CANopen interface of the GSV-6 measuring amplifier

Operating instructions

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Contents

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General

In addition to the standard serial UART, the GSV-6 CAN offers a CANbus interface. This offers two switchable application protocols: the proprietary ME binary protocol and one that complies with the CANopen standard. This is defined by the standardization body "CAN in Automation" (abbreviated CiA) in its publication DS-301. The GSV-6 CANopen corresponds to the device category of measuring devices described in CiA publication DS-404 ("Device Profile Measuring Devices").
This document describes only the CANopen protocol; the description of the ME binary protocol is published in the general protocol description. Switching between the two application protocols is possible.
Some device settings are accessible via CANopen using the object dictionary via Service Data Objects (SDOs). Measured values are sent via Process Data Objects (TX-PDOs).

Using the CANopen interface, write access

The factory default configuration usually disables the CANopen interface. This allows basic CAN interface settings, such as the baud rate, node ID, and on/off state, to be configured using one of the GSVmultichannel or GSV-8term programs. These settings are stored in the device's non-volatile memory. After the CANopen interface is enabled or after bootup, i.e., after power is applied while the CAN interface is enabled, the GSV-6 CANopen automatically enters the pre-operational state (see Network Management, p. 8). In this state, the object dictionary is accessible, meaning settings can be read and written via CAN. However, measured values, i.e., TX-PDOs, are not sent. For the GSV-6 CANopen to do this, it must be placed in the operational state via Network Management (see there).

The CANopen interface can only be switched on and off via the serial interface (using firmware command 140d). For more convenient operation, the Windows programs GSV8term and GSVmultichannel are available, which communicate with the GSV-6 via USB or serial interface.
The prerequisite for switching on the CANopen interface is the enabled measured value data type "Float." This is already set by default. The measured value type can also be changed via USB/serial using the programs mentioned above.

Changing the CANopen settings using the Windows program GSVmultichannel (version 2.02 and later):
1. Install the program
2. Add Channel, enter the device type "GSV-6" and COMport No., and click "Connect."
3. Menu bar -> Device -> Advanced Settings... -> Interface tab Open the CAN settings menu in the GSV8terminal.exe program:
1. Enter the interface number <Enter> when prompted.
2. <Enter> to open the measured value display and the first main menu page.
3. Press F2 <Enter> to open the second main menu page.
4. Press c , then the corresponding numbers (and <Enter>) to change the settings.
Press F1 to display the control keys; then <Enter> to return to the measured value display.

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CAN-IDs

The CAN identifiers are assigned by the device after initial commissioning according to the predefined connection set described in the CANopen communication profile DS-301.

The so-called COB-ID forms the ID of the CAN frame (11 bits). It consists of the device address (= "Node-ID", bits <6:0>, range 0x01..0x7F) and an offset to identify the service (bits <10:7>); with the exception of network management, for which ID 0 is reserved. The following table shows the ranges for the various services. The transmission direction (send/receive) is specified from the perspective of the GSV-6 CANopen.

Service (object type)	**COB-ID (dez.)**	**COB-ID (hex.)**	**Offset (hex)**
Network Management (Receive)	0	0x000	-
TxPDO Nr.1 (Send Ch. 1 & 2)	385 - 511	0x181 - 0x1FF	0x180
TxPDO Nr.2 (Send Ch. 3 & 4)	641-767	0x281 - 0x2FF	0x280
TxPDO Nr.3 (Send Ch. 5 & 6)	897-1023	0x381 - 0x3FF	0x380
SDO (send)	1409 - 1535	0x581 - 0x5FF	0x580
SDO (receive)	1537 - 1663	0x601 - 0x67F	0x600
Heartbeat / Boot-Message (Send)	1793 - 1919	0x701 - 0x77F	0x700

Table 1: Distribution of identifiers

Changing the node ID and the CAN bit rate

Changing the node ID and CAN bit rate can only be done via the serial interface. This is possible using firmware command 140. For more convenient configuration, you can also use the Windows program GSVmultichannel or the terminal program GSV-8term.exe: Press F2 <Enter> to go to the second menu page and then press c <Enter> to view and change the CAN settings. The following bit rates are supported by the GSV-6 CANopen:
25 kBits/s
50 kBits/s
100 kBits/s
125 kBits/s
250 kBits/s
500 kBits/s
1000 kBits/s = 1MBit/s
The set CAN bit rate applies to both protocols (ME-CAN and CANopen).

Connecting the CAN bus lines

The connection connector depends on the housing design. In the GSV-6T3 CAN, the CAN bus lines are routed to two parallel 5-pin M12 connectors. The CAN signals are assigned as follows, according to CAN-CiA303-1:

M12 Pin No.	Description
5	CAN-L
3	CAN-GND
4	CAN-H
1	Shielding = connector housing
2	Supply voltage

Table 2: Connection of the CAN bus lines

The cable shield should be placed on the metallic union nut of the M12 connector or on pin 1.

Bus termination

The CAN bus connections are not terminated in the device. A standard CAN bus M12 plug with integrated 120 Ohm terminating resistor fits into the socket on the device. If the device is connected at the end of the CAN bus line, such a plug should be used and the GSV-6 CANopen should be connected to the CAN bus at the device plug.

Default settings

CAN-Bitrate	1000 kBits/s
Node-ID	0x40
Transmission-Type (Obj. 180n.2, n=0..2)	255
Event-Timer (Obj. 180n.5, n=0..2)	0x03E8, d.h. 1 (bzw.3) PDO /s
Producer Heartbeat Time (Obj. 1017)	0, i.e., heartbeat disabled. The bootup frame is sent once after power-up and after a reset.
Mapping TxPDO 1	Analog input channel 1 und 2 PV
Mapping TxPDO 2	Analog input channel 3 und 4 PV
Mapping TxPDO 3	Analog input channel 5 und 6 PV

Table 3: Default settings

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Network Management

Network management messages change the state of the device (Stop / Pre-Operational / Operational).

Start Node

Node = module address or 0 = all modules „Broadcast-message.“
The "Start Node" command puts the GSV-6 CANopen into the Operational state. In this state, it can communicate via PDOs.

ID	DLC	B0	B1
0	2	**0x01**	Node-ID o. 0

Stop Node

Node = module address or 0 = all modules "Broadcast message" The "Stop Node" command puts the GSV-6 CANopen into Stop mode. In this state, no communication via SDOs or PDOs is possible. Instead, it can be parameterized via the serial or USB interface..

ID	DLC	B0	B1
0	2	**0x02**	Node-ID o. 0

Enter Pre-Operational

Node = module address or 0 = all modules "Broadcast message" The "Enter Pre-Operational" command sets the GSV-6 CANopen to the pre-operational state. In this state, communication can take place via SDOs, but not via PDOs. The device automatically enters this state after power-on.

ID	DLC	B0	B1
0	2	**0x80**	Node-ID o. 0

Reset Node

Node = module address or 0 = all modules "Broadcast message" The "Reset Node" command performs a reset of the GSV-6 CANopen. If the SDO Restore Parameters (1011h) was previously written to, the default settings are restored; the type of these (communication/measurement app parameters) depends on the subindex of 1011h to which the data was written, see page 17. After the reset, it is in the pre-operational state and sends the "Boot-up Message" once.

ID	DLC	B0	B1
0	2	**0x81**	Node-ID o. 0

Reset Communication Protocol

Node = module address or 0 = all modules "Broadcast message" The "Reset Communication Protocol" command reinitializes the CANopen portion of the device software (protocol stack). If the SDO Restore Parameters (1011.1h or 1011.2h, see p. 17) was previously written to, the default communication settings are restored. Communication settings are those controlled by the SDO indices 1xxxh. After executing this NMT, it is in the pre-operational state and sends the "Boot-up Message" once.

ID	DLC	B0	B1
0	2	**0x82**	Node-ID o.

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Interpretation of the default TxPDOs

If the corresponding transmission conditions are met (see below), the GSV-6 CANopen communicates measured values in its delivery state by consecutively sending 3 Tx-PDOs, see Table 1.

After bootup, the device is in the preoperational state. For the Tx PDOs to be sent, the "Enter Operational State NMT" must be given. Then—if the transmission conditions are met (see below)—the following PDO frames are sent in chronological order from left to right and top to bottom:

TxPDO No. 1 for input channels 1 and 2:

Measured value channel 1				**Measured value channel 2**			
LSbyte	Byte 2	Byte 3	MSbyte	LSbyte	Byte 2	Byte 3	MSbyte

TxPDO No. 2 for input channels 3 and 4:

Measured value channel 3				**Measured value channel 4**			
LSbyte	Byte 2	Byte 3	MSbyte	LSbyte	Byte 2	Byte 3	MSbyte

TxPDO No. 3 for input channels 4 and 5:

Measured value channel 5				**Measured value channel 6**			
LSbyte	Byte 2	Byte 3	MSbyte	LSbyte	Byte 2	Byte 3	MSbyte

The content of the TxPDOs can be changed using so-called dynamic mapping, see p. 22

Transmission conditions for TxPDOs

- State = Operational AND
- PDO = valid (Object 180n.1 Data-Bit 31 =0) UND
- TxPDO- Mapping not empty (Obj. 1A0n.0 >0) UND
- Event-Timer (180n.5) expired

The numerical representation of the measured values is in 32-bit float format (according to IEEE754); if the measuring amplifier is correctly parameterized, these are physically scaled measured values that do not require any further conversion.

Heartbeat Protocol

Using the heartbeat protocol, other participants in the network can determine whether the module is still functional and what its status is. The CAN identifier, which the module uses

to send a heartbeat, is fixed at 700h + Node ID.
The repeat time (also called producer heartbeat time) is set via the SDO object with index 1017h. A value of 0 means no heartbeat frames are sent, see page 18. The heartbeat protocol transmits one byte of payload data encoding the device status.

Device status on the CANopen network	**Code (dez.)**	**Code (hex)**
Bootup	0	0x00
Stopped	4	0x04
Pre-Operational	127	0x7F
Operational	5	0x05

After powering on the power supply or executing the "Reset Node" network management object, the module autonomously sends the so-called "boot-up message." Example: Powering on the module with node ID 0x40:

ID	**DLC**	**B0**
740h	1	00h

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SDO communication

Access to the device's parameters (object directory) is via an SDO (Service Data Object) channel. The GSV-6 CANopen responds to SDO requests, which can take some time, especially for certain write requests. For SDO requests, it is recommended to always wait for the response from the slave (= the GSV-6 CANopen) before sending new requests. Furthermore, it is recommended to refrain from setting the communication parameters in a blanket manner, as they are immediately stored in the device's non-volatile EEPROM, which is only specified for a limited number of write cycles (approximately 1 million). It is recommended to first read the parameters and only change them by writing if the read value deviates from the desired one.
An SDO telegram has the following structure:

ID	DLC	B0	B1	B2	B3	B4	B5	B6	B7
TX: NodeID+0x580 RX: NodeID+0x600	8	CMD	Index		Subindex	Datenbytes			

The number of valid data bytes depends on the object's data type. For read requests and write responses, the data bytes are irrelevant and should all be 0x00. The same applies to unused bytes in the data slot if the data type is shorter than 4 bytes. Valid data bytes always begin with the LS byte in B4 of the CAN data frame.

The Command Byte (CMD) has the following meaning

Function	Number of valid data bytes	CMD	ID-Offset
Master reads from slave (RX)	irrelevant (none)	**40h**	600h
Slave responds to read request (TX)	**1**	**4Fh**	580h
	2	**4Bh**	
	3	**47h**	
	4	**43h**	
Master writes to slave (RX)	**1**	**2Fh**	600h
	2	**2Bh**	
	3	**27h**	
	4	**23h**	
Slave responds with OK (TX)	irrelevant (none)	**60h**	580h
Slave responds with error message (TX)	4	**80h**	580h

Indexes

The individual objects are distinguished in the object directory by indexes. The index is a 16-bit number, the most significant byte of which often represents categories or functional areas; the top 4 bits sometimes also represent data types. Within an object, there are often different parameters or functionalities, which are then differentiated by the subindex.
Note:
For index and data bytes, the LS byte is transmitted first! An example of an SDO frame can be found on page 15.

SDO-Error Messages

If indexes are accessed incorrectly, you will receive an error message. An error message always has the following structure:

ID	DLC	B0	B1	B2	B3	B4	B5	B6	B7
NodeID+0x580	8	0x80	Index		Subindex	Rrror-Code			

The index and subindex refer to the object to which the incorrect access occurred.

The error messages may contain the following content:

Fehlercode (hex)	Meaning
0504 0001	Command byte unknown or invalid
0601 0000	Access to object not supported
0601 0001	Read access to object not supported
0601 0002	Write access to object not supported
0602 0000	Object does not exist in the object directory
0604 0041	Object parameter cannot be mapped to a PDO
0604 0042	Object cannot be mapped to the PDO due to length violation
0604 0043	Parameter incompatible with device properties
0604 0047	General internal device incompatibility
0606 0000	EEPROM (=hardware memory) error
0607 0010	Data type error: Parameter length incorrect
0607 0012	Data type error: Parameter too long
0607 0013	Data type error: Parameter too short
0609 0011	Subindex does not exist in the object directory
0609 0030	Invalid parameter value (write only)
0609 0031	Parameter value too large (write only)

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0609 0032	Parameter value too small (write only)
0800 0000	Undetermined error
0800 0020	Data transfer to the application or saving is not permitted
0800 0022	Current device state does not allow data transfer
0800 0024	Object contains no data

Object directory

This chapter describes the objects implemented in the GSV-6 CANopen. For further information, refer to the CANopen communication profile DS-301 for "Communication Objects" (indices 0x1000..0x1A03) and the device profile DS-404 for "Application Objects" (indices 0x6114..0x8100).

Index (Hex)	Name	Category	Details
1000	Device Type	communication	p.14
1001	Error register	communication	p.14
1002	Manufacturer Status register	application	p.15
1011	Restore Default Parameters[1]	communication, application	p.15
1017	Producer Heartbeat Time	communication	p.
1018	Identity Object	communication	p.17
1800	Tx PDO 1 Communication Parameter	communication	p.18
1801	Tx PDO 2 Communication Parameter	communication	p.18
1802	Tx PDO 3 Communication Parameter	communication	p.18
1A00	Tx PDO 1 Mapping Parameter	communication	p.19
1A01	Tx PDO 2 Mapping Parameter	communication	p.19
1A02	Tx PDO 3 Mapping Parameter	communication	p.20
2020	FT Sensor Storage Info[2]	Manufacturer-defined, application	p.22
2021	FT Sensor 1 Info[2]	Manufacturer-defined, application	p.22
2022	FT Sensor 2 Info[2]	Manufacturer-defined, application	p.22
2023	FT Sensor 3 Info[2]	Manufacturer-defined, application	p.22
2024	FT Sensor 4 Info[2]	Manufacturer-defined, application	p.22
2038	CAN Application Protocol[2]	Manufacturer-defined, communication	p.23
6112	AI Operating Mode	application, Analog Input	p.24
6114	AI ADC sample rate	application, Analog Input	p.24
611C	AI TEDS control	application, Analog Input	p.25
6125	AI Autozero	application, Analog Input	p.26

1 This object is only available from device revision 3.49

6126	AI Scaling Factor	application, Analog Input	p.26
6127	AI Scaling Offset	application, Analog Input	p.26
6130	AI Process Value Float	application, Analog Input	p.27
6131	AI Physical Unit PV	application, Analog Input	p.27
6150	AI Status	application, Analog Input	p.29
6160	AI Control byte	application, Analog Input	p.30
7100	AI Field Value	application, Analog Input	p.30

Index 1000h

DeviceType

The device profile can be queried via the object with the index 1000h.

Sub-Index	Data type	Access	Meaning	Default value
0	Unsigned32	ro	Device properties	0x80020194

The object is read-only. Only subindex 0 is supported. Access to other subindexes is acknowledged with an error message.

Example: Read parameter, module ID = 0x40, index = 1000h

ID	DLC	B0	B1	B2	B3	B4	B5	B6	B7
640h	8	40h	00h	10h	00h	00h	00h	00h	00h

Table 4: SDO request

In response you will receive from the GSV-6 CANopen:

ID	DLC	B0	B1	B2	B3	B4	B5	B6	B7
5C0h	8	42h	00h	10h	00h	94h	01h	02h	80h

Interpretation of the data of this object:

Byte 4 + Byte 5 = 0194h = 404d (Device Profile Number)

Byte 6 + Byte 7<6:0> = 0002h = 00010b (Additional Information)

Individual bits mean the following:

Bit17=1: Analog Input function block present

Bit31=1: PDO default mapping specified in the obsolete DS404 is not used.

Index 1001h

Error Register

The current error status can be queried via the object with the index 1001h.

Sub-Index	Data type	Access	Meaning	Default value
0	Unsigned8	ro	Error condition	0x00

The object is read-only. Only subindex 0 is supported. Access to other subindexes results in an error message.

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Interpretation of this object's data:
The data byte contains flags, of which the following are currently supported:
Bit 0: "Generic Error" This flag is for any error=1 and in an error-free state=0.
Bit 2: "Voltage Error" This flag, when set to 1, indicates that the sensor's bridge power supply is faulty. The cause could be a fault in the sensor (cable), a device defect, or a short circuit in the sensor power supply.

Index 1002h

Manufacturer Status Register
The object with index 1002h can be used to query flags of the measurement application's operating status.

Sub-Index	Data type	Access	Meaning	Default value
0	Unsigned32	ro	Operating status flags	0x0005FF02

The object is read-only. Only subindex 0 is supported. Access to other subindexes results in an error message.

Interpretation of this object's data:
The data value contains flags, of which the following are currently in use:

Bit-No.	Meaning	State changeable with Obj.
0..2	Number of active channels	
3	=1: “Save-Tara”: Result of the zero setting routine is stored non-volatile	-
4	=1: Serial interface outputs the user monitor protocol	
5	=1: The offset point is also loaded from TEDS data	-
7	=1: The peak value is output as the measured value	-
8	=1: If bit 7 =1, the maximum value is also reset when taring via digital input.	-
9	=1: Use TEDS	
10	=1: Calculation for multi-axis sensor active	2020.1h
11	=1: ClickRclackR Menu output 0-20mA, if analog output type = current	-
12	=1: Linearization globally active	-

Index 1011h[2]

Restore Default Parameters

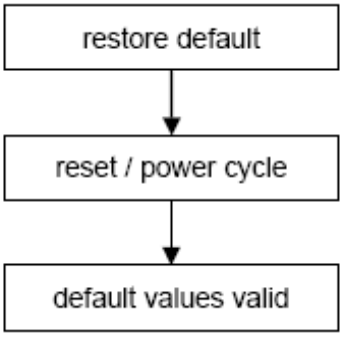
Operating parameters can be restored by writing to object 1011h.

Sub-Index	Data type	Access	Meaning	Read value (=default)

2 This object is only available at firmware revision number 3.49

0	unsigned8	ro	Highest existing subindex	0x04
1	unsigned32	rw	Load all manufacturer parameters	0x00000001
2	unsigned32	rw	Loading the manufacturer's communication settings	0x00000001
3	unsigned32	rw	Loading the manufacturer's application settings	0x00000001
4	unsigned32	rw	Loading the last power-on values of the communication settings	0x00000001

Reading subindices 1..4d results in Data=0x00000001, meaning configuration records can be restored using all subindices 1..4d.
This is done by **writing** to these subindices. The data value is a signature consisting of 4 ASCII characters. This must be **"load,"** otherwise the request is rejected with SDO error message 08000020h.
Subindices 1 and 3 indicate records with parameters associated with objects in the "Application" category (indices 6112..7100h, in CiA404) and "Vendor-defined" (indices 1002 and 2020) categories. These are the parameters that can also be restored via the serial interface using "GetAll."
The restored values do not become valid immediately, but only after the device is switched on again or after the NMTs “Reset Node” or “Reset Communication” (for subindex 2) are sent, i.e. they are only then passed to the application:



Subindex 1 “Restore all Default Parameters”:
Restore all manufacturer configuration parameters, i.e., default communication **and** default application parameters.
Subindex 2 "Restore Communication Default Parameters":
Restores the factory-specified default values of the communication parameters.
These are:

Name	**Associated object**		**Default value**
	Index	Subindex	
Node-ID	1800h	1	0x40
Heartbeat-Time	1017h	0	0x0000 (Heartbeat disabled)
Event-Timer Periode	1800h	5	0x03E8 (1 PDO /s)
TxPDO Mapping	1A00h..1A02h	0..2	s. p. 19 … 20

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The objects associated with this belong to the category “Communication”, indices 1000..1A02h, see CiA301.
Restores the manufacturer's operating parameters. These are all the parameters that can also be restored via the serial interface using "GetAll" (No. 09d) with parameter = 1, see GSV protocol specification.pdf
Subindex 4 “Restore Last Power-On Parameters”:
Restores the communication parameters that were loaded during the last power-on. This option is only useful if changed communication parameters, such as a PDO mapping, have not yet been written to the non-volatile memory.

Index 1017h

Producer Heartbeat Time
The producer heartbeat time is set using the object with index 1017h. The time is specified in milliseconds. A time of 0 ms disables the heartbeat protocol. Using the heartbeat service, another node or a master can determine whether the GSV-6 CANopen is still “alive” and what its current state is.

Sub-Index	Data type	Access	Meaning	Default value
0	unsigned16	rw	Producer Time	0x0000

The object can be read and written. Only subindex 0 is supported. Access to other subindexes is acknowledged with an error message.
A write attempt is rejected if the CAN bus utilization for this device alone would exceed 80%. This check also considers the event timer (1800.5h) and the CAN bit rate, but not services from other devices.
The heartbeat time is one of the communication parameters and is automatically saved to 1017h when written to, and protected from power failure.

Index 1018h

Identity Object
Device- or instance-specific numbers can be queried via the object with the index 1018h.

Sub-Index	Data type	Access	Meaning	Default value
0	unsigned8	ro	Highest existing sub-index	0x04
1	Unsigned32	ro	Vendor ID	0x00000270
2	Unsigned32	ro	Product code	0x00060000
3	Unsigned32	ro	Revision number (firmware version)	-
4	Unsigned32	ro	Serial number	-

The object is read-only. Subindices 0 to 4 are supported. Access to other subindices results in an error message.
Sub-Index 1 „Vendor ID“:
The Vendor ID is a unique manufacturer identifier. Every manufacturer of CANopen devices has a unique identifier, which is centrally assigned and managed by CAN in Automation. ME-Messsysteme have the Vendor **ID = 270h.**
Sub-Index 2 „Product Code“:
This is 0x00060000, corresponding to GSV-6.

Sub-Index 3 „Revision number“:
The "Revision Number" corresponds to the firmware version and revision number. The contents of the 32-bit value are to be interpreted as individual bytes containing integer values.

MSB Bits <31:24>	Bits<23:16>	Bits<15:8>	LSB Bits<7:0>
Version number, „Tenth“	Version No. „One-th“ (LS-Digit)	00h	Revision number

Sub-Index 4 „Serial number“:
The serial number is specific to each device and is also indicated on the device's rating plate. It is to be interpreted as a single integer decimal number, the eight lower-order decimal digits of which constitute the serial number; its basic value range is therefore up to 99999999d. If the read number has fewer than eight digits, the higher-order digits must be padded with zeros up to eight digits.

Indices 1800h - 1802h

Tx PDO Communication Parameter
Objects 1800h to 1803h can be used to query communication parameters of the 4 Tx-PDOs, which contain the measured values (“AI PV”) of the 8 input channels.

Index	Name	Default value subindex 1
1800h	Tx PDO 1 Communication Parameter	0x400001C0
1801h	Tx PDO 2 Communication Parameter	0x400002C0
1802h	Tx PDO 3 Communication Parameter	0x400003C0

The data of the following subindices are the same for all 4 objects except subindex 1:

Sub-Index	Data type	Access	Meaning	Default value
0	unsigned8	ro	Highest existing sub-index	0x05
1	Unsigned32	rw	COB-ID used by PDO	s. Table above
2	Unsigned8	ro	Transmission type	0xFF
5	Unsigned16	rw	Event Timer Period	0x03E8

Subindices 0 to 2 and 5 are supported. Access to other subindices results in an error message.

Interpretation of the data of these objects:
Subindex 1 “COB-ID used by PDO”:
Bits <28:0> form the COB ID of the TX PDO service, which consists of the device address (= "NodeID") and the service offset (here = 180h). Bits <31:29> have the following meaning:
Bit 29 = 0: The GSV-6 CANopen only supports CAN frames with an 11-bit CAN ID.
Bit 30 = 1: The GSV-6 CANopen does not support RTRs.
Bit 31 = "valid": =0: PDO is valid. When writing to subindex 1, only bit 31 may be changed; see "Dynamic PDO Mapping", S. 20.
Subindex 2 “Transmission type”:
Currently, only one transmission type is supported:
Value = 255d = 0xFF:
The GSV-6 CANopen sends TX PDOs if the event timer has expired and the device is in

the operational state and the inhibit time has not yet expired.
Subindex 5 "Event Timer Period":
The Event Timer Period specifies the time period at which TX-PDOs are sent. The value is specified in multiples of 1 ms. A value of 0 means this function is disabled.
It is highly recommended to set **the internal data rate (= that of the serial interface) to a value such that the period of this data rate is less than or equal to the Event Timer Period.** This ensures that each TX-PDO frame contains a current measured value. Since the serial data rate also corresponds to the internal update rate of the analog input, otherwise the same measured values would be repeated in multiple TX-PDOs. This setting can be made on the CAN bus using object 6114h, see below.
Example: Event Timer = 100d, corresponding to 100 ms. The internal data rate should then be 1000/100ms = 10 measured values/s or greater (10/s is the default setting).

A write attempt will be rejected if the CAN bus utilization for this device alone would exceed 80%. This check also considers the heartbeat timer (1017h) and the CAN bit rate.
The event timer period is one of the communication parameters and is automatically saved to 1800.5h when writing, ensuring it is safe from power failure.

Index 1A00h

Tx PDO 1 Mapping Parameter
The object 1A00h can be used to query which objects the TX-PDO No. 1 contains.

Sub-Index	Data type	Access	Meaning	Default value
0	unsigned8	rw	Number of objects mapped in TX-PDO 1	0x02
1	Unsigned32	rw	Mapping for object 1: Default: Input channel 1	0x61300120
2	Unsigned32	rw	Mapping for object 2: Default: Input channel 2	0x61300220

Subindexes 0 to 7 are supported. Access to other subindexes is rejected with an error message.
Subindex 0: Subindex 0 contains the number of mapped objects. Value range: 0 to 7.
Subindexes 1 to 7: Mapping entries. Allowed values:
0x6130<01..06>20: SDO AI Process Value Float
0x6150<01..06>08: SDO AI Status

Index 1A01h

Tx PDO 2 Mapping Parameter
The object 1A00h can be used to query which objects the TX-PDO No. 2 contains.

Sub-Index	Data type	Access	Meaning	Default value
0	unsigned8	rw	Number of objects mapped in TX-PDO 2	0x02
1	Unsigned32	rw	Mapping for object 1: Default: Input channel 3	0x61300320
2	Unsigned32	rw	Mapping for object 2: Default: Input channel 4	0x61300420

Subindexes 0 to 7 are supported. Access to other subindexes is rejected with an error message.
Subindex 0: Subindex 0 contains the number of mapped objects. Value range: 0 to 7.

Subindexes 1 to 7: Mapping entries. Allowed values:
0x6130<01..06>20 is SDO: AI Process Value Float
0x6150<01..06>08 is SDO: AI Status

Index 1A02h

Tx PDO 3 Mapping Parameter
The object 1A00h can be used to query which objects the TX-PDO No. 3 contains.

Sub-Index	Data type	Access	Meaning	Default value
0	unsigned8	rw	Number of objects mapped in TX-PDO 3	0x02
1	Unsigned32	rw	Mapping for object 1: Default: Input channel 5	0x61300520
2	Unsigned32	rw	Mapping for object 2: Default: Input channel 6	0x61300620

Subindexes 0 to 7 are supported. Access to other subindexes is rejected with an error message.
Subindex 0: Subindex 0 contains the number of mapped objects. Value range: 0 to 7.
Subindexes 1 to 7: Mapping entries. Allowed values:
0x6130<01..06>20 is SDO: AI Process Value Float
0x6150<01..06>08 is SDO: AI Status

Interpretation of the data of objects 1A00h - 1A02h:
Each of the three TX-PDOs consists of the data from 1 to 1 object(s); this number of objects is specified in subindex 0. Subindices 1 to 7 contain the mappings in the order in which they appear in the TxPDO.
Example (default): Subindex 0: =2. Subindex 1 contains the mapping for the first object in the respective PDO, and subindex 2 contains the mapping for the second object in the PDO.
Bits <31:16> of the data entry contain the index of the mapped object, bits <15:8> the subindex, and bit <7:0> the length of the value within the TX-PDO in bits.
For example, 1A00.1h reads 6130.01.20, i.e., the first object in the PDO is the analog input process value of channel 1 (object 6130.1h) with a length of 32 bits. Overall, the default mapping entries in 1A00h - 1A03h result in the following TX PDO data frames:

B0	B1	B2	B3	B4	B5	B6	B7
Analog Input Process Value ch. 1/3/5				**Analog Input Process Value ch. 2/4/6**			
LSByte	Byte 1	Byte 2	MSByte	LSByte	Byte 1	Byte 2	MSByte

Dynamic PDO-Mapping

Since the GSV-6 CANopen supports three different TxPDOs, the placeholder for n in the description below must first be determined: n = TxPDO No. -1, e.g., n=0 for TxPDO 1, and so on, up to n=2 for TxPDO 3. To permanently deactivate a TxPDO, omit steps 3 and 4 below.
To change the content of one of the three TxPDOs, please proceed as follows:

1. Invalidate the PDO by first reading object 180n.1 (index 180nh, subindex 1), then

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storing this value and setting its bit 31 to 1 (ORing it with 0x80.00.00.00), and then writing this value back to 180n.1.
2. Invalidate the PDO mapping by writing a null byte (0x00) to 1A0n.0.
3. Write the desired PDO mapping to 1A0n.1 to 1A0n.x, where x is the number of desired objects in the PDO frame. The following values are possible:
- 0x6130 0k 20: An "AI Process Value," i.e., a measured value (see p. 29), is to be mapped. k is the placeholder for the subindex of object 6130h, i.e., the channel number. Its value range is 1 to 6.
- 0x6150 0k 08: An "AI Status" value (see page 31) is to be mapped. k is the placeholder for the subindex of object 6150h, i.e., the channel number. Its assignment corresponds to that of object 6130h.
4. Validate the PDO mapping again by writing the number of mapped objects to 1A0n.0.
5. Validate the PDO again by writing the value originally read from 180n.1 in step 1 (the one with bit 31 = 0) back to 180n.1. If the mapping is correct, it is saved permanently in this step so that the GSV-6 restores it the next time it is switched on.

If steps 3 and 4 are omitted, i.e., 1A0n.0 remains = 0, an "empty mapping" is saved, so that the corresponding TxPDO is permanently deactivated and will not be sent the next time the device is powered on.
This allows unnecessary measured values to be omitted, thus reducing CANbus load.

Application-specific objects, analog input function block

The objects in this range are divided into subindices, and the largest available subindex is always read at subindex 0. Subindices 1 to 6 contain parameters that, for many objects, apply to the respective analog input channels 1 to 6.
For some objects, the value is the same for all input channels 1 to 6. Writing to one of these subindices then changes the values of all subindices 1 to 6.

Index 2020h[3]

FT Sensor Information

Object 2020h can be used to determine the number of stored data records for six-axis sensors (=FT sensor) and to read and set the enabled array. The calculation of the physical six-axis values can also be enabled and disabled.

Sub-Index	Data type	Access	Meaning	Default value
0	unsigned8	ro	Highest existing sub-index	0x03
1	unsigned8	rw	Ordinal No. of activated FT sensor	0x00
2	unsigned8	ro	Number of stored FT records	0x00
3	unsigned8	ro	Maximum number of FT records	0x04

Subindices 0 to 3 are supported. Access to other subindices is acknowledged with an error message.
The value range of the number of the activated FT sensor at subindex 1 is:
0 to <number of stored FT data records>. A value of 0 means that the calculation of the physical six-axis values is deactivated, so the default TxPDOs no. 1 to 3 (= object 6130.1-6) display raw values scaled in mV/V. If the value in subindex 1 is greater than 0, the measured values have the following meaning:

Channel No.	TxPDO No.	Inside TxPDO	Meaning	Unit
1	1	1st value	Force in X-direction	N
2	1	2nd value	Force in Y-direction	N
3	2	1st value	Force in Z-direction	N
4	2	2nd value	Torque in X-direction	Nm
5	3	1st value	Torque in Y-direction	Nm
6	3	2nd value	Torque in Z-direction	Nm

This object is “Manufacturer defined”, i.e. not predefined in the CANopen standard.

Indices 2021h - 2024h[4]

FT Sensor Data

3 Dieses Objekt ist erst an Firmware-Revisionsnummer 3.49 vorhanden

Objects 2021h to 2025h can be used to read the contents of six-axis sensor data sets, provided sensor data is stored. Sensor data is currently only saved via the serial interface or the ME CAN protocol. If no sensor data is stored, access to subindices 1 to 16 is aborted with the error message 0x08000024 "Object contains no data."
Object 2021h is assigned to FT sensor no. 1, object 2022h to no. 2, and so on up to 2024h to sensor no. 4. The layout of objects 2021h to 2024h is identical:

Sub-Index	Data type	Access	Meaning	Unit	Default value
0	unsigned8	ro	Highest existing sub-index	-	0x11
1	unsigned32	ro	FT sensor serial number	-	-
2	Float	ro	Nominal maximum value of the force in X direction (Fx max)	N	-
3	Float	ro	Nominal maximum value of the force in Y direction (Fy max)	N	-
4	Float	ro	Nominal maximum value of the force in Z direction (Fz max)	N	-
5	Float	ro	Nominal maximum value of the torque in X direction (Mx max)	Nm	-
6	Float	ro	Nominal maximum value of the torque in Y direction (My max)	Nm	-
7	Float	ro	Nominal maximum value of the torque in Z direction (Mz max)	Nm	-
8	Float	rw	Geometric offset in X direction	m	-
9	Float	rw	Geometric offset in Y direction	m	-
10	Float	rw	Geometric offset in Z direction	m	-
11	Float	ro	Zero signal (load-free) of component 0 (raw value)	mV/V	-
12	Float	ro	Zero signal (load-free) of component 1 (raw value)	mV/V	-
13	Float	ro	Zero signal (load-free) of component 2 (raw value)	mV/V	-
14	Float	ro	Zero signal (load-free) of component 3 (raw value)	mV/V	-
15	Float	ro	Zero signal (load-free) of component 4 (raw value)	mV/V	-
16	Float	ro	Zero signal (load-free) of component 5 (raw value)	mV/V	-
17	unsigned32	ro	Sensor type: =0: Standard solution. =1: With "Matrix Plus" 2. Ord.	-	-

Only subindices 0 to 17 are supported. Access to other subindices results in an error message.
These objects are "manufacturer-defined," meaning they are not predefined in the CANopen standard.

Index 2038h[4]

CAN Application Protocol
With object 2038h the application protocol of the CAN bus can be changed from CANopen to ME-Binary.
Note: After successful modification and subsequent restart of the device, the entire CANopen application protocol is no longer valid, i.e. communication with a CANopen

4 Dieses Objekt ist erst an Firmware-Revisionsnummer 3.49 vorhanden

master program is no longer possible!
However, resetting to the CANopen protocol is also possible via the ME-Binary protocol, as well as via the serial interface, using the SetCANSetting command.

Sub-Index	Data type	Access	Meaning	Default value
0	unsigned8	ro	Highest existing sub-index	0x02
1	unsigned32	wo	1st Signatur	0x432D454D
2	unsigned32	wo	2nd Signatur	0x72704E41

Subindices 0 to 2 are supported. Access to other subindices results in an error message.
To change the application protocol, the signature "ME-C" must first be written to subindex 1, i.e., the 32-bit number 0x432D454D. Then, the signature "ANpr" must be written to subindex 2, i.e., the 32-bit number 0x72704E41. The ME binary protocol will then become valid after the next device reboot.

Index 6112h

AI Operating Mode

Object 6112h can be used to set whether the measurement data objects of all channels contain normal current measured values, maximum or minimum values.

Sub-Index	Data type	Access	Meaning	Default value
0	unsigned8	ro	Highest existing sub-index	0x06
1 to 6	unsigned8	rw	Measuring value mode	0x01

Subindices 0 to 6 are supported. Access to other subindices results in an error message.
Setting to zero with Obj. 6125h resets the maximum and minimum value registers.

Interpretation of the data of this object:

Value	Meaning
0x00	The channel identified by the subindex is disabled
0x01	The measured values of all channels k (Obj. 6130.k) are normal current values
0x0A	The measured values of all channels k (Obj. 6130.k) are maximum values

Any attempt to set a value other than one of these 3 will result in an error message.
This object can also be used to change the number of channels in the measurement application. To increase the number of channels, write the value 0x01 or 0x0A to the subindex of the desired number of channels. To decrease the number of channels, write the value 0x00 to the subindex of the desired number of channels + 1, i.e., to the subindex of the first channel to be deactivated. Changing the maximum mode (value 0x01 or 0x0A) affects all activated channels. Changing the number of channels only affects the measurement application; the TxPDO mapping (see object 1A0n) remains unaffected. The data content of deactivated channels, readable via TxPDO and object 6130h, is meaningless.

Index 6114h

AI Sample Rate

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Object 6114h can be used to read and set the measurement data period of the GSV-6. The value is specified in microseconds. This should be less than or equal to the TX PDO transmission period set by the event timer (object 1800.5h) (see p. 18), so that each TX PDO contains a current measurement value:

(AI_Sample_Rate_in_µs / 1000) <= EventTimerPeriod_in_ms

Sub-Index	Data type	Access	Meaning	Default value
0	unsigned8	ro	Highest existing sub-index	0x06
1 to 7	Unsigned32	rw	AI ADC Sampling Period in µs	0x000186A0

Subindices 0 to 7 are supported. Access to other subindices is acknowledged with an error message. Subindex 7 is reserved for (future) devices with a counter input.
The data period is the same for all input channels, i.e., writing to one of the subindices 1 to 7 changes the values of all subindices 1 to 10.
When writing to 6114.1..7:
Tips for setting the ADC period:

1. 1. The value of the measurement data period should not be chosen too small to ensure the best possible signal-to-noise ratio.
   Ideally, the above equation applies exactly:
   (ADC_period_in_µs / 1000) = EventTimerPeriod_in_ms
2. If it is known that EM interference is present at a certain frequency and its multiples, it is advisable to choose the measurement data period value so that it corresponds to this fundamental frequency of the interference or a multiple of it. For example, if the power grid frequency is 50 Hz, measurement data rates of 5 Hz, 10 Hz, 25 Hz, 50 Hz, and 100 Hz are favorable, since the frequency response of the digital signal processing then exhibits an attenuation maximum at 50 Hz (the so-called notch frequency).

Index 611Ch

AI TEDS control

This object describes or modifies the device behavior with respect to connected sensors using TEDS. Only channel 1 can be configured using TEDS, therefore only subindex 1 is present.

Sub-Index	Data type	Access	Meaning	Default value
0	unsigned8	ro	Highest existing sub-index	0x01
1	unsigned8	rw	TEDS Behaviour	0x02

Subindices 0 and 1 are supported. Access to other subindices results in an error message.

A value of 0 means that the contents of the TEDS memory of a connected sensor are discarded and not used. A value of 2 means that the GSV-6 automatically configures the scaling so that measured values scaled to physical quantities are transmitted in the

TxPDO of the corresponding input channel when a sensor with valid and supported TEDS data is connected.

Index 6125h

AI Autozero

AI Autozero (Obj. 6125h) can be used to zero the analog input so that the "AI Field Value" (Obj. 7100h) and the "AI Process Value" (Obj. 6130h and TX-PDO) of the channel (No. = subindex) become zero. This also affects the analog output.

Sub-Index	Data type	Access	Meaning	Default value	fuction when writing
0	unsigned8	ro	Highest existing sub-index	0x06	-
1	Unsigned32	wo	Signature AI Autozero	„zero“	Setting zero input channel 1
2 ...	Unsigned32	wo	Signature AI Autozero	„zero“	Setting zero input channel 2...
...7	Unsigned32	wo	Signature AI Autozero	„zero“	Setting zero input channel 7

The object is write-only. Subindexes 0 to 7 are supported. Access to other subindexes results in an error message. Subindex 7 is reserved for (future) devices with a counter input.

To perform a zero calibration, the signature "zero" must be written to 6125.k, i.e., the byte sequence 7Ah, 65h, 72h, 6Fh. Subindices 1 to 6 correspond to the channel number of the analog input whose measured value is to be set to zero. However, if measurement with a six-axis sensor is active, all input channels 1 to 6 are set to zero on subindices 1 to 6, as this is necessary for correct six-axis sensor calculation. Once the zero calibration is complete, the SDO response frame is placed on the CAN bus.

Index 6126h

AI Scaling factor

Object 6126h can be used to read and write the "UserScale" scaling factor. This factor changes the representation and value range of the AI Process Value (object 6130h and TX-PDO); the AI Field Value remains unaffected. However, when measurement with six-axis sensors is enabled, the AI Scaling factor is not used.

Sub-Index	Data type	Access	Meaning	Default value
0	unsigned8	ro	Highest existing sub-index	0x06
1 to 7	Float	rw	AI Scaling Factor channels 1 to 7 (7)	2.0

The object can be read and written. Subindices 0 to 7 are supported. Access to other subindices is acknowledged with an error message. Subindex 7 is reserved for (future) devices with a counter input.

Index 6127h

AI Scaling Offset

With object 6127h a summand "UserOffset" can be read and written, which is added to the measured value (AI Process value).

Sub-Index	Data type	Access	Meaning	Default value
0	unsigned8	ro	Highest existing sub-index	0x06
1 to 7	Float	rw	AI Scaling Offset channels 1 to 6 (7)	0,0

The object can be read and written. Subindices 0 to 7 are supported. Access to other subindices is acknowledged with an error message. Subindex 7 is reserved for (future) devices with a counter input.
The AI Scaling Offset may also be negative, in which case its value is subtracted from the measured value.

Index 6130h

AI Process Value Float

The analog input process value is the measured value scaled with the AI_Scaling_Factor in 32-bit floating-point notation according to IEEE-754. No further conversion (as with 7100h) is necessary.

Sub-Index	Data type	Access	Meaning	Default value
0	unsigned8	ro	Highest existing sub-index	0x06
1 to 7	Float	ro	AI Process Value Float channels 1 to 6 (7)	-

The object is read-only. Subindices 0 to 7 are supported. Access to other subindices is acknowledged with an error message. Subindex 7 is reserved for (future) devices with a counter input. Subindices 1 to 6 can be mapped to TxPDOs, which is the default state.

Index 6131h

AI Physical Unit PV

Using object 6131h, a physical unit can be read or set for each input channel (=subindex). The unit does not affect other objects, i.e., the representation of the AI Process Value remains the same after changing the unit.

Sub-Index	Data type	Access	Meaning	Default value
0	unsigned8	ro	Highest existing sub-index	0x06
1 to 7	Unsigned32	rw	AI Physical Unit	0xFD262600 (“mV/V“)

The object is read-only. Subindices 0 to 7 are supported. Access to other subindices is acknowledged with an error message. Subindex 7 is reserved for (future) devices with a counter input.
Attempts to set unsupported units (see table below) will be rejected with abort code 06090030h.
The following units can be set; coded according to CiA 303-2:

Unit	Code (Data, hex)	Code serial
mV/V	0xFD.26.26.00	0

Unit	Code (Data, hex)	Code serial
kg	0x00.02.00.00	1
g	0x00.4B.00.00	2
N	0x00.21.00.00	3
cN	0xFE.21.00.00	4
V	0x00.26.00.00	5
µm/m	0xFA.01.01.00	6
(keine)	0x00.00.00.00	7
t	0x00.4C.00.00	8
kN	0x03.21.00.00	9
lb	**0x00.EA.00.00**	10
oz	**0x00.EB.00.00**	11
kp	**0x00.EC.00.00**	12
lbf	**0x00.ED.00.00**	13
pdl	**0x00.EE.00.00**	14
mm	0xFD.01.00.00	15
m	0x00.01.00.00	16
cNm	0xFE.56.00.00	17
Nm	0x00.56.00.00	18
°C	0x00.2D.00.00	19
°F	0x00.AC.00.00	20
K	**0x00.E8.00.00**	21
oztr	**0x00.E7.00.00**	22
dwt	**0x00.E6.00.00**	23
kNm	0x03.56.00.00	24
%	**0x00.E5.00.00**	25
0/00	**0x00.E4.00.00**	26
W	0x00.24.00.00	27
kW	0x03.24.00.00	28
rpm	0x00.00.47.00	29
bar	0x00.4E.00.00	30
Pa	0x00.22.00.00	31
hPa	0x02.22.00.00	32
MPa	0x06.22.00.00	33

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Unit	Code (Data, hex)	Code serial
N/mm²	0x06.21.58.00	34
°	0x00.41.00.00	35
Hz	0x00.20.00.00	36
m/s	0x00.01.03.00	37
km/h	0x03.01.48.00	38
m³/h	0x00.59.48.00	39
mA	0xFD.04.00.00	40
A	0x00.04.00.00	41
m/s²	0x00.55.00.00	42
flbs	**0x00.E3.00.00**	43
ftlb	**0x00.E2.00.00**	44
J	0x00.23.00.00	45
kWh	**0x00.E1.00.00**	46
<User-defined Text Nr. 1>	**0x00.FF.00.00**	-1
< User-defined Text Nr. 2>	**0x00.FE.00.00**	-2

Codes in bold are manufacturer-defined but follow the principles specified in CiA 303-2.

Index 6150h

AI Status

Object 6150h can be used to read the validity state of the AI Input PV.

Sub-Index	Data type	Access	Meaning	Default value
0	unsigned8	ro	Highest existing sub-index	0x06
1 to 7	Unsigned8	ro	AI Status Eingangskanäle 1 to 6	0x00

The object is read-only. Subindices 0 to 7 are supported. Access to other subindices is acknowledged with an error message. Subindex 7 is reserved for (future) devices with a counter input. Subindices 1 to 6 can be mapped in the TxPDO.

Interpretation of the data of this object:

Bits 3,4,7	Bit 6	Bit 5	Bit 2	Bit 1	Bit 0
reserved	Object dictionary changed	TEDS Sensor connected	Negative overflow	Positive overflow	Sensor fault

A set bit 0 (sensor error) indicates a defective sensor, a defective sensor cable, or a faulty sensor connection. In this case, the AI field and process values are invalid.

In the case of a positive or negative overflow, the sensor deflection is so large (or negative) that the sensor's measuring range (maximum or minimum value exceeded) or the raw value (saturation) has been exceeded or undershot.
Bit 5 = 1 means that a TEDS sensor is connected and its data is being used, which can only be the case at subindex 1.
Bit 6 = 1 indicates that the data in objects 6112h to 6127h or 6131h has changed. The object dictionary may be invalid and should be reread. Bit 6 can be cleared by writing to bit 3 of object 6160h (AI control byte).

Index 6160h

AI control byte

Writing to this object triggers various functions of the analog input or the object directory.

Sub-Index	Data type	Access	Meaning	Default value
0	unsigned8	ro	Highest existing sub-index	0x06
1 to 10	unsigned8	wo	Control flags for entries 1 to 10	-

The object is read-only. Subindices 0 to 7 are supported. Access to other subindices is acknowledged with an error message. Subindex 7 is reserved for (future) devices with a counter input. Subindices 1 to 6 can be mapped in the TxPDO.

Setting the corresponding bit triggers the following function:

Bits <7:4>	Bit 3	Bit 2	Bit 1	Bit 0
Reserved	Reset bit OD changed	Reserved	Perform Auto-Tare	Reserved

Setting bit 1 triggers a Set Zero routine, as described in object 6125h, on the input channel indicated by the subindex.
Setting bit 3 clears bit 6 of object 6150h.

Index 7100h

AI Field Value

The Analog Input Field Value is the unscaled measured value of the analog input channels 1 to 8 in raw data representation.

Sub-Index	Data type	Access	Meaning	Default value
0	unsigned8	ro	Highest existing sub-index	0x06
1 to 6	Signed16	ro	AI Field Value channels 1 to 6	-

The object is read-only. Subindices 0 through 6 are supported. Access to other subindices results in an error message.

To interpret the data content:
To obtain scaled values, the following calculations must be performed:

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Skaled measuring value = (AI_Field_Value * 1,05 * AI_Scaling_Factor) / 32767

Example of commissioning by a CAN bus master

All numbers and data contents are in hexadecimal. The device has a node ID of 0x40 (default value). Otherwise, the COB ID is different accordingly. The DLC corresponds to the number of bytes specified in the "CAN Data" column.

Continuous measurement value transmission

Desired data rate of the TxPDOs: 10 measured values * 8 channels/s. Transmission should be based on the event timer.

	Action	Condition for action	COB ID	CAN-Data
1	Boot-up or reset	none	n.a.	n.a.
2	Bootup-Frame from GSV	Switched on or resetted	740	00
3	Read SDO „Device-type“	none	640	40 00 10 00 00 00 00 00
4	GSV responds to SDO „Device-type“	Read command given before	5C0	43 00 10 00 94 01 02 80
5	Read SDO „Event timer“ (in Tx PDO 1 Communication Parameter)	none	640	40 00 18 05 00 00 00 00
6	GSV responds to SDO “Event timer”	Read command given before	5C0	4B 00 18 05 **E8 03** 00 00
7	Set desired event timer value	0x03E8 = 1000ms, i.e., 1 PDO/s does not correspond to the desired value. Therefore, set to 0x0064 = 100ms.	640	2B 00 18 05 **64 00** 00 00
8	GSV responds „**OK**“ to Write-SDO „Event timer“	Read command given before	5C0	**60** 00 18 05 00 00 00 00
9	Master puts GSV into Operational State	none	000	01 40

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Changelog

Version	Datum	Änderungen
ba-gsv6CanOpen_v1.odt	6.9.2022	1st version (german)
ba-gsv6CanOpen_v2_EN.odt	19.02.2025	Translation, Updates, including firmware revision 3.49

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They are not warranted characteristics in the sense of §459 Paragraph 2, BGB (German Civil Code) or similar regulations and affect no liability.

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