

EUROMAP 27-4

Pipe and Profile Extrusion Lines
Generic CANopen Interface
Part 4: Saw

Version 3.0, April 2007
(23 pages)

This recommendation was prepared by the Technical Commission of EUROMAP in cooperation with CiA.

An identical text ist published under CiA 420-4 DS V3.0: "CANopen Profiles for Extruder Downstream Devices, Part 4: Saw";

see also <http://www.can-cia.org/downloads/ciaspecifications/?2038>

HISTORY

Date	Changes
2002-10-22	<i>Publication of version 1.0</i>
2004-02-27	<i>Publication of version 2.0</i>
2007-04-12	<i>Publication of version 3.0</i>
	Editorial corrections and clarifications
	Start request for saw program included

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1 Scope

The CANopen application profile for extruder downstream devices includes several parts:

- Part 1 specifies general definitions
- Part 2 specifies the device profile for the puller downstream device
- Part 3 specifies the device profile for the corrugator downstream device
- Part 4 specifies the device profile for the saw downstream device
- Part 5 specifies the device profile for the co-extruder device
- Part 6 specifies the device profile for the calibration-table downstream device

This part specifies the CANopen interface for the saw downstream device.

2 References

EUROMAP 27 Part 1: General definitions

The references given in EUROMAP 27-1 apply to this specification as well.

3 Abbreviations and definitions

3.1 Abbreviations

The abbreviations given in EUROMAP 27-1 apply to this specification as well.

3.2 Definitions

The definitions given in EUROMAP 27-1 apply to this specification as well.

4 Operating principles

4.1 General

The saw downstream device interface shall support all mandatory functions of /CiA301/ and EUROMAP 27-1 as well as all mandatory functions defined in this specification.

5 PDO specification

5.1 Overview

Table 1 shows the process data mapped into TPDOs and RPDOs.

Table 1 – TPDO and RPDO mapping

PDO number	Index/sub-index	Name/description
TPDO 1	6030 00 _h	Status word
	6000 00 _h	Counter value
	(See Note)	Device-specific process data

PDO number	Index/sub-index	Name/description
TPDO 2	6001 00 _h	Actual saw counter
	6007 00 _h	Product speed
RPDO 1	6020 00 _h	Control word
	6005 00 _h	Saw sync speed set value
	6002 00 _h	Product length value
Note: The TPDO 1 is able to map one and only one device-specific process data		

5.2 First TPDO

This TPDO shall be transmitted to the master-extruder. It contains by default the *status word* and the *counter value*.

Table 2 specifies the object description of the PDO communication parameter and Table 3 specifies the associated entry description. The values are defined in /CiA301/. The sub-index 04_h is reserved for compatibility reasons and shall not be implemented.

Table 2 — Object description

Attribute	Value
Index	1800 _h
Name	TPDO 1 communication parameter
Object code	Record
Data type	PDO communication parameter record
Category	Mandatory

Table 3 — Entry description

Attribute	Value
Sub-index	00 _h
Description	Highest sub-index supported
Entry category	Mandatory
Access	const
PDO mapping	No
Value range	02 _h to 05 _h
Default value	Device-specific
Sub-index	01 _h
Description	COB-ID
Entry category	Mandatory
Access	const
PDO mapping	No
Value range	4000 0180 _h + node-ID or C000 0180 _h + node-ID
Default value	4000 0180 _h + node-ID

Attribute	Value
Sub-index	02 _h
Description	Transmission type
Entry category	Mandatory
Access	rw
PDO mapping	Optional
Value range	See /CiA301/
Default value	01 _h
Sub-index	03 _h
Description	Inhibit time
Entry category	Optional
Access	rw
PDO mapping	No
Value range	See /CiA301/
Default value	0000 _h
Sub-index	05 _h
Description	Event timer
Entry category	Optional
Access	rw
PDO mapping	No
Value range	See /CiA301/
Default value	0000 _h

Table 4 specifies the object description of the PDO mapping parameter and Table 5 specifies the associated entry description. The values are defined in /CiA301/. The unused bytes in the data field shall only be used for a manufacturer-specific second status word.

Table 4 — Object description

Attribute	Value
Index	1A00 _h
Name	TPDO 1 mapping parameter
Object code	Record
Data type	PDO mapping parameter record
Category	Mandatory

Table 5 — Entry description

Attribute	Value
Sub-index	00 _h
Description	Highest sub-index supported
Entry category	Mandatory
Access	rw (constant in NMT operational state)
PDO mapping	No
Value range	00 _h , 02 _h to 03 _h
Default value	02 _h
Sub-index	01 _h
Description	1 st application object
Entry category	Mandatory
Access	const
PDO mapping	No
Value range	6030 00 10 _h
Default value	6030 00 10 _h
Sub-index	02 _h
Description	2 nd application object
Entry category	Mandatory
Access	const
PDO mapping	No
Value range	6000 00 20 _h
Default value	6000 00 20 _h
Sub-index	03 _h
Description	3 rd application object
Entry category	Mandatory
Access	const
PDO mapping	No
Value range	See /CiA301/
Default value	Device-specific

5.3 Second TPDO

This TPDO shall be transmitted to the master-extruder. It contains by default the *actual saw counter*, and the *product speed*.

Table 6 specifies the object description of the PDO communication parameter and Table 7 specifies the associated entry description. The values are defined in /CiA301/. The sub-index 04_h is reserved for compatibility reasons and shall not be implemented.

Table 6 — Object description

Attribute	Value
Index	1801 _h
Name	TPDO 2 communication parameter
Object code	Record
Data type	PDO communication parameter record
Category	Mandatory

Table 7 — Entry description

Attribute	Value
Sub-index	00 _h
Description	Highest sub-index supported
Entry category	Mandatory
Access	const
PDO mapping	No
Value range	02 _h to 05 _h
Default value	Device-specific
Sub-index	01 _h
Description	COB-ID
Entry category	Mandatory
Access	const
PDO mapping	No
Value range	4000 0280 _h + node-ID
Default value	4000 0280 _h + node-ID
Sub-index	02 _h
Description	Transmission type
Entry category	Mandatory
Access	rw
PDO mapping	Optional
Value range	See /CiA301/
Default value	01 _h
Sub-index	03 _h
Description	Inhibit time
Entry category	Optional
Access	rw
PDO mapping	No
Value range	See /CiA301/
Default value	0000 _h

Attribute	Value
Sub-index	05 _h
Description	Event timer
Entry category	Optional
Access	rw
PDO mapping	No
Value range	See /CiA301/
Default value	0000 _h

Table 8 specifies the object description of the PDO mapping parameter and Table 9 specifies the associated entry description. The values are defined in /CiA301/.

Table 8 — Object description

Attribute	Value
Index	1A01 _h
Name	TPDO 2 mapping parameter
Object code	Record
Data type	PDO mapping parameter record
Category	Mandatory

Table 9 — Entry description

Attribute	Value
Sub-index	00 _h
Description	Highest sub-index supported
Entry category	Mandatory
Access	const
PDO mapping	No
Value range	02 _h
Default value	02 _h
Sub-index	01 _h
Description	1 st application object
Entry category	Mandatory
Access	const
PDO mapping	No
Value range	6001 00 20 _h
Default value	6001 00 20 _h

Attribute	Value
Sub-index	02 _h
Description	2 nd application object
Entry category	Mandatory
Access	Const
PDO mapping	No
Value range	6007 00 20 _h
Default value	6007 00 20 _h

5.4 First RPDO

This RPDO shall be received from the master-extruder. It contains by default the *control word*, the *saw sync speed set value* and the *product length set value*.

Table 10 specifies the object description of the PDO communication parameter and Table 11 specifies the associated entry description. The values are defined in /CiA301/. The sub-index 04_h is reserved for compatibility reasons and shall not be implemented.

Table 10 — Object description

Attribute	Value
Index	1400 _h
Name	RPDO 1 communication parameter
Object code	Record
Data type	PDO communication parameter record
Category	Mandatory

Table 11 — Entry description

Attribute	Value
Sub-index	00 _h
Description	Highest sub-index supported
Entry category	Mandatory
Access	const
PDO mapping	No
Value range	02 _h to 05 _h
Default value	Device-specific
Sub-index	01 _h
Description	COB-ID
Entry category	Mandatory
Access	const
PDO mapping	No
Value range	4000 0200 _h + node-ID
Default value	4000 0200 _h + node-ID

Attribute	Value
Sub-index	02 _h
Description	Transmission type
Entry category	Mandatory
Access	rw
PDO mapping	Optional
Value range	See /CiA301/
Default value	01 _h
Sub-index	03 _h
Description	Inhibit time
Entry category	Optional
Access	rw
PDO mapping	No
Value range	See /CiA301/
Default value	0000 _h
Sub-index	05 _h
Description	Event timer
Entry category	Optional
Access	rw
PDO mapping	No
Value range	See /CiA301/
Default value	0000 _h

Table 12 specifies the object description of the PDO mapping parameter and Table 13 specifies the associated entry description. The values are defined in /CiA301/. The unused bytes in the data field shall only be used for a manufacturer-specific second control word.

Table 12 — Object description

Attribute	Value
Index	1600 _h
Name	RPDO 1 mapping parameter
Object code	Record
Data type	PDO mapping parameter record
Category	Mandatory

Table 13 — Entry description

Attribute	Value
Sub-index	00 _h
Description	Highest sub-index supported
Entry category	Mandatory
Access	const
PDO mapping	No
Value range	03 _h
Default value	03 _h
Sub-index	01 _h
Description	1 st application object
Entry category	Mandatory
Access	const
PDO mapping	No
Value range	6020 00 10 _h
Default value	6020 00 10 _h
Sub-index	02 _h
Description	2 nd application object
Entry category	Mandatory
Access	const
PDO mapping	No
Value range	6005 00 10 _h
Default value	6005 00 10 _h
Sub-index	03 _h
Description	3 rd application object
Entry category	Mandatory
Access	const
PDO mapping	No
Value range	6002 00 20 _h
Default value	6002 00 20 _h

6 Application object specification

6.1 Object 6000_h: Counter value

This object shall provide the actual counts from measuring wheel or motor encoder. The dimensionless value shall be counted from 0000 0000_h up to its overrun at FFFF FFFF_h.

Table 14 specifies the object description and Table 15 specifies the entry description.

Table 14 — Object description

Attribute	Value
INDEX	6000 _h
Name	Counter value
Object code	Var
Data type	Unsigned32
Category	Mandatory

Table 15 — Entry description

Attribute	Value
Sub-index	00 _h
Access	ro
PDO mapping	Default
Value range	Unsigned32
Default value	No

6.2 Object 6001_h: Actual saw counter

This object shall provide the actual counter value. The value shall be given in 0,1 m. Negative values shall indicate wrong directions.

Table 16 specifies the object description and Table 17 specifies the entry description.

Table 16 — Object description

Attribute	Value
INDEX	6001 _h
Name	Actual saw counter
Object code	Var
Data type	Integer32
Category	Mandatory

Table 17 — Entry description

Attribute	Value
Sub-index	00 _h
Access	ro
PDO mapping	Default
Value range	Integer32
Default value	No

6.3 Object 6002_h: Product length set value

This object shall store the product length to cut requested by the master-extruder. The value shall be given in 0,1 mm.

Table 18 specifies the object description and Table 19 specifies the entry description.

Table 18 — Object description

Attribute	Value
INDEX	6002 _h
Name	Product length set value
Object code	Var
Data type	Unsigned32
Category	Mandatory

Table 19 — Entry description

Attribute	Value
Sub-index	00 _h
Access	rw
PDO mapping	Default
Value range	Unsigned32
Default value	0000 0000 _h

6.4 Object 6003_h: Scaling factor

This object shall indicate the default factor between counted pulses and length. The value shall be given in pulse/m.

Note: Pulse/mm per bit does not allow the necessary scaling resolution that is required for calibration.

Table 20 specifies the object description and Table 21 specifies the entry description.

Table 20 — Object description

Attribute	Value
INDEX	6003 _h
Name	Scaling factor
Object code	Var
Data type	Unsigned32
Category	Mandatory

Table 21 — Entry description

Attribute	Value
Sub-index	00 _h
Access	rw
PDO mapping	Optional
Value range	Unsigned32
Default value	Device-specific

6.5 Object 6004_h: Saw minimum product length

This object shall provide the minimum product length due to the limitations of the saw device. The value shall be given in 0,1 mm.

Table 22 specifies the object description and Table 23 specifies the entry description.

Table 22 — Object description

Attribute	Value
INDEX	6004 _h
Name	Saw minimum product length
Object code	Var
Data type	Unsigned32
Category	Mandatory

Table 23 — Entry description

Attribute	Value
Sub-index	00 _h
Access	ro
PDO mapping	Optional
Value range	Unsigned32
Default value	No

6.6 Object 6005_h: Saw sync speed set value

This object shall store the set value of puller (line) speed cyclically transmitted from the master-extruder. This value may be used to synchronize saw motion and puller. The value shall be given in 0,01%.

Table 24 specifies the object description and Table 25 specifies the entry description.

Table 24 — Object description

Attribute	Value
INDEX	6005 _h
Name	Saw sync speed set value
Object code	Var
Data type	Unsigned16
Category	Mandatory

Table 25 — Entry description

Attribute	Value
Sub-index	00 _h
Access	rw
PDO mapping	Optional
Value range	0 _d to 10000 _d
Default value	0 _d

6.7 Object 6006_h: Saw sync speed set maximum

This object shall indicate the maximum set value of the line (e.g. puller and saw) speed. The value shall be given in 1 mm/min.

Table 26 specifies the object description and Table 27 specifies the entry description.

Table 26 — Object description

Attribute	Value
INDEX	6006 _h
Name	Saw sync speed set maximum
Object code	Var
Data type	Unsigned32
Category	Mandatory

Table 27 — Entry description

Attribute	Value
Sub-index	00 _h
Access	rw
PDO mapping	Optional
Value range	Unsigned32
Default value	0 _d

6.8 Object 6007_h: Product speed

This object shall provide the actual value calculated from measuring wheel or motor encoder pulses and time. The accuracy of this value shall be better than 0,3%. The value shall be given in mm/min. Negative values shall reversed directions.

Table 28 specifies the object description and Table 29 specifies the entry description.

Table 28 — Object description

Attribute	Value
INDEX	6007 _h
Name	Product speed
Object code	Var
Data type	Integer32
Category	Mandatory

Table 29 — Entry description

Attribute	Value
Sub-index	00 _h
Access	ro
PDO mapping	Default
Value range	Integer32
Default value	No

6.9 Object 6008_h: Saw speed real maximum

This object shall provide maximum speed value of the saw based on the real maximum saw speed at 100% set value. The value shall be given in mm/min.

Table 30 specifies the object description and Table 31 specifies the entry description.

Table 30 — Object description

Attribute	Value
INDEX	6008 _h
Name	Saw speed real maximum
Object code	Var
Data type	Unsigned32
Category	Mandatory

Table 31 — Entry description

Attribute	Value
Sub-index	00 _h
Access	ro
PDO mapping	Optional
Value range	Unsigned32
Default value	No

6.10 Object 6009_h: Height adjustments

This object shall indicate an array for height adjustment values configured by the master-extruder (e.g. the distance from the centerline to the bottom of the product). The values shall be given in 0,1 mm. Positive values shall be given if the distance is above the centerline and negative values shall be given if the distance is below the centerline.

Table 32 specifies the object description and Table 33 specifies the entry description.

Table 32 — Object description

Attribute	Value
INDEX	6009 _h
Name	Height adjustments
Object code	Array
Data type	Integer16
Category	Optional

Table 33 — Entry description

Attribute	Value
Sub-index	00 _h
Description	Highest sub-index supported
Entry category	Mandatory
Access	const
PDO mapping	No
Value range	01 _h to 0A _h
Default value	Device-specific

Attribute	Value
Sub-index	01 _h
Description	Height adjustment 1
Entry category	Mandatory
Access	rw
PDO mapping	Optional
Value range	Integer16
Default value	0000 _h
to	
Sub-index	02 _h
Description	Height adjustment 2
Entry category	Optional
Access	rw
PDO mapping	Optional
Value range	Integer16
Default value	0000 _h
to	
Sub-index	0A _h
Description	Height adjustment 10
Entry category	Optional
Access	rw
PDO mapping	Optional
Value range	Integer16
Default value	0000 _h

6.11 Object 600A_h: Saw cut depth

This object shall store the set value received from the master-extruder. The value shall be given in mm measured from the ground position.

Table 34 specifies the object description and Table 35 specifies the entry description.

Table 34 — Object description

Attribute	Value
INDEX	600A _h
Name	Saw cut depth
Object code	Var
Data type	Unsigned16
Category	Optional

Table 35 — Entry description

Attribute	Value
Sub-index	00 _h
Access	rw
PDO mapping	Optional
Value range	Unsigned16
Default value	0000 _h

6.12 Object 600B_h: Early warning length

This object shall indicate the configured length set value for the *early warning* signal if the *early warning* function is implemented at the *configuration word* (see clause 6.13). If the *actual saw counter* object (see clause 6.2) increases and get higher than the *early warning length*, the saw shall generate a signal on pin 22 as defined in /EUROMAP29/. The value shall be given in 0,1 mm. The value of 0_d shall indicate that no warning is generated.

Table 36 specifies the object description and Table 37 specifies the entry description.

Table 36 — Object description

Attribute	Value
INDEX	600B _h
Name	Early warning length
Object code	Var
Data type	Unsigned32
Category	Optional

Table 37 — Entry description

Attribute	Value
Sub-index	00 _h
Access	rw
PDO mapping	Optional
Value range	Unsigned32
Default value	0 _d

6.13 Object 6010_h: Configuration word

This object shall provide the configured functionality.

Figure 1 specifies the object structure and Table 38 defines the values.

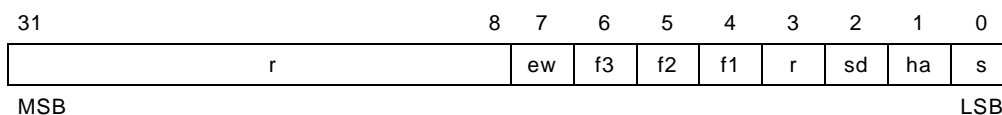


Figure 1 — Object structure

Table 38 — Value definition

Signal	Value	Definition
s (speed measuring)	0 _b 1 _b	Speed measuring not available Speed measuring available
ha (height adjustment)	0 _b 1 _b	Height adjustment not available Height adjustment available
sd (saw cut depth)	0 _b 1 _b	Saw cut depth not available Saw cut depth available
f1, f2, f3 (auxiliary function)	0 _b 1 _b	Auxiliary function not available Auxiliary function available
ew (early warning)	0 _b 1 _b	Early warning signal not available Early warning signal available
r (reserved)	0 _d	Reserved

Table 39 specifies the object description and Table 40 specifies the entry description.

Table 39 — Object description

Attribute	Value
INDEX	6010 _h
Name	Configuration word
Object code	Var
Data type	Unsigned32
Category	Mandatory

Table 40 — Entry description

Attribute	Value
Sub-index	00 _h
Access	ro
PDO mapping	No
Value range	See Table 38
Default value	No

6.14 Object 6020_h: Control word

This object shall indicate the commands transmitted by the master-extruder. The master-extruder shall set the bits to 1_b if the corresponding button is pressed but not shorter than 100 ms.

Figure 2 specifies the object structure and Table 41 defines the values.

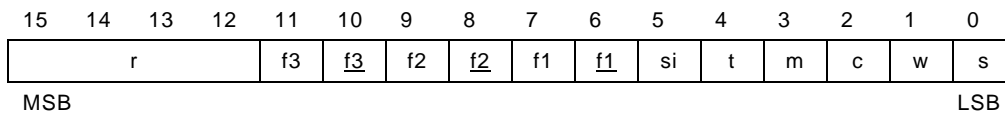


Figure 2 — Object structure

Table 41 — Value definition

Signal	Value	Definition
s (saw program on/off)	0 _b 1 _b	0 _b Saw program is off and actual saw counter is reset and off (default value) 1 _b Saw program and actual saw counter are on
w (wall-thickening active)	0 _b 1 _b	0 _b After a manual cut wall-thickening is off – the current product length will be repeated (default value) 1 _b After a manual cut wall-thickening is on – the current product length shall be destroyed and shall be not repeated
c (change of actual length setting)	0 _b ⇒1 _b or 1 _b ⇒0 _b	The new product length shall be loaded prior to the cut of the current product and shall be taken automatically by the comparator after the next cut. Each value change shall force the saw to takeover the new length setting (default value)

Signal	Value	Definition
		shall be 0 _b)
m (manual cut by master-extruder)	0 _b 1 _b	No cut command (default value) Cut immediately
t (tip pulse)	0 _b 1 _b	No tip command (default value) Tip out product (See Note)
si (stop immediately)	0 _b 1 _b	No action (default value) Stop saw immediately and move to the initial saw position
f1, f2, f3 (function stop)	0 _b 1 _b	No command (default value) Stop function (start prevention)
f1, f2, f3 (function start)	0 _b 1 _b	No command (default value) Start function
r (reserved)	0 _d	Reserved
Note: Pulse length is selectable and is generated by the master-extruder		

Table 42 specifies the object description and Table 43 specifies the entry description.

Table 42 — Object description

Attribute	Value
INDEX	6020 _h
Name	Control word
Object code	Var
Data type	Unsigned16
Category	Mandatory

Table 43 — Entry description

Attribute	Value
Sub-index	00 _h
Access	rw
PDO mapping	Default
Value range	See Table 41
Default value	See Table 41

6.15 Object 6030_h: Status word

This object shall provide the status transmitted to the master-extruder. The saw downstream device shall set the bits to 1_b if the corresponding button is pressed but not shorter than 100 ms.

Figure 3 specifies the object structure and Table 44 defines the values.

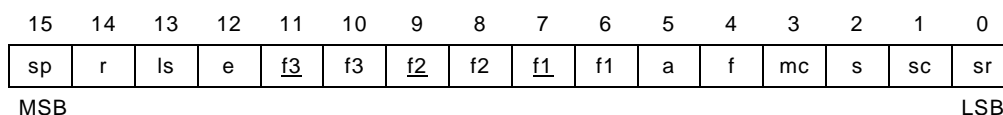


Figure 3 — Object structure

Table 44 — Value definition

Signal	Value	Definition
sr (saw ready)	0 _b 1 _b	Saw is not ready to cut Saw is ready to cut or cut is in progress
sc (saw is cutting)	0 _b 1 _b	Saw is not cutting Saw is cutting
s (sample)	0 _b 1 _b	No request Request to insert sample
mc (manual cut by saw)	0 _b 1 _b	No immediate cut Immediate cut
f (fault downstream device)	0 _b 1 _b	No fault Fault (saw switched off and start is prevented)
a (alarm downstream device)	0 _b 1 _b	No alarm Alarm (saw not switched off, next cut still permitted)
f1, f2, f3 (function run)	0 _b 1 _b	Function is not running Function is running
f1, f2, f3 (function ready to start)	0 _b 1 _b	Function is blocked Function is ready to start
e (enable saw program)	0 _b 1 _b	Saw program is stopped and restart prevented Saw program is enabled
ls (cut from limit switch)	0 _b 1 _b	Limit switch is not pressed Limit switch is pressed
sp (start saw program)	0 _b 1 _b	No saw program start requested Start saw program is requested
r (reserved)	0 _d	Reserved

Table 45 specifies the object description and Table 46 specifies the entry description.

Table 45 — Object description

Attribute	Value
INDEX	6030 _h
Name	Status word
Object code	Var
Data type	Unsigned16
Category	Mandatory

Table 46 — Entry description

Attribute	Value
Sub-index	00 _h
Access	ro
PDO mapping	Default
Value range	See Table 44
Default value	No

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