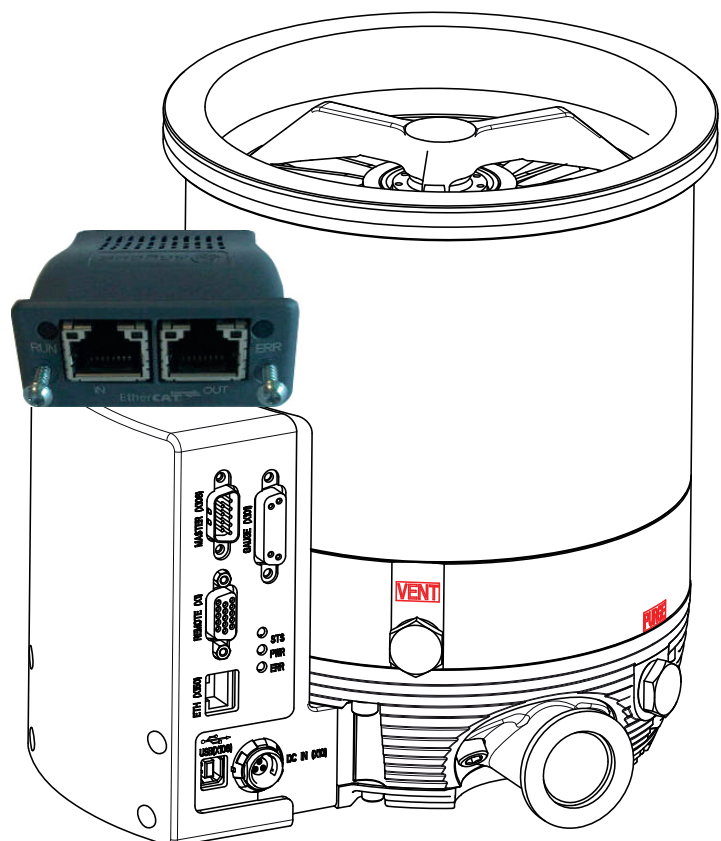


# TURBOVAC iX

# EtherCAT Interface

# Operating Instructions 300687441\_002\_C0



# Contents

	<b>Page</b>
<b>1 Description</b>	<b>5</b>
1.2 Communication connector	5
1.3 EtherCAT® Option Status LEDs	5
<b>2 Object Dictionary</b>	<b>7</b>
2.1 Process Data Objects (PDO)	7
2.2 Service Data Object (SDO) parameter access	7
<b>3 CANopen over EtherCAT (CoE)</b>	<b>8</b>
<b>4 CoE communication area</b>	<b>12</b>
4.1 Device type object	12
4.2 Error register	12
4.3 Pre-defined error field	12
4.4 Manufacturer device Name	13
4.5 Manufacturer hardware Version	13
4.6 Identity object	13
4.7 PDO Mapping	14
4.8 RxPDO - Mapping	14
4.8.1 Output Assembly	14

4.9	TxPDO mappings	14
4.9.1	Input Assembly	15
4.9.1.1	Exception status	17
4.9.1.2	Speed status	17
4.10	Sync manager	18
4.10.1	Sync manager configuration	18
4.10.2	Sync manager 2 PDO assignment object	19
4.10.3	Sync manager 3 PDO assignment object	19
4.11	Discrete input points, status information	20
4.12	Discrete output points, control commands	21
4.13	Warning object	22
4.14	Warning Bits	22
4.15	Errors	23
4.15.1	Error memory: Failure Code	23
4.15.2	Error memory: Frequency	26
4.15.3	Error memory: Operation hours	26
4.16	AC DC Drive	27
4.17	Temperature Bearing	30
4.18	Temperature Motor	30
4.19	Temperature Frequency Converter	31
4.20	CoE Objects Snapshots	32
<b>5</b>	<b>XML File</b>	<b>33</b>

# Safety Information

---

## NOTICE



### Obligation to Provide Information

Before installing and commissioning the device, carefully read these Operating Instructions and follow the information so as to ensure optimum and safe working right from the start.

The Leybold **TURBOVAC iX** has been designed for safe and efficient operation when used properly and in accordance with these Operating Instructions. It is the responsibility of the user to carefully read and strictly observe all safety precautions described in this section and throughout the Operating Instructions. The equipment must only be operated in the proper condition and under the conditions described in the Operating Instructions. It must be operated and maintained by trained personnel only. Consult local, state, and national agencies regarding specific requirements and regulations. Address any further safety, operation and/or maintenance questions to our nearest office.

---

## DANGER



DANGER indicates an imminently hazardous situation which, if not avoided, will result in death or serious injury.

---

## WARNING



WARNING indicates a potentially hazardous situation which, if not avoided, could result in death or serious injury.

---

## CAUTION



CAUTION indicates a potentially hazardous situation which, if not avoided, could result in minor or moderate injury.

---

## NOTICE



NOTICE is used to notify users of installation, operation, programming or maintenance information that is important, but not hazard related.

---

We reserve the right to alter the design or any data given in these Operating Instructions. The illustrations are not binding.

Retain the Operating Instructions for further use.

Installation and operation of the TURBOVAC iX is described in Operating Instructions 300450820. Described in these Operating Instructions is only the EtherCAT interface of the TURBOVAC iX.

---

## WARNING



Before making any connections, deenergise the pump and wait until it no longer turns. Since in spite of this dangerous voltages can remain present, the equipment must only be opened by a trained electrician.

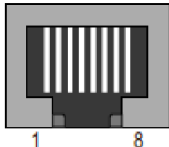
---

1 Description

EtherCAT is an open high performance Ethernet-based fieldbus system that overcomes the system limitations of other Ethernet solutions. The Ethernet packet is no longer received, then interpreted and copied as process data at every connection; instead the Ethernet frame is processed on the fly. The development goal of EtherCAT was to apply Ethernet to automation applications that require short data update times (also called cycle times) with low communication jitter (for synchronization purposes) and low hardware costs.

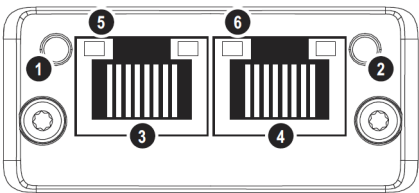
1.2 Communication connector

The EtherCAT® Option is connected to the network using a RJ45 connector. The pin assignment is shown below.

Pin	Signal	Note	EtherCAT® Connector
1	Tx+	-	
2	Tx-	-	
3	Rx+	-	
4	-	Normally left unused; to ensure signal integrity, these pins are tied together and terminated to PE via a filter circuit in the module.	
5	-		
6	Rx-	-	
7	-	Normally left unused; to ensure signal integrity, these pins are tied together and terminated to PE via a filter circuit in the module.	
8	-		

1.3 EtherCAT® Option Status LEDs

LED	Item
1	Run LED (a)
2	Error LED (a)
3	EtherCAT ( port 1)
4	EtherCAT ( port 2)
5	Link/Activity ( port 1)
6	Link/Activity ( port 2)



The flash sequences for these LEDs are defined in DR303-3 (CiA).

# Description

## Run LED

This LED reflects the status of the CoE (CANopen over EtherCAT) communication.

Led State	Indication	Description
Off	INIT	CoE device in 'INIT'-state (or no power)
Green	OPERATIONAL	CoE device in 'OPERATIONAL'-state
Green blinking	PRE-OPERATIONAL	CoE device in 'PRE-OPERATIONAL'-state
Green, single flash	SAFE-OPERATIONAL	CoE device in 'SAFE-OPERATIONAL'-state
Red	(Fatal Event )	If RUN and ERR turns red, this indicates a fatal event, forcing the bus interface to a physically passive state.

## ERR LED

This LED indicates EtherCAT communication errors etc.

Led State	Indication	Description
Off	No error	No error ( or no power )
Red, blinking	Invalid configuration	State change received from master is not possible due to invalid register or object settings
Red, double flash	Application watchdog timeout	Syncc manager watchdog timeout
Red	Application controller failure	Anybus module in Exception If RUN and ERR turns red, this indicates a fatal event, forcing the bus interface to a physically passive state.

## Link/Activity

These LEDs indicate the EtherCAT link status and activity.

Led State	Indication	Description
Off	No link	Link not sensed ( or no power )
Green	Link sensed, no activity	Link sensed, no traffic detected
Green, flickering	Link sensed, activity detected	Link sensed, traffic detected

## 2 Object Dictionary

The Object Dictionary consists of two sections:

The tables below give an overview of the communication objects available in the implementation of the TURBOVAC iX

It might be possible, that the CoE Online dictionary of the device will show additional entries or subentries which are not explained in this manual. These entries or subentries are under development and so far not fully supported.

### Communication Profile Objects (DSP 301)

Index ( hex)	Name
1000	Device Type
1001	Error register
1003	Pre-defined error field
1008	Manufacturer Device Name
1009	Manufacturer Hardware Version
1011	Restore default parameters
1018	Identity
1600	DO RxPDO Map
1A00	DI TxPDO Map
1C00	Sync manager type
1C12	RxPDO assign
1C13	TxPDO assign
1C32	SM output parameter
1C33	SM input parameter

### Manufacturer Specific Profile Objects (DS 301)

Index ( hex)	Name
2002	Input Points
2003	Output Points
2004	Warning Bytes
2006	Error memory: Failure code
2007	Error memory: Frequency
2008	Error memory: Operation hours
2009	AC/DC Drive
200B	Temperature Bearing
200C	Temperature Motor
200D	Temperature Converter

#### 2.1 Process Data Objects (PDO)

Cyclic data is implemented on EtherCAT networks by using „Process Data Objects“ or PDOs. Separate data objects are used for transmitting (TxPDOs) and receiving (RxPDOs) data.

#### 2.2 Service Data Object (SDO) parameter access

The service data object (SDO) provides access to all objects in the EtherCAT object Dictionary.

# CANopen over EtherCAT

## 3 CANopen over EtherCAT (CoE)

The CoE protocol over EtherCAT uses a modified form of the CANopen object dictionary. This is specified in the table below:

Index	Description	Sub-index	Name Subindex	Access
0x1000	Device Type	-	-	R
0x1001	Error register	-	-	R
0x1003	Pre-defined error field	0x00	Number of Elements	R
		0x01-0x05	Error 1 ... 5	R
0x1008	Manufacturer Device Name	-	-	R
0x1009	Manufacturer Hardware Version	-	-	R
0x1011	Restore default parameters	0x00	Number of Elements	R
		0x01	Restore all parameters	R/W
0x1018	Identity	0x00	Number of Elements	R
		0x01	Vendor ID	R
		0x02	Product Code	R
		0x03	Revision Number	R
		0x04	Serial Number	R
0x1600	RxPDO 1	0x00	Number of elements	R
		0x01	Output Object 1	R
0x1A00	TxPDO 1	0x00	Number of elements	R
		0x01-9	Input Object 9	R
0x1C00	Sync Man Communication type	0x00	Number of elements	R
		0x01	Channel 1	R
		0x02	Channel 2	R
		0x03	Channel 3	R
		0x04	Channel 4	R
0x1C12	Sync Man 2 Assignment	0x00	Number of elements	R
		0x01	PDO Mapping object index of assigned RxPDO	R
0x1C13	Sync Man 3 Assignment	0x00	Number of elements	R
		0x01	PDO Mapping object index of assigned TxPDO	R
0x1032	Sync Man 2 Synchronization	0x00	Number of elements	R
		0x01	Synchronization type	R
0x1033	Sync Man 3 Synchronization	0x00	Number of elements	R
		0x01	Synchronization type	R
		0x02	Configuration Output Assemblies	R
0x2002	Discrete Inputs points	0x00	Number of elements	R
		0x01	Pump On/Off status	R
		0x02	Normal speed reached	R
		0x03	Acceleration	R
		0x04	Deceleration	R
		0x05	Generator mode	R
		0x06	Standby mode	R



# CANopen over EtherCAT

Index	Description	Sub-index	Name Subindex	Access
		0x07	Standstill	R
		0x08	Control via EtherCAT	R
		0x09	At standby speed	R
0x2003	Discrete output points	0x00	Number of elements	R
		0x01	Pump On/Off command	R/W
		0x02	Purge Valve On/Off command	R/W
		0x03	Quit failure command	R/W
		0x04	Standby command	R/W
		0x05	Venting Valve On/Off command	R/W
		0x06	Control via Ethercat	R/W
0x2004	Warning bytes	-		R
0x2006	Error memory: Failure code	0x00	Number of elements	R
		0x01... 0x7F	Failure storage error code	R
0x2007	Error memory: Frequency	0	Number of elements	R
		0x01... 0x7F	Failure storage frequency at error	R
0x2008	Error memory: Operation hours	0x00	Number of elements	R
		0x01... 0x7F	Failure storage operation hours	R
0x2009	AC DC Drive object	0x00	Number of elements	R
		0x01	At reference speed	R
		0x02	Frequency setpoint set by Network (EtherCAT ) system	R/W
		0x03	Process control	R/W
		0x04	reserved	R
		0x05	Actual speed	R
		0x06	Speed reference	R/W
		0x07	Actual motor current	R
		0x08	Limit motor current	R
		0x09	Actual power mains side	R
		0x0A	Input voltage	R
		0x0B	Low speed limit	R
		0x0C	High speed limit	R
		0x0D	reserved	R/W
		0x0E	reserved	R
		0x0F	reserved	R
		X010	reserved	R
		0x11	Standby speed	R/W
		0x12	reserved	R
		0x13	reserved	R
		0x14	Pump operation hours	R
		0x15	Pump operation cycles	R
		0x16	Converter operation hours	R
		0x17	reserved	R

# CANopen over EtherCAT

Index	Description	Sub-index	Name Subindex	Access
0x200B	Temperature Bearing	0x00	Number of elements	R
		0x01	Bearing temperature value	R
		0x02	Reserved	R
		0x03	Alarm trip point value	R
		0x04	Warning trip point value	R
0x200C	Temperature Motor	0x00	Number of elements	R
		0x01	Motor temperature value	R
		0x02	Reserved	R
		0x03	Alarm trip point value	R
		0x04	Warning trip point value	R
0x200D	Temperature Converter	0x00	Number of elements	R
		0x01	Converter temperature value	R
		0x02	Reserved	R
		0x03	Alarm trip point value	R
		0x04	Warning trip point value	R

## 3.1 CoE object dictionary

Index ( hex)	Name
0x0000 to 0x0FFF	Data type area
0x1000 to 0x1FFF	CoE communication area
0x2000 to 0x5FFF	Manufacturer specific area
0x6000 to 0x9FFF	Profile area
0xA000 to 0xFFFF	Reserved area

The object description format describes object related information such as size, range and descriptions.

### Object description format

Index	Object Name		
Access	Range	Size	Unit
Default			
Description			

Index	Object Name		
Sub index 0			
Access	Range	Size/data type	Unit
Default			
Description			

Sub index 1			
Access	Range	Size/data type	Unit
Default			
Description			

Sub index ...			
Access	Range	Size/data type	Unit
Default			
Description			

<b>Index</b>	A signed 16-bit number. This is the index of the object dictionary entry specified in four hexadecimal characters.
<b>Access</b>	A value describing how the object may be accessed (RW = read/ write, RO = read-only and WO = write-only).
<b>Size</b>	The size of the object/sub-index in bytes
<b>Unit</b>	The physical unit (e.g. ms, counts per second etc.)

# CoE Communication Area

## 4 CoE communication area

### 4.1 Device type object

0x1000	Device Type		
Sub index 0x00			
Access RO	Range	Data type: unsigned 32	Unit: N/A
Default	0x00000000		
Description	The device type is vendor specific. The value for this object is always 0x00000000		

### 4.2 Error register

0x1001	Error register		
Sub index 0x00			
Access RO	Range	Data type: unsigned 8	Unit: N/A
Default	0x00		
Description			
If the system is in operational mode, a present error typically causes the turbo pump to shut down automatically. If not longer present, the error can be reset. Bit 7 in the control byte of the output assembly can be used for a failure reset. Bit 7 in the output assembly has only an effect, if Bit 0 has the value 0. This was implemented, to avoid a continuously failure reset.			

### 4.3 Pre-defined error field

0x1003	No. of occurred error		
Sub index 0x00			
Access RO	Range 0 to 0x00	Data type: unsigned 8	Unit: N/A
Default	0x00		
Description	The value shows the number of occurred errors ( maximum last 5 errors )		
Sub index 0x01	1 <sup>st</sup> error		
Access RO	Range 0 to 0xFFFFFFFF	Data type: unsigned 32	Unit: N/A
Default	0x00000000		
Description	Independent which failure occurs the value will be always 0x00001000. For Details object 2006, should be used		
Sub index 0x02	2 <sup>nd</sup> error		
Access RO	Range 0 to 0xFFFFFFFF	Data type: unsigned 32	Unit: N/A
Default	0x00000000		
Description	Independent which failure occurs the value will be always 0x00001000. For Details object 2006, should be used		

Sub index 0x03	<b>3<sup>rd</sup> error</b>		
Access RO	Range 0 to 0xFFFFFFFF	Data type: unsigned 32	Unit: N/A
Default	0x00000000		
Description	Independent which failure occurs the value will be always 0x00001000. For Details object 2006, should be used		
Sub index 0x04	<b>4<sup>th</sup> error</b>		
Access RO	Range 0 to 0xFFFFFFFF	Data type: unsigned 32	Unit: N/A
Default	0x00000000		
Description	Independent which failure occurs the value will be always 0x00001000. For Details object 2006, should be used		
Sub index 0x05	<b>5<sup>th</sup> error</b>		
Access RO	Range 0 to 0xFFFFFFFF	Data type: unsigned 32	Unit: N/A
Default	0x00000000		
Description			

## 4.4 Manufacturer device Name

<b>0x1008</b>	<b>Manufacturer device name</b>		
Sub index 0x00			
Access RO	Range	Data type: visible string	Unit: N/A
Default	TURBOVAC i/iX		
Description	Name of the device as non zero terminated string		

## 4.5 Manufacturer hardware Version

<b>0x1009</b>	<b>Manufacturer hardware version</b>		
Sub index 0x00			
Access RO	Range	Data type: visible string	Unit: N/A
Default	–		
Description	Hardware version of the device as non zero terminated string		

## 4.6 Identity object

<b>0x1018</b>	<b>Identity</b>		
Sub index 0x00			
Access	Range 0 to 0x00	Data type: unsigned 8	Unit
Default	4		
Description	Number of sub index		
Sub index 0x01	<b>Vendor ID</b>		
Access : RO	Range N/A	Data type: unsigned 32	Unit: N/A
Default	0x00000723		
Description	This contains the EtherCAT Technology Group vendor ID		

# CoE Communication Area

Sub index 0x02	<b>Product Code</b>		
Access : RO	Range N/A	Data type: unsigned 32	Unit: N/A
Default	0x000000B4		
Description	This has the value of the Product ID code.		
Sub index 0x03	<b>Revision number</b>		
Access : RO	Range N/A	Data type: unsigned 32	Unit: N/A
Default	0x00010001		
Description	Contains the option module software version number (the major version is placed in the high word of this object, and the minor version in the low word)		
Sub index 0x04	<b>Serial number</b>		
Access : RO	Range N/A	Data type: unsigned 32	Unit: N/A
Default	-		
Description	Contains the hardware serial number ( only last 6 digits ) of the turbo pump.		

## 4.7 PDO Mapping

The mapping for the PDOs is fixed and can not be changed.

## 4.8 RxPDO - Mapping

### 4.8.1 Output Assembly

0x1600	<b>Receive PDO mapping</b>							
Sub index 0x00	Number of mapped objects							
Access RO	Range			Data type: unsigned 8			Unit: N/A	
Default	1							
Description	The number of mapped objects in this PDO							
Sub index 0x01	<b>1<sup>st</sup> mapped object</b>							
Access : RO	Range 0 to 0xFFFFFFFF			Data type: unsigned 32			Unit: N/A	
Default	0x20D30008    control byte 1							
Description	Bits 0 to 7: Length of the mapped object in bits, e.g. a 32-bit parameter would have a length of 32 or 0x20. Bits 8 to 15: Sub-index of the mapped object. Bits 16 to 31: Index of the mapped object.							
	Bit 7 Quit failure	Bit 6 –	Bit 5 Standby	Bit 4 –	Bit 3	Bit 2	Bit 1 –	Bit 0 Pump on
	Bit 0 set to 0: Function is disabled Bit 0 set to 1: Function is enabled A failure reset (Bit 7) will only be possible if Bit 0 is not set.							

## 4.9 TxPDO mappings

The mapping for the PDOs is fixed and can not be changed.

## 4.9.1 Input Assembly

0x1A00	Transmit PDO mapping 1							
Sub index 0x00	Number of mapped objects							
Access	Range			Data type: unsigned 8			Unit: N/A	
Default	9							
Description	The number of mapped objects in this PDO							
Sub index 0x01	1 <sup>st</sup> mapped object							
Access : RO	Range 0 to 0xFFFFFFFF			Data type: unsigned 32			Unit: N/A	
Default	0x20CA0008    status byte   1							
Description	Bits 0 to 7: Length of the mapped object in bits, e.g. a 32-bit parameter would have a length of 32 or 0x20. Bits 8 to 15: Sub-index of the mapped object. Bits 16 to 31: Index of the mapped object.							
Content of status byte 1	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
	Exception status ( see table above )							
Sub index 0x02	2 <sup>nd</sup> mapped object							
Access : RO	Range 0 to 0xFFFFFFFF			Data type: unsigned 32			Unit: N/A	
Default	0x20CB0008    status byte   2							
Description	Bits 0 to 7: Length of the mapped object in bits, e.g. a 32-bit parameter would have a length of 32 or 0x20. Bits 8 to 15: Sub-index of the mapped object. Bits 16 to 31: Index of the mapped object.							
Content of status byte 2	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
	Speed Status    (see the “Speed Control Attribute and Speed Status Attribute Bit Map” above)							
Sub index 0x03	3 <sup>rd</sup> mapped object							
Access : RO	Range 0 to 0xFFFFFFFF			Data type: unsigned 32			Unit: N/A	
Default	0x20CC0008    status byte   3							
Description	Bits 0 to 7: Length of the mapped object in bits, e.g. a 32-bit parameter would have a length of 32 or 0x20. Bits 8 to 15: Sub-index of the mapped object. Bits 16 to 31: Index of the mapped object.							
Content of status byte 3	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
	–	–	–	–	Alarm	Warning	–	Pump on
Sub index 0x04	4 <sup>th</sup> mapped object							
Access : RO	Range 0 to 0xFFFFFFFF			Data type: unsigned 32			Unit: N/A	
Default	0x20CD0010    status byte   4							
Description	Bits 0 to 7: Length of the mapped object in bits, e.g. a 32-bit parameter would have a length of 32 or 0x20. Bits 8 to 15: Sub-index of the mapped object. Bits 16 to 31: Index of the mapped object.							
Content of status byte 4	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
	Pump Speed (revolutions per second, low byte )							
Sub index 0x05	5 <sup>th</sup> mapped object							
Access : RO	Range 0 to 0xFFFFFFFF			Data type: unsigned 32			Unit: N/A	
Default	0x20CD0010    status byte   5							
Description	Bits 0 to 7: Length of the mapped object in bits, e.g. a 32-bit parameter would have a length of 32 or 0x20. Bits 8 to 15: Sub-index of the mapped object. Bits 16 to 31: Index of the mapped object.							
Content of status byte 5	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
	Pump Speed (revolutions per second, high byte )							

# CoE Communication Area

Sub index 0x06	<b>6<sup>th</sup> mapped object</b>							
Access : RO	Range 0 to 0xFFFFFFFF			Data type: unsigned 32			Unit: N/A	
Default	0x20CD0010    status byte 6							
Description	Bits 0 to 7: Length of the mapped object in bits, e.g. a 32-bit parameter would have a length of 32 or 0x20. Bits 8 to 15: Sub-index of the mapped object. Bits 16 to 31: Index of the mapped object.							
Content of status byte 6	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
	No function							
Sub index 0x07	<b>7<sup>th</sup> mapped object</b>							
Access : RO	Range 0 to 0xFFFFFFFF			Data type: unsigned 32			Unit: N/A	
Default	0x20CD0010    status byte 7							
Description	Bits 0 to 7: Length of the mapped object in bits, e.g. a 32-bit parameter would have a length of 32 or 0x20. Bits 8 to 15: Sub-index of the mapped object. Bits 16 to 31: Index of the mapped object.							
Content of status byte 7	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
	No function							
Sub index 0x08	<b>8<sup>th</sup> mapped object</b>							
Access : RO	Range 0 to 0xFFFFFFFF			Data type: unsigned 32			Unit: N/A	
Default	0x20CD0010    status byte 8							
Description	Bits 0 to 7: Length of the mapped object in bits, e.g. a 32-bit parameter would have a length of 32 or 0x20. Bits 8 to 15: Sub-index of the mapped object. Bits 16 to 31: Index of the mapped object.							
Content of status byte 8	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
	Current [1/10 Amps] (actual motor current, low byte )							
Sub index 0x09	<b>9<sup>th</sup> mapped object</b>							
Access : RO	Range 0 to 0xFFFFFFFF			Data type: unsigned 32			Unit: N/A	
Default	0x20CD0010    status byte 9							
Description	Bits 0 to 7: Length of the mapped object in bits, e.g. a 32-bit parameter would have a length of 32 or 0x20. Bits 8 to 15: Sub-index of the mapped object. Bits 16 to 31: Index of the mapped object.							
Content of status byte 9	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
	Current [1/10 Amps] (actual motor current, high byte )							



## 4.9.1.1 Exception status

Bit	Function
0	ALARM / device – common
1	ALARM / device – specific
2	ALARM / manufacturer – specific
3	0 ( reserved )
4	WARNING / device – common
5	WARNING / device – specific
6	WARNING / manufacturer – specific
7	1 ( expand method )

## 4.9.1.2 Speed status

Bit	Speed Status	Status Description
0	Running	On and SpeedActual >0
1	Reserved	-
2	At Standby Speed	SpeedActual = SpeedStandby
3	Reserved	-
4	Stopped	SpeedActual = 0
5	Accelerating	SpeedActual is increasing
6	At Reference	SpeedActual = SpeedRef
7	Decelerating	SpeedActual is decreasing

# CoE Communication Area

## 4.10 Sync manager

### 4.10.1 Sync manager configuration

The sync managers are the EtherCAT means for setting access attributes for different areas of memory and triggering or notifying the application when the memory is accessed. The following objects specify how the sync managers (and thus corresponding memory areas) are utilized by the CoE protocol.

0x1C00	<b>Sync manager communication type</b>		
Sub index 0x00	number of sync manager channels used		
Access: RO	Range: N/A	Data type: unsigned 8	Unit: N/A
Default	4		
Description	The number of sync manager protocols used by the CoE protocol.		
Sub index 0x01	<b>Usage of sync manager 0</b>		
Access : RO	Range N/A	Data type: unsigned 8	Unit: N/A
Default	1		
Description	Sync manager 0 is used by CoE as the mailbox receive channel (master to slave).		
Sub index 0x02	<b>Usage of sync manager 1</b>		
Access : RO	Range N/A	Data type: unsigned 8	Unit: N/A
Default	2		
Description	Sync manager 1 is used by CoE as the mailbox send channel (slave to master).		
Sub index 0x03	<b>Usage of sync manager 2</b>		
Access : RO	Range N/A	Data type: unsigned 8	Unit: N/A
Default	3		
Description	Sync manager 2 is used by CoE as the process data output (RxPDOx - master to slave).		
Sub index 0x04	<b>Usage of sync manager 3</b>		
Access : RO	Range N/A	Data type: unsigned 8	Unit: N/A
Default	-		
Description	Sync manager 3 is used by CoE as the process data input (TxPDOs - slave to master).		

## 4.10.2 Sync manager 2 PDO assignment object

0x1C12	Sync manager 2 PDO assignment object		
Sub index 0x00			
Access: RO	Range: 0 to 255	Data type: unsigned 8	Unit: N/A
Default	1		
Description	The number of RxPDOs assigned to this sync manager (used for process data output).		
Sub index 0x01	Usage of sync manager 0		
Access : RO	Range: 0x1600 to	Data type: unsigned 16	Unit: N/A
Default	0x1600		
Description	The object index of a RxPDO to assign to this sync manager.		

## 4.10.3 Sync manager 3 PDO assignment object

0x1C13	<b>Sync manager 3 PDO assignment object</b>		
Sub index 0x00			
Access: RO	Range: 0 to 255	Data type: unsigned 8	Unit: N/A
Default	1		
Description	The number of TxPDOs assigned to this sync manager (used for process data input).		
Sub index 0x01	<b>Usage of sync manager 0</b>		
Access : RO	Range: 0x1A00 to	Data type: unsigned 16	Unit: N/A
Default	0x1A00		
Description	The object index of a TxPDO to assign to this sync manager.		

# CoE Communication Area

## 4.11 Discrete input points, status information

0x2002	<b>Input points object</b>		
Sub index 0x00	number implemented sub indexes		
Access: RO	Range: N/A	Data type: unsigned 8	Unit: N/A
Default	9		
Description	The number input points.		
Sub index 0x01	<b>Pump On/Off Status</b>		
Access : RO	Range 0 to 1	Data type: unsigned 8	Unit: Bool
Default	N/A		
Description	0 = Pump Off (or Pump On and Speed = 0) 1 = Pump On (Pump running)		
Sub index 0x02	<b>Normal speed reached</b>		
Access : RO	Range 0 to 1	Data type: unsigned 8	Unit: Bool
Default	N/A		
Description	0 = actual speed below normal speed 1 = normal speed reached		
Sub index 0x03	<b>Acceleration</b>		
Access : RO	Range 0 to 1	Data type: unsigned 8	Unit: Bool
Default	N/A		
Description	0 = speed is not increasing 1 = the pump speed increases		
Sub index 0x04	<b>Deceleration</b>		
Access : RO	Range 0 to 1	Data type: unsigned 8	Unit: Bool
Default	-		
Description	0 = speed is not decreasing 1 = the pump speed decreases		
Sub index 0x05	<b>Reserved</b>		
Access : RO	Range 0 to 1	Data type: unsigned 8	Unit: Bool
Default	-		
Description	don't care		
Sub index 0x06	<b>Reserved</b>		
Access : RO	Range 0 to 1	Data type: unsigned 8	Unit: Bool
Default	-		
Description	don't care		
Sub index 0x07	<b>Standstill</b>		
Access : RO	Range 0 to 1	Data type: unsigned 8	Unit: Bool
Default	-		
Description	1 = Standstill and drive not active		
Sub index 0x08	Control via EtherCAT		
Access : RO	Range 0 to 1	Data type: unsigned 8	Unit: Bool
Default	-		
Description	1 = the pump is under control via EtherCAT		
Sub index 0x09	<b>Reserved</b>		
Access : RO	Range 0 to 1	Data type: unsigned 8	Unit: Bool
Default	-		
Description	don't care		

## 4.12 Discrete output points, control commands

Write access is only possible, if the status of the EtherCAT is different than Operational.

0x2003	<b>Output points objects</b>		
Sub index 0x00	number implemented sub indexes		
Access: RO	Range: N/A	Data type: unsigned 8	Unit: N/A
Default	6		
Description	The number output points.		
Sub index 0x01	<b>Pump On/Off command</b>		
Access : RW	Range 0 to 1	Data type: unsigned 8	Unit: Bool
Default	0x00		
Description	0 = Pump Off 1 = Pump On		
Sub index 0x02	<b>Reserved</b>		
Access : RW	Range 0 to 1	Data type: unsigned 8	Unit: Bool
Default	0x00		
Description	-		
Sub index 0x03	<b>Quit failure</b>		
Access : RW	Range 0 to 1	Data type: unsigned 8	Unit: Bool
Default	0x00		
Description	0 = do not reset error condition 1 = Reset error condition Reset only possible if Pump On/Off ist set to Off		
Sub index 0x04	<b>Standby request</b>		
Access : RW	Range 0 to 1	Data type: unsigned 8	Unit: Bool
Default	0x00		
Description	0 = Pump will run at target speed 1 = pump will run at standby speed		
Sub index 0x05	<b>Reserved</b>		
Access : RW	Range 0 to 1	Data type: unsigned 8	Unit: Bool
Default	-		
Description	-		
Sub index 0x06	<b>Control via EtherCAT</b>		
Access : RW	Range 0 to 1	Data type: unsigned 8	Unit: Bool
Default	0x00		
Description	Device will be controlled by Network adapter		

# CoE Communication Area

## 4.13 Warning object

0x2004	<b>Warning bytes</b>		
Access : RO	Range 0 to 0xFFFF	Data type: unsigned 16	Unit: N/A
Default	0x0000		
Description	See attached list below for details description of each bit		

## 4.14 Warning Bits

Bit	Designation	Possible cause	Remedy
0	Pump temperature 1 has passed the warning threshold	Forevacuum pressure too high.	Check the ultimate pressure of the backing pump and install a bigger backing pump if req.
1	Pump temperature 2 has passed the warning threshold	Gas flow too high	Seal leak, check process.
2	Pump temperature 3 has passed the warning threshold	Fan defective	Replace fan.
3	The minimum permissible ambient temperature is not reached.	Water cooling switched off	Switch on water cooling.
4	not used	Ambient temperature too low	Ensure min. ambient temperature of 5 °C.
5		Pump cooling too high	Reduce water cooling.
6	Overspeed warning: The actual value exceeds the setpoint by more than 10 Hz		Consult Leybold service.
7	Pump temperature 4 has passed the warning threshold	Forevacuum pressure too high.	Check the ultimate pressure of the backing pump and install a bigger backing pump if req.
		Gas flow too high	Seal leak, check process.
		Fan defective	Replace fan.
		Water cooling switched off	Switch on water cooling.
8 - 10	not used		
11	Overload warning: The pump speed has dropped under the normal operation threshold	Forevacuum pressure too high.	Check the ultimate pressure of the backing pump and install a bigger backing pump if req.
		Gas flow too high	Seal leak, check process
12	Pump temperature 5 has passed the warning threshold	Forevacuum pressure too high.	Check the ultimate pressure of the backing pump and install a bigger backing pump if req.
13	Pump temperature 6 has passed the warning threshold	Gas flow too high	Seal leak, check process.
		Fan defective	Replace fan.
		Water cooling switched off	Switch on water cooling.
14	Power supply voltage warning: Supply voltage failure during active operation of the pump P4 > Umax or P4 < Umin	Intermediate circuit voltage too low	
		DC power supply voltage below 24V or 48 V	
		Mains voltage failure	

## 4.15 Errors

### 4.15.1 Error memory: Failure Code

0x2006	<b>Error memory: Failure code</b>		
Sub index 0x00	number implemented sub indexes		
Access: RO	Range: 0 – 127	Data type: unsigned 8	Unit: N/A
Default	127		
Description	The number implemented sub indexes.		
Sub index 0x01	<b>Stored error code</b>		
Access : RO	Range 0 to 0xFFFF	Data type: unsigned 16	Unit: N/A
Default	0x0000		
Description	See attached list below for details description for the error code. Index 1 stores the error code of the newest failure event. Index 127 stores the oldest one.		

Error code	Designation	Possible cause	Remedy
1	Overspeed warning. The actual frequency exceeds the setpoint by over 10 Hz.	Frequency converter defective	Contact Leybold Service.
2	Pass through time error The pump has not reached the minimum speed after the maximum run-up time has elapsed.	Forevacuum pressure too high. Gas flow too high Rotor blocked	Check the ultimate pressure of the backing pump and install a bigger backing pump if req. Seal leak, check process Check if the rotor turns freely. Contact Leybold Service if the rotor is damaged or blocked.
3	Error threshold pump temperature 3 exceeded. The maximum permissible bearing temperature was exceeded.	Forevacuum pressure too high. Gas flow too high Fan defective Water cooling switched off	Check the ultimate pressure of the backing pump and install a bigger backing pump if req. Seal leak, check process Replace fan Switch on water cooling
4	Short circuit error		
5	Converter temperature error Overtemperature at the power output stage or within the frequency converter	Ambient temperature too high Poor cooling	Ensure max. ambient temperature of 45°C Improve cooling
6	Run-up time error The pump has not reached the normal operating frequency after the maximum run-up time.	Forevacuum pressure too high. Gas flow too high	Check the ultimate pressure of the backing pump and install a bigger backing pump if req. Seal leak, check process
7	Motor temperature error The motor temperature has exceeded the shutdown threshold.	Forevacuum pressure too high. Gas flow too high Fan defective Water cooling switched off	Check the ultimate pressure of the backing pump and install a bigger backing pump if req. Seal leak, check process Replace fan Switch on water cooling
8	The pump could not be identified or no pump has been connected.	Pump not correctly connected to the frequency converter. Defective hardware	Check the connection between pump and frequency converter. Contact Leybold Service.

# CoE Communication Area

Error code	Designation	Possible cause	Remedy
61	Low motor temperature warning		
82	Fan voltage has failed		
83	Motor temperature low warning		
84	Motor overtemperature warning		
85 to 96	Frequency converter collective error		
97	Frequency converter internal volume temperature error		
101	Overload warning The pump speed has dropped under the normal operation threshold	Forevacuum pressure too high. Gas flow too high	Check the ultimate pressure of the backing pump and install a bigger backing pump if req. Seal leak, check process
103	Supply voltage warning Intermediate circuit voltage too low or maximum time for generator operation was exceeded.	DC supply voltage below 24V Mains voltage has failed	Check the voltage at the power supply and if required set up correctly Remedy the cause for the mains power failure
106	Overload error The pump speed has dropped under the minimum speed	Forevacuum pressure too high. Gas flow too high	Check the ultimate pressure of the backing pump and install a bigger backing pump if req. Seal leak, check process
111	The minimum permissible motor temperature is not attained.	Ambient temperature too low Pump cooling too high	Ensure min. ambient temperature of 0°C Reduce water cooling
116	The speed of the pump has dropped below the normal operation threshold and has stayed there for a longer period of time.	Forevacuum pressure too high. Gas flow too high	Check the ultimate pressure of the backing pump and install a bigger backing pump if req. Seal leak, check process
117	Motor current error (start-up error), Motor current below nominal current, switchover from open loop controlled to closed loop controlled operation was not successful	Cable fault Faulty connector	Contact Leybold Service
126	Defective bearing temperature sensor.	Defective component, short-circuit or broken cable	Contact Leybold Service
128	Defective motor temperature sensor.	Defective component, short-circuit or broken cable	Contact Leybold Service
143	Overspeed error		
144	Bearing break-in function active		Disable bearing break-in function and restart the pump



# CoE Communication Area

Error code	Designation	Possible cause	Remedy
225	Temperature derating active. One of the temperature warning values was exceeded and the maximum permissible motor current was reduced		
226 to 236	Frequency converter collective error		Reset error, try to restart. If this is not possible inform Leybold Service or send in the pump.
237	Communication in error: is initiated when a communication error on CAN level was determined.		Reset error, try to restart. If this is not possible inform Leybold Service or send in the pump.
238	Frequency converter collective error		Reset error, try to restart. If this is not possible inform Leybold Service or send in the pump.
240	EEPROM error (CRC) inconsistent data in the EEPROM		
252	Hardware plausibility error. Frequency converter and communication electronics are not from the same pump	Front end and frequency converter were interchanged	Establish the correct hardware configuration or run a software update
600	Second gauge head stage was not started		Check gauge head and connection, if required replace the gauge head.
601	Gauge head lost		
602	No power supply at the gauge head		
608	Broken filament		
609	Pirani error		
603	No power from the supply. Return signal from the gauge head output voltage is missing.		
610	Inside volume temperature warning		Improve cooling.
611	Inside volume temperature error		Improve cooling.
612	Intermediate circuit voltage warning		

# CoE Communication Area

## 4.15.2 Error memory: Frequency

0x2007	<b>Actual frequency when failure occurred</b>		
Sub index 0x00	number implemented sub indexes		
Access: RO	Range: 0 – 127	Data type: unsigned 8	Unit: N/A
Default	127		
Description	The number implemented sub indexes.		
Sub index 0x01	<b>Stored error frequency</b>		
Access : RO	Range 0 to 0xFFFF	Data type: unsigned 16	Unit: N/A
Default	0x0000		
Description	Index 1 stores frequency which was present at the newest failure event. Index 127 stores the oldest one.		

## 4.15.3 Error memory: Operation hours

0x2008	<b>Pump Operation hours when failure occurred</b>		
Sub index 0x00	number implemented sub indexes		
Access: RO	Range: 0 – 127	Data type: unsigned 8	Unit: N/A
Default	127		
Description	The number implemented sub indexes.		
Sub index 0x01	<b>Stored operation hour</b>		
Access : RO	Range 0 to 0xFFFF	Data type: unsigned 16	Unit: N/A
Default	0x0000		
Description	Index 1 stores the operation hour which was present at the newest failure event. Index 127 stores the oldest one.		

## 4.16 AC DC Drive

0x2009	<b>AC DC Drive Object</b>		
Sub index 0x00	number implemented sub indexes		
Access: RO	Range: 0.23	Data type: unsigned 8	Unit: N/A
Default	23		
Description	The number implemented sub indexes.		
Sub index 0x01	<b>At reference speed</b>		
Access : RO	Range 0 to 0xFFFF	Data type: unsigned 16	Unit: N/A
Default	0x0000		
Description	Bit 0 will be set if the target speed is reached		
Sub index 0x02	<b>Frequency setpoint set by Network (EtherCAT) system</b>		
Access : RO	Range 0 to 0xFFFF	Data type: unsigned 16	Unit: N/A
Default	0x0000		
Description	Bit 0 will be set, if the frequency converter accept the frequency setpoint from the EtherCAT network.		
Sub index 0x03	<b>Process control</b>		
Access : RO	Range 0 to 0xFFFF	Data type: unsigned 16	Unit: N/A
Default	0x0000		
Description	Bit 0 =0 local mode of the system Bit 0 =1 cosystem will be control via EtherCAT		
Sub index 0x04	<b>Reserved</b>		
Access : RO	-		
Default	-		
Description	-		
Sub index 0x05	<b>Actual speed</b>		
Access : RO	Range 0 to 0xFFFF	Data type: unsigned 16	Unit: RPS
Default	0x0000		
Description	Value show the actual speed of the turbo pump in rotation per seconds		
Sub index 0x06	<b>Speed reference</b>		
Access : RW	Range 0 to 0xFFFF	Data type: unsigned 16	Unit: RPS
Default	0x0000		
Description	Reference speed for Normal Operation.Value can be written via EtherCAT, but will not stored in the frequency converter. Default value depends on pump size		
Sub index 0x07	<b>Actual Motor current</b>		
Access : RO	Range 0 to 0xFFFF	Data type: unsigned 16	Unit: 0,1A
Default	0x0000		
Description	Value of the present motor current. Scaling ist 0.1 A. Max motor current ist about 1,8A		

# CoE Communication Area

Sub index 0x08	<b>Limit Motor current</b>		
Access : RO	Range 0 to 0xFFFF	Data type: unsigned 16	Unit: 0,1A
Default	0x0000		
Description	Value of the present motor current. Scaling ist 0.1 A. Max motor current ist about 1,8A		
Sub index 0x09	<b>Actual power on mains side</b>		
Access : RO	Range 0 to 0xFFFF	Data type: unsigned 16	Unit: 0,1W
Default	0x0000		
Description			
Sub index 0x0A	<b>Input Voltage</b>		
Access : RO	Range 0 to 0xFFFF	Data type: unsigned 16	Unit: 0,1V
Default	0x0000		
Description	Actual value of the supply voltage (Mains)		
Sub index 0x0B	Low speed limit		
Access : RO	Range 0 to 0xFFFF	Data type: unsigned 16	Unit: RPS
Default	0x0000		
Description	Low limit of the pump speed, Value in rotation per second. Default value depends on pump size		
Sub index 0x0C	<b>High speed limit</b>		
Access : RO	Range 0 to 0xFFFF	Data type: unsigned 16	Unit: RPS
Default	0x0000		
Description	High limit of the pump speed, Value in rotation per second. Default value depends on pump size.		
Sub index 0x0D	<b>Reserved</b>		
Access : RW	Range 0 to 0xFFFF	Data type: unsigned 16	Unit: N/A
Default	-		
Description	-		
Sub index 0x0E	<b>Reserved</b>		
Access : RW	Range 0 to 0xFFFF	Data type: unsigned 16	Unit: N/A
Default	-		
Description	-		
Sub index 0x0F	<b>Reserved</b>		
Access : RO	Range 0 to 0xFFFF	Data type: unsigned 16	Unit: N/A
Default	-		
Description	-		
Sub index 0x10	<b>Reserved</b>		
Access : RO	Range 0 to 0xFFFF	Data type: unsigned 16	Unit: N/A
Default	-		
Description	-		

# CoE Communication Area

Sub index x011	<b>StandbySpeed</b>		
Access : RO	Range 0 to 0xFFFF	Data type: unsigned 16	Unit: RPS
Default	0x0000		
Description	Speed setting for the Standby function [RPS]. Default value depends on pump size.		
Sub index 0x12	<b>Speed actual Data Units</b>		
Access : RO	Range 0 to 0xFFFF	Data type: unsigned 16	Unit: RPS
Default	0x1F0E		
Description	Fixed value: RPS --> 0x1F0E (rotations per second)		
Sub index 0x13	<b>Speed Ref Data Units</b>		
Access : RO	Range 0 to 0xFFFF	Data type: unsigned 16	Unit: RPS
Default	0x1F0E		
Description	Fixed value: RPS --> 0x1F0E (rotations per second)		
Sub index 0x14	<b>Pump operation hours</b>		
Access : RO	Range 0 to 0xFFFF	Data type: unsigned 16	Unit: hours
Default	0x0000		
Description			
Sub index 0x15	<b>Pump operation cycles</b>		
Access : RO	Range 0 to 0xFFFF	Data type: unsigned 16	Unit: N/A
Default	0x0000		
Description			
Sub index 0x16	<b>Converter Operation hours</b>		
Access : RO	Range 0 to 0xFFFF	Data type: unsigned 16	Unit: hours
Default	0x0000		
Description			
Sub index 0x17	<b>Reserved</b>		
Access : RO	Range 0 to 0xFFFF	Data type: unsigned 16	Unit: N/A
Default	-		
Description	-		

# CoE Communication Area

## 4.17 Temperature Bearing

0x200B	<b>Temperature Beraring</b>		
Sub index 0x00	<b>number implemented sub indexes</b>		
Access: RO	Range: N/A	Data type: unsigned 8	Unit: N/A
Default	4		
Description	The number implemented sub indexes.		
Sub index 0x01	<b>Bearing temperature value</b>		
Access : RO	Range 0 to 0xFFFF	Data type: unsigned 16	Unit: 0,10C
Default	0x0000		
Description	Actual bearing temperature.		
Sub index 0x02	<b>Reserved</b>		
Access : RO	Range 0 to 0xFFFF	Data type: unsigned 16	Unit: N/A
Default	0x0000		
Description	-		
Sub index 0x03	<b>Alarm Trip Point high</b>		
Access : RO	Range 0 to 0xFFFF	Data type: unsigned 16	Unit: 0,10C
Default	0x0000		
Description	Trigger level Alarm Setpoint in 0,10C		
Sub index 0x04	<b>Warning Trip Point high</b>		
Access : RO	Range 0 to 0xFFFF	Data type: unsigned 16	Unit: 0,10C
Default	0x0000		
Description	Trigger level Warning Setpoint in 0,10C		

## 4.18 Temperature Motor

0x200C	<b>Temperature Motor</b>		
Sub index 0x00	<b>number implemented sub indexes</b>		
Access: RO	Range: N/A	Data type: unsigned 8	Unit: N/A
Default	4		
Description	The number implemented sub indexes.		
Sub index 0x01	<b>Motor temperature value</b>		
Access : RO	Range 0 to 0xFFFF	Data type: unsigned 16	Unit: 0,10C
Default	0x0000		
Description	Actual motor temperature.		
Sub index 0x02	<b>Reserved</b>		
Access : RO	Range 0 to 0xFFFF	Data type: unsigned 16	Unit: N/A
Default	0x0000		
Description	-		
Sub index 0x03	<b>Alarm Trip Point high</b>		
Access : RO	Range 0 to 0xFFFF	Data type: unsigned 16	Unit: 0,10C
Default	0x0000		
Description	Trigger level Alarm Setpoint in 0,10C		
Sub index 0x04	<b>Warning Trip Point high</b>		
Access : RO	Range 0 to 0xFFFF	Data type: unsigned 16	Unit: 0,10C
Default	0x0000		
Description	Trigger level Warning Setpoint in 0,10C		

## 4.19 Temperature Frequency Converter

0x200D	<b>Temperature Converter</b>		
Sub index 0x00	<b>number implemented sub indexes</b>		
Access: RO	Range: N/A	Data type: unsigned 8	Unit: N/A
Default	4		
Description	The number implemented sub indexes.		
Sub index 0x01	<b>Converter temperature value</b>		
Access : RO	Range 0 to 0xFFFF	Data type: unsigned 16	Unit: 0,10C
Default	0x0000		
Description	Actual motor temperature.		
Sub index 0x02	<b>Reserved</b>		
Access : RO	Range 0 to 0xFFFF	Data type: unsigned 16	Unit: N/A
Default	0x0000		
Description	-		
Sub index 0x03	<b>Alarm Trip Point high</b>		
Access : RO	Range 0 to 0xFFFF	Data type: unsigned 16	Unit: 0,10C
Default	0x0000		
Description	Trigger level Alarm Setpoint in 0,10C		
Sub index 0x04	<b>Warning Trip Point high</b>		
Access : RO	Range 0 to 0xFFFF	Data type: unsigned 16	Unit: 0,10C
Default	0x0000		
Description	Trigger level Warning Setpoint in 0,10C		

# CoE Communication Area

## 4.20 CoE Objects Snapshots

The following Snapshot was taken from a configuration tool from the manufacturer Beckhoff.

General EtherCAT Process Data Startup CoE - Online Online			
Update List			
<input type="checkbox"/> Auto Update <input checked="" type="checkbox"/> Single Update <input type="checkbox"/> Show Offline Data			
Advanced...			
All Objects			
Add to Startup...			
Online Data			
Module OD (AoE Port): 0			
Index	Name	Flags	Value
1000	Device type	RO	0x00000000 (0)
1001	Error register	RO	0x00 (0)
+ 1003:0	Pre-defined error field	RW	> 5 <
1008	Manufacturer Device Name	RO	TURBOVAC i/IX
1009	Manufacturer Hardware Version	RO	V1
+ 1011:0	Restore default parameters	RO	> 1 <
- 1018:0	Identity	RO	> 4 <
1018:01	Vendor ID	RO	0x00000723 (1827)
1018:02	Product code	RO	0x000000B4 (180)
1018:03	Revision	RO	0x00010001 (65537)
1018:04	Serial number	RO	0x00000000 (0)
+ 1600:0	DO RxPDO-Map	RO	> 1 <
+ 1A00:0	DI TxPDO-Map	RO	> 9 <
+ 1C00:0	Sync manager type	RO	> 4 <
+ 1C12:0	RxPDO assign	RO	> 1 <
+ 1C13:0	TxPDO assign	RO	> 1 <
+ 1C32:0	SM output parameter	RO	> 1 <
+ 1C33:0	SM input parameter	RO	> 1 <
+ 2002:0	Input points	RO	> 9 <
+ 2003:0	Output points	RO	> 6 <
2004	Warning bytes	RO	0x0000 (0)
+ 2006:0	Error memory: Failure code	RO	> 127 <
+ 2007:0	Error memory: Frequency	RO	> 127 <
+ 2008:0	Error memory: Operation hours	RO	> 127 <
+ 2009:0	AC DC drive	RO	> 23 <
+ 200B:0	Temperature bearing	RO	> 4 <
+ 200C:0	Temperature motor	RO	> 4 <
+ 200D:0	Temperature converter	RO	> 4 <
20D3	Pump control	RW P	0x00 (0)
20CA	Exception Status	RO P	0x90 (144)
20CB	Speed Status	RO P	0x01 (1)
20CC	Statusbits	RO P	0x04 (4)
20CD	Pump speed (low byte)	RO P	0x0020 (32)
20CE	Pump speed (high byte)	RO P	0x0000 (0)
20CF	Reserved	RO P	0x0000 (0)
20D0	Reserved	RO P	0x0000 (0)
20D1	Actual motor current (low byte)	RO P	0x0000 (0)
20D2	Actual motor current (high byte)	RO P	0x0000 (0)



## **5 XML File**

The XML file serves the integration into specific tools for configuring EtherCAT interfaces.

The necessary XML file can be downloaded from the Leybold web page.

# Sales and Service

## Germany

### Leybold GmbH

Sales, Service, Support Center (3SC)  
Bonner Strasse 498  
D-50968 Cologne  
T: +49-(0)221-347 1234  
F: +49-(0)221-347 31234  
sales@leybold.com  
www.leybold.com

### Leybold GmbH

#### Sales Area North

Branch Office Berlin  
Industriestrasse 10b  
D-12099 Berlin  
T: +49-(0)30-435 609 0  
F: +49-(0)30-435 609 10  
sales.bn@leybold.com

### Leybold GmbH

#### Sales Office South

Branch Office Munich  
Karl-Hammerschmidt-Strasse 34  
D-85609 Aschheim-Dornach  
T: +49-(0)89-357 33 9-10  
F: +49-(0)89-357 33 9-33  
sales.mn@leybold.com  
service.mn@leybold.com

### Leybold Dresden GmbH

#### Service Competence Center

Zur Wetterwarte 50, Haus 304  
D-01109 Dresden  
Service:  
T: +49-(0)351-88 55 00  
F: +49-(0)351-88 55 041  
info.dr@leybold.com

## Europe

### Belgium

### Leybold Nederland B.V.

#### Belgisch bijkantoor

Leuvensesteenweg 542-19A  
B-1930 Zaventem  
Sales:  
T: +32-2-711 00 83  
F: +32-2-720 83 38  
sales.zv@leybold.com  
Service:  
T: +32-2-711 00 82  
F: +32-2-720 83 38  
service.zv@leybold.com

### France

### Leybold France S.A.S.

Parc du Technopolis, Bâtiment Beta  
3, Avenue du Canada  
F-91940 Les Ulis cedex  
Sales and Service:  
T: +33-1-69 82 48 00  
F: +33-1-69 07 57 38  
info.ctb@leybold.com  
sales.ctb@leybold.com

### Leybold France S.A.S.

Valence Factory  
640, Rue A. Bergès  
B.P. 107  
F-26501 Bourg-lès-Valence Cedex  
T: +33-4-75 82 33 00  
F: +33-4-75 82 92 69  
marketing.vc@leybold.com

## Great Britain

### Leybold UK LTD.

Unit 9  
Silverglade Business Park  
Leatherhead Road  
Chessington  
Surrey (London)  
KT9 2QL  
Sales:  
T: +44-13-7273 7300  
F: +44-13-7273 7301  
sales.ln@leybold.com  
Service:  
T: +44-13-7273 7320  
F: +44-13-7273 7303  
service.ln@leybold.com

## Italy

### Leybold Italia S.r.l.

Via Filippo Brunelleschi 2  
I-20093 Cologno Monzese  
Sales:  
T: +39-02-27 22 31  
F: +39-02-27 20 96 41  
sales.mi@leybold.com  
Service:  
T: +39-02-27 22 31  
F: +39-02-27 22 32 17  
service.mi@leybold.com

## Netherlands

### Leybold Nederland B.V.

Floridareef 102  
NL-3565 AM Utrecht  
Sales and Service:  
T: +31-(30) 242 63 30  
F: +31-(30) 242 63 31  
sales.ut@leybold.com  
service.ut@leybold.com

## Switzerland

### Leybold Schweiz AG

Hinterbergstrasse 56  
CH-6312 Steinhausen  
Warehouse and shipping address:  
Riedthofstrasse 214  
CH-8105 Regensdorf  
Sales:  
T: +41-44-308 40 50  
F: +41-44-302 43 73  
sales.zh@leybold.com  
Service:  
T: +41-44-308 40 62  
F: +41-44-308 40 60  
service.zh@leybold.com

## Spain

### Leybold Hispánica, S.A.

C/. Huelva, 7  
E-08940 Cornellà de Llobregat  
(Barcelona)  
Sales:  
T: +34-93-666 43 11  
F: +34-93-666 43 70  
sales.ba@leybold.com  
Service:  
T: +34-93-666 46 11  
F: +34-93-685 43 70  
service.ba@leybold.com

## Headquarter

### Leybold GmbH

Bonner Strasse 498  
D-50968 Cologne  
T: +49-(0)221-347-0  
F: +49-(0)221-347-1250  
info@leybold.com

## America

### USA

### Leybold USA Inc.

5700 Mellon Road  
USA-Export, PA 15632  
T: +1-724-327-5700  
F: +1-724-325-3577  
info.ex@leybold.com  
Sales:  
T: +1-724-327-5700  
F: +1-724-333-1217  
Service:  
T: +1-724-327-5700  
F: +1-724-325-3577

## Brazil

### Leybold do Brasil

Rod. Vice-Prefeito Hermenegildo Tonolli,  
nº. 4413 - 6B  
Distrito Industrial  
Jundiaí - SP  
CEP 13.213-086  
Sales and Service:  
T: +55 11 3395 3180  
F: +55 11 99467 5934  
sales.ju@leybold.com  
service.ju@leybold.com

## Asia

### P. R. China

### Leybold (Tianjin)

International Trade Co. Ltd.  
Beichen Economic  
Development Area (BEDA),  
No. 8 Western Shuangchen Road  
Tianjin 300400  
China  
Sales and Service:  
T: +86-400 038 8989  
F: +86-800 818 0033  
F: +86-22-2697 4061  
F: +86-22-2697 2017  
sales.tj@leybold.com  
service.tj@leybold.com

## India

### Leybold India Pvt Ltd.

T-97/2, MIDC Bhosari  
Pune-411 026  
Indien  
Sales and Service:  
T: +91-80-2783 9925  
F: +91-80-2783 9926  
sales.bgl@leybold.com  
service.bgl@leybold.com

## Japan

### Leybold Japan Co., Ltd.

Headquarters  
Shin-Yokohama A.K.Bldg., 4th floor  
3-23-3, Shin-Yokohama  
Kohoku-ku, Yokohama-shi  
Kanagawa-ken 222-0033  
Japan  
Sales:  
T: +81-45-471-3330  
F: +81-45-471-3323  
sales.yh@leybold.com

### Leybold Japan Co., Ltd.

Tsukuba Technical Service Center  
1959, Kami-yokoba  
Tsukuba-shi, Ibaraki-shi 305-0854  
Japan  
Service:  
T: +81-29 839 5480  
F: +81-29 839 5485  
service.iik@leybold.com

## Malaysia

### Leybold Malaysia

### Leybold Singapore Pte Ltd.

No. 1 Jalan Hi-Tech 2/6  
Kulim Hi-Tech Park  
Kulim, Kedah Darul  
Aman 09000  
Malaysia  
Sales and Service:  
T: +604 4020 222  
F: +604 4020 221  
sales.ku@leybold.com  
service.ku@leybold.com

## South Korea

### Leybold Korea Ltd.

3F. Jellzone 2 Tower  
Jeongja-dong 159-4  
Bundang-gu Sungnam-si  
Gyeonggi-do  
Bundang 463-384, Korea  
Sales:  
T: +82-31 785 1367  
F: +82-31 785 1359  
sales.bd@leybold.com  
Service:  
623-7, Upsung-Dong  
Cheonan-Si  
Chungcheongnam-Do  
Korea 330-290  
T: +82-41 589 3035  
F: +82-41 588 0166  
service.cn@leybold.com

## Singapore

### Leybold Singapore Pte Ltd.

42 Loyang Drive  
Loyang Industrial Estate  
Singapore 508962  
Singapore  
Sales and Service:  
T: +65-6303 7030  
F: +65-6773 0039  
sales.sg@leybold.com  
service.sg@leybold.com

## Taiwan

### Leybold Taiwan Ltd.

10F., No. 32, Chenggong 12th St.,  
Zhubei City, Hsinchu County 302  
Taiwan, R.O.C.  
Sales and Service:  
T: +886-3-500 1688  
F: +886-3-583 3999  
sales.hc@leybold.com  
service.hc@leybold.com



www.leybold.com