



mPSU Medical Power Supply Units

CANopen® Protocol Specification Document

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Revision Record

Changes to the previous version are marked in green.

Revision	Date	Description
1.0	10.06.2026	First Release

1. Legal Information

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2. Abbreviations and Acronyms

Acronym / Abbreviation	Definition
BMS	Battery Management System
CAN	Controller Area Network
CiA	CAN in Automation
COB	Communication Object Identifier
Cont.	Continued
DCF	Device Configuration File
EDS	Electronic Datasheet
EMCY	Emergency
LSS	Layer Setting Service
mPSU	Modular power supply unit
NMT	Network Management
NVM	Non-Volatile Memory
RPDO	Receive Process Data Object
SDO	Service Data Object
SRD	SDO Requesting Device
SYNC	Synchronization
TPDO	Transmit Process Data Object

Tab. 1: Abbreviations and acronyms

3. Introduction

3.1 Purpose

This document describes the CANopen® protocol used for communication between the modular power supply unit (mPSU) and the host system connected on a CANopen® network.

3.2 Scope

This document is intended for engineers and technical personnel who

- Have at least basic knowledge of CANopen®
- Have prior experience configuring and using CANopen® devices
- Intend to integrate or interface the mPSU with their systems via CANopen®

The availability and operation of tools and equipment for CANopen® communication are assumed.

This document is valid for the following versions of the mPSU:

1-phase mPSU:

- 1Ph 24V 150W
- 1Ph 24V 300W
- 1Ph 24V 600W
- 1Ph 24V 1000W
- 1Ph 48V 1000W
- 1Ph 48V 1500W

3-phase mPSU:

- 3Ph 24V 600W

NOTICE



Users must refer to the User Manual for warnings, hazards and further information on the mPSU.

3 Introduction

3.3 mPSU Overview

The mPSU CANopen® interface provides a standardized communication channel for configuring and controlling the mPSU.

Through this interface, users can

- Configure device parameters.
- Control the output voltage and output current.

To control the mPSU via CANopen®, the interface must be configured. The following instructions detail the necessary steps to establish a basic communication interface for controlling the output voltage and output current using Process Data Objects (PDOs), as defined in the CAN-in-Automation (CiA) standard CiA-453.

The mPSU is designed to operate with commercially available BUS analyzer tools that support CANopen®.

A CANopen® network can have a maximum of 128 devices: 1 master and up to 127 slaves. Each device must have a unique node ID (node address).

3.4 Supported CiA Standards

- CiA-301: CANopen® application layer and communication profile: Describes how the devices in a CANopen® network exchange data with each other
- CiA-302-1: Additional application layer functions, general definitions
- CiA-305: Layer Setting Services (LSS): Describes the configuration of bitrate and node-ID of a CANopen® device over CANopen® network
- CiA-453: Power Supply: Configuration; Control of output voltage and current

3.5 References

Description	Location
CiA-301	www.can-cia.org
CiA-305	
CiA-453	
EDS-File	Request from your Delta sales contact
Bootloader EDS-File	

Tab. 2: References

4. Protocol Specification

This section explains the CANopen® protocol in order to configuration and control the mPSU.

4.1 Supported Bitrates

The bitrate must be set for the transfer speed on the CANopen® network.

- The mPSU must have the same bitrate as the NMT-Master and the host system.
- The longer the cable length used, the lower the possible bitrate. Please note the maximum length of the branches depends of the bitrate (see CiA-301).

Bitrate [kbit/s]	Supported by mPSU
1000	Yes
800	Yes
500 (default)	Yes
250	Yes
125	Yes
100	Yes
50	Yes
20	Yes
10	Yes
Automatic bitrate detection	No

Tab. 3: Supported bitrates

The bitrate can be configured with the **LSS** (CiA-305).

4.2 Supported CANopen® Services

CANopen® Service	Supported by mPSU
NMT	Yes
EMCY	Yes
SYNC	Yes
SDO	Yes
PDO	Yes
TIME	No
Heartbeat	Yes
Node Guarding	No
LSS	Yes

Tab. 4: Supported CANopen® services

4.2.1 Network Management (NMT)

4.2.2 Introduction

The Network Management (NMT) has the task to initialize, start, stop and monitor devices on the CANopen® network. Only 1 NMT-master is allowed in a CANopen® network. All other devices on the CANopen® network are NMT-slaves. The mPSU is configurable as a non-self-starting NMT-slave or as a self-starting NMT-slave.

NOTICE



By default, the mPSU (NMT-slave) enters the “operational state” after startup and must not be set to this state by an NMT-master in the CANopen network. (Stand-alone application).

If an NMT master exists, the mPSU (NMT slave) must be reconfigured as a non-self-starting device (0x6200:0x05 = 0).

After startup, the mPSU is in the “pre-operational state” and must be set to the “operational state” by an NMT-master in the CANopen network.

In the “pre-operational state,” no output voltage is available. Only configuration of the mPSU is possible.

4.2.3 Synchronization Object (SYNC)

The Synchronization Object is a special service that can be used to synchronize anything, but it is mostly used to synchronize PDO transmissions on the CANopen® network. Two services are available:

- SYNC-producer
- SYNC-consumer

The SYNC-producer sends a synchronization message on the CANopen network to synchronize all other devices. Only one SYNC-producer is allowed on the CANopen® network. All other devices are SYNC-consumers.

The mPSU is a SYNC-consumer.

4.3 Emergency Object (EMCY)

The Emergency Object (EMCY) informs all devices on the CANopen® network of a detected error in the mPSU. The EMCY message contains an error code that specifies the type of error.

The mPSU sends the following EMCY-Messages with error code, depending on the cause:

Error code	Description
0x3101	Power Input - Undervoltage
0x3102	Power Input - Overvoltage
0x3301	Output - Undervoltage
0x3302	Output - Overvoltage
0x3303	Aux Output - Overcurrent
0x2002	Output - Overcurrent
0xFF00	Fan 1 Failure
0xFF01	Fan 2 Failure
0x4200	Overtemperature
0x6100	Internal Failure

Tab. 5: Error codes for the Emergency Object (EMCY)

The details of the other standardized CANopen® error codes are listed in CiA-301.

4.4 Device Profile Compatibility

The mPSU provides the mandatory objects from CiA-453, as well as some of the optional objects.

See “4.7 Object Dictionary EDS-file”, p. 15, and “4.8 Object Data Descriptions”, p. 27 for CiA-453 objects that are implemented.

4.5 Process Data Object (PDO) Communications

The Process Data Object (PDO) is a communication channel for efficient data exchange of real-time data. The transmissions are always broadcast messages without confirmation.

There are two types of PDO:

- Receive Process Data Object (RPDO)
- Transmit Process Data Object (TPDO)

4.5.1 Transmit Process Data Object (TPDO)

The Transmit Process Data Object (RPDO) is a cyclic message on the CANopen® network. The mPSU sends this message to other devices that need data from the mPSU to operate.

The mPSU supports 4 TPDO.

4.5.2 Receive Process Data Object (RPDO)

The **Receive Process Data Object (RPDO)** is a cyclic message on the CANopen® network that the mPSU needs for operation.

NOTICE



For a safety operation, the timeout for each used cyclic message (RPDO) from the host system must be configured in the mPSU.

The mPSU supports 4 RPDO.

4.5.3 CANopen® Initialization

The mPSU out-the-box has a default bitrate of 500 kbit/s and has no set node ID (node ID = 0xFF, unconfigured CANopen® device). During the commissioning procedure, the node-ID must be set with the rotary switch.

The mPSU needs to be configured with the following parameters:

- Valid and free Node-ID in the CANopen® network (set via rotary switch)
- Valid bitrate according to the other devices in the CANopen® network (via LSS CiA-305)

4.5.4 Controlling the power supply via CANopen®

Changeable environment:

To ensure safe operation, the power supply must receive cyclical data from the host system. A timeout must be configured to monitor host system messages.

NOTICE



For safe operation, the timeout for each cyclic message (**RPDO**) used from the host system must be configured in the power supply.

4.6 SDO Communications

The Service Data Object (SDO) serves as a communication channel for device configuration. This communication is always a transmission with confirmation from the receiver.

The mPSU supports 1 SDO-Client and 1 SDO-Server with 2 CAN identifiers which are assigned. These CAN identifiers depend on the node-ID.

4 Protocol Specification

4.7 Object Dictionary EDS-file

The CANopen® interface has an object dictionary, which is used to configure and communicate with the mPSU. An entry in the object dictionary is defined by its index (e.g. 0x2000:0x01) and sub-index (e.g. 0x2000:0x01).

4.7.1 Communication Segment

Object		Description	Unit	Default value (EDS-File)	Data type
Index	Sub-Index				
0x1000	0x00	Device Type	–	453 (0x200001C5)	Uint32
0x1001	0x00	Error Register	–	0x00	Uint8
0x1005	0x00	COB-ID SYNC	–	0x00000080	Uint32
0x1006	0x00	Communication Cycle Period	–	0x00	Uint32
0x1007	0x00	Synchronous Window Length	–	0x00	Uint32
0x1008	0x00	Manufacturer Device Name	–	Depends on mPSU variant, e.g.: “mPSU- W3AC-24DC-600”	Visible_ String[34]
0x1009	0x00	Manufacturer Software Version	–	e.g.: “1.0”	Visible_ String[34]

Store Parameter Field					
Object		Description	Unit	Default value (EDS-File)	Data type
Index	Sub-Index				
0x1010	0x00	Highest Sub-index Supported	–	1	Uint32
	0x01	Save all Parameters	–	0x00	Uint32

Restore Default Parameters					
Object		Description	Unit	Default value (EDS-File)	Data type
Index	Sub-Index				
0x1011	0x00	Highest Sub-index Supported	–	1	Uint32
	0x01	Restore all Default Parameters	–	0x00	Uint32
0x1014	0x00	COB-ID EMCY	–	0x00000080	Uint32
0x1015	0x00	Inhibit Time EMCY	–	0x00	Uint16

Heartbeat Consumer Entries					
Object		Description	Unit	Default value (EDS-File)	Data type
Index	Sub-Index				
0x1016	0x00	Highest Sub-index Supported	–	1	Uint32
	0x01	Consumer Heartbeat 1	–	0x000000	Uint32
	0x02	Consumer Heartbeat 2	–	0x000000	Uint32
0x1017	0x00	Producer Heartbeat Time	–	0x03E8	Uint16

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Identity Object					
Object		Description	Unit	Default value (EDS-File)	Data type
Index	Sub-Index				
0x1018	0x00	Highest Sub-index Supported	–	4	UInt8
	0x01	Vendor ID	–	0x000004C4	UInt32
	0x02	Product Code	–	–	UInt32
	0x03	Revision Number	–	–	UInt32
	0x04	Serial Number	–	–	UInt32
0x1019	0x00	Synchronous Counter Overflow value	–	0x00	UInt8

Error Behavior					
Object		Description	Unit	Default value (EDS-File)	Data type
Index	Sub-Index				
0x1029	0x00	Highest Subindex Supported	–	1	UInt8
	0x01	Communication Error	–	0	UInt8

Server SDO Parameter 1					
Object		Description	Unit	Default value (EDS-File)	Data type
Index	Sub-Index				
0x1200	0x00	Highest Sub-index Supported	–	2	UInt8
	0x01	COB-ID Client -> Server	–	0x600 + Node-ID	UInt32
	0x02	COB-ID Server -> Client	–	0x580 + Node-ID	UInt32

Communication Parameter RPDO 1					
Object		Description	Unit	Default value (EDS-File)	Data type
Index	Sub-Index				
0x1400	0x00	Highest Sub-index Supported	–	5	UInt8
	0x01	COB-ID	–	0xC0000200	UInt32
	0x02	Transmission Type	–	0xFF	UInt8
	0x03	Inhibit Time	–	0x0	UInt16
	0x04	Compatibility Entry	–	0x0	UInt16
	0x05	Event Timer	–	0x0	UInt8

Communication Parameter RPDO 2					
Object		Description	Unit	Default value (EDS-File)	Data type
Index	Sub-Index				
0x1401	0x00	Highest Sub-index Supported	–	5	UInt8
	0x01	COB-ID	–	0xC0000300	UInt32
	0x02	Transmission Type	–	0xFF	UInt8
	0x03	Inhibit Time	–	0x0	UInt16
	0x04	Compatibility Entry	–	0x0	UInt16
	0x05	Event Timer	–	0x0	UInt8

4 Protocol Specification

Communication Parameter RPDO 3					
Object		Description	Unit	Default value (EDS-File)	Data type
Index	Sub-Index				
0x1402	0x00	Highest Sub-index Supported	–	5	UInt8
	0x01	COB-ID	–	0xC0000400	UInt32
	0x02	Transmission Type	–	0xFF	UInt8
	0x03	Inhibit Time	–	0x0	UInt16
	0x04	Compatibility Entry	–	0x0	UInt16
	0x05	Event Timer	–	0x0	UInt8

Communication Parameter RPDO 4					
Object		Description	Unit	Default value (EDS-File)	Data type
Index	Sub-Index				
0x1403	0x00	Highest Sub-index Supported	–	5	UInt8
	0x01	COB-ID	–	0xC0000500	UInt32
	0x02	Transmission Type	–	0xFF	UInt8
	0x03	Inhibit Time	–	0x0	UInt16
	0x04	Compatibility Entry	–	0x0	UInt16
	0x05	Event Timer	–	0x0	UInt8

Communication Mapping Parameter RPDO 1					
Object		Description	Unit	Default value (EDS-File)	Data type
Index	Sub-Index				
0x1600	0x00	Highest Sub-index Supported	–	64	UInt8
	0x01	Mapping Entry 1	–	0x50040008	UInt32
	0x02	Mapping Entry 2	–	0x50040008	UInt32
	0x03	Mapping Entry 3	–	0x50040008	UInt32
	0x04	Mapping Entry 4	–	0x50040008	UInt32
	0x05	Mapping Entry 5	–	0x50040008	UInt32
	0x06	Mapping Entry 6	–	0x50040008	UInt32
	0x07	Mapping Entry 7	–	0x50040008	UInt32
	0x08	Mapping Entry 8	–	0x50050001	UInt32
	0x09	Mapping Entry 9	–	0x50050001	UInt32
	0x0A	Mapping Entry 10	–	0x50050001	UInt32
	0x0B	Mapping Entry 11	–	0x50050001	UInt32
	0x0C	Mapping Entry 12	–	0x50050001	UInt32
	0x0D	Mapping Entry 13	–	0x50050001	UInt32
	...	Mapping Entry ...	–	0x50050001	UInt32
	0x40	Mapping Entry 64	–	0x50050001	UInt32

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Communication Mapping Parameter RPDO 2					
Object		Description	Unit	Default value (EDS-File)	Data type
Index	Sub-Index				
0x1601	0x00	Highest Sub-index Supported	–	64	UInt8
	0x01	Mapping Entry 1	–	0x50040008	UInt32
	0x02	Mapping Entry 2	–	0x50040008	UInt32
	0x03	Mapping Entry 3	–	0x50040008	UInt32
	0x04	Mapping Entry 4	–	0x50040008	UInt32
	0x05	Mapping Entry 5	–	0x50040008	UInt32
	0x06	Mapping Entry 6	–	0x50040008	UInt32
	0x07	Mapping Entry 7	–	0x50040008	UInt32
	0x08	Mapping Entry 8	–	0x50050001	UInt32
	0x09	Mapping Entry 9	–	0x50050001	UInt32
	0x0A	Mapping Entry 10	–	0x50050001	UInt32
	0x0B	Mapping Entry 11	–	0x50050001	UInt32
	0x0C	Mapping Entry 12	–	0x50050001	UInt32
	0x0D	Mapping Entry 13	–	0x50050001	UInt32
	...	Mapping Entry ...	–	0x50050001	UInt32
	0x40	Mapping Entry 64	–	0x50050001	UInt32

Communication Mapping Parameter RPDO 3					
Object		Description	Unit	Default value (EDS-File)	Data type
Index	Sub-Index				
0x1602	0x00	Highest Sub-index Supported	–	64	UInt8
	0x01	Mapping Entry 1	–	0x50040008	UInt32
	0x02	Mapping Entry 2	–	0x50040008	UInt32
	0x03	Mapping Entry 3	–	0x50040008	UInt32
	0x04	Mapping Entry 4	–	0x50040008	UInt32
	0x05	Mapping Entry 5	–	0x50040008	UInt32
	0x06	Mapping Entry 6	–	0x50040008	UInt32
	0x07	Mapping Entry 7	–	0x50040008	UInt32
	0x08	Mapping Entry 8	–	0x50050001	UInt32
	0x09	Mapping Entry 9	–	0x50050001	UInt32
	0x0A	Mapping Entry 10	–	0x50050001	UInt32
	0x0B	Mapping Entry 11	–	0x50050001	UInt32
	0x0C	Mapping Entry 12	–	0x50050001	UInt32
	0x0D	Mapping Entry 13	–	0x50050001	UInt32
	...	Mapping Entry ...	–	0x50050001	UInt32
	0x40	Mapping Entry 64	–	0x50050001	UInt32

4 Protocol Specification

Communication Mapping Parameter RPDO 4

Object		Description	Unit	Default value (EDS-File)	Data type
Index	Sub-Index				
0x1603	0x00	Highest Sub-index Supported	–	64	UInt8
	0x01	Mapping Entry 1	–	0x50040008	UInt32
	0x02	Mapping Entry 2	–	0x50040008	UInt32
	0x03	Mapping Entry 3	–	0x50040008	UInt32
	0x04	Mapping Entry 4	–	0x50040008	UInt32
	0x05	Mapping Entry 5	–	0x50040008	UInt32
	0x06	Mapping Entry 6	–	0x50040008	UInt32
	0x07	Mapping Entry 7	–	0x50040008	UInt32
	0x08	Mapping Entry 8	–	0x50050001	UInt32
	0x09	Mapping Entry 9	–	0x50050001	UInt32
	0x0A	Mapping Entry 10	–	0x50050001	UInt32
	0x0B	Mapping Entry 11	–	0x50050001	UInt32
	0x0C	Mapping Entry 12	–	0x50050001	UInt32
	0x0D	Mapping Entry 13	–	0x50050001	UInt32
	...	Mapping Entry ...	–	0x50050001	UInt32
	0x40	Mapping Entry 64	–	0x50050001	UInt32

Communication Parameter TPDO 1

Object		Description	Unit	Default value (EDS-File)	Data type
Index	Sub-Index				
0x1800	0x00	Highest Sub-index Supported	–	6	UInt8
	0x01	COB-ID	–	0xC0000180	UInt32
	0x02	Transmission Type	–	0xFF	UInt8
	0x03	Inhibit Time	–	0x0	UInt16
	0x04	Compatibility Entry	–	0x0	UInt8
	0x05	Event Timer	–	0x0	UInt16
	0x06	Sync Start Value	–	0x0	UInt8

Communication Parameter TPDO 2

Object		Description	Unit	Default value (EDS-File)	Data type
Index	Sub-Index				
0x1801	0x00	Highest Sub-index Supported	–	6	UInt8
	0x01	COB-ID	–	0xC0000280	UInt32
	0x02	Transmission Type	–	0xFF	UInt8
	0x03	Inhibit Time	–	0x0	UInt16
	0x04	Compatibility Entry	–	0x0	UInt8
	0x05	Event Timer	–	0x0	UInt16
	0x06	Sync Start Value	–	0x0	UInt8

Communication Parameter TPDO 3

Object		Description	Unit	Default value (EDS-File)	Data type
Index	Sub-Index				
0x1802	0x00	Highest Sub-index Supported	–	6	UInt8
	0x01	COB-ID	–	0xC0000380	UInt32
	0x02	Transmission Type	–	0xFF	UInt8
	0x03	Inhibit Time	–	0x0	UInt16
	0x04	Compatibility Entry	–	0x0	UInt8
	0x05	Event Timer	–	0x0	UInt16
	0x06	Sync Start Value	–	0x0	UInt8

4 Protocol Specification

Communication Parameter TPDO 4

Object		Description	Unit	Default value (EDS-File)	Data type
Index	Sub-Index				
0x1803	0x00	Highest Sub-index Supported	–	6	UInt8
	0x01	COB-ID	–	0xC0000480	UInt32
	0x02	Transmission Type	–	0xFF	UInt8
	0x03	Inhibit Time	–	0x0	UInt16
	0x04	Compatibility Entry	–	0x0	UInt8
	0x05	Event Timer	–	0x0	UInt16
	0x06	Sync Start Value	–	0x0	UInt8

Communication Parameter TPDO 5

Object		Description	Unit	Default value (EDS-File)	Data type
Index	Sub-Index				
0x1804	0x00	Highest Sub-index Supported	–	6	UInt8
	0x01	COB-ID	–	0xC0000190	UInt32
	0x02	Transmission Type	–	0xFF	UInt8
	0x03	Inhibit Time	–	0x0	UInt16
	0x04	Compatibility Entry	–	0x0	UInt8
	0x05	Event Timer	–	0x0	UInt16
	0x06	Sync Start Value	–	0x0	UInt8

Communication Parameter TPDO 6

Object		Description	Unit	Default value (EDS-File)	Data type
Index	Sub-Index				
0x1805	0x00	Highest Sub-index Supported	–	6	UInt8
	0x01	COB-ID	–	0xC0000195	UInt32
	0x02	Transmission Type	–	0xFF	UInt8
	0x03	Inhibit Time	–	0x0	UInt16
	0x04	Compatibility Entry	–	0x0	UInt8
	0x05	Event Timer	–	0x0	UInt16
	0x06	Sync Start Value	–	0x0	UInt8

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Communication Mapping Parameter TPDO 1					
Object		Description	Unit	Default value (EDS-File)	Data type
Index	Sub-Index				
0x1A00	0x00	Highest Sub-index Supported	–	64	UInt8
	0x01	Mapping Entry 1	–	0x50000008	UInt32
	0x02	Mapping Entry 2	–	0x50000008	UInt32
	0x03	Mapping Entry 3	–	0x50000008	UInt32
	0x04	Mapping Entry 4	–	0x50000008	UInt32
	0x05	Mapping Entry 5	–	0x50000008	UInt32
	0x06	Mapping Entry 6	–	0x50000008	UInt32
	0x07	Mapping Entry 7	–	0x50020001	UInt32
	0x08	Mapping Entry 8	–	0x50020001	UInt32
	0x09	Mapping Entry 9	–	0x50020001	UInt32
	0x0A	Mapping Entry 10	–	0x50020001	UInt32
	0x0B	Mapping Entry 11	–	0x50020001	UInt32
	0x0C	Mapping Entry 12	–	0x50020001	UInt32
	0x0D	Mapping Entry 13	–	0x50020001	UInt32
	...	Mapping Entry ...	–	0x50020001	UInt32
	0x40	Mapping Entry 64	–	0x50020001	UInt32

Communication Mapping Parameter TPDO 2					
Object		Description	Unit	Default value (EDS-File)	Data type
Index	Sub-Index				
0x1A01	0x00	Highest Sub-index Supported	–	64	UInt8
	0x01	Mapping Entry 1	–	0x50000008	UInt32
	0x02	Mapping Entry 2	–	0x50000008	UInt32
	0x03	Mapping Entry 3	–	0x50000008	UInt32
	0x04	Mapping Entry 4	–	0x50000008	UInt32
	0x05	Mapping Entry 5	–	0x50000008	UInt32
	0x06	Mapping Entry 6	–	0x50000008	UInt32
	0x07	Mapping Entry 7	–	0x50020001	UInt32
	0x08	Mapping Entry 8	–	0x50020001	UInt32
	0x09	Mapping Entry 9	–	0x50020001	UInt32
	0x0A	Mapping Entry 10	–	0x50020001	UInt32
	0x0B	Mapping Entry 11	–	0x50020001	UInt32
	0x0C	Mapping Entry 12	–	0x50020001	UInt32
	0x0D	Mapping Entry 13	–	0x50020001	UInt32
	...	Mapping Entry ...	–	0x50020001	UInt32
	0x40	Mapping Entry 64	–	0x50020001	UInt32

4 Protocol Specification

Communication Mapping Parameter TPDO 3

Object		Description	Unit	Default value (EDS-File)	Data type
Index	Sub-Index				
0x1A02	0x00	Highest Sub-index Supported	–	64	UInt8
	0x01	Mapping Entry 1	–	0x50000008	UInt32
	0x02	Mapping Entry 2	–	0x50000008	UInt32
	0x03	Mapping Entry 3	–	0x50000008	UInt32
	0x04	Mapping Entry 4	–	0x50000008	UInt32
	0x05	Mapping Entry 5	–	0x50000008	UInt32
	0x06	Mapping Entry 6	–	0x50000008	UInt32
	0x07	Mapping Entry 7	–	0x50020001	UInt32
	0x08	Mapping Entry 8	–	0x50020001	UInt32
	0x09	Mapping Entry 9	–	0x50020001	UInt32
	0x0A	Mapping Entry 10	–	0x50020001	UInt32
	0x0B	Mapping Entry 11	–	0x50020001	UInt32
	0x0C	Mapping Entry 12	–	0x50020001	UInt32
	0x0D	Mapping Entry 13	–	0x50020001	UInt32
	...	Mapping Entry ...	–	0x50020001	UInt32
	0x40	Mapping Entry 64	–	0x50020001	UInt32

Communication Mapping Parameter TPDO 4

Object		Description	Unit	Default value (EDS-File)	Data type
Index	Sub-Index				
0x1A03	0x00	Highest Sub-index Supported	–	64	UInt8
	0x01	Mapping Entry 1	–	0x50000008	UInt32
	0x02	Mapping Entry 2	–	0x50000008	UInt32
	0x03	Mapping Entry 3	–	0x50000008	UInt32
	0x04	Mapping Entry 4	–	0x50000008	UInt32
	0x05	Mapping Entry 5	–	0x50000008	UInt32
	0x06	Mapping Entry 6	–	0x50000008	UInt32
	0x07	Mapping Entry 7	–	0x50020001	UInt32
	0x08	Mapping Entry 8	–	0x50020001	UInt32
	0x09	Mapping Entry 9	–	0x50020001	UInt32
	0x0A	Mapping Entry 10	–	0x50020001	UInt32
	0x0B	Mapping Entry 11	–	0x50020001	UInt32
	0x0C	Mapping Entry 12	–	0x50020001	UInt32
	0x0D	Mapping Entry 13	–	0x50020001	UInt32
	...	Mapping Entry ...	–	0x50020001	UInt32
	0x40	Mapping Entry 64	–	0x50020001	UInt32

Program Control

Object		Description	Unit	Default value (EDS-File)	Data type
Index	Sub-Index				
0x1F51	0x00	Highest Sub-index Supported	–	1	UInt8
	0x01	Program Number	–	1	UInt8

4 Protocol Specification

4.7.2 Manufacturer Segment

In the PDF, you can click on an index to jump to the description for that object.

Object		Description	Unit	Default value (EDS-File)	Data type
Index	Sub-Index				
0x2000	0x00	Thermal load	°C	0xFF	Uin8
0x2001	0x00	Power good status	–	0xFF	Uin8
0x2002	0x00	Current limitation status	–	0xFF	Uin16
0x2003	0x00	Protection status	–	0xFF	Uin8

Fan Speed					
Object		Description	Unit	Default value (EDS-File)	Data type
Index	Sub-Index				
0x2004	0x00	Highest Sub-index Supported	–	0x03	Uin8
	0x01	Set Fan Speed	–	0x00000000	Uin8
	0x02	Fan 1 speed value	–	0xFFFFFFFF	Uin32
	0x03	Fan 2 speed value	–	0xFFFFFFFF	Uin32

Fan Status					
Object		Description	Unit	Default value (EDS-File)	Data type
Index	Sub-Index				
0x2005	0x00	Highest Sub-index Supported	–	0x03	Uin8
	0x01	Set Fan Speed	–	0x00000000	Uin8
	0x02	Fan 1 speed value	–	0xFFFFFFFF	Uin32

Fan Configuration					
Object		Description	Unit	Default value (EDS-File)	Data type
Index	Sub-Index				
0x2006	0x00	Highest Sub-index Supported	–	0x01	Uin8
	0x01	Fan Start Temperature	–	0xFF	Uin8
0x2008	0x00	Firmware Update Password	–	0x00000000	Uin8

Device Data Setup					
Object		Description	Unit	Default value (EDS-File)	Data type
Index	Sub-Index				
0x2009	0x00	Highest Sub-index Supported	–	0x03	Uin8
	0x01	Delta internal	–	–	Uin32
	0x02	Delta internal	–	–	Uin32
	0x03	Delta internal	–	–	Uin32

Input Voltage					
Object		Description	Unit	Default value (EDS-File)	Data type
Index	Sub-Index				
0x200A	0x00	Highest Sub-index Supported	–	0x03	Uin8
	0x01	Input Voltage L1	–	0xFFFFFFFF	Uin32
	0x02	Input Voltage L2	–	0xFFFFFFFF	Uin32
	0x03	Input Voltage L3	–	0xFFFFFFFF	Uin32
0x200B	0x00	Input Power	–	0xFFFFFFFF	Uin32
0x2100	0x00	Security Factory Command	–	0x00000000	Uin32

4 Protocol Specification

4.7.3 Device Profile Segment (CiA-419)

SI Unit And Prefix					
Object		Description	Unit	Default value (EDS-File)	Data type
Index	Sub-Index				
0x6000	0x00	Highest Sub-index Supported	–	0x06	UInt8
	0x01	Voltage	–	0x2600FD00	UInt32
	0x02	Current	–	0x0400FD00	UInt32
	0x03	Power	–	0x2400FD00	UInt32
	0x04	Reserved	–	0x00000000	UInt32
	0x05	Temperature	–	0xFE000000	UInt32
	0x06	Time	–	0x0300FD00	UInt32

Device Status					
Object		Description	Unit	Default value (EDS-File)	Data type
Index	Sub-Index				
0x6011	0x00	Highest Sub-index Supported	–	0x01	UInt8
	0x01	Condition	–	–	UInt32

Device Failure Status					
Object		Description	Unit	Default value (EDS-File)	Data type
Index	Sub-Index				
0x6012	0x00	Highest Sub-index supported	–	0x01	UInt8
	0x01	Condition	–	–	UInt8

Device Failure Status Delay Time					
Object		Description	Unit	Default value (EDS-File)	Data type
Index	Sub-Index				
0x6014	0x00	Highest Sub-index supported	–	0x10	UInt8
	0x01	Reserved	–	0xFFFFFFFF	UInt32
	0x02	Reserved	–	0xFFFFFFFF	UInt32
	0x03	Reserved	–	0xFFFFFFFF	UInt32
	0x04	Reserved	–	0xFFFFFFFF	UInt32
	0x05	Reserved	–	0xFFFFFFFF	UInt32
	0x06	Reserved	–	0xFFFFFFFF	UInt32
	0x07	Reserved	–	0xFFFFFFFF	UInt32
	0x08	Reserved	–	0xFFFFFFFF	UInt32
	0x09	Reserved	–	0xFFFFFFFF	UInt32
	0x0A	Reserved	–	0xFFFFFFFF	UInt32
	0x0B	Reserved	–	0xFFFFFFFF	UInt32
	0x0C	Reserved	–	0xFFFFFFFF	UInt32
	0x0D	Reserved	–	0xFFFFFFFF	UInt32
	0x0E	Reserved	–	0xFFFFFFFF	UInt32
	0x0F	Power Output Undervoltage	ms	0x00007530	UInt32
	0x10	Power Output Overcurrent	ms	0x00007530	UInt32
0x6020	0x00	Temperature Actual Value	°C	0x7FFF	Sint16
0x6030	0x00	Operating Hours	h	–	UInt32

4 Protocol Specification

Input Status					
Object		Description	Unit	Default value (EDS-File)	Data type
Index	Sub-Index				
0x6111	0x00	Highest Sub-index Supported	–	0x01	UInt8
	0x01	Condition	–	–	UInt32

Input Actual Values					
Object		Description	Unit	Default value (EDS-File)	Data type
Index	Sub-Index				
0x6113	0x00	Highest sub-index supported	–	0x05	UInt8
	0x01	Voltage	mV	0x01	Sint32
	0x02	Current	mA	0x02	Sint32
	0x03	Power	mW	0x03	Sint32
	0x04	Link Voltage	mV	0x04	Sint32
	0x05	Temperature	°C	0x05	Sint16

Output 1 Commands					
Object		Description	Unit	Default value (EDS-File)	Data type
Index	Sub-Index				
0x6200	0x00	Highest sub-index supported	–	0x05	UInt8
	0x01	Reserved	–	0xFF	UInt8
	0x02	OnOff	–	0x01	UInt8
	0x03	Reserved	–	0xFF	UInt8
	0x04	Reserved	–	0xFF	UInt8
	0x05	SelfStarting	–	0x01	UInt8

Output 1 Status					
Object		Description	Unit	Default value (EDS-File)	Data type
Index	Sub-Index				
0x6201	0x00	Highest Sub-index Supported	–	0x01	UInt8
	0x01	Condition	–	–	UInt32

Output 1 Ranges					
Object		Description	Unit	Default value (EDS-File)	Data type
Index	Sub-Index				
0x6203	0x00	numOfEntries	–	0x08	UInt8
	0x01	Voltage max	–	–	Sint32
	0x02	Voltage min	–	–	Sint32
	0x03	Current max	–	–	Sint32
	0x04	Current min	–	–	Sint32
	0x05	Power max	–	–	Sint32
	0x06	Power min	–	–	Sint32
	0x07	Reserved	–	–	UInt32
	0x08	Reserved	–	–	UInt32

4 Protocol Specification

Output 1 Actual Values					
Object		Description	Unit	Default value (EDS-File)	Data type
Index	Sub-Index				
0x6204	0x00	numOfEntries	–	0x05	Uint8
	0x01	Voltage	–	0x01	Sint32
	0x02	Current	–	0x02	Sint32
	0x03	Power	–	0x03	Sint32
	0x04	Reserved	–	0x04	Sint32
	0x05	Temperature	–	0x05	Sint32

Output 1 Set Values					
Object		Description	Unit	Default value (EDS-File)	Data type
Index	Sub-Index				
0x6205	0x00	Highest Sub-index Supported	–	0x08	Uint8
	0x01	Set voltage	–	0x01	Sint32
	0x02	Reserved	–	0x7FFFFFFF	Sint32
	0x03	Reserved	–	0x7FFFFFFF	Sint32
	0x04	Reserved	–	0x7FFFFFFF	Sint32
	0x05	Reserved	–	0x7FFFFFFF	Sint32
	0x06	Reserved	–	0x7FFFFFFF	Sint32
	0x07	Reserved	–	0x7FFFFFFF	Sint32
	0x08	Set current	–	0x7FFFFFFF	Sint32

4.8 Object Data Descriptions

4.8.1 0×2000:0×00 – Thermal Load

In this object there is the value of the thermal load listed.

Range	0 to 125%
-------	-----------

4.8.2 0×2001:0×00 – Power Good Status

Value of the Power Good Status.

1	Output voltage out of range or input voltage failing for > 15ms
0	Output voltage in range and input voltage present

4.8.3 0×2002:0×00 – Current Limitation Status

Value of the Current Limitation Status.

1	Output Current is limited to “Set current” → value 0×6205:0×08.
0	Output Current is not limited.

4 Protocol Specification

4.8.4 0×2003:0×00 – Protection Status

Bit-field of the Protection Status:

Protection Status		
Bit	Group	Description
0	Power Input	Undervoltage
1		Overvoltage
2		Reserved
3		Reserved
4		Reserved
5		Reserved
6		Reserved
7		Reserved
8	Power Output	Undervoltage
9		Overvoltage
10		Overcurrent
11		Reserved
12		Reserved
13		Reserved
14		Reserved
15		Reserved
16	Thermal	Fan 1 Failure
17		Fan 2 Failure
18		Overtemperature
19		Reserved
20		Reserved
21		Reserved
22		Reserved
23		Reserved
24	General	Internal Failure
25		Aux Output Overcurrent
26		Reserved
27		Reserved
28		Reserved
29		Reserved
30		Reserved
31		Reserved

4 Protocol Specification

4.8.5 0×2004 – Fan Speed

In this object there are the fan speed values listed.

4.8.5.1 0×2004:0×01 – Set Fan Speed

In this object, a manual fan speed could be set. Is it lower as internal calculated then the internal is used. Only a higher one as internal calculated has an effect.

Range	0 to 100%
-------	-----------

4.8.5.2 0×2004:0×02 – Fan 1 Speed Value

Fan speed from fan 1 is displayed.

Range	0 to 100%
-------	-----------

4.8.5.3 0×2004:0×03 – Fan 2 speed value

Fan speed from fan 2 is displayed.

Range	0 to 100%
-------	-----------

4.8.6 0×2005 – Fan Status

In this object there is the fan status listed.

4.8.6.1 0×2005:0×01 – Fan 1 Status

In this object there is the fan status listed.

0	Ok
1	Error

4.8.6.2 0×2005:0×02 – Fan 2 Status

In this object there is the fan status listed.

0	Ok
1	Error

4.8.7 0×2006 – Fan Configuration

In this object there are the fan configuration data listed.

4.8.7.1 0×2006:0×01 – Fan Start Temperature

Threshold of temperature at which the fan is started.

Range	50 to 80 °C
-------	-------------

4.8.8 0×2008:0×00 – Firmware Update Password

Set value "0×00BC614E" to set access rights to the object 0×1F51:0×01.

4 Protocol Specification

4.8.9 0×2009:0×00 – Device Data Setup

Delta internal used.

4.8.9.1 0×2009:0×01 – Product Code

Delta internal used.

4.8.9.2 0×2009:0×02 – Revision Number

Delta internal used.

4.8.9.3 0×2009:0×03 – Serial Number

Delta internal used.

4.8.10 0×200A – Input Voltage

In this object there are the measurement values of the input data listed.

4.8.10.1 0×200A:0×01 – Input Voltage L1

Current measurement value of input voltage L1.

4.8.10.2 0×200A:0×02 – Input Voltage L2

Current measurement value of input voltage L2.

4.8.10.3 0×200A:0×03 – Input Voltage L3

Current measurement value of input voltage L3.

4.8.11 0×200B:0×00 – Input Power

Current measurement value of input power.

4.8.12 0×2100:0×00 – Security Factory Command

Delta internal used.

4.9 Firmware Updates

The full CANopen® configuration (node-ID, bitrate, PDO configuration, etc.) is stored in a non-volatile memory and remains unchanged during the FW update process. The configuration is still available after the update.

For updating the firmware on the mPSU, the mPSU must be set to **Bootloader mode** (CANopen® Object **0x2008:0x00** = "0x12345678", see "4.8.8 0x2008:0x00 – Firmware Update Password", p. 29).

Use this **Bootloader** EDS file after this point (object dictionary see Appendix 3.1)

The mPSU will provide the **0x1F50:0x01** internally only when it is in **Bootloader mode**. Otherwise, the mPSU will reject the write command to **0x1F50:0x01** via CANopen®.

4.9.1 Transfer firmware file to mPSU

Only firmware files in BIN format are supported. Please set following sequence:

- **0x1F51:0x01** = 3 – erase internal application.
- Transfer new firmware (BIN file) to **0x1F50:0x01** – the transferred firmware data will be flashed internally.

Once the transfer is complete, you can start the newly flashed application.

4.9.2 Start Application

After the transmission of the firmware file to CANopen® object **0x1F50:0x01**, set the CANopen® object **0x1F51:0x01** = 1 to start the Application.

NOTICE



During the update process the mPSU has no functionality.

After the successful start of the application process, the mPSU starts with a CANopen® Bootup-message on the CANopen® network.

After the application process is successfully started, the mPSU begins with a CANopen® Bootup-message on the CANopen® network.

4.9.3 Delete Device Configuration

The full CANopen® configuration (node-ID, bitrate, PDO configuration, etc.) is stored in a non-volatile memory and remains unchanged during the FW update process.

To delete the device configuration on the mPSU, enter the command **0x1011:0x00**, which restores all data to the default values from the EDS file.

After that the CANopen® configuration must be stored via **0x1010:0x00 = 0x65766173**

NOTICE



When the current CANopen® configuration is deleted, the mPSU will start up with default values next time.

5 Object Dictionary – Bootloader EDS file

5. Object Dictionary – Bootloader EDS file

5.1 Communication Segment

Object		Description	Unit	Default value (EDS-File)	Data type
Index	Sub-Index				
0×1000	0×00	Device Type	–	453 (0×200001C5)	Uint32
0×1001	0×00	Error Register	-	0×00	Uint8

Identity Object					
Object		Description	Unit	Default value (EDS-File)	Data type
Index	Sub-Index				
0×1018	0×00	Highest Sub-index Supported	–	4	Uint8
	0×01	Vendor ID	-	0×000004C4	Uint32
	0×02	Product Code	-	–	Uint32
	0×03	Revision Number	-	–	Uint32
	0×04	Serial Number	-	–	Uint32

Download Program Data					
Object		Description	Unit	Default value (EDS-File)	Data type
Index	Sub-Index				
0×1F50	0×00	Highest Sub-index Supported	–	1	Uint8
	0×01	Program Area 1	-	–	DOMAIN

Program Control					
Object		Description	Unit	Default value (EDS-File)	Data type
Index	Sub-Index				
0×1F51	0×00	Highest Sub-index Supported	–	1	Uint8
	0×01	Program Number 1	-	–	Uint8

Program Software Identification					
Object		Description	Unit	Default value (EDS-File)	Data type
Index	Sub-Index				
0×1F56	0×00	Highest Sub-index Supported	–	1	Uint8
	0×01	Program Number 1	-	–	Uint32

Flash Status Identification					
Object		Description	Unit	Default value (EDS-File)	Data type
Index	Sub-Index				
0×1F57	0×00	Highest Sub-index Supported	–	1	Uint8
	0×01	Program Number 1	-	–	Uint32

5.2 Manufacturer Segment

Object		Description	Unit	Default value (EDS-File)	Data type
Index	Sub-Index				
–	–	–	–	–	–

5.3 Device Profile Segment (CiA-419)

Object		Description	Unit	Default value (EDS-File)	Data type
Index	Sub-Index				
–	–	–	–	–	–



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