

CANopen Interface

Original Description

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Description CANopen Interface

1. Field of application

These instructions serve to describe the CANopen interface from A.S.T. GmbH products.

- KAx-DI Force transducer with integrated CANopen-Interface
- BD 344 Inline Interface
- DI 1000 Digital Interface
- LS 1000 Switching Amplifier



NOTE! Further information and **eds-files** about the products on our website "www.ast.de"!

2. Abbreviations (according to CiA)

- AI – Analog Input (channel n)
- FVn – Field value channel n (unprocessed measured value) (floating point value from -2.0 to +2.0)
- PVn – Process value channel n (force measurement value in relation of nominal value)
- 0x1234:5 – Object with the index 0x1234 (hexadecimal) and Subindex 5

3. Presets

3.1. CANopen-node-settings

- Node number: 127
- Bitrate: 125 kBit/s
- Heartbeat-Intervall: 1000 msec

3.2. PDOm Presets (m=1...4)

- PDOm is locked default
- PDOm default Mapping:
 - 0x6130:n - PV (4 Byte)
 - 0x6150:n - Status (1 Byte)
 - 0x6132:n - Digits (1 Byte)
 - 0x6110:n - Type of sensor(2 Byte)
- Example 1 – 76.492 kN (nominal value example 100.0 kN):
 - 76.492 – Force value as a floating point number
 - Status: okay
 - Digits: 3
 - Type of sensor: 71 (Full Bridge)
- Example. 2 – 1256.8 N (nominal value example z. B. 2500.0 N):
 - 1256.8 – Force value as a floating point number
 - Status: Overload
 - Digits: 1
 - Type of sensor: 71 (Full Bridge)

4. Objects (per channel n)

4.1. Process data

- [0x6130:n] AI Float PVn: Force value of channel n in physical units
- [0x6100:n] AI Float FVn: Measuring value in range ± 2.000 ,
in relation to the input signal (mV(V))
- [0x6131:n] AI Physical unit PVn: Physical unit according to CiA profile 404
- [0x2110:n] AI Nominal Value PVn: Nominal value of the force transducer
- [0x6150:n] AI Status PVn: Over-/Underload according to CiA-profile 404

4.2. Further information (channel n)

- [0x6132:n] AI Decimal digits PVn: Decimal places (possibly usable for advertisements)
- [0x6110:n] AI Sensor type PVn: Type of Sensor according CiA-Profil 404
- [0x61B0:n] AI Signal Name (PV) Name of Process Value (<28 char)
- [0x61B1:n] AI connector identification Name of Field Value (< 28 char)

4.3. Calibration objects (channel n)

- [0x6121:n]	PV Value1 Y1:	Calibration point 1
- [0x6123:n]	PV Value2 Y2:	Calibration point 2
- [0x6126:n]	AI Scaling Factor PVn:	calculated graph of calibration
- [0x6127:n]	AI Scaling Offset PVn:	Set a zero displacement
- [0x6134:n]	AI lower Limit PVn:	set Bit in status PVn [0x6150:n]
- [0x6135:n]	AI upper Limit PVn:	set Bit in status PVn [0x6150:n]
- [0x9100:n]	AI 32 Bit FVn:	Raw value of the AD converter
- [0x9120:n]	ADC Value X1:	Raw value of calibration point 1
- [0x9122:n]	ADC Value X2:	Raw value of calibration point 2

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5. Allgemeine Objektübersicht

5.1. Communication Objects CiA 301

Index	Sub	Name	Remarks
0x1000	0	Device Type	Measurement Devices CIA DS 404
0x1008	0	Manufacturer Device Name	Name of the device
0x1009	0	Manufacturer Hardware Version	String for Version of Hardware
0x100A	0	Manufacturer Software Version	String for Version of Software
0x1010	0	Store Parameter Field	Number of entries
0x1010	1	_Save all Parameters	Write 0x65766173 to save
0x1010	2	_Save Communication Parameters	Write 0x65766173 to save
0x1010	3	_Save Application Parameters	Write 0x65766173 to save
0x1011	0	Restore Default Parameters	Number of entries
0x1011	1	_Load all Default Parameters	Write 0x64616F6C to load
0x1011	2	_Load Communication Default Parameters	Write 0x64616F6C to load
0x1011	3	Load Application Default Parameters	Write 0x64616F6C to load
0x1017	0	Producer Heartbeat Time	in msec
0x1018	0	Identity Object	Number of entries
0x1018	1	_Vendor Id	A.S.T. = 937
0x1018	2	_Product Code	
0x1018	3	_Revision number	
0x1018	4	_Serial number	
0x180x	0	Transmit PDOm Communication Parameter	Number of entries (m=1...4)
0x180x	1	_COB ID	NODEID + 0x180
0x180x	2	_TransmissionType	1..240:after n-th SYNC, 254/255:EventTimer
0x180x	3	_Inhibit Time	not used
0x180x	4	_Compatibility Entry	not used
0x180x	5	_Event Timer	in msec, transmit automatically after this time
0x180x	6	_SYNC start value	not used
0x1A0x	0	Transmit PDOx Mapping Parameter	Number of entries
0x1A0x	1	_Mapping Entry 1	Index, Subindex, Length
0x1A0x	k	_Mapping Entry k	Index, Subindex, Length

5.2. Manufacturer Objects

Index	Sub	Name	Remarks	default value
0x2008	0	User Device Name	String. <28 char	like 0x1008
0x2010	0	Number of entries		2
0x2010	1	Node number	1..127; valid after reboot	127
0x2010	2	Index of Bitrate	4 (125 kbps): valid after reboot	4
			3 (250 kbps)• valid after reboot	
			2 (500 kbps): valid after reboot	
0x2011	n	AI Nominal Value FV	Field Value (mV/V)	2.0
0x2131	n	AI Nominal Value PV	Process Value (N. kg...)	...
0x2148	n	AI Minimum Value PV	Process Value (N. kg...)	...
0x2149	n	AI Maximum Value PV	Process Value (N. kg...)	...

5.3. Device Profile Objects (CiA404)

Index	Sub	Name	Remarks	default value
0x6100	n	AI input float FV	Field value	measuring value
0x6101	n	AI Physical unit FV	e.g. mV/V	e.g. 0xFD262600
0x6110	n	AI Sensor type	Full Bridge	71
0x6112	n	AI Operating mode	Enable/Disable Channel	1
0x6114	n	AI ADC sample rate	in usec!	4358
0x6120	n	AI input scaling 1 FV	Scale Point 1 (zero)	0.0
0x6121	n	AI input scaling 1 PV	Scale Point 1 (zero)	0.0
0x6122	n	AI input scaling 2 FV	Scale Point 2 (load)	Nominal Value FV
0x6123	n	AI input scaling 2 PV	Scale Point 2 (load)	Nominal Value PV
0x6130	n	AI input float PV	Process Value	measuring value
0x6131	n	AI Physical unit PV	example. kN. example kg....	e.g. 0x03210000 e.g. 0x00020000
0x6132	n	AI Decimal digits PV	Decimal digits	3
0x6134	n	AI lower Limit	lower Limit (Status-Bit6)	-50%
0x6135	n	AI upper Limit	upper Limit (Status-Bit5)	+150%
0x6138	n	AI Tare Zero PV	Tara Value	0.0
0x6139	n	AI Autotare	write only (0x61726174)	---
0x6140	n	AI Netto	Netto Value (PV - Tara)	-PV (0x6130)
0x6148	n	AI Span Start	Span Start (Status-Bit2)	-20%
0x6149	n	AI Span End	Span End (Status-Bit1)	+120%
0x6150	n	AI Status	Bit6: LimitLow Bit5: LimitUpper Bit3: NoSync Bit2: negative underload Bit1: positive overload Bit0: ADC-Error	0
0x61A0	n	AI Filter type	1:Moving Average. 2:Repeating Average	0
0x61A1	n	AI Filter constant	Count of Values for 0x61A0	0; max. 65000
0x61B0	n	AI Signal Name (PV)	Name of Process Value (<28 char)	"DMS Bridge n"
0x61B1	n	AI connector identification	Name of Field Value (< 28 char)	"DMS Analog Input n"

6. Examples of using

6.1. Node number and/or bitrate changes

- Set the new node number to [0x2010:1] (node number) [1...127]
- Set the new bitrate index to [0x2010:2] (Index of Bitrate) [2, 3, 4]
(2: 500 kBit/s; 3: 250 kBit/s; 4: 125 kBit/s)
- Save with 0x65766173 ("save") in object 0x1010Sub2
- Send NMT command "Reset Node" or switch on/off
- Adjust remote station for new bit rate

6.2. Changing NodeID

- Write the new NodeID to object 0x2010Sub1
- Then save it, writing 0x65766173 ("save") to object 0x1010Sub2
- Restart the CAN Node (Sensor)

6.3. Changing Bitrate

- Write the new BitrateIndex to object 0x2010Sub2
- Then save it, writing 0x65766173 ("save") to object 0x1010Sub2
- Restart the CAN Node (Sensor)

6.4. Change heartbeat time interval

- Set the time (ms) to [0x1017] (Producer Heartbeat Time) or from 0 to deactivate
- Then save it, writing 0x65766173 ("save") to object 0x1010:2

6.5. Changing the decimal digits of channel 1

- Write the desired number to object 0x6132: 1
- Write 0x65766173 ("save") to object 0x1010:3 to save the new value

7. TPDO Modification

7.1. Disable automatic TPDO generation (z=0...3)

- Set 255 to [0x180z:2] (Transmission Type)
- Set 0 to [0x180z:5] (Event Timer)
- Save configuration, writing 0x65766173 ("save") to object 0x1010: 2

7.2. Activate automatic (time-controlled) TPDO generation (z=0...3)

- Set 255 to [0x180z:2] (Transmission Type)
- Set the new interval time (in ms) to [0x180z:5] (Event Timer)
- Then save it, writing 0x65766173 ("save") to object 0x1010:2

7.3. Enable synchronous TPDO activity (z=0...3)

- Set from 1...240 (Number of SYNC's) to [0x180z:2] (Transmission Type)
- Then save it, writing 0x65766173 ("save") to object 0x1010:2

7.4. Configure TPDO1

- Disable TPD01 (setting Bit31 = 0x80000000 in object 0x1800:1)
- Write the desired COBID to object 0x1800:1
- Write the Transmission Type to object 0x1800:2
- If transmission Type 254 or 255, write time in msec to object 0x1800:5
- Fill the TP01-Map (0x1 A00) with desired Map-Objects (up to 8 Bytes)
- Enable TPD01 (reset Bit31 = 0x80000000 in object 0x1800:1)
- Save configuration, writing 0x65766173 ("save") to object 0x1010:2