

TRA 410, 421: Electronic room thermostat for heating and heating/cooling with display

How energy efficiency is improved

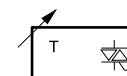
Individual, optimised energy use through precise adherence to setpoints

Features

- Electronic room thermostat for 24 V or 230 V for heating or heating/cooling with display
- Clear LCD with backlight on TRA 421
- Silent-switching Triac output (24 V types)
- Easy to wire up
- NTC sensor
- Time programme and pilot clock output integrated in TRA 421
- Optimised time programme for comfort control and energy saving
- Input for lowering the room temperature
- Input for heating/cooling changeover
- Input for external temperature sensor
- Cooling lock function on versions for heating/cooling
- Integrated "NC" and "NO" changeover
- Modern design with ergonomic setpoint adjuster
- Restriction of temperature setting range
- Automatic frost protection facility at 5 °C and valve protection facility



TRA4**F21*



Technical data

Power supply		
Power supply		See type list
Power consumption		< 0.3 W in idle state
Fuse		In housing: 230 V= T1AH 24 V= T1A
Parameters		
Number of actuators		AXT 211/201: 230 V, max. 5 pcs. parallel 24 V, max. 4 pcs. parallel
Setting range		5...30 °C
Switching difference		±0.2 K
Set-back		2 K or adjustable
Measuring element		NTC 22k
Ambient conditions		
Ambient temperature		0...50 °C
Ambient humidity		5...80% rh, no condensation
Construction		
Housing		Cover: White (RAL 9016) Lower section: Signal white (RAL 9003)
Housing material		Thermoplastic PC + ABS
Fitting		Wall, recessed junction box
Inputs/outputs		
Switching element		230 V, relay 24 V, Triac
Switch rating		230 V, 1 A 24 V, 1 A
ECO input		230 V, voltage detection 230 V 24 V, voltage detection 24 V
Heating/cooling		Input: 230 V, voltage detection 230 V 24 V, voltage detection 24 V

Pilot timer	Output: 230 V, 100 mA 24 V, 100 mA
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Connection terminals / cable

Connection terminals	Screw terminals 0.22 mm ² to 1.5 mm ²
Power cable	Solid: NYM-J/NYM-O (max. 5 × 1.5 mm ²) Flexible: H03V2V2H2-F / H05V2V2H2-F

Standards, directives

Type of protection	IP20 (EN 60529)
Protection class 24 V	III (EN 60730)
Protection class 230 V	II (EN 60730)

CE conformity according to

EMC Directive 2004/108/EC	EN 61000-6-1, EN 61000-6-3
Low-voltage directive 2006/95/EC	EN 60730-1, EN 60730-2-9

Overview of types

Type	Description	Power supply	Weight
TRA410F210	Heating, lowering, frost protection function	230 V~, ±10%, 50 Hz	130 g
TRA410F212	Heating, lowering, frost protection function	24 V~, ±20%, 50 Hz	130 g
TRA421F210	Heating/cooling, lowering, frost protection and valve protection function, cooling lock	230 V~, ±10%, 50 Hz	140 g
TRA421F212	Heating/cooling, lowering, frost protection and valve protection function, cooling lock	24 V~, ±10%, 50 Hz	140 g

Accessories

Type	Description
AXT2**	Thermal valve actuators (see product data sheet)
EGT554F103	Cable temperature sensor NTC 22k, -35...100 °C, IP67, length 3 m

Description of operation

For intelligent unitary control (2-point) in residential and business spaces.

With relay output at 230 V: Up to 5 thermal actuators.

With Triac outputs at 24 V: Up to 4 thermal actuators.

The room temperature is measured by a temperature sensor and compared with the current setpoint. Depending on the control offset, the heating or cooling in the room is increased or reduced. If there is a heat or cooling requirement, the thermal actuator is activated. Room temperature adjustments, control and operation are performed using the rotary knob/button. All the required symbols as well as the thermal actuator output are indicated in the large display. The symbol for heating or cooling flashes slowly if the output is active.

Intended use

This product is only suitable for the purpose intended by the manufacturer, as described in the "Description of operation" section.

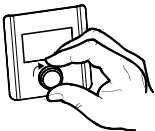
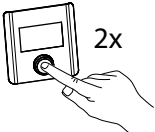
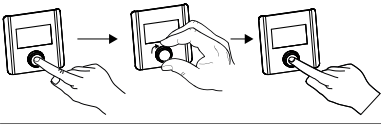
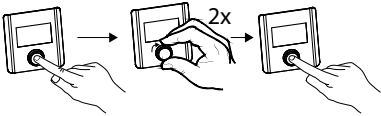
All related product regulations must also be adhered to. Changing or converting the product is not admissible.

Table with function summary

Function	TRA 410	TRA 421
Heating	x	x
Heating/cooling		x
Permanent set-back – ECO mode	x	
Adjustable set-back – ECO mode		x
Normal operating modes – reduced – OFF	x	x
Time programme integrated and adjustable		x

Function	TRA 410	TRA 421
Optimised time programme		x
Set-back input	x	
Change-over input		x
Pilot clock output (set-back– switch-off)		x
Selection of heating system: Floor – radiator – convector		x
Setpoint temperature restriction	x	x
10-hour backup power supply		x
Selection of NC or NO		x
Valve protection facility	x	x
Frost protection facility	x	x
LCD with backlight		x
Connection for floor sensor		x

The following table shows basic operation of the setting knob.







	Adjust setpoint
	Change operating mode
	Set functions and values
	Parameters for technicians

TRA 410 description of operation

The TRA 410 room thermostat, which is suitable for heating, features proportional-integral control. The setpoint temperature can be adjusted by turning the button. This value is either accepted automatically after 5 seconds or by pressing the button. The operating modes or settings can be displayed using two menu structures and then adjusted using the rotary knob/push button.

⚙️ Operating modes

The operating mode can be set by pressing the knob twice. The following options can be selected by turning the rotary knob to the left or right:

- Normal operation 
- ECO mode 
- ECO-In/Auto 
- Locking 
- Switch-off 
- Back 

**Note**

The operating mode currently set is not visible. If, for example, normal operation is active, only ECO mode and the operating mode ECO-In/Auto is shown.

“Normal” or “ECO” operating modes

If ECO operating mode is selected, ECO can be operated either using the pre-set and reduced temperature of 2 °C or via the external input with a timer.

The room thermostat detects a voltage supplied by the electrical distributor, external timer or pilot signal from the TRA 421. If the input is active, the room thermostat automatically switches to ECO mode. As soon as the ECO signal is inactive, it switches to normal operation.

Locking the operating knob

The “turn and push” operating knob can be locked. Press the button for 5 seconds to unlock.

Switching off the thermostat

The room thermostat can be switched off. Temperature control is deactivated and the output is dormant. The valve protection and frost protection facility remain active at 5 °C, however.

Valve protection facility

The valve protection facility is activated at 14-day intervals for 10 minutes if no temperature regulation has taken place (output open). The actuator is activated and opens the valve.

Frost protection facility

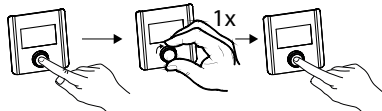
The integrated frost protection facility is permanently set to 5 °C. This function prevents pipes from freezing when regulation is inactive.

Back

Returns to the basic level or one level back.

⚙ Settings

The settings can be selected as follows:



The following options are available:

Min. limitation

MIN

Max. limitation

MAX

Actual value correction

REAL °C

Back

BACK

Setpoint limitation

A minimum and maximum setpoint limit can be set.

Actual value correction

The effect of the wall temperature can be corrected by ± 2 °C. The corrected temperature is the temperature indicated in the display.

Back

Returns to the basic level or one level back.







TRA 421 description of operation

The TRA 421 room thermostat is suitable for heating and cooling and offers different pre-set PI controls. Quasi 2-point control can be parametrised for systems with fast response times, such as fan coil units. The setpoint temperature can be adjusted by turning the button. This value is either accepted automatically after 5 seconds or by pressing the button. The operating modes or settings can be displayed using three menu structures and then adjusted using the rotary knob/push button.

⚙️ Operating modes

The operating mode can be set by pressing the knob twice.

The following options can be selected by turning the rotary knob to the left or right:

Normal operation	
ECO mode	
ECO-In/Auto	
Unoccupied	
Locking	
Switch-off	
Back	BACK



Note

The operating mode currently set is not visible. If, for example, normal operation is active, only ECO mode and the operating mode ECO-In/Auto is shown.

“Normal” or “ECO” operating modes

If ECO operating mode is selected, ECO can be operated either using the adjustable reduced temperatures or via the internal time programme. The preset temperature for normal operation (21 °C) or reduced operation (19 °C) is automatically accepted by manual change-over of the operating mode or when switching using the time programme. These values can be defined in the “Settings” menu. The pilot clock output is active in accordance with the time programme independent of the operating mode when parameter Par-230 = 0. When parameter Par-230 = 1, the pilot clock output is not active in accordance with the time programme. The time programme can be used for the local set-back. If the operating mode “ECO” is selected, the pilot clock output is active.

Entering unoccupied periods

The number of days the building will be unoccupied can be defined by turning. You can set a maximum of 99 days. The room thermostat switches to the set reduced temperature of 16 °C. The reduced temperature can be changed or it automatically switches back to the preset temperature once the set number of days has elapsed. The function can be deactivated by setting the number of days to 0. See Settings for information on presetting the value.

Locking the operating knob and the public authority version

The “turn and push” operating knob can be locked. Press the button for 5 seconds to unlock. On the public authority version, the lock can be secured with an access code. For more information, see the parameter Par-030.

Switching off the thermostat

The room thermostat can be switched off. Temperature control is deactivated and the output is dormant. The valve protection and frost protection facility remain active at 5 °C, however. When parameter P-230 = 1 is activated, the pilot clock output can be used to switch-off via a separate relay in the system.

Valve protection facility

The valve protection facility is activated at 14-day intervals for 10 minutes if no temperature regulation has taken place (output open). The actuator is activated and opens the valve. The valve protection facility is also active for the Normally open direction of operation.

Frost protection facility

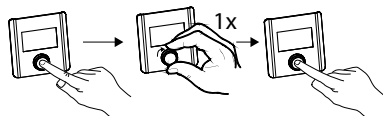
The integrated frost protection facility controls in accordance with the set frost protection value and prevents pipes from freezing during periods with no regulation.

Back


Returns to the basic level or one level back.

⚙ Settings


The settings can be selected as follows:




The following options are available:

Specifications for heating °C 


Normal operation

Specifications for heating °C 

ECO

Specifications for cooling °C 

Normal operation

Specifications for cooling °C 

ECO

Unoccupied

Specifications °C 

Min./max. Limiting

MIN
MAX

Time/day

Lo

Time programme

Pro

Actual value correction

CAL °C

Lighting

LEd

Factory setting

USER

Back

BACK

Temperature specifications in normal operation – Heating

The factory temperature setting is 21 °C. The advantage of this function is that the value is applied again when the operating mode is changed or when a switch is made using the switching programme.

Temperature specifications in ECO mode – Heating

The factory temperature setting is 19 °C. The advantage of this function is that the value is applied again when the operating mode is changed or when a switch is made using the switching programme.

Temperature specifications in normal operation – Cooling

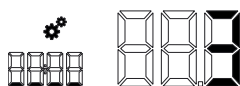
The factory temperature setting is 21 °C. The advantage of this function is that the value is applied again when the operating mode is changed or when a switch is made using the switching programme.

Temperature specifications in ECO mode – Cooling

The factory temperature setting is 23 °C. The advantage of this function is that the value is applied again when the operating mode is changed or when a switch is made using the switching programme.

Temperature specifications for the floor sensor

If a floor sensor is connected and activated in parameter 040, the following symbol is displayed next:



The factory setting is 3, which corresponds to approx. 22 °C. It is possible to change this:

°C	18	19	20	21	22	23	24	25	26	27	28
	1	2	3	4	5	6					

When serving as a floor sensor, a comfortable floor temperature is controlled. As soon as this comfort temperature has been reached, the internal sensor continues to control the room.

Temperature specifications in unoccupied mode

The temperature for this mode can be adjusted between 5 °C and 20 °C. The factory setting is 16 °C.

Setpoint limitation

A minimum and maximum setpoint limit can be set.

Time and weekday

The time and weekday must be entered for the time programme. When restarting or once the 10-hour backup power supply has run out, this setting must be renewed.

Time programme

An individual temperature profile for each day provides the ideal comfort level with the minimum energy consumption. 4 time programmes for every day are available in the room thermostat. The settings can be made individually in blocks for the whole week (Monday to Sunday), for work days and weekends or every day. Two time programmes are preset for the week: Normal operation from 6 am to 10 am and from 3 pm to 10 pm. A set-back mode is activated for the hours in between. Additional time programmes can be programmed for temperature requirements that differ from these. The room thermostat includes a pilot clock output which is always active in accordance with the time programme and independently of the operating mode. This output can be used to switch further room thermostats to set-back mode, such as by using an FXV 3*** control distributor, for example.

Actual value correction

The effect of the wall temperature can be corrected by ± 2 °C. The corrected temperature is the temperature indicated in the display.

Setting the backlight

The backlight of the display can be set or switched off.

Resetting to factory settings

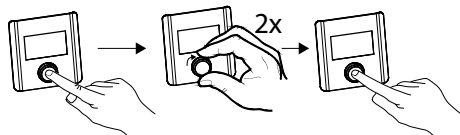
All settings and changed access codes can be reset to factory settings. The button must be pressed for 5 seconds in order to confirm the reset. The room thermostat is restarted after the reset. The time and weekdays have to be re-entered.

Back

Returns to the basic level or one level back.

Parameters

To set the parameters, please proceed as follows:



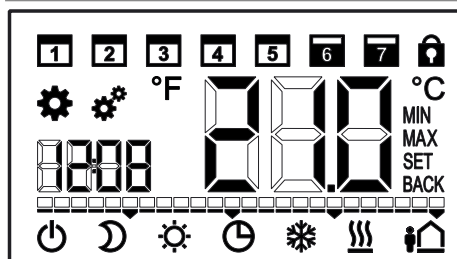
The corresponding settings are shown in the manual.



Parameters	Description
Par-010	Preset PWM control algorithm for the following applications: Standard underfloor heating Low-energy underfloor heating Radiator Passive convector (slow warm-up time) Fan coil units – PI quasi 2-point control
Par-020	Activating/deactivating cooling lock The cooling lock prevents the controlled room from cooling down. When the cooling lock is activated and the operating mode is set to cooling, the heating mode is also inactive.
Par-030	Locking operation with a code or public authority version. Locking must also be activated in the operating mode menu. These settings cannot be changed. The locking code is requested when the button is pressed for 5 seconds.
Par-031	Codes for locking operation can be adjusted to between 0000 and 9999.
Par-040	Activating an external sensor Instead of an internal sensor, an external sensor can also be connected. When using as an external room sensor, the internal sensor of the room thermostat is deactivated. Setting the setpoint temperature of the external sensor in the "Settings" menu.
Par-041	Setting for correcting the floor temperature Any different measurement of the actual floor temperature can be corrected. Setting range -2 °C to +2 °C
Par-050	Adjusting the time period for which the display is illuminated. Determines the time period for which the display is illuminated after operation. The setting range is from 0 to 30 seconds in 5-second steps.
Par-090	Displaying the output signal status on the thermal actuator. When the output for thermal actuators is active, the heating or cooling symbol flashes slowly. If this output is inactive, the symbol is displayed continuously.
Par-110	Setting the direction of operation of the room controller (NC – normally closed, or NO – normally open). Factory setting: NC, normally closed. The direction of operation of the room controller and, in turn, the output for thermal actuators is reversed. Thermal actuators (NO) must be used to do so. When using this function together with the FXV 3210 control distributor, the direction of operation must also be set to NO on the control distributor.
Par-161	Setting the frost-protection temperature. Automatically activates the frost-protection facility when the temperature goes below the set temperature of 5 °C. The limit value can be set to between 5 °C and 10 °C.
Par-170	Activate the "optimised time programme". If the "optimised time programme" function is activated (factory setting), the setpoint is reached at the defined time. In order to reach the setpoint, heating or cooling mode is initiated in good time ahead of the defined time. In order to save energy, the time needed to reach the temperature for reduced operation in good time is calculated.
Par-190	Setting the cycle time for the valve protection facility The cycle time for the valve protection function can be set. This function prevents the plug from sticking inside the valve. If the function is set to 0 days, the function is deactivated. The factory setting is every 14 days independently of the condition of the output during this period.
Par-191	Defining the actuation duration while the valve protection facility is active. The actuation time can be optimised depending on the running time of the thermal actuator. The factory setting is 5 minutes.
Par-230	Specification of the pilot clock output The pilot clock output can be used either to forward the time programme or to generally set-back or switch-off the system.
Par-420	Service code 1234 is used to adjust the service menu. In order to avoid unwanted access to the service parameters, we recommend that the service code be changed by the installer and documented in a safe location. The service code can be reset. See Settings for "Resetting to factory settings".

Display

An LCD is used, dimensions 58 x 34 mm



Weekday



Unlocking



Operating mode



Setting/parameter



Fahrenheit



Actual value and setpoint



Time



Celsius



Minimum setpoint limit



Maximum setpoint limit



Confirm



Level back



Switching times



Switch-off



ECO reduction



Normal operation



Time programme



Cooling



Heating



Unoccupied



Additional information

Backup power supply

Once the backup power supply has run out (approx. 10 hours), the settings are not lost. Only the time and weekday have to be re-entered.

Switching output display

Whether the switching output is active and the thermal actuator is being controlled is indicated on the display. If the output is active, the "Heating" or "Cooling" symbol flashes slowly. The switching output display can be activated or deactivated from the "Parameters" menu.

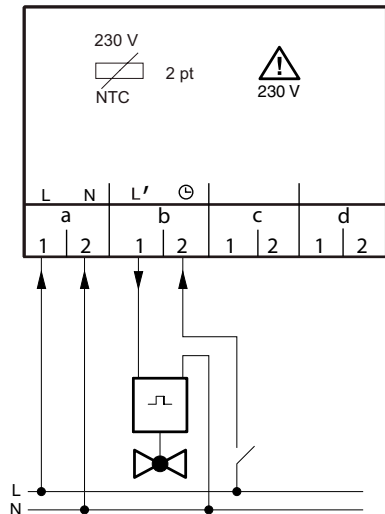
Disposal

When disposing of the product, observe the currently applicable local laws.

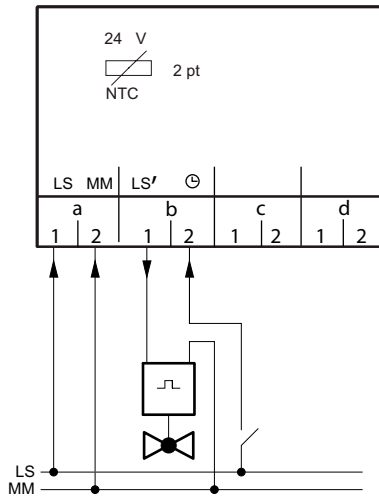
More information on materials can be found in the Declaration on materials and the environment for this product.

Connection diagram

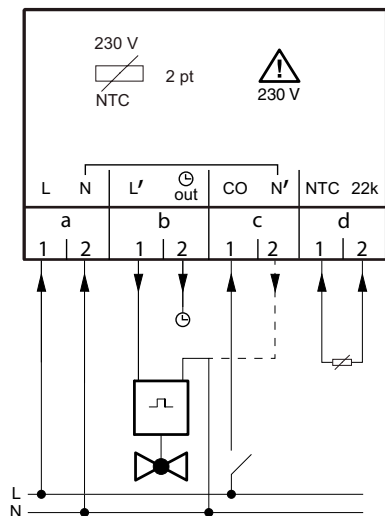
TRA410F210, 230 V



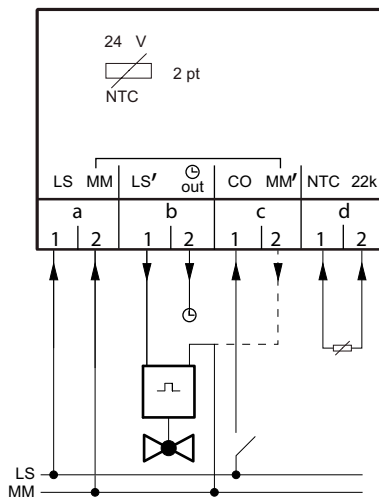
TRA410F212, 24 V



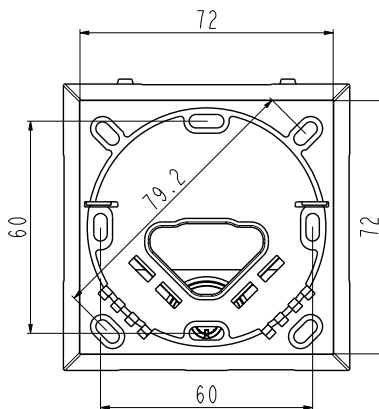
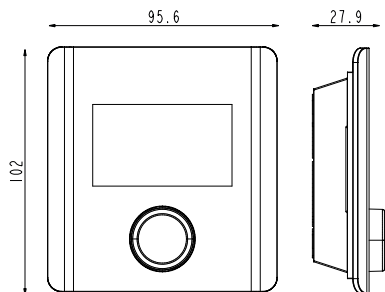
TRA421F210, 230 V



TRA421F212



Dimension drawing



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