

INSTRUCTIONS

OJ-DV-IO-Module

Optional module for OJ-DV motor controller



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A DRIVES PROGRAMME DEDICATED TO VENTILATION SOLUTIONS


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1. Product presentation

OJ-DV-IO-Module is an add-on module for the OJ-DV range of motor controllers. The OJ-DV-IO-Module allows a number of A/D inputs and outputs to be added to the OJ-DV controller. Product use: see section 5.

2. Introduction

- Read this manual thoroughly and follow the instructions it contains before taking the OJ-DV-IO-Module into use.
- This manual contains important information and should be used when installing, connecting and commissioning the OJ-DV-IO-Module as well as during maintenance, service and troubleshooting.
- If the instructions contained in this manual are not observed, the liability of the supplier and the warranty shall be voided (see also section 6. *Prohibition on use*).
- Technical descriptions, drawings and figures must not be wholly or partly copied or disclosed to third parties without the permission of OJ Electronics A/S.
- All rights are reserved if the product is included in patent rights or other form of registration.

3. Key to symbols

Particular attention should be paid to the sections in these instructions which are marked with symbols and warnings.



Warning

- This symbol is used where there is a risk of severe or fatal personal injury.



Caution

- This symbol is used where potentially dangerous situations may result in minor or moderate personal injury. The symbol is also used to warn against unsafe and hazardous conditions.



Note

- This symbol is used to indicate important information and in situations which may result in serious damage to equipment and property.



Warning

4. Ensuring safety before installation

- Disconnect the supply voltage to the OJ-DV before you start to install the OJ-DV-IO-Module.
- OJ-DV contains capacitors which become charged during operation. These capacitors can remain charged even after the power supply has been cut off. There is a risk of severe personal injury if the connection terminals or wire ends are touched before these capacitors have been completely discharged. The discharge time is about 3 minutes under normal conditions.
- OJ-DV-IO-Module contains free and exposed electronic components. Electrostatic discharge (ESD) may destroy the product. To prevent destruction of the product's electronic components, the OJ-DV-IO-Module must be handled and installed correctly with respect to electrostatic discharge (ESD).
- OJ-DV-IO-Module must only be installed by qualified personnel or people who have received appropriate training and have thus become qualified to install the product.
- Qualified personnel are familiar with the instructions and safety precautions described in this manual.
- Mains voltage must always be disconnected before any service or maintenance tasks are performed on the product.
- After installing the OJ-DV-IO-Module, check that all openings, covers and cable glands are correctly fitted and closed before connecting OJ-DV to mains voltage. Unused cable glands must be replaced with blank glands.

5. Product use

- The OJ-DV-IO-Module is used specifically for applications which require OJ-DV to regulate and control other external devices in the application or system via A/D signals. See section 14. Functions.
- OJ-DV-IO-Module is used when a thermistor is used to monitor the temperature of the motor.



Warning

6. Prohibition on use

- The OJ-DV-IO-Module must not be taken into use until the machine or product into which it is incorporated has in its entirety been declared to be in conformity with all relevant national and international regulations.
- The product carries a manufacturer's warranty if installed in accordance with these instructions and applicable installation regulations.
- If the product has been damaged, e.g. during transport, it must not be used.

7. EMC – Electromagnetic compatibility

- No special conditions.

8. Approvals and certifications

CE marking

- OJ Electronics A/S hereby declares under sole responsibility that the product complies with the following European Parliament directives:
 - EMC - Electromagnetic compatibility: 2004/108/EU
 - RoHS - Restriction of the use of certain hazardous substances in electrical and electronic equipment: 2011/65/EU

Product standard

- According to EN-61800 Part 2

EMC – Electromagnetic compatibility

- According to EN-61800-3 (C1 and C2)

Corrosion

- According to EN/ISO 12944-2:1998 C4

RoHS compatible

- Contains no hazardous substances according to the RoHS Directive.

9. Product programme

The OJ-DV-IO-Module product programme consists of:

- OJ-DV-IO-Module – see table 9

Table 9	
Functions	OJ-DV IO Module
Digital inputs	2
Relay output; max. 24VAC/30VDC/1A	2
0-10V analogue input	1
0-10V analogue output	1
+10VDC out	1
+24VDC out	1
Thermistor input	1
Terminal/connector overview	See fig. 12.

Product label

- OJ-DV-IO-Module is equipped with a label containing a production code.

10. Mechanical installation

- OJ-DV-IO-Module is fitted inside OJ-DV.
- See figs 10.1, 10.3, 10.4 and 10.5 for details of mechanical installation in OJ-DV sizes 0.55 kW...3.0 kW.
- See figs 10.2, 10.6, 10.7 and 10.8 for details of mechanical installation in OJ-DV sizes 4.0 kW...15.0 kW.



Warning

Opening the OJ-DV

- Disconnect the voltage supply to OJ-DV and wait approx. 3 minutes before opening the cover.
- Open OJ-DV by loosening the six Torx 20 screws in its plastic cover.
- Carefully remove the loosened cover.

Fig. 10.1

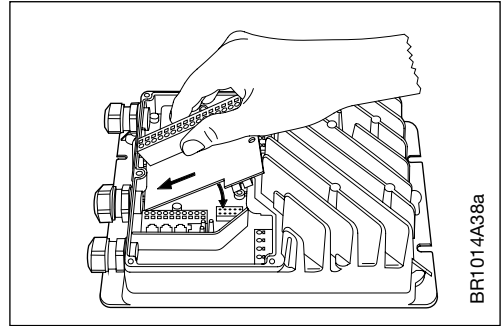


Fig. 10.2

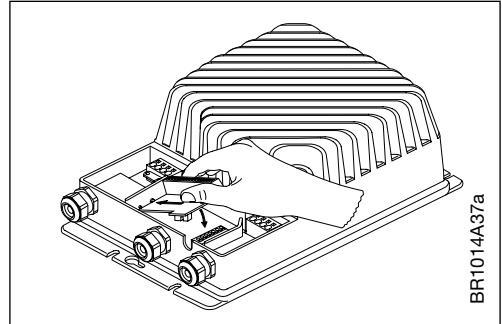


Fig. 10.3

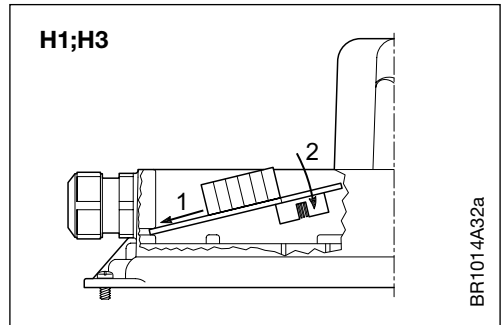


Fig. 10.4

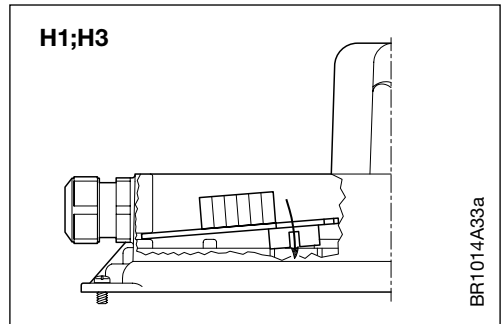


Fig. 10.5

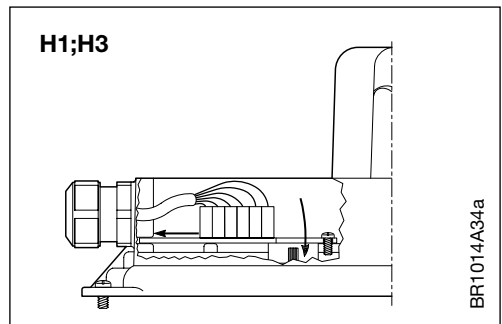


Fig. 10.6

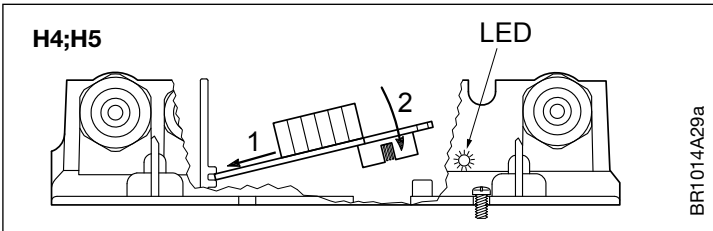


Fig. 10.7

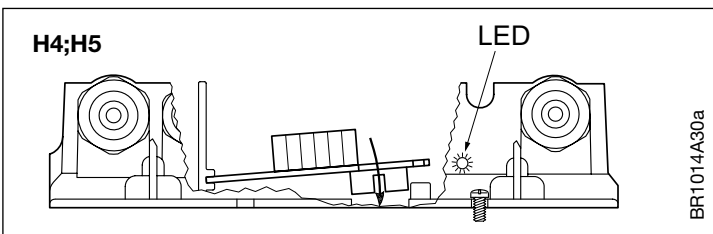
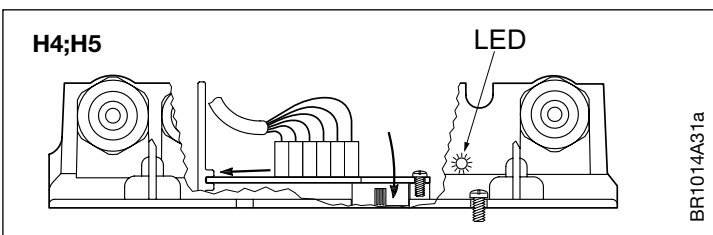


Fig. 10.8



Mechanical installation



Warning

Incorrect mechanical installation may cause faulty operation and impaired performance.

- OJ-DV-IO-Module must only be installed by trained/qualified personnel.
- OJ-DV-IO-Module should be fitted in the space between the input terminals and the motor output terminals.
- Fit the OJ-DV-IO-Module by gently inserting the circuit board at an angle into the 3-point holder in the space between the input terminals and the motor output terminals. H1&H3: see fig. 10.3; H4&H5: see fig. 10.6.



Note

- In OJ-DV sizes 0.55 kW....3.0 kW, the 3-point holder is located on the bottom – see fig. 10.1.
- In OJ-DV sizes 4.0 kW....15.0 kW, the 3-point holder is located on the left-hand side – see fig. 10.2.
- Carefully align the 10-pin connectors opposite one another and gently press them together – H1&H3: see fig. 10.4; H4&H5: see fig. 10.7.
- Attach the OJ-DV-IO-Module with the accompanying screw – H1&H3: see fig. 10.5; H4&H5: see fig. 10.8.
- It is not possible to fit a braking chopper and OJ-DV-IO-Module simultaneously.

Fig. 10.1

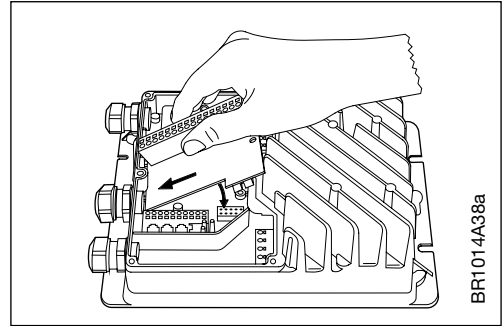


Fig. 10.2

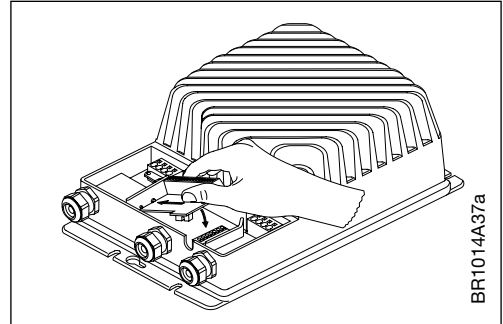


Fig. 10.3

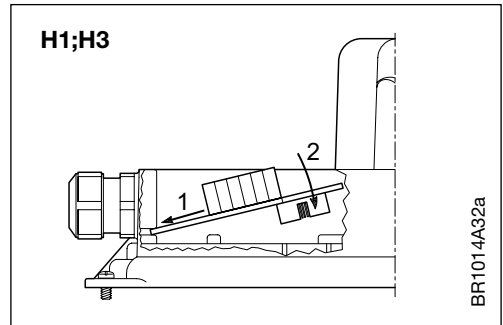


Fig. 10.4

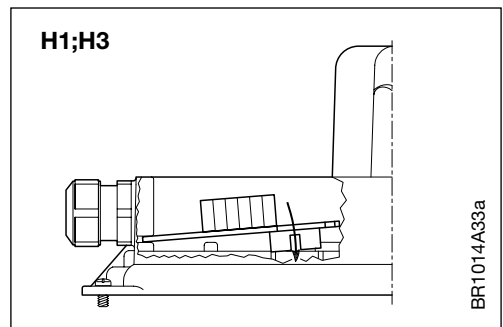


Fig. 10.5

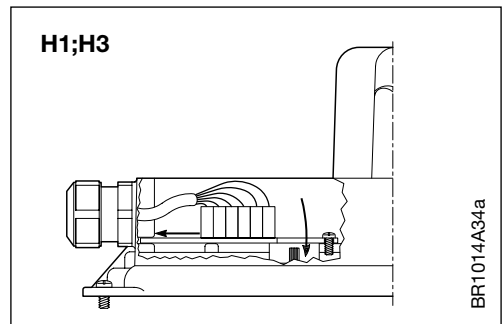


Fig. 10.6

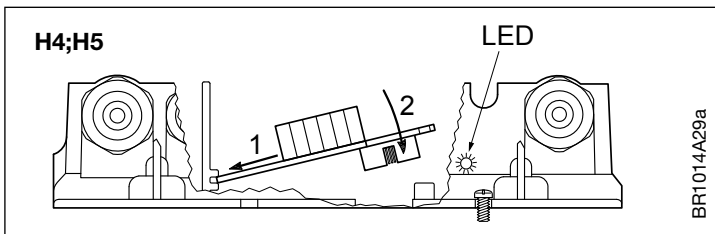


Fig. 10.7

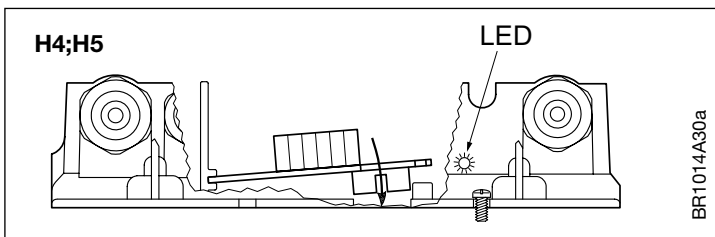
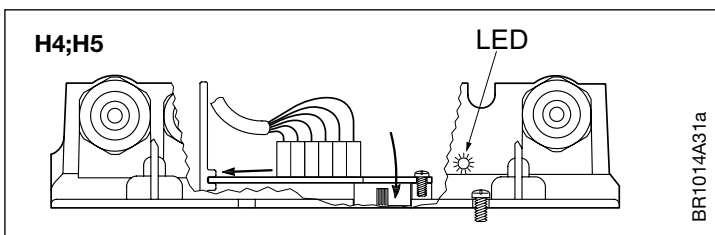


Fig. 10.8



Cable entries – cable glands – strain relief

- Insert signal cables for the OJ-DV-IO-Module into OJ-DV through the cable glands.
- OJ-DV is factory-equipped with three cable glands. If additional cable entries are required, remove the knockout from the middle of the OJ-DV and fit an M16 cable gland.
- As OJ-DV is not equipped with threads for cable glands, the additional cable glands must be attached by means of a separate M16 nut on the inside.
- Remember to re-tighten the cable glands to ensure the ingress protection level of the OJ-DV and to provide cable strain relief.

11. Electrical installation



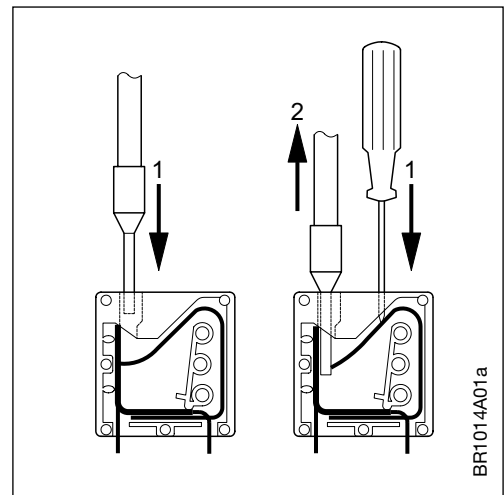
Warning

- The OJ-DV-IO-Module must only be electrically installed by trained/qualified personnel.

Spring terminals

- The connection terminals are spring loaded and the stripped wire can be easily inserted into the terminal by carefully pushing the wire into the terminal without using tools. Alternatively, the terminal spring can be loosened by pressing it lightly with a screwdriver or similar implement. See fig. 11.
- Solid and multi-core cables/leads can be used.
- If multi-core cables/leads are used, core sleeves/ end sleeves must always be used.
- Stripped wire ends or end sleeves must be between 8 and 15 mm.
- Wires can be removed by carefully loosening the terminal spring by pressing lightly with a screwdriver or similar implement. See fig. 11.

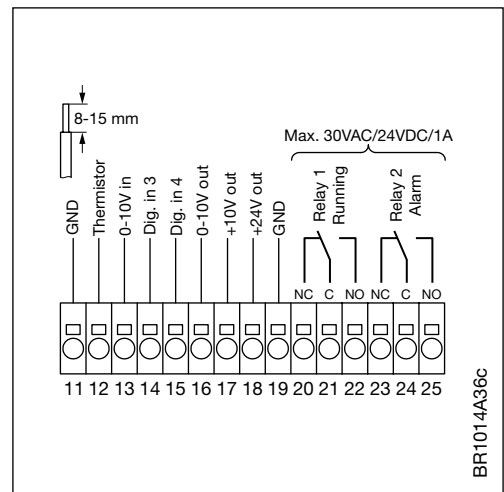
Fig. 11



BR1014A01a

12. Terminal and connector overview

Fig. 12



BR1014A36c

13. Checklist – mechanical and electrical installation

- Before OJ-DV is energized for the first time, installation and connection must be checked.
- Use the table below as a checklist.

Item to be checked	Description of check	✓
Completion	Check that the entire installation is ready to be commissioned, both electrically and mechanically, before energizing the installation.	
	Check that no people or animals are present in the vicinity of moving parts.	
Product conformity	Check that the voltage on the wires connected to the OJ-DV-IO-Module does not exceed 24VAC/30VDC.	
Mechanical installation	Check that the OJ-DV-IO-Module has been attached correctly, that the connector between the OJ-DV-IO-Module and the OJ-DV has been fitted properly and that the OJ-DV-IO-Module has been secured with the accompanying screw.	
	Check that the OJ-DV terminal cover has been correctly fitted and that all screws have been tightened before energizing the product.	
	Check that all unused cable glands and other unused openings are appropriately blanked off in accordance with the applicable enclosure rating.	
Electrical installation	Check that cables have been correctly inserted into OJ-DV and that the cable glands have been correctly tightened.	
	Pull the signal leads gently to ensure that they have been correctly inserted and properly connected to the terminals of the OJ-DV-IO-Module.	
	Check that all cables are correctly ended and securely attached.	
	Check that all cables are free of visible damage throughout their length.	
	Check whether there are any loose connections, which may cause overheating and serious damage to the product and property.	
Cabling	Check that all cabling has been fitted correctly and that motor and control cables are kept apart in separate cable conduits.	
	Check that all cables are securely attached and relieved of tension and torsion.	

14. Functions

Thermistor input

- The thermistor input, terminals 11 (GND) and 12, is for connecting a thermistor/temperature sensor. See fig. 12.
- The sensor is installed in the motor and measures the temperature of the motor starter parts/winding.
- The function is designed to prevent the motor from overheating.
- If the temperature measured in the motor exceeds the set value (°C), OJ-DV will reduce motor speed in order to reduce the amount of heat generated by the motor.
- If the speed reduction does not lower the temperature, the OJ-DV will stop the motor and activate an alarm.

0-10V in

- No function at present, for future use.

Digital input 3: Fire mode

- Digital input 3 on terminals 11 (GND) & 14 is for connecting a signal for fire mode operation. See fig. 12.
 - When the input is open/deactivated, OJ-DV will operate in fire mode.
 - When the input is closed/activated, OJ-DV will operate in standard mode.
 - Fire mode designates a function in which OJ-DV is kept operating by an emergency program which disables the alarm monitor.
 - Among other things, the function can be used in connection with smoke extraction from a burning property. When fire mode is activated, an extraction fan will continue to remove smoke from the property for as long as possible.
 - In fire mode, OJ-DV is able to maintain operation for at least an hour even when the OJ-DV and fan motor are overheated (max. 70°C).
 - In fire mode, the overheating protection built into OJ-DV is disabled and the motor is not stopped if communication is lost.
 - In fire mode, the fan is not stopped in case of faults or other alarms from either the fan or the OJ-DV.
 - Speed is controlled to the actual setting, determined by an external 0-10V signal, a potentiometer or via Modbus from a Modbus master controller.

Digital input 4: Rotation direction

- Digital input 4 on terminals 11 (GND) & 15 is for connecting a signal to change the rotation direction of the connected motor. See fig. 12.
 - When the input is open/deactivated, motor rotation will be clockwise (CW).
 - When the input is closed/activated, motor rotation will be counterclockwise (CCW).

Analogue output 1: Visualisation of motor speed

- Analogue output 1 on terminals 16 & 19 (GND) is a 0-10V output. See fig. 12.
- The 0-10V signal is directly related to motor speed (%):
 - 0% speed = 0V on output
 - 100% speed = 10V on output

Analogue +10V out

- Analogue output +10V out on terminals 17 & 19 (GND) is a fixed +10V output.

Analogue +24V out

- Analogue output +24V out on terminals 18 & 19 (GND) is a fixed +24V output.

Relay output 1: Operating signal

- Relay 1 (terminals 20, 21, 22) can be used to send an operating signal to an external device. See fig. 12.
- The signal output is a changeover relay which is closed between terminals 20 and 21 in idle position and otherwise closes between terminals 21 and 22.
- When OJ-DV receives a start/release signal, the relay changes position, closing between terminals 21 and 22. The relay is simultaneously opened between terminals 21 and 20.
- When the start/release signal to OJ-DV is removed, the relay returns to its starting position, closing between terminals 20 and 21.

Relay output 2: Alarm relay

- Relay 2 (terminals 23, 24, 25) can be used to send an alarm signal to an external device. See fig. 12.
- The signal output is a changeover relay which is closed between terminals 23 and 24 in idle position and otherwise closes between terminals 24 and 25.
- If OJ-DV has stopped due to a critical alarm, the relay will switch position and close between terminals 24 and 25. The relay is simultaneously opened between terminals 24 and 23.
- When the alarm is reset/acknowledged, the relay returns to its original position, closing between terminals 23 and 24.

Function selector

- The optional OJ-DV-IO-Module features a function selector with 16 positions.
- The selector has 16 dedicated positions ranging from "0" to "F" (Hex).
- Settings "0"... "F" of the function selector are for future use and therefore have no active function at present.

15. Maintenance

- Under normal operating conditions and load profiles, OJ-DV-IO-Module is maintenance free.

16. Troubleshooting



Warning

- Before opening OJ-DV, the mains voltage must be disconnected for at least 3 minutes to ensure there is no risk of dangerous residual currents in electronic circuits or capacitors.
- If natural drafts through the duct system cause the fan to rotate even though it has received no operating signal, there is a risk that the motor will induce voltage on the OJ-DV motor terminals, making them dangerous to touch.
- Troubleshooting overview

Symptom	Cause	Action
OJ-DV-IO-Module inoperative	Lacking supply voltage to OJ-DV	Check the voltage supply to OJ-DV terminals "L" and "N" on 230V models (H1). "L1", "L2" and "L3" on 3x400V and 3x230V models (H3...H5). (Nominal supply voltage is stated on the rating plate.)
		Check whether short-circuit protection has been activated.
		Check that the voltage supply to OJ-DV has not been cut off by other components.
	Poor electrical connections	Check electrical connections on OJ-DV and OJ-DV-IO-Module.
		Check that the 10-pin connector between the OJ-DV-IO-Module and OJ-DV has been properly fitted and connected.
	Defective OJ-DV controller	Replace OJ-DV. Never attempt to repair a defective OJ-DV controller. Contact your supplier for replacement/repair.
Defective OJ-DV-IO-Module	Replace OJ-DV-IO-Module.	

17. Repair



Warning

- OJ-DV-IO-Module cannot be repaired on site. Never attempt to repair a defective unit.
- Contact your supplier to obtain a replacement.
- Additional technical data are available on request from OJ Electronics A/S.

18. Disposal



- OJ-DV-IO-Module contains electronic components which must not be disposed of together with household waste.
- OJ-DV-IO-Module must be disposed of in accordance with applicable local rules and regulations.
- OJ-DV-IO-Module meets the requirements on marking of electronic waste contained in the European WEEE Directive 2012/19/EU.

19. Technical specifications

Technical data

Electrical connection	15 spring terminals, max. 2.5 mm ²	
Digital inputs	2 potential-free inputs	
Sensor input	1 thermistor input	
Analogue input	1 x 0-10VDC	
Digital relay outputs	2 potential-free changeover relays, max. 1A, 30VDC/24VAC	
Analogue output	1 x 0-10VDC	
Voltage output	1 x +10VDC	} Total max. consumption 450 mA
Voltage output	1 x +24VDC	
Function selector	Rotary selector, 16 settings (Hex: 0...F) <i>Factory setting: "0"</i>	
Ambient operating temperature	-40/+50°C	
Ambient temperature, storage	-50/+70°C	
Dimensions	80.5 x 59.5 x 27 mm	
Enclosure	IP00	
Weight	44 g	