CiA® 420

CANopen®

Profiles for extruder downstream devices

Part 5: Simple and advanced co-extruder

Version: 2.1.0
07 May 2015

© CAN in Automation (CiA) e. V.

HISTORY

Date	Changes
2004-02-27	*Publication of version 1.0* as draft standard proposal
2007-01-31	*Publication of version 2.0* as draft standard
2014-09-01	*Publication of version 2.1.0* as draft standard proposal
2015-05-07	*Publication of version 2.1.0* 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.

General information on licensing and patents

CAN in AUTOMATION (CiA) calls attention to the possibility that some of the elements of this CiA specification may be subject of patent rights. CiA shall not be responsible for identifying any or all such patent rights.

Trademarks

CANopen and CiA are registered community trademarks of CAN in Automation. The use is restricted for CiA members or owners of CANopen® vendor ID. More detailed terms for the use are available from CiA.

CONTENTS

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

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 simple and advanced co-extruder.

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 principles

4.1   General

The co-extruder downstream device interface shall support all mandatory functions of /CiA301/ as well as all mandatory functions defined in this specification.

5   PDO specification

5.1   General

This specification describes two different co-extruder functionalities:

- Simple co-extruder

- Advanced co-extruder

The *device type* object (see /CiA420-1/) indicates, which co-extruder class is supported.

The simple co-extruder shall support the first TPDO. The second TPDO may be implemented if the melt pressure function is supported. The first RPDO is different for simple and advanced co-extruder. They shall be supported accordingly.

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$_h$	Speed set value
	6006 00$_h$	Motor load actual value
	6004 00$_h$	Speed set value back
TPDO 2	6046 01$_h$	Melt pressure 1

PDO number	Index/sub-index	Name/description
	6046 02$_h$	Melt pressure 2
	6046 03$_h$	Melt pressure 3
	6047 00$_h$	Output
RPDO 1 (simple co-extruder)	6020 00$_h$	Control word
	6002 00$_h$	Speed set value
RPDO 1 (advanced co-extruder)	6020 00$_h$	Control word
	6002 00$_h$	Speed set value
	6007 00$_h$	Speed ramp value

5.2 First TPDO

This TPDO shall be transmitted to the master-extruder. It contains by default the *status word* the *speed actual value*, the *motor load actual value* and the *speed set value back*.

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 06$_h$
Default value	Manufacturer-specific
Sub-index	01$_h$
Description	COB-ID
Entry category	Mandatory
Access	const
PDO mapping	No
Value range	4000 0180$_h$ + node-ID
Default value	4000 0180$_h$ + node-ID

Attribute	Value
Sub-index	02h
Description	Transmission type
Entry category	Mandatory
Access	rw
PDO mapping	Optional
Value range	See /CiA301/
Default value	01h
Sub-index	03h
Description	Inhibit time
Entry category	Optional
Access	rw
PDO mapping	No
Value range	See /CiA301/
Default value	0000h
Sub-index	05h
Description	Event timer
Entry category	Optional
Access	rw
PDO mapping	No
Value range	See /CiA301/
Default value	0000h
Sub-index	06h
Description	Sync start value
Entry category	Optional
Access	rw
PDO mapping	No
Value range	See /CiA301/
Default value	0000h

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	1A00h
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	6030 00 10_h
Default value	6030 00 10_h
Sub-index	02_h
Description	2nd application object
Entry category	Mandatory
Access	const
PDO mapping	No
Value range	6000 00 10_h
Default value	6000 00 10_h
Sub-index	03_h
Description	3rd application object
Entry category	Mandatory
Access	const
PDO mapping	No
Value range	6006 00 10_h
Default value	6006 00 10_h

Attribute	Value
Sub-index	04$_h$
Description	4th application object
Entry category	Mandatory
Access	const
PDO mapping	No
Value range	6004 00 10$_h$
Default value	6004 00 10$_h$

5.3 Second TPDO

This TPDO may be transmitted to the master-extruder. It contains by default the *melt pressure1* to *3*, and the *output*.

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	Optional

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	Conditional: Mandatory if TPDO2 is supported

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	6046 01 10$_h$
Default value	6046 01 10$_h$
Sub-index	02$_h$
Description	2nd application object
Entry category	Mandatory
Access	const
PDO mapping	No
Value range	6046 02 10$_h$
Default value	6046 02 10$_h$
Sub-index	03$_h$
Description	3rd application object
Entry category	Mandatory
Access	const
PDO mapping	No
Value range	6046 03 10$_h$
Default value	6046 03 10$_h$
Sub-index	04$_h$
Description	4th application object
Entry category	Mandatory
Access	const
PDO mapping	No
Value range	6047 00 10$_h$
Default value	6047 00 10$_h$

5.4   First RPDO for simple co-extruder

This RPDO shall be received from the master-extruder by the simple co-extruder. It contains by default the *control word* and the *speed 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 for simple co-extruder

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 0200$_h$ + node-ID
Default value	4000 0200$_h$ + 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	1600$_h$
Name	RPDO 1 mapping parameter
Object code	RECORD
Data type	PDO mapping parameter record
Category	Mandatory for simple co-extruder

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	6020 00 10$_h$
Default value	6020 00 10$_h$

Attribute	Value
Sub-index	02$_h$
Description	2nd application object
Entry category	Mandatory
Access	const
PDO mapping	No
Value range	6002 00 10$_h$
Default value	6002 00 10$_h$

5.5 First RPDO for advanced co-extruder

This RPDO shall be received from the master-extruder by the advanced co-extruder. It contains by default the *control word*, the *speed set value,* and the *speed ramp 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 14 — Object description

Attribute	Value
Index	1400$_h$
Name	RPDO 1 communication parameter
Object code	RECORD
Data type	PDO communication parameter record
Category	Mandatory for advanced co-extruder

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$_h$ 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 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/.

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 for advanced co-extruder

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	03$_h$
Default value	03$_h$

Attribute	Value
Sub-index	01$_h$
Description	1st 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	2nd application object
Entry category	Mandatory
Access	const
PDO mapping	No
Value range	6002 00 10$_h$
Default value	6002 00 10$_h$
Sub-index	03$_h$
Description	3rd application object
Entry category	Mandatory
Access	const
PDO mapping	No
Value range	6007 00 10$_h$
Default value	6007 00 10$_h$

6 Application object specification

6.1 Object 6000$_h$: Speed actual value

This object shall provide the actual speed value of the co-extruder. The value shall be given in 0,01% of the maximum speed. Negative values shall indicate reverse directions. Scaling is given in object 6001$_h$.

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

Table 18 — Object description

Attribute	Value
Index	6000$_h$
Name	Speed actual value
Object code	VAR
Data type	INTEGER16
Category	Mandatory

Table 19 — Entry description

Attribute	Value
Sub-index	00_h
Access	ro
PDO mapping	Default
Value range	-10000_d to $+10000_d$
Default value	No

6.2   Object 6001_h: Speed real maximum

This object shall provide the maximum speed value of the co-extruder based on the real maximum co-extruder speed. The value shall be given in 0,001 1/min (rotation per minute).

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

Table 20 — Object description

Attribute	Value
Index	6001_h
Name	Speed real maximum
Object code	VAR
Data type	UNSIGNED32
Category	Mandatory

Table 21 — Entry description

Attribute	Value
Sub-index	00_h
Access	ro
PDO mapping	Optional
Value range	UNSIGNED32
Default value	No

6.3   Object 6002_h: Speed set value

This object shall indicate the speed set value send by the master-extruder controller. The interpretation of this value is different at simple and advanced co-extruder:

- For simple co-extruder: The speed set value is transmitted directly to the main motor drive of the co-extruder. This means that during ramping up or down every single value is transmitted.

- For advanced co-extruder: The speed set value is interpreted as total value for the co-extruder, including dosing feeders if existing. The speed set value may be displayed, changed and communicated also from co-extruder. The *speed set value back* (Object 6004_h) communicates the given set value back to the main extruder. The additional *value speed ramp value* (Object 6007_h) is transmitted to guarantee that in case of synchronized speed changes all extruder reach their new set value at the same time. The increase and decrease key function works locally only.

The value shall be given in 0,01% of the maximum speed. Negative values shall indicate reversed directions. Scaling is given in object 6003_h.

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

Table 22 — Object description

Attribute	Value
Index	6002$_h$
Nam-	Speed set value
Object code	VAR
Data type	INTEGER16
Category	Mandatory

Table 23 — Entry description

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

6.4 Object 6003$_h$: Speed set maximum

This object shall indicate the maximum speed set value of the co-extruder. The value shall be given in 0,001 1/min (rotation per minute).

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

Table 24 — Object description

Attribute	Value
Index	6003$_h$
Name	Speed set maximum
Object code	VAR
Data type	UNSIGNED32
Category	Mandatory

Table 25 — Entry description

Attribute	Value
Sub-index	00$_h$
Access	rw
PDO mapping	Optional
Value range	UNSIGNED32
Default value	0000 0000$_h$

6.5 Object 6004$_h$: Speed set value back

This object shall provide the speed set value received from the master-extruder (see object 6002$_h$) as a confirmation to the master-extruder. The value shall be given in 0,01% of the maximum speed. Scaling is given in object 6003$_h$.

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

Table 26 — Object description

Attribute	Value
Index	6004$_h$
Name	Speed set value back
Object code	VAR
Data type	INTEGER16
Category	Mandatory

Table 27 — Entry description

Attribute	Value
Sub-index	00$_h$
Access	ro
PDO mapping	Default
Value range	-10000$_d$ to +10000$_d$
Default value	No

6.6 Object 6005$_h$: Speed step

This object shall indicate the size of the first speed change at using increase or decrease key requested by the master-extruder controller. The value shall be given in 0,01% of the maximum speed (per bit). Scaling is given in object 6003$_h$.

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

Table 28 — Object description

Attribute	Value
Index	6005$_h$
Name	Speed step
Object code	VAR
Data type	UNSIGNED16
Category	Mandatory

Table 29 — Entry description

Attribute	Value
Sub-index	00$_h$
Access	rw
PDO mapping	Optional
Value range	0$_d$ to 10000$_d$
Default value	1$_d$

6.7 Object 6006$_h$: Motor load actual value

This object shall provide the actual value of the co-extruder load. The value shall be given in 0,01% of the maximum load. Negative value shall be given if the load is negative.

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

Table 30 — Object description

Attribute	Value
Index	6006$_h$
Name	Motor load actual value
Object code	VAR
Data type	INTEGER16
Category	Mandatory

Table 31 — Entry description

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

6.8 Object 6007$_h$: Speed ramp value

This object shall indicate the time, which is needed to increase speed from 0 to 100%. The value shall be given in 1 ms. The value of FFFF FFFF$_h$ shall indicate that there is no valid data available. The value of 0000 0000$_h$ shall not be used.

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

Table 32 — Object description

Attribute	Value
Index	6007$_h$
Name	Speed ramp value
Object code	VAR
Data type	UNSIGNED32
Category	Conditional; mandatory for advanced co-extruder

Table 33 — Entry description

Attribute	Value
Sub-index	00$_h$
Access	rw
PDO mapping	Default
Value range	0000 0001$_h$ to FFFF FFFF$_h$
Default value	FFFF FFFF$_h$

6.9 Object 600B$_h$: Actual temperatures

This object shall provide actual temperatures of the co-extruder. The value shall be given in 0,1°C. Negative values means below 0°C.

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

Table 34 — Object description

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

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 temperature 1
Entry category	Mandatory
Access	ro
PDO mapping	Optional
Value range	-2732$_d$ to +32767$_d$
Default value	No
Sub-index	02$_h$
Description	Actual temperature 2
Entry category	Optional
Access	ro
PDO mapping	Optional
Value range	-2732$_d$ to +32767$_d$
Default value	No
to	
Sub-index	0A$_h$
Description	Actual temperature 10
Entry category	Optional
Access	ro
PDO mapping	Optional
Value range	-2732$_d$ to +32767$_d$
Default value	No

6.10 Object 600C$_h$: Set temperatures

This object shall indicate set temperature values configured by the master-extruder. The value of the *controller on/off* (sub-index 01$_h$) is defined in /CiA420-1/. The values of sub-index 02$_h$ to sub-index 0B$_h$ shall be given in 0,1°C. Negative values shall indicate temperatures below 0°C.

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

Table 36 — Object description

Attribute	Value
Index	600C$_h$
Name	Set temperatures
Object code	RECORD
Data type	Set process data (see /CiA420-1/)
Category	Optional

Table 37 — 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 0B$_h$
Default value	Manufacturer-specific
Sub-index	01$_h$
Description	Controller on/off
Entry category	Mandatory
Access	rw
PDO mapping	Optional
Value range	See /CiA420-1/
Default value	0000$_h$
Sub-index	02$_h$
Description	Set temperature 1
Entry category	Mandatory
Access	rw
PDO mapping	Optional
Value range	-2732$_d$ to +32767$_d$
Default value	Manufacturer-specific
Sub-index	03$_h$
Description	Set temperature 2
Entry category	Optional
Access	rw
PDO mapping	Optional
Value range	-2732$_d$ to +32767$_d$
Default value	Manufacturer-specific
to	

Attribute	Value
Sub-index	0B$_h$
Description	Set temperature 10
Entry category	Optional
Access	rw
PDO mapping	Optional
Value range	-2732$_d$ to +32767$_d$
Default value	Manufacturer-specific

6.11 Object 6045$_h$: Melt temperature

This object shall provide the melt temperature of the co-extruder. The value shall be given in 0,1°C. Negative values shall indicate temperatures below 0°C.

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

Table 38 — Object description

Attribute	Value
Index	6045$_h$
Name	Melt temperature
Object code	VAR
Data type	INTEGER16
Category	Optional

Table 39 — Entry description

Attribute	Value
Sub-index	00$_h$
Access	ro
PDO mapping	Optional
Value range	-2732$_d$ to +32767$_d$
Default value	No

6.12 Object 6046$_h$: Melt pressures

This object shall provide an array with melt pressure values measured by the co-extruder. The value shall be given in 0,1 bar. The value of 0000$_h$ shall be provided if the measuring system is not available (see *mp* signal in object 6010$_h$).

Table 40 specifies the object description and Table 41 specifies the entry description.

Table 40 — Object description

Attribute	Value
Index	6046$_h$
Name	Melt pressures
Object code	ARRAY
Data type	UNSIGNED16
Category	Optional

Table 41 — Entry description

Attribute	Value
Sub-index	00$_h$
Description	Highest sub-index supported
Entry category	Mandatory
Access	const
PDO mapping	No
Value range	03$_h$ to 0A$_h$
Default value	Manufacturer-specific
Sub-index	01$_h$
Description	Melt pressure 1
Entry category	Mandatory
Access	ro
PDO mapping	Default
Value range	UNSIGNED16
Default value	No
to	
Sub-index	03$_h$
Description	Melt pressure 3
Entry category	Mandatory
Access	ro
PDO mapping	Default
Value range	UNSIGNED16
Default value	No
Sub-index	04$_h$
Description	Melt pressure 4
Entry category	Optional
Access	ro
PDO mapping	Optional
Value range	UNSIGNED16
Default value	No
to	
Sub-index	0A$_h$
Description	Melt pressure 10
Entry category	Optional
Access	ro
PDO mapping	Optional
Value range	UNSIGNED16
Default value	No

6.13 Object 6047$_h$: Output

This object shall provide the actual output values measured or calculated by the co-extruder controller. The value shall be given in 0,1 kg/h. The value of 0000$_h$ shall be provided if the measuring system is not available (see *o* signal in object 6010$_h$).

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

Table 42 — Object description

Attribute	Value
Index	6047_h
Name	Output
Object code	VAR
Data type	UNSIGNED16
Category	Optional

Table 43 — Entry description

Attribute	Value
Sub-index	00_h
Access	ro
PDO mapping	Default
Value range	UNSIGNED16
Default value	No

6.14   Object 6010_h: Configuration word

This object shall provide the configured functionality.

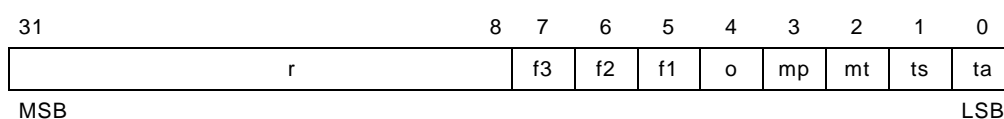Figure 1 specifies the object structure and Table 44 defines the values.

31								8	7	6	5	4	3	2	1	0
				r					f3	f2	f1	o	mp	mt	ts	ta
MSB																LSB

Figure 1 — Object structure

Table 44 — Value definition

Signal	Value	Definition
ta (actual temperatures)	0_b 1_b	Temperature measuring system not available Temperature measuring system available
ts (set temperatures)	0_b 1_b	Temperature setting function not available Temperature setting function available
mt (melt temperature)	0_b 1_b	Melt temperature measuring system not available Melt temperature measuring system available
mp (melt pressures)	0_b 1_b	Melt pressure measuring system not available Melt pressure measuring system available
o (output measuring)	0_b 1_b	Output measuring system not available Output measuring system available
f1, f2, f3 (auxiliary function)	0_b 1_b	Auxiliary function not available Auxiliary function available
r (reserved)	Reserved; always 0	

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

Table 45 — Object description

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

Table 46 — Entry description

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

6.15 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 47 defines the values.

15		9	8	7	6	5	4	3	2	1	0
	r		f3	f3	f2	f2	f1	f1	e	d	d

MSB   LSB
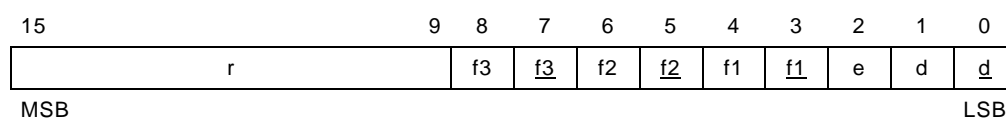
Figure 2 — Object structure

Table 47 — Value definition

Signal	Value	Definition
d (drive stop)	0$_b$ 1$_b$	No command (default value) Stop drive (start prevention)
d (drive start)	0$_b$ 1$_b$	No command (default value) Start drive
e (master-extruder run)	0$_b$ 1$_b$	Master-extruder stopped (default value) Master-extruder is running
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)	Reserved; always 0	

Table 48 specifies the object description and Table 49 specifies the entry description.

Table 48 — Object description

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

Table 49 — Entry description

Attribute	Value
Sub-index	00$_h$
Access	rw
PDO mapping	Default
Value range	See Table 47
Default value	See Table 47

6.16 Object 6030$_h$: Status word

This object shall provide the status transmitted to the master-extruder. The co-extruder 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 50 defines the values.

15				12	11	10	9	8	7	6	5	4	3	2	1	0
		r			f3	f3	f2	f2	f1	f1	d	i	a	f	ds	dr

MSB   LSB
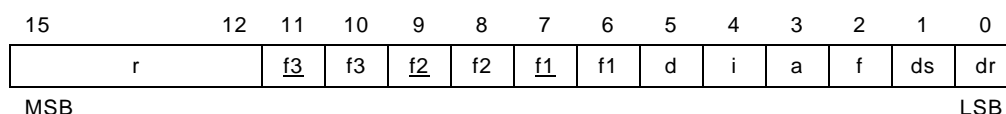
Figure 3 — Object structure

Table 50 — Value definition

Signal	Value	Definition
dr (drive run)	0$_b$ 1$_b$	Drive is not running (drive controller disabled) (See Note 1) Drive is running (drive controller enabled) (See Note 2)
ds (drive ready to start)	0$_b$ 1$_b$	Drive is not ready to start Drive is ready to start
f (fault downstream equipment)	0$_b$ 1$_b$	No fault Fault (co-extruder switched-off and start prevention of co-extruder)
a (alarm downstream equipment)	0$_b$ 1$_b$	No alarm Alarm (co-extruder not switched-off, co-extruder start still permitted)
i (increase set value)	0$_b$ 1$_b$	No request Increase speed request (Example: Is the signal shorter than 1 s only one step takes place. A longer signal activates one step and after the first second the selected ramp is used to increase the speed)
d (decrease set value)	0$_b$ 1$_b$	No request Decrease speed request (Example: Is the signal shorter than 1 s only one step takes place. A longer signal activates one step and after the first second the selected ramp is used to decrease the speed)
f1, f2, f3 (function run)	0$_b$	Function is not running

Signal	Value	Definition
	1_b	Function is running
f1, f2, f3 (function ready to start)	0_b 1_b	Function is blocked Function is ready to start
r (reserved)	Reserved; always 0	
NOTE 1 Independent of the actual speed. NOTE 2 Independent of the speed settings.		

Table 51 specifies the object description and Table 52 specifies the entry description.

Table 51 — Object description

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

Table 52 — Entry description

Attribute	Value
Sub-index	00_h
Access	ro
PDO mapping	Default
Value range	See Table 50
Default value	No