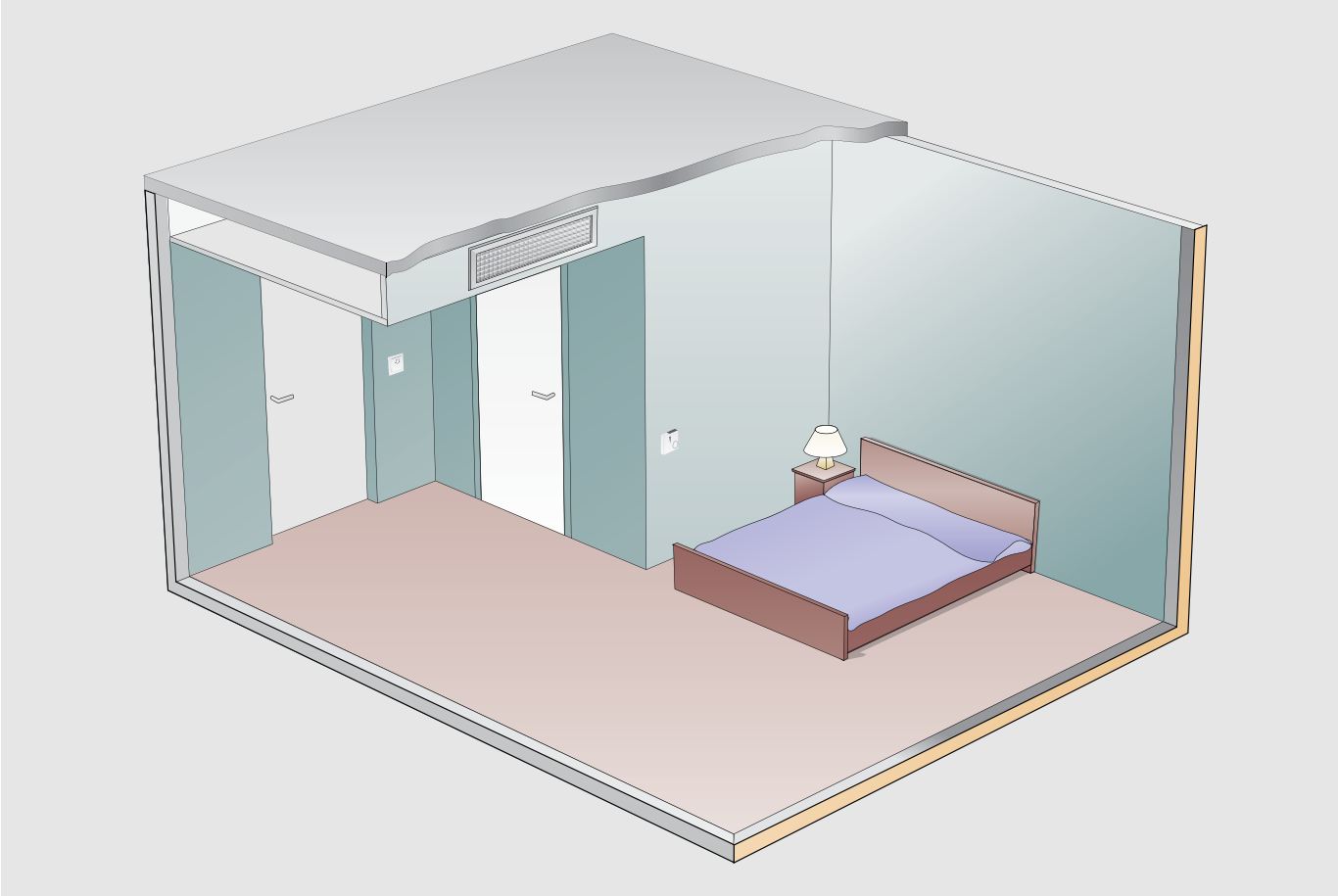
TITAN

Digital control system for controlling room temperature and air quality



General

TITAN Room control equipment

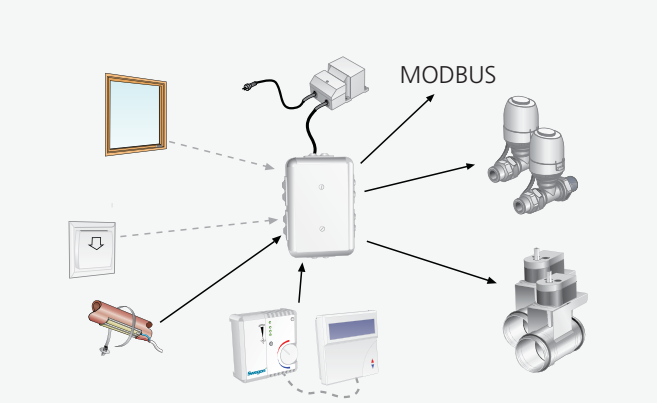
- For individual control of both room temperature and air volume.
- Specially designed for hotel rooms
- Adaptable energy-saving functions
- Up to six pairs of actuators (six for cooling + six for heating) per controller

Functions

- Automatic control of the cooling, heating and air volume
- Room climate can also be manually controlled via a function pushbutton and knob.
- Occupant presence control via key card
- Simple configuration of settings via hand-held terminal
- Inputs for condensation sensor, window contact and other normally-closed contacts
- Possible connection up to main control system via MODBUS

Application

Specially designed for controlling the indoor climate in hotel rooms.



TITAN in a nutshell

The TITAN consists of the following components: Digital controller, room thermostat, hand-held terminal, thermo-electrical actuator, valves, cables and accessories

Control function: PI

Power supply: 24 V AC

Technical Description

Features of the TITAN

The TITAN room control equipment is specially designed for controlling the indoor climate in hotel rooms. Since the room environment should be peaceful, quiet and offer the highest degree of comfort possible, uniform temperature and a healthy indoor climate are significant necessities, regardless of the outdoor temperature and season. Individual variations in room level are also significant necessities. During certain times of the year, high humidity may also involve risk of condensation.

The TITAN room control system with its unique capability for controlling both the supply air flow and the temperature, together with the Primo Hotel climate unit is the optimal solution for a healthy climate in hotel rooms.

Takes prevailing circumstances into account

- Controller input for key card reader makes it possible to adapt airflow and temperature on the basis of occupant presence in the room.
- In response to signals indicating an open window, the controller regulates the valves and damper to reduce the heating water flow and air flow respectively to a minimum.

Flexibility

- The user can easily configure the controller functions and parameters by means of the hand-held terminal.
- Up to six pairs of actuators (six for cooling + six for heating) can be wired to each controller

User friendliness

- Simple and clear room thermostat design; optically displays the airflow rate and cooling or heating load
- The actuator's "first open" function simplifies pressure testing and venting the water system
- The actuator indicates the position of the valve by means of a clearly visible cylinder body.

Safety and minimal maintenance

- Input for condensation sensor that immediately cuts off the cooling water in the event of condensate precipitation
- Regular exercizing of the valves prevents the valve spindles from becoming jammed
- Power-saving components reduce production of heat inside the controller enabling more accurate control and a longer useful life

Energy saving mode

- If there is no occupant in the room, the system automatically switches over to the energy saving mode, both in terms of lower airflow and temperature.

Operation

Control

The controller provides proportional and integral (PI) control. The I section senses both the size and the duration of the control deviation and adjusts the actuator opening time accordingly. This type of control is called pulse-width modulation (PWM). Compared with on/off control, for instance, PWM control offers more uniform room temperature which enhances room comfort.

Timed airing

When the key card is inserted into the card reader, the controller sets the air damper to the high airflow setting to air the room. After 5 min. the controller returns to the auto mode (a separate indicator is lit on the room thermostat) and an operating condition according to the status of the sensors, see Table 1. The airing period can be easily changed or deactivated by means of the hand-held terminal, or from a comprehensive control system.

Manual control

When the TITAN registers the presence of occupants in the room (key card inserted into the card reader) the user can control the airflow and temperature with the controls on the room thermostat. The standard temperature setting range is 16–28 °C, however from the hand-held terminal it can be set to a new range within the interval of 0–31.9 °C.

When the controller is set to the auto mode, the airflow is determined on the basis of the status of the sensors. See Table 1. The user can also control the airflow in three steps. The controller controls the supply air and extract air damper motors by means of three voltage levels that open the pivital dampers to different settings. If the system is set for a high rate of airflow, the controller increases the flow of fresh supply air, not just the flow of recirculated air as in many other room climate systems.

The output signals from the controller to the supply air and extract air dampers respectively are individually adjustable. To achieve balance in the room when the duct pressures in the supply air and extract air ducts are not the same, the user can easily adjust the flows via the hand-held terminal.

Automatic control

When the user withdraws the key card from the card reader and leaves the room, the controller automatically decreases the supply air to a low rate of airflow and the system returns to the auto mode. The valve actuators for the cooling and heating water circuits respectively are controlled in this position in response to the status of the other sensors in the room, but with a greater permissible differential, so-called energy saving mode. See Table 1 for possible operating conditions.

Data communication

The control unit has a built-in communication port that enables connection to an RS 485 network with modbus for supervising and over-modulation via a main system, such as a computer.

Operating conditions

The various operating conditions of the controller are shown in Table 1. The various operating conditions are based on occupant presence in the room and the status of the window contact and condensation sensor. According to each operating condition, the controller controls the airflow, cooling and heating until the user manually sets the airflow or temperature. Airing function or flow boosting function in progress (see below) are exceptions from the operating conditions specified in Table 1. Operating conditions.

Table 1. The operating conditions of the controller

Occupant presence	Window	Conden-sation	Airflow	Cooling	Heating
Yes	Closed	No	Normal	Normal	Normal
Yes	Closed	Yes	High	Off	Normal
Yes	Open	No	Low	Off	Frost protection
Yes	Open	Yes	Low	Off	Frost protection
No	Closed	No	Low	Energy saving [1)]	Energy saving [1)]
No	Closed	Yes	Low	Off[1)]	Normal [1)]
No	Open	No	Low	Off	Frost protection
No	Open	Yes	Low	Off	Frost protection

[1)] The neutral zone can be reconfigured in the current operating condition.

Flow boost in the event of rapid changes in temperature

When the difference between the actual temperature and the temperature setpoint exceed 2.5 °C the controller sets the air damper to the high airflow setting to increase heating or cooling capacity. When the difference has dropped to a level below the preset value, the air damper returns to the normal flow setting.

The temperature difference can be set to another value via the hand-held terminal. The flow boost function can also be deactivated completely.

Valve actuators and valves

When the actual room temperature is 0.5 °C above or below the preset setpoint, the actuator opens either the cooling water valve or the heating water valve.

The actuator is of NC type (Normally-closed) but is equipped with a so-called "first open" function which is described in the section "Accessories".

The valves are exercised once every 24-hour period. On these occasions, all the actuators wired to the controller are opened fully for 3 minutes, which prevents the valve spindles from becoming jammed.

Technical data

TITAN RE Controller

Designation:	TITAN RE
Storage temperature:	0–70 °C
Operating temperature:	+5–40 °C
Degree of protection	IP 44
Dimensions:	80 × 122 × 40 mm.
Power supply:	24 V AC ±10 %
Power consumption:	2 VA
Control function:	PI
P-band, heating increments:	1.5 K
P-band, cooling increments	1 K
Neutral zone, presence in room:	1 K
Neutral zone, no presence:	8 K
Neutral zone, frost protection:	24 K
Integration period	20 min.
Valve exercising:	Once/24 h period (fully open for 3 min.)
Installation:	Fastening holes in enclosure
Connections:	Terminal blocks: 0.75mm^2 long multicore cable
Data communication:	Modbus
Inputs:	
Room thermostat:	Terminal blocks: 0.75mm^2 long multicore cable
Condensation sensor:	Resistance
Key card (presence):	NO/NC (optional), default = closed if occupant is present (to be fitted with a jumper on delivery)
Window contact:	NO, default = closed if the window is closed (to be fitted with a jumper on delivery)
Outputs:	
Actuator, heating:	24 V DC, PWM (alt. on/off)
Actuator, cooling:	24 V DC, PWM (alt. on/off)
Supply air damper:	0–10 V DC (low/normal/high) [1)]
Extract air damper:	0–10 V DC (low/normal/high) [1)]

[1)] The default values for the three DC levels of the control signal are adjusted for 200 Pa duct pressure and for restricting the supply air and extract air flows to levels that conform to those specified in the Primo Hotel product datasheet.

Figure 1. TITAN RE Controller

TITAN RT Room thermostat

Designation:	TITAN RT
Storage temperature:	0–70 °C
Operating temperature:	+5-40 °C
Degree of protection:	IP 44
Dimensions:	77 × 77 × 27 mm
Power supply:	12 V DC,
Actual value, range:	0–31.9 °C
Setpoint, range:	16–28 °C (22 °C with knob in centre position)
Installation:	Against a wall or 70 mm standard electrical box, not exposed to direct sunlight
Cable glands:	Min. hole diameter: 12 mm.
In-operation LED, temp.: (multicoloured diode):	Cooling load: Blue Heating load: Red Dead band: Not lit
In-operation LED, air: (three green diodes)	Low flow: One LED lit Normal flow: 2 LEDs lit High flow: 3 LEDs lit
In-operation LED, auto mode:	Active: Lit Inactive: Not lit (green diode marked AUTO)

Inputs:

Hand-held terminal:	K4 Modular contact for hand-held unit

Outputs:

Room thermostat:	Terminal block: 0.75 mm^2 long multicore cable

Figure 2. TITAN RT Room thermostat

Accessories

TITAN CU Hand-held terminal

By connecting the hand-held terminal to the room thermostat the terminal can then be used for reconfiguring controller settings.

The following are some of the parameters that can be altered:

- Control signal level (0–10 V) to the supply air and extract air dampers
- Control signal to the actuators (on/off, PWM, 0-10 V)
- Period for discharge of supply air at high flow setting when occupant enters the room
- Dead-band adjustment under certain operating conditions
- Normally-closed or normally-open contact for the key card input
- Standard temperature setpoint
- P-band, (cooling and heating)
- Control function
- Valve exercizing on/off

For a detailed description of how to operate the hand-held terminal and the configurable parameters, see separate manual.

Figure 3. TITAN CU Hand-held terminal

LUNA TS Transformer

Designation:	LUNA TS
Enclosure:	One-piece cast, plastic enclosure
Insulation:	Double-insulated
Degree of protection:	IP 54
Primary side:	230 V AC, 50-60 Hz, connection with SE power plug
Secondary side:	24 V AC, 2.5 A secondary fuse, factory-fitted connector on the 2 connection cables (1 m). Clip off to suitable length, peel off the insulation from the cables and connect them to appropriate screw terminal blocks on the controller.
Installation:	Fastening holes on enclosure

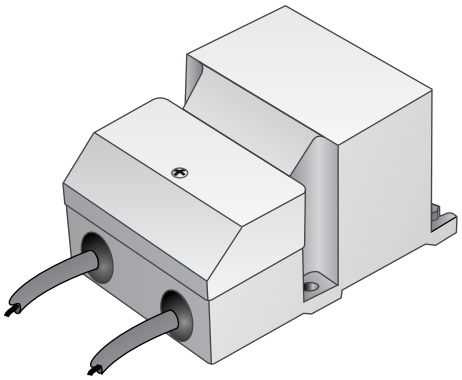


Figure 4. LUNA TS Transformer

The product is CE marked and meets EU provisions applicable to EMC and LVD.

LUNA T-CG Condensation sensor

Designation:	LUNA T-CG-2
Sensor element:	Copper element
Dimensions:	30 × 15 × 0.4 mm (sensor)
Fastening:	Self-adhesive tape + bundling strap.
Recommended position:	On cooling water supply flow pipe, as close as possible to the product's coil. **Important!** The sensor must not be covered by condensation insulation, if fitted.
Cable:	2 × 0.25 mm^2, length: 1.5 m

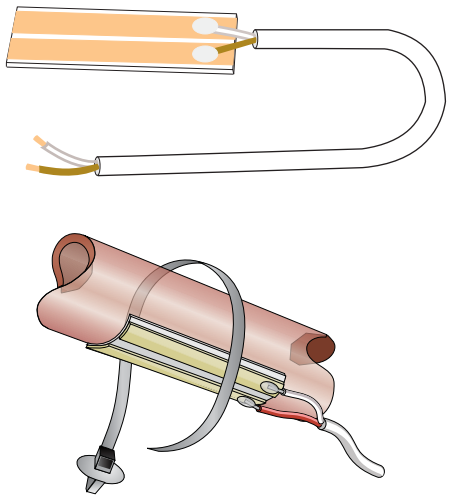


Figure 5. LUNA T-CG Condensation sensor

LUNA AT Valve actuator

Designation:	LUNA AT-2
Marking:	Swegon logotype on enclosure
Enclosure:	Polyamide, grey plastic
Temperature, storage:	–25 – +60 °C
Temperature, operation:	0-60 °C (room air) 10-100 °C (water)
Degree of protection:	IP 54
Weight :	100 g.
Power supply:	24 V AC/DC ±10 %, 0–60 Hz
Function:	NC, two-point thermoelectrical
Cable:	2-wire, 0.75 mm^2, L = 1.0 m
Power consumption, start:	6 VA for a maximum of 2 min.
Power consumption, operation:	1.8 VA
Opening/closing period:	approx 3 min.
Actuating force:	100 N +5 %
Stroke:	4 mm
Connection:	As standard, the T-VA-80 adapter is included, fits an M30 × 1.5 mm threaded socket.
Mounting:	Horizontal or vertical

The product is CE marked and meets EU provisions applicable to EMC.

"First open" function
On delivery, the actuator is equipped with a "first open" function that simplifies pressure testing and venting the water system The function signifies that the actuator is open on installation (however not completely open; the water flows should therefore be adjusted with the actuator dismantled). After it has been energized for approx. 6 minutes, the function will be automatically deactivated. A clicking noise will be heard after which the actuator will change over to the NC mode and the normal control function will begin.

Position indication
The cylinder-shaped position indicator of the valve actuator clearly shows the present position of the valve. See Figure 6. When the indicator is in the lowered position and flush with the enclosure surface, the actuator is then in the closed position. When the indicator is in the raised position above the enclosure, the actuator is in the open position.

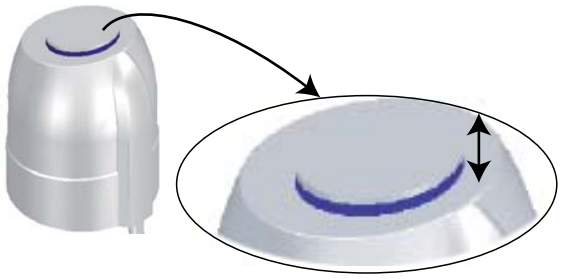


Figure 6. LUNA AT Valve actuator with position indicator

SYST VD Valve

The SYST VD is a straight valve that fits the LUNA AT actuator together with the LUNA T-VA-80 adaptor.

Dimensions: See Figure 7 and Table 2

k_v values: Default 1.90, see Table 3

Max. permissible operating pressure: 1000 kPa

Max. permissible pressure drop:
Across open valve: 20 kPa
Across closed valve: 150 kPa

Max. supply flow temperature: 110 °C

Max. permissible concentration of glycol in the water: 40 %

Adapters for alternative makes of valve

As standard, the LUNA T-VA-80 adapter is supplied with every LUNA AT actuator. The adapter fits type SYST VD CLC valves and also other makes of valve.

Designation: See also section "Ordering key".

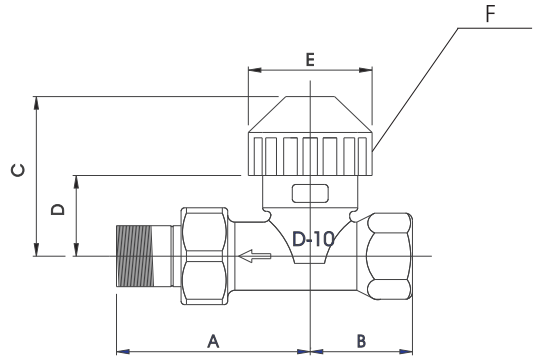


Figure 7. SYST VD Valve

Table 2. SYST VD Valve dimensions

Type	DN	Dimensions (mm):					
		A	B	C	D	E	F
VD115	1/2"	61	33	46.5	24.5	35	M30 × 1.5

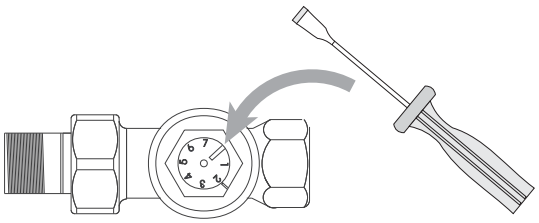


Figure 8. To adjust k_v value

Table 3. To adjust the k_v value for the SYST VD valve

Type	Adjustment setting (default setting 0)							
	1	2	3	4	5	6	7	0
VD115	0.25	0.65	0.88	1.12	1.30	1.46	1.57	1.90

Installation

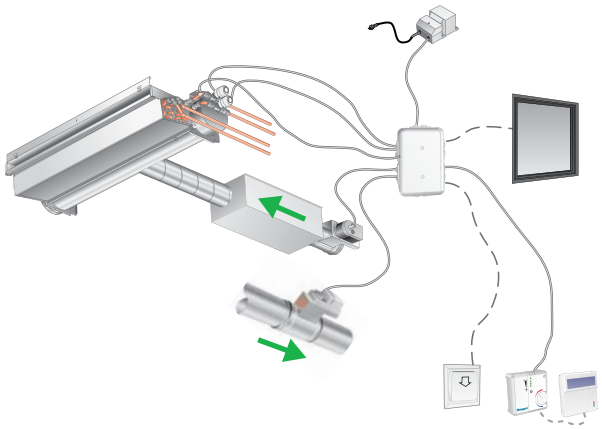


Figure 9. Overview, installation

Where to install the controller
Mount the controller above the suspended ceiling, max. 1.0 metre from the valve actuators and max. 1.2 metres from the supply air and extract air dampers. If the controller cannot be situated as described above, it will be necessary to splice one of the damper motors' (and possibly the actuators') cables with required insulation.

Table 4 and Figure 10 show how to connect the TITAN's various accessories and external contacts to the controller.

To connect the room thermostat
Connect the TITAN RT room thermostat by means of a cable from the controller. Figure 10 and Table 5 show how to connect the room thermostat.

To connect the valve actuator
Use the actuators' factory-fitted 2-conductor cable (L = 1.0 m) for wiring the cooling water and heating water actuators to the screw terminal blocks of the controller, terminals no. 1 and 2 (cooling) and 3 and 4 (heating) respectively.

To connect the damper motor
Use the damper motors' factory-fitted 5-conductor cable (L = 1.2 m) for wiring the motors of the supply air and extract air dampers to the screw terminal blocks of the controller, terminal nos. 5, 6 and 9 (supply air) and 5, 6 and 10 (extract air) respectively. Use only the red, brown and blue wires of the cable from the damper motors; clip off the other two wires and insulate them.

To connect the condensation sensor
Use the factory-fitted 2-conductor cable (L = 1.5 m) for wiring the LUNA T-CG condensation sensor to the screw terminal blocks of the controller, terminal nos. 8 and 12.

To connect the external window switch and key card switch
Connect a normally closed (or normally open) window switch by means of external cabling to the screw terminal blocks of the controller, terminal nos. 8 and 11.

Connect a normally closed switch from the key card holder by means of external cabling to the screw terminal blocks of the controller, terminal nos. 6 and 7 (fitted with a jumper on delivery).

To connect the transformer
Use the cables from the secondary side (L = 1 m) for wiring the LUNA TS transformer to the screw terminal blocks of the controller, terminal nos. 5 and 6.

Table 4. Connection to the screw terminal blocks of the controller

Terminal	Id	Function	Wire colour
1	Y1	Function signal, cooling actuator	Blue
2	G	System phase (cooling actuator)	Brown
3	G	System phase (heating actuator)	Brown
4	Y2	Function signal, heating actuator	Blue
5	G	System phase (transformer)	Black/ white
		System phase (supply air damper)	Brown
		System phase (extract air damper)	Brown
		System phase (window contact)	1)
6	G0	System zero (transformer)	Black
		System zero (supply air damper)	Blue
		System zero (extract air damper)	Blue
7	I1	Mode signal key	1)
8	G0	System zero, window	1)
		System zero (condensation sensor)	White
9	Y3	Function signal, supply air damper	Red
10	Y4	Function signal, extract air damper	Red
11	I2	Mode signal, window	1)
12	I3	Function signal, condensation sensor	Brown

1) Cables from the key card reader and window contact can be wired to one of the two terminals in each pair of terminal blocks.

Table 5. Connection between the TITAN RT and the TITAN RE

Terminals on the TITAN RT	Terminals on the TITAN RE	Cable colour
A	A	Blue/white
B	B	Blue
C	C	Orange/white
12V	2V	Blue/white

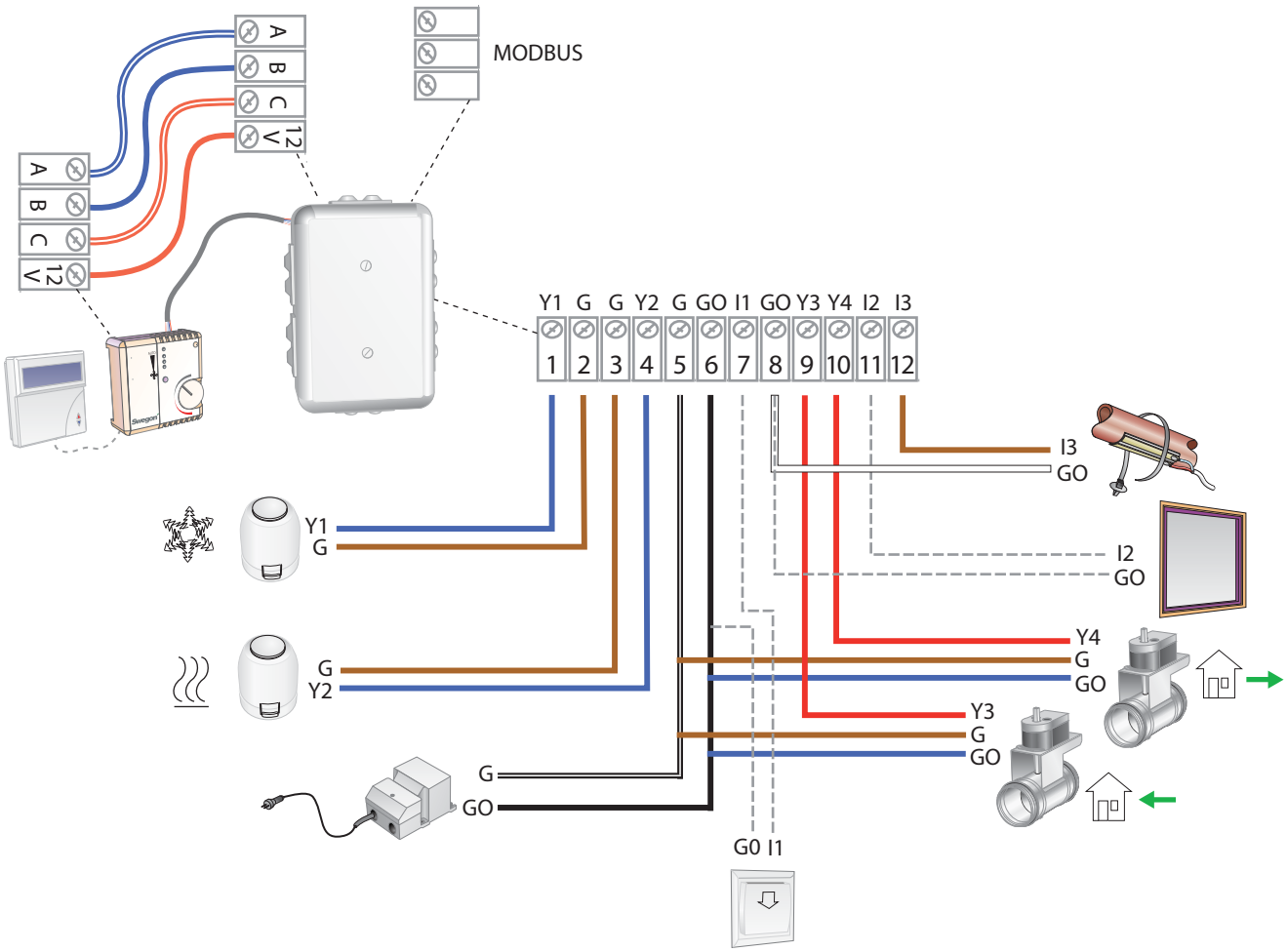


Figure 10. Connections to the TITAN RE Controller

Specification

Ordering key, Control equipment

Controller (with 5 metre long connection cable)	TITAN RE

Room thermostat	TITAN RT

Ordering key, Accessories

Hand-held terminal	TITAN CU

Valve actuator	LUNA a AT-2

Valve	SYST VD 115-CLC

Condensation sensor	LUNA a T-CG-2

Transformer	LUNA a TS-1

Adapter, actuator/valve	LUNA a T-VA-	aa

To valve type:

32 = Tour & Andersson
39 = Oventrop
50 = Honeywell, Reich, MNG, Böhnisch (H), Cazzaniga
54 = Certain MMA valves
59 = Danfoss RAV/L
72 = Danfoss RAV
78 = Danfoss RA
80 = Siemens, etc.

Explanatory text

Example of explanatory text to Swedish VVS AMA standard.

Swegon's type TITAN digital control equipment for the Primo Hotel water-based indoor climate unit, with the following functions:

- Designed for room control
- Programmable digital controller
- Individual temperature control
- Indication of the present airflow and heating/cooling load
- PWM Control function (24 V AC) and 0–10 V DC
- Controls heating and cooling in sequence
- Controls the supply air and extract air flows
- Automatic conditioning of valves
- Electrothermal actuator, two-position (on/off) with clear position indicator
- "First open" function for simple filling, pressure testing and venting the water system
- Inputs for condensation sensor, external window contact and external key card reader in the controller

Delivery

- The valves are delivered to the plumbing contractor for installation in the system.
- The room controller is delivered to the electrical contractor, systems contractor or other contractor for installation to the unit junction box.
- All electrical installation, including wiring the actuators, motorised dampers and various sensors is to be carried out by the electrical contractor or the systems contractor.
- The electrical contractor or the systems contractor provides an earthed socket for each transformer, a fitted mounting box for the room thermostat and possible external cables.

Accessories

- TITAN CU Hand-held terminal, xx pcs
- LUNA AT-2 Valve actuator, xx pcs
- SYST VD 115-CLC Valve, xx pcs
- LUNA a T-CG-2 Condensation sensor, xx pcs
- LUNA a TS-1 Transformer, xx pcs
- LUNA a T-VA-aa Adapter, actuator/valve , xx pcs

Specify the quantity separately in digits or with reference to the drawing.