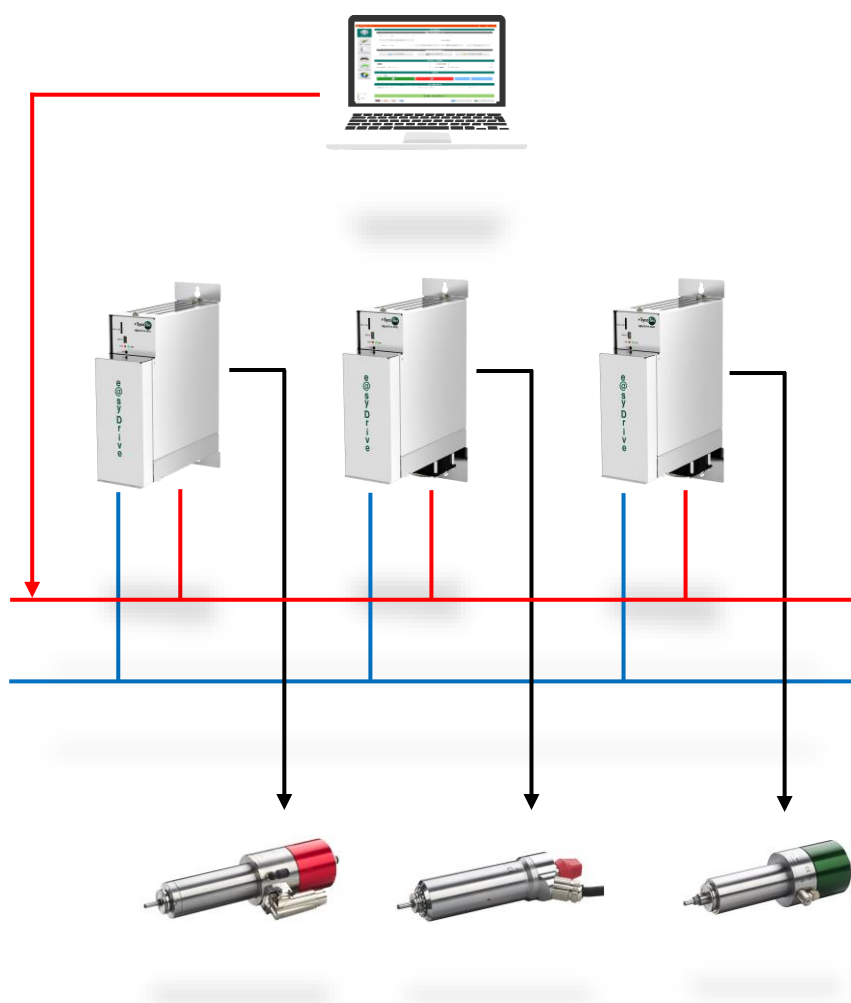


# Object description CANopen of HF Inverters e@syDrive 4624, 4625, 4626

EN



INDUSTRIAL DRIVES

**ATTENTION**

*This CANopen object description is only valid in connection with the operating manual of HF Inverter e@syDrive 4624, 4625, 4626 (material no. 2.002.1912)!*

- *The safety information must be observed before commissioning!*



## Table of Contents

<b>1</b>	<b>USER INFORMATION .....</b>	<b>4</b>
1.1	SYMBOLS USED .....	4
1.2	IMPORTANT INFORMATION.....	4
1.3	INTENDED USE .....	4
1.4	ABBREVIATIONS .....	4
<b>2</b>	<b>SCOPE OF SUPPLY.....</b>	<b>6</b>
<b>3</b>	<b>CANOPEN CONNECTION.....</b>	<b>6</b>
3.1	CONNECTION EXAMPLE .....	6
<b>4</b>	<b>CANOPEN OBJECTS.....</b>	<b>6</b>
4.1	COMMUNICATION OBJECTS .....	6
4.1.1	GENERAL COMMUNICATION OBJECTS .....	6
	OBJECT 0X1000 : DEVICE TYPE.....	6
	OBJECT 0X1001 : ERROR REGISTER.....	7
	OBJECT 0X1003 : PREDEFINED ERROR FIELD .....	7
	OBJECT 0X1005 : COB ID SYNC .....	7
	OBJECT 0X1008 : MANUFACTURER DEVICE NAME.....	7
	OBJECT 0X1010 : STORE PARAMETERS.....	7
	OBJECT 0X1011 : RESTORE DEFAULT PARAMETERS .....	8
	OBJECT 0X1014 : COB ID EMCY.....	8
	OBJECT 0X1015 : INHIBIT TIME EMERGENCY .....	8
	OBJECT 0X1016 : CONSUMER HEARTBEAT TIME .....	8
	OBJECT 0X1017 : PRODUCER HEARTBEAT TIME .....	8
	OBJECT 0X1018 : IDENTITY OBJECT .....	9
	OBJECT 0X1029 : ERROR BEHAVIOUR.....	9
4.1.2	SDO PARAMETERS.....	10
	OBJECT 0X1200 : SERVER SDO PARAMETER .....	10
4.1.3	RECEIVE PDO PARAMETER AND MAPPING OBJECTS .....	10
	OBJECT 0X1400 : RECEIVE PDO COMMUNICATION PARAMETER.....	10
	OBJECT 0X1600 : RECEIVE PDO MAPPING PARAMETER.....	11
4.1.4	TRANSMIT PDO PARAMETERS AND MAPPING OBJECTS.....	11
	OBJECT 0X1800 : TRANSMIT PDO COMMUNICATION PARAMETER.....	11
	OBJECT 0X1A00 : TRANSMIT PDO MAPPING PARAMETER.....	12
4.2	MANUFACTURER-SPECIFIC OBJECTS.....	12
	OBJECT 0X3000 : PARAMETER .....	12
4.3	STANDARDIZED DEVICE OBJECTS (CIA 402 DRIVES AND MOTION CONTROL).....	28
	OBJECT 0X603F : ERROR_CODE .....	28
	OBJECT 0X6040 : CONTROLWORD.....	28
	OBJECT 0X6041 : STATUSWORD .....	29
	OBJECT 0X6042 : VL_TARGET_VELOCITY.....	30
	OBJECT 0X6043 : VL_VELOCITY_DEMAND.....	30
	OBJECT 0X6044 : VL_VELOCITY_ACTUAL_VALUE .....	30
	OBJECT 0X6046 : VL_VELOCITY_MIN_MAX_AMOUNT.....	30
	OBJECT 0X6048 : VL_VELOCITY_ACCELERATION .....	31
	OBJECT 0X6049 : VL_VELOCITY_DECCELERATION .....	31
	OBJEKT 0X6402 : MOTOR_TYPE.....	32
	OBJECT 0X6502 : SUPPORTED_DRIVE_MODES.....	32
<b>5</b>	<b>STATE MACHINE.....</b>	<b>33</b>
<b>6</b>	<b>NOTES ON PDO FUNCTIONALITY .....</b>	<b>34</b>
	<b>WARRANTY CONDITIONS.....</b>	<b>35</b>

# 1 User Information

## 1.1 Symbols Used

### Operating Manual

 <b>ATTENTION</b>	Indicates a hazardous situation that can cause damage to property or mild to moderate injuries.
	Important information for operator and engineer.

## 1.2 Important Information

Target group: This document is intended for machine manufacturers and persons responsible for putting into service and operating the frequency inverter e@syDrive 4624, 4625, 4626.



### ATTENTION

*The operating manual must be read by the user/operator before starting up the unit for the first time in order to avoid incorrect operation and other damage. Duplication and distribution of the operating manual require SycoTec's prior consent.*

All specifications, information and properties of the product described in the operating manual correspond to the status on going to press.

Modifications and improvements to the product as a result of new technical developments are possible.

This does not imply any right to retrofitting of existing units.

SycoTec assumes no responsibility for damage arising through:

- use of incorrect information
- improper use



*The safety and application instructions in the hardware description and in the software description of the frequency inverter must be observed!*

## 1.3 Intended Use

This document provides basic instructions on how to connect the frequency inverter e@syDrive 4624, 4625, 4626 to the CAN interface as well as a description of the objects used.

The implemented protocol is based on the following CANopen profiles:

- CiA 301 Application Layer and Communication Profile
- CiA 402 Drives and Motion Control

## 1.4 Abbreviations

A	Ampere
AIN	Analog input
ASM	Asynchronous machine
b	Binary
C_24V	External 24V supply voltage for CAN +
CAN	Controller Area Network
CANH	CAN bus high-level
CANL	CAN bus low-level
C_GND	External 24V supply voltage for CAN -
CiA	CAN in Automation
COB	CAN-Communication Object
const	constant
DC	Direct Current
DIN	Digital input

EDS	Electronic Data Sheet
EEPROM	Electrical Eeasable programmable read only memory
EMCY	Emergency
h	Hour
hex	Hexadecimal
HF	High-frequency
Hz	Hertz
ID	Identification
INV	Inverter
ISO	International Standard Organization
kbit	Kilobit
LED	Light-emitting diode
LSB	Least significant bit
mA	Milliampere
μs	Microsecond
ms	Millisecond
MSB	Most significant bit
Mx	Motor parameter set x
NMT	Network management
NTC	Negative temperature coefficient
PC	Personal Computer
PDO	Process Data Object
PLC	Programmable logic controller
PM BL motor	Permanent-magnet brushless motor
PMSM	Permanent-magnet synchronous motor without rotor position sensor
PTC	Positive temperature coefficient
Px	Parameter x
ro	Read only
RPDO	Receive-PDO
rpm	Revolutions per minute
RTR	Remote transmission request
rw	Read write
rx	Receive
s	Second
SDO	Service Data Object
SYNC	Synchronous
TPDO	Transmit PDO
tx	Transmit
USB	Universal Serial Bus
V	Volt
W	Watt
V/Hz	Voltage-frequency ratio

## 2 Scope of Supply

CANopen object description e@syDrive 4624, 4625, 4626

Material no. 2.002.6929

**i** Check that all parts are present.

## 3 CANopen Connection

High speed CAN according to ISO 11898 with a bit rate of 250 kbit/s or a baud rate of 250 kHz.

The CAN interface on the e@syDrive 4624, 4625, 4626 is galvanically isolated. An external 24 V DC power supply is required. The voltage range is 18...30 V.

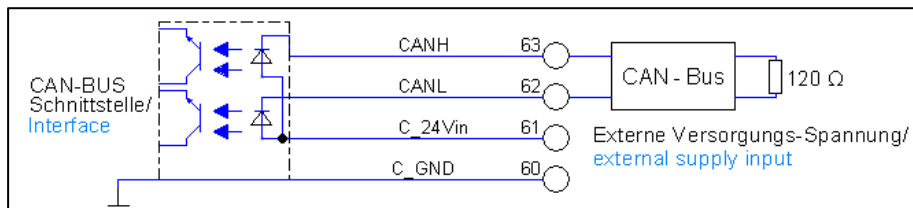
A terminating resistance is not included. This terminating resistance (120 Ohm) must be connected externally in parallel between CAN\_H (63) and CAN\_L (62). If the resistor is not connected, communication between the PC and the INV cannot be established.

The maximum input voltage for CAN\_H and CAN\_L is +16 V DC.

The CAN-ID can be configured via the operating software SycoDrive.

**i** To operate the frequency inverter via CANopen, the parameters "Input for start" (3000:8c / P140) and "Input for rated frequency" (3000:8d / P141) must be set to "CAN".

### 3.1 Connection Example



## 4 CANopen Objects

All objects contained in the EDS file are described here.

The EDS file can be downloaded from the download area of the SycoTec website.

### 4.1 Communication Objects

#### 4.1.1 General Communication Objects

Object 0x1000 : Device Type

This object must contain information on the device type and its functionality.

The object is composed of a 16-bit field which describes the device profile that is used and a second 16 bit field which gives additional information about the functionality of the device.

MSB						LSB
Additional information			Device profile number			
0x0001			0x0192			
Supports generic PDO mapping for frequency inverters			Profile 402			

Index (hex)	Name	Object type	Data type	Access	PDO mapping	Default
1000	Device Type	Variable	Unsigned32	ro	no	0x10192

## Object 0x1001 : Error Register

This object must display any device errors that occurred.

Value	Meaning
1	Generic error

The generic error is signaled at any error situation.

Index (hex)	Name	Object type	Data type	Access	PDO mapping	Default
1001	Error Register	Variable	Unsigned8	ro	no	

## Object 0x1003 : Predefined Error Field

This object stores the 8 most recent error states.

Subindex 0 shows the number of errors stored. Writing the value 0 to the subindex 0 clears the entire error list.

Subindex 1 stores every newly added error state; the previous error messages slip down one position.

Index (hex)	Name	Object type	Data type	Access	PDO mapping	Default
1003	Predefined Error Field	Array				
1003:00	Number of Errors	Variable	Unsigned8	rw	no	0
1003:01	Standard Error Field	Variable	Unsigned32	ro	no	0

## Object 0x1005 : COB ID SYNC

This object shall indicate the configured COB-ID of the synchronization object (SYNC). Further, it defines whether the CANopen device generates the SYNC.

Index (hex)	Name	Object type	Data type	Access	PDO mapping	Default
1005	COB ID SYNC	Variable	Unsigned32	rw	no	0x00000080

## Object 0x1008 : Manufacturer device name

This object contains the short name of the device type.

Index (hex)	Name	Object type	Data type	Access	PDO mapping	Default
1008	Manufacturer device name	Variable	Visible string	const	no	Check if segmented (normal) transfer is supported

## Object 0x1010 : Store parameters

This object can be used to save the current application parameters to the frequency inverter.

Subindex 0 indicates the number of the highest supported sub-index.

Subindex 3 can be used to save the current manufacturer parameters. Writing the value 0x65766173 (hexadecimal representation of "save") to this sub-index initiates the storing of the content of object 0x3000 and all sub-index are written to the EEPROM.

Index (hex)	Name	Object type	Data type	Access	PDO mapping	Default
1010	Store parameters	Array				
1010:00	Highest sub-index supported	Variable	Unsigned8	const	no	3
1010:03	Save application parameters	Variable	Unsigned32	rw	no	0

#### Object 0x1011 : Restore default parameters

This object can be used to write the default parameters to the frequency inverter.

Subindex 0 indicates the number of the highest supported sub-index.

Subindex 3 can be used to restore the factory defaults for manufacturer parameters. Writing the value 0x64616f6c (hexadecimal representation of "load") to this sub-index initiates the reset of the content of object 0x3000 and all sub-index are reset to factory default settings.

Index (hex)	Name	Object type	Data type	Access	PDO mapping	Default
1011	Restore default parameters	Array				
1011:00	Highest sub-index supported	Variable	Unsigned8	const	no	3
1011:03	Restore application default parameters	Variable	Unsigned32	rw	no	0

#### Object 0x1014 : COB ID EMCY

This Object defines the COB-ID of the emergency object (EMCY).

Index (hex)	Name	Object type	Data type	Access	PDO mapping	Default
1014	COB ID EMCY	Variable	Unsigned32	ro	no	Node-ID + 0x80

#### Object 0x1015 : Inhibit Time Emergency

This object indicates the minimum amount of time that must pass before another EMCY is sent.

Writing the value 0 deactivates delayed sending.

With delayed transmission, the entries are written to a queue. The queue is limited to a maximum number of fast consecutive EMCYs (20 entries). If this number is exceeded, an EMCY is sent immediately, indicating the overflow.

Index (hex)	Name	Object type	Data type	Access	PDO mapping	Default
1015	Inhibit Time Emergency	Variable	Unsigned16	rw	no	0x0

#### Object 0x1016 : Consumer Heartbeat Time

This object checks whether each module defined in this object (up to 5 modules) has generated a heartbeat within the defined time.

When the defined time is exceeded, a heartbeat event is triggered.

The heartbeat time is specified in milliseconds.

When writing 0 to subindex 1 disables monitoring.

Index (hex)	Name	Object type	Data type	Access	PDO mapping	Default
1016	Consumer Heartbeat Time	Array				
1016:00	Number of entries	Variable	Unsigned8	ro	no	1
1016:01	Consumer Heartbeat Time	Variable	Unsigned32	rw	no	0x10800

#### Object 0x1017 : Producer Heartbeat Time

This object defines the cyclic time of the heartbeat messages.

The heartbeat time is specified in milliseconds.

When writing the value 0 no heartbeat is sent.

Index (hex)	Name	Object type	Data type	Access	PDO mapping	Default
1017	Producer Heartbeat Time	Variable	Unsigned16	rw	no	1000



### Object 0x1018 : Identity Object

This object contains identity information of the device.

Subindex 0 gives information about the number of entries.

Subindex 1 contains the manufacturer identification number assigned by CiA.

Subindex 2 contains the material number of the device.

Value	Material number	Device
0x01317f3d	2.002.1053	Frequency inverter e@syDrive 4624
0x01317f3e	2.002.1054	Frequency inverter e@syDrive 4625
0x01317f3f	2.002.1055	Frequency inverter e@syDrive 4626

Subindex 3 shows the revision number of the firmware.

Subindex 4 contains the serial number.

Index (hex)	Name	Object type	Data type	Access	PDO mapping	Default
1018	Identity Object	Record				
1018:00	Number of entries	Variable	Unsigned8	ro	no	4
1018:01	Vendor Id	Variable	Unsigned32	ro	no	0x00000433
1018:02	Product Code	Variable	Unsigned32	ro	no	
1018:03	Revision number	Variable	Unsigned32	ro	no	
1018:04	Serial number	Variable	Unsigned32	ro	no	

### Object 0x1029 : Error behaviour

This object defines to which NMT state (Pre-Op, Operational, Stopped) the device switches in error cases (communication error or device error) or whether in case of an error no change of the NMT state should take place. Processing of the two error behaviour registers occurs as soon as one of the parameters "Input for start" and "Input for rated frequency" is set to "CAN".

In "operational" mode, the full functionality of the CAN interface (including PDO transmission) is available; secure control via the interface is guaranteed.

In "Pre-Op" mode, no PDO data is transmitted, but control is still possible via SDO access. The motor may go into operation if one of the parameters "Input for start" and "Input for rated frequency" is set to "CAN".

Subindex 0 indicates the number of supported subindexes.

Subindex 1 describes the behaviour if a communication error occurred.

Subindex 2 describes the behaviour if an internal device error occurred.

Value	Meaning
0	Enter NMT pre-operational state (only if current NMT state is operational)
1	No NMT state change
2	Enter NMT stopped state

NOTE: See CiA402-3.

Index (hex)	Name	Object type	Data type	Access	PDO mapping	Default
1029	Error behaviour	Array				
1029:00	Number of Error Classes	Variable	Unsigned8	ro	no	2
1029:01	Communication Error	Variable	Unsigned8	rw	no	1
1029:02	Specific Error Class	Variable	Unsigned8	rw	no	1

#### 4.1.2 SDO Parameters

##### Object 0x1200 : Server SDO Parameter

This object is used to access the entries in the object directory used on the device.

Subindex 0 indicates the largest supported subindex.

Subindex 1 describes the COB-ID for the communication from the inverter to the server (rx).

Subindex 2 describes the COB-ID for the communication from the server to the inverter (tx).

Index (hex)	Name	Object type	Data type	Access	PDO mapping	Default
1200	Server SDO Parameter	Record				
1200:00	Number of entries	Variable	Unsigned8	Ro	no	2
1200:01	COB ID Client to Server	Variable	Unsigned32	Ro	no	Node-ID + 0x600
1200:02	COB ID Server to Client	Variable	Unsigned32	Ro	no	Node-ID + 0x580

#### 4.1.3 Receive PDO Parameter and Mapping Objects

##### Object 0x1400 : Receive PDO Communication Parameter

This object is used to set the communication parameters of the RPDO.

Before changing PDO parameters, the PDO must first be disabled. Set bit 31 of the COB-ID to 1 (ex.: COB-ID to 0x80000181). The parameters can then be rewritten. The PDO is enabled by deleting bit 31 of the COB-ID (ex.: COB-ID back to 0x0181).

Subindex 0 indicates the largest supported subindex.

Subindex 1 determines whether the RPDO in question is used and defines its COB-ID.

Subindex 2 defines the Transmission Type of the object.

Value	Description Transmission Type
254	Asynchronous (manufacturer specific): asynchronous transmission
255	Asynchronous (device profile specific): asynchronous transmission

Subindex 3 describes the blocking time of the PDO with a resolution of 100  $\mu$ s. Within this time after the PDO has been sent, the PDO will not be sent again. For event-driven PDO, the bus load can be reduced this way.

Subindex 4 is not used (reserved by CiA).

Subindex 5 contains the event timer of the PDO, which defines the time intervals for the cyclic transmission of the PDO.

Index (hex)	Name	Object type	Data type	Access	PDO mapping	Default
1400	Receive PDO Communication Parameter	Record				
1400:00	Number of entries	Variable	Unsigned8	ro	no	5
1400:01	COB ID	Variable	Unsigned32	rw	no	Node-ID + 0x200
1400:02	Transmission Type	Variable	Unsigned8	rw	no	
1400:03	Inhibit Time	Variable	Unsigned16	rw	no	0x0000
1400:04	Compatibility Entry	Variable	Unsigned8	rw	no	
1400:05	Event Timer	Variable	Unsigned16	rw	no	3000

#### Object 0x1600 : Receive PDO Mapping Parameter

This object contains information about the data to be received within the respective RPDO.

Subindex 0 contains the number of valid mapping entries.

Subindex 1 contains the 1st mapping entry. Dummy objects can also be mapped. They serve as placeholders in the PDO.

Subindex 2 contains the 2nd mapping entry. Dummy objects can also be mapped. They serve as placeholders in the PDO.

Index (hex)	Name	Object type	Data type	Access	PDO mapping	Default
1600	Receive PDO Mapping Parameter	Record				
1600:00	Number of entries	Variable	Unsigned8	const	no	2
1600:01	PDO Mapping Entry	Variable	Unsigned32	const	no	0x60400010
1600:02	Mapping Entry 2	Variable	Unsigned32	const	no	0x60420010

#### 4.1.4 Transmit PDO Parameters and Mapping Objects

#### Object 0x1800 : Transmit PDO Communication Parameter

This object is used to set the communication parameters of the TPDO.

Before changing PDO parameters, the PDO must first be disabled. Set bit 31 of the COB-ID to 1 (ex.: COB-ID to 0x80000181). The parameters can then be rewritten. The PDO is enabled by deleting bit 31 of the COB-ID (ex.: COB-ID back to 0x0181).

Subindex 0 indicates the largest supported subindex.

Subindex 1 determines whether the TPDO in question is used and defines its COB-ID.

Subindex 2 defines the Transmission Type of the object.

Value	Description Transmission Type
254	Asynchronous (manufacturer specific): asynchronous transmission
255	Asynchronous (device profile specific): asynchronous transmission



*The Transmission Type can only be changed in the NMT mode Pre-Op or Stopped!*

Subindex 3 describes the blocking time of the PDO with a resolution of 100  $\mu$ s. Within this time after the PDO has been sent, the PDO will not be sent again. For event-driven PDO, the bus load can be reduced this way.

Subindex 4 is not used (reserved by CiA).

Subindex 5 contains the event timer of the PDO, which defines the time intervals for the cyclic transmission of the PDO.

Index (hex)	Name	Object type	Data type	Access	PDO mapping	Default
1800	Transmit PDO Communication Parameter	Record				
1800:00	Number of entries	Variable	Unsigned8	ro	no	5
1800:01	COB ID	Variable	Unsigned32	rw	no	Node-ID + 0x180
1800:02	Transmission Type	Variable	Unsigned8	rw	no	254
1800:03	Inhibit Time	Variable	Unsigned16	rw	no	0x0000
1800:04	Compatibility Entry	Variable	Unsigned8	rw	no	
1800:05	Event Timer	Variable	Unsigned16	rw	no	1000

#### Object 0x1a00 : Transmit PDO Mapping Parameter

This object contains information about the data to be received within the respective TPDO.

Subindex 0 contains the number of valid mapping entries.

Subindex 1 contains the 1st mapping entry. Dummy objects can also be mapped. They serve as placeholders in the PDO.

Subindex 2 contains the 2nd mapping entry. Dummy objects can also be mapped. They serve as placeholders in the PDO.

Index (hex)	Name	Object type	Data type	Access	PDO mapping	Default
1a00	Transmit PDO Mapping Parameter	Record				
1a00:00	Number of entries	Variable	Unsigned8	const	no	2
1a00:01	PDO Mapping Entry	Variable	Unsigned32	const	no	0x60410010
1a00:02	Mapping Entry 2	Variable	Unsigned32	const	no	0x60440010

## 4.2 Manufacturer-specific Objects

#### Object 0x3000 : parameter

This object contains the manufacturer-specific parameters that can be used to set, operate and analyze the inverter.

The object consists of 93 subnumbers. The subnumbers refer to the corresponding parameter number (for details see manual SycoDrive).

Index (hex)	Name	Object type	Data type	Access	PDO mapping	Default
3000	Parameter	Array				

#### Subindex 0

Subindex 0 indicates the largest supported parameter number (Px).

Index (hex)	Name	Object type	Data type	Access	PDO mapping	Default
3000:00	nr_of_parameter	Variable	Unsigned8	ro	no	149

#### Subindex 1

Subindex 1 refers to the Rated frequency (P1). It is used to select the speed for the motor via the software SycoDrive. The value is given in Hz.

Index (hex)	Name	Object type	Data type	Access	PDO mapping	Default
3000:01	f_soll	Variable	Unsigned16	ro	no	

#### Subindex 8

Subindex 8 refers to the Speed display (P8). A display of speed in Hz or in rpm can be selected:

Value	Selection inverter
8005 <sub>hex</sub>	Hz
8006 <sub>hex</sub>	rpm

NOTE: See also Operating Manual Operating Software SycoDrive for HF Inverters e@syDrive 4624, 4625, 4626.

Index (hex)	Name	Object type	Data type	Access	PDO mapping	Default
3000:08	drehzahl	Variable	Unsigned16	rw	no	

#### Subindex a

Subindex a refers to the Rated frequency (P10). It is a display value. The value is given in Hz.

Index (hex)	Name	Object type	Data type	Access	PDO mapping	Default
3000:0a	f_soll_akt	Variable	Unsigned16	ro	optional, TPDO only	

## Subindex b

Subindex b refers to the Peak current (P11). It is a display value. The value is given from 5...240 in 0.1 A steps; 240 equals 24 A.

Index (hex)	Name	Object type	Data type	Access	PDO mapping	Default
3000:0b	I_linit_akt	Variable	Unsigned16	ro	optional, TPDO only	

## Subindex d

Subindex d refers to the Actual frequency (P13). It is a display value. The value is given in Hz.

Index (hex)	Name	Object type	Data type	Access	PDO mapping	Default
3000:0d	f_wr_ist	Variable	Unsigned16	ro	optional, TPDO only	

## Subindex f

Subindex f refers to the Motor voltage (P15). It is a display value. The value is given from 0...650 in 0.1 V steps; 650 equals 65 V.

Index (hex)	Name	Object type	Data type	Access	PDO mapping	Default
3000:0f	V_motor	Variable	Unsigned16	ro	optional, TPDO only	

## Subindex 10

Subindex 10 refers to the DC link voltage (motor) (P16). It is a display value. The value is given from 0...750 in 0.1 V steps; 750 equals 75 V.

Index (hex)	Name	Object type	Data type	Access	PDO mapping	Default
3000:10	u_zkreis	Variable	Unsigned16	ro	optional, TPDO only	

## Subindex 12

Subindex 12 refers to the Active current (P18), corrected by an offset of 25.000 mA. It is a display value. The value is given in mA.

Index (hex)	Name	Object type	Data type	Access	PDO mapping	Default
3000:12	I_mot	Variable	Unsigned16	ro	optional, TPDO only	

## Subindex 13

Subindex 13 refers to the Active power (P19). It is a display value. The value is given in W.

Index (hex)	Name	Object type	Data type	Access	PDO mapping	Default
3000:13	P_wirk	Variable	Unsigned16	ro	optional, TPDO only	

## Subindex 14

Subindex 14 refers to the Motor code (P20). It is a display value.

Index (hex)	Name	Object type	Data type	Access	PDO mapping	Default
3000:14	Motorcode	Variable	Unsigned16	ro	optional, TPDO only	

## Subindex 15

Subindex 15 refers to the I<sup>2</sup>t load (P21). It is a display value. The value is given from 0...1000 in 0.1 % steps; 1000 equals 100 %.

Index (hex)	Name	Object type	Data type	Access	PDO mapping	Default
3000:15	I2tLoad	Variable	Unsigned16	ro	optional, TPDO only	

## Subindex 19

Subindex 19 refers to the runtime of the inverter (P25). It is a display value. The value is given in h.

Index (hex)	Name	Object type	Data type	Access	PDO mapping	Default
3000:19	h_Umrichter	Variable	Unsigned16	ro	optional, TPDO only	

## Subindex 1a

Subindex 1a refers to the runtime of the motor (P26). It is a display value. The value is given in h.

Index (hex)	Name	Object type	Data type	Access	PDO mapping	Default
3000:1a	h_Motor	Variable	Unsigned16	ro	optional, TPDO only	

## Subindex 1b

Subindex 1b refers to the operating status (P27 – inverter flags) of the inverter.

Bit 10	Bit 9	Bit 8	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0	Status
X	X	X	X	X	X	X	X	X	X	1	OPERATION
X	X	X	X	X	X	X	X	X	1	X	WARNING
X	X	X	X	X	X	X	X	1	X	X	FAILURE
X	X	X	X	X	X	X	1	X	X	X	MOTOR ROT
X	X	X	X	X	X	1	X	X	X	X	MOTOR STOP
X	X	X	X	X	1	X	X	X	X	X	OVERLOAD
X	X	X	X	1	X	X	X	X	X	X	SPEED REACHED
X	X	X	1	X	X	X	X	X	X	X	CURRENT LIMIT
X	X	1	X	X	X	X	X	X	X	X	MOTOR TEMP
X	1	X	X	X	X	X	X	X	X	X	I2T
1	X	X	X	X	X	X	X	X	X	X	MOTOR HOLD

NOTE: See also Operating Manual Operating Software SycoDrive for HF Inverters e@syDrive 4624, 4625, 4626.

Index (hex)	Name	Object type	Data type	Access	PDO mapping	Default
3000:1b	Inv_Flag	Variable	Unsigned16	ro	optional, TPDO only	

## Subindex 1e

Subindex 1e refers to the 1st Error (P30). It is a display value.

Index (hex)	Name	Object type	Data type	Access	PDO mapping	Default
3000:1e	stoerung_1	Variable	Unsigned16	ro	optional, TPDO only	

## Subindex 1f

Subindex 1f refers to the 2nd Error (P31). It is a display value.

Index (hex)	Name	Object type	Data type	Access	PDO mapping	Default
3000:1f	stoerung_2	Variable	Unsigned16	ro	optional, TPDO only	

## Subindex 20

Subindex 20 refers to the 3rd Error (P32). It is a display value.

Index (hex)	Name	Object type	Data type	Access	PDO mapping	Default
3000:20	stoerung_3	Variable	Unsigned16	ro	optional, TPDO only	

## Subindex 21

Subindex 21 refers to the 4th Error (P33). It is a display value.

Index (hex)	Name	Object type	Data type	Access	PDO mapping	Default
3000:21	stoerung_4	Variable	Unsigned16	ro	optional, TPDO only	

## Subindex 22

Subindex 22 refers to the 5th Error (P34). It is a display value.

Index (hex)	Name	Object type	Data type	Access	PDO mapping	Default
3000:22	stoerung_5	Variable	Unsigned16	ro	optional, TPDO only	

## Subindex 24

Subindex 24 refers to the type of the Inverter (P36). It is a display value.

Index (hex)	Name	Object type	Data type	Access	PDO mapping	Default
3000:24	t_Umrichter	Variable	Unsigned16	ro	optional, TPDO only	

## Subindex 25

Subindex 25 refers to the Firmware (P37) of the inverter. It is a display value.

Index (hex)	Name	Object type	Data type	Access	PDO mapping	Default
3000:25	rev_software	Variable	Unsigned16	ro	optional, TPDO only	

## Subindex 27

Subindex 27 refers to the Serial number (P39) of the inverter. It is a display value.

Index (hex)	Name	Object type	Data type	Access	PDO mapping	Default
3000:27	serialnummer	Variable	Unsigned16	ro	optional, TPDO only	

## Subindex 29

Subindex 29 refers to the Minimum frequency (P41). The value is given in Hz.

Index (hex)	Name	Object type	Data type	Access	PDO mapping	Default
3000:29	f_mot_min	Variable	Unsigned16	rw	no	

## Subindex 2a

Subindex 2a refers to the Maximum frequency (P42). The value is given in Hz.

Index (hex)	Name	Object type	Data type	Access	PDO mapping	Default
3000:2a	f_mot_max	Variable	Unsigned16	rw	no	

## Subindex 2c

Subindex 2c refers to the Motor peak current (P44).

The value is given from 0...1000 in 0.1 A steps; 1000 equals 100 A.

Index (hex)	Name	Object type	Data type	Access	PDO mapping	Default
3000:2c	I_limit	Variable	Unsigned16	rw	no	

## Subindex 2e

Subindex 2e refers to the Acceleration ramp (P46).

The value is given from 5...4000 in 0.1 s steps; 4000 equals 400 s.

Index (hex)	Name	Object type	Data type	Access	PDO mapping	Default
3000:2e	t_hoch	Variable	Unsigned16	rw	no	

## Subindex 2f

Subindex 2f refers to the Deceleration ramp (P47).

The value is given from 5...4000 in 0.1 s steps; 4000 equals 400 s.

Index (hex)	Name	Object type	Data type	Access	PDO mapping	Default
3000:2f	t_runter	Variable	Unsigned16	rw	no	

## Subindex 33

Subindex 33 refers to the Start-up time (P51) for micro step start-up in the PMSM motor from 0 Hz to start-up frequency. The value is given from 0...4000 in 0.1 s steps; 1000 equals 100 s.

Index (hex)	Name	Object type	Data type	Access	PDO mapping	Default
3000:33	t_anlauf	Variable	Unsigned16	rw	no	

## Subindex 34

Subindex 34 refers to the Start-up current (P52) for micro step start-up.

The value is given from 1...160 in 0.1 A steps; 160 equals 16 A.

Index (hex)	Name	Object type	Data type	Access	PDO mapping	Default
3000:34	I_anlauf	Variable	Unsigned16	rw	no	

## Subindex 35

Subindex 35 refers to the Start-up frequency (P53) for micro step start-up. The value is given in Hz.

Index (hex)	Name	Object type	Data type	Access	PDO mapping	Default
3000:35	f_anlauf	Variable	Unsigned16	rw	no	

## Subindex 36

Subindex 36 refers to the Switch off time (P54) for micro step start-up. The value is given in  $\mu$ s.

Index (hex)	Name	Object type	Data type	Access	PDO mapping	Default
3000:36	t_WR_aus	Variable	Unsigned16	rw	no	

## Subindex 37

Subindex 37 refers to the DC brake time (P55) for direct current braking with an ASM 3-phase motor.

The value is given from 0...1200 in 0.1 s steps; 1200 equals 120 s.

Index (hex)	Name	Object type	Data type	Access	PDO mapping	Default
3000:37	t_DC_brems	Variable	Unsigned16	rw	no	



## Subindex 38

Subindex 38 refers to the DC brake current (P56) for direct current braking with an ASM 3-phase motor.

The value is given from 0...160 in 0.1 A steps; 160 equals 16 A.

Index (hex)	Name	Object type	Data type	Access	PDO mapping	Default
3000:38	I_DC_brems	Variable	Unsigned16	rw	no	

## Subindex 39

Subindex 39 refers to the Holding current (P57). The value is given from 0...30 in 0.1 A steps; 30 equals 3 A.

Index (hex)	Name	Object type	Data type	Access	PDO mapping	Default
3000:39	I_DC_halt	Variable	Unsigned16	rw	no	

## Subindex 3c

Subindex 3c refers to the Voltage 0 (P60) of the V/Hz table. The value is given from 1...650 in 0.1 V steps; 650 equals 65 V.

Index (hex)	Name	Object type	Data type	Access	PDO mapping	Default
3000:3c	U0	Variable	Unsigned16	rw	no	

## Subindex 3d

Subindex 3d refers to the Frequency 1 (P61) of the V/Hz table. The value is given in Hz.

Index (hex)	Name	Object type	Data type	Access	PDO mapping	Default
3000:3d	f1	Variable	Unsigned16	rw	no	

## Subindex 3e

Subindex 3e refers to the Voltage 1 (P62) of the V/Hz table.

The value is given from 1...650 in 0.1 V steps; 650 equals 65 V.

Index (hex)	Name	Object type	Data type	Access	PDO mapping	Default
3000:3e	U1	Variable	Unsigned16	rw	no	

## Subindex 3f

Subindex 3f refers to the Frequency 2 (P63) of the V/Hz table. The value is given in Hz.

Index (hex)	Name	Object type	Data type	Access	PDO mapping	Default
3000:3f	f2	Variable	Unsigned16	rw	no	

## Subindex 40

Subindex 40 refers to the Voltage 2 (P64) of the V/Hz table.

The value is given from 1...650 in 0.1 V steps; 650 equals 65 V.

Index (hex)	Name	Object type	Data type	Access	PDO mapping	Default
3000:40	U2	Variable	Unsigned16	rw	no	

## Subindex 41

Subindex 41 refers to the Frequency 3 (P65) of the V/Hz table. The value is given in Hz.

Index (hex)	Name	Object type	Data type	Access	PDO mapping	Default
3000:41	f3	Variable	Unsigned16	rw	no	

## Subindex 42

Subindex 42 refers to the Voltage 3 (P66) of the V/Hz table.

The value is given from 1...650 in 0.1 V steps; 650 equals 65 V.

Index (hex)	Name	Object type	Data type	Access	PDO mapping	Default
3000:42	U3	Variable	Unsigned16	rw	no	

## Subindex 46

Subindex 46 refers to the Speed control (P70).

Bit 3	Bit 2	Bit 1	Bit 0	Display inverter
0	0	0	0	No motor active
X	X	X	1	Pure speed control active (PMSM only)
X	X	1	X	V/Hz control active (DASM only)
X	1	X	X	I*R control active (DASM only)
1	X	X	X	Load compensation active (DASM only)

NOTE: See also Operating Manual Operating Software SycoDrive for HF Inverters e@syDrive 4624, 4625, 4626.

Index (hex)	Name	Object type	Data type	Access	PDO mapping	Default
3000:46	Regler	Variable	Unsigned16	ro	no	

## Subindex 47

Subindex 47 refers to the I\*R factor (P71) of the controller.

The value is given from 1...100 in 0.1 V/A steps; 100 equals 10 V/A.

Index (hex)	Name	Object type	Data type	Access	PDO mapping	Default
3000:47	I*R-Faktor	Variable	Unsigned16	rw	no	

## Subindex 48

Subindex 48 refers to the Load comp. factor (P72) of the controller.

The value is given from 0...400 in 0.1 %/A~ steps; 400 equals 40 %/A~.

Index (hex)	Name	Object type	Data type	Access	PDO mapping	Default
3000:48	Lastkompensation	Variable	Unsigned16	rw	no	

## Subindex 49

Subindex 49 refers to the Filter time (P73) of the I\*R and Load compensation. The value is given in s.

Index (hex)	Name	Object type	Data type	Access	PDO mapping	Default
3000:49	Komp-t_filt	Variable	Unsigned16	rw	no	

## Subindex 4b

Subindex 4b refers to the I<sup>2</sup>t threshold (P75). The value is given from 0...1000 in 0.1 % steps;

1000 equals 100 %.

Index (hex)	Name	Object type	Data type	Access	PDO mapping	Default
3000:4b	I2tThd	Variable	Unsigned16	rw	no	

## Subindex 4c

Subindex 4c refers to the tau of the I<sup>2</sup>t time (P76). The parameter I<sup>2</sup>t time (P76), which can be set via the software, is not transmitted directly to the inverter, but is previously converted to Tau. Via subindex 4c Tau is specified directly. The following formula can be used:

$$\text{Tau} = P76 / (-\ln(1 - (P93 * P75)^2 / (P44)^2))$$

P44: Motor peak current

P75: I<sup>2</sup>t threshold (Accepts values between 0.0 and 1.0.)

P76: I<sup>2</sup>t time

P93: Rated current

Tau has a minimum of 1 second and a maximum of 3.600 seconds.

This results in the following minimum and maximum values for the I<sup>2</sup>t time (P76):

$$P76_{\min} = 1s * (-\ln(1 - (P93 * P75)^2 / (P44)^2))$$

$$P76_{\max} = 3600s * (-\ln(1 - (P93 * P75)^2 / (P44)^2))$$

Index (hex)	Name	Object type	Data type	Access	PDO mapping	Default
3000:4c	I2tPer	Variable	Unsigned16	rw	no	

## Subindex 4d

Subindex 4d refers to the Function of the I<sup>2</sup>t monitoring (P77).

Value	Selection inverter
806a <sub>hex</sub>	Deactivated
806b <sub>hex</sub>	Warning
806c <sub>hex</sub>	Motor stop

NOTE: See also Operating Manual Operating Software SycoDrive for HF Inverters e@syDrive 4624, 4625, 4626.

Index (hex)	Name	Object type	Data type	Access	PDO mapping	Default
3000:4d	I2tFct	Variable	Unsigned16	rw	no	

## Subindex 4f

Subindex 4f refers to the V control KP (P79). The value is given in %.

Index (hex)	Name	Object type	Data type	Access	PDO mapping	Default
3000:4f	U-Reg-KP	Variable	Unsigned16	rw	no	

## Subindex 50

Subindex 50 refers to the V control TN (P80). The value is given in ms.

Index (hex)	Name	Object type	Data type	Access	PDO mapping	Default
3000:50	U-Reg-t <sub>n</sub>	Variable	Unsigned16	rw	no	

## Subindex 51

Subindex 51 refers to the Speed control KP (P81). The value is given in %.

Index (hex)	Name	Object type	Data type	Access	PDO mapping	Default
3000:51	N-Reg-KP	Variable	Unsigned16	rw	no	

## Subindex 52

Subindex 52 refers to the Speed control TN (P82). The value is given in ms.

Index (hex)	Name	Object type	Data type	Access	PDO mapping	Default
3000:52	N-Reg-t <sub>n</sub>	Variable	Unsigned16	rw	no	

## Subindex 53

Subindex 53 refers to the speed control TV (P83). The value is given in ms.

Index (hex)	Name	Object type	Data type	Access	PDO mapping	Default
3000:53	N-Reg-t_v	Variable	Unsigned16	rw	no	

## Subindex 54

Subindex 54 refers to the Speed control TF (P84). The value is given in ms.

Index (hex)	Name	Object type	Data type	Access	PDO mapping	Default
3000:54	N-Reg-t_fill	Variable	Unsigned16	rw	no	

## Subindex 55

Subindex 55 refers to the Temperature monitoring (P85).

Value	Selection inverter
0000 <sub>hex</sub>	Off
802a <sub>hex</sub>	NTC
802b <sub>hex</sub>	PTC
802c <sub>hex</sub>	PT1000
802d <sub>hex</sub>	KTY84

NOTE: See also Operating Manual Operating Software SycoDrive for HF Inverters e@syDrive 4624, 4625, 4626.

Index (hex)	Name	Object type	Data type	Access	PDO mapping	Default
3000:55	Motorschutz	Variable	Unsigned16	rw	no	

## Subindex 56

Subindex 56 refers to the Resistance value (P86) of the temperature monitoring. The value is given in Ohm.

Index (hex)	Name	Object type	Data type	Access	PDO mapping	Default
3000:56	Sensorwert	Variable	Unsigned16	rw	no	

## Subindex 5a

Subindex 5a refers to the Motor type (P90).

Value	Selection inverter
8001 <sub>hex</sub>	No motor
8002 <sub>hex</sub>	ASM 3-phase
8003 <sub>hex</sub>	PMSM

NOTE: See also Operating Manual Operating Software SycoDrive for HF Inverters e@syDrive 4624, 4625, 4626.

Index (hex)	Name	Object type	Data type	Access	PDO mapping	Default
3000:5a	Motortyp	Variable	Unsigned16	rw	no	

## Subindex 5b

Subindex 5b refers to the Rated frequency (P91). The value is given in Hz.

Index (hex)	Name	Object type	Data type	Access	PDO mapping	Default
3000:5b	f_mot_nenn	Variable	Unsigned16	rw	no	

## Subindex 5c

Subindex 5c refers to the Rated voltage (P92). The value is given from 0...650 in 0.1 V steps; 650 equals 65 V.

Index (hex)	Name	Object type	Data type	Access	PDO mapping	Default
3000:5c	U_mot_nenn	Variable	Unsigned16	rw	no	

## Subindex 5d

Subindex 5d refers to the Rated current (P93). The value is given from 5...160 in 0.1 A steps; 160 equals 16 A.

Index (hex)	Name	Object type	Data type	Access	PDO mapping	Default
3000:5d	I_mot_nenn	Variable	Unsigned16	rw	no	

## Subindex 5e

Subindex 5e refers to cos\_phi (P94). The value is given in %.

Index (hex)	Name	Object type	Data type	Access	PDO mapping	Default
3000:5e	cos_phi	Variable	Unsigned16	rw	no	

## Subindex 60

Subindex 60 refers to the Number of pole pairs (P96).

Index (hex)	Name	Object type	Data type	Access	PDO mapping	Default
3000:60	mot_polpaarzahl	Variable	Unsigned16	rw	no	

## Subindex 61

Subindex 61 refers to the Input current (P97). It is a display value. The value is given in 0.1 A steps.

Index (hex)	Name	Object type	Data type	Access	PDO mapping	Default
3000:61	Nsoll_I_in	Variable	Unsigned16	ro	no	

## Subindex 62

Subindex 62 refers to the Input voltage (P98). It is a display value. The value is given in 0.1 V steps.

Index (hex)	Name	Object type	Data type	Access	PDO mapping	Default
3000:62	Nsoll_U_in	Variable	Unsigned16	ro	no	

## Subindex 63

Subindex 63 refers to the Temperature at heat sink (P99). It is a display value. The value is given in 0.1 °C steps.

Index (hex)	Name	Object type	Data type	Access	PDO mapping	Default
3000:63	Temp_KK	Variable	Unsigned16	ro	no	

## Subindex 64

Subindex 64 refers to the DC link voltage (input) (P100). It is a display value. The value is given in 0.1 V steps.

Index (hex)	Name	Object type	Data type	Access	PDO mapping	Default
3000:64	Uzk_input	Variable	Unsigned16	ro	no	

## Subindex 65

Subindex 65 refers to the diagnosis function of the relays and LEDs in the Actuator / Sensor Test (P101).

Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0	Output
X	X	X	X	X	X	X	1	Relay 1
X	X	X	X	X	X	1	X	Relay 2
X	X	X	X	X	1	X	X	LED Fault
X	X	X	X	1	X	X	X	LED Operation
X	X	X	1	X	X	X	X	Invert Relay 1
X	X	1	X	X	X	X	X	Invert Relay 2
X	1	X	X	X	X	X	X	Invert LED Fault
1	X	X	X	X	X	X	X	Invert LED Operation

NOTE: See also Operating Manual Operating Software SycoDrive for HF Inverters e@syDrive 4624, 4625, 4626.

Index (hex)	Name	Object type	Data type	Access	PDO mapping	Default
3000:65	diag1	Variable	Unsigned16	ro	no	

## Subindex 66

Subindex 66 refers to the diagnosis function of the digital inputs, the PLC input and the motor temperature monitoring in the Actuator / Sensor Test (P102).

Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0	Input
X	X	X	X	X	X	X	1	DIN 1
X	X	X	X	X	X	1	X	DIN 2
X	X	X	X	X	1	X	X	DIN 3
X	X	X	X	1	X	X	X	DIN 4
X	X	X	1	X	X	X	X	DIN 5
X	X	1	X	X	X	X	X	DIN 6
X	1	X	X	X	X	X	X	Temperature monitoring (motor)
1	X	X	X	X	X	X	X	PLC input

NOTE: See also Operating Manual Operating Software SycoDrive for HF Inverters e@syDrive 4624, 4625, 4626.

Index (hex)	Name	Object type	Data type	Access	PDO mapping	Default
3000:66	diag2	Variable	Unsigned16	ro	no	

## Subindex 68

Subindex 68 refers to the Fixed frequency 1 (P104). The value is given in Hz.

Index (hex)	Name	Object type	Data type	Access	PDO mapping	Default
3000:68	fix_freq_1	Variable	Unsigned16	rw	no	

## Subindex 69

Subindex 69 refers to the Fixed frequency 2 (P105). The value is given in Hz.

Index (hex)	Name	Object type	Data type	Access	PDO mapping	Default
3000:69	fix_freq_2	Variable	Unsigned16	rw	no	

## Subindex 6a

Subindex 6a refers to the Fixed frequency 3 (P106). The value is given in Hz.

Index (hex)	Name	Object type	Data type	Access	PDO mapping	Default
3000:6a	fix_freq_3	Variable	Unsigned16	rw	no	

## Subindex 6b

Subindex 6b refers to the Fixed frequency 4 (P107). The value is given in Hz.

Index (hex)	Name	Object type	Data type	Access	PDO mapping	Default
3000:6b	fix_freq_4	Variable	Unsigned16	rw	no	

## Subindex 6e

Subindex 6e refers to DIN1 (P110).

Value	Selection inverter
0000 <sub>hex</sub>	Off
803b <sub>hex</sub>	Start/Stop
803c <sub>hex</sub>	Stop

NOTE: See also Operating Manual Operating Software SycoDrive for HF Inverters e@syDrive 4624, 4625, 4626.

Index (hex)	Name	Object type	Data type	Access	PDO mapping	Default
3000:6e	dig_in_1	Variable	Unsigned16	rw	no	

## Subindex 6f

Subindex 6f refers to DIN2 (P111).

Value	Selection inverter
0000 <sub>hex</sub>	Off
803d <sub>hex</sub>	Start impulse
803e <sub>hex</sub>	Reset
803f <sub>hex</sub>	Speed direction

NOTE: See also Operating Manual Operating Software SycoDrive for HF Inverters e@syDrive 4624, 4625, 4626.

Index (hex)	Name	Object type	Data type	Access	PDO mapping	Default
3000:6f	dig_in_2	Variable	Unsigned16	rw	no	

## Subindex 70

Subindex 70 refers to DIN3 (P112).

Value	Selection inverter
0000 <sub>hex</sub>	Off
803e <sub>hex</sub>	Reset
803f <sub>hex</sub>	Speed direction
8040 <sub>hex</sub>	Motor code bit 0

NOTE: See also Operating Manual Operating Software SycoDrive for HF Inverters e@syDrive 4624, 4625, 4626.

Index (hex)	Name	Object type	Data type	Access	PDO mapping	Default
3000:70	dig_in_3	Variable	Unsigned16	rw	no	

## Subindex 71

Subindex 71 refers to DIN4 (P113).

Value	Selection inverter
0000 <sub>hex</sub>	Off
803e <sub>hex</sub>	Reset
803f <sub>hex</sub>	Speed direction
8040 <sub>hex</sub>	Motor code bit 1

NOTE: See also Operating Manual Operating Software SycoDrive for HF Inverters e@syDrive 4624, 4625, 4626.

Index (hex)	Name	Object type	Data type	Access	PDO mapping	Default
3000:71	dig_in_4	Variable	Unsigned16	rw	no	

## Subindex 72

Subindex 72 refers to DIN5 (P114).

Value	Selection inverter
0000 <sub>hex</sub>	Off
803e <sub>hex</sub>	Reset
803f <sub>hex</sub>	Speed direction
8040 <sub>hex</sub>	Motor code bit 2
8041 <sub>hex</sub>	Fixed frequency bit 1
8042 <sub>hex</sub>	Parameter import

NOTE: See also Operating Manual Operating Software SycoDrive for HF Inverters e@syDrive 4624, 4625, 4626.

Index (hex)	Name	Object type	Data type	Access	PDO mapping	Default
3000:72	dig_in_5	Variable	Unsigned16	rw	no	

## Subindex 73

Subindex 73 refers to DIN6 (P115).

Value	Selection inverter
0000 <sub>hex</sub>	Off
803e <sub>hex</sub>	Reset
803f <sub>hex</sub>	Speed direction
8040 <sub>hex</sub>	Motor code bit 3
8041 <sub>hex</sub>	Fixed frequency bit 0
8043 <sub>hex</sub>	Parameter export

NOTE: See also Operating Manual Operating Software SycoDrive for HF Inverters e@syDrive 4624, 4625, 4626.

Index (hex)	Name	Object type	Data type	Access	PDO mapping	Default
3000:73	dig_in_6	Variable	Unsigned16	rw	no	

## Subindex 74

Subindex 74 refers to the PLC input (P116).

Value	Selection inverter
0000 <sub>hex</sub>	Off
803b <sub>hex</sub>	Start/Stop

NOTE: See also Operating Manual Operating Software SycoDrive for HF Inverters e@syDrive 4624, 4625, 4626.

Index (hex)	Name	Object type	Data type	Access	PDO mapping	Default
3000:74	Start_In	Variable	Unsigned16	rw	no	



## Subindex 78

Subindex 78 refers to Relay 1 (P120).

Value	Selection inverter
0000 <sub>hex</sub>	Off
804a <sub>hex</sub>	Operation
804b <sub>hex</sub>	Warning
804c <sub>hex</sub>	Failure
804d <sub>hex</sub>	Overload
804e <sub>hex</sub>	Nominal speed reached
804f <sub>hex</sub>	Current limit
8050 <sub>hex</sub>	Motor temperature
8051 <sub>hex</sub>	Motor downtime
8052 <sub>hex</sub>	Motor runs
8053 <sub>hex</sub>	I <sup>2</sup> t warning
8054 <sub>hex</sub>	Holding operation

NOTE: See also Operating Manual Operating Software SycoDrive for HF Inverters e@syDrive 4624, 4625, 4626.

Index (hex)	Name	Object type	Data type	Access	PDO mapping	Default
3000:78	relais_1	Variable	Unsigned16	rw	no	

## Subindex 79

Subindex 79 refers to Relay 2 (P121).

Value	Selection inverter
0000 <sub>hex</sub>	Off
804a <sub>hex</sub>	Operation
804b <sub>hex</sub>	Warning
804c <sub>hex</sub>	Failure
804d <sub>hex</sub>	Overload
804e <sub>hex</sub>	Nominal speed reached
804f <sub>hex</sub>	Current limit
8050 <sub>hex</sub>	Motor temperature
8051 <sub>hex</sub>	Motor downtime
8052 <sub>hex</sub>	Motor runs
8053 <sub>hex</sub>	I <sup>2</sup> t warning
8054 <sub>hex</sub>	Holding operation

NOTE: See also Operating Manual Operating Software SycoDrive for HF Inverters e@syDrive 4624, 4625, 4626.

Index (hex)	Name	Object type	Data type	Access	PDO mapping	Default
3000:79	relais_2	Variable	Unsigned16	rw	no	

## Subindex 7d

Subindex 7d refers to the Warning current (P125) of the relays.

The value is given from 4...120 in 0.1 A steps; 120 equals 12 A.

Index (hex)	Name	Object type	Data type	Access	PDO mapping	Default
3000:7d	I_warn	Variable	Unsigned16	rw	No	

## Subindex 81

Subindex 81 refers to the source for AIN (P129).

Value	Selection inverter
805a <sub>hex</sub>	U (0...10 V)
805b <sub>hex</sub>	I (0...20 mA)

NOTE: See also Operating Manual Operating Software SycoDrive for HF Inverters e@syDrive 4624, 4625, 4626.

Index (hex)	Name	Object type	Data type	Access	PDO mapping	Default
3000:81	analog_in	Variable	Unsigned16	rw	no	

## Subindex 82

Subindex 82 refers to the CAN node ID (P130).

Index (hex)	Name	Object type	Data type	Access	PDO mapping	Default
3000:82	can_node_id	Variable	Unsigned16	rw	no	

## Subindex 87

Subindex 87 refers to the Minimum frequency AIN (P135). The value is given in Hz.

Index (hex)	Name	Object type	Data type	Access	PDO mapping	Default
3000:87	f_fern_min	Variable	Unsigned16	rw	no	

## Subindex 88

Subindex 88 refers to the Maximum frequency AIN (P136). The value is given in Hz.

Index (hex)	Name	Object type	Data type	Access	PDO mapping	Default
3000:88	f_fern_max	Variable	Unsigned16	rw	no	

## Subindex 89

Subindex 89 refers to the Maximum voltage (P137) of the analog input.

The value is given from 1...100 in 0.1 V steps; 100 equals 10 V.

Index (hex)	Name	Object type	Data type	Access	PDO-mapping	Default
3000:89	AIN_Vmax	Variable	Unsigned16	rw	no	

## Subindex 8a

Subindex 8a refers to the Maximum current (P138) of the analog input.

The value is given from 4...200 in 0.1 mA steps; 200 equals 20 mA.

Index (hex)	Name	Object type	Data type	Access	PDO mapping	Default
3000:8a	AIN_I <sub>max</sub>	Variable	Unsigned16	rw	no	

## Subindex 8b

Subindex 8b refers to the AOUT 10V (P139).

The value is given from 5...1000 in 0.1 A steps; 1000 equals 100 A.

Index (hex)	Name	Object type	Data type	Access	PDO mapping	Default
3000:8b	AOUT_I <sub>max</sub>	Variable	Unsigned16	rw	no	

## Subindex 8c

Subindex 8c refers to the Input for start (P140). It describes from which source the frequency inverter receives the start / stop command.

Value	Selection inverter
805C <sub>hex</sub>	Digital inputs
805d <sub>hex</sub>	SycoDrive
805e <sub>hex</sub>	CAN

NOTE: See also Operating Manual Operating Software SycoDrive for HF Inverters e@syDrive 4624, 4625, 4626.

Index (hex)	Name	Object type	Data type	Access	PDO mapping	Default
3000:8c	input_start	Variable	Unsigned16	rw	no	

## Subindex 8d

Subindex 8d refers to the Input for rated frequency (P141). It describes from which source the frequency inverter receives the setpoint.

Value	Selection inverter
805C <sub>hex</sub>	Digital inputs
805d <sub>hex</sub>	SycoDrive
805e <sub>hex</sub>	CAN
805f <sub>hex</sub>	Analog input

NOTE: See also Operating Manual Operating Software SycoDrive for HF Inverters e@syDrive 4624, 4625, 4626.

Index (hex)	Name	Object type	Data type	Access	PDO mapping	Default
3000:8d	input_f-soll	Variable	Unsigned16	rw	no	

## Subindex 92

Subindex 92 refers to the Direction of rotation (P146).

The direction of rotation is determined by the current setting of the parameter / object "Direction of rotation" (P146 / 0x3000:92) in connection with the setpoint value via CAN (0x6042 vl\_target\_velocity). A positive sign of vl\_target\_velocity (0x6042) leads to the direction of rotation set via PC or digital inputs, a negative sign to the corresponding opposite direction of rotation.

Value	Selection inverter
8062 <sub>hex</sub>	Counter-clockwise
8063 <sub>hex</sub>	Clockwise
8064 <sub>hex</sub>	Digital input

NOTE: See also Operating Manual Operating Software SycoDrive for HF Inverters e@syDrive 4624, 4625, 4626.

Index (hex)	Name	Object type	Data type	Access	PDO mapping	Default
3000:92	drehrichtung	Variable	Unsigned16	rw	no	

## Subindex 95

Subindex 95 refers to the motor parameter sets saved in the inverter (M1...M16). Each bit represents a memory location for a motor parameter set, where bit 0 (LSB) represents parameter set 1 (M1).

Bit 15	Bit 14	Bit 13	Bit 12	Bit 11	Bit 10	Bit 9	Bit 8	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0	Mx
X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	1	1
X	X	X	X	X	X	X	X	X	X	X	X	X	X	1	X	2
X	X	X	X	X	X	X	X	X	X	X	X	X	1	X	X	3
X	X	X	X	X	X	X	X	X	X	X	X	1	X	X	X	4
X	X	X	X	X	X	X	X	X	X	X	1	X	X	X	X	5
X	X	X	X	X	X	X	X	X	X	1	X	X	X	X	X	6
X	X	X	X	X	X	X	X	X	1	X	X	X	X	X	X	7
X	X	X	X	X	X	X	X	1	X	X	X	X	X	X	X	8
X	X	X	X	X	X	X	1	X	X	X	X	X	X	X	X	9
X	X	X	X	X	X	1	X	X	X	X	X	X	X	X	X	10
X	X	X	X	X	1	X	X	X	X	X	X	X	X	X	X	11
X	X	X	X	1	X	X	X	X	X	X	X	X	X	X	X	12
X	X	X	1	X	X	X	X	X	X	X	X	X	X	X	X	13
X	X	1	X	X	X	X	X	X	X	X	X	X	X	X	X	14
X	1	X	X	X	X	X	X	X	X	X	X	X	X	X	X	15
1	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	16

NOTE: See also Operating Manual Operating Software SycoDrive for HF Inverters e@syDrive 4624, 4625, 4626.

Index (hex)	Name	Object type	Data type	Access	PDO mapping	Default
3000:95	MotorMemory.all	Variable	Unsigned16	ro	optional, TPDO only	

## 4.3 Standardized Device Objects (CiA 402 Drives and Motion Control)

## Object 0x603f : error\_code

This object must provide the error code of the last error, which occurred in the inverter.

Emergency messages are triggered by internal errors and serious warnings in the drive unit. They are defined in detail in "CiA402-3". They must contain the 16-bit error code. Error codes from xx00h to xx7Fh are defined in "CiA301".

The meanings of the error codes are given in "CiA402-2" Table 24.

Index (hex)	Name	Object type	Data type	Access	PDO mapping	Default
603f	error_code	Variable	Unsigned16	ro	optional	


## Object 0x6040 : Controlword

This object must specify the received command that controls the inverter. It must be structured as follows:

15	11	10	9	8	7	6	4	3	2	1	0
ms		r	oms	h	fr	oms		eo	qs	ev	so
MSB											LSB

Legend: ms = manufacturer-specific; r = reserved; oms = operation mode specific; h = stop; fr = fault reset; eo = enable operation; qs = quick stop; ev = enable voltage; so = switch on.

The bits 0 to 9 shall be supported according to the mode of operation. If the related functionality is not available, an appropriate emergency messages shall be generated. The commands shall be coded as specified in the following table:

Command	Bits of the control word					Transitions
	Bit 7	Bit 3	Bit 2	Bit 1	Bit 0	
Shutdown	0	x	1	1	0	2, 6, 8
Switch on	0	0	1	1	1	3
Switch on + enable operation	0	1	1	1	1	3 + 4 (NOTE)
Disable voltage	0	x	x	0	X	7, 9, 10, 12
Quick stop	0	x	0	1	X	7, 10, 11
Disable operation	0	0	1	1	1	5
Enable operation	0	1	1	1	1	4, 16
Fault reset		x	x	x	X	15

NOTE: Automatic transition to "Enable operation" state after executing "SWITCHED ON" state functionality.

All implemented bits of the control word are valid independently of the inverter state.

Index (hex)	Name	Object type	Data type	Access	PDO mapping	Default
6040	Controlword	Variable	Unsigned16	rw	optional	



To start/stop the frequency inverter via CANopen, the parameter "Input for start" (3000:8c / P140) must be set to "CAN".

Object 0x6041 : Statusword

This object provides the status of the inverter. The object must be structured as defined:

15	14	13	12	11	10	9	8	7	6		4	3	2	1	0
ms		oms		ila	tr	rm	ms	w	sod	qs	ve	f	oe	so	rtso
MSB															LSB

Legend: ms = manufacturer-specific; oms = operation mode specific; ila = internal limit active; tr = target reached; rm = remote; w = warming; sod = swith on disabled; qs = quick stop; ve = voltage enabled; f = fault; oe = operation enabled; so = switched on; rtso = ready to switch on.

Bits 10, 9 and 6 to 0 shall be supported. The oms bits are supported when the mode of operation is supported. If the related functionality of the oms bits is not available, the corresponding bit must be 0<sub>b</sub>.

The bit combinations defined in the following table code the inverter states:

Status word	Inverter state
xxxx xxxx x0xx 0000 <sub>b</sub>	Not ready to switch on
xxxx xxxx x1xx 0000 <sub>b</sub>	Switch on disabled
xxxx xxxx x01x 0001 <sub>b</sub>	Ready to switch on
xxxx xxxx x01x 0011 <sub>b</sub>	Switched on
xxxx xxxx x01x 0111 <sub>b</sub>	Operation enabled
xxxx xxxx x00x 0111 <sub>b</sub>	Quick stop active
xxxx xxxx x0xx 1111 <sub>b</sub>	Fault reaction active
xxxx xxxx x0xx 1000 <sub>b</sub>	Fault

All implemented bits of the status word are valid independently of the inverter state.

Index (hex)	Name	Object type	Data type	Access	PDO mapping	Default
6041	Statusword	Variable	Unsigned16	ro	optional	

## Object 0x6042 : vl\_target\_velocity

This object must specify the required speed of the system. The value shall be given in Hertz (Hz).

The direction of rotation is determined by the current setting of the parameter / object "Direction of rotation" (P146 / 0x3000:92) in connection with the setpoint value via CAN (0x6042 vl\_target\_velocity). A positive sign of vl\_target\_velocity (0x6042) leads to the direction of rotation set via PC or digital inputs, a negative sign to the corresponding opposite direction of rotation.

Index (hex)	Name	Object type	Data type	Access	PDO mapping	Default
6042	vl_target_velocity	Variable	Integer16	rw	optional	0x0



*For speed specification via CANopen, the parameter "Input for rated frequency" (3000:8d / P141) must be set to "CAN".*

## Object 0x6043 : vl\_velocity\_demand

This object shall provide the instantaneous velocity generated by the ramp function. It is an internal object of the drive device. The value is given in the same unit as the target speed (vl\_target\_velocity). Positive values indicate a forward direction and negative values indicate a reverse direction.

Index (hex)	Name	Object type	Data type	Access	PDO mapping	Default
6043	vl_target_demand	Variable	Integer16	ro	optional	

## Object 0x6044 : vl\_velocity\_actual\_value

This object must provide the speed at the motor spindle or load. Depending on the design, the inverter must provide a corresponding image of the current speed, e.g. derived from the speed demand.

The value is given in the same unit as the target speed (vl\_target\_velocity). Positive values indicate a forward direction and negative values indicate a reverse direction.

Index (hex)	Name	Object type	Data type	Access	PDO mapping	Default
6044	vl_target_actual_value	Variable	Integer16	ro	optional	

## Object 0x6046 : vl\_velocity\_min\_max\_amount

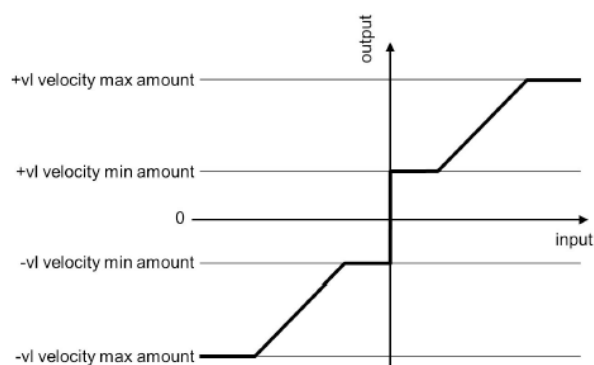
This object must indicate the configured minimum and maximum speed. The values must be given in Hertz (Hz).

Subindex 0 indicates the number of supported subindexes.

Subindex 1 indicates the minimum speed (P41) and is internally transmitted to the minimum positive and negative values.

Subindex 2 indicates the maximum speed (P42) and is internally transmitted to the maximum positive and negative values.

The described transfer characteristic is shown here:



Index (hex)	Name	Object type	Data type	Access	PDO mapping	Default
6046	vl_velocity_min_max_amount	Array				
6046:00	vl_velocity_min_max_amount_number_of_entries	Variable	Unsigned8	ro	no	2
6046:01	vl_velocity_min_max_amount_vl_velocity_min_amount	Variable	Unsigned32	rw	optional	
6046:02	vl_velocity_min_max_amount_vl_velocity_max_amount	Variable	Unsigned32	rw	optional	

Object 0x6048 : vl\_velocity\_acceleration

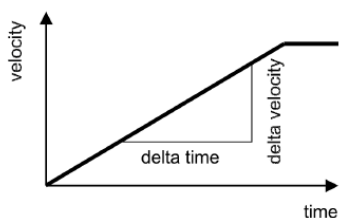
This object must indicate the configured delta velocity and the delta time of the slope of the acceleration ramp.

Subindex 0 indicates the number of supported subindexes.

Subindex 1 indicates the delta velocity. The value of the delta velocity must be specified in revolutions per minute (rpm).

Subindex 2 indicates the delta time. The value of the delta time is given in seconds.

The delta velocity and the delta time are shown here:



Index (hex)	Name	Object type	Data type	Access	PDO mapping	Default
6048	vl_velocity_acceleration	Record				
6048:00	vl_velocity_acceleration_number_of_entries	Variable	Unsigned8	ro	no	2
6048:01	vl_velocity_acceleration_Delta_speed	Variable	Unsigned32	rw	optional	
6048:02	vl_velocity_acceleration_Delta_time	Variable	Unsigned16	rw	optional	

Object 0x6049 : vl\_velocity\_decceleration

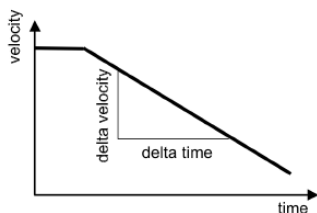
This object must indicate the configured delta velocity and the delta time of the slope of the deceleration ramp.

Subindex 0 indicates the number of supported subindexes.

Subindex 1 indicates the delta velocity. The value of the delta velocity must be specified in revolutions per minute (rpm).

Subindex 2 indicates the delta time. The value of the delta time is given in seconds.

The delta velocity and the delta time are shown here:



Index (hex)	Name	Object type	Data type	Access	PDO mapping	Default
6049	vl_velocity_deceleration	Record				
6049:00	vl_velocity_deceleration_number_of_entries	Variable	Unsigned8	ro	no	2
6049:01	vl_velocity_deceleration_Delta_speed	Variable	Unsigned32	rw	optional	
6049:02	vl_velocity_deceleration_Delta_time	Variable	Unsigned16	rw	optional	

Objekt 0x6402 : motor\_type

This object must indicate the type of motor attached to and driven by the drive device.

The following table specifies the value definition:

Value	Name	INV name
0007 <sub>hex</sub>	Squirrel cage Induction motor	ASM 3-phase
000B <sub>hex</sub>	Trapezoidal PM BL motor	PMSM
7fff <sub>hex</sub>	No motor type assigned	No motor

NOTE: See CiA402-2 Table 7

Index (hex)	Name	Object type	Data type	Access	PDO mapping	Default
6402	Motor_type	Variable	Unsigned16	rw	optional	0xB

Object 0x6502 : supported\_drive\_modes

This object contains information about the supported drive modes.

31	16	15	11	10	9	8	7	6	5	4	3	2	1	0
Manufacturer-specific		r	cstca	cst	csv	csp	ip	hm	r	tq	pv	vl	pp	
MSB													LSB	

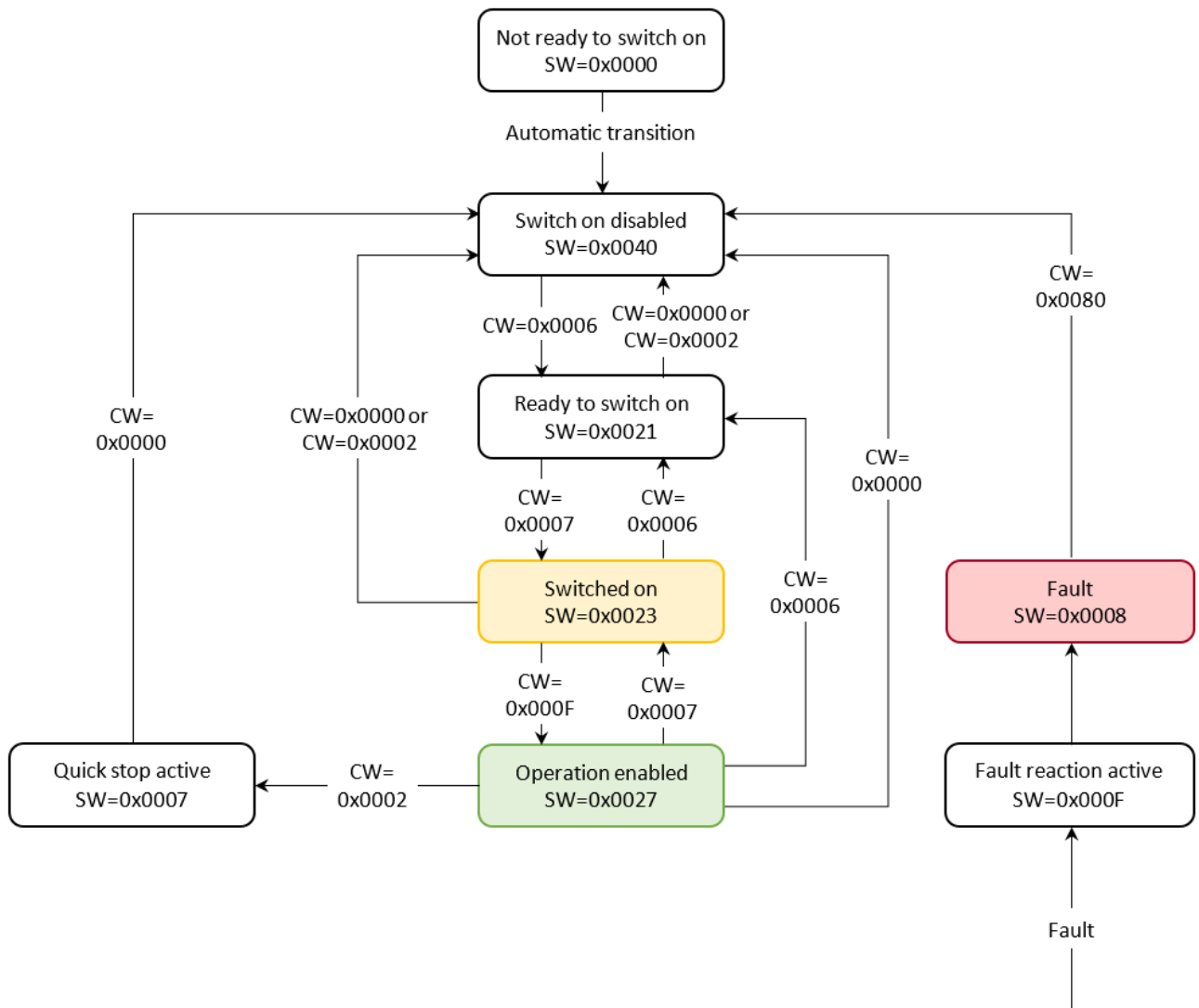
Legend: cstca = cyclic synchronous torque mode with communication angle; cst = cyclic synchronous torque mode; csv = cyclic synchronous velocity mode; csp = cyclic synchronous position mode; ip = interpolated position mode; hm = homing mode; r = reserved; tq = torque-controlled mode; pv = profile velocity mode; vl = velocity-controlled mode; pp = profile position mode.

Index (hex)	Name	Object type	Data type	Access	PDO mapping	Default
6502	Supported_drive_modes	Variable	Unsigned32	ro	optional	2



## 5 State Machine

The following figure shows the individual states (Statusword) and commands for changing the states (Controlword).



## 6 Notes on PDO Functionality

Transmit PDO: Process data of the inverter to the controller

Receive PDO: Process data of the controller to the inverter

The frequency inverter 4624, 4625, 4626 each have a transmit PDO and a receive PDO. The data mapped in these PDO (i.e., the internal registers of the inverter, which are sent or received a part of the PDO) is fixed and cannot be changed.

The transmit PDO contains the two objects 0x6041:0 (Statusword) and 0x6044:0 (vl\_velocity\_actual\_value). These are sent cyclically by the inverter. Preset as Transmission Type (object 0x1800:2) is a system-specific transmission rate. The PDO is only sent when the status changes. The Transmission Type can be set that this PDO reacts to sync events of the controller and sends data to an n-th sync event. To do this, in the register 0x1800:2, a value between 1 (send PDO for each sync event) and 240 (send PDO for each 240th sync event).



*The register 0x1800:2 can only be written in NMT mode Pre-Op or Stopped!*

The receive PDO expects as data object the Controlword (mapping to object 0x6040:0) and the parameter vl\_target\_velocity (0x6042:0). The controller must send a corresponding transmit PDO with matching COB-ID and the associated data as content. The inverter responds to each received PDO and processes it accordingly.

Control side evaluation of the transmit PDO: A receive PDO matching the transmit PDO must be implemented in the controller. The received data for the Statusword of the inverters and the current speed can then be further processed in the controller.

For proper control of the inverter via its receive PDO, the Controlword should first be written to the controller via a transmit PDO, so that the inverter is switched to the correct mode for its start. At the same time (or later), the speed settings can be updated with each PDO.

The correct procedure for changing the Transmission Type for the TPDO of the inverter is as follows:

- (1) Inverter must be in Pre-Op-Mode
- (2) Set COB-Invalid-BIT in the COB-ID of the TPDO1 (Object 0x1800:1). Then TPDO parameters can be changed! (New COB-ID = COB-ID | 0x80000000)
- (3) Write new value to Transmission Type (Object 0x1800:2).
- (4) Delete COB-Invalid-BIT in the COB-ID of TPDO1 (Object 0x1800:1). (New COB-ID = COB-ID & ~(0x80000000))
- (5) Switch inverter to Operational Mode

If, for example, the Transmission Type is set to 10, the inverter sends TPDO1 with the current Statusword and the current speed for every tenth SYNC received from the master.

A change of the Transmission Type for the RPDO1 is not advisable. Here, the master sends the PDO with the new Controlword and the new setpoint speed, which must be processed by the inverter immediately. Since PDO transmitted by the master are sent independently of SYNC pulses, the inverter does not react to the PDO in this case!

## Warranty Conditions

Under current SycoTec delivery and payment conditions, SycoTec undertakes warranty for satisfactory function and freedom from faults in material and manufacture for a period of 12 months from the date of sale certified by the vendor.

In the event of justifiable complaints, SycoTec shall supply spare parts or carry out repairs free of charge under warranty. SycoTec accepts no liability for defects and their consequences which have arisen or could have arisen as a result of natural wear and tear, improper handling, cleaning or maintenance, non-compliance with the maintenance, operating or connecting instructions, corrosion, impurities in the air supply or chemical or electrical influences which are unusual or not admissible in accordance with SycoTec's standards. The warranty claims shall become null and void if defects or their consequences can be attributed to interventions in or modifications to the product. Warranty claims can only be validated if they are notified immediately in writing to SycoTec.

A copy invoice or delivery note clearly showing the manufacture number shall be attached if products are returned.

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(DE = original)

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