Energetyka

AZZ 4.xx

smart energy management

Independent short-circuit protection

Technical documentation

Document version: 36972_1 ENG
Update: 29.01.2019

Safety information

Dangerous voltages can occur on the connectors, even though the auxiliary voltage has been disconnected.

National and local electrical safety regulations must always be followed.

Exploration of damaged device can result in malfunction of protected object and result in threat to life and health.

Reliable and defect-free operation of the device needs appropriate transportation, handling, storage, installation and commissioning as well as correct operation and maintenance.

The installation and operation of the equipment should only be carried out by appropriately trained personnel.

Comments

We reserve the right to modify the device.

Device is an industrial monitoring and control instrument.

Remaining user documentation can be downloaded from energetyka.itr.org.pl

Spis treści:

1. General Information 4
1.1. Symbols 4
1.2. Destination of the equipment 4
1.3. Device characteristics 5
1.4. Front panel 5
1.5. Visual signalling 6
2. Functional tests 7
2.1. EC directives and harmonized standards 7
2.2. Electromagnetic compatibility 7
2.2.1. Immunity 7
2.3. Product safety requirements 8
2.4. Climatic environmental tests 8
2.5. Mechanical tests 8
2.6. Degree of protection 8
2.7. Installation requirements 8
3. Technical parameters 9
3.1. Input circuits 9
3.1.1. Current input circuits 9
3.1.2. Zero sequence current input circuit 9
3.1.3. External tripping input circuit 9
3.2. Output circuits 9
3.2.1. Magnetic trip and signalling output circuit 9
3.3. Power supply 9
3.4. Connectors 9
3.5. Reset to pickup ratios 9
3.6. Protections accuracy 10
3.7. Environmental conditions 10
3.8. Degree of protection 10
4. Device operation 10
5. Protections 11
5.1. I> dependent short-circuit protection 11
5.1.1. I> protection characteristics 12
5.2. Short-circuit protection I>> independent 12
5.3. Earth fault protection I0> 13
5.4. Remote tripping 13
6. Diagnostic 14
6.1. SC – Self-check 14
6.2. Autotest 14
6.2.1. PAT - Protection and Automation Test 14
7. Case sizes 15
8. Application schematics 16
9. Description of connection sockets 17
10. Remarks of manufacturer 19
10.1. Maintenance, inspections, repairs 19
10.2. Storage and transport 19
10.3. Place of installation 19
10.4. Disposal 19
10.5. Guarantee and service 19
11. Order specification 21
12. Contact 22

1. General Information

1.1. Symbols

Electrical warning symbol indicates the presence of hazardous energy circuits or electric shock hazards.

The warning symbol indicates the important information related to the threat to life and health

The information symbol indicates the clarification of relevant features and parameters of the device.

1.2. Destination of the equipment

Independent short-circuit protection AZZ 4.xx, is intended for the protection of MV lines against short-circuits and overloads.

Fig. 1.1 AZZ 4.02 device view

AZZ 4.02 is equipped with a **Protections and Automatics Test (PAT)** mechanism – a mechanism that verifies the correctness of protection and automatics using external testing systems. It can be used to check the correct functioning of the protection, along with measuring transformers and measuring circuits.

The device is equipped with a protective cover, preventing direct access to its front panel. During normal operation, the protective cover should be closed. It should only be opened to carry out measurements and adjust settings. After their completion, it should be reinstalled.

1.3. Device characteristics

Diagnostic and autotests

- SC – Self-check
  - voltages: power supply, reference
  - memory: programme
  - calibration coefficients of the measuring circuits
- PAT – Protections and Automatics Test

Jacket

- small dimensions 170 / 120 / 48 mm

User interface

- DIP or HEX type toggle switches
- test port for verification of the correctness of the protection I> dependent, I>> and Io>
- display enabling the preview of the measurement values

Alarm

- LED indicator for the correct POWER operation and TRIP protection tripping/activation

1.4. Front panel

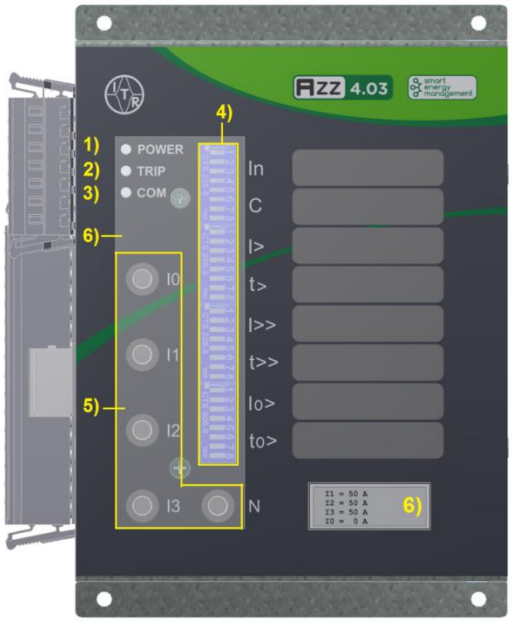

Fig. 1.2 Front panel view

The front panel hosts:

1) LED signalling the correct power supply of the device with test currents
2) Protection tripping/activation signalling LED
3) DIP or HEX type switch for parametrisation of the protections
4) Test port
5) Protective cover preventing access to the test port and switches
6) LCD display (applies only to AZZ 4.03)

With a special design version, it is possible to install a display on the front panel to enable the preview of the measurement values.

1.5. Visual signalling

Tab. 1.5.1. Meanings of predefined diodes:

Symbol/Name	Color	Description
POWER	green	Signals that the test current has exceeded the minimum value required to correctly power the device - Continuous light.
TRIP	red	Signalling of tripping/activation of protections: I> dependent, I>>, I0> - Continuous light.

2. Functional tests

2.1. EC directives and harmonized standards

EU Directive applies to:

- electromagnetic compatibility (EMC) 2004/108/WE;
- low-voltage electrical devices (LVD) 2006/95/WE.

Tab. 2.1.1 Harmonized standards:

No. standards	Title of the standard
PN-EN 60255-1:2010	Measuring relays and protection equipment - Part 1: Common requirements
PN-EN 60255-26:2014	Measuring relays and protection equipment - Part 26: Electromagnetic compatibility requirements
PN-EN 60255-27:2014	Measuring relays and protection equipment - Part 27: Product safety requirements
PN-EN 60529:2003	Degrees of Protection Provided by Enclosures (IP Code)

2.2. Electromagnetic compatibility

Tab. 2.2.1 Emission tests

Port	Frequency range	Limits	Basic standard
Enclosure port	30 MHz – 230 MHz	40 dB(µV/m) quasi peak at 10 m	CISPR 11
	230 MHz – 1000 MHz	47 dB(µV/m) quasi peak at 10 m	
Auxiliary power supply port	0,15 MHz – 0,5 MHz	79 dB(µV) quasi peak	CISPR 22
		66 dB(µV) average	
	0,5 MHz – 30 MHz	73 dB(µV) quasi peak	
		60 dB(µV) average	

2.2.1. Immunity

Tab. 2.2.1.1 Communication ports

Environmental phenomena	Test specification	Description	Basic standard	Acceptance criteria
Conducted disturbance induced by radio-frequency fields	Frequency sweep		PN-EN 61000-4-6	A
	0,15-80 MHz	Frequency range		
	10 V	r.m.s.		
	80 %AM (1kHz)	Amplitude Modulated		
	150 Ω	Source impedance		
	Spot frequencies			
	27 MHz, 68 MHz	Frequencies		
	10 V	r.m.s.		
	80 %AM (1kHz)	Amplitude Modulated		
	150 Ω	Source impedance		
	100 %	Duty cycle		
Fast transient – Zone A	5/50 ns	Tr/Th	PN-EN 61000-4-4	B
	5 kHz	Repetition frequency		
	4 kV	Peak voltage		
Slow damped oscillatory wave	1 MHz	Voltage oscillation frequency	PN-EN 61000-4-12	B
	75 ns	Tr - Voltage rise time		
	400 Hz	Repetition frequency		
	200 Ω	Output impedance		
	1 kV	Differential mode - peak voltage		
	2,5 kV	Common mode - peak voltage		
Surge - Zone A	1,2/50 (8/ 20) µs	Voltage (current) rise time / time to half value Tr /Th	PN-EN 61000-4-5	B
	2 kV	L - N		
	4 kV	Line-to-earth		
	2 Ω	Source impedance		
Power frequency - Zone B (concerns only binary inputs)	Differential mode 100 V	Test voltage (r.m.s.) - Line-to-line	PN-EN 61000-4-16	A
	Common mode 300 V	Test voltage (r.m.s.) - Line-to-earth		

Tab. 2.2.1.2 Enclosure port

Environmental phenomena	Test specification	Basic standard	Acceptance criteria
Radiated radiofrequency electromagnetic field	80-1000 MHz 10 V / m (r.m.s.) 80% AM (1 kHz)	IEC 61000-4-3	A
Electrostatic discharge	contact discharge 6 kV (charge voltage) air discharge 8 kV (charge voltage)	IEC 61000-4-2	B
Power frequency magnetic field	50 Hz or 60 Hz frequency 30 A (r.m.s.) / m - continuous 300 A (r.m.s.) / m - 1 to 3 s	IEC 61000-4-8	A B

2.3. Product safety requirements

Voltage test of solid insulation and insulation resistance measurements for auxiliary power supply, inputs, outputs, communication and measuring circuits:

Tab. 2.3.1 Product safety

Type of insulation test	Value	Basic standard
Dielectric voltage test 50 Hz or 60 Hz	2,2 kV/AC 1 minute or 3,1 kV/DC 1 minute	PN-EN 60255-27
Peak impulse voltage test	5 kV pulse 1,2/50 µs; 0,5 J	
Insulation resistance	>100 MOhm 500 VDC	

2.4. Climatic environmental tests

Tab. 2.4.1 Climatic environmental test

Test	Standard	Description
Cold tests	PN-EN 60068-2-1:2009	Minimum operational temperature -20˚C/16 hours Minimum storage temperature -55˚C/16 hours
Dry - heat tests	PN-EN 60068-2-2:2009	Maximum operational temperature +55˚C/16 hours Maximum storage temperature +70˚C/16 hours
Damp - heat tests	PN-EN 60068-2-78:2013-11	+40˚C; 95% rh /10 days

2.5. Mechanical tests

Tab. 2.5.1 Mechanical tests

Test	Standard	Class
Sinusoidal vibration	PN-EN 60255-21-1:1999	2
Single and multiple shocks and bumps	PN-EN 60255-21-2:2000	2
Seismic	PN-EN 60255-21-3:1999/Ap1:2002P	0

2.6. Degree of protection

Tab. 2.6.1 Degree of protection

Test	Description	Standard	Degree of protection
Degrees of protection provided by enclosures (IP Code)	Front panel side	PN-EN 60529:2003	IP 67
	Connector side without connectors		IP 20
	Connector side with connectors plugged		IP 30

2.7. Installation requirements

Tab. 2.7.1 Installation requirements

Definition	Reguirements
Class equipment	1
Overvoltage category	III
Pollution degree	2
Electrical environment	B

3. Technical parameters

3.1. Input circuits

The device may operate in 50 Hz or 60 Hz grids.
Frequency is measured in 45 to 65 Hz range.

3.1.1. Current input circuits

Collaboration with the following types of current transformers:

- W2: SVA100 16–56 A
- W3: SVA100 32–112 A
- W4: SVA100 64–224 A
- W5: SVA100 128–448 A
- W6: SVA100 256–896 A

3.1.2. Zero sequence current input circuit

Rated current I_{0n}:	0,05 A
Long term current-carrying capacity	1,2 I_{0n}
1-second current-carrying capacity	50 I_{0n}
Power consumption at rated current	<0,2 VA
Measurement range	to 5 I_{0n}

3.1.3. External tripping input circuit

Tripping voltage	110 … 230 V AC

3.2. Output circuits

3.2.1. Magnetic trip and signalling output circuit

Tripping energy	> 0.1 Ws
Output voltage	24 V

After the tripping of the protection, a rectangular signal (50 ms – active, 400 ms – inactive) is generated until the short-circuit current is broken.

3.3. Power supply

Minimum current required for correct operation	
Single-phase	0,075 A

3.4. Connectors

Type	WAGO rozłączne
Connection wires	0,25..2,50 mm^2

3.5. Reset to pickup ratios

Reset to pickup ratios	0,95

3.6. Protections accuracy

Protections accuracy of current	5 %

3.7. Environmental conditions

Operating temperature	-20˚C … +55 ˚C
Storage temperature	-35˚C … +70 ˚C
Maximum relative humidity	no condensation, frost, ice

3.8. Degree of protection

Front panel side	IP60
Connector side without connectors	IP20
Connector side with connectors plugged	IP30

4. Device operation

The device is equipped with eight groups of HEX or DIP type switches. The protection settings are selected by setting the switches, as described, in the correct positions. Tripping or activation of the protections is indicated by the lighting up of the TRIP LED. The correct operation of the device is indicated by the lighting up of the POWER light (min. operating current: 75 mA/phase).

Table 4.1. Description of the functions of the toggle switches.

DIP	HEX	Description
1 (1-4)	1	In - current transformer rated current
1 (5-8)	2	C - choice of dependent characteristics
2 (1-4)	3	I> - dependent overcurrent protection starting value
2 (5-8)	4	t> - time of delay for I> dependent protection
3 (1-4)	5	I>> - short-circuit protection I>> starting value
3 (5-8)	6	t>> - time of delay for I>> protection
4 (1-4)	7	I0 > - earth fault overcurrent protection starting value
4 (5-8)	8	t0>> - time of delay for earth fault overcurrent protection

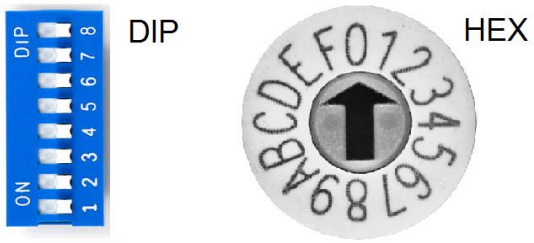

Fig. 4.1. View of setting switches

5. Protections

Individual values can be changed using DIP or HEX toggle switches, depending on the design version (see the *Procurement Specification*).

Table 5.1 'In' switches

DIP 1-1	OFF	ON	OFF	ON	OFF	ON	OFF	ON	OFF	ON	OFF	ON	OFF	ON	OFF	ON
DIP 1-2	OFF	OFF	ON	ON	OFF	OFF	ON	ON	OFF	OFF	ON	ON	OFF	OFF	ON	ON
DIP 1-3	OFF	OFF	OFF	OFF	ON	ON	ON	ON	OFF	OFF	OFF	OFF	ON	ON	ON	ON
DIP 1-4	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	ON	ON	ON	ON	ON	ON	ON	ON
HEX1	0	1	2	3	4	5	6	7	8	9	A	B	C	D	E	F
W2	16	18	20	22	24	26	28	30	32	34	36	40	44	48	52	56
W3	32	36	40	44	48	52	56	60	64	68	72	80	88	96	104	112
W4	64	72	80	88	96	104	112	120	128	136	144	160	176	192	208	224
W5	128	144	160	176	192	208	224	240	256	272	288	320	352	384	416	448
W6	256	288	320	352	384	416	448	480	512	544	576	640	704	768	832	896

5.1. I> dependent short-circuit protection

The short-circuit protection features six dependent characteristics. The selection of the characteristic is determined by the setting of the 'C' switches. There is also an independent protection operation setting (see table 5.1.1). The protection is activated when the current exceeds the value set on the 'I>' switch and it is indicated by the lighting up of the 'TRIP' LED. Tripping of the protection causes energisation of outputs O1 and O2 (generating a 24 V DC rectangular signal to the magnetic trip of the circuit breaker and to the signalling).

Table 5.1.1 'C' switches

DIP 1-5	OFF	ON	OFF	ON	OFF	ON	OFF
DIP 1-6	OFF	OFF	ON	ON	OFF	OFF	ON
DIP 1-7	OFF	OFF	OFF	OFF	ON	ON	ON
DIP 1-8	OFF	OFF	OFF	OFF	OFF	OFF	OFF
HEX 2	0	1	2	3	4	5	6
Characteristics	Independent	Steep	V. steep	IEC normally dependent	IEC very dependent	IEC extremely dependent	IEC long time dependent

Setting the 'C' switch to the OFF position causes independent operation of the protection.

Table 5.1.2 'I>' switches

DIP 2-1	OFF	ON	OFF	ON	OFF	ON	OFF	ON	OFF	ON	OFF	ON	OFF	ON	OFF	ON
DIP 2-2	OFF	OFF	ON	ON	OFF	OFF	ON	ON	OFF	OFF	ON	ON	OFF	OFF	ON	ON
DIP 2-3	OFF	OFF	OFF	OFF	ON	ON	ON	ON	OFF	OFF	OFF	OFF	ON	ON	ON	ON
DIP 2-4	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	ON	ON	ON	ON	ON	ON	ON	ON
HEX 3	0	1	2	3	4	5	6	7	8	9	A	B	C	D	E	F
x In	0,9	0,95	1,0	1,05	1,1	1,15	1,2	1,3	1,4	1,5	1,6	1,8	2,0	2,25	2,5	-

Table 5.1.3 't>' switches

DIP 2-5	OFF	ON	OFF	ON	OFF	ON	OFF	ON	OFF	ON	OFF	ON	OFF	ON	OFF	ON
DIP 2-6	OFF	OFF	ON	ON	OFF	OFF	ON	ON	OFF	OFF	ON	ON	OFF	OFF	ON	ON
DIP 2-7	OFF	OFF	OFF	OFF	ON	ON	ON	ON	OFF	OFF	OFF	OFF	ON	ON	ON	ON
DIP 2-8	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	ON	ON	ON	ON	ON	ON	ON	ON
HEX 4	0	1	2	3	4	5	6	7	8	9	A	B	C	D	E	F
time (s)	0,04	1	2	3	4	5	6	8	10	15	30	60	120	180	240	300

5.1.1. I> protection characteristics

$$T_Z = \frac{T \cdot \beta}{\left(\frac{I}{I_r}\right)^{\alpha} - 1}$$

where:

I – current value measured during activation;
T, Ir – protection setting parameters;
α, β – define the characteristic type according to the table:

Characteristics	Name	Standard	α	β
Steep	Dependent characteristics - steep	-	1	9
Very steep	Dependent characteristics - very steep	-	2	99
IEC normally dependent	Dependent characteristics - IEC (standard inverse)	IEC	0,02	0,14
IEC very dependent	Very dependent characteristics - IEC (very inverse)	IEC	1	13,5
IEC extremely dependent	Extremely dependent characteristic - IEC (extremely inverse)	IEC	2	80
IEC long time dependent	Dependent characteristics with extended time – IEC (long time inverse)	IEC	1	120

5.2. Short-circuit protection I>> independent

The protection is activated when the current exceeds the value set on the 'I>>' switch and it is indicated by the lighting up of the 'TRIP' LED. Tripping of the protection causes energisation of outputs O1 and O2 (generating a 24 V DC rectangular signal to the magnetic trip of the circuit breaker

and to the signalling).

Table 5.2.1 'I>>' switches

DIP 3-1	OFF	ON	OFF	ON	OFF	ON	OFF	ON	OFF	ON	OFF	ON	OFF	ON	OFF	ON
DIP 3-2	OFF	OFF	ON	ON	OFF	OFF	ON	ON	OFF	OFF	ON	ON	OFF	OFF	ON	ON
DIP 3-3	OFF	OFF	OFF	OFF	ON	ON	ON	ON	OFF	OFF	OFF	OFF	ON	ON	ON	ON
DIP 3-4	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	ON	ON	ON	ON	ON	ON	ON	ON
HEX 5	0	1	2	3	4	5	6	7	8	9	A	B	C	D	E	F
x In	1	2	3	4	5	6	7	8	9	10	12	14	16	18	20	-

Table 5.2.2 't>>' switches

DIP 3-5	OFF	ON	OFF	ON	OFF	ON	OFF	ON	OFF	ON	OFF	ON	OFF	ON	OFF	ON
DIP 3-6	OFF	OFF	ON	ON	OFF	OFF	ON	ON	OFF	OFF	ON	ON	OFF	OFF	ON	ON
DIP 3-7	OFF	OFF	OFF	OFF	ON	ON	ON	ON	OFF	OFF	OFF	OFF	ON	ON	ON	ON
DIP 3-8	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	ON	ON	ON	ON	ON	ON	ON	ON
HEX 6	0	1	2	3	4	5	6	7	8	9	A	B	C	D	E	F
time (s)	0,04	0,07	0,1	0,15	0,2	0,25	0,3	0,4	0,6	0,8	1,0	1,4	1,8	2,2	2,6	3,0

5.3. Earth fault protection I0>

The starting value of the protection is determined by the setting of switches 'I0>'. The protection tripping delay time is set using switch 'tI0>'. The protection is activated when I0 current exceeds the starting value set and it is indicated by the lighting up of the 'TRIP' LED. Tripping of the protection causes energization of outputs O1 and O2 (generating a 24 V DC rectangular signal to the magnetic trip of the circuit breaker and to the signalling).

Table 5.3.1 'I0>' switches

DIP 4-1	OFF	ON	OFF	ON	OFF	ON	OFF	ON	OFF	ON	OFF	ON	OFF	ON	OFF	ON
DIP 4-2	OFF	OFF	ON	ON	OFF	OFF	ON	ON	OFF	OFF	ON	ON	OFF	OFF	ON	ON
DIP 4-3	OFF	OFF	OFF	OFF	ON	ON	ON	ON	OFF	OFF	OFF	OFF	ON	ON	ON	ON
DIP 4-4	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	ON	ON	ON	ON	ON	ON	ON	ON
HEX 7	0	1	2	3	4	5	6	7	8	9	A	B	C	D	E	F
x In	0,2	0,3	0,4	0,5	0,6	0,7	0,8	0,9	1,0	1,2	1,4	1,6	1,8	2,0	2,5	-

Table 5.3.2 't0>' switches

DIP 4-5	OFF	ON	OFF	ON	OFF	ON	OFF	ON	OFF	ON	OFF	ON	OFF	ON	OFF	ON
DIP 4-6	OFF	OFF	ON	ON	OFF	OFF	ON	ON	OFF	OFF	ON	ON	OFF	OFF	ON	ON
DIP 4-7	OFF	OFF	OFF	OFF	ON	ON	ON	ON	OFF	OFF	OFF	OFF	ON	ON	ON	ON
DIP 4-8	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	ON	ON	ON	ON	ON	ON	ON	ON
HEX 8	0	1	2	3	4	5	6	7	8	9	A	B	C	D	E	F
czas (s)	0,1	0,2	0,4	0,6	0,8	1,0	1,5	2,0	2,5	3,0	3,5	4,0	6,0	8,0	10	20

5.4. Remote tripping

The device has one external tripping input. Energising the output causes energisation of the outputs that generate a 24 V DC rectangular signal to the magnetic trip of the circuit breaker and to the signalling.

6. Diagnostic

6.1. SC – Self-check

Subject to self-check are: voltages (supply, reference, battery), memory (program and data), correctness of internal module-to-module communication, calibration factors of measurement channels and device set points. Following detection of damage that could pose threat to safe operation of the switchgear, device operation is stopped, AL relay contacts are opened, optical signalization on the front panel is activated. Such a state requires servicing..

6.2. Autotest

6.2.1. PAT - Protection and Automation Test

PAT – Protections and Automation Test check operation of the protections and the automatic functions using external testers. It allows to check protections and automatic functions including inputs circuits (measuring and digital inputs) used by the protection. PAT requires the test signal generators that are attached to the inputs of the bay controller. After the start, test signals are attached to inputs and PAT checks the response to the protection.

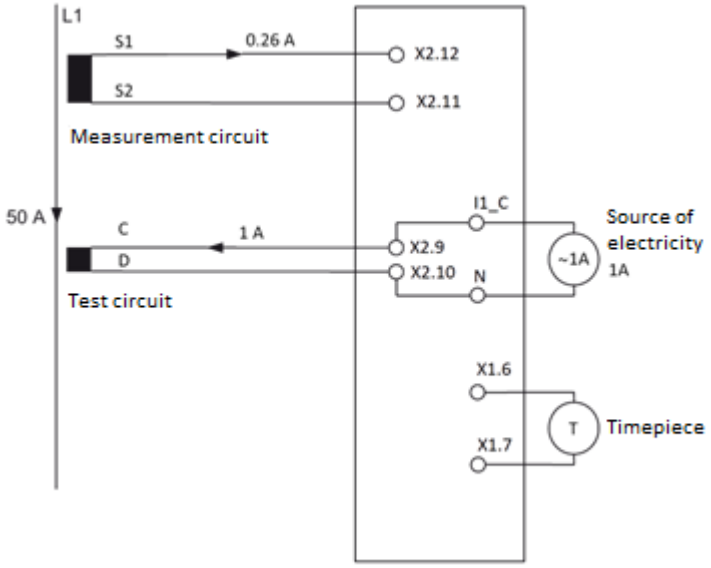

Fig. 6.2.1 Test device wiring diagram on the example of SVA100 16−56 A

In order to verify the correctness of the operation of the device and the installed wiring, a 1A 50Hz current source should be connected to the X1 connector, according to Fig. 6.2.1, and a timer or a different signalling device should be connected to pulse output O_2. The current transformer test winding is selected to have a 1A current flow, offset by 50A primary current (SVA100 16-56A type transformer). The AZZ device should be parametrised to have the device (selected protection) tripped for the desired forced current flow. Additionally, using the timer, the tripping delay time can be checked.

If no tripping takes place when the current flow is forced, this may mean damage to the device, incorrect wiring or incorrect parametrisation of the device.

The verification of the correct operation of the earth fault protections requires the supply of power to the device via phase circuits.

7. Case sizes

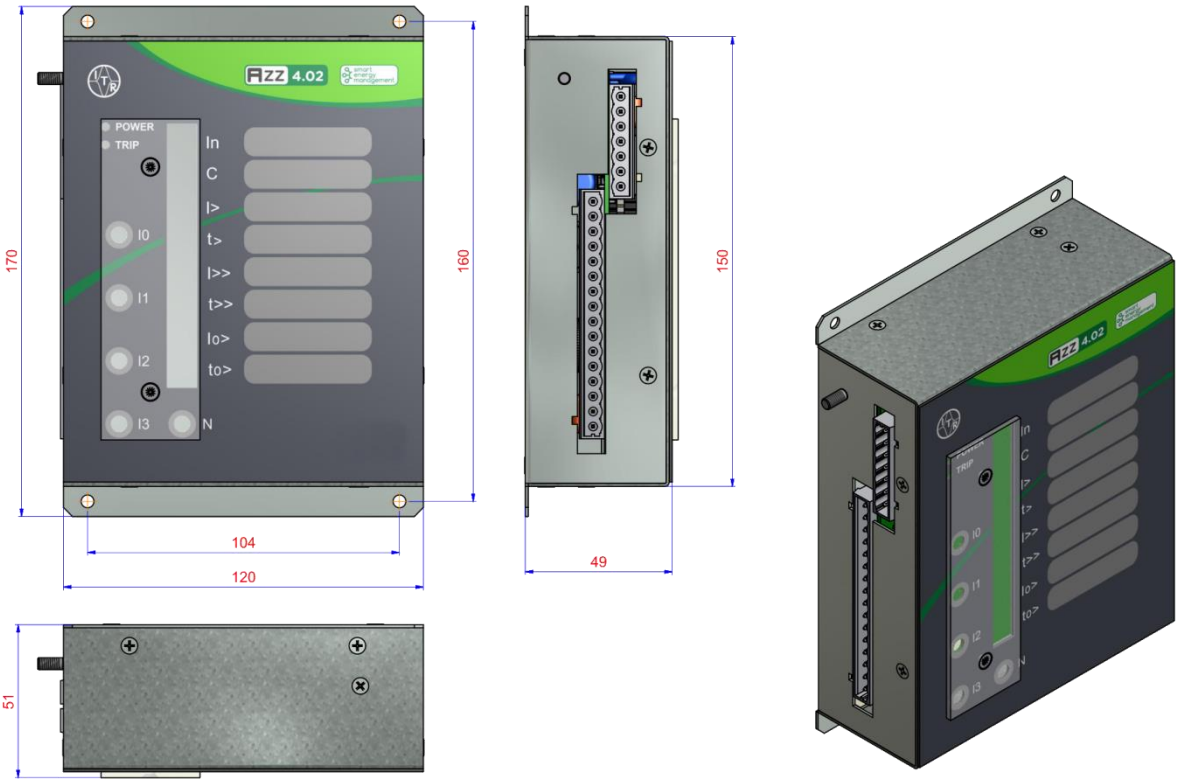

Fig. 7.1. 5. Case sizes

8. Application schematics

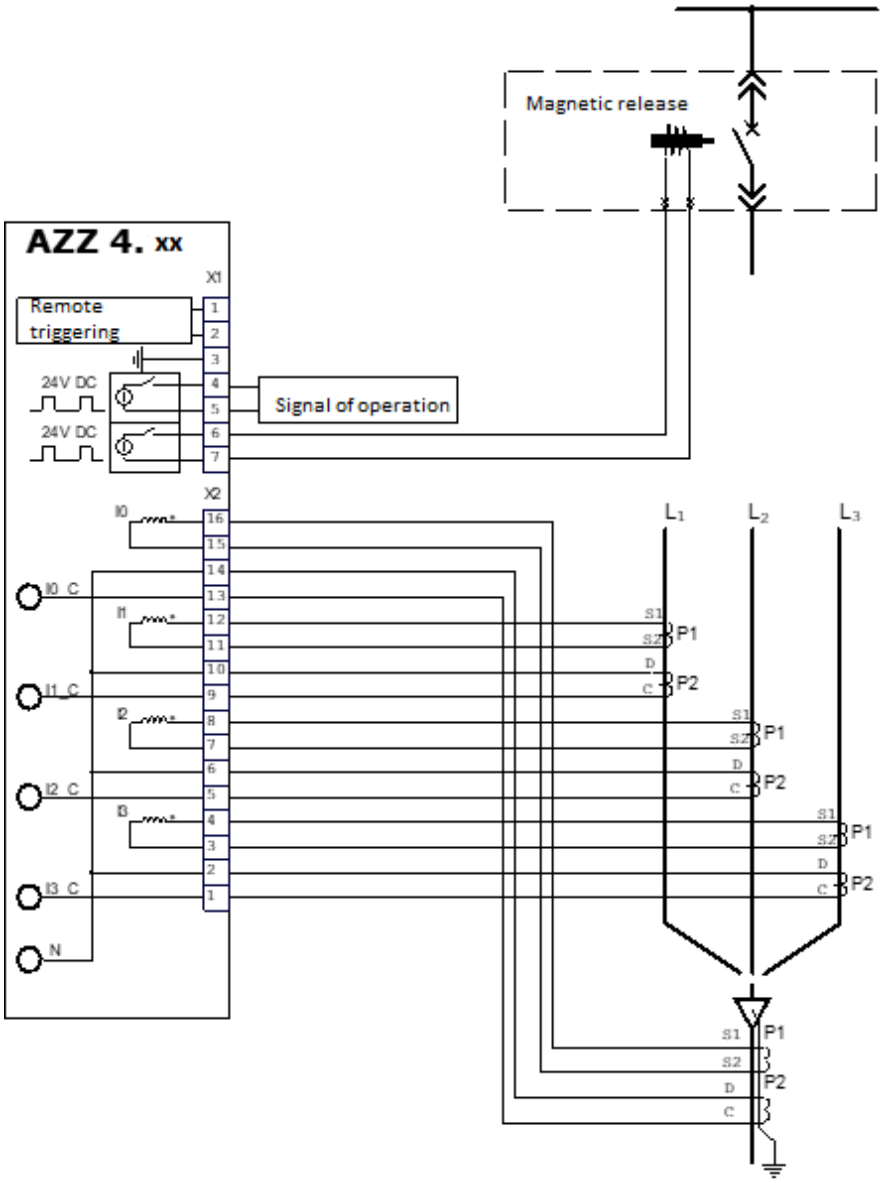

Fig. 8.1. Application schematics AZZ 4.02

9. Description of connection sockets

Table 9.1. X1 socket description

Terminal No	Marking	Description/Designation
1	EXT1	Remote tripping
2	EXT2	
3	PE	PE protective earthing
4	WY_1 (+)	Pulse output – triggering signalling
5	WY_1 (-)	
6	WY_2 (+)	Pulse output – magnetic trip
7	WY_2 (-)	

Table 9.2. X2 socket description

Terminal No	Marking	Description/Designation
1	L3(C)	Phase L3 – start of test winding
2	L3(D)	Phase L3 – end of test winding
3	L3(S1)	Phase L3 – end of winding
4	L3(S2)	Phase L3 – start of winding
5	L2(C)	Phase L2 – start of test winding
6	L2(D)	Phase L2 – end of test winding
7	L2(S1)	Phase L2 – end of winding
8	L2(S2)	Phase L2 – start of winding
9	L1(C)	Phase L1 – start of test winding
10	L1(D)	Phase L1 – end of test winding
11	L1(S1)	Phase L1 – end of winding
12	L1(S2)	Phase L1 – start of winding
13	L0(C)	Io – start of test winding
14	L0(D)	Io – end of test winding
15	L0(S1)	Io – end of winding
16	L0(S2)	Io – start of winding

Table 9.3. X3 socket description (applicable to AZZ4.03)

Terminal No	Marking	Description/Designation
1	24V(+)	Communication modem power supply voltage
2	RT	Terminating resistor, short circuit with pin No 3 when in use
3	A	RS485-A data line
4	B	RS485-B data line
5	24V(-)	Communication modem power supply voltage

Table 9.4. Description of the test ports on the front panel

Marking	Description/Designation
Io	Io test input
I1	L1 phase test input
I2	L2 phase test input
I3	L3 phase test input
N	Common for L1, L2, L3 and Io

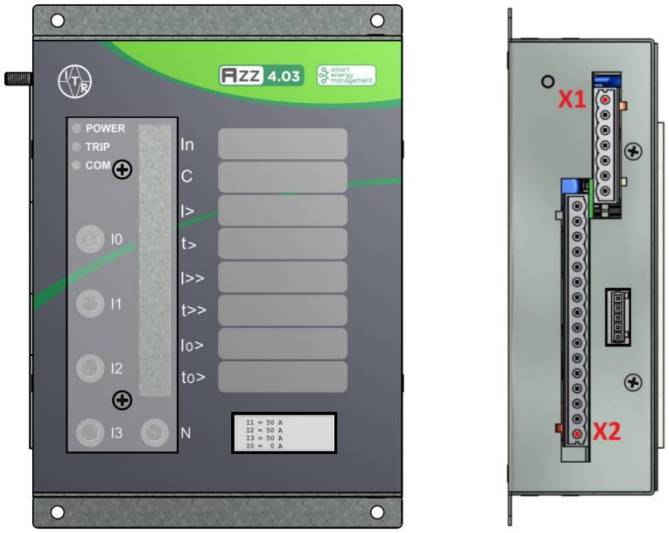

Fig. 9.1. Device view from the connectors/ports side

The red point on the connector means the first pin.

10. Remarks of manufacturer

10.1. Maintenance, inspections, repairs

The manufacturer recommends that correctness of device operation is verified:

a) each time - during commissioning,
b) at least once a year - in mine face installations,
c) at least once every 5 years in installations other than front face.

Also inspections resulting from branch regulations should be undertaken.

10.2. Storage and transport

Devices are packed in transport packages and secured against damage during transport and storage. Devices should be stored in transport packages, indoors, in places free from vibrations and direct effects of weather conditions, dry, well ventilated, free from harmful vapors and gases. Ambient air temperature should be between –35°C and +75°C, and relative humidity should not exceed 80%. All shipped devices are attached with complete set of connectors, grounding braid, warranty card and quality certificate.

10.3. Place of installation

The AZZ 4.xx device is intended for board mounting. The total length of cables connected to the input and output ports must not exceed 3 m.
The device installation is carried out according to the following sub-sections:

- mounting of the device at the target location
- tightening of fixing bolts
- installation of circuits connectors

10.4. Disposal

Devices are made mostly from recyclable materials, or materials that can be processed again or disposed of in environmentally sound manner. Decommissioned devices can be collected for recycling, provided that their condition is that of normal wear and tear. All components that are not recyclable shall be disposed of in environmentally sound manner.

10.5. Guarantee and service

Regular 36-month guarantee period. Had the sale been preceded by execution of an Agreement between the Buyer and the Seller, provisions of such Agreement shall apply. Guarantee covers remedying of defects, free of charge, provided that instructions specified in the Warranty Card are adhered to. Detailed guarantee conditions may be found at energetyka.itr.org.pl in the w „Sale Regulations".

- The guarantee period is counted from the date of sale.
- The warranty is extended by a period of residence of the product in the repair.
- Unauthorized tampering with the product will void the warranty.
- Warranty does not cover damage resulting from improper use of the product.

11. Order specification

	A	B	C
Case options			
DIP switch	1		
HEX switch	2		
Special version of execution			
Standard design		0	
Design with a display		1	
Extension module 1			
none			0
RS485, MODBUS RTU			1

Example of an order:

- AZZ 4.xx A100 – design with DIP toggle switches
- AZZ 4.xx A111 – design with DIP toggle switches, a display and an RS485 communication module

12. Contact

Tele- and Radio Research Institute
ICT and Electronics Centre

03-450 Warsaw, ul. Ratuszowa 11

tel.: + 48 22 590 73 91
e-mail: energetyka@itr.org.pl
www: energetyka.org.pl