

House cabling made the easy way– the trend towards structured cabling in residential buildings

Part 8: Measurements

Measurements are unpopular topics in installation technology. They cost time and those who wish to measure correctly need an efficient, state-of-the-art measuring instrument with the latest firmware which are constantly changing.

There is no doubt that correct, standard-conform measurements represent an expense that is not to be underestimated. But the resulting benefits justify this by all means because the skilled set-up technician can get double benefits out of exact measurements. On the one hand, he can recognise installation errors and their possible causes from the measuring reports and find remedies with a little practice. On the other hand the measuring reports together with the acceptance and handover reports are important proof of the proper and professional installation workmanship. They therefore also serve for the set-up technician's safety, which can be helpful in the event of later warranty claims by the customer.

Permanent link and channel

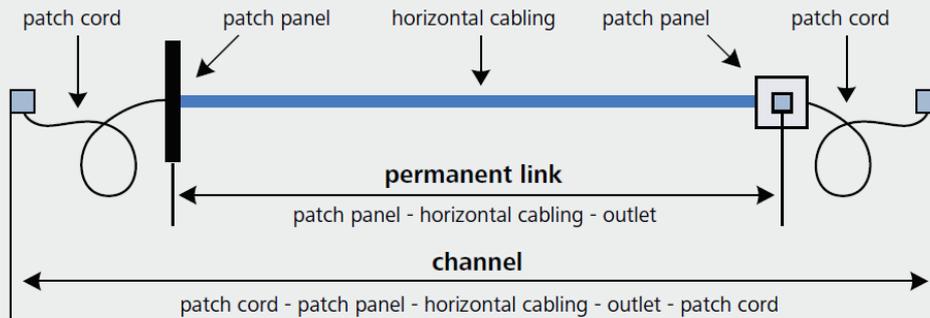
There are a few important points to be observed in the measurements.

Basically, every connection of the permanent link must be measured individually. The permanent link is the permanently installed cabling (patch panel, installation cables and outlet) - that is the cabling permanently linked with the building exactly like the electrical installation. It is not changed by the end customer later either.

The channel includes the permanent link and, additionally, the patch cords in the distributor and on the outlet. The channel is only measured in troubleshooting because that covers the whole line between the active network component (switch or router) and terminating device (PC, laptop, access point, etc.) with a single measuring process.

If the patch cords are enclosed, one is tempted to plug them in and make a channel measurement to also document the quality of the patch cords. Also, lower nominal values are prescribed for the channel than for the permanent link. The catch here is: If the patch cords are pulled off, the measurements are invalid because the line was changed. So the patch cords would always have to be left plugged in. This may be possible in the distributor but not at the outlets.

Alone for design reasons, no customer would every agree to leave the patch cordes plugged in in all connections in all rooms, not to mention the danger of accidents from tripping over them.



Example for permanent link and channel

Measurements according to classes and not categories

The performance capability of an installed cabling with symmetrical copper cables (= cables with twisted wire pairs) is divided into classes; a category always refers to a single component (for example the patch panel or the outlet alone) and is not measured on site bit by the manufacturer in the laboratory.

Most important performance classes for lines with symmetrical copper cables in accordance with ISO/IEC und DIN EN:

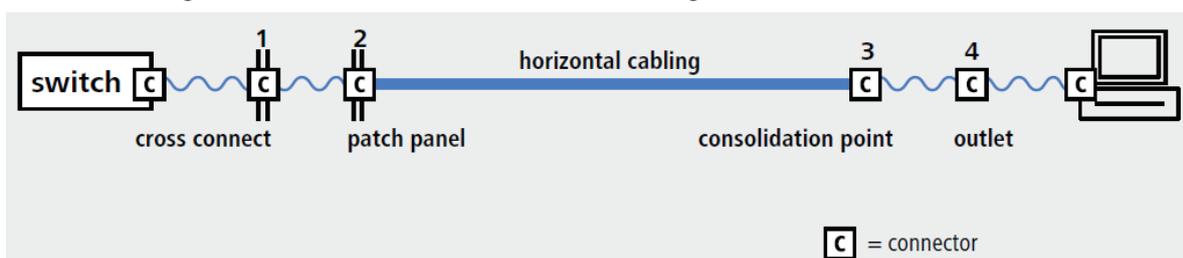
- Class D: up to 100 MHz, for data rates of up to 1 Gbit/s
- Class E: up to 250 MHz, for data rates of up to 1 Gbit/s
- Class EA: up to 500 MHz, for data rates of up to 10 Gbit/s
- Class F: up to 600 MHz, for multimedia applications
- Klasse FA: bis 1.000 MHz, for multimedia applications

Therefore measurements on the building site are always made according to classes and not categories.

Number of connections important for measuring result

According to standard EN 50173-4 up to three connections are allowed in house cablings in a permanent link; up to four are allowed in the channel.

Since the number of connections has a direct influence on the measuring results, other nominal values are defined respectively in the standards for this. Therefore the number of connections on the measuring instrument must be set before starting the measurement.



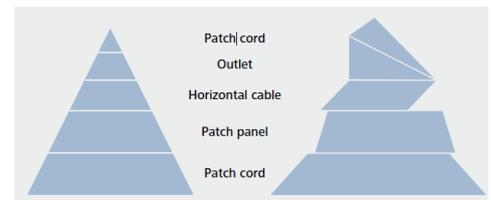
4-Connector-Model

Frequent errors and possible causes

Problems with the NEXT occur at the start or end of a permanent link and rarely in the middle. Poor NEXT values often indicate a laying error in the patch panel or the outlet.

Problems with the return loss arise when the signal path is influenced. This is the case, for example, when a cable is bent or pinched.

Low quality patch cords which are poorly adapted to the jacks in the panel or the outlet can cause both NEXT and return loss problems.



Cabling systems and mix & match

Important information about the measuring instrument

Measuring instruments are subject to natural wear. The test tips (plug or personality module) must be replaced according to manufacturer specifications after a certain number of measurements because the fine contacts wear due to the frequent plugging and unplugging. It is also important to calibrate measuring instruments according to manufacturer specifications before starting measurements. A measuring instrument must be checked and adjusted by the manufacturer or an authorised body by the way at certain intervals. Only then are accurate and reliable measured values guaranteed.

And another tip from practice: It is worth making sure that the measuring instrument uses the latest firmware version. A quick glance at the manufacturer's homepage will give you clarity.

You will find further information on the Telegärtner homepage.