Endurance - CANopen EDS Document V1.0

This document describes the object dictionary for Sure Grip Controls joysticks. The document is an essential part of the CANopen device profile. For further information about CANopen, reference “CANopen application layer and communication profile, CiA draft standard 301, version 4.01” and “CANopen device profile for generic I/O modules, CiA draft standard 401 part 2, version .1.” In order to access an entry within an object, the service data object (SDO) is used. The initiate SDO download/upload protocol and the upload SDO segment protocol (used when data type is VISIBLE_STRING) are supported. Each object has an index and a name. For each entry within an object there is a sub-index followed by a name and a description (if applicable).

The different Data types of an entry can be as follows:

- U32 (UNSIGNED32), U16 (UNSIGNED16) or U8 (UNSIGNED8)
- S32 (INTEGER32), S16 (INTEGER16) or S8 (INTEGER8)
- STR (VISIBLE_STRING)

The Access of an entry can be as follows:

- Ro (Read Only)
- RW (Read Write)
- Wo (Write Only)
- const

The min and max value of an entry is also specified where applicable. This does not mean that there is a check within the joystick that the written value is within the value range, i.e. the user is responsible to write a value within the value range. It should also be observed that the default value of an entry may not be true for all applications. The unit/scale gives either the unit of the value and/or the scaling used where applicable.

Parameter/Variable Index

1000h Device Type

Sub-Index	Name	Description	Data Type	Access	Min	Max	Default	Unit/Scale
0	Device Type	401 I/O Module Predefined -Digital input/output -Analog input	U32	const	-	-	0x00070191	-

1001h Error Register

Sub-Index	Name	Description	Data Type	Access	Min	Max	Default	Unit/Scale
0	Error Register	Bit 0 (Generic): 1 in case of an unknown error. Bit 1 (Current): Always zero. Bit 2 (Voltage): 1 in case of a voltage to high or low. Bit 3 (Temperature): Always zero. Bit 4 (Communication Error): Always zero. Bit 5 (Device Profile Specific): Always zero. Bit 6 (Reserved): Always zero. Bit 7 (Manufacture-Specific): 1 in case of an IIC grip communication error, or a calibration error	U8	Ro	-	-	00	-

1003h Error Log: Code

Sub-Index	Name	Description	Data Type	Access	Min	Max	Default	Unit/Scale
0h	Log Size	The entry at sub-index 0 contains the number of actual errors that are recorded starting at subindex 1. Writing a zero to sub-index 0 clears the error log. Writing a value other than zero to sub-index 0 will result in an abort message.	U8	RW	0	10	-	-
1h	Error 1 Code	Every new error is stored at sub-index 1, the older ones move down the list.	U32	Ro	0	2^{32}-1	-	-
2h	Error 2 Code		U32	Ro	0	2^{32}-1	-	-
3h	Error 3 Code		U32	Ro	0	2^{32}-1	-	-
4h	Error 4 Code		U32	Ro	0	2^{32}-1	-	-
5h	Error 5 Code		U32	Ro	0	2^{32}-1	-	-
6h	Error 6 Code		U32	Ro	0	2^{32}-1	-	-
7h	Error 7 Code		U32	Ro	0	2^{32}-1	-	-
8h	Error 8 Code		U32	Ro	0	2^{32}-1	-	-
9h	Error 9 Code		U32	Ro	0	2^{32}-1	-	-
Ah	Error 10 Code		U32	Ro	0	2^{32}-1	-	-

1008h Manufacturer Device Name

Sub-Index	Name	Description	Data Type	Access	Min	Max	Default	Unit/Scale
0	Manufacturer Device Name	Returns: Device Name	Visible string	const	-	-	XU Endurance Series	-

1009h Manufacturer Hardware Version

Sub-Index	Name	Description	Data Type	Access	Min	Max	Default	Unit/Scale
0	Manufacturer Hardware Version	Return: Hardware Version	Visible string	const	-	-	CCD-00049- B	-

100Ah Manufacturer Software Version

Sub-Index	Name	Description	Data Type	Access	Min	Max	Default	Unit/Scale
0	Manufacturer Software Version	Software Version Return: FIRXXXX	Visible string	const	-	-	FIR-00037-A	-

100Bh CAN Node ID

Sub-Index	Name	Description	Data Type	Access	Min	Max	Default	Unit/Scale
0	CAN Node ID	Changes the CAN Node ID, after reset.	U8	RW	1	127	0x11- Default right 0x10-Default left	-

1014h COB-ID EMDY Message

Sub-Index	Name	Description	Data Type	Access	Min	Max	Default	Unit/Scale
0	COB-ID EMCY Message	Defines the COB-ID of the EMCY object.	U32	Ro	0	2^{32}-1	80h+Node Id	-

1017h Producer Heartbeat Time

Sub-Index	Name	Description	Data Type	Access	Min	Max	Default	Unit/Scale
0	Producer heartbeat time	Time in milliseconds on how often the joystick will transmit a heartbeat. A value of 0 will disable the heartbeat. Reboot required.	U16	RW	0	2^{16}-1	100	-

1018h Identity Object

Sub-Index	Name	Description	Data Type	Access	Min	Max	Default	Unit/Scale
0	Number of entries		U8	const	-	-	4	-
1	Vendor Id	Returns the Vendor Id for Sure Grip = 0x0000047B	U32	Ro	-	-	0x0000047B	-
2	Product Code		U32	Ro	-	-	2h	-
3	Revision Number		U32	Ro	-	-	10001h	-
4	Serial Number	Device Serial Number	U32	Ro	-	-	0x00000023	-

1200h Server SDO1 Parameters

Sub-Index	Name	Description	Data Type	Access	Min	Max	Default	Unit/Scale
0	Number of entries		U8	const	-	-	2	-
1	COB-ID used by SDO1rx		U32	Ro	0	2^{32}-1	600h+Node Id	-
2	COB-ID used by SDO1tx		U32	Ro	0	2^{32}-1	580h+Node Id	-

1400h Receive PDO1 Communication Parameters

Sub-Index	Name	Description	Data Type	Access	Min	Max	Default	Unit/Scale
0	Number of entries		U8	const	-	-	2	-
1	COB-ID used by PDO1Rx		U32	RW	0	2^{32}-1	200h+Node Id	-
2	Transmission Type	FEh: event driven (manufacturer specific)	U8	Ro	0	255	FEh	-

1800h Transmit PDO1 Communication Parameters

Sub-Index	Name	Description	Data Type	Access	Min	Max	Default	Unit/Scale
0	Number of entries		U8	const	-	-	5	-
1	COB-ID used by PDO1Tx		U32	RW	0	2^{32}-1	180h+Node Id +2^{30}	-
2	Transmission Type	FEh: event driven (manufacturer specific)	U8	Ro	0	255	FEh	-
3	Inhibit Time	Minimum interval for PDO transmission. The value is defined as multiple of 100 microseconds. The value of 0 will disable the inhibit time.	U16	RW	0	2^{16}-1	0	ms
4	Reserved	Not implemented; a read or write access results in an SDO abort with abort code 06090011h.	-	-	-	-	-	-
5	Event Timer	Maximum interval for PDO transmission. Value of 0 disables the event timer.	U16	RW	0	2^{16}-1	20	ms

1801h Transmit PDO2 Communication Parameters

Sub-Index	Name	Description	Data Type	Access	Min	Max	Default	Unit/Scale
0	Number of entries		U8	const	-	-	5	-
1	COB-ID used by PDO2Tx		U32	RW	0	2^{32}-1	280h+Node Id +2^{30}	-
2	Transmission Type	FEh: event driven (manufacturer specific)	U8	Ro	0	255	FEh	-
3	Inhibit Time	Minimum interval for PDO transmission. The value is defined as multiple of 100 microseconds. The value of 0 will disable the inhibit time.	U16	RW	0	2^{16}-1	0	ms
4	Reserved	Not implemented; a read or write access results in an SDO abort with abort code 06090011h.	-	-	-	-	-	-
5	Event Timer	Maximum interval for PDO transmission. Value of 0 disables the event timer.	U16	RW	0	2^{16}-1	20	ms

1802h Transmit PDO3 Communication Parameters

Sub-Index	Name	Description	Data Type	Access	Min	Max	Default	Unit/Scale
0	Number of entries		U8	const	-	-	5	-
1	COB-ID used by PDO3Tx		U32	RW	0	2^{32}-1	380h+Node Id +2^{30}	-
2	Transmission Type	FEh: event driven (manufacturer specific)	U8	Ro	0	255	FEh	-
3	Inhibit Time	Minimum interval for PDO transmission. The value is defined as multiple of 100 microseconds. The value of 0 will disable the inhibit time.	U16	RW	0	2^{16}-1	0	ms
4	Reserved	Not implemented; a read or write access results in an SDO abort with abort code 06090011h.	-	-	-	-	-	-
5	Event Timer	Maximum interval for PDO transmission. Value of 0 disables the event timer.	U16	RW	0	2^{16}-1	20	ms

1803h Transmit PDO1 Communication Parameters

Sub-Index	Name	Description	Data Type	Access	Min	Max	Default	Unit/Scale
0	Number of entries		U8	const	-	-	5	-
1	COB-ID used by PDO4Tx		U32	RW	0	2^{32}-1	480h+Node Id +2^{30}	-
2	Transmission Type	FEh: event driven (manufacturer specific)	U8	Ro	0	255	FEh	-
3	Inhibit Time	Minimum interval for PDO transmission. The value is defined as multiple of 100 microseconds. The value of 0 will disable the inhibit time.	U16	RW	0	2^{16}-1	0	ms
4	Reserved	Not implemented; a read or write access results in an SDO abort with abort code 06090011h.	-	-	-	-	-	-
5	Event Timer	Maximum interval for PDO transmission. Value of 0 disables the event timer.	U16	RW	0	2^{16}-1	20	ms

1600h Receive PDO1 Map Parameters

Sub-Index	Name	Description	Data Type	Access	Min	Max	Default	Unit/Scale
0	Number of mapped application objects in RPDO		U8	RW	-	-	2	-
1	Mapping for output in RGB LEDs	Used for Control RGB LEDs SGID and Intensity of RGB.	U32	RW	0	2^{32}-1	0x63200120	-
2	Mapping for output number of LEDs	Used for LED position.	U32	RW	0	2^{32}-1	0x62000108	-

1A00h Transmit PDO1 Map Parameters

Sub-Index	Name	Description	Data Type	Access	Min	Max	Default	Unit/Scale
0	Number of mapped application objects in TPDO		U8	RW	0	3	3	-
1	Mapping for Buttons 1-8 Status		U32	RW	0	2^{32}-1	60000108h	-
2	Mapping for Buttons 9-16 Status		U32	RW	0	2^{32}-1	60000208h	-
3	Mapping of Button 17-24		U32	RW	0	2^{32}-1	60000308h	-

1A01h Transmit PDO2 Map Parameters

Sub-Index	Name	Description	Data Type	Access	Min	Max	Default	Unit/Scale
0	Number of Mapped Applications Objects in PDO2Tx		U8	RW	0	2	2	-
1	Mapping for X-Axis Proportional		U32	RW	0	2^{32}-1	64010110h	-
2	Mapping for Y-Axis Proportional		U32	RW	0	2^{32}-1	64010210h	-

1A02h Transmit PDO3 Map Parameters

Sub-Index	Name	Description	Data Type	Access	Min	Max	Default	Unit/Scale
0	Number of Mapped Applications Objects in PDO3Tx		U8	RW	0	3	3	-
1	Mapping for XIO1 Proportional		U32	RW	0	2^{32}-1	64010310h	-
2	Mapping for XIO2 Proportional		U32	RW	0	2^{32}-1	64010410h	-
3	Mapping for XIO3 Proportional		U32	RW	0	2^{32}-1	64010510h	-

1A03h Transmit PDO4 Map Parameters

Sub-Index	Name	Description	Data Type	Access	Min	Max	Default	Unit/Scale
0	Number of Mapped Applications Objects in PDO4Tx		U8	RW	0	2	2	-
1	Mapping for XIO4 Proportional		U32	RW	0	2^{32}-1	64010610h	-
2	Mapping for XIO5(trigger) Proportional		U32	RW	0	2^{32}-1	64010710h	-
3	Mapping for XIO6 Proportional		U32	RW	0	2^{32}-1	64010810h	-

3000h CAN Baud Rate

Sub-Index	Name	Description	Data Type	Access	Min	Max	Default	Unit/Scale
0	CAN Baud Rate	Changes the baud rate of the CAN, requires power cycle.	U32	RW	250000	1000000	250000	-

1F80h NMT Startup

Sub-Index	Name	Description	Data Type	Access	Min	Max	Default	Unit/Scale
0	NMT Startup	This entry allows you to enable NMT Auto Start feature according to spec CiA 302-6.2. Enabling this results in the device entering NMT Operational mode upon power up.	U32	Ro	-	-	8h	-

6000h Read Input 8-Bit

Sub-Index	Name	Description	Data Type	Access	Min	Max	Default	Unit/Scale
0	Number of Inputs 8-Bit		U8	Ro	-	-	3	-
1	Buttons 1 – 8 Status	1: button is active 0: button is inactive	U8	Ro	-	-	0	-
2	Buttons 9 – 16 Status	1: button is active 0: button is inactive	U8	Ro	-	-	0	-
3	Buttons 17 – 24 Status	1: button is active 0: button is inactive	U8	Ro	-	-	0	-

6200h Write output 8-Bit

Sub-Index	Name	Description	Data Type	Access	Min	Max	Default	Unit/Scale
0	Number of Inputs 8-Bit		U8	Ro	0	-	1	-
1	Digital Outputs	Outputs used for Number of LEDs.	U8	Wo	0	16	0	-

6320h Write output 32-Bit

Sub-Index	Name	Description	Data Type	Access	Min	Max	Default	Unit/Scale
0	Number of Inputs 32-Bit		U8	Ro	0	1	1	-
1	Digital Output	LED controls i.e. intensity of LED and SGID.	U32	Wo	0	2^{32}-1	0	-

6401h Read Analog Input 16-Bit

Sub-Index	Name	Description	Data Type	Access	Min	Max	Default	Unit/Scale
0	Number of Analog Inputs		U8	Ro	0	8	8	-
1	X-Axis Proportional		S16	Ro	-1000	1000	0	-
2	Y-Axis Proportional		S16	Ro	-1000	1000	0	-
3	XIO1 Proportional		S16	Ro	-1000	1000	0	-
4	XIO 2 Proportional		S16	Ro	-1000	1000	0	-
5	XIO 3 Proportional		S16	Ro	-1000	1000	0	-
6	XIO 4 Proportional		S16	Ro	-1000	1000	0	-
7	XIO 5(trigger) Proportional		S16	Ro	-1000	1000	0	-
8	XIO 6 Proportional		S16	Ro	-1000	1000	0	-

Table 1: Error Handling

Byte	0	1	2	3	4	5	6	7
Content	Emergency Error Code Table 2	Error Register Table 4	Manufacturer Specific Table 3					

Table 2: Emergency Error Codes

Inputs	CANopen Failure Codes					
	Voltage to High		Voltage to Low		Not Calibrated	
	Error Code	Manufacture Specific	Error Code	Manufacture Specific	Error Code	Manufacture Specific
X	0x3110	0x80	0x3120	0x80	0xFF10	0x80
Y	0x3110	0x81	0x3120	0x81	0xFF10	0x81
Handle Prop. 1	0x3110	0x82	0x3120	0x82		
Handle Prop. 2	0x3110	0x83	0x3120	0x83		
Handle Prop. 3	0x3110	0x84	0x3120	0x84		
Handle Prop. 4	0x3110	0x85	0x3120	0x85		
Handle Prop. 5	0x3110	0x86	0x3120	0x86		
Handle Prop. 6	0x3110	0x87	0x3120	0x87		

Table 3: Manufacturer Specific Error Codes

Manufacturer Specific Definition				
Byte 0 Occurrence Counter	**Byte 1 Sensor Identifier**		**Byte 2 Not Used**	**Byte 3 Not Used**
0-127	Digital Inputs	0x00 – 0x3F	0	0
0-127	Digital Outputs	0x40 – 0x7F	0	0
0-127	Analog Inputs	0x80 – 0xBF	0	0