



BSI Standards Publication

CleANopen - Application profile for municipal vehicles

National foreword

This British Standard is the UK implementation of EN 16815:2019. It supersedes PD CEN/TR 16815:2015, which is withdrawn.

The UK participation in its preparation was entrusted to Technical Committee B/508/1, Waste containers and associated lifting devices on refuse collection vehicles.

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Date	Text affected
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English Version

CleANopen - Application profile for municipal vehicles

CleANopen - Profil d'application aux véhicules
municipaux

CleANopen - Anwendungsprofil für
Kommunalfahrzeuge

This European Standard was approved by CEN on 30 December 2018.

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European foreword

This document (EN 16815:2019) has been prepared by Technical Committee CEN/TC 183 “Waste management”, the secretariat of which is held by DIN.

This European Standard shall be given the status of a national standard, either by publication of an identical text or by endorsement, at the latest by September 2019, and conflicting national standards shall be withdrawn at the latest by September 2019.

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. CEN shall not be held responsible for identifying any or all such patent rights.

This document is based on the version 2.0 of the CiA 422 specification series describes the embedded body control network of refuse collecting vehicles (RCV). It specifies the CANopen (EN 50325-4) communication interfaces and the application functionality of several functional elements (virtual devices). It does not specify CANopen devices.

This document is structured as follows:

- the 1st part (Clauses 3 to 9) contains general definitions and describes the functionality of the virtual devices as well as the CANopen physical layer requirements and recommendations.
- the 2nd part (Clause 10) provides a detailed overview of communication and application parameters supported by the different virtual devices. Virtual devices include the body controller, and the change container, compaction, lifter, identification, measuring A and B, bin classification, washing, truck gateway as well as GPS units. Also a monitoring device is described
- the 3rd part (Clauses 11 to 15) and its sub-parts specify the pre-defined Process Data Objects (PDO) and the additional pre-defined SDOs. The pre-defined Transmit-PDOs for all virtual devices are specified in Clause 11. This includes the PDO communication parameter set as well as the PDO mapping parameter set. The corresponding Receive-PDOs are specified in Clause 13. The SDO communication between bin classification units and measuring units is specified in Clause 15.
- the 4th part (Clause 16) specifies the application parameters. This covers the process data (mainly mapped into PDOs), configuration data, and diagnostic information (both mainly transmitted by SDO communication services). In this clause are defined parameter pools for the measuring units, and the data read as well as write for identification units. Other introduced parameters include support profile version, extended status for measuring units and measuring ident controllers.

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1 Scope

This document provides a set of CANopen application profile specifications that describes the *CleANopen* embedded body control network of municipal vehicles, e.g. refuse collecting trucks.

It specifies the CANopen communication interfaces and the application functionality of several functional elements (virtual devices).

It does not specify CANopen devices.

The *CleANopen* application profile specifications consist of several parts dealing with the following:

- general definitions;
- functionality of the virtual devices;
- pre-defined PDOs and SDOs;
- application objects.

2 Normative references

The following documents are referred to in the text in such a way that some or all of their content constitutes requirements of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

ISO 639-1, *Codes for the representation of names of languages — Part 1: Alpha-2 code*

ISO/IEC 646, *Information technology — ISO 7-bit coded character set for information interchange*

ISO 11898-2, *Road vehicles — Controller area network (CAN) — High-speed medium access unit*

SAE J1939-71, *Recommended practice for a serial control and communication network — Vehicle application layer*

3 Terms and definitions

For the purposes of this document, the following terms and definitions apply.

ISO and IEC maintain terminological databases for use in standardization at the following addresses:

- IEC Electropedia: available at <http://www.electropedia.org/>
- ISO Online browsing platform: available at <http://www.iso.org/obp>

3.1

CleANopen unit

virtual device that provides functional elements specified in this application profile

3.2

functional element

atomic application function

3.3

virtual device

part of the logical device as defined in [CiA301]

3.4

left side

when viewing forward, the left side

3.5

pitch

angle from the front to the back of the vehicle (see Figure 1)

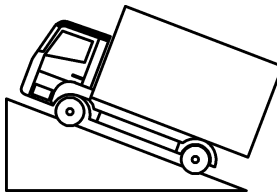


Figure 1 — Pitch example

3.6

right side

when viewing forward, the right side

3.7

roll

angle from the left to the right side of the vehicle (see Figure 2)

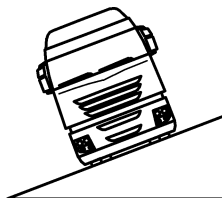


Figure 2 — Roll example

4 Acronyms

The acronyms given in documents CiA301, CiA413 series and SAEJ1939 apply for this standard, too.

BCU	Bin classification unit
BC	Body controller
MIC	Measuring ident controller
CAN	Controller area network
CCU	Change container unit
COB	Communication object

COB-ID	COB identifier
CSDO	Client SDO
CU	Compaction unit
GPS	Global positioning system
GPSU	GPS unit
IDU	Identification unit
IVN	In-vehicle network
LSB	Least significant bit
LU	Lifter unit
MSB	Most significant bit
MU	Measuring unit
SSDO	Server SDO
TGU	Truck gateway unit
WU	Washing unit

5 Abbreviations

Acc.	Access
Cat.	Category
const	constant
ro	read-only
rw	read/write

6 General architecture

6.1 General

This application profile specification describes the virtual devices of municipal vehicle bodies (CleANopen units). Figure shows a simple example: The BC virtual device controls the overall system, however the other virtual devices communicate directly by means of PDOs. The virtual interfaces are implemented as CANopen interfaces or as CANopen device internal interfaces if the virtual devices reside in the same CANopen device. If the virtual interfaces between virtual devices are implemented as CANopen interfaces they use SDO or PDO services to read or write application objects.

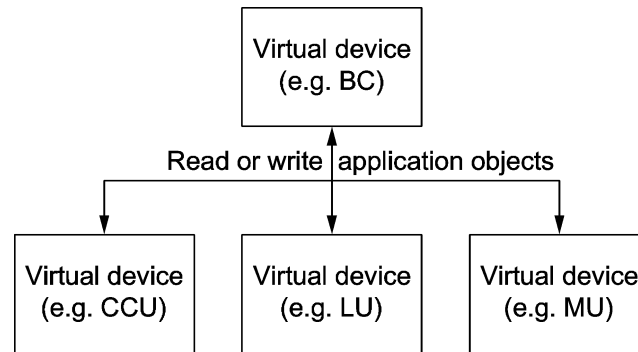


Figure 3 — Virtual devices interconnection (example)

Most of the application objects are mapped into pre-defined PDOs.

If an implemented application object is not mapped into one of the pre-defined PDOs, other CANopen devices can access them by means of SDO.

The CSDOs, which corresponds to the Default SSDO, shall be implemented always in the BC virtual device.

CANopen devices compliant to this application profile without BC functionality shall not implement any CSDO that relates to Default SSDO.

For systems not comprising a BC, additional SDO channels are needed.

This application profile pre-defines some SDO channels for dedicated functionality.

For some virtual devices up to eight instances are specified. The instances with the very same number belong to one sub-system, e.g. LU 1, MU-A 1, and WU 1 belong to sub-system 1; LU 2, MU-B 2, and WU 2 belong to sub-system 2.

When the BC is implemented, it is connected to all sub-systems.

6.2 Communication to the in-vehicle networks

The communication to the truck's in-vehicle networks is possible by means of truck gateways provided by the truck manufacturer. There are different implementations on the market as shown in the examples given in Figure 4.

In the past, most truck manufacturers provided digital and analog inputs and outputs (a). In this implementation example, the TGU only transmits and receives those objects that are not used by the BC. It is also possible to implement the TGU in a generic I/O module compliant to [CiA 401 (b)]; it provides than TGU-compliant PDOs.

Nowadays, some truck manufacturers provide a [CiA 413] or [CiA 422] compliant truck gateway (c). In this implementation example, the truck gateway provides TPDOs and RPDOs that correspond to those provided by the TGU.

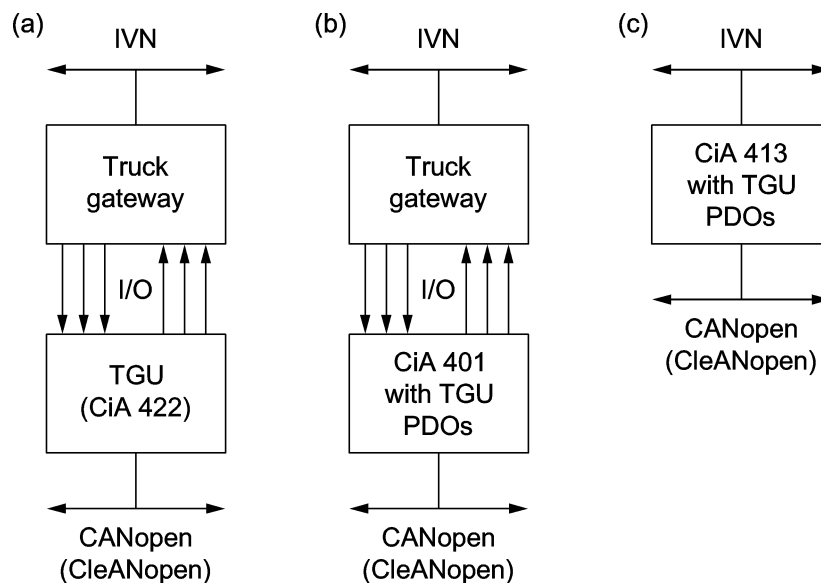


Figure 4 — Truck gateway implementation examples

If the TGU is implemented in the very same CANopen device as the BC, the communication can be done device-internally without transmitting COBs on the CAN network.

6.3 Numbering of the lifter units (LUs)

The LUs can be positioned on the vehicle in different ways. The numbering of the LUs as given in this clause shall be used for the vehicles implementing this specification. The lifter units shall be enumerated from left to right while standing in front of the lifter. One compartment consists of four LUs in maximum. The 1st compartment consists of LUs 1 to 4. If there is a second compartment on the truck (e.g. for organic waste) it consists of the LUs 5 to 8. For other configurations it is up to the system integrator to provide the LU numbering.

Figure 5 specifies the LU numbering for the single compartment front loader.

Figure 6 specifies the LU numbering for the single compartment rear loader.

Figure 7 specifies the LU numbering for the single compartment left side loader.

Figure 8 specifies the LU numbering for the single compartment right side loader.

Figure 9 specifies the LU numbering for the two-compartment rear loader.

Figure 10 specifies the LU numbering for the two-compartment combined rear and side loader.

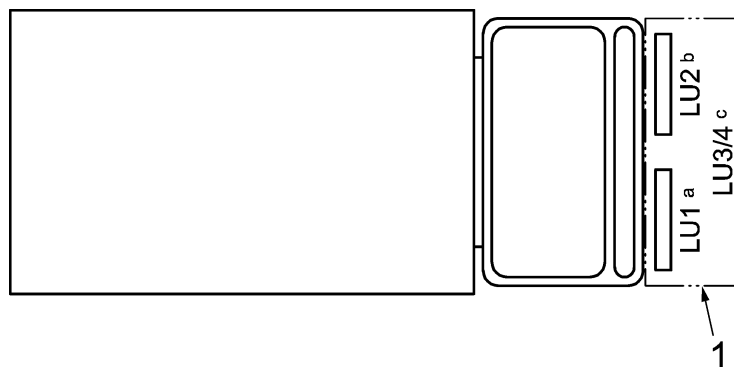


Figure 5 — LU numbering for the single compartment front loader

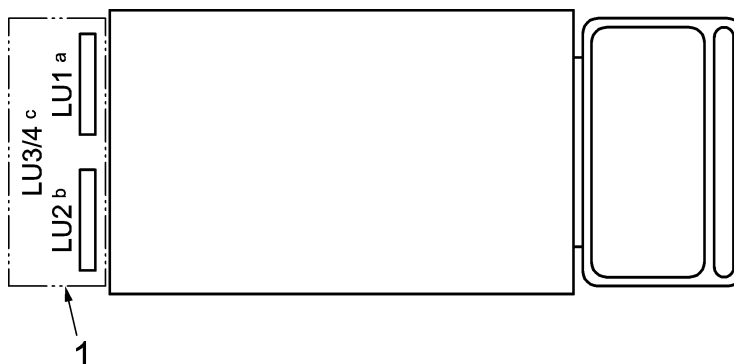


Figure 6 — LU numbering for the single compartment rear loader

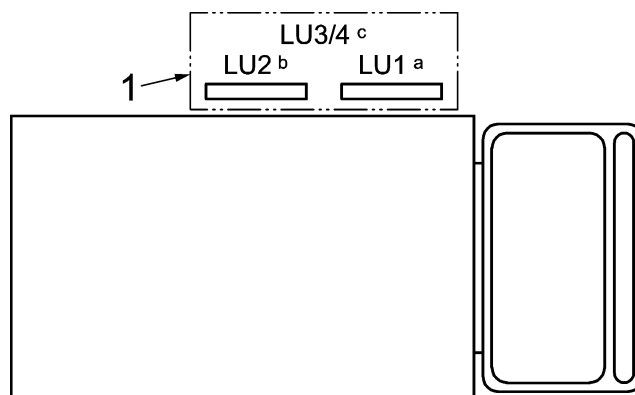


Figure 7 — LU numbering for the single compartment left side loader

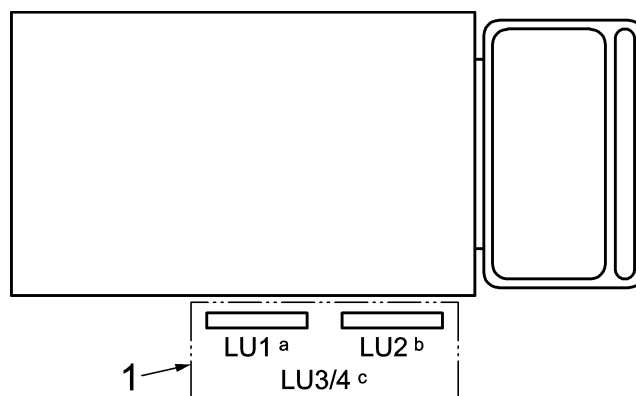


Figure 8 — LU numbering for the single compartment right side loader

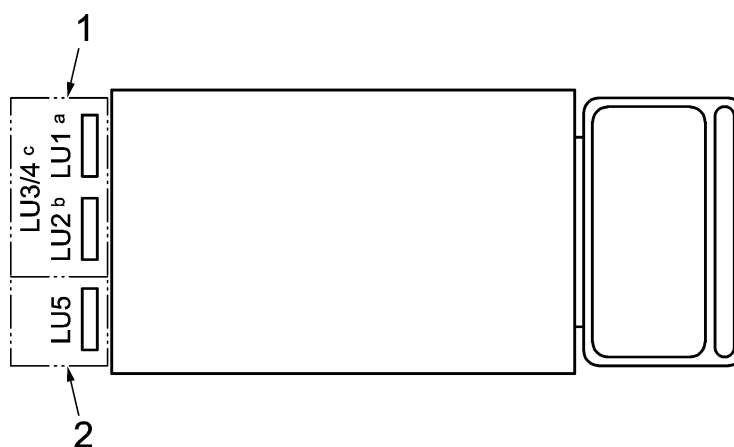


Figure 9 — LU numbering for the two compartment rear loader

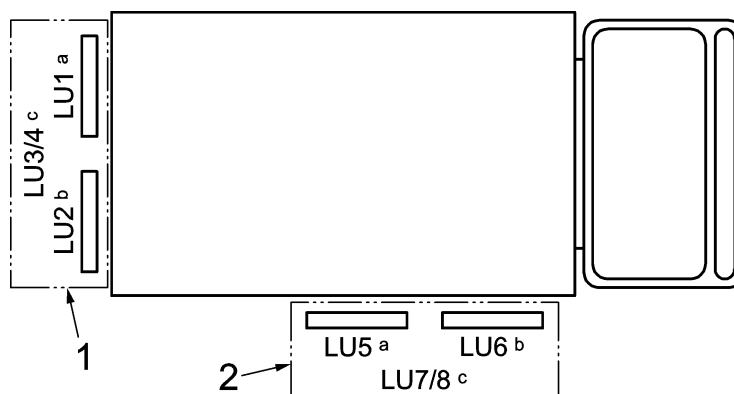


Figure 10 — LU numbering for the two compartment combined rear and side loader

6.4 Virtual device description

6.4.1 General

Every virtual device represents a specific functional unit. Some of them can be installed multiply in one application.

The following brief descriptions give an overview on the functionality of the different virtual devices.

The supported application objects are summarized in the clause on functionality of the virtual devices of this application profile.

The detailed PDO interfaces are specified in the appropriate clause on pre-defined Process Data Objects (PDO) of this application profile.

The detailed application objects are specified in the appropriate clause of this application profile.

6.4.2 Body controller (BC)

The BC is the interface to the hydraulic and the pneumatic power supply of the disposal vehicle. Related to its operating mode some other units request optionally the supply of pressure from the BC. Other units need optionally the BC status information (e.g. to estimate the intervals of maintenance) for their operations.

6.4.3 Bin classification unit (BCU)

The BCU classifies a waste bin attached to the lifter. Other units — virtual devices — use this classification for sequence control purposes:

- LU lifts and empties or does not lift and does not empty the bin.
- WU washes or does not wash the bin.

The BCU implements optionally the *measuring ident controller* (MIC) functional element. The MIC combines the results of identification (through the IDU) and a measuring (through the MU). The MIC coordinates the correct matching of measured values and the waste bin using information from IDU and LU. The MIC can detect (using the LU) the emptying of a waste bin with or without transponder.

There are up to eight BCU (1 to 8) instances possible in one logical *CleANopen* network.

6.4.4 Change container unit (CCU)

The CCU is used for changing the collecting reservoir (container) of a disposal vehicle. It is also used for providing information about the mounted container (fixed or changeable).

6.4.5 Compaction unit (CU)

The CU is used for compacting the waste and for providing information about the compaction process. It is used for synchronizing and for coordinating its activities with the LU. Other units use optionally the CU status information (e.g. to estimate the intervals of maintenance).

6.4.6 GPS unit (GPSU)

The GPSU is used for providing geographical positioning as well as date and time information, which is recorded by other units.

6.4.7 Identification unit (IDU)

The IDU is used for identifying waste bins by identifying a transponder attached to the waste bin. It can also write information to the transponder. The identification process is started by means of an explicit start command received from the MIC or automatically, when the IDU is supporting continuous identification.

6.4.8 Lifter unit (LU)

The LU is used for controlling the emptying procedure of a single waste bin. It is also used for informing additionally other units:

- about the state of a lifter,
- if a waste bin is attached or not,
- about the position of the lifter and whether the lifter is in the measuring window or not.

It is possible to configure the LU. For example, that the lifter adjust its speed in the emptying process. This is needed to consider the particular features of some other units (e.g. MU). The LU is used for communicating with the CU to inform it whether the CU is or not in operation. The LU is used for communicating with the BC to demand power supply (e.g. hydraulic).

There are up to eight LU (1 to 8) instances possible in one logical *CleANopen* network.

6.4.9 Measuring unit (MU)

The MU is used for issuing measurement results acquired while treating the bin or the container. The MU is used for abstracting particularly the functionality of scales or devices to measure the volume. As scale the MU is used for measuring the weight of waste in the waste bin. As volume measurement device the MU provides the volume of the disposed waste.

In some cases, it is necessary to measure up to two physical values on one lifter (e.g. weight and volume). For this case, the Measuring Unit A and Measuring Unit B are provided.

Especially for scales, modes for manual and automatic measuring are implemented. While automatic measurement the scale controls the entire weighing process. While manual measuring the user is responsible for control of the measuring process.

There are up to eight MU-A (1 to 8) and up to eight MU-B (1 to 8) instances possible in one logical *CleANopen* network.

6.4.10 Truck gateway unit (TGU)

The TGU is used for providing the access to the in-vehicle networks of the truck.

6.4.11 Washing unit (WU)

The WU is used for cleaning the waste bins. The LU provides the waste; it allows and starts the washing process. The WU informs about the state of the washing process and the washing equipment. While washing, no movement of the lifter is allowed.

There are up to eight WU (1 to 8) instances possible in one logical *CleANopen* network.

7 Physical layer specification

7.1 General

The CAN interface shall be compliant to the definitions and recommendations given in ISO 11898-2 and [CiA 301] and [CiA 303-1].

7.2 Bit rate

The physical CANopen device compliant to this application profile shall provide a default bit rate of 250 kbit/s and shall use the bit timing as specified in [CiA 301]. Other bit rates defined in [CiA 301] can be supported.

7.3 Bus topology

The bus topology shall be compliant to the definitions and recommendations given in ISO 11898-2, [CiA 301] and [CiA 303-1].

7.4 Bus cable

The bus cable used shall be compliant to the definitions and recommendations given in ISO 11898-2 and [CiA 303-1].

7.5 Bus connector

The bus connector used shall be compliant to the definitions and recommendations given in ISO 11898-2 and [CiA 303-1].

7.6 Node-ID assignment

The assignment of a node-ID is required for every physical CANopen device. The assignment of node-IDs is manufacturer specific. For a better plug and play behaviour the assignment of the node-IDs is recommended as shown in Table 1.

Table 1 — Recommended node ID assignment

Device	Node-ID
Body controller (BC)	10
Compaction unit (CU)	11
Container change unit (CCU)	12
Lifter unit (LU) 1 to 8	20 to 27
Bin classification unit (BCU) 1 to 8	30 to 37
Identification unit (IDU) 1 to 8	50 to 57
Measuring unit A (MU-A) 1 to 8	60 to 67
Measuring unit B (MU-B) 1 to 8	70 to 77
Washing unit (WU) 1 to 8	80 to 87
Truck gateway unit (TGU)	89
GPS unit (GPSU)	90
Monitoring device 1 to 8	91 to 98

If more than one virtual device is integrated to one CANopen device, the lowest node-ID shall be used.

8 Error handling

8.1 Principle

Emergency messages shall be triggered by internal errors in the physical device and they are assigned to high priority to ensure that they get access to the bus without latency. By default, the Emergency messages shall contain the error field with pre-defined error numbers and additional information.

8.2 Error behaviour

If a serious device failure is detected the physical device shall enter by default autonomously the pre-operational state. If object 1029_h is implemented, the physical device can be configured to enter alternatively the stopped state or remain in the current state in case of a device failure. Device failures shall include the following communication errors:

- Bus-off conditions of the CANopen interface;
- Life guarding event with the state ‘occurred’;
- Heartbeat event with state ‘occurred’.

Severe device errors also can be caused by device internal failures.

8.3 Additional error code specification

Devices compliant to this application profile specification can use the error codes as defined in [CiA 301].

The third byte of the Emergency message (first byte of) described in the EMCY protocol in [CiA 301] shall be used as defined in Figure 11.

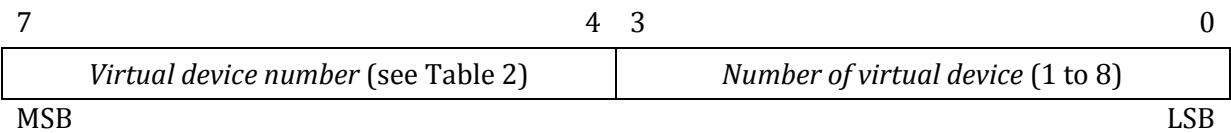


Figure 11 — Byte number 3 of the EMCY message

Table 1 — Virtual device numbers

Virtual device name	Number
BC	01 _h
CCU	03 _h
CU	04 _h
LU	05 _h
IDU	06 _h
MU-A	07 _h
BCU	08 _h
WU	09 _h
MU-B	0B _h
GPSU	0C _h
TGU	0D _h

9 Data type specification

The application objects specified in this application profile use the data types defined in [CiA 301]. The *BOOLEAN_n* data type is specified in this part of the application profile.

Data of basic data type *BOOLEAN_n* is represented as bit sequences of length *n* bit. The value attains a combination of TRUE and FALSE. The value TRUE (res. FALSE) is represented by the bit value 1 (res. 0). The profile-specific basic data types are specified in Table 3.

Table 2 — Profile specific basic data type definitions

Index	Object	Name	Examples
0060 _h	DEFTYPE	BOOLEAN2	bit ₁ , bit ₂
0061 _h	DEFTYPE	BOOLEAN3	bit ₁ , bit ₂ , bit ₃
0062 _h	DEFTYPE	BOOLEAN4	bit ₁ , bit ₂ , bit ₃ , bit ₄

10 Object dictionary entries

10.1 General

Every CANopen device compliant with this application profile supports some general communication and application objects as well as virtual device specific application objects. It consists of one or more virtual devices as defined in [CiA301]. A virtual device shall not be distributed to several CANopen devices. Each virtual device supports a set of mandatory function-depending application objects and can implement additionally a variable set of optional application objects.

All objects are specified by means of object and entry description as defined in [CiA301]. The description attributes are defined in [CiA301]. The *category* attribute indicates, if an object shall be supported (*Mandatory*) or can be supported (*Optional*). The *access* attribute indicates, if an object is constant (*const*), read only (*ro*), read/write (*rw*) or write only (*wo*). *Read only* indicates that this object shall not be written via the bus; *read/write* allows to read and to write this object; and *write only* means that this object shall be not read via the bus. The *default value* attribute defines the behavior of objects after power-on or NMT application reset.

The information given in 10.3 about application objects mapped into PDOs is informative, except the mapped *dummy* objects, they shall be mapped.

10.2 General communication objects

10.2.1 General

CANopen devices compliant with this application profile use default values for some communication objects (1000_h to 1FFF_h), which are not specified in all details in [CiA301]. In the following sub-clauses these default values are specified in details.

10.2.2 Object 1000_h: Device type

This object describes the type of device and its functionality. The object and entry description are given in [CiA301]. Figure 12 shows the object structure and Table 4 defines the values for the *virtual device code* field.

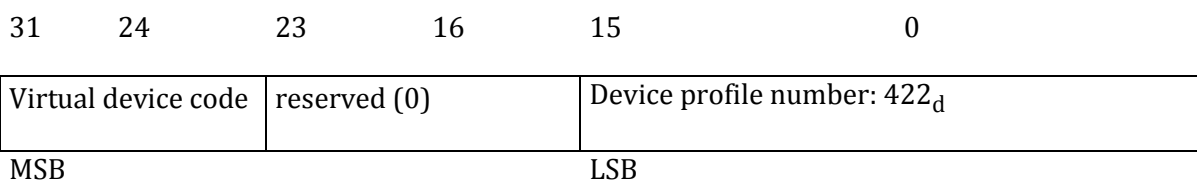


Figure 1 — Object structure

Table 3 — Virtual device code values

Code	Function
01 _h	Body controller (BC)
02 _h	reserved for compatibility reason
03 _h	Change container unit (CCU)
04 _h	Compaction unit (CU)
05 _h	Lifter unit (LU)
06 _h	Identification unit (IDU)
07 _h	Measuring unit A (MU-A)
08 _h	Bin classification unit (BCU)
09 _h	Washing unit (WU)
0A _h	reserved for compatibility reason

Code	Function
0B _h	Measuring unit B (MU-B)
0C _h	GPS unit (GPSU)
0D _h	Truck gateway unit (TGU)
0E _h	reserved for future use by CiA
.....	
FD _h	reserved for future use by CiA
FE _h	Monitoring device
FF _h	reserved

10.2.3 Object 1001_h: Error register

The device profile specific bit in the error register is reserved for future use. The object and entry description are given in [CiA301].

10.2.4 Object 1016_h: Consumer heartbeat times

This object shall be implemented, if the CANopen device receives event-triggered PDOs. The consumer heartbeat times are manufacturer-specific. The object and entry description are given in [CiA301].

10.2.5 Object 1017_h: Producer heartbeat time

This object shall be implemented. The heartbeat producer time shall be set to > 0 by default; the value is manufacturer-specific. The object and entry description are given in [CiA301].

10.2.6 Object 1018_h: Identity

This object is mandatory and contains in sub-index 01_h the unique vendor-ID assigned by CiA. Sub-index 02_h to 04_h are optional. The object and entry description are given in [CiA301].

10.2.7 Object 1029_h: Error behavior

This object specifies to which state the physical device shall be set, when a communication error or a device internal error is detected. Besides the specification given in [CiA301] the following sub-indexes can be implemented optionally. If the entire object is not implemented the CANopen device shall behave as the default values define.

Table 5 defines the values.

Table 4 — Value definition

Value	Definition
00 _h	Change to NMT state Pre-operational (only if currently in NMT state Operational)
01 _h	No change of the NMT state
02 _h	Change to NMT state Stopped

The object description and the entry description for sub-index 00_h and 01_h are given in [CiA301]. Table 6 specifies the entry description for sub-index 02_h.

Table 5 — Entry description for sub index 02h

Attribute	Value
Sub-index	02 _h
Description	Internal device error
Access	rw
Entry category	Optional
PDO mapping	No
Value range	00 _h to 02 _h
Default value	00 _h

10.2.8 Object 1F80_h: NMT startup

This object shall be implemented. The object entry description is given in [CiA302-2]. The default value shall be the value for self-starting devices (see [CiA303-2]).

10.3 Supported application objects, PDOs, and SDOs

10.3.1 General

If a specific entity of a virtual device is implemented in the CANopen device (e.g. IDU 4), in all relevant application objects the related sub-indexes (in this example 04_h) need to be implemented. If several entities of a virtual device are implemented in the CANopen device (e.g. LU 2 and LU 6), in all relevant application objects the two related sub-indexes (in this example 02_h and 04_h) need to be implemented.

The CANopen device, which implements one or more entities of a virtual device, needs to support the related TPDOs and RPDOs. For example: If WU 3 and WU 5 are implemented, TPD 60 and TPDO 92 (containing the WU status and WU-to-BC request) as well as RPDO 64 and RPDO 96 (containing the WU-to-BC status) need to be supported (see Table 25).

10.3.2 General application objects

Every CANopen device compliant with this application profile can implement the application objects shown in Table 7. The *category*, *access*, and *default value* attributes shall be used.

Table 6 — General application objects

Index	Name	Cat.	Acc.	Default value
6000 _h	Supported virtual device types (NOTE)	C	const	Manufacturer-specific
6001 _h	Supported profile version	O	const	Manufacturer-specific
6008 _h	Absolute work hours	O	ro	No
NOTE Mandatory for CANopen devices supporting more than one virtual device.				

10.3.3 Body controller (BC)

All applications objects used by the BC virtual device are listed in Table 8. The *category*, *access*, and *default value* attributes shall be used.

Table 7 — BC specific application objects

Index	Name	Cat.	Acc.	Default value
6020 _h	Body controller status	M	ro	No
6100 _h	Lifter unit status	O	rw	3FFF _h
6130 _h	Lifter unit body controller request	M	rw	FF _h
6131 _h	Lifter unit body controller status	M	ro	No
6140 _h	Identification unit status	O	rw	3FFF _h
6161 _h	Measuring unit A extended status	O	rw	1FFF FFFF _h
6171 _h	Measuring unit B extended status	O	rw	1FFF FFFF _h
6180 _h	Bin classification unit status	O	rw	3FFF _h
61A0 _h	Washing unit status	O	rw	3FFF _h
61B0 _h	Washing unit body controller request	O	rw	FF _h
61B1 _h	Washing unit body controller status	O	ro	No
61C1 _h	Measuring ident controller extended status	O	rw	3FFF FFFF _h
6300 _h	Compaction unit status	O	rw	3FFF _h
6310 _h	Compaction unit body controller request	O	rw	FF _h
6311 _h	Compaction unit body controller status	O	ro	No
6320 _h	Change container unit status	O	rw	3FFF _h
6330 _h	Change container unit body controller request	O	rw	FF _h
6331 _h	Change container unit body controller status	M	ro	No
6406 _h	Vehicle speed	O	rw	FFFF _h
6408 _h	Engine speed	O	rw	FFFF _h
640A _h	Maximum vehicle speed limit	O	rw	FF _h
6410 _h	First clutch dependent PTO feedback	O	rw	TRUE TRUE
6411 _h	Second clutch dependent PTO feedback	O	rw	TRUE TRUE
6412 _h	Clutch independent PTO feedback	O	rw	TRUE TRUE
6413 _h	First engine mounted PTO feedback	O	rw	TRUE TRUE
6414 _h	Second engine mounted PTO feedback	O	rw	TRUE TRUE
6416 _h	Parking brake device active	O	rw	TRUE TRUE

Index	Name	Cat.	Acc.	Default value
6418 _h	Stopping brake device active	0	rw	TRUE TRUE
6419 _h	First clutch dependent PTO engagement consent	0	rw	TRUE TRUE
641A _h	Second clutch dependent PTO engagement consent	0	rw	TRUE TRUE
641B _h	Clutch independent PTO engagement consent	0	rw	TRUE TRUE
641C _h	First engine mounted PTO engagement consent	0	rw	TRUE TRUE
641D _h	Second engine mounted PTO engagement consent	0	rw	TRUE TRUE
641E _h	Transmission neutral switch active	0	rw	TRUE TRUE
641F _h	Transmission reverse direction switch active	0	rw	TRUE TRUE
6420 _h	Clutch closed state active	0	rw	TRUE TRUE
6422 _h	Engine speed control upper limit allowed	0	rw	TRUE TRUE
6423 _h	Engine speed control lower limit allowed	0	rw	TRUE TRUE
6424 _h	Engine speed control allowed	0	rw	TRUE TRUE
6426 _h	Engine stop allowed	0	rw	TRUE TRUE
6427 _h	Vehicle speed limit control allowed	0	rw	TRUE TRUE
642D _h	First clutch dependent PTO switch	0	ro	No
642E _h	Second clutch dependent PTO switch	0	ro	No
642F _h	Clutch independent PTO switch	0	ro	No
6430 _h	First engine mounted PTO switch	0	ro	No
6431 _h	Second engine mounted PTO switch	0	ro	No
6432 _h	Engine stop switch	0	ro	No
6435 _h	Requested engine speed lower limit	0	ro	No
643C _h	Request engine speed	0	ro	No
643D _h	Remote emergency light request	0	ro	No
643E _h	Stopping brake device request	0	ro	No
67F0 _h	Boolean 4	0	const	TRUE TRUE TRUE TRUE

In Table 9 it is specified, which PDOs the BC virtual device shall (category = M) and can (category = 0) support. The PDO numbers and mapped application objects for virtual device entities are given for the entity 1 without brackets, the PDO number and mapped application objects (sub-index corresponds to the entity no.) for the entities 2 to 8 are given in brackets.

If the CANopen device implements the corresponding TPDO and RPDO, the PDO is normally communicated device-internally and not via CAN. The PDO communication and mapping parameter sets are specified in detail in Clauses 11 to 15.

Table 8 — PDOs supported by the BC virtual device

PDO no.	Cat.	Mapped application objects
TPDO 7	M	6020 00 _h , 6331 00 _h
TPDO 10	O	6311 00 _h
TPDO 32 (TPDO 48) (TPDO 64) (TPDO 80) (TPDO 96) (TPDO 112) (TPDO 128) (TPDO 144)	O	6131 01 _h , 61B1 01 _h (6131 02 _h , 61B1 02 _h) (6131 03 _h , 61B1 03 _h) (6131 04 _h , 61B1 04 _h) (6131 05 _h , 61B1 05 _h) (6131 06 _h , 61B1 06 _h) (6131 07 _h , 61B1 07 _h) (6131 08 _h , 61B1 08 _h)
TPDO 260	O	643C 01 _h , 6435 01 _h , 642D 00 _h , 642E 00 _h , 642F 00 _h , 6430 00 _h , 6431 00 _h , 643D 00 _h , 643E 00 _h , 6432 00 _h , 67F0 00 _h
RPDO 5	O	6320 00 _h , 6330 00 _h
RPDO 9	O	6300 00 _h , 6310 00 _h
RPDO 18 (RPDO 34) (RPDO 50) (RPDO 66) (RPDO 82) (RPDO 98) (RPDO 114) (RPDO 130)	O	6100 01 _h , 6130 01 _h (6100 02 _h , 6130 02 _h) (6100 03 _h , 6130 03 _h) (6100 04 _h , 6130 04 _h) (6100 05 _h , 6130 05 _h) (6100 06 _h , 6130 06 _h) (6100 07 _h , 6130 07 _h) (6100 08 _h , 6130 08 _h)
RPDO 20 (RPDO 36) (RPDO 52) (RPDO 68) (RPDO 84) (RPDO 100) (RPDO 116) (RPDO 132)	O	6140 01 _h (6140 02 _h) (6140 03 _h) (6140 04 _h) (6140 05 _h) (6140 06 _h) (6140 07 _h) (6140 08 _h)
RPDO 11 (RPDO 14) (RPDO 31) (RPDO 79) (RPDO 127) (RPDO 262) (RPDO 265) (RPDO 268)	O	6161 01 _h , 0004 00 _h (6161 02 _h , 0004 00 _h) (6161 03 _h , 0004 00 _h) (6161 04 _h , 0004 00 _h) (6161 05 _h , 0004 00 _h) (6161 06 _h , 0004 00 _h) (6161 07 _h , 0004 00 _h) (6161 08 _h , 0004 00 _h)

PDO no.	Cat.	Mapped application objects
RPDO 27 (RPDO 43) (RPDO 59) (RPDO 75) (RPDO 91) (RPDO 107) (RPDO 123) (RPDO 139)	0	6180 01 _h , 0006 00 _h (6180 02 _h , 0006 00 _h) (6180 03 _h , 0006 00 _h) (6180 04 _h , 0006 00 _h) (6180 05 _h , 0006 00 _h) (6180 06 _h , 0006 00 _h) (6180 07 _h , 0006 00 _h) (6180 08 _h , 0006 00 _h)
RPDO 28 (RPDO 44) (RPDO 60) (RPDO 76) (RPDO 92) (RPDO 108) (RPDO 124) (RPDO 140)	0	61A0 01 _h , 61B0 01 _h (61A0 02 _h , 61B0 02 _h) (61A0 03 _h , 61B0 03 _h) (61A0 04 _h , 61B0 04 _h) (61A0 05 _h , 61B0 05 _h) (61A0 06 _h , 61B0 06 _h) (61A0 07 _h , 61B0 07 _h) (61A0 08 _h , 61B0 08 _h)
RPDO 30 (RPDO 46) (RPDO 62) (RPDO 78) (RPDO 94) (RPDO 110) (RPDO 126) (RPDO 142)	0	61C1 01 _h (61C1 02 _h) (61C1 03 _h) (61C1 04 _h) (61C1 05 _h) (61C1 06 _h) (61C1 07 _h) (61C1 08 _h)
RPDO 257	0	6410 00 _h , 6411 00 _h , 6412 00 _h , 6413 00 _h , 6414 00 _h , 6418 00 _h , 6419 00 _h , 641A 00 _h , 641B 00 _h , 641C 00 _h , 641D 00 _h , 641E 00 _h , 641F 00 _h , 6420 00 _h , 0062 00 _h
RPDO 258	0	6416 00 _h , 6422 00 _h , 6423 00 _h , 6424 00 _h , 6426 00 _h , 6427 00 _h
RPDO 259	0	6406 01 _h , 6408 01 _h , 640A 01 _h , 6428 00 _h
RPDO 391 (RPDO 407) (RPDO 423) (RPDO 439) (RPDO 455) (RPDO 471) (RPDO 487) (RPDO 503)	0	6171 01 _h , 0004 00 _h (6171 02 _h , 0004 00 _h) (6171 03 _h , 0004 00 _h) (6171 04 _h , 0004 00 _h) (6171 05 _h , 0004 00 _h) (6171 06 _h , 0004 00 _h) (6171 07 _h , 0004 00 _h) (6171 08 _h , 0004 00 _h)

10.3.4 Change container unit

All applications objects used by the CCU virtual device are listed in Table 10. The *category*, *access*, and *default value* attributes shall be used.

Table 9 — CCU specific application objects

Index	Name	Cat.	Acc.	Default value
6020 _h	Body controller status	M	rw	3FFF _h
6100 _h	Lifter unit status	O	rw	3FFF _h
6140 _h	Identification unit status	O	rw	3FFF _h
6161 _h	Measuring unit A extended status	O	rw	1FFF FFFF _h
6171 _h	Measuring unit B extended status	O	rw	1FFF FFFF _h
6180 _h	Bin classification status	O	rw	3FFF _h
61A0 _h	Washing unit status	O	rw	3FFF _h
61C1 _h	Measuring ident controller extended status	O	rw	3FFF FFFF _h
6300 _h	Compaction unit status	O	rw	3FFF _h
6320 _h	Change container unit status	M	ro	No
6322 _h	Change container unit position	M	ro	No
6330 _h	Change container unit body controller request	M	ro	No
6331 _h	Change container unit body controller status	M	rw	FF _h

In Table 11, it is specified which PDOs the CCU virtual device shall (category = M) and can (category = O) support. The PDO numbers and mapped application objects for virtual device entities are given for the entity 1 without brackets, the PDO number and mapped application objects (sub-index corresponds to the entity no.) for the entities 2 to 8 are given in brackets.

If the CANopen device implements the corresponding TPDO and RPDO, the PDO is normally communicated device-internally and not via CAN. The PDO communication and mapping parameter sets are specified in detail in Clause 11 to 15.

Table 10 — PDOs supported by the CCU virtual device

PDO no.	Cat.	Mapped application objects
TPDO 5	M	6320 00 _h , 6330 00 _h
TPDO 6	M	6320 00 _h , 6322 00 _h
RPDO 7	M	6020 00 _h , 6331 00 _h
RPDO 9	O	6300 00 _h , 0005 00 _h
RPDO 18 (RPDO 34) (RPDO 50) (RPDO 66) (RPDO 82) (RPDO 98) (RPDO 114) (RPDO 130)	O	6100 01 _h , 0005 00 _h (6100 02 _h , 0005 00 _h) (6100 03 _h , 0005 00 _h) (6100 04 _h , 0005 00 _h) (6100 05 _h , 0005 00 _h) (6100 06 _h , 0005 00 _h) (6100 07 _h , 0005 00 _h) (6100 08 _h , 0005 00 _h)
RPDO 20 (RPDO 36) (RPDO 52) (RPDO 68) (RPDO 84) (RPDO 100) (RPDO 116) (RPDO 132)	O	6140 01 _h (6140 02 _h) (6140 03 _h) (6140 04 _h) (6140 05 _h) (6140 06 _h) (6140 07 _h) (6140 08 _h)
RPDO 11 (RPDO 14) (RPDO 31) (RPDO 79) (RPDO 127) (RPDO 262) (RPDO 265) (RPDO 268)	O	6161 01 _h , 0004 00 _h (6161 02 _h , 0004 00 _h) (6161 03 _h , 0004 00 _h) (6161 04 _h , 0004 00 _h) (6161 05 _h , 0004 00 _h) (6161 06 _h , 0004 00 _h) (6161 07 _h , 0004 00 _h) (6161 08 _h , 0004 00 _h)
RPDO 27 (RPDO 43) (RPDO 59) (RPDO 75) (RPDO 91) (RPDO 107) (RPDO 123) (RPDO 139)	O	6180 01 _h , 0006 00 _h (6180 02 _h , 0006 00 _h) (6180 03 _h , 0006 00 _h) (6180 04 _h , 0006 00 _h) (6180 05 _h , 0006 00 _h) (6180 06 _h , 0006 00 _h) (6180 07 _h , 0006 00 _h) (6180 08 _h , 0006 00 _h)

PDO no.	Cat.	Mapped application objects
RPDO 28 (RPDO 44) (RPDO 60) (RPDO 76) (RPDO 92) (RPDO 108) (RPDO 124) (RPDO 140)	0	61A0 01 _h , 0005 00 _h (61A0 02 _h , 0005 00 _h) (61A0 03 _h , 0005 00 _h) (61A0 04 _h , 0005 00 _h) (61A0 05 _h , 0005 00 _h) (61A0 06 _h , 0005 00 _h) (61A0 07 _h , 0005 00 _h) (61A0 08 _h , 0005 00 _h)
RPDO 30 (RPDO 46) (RPDO 62) (RPDO 78) (RPDO 94) (RPDO 110) (RPDO 126) (RPDO 142)	0	61C1 01 _h (61C1 02 _h) (61C1 03 _h) (61C1 04 _h) (61C1 05 _h) (61C1 06 _h) (61C1 07 _h) (61C1 08 _h)
RPDO 391 (RPDO 407) (RPDO 423) (RPDO 439) (RPDO 455) (RPDO 471) (RPDO 487) (RPDO 503)	0	6171 01 _h , 0004 00 _h (6171 02 _h , 0004 00 _h) (6171 03 _h , 0004 00 _h) (6171 04 _h , 0004 00 _h) (6171 05 _h , 0004 00 _h) (6171 06 _h , 0004 00 _h) (6171 07 _h , 0004 00 _h) (6171 08 _h , 0004 00 _h)

10.3.5 Compaction unit

All applications objects used by the CU virtual device are listed in Table 12. The *category*, *access*, and *default value* attributes shall be used.

Table 11 — CU specific application objects

Index	Name	Cat.	Acc.	Default value
6020 _h	Body controller status	0	rw	3FFF _h
6100 _h	Lifter unit status	0	rw	3FFF _h
6102 _h	Lifter unit position	0	rw	FFFF _h
6140 _h	Identification unit status	0	rw	3FFF _h
6161 _h	Measuring unit A extended status	0	rw	1FFF FFFF _h
6171 _h	Measuring unit B extended status	0	rw	1FFF FFFF _h
6180 _h	Bin classification status	0	rw	3FFF _h
61A0 _h	Washing unit status	0	rw	3FFF _h
61C1 _h	Measuring ident controller extended status	0	rw	3FFF FFFF _h

Index	Name	Cat.	Acc.	Default value
6300 _h	Compaction unit status	M	ro	No
6310 _h	Compaction unit body controller request	M	ro	No
6311 _h	Compaction unit body controller status	M	rw	FF _h
6320 _h	Change container unit status	O	rw	3FFF _h
6322 _h	Change container unit position	O	rw	FFFF _h

In Table 13, it is specified, which PDOs the CU virtual device shall (category = M) and can (category = O) support. The PDO numbers and mapped application objects for virtual device entities are given for the entity 1 without brackets, the PDO number and mapped application objects (sub-index corresponds to the entity no.) for the entities 2 to 8 are given in brackets.

If the CANopen device implements the corresponding TPDO and RPDO, the PDO is normally communicated device-internally and not via CAN. The PDO communication and mapping parameter sets are specified in detail in Clause 11 to 15.

Table 12 — PDOs supported by the CU virtual device

PDO no.	Cat.	Mapped application objects
TPDO 9	M	6300 00 _h , 6310 00 _h
RPDO 5	O	6320 00 _h , 0005 00 _h
RPDO 6	O	6320 00 _h , 6322 00 _h
RPDO 7	O	6020 00 _h , 0005 00 _h
RPDO 10	O	6311 00 _h
RPDO 18 (RPDO 34) (RPDO 50) (RPDO 66) (RPDO 82) (RPDO 98) (RPDO 114) (RPDO 130)	O	6100 01 _h , 0005 00 _h (6100 02 _h , 0005 00 _h) (6100 03 _h , 0005 00 _h) (6100 04 _h , 0005 00 _h) (6100 05 _h , 0005 00 _h) (6100 06 _h , 0005 00 _h) (6100 07 _h , 0005 00 _h) (6100 08 _h , 0005 00 _h)
RPDO 19 (RPDO 35) (RPDO 51) (RPDO 67) (RPDO 83) (RPDO 99) (RPDO 115) (RPDO 131)	O	6100 01 _h , 6102 01 _h (6100 02 _h , 6102 02 _h) (6100 03 _h , 6102 03 _h) (6100 04 _h , 6102 04 _h) (6100 05 _h , 6102 05 _h) (6100 06 _h , 6102 06 _h) (6100 07 _h , 6102 07 _h) (6100 08 _h , 6102 08 _h)

PDO no.	Cat.	Mapped application objects
RPDO 20 (RPDO 36) (RPDO 52) (RPDO 68) (RPDO 84) (RPDO 100) (RPDO 116) (RPDO 132)	0	6140 01 _h (6140 02 _h) (6140 03 _h) (6140 04 _h) (6140 05 _h) (6140 06 _h) (6140 07 _h) (6140 08 _h)
RPDO 11 (RPDO 14) (RPDO 31) (RPDO 79) (RPDO 127) (RPDO 262) (RPDO 265) (RPDO 268)	0	6161 01 _h , 0004 00 _h (6161 02 _h , 0004 00 _h) (6161 03 _h , 0004 00 _h) (6161 04 _h , 0004 00 _h) (6161 05 _h , 0004 00 _h) (6161 06 _h , 0004 00 _h) (6161 07 _h , 0004 00 _h) (6161 08 _h , 0004 00 _h)
RPDO 27 (RPDO 43) (RPDO 59) (RPDO 75) (RPDO 91) (RPDO 107) (RPDO 123) (RPDO 139)	0	6180 01 _h , 0006 00 _h (6180 02 _h , 0006 00 _h) (6180 03 _h , 0006 00 _h) (6180 04 _h , 0006 00 _h) (6180 05 _h , 0006 00 _h) (6180 06 _h , 0006 00 _h) (6180 07 _h , 0006 00 _h) (6180 08 _h , 0006 00 _h)
RPDO 28 (RPDO 44) (RPDO 60) (RPDO 76) (RPDO 92) (RPDO 108) (RPDO 124) (RPDO 140)	0	61A0 01 _h , 0005 00 _h (61A0 02 _h , 0005 00 _h) (61A0 03 _h , 0005 00 _h) (61A0 04 _h , 0005 00 _h) (61A0 05 _h , 0005 00 _h) (61A0 06 _h , 0005 00 _h) (61A0 07 _h , 0005 00 _h) (61A0 08 _h , 0005 00 _h)
RPDO 30 (RPDO 46) (RPDO 62) (RPDO 78) (RPDO 94) (RPDO 110) (RPDO 126) (RPDO 142)	0	61C1 01 _h (61C1 02 _h) (61C1 03 _h) (61C1 04 _h) (61C1 05 _h) (61C1 06 _h) (61C1 07 _h) (61C1 08 _h)

PDO no.	Cat.	Mapped application objects
RPDO 391 (RPDO 407) (RPDO 423) (RPDO 439) (RPDO 455) (RPDO 471) (RPDO 487) (RPDO 503)	0	6171 01 _h , 0004 00 _h (6171 02 _h , 0004 00 _h) (6171 03 _h , 0004 00 _h) (6171 04 _h , 0004 00 _h) (6171 05 _h , 0004 00 _h) (6171 06 _h , 0004 00 _h) (6171 07 _h , 0004 00 _h) (6171 08 _h , 0004 00 _h)

10.3.6 Lifter unit

All generic applications objects used by the LU virtual device are listed in Table 14. The *category*, *access*, and *default value* attributes shall be used.

Table 13 — LU specifics application objects

Index	Name	Cat.	Acc.	Default value
6020 _h	Body controller status	0	rw	3FFF _h
6100 _h	Lifter unit status	M	ro	No
6102 _h	Lifter unit position	M	ro	No
6104 _h	Lifter unit bin counter	0	ro	No
6105 _h	Lifter unit absolute bin counter	0	ro	No
6108 _h	Lifter unit configuration	0	ro	No
610A _h	Lifter unit measuring window low position	0	rw	FFFF _h
610B _h	Lifter unit measuring window high position	0	rw	FFFF _h
6111 _h	Lifter unit speed table up speed position 1	0	rw	FFFF _h
6112 _h	Lifter unit speed table up speed position 2	0	rw	FFFF _h
6113 _h	Lifter unit speed table up speed position 3	0	rw	FFFF _h
6114 _h	Lifter unit speed table up speed position 4	0	rw	FFFF _h
6115 _h	Lifter unit speed table up speed position 5	0	rw	FFFF _h
6116 _h	Lifter unit speed table up speed position 6	0	rw	FFFF _h
6117 _h	Lifter unit speed table up speed position 7	0	rw	FFFF _h
6118 _h	Lifter unit speed table up speed position 8	0	rw	FFFF _h
6119 _h	Lifter unit speed table up speed position 9	0	rw	FFFF _h
611A _h	Lifter unit speed table up speed position 10	0	rw	FFFF _h
6121 _h	Lifter unit speed table down speed position 1	0	rw	FFFF _h
6122 _h	Lifter unit speed table down speed position 2	0	rw	FFFF _h

Index	Name	Cat.	Acc.	Default value
6123 _h	Lifter unit speed table down speed position 3	0	rw	FFFF _h
6124 _h	Lifter unit speed table down speed position 4	0	rw	FFFF _h
6125 _h	Lifter unit speed table down speed position 5	0	rw	FFFF _h
6126 _h	Lifter unit speed table down speed position 6	0	rw	FFFF _h
6127 _h	Lifter unit speed table down speed position 7	0	rw	FFFF _h
6128 _h	Lifter unit speed table down speed position 8	0	rw	FFFF _h
6129 _h	Lifter unit speed table down speed position 9	0	rw	FFFF _h
612A _h	Lifter unit speed table down speed position 10	0	rw	FFFF _h
6130 _h	Lifter unit body controller request	0	ro	No
6131 _h	Lifter unit body controller status	0	rw	FF _h
6140 _h	Identification unit status	0	rw	3FFF _h
6161 _h	Measuring unit A extended status	0	rw	1FFF FFFF _h
6171 _h	Measuring unit B extended status	0	rw	1FFF FFFF _h
6180 _h	Bin classification unit status	0	rw	3FFF _h
61A0 _h	Washing unit status	0	rw	3FFF _h
61C1 _h	Measuring ident controller extended status	0	rw	3FFF FFFF _h
6300 _h	Compaction unit status	0	rw	3FFF _h
6320 _h	Change container unit status	0	rw	3FFF _h
6322 _h	Change container unit position	0	rw	FF _h

In Table 15, it is specified, which PDOs the LU virtual device shall (category = M) and can (category = O) support. The instance-specific PDOs of LU 1 are listed without brackets; the related PDOs for LU 2 to LU 8 are given in brackets. The PDO numbers and mapped application objects for other virtual device entities are given for the entity 1 without brackets, the PDO number and mapped application objects (sub-index corresponds to the entity no.) for the entities 2 to 8 are given in brackets.

If the CANopen device implements the corresponding TPDO and RPDO, the PDO is normally communicated device-internally and not via CAN. The PDO communication and mapping parameter sets are specified in detail in Clauses 11 to 15.

Table 14 — PDOs supported by the LU virtual device

PDO no.	Cat.	Mapped application objects
TPDO 18 (TPDO 34) (TPDO 50) (TPDO 66) (TPDO 82) (TPDO 98) (TPDO 114) (TPDO 130)	O	6100 01 _h , 6130 01 _h (6100 02 _h , 6130 02 _h) (6100 03 _h , 6130 03 _h) (6100 04 _h , 6130 04 _h) (6100 05 _h , 6130 05 _h) (6100 06 _h , 6130 06 _h) (6100 07 _h , 6130 07 _h) (6100 08 _h , 6130 08 _h)
TPDO 19 (TPDO 35) (TPDO 51) (TPDO 67) (TPDO 83) (TPDO 99) (TPDO 115) (TPDO 131)	M	6100 01 _h , 6102 01 _h (6100 02 _h , 6102 02 _h) (6100 03 _h , 6102 03 _h) (6100 04 _h , 6102 04 _h) (6100 05 _h , 6102 05 _h) (6100 06 _h , 6102 06 _h) (6100 07 _h , 6102 07 _h) (6100 08 _h , 6102 08 _h)
RPDO 5	O	6320 00 _h , 0005 00 _h
RPDO 6	O	6320 00 _h , 6322 00 _h
RPDO 7	O	6020 00 _h , 0005 00 _h
RPDO 9	O	6300 00 _h , 0005 00 _h
RPDO 20 (RPDO 36) (RPDO 52) (RPDO 68) (RPDO 84) (RPDO 100) (RPDO 116) (RPDO 132)	O	6140 01 _h (6140 02 _h) (6140 03 _h) (6140 04 _h) (6140 05 _h) (6140 06 _h) (6140 07 _h) (6140 08 _h)
RPDO 11 (RPDO 14) (RPDO 31) (RPDO 79) (RPDO 127) (RPDO 262) (RPDO 265) (RPDO 268)	O	6161 01 _h , 0004 00 _h (6161 02 _h , 0004 00 _h) (6161 03 _h , 0004 00 _h) (6161 04 _h , 0004 00 _h) (6161 05 _h , 0004 00 _h) (6161 06 _h , 0004 00 _h) (6161 07 _h , 0004 00 _h) (6161 08 _h , 0004 00 _h)

PDO no.	Cat.	Mapped application objects
RPDO 27 (RPDO 43) (RPDO 59) (RPDO 75) (RPDO 91) (RPDO 107) (RPDO 123) (RPDO 139)	0	6180 01 _h , 0006 00 _h (6180 02 _h , 0006 00 _h) (6180 03 _h , 0006 00 _h) (6180 04 _h , 0006 00 _h) (6180 05 _h , 0006 00 _h) (6180 06 _h , 0006 00 _h) (6180 07 _h , 0006 00 _h) (6180 08 _h , 0006 00 _h)
RPDO 28 (RPDO 44) (RPDO 60) (RPDO 76) (RPDO 92) (RPDO 108) (RPDO 124) (RPDO 140)	0	61A0 01 _h , 0005 00 _h (61A0 02 _h , 0005 00 _h) (61A0 03 _h , 0005 00 _h) (61A0 04 _h , 0005 00 _h) (61A0 05 _h , 0005 00 _h) (61A0 06 _h , 0005 00 _h) (61A0 07 _h , 0005 00 _h) (61A0 08 _h , 0005 00 _h)
RPDO 30 (RPDO 46) (RPDO 62) (RPDO 78) (RPDO 94) (RPDO 110) (RPDO 126) (RPDO 142)	0	61C1 01 _h (61C1 02 _h) (61C1 03 _h) (61C1 04 _h) (61C1 05 _h) (61C1 06 _h) (61C1 07 _h) (61C1 08 _h)
RPDO 32 (RPDO 48) (RPDO 64) (RPDO 80) (RPDO 96) (RPDO 112) (RPDO 128) (RPDO 144)	0	6131 01 _h , 61B1 01 _h (6131 02 _h , 61B1 02 _h) (6131 03 _h , 61B1 03 _h) (6131 04 _h , 61B1 04 _h) (6131 05 _h , 61B1 05 _h) (6131 06 _h , 61B1 06 _h) (6131 07 _h , 61B1 07 _h) (6131 08 _h , 61B1 08 _h)
RPDO 391 (RPDO 407) (RPDO 423) (RPDO 439) (RPDO 455) (RPDO 471) (RPDO 487) (RPDO 503)	0	6171 01 _h , 0004 00 _h (6171 02 _h , 0004 00 _h) (6171 03 _h , 0004 00 _h) (6171 04 _h , 0004 00 _h) (6171 05 _h , 0004 00 _h) (6171 06 _h , 0004 00 _h) (6171 07 _h , 0004 00 _h) (6171 08 _h , 0004 00 _h)

10.3.7 Identification unit

All applications objects used by the IDU virtual device are listed in Table 16. The *category*, *access*, and *default value* attributes shall be used.

Table 15 — IDU specific application objects

Index	Name	Cat.	Acc.	Default value
6020 _h	Body controller status	0	rw	3FFF _h
6100 _h	Lifter unit status	0	rw	3FFF _h
6140 _h	Identification unit status	M	ro	No
6142 _h	Identification unit bin identifier	M	ro	No
6143 _h	Identification unit bin data	0	ro	No
6144 _h	Identification unit bin data write	0	rw	Manufacturer-specific
6146 _h	Identification unit bin data checksum and tag type	0	ro	No
6147 _h to 614D _h	Identification unit 2 to Identification unit 8 bin data	0	ro	No
6150 _h to 6156 _h	Identification unit 2 to Identification unit 8 bin data write	0	rw	Manufacturer-specific
6161 _h	Measuring unit A extended status	0	rw	1FFF FFFF _h
6171 _h	Measuring unit B extended status	0	rw	1FFF FFFF _h
6180 _h	Bin classification status	0	rw	3FFF _h
61A0 _h	Washing unit status	0	rw	3FFF _h
61C1 _h	Measuring ident controller extended status	0	rw	3FFF FFFF _h
6300 _h	Compaction unit status	0	rw	3FFF _h

In Table 17, it is specified, which PDOs the IDU virtual device shall (category = M) and can (category = 0) support. The instance-specific PDOs of IDU 1 are listed without brackets; the related PDOs for IDU 2 to IDU 8 are given in brackets. The PDO numbers and mapped application objects for other virtual device entities are given for the entity 1 without brackets, the PDO number and mapped application objects (sub-index corresponds to the entity no.) for the entities 2 to 8 are given in brackets.

If the CANopen device implements the corresponding TPDO and RPDO, the PDO is normally communicated device-internally and not via CAN. The PDO communication and mapping parameter sets are specified in detail in [CiA422-3].

Table 16 — PDOs supported by the IDU virtual device

PDO no.	Cat.	Mapped application objects
TPDO 20 (TPDO 36) (TPDO 52) (TPDO 68) (TPDO 84) (TPDO 100) (TPDO 116) (TPDO 132)	M	6140 01 _h (6140 02 _h) (6140 03 _h) (6140 04 _h) (6140 05 _h) (6140 06 _h) (6140 07 _h) (6140 08 _h)
TPDO 21 (TPDO 37) (TPDO 53) (TPDO 69) (TPDO 85) (TPDO 101) (TPDO 117) (TPDO 133)	O	6142 01 _h (6142 02 _h) (6142 03 _h) (6142 04 _h) (6142 05 _h) (6142 06 _h) (6142 07 _h) (6142 08 _h)
TPDO 386 (TPDO 402) (TPDO 418) (TPDO 434) (TPDO 450) (TPDO 466) (TPDO 482) (TPDO 498)	O	6146 01 _h (6146 02 _h) (6146 03 _h) (6146 04 _h) (6146 05 _h) (6146 06 _h) (6146 07 _h) (6146 08 _h)
RPDO 5	O	6320 00 _h , 0005 00 _h
RPDO 7	O	6020 00 _h , 0005 00 _h
RPDO 9	O	6300 00 _h , 0005 00 _h
RPDO 18 (RPDO 34) (RPDO 50) (RPDO 66) (RPDO 82) (RPDO 98) (RPDO 114) (RPDO 130)	O	6100 01 _h , 0005 00 _h (6100 02 _h , 0005 00 _h) (6100 03 _h , 0005 00 _h) (6100 04 _h , 0005 00 _h) (6100 05 _h , 0005 00 _h) (6100 06 _h , 0005 00 _h) (6100 07 _h , 0005 00 _h) (6100 08 _h , 0005 00 _h)

PDO no.	Cat.	Mapped application objects
RPDO 11 (RPDO 14) (RPDO 31) (RPDO 79) (RPDO 127) (RPDO 262) (RPDO 265) (RPDO 268)	0	6161 01 _h , 0004 00 _h (6161 02 _h , 0004 00 _h) (6161 03 _h , 0004 00 _h) (6161 04 _h , 0004 00 _h) (6161 05 _h , 0004 00 _h) (6161 06 _h , 0004 00 _h) (6161 07 _h , 0004 00 _h) (6161 08 _h , 0004 00 _h)
RPDO 27 (RPDO 43) (RPDO 59) (RPDO 75) (RPDO 91) (RPDO 107) (RPDO 123) (RPDO 139)	0	6180 01 _h , 0006 00 _h (6180 02 _h , 0006 00 _h) (6180 03 _h , 0006 00 _h) (6180 04 _h , 0006 00 _h) (6180 05 _h , 0006 00 _h) (6180 06 _h , 0006 00 _h) (6180 07 _h , 0006 00 _h) (6180 08 _h , 0006 00 _h)
RPDO 28 (RPDO 44) (RPDO 60) (RPDO 76) (RPDO 92) (RPDO 108) (RPDO 124) (RPDO 140)	0	61A0 01 _h , 0005 00 _h (61A0 02 _h , 0005 00 _h) (61A0 03 _h , 0005 00 _h) (61A0 04 _h , 0005 00 _h) (61A0 05 _h , 0005 00 _h) (61A0 06 _h , 0005 00 _h) (61A0 07 _h , 0005 00 _h) (61A0 08 _h , 0005 00 _h)
RPDO 30 (RPDO 46) (RPDO 62) (RPDO 78) (RPDO 94) (RPDO 110) (RPDO 126) (RPDO 142)	0	61C1 01 _h (61C1 02 _h) (61C1 03 _h) (61C1 04 _h) (61C1 05 _h) (61C1 06 _h) (61C1 07 _h) (61C1 08 _h)
RPDO 391 (RPDO 407) (RPDO 423) (RPDO 439) (RPDO 455) (RPDO 471) (RPDO 487) (RPDO 503)	0	6171 01 _h , 0004 00 _h (6171 02 _h , 0004 00 _h) (6171 03 _h , 0004 00 _h) (6171 04 _h , 0004 00 _h) (6171 05 _h , 0004 00 _h) (6171 06 _h , 0004 00 _h) (6171 07 _h , 0004 00 _h) (6171 08 _h , 0004 00 _h)

10.3.8 Measuring unit A

All applications objects used by the MU-A virtual device are listed in Table 18. The *category*, *access*, and *default value* attributes shall be used.

Table 17 — MU A specific application objects

Index	Name	Cat.	Acc.	Default value
6020 _h	Body controller status	O	rw	3FFF _h
6100 _h	Lifter unit status	O	rw	3FFF _h
6102 _h	Lifter unit position	O	rw	FFFF _h
6140 _h	Identification unit status	O	rw	3FFF _h
6161 _h	Measuring unit A extended status	M	ro	No
6162 _h	Measuring unit A gross value	M	ro	No
6163 _h	Measuring unit A tara value	M	ro	No
6164 _h	Measuring unit A net value	M	ro	No
6165 _h	Measuring unit A measuring identifier	O	ro	No
6166 _h	Measuring unit A measuring time (NOTE 1)	C	ro	No
6167 _h	Measuring unit A signature (NOTE 2)	C	ro	No
6168 _h	Measuring unit A physical unit	M	ro	No
6169 _h	Measuring unit A parameter pool	O	ro	No
6171 _h	Measuring unit B extended status	O	rw	1FFF FFFF _h
6180 _h	Bin classification status	O	rw	3FFF _h
61A0 _h	Washing unit status	O	rw	3FFF _h
61C1 _h	Measuring ident controller extended status	O	rw	3FFF FFFF _h
6300 _h	Compaction unit status	O	rw	3FFF _h
6320 _h	Change container unit status	O	rw	3FFF _h
NOTE 1 Mandatory, if object 6167 _h is not implemented.				
NOTE 2 Mandatory, if object 6166 _h is not implemented.				

In Table 19, it is specified, which PDOs the MU-A virtual device shall (category = M) and can (category = O) support. The instance-specific PDOs of MU-A 1 are listed without brackets; the related PDOs for MU-A 2 to MU-A 8 are given in brackets. The PDO numbers and mapped application objects for other virtual device entities are given for the entity 1 without brackets, the PDO number and mapped application objects (sub-index corresponds to the entity no.) for the entities 2 to 8 are given in brackets.

If the CANopen device implements the corresponding TPDO and RPDO, the PDO is normally communicated device-internally and not via CAN. The PDO communication and mapping parameter sets are specified in detail in Clauses 11 to 15.

Table 18 — PDOs supported by the MU A virtual device

PDO no.	Cat.	Mapped application objects
TPDO 11 (TPDO 14) (TPDO 31) (TPDO 79) (TPDO 127) (TPDO 262) (TPDO 265) (TPDO 268)	M	6161 01 _h , 6163 01 _h (6161 02 _h , 6163 02 _h) (6161 03 _h , 6163 03 _h) (6161 04 _h , 6163 04 _h) (6161 05 _h , 6163 05 _h) (6161 06 _h , 6163 06 _h) (6161 07 _h , 6163 07 _h) (6161 08 _h , 6163 08 _h)
TPDO 12 (TPDO 15) (TPDO 47) (TPDO 95) (TPDO 143) (TPDO 263) (TPDO 266) (TPDO 269)	O	6161 01 _h , 6164 01 _h (6161 02 _h , 6164 02 _h) (6161 03 _h , 6164 03 _h) (6161 04 _h , 6164 04 _h) (6161 05 _h , 6164 05 _h) (6161 06 _h , 6164 06 _h) (6161 07 _h , 6164 07 _h) (6161 08 _h , 6164 08 _h)
TPDO 13 (TPDO 16) (TPDO 63) (TPDO 111) (TPDO 261) (TPDO 264) (TPDO 267) (TPDO 270)	O	6161 01 _h , 6162 01 _h (6161 02 _h , 6162 02 _h) (6161 03 _h , 6162 03 _h) (6161 04 _h , 6162 04 _h) (6161 05 _h , 6162 05 _h) (6161 06 _h , 6162 06 _h) (6161 07 _h , 6162 07 _h) (6161 08 _h , 6162 08 _h)
RPDO 5	O	6320 00 _h , 0005 00 _h
RPDO 7	O	6020 00 _h , 0005 00 _h
RPDO 9	O	6300 00 _h , 0005 00 _h
RPDO 18 (RPDO 34) (RPDO 50) (RPDO 66) (RPDO 82) (RPDO 98) (RPDO 114) (RPDO 130)	O	6100 01 _h , 0005 00 _h (6100 02 _h , 0005 00 _h) (6100 03 _h , 0005 00 _h) (6100 04 _h , 0005 00 _h) (6100 05 _h , 0005 00 _h) (6100 06 _h , 0005 00 _h) (6100 07 _h , 0005 00 _h) (6100 08 _h , 0005 00 _h)

PDO no.	Cat.	Mapped application objects
RPDO 19 (RPDO 35) (RPDO 51) (RPDO 67) (RPDO 83) (RPDO 99) (RPDO 115) (RPDO 131)	0	6100 01 _h , 6102 01 _h (6100 02 _h , 6102 02 _h) (6100 03 _h , 6102 03 _h) (6100 04 _h , 6102 04 _h) (6100 05 _h , 6102 05 _h) (6100 06 _h , 6102 06 _h) (6100 07 _h , 6102 07 _h) (6100 08 _h , 6102 08 _h)
RPDO 20 (RPDO 36) (RPDO 52) (RPDO 68) (RPDO 84) (RPDO 100) (RPDO 116) (RPDO 132)	0	6140 01 _h (6140 02 _h) (6140 03 _h) (6140 04 _h) (6140 05 _h) (6140 06 _h) (6140 07 _h) (6140 08 _h)
RPDO 27 (RPDO 43) (RPDO 59) (RPDO 75) (RPDO 91) (RPDO 107) (RPDO 123) (RPDO 139)	0	6180 01 _h , 0006 00 _h (6180 02 _h , 0006 00 _h) (6180 03 _h , 0006 00 _h) (6180 04 _h , 0006 00 _h) (6180 05 _h , 0006 00 _h) (6180 06 _h , 0006 00 _h) (6180 07 _h , 0006 00 _h) (6180 08 _h , 0006 00 _h)
RPDO 28 (RPDO 44) (RPDO 60) (RPDO 76) (RPDO 92) (RPDO 108) (RPDO 124) (RPDO 140)	0	61A0 01 _h , 0005 00 _h (61A0 02 _h , 0005 00 _h) (61A0 03 _h , 0005 00 _h) (61A0 04 _h , 0005 00 _h) (61A0 05 _h , 0005 00 _h) (61A0 06 _h , 0005 00 _h) (61A0 07 _h , 0005 00 _h) (61A0 08 _h , 0005 00 _h)
RPDO 30 (RPDO 46) (RPDO 62) (RPDO 78) (RPDO 94) (RPDO 110) (RPDO 126) (RPDO 142)	0	61C1 01 _h (61C1 02 _h) (61C1 03 _h) (61C1 04 _h) (61C1 05 _h) (61C1 06 _h) (61C1 07 _h) (61C1 08 _h)

PDO no.	Cat.	Mapped application objects
RPDO 391 (RPDO 407) (RPDO 423) (RPDO 439) (RPDO 455) (RPDO 471) (RPDO 487) (RPDO 503)	0	6171 01 _h , 0004 00 _h (6171 02 _h , 0004 00 _h) (6171 03 _h , 0004 00 _h) (6171 04 _h , 0004 00 _h) (6171 05 _h , 0004 00 _h) (6171 06 _h , 0004 00 _h) (6171 07 _h , 0004 00 _h) (6171 08 _h , 0004 00 _h)

Each entity of the MU-A virtual device shall provide one SSDO connected to the CSDO of the MIC in the BCU virtual device. If both virtual devices of the SDO channel are implemented on the very same CANopen device, the SDO communication is normally realized device-internally.

10.3.9 Measuring unit B

All applications objects used by the MU-B virtual device are listed in Table 20. The *category*, *access*, and *default value* attributes shall be used.

Table 19 — MU-B-specific application objects

Index	Name	Cat.	Acc.	Default value
6020 _h	Body controller status	0	rw	3FFF _h
6100 _h	Lifter unit status	0	rw	3FFF _h
6102 _h	Lifter unit position	0	rw	FFFF _h
6140 _h	Identification unit status	0	rw	3FFF _h
6161 _h	Measuring unit A extended status	0	rw	1FFF FFFF _h
6171 _h	Measuring unit B extended status	M	ro	No
6172 _h	Measuring unit B gross value	M	ro	No
6173 _h	Measuring unit B tara value	M	ro	No
6174 _h	Measuring unit B net value	M	ro	No
6175 _h	Measuring unit B measuring identifier	0	ro	No
6176 _h	Measuring unit B measuring time (NOTE 1)	C	ro	No
6177 _h	Measuring unit B signature (NOTE 2)	C	ro	No
6178 _h	Measuring unit B physical unit	M	ro	No
6179 _h	Measuring unit B parameter pool	0	ro	No
6180 _h	Bin classification status	0	rw	3FFF _h
61A0 _h	Washing unit status	0	rw	3FFF _h
61C1 _h	Measuring ident controller extended status	0	rw	3FFF FFFF _h

Index	Name	Cat.	Acc.	Default value
6300 _h	Compaction unit status	0	rw	3FFF _h
6320 _h	Change container unit status	0	rw	3FFF _h
NOTE 1 Mandatory, if object 6167 _h is not implemented.				
NOTE 2 Mandatory, if object 6166 _h is not implemented.				

In Table 21, it is specified, which PDOs the MU-B virtual device shall (category = M) and can (category = 0) support. The instance-specific PDOs of MU-B 1 are listed without brackets; the related PDOs for MU-B 2 to MU-B 8 are given in brackets. The PDO numbers and mapped application objects for virtual device entities are given for the entity 1 without brackets, the PDO number and mapped application objects (sub-index corresponds to the entity no.) for the entities 2 to 8 are given in brackets.

If the CANopen device implements the corresponding TPDO and RPDO, the PDO is normally communicated device-internally and not via CAN. The PDO communication and mapping parameter sets are specified in detail in Clauses 11 to 15.

Table 20 — PDOs supported by the MU B virtual device

PDO no.	Cat.	Mapped application objects
TPDO 391 (TPDO 407) (TPDO 423) (TPDO 439) (TPDO 455) (TPDO 471) (TPDO 487) (TPDO 503)	M	6171 01 _h , 6173 01 _h (6171 02 _h , 6173 02 _h) (6171 03 _h , 6173 03 _h) (6171 04 _h , 6173 04 _h) (6171 05 _h , 6173 05 _h) (6171 06 _h , 6173 06 _h) (6171 07 _h , 6173 07 _h) (6171 08 _h , 6173 08 _h)
TPDO 392 (TPDO 408) (TPDO 424) (TPDO 440) (TPDO 456) (TPDO 472) (TPDO 488) (TPDO 504)	0	6171 01 _h , 6174 01 _h (6171 02 _h , 6174 02 _h) (6171 03 _h , 6174 03 _h) (6171 04 _h , 6174 04 _h) (6171 05 _h , 6174 05 _h) (6171 06 _h , 6174 06 _h) (6171 07 _h , 6174 07 _h) (6171 08 _h , 6174 08 _h)
TPDO 393 (TPDO 409) (TPDO 425) (TPDO 441) (TPDO 457) (TPDO 473) (TPDO 489) (TPDO 505)	0	6171 01 _h , 6172 01 _h (6171 02 _h , 6172 02 _h) (6171 03 _h , 6172 03 _h) (6171 04 _h , 6172 04 _h) (6171 05 _h , 6172 05 _h) (6171 06 _h , 6172 06 _h) (6171 07 _h , 6172 07 _h) (6171 08 _h , 6172 08 _h)
RPDO 5	0	6320 00 _h , 0005 00 _h

PDO no.	Cat.	Mapped application objects
RPDO 7	0	6020 00 _h , 0005 00 _h
RPDO 9	0	6300 00 _h , 0005 00 _h
RPDO 18 (RPDO 34) (RPDO 50) (RPDO 66) (RPDO 82) (RPDO 98) (RPDO 114) (RPDO 130)	0	6100 01 _h , 0005 00 _h (6100 02 _h , 0005 00 _h) (6100 03 _h , 0005 00 _h) (6100 04 _h , 0005 00 _h) (6100 05 _h , 0005 00 _h) (6100 06 _h , 0005 00 _h) (6100 07 _h , 0005 00 _h) (6100 08 _h , 0005 00 _h)
RPDO 19 (RPDO 35) (RPDO 51) (RPDO 67) (RPDO 83) (RPDO 99) (RPDO 115) (RPDO 131)	0	6100 01 _h , 6102 01 _h (6100 02 _h , 6102 02 _h) (6100 03 _h , 6102 03 _h) (6100 04 _h , 6102 04 _h) (6100 05 _h , 6102 05 _h) (6100 06 _h , 6102 06 _h) (6100 07 _h , 6102 07 _h) (6100 08 _h , 6102 08 _h)
RPDO 20 (RPDO 36) (RPDO 52) (RPDO 68) (RPDO 84) (RPDO 100) (RPDO 116) (RPDO 132)	0	6140 01 _h (6140 02 _h) (6140 03 _h) (6140 04 _h) (6140 05 _h) (6140 06 _h) (6140 07 _h) (6140 08 _h)
RPDO 11 (RPDO 14) (RPDO 31) (RPDO 79) (RPDO 127) (RPDO 262) (RPDO 265) (RPDO 268)	0	6161 01 _h , 0004 00 _h (6161 02 _h , 0004 00 _h) (6161 03 _h , 0004 00 _h) (6161 04 _h , 0004 00 _h) (6161 05 _h , 0004 00 _h) (6161 06 _h , 0004 00 _h) (6161 07 _h , 0004 00 _h) (6161 08 _h , 0004 00 _h)
RPDO 27 (RPDO 43) (RPDO 59) (RPDO 75) (RPDO 91) (RPDO 107) (RPDO 123) (RPDO 139)	0	6180 01 _h , 0006 00 _h (6180 02 _h , 0006 00 _h) (6180 03 _h , 0006 00 _h) (6180 04 _h , 0006 00 _h) (6180 05 _h , 0006 00 _h) (6180 06 _h , 0006 00 _h) (6180 07 _h , 0006 00 _h) (6180 08 _h , 0006 00 _h)

PDO no.	Cat.	Mapped application objects
RPDO 28 (RPDO 44) (RPDO 60) (RPDO 76) (RPDO 92) (RPDO 108) (RPDO 124) (RPDO 140)	0	61A0 01 _h , 0005 00 _h (61A0 02 _h , 0005 00 _h) (61A0 03 _h , 0005 00 _h) (61A0 04 _h , 0005 00 _h) (61A0 05 _h , 0005 00 _h) (61A0 06 _h , 0005 00 _h) (61A0 07 _h , 0005 00 _h) (61A0 08 _h , 0005 00 _h)
RPDO 30 (RPDO 46) (RPDO 62) (RPDO 78) (RPDO 94) (RPDO 110) (RPDO 126) (RPDO 142)	0	61C1 01 _h (61C1 02 _h) (61C1 03 _h) (61C1 04 _h) (61C1 05 _h) (61C1 06 _h) (61C1 07 _h) (61C1 08 _h)

Each entity of the MU-B virtual device shall provide one SSDO connected to the CSDO of the MIC in the BCU virtual device. If both virtual devices of the SDO channel are implemented on the very same CANopen device, the SDO communication is normally realized device-internally.

10.3.10 Bin classification unit

All applications objects used by the BCU virtual device are listed in Table 22, which includes the MIC functionality. The *category*, *access*, and *default value* attributes shall be used.

Table 21 — BCU-specific application objects

Index	Name	Cat.	Acc.	Default value
6020 _h	Body controller status	0	rw	3FFF _h
6100 _h	Lifter unit status	0	rw	3FFF _h
6140 _h	Identification unit status	0	rw	3FFF _h
6142 _h	Identification unit bin identifier	0	rw	FFFF FFFF FFFF FFFF _h
6161 _h	Measuring unit A extended status	0	rw	1FFF FFFF _h
6162 _h	Measuring unit A gross value	0	rw	7FFF FFFF _h
6163 _h	Measuring unit A tara value	0	rw	7FFF FFFF _h
6164 _h	Measuring unit A net value	0	rw	7FFF FFFF _h
6171 _h	Measuring unit B extended status	0	rw	1FFF FFFF _h
6172 _h	Measuring unit B gross value	0	rw	7FFF FFFF _h
6173 _h	Measuring unit B tara value	0	rw	7FFF FFFF _h
6174 _h	Measuring unit B net value	0	rw	7FFF FFFF _h
6180 _h	Bin classification unit status	M	ro	No

Index	Name	Cat.	Acc.	Default value
6183 _h	Bin classification unit bin volume	M	ro	No
61A0 _h	Washing unit status	0	rw	3FFF _h
61C1 _h	Measuring ident controller extended status	0	ro	No
6300 _h	Compaction unit status	0	rw	3FFF _h
6320 _h	Change container unit status	0	rw	3FFF _h

In Table 23, it is specified, which PDOs the BCU virtual device shall (category = M) and can (category = 0) support. The instance-specific PDOs of BCU 1 are listed without brackets; the related PDOs for BCU 2 to BCU 8 are given in brackets. The PDO numbers and mapped application objects for other virtual device entities are given for the entity 1 without brackets, the PDO number and mapped application objects (sub-index corresponds to the entity no.) for the entities 2 to 8 are given in brackets.

If the CANopen device implements the corresponding TPDO and RPDO, the PDO is normally communicated device-internally and not via CAN. The PDO communication and mapping parameter sets are specified in detail in Clauses 11 to 15.

Table 22 — PDOs supported by the BCU virtual device

PDO no.	Cat.	Mapped application objects
TPDO 27 (TPDO 43) (TPDO 59) (TPDO 75) (TPDO 91) (TPDO 107) (TPDO 123) (TPDO 139)	M	6180 01 _h , 6183 01 _h (6180 02 _h , 6183 02 _h) (6180 03 _h , 6183 03 _h) (6180 04 _h , 6183 04 _h) (6180 05 _h , 6183 05 _h) (6180 06 _h , 6183 06 _h) (6180 07 _h , 6183 07 _h) (6180 08 _h , 6183 08 _h)
TPDO 30 (TPDO 46) (TPDO 62) (TPDO 78) (TPDO 94) (TPDO 110) (TPDO 126) (TPDO 142)	0	61C1 01 _h (61C1 02 _h) (61C1 03 _h) (61C1 04 _h) (61C1 05 _h) (61C1 06 _h) (61C1 07 _h) (61C1 08 _h)
RPDO 5	0	6320 00 _h , 0005 00 _h
RPDO 7	0	6020 00 _h , 0005 00 _h
RPDO 9	0	6300 00 _h , 0005 00 _h

PDO no.	Cat.	Mapped application objects
RPDO 18 (RPDO 34) (RPDO 50) (RPDO 66) (RPDO 82) (RPDO 98) (RPDO 114) (RPDO 130)	0	6100 01 _h , 6130 01 _h (6100 02 _h , 6130 02 _h) (6100 03 _h , 6130 03 _h) (6100 04 _h , 6130 04 _h) (6100 05 _h , 6130 05 _h) (6100 06 _h , 6130 06 _h) (6100 07 _h , 6130 07 _h) (6100 08 _h , 6130 08 _h)
RPDO 20 (RPDO 36) (RPDO 52) (RPDO 68) (RPDO 84) (RPDO 100) (RPDO 116) (RPDO 132)	0	6140 01 _h (6140 02 _h) (6140 03 _h) (6140 04 _h) (6140 05 _h) (6140 06 _h) (6140 07 _h) (6140 08 _h)
RPDO 11 (RPDO 14) (RPDO 31) (RPDO 79) (RPDO 127) (RPDO 262) (RPDO 265) (RPDO 268)	0	6161 01 _h , 6163 01 _h (6161 02 _h , 6163 02 _h) (6161 03 _h , 6163 03 _h) (6161 04 _h , 6163 04 _h) (6161 05 _h , 6163 05 _h) (6161 06 _h , 6163 06 _h) (6161 07 _h , 6163 07 _h) (6161 08 _h , 6163 08 _h)
RPDO 12 (RPDO 15) (RPDO 47) (RPDO 95) (RPDO 143) (RPDO 263) (RPDO 266) (RPDO 269)	0	6161 01 _h , 6164 01 _h (6161 02 _h , 6164 02 _h) (6161 03 _h , 6164 03 _h) (6161 04 _h , 6164 04 _h) (6161 05 _h , 6164 05 _h) (6161 06 _h , 6164 06 _h) (6161 07 _h , 6164 07 _h) (6161 08 _h , 6164 08 _h)
RPDO 13 (RPDO 16) (RPDO 63) (RPDO 111) (RPDO 261) (RPDO 264) (RPDO 267) (RPDO 270)	0	6161 01 _h , 6162 01 _h (6161 02 _h , 6162 02 _h) (6161 03 _h , 6162 03 _h) (6161 04 _h , 6162 04 _h) (6161 05 _h , 6162 05 _h) (6161 06 _h , 6162 06 _h) (6161 07 _h , 6162 07 _h) (6161 08 _h , 6162 08 _h)

PDO no.	Cat.	Mapped application objects
RPDO 27 (RPDO 43) (RPDO 59) (RPDO 75) (RPDO 91) (RPDO 107) (RPDO 123) (RPDO 139)	0	6180 01 _h , 0006 00 _h (6180 02 _h , 0006 00 _h) (6180 03 _h , 0006 00 _h) (6180 04 _h , 0006 00 _h) (6180 05 _h , 0006 00 _h) (6180 06 _h , 0006 00 _h) (6180 07 _h , 0006 00 _h) (6180 08 _h , 0006 00 _h)
RPDO 28 (RPDO 44) (RPDO 60) (RPDO 76) (RPDO 92) (RPDO 108) (RPDO 124) (RPDO 140)	0	61A0 01 _h , 0005 00 _h (61A0 02 _h , 0005 00 _h) (61A0 03 _h , 0005 00 _h) (61A0 04 _h , 0005 00 _h) (61A0 05 _h , 0005 00 _h) (61A0 06 _h , 0005 00 _h) (61A0 07 _h , 0005 00 _h) (61A0 08 _h , 0005 00 _h)
RPDO 391 (RPDO 407) (RPDO 423) (RPDO 439) (RPDO 455) (RPDO 471) (RPDO 487) (RPDO 503)	0	6171 01 _h , 6173 01 _h (6171 02 _h , 6173 02 _h) (6171 03 _h , 6173 03 _h) (6171 04 _h , 6173 04 _h) (6171 05 _h , 6173 05 _h) (6171 06 _h , 6173 06 _h) (6171 07 _h , 6173 07 _h) (6171 08 _h , 6173 08 _h)
RPDO 392 (RPDO 408) (RPDO 424) (RPDO 440) (RPDO 456) (RPDO 472) (RPDO 488) (RPDO 504)	0	6171 01 _h , 6174 01 _h (6171 02 _h , 6174 02 _h) (6171 03 _h , 6174 03 _h) (6171 04 _h , 6174 04 _h) (6171 05 _h , 6174 05 _h) (6171 06 _h , 6174 06 _h) (6171 07 _h , 6174 07 _h) (6171 08 _h , 6174 08 _h)
RPDO 393 (RPDO 409) (RPDO 425) (RPDO 441) (RPDO 457) (RPDO 473) (RPDO 489) (RPDO 505)	0	6171 01 _h , 6172 01 _h (6171 02 _h , 6172 02 _h) (6171 03 _h , 6172 03 _h) (6171 04 _h , 6172 04 _h) (6171 05 _h , 6172 05 _h) (6171 06 _h , 6172 06 _h) (6171 07 _h , 6172 07 _h) (6171 08 _h , 6172 08 _h)

The MIC in the BCU virtual device shall provide one CSDO connected to the SSDO of each entity of the MU-A and MU-B virtual device. If both virtual devices of the SDO channel are implemented on the very same CANopen device, the SDO communication is normally realized device-internally.

10.3.11 Washing unit

All applications objects used by the WU virtual device are listed in Table 24. The *category*, *access*, and *default value* attributes shall be used.

Table 23 — WU-specific application objects

Index	Name	Cat.	Acc.	Default value
6020 _h	Body controller status	0	rw	3FFF _h
6100 _h	Lifter unit status	0	rw	3FFF _h
6102 _h	Lifter unit position	0	rw	FFFF _h
6140 _h	Identification unit status	0	rw	3FFF _h
6161 _h	Measuring unit A extended status	0	rw	1FFF FFFF _h
6171 _h	Measuring unit B extended status	0	rw	1FFF FFFF _h
6180 _h	Bin classification unit status	0	rw	3FFF _h
61A0 _h	Washing unit status	M	ro	No
61B0 _h	Washing unit body controller request	M	ro	No
61B1 _h	Washing unit body controller status	0	rw	3FFF _h
61C1 _h	Measuring ident controller extended status	0	rw	3FFF FFFF _h
6300 _h	Compaction unit status	0	rw	3FFF _h
6320 _h	Change container unit status	0	rw	3FFF _h

In Table 25, it is specified, which PDOs the WU virtual device shall (category = M) and can (category = 0) support. The instance-specific PDOs of WU 1 are listed without brackets; the related PDOs for WU 2 to WU 8 are given in brackets. The PDO numbers and mapped application objects for other virtual device entities are given for the entity 1 without brackets, the PDO number and mapped application objects (sub-index corresponds to the entity no.) for the entities 2 to 8 are given in brackets.

If the CANopen device implements the corresponding TPDO and RPDO, the PDO is normally communicated device-internally and not via CAN. The PDO communication and mapping parameter sets are specified in detail in Clauses 11 to 15.

Table 24 — PDOs supported by the WU virtual device

PDO no.	Cat.	Mapped application objects
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PDO no.	Cat.	Mapped application objects
TPDO 28 (TPDO 44) (TPDO 60) (TPDO 76) (TPDO 92) (TPDO 108) (TPDO 124) (TPDO 140)	M	61A0 01 _h , 61B0 01 _h (61A0 02 _h , 61B0 02 _h) (61A0 03 _h , 61B0 03 _h) (61A0 04 _h , 61B0 04 _h) (61A0 05 _h , 61B0 05 _h) (61A0 06 _h , 61B0 06 _h) (61A0 07 _h , 61B0 07 _h) (61A0 08 _h , 61B0 08 _h)
RPDO 5	O	6320 00 _h , 0005 00 _h
RPDO 7	O	6020 00 _h , 0005 00 _h
RPDO 9	O	6300 00 _h , 0005 00 _h
RPDO 18 (RPDO 34) (RPDO 50) (RPDO 66) (RPDO 82) (RPDO 98) (RPDO 114) (RPDO 130)	O	6100 01 _h , 0005 00 _h (6100 02 _h , 0005 00 _h) (6100 03 _h , 0005 00 _h) (6100 04 _h , 0005 00 _h) (6100 05 _h , 0005 00 _h) (6100 06 _h , 0005 00 _h) (6100 07 _h , 0005 00 _h) (6100 08 _h , 0005 00 _h)
RPDO 19 (RPDO 35) (RPDO 51) (RPDO 67) (RPDO 83) (RPDO 99) (RPDO 115) (RPDO 131)	O	6100 01 _h , 6102 01 _h (6100 02 _h , 6102 02 _h) (6100 03 _h , 6102 03 _h) (6100 04 _h , 6102 04 _h) (6100 05 _h , 6102 05 _h) (6100 06 _h , 6102 06 _h) (6100 07 _h , 6102 07 _h) (6100 08 _h , 6102 08 _h)
RPDO 20 (RPDO 36) (RPDO 52) (RPDO 68) (RPDO 84) (RPDO 100) (RPDO 116) (RPDO 132)	O	6140 01 _h (6140 02 _h) (6140 03 _h) (6140 04 _h) (6140 05 _h) (6140 06 _h) (6140 07 _h) (6140 08 _h)
RPDO 11 (RPDO 14) (RPDO 31) (RPDO 79) (RPDO 127) (RPDO 262) (RPDO 265) (RPDO 268)	O	6161 01 _h , 0004 00 _h (6161 02 _h , 0004 00 _h) (6161 03 _h , 0004 00 _h) (6161 04 _h , 0004 00 _h) (6161 05 _h , 0004 00 _h) (6161 06 _h , 0004 00 _h) (6161 07 _h , 0004 00 _h) (6161 08 _h , 0004 00 _h)

PDO no.	Cat.	Mapped application objects
RPDO 27 (RPDO 43) (RPDO 59) (RPDO 75) (RPDO 91) (RPDO 107) (RPDO 123) (RPDO 139)	0	6180 01 _h , 0006 00 _h (6180 02 _h , 0006 00 _h) (6180 03 _h , 0006 00 _h) (6180 04 _h , 0006 00 _h) (6180 05 _h , 0006 00 _h) (6180 06 _h , 0006 00 _h) (6180 07 _h , 0006 00 _h) (6180 08 _h , 0006 00 _h)
RPDO 28 (RPDO 44) (RPDO 60) (RPDO 76) (RPDO 92) (RPDO 108) (RPDO 124) (RPDO 140)	0	61A0 01 _h , 0005 00 _h (61A0 02 _h , 0005 00 _h) (61A0 03 _h , 0005 00 _h) (61A0 04 _h , 0005 00 _h) (61A0 05 _h , 0005 00 _h) (61A0 06 _h , 0005 00 _h) (61A0 07 _h , 0005 00 _h) (61A0 08 _h , 0005 00 _h)
RPDO 30 (RPDO 46) (RPDO 62) (RPDO 78) (RPDO 94) (RPDO 110) (RPDO 126) (RPDO 142)	0	61C1 01 _h (61C1 02 _h) (61C1 03 _h) (61C1 04 _h) (61C1 05 _h) (61C1 06 _h) (61C1 07 _h) (61C1 08 _h)
RPDO 391 (RPDO 407) (RPDO 423) (RPDO 439) (RPDO 455) (RPDO 471) (RPDO 487) (RPDO 503)	0	6171 01 _h , 0004 00 _h (6171 02 _h , 0004 00 _h) (6171 03 _h , 0004 00 _h) (6171 04 _h , 0004 00 _h) (6171 05 _h , 0004 00 _h) (6171 06 _h , 0004 00 _h) (6171 07 _h , 0004 00 _h) (6171 08 _h , 0004 00 _h)

10.3.12 Truck gateway unit

All applications objects used by the TGU virtual device are listed in Table 26. The *category*, *access*, and *default value* attributes shall be used.

Table 25 — TGU-specific application objects

Index	Name	Cat.	Acc.	Default value
6400 _h	Brake light switch	0	ro	No
6401 _h	Spring brake engaged	0	ro	No

Index	Name	Cat.	Acc.	Default value
6402 _h	Auxiliary equipment supply pressure	0	ro	No
6404 _h	Current gear	0	ro	No
6406 _h	Vehicle speed	0	ro	No
6408 _h	Engine speed	0	ro	No
640A _h	Maximum vehicle speed limit	0	ro	No
640C _h	Engine speed upper limit	0	ro	No
640E _h	Engine speed lower limit	0	ro	No
6410 _h	First clutch dependent PTO feedback	0	ro	No
6411 _h	Second clutch dependent PTO feedback	0	ro	No
6412 _h	Clutch independent PTO feedback	0	ro	No
6413 _h	First engine mounted PTO feedback	0	ro	No
6414 _h	Second engine mounted PTO feedback	0	ro	No
6415 _h	Refuse stepper step switch active	0	ro	No
6416 _h	Parking brake device active	0	ro	No
6417 _h	Parking light device active	0	ro	No
6418 _h	Stopping brake device active	0	ro	No
6419 _h	First clutch dependent PTO control allowed active	0	ro	No
641A _h	Second clutch dependent PTO control allowed active	0	ro	No
641B _h	Clutch independent PTO control allowed active	0	ro	No
641C _h	First engine mounted PTO control allowed active	0	rw	TRUE TRUE
641D _h	Second engine mounted PTO control allowed active	0	ro	No
641E _h	Transmission neutral switch active	0	ro	No
641F _h	Transmission reverse direction switch active	0	ro	No
6420 _h	Clutch closed state active	0	ro	No
6421 _h	Clutch open state active	0	ro	No
6422 _h	Engine speed control upper limit allowed	0	ro	No
6423 _h	Engine speed control lower limit allowed	0	ro	No
6424 _h	Engine speed control allowed	0	ro	No
6425 _h	Engine torque limit control allowed	0	ro	No
6426 _h	Engine stop allowed	0	ro	No
6427 _h	Requested vehicle speed limit control allowed	0	ro	No