

User Manual



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JMX22-15009
Distributed Drive

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Translation of the german original User Manual

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Table of Contents

1	Introduction.....	5
1.1	Information on this document	5
1.2	Typographical conventions	5
2	Safety.....	6
2.1	General Information.....	6
2.2	Purpose	6
2.2.1	Intended use.....	6
2.2.2	Usage other than intended	6
2.3	Warnings used in this document	7
2.4	General Safety Instructions	8
3	Product Description	12
3.1	System overview	13
3.2	Design	14
3.3	Product features	14
3.4	Brake	15
3.5	Status indication	15
3.5.1	Flashing patterns of the LEDs	16
3.5.2	Status display LEDs	16
3.5.3	Warning and error status of LEDs L1 and L2	17
3.5.4	Warning and error status of LED L4	20
3.5.5	Warning and error status of LED L6	21
3.5.6	LED states during the boot process	21
3.6	DIP switch sliders	22
3.7	Nameplate	23
3.8	Scope of delivery	25
4	Technical data.....	26
4.1	Dimensions.....	26
4.2	Mechanical specifications.....	27
4.3	Electrical properties	28
4.4	Torque curves.....	29
4.4.1	Torque reduction	29
4.5	Environmental conditions	30
5	Mechanical installation	31
5.1	Required equipment	31
5.2	Mounting the drive	32
5.3	Mounting the protective conductor	32

- 6 Electrical connection 33**
 - 6.1 Connection X1 - voltage supply..... 33
 - 6.2 Connection X2, X3 - EtherCAT®..... 35
 - 6.2.1 Communication with the EtherCAT® master 36
 - 6.2.2 File access via the EtherCAT® protocol (FoE)..... 36
 - 6.2.3 Error due to an interruption in communication..... 36
 - 6.3 Connection X5 - I/O interface 37
- 7 Configuration of the power supply 38**
 - 7.1 Electrical requirements for the supply unit..... 38
 - 7.2 Selecting the DC bus supply 39
 - 7.3 DC bus supply with JMX-15P 40
 - 7.4 DC bus supply with generic power supply unit..... 40
 - 7.5 Topology of the energy supply 41
 - 7.6 Supply voltages 41
 - 7.7 Power feedback..... 42
- 8 Error list..... 43**
- 9 Warning messages..... 54**
- 10 Safety function STO 55**
- 11 Malfunctions 56**
 - 11.1 General problems 56
 - 11.2 Electrical and connection issues 56
 - 11.3 communication issues 57
- 12 Service..... 58**
 - 12.1 Customer service..... 58
- 13 Spare parts and accessories..... 59**
 - 13.1 Cable and plug connections 59
- 14 Maintenance..... 62**
 - 14.1 Repairs 62
 - 14.2 Storage and shipment 62
 - 14.3 Return and disposal..... 63

1 Introduction

1.1 Information on this document

This document forms an integral part of the product and must be read and understood prior to using it. It contains important and safety-related information for the proper use of the product as intended.

Target groups

This document is intended for specialists with appropriate qualifications. Only competent and trained personnel is allowed to put this device into operation. During the whole product life cycle, safe handling and operation of the device must be ensured. In the case of missing or inadequate technical knowledge or knowledge of this document any liability is excluded.

Availability of information

Make sure this document is kept at the ready in the vicinity of the product throughout its service life.

For information on new revisions of this document, visit the download area on our website. This document is not subject to any updating service.

[Start | Bucher Automation - We automate your success.](#)

For further information refer to the following information products:

- JetSym software Online Help
Detailed description of software functions with application examples
- Application-oriented manuals
Cross-product documentation
- Version updates
Information about new versions of software products or of the operating system of your device

INFO

EtherCAT®

EtherCAT® is a registered trademark and patented technology, licensed by Beckhoff Automation GmbH, Germany.

1.2 Typographical conventions

This manual uses different typographical effects to support you in finding and classifying information. Below, there is an example of a step-by-step instruction:

- ✓ This symbol indicates requirements which have to be met before executing the following action.
- ▶ This sign or a numbering at the beginning of a paragraph marks an action instruction that must be executed by the user. Execute the instructions one after the other.
- ⇒ The target after a list of instructions indicates reactions to, or results of these actions.

INFO

Further information and practical tips

In the info box you will find helpful information and practical tips about your product.

2 Safety

2.1 General Information

When placed on the market, this product corresponds to the current state of science and technology.

In addition to the operating instructions, the laws, regulations and guidelines of the country of operation or the EU apply to the operation of the product. The operator is responsible for compliance with the relevant accident prevention regulations and generally accepted safety rules.

2.2 Purpose

2.2.1 Intended use

The distributed drives of the JMXyy-15xx model range are intended for industrial or commercial applications.

They are in conformity with the relevant parts of the harmonized standard series IEC 61800. If in special cases, that is when motors are used in non-industrial or non-commercial plants increased requirements apply, these requirements must be complied with on the part of the plant.

Typical areas of application include robotics and handling, machine tools, packaging and food machines and similar machines.

The distributed drives may only be operated within the operating ranges and ambient conditions (installation altitude, degree of protection, temperature range, electrical and mechanical data, etc.) specified in the documentation.

Before commissioning of the systems and machines where the distributed drives will be installed, the conformity of the system or machine with the Machinery Directive must be established.

Systems and machines with inverter-fed three-phase motors must meet the protection requirements of the EMC directive. The system installer is responsible for carrying out the installation properly. Signal and power lines must be shielded.

The distributed drives must not be placed in operation until after the entire system has been installed in accordance with EMC requirements.

2.2.2 Usage other than intended

The use of distributed drives of the JMXyy-15xx series outside of the application ranges given here or under operating ranges and ambient conditions other than those described in the documentation is considered non-designated use.

When used in safety functions, a higher-level safety system is required and an additional monitoring and protective device must be provided in accordance with the applicable safety provisions.

Therefore, do not use the drives in technical systems for which a high level of failure safety is specified. The following application areas are considered as non-designated use:

- Aviation and aerospace
- Machines specially constructed or used for a nuclear application whose failure may lead to the emission of radioactivity

- Medical devices that come into direct contact with the human body.
- Machines for transporting and lifting persons
- Special facilities for use at fairs and amusement parks
- Devices for domestic use

2.3 Warnings used in this document

DANGER



High risk

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

WARNING



Medium risk

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

CAUTION



Low risk

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

NOTICE

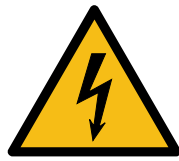


Material damage

Indicates a situation which, if not avoided, could result in malfunctions or material damage.

2.4 General Safety Instructions

DANGER

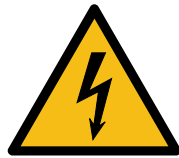


Danger due to high electrical voltage

Touching live parts may result in death or severe injuries.

- ▶ Carry out the following steps before starting work to ensure safety.
- ☑ Prepare for shutting off the system. Inform everyone involved who will be affected by the process.
- ☑ Isolate the drive system from the power supply and secure it against being turned on again.
- ☑ Wait for the discharge time (approx. 10 minutes) and check all power connections to ensure they are at zero potential.
- ☑ Ground according to requirements.
- ☑ Cover over neighboring live parts.
- ☑ Ensure the drives cannot move. Depressurize the compressed air lines and ensure that the pressure is released.

DANGER



Danger due to high operating voltage!

The high operating voltage of the device leads to severe injuries or death.

Comply with the following rules throughout the entire work process.

- ▶ Do not remove any cover plates and keep all control cabinet doors closed during operation.
- ▶ Check whether all live connections are safely protected against contact.
- ▶ Do not open the device.
- ▶ Never touch the wiring terminals of the device for voltage supply and DC link voltage during operation.

DANGER



Risk of electric arc due to improper handling

Improper handling can result in an electric arc, which may lead to severe injury or death.

- ▶ Open the plug connections only in de-energized state.
- ▶ Install the drive only in an environment where there is no danger of fire, corrosion or explosion, without any flammable gases or vapors.
- ▶ Observe the specified limit values for voltage.
- ▶ Wire according to regulations.

⚠ WARNING**Risk of fire due to improper operation of the drive**

In case of improper operation or due to an error, the drive may overheat and cause a fire that may result in serious personal injuries or death.

- ▶ Operate the drive according to the specification. The maximum speed must never be exceeded.
- ▶ Do not use any damaged drives or devices.
- ▶ Turn off the drive immediately if the temperature is too high.

⚠ WARNING**Risk of burns due to hot surfaces**

The drive may become hot during operation and can cause burns if touched.

- ▶ Take protective measures against accidentally touching the drive, for example protective covers.
- ▶ Ensure there are no parts sensitive to temperature, such as connection cables, close to or fastened onto the drive.
- ▶ Ensure there is adequate heat dissipation and maintain the required distances during installation so as not to prevent or restrict ventilation.
- ▶ Allow the drive to cool off for a while before carrying out cleaning or maintenance work on the drive.
- ▶ Wear personal protective equipment.

⚠ WARNING**Danger due to rotating parts**

When the drive is running, there is risk of injury due to entanglement or being drawn in by open moving machine parts.

- ▶ Never touch a rotating drive shaft.
- ▶ Always wear close-fitting clothes, no jewelry and no open, long hair.
- ▶ Do not wear gloves.
- ▶ Provide monitoring and protective devices in accordance with the applicable safety requirements.
- ▶ Before all work on the drive, de-energize it and ensure that the drive is no longer able to move.
- ▶ Ensure that even an unintended movement of the drive will not endanger persons or property.

⚠ WARNING**Risk of injury due to movable and forcibly ejected parts**

Touching movable drive elements and the forcible ejection of drive parts that come loose, such as feather keys, can cause severe injuries or death.

- ▶ Operate the drive only with the drive element mounted or with the feather key protective cap included with delivery.
- ▶ Do not touch any movable parts.
- ▶ Wear goggles.

⚠ WARNING**Danger for persons with pacemakers and implants!**

The drive generates electromagnetic fields during operation. Electrical, magnetic and electromagnetic errors endanger especially persons with heart pacemakers or implants.

- ▶ Do not remain in the immediate vicinity of the drive if you belong to the group of persons above.
- ▶ As an affected person, maintain a minimum distance of 300 mm from the drives.

⚠ WARNING**Risk of death due to falling loads during lifting and transport processes**

Improperly performed lifting and transport processes as well as unsuitable or defective devices and tools can lead to severe or fatal injuries and material damage.

- ▶ Lifting devices, industrial trucks and load handling attachments must meet requirements.
- ▶ The load capacity of the lifting equipment and load handling attachments must be in line with the weight of the drive.
- ▶ Fasten and secure the load to be transported carefully to the lifting equipment.
- ▶ Do not stand in the swivel range of lifting equipment or under suspended loads.

NOTICE**Material damage due to loose power connection**

Vibrations or insufficient tightening torques can lead to loose power connections. This can lead to fire damage, defects in the device or malfunctions.

- ▶ Tighten all power connections to the specified tightening torques.
- ▶ Check all power connections at regular intervals, especially after transport.

NOTICE**Damage to the drive due to excessive application of force**

- ▶ To avoid damage to the drive and especially the bearings, do not exert excessive (impact) force on the drive shaft.

NOTICE**Damage to the drive due to electrostatic discharge**

Some components installed in the drive respond sensitively to electrostatic discharge.

- ▶ Discharge the static electricity preventively, place the drive on a conductive surface and avoid contact with highly insulating materials.
- ▶ Fasten the transparent cover before you supply electrical power to the system.

3 Product Description

The distributed drives of the JMX product family are digital drives with three-phase, brushless motors.

The drives of the JMX product family are shipped two types of software:

- **Boot firmware:** This boots the drive by activating a set of basic services, and after an initial phase of identification and diagnostics of the system runs the firmware
- **Firmware:** This manages the operating functions of the drive

3.1 System overview

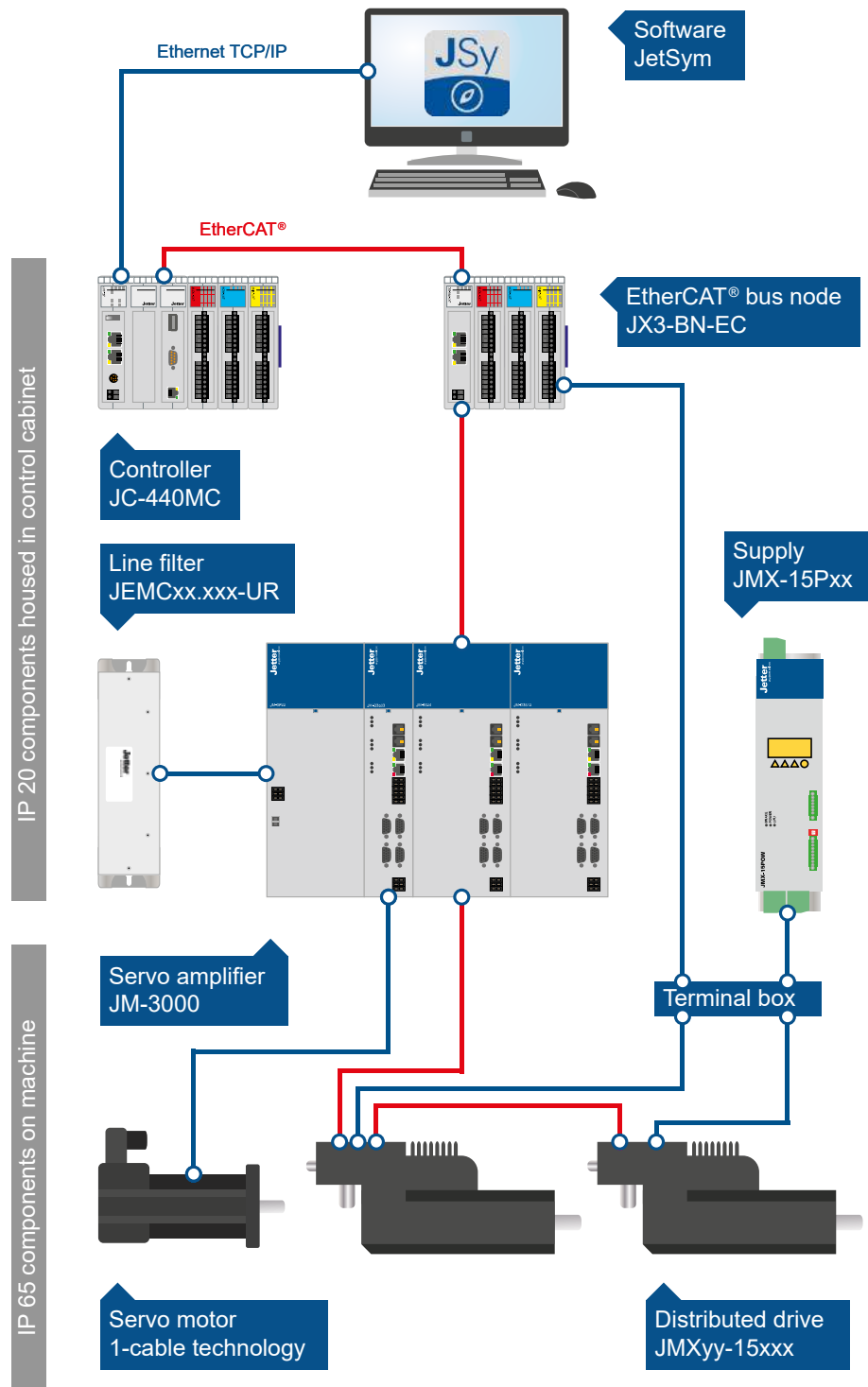


Fig. 1: System overview

3.2 Design

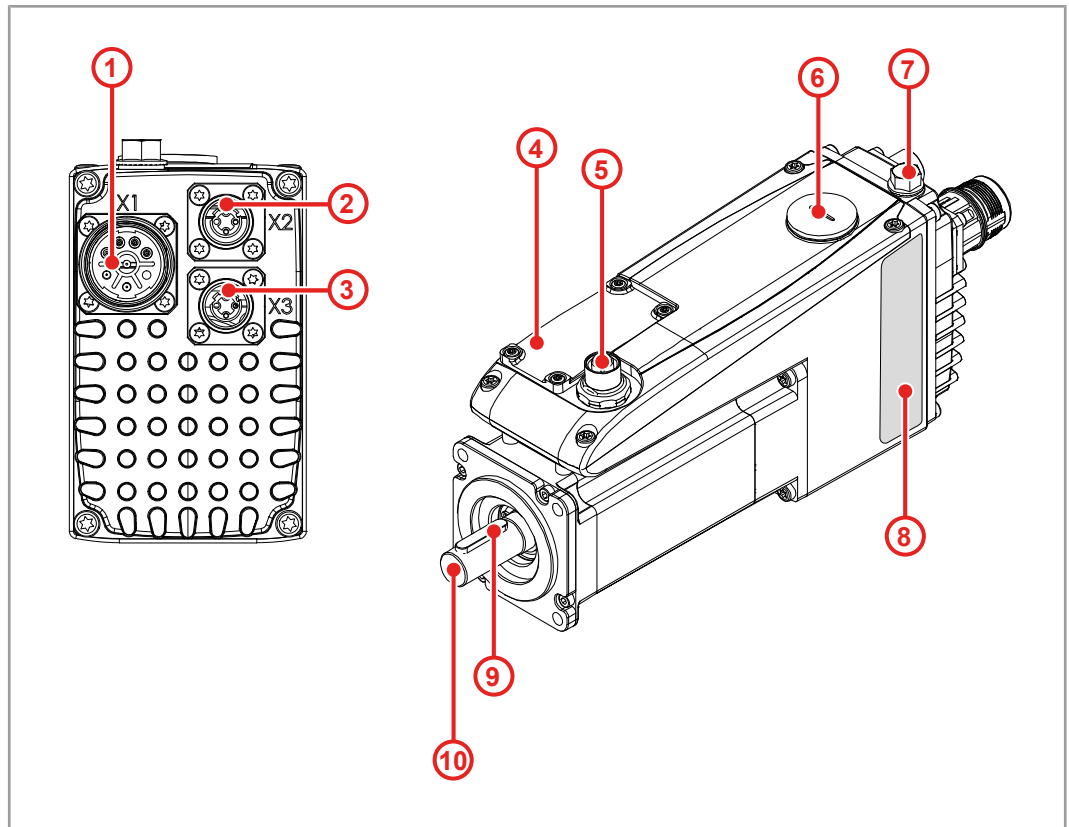


Fig. 2: Design

1	Male connector X1: Power supply
2	Socket X2: EtherCAT® interface input
3	Socket X3: EtherCAT® interface output
4	Status display LEDs
5	Socket X5: I/O interface
6	Socket X4: RS232 n. c.*
7	Connection of the grounding cable (PE)
8	Nameplate
9	Feather key
10	Drive shaft
*n. c. = not connected (= no function)	

3.3 Product features

- SinCos motor feedback system with HIPERFACE®
- Holding brake (optional)
- Thermal sensor
- Interface to the fieldbus
- 4 digital inputs
- LEDs

3.4 Brake

A holding brake can optionally be installed in the JMX22-15009.

If it is configured, the brake is automatically managed by the drive, specifically by the enable/disable process.

It can also be switched by the controller program or the commissioning software.

The brake parameters can be found in the drive setup.

i INFO

The brake is already configured for JMX drives and therefore no parameterization is required.

3.5 Status indication

LEDs indicate the communication status of the device as well as the status of the power supply.

- The LEDs are controlled by the microcontroller. Therefore, the indicated operating states depend on its firmware.
- The LEDs are located on the top of the JMX22-15009 drive. They are protected by a transparent plastic cover that is screwed on.

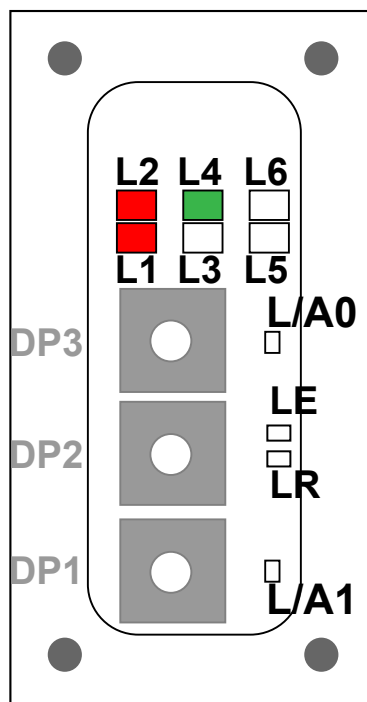


Fig. 3: Status indication

3.5.1 Flashing patterns of the LEDs

Parameter	Flashing pattern	Description
OFF	-	LED turned off
ON	Continuously lit	LED turned on
BLK	200 ms on, 200 ms off	Slow continuous flashing
1 FL	200 ms on, 1 s off	Flashes 1 time, after pause of 1 s flashes again
2 FL	200 ms on, 200 ms off, 200 ms on, 1 s off	Flashes 2 times, after pause of 1 s flashes again 2 times
3 FL	200 ms on, 200 ms off, 200 ms on, 200 ms off, 200 ms on, 1 s off	Flashes 3 times, after pause of 1 s flashes again 3 times
FLK	50 ms on, 50 ms off	Fast, continuous flashing (flickering)

3.5.2 Status display LEDs

LED	Function	Color/action	Description
L1	Enable status	Green	No error
L2			
L1	Disable status	Green	No error
L2		Green flashing	
L3		n. c.	
L4	I2T	Green-orange-red	
L5		n. c.	
L6	Hardware enable status (according to the input /STO and error status)	off ---	No voltage on the input and/or error active
		Green	Voltage on the input and no error active
LE	EtherCAT®-ERR	OFF ---	No error
		BLK	Configuration error
		1 FL	Unrequested status change
		2 FL	Watchdog of the Sync Manager (SM) active
		ON	Hardware errors NOTICE! Please contact Bucher Automation AG

LED	Function	Color/action	Description
RP	EtherCAT®-RUN	OFF	INIT
		BLK	PRE-OPERATIONAL
		1 FL	SAFE-OPERATIONAL
		ON	OPERATIONAL
		FLK	BOOTSTRAP
L/A0	Activity on EtherCAT® input	OFF	No connection
L/A1	Activity on EtherCAT® output		
L/A0	Activity on EtherCAT® input	ON	Connected; no transfer
L/A1	Activity on EtherCAT® output		
L/A0	Activity on EtherCAT® input	FLK	Connected; transfer active
L/A1	Activity on EtherCAT® output		

Tab. 1: Interpretation of the status of the LEDs

3.5.3 Warning and error status of LEDs L1 and L2

Depending on the status, LEDs L1 and L2 are lit orange (warning) or red (error). The actions are the same for both states.

If there are multiple warnings/errors, the LEDs indicate only the warning or error that has the lowest visualization order in the table below (this is equivalent to a higher priority).

Warning

LED	Action	Color	Priority	Description
L1	1 FL	Orange	11	EtherCAT® communication error
L2	ON			
L1	1 FL	Orange	12	Real-time error
L2	BLK			
L1	1 FL	Orange	13	Position tracking error
L2	1 FL			
L1	1 FL	Orange	14	Limit value was reached
L2	2 FL			
L1	1 FL	Orange	16	I2T limit value was reached
L2	3 FL			
L1	3 FL	Orange	23	Overspeed
L2	1 FL			
L1	3 FL	Orange	24	Internal error
L2	ON			
L1	BLK	Orange	6	Error in /STO management
L2	ON			
L1	BLK	Orange	7	Feedback sensor error
L2	BLK			
L1	BLK	Orange	8	Execution of the last command failed
L2	1 FL			
L1	ON	Orange	0	Overvoltage on the DC bus
L2	BLK			
L1	ON	Orange	1	Short circuit of the motor or power section
L2	ON			
L1	ON	Orange	2	Overcurrent of the motor or power section
L2	ON			
L1	ON	Orange	3	Temperature management
L2	1 FL			
L1	ON	Orange	4	Undervoltage on the DC bus
L2	2 FL			
L1	ON	Orange	5	Control voltage error
L2	3 FL			

Tab. 2: Warning status of LEDs L1 and L2

Error

LED	Action	Color	Priority	Description
L1	1 FL	Red	11	EtherCAT® communication error
L2	ON			
L1	1 FL	Red	12	Real-time error
L2	BLK			
L1	1 FL	Red	13	Position tracking error
L2	1 FL			
L1	1 FL	Red	14	Limit value was reached
L2	2 FL			
L1	1 FL	Red	15	I2T limit value was reached
L2	3 FL			
L1	3 FL	Red	23	Overspeed
L2	1 FL			
L1	3 FL	Red	24	Internal error
L2	ON			
L1	BLK	Red	6	Error in /STO management
L2	ON			
L1	BLK	Red	7	Feedback sensor error
L2	BLK			
L1	BLK	Red	8	Execution of the last command failed
L2	1 FL			
L1	ON	Red	0	Overvoltage on the DC bus
L2	BLK			
L1	ON	Red	1	Short circuit of the motor or power section
L2	ON			
L1	ON	Red	2	Overcurrent of the motor or power section
L2	ON			
L1	ON	Red	3	Temperature management
L2	1 FL			
L1	ON	Red	4	Undervoltage on the DC bus
L2	2 FL			
L1	ON	Red	5	Control voltage error
L2	3 FL			

Tab. 3: Error status of LEDs L1 and L2

3.5.4 Warning and error status of LED L4

For a limited amount of time, the current supplied to the drive can be higher than the rated current (**overload**).

To protect the drive and supply section during the overload periods, the converter controls the energy transferred to the drive and if necessary restricts the current supply.

Parameter I2TValue indicates the magnitude of the energy transfer according to the table below:

LED	I2TValue	Color/action	Description
L4	0	Green, 1 FL	No current supply, the drive is stopped
		Green ON	The current supply varies between the value 0 and the rated current
	> 0 and < 80	Orange, ON	The current supply exceeds the critical value for overload
	≥ 80 and < 100	Orange, flashing	Warning, the current supply is approaching the maximum level of overload
	≥ 100	Red, ON	Error, the current supply has reached the maximum level of overload and the drive will be turned off

Tab. 4: Interpretation of the status of LED L4

3.5.5 Warning and error status of LED L6

LED L6 indicates the status of the STO system.

The signal via LED L6 is only a message and is not certified as part of the safety system.

LED	STO status	Action
L6	Voltage present on the input and no error	ON
	No voltage on the input and/or error	OFF

Tab. 5: Interpretation of the status of LED L6

INFO

The above description of the LEDs does not apply during the boot phase and when starting the JMX22-15009 firmware.

3.5.6 LED states during the boot process

LED	L1	L2	L3	L4	L5	L6	State
Color	-	-	orange	orange	-	-	Boot Startup
Flashing pattern	OFF	OFF	ON	ON	OFF	OFF	
Color	-	-	Green	Green	-	-	Firmware Startup
Flashing pattern	OFF	OFF	ON	ON	OFF	OFF	
Color	orange	orange	orange	orange	orange	orange	Firmware download phase
Flashing pattern	1 FL	1 FL	ON	ON	1 FL	1 FL	
Color	orange	orange	orange	orange	orange	orange	
Flashing pattern	BLK	BLK	ON	ON	BLK	BLK	
Color	orange	orange	orange	orange	orange	orange	
Flashing pattern	ON	ON	ON	ON	ON	ON	
Color	orange	orange	orange	orange	orange	orange	
Flashing pattern	FLK	FLK	ON	ON	FLK	FLK	
Color	Green	Green	orange	orange	Green	Green	
Flashing pattern	BLK	BLK	ON	ON	BLK	BLK	
Color	Red	Red	Red	Red	Red	Red	

LED	L1	L2	L3	L4	L5	L6	State
Flashing pattern	ON	ON	ON	ON	ON	ON	
Color	Red	-	Red	Red	Red	Red	Firmware exception error Error during firmware download or damaged firmware flash memory
Flashing pattern	ON	OFF	ON	ON	BLK	BLK	
Color	Red	-	Red	Red	Red	Red	CPLD programming aborted due to an error
Flashing pattern	ON	OFF	ON	ON	BLK	BLK	
Color	Green	-	Red	Red	Red	Red	One or more incompatibilities between boot, hardware and firmware
Flashing pattern	BLK	OFF	ON	ON	BLK	BLK	

3.6 DIP switch sliders

The DIP switches are located on the top of the JMX22-15009 drive under the plastic cover.

They have no function and must be set to 0 or OFF.

3.7 Nameplate

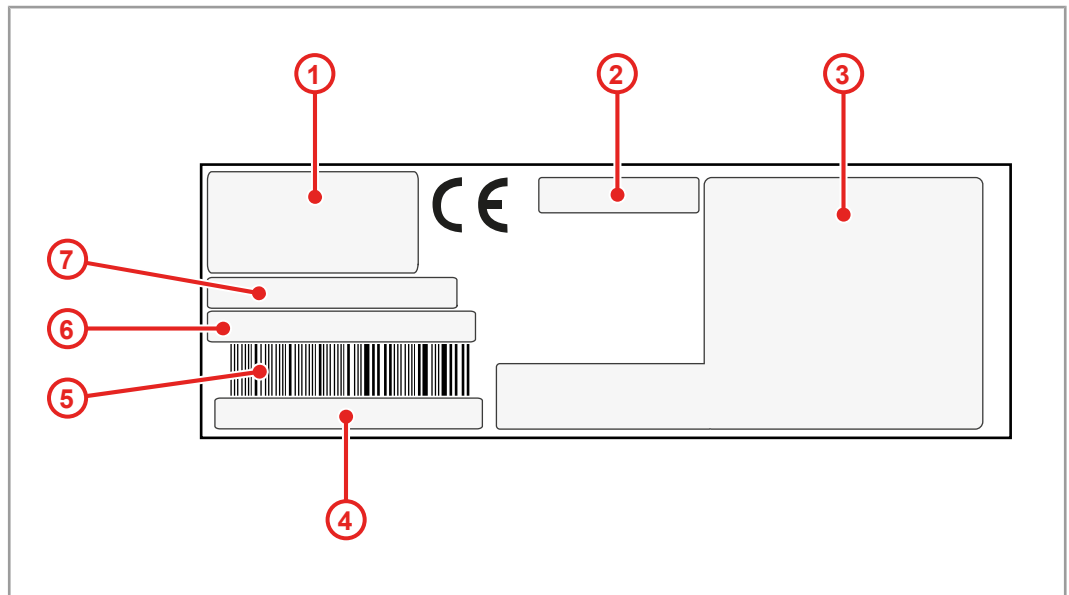


Fig. 4: Nameplate

1	Company logo		
2	Warning signs and mandatory signs		
3	Power data		
		U_{PWR}	Supply voltage
		P_{PWR}	Power consumption including power dissipation
		P_n	Rated power
		M_0	Continuous stall torque
		M_n	Rated torque
		N_n	Rated speed
		U_{Ctr}	Control voltage
		I_{Ctr}	Power consumption on control voltage side
		T_A	Ambient temperature
		HW	Hardware revision
		IP	Degree of protection
4	Serial number		
5	Barcode of the serial number		
6	Item number		
7	Article designation (see Order number code [▶ 24])		

3.7.1 Order number code

JetMove External	PK	Module			Servoamplifier			Motor							
Order number code	JMxx	-	1	0	xxx	-	S1	I4	R1	-	V	B	Px	Fxx	X

Product class

JMX = JetMove External
 1. x = Basic flange size
 2. x = Additional information:
 0 = No difference; 1 = Shaft;
 2 = Centering;
 3 = Flange size larger than 1st x;
 4 = Others

Module (product group)

Series
 1xxx = Series 1000

Power supply voltage
0 = DC 0 ... 48 V
 2 = AC 230 V
 4 = AC 400 ... 480 V
5 = DC 560 V (supply)

Power class in Mrated in Ndm
 008: 0,8 Nm
 016: 1,6 Nm

Servoamplifier options

S = Safety options (optional)
 = No option
S1 = STO (Save Torque Off) = On JMX board

I = Communication interface (optional)
 = No option = EtherCAT = Standard/none = EtherCAT as standard interface
 I4 = CANopen interface
 ...

R = Brake resistor (optional)
 R1 = Brake resistor integrated into JMX
 = No option = without integrated resistor ⇨ external resistor required

Motor options

_ = IP Protection
 Standard = IP65 for motor and controller
 JMX50: Standard = motor and controller IP65, heat sink IP56

_ = Brake (_ = without brake)
B = With motor holding brake DC 24 V

_ = Feather Key
P = With key = Shaft with keyway (standard)
 Without P = without key = plain shaft = option

F = Encoder type
 _ = 4096 Inc - singleturn, 12 bit, absolute JMX-10xxx
 F51 = Multiturn-Absolut 4096 Inc multiturn, absolutely battery buffered
F11 = SEK 37 (singleturn) - JMX-15xxx
 F14 = SKM 36 (multiturn absolut encoder) - JMX-15xxx

X = Special style

3.8 Scope of delivery

Scope of delivery	Item number	Quantity
JMX22-15009		1
Plastic cap for M12 connection		1
Feather key protective cap		1
Supplementary sheet with installation instructions		1
USB stick with complete documentation		1

4 Technical data

This chapter contains electrical, mechanical data and operating data of the JMX22-15009.

4.1 Dimensions

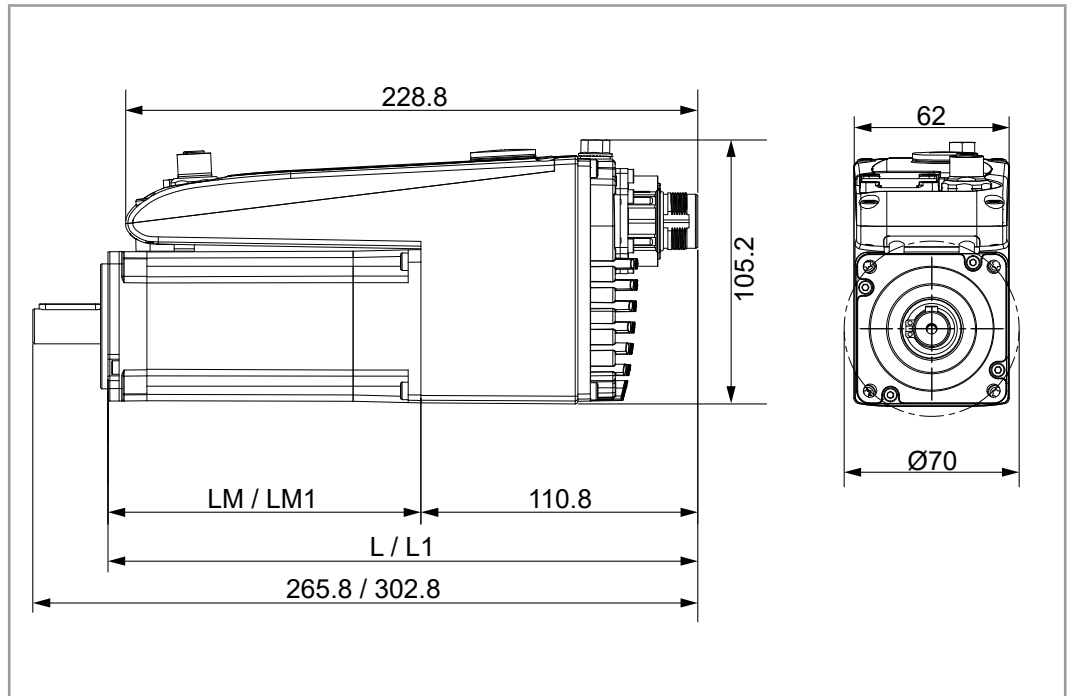


Fig. 5: Dimensions in mm

LM without brake	LM1 with brake	L without brake	L1 with brake
125 mm	162 mm	235.8 mm	272.8 mm

INFO

CAD data

CAD data of the device can be found in the download area of our [homepage](#).

4.2 Mechanical specifications

Parameter	Description	Standards
Mounting orientation	No limitation	
Weight without brake	1.9 kg	
Weight with brake	2.33 kg	
Flange size	60 mm	
Moment of inertia without brake / with brake	0.24 / 0.29 kg*cm ²	
Axial load	70 N	
Radial load	220 N	
Enclosure specifications		
Material	Metal, plastic	
Cooling	Without additional fans	
Insulation class		
Insulation class	F	
Brake holding torque		
Brake holding torque	2.0 Nm	
Vibration resistance		
Frequency sweeps	1 octave/minute, sinusoidal	DIN EN 60068-2-6
Constant acceleration	2 g	5 Hz ≤ f ≤ 500 Hz
Number and direction	10 sweeps for all 3 spatial axes	
Shock resistance		
Type of shock	Half-sine wave	DIN EN 60068-2-27
Intensity and duration	14 g for 11 ms	
Number and direction	3 shocks in the directions of all 3 spatial axes	
Degree of protection		
Degree of protection	IP65	DIN EN 60529
Bearing service life		
At rated speed of 3,000 rpm	20,000 h	

Tab. 6: Mechanical specifications

4.3 Electrical properties

Power data

Parameter	Description	Value
U_{PWR}	Supply voltage	DC 560 V (DC 275 ... 730 V)
	NOTICE! The DC bus must originate from a TT or TN power grid.	
	Line voltage (rated voltage between phase and ground)	Max. 300 V Overvoltage category III
	DC link capacitance	1 μ F
P_{PWR}	Power consumption including power dissipation	550 W
P_n	Rated power	470 W
M_0	Continuous stall torque	1.3 Nm
M_n	Rated torque	0.9 Nm
N_n	Rated speed	5000 rpm @DC 560 V
U_{Ctr}	Control voltage	DC 24 V (DC 21.6 ... 25.4 V) NOTICE! A power supply unit (PELV) with DC 24 V is required for the control voltage.
	Internal fuse	2A-T, not-replaceable
	Minimum voltage for brake operation	21.6 V
	Additional protective measures	Electronic protection against short circuit
I_{Ctr}	Power consumption on control voltage side	Max. 0.35 A (Dig Out Off) plus 0.46 A with use of the motor brake
I_n	Motor rated current	1 A
I_o	Motor continuous stall current	1.44 A
M_{max}	Max. motor torque	3.9 Nm
I_{max}	Max. motor current	4.3 A
N_{max}	Max. speed	6500 rpm
KE	Back EMF constant	55.0 V/1000
KT	Torque constant	0.9 Nm/A
R2ph	Winding resistance	14.4 Ω
L2ph	Winding inductance	41.8 mH
P_{mot}	Motor pole count	8

Tab. 7: Power data

Electrical safety

Parameter	Description	Standard
Class of protection	III	DIN EN 61131-2
Dielectric test voltage	Functional ground is internally connected to chassis ground.	
Overtoltage category	II	

Tab. 8: Electrical safety

4.4 Torque curves

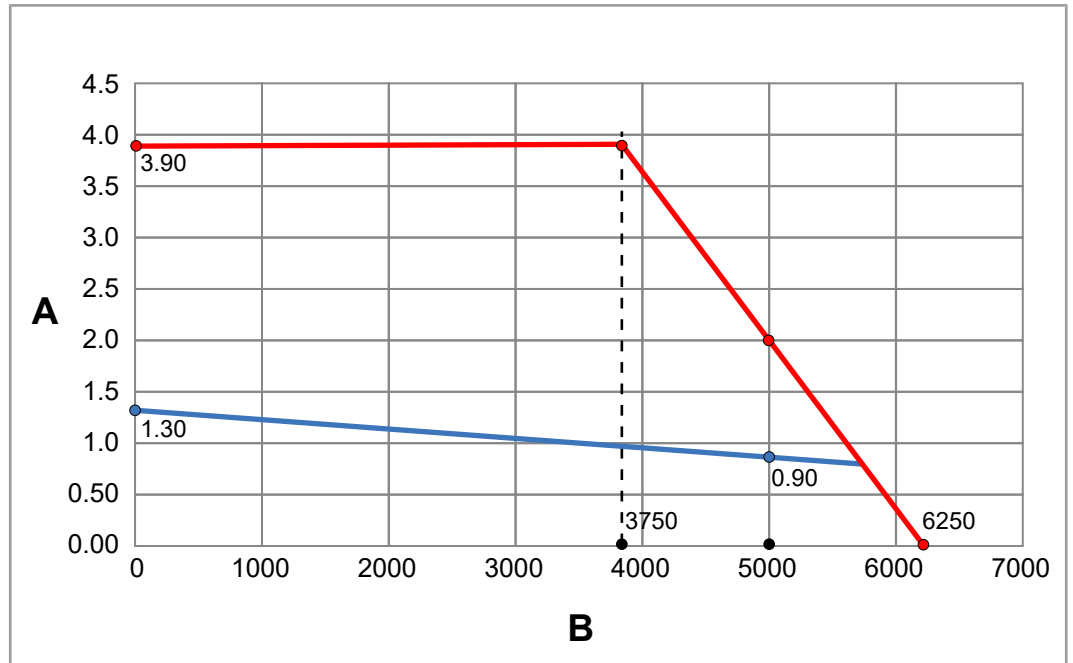


Fig. 6: Torque curves

A	Torque in Nm
B	Speed in rpm

4.4.1 Torque reduction

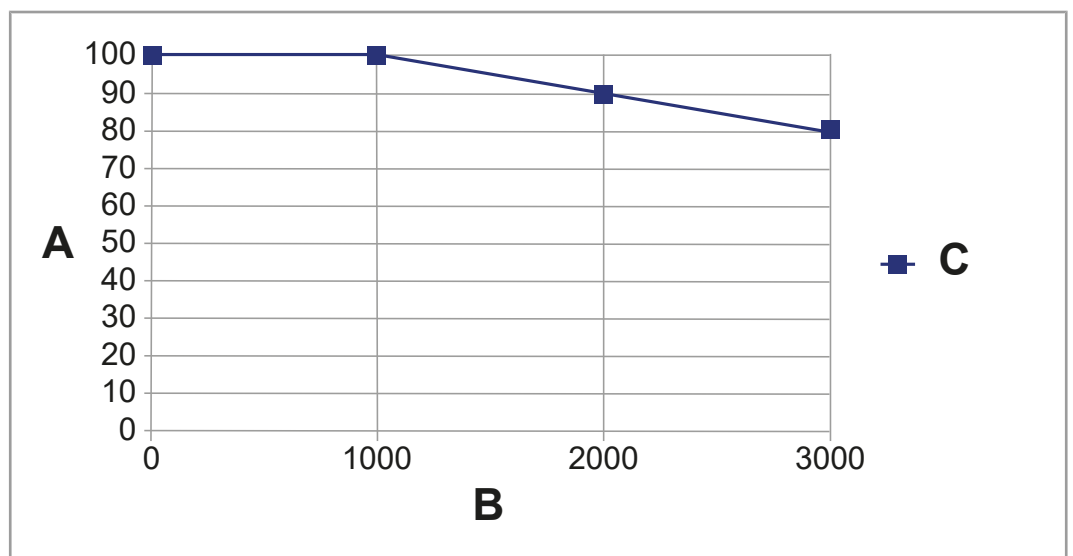


Fig. 7: Torque reduction depending on the altitude

4.5 Environmental conditions

Parameter	Description	Standards
Operating temperature	0 ... +40 °C	DIN EN 61131-2
Storage temperature	-20 °C ... +70 °C	DIN EN 60068-2-1
Air humidity	5 % ... 95 % at 40 °C, non-condensing	IEC 60068-2-78
Max. operating altitude	2,000 m above sea level	DIN EN 61131-2
<p>NOTICE! For an installation altitude between 2,000 m and 4,000 m above sea level, in order to counteract the transient overvoltages, overvoltage protection must be installed on the machine to restrict the overvoltages of the circuit to overvoltage category II. This can be achieved with a galvanic isolation transformer.</p>		
Installation location	<p>The drives must not be used in an environment where there is risk of fire, corrosion or explosion.</p> <p>The drives can be used / installed outdoors, but must not be exposed to direct sunlight (UV rays).</p>	
Corrosion immunity and chemical resistance	<p>No special protection against corrosion. The ambient air must be free of high concentrations of acids, alkalis, corrosive agents, salt, metal vapors or other corrosive or electrically conductive impurities.</p>	
Degree of pollution – electronic environment	Level 3	DIN EN 61131-2
	<p>Occurrence of conductive impurities or dry non-conductive impurities that become conductive, since condensation may be expected.</p>	

Tab. 9: Environmental conditions

5 Mechanical installation

This section describes the quick assembly of the JMX22-15009 drive.

⚠ CAUTION



Possible risk of personal injuries and material damage due to failure to comply with the safety instructions

- ▶ Before assembling the drive, read and comply with the safety precautions and restrictions on usage provided in the safety chapter.
- ▶ All work on the device must be carried out only by authorized and qualified personnel.

NOTICE



Damaged drives

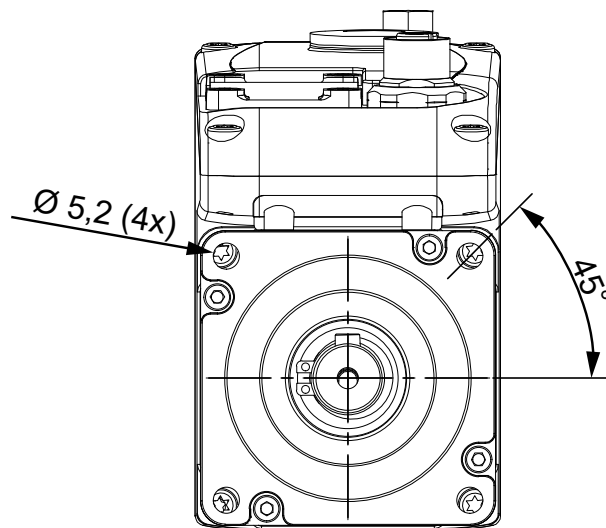
Damaged drives can result in considerable material damage.

- ▶ Check the drive for external damage and incorrect connections.
- ▶ Install only completely intact drives.

5.1 Required equipment

- ▶ Have the following devices, tools and materials on hand:
 - JetControl controller and supply unit
 - Power cable for connecting to socket X1
 - Screwdriver for tightening the cables according to the designated wiring
 - 4 M5 screws for fastening the flange
 - Various connection cables

5.2 Mounting the drive



1. Screw the motor onto the flange in the designated position with the 4 matching screws.
2. Ensure to allow for unimpeded ventilation of the motor. Observe the permitted ambient temperature.

5.3 Mounting the protective conductor

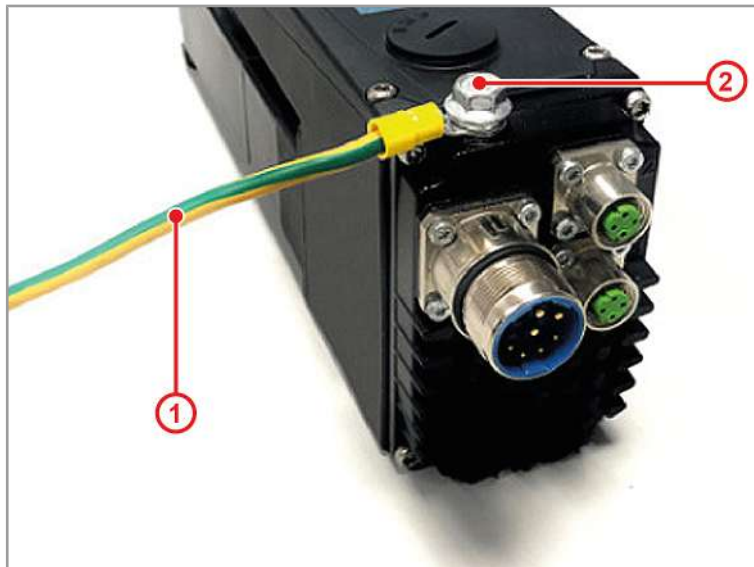


Fig. 8: Protective conductor mounting

- Connect the PE protective conductor (1) with the PE pin of the voltage supply input connection and with the screw (2) on the housing.

6 Electrical connection

NOTICE



Damages to material or functional impairment

Improper implementation of the wiring harness may cause mechanical stress.

- ▶ Protect the cables from bending, twisting or chafing.
- ▶ Install strain reliefs for the connecting cables.

6.1 Connection X1 - voltage supply

Interface

Connect the following to male connector X1:

- DC 560 V DC link voltage from supply unit JMX-15P
- DC 24 V logic voltage
- Control inputs to enable the torque

Pin assignment

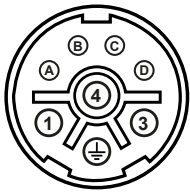


Fig. 9: M23, male, 8-pin

Pin	Signal	Description
1	HV-	Supply voltage (negative pole)
2	⊕	Grounding
3	-	n. c.*
4	HV+	Supply voltage (positive pole)
A	/STO1	/STO1 digital input
B	GND	Reference potential (control voltage and dig. inputs)
C	/STO2	/STO2 digital input
D	CV	Control voltage (24 VDC)

*n. c. = not connected (= no function)

Tab. 10: Pin assignment for male connector X1

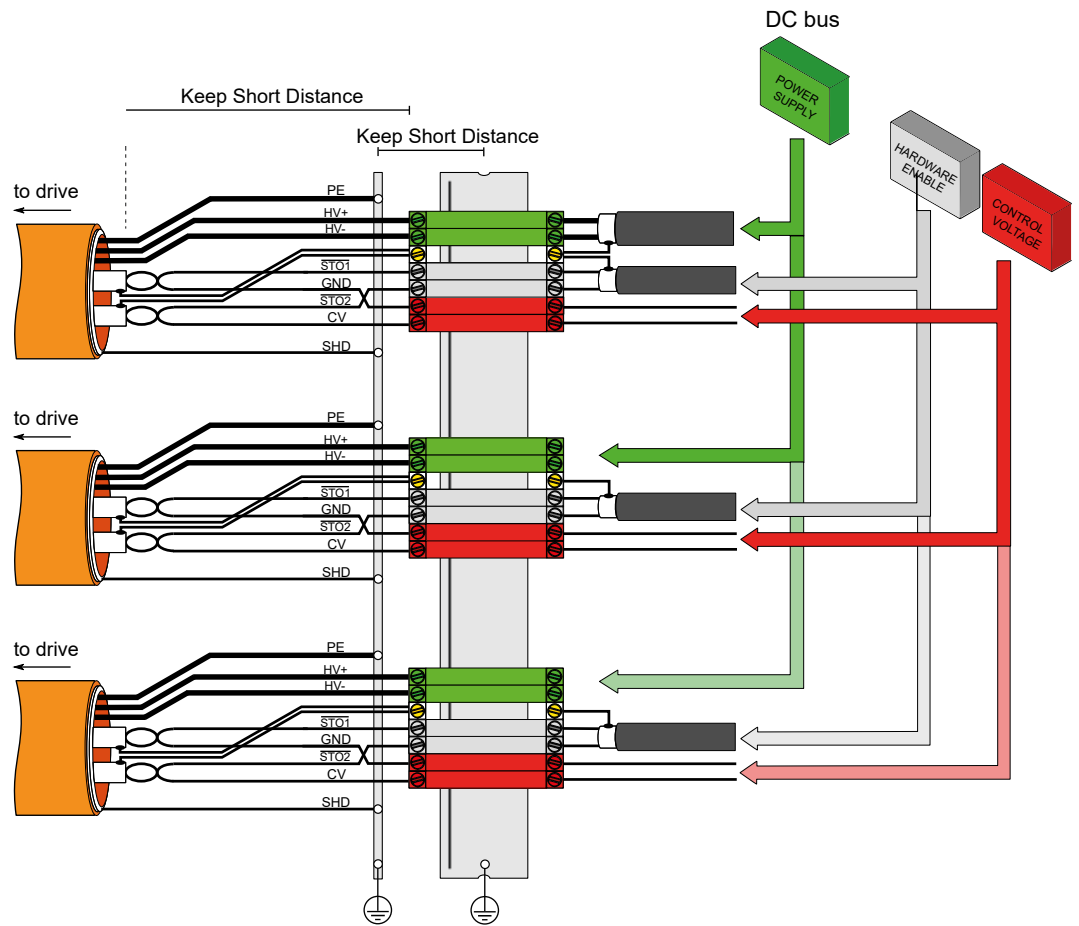


Fig. 10: Connection diagram

INFO

Cable gland in a terminal distributor box

1. When using cable glands in a terminal distributor box, use a variant that makes it possible to ground the outer shielding (SHD) via a conductive connection with the grounded distributor box (for example the AGRO easy connect metal cable gland with metal spring).
2. Route the shields of the signal lines to PE.

The illustration below shows a connection example of the inputs and outputs. The 24 V voltage for the inputs and outputs and the ground reference of the outputs are set up via internal connections of the JMX22-15009.

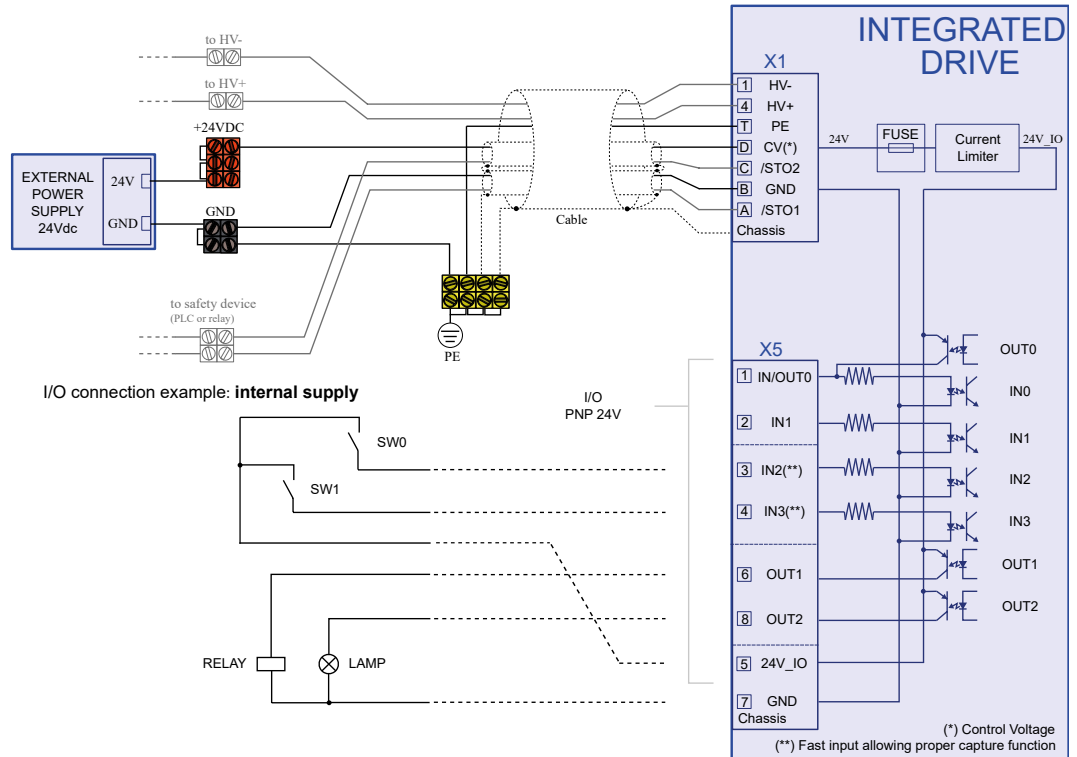


Fig. 11: Wiring example of internal connections

INFO Avoid placing the I/O signal cable parallel to the power cables. Choose a suitable form of laying them separately.

We recommend using a shielded cable and connecting the shielding with the metallic part of the round connector. Follow the manufacturer's specifications for connecting the shield on the controller/ PLC side.

6.2 Connection X2, X3 - EtherCAT®

Ports and interfaces

Connect to sockets X2 and X3:

- EtherCAT® fieldbus
- 1. Connect the cable coming from the EtherCAT® master to socket X2.
- 2. Connect to socket X3 EtherCAT® Slave Stations if the EtherCAT® fieldbus is to be connected with additional slave stations.

Assignment

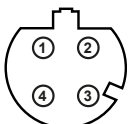


Fig. 12: M12, d coded, 4-pin, female

Pin	Signal	Description
1	TX Data+	Data output +
2	RX Data+	Data input +
3	TX Data-	Data output -
4	RX Data-	Data input -

Tab. 11: Pinout of sockets X2 and X3

6.2.1 Communication with the EtherCAT® master

NOTICE



Damage to the drive

- ▶ Connect and disconnect the communication connector only when the drive is turned off.
- ▶ Check also whether the drive, master, PC, all devices and the grounding control supply pin of the power supply input connector are correctly connected with the protective conductor.

Baud rate

- ▶ Connect the cables of the EtherCAT® network to the EtherCAT® fieldbus connection.
- The baud rate (communication speed) is set to 100 Mbit/s according to its technical properties.
- The node number is defined by the position (position address).
 - This method is generally used by masters for automatic detection of drives in the EtherCAT® network.
 - The master gives each node an address that matches the physical position of the drive in the network.

See also [Status display LEDs \[▶ 16\]](#)

6.2.2 File access via the EtherCAT® protocol (FoE)

- The FoE protocol is implemented in the drive, but is only used to update the firmware.
- It is used automatically by JetSym during a firmware download.

INFO

Please note the instructions in JetSym for the firmware download.

6.2.3 Error due to an interruption in communication

If a main bus communication cable is disconnected or cut off, communication is interrupted immediately.

The error message in this case is as described under EtherCAT® communication error. See [Error list \[▶ 43\]](#)

6.3 Connection X5 - I/O interface

Interface Assignment

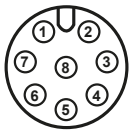


Fig. 13: M12, female, A coded, 8-pin

Connect to socket X5:

Pin	Signal	Description
1	IN/OUT0	Limit switch (+) input
2	IN1	Limit switch (-) input
3	IN2	Reference switch input
4	IN3	Touch probe input
5	24V_IO	24 V from internal control section, for external sensor voltage supply
6	OUT1	Digital output 1, n. c.*
7	GND	Ground of +24 V
8	OUT2	Digital output 2, n. c.*
Housing	PE	Grounding

*n. c. = not connected (= no function)

Tab. 12: Pin assignment of socket X5

7 Configuration of the power supply

DANGER



Electric shock

An incorrect connection can lead to high electrical voltage.

- ▶ Connect the power grid and grounding according to applicable safety requirements.

NOTICE



Material damage due to incorrect dimensioning

Inadequately dimensioned lines can lead to overheating and thus to a risk of fire.

- ▶ The supply unit is intended for a fixed connection to a three-phase power grid type TT or TN. The rated current for the short circuit of the electrical line must be <math>< 5\text{ kA}</math>.
- ▶ Read the operating instructions of the devices you are using before starting with the installation.
- ▶ Do not make the connection for the power supply until after the wiring and the protective devices connected by it are correctly dimensioned.
- ▶ Ensure that the protective devices at the input of the supply unit have adequate interrupt rating.

7.1 Electrical requirements for the supply unit

The following preconditions must be observed to comply with the electrical requirements:

- The supply unit must be installed in a TT or TN power grid.
- The line voltage between phase and ground must be equal to or less than AC 300 V.
- The output voltage of the DC bus must be in line with the electrical properties of the connected drives to ensure the required output in terms of speed and torque.
 - Reducing the DC link voltage generally leads to a proportional reduction of the motor speed.
- The maximum voltage must be appropriate for the electrical properties of the connected drives,
 - In particular, a margin must be ensured to prevent overvoltage errors on the DC bus.
- The maximum current requirement of the individual drives is linked with parameter I2T. For details see [Warning and error status of LED L4](#) ▶ 20].

Function	Parameter	Requirement
Output voltage	VDC	Min. DC 275 V; max. DC 730 V
Ripple of the output voltage	DVdc	The supply unit must ensure leveling of the output voltage in line with the output requirements.
Maximum output voltage during the braking process	Vdc _{max}	DC 785 V
Soft-Start	-	A soft-start system is required by which the supply unit limits the charge current of the capacitors during power-on to prevent overcurrent and overvoltage surges on the DC bus.
Output current	Idc	The supply unit must provide a rated and surge current that is appropriate for the type and current requirement of each individual drive and also for the simultaneity factor.
Protection against overcurrent and short circuit of the output	-	The supply unit must be equipped with internal protective devices against short circuit and overvoltage on the DC bus that are appropriate for the installation. Otherwise the cables of the DC bus must be protected with external devices (for example fuses) in line with the load, the electrical properties of the installation and the requirements of the applicable standards.

Tab. 13: Electrical requirements

7.2 Selecting the DC bus supply

The power section of the drives of the JMX product family is designed for supply with a continuous voltage that can be obtained without any problems from the line voltage via the AC/DC supply unit JMX-15P.

However, it is possible to implement an installation with another voltage supply that meets the conditions listed in the section [Electrical requirements for the supply unit](#) [▶ 38].

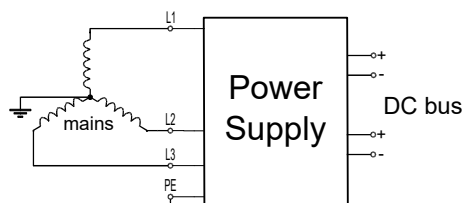


Fig. 14: Power supply connection diagram

7.3 DC bus supply with JMX-15P

A supply unit of JMX-15P series is preferable to supply power to the drives of the JMX series.

For more detailed information refer to the corresponding operating instructions.

Benefits of the JMX-15P

- The JMX was designed for power supply to the drives of the JMX-15P model range
- Built-in overcurrent protection devices
- The direct current properties of the DC link voltage are suitable for drives of the JMX series
- Integrated protective functions
 - Overload on the outputs of the DC bus
 - Short circuit in the brake circuit
 - Brake energy overload
 - Charging energy overload
 - Undervoltage/overvoltage/excessive ripple of the DC bus
 - Overtemperature in the power and control section

Configuration of DC bus outputs

- The supply units of JMX-15P series have 2 DC bus outputs.
- It is possible to separate these outputs with 2 branches or to interconnect them in parallel. For the latter configuration, the flow of current through the cable must be adjusted after the cables come together to the maximum permitted current of the supply unit.
- One or more drives of the JMX series can be connected to the same output line of the supply unit.

7.4 DC bus supply with generic power supply unit

The drives can be supplied via a DC bus that is generated by a generic power supply unit.

Prerequisites

- The requirements described in sections [Electrical requirements for the supply unit \[▶ 38\]](#) and [DC bus supply with JMX-15P \[▶ 40\]](#) must be observed.
- In addition, compliance with the applicable standards for electrical drive systems with variable speed must be ensured.

7.5 Topology of the energy supply

The drives of the JMX series can be operated in a **star configuration**.

This means that the current supply and control supply as well as any other signals on the power supply input connection must be connected from each source to the drive with a point-to-point connection.

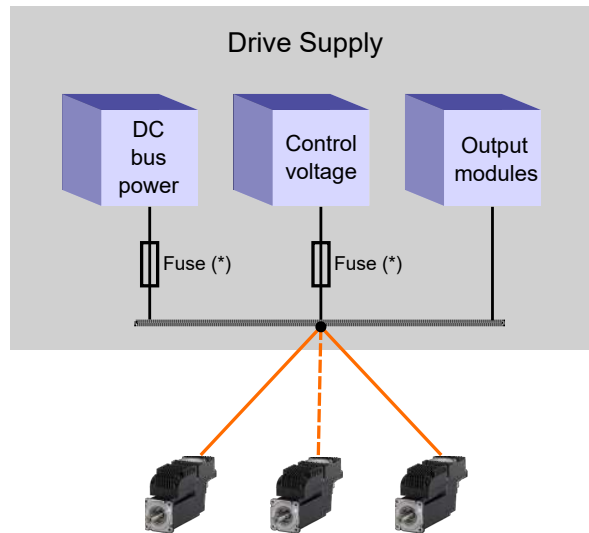


Fig. 15: Block diagram – power supply unit connection

NOTICE! The fuses identified with (*) are only required in the case of an unprotected power supply. Protective measures like these are not necessary if the JMX-15P is used for the DC bus.

The protective measures described in the illustration above require wiring with the same conductor cross-section, including to any branches.

NOTICE! The dimensioning of the fuses for the DC link and control section as well as the selection of the cables must be coordinated with the overall load and the properties of the installation (in accordance with applicable requirements). If these aspects are not taken into consideration, the sections must be protected individually.

7.6 Supply voltages

The drives of the JMX model range have two areas, control and power, that must be supplied separately with DC voltage (electrical isolation between these two areas).

1. Check whether the voltage values specified in section [Electrical properties](#) [▶ 28] are being observed.
2. Pay special attention to possible voltage fluctuations to prevent undesirable error or warning notifications.
3. Take into consideration that the drive cannot expend the energy of the power feedback.
4. Pay attention to a drop in the motor output due to a reduction in the supply voltage.

i INFO

Supply the rated voltage to the power section.

- If the supply voltage of the control section falls below the lowest limit value, the drive is deactivated. See [Electrical properties \[▶ 28\]](#).
- For motors with brake, there is a limit value that puts the drive in an error state if the supply voltage of the control section is not sufficient to ensure safely releasing the brake. See [Error list \[▶ 43\]](#): Control voltage error.

7.7 Power feedback

Power feedback is a work phase of the drive in which it feeds energy back into the DC link while the motor is decelerating.

If this energy is not absorbed or diverted, the DC link voltage can rise and cause a drive error.

The drives of the JMX series are not capable of diverting this energy internally. Therefore, the DC bus must be supplied either

- with a bidirectional supply unit, or
- with a supply unit with a brake chopper with connected braking resistor.

Both variants limit the DC bus voltage and allow the drive to work normally even when the motor is braking.

i INFO

To evaluate the level of power feedback of the drive, the peak value of the kinematic energy generated by the motor during its deceleration and the continuously generated total energy must be taken into consideration. This data is the decisive factor for selecting the DC power supply.

- ▶ Please read the manual and the documents of the supply unit.

8 Error list

- Errors always lead to an error response from the drive:
 - The drive shaft will be stopped
 - An error number will be reported to JetControl
- The state of the MCX axis changes to **ERROR DISABLE** state
- An error acknowledgment command (**ClearErrors()**) is required to quit this state

The tables below give a summary of error numbers and causes and error responses of the drives.

Overvoltage on the DC bus

Error number	Error designation	Description	Error response
0.1	Overvoltage on the DC bus.	<p>Overvoltage in the voltage supply of the power section (DC bus ≥ 840 V).</p> <ol style="list-style-type: none"> 1. Check the line cross-section of the voltage supply and the electrical connections. 2. Check the power feedback unit circuit as well. 	The drive switches off.

Tab. 14: Error category Overvoltage on the DC bus

Temperature management

Error number	Error designation	Description	Error re- sponse
1.0	Overtemperature of the power section.	Overtemperature of the power section ($T \geq 110 \text{ }^\circ\text{C}$). <ul style="list-style-type: none"> ▶ Check the ambient temperature and ventilation of the power section. 	The drive is stopped with the quick stop ramp and deactivated.
1.1	Overtemperature of the control section.	Overtemperature of the control section ($T \geq 95 \text{ }^\circ\text{C}$). <ul style="list-style-type: none"> ▶ Check the ambient temperature, ventilation and power consumption of the control section. 	
1.2	Overtemperature of the motor.	Overtemperature of the motor. <ul style="list-style-type: none"> ▶ Check the ambient temperature, ventilation and heat dissipation and analyze the work cycle in relation to motor output and the torque characteristics. 	
1.6	Hardware error of the temperature sensor on the power section.	Sensor failure. <ul style="list-style-type: none"> ▶ Contact Bucher Automation AG. 	
1.7	Hardware error of the temperature sensor on the control section.	Sensor failure. <ul style="list-style-type: none"> ▶ Contact Bucher Automation AG. 	
1.8	Hardware error of the motor temperature sensor.	Sensor failure. <ul style="list-style-type: none"> ▶ Contact Bucher Automation AG. 	
1.9	Overtemperature of the feedback sensor.	Overtemperature of the feedback sensor: $T \geq 115 \text{ }^\circ\text{C}$ for single-turn rotary encoder; $T \geq 110 \text{ }^\circ\text{C}$ for multi-turn rotary encoder. <ul style="list-style-type: none"> ▶ Check the ambient temperature, ventilation and heat dissipation and analyze the work cycle in relation to motor output and the torque characteristics. 	

Tab. 15: Error category Temperature management

Undervoltage on the DC bus

Error number	Error designation	Description	Error response
3.0	Undervoltage on the DC bus.	<p>Undervoltage in the voltage supply of the power section (DC bus ≤ 150 V).</p> <ol style="list-style-type: none"> 1. Check the supply voltage of the drive and wiring. If a voltage drop occurs during a certain movement, use an oscilloscope to monitor the course of the characteristic curve of the DC link voltage on the power section. 2. Reduce the speed and acceleration in the work cycle or use a more powerful voltage supply. 	The drive switches off.

Tab. 16: Error category Undervoltage on the DC bus**Short circuit of the motor or power section**

Error number	Error designation	Description	Error response
4.0	Short circuit of the motor or power section.	<p>Short-circuit error of the motor or power section.</p> <ol style="list-style-type: none"> 1. Wait 20 seconds before resetting the error to allow the accumulated energy to be given off. 2. If the problem recurs, contact Bucher Automation AG. 	The drive switches off.

Tab. 17: Error category Short circuit of the motor or power section

Fatal parameter error

Error number	Error designation	Description	Error re- sponse
6.0	Blocking current is not set.	The parameter is not consistent. 1. Turn the device off and back on again. 2. If the problem recurs, contact Bucher Automation AG.	The drive is stopped with the quick stop ramp and deactivated.
6.1	Surge current of the motor is not set.		
6.2	Torque constant of the motor is not set.		
6.3	Inductance of the motor is not set.		
6.4	Resistance of the motor is not set.		
6.5	Inertia of the motor is not set.		
6.6	Pole count of the motor is not set.		
6.7	Rated speed of the motor is not set.		
6.8.	Feedback sensor is not set.		
6.9	Maximum rated current is not set.		
6.10	Maximum surge current of the motor is not set.		
6.11	Amperage is not calibrated.		
6.12	Voltage level is not calibrated.		
6.13	Feedback sensor is not supported.		
6.14	Position encoder is not aligned: Commutation not possible.		
6.15	Pole pitch is not set.		

Tab. 18: Error category Fatal parameter error

Real-time error

Error number	Error designation	Description	Error response
7.0	EtherCAT is not in Operational state.	The interpolation parameters of the master are not consistent. 1. Restart JetControl together with the drives. 2. If the problem recurs, contact Bucher Automation AG.	The drive is stopped with the quick stop ramp and deactivated.
7.1	PDO missing.		
7.2	Parameters of cubic interpolation are not compatible.		
7.3	Incorrect cycle time for cubic interpolation.		
7.4	Incorrect period for interpolation.		
7.5	Interpolation parameters are outside of the permitted range.		
7.6	Interpolation type is not compatible.		

Tab. 19: Error category Real-time error

**EtherCAT®
communication error**

Error number	Error designation	Description	Error response
8.0	Watchdog of the Sync Manager has expired.	The watchdog of the <i>Sync Managers (SM)</i> for RxPDO has expired; RxPDO was not received. <ol style="list-style-type: none"> 1. Restart JetControl together with the drives. 2. If the problem recurs, contact Bucher Automation AG. 	The drive is stopped with the quick stop ramp and deactivated.
8.1	Watchdog of the Sync 0 has expired.	The watchdog for <i>Sync signal 0</i> has expired. <ol style="list-style-type: none"> 1. Restart JetControl together with the drives. 2. If the problem recurs, contact Bucher Automation AG. 	
8.2	PLL error	PDO and <i>Sync Signal 0</i> are not synchronized. <ol style="list-style-type: none"> 1. Restart JetControl together with the drives. 2. If the problem recurs, contact Bucher Automation AG. 	
8.3	Synchronization error	RxPDO has not been received, or has not been received synchronously with the set synchronization reference. <ol style="list-style-type: none"> 1. Restart JetControl together with the drives. 2. If the problem recurs, contact Bucher Automation AG. 	

Tab. 20: Error category EtherCAT® communication error

Overcurrent of the motor or power section

Error number	Error designation	Description	Error response
10.0	Short circuit of the motor or power section.	<p>Amperage in the power section or in the motor phases is unusually high or too high. This typically occurs when the drive is not capable of controlling the amperage correctly due to a deviation or suboptimal parameterization (tuning).</p> <p>The magnitude and duration of the overcurrent can damage the drive.</p> <ul style="list-style-type: none"> ▶ Check the tuning of the current control loop and reduce the dynamic response behavior. <p>This deviation can occur if the ActualFieldCurrent (Id) < -50 % IS with a brake ramp that is simultaneously very stable. Under these conditions, the supply voltage of the DC bus is too weak to control the amperage. The electric motor counterforce allows the amperage to rise to values above the tolerance limit, which can trigger an overcurrent error.</p> <ol style="list-style-type: none"> 1. Reduce the brake ramp or the speed of the start ramp. Increase the supply voltage of the DC bus. 2. Wait 20 seconds before resetting the error to allow the accumulated energy to be given off. 3. If the problem recurs, contact Bucher Automation AG. 	The drive switches off.

Tab. 21: Error category Overcurrent of the motor or power section**Position tracking error**

Error number	Error designation	Description	Error response
12.0	Position tracking error	<p>The tracking error is outside of the defined error limit.</p> <ul style="list-style-type: none"> ▶ Check whether the motor movement is compatible with the settings. 	The drive is stopped with the quick stop ramp and deactivated.

Tab. 22: Error category Position tracking error

Execution of the last command failed

Error number	Error designation	Description	Error response
13.0	Execution of the last command failed.	The last command from SysMng-Command was terminated with an error.	The drive is stopped with the quick stop ramp and deactivated.

Tab. 23: Error category Execution of the last command failed**Error in /STO management**

Error number	Error designation	Description	Error response
14.0	/STO = 0 V with drive activated.	Occurs in the following cases: <ul style="list-style-type: none"> • The drive is active and no voltage is applied to the digital /STO input. • An attempt was made to activate the drive with the /STO signal missing. 	The drive switches off.
14.1	/STO input level is outside of the permitted range.	<ol style="list-style-type: none"> 1. The voltage applied to the /STO input was in the middle range of the defined limit values for longer than 500 ms. 2. Ensure that the transition between the voltage levels takes place in less than 500 ms and that the voltage values are within the permitted limits (see Electrical properties of the STO input). 	
14.2	Error in the /STO hardware circuit.	A deviation was detected in the internal signals of the safety system. <ul style="list-style-type: none"> ▶ Contact Bucher Automation AG. 	
14.3	Configuration of the /STO DIP switch is invalid.	An invalid setting of the DP5-DIP switch was detected (see DIP switch sliders [▶ 22]).	
14.4	Hardware error of the /STO-internal supply.	A deviation was detected in the safety system. <ul style="list-style-type: none"> ▶ Contact Bucher Automation AG. 	

Tab. 24: Error category Error in /STO management

I2T limit value was reached

Error number	Error designation	Description	Error response
16.0	I2T limit value was reached.	The I2T value has reached 100 %. This means that the maximum overload of the drive has been reached.	The drive is stopped with the quick stop ramp and deactivated.

Tab. 25: Error category I2T limit value was reached**Feedback sensor error**

Error number	Error designation	Description	Error response
23.1281 ... 23.1310	Internal sensor error.	Internal sensor error. ▶ If the problem recurs, contact Bucher Automation AG.	The drive switches off.
23.1328 23.1329	Communication: Time-out while receiving data.	Communication with the sensor failed. Reset the error. ▶ If the problem recurs, contact Bucher Automation AG.	
23.1333	Communication: No free storage space available.	Communication with the sensor failed. Stop the oscilloscope and reset the error. ▶ If the problem recurs, contact Bucher Automation AG.	
23.1344	Communication: Checksum error	Communication with the sensor failed. 1. Reset the error. 2. If the problem recurs, contact Bucher Automation AG.	
23.1345	Communication: Parity error	Communication with the sensor failed. 1. Reset the error. 2. If the problem recurs, contact Bucher Automation AG.	
23.1346	Communication: Framing error	Communication with the sensor failed. 1. Reset the error. 2. If the problem recurs, contact Bucher Automation AG.	
23.1347	Communication: Overflow error	Communication with the sensor failed. 1. Reset the error. 2. If the problem recurs, contact Bucher Automation AG.	

Error number	Error designation	Description	Error response
23.1367	Commutation search: Error during the initialization of the incremental counter.	The alignment between rotary encoder and motor position failed. ▶ If the problem recurs, contact Bucher Automation AG.	The drive switches off.
23.1370	Commutation search: Sine or cosine polarity is incorrect.	The polarity of the sine or cosine signals is incorrect. ▶ If the problem recurs, contact Bucher Automation AG.	
23.1392	Position tracking error: Offset of analog and digital position.	Electrical problems occurred when the position was restored from analog and digital signals. 1. Reset the error. 2. If the problem recurs, contact Bucher Automation AG.	
23.1393	Incorrect sine or cosine values.	Electrical problems occurred when the position was restored from sine or cosine signals. 1. Reset the error. 2. If the problem recurs, contact Bucher Automation AG.	
23.1396	Hardware error of the sine and cosine signal.	Drive-internal electrical problems. 1. Reset the error and the logic supply. 2. If the problem recurs, contact Bucher Automation AG.	

Tab. 26: Error category Feedback sensor error

Control voltage error

Error number	Error designation	Description	Error response
25.0	The control voltage is too low for the brake.	The supply voltage of the control section is not adequate to ensure the braking power. ▶ Increase or stabilize the supply voltage.	The drive is stopped with the quick stop ramp and deactivated.

Tab. 27: Error category Control voltage error

Overspeed

Error number	Error designation	Description	Error response
28.0	Overspeed	The defined maximum speed was exceeded for more than 10 ms. The limit value can be calculated from <i>MaxMator-Speed</i> *1.2 and is thus 20 % above the maximum speed reached by the motor.	The drive switches off.

Tab. 28: Error category Excessive rpms**Internal error**

Error number	Error designation	Description	Error response
31.0	Internal software reset.	<p>An internal firmware error occurred.</p> <ul style="list-style-type: none"> ▶ Execute the following STX commands: <pre><MCaxis>.Drive.GenericAccess.CANopen.ReadUint16(0x55A4,03)</pre> <p>and</p> <pre><MCaxis>.Drive.GenericAccess.CANopen.ReadUint32(0x55A4,03)</pre> <ul style="list-style-type: none"> ▶ Report this error to Bucher Automation AG. 	

Tab. 29: Error category Internal error

9 Warning messages

- Warning messages are only displayed in the **JetControl** controller. There is no stop and the drive does not switch off.
- If the reason for the warning message no longer exists, the display is deleted automatically and no acknowledgment is needed.

Warning message in JetSym	Description
Undervoltage DC link	<p>Undervoltage for the power supply of the power section (DC bus ≤ 200 V).</p> <ol style="list-style-type: none"> 1. Check the supply voltage of the drive and wiring. If a voltage drop occurs during a certain movement, use an oscilloscope to monitor the course of the characteristic curve of the DC link voltage on the power section. 2. Reduce the speed and acceleration in the work cycle or use a more powerful voltage supply.
Overtemperature drive	<p>Overtemperature of the power section ($T \geq 105$ °C) or overtemperature of the control section ($T \geq 85$ °C).</p> <ul style="list-style-type: none"> ▶ Check the ambient temperature and ventilation of the power section. and control section and the power consumption of the control section.
Overtemperature motor	<p>Overtemperature of the motor. The motor temperature is 10 °C lower than the error limit value.</p> <ul style="list-style-type: none"> ▶ Check the ambient temperature, ventilation and heat dissipation and analyze the work cycle in relation to motor output and the torque characteristics.
I2TMotor	The I2T value has reached 80 %.
DriveSpecific	This warning refers to special states that are measured in the JMX22-15009 and are not listed in the general warnings of the Bucher Automation drives above.

Tab. 30: Warning messages

10 Safety function STO

INFO

The JMX22-15009 drive does not have any certified STO as a safety function.

The STO inputs are only used as HW enable inputs. The logic level must be high for both for the motor current to be able to flow and torque to be applied.

11 Malfunctions

This section contains a summary of possible faults and how to eliminate them for JMX22-15009 device.

11.1 General problems

Problem	Solution
The LEDs are turned off.	<ul style="list-style-type: none"> – Check whether the drive is being supplied correctly, especially the control section. See also Supply voltages [▶ 41] – Check the wiring.
The LEDs are lit, but the drive is not communicating.	<ul style="list-style-type: none"> – See also LED states during the boot process [▶ 21]
Interpretation of the boot sequence based on the LED status	
The internal brake does not hold the motor securely in position.	<ul style="list-style-type: none"> – If the load exerts a higher torque on the braking torque, more powerful brake systems must be used – The internal brake is damaged. It may be necessary to perform a brake inspection. Please contact Bucher Automation AG.

Tab. 31: General problems

11.2 Electrical and connection issues

Problem	Solution
What is the reference voltage (0 V) of the digital inputs and outputs?	The voltages of the digital inputs and outputs are relative to the reference potential of the power supply socket X1.

Tab. 32: Electrical and connection issues

11.3 communication issues

Problem	Solution
The drive is not communicating via EtherCAT®.	<ul style="list-style-type: none"> – Connect the drive and look at the connection settings as they are listed in Communication with the EtherCAT® master [▶ 36]. – Check whether the drive is turned on: LEDs L1 and L2 must not be switched off. – Check the connection between the communication ports connected to the EtherCAT® network: the corresponding LEDs L/A 0 and L/A 1 must not be switched off. – Check to ensure the status of LED ERR is ON and the EtherCAT® communication error (see Error list [▶ 43]) is not active. If necessary remedy the error.
Error during firmware download	Check whether communication with the drive is active and check the messages displayed in JetSym.

Tab. 33: communication issues

12 Service

12.1 Customer service

Should you have any questions, suggestions, or problems, please don't hesitate to contact our service representatives. To contact them, please call our technical hotline or use the contact form on our homepage:

[Technical hotline | Bucher Automation - We automate your success.](#)

You are also welcome to send an e-mail to our technical hotline:

hotline@bucherautomation.com

Please supply the following information when contacting our technical hotline:

- Hardware revision and serial number
For the hardware revision and serial number of your product, please refer to the nameplate.

13 Spare parts and accessories

NOTICE

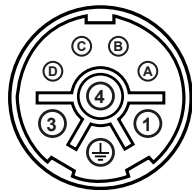
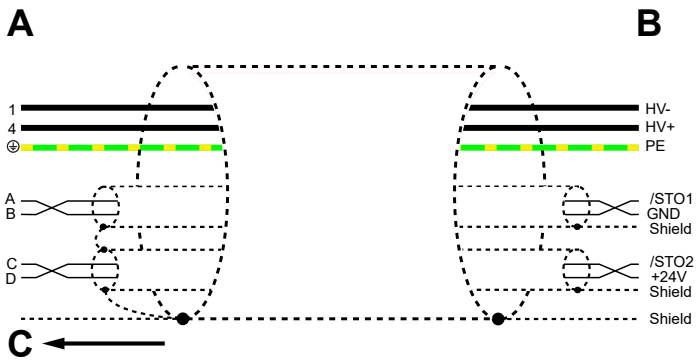


Inadequate accessories might cause damage to the product
 Parts and equipment from other manufacturers might impede the function of the device and cause damage to the product.

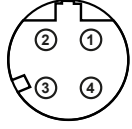
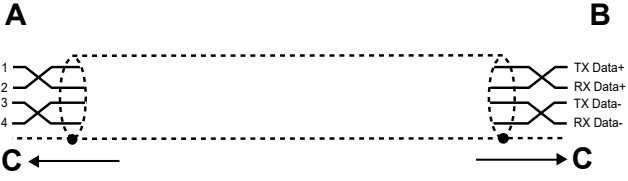
► Only use accessories recommended by Bucher Automation AG.

13.1 Cable and plug connections

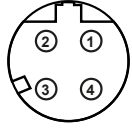
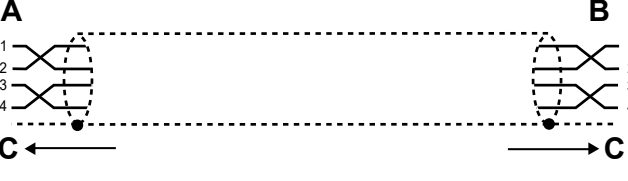
The following plug connectors and cables are required for the installation of the JMX22-15009:

Connector	Cables	
 <p>female, Hummel Front view</p>		
<ul style="list-style-type: none"> – Manufacturer: Hummel – Connector: 7.550.600.000 – Socket: 7.084.943.122 – Pins: <ul style="list-style-type: none"> – (3x, Pin 1, 4, T) 7.010.942.002 – (4x) 7.010.941.002 	A	JMX22 side
	B	Power supply unit side
	C	On the heat sink
		<ul style="list-style-type: none"> – Overall shielding – 2 wires + PE + 2 shielded and twisted pairs – low capacity – Maximum total length: 50 m – Bucher Automation cable art. no. 60886888_02 KAY_1513_0200 or – Molino Movinflex 4G25-2RC/PUR or – UNIKA UNIDRALL 5005 art. no. 3J049

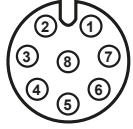
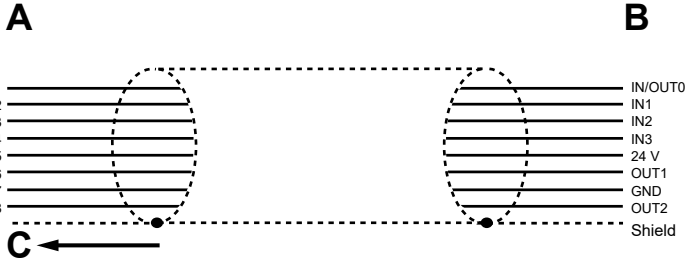
Tab. 34: Cable for connection to X1

Connector	Cables		
 <p>male, D-code Front view</p>			ETC
<p>Example: Connector: M12, D-code (ETC)</p>	A	JMX22 side	
	B	Master side	
	C	On the heat sink	
	<ul style="list-style-type: none"> – Complete shielding (foil and braiding) – 2 twisted-pairs – Maximum total length: 100 m (ETC) – Conductor material: Tin-plated copper – Bucher Automation cable from M12 to controller (RJ45) art. no. 60887212_00 KAY_ST_ST_04_M12D-PURS_RJ45_2M 		

Tab. 35: Main bus cable master – X3

Connector	Cables		
 <p>Male, D-code Front view</p>			ETC
<p>Connector: M12, D-code (ETC)</p>	A	JMX22-X2 side	
	B	Next JMX22 to X2	
	C	On the heat sink	
	<ul style="list-style-type: none"> – Complete shielding (foil and braiding) – 2 twisted-pairs – Maximum total length: 100 m (ETC) – Conductor material: Tin-plated copper – Bucher Automation cable from M12 (X3 1. JMX) to M12 (X2 2. JMX art. no. 60885976_00 KAY_ST_ST_04_M12DPURS_1M 		

Tab. 36: ETC cable for connection to X2

Connector	Cables	
 <p data-bbox="491 394 655 472">Male, A-code Front view</p>		
<p data-bbox="424 568 667 633">Connector: M12, A-code</p>	<p data-bbox="738 568 762 600">A</p>	<p data-bbox="925 568 1070 600">JMX22 side</p>
	<p data-bbox="738 620 762 651">B</p>	<p data-bbox="925 620 1265 651">Controller and actuator side</p>
	<p data-bbox="738 672 762 703">C</p>	<p data-bbox="925 672 1129 703">On the heat sink</p>
	<ul style="list-style-type: none"> <li data-bbox="738 723 999 754">– Overall shielding <li data-bbox="738 768 884 799">– 8 wires <li data-bbox="738 813 1134 844">– Maximum total length: 30 m <li data-bbox="738 857 1374 925">– Bucher Automation cable art. no. 60887202_00 KAY_ST_08_M12APURS_SIG_1.5M 	

Tab. 37: I/O cable for connection to X5

14 Maintenance

This device is maintenance-free.

Therefore, for the operation of the device no inspection or maintenance is required.

14.1 Repairs

Defective components could cause dangerous malfunctions and could compromise safety.

Only the manufacturer is allowed to repair the device.

It is forbidden to open the device.

Modifications to the device

Modifications and alterations to the device and its functions are not allowed. In the case of modifications to the device, any liability is excluded.

The original parts are specifically designed for the device. Parts and equipment from other manufacturers must, therefore, not be used.

Any liability for any damages resulting from the use of non-original parts and equipment is excluded.

14.2 Storage and shipment

Storage

When storing the device observe the environmental conditions given in chapter "Technical specifications".

Shipment and packaging

The device contains electrostatically sensitive components which can be damaged if not handled properly. Damages to the device may impair its reliability.

To protect the device from impact or shock, it must be shipped in its original packaging, or in an appropriate protective ESD packaging.

In case of damaged packaging inspect the device for any visible damage, and inform your freight forwarder and the Bucher Automation AG of the damage caused during shipment. If the device is damaged or has been dropped, it is strictly forbidden to use it.

14.3 Return and disposal

Disposal options

Meaning of WEEE icon

Return your Bucher Automation AG product to us for proper disposal. Visit our [home-page](#) for detailed information and to download the required Returns form.

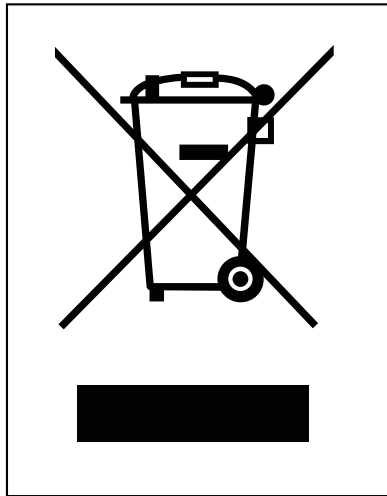


Fig. 16: WEEE icon – crossed out trash can

The product is waste electronic equipment and must be disposed of by a certified waste management facility. Do not dispose of the product with normal household waste. Applicable local environmental directives and regulations must be complied with.

Batteries

Prior to disposing of waste electronics, remove any batteries where this is possible in a safe and non-destructive way. Dispose of batteries properly.

Personal data

It is the responsibility of the customers to delete any personal data stored on waste electric and electronic equipment prior to disposal.

List of figures

Fig. 1	System overview	13
Fig. 2	Design	14
Fig. 3	Status indication	15
Fig. 4	Nameplate	23
Fig. 5	Dimensions in mm	26
Fig. 6	Torque curves.....	29
Fig. 7	Torque reduction depending on the altitude	29
Fig. 8	Protective conductor mounting.....	32
Fig. 9	M23, male, 8-pin.....	33
Fig. 10	Connection diagram	34
Fig. 11	Wiring example of internal connections.....	35
Fig. 12	M12, d coded, 4-pin, female	35
Fig. 13	M12, female, A coded, 8-pin.....	37
Fig. 14	Power supply connection diagram.....	39
Fig. 15	Block diagram – power supply unit connection	41
Fig. 16	WEEE icon – crossed out trash can	63

List of tables

Tab. 1	Interpretation of the status of the LEDs	16
Tab. 2	Warning status of LEDs L1 and L2	18
Tab. 3	Error status of LEDs L1 and L2	19
Tab. 4	Interpretation of the status of LED L4	20
Tab. 5	Interpretation of the status of LED L6	21
Tab. 6	Mechanical specifications	27
Tab. 7	Power data	28
Tab. 8	Electrical safety	29
Tab. 9	Environmental conditions	30
Tab. 10	Pin assignment for male connector X1	33
Tab. 11	Pinout of sockets X2 and X3	35
Tab. 12	Pin assignment of socket X5	37
Tab. 13	Electrical requirements	39
Tab. 14	Error category Overvoltage on the DC bus	43
Tab. 15	Error category Temperature management	44
Tab. 16	Error category Undervoltage on the DC bus	45
Tab. 17	Error category Short circuit of the motor or power section	45
Tab. 18	Error category Fatal parameter error	46
Tab. 19	Error category Real-time error	47
Tab. 20	Error category EtherCAT® communication error	48
Tab. 21	Error category Overcurrent of the motor or power section	49
Tab. 22	Error category Position tracking error	49
Tab. 23	Error category Execution of the last command failed	50
Tab. 24	Error category Error in /STO management	50
Tab. 25	Error category I2T limit value was reached	51
Tab. 26	Error category Feedback sensor error	51
Tab. 27	Error category Control voltage error	52
Tab. 28	Error category Excessive rpms	53
Tab. 29	Error category Internal error	53
Tab. 30	Warning messages	54
Tab. 31	General problems	56
Tab. 32	Electrical and connection issues	56
Tab. 33	communication issues	57
Tab. 34	Cable for connection to X1	59
Tab. 35	Main bus cable master – X3	60
Tab. 36	ETC cable for connection to X2	60
Tab. 37	I/O cable for connection to X5	61

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