

WISE - Modbus RTU

Technical documentation for project designers and system adjusters

20111215

Cables

The cables used in the network must conform to RS-485 Standard with twisted pair conductors. The cables must be shielded. The network should be built as a bus line with common conductors connected. The type of cable must conform to EIA-485 Standard. Swegon has suitable cables in stock.

Usable types of cables:

1. LINK Wa network cable, Modbus
2. LiYcY from Nexans
3. Belden 9842

Network structure

The system is divided up into two levels: the zone loop and room loops. The zone loop is connected between the Super WISE and all the zone/router products. There can be a maximum of 10 zones with up to 8 zone dampers in each zone. Up to 60 room controllers (nodes) can be connected within each zone. The so-called room loop can be divided up into several different loops that can be connected to optional zone dampers/routers within the zone. The zone product Modbus ID is the factor that determines to which zone it belongs, not its physical location inside the building. To ensure the correct operation of the room products, each zone has to have a Modbus ID series that is the same for all the zones. Therefore it is important that the room loops are always connected to the "correct zone".

Network Structure with BACnet

If you intend to connect the Super WISE up to BACnet, strict rules apply to how you install and connect the network cable. BACnet requires an EDE file which you can create directly in the Super WISE after its installation. The EDE file must not be created until all the controllers in the system are connected and have been detected by the Super WISE. If the EDE file is created beforehand, strict rules will apply to installing the network; it will then have to follow the EDE file structure without the slightest deviation.

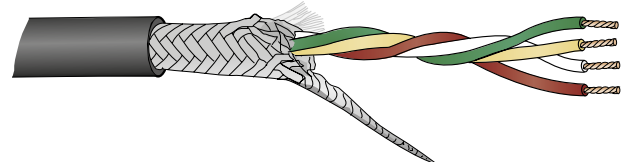
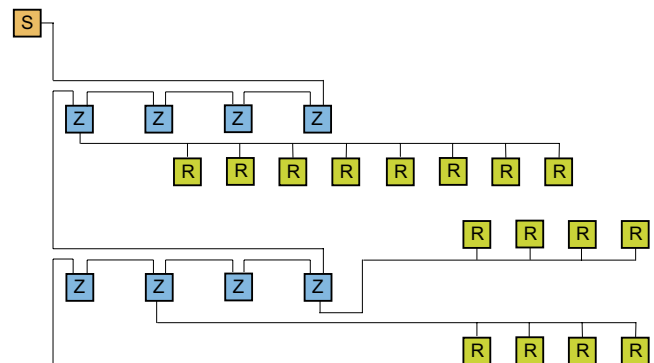


Figure 1. Exemple of a Swegons LINK Wa network cable. Use following colour codes

Cable type	D0 (+)	D1 (-)	Common
Link Wa	Brown	Yellow	White
LiYcY	Brown	Yellow	White
Belden	Blue	White/Blue	Orange

RS485 Modbus standard prescribes colour code brown/yellow/white to minimize miss connections. When using twisted pair cable, always connect '+/-' within one single pair.



- S Super WISE
- Z CONTROL Zone or Super WISE Router
- R ADAPT, CONTROL Room or CONDUCTOR room controllers

Network section 1. Super WISE -> Zone products, blue loop.

The network cable should be run continuously (bus line) from Super WISE (1) down to the last zone damper or the Router (3). The total length must not exceed 600 metres. Super WISE is the master in the Modbus network and has a built-in termination. It must therefore be placed at one end of the loop.

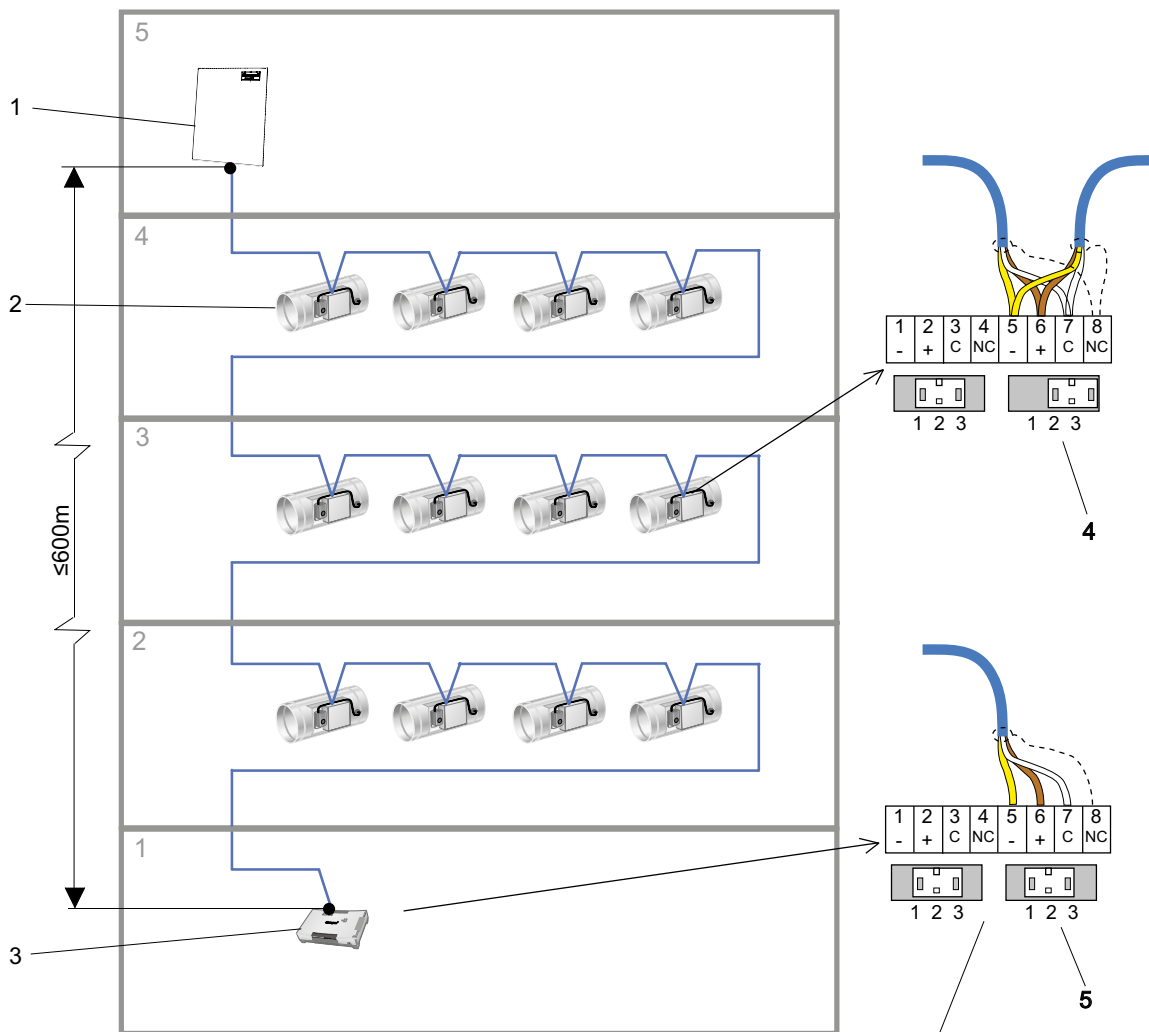
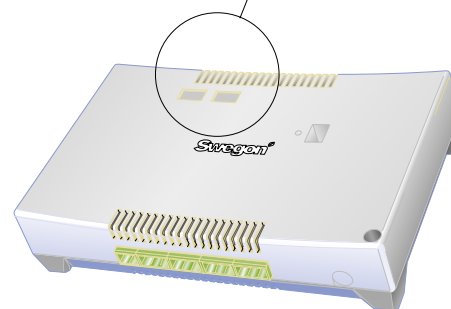


Figure 2. A basic circuit diagram of a 5 storey building.

1. Super WISE
2. CONTROL Zone dampers, PSFE, PS, PE, FS or FE. Type PED must not be connected in networks where Super WISE is included.
3. Super WISE Router
4. Termination positions for all the zone products in the centre of the Modbus loop
5. Termination of the last zone product if Super WISE is included in the system.



Terminations for zone and room products

Termination is carried out for the connection being used; these differ between the room and zone products.

Terminations

Position 1	Passive termination for Modbus Slave is used if the product is placed first or last on the loop.
Position 2	Termination for Modbus Master, with internal pull-up resistor to ensure a proper 0 level, is permissible only on the first or last unit in the network.
Position 3	Unterminated for Modbus Slave, used if the products are mounted in the middle of the loop.

Network section 2. Zone -> room controllers, red loop.

In this example, each floor of the building has a Modbus loop of its own that should be terminated in each end. CONTROL Zone (1) or Super WISE Router (2) acts as a Modbus Master and is as standard terminated on delivery. The total network cable in each zone must not exceed 600 m.

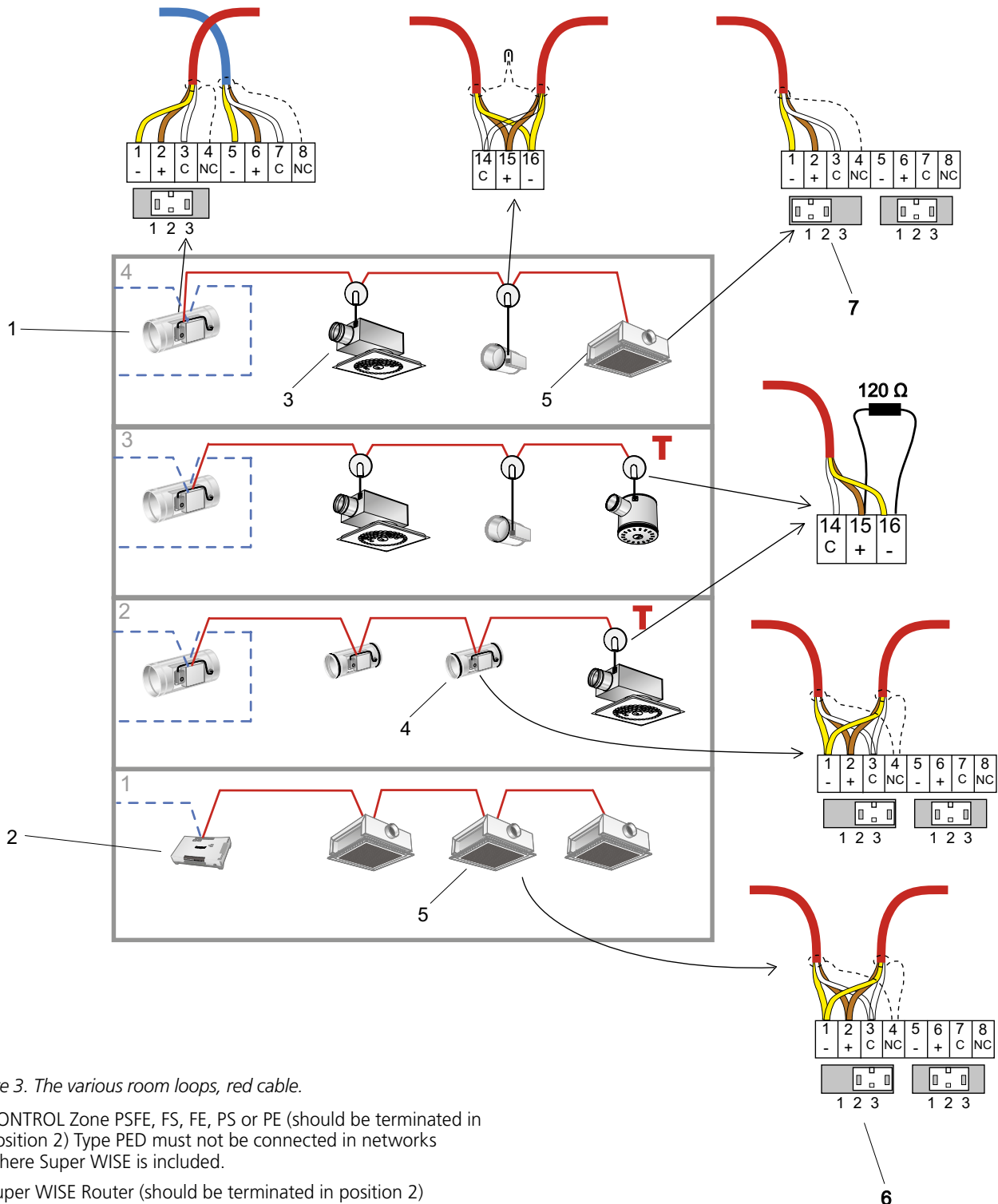


Figure 3. The various room loops, red cable.

1. CONTROL Zone PSFE, FS, FE, PS or PE (should be terminated in position 2) Type PED must not be connected in networks where Super WISE is included.
2. Super WISE Router (should be terminated in position 2)
3. ADAPT C, ADAPT S, ADAPT F, ADAPT E, ADAPT D
4. CONTROL Room FSFE
5. PARASOL, PARAGON
6. Termination of CONDUCTOR or CONTROL Room products placed in the centre
7. Termination of CONDUCTOR or CONTROL Room products placed last

Network example, BMS

The installation is carried out according to the project designer's reference documents. Swegon takes no responsibility for installations of this type of network.

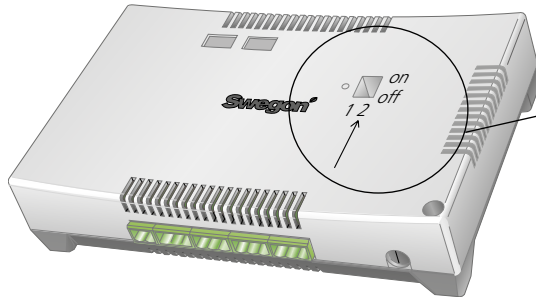


Figure 5. To set the BMS mode switch on CONTROL Zone, Room or CONDUCTOR. After a change is made, the controller must be restarted.

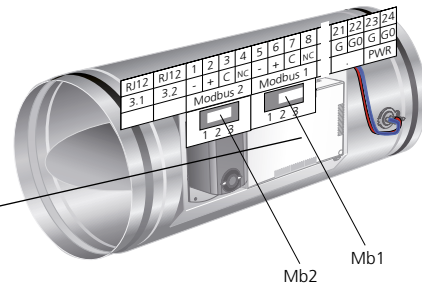


Figure 6. Terminations for CONTROL Zone or Room Mb1 are used in BMS mode.

Terminations

Position 1	Passive termination for Modbus Slave is used if the product is placed last on the loop.
Position 2	Termination for Modbus Master, with internal pull-up resistor to ensure a proper 0 level, is permissible only on the first or last unit in the network.
Position 3	Unterminated for Modbus Slave, used if the products are mounted in the middle of the loop.

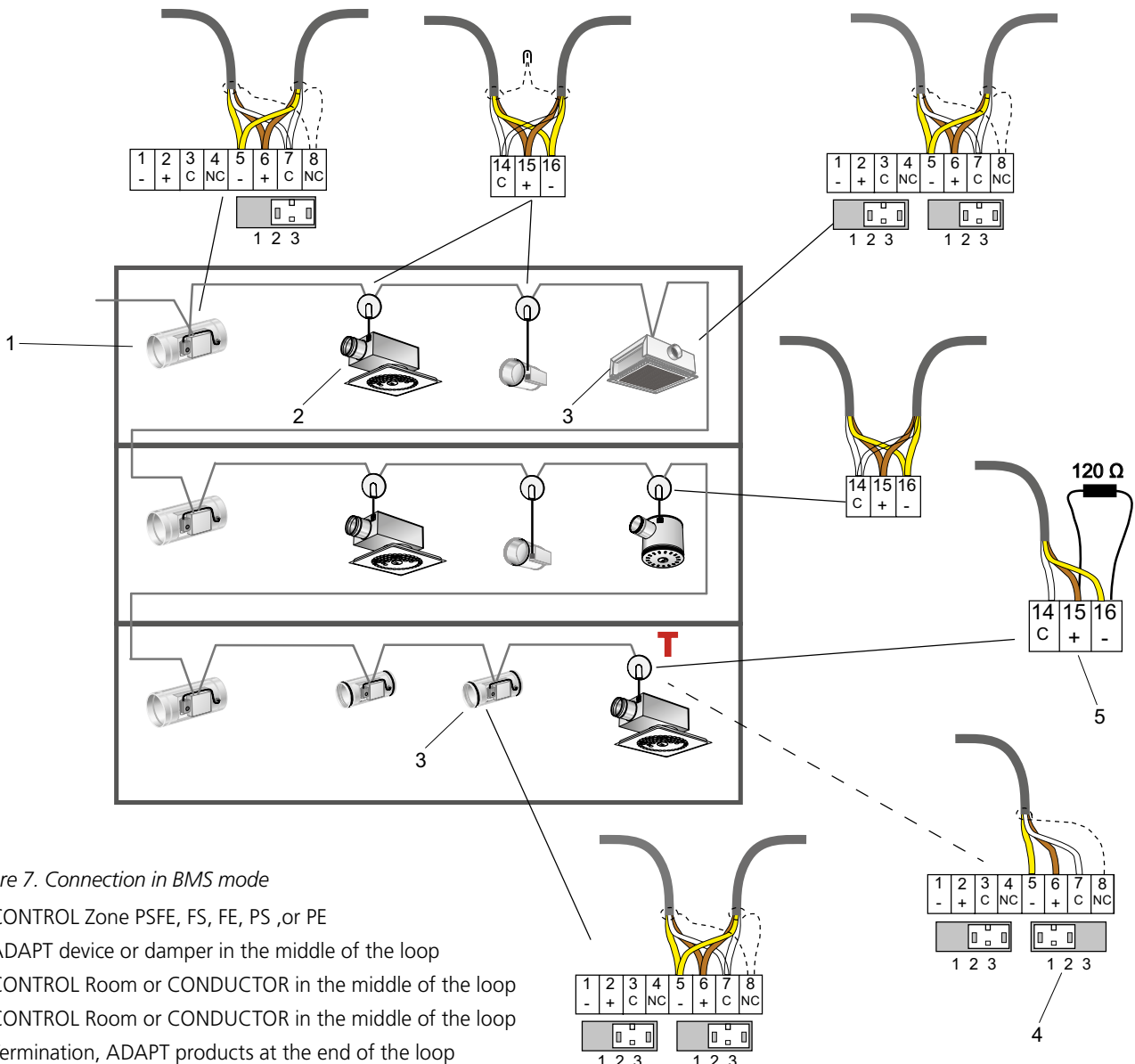


Figure 7. Connection in BMS mode

1. CONTROL Zone PSFE, FS, FE, PS ,or PE
2. ADAPT device or damper in the middle of the loop
3. CONTROL Room or CONDUCTOR in the middle of the loop
4. CONTROL Room or CONDUCTOR in the middle of the loop
5. Termination, ADAPT products at the end of the loop