KOLLMORGEN
Because Motion Matters™

Installation Manual
For
KSM Modules

Series KSM31R

Installation manual for extension module KSM 31R.

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

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Valid from FW release 2.0.2.30

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 further development of the product progresses. 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.

The term "safe" used in the following text in any case refers to the classification as a safe function for application up to Pl 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.

The modules of the KSM series are internally built up of two independent processing units. In the following these are referred to as system A and system B.

1.2 Co-valid Documents

Description	Reference
Installation manual for KSM device series KSM11/12	HB-37350-810-01-xxF-EN KSM Installation manual

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 electrical engineering, electronics and information technology)

2 Safety Regulations

2.1 Intended Use

The KSM31R device can only work with a basic device.
So the same safety regulations as device series KSM11/12 are guilty.

2.2 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 grounding by means of a grounding strap should take place before and during these procedures.

2.1 Transport/Storage

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

3 Device Types

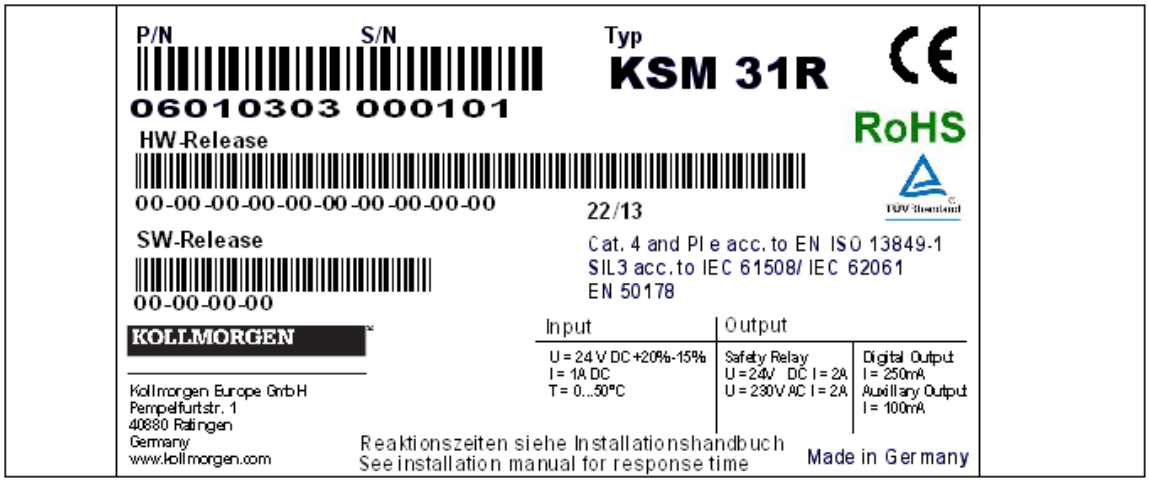
3.1 Characteristics of the Module

Type Designation	Device Design
	Design of module with the following periphery: 12 Digital inputs 2 I/O optionally configurable as input or output 2 Pulse outputs 4 Safety relay outputs 2 Signal outputs 12 Status LEDs for inputs 10 Status LEDs for I/O 1 Backplane bus interface

3.2 Identification

The name plate is located on the left side wall of the module and contains the following information:

- Type Designation
- Part Number
- Serial Number
- Identification of Hardware Release
- Identification of Software Release
- Safety Category
- Input Characteristics
- Output Characteristics
- Date of Manufacture (week/year)



Name plate KSM31R (image enlarged)

3.3 Scope of Delivery

The scope of delivery contains:

KSM31R module:

- Plug for all signal terminals
- Backplane bus plug

4 Connection and Installation

4.1 General Notes on Installation

Strictly follow the safety regulations when installing!

Degree of protection IP52

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 exceed 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.

Use of the module as PESSRAL acc. to EN81:

When using the module as PESSRAL acc. to EN81 (elevator standard), the device must be installed at a minimum distance of 200mm to the transmitting facility with the following frequency ranges (mobile radio, etc.) 166-1000 MHz, 1710-1784 MHz, 1880-1960 MHz. The field strength of the transmitting facility must not exceed the following field strength values: 30V/m at 166-1000 and 1710-1784 MHz, 10V/m at 1880-1960 MHz .

Installation in a closed housing with degree of protection IP5X or better is additionally required.

⚠Safety Note:

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.

Additional safety regulations when using as PESSRAL acc. to EN81

Install the device at a distance of at least 200 mm from the HF-transmitting facility (WLAN, GSM, etc.). The transmitting facilities must thereby not exceed the max. field strengths as specified above.

The device must be installed in a closed housing, IP5X or better.

4.2 Installation and Assembly of the 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.

4.3 Installation of Backplane Bus System

Device KSM31R is connected to the basic device over backplane bus.

Example: KSM11 + KSM31R + KSM5x
(basic device + KSM31R + communication device)

Power supply for KSM31R module is on the back plane bus and is generated from basic device. Supply for digital outputs is on X11 of KSM31R device.

Note:

- Max. two extension modules can be connected to a basic device (exclusive bus modules).
- Not more than one basic device can be connected on the same backplane bus.

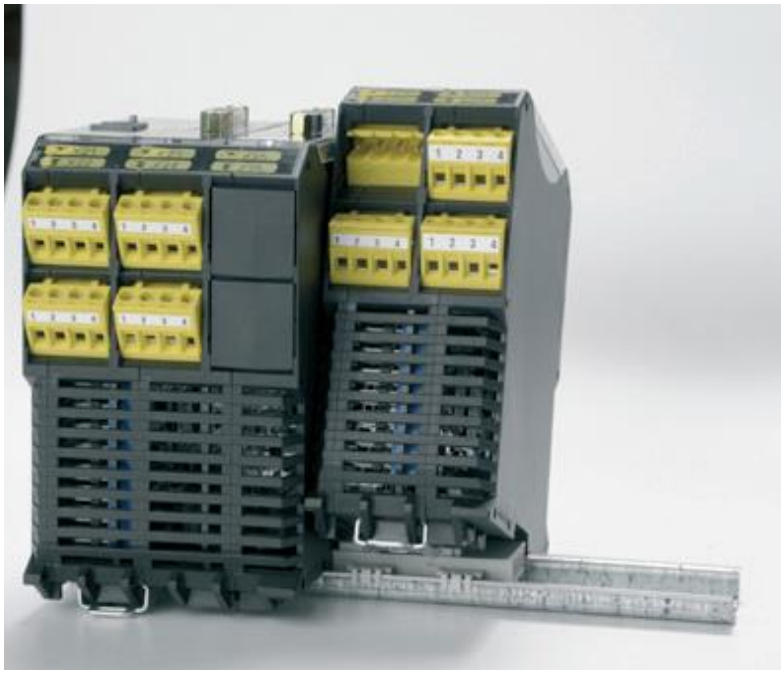
4.4 Assembling the Modules

The modules are mounted on C-standard rails by means of snap-on latches.

4.4.1 Assembly on C-rail

The devices are inserted into the rail under an oblique angle and then snapped on downwards.

For disassembling use a screwdriver, insert it into the slot of the downwards pointing latch and then move it up.



4.4.2 Assembly on Backplane Bus

After assembling the backplane bus the device can be installed. For this purpose insert the module from above into the plug connection under a oblique angle and snap it onto the C-rail.

Insert the module from above under an oblique angle.

Snap-on downwards on to the C-rail.

The backplane plug connection can later be extended. The system configuration can thus be extended by additional modules.

Snap the backplane bus element into the C-rail and insert it into the counter-piece by sliding it sideways.

4.5 Terminal Assignment

Pin	Name	Function
X07:1 X07:2 X07:3 X07;4	K1/11 K1/12 K2/11 K2/12	Feedback contact relay 1 Feedback contact relay 1 Feedback contact relay 2 Feedback contact relay 2
X08:1 X08:2 X08:3 X08;4	K3/11 K3/12 K4/11 K4/12	Feedback contact relay 3 Feedback contact relay 3 Feedback contact relay 4 Feedback contact relay 4
X09:1 X09:2 X09:3 X09;4	K5/11 K5/12 K6/11 K6/12	Feedback contact relay 5 Feedback contact relay 5 Feedback contact relay 6 Feedback contact relay 6
X10:1 X10:2 X10:3 X10;4	K7/11 K7/12 K8/11 K8/12	Feedback contact relay 7 Feedback contact relay 7 Feedback contact relay 8 Feedback contact relay 8
X11:1 X11:2 X11:3 X11;4	U24 extern U24 extern GND extern GND extern	Power supply IO +24 VDC Power supply IO +24 VDC Power supply IO 0 VDC Power supply IO 0 VDC
X12:1 X12:2 X12:3 X12:4	IO01 IO02 P1 P2	I/O extension 1 (EAEx.1 / EAAx.1) I/O extension 2 (EAEx.2 / EAAx.2) Pulse output P1 Pulse output P2
X13:1 X13:2 X13:3 X13:4	 Ax.1 Ax.2	Nicht verwendet Nicht verwendet Auxiliary output Ax.1 (no safety output) Auxiliary output Ax.2 (no safety output)
X14:1 X14:2 X14:3 X14:4	Digital IN01 Digital IN02 Digital IN03 Digital IN04	Digital In 01 (Ex.1) Digital In 02 (Ex.2) Digital In 03 (Ex.3) Digital In 04 (Ex.4)
X17:1 X17:2 X17:3 X17;4	K1.1 K1.2 K2.1 K2.2	Relay output 1 Relay output 1 Relay output 2 Relay output 2
X18:1 X18:2 X18:3 X18;4	K3.1 K3.2 K4.1 K4.2	Relay output 3 Relay output 3 Relay output 4 Relay output 4

Pin	Name	Function
X19:1 X19:2 X19:3 X19;4	K5.1 K5.2 K6.1 K6.2	Relay output 5 Relay output 5 Relay output 6 Relay output 6
X20:1 X20:2 X20:3 X20;4	K7.1 K7.2 K8.1 K8.2	Relay output 7 Relay output 7 Relay output 8 Relay output 8
X21:1 X21:2 X21:3 X21:4		Not used
X22:1 X22:2 X22:3 X22:4		Not used
X23:1 X23:2 X23:3 X23:4	Digital IN05 Digital IN06 Digital IN07 Digital IN08	Digital In 05 (Ex.5) Digital In 06 (Ex.6) Digital In 07 (Ex.7) Digital In 08 (Ex.8)
X24:1 X24:2 X24:3 X24:4	Digital IN09 Digital IN10 Digital IN11 Digital IN12	Digital In 09 (Ex.9) (OSSD) Digital In 10 (Ex.10) (OSSD) Digital In 11 (Ex.11) (OSSD) Digital In 12 (Ex.12) (OSSD)

Note)

X: 1-> KSM31R device number 1
2-> KSM31R device number 2

4.6 Safety Related Assessment of the Outputs

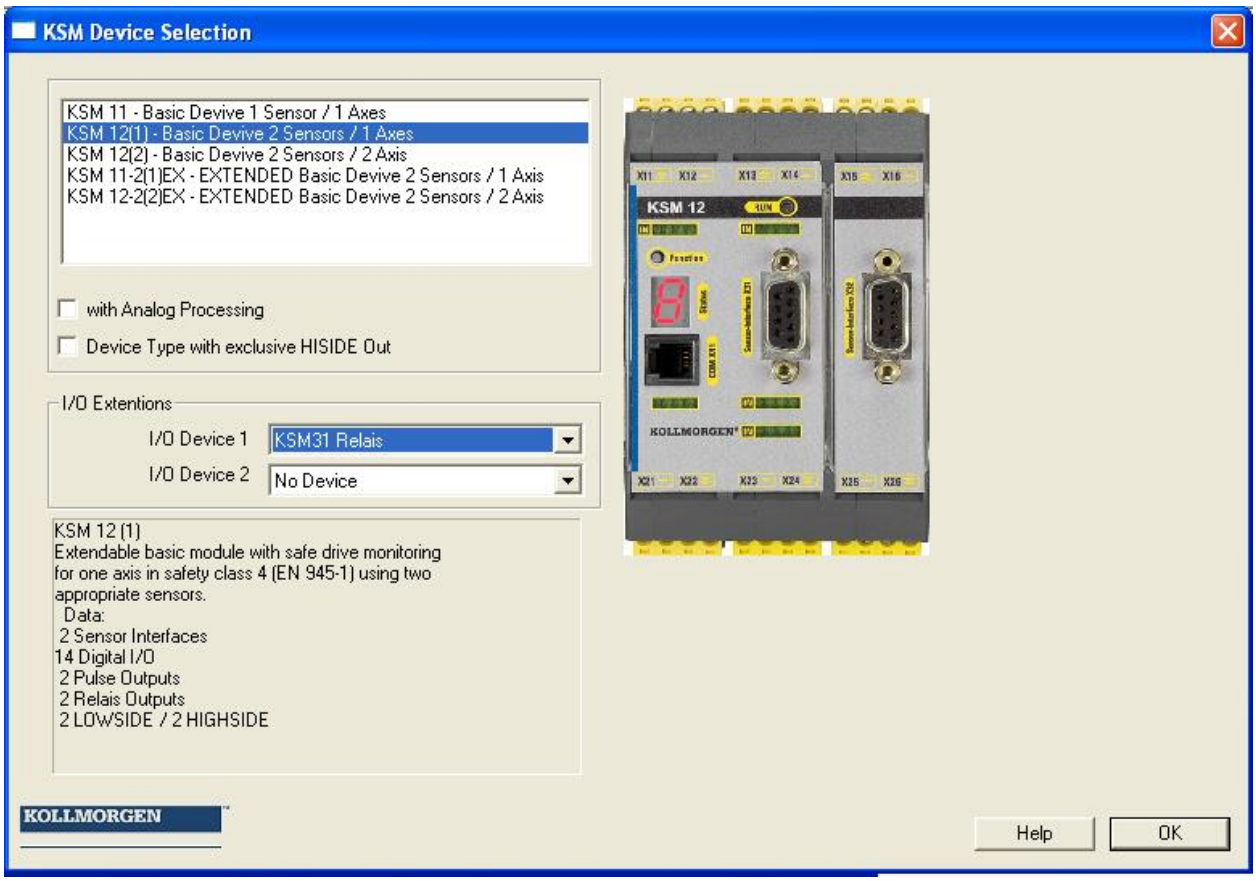
The outputs can be loaded as follows:

Output	Voltage	Current
Ax.1, Ax.2	24 VDC	100 mA
EAAx.1-2	24 VDC	250 mA
K1-K8	24 VDC 48 VDC 230 VAC	2 A 2 A 2 A

4.7 Configuration KSM31R

4.7.1 First Step

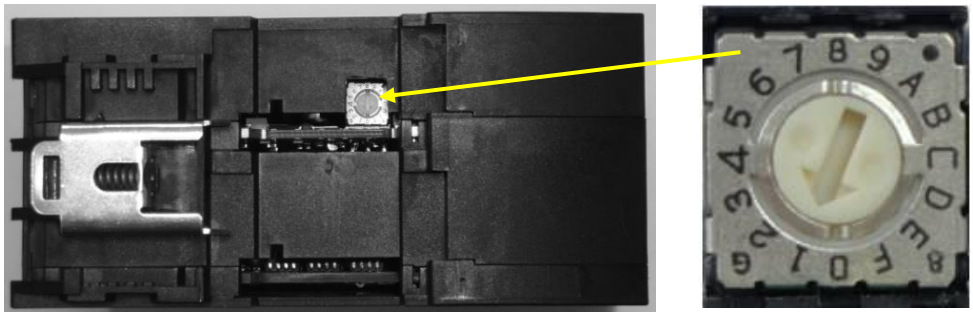
After starting the “SafePLC” program, select the basic device and secondly the extension module KSM31R.



4.7.2 Second Step

On the KSM31R module the bus address must be set by using the address switch.

This setting is made on the back of the module

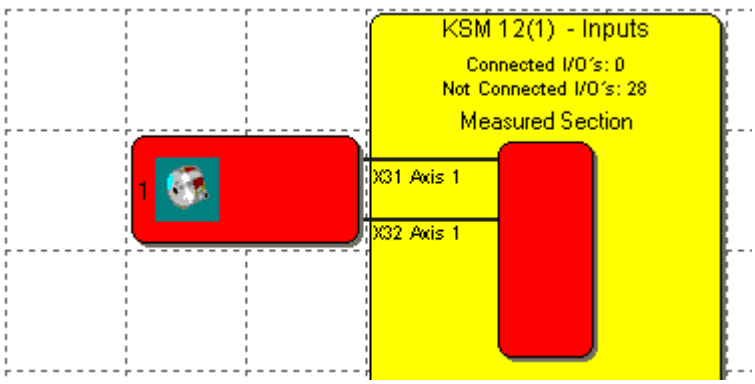


Note:

- Address range of the KSM31R module from 1...15.
- Address "0" is reserved for the basic device.

4.7.3 Third Step

In the main menu of the "Safe PLC" program, open the configuration dialog for the KSM31R module by double-clicking on the basic device.



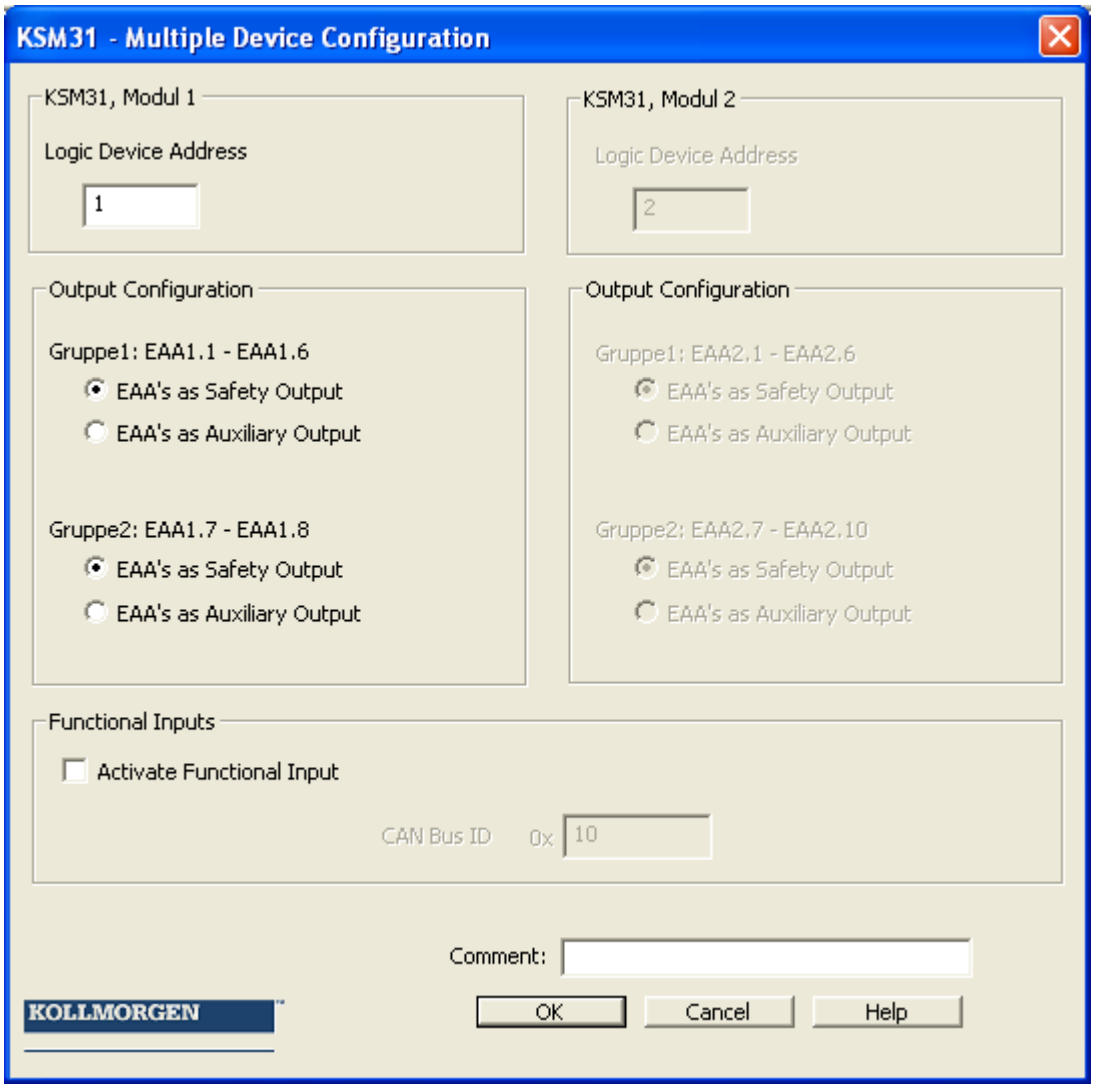
4.7.4 Fourth Step

The following settings must be made in the KSM31R configuration dialogue:

- Logic address KSM31R device x: Setting the address switch of the KSM module x
- Group1 EAAx.1-EAAx.6 or group1 EAAx.7-EAAx.10: When using these outputs one can choose between safety and standard outputs.

⚠Safety Note:

Group1 EAAx.1-EAAx.6 or group1 EAAx.7-EAAx.10 should always be set to safety outputs for using in a safety application.



5 Maintenance

5.1 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!

5.2 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.
- Set 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.

5.3 Maintenance Intervals

Module Replacement	See technical data
Function Test	See chapter "Installation"

6 Technical Data

6.1 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

6.2 Safety Related Characteristic Data

Max. Obtainable Safety Class	• SIL 3 acc. to EN61508 • Category 4 acc. to EN945-1 • Performance-Level e acc. to EN ISO 13849-1
System Structure	2-channel with diagnose (1002)
Rating of Operating Mode	"high demand" acc. to EN 61508 (high demand rate)
Probability of an endangering failure per hour (PFH-value)	< 1,4 E-8 (14FIT)
Proof-Test-Interval (EN61508)	20 years, after this time the module must be replaced

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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