

JULY 2019



## **USER'S MANUAL**

POWER SUPPLY - ISOLATOR - SIGNAL  
CONVERTER

**ZSP-41**

POWER SUPPLY - ISOLATOR - SIGNAL  
CONVERTER- SIGNAL MULTIPLIER

**ZSP-41/2**





ISOLATOR - SIGNAL CONVERTER

**TYPE SP-11**

CURRENT SIGNAL ISOLATOR  
WITHOUT AUXILIARY POWER

**TYPE SP-02**

## Symbols used

Symbol	Description
	Carefully follow the information in this document to ensure safety and full functionality of the device.
	Information particularly useful for the installation and use of the device.
	Information particularly useful for the installation and use of the device by Ex.
	Information on the disposal of used equipment.

## BASIC REQUIREMENTS AND SAFETY OF USE



- The producer takes no liability for damage resulting from incorrect installation of the device, neglecting to keep the device in proper technical condition, and using the device for purposed other than its intended purpose.
- Installation should be conducted by qualified personnel, authorized for installation of electrical equipment and measuring devices. The installer is responsible to conduct the installation according to this manual as well as laws and standards of safety and electromagnetic compatibility applicable for this kind of installation.
- In any installation equipped with measuring devices, there is an injury hazard from compressed agent in case of a leak. Follow all safety requirements during the installation, use, and inspection of the display.
- In case of malfunction, disconnect the device and return it to the producer or an authorized service unit for repair.



In order to minimize the possibility of malfunction and the resulting hazard to personnel, avoid installing the device in dangerous environment where there is a possibility of the following:

- Mechanical impact, excess shock and vibration.
- Excess temperature fluctuation.
- Steam condensation, dusting, icing.



Installation of intrinsically safe devices must be conducted very carefully, following all standards and laws applicable for installations of this kind.

Changes and alterations introduced in production documents may anticipate the update of user's paper documents. Up-to-date instruction manuals are available on producer's website at [www.aplisens.pl](http://www.aplisens.pl)

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## 1. INTRODUCTION

The subject of this user's manual are rail-mounted signal converters (isolators) type ZSP-41, ZSP-41/2, SP-11 and SP-02.

The manual includes data, hints, and recommended action for installation and use of the converters, as well as troubleshooting tips.

## 2. SAFETY PROCEDURES



- Read this instruction carefully prior to, installation, startup, or any other work.
- Installation and maintenance can only be conducted by qualified personnel, authorized to install electrical equipments and measuring devices.
- Use the device according to its intended use, without exceeding maximum acceptable parameters.
- Prior to assembly or disassembly of the device, be sure to disconnect the power source.
- It is not acceptable to conduct any repair or otherwise tamper with the electronic circuit of the device. Damage assessment and possible repair can only be made by the producer or an authorized unit.
- Do not use the device when it is damaged. If malfunction occurs, disconnect the device.

## 3. CONSIGNMENT CONTENTS

Along with the device, the user receives the following:

- a) Product certificate, functioning as a warranty card;
- b) Declaration of conformity (on customer's request);
- c) User's manual designated „IO.ZSP-41.SP-11.SP-02(ENG)“

Positions b), c) are available from the website [www.aplisens.pl](http://www.aplisens.pl)

## 4. TRANSPORT AND STORAGE

### 4.1. Transport

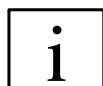
When transported, the devices should be packed in individual and/or group packaging and carried on a covered means of transport. The packaging should be secured against shifting and atmospheric weather effects.

### 4.2. Storage

The device should be stored in the manufacturer's packaging, in a covered room, free of vapor and corrosive agents, where temperature and relative humidity do not exceed maximum acceptable limits.

## 5. WARRANTY

The producer provides warranty under the conditions specified in Product Certificate that works as a warranty card.



Warranty will be void if the device is not used according to its intended use, the user does not follow this instruction manual, the device is handled by unqualified personnel or the construction has been tampered with.

## 6. CONSTRUCTION

### 6.1. Intended use and features

Rail-mounted Signal Converters (isolators) are intended to operate in automatic adjustment systems wherever a galvanic separation of system input or output signal is required. They also enable to change analogue signals of 0...20mA, 4...20mA, 0...10V. Also, versions with non-standard analogue signals are available. Moreover, the ZSP-41/2 is installed wherever additional duplication of output signals is required.

### 6.2. Construction and dimensions

All elements of the isolators' electronic systems are installed on a printed circuit board. A front panel with clamps is welded to the circuit board. The entire set is assembled in housing made of plastic. Signal converters have switches to selected input and output signals, accessible after sliding the printed circuit board out of the housing.

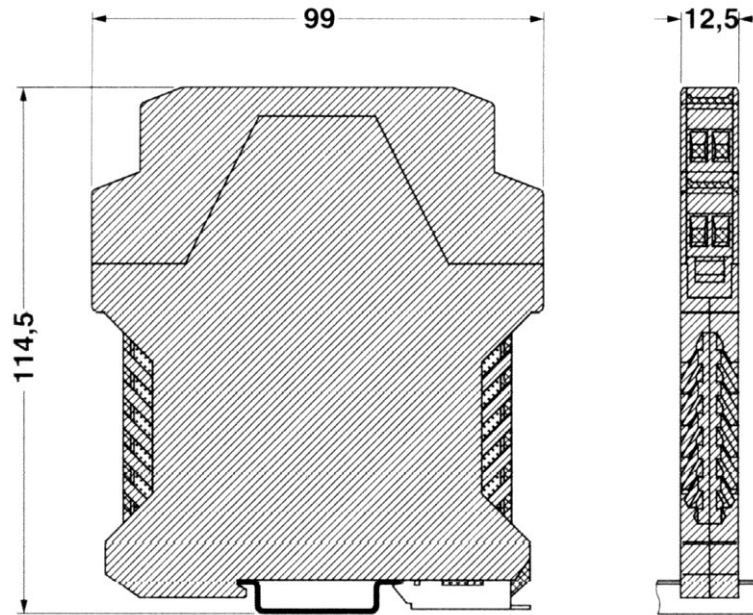


Figure 1. Housing - dimensions

## 7. INSTALLATION

Isolator housing allows for installation on the following rails:

- TS-32 (EN 50 035),
- TS-35 (EN 50 022).

Rail-mounted Signal Converters must be used in conditions specified in this user manual. Clamp connection configuration and typical operation configuration is illustrated in figure 2, 5, 8, 11. Selection of input and output signals with switches while isolators are energized does not cause damage.

## 8. CONNECTING



All connection and installation steps must be performed with power disconnected.



Power supplies and isolators are equipped in plug-in connectors protecting against incorrect wiring.

### 8.1. Connecting the ZSP-41 and ZSP-41/2



The ZSP-41 isolator is only equipped with one input clamp block, mounted to clamps 1-2. After selecting dual-line converter, the connection must be reclamped to clamps 3-4.

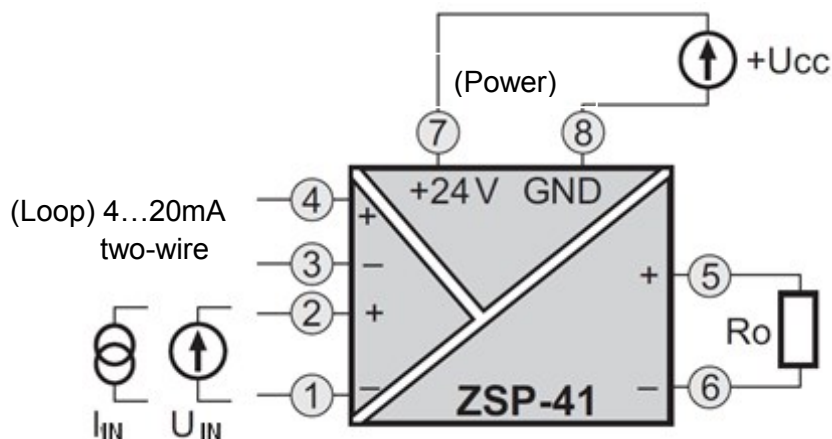


Figure 2. ZSP-41 connection diagram

IN	OUT	SWITCHES					
		1	2	3	4	5	6
0-20mA	0-20mA	-	-	-	-	-	-
0-20mA	4-20mA	-	+	-	-	-	-
0-20mA	0-10V	-	-	-	+	-	-
4-20mA	0-20mA	-	-	+	-	-	-
4-20mA	4-20mA	-	+	+	-	-	-
4-20mA	0-10V	-	-	+	+	-	-
0-10V	0-20mA	-	-	-	-	+	+
0-10V	4-20mA	-	+	-	-	+	+
0-10V	0-10V	-	-	-	+	+	+
PD	0-20mA	-	-	+	-	-	-
PD	4-20mA	-	+	+	-	-	-
PD	0-10V	-	-	+	+	-	-

Figure 3. ZSP-41 – Selecting input and output signals with switches – **OWC** version

Dip	Input						Output			
	DP2		DP4				1	2	3	4
	1	2	1	2	3	4				
<b>4...20mA</b>	+	+	+	-	+	+	-	+	-	+
<b>0...20mA</b>	+	+	+	+	-	+	-	-	-	-
<b>0...10V</b>	+	+	-	+	-	+	+	-	+	-
<b>PD</b>	-	+	+	-	+	+				

Figure 4. ZSP-41 - Selecting input and output signals with switches – **OW** version

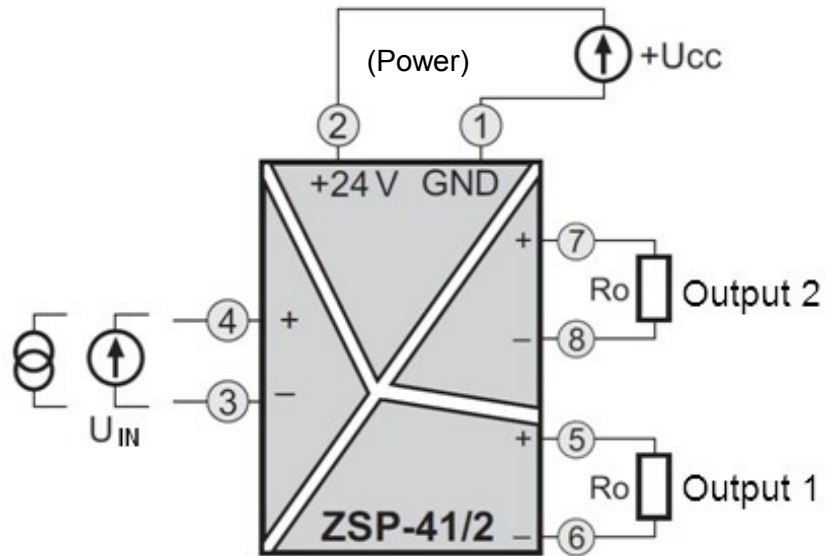


Figure 5. ZSP-41/2 connection diagram.

Dip	Output 1		Output 2		Input							
	1	2	3	4	5	6	1	2	3	4	5	6
4...20mA	+	-	+	-	+	-	-	+	-	+	-	-
0...20mA	-	-	-	-	-	-	-	+	-	+	-	-
0...10V	-	+	-	+	-	+	-	+	-	+	+	-
PD					+	-	+	-	+	-	-	-

Figure 6. ZSP-41/2 - Selecting input and output signals with switches – **OWC** version

Dip	Input								Output 1				Output 2			
	1	2	3	4	5	6	7	8	1	2	3	4	1	2	3	4
4...20mA	-	+	-	+	+	-	+	+	-	+	-	+	-	+	-	+
0...20mA	-	+	-	+	+	+	-	+	-	-	-	-	-	-	-	-
0...10V	-	+	-	+	-	+	-	+	+	-	+	-	+	-	+	-
PD	+	-	+	-	+	-	+	+								

Figure 7. ZSP-41/2 - Selecting input and output signals with switches – **OW** version

- (+) – Switch ON
- (-) – Switch OFF
- (PD) – Two-wire transmitter



## 8.2. Connecting the SP-11

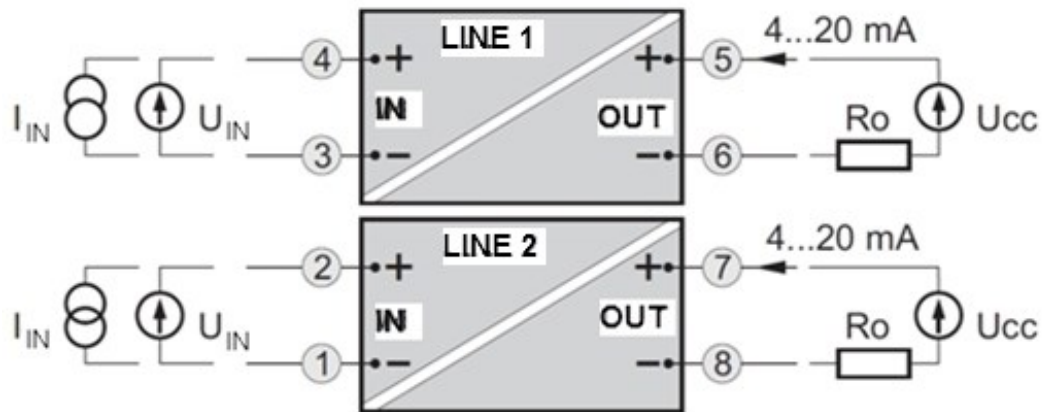


Figure 8. SP-11 connection diagram

INPUT	SWITCHES			
	1	2	3	4
4...20mA	-	+	-	-
0...20mA	-	-	-	-
0...5mA	-	-	+	-
1...5mA	-	+	+	-
0...10V	+	-	-	+
2...10V	+	+	-	+

Figure 9. SP-11 - Selecting input and output signals with switches – **OWC** version

INPUT	SWITCHES			
	1	2	3	4
4...20mA	+	-	+	+
0...20mA	+	+	-	+
0...5mA	+	+	-	-
1...5mA	+	-	+	-
0...10V	-	+	-	+
2...10V	-	-	+	+

Figure 10. SP-11 - Selecting input and output signals with switches – **OW** version

(+) - Switch ON  
 (-) - Switch OFF

### 8.3. Connecting the SP-02

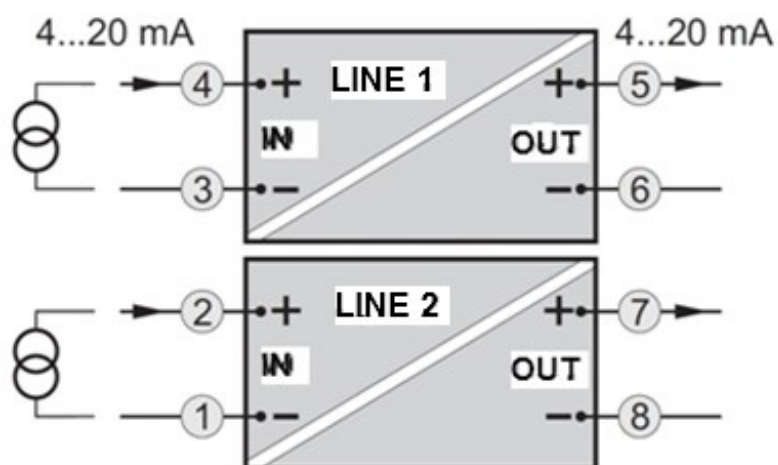



Figure 11. SP-02 connection diagram

## 9. TECHNICAL PARAMETERS

### 9.1. Electrical parameters of ZSP-41 and ZSP-41/2

Two-wire power supply	24V DC $\pm 20\%$
Power consumption	<2 VA with ZSP-41 <3 VA with ZSP-41/2
	When switching on in the ZSP-41 isolator, the maximum temporary power consumption is about 3,5VA (power necessary to start up the internal converter)
Input signal	0...20mA, 4...20mA, two-wire (4...20mA + converter power supply) 0...10V
Input resistance	$\geq 50\text{k}\Omega$ (voltage input) $\leq 50\Omega$ (current input)
Output signal	0...20mA, 4...20mA, 0...10V
Output resistance	0...500 $\Omega$ (current output) $\geq 1\text{ k}\Omega$ (voltage output)
Insulation type	optoelectronic
Resistance to electrical breakdown	1.5kV AC 50Hz 1min
Conversion errors	
- basic error (***)	$\leq \pm 0.16\%$
- temperature change effect	$\leq \pm 0.1\%/10^\circ\text{C}$
- load resistance change effect	$\leq \pm 0.1\%/100\Omega$ (current output) $\leq \pm 0.1\%$ with $\geq 1\text{k}\Omega$ (voltage output)
- power voltage change effect	$\leq \pm 0.1\%$

(\*\*\*) ERROR VALUE REFERS TO RANGE SETTING 4...20mA/4...20mA WITHOUT POWER SUPPLY TO INPUT CONVERTER. WITH OTHER SETTINGS (WITHOUT ADDITIONAL CALIBRATION) BASIC ERROR IS 0.25% - not applicable to **OWC** version.

## 9.2. Electrical parameters of SP-11

Two-wire power supply	9...36 V DC
Power consumption	<1 VA
Input signal	0...20mA, 4...20mA, 0...5mA, 1...5mA 0...10V, 2...10V
Input resistance	≥ 50kΩ (voltage input) ≤ 50Ω (current input)
Output signal	4...20mA
Output resistance	0...( Usup[V]-9V)/0,025A [Ω] Max. 500Ω
Insulation type	optoelectronic
Resistance to electrical breakdown	1.5kV AC 50Hz 1min
Conversion errors	
- basic error (***)	≤±0.16%
- temperature change effect	≤±0.1%/10°C
- load resistance change effect	≤±0.1%/100Ω
- power voltage change effect	≤±0.1%

(\*\*\*) ERROR VALUE REFERS TO RANGE SETTING 4...20mA/4...20mA WITHOUT POWER SUPPLY TO INPUT CONVERTER. WITH OTHER SETTINGS (WITHOUT ADDITIONAL CALIBRATION) BASIC ERROR IS 0.25% - not applicable to **OWC** version.

## 9.3. Electrical parameters of SP-02

Input voltage	≤ 3.5V + I <sub>out</sub> × R <sub>L</sub>
Input signal	4...20mA
Output signal	4...20mA 0...10V
Output resistance	0...500 Ω (current output) ≥ 2 kΩ (voltage output)
Insulation type	transformer
Resistance to electrical breakdown	1.5kV AC 50Hz 1min
Conversion errors	
- basic error	≤±0.16%
- temperature change effect	≤±0.1%/10°C
- load resistance change effect	≤±0.1%/100Ω
- power voltage change effect	≤±0.1%

#### 9.4. Permissible operating conditions:

Ambient temperature	+5 °C ...60 °C
Relative humidity	do 80%
Atmospheric pressure	80...120kPa
Working position	any

##### 9.4.1. Mechanical resistance

*Stroke: acc. to PN-EN 60068-2-27, 31*

50g/11ms

*Sinusoidal vibration: acc. to PN-EN 60068-2-6, Fc test;*

Up to 1,6mm; 2...25Hz;

Up to 4g with 25...100Hz;

##### 9.4.2. Housing protection class

acc. to PN-EN 60529:2003 – IP20

##### 9.4.3. Housing

Type	ME 12,5 (PHOENIX)
Housing material	Polyamide
Width/Length/Height	12,5/114,5/99 mm
Weight	0.08 kg

## 9.5. Marking

### Power supply – isolator – signal converter type ZSP-41

**ZSP-41/1** – standard version

**ZSP-41/1 / \_\_\_ ÷ \_\_\_** – special version

Non-standard input signal



### Power supply – isolator – signal converter – signal multiplier type ZSP-41/2

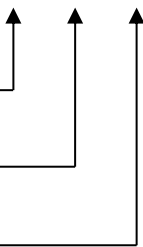
**ZSP-41/2** – standard version

**ZSP-41/2 / \_\_\_ / \_\_\_ / \_\_\_** – special version

Input signal

Output signal 1

Output signal 2



### Isolator – signal converter type SP-11

Single-line version:

**SP-11/1** – standard version

**SP-11 / 1 / \_\_\_ ÷ \_\_\_** – special version

Non-standard input signal



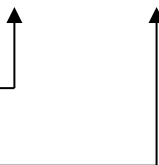
Dual-line version SP-11/2:

**SP-11/2** – standard version

**SP-11 / 2 / \_\_\_ ÷ \_\_\_ / \_\_\_ ÷ \_\_\_** – special version

Non-standard input signal Line 1

Non-standard input signal Line 2



### Current signal isolator without auxiliary energy type SP-02

**SP-02/ \_\_\_** – standard version

Number of lines (1 or 2)



**SP-02/0...10V / \_\_\_** – special version (with voltage output 0...10V)

Number of lines (1 or 2)



## 10. INSPECTION

### 10.1. Periodical inspection

Periodical inspection must be conducted according to user standards in force.

While inspecting, check the condition of electrical connections on clamps (firmness of connections) and the stability of fixing.

### 10.2. Non-periodical inspection

If the device is exposed to mechanical damage, electrical overvoltage or it works improperly – conduct inspection as necessary.

If there is no signal on the transmission line or signal value is incorrect, check the condition of the cable, the condition of connections on clamps, etc. Check if the power voltage value and load resistance is correct.

If the line is functional, check the operation of the device.

## 11. SCRAPPING, DISPOSAL



Waste or damaged transmitters should be dismantled and disposed of in accordance with Directive (2012/19/EC) on waste electrical and electronic equipment (WEEE) or returned to the manufacturer.

## 12. ADDITIONAL INFORMATION

The producer retains the right to implement structural and technological alterations that do not lower the device parameters.

