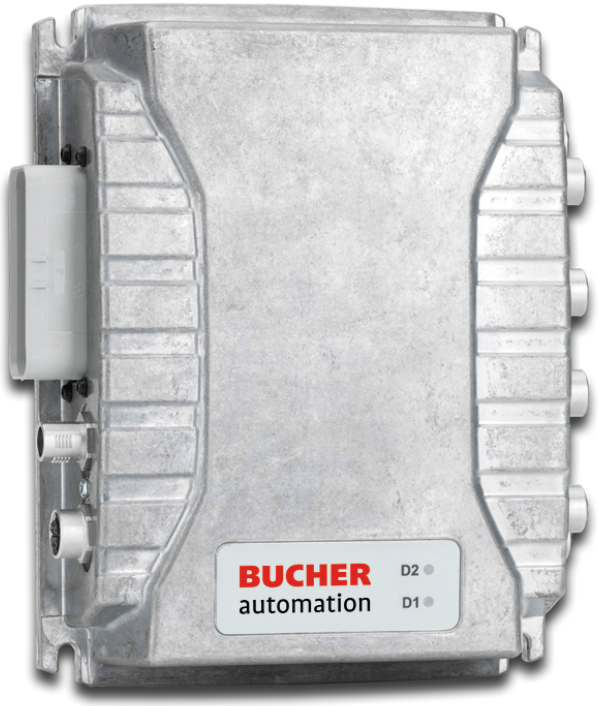
BUCHER automation

User Manual



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JetControlMobile 631B

Mobile Controller

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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 the device. 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 are 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.

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For further information refer to the following information products:

– Online help for the JetSym software
  Functions of software products with application examples
– Application-oriented manuals
  Product-independent documentation
– Version updates
  Information about changes to the software products and operating system of your device

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

The product corresponds to the current state of science and technology when placed on the market.
In addition to this user manual, the laws, regulations and directives 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 recognized safety rules.

RoHS 2

The device conforms to the EU directive 2011/65/EU (RoHS 2).

2.2 Purpose

2.2.1 Intended use

The device is intended for controlling applications in the field of commercial vehicles and mobile machines.

Operate the device only in accordance with the intended conditions of use and within the limits set forth in the technical specifications.
Intended use of the product includes its operation in accordance with this manual.

2.2.2 Non-intended use

Do not use the device in technical systems for which a high level of failure safety is specified.

Machinery Directive

This device is not a safety-related part as per Machinery Directive 2006/42/EC and must, therefore, not be used for safety-relevant applications.

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.

3 Product description

The JCM-631B multi-monitor is designed to connect 2 displays via FPD link II. You can connect up to 8 cameras. All common interfaces such as CAN, Ethernet, RS 232 and USB, as well as digital inputs and outputs, are available.

3.1 Design

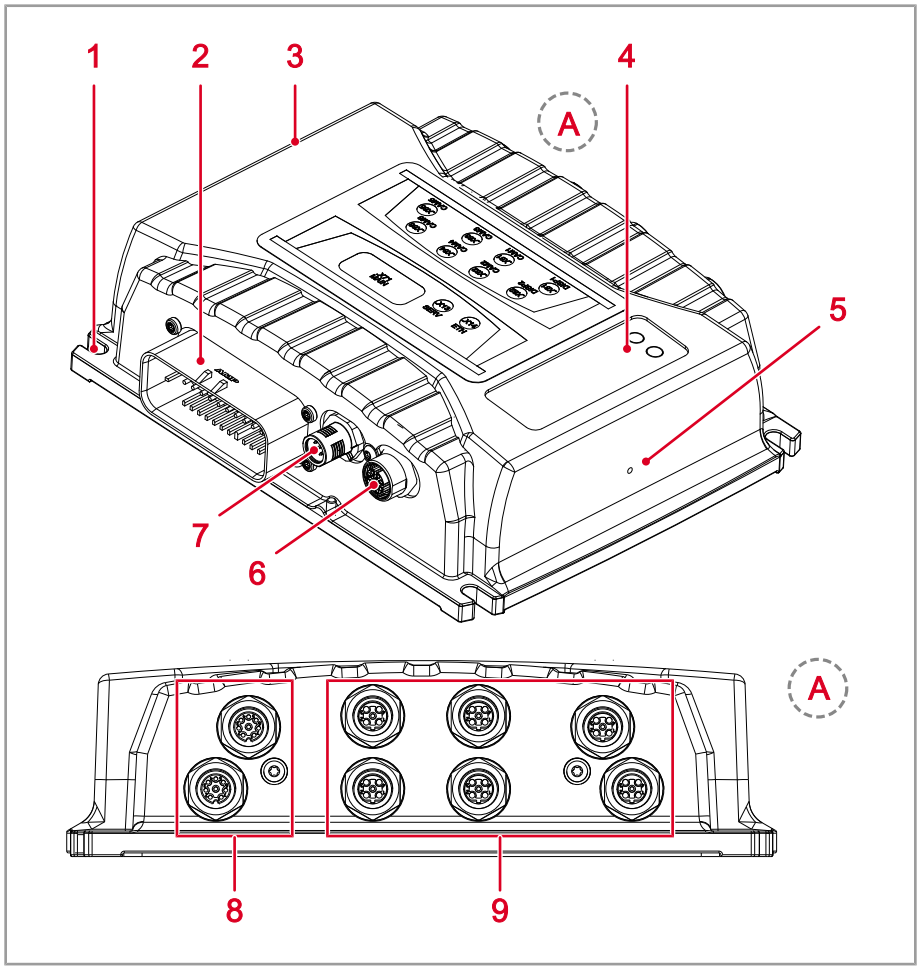


Fig. 1: Design

1	Fastening lugs
2	X71: Connector plug power supply and CAM7 ... CAM8
3	Position of the nameplate
4	Diagnostic LEDs
5	Protective vent
6	X14: Interface Service 2 (ETH)
7	X13: Interface Service 1 (USB)
8	X81/ X82: Connector display 1 and display 2
9	X61 ... X66: Connector CAM1 ... CAM2

3.2 Product features

- i.MX6 DUAL, 2x 1 GHz
- 1 GB RAM
- 1 GB flash memory (of which 100 MB is available to the user in `/app/` and 450 MB in `/data/`)
- Programming to IEC 61131-3 using STX or in C/C++
- 8 camera ports
- 2x FPD link II OUT
- 3 digital inputs
- 2 digital outputs
- "CAN" 4x
- USB
- RS 232
- Ethernet

3.3 LED indicators

The JCM-631B has 2 LEDs. The LED D2 can be configured by the user.

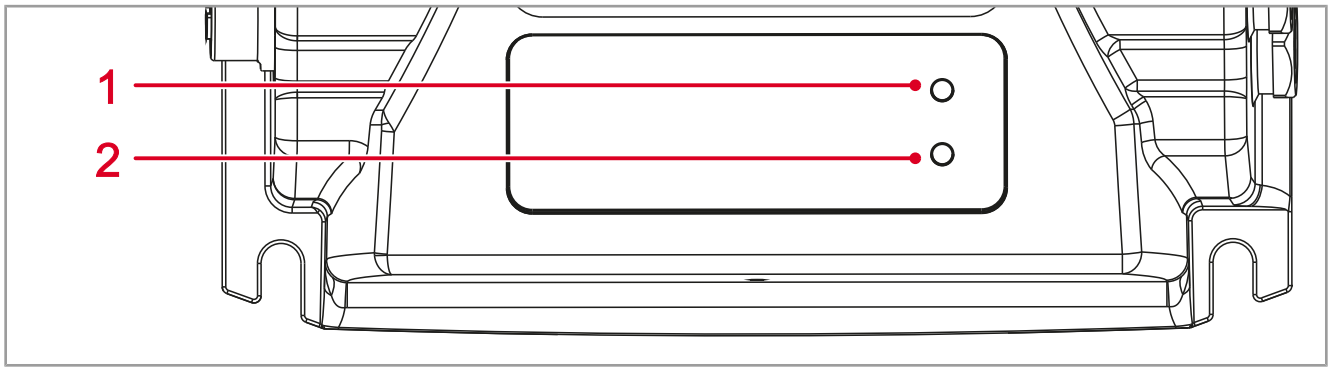


Fig. 2: LED indicators

1	LED D2
2	LED D1

3.3.1 Diagnostic capability via LEDs

Color and status of the LEDs are an excellent source of information for analyzing various states. In the JetSym programming tool, diagnostics can be performed in the Hardware Manager or via the Setup pane by entering the corresponding register number.

LED	Status	Color	Description
D1 / D2	flashing alternately	red / green	Boot-up
D1	ON	green	OS started; LED D2 is available for user programming.
	flashing	orange	Rauc bundle is being installed
	ON	orange	Rauc bundle is installed; installation complete after restart
	slowly flashing	orange	FPGA update is being installed
	flashing	red	System is shutting down
	fast flashing	red	System error
D2	---	---	You can control the display of LED D2 via register 700.000.063 [▶ 60].

3.4 Nameplate

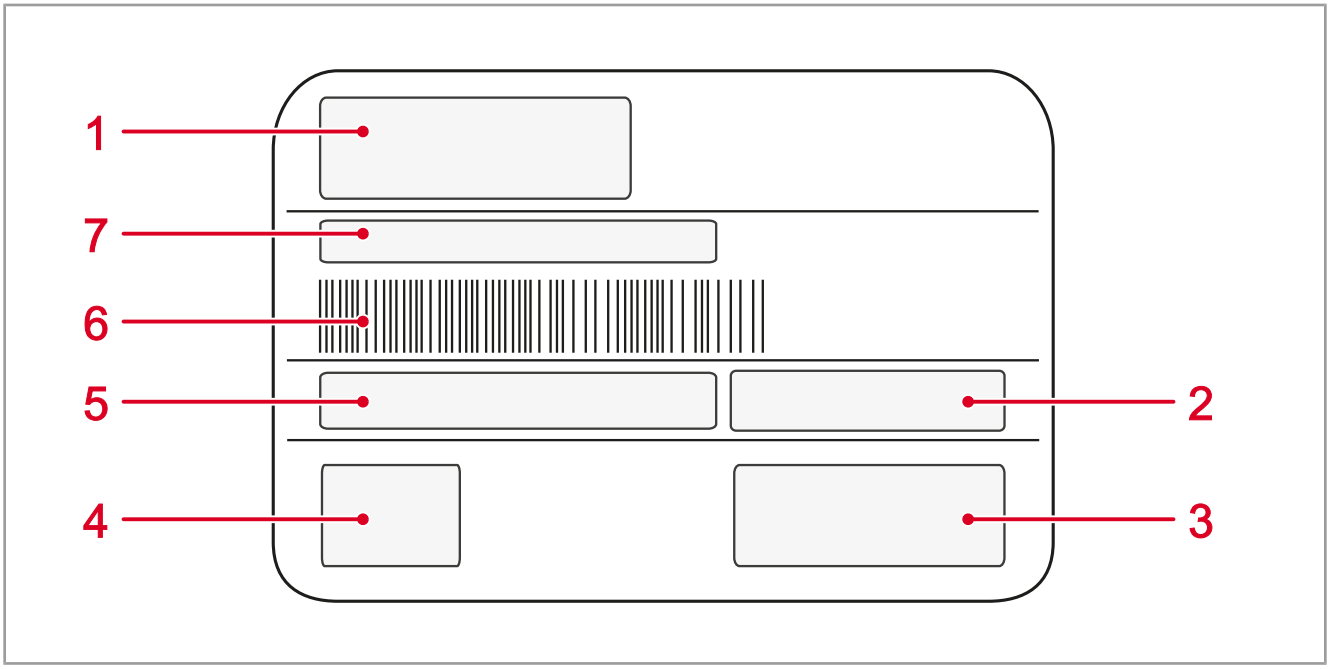


Fig. 3: Example of a nameplate

1	Company logo
2	Article number and hardware revision
3	Certification mark
4	Power supply specifications
5	Model code number
6	Bar code
7	Serial number

3.5 Scope of delivery

Scope of delivery	Item number	Quantity
JCM-631B	10002608	1

4 Technical specifications

This chapter contains information on both electrical and mechanical data as well as on operating data of the JCM-631B device.

4.1 Dimensions

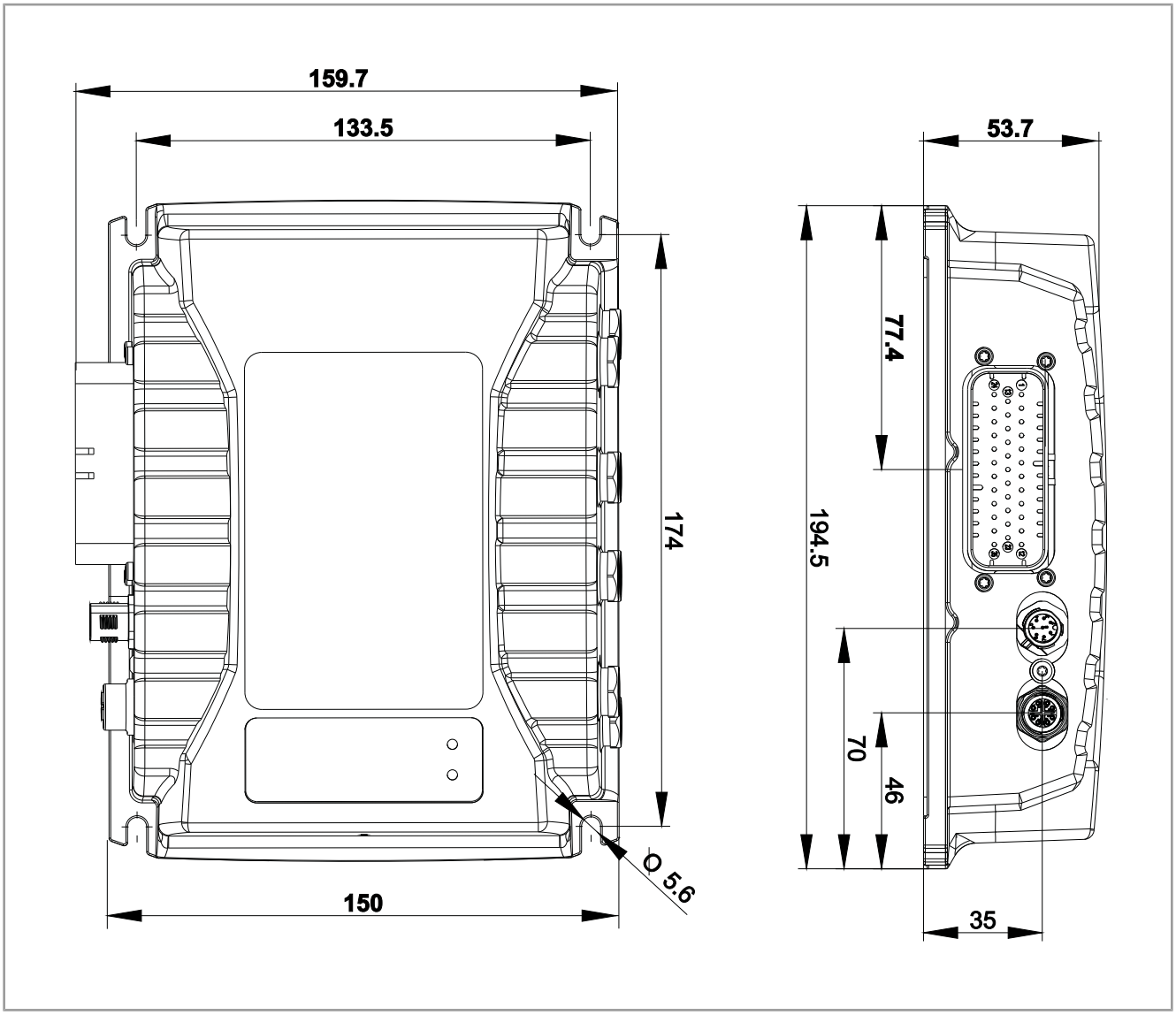


Fig. 4: Dimension in mm

4.2 Mechanical specifications

Parameter	Description	Standards
Weight	1.25 kg	
Housing specifications		
Material	Diecast aluminum housing	
Housing potential	Galvanically isolated	
Housing film	Film in logo area with viewing window for diagnostic LEDs	
Coating	None, C4 quality optional	
Screw connection	All screw connections on the outside of the housing should be salt spray resistant.	
Vibration resistance		
Variable frequency (10 Hz … 150 Hz)	6 h	DIN EN 60068-2-6
Shock resistance		
Type of shock	Half-sine wave	DIN EN 60068-2-27
Intensity and duration	30 g for 11 ms	
Number and direction	6,000 shocks (1,000 shocks in 6 directions)	
Testing temperature:	Room temperature	
Degree of protection	IP65	DIN EN 60529

Tab. 1: Mechanical specifications

4.3 Electrical properties

Parameter	Description	Standards
Operating voltage	DC 8 V … 32 V	
	12 V and 24 V from vehicle electrical system	
	At an operating voltage below 7 V, the device is switched off to prevent malfunctions.	
External fusing	8 A	
	No separate operating voltage supply for the outputs; housing and GND are routed separately.	
Total current consumption of device at 24 V	Quiescent current switched off at KL 30 <3 mA	
Load dump protection	Up to +202 V	ISO 16750-2 pulse 5a (Ri = 8 Ω, td = 100 ms)
Protection against polarity reversal	Yes, up to 32 V continuously	

Tab. 2: Electrical properties – Controller

4.3.1 CPU core and operating system

Parameter	Description
CPU	
Type	CORTEX A9 Dualcore
Switching frequency	2x, 1 GHz
Flash memory capacity	4 GB
	of which 1 GB is available to the user (100 MB in `/app/` and 450 MB in `/data/`)
RAM	1 GB, DDR3
Co-processor	CORTEX M4
FPGA	
RAM	128 MB, DDR2
Operating system	Linux, Kernel 6.6 or later

Tab. 3: CPU core and operating system

4.3.2 Ports and interfaces

CAN port

Parameter	Description
Adjustable Baud rates	125 kBd
	250 kBd
	500 kBd
	1 MBd
Default Baud rate	250 kBd
Protocol	CANopen
	SAE J1939
Default node ID on the CANopen bus	127 (0x7F)
Terminating resistor	Does not exist. Must be connected externally.
Number pf CAN ports	4

Tab. 4: CAN port

USB port

Parameter	Description
Data rate	USB 2.0
Type	480 MBaud max.
Protocol	USB host
Connection topology	Connection is single-ended to service connector X13 [▶ 28].
Maximum cable length	0.3 m
Current-carrying capacity	500 mA, short-circuit-proof

Tab. 5: USB port

Ethernet port

Parameter	Description
Bit rate	300 MBit/s
Protocols	All typical LAN protocols
Connection topology	Connection is single-ended to service connector X14 [▶ 29]
Default Ethernet IP	192.168.10.15

Tab. 6: Ethernet port

Serial interface RS 232(Connector X71)

Parameter	Description
Adjustable Baud rates	9.6 kBd
	19.2 kBd
	38.4 kBd
	57.6 kBd
	115.2 kBd
Protocols	All typical COM protocols
Connection topology	1x connection on connector X71 [▶ 25]

Tab. 7: Serial interface (Connector X71)

Serial interface RS 232 (Service connector X13)

Parameter	Description
Baud rate	115.2 kBd
Protocols	All typical COM protocols
Connection topology	1x connection on service connector X13 [▶ 28]

Tab. 8: Serial interface RS 232 (Service connector X13)

Video interface

FPD link II

Parameter	Description
Protocols	FPD link II
Color depth	18 bits (determined by FPD link II)
Possible resolution	480 x 272 … 1,280 x 800
Bandwidth	1,032 Mbps
Connection topology	The connection is implemented redundantly. The displays are internally powered with U_b (24 V), max. 500 mA (protected by PTC).

Tab. 9: FPD link II

CAM1 … CAM8

Parameter	Description
Signal type	Analog FBAS, 1 Vpp
Protocols	PAL, NTSC
Connection topology	Single connector. The cameras are powered by CAM POWER IN (daisy-chained).

Tab. 10: Cam

4.3.3 Inputs and outputs

Digital outputs DO 1 ... 2

Parameter	Description
Quantity	2
Function	Digital output signal
Design	H-side switch
Voltage rating	DC 8 V … 32 V (U_b)
Output current	500 mA max. per output, short-circuit proof
Protective features	Thermal tripping (hardware)
	Protection against polarity reversal across entire device
	Short-circuit-proof
Electrical isolation	None

Tab. 11: Digital outputs DO 1 ... 2

CAM POWER OUT (DO3)

Parameter	Description
Quantity	1
Function	Supply voltage of the cameras
Power consumption	500 mA per camera, total 3 A max.

Tab. 12: CAM POWER OUT

Digital inputs DI 1 … 3

Parameter	Description
Quantity	3
Function	Digital input signal
Design	PNP
Operating point ON	7.5 V min.
Operating point OFF	5.0 V max
Input resistance	3.30 kΩ
Frequency band	0 Hz… 100 Hz (static)
Electrical isolation	None

Tab. 13: Digital inputs DI 1 … 3

4.4 Environmental conditions

Parameter	Description	Standards
Operating temperature	-30 °C ... +75 °C	DIN EN 61131-2 DIN EN 60068-2-1 DIN EN 60068-2-2
	When mounting the rear panel directly onto a heat-dissipating metal plate of sufficient thickness.	
Max. housing temperature	75 °C	
Climatic conditions	Humid heat	
Storage temperature	-40 °C ... +85 °C	
Humidity	10 % … 95 %	
Salt water resistance	Not designed for maritime applications.	
Degree of pollution – Electronics	Level 2	DIN EN 61131-2

Tab. 14: Environmental conditions

4.5 EMC values

EMC according to ECE-R10.06:2019

Emitted interference

Testing procedure	Standards
EUB: SA field - absorber chamber RE	ECE-R10.06:2019 CISPR25:2004 RE
EUB: SA-Ltg - Interference pulses on supply lines CTE	ECE-R10.06:2019 ISO7637-2:2004 CTE

Tab. 15: Emitted interference

Electromagnetic interference

Testing procedure	Standards
EUB: SF-Ltg - clamp-on ammeter BCI	ECE-R10.06:2019 ISO11452-4:2011 BCI
EUB: SF field - absorber chamber ALSE	ECE-R10.06:2019 ISO11452-2:2004 RI
EUB: SF-Ltg - Interference pulses on supply lines TSUP – SF-Ltg - Interference pulses : Pulse 1 (24 V electrical system) – SF-Ltg - Interference pulses : Pulse 2 a (24 V electrical system) – SF-Ltg - Interference pulses : Pulse 2b (24 V electrical system) – SF-Ltg - Interference pulses : Pulse 3 a (24 V electrical system) – SF-Ltg - Interference pulses : Pulse 3b (24 V electrical system) – SF-Ltg - Interference pulses : Pulse 4 (12 V electrical system) – SF-Ltg - Interference pulses : Pulse 4 (24 V electrical system)	ECE-R10.06:2019 ISO7637-2:2004 TSUP

Tab. 16: Electromagnetic interference

5 Mechanical installation

⚠ WARNING



Risk of burns

Contact with hot surface may cause burns.

- ► Take protective measures to prevent inadvertent contact with the device.
- ► Allow the device to cool down for some time before you start working on it.

NOTICE



Damages to material or functional impairment due to welding

Welding on the chassis may damage the device material, or impair device functions.

- ► Before you start welding, disconnect all connections between the device and the electric system of the vehicle.
- ► Protect the device from flying sparks and welding beads (splatter).
- ► Do not touch the device with the welding electrode or earth clamp.

NOTICE



Dirt and moisture can affect the electrical connections

- ► Protect unused pins using blanking plugs.
- ► Protect all electrical connections with appropriate single wire seals.
- ► Clean the area around a connector prior to removing the mating connector.

5.1 Requirements for installation location and mounting surface

NOTICE



Overheating

Heat build-up can impair the function of the device

- ► Mount the device on a heat-conductive surface.
- ► Do not mount the device in the vicinity of parts which may become very hot.

The device can directly be fastened to the vehicle or to a mounting plate.

Installation location

The installation location must meet the following requirements:

– The installation location must allow air to circulate.
– The installation location must be of sufficient size.
– The device must be easily accessible to allow for service work. It should be possible to disconnect the connectors at any time.
– A sufficient distance must be maintained from parts that generate a lot of heat.

Mounting surface

Note the following requirements for the mounting surface:

– Use heat-dissipating materials, e.g. galvanized steel plate or anodized aluminium.
– The installation surface must be level.

5.2 Mounting orientation

When mounting, observe the permitted and prohibited mounting orientations.

5.2.1 Allowed mounting orientations

When installing the controller, make sure that the connector plugs point to the side.

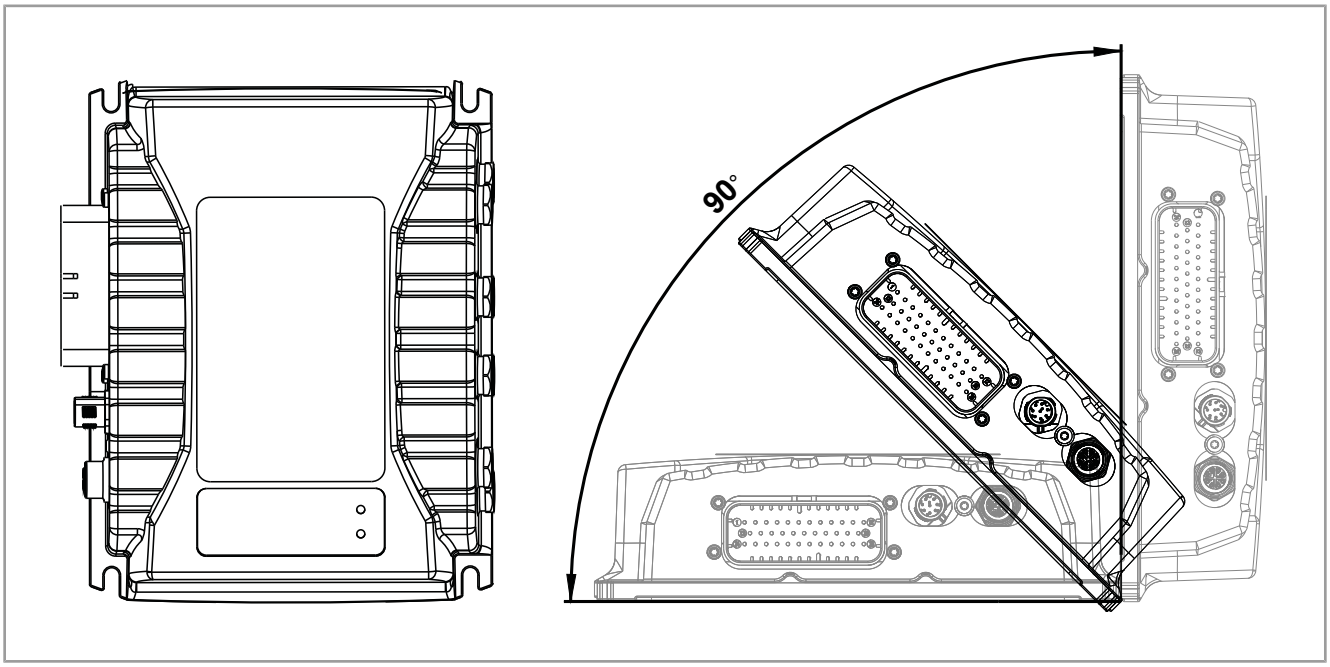


Fig. 5: Allowed mounting orientations

5.2.2 Prohibited mounting orientations

Mounting orientations overhead or with the connector plugs pointing upwards are prohibited.

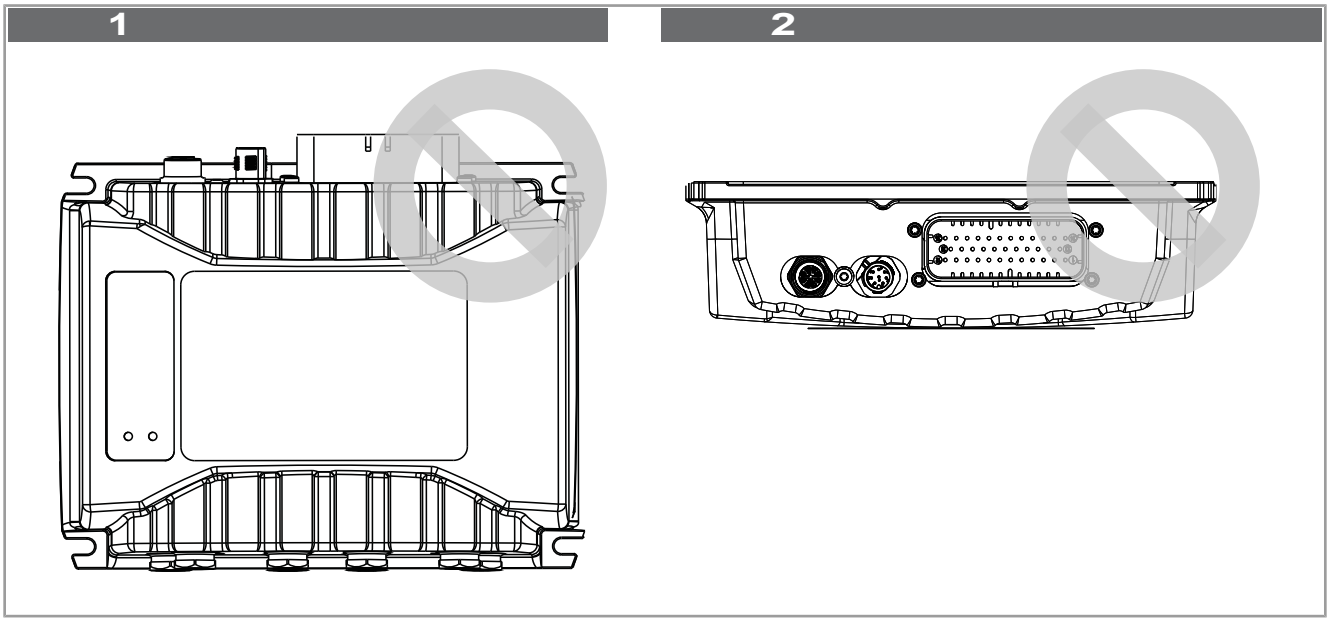


Fig. 6: Forbidden mounting orientations

5.3 Installing the controller

The following installation example shows the installation of a JCM-631B on a mounting surface with drill holes.

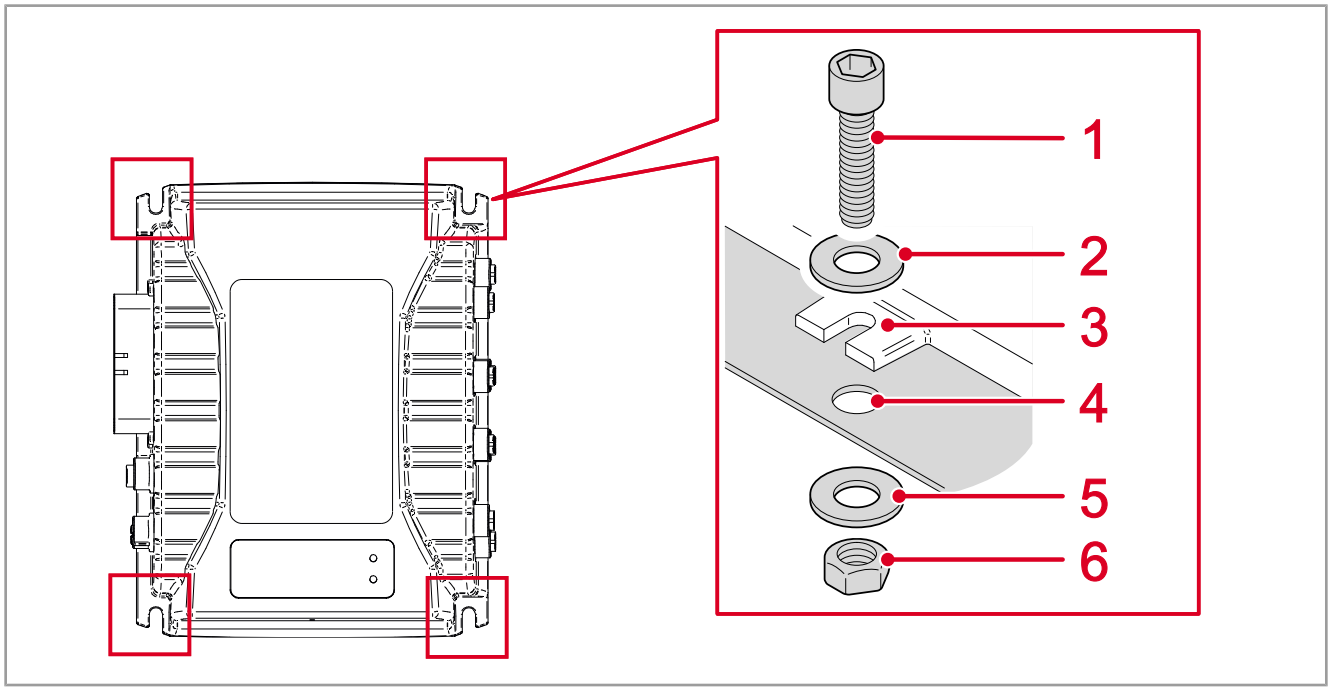


Fig. 7: Installation drawing

1	Screw, e. g. 4 x M5 x 30, galvanized, property class 8.8
2	Washer, 4 x, size 5.3 x 10
3	Fastening lug
4	Drill hole without thread in the mounting surface; The mounting surface must have a thickness of 5 mm min. It must be heat-conducting.
5	Lock washer, 4 x M5
6	Lock nut, 4 x M5, galvanized, property class 8

6 Electrical connection

⚠ WARNING



Transient overvoltages

Damage to the device, in extreme cases consequential damage to persons due to malfunction of the device.

► For lines longer than 30 m, install separate overvoltage protection for each line.

⚠ WARNING



Risk of burns

Contact with hot surface may cause burns.

► Take protective measures to prevent inadvertent contact with the device.

► Allow the device to cool down for some time before you start working on it.

⚠ WARNING



Signal disruption due to incorrect CAN wiring

Unshielded or incorrectly twisted CAN lines may cause communication faults. In the worst case, a malfunction of the device can lead to subsequent physical injury.

► Use-shielded connecting cables to CAN interfaces.

► Connect 120 Ω termination resistors to both ends of the CAN bus.

NOTICE



Improving electromagnetic compatibility

Improper implementation of the wiring harness may impair electromagnetic compatibility.

► Keep the cables as short as possible.

► Lay power lines and signal lines separated from each other.

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.

NOTICE

Surges resulting from missing protection or fusing

Surges may cause malfunctions or damage to the product.

- ► Protect the voltage inputs from surges according to the requirements.
- ► Ensure that the device is handled in accordance with ESD regulations.

6.1 Pin assignment

6.1.1 X71 - Connector (male)

Purpose

Connect the following to the plug:

- Power supply
- CAN 1 … 4
- Camera 7… 8
- DO1 … DO3
- DI1 … DI3
- Serial interface RS 232

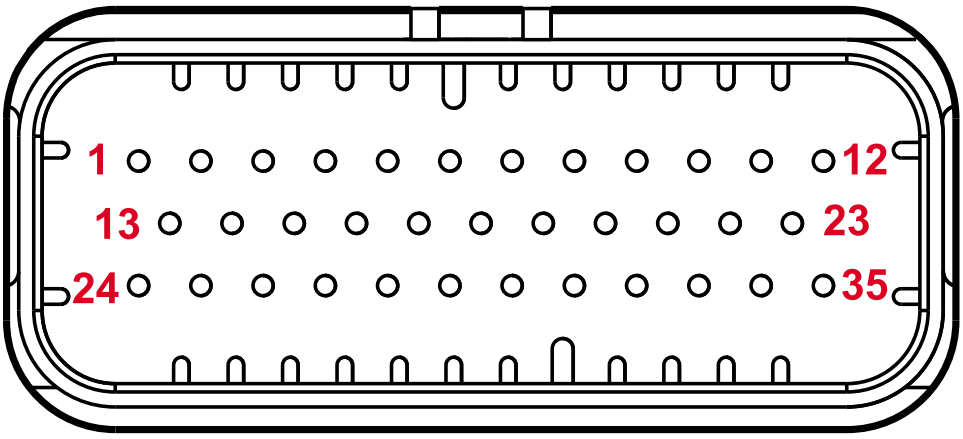


Fig. 8: Connector, 35-pin, AMPSEAL

Pin	IO	Signal	Description
1	I	U_{ign}	Ignition (automobile terminal designation 15)
2	I	GND	Battery - (automobile terminal designation 31)
3	I	U_{bat}	Battery + (automobile terminal designation 30)
4	IO	CAN3_L	CAN3-Low
5	IO	CAN2_L	CAN2-Low
6	IO	CAN1_L	CAN1-Low (CAN terminator connection)
7	IO	CAN4_L	CAN4-Low

Pin	IO	Signal	Description
8	IO	CAN4_H	CAN4-High
9	O	GND	GND for RS 232 (COM1)
10	O	GND	GND for CAM8
11	O	DO1	Digital output 1
12	O	DO2	Digital output 2
13	O	UCAM	Power supply DC 12 V / 24 V for CAM8
14	I	CAM7	Video input - for CAM7
15	I	CAM8	Video input + for CAM8
16	IO	CAN3_H	CAN3-High
17	IO	CAN2_H	CAN2-High
18	IO	CAN1_H	CAN1-High (CAN terminator connection)
19	O	GND	
20	O	GND	
21	O	GND	GND for CAM7
22	O	GND	
23	-		Shield
24	O	UCAM	Power supply DC 12 V / 24 V for CAM7
25	I	CAM7	Video input + for CAM7
26	I	CAM8	Video input - for CAM8
27	O		RS 232 TX (COM1)
28	I		RS 232 RX (COM1)
29	I	DI1	Digital input 1
30	O	DO3	See Camera supply [▶ 30]
31	I	DC 12 V/24 V	See Camera supply [▶ 30]
32	I	DI2	Digital input 2
33	I	DI3	Digital input 3
34	-		Shield
35	-		Shield

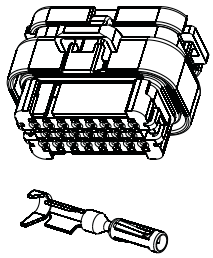
Cable for the connector plug

The connecting cable must meet the following requirements:

Parameter	Description
Core cross-section	0.75 mm^2 … 1.5 mm^2 (AWG 20 ... 16)
Minimum diameter of the isolation	1.7 mm
Maximum diameter of the insulation	2.7 mm

Mating part of the connector

Compatible mating part of the 35-pin AMPSEAL connector:



Parameter	Description
Manufacturer	AMPSEAL
Item no. of housing	776164-4
Item no. of crimp contact (jack)	0-0770520-1
Wire size range	0.75 mm² ... 1.5 mm² (AWG 20 ... 16)

6.1.2 X13 – Service connector 1 (USB)

Purpose

Connect the following to the plug:

– USB

NOTICE

Unexpected malfunction due to connection of devices

The USB interface is intended and tested exclusively as a service interface for updates via USB stick. Connecting other devices (such as cell phones) can lead to unexpected malfunctions.

► Only connect USB sticks to the USB interface.

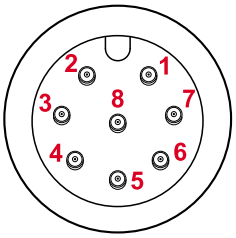


Fig. 9: M12 connector (male), 8-pin, A-coded

Pin	Signal
1	USB 5 V
2	USB DATA -
3	USB DATA +
4	n. c. **NOTICE! Do not connect this pin!**
5	USB shield -
6	RS 232 RX (service interface)
7	RS 232 TX (service interface)
8	GND

Cable for service connector 1

To connect devices to service connector 1, you can order cables separately as an accessory [▸ 68].

6.1.3 X14 – Service connector 2 (Ethernet)

Purpose

Connect the following to the plug:

– Ethernet port

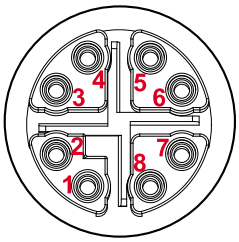


Fig. 10: M12 socket, 8-pin, X-coded

Pin	Signal
1	D1+
2	D1-
3	D2+
4	D2-
5	D4+
6	D4-
7	D3-
8	D3+

Cable for service connector 2

To connect devices to service connector 2, you can order cables separately as an accessory [▶ 68].

6.1.4 X61 ... X66 – CAM1 ... CAM6

Purpose

Connect these following devices:

– Camera 1… 6

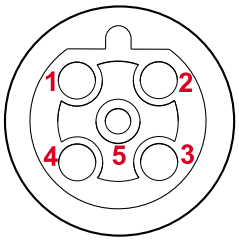


Fig. 11: M12 socket, 5-pin, B-coded

Pin	Signal	Description
1	Video -	
2	GND	
3	Video +	
4	UCAM	Supply from DO3 or via CAM POWER IN (see Camera supply [▶ 30])
5	GND	

6.1.5 X81, X82 – Display 1 and Display 2

Purpose

Connect to the socket:

– FPD link II for connecting the JVM-Mxx displays

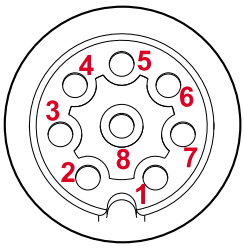


Fig. 12: M12 socket, 8-pin, A-coded

Pin	Signal	
1	Power supply: 24 V	
2	GND	
3	GND	
4	FPD link II	
5	CAN1_L	Must be provided with a suitable terminating resistor at X71.
6	FPD link II	
7	Power supply: 24 V	
8	CAN1_H	Must be provided with a suitable terminating resistor at X71.

Cables

To connect devices to service connector 1, you can order cables separately as an accessory [▶ 68].

6.2 Camera supply

NOTICE

Device damage or malfunctions

Simultaneous use of DO3 and connected cameras can lead to device damage or malfunctions

► Make sure that DO3 remains deactivated as soon as a camera is connected to the system.

Variant 1

You can use DO3 (register 700.000.058) to connect a 12 V power supply unit that supplies all cameras. The power supply unit of the cameras is supplied via the IO driver module.

The power supply unit can deliver a maximum of 3 A. The sum of all camera currents must not exceed 3 A, otherwise the power supply unit will be overloaded. In addition, each camera is fused with 500 mA.

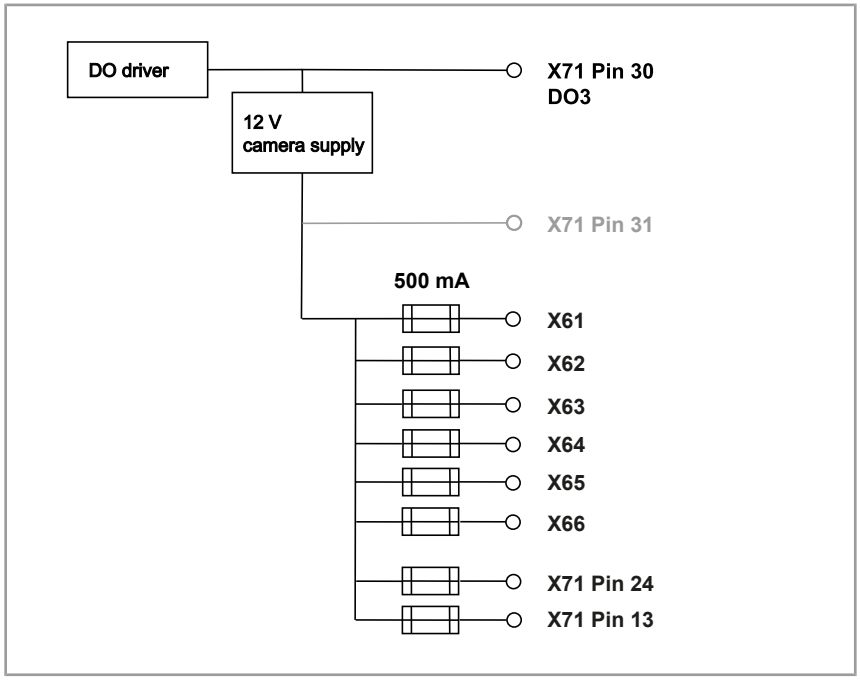


Fig. 13: Camera supply - variant 1

Variant 2

You can feed in an external power supply for the cameras via X71 pin 31.

NOTICE

Power supply conflict

Activating DO3 switches on the internal power supply unit, which can lead to a current conflict with X71 pin 31.

► Make sure that DO3 remains FALSE if an external supply is fed in via X71 pin 31.

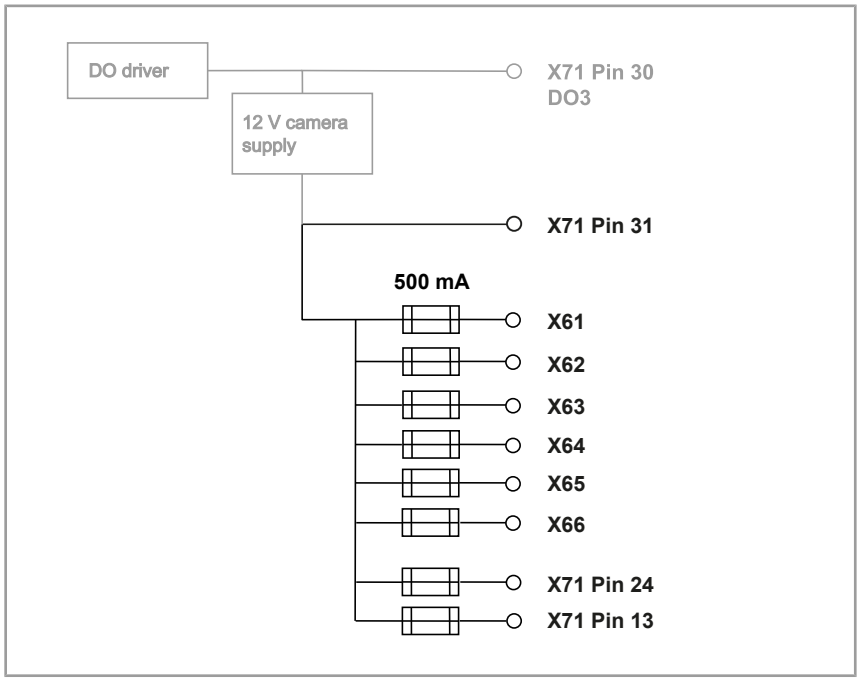


Fig. 14: Camera supply - variant 2

6.3 Commissioning

This chapter outlines the steps for initial commissioning of this device.

⚠ DANGER



Uncontrolled axis movements

High mechanical forces due to axis movements and accelerations.

- ► Keep out of the danger zone of the machine.
- ► Do not disable any safety equipment.
- ► Have malfunctions eliminated by qualified personnel.

NOTICE



Surges resulting from missing protection or fusing

Surges may cause malfunctions or damage to the product.

- ► Protect the voltage inputs from surges according to the requirements.
- ► Ensure that the device is handled in accordance with ESD regulations.

6.3.1 Connecting the voltage supply

Follow the steps below to connect the power supply:

✓ Make sure that the enabling relay is connected and jumpered.

1. Connect the following pins:
   Power supply
   Terminating resistor of 120 Ω at the beginning and end of the CAN bus
2. Switch on the ignition.

⇨ The controller is supplied with power.

6.3.2 Booting up the controller

✓ You will need the cable with the designation **Programming cable 2 m** (see Accessories [▶ 68]).
Connect the cable to the **Service plug 2**.

1. Connect controller and PC by means of the Ethernet patch cable.
2. Power-up the controller.
   ⇨ The controller steps through the boot process.
   ⇨ The LED **R** lit green once the controller is ready for operation.
3. Establish an Ethernet connection between PC and the hardware. The controller has got default IP address **192.168.10.15**.
4. Launch the programming tool JetSym..

⇨ The controller is ready to be configured.

ⓘ Info

Further information

For more information on this topic refer to the online help in our software products or to the application-oriented manuals on www.bucherautomation.com.

6.3.3 Setting up an Ethernet connection between controller and PC

Before you can program a Bucher Automation controller, you must first establish an Ethernet connection between your PC and the controller.

✓ You will need the cable with the designation **Programming cable 2 m** (see Accessories [▶ 68]).

✓ The controller unit and PC are switched on and connected with an Ethernet cable.

1. Set up a new network connection in your PC's operating system. How you set up a network connection depends on the version of the operating system.
2. Configure the network connection of your PC so that a connection to the controller is established. It is important that the IP addresses of the controller and the network connection match in the first 3 IP address elements (default IP address: 192.168.10.15).

⇨ The network connection is set up and you can program the controller.

7 Identification and Configuration

7.1 Identification

This chapter describes how to identify the JCM-631B device:

– Determining the hardware revision
– Retrieving Electronic Data Sheet (EDS) information. The EDS holds numerous non-volatile production-relevant data.
– Determining the OS version of the device and its software components

7.1.1 Web interface

The device has a web interface with a graphical user interface. You can access the web interface using a web browser and the IP address of the device. The user interface consists of several pages for outputting values that you can make available to the Bucher Automation AG for service purposes.

User interface of the web interface

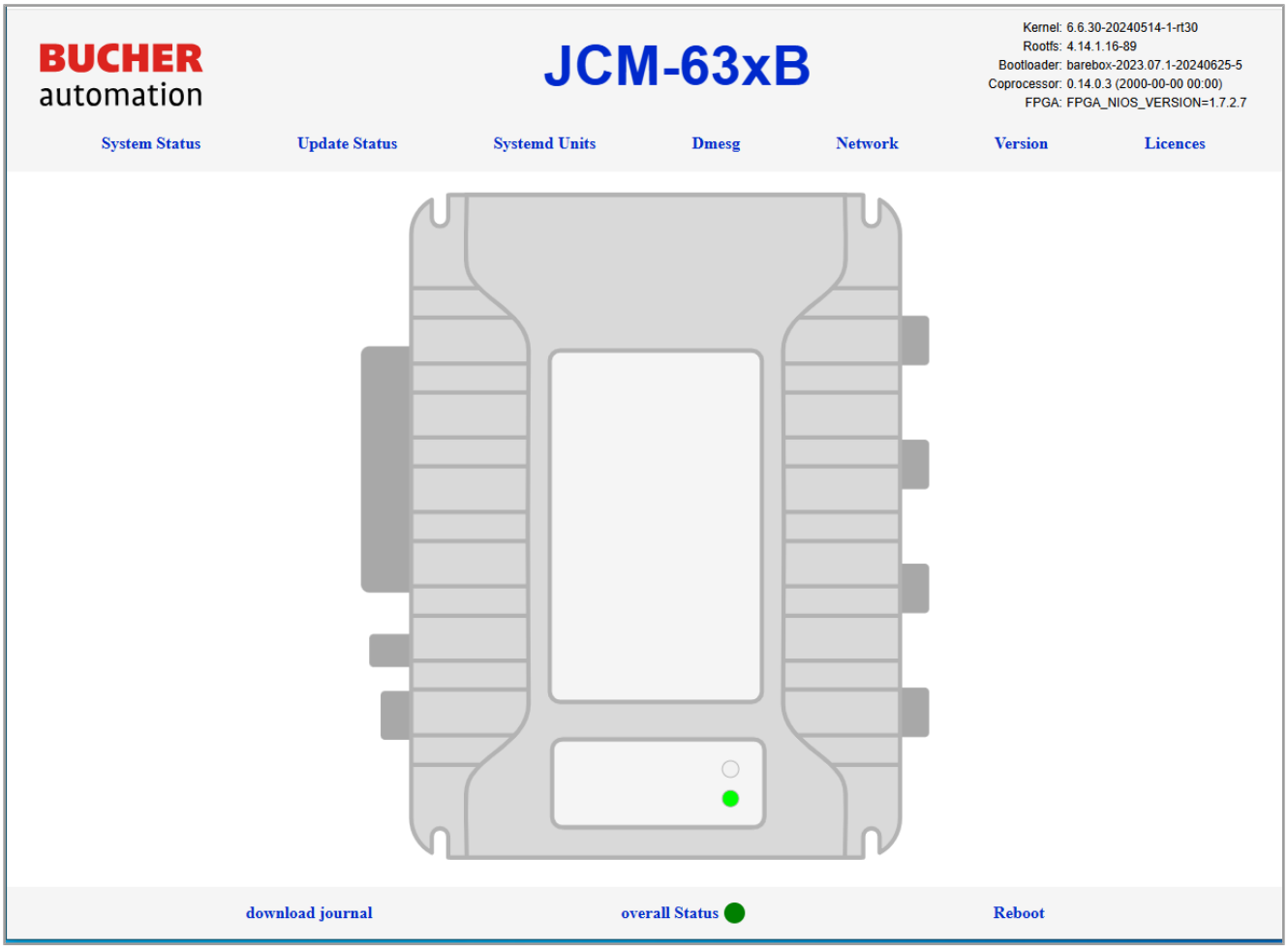


Fig. 15: Web interface

You or Technical Support [▶ 67] will find the following information on the pages:

– System status and Overall_Status
  Information on the general system status
– Update status
  Details of the currently installed operating system versions
– Systemd Units
  List of all Systemd services (service units)
– Dmesg
  System log with all system messages
– Network
  Information on IP addresses and CAN
– Version
  All internally used versions, libraries and layer information
– Licences
  License overview of the open source software used
– Download_journal
  Downloads all system information in a TAR-GZ archive folder, which you can forward to Technical Support.
– Reboot
  Restarts the device.
  NOTICE! The restart will be performed immediately - there will be no further prompts!

7.1.2 Electronic Data Sheet (EDS)

Each JCM-631B features an Electronic Data Sheet (EDS). Numerous production-relevant data are permanently stored in the EDS. The EDS data can be read out via files in the file system of the controller or via special registers.

EDS registers

Use the EDS registers to retrieve Electronic Data Sheet (EDS) information. These registers contain the exact same information as the EDS file. They are read-only (ro).

Register overview

You can find an overview of the EDS registers in the chapter Register overview [▶ 55].

7.1.3 Version registers

The operating system provides several registers which can be used to read out the hardware revision or OS version of the device and its components.
You will need this information when contacting the Bucher Automation AG support hotline in case of a problem.

Operating system version

The device features special registers containing unique OS version numbers.

Format of software version numbers

The JCM-631B software version is identified by a 4-part number.



Fig. 16: Software version numbers

Digits	Description
1	Represents major or main version number
2	Represents minor or secondary version number
3	Represents branch or intermediate version number
4	Represents build version number

Tab. 17: Format of software version numbers

Released version

A released version is identified by both the branch and build values being 0.

Register overview

The operating system versions can be read from the registers listed below:

Registers	Description
190000	Kernel version
190001	File collection version

Registers	Description
190002	Co processor version
190003	FPGA version
200169	Operating system version
210001	JetVM Version

Tab. 18: Register overview

7.2 Operating system

We are continuously striving to enhance the operating systems of our products. Enhancing means adding new features, and upgrading existing functions. Current OS files are available for download from our website on the pages of the respective product.

ⓘ Info

Further information

More information on this subject is available on our website.

Start | www.bucherautomation.com

7.2.1 Operating system update of the controller

This chapter describes how to carry out an OS update of the JCM-631B controller. There are several ways of transferring the OS file to the controller:

– Via an FTP connection
– From a USB flash drive
– From within the application program

OS update with update.ini

You can easily perform an OS update by saving the rauc.bundle file and an update.ini file in the `/data/` directory.

Performing the update

✓ Ensure that you have access to the rauc.bundle file.

1. Save the rauc.bundle file in the `/data/` directory of the controller. Example path: `/data/os/jcm-63x-update-bundle.raucb`
2. Create the update.ini file in the `/data/` directory. The contents of the update.ini file are limited to the path of the rauc.bundle file. Sample content: `/data/os/jcm-63x-update-bundle.raucb`
3. Reboot the controller.

⇨ The auto-update process starts automatically when you restart the controller. The update process ends with another restart of the controller.

The update.ini file is deleted at the beginning of the process to prevent unwanted multiple updates. The application will only start after the update has been successfully completed.

Since the rauc.bundle may contain updates for multiple components, several restarts may be necessary to complete the update.

Documentation

The result of the update process is stored in the file `/data/update_status.txt`. The file contains:

– Result (Success/Failure/Timeout Failure)
– Date and time of the update
– Path of the installed update

Updating the operating system by means of FTP

With the help of an FTP client, it is possible to transfer an OS file to the controller JCM-631B and perform an update.

Performing the update

✓ An OS file for the controller JCM-631B is available on the PC.
✓ An `update.ini` file matching to the OS file is available on the PC.
✓ An FTP connection to the controller is possible.
✓ The login parameters for a user with admin or system rights are available.
✓ The OS is running.
✓ The controller is and remains switched ON.

1. Open an FTP connection to the JCM-631B.
2. Log in with admin or system rights.
   User: *admin*
   Password: *admin*
3. Change to the `/data/` directory.
4. Transfer the OS file.
5. Transfer the `update.ini`.
   ⇨ Wait until the update process is completed
6. Clear the FTP connection.
7. To install the operating system, restart the controller.

OS update from a USB flash drive

With the help of an USB flash drive, it is possible to transfer an OS file to the controller JCM-631B.

Prepare USB flash drive

► Save the following files to the USB flash drive:

– The OS file `update-bundle.raucb`

– An `update.ini` file that matches the OS file

– An `autocopy.ini` file with the following content:

```
[OPTIONS]
CommandCount         = 3
[COMMAND_1]
Command             = FileCopy
Source             = ./update.ini
Destination         = /data/update.ini
[COMMAND_2]
Command             = FileCopy
Source             = ./update-bundle.raucb
Destination         = /data/update-bundle.raucb
[COMMAND_3]
Command             = reboot
```

Performing the update

✓ Ensure that the above files are saved on the USB flash drive.

1. Connect the USB flash drive to the controller.

   ⇨ The update process starts automatically.

   ⇨ Once the files have been copied, the controller will restart automatically.

2. Once the controller has restarted, remove the USB flash drive. This prevents the OS file from being imported multiple times.

Since the rauc.bundle may contain updates for multiple components, several restarts may be necessary to complete the update.

Updating the OS from within the application program

The file functions included in the STX language set allow you to carry out a program-controlled OS update of a JCM-631B from within an OS file.

Update preparation

- Save the OS file in the file system of the JCM-631B. Example path: `/data/jcm-63xb.raucb`

STX Program

An `update.ini` file is created in the application program. The application program triggers a restart of the controller to start the installation.

```
Var
    StartUpdate: Bool;
End_Var;

Function f_UpdateOS;
    Var
        fhandle: File;
    End_Var;

    If FileOpen(fhandle,'/data/update.ini',fWrite) then
        FilePutString(fhandle,'/data/jcm63xb.raucb$n');
        FileClose(fhandle);

        mem[202960] := 0x424F6F74; //trigger reboot
        mem[202961] := 102;
    End_if;

End_Function;

Task tUpdateOS Autorun
    StartUpdate := False;
        When StartUpdate Continue;
        f_UpdateOS ();
End_Task;
```

7.3 File System

The file system allows access to files on the eMMC and a USB flah drive. Some files may be protected against read/write access or deletion. This is normal behavior. Some of these files are virtual files, such as firmware images, or protected files, such as EDS files.

NOTICE



Malfunctions caused by missing or damaged system files

Careless working with system files can result in malfunctions of the device.

► Do not delete or move any system files.

System directories

The directory structure follows the Filesystem Hierarchy Standard with the exceptions of `/app/`, `/data/`, and `/jetapp/`.

NOTICE! Be sure to use the correct upper/lower case letters for the system directories.

Directory	Description
`/app/`	Directory for applications
`/data/`	Directory for storing data.
`/jetapp/`	Directory for storing the Bucher Automation application.
`/media/usb/`	Root directory of the USB flash drive

Tab. 19: System directories

NOTICE



Delays during boot-up

Application files in the system directory `/data/` cause delays during boot-up.

► Copy all application files to the `/app/` directory, **not** to the `/data/` directory.

Formatting and checking of data

The JCM-631B is able to format only the flash drive. Formatting or checking the USB flash drive is not possible.

7.3.1 Properties

The following properties apply to the internal flash disk and USB flash drive:

– 8 files max. to be opened simultaneously
– Separate directory names by a slash "/", not by a backslash "\".
– When the controller creates a file, the file contains date and time assigned by the controller.
– Date, time, and file size are not available for all system files.

Flash disk - Properties

The following disk space is available to the user:

Parameter	Value
Flash disk capacity	4 GB
Of which directory `/app/`	100 MB
Of which directory `/data`	450 MB

NOTICE



Write cycle limitations

Data is stored on a NAND flash with only a limited amount of write cycles. Take this into account when configuring the type and volume of customer data to be stored.

► Write data to the flash drive only when absolutely necessary.

USB flash drive - Properties

– The available memory size depends on the USB flash drive being used. Tested size: 2 GB ... 512 GB
– The USB flash drive must be formatted in FAT 32.

Guarantee

Bucher Automation AG only assumes a guarantee for USB flash drives optionally available from Bucher Automation AG. Refer to the Accessories [▸ 69] section for matching USB flash drives.

8 Programming

The JCM-631B is programmed using the JetSym programming tool.

8.1 Abbreviations, module register properties and formats

Abbreviations

The abbreviations used in this document are listed in the table below:

Abbreviation	Description
R 100	Register 100
MR 150	Module register 150

Tab. 20: Abbreviations

Module register properties

Each module register is characterized by certain properties. Most properties are identical for many module registers. In the following description, module register properties are mentioned only if a property deviates from the default properties listed below.

Property	Default
Access	Read/write
Value after reset	0 or undefined (e.g. revision/version number)
Takes effect	Immediately
Write access	Always
Data type	Integer

Tab. 21: Module register properties

Numerical formats

The numerical formats used in this document are listed in the table below:

Notation	Format of numerical values
100	Decimal
0x100	Hexadecimal
0b100	Binary

Tab. 22: Numerical formats

8.2 Storage options - Overview

The JCM-631B features several types of program and data memory. There is volatile memory that requires power to maintain the stored information, and non-volatile memory which does not require power to maintain the stored information. This memory is located directly on the CPU.

This chapter gives an overview of the available memory.

8.2.1 File system memory

The file system memory is for storing data and program files.

Properties

– Non-volatile
– Size of internal flash disk: 4 GB

8.2.2 Memory for non-volatile application program registers

Non-volatile registers store data that must not be lost when the JCM-631B is de-energized.

NOTICE



Write cycle limitations

Data is stored on a NAND flash with only a limited amount of write cycles. Take this into account when configuring the type and volume of customer data to be stored.

► Write data to the flash drive only when absolutely necessary.

Properties

– Global variables with dedicated addresses (%VL)
– The size of a register variable is always 4 bytes.
– Register variables are not initialized by the operating system.
– Register numbers from 1,000,000

8.2.3 Memory for non-volatile application program variables

Non-volatile variables store data that must not be lost when the JCM-631B is de-energized.

Properties

– Global variables that are assigned to permanent registers (%RL)
– Variables are stored in a compact way.
– Size: 120,000 bytes
– Register numbers: 1,000,000 ... 1,029,999

8.2.4 Special registers

Special registers let you control OS functions and retrieve status information.

Properties

– Global variables with dedicated addresses (%VL)
– When the operating system is launched, special registers are initialized using their default values.
– Register numbers: 100000 ... 999999

8.2.5 Inputs and outputs

Inputs and outputs are 1-bit variables. This means they can be either TRUE or FALSE.

Properties of inputs/outputs

– Variables which are assigned to permanent addresses (%XL)
– IO registers: see Register interfaces

8.2.6 Flag

Flags are one-bit operands. This means they can be either TRUE or FALSE.

Properties of user flags

– Global variables with dedicated addresses (%MX)
– Non-volatile
– Quantity: 256
– Flag numbers: 0 ... 255

Properties of overlaid user flags

– Global variables with dedicated addresses (%MX)
– Non-volatile
– Overlaid by registers 1000000 ... 1000055
– Quantity: 1,792
– Flag numbers: 256 ... 2047

Properties of special flags

– Global variables with dedicated addresses (%MX)
– When the operating system is launched, special flags are initialized using their default values
– Quantity: 256
– Flag numbers: 2048 ... 2303

8.2.7 Saving and loading an application program

The user determines the program to be executed. When uploading the application program to the controller, this program is stored as a file to the internal flash disk. The device saves the path and file name in the file `/app/start.ini`.

Path and file name

By default, JetSym creates a subdirectory with the project name in the `/app/` directory and saves the application program there with the file extension `.esx`. Path and file names are always converted into lower case letters.

/app/start.ini – Structure

This file is a text file with one section holding 2 entries:

Element	Description
[Startup]	Section name
Project	Path to the application program file relative to `/app/`
Program	Name of the application program file

Example

```
[Startup]
Project = test_program
Program = test_program.esx
```

The application program is loaded from the file `/app/test_program/test_program.esx`.

Loading an application program

When the application program is restarted via JetSym or after booting the JCM-631B, the application program is loaded via the file system and executed.

The application program is loaded by the OS of the JCM-631B as follows:

Step	Description
1	The OS reads the file `/app/start.ini` from the internal flash disk.
2	The OS evaluates the `Project` entry. It contains the path leading to the application program file.
3	The OS evaluates the `Program` entry. This entry contains the program name.
4	The OS loads the application program from the file `<Project>/<Program>`.

8.3 CANopen STX API

The CANopen STX API is a platform allowing users to send and receive CANopen messages via STX functions.

The device uses the STX functions to communicate with other CANopen nodes.

The CANopen standard

CANopen is an open standard for networking and communication, used e.g. in automotive applications. The CANopen protocol is being further developed by the CiA e.V. (CAN in Automation). On the physical layer it uses CAN high-speed in accordance with ISO 11898.

Specifications

The CANopen specifications can be obtained from the **CiA e.V.** homepage http://www.can-cia.org.
The key specification documents are:

– CiA DS 301 – This document is also known as Communication Profile and describes the fundamental services and protocols used under CANopen.
– CiA DS 302 – Framework for programmable devices (CANopen Manager, SDO Manager)
– CiA DR 303 – Information on cables and connectors

ⓘ Info

Further information

For in-depth information, see the *CANopen STX API* application-oriented manual.

For application-oriented manuals open www.bucherautomation.com and go to *product page JCM-631B > Product-independent documentation*.

8.3.1 STX Functions

Application

STX functions are used to enable communication between the JCM-631B and other CANopen nodes.

The JCM-631B supports the following STX functions:

Function	Description
`CanOpenInit()`	Calling up the `CanOpenInit()` function initializes one of the available CAN buses.
`CanOpenSetCommand()`	The function `CanOpenSetCommand()` lets you change the heartbeat status of the device itself and of all other devices (NMT slaves) on the CAN bus.
`CanOpenUploadSDO()`	The function `CanOpenUploadSDO()` lets you access a particular object in the Object Directory of the message recipient and read the value of the object. Data is exchanged in accordance with the SDO upload protocol.
`CanOpenDownloadSDO()`	The function `CanOpenDownloadSDO()` lets you access a particular object in the Object Directory of the message recipient and specify the value of the object. Data is exchanged in accordance with the SDO download protocol.

Function	Description
`CanOpenAddPDORx()`	Calling up the `CanOpenAddPDORx()` function allows for process data coming from other CANopen devices to be entered for reception.
`CanOpenAddPDOTx()`	By calling up the `CanOpenAddPDOTx()` function, process data can be placed on the bus.

Tab. 23: Supported STX functions

ⓘ Info

Further information

For in-depth information, see the *CANopen STX API* application-oriented manual.

For application-oriented manuals open www.bucherautomation.com and go to *product page JCM-631B > Product-independent documentation*.

ⓘ Info

Further information

For more information on this subject, refer to the JetSym Online Help.

8.3.2 Heartbeat monitoring

The heartbeat protocol is for monitoring the activity of communication partners. If the inactivity exceeds the set interval (Heartbeat consumer time), the status is set to "**offline**".

The application program lets you define heartbeat functions, such as

– Displaying information to the user
– Rebooting the device
– Ignoring process data

ⓘ Info

Further information

For in-depth information, see the *CANopen STX API* application-oriented manual.

For application-oriented manuals open www.bucherautomation.com and go to *product page JCM-631B > Product-independent documentation*.

8.3.3 CANopen object directory

The device's OS supports the following objects:

Index (hex)	Object (code)	Object name	Data type	Access
1000	VAR	Device type	Unsigned32	RO (read only)
1001	VAR	Error Register	Unsigned8	RO
1002	VAR	Manufacturer status	Unsigned32	RO
1003	ARRAY	Pre-defined error field	Unsigned32	RO
1008	VAR	Manufacturer Device Name	String const	1008
1009	VAR	Manufacturer Hardware Version	String const	1009
100 A	VAR	Manufacturer Software Version	String const	100 A

Index (hex)	Object (code)	Object name	Data type	Access
100 B	VAR	Node ID	Unsigned32	RO
1017	VAR	Producer Heartbeat Time	Unsigned16	R/W (read & write)
1018	RECORD	Identity	Identity	RO
1200	RECORD	Server 1 - SDO parameter	SDO parameter	RO
1201	RECORD	Server 2 - SDO parameter	SDO parameter	R/W
1203	RECORD	Server 3 - SDO parameter	SDO parameter	R/W
1203	RECORD	Server 4 - SDO parameter	SDO parameter	R/W

ⓘ Info

Further information

For in-depth information, see the *CANopen STX API* application-oriented manual.

For application-oriented manuals open www.bucherautomation.com and go to *product page JCM-631B > Product-independent documentation*.

8.4 SAE J1939 STX API

SAE J1939 is an open standard for networking and communication in the commercial vehicle sector. The focal point of the application is the networking of the power train and chassis. The J1939 protocol originates from the international **Society of Automotive Engineers (SAE)** and works on the physical layer with CAN high-speed according to ISO 11898.

Specifications

The SAE J1939 specifications can be obtained from the SAE homepage http://www.sae.org.

The key SAE J1939 specifications are:

– J1939-11 - Information on the physical layer
– J1939-21 - Information on the data link layer
– J1939-71 - Information on the application layer vehicles
– J1939-73 - Information on the application layer range analysis
– J1939-81 - Network management

ⓘ Info

Further information

For further information refer to the *SAE J1939 STX API* application-oriented manual in the download area of our homepage.

For application-oriented manuals open www.bucherautomation.com and go to *product page JCM-631B > Product-independent documentation*.

NOTICE



Mixed operation of CANopen and J1939

Mixed operation of CANopen and J1939 can lead to unexpected behavior of the CAN bus.

8.4.1 STX Functions

Application

STX functions are used in the communication between the JCM-631B and other devices in a vehicle.

The JCM-631B supports the following STX functions:

Function	Description
`SAEJ1939Init()`	Calling up the funvtion `SAEJ1939Init()` initializes one of the existing CAN buses (not CAN 0, because it is reserved for CANopen) for the J1939 protocol.
`SAEJ1939SetSA()`	The function `SAEJ1939SetSA()` lets you change your own SA (Source Address) during runtime.
`SAEJ1939GetSA()`	The function `SAEJ1939GetSA()` lets you determine your own SA (Source Address).
`SAEJ1939AddRx()`	Calling up the function `SAEJ1939AddRx()` prompts the JCM-631B to receive a specific message.
`SAEJ1939AddTx()`	Calling up the function `SAEJ1939AddTx()` prompts the JCM-631B to cyclically send a specific message via the bus.
`SAEJ1939RequestPGN()`	Calling up the function `SAEJ1939RequestPGN()` sends a request to the DA (Destination Address) following a PGN.
`SAEJ1939GetDM1()`	Calling up the function `SAEJ1939GetDM1()` requests the current diagnostics error codes (also see SAE J1939-73 No. 5.7.1).
`SAEJ1939GetDM2()`	Calling up the function `SAEJ1939GetDM2()` requests the diagnostics error codes that preceded the current ones (also see SAEJ1939-73 No. 5.7.2).
`SAEJ1939 SetSPNConversion()`	Calling up the function `SAEJ1939SetSPNConversion()` defines the arrangement of bytes in the message which is requested by the `SAEJ1939GetDM1()` or `SAEJ1939GetDM2()` function.
`SAEJ1939 GetSPNConversion()`	Calling up the function `SAEJ1939GetSPNConversion()` determines the currently set conversion method.

ⓘ Info

Further information

For further information refer to the *SAE J1939 STX API* application-oriented manual in the download area of our homepage.

For application-oriented manuals open www.bucherautomation.com and go to *product page JCM-631B > Product-independent documentation*.

8.5 Controlling displays

Connection

JVM-Mxx displays are connected to the FPD link II interfaces (sockets X81, X82 [▶ 30]) of a JCM-63x controller.

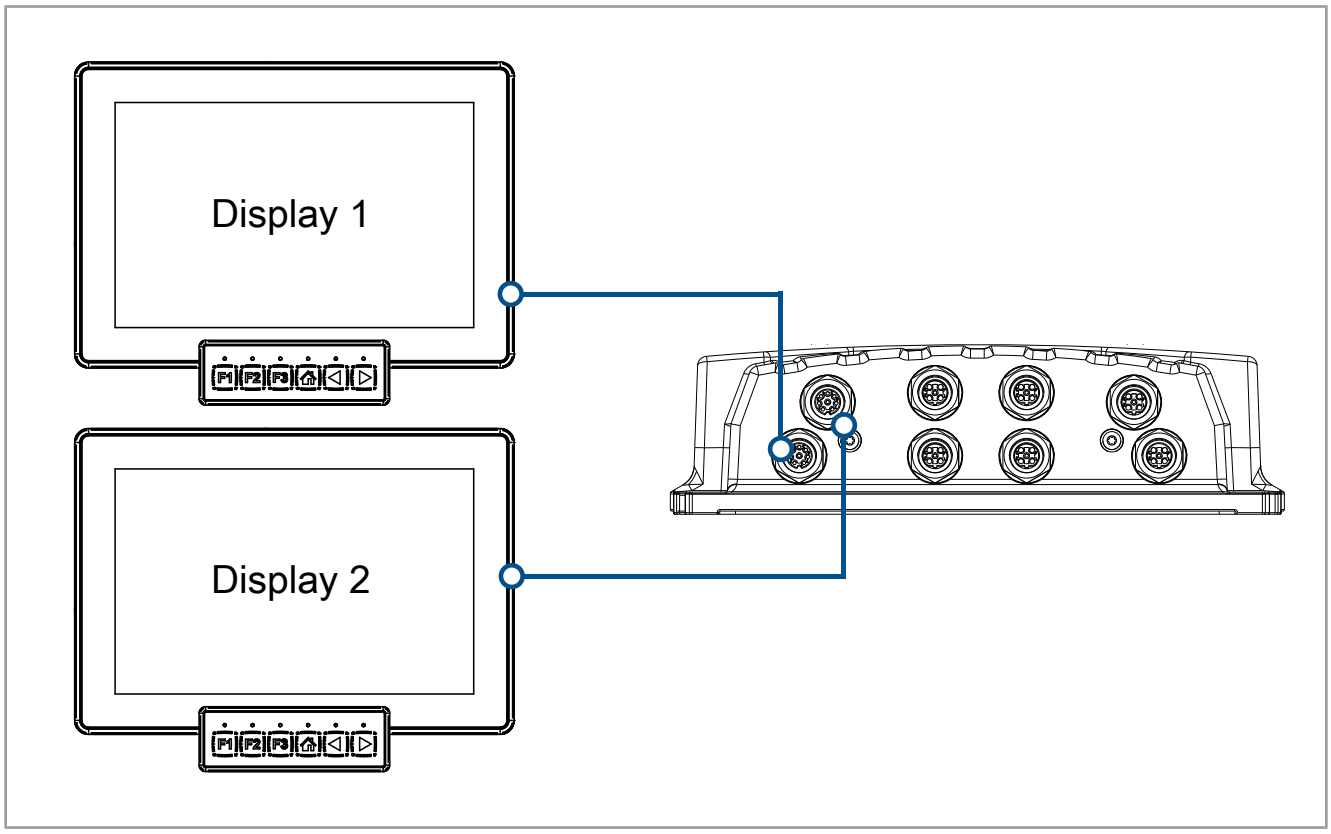


Fig. 17: Controlling displays

An operating system service that communicates with the displays runs on JCM-63x controllers.

In order for the service to communicate, the following must be observed:

– The CAN1 must be terminated externally at connector X71.
– The baud rate on CAN1 must be 250 kBaud.

CANopen

The displays communicate via CANopen. CANopen devices with node IDs 0x21 (33) to 0x24 (36) can be operated on the same bus.

The following CAN IDs are reserved for the displays:

0x000
0x0A1 … 0x0A4
0x1A1 … 0x1A4
0x221 … 0x224
0x2A1 … 0x2A4
0x3A1 … 0x3A4
0x4A1 … 0x4A4

0x5A1 … 0x5A4
0x621 … 0x624
0x721 … 0x724

Tab. 24: Reserved CAN IDs for displays

Automatic detection

The JCM-63x controller automatically detects which display is connected to which port and sets the appropriate resolution.

When booting for the first time with a new configuration, the system may boot with an incorrect configuration. The display is then either blurred or only a small portion of the screen is used. If CAN1 is configured correctly, the JCM-63x controller will automatically reconfigure itself. The behavior of the JCM-63x controller visible from the outside resembles a reboot.

8.6 FTP server

The controller supports the *FTP server* feature. The FTP server handles directories and files using an FTP client.

The files can be stored to the following storage media:

– Internal flash drive
– USB flash drive

Enabling the FTP server feature

On this device, the *FTP server* feature is permanently enabled. This is due to the device configuration upon purchase.

ⓘ Info

Further information

For in-depth information, see the *File System* application-oriented manual.

For application-oriented manuals open www.bucherautomation.com and go to *product page JCM-631B > Product-independent documentation*.

8.7 User-programmable IP interface

The user-programmable IP interface lets you send or receive any data via Ethernet interface on the JCM-631B using TCP/IP or UDP/IP. The data is processed in the application program.

Applications

The user-programmable IP interface allows the programmer to carry out data exchange via Ethernet connections which do not use standard protocols, such as FTP, HTTP, JetIP, or Modbus/TCP. The following applications are possible:

– Server
– Client
– TCP/IP
– UDP/IP

Required programmer's skills

To be able to program user-programmable IP interfaces the following knowledge of data exchange via IP networks is required:

– IP addressing (e.g. IP address, port number, subnet mask)
– TCP (e.g. connection establishment/termination, data stream, data backup)
– UDP (e.g. datagram)

Restrictions

For communication via user-programmable IP interface, the programmer must not use any ports which are already used by the operating system of the controller. Therefore, do not use the following ports:

Protocol	Port number	Default value	User
TCP	Depending on the FTP client	20	FTP server (data)
TCP	21		FTP server (controller)
TCP	23		System logger
TCP	80		HTTP server
TCP	From the file /EMAIL/email.ini	25, 110	E-mail client
TCP	502		Modbus/TCP server
TCP, UDP	1024 - 2047		Various
TCP, UDP	IP configuration	50000, 50001	JetIP
TCP	IP configuration	52000	Debug server

ⓘ Info

Further information

For in-depth information, see the *User-programmable Interface* application-oriented manual.

For application-oriented manuals open www.bucherautomation.com and go to *product page JCM-631B > Product-independent documentation*.

9 Registers - Overview

This register overview gives a condensed summary of the registers and flags of the JCM-631B device.

Default IP address

IP address	192.168.10.15
Subnet mask	255.255.255.0

General overview - Registers

Register range	Description
100000 ... 100999	Electronic Data Sheet (EDS)
102000 … 102999	Real-time clock
103000 … 103999	Serial interface RS 232
104000 ... 104999	Ethernet
106000 ... 106499	CAN
107000 ... 107999	Flash drive
108000 ... 108599	System information
109000 ... 109003	Revisions
200000 ... 209999	General system registers
210000 ... 219999	Application program
1000000 ... 1029999	Application registers (non-volatile; integer/float)
600000000 … 600299999	JCM register (JCM-631B only)

Flags - General overview

Flag	Description
0 ... 255	Application flags (non-volatile)
256 ... 2047	Overlaid by registers R 1000000 through 1000055
2048 ... 2303	Special flags

Electronic nameplate (entire device)

Register range	Description
100900 … 100993	**Production**
100900	Internal version number
100901 ... 100907	Serial number (register string)
100992	Navision ID
100993	FBG version

Ethernet

The settings will only take effect after restarting the device.

Registers	Description
104531	IP address
104532	Current subnet mask
105533	Standard gateway
100801	MAC address (OUI)
100802	MAC address (individual part)

Real-time clock

Register	Description
102810 … 102820	**Direct access (localized)**
102810	Milliseconds
102811	Seconds
102812	Minutes
102813	hours
102814	Day of the week (0 = Sunday)
102815	Day
102816	Month
102817	Year
102818	Deviation in minutes
102819	Standard deviation plus daylight savings time
102820	Daylight savings time is active
102910 … 102917	**Direct access (UTC)**

Register	Description
102910	Milliseconds
102911	Seconds
102912	Minutes
102913	hours
102914	Day of the week (0 = Sunday)
102915	Day
102916	Month
102917	Year
102920 … 102928	**Buffer access (UTC - not suitable** for JetSym **setup)**
102920	Milliseconds
102921	Seconds
102922	Minutes
102923	hours
102924	Day of the week (0 = Sunday)
102925	Day
102926	Month
102927	Year
102928	Read/write trigger

CAN

Registers	Description
106000	Baud rate CAN 1
106100	Baud rate CAN 2
106200	Baud rate CAN 3
106300	Baud rate CAN 4

Revisions

Registers	Description
190000	Kernel version
190001	File collection version
190002	Coprocessor version
190003	FPGA revision

General system registers

Registers	Description
200000	OS version (major * 100 + minor)
200001	**Application program is running (bit 0 = 1)**
0/2	Stops program
1	Starts program
3	Resumes program
200169	OS version (IP format)
202980	Error history: Number of entries
202981	Error history: Index
202982	Error history: Entry
203000	Interface monitoring: JetIP
203001	Interface monitoring: SER
203005	Interface monitoring: STX debug server
203100 ... 203107	32-bit overlaying – Flag 0 ... 255
203108 ... 203123	16-bit overlaying – Flag 0 ... 255
203124 ... 203131	32-bit overlaying – Flag 2048 ... 2303
203132 ... 203147	16-bit overlaying – Flag 2048 ... 2303
209700	System logger: Global enable
209701 ... 209754	System components enable

Application program

Register	Description
210000	**Application program is running (bit 0 = 1)**
210001	JetVM version
210004	**Error register (bit-coded)**
Bit 8	Illegal jump
Bit 9	Illegal call
Bit 10	Illegal index
Bit 11	Illegal opcode
Bit 12	Division by 0
Bit 13	Stack overflow
Bit 14	Stack underflow
Bit 15	Illegal stack
Bit 16	Error when loading the application program
Bit 24	Timeout - Cycle time
Bit 25	Timeout - Task lock
Bit 31	Unknown error
210006	Highest task number
210007	Minimum program cycle time
210008	Maximum program cycle time
210009	Current program cycle time
210011	Current task number
210050	Current program position within an execution unit
210051	ID of the execution unit being processed
210056	Desired total cycle time in µs
210057	Calculated total cycle time in µs
210058	Maximum time slice per task in µs
210060	Task ID (for R210061)
210061	Priority for task [R210060]
210063	Length of scheduler table
210064	Index in scheduler table
210065	Task ID in scheduler table
210070	Task ID (for R210071)
210071	Timer number (0 ... 31)
210072	Manual triggering of a timer event (bit-coded)
210073	End of cyclic task (task ID)
210074	Command for cyclic tasks
210075	Number of timers
210076	Timer number (for R210077)
210077	Timer value in milliseconds
210100 ... 210199	Task state Please use the STX function TaskGetInfo() as described in the JetSym online help.
210400 ... 210499	Task - Program address
210600	Task ID of a cyclical task (for R210601)
210601	Processing time of a cyclical task in per mil figure
210609	**Task lock timeout in ms**
-1	Monitoring disabled
210610	Timeout (bit-coded, bit 0 → timer 0 etc.)

Application registers

Register	Description
1000000 ... 1005999	32-bit integer (remanent)

32 combined flags

Registers	Description
203100	0 ... 31
203101	32 ... 63
203102	64 ... 95
203103	96 ... 127
203104	128 ... 159
203105	160 ... 191
203106	192 ... 223
203107	224 ... 255

16 combined flags

Registers	Description
203108	0 ... 15
203109	16 ... 31
203110	32 ... 47
203111	48 ... 63
203112	64 ... 79
203113	80 ... 95
203114	96 ... 111
203115	112 ... 127
203116	128 ... 143
203117	144 ... 159
203118	160 ... 175
203119	176 ... 191
203120	192 ... 207
203121	208 ... 223
203122	224 ... 239
203123	240 ... 255

32 combined special flags

Registers	Description
203124	2048 ... 2079
203125	2080 ... 2111
203126	2112 ... 2143
203127	2144 ... 2175
203128	2176 ... 2207
203129	2208 ... 2239
203130	2240 ... 2271
203131	2272 ... 2303

16 combined special flags

Registers	Description
203132	2048 ... 2063
203133	2064 ... 2079
203134	2080 ... 2095
203135	2096 ... 2111
203136	2112 ... 2127
203137	2128 ... 2143
203138	2144 ... 2159
203139	2160 ... 2175
203140	2176 ... 2191
203141	2192 ... 2207
203142	2208 ... 2223
203143	2224 ... 2239
203144	2240 ... 2255
203145	2256 ... 2271
203146	2272 ... 2287
203147	2288 ... 2303

Application registers with overlaid flags

Registers	Description
1000000	256 ... 287
1000001	288 ... 319
1000002	320 ... 351
1000003	352 ... 383
1000004	384 ... 415
1000005	416 ... 447
1000006	448 ... 479
1000007	480 ... 511
1000008	512 ... 543
1000009	544 ... 575
1000010	576 ... 607
1000011	608 ... 639
1000012	640 ... 671
1000013	672 ... 703
1000014	704 ... 735
1000015	736 ... 767
1000016	768 ... 799
1000017	800 ... 831
1000018	832 ... 863
1000019	864 ... 895
1000020	896 ... 927
1000021	928 ... 959
1000022	960 ... 991

Registers	Description
1000023	992 ... 1023
1000024	1024 ... 1055
1000025	1056 ... 1087
1000026	1088 ... 1119
1000027	1120 ... 1151
1000028	1152 ... 1183
1000029	1184 ... 1215
1000030	1216 ... 1247
1000031	1248 ... 1279
1000032	1280 ... 1311
1000033	1312 ... 1343
1000034	1344 ... 1375
1000035	1376 ... 1407
1000036	1408 ... 1439
1000037	1440 ... 1471
1000038	1472 ... 1503
1000039	1504 ... 1535
1000040	1536 ... 1567
1000041	1568 ... 1599
1000042	1600 ... 1631
1000043	1632 ... 1663
1000044	1664 ... 1695
1000045	1696 ... 1727
1000046	1728 ... 1759
1000047	1760 ... 1791
1000048	1792 ... 1823
1000049	1824 ... 1855
1000050	1856 ... 1887
1000051	1888 ... 1919
1000052	1920 ... 1951
1000053	1952 ... 1983
1000054	1984 ... 2015
1000055	2016 ... 2047

Register interfaces

Register range	Description	Access	Unit
700.000.000	**Main_Status**	R	BITFIELD
Bit 0	PowerSupplyUndervoltage	R	BITFIELD
Bit 1	RTC_BatteryUndervoltage	R	BITFIELD
Bit 2	CAM1_Undervoltage	R	BITFIELD
Bit 3	CAM1_Overvoltage	R	BITFIELD
Bit 4	CAM2_Undervoltage	R	BITFIELD
Bit 5	CAM2_Overvoltage	R	BITFIELD
Bit 6	CAM3_Undervoltage	R	BITFIELD
Bit 7	CAM3_Overvoltage	R	BITFIELD
Bit 8	CAM4_Undervoltage	R	BITFIELD
Bit 9	CAM4_Overvoltage	R	BITFIELD
Bit 10	CAM5_Undervoltage	R	BITFIELD
Bit 11	CAM5_Overvoltage	R	BITFIELD
Bit 12	CAM6_Undervoltage	R	BITFIELD
Bit 13	CAM6_Overvoltage	R	BITFIELD
Bit 14	CAM7_Undervoltage	R	BITFIELD
Bit 15	CAM7_Overvoltage	R	BITFIELD
Bit 16	CAM8_Undervoltage	R	BITFIELD
Bit 17	CAM8_Overvoltage	R	BITFIELD
Bit 18	DISP1_Undervoltage	R	BITFIELD
Bit 19	DISP2_Undervoltage	R	BITFIELD
Bit 20	DISP3_Undervoltage	R	BITFIELD

Register range	Description	Access	Unit
Bit 21	Baseboard_Overtemperature	R	BITFIELD
Bit 22	Baseboard_Undertemperatur	R	BITFIELD
Bit 23	FPGAboard_Overtemperature	R	BITFIELD
Bit 24	FPGAboard_Undertemperature	R	BITFIELD
Bit 25	CPUboard_Overtemperature	R	BITFIELD
Bit 26	CPUboard_Undertemperature	R	BITFIELD
Bit 27	Baseboard_PowerFault	R	BITFIELD
Bit 28	FPGABoard_PowerFault	R	BITFIELD
Bit 29	CPUBoard_PowerFault	R	BITFIELD
Bit 30	PowerON_INPUT_IS_OFF	R	BITFIELD
700.000.001	PowerSupplyVoltage	R	1 mV
700.000.002	RTC_BatteryVoltage	R	1 mV
700.000.003	CAMx_OvervoltageThreshold	R/W	1 mV
700.000.004	CAMx_UndervoltageThreshold	R/W	1 mV
700.000.005	CAM1_PowerVoltage	R	1 mV
700.000.006	CAM2_PowerVoltage	R	1 mV
700.000.007	CAM3_PowerVoltage	R	1 mV
700.000.008	CAM4_PowerVoltage	R	1 mV
700.000.009	CAM5_PowerVoltage	R	1 mV
700.000.010	CAM6_PowerVoltage	R	1 mV
700.000.011	CAM7_PowerVoltage	R	1 mV
700.000.012	CAM8_PowerVoltage	R	1 mV
700.000.013	DSPx_UndervoltageThreshold	R/W	1 mV

Register range	Description	Access	Unit
700.000.014	DSP1_PowerVoltage	R	1 mV
700.000.015	DSP2_PowerVoltage	R	1 mV
700.000.016	DSP3_PowerVoltage	R	1 mV
700.000.017	OvertemperatureThreshold	R/W	0.1 °C
700.000.018	UndertemperatureThreshold	R/W	0.1 °C
700.000.019	Baseboard_Temperature	R	0.1 °C
700.000.020	FPGAboard_Temperature	R	0.1 °C
700.000.021	CPUboard_Temperature	R	0.1 °C
700.000.022	Baseboard_5V	R	1 mV
700.000.023	Operating_time (Operating minutes counter stored persistently in the RTC.)	R	1 min
700.000.040	**DIGITAL_IO_Status**	R	BITFIELD
Bit 0	DI1_DigitalValue	R	BITFIELD
Bit 1	DI2_DigitalValue	R	BITFIELD
Bit 2	DI3_DigitalValue	R	BITFIELD
Bit 3	DO1_DigitalFeedbackValue	R	BITFIELD
Bit 4	DO2_DigitalFeedbackValue	R	BITFIELD
Bit 5	DO3_DigitalFeedbackValue	R	BITFIELD
Bit 6	DO1_OverCurrect	R	BITFIELD
Bit 7	DO2_OverCurrent	R	BITFIELD
Bit 8	DO3_OverCurrent	R	BITFIELD
700.000.041	**DIGITAL_IO_Mode**	R/W	BITFILED
Bit 0	DI1_RatiometricThreshold	R/W	BITFILED
Bit 1	DI2_RatiometricThreshold	R/W	BITFILED

Register range	Description	Access	Unit
Bit 2	DI3_RatiometricThreshold	R/W	BITFILED
700.000.042	DI1_Threshold	R/W	1 mV
700.000.043	DI1_Voltage	R	1 mV
700.000.044	DI1_Threshold	R/W	1 mV
700.000.045	DI2_Voltage	R	1 mV
700.000.046	DI3_Threshold	R/W	1 mV
700.000.047	DI3_Voltage	R	1 mV
700.000.048	DO1_DigitalValue	R/W	1 or 0
700.000.049	DO1_VoltageThreshold	R/W	1 mV
700.000.050	DO1_Voltage	R	1 mV
700.000.051	DO1_OverCurrentThreshold	R/W	1 mA
700.000.052	DO1_Current	R	1 mA
700.000.053	DO2_DigitalValue	R/W	1 or 0
700.000.054	DO2_VoltageThreshold	R/W	1 mV
700.000.055	DO2_Voltage	R	1 mV
700.000.056	DO2_OverCurrentThreshold	R/W	1 mA
700.000.057	DO2_Current	R	1 mA
700.000.058	DO3_DigitalValue	R/W	1 or 0
700.000.059	DO3_VoltageThreshold	R/W	1 mV
700.000.060	DO3_Voltage	R	1 mV
700.000.061	DO3_OverCurrentThreshold	R/W	1 mA
700.000.062	DO3_Current	R	1 mA

Register range	Description	Access	Unit
700.000.063	LED_D2 The LED D2 can be configured by the user. The hexadecimal value entered in register 700.000.063 determines the color and flashing cycle of the LED. The value has the format 0x**YZ**. Examples: – 0x22 → D2 flashes green – 0x01 → D2 lights up red	W	
	Y = Flashing cycle		
	0 = ON / no flashing		
	1 = Slow flashing		
	2 = Flashing		
	3 = Fast flashing		
	Z = LED color		
	0 = OFF		
	1 = Red		
	2 = Green		
	3 = Yellow		
700.000.064	Display Power Control 1 = Displays ON 0 = Displays OFF	R/W	1 or 0

10 Maintenance

This product is maintenance-free. The operation of the product does not required inspection or maintenance efforts.

10.1 Repairs

Defective components can cause dangerous malfunctions and compromise safety.
Only the manufacturer is authorized to perform repair work.
It is forbidden to open the product.

Product modifications

Modifications and alterations to the product and its functions are not allowed. The manufacturer exempts from liability for any modifications made to the product.

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

The manufacturer exempts from liability for any damage resulting from the use of non-original parts and equipment is excluded.

10.2 Storage and Shipment

Storage

When storing the product, observe the environmental conditions given in chapter “Technical specifications”.

Shipment and packaging

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

To protect the product from impact or shock, it must be shipped in its original packaging, or in an appropriate protective ESD packaging.
If the packaging is damaged, inspect the device for any visible damage, and immediately inform your freight forwarder and Bucher Automation AG of the damage caused during shipment. It is strictly forbidden to use a product that has been damaged or dropped.

10.3 Return and Disposal

The WEEE icon (crossed-out wheeled bin) says that end users must not dispose of waste electrical and electronic equipment together with household waste, but separately in an appropriate way. Applicable local environmental directives and regulations must be complied with.



Fig. 18: WEEE icon – crossed out wheeled bin

Disposal options

To do so, you may either resort to professional disposal service providers or return waste electronics to Bucher Automation AG.

Find detailed information along with the required Return Delivery Form on our website.

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 end user to delete any personal data stored on waste electric and electronic equipment prior to disposal.

Packaging material

The product’s packaging materials must not be disposed of together with household waste. Find detailed information on how to return packaging material to Bucher Automation AG on our website.

11 Service

11.1 Technical support

In case of questions, suggestions, or issues, please contact our experts from Technical Support. You may reach out by phone or through the contact form on our homepage:

Technical Support | www.bucherautomation.com

Or email us:

support@bucherautomation.com

Please supply the following information when contacting Technical Support:

– Hardware revision and serial number
  The hardware revision and serial number is printed on the nameplate of the product.
– OS version
  To determine the operating system version, use the functions of the development environment.

ⓘ Info

Open source software used

The controller contains components that are licensed under open source licenses. The corresponding licenses can be found in the webinterface [▶ 34] of the control unit in the Licences area.

12 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.

12.1 Accessories

ⓘ Info

Ordering Accessories

The accessories are not part of the scope of delivery.

Suitable accessories can be obtained from Bucher Automation AG.

Component	Item number
EVAL kit consisting of – Cable set 0.25 m – Connector boxes with 4 mm banana sockets – Labeling films JCM-631B	10002378
AmpSeal 35-pin mating connector set, loose	10001728
Programming cable 2 m M12/8-pin/X-coded to RJ45 (Cat5e)	60880135
Programming and service cable USB socket and RS 232 to Sub D	60882337
M12 to USB A female cable, length 1.5 m	60887428
M12 to USB A female cable, length 0.9 m	60887429

Tab. 25: Accessories

12.1.1 Displays

Component	Item number
4.3" display 480 x 272 resolution, RAM mount	10002054
10.1" display 1024 x 600 resolution, PCAP touch, VESA mount	10002028
Connection cable for displays to the JCM-631B, length 3 m	60882820
Connection cable for displays to the JCM-631B with angled plug, length 3.5 m	60883231

Tab. 26: Accessories – Displays

12.1.2 USB flash drives

Component	Item number
USB flash drive XMORE, 4 GB, XQC8	60876836
USB flash drive, 8 GB	60881279

Tab. 27: Accessories – USB flash drives

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