

Instructions for Use

Wega 1

Wega 1 V

Wega 2

Wega 2 V



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General notes

Before using this device, carefully read and understand the contents of this document and keep it for future reference.

The content reflects the most accurate information at the date of printing. We reserve the right to make technical changes at any time and without prior notice as necessary in the framework of on-going developments. This release of the document becomes invalid when a new issue of this document is released.

Installation, connection and commissioning of the devices must be carried out by an electrician observing the 'Five Safety Rules' according to EN 50110.

Important terms

The terms listed below serve to ensure safety for life and limb and also determine the service life of the equipment.



DANGER!

... indicates a hazardous situation which, if not avoided, could lead to death or serious injury.



WARNING!

... indicates a hazardous situation which, if not avoided, may lead to death or serious injury.



CAUTION!

... indicates a hazardous situation which, if not avoided, may lead to wounds and minor injuries.



NOTICE!

... is used for application purposes and does not refer to personal injuries.

CE Declaration of conformity

This device is in conformity with the requirements of the EC Electromagnetic Compatibility (EMC) Directive in their current form.

If required, the **CE** Declaration of Conformity may be requested from the following address:



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General safety notes



DANGER!

- Only electrically skilled or instructed persons may install the integrated voltage detecting systems Wega and use them to detect the presence or absence of voltage.
 - When installing the device, the 'Five Safety Rules' of electrical engineering as defined by the standard EN 50110 must be observed:
 - Disconnect completely
 - Secure against re-connection
 - Verify that the installation is dead
 - Carry out earthing and short-circuiting
 - Provide protection against all adjacent live parts
 - For a reliable and safe 'voltage present' indication according to IEC 61243-5 and IEC 62271-213, it must be ensured that the Wega is only used within its rated voltage and frequency and that it has been matched with the entire system.
 - The Wega is a part of the entire voltage detection system (incl. cable and e.g. coupling capacitance), meaning that the system manufacturer or operator is responsible for the correct interpretation and thus the function of the entire voltage detection system.
 - The system manufacturer specifies the rated voltage of the switchgear and the permissible nominal or nominal voltage range, which must also be considered for the voltage testing system.
 - Verify the absence of voltage at all poles before accessing the high voltage parts.
 - The Wega does not differentiate between the state „Voltage not present“ ($U < 0.1 \times U_n$) and the state „Activated AND earthed“ ($U = 0 \text{ V}$).
 - Damaged devices which do not have a guaranteed level of functional efficiency or safety or which do not have clearly legible labels must not be used.
 - The user is obliged to check that the device is in a faultless condition prior to each use.
 - Wega may only be used for the purpose for which it has been designed as described in the present Instructions for Use.
 - Any warranty claim is void in the case of damages caused by non-observance of this Instructions for Use. Horstmann GmbH is not liable for any consequential damage arising from or relating to this non-observance.
 - Only use the integrated voltage detecting systems Wega for indoor applications.
-



CAUTION!

- In the case of adverse lighting conditions the visual display should be either darkened or illuminated additionally.
 - Keep and transport the integrated voltage detecting system Wega in a clean and dry place. All damages are to be avoided.
-



NOTICE!

- When performing cable tests or DC tests on switchgear or cable sections equipped with a Wega, we recommend short-circuiting the measuring sockets with the earth socket if the triple line-to-earth operating voltage is exceeded. The short-circuiting can be done via short laboratory cables (max. 25 cm) or alternatively with the 4-pole Wega short-circuit plug (part no. 51-9904-001).
With correct C2 design of the Wega and exceeding the triple line-to-earth operating voltage (measuring voltage $> 60 \text{ V}$), it can be assumed that internal surge arresters in the Wega will ignite to protect the electronics. The ignition of the surge arresters in cable tests can be prevented by earthing the measuring sockets.

1 Intended use

The Wega is an integrated voltage detecting system. The device determines and displays the operating conditions of the medium-voltage systems according to EN 50110-1.

The Wega complies with the requirements for Voltage Detecting and Indicating Systems (VDIS) in accordance with IEC 62271-213. The voltage detecting systems are capacitively coupled to live parts.

2 Device description

2.1 Scope of delivery

Complete Wega unit:

- Wega 1 voltage detecting system (base type).
- Instructions for Use.
- Optional:
 - 1 set of connection leads (prefabrication according to agreement)
 - For any additional accessories, see product catalogue



NOTICE!

Requires perfectly coordinated components:

- Coupling capacitor (on the side of the switchgear) either in a bushing or a post-type insulator.
- Connection leads between the Wega and the coupling capacitor.

The switchgear manufacturer or operator is responsible for the proper coordination of the system.

2.2 System structure

The Wega is part of an integrated voltage detecting and indication system in accordance with IEC 62271-213. The drawing below shows the Wega within the complete system.

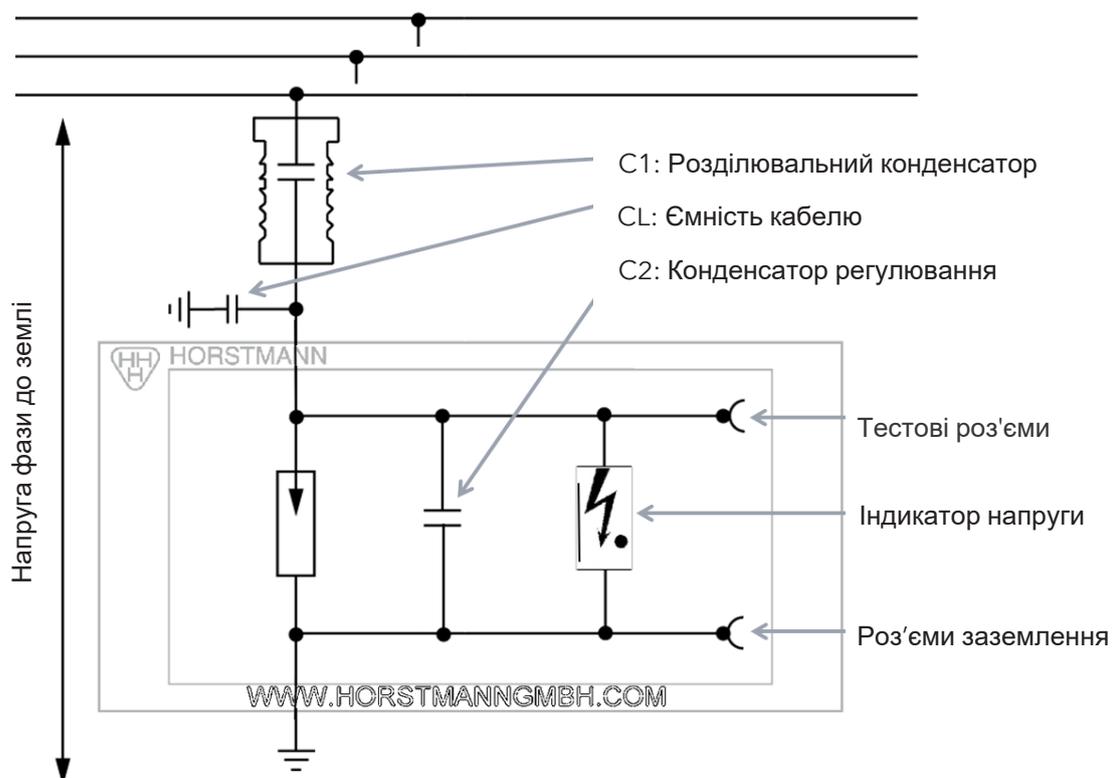


Fig. 2.1: Schematic illustration of the Wega as part of an integrated voltage detecting and indicating system

2.3 Connections and controls

2.3.1 Front Wega 1 / Wega 1 V

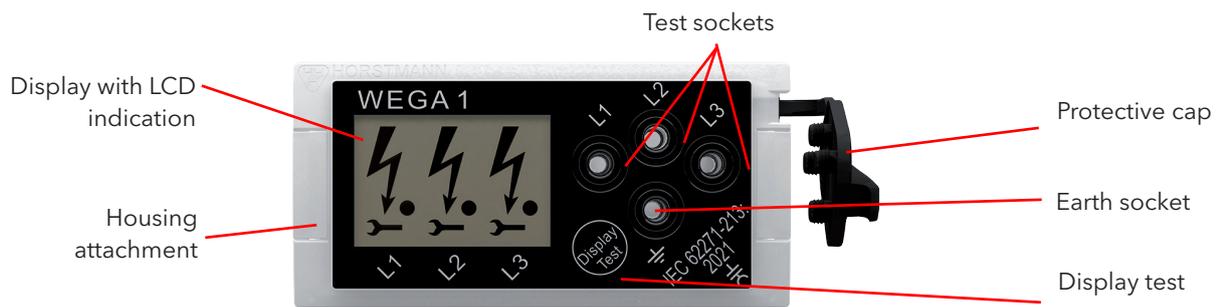


Fig. 2.2: Front Wega 1 / Wega 1 V with indications and controls

2.3.2 Front Wega 2 / Wega 2 V

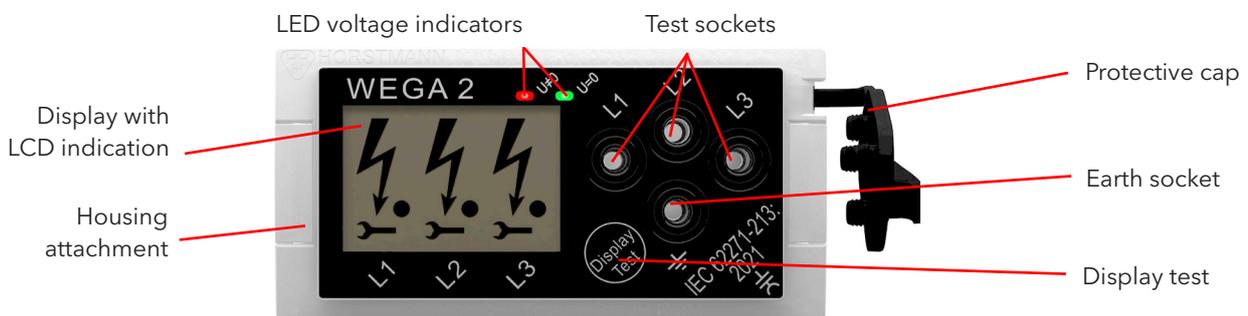


Fig. 2.3: Front Wega 2 / Wega 2 V with indications and controls

2.3.3 Back Wega 1

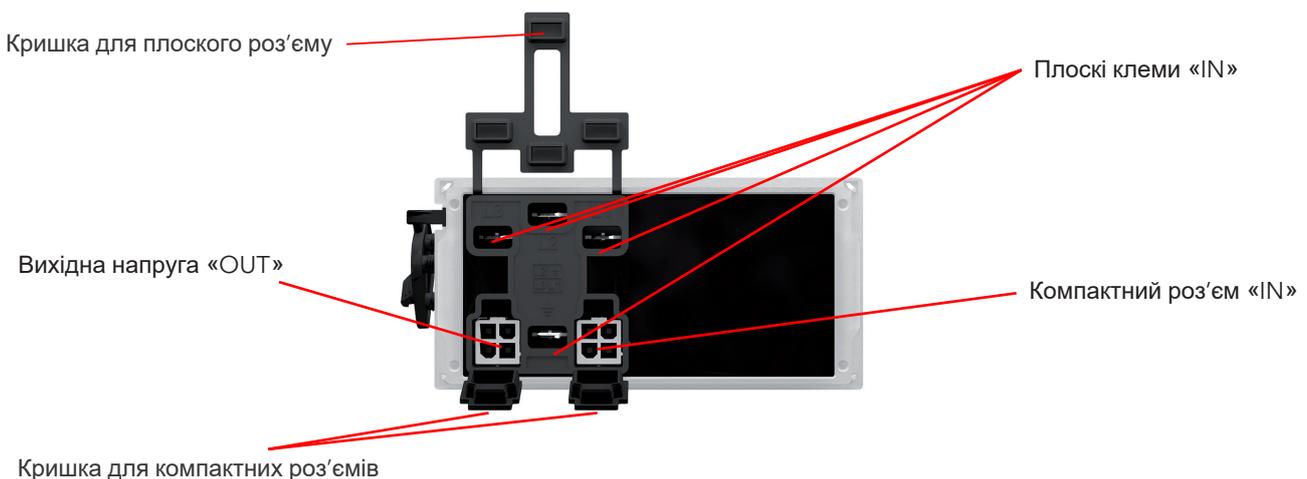


Fig. 2.4: Wega 1 rear with connections and controls



NOTICE!

Close with covers the connections that are not required!

- "IN": Voltage input from a bushing or an insulator.
- "OUT": Voltage signal for short-circuit indicators such as Sigma or ComPass.

2.3.4 Back Wega 1 V

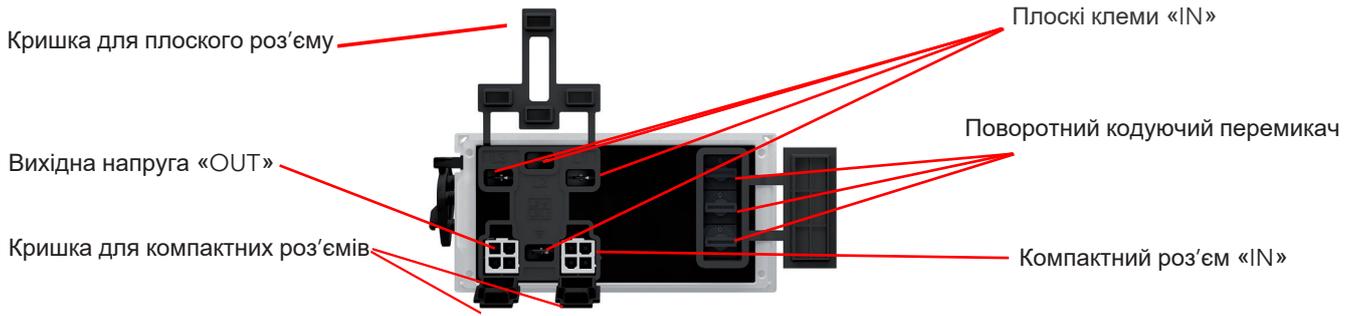


Fig. 2.5: Wega 1 V rear with connections



NOTICE!

Close with covers the connections that are not required!

- "IN": Voltage input from a bushing or an insulator.
- "OUT": Voltage signal for short-circuit indicators such as Sigma or ComPass.

2.3.5 Back Wega 2

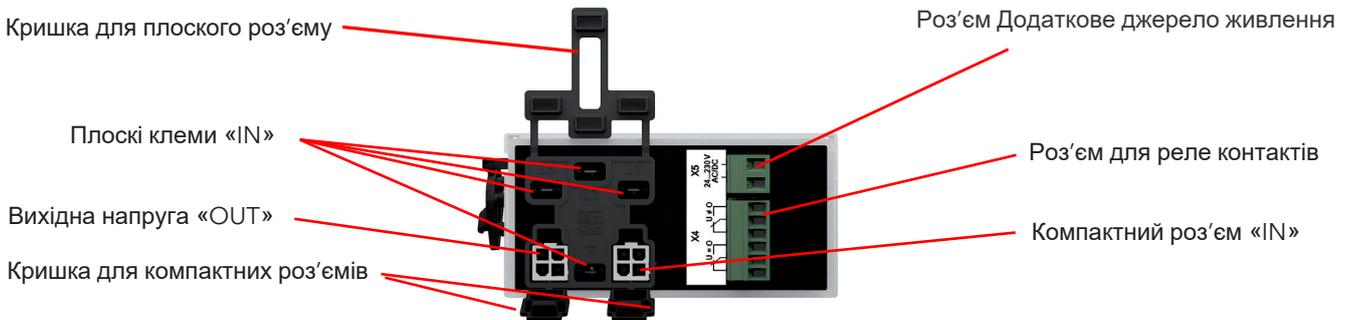


Fig. 2.6: Wega 2 rear with connections



NOTICE!

Close with covers the connections that are not required!

- "IN": Voltage input from a bushing or an insulator.
- "OUT": Voltage signal for short-circuit indicators such as Sigma or ComPass.

2.3.6 Back Wega 2 V

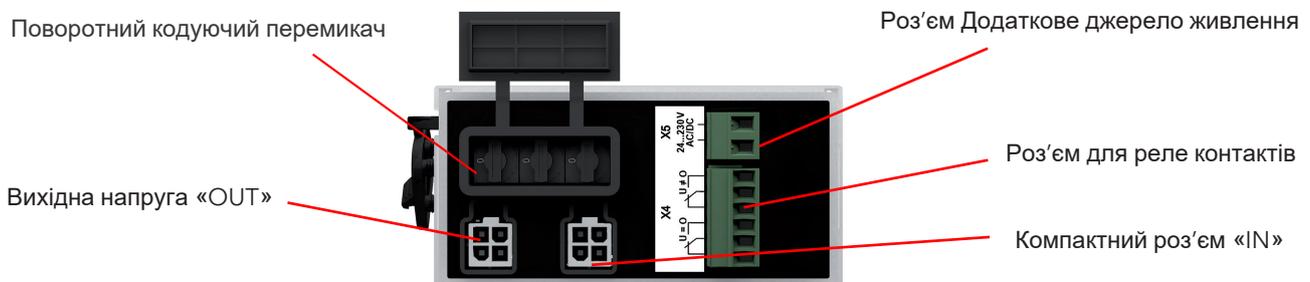


Fig. 2.7: Wega 2 V rear with connections and controls



NOTICE!

Close with covers the connections that are not required!

- "IN": Voltage input from a bushing or an insulator.
- "OUT": Voltage signal for short-circuit indicators such as Sigma or ComPass.

2.4 Dimensional drawings

The cut-out dimensions 92+0.8 mm x 45+0.6 mm in accordance with DIN 61554 apply to all versions of the Wega.

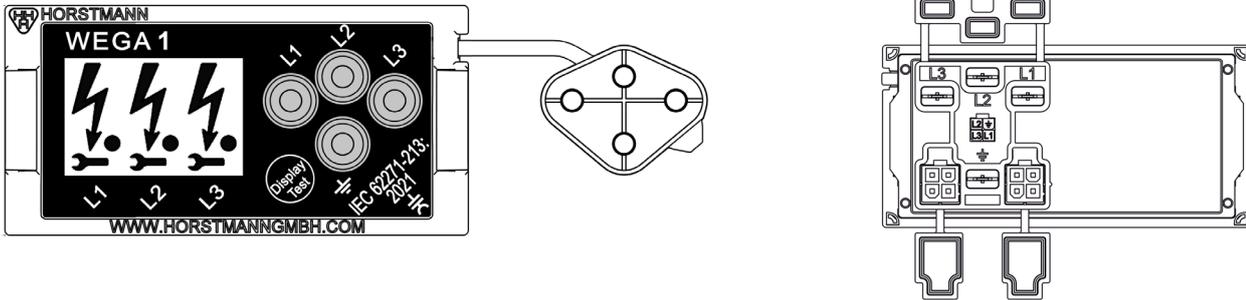


Fig. 2.8: Dimensional drawing of Wega 1

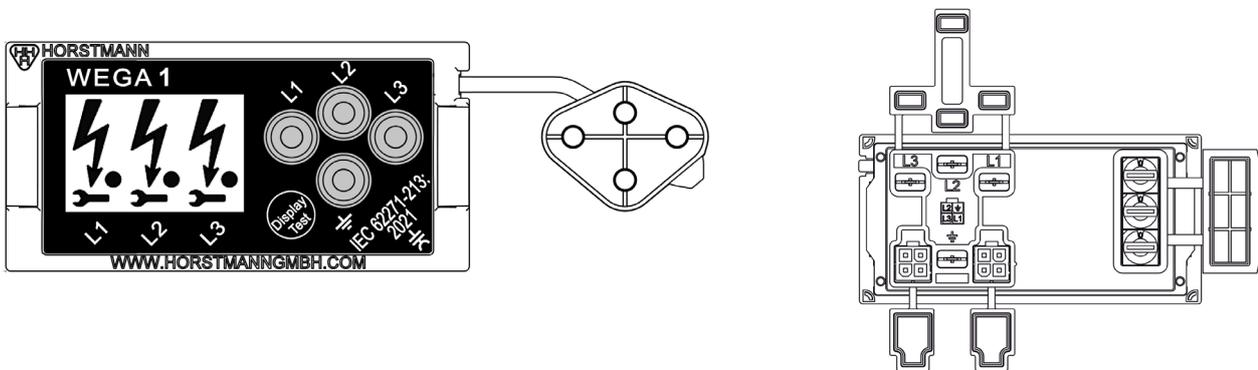


Fig. 2.9: Dimensional drawing of Wega 1 V

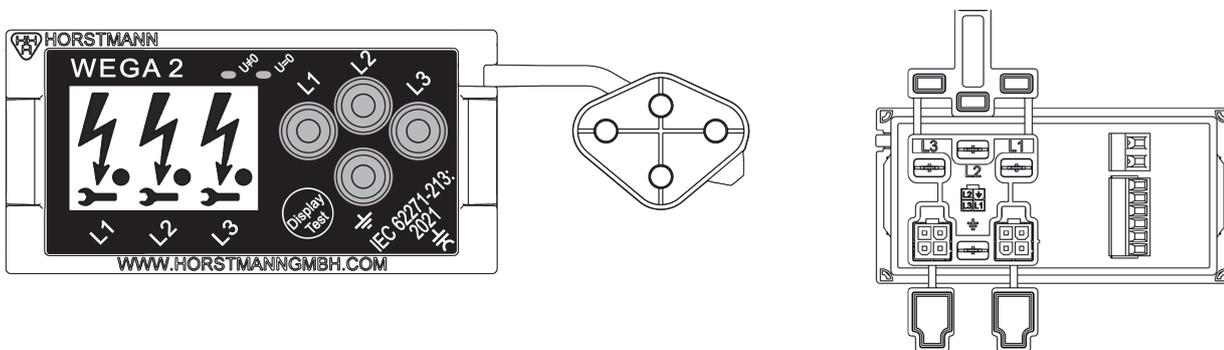


Fig. 2.10: Dimensional drawing of Wega 2

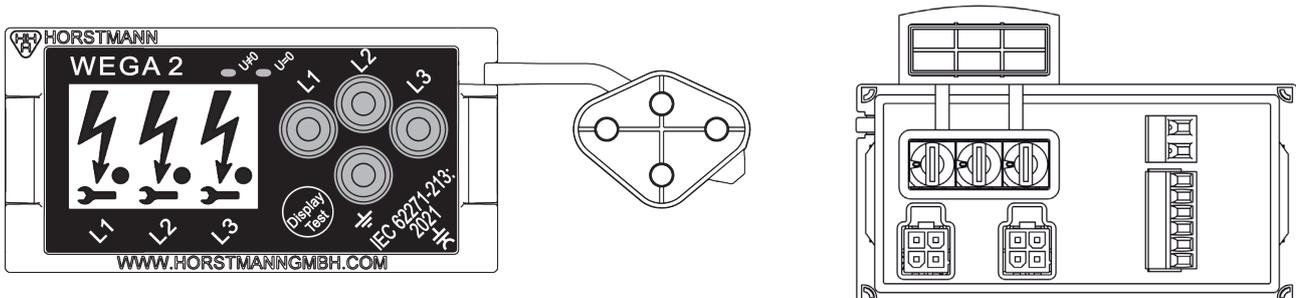


Fig. 2.11: Dimensional drawing of Wega 2 V

3 Device function

3.1 Functional principle

The Wega determines the status of the switchgear in which it is installed and checks whether voltage is present or not by showing the information on the display. In addition, a voltage detection, a maintenance test or a phase comparison can be performed with a suitable test instrument (e.g. Horstmann Orion 3.1 or Orion M1) by connecting it to the test sockets.



WARNING!

The Wega does not differentiate between the state "Voltage not present" ($U < 0.1 \times U_n$) and the state "Activated AND earthed" ($U = 0 \text{ V}$).

3.2 Electrical connection

The Wega does not differentiate between the state "Voltage not present" ($U < 0.1 \times U_n$) and the state "Activated AND earthed" ($U = 0 \text{ V}$).

3.3 Display indication

Indication	Definition
	<i>Voltage present</i> Threshold value for voltage presence indication: $0.1 - 0.45 \times U_n$. Installation note: The voltage signal is too low when operating the system at nominal voltage. The cause is usually the selected adjustment capacitor which is too large or the operation of the switchgear at a nominal voltage that is lower than originally envisaged.
	<i>Voltage present and passed maintenance test</i> The current flowing through the display unit meets the current monitoring requirements of IEC 61243-5 (section 5.28) and IEC 62271-213 (section 11.4.2). A maintenance test is not necessary due to the continuous monitoring.
	<i>Voltage present and integrated maintenance test passed; voltage signal, nonetheless, is too high</i> Installation note: Voltage signal too high. The cause is usually the selected adjustment capacitor which is too small, an earth fault or the operation of the switchgear at a nominal voltage that is higher than originally envisaged.
	<i>Voltage not present</i> When the system is switched off at all poles, all symbols are switched off. Voltage applied $< 0.1 \times U_n$.

Tab. 3.1: Displayed symbols

3.4 Functional test

A functional test can be done while the unit is fixed in the installation and is either energized (indication of arrow or arrow and dot symbols) or the unit is de-energized.

3.4.1 Energised state

There are two possibilities to perform the functional test in the energised state:

- Function test by short-circuiting one of the three testing sockets with the earth socket. Displayed symbol (L1, L2 or L3) disappears. After the test, the short-circuit bridge must be removed again.
- Functional test using the "Function tester for Wega"
 - Plug in the connecting leads of the function tester to one of the three test sockets and the earth socket of the Wega 1. Switch on the function tester.
 - The appropriate arrow and dot symbols appear (see Tab. 3.1). The wrench tool symbol is not activated.

3.4.2 De-energised state

For the function test in de-energised state, press the "Display test" button. All symbols of the LCD display are activated for a short time.



DANGER!

- If the specified indication does not appear:
 - The Wega is defect. Do not use this device for the voltage detection!
- Attach the protective cap after the functional test!

3.5 Active zero voltage indicator

Wega 2 / Wega 2 V only: This is activated if the system switches to the voltage-free state. The indication occurs with a green flashing LED on the front plate above the LCD display. This indication is activated permanently if at least one of the three voltages is not present.

3.6 Voltage detection

The Wega is suitable for continuous operation. After installation of the Wega in the switchgear, a continuous voltage detection is performed.

The voltage state is displayed for each phase via the LCD indication (s. Tab. 3.1).

Wega 2/ Wega 2 V only: In addition, if voltage is present on at least one of the three phases, this is indicated by a continuously lit red LED on the front of the unit.

3.7 Phase comparison

Perform a phase comparison using a phase comparator for LRM systems available as an option in accordance with IEC 62271-215 or IEC 61243-5 (for example, Horstmann Orion 3.1 or Orion M1). Connect the phase comparator's connecting leads to one of the three test sockets and the earth socket. The test sockets are accessible once the protective cap has been removed.

- The corresponding indication of the Wega may be weaker or may even go off.
- Put on protective cap after phase comparison!

3.8 Remote signals (Wega 2 or Wega 2 V only)

The remote signals are brought out via a 6-pin plug-in terminal block on the rear side of the Wega (see Fig. 2.6 and Fig. 2.7).

- The relay "voltage present" is switched on, if the voltage of at least one of the three phases is greater than $0,45 * U_n$.
- The relay "voltage not present" is switched on, if the voltage of at least one of the three phases is lower than $0,1 * U_n$.

Each of the two relays has one Form C change over contacts, comprising a common connection (COM - Common), a normally close contact (NC - normally closed) and a normally open contact (NO - normally open). The relay contact are galvanically isolated from the measuring voltage and the auxiliary power supply. The following relay functions arise depending on the level of the measuring voltage:

Auxiliary power supply	Network state medium voltage	Relay U = 0 (voltage not present)	Relay U ≠ 0 (voltage present)	LED green (U = 0)	LED red (U ≠ 0)
present (Vaux ≠ 0)	Voltage present on L1, L2 and L3	off 	on 	off 	on 
	At least one 'Voltage present' and at least one 'Voltage not present'	on 	on 	on 	on 
	Voltage not present on L1, L2 and L3	on 	off 	blink 	off 
not present (Vaux = 0)		off 	off 	off 	off 

Tab. 3.2: Relays positions

Explanatory notes for the table:

For reasons of clarity, not all possible combinations of measuring voltages and auxiliary power supply are given. The relay's contact position of the de-energized state (relay off) are depicted on the rear side of the integrated voltage detecting system Wega 2/ Wega 2 V.

3.9 Auxiliary power supply monitoring (Wega 2 or Wega 2 V only)

The absence of auxiliary power supply can be detected by the following features:

- Both relays ($U = 0$ and $U \neq 0$) are switched off at the same time.
- Both LEDs (green and red LED on the front side) are switched off at the same time.

The auxiliary power supply must be checked in both cases.

3.10 Detection of a malfunction (Wega 2 or Wega 2 V only)

If there is a malfunction of the Wega, it can be detected by the following steps:

- Both relays ($U = 0$ and $U \neq 0$) are switched off at the same time and
- Both LEDs (green and red LED on the front side) flash at the same time.

The LCD indication "Voltage present" and "Voltage not present" operate independently of this malfunction.

Fault correction: The auxiliary power supply for the Wega 2/Wega 2 V must be switched off and switched on again after approx. 10 s. If the malfunction is not corrected following this, the Wega 2/Wega 2 V must be taken out of operation and replaced. It is important to ensure that the device is no longer used as a voltage detecting system.

4 Installation



DANGER!

Verify that the system is de-energized for installation and dismantling!

4.1 Electrical connection

The connection cables are provided by the respective switchgear manufacturer. The Wega can be connected to the switchgear with a connection cable equipped with flat plugs or compact plugs. Optionally, a short-circuit direction and earth fault direction indicator (e.g. ComPass B or Sigma D series) can be connected (s. Fig. 4.1, "OUT"). Use the connecting lead sets from the manufacturer for this purpose. The connecting lead sets are available in different lengths.

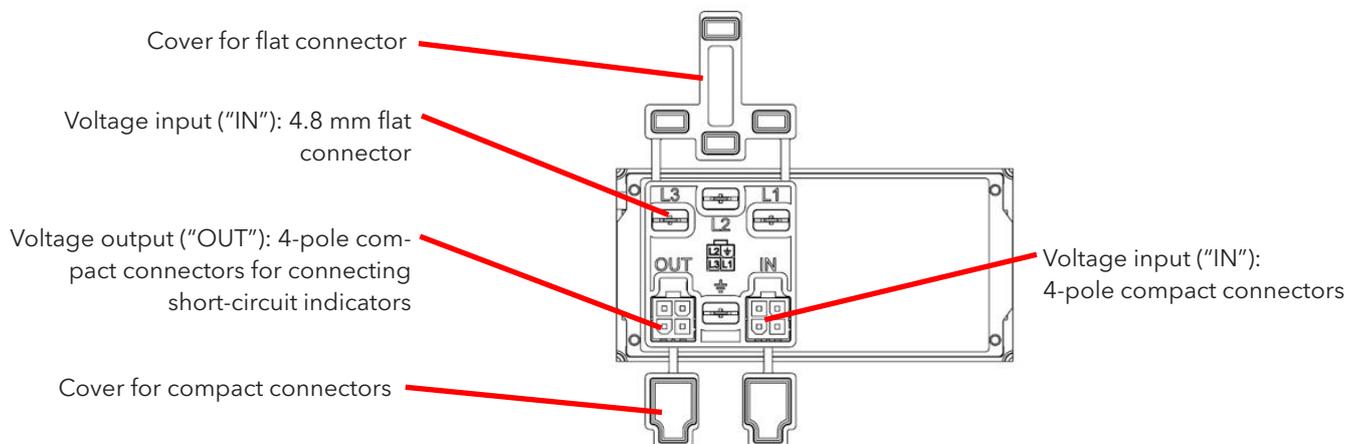


Fig. 4.1: Connections, using Wega 1 as example



DANGER!

- Expose the required connection by removing the cover.
- Keep the connections closed which are not needed!
- The input compact connection and the flat connector connection option are connected in parallel.

4.1.1 Connecting the flat connectors

The connection to the switchgear is made via 4 flat connectors 4.8 x 0.8 mm (s. Fig. 4.1). Plug the flat connector receptacles onto the flat connectors (L1, L2, L3 and $\underline{\underline{\perp}}$ earth symbol). Slide the sealing grommets available on the cable side into the openings on the device side.



NOTICE!

Observe the correct phase assignment when plugging in flat connectors!

4.1.2 Connecting the 4-pole compact connectors

The connection to the switchgear is made via a 4-pole compact connector (s. Fig. 4.1, "IN").



CAUTION!

Prevent slipping-out by engaging the ratchet mount.



DANGER!

The compact connector "OUT" must not be used for the voltage input!

Use the connecting lead sets from the manufacturer for this purpose. The connecting lead sets are available in different lengths.

Optionally, a short-circuit direction and earth fault direction indicator (e.g. ComPass B or Sigma D series) can be connected to the 4-pin compact connector "OUT". Use the connecting lead sets from the manufacturer for this purpose. The connecting lead sets are available in different lengths.

4.1.3 Relay connection (Wega 2 or Wega 2 V only)

6-pin terminal block (X4):

- $U \neq 0$ make or break contacts of the "voltage present" relay
- $U = 0$ make or break contacts of the "voltage not present" relay

4.1.4 Application note Relay (Wega 2 or Wega 2 V only)

Example 1: Detecting of the status: "Voltage not present" for one, two or all three phases

Task: The "voltage not present" state is to be signalled remotely with a contact (maker contact, normally open contact) if the voltage fails on at least one phase.

Solution: Use of change over contact "U = 0" (maker contact, normally open contact).

The connections for the remote signalling relays must be connected as follows:

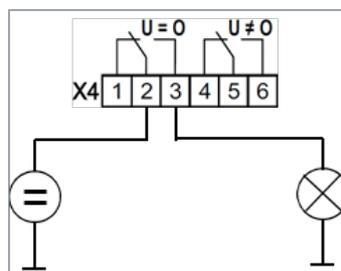


Fig. 4.2: Application example 1



NOTICE!

The change over contacts show the de-energized state of the relays.

- If "voltage not present" has been detected on at least one phase, the lamp lights up.
- If the auxiliary power supply for the Wega 2 fails, the lamp does not light up.

Example 2: Detecting of the status: "Voltage not present" only in the event of a failure of all three phases

Task: The state "voltage not present" for all three phases is to be signalled remotely with a contact (normally open contact)

Solution: Series connection of the change over contacts "U = 0" and "U ≠ 0".

The connections for the remote signalling relays must be connected as follows:

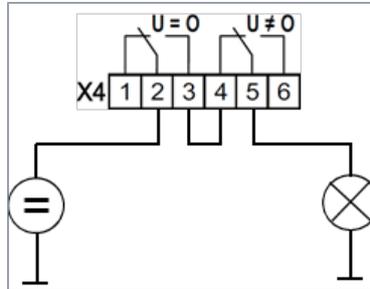


Fig. 4.3: Application example 2



NOTICE!

The change over contacts show the idle state of the relays.

- Only if "voltage not present" has been detected for all three phases, the lamp lights up.
- If the auxiliary power supply for the Wega 2 fails, the lamp does not light up.

4.1.5 Auxiliary power supply (Wega 2 or Wega 2 V only)

The auxiliary power supply must be connected to the 2-pin terminal block. The auxiliary power supply must be in the range:

- 24–230 V (AC or DC).

4.2 Mechanical installation

1. For Wega 1 V and Wega 2 V, the C2 value must be set phase-selectively via the rotary coding switches on the rear of the unit before mechanical installation. See Section 5.1.
2. Insert the Wega into the prepared DIN cut-out (92 mm x 45 mm) in the front of the switchgear. Note the installation depth.

Connected lead	Minimum installation depth
Flat connectors with single-core cables	35 mm
4-pole compact connectors with single-core leads, angle 0°	70 mm
4-pole compact connectors with single-core leads, angle 90°	38 mm
4-pole compact connectors with coaxial leads	80 mm

Tab. 4.1: Installation depth

3. Press in the slider elements on both sides.

4.3 Disassembly

To disassemble, insert a flat-blade screwdriver into a gap in one of the two fixings and turn. The unit then detaches from the cut-out.

5 Setup

An adjustment capacitor must be determined prior to commissioning in order to customize the Wega to different switchgear, coupling capacitors, nominal voltages or cable lengths.

5.1 Setup of Wega 1 V and 2 V

For initial setup of the Wega 1 V and Wega2 V versions the C2 values need to be adjusted first before installation into cut-out, with the operating voltage applied. Perform the following steps:

- The connections from the bushings should be plugged into the Wega. The operating voltage of the system should be applied.
- Expose the shaft with the rotary coding switches and make sure that all rotary coding switches are set to the "0" indication.
- Place a tool, e.g. a flat-blade screwdriver, on the groove of one of the rotary switches and turn the unit that way that the indication of the Wega can be observed.
- At the beginning all indication symbols should be visible on the display. The interface current should be checked if the tool symbols are not shown on the display. Then possibly tuning with an additional C2 value may not be possible.
- Step by step - turn the switch - anti-clockwise. Alter the switch position until the tool symbol is no longer shown on the display.
- Record the value of the rotary switch setting and change the settings of the other switches to the same value. The set C2 capacitor values can be read from the attached information sign.

S	C2/nF	S	C2/nF
0	0	8	15,0
1	1,5	9	16,5
2	3,3	A	18,3
3	4,8	B	19,8
4	6,8	C	21,8
5	8,3	D	23,3
6	10,1	E	25,1
7	11,6	F	26,6

L3	L2	L1
----	----	----

Fig. 5.1: Example of an assignment table of the switch position and the corresponding C2 values

- Check the setting (s. 5.2)!

5.2 Checking the correct setting

After installation, it is recommended to check the correct setting. A switchgear, in which the Wega is installed, must be run at the intended nominal voltage for this purpose.

5.3 Optical check of the indication

The settings are correct if:

- The arrow and dot symbols are visible on all three phases L1, L2 and L3.

An incorrect setting exists if:

- The over voltage indication (tool symbols) is visible (note: adjustment capacitance is too low).
- The dot symbols are not visible (note: adjustment capacitance is too high).
- The arrow symbols are difficult to see (note: adjustment capacitance is far too high).

5.4 Checking the LRM interface via measurement techniques

Connect a suitable interface tester for interfaces at the LRM interface L1 in accordance with IEC 62271-215 or IEC 61243- (for example, Horstmann Orion 3.1 or Orion M1).

The interface tester with current measurement function must display the following test result:

The power from the interface must be equal to or higher than 3.2 μ A (50 Hz).

This test must be repeated with the interfaces for phases L2 and L3.

If deviations occur during the optical check of the indicator or during checks of the LRM interfaces via measurement techniques, the tuning of the Wega to the switchgear (selection of the adaptation capacitor) must be checked.

6 Maintenance

6.1 Servicing

Ensure that the Wega is kept in a clean and dry state. Otherwise, the device is maintenance-free. The device contains no batteries or any other parts which need to be replaced by the user.

6.2 Maintenance test

The maintenance test on voltage detecting and indicating systems shall be performed in accordance with IEC 62271-213. The interval periods of maintenance tests are defined by the national regulations of the respective places of use, e.g. in Germany the interval period for maintenance test is every 6 years at the latest.

The Wega is equipped with a feature that permanently monitors the current through the indicating unit. Thus, the Wega complies with the requirements regarding the current monitoring in accordance with IEC 62271-213 (section 11.4.2). A maintenance test is not necessary in general due to the permanent monitoring.



NOTICE!

As the LCD indication may have a different contrast depending on the viewing angle, the following must be observed: The maintenance test is passed if, when viewed from a perpendicular angle the dot symbol has the same contrast as the corresponding arrow symbol!

7 Disposal

At the end of its service life, the Wega must be disposed of in accordance with the legal regulations of the respective place of use.

8 Technical data

Electrical data

Nominal voltage	From 1 kV (nominal voltage of the switchgear)
Nominal frequency	50 / 60 Hz
Power supply	The LCD indication is powered by the measuring voltage
Interface	Test socket for each phase and one earth socket, compliant with LRM
Indication	LCD indication (display) with black symbols for: <ul style="list-style-type: none"> • Voltage present • Maintenance test passed • Over-voltage
Voltage-limiting predetermined breaking point	90 V ± 20% (The effects of tripping the voltage-limiting predetermined breaking point must be checked against the switchgear's protection concept.)
Operating temperature	-40 °C to +75 °C
Operating time	Suitable for permanent operation
Auxiliary power supply (only Wega 2 / Wega 2 V)	24 V - 230 V (AC or DC)

Relay characteristics (only for Wega 2 and Wega 2 V)

Type	32.21-4000, changeover contact, switching capabilities DC 3A/30V 0.35A/110V 0.2A/220V
Contact	Permanent contact
Shock resistance	20 G
Vibration resistance	10 G
Power supply	Integrated universal power supply Power input: approx. 0.5 W

Mechanical data

Cut-out on the system side	92 ^{+0.8} mm x 45 ^{+0.6} mm
Housing material	Polycarbonate
Measuring and earth socket	LRM system, the distance between the sockets is 14 mm, the socket has an inner diameter of 4 mm
Type of protection	IP54 (applies only with the fitted protective cap for the interface and with closed covers for unused connections on the rear.)

	Total weight	Dimensions (W x H x D) (installation housing for panel cut-out 96 mm x 48 mm in accordance with DIN IEC 61554)	Installation depth (from the front panel)
Wega1	130 g	96 mm x 48 mm x 34 mm	20 mm
Wega 1 V	125 g	96 mm x 48 mm x 34 mm	20 mm
Wega 2	220 g	96 mm x 48 mm x 62 mm	48 mm
Wega 2 V	215 g	96 mm x 48 mm x 62 mm	48 mm