

BOB2 Box

User Manual



BOB2 Box

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The product information, specifications, and technical data embodied in this manual represent the technical status at the time of writing and are subject to change without prior notice.

We have done our best to ensure that the information given in this manual is useful, accurate and entirely reliable. However, OMICRON does not assume responsibility for any inaccuracies which may be present.

The user is responsible for every application that makes use of an OMICRON product.

OMICRON translates this manual from the source language English into a number of other languages. Any translation of this manual is done for local requirements, and in the event of a dispute between the English and a non-English version, the English version of this manual shall govern.

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About this manual

The purpose of this user manual is to provide information on how to use the *BOB2* box safely, properly, and efficiently. The user manual of the *BOB2* box contains important safety rules for working with the *BOB2* box and makes you familiar with the operation of the *BOB2* box. Following the instructions in this user manual will help you to prevent danger, repair costs, and possible down time due to incorrect operation.

The user manual of the *BOB2* box shall always be available at the site where the *BOB2* box is used. It shall be read and observed by all personnel using the *BOB2* box. Reading the user manual of the *BOB2* box alone does not release you from the duty of complying with all safety regulations relevant and applicable to working on systems in any power distribution network.

1 Safety

1.1 Designated use

The *BOB2* box is generic test adapter for ARCO test sets and used for the simple and comprehensive testing of recloser and sectionalizer controls (henceforth referred to as 'recloser controls').

Do not use the *BOB2* box in any other way than described above or in working environments that exceed the specifications given in chapter "Technical data" on page 21. Improper use may result in damage to persons or property.

1.1.1 Disclaimer

The advisory procedures and information contained within this user manual have been compiled as a guide to the safe and effective operation of the *BOB2* box. It has been prepared in conjunction with application engineers and the collective experience of the manufacturer.

The in-service conditions for the use of the *BOB2* box may vary between customers and end-users. Consequently, this user manual is offered as a guide only. It shall be used in conjunction with the customers own safety procedures, maintenance program, engineering judgment, and training qualifications.

1.2 Safety symbols used

In this manual, the following symbols indicate safety instructions for avoiding hazards.



WARNING

WARNING indicates a hazardous situation that, if not avoided, could result in death or serious injury.

NOTICE

NOTICE indicates information considered important, but not hazard-related (e.g. messages related to equipment damage or data loss).

1.3 Safety instructions

Before working with the *BOB2* box, carefully read the following safety instructions. Only use the *BOB2* box after you have read this user manual (including chapter "Technical data" on page 21) and the First Steps guide of the ARCO test set and fully understood the instructions therein. If you do not fully understand any safety rule or instruction or any part thereof, contact OMICRON electronics before proceeding (→ page 23).

1.3.1 Rules for use

- The *BOB2* box must only be used when in a technically sound condition. Its use must be in accordance with the safety regulations for the specific job site and application.
- Always be aware of the dangers of high voltages. Pay attention to the information provided in this user manual and the First Steps guide of the ARCO test set.
- Testing with the *BOB2* box shall only be carried out by authorized and qualified personnel. Before starting to work, clearly establish the responsibilities of all personnel involved.
- Personnel using the *BOB2* box must be familiar with all necessary personal safety equipment.
- Testing with the *BOB2* box must comply with all on-site procedures and methods for personal safety.
- Personnel receiving training, instruction, direction, or education on the *BOB2* box should remain under the constant supervision of an experienced operator while working with the equipment.
- Keep this user manual and the First Steps guide of the ARCO test set available on site where the *BOB2* box is used.

1.3.2 Safe operation procedures

- Before use, always check the *BOB2* box for damage. Immediately replace any damaged *BOB2* box.
- Operate the *BOB2* box only under the environmental conditions specified in chapter "Technical data" on page 21.
- Do not operate the *BOB2* box when explosive gas or vapors are present.
- Before connecting cables to the *BOB2* box, you must connect the *BOB2* box to the ARCO test set via the controller interface.
- When connecting or disconnecting a *BOB2* box, verify that the installation is dead, and observe the procedure described in section "Wiring" on page 13.
- When disconnecting a *BOB2* box, always start from the device feeding the power or signal, and disconnect protective earth as the last step.
- Always follow the on-site procedures and methods for personal safety.
- Always follow the steps described in this user manual and in the First Steps guide of the ARCO test set.
- The *BOB2* box does not comprise any serviceable parts. Do not open the *BOB2* box, and do not carry out any modifications, extensions, or adaptations.
- If the ARCO test set or *BOB2* box seems to be functioning improperly, please contact OMICRON Technical Support (→ page 23).

1.4 Operator qualifications

Testing with the *BOB2* box shall only be carried out by authorized and qualified personnel that are experienced in recloser testing. They must be familiar with the five safety rules:

- Disconnect completely.
- Secure against re-connection.
- Verify that the installation is dead.
- Carry out grounding and short-circuiting.
- Provide protection against adjacent live parts.

For more detailed information on operator qualifications, refer to the corresponding sections in the reference manual of the ARCO test set.

1.5 Cleaning

Before cleaning the *BOB2* box, ensure that it is completely disconnected from power supply. To clean the *BOB2* box, use a cloth dampened with isopropanol alcohol.

2 Declaration of conformity (EU)

The equipment adheres to the guidelines of the council of the European Community for meeting the requirements of the member states regarding the low voltage directive (LVD) and the RoHS directive.

3 Recycling

This device (including all accessories) is not intended for household use. After use, the device cannot be disposed of as household waste!



For customers in EU countries (incl. EEA)

OMICRON devices are subject to the EU Waste Electrical and Electronic Equipment Directive (WEEE directive). As part of our legal obligations under this legislation, OMICRON offers to take back the OMICRON device and ensure that it is disposed of by authorized recycling agents.



For customers outside the EEA

Please contact the competent authorities for the relevant environmental regulations in your country and dispose the OMICRON device only in accordance with your local legal requirements.

4 Device overview

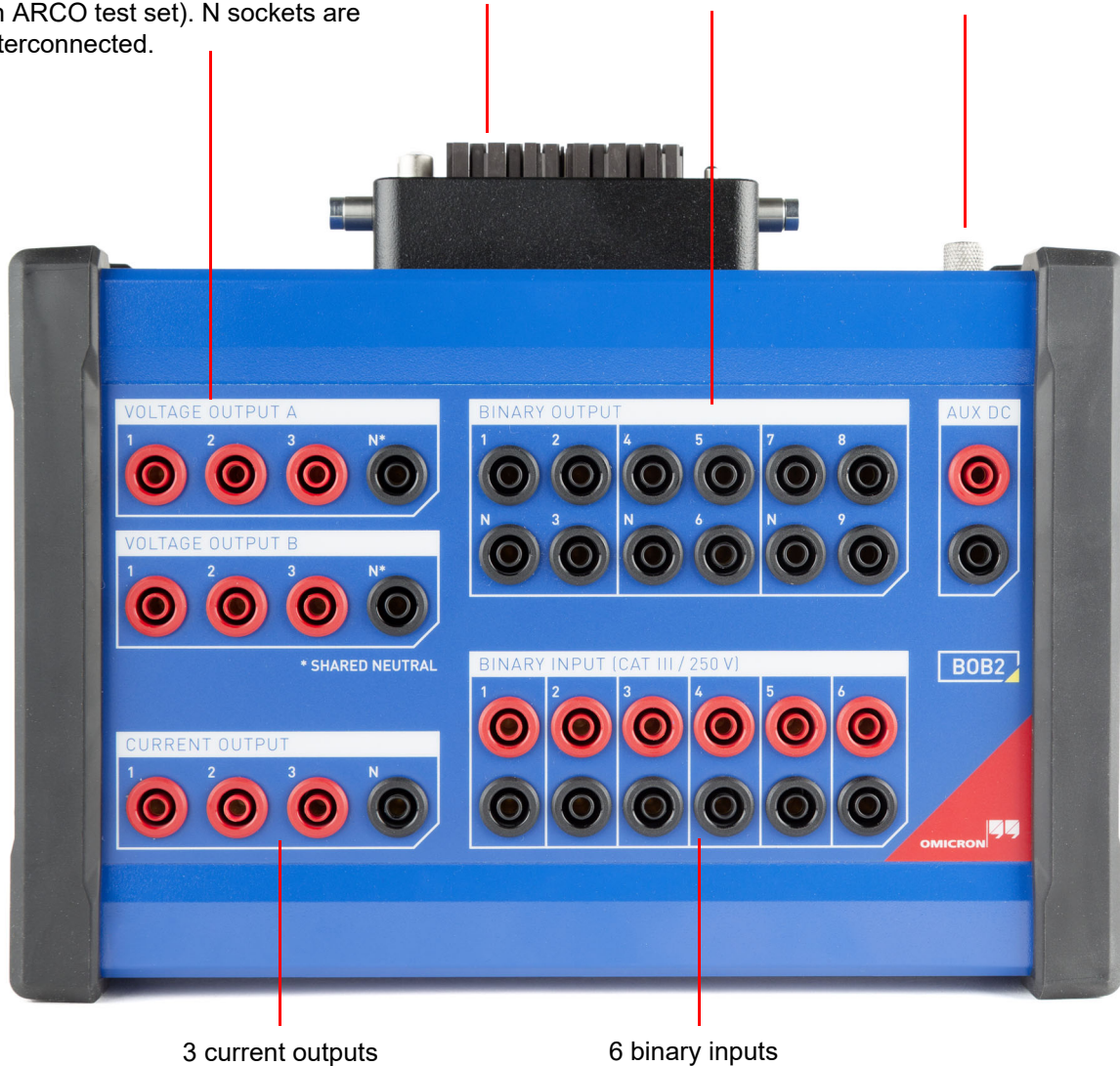
This chapter gives an overview of the front panel elements of the *BOB2* box. For safety information regarding the outputs and inputs, please refer to the subsequent pages.

6 conventional voltage outputs with 8 V or 150 V range (depends on ARCO test set). N sockets are interconnected.

Connection interface

9 binary outputs in 3 groups

4 mm/0.16 " socket for additional PE connection



3 current outputs

6 binary inputs

5 Safety information regarding the outputs and inputs



WARNING

Death or severe injury caused by high voltage possible

The *ARCO 400* outputs can be activated remotely when *ARCO 400* is switched on and connected to a controlling software or device (via network, Wi-Fi, or USB).

- ▶ Do not touch voltage signals or any other signal connected to the *BOB2* box while *ARCO 400* is switched on.
- ▶ Observe all necessary safety instructions provided in this chapter.

5.1 Voltage outputs

In combination with *ARCO 400*, the *BOB2* box provides 6 voltage outputs.

NOTICE

Equipment damage possible

The N sockets of the voltage outputs are internally connected to each other.

5.2 Current outputs

In combination with *ARCO 400*, the *BOB2* box provides 3 current outputs.



WARNING

Death or severe injury caused by dangerous inductive loads possible

If charged with current, inductive loads may store a dangerous amount of energy. For example, an energy of < 350 mJ is considered safe according to the IEC 61010-1 safety standard.

- ▶ Make sure that the possibly stored energy of the inductive device under test is within safe limits.
- ▶ Do not use *ARCO 400* to test particularly critical devices such as power transformers and current transformers (due to secondary injection, e.g. winding resistance measurement).
- ▶ If in doubt, contact OMICRON Support for more information.



WARNING

Death or severe injury caused by high voltage possible

Although the output voltages of the current generators are within touch-safe limits, the isolation to other input and output groups is implemented as functional isolation only (see section 'Isolation coordination' in the reference manual of the ARCO test set). Therefore, the outputs can conduct life-threatening voltages in case of a single failure.

- ▶ If it is not possible to use the safety test leads and safety sockets, observe the wiring instructions and safety precautions given in section "Wiring" on page 13.
- ▶ Do not touch the current signals while *ARCO 400* is switched on.

5.3 Binary outputs

In combination with *ARCO 400*, the *BOB2* box provides 9 binary relay outputs.



WARNING

Death or severe injury caused by high voltage possible

The binary outputs are only functionally isolated from each other and against other groups (see section 'Isolation coordination' in the *ARCO 400* Reference Manual).

- ▶ If it is not possible to use safety test leads and safety sockets, observe the wiring instructions and safety precautions given in section "Wiring" on page 13.
- ▶ Do not touch these signals while *ARCO 400* is switched on.

5.4 Binary inputs

In combination with *ARCO 400*, the *BOB2* box provides 6 binary inputs.



WARNING

Death or severe injury caused by high voltage possible

The binary inputs are only functionally isolated from each other and against other groups (see section 'Isolation coordination' in the *ARCO 400* Reference Manual).

- ▶ If it is not possible to use safety test leads and safety sockets, observe the wiring instructions and safety precautions given in section "Wiring" on page 13.
- ▶ Do not touch these signals while *ARCO 400* is switched on.

5.5 AUX DC

In combination with *ARCO 400*, the *BOB2* box provides 1 **AUX DC** output.



WARNING

Death or severe injury caused by hazardous voltage levels due to control by software possible

The **AUX DC** output of the *BOB2* interface can be programmed to output hazardous voltage without user intervention. It will then output the pre-programmed voltage directly after the start-up of *ARCO 400*. This may lead to damage to property or persons. Since the outputs of *ARCO 400* are only controlled by software, a wrong **AUX DC** setting (e.g. set in software, software or hardware error) could lead to an unexpected value (up to 264 V).

- ▶ Check that the voltage applied at the **AUX DC** output of the *BOB2* interface is safe before connecting any test leads to this output.
- ▶ Follow the wiring procedure described in this manual.

6 Wiring

Depending on the device under test, the wiring varies between different test cases. Here are some general steps that you need to follow to wire up and use the *BOB2* box:

1. If necessary, install an appropriate terminal adapter to enable a safe connection with safety banana cables.
2. Before wiring the test setup, connect *ARCO 400* to protective earth.
3. Connect the extension cable to *ARCO 400*.
4. Connect the *BOB2* box to *ARCO 400* via the extension cable.
5. Connect the *BOB2* box to the device under test using safety banana cables (OMICRON standard accessory).

For further information on different connection options, refer to section 6.1 "Adapters and test leads for use with BOB2" on page 14.

WARNING



Death or severe injury caused by high voltage possible

The outputs of the *ARCO 400* are controlled exclusively by its control software and the firmware in the *ARCO* test set. Therefore, only turning off the outputs in the control software is not sufficiently safe.

- ▶ Do not work on connected touchable test objects, connections or terminals while the *ARCO* test set is switched on.
- ▶ Always make sure that the *ARCO* test set is unplugged from power supply and all parts in the working area are powerless before working on test objects, connections or terminals connected to the *BOB2* box.

WARNING



Death or severe injury caused by high voltage possible

The isolation of potentially hazardous voltages and of the housing of the *BOB2* box is implemented as basic isolation. Therefore, a single failure could lead to dangerous situations if the connection to protective earth is not established before any signals are connected to the *BOB2* box.

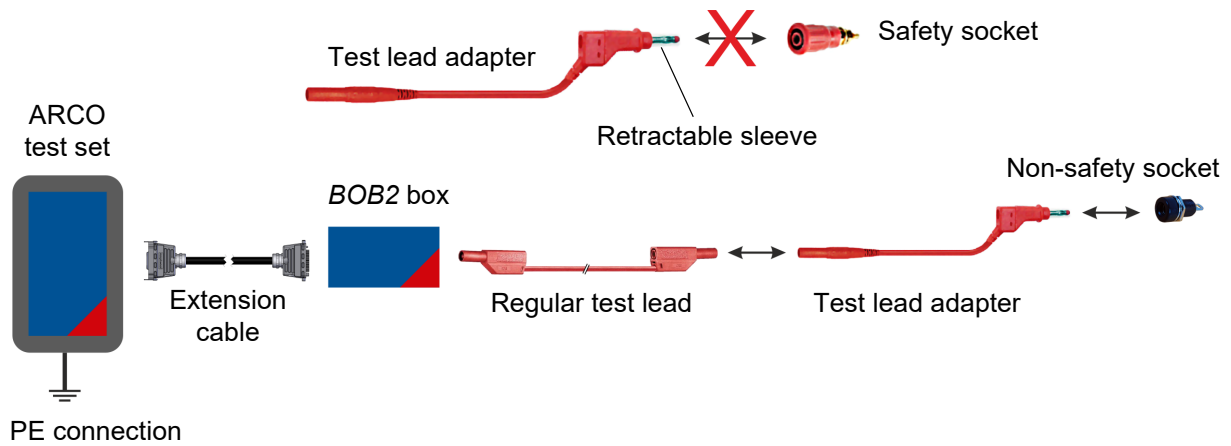
- ▶ Before feeding any signal to the *BOB2* box, ensure that the *BOB2* box is connected to the *ARCO* test set and that the *ARCO* test set is connected to protective earth (PE).

6.1 Adapters and test leads for use with BOB2

6.1.1 Test lead adapters for non-safety sockets

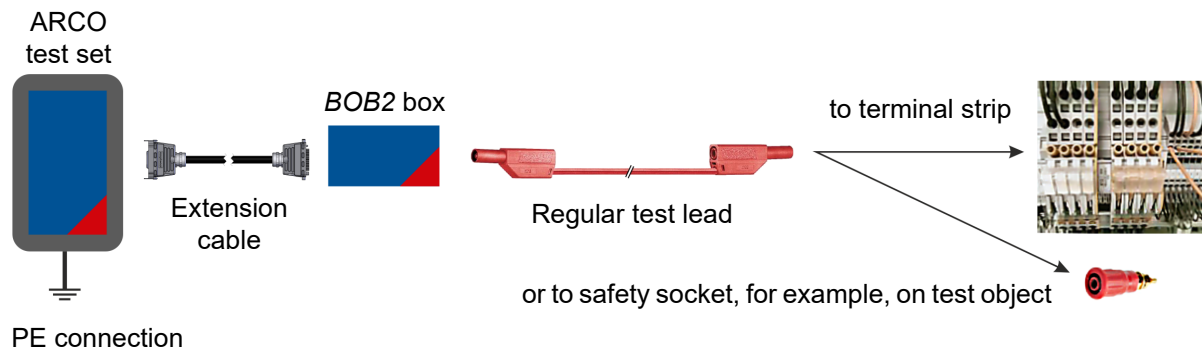
The optional CMC Wiring Accessory Package that can be used together with the *BOB2* box includes flexible test lead adapters of 5 cm/2 " length with a retractable sleeve (6 x black, 6 x red). These test leads are to be used as adapters, only. They are intended to make the 4 mm/0.16 " banana plugs of the standard test leads fit into non-safety sockets.

Never directly insert one of the retractable sleeves into an output socket at the front of the *BOB2* box. This does not comply with the designated purpose of these leads and is contrary to the safety regulations. Use the regular test leads, only. Plug in the regular test leads of 2.0 m/6 ft. length into either the appropriate output safety sockets of the *BOB2* box or the test lead adapters.



6.1.2 Regular test leads for safety sockets

Use the regular test leads of 2.0 m/6 ft. length to connect the outputs of the *BOB2* box to other safety sockets of, for example, amplifiers, test objects, or banana adapters.



6.1.3 Terminal adapters

The optional CMC Wiring Accessory Package that can be used together with the *BOB2* box includes flexible terminal adapters to connect the regular test leads to screw-clamp terminals.

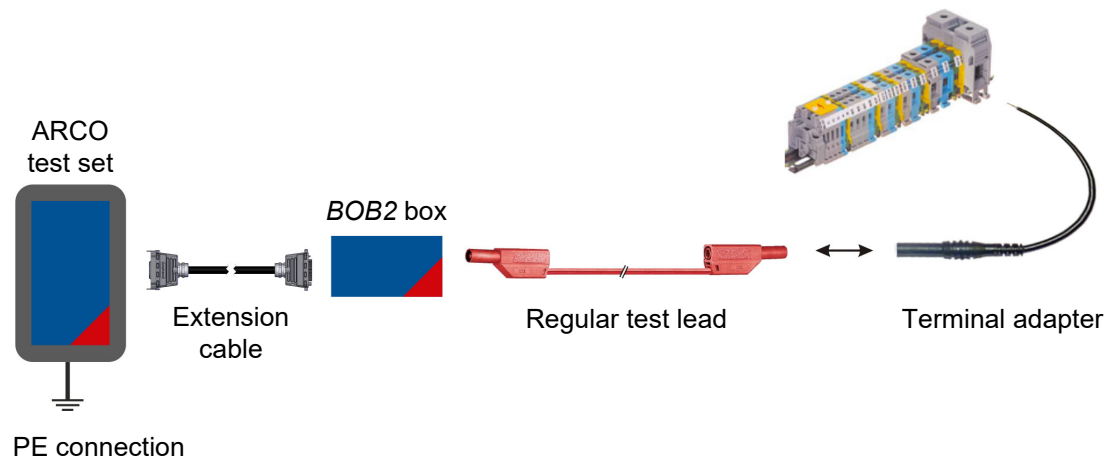


WARNING

Death or severe injury caused by high voltage possible

The terminal adapters have blank ends.

- ▶ Before connecting the terminal adapters, turn off the ARCO test set and any possible power source applying voltage or current to the terminal strip.
- ▶ Only then connect the terminal adapter.
- ▶ Always insert the terminal adapter with its blank end first into the terminal strip and fasten it before connecting it to a test lead.



6.1.4 M4 (0.15 ") and M5 (0.20 ") cable lug adapters

The optional CMC Wiring Accessory Package that can be used together with the *BOB2* box includes the following:

- M4 (0.15 ") cable lug adapters to connect regular test leads to screw-clamp terminals.
- M5 (0.20 ") cable lug adapters to connect regular test leads to common and most widespread screw-clamp terminal types.

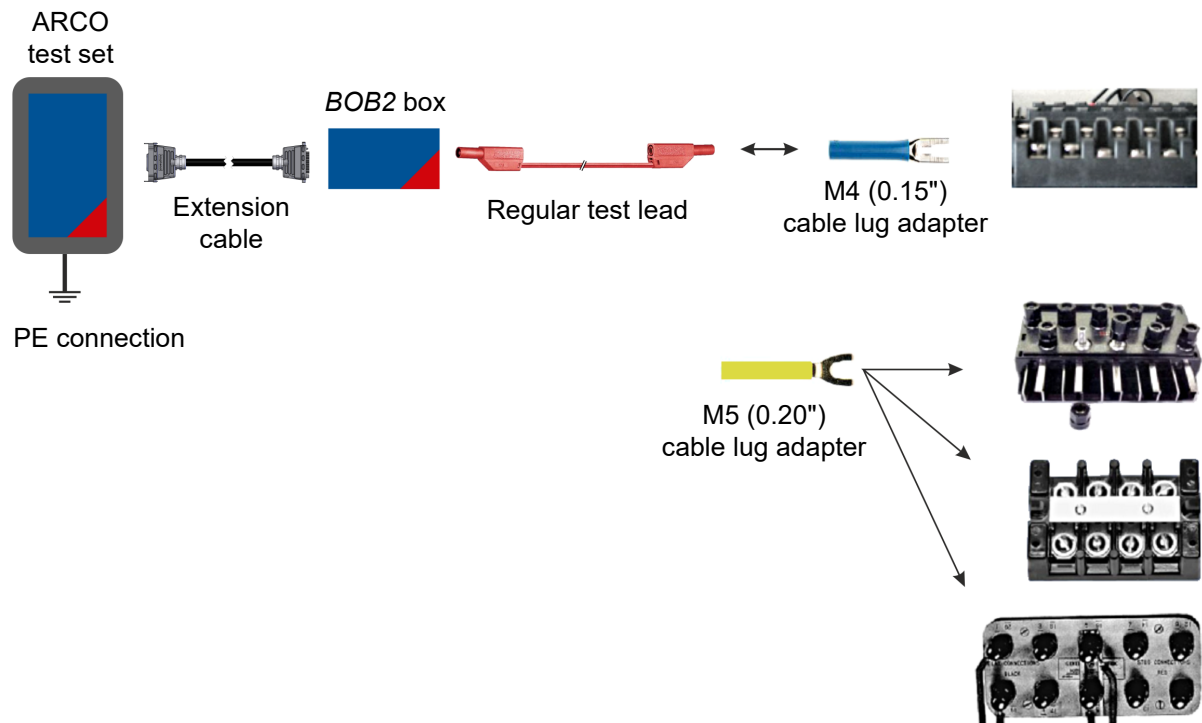


WARNING

Death or severe injury caused by high voltage possible

The cable lug adapters have blank ends.

- ▶ Turn off the ARCO test set and any possible power source applying voltage or current to the screw-clamp terminals.
- ▶ Only then connect the cable lug adapter.
- ▶ Always insert the cable lug adapter with its blank end first into the screw-clamp terminal, and fasten it before connecting it to a test lead.



7 BOB2 configuration in control software

In *ARCO Control*, you can choose between two predefined controller configurations for the *BOB2* box:

- Generic 3-Phase
- Generic 3-Phase TS

Depending on your selection, the hardware configuration varies – please see the following subsections for a more detailed description.



If you want to upload a new controller configuration for the *BOB2* box, contact OMICRON Technical Support (→ page 23).

7.1 Configuration for Generic 3-Phase controller

7.1.1 Binary inputs

Binary input	Function	Nominal range (V)	Input load (mA)
B-IN 1+	Trip	12	80
B-IN 1-			
B-IN 2+			
B-IN 2-			
B-IN 3+	Close	12	80
B-IN 3-			
B-IN 4			
B-IN 5			
B-IN 6			

7.1.2 Binary outputs

Potential group	Binary output	Function	Comment
I	B-OUT 1	52a	Circuit breaker contact 52a
	B-OUT 2		
	B-OUT 3		
II	B-OUT 4	52b	Circuit breaker contact 52b
	B-OUT 5		
	B-OUT 6		
III	B-OUT 7	BO7	Generic binary output (default: open)
	B-OUT 8	BO8	Generic binary output (default: open)
	B-OUT 9	BO9	Generic binary output (default: open)

7.1.3 Circuit breaker simulation timing

Trip	(ms)	Close	(ms)
Trip time	30	Close time	40
52a Trip	20	52a Close	40
52b Trip	30	52b Close	30

7.1.4 Debounce and deglitch times

Time	(ms)
Debounce time	3
Deglitch time	-

7.1.5 Amplifier configuration

Voltages

Voltages are disabled by default. However, if voltages are required for a specific test setup, you can enable and configure them in the *ARCO Control* software. Refer to the user manual of the device under test for the appropriate settings.

Currents

The table below shows the default current output settings for the selected configuration. The actual configuration of the device under test may vary.

Current output settings	
Current configuration	3 x I
CT ratio prim.	1000 A
CT ratio sec.	1 A
I max (L-E)	12.50 A
CT star point	Load

7.2 Configuration for Generic 3-Phase TS controller

7.2.1 Binary inputs

Binary input	Function	Nominal range (V)	Input load (mA)
B-IN 1+	Trip A	12	80
B-IN 1-			
B-IN 2+	Close A	12	80
B-IN 2-			
B-IN 3+			
B-IN 3-	Trip B	12	80
B-IN 4	Close B	12	80
B-IN 5	Trip C	12	80
B-IN 6	Close C	12	80

7.2.2 Binary outputs

Potential group	Binary output	Function	Comment
I	B-OUT 1	52a A	Circuit breaker contact 52a, phase A
	B-OUT 2	52b A	Circuit breaker contact 52b, phase A
	B-OUT 3	52a B	Circuit breaker contact 52a, phase B
II	B-OUT 4	52b B	Circuit breaker contact 52b, phase B
	B-OUT 5	52a C	Circuit breaker contact 52a, phase C
	B-OUT 6	52b C	Circuit breaker contact 52a, phase C
III	B-OUT 7	BO7	Generic binary output (default: open)
	B-OUT 8	BO8	Generic binary output (default: open)
	B-OUT 9	BO9	Generic binary output (default: open)

7.2.3 Circuit breaker simulation timing

Trip	(ms)	Close	(ms)
Trip time	30	Close time	40
52a Trip	20	52a Close	40
52b Trip	30	52b Close	30

7.2.4 Debounce and deglitch times

Time	(ms)
Debounce time	3
Deglitch time	-

7.2.5 Amplifier configuration

Voltages

Voltages are disabled by default. However, if voltages are required for a specific test setup, you can enable and configure them in the *ARCO Control* software. Refer to the user manual of the device under test for the appropriate settings.

Currents


The table below shows the default current output settings for the selected configuration. The actual configuration of the device under test may vary.

Current output settings	
Current configuration	3 x I
CT ratio prim.	1000 A
CT ratio sec.	1 A
I max (L-E)	12.50 A
CT star point	Load

7.3 Updating the BOB2 controller configuration

Before you start testing with your *BOB2* box, make sure that its latest controller configuration is installed on your *ARCO* test set.

To update the *BOB2* controller configuration, follow the steps below:

1. Connect the *BOB2* box as described in section 6 "Wiring" on page 13 to the *ARCO* test set.
2. Connect *ARCO Control* via USB cable, Ethernet cable, or Wi-Fi to the *ARCO* test set.
For detailed information on how to use *ARCO Control*, refer to the *ARCO Control* User Manual and to the introduction videos that are installed with *ARCO Control*.
3. After associating to the test set, click the  button in the **Controller Selection** screen. Then, the **Adapter Management** screen opens.
4. In the **Adapter Management** screen, click the **Update** button and select the appropriate *BOB2* controller configuration file.

8 Technical data

Climatic specifications

Operating temperature	- 10 °C ... + 50 °C / + 14 °F ... + 122 °F
Storage and transportation	- 25 °C ... + 70 °C / - 13 °F ... + 158 °F
Maximum operating altitude	4,000 m / 13,100 ft
Humidity	5 ... 95 % relative humidity; no condensation

Mechanical Data

Weight	1.9 kg / 4.2 lb
Dimensions (W x H x D)	260 mm x 70 mm x 200 mm / 10.24 " x 2.76 " x 7.87 "
Protection class	IP 30 according to IEC 60529

Measurement categories

Binary inputs	CATIII 250 V
Binary outputs	CATIII 250 V

Analog outputs

Voltage outputs	Depends on the <i>ARCO 400</i> configuration: 6 x 8V ¹ or 6 x 150V ²
Current outputs	3 x 12.5 A

Safety standards

Europe	EN 61010-1; EN 61010-2-030
USA	UL 61010-1; UL 61010-2-030
International	IEC 61010-1; IEC 61010-2-030

-
1. Standard *ARCO 400* test set.
 2. *ARCO 400* test set with 150 V option. This option is used for testing recloser controls that require higher voltage amplitudes. An *ARCO 400* test set with 150 V option needs to be ordered separately (order number: VEHO0007).

BOB2 Box

Support

When you are working with our products we want to provide you with the greatest possible benefits. If you need any support, we are here to assist you!



24/7 Technical support – get support

www.omicronenergy.com/support

At our technical support hotline, you can reach well-educated technicians for all of your questions. Around the clock – competent and free of charge.

Make use of our 24/7 technical support hotlines:

Americas: +1 713 830-4660 or +1 800-OMICRON

Asia-Pacific: +852 3767 5500

Europe / Middle East / Africa: +43 59495 4444

Additionally, you can find our Service Center or Sales Partner closest to you at www.omicronenergy.com.



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