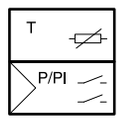
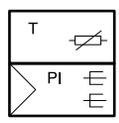
NRT 300: Electronic air-conditioning controller, heating/cooling, equiflex

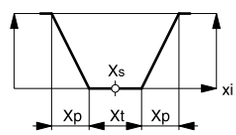
NRT300F0*1



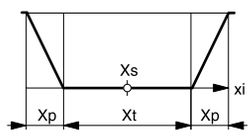
NRT300F041



NRT300F061



Sequence, dead zone normal



Sequence, dead zone extended

How energy efficiency is improved

Key directly on device for individual changeover between presence and absence

Areas of use

Individual unitary control and zone control (heating, cooling, heating/cooling) e.g. in air conditioning units (2- or 4-pipe systems) in hotels and residential and business spaces.

Features

- Air-conditioning controller for 2- and 4-pipe systems (heating, cooling, heating/cooling)
- Measurement of room temperature by either integrated or external temperature sensor
- Saves energy costs by means of frontal presence/absence key and rotary knob
- Inputs for C/O signal, changeover between presence and absence, dew-point monitoring and set-point shift
- Choice of P or PI control with 2-point, pulse-pause, 3-point or outputs (0...10 V)
- LED indicator
- SERVice level with adjustable control parameters
- Frost-protection function
- Electrical connection in baseplate
- Electronics in attachable housing

Technical data

Power supply		
	Power supply	24 V~, ±20%, 50...60 Hz
	Power consumption	Approx. 2.5 VA
Parameters		
	Setting range X_S	10...30 °C
	Proportional band	2...20 K
	Integral action time	2...20 min or OFF (as P-controller)
	Period or running time of actuator	0.5...20 min
	Control parameters	Non-volatile
Dead zone X_t	Normal	0,4...5 K
	Extended	8 K
Sensor time constant for air	In room (0.1 m/s)	8 min
	In duct (0.5 m/s)	3 min
	In duct (3 m/s)	1 min
Ambient conditions		
	Admissible ambient temperature	0...50 °C
	Admissible ambient humidity	5...95% rh, no condensation
Inputs/Outputs		
	Command variable w	0...10 V, R_i = 90 kΩ
	Influence of w	1.6 K/V
Function		
	Operating mode	Sequence (heating/cooling)
	Change-over functions[1)]	X_t, C/O, TP
Construction		
	Weight	0.1 kg
	Housing	Pure white (RAL 9010)
	Housing material	Fire-retardant thermoplastic
	Fitting	Wall fitting/recessed junction box
	Cable feed	At rear
	Screw terminals	For wire of up to 1 mm²

[1)] *X_t = dead zone ON/OFF; c/o = summer/winter, (changeover); TP = dew-point monitoring*

Standards and directives		
	Type of protection	IP 30 (EN 60529)
	Protection class	III (IEC 60730)
CE conformity according to	EMC directive 2004/108/EC	EN 61000-6-1, EN 61000-6-2, EN 61000-6-3, EN 61000-6-4

Overview of types

Type	Output signal	Load on outputs
NRT300F041	Switched	0.5 A (0.9 A when external sensor fitted)
NRT300F061	Continuous	0...10 V, load > 5 kΩ; with overflow > 11 V (load-dependent)

NRT300F061: Suitable as a master controller for max. 10 × NRT300: (slope S = P-band X_p; shift starting point FF = setpoint X_s; operating mode = sequence)

Accessories

Type	Description
AVF***	Motorised valve actuator (see product data sheet)
AVM***	Motorised valve actuator (see product data sheet)
AXM***	Motorised valve actuator (see product data sheet)
AXT2**	Thermal valve actuators (see product data sheet)
EGH102F001	Dew-point monitor with sensor in housing
EGH102F101	Dew-point monitor with sensor on cable
0296724000	Sensor holder for wall mounting
0368139000	Rubber bung as sensor holder in ventilation duct
0303124000	Recessed junction box
0313214001	Fixing kit for all applications (holder, heat-conducting paste, retaining strap)
0313347001	Cover plate, pure white, for 76 × 76 mm
0313367001	Cable-type sensor (NTC) 1.5 m, for measurements in air duct, max. 70 °C, R25 = 10 kΩ
0313367003	Cable-type sensor (NTC) 3.0 m, for measurements in air duct, max. 70 °C, R25 = 10 kΩ
0313367010	Cable-type sensor (NTC) 10 m, for measurements in air duct, max. 70 °C, R25 = 10 kΩ
0313367020	Cable-type sensor (NTC) 20 m, for measurements in air duct, max. 70 °C, R25 = 10 kΩ
0313409001	Holder for sensor cartridge in ventilation duct
0313414001	Bracket for wall mounting
0386273001	Plug-in power unit, input 230 V~, output 21 V~ (0.34 A), length of cable 1.8 m, IP 30
0313501001	Housing with scale 10...30 °C

Description of operation

The temperature is measured with a temperature sensor. In the room controller, the sensor is integrated into the housing. For channel controllers, an external sensor is connected. The resistance of the sensor is converted into an actual-value signal (x_i) by a measuring bridge, and is then compared with the setpoint X_S. The controller amplifies the control offset and, depending on its type, creates the corresponding output signals:

F041, S1/2 = OFF:

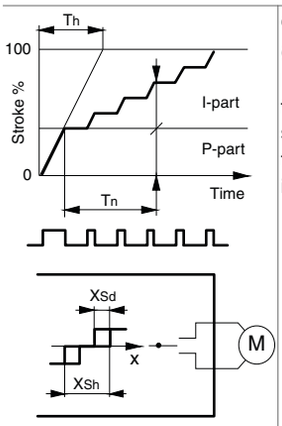
OPEN/STOP/CLOSED signals (3-point control) for the PI control with a motorised drive without a positioner. For heating with changeover to cooling via external signal (C/O) for 2-pipe system.

F041, S1/2 = ON:

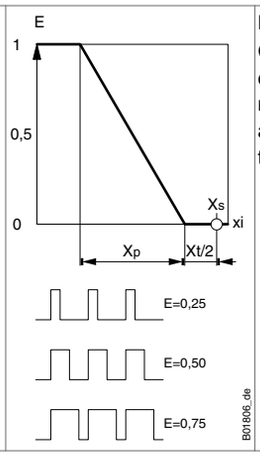
Pulse-pause signals (2-point control) for P control for heating and cooling, for a thermal or continuous actuator for 4-pipe systems, or heating with changeover via external signal (C/O) to cooling for thermal actuator of a 2-pipe system.

F061:

Continuous signal for PI control for heating and cooling, for a continuous actuator for 4-pipe systems, or heating with changeover via external signal (C/O) to cooling for continuous actuator of a 2-pipe system.



Open-Stop-Close signals
(Proportional-integral control F041)
In the case of an abrupt control offset, first a longer P pulse and then continuous smaller I pulses are output, until the control offset is smaller than half the switching range X_{Sh}.



Pulse-Pause signals (proportional control F041)
Control factor E (pulse duration/period duration) changes in proportion to the control offset. As a result, the average heating output also changes, as well as the stroke of a proportional thermal actuator such as a P-controller.

Dead zone changeover (X_t):

Thus, for the heating/cooling sequence, the dead zone is increased to 4 Xp. As a result, the temperature is decreased in heating mode and increased in cooling mode (Eco mode).

Setpoint shift (command variable w):

The setpoint is increased with respect to the defined value X_S with an influence of + 1.6 K/V. This can be used, for example, to adjust the room temperature to the increasing outside temperature (summer shift), or to avoid condensation due to rising humidity.

Dew point (TP):

Frost-protection function:

When the contact of the dew-point monitor is closed, the cooling output becomes inactive or the cooling valve is closed.

Independently of the defined setpoint and dead zone, at temperatures < 6 °C, the heating valve is opened. If the temperature rises above 7 °C, the frost-protection function becomes inactive. If necessary, the temperature must be compensated in order to adhere precisely to the switching points.

Summer-/wintertime changeover (C/O):

When the contact is closed, the output for heating is switched to cooling.

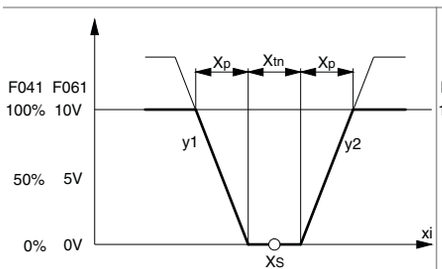
Factory settings:

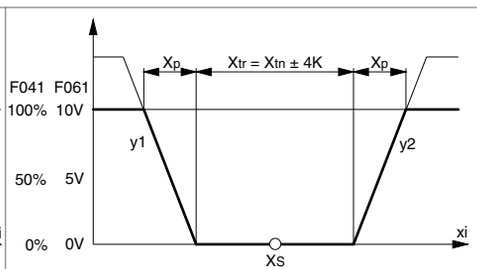
Proportional band	X_p = 2 K
Dead zone for normal	X_{tn} = 0.4 K
Integral action time	t_n = inactive
Temperature compensation	ZERO = inactive

Additionally for F041:

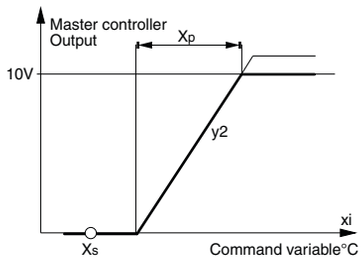
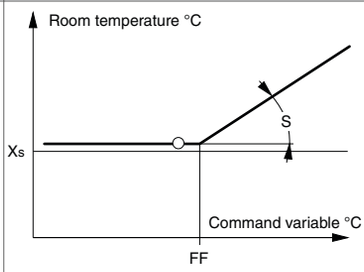
Period or running time	t_p = 4 min
	t_y = 4 min

Control characteristics





Contact X_t open; presence: sequence operating mode (heating and cooling). When actual value x_i = setpoint X_s: both control units closed	Contact X_t closed; absence: sequence operating mode (reduced mode). The dead zone is increased and causes a decrease in the heating mode and an increase in the cooling mode.

Fixed-value + schedule function With NRT 300 as the master controller	With NRT 300 as the slave controller
	
Output y_2 or y_1 of the master controller can influence multiple controllers. With setpoint adjustment knob X_S, shift starting point FF can be selected, and with P-band X_P the slope can be selected.	In the fixed-value range, all the connected controllers regulate to the defined value X_S. In the follow-on range, the temperature is increased with slope S. The result of the influence of 1.6 K/V for the slave controller and the P-band of the master controller of 10 V/XP is: S = 16/X_p. With X_P = 2...20 K for the master controller, the following slope results in K/K: S = 8...0.8

Intended use

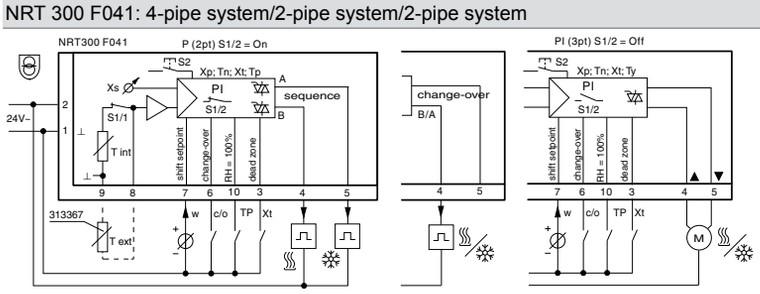
This product is only suitable for the purpose intended by the manufacturer, as described in the “Description of operation” section.
All related product documents must also be adhered to. Changing or converting the product is not admissible.

Disposal

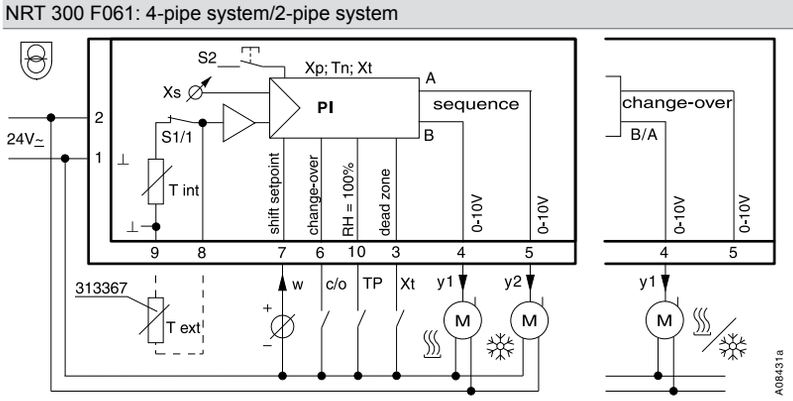
When disposing of the product, observe the currently applicable local laws.
More information on materials can be found in the Declaration on materials and the environment for this product.

Connection diagrams

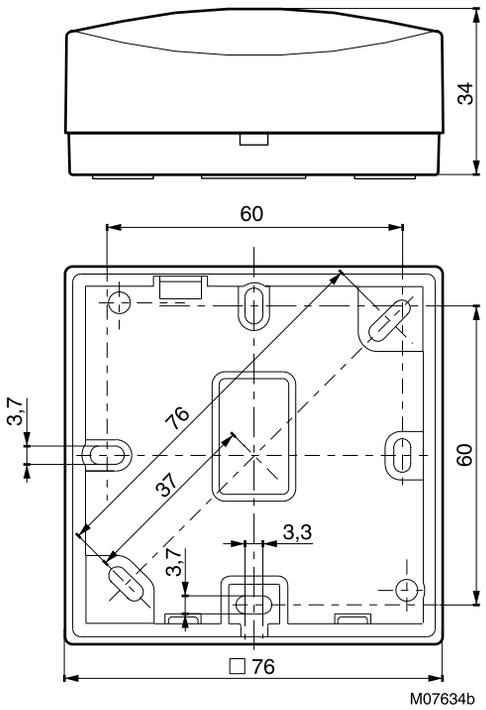
NRT 300 F041: 4-pipe system/2-pipe system/2-pipe system



NRT 300 F061: 4-pipe system/2-pipe system



Dimension drawing



Accessories

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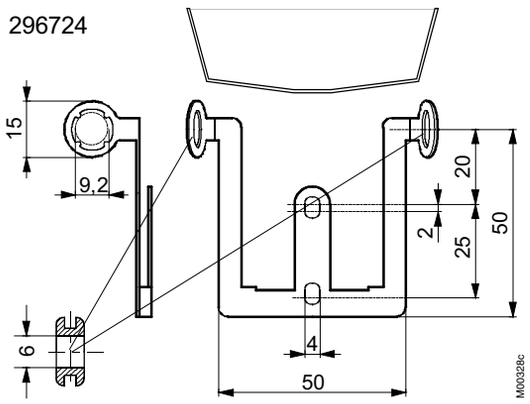

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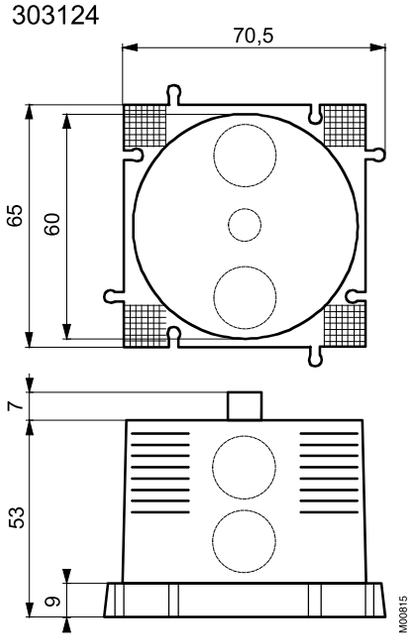

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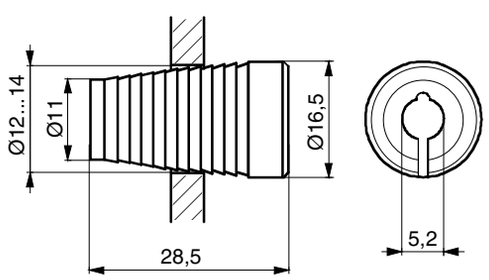

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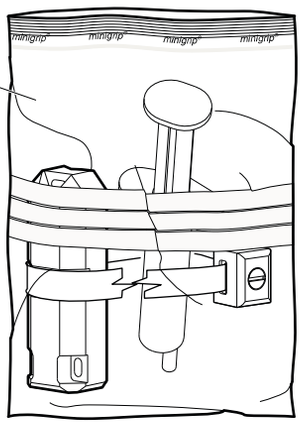

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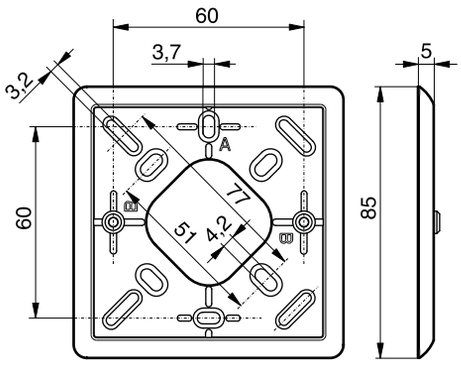

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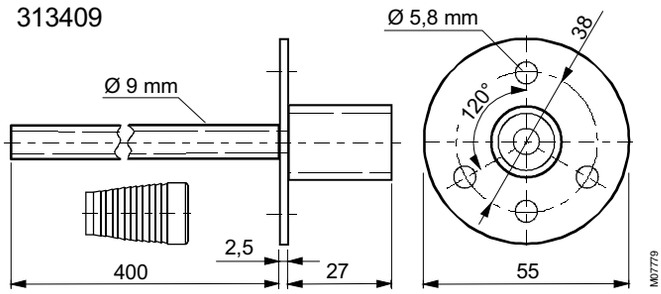

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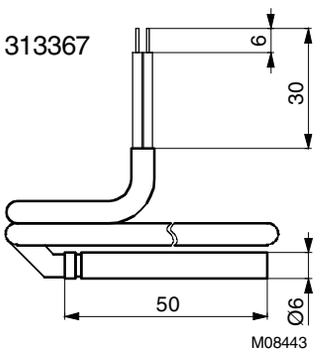

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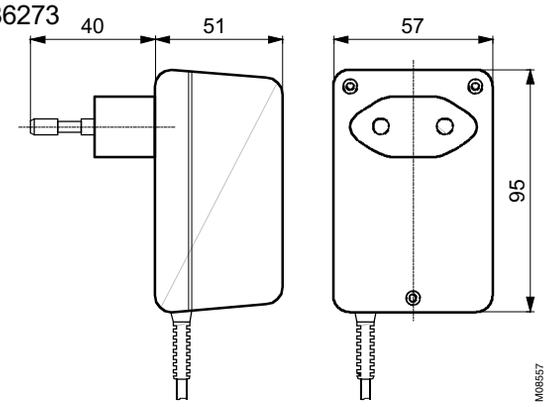

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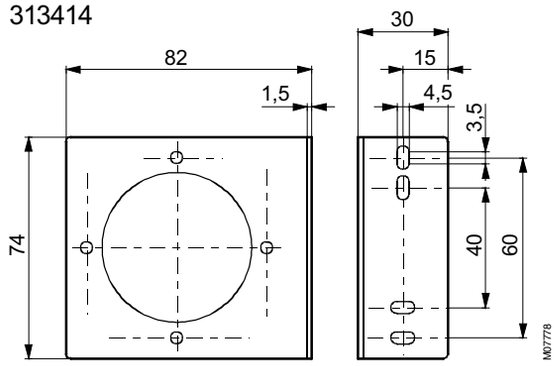
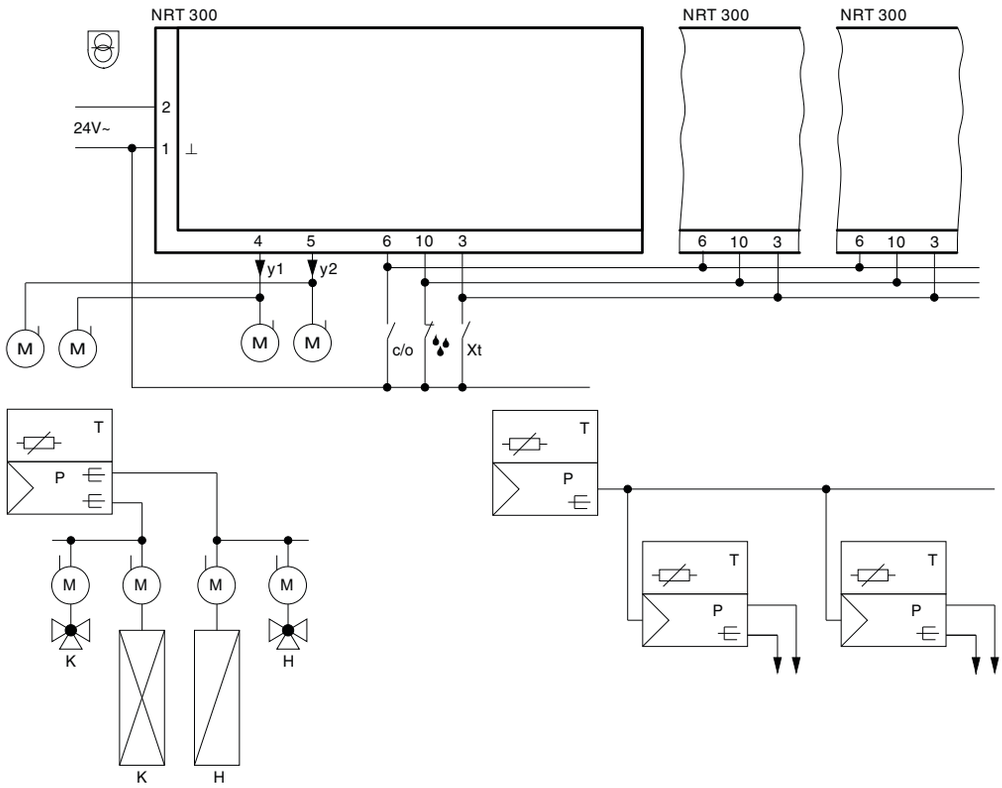


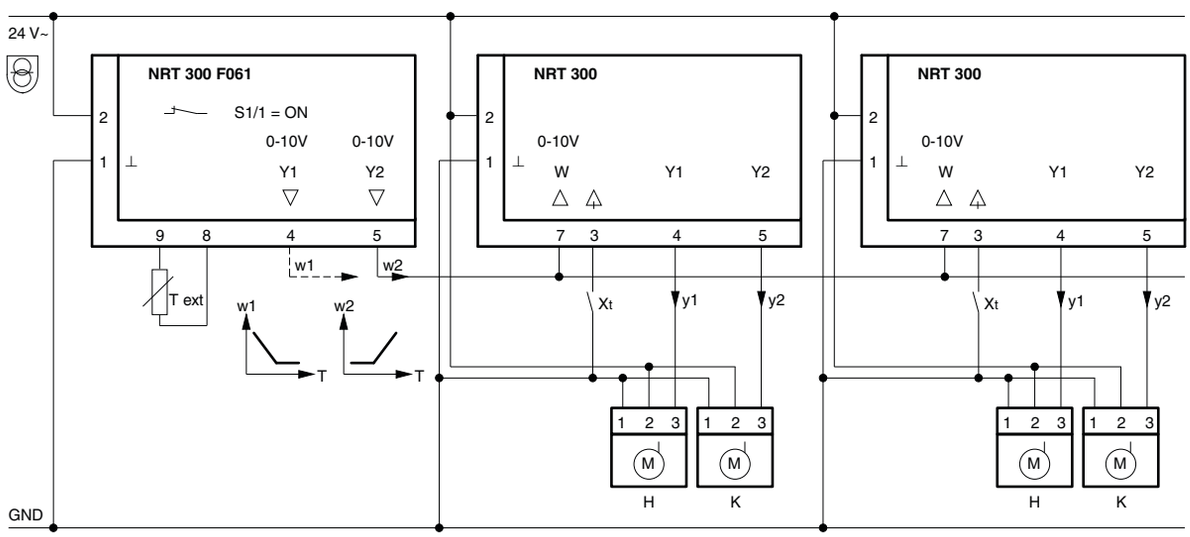
Fixed-value control for heating/cooling



F041: Maximum of 4 actuators per output

F061: Outputs y_1 and y_2 (total load > 5 kΩ) for actuators with positioner, e.g. max. 6 per R_i = 30 kΩ (AVR...S, B1W...S, V1W...S, AR...S, AK...S)

Fixed-value + schedule control with NRT 300 F061 as master controller



Outputs w1 (y_1) and w2 (y_2) (total load > 5 kΩ) of the master controller to shift max. 10 × NRT 300

Key	
H	Heating
K	Cooling
T	Temperature
w	Command signal

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