BUCHER automation

User Manual



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JetViewMobile 306

ISOBUS terminal

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Translation of the german original User Manual

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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.

Purpose of the Document

This document describes rules for the design of the system menu in ISOBUS operating devices of Bucher Automation AG.

It does not describe all the functions and operation of the virtual ISOBUS terminal.

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.

Start | www.bucherautomation.com

For further information refer to the following information products:

– User manuals
  Information on commissioning Bucher Automation 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

ⓘ Info

Further information

For further information on the noise immunity of a system, please refer to the Application Note 016 *EMC-Compatible Installation of the Electric Cabinet* available for download on www.bucherautomation.com.

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.

1.3 Legal notices

The firmware and tools used by the device use software products or components of the third-party providers named below.

Licenses of third-party providers

Product	Licensor	Link to the license document	License type
FSF lib	Free Software Foundation	https://www.fsf.org/licensing	GPLv3
CMSYS	ARM Limited	ARM contract reference LEC-PRE-00489n-V3.0	Open Source
ST lib	ST Microelectronics	http://www.st.com/software_license_agreement_liberty_v2	Free for controllers belonging to ST
Python	Python Software Foundation (PSF)	https://docs.python.org/3/license.html	GPL-compatible
srec_cat	Peter Miller	http://srecord.sourceforge.net	GNU GPLv3

Tab. 1: Licenses of third-party providers

2 Safety

2.1 General Information

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.

CE

The device is CE compliant according to the ISO 14982 standard on agricultural and forestry machinery.

RoHS 2

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

2.2 Purpose

2.2.1 Intended use

The JVM-306 device is intended for operation of ISOBUS applications for mobile work 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 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.

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-306 control unit is an ISOBUS Universal Terminal that features intuitive operation. Due to the ISOBUS-UT functionality, it works together with ISOBUS controllers. Communication is via the ISOBUS protocol.

Supported firmware

This document refers to firmware version 2.0.0.84 and higher.

3.1 Design

Front side

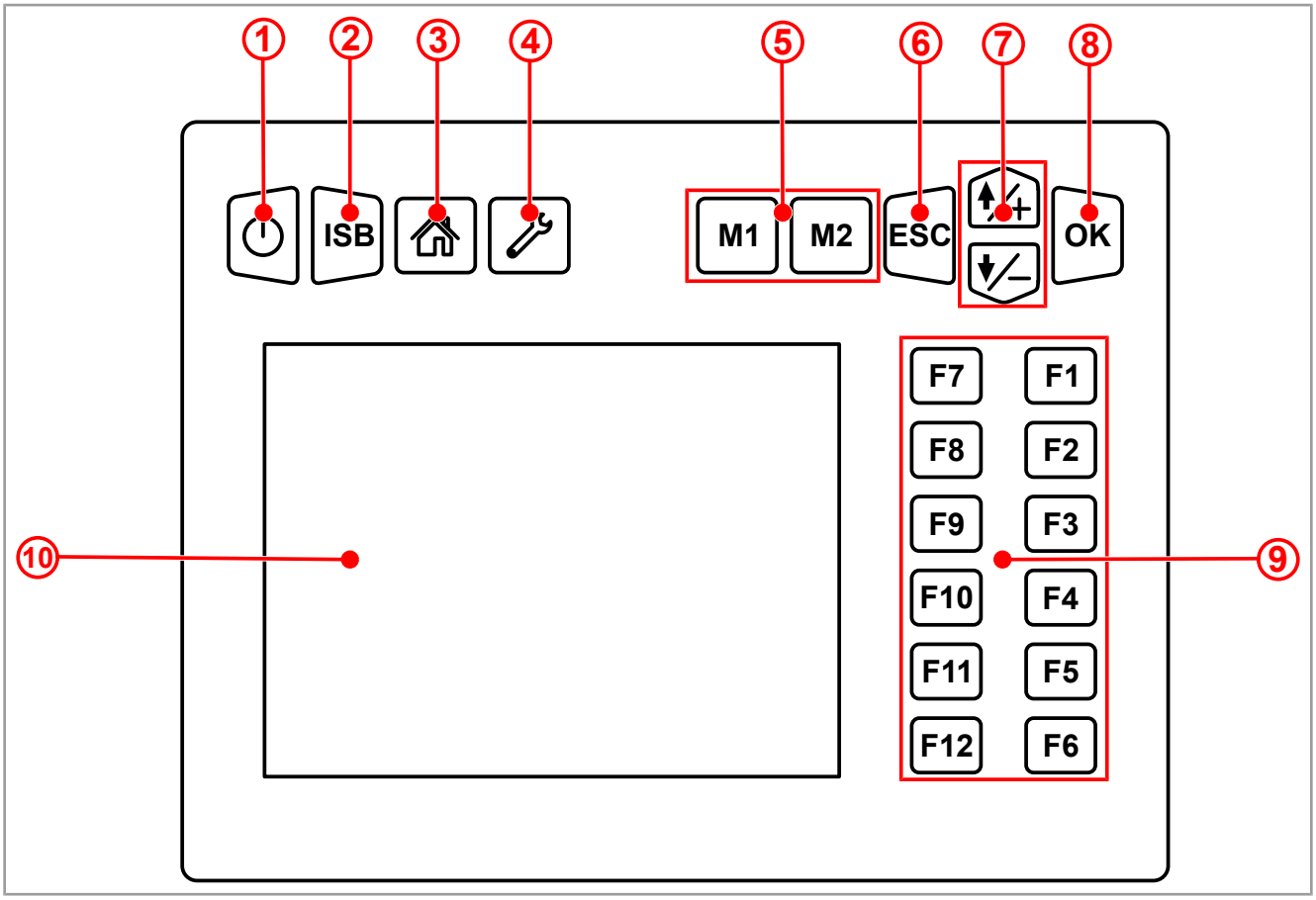


Fig. 1: Front side of the control unit

1	On/Off key
2	ISB key
3	Home key
4	Settings key
5	Special function keys
6	ESC key
7	Navigation keys
8	OK key
9	Function keys
10	TFT touchscreen

Rear

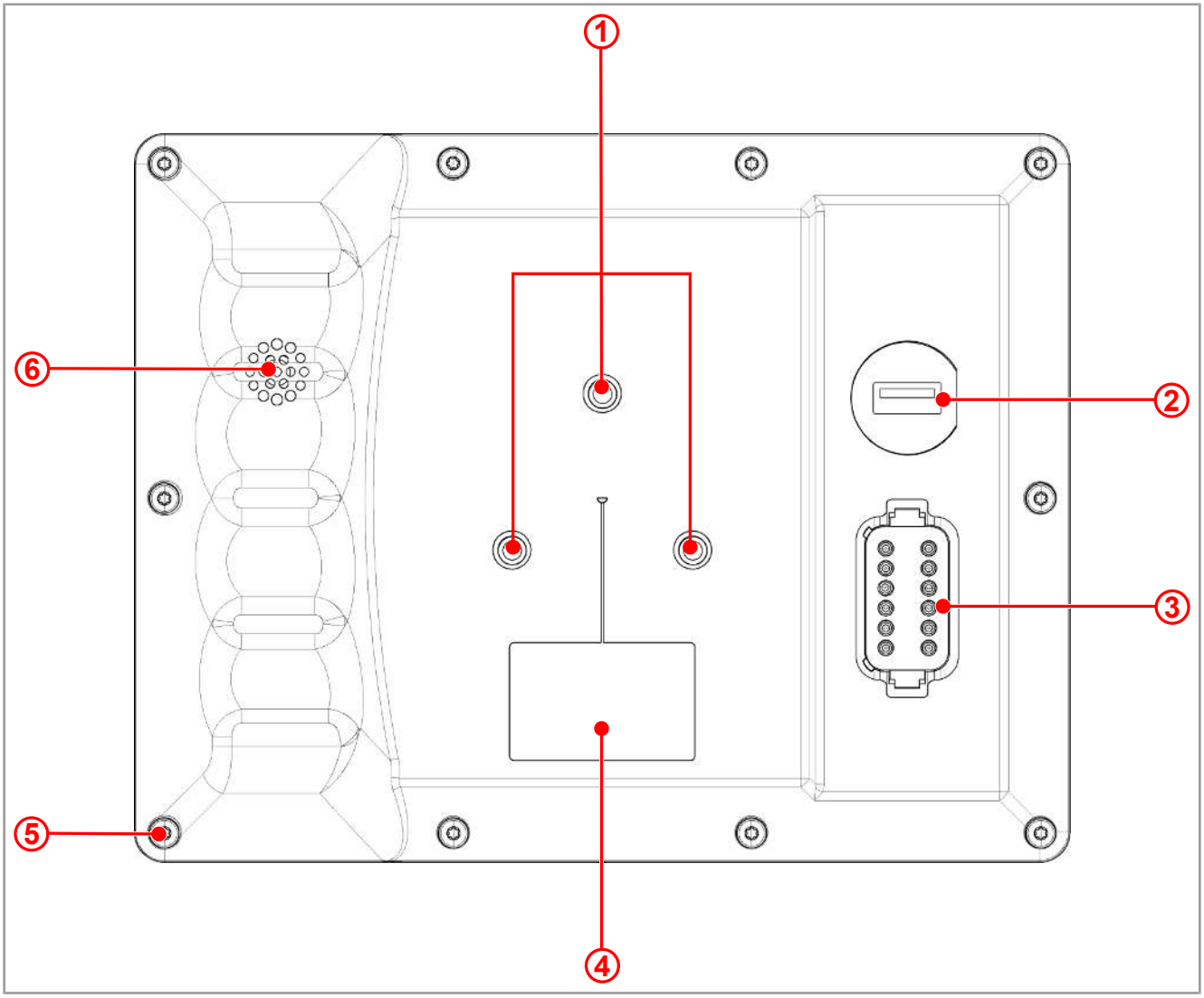


Fig. 2: Rear of the control unit

1	RAM mount holder
2	USB interface
3	Deutsch plug DT12
4	Nameplate
5	Housing screw connection
6	Loudspeaker

3.2 Product Features

- Display: 5.7″ touchscreen
- Input: 14 freely programmable function keys (softkeys F1 … F12, M1, M2);
  8 permanently assigned hard keys (On/Off, ISB, settings, M1, M2, ESC, navigation, OK)
- 2 digital inputs for tractor speed signals
- 1 digital input for the speed of the rear PTO shaft
- 1 three-point digital input (hitch)
- 1 three-point analog input (hitch)

– 1 digital input for the ignition signal
– 1 Deutsch plug DT12
– Real-time clock (RTC) with battery backup
– ISOBUS-UT function
  16 MB flash memory (for IOP data)
– ISOBUS-TECU function
  Calibrating function for the tractor speed signal
– ISOBUS-FS function
– Update of the operating system and system menu via USB
– Adaptable system menu

3.3 Nameplate

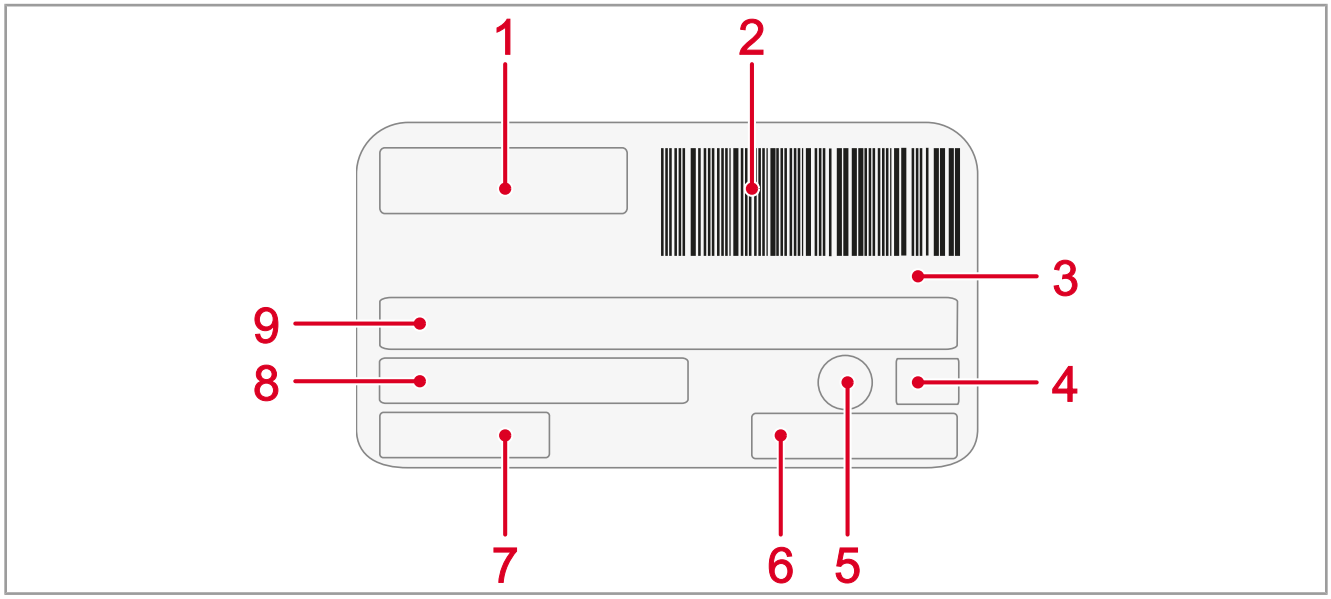


Fig. 3: Nameplate

1	Manufacturer logo
2	Barcode
3	Serial number
4	CE certification mark
5	E1 approval
6	E1 approval number
7	Hardware revision
8	Part number
9	Product type

3.4 Scope of Delivery

Scope of delivery	Item number	Quantity
JVM-306-K00-O21	10002173	1

4 Technical Specifications

This chapter contains information on both electrical and mechanical data as well as on operating data of the JVM-306 device.

4.1 Dimensions

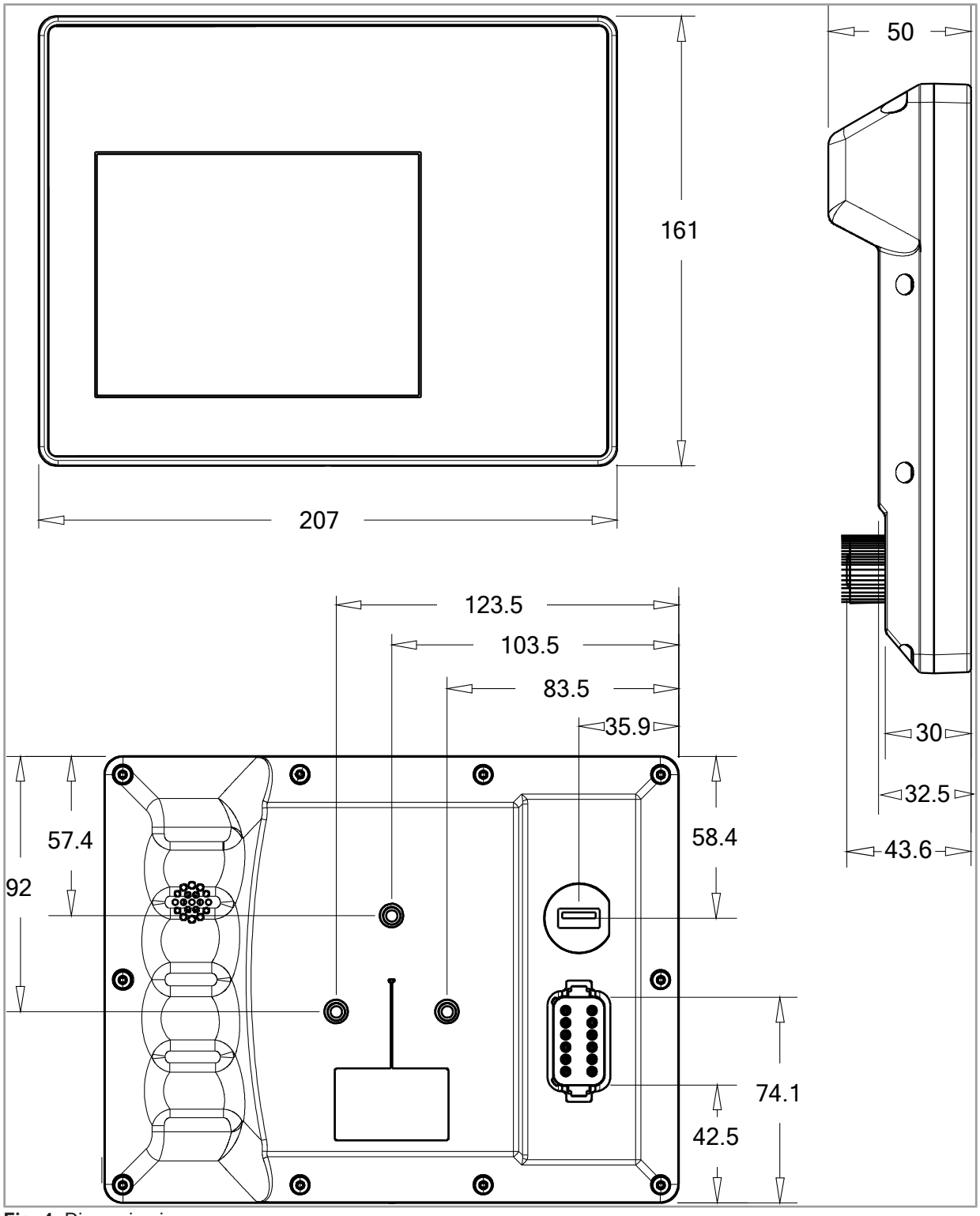


Fig. 4: Dimension in mm

4.2 Display

Parameter	Description
Type	TFT screen with touch function
Resolution	640 x 480 pixels
Screen diagonal	5.7"
Backlighting	LED, typ. 600 cd/m^2 , dimmable

Tab. 2: Technical data – display

4.3 Pushbuttons

Parameter	Description
Number of membrane keys	21 keys plus PWR
Backlighting	Dimmable
	Adjustable between 0 % … 100 %
Typical service life	1,000,000 activations

Tab. 3: Technical data – keys

4.4 Processor Kernel

Parameter	Description
CPU	STM32H7
FLASH	16 MB

Tab. 4: Technical data – computer core

4.5 Mechanical specifications

Parameter	Description	Standards
Weight	460 g	
Enclosure specifications		
Material	Plastic	
Vibration strength	10 Hz … 150 Hz, 6 h	ISO 16750-3
Shock resistance		
Type of shock	Half-sine wave	ISO 16750-3
Intensity and duration	50 g for 18 ms	
Number and direction	10 shocks in all 3 directions of the spatial axes	

Tab. 5: Technical data – mechanical properties

4.6 Environmental conditions

Parameter	Description	Standards
Operating temperature	-20 °C … +70 °C	ISO 16750-4
Climatic conditions	Humid heat	
Storage temperature	-30 °C … +70 °C	ISO 16750-4 DIN EN 60068-2-1 DIN EN 60068-2-2
Relative humidity	5% … 95%	
Degree of protection	With mating plug: IP65; Without mating plug: IP20	

Tab. 6: Technical data – environmental conditions

4.7 Electrical properties

Power supply T_ECU

Parameter	Description
Nominal voltage	DC 8.5 V … 18 V
Permissible voltage range VBAT_ECU	DC 8 V ... 18 V
Maximum current consumption	2 A
Typical logic current consumption (VBAT_ECU)	320 mA at DC 12 V
Power consumption	Approx 3 W
Integrated protective functions	Reverse polarity protection, overvoltage, short voltage pulses

Tab. 7: Technical data – power supply VBAT_ECU

4.8 EMC values

The JVM-306 has CE approval in accordance with EN ISO 14982 for 12 V on-board systems.

Pulses in accordance with ISO 7637-2

Test pulse	Values	Function class
1	-450 V	C
2a	+37 V	A
2b	+20 V	C
3a	-150 V	A
3b	+150 V	A
4	Ua1: -6 V / 50 ms Ua2: -2 V / 500 ms	B (12 V systems)

Tab. 8: Pulses in accordance with ISO 7637-2

Pulses in accordance with ISO 16750-2 (12 V on-board systems)

Test pulse	Values	Function class
5a	Load Dump 70 V / 2 Ω / 350 ms	C

Tab. 9: Pulses in accordance with ISO 16750-2 for 12 V on-board systems

Irradiation in accordance with ISO 11452

Irradiation	Function class
20 MHz ... 2 GHz 30 V/m	A

Tab. 10: Irradiation in accordance with ISO 11452

Emitted radiation acc. to CISPR 25

Emitted radiation	Limit values
Narrowband emission 30 MHz ... 1,000 MHz	30 MHz … 75 MHz = 52 … 42 dBµV/m 75 MHz … 400 MHz = 42 … 53 dBµV/m 400 MHz … 1,000 MHz = 53 dBµV/m
Wideband emission 30 MHz ... 1,000 MHz	30 MHz … 75 MHz = 62 … 52 dBµV/m 75 MHz … 400 MHz = 52 … 63 dBµV/m 400 MHz … 1,000 MHz = 63 dBµV/m

Tab. 11: Emitted radiation acc. to CISPR 25

ESD acc. to EN 61000-4-2

Electrostatic discharge (ESD)	Function class
Contact ±4 kV	A
Air ±8 kV	A

Tab. 12: Electrostatic discharge (ESD) acc. to EN 61000-4-2

4.9 Ports and interfaces

4.9.1 ISOBUS interface

Parameter	Description
Baud rate	250 kBaud
Protocol	ISOBUS
Terminating resistance	External
Cable specification	CAN-compliant, twisted wire pairs, unshielded

Tab. 13: Technical data – ISOBUS interface

4.9.2 USB interface

Parameter	Description
Supply unit	5 V, max. 200 mA
Data rate	USB 1.1
Protocol	USB-Host-Interface

Tab. 14: Technical data – USB interface

4.10 Inputs/outputs according to ISO11786:1995

All inputs in the operating voltage range are short-circuit-proof.

Digital inputs for tractor speed

Parameter	Description
ISO11786: Digital inputs for wheel speed and ground speed with 2 modes.	
Abbreviation	IN_1 … IN_2
Quantity	2
Pull resistance	4.7 kΩ
H level	Mode 1: ≥ 3.4 V Mode 2: ≥ 6.2 V
L level	Mode 1: ≥ 2.5 V Mode 2: ≥ 1.5 V
Accuracy	2 %
System menu functions	Mode and pull-up selection Pulse/meter calibration

Tab. 15: Digital inputs for tractor speed acc. to ISO11786:1995

Input for PTO speed

Parameter	Description	
ISO11786: PTO speed with 2 modes		
Abbreviation	PTO_IN	
Quantity	1	
Pull resistance	4.7 kΩ	Can be switched off
H level	Mode 1: ≥ 3.4 V Mode 2: ≥ 6.2 V	Standard = mode 1
L level	Mode 1: ≥ 2.5 V Mode 2: ≥ 1.5 V	
Signal	Duty cycle 20 % … 80 %	

Tab. 16: Input for PTO speed acc. to ISO11786:1995

Digital input for hitch position

Parameter	Description
ISO11786: Hitch position (digital input)	
Abbreviation	TP_DI_IN
Quantity	1
H level	≥ 6.2 V
L level	≥ 1.5 V
Source resistance	100 Ω ± 10 Ω
Input resistance	> 3 kΩ

Tab. 17: Digital input for hitch position acc. to ISO11786:1995

Analog input for hitch position

Parameter	Description
ISO11786: Hitch position (analog input)	
Abbreviation	TP_AI_IN
Quantity	1
Voltage range	0 V … 10 V
Input resistance	> 3 kΩ

Tab. 18: Analog input for hitch position acc. to ISO11786:1995

Input/output for ignition

Parameter	Description
Ignition input/output	
Abbreviation	IGN_KEY
Quantity	1
Input	
Voltage supply	12 V
Output	
Max. output current	0.5 A

Tab. 19: Input/output for ignition

4.11 Acoustic signal generator

Category	Description	
Type	Piezo	
Volume	> 70 dB	With resonance frequency and without mechanical damping.
Volume control	Turned off, 10% … 100%	Controlled via PWM.
Frequency range	200 Hz … 4 kHz	

Tab. 20: Technical data – acoustic signal generator

4.12 Real-time clock

Parameter	Description	
Battery type	CR2032	
Service life	Approx. 10 years from production.	The service life of the battery depends on the ambient conditions and may therefore differ.

Tab. 21: Technical data – real-time clock

5 Mechanical installation

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.

NOTICE



Compliance with degree of protection

The protection class of the device is only ensured if the M12 cable gland is tightened securely.

5.1 Allowed mounting orientations

The device has a RAM mount connection and can be installed in the driver's cab with a suitable holder.

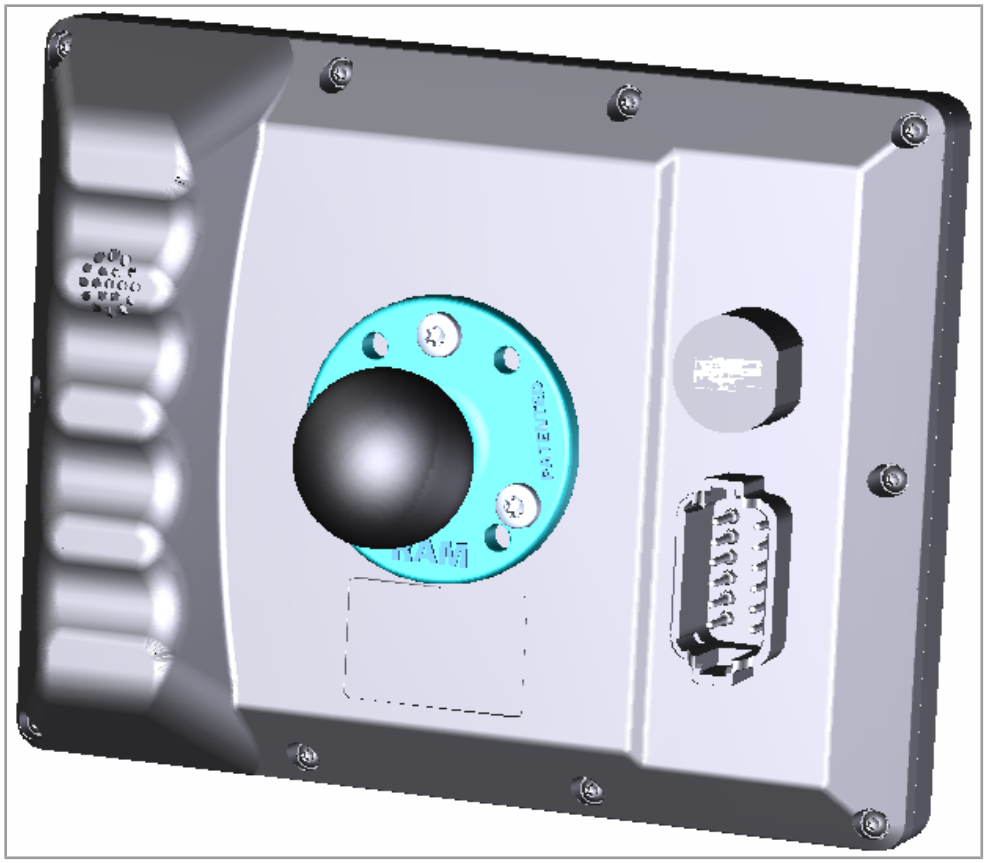


Fig. 5: Permitted installation position with RAM mount holder

6 Electrical connection

⚠ WARNING



Signal interference due to faulty CAN wiring

Unshielded or untwisted CAN lines can result in communication disruptions. In extreme cases a malfunction of the device may result in personal injuries.

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

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 Deutsch plug DT12

Function

The Deutsch plug has the following functions:

– Voltage supply of the JVM-306
– Voltage output to ECU with 1 A load current
– Transfer of TECU signals acc, to ISO11786:1995
– ISOBUS-CAN bus interface
– Detection of ignition

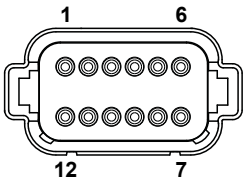


Fig. 6: Deutsch plug, 12-pin

Pin	Description	Signal
1	Power supply voltage KL30 (+12 V)	
2	Input for speed of rear PTO shaft	PTO_IN
3	Digital input for hitch position	TP_DI_IN
4	*High side*	CAN-H
5	*Low side*	CAN-L
6	Analog input for hitch position,	TP_AI_IN
7	RS-232-RX	
8	RS-232-TX	
9	True ground speed of the tractor	IN_1
10	Ignition On/Off (max. 0.5 A)	IGN_KEY
11	Wheel speed of the tractor	IN_2
12	Reference potential	GND

7 Firmware and system menu

This section describes how to load the firmware and system menu into the control unit. The following options are available:

– Via USB
– Via CAN bus

The update via CAN bus requires special Accessories.

7.1 Creating an EDC file

The EDC file contains all the information needed to update the firmware, including the system menu.

The EDC file must be generated. Follow these steps:

1. Unpack the corresponding firmware package. This package is provided for you by Bucher-Automation support (support@bucherautomation.com).
2. Run script *edc_make.bat*.

⇨ 3 files are generated, one for each of the available interfaces:

– *43434445.EDC*: Updating the firmware and system menu via USB
– *43434445_EDC_x_x_x_x_.hex*: Updating the firmware and system menu via CAN bus
– *43434445 _Emergency.hex*: Update firmware and system menu via RS232 (not supported).

7.2 Description of the IOP file of the system menu

The system menu is written by an IOP file that is usually created using ISO-Designer software from Bucher-Automation.

Running script *edc_make.bat*, which is included in the firmware package, links the IOP file with the files of the firmware in an EDC file and transfers them together to the control unit (Creating an EDC file).

Structure of EDC file – example

```
4544-4334;1.6.0.48;43434445; output file (EUID is hardware-dependent)
4669-726d;1.6.0.48;small_HMI.hex; firmware
426f-6f74;1.0.0.2;bootloader_v2.hex; Bootloader
496f-7072;1.0.0.0;MyProject1.iop; customer-specific system menu
4c5f-3f3f;0.0.0.8;system_menu_de.iop; system menu (additional language)
5069-6374;1.0.0.3;start_up.png; illustration on start screen
```

Where:

– Column 1 (`496f-7072`) is the EUID that identifies the content of the system menu.
It must not be changed!
– Column 2 is the version number of the IOP file of the system menu; available at runtime.
– Column 3 (`MyProject1.iop`) is the name of the IOP file.
Adapt the content of this column to the name of your IOP file if necessary.
– Column 4 is the comment field. It is not compiled.

Multiple menu languages

To integrate additional menu languages see Language selection in the system menu [▶ 40].

7.3 Updating the firmware and system menu via USB

The firmware and system menu of the JVM-306 can be updated via USB.

ⓘ Info

Do not update while using

The firmware and system menu must not be updated while the motor is running or the vehicle is being used.

ⓘ Info

This procedure requires an operating system that is already installed.

Update preparation

✓ The required firmware package *JVM-306-K00-O21_rev_x_x_x_x.zip* has been provided by support (support@bucherautomation.com).

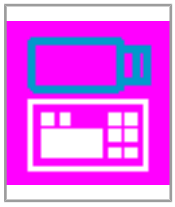
1. Make certain the control unit is turned off.
2. Connect the 12 V voltage supply.
3. Unpack the firmware package *JVM-306-K00-O21_rev_x_x_x_x.zip*.
   The sequence *x_x_x_x* represents the firmware version.
4. Create the EDC file: Creating an EDC file.

Perform update

1. Copy file *43434445 .EDC* onto a USB stick.
2. Insert the USB stick in the USB A socket of the device.
3. Turn on the device.
4. Open the system settings:



5. Select option Update via USB:



⇨ The firmware and system menu are updated.

7.4 Updating the firmware and system menu via CAN bus

The firmware and system menu of the JVM-306 can be updated via CAN bus.

For a detailed description of the Python script *smallhmi_updater.py* please contact support at support@bucherautomtation.com.

ⓘ Info

Do not update while using

The firmware and system menu must not be updated while the motor is running or the vehicle is being used.

Update preparation

- ✓ The required file package *JVM-306_CAN_updater_rev_1_0_0_2.zip* and the system requirements have been provided by support (support@bucherautomation.com).
- ✓ The required PEAK-P-CAN USB/CAN dongle is on hand.
- ✓ A PC with operating system Windows 10 Pro 64 is available.

1. Connect the control unit and PC by means of the dongle and a CAN cable.
2. Make certain the control unit is turned off.
3. Connect the 12 V voltage supply.

Perform update

1. Insert the PEAK-P-CAN USB/CAN dongle in the USB interface of a Windows computer.
2. Unpack file package *JVM-306_CAN_updater_rev_1_0_0_2.zip* in a directory of your choice.
3. Create the EDC file: Creating an EDC file.
4. Optional: Replace the standard file *43434445_EDC_x_x_x_x.hex* with a customized file.
5. Connect the JVM-306 with the dongle.
6. Turn on the JVM-306.
   NOTICE! Make certain it is turned on throughout the entire process.
7. Run file *JVM-306 _updater.bat*.
   ⇨ The device-specific firmware file (*43434445_EDC_x_x_x_x.hex*) is loaded in the control unit via CAN.
8. Restart the control unit. To do this, either turn on the ignition or press the On/Off key on the control unit.

⇨ The firmware and system menu are updated.

8 Programming

This section is intended exclusively for qualified personnel familiar with ISOBUS visualization.

The device already has a system menu for end users when it leaves the factory that can be adapted to relevant needs.

8.1 Properties of the system menu

The system menu contains the general functions of the control unit. It is written by a customer-specific IOP file that is transferred to the control unit together with the firmware. The script for linking the two files is provided by Bucher Automation together with the file package.

No ECU visualization is required to use these functions. The objects of the system menu are used separately from the ECU objects, which means that no check for any object collisions is necessary.

Displaying the system menu

To open the system menu while ECU visualization is active, press the HOME key.

ⓘ Info

Version-dependent availability of device functions

The description of the object IDs contains all the available system menu functions for the product. However, some functions are not accessible for all device versions. Because of this, check the device-specific description before adapting the system menu:

- The RTC values are synchronized with the real-time clock, provided the hardware is present.
- The hardware-specific objects are only active if the corresponding hardware is present:
  - Speed channels
  - Input for PTO speed
  - Hitch position (digital)
  - Hitch position (analog)
  - Input or output for ignition
  - Assignment of ISOBUS-AUX-N devices

8.1.1 Reserved object IDs

Data mask/alarm mask objects

Alarm masks are defined without a signal tone.

Object ID	Description
1000	Home data mask.
1001 … 1029	Data masks for settings.
1030	Download the IOP file.
1031	Prompt for update via USB.
1032	Update via USB.
1035	InputBoolean editor.

Object ID	Description
1036	InputNumber editor.
1037	InputString editor.
1038	InputList editor.
1040	Messaging: The IOP cache has been deleted!
1041	Messaging: New settings become active after a restart. Appears for example after the language of the system menu is changed.
1042	Alarm mask: Shows the "Shutdown" messaging. Appears while the system is being shut down.
1051	Alarm mask: Error: Connection lost.
1052	Alarm mask: Error during update via USB.
1053	Alarm mask: Error: USB stick not found.
1054	Alarm mask: Error: Information about parsing error.
1100	Stop key pressed. Appears in the system menu mode only when the Stop key is pressed.
1101	AUX assignments (editor data mask with read/write access)
1102	AUX alarm mask
1103	AUX extended view (read access only)

Tab. 22: Data mask/alarm mask objects

FillAttributes objects

These objects can be used to define different background colors for incorrect values in input fields. The numeric editor checks for min/max values. As soon as a value is outside of the permitted range, object 101 is used, otherwise object 100.

Object ID	Description
100	Used when the entry in the editor field is correct. Set this attribute on rectangle object 200.
101	Used when the entry in the editor field is faulty. Set this attribute on rectangle object 200.

Tab. 23: FillAttributes objects

Rectangular objects

Object ID	Description
200	Editor field

Tab. 24: Rectangular objects

String variables

Object ID	Description
65000	Content of the editor field.
65001	Original value of the edited object.

Object ID	Description
65002	Serial number
65003	Manufacturing date
65004	Software version
65005	Hardware revision
65006	Device type
65007	ActiveObjectPool version
65008	Min/max value in the editor as text string. Structure is automatically arranged as follows: [%min_value-%max_value]
65009	Information about the EDC file (version of the loaded file collection).
65010	Version of the saved EDC file.
65042	Key name (access from KEY TEST data mask only) (key codes [▶ 33]).
65044	Bootloader version

Tab. 25: String variables

Numeric variables

The variables identified with an asterisk (rw*) are saved in non-volatile memory (EEPROM).

Object ID	Access	Description
65101	rw	Edited Boolean value.
65102	ro	Download status of the IOP file as %.
65103	ro	Operating hours
65104	ro	Memory usage as %.
65105	rw	Real-time clock: Year
65106	rw	Real-time clock: Month
65107	rw	Real-time clock: Day
65108	rw	Real-time clock: Weekday
65109	rw	Real-time clock: Hour
65110	rw	Real-time clock: Minute
65111	rw	Real-time clock: Second
65112	rw*	Language code **NOTICE! Language according to index number** (Language selection in the system menu [▶ 40])
65113	rw*	System units of measure (0 = metric, 1 = imperial)
65114	rw*	Decimal separator (0 = comma, 1 = dot)
65115	ro	Ground speed
65116	ro	Wheel speed

Object ID	Access	Description
65117	ro	Pulse counter for ground speed.
65118	ro	Pulse counter for wheel speed.
65119	ro	Ground speed: Pulses/meter
65120	ro	Wheel speed: Pulses/meter
65121	ro	Device temperature in °C (internal value)
65122	ro	Operating voltage in mV.
65123	rw*	Background brightness of the screen as %; adjustment range 10 % … 100 %.
65124	rw*	Background brightness of the keyboard as %; adjustment range 0 % … 100 %.
65126	ro	Battery voltage of the real-time clock in V.
65127	ro	Upper part of the scrollbar of the ListObject editor.
65128	ro	Lower part of the scrollbar of the ListObject editor.
65129	rw*	Activate TECU. 0 = deactivate.
65130	rw*	Calibration of the ground speed.
65131	rw*	Calibration of the wheel speed.
65132	rw*	Pull-up resistance at the input for the ground speed.
65133	rw*	Pull-up resistance at the input for the wheel speed.
65134	rw*	Large hysteresis for inputs. 0 = deactivated.
65137	rw*	Max. volume as %; Adjustment range: 0 % … 100 %.
65138	rw*	Real-time clock format: 0 = 24 h, 1 = 12 h
65139	rw*	Real-time clock time change: 0 = standard time, 1 = daylight savings time
65140	rw*	am/pm setting for real-time clock: 0 = am, 1 = pm, 2 = empty (for 24-h format)
65141	ro	Input for PTO speed: 0 = 0.125 rpm/bit)
65142	rw*	Pull-up resistance at the input for the PTO speed.
65143	ro	Value on the hitch digital input
65144	rw*	Pull-up resistance for hitch digital input.
65145	ro	Value on the hitch analog input: Adjustment range: 0 % … 100 %, equivalent to 0 … 250.

Object ID	Access	Description
65146	rw*	Operating principle of the ignition: 0 = input, 1 = output
65164	rw*	Activate key tone.
65165	rw*	UT instance number: 0 … 31
65167	ro	Current status of the TECU: 1 = active, 0 = not active
65168	rw*	Control of background brightness: 1 = automatic, 0 = fixed (no dimming by the light sensor), 2 … 100 = defined sensitivity (optional)
65169	rw*	FS active: 0 = file system functions deactivated, 1 = activated
65170	ro	AUX: Number of active assignments
65171	ro	AUX: Current page (selected page in the AUX Assignment Editor.
65172	ro	AUX: Total number of pages (number of pages in the AUX Assignment Editor.)
65174	rw	AUX: Selection of filter for the AUX assignment; (0 = all, 1 = not assigned, 2 = assigned, 3 = conflict).
65175 … 65179	ro	AUX: Selection of the connection type for the assignment, lines 1 … 5; Possible values: 0: Unlink; 1: Unlink, single; 2: Established; 3: Established single, 4: Conflict
65180	rw	Date format selection: Adjustment range: 0 … 5; affects pointer 65520.
65181	ro	Number of active download sessions; 0 = no pool download from the ECU.
65182	ro	Error code for parsing errors; 0 = no errors.
65183	ro	ID of the incorrect object. Used for parsing errors.
65187	rw	TECU: Activate sending of data for the ground speed; 0 = deactivate.

Tab. 26: Numeric variables

Object pointer

Object ID	Points to
65200	Edited list object elements
65201	Edited list object elements +1
65202	Edited list object elements +2
65203	Edited list object elements +3
65204	Edited list object elements +4
65205	Edited list object elements +5

Object ID	Points to
65206	Edited list object elements -1
65207	Edited list object elements -2
65208	Edited list object elements -3
65209	Edited list object elements -4
65210	Edited list object elements -5
65219	Edited list object elements, previously selected element
65300	Object pointer to containers of keys. Applied by StringEditor.
65500 … 65509	Pool of active ECU objects (up to 10 ECUs). If ECU is connected: Points to Working Set designator. If ECU is not connected: Pointer is NULL.
65510 … 65514	Points to the selected AUX control units, lines 1 … 5.
65515 … 65519	Points to the selected AUX inputs (control elements), lines 1 … 5.
65520	Points to the container (OID 3030 … 3035) with the selected date format.
65521	Points to the AUX alarm.

Tab. 27: Object pointer

Key objects

Object ID	Description
256 … 511	Key objects for alphanumeric keyboard; Offset: 8-bit character code (IEC8859-1) Example: Code for letter "A" (ASCII 65_{dec}) = 256 + 65 = 321

Tab. 28: Key objects

Container objects

Object ID	Description
3100 … 3199	Container for keyboard assignments.
3000	Listbox
3001	Working set designator (discontinued, for backward compatibility only).
3030 … 3035	Container for different date formats.
3036	Internal AUX designator object pointer – Unknown AUX assignment (bitmap [?]).
3037	Internal AUX designator object pointer – No AUX assignment (bitmap [X]).
3038	Internal AUX designator object pointer – Multiple AUX assignments (bitmap [++]).
3039	No attachment device selected.
3040	No function of an attachment device (ECU function) selected.
3050 .. 3058	Causes of AUX alarm For details see AUX alarm function [▶ 38]

Tab. 29: Container objects

InputList objects

The following rule applies to all InputList objects: If SelectedIndex = 255, no value is generated and the relevant line on the editor data mask remains empty. For details see AUX assignment in the Assignment Editor [▶ 34].

Object ID	Description
10510 … 10514	List of attachment devices for lines 1 … 5 (line 1 = 10510, etc.); Value range: 0 … 10, where: 0 = not selected, 1 = ECU 1, 10 = ECU 10; 255 = empty
10515 … 10519	List of attachment device functions for lines 1 … 5 (line 1 = 10510, etc.); Value range: 0 … 100 where: 1 = not assigned; 2 … 100 = functions; 255 = empty
10520 … 10524	List of connection states for lines 1 … 5 (line 1 = 10520). **NOTICE! The deactivation of the editing mode is mandatory.** Value range: 0 … 5 where: 0 = cancel assignment, 5 = restricted; 255 = empty.

Tab. 30: InputList objects

8.1.2 Physical keys

Key name	Description / behavior
PWR_ON	Voltage supply on/off; Turn on: press briefly once. Turn off: press and hold for approx. 2 s.
HOME	Switch between start screen of the system menu and visualization of active ECU objects.
LEFT	Moves the input focus to the left
RIGHT	Moves the input focus to the right
TOP	Moves the input focus up. Press once: increase/ upward navigation by lines or steps. Press and hold: Progressive increase/upward navigation.
BOTTOM	Moves the input focus down. Press 1 time: reduction/ downward navigation by lines or steps. Press and hold: Progressive reduction/downward navigation.
ENTER	Starts or exits editing mode; changes are saved (OK key).
ESC	Exits editing mode; changes are NOT saved .
ISB	Switches the inputs off when activated. Press and hold for 1 s.
EDIT (screwdriver)	Opens the system menu and device settings.
SK_1 … SK_n	Keys for free assignment with functions.

Tab. 31: Physical keys

8.1.3 Key codes

Key code	Description
1 … 29	Opens data or alarm masks 1000 …. 1029; Example: 1 = opens screen 1001. 29 = opens Home screen (1000).
30	Jumps to the pool of active objects, if present (first ECU).
31	Like LEFT key.
32	Like RIGHT key.
33	Like UP key.
34	Like DOWN key.
35	Like ENTER key.
36	Like ESC key.
37	Like ISB key.
38	CLR: Deletes the content of the editor field (numeric: set to zero)
39	DEL: Deletes the marked character in the editor field.
40	Deletes all saved IOPs.
41	Jumps to the end of the list.
42	Jumps to the beginning of the list.
43	Increases the numeric value.
44	Reduces the numeric value.
46	Opens the status mask for the USB update and updates the variable with the USB information.
47	Starts the update via USB and opens the USB update mask.
48	Opens touch calibration (system-internal mask).
50	Selects edited list object: current element +1 (following element).
51	Selects edited list object: current element +2.
52	Selects edited list object: current element +3.
53	Selects edited list object: current element +4.
54	Selects edited list object: current element +5.
55	Selects edited list object: current element -1 (previous element).
56	Selects edited list object: current element -2.
57	Selects edited list object: current element -3.
58	Selects edited list object: current element -4.
59	Selects edited list object: current element -5.
68	Opens the KEY TEST data mask.
70	Opens the TECU settings.
71	TECU: Starts calibration (wheel speed).

Key code	Description
72	TECU: Saves calibration (wheel speed).
73	TECU: Resets counter (wheel speed).
74	TECU: Starts calibration (ground speed).
75	TECU: Saves calibration (ground speed).
76	TECU: Resets counter (ground speed).
102	Scrolls on softkey page; relevant when more softkeys have been configured than there are hardware keys available.
105	Cancels editing. Changes to string or numeric variables are discarded.
106	Closes editing with OK. Manual changes to the variable are saved.
110	Opens the editor for the AUX assignment.
111	Shows the next AUX assignment page.
112	Shows the previous AUX assignment page.
113	First AUX assignment page.
114	Last AUX assignment page.
115	Deletes all AUX assignment.
200	Transfers the ID (- 256) of the key that was pressed to the editor as an ASCII key code.
202	Forwards the ID of the key that was pressed (ID % 100) + 3100 to the value of object pointer 65300.
203	Shows the download mask if a download is active.

Tab. 32: Key codes

8.2 AUX assignment

The JVM-306 ISOBUS control unit provides the option of assigning functions of an AUX-N attachment device to the keys of the input device.

8.2.1 AUX assignment in the Assignment Editor

The Assignment Editor is used to make the key assignment of the input device with functions of the attachment device.

Features of the Assignment Editor:

– The editor data mask has the invariable OID 1101.

  Assignments can be configured and edited here.

– All objects are accessible via ISO Designer.

– In the standard configuration the editor consists of a table with 5 columns, each having 5 rows. Each row has its own object ID.

– Only read access is possible to all the entries of the InputList. They cannot be edited because this property is deactivated in ISO Designer.

The AUX extended view (OID 1103) is a variant of the editor data mask. It is equivalent to the editor data mask with the following restrictions:

– Assignments cannot be edited.
– The view cannot be filtered.

Object mapping – ISO Designer

AUX assignment (string)			Current page 65171 (NUM)	Total pages 65172 (NUM)
Filter: 65174 (NUM)			Current assignments: 65170 (NUM)	
AUX input device Object pointer	AUX control element Object pointer	Connection status InputList	ECU attachment device InputList	ECU function InputList
65510	65515	10520	10510	10515
65511	65516	10521	10511	10516
65512	65517	10522	10512	10517
65513	65518	10523	10513	10518
65514	65519	10523	10514	10519

Tab. 33: Example of object mapping in ISO Designer

Graphical view – control unit

The mapped objects appear as follows in the graphical representation of the editor data mask:

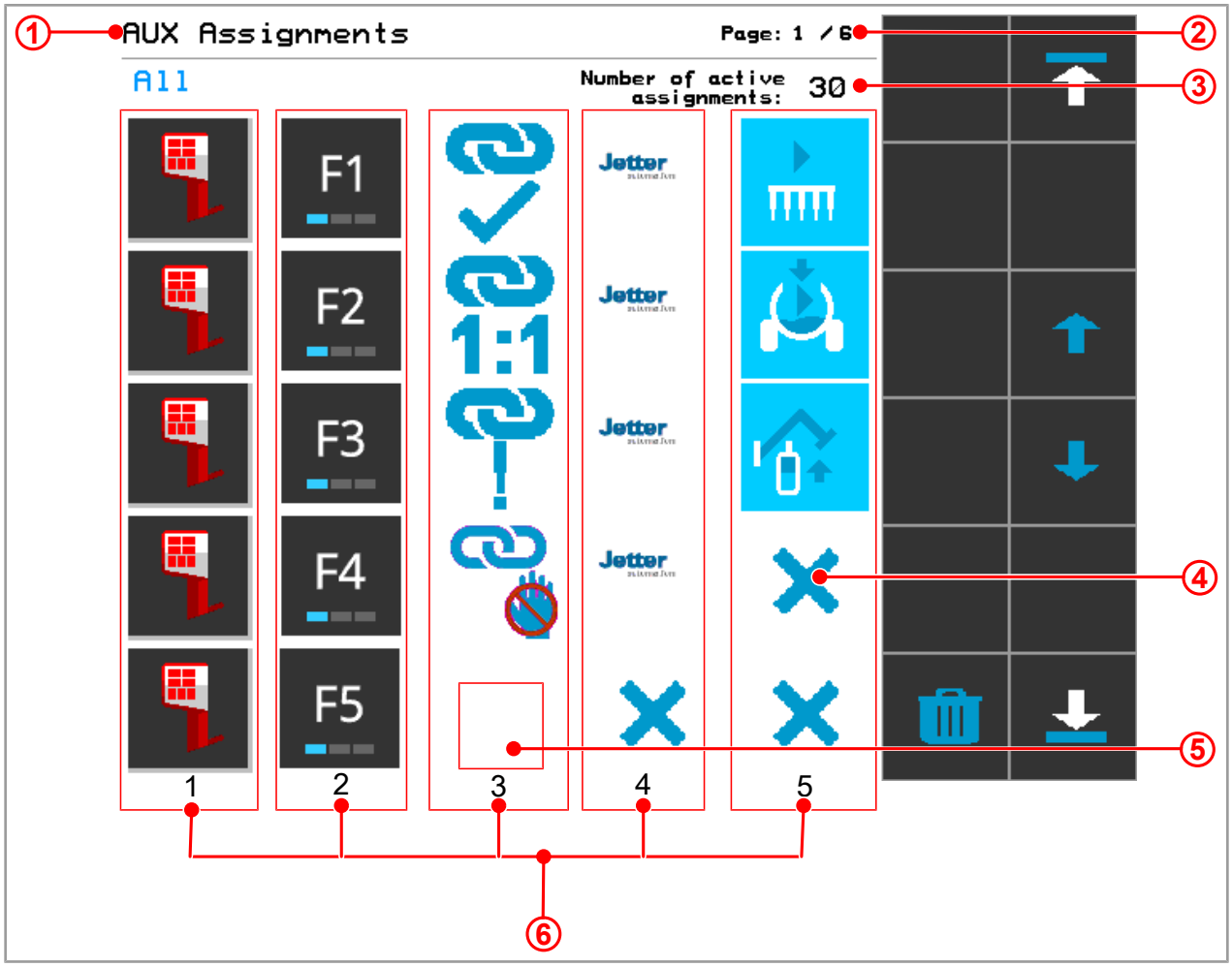


Fig. 7: Editor data mask: Representation of mapped objects on the control unit

1	Filter for AUX assignments
2	Pagination
3	Number of current assignments
4	No assignment
5	Empty cell (SelectedIndex = 255)
6	Columns 1 ... 5 (see description below)

Description of the columns

Column 1: Input device (*AUX input unit*); the detected input devices are visualized by the AUX handling function.

Column 2: Control elements of the input device (*AUX input*); the elements are visualized by the AUX handling function.

Column 3: Information about the status and type of the connection. The object IDs are permanently assigned. The status and type of the connection are detected by the **SelectedIndex** and are visualized in the form of customer-specific bitmaps.

The following connection states are possible:

Connecting states and types

SelectedIndex	Status	Description
0	Not connected	No ECU function is assigned.
1	Not connected	No ECU function is assigned. Only a 1:1 assignment is permitted.
2	Connected	The connection has been established.
3	Connected	The connection has been established. Only a 1:1 assignment is permitted.
4	Conflict	An existing assignment cannot be used. **NOTICE! The malfunction must be remedied before use.**
5	Restricted	An existing assignment cannot be edited. The assignment can be canceled.
255	Not found	No assignment. The cell is empty.

Tab. 34: Connecting states and types

Column 4: ECU attachment device (*ECU device*): The connected attachment devices are shown as an InputList. The assignment of the attachment devices is not possible in the Assignment Editor, only in the InputList. Visualization is made available by the ECU at runtime.

If SelectedIndex = 255, no attachment device is connected. Visualized here by an X.

Column 5: ECU function (*ECU function*): The function of the attachment device can be selected in the InputList. Only complete functions are shown. The selected assignment is transferred to the ECU immediately. Visualization is made available by the ECU at runtime.

If SelectedIndex = 255, no function is connected. Visualized here by an X.

8.2.2 Navigation in the AUX assignment list

The editor data mask (OID 1101) detects the key codes [▶ 33] listed below from the softkey data mask.

The Down key does not respond if there are no more pages.

Key behavior

Key behavior	Editor (OID 1101)	Display (OID 1103)	Key code
Down: shows the next 5 assignments	√	√	111
Up: shows the previous 5 assignments	√	√	112
Start: shows the first page of assignments	√	√	113
End: shows the last page of assignments	√	√	114
Delete all: removes all assignments	√	No function	115

Tab. 35: Navigation keys in the AUX assignment list

8.2.3 Filter AUX assignments

Access to the filter is available via numeric variable 65174.

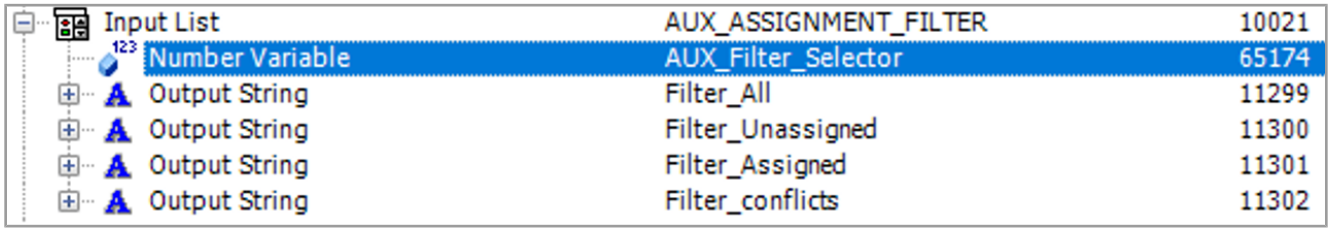


Fig. 8: Configuration of filter options for AUX assignments

The filter options listed below are available:

Filter options for AUX assignments

ID	Filter criterion	Description
0	All	Shows all available AUX entries, including those that are not assigned.
1	Not assigned	Shows only the AUX inputs that are not assigned.
2	Assigned	Shows only assignments that are ready for operation.
3	Conflict	Shows only faulty assignments.

Tab. 36: Filter options for AUX assignments

8.2.4 Remove AUX assignments

Assignments can be removed by selecting the attachment device or the "None" function in the InputList (Reserved object IDs [▶ 26]).

Container 3039 includes detected attachment devices without AUX assignment. Container 3040 includes detected functions of an attachment device without AUX assignment.



Fig. 9: Visualization for missing AUX assignment

Visualization of assignments that are not found must be defined in the system menu because this is not made available by the connected devices. In the standard configuration, assignments that are not present are visualized by an X that is included in container 3037. The size of the icon is equivalent to a softkey.

8.2.5 AUX alarm function

There is a specific alarm mask for AUX assignments that appears in the event of a malfunction. The cause of the alarm is determined by object pointer 65521. In the standard configuration it points at container 3050 for normal operation. However, this changes at runtime depending on the cause of the alarm.

The diagram below shows an example of the mapping of the object pointer to the AUX alarm container:

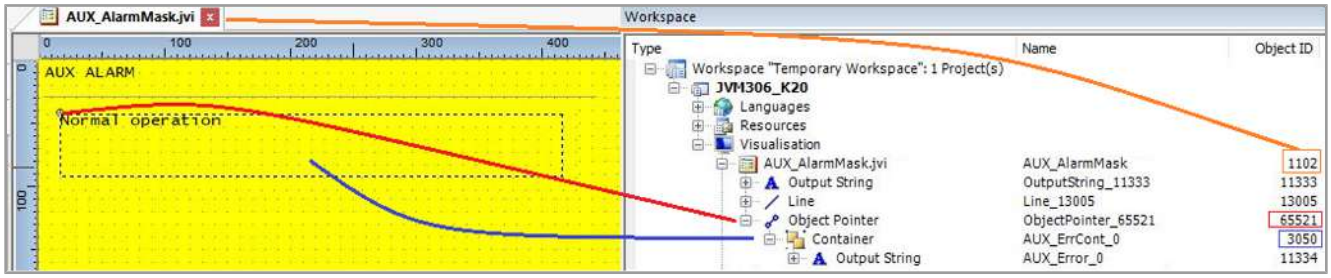


Fig. 10: Mapping of the object pointer to AUX alarm containers

The following containers are reserved for the AUX alarm function:

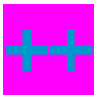
AUX alarm objects

Container-ID	Description
3050	Normal operation; The AUX function is working with no malfunctions.
3051	AUX alarm function is active. This is not an error message. It indicates that an alarm is pending.
3052	Connection to the AUX input device lost.
3053	The connection to the control element of an AUX input device was lost.
3054	AUX connection was lost.
3055	Invalid AUX assignment(s) was/were removed.
3056	AUX assignment was declined.
3057	AUX input error (control element). The AUX input has a malfunction, for example incorrect function of a switch or short circuit.
3058	AUX assignment is not available. A secondary ISOBUS control unit cannot use the AUX assignment.

Tab. 37: Containers for AUX alarm objects

System menu-internal bitmaps

The containers listed below include visualization of the status and type of the AUX assignment. They are integrated into the system menu because they are not made available by the connected devices.

Container-OID	Function	Bitmap
3036	Indicates an unknown AUX assignment.	
3037	Indicates there is no AUX assignment present.	
3038	Indicates that multiple functions have been assigned to a control element.	

8.3 Character set types of the system menu

The character set types listed in the table below are supported.

Character formats bold, italic and underlined are not supported.

Type	Character set
0	ISO8859-1 (ISO Latin-1, West European)
1	ISO8859-15 (ISO Latin-9, West European)
2	ISO8859-2 (ISO Latin-2, Central European)
4	ISO8859-4 (ISO Latin-4, North European)
5	ISO8859-5 (Cyrillic)
7	ISO8859-7 (Greek)

Tab. 38: Supported character set types

8.4 Language selection in the system menu

The EDC file contains a separate IOP file for each language. Once while the device is booting up, the firmware loads the IOP file of the system menu and automatically searches for the corresponding IOP file with the contents in the selected system language.

The individual language files in the file collection are written in file *edc.cfg*. EUID *496f-7072* contains the language file of the system menu currently being used. Separate IOP files must be added for each additional language that is needed. This is also done in file *edc.cfg* using EUID *4c5f-3f3f*. This IOP file contains only those objects that differ from the default system language. Generally this does not relate to the system menu as a whole.

EDC file – sample configuration

Example of the language-related section of the edc.cfg file:

– `496f-7072;1.0.0.0;language_EN.iop; system menu`

  English is the default language of the system menu and is always parsed.

– `4c5f-3f3f;1.0.0.0;language_DE.iop; first language-specific IOP file`

  German was added as the first additional system language and is parsed as soon as German is selected as the menu language in the settings.

– `4c5f-3f3f;1.0.0.0;language_FR.iop; second language-specific IOP file`

  French was added as the second additional system language and is parsed as soon as French is selected as the menu language in the settings.

Compiler *edc.py* reads the two-place language abbreviation of the IOP file name and stores the binary information in the EDC file together with the corresponding hexadecimal representation (UDS and Emergency).

Language abbreviation

The table below shows the language abbreviations permitted in ISOBUS for the languages supported by the device as well as their assignment to an index. The language abbreviation is forwarded via the ISOBUS. The selected index is stored in variable ID 65112.

Index	Language abbreviation	Language
0	en	English
1	nl	Dutch
2	fr	French

Index	Language abbreviation	Language
3	de	German
4	it	Italian
5	es	Spanish
6	da	Danish
7	sv	Swedish
26	cs	Czech
45	hr	Croatian
46	hu	Hungarian
83	no	Norwegian
88	pl	Polish
94	ro	Romanian
122	tr	Turkish

Tab. 39: Assignment of index and language abbreviation

8.5 Programming examples

8.5.1 Programming example of the use of working sets

Up to 10 ECUs can be connected to the JVM-306 ISOBUS control unit. They are mapped to object pointers 65500 … 65509.

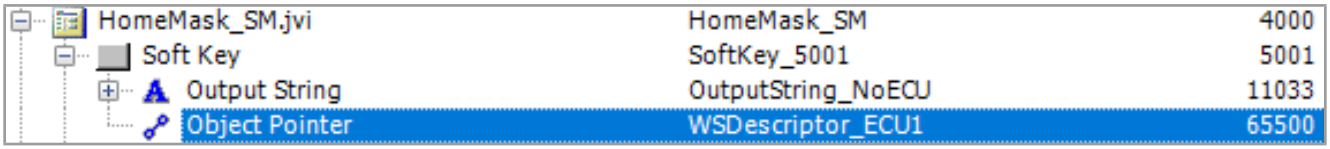


Fig. 11: Object pointer to working set

The string "No ECU" is generated in the following cases:

– Object pointer 65500 = NULL;

– ECU pool cannot be reached.

Each connected ECU has an individual key code that opens the ECU pool. In the example below, soft-key 5001 has key code 30. Key codes 90 … 99 call the relevant ECUs 1 … 10 of the ECU pool.

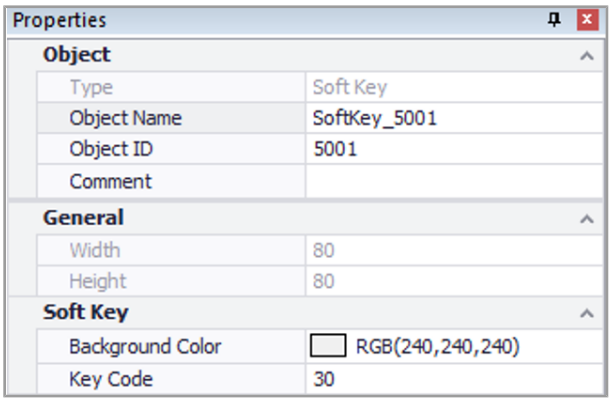


Fig. 12: ECU-specific key code for opening the ECU pool

8.5.2 Programming example for numeric editor

Buttons with numbers, characters and a decimal point are available in the numeric editor. The editor value and min/max range are represented as a string.

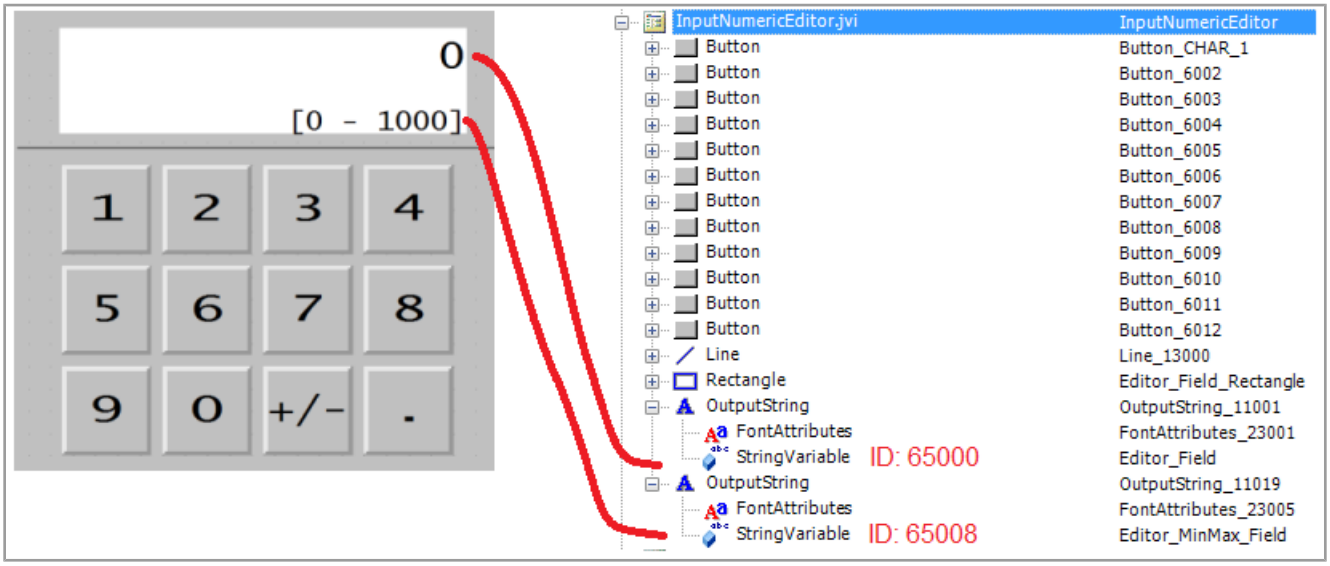


Fig. 13: Programming example for numeric editor

8.5.3 Programming example for list editor

This example contains a list with 5 navigable lines: the active line ±2 relative positions. Navigation by ±5 lines is possible.

The scrollbar consists of two linear bar graphs with one superimposed on the other.

Keys X (key code 36) and OK (key code 35) are defined as buttons.

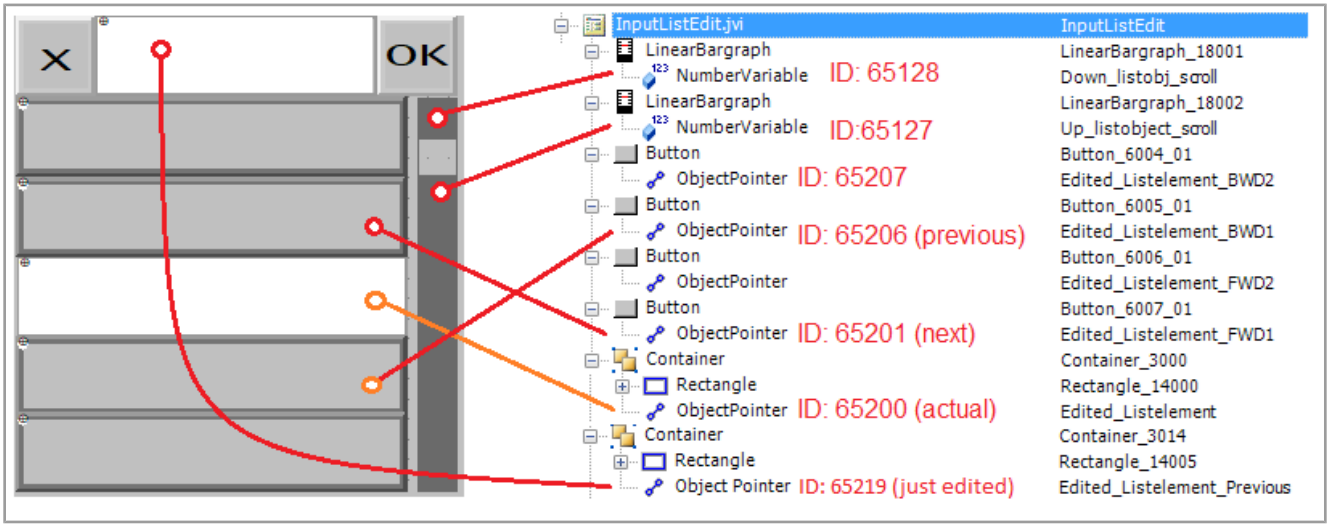


Fig. 14: Programming example for list editor

8.5.4 Programming example for string editor

The example shows a keyboard assignment. A letter is assigned to each key based on the following formula:

ObjectID = 256 + ASCII code of the respective letter.

Example:

The letter A has ASCII code 65. Therefore:

256 + 65 = 321

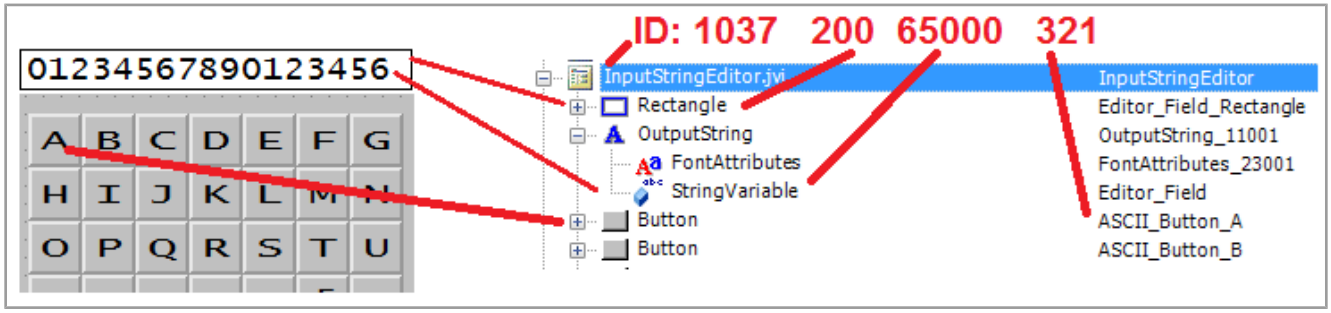


Fig. 15: Programming example for string editor

The object ID of the string editor is 1037.

The object ID of the editor field (rectangle object) is 200. The ID of the editor field content is stored in the value of object ID 65000, a string variable.

8.5.5 Programming example for multiple keyboards

Object IDs 3100 … 3199 are reserved for keyboard containers. This means that 100 keyboard sets can be programmed. The keyboard with object ID 3100 is the assignment that is shown when the string editor is opened.

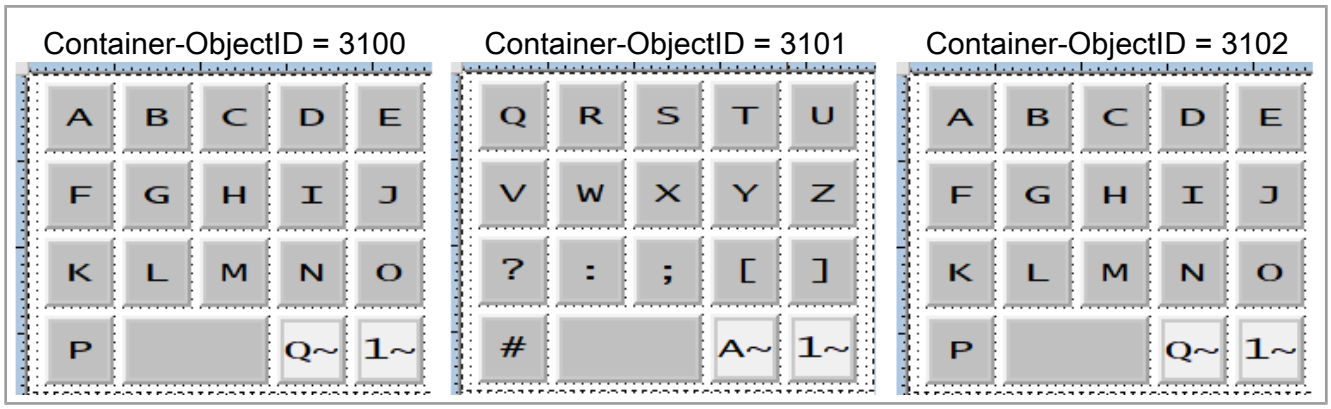


Fig. 16: Programming example for multiple keyboard sets

Follow the steps below to create multiple keyboard sets.

1. Create a container for each keyboard.
2. Assign the appropriate buttons. There are 2 types available:
   - **Keys with standard letters:**

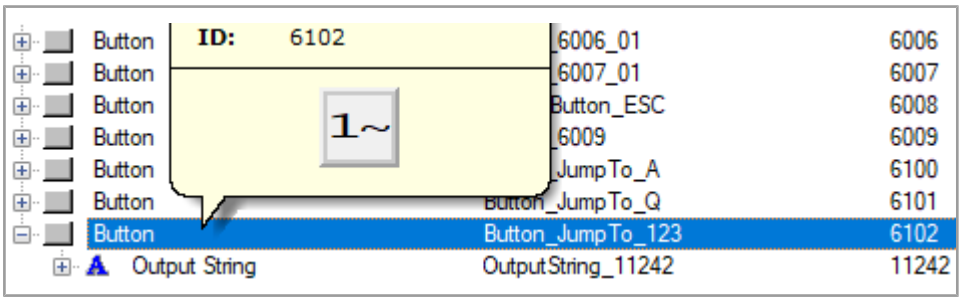
     Key code: 200

     Object ID: ASCII-Code + 256
   - **Keys that link to the next keyboard set:**

     Key code: 202

     Object ID: 61 xx

     Where
     xx stands for the last two places of the object ID of the targeted container.
     In the next example, ID 6102 replaces this container with 3102.



3. Assign an object pointer to the data mask of the string editor (object ID 1037) instead of an individual key. The object pointer refers to another keyboard container. The object ID of the pointer (65300) behaves differently: Its value changes as soon as the keyboard is switched.

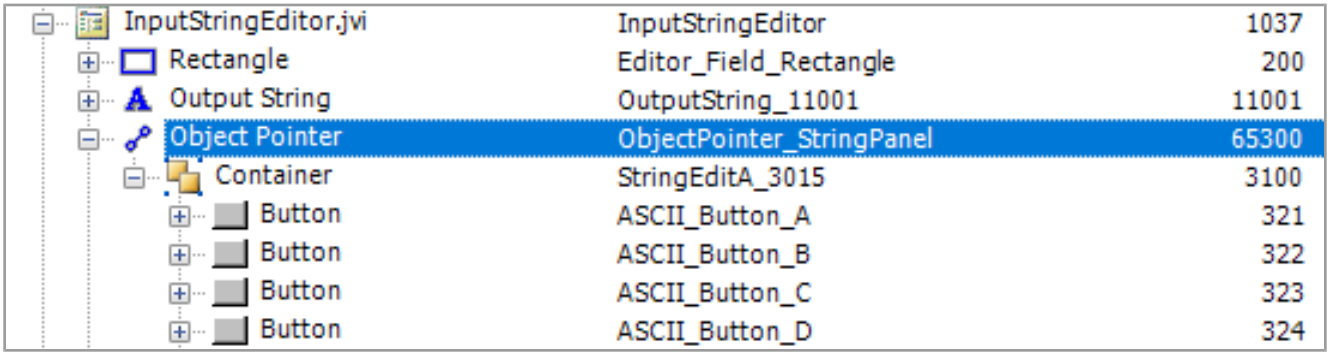


Fig. 17: Object pointer for changing the keyboard set

8.5.6 Programming example for error messages

This example shows an error message that appears when the connection to the ECU is interrupted. Additional error messages can be created in a similar manner using the relevant object ID.

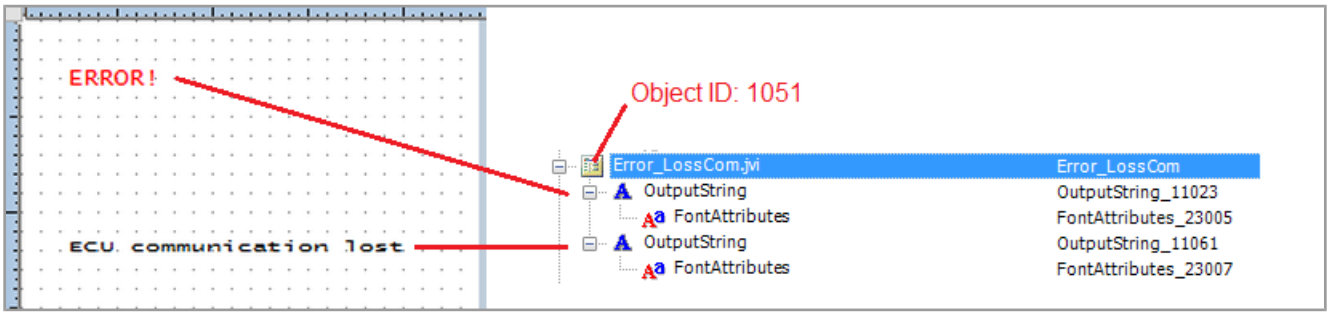


Fig. 18: Programming example for error messages

8.6 Defining the date format

The date format applied on the control unit is in line with ISO 11783-7:2009, section A.23.3). The numeric variable (object ID 65180) is used to select the desired date format (values 0 … 5).

Value	Date format	Container
0	ddmmyyyy	3030
1	ddyyymm	3031
2	mmyyyydd	3032
3	mmddyyyy	3033
4	yyyymmdd	3034

Value	Date format	Container
5	yyyyddmm	3035

Tab. 40: Available date formats

Pointer 65520 points to the selected container. Containers 3030 … 3035 contain the data related to the year, month and day in the relevant order. For example, container 3034 organizes the date components in the order year – month – day.



Fig. 19: Container IDs of the date components

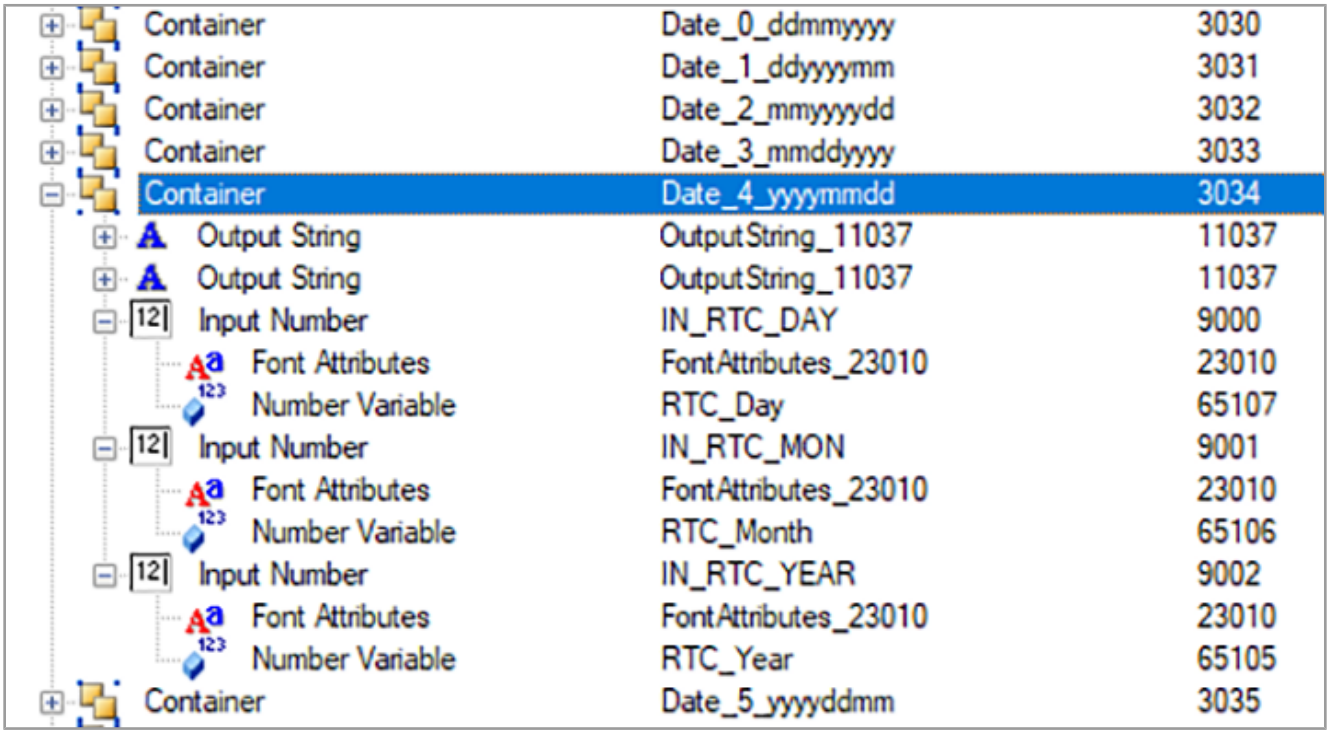


Fig. 20: Container for date format

The format is defined with variable 65180. The output strings named here contain the date format; for example, the value of the first string is DD-MM-YYYY.

The object IDs of the strings are random. Only the positions in the input list are permanent (1 … 6).

9 Maintenance

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

9.1 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.

9.2 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.

9.3 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. 21: 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.

10 Service

10.1 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.

11 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.

11.1 Accessories

Component	Item number
JVM-306 connection cable to InCab, length 1.5 m	60887142
RAM mount holder consisting of: – Ball and screw for housing – Arm mount with suction cup	10002194

Glossary

Attachment device



A device that is attached to a municipal or agricultural tractor unit. Examples: plow, spreader, mower. In the context of ISO 11783: "implement"

Control unit



Device for reading, displaying, saving and documenting messages, variables and processes. In the context of ISO 11783: "virtual terminal".

Input device



A device used as the input unit of a computer, for example a joystick in the driver's cab. In the context of ISOBUS 11783: "auxiliary input device".

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