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## eDrive Basic CAN control

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## History

Version	Author	Description	Date
1.0	Gregor Kosc	Initial version	07.09.2015

## DESCRIPTION

This document describes basic data flow on CAN bus for controlling the drive.

## LEGAL REGULATIONS

Standards:

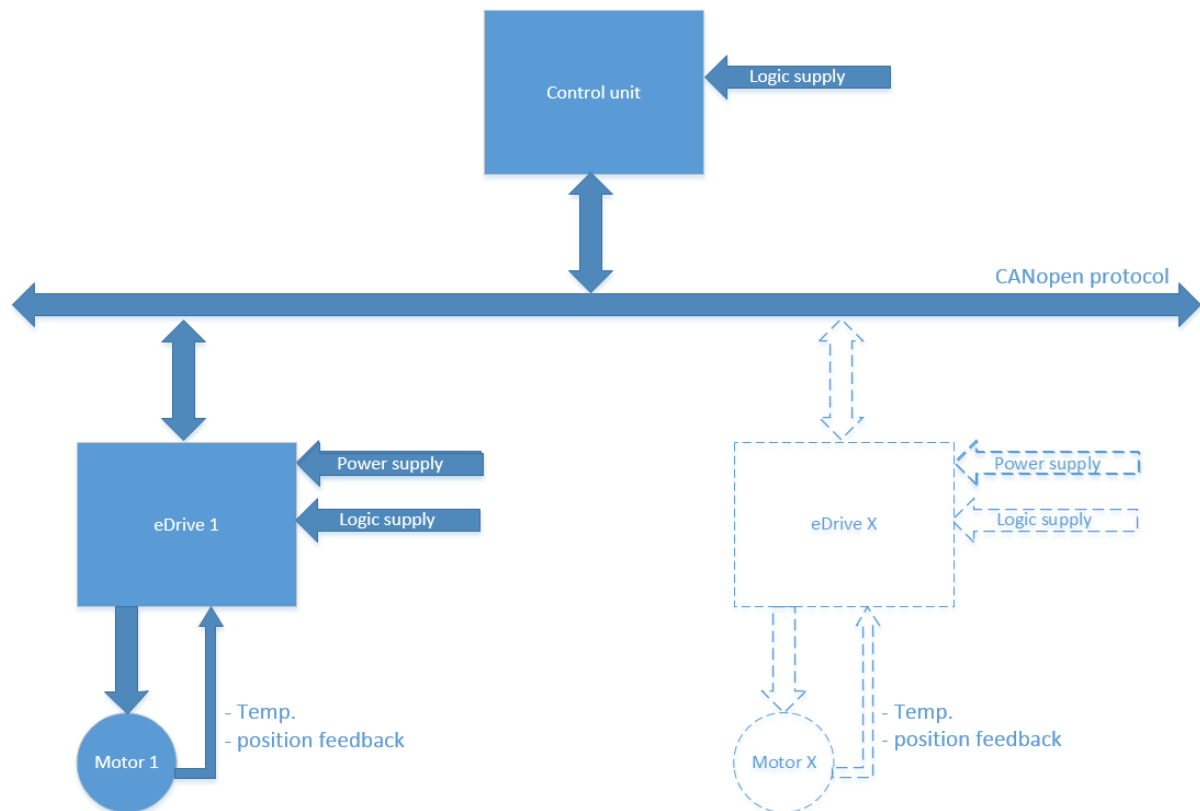
Nr.:	Standard	Description	Issued
1	ISO 11898-1	Road vehicles – Controller area network (CAN) – Part 1: Data Link Layer	
2	ISO 11898-2	Road vehicles – Controller area network (CAN) – Part 2: High-speed medium access unit	
3	ISO 11898-3	Road vehicles – Controller area network (CAN) – Part 3: Low-speed, fault-tolerant, medium-dependent interface	
4	CiA301 Version: 4.2.0	CANopen application layer and communication profile	February 2011
5	CiA402 Version: 3.0.0.	CANopen device profile for drives and motion control	December 2007

### GENERAL NOTICE:

For latest version of documentation please contact the e-mail address  
[info@emsiso.com](mailto:info@emsiso.com)

## DESCRIPTION OF REQUIREMENTS

### 1.1 Connections for supply and communication



## BASIC COMMUNICATION OVER CAN

### 1.2 Default PDO configuration

#### 1.2.1 Receive PDO 1 (data from control unit to eDrive)

byte							
0	1	2	3	4	5	6	7
Control Word		Target Velocity				Target Torque	

#### 1.2.2 Receive PDO 2 (data from control unit to eDrive)

byte							
0	1	2	3	4	5	6	7
Target Position				Res.	Res.	Res.	Res.

#### 1.2.3 Transmit PDO 1 (data from eDrive to control unit)

byte							
0	1	2	3	4	5	6	7
Status Word		Position Actual Value				Torque Actual val	

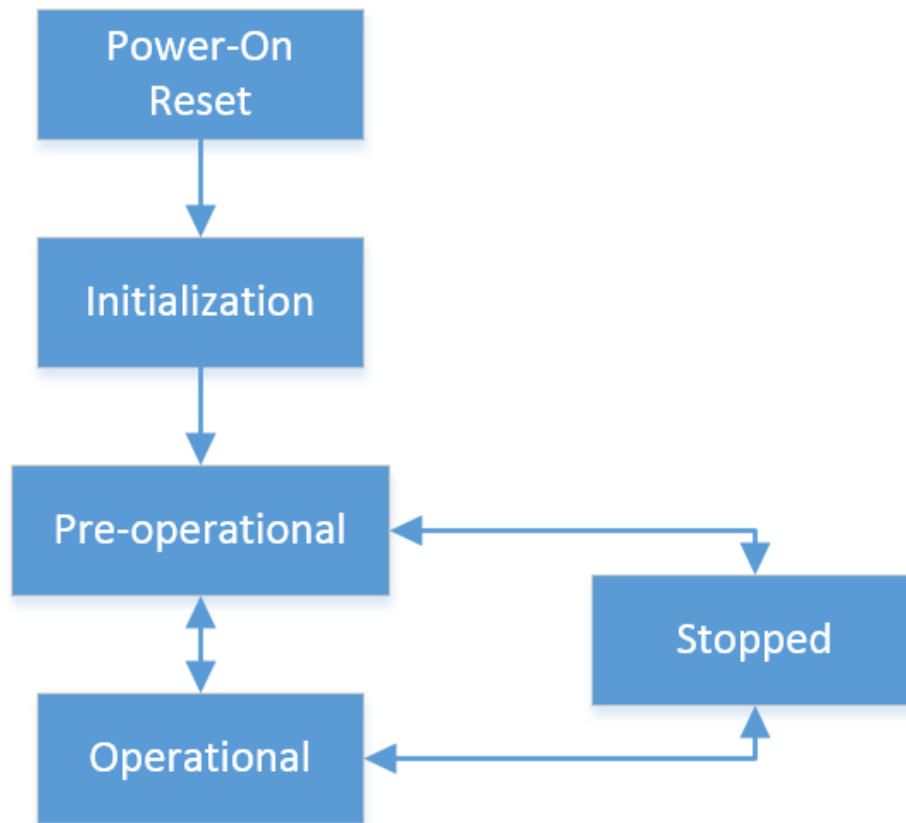
#### 1.2.4 Transmit PDO 2 (data from eDrive to control unit)

byte							
0	1	2	3	4	5	6	7
Controller temp	Motor temp	DC Link Voltage		Logic Power Supply Voltage		Current Demand	

#### 1.2.5 Transmit PDO 3 (data from eDrive to control unit)

byte							
0	1	2	3	4	5	6	7
Motor current actual value		Electrical angle		Phase A Current		Phase B Current	

### 1.3 Network management (NMT) state of slave



Upon power-up eDrive (CANopen slave node) comes out of »power-on reset« and goes into initialization. It initializes the entire application, CAN/CANopen interfaces and communication. At the end of the initialization the node tries to transmit boot-up message. As soon as it is transmitted successfully, the node switches to Pre-operational state.

Using the NMT Master message, an NMT Master can switch individual nodes or all nodes back and forth between the three major states: Pre-operation, Operational and stopped.

### 1.4 Synchronized or grouped polling (SYNC)

The Sync-Producer (Control unit) provides the synchronization-signal for the Sync-Consumer (eDrive). When the Sync-Consumer receives the signal they start carrying out their synchronous tasks (like transmitting TPDOs).

## Master on power up sequence:

1. Wait for boot-up message from slave.  
*Slave (eDrive) is by default configured to node id = 10.*  
*Slave message:*

COB-ID (11bits)	Data byte 1
0x700+NodeID	0x00

*Note: other bytes not send*

2. Check vendor ID (sdo read object 0x1018, 1 -> eDrive response 0x3C6)

*Sdo read command from master (control unit):*

COB-ID (11bits)	Command byte	Obj. Index (2 byte)	Obj. sub-index (byte)	Data (4bytes)
0x600+NodeID	0x40	0x1810	0x01	0

*Sdo read response from slave (eDrive):*

COB-ID (11bits)	Command byte	Obj. Index (2 byte)	Obj. sub-index (byte)	Data (4bytes)
0x580+NodeID	0x43	0x1810	0x01	0x19030000

3. Send NMT operational (broadcast)

*Broadcast NMT request go to 'Operational':*

COB-ID (11bits)	Data byte 0	Data byte 1
0x000	0x01	0x00

*NMT Command:*

0x01 = start remote node  
 0x02 = stop remote node  
 0x80 = enter pre-operational  
 0x81 = reset node  
 0x82 = reset communication

4. Send PDO to enable PWM

COB-ID (11bits)	Data (default slave RPDO1)
0x200+Node-ID	06 00 xx xx xx xx xx xx

COB-ID (11bits)	Data (default slave RPDO1)
0x200+Node-ID	07 00 xx xx xx xx xx xx

COB-ID (11bits)	Data (default slave RPDO1)
0x200+Node-ID	0F 00 xx xx xx xx xx xx

5. Periodically:
  - a. send sync (each slave (eDrive will response with three TPDOs)

*master broadcast sync message:*

COB-ID (11bits)	Data byte 0
0x080	0x00

*Other data bytes are not transmitted.*

Slave response:

COB-ID (11bits)	Data (default slave TPDO1)
0x180+Node-ID	xx xx xx xx xx xx xx xx

COB-ID (11bits)	Data (default slave TPDO2)
0x280+Node-ID	xx xx xx xx xx xx xx xx

COB-ID (11bits)	Data (default slave TPDO3)
0x380+Node-ID	xx xx xx xx xx xx xx xx

COB-ID (11bits)	Data (default slave TPDO4)
0x480+Node-ID	xx xx xx xx xx xx xx xx

b. master transmits PDO-for controlling

COB-ID (11bits)	Data (default slave RPDO1)
0x200+Node-ID	0F 00 xx xx xx xx xx xx

COB-ID (11bits)	Data (default slave RPDO2)
0x300+Node-ID	0F 00 xx xx xx xx xx xx

6. To disable PWM

COB-ID (11bits)	Data (default slave RPDO1)
0x200+Node-ID	06 00 xx xx xx xx 00 00

7. To disable drive

Broadcast NMT request go to 'Pre-operational'