European Plastics and Rubber Machinery

EUROMAP 27-5	Pipe and Profile Extrusion Lines **Generic CANopen Interface** Part 5: Simple and advanced co-extruder

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see also www.can-cia.org/index.php?id=specifications.

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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 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 6000 00_h 6006 00_h 6004 00_h	Status word Speed set value Motor load actual value Speed set value back
TPDO 2	6046 01_h 6046 02_h 6046 03_h 6047 00_h	Melt pressure 1 Melt pressure 2 Melt pressure 3 Output
RPDO 1 (simple co-extruder)	6020 00_h 6002 00_h	Control word Speed set value
RPDO 1 (advanced co-extruder)	6020 00_h 6002 00_h 6007 00_h	Control word Speed set value 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

Attribute	Value
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
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	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

Attribute	Value
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 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

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 14 specifies the object description of the PDO communication parameter and Table 15 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 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 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	

Attribute	Value
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	
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

Attribute	Value
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

6.15 Object 6010_h: Configuration word

This object shall provide the configured functionality.

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

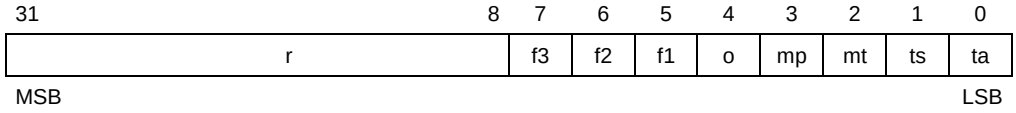

Figure 1 — Object structure

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

6.16 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.

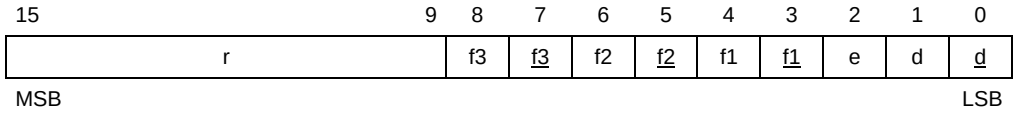

Figure 2 — Object structure

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

6.17 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.

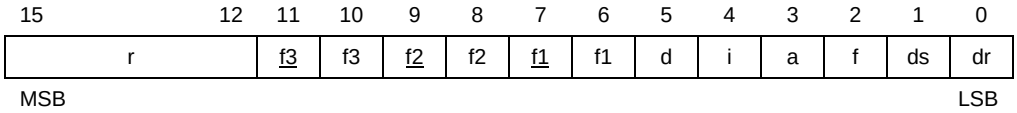

Figure 3 — Object structure

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 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
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

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