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SAUTER ITALIA SPA

NRT405F901

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October 2013

Latest revision: 2.0

Manual for products with software revision 1.1-1-01 or later

Functions described in this manual are handled through NRT tool version 1.3-1-10.

Part I **Introduction**

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Chapter 1 About this manual

This manual describes the NRT405F901controller.

Terms

Term used in this manual:

FS **Factory setting**

Additional information

Additional information concerning NRT405F901can be found in:

- ***Manual NRT tool*** – Describes how to configure the controller

The information is available for download from SAUTER ITALIA SPA's website, www.sauteritalia.it.

Chapter 2 Introduction to NRT405F901

Fan coil controller

NRT405F901 is a fan coil controller for control of heating, cooling and fan control. NRT405F901 enables you to create anything from stand-alone systems for managing the functions in a single room to large, integrated SCADA systems.

NRT405F901 offers built-in communication. It can be connected to bus lines, such as Modbus RTU or BACnet MS/TP, in order to communicate with a central SCADA system via RS485.

Applications

The NRT405F901 controller offers appealing design and functionality. It is suitable in buildings where a high level of comfort and low energy consumption are desired, such as offices, schools, shopping centres, airports, hotels and hospitals.

NRT405F901 is suitable for control of thermal and three-position actuators. It offers three digital outputs for control of a fan-coil unit.

Mounting

The modular design with a separate bottom plate for wiring makes the controller easy to install and commission. Mounting takes place directly on the wall or on a device box.

Communication

Communication

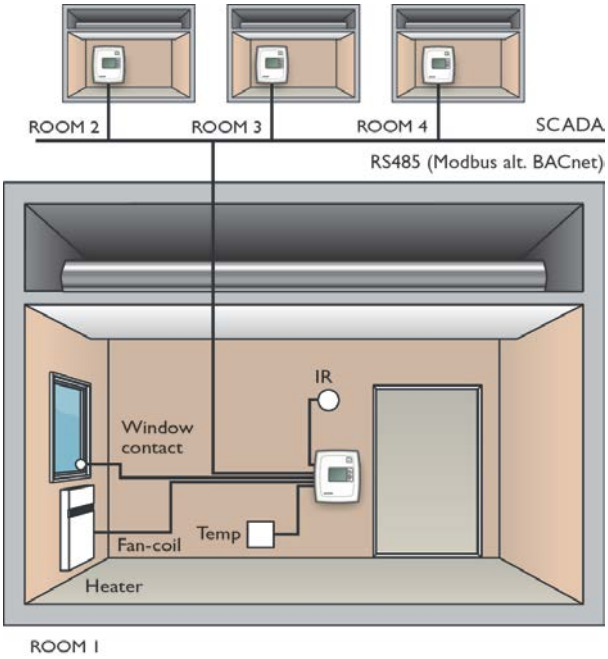
The controller can be connected to a central SCADA system via RS485 (Modbus RTU or BACnet MS/TP) and configured for a specific application using the configuration software NRT tool, downloadable free of charge from the SAUTER ITALIA SPA website www.sauteritalia.it. Additional information can be found in the NRT tool manual.

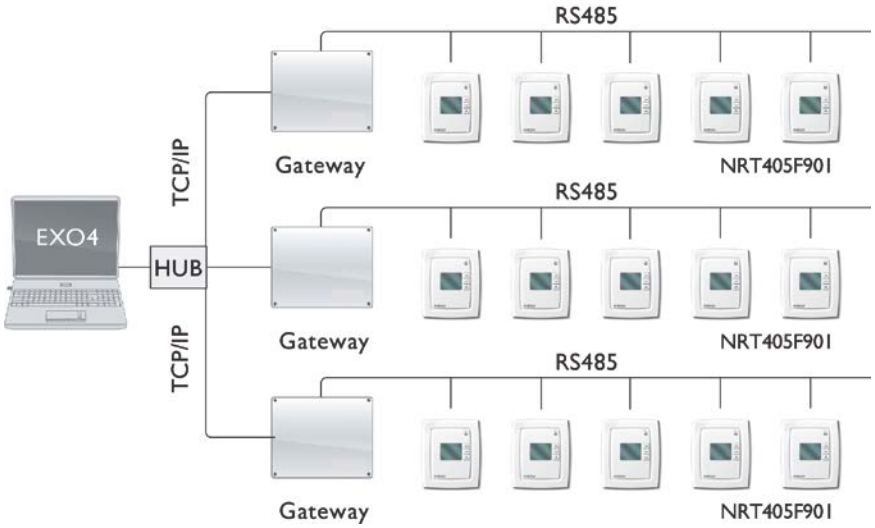
Control

The controller can be configured for the following control modes/control sequences:

- Heating
- Heating or cooling via change-over function
- Heating/Heating (NRT405F901 is configured for electric heater)
- Heating/Cooling
- Cooling

Application examples





Chapter 3 **Functions**

	2-pipe	4-pipe	Electric heater	3-position control	Thermal actuators	Communication
NRT405F901	•	•	•	•	•	•

Table 1. The control functions

Design

Figure 1. NRT405F901

Chapter 4 **Technical data**

Supply voltage ..... 230 V AC ±10 %, 50...60 Hz
Power consumption ..... < 3 W
Outputs, relays for fan control ..... 230 V AC, 3 A fan-coil
Actuator, Triac..... 230 V AC, max. 300 mA
Basic setpoint ..... 5...50°C
Hysteresis ..... ±0.5 K (adjustable)
P-band..... 10°C
I-time ..... 300 s
Analogue input ..... One PT1000
Digital input..... One closing potential-free contact
Universal input ..... One PT1000 or closing potential-free contact
Mounting ..... Wall
Protection class..... IP20

Communication

Type ..... RS485: Modbus (with automatic
..... detection/change-over) or BACnet
Communication speed ..... 9600, 19200, 38400 bps (Modbus
..... and BACnet) or 76800 bps (BACnet only)
Functions as
Modbus..... RTU slave
BACnet..... MS/TP Slave and Master
Modbus ..... 8 bits, 1 or 2 stop bits. Odd, even (FS) or no parity

Memory

Non-volatile (EEPROM) ..... All settings and configurations are saved
See also chapter named *Memory functions during power failure.*

Built-in temperature sensor

Type ..... NTC, linearised, 15 kOhm
Measuring range ..... 0...50°C
Accuracy of measurement ..... +/-0.5°C at 15...30°C

Built-in display

Display type..... Backlit, LCD

CE

This product conforms to the EMC and LVD requirements in the European harmonised standards EN 60730-1:2000 and EN 60730-2-9:2002. It carries the CE mark.

ROHS

This product conforms to the Directive 2011/65/EU of the European Parliament and of the Council.

Inputs

AI..... External PT1000 sensor instead of the internal NTC
UI..... Change-over input; potential-free switch (configurable for NO/NC
..... *or* PT1000
DI..... Digital input; potential-free window contact or occupancy contact,
..... configurable for NO/NC.

Outputs

DO1 ..... Fan-coil output 1 for fan control, relay, 230 V AC, 3 A
DO2 ..... Fan-coil output 2 for fan control, relay, 230 V AC, 3 A
DO3 ..... Fan-coil output 3 for fan control, relay, 230 V AC, 3 A
DO4 ..... Digital output 4 for heating/cooling, 230 V AC, max. 300 mA.
..... Max. 20 A during 20 ms.
DO5 ..... Digital output 5 for heating/cooling, 230 V AC, max. 300 mA.
..... Max. 20 A during 20 ms.
AO1, AO2 ..... Analogue outputs, 0…10 V DC, max. 1 mA, short-circuit proof,
..... Adjustable to 2...10 V, 10...0 V, 10...2 V

For more information on inputs and outputs, see chapter *Wiring*.

Accessories for NRT405F901

External temperature sensor EGT456F101
Change-over EGT456F101, RAM100F001

The accessories are available from SAUTER ITALIA SPA. For more detailed information concerning these accessories, see the individual product sheet and instruction for each product, available via www.sauteritalia.it.

Part II **Installation**

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Chapter 5 Preparations for installation

Using labels

A series of labels are located on the back of the electronics cassette, which simplify extensive installations of NRT controllers. By using these labels to convey information to the individual responsible for the physical installation, it is possible to save much time and to minimise errors during wiring.

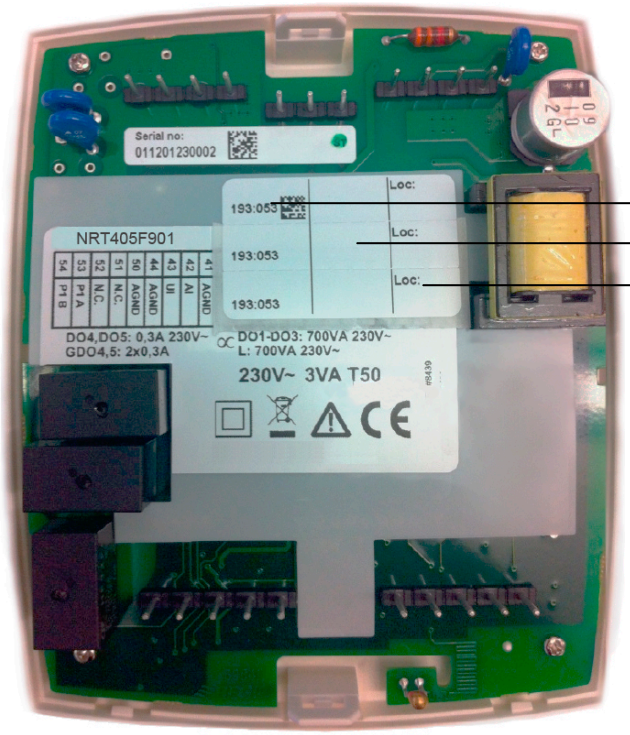


Figure 2. Label on the back of the controller

The three-piece label can be divided and its parts attached to the building drawings and the bottom part of the controller. The label contains information regarding communication address etc., together with a field for notes where a reference number for the wiring diagram can be entered.

Depending on the communication protocol used, the address on the label can mean different things.

Example 1

If the label address is 191:183, the following addresses are used for the different communication protocols:

PLA=191, ELA=183.

Modbus: Address=183.

BACnet: Device ID=191183 (the 4 low digits=1183, the 3 high digits=19), MS/TP MAC address=83.

Example 2

If the label address is 10:001, the following addresses are used for the different communication protocols:

PLA=10, ELA=1.

Modbus: Address=1.

BACnet: Device ID=10001 (the 4 low digits=1, the 3 high digits=1), MS/TP MAC address=1.

Configuration

NRT tool is used in order to configure the electronic unit. Password for the different log on levels in NRT tool is 1111 (log on as an administrator) and 3333 (log on as an operator). This will work for models with integrated communication. In all other models, the device is configured via the display.

The computer running NRT tool is connected to the back of the device by way of a converter (USB to RS485). The converter is connected to terminals 53 and 54.

If the electronic unit needs to be configured, it may be advantageous to do so before it is sent to the building in which it is to be installed. For more information on configuring, see the chapter *Configuration*.

The bottom plate containing information on placement and wiring can be sent separately to the building for electrical installation.

Chapter 6 **Installation**

Mounting

Mount the controller in a location that has a temperature representative for the room. A suitable location is approx. 1.6 m above floor level in a place with unobstructed air circulation.

Depress the locking tab in the top edge of the cover by using a screwdriver. Gently twist the screwdriver until the bottom plate and the electronic unit separate somewhat (see figure 3, below). Then use the gap visible at the edge of the bottom plate to open the top half completely (see figure 4). Do the same thing for the bottom half of the device.

Figure 3

Figure 4

Lift the electronics unit up from the bottom plate. The bottom plate with terminals has a number of fixing hole patterns. Select suitable holes and screw the bottom plate onto the wall or connection box, so that the arrows on the bottom plate point upwards.

NOTE: Do not fasten the screws too tightly!

Communication, wiring

The communication cable must be a screened, twisted pair cable. If the length of the loop exceeds 300 m, a repeater is required. See figure below:

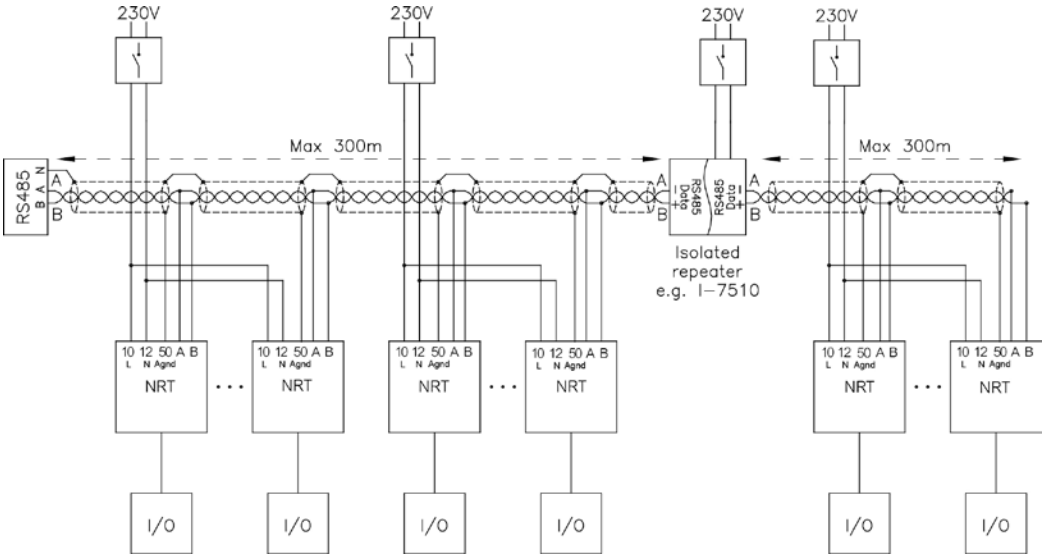


Figure 5. Wiring

Bottom plate connections

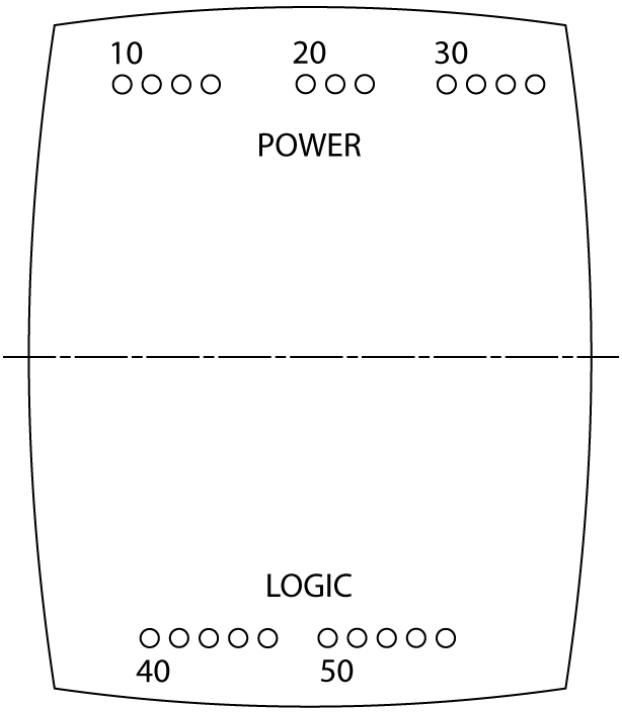
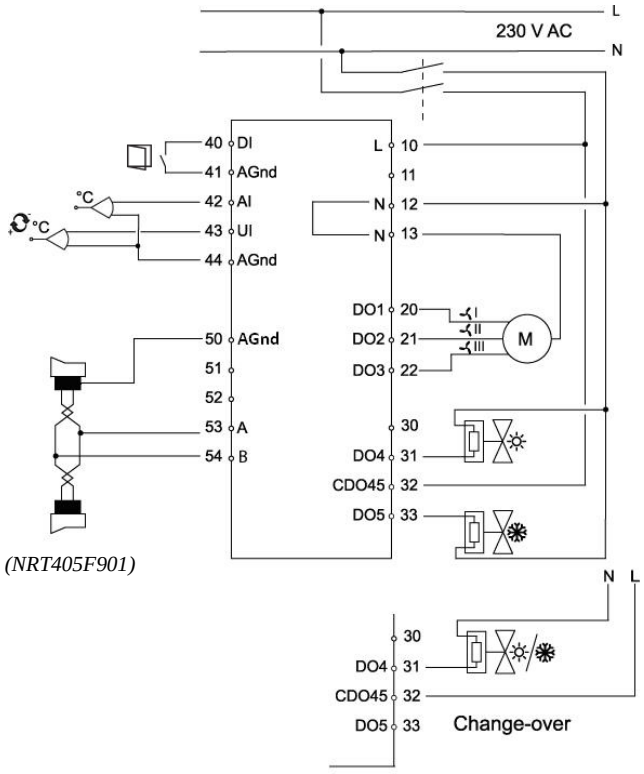


Figure 6. Bottom plate connections

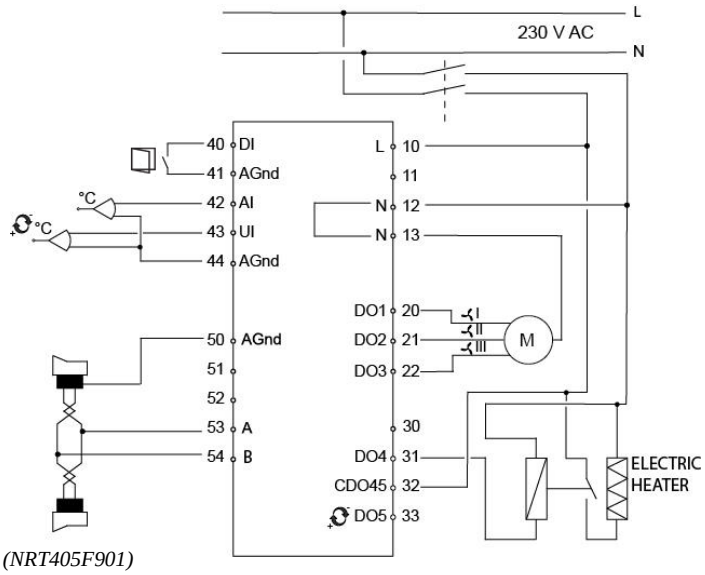
Wiring for NRT405F901

Wiring of thermal actuator



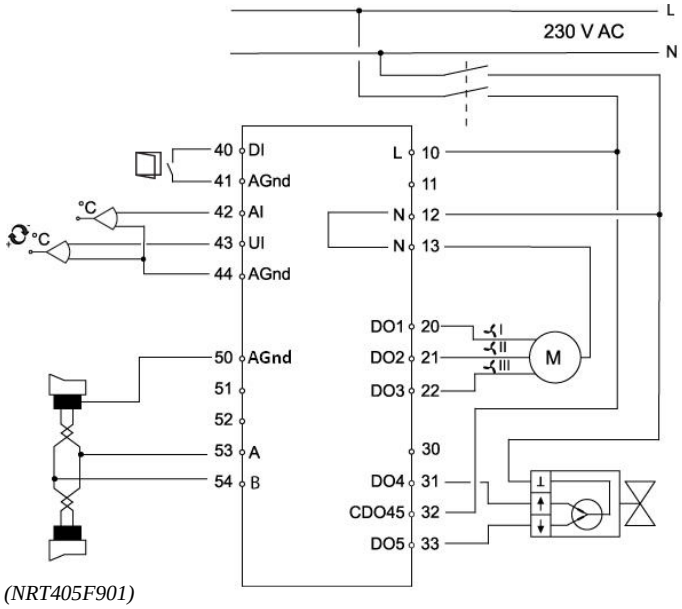
(NRT405F901)

Wiring of electric heater with solid state-relay



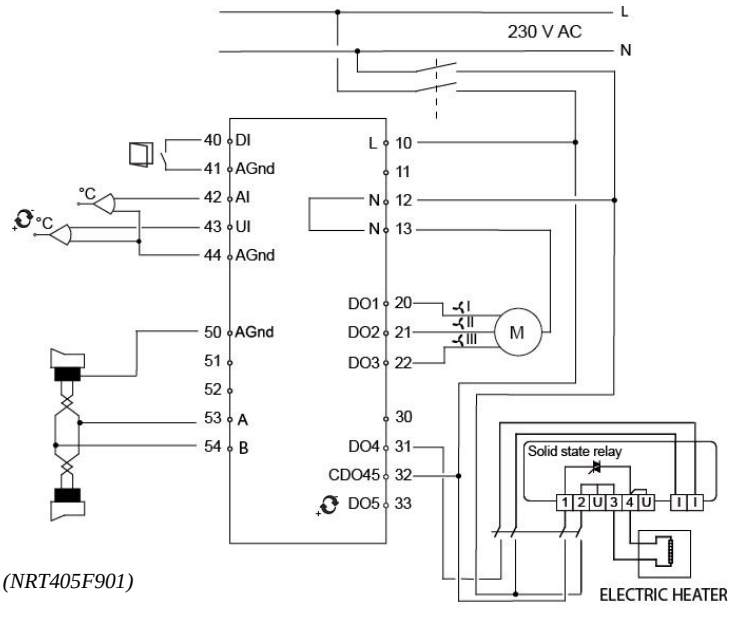
(NRT405F901)

Wiring of 3-position actuator



(NRT405F901)

Wiring of electric heater with solid state relay



(NRT405F901)

Wiring of various actuators

When wiring thermal actuators, DO4 is used for heating and DO5 for cooling actuators. If the change-over function is used together with a 2-pipe installation, the actuator should be connected to DO4 if an electric heater is not used. If an electric heater is used, the change-over function is instead located on DO5. When wiring 3-position actuators, DO4 is used for the increase signal and DO5 for the decrease signal, including when the change-over function is used.

Terminal	Designation	Description	Function
10	L	230 V AC Line	Supply voltage
11	NC	Not connected	
12	N	230 V AC Neutral	Power supply (internally connected to terminal 13)
13	N	Fan-coil common / 230 V AC Neutral	Common fan-coil connector (internally connected to terminal 12)
20	DO1	Fan-coil output 1 for fan control	Relay, 230 V AC, 3 A
21	DO2	Fan-coil output 2 for fan control	Relay, 230 V AC, 3 A
22	DO3	Fan-coil output 3 for fan control	Relay, 230 V AC, 3 A
30	NC	Not connected	
31	DO4	Digital output 4 for heating/cooling or opening with 3-point actuator	Digital output, 230 V AC, max 300 mA. Max 2 A during 20 ms.
32	CDO45	Common DO4 & 5	Common connection for digital outputs 4 and 5
33	DO5	Digital output 5 for cooling or closing with 3-point actuator Heating/cooling signal when electric heater is configured.	Digital output, 230 V AC, max 300 mA. Max 2 A during 20 ms.
40	DI	Digital input	Floating (potential-free) window contact or occupancy contact. Configurable for NO/NC.
41	AGnd	Analogue ground	
42	AI	Analogue input	External PT1000 instead of the internal NTC
43	UI	Universal input	Change-over input. Floating (potential-free) switch (configurable for NO/NC) or PT1000.
44	AGnd	Analogue ground	
50	AGnd	Analogue ground	
51	NC	Not connected	
52	NC	Not connected	
53	A	RS485 communication A	NRT405F901
54	B	RS485 communication B	NRT405F901

Chapter 7 **Commissioning**

It is easiest to set parameters by using NRT tool.

If the measured room temperature is to be compensated for, this should be performed only under stable conditions.

Troubleshooting

The Manual/Auto function in NRT tool enables testing various outputs. The output itself is not affected directly, but rather the software object that controls the output. This means that the built-in safety functions cannot be deactivated.

The controller has different types of indications which can be used to support troubleshooting. See section *Indications*.

Part III **Configuration**

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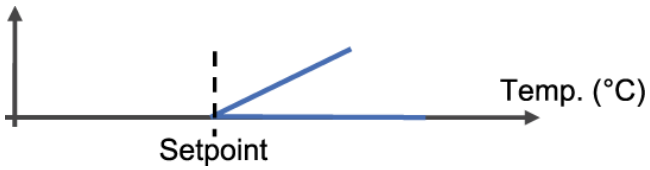
Chapter 8 **Control principles**

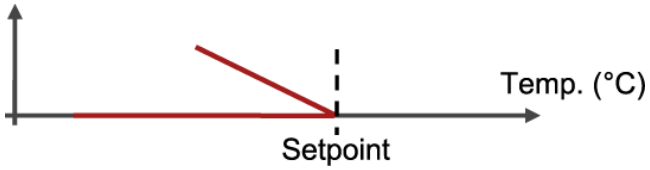
Control principle for cooling function, 2-pipe installations

During control of cooling, the output starts to increase when the temperature rises above the setpoint value.



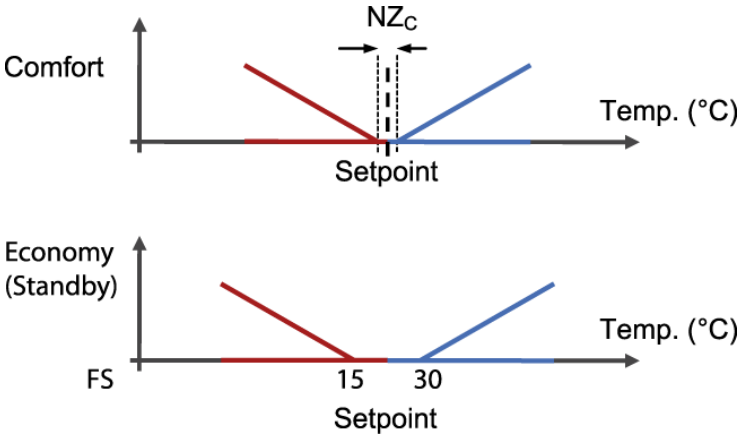
Control principle for heating function, 2-pipe installations

During control of heating, the output starts to increase when the temperature falls below the setpoint value.



Control principle in 4-pipe installations

At Comfort mode, neither heating nor cooling is used in order to minimise energy consumption when the temperature is in the neutral zone. The heating output is activated when the temperature falls below the set value for the neutral zone. The cooling output is activated when the temperature exceeds the set value for the neutral zone. The neutral zone is divided into two equal parts with one part below and one part above the setpoint. See the figure below. The factory setting for NZC is 2 K.



The above schematic drawings of the control principle show the corresponding requirement of the controller function. This requirement is recalculated by the controller to a value for the actuator output, depending on the selected output function.

Chapter 9 **Operating modes**

Different operating modes

There are four different operating modes. Switching between these modes is performed locally. In controllers with communication, the operating mode can also be changed through the main SCADA system.

Comfort

is shown in the display. A presence detector can be connected to DI in order to choose between Comfort and Economy. Switching between Comfort/Economy and Off can also be performed via the occupancy button. Comfort/Economy is selected via the parameter list.

Economy (Standby)

"Standby" is shown in the display. Heating and cooling have freely adjustable setpoints. Factory settings: heating = 15°C, cooling = 30°C,

Off

The controller neither heats nor cools and the fan is at a standstill, assuming mould protection has not been selected in which case the fan is still running.

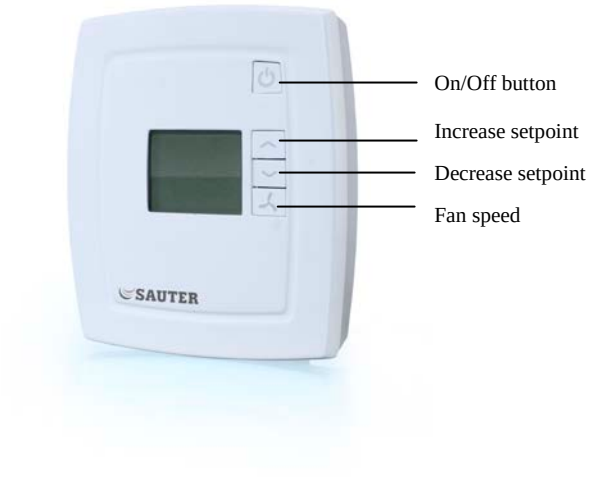
Windows

is shown in the display. The controller is in Off mode, and the fan will stop if mould protection has not been selected or if extended running for a fan in combination with an electric heater has been selected. The window contact is connected to DI and must be configured.

Occupancy control

Parameter 3 decides whether DI is the input for a window contact or a presence detector. A presence detector can be connected to DI in order to choose between Comfort and Economy mode.

Chapter 10 **Button management**



On/Off button

By pressing the On/Off button, NRT405F901 will switch between Off mode and Comfort/Economy mode.

Setpointbuttons

The INCREASE and DECREASE buttons are used to change the setpoint value. The desired contents of the display can be configured via the parameter list. There are four alternatives:

1. The actual value is shown, or, when the setpoint has been changed via the INCREASE and DECREASE buttons, the setpoint value is shown in the display together with the setpoint (thermometer) symbol.
2. The actual value is shown, or, when the setpoint has been changed via the INCREASE and DECREASE buttons, the setpoint adjustment is shown in the display together with the setpoint (thermometer) symbol.
3. The setpoint value is shown (factory setting).
4. The setpoint adjustment is shown.

When the setpoint adjustment is displayed (alternatives 2 and 4), the basic setpoint is 22°C.

The basic setpoint is changeable in parameter 64 (factory setting=22°C).

Fan button

By pressing the fan button, the fan speed is set to to Low, Medium, High and Auto.

If the fan has been configured not to be affected by the controller output, the ”AUTO” option will not be shown when pressing the fan button.

Configuration via the parameter list

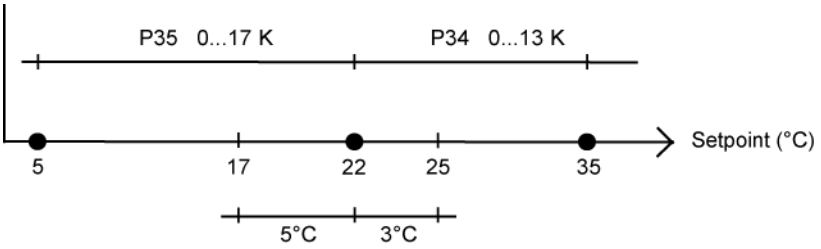
The factory settings are changed in the parameter list shown in the display by using the buttons on the controller.

The parameter values are changed with the INCREASE and DECREASE buttons and changes confirmed with the On/Off button.

Setpoint limitation

In parameter 34 and 35 it is possible to set the maximum permitted increase as well as decrease of the setpoint.

Example: If P35=5 and P34=3, the setpoint can be adjusted between 17°C and 25°C (see the picture below).



Chapter 11 Types of actuators

NRT405F901 can be used with two types of actuators:

- Thermal actuators
- 3-point actuators (Increase/decrease actuators)

The type of actuator is configured using NRT tool or in the parameter menu of the display.

Thermal actuators

When control of a thermal actuator has been selected, it is controlled digitally through output DO... via time proportional pulses. By pulsing, the degree of opening of the actuator (and its valve) is varied. The period time (in seconds) equals the sum of output on time and output off time. The factory setting (FS) for period time is 60s. The controller varies output on time and off time proportionally, depending on the output signal requirements of the actuator.

3-position actuators

For 3-position actuators, two digital outputs (DO4/DO5) are used for control of a single actuator; one output controlling opening the actuator and another closing it. The run time (in seconds) can be configured for different actuators (FS=120 s).

Exercising

All actuators, independent of type, are exercised. This is performed by the controller at a set interval measured in hours (FS=23 hour interval). Exercising means a signal to open is sent to the actuator for as long as the actuator's configured run time. A signal to close is then sent for an equal amount of time, after which exercising is completed.

The interval between exercises is set in parameters 22 and 23. If the parameter is set to ”0”, the function is deactivated.

If an electric heater has been selected, no exercise will take place.

Number of parameter	Description	Factory setting
22	Time (in hours) between exercise of heating actuator	23
23	Time (in hours) between exercise of cooling actuator	23

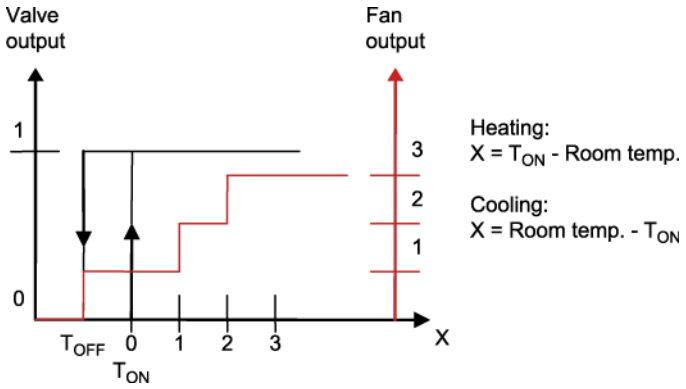
Chapter 12 **Fan control**

Automatic fan speed control

The current fan speed is shown in the display and can be set manually to Low, Medium or High speed. It can also be set to Auto, which means that the fan speed is controlled by the heating and/or cooling demand, depending on the configuration.

By pressing the fan button, the fan speed is set to Low → Medium → High or → Auto.

The factory setting in the Auto position is that the fan speed is controlled at both heating and cooling demand. The first step starts when the output signal from the controller internally exceeds 20 % (5% if an electric heater is used). The second step starts at 60 % and the third at 100 %. When the fan speed decreases, each fan step has a hysteresis of 5 % for changing over to the next step. For example, the fan will change from the third to the second step when the output signal falls below 95 %.



Manual fan speed control

By pressing the fan button, the fan speed is set to Low → Medium → High or → Auto.

When there is no heating or cooling demand in the Auto position, the fan will run at its lowest setting. This is editable in parameter 31, enabling the fan to stop entirely when there is no heating or cooling demand. The fan is also inactive in the Off and Window modes. However, it will continue to run if mould protection has been configured. If the fan has been configured not to be affected by the controller output (parameter 25), the ”Auto” option will not be shown when pressing the fan button.

Number of parameter	Description	Factory setting
25	Configuration of fan control: 0=No control, 1=The fan is controlled by heating requirement, 2=The fan is controlled by cooling requirement, 3=The fan is controlled by both heating and cooling requirement. When using an electric heater this parameter should only be set to 1 or 3, otherwise there is a risk of overheating.	3

Mould protection

When this function has been configured, the fan will always run at the lowest speed and circulate air in the room to minimise the risk of mould growth in the fan-coil unit. The function is deactivated on delivery.

Chapter 13 **Change-over**

Change-over is a function enabling installations using only 2-pipe systems to use the same pipe for both heating and cooling depending on whether heating or cooling is required during, for instance, the summer months (Cooling control) or winter months (Heating control).

Input may consist of either an analogue PT1000 sensor, or of a closing contact connected to a universal input (FS = no sensor connected).

The PT1000 sensor must be mounted so that it can measure the temperature on the supply pipe to the coil. Should this fall below 16°C (FS), change-over is activated and cooling controlled on the output DO4. If the temperature rises above 28°C (FS), the change-over function is turned off and heating is controlled on the output.

Change-over can also be controlled via a central command. See list of variables contained in Part IV.

Chapter 14 **Display handling**

The display is handled using the buttons on the controller: See chapter 10 for more information.

Display indications

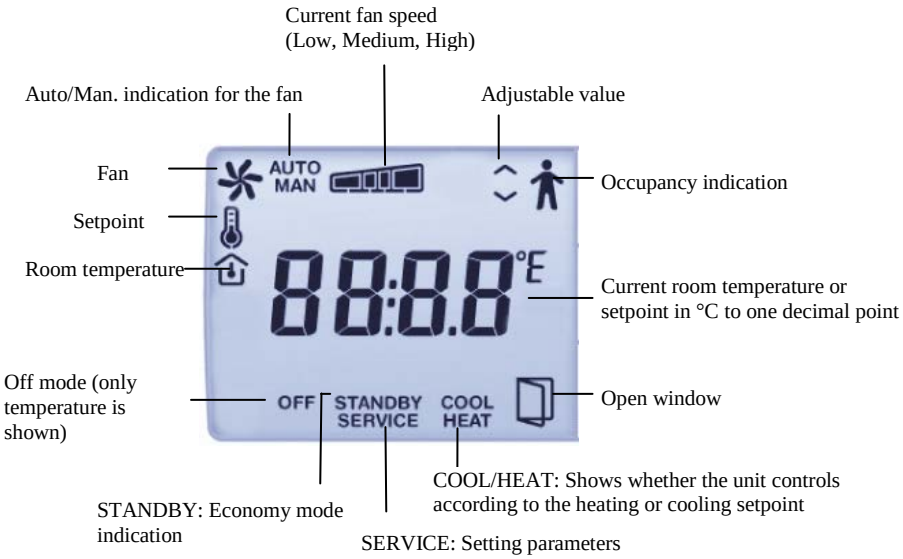


Figure 8. Indications in the display

The parameter menu

When the controller is in Comfort or Window mode, different parameter settings may be adjusted in a parameter menu. This menu appears if the INCREASE and DECREASE buttons are pressed simultaneously for approx. 5 seconds until the Service indication appears in the display. Thereafter, the INCREASE button should be pressed twice.

Initially, only a parameter number (P01, P02, P03 etc.) is shown in the parameter menu. By pressing the INCREASE and DECREASE buttons, the parameters can be cycled through. When the correct parameter is selected, the On/Off button is pressed after which the parameter's value is shown and the parameter number disappears. The parameters value may now be changed using the INCREASE and DECREASE buttons. By depressing the INCREASE or DECREASE button, the value shown in the display is initially only changed slowly. The changing speed thereafter increases in steps of approx. 3-4 steps with 2-3 seconds in between.

Confirm/Undo

To confirm changing the parameter, the On/Off button is pressed once more. The display will then return to showing the parameter number. Before the change is confirmed, the original value (i.e. the value from before the change took place) can be returned by pressing the INCREASE and DECREASE buttons simultaneously. The original value will then return in the display.

Return

After approx. 1 minute, or when INCREASE and DECREASE is pressed simultaneously while in the menu, the display will return to its normal view mode. The text Exit is shown after the last parameter in the display. Pressing the On/Off button when Exit is shown will eject the user from the parameter menu. Press INCREASE to go to the first parameter and DECREASE to go to the last parameter.

Parameters

Below, all parameters are presented. Please refer to the enclosed instructions to see which parameters specifically apply to your controller. The following parameters can be changed in the parameter menu:

Number of parameter	Description	Factory setting (FS)
1	Control modes 2=2-pipe system 3=4-pipe system 4=Electric heater	3
2	Change-over mode: 0=Heating control 1=Cooling control 2= Automatic change-over depending on analogue temperature sensor or digital input	2
3	Operating mode when activating digital input 1: 0=Economy mode (presence) 1=Off mode (windows)	1
4	Mould protection: 0=Not active 1=Active (fan never stops)	0
5	NZC, neutral zone at Comfort. If the neutral zone is 2 K, the heating setpoint equals the setpoint minus 1 and the cooling setpoint equals the setpoint plus 1.	1 K
6	Heating setpoint during abscence.	15°C
7	Cooling setpoint during abscence.	30°C
8	P-band for the room controller.	4 K
9	I time for the room controller.	300 s
10	Hysteresis (ΔT).	1 K
11	Switch-off timer for Comfort mode.	0 min
12	Power-on-delay for Comfort mode.	0 min
13	Sensor connected to AI1: 0=Internal sensor 1=External room sensor	0
14	Sensor connected to UI1: 0=None 1=Change-over digital 2=Change-over analogue	0
15	Type of digital actuator: 0=Thermal 1=3-position	0
16	Output signal for actuator connected to AO1: 0=0…10 V 1=2…10 V 2=10…2 V 3=10…0 V	0

Number of parameter	Description	Factory setting (FS)
17	Output signal for actuator connected to AO2: 0=0…10 V 1=2…10 V 2=10…2 V 3=10…0 V	0
18	Period time for heating actuator if thermal actuators.	480 s
19	Period time for cooling actuator if thermal actuators.	480 s
20	Run time for heating actuator with increase/decrease actuators.	120 s
21	Run time for cooling actuator with increase/decrease actuators.	120 s
22	Time (in hours) between exercise of heating actuator.	23
23	Time (in hours) between exercise of cooling actuator.	23
24	Setpoint or actual value shown in display: 0=Actual, setpoint when changing setpoint value 1=Actual, setpoint adjustment when changing setpoint value 2=Setpoint 3=Only setpoint adjustment	2
25	Configuration of fan control: 0=No control 1=The fan is controlled by the heating requirement 2=The fan is controlled by the cooling requirement 3=The fan is controlled by both the heating and cooling requirement When using an electric heater this parameter should only be set to 1 or 3, otherwise there is a risk of overheating.	3
26	Start signal in % for controller output, heating or cooling, for fan speed 1.	20 (5 when using electric heater)
27	Start signal in % for controller output, heating or cooling, for fan speed 2.	60
28	Start signal in % for controller output, heating or cooling, for fan speed 3.	100
29	Hysteresis for start/stop of fans in % of controller output.	5
30	Number of fan speeds.	3
31	Fan speed in Auto mode: 0=Fan speed follows cooling/heating output 1=Fan speed is limited to the lowest speed setting	0
32	Temperature compensation on AI1.	0 K
33	Temperature compensation for internal room sensor.	0 K
34	Maximum permitted upward setpoint offset. Settable value=0...13 K.	3 K
35	Maximum permitted downward setpoint offset. Settable value=0...17 K.	3 K
36	NO/NC* digital input 1: 0=NO 1=NC	1
37	NO/NC* universal input 1: 0=NO 1=NC	0
38	NO/NC* digital output 4: 0=NO 1=NC	1
39	NO/NC* digital output 5: 0=NO 1=NC	1

Number of parameter	Description	Factory setting (FS)
40	Manual/Auto heating output signal: 0=Off 1=Manual 2=Auto	2
41	Manual/Auto cooling output signal: 0=Off 1=Manual 2=Auto	2
42	Heating output signal in manual mode.	0
43	Cooling output signal in manual mode.	0
44	Model.	-
45	Major version.	-
46	Branch version.	-
47	Launched version or beta version.	-
48	Revision.	-
49	Display backlight low	10
50	Display backlight high	30
51	PLA-address	FS
52	ELA-address	FS
53	Modbus address	254
54	Parity bit Modbus communication: 0=No parity 1=Odd parity 2=Even parity	2
55	Modbus timeout for characters (t1.5), in ms. Should be 3.5 times a character, ie. at least 2 ms.	2
56	Response lag Modbus (t3.5), in ms. Should be 3.5 times a character, ie. at least 5 ms.	5
57	Communication protocol: 0 = Modbus 1 = BACnet MS/TP	0
58	BACnet MS/TP MAC address: 0-127=master address 128-254=slave address	FS (0-99)
59	BACnet MS/TP, device id, the 4 lowest digits. Ex. 4567 in 1234567	FS
60	BACnet MS/TP, device id, the 3 highest digits. Ex. 123 in 1234567	FS
61	BACnet MS/TP, Max_Master	127
62	Speed for communication protocol: 0 = 9600 bps 1 = 19200 bps 2 = 38400 bps 3 = 76800 bps	0
63	Set communication parameters to factory settings (does not apply to addresses): 1 = Factory settings (Modbus@9600)	0
64	Basic setpoint for NRT405F901, 5…50°C	22

Table 13. Parameter list

*NO = Normally Open, NC = Normally Closed

Chapter 15 Memory functions during power failure

During a power failure, the controller has an integrated function that enables settings and configuration to be stored in a so-called non-volatile memory (EEPROM). Settings and configurations are saved in the memory whenever they are changed, so that the latest values are always stored. However, measurements and other variables utilised by the controller during normal operation, and which tend to fluctuate continually, are not saved.

Values can be saved approximately 100 000 times to this non-volatile memory. Changed settings should therefore not be sent systematically and with great frequency to the controller via network communication. Sending normal changes via the network - e.g. such as changing the running mode a few times per day - will however present no problems.

Example

Activating the occupancy detection will not be saved to memory. Rather, the controller will return to its current mode after powering up.

Part IV **Signals**

Table of contents

Chapter 16 **Modbus signal types**

Modbus types

Modbus signal types (types listed below):

1 = Coil Status Register (Modbus function = 1, 5 and 15)

2 = Discrete Input (Modbus function = 2)

3 = Coil Status Register (Modbus function = 3, 6 and 16)

4 = Input Register (Modbus function = 4)

Supports the following Modbus functions:

1 = Read Coils

2 = Read Discrete Input

3 = Read Holding Register

4 = Read Input Register

5 = Write Single Coil

6 = Write Single Register

15 = Write Multiple Coils

16 = Write Multiple Registers

Scaling factor Modbus

All floating point numbers have a scaling factor of 10. Integers, Index and Logic signals always have a scaling factor of 1.

Wiring, Modbus

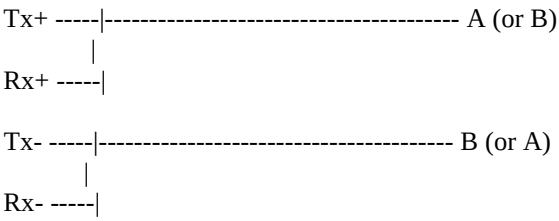
A Modbus type protocol consists of multiple layers (OSI model). The bottom layer is always the physical layer, the number of connection wires and signal levels. The next layer describes the communication digits (number of bits, stop bits, parity bits etc). After these come the layers describing Modbus-specific functions (number of digits per message, the meaning of different messages, etc). For Modbus, the bottom layer can be either RS485, RS422 or RS232.

RS485 and RS422

RS485 and RS422 constitute the purely electrical part of the protocol, ie. the physical layer. RS485 has two connections, A and B. Often, there is also a Protective earth. RS485 units are connected A → A and B → B. It may prove necessary to shift A and B in order to make Modbus work properly. RS485 is a so called half duplex communication: The communication can only go in one direction, eg. the main unit will initially send a request, and thereafter listen to the reply. A and B are used both for sending and receiving.

RS422 is a full duplex communication, meaning that 4 connecting wires are required; 2 for sending (Tx+ and Tx-) and 2 for receiving (Rx+ and Rx-). Tx is used for sending and Rx for receiving, meaning the Tx in a unit must be connected to the Rx in another and vice versa. Pertaining to signal levels, etc., RS422 and RS485 are identical.

In order to connect RS485 and RS422: Connect Tx+ to Rx+ and Tx- to Rx- on the RS422 unit. We have now changed a 4-wire system to a 2-wire system and can connect them to A and B on the RS485 unit. It is usually easiest to find out what fits where simply by experimenting. Wrong polarity makes the system not function, but is incapable of harming any unit.



Bit rate, two stop bits, parity is next layer.

These settings must correspond to the settings in the main unit. Find out what the settings for the main unit are, and then enter the same settings into the controller.

Parity can be set to odd, even (FS) or none. If no parity is set, two stop bits will automatically be used. If odd or even parity is set only one stop bit will be used, or the total amount of bits will be too great. 1 start bit, 8 data bits, 1 parity bit and 1 stop bit gives a total of 11 bits, which is the maximum.

Chapter 17 **Modbus signals**

Discrete inputs

Name of signal	Type	Modbus address	Description
RC_Actual_L.NRTDigIn(0)	L,2	1	Not used
RC_Actual_L.NRTDigIn1	L,2	2	Value on digital input 1
Not used in this model	L,2	3	
RC_Actual_L.NRTUDigIn1	L,2	4	Value on universal digital input 1
RC_Actual_L.NRTDigOut(0)	L,2	5	Not used
RC_Actual_L.NRTDigOut1	L,2	6	Value on digital output 1
RC_Actual_L.NRTDigOut2	L,2	7	Value on digital output 2
RC_Actual_L.NRTDigOut3	L,2	8	Value on digital output 3
Not used in this model	L,2	9-10	
RC_Actual_L.NRTUDigOut1	L,2	11	Heating (Value on digital output 4)
RC_Actual_L.NRTUDigOut2	L,2	12	Cooling (Value on digital output 5)
RC_Actual_L.NRTDIOpenWindow	L,2	13	Indicates open window
Not used in this model	L,2	14	
RC_Actual_L.NRTDIPresences	L,2	15	Indicates presence from digital input
RC_Actual_L.NRTDIChangeOver	L,2	16	Indicates change-over from digital input
RC_Actual_L.NRTFanSpeed1	L,2	17	Indicates fan speed 1
RC_Actual_L.NRTFanSpeed2	L,2	18	Indicates fan speed 2
RC_Actual_L.NRTFanSpeed3	L,2	19	Indicates fan speed 3
Not used in this model	L,2	20	
RC_Actual_L.NRTCVHeatPulsProp	L,2	21	Indicates pulse prop. heating
RC_Actual_L.NRTCVCoolPulsProp	L,2	22	Indicates pulse prop. cooling
RC_Actual_L.NRTCVHeatInc	L,2	23	Indicates increase heating/cooling DO4
RC_Actual_L.NRTCVHeatDec	L,2	24	Indicates decrease heating/cooling DO5
Not used in this model	L,2	25-26	
RC_Actual_L.NRTAIChangeOverState	L,2	27	Indicates change-over status from analogue input
RC_Actual_L.NRTChangeOverState	L,2	28	Indicates change-over status from both digital and analogue input
Not used in this model	L,2	29-30	
RC_Actual_L. NRTPresence	L,2	31	Occupancy indication (with on- and switch-off delay)
Not used in this model	L,2	32-33	

Coil status register

Name of signal	Type	Modbus address	Default value	Description
RC_Setp_L.NRTBypass	L,1	1	0	Puts the unit in Bypass mode. Reverts automatically after Bypass time has elapsed (default=120 min).
RC_Setp_L.NRTShutDown	L,1	2	0	Puts the unit in Shutdown mode.
RC_Setp_L.NRTModbusTwoStop	L,1	3	0	Two stop bits for Modbus communication
RC_Setp_L.NRTDiNC(0)	L,1	4	0	Not used
RC_Setp_L.NRTDi1NC	L,1	5	0	Normally open (NO) or normally closed (NC) on digital input. 0=NO, 1=NC.
Not used in this model	L,1	6	.	
RC_Setp_L.NRTUDi1NC	L,1	7	0	Normally open (NO) or normally closed (NC) on universal digital input. 0=NO, 1=NC.
Not used in this model	L,1	8	-	
RC_Setp_L. NRTDO4NC	L,1	9	1	DO4 NO/NC
RC_Setp_L.NRTDO5NC	L,1	10	1	DO5 NO/NC
RC_Setp_L.NRTDilAct	L,1	11	0	DI1-activation (presence/window) → Economy/Off
RC_Setp_L.NRTMPAct	L,1	12	0	Activation of Mould protection.
RC_Setp_L.NRTTermoModel	L,1	13	0	EEPROM storage of Thermo model variable (3-point actuator)
RC_Setp_L.NRTMinFanSpeed	L,1	14	1	The fan is run at its minimum speed setting if the automatic fan control calculates that the fan can be switched off.
Not used in this model	-	15	-	
RC_Setp_L.NRTComFactoryDefaults	L,1	16	0	Set communication parameters to factory settings (does not apply to addresses): 1 = Factory settings (resets to 0)

Input register

Name of signal	Type	Modbus address	Description
RC_Actual_X.NRTSoftware	X,4	1	Type of NRT software: 0 = Not used 1 = NRT4xx
RC_Actual_X.NRTVerMajor	X,4	2	Major version
RC_Actual_X.NRTVerMinor	X,4	3	Minor version
RC_Actual_X.NRTVerBranch	X,4	4	Branch version
RC_Actual_X.NRTRevision	X,4	5	Revision
Not used in this model	X,4	6	
RC_Actual_X.NRTUnitState	X,4	7	Current running mode: 0 = Off 1 = Economy (Unoccupied) 2 = Not used (Stand-by) 3 = Not used (Occupied) 4 = Comfort (ByPass)
RC_Actual_X.NRTControllerState	X,4	8	Current control: 0 = Off 1 = Heating 2 = Cooling
RC_Actual_X.NRTFanSpeed	X,4	9	Current fan speed: 0 = Off 1 = Fan speed 1 active 2 = Fan speed 2 active 3 = Fan speed 3 active
Not used in this model	X,4	10	
RC_Actual_R.NRTRoomTemp	R,4	11	Room temperature
RC_Actual_R.NRTRoomTempExt	R,4	12	Room temperature from external sensor
RC_Actual_R.NRTRoomTempInt	R,4	13	Room temperature from internal sensor
RC_Actual_R.NRTAIChangeOver	R,4	14	Change-over temperature
RC_Actual_R.NRTAnaIn1	R,4	15	Value on analogue input 1
RC_Actual_R.NRTUAnaIn1	R,4	16	Value on universal analogue input 1
RC_Actual_R.NRTUAnaOut1	R,4	17	Value on universal analogue output 1
RC_Actual_R.NRTUAnaOut2	R,4	18	Value on universal analogue output 2
RC_Actual_R.NRTSetPAdjustment	R,4	19	Setpoint adjustment from internal unit
RC_Actual_R.NRTPIDSetP	R,4	20	Controller setpoint
RC_Actual_R.NRTPIDOutput	R,4	21	Controller output signal (0…100 %)
RC_Actual_R.NRTHeatOutput	R,4	22	Heating output signal (0…100 %)
RC_Actual_R.NRTCoolOutput	R,4	23	Cooling output signal (0…100 %)
RC_Actual_R.NRTAI1Raw	R,4	24	Raw value for analogue input 1
RC_Actual_R.NRTUI1Raw	R,4	25	Raw value for universal input 1
RC_Actual_R.RoomTemp_NRT2	R,4	26	Room temperature input value from secondary internal sensor

Holding register

Name of signal	Type	Modbus address	Default setting	Description
Not used in this model	X,3	1-2	-	
RC_Setp_X.NRTHeatOutputSelect	X,3	3	2	Manual/Auto heating output
RC_Setp_X.NRTCoolOutputSelect	X,3	4	2	Manual/Auto cooling output
RC_Setp_X.NRTFanSelect	X,3	5	4	Select fan mode: 0 = Off 1 = Manual speed 1 2 = Manual speed 2 3 = Manual speed 3 4 = Auto
RC_Setp_X. NRTFanControlMode	X,3	6	3	Select fan control: 0 = No control 1 = The fan is controlled by heating requirement 2 = The fan is controlled by cooling requirement 3 = The fan is controlled by both heating and cooling requirement
RC_Setp_X.NRTFanSpeed1Start	X,3	7	20	Controller output signal in % for fan speed 1
RC_Setp_X.NRTFanSpeed2Start	X,3	8	60	Controller output signal in % for fan speed 2
RC_Setp_X.NRTFanSpeed3Start	X,3	9	100	Controller output signal in % for fan speed 3
RC_Setp_X.NRTFanSpeedHyst	X,3	10	5	Controller output signal hysteresis start/stop fan speed
RC_Setp_X.NRTFanSpeedMax	X,3	11	3	Number of fan speeds (1-3)
Not used in this model	X,3	12	-	
RC_Setp_X.NRTChangeOverSelect	X,3	13	2	Manual/Auto Change-over (0=Heating, 1=Cooling, 2=Auto)
RC_Setp_X.NRTRemoteState	X,3	14	5	Used for remote control: 0 = Off 1 = Economy/Standby 2 = Economy/Standby 3 = Presence 5 = No remote control
RC_Setp_X.NRTUnitReturnState	X,3	15	-	Pre-set running mode: 0 = Off 1 = Standby
RC_Setp_X.NRTUnitShutDownState	X,3	16	0	Shutdown mode: 0 = Off 1 = Standby
Not used in this model	X,3	17	-	

Name of signal	Type	Modbus address	Default setting	Description
RC_Setp_X.NRTControllerMode	X,3	18	3	Control mode selection: 2= Heating or Cooling via change-over 3 = Heating/Cooling 4 = Electric heating
RC_Setp_X.NRTCVHeatType	X,3	19	0	Type of actuator, heating: 0 = 0…10 V 1 = 2…10 V 2 = 10…2 V 3 = 10…0 V
RC_Setp_X.NRTCVCoolType	X,3	20	0	Type of actuator, cooling
RC_Setp_X.NRTCVHeatExerciseInterval	X,3	21	23	Time (in hours) between exercise of heating actuator.
RC_Setp_X.NRTCVCoolExerciseInterval	X,3	22	23	Time (in hours) between exercise of cooling actuator.
Not used in this model	X,3	23	-	
RC_Setp_X.NRTAi1	X,3	24	0	Signal connected on AI1: 0 = Not used (Internal Room sensor used) 1 = External Room sensor
Not used in this model	X,3	25-27	-	
RC_Setp_X.NRTDi2	X,3	28	N/A	Not used (Signal connected on DI2: 1 = Open window 2 = Condensation alarm)
RC_Setp_X.NRTDi3	X,3	29	N/A	Not used
RC_Setp_X.NRTUi1	X,3	30	0	Signal connected on UI1: 0 = Not used 1 = Change-over sensor, digital 2 = Change-over sensor, analogue
Not used in this model	X,3	31 - 41	-	
RC_Setp_X.NRTUo1	X,3	42	1	Signal connected on UO1: 0 = Not used 1 = Thermo valve, heating 2 = Thermo valve, cooling
RC_Setp_X.NRTUo2	X,3	43	2	Signal connected on UO2
RC_Setp_X.NRTModbusSlaveAddr	X,3	44	Factory set	Address Modbus slave
RC_Setp_X.NRTModbusParity	X,3	45	2	Modbus parity bit: 0 = No parity 1 = Odd parity 2 = Even parity
RC_Setp_X.NRTModbusCharTimeout	X,3	46	3	Modbus timeout for characters (t1.5), in ms. Should be 1.5 times a character, ie. at least 2 ms.

Name of signal	Type	Modbus address	Default setting	Description
RC_Setp_X.NRTModbusAnswerDelay	X,3	47	5	Response lag Modbus (t3.5), in ms. Should be 3.5 times a character, ie. at least 5 ms.
RC_Setp_X.NRTDispBacklightLO	X,3	48	10	Display backlight low (0...100)
RC_Setp_X.NRTDispBacklightHi	X,3	49	30	Display backlight high (0...100)
RC_Setp_X.NRTDispContrast	X,3	50	15	Contrast (0…15)
RC_Setp_X.NRTDisplayViewMode	X,3	51	2	Viewing options for the display: 0 = Room temperature and setpoint when adjusting 1 = Room temperature and setpoint when adjusting 2 = Setpoint 3 = Setpoint adjustment
Not used in this model	X,3	52-55	-	
Not used in this model	I,3	56	-	
RC_Setp_I.NRTPresenceOffTime	I,3	57	0 min	Switch-off delay when changing to no presence (min)
RC_Setp_I.NRTPresenceOnTime	I,3	58	0 min	Switch-on delay when changing to presence (min)
RC_Setp_I.NRTCVHeatPeriodTime	I,3	59	60 sec	Period time for pulse prop. control valve, heating (sec)
RC_Setp_I.NRTCVCoolPeriodTime	I,3	60	60 sec	Period time for pulse prop. control valve, cooling (sec)
RC_Setp_I.NRTCVHeatRunTime	I,3	61	120 sec	Run time closed valve to open, heating (sec)
RC_Setp_I.NRTCVCoolRunTime	I,3	62	120 sec	Run time closed valve to open, cooling (sec)
Not used in this model	X,3	63-67	-	
Not used in this model	R,3	68-69	-	
RC_Setp_R.NRTStandbySetPDeadBand	R,3	70	8°C	Deadband for Economy mode
RC_Setp_R.NRTUnOccSetPHeat	R,3	71	15°C	Heating setpoint when in Unoccupied mode
RC_Setp_R.NRTUnOccSetPCool	R,3	72	30°C	Cooling setpoint when in Unoccupied mode
RC_Setp_R.NRTFrostSetP	R,3	73	N/A	Not used
RC_Setp_R.NRTSetpointOffsetPos	R,3	74	13°C	Max. upward setpoint offset
RC_Setp_R.NRTSetpointOffsetNeg	R,3	75	17°C	Max. downward setpoint offset
Not used in this model	R,3	76	-	
RC_Setp_R.NRTPIDPGain	R,3	77	10°C	Room controller P-band
RC_Setp_R.NRTPIDITime	R,3	78	300 sec	Room controller I time
RC_Setp_R.NRTCVDeadband	R,3	79	N/A	Not used (Control valve dead band)

Name of signal	Type	Modbus address	Default setting	Description
RC_Setp_R.NRTAIChangeOverLimitLow	R,3	80	18°C	Controller switches over to control of cooling if change-over temperature is lower
RC_Setp_R.NRTAIChangeOverLimitHigh	R,3	81	28°C	Controller switches over to control of heating if change-over temperature is higher
RC_Setp_R.NRTAi1Comp	R,3	82	0°C	Compensation for analogue input 1
RC_Setp_R. NRTUi1Comp	R,3	83	0°C	Compensation for universal input 1
RC_Setp_R.NRTInternalTempComp	R,3	84	0°C	Compensation for internal room sensor
RC_Setp_R.NRTTempFilterFactor	R,3	85	0.2°C	Filter factor for temperature on analogue input 0 = No filter 1 = Max filter
Not used in this model	R,3	86-89	-	
RC_Setp_R.NRTThermostatHyst	R,3	90	10	Room hysteresis
RC_Setp_R.NRTComfortSetPDeadBand	R,3	91	2	Deadband for Comfort mode.
RC_Setp_R. NRTComfortSetP	R,3	92	22°C	Setpoint for Comfort mode.
Not used in this model	R,3	93	-	
RC_Setp_R.NRTHeatOutputManual	R,3	94	0 %	Manual output heating output (0…100 %)
RC_Setp_R.NRTCoolOutputManual	R,3	95	0 %	Manual output cooling output (0…100 %)
RC_Setp_R.NRTRoomTempRemote	R,3	96	-255	Used for remote control of room temperature. External Room sensor must be selected.
RC_SetpExt_R.NRTSetPoint	R,3	284	22°C	Basic setpoint

Chapter 18 **BACnet signal types**

BACnet	In order to communicate via BACnet, the protocol has to be changed either via NRT tool or via the parameter list in the display. Once the protocol has been set to BACnet, it can only be switched back to Modbus via the display.
MS/TP mode	Both MS/TP master and slave are supported. The mode is controlled by setting the MAC address. If <127, master mode is selected. A MAC address of >127 enables slave.
Object type	The BACnet types of the signals (types in the list below): • Analogue inputs • Analogue values • Binary inputs • Binary values • Loop • Multistate inputs • Multistate values • Device
Out_of_service	The property out_of_service is not writable for all Object Types.
Commandable	The value objects are not commandable (i.e. does not use a priority array).
EDE files	EDE files for BACnet are included in the NRT tool installation.

Chapter 19 **BACnet signals**

Analogue inputs

Object name	Object ID	Description	Unit	Writeable
RC_Actual_R.NRTRoomTemp	Analog input, 0	Room temperature	°C	No
RC_Actual_R.NRTAIChangeOver	Analog input, 1	Change-over temperature	°C	No
RC_Actual_R.NRTAnaIn1	Analog input, 2	Value on analogue input 1	°C	No
RC_Actual_R.NRTUAnaIn1	Analog input, 3	Value on universal analogue input 1	V	No
Not used in this model	Analog input, 4			No

Analogue values

Object name	Object ID	Description	Unit	Writeable
RC_Actual_R.NRTUAnaOut1	Analog value, 0	Value on universal analogue output 1	V	No
RC_Actual_R.NRTUAnaOut2	Analog value, 1	Value on universal analogue output 2	V	No
RC_Actual_R.NRTSetPAdjustment	Analog value, 2	Setpoint adjustment from internal unit	°C	No
RC_Actual_R.NRTPIDSetP	Analog value, 3	Controller setpoint	°C	No
RC_Actual_R.NRTPIDOutput	Analog value, 4	Controller output	%	No
RC_Actual_R.NRTHeatOutput	Analog value, 5	Heating control	%	No
RC_Actual_R.NRTCoolOutput	Analog value, 6	Cooling control	%	No
Not used in this model	Analog value, 7-8			Yes
RC_Setp_R.NRTUnOccSetPHeat	Analog value, 9	The room heating setpoint when in unoccupied mode	°C	Yes
RC_Setp_R.NRTUnOccSetPCool	Analog value, 10	The room cooling setpoint when in unoccupied mode	°C	Yes
Not used in this model	Analog value, 11-12			Yes
RC_Setp_R.NRTHeatOutputManual	Analog value, 13	Manual value heating output	%	Yes
RC_Setp_R.NRTCoolOutputManual	Analog value, 14	Manual value cooling output	%	Yes
RC_Setp_R.NRTRoomTempRemote	Analog value,15	Remote control of room temperature.	°C	Yes

Object name	Object ID	Description	Unit	Writeable
RC_Setp_R.NRTStandbySetPDeadBand	Analog value,16	Deadband for Standby mode	°C	Yes
Not used in this model	Analog value,17-28			Yes
RC_Setp_R.NRTAIChangeOverLimitLow	Analog value,29	Cooling if lower change-over temperature	°C	Yes
RC_Setp_R.NRTAIChangeOverLimitHigh	Analog value,30	Heating if higher change-over temperature	°C	Yes
RC_Setp_R.NRTThermostatHyst	Analog value,31	Room temperature hysteresis	°C	Yes
RC_Setp_R.NRTComfortSetPDeadband	Analog value,32	Deadband for comfort mode.	°C	Yes
RC_Setp_R.NRTComfortSetP	Analog value,33	Setpoint for comfort mode	°C	Yes

Binary inputs

Object name	Object ID	Description	Values	Writeable
RC_Actual_L.NRTDIOpenWindow	Binary input, 0	Indicates open window	ACTIVE/ INACTIVE	No
Not used in this model	Binary input, 1	Indicates condensation alarm from digital input	YES/NO	No
RC_Actual_L.NRTDIPresences	Binary input, 2	Indicates presence from digital input	ACTIVE/ INACTIVE	No
RC_Actual_L.NRTDIChangeOver	Binary input, 3	Indicates change-over from digital input	ACTIVE/ INACTIVE	No
Not used in this model	Binary input, 4-6			No

All binary inputs have normal polarity

Binary values

Object name	Object ID	Description	Values	Writeable
Not used in this model	Binary value, 0			No
RC_Actual_L.NRTCVHeatPulsProp	Binary value, 1	Indicates pulse prop. heating	ACTIVE/ INACTIVE	No
RC_Actual_L.NRTCVCoolPulsProp	Binary value, 2	Indicates pulse prop. cooling	ACTIVE/ INACTIVE	No
RC_Actual_L.NRTCVHeatInc	Binary value, 3	Indicates heating increase	ACTIVE/ INACTIVE	No
RC_Actual_L.NRTCVHeatDec	Binary value, 4	Indicates heating decrease	ACTIVE/ INACTIVE	No
Not used in this model	Binary value, 5-6			No
RC_Actual_L.NRTChangeOverState	Binary value, 7	Indicates change-over status from both digital and analogue input	ACTIVE/ INACTIVE	No

Object name	Object ID	Description	Values	Writeable
Not used in this model	Binary value, 8			No
RC_Actual_L.NRTBypass	Binary value, 9	Forces the unit into Bypass mode. Reverts automatically after Bypass time has elapsed (FS=120 min)	ACTIVE/ INACTIVE	Yes
RC_Actual_L.NRTShutDown	Binary Value, 10	Forces the unit into Shutdown mode	ACTIVE/ INACTIVE	Yes

All binary values have normal polarity

Loop

Object name	Object ID	Description
Controller	Loop, 0	The NRT controller

Multistate inputs

Object name	Object ID	Description	Values	Writeable
Not used in this model	Multistate input, 0			No
RC_Actual_X.NRTUnitState	Multistate input, 1	Current running mode	1=Off 2=Unoccupied 3=Stand-by 4=Occupied 5=Bypass	No
RC_Actual_X.NRTControllerState	Multistate input, 2	Current control mode	1=Off 2=Heating 3=Cooling	No
RC_Actual_X.NRTFanSpeed	Multistate input, 3	Current fan speed	1=Off 2=Fan speed 1 3=Fan speed 2 4=Fan speed 3	No

Multistate values

Object name	Object ID	Description	Values	Writeable
RC_Setp_X.NRTHeatOutputSelect	Multistate value, 0	Manual/Auto heat output	1=Off 2=Manual output 3=Automatic output	Yes
RC_Setp_X.NRTCoolOutputSelect	Multistate value, 1	Manual/Auto cool output	1=Off 2=Manual output 3=Automatic output	Yes
RC_Setp_X.NRTFanSelect	Multistate value, 2	Fan mode select	1=Off 2=Manual speed 1 3=Manual speed 2 4=Manual speed 3 5=Auto 6=Auto 2 7=Auto 1	Yes
Not used in this model	Multistate value, 3	Manual/Auto forced ventilation	1=Off 2=Manual on 3=Auto	Yes
RC_Setp_X.NRTChangeOverSelect	Multistate value, 4	Manual/Auto change-over	1=Heating 2=Cooling 3=Auto	Yes
RC_Setp_X.NRTRemoteState	Multistate value, 5	Remote control unit state	1=Off 2=Economy/Standby 3=Economy/ Standby 4=Presence 6=No remote control	Yes

Device

The **Device** object contains to writeable properties; **Description** and **Location**. **Description** can be 17 characters in length and **Location** can be 33 characters, as long as single byte character encoding is used.

Part V Index

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