Please note

- No photos or videos during the presentation or the company tour
- No publishing of content without prior approval

Bitte beachten

- Keine Fotos oder Videos während der Präsentation oder des Firmenbesuchs
- Veröffentlichung von Inhalten nur nach Freigabe

EnDat 2.2 Seminar – Cable and Connector

- Connecting elements
- Power supply and cable overview
- Cable quality and cable tests

EnDat 2.2 Seminar – Cable and Connector

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M12 Connecting Elements

- EnDat 2.2 standard: M12 8-pin
- 4*supply + 2*clock + 2*data; single shield
- Versions:
  - straight
  - right-angle
  - manually assembled

EnDat 2.1

EnDat 2.2

Other Connecting Elements

D-Sub connector

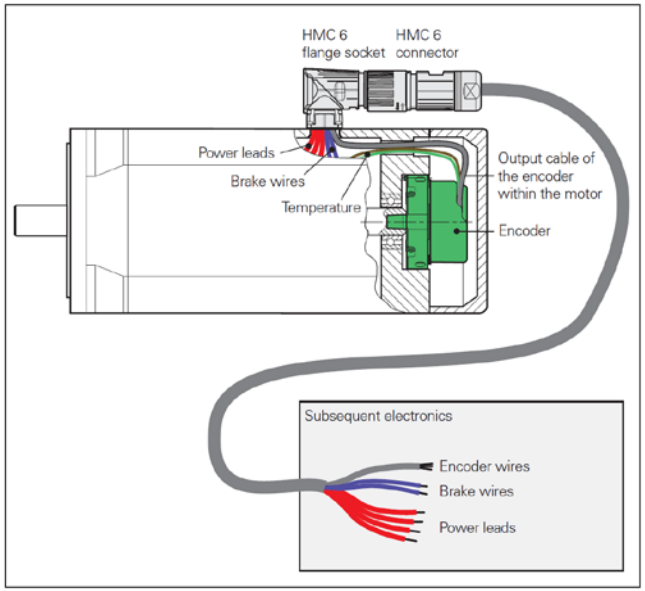
- Is used with HEIDENHAIN controls and interface electronics
- Is suited for 8 … 16 MHz if appropriately wired
- Wiring is more critical than with the M12 system

Other connecting elements

- Suitability of cable lengths and frequency must be tested
- Cable cross-sections (caution with RJ-45 connecting elements, for example)!
- M23 9-pin (particularly for servo motors)

Servomotor

- M12 flange socket straight
  + Cable with right-angle connecting element
- M23 9-pin
- HMC 6



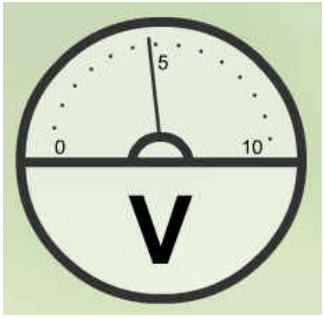
EnDat 2.2 Seminar – Cable and Connector

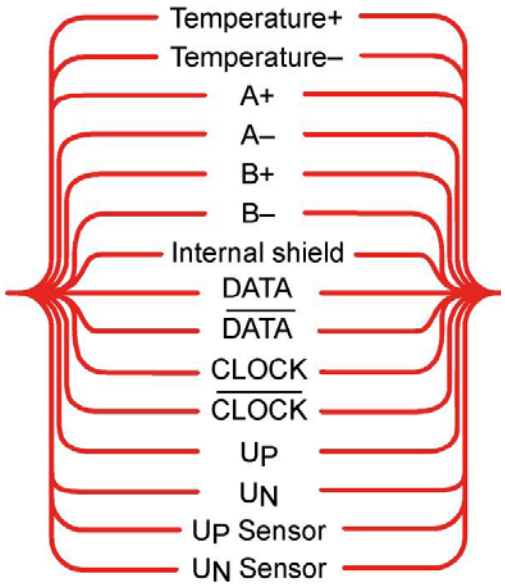
- Connecting elements
- **Power supply and cable overview**
- Cable quality and cable tests

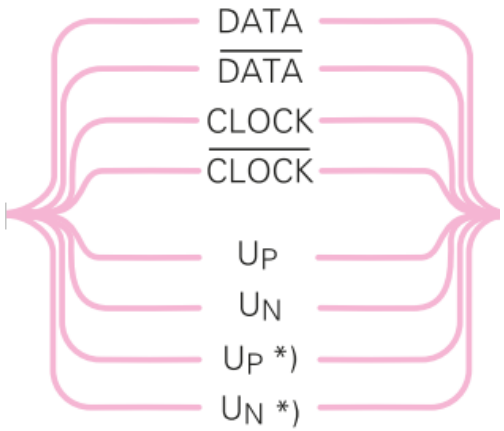
Weitere Steckverbinder

Power supply at the encoder

EnDat 2.1	4,75 .. 5,25 V	remote sense required
EnDat 2.2 (1. generation):	3,6 .. 5,25 V	remote sense omitted
EnDat 2.2 (future):	3,6 .. 14 V	remote sense omitted





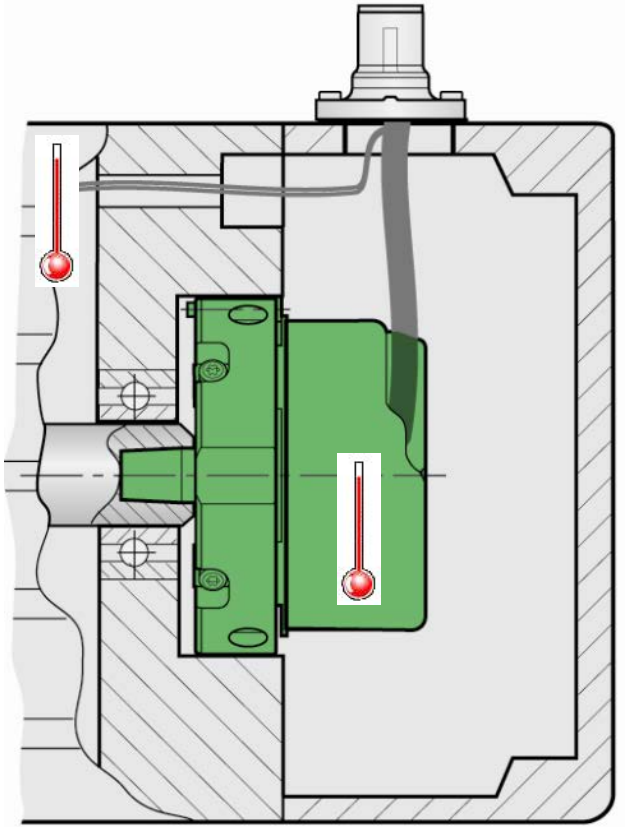


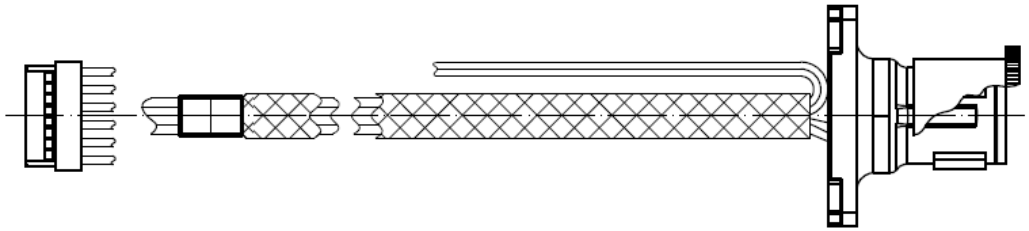
* For parallel voltage supply lines or battery buffering

EnDat 2.1 EnDat 2.2

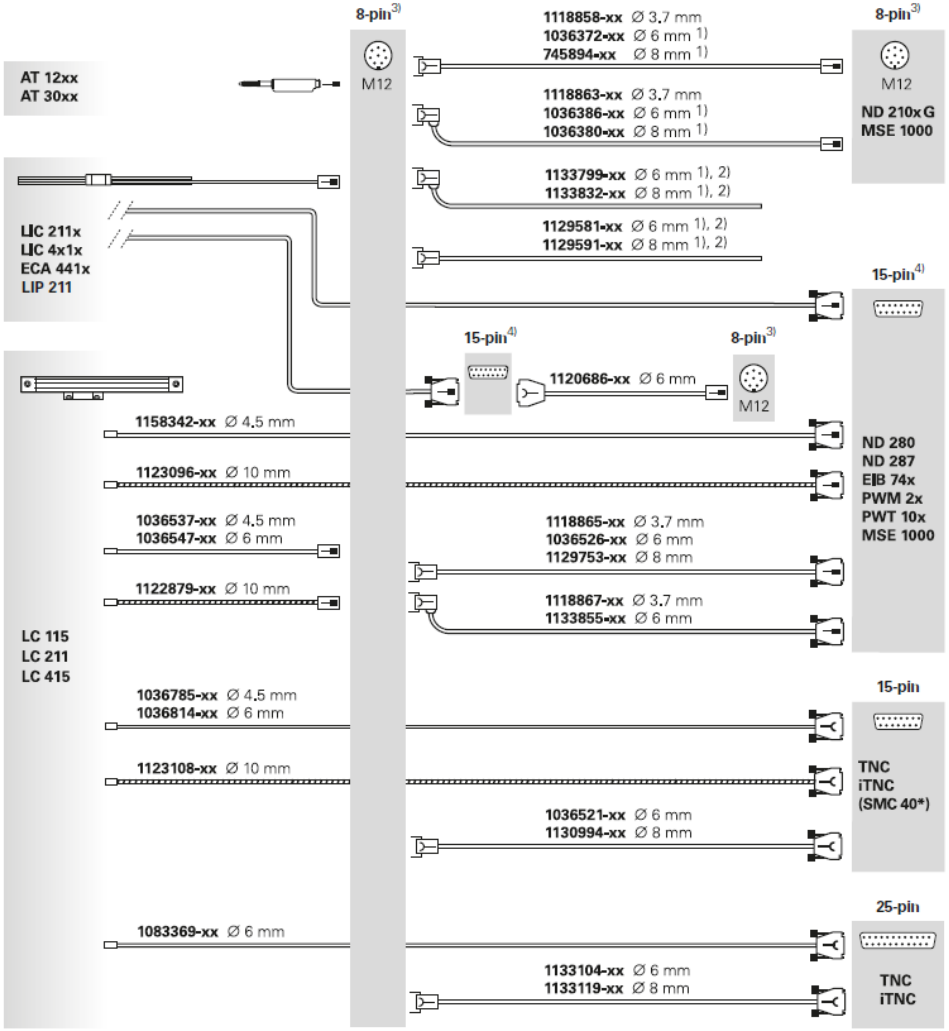
Motor-Encoder for Integration and Temperature Sensor

- The temperature data of the rotary encoder and the motor can be digitized in the encoder and transmitted.
- A special cable assembly is used for the connection.

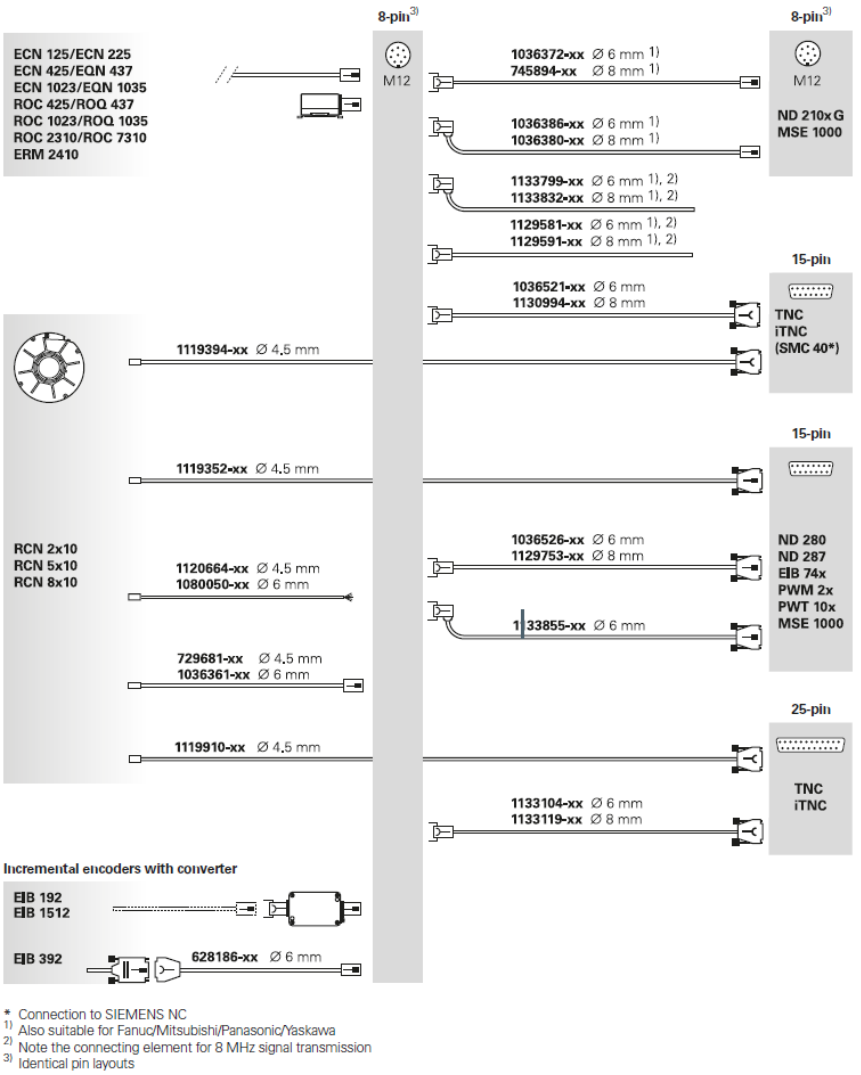




Cable Overview



* Connection to SIEMENS NC
1) Also suitable for Fanuc/Mitsubishi/Panasonic/Yaskawa
2) Note the connecting element for 8 MHz signal transmission
3), 4) Identical pin layouts



* Connection to SIEMENS NC
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Current version see brochure „Cables and Connectors“

Line Drop

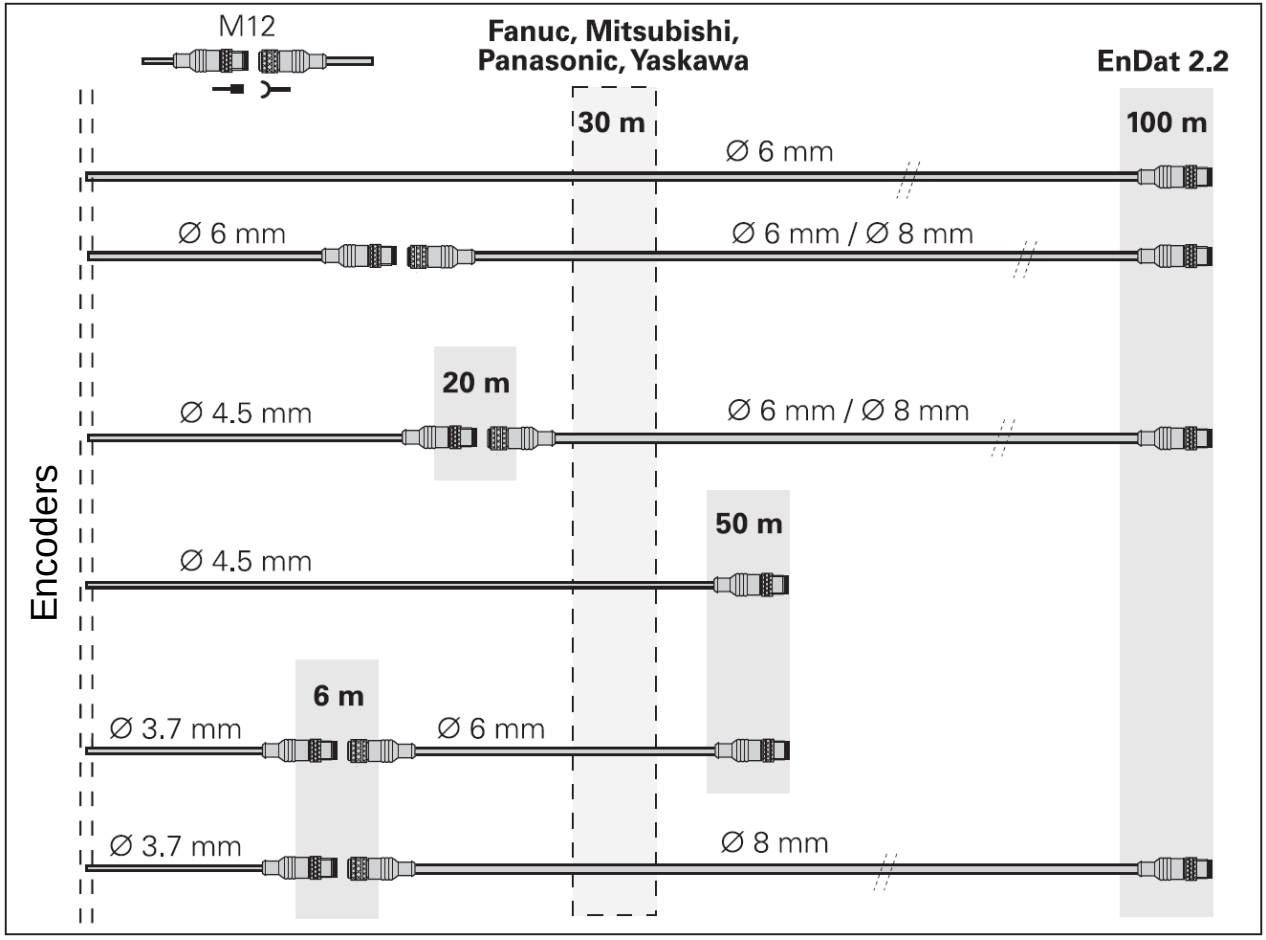
Line drop on power lines

- See “General electrical information” in the Interfaces of HEIDENHAIN Encoders catalog.
- The specifications for the maximum power consumption are indicated in the documentation of the encoder.

General Information

- For a worst-case assumption, the minimum supply voltage provided by the subsequent electronics is to be considered.
- The supply voltage of the subsequent electronics should be set as high as possible.
- To attain greater cable lengths, two wires each should be used for the voltage supply.
- Adapter cables that tend to have relatively small wire cross sections should be chosen as short as possible.

Attainable Cable Lengths



EnDat 2.2 Seminar – Cable and Connector

- Connecting elements
- Power supply and cable overview
- **Cable quality and cable tests**

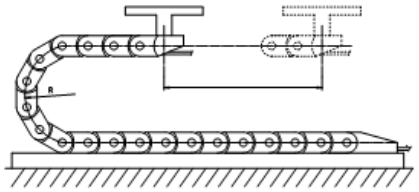
Electrical and Mechanical Properties

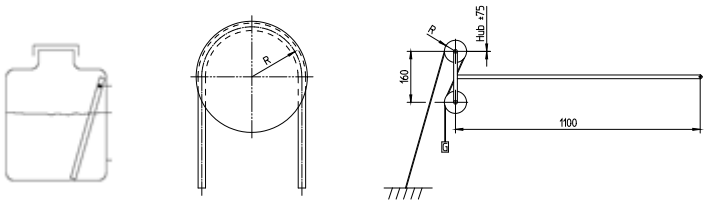
Test of the electrical properties (excerpt)

- Shield resistance
- Dielectric strength
- Insulation resistance
- ...

Test of the mechanical properties (excerpt)

- Roll test
- Drag chain test
- Resistance to media
- ...





Approval Testing for Cables

Test of the electrical transmission properties (excerpt)

- Bit error rate measurement
- Eye diagram
- Transmission of individual pulses
- Temperature stability of cable propagation time
- ...

EMV tests (excerpt)

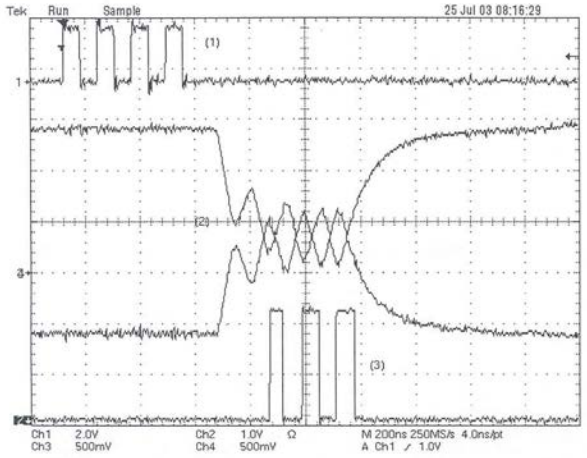
- All tests for electrical transmission properties subject to EMC influence
- Complete device test as per the EN 61000-6-4 and EN 61000-6-2 standards
- ...

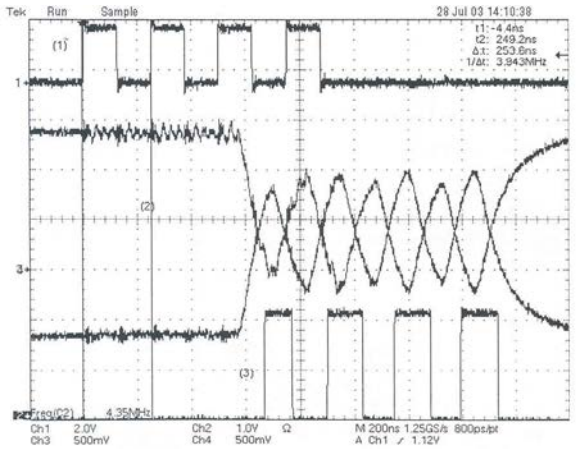
Due to the transmission frequencies up to 16 MHz, the transmission properties become particularly important (as with other transmission standards in this frequency range).

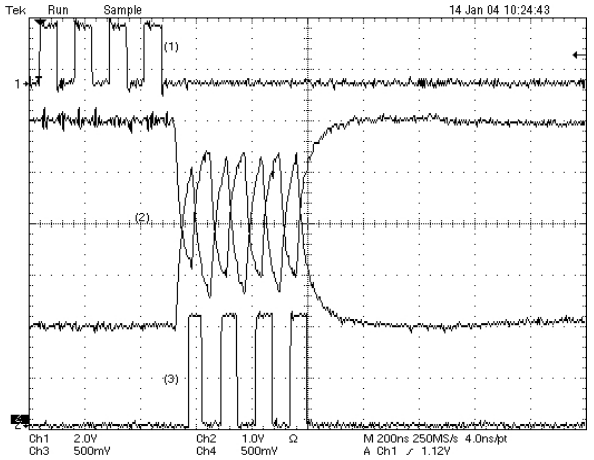
Transmission Properties

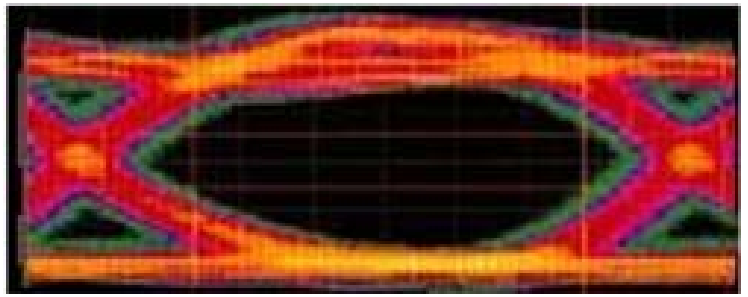
Test equipment

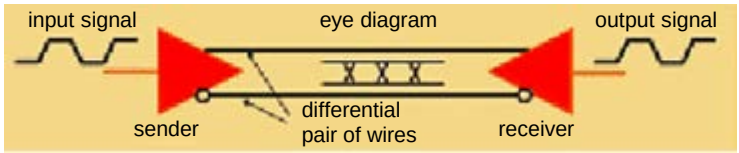
- Oscilliscope
- Signal generator











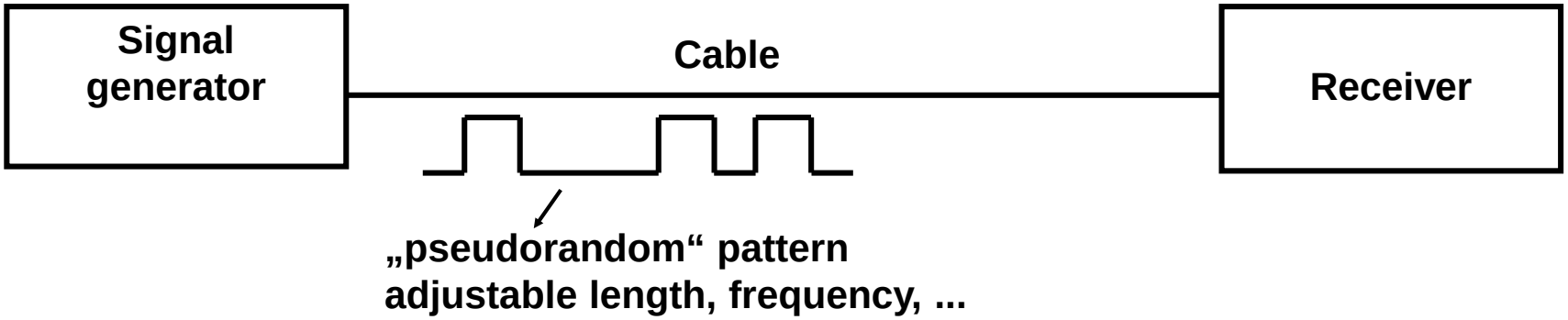
Serial data transfer via a differential pair of wires

Measurement of Bit-Error Rates

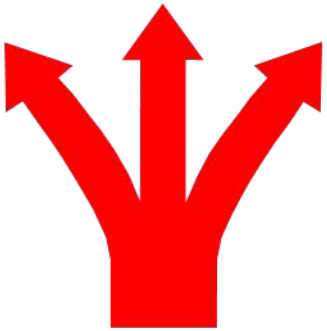
GB1400 Pattern Generator and Error Detector

Features

- Test digital data transmission up to 1400 Mb/s
- Set Data Rate with 1 kHz resolution
- Vary Clock and Data timing with 5 pS resolution
- Phase-Synchronous Clock and Data Edge Tracking
- 1-Mbit data pattern memory
- Measure Eye-Width at Specific BER Automatically
- Auto-Synchronization Rx/Tx Lock-up
- Front panel or computer control operation



Noise Emission (Selection)



Goal: Minimize effects on the environment

Interferences (Selection)

Conducted disturbances

Surge

ESD

Burst

Electromagnetic fields

Summary

Cable approval

- Comprehensive and long-term tests are necessary for approval.
- Appropriate test equipment is essential.
- If this type of specification is carried out, then the maximum requirements of 100 m cable length at a transmission frequency of 8 MHz or 20 m at 16 MHz must be tested.
- EnDat 2.1 cables from HEIDENHAIN are not suited for 8 MHz and long cable lengths.

HEIDENHAIN connecting cables

- Contact partners in the Sales department can give information about the connection cable prices.

HEIDENHAIN can not perform acceptance tests for a customer’s own cables.