Jetter
automation

User Manual

JXM-HMI

We automate your success.

Table of contents

1 Introduction

1.1 Information on this document

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

Target groups

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

Availability of information

Make sure this document is kept at the ready in the vicinity of the product throughout its service life.
For information on new revisions of this document, visit the download area on our website. This document is not subject to any updating service.

Start | Jetter - We automate your success.

For further information refer to the following information products:

■ Version updates
  Information about new versions of software products or of the operating system of your controller.

■ Online help of the JetSym software
  Detailed description of software functions with application examples

■ Application-oriented manuals
  Information on file systems and communication interfaces

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.

More information on this subject is available on our website.

Start | Jetter - We automate your success.

ⓘ **INFO**   "Info" provides you with useful information and practical tips about the product.

2 Safety

2.1 General information

At the time of placing on the market, this product corresponds to the current state of the art and meets the recognized safety rules.

Besides this user manual, laws and regulations in the operator's country are relevant to the operation of the product. The operator is responsible for complying with the directives mentioned below:

- Applicable legislation, rules, and regulations
- Relevant accident prevention regulations
- Accepted safety rules
- EU directives and other country-specific regulations

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

2.2 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 potential hazardous situation which, if not avoided, could result in death or serious injury.

⚠ CAUTION	**Low risk**
	Indicates a hazardous situation which, if not avoided, could result in minor or moderate injury.

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

2.3 Usage other than intended

This device must not be used in technical systems which to a high degree have to be fail-safe.

Machinery Directive This device is no safety-related part as per Machinery Directive 2006/42/EC, and must, therefore, not be used for safety-relevant applications. This device is NOT intended for the purpose of personal safety, and must, therefore, not be used to protect persons.

3 Product description

The JXM-HMI is a universal human-machine interface with three rugged push encoders. It is therefore ideally suited for a wide range of dosing and control applications in self-propelled machines. Thanks to its compact design, the JXM-HMI can be flexibly mounted individually or in combination with a JetViewMobile 104, for example, in the driver's cabin. Integrated LEDs ensure that the push encoders are always perfectly visible.

The CANopen® communication interface lets you connect the module to common CAN networks of self-propelled machines.

3.1 Features

- 1 CAN port with terminating resistor
- Communication via CANopen® protocol
- Adjustable key illumination
- 3 push encoders

3.2 Nameplate
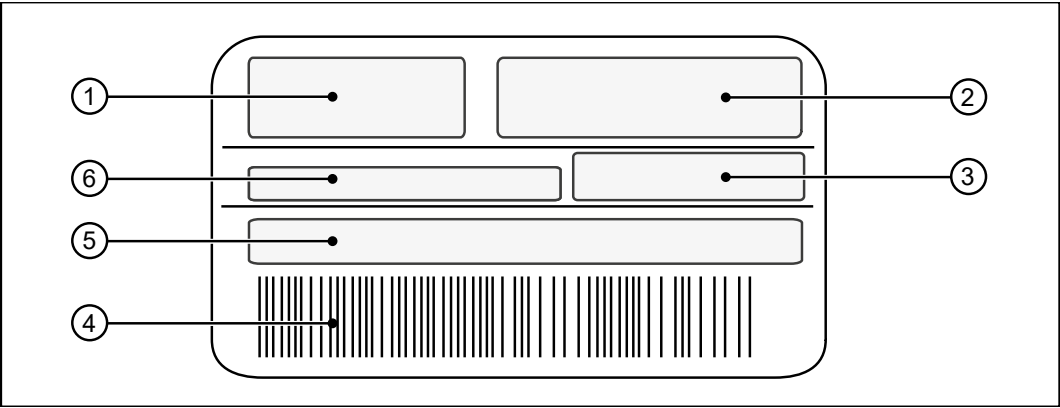
Fig. 1: Sample nameplate

①	Logo	②	Certification mark
③	Item number	④	Barcode
⑤	Serial number	⑥	Model code number

4 Mechanical installation

Mount the JXM-HMI only in a suitable place in the vehicle interior.

NOTICE	**Damages to material or functional impairment**

Welding on the chassis may cause damages to material of the device, or impair its 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.

4.1 Mounting in combination with a JVM-104

The JXM-HMI is particularly well suited for use in conjunction with the JVM-104 HMI. A special mounting plate is available for this purpose which enables both devices to be mounted together.

Mounting Accessories

Use the following accessories for installation:

Accessories	Item number
Holding plate for combination of JXM-HMI **and JVM-104 for RAM Mount ball** consisting of mounting plate and screws for housing with Deutsch or M12 connector, without RAM mount attachments	10001832

Tab. 1: Mounting Accessories

The illustration below shows how to install the device:

Fig. 2: Installation drawing

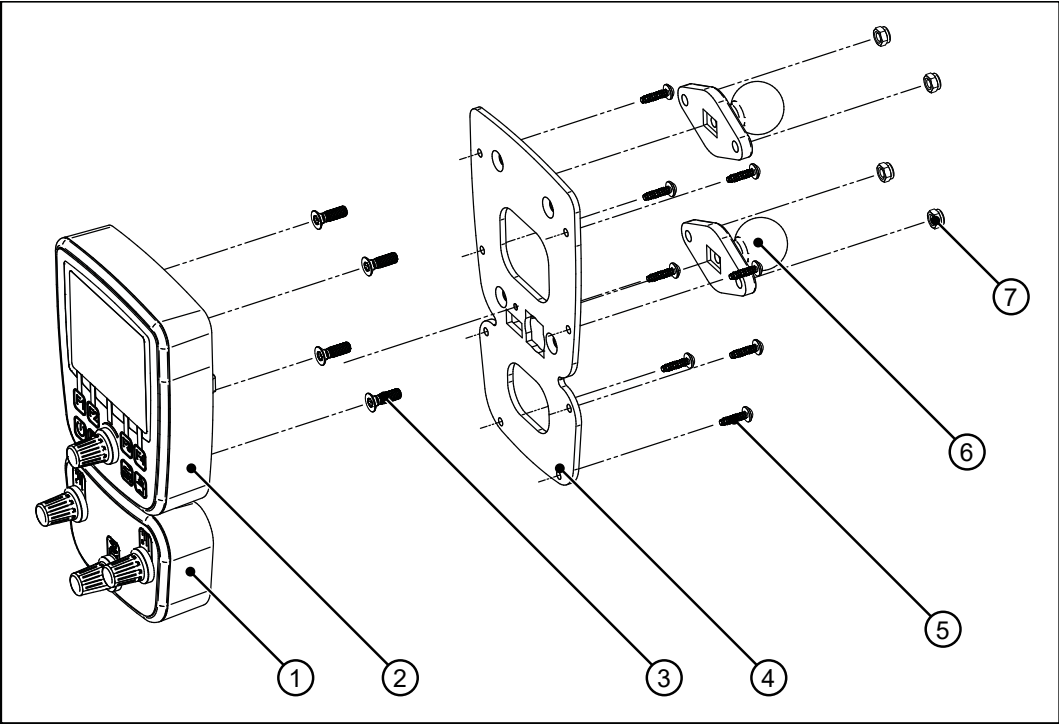| ①	JXM-HMI	②	JVM-104
③	2 x countersunk screws for mounting a RAM Mount ball	④	Mounting plate with opening for connector
⑤	8 x screws for fixing the mounting plate to the JXM-HMI and JVM-104	⑥	RAM Mount ball
⑦	2 x self-locking nuts		

1. Screw the desired RAM Mount attachments onto the mounting plate.
2. Hold the JXM-HMI and the JVM-104 against the mounting plate from behind. The connectors must be accessible through the openings in the mounting plate.
3. Screw the mounting plate onto the JVM-104 and the JXM-HMI.

Installing the strain relief

Install strain reliefs for the connecting cables.

- Ensure that there is sufficient clearance between the strain reliefs and the connectors.
- Connectors must not be obstructed, so that they can be removed in the event of service.

4.1.1 Requirements for the installation location

- The installation surface must be level.
- The installation surface should be no more than 5 mm thick.
- The installation location must allow air to circulate.
- The installation compartment must allow adequate air circulation.
- The installation location must be of sufficient size.
- The device must be easily accessible to allow for service work.

Space required for installation and service

It must be possible to disconnect the connectors at any time.

Avoiding unsuitable installation locations

The following installation locations are unsuitable for installation:

Unsuitable installation location	Reason
Outdoor installation	The device must not be exposed to rain or a jet of water. Do not use a steam jet or other such devices to clean the device.
This location is not ventilated.	The JVM-104 could overheat as heat builds up.
Installation location close to heat-sensitive materials	The materials could become warped or misshapen as a result of heat produced by the device.
Installation surfaces are uneven.	The installation surface could become misshapen when fitting the device. Fastening is unstable and precarious.

5 Technical specifications

5.1 Dimensions
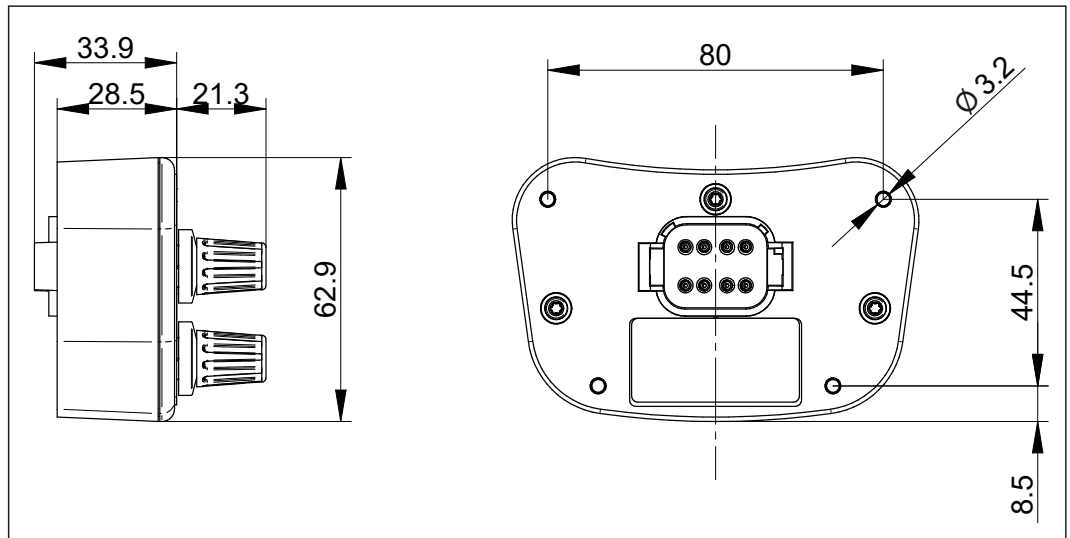
Fig. 3: Dimensions (in mm)

5.2 Environmental conditions

Category	Description	Standards
Operating temperature	-30 … +85 °C	
Storage temperature	-30 … +85 °C	
Relative humidity	5 ... 95 %	
Installation location	The device must be installed in the driver's cab.	
Degree of protection	IP42 with mating connector plugged in	ISO 20653:2013

Tab. 2: Environmental conditions

Climatic tests

Category	Standards	Functional class
Temperature, cyclically	DIN EN 60068-2-14 (2 cycles for function test)	A
	DIN EN 60068-2-14 (5 cycles for material test)	C
Humidity/temperature, cyclically	DIN EN 60068-2-38 (-10 °C ... 55 °C)	A

Tab. 3: Climatic tests

5.3 Mechanical specifications

Category	Description	Standards
Vibration		ISO 16750-3
Floating frequency	10 … 150 Hz	
Period	6 h	
Shock resistance		ISO 16750-3
Type of shock	Half-sine wave	
Intensity and duration	50 g (500 m/s²) for 18 ms	
Number and direction	10 shocks in all 6 directions	
Height of fall		ISO 16750-3

Category	Description	Standards
Free fall	1 m onto solid ground or steel plate	

Tab. 4: Mechanical specifications

5.4 Electrical properties

Category	Description
Abbreviation	VBAT_ECU
Operating voltage	8 … 32 V DC

Tab. 5: Power Supply

5.5 EMC values

The JXM-HMI has E1 approval according to ECE R10 Rev. 5 and CE conformity according to ISO 14982.

Pulses to ISO 7637-2

Test pulse	Values	Functional class
1	-450 V	C
2a	+37 V	B
2b	+20 V	C
3a	-150 V	A
3b	+150 V	A
4 (24 V)	Ua1: -12 V / 50 ms Ua2: -5 V / 500 ms	A
4 (12 V)	Ua1: -6V / 15 ms Ua2: -2.5 V / 1000 ms	A
5b	Load dump 70 V / 2 Ω / 350 ms	A (as of HW revision 02.00) E (up to HW revision 01.00)

Tab. 6: Pulses to ISO 7637-2

ESD EN 61000-4-2

Category	Values	Functional class
Contact discharge	±4 kV (to conductive surfaces)	A
Discharge through air	±8 kV (to insulating surfaces)	A

Tab. 7: ESD EN 61000-4-2

Radiated electro-magnetic energy ISO 11452-2 2004 and ISO 11452-4 2004

Category	Values	Functional class
Protection against RF noise	20 MHz ... 2 GHz 30 V/m	A

Tab. 8: Irradiation to ISO 11452

5.6 Ports and interfaces

CAN port

Category	Description
Baud rate	125 kBaud ... 1 MBaud
Protocol	CANopen®
Default node ID on the CANopen® bus	0x11
Terminating resistor	Integrated
Connector specifications	Twisted pair conductors, unshielded
CANopen® ports	1
Protection	■ Short circuit ■ Overvoltage protection (32 V max.)

Tab. 9: CAN port

6 Electrical connection

NOTICE	**Damages to material or functional impairment**

Improper implementation of the wiring harness may cause mechanical stress.

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

NOTICE	**Overvoltage due to missing external fuses**

High voltages can impair the functions of the device or damage the device.

- Make sure that the voltage inputs are fused according to the requirements.
- Observe the ESD principles when handling the device.
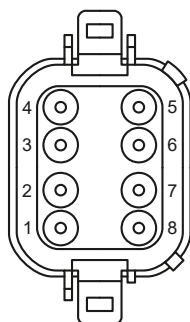
6.1 Pin assignment - Power supply/CAN/ignition

4	VBAT_ECU	5	VBAT_ECU
3	GND_IN	6	GND_OUT
2	CAN_H_IN	7	CAN_H_OUT
1	CAN_L_IN	8	CAN_L_OUT

Fig. 4: Deutsch connector, 8 pins

7 Programming

7.1 Device status

Status	Condition	Features
Bootloader PRE-OPERATIONAL		
No firmware present		■ Information SDOs are accessible
		■ Firmware update possible
		■ Heartbeat
OPERATIONAL		
Firmware successfully started		■ All SDOs are accessible
		■ Heartbeat

Tab. 10: Device status

7.2 Setting the node ID

The default node ID of the JXM-HMI is 0x11 hexadecimal. The node ID can be changed by SDO via the System parameters [▶ 17].

7.3 CAN identifier

Message type	Description	CAN identifiers
NMT	Network Management Telegram	0x000
SDO TX	Service Data Object receive	0x580 + node ID
SDO RX	Service Data Object send	0x600 + node ID
TXPDO1	Process Data Object send	0x180 + node ID
RXPDO1	Process Data Object receive	0x200 + node ID
EMCY	Emergency message	0x80 + node ID
Error control	Error Control Protocol (Heartbeat)	0x700 + node ID

Tab. 11: CAN identifiers

7.4 CAN communication

7.4.1 NMT commands

The JXM-HMI changes into OPERATIONAL mode immediately after switching on. The following NMT commands are supported:

NMT commands	Description
Reset Node	The node is reloaded and all settings are set to their default values.

Tab. 12: NMT commands

7.4.2 Heartbeat

The device sends a heartbeat message in a 1 s cycle. If the heartbeat is not transmitted within 3 s, the HMI is not active.

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

Tab. 13: Index of the heartbeat message

7.4.3 TXPDO1

TXPDO1 is sent each time the encoder values change, but not more than once per 100 ms. Encoder values are values of a free-running counter. With a positive overflow the value changes to 0x0, with a negative overflow to 0xffff. Dynamization can take place in the controller.

Byte 0/1	Byte 2/3	Byte 4/5	Byte 6
Uint16_t Encoder 1 value	Uint16_t Encoder 2 value	Uint16_t Encoder 3 value	Encoder return: Bit 0 = Encoder 1 Bit 1 = Encoder 2 Bit 2 = Encoder 3

Tab. 14: TXPDO1

7.4.4 RXPDO1

Telegrams sent to the JXM-HMI in OPERATIONAL mode:

Description	Byte 0	Byte 1	Byte 2	Byte 3/4	Byte 5	Byte 6/7
Key illumination/ LED control (cyclic transmis- sion)	1		Key illumi- nation 0 … 100 %			

Tab. 15: RXPDO1

7.4.5 SDO communication

According to CANopen® the following indices can be queried:

Index	Subindex	Description	Type	Dir	Default value
0x1000	0	Device type	U32	R	
0x1001	0	Error register: Bit 0: Generic error Bit 3: Temperature Bit 4: Communication error	U32	R	
0x1008	0	Device Name	STR	R	
0x1009	0	Hardware revision of device	STR	R	
0x100A	0	Software version of device	STR	R	
0x1018	0	Number of supported en- tries	U8	R	
	1	Distributor ID	U32	R	0x000000B3 (Jetter's distributor ID)
	2	Product code	U32	R	
	3	Revision number	U32	R	
	4	Serial number	U32	R	

Tab. 16: SDO communication

7.5 Encoder configuration

Index	Subindex	Description	Type	Dir	Default value
0x2002… 0x2004 Encoder 1 … encoder 3	0	Number of supported entries	U8	R	7
	1	Bit 0 = 0 Increment direction right Bit 0 = 1 Increment direction left	U8	R/W	0
		Bit 1 = 0 Dynamization OFF Bit 1 = 1 Dynamization ON	U8	R/W	0
		Bit 2 = 0 Limit values OFF Bit 2 = 1 Limit values ON	U8	R/W	0
	2	Rotary pulse/second up to level 1	U16	R/W	4
	3	Level 1 step size	U16	R/W	10
	4	Rotary pulse/second up to level 2	U16	R/W	7
	5	Level 2 step size	U16	R/W	100
	6	Rotary pulse/second up to level 3	U16	R/W	10
	7	Level 3 step size	U16	R/W	1000
	8	Minimum value	U16	R/W	0
	9	Max. value	U16	R/W	0
	10	Value/encoder output (analog to TXPDO1 [▶ 15])	U16	R/W	0

Tab. 17: Encoder configuration

7.6 System parameters

| INFO | You can only use the set system parameters after restarting the system. |

Index	Subindex	Description	Type	Dir	Default value
0x4556	0	Number of supported entries	U8	R	4
	3	CAN baud rate: 3 = 1 MBaud 2 = 500 kBaud 1 = 250 kBaud 0 = 125 kBaud	U8	R/W	1
	4	CANopen® node ID	U8	R/W	0x11

Tab. 18: System parameters

7.7 Troubleshooting

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.

Emergency object telegrams (EMCY telegrams)

Byte 0/1	Byte 2	Byte 3-7
Emergency Error Code	Error register	Manufacturer specific error field
	Object 0x1001	Always 0 is sent.

Tab. 19: Bit values of emergency objects

Error memory (error history)

Code	Description
0x0000	No error or error reset
0x1000	Generic error
0x3100	Voltage VBAT_ECU exceeds the permitted limits
0x4200	Device temperature is too high
0x8110	CAN data overrun (lost objects)
0x8140	Recovered from bus-off

Tab. 20: Emergency Error Codes

8 Maintenance and repairs

8.1 Maintenance, repairs and disposal

Maintenance

This device is maintenance-free.
Therefore, for the operation of the device no inspection or maintenance are required.

Repairs

Defective components could cause dangerous malfunctions and could compromise safety.
Only the manufacturer is allowed to repair the device.
Do not open the device!

Disposal of obsolete equipment

The device must be disposed of in accordance with the Environmental Product Declaration EPD. Applicable local environmental directives and regulations must be complied with. This product must be disposed of as waste electronic equipment. Waste packaging material must be recycled or reused.

Modifications and alterations to the device

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

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

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

8.2 Storage and shipment

Storage

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

Shipment and packaging

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

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

9 Service

9.1 Customer service

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

Technical hotline | Jetter - We automate your success.

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

hotline@jetter.de

Please supply the following information when contacting our technical hotline:

■ Hardware revision and serial number
For the hardware revision number, please refer to the nameplate.

List of figures

List of tables

Jetter
automation

Jetter AG
Graeterstrasse 2
71642 Ludwigsburg
www.jetter.de

E-mail   info@jetter.de
Phone   +49 7141 2550-0

60884702

We automate your success.