BUCHER automation

User Manual



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JVM-M043-O22

HMI

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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

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.

2.2 Purpose

2.2.1 Intended use

This device is a display for commercial vehicles and self-propelled 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.

SELV

The operating voltage of this device is classified as Safety Extra Low Voltage and is, therefore, not subject to the EU Low Voltage Directive. The device may only be operated from a SELV source.

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 JVM-M043-O22 is a display for commercial vehicles and mobile machines. The display is connected to a JCM-63x controller via CAN and FPD link II.

3.1 Configuration

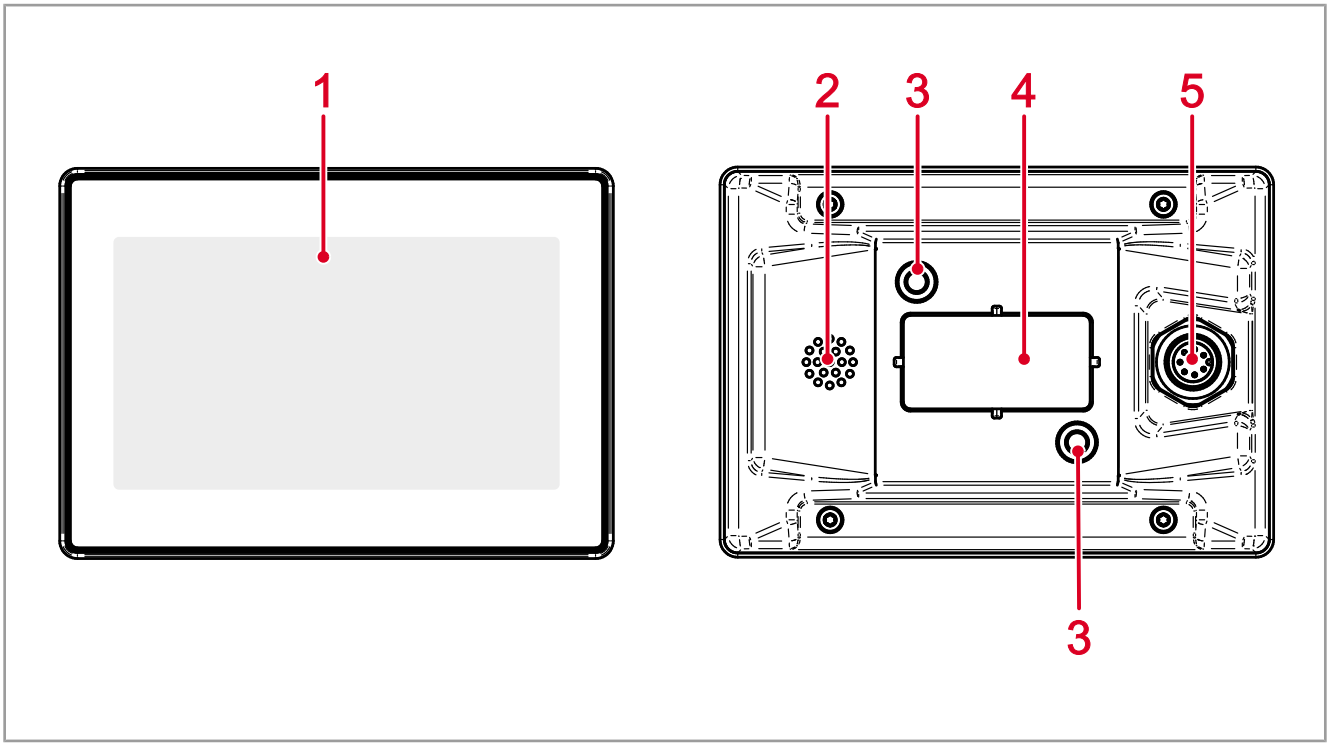


Fig. 1: Design

1	Display
2	Acoustic signal generator
3	Thread for RAM Mount RAM-B-238U
4	Nameplate and pressure equalization element
5	Connector

3.2 Features

- 4.3" TFT
- Resolution 480 x 272 px
- LED backlight
- Contrast 300:1
- 800 cdl/m², dimmable
- Acoustic signal generator
- Power voltage DC 8 V … 32 V
- FPD link II and CANopen
- Operating temperature range -20 °C … +60 °C

3.3 Nameplate

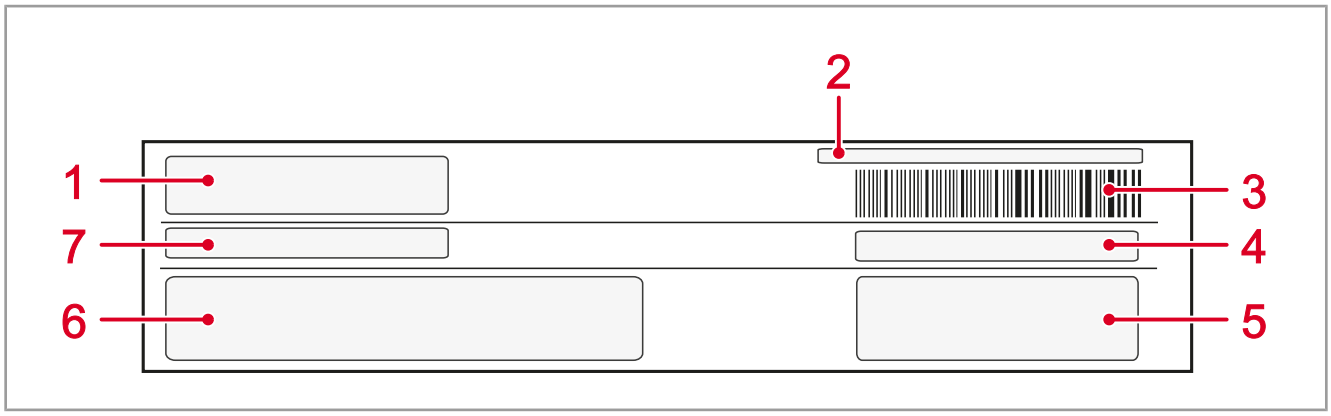


Fig. 2: Nameplate

1	Company logo
2	Serial number
3	Bar code
4	Hardware revision
5	Approvals and certification mark
6	Power supply specifications
7	Model code number

3.4 Scope of delivery

Scope of delivery	Item number	Quantity
JVM-M043-O22	10002054	1

4 Technical specifications

This chapter contains information on both electrical and mechanical data as well as on operating data of the JVM-M043-O22 device.

4.1 Dimensions

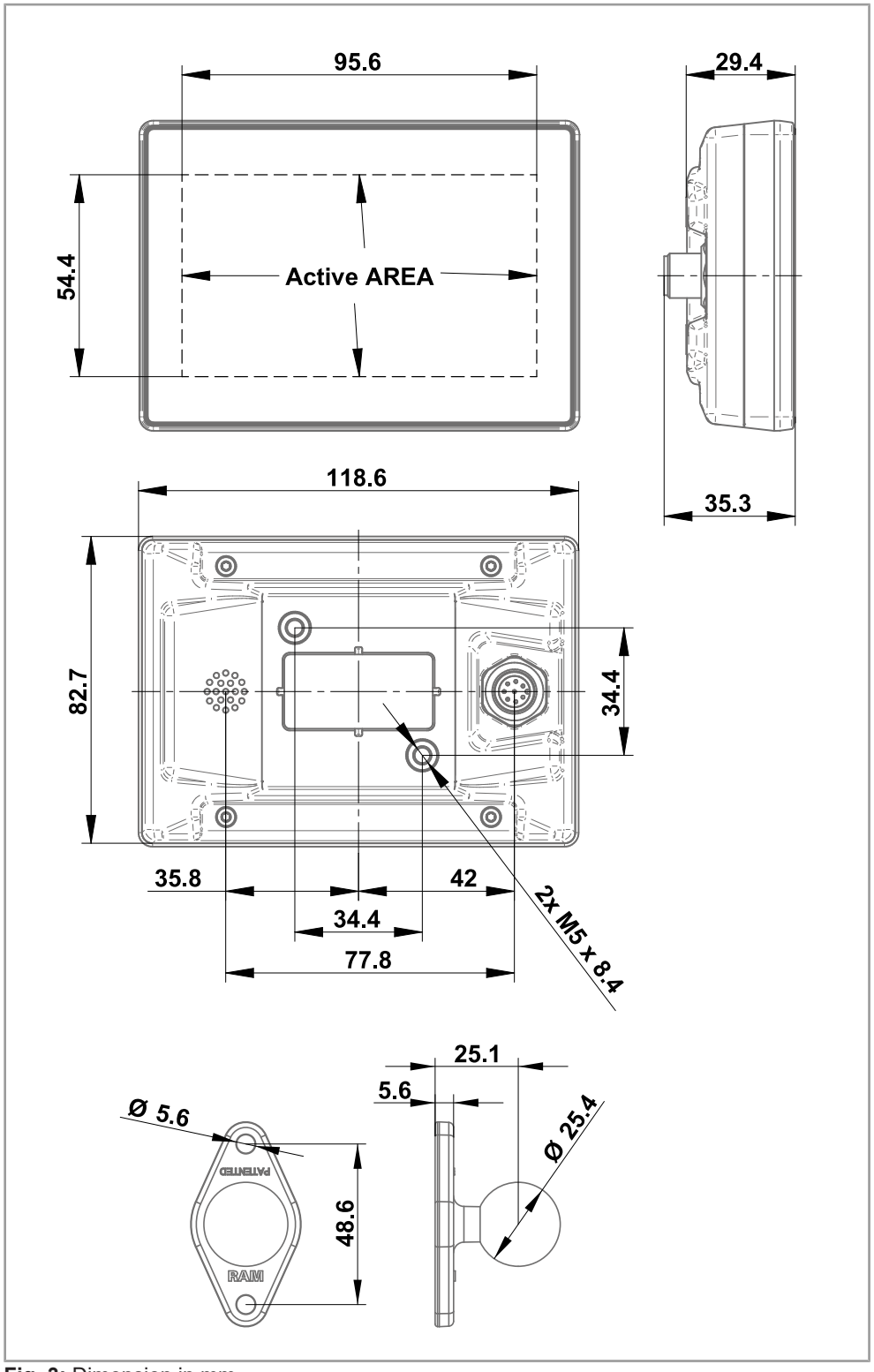


Fig. 3: Dimension in mm

4.2 Mechanical specifications

Parameter	Description
Generic housing	
Material	Plastic, injection molding
Mounting type	M5 x 10 mm, RAM Mount RAM-B-238U

Tab. 1: Mechanical specifications

4.3 Environmental conditions

Parameter	Description	Standards
Operating temperature	-20 °C ... +60 °C	ISO 16750-4
Climatic conditions	Humid heat	
Storage temperature	-30 °C ... +80 °C	
Humidity	10 % … 80 %	
Salt water resistance	Not designed for maritime applications	

Tab. 2: Environmental conditions

4.4 EMC Values

The display is ECE-R10 approved.

Pulses ISO 7637-2

Test pulse	Values	Function class
1	-450 V	C
2 a	+37 V	A
2b	+20 V	C
3 a	-150 V	A
3b	+150 V	A
4	Ua1: -12 V / 50 ms Ua2: -5 V / 500 ms	B (24 V systems)

Tab. 3: Pulses ISO 7637-2

Pulses ISO 16750-2

Test pulse	Values	Function class
5b	Load dump 70 V / 2 Ω / 350 ms	C

Tab. 4: Pulses ISO 16750-2

Irradiation to ISO 11452

Irradiation to ISO 11452	Function class
20 MHz ... 2 GHz ; 30 V/m	A
20 MHz ... 2 GHz ; 100 V/m	B

Tab. 5: Irradiation to ISO 11452

Emission CISPR 25

Emission CISPR 25	Limit
Narrow band emission 30 MHz ... 1,000 MHz	30 MHz ... 75 MHz → 52 dBµV/m ... 42 dBµV/m via logarithm of decreasing frequency
	75 MHz ... 400 MHz → 42 dBµV/m ... 53 dBµV/m via logarithm of decreasing frequency
	400 MHz … 1,000 MHz→ 53 dBµV/m constant
Wide band emission 30 MHz ... 1,000 MHz	30 MHz ... 75 MHz → 62 dBµV/m ... 52 dBµV/m via logarithm of decreasing frequency
	75 MHz ... 400 MHz → 52 dBµV/m ... 63 dBµV/m via logarithm of decreasing frequency
	400 MHz … 1,000 MHz→ 63 dBµV/m constant

Tab. 6: Emission CISPR 25

ESD EN 61000-4-2

ESD EN 61000-4-2	Function class
Contact ±4 kV	A
Air ±8 kV	A

Tab. 7: ESD EN 61000-4-2

4.5 Display

Parameters	Description		
Type	TFT		
Resolution	480 x 272 pixels		
Size	4.3"		
Contrast	300:1		
Background lighting	LEDs	800 cd/m^2	dimmable
Horizontal viewing angle	≥ 150°		
Vertical viewing angle	≥ 150°		

Tab. 8: Display

4.6 Acoustic signal generator

Parameter	Description	
Type	Piezo	
Volume	> 75 dB	At a distance of 1 m and an angle of ±15"

Tab. 9: Acoustic signal generator

5 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



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.

5.1 Pin assignment – Cable connector

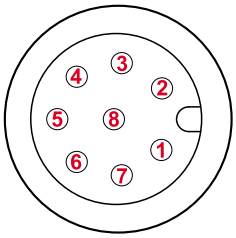


Fig. 4: M12 connector (male), 8-pin, A-coded

Pin	Signal
1	Battery voltage VBAT
2	GND
3	GND
4	FPD link II+
5	CAN1_L
6	FPD link II-
7	Battery voltage VBAT
8	CAN1_H

6 Controlling displays

Connection

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

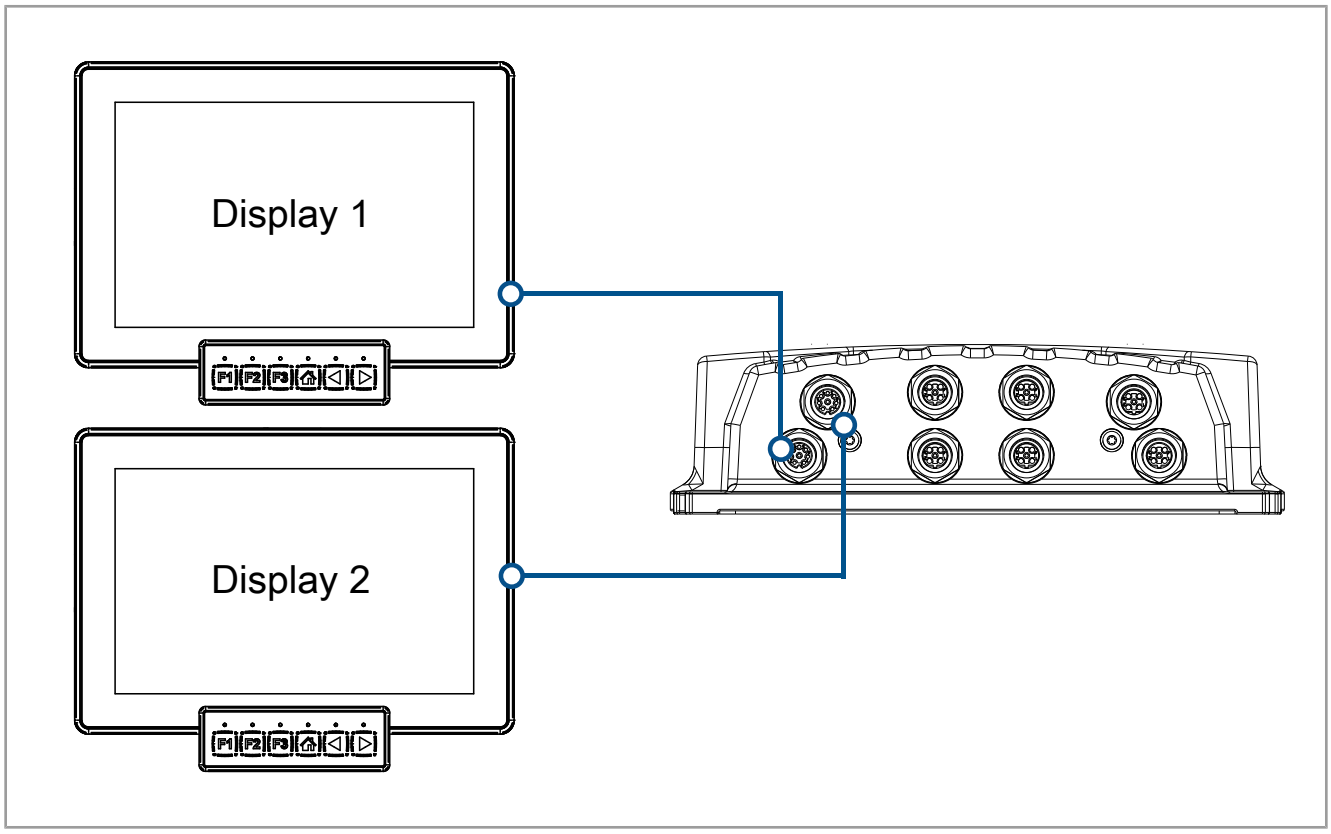


Fig. 5: Controlling displays

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. 10: 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.

7 Programming

7.1 Factory programming

The display is programmed with the currently approved firmware at the factory and can be used in conjunction with the JCM-63x controller without any further programming.

The following programming information is available for experienced users.

7.2 OS update via JetEasyDownload

To update the operating system of a device, use a PEAK CAN dongle and the Bucher Automation command line tool JetEasyDownload (version 1.00.0.15 or higher).

JetEasyDownload parameters

Calling JetEasyDownload requires the applicable specifications parameters.

Parameter	Description	Values	
-H<Num>	Hardware	0 =	PCAN_ISA1CH
		1 =	PCAN_ISA2CH
		2 =	PCAN_PCI_1CH
		3 =	PCAN_PCI_2CH
		4 =	PCAN_PCC_1CH
		5 =	PCAN_PCC_2CH
		6 =	PCAN_USB_1CH
		7 =	PCAN_USB_2CH
		8 =	PCAN_Dongle Pro
		9 =	PCAN_Dongle
		10 =	PCAN_NET Bucher Automation
		11 =	PCAN_DEV default device
		20 =	IXXAT V2.18
		22 =	IXXAT V3
		100 =	CAN hardware detected first
-T<nodeID>	Target node ID	The Node ID is given as a decimal.	

Parameter	Description	Values	
-B<Num>	Baud rate **Mind the permissible baud rates of your device!**	0 =	10 kBd
		1 =	20 kBd
		2 =	50 kBd
		3 =	100 kBd
		4 =	125 kBd
		5 =	250 kBd
		6 =	500 kBd
		7 =	1 MBd
-S<Num>	SDO timeout	Default	300 ms
-L<name>	OS file name	e.g. JVM-M043-O22_Vx.xx.x.xx.os	

Tab. 11: JetEasyDownload parameters

Performing the update

JetEasyDownload– H100 –T33– B5– S300 –LJVM-Mxx-IC.os

- ✓ JetEasyDownload and the PEAK CAN dongle are ready for use.
- ✓ A CAN connection is established between the PEAK CAN dongle and the JVM-M043-O22.

1. Call up JetEasyDownload with the above parameters and a valid OS file.
   - ⇨ The device carries out a reset.
   - ⇨ The device starts in boot loader mode with a single heartbeat in init state (data = 0x00).
2. Wait for approx. 7 seconds while the device formats the flash memory.
   - ⇨ The device initiates the download process.

⇨ The device starts automatically with the new firmware.

7.3 CAN communication

7.3.1 CAN identifier

– Display 1 (connector X81 on JCM-63x) has node ID 33.
– Display 2 (connector X82 on JCM-63x) has node ID 34.

Object	Description	CAN identifier
NMT	Network Management Telegram	0x000
EMCY	Emergency message	0x80 + node ID
TxPDO1	Process Data Object send	0x180 + node ID
RxPDO1	Process Data Object receive	0x200 + node ID
TxPDO2	Process Data Object send	0x280 + node ID
SDO (Tx)	Service Data Object receive	0x580 + node ID
SDO (Rx)	Service Data Object send	0x600 + node ID
Heartbeat	Error Control Protocol (Heartbeat)	0x700 + node ID

Tab. 12: CAN identifier

7.3.2 NMT commands

The display switches into **Operational** state immediately after switching on. The following NMT commands are supported:

NMT commands	Description
RESET	Resets the JVM-M043-O22
PREOPERATIONAL	Switches to the **Pre-Operational** state
OPERATIONAL	Switches to the **Operational** state

Tab. 13: NMT commands

7.3.3 Heartbeat

The device sends a heartbeat message every 1 s. If the heartbeat is not transmitted within 3 s, the display is not active.

Description	Byte 0
BOOTUP	CMD 0
OPERATIONAL	CMD 5
PRE-OPERATIONAL	CMD 127

Tab. 14: Index of the heartbeat message

7.3.4 TxPDO1

TxPDO1 is used internally for communication with JetViewSoft and JetSym.

7.3.5 TxPDO2

TxPDO2 is used internally for communication with JetViewSoft and JetSym.

7.3.6 RxPDO1

Telegrams sent to or received from the display in **Operational** state.

Description	Byte 0	Byte 1	Byte 2/3	Byte 4/5	Byte 6/7
Backlight / LED control (cyclical transmission)	1	Display backlight 0 % … 100 %	Byte 2 = 0 Byte 3 = backlight keys 0 % ... 100 %		

Tab. 15: RxPDO1

7.3.7 SDO communication

According to CANopen the following indices can be queried.

Function					
Index	**Subindex**	**Description**	**Type**	**Access**	**Default value / unit**
		Display backlight			
2A01	04	Intensity	U8	R/W	0 % … 100 % 100 = 100 %
		Key and signal LEDs			
2A03	04	Key backlight intensity	U8	R/W	0 % … 100 %
	05	Number of keys	U8	R	0 … 24
	07	Signal LEDs	U32	R/W	Bits
		Acoustic signal generator			
2A06	04	Active Turns the acoustic signal generator on or off. Ongoing sound patterns are interrupted in the process.	U32	R/W	0 or 1
	05	Sound pattern: Frequency	U32	R/W	Hz
	06	Sound pattern: Repetitions	U32	R/W	1 - n
	07	Sound pattern: Pulse width on	U32	R/W	1 ms
	08	Sound pattern: Pulse width off	U32	R/W	1 ms
	09	Sound pattern: Update Subindexes 05 … 08 are transferred and processing is started.	U8	W	

Tab. 16: SDO communication – function

EDS identification

Index	Subindex	Description	Type	Access	Default value / unit
		EDS			
4555	03	Version	U8	R	
4555	04	Module code	U16	R	
4555	05	Device Name	String	R	Char[32]
4555	06	PCB revision	U8	R	
4555	07	PCB options	U8	R	
4555	08	Min. OS version	U32	R	
4555	09	Min. boot loader version	U32	R	
4555	0 A	Version	U8	R	
4555	0 B	Serial number	String	R	Char[20]
4555	0C	Day	U8	R	
4555	0D	Month	U8	R	
4555	0E	Year	U16	R	
4555	0F	Test number	U8	R	
4555	10	Test revision	U32	R	
4555	64	Version	U8	R	
4555	65	Display type	U8	R	
4555	66	CAN-ID	U8	R	
4555	67	Touch keys	U8	R	
4555	68	Key	U8	R	
4555	69	LED	U8	R	
		ENP			
4565	01	Version	U8	R	
4565	03	Serial number	String	R	Char[32]
4565	04	Item number	String	R	Char[16]
4565	05	Hardware revision	String	R	Char[16]

Tab. 17: SDO communication – EDS

Identification device information					
Index	**Subindex**	**Description**	**Type**	**Access**	**Default value / unit**
0x1018	0	Number of supported entries	U8	R	
	1	Manufacturer ID	U32	R	0x000000B3
	2	Product code	U32	R	
	3	Revision number	U32	R	
0x1000	0	Device type	U32	R	
0x1008	0	Device name		R	
0x1009	0	Hardware revision		R	
0x100A	0	Software version		R	

Tab. 18: SDO communication – device information

7.4 Troubleshooting

Emergency object telegrams (EMCY telegrams)

EMCY telegrams are sent at startup or after any changes at an inhibit time of 50 ms (minimum pause between 2 telegrams). An EMCY telegram is sent when an event is started or changed.

Byte	Contents	
0 … 1 =	Emergency error code	
2 =	Error register	Object 0x1001
3 … 7 =	Manufacturer-specific field	
	Always 0 is sent.	

Tab. 19: Bit values of emergency objects

Emergency Error Codes

Code	Mandatory field	Name	Description
0x1000		**Generic error**	
	3	GenericError, acoustic signal generator	
	6	GenericError, FPD	
	7	GenericError, FPGA	
	13	GenericError, CAN	
0x3100		MainVoltageOutOfRange	Transmitted at a voltage < 9 V. Detects when power is turned off from the JCM-63x.
0x3101		MainVoltageBacklightOff	Transmitted at a supply voltage < 8.2 V. The backlight is switched off.
0x5000		GeneralHardwareError	FPGA update error
0x6000		GeneralSoftwareError	FPFA update flash deletion failed

Code	Mandatory field	Name	Description
0x6101	2	InternalSoftwareError_Boot	Error during bootup, backlight
0x6101	3	InternalSoftwareError_Boot	Error during bootup, buzzer
0x6101	6	InternalSoftwareError_Boot	Error during bootup, FPD
0x6101	7	InternalSoftwareError_Boot	Error during bootup, FPGA
0x6101	8	InternalSoftwareError_Boot	Error during bootup, keypad
0x6101	9	InternalSoftwareError_Boot	Error during bootup, PWM
0x6101	11	InternalSoftwareError_Boot	Error during bootup, temperature
0x6101	12	InternalSoftwareError_Boot	Error during bootup, touch keys
0x8110		CANOverrun	
0x8140		RecoveredFromBusoff	
0xFF01		FPDLinkError	Image transmission disrupted
0xFF10		KeyboardError	
0xFF20	0	TouchError	Touch not responding
0xFF20	1	TouchError	Touch driver could not detect which touch type is connected.
0xFF20	2	TouchError	Touch initialization failed

Tab. 20: Emergency Error Codes

7.4.1 FPD link error

If there is no FPD link connection, the display flickers.

7.4.2 Display

The display shows the information transmitted via FPD link II. If the video signal fails, the display flickers.

After switching on the display, a striped pattern from the self-test is displayed, but this is immediately overwritten by the received image signal. The display image is generated and transmitted by a JCM-63x.
The typical video settings are:

Parameter	Description
Resolution	480 x 272 pixels
Display refresh rate	9 MHz
Hsync	02, 41, 02
Vsync	2, 10, 2

Tab. 21: Video settings

7.4.3 Undervoltage

If the voltage on the display falls below 9 V, the emergency code 0x3100 is sent.

If the voltage on the display falls below 8.2 V, emergency code 0x3101 is sent and the backlight is turned off.

When the voltage on the display rises above 9 V again, the backlight is switched back on.

The power supply to the displays can be switched by the JCM-63x controller. This is why the battery voltage on the displays is slightly lower.

When the displays are switched off via register 700.000.064 of the JCM-63x controller, emergency code 0x3100 is sent.

8 Maintenance

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

8.1 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.

8.2 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.

8.3 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. 6: 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.

9 Service

9.1 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.

10 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.

10.1 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
Connection cable for display to a JCM-63x controller, length 3 m	60882820
Connection cable with angled plug for display to a JCM-63x controller, length 3.5 m	60883231

Tab. 22: Accessories

Bucher Automation AG
Thomas-Alva-Edison-Ring 10
71672 Marbach/Neckar, Germany
T +49 7141 2550-0
info@bucherautomation.com

www.bucherautomation.com