CiA® 420

CANopen®

Profiles for extruder downstream devices

Part 6: Calibration-table

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HISTORY

Date	Changes
2007-01-31	*Publication of version 1.0* as draft standard
2014-09-01	*Publication of version 1.1.0* as draft standard proposal
2015-05-07	*Publication of version 1.1.0* as public specification
	NOTE: This document has been converted into "docx format". The conversion caused minor layout differences to the predecessor document in "doc format". The technical content word-by-word is the very same.

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CONTENTS

1 Scope

The CANopen application profile for extruder downstream devices include 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

NOTE   All parts of this specification have been developed jointly with the European Committee of Machinery Manufacturers for the Plastics and Rubber Industries (Euromap) and is documented there as Euromap 27.

This part specifies the CANopen interface for calibration-tables.

2 References

/CiA420-1/   CiA 420, CANopen profile for extruder downstream devices - Part 1: General definitions

The references given in /CiA420-1/ apply to this specification as well.

3 Abbreviations and definitions

3.1 Abbreviations

The abbreviations given in /CiA420-1/ apply to this specification as well.

3.2 Definitions

The definitions given in /CiA420-1/ apply to this specification as well.

4 Operating principle

4.1 General

The calibration-table downstream device interface shall support all mandatory functions of /CiA301/ and /CiA420-1/ as well as all mandatory functions defined in this specification.

5 PDO specification

5.1 Overview

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

Table 1 – TPDO and RPDO mapping

PDO number	Index/sub-index	Name/description
TPDO 1	6030 01$_h$ 6030 02$_h$ 6030 03$_h$ 6030 04$_h$	Status word 1 Status word 2 Status word 3 Status word 4
TPDO 2	6007 01$_h$ 6007 02$_h$ 600F 00$_h$ 600A 00$_h$	Actual flow rate 1 Actual flow rate 2 Actual water pressure Actual force
TPDO 3	600D 01$_h$ 600D 02$_h$	Actual vacuum 1 Actual vacuum 2
RPDO 1	6020 01$_h$ 6020 02$_h$ 6020 03$_h$ 6020 04$_h$	Control word 1 Control word 2 Control word 3 Control word 4

5.2 First TPDO

This TPDO shall be transmitted to the extruder controller.

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/.

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 06$_h$
Default value	Manufacturer-specific

Attribute	Value
Sub-index	01_h
Description	COB-ID
Entry category	Mandatory
Access	const
PDO mapping	No
Value range	See /CiA301/
Default value	4000 0180_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
Sub-index	05_h
Description	Event timer
Entry category	Optional
Access	rw
PDO mapping	No
Value range	See /CiA301/
Default value	0000_h
Sub-index	06_h
Description	Sync start value
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/.

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	const
PDO mapping	No
Value range	04$_h$
Default value	04$_h$
Sub-index	01$_h$
Description	1st application object
Entry category	Mandatory
Access	const
PDO mapping	No
Value range	See /CiA301/
Default value	6030 01 10$_h$
Sub-index	02$_h$
Description	2nd application object
Entry category	Mandatory
Access	const
PDO mapping	No
Value range	See /CiA301/
Default value	6030 02 10$_h$
Sub-index	03$_h$
Description	3rd application object
Entry category	Mandatory
Access	const
PDO mapping	No
Value range	See /CiA301/
Default value	6030 03 10$_h$

Attribute	Value
Sub-index	04$_h$
Description	4th application object
Entry category	Mandatory
Access	const
PDO mapping	No
Value range	See /CiA301/
Default value	6030 04 10$_h$

5.3 Second TPDO

This TPDO shall be transmitted to the extruder controller.

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/.

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 06$_h$
Default value	Manufacturer-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

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$_h$
Sub-index	06$_h$
Description	Sync start value
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	04_h
Default value	04_h
Sub-index	01_h
Description	1st application object
Entry category	Mandatory
Access	const
PDO mapping	No
Value range	See /CiA301/
Default value	$6007\ 01\ 10_h$
Sub-index	02_h
Description	2nd application object
Entry category	Mandatory
Access	const
PDO mapping	No
Value range	See /CiA301/
Default value	$6007\ 02\ 10_h$
Sub-index	03_h
Description	3rd application object
Entry category	Mandatory
Access	const
PDO mapping	No
Value range	See /CiA301/
Default value	$600F\ 01\ 10_h$
Sub-index	04_h
Description	4th application object
Entry category	Mandatory
Access	const
PDO mapping	No
Value range	See /CiA301/
Default value	$600A\ 00\ 10_h$

5.4 Third TPDO

This TPDO shall be transmitted to the extruder controller only if one of the measured values is available (see object 6010_h). In that case all mapped objects are mandatory.

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/.

Table 10 — Object description

Attribute	Value
Index	1802$_h$
Name	TPDO 3 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	Manufacturer-specific
Sub-index	01$_h$
Description	COB-ID
Entry category	Mandatory
Access	const
PDO mapping	No
Value range	4000 0380$_h$ + node-ID
Default value	4000 0380$_h$ + 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 12 specifies the object description of the PDO mapping parameter and Table 13 specifies the associated entry description. The values are defined in /CiA301/.

Table 12 — Object description

Attribute	Value
Index	$1A02_h$
Name	TPDO 3 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	02_h
Default value	02_h
Sub-index	01_h
Description	1st application object
Entry category	Mandatory
Access	const
PDO mapping	No
Value range	See /CiA301/
Default value	600D 01 10_h
Sub-index	02_h
Description	2nd application object
Entry category	Mandatory
Access	const
PDO mapping	No
Value range	See /CiA301/
Default value	600D 02 10_h

5.5 First RPDO

This RPDO shall be received from the extruder controller.

Table 14 specifies the object description of the PDO communication parameter and Table 15 specifies the associated entry description. The values are defined in /CiA301/.

Table 14 — Object description

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

Table 15 — 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	COB-ID
Entry category	Mandatory
Access	const
PDO mapping	No
Value range	$4000\ 0200_h$ + node-ID
Default value	$4000\ 0200_h$ + node-ID
Sub-index	02_h
Description	Transmission type
Entry category	Optional
Access	rw
PDO mapping	Optional
Value range	See /CiA301/
Default value	01_h

Table 16 specifies the object description of the PDO mapping parameter and Table 17 specifies the associated entry description. The values are defined in /CiA301/.

Table 16 — Object description

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

Table 17 — Entry description

Attribute	Value
Sub-index	00$_h$
Description	Highest sub-index supported
Entry category	Mandatory
Access	const
PDO mapping	No
Value range	No
Default value	04$_h$
Sub-index	01$_h$
Description	1st application object
Entry category	Mandatory
Access	const
PDO mapping	No
Value range	See /CiA301/
Default value	6020 01 10$_h$
Sub-index	02$_h$
Description	2nd application object
Entry category	Mandatory
Access	const
PDO mapping	No
Value range	See /CiA301/
Default value	6020 02 10$_h$
Sub-index	03$_h$
Description	3rd application object
Entry category	Mandatory
Access	const
PDO mapping	No
Value range	See /CiA301/
Default value	6020 03 10$_h$

Attribute	Value
Sub-index	04$_h$
Description	4th application object
Entry category	Optional
Access	const
PDO mapping	No
Value range	See /CiA301/
Default value	6020 04 10$_h$

6 Application object specification

6.1 Object 6007$_h$: Actual flow rates

This object shall provide an array with actual flow rates. The value shall be given in 0,1 l/min.

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

Table 18 – Object description

Attribute	Value
Index	6007$_h$
Name	Actual flow rates
Object code	ARRAY
Data type	UNSIGNED16
Category	Mandatory

Table 19 – Entry description

Attribute	Value
Sub-index	00$_h$
Description	Highest sub-index supported
Entry category	Mandatory
Access	ro
PDO mapping	No
Value range	02$_h$ to 0A$_h$
Default value	No
Sub-index	01$_h$
Description	Actual flow rate 1
Entry category	Mandatory
Access	ro
PDO mapping	Default
Value range	UNSIGNED16
Default value	No

Attribute	Value
Sub-index	02$_h$
Description	Actual flow rate 2
Entry category	Mandatory
Access	ro
PDO mapping	Default
Value range	UNSIGNED16
Default value	No
Sub-index	03$_h$
Description	Actual flow rate 3
Entry category	Optional
Access	ro
PDO mapping	Optional
Value range	UNSIGNED16
Default value	No
to	
Sub-index	0A$_h$
Description	Actual flow rate 10
Entry category	Optional
Access	ro
PDO mapping	Optional
Value range	UNSIGNED16
Default value	No

6.2 Object 6008$_h$: Flow rate set value

This object shall indicate the flow rate set value send by the master-extruder. The values in sub-index 02$_h$ to sub-index 0B$_h$ shall be given in 0,1 l/min. Positive values shall indicate the regular flow, negative values shall not be used.

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

Table 20 – Object description

Attribute	Value
Index	6008$_h$
Name	Flow rate set value
Object code	RECORD
Data type	Set process data
Category	Optional

Table 21 – 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 0A$_h$
Default value	Manufacturer-specific
Sub-index	01$_h$
Description	Controller on/off
Entry category	Mandatory
Access	rw
PDO mapping	No
Value range	See /CiA420-1/
Default value	Manufacturer-specific
Sub-index	02$_h$
Description	Set process data 1
Entry category	Mandatory
Access	rw
PDO mapping	No
Value range	INTEGER16
Default value	Manufacturer-specific
Sub-index	03$_h$
Description	Set process data 2
Entry category	Optional
Access	rw
PDO mapping	No
Value range	INTEGER16
Default value	Manufacturer-specific
to	
Sub-index	0B$_h$
Description	Set process data 10
Entry category	Optional
Access	rw
PDO mapping	No
Value range	INTEGER16
Default value	Manufacturer-specific

6.3 Object 6009$_h$: Height adjustment

This object shall indicate an array for height adjustment values configured by the extruder (e.g. the distance from the center-line 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 22 specifies the object description and Table 23 specifies the entry description.

Table 22 – Object description

Attribute	Value
Index	6009$_h$
Name	Height adjustment
Object code	ARRAY
Data type	INTEGER16
Category	Optional

Table 23– 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	Manufacturer-specific
Sub-index	01$_h$
Description	Height adjustment 1
Entry category	Mandatory
Access	rw
PDO mapping	No
Value range	INTEGER16
Default value	0000$_h$
Sub-index	02$_h$
Description	Height adjustment 2
Entry category	Optional
Access	rw
PDO mapping	No
Value range	INTEGER16
Default value	0000$_h$
to	
Sub-index	0A$_h$
Description	Height adjustment 10
Entry category	Optional
Access	rw
PDO mapping	No
Value range	INTEGER16
Default value	0000$_h$

6.4 Object 600A$_h$: Actual force

This object shall provide the actual force, given by extraction of product (e.g. pipe or profile). This force is measured between puller and calibration unit. The value shall be given in 0,01 kN. Positive values shall indicate a force from puller to calibration-table, negative values shall indicate the other direction.

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

Table 24 – Object description

Attribute	Value
Index	600A$_h$
Name	Actual force
Object code	VAR
Data type	INTEGER16
Category	Mandatory

Table 25 – Entry description

Attribute	Value
Sub-index	00$_h$
Access	ro
PDO mapping	Default
Value range	INTEGER16
Default value	No

6.5 Object 600B$_h$: Actual temperature

This object shall provide an array with actual temperatures. The value shall be given in 0,1 °C per bit. Negative values shall indicate negative temperatures.

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

Table 26 – Object description

Attribute	Value
Index	600B$_h$
Name	Actual temperature
Object code	ARRAY
Data type	INTEGER16
Category	Optional

Table 27 – 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	Manufacturer-specific

Attribute	Value
Sub-index	01$_h$
Description	Actual temperature 1
Entry category	Mandatory
Access	ro
PDO mapping	Optional
Value range	INTEGER16
Default value	No
Sub-index	02$_h$
Description	Actual temperature 2
Entry category	Optional
Access	ro
PDO mapping	Optional
Value range	INTEGER16
Default value	No
to	
Sub-index	0A$_h$
Description	Actual temperature 10
Entry category	Optional
Access	ro
PDO mapping	Optional
Value range	INTEGER16
Default value	No

6.6 Object 600C$_h$: Temperature set value

This object shall indicate the temperature set value send by the master-extruder. The values in sub-index 02$_h$ to sub-index 0B$_h$ shall be given in 0,1 °C. Negative values means negative temperature.

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

Table 28 – Object description

Attribute	Value
Index	600C$_h$
Name	Temperature set value
Object code	RECORD
Data type	Set process data
Category	Optional

Table 29 – Entry description

Attribute	Value
Sub-index	00h
Description	Highest sub-index supported
Entry category	Mandatory
Access	const
PDO mapping	No
Value range	02h to 0Ah
Default value	Manufacturer-specific
Sub-index	01h
Description	Controller on/off
Entry category	Mandatory
Access	rw
PDO mapping	No
Value range	See /CiA420-1/
Default value	Manufacturer-specific
Sub-index	02h
Description	Set temperature 1
Entry category	Mandatory
Access	rw
PDO mapping	No
Value range	INTEGER16
Default value	Manufacturer-specific
Sub-index	03h
Description	Set temperature 2
Entry category	Optional
Access	rw
PDO mapping	No
Value range	INTEGER16
Default value	Manufacturer-specific
to	
Sub-index	0Bh
Description	Set temperature 10
Entry category	Optional
Access	rw
PDO mapping	No
Value range	INTEGER16
Default value	Manufacturer-specific

6.7 Object 600D$_h$: Actual vacuum value

This object shall provide an array with actual vacuum values from vacuum tank. The value shall be given in 1 mbar. Positive values shall indicate negative pressures; negative values shall indicate positive pressures.

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

Table 30 – Object description

Attribute	Value
Index	600D$_h$
Name	Actual vacuum value
Object code	ARRAY
Data type	INTEGER16
Category	Optional

Table 31 – 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 0A$_h$
Default value	Manufacturer-specific
Sub-index	01$_h$
Description	Actual vacuum 1
Entry category	Mandatory
Access	ro
PDO mapping	Default
Value range	INTEGER16
Default value	No
Sub-index	02$_h$
Description	Actual vacuum 2
Entry category	Mandatory
Access	ro
PDO mapping	Default
Value range	INTEGER16
Default value	No

Attribute	Value
Sub-index	03h
Description	Actual vacuum 3
Entry category	Optional
Access	ro
PDO mapping	Optional
Value range	INTEGER16
Default value	No
to	
Sub-index	0Ah
Description	Actual vacuum 10
Entry category	Optional
Access	ro
PDO mapping	Optional
Value range	INTEGER16
Default value	No

6.8 Object 600Eh: Vacuum set value

This object shall indicate the vacuum set value send by the master-extruder. The values in sub-index 02h to sub-index 0Bh shall be given in 1 mbar. Positive values shall indicate negative pressures; negative values shall indicate positive pressures.

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

Table 32 – Object description

Attribute	Value
Index	600Eh
Name	Vacuum set value
Object code	RECORD
Data type	Set process data
Category	Optional

Table 33 – Entry description

Attribute	Value
Sub-index	00h
Description	Highest sub-index supported
Entry category	Mandatory
Access	const
PDO mapping	No
Value range	02h to 0Ah
Default value	Manufacturer-specific

Attribute	Value
Sub-index	01_h
Description	Controller on/off
Entry category	Mandatory
Access	rw
PDO mapping	No
Value range	See /CiA420-1/
Default value	Manufacturer-specific
Sub-index	02_h
Description	Set process data 1
Entry category	Mandatory
Access	rw
PDO mapping	No
Value range	INTEGER16
Default value	Manufacturer-specific
Sub-index	03_h
Description	Set process data 2
Entry category	Optional
Access	rw
PDO mapping	No
Value range	INTEGER16
Default value	Manufacturer-specific
to	
Sub-index	$0A_h$
Description	Set process data 10
Entry category	Optional
Access	rw
PDO mapping	No
Value range	INTEGER16
Default value	Manufacturer-specific

6.9 Object $600F_h$: Actual water pressures

This object shall provide an array with actual water pressure values. The value shall be given in 0,1 bar. Table 34 specifies the object description and Table 35 specifies the entry description.

Table 34 – Object description

Attribute	Value
Index	$600F_h$
Name	Actual water pressures
Object code	ARRAY
Data type	UNSIGNED16
Category	Mandatory

Table 35 – 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	Manufacturer-specific
Sub-index	01$_h$
Description	Actual pressure 1
Entry category	Mandatory
Access	ro
PDO mapping	No
Value range	UNSIGNED16
Default value	No
Sub-index	02$_h$
Description	Actual pressure 2
Entry category	Optional
Access	ro
PDO mapping	No
Value range	UNSIGNED16
Default value	No
to	
Sub-index	0A$_h$
Description	Actual pressure 10
Entry category	Optional
Access	ro
PDO mapping	No
Value range	UNSIGNED16
Default value	No

6.10 Object 6010$_h$: Configuration word

This object shall provide the configured functionality. Figure 1 specifies the structure of sub-index 01$_h$ (configuration word 1) and Table 36 defines the values.
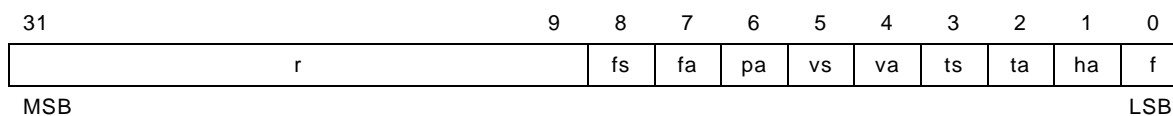
31			9	8	7	6	5	4	3	2	1	0
	r			fs	fa	pa	vs	va	ts	ta	ha	f
MSB												LSB

Figure 1 — Structure of sub-index 01$_h$

Table 36 — Value definition

Signal	Value	Definition
f (Actual extraction force)	0_b 1_b	Force measuring not available Force measuring available
ha (height adjustment)	0_b 1_b	Height adjustment not available Height adjustment available
ta (actual temperatures)	0_b 1_b	Temperature measuring not available Temperature measuring available
ts (set temperatures)	0_b 1_b	Temperature setting not available Temperature setting available
va (actual vacuum values)	0_b 1_b	Vacuum measuring not available Vacuum measuring available
vs (set vacuum values)	0_b 1_b	Vacuum setting not available Vacuum setting available
pa (actual pressure values)	0_b 1_b	Pressure measuring not available Pressure measuring available
fa (actual flow rates)	0_b 1_b	Flow rate measuring not available Flow rate measuring available
fs (set flow rates)	0_b 1_b	Flow rate setting not available Flow rate setting available
r		Reserved; always 0

Figure 2 specifies the structure of sub-index 02_h (configuration word 2) and Table 37 defines the values.

31	19	18	16	15	8	7	0
	r		f3 to f1		w8 to w1		v8 to v1

MSB   LSB
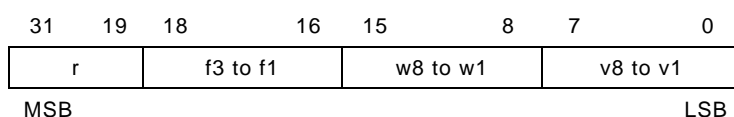
Figure 2 — Structure of sub-index 02_h

Table 37 — Value definition

Signal	Value	Definition
v1, .., v8 (start/stop function of vacuum pumps)	0_b 1_b	Vacuum pump not available Vacuum pump available
w1, .., w8 (start/stop function of water pump)	0_b 1_b	Water pump not available Water pump available
f1, .., f3 (auxiliary function)	0_b 1_b	Auxiliary function not available Auxiliary function available
r		Reserved; always 0

Table 38 specifies the object description and Table 39 specifies the entry description.

Table 38 – Object description

Attribute	Value
Index	6010_h
Name	Configuration word
Object code	ARRAY
Data type	UNSIGNED32
Category	Mandatory

Table 39 – 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	Configuration word 1
Entry category	Mandatory
Access	ro
PDO mapping	No
Value range	See value definition
Default value	No
Sub-index	02_h
Description	Configuration word 2
Entry category	Mandatory
Access	ro
PDO mapping	No
Value range	See value definition
Default value	No

6.11 Object 6020_h: Control word

This object shall indicate the commands transmitted by the extruder. Figure 3 specifies the structure of sub-index 01_h (control word 1) and Table 40 defines the values.

15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
							r								e

MSB   LSB
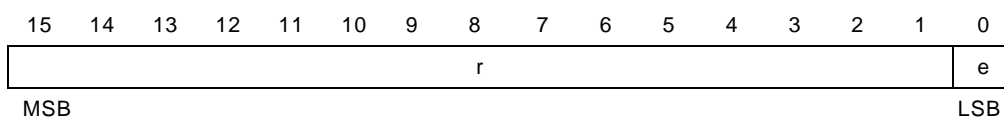
Figure 3 — Structure of sub-index 01_h

Table 40 — Value definition

Signal	Value	Definition
e (extruder run)	0_b 1_b	Extruder stopped (default value) Extruder is running
r (reserved)		Reserved; always 0

Figure 4 specifies the structure of sub-index 02_h (control word 2) and Table 41 defines the values.

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15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
v8	v7	v6	v5	v4	v3	v2	v1	v8	v7	v6	v5	v4	v3	v2	v1

MSB   LSB
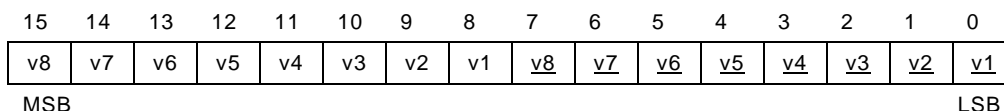
Figure 4 — Structure of sub-index 02$_h$

Table 41 — Value definition

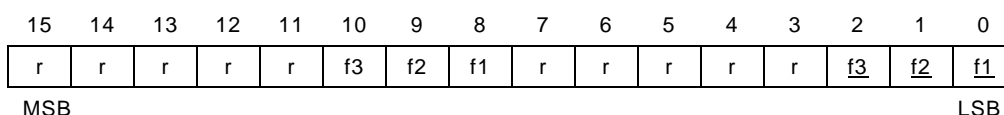| Signal	Value	Definition
v1 to v8 (vacuum pump 1 to vacuum pump 8)	0_b 1_b	No command (default value) Stop function (start prevention)
v1 to v8 (vacuum pump 1 to vacuum pump 8)	0_b 1_b	No command (default value) Start function

Figure 5 specifies the structure of sub-index 03$_h$ (control word 3) and Table 42 defines the values.

15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
w8	w7	w6	w5	w4	w3	w2	w1	w8	w7	w6	w5	w4	w3	w2	w1

MSB   LSB
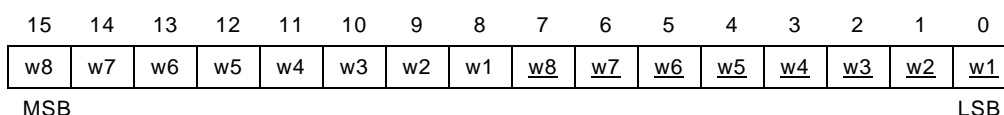
Figure 5 — Structure of sub-index 03$_h$

Table 42 — Value definition

Signal	Value	Definition
w1 to w8 (water pump 1 to water pump 8)	0_b 1_b	No command (default value) Stop function (start prevention)
w1 to w8 (water pump 1 to water pump 8)	0_b 1_b	No command (default value) Start function

Figure 6 specifies the structure of sub-index 04$_h$ (control word 4) and Table 43 defines the values.

15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
r	r	r	r	r	f3	f2	f1	r	r	r	r	r	f3	f2	f1

MSB   LSB

Figure 6 — Structure of sub-index 04$_h$

Table 43 — Value definition

Signal	Value	Definition
f1 to f3 (function 1 to function 3)	0_b 1_b	No command (default value) Stop function (start prevention)
f1 to f3 (function 1 to function 3)	0_b 1_b	No command (default value) Start function
r (reserved)	Reserved; always 0	

Table 44 specifies the object description and Table 45 specifies the entry description.

Table 44 – Object description

Attribute	Value
Index	6020$_h$
Name	Control word
Object code	ARRAY
Data type	UNSIGNED16
Category	Mandatory

Table 45 – Entry description

Attribute	Value
Sub-index	00$_h$
Description	Highest sub-index supported
Entry category	Mandatory
Access	const
PDO mapping	No
Value range	04$_h$
Default value	04$_h$
Sub-index	01$_h$
Description	Control word 1
Entry category	Mandatory
Access	rw
PDO mapping	Default
Value range	See value definition
Default value	0000$_h$
to	
Sub-index	04$_h$
Description	Control word 4
Entry category	Mandatory
Access	rw
PDO mapping	Default
Value range	See value definition
Default value	0000$_h$

6.12 Object 6030$_h$: Status word

This object shall provide the status transmitted to the master-extruder. Figure 7 specifies the structure of sub-index 01$_h$ (status word 1) and Table 46 defines the values.

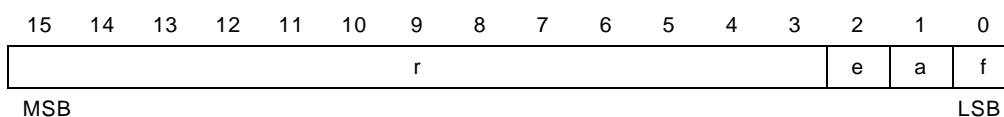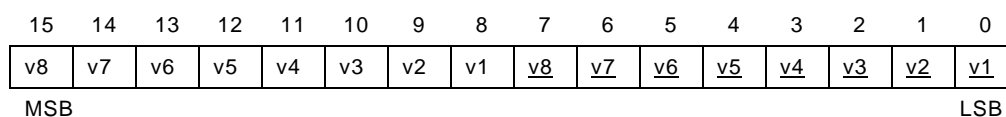| 15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
						r							e	a	f

MSB   LSB

Figure 7 — Structure of sub-index 01$_h$

Table 46 — Value definition

Signal	Value	Definition
f (fault downstream equipment)	0_b 1_b	No fault Fault
a (alarm downstream equipment)	0_b 1_b	No alarm Alarm
e (enable extruder)	0_b 1_b	Extruder shall stop and start is not allowed Extruder enabled to run
r (reserved)	Reserved; always 0	

Figure 8 specifies the structure of sub-index 02_h (status word 2) and Table 47 defines the values.

15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
v8	v7	v6	v5	v4	v3	v2	v1	<u>v8</u>	<u>v7</u>	<u>v6</u>	<u>v5</u>	<u>v4</u>	<u>v3</u>	<u>v2</u>	<u>v1</u>

MSB   LSB

Figure 8 — Structure of sub-index 02_h

Table 47 — Value definition

Signal	Value	Definition
<u>v1</u> to <u>v8</u> (vacuum pump 1 to vacuum pump 8)	0_b 1_b	Function is not running Function is running
v1 to v8 (vacuum pump 1 to vacuum pump 8)	0_b 1_b	Function is blocked Function is ready to start

Figure 9 specifies the structure of sub-index 03_h (status word 3) and Table 48 defines the values.

15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
w8	w7	w6	w5	w4	w3	w2	w1	<u>w8</u>	<u>w7</u>	<u>w6</u>	<u>w5</u>	<u>w4</u>	<u>w3</u>	<u>w2</u>	<u>w1</u>

MSB   LSB
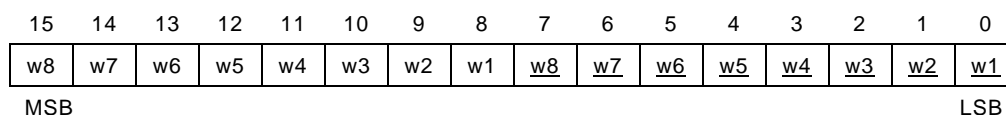
Figure 9 — Structure of sub-index 03_h

Table 48 — Value definition

Signal	Value	Definition
<u>w1</u> to <u>w8</u> (water pump 1 to water pump 8)	0_b 1_b	Function is not running Function is running
w1 to w8 (water pump 1 to water pump 8)	0_b 1_b	Function is blocked Function is ready to start

Figure 10 specifies the structure of sub-index 04_h (status word 4) and Table 49 defines the values.
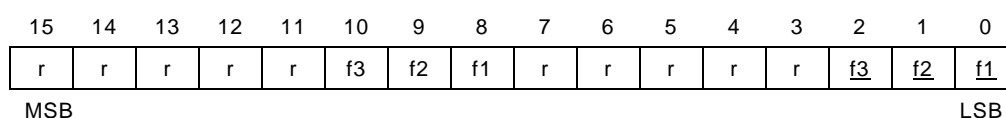
15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
r	r	r	r	r	f3	f2	f1	r	r	r	r	r	<u>f3</u>	<u>f2</u>	<u>f1</u>

MSB   LSB

Figure 10 — Structure of sub-index 04_h

Table 49 — Value definition

Signal	Value	Definition
f1, …, f3 (function 1 to function 3)	0_b 1_b	Function is not running Function is running
f1, …, f3 (function 1 to function 3)	0_b 1_b	Function is blocked Function is ready to start
r (reserved)	Reserved; always 0	

Table 50 specifies the object description and Table 51 specifies the entry description.

Table 50 – Object description

Attribute	Value
Index	6030_h
Name	Status word
Object code	ARRAY
Data type	UNSIGNED16
Category	Mandatory

Table 51 – Entry description

Attribute	Value
Sub-index	00_h
Description	Highest sub-index supported
Entry category	Mandatory
Access	const
PDO mapping	No
Value range	04_h
Default value	04_h
Sub-index	01_h
Description	Status word 1
Entry category	Mandatory
Access	ro
PDO mapping	Default
Value range	See value definition
Default value	No
to	
Sub-index	04_h
Description	Status word 4
Entry category	Mandatory
Access	Ro
PDO mapping	Default
Value range	See value definition
Default value	No