This recommendation was prepared by the Technical Commission of EUROMAP.
## History

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1 Introduction

Please note:
When applying EUROMAP 75 please check in your quotation or machine documentation, if there is marked which Ethernet System is used for the device profile.

1.1 Purpose
This document describes the profile for EUROMAP 75 measuring amplifiers.

1.2 Scope
The EUROMAP 75 specification is divided into a general description, the device profile, a definition of the interface between the injection moulding machines and signal converters and the implementation of different (Realtime-) Ethernet Systems. The present part of document describes the demands on EUROMAP 75 devices, the physical layer and the wiring concept.

1.3 References

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1.4 Document Overview
This document is divided into:

- Physical layer
- Wiring concept
2 Demands on EUROMAP 75 devices

2.1 Physical layer

Recommended is the use of two 8-pin M12 connectors, with the pinning according to the EUROMAP 75 - M12 interface specification for 24V/2A peripheral devices.

2.1.1 M12 connector

- The following signals are used:

<table>
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<tr>
<th>Pin</th>
<th>Signal</th>
<th>Code</th>
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<tr>
<td>2</td>
<td>TD+ Transmission Data +</td>
<td>orange/white</td>
</tr>
<tr>
<td>3</td>
<td>TD- Transmission Data -</td>
<td>orange</td>
</tr>
<tr>
<td>5</td>
<td>RD+ Receiver Data +</td>
<td>green/white</td>
</tr>
<tr>
<td>6</td>
<td>GND Ground 24V DC</td>
<td>blue</td>
</tr>
<tr>
<td>7</td>
<td>+24V Power supply 24V DC</td>
<td>brown</td>
</tr>
<tr>
<td>8</td>
<td>RD- Receiver Data -</td>
<td>green</td>
</tr>
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</table>

- Shielding on connector housing

- The master/manager node has a female connector

- All devices (peripheral equipment) have two connectors:
  - one bus-in connector, A-coding, M12-male
  - one bus-out connector, A-coding, M12 female

Also recommended is the use of a hybrid-cable, according to the EUROMAP 75 - M12 interface specifications.
2.1.2 Hybrid-cable

• Construction :

- Power line 1x2x22/19AWG
  stranded bare copper wire 22/19AWG – nom. cross section 0.38mm²,
  Insulation: solid polypropylene (hardness D/74) – max D 1.5mm,
  Insulation color: blue, brown

- Flexible LAN data star quad (2 pairs ) – 1 x 4 x 24/19AWG
  stranded bare copper wire 24/19AWG - nom. cross section 0.25mm² ,
  Insulations: solid polypropylene (hardness D/74) – nom D 1.35mm,
  Insulation color: orange, orange/white, green, green/white
  Separation: non-woven tape
  shielded with a spiral of tinned copper wires with 95% coverage
  TD+ with TD- (Pin 2 with Pin 3) are twisted pair
  RD+ with RD- (Pin 5 with Pin 8) are twisted pair

  Overall Separation: helicoidally non-woven tape
  Overall shield: braid of tinned copper wires with 85% coverage
  Overall jacket: halogen free, oil resistant, UL/CSA, flame retardant - IEC 60332, TPE or PUR
  outer D 7.0mm (± 1.0mm) – black color

• Electrical and transmission properties @ 20°C – LAN unit

  - Mutual capacitance @ 1 KHz 50 nF/km
  - Propagation delay @ 100 MHz 4.7nsec/m
  - Insulation resistance, min 5 GΩ x km
  - Characteristic impedance 100 Ω (± 15%)

• Electrical properties @ 20°C – power unit

  - DC conductor resistance, max. 52.0 Ω/km
  - Test voltage (core/core, core/screen) 2.0 KVac

• Mechanical characteristics

  - Min. bending radius 12 x outer cable diameter
  - Max. speed (drag chain) 1.0 m/sec
  - Max. acceleration (drag chain) 2.0 m/sec²
  - Number of cycles (drag chain) 3 millions

• Other characteristics

  - Operating temperature -20°C/+80°C
  - Max. operating voltage (LAN pairs) 125V – not for power purposes
  - Max. operating voltage (power core) 48V
2.2 Wiring concept

2.2.1 RT (realtime Ethernet) Network

Ethernet devices are wired as a bus. The wiring system used, line topology (daisy chain), ring topology or star topology, is dependent on the RT Ethernet system applied in each case.

- The injection moulding machine is the only source of 24 V energy for the complete network, i.e. connected EUROMAP 75 peripheral equipment never feeds into the 24 V power supply.
- The 24 V power supply is to be conducted in accordance with the standard IEC1131.
- The maximum load capacity per machine outlet (source) is 2A. If the sum of connected equipment exceeds the limit of 2A an additional machine outlet is to be used. The topology of the network is to be adapted accordingly.

GND concept of the machine connection:

- The M12 sockets (screened) on the injection moulding machine have a low-impedance connection to the machine ground.
- The GND cable of the 24V supply is always connected to the machine ground with low-impedance.

GND concept of the peripheral equipment:

- The supply cables +24V and GND are connected through to the peripheral device from the M12 connector (BUS IN) to the M12 socket (BUS OUT). This connection must have an ampacity of at least 2A.
- The screened M12 connector (BUS IN) and the screened M12 socket (BUS OUT) are connected together with low impedance.
- Preferably, the screened M12 plug connector and the housing of the peripheral device are also to be connected with low-impedance, i.e. “not isolated”. For this execution an additional, low-impedance connection with large-surface area between the machine ground and the housing of the peripheral device is to be provided (e.g. ground strap).
- Alternatively, e.g. on peripheral devices with an additional external power supply, the M12 plug connectors can be “isolated” from the housing (≥ 1MΩ). The difference in potential between the machine ground and the GND of the peripheral devices must not exceed 3V.

The sketches below illustrate the different wiring concepts.
Figure 1: RT Network – Example of a line topology (daisy chain)
Figure 2: RT Network – Example of a ring topology
Figure 3: RT Network – Example of a star topology
2.2.2 EUROMAP 75 cable

The EUROMAP 75 cable is defined as follows:

Figure 4: EUROMAP 75 cable – “isolated” wiring
Figure 5: EUROMAP 75 cable – “not isolated” wiring
Figure 6: Example of a hybrid-cable
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