

Assembly Instructions

Marex 3D

Joystick Type 531

R417003072/01.2018, EN



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1 About this documentation

1.1 Validity

These assembly instructions apply for the following product:

- Joystick Type 531, for example R417003030 or R417003096

These assembly instructions are intended for mechanics and service technicians. They contain important information for properly and safely installing, connecting and dismantling the Joystick Type 531.

The Joystick Type 531 is a component of the Marex 3D ship control system. Refer to the documentation on Marex 3D for information on the operation.

- ▶ Read these assembly instructions completely, especially the chapter 2, Safety instructions, before installing or dismantling the Joystick Type 531.

1.2 Required and additional documentations

Before starting the operation of the Joystick Type 531 make sure to read and understand the documents listed in table 1.

- ▶ Observe also the instructions for the other system components.
- ▶ Observe also the boat’s operating instructions.

Table 1: Required and additional documentations

Titel	Document No.	Document Type
Marex 3D	R417003094	Instruction Manual
3D Tuning	R417003097	Software description



Contact Aventics Marine at marineservice@aventics.com or www.marex-shipcontrols.com for further documents.

1.3 Presentation of information

Consistent symbols, terms and abbreviations are used in this document and safety instructions are given in a consistent

About this documentation

manner. For easy understanding, explanations are provided in the following sections.

1.3.1 Safety messages




This documentation includes safety instructions placed before a sequence of actions during which there is a risk of damage to persons or property. The precautions described must be observed.

Safety instructions are structured as follows:

 SIGNAL WORD	
Type and source of risk	
Consequences	
▶	Precautions

- **Warning sign:** Draws attention to the risk
- **Signal word:** Identifies the hazard level
- **Type and source of hazard:** Identifies the type and source of the hazard
- **Consequences:** Describes the consequences of non-observance
- **Prevention:** Describes how to avert the danger

Table 2: Hazard classes according to ANSI Z535.6-2006



Warning sign	Signal word	Meaning
	DANGER	Indicates a hazardous situation which, if not avoided, will result in death or serious injury.
	WARNING	Indicates a hazardous situation which, if not avoided, could result in death or serious injury.
	CAUTION	Indicates a hazardous situation which, if not avoided, could result in minor or moderate injury.
	NOTICE	Property damage: The product or the environment may be damaged.

About this documentation

1.3.2 Symbols

The following symbols mark notices which are not relevant to safety but contain useful knowledge for the proper operation of the product.

Table 3: Meaning of symbols

Symbol	Meaning
	If this information is not observed, the optimal use or operation of the product cannot be ensured.
	Single, independent step
1.	Numbered instructions: The numbers indicate the steps which must be executed in a given order.
2.	
3.	

1.3.3 Designations

The following abbreviations are used in these assembly instructions:

Table 4: Designations

Designation	Meaning
Marex 3D	Electronic remote control for ship propulsions including thrusters
3D-mode	Operating mode of Marex 3D in which the joystick controls all ship propulsions.
Thruster mode	Operating mode of Marex 3D in which the joystick controls the thrusters only.
Heading mode	Operating mode of Marex 3D in which the heading of the ship is kept automatically.
Joystick	Operating element for 3D and thruster mode

1.3.4 Abbreviations

The following abbreviations are used in these assembly instructions:

Table 5: Abbreviations

Abbreviation	Meaning
CAN	Controller Area Network Asynchronous serial bus system to link control units.

1.3.5 Measuring units

If not stated otherwise, the dimensions in this document are in mm.

2 Safety instructions

2.1 About this chapter

The Joystick Type 531 has been manufactured in strict compliance with the generally accepted rules of technology. However, this does not exclude the risk of damage to persons or property if the general safety instructions in this chapter and the safety instructions in this document are not observed.

- ▶ Read these assembly instructions completely and carefully before mounting the Joystick Type 531.
- ▶ Keep these assembly instructions in a location where they are accessible to all users at any time.
- ▶ Always include these assembly instructions when passing the Joystick Type 531 on to third parties.

2.2 Intended use

The Joystick Type 531 is used to control ship propulsion systems and thrusters. It is designed for boats, yachts and small commercial vessels for in- and outdoor application. The Joystick Type 531 must only be operated with Marex 3D under the conditions described in these assembly instructions and under observance of the instructions for the Marex 3D system.

Safety instructions

A separate emergency stop switch must be provided on every control station.

- ▶ Comply with the operating conditions and performance limits stated in chapter 11, Technical data.

Intended use includes having fully read and understood this manual and especially chapter 2.

2.3 Improper use

Any use other than as described in "Intended use" is improper and thus inadmissible.

If, in applications relevant to safety, inappropriate products are installed or used, unintended operating conditions can be created in the application which may cause damage to persons and/or property. Therefore only apply a product within applications relevant to safety if this kind of use is clearly specified and permitted in the product's documentation as for example within explosive areas or in parts of a control system which are relevant for functional safety.

Unintended use of the product does also include:

- connecting the Joystick Type 531 to unsuitable supply voltage (see chapter 11, Technical data)
- combining the Joystick Type 531 with further components which are not suitable for that purpose,
- exposing the Joystick Type 531 to ambient conditions which are not admissible (see chapter 11, Technical data).

AVENTICS declines any responsibility for damage resulting from unintended use. The user of the equipment is fully responsible for any risk arising from unintended use of the product.

2.4 Personnel qualifications

The activities described in these assembly instructions require basic knowledge of mechanics and electrics as well as knowledge of the corresponding terminology. To ensure the safe use of the product, those activities may only be performed

by authorized personnel or by instructed persons supervised by authorized personnel.

An authorized person is someone who due to his/her expert training, knowledge and experience including his/her knowledge of the relevant regulations can assess the assigned tasks, recognize possible dangers and take appropriate safety measures. Authorized personnel must comply with the applicable specialist regulations.

2.5 General safety instructions

- Observe the valid regulations pertaining to accident prevention and environmental protection.
- Observe the safety instructions and guidelines of the country in which the product is used.
- Only use AVENTICS products in technically perfect condition.
- Check the product for obvious defects as for example cracks in the housing or missing screws, caps or sealings.
- You must not modify or convert the Joystick Type 531.
- Persons who install, operate, dismantle or maintain AVENTICS products must not be under the influence of alcohol, other drugs or medications which affect the responsiveness.
- Incorrect assembly, unintended use or inappropriate handling will invalidate the warranty.
- Only use original accessories and spare parts.
- Under no circumstances the product may be subjected to mechanical load. Never use the product as a handle or step. Do not place objects on the product.

2.6 Product- and technology-related safety messages

NOTICE

Risk of property damage due to unintentional joystick movement

Using the joystick as a support can lead to unintentional navigation maneuvers.

- ▶ Do not use the joystick as support.
- ▶ Do not lean against the joystick.

- Mounting work and initial operation must only be performed by qualified personnel as per chapter 2.4, Personnel qualifications.
- Follow the instructions in chapter 7, Assembly, to mount the joystick professionally.
- Check the installation site for possible causes of accident and eliminate those before the assembly.

2.7 Operator's obligations

Installation and maintenance work is subject to the country-specific safety regulations and standards of the application. As an operator of a ship which shall be equipped with a Joystick Type 531 and further components of a ship remote control system, you are responsible that

- the product is in technically perfect condition,
- the product is used as intended,
- any staff handling the product has read and understood the documentation,
- users of the product are trained and instructed,
- the regulations related to safety, accident prevention and environmental protection are complied with.

General notes regarding property damages and product damages

3 General notes regarding property damages and product damages

CAUTION

Risk of injury or property damage due to unsuitable cables

Using unsuitable cables can lead to errors or malfunctions in the Marex 3D system.

- ▶ Only use cables supplied by AVENTICS. These provide
 - EMC shielding
 - a perfect data transmission
 - safe and tight connections
 - a reliable electric power transmission

NOTICE

Risk of property damage due to inadmissible power supply

Using an external power supply for the joystick can cause a failure of the device. A control of the ship's movement might no longer be possible.

- ▶ Always use the internal power supply of the Marex 3D controller.

NOTICE

Risk of property damage due to missing terminating resistors

The CANbus communication does not work if terminating resistors are not applied. This may result in unexpected ship behaviour.

- ▶ Make sure to connect a terminating resistor at the last component of the Marex 3D CANbus line, see also fig.4, CANbus connection Marex 3D controller to Joystick Type 531.

- ▶ Observe the instructions in chapter 8.1, Cleaning, for the preservation and cleaning of the Joystick Type 531.

4 Scope of delivery

The standard delivery includes:

- 1 Joystick Type 531 (e. g. R417003030 or R417003096)

For the assembly:

- Assembly instructions
 - 1 Drilling template
 - 4 M5 nuts (premounted)
 - 4 Washers (premounted)
- ▶ Refer also to the delivery note and the project documentation for information on the items supplied.

5 About this product

5.1 Performance description

The Joystick Type 531 is a component of the Marex 3D ship control system. Mounted at a control panel, it is used to maneuver a ship intuitively at slow speeds. The operator presets the heading, rotating angle and speed of the ship by adjusting the control stick and the rotating control knob. Those movements are mirrored by the ship which permits to perform slow speed maneuvers with a high grade of precision and comfort.



Refer to the 3D manual for a detailed description of the Joystick Type 531, see chapter 1.2, Required and additional documentations.

5.2 Product identification

A product type plate can be found at the bottom of every Joystick Type 531 and on its packaging. The type plate contains the following information:



Fig. 1: Type plate of the Joystick Type 531

- 1 Data matrix code
- 2 CE label
- 3 Software version
- 4 Manufacturing date
- 5 Serial number
- 6 Material number

The data matrix code includes the material number, serial number, manufacturing date and software version.

6 Transport and storage

6.1 Product transport

<i>NOTICE</i>
<p>Damage due to improper transport</p> <p>Improper transport can cause substantial material damage.</p> <ul style="list-style-type: none">▶ Be careful when unloading the packages on delivery and in case of in-plant transport. Observe the symbols and instructions on the package.▶ Only remove the packaging shortly before the assembly.

6.2 Delivery check

- ▶ Check the supply immediately on receipt for completeness and transport damage.
- ▶ Proceed as follows if any visible damage is discovered during receipt of delivery:
 - Do not accept the delivery or only under reservation.
 - Note the extent of damage on the transportation documents or the delivery note.
 - Submit a claim.

6.3 Product storage

- ▶ Do not destroy the packaging and only remove it shortly before installation.
- ▶ Adhere to the following conditions for storage:
 - Only store the Joystick Type 531 in its original packaging.
 - Do not store the Joystick Type 531 outside.
 - Store the packages in a dry and dust-free place.
 - Do not expose the packages to aggressive media.
 - Protect the packages against solar radiation.
 - Observe the admissible storage temperature of 233 to 358K (-40°C to 85°C), see also chapter 11, Technical data.
- ▶ Avoid mechanical impact.
- ▶ Make sure all M12 protective caps are applied.

Maximum storage period

The Joystick Type 531 may be stored for two years at maximum. The storage period will be prolonged by 2 more years if the joystick is connected to the power supply for at least one minute before expiry.

7 Assembly



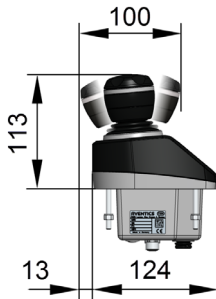
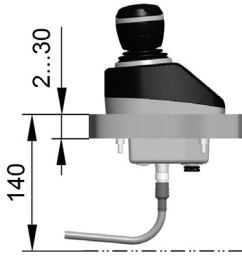
CAUTION

Risk of injury and property damage due to improper installation or mounting work

Improper installation can cause damage to property.

- ▶ The Joystick Type 531 may only be installed by AVENTICS or qualified personnel as specified in chapter 2.4.
- ▶ Install or uninstall the Joystick Type 531 only if the component and the system are powered off.
- ▶ Prepare mounting work carefully.
- ▶ Make sure there is enough space to mount the product professionally.

Assembly



7.1 Installation conditions

The mounting bolts are suitable for a panel thickness between 2 to 30 mm.

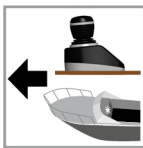
The mounting depth for the electric plugs and connections below the console or panel is 140 mm approximately.

- ▶ Install the Joystick Type 531 in such a way that its moving range is not restricted by other components and all operating and indicating elements are visible and can be easily operated at all times.

A circumferential sealing is provided around the Joystick Type 531 to seal its edge to the panel surface.

- ▶ Make sure that no bores or gaps in the panel surface are located in the sealing area as otherwise the tightness of the panel can not be guaranteed.
- ▶ Use an elastic sealant in addition when installing the Joystick Type 531 on panels which are uneven or have a rough, structured surface. This prevents the penetration of water into the panel.

7.1.1 Mounting orientation



Always install the joystick in forward direction with the stick pointing upward.

7.2 Mounting

1. Prepare a panel cutout by using the drilling template which is included in the delivery (fig. 2).
2. For the mounting bolts, drill 4 holes with a diameter of 5.5mm into the panel.
3. Insert the joystick into the opening from above.
4. Use the nuts and washers supplied to mount the Joystick Type 531 and fix the nuts with a maximum torque of 2 Nm.

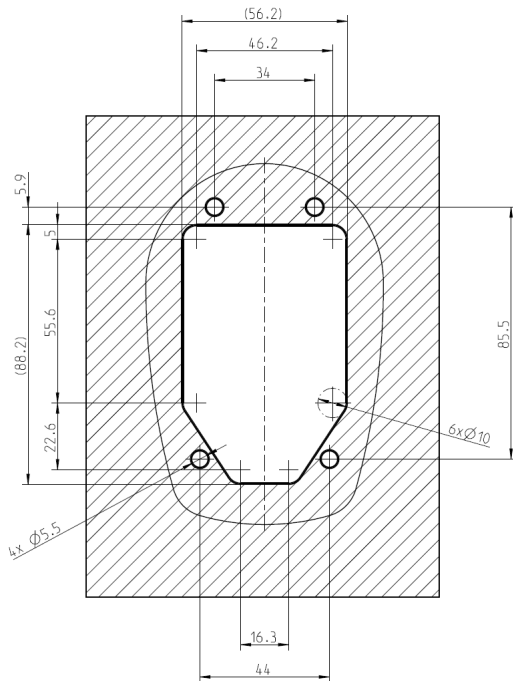


Fig. 2: Panel cutout for Joystick Type 531

7.3 Connecting the Joystick Type 531

NOTICE

Risk of property damage due to missing terminating resistors

The CANbus communication does not work if terminating resistors are not applied. This may result in unexpected ship behaviour.

- ▶ Make sure to connect a terminating resistor at the last component on each CANbus line, see also fig 4, CANbus connection Marex 3D controller to Joystick Type 531.

7.3.1 Connections

At the bottom of the joystick, two round M12 connectors are provided for the connection to the Marex 3D controller and other joysticks.



Fig. 3: Electrical connections

- | | | | |
|----------|-----|---------------------|-----------------------------------------------|
| 1 | X11 | M12, 5 pins, male | Connection for the 3D controller and joystick |
| 2 | X12 | M12, 5 pins, female | Connection for the joystick |
| 3 | X31 | not assigned | |

Proceed as follows to connect the joystick:

1. Make sure that all components are dead before connecting the joystick.
2. Use the connector X12 at the Marex 3D controller to connect a CANbus cable M12. Route the other end of the cable to Joystick Type 531 and connect it to connector X11 from underneath the control panel (fig. 4).

- To connect another joystick, apply another CANbus cable to the connector X12 at the joystick. Route the cable to the next joystick and connect it to X11. Proceed accordingly to connect more joysticks if applicable.



Refer to the Marex 3D manual if you want to connect more than 4 joysticks to the Marex 3D controller.



The maximum cable length from the Marex 3D controller to the last joystick is 300 m.

- Apply a torque of 0.4 Nm to fasten the M12 connectors.
- If no further joysticks are being installed, apply a terminating resistor (AVENTICS material No. 8941054274) to X12 at the last joystick.



There is no need to connect a terminating resistor to the Marex 3D controller as one is already included in the device.

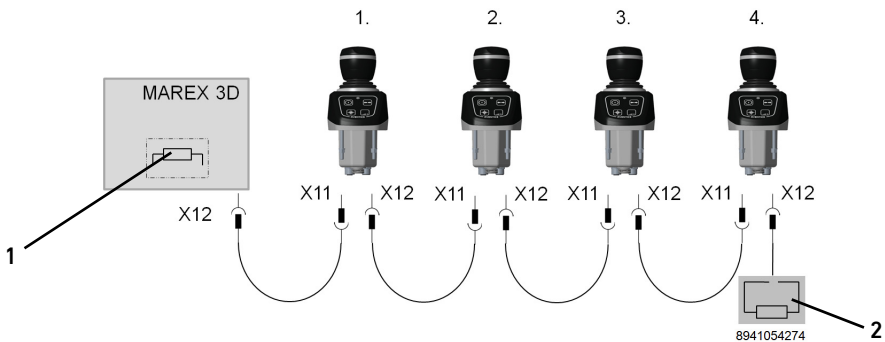


Abb. 4: CANbus connection Marex 3D controller to Joystick Type 531

- Terminating resistor in the Marex 3D controller
- Terminating resistor, material No. 8941054274

8 Maintenance and repair

8.1 Cleaning

NOTICE

Product damage due to inappropriate cleaning

Cleaning agents containing solvents may damage the product's surface and cause premature aging.

- ▶ Do only use solvent-free, non-abrasive cleaning agents
- ▶ Never use pressure washers or steam cleaners to clean the Joystick Type 531.

Clean the product only by using a slightly moistened, lint-free cloth. Only use water or mild cleaning agents.

Surface protection

Continuous and excessive exposure to sea water can cause corrosion at the joystick's metal parts.

- ▶ Wipe off water stains regularly by using a lint-free cloth.

8.2 Inspection

Make sure the component is always in technically perfect condition. Check the Joystick Type 531 regularly for visual damage, especially at the keypad and bellow.

NOTICE! Do not attempt to repair a damaged joystick yourself. In case of defects, always replace the complete joystick.

8.3 Maintenance

The Joystick Type 531 does not require maintenance.

9 Disassembly and replacement



CAUTION

Risk of injury and property damage when servicing components under power

- ▶ If you dismantle or replace the Joystick Type 531 while Marex 3D is in operation, the ability to steer may be lost. Components may be destroyed if connections are removed under power.
- ▶ Only perform assembly or disassembly work on electrical connections if the Marex 3D system is powered off.

Proceed as follows to dismantle the Joystick Type 531:

1. Switch Marex 3D off.
2. Make sure the Joystick Type 531 is powered off.
3. Remove the electrical connections at connectors X11 and X12 (see chapter 7.3, Connecting the Joystick Type 531).
4. Loosen the mounting nuts. You may now remove the Joystick Type 531 from the control panel.

10 Disposal

NOTICE

Environmental damage due to improper disposal

Electronic components require special waste treatment and must only be disposed of by approved specialist companies.

- ▶ Dispose of electronic scrap in an environmentally sound way. Consult the responsible local authorities regarding the environmentally sound disposal.

Dispose of the packaging in an environmentally compatible way.

11 Technical data

Table 6: Technical data

General:	
Dimensions width x height x depth	83 x 175 x 124 mm
Weight	0.7 kg
Power supply	38 V DC (internal system power supply via Marex 3D controller)
Admissible ambient temperature	248 to 350 K (-25°C to 77°C)
Storage temperature	233 to 358 K (-40°C to 85°C)
Max. storage period	2 years
Protection class	IP 66 - EN 60529 (IEC 60529)
Vibration resistance	4 g (IEC 60068-2-6:2007)
Maximum strain	X and Y-axes: 150 N Z-axis: 1.5 Nm
Material:	
Stick	High-end synthetics, black, with stainless steel application
Body	High-end synthetics, black, textured surface
Bottom	High-end synthetics, mirror-finished chrome-plated
Keypad	Up to 4 keys, backlit with status indicators
Joystick	3 axes, spring-centered
	1 Double potentiometer per axis
	Separate linearity of +/- 2 %

12 Appendix

12.1 Installation drawings

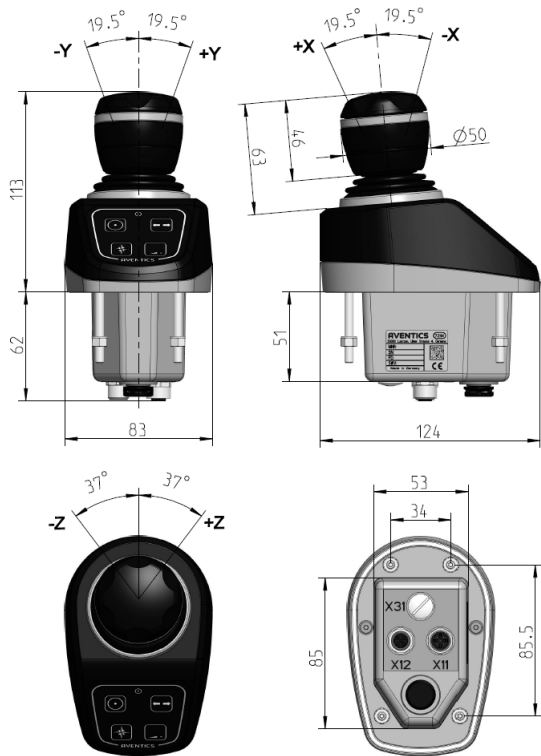


Fig. 5: Dimension drawing of Joystick Type 531, R417003030

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The data specified above only serve to describe the product. No statements concerning a certain condition or suitability for a certain application can be derived from our information. The given information does not release the user from the obligation of own judgement and verification. It must be remembered that our products are subject to a natural process of wear and aging.

An example configuration is depicted on the title page. The delivered product may thus vary from that in the illustration.

Translation of the original operating instructions. The original operating instructions were created in the German language.

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