ControlNet is a high-performance network for industrial applications. It is used for distributed I/O, i.e. for communication between control systems and distributed I/O units.

ControlNet has the following main features:
- Tested to meet the EMC directive.
- High bit rate: 5 Mbit/s.
- 99 addressable nodes per network.*
- Up to 48 taps in a 250 m coax segment.
- RG6 coaxial cable and BNC connectors – simple to install.
- Up to 1 km coax segment length without repeaters.
- Fiber optic links can be included to increase network length and obtain galvanic isolation. The total attenuation of a fiber cable section must be less than 13.3 dB, implying section lengths up to about 7000 m.
- 62.5/125 µm multimode optic fiber is used with ST connectors, operating at 1300 nm wavelength.

* Note that there are restrictions on the number of nodes that can be handled by for example 200-CICN.
Installation Overview

Units such as CICN, ACN, RACN, RPT, RPTD and RPA are connected to taps fitted to the trunk cable. The tap facilitates unit connection, and it also suppresses high frequency noise that might be present on a running network. A tap can be mounted on a DIN-rail, using the mounting bracket which is included in the tap package together with two coaxial cable connectors for the trunk cable.

All necessary tools for attachment of coax connectors are included in the Coax tool kit.

The maximum allowable coax segment length depends on the number of taps that are installed. The diagram, on the right, can be used to estimate the maximum length of ControlNet standard cable for a certain number of taps. If the maximum allowable length is exceeded, coax repeaters (RPT or RPTD) can be installed.

When configuring a network using repeaters, only one path is allowed between any two nodes.

Fiber optic links can extend network length considerably and provide galvanic isolation between nodes. They are mandatory to interconnect equipment in different buildings, in order to avoid problems due to lightning and electrical interference.

A fiber link consisting of a fiber repeater adaptor (RPA) and a fiber repeater module (RPFM) at each end can be installed in place of a coax repeater. The two ends are interconnected by a fiber optic cable pair. The link can be up to 7 km in length if the installation is excellent with few connectors and splices and a cable attenuation less than 1.5 dB/km at 1300 nm wavelength.

Fiber optic cables should be installed by specially trained personnel. An interbuilding backbone cable with spare fibers ends normally at connector panels, to which the repeater modules are connected by means of flexible, ready-terminated interconnect cables.

<table>
<thead>
<tr>
<th>Coax Segment Lengths</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cable length in m</td>
</tr>
<tr>
<td>1000</td>
</tr>
<tr>
<td>750</td>
</tr>
<tr>
<td>500</td>
</tr>
<tr>
<td>250</td>
</tr>
<tr>
<td>Repeater not required</td>
</tr>
<tr>
<td>2</td>
</tr>
<tr>
<td>24</td>
</tr>
<tr>
<td>32</td>
</tr>
<tr>
<td>48</td>
</tr>
</tbody>
</table>

Maximum allowable segment length = 1000 m – 16.3 m x (number of taps – 2). If L m High-Flex cable is used, reduce the allowed segment length by 1.6 x L m.

* Note that there are restrictions on the number of nodes that can be handled by for example 200-CICN.
ControlNet Components

Taps

<table>
<thead>
<tr>
<th>Tap Type</th>
<th>Code</th>
</tr>
</thead>
<tbody>
<tr>
<td>Straight T-tap</td>
<td>TPS</td>
</tr>
<tr>
<td>Right angle T-tap</td>
<td>TPR</td>
</tr>
<tr>
<td>Straight Y-tap</td>
<td>TPYS</td>
</tr>
<tr>
<td>Right angle Y-tap</td>
<td>TPYR</td>
</tr>
</tbody>
</table>

Each tap kit contains:
- Drop cable (1 m, the cable must not be lengthened or shortened)
- BNC connector kit (x 2) Order code: BNC-RG6
- Universal mounting bracket

Cables

Trunk Cable RG-6:

- **Standard PVC**
  (-40 to +80°C). For normal indoor industrial applications.
  Order codes: ALA RG6-PVC, Belden 1189A, Comm/Scope 5740

- **Flooded burial**
  (-55 to +80°C). For moist and outdoor industrial applications.
  Order codes: Belden 1190A, Comm/Scope 5740B

- **Plenum-FEP**
  (-70 to +200°C). Fire-resistant for high- and low-temperature applications, as well as corrosive areas (harsh chemicals).
  Order codes: ALA RG6-FEP, Belden 1152A, Comm/Scope 2227K

- **High-Flex**
  (-40 to +75°C). For mobile device applications.
  Order code: ALA RG6F, Belden YR28890, Comm/Scope 5740F

- **Messenered**
  (-40 to +80°C). For aerial runs where a great tensile strength is required.
  Order codes: Belden 1191A, Comm/Scope 5740M

- **Interlocking armor**
  (-40 to +80°C). Standard cable armored PVC/aluminum or PVC/steel for heavy duty applications.
  Order codes: Belden PVC/aluminum 121189A, Belden PVC/steel 131189A, Comm/Scope 5740A

- **Siamese**
  (-40 to +80°C). Dual standard cable.
  Order codes: Belden 9072, Comm/Scope 5740S

Fiber Optic Cables:

- Fiber type: Multimode 62.5/125 μm
- Connector type: ST (plastic or ceramic)
- Several vendors can supply interconnect cables ready-terminated in required lengths.

Terminators and Connectors for Coax Cables

<table>
<thead>
<tr>
<th>Connector Type</th>
<th>Code</th>
</tr>
</thead>
<tbody>
<tr>
<td>BNC-75 Ω terminator</td>
<td>BNCT</td>
</tr>
<tr>
<td>Barrel (plug to plug)</td>
<td>BNCP</td>
</tr>
<tr>
<td>Isolated bulkhead (jack to jack)</td>
<td>BNCJ</td>
</tr>
<tr>
<td>Bullet (jack to jack)</td>
<td>BNCJ</td>
</tr>
<tr>
<td>BNC/RG6-PLUG</td>
<td>BNC-RG6</td>
</tr>
<tr>
<td>Right angle (jack to plug)</td>
<td>BNCRJP</td>
</tr>
</tbody>
</table>
Tools

Coax tool kit
Tools for installation of cable connectors, including extra connectors and the ControlNet Planning and Installation Manual.
Order code: CTK

The following parts can be ordered separately
1) Crimp die
2) Crimp tool
3) BNC/RG6 plug
4) Memory blade holder -FEP
5) Memory blade holder -PVC
6) Blade cassette
7) Strip tool with blade cassette and PVC memory holder
8) Planning and Installation Manual

Order code
Crimp die: CDIE
Crimp tool: CTOOL
BNC/RG6 plug: BNC-RG6
Memory blade holder -FEP: BHFEP
Memory blade holder -PVC: BHPVC
Blade cassette: BC
Strip tool with blade cassette and PVC memory holder: STOOL
Planning and Installation Manual: CN-IME

Repeaters

Coax repeater RPT
For 85-250 V AC.
Order code: RPT

Coax repeater RPTD
For 20-72 V DC.
Order code: RPTD

Fiber repeater adapter RPA
Order code: RPA

Fiber repeater module RPFM
Order code: RPFM

All sizes are given in mm.

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