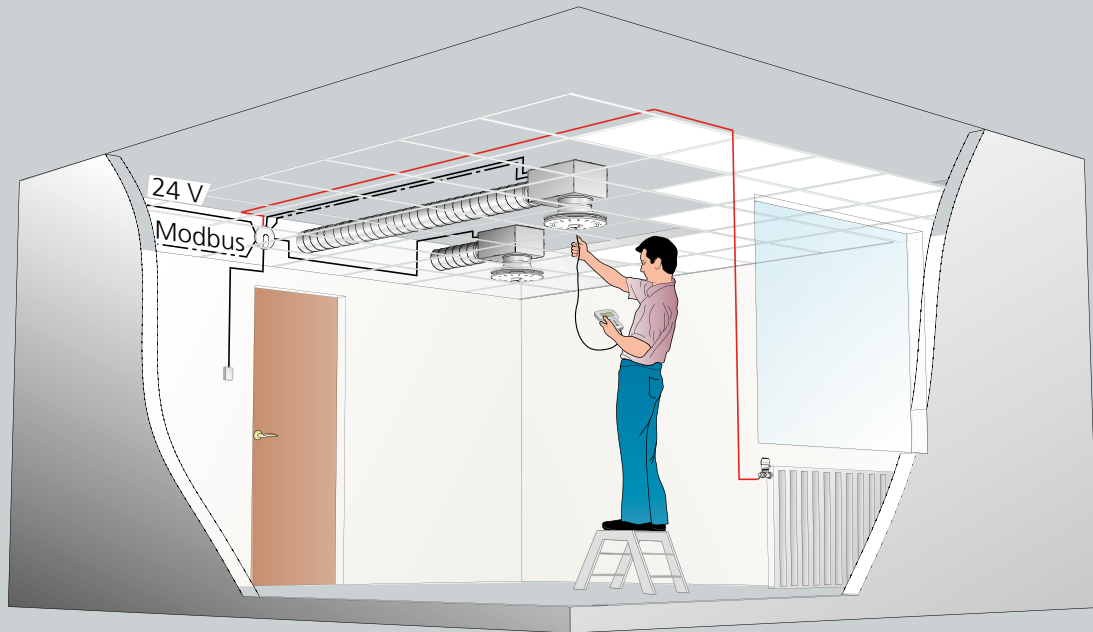


WISE Project Manual

Technical documentation for planners, system adjusters and operations technicians



QUICK FACTS

- ADAPT Don and Damper with software version 5
- ADAPT Damper with CAC-control
- CONTROL Damper with room function
- Super WISE, web-based tool

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Overview – ADAPT functions

The ADAPT products are equipped with a complete built-in controller for controlling the room climate using temperatures, air quality and occupancy as controlling parameters, and using airflows and radiator valves as regulating functions. ADAPT Damper requires DETECT Quality and in some cases DETECT Temp to obtain specified functions:

- Measurement of the room temperature
- Measurement of the supply air
- Measurement of the airflow
- Airflow control
- CAC Air quality detection (ADAPT Damper)
- Motor regulation
- Occupancy detection
- Indication of the operating mode
- Modbus slave according to RTU

Installation

Separate installation instructions are available for all the ADAPT products.

The controller has a limited number of outputs and inputs as tabulated below.

Table 1 & 2. Controller inputs.

Terminal	Type	Description
1	G	Voltage, 24 V AC
2	G0	System zero
3	G	24 V AC
4	Z	Input, 0-10 V DC
5	G0	System zero
6	V	Heating on/off or a second cooling phase
7	G	24 V AC
8	X	Occupancy, input
9	G0	System zero
10	R	Occupancy, output
11	G	24 V AC
12	Y	Output, 0-10 V
13	G0	System zero
14	C	Modbus Common
15	+	Modbus RTU +
16	-	Modbus RTU -

Jack	Type	Description
20	RJ45	Connector to the master air diffuser
21	RJ45	Connection of slave air diffuser
22	RJ45	Connection of slave air diffuser
23	RJ12	Modbus connection to master air diffuser

Technical data

All technical and electrical data are specified in the catalogue leaflet for each product.

Transformer

To avoid voltage drops it is important to correctly size the transformer with the 24 V power supply cable. A computer program for the sizing of transformers and determining the appropriate length of cables is available for download at www.swegon.com. The minimum recommended cross-sectional area of the voltage supply conductor is 1.0 mm².

Simplified connection

If an ADAPT air diffuser is installed in a room without accessories, and where no radiator or slave control should take place, 24 V AC can be connected directly to the air diffuser port, see Figure X. A \varnothing 1.0 (0.78 mm²) type RKKX single-conductor cable is recommended.

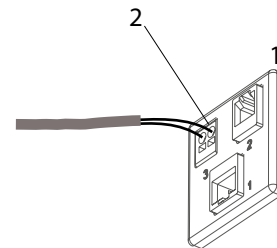


Figure 1. To connect 24 V directly to the air diffuser.
1 = Connection port to the air diffuser.
2 = Plug contact for 24 V AC.

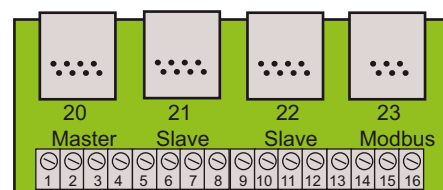


Figure 2. Controller inputs.

Room control

Temperature

The built-in temperature sensors for supply air and room temperature have a measurement tolerance of ± 0.5 K. The time constant for the measurement is approx. 2 min. The controller has a built-in limiting function that prevents the airflow from increasing if cooling is required and the supply air temperature is higher than the room temperature. Since the ADAPT Damper Master has only one temperature sensor, this limiting function does not work in extract air. All the temperature limits can be changed using the TUNE Adapt hand-held terminal. The table shows which temperatures can be specified depending on how the product is used and configured.

Various operating modes

Normal operation, (occupancy)

The control system works to attain the temperature values for heating 21 °C, cooling 23 °C, i.e. a room value of 22 °C ± 1 K. These temperature set points can be changed using the TUNE Adapt or using the ADJUST Temp remote set point adjuster, and also via a main control system. The airflow is controlled between the min/max limit settings. In the normal operating mode, the user can choose to enable the cold draught protection function. This means that the heat valve will not close more than the preset value as long as the controller's cooling value does not exceed 50% (adjustable).

Vacancy (energy save mode)

The control system works to attain new temperature set points: heating 20 °C, cooling 25°C, i.e. a room set point of 22.5°C ± 2.5 K. These temperature set points can be changed using the TUNE Adapt or TUNE Temp remote set point adjuster. The values can also be changed via a main control system. The airflow is controlled down to the extract airflow, but if the temperature exceeds the new set point, 25 °C, the system begins cooling the room even if there are no occupants. In the vacancy mode, the cold draught protection function is not enabled.

Change-over "heating with warm air"

The ADAPT controller has built-in functionality that can sense the difference between the room and supply air temperature and in doing so can match the airflow to the mode of operation of your choice. In the hand-held micro terminal or via Modbus, you can reset the controller to automatically increase the airflow for normal heating needs if the room temperature is lower than the supply air temperature, so-called change-over function. This function should always be combined with a DETECT Temp room sensor and can only be used on a master air diffuser located in the supply air.

Table 3. Temperature.

Type of product	Room temp.	Supply air temp.
ADAPT air diffuser master (supply air)	X	X
ADAPT air diffuser master (supply air)	X	X
ADAPT register slave (extract air)	X	-
ADAPT Damper master (extract air)	X	-
ADAPT Damper slave (supply air)	-	X

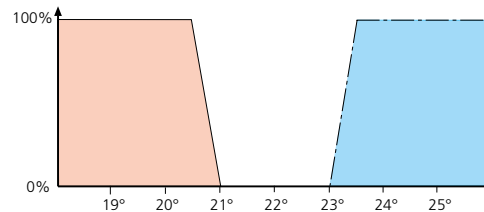


Diagram 1. The control process for occupancy and standard setting for temperature control, 0% corresponds to the min. airflow and no heating, 100% corresponds to the max. airflow or maximum heating.

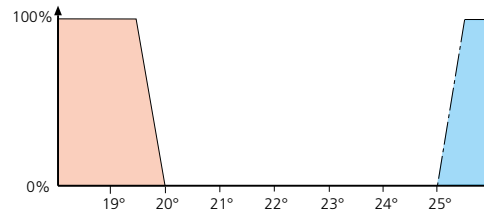


Diagram 2. The control process for vacancy and standard setting for temperature control

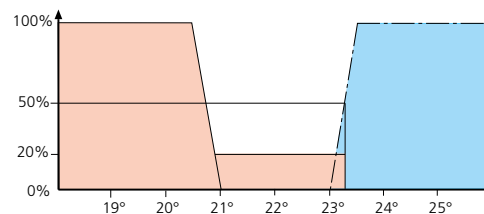


Diagram 3. The control process for occupancy and standard setting for temperature control, with the cold down-draught protection function enabled. The diagram shows how the cold down-draught protection function is enabled to 20% until the need for cooling has reached 50%.

Night-time cooling (chilling the building structure with free cooling)

The controller switches over to a new cooling set point, 18 °C. This can be initiated only via Modbus and a main control system.

Morning Boost (rapid heat-up with warm air)

The controller switches over to a new room set point, 28°C. This can be initiated only via Modbus and a main control system.

Switching between various operating conditions

Switching between occupancy/vacancy is controlled via the built-in presence detector. Night-time cooling and Morning Boost can only be initiated via a main control system via Modbus.

Cold down-draught protection function

If this function is enabled with a value >0%, the heat valve remains time-proportionally enabled until the cooling mode has exceeded the 50% limit which can be changed under the Application Menu, see Diagram 3. This function is only available in the Program Version 4 or later.

Modbus temperature functions

All the temperature values and settings can be reached via Modbus. For detailed particulars of all the variables, see the separate "WISE tables" that are available at www.swegon.com.

TUNE Adapt

The hand-held terminal has a temperature menu in which all the settings can be changed.

* TEMPERATURE MENU *	
COOL TEMP OCC	23°
HEAT TEMP OCC	21°
COOL TEMP UNOCC	25°
HEAT TEMP UNOCC	20°
CALC SETP	21.0°
ROOM TEMP DEV	0.0°
EXTERNAL INPUT	100%
NIGHTCOOL	18°
MORNING HEAT	25°
VALVE TIME	350sec

CAC Air quality control

ADAPT Damper with Clean Air Control has an integrated VOC sensor which measures and regulates the airflow for maintained air quality within the room. The output signal (pulse ratio) of the VOC sensor follows the CO₂ content in the room by measuring other gases that are created proportionately with CO₂. The highly sensitive VOC sensor responds quickly to the presence of CO, CH₄, liquefied petroleum gas, alcohols, ketones, organic acids, amino, aliphatic and aromatic hydrocarbons.

The simplest way to test the function for correct performance is to spray denatured alcohol into the extract air register. This should cause an immediate reaction in the CAC value.

VOC equivalent with CO₂

Swegon's Clean Air Control VOC sensor does not detect CO₂. On the other hand, it does detect a number of different impurities/emissions from people, for instance. This means that it reacts in a manner equivalent to that of a CO₂ sensor. Moreover, in contrast to a CO₂ sensor, it also reacts to the unhealthy emissions mentioned earlier.

Both the pulse ratio (0-90%) and CAC equivalent to the CO₂-value are specified in the TUNE Adapt and Modbus variables.

Table 4.

Substance group	Example	Source
Alcohols	Spirits	Detergent
Aldehydes	Formaldehyde	Construction materials
Ketones	Butanone	Paint residue
Ester	Methyl acetate	Glue
Aromatic acids	Xylene	Paint and glue

TUNE Adapt

The hand-held terminal has a CAC menu, in which all the settings for the regulation range can be changed.

* AIR FLOW *	
OCCUPANCY	
MIN	10l/s
MAX	40l/s
UNOCCUPIED	
MIN	5l/s
PRESSURE SENSOR	
FLOW PRESS	45.2Pa
PRESS 0-CAL.	00.0Pa
DAMPER POS	100%
SLAVE OUTPUT	0%
CO2	
MIN SET	800ppm
MAX SET	1000ppm
PPM PER VOLT	200
CAC SET POINTS (version before 170501, see figure below)	
CAC MIN SET	25%
CAC MAX SET	35%
CAC SET POINTS (version after 170501, see figure below)	
CAC MIN SET	35%
CAC MAX SET	45%

Clean Air Control

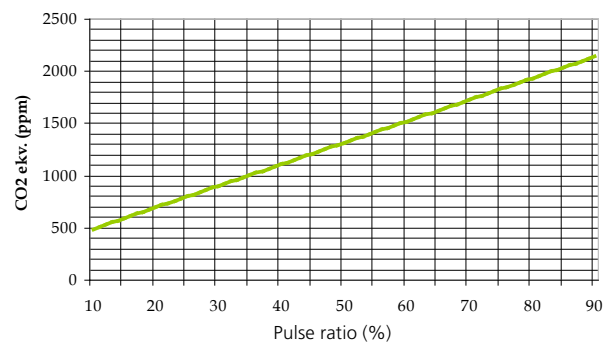
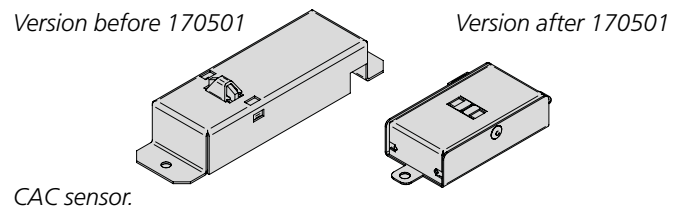


Diagram 4. The CAC/CO₂ ratio. NOTE! The diagram applies only to version of the sensor before 170501.



Occupancy control

Built-in presence detector

The air diffusers have a built-in presence detector that cover approx. 16 m² floor area. The value varies with the installation height. In a room fitted with several air diffusers, all the presence detectors work together to achieve optimal detection. If the system includes an external connected DETECT Occupancy, this unit will also work together with the built-in detectors so that the air diffusers will always switch over to the occupancy mode as soon as motion is detected.

Delay times have been programmed in the controller: the switch-on delay is set to 0; the switch-off delay is set to 20 min. The times can be changed using the TUNE Adapt. If the presence detector via relay is used for controlling the lighting (on/off), the switch-on delay must always be set to 0. When lighting control is not used, the switch-on delay can appropriately be set to 30 s.

The ADAPT Damper products lack a built-in sensor circuit card with presence detector and should then be equipped with a separate DETECT Occupancy presence detector. In this situation, DETECT Occupancy should have preset switch-on/switch-off delays. The values of the built-in controller will be disabled. See more about settings in the installation instructions for the DETECT Occupancy. If a presence detector is not to be connected to the ADAPT Damper, it is supplied preset for continuous occupancy.

Operating times

The ADAPT controller has a continuous operating time measurement function that measures the absolute time during which the controller has been powered and the time during which the controller has been in the occupancy mode. These times enable the user to easily analyse occupancy (and consequently, how often the premises need to be cleaned) for control of the light fittings and planning maintenance at the right time. The time count is automatically reset to zero after 32,767 hours, which is equivalent to 3.7 years.

Control of the lighting

In response to signals from the built-in presence detector, the lighting can be switched on/switched off via a relay connected to the CONNECT Adapt junction box.

Modbus occupancy functions

All the occupancy functions and settings can be reached via Modbus. For detailed particulars of all the variables, see separate tables that can be found at www.swegon.com.

Air quality control

When air quality control is enabled, it applies to operation in both the occupancy and vacancy modes. As from Program Version 5, this type of regulation can only be enabled when the system is operating in the occupancy mode. If you still would like to have air quality control enabled while the system is operating in the vacancy mode, it is possible to enable this function. See the Application menu.

TUNE Adapt

The various variables for the occupancy function can be checked and changed in the hand-held terminal.

* ADVANCED MENU *	
TEMPERATURE	
AIRFLOW	
OCCUPANCY (INT)	
* OCCUPANCY (INT) *	
OCC SENSOR LEV	0000
OCC STATUS	0
OCC STATUS+DELAY	0
DELAY OFF	20m
DELAY ON	00s

Table 5. Temperature relay in DETECT Occupancy

Jumper	Temp °C	Description
● ●	24	Enables normal regulation if the temperature exceeds the preset value
● ●	26	
■ ■	28	
■ ■	15	Enables normal regulation if the temperature is lower than the preset value
● ●	17	
● ●	19	

When the built-in temperature control should not be activated; disconnect the jumpers.

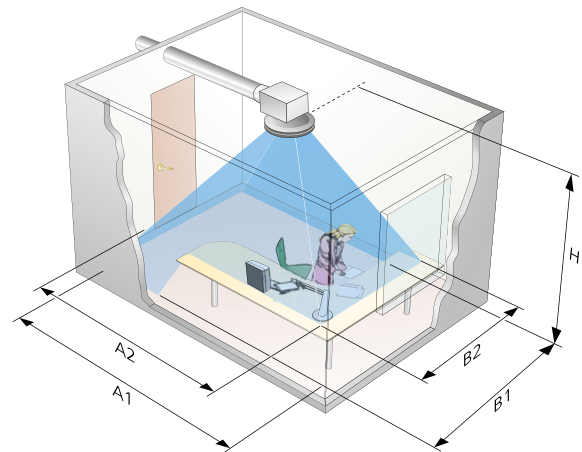


Table 6. Coverage area of the presence detector

H	A1	B1	A2	B2
2.2	4.5	4.0	2.9	2.5
2.4	4.8	4.3	3.3	2.9
2.6	5.3	4.7	3.7	3.2
2.8	5.7	5.0	4.1	3.6
3.0	6.1	5.4	4.5	4.0

Dimensions are specified in metres, A1-B1 refer to dimensions at floor level, A2-B2 refer to dimensions at desktop height.

Table 7. The setting of times in DETECT Occupancy

On	Off	Position	On	Off
■ ■	■ ■	A	0 s	5 s
● ●	● ●	B	10 s	1 min
● ●	● ●	C	30 s	5 min
● ●	● ●	D	1 min	10 min
● ●	● ●	E	5 min	20 min
● ●	● ●	F	10 min	30 min

Always switch off the power supply before repositioning the jumpers. DETECT Occupancy is supplied as standard set to position B for both delayed switch on and position A for delayed switch off.

Heating control

The CONNECT Adapt junction box can be used for connecting up to the heat valve control function. The system makes it possible to control approx. 3 valves with a total output of 18 VA. An intermediate relay must be installed if more than 3 valves are to be controlled, see the wiring diagram. The intermediate relay should be of semi-conductor type, able to manage many switching on/off operations without becoming worn. These types of relay are also quiet; therefore you will not have to hear the clicking sound that commonly occurs in mechanical relays. The heating control function is time proportional with an adjustable time constant.

Valve exercise is enabled and takes place at 5-day intervals. The time is adjustable for 1-7 24-hour days.

First open function

The ACTUATOR valve actuator has first open function. The valve is then supplied set to an open position making it possible to fill and vent the radiator system without any problem. When the ADAPT air diffuser/damper has been powered, the valves must be enabled for at least 6 minutes so that the catches will release. The controller is equipped with a function for valve exercising which involves energizing the valve for 8 minutes every fifth day, as standard. There is a test function in the TUNE Adapt which energizes the valve output for 10 minutes. This makes the "first open" catch release.

Modbus variables, heating control

All the values and settings can be reached via Modbus as tabulated below. For detailed particulars of all the variables, see the separate tables that can be found at www.swegon.com.

Two-phase cooling control

The ADAPT controller can be configured for two-phase cooling in sequence, first airborne cooling and if this is not sufficient the valve opens for waterborne cooling. Heating control cannot take place when two-phase cooling is enabled; the heating valve output circuit is then forgone.

TUNE Adapt

The various variables for radiator control can be checked and changed in the hand-held terminal. The time interval for valve exercising cannot be changed TUNE Adapt version 5.

* ADVANCED MENU *	
OCCUPANCY (INT)	
COMMUNICATION	
APPLICATION MENU	
* APPLICATION MENU *	
APPLICATION	0
LED FUNCTION	
HEATING	
PRESENT	
COLD PROTEC	
ACTIVE LEVEL	20%
COOL LIMIT	50%
VALVE EXERCISE	
INTERVAL	5 days

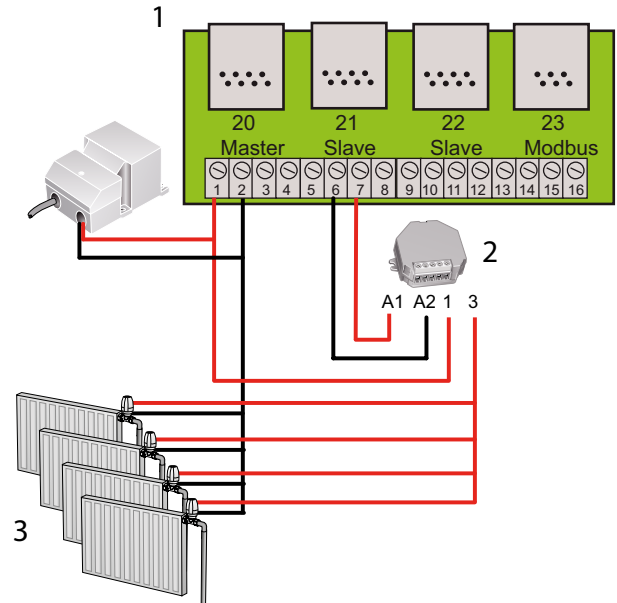


Figure 3. Connecting the intermediate relay for more than 3 radiators.

- 1 = The terminal block in CONNECT Adapt.
- 2 = Semi-conductor relay for at least 2 A 24 V AC
- 3 = Radiators with ACTUATOR valve actuator.

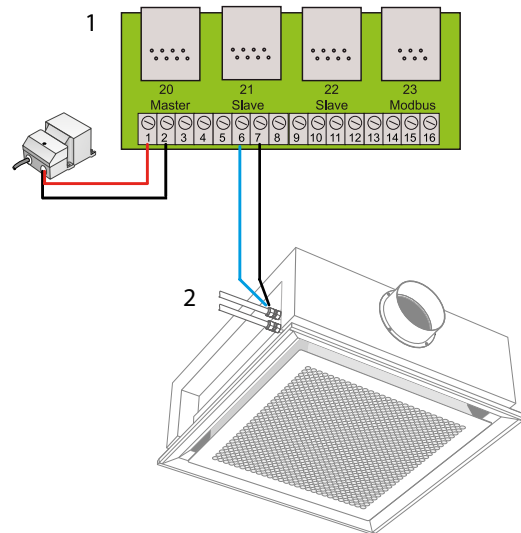


Figure 4. Connect the cooling circuit valve and the fan control system.

- 1 = The terminal block in CONNECT Adapt.
- 2 = ACTUATOR for valve on Parasol

External control

The ADAPT products have an analogue input (0-10 V DC) that can be used for various functions. They can be connected via CONNECT Adapt, wiring terminals 4 and 5.

DETECT Quality 0

The air quality is checked using the DETECT Quality 0 which transmits a CO₂ signal to the master air diffuser. Then the room temperature is regulated by means of the built-in temperature sensor in the air diffuser. The CO₂ signal oversteers the temperature control function if the CO₂ value in the room becomes too high. The preset limit values are 800-1000 ppm. The air quality is regulated regardless of whether the system is operating in the Occupancy or Vacancy mode. When the CO₂-control operates independent of the room temperature, the air in the room is likely to be cooled down more than is necessary. If the heating control with radiator function has been enabled, the radiators will heat up if the room temperature becomes too low.

TUNE Temp

Set point adjuster which enables the user to change the set point for room temperature regulation ± 3 K as the need arises. N.B.! Offsetting the setpoint does not affect the preset vacancy temperature in controller version 5.0 or later.

DETECT Temp

DETECT Temp is an analogue (0-10 V DC) temperature sensor that can be connected to the connection box. The ADAPT products are readjusted for interpreting this signal as room temperature. The DETECT Temp function is available from Program Version 4.

DETECT Occupancy

In addition to the analogue input, there is also a digital input that can be used for connecting an external presence detector. This input is normally used for the ADAPT Damper duct products.

Modbus variables, external control

All the values and settings can be reached via Modbus. For detailed particulars of all the variables, see separate tables that can be found at www.swegon.com.

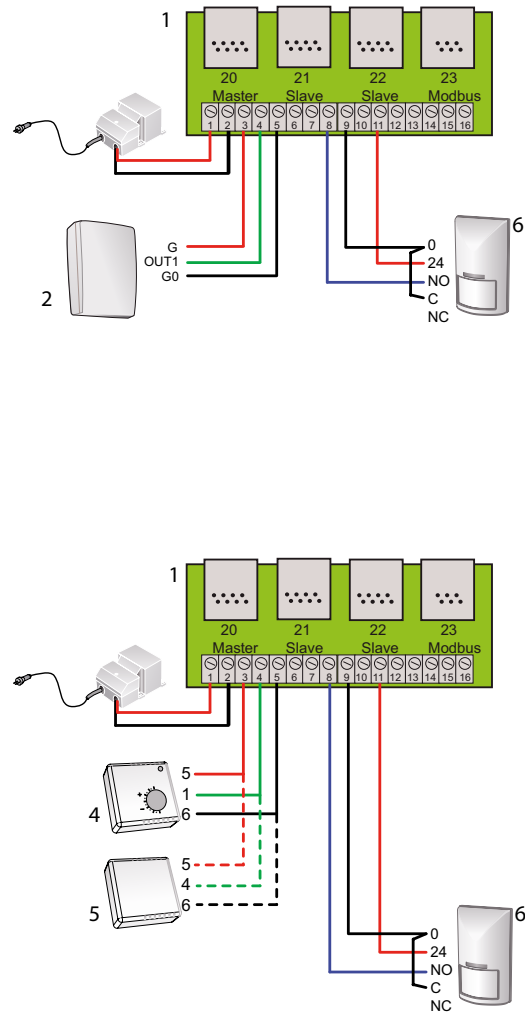


Figure 5. Connecting the accessories

- 1 The interconnection card in CONNECT Adapt.
- 2 * DETECT Qa 0
- 3 * TUNE Ta
- 4 * DETECT Ta
- 5 * DETECT Oa (normally for ADAPT Damper only)

Note: * Only one of these accessories can be connected.

Table 8. To set the application function. The presence detector does not need to be configured.

Accessories:	Application
Normal	0
External actuation	1
DETECT Q 0	2
(Slave air diffuser)	3
TUNE Temp	4
DETECT Temp	5

Master – Slave

The ADAPT products can be connected in a master-slave relationship where one air diffuser is always the master and up to three air diffusers are slaves. An extract air terminal can also be a master depending on the choice of products and the room solution. For guidance see Figure 6.

In a system with master-slave, an analogue connection is made between the various air diffusers. The analogue signals make it necessary to adjust each air diffuser taking into account the airflows between which it shall regulate. This provides maximal flexibility for the possibility of having different supply air/extract airflows.

Thanks to the analogue interconnection of the presence detector, it is enough that one air diffuser has detected occupancy in the room for the entire system to switch over to the occupancy mode.

Table 9. Analogue control signal.

The relevant value can be measured between wiring terminals 12 and 13 on the control circuit card.

Control mode	Control signal to slave
Vacancy flow	2.0 V
Min. airflow	2.0 V
Max. airflow	8.0 V
Emergency, close	<1.5 V
Emergency, open	> 8.5 V

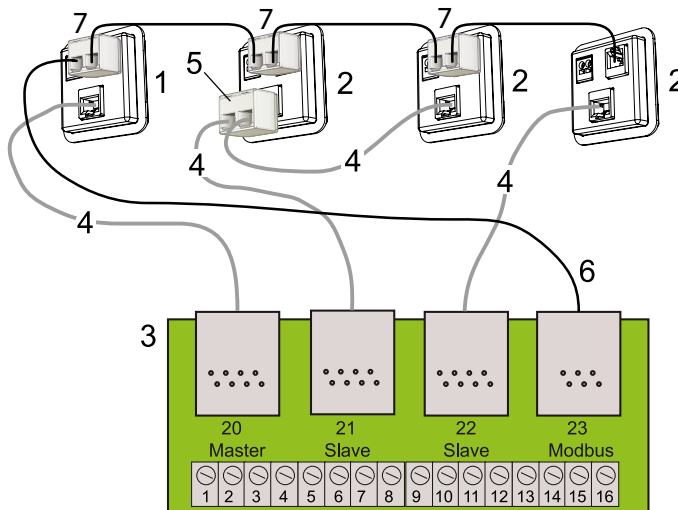


Figure 6. Connection with LINK Adapt and LINK Modbus

- 1 The air diffuser contact in the master air diffuser.
- 2 The air diffuser contact in the slave air diffuser.
- 3 The interconnection card in CONNECT Adapt.
- 4 LINK Adapt, RJ 45 Internet cable, 24 AWG.
- 5 SPLIT Link a 45 branch contact RJ45.
- 6 LINK Modbus RJ12 connected to the master air diffuser.
- 7 SPLIT Modbus RJ12, max. stab length, 10 m.

Connect all the slave air diffusers to Modbus

Normally only the master air diffuser is connected to a main control system via the CONNECT Adapt junction box.

Slave air diffusers can also be connected to a main control system however this must be done directly in the RJ12 connection of the air diffuser. A splitter must be used for connecting several air diffusers.

N.B.! The Modbus stubs can be too long and cause communication problems. The recommended maximal permissible stub length per junction box is altogether 10 metres. If a longer LINK Modbus is required, install additional CONNECT Adapt for Modbus connection, Fig. 8. It does not matter which Modbus contact on the network the ADAPT product is connected to; its Modbus ID is the determining factor for how the product is shown in the main control system and Super WISE. If several CONNECT Adapt are used for connection, the control signals must also be wired further.

Calculation of the maximal stub length

The stub length is critical in the installation. That which affects the length is the speed of communication and the pulse rise time of the transceiver. The bus wire is assumed to be terminated at each end. The ADAPT products use a fail-safe transceiver with the following data:

Signal rate = 200 kbps

Rise time = 500 ns

Maximal stub length 11.6 metres

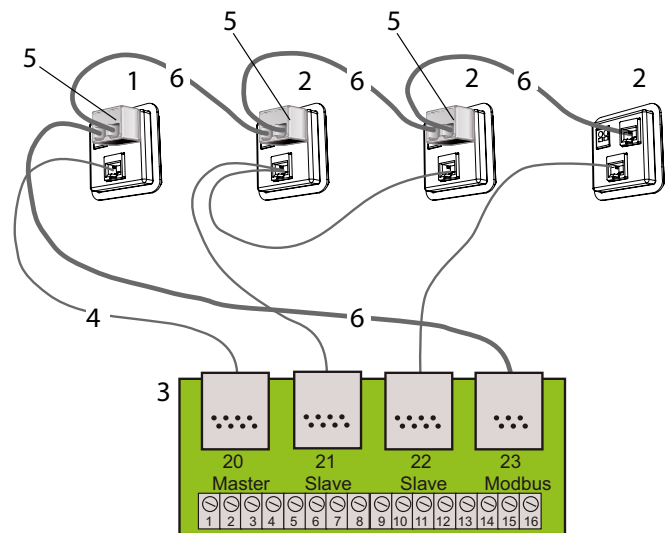


Figure 7. Connection with LINK Modbus

- 1 The air diffuser contact in the master air diffuser.
- 2 The air diffuser contact in the slave air diffuser.
- 3 The interconnection card in CONNECT Adapt.
- 4 LINK Adapt, RJ 45 Internet cable, 24 AWG.
- 5 SPLIT Link a 12 branch contact, RJ12.
- 6 LINK Modbus RJ12 cord, the total length must not exceed 10 m.

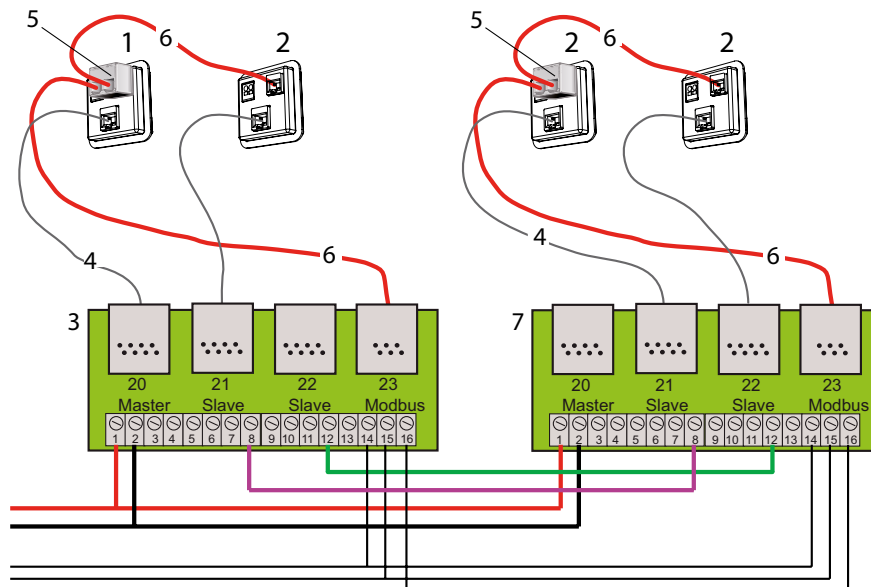


Figure 8. The wiring of several ADAPT via 2 CONNECT Adapt

1 -6 see the figure text above.

7 One extra CONNECT Adapt.



Light-emitting diode operation

The sensor module on the ADAPT air diffusers has an LED that indicate the current operating mode. The LED can be lit in different colours; however this can be switched it off completely if the light emitted is found disturbing.

The table shows the various functions that can be indicated by the diode.

Table 10. LED functions.

Colour / output	Explanation
Green / steady	Normal operation, no alarm
Green / flashing	Start up with 0 calibration
Red / steady	Alarms, see the alarm list. Also for too low supply voltage, not visible in the alarm list.
Red / flashing	Internal sensor failure, see the alarm list. Too low supply voltage.
Orange / steady	Commissioning mode, max. airflow
Orange / flashing 2 sec. interval	Commissioning mode, min. or vacancy airflow. Further forced control via Modbus. Emergency mode, Manual occupancy or Test mode.

Modbus variables for the LED and alarms

All the values and settings can be reached via Modbus. For detailed particulars of all the variables, see the separate tables that can be found at www.swegon.com.

TUNE Adapt

The various variables for alarms can be checked in the hand-held terminal.

* SWEGON TUNE ADAPT *	
USER MENU	
ALARM MENU	
LANGUAGE	
AD	* ALARM MENU *
TE	FUNCTION ALARM
SA	DAMPER STROKE 0
	MOTOR 0
	PRESSURE SENSOR 0
	ROOM TEMP 0
	SUPPLY TEMP 0
	WRONG SET POINT 0
	COMFORT ALARM 0
	TEMPERATURE 0
	AIR QUALITY 0
	ALARM SETTINGS
	SET TIME 60
	RESET TIME 1
	MAX TEMP DEV 2
	MAX CO2 DEV 200

Main control system, Modbus RTU

The ADAPT controller has many facilities for communication with a main control system. Most of the variables are open and can be read or entered. There are a number of product-specific variables that are password protected. These have been programmed at the factory and should not be changed.

The communication format can be changed and in its standard form is preset for 38400 bps, None parity, 1 stop bit and always 8-bit format. All the ADAPT master products can have a continuous Modbus ID between 1 and 248. Unless otherwise specified in the purchase order, the air diffusers are supplied with ID 1. The ID number is specified on the product rating label. The user can easily change the Modbus ID number with the TUNE Adapt.

When the TUNE Adapt hand-held terminal is connected to the sensor module for the air diffusers or to the special outlet for the Damper products, communication with the main control system is interrupted, but will be restored when the hand-held terminal is later disconnected.

All the variables can be entered an unlimited number of times without overburdening the memory.

For the main control system, the following variables can be interesting to read:

- The room temperature
- Estimated temperature set point
- The airflow, l/s (N.B.! Normally the master air diffuser only)
- The cooling control value, %
- The heating control value, %
- The controller mode (occupancy/vacancy, etc.)
- Alarm 1 – Stroke error
- Alarm 2 – Motor failure
- Alarm 3 – Pressure sensor failure
- Alarm 4 – Temperature sensor failure (internal)
- Alarm 5 – Temperature sensor failure (external)
- Alarm 6 – CAC sensor error
- Alarm 7 – Comfort alarm
- Alarm 8 – Nonconforming temperature
- Alarm 9 – Nonconforming CO₂ content

There is a configuration set of variables for alarms and operating modes in binary format as a group alarm. For detailed particulars of all the variables, see the separate tables that can be downloaded from www.swegon.com.

The following variables for the main control system can be actuated:

- Emergency control (On/Off)
- Emergency control, power (open/close)
- Night-time cooling (On/Off)
- Morning heat (On/Off)
- Occupancy control (On/Off)
- Occupancy mode (Occupancy/Vacancy)

All the other variables can be changed, but the above described values are typical for controlling via time schedule.

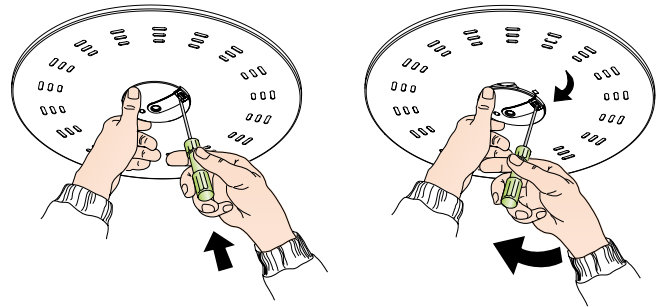


Figure 9. To open the sensor module, use a screw driver, be careful when reinstalling the module to avoid damaging the positioning pins.

TUNE Adapt

Description

TUNE Adapt is a hand-held terminal for setting and viewing the readings of all ADAPT products. TUNE Adapt is powered by the product it is connected to. TUNE Adapt is supplied as standard with display in four languages: Swedish, English, French and Danish. The compatibility of the various versions of the ADAPT controller is as follows: hand-held micro terminals of later version cannot read older versions of ADAPT controllers, hand-held micro terminals of older version can always read the newer ADAPT controllers, however the newer variables will then be lacking in the hand-held micro terminal. The hand-held terminal must not be confused with the terminal that is supplied with the GOLD air handling unit, it has different software.

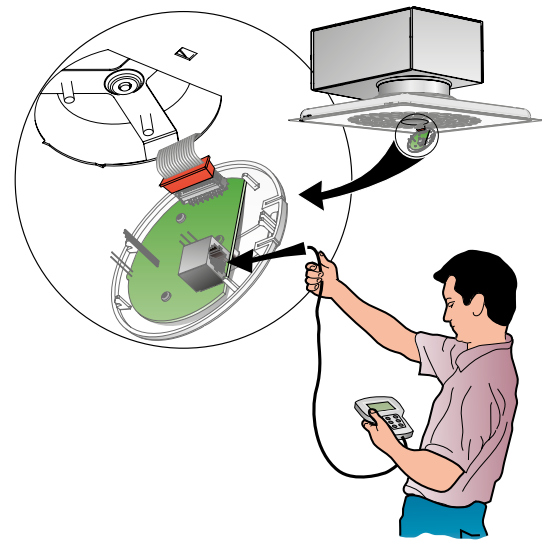


Figure 10. TUNE Adapt can be connected to the air diffuser using the RJ12 contact on the circuit card.

Keypad functions

The arrow keys are used for advancing up and down in the menus. To change to an underlying menu press "enter" \leftarrow . In the menus for entering settings, you must immediately press "enter" again to come to the image where you can change the variables. All the variables that can be changed will then be highlighted.

The +/- keys are used for increasing or decreasing the values. The values are changed immediately in the ADAPT products, without having to press "enter".

Press X to return to the previous menu.

The display can show only four lines with text. In the descriptions that follow, the menus below are displayed in a fainter tone. The menus appear more distinctly as you press the arrow "down" key.

There is a small red LED to the side of the "enter" key. When it shines/ flashes, the ADAPT product, to which it is connected, is being 0 calibrated. Wait a minute or two and reconnect TUNE Adapt.

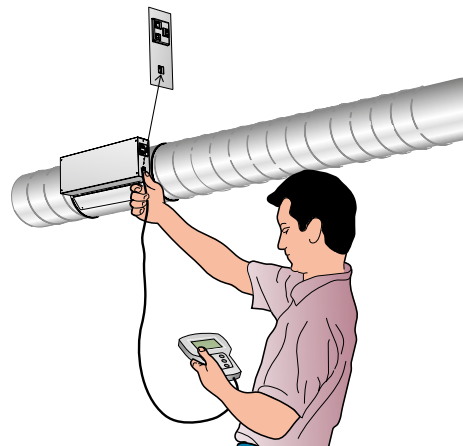


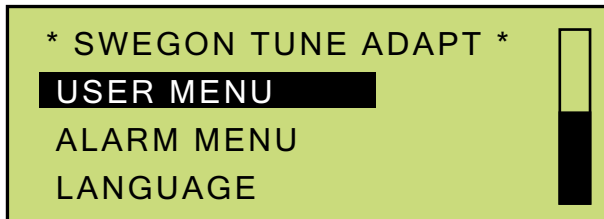
Figure 11. TUNE Adapt can be connected directly to the single contact on the side in the duct dampers.

The display screen

The uppermost line always shows the Swegon headline, on later versions the program version for the ADAPT products is shown as well.

The line with highlighted text is the selected line you can advance to by pressing the ↵ "enter button".

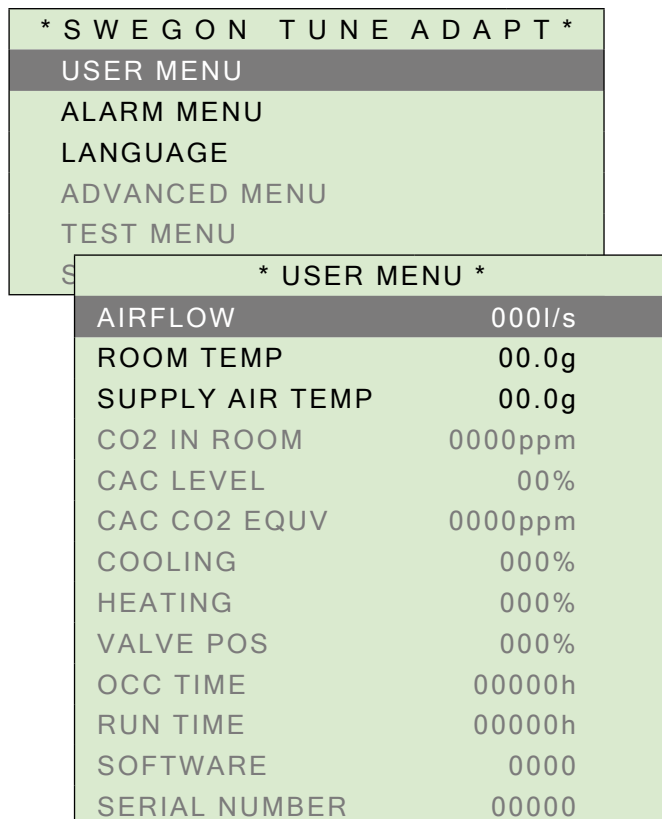
The pile to the right indicates whether there are more menu lines below that you can access by navigating downward. The black field at the lower edge shows that there are menu lines below. The contrary applies if there is a black field at the upper edge.



Tune Adapt menu structures

Descriptions of the menus

The input menu for start up. The image shows all the functions that are available from the start menu. Press enter to advance to the menu selected.



Airflow

The current airflow in l/s and the estimated set-point is shown here.

Room temp

Shows the room temperature in °C regardless of whether the temperature is measured by the built-in sensor or a connected DETECT Temp. In certain applications, for example ADAPT Damper for supply air, the room temperature cannot be shown. The value -1 is given in this case. In ADAPT Damper, the extract air temperature can be one or two degrees higher than the representative room temperature. This should be taken into consideration when selecting the set points for the temperature settings.

Supply air temp

Shows the value of the built-in temperature sensor. In certain applications such as ADAPT Damper if the extract air, the temperature cannot be shown, the value -1 is then given.

CO₂ in room

If DETECT Quality is connected and Application type is set to 2 the carbon dioxide value in the room is shown.

CAC

If Clean Air Control is enabled, the air quality value and the corresponding recalculated CO₂ value in ppm are shown here. Good air quality corresponds here to a CAC value that is lower than 35%.

Cooling (Cooling load)

Shows the value of the cooling load 0-100%, 0% corresponds to vacancy or the occupancy flow, 100% corresponds to the max. flow.

Heating (Heating load)

The heating load in % is shown here if the controller is set for heating control. Heating control is time proportional which means that the valve is open only during that part of the time cycle to which the heat load corresponds, example: heating load 50%, the valve is open 50% of 350 s = 175 s. and then closed for 175 s.

Valve pos (Valve pos, later than version 3)

The value of the valve output is shown here, which most often is equal to the heating load. If the cold down draught protection function is enabled, the heating load can be 0% while the valve output can be 20% for instance.

Occ time (Time occupied)

The controller has a time counter which automatically counts the time during which the premises is occupied. The function can for instance be used for analysis of the cleaning interval, etc.

Run time (Total runtime)

The controller has a built-in operating time counter which is enabled as soon as the controller is powered. The counter automatically resets after 32767 hours, approx. 3.7 years.

Software

Current version of the software.

Serial number

The product serial number.

Alarm menu

These menus show the value 1 if something is abnormal in the ADAPT product. At the same time, the diode in the sensor module shines red.

* SWEGON TUNE A V5 *	
USER MENU	
ALARM MENU	
LANGUAGE	
AD	* ALARM MENU *
TE	FUNCTION ALARM
SA	DAMPER STROKE 0
	MOTOR 0
	PRESSURE SENSOR 0
	ROOM TEMP 0
	SUPPLY TEMP 0
	WRONG SET POINT 0
	COMFORT ALARM 0
	TEMPERATURE 0
	AIR QUALITY 0
	ALARM SETTINGS
	SET TIME 60
	RESET TIME 1
	MAX TEMP DEV 2
	MAX CO2 DEV 200

Damper stroke

When the controller is started up, a stroke check is carried out. If this check fails, an alarm is initiated.

Motor

If the control function is not operating so that the motor can steer to the desired position within the length of damper stroke detected, an alarm is initiated.

Pressure sensor

If the pressure sensor transmits unreasonable values or if communication to this sensor ceases, an alarm is initiated.

Room Temp

Refers to failure of the built-in temperature sensor normally fitted inside the sensor module.

Supply Temp

Refers to failure of the built-in temperature sensor normally fitted in the supply airflow path inside the air diffuser.

Wrong set point

An alarm is initiated if the heating set point and cooling set point cross one another. The heating load must always be lower than the cooling set point.

CAC Sensor error

Indicates that the built-in sensor is faulty or is missing.

Comfort alarm

Activates the comfort control system and initiates an alarm if the temperature or CO₂ value deviates more than the preset limit values during a period longer than the preset period (60 min.). If the cause of the alarm is remedied, the alarm value is cleared after the preset period (5 min.).

Language menu

Used for changing the language in TUNE Adapt.

* SWEGON TUNE A V5 *	
USER MENU	
ALARM MENU	
LANGUAGE	
ADVANCED MENU	
TEST MENU	
SA	* LANGUAGE MENU *
	ENGLISH
	SVENSKA
	SUOMI
	DANSK

Language menu

As standard, TUNE Adapt is supplied with text in four languages: English, Swedish, Finnish and Danish. Scroll down to the language desired and press enter.

Other language combinations are the following:

English, Swedish, Russian and Polish

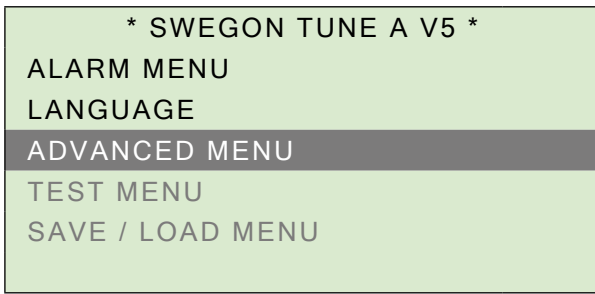
or

English, Swedish, German and French

These variants must however be ordered separately.

Advanced menu

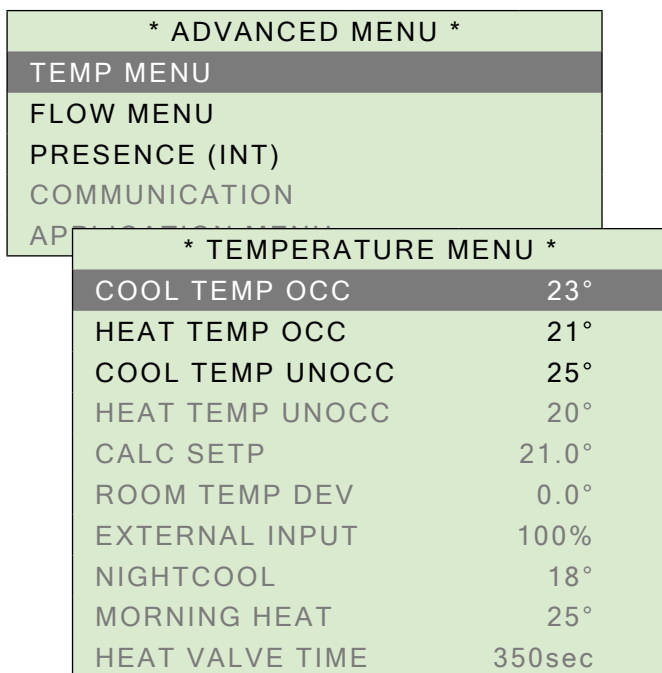
All the setting values can be changed in these menus.



When you select the ADVANCED MENU, a warning is shown to remind you to be especially cautious; changing data in these menus could compromise the regulator function.

Temperature menu

In order to be able to change a value, it must be highlighted by pressing enter on the first menu line. In the image, this value is: COOL TEMP OCC.



Cool temp occ (Cooling temperature, occupied)

The temperature at which cooling control begins. If the system has sufficient capacity, this will be the maximum room temperature in the cooling mode.

Heat temp occ (Heating temperature, occupied)

The temperature at which heating control begins. This will be the room's lowest temperature if the ADAPT product steers heating control. If this does not take place, the value is insignificant.

Cool temp unocc (Cooling temperature, unoccupied)

The same function as for the occupancy temperature.

Heat temp unocc (Heating temperature, unoccupied)

The same function as for the occupancy temperature

Calc setp (Calculated set-point)

The estimated value for control is shown here. When the room temperature is between the heating and cooling set point, the room temperature is shown in this variable. If the room temperature is above the set point for cooling control, the set point is shown (for example 23.0°)

Room temp dev (Room temperature deviation)

The difference is shown here between the actual values and the preset set points for cooling/heating for occupancy or vacancy. When the room temperature is in the dead band, the value 0 is shown. If TUNE Temp is used for set point displacement, the change can be read in this menu only.

Example:

Cooling set point 23°: if the room temperature is 22.5° the value 0,0 is shown on the nonconforming temperature line. Now if TUNE Temp knob is turned down as much as possible for reduced room temperature, the cooling set point will be 20° and the value 2.5° will then be shown. This means that it is 2.5° too warm in the room and the cooling control function will start.

External input

The external input level 0-100% corresponds to the input function when an external control is used, see the Application Menu.

Nightcool (Night-time cooling)

Set point for night-time cooling. This set point applies when the night-time cooling function is enabled from a main control system and it leads to boosting the airflow until the flow reaches its preset max. airflow rate.

Morning heat

This function is not enabled in the controller, (will be introduced in a later version).

Heat valve time (protected variable)

This time is the normal time it takes for a thermal actuator to open completely from the cold position. The time is used for the time proportional opening when the heating load is <100%.

If the ADAPT controller is to control electric heating via semi-conductor relay the time should be set to max. 60 sec. The variable can only be changed via a special Modbus tool of Modbus Poll type.

Airflow

In order to be able to change a value, you must highlight it by pressing enter on the first menu line. In the image, this is: OCCUPANCY.

* ADVANCED MENU *	
TEMPERATURE	
AIRFLOW	
OCCUPANCY (INT)	
COMMUNICATION	
AP	
* AIR FLOW *	
OCCUPANCY	
MIN	10l/s
MAX	40l/s
UNOCCUPIED	
MIN	5l/s
PRESSURE SENSOR	
FLOW PRESS	45.2Pa
PRESS 0-CAL.	00.0Pa
DAMPER POS	100%
SLAVE OUTPUT	0%
CO2	
MIN SET	800ppm
MAX SET	1000ppm
PPM PER VOLT	200
CAC SET POINTS	
CAC MIN SET	25%
CAC MAX SET	35%

Occupancy min/max

The airflows to be used for the relevant room can be set here. If the product is marked with a “default” in the designation, then it is a product from stock with standard settings that probably are not applicable to the current installation.

Unoccupied

The airflow for vacancy of occupants

Pressure sensor

The current flow pressure can be read here. This pressure is almost identical to the static pressure drop across the air diffuser.

Zero calibration can be carried out, however this requires that you are sure that there is no airflow. It will not help to force the damper to close. 0-calibration has been carried out at the factory prior to delivery and should not normally need to be changed.

Damper pos (Damper position)

The current damper blade position can be read here. When commissioning, make sure that this value is at least 85% open for the design room in the zone.

Slave output

Shows the slave output flow level: 0% is minimum or vacancy flow, 100% corresponds to the maximum airflow.

CO₂

Under this menu, set the limit values for the proportional airflow control function in relation to the CO₂ value. Control starts from the minimum set point and proportionally increases to 100% airflow for the maximum set point.

ppm per Volt

This is the interpretive value of the input signal from the CO₂ sensor. This is normally 200 ppm/V.

CAC MIN.

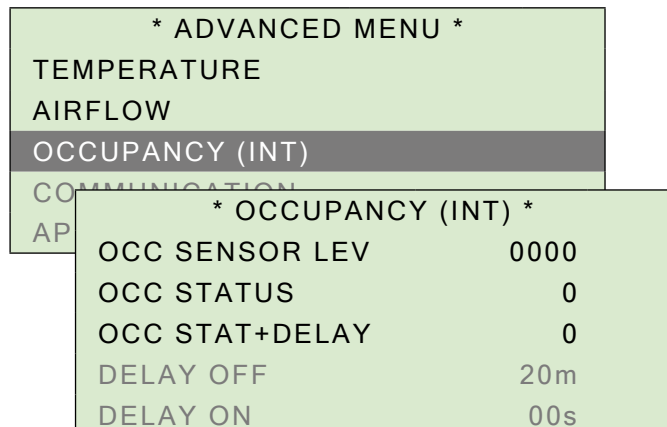
The lower limit where the airflow increase starts for ventilation to remove impurities.

CAC MAX.

The upper limit where the airflow has reached its max. value.

Occupancy (INT)

In order to be able to change a value, you must highlight it by pressing enter on the first menu line. In the image, this is: Occupancy.



Occ sensor lev (Occupancy sensor level)

Indicates the signal level from the built-in presence sensor. The limit value for detecting occupancy is 250.

Occ status

Shows the momentary status from the built-in presence detector 1=occupancy. The value returns to 0 after 1 minute if no new occupancy has been detected.

Occ stat + delay

The occupancy situation including the delay. This value applies to the entire system of master/slave air diffusers that are interconnected.

Delay off

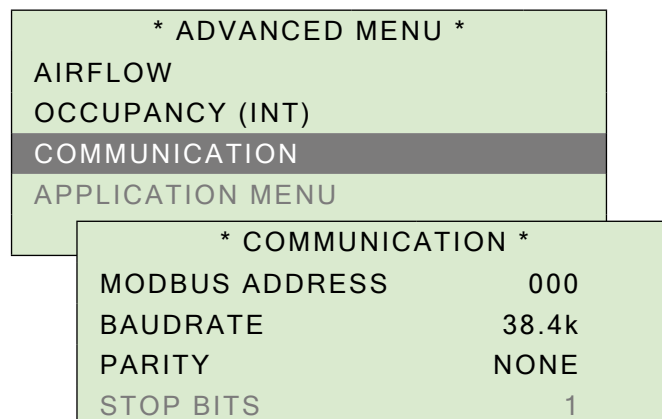
The time until the controller switches over to vacancy if no new occupancy has been detected.

Delay on

The switch on delay time must always be 0 if the lighting is to be controlled. Otherwise the value can appropriately be 30 s.

Communication

In order to be able to change a value, it must be highlighted by pressing enter on the first menu line. In the image, this is: Modbus address.



Modbus address

The address can be set to a value between 1-248.

Baud rate

The communication speed can be set to three levels: 9.6k - 19.2k - 38.4k.

Parity

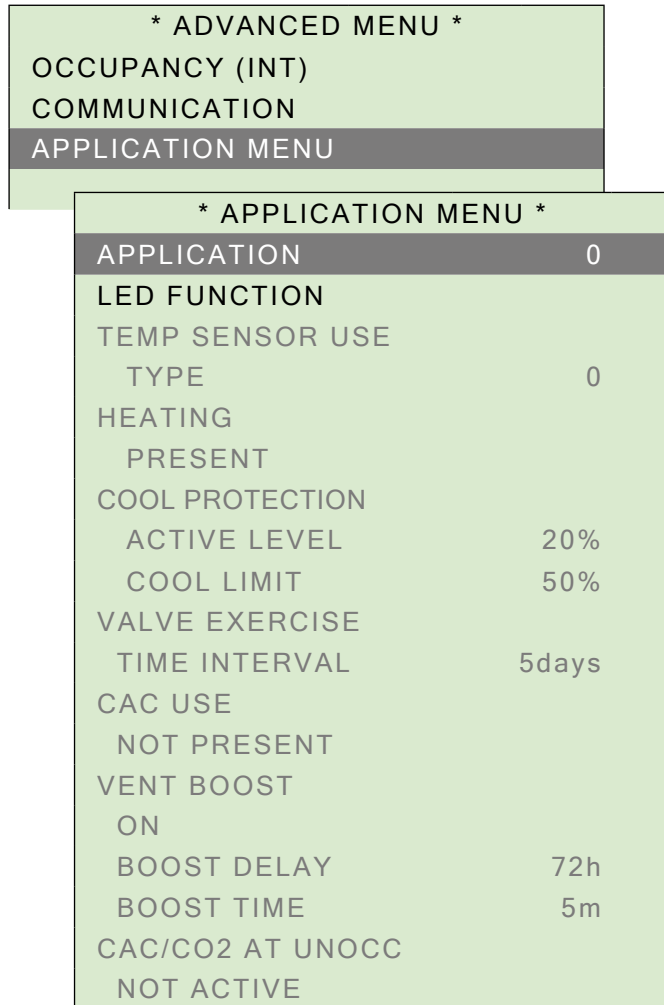
The parity check can be set to: Even/Uneven/None.

Stop bits

Can be set either to 1 or 0.

Application menu

In order to be able to change a value, it must be highlighted by pressing enter on the first menu line. In the image, this is: APPLICATION.



Application

Select the application that fits the description. The application describes how the external control input on the master air diffuser should be used. The slave air diffuser should always have the value 3.

- 0 = Temperature control (ADAPT)
- 1 = External control with 0-10 V DC signal
- 2 = Temp. control (ADAPT) + CO₂ (DETECT Q 0)
- 3 = Slave controller
- 4 = Set point switch, TUNE Temp
- 5 = External temp. sensor, DETECT Temp

LED function

Here you can choose whether the LED should be out or used for indicating the functions, see the Alarm Menu.

Temperature sensor use (from Software Version 5)

How the built-in temperature sensors should be used is adjusted with this variable. This function is programmed from the factory. If "default" ADAPT Damper is supplied directly from stock, you will have to change this variable if the damper is to be adjusted for use as a slave.

- 0 = ADAPT supply air diffuser
- 1 = ADAPT Exhaust and Damper for extract air
- 2 = ADAPT Damper for supply air

Heat valve control (Software later than Version 4)

If the ADAPT controller is to be used for controlling the radiators, this function must be enabled, however it cannot be combined with two-phase cooling. In the Ver. 3 ADAPT, change-over can only take place in Modbus via variable 0x0006.

Cold down draught protection (Software later than Version 3)

This function applies only from Program Version 4. The controller can also control heating if there is no heating load. This function is used for reducing cold down draughts by the windows. The heating control feature will be enabled to the preset level, for example 20%, until the cooling load has reached 50%.

Valve exercise (Software later than Version 4)

This function applies only from Program Version 4. During the summer half of the year, the valves may need to be exercised so that they will not jam. The exercising feature can be enabled by setting the time between these occasions to >0. The time is expressed in 24-hour periods. Exercising takes place by enabling the valve output for 10 minutes. The function is enabled as standard.

CAC Use

Activation of the built-in air quality sensor in ADAPT Damper on the extract air duct.

Ventilation boost function

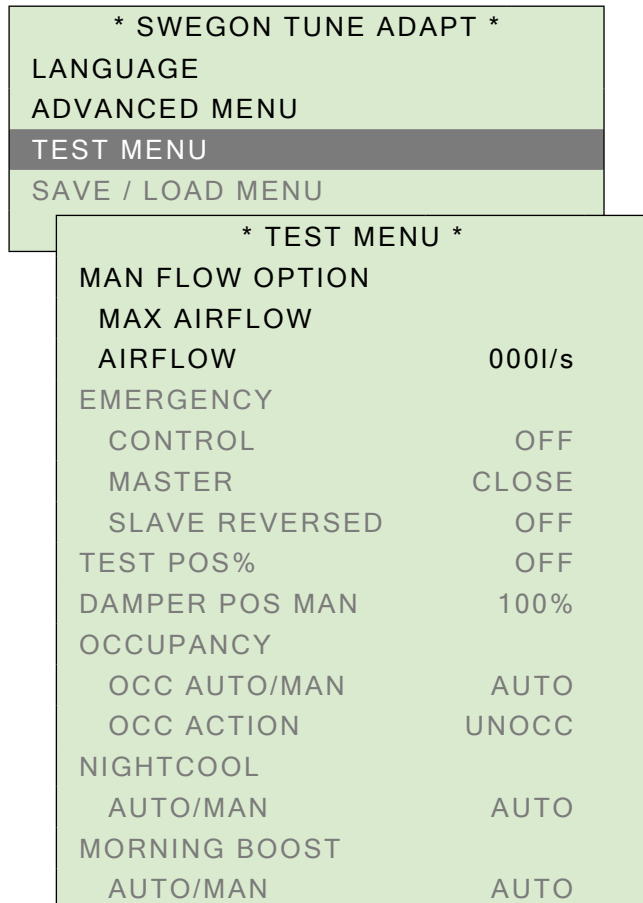
Enables the function for forcing the airflow for a shorter time (5 minutes) when the ventilation system has operated in the vacant room mode longer than the preset time (72 hours).

CAC/CO₂-function for vacancy

Provision for enabling the CAC/CO₂ function even when the ventilation system is operating in the room vacancy mode.

Test menu

These menu functions are used for commissioning and performance checks. When you select the TEST MENU, a warning is shown to remind you to be especially cautious; changing any data in these menus could cause the control system to stop operating.



Man flow option (Commissioning mode)

This function is used during the commissioning and performance check phase. All the products are supplied preset for maximum flow. The LED shines orange. During the commissioning phase, this mode should be reset to MIN FLOW – VACANCY FLOW – and DISABLED. The LED shines orange for minimum and vacancy flows.

Emergency

This menu can be used for testing the emergency function. It is also possible to set whether the event should be “Close” or “Open” as well as reversed function on the slave air diffusers. Set the Open or Close event in the master air diffuser. The reversed function for the slave air diffusers can only be set if TUNE Adapt is connected to each respective slave air diffuser.

Do not forget to set USE to “OFF” when the test is completed.

Test mode

The damper position can be manually steered with this function to a fixed value within 0-100%. Do not forget to reset the test mode to “OFF”.

When the test mode is enabled, the LED shines orange.

Occupancy

The occupancy function can be forced here to AUTO or MAN. UNOCCUPIED or OCCUPANCY should be set in the manual mode. If the ADAPT Damper in the master version lacks a built-in presence detector, this value should be set to continuous OCCUPANCY if DETECT Occupancy is not connected.

Valve test

If activated the valve opens during 10 minutes. Serves to check the valve operation and to override the “first-stop” function of the valve.

Night cooling

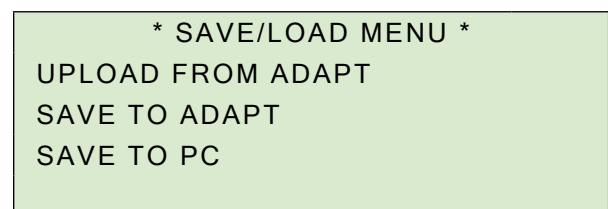
This function is used to test the night cooling function, do not forget to set USE to “OFF” when the test is completed.

Morning boost

This function is used to test the morning heat function, do not forget to set USE to “OFF” when the test is completed.

Save/Load menu

These menu functions are used for transferring data from one air diffuser to another.



Upload from ADAPT

Connect the first air diffuser and select UPLOAD FROM ADAPT.

Save to ADAPT

Connect to the next air diffuser whose variables should be updated and select SAVE TO ADAPT. Caution; when saving to a new ADAPT unit data from the previous unit is carried over. Therefore a new 0-calibration of the pressure sensor must be performed. Data must only be transferred between units of the same type and dimensions.

Save to PC

The save to PC function requires special equipment that can only be handled by Swegon specialists.

CONTROL Damper - Room functions

CONTROL Da FSFE, with associated SLAVE Control slave damper for extract air, if required, is supplied fully configured from the factory. The TUNE Control (3) hand-held room terminal is used for changing the control values.

Functions

- Wireless room sensor with set point adjustment and service functions
- Control against temperature, CO2 content and window contact
- Airflow regulation for primary cooling or ventilation
- Heating control in sequence with cooling control
- Two-phase cooling with water in a second phase, provision for condensation monitoring
- Slave airflow regulation with SLAVE Control
- Emergency settings open or closed via Modbus RTU
- Night-time cooling operation via Modbus RTU
- Presence detector, for switching to the economy mode when the room is not in use
- Built-in relay for control of the lighting or the fan in the cooling unit
- Wireless hand-held terminal for making checks and the setting of values

Table 11. Designation code

Code	Function
FSFE	Room application with supply air master and extract air slave.

Explanation: F = flow
 E = extract air
 S = supply air

Technical data

All technical and electrical data are specified in the catalogue leaflet for each product.

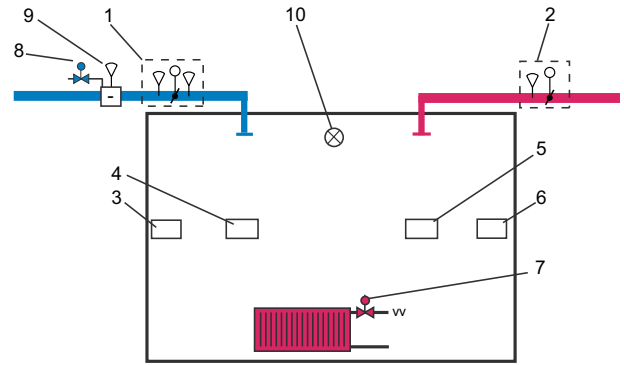


Figure 12. Room functions.

Key to the digits used in the figure:

- 1= CONTROL Damper FSFE
- 2= SLAVE Control
- 3= TUNE Ca room terminal, temp. sensor and set point adjustment
- 4= DETECT Oa, presence detector
- 5= DETECT Qa 0, carbon dioxide sensor
- 6= Window contact
- 7= On/off or 0 - 10 V DC heating control, max. four type 24 V thermo-actuators
- 7= On/off or 0 - 10 V DC cooling control, max. four type 24 V thermo-actuators
- 9= Condensation guard
- 10= Lighting or on/off fan regulation, max. 2 A, 250 V

Controller connections

RJ12	RJ12	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24
3.1	3.2	-	+	C	NC	-	+	C	NC	G0	X4	G0	X5	G0	X6	G0	X7	G0	X8	G0	X9	G	G0	G	G0
		Modbus 2				Modbus 1				Sw	Occ	Pa	CO2	Ω	°C	Pwr	Pwr								

10V	X11	X12	X13	X14									
Y	Y	G0	Y	G	G0	Y	G	G0	Y	G	G0	Y	G
25	26	27	28	29	30	31	32	33	34	35	36	37	38

Table 12. Controller connections

The functions of the various connections are specified in the figure and in the table. Wiring terminals 1 – 24 are inputs for supply voltage and control signal transmission; wiring terminals 25 – 38 are outputs for regulation. All the wiring terminals can be connected with jacks.

Plinth	Type	Description
1	-	Modbus Master RTU -
2	+	Modbus Master RTU +
3	C	Modbus common
4	NC	Blind terminal, has no internal connection in the controller
5	-	Modbus Slave RTU -
6	+	Modbus Slave RTU +
7	C	Modbus common
8	NC	Blind terminal, has no internal connection in the controller
9	G0	System common
10	X4	Window switch 10 V DC
11	G0	System common
12	X5	Occupancy input 10 V DC
13	G0	System common
14	X6	Airflow input 0-10 V DC
15	G0	System common
16	X7	CO ₂ input 0-10 V DC
17	G0	System common
18	X8	Condensation guard
19	G0	System common
20	X9	Temperature sensor supply air
21	G	Power 24 V AC
22	G0	System common
23	G	Input Power 24 V AC
24	G0	System common

Plinth	Type	Description
25	Y	+ 10 V DC
26	Y	+ 10 V DC
27	G0	System common
28	Y	Control signal 0-10 V cooling valve
29	G	Cool valve on/off max load 72 VA
30	G0	System common
31	Y	Control signal 0-10V Heat valve
32	G	Heat valve on/off max load 72 VA
33	G0	System common
34	Y	Control signal 0-10 V supply damper
35	G	Power 24 V AC max load 25 VA
36	G0	System common
37	Y	Control signal 0-10V exhaust damper
38	G	Power 24 V AC max load 25 VA

Room control

Temperature

The built-in temperature sensors for supply air and room temperature have a measurement tolerance of ± 0.5 K. The time constant for the measurement is approx. 2 min. The controller has a built-in limiting function that prevents the airflow from increasing if cooling is required and the supply air temperature is higher than the room temperature. All the temperature limits can be changed using the TUNE Control hand-held terminal.

The airflow

The airflow is controlled in response to the needs of the room by means of the cooling (%) or heating (%) regulation variables. If these are 0%, the airflow set point will be the min. airflow or the vacancy flow if a connected CO₂ sensor does not indicate a higher airflow. When any of the variables increases toward 100%, the airflow will increase if the supply air temperature is lower, so that cooling can take place with air, or vice versa if heating with air.

Various operating modes

Normal operation, (occupancy)

The control system works to attain the temperature values for heating 21 °C, cooling 23 °C, i.e. a room value of 22 °C ± 1 K. These temperature set points can be changed using the TUNE Control. The airflow is controlled between the min/max limit settings.

Vacancy (energy save mode)

The control system works to attain new temperature set points: heating 20 °C, cooling 25°C, i.e. a room set point of 22.5°C ± 2.5 K. These temperature set points can be changed using the TUNE Control. The airflow is controlled down to the extract airflow, but if the temperature exceeds the new set point, 25 °C, the system begins cooling the room even if there are no occupants.

Change-over "heating with warm air"

The ADAPT controller has built-in functionality that can sense the difference between the room air and supply air temperature and in doing so can match the airflow to the function of your choice, i.e. cooling or heating with air.

Night-time cooling (chilling the building structure with free cooling)

The controller switches over to a new cooling set point, 17 °C. This can be initiated only via Modbus and a main control system.

Switching between various operating conditions

The switching between occupancy/vacancy is controlled via the DETECT O presence detector. Night-time cooling can only be initiated from the main control system via Modbus.

Modbus temperature functions

All the temperature values and settings can be reached via Modbus. For detailed particulars of all the variables, see the separate "WISE tables" that are available at www.swegon.com.

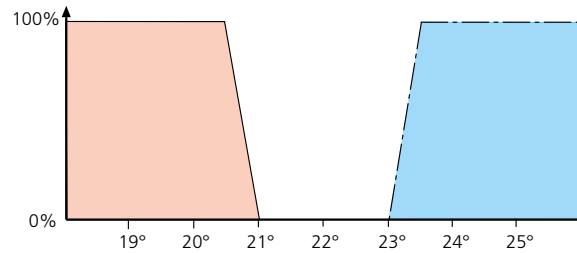


Diagram 5. The control process for occupancy and standard setting for temperature control, 0% corresponds to the min. airflow and no heating, 100% corresponds to the max. airflow or maximum heating.

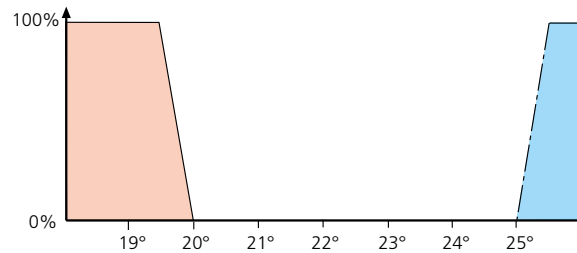


Diagram 6. The control process for vacancy and standard setting for temperature control

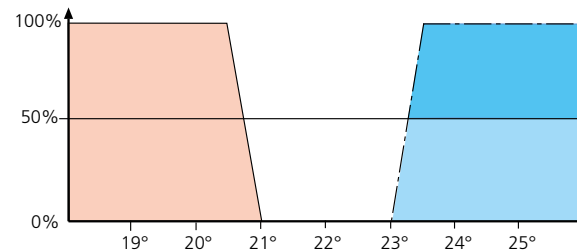


Diagram 7. 2-phase cooling. The control process for occupancy and standard setting for temperature control. When cool value has reached 50% the airflow is up to 100% and the 2nd step with water cooling starts.

TUNE Control hand-held room terminal

The wall-mounted room terminal can be installed as a wireless or fixed wired unit. The useful life of the battery fitted for a wireless connection is approx. 2 years. A warning indicator will appear in the terminal display when the battery voltage is low. A straight, type RJ12 LINK Modbus cable is used for the wired connection. The terminal display provides information about current operating modes and at the same time has set point adjustment for the room temperature. A changed room temperature setpoint will automatically return to the initial setting after 4 hours. This time can be changed.

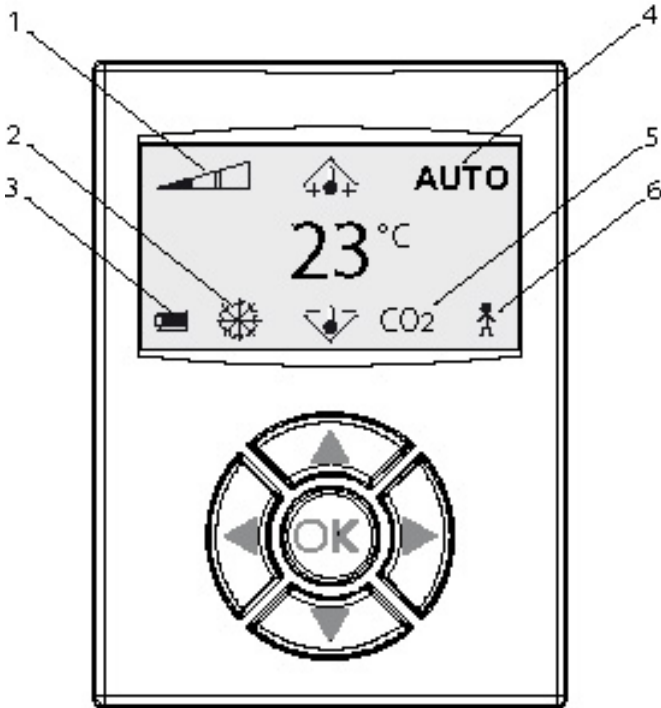


Figure 13. TUNE Control room terminal. The temperature displayed refers to the set point for the current control mode

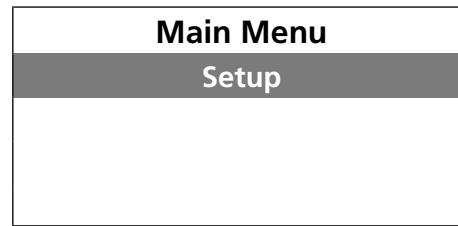
Key to the digits used in the figure:

- 1= Airflow scale in 3 steps, min., medium and max. airflow.
- 2= Cooling/heating symbol
- 3= Battery level, or window symbol if the window is open.
- 4= Operating mode: AUTO, MAN or STOP
- 5= CO₂-reading is shown when the CO₂ value > CO₂ min.
- 6= Occupancy symbol is shown only if someone is inside the room

Setting keys		
▲	UP	To increase the temperature set-point
▼	DOWN	To decrease the temperature set-point
Setting keys		
◀	LEFT	Used in the subordinate menus
▶	RIGHT	Used in the subordinate menus
Confirmation key		
OK	CONFIRM	Input to the subordinate menus, hold the key pressed in for 5 sec.

Room unit menu structure

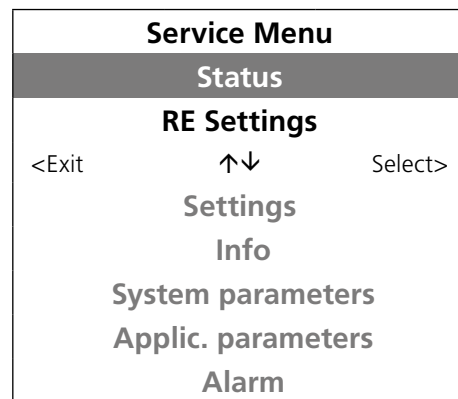
If the OK key is pressed and held pressed in for more than 5 sec., this menu will appear and give you access to more information.



Select Setup from the main menu to advance further, use the OK key and enter code 1919.

Service menu

In the menu structure, use the ▲ ▼ (up/down) arrow keys to advance to the menus that are shaded in the images below. At the lower edge of the menu screen, you will find information about what function the ◀ ▶ (left/right) arrow keys have.



Status

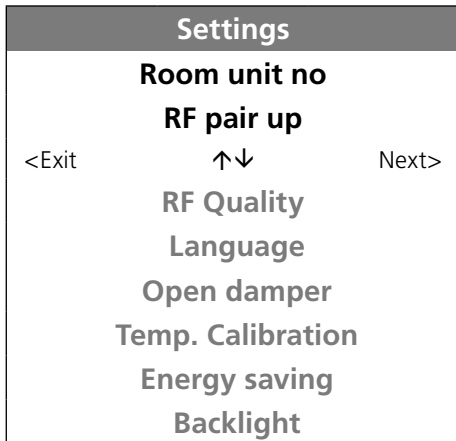
The current settings and certain actual values are shown in these menus.

Cool/Heat %	-67
SA Damp. pos %	100
EA Damp. pos %	43
<Exit	Next>

CO2 level ppm	-67
Supply air l/s	0
Exhaust air l/s	9
<Previous	Exit>

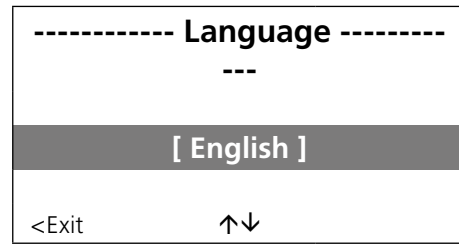
Settings

These menus are used for entering various basic settings for the function of the room terminal.



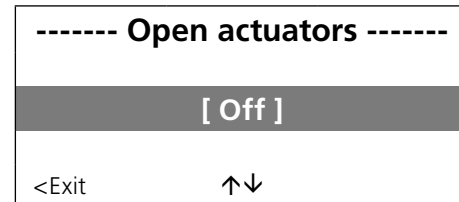
Language

Select the desired language in the hand-held terminal unit. The standard language setting on delivery is English.



Open actuators

Select [Off] if normal operation is to be enabled; select [On] for forced control to the open position. Used for testing the damper motor for correct function.

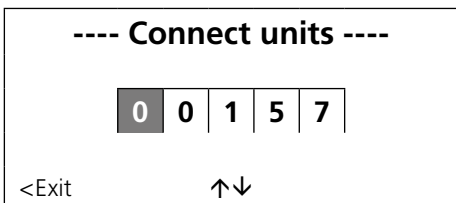


The room terminal's number.

It is possible to utilise two room terminal connected to the same controller for calculation of the mean room temperature in large rooms. If two room terminals are used, the two room terminals must have different identification numbers. You can set which terminal will be the first one and which will be the second.

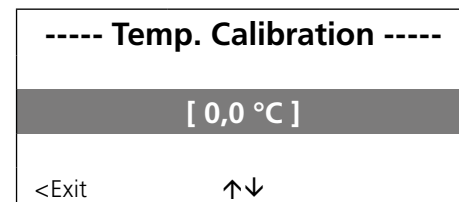
Connect units

In this menu, the RF number that appears on the controller rating plate can be entered. This enables the establishment of wireless communication with the controller. This is not required if the hand-held terminal is connected to the hand-held terminal unit by means of a communication cable.



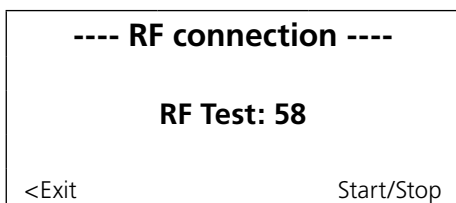
Temp. Calibration

There is provision in this menu for adjusting the built-in temperature sensor's value compared with the reading on a calibration thermometer.



RF Test

The quality of the wireless communication can be tested here. A value of >50 is required, the max. value is 100

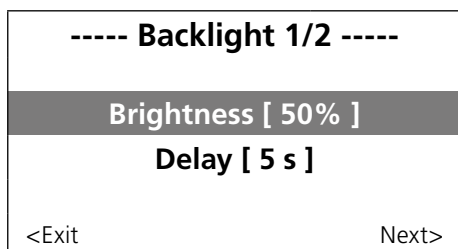


Energy saving

The function of the background lighting. None or Automatic with switch-off delay.

Background lighting

In this menu, you can set the background lighting in the room terminal. The background lighting is on only for a few seconds to save the battery. By pressing the right-hand key, you can select the next menu for setting the delay.

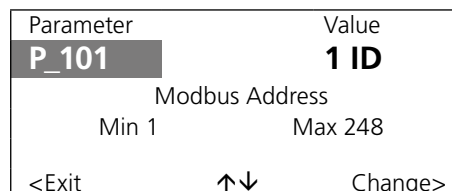


Info Menu

Information about the software versions, etc. is shown in this menu.

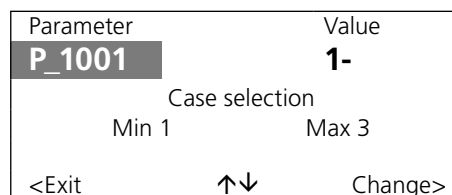
System Parameter Menu

The basic functions that affect communications and what application should be used can be set in these menus. These values are always preset at the factory and there are separate tables for these parameters. Upon leaving these menus all changes must be confirmed to be saved.



Application Parameter Menu

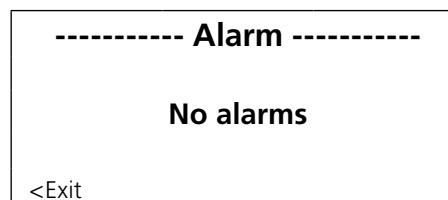
The function and the size-specific values for the controller can be set in these menus. These values are always preset at the factory. See the separate tables for these parameters, or the configuration document.



Alarms

The various types of alarms normally available in the controller are shown here.

PI overload denotes that the controller cannot reach its set point for room temperature or airflow. This may be due to excessively low pressure for example.



Occupancy control

DETECT Occupancy

There are pre-programmed delay times in the controller: the switch-on delay is set to 0; the switch-off delay is set to 20 minutes. The times can be changed with the TUNE Control. If the presence detector via the built-in relay is used for controlling the lighting (on/off), the switch-on delay must always be 0. When lighting control is not used, the switch-on delay can appropriately be set to 30 seconds.

Control of the lighting

The lighting can be switched on/switched off by means of the built-in relay. The wiring can be done after you have removed the cover on the controller. The max. permissible load is 5 A. If the HF air diffuser is to be controlled, the system must include an intermediate relay that can cope with the high currents.

Modbus occupancy functions

All the occupancy functions and settings can be reached via Modbus. For detailed particulars of all the variables, see the separate tables that can be fetched at www.swegon.com.

Air quality control

When air quality control is enabled, it applies to operation in both the occupancy and vacancy modes.

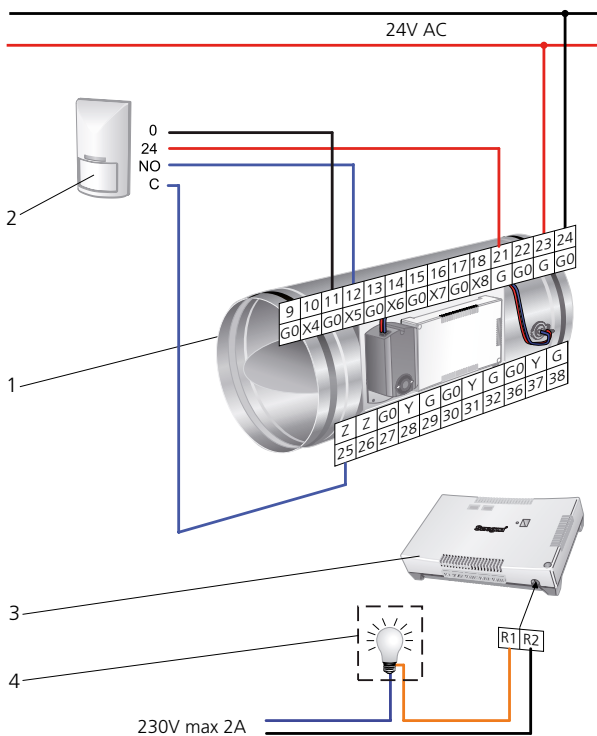


Figure 14. To connect the wall-mounted or ceiling-mounted DETECT Occupancy Note that the built-in temperature function must be disabled by disconnecting the jumpers for this function. The built-in R1 – R2 relay can be connected after you have removed the enclosure.

- 1 = CONTROL Damper
- 2 = DETECT Oa V 110 or T 360
- 3 = Controller mounted on CONTROL Da
- 4 = Lighting controlled via the built-in relay. Max. 250 V, 5 A.

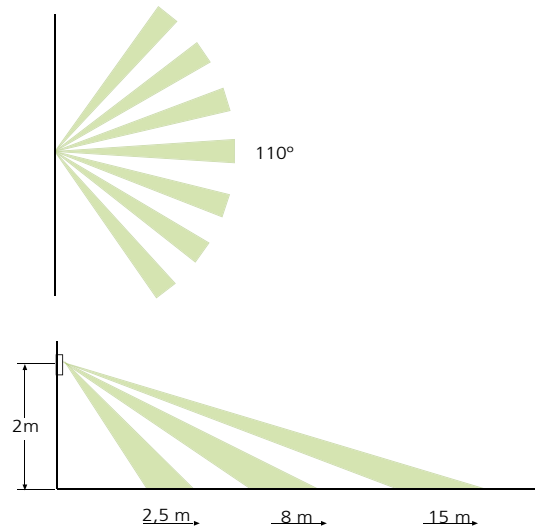


Figure 15. Coverage area of a wall-mounted DETECT Occupancy

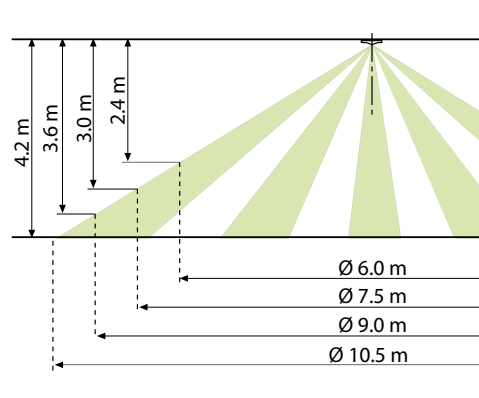


Figure 16. Coverage area of a ceiling-mounted DETECT Occupancy

Table 13. The setting of times in DETECT Occupancy

On	Off	Position	On	Off
● ●	■ ■	A	0 s	5 s
■ ■	● ●	B	10 s	1 min
● ●	● ●	C	30 s	5 min
● ●	● ●	D	1 min	10 min
● ●	● ●	E	5 min	20 min
● ●	● ●	F	10 min	30 min

Always switch off the power supply before repositioning the jumpers. DETECT Occupancy is supplied as standard set to position B for both delayed switch on and position A for delayed switch off.

Table 14. Temperature relay in DETECT Occupancy

Jumper	Temp °C	Description
● ●	24	
● ●	26	Enables normal regulation if the temperature exceeds the preset value
■ ■	28	
■ ■	15	
● ●	17	Enables normal regulation if the temperature is below the preset value
● ●	19	

To deactivate the built-in temperature control, disconnect the jumpers.

Heating control

A heat valve control system can be connected to the controller. The system makes it possible to control approx. 10 valves with a total capacity of 72 VA. Heating control can be selected as 24 V AC on/off and is then time proportional, or as 0 - 10 V DC.

Valve exercise is enabled and takes place at 72-hour intervals. The time is adjustable for 0 – 120 hours. 0 denotes that the function is shut off.

First open-function

The ACTUATOR valve actuator has first open function. The valve is then supplied set to an open position making it possible to fill and vent the radiator system without any problem. When the CONTROL Da has been energized, the valves must be enabled for at least 6 minutes so that the catches will release. The controller is equipped with a function for valve exercise, which involves energizing the valve for 8 minutes so that the catches release.

Modbus variables, heating control

All the values and settings can be reached via Modbus. For detailed particulars of all the variables, see the separate tables that can be fetched at www.swegon.com.

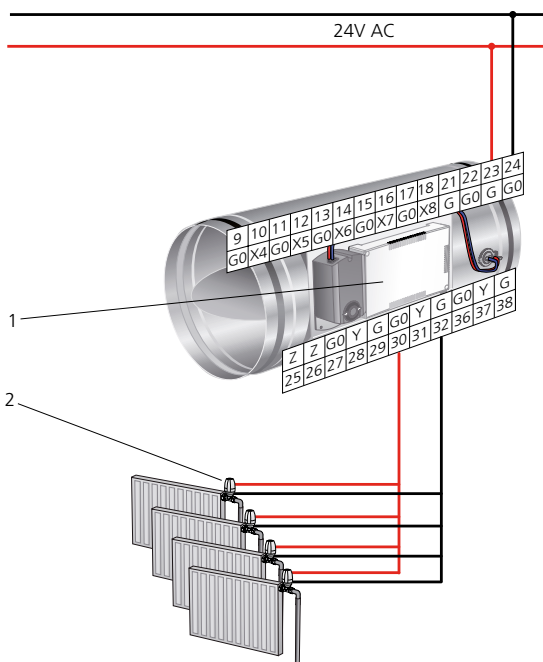


Figure 17. To connect the radiator valves. Max. 10 valves.
 1 = Radiator with wiring terminals suitable for connection with a jack.
 2 = Valve actuator for heating circuit, 24 V AC on/off or 0 - 10 V DC

Two-phase cooling control

The CONTROL controller can be configured for two-phase cooling in sequence with heating, first airborne cooling and if this is not sufficient the valve opens for waterborne cooling. The built-in relay can be configured to control the fan in a fan coil unit in one on/off step. The fan has a switch-off delay of 5 minutes. This delay is adjustable and prevents any disruptive start/stop during cooling operation. There is provision for connecting a condensation guard.

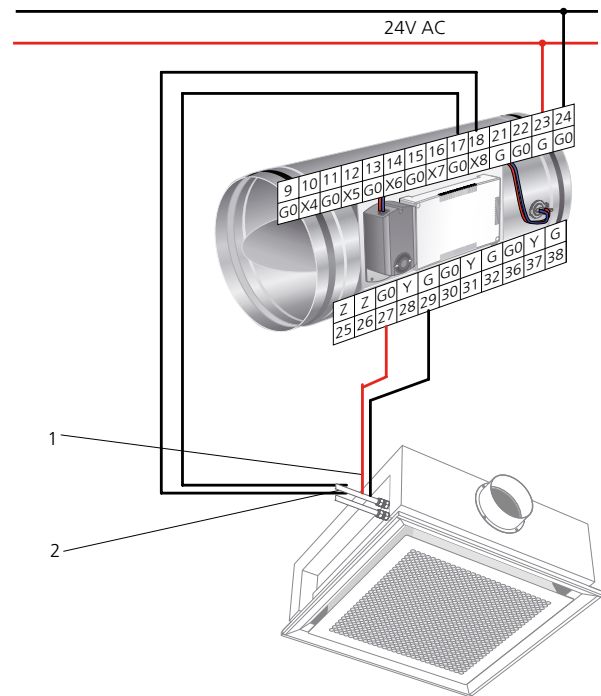


Figure 18. To connect the cooling circuit valve and the fan control system.
 1 = Valve actuator for cooling circuit, 24 V AC on/off or 0 - 10 V DC.
 2 = Condensation sensor

DETECT Quality

Air quality control with DETECT Quality 0 with a CO₂ signal to CONTROL Db. The CO₂ signal oversteers the temperature control function if the CO₂ value in the room becomes too high. The preset limit values are 800 - 1000 ppm. These values are set in the CONTROL controller. The air quality is regulated regardless of whether the system is operating in the Occupancy or Vacancy mode. If CO₂ control takes place independent of the room temperature, the air in the room is likely to be cooled down more than is necessary. If the heating control with radiator function has been enabled, the radiators will heat up if the room temperature becomes too low.

- DETECT Qa 0, single room sensor without display

Window contact

A window contact can be wired to CONTROL Damper. The contact should normally be closed when the window is closed. When the window is opened, all ventilation, cooling and heating is completely shut off. If the temperature should drop in the room, the frost protection function will switch on with a set point of 10 °C. The window contact must be enabled in Parameter P_1621.

Modbus variables, external control

All the values and settings can be reached via Modbus. For detailed particulars of all the variables, see the separate tables that can be downloaded from www.swegon.com.

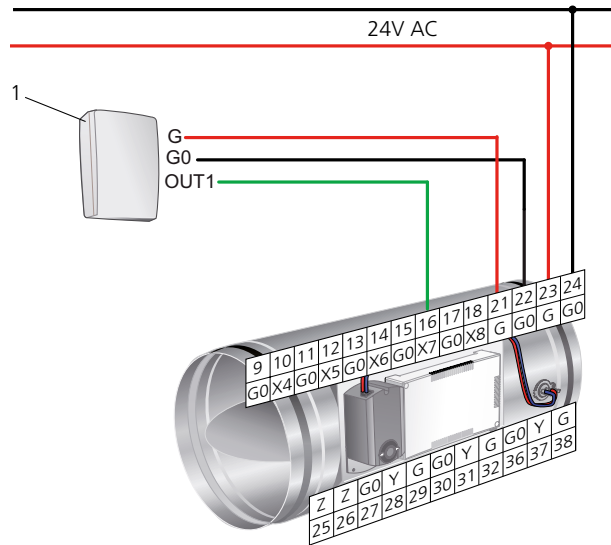


Figure 19. To connect accessories
1 DETECT Qa 0

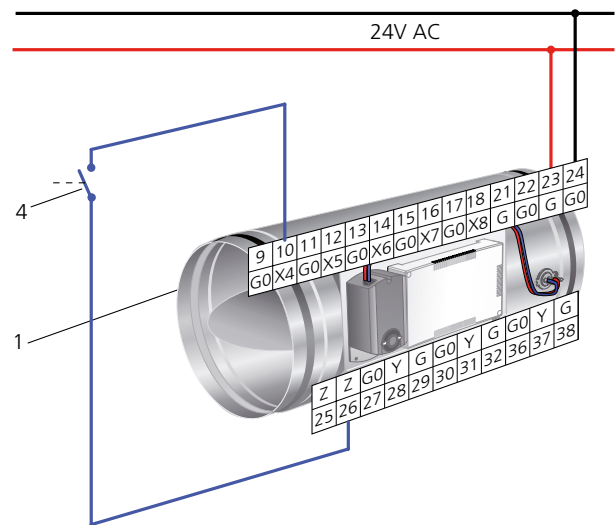


Figure 20. To connect a window contact
1 CONTROL Db
2 Window contact.

Connection for Modbus communication

The details apply to Program Version 0.18 or later.

CONTROL Damper has two different connections used for Modbus communication. The connections are used in different ways, depending on whether CONTROL Damper is configured for the Super WISE or a BMS system.

Mb 1 Communication loop to main control system in BMS mode (Damage). The communication settings can only be changed when CONTROL Damper is configured for the BMS mode, Dip switch 2 set to the ON position. The connection is Modbus slave.

Mb 2 Communication loop under CONTROL Damper zone damper or Super WISE Router. The communication settings are fixed and cannot be changed.

Terminations

CONTROL Damper has built-in termination resistance that can be enabled depending on where in the system the product is located, see table. The termination plug should be pulled outward using small pliers.

Modbus cables

A RS485 Serial Line is used in the WISE system (the cables must be shielded).

One end of each Modbus cable must be connected to protective ground, Gnd. On CONTROL Damper, the cable shield should be connected to Gnd (wiring terminal 4 or 8). This wiring arrangement is not shown in the figure because such wiring is only done on the first and the last controller, which are not necessarily CONTROL Dampers.

Category 5 cables with AWG24 area or better can be used for cable lengths up to 800 metres. The cable ends must be fitted with termination for fault-free operation.

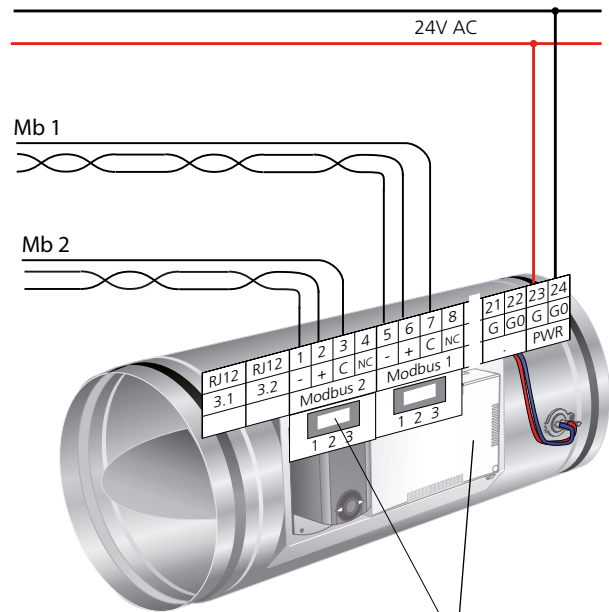


Figure 21. CONTROL Da room application Modbus connections. Explanation, 1=Termination resistance.

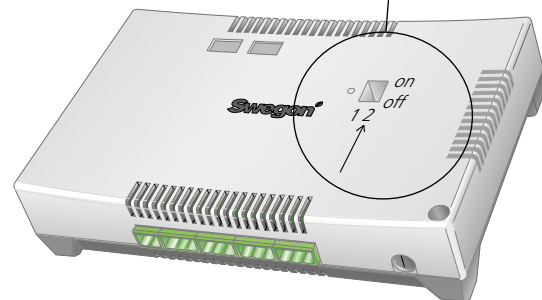


Figure 22. To set the switch for BMS mode on CONTROL Damper.

Table 15. Configuration, Modbus connections

Connection	Plinth	Function
Modbus 1	5-8	RTU Slave to BMS System
Modbus 2	1-4	RTU Slave to Super WISE
Modbus 3	RJ12	RTU Slave to TUNE Control

Note: it is possible to connect up to the network using one connection only: either Mb2 or Mb 2.

Table 16. Terminations

Mb 1 & 2 (Slave)	
In the middle of the loop	3
Last in the loop	1

CONTROL Damper – Zone functions

CONTROL Damper, with associated SLAVE Control slave damper for extract air, is supplied fully configured from the factory. Changes in the controlled pressure or airflow with offset can be made using the TUNE Control hand-held terminal.

Functions

- Pressure regulation in supply and extract air zones respectively
- Flow regulation of the slave unit or constant flow
- Slave flow regulation that sums several CONTROL Damper units via Super WISE
- Emergencies open or closed via Modbus RTU
- Circuit closure via external contact function
- Wireless hand-held terminal for checking and setting values

Installation

Separate installation instructions are available for CONTROL Damper and SLAVE Control. The dampers are always furnished with a code (see table below) that shows which function is preset. All the configuring can be changed afterward if the dampers have been installed at the wrong place.

Table 17. Configuration codes

Code	Function
PS	Pressure regulation and flow measurement in the supply air duct.
PE	Pressure regulation and flow measurement in the extract air duct.
PSFE	Pressure regulation in the supply air duct. Slave Zone of the extract air with a SLAVE Zone. Used most often when a supply air duct should control an extract air duct with or without offset. The PSFE option requires the accessory SLAVE Zone.
FS	Flow regulation in the supply air duct. Is most often used for constant flow regulation.
FE	Flow regulation in the extract air duct. Most often used when Super WISE calculates the flows to be regulated.
PED	Pressure regulation in the extract air with reverse operation where the GOLD unit or zone dampers is/ are used for balancing the airflow
MSFE	Measurement of airflow in the supply air duct. Slave control of exhaust air with SLAVE Zone. MSFE functionality requires that the product is combined with accessories, SLAVE Zone.
OS	Optimisation of the supply air duct
OE	Optimisation of extract air duct
OSOE	Optimisation of both supply- and extract air duct.
OSFE	Optimisation of the supply air duct. Slave control of extract air duct with SLAVE Zone. Is used to extract as much air as supplied to the zone. Separate offset can be set.

P = Pressure
 F = Flow
 S = Supply air
 E = Extract air
 D = Reverse exhaust air control
 M = Measurement of flow only
 O = Optimisation

These codes are translated to a numeric value that is programmed in the controller, see table below. Everything is usually preset on delivery from the factory.

Table 18. Values for programming.

Parameter	P_1701	P_1702	P_1703	P_1704	P_1705	P_1706
PS	2	2	0	1	0	1
PE	3	2	0	0	1	1
PSFE	1	2	0	1	1	1
FS	2	1	0	1	0	0
FE	3	1	0	0	1	0
PED	4	2	0	0	1	1
MSFE	5	1	0	1	1	0
OS	2	3	0	1	0	0
OE	3	3	0	0	1	0
OSOE	1	3	0	1	1	0
OSFE	1	4	0	1	1	0

N.B.! When a controller is to be "connected" to a group for summation of the airflows in Super WISE, strict rules apply to the Modbus ID number. This in combination with P_1701 defines the product for Super WISE. For further information about MB ID, see the section on Super WISE. The MB ID should be according to the table. It is important that the correct code is entered; otherwise Super WISE or TUNE Control cannot interpret data correctly. Normally, CONTROL Damper is delivered with all settings factory made.

Technical data

All technical and electrical data are specified in the catalogue leaflet for each product.

Connections

Connect the CONTROL Damper to 24 V AC supply voltage and protect the circuit with a maximal 6 A fuse. Wire all other connections to Modbus and other components according to the wiring diagram. The controller is equipped with jack-like screw terminals, which substantially simplify installation..

Requirements on wire cross-sectional areas

Supply voltage with 24 V AC to (1), at maximal 6 A is necessary. $\geq 1.0 \text{ mm}^2$. Signal wire from (3) to (1) maximal 30 m $\geq 0.75 \text{ mm}^2$. A 4-wire with 0.75 mm^2 should be fitted between (1) and (2). RKKX is an appropriate type of cable for use.

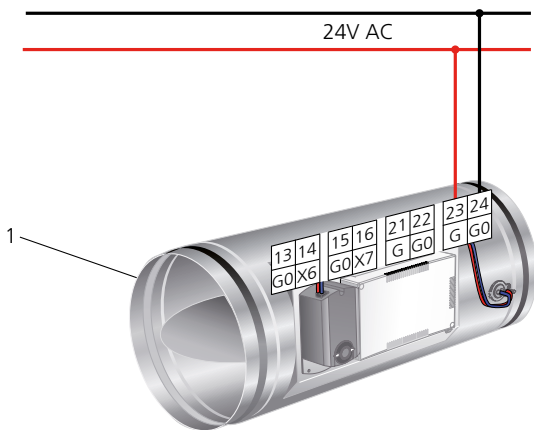


Figure 23. CONTROL Da Configuration Code FS and FE

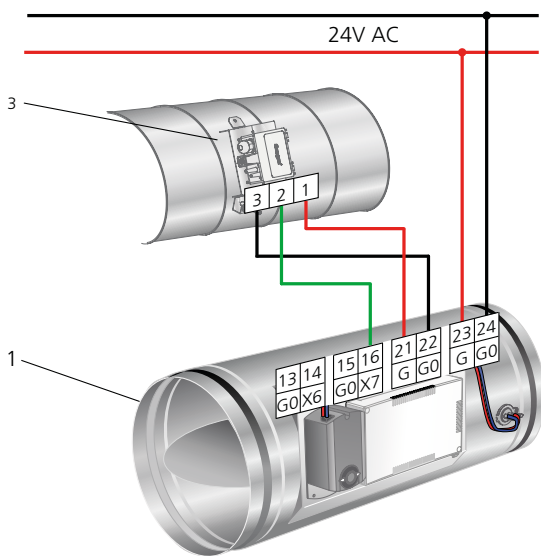


Figure 24. CONTROL Da configuration code PS and PE, PS must always be mounted on the supply air duct and PE on the extract air duct.

Explanations, figures 23-26

1. CONTROL Damper
2. SLAVE Control
3. DETECT Pressure pressure sensor
4. Exterior contact for shutting the damper off.

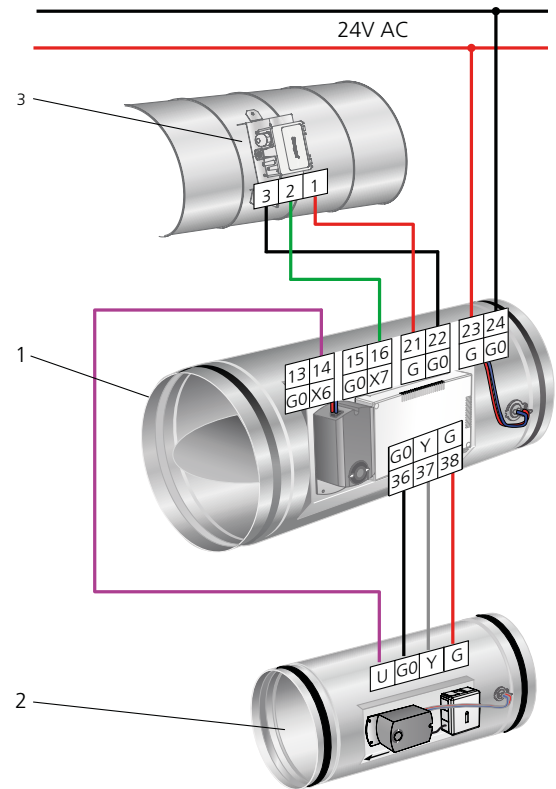


Figure 25. CONTROL Damper, configuration code PSFE with SLAVE Ca.

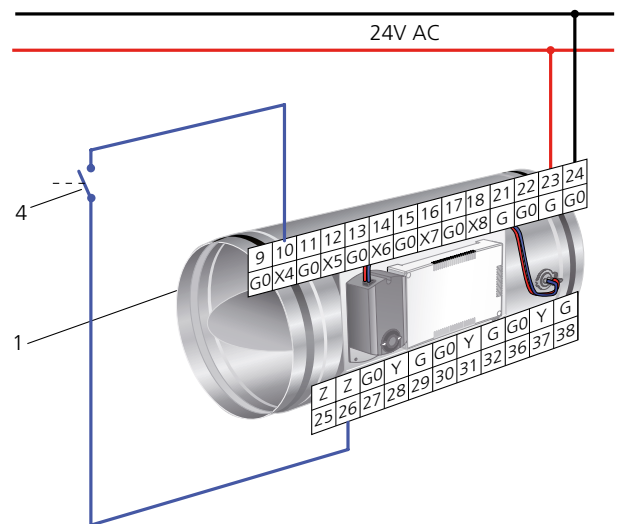


Figure 26. CONTROL Damper, further contact for switching off the function. The damper closes completely.

Connection for Modbus communication

The details apply to Program Version 0.18 or later.

CONTROL Damper has two different connections used for Modbus communication. The connections are used differently, depending on whether CONTROL Damper is configured for the Super WISE or a BMS system.

Mb 1 Communication loop to main control system such as Super WISE or BMS (Damage). The communication settings can only be changed when CONTROL Damper is configured for the BMS mode, Dip switch 2 set to the ON position. The connection is Modbus slave.

Mb 2 Communication loop to underlying room controllers in the WISE system. The connection is Modbus master, and must always be terminated in position 2.

Terminations

CONTROL Damper has built-in termination resistance that can be enabled depending on where in the system the product is located. The termination plug should be pulled outward using small pliers.

Mb 1 If CONTROL Damper is last in the Modbus loop; activate the termination to position 1, and otherwise position 3.

Mb 2 If CONTROL Damper is a master for an underlying loop of air diffusers; activate the termination to position 2.

Modbus cables

An RS485 Serial Line is used in the WISE system (the cables must be shielded).

One end of each Modbus cable must be connected to protective ground. On CONTROL Damper, the cable shield should be connected to NC (wiring terminal 4 or 8). This wiring arrangement is not shown in the figure because such wiring is only done on the first and the last controller, which are not necessarily CONTROL Dampers.

Category 5 cables with AWG24 area or better can be used for cable lengths up to 800 metres. The cable ends must be fitted with termination for fault-free operation.

Table 19. Configuration, Modbus connections

Connection	Plinth	Function
Modbus 1	5-8	RTU slave to Super WISE
Modbus 2	1-4	RTU master to room
Modbus 3	RJ12	RTU master

Table 20. Terminations

Mb 1 (Slave for the Super WISE loop)	
In the middle of the loop	3
Last in the loop	1
Mb 2 (Master for the room loop)	
First in the loop	2

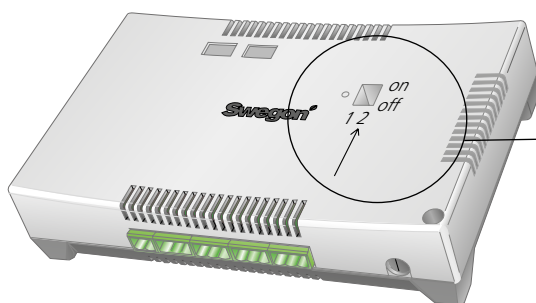


Figure 27. To set the switch for BMS mode on CONTROL Damper.

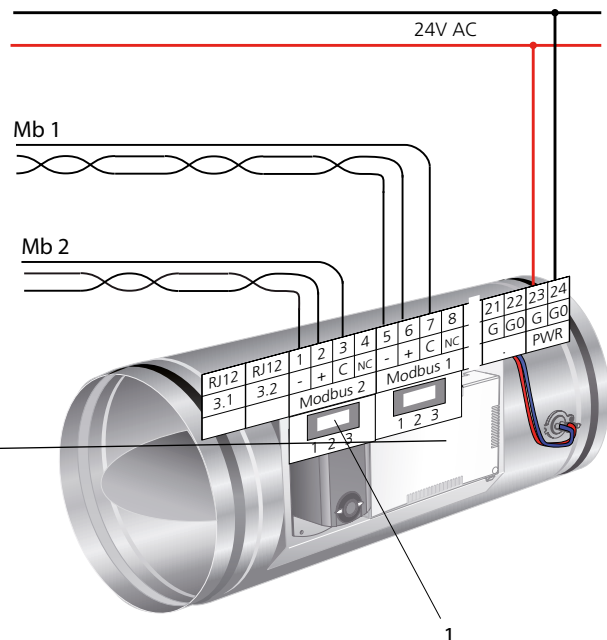


Figure 28. CONTROL Damper Modbus connections. Explanation, 1=Termination resistance, the settings are shown under the section entitled Network Structure.

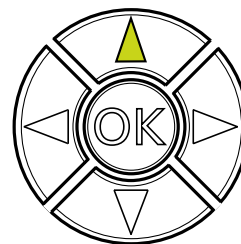


Figure 29. The key set.

TUNE Control

The parts of the hand-held micro terminal

1 Display

Shows the current status of the climate system and information about the pressure and airflow. It also shows the settings you enter with the key set.

2 Key set

Used for changing parameter settings.

To use the TUNE Control

The following section describes how the room terminal unit should be used for reading and changing values and settings.

The key set

The key set is used for navigating forward and back in the menus.

1 Keys for entering settings

- ▲ UP Next menu/parameter (increase)
- ▼ DOWN Previous menu/parameter (decrease)

2 Keys for entering settings

- ▶ RIGHT See the menu screen
- ◀ LEFT See the menu screen

3 Accept key for pressure and airflow

- OK CONFIRM Confirms the setting

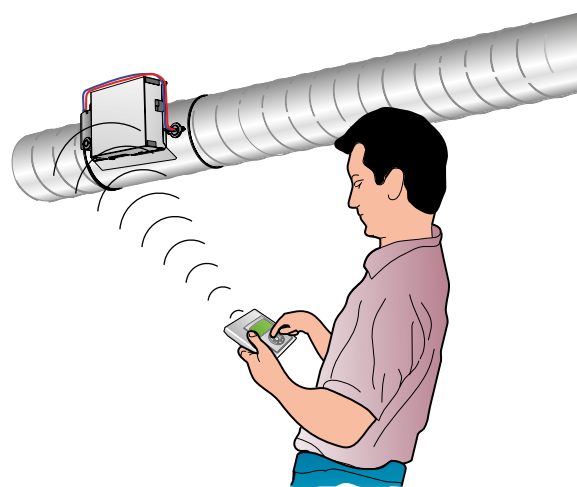
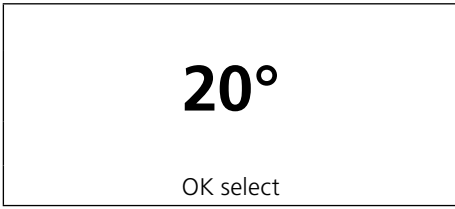


Figure 30. Wireless communication with CONTROL Damper. The communication distance is limited to <5 metres when the sheet metal cover is on the controller. If the cover is removed, the distance can be up to 20 metres including walls of a simpler type in between. If any communication problem should arise, the TUNE Control can be connected directly in the controller with the spiral cord to the RJ12 contact to the side of wiring terminal 1.

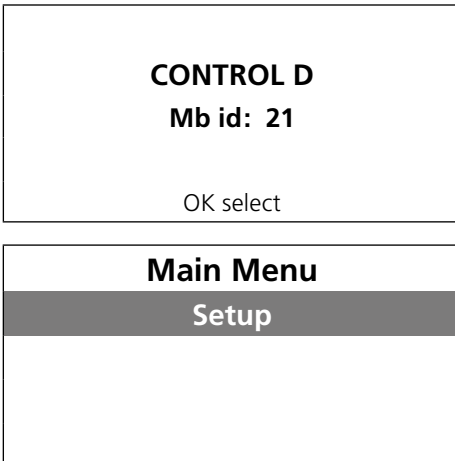
TUNE Control menu structure

The first menu will always show a temperature when the TUNE Adapt is started up with battery power for the first time.



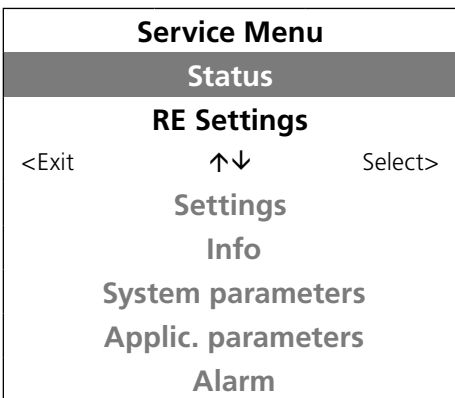
To readjust the TUNE Control to become a control unit for CONTROL Damper/Optimize, the following code must be entered: "1919". After that, set the correct RF frequency. Go to the "Connect units" menu. When communication has been established, the hand-held terminal display shows the name of the product to which it is connected. "No reception" will be shown if communication has been interrupted.

Then Setup is selected from the main menu. To advance further, the OK key is used.



Service Menu

In the menu structure, the arrow ▲ ▼ (up/down) keys are used to advance to the menus that are shaded in the images below. At the lower edge of the menu screen, information about what functions the arrow ◀ ▶ (left/right) keys have is presented.



Status

This menu shows whether the controller is force controlled which means that normal regulation is blocked.

Emergency	0
Manual	0
Switch	0
<Exit	

For normal control all the values should be 0. The emergency position signifies that a main control system has transmitted an "emergency signal" to the controller. This can cause the damper to be completely open or closed depending on the configuration.

Manual signifies that the user has forced the damper to a specific position.

Switch indicates that the connected contact function is enabled and that the damper is closed.

RE Settings, CONTROL Damper PSFE

The controller's actual values and set points for pressure and airflow are shown in this menu. The menu shows only the values that apply to the preset control function. In the menu example below, the controller is set to the PSFE function, i.e. Pressure regulation of the supply air and slave regulation with SLAVE Control.

Pos %	75	
SA Pa	31	30
SA l/s	210	
<Exit	OK select	Next>

The CONTROL Damper supply air damper, damper position, regulated pressure, pressure and airflow set points are shown in the first menu.

Pos %	65	
SA l/s	195	30
Offset l/s		-15
<Previous	OK select	Exit>

The extract air damper values are shown in the next menu. The set points can be changed in the right-hand column in both menus by pressing OK and then pressing the appropriate arrow key to increase/decrease the value, ▲ ▼ .

RE settings CONTROL Damper PS

The controller’s actual values and set points for pressure and airflow in the supply air system are shown in this menu. It is simple to change the set point for pressure. Press OK and increase/decrease with the arrow keys ▲ ▼. The airflow is not shown in the first version of TUNE Control. However, if you return the hand-held unit to us, we will update it free of charge to include this reading.

Pos %	75	
TL Pa	31	30
TL I/s	210	
<Exit	OK select	

RE settings CONTROL Damper PE

The controller’s actual values and set points for pressure and airflow in the extract air system are shown in this menu. It is simple to change the set point for pressure. Press OK and increase/decrease with the arrow keys ▲ ▼. The airflow is not shown in the first version of TUNE Control. However, if you return the hand-held unit to us, we will update it free of charge to include this reading.

Pos %	75	
FL Pa	31	30
FL I/s	210	
<Exit	OK select	

RE settings CONTROL Damper FS

The controller’s actual values and set points for airflow in the supply air system are shown in this menu. It is simple to change the set point for pressure. Press OK and increase/decrease with the arrow keys ▲ ▼.

Pos %	75	
TL I/s	244	250
<Exit	OK select	

RE settings CONTROL Damper FE

The controller’s actual values and set points for airflow in the extract air system are shown in this menu. It is simple to change the set point for pressure. Press OK and increase/decrease with the arrow keys ▲ ▼.

Pos %	75	
FL I/s	178	175
<Exit	OK select	

Settings

These menus are used for entering the basic settings.

Settings		
(MB Address)		
Connect units		
<Exit	↑↓	Select>
RF Test		
Language		

Modbus address

This menu function is not used for the zone version of CONTROL Damper.

Connect units

In this menu, the RF number that appears on the controller rating plate can be entered. This enables the establishment of wireless communication with the controller. This is not required if the hand-held terminal is connected to the hand-held terminal unit by means of a communication cable.

---- Connect units ----		
0	0	1 5 7
<Exit	↑↓	

RF Test

The quality of the wireless communication can be tested here. A value of >50 is required, the max. value is 100.

---- RF connection ----	
RF Test: 58	
<Exit	Start/Stop

Language

Select the desired language in the hand-held terminal unit. The standard language setting on delivery is English.

----- Language -----	

[English]	
<Exit	↑↓

Info Menu

Information about the software versions, etc. is shown in this menu.

Application		D1D2
Prog. version	0.20	0.24
Parameter ver.		5
Serial number	31297	157
Room temperature	23.2 C	
Battery level	5.8 V	
<Exit		

System Parameter Menu

The basic functions that affect communications and what application should be used can be set in these menus. These values are always preset at the factory and there are separate tables for these parameters. Upon leaving these menus all changes must be confirmed to be saved.

Parameter	Value
P_101	1 ID
Modbus Address	
Min 1	Max 248
<Exit	↑↓ Change>

Application Parameter Menu

The function and the size-specific values for the controller can be set in these menus. These values are always preset at the factory. See the separate tables for these parameters, or the configuration document.

Parameter	Value
P_1001	1-
Case selection	
Min 1	Max 3
<Exit	↑↓ Change>

Alarm Menu

Possible alarms are shown here, PI overload signifies that the control set point cannot be obtained.

----- Alarm -----
No alarms
<Exit

Super WISE

Super WISE is a complete computer that communicates with all Swegon products that are included in the WISE and Conductor system as well as the GOLD air handling unit. Super WISE operates also as a Gateway to the controlling intelligent building system.

Functions:

- Pressure optimisation of the supply air and extract air fans
- Addition and subtraction of airflows within a zone
- Can manage 10 zones with up to 8 dampers (CONTROL Damper) in each zone
- Up to 60 rooms can be connected in each zone
- Gateway to building automation via Modbus RTU, Modbus TCP or BACnet TCP
- Flat data structure permits access to more than 50 variables per damper or room controller
- Built-in web page for supervision of all Swegon connected zones and room products
- Logging function with saved data for up to 90 days
- Fire, summer night cooling function from GOLD down to room level.

Optimisation function

When connected together with the GOLD, the Super WISE has a fully developed function for optimising the performance of the fans. Communication is carried out via Modbus RTU connection via RS-485. The optimising function fetches information about the damper blade positions of all the connected up zone dampers, supply air and extract air respectively are separated from one another. The optimising function adjusts the pressure regulation in the GOLD air handling unit so that at least one damper (both supply air and extract air system) is at least 80% open in the system the whole time. If any damper is more open than 90% the pressure in the air handling unit will increase. The recommended limit values are 80-90%.

Summation in zones

All the airflows of the master dampers are added/subtracted in each zone. The result is then divided among the connected slave dampers in the zone.

Table 21. Grouping of dampers.

Damper no.	Damper type	Zone (0-9)
1	Supply air damper	Master 1
2	Supply air damper	Master 2
3	Supply air damper	Master 3
4	Supply air damper	Master 4
5	Extract air damper	Master 5
6	Extract air damper	Slav 1
7	-	Slav 2
8	-	Slav 3

Example:

$$\text{Master 1} + \text{Master 2} + \text{Master 3} + \text{Master 4} - \text{Master 5} = \text{Slave 6}$$

Table 22. MB ID system of the dampers.

Damper no.	Type of damper	Zone 0 MB ID	Zone 1 MB ID	Zone 2 MB ID	Zone 3 MB ID	n	Zone 9 MB ID
1	Master	1	11	21	31	.	91
2	Master	2	12	22	32	.	92
3	Master	3	13	23	33	.	93
4	Master	4	14	24	34	.	94
5	Master	5	15	25	35	.	95
6	Master	6	16	26	36	.	96
7	Master	7	17	27	37	.	97
8	Master	8	18	28	38	.	98
6	Slave	134	144	154	164	.	224
7	Slave	135	145	155	165	.	225
8	Slave	136	146	156	166	.	226

Up to 8 dampers can be defined in one zone. All 8 of these can be master dampers, and no slave flow calculation will then be carried out. Max. 3 slave flow dampers can be defined per zone. All the master dampers will then be added up and the airflow will then be divided among the slave dampers that have been defined. Swegon recommends always specifying the slave dampers last on the list (dampers 6 – 8)

Super WISE web page

A separate handbook that provides a detailed description of all the functions, the Super WISE Manual, is available for downloading at www.swegon.com.

The functions of the web page in a nutshell:

- Presents the network in the form of a tree structure similar to that of the Windows File Manager
- Provides a graphic overview of the zone dampers and room illustrations
- Offers access to detailed data for all the zone dampers and room controllers
- A number of tabs for supervision and settings

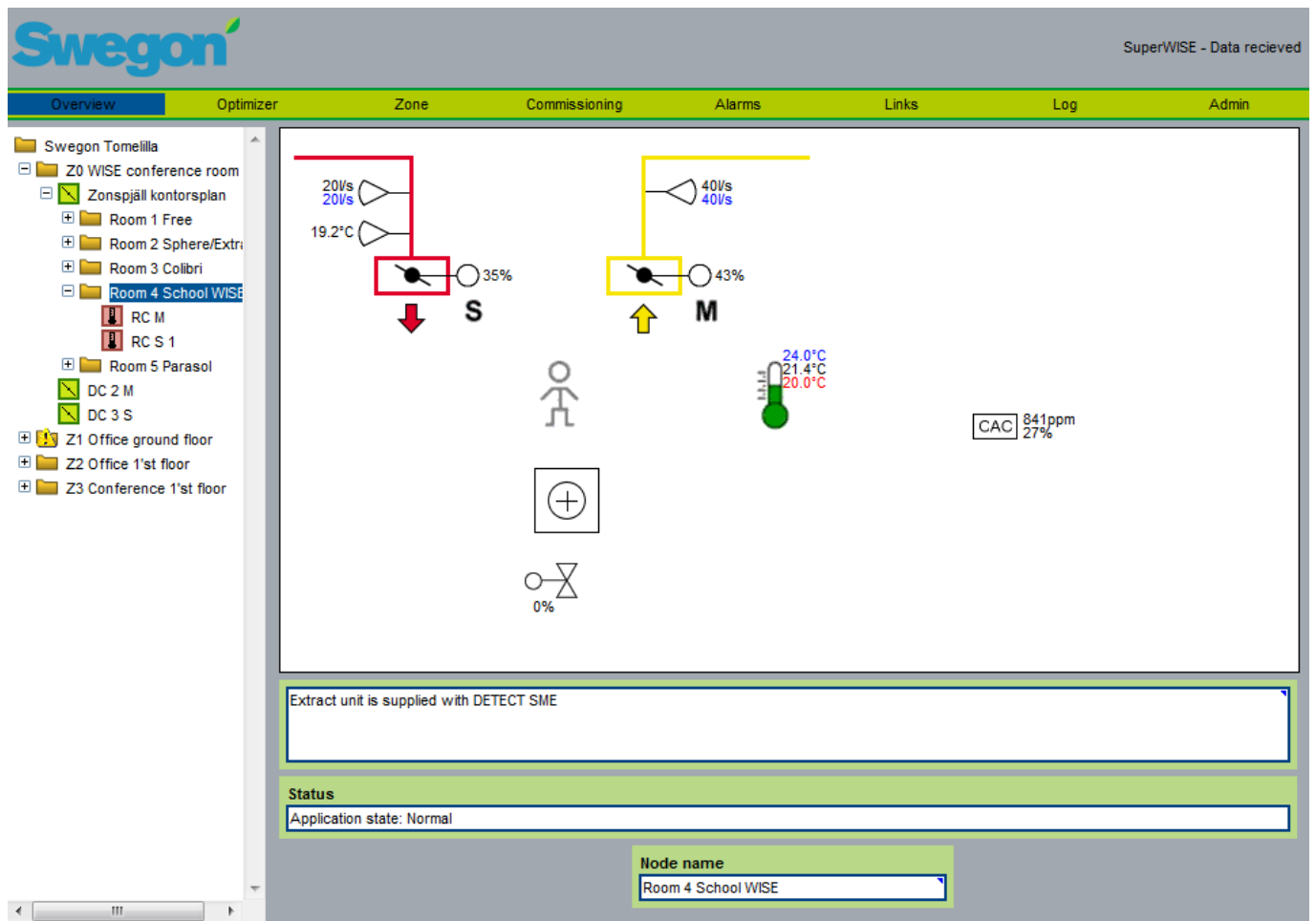
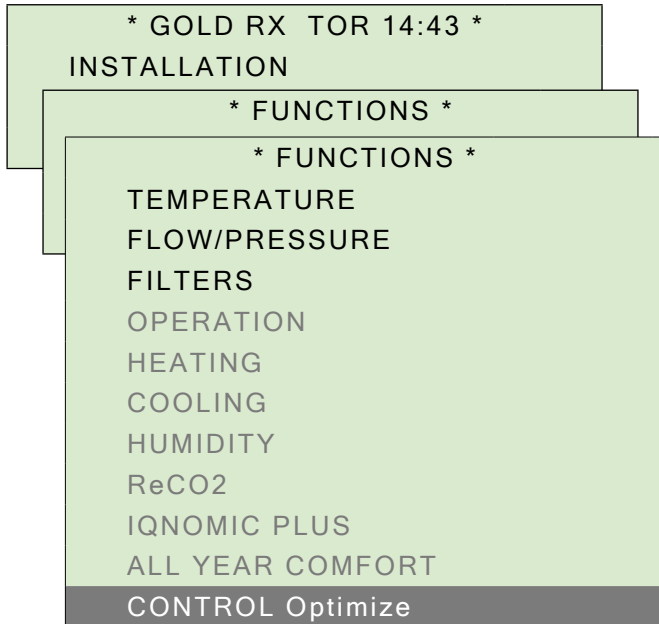


Figure 31. The illustration shows the Super WISE web page.

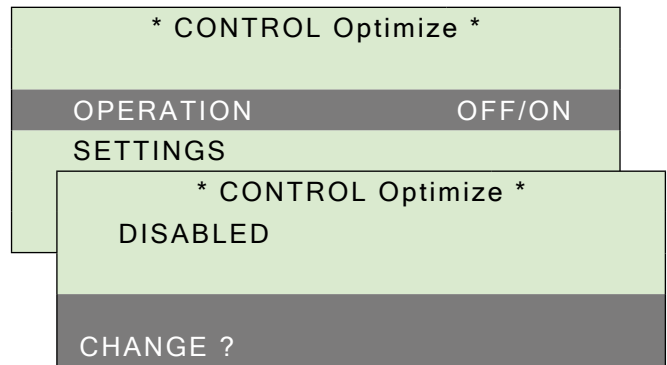
Settings in the GOLD

To enable communication between the GOLD – Super WISE, enter the settings in the hand-held micro terminal of the GOLD under the Functions Menu. The GOLD must have Program Version 5.08 or better.

There is a special tab on the web page for setting the function with Super WISE optimising. The CONTROL Optimize function has equal status with Super WISE in the hand-held terminal.

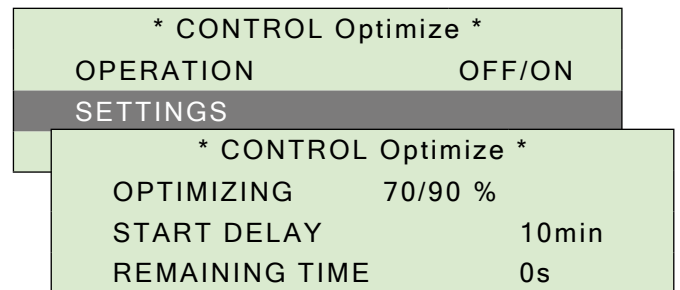


Check that the function for CONTROL Optimize is enabled.



Settings for optimising

The basic settings for the damper positions used for optimising can be changed here. The changes are automatically saved in Super WISE.



CONTROL OPTIMIZE		PS/FS		PE/FE	
Function	Active	Supply air 20	46%	Extract air 50	100%
Upper damper limit	90%	Supply air 21	0%	Extract air 51	0%
Lower damper limit	70%	Supply air 22	0%	Extract air 52	0%
Step size	5Pa	Supply air 23	0%	Extract air 53	0%
Interval	1Min	Supply air 24	0%	Extract air 54	0%
Allowed deviation	5Pa	Supply air 25	0%	Extract air 55	0%
Start up delay	5Min	Supply air 26	0%	Extract air 56	0%
Time to start optimize	0s	Supply air 27	0%	Extract air 57	0%

Figure 32. The illustration shows the GOLD Web page, Tab for C Optimize. You can enter all the settings using the web page instead of doing so in the hand-held terminal. The illustration is cut off at the bottom edge. When Super WISE is connected, not all the damper positions are shown in the table on this page. These positions can be read directly in the Super WISE.

Super WISE communication

The Modbus structure with Super WISE

Swegon's CONTROL Damper zone damper acts as a router and divides the network into smaller parts. All the air diffusers and room dampers in one zone should be wired to the same loop, a so-called zone loop. A zone usually consists of two or more zone dampers. We suggest that you choose a supply air damper as a router with all the room products subordinate to it. The room products are Modbus slaves and the zone damper is the Modbus master. This should be done for all the zones in the system. In systems without CONTROL Damper, the Super WISE Router will be used as the communication unit between Super WISE and the room products.

Also wire all the zone dampers in the ventilation system together on the same loop, a so-called system loop, under the Super WISE. Note that also the zone dampers that do not have a subordinate room loop wired to them must be wired to Super WISE.

Technical network requirements

Network cable	Belden 9841NH
Cable cross sectional area	min AWG 24 or 0.20mm ²
Cable length	Max. 600 m
Termination	120 Ohm
Number of nodes/loops	Theoretically 245 nodes/loops, in practice: 90
Protocol	
Modbus RTU	RS485
Adjustable speed	9.600 - 19.200 - 38.400
Word length, fixed	8 bits
Stop bits, adjustable	1 or 2
Parity, adjustable	none - odd - even

The Modbus network structure without Super WISE

A system that is able to communicate via Modbus on various levels is required in order to be able to use the main control functions.

Modbus RTU

All the zone and room products in the WISE system are capable of intercommunication via the open Modbus RTU protocol. The Modbus variables for all the products can be downloaded from Swegon's home page.

The system operates excellently in the "Stand-alone" version. This means that air diffusers and dampers do not need to be connected up to a main control system in order to obtain full functionality.

Factory configuration

All the Swegon products can be supplied preconfigured from the factory, with the design flows, temperature requirements, control function, marking, Modbus speed and optional Modbus address. If Super WISE is included in the system, the modbus address should be placed according to a special schedule. This enables Super WISE to automatically identify all the Swegon controllers.

Modbus lists (tag list)

A complete and separate document is available containing all the Modbus variables and parameter tables for all the different products in the WISE system. The document can be downloaded from www.swegon.com.

Terminations

CONTROL Damper, Super WISE Router and the CONDUCTOR products have built-in termination resistance that can be enabled if the product is first or last in a Modbus loop.

Table 23. Terminations

Position	RTU type	Termination
First on loop	Master	2
Centre of loop	Slave	3
End of loop	Slave	1

Table 24. Modbus types, Mb1 and Mb2.

Product	Connection	RTU typ
CONTROL Damper zone	Mb1	Slave
CONTROL Damper zone	Mb2	Master
CONTROL Damper room	Mb1	Slave
CONTROL Damper room	Mb2	Slave
CONDUCTOR	Mb1	Slave
CONDUCTOR	Mb2	Slave

Network, example 1

Schematic image of a Modbus network where WISE is used in combination with a GOLD air handling unit. Each zone section must be terminated "T". In the CONTROL Damper there is a built-in termination resistor that you must move to the correct position. A separate 150 Ohm termination resistor must be wired inside the junction box of the ADAPT diffusers. In this installation, the Modbus communication in the ADAPT products must always be set for 38.400 - 1 stop bits and no parity.

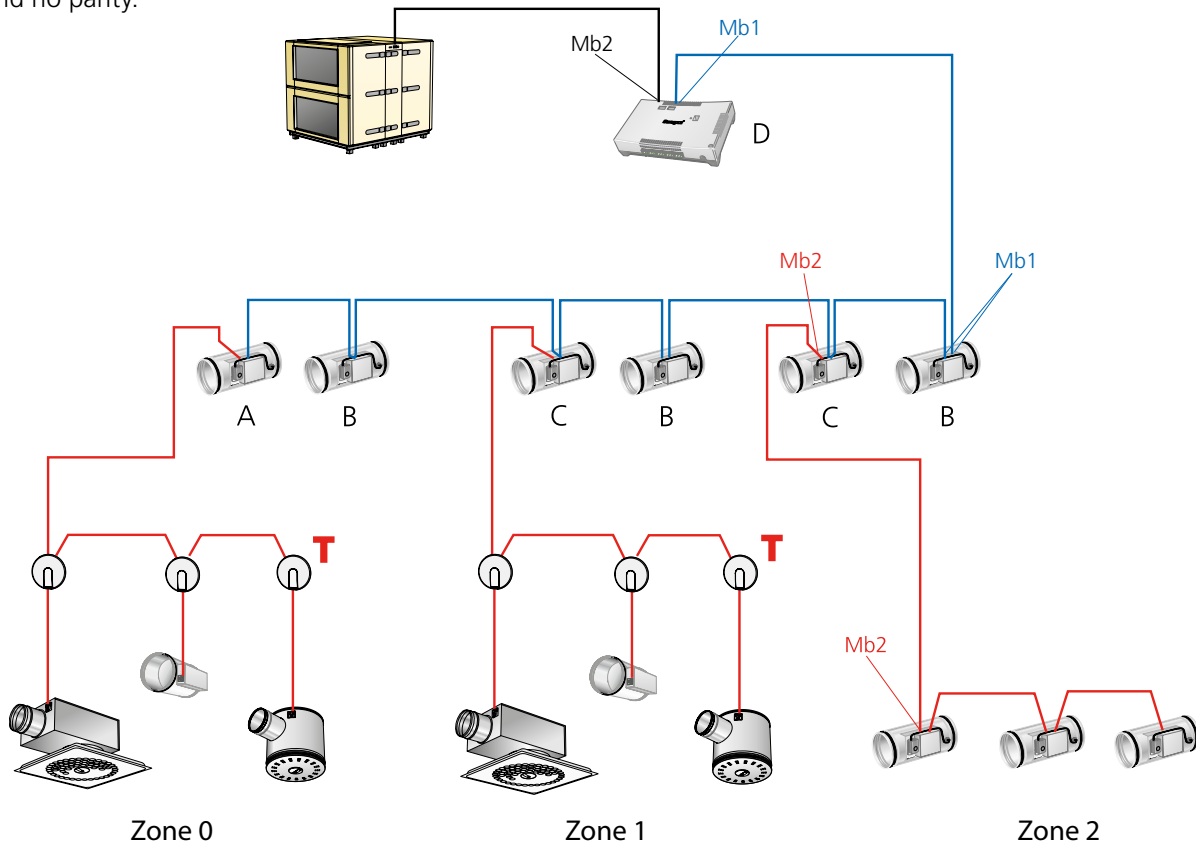


Figure 33. Schematic image of a Modbus network, where the Super WISE is used in combination with a GOLD air handling unit. Mb1 for plinths 5-8, Mb2 for plinths 1-4. Zone 3 is for CONTROL Da FSFE or CONDUCTOR W1-W4. Explanations: Mb1 refers to wiring terminals 5 - 8, Mb2 refers to wiring terminals 1 - 4. Zone 3 can be room controller CONTROL Da FSFE or CONDUCTOR W1-W4.

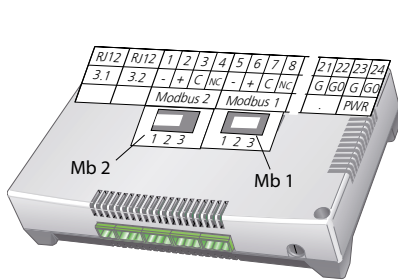


Figure 34. Terminations (C) for Super WISE Router. Mb1 position 3, Mb2 in position 2.

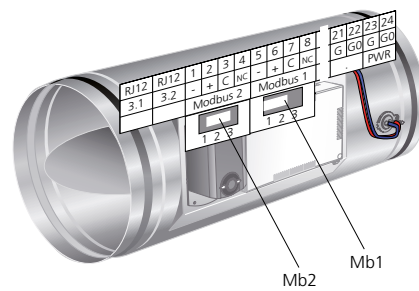


Figure 35. Terminations for CONTROL Damper (1) in the upper figure. Mb1 position 1, Mb2 always in position 2.

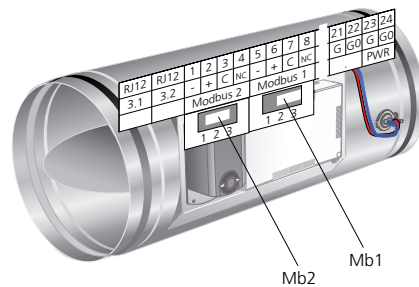


Figure 36. Terminations for CONTROL Damper (2 and 3) in the upper figure. Mb1 position 3, Mb2 in position 2.

Table 25. Terminations

Location	Type RTU	Termination
First in the loop	Master	2
In the middle of the loop	Slave	3
Last in the loop	Slave	1

Network, example 2

Schematic image of a smaller Modbus network where the WISE is connected up to a main BMS/SCADA control system. Termination should be carried out as shown in the figure. The theoretical network length will be 600 metres with a theoretical 128 items however in practice 60 dampers and room products. CONTROL Damper must be set to BMS mode by setting Ohm switch 2 to position ON, see the figure. In the BMS mode, the communication interface can be changed according to the table "Technical Network Requirements".

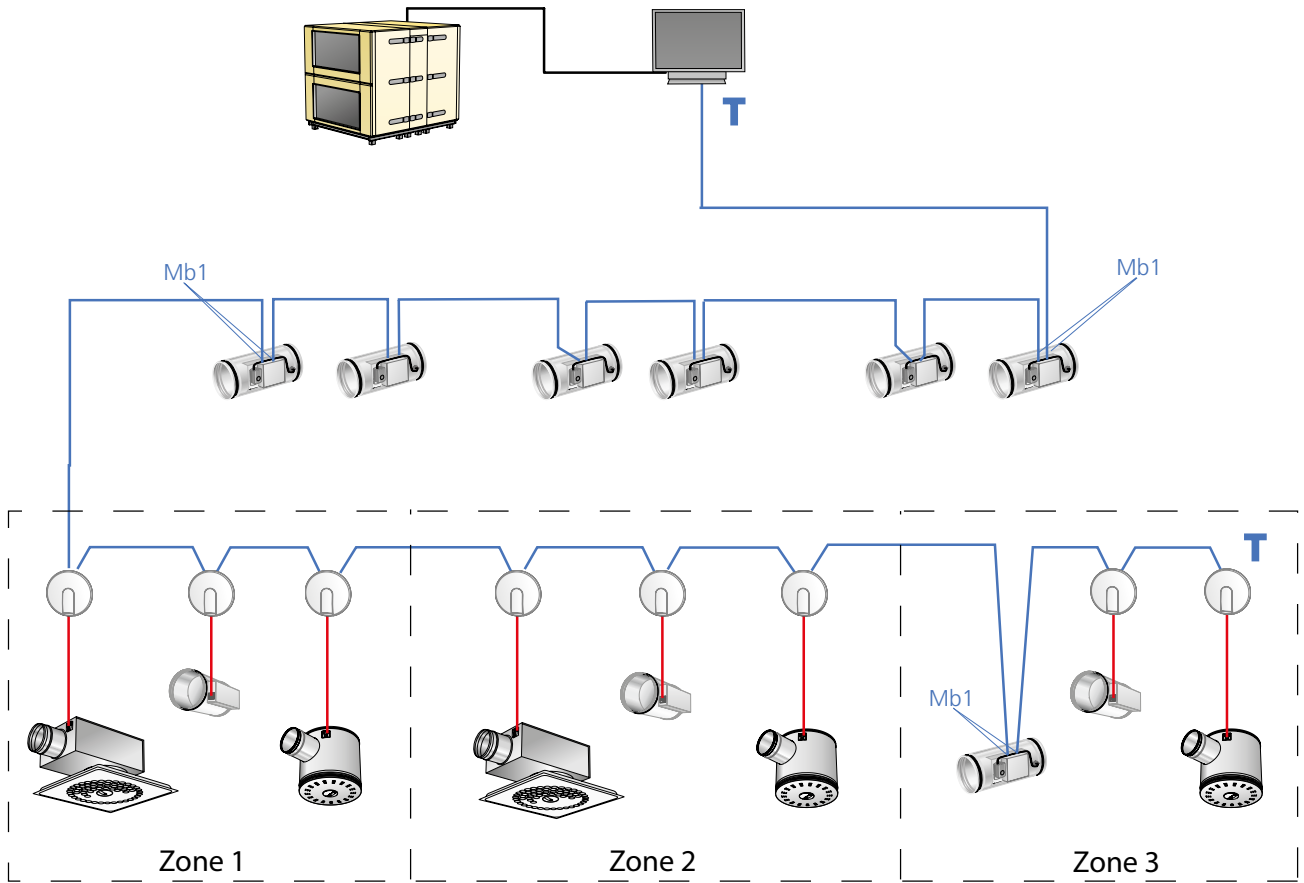


Figure 37. Schematic image of a smaller Modbus network where the WISE is connected to a main MBS/SCADA control system. In Zone 3 a CONTROL Damper FSFE is shown for room application, can also be a CONDUCTOR controller. Termination (T) must be wired last in the loop. If it is a CONTROL Damper then it has a built-in termination resistor. The red wires in the figure are LINK Modbus. All the others are network cables for Modbus RTU communication.

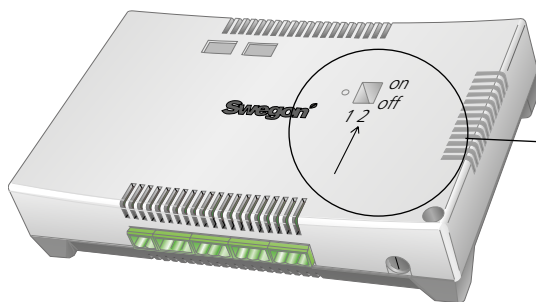


Figure 38. To set the switch for BMS mode on CONTROL Damper. After this change, the controller must be restarted.

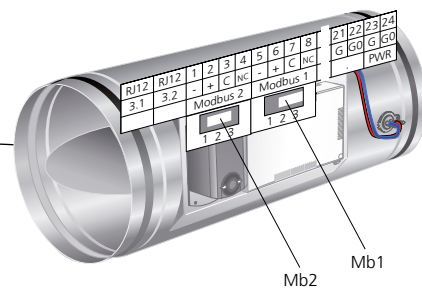


Figure 39. Terminations for CONTROL Damper. Mb1 position 3, if the controller is last in the network loop (zone 3 for instance) the termination should be 1.

Super WISE network structure

Super WISE installed in a system with GOLD units requires one Super WISE per air handling unit. The optimising function communicates with the air handling unit via RS485. The communication upward via ETHERNET makes the Super WISE and the GOLD air handling units accessible, on one hand via web browser on the other via the main intelligent building system via Modbus TCP. It is possible to connect the main control system via the RS485 interface with Modbus RTU, Modbus TCP or BACnet TCP.

Installation instructions

Separate instructions are available for download at www.swegon.com. These instructions provide detailed information about selecting cables and the composition of the network structure.

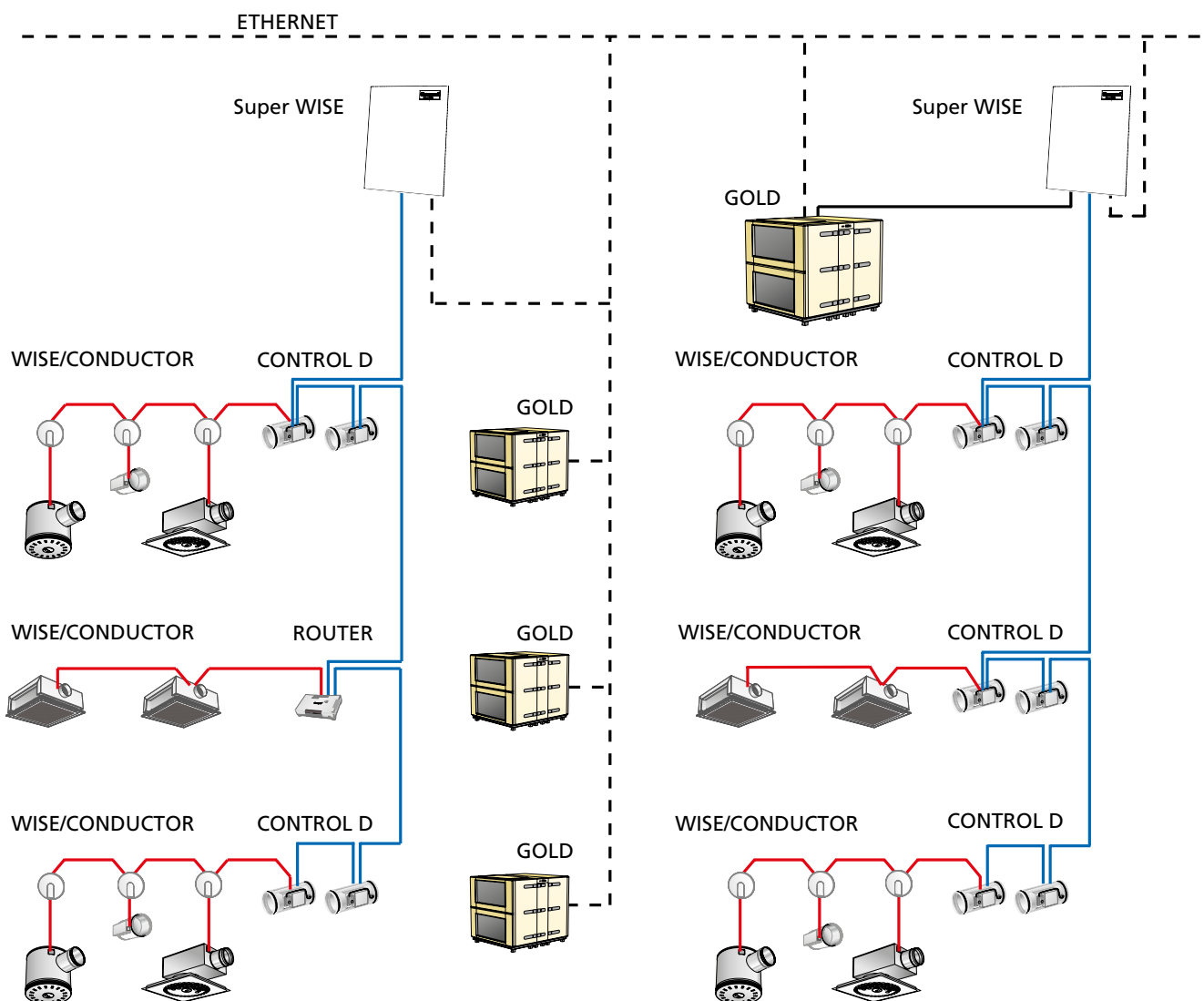


Figure 40. Shows how the various components are installed in a building. The left-hand sections shows a Super WISE that is not connected to the air handling unit: consequently no optimising can take place. The right-hand section shows the connections necessary for enabling the optimising function.

Explanation:

The dashed black line denotes upward communication to ETHERNET.

The solid black line denotes connection to the GOLD for the optimising function.

The blue line denotes connection between the zone loop and the zone dampers and routers.

The red line denotes connection of the room loop from the zone/router to the room regulators..

Adjustment

If all the ADAPT Diffusers and ADAPT Dampers are supplied as "default", i.e. set to the standard settings for air flows, etc., then all the air diffusers and registers must be set for the air flows, at which the air diffusers and registers must operate before you begin adjustment. In the adjustment mode, the air diffusers (forced) are set to maximum. airflow. This is evident by the LED which has a steady orange glow. If the rooms have balanced ventilation, make sure that the door is open during the adjustment process. The extract air system is normally adjusted first.

To adjust the system without optimization

- Zone damper (1) controls the pressure in the zone to given static pressure. Reference pressure (2) is normally preset to $P_s=40$ Pa at the factory.
- Look for the reference zone (the zone that has the lowest flow expressed as a percentage compared to the design max. flow). This can be done simply by reading the current airflow in each zone damper using the TUNE Control hand-held terminal.
- Shut off x number of zone dampers (3) that correspond to the flow which is deducted from the max. flow based on the diversity factor (in order to guarantee airflow to the remaining zones). Use TUNE Control, and adjust CONTROL Damper to the closed position by temporarily reducing the pressure set-point or the air flow.
- Inspect all the diffusers in the reference zone and check that they are energised and operate correctly.
- Adjust the reference pressure (4) of the air handling unit until the design zone damper is 85-90% open. This applies only to systems that do not have CONTROL Optimize.
- Read the total design airflow for the zone across the zone damper (1). If needed, increase/decrease the reference pressure in the zone damper. Both the airflow damper position and pressure reading are visible at the same time in the display and the pressure set-point can be immediately changed if required. If the pressure is too high, you can find out why only by connecting up to the design room and checking its damper position, which should be between 70-90% open.
- Then connect up one diffuser in the zone. Begin with the extract air if there is balance in the room. Check the diffuser size and the design set points. Read the current airflow (actual value), then reset the adjustment level to min flow and read the same. Finally reset the adjustment level to the unoccupied flow rate, and check this as well. Disconnect the adjustment level and enter the data in your report. We also recommend that you simultaneously begin commissioning, by checking the presence detector and other control functions, if any, such as CO₂, radiator in sequence etc. This will save much time and money. If there are slave air diffusers in the room, they must also be checked separately.

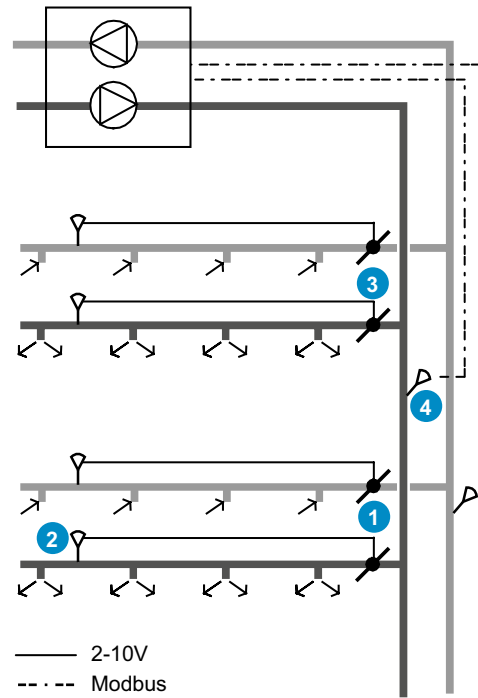


Figure 41. Overall view of a system with the following components:

- 1 = Zone damper, CONTROL Damper
- 2 = Pressure sensor, DETECT Pressure
- 3 = Zone damper, CONTROL Damper
- 4 = Locations of the pressure sensors in the air handling unit

- Follow the same procedure for every diffuser/damper in the zone.
- When all the zones except the shut-off zones are ready and checked, adjust these zones to normal operation. Carry out the same performance check as that described above.
- When the last zone has been checked and its data has been entered in the report, the system is adjusted, started up and operational.
- Follow the same procedure for the supply air.
- If the extract air is centrally located, check its airflows directly in the zone damper.

To adjust the system with optimisation

Using our Super WISE system optimiser (5) offers you several benefits: You can place the unit pressure sensors (6) close to the air handling unit without having to search for a design zone for supply air and extract air respectively. Super WISE is connected together (Modbus RTU) with all the zone dampers and reads each damper position. It then lowers the pressure generated by the air handling unit until one damper is almost fully open. In this way, the air handling unit always uses the least possible energy regardless of the min. or max flow setting.

- Check that Super WISE is operating. Do so via the GOLD air handling unit hand-held terminal or web page. All the positions of the zone damper can be seen on the web page.
- Choose an x number of zones that are to be deducted based on the diversity factor, select the zones that have the least percentage opening %, "close" these zones. Use TUNE Control, and adjust CONTROL Damper to the "closed" position by temporarily reducing the pressure set-point or the air flow.
- Set the air handling unit's max. set-point for pressure regulation. It should be a few percentages above the current pressure that refers to the max. airflow at the defined diversity factor. This must be done separately for the supply air and extract air respectively. This setting can be entered directly in the GOLD air handling unit menu.
- Inspect all the diffusers in the reference zone and check that they are energised and operate correctly.
- Read the total design airflow for the zone across the zone damper (1). If needed, increase/decrease the reference pressure in the zone damper, both the airflow damper position and pressure reading are visible at the same time in the display and the pressure set-point can be immediately changed if required. If the pressure is too high, you can find out why only by connecting up to the design room and checking its damper position, which should be between 70-90% open.
- Then connect up one diffuser in the zone. Begin with the extract air if there is balance in the room. Check the diffuser size and the design set-points. Read the current airflow (actual value), then reset the adjustment level to min flow and read the same. Finally reset the adjustment level to the unoccupied flow rate, and check this as well. Disconnect the adjustment level and enter the data in the report. It is advisable to also commission at the same time, checking the presence detector and the other control functions, if required, such as CO₂, radiator in sequence, etc. This saves you time and money. If there are slave air diffusers in the room, they must also be checked separately.
- Follow the same procedure for the every diffuser/damper in the zone.
- When all the zones except the shut-off zones are ready and checked, adjust these zones to normal operation. Carry out the same performance check as that described above.
- When the last zone has been checked and its data has been entered in the report, the system is adjusted, started up and operational.

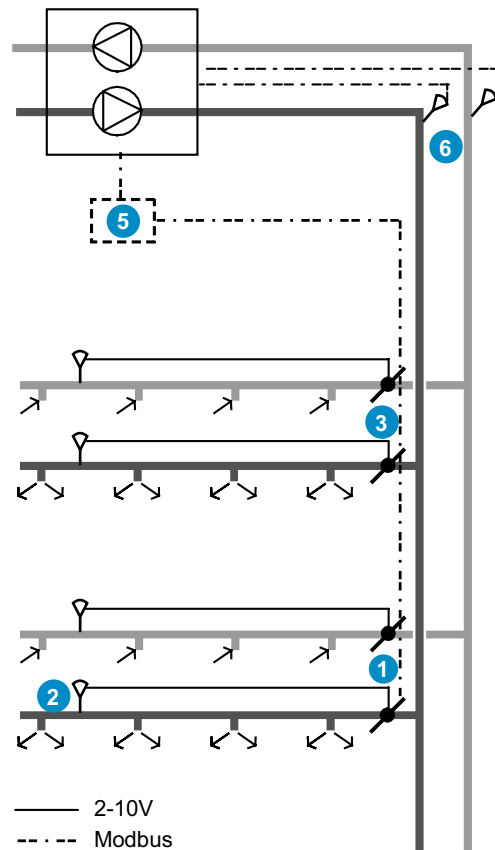


Figure 42. Overall view of a system with the following components:
 1 = Zone damper, CONTROL Damper
 2 = Pressure sensor, DETECT Pressure
 3 = Zone damper, CONTROL Damper
 5 = System optimization, Super WISE
 6 = Locations of the sensors when Super WISE is used

- Follow the same procedure for the supply air.
- The same procedure must be carried out for the extract air registers if there is balanced ventilation in the room.
- If the extract air is centrally located, check its airflows directly in the zone damper.
- If the ventilation system has been adjusted for extract air, do the same for the min. pressure set point, which also should be a few percentages below the current pressure. Set the min. pressure value in Super WISE. The starting value for the feedback control should also be set. Choose a value that is 50% above the min. value. The starting value should be used as the reference pressure of the air handling unit until the starting delay for system optimization has counted down to 0.

To consider:

The TUNE Adapt is required for adjusting all the room products, and the TUNE Control hand-held terminal is required for the zone dampers and system optimiser. If the system is correctly sized, the pressure sensors are correctly located and all the air diffusers and dampers are correctly configured, everything should work perfectly when the system is energised. Naturally all the air diffusers must still be checked so that the technician making the adjustments can approve and write out a report on the ventilation plant. Performance check forms matched to the various products of the WISE system can be downloaded from www.swegon.com.

To check the performance of the ADAPT products

A reference manual containing all the configuration variables is supplied with each product. The TUNE Adapt and a multimeter for AC/DC are needed for performance testing. Always begin by measuring of the supply voltage to make sure that it is not too low. Carry out the test while checking the radiator valves if these are included in the system. The voltage interval is 21.6 to 27.6 V AC. In order to carry out the following checks, it is important that the controller is not being forced by a main control system before its performance is checked. If the controller is not forced, a green LED will be lit and controls will operate normally. All ADAPT products are supplied in the max. flow commissioning mode.

Checking the airflow

This can be done by reading the airflow when the adjustment level is enabled. There are three levels: Max. airflow, Min. airflow and the airflow for when the premises are unoccupied.

To check the temperature

This check involves testing the control function via non-conforming room temperature. Change the cooling control set-point so that this value becomes lower than the current room temperature. The cooling load value can be read as a percentage in TUNE Adapt. This should rise up to 100% after a few minutes. The speed is conditional on the difference between the actual value and the set-point. Keep in mind that the supply air temperature setting must be lower than the room temperature. If this is not the case, the flow search will be blocked.

To check the DETECT Qa, Application 1 & 2

The simplest test is to blow on DETECT Quality and read the value in TUNE Adapt. The application must be set to 2 and the value can be read in the User Menu. If the function is used as a combined CO₂ and temperature function, no value can be shown in the controller.

To check for occupancy

You can check the performance of the built-in presence detector by reading the sensor level under the Occupancy Menu in TUNE Adapt. When an occupant moves below an air diffuser, the level should be higher than 1000. The lower limit for detection is 250. The controller should be set to Occupancy. This can be read in the Occupancy menu. With the function set to the Test mode you can manually reset the controller to the occupancy/unoccupied setting. If the lighting control is used, the lighting in the premises will be lit/off when you change occupancy/unoccupied mode.

To check the TUNE Temp, Application 4

Checking that the signal operates correctly can only be done by adjusting the knob to max/min. The results can only be read in the heating or cooling load in the User Menu.

To check the DETECT Temp, Application 5

You can check whether the signal reaches the controller by reading the room temperature. If it shows a relevant value, then everything is operating normally.

To check the ADAPT Slave controller, Application 3

You can check whether the signal reaches the controller under the Temperature Menu Input %. The value should be between 20-80% if the master controller is not in the alarm mode.

To check the ACTUATOR Va radiator valve

The simplest way to check how the valve is operating is to set the heating set-point to a value that is higher than the current room temperature. Check that the heating set-point increases to 100%. The valve opens. It takes approx. 3 minutes before it will be completely open, however you can see already after one or two minutes that the "hat lifts" so that the blue edge is visible. See also the text dealing with the "First Open" function in the section about regulating the heating.

Table 26. Hierarchy list

Operation	Priority	Explanation
Emergency	Highest	Forcing of the damper by the main control system to open or closed blade position
Damper blade pos. Manually actuated	High	Manual forcing to fixed damper blade positions
Adjustment level	Intermediate	Manual forcing to fixed airflows, so-called adjustment level
Occupancy Manual	Low	Manual control of the occupancy function
Application	Lowest	Various settings, such as slave, etc.

Table 14 shows the priority of the various settings. If an ADAPT product is to operate normally, all the priorities higher than Application type must be disabled.

Margin of error, airflow control

A margin of airflow error according to the diagram is important for the ADAPT products to operate in their respective normal operating ranges.

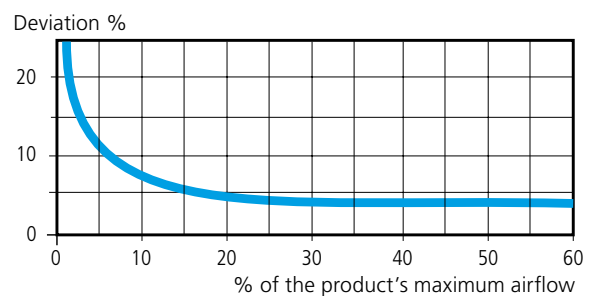


Diagram 8. Margin of error, airflow control.

Typical Performance Check Form for the ADAPT products.

Swegon		Date of manufacture 2009-02-04		Checked by:		Date:	
ADAPT Configuration Data and Performance Check				Project: The Rosen District in Visby			
Product:		ADAPT Da 250-M		RF: 00000		Order no. (Order #): 100 031 259	
Marking:		TD10:Room 23				Production no. (VstOrder #): 69 875	
This list refers to the same menu structure as that in the TUNE Adapt hand-held micro terminal. (4) means that the value exists only in Version 4.							
USER MENU		Reading		OCCUPANCY		Reading	
Airflow	0000l/s	-	-	Sensor level	0000	-	-
Room temp.	00.0gc	-	-	Occupancy status	0	-	-
Supply air temp.	00.0gc	-	-	Status + delay	0	-	-
CO2 in the room	0000ppm	-	-	Off, delay	00m	20	-
Cooling load	000%	-	-	On, delay	00s	0	-
Heating load	000%	-	-	ALARM MENU		Reading	
Heat valve, item (4)	000%	-	-	Stroke error *	0	-	-
Occupancy time	00000h	-	-	Motor failure *	0	-	-
Running time	00000h	-	-	Pressure sensor error *	0	-	-
Software	4	-	-	Temp. sensor error, external *	0	-	-
Serial number	00000	-	-	Temp. sensor error, internal *	0	-	-
TEMPERATURE				Wrong set-points *	0	-	-
Cooling value, occupancy	00g	23		* = 0 or 1, where 1 is an error reading			
Heating value, occupancy	00g	21		COMMUNICATON		Set	
Cooling value, no occupants	00g	25		Modbus Address	0000	1	
Heating value, no occupants	00g	20		Baud rate	0	3	
Estimated set-point			-	Parity	0	2	
Nonconforming room temp.	000g		-	Stop bits	0	1	
External input	000%		-	APPLICATION MENU		Set	
Night-time cooling	00g	18		Application	0	0	
Morning heat	00g	28		LED indicaton	0	1	
Heat control, enabled (4)	0	0		Temp. Sensor used (4)	0	1	
Valve time	0000s	350		Radiator control (4)	0	1	
AIRFLOW MENU		Set		New			
Max q, occupancy	000ls	15		Cool protection (4)	00%	0	
Min q, occupancy	000ls	25		Cooling limit value (4)	00%	50%	
Min q, no occupants	000ls	200		Valve exercise (4)	0days	2	
Flow pressure	000.0P		-	TEST MENU		Reading	
0 calibration	00.0P		-	Emergency use	0	-	-
Damper blade position	000%	0		Occurance	0	-	-
Slave output	000%		-	Test mode	0	-	-
CO2 min set-point	0000pp	500		Damper blade pos., manually actuated	000%		-
CO2 max set-point	0000pp	1000		Occupancy Auto/Manual	0		
CO2 per volt	000pp	200		Occupancy/Unoccupied	0		
				Adjustment level	0	3	
				Airflow	0		
Do not forget to set the Adjustment level to INACTIVE!							

CONTROL products – performance check

Checks are carried out with the TUNE Control hand-held terminal, where all the controlled values can be read. See the manual for the hand-held terminal. Note that there are two manuals: one for the CONTROL Da zone dampers and one for the CONTROL Db room applications.

The controller has light-emitting diodes that indicate whether something is wrong. Diode 1 normally flashes green slowly. If something is wrong in the installation, the diodes shine in different colours and flash at different intervals. See the FAQ list for problem analysis. Alarms can also be read in TUNE Control, where they are presented in plain text.

To check the pressure regulation

Control values and setpoints for pressure regulation can be read in TUNE Control. If the pressure sensor is not correctly connected the actual value displayed with most likely be 0 Pa and the damper will then be fully open (100%) and the airflow reading will be unexpectedly high for the size of the equipment. The probable cause is that the pressure sensor's plastic tube is not correctly fitted, or that the whole sensor is not vertically positioned. If the DETECT Pressure sensor is not connected, an alarm is shown and the damper will then be in alarm position 50%. The LED on the controller will flash red.

To check the direction of motor actuation

If you suspect that the motor actuates in the wrong direction, the simplest way to check this is by disconnecting the control signal wire from motor wiring terminal no. 34 (supply air) or 37 (extract air). On doing so the motor will close completely and the airflow will decrease down to 0 l/s, which you monitor in TUNE Control.

Checking the room functions

Applicable to CONTROL Db FSFE with SLAVE Cb.

To check the temperature

This check involves testing the performance of the control function via nonconforming room temperature and changing the cooling control setpoint so that this value becomes lower than the current room temperature. The heat/Cool value can be read as a percentage in TUNE Control. This should rise up to 100% after a few minutes. The speed is conditional on the difference between the actual value and the setpoint. Increase or decrease the setpoint in the room controller.

Air quality control

The simplest test is to blow air on DETECT Quality and read the value in TUNE Control. The function must be defined in Application parameter P_1537 or P_1437. If the value is shown as 0 ppm then the application is not defined or the electrical connection is incorrect.

To check for occupancy

If DETECT Occupancy is connected; this is indicated in the display. The controller shows ECON at the upper edge near vacancy and AUTO and a small man symbol in the lower edge near occupancy. The function must be defined in Application parameter P_1521 or P_1421 .

Window contact

Open the window. Doing so will cause a window symbol to be shown in the lower left-hand corner in the display. The function must be defined in Application parameter P_1520 or P_1420.

To test valves

When you check the temperature, the controller will then assume either a 100% cooling or heating mode. A snow flake symbol for cooling or a heating symbol will be shown to the side of the coil symbol in the display. An actual control value can be read under status. The relevant valve will then be fully open for -100% (cooling) and 100% (heating). The function of the valves (on/off or 0-10V) can be set in Application parameters P_1546 and P_1547 or P_1446.

Table 27. Light-emitting diode, LED, functions

LED 1	LED 2 under the metallic enclosure	DIP 1	DIP 2	Description
Green flashing, 1 sec.	Not lit	0	0	Normal operation
Red and green flashing	Not lit	0	0	Normal operation, but with warnings - Room controller, Temperature sensor or Pressure sensor is missing - Room controller temperature reading is outside the limit values - The parameter file is incorrect.
Red flashing, 1 sec.	Not lit	0	0	Emergency: External memory error or Outputs are short circuited.
Orange flashing, 1 sec.	Not lit	1	0	Service state
x	x	0	1	BMS mode
Orange	Orange	x	x	The controller lacks a bootloader or the control is in the process of starting up.
Green	Green	x	x	The controller has a bootloader but lacks software.
Orange	Green	1	x	The controller has a bootloader but lacks software.
Green flashing rapidly	Green	x	x	The parameter file is being updated
x	Red	x	x	Too low voltage supply, 24 V AC.
x	Green flashing rapidly	x	x	The radio communication with TUNE Control is enabled
x	Red flashing rapidly	x	x	MB-forwarding, Super WISE is fetching information from the room controller
Green flashing, 1 sec.	Red	0	0	The controller is updating the room list; the Super WISE is scanning.