PCAN-MicroMod FD DR CANopen Digital 1

User Manual

Relevant products

Product designation	Model	Part no.
PCAN-MicroMod FD DR CANopen Digital 1		IPEH-003100

Imprint

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1 Introduction

The PCAN-MicroMod FD DR CANopen Digital 1 is an I/O module for operation in CANopen and CANopen FD networks. The modern standard CANopen FD makes it possible to handle the ever-increasing demand for data transmission from sensors, machines, and complex production plants. The module has a CAN FD interface as well as 8 digital inputs and 8 digital outputs. With its DIN rail casing and the support of the extended temperature range, the module is suitable for use in an industrial environment.

The node ID and bit rates are set via rotary switches. Thus, no configuration software is required for putting the device in operation. Due to the support of the CANopen and CANopen FD standards, a problem-free use in existing networks is guaranteed.

The PCAN-MicroMod FD DR CANopen Digital 1 was developed in cooperation with our partner Embedded Systems Academy, specialized in CANopen.

1.1 Properties at a Glance

- I/O module for CANopen® and CANopen FD®
  - Communication profiles according to CiA® 301 version 4.2.0 and CiA® 1301 version 1.0.0
  - Device profile according to CiA® 401 version 3.0.0

- High-speed CAN connection (ISO 11898-2)
  - Selectable CANopen bit rates:
    Nominal: 20, 50, 125, 250, 500, 800, and 1000 kbit/s
  - Selectable CANopen FD bit rates:
    Nominal: 250, 500, 800, and 1000 kbit/s
    Data: 1, 2, 4, 5, 8, and 10 Mbit/s
  - NXP TJA1044GT CAN transceiver
  - Galvanic isolation against the power supply up to 500 V
- Configuration of the CAN and CAN FD bit rates as well as the node ID with rotary switches on the casing
- 2 LEDs “RUN” and “ERROR” for status indication according to CiA® 303-3
- 8 digital inputs
  - Comply with IEC 61131-2 standard
  - Input characteristics: Type 3
  - 2 groups of 4 inputs to be used either as sourcing or sinking inputs
  - Galvanic isolation of the digital inputs 0 to 3 and 4 to 7 each up to 100 V against the module supply
- 8 digital outputs
  - 500 mA load per High-side output
  - Thermal protection per output
  - Short circuit detection per output
  - Open load detection in on-state and off-state per output
- LEDs for status indication of the digital inputs and outputs
- Connections for CAN, I/O, and power supply via 5-pole screw-terminal strips (Phoenix)
- Plastic casing (width: 22.5 mm) for mounting on DIN rail (DIN EN 60715 TH35)
- Voltage supply 8 to 36 V

- Voltage supply digital high-side outputs 12 to 36 V
- Extended operating temperature range from −40 to 85 °C (−40 to 185 °F)

1.2 Operation Requirements

- Power supply 8 to 36 V DC (connection via included mating connector)

1.3 Scope of Supply

- Device in DIN rail plastic casing
- 6 mating connectors

Downloads:

- CANopen EDS file + CANopen FD XDD file

2 CANopen Basics

The PCAN-MicroMod FD DR CANopen Digital 1 supports both classical CANopen and CANopen FD. The documents used for the implementation of the pre-loaded firmware are:

- CiA® 301 Version 4.2.0 – CANopen application layer and communication profile
- CiA® 401 Version 3.0.0 – CANopen device profile for generic I/O modules
- CiA® 1301 Version 1.0.0 – CANopen FD application layer and communication profile
- Not yet published: CiA® 401-B/F – CANopen FD device profile for generic I/O modules

These documents are available from the CAN in Automation users group (www.can-cia.org).

This manual does not include a full description of CANopen and CANopen FD. For more details, see the publications listed above or read the book “Embedded Networking with CAN and CANopen” (ISBN 978-0692740873, www.canopenbook.com).

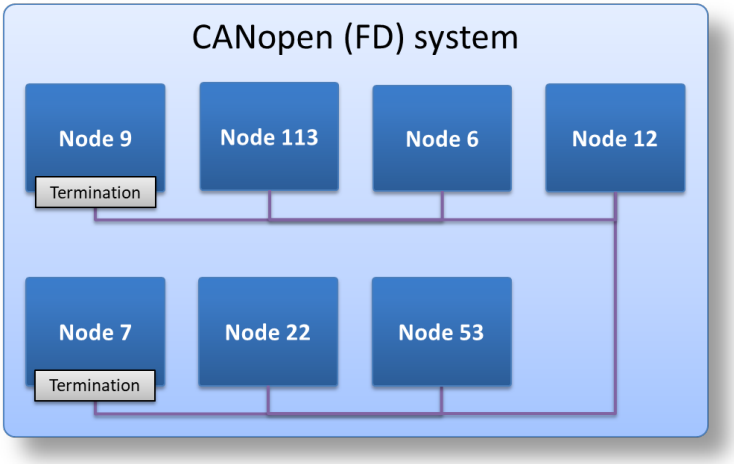
For CANopen system configuration, maintenance, and test we strongly suggest using CANopen utilities, monitors, and analyzers with symbolic support. These directly display symbolic names for parameters instead of plain hex numbers. PEAK-System and EmSA offer the following tools:

- CANopen Magic Analyzer (www.canopenmagic.com)
- CANopen Architect Editor (www.canopenarchitect.com)

In this chapter, the term CANopen refers to both concepts, classic CANopen and CANopen FD. Where applicable, CANopen FD is mentioned separately.

2.1 Wiring

The connectors and wiring of a CANopen system are not fully specified. Depending on the specific transceivers (line drivers) used by the devices, different cable layouts and terminations might be required. For details, refer to the documentation of the implemented transceivers. The PCAN-MicroMod FD DR CANopen Digital 1 uses a High-speed CAN transceiver. The signals CAN-High and CAN-Low are interconnected with all devices using a preferably shielded and twisted wire pair. In addition, GND should also be interconnected. The physical layout is that of a bus (no star or ring) with 120 Ohm termination resistors at each end.



2.2 Hardware Settings: Bit Rate and Node ID

The most essential CANopen settings are the CAN bit rate and a device's node ID.

In any CANopen system, all connected devices must use the same bit rate settings. Classic CANopen uses a single bit rate. CANopen FD is based on CAN FD and therefore uses two bit rates, the nominal and the data bit rate.

In any CANopen system, every connected device must use a unique node ID in the range of 1 to 127. The node ID of a device should be set before it is connected to a CANopen system.

For details about adjustment of these settings on the device, see 3.1 *Device Configuration* on page 15.

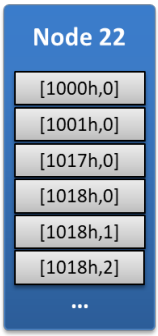
2.3 NMT: Network Management (CANopen and CANopen FD)

Every CANopen device implements a CANopen Network Management state machine. Upon power-up (or reset), each device transmits a boot-up message (using CAN ID 700h + own node ID, 1 data byte set to zero). When the heartbeat producer is enabled (object [1017h,0] in milliseconds is set to a value greater than 0), a device produces a cyclic heartbeat message (same CAN ID as bootup) where the single data byte reflects the current device state: Pre-Operational, Operational, or Stopped.

Using the NMT Master message, an NMT Master can direct individual or all nodes to switch to any device state or perform a reset.

2.4 CANopen Object Dictionary (CANopen and CANopen FD)

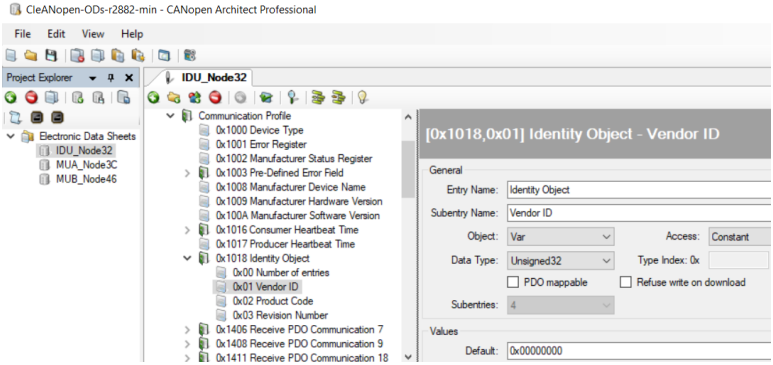
In CANopen, a device stores all its parameters (configuration parameters as well as process data) in an Object Dictionary. A 16-bit Index and an 8-bit Subindex value are used to reference a single parameter. For example, Object [1018h,1] (Index 1018h and Subindex 1) holds the 32-bit CANopen vendor ID of the device's manufacturer. Object [1008h,0] holds a string with the device's name.



2.5 EDS/XDD: Electronic Data Sheet

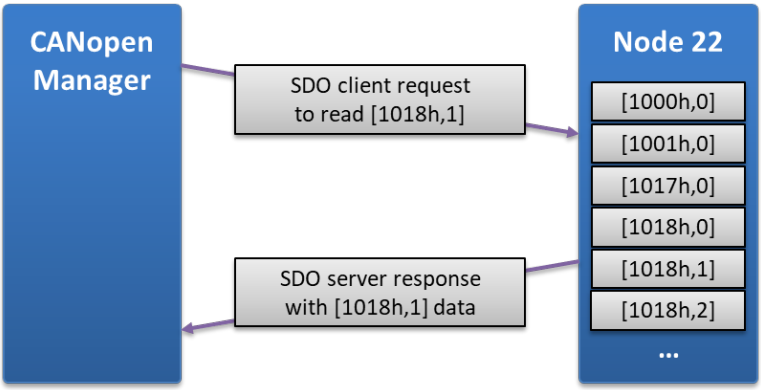
The EDS is the electronic representation of an Object Dictionary. Manufacturer of CANopen devices publish EDS files along with their products so that CANopen managers and tools can load these to provide the user direct access to the parameters provided by a device. EDS files are generated using an EDS editor like CANopen Architect.

XDD files are newer versions of Electronic Data Sheets. They are based on the XML data format and are mandatory for CANopen FD devices.



2.6 SDO: Service Data Objects (classic CANopen)

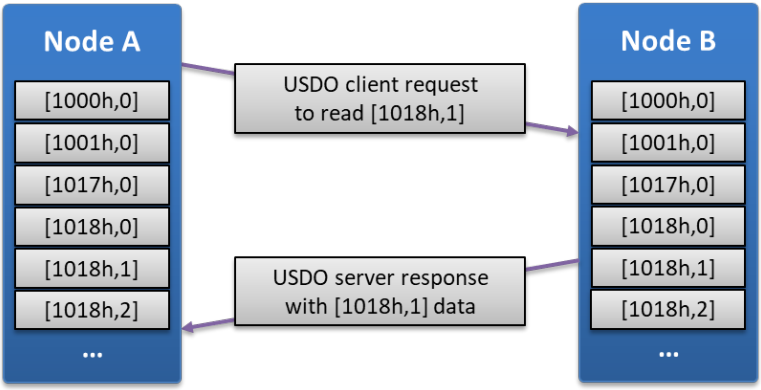
This service is available to a single manager or diagnostic tool in a classic CANopen system. It is a confirmed service with a request and a response to read or write any Object Dictionary entry in any connected node.



A request could be: “Node number 22, what is your data at [1018h,1]?”. If node 22 is present, then it sends a response containing the requested data. Data of 32 bits or less is accessed with a single message pair (request, response). If data is larger, then data gets segmented and multiple request and responses are exchanged.

2.7 USDO: Universal Service Data Objects (CANopen FD)

On CANopen FD, this service replaces the SDO. Main changes are that here every node can send USDO requests to every other node and that data sizes in a single request and response scheme can be much bigger, as CAN FD supports large data packages.



There are further advanced modes for long distance routing of messages as well as broadcasts to all nodes.

2.8 PDO: Process Data Objects

This service provides direct (unconfirmed) data exchange between multiple CANopen devices. Devices can produce TransmitPDO messages that contain multiple Object Dictionary entries and can be processed as ReceivePDO by multiple other devices.

PDOs have communication parameters (which CAN ID to use, trigger options) and mapping parameters (which Object Dictionary entries are contained in the PDO).

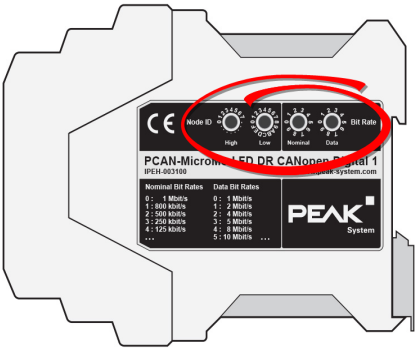
The figure illustrates how node 22 produces a repeated TPDO with the two Object Dictionary entries [6000h,1] and [6000h,2] in it. These can be received and processed by multiple nodes if they have matching RPDO parameters configured.

3 Device Setup

3.1 Device Configuration

Following basic device settings can be configured by hardware:

- CANopen (FD) node ID
- Bit rate (incl. selection between CANopen and CANopen FD)
- Internal CAN bus termination

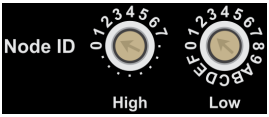


Right-side view of PCAN-MicroMod FD DR CANopen casing
with dials for node ID and bit rate

3.1.1 CANopen (FD) Node ID

The node ID can become a value in the range of 1 to 7Fh (1 to 127 decimal). The two *Node ID* dials represent the high and low hex digit.

- High: 0h to 7h. Using other positions leads to an invalid node ID.
- Low: 0h to Fh



Example

To set the node ID of 100 (= 64h) you need to use the following dial positions:
High = 6, Low = 4

> **Note:** A change of this setting takes effect only after a reset (power cycle) of the device.

3.1.2 Bit Rate and FD

The nominal bit rate and data bit rate (for CANopen FD) are set by the two dials with respective designations. In addition, the *Data* dial determines the used CANopen mode (see also table below).

- CANopen (no FD): position 9
- CANopen FD: positions 0 to 5 (according to CiA® 1301 specification)

Nominal bit rate	Nominal dial position
1 Mbit/s	0
800 kbit/s	1
500 kbit/s	2
250 kbit/s	3
125 kbit/s	4
50 kbit/s	5
20 kbit/s	6

Data bit rate (CANopen FD)	Data dial position
1 Mbit/s	0
2 Mbit/s	1
4 Mbit/s	2
5 Mbit/s	3
8 Mbit/s	4
10 Mbit/s	5
No Bit Rate Switch (only nominal bit rate)	8
CANopen mode, no FD (only nominal bit rate)	9

If you select a dial position not covered by these tables, the device handles this as an error. This is indicated by an alternating blinking of the *Run* and the *Error* LEDs.

Supplemental information: Appendix E *Bit Rate Timing Parameters* on page 40

> **Note:** A change of this setting takes effect only after a reset (power cycle) of the device.

3.1.3 Internal CAN Bus Termination

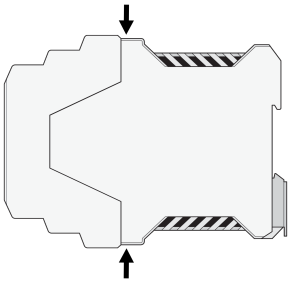
An internal CAN bus termination can be activated, i.e. a resistance of 120 Ω between CAN-High and CAN-Low. This is useful in special cases, e.g. if the device is always connected to the unterminated end of a CAN bus (stipulation: terminating resistors at both ends).

> **Tip:** We recommend terminating the CAN cabling directly, for example with termination resistors. This allows CAN nodes to be flexibly connected to the bus.

To access the corresponding termination switch on the circuit board, you must open the device casing:

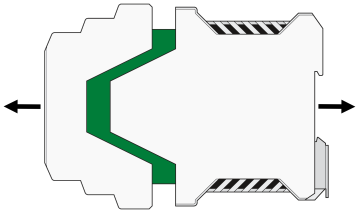
Attention! Electrostatic discharge (ESD) can damage or destroy components on the circuit board. Take precautions to avoid ESD when handling the circuit board.

1. Disconnect the power supply (connector F).
2. With flat screw driver (or something similar) slightly press into the recesses on each the top and the bottom of the device casing.



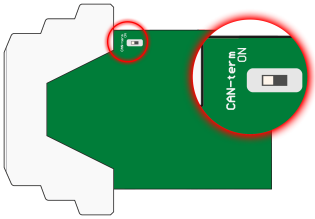
This unlocks the latches.

3. Pull the two casing sections apart.



The casing section with connectors (left in the figure) is attached to the circuit board.

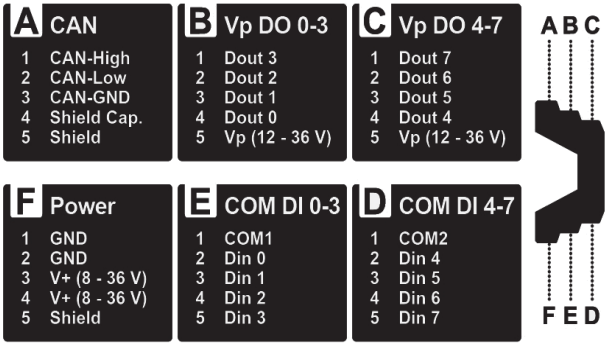
4. On the circuit board, set the *CAN-Term* switch to ON.



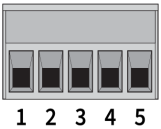
5. For reassembling, insert the circuit board into the guide slot of the casing's countersection and push both sections together until the latches lock with click sound.

3.2 Connectors

The device has 6 5-pin connection sockets (designated A to F). A mating connector for each socket has screw terminals to hold the corresponding wires.



Positioning and pin assignment of connectors



Front view of mating connector

3.2.1 [A] CAN

Pin Assignment

Pin	Designation	Function
A-1	CAN-High	High-speed CAN connection (ISO 11898-2), 2 lines for differential signal
A-2	CAN-Low	
A-3	CAN-GND	Auxiliary GND (not required for High-speed CAN communication)
A-4	Shield Cap.	Access to shield via capacitor
A-5	Shield	Direct access to shield

Technical Specifications

CAN/CANopen	
Protocols on OSI layer 2	CAN FD ISO 11898-1:2015, CAN 2.0 A/B
Protocols on higher OSI layers	CANopen FD (based on CAN FD), CANopen (based on CAN 2.0)
CANopen specifications	CiA® 301 Version 4.2.0 – CANopen application layer and communication profile CiA® 401 Version 3.0.0 – CANopen device profile for generic I/O modules CiA® 1301 Version 1.0.0 – CANopen FD application layer and communication profile Not yet published: CiA® 401-B/F – CANopen FD device profile for generic I/O modules
CAN transceiver	NXP TJA1044GT
CANopen bit rates	Nominal: 20, 50, 125, 250, 500, 800, 1000 kbit/s
CANopen FD bit rates	Nominal: 250, 500, 800, 1000 kbit/s Data: 1, 2, 4, 5, 8, 10 Mbit/s
Galvanic isolation	up to 500 V against power supply
Electric strength	+/−20 V permanent
Termination	switchable on board (120 Ω between CAN-High and CAN-Low)

3.2.2 [B + C] Digital Outputs “Vp DO”

Pin Assignment

Pin	Designation	Function
B-1	Dout 3	Digital outputs, High-side driver
B-2	Dout 2	
B-3	Dout 1	
B-4	Dout 0	
B-5	Vp	High-side driver supply, 12 – 36 V DC
C-1	Dout 7	Digital outputs, High-side driver
C-2	Dout 6	
C-3	Dout 5	
C-4	Dout 4	
C-5	Vp	High-side driver supply, 12 – 36 V DC

Technical Specifications

I/O digital outputs	
Count	8
Type	High-side driver
Load	500 mA per output
Voltage range	12 to 36 V (corresponding to Vp supply))
Current limit control	640 mA min., 870 mA typ., 1200 mA max.
Safety	Thermal protection per output Short circuit detection per output
Additional feature	Open load detection per output (disabled by default)

Open Load Detection

- Each digital output has a separate open load detection.
- By default it is disabled.

- To enable the detection, the device must be configured with CANopen Object Dictionary entry [2202h,1] (see *Digital1_DR_CiA401* on page 41).
- The state of the digital output may not alter within 100 ms in order to obtain a reliable detection.
- As long as a digital output is not active, a detection current in the range of 50 to 100 µA is used (typically 74 µA).

> **Note:** If a load with very low power consumption is connected to the digital output, this could lead to unwanted behavior of the load (e.g. a small LED could glow). In this case, disable the open load detection for the corresponding digital output.

3.2.3 [D + E] Digital Inputs “COM DI”

Pin Assignment

Pin	Designation	Function
D-1	COM2	External reference for digital inputs 4 to 7, arbitrary polarity*
D-2	Din 4	Digital inputs 4 to 7
D-3	Din 5	
D-4	Din 6	
D-5	Din 7	
E-1	COM1	External reference for digital inputs 0 to 3, arbitrary polarity*
E-2	Din 0	Digital inputs 0 to 3
E-3	Din 1	
E-4	Din 2	
E-5	Din 3	

* Examples: COM on GND → digital inputs switch on +24 V, COM on +24 V → digital inputs switch on GND

Technical Specifications

I/O digital inputs	
Count	8
Characteristics standard	IEC 61131-2
Characteristics type	Type 3
Input voltage range	−33 – +33 V
Input current range	2 – 15 mA
Switching thresholds	Low → High: max. 10.95 V, typ. 10.4 V High → Low: min. 8.7 V, typ. 9.2 V
Circuitry	2 groups of 4 inputs either sourcing or sinking inputs (depending on COM connection)
Isolation	2 groups of 4 inputs up to 100 V against device supply

3.2.4 [F] Power

Pin Assignment

Pin	Designation	Function
F-1	GND	Ground for power supply
F-2	GND	
F-3	V+	Supply voltage input: 12 – 36 V DC
F-4	V+	
F-5	Shield	Shield

Technical Specifications

Power supply	
Operating voltage device (V+)	12 to 36 V DC, 24 V nominal
Current consumption device supply (V+)	max. 20 mA at 24 V
Supply high-side drivers (Vp)	12 to 36 V DC

3.3 Default Data Mapping

For the PCAN-MicroMod FD DR CANopen Digital 1 the 8 digital inputs are in Object Dictionary entry [6000h,1]. The 8 digital outputs are in Object Dictionary entry [6200h,1].

The default PDO mapping applies. The digital inputs read will be transmitted in a single-byte TPDO using CAN ID 180h + node ID. The CAN ID 200h + node ID is the default RPDO used. The data byte received is copied to the outputs.

Mapping overview: Appendix F *EDS and XDD Contents Description* on page 41

General background information: 2 *CANopen Basics* on page 8

4 Operation

4.1 Device Bootup

Run LED

When the power supply is applied to connector F, the *Run* LED is blinking green (2 Hz) indicating the CANopen Pre-Operational status.

Initial CANopen or CANopen FD messages

At bootup, the device transmits two CANopen or CANopen FD messages on the connected bus:

- 700h + node ID
  - Bootup Message
  - 1 data byte
  - Indicates operational device after boot-up
- 80h + node ID
  - Emergency Message
  - 8 data bytes for CANopen, 20 data bytes for CANopen FD
  - All data bytes = 00: no error condition

Error LED

If the *Error* LED flashes red 1 time per second, the initial messages could not be transmitted. Possible reasons:

- No other active CAN client is on the CAN bus.
- The device's bit rate setting does not match the used bit rate on the bus.

4.2 LEDs

Run

The CANopen Run state is indicated according to the CiA® 303-3 specification.

LED indication (green)	State	Description
Off	Reset	If power is applied, the device is performing a reset.
1 flash per second	Stopped	The device is in Stopped state.
Blinking (2 Hz)	Pre-Operational	The device is in Pre-Operational state.
On	Operational	The device is in Operational state.

Special states besides the CiA specification:

LED indication	State	Description
Fast blinking orange	CAN flash mode	The device is ready for firmware update via CAN.
Blinking green (alternating with *Error* LED)	Invalid configuration	Likely the dials for the node ID or the bit rate have an invalid setting (see 3.1 *Device Configuration* on page 15).

Error

The CANopen Error state is indicated according to the CiA® 303-3 specification.

LED indication (red)	State	Description
Off	No error	The device is in working condition.
1 flash per second	Warning limit reached	At least one of the error counters of the CAN controller has reached or exceeded the warning level (too many error frames).
Blinking (alternating with *Run* LED)	Invalid configuration	Likely the dials for the node ID or the bit rate have an invalid setting (see 3.1 *Device Configuration* on page 15).
On	Bus off	The CAN controller is bus-off.

Digital Out

Each of the 8 LEDs indicates the state of a digital output.

LED indication	State	Description
Off	Low/0	The digital output is inactive.
On green	High/1	The digital output is active.
On red	Open load	The open load detection has encountered missing load on the digital output. More information about open load detection: 3.2 *Connectors* on page 19

Digital In

Each of the 8 LEDs indicates the state of a digital input.

LED indication	State	Description
Off	Low/0	The digital input is on Low level.
On green	High/1	The digital input is on High level.

4.3 Error Handling

Fault conditions are announced by the CANopen Emergency (EMCY) message with the ID 80h + node ID. Each EMCY has a 16-bit error code and 5 freely definable additional bytes. A maximum of 2 of those bytes are used, further bytes have the value 0x00. Byte 3 is a copy of object 1001h, the Error register.

Condition	Bytes 1/2: Error code*	Byte 3: Error register	Byte 4: Bitmask	Byte 5	Bytes 6 … 8
Mains power undervoltage (< 12 V)	0x3100	Set bits: 0, 7	0x00	0x00	0x00
Dout open-load	0x2330	Set bits: 0, 7	Affected Dout lines = 1	0x00	
Dout overvoltage	0x3310	Set bits: 0, 2	Affected Dout lines = 1	0x00	
Dout thermal shutdown	0x4200	Set bits: 0, 3	Affected Dout lines = 1	0x08 if global thermal shutdown, 0x00 otherwise	
Dout undervoltage (< 8 V)	0x3320	Set bits: 0, 2	0x00	0x00	

* From CiA® 401 and CiA® 301 specifications.

The 20-byte version of the EMCY message used in CANopen FD adds information and has the following structure:

Byte(s)	Meaning	Remark
1	Logical device number	Always 0
2	Reserved	Always 0
3/4	Specification number	0x0151 for CiA® 1301
5 … 12	Traditional EMCY data	See above
13	Status with error priority, error class, and error state	See CiA® 1301
14	Reserved	Always 0
15 … 20	Event time	Always 0 for time information not available

When a Dout Error occurs, all outputs are set to their “Error Value”, on condition that their bit in entry [6206h,1] “Error Mode” is set and that they are not blocked globally by entry [6208h,1] “Filter Mask”.

Object 1029h “Error Behavior” defines what happens to the CANopen NMT state when an EMCY of a particular type occurs. Entries in this Object are:

Object entry	Short name	Description
[1029h,1]	Communication Error	General communication error, like RPDO too long.
[1029h,2]	Output Error	Errors related to the digital outputs (as indicated above).
[1029h,3]	Input Error	Not in use at present.

Possible values for the “Error Behavior” entries are:

Value	Error behavior
0 (default)	Change to NMT state Pre-operational (only if currently in NMT state Operational).
1	No change of the NMT state.
2	Change to NMT state Stopped.

5 Firmware Update

A firmware update of the PCAN-MicroMod FD DR CANopen Digital 1 (in the following: MicroMod FD device) is done via a CAN connection.

5.1 Prerequisites

- Computer with Windows 11, 10 (32/64-Bit)
- CAN interface from PEAK-System installed in/attached to the computer
- CAN cabling between the CAN interface and the device with proper termination (120 Ω on each end of the CAN bus)
- PEAK-Flash software (see following section 5.2)

5.2 Flash Software Preparation

With the freely available PEAK-Flash tool for Windows, it is possible to update the firmware of our hardware products.

The software package is freely available from these places:

1. Download the current version of PEAK-Flash from the following web page: www.peak-system.com/quick/DL-Software-E
2. Unpack the downloaded `PEAK-Flash.zip` file to an arbitrary directory on your Windows computer.
   The `PEAK-Flash.exe` file in the target directory is the executable to be used later.

Tip: We recommend downloading PEAK-Flash regularly, as it contains firmware files for our products. This will provide your device with the latest official firmware version.

5.3 Update Procedure

1. Disconnect the power supply of the MicroMod FD device (connector F).
2. From the MicroMod FD device, take note of the current *Bit Rate* dials settings.
3. On the MicroMod FD device, set the *Bit Rate* dials *Nominal* to 2 (500 kbit/s) and *Data* to 9 (no CAN FD).
4. Power on the MicroMod FD device by re-establishing the F connection.
5. On Windows, start `PEAK-Flash.exe`.
   Panel 1 of PEAK-Flash with general information is shown.
6. Click on *Next*.
   Panel 2 *Select Hardware* of PEAK-Flash is shown.
7. Select *Modules connected to the CAN bus*.
8. From the list *Channels of connected CAN hardware*, select the CAN interface that establishes the connection to the CAN bus.
9. From the *Bit rate* list, select 500 kbit/s (usually pre-selected).
10. Click on *Detect*.
    After a few seconds, a new entry with the name of the MicroMod FD device is shown in the field below, including device information.
11. Click on *Next*.
    Panel 3 *Select Firmware* of PEAK-Flash is shown.

12. Select one of the two options:
    - *Embedded Firmware* uses the update file contained in the program.
    - *Firmware File* allows to use an alternative firmware file `*.bin` that you select.
13. Click on *Next* and check the provided information on panel 4 of PEAK-Flash.
14. Click on *Start* and observe the log output.

    During the flash process the Run LED on the MicroMod FD device is blinking quickly in orange color. The flash process is running for about 30 seconds.
15. On the MicroMod FD device, set the *Bit Rate* dials back to the initial settings noted before.
16. In PEAK-Flash, Click on *Reset Module*.

    The MicroMod FD device is now ready for use with the new firmware.

6 Technical Specifications

Casing and connectors	
Connectors	6 x screw terminal block 5-pin
Functions	CAN, I/O, power supply
Mating connector type	Phoenix Contact MC 1,5/ 5-ST-3,5 GY7035 – 1769087
Casing mounting	DIN rail, DIN EN 60515 TH35
Casing dimensions	111 x 22.6 x 99 mm (L x W x H)
Weight	Without mating connectors: 115 g With 6 mating connectors: 133 g

Power supply	
Operating voltage device (V+)	12 to 36 V DC, 24 V nominal
Current consumption device supply (V+)	max. 20 mA at 24 V
Supply high-side drivers (Vp)	12 to 36 V DC

CAN/CANopen	
Protocols on OSI layer 2	CAN FD ISO 11898-1:2015, CAN 2.0 A/B
Protocols on higher OSI layers	CANopen FD (based on CAN FD), CANopen (based on CAN 2.0)
CANopen specifications	CiA® 301 Version 4.2.0 – CANopen application layer and communication profile CiA® 401 Version 3.0.0 – CANopen device profile for generic I/O modules CiA® 1301 Version 1.0.0 – CANopen FD application layer and communication profile Not yet published: CiA® 401-B/F – CANopen FD device profile for generic I/O modules
CAN transceiver	NXP TJA1044GT
CANopen bit rates	Nominal: 20, 50, 125, 250, 500, 800, 1000 kbit/s

CAN/CANopen	
CANopen FD bit rates	Nominal: 250, 500, 800, 1000 kbit/s Data: 1, 2, 4, 5, 8, 10 Mbit/s
Galvanic isolation	up to 500 V against power supply
Electric strength	+/−20 V permanent
Termination	switchable on board (120 Ω between CAN-High and CAN-Low)

I/O digital inputs	
Count	8
Characteristics standard	IEC 61131-2
Characteristics type	Type 3
Input voltage range	−33 – +33 V
Input current range	2 – 15 mA
Switching thresholds	Low → High: max. 10.95 V, typ. 10.4 V High → Low: min. 8.7 V, typ. 9.2 V
Circuitry	2 groups of 4 inputs either sourcing or sinking inputs (depending on COM connection)
Isolation	2 groups of 4 inputs up to 100 V against device supply

I/O digital outputs	
Count	8
Type	High-side driver
Load	500 mA per output
Voltage range	12 to 36 V (corresponding to Vp supply))
Current limit control	640 mA min., 870 mA typ., 1200 mA max.
Safety	Thermal protection per output Short circuit detection per output
Additional feature	Open load detection per output (disabled by default)

Environment	
Operating temperature	−40 to +85 °C (−40 to +185 °F)
Temperature for storage and transport	−40 to +70 °C (−40 to +158 °F)
Relative humidity	15 – 90 %, not condensing
Ingress protection (IEC 60529)	IP20

Conformity	
RoHS	EU directive 2011/65/EU (RoHS 2) EU directive 2015/863/EU (amended list of restricted substances) DIN EN IEC 63000:2019-05; VDE 0042-12:2019-05
EMC	EU directive 2014/30/EU DIN EN 61326-1:2013-07; VDE 0843-20-1:2013-07
CANopen / CANopen FD	Official conformance test for CiA® 301 CANopen, Certificate no. CiA202006-301V42/303-0241 Official conformance test for CiA® 1301 CANopen FD, Certificate no. CiA202112-1301V10/100-0001

Appendix A CE Certificate

EU Declaration of Conformity

This declaration applies to the following product:

Product name: **PCAN-MicroMod FD DR CANopen Digital 1**

Item number(s): **IPEH-003100**

Manufacturer: PEAK-System Technik GmbH
Otto-Roehm-Strasse 69
64293 Darmstadt
Germany

We declare under our sole responsibility that the mentioned product is in conformity with the following directives and the affiliated harmonized standards:

EU Directive 2011/65/EU (RoHS 2) + 2015/863/EU (amended list of restricted substances)

DIN EN IEC 63000:2019-05;VDE 0042-12:2019-05
Technical documentation for the assessment of electrical and electronic products with respect to the restriction of hazardous substances (IEC 63000:2016); German version EN IEC 63000:2018

EU Directive 2014/30/EU (Electromagnetic Compatibility)

DIN EN 61326-1:2013-07;VDE 0843-20-1:2013-07
Electrical equipment for measurement, control and laboratory use - EMC requirements - Part 1: General requirements (IEC 61326-1:2012);
German version EN 61326-1:2013

Darmstadt, 8 May 2020

Uwe Wilhelm, Managing Director

Appendix B CANopen Certificate

CANopen certified by CiA

Certificate # **CiA202006-301V42/303-0241**

Vendor ID **00 00 01 75**

Manufacturer Peak-System Technik GmbH

Device PCAN-MicroMod FD DR CANopen Digital 1

Product code: 48003100h
Object 1018h/02h

Revision number: 00000002h
Object 1018h/03h

Hardware version: V3.
Object 1009h

Software version: V1.10.0.002
Object 100Ah

EDS Digital1_DR_CiA401.eds

File version: 2

File revision: 1

EDS version: 4.0

Nuremberg, 02.06.2020

Technical Manager

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CANopen certified by CiA

Appendix C CANopen FD Certificate

CANopen FD® Conformance Test Assessment

PEAK-System Technik GmbH

Vendor-ID:	$0000\ 0175_h$
Test number:	CiA202112-1301V10/100-0001
Device name:	PCAN-MicroMod FD DR CANopen Digital 1
Product code (data object $1018_h/02_h$):	$4800\ 3100_h$
XML file name:	Digital1_DR_CiA401.xdd
Tester:	CiA GmbH
Test version:	1.0

CiA confirms that the product has successfully passed the CANopen FD conformance assessment.

Nuremberg, January 19, 2022

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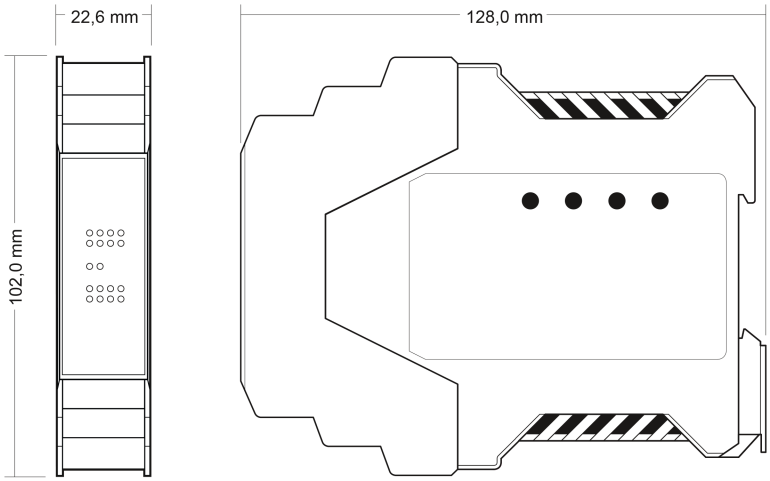
Appendix D Dimension Drawing



The scale of the drawings differs from an 1-to-1 representation.

Appendix E Bit Rate Timing Parameters

CiA® Profile	Nominal (BR/SP)	Data (BR/SP)	CAN Clock	Nom BRP	Nom TSEG1	Nom TSEG2	Nom SJW	Data BRP	Data TSEG1	Data TSEG2	Data SJW
1301-00	1M/80%	1M/80%	80MHz	2	31	8	8	2	31	8	8
1301-01	1M/80%	2M/75%	80MHz	1	63	16	16	1	29	10	10
1301-02	1M/80%	4M/70%	80MHz	1	63	16	16	1	13	6	6
1301-03	1M/80%	5M/62.5%	80MHz	1	63	16	16	1	9	6	6
1301-04	1M/80%	8M/60%	80MHz	1	63	16	16	1	5	4	4
1301-05	1M/80%	10M/62.5%	80MHz	1	63	16	16	1	4	3	3
1301-10	800k/80%	1M/80%	80MHz	2	39	10	10	2	31	8	8
1301-11	800k/80%	2M/75%	80MHz	1	79	20	20	1	29	10	10
1301-12	800k/80%	4M/70%	80MHz	1	79	20	20	1	13	6	6
1301-13	800k/80%	5M/62.5%	80MHz	1	79	20	20	1	9	6	6
1301-14	800k/80%	8M/60%	80MHz	1	79	20	20	1	5	4	4
1301-15	800k/80%	10M/62.5%	80MHz	1	79	20	20	1	4	3	3
1301-20	500k/80%	1M/80%	80MHz	2	63	16	16	2	31	8	8
1301-21	500k/80%	2M/75%	80MHz	1	127	32	32	1	29	10	10
1301-22	500k/80%	4M/70%	80MHz	1	127	32	32	1	13	6	6
1301-23	500k/80%	5M/62.5%	80MHz	1	127	32	32	1	9	6	6
1301-24	500k/80%	8M/60%	80MHz	1	127	32	32	1	5	4	4
1301-25	500k/80%	10M/62.5%	80MHz	1	127	32	32	1	4	3	3
1301-30	250k/80%	1M/80%	80MHz	2	127	32	32	2	31	8	8
1301-31	250k/80%	2M/75%	80MHz	1	255	64	64	1	29	10	10
1301-32	250k/80%	4M/70%	80MHz	1	255	64	64	1	13	6	6
1301-33	250k/80%	5M/62.5%	80MHz	1	255	64	64	1	9	6	6
1301-34	250k/80%	8M/60%	80MHz	1	255	64	64	1	5	4	4
1301-35	250k/80%	10M/62.5%	80MHz	1	255	64	64	1	4	3	3

Appendix F EDS and XDD Contents Description

The following paragraphs and tables contain an automated report of the CANopen EDS file and the CANopen FD XDD file that are in the scope of supply of the device. These files describe the device functionality in a CANopen and CANopen FD environment.

Digital1_DR_CiA401

Electronic Datasheet Information

Version 2, revision 1
EDS for PCAN-MicroMod FD DR CANopen Digital 1
Created on 01-16-2020, 08:35AM by Kl
Modified on 04-29-2020, 04:33PM by Kl

PEAK-System Technik GmbH
www.peak-system.com
CANopen and CANopen FD Digital I/O Module
PCAN-MicroMod FD DR CANopen Digital 1
DIN Rail mountable, 8 inputs and 8 outputs

Product Information

Property	Value
Vendor Name	PEAK-System
Vendor ID	0x00000175

Property	Value
Product Name	PCAN-MicroMod FD DR CANopen Digital 1
Product Code	0x48003100
Revision Number	0x00000002
Order Code	IPEH-003100

Commissioning Information

Property	Value
Node ID	0x00
Name	
Baudrate	125 kbps
Network Number	0
Network Name	
LSS Serial Number	0x00000000
CANopen Manager	No

PDO Configuration

Communication Parameters

PDO	COBID	Tx Type	Inhibit Time	Event Time	Sync Start
RPDO1	$NODEID+0x200	255			
RPDO2	$NODEID+0x80000300	255			
RPDO3	$NODEID+0x80000400	255			
RPDO4	$NODEID+0x80000500	255			
TPDO1	$NODEID+0x40000180	255	1.0 ms	0 ms	
TPDO2	$NODEID+0xC0000280	255	1.0 ms	0 ms	

PDO	COBID	Tx Type	Inhibit Time	Event Time	Sync Start
TPDO3	$NODEID+0xC0000380	255	1.0 ms	0 ms	
TPDO4	$NODEID+0xC0000480	255	1.0 ms	0 ms	

Mappings

PDO	Mappings
RPDO1	[0x6200,0x01] Dout Write 8-bit - Dout_0_7 (Unsigned8)
RPDO2	<no mapped entries>
RPDO3	<no mapped entries>
RPDO4	<no mapped entries>
TPDO1	[0x6000,0x01] Din Read 8-bit - Din_0_7 (Unsigned8)
TPDO2	<no mapped entries>
TPDO3	<no mapped entries>
TPDO4	<no mapped entries>

Object Dictionary

Overview

Index	Subindex	Name	Type	Access	Default Value
0x0002	0x00	INTEGER8	I8	WO	
0x0003	0x00	INTEGER16	I16	WO	
0x0004	0x00	INTEGER32	I32	WO	
0x0005	0x00	UNSIGNED8	U8	WO	
0x0006	0x00	UNSIGNED16	U16	WO	
0x0007	0x00	UNSIGNED32	U32	WO	

Index	Subindex	Name	Type	Access	Default Value
0x1000	0x00	Device Type	U8	RO	1
	0x01	Device Type 1	U32	RO	0x00030191
0x1001	0x00	Error Register	U8	RO	
0x1003	0x00	Pre-Defined Error Field	U8	RW	0
	0x01	Pre-Defined Error Field 1	U32	RO	
	0x02	Pre-Defined Error Field 2	U32	RO	
	0x03	Pre-Defined Error Field 3	U32	RO	
	0x04	Pre-Defined Error Field 4	U32	RO	
0x1005	0x00	COB-ID SYNC	U32	CO	0x00000080
0x1008	0x00	Manufacturer Device Name	VisStr	RO	See description
0x1009	0x00	Manufacturer Hardware Version	VisStr	RO	See description
0x100A	0x00	Manufacturer Software Version	VisStr	RO	See description
0x1010	0x00	Store Parameters	U8	CO	4
	0x01	Save All Parameters	U32	RW	
	0x02	Save Communication Parameters	U32	RW	
	0x03	Save Application Parameters	U32	RW	
	0x04	Save Manufacturer Parameters	U32	RW	
0x1011	0x00	Restore Default Parameters	U8	CO	4
	0x01	Restore All Default Parameters	U32	RW	
	0x02	Restore Communication Default Parameters	U32	RW	
	0x03	Restore Application Default Parameters	U32	RW	
	0x04	Restore Manufacturer Default Parameters	U32	RW	
0x1014	0x00	COB-ID EMCY	U32	CO	$NODEID+0x80
0x1015	0x00	Inhibit Time Emergency	U16	RW	0

Index	Subindex	Name	Type	Access	Default Value
0x1016	0x00	Heartbeat Consumer Time	U8	CO	3
	0x01	Heartbeat Consumer 1	U32	RW	0x00000000
	0x02	Heartbeat Consumer 2	U32	RW	0x00000000
	0x03	Heartbeat Consumer 3	U32	RW	0x00000000
0x1017	0x00	Producer Heartbeat Time	U16	RW	0
0x1018	0x00	Identity Object	U8	CO	3
	0x01	Vendor ID	U32	RO	0x00000175
	0x02	Product Code	U32	RO	0x48003100
	0x03	Revision number	U32	RO	0x00000002
0x1029	0x00	Error Behavior	U8	CO	3
	0x01	Communication Error	U8	RW	0
	0x02	Output Error	U8	RW	0
	0x03	Input Error	U8	RW	0
0x1030	0x00	Version Information	U8	RO	2
	0x01	Version Information 1	U32	RO	0x51500100
	0x02	Version Information 2	U32	RO	0x19100300
0x1031	0x00	Active Error History	U8	CO	5
	0x01	Error History Status	U32	RO	
	0x02	Error History Command	U16	RW	0x0000
	0x03	Error History Command Input	U16	RW	0x0000
	0x04	Error History Domain	Dom	RO	See description
	0x05	Error History Processing	U32	RW	
0x1032	0x00	Active Error List	U8	RO	0
	0x01	Error Event 1	U32	RO	
	0x02	Error Event 2	U32	RO	
	0x03	Error Event 3	U32	RO	
	0x04	Error Event 4	U32	RO	

Index	Subindex	Name	Type	Access	Default Value
0x1200	0x00	SDO Server Parameter	U8	CO	2
	0x01	COB-ID Client to Server	U32	CO	$NODEID+0x600
	0x02	COB-ID Server to Client	U32	CO	$NODEID+0x580
0x1400	0x00	Receive PDO 1 Communication	U8	CO	2
	0x01	COB-ID	U32	RW	$NODEID+0x200
	0x02	Transmission Type	U8	RW	255
0x1401	0x00	Receive PDO 2 Communication	U8	CO	2
	0x01	COB ID	U32	RW	$NODEID+0x80000300
	0x02	Transmission Type	U8	RW	255
0x1402	0x00	Receive PDO 3 Communication	U8	CO	2
	0x01	COB ID	U32	RW	$NODEID+0x80000400
	0x02	Transmission Type	U8	RW	255
0x1403	0x00	Receive PDO 4 Communication	U8	CO	2
	0x01	COB ID	U32	RW	$NODEID+0x80000500
	0x02	Transmission Type	U8	RW	255
0x1600	0x00	Receive PDO 1 Mapping	U8	RW	1
	0x01	PDO Mapping Entry	U32	RW	0x62000108
0x1601	0x00	Receive PDO 2 Mapping	U8	RW	0
	0x01	PDO Mapping Entry	U32	RW	0
0x1602	0x00	Receive PDO 3 Mapping	U8	RW	0
	0x01	PDO Mapping Entry	U32	RW	0
0x1603	0x00	Receive PDO 4 Mapping	U8	RW	0
	0x01	PDO Mapping Entry	U32	RW	0

Index	Subindex	Name	Type	Access	Default Value
0x1800	0x00	Transmit PDO 1 Communication	U8	CO	5
	0x01	COB-ID	U32	RW	$NODEID+0x40000180
	0x02	Transmission Type	U8	RW	255
	0x03	Inhibit Time	U16	RW	10
	0x05	Event Timer	U16	RW	0
0x1801	0x00	Transmit PDO 2 Communication	U8	CO	5
	0x01	COB-ID	U32	RW	$NODEID+0xC0000280
	0x02	Transmission Type	U8	RW	255
	0x03	Inhibit Time	U16	RW	10
	0x05	Event Timer	U16	RW	0
0x1802	0x00	Transmit PDO 3 Communication	U8	CO	5
	0x01	COB ID	U32	RW	$NODEID+0xC0000380
	0x02	Transmission Type	U8	RW	255
	0x03	Inhibit Time	U16	RW	10
	0x05	Event Timer	U16	RW	0
0x1803	0x00	Transmit PDO 4 Communication	U8	CO	5
	0x01	COB ID	U32	RW	$NODEID+0xC0000480
	0x02	Transmission Type	U8	RW	255
	0x03	Inhibit Time	U16	RW	10
	0x05	Event Timer	U16	RW	0
0x1A00	0x00	Transmit PDO 1 Mapping	U8	RW	1
	0x01	PDO Mapping Entry	U32	RW	0x60000108
0x1A01	0x00	Transmit PDO 2 Mapping	U8	RW	0
	0x01	PDO Mapping Entry	U32	RW	0
0x1A02	0x00	Transmit PDO 3 Mapping	U8	RW	0
	0x01	PDO Mapping Entry	U32	RW	0

Index	Subindex	Name	Type	Access	Default Value
0x1A03	0x00	Transmit PDO 4 Mapping	U8	RW	0
	0x01	PDO Mapping Entry	U32	RW	0
0x2018	0x00	MicroCANopen Identity Object	U8	CO	4
	0x01	Vendor Id	U32	CO	0x01455341
	0x02	Product Code	U32	RO	
	0x03	Revision number	U32	RO	
	0x04	EDS/XDD Version	U32	CO	0x00020000
0x2019	0x00	Hardware ID	U8	RO	4
	0x01	Hardware ID 1	U32	CO	
	0x02	Hardware ID 2	U32	CO	
	0x03	Hardware ID 3	U32	CO	
	0x04	Hardware ID 4	U32	CO	
0x2020	0x00	Maintenance	U8	RO	0x01
	0x01	Password	U32	WO	
	0x02	Command	U32	WO	
	0x03	Result	U8	RO	0x00
0x2202	0x00	Dout OpenLoad Monitoring Enable 8-bit	U8	CO	1
	0x01	Dout_0_7	U8	RW	0x00
0x6000	0x00	Din Read 8-bit	U8	RO	1
	0x01	Din_0_7	U8	RO	
0x6002	0x00	Din Polarity	U8	RO	1
	0x01	Din_0_7	U8	RWR	0

Index	Subindex	Name	Type	Access	Default Value
0x6020	0x00	Din Read 1-bit	U8	RO	8
	0x01	Din_0	Bool	RO	
	0x02	Din_1	Bool	RO	
	0x03	Din_2	Bool	RO	
	0x04	Din_3	Bool	RO	
	0x05	Din_4	Bool	RO	
	0x06	Din_5	Bool	RO	
	0x07	Din_6	Bool	RO	
	0x08	Din_7	Bool	RO	
0x6200	0x00	Dout Write 8-bit	U8	RO	1
	0x01	Dout_0_7	U8	RWW	0x00
0x6202	0x00	Dout Polarity 8-bit	U8	RO	1
	0x01	Dout_0_7	U8	RWW	0x00
0x6206	0x00	Dout Error Mode 8-bit	U8	RO	1
	0x01	Dout_0_7	U8	RWW	0xFF
0x6207	0x00	Dout Error Value 8-bit	U8	RO	1
	0x01	Dout_0_7	U8	RWW	0x00
0x6208	0x00	Dout Filter Mask 8-bit	U8	RO	1
	0x01	Dout_0_7	U8	RWW	0xFF

Index	Subindex	Name	Type	Access	Default Value
0x6220	0x00	Dout Write 1-bit	U8	RO	8
	0x01	Dout_0	Bool	RW	0
	0x02	Dout_1	Bool	RW	0
	0x03	Dout_2	Bool	RW	0
	0x04	Dout_3	Bool	RW	0
	0x05	Dout_4	Bool	RW	0
	0x06	Dout_5	Bool	RW	0
	0x07	Dout_6	Bool	RW	0
	0x08	Dout_7	Bool	RW	0
0x6404	0x00	Ain Read Manufacturer-specific	U8	RO	1
	0x01	Vcc 12-bit	U16	RO	

Device Type (0x1000, CANopen FD only)

Subindex	0x00
Name	Number of Entries
Data Type	Unsigned8
Access	ReadOnly
Can be mapped	No
Default Value	1

Only valid for CANopen FD. In CANopen, this entry is the Device Type described in the following entry [1000h,1].

Subindex	0x01
Name	Device Type 1

Subindex	0x01
Data Type	Unsigned32
Access	ReadOnly
Can be mapped	No
Default Value	0x00030191

Only valid for CANopen FD. In CANopen, this entry is at [1000h,0] and [1000h,1] doesn't exist.

Error Register (0x1001)

Subindex	0x00
Data Type	Unsigned8
Access	ReadOnly
Can be mapped	No
Default Value	

Pre-Defined Error Field (0x1003, CANopen only)

Subindex	0x00
Name	Number of Errors
Data Type	Unsigned8
Access	ReadWrite
Can be mapped	No
Default Value	0

Subindex	0x01
Name	Pre-Defined Error Field 1
Data Type	Unsigned32
Access	ReadOnly
Can be mapped	No
Default Value	

Subindex	0x02
Name	Pre-Defined Error Field 2
Data Type	Unsigned32
Access	ReadOnly
Can be mapped	No
Default Value	

Subindex	0x03
Name	Pre-Defined Error Field 3
Data Type	Unsigned32
Access	ReadOnly
Can be mapped	No
Default Value	

Subindex	0x04
Name	Pre-Defined Error Field 4
Data Type	Unsigned32

Subindex	0x04
Access	ReadOnly
Can be mapped	No
Default Value	

COB-ID SYNC (0x1005)

Subindex	0x00
Data Type	Unsigned32
Access	Const
Can be mapped	No
Default Value	0x00000080

Manufacturer Device Name (0x1008)

Subindex	0x00
Data Type	Visible String
Access	ReadOnly
Can be mapped	No
Default Value	PCAN-MicroMod FD DR CANopen Digital 1

Manufacturer Hardware Version (0x1009)

Subindex	0x00
Data Type	Visible String
Access	ReadOnly
Can be mapped	No
Default Value	V2.00

Manufacturer Software Version (0x100A)

Subindex	**0x00**
Data Type	Visible String
Access	ReadOnly
Can be mapped	No
Default Value	

Store Parameters (0x1010)

Subindex	**0x00**
Name	Highest Subindex
Data Type	Unsigned8
Access	Const
Can be mapped	No
Default Value	4

Subindex	**0x01**
Name	Save All Parameters
Data Type	Unsigned32
Access	ReadWrite
Can be mapped	No
Default Value	

Subindex	**0x02**
Name	Save Communication Parameters

Subindex	0x02
Data Type	Unsigned32
Access	ReadWrite
Can be mapped	No
Default Value	

Subindex	0x03
Name	Save Application Parameters
Data Type	Unsigned32
Access	ReadWrite
Can be mapped	No
Default Value	

Subindex	0x04
Name	Save Manufacturer Parameters
Data Type	Unsigned32
Access	ReadWrite
Can be mapped	No
Default Value	

Restore Default Parameters (0x1011)

Subindex	0x00
Name	Highest Subindex
Data Type	Unsigned8
Access	Const
Can be mapped	No

Subindex	0x00
Default Value	4

Subindex	0x01
Name	Restore All Default Parameters
Data Type	Unsigned32
Access	ReadWrite
Can be mapped	No
Default Value	

Subindex	0x02
Name	Restore Communication Default Parameters
Data Type	Unsigned32
Access	ReadWrite
Can be mapped	No
Default Value	

Subindex	0x03
Name	Restore Application Default Parameters
Data Type	Unsigned32
Access	ReadWrite
Can be mapped	No
Default Value	

Subindex	0x04
Name	Restore Manufacturer Default Parameters
Data Type	Unsigned32
Access	ReadWrite
Can be mapped	No
Default Value	

COB-ID EMCY (0x1014)

Subindex	0x00
Data Type	Unsigned32
Access	Const
Can be mapped	No
Default Value	$NODEID+0x80

Inhibit Time Emergency (0x1015)

Subindex	0x00
Data Type	Unsigned16
Access	ReadWrite
Can be mapped	No
Default Value	0

Heartbeat Consumer Time (0x1016)

Subindex	0x00
Name	Highest Subindex
Data Type	Unsigned8
Access	Const
Can be mapped	No
Default Value	3

Subindex	0x01
Name	Heartbeat Consumer 1
Data Type	Unsigned32
Access	ReadWrite
Can be mapped	No
Default Value	0x00000000

Subindex	0x02
Name	Heartbeat Consumer 2
Data Type	Unsigned32
Access	ReadWrite
Can be mapped	No
Default Value	0x00000000

Subindex	0x03
Name	Heartbeat Consumer 3
Data Type	Unsigned32
Access	ReadWrite
Can be mapped	No
Default Value	0x00000000

Producer Heartbeat Time (0x1017)

Subindex	0x00
Data Type	Unsigned16

Subindex	0x00
Access	ReadWrite
Can be mapped	No
Default Value	0

Identity Object (0x1018)

Subindex	0x00
Name	Highest Subindex
Data Type	Unsigned8
Access	Const
Can be mapped	No
Default Value	3

Subindex	0x01
Name	Vendor ID
Data Type	Unsigned32
Access	ReadOnly
Can be mapped	No
Default Value	0x00000175

Subindex	0x02
Name	Product Code
Data Type	Unsigned32
Access	ReadOnly
Can be mapped	No
Default Value	0x48003100

Subindex	0x03
Name	Revision number
Data Type	Unsigned32
Access	ReadOnly
Can be mapped	No
Default Value	0x00000002

Error Behavior (0x1029)

Subindex	0x00
Name	Highest Subindex
Data Type	Unsigned8
Access	Const
Can be mapped	No
Default Value	3

Subindex	0x01
Name	Communication Error
Data Type	Unsigned8
Access	ReadWrite
Can be mapped	No
Default Value	0

00h: Change to NMT state Pre-operational (only if currently in NMT state Operational)
01h: No change of the NMT state
02h: Change to NMT state Stopped

Subindex	0x02
Name	Output Error
Data Type	Unsigned8
Access	ReadWrite
Can be mapped	No
Default Value	0

00h: Change to NMT state Pre-operational (only if currently in NMT state Operational)
01h: No change of the NMT state
02h: Change to NMT state Stopped

Subindex	0x03
Name	Input Error
Data Type	Unsigned8
Access	ReadWrite
Can be mapped	No
Default Value	0

00h: Change to NMT state Pre-operational (only if currently in NMT state Operational)
01h: No change of the NMT state
02h: Change to NMT state Stopped

Version Information (0x1030, CANopen FD only)

Subindex	0x00
Name	Highest Subindex
Data Type	Unsigned8

Subindex	0x00
Access	ReadOnly
Can be mapped	No
Default Value	2

Subindex	0x01
Name	Version Information 1
Data Type	Unsigned32
Access	ReadOnly
Can be mapped	No
Default Value	0x51500100

CiA 1301 Version: 1.0.(2) from 21 October 2019

Subindex	0x02
Name	Version Information 2
Data Type	Unsigned32
Access	ReadOnly
Can be mapped	No
Default Value	0x19100300

CiA 401 Version: 3.0.(0) from 03 June 2019, CiA 401-B/F not released yet

Active Error History (0x1031, CANopen FD only)

Subindex	**0x00**
Name	Highest Subindex
Data Type	Unsigned8
Access	Const
Can be mapped	No
Default Value	5

Subindex	**0x01**
Name	Error History Status
Data Type	Unsigned32
Access	ReadOnly
Can be mapped	No
Default Value	

Subindex	**0x02**
Name	Error History Command
Data Type	Unsigned16
Access	ReadWrite
Can be mapped	No
Default Value	0x0000

Subindex	**0x03**
Name	Error History Command Input

Subindex	0x03
Data Type	Unsigned16
Access	ReadWrite
Can be mapped	No
Default Value	0x0000

Subindex	0x04
Name	Error History Domain
Data Type	Domain
Access	ReadOnly
Can be mapped	No
Default Value	

Subindex	0x05
Name	Error History Processing
Data Type	Unsigned32
Access	ReadWrite
Can be mapped	No
Default Value	

Active Error List (0x1032, CANopen FD only)

Subindex	0x00
Name	Highest Subindex
Data Type	Unsigned8
Access	ReadOnly
Can be mapped	No

Subindex	0x00
Default Value	0

Subindex	0x01
Name	Error Event 1
Data Type	Unsigned32
Access	ReadOnly
Can be mapped	No
Default Value	

Subindex	0x02
Name	Error Event 2
Data Type	Unsigned32
Access	ReadOnly
Can be mapped	No
Default Value	

Subindex	0x03
Name	Error Event 3
Data Type	Unsigned32
Access	ReadOnly
Can be mapped	No
Default Value	

Subindex	0x04
Name	Error Event 4
Data Type	Unsigned32
Access	ReadOnly
Can be mapped	No
Default Value	

SDO Server Parameter (0x1200, CANopen only)

Subindex	0x00
Name	Highest Subindex
Data Type	Unsigned8
Access	Const
Can be mapped	No
Default Value	2

Subindex	0x01
Name	COB-ID Client to Server
Data Type	Unsigned32
Access	Const
Can be mapped	No
Default Value	$NODEID+0x600

Subindex	0x02
Name	COB-ID Server to Client
Data Type	Unsigned32
Access	Const

Subindex	0x02
Can be mapped	No
Default Value	$NODEID+0x580

Receive PDO 1 Communication (0x1400)

Subindex	0x00
Name	Highest Subindex
Data Type	Unsigned8
Access	Const
Can be mapped	No
Default Value	2

Subindex	0x01
Name	COB-ID
Data Type	Unsigned32
Access	ReadWrite
Can be mapped	No
Default Value	$NODEID+0x200

Subindex	0x02
Name	Transmission Type
Data Type	Unsigned8
Access	ReadWrite
Can be mapped	No
Default Value	255

Receive PDO 2 Communication (0x1401)

Subindex	**0x00**
Name	Highest Subindex
Data Type	Unsigned8
Access	Const
Can be mapped	No
Default Value	2

Subindex	**0x01**
Name	COB ID
Data Type	Unsigned32
Access	ReadWrite
Can be mapped	No
Default Value	$NODEID+0x80000300

Subindex	**0x02**
Name	Transmission Type
Data Type	Unsigned8
Access	ReadWrite
Can be mapped	No
Default Value	255

Receive PDO 3 Communication (0x1402)

Subindex	**0x00**
Name	Highest Subindex
Data Type	Unsigned8
Access	Const
Can be mapped	No
Default Value	2

Subindex	**0x01**
Name	COB ID
Data Type	Unsigned32
Access	ReadWrite
Can be mapped	No
Default Value	$NODEID+0x80000400

Subindex	**0x02**
Name	Transmission Type
Data Type	Unsigned8
Access	ReadWrite
Can be mapped	No
Default Value	255

Receive PDO 4 Communication (0x1403)

Subindex	**0x00**
Name	Highest Subindex
Data Type	Unsigned8
Access	Const
Can be mapped	No
Default Value	2

Subindex	**0x01**
Name	COB ID
Data Type	Unsigned32
Access	ReadWrite
Can be mapped	No
Default Value	$NODEID+0x80000500

Subindex	**0x02**
Name	Transmission Type
Data Type	Unsigned8
Access	ReadWrite
Can be mapped	No
Default Value	255

Receive PDO 1 Mapping (0x1600)

Subindex	**0x00**
Name	Highest Subindex
Data Type	Unsigned8
Access	ReadWrite
Can be mapped	No
Default Value	1

Subindex	**0x01**
Name	PDO Mapping Entry
Data Type	Unsigned32
Access	ReadWrite
Can be mapped	No
Default Value	0x62000108 [0x6200,0x01] Dout Write 8-bit - Dout_0_7 (Unsigned8)

Receive PDO 2 Mapping (0x1601)

Subindex	**0x00**
Name	Highest Subindex
Data Type	Unsigned8
Access	ReadWrite
Can be mapped	No
Default Value	0

Subindex	0x01
Name	PDO Mapping Entry
Data Type	Unsigned32
Access	ReadWrite
Can be mapped	No
Default Value	0 <invalid mapping>

Receive PDO 3 Mapping (0x1602)

Subindex	0x00
Name	Highest Subindex
Data Type	Unsigned8
Access	ReadWrite
Can be mapped	No
Default Value	0

Subindex	0x01
Name	PDO Mapping Entry
Data Type	Unsigned32
Access	ReadWrite
Can be mapped	No
Default Value	0 <invalid mapping>

Receive PDO 4 Mapping (0x1603)

Subindex	0x00
Name	Highest Subindex
Data Type	Unsigned8

Subindex	0x00
Access	ReadWrite
Can be mapped	No
Default Value	0

Subindex	0x01
Name	PDO Mapping Entry
Data Type	Unsigned32
Access	ReadWrite
Can be mapped	No
Default Value	0 <invalid mapping>

Transmit PDO 1 Communication (0x1800)

Subindex	0x00
Name	Highest Subindex
Data Type	Unsigned8
Access	Const
Can be mapped	No
Default Value	5

Subindex	0x01
Name	COB-ID
Data Type	Unsigned32
Access	ReadWrite
Can be mapped	No
Default Value	$NODEID+0x40000180

Subindex	0x02
Name	Transmission Type
Data Type	Unsigned8
Access	ReadWrite
Can be mapped	No
Default Value	255

Subindex	0x03
Name	Inhibit Time
Data Type	Unsigned16
Access	ReadWrite
Can be mapped	No
Default Value	10

Subindex	0x05
Name	Event Timer
Data Type	Unsigned16
Access	ReadWrite
Can be mapped	No
Default Value	0

Transmit PDO 2 Communication (0x1801)

Subindex	0x00
Name	Highest Subindex

Subindex	0x00
Data Type	Unsigned8
Access	Const
Can be mapped	No
Default Value	5

Subindex	0x01
Name	COB-ID
Data Type	Unsigned32
Access	ReadWrite
Can be mapped	No
Default Value	$NODEID+0xC0000280

Subindex	0x02
Name	Transmission Type
Data Type	Unsigned8
Access	ReadWrite
Can be mapped	No
Default Value	255

Subindex	0x03
Name	Inhibit Time
Data Type	Unsigned16
Access	ReadWrite
Can be mapped	No
Default Value	10

Subindex	0x05
Name	Event Timer
Data Type	Unsigned16
Access	ReadWrite
Can be mapped	No
Default Value	0

Transmit PDO 3 Communication (0x1802)

Subindex	0x00
Name	Highest Subindex
Data Type	Unsigned8
Access	Const
Can be mapped	No
Default Value	5

Subindex	0x01
Name	COB ID
Data Type	Unsigned32
Access	ReadWrite
Can be mapped	No
Default Value	$NODEID+0xC0000380

Subindex	0x02
Name	Transmission Type

Subindex	0x02
Data Type	Unsigned8
Access	ReadWrite
Can be mapped	No
Default Value	255

Subindex	0x03
Name	Inhibit Time
Data Type	Unsigned16
Access	ReadWrite
Can be mapped	No
Default Value	10

Subindex	0x05
Name	Event Timer
Data Type	Unsigned16
Access	ReadWrite
Can be mapped	No
Default Value	0

Transmit PDO 4 Communication (0x1803)

Subindex	0x00
Name	Highest Subindex
Data Type	Unsigned8
Access	Const
Can be mapped	No

Subindex	0x00
Default Value	5

Subindex	0x01
Name	COB ID
Data Type	Unsigned32
Access	ReadWrite
Can be mapped	No
Default Value	$NODEID+0xC0000480

Subindex	0x02
Name	Transmission Type
Data Type	Unsigned8
Access	ReadWrite
Can be mapped	No
Default Value	255

Subindex	0x03
Name	Inhibit Time
Data Type	Unsigned16
Access	ReadWrite
Can be mapped	No
Default Value	10

Subindex	0x05
Name	Event Timer
Data Type	Unsigned16
Access	ReadWrite
Can be mapped	No
Default Value	0

Transmit PDO 1 Mapping (0x1A00)

Subindex	0x00
Name	Highest Subindex
Data Type	Unsigned8
Access	ReadWrite
Can be mapped	No
Default Value	1

Subindex	0x01
Name	PDO Mapping Entry
Data Type	Unsigned32
Access	ReadWrite
Can be mapped	No
Default Value	0x60000108 [0x6000,0x01] Din Read 8-bit - Din_0_7 (Unsigned8)

Transmit PDO 2 Mapping (0x1A01)

Subindex	0x00
Name	Highest Subindex

Subindex	0x00
Data Type	Unsigned8
Access	ReadWrite
Can be mapped	No
Default Value	0

Subindex	0x01
Name	PDO Mapping Entry
Data Type	Unsigned32
Access	ReadWrite
Can be mapped	No
Default Value	0 <invalid mapping>

Transmit PDO 3 Mapping (0x1A02)

Subindex	0x00
Name	Highest Subindex
Data Type	Unsigned8
Access	ReadWrite
Can be mapped	No
Default Value	0

Subindex	0x01
Name	PDO Mapping Entry
Data Type	Unsigned32
Access	ReadWrite
Can be mapped	No

Subindex	0x01
Default Value	0 <invalid mapping>

Transmit PDO 4 Mapping (0x1A03)

Subindex	0x00
Name	Highest Subindex
Data Type	Unsigned8
Access	ReadWrite
Can be mapped	No
Default Value	0

Subindex	0x01
Name	PDO Mapping Entry
Data Type	Unsigned32
Access	ReadWrite
Can be mapped	No
Default Value	0 <invalid mapping>

MicroCANopen Identity Object (0x2018)

Subindex	0x00
Name	Highest Subindex
Data Type	Unsigned8
Access	Const
Can be mapped	No
Default Value	4

Subindex	0x01
Name	Vendor Id
Data Type	Unsigned32
Access	Const
Can be mapped	No
Default Value	0x01455341

Subindex	0x02
Name	Product Code
Data Type	Unsigned32
Access	ReadOnly
Can be mapped	No
Default Value	

Subindex	0x03
Name	Revision number
Data Type	Unsigned32
Access	ReadOnly
Can be mapped	No
Default Value	

Subindex	0x04
Name	EDS/XDD Version
Data Type	Unsigned32

Subindex	0x04
Access	Const
Can be mapped	No
Default Value	0x00020000

File Information:
Bits 31-16: File Version
Bits 15-0: File Revision

Hardware ID (0x2019)

Subindex	0x00
Name	Highest Subindex
Data Type	Unsigned8
Access	ReadOnly
Can be mapped	No
Default Value	4

Subindex	0x01
Name	Hardware ID 1
Data Type	Unsigned32
Access	Const
Can be mapped	No
Default Value	

The Hardware ID entries together contain the unique 128-bit ID number that is also reported during identification with PEAK tools.

Subindex	0x02
Name	Hardware ID 2
Data Type	Unsigned32
Access	Const
Can be mapped	No
Default Value	

Subindex	0x03
Name	Hardware ID 3
Data Type	Unsigned32
Access	Const
Can be mapped	No
Default Value	

Subindex	0x04
Name	Hardware ID 4
Data Type	Unsigned32
Access	Const
Can be mapped	No
Default Value	

Maintenance (0x2020)

Subindex	0x00
Name	Highest Subindex
Data Type	Unsigned8
Access	ReadOnly

Subindex	0x00
Can be mapped	No
Default Value	0x01

Maintenance and support command interface - use with care!

Subindex	0x01
Name	Password
Data Type	Unsigned32
Access	WriteOnly
Can be mapped	No
Default Value	

Writing the correct password is required to unlock the maintenance commands of the following entries. The password is given by technical support on request only.

Subindex	0x02
Name	Command
Data Type	Unsigned32
Access	WriteOnly
Can be mapped	No
Default Value	

Available commands:

0x41726C43 ("ClrA"): Clear activation data
0x43726C43 ("ClrC"): Clear configuration data

Commands are only effective after the password has been written into subindex 1 of this entry.

Subindex	**0x03**
Name	Result
Data Type	Unsigned8
Access	ReadOnly
Can be mapped	No
Default Value	0x00

Available results:

0x00 : no result because no command was given
0x01 : command executed without error
0xFF : error when executing the command

Dout OpenLoad Monitoring Enable 8-bit (0x2202)

Subindex	**0x00**
Name	Highest Subindex
Data Type	Unsigned8
Access	Const
Can be mapped	No
Default Value	1

Subindex	0x01
Name	Dout_0_7
Data Type	Unsigned8
Access	ReadWrite
Can be mapped	No
Default Value	0x00

Bit set: OpenLoad monitoring active for this output
Bit cleared: OpenLoad monitoring disabled for this output

Din Read 8-bit (0x6000)

Subindex	0x00
Name	Highest Subindex
Data Type	Unsigned8
Access	ReadOnly
Can be mapped	No
Default Value	1

Subindex	0x01
Name	Din_0_7
Data Type	Unsigned8
Access	ReadOnly
Can be mapped	Yes
Default Value	

Din Polarity (0x6002)

Subindex	**0x00**
Name	Highest Subindex
Data Type	Unsigned8
Access	ReadOnly
Can be mapped	No
Default Value	1

Subindex	**0x01**
Name	Din_0_7
Data Type	Unsigned8
Access	ReadWriteRead
Can be mapped	Yes
Default Value	0

Din Read 1-bit (0x6020)

Subindex	**0x00**
Name	Highest Subindex
Data Type	Unsigned8
Access	ReadOnly
Can be mapped	No
Default Value	8

Subindex	0x01
Name	Din_0
Data Type	Boolean
Access	ReadOnly
Can be mapped	No
Default Value	

Subindex	0x02
Name	Din_1
Data Type	Boolean
Access	ReadOnly
Can be mapped	No
Default Value	

Subindex	0x03
Name	Din_2
Data Type	Boolean
Access	ReadOnly
Can be mapped	No
Default Value	

Subindex	0x04
Name	Din_3
Data Type	Boolean

Subindex	0x04
Access	ReadOnly
Can be mapped	No
Default Value	

Subindex	0x05
Name	Din_4
Data Type	Boolean
Access	ReadOnly
Can be mapped	No
Default Value	

Subindex	0x06
Name	Din_5
Data Type	Boolean
Access	ReadOnly
Can be mapped	No
Default Value	

Subindex	0x07
Name	Din_6
Data Type	Boolean
Access	ReadOnly
Can be mapped	No
Default Value	

Subindex	0x08
Name	Din_7
Data Type	Boolean
Access	ReadOnly
Can be mapped	No
Default Value	

Dout Write 8-bit (0x6200)

Subindex	0x00
Name	Highest Subindex
Data Type	Unsigned8
Access	ReadOnly
Can be mapped	No
Default Value	1

Subindex	0x01
Name	Dout_0_7
Data Type	Unsigned8
Access	ReadWriteWrite
Can be mapped	Yes
Default Value	0x00

Dout Polarity 8-bit (0x6202)

Subindex	**0x00**
Name	Highest Subindex
Data Type	Unsigned8
Access	ReadOnly
Can be mapped	No
Default Value	1

Subindex	**0x01**
Name	Dout_0_7
Data Type	Unsigned8
Access	ReadWriteWrite
Can be mapped	Yes
Default Value	0x00

Dout Error Mode 8-bit (0x6206)

Subindex	**0x00**
Name	Highest Subindex
Data Type	Unsigned8
Access	ReadOnly
Can be mapped	No
Default Value	1

Subindex	0x01
Name	Dout_0_7
Data Type	Unsigned8
Access	ReadWriteWrite
Can be mapped	Yes
Default Value	0xFF

Dout Error Value 8-bit (0x6207)

Subindex	0x00
Name	Highest Subindex
Data Type	Unsigned8
Access	ReadOnly
Can be mapped	No
Default Value	1

Subindex	0x01
Name	Dout_0_7
Data Type	Unsigned8
Access	ReadWriteWrite
Can be mapped	Yes
Default Value	0x00

Dout Filter Mask 8-bit (0x6208)

Subindex	0x00
Name	Highest Subindex
Data Type	Unsigned8

Subindex	0x00
Access	ReadOnly
Can be mapped	No
Default Value	1

Subindex	0x01
Name	Dout_0_7
Data Type	Unsigned8
Access	ReadWriteWrite
Can be mapped	Yes
Default Value	0xFF

Dout Write 1-bit (0x6220)

Subindex	0x00
Name	Highest Subindex
Data Type	Unsigned8
Access	ReadOnly
Can be mapped	No
Default Value	8

Subindex	0x01
Name	Dout_0
Data Type	Boolean
Access	ReadWrite
Can be mapped	No
Default Value	0

Subindex	0x02
Name	Dout_1
Data Type	Boolean
Access	ReadWrite
Can be mapped	No
Default Value	0

Subindex	0x03
Name	Dout_2
Data Type	Boolean
Access	ReadWrite
Can be mapped	No
Default Value	0

Subindex	0x04
Name	Dout_3
Data Type	Boolean
Access	ReadWrite
Can be mapped	No
Default Value	0

Subindex	0x05
Name	Dout_4
Data Type	Boolean

Subindex	0x05
Access	ReadWrite
Can be mapped	No
Default Value	0

Subindex	0x06
Name	Dout_5
Data Type	Boolean
Access	ReadWrite
Can be mapped	No
Default Value	0

Subindex	0x07
Name	Dout_6
Data Type	Boolean
Access	ReadWrite
Can be mapped	No
Default Value	0

Subindex	0x08
Name	Dout_7
Data Type	Boolean
Access	ReadWrite
Can be mapped	No
Default Value	0

Ain Read Manufacturer-specific (0x6404)

Subindex	**0x00**
Name	Highest Subindex
Data Type	Unsigned8
Access	ReadOnly
Can be mapped	No
Default Value	1

Subindex	**0x01**
Name	Vcc 12-bit
Data Type	Unsigned16
Access	ReadOnly
Can be mapped	Yes
Default Value	