

Installation Manual

KSM55

EtherCAT



Installation manual for extension module KSM 55.

Note: The German version is the original version of the installation manual.

Status: 06/2013

Subject to change without prior notification

The contents of this documentation has been collated with greatest care and corresponds with our present status of information. However, we would like to point out, that this document cannot always be updated at the same time as the further development of the product. Information and specifications can be changed at any time. Please keep yourself informed about the current version under www.kollmorgen.com .

Devices of the

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1 Important Notes

Definition of individual target groups

Project engineers for safe drive systems:
Engineers and technicians

Assembly, electric installation, maintenance and replacement of devices:
Maintenance electricians and service technicians

Commissioning, operation and configuration:
Technicians and engineers

1.1 Definitions

The designation KSM is used as generic term for all derivatives from the KSM product range. Wherever this description refers to a certain derivative, the complete designation is used.

KSM55 is the short form of the communication device EtherCAT KSM55.

The term "safe" used in the following text in any case refers to the classification as a safe function for application up to PI e acc. to EN ISO 13849-1 or SIL3 acc. to EN 61508.

The system software "SafePLC" serves the purpose of configuring and programming KSM modules.

1.2 Co-valid Documents

Description	Reference
General information about KSM devices and their usage.	KSM Installation manual KSM Programming manual
Description CAN data format.	TD-37350-810-51-xxF-EN Status message data

Table 1: co-valid documents

Note:

- Thoroughly read the manuals before you start the installation and the commissioning of the KSM module.
- Paying attention to the documentation is a prerequisite for trouble-free operation and fulfillment of possible warranty claims.

1.3 Abbreviations Used

Abbreviation	Meaning
AC	Alternating voltage
IL	Instruction list
ELIA	Employer's liability insurance association
CLK	Clock (cycle)
CPU	Central Processing Unit
DC	Direct voltage
DI1..DI14	Digital Input
DIN	Deutsches Institut für Normung (German Institute for Standardization)
DO	Digital Output
EMU	Emergency Monitoring Unit
EMC	Electromagnetic compatibility
ELC	Emergency Limit Control
EN	European Standard
HISIDE	Output with 24VDC nominal level switching to plus
IP20	Degree of protection for housing
ISO	International Organisation for Standardisation
LED	Light Emitting Diode
LOSIDE	Output switching to reference potential
OLC	Operational Limit Control
PIA	Process image of outputs
PII	Process image of inputs
PESSRAL	Programmable electronic system in safety related applications for elevators
P1,P2	Pulse outputs
PLC	Programmable Logic Controller
POR	Power on Reset
PSC	Position Supervision Control
SELV	Safety Extra Low Voltage
SSI	Synchronous Serial Interface
VDE	Verband der Elektrotechnik, Elektronik und Informationstechnik e. V. (association for el. engineering, electronics and information technology)

Table 2: Abbreviations

2 Safety Regulations

2.1 Intended Use

The communication device EtherCAT KSM55 is an extension for the devices of the KSM11/12 series for non safe data exchange over EtherCAT protocol.

2.2 General Safety Regulations

Safety Note:

- In order to avoid damage to persons and property only qualified personnel is entitled to work on the device. The term qualified personnel refers to persons who have successfully completed electro technical training and are fully familiar with the applicable rules and standards of electrical engineering.

The qualified person must become familiar with the operating instructions (see IEC364, DIN VDE0100).

- The qualified must have profound knowledge of the national accident prevention regulations
- The use of the device must be strictly limited to the intended use as specified in the following list. The values of data listed under section "3.2 Characteristic device data" must also be observed.
- The contents of this installation manual is restricted to the basic function of the device or its installation. The "Programming instructions KSM11/12" contains a more detailed description of the programming and re-parameterization of the devices. Exact knowledge and understanding of these instructions is mandatory for a new installation or modification of device functions or device parameters.
- Commissioning (i.e. starting up the intended operation) is only permitted in strict compliance with the EMC-directive. The EMC-testing regulations EN55011:2007 + A2:2007 and EN 61000-6-2:2005 are used as basis.
- Compliance with the conditions acc. to EN 60068-2-6 related to the values specified under "Technical characteristics" is mandatory for storage and transport.
- The wiring and connecting instructions in chapter "Installation" must be strictly followed.
- The applicable VDE-regulations and other special safety regulations of relevance for the application must be strictly followed.
- Evidence of the configured monitoring functions as well as their parameters and links must be issued by means of a validation report.
- The implementation of the module must be coordinated with the demands of the responsible acceptance testing authority (e.g. TÜV or ELIA).
- Do not install or operate damaged products. Report damages immediately to the responsible forwarding agent.
- Never open the housing and/or make unauthorized conversions.
- Inputs and outputs for standard functions or digital and analog data transmitted via communication modules must not be used for safety relevant applications.

 **WARNING:**

Using our devices contrary to the rules and conditions specified hereunder can lead to injuries or fatalities as well as damage to connected devices and machines! This will also cause the loss of all warranty and compensation claims against Kollmorgen.

2.3 Operation and Service

The module must always be de-energized before installation and removal, or before disconnecting signal lines. For this purpose all live supply lines to the device must be checked for safe isolation from supply

When installing or removing the module appropriate measures must be applied to prevent electrostatic discharge to the externally arranged terminal and plug connections. Contact with such terminals should be reduced to a minimum and earthing should by means of e.g. an earthing strap should take place before and during these procedures.

2.4 Transport and Storage

Information concerning transport, storage and proper handling must be strictly followed. The climate related specifications in chapter "Technical data" must be complied with.

2.5 Scope of Delivery

The scope of delivery contains

- Extension device EtherCAT KSM55
- ESI-file
- Installation manual
- Backplane bus plug

3 Device Description and Operation

Together with the KSM basic device this device works as a gateway from back plane CAN bus to EtherCAT. The user has the possibility to send the status message data to EtherCAT. Max. user data from 8 CAN messages can be send.

Till 32 byte user data can be received from EtherCAT and send to the KSM device. This 32 byte data will be transmitted with 4 CAN messages to 4 basic devices.

Device has to be configured as a EtherCAT slave device.

Ethernet data rate will be 100Mbit/s in full duplex mode. Size of output data is 64 byte, input data is 32 Byte.

3.1 Characteristic Data

Device KSM55	
Response time	Cycle Time 10 ms
Number of CAN objects	1 to 8
Data size CAN telegram	8 Byte
CAN ID	Standard (11 bBit)

Table 3: Characteristic Data

3.2 Device Settings

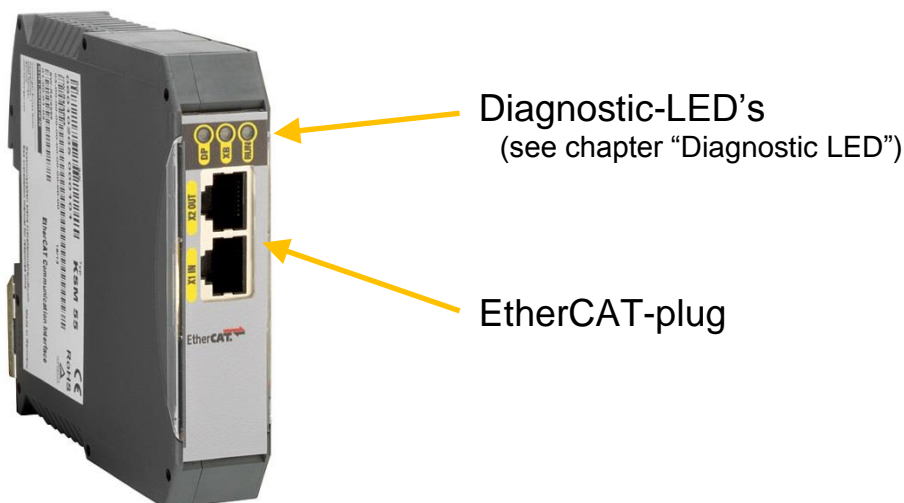


Image 1: Front

No settings on the device needed.

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4 Safety Related Characteristics

KSM55 can only be used as a non safe communication with EtherCAT protocol.

5 Connection and Installation

KSM55 has to be connected to a basic device (KSM11, KSM12) with a back plan.

Example: KSM 55 together with KSM12:

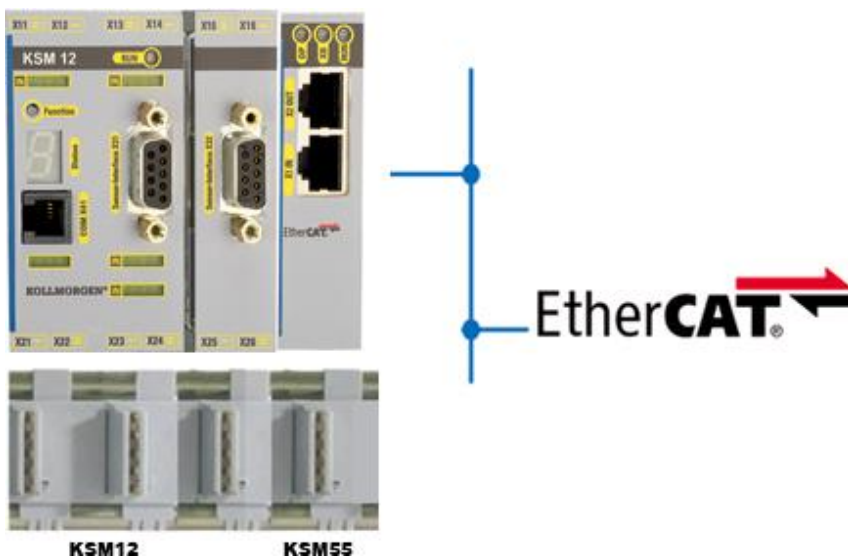


Image 2: Device Connection

5.1 General Notes on Installation

Strictly follow the safety regulations when installing!

Degree of protection IP20

Route all signal lines for the interfacing of digital inputs and contact monitoring separately.

You should in any case disconnect 230VAC voltages from low voltage power lines, if these voltages are used in connection with the application.

The cable lengths for digital inputs and outputs must normally not exceed **30 m**.

If the cable lengths exceeds 30 m you must apply appropriate measures for fault exclusion concerning impermissible overvoltage. Appropriate measures include e.g. lightning protection for outdoor lines, overvoltage protection of the indoor system, protected routing of cables.

Measures concerning the electromagnetic compatibility (EMC)

The KSM module is intended for use in the drive environment and meets the EMC-requirements mentioned above.

It is also assumed that the electromagnetic compatibility of the overall system is ensured by application of appropriate measures.

Safety Notes:

Electric power supply lines of the KSM and "discontinuous-action lines" of the power converter must be isolated from each other.

Signal lines and power lines of the power converter must be routed through separate cable ducts. The distance between the cable ducts should be minimum 10 mm.

Only shielded cables must be used to connect the position and speed sensors. The signal transmission cable must be RS-485-standard compliant (lines twisted in pairs).

Care must be taken to ensure that the shielding is correctly connected in the 9-pin SUB-D plugs of the position and speed sensors. Only metal or metal coated plugs are permitted.

The shielding on the sensor side must comply with appropriate methods.

EMC-compliant installation of the power converter technology in the environment of the KSM module must be assured. Special attention must be paid to the routing of cables, the shielding of motor cables and the connection of the braking resistor. Strict compliance with the installation instructions of the power converter manufacturer is mandatory.

All contactors in the environment of the power converter must be equipped with appropriate suppressor circuits.

Suitable measures to protect against overvoltages must be applied.

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5.2 Installation KSM-Module

The module is solely to be installed in control cabinets with a degree of protection of at least IP54.

The modules must be vertically fastened on a top hat rail.

The ventilation slots must be kept unobstructed, to ensure adequate air circulation inside the module.

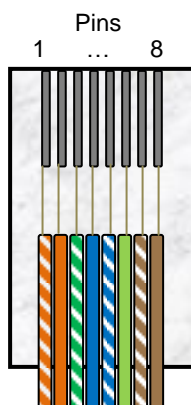
5.3 Assembly on Backplane Bus



Image 3: Assembly

For more information see “Installation Manual KSM”.

5.4 Terminal Assignment



RJ45

Pin	Name	Description	Color
1	TX+	Tranceive Data +	White-Orange
2	TX-	Tranceive Data -	Orange
3	RX+	Receive Data +	White-Green
4	nc.	Not used	Blue
5	nc.	Not used	White-blue
6	RX-	Receive Data -	Green
7	nc.	Not used	White-Brown
8	nc.	Not used	Brown

Image 4: Assignment RJ45

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6 Start Up

6.1 Procedure

Start-up must only be performed by qualified personnel!
Strictly follow the safety regulations when commissioning!

6.2 Parameterization

Usage of program TwinCAT from Beckhoff.

6.2.1 Installation ESI-File

Copy ESI-File into ESI-Folder of TwinCAT program.
TwinCAT program has to be closed for this step.
After starting TwinCAT the ESI cache will be reinitialized.

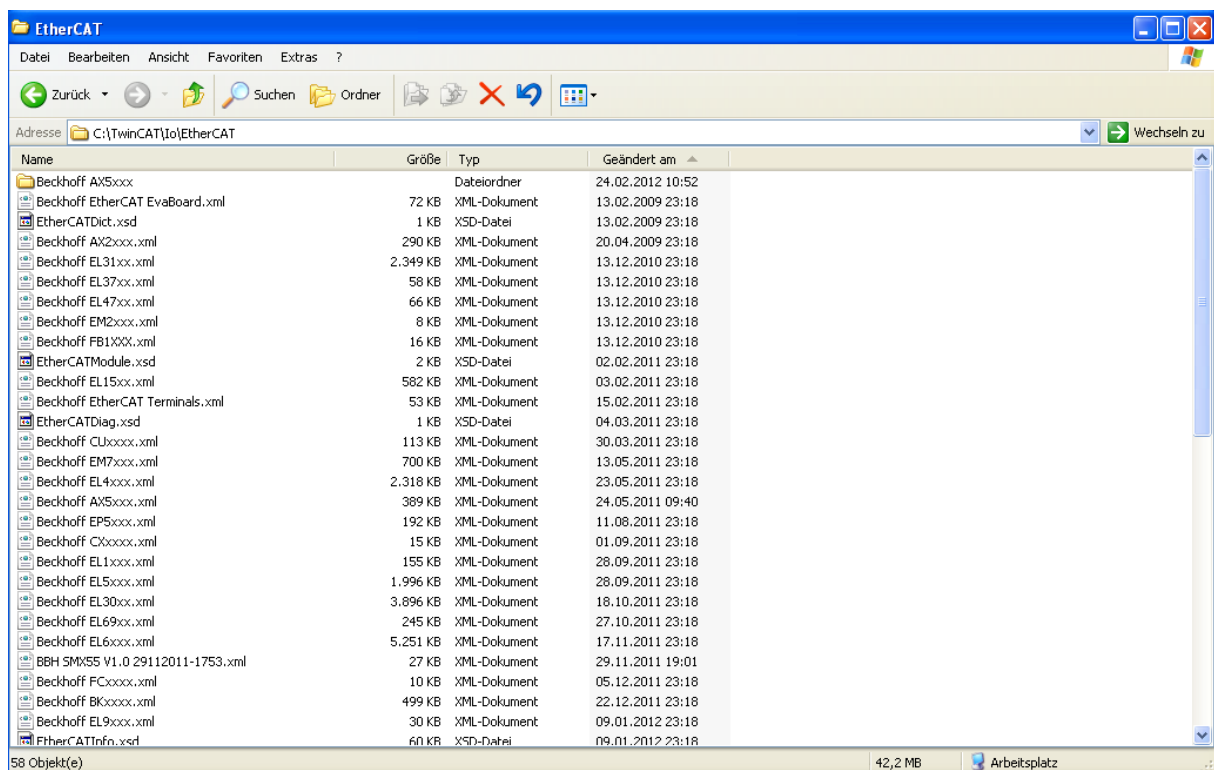


Image 5: TwinCAT root for ESI-File

6.2.2 Settings SafePLC

CAN-IDs for the status message data can be configured in the connection settings SafePLC.

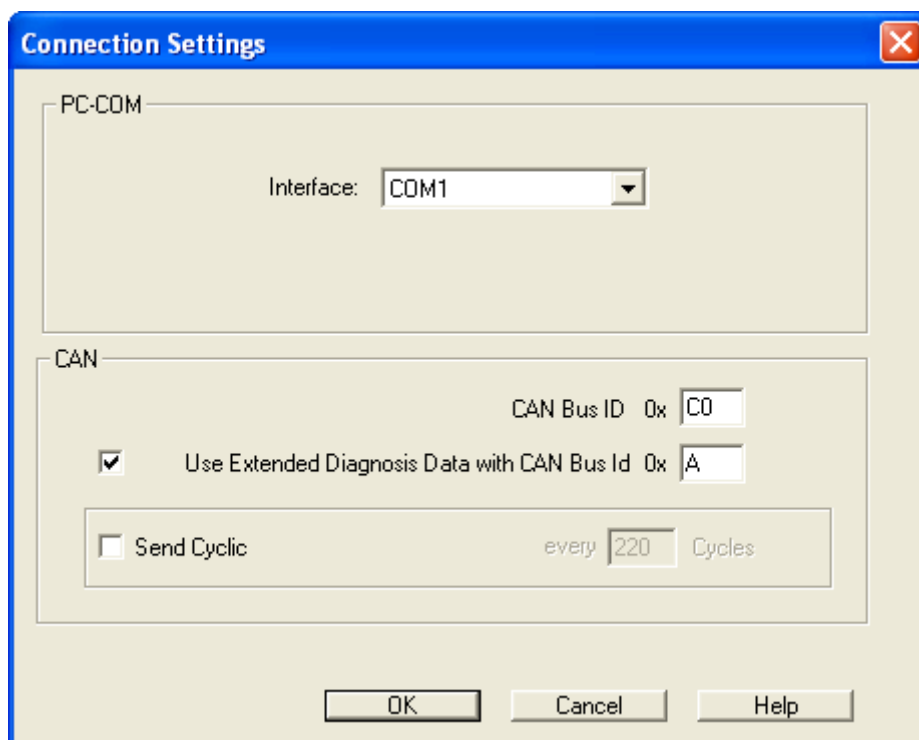


Image 6: Connection settings SafePLC

⚠ Note: The 4 CAN messages with input bytes for KSM55 are sent with the backplane bus with CAN ID's - 0x9D bis 0xA0 – and can't be use for other points.

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Following table shows the defined CAN ID's for input and output bytes for EtherCAT.

Bytes	CAN-ID	Direction
0 bis 7	0xA1	Output (KSM55->EtherCAT Master)
8 bis 15	0xA2	Output (KSM55->EtherCAT Master)
16 bis 23	0xA3	Output (KSM55->EtherCAT Master)
24 bis 31	0xA4	Output (KSM55->EtherCAT Master)
32 bis 39	0xA5	Output (KSM55->EtherCAT Master)
40 bis 47	0xA6	Output (KSM55->EtherCAT Master)
48 bis 55	0xA7	Output (KSM55->EtherCAT Master)
56 bis 63	0xA8	Output (KSM55->EtherCAT Master)
0 bis 7	0x9D	Input (EtherCAT Master->KSM55)
8 bis 15	0x9E	Input (EtherCAT Master->KSM55)
16 bis 23	0x9F	Input (EtherCAT Master->KSM55)
24 bis 31	0xA0	Input (EtherCAT Master->KSM55)

Table 4: Defined CAN-IDs CAN messages to EtherCAT

6.2.3 Integration KSM55 into TwinCAT

Open TwinCAT system manager and if necessary create a new project.

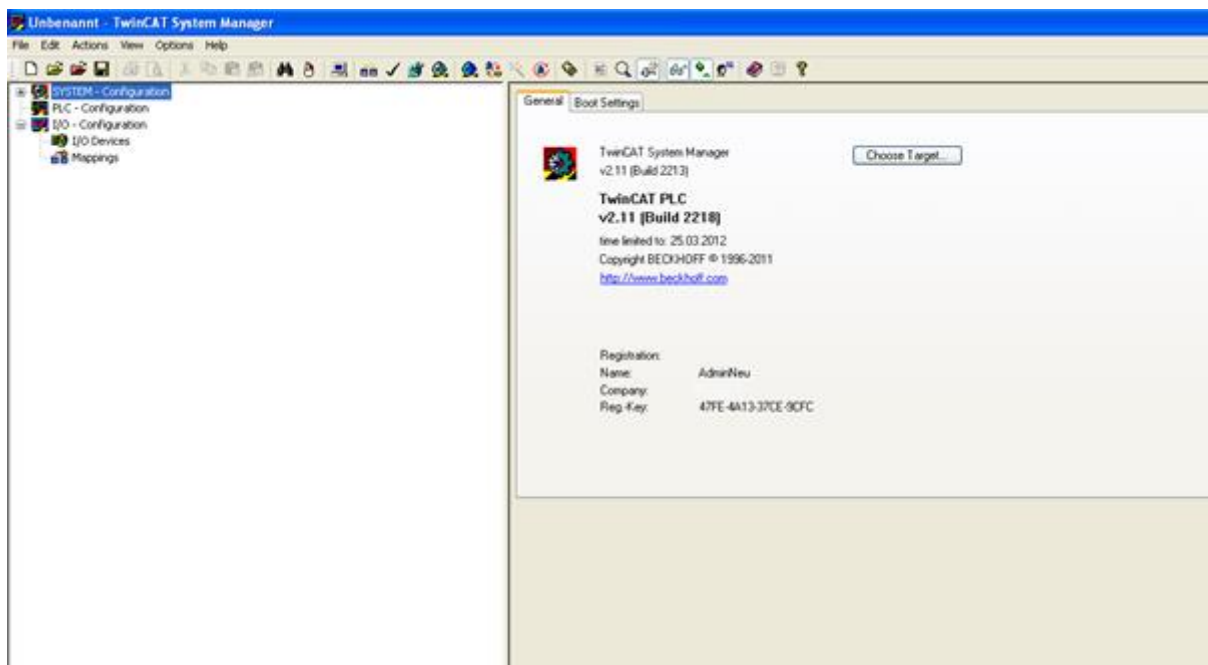


Image 7: TwinCAT System Manager

Right-click “I/O Device” -> “Append Device”.

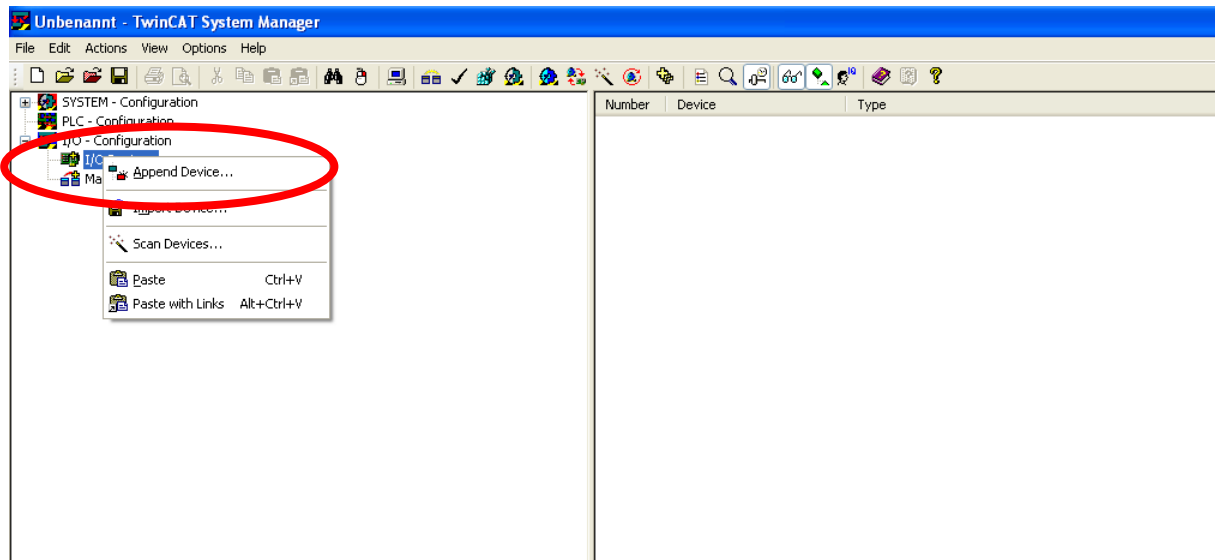


Image 8: TwinCAT System Manager with context menu “I/O Device”

Confirm EtherCAT

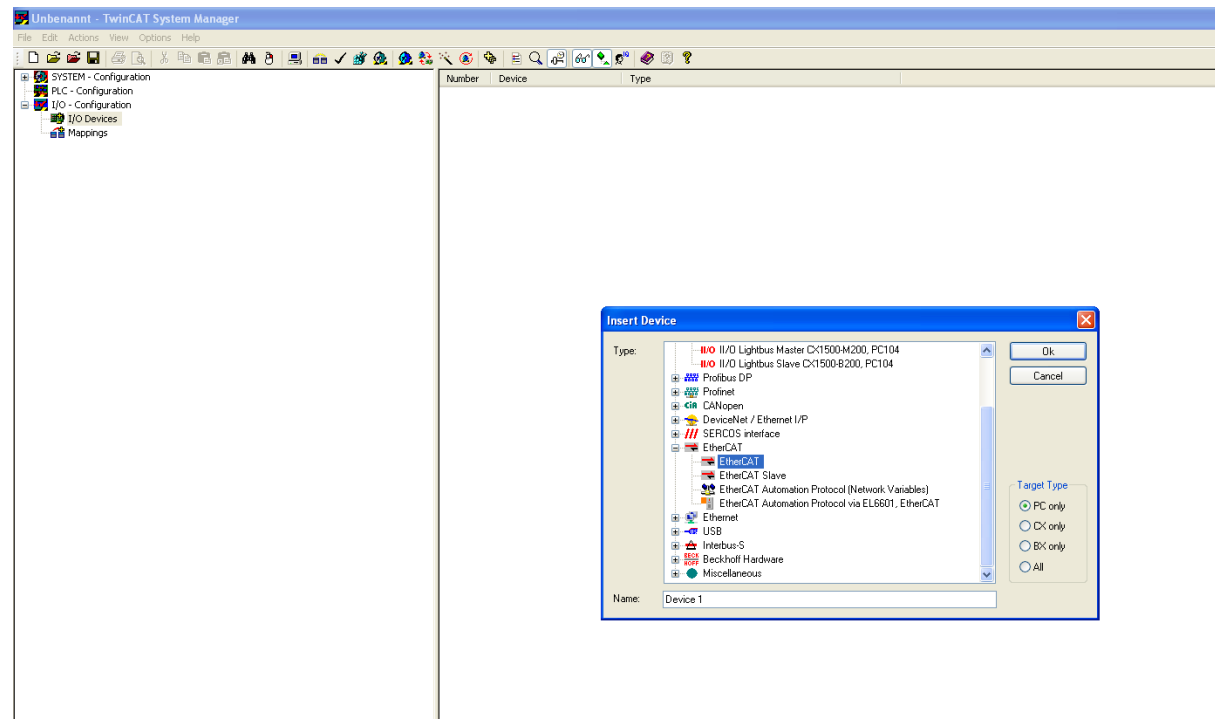


Image 9: TwinCAT menu “I/O Device”

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Now a EtherCAT master is added into TwinCAT and searching for EtherCAT slave can be started. The EtherCAT –Slave should be running and connected to the PC (TwinCAT program).

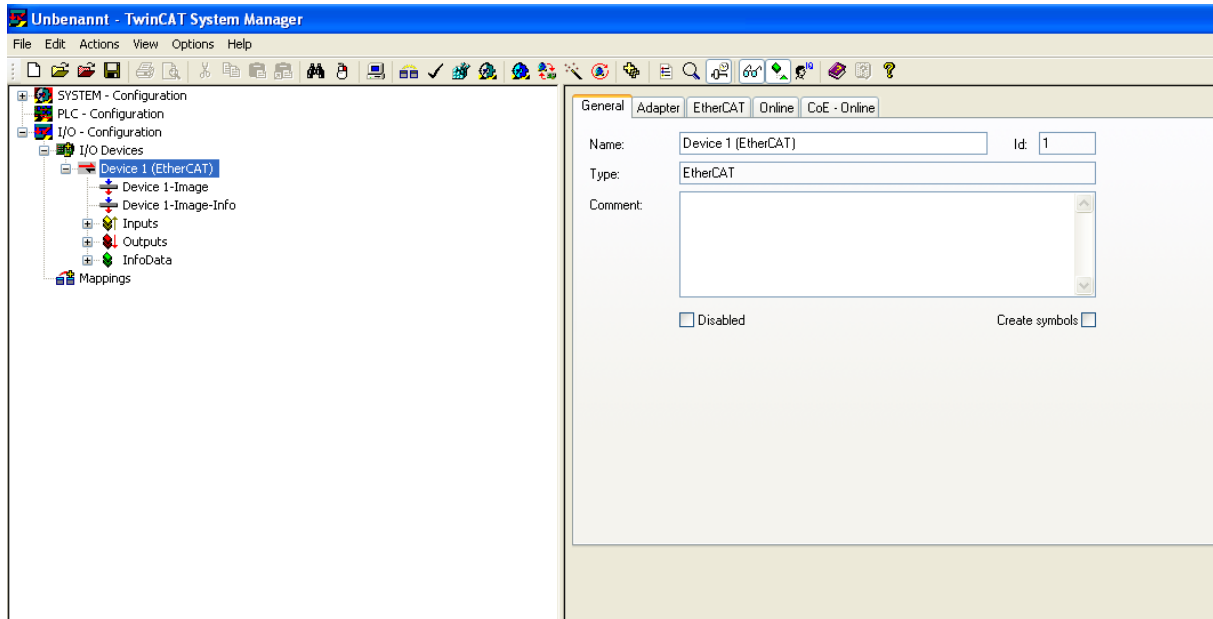


Image 10: TwinCAT with EtherCAT master device

Click “Device 1 (EtherCAT)” and then “Scan boxes”.
Searching for slave devices starts.

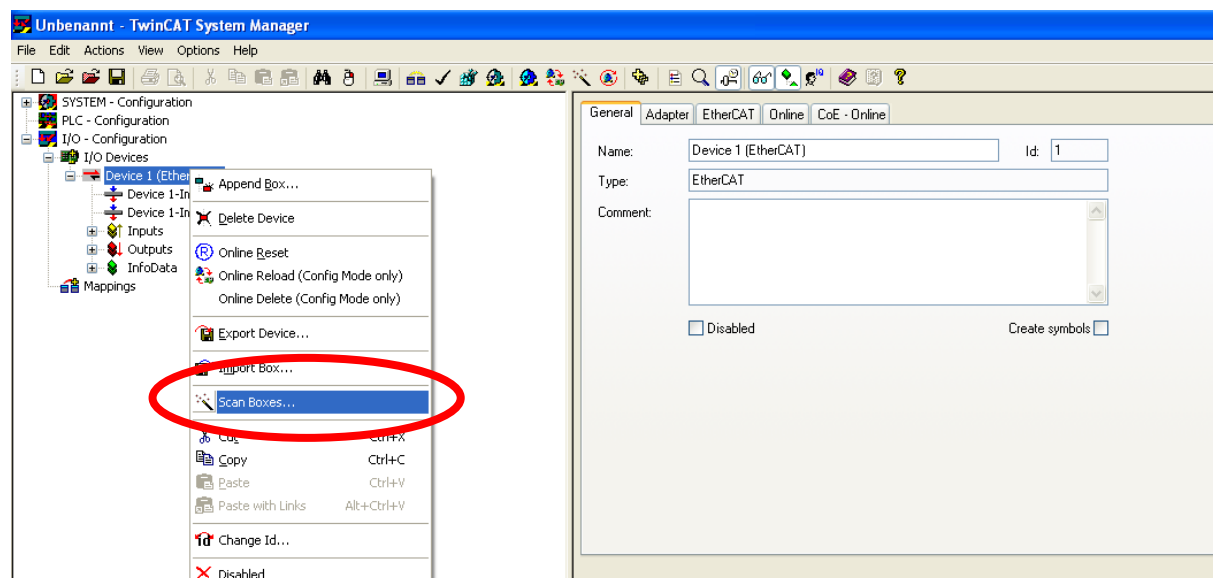


Image 11: TwinCAT with context menu of EtherCAT master.

By clicking on the “KSM55”, the input and output bytes are displayed.

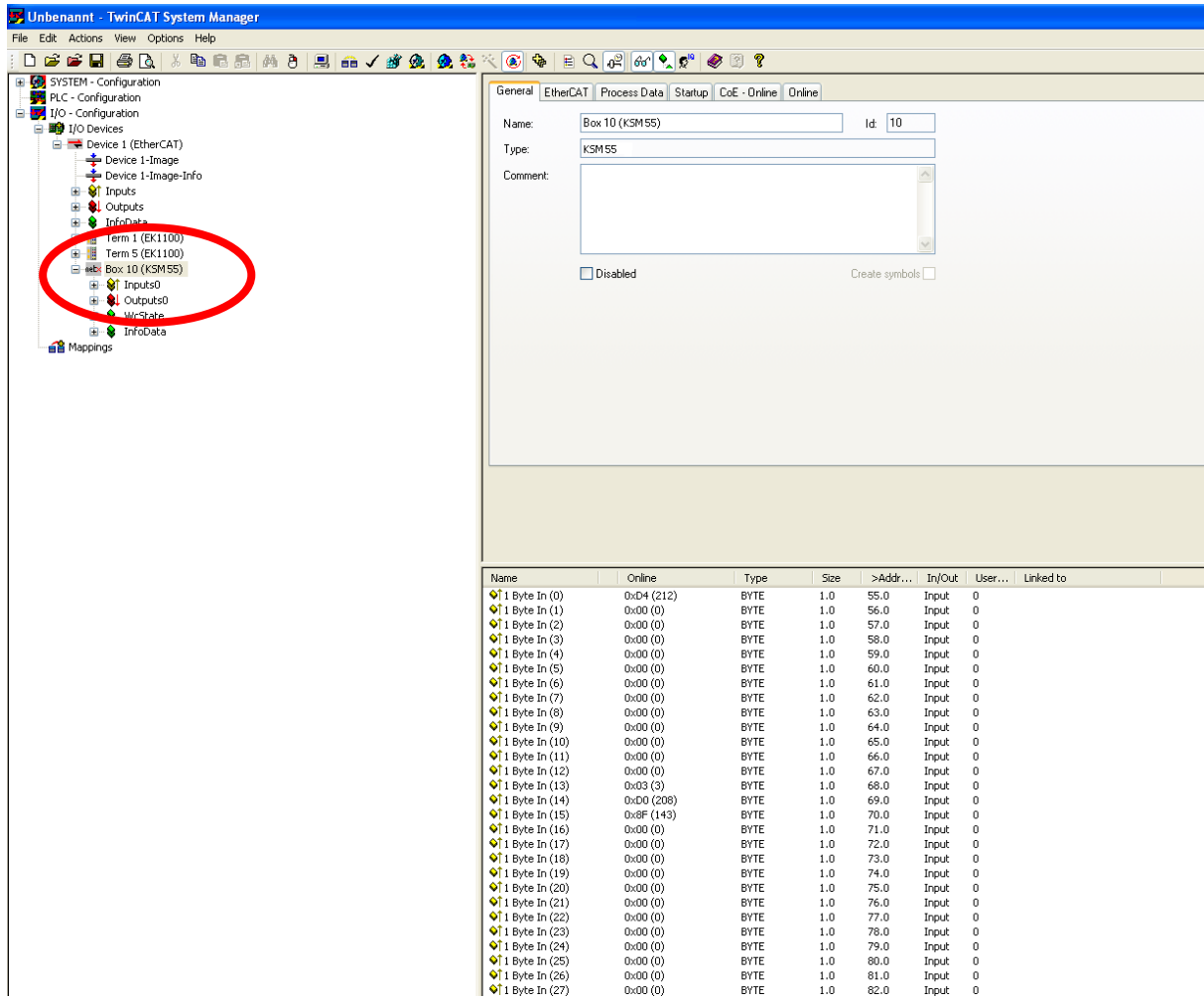


Image 12: TwinCAT with founded EtherCAT-slaves

If “Free Run Status change” in the toolbar is selected, the EtherCAT connection is opened. Status message data sent from KSM55 over EtherCAT are displayed in TwinCAT.

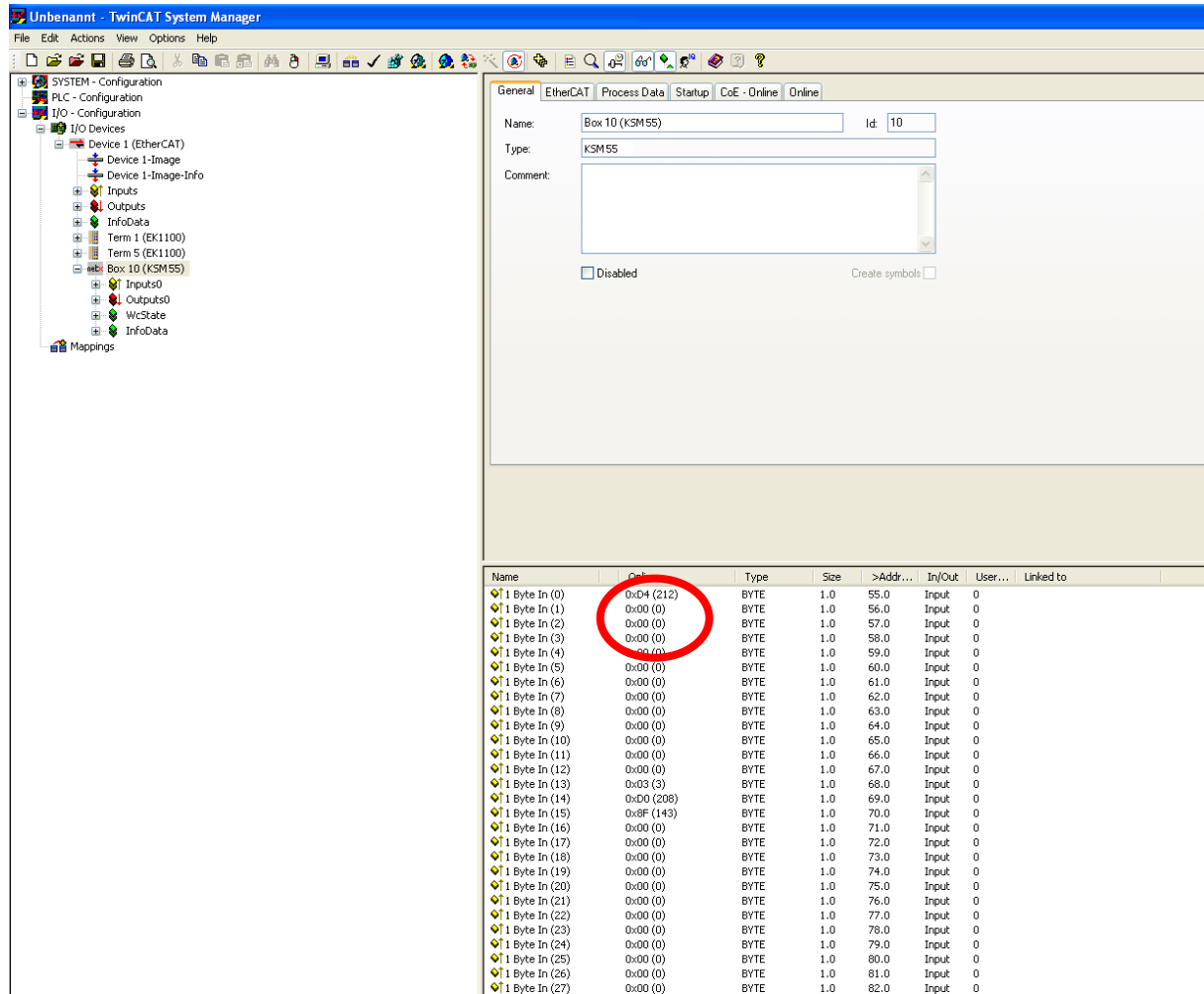


Image 13: TwinCAT with Free Run mode

Output bytes sent to KSM55 device can be selected and set here.

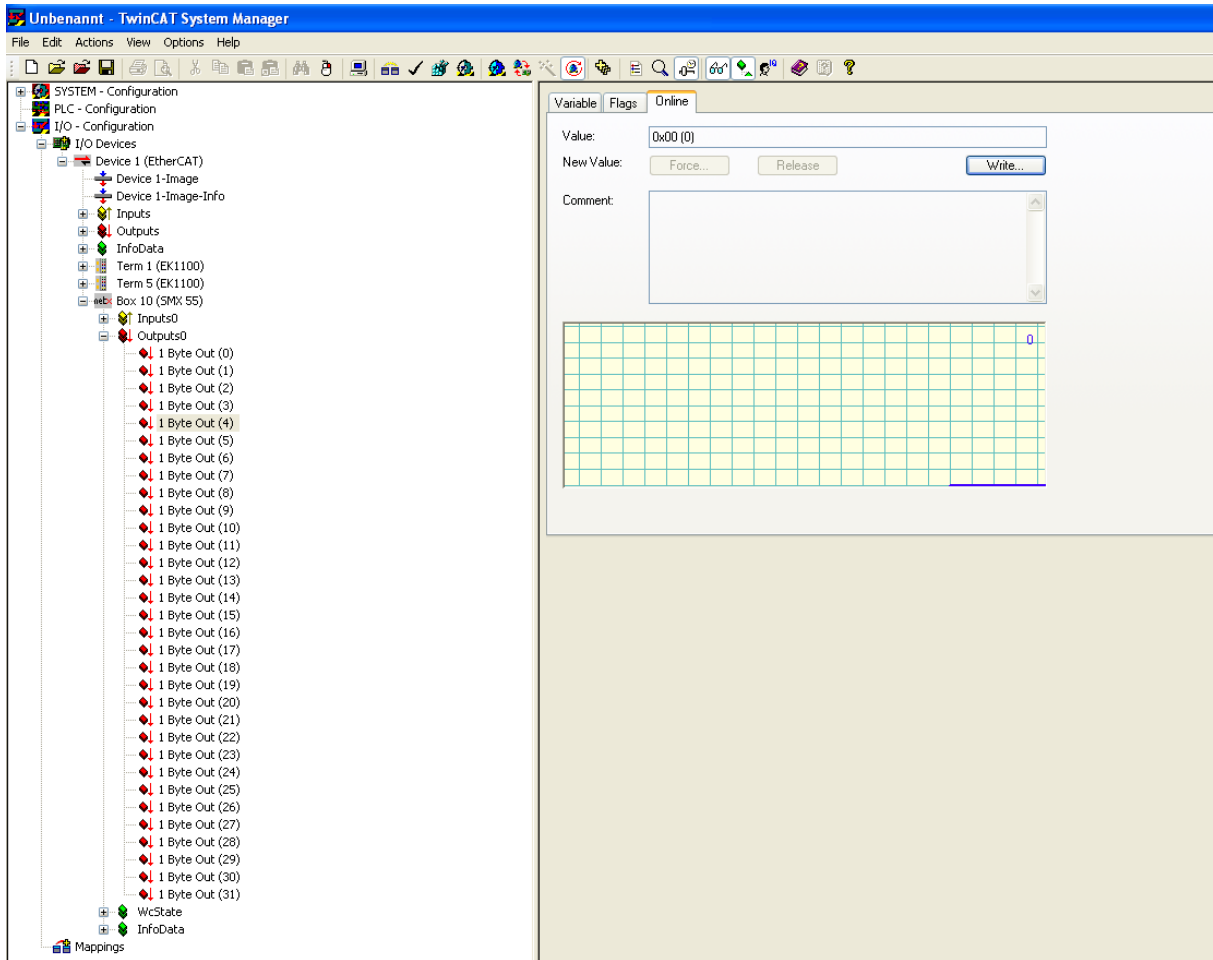


Image 14: TwinCAT output bytes

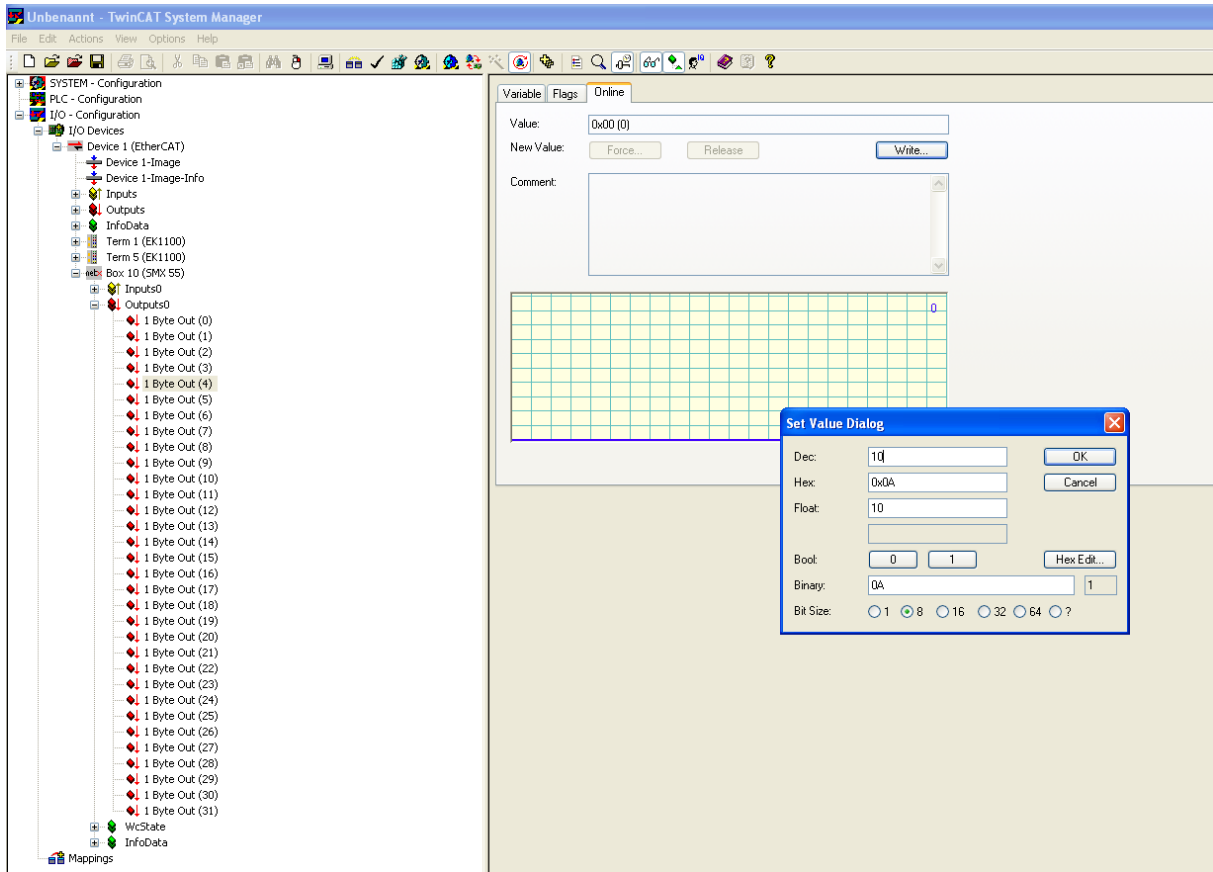


Image 15: TwinCAT with dialog “Set Value Dialog”

6.3 Diagnostic-LED

Device KSM55 has three LEDs.

Conditions:

LED	Color	Mode	Description
RUN	Green	Blinking	Device OK
DP	Green	Constant	EtherCAT Connection is active
	Green	Blinking	KSM55 initialized, waiting for EtherCAT connection
	Red	Blinking	KSM55 in start up mode
XB	Green	Blinking	Minimum one CAN message (KSM) received
	Red	Blinking	No CAN message received

Table 5: LED-Conditions

6.4 Modification / Handling Changes to the Device

Maintenance work must solely be carried out by qualified personnel.
Regular maintenance work is not required.

Repair

The devices must always be replaced as whole units
Repair work on the device can only be performed in the factory.

Warranty

By opening the module without permission the warranty will become null and void.


Note: By modifying the module the safety approval will become null and void!

7 Maintenance

7.1 Exchanging a Module

The following should be noted when exchanging a module KSM31R:

- Disconnect the electric power converter from the main supply.
- Switch off the electric power supply for the device and disconnect.
- Take the module off the top hat rail and pack up EMC-compliant.
- Setting bus address on the new device and mount the new module on the top hat rail
- Reconnect all connections.
- Switch on the electric power converter.
- Switch on the supply voltage.

 **Note:** Pluggable connections of the KSM module must generally not be disconnected or connected in live condition.

8 Technical Data

8.1 Environmental Conditions

Class of Protection	IP 20
Ambient Temperature	0 °C* ... 50 °C
Climatic Category	3 acc. to DIN 50 178
Lifetime	90000h at 50 °C ambient

Table 8: Environmental Conditions

About Kollmorgen

Kollmorgen is a leading provider of motion systems and components for machine builders. Through world-class knowledge in motion, industry-leading quality and deep expertise in linking and integrating standard and custom products, Kollmorgen delivers breakthrough solutions that are unmatched in performance, reliability and ease-of-use, giving machine builders an irrefutable marketplace advantage.

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