2.3 CANopen communication

The CANopen protocol standard defines several CAN message types for data exchange, network management and reporting device errors. All message types for data exchange are accessing the object dictionary of a CANopen device.

Message Type	Description	Default CAN-Identifiers
NMT	**Network Management Telegram** These telegrams are sent from the master to the slave nodes in order to control the network state of the slaves. - Highest priority CAN identifier - Broadcast message from master to all slaves Possible states of a CANopen device: stopped, preoperational, operational.	0x00
SDO	**Service Data Object** These telegram type is used to exchange configuration data. - used in device states preoperational and operational - Lower priority CAN identifier - Mainly used during bus start up. - Each telegram is initiated from master node. - Each telegram is answered, so transfer is slowly. - There is only one object (data from object dictionary) that can be exchanged - Data is addressed using index and sub index.	0x600 + Node-ID 0x580 + Node-ID
PDO	**Process Data Object** These telegram type is used to transfer process data (for example digital input bitmap) - High priority CAN identifier - PDOs may only be transmitted in operational device state. - Predefined data content of max. 8 bytes. No addressing using index and sub index. - Data transfer may be initiated from each node. - Data transfer is not answered	0x180 + Node-ID … 0x480 + Node-ID 0x200 + Node-ID … 0x500 + Node-ID

Message Type	Description	Default CAN-Identifiers
EMCY	**Emergency Message** These telegrams are sent in order to indicate an error condition of the device. - High priority CAN identifier	0x80 + Node-ID
SYNC	**Synchronization Message** This telegram is sent from master to all slaves, in order to synchronize exchanging of process data with hardware and in order to cause transmission of PDOs - High priority CAN identifier - Message without any data content	0x80
Boot-Up	**Boot Up Message** This telegram type is used to indicate, that a node has performed a reset and is no ready to take part within the network communication. - Low priority CAN identifier - Sent only once after node has performed reset procedure.	0x700 + Node-ID
Error-Control	**Error-Control Protocol** These telegram types are used to monitor the device state. The protocols are used to detect breakdowns of slaves or the master in order to enter fail safe condition states. There are two types of Error-Control Protocols: - Node-Guarding / Life Guarding The master polls each slave individually. The slave sends an answer protocol if still alive. - Heartbeat Each node periodically transmits its NMT state.	0x700 + Node-ID