MicroniK 200

R7426D
UNIVERSAL INPUT CONTROLLER

SPECIFICATION DATA

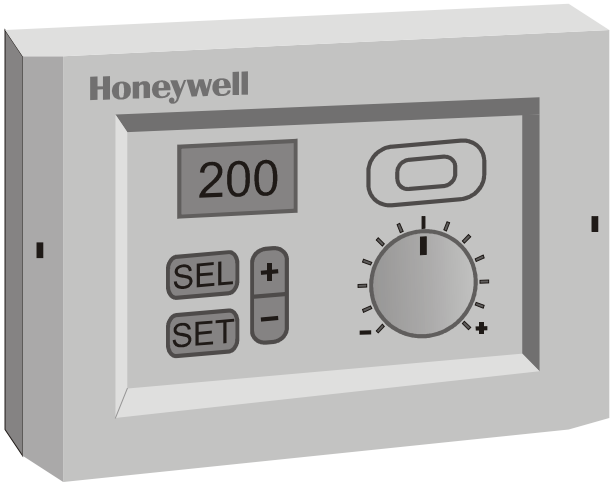


Fig. 1. Temperature Controller

GENERAL

The R7426D universal input controller covers all space or discharge air humidity control applications and special applications, e.g. pressure control, within the specified 0...10 Vdc input ranges. The controller provides input span adjustment to match exactly the output specification of used transmitters.

Fig. 2. LC Display

FEATURES

- **Microcontroller design based on modern digital technology**
- **User interface with LC-display, 4 push-buttons, and a CPA control potentiometer**
- **Control operating range 0...100%**
- **Selectable proportional plus integral (P+I), proportional plus integral plus derivative (P+I+D), or proportional (P) control only**
- **Two analog inputs 0...10 Vdc for transmitters**
- **Input span adjustment**
- **Pre-programmed control parameters**
- **Digital parameter setting**
- **Control output monitoring and manual output signal override**
- **Selectable direct/reverse acting output**
- **Master/submaster cascade control**
- **Main variable control and optional high or low limit control**
- **Temperature compensation input**
- **Optional remote setpoint adjustment**
- **24 Vac power supply**

Order Numbers

Order-No.	Controller Description
R7426D2000	Universal input controller with two inputs for transmitters for master / submaster cascade control or main and optional low or high limitation control and one temperature compensation input to provide reset of the main setpoint. It has one analog output 0(2)...10 Vdc and one deviation signal output, e.g. for dehumidification control by another controller.

CE

TECHNICAL DATA

General	Electronic	8-bit microcontroller, 10-bit A/D converter, EEPROM, and LC display	
	Power supply	24 Vac +10...-15%, 50/60Hz	
	Power consumption	3 VA + Actuator power requirements	
	Control range	0...100%	
Universal Input	X1	Universal input 1 (main sensor)	0...100%, adjustable span 0...10 Vdc
	X2	Universal input 2 (e.g. limit or cascade sensor)	
Temperature Input	T3	Compensation temperature sensor	accuracy ±0.5 K excluding sensor
	Automatic identification of sensor type	**Temperature range**	**Characteristics**[2]
	Pt 1000	-30....+130°C	1000 Ω at 0°C
	BALCO 500	-30....+130°C	500 Ω at 23.3°C
	NTC 20kΩ	-30....+85°C / -30....+130°C[1]	20 kΩ at 25°C
CPA/SPA-Input[1]		**CPA/SPA range**	**Sensor & CPA/SPA types**
	CPATYP 0	CPA: ±10%	internal
	CPATYP 1 (100kΩ...0Ω)	CPA: ±10%	43193982-001
	CPATYP 2 (100kΩ...0Ω)	SPA: 0...100%	43193982-001
Digital inputs		**Mode**	**Potential-free contact**
	Plant / System ON/OFF input	OFF ON	open > 40kΩ closed < 100Ω
Outputs	ON/OFF output	OFF (delay adjustable) ON	max. load 450 mA at 24 Vac
	Deviation signal output X_w	Deviation range: -5...+5 Vdc (-25...+25%), 200 mV/%	max. load 0.5 mA at 5 Vdc
	Analog output Y1	Control range[1] 0/2...10 Vdc (0...100%), full range 0...12 Vdc	max. load 1.2 mA at 12 Vdc
Ambient limits	Operating temperature	0...50°C (32...122°F)	
	Transport and storage temperature	-35...+70°C (-31...+158°F)	
	Relative humidity	5...95%rh non-condensing	
Safety	Protection class	II as per EN60730-1	
	Protection standard	IP30 or IP40 (front panel mounting) as per EN60529	
Housing	Dimensions (H x W x D)	105 x 152 x 37 mm	
	Weight	250 g	
	Mounting	Front door, back panel, wall, or rail	
Connections	Connection terminal	terminals max. 1 x 1.5 mm^2	

[1] Selectable

[2] same sensor type must be used for T1, T2, and T3

CONTROL AND CONFIGURATION PARAMETER

Control Parameter		Parameter Description	Low	High	Default	Reso-lution	Unit
No.	**Name**						
P.01	**W1**	Main setpoint for input X1	0	100	50	0.5	%
P.02	**Wlim**	Limit setpoint (low or high) for input X2	0	100	90	1	%
P.03	**Wcomp**	Compensation changeover point for input T3	-5	40	20	1	°C
P.04	**Wi**	Winter compensation authority	-350	+350	0	2	%
P.05	**Su**	Summer compensation authority	-350	+350	0	2	%
P.06	**Wcas**	Submaster or cascade setpoint	OFF, 0	100	OFF	0.5	%
P.07	**Rcas**	Cascade reset span adjustment	0	50	10	0.5	%
P.08	**Xp1**	Throttling range (main control loop) X1	1	50	10	0.5	%
P.09	**Xp2**	Throttling range (cascade or limit control loop) X2	1	50	10	0.5	%
P.12	**tr1**[1)]	Reset time (main control loop) X1	OFF, 20s	20min	OFF	10/0.5	sec/min
P.13	**tr2**[1)]	Reset time (cascade or limit control loop) X2	OFF, 20s	20min	OFF	10/0.5	sec/min
P.15	**Ystart**	Start point for mid range shift of output Y1	-50	+50	0	0.5	%
P.17	**X1Cal**	Calibration of sensor X1	-20	+20	0	0.1	%
P.18	**X2Cal**	Calibration of sensor X2	-20	+20	0	0.1	%
P.19	**T3Cal**	Calibration of temperature sensor T3	-20	+20	0	0.1	K
P.27	**td**	Derivative decay time for P+I+D control	1	60	1	1	s
P.28	**vd**[3)]	Derivative amplification for P+I+D control	0	5	0	0.1	-

Config. Parameter		Values	Default	Unit
No.	**Name**			
C.01	**DIR/REVY1**	Selects the output action of Y1: Dir = Direct acting Rev = Reverse acting	Dir	
C.05	**CPATYP**	Selects the **C**ontrol **P**oint /setpoint **A**djustment type: 0 = internal (default) 1 = ±10% (100 kΩ...0 Ω) 2 = 0...100% (100 kΩ...0 Ω)	0	
C.06	**YRange**	Selects the output control range: 0 = 2 … 10Vdc 1 = 0 … 10Vdc	1	
C.12	**X2ext**	Enable / Disables the X1 sensor input to be used for both X1 and X2 inputs: 0 = X2 installed 1 = X1 signal used for X2 2 = X2 disabled	0	
C.13	**LimTyp**	Limitation control type: 0 = Low limit 1 = High limit	1	
C.14	**Senstyp**	Sensor type determines automatic detection or manual selection of NTC sensor: 0 = Auto detection of T3 1 = NTC sensor type T3	0	
C.15	**Y1CTRF**	Control function: 0 = direct control behavior 1 = reverse control behavior	1	
C.22	**Adr**[2)]	Serial communication address: 0 = Min. 255 = Max.	254	
C.23	**DefProg**	Initiates the default programming: 0 = No default programming 1 = Initiates default programming	0	
C.24	**UStartPoint**	Start point (0%) of X1/X2 span adjustm.: 0 = Min. 10 = Max. (resolution 0.1)	0	V
C.25	**UEndPoint**	End point (100%) of X1/X2 span adjustm.: 0 = Min. 10 = Max. (resolution 0.1)	10	V
C.26	**OffDelay**	OFF delay for ON/OFF output: 0 = Min. 60 = Max. (resolution 1)	0	min

1) for tr > 2 min resolution = 0.5 min , for tr < 2 min resolution = 10 sec

2) actual value will not be changed during reset to default parameter

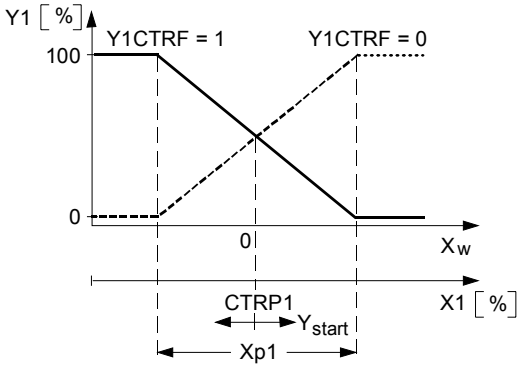
3) 0 = derivative function disabled

APPLICATION

NOTE: All diagrams show proportional control action, only. If P+I or P+I+D control is in operation, the slopes for the different controls are not defined.

Main Control (W1, Xp1, tr1, td, and vd)

The controller compares the actual value measured by the main sensor (X1) with the calculated setpoint (CTRP1) and generates an internal deviation signal (X_W). CTPR1 is the sum of the main setpoint (**W1**), the compensation effect and the CPA.



NOTE: Limit or cascade sensor X2 must be disabled (**X2ext** =2).

Depending on the deviation signal, the control output (Y1) value is calculated and converted to an analog signal. Direct or reverse control action is selected by the configuration parameter **Y1CTRF**. The ''Throttling range'' setting (**Xp1**) controls the output span.

The startpoint $\mathbf{Y_{start}}$ determines in % the midrange shift of the output (Y1) from the calculated setpoint (CTRP1).

Limit Control (Wlim, Xp2, tr2, td and vd)

The R7426D controller offers limit control ($\mathbf{W_{lim}}$) which is performed by comparing the deviation signals of the main and limit control loops. The lowest (low limit control) or highest (high limit control) deviation signal is selected and fed into the output stage to control the final control device, e.g. humidifier valve actuator.

High limit control is performed if control parameter **LimTyp** = 1 and low limit control is performed if control parameter **LimTyp** = 0. During limit control the throttling range (**Xp2**) and reset time (**tr2**) are active.

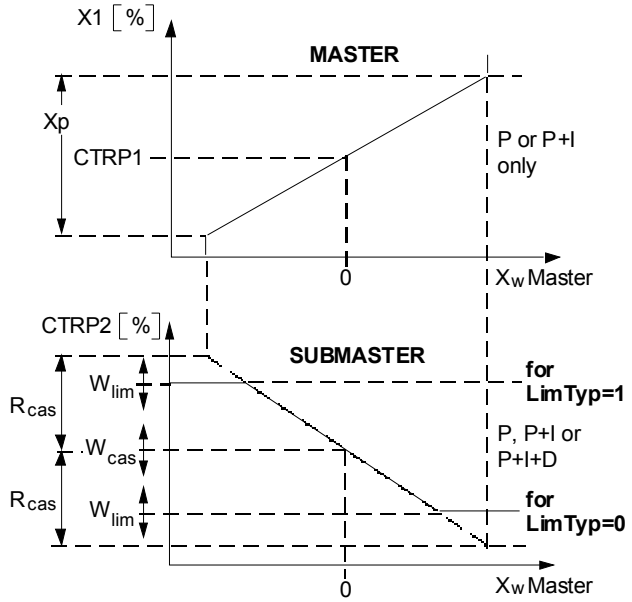
Limit control will be active only if sensor X2 (control parameter **X2ext** = 0) is connected or alternatively sensor X1 (control parameter **X2ext** = 1) supplies the control loop.

Cascade Control (W_{cas}, R_{cas}, xp2, tr2, td, and vd)

The R7426B controller provides cascade control which uses two control loops, master and submaster, to maintain the master setpoint (CTRP1).

At zero deviation of the master control loop (X_WMaster), the cascade input X2 is controlled by the programmed setpoint ($\mathbf{W_{cas}}$ = CTRP2). If the controlled input X1 deviates, the submaster setpoint (CTRP2) is altered.

The reset span adjustment ($\mathbf{R_{cas}}$) determines the degree of reset effect.



The reset time and the throttling range of the P+I control for the submaster can be adjusted by the control parameters **tr2** and **Xp2**.

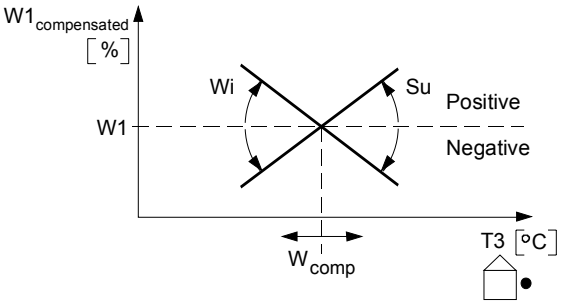
High limit of CTRP2 is performed if control parameter **LimTyp** = 1 and low limit of CTRP2 is performed if control parameter **LimTyp** = 0.

CONTROLLER FUNCTIONS

Temperature Compensation

Temperature compensation, e.g. outside air, is performed when T3 is connected. The control parameter $\mathbf{W_{comp}}$ defines the compensation changeover point for summer and winter compensation. The degree of summer and winter compensation is defined by control parameters **Wi** and **Su**.

Winter compensation is performed if temperature T3 < $\mathbf{W_{comp}}$. Summer compensation is performed if temperature T3 > $\mathbf{W_{comp}}$.



Smoothing Filter for Temperature Input T3

A smoothing filter for the outside air temperature input T3 is incorporated to eliminate sudden temperature variations. This provides more stable operation of the control system. This

function will work only if the controller parameters have never been changed by means of the PC tool.

Analog Output Range

The output control signal is used to control valve or damper actuators with electronic positioners or pneumatic actuators via E/P transducers.

The full output range is 0...12 Vdc. The output control range is software configurable via the control parameter **YRange** to either 2...10 Vdc or 0...10 Vdc.

The output can be selected for direct or reverse acting.

Dehumidification Control

The universal controller R7426D in addition with a temperature controller can perform dehumidification control.

The deviation signal X_W of the main or master control loop is transmitted to a temperature controller and is compared with the cooling deviation signal of the temperature control (X_{wc}). The signal with the highest cooling demand is used to control the cooling output of the temperature controller.

The deviation signal output on terminal 17 is in a range of -5...+5 Vdc (200mV/%).

Plant / System ON/OFF Input and ON/OFF Output

The Plant / System ON/OFF input is used to switch the universal controller ON or OFF from another MicroniK 200 controller with RTC, a time clock module, or a manual switch.

The ON/OFF output is controlled by the Plant / System ON/OFF input and provides an OFF switching output with adjustable delay time e.g. to operate the fan still for a certain time after humidification.

ON/OFF Input	Controller Function	ON/OFF Output: Delay
ON	Normal control	OFF → ON: 0 min
OFF	Output Y1 = 0%	ON → OFF: 0...60 min

ADJUSTMENTS

Universal Inputs X1/X2

The universal inputs X1 and X2 accept any analog inputs within the range of 0...10 Vdc and provides an input span adjustment to match the range of the connected transmitters.

Transmitters with industrial standard outputs of 0...20 mA or 4...20 mA can be used by connecting a 500 Ω resistor in parallel to the input.

The input span can be adjusted by the control parameters **UStartPoint** or **UendPoint** and is converted to a 0...100% input range.

The control parameters **UStartPoint** and **UEndPoint** are common to the universal inputs X1 and X2.

Control Point / Setpoint Adjustment (CPATYP)

The control or setpoint can be adjusted via the internal or an external potentiometer connected to the CPA/SPA input. The CPA/SPA type is selected by the control parameter **CPATYP** (see page 2, *Technical Data*).

Calibration of Inputs (X1CAL, X2CAL, and T3CAL)

In case of an offset as a result of long wiring lengths the sensor inputs (X1, X2 and T3) can be adjusted separately by the control parameters **X1CAL**, **X2CAL**, and **T3CAL**.

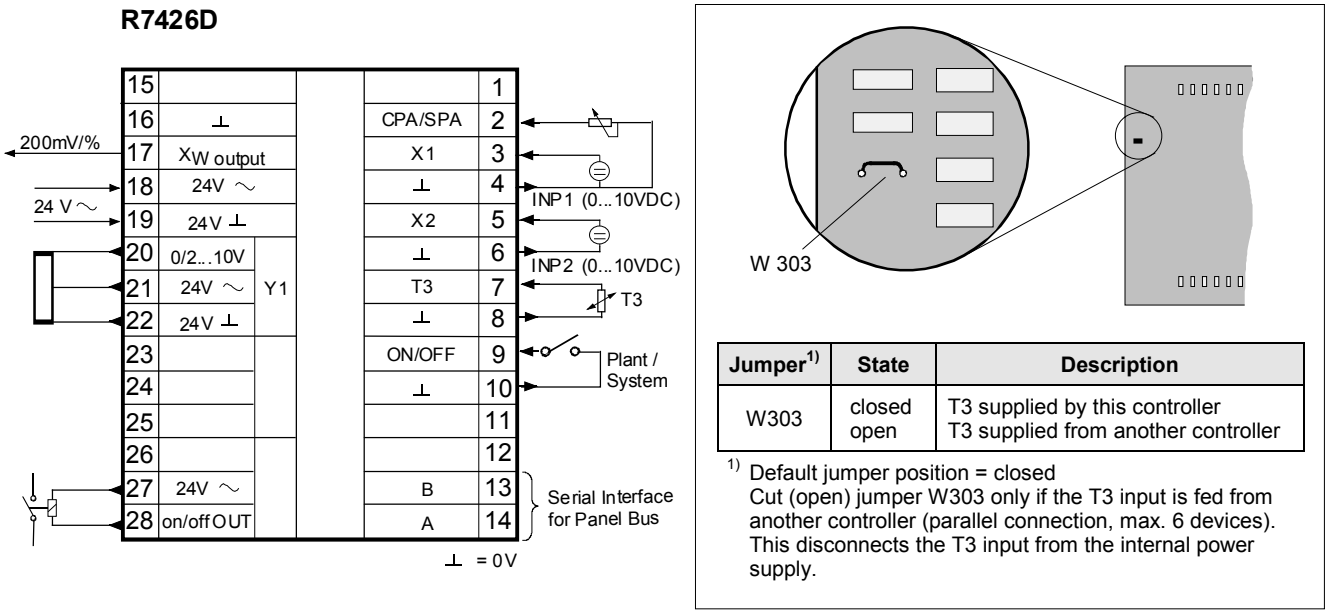
WIRING

Wiring run	Type of wires	Length max. 1.0mm²	Length max. 1.5mm²
From controller to all input and output devices	local standard	100m	150m

Offset for temperature sensors due to wire resistance per 10m distance from sensor to controller:

Type of wire	Temperature offset Pt 1000	BALCO 500	NTC
0.5 mm² (AWG20)	0.18°C (0.324°F)	0.3°C (0.54°F)	negligible
1.0 mm² (AWG17)	0.09°C (0.162°F)	0.15°C (0.27°F)	
1.5 mm² (AWG15)	0.06°C (0.108°F)	0.1°C (0.18°F)	

CONNECTIONS



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

[1)] Default jumper position = closed
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.

⚠ CAUTION

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

Fig. 3. Connections and Jumper coding

MOUNTING AND DIMENSIONS

All dimensions in mm.

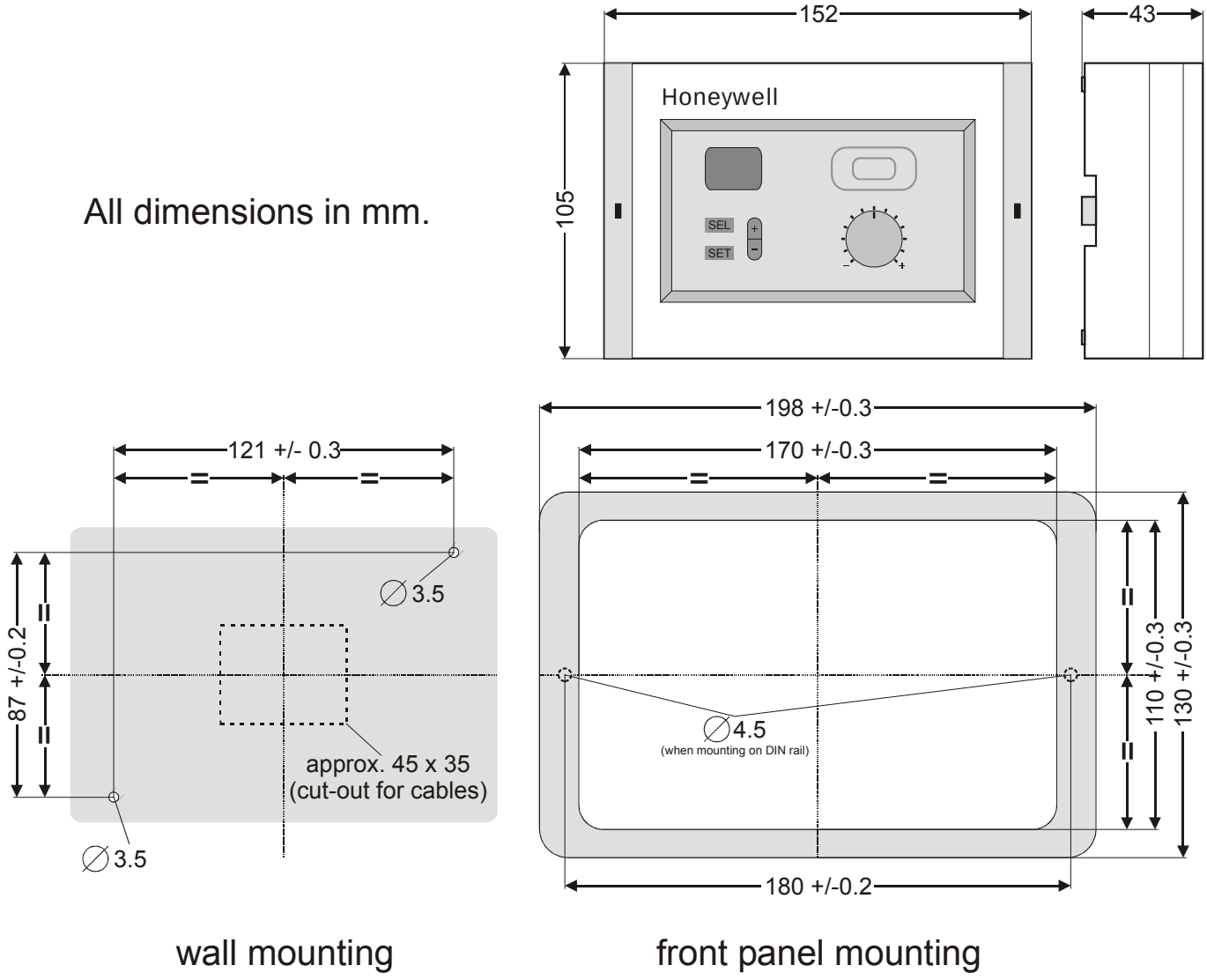


Fig. 4. Dimensions and mounting

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