

Engineering notes

The moduNet180 repeater is available as a compact auxiliary unit. By means of a top-hat rail (EN 60715), it can be fitted in a cabinet (MCC) and is supplied with 24V alternating or DC voltage or with 230 V mains power.

A voltage of 13 V= is provided at terminal 02 to supply electrical/optical converters; the maximum load must not exceed 100 mA.

The following connection conditions must be met:

- Conductor cross-section, min. 0.8 mm², max. 2.5 mm², copper conductor compliant with standards and national installation regulations
- When the power supply is connected, it is mandatory to connect the protective earth to the terminal provided for this purpose
- Communication cabling must be undertaken correctly, must be separated from cabling carrying power, and must meet the requirements of standards EN 50174-1, EN 50174-2 and EN 50174-3.
- No account has been taken of special standards such as IEC/EN 61508, IEC/EN 61511, IEC/EN 61131-1 and IEC/EN 61131-2 or similar standards.
- Local standards regarding installation, application, access, access authorisations, accident prevention, safety, dismantling and disposal must be observed. Compliance is also required with installation standards EN 50178, 50310, 50110, 50274, 61140 and similar.
- For further information, consult the fitting instructions.

The repeater is fully transparent within the novaNet network, allowing passage of all telegrams without considering their address or direction. A total of 4-novaNet channels are available.

If a telegram enters one channel, it is forwarded to the other three channels. The signal is refreshed and amplified, but this delays it by a throughput time of approx. 20 µs for copper wires and 25 µs for OWG.

Each channel of the repeater places a load of 1 kΩ and 12 nF on the novaNet network.

Several connection options (terminals / plugs) are available for each channel, for a novaNet data line via copper cables (2-core, twisted and screened) with max. rating of 200 nF / 300 Ω.

Channels 2, 3 and 4 have additional connection terminals for a converter with a V24 interface (RS232C) for OWG transmission. Parallel operation of the same channel with copper cable and OWG is not permitted.

LED displays

The repeater has a total of 9 LED indicators:

- 1 green LED (Power) which lights up during operation.
- 4x 2 yellow LEDs for each novaNet channel; Send and Receive

Network extension

The following considerations are based on a screened standard cable (4x 2x 0.6mm) with the following electrical specifications:

Operating capacitance: 48 nF/km
Loop resistance: <124 Ω/km

A novaNet network must keep to the following limits:

Total capacitance including all network participants: 200 nF
Loop resistance: up to 300 Ω between any 2 AS

Each system bus component (automation station, repeater, router) places a load of 0.6 nF on the novaNet.

Application example

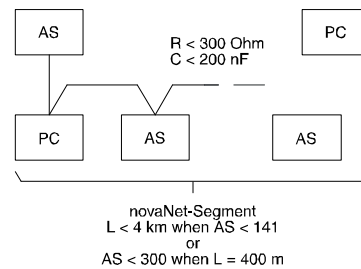
Step 1: Calculate total resistance:
 $300 \Omega / 124 \Omega/\text{km} = 2.42 \text{ km}$
line length

Step 2: Calculate total capacitance:
 $48 \text{ nF}/\text{km} \times 2.42 \text{ km} = 116.16 \text{ nF}$
 $200 \text{ nF} - 116.16 \text{ nF} = 83.84 \text{ nF}$
 $83.84 \text{ nF} / 0.6 \text{ nF}/\text{AS} = 139.7 \text{ AS}$

One novaNet segment with a length of 2.42 km can therefore be assigned with a maximum of 139 automation stations according to the above example.

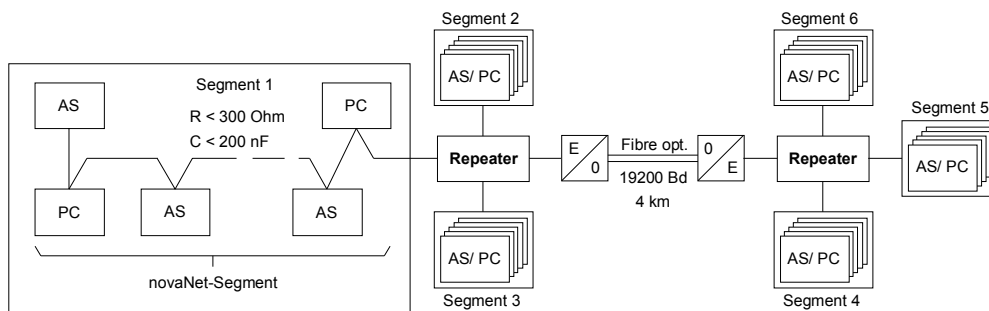
Conversely, the network length for 300 automation stations can be 400 m at most:

$300 \times 0.6 \text{ nF} = 180 \text{ nF}$
 $200 \text{ nF} - 180 \text{ nF} = 20 \text{ nF}$ $20 \text{ nF} : 48 \text{ nF}/\text{km} = 0.416 \text{ Km}$
⇒ up to 400 m



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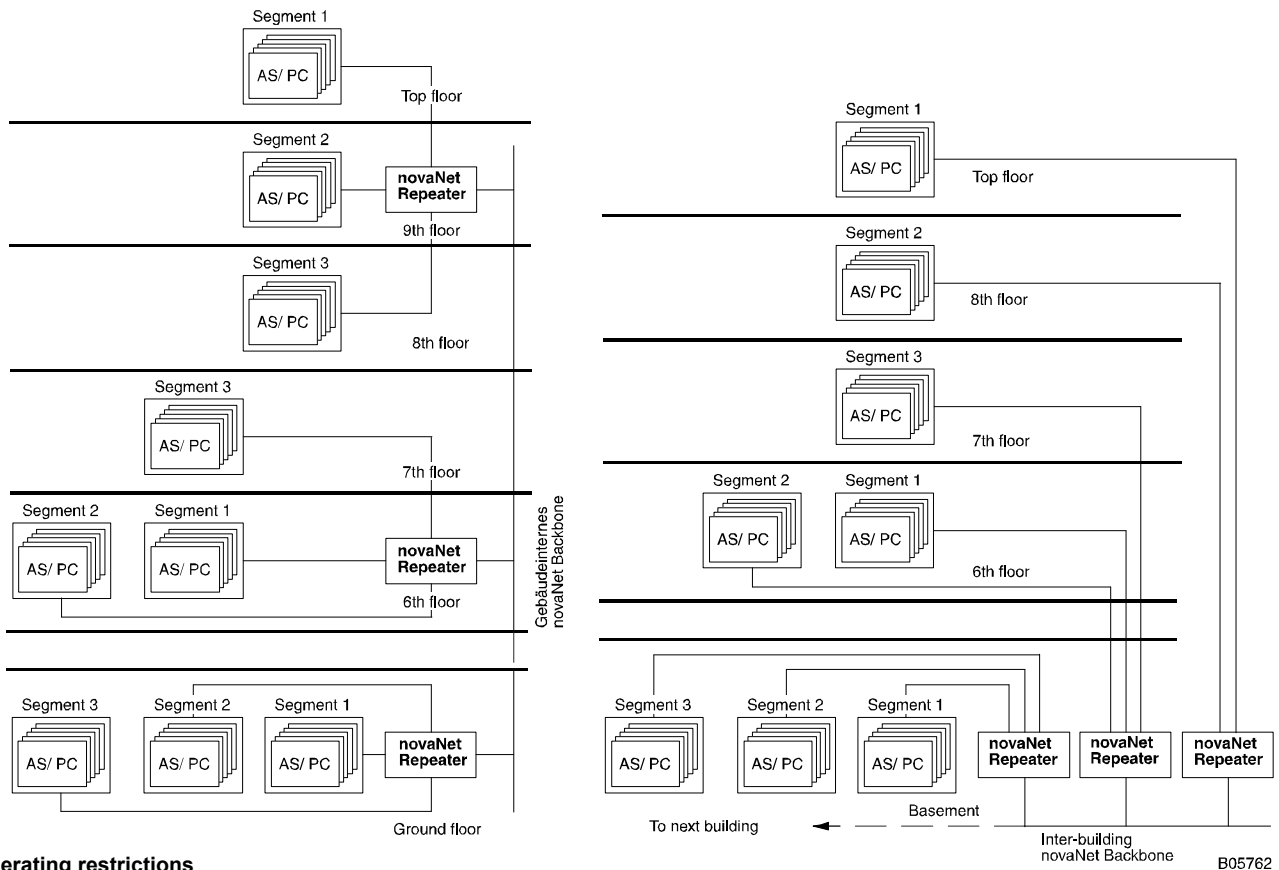
If the maximum values (length / number of AS) are no longer respected in a novaNet network, the moduNet180 repeater must be used.



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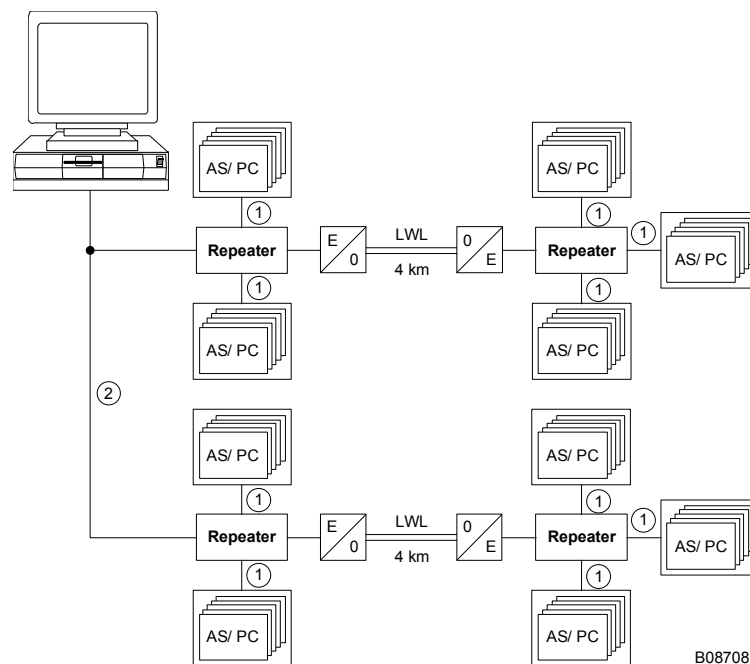
One novaNet segment can be built up on each channel of the repeater. It is possible to use the repeater as a "floor or building distributor". For this purpose, a bus (backbone) is built up on the back, consisting only of the moduNet180 repeater.



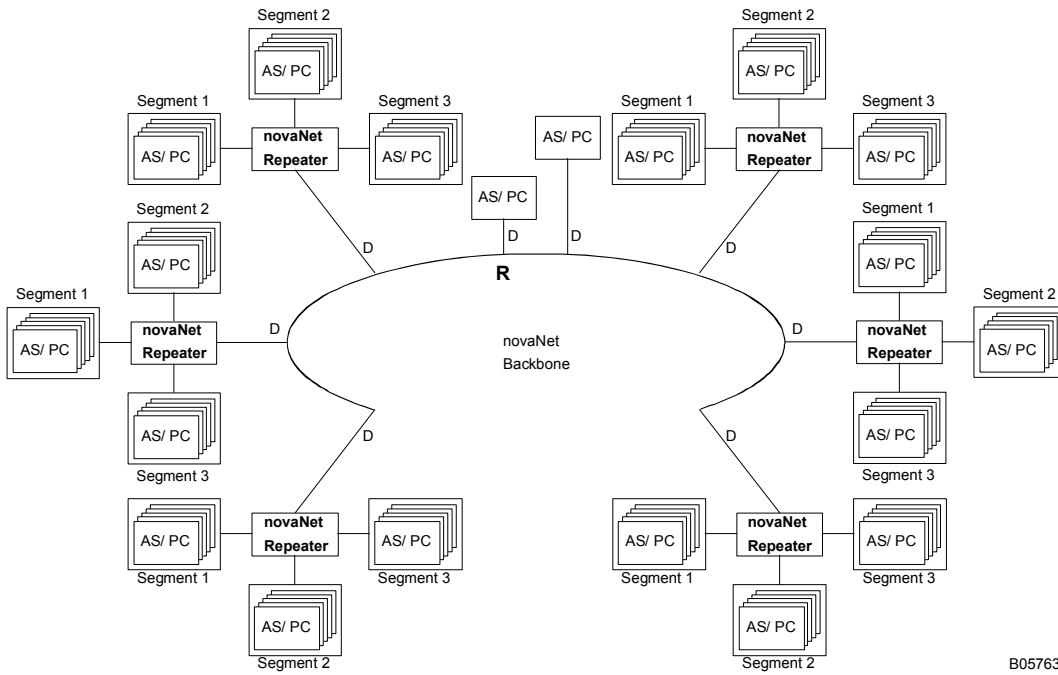
Operating restrictions

Due to the time delay, the path of a telegram must not pass through more than 3 repeaters, or a maximum of 4 repeaters provided that OWG is used for 2 connections.

- 1) 200 nF / 300 Ω
- 2) The repeaters on the PC side are located close to each other so that no additional delays occur during telegram traffic. Any automation stations connected in this building are usually connected directly to a repeater output (short distances).



Example of a simple backbone structure:

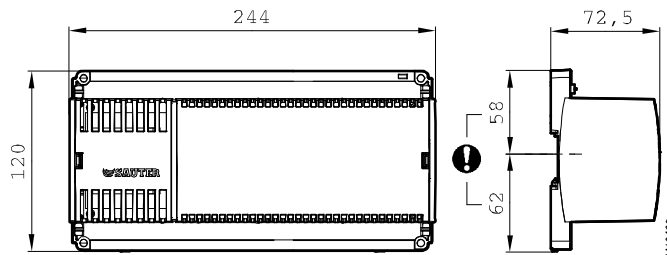


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The backbone consists of a "stem" or "trunk". Branches with one repeater each lead off from this "trunk". However, automation stations may also be connected directly. In the above example, the route travelled by each telegram between the most distant points only passes via two repeaters in each case. However, lengths "R" plus all branches "D" taken together must not exceed the specification for the novaNet segment of 200 nF / 300 Ω.

A novaNet network built up from segments of this sort consists of one single network in logical terms. It is also mandatory for all participants connected to this novaNet network to have a unique address.

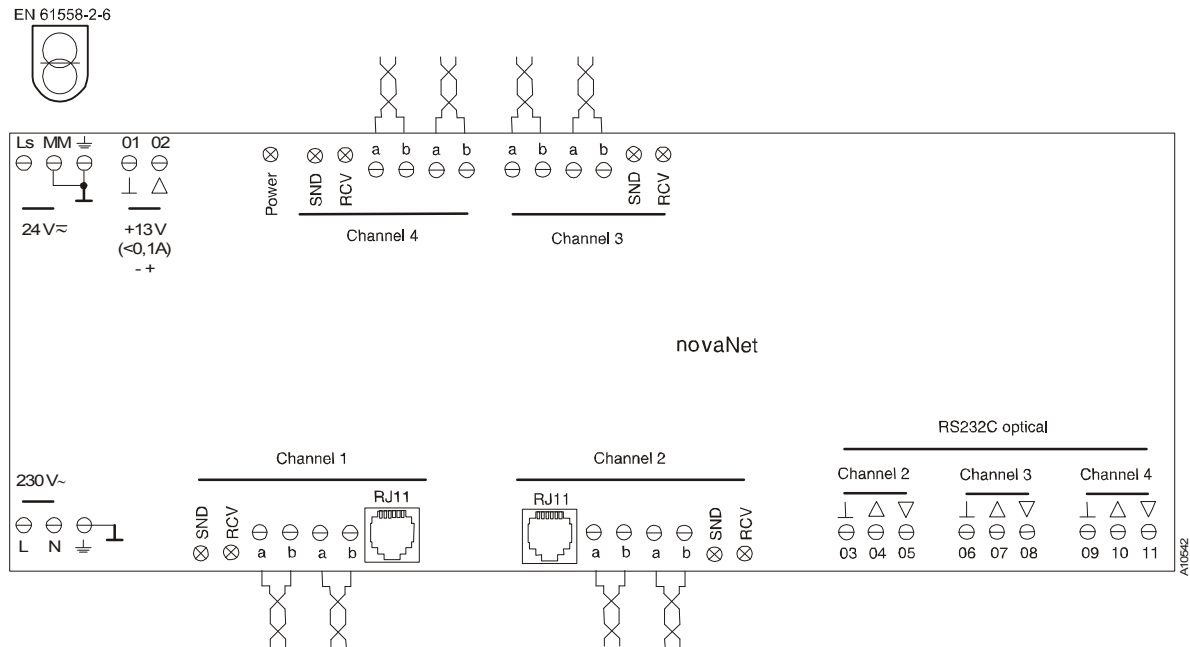
Dimension drawing



Wiring diagram

Note: When using the V24 interfaces (transmission via OWG), the parallel channel connection must not be assigned with copper cable, otherwise data collisions will occur.

For longer distances, mono-mode is preferable on the OWG side.



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