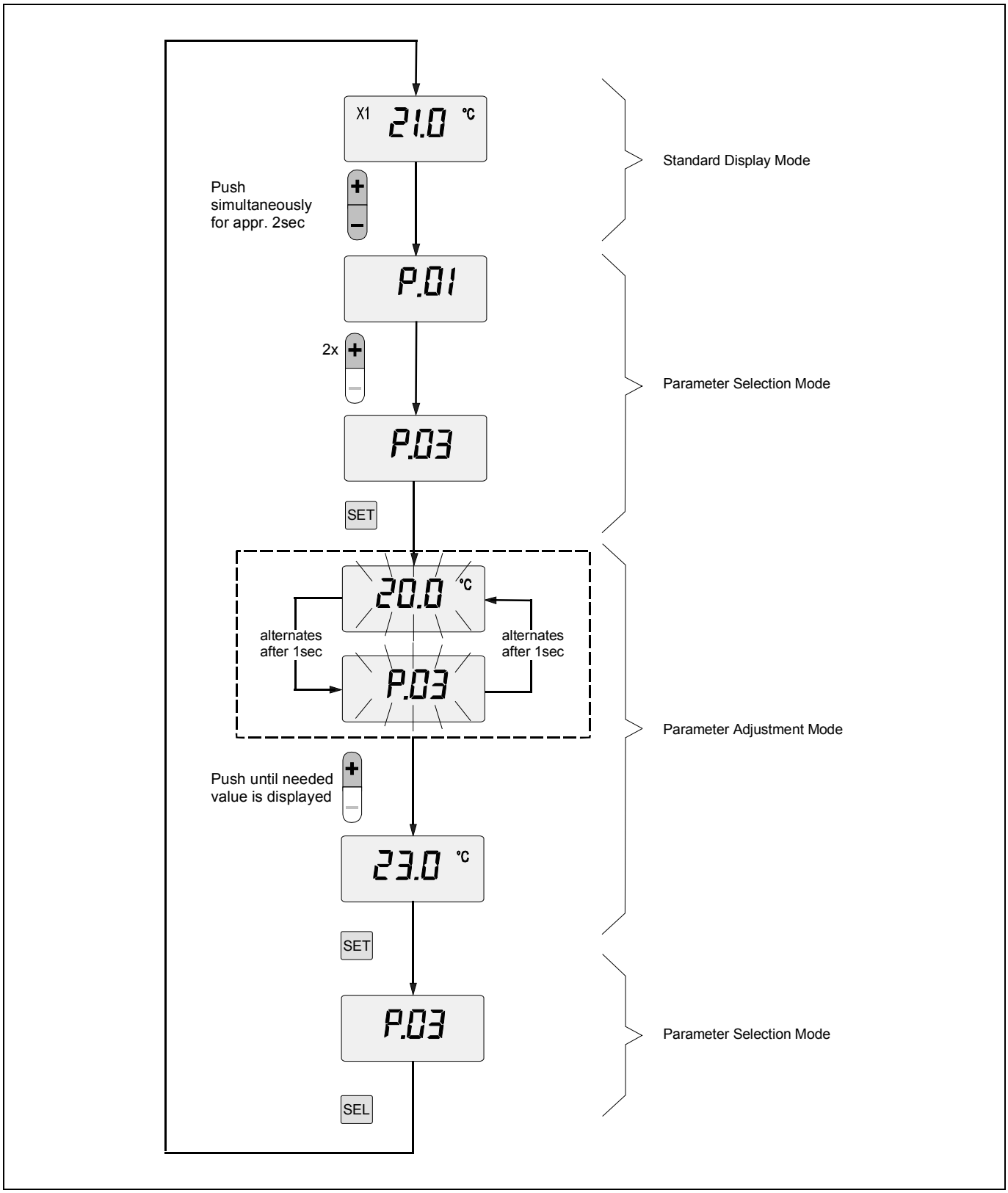


Fig. 14. Adjustment example

HONEYWELL

Control Products
Honeywell AG
Böblinger Straße 17
D-71101 Schönaich
Phone: (49) 7031 63701
Fax: (49) 7031 637493
http://europe.hbc.honeywell.com

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