

**EUROMAP 66-1**

Protocol for Communication with Peripheral  
Equipment

**General Description**

Version 1.2, December 2002  
(10 pages)

This recommendation was prepared by the Technical Commission of EUROMAP.

## History

<b>Date</b>	<b>Changes</b>
June 2002	Document revised. Improvement of some typing errors. Consistent representation of hex values.
December 2002	Power supply 24V DC for the CAN network is optional (see 3.1); Fig. 1 and 2 modified

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# 1 Introduction

## 1.1 Purpose

This document describes the part of EUROMAP 66 which is common to all EUROMAP 66 devices.

## 1.2 Scope

The EUROMAP 66 specification is divided into a general description and the device profile descriptions. The present part of document describes the general aspects.

## 1.3 Definitions, acronyms and abbreviations

EUROMAP	European Committee of Manufacturers of Plastics and Rubber Machinery ( <a href="http://www.euromap.org/">http://www.euromap.org/</a> ).
CiA	CAN in Automation. Organization responsible for the definition of different CAN protocols, a.o. CAN Application Layer (CAL) and CANopen ( <a href="http://www.can-cia.de/">http://www.can-cia.de/</a> ).
CAL	CAN Application Layer. Communication mechanisms standardized by CiA for CAN-based systems (DS 201..207).
CANopen	Communication profiles (DS 301) and device profiles (CiA DS 40x) based on CAL, standardized by CiA.

## 1.4 References

<u>Short name</u>	<u>Title</u>	<u>Version</u>	<u>Author</u>
CiA DS-102	CAN Physical Layer for Industrial Applications	2.0	CiA
CiA DS-301	CANopen Application Layer and Communication Profile	4.0	CiA

## 1.5 Document Overview

The next chapter of this document gives a short overview over CAN and CANopen.

Chapter 3 specifies the concrete demands to EUROMAP 66 hard- and software.

## 2 Overview

### 2.1 CAN

Machines and EUROMAP 66 devices communicate over CAN ("Controller Area Network").

For detailed information see [CiA DS-102].

### 2.2 CANopen

EUROMAP 66 is based on CANopen.

CANopen is a relatively complex definition which consists of different components:

- CAN Application Layer (CAL)
- CANopen communication profile
- CANopen device profile

The **CAN Application Layer** (CAL) defines services which have to be implemented by CANopen devices, as well as the protocol for the utilization of these services. See [DSP-20x].

CANopen devices make all data available via the object directory. The **CANopen communication profile** defines (a.o.) this object directory and the access mechanisms to the individual objects. Additionally, some mandatory and optional objects are defined for the communication ("Communication Profile Area"). See [DS-301].

The identification of the objects in the directory is affected by means of index and subindex. The index ranges available for the different objects and object types are defined in the communication profile. Available, a.o., is also an area for manufacturer-specific extensions ("Manufacturer Specific Profile Area").

The **CANopen device profiles**, finally, define the device-specific mandatory and optional objects ("Standardized Device Profile Area"). They define in the main how the functionality of a device must be implemented, if it is implemented at all.

Device profiles exist for different types of devices. A type of device "EUROMAP..", however, does not exist. A definition of a corresponding profile, furthermore, would take up very much time. A profile meeting the requirements for heating/cooling equipment closely is the CiA DS 404 ("CANopen Device Profile for Measuring Devices and Closed-Loop Controllers").

EUROMAP 66, however, defines additional objects specific to plastic machinery peripheral devices.

## 3 Demands on EUROMAP 66 devices

### 3.1 Physical layer

- It is recommended to use two 9-pin D-Sub connectors (DIN 41652 or corresponding international standard) with the pinning according to CiA DS-102, Version 2.0 (male and female).
- CAN ISO High Speed standard (ISO 11898-2).
- The following signals are used:
  - (pin2) CAN Low
  - (pin3) CAN Ground (connected only at the insulated side)
  - (pin5) CAN Shield (not connected with the DSUB9 connector housing or the device housing)
  - (pin7) CAN High
  - (pin9) Optional: CAN 24V DC

Power supply 24V DC for the CAN network is optional; (in accordance with EN61131-2 for 24V DC PS2 and a current range of 0.5A to 1.0A)
- The following cable is used:
  - Shielded, twisted pair with a wire cross-section of minimum 0.34 mm<sup>2</sup>.
  - Wire CAN Low with wire CAN High (pin2 with pin7) are twisted pair.
  - Wire CAN Ground and CAN 24V (pin3 with pin9) are twisted pair.
  - The shield is connected to pin5, but not to the connector housing.
  - The shield of the cable is connected to ground only by the master (machine).
  - The cable has to be characterized with a printed "EUROMAP 66" legend.
- All devices (peripheral equipment) and the master (machine) have one termination plug (female) with integrated resistor of 120 OHM permanently attached by a chain, a cord or similar possibility. There is never an unplugged connector in a CAN network.

Exception:

If it's permanently attached a bus end resistor of 120 OHM by the machine-control, there's no need of an external termination plug with integrated resistor attached by a chain, a cord or similar possibility.
- The master node (machine) has a male connector.
- The baudrate is 250kbaud. Other baudrates corresponding to CiA DR-303-1 can be supported (not used).
- DC-decoupling for each node with insulation voltage against GND of 500VDC have to be done. A minimum line length of 180m by using a baudrate of 250kbaud must be guaranteed with all nodes isolated.
- Standard frames (no extended frames).
- Setting of the CANopen device ID (two digits: 1 to 99) is done on the device, e.g. by selector switch or on a service panel, with the possibility of non volatile storage.

### 3.2 Wiring concept

#### 3.2.1 CAN Network

CAN devices are wired as a bus. They always feature two CAN connectors. The wiring is from the control to the first connector of the first device, then from the second connector to the next device, and so on. The CAN bus must be terminated to avoid reflections.

The sketch below illustrates the wiring concept.

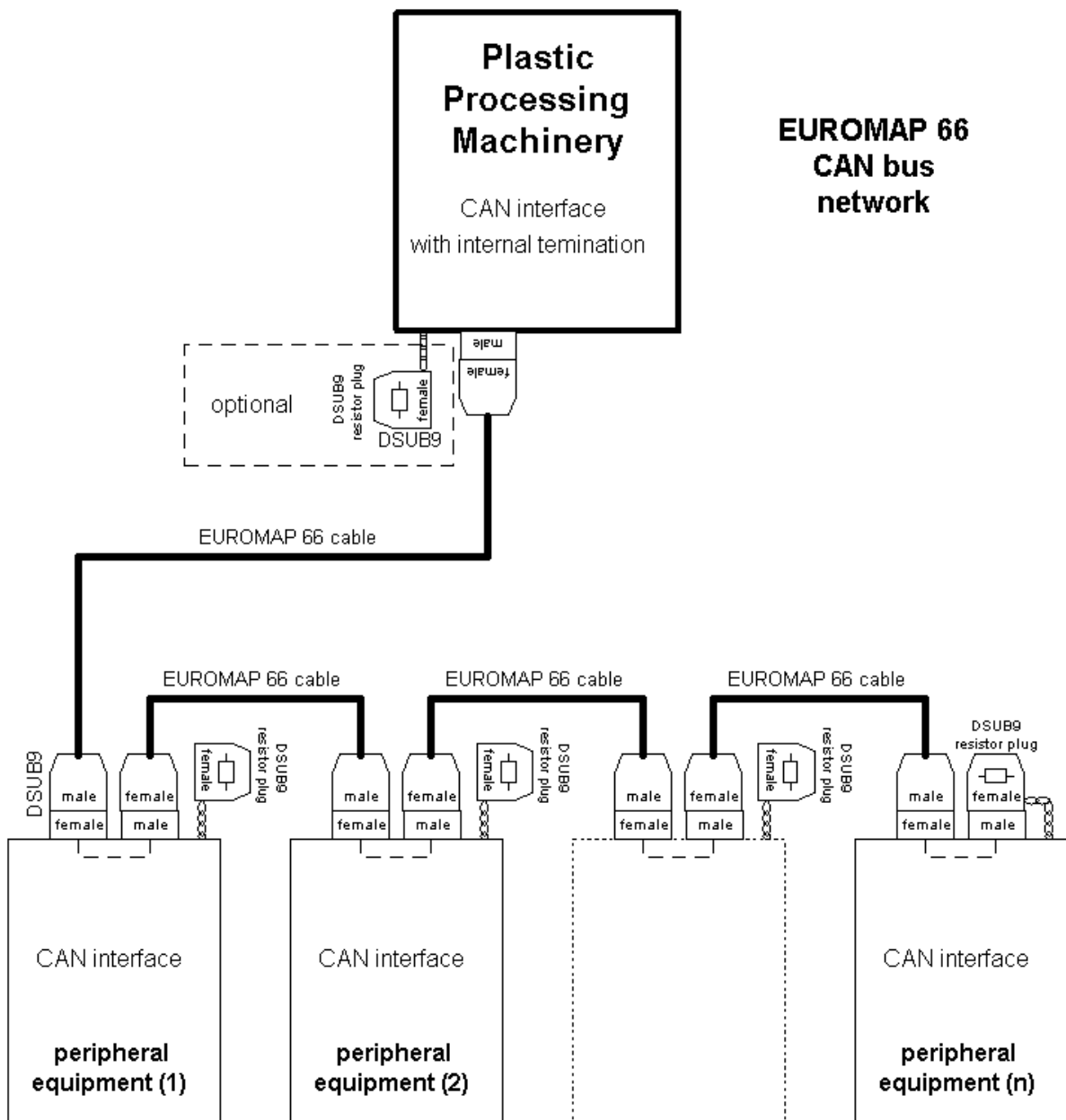


Figure 1: CAN Network

### 3.2.2 EUROMAP 66 cable

The EUROMAP 66 cable is defined as follows:

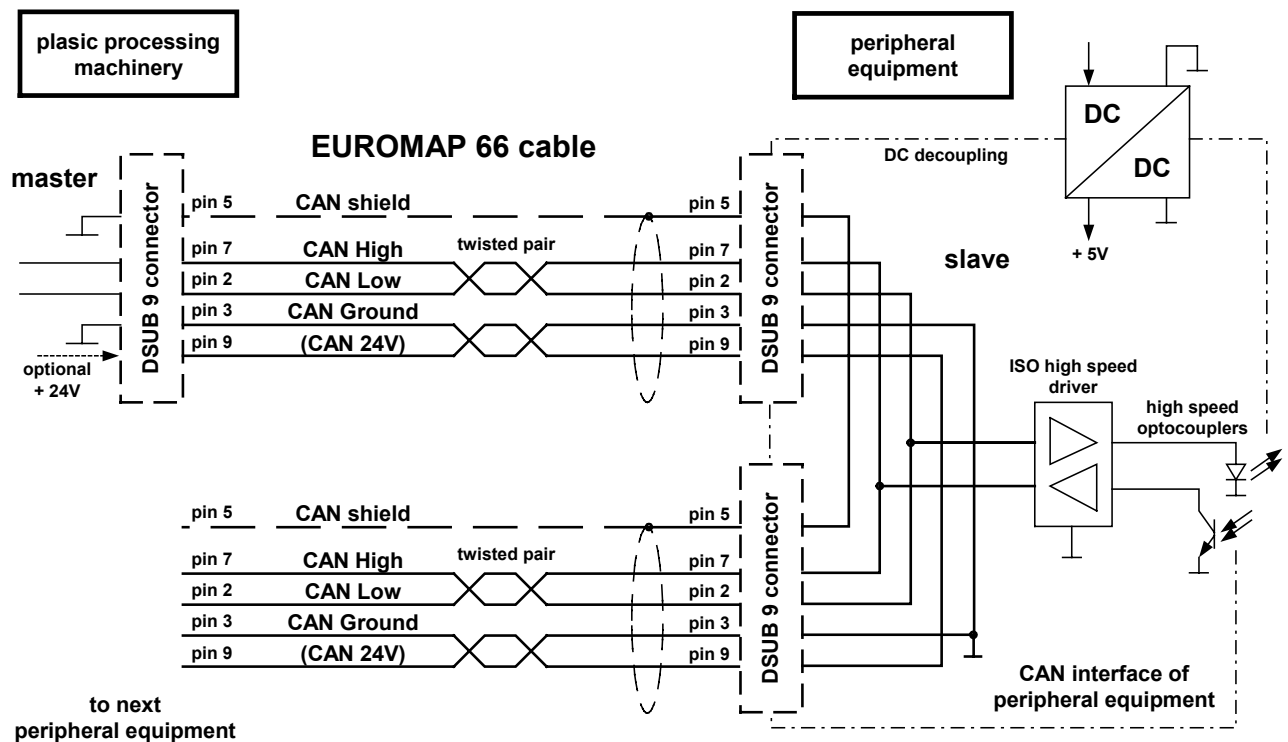


Figure 2: EUROMAP 66 cable

See also 3.1 Physical layer.

## 3.3 CANopen

### 3.3.1 Basic aspects

In principle CANopen EUROMAP devices must be implemented as per [DS-301]. The requirements listed below form a subset of this specification.

### 3.3.2 General requirements

The following general requirements apply:

- A CANopen EUROMAP device must support the requirements which apply to a "Minimum capability device" as per [DS-301].
- Master/slave: the machine (control) is CANopen master, the peripheral device is slave.
- The COB IDs must be set by default as per Predefined Connection Set.
- Node guarding must be supported. The reaction to a Node-Guard-Event lies in the competence of the manufacturer of the device (e.g. continue working with the last valid nominal values or switch off).
- The Bootup Protocol has to be implemented.
- Object 1008h (manufacturer device name), 1009h (manufacturer hardware version) and 100Ah (manufacturer software version) are mandatory. 1008h contains the manufacturer specific device type.



- SDO must be acknowledged within 50 milliseconds.
- SDO with invalid values (modes which are not supported, value outside tolerance, etc.) are generally to be acknowledged with SDO-Abort.

### 3.3.3 Mandatory Objects for all EUROMAP 66 devices

Object at index 2000h describes type and version of the EUROMAP device. It is composed of a 8-bit field which describes the EUROMAP code, and three 8-bit fields which gives information about the EUROMAP device profile. The device profile parameter is profile specific. Its specification does not fall within the scope of this document, it is defined in the appropriate device profile.

#### OBJECT DESCRIPTION

Index	2000h
Name	EUROMAP66_Device_Profile
Object Code	VAR
Data Type	UNSIGNED32
Category	Mandatory

#### ENTRY DESCRIPTION

Access	ro
PDO Mapping	No
Value Range	UNSIGNED32
Default Value	No

MSB			LSB
Profile Version	Profile Index	EUROMAP66-Profile Code	EUROMAP66 Code

EUROMAP66-Code: 66 (42h)

## **EUROMAP**

Europäisches Komitee der Hersteller von Kunststoff- und Gummimaschinen

European Committee of Machinery Manufacturers for the Plastics and Rubber Industries

Comité Européen des Constructeurs de Machines pour Plastiques et Caoutchouc

Comitato Europeo Costruttori Macchine per Materie Plastiche e Gomma

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