



WARRANTY  
**3**  
YEARS



AC 083  
QMS

# **LABOR - ASTER**

## **INDUSTRIAL AUTOMATION**

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### **SEPARATORS**

ANALOG SEPARATORS, including HART system  
DUPLICATORS  
BINARY SEPARATORS  
TRANSMISSION LINES SEPARATORS

### **CONVERTERS**

TEMPERATURE, RESISTANCE, POSITION CONVERTERS  
VOLTAGE, CURRENT CONVERTERS  
FREQUENCY CONVERTERS, including PLC  
ANALOG → MODBUS → ANALOG, also multichannel  
TENSOMETRIC CONVERTERS

### **INDICATORS**

DIGITAL LED, LCD, 4÷20mA DISPLAYS  
LED BARS  
MULTICHANNELS  
SETTING UNITS, COUNTER-DISPENSERS  
SETTABLE SOURCES (auto/manual)  
METER and SETTABLE SOURCE with BATTERY SUPPLY

FUNCTION BLOCKS arithmetic - logic  
MODBUS RTU CONVERTERS, including multichannel  
VALVES CONTROL TRANSMITTERS  
SUPPLIERS  
OVERVOLTAGE PROTECTION UNITS  
RELAY MODULES  
Pt100 SENSORS

### **Ex DEVICES with INTRINSICALLY SAFE CIRCUITS**

separators, transmitters, suppliers,  
contacts to cooperate with hazardous zone,  
digital indicators, current source 4÷20mA

Valid price list and catalogue can be found on our website [WWW.LABOR-AUTOMATYKA.PL](http://WWW.LABOR-AUTOMATYKA.PL)

March 2015

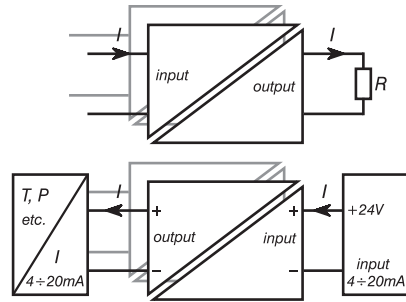
ap12e





1, 2 or 4 channels

## S1, S1-L2W, S1-L4 ISOLATED SELF-POWERED SEPARATOR

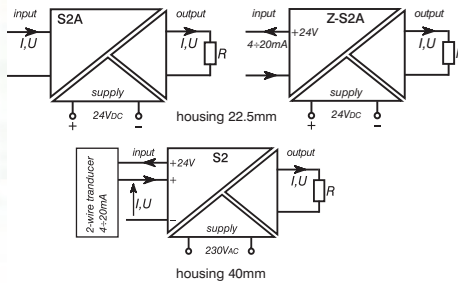


- galvanic isolation • 1 or 2 channels, housing 12.5mm - isolation 2kV/100pF
- 1 or 2 channels, housing 22.5mm - isolation 2kV/10pF
- 3 or 4 channels, housing 22.5mm - isolation 2kV/100pF
- 1 channel, housing 22.5mm - isolation 4kV/10pF
- input •  $I_{IN}=0/4\div 20\text{mA}$  (any  $I < 50\text{mA}$ ,  $U_{IN} < 30\text{V}$ )
- output •  $I_{OUT}=0/4\div 20\text{mA}$  ( $I_{OUT}=I_{IN}$  or as agreed)
- load resistance •  $R_L=0\div 1000\Omega$  or two-wire transmitter
- voltage drop on input •  $2.5\text{V} + R_L \cdot 20\text{mA}$  (when  $I=20\text{mA}$ )
- time constant • 5ms or as agreed
- accuracy •  $\pm 0.05\% - 0.05\% \cdot R_L / 100\Omega$

1, 2, 3 or 4 channels in one housing  
simplest isolation for current loop  $0/4\div 20\text{mA}$ ,  
for operating with two wire transmitter or fire and smoke sensors



## S2A SEPARATOR WITH ISOLATED SUPPLY CIRCUIT - housing 22.5mm Z-S2A SUPPLIER-SEPARATOR WITH ISOLATED SUPPLY CIRCUIT -housing 22.5mm S2 SEPARATOR and SUPPLIER-SEPARATOR WITH ISOLATED SUPPLY CIRCUIT - housing 40mm

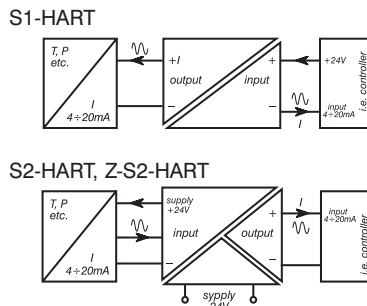


- S2A input • any standard signal
- Z-S2A input •  $4\div 20\text{mA}$  current loop supplied from 24V, to operate with two-wire transmitter
- S2 input • any standard signal and 24V supply for two-wire transmitter
- output • any standard analog signal
- load resistance •  $0\div 700\Omega$  for current output
- $\geq 2\text{k}\Omega$  for voltage output
- galvanic isolation • all circuits mutually separated
- S2A, Z-S2A supply • 24VDC
- S2 supply • 230VAC
- isolation test voltage • 2kV

possibility of calibration the beginning and the end of the range



## S1-HART, S2-HART, Z-S2-HART BIDIRECTIONAL SEPARATORS TRANSPARENT FOR HART COMMUNICATION



### S1-HART self-powered separator

- metrological parameters • same as for S1 separator

### S2-HART separator with 24VDC object supply

- metrological parameters • same as for S2A separator

### Z-S2-HART supplier-separator with 24VDC object supply for operation with two-wire transmitters e.g. pressure, temperature etc.

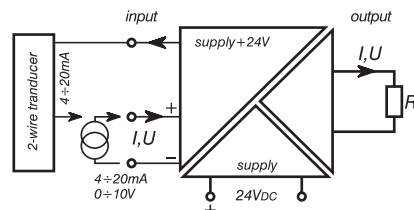
- metrological parameters • same as for Z-S2A separator

to operate with smart transmitter with HART communication



thin housing 12.5mm

## S2D SEPARATOR WITH ISOLATED SUPPLY CIRCUIT - housing 12.5mm width



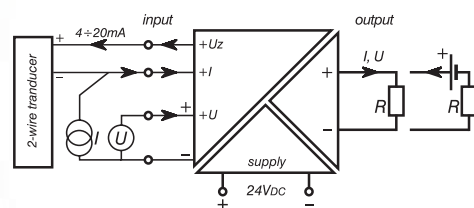
- galvanic isolation • all circuits mutually separated
- input • any standard signal, including powering  $4\div 20\text{mA}$  current loop for two-wire transmitters
- output • any standard analog signal, including passive  $4\div 20\text{mA}$
- input resistance •  $50\Omega$  for current inputs,  $\geq 100\text{k}\Omega$  for voltage signals
- load resistance •  $0\div 700\Omega$  or current output,  $\geq 2\text{k}\Omega$  or voltage output
- accuracy • 0.1% of range
- supply • 24VDC
- isolation test voltage • 2kV

possibility of calibration point at the beginning and the end of the range



thin housing 6.2mm

## S2E SEPARATOR WITH ISOLATED SUPPLY CIRCUIT - housing 6.2mm width

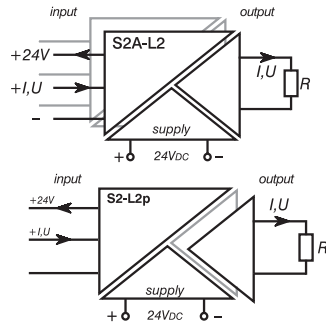


- galvanic isolation • all circuits mutually separated
- input • any standard signal, including powering  $4\div 20\text{mA}$  current loop for two-wire transmitters
- output • any standard analog signal, including passive output controlling  $4\div 20\text{mA}$  loop powered by e.g. controller
- input resistance •  $50\Omega$  for current inputs,  $\geq 100\text{k}\Omega$  or voltage signals
- load resistance •  $0\div 600\Omega$  for current output,  $\geq 2\text{k}\Omega$  for voltage output
- accuracy • 0.1% of range
- supply • 24VDC
- isolation test voltage • 2kV

**S2-L2 SEPARATOR and SUPPLIER-SEPARATOR with isolated supply circuit: 1 or 2 channels**  
**S2-L2p SUPPLIER-SEPARATOR-REPEATER with isolated supply circuit: 2 outputs**



housing 22.5mm



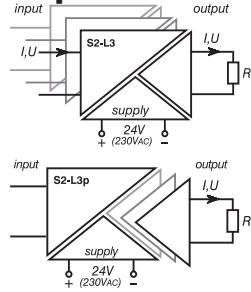
- galvanic isolation • all circuits mutually separated
- input • any standard signal, including 24V supplying 4÷20mA loop for two-wire transmitters
- output • any standard analog signal, including passive 4÷20mA
- input resistance • 50Ω for current inputs, ≥100kΩ for voltage signals
- load resistance • 0÷700Ω for current output, ≥2kΩ or voltage output
- accuracy • 0.1% of range
- supply • 24VDC
- isolation test voltage • 2kV

low cost multichannel version

**S2-L3 SEPARATOR with isolated supply circuit: 3 chnns. supply 24Vdc or 2 chnns. supply 230VAC**  
**Z-S2-L3 SEPARATOR and SUPPLIER-SEPARATOR: 3 chnns. supply 24Vdc or 2 chnns. supply 230VAC**  
**S2-L3p SUPPLIER-SEPARATOR-REPEATER with isolated supply circuit: 2 or 3 channels**



housing 50mm



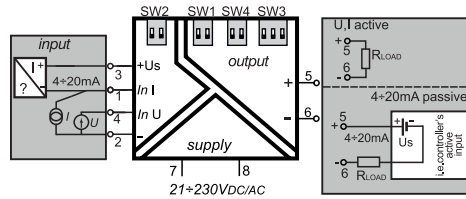
- galvanic isolation • all circuits mutually separated
- S2-L3 input • any standard I, U signal
- Z-S2-L3 input • 4÷20mA, supplying two-wire transmitter loop
- S2-L3p input • any standard I, U
- Z-S2-L3p input • 4÷20mA, supplying two-wire transmitter loop
- wyjście • dowolny sygnal standardowy
- input resistance • 50Ω or current inputs, ≥100kΩ for voltage signals
- load resistance • 0÷700Ω for current output, ≥2kΩ or voltage output
- isolation test voltage • 2kV

for duplicating and repeating signals rail or wall housing

**S2Us-U UNIVERSAL SEPARATOR with universal supply**



thin housing 12.5mm



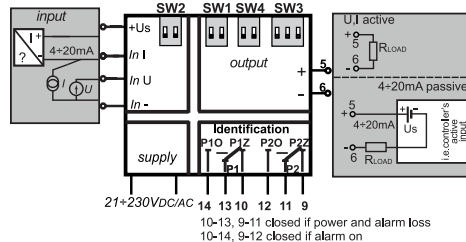
- galvanic isolation • all circuits mutually separated
- input • settable signal 0÷20mA, 4÷20mA or 0÷10V possibility of supplying input 4÷20mA loop with two-wire transmitter
- output • settable signal 0÷20mA, 4÷20mA or 0÷10V, including passive 4÷20mA
- input resistance • 50Ω for current inputs, ≥100kΩ for voltage signals
- load resistance • 0÷700Ω for current output, ≥2kΩ or voltage output
- settings • code switches for setting the input and output
- accuracy • 0.1% of range
- supply • universal: 21÷240VAC/DC
- isolation test voltage • 2kV

universal supply setting the input and output signals with SW1, SW2, SW3, SW4 switches

**S2Us-G SETTABLE SEPARATOR with alarm indication and universal supply**



housing 22.5mm



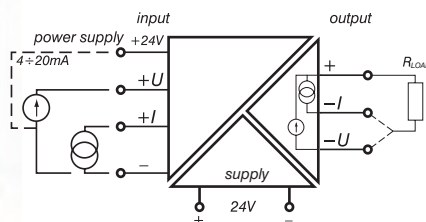
- galvanic isolation • all circuits mutually separated
- input • settable signal 0÷20mA, 4÷20mA or 0÷10V possibility of supplying input 4÷20mA loop with two-wire transmitter
- output • settable signal 0÷20mA, 4÷20mA or 0÷10V, including passive 4÷20mA
- input resistance • 50Ω for current inputs, ≥100kΩ or voltage signals
- load resistance • 0÷700Ω or current output, ≥2kΩ for voltage output
- settings • code switches for setting the input and output
- accuracy • 0.1% of range
- supply • universal: 21÷240VAC/DC
- isolation test voltage • 2kV

setting the input and output signals with SW1, SW2, SW3, SW4 switches two relay alarm thresholds set by potentiometers

**S2Us, S2Us-W UNIVERSAL SEPARATOR WITH SETTABLE IN/OUT STANDARDS**  
**S2Us-L2 TWO CHANNELS WITH 24VDC SUPPLY IN HOUSING 22.5mm WIDTH**  
**S2Us-L2p SETTABLE SEPARATOR-REPEATER (ONE INPUT, TWO OUTPUTS)**



S2Us-L2 22.5mm width S2Us-W 12.5mm width S2Us 25mm width



- galvanic isolation • all circuits mutually separated
- input • settable signal 0÷20mA, 4÷20mA or 0÷10V possibility of supplying input 4÷20mA loop with two-wire transmitter
- output • settable signal 0÷20mA, 4÷20mA or 0÷10V
- input resistance • 50Ω for current inputs, ≥100kΩ for voltage signals
- load resistance • 0÷700Ω for current output, ≥2kΩ for voltage output
- accuracy • 0.1% of range
- settings • code switches for setting the input and output
- isolation test voltage • 2kV

S2Us-W – optional universal supply 20÷230VAC/DC

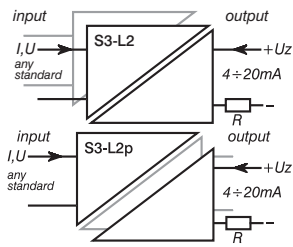
universal separator – settable any standard of the input/output signal





two channels 12.5mm width  
one channel 22.5mm

**S3, S3-L2 TWO-WIRE SEPARATOR any standard → 4÷20mA**  
**S3U, S3U-L2 UNIVERSAL SEPARATOR with settable input standard → 4÷20mA**  
**S3-L2p, S3U-L2p TWO-WIRE REPEATER, also with universal input**



S3, S3U – housing 22.5mm, one channel  
S3-L2, S3U-L2, S3-L2p, S3U-L2p – housing 12.5mm, two channels

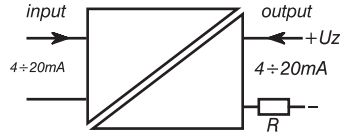
- galvanic isolation • all circuits mutually separated
- input • S3, S3-L2, S3-L2p - any standard according to order  
S3U, S3U-L2, S3U-L2p – settable: 0/4÷20mA, 0÷10V
- input resistance • 50Ω for current inputs,  
≥ 100kΩ or voltage signals
- output • two-wire control of 4÷20mA current loop (external supply)
- external circuit power supply • 9V ≤ Uz ≤ 36V
- load resistance • R<sub>MAX</sub> = (Uz - 9V) / 20mA
- accuracy • 0.1%
- isolation test voltage • 2kV

two-wire separator for measurement cards with active current inputs



one channel 6.5mm width  
one or two channels 12.5mm width

**S3A, S3A-2 TWO-WIRE SEPARATOR 4÷20mA → 4÷20mA**



one or two independent channels in one housing

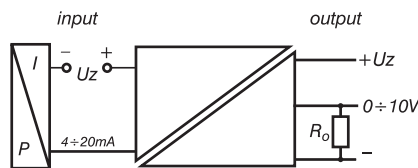
- galvanic isolation • all circuits mutually separated
- input • 4÷20mA
- input resistance • 250Ω, always 5V on the input
- output • two-wire control of 4÷20mA current loop (external supply)
- external circuit power supply • 9V ≤ Uz ≤ 36V
- load resistance • R<sub>MAX</sub> = (Uz - 9V) / 20mA
- accuracy • 0.1%
- isolation test voltage • 2kV

low cost version of two-wire separator



dimensions: width x height x depth  
18mm x 90mm x 58mm

**As 416 SEPARATOR 4÷20mA → VOLTAGE, WITH THREE-WIRE OUTPUT**

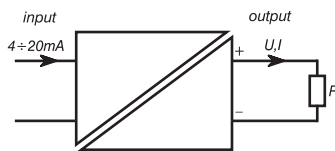


- galvanic isolation • all circuits mutually separated
- input • 4÷20mA
- input resistance • 250Ω, always 5V on the input
- three-wire output • 0÷10V, 0÷5V, 2÷10V, 1÷5V
- load resistance • R<sub>LOAD</sub> > 4.7kΩ
- accuracy • 0.1% of full scale
- supply • Uz = 16÷36V for R<sub>0</sub> = ∞ current consumption < 3mA
- isolation test voltage • 2kV

**S4 SELF-POWERED SEPARATOR 4÷20mA → any standard**



housing 22.5mm



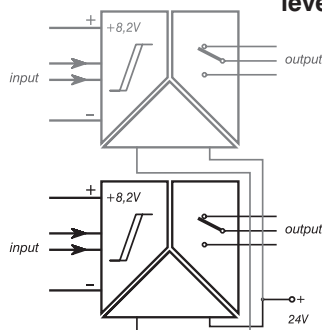
- galvanic isolation • all circuits mutually separated
- input • 4÷20mA
- input voltage dropout • 2V + U<sub>OUT</sub> or 2V + 20mA · R<sub>LOAD</sub>
- output • any standard
- load resistance • 0÷500Ω for current output,  
≥ 2kΩ for voltage output
- accuracy • 0.1% of full scale
- isolation test voltage • 2kV

easiest separation and translation of 4÷20mA signal to any other signal

**SB-L1, SB-L2 BISTATE SEPARATOR ONE or TWO CHANNELS**  
**level translator for high frequencies e.g. 100kHz, 0/5V → 0/24V**  
**level comparator for analog signals**



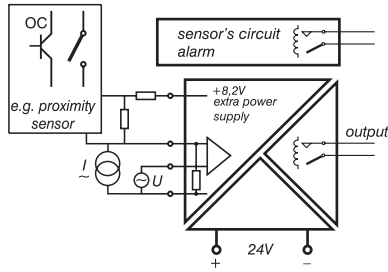
housing 40mm



- galvanic isolation • all circuits mutually separated
- input • proximity sensor, supplied with voltage 8.2÷12V from the separator, Hall sensor for current comparison, transistor or metallic switch, voltage 0÷100V<sub>AC/DC</sub>, current 0÷1A<sub>AC/DC</sub>, signal from an encoder 100kHz, 0/5V
- output • relay contact 2A/250V f<sub>MAX</sub>=3Hz,  
reed relay 0.3A/250V/50Hz,  
opto-relay 0.1A/350V/450Hz,  
OC 50mA/60V/20kHz,  
fast output 100kHz, 0/24V
- isolation test voltage • 2kV

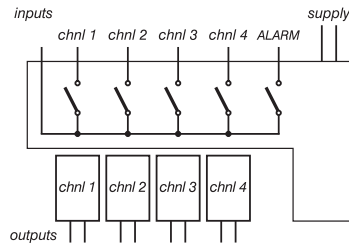
transfer of contacts state  
analog signal comparison – output power relay

## SB-2 BISTATE TWO-CHANNEL SEPARATOR BKT CIRCUIT CONTROL BLOC



- galvanic isolation • all circuits mutually separated
- input • proximity sensor, Hall sensor for current comparison, transistor or metallic switch, voltage or current with hysteresis
- output • relay contact, opto-relay or OC
- alarm • shorting or opening in sensor circuit can be used as signal for control bloc
- output phase selection • switches
- supply • 24VDC
- isolation test voltage • 2kV

## SB-4 BISTATE FOUR-CHANNEL SEPARATOR

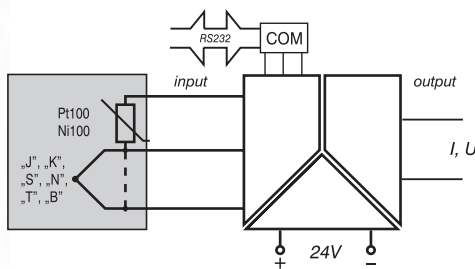


- inputs • 4 inputs mutually separated, signals: contacts, NAMUR signals, bistate sensors
- outputs • 5 outputs with common terminal, including ALARM signals: relay contacts  $f \leq 10\text{Hz}$ , opto-relay  $f \leq 500\text{Hz}$
- ALARM function • signaling of connection line, shorting and opening
- output phase selection • switches
- supply • 24VDC
- isolation test voltage • 2kV

four channels in 22.5mm housing

when calculated on one channel - most economical version of separation barrier for bistate signals of contact or NAMUR type e.g. from inductive proximity sensors

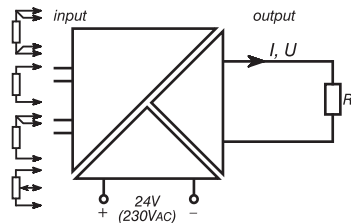
## TP-S2 PROGRAMMABLE TEMPERATURE CONVERTER



- galvanic isolation • all circuits mutually separated
- input • cooperation with sensors: Pt, Ni, (or other according to agreement), thermocouples J, K, S, T, B, N (cold ends temperature compensation options)
- sensor connection • three-wire line
- output • programmable selection  $0/4 \div 20\text{mA}$ ,  $0 \div 10\text{V}$
- load resistance •  $0 \div 700\Omega$  for current output,  $\geq 2\text{k}\Omega$  or voltage output
- parameters configuration • with AsSETUP program
- accuracy • 0.1% of full scale, for span of  $>50^\circ\text{C}$
- supply • 24VDC
- isolation test voltage • 2kV

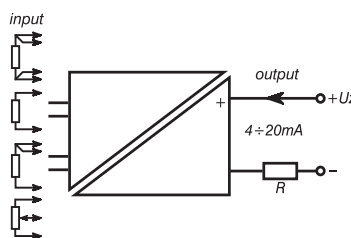
universal transmitter for temperature or potentiometer position measurement

## R-S2 RESISTANCE, TEMPERATURE CONVERTER



- galvanic isolation • all circuits mutually separated
- input • resistance change -  $\Delta R_{\text{MIN}} = 1\Omega$ ;  $\Delta R_{\text{MAX}} = 5\text{k}\Omega$ , Pt100, Pt500, Pt1000, Ni, Cu, PTC, NTC, potentiometer position -  $\Delta R = 10\Omega \div 5\text{k}\Omega$
- sensor connection • three or four-wire line
- output • any standard analog signal according to agreement
- load resistance •  $0 \div 700\Omega$  or current output,  $\geq 2\text{k}\Omega$  or voltage output
- accuracy • 0.1% of full scale, for span of  $>50^\circ\text{C}$
- supply • 24VDC or 230VAC
- isolation test voltage • 2kV

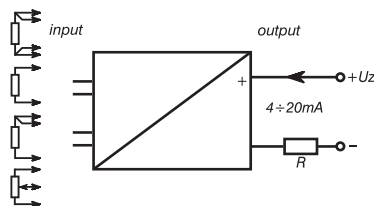
## R-S3 TWO-WIRE RESISTANCE, TEMPERATURE CONVERTER



- galvanic isolation • all circuits mutually separated
- input • resistance change -  $\Delta R_{\text{MIN}} = 1\Omega$ ;  $\Delta R_{\text{MAX}} = 5000\Omega$ , Pt100, Ni100 -  $\Delta T_{\text{MIN}} = 20^\circ\text{C}$ , Pt500 -  $\Delta T_{\text{MIN}} = 5^\circ\text{C}$ , Pt1000 -  $\Delta T_{\text{MIN}} = 2.5^\circ\text{C}$ , potentiometer position -  $\Delta R = 10\Omega \div 5\text{k}\Omega$
- sensor connection • three or four-wire line
- line compensation • total
- sensor current • 0.4mA
- output •  $4 \div 20\text{mA}$
- output circuit • external supply  $12\text{V} \leq U_Z \leq 36\text{V}$
- load resistance •  $R_{\text{LOAD}} \leq (U_Z - 12\text{V}) / 20\text{mA}$
- accuracy • 0.1% of full scale, for span of  $>50^\circ\text{C}$
- isolation test voltage • 2kV

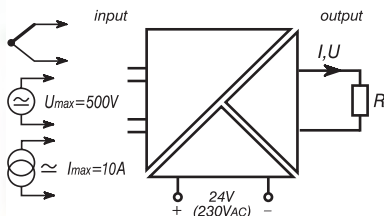
e.g. temperature converter with separation for card with active  $4 \div 20\text{mA}$  inputs

## RD, RD1 TWO-WIRE RESISTANCE, TEMPERATURE CONVERTER



- input
  - resistance change
    - Pt100, Ni100  $\Delta R_{MIN}=5\Omega$ ;  $\Delta R_{MAX}=1000\Omega$ ,
    - Pt500  $\Delta T_{MIN}=20^{\circ}\text{C}$ ,
    - Pt1000  $\Delta T_{MIN}=5^{\circ}\text{C}$ ,
    - Pt1000  $\Delta T_{MIN}=2.5^{\circ}\text{C}$ ,
  - potentiometer position  $\Delta R=10\Omega \div 5k\Omega$
- sensor connection • two or three-wire line, (four-wire for RD1)
- sensor current • 0.8mA
- output • 4-20mA
- load resistance •  $R_{LOAD} \leq (U_Z - 10V) / 20mA$
- accuracy • 0.1% of full scale, for span  $>50^{\circ}\text{C}$
- output circuit • external supply  $10V \leq U_Z \leq 36V$

## U-S2, U-S2-W12.5, U-S2-W22.5 VOLTAGE, CURRENT, TEMPERATURE CONVERTER

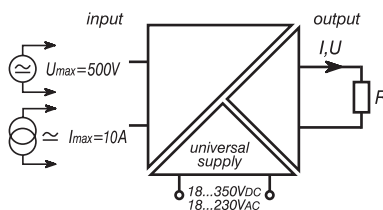


- galvanic isolation • all circuits mutually separated
- input
  - voltage  $\Delta U_{MIN}=1mV$ ;  $\Delta U_{MAX}=500VAC/DC$ ,
  - current  $\Delta I_{MIN}=1\mu A$ ;  $\Delta I_{MAX}=10A AC/DC$ ,
  - thermocouple - J, K, R, S, T, B, N, L etc.
- output • any analog standard signal
- input resistance •  $\geq 250k\Omega$  for voltage signals, 50 $\Omega$  for current inputs
- linearization option • or thermocouple or other sensor
- load resistance • 0-700 $\Omega$  for current output,  $\geq 2k\Omega$  for voltage output
- temperature compensation • for cold ends of thermocouple  $-20^{\circ}\text{C} \div +70^{\circ}\text{C}$
- accuracy • see Technical Data Sheet
- isolation test voltage • 2kV

U-S2-W12.5 - housing 12.5mm, supply 24Vdc  
 U-S2-W22.5 - housing 22.5mm, supply 24Vdc, 230VAc or any other e.g. 200Vdc  
 U-S2 - housing 40mm, supply 24Vdc, 230VAc or any other e.g. 200Vdc

typical application: high voltage, current from transformers, temperature measurement

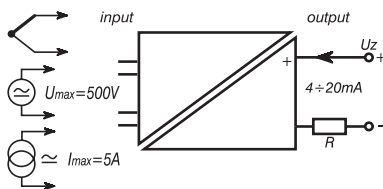
## U-S2A HIGH CURRENTS OR VOLTAGE AC/DC RMS CONVERTER



- galvanic isolation • all circuits mutually separated
- input • RMS measurement (it means average value for DC) 1mA-10A, 100mV-500V band 3Hz-10kHz, sampling 100kHz
- output • any standard analog signal according to agreement
- input resistance • for voltage signals  $\geq 250k\Omega$ , internal shunt for current inputs
- load resistance • output 0/4-20mA 0-800 $\Omega$ , 0/1-5mA 0-3k $\Omega$ , 0-10V  $\geq 2k\Omega$
- supply • universal 18-230VAC/DC
- isolation test voltage • 2kV

high current, voltage AC and DC measurements, e.g. current measurement from transformers 1A, 5A, 10A

## U-S3 TWO-WIRE VOLTAGE, CURRENT, TEMPERATURE CONVERTER



- galvanic isolation • all circuits mutually separated
- input
  - voltage  $\Delta U_{MIN}=1mVDC$ ;  $\Delta U_{MAX}=500VDC$ ,
  - current  $\Delta I_{MIN}=1\mu ADC$ ;  $\Delta I_{MAX}=5ADC$ ,
  - thermocouple - J, K, R, S, T, B, N, L etc.
- output • 4-20mA current loop control
- input resistance •  $\geq 250k\Omega$  or voltage signals, 50 $\Omega$  for current inputs
- linearization option • for thermocouple or other sensor
- temperature compensation • for cold ends of thermocouple  $-20^{\circ}\text{C} \div +70^{\circ}\text{C}$
- load resistance •  $R_{LOAD} \leq (U_Z - 10V) / 20mA$
- accuracy • see Technical Data Sheet
- output circuit • external supply  $19V \leq U_Z \leq 36V$
- isolation test voltage • 2kV

converter with separation for current, voltage or temperature changes measurement

## Z... NETWORK SUPPLIERS AND SEPARATING CONVERTERS DC-DC



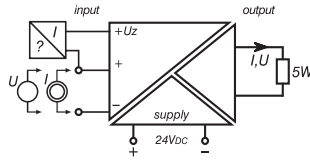
Network supplier 230V/50Hz	Without pulse processing	As401	70mA or 2 x 35mA
	U <sub>out</sub> =24Vdc or other according to order	ZL1	100mA or 2 x 50mA
		As404	400mA or 2 x 200mA
		ZSB 0,8/24	800mA
	With pulse processing	ZSB 4 x 0,1	4 outputs 24V/50mA
		ZSB 1/24	1A
		As405	1.5A
As406		2.5A	
U <sub>out</sub> =24Vdc or other according to order	As407	5A	
	As408	10A	
	As408	10A	
Separating transformers	With pulse processing	ZL2	100mA/3W
	U <sub>out</sub> =24Vdc	ZL4	1.5A/30W
Transformer up or down, supplied from 8-35Vdc, without separation		ZL5	5-35V/10W



# ANALOG CONTROL of: VALVES, ACTUATORS, POSITIONERS and ELECTROMAGNETIC BRAKES

<b>S2A-PWM</b>	- pulse output 0/24V with PWM regulation without output current control
<b>S2-5W</b>	- analog output with current control or output voltage control, maximum output power 5W
<b>S2-30W</b>	- analog output with current control or output voltage control, maximum output power 30W
<b>WZM- (<math>\pm 150\text{mA}</math>)</b>	- analog current source with range $[-150 \div 150\text{mA}]$ and maximal load resistance $R_{LOAD} \leq 450\Omega$
<b>WZM-A (<math>-0.6 \div 0.6\text{A}</math>)</b>	- analog current source with range $[-0.6 \div 0.6\text{A}]$ and maximal load resistance $R_{LOAD} \leq 50\Omega$
<b>WZM-B (<math>0.6 \div -0.6\text{A}</math>)</b>	- analog current source with range $[0.6 \div -0.6\text{A}]$ and maximal load resistance $R_{LOAD} \leq 50\Omega$
<b>WZM-O (<math>0 \div 1.2\text{A}</math>)</b>	- analog current source with range $[0 \div 1.2\text{A}]$ and maximal load resistance $R_{LOAD} \leq 22\Omega$
<b>WZM-F (<math>1.2\text{A} \div 0</math>)</b>	- analog current source with range $[1.2\text{A} \div 0]$ and maximal load resistance $R_{LOAD} \leq 22\Omega$
<b>WZM-MFAC</b>	- analog current source with range $[0 \div 200\text{mA}]$ and maximal load resistance $R_{LOAD} \leq 32\Omega$
<b>WZM-PP</b>	- two differential current sources in one housing: first with range $[0.4 \div 0.8\text{A}]$ and second with range $[0.8 \div 0.4\text{A}]$ , maximal load resistance $R_{LOAD} \leq 19.5\Omega$
<b>ZPM</b>	- current source settable by potentiometer with digital indication, maximal load resistance $R_{LOAD} \leq 19.5\Omega$

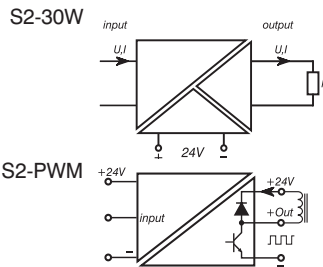
## S2-5W SEPARATOR WITH ANALOG POWER OUTPUT (DC)



- application • analog power output with current or voltage control
- galvanic isolation • all circuits mutually separated
- input • any analog standard, including possibility of supplying two-wire 4÷20mA line (e.g. from EMERSON DCS OVATION card)
- output • any analog signal  $I \leq 250\text{mA}$ ,  $U \leq 24\text{V}$ ,  $P \leq 5\text{W}$
- accuracy • 0.2% of full scale
- supply • 24VDC
- isolation test voltage • 2kV

parameters modification is possible according to user needs

## S2-30W SEPARATOR WITH ANALOG POWER OUTPUT (DC) S2A-PWM SEPARATOR WITH PULSE POWER OUTPUT (PWM)

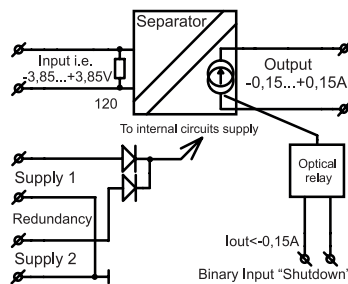


- galvanic isolation • all circuits mutually separated
- input • dowolny standard
- output • S2-30W - any analog signal with power up to 30W  
S2A-PWM - OC, 300Hz,  $I=2\text{A}$ ,  $U=24\text{V}$
- accuracy • 0.2% of full scale
- supply • 24VDC, 230VAC or according to agreement
- isolation test voltage • 2kV

S2-30W - rail housing 108mm width  
S2A-PWM - rail housing 22.5mm width

it can be used e.g. as positioner or valve driver

## WZM- $\pm 150\text{mA}$ AMPLIFIER with ANALOG POWER OUTPUT (DC)

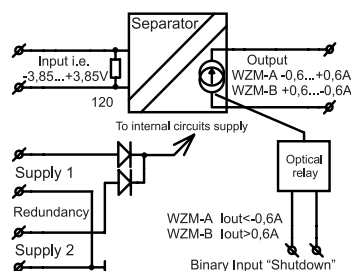


- application • regulation of valve driven by current source  $\pm 150\text{mA}$  controlled by analog signal
- galvanic isolation • all circuits mutually separated
- input • any analog standard, e.g. from EMERSON DCS OVATION card
- output •  $-150\text{mA} \div +150\text{mA}$ , coil resistance  $R_{LOAD} \leq 450\Omega$
- "SHUTDOWN" • emergency shutdown  $I_{OUT} = -150\text{mA}$ , other setting possible according to agreement
- accuracy • 0.2% of full scale
- supply • 24VDC
- isolation test voltage • 2kV

rail housing 108mm width

parameters modification is possible according to user needs

## WZM-A- ( $-0.6\text{A} \div 0.6\text{A}$ ) AMPLIFIER with ANALOG POWER OUTPUT 0.6Adc WZM-B- ( $0.6\text{A} \div -0.6\text{A}$ ) AMPLIFIER with ANALOG POWER OUTPUT 0.6Adc



- application • regulation of valve driven by current source  $\pm 0.6\text{A}$  controlled by analog signal
- galvanic isolation • all circuits mutually separated
- input • any analog standard, e.g. from EMERSON DCS OVATION card
- output • A:  $-0.6\text{A} \dots +0.6\text{A}$  B:  $+0.6\text{A} \dots -0.6\text{A}$   
coil resistance  $R_{LOAD} \leq 50\Omega$
- "SHUTDOWN" • emergency shutdown A:  $I_{OUT} = -0.6\text{A}$ ; B:  $I_{OUT} = +0.6\text{A}$   
other setting possible according to agreement
- accuracy • 0.2% of full scale
- supply • 24VDC
- isolation test voltage • 2kV

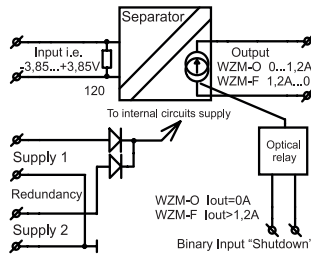
rail housing 108mm width

parameters modification is possible according to user needs

**WZM-O-(0...1.2A) AMPLIFIER with ANALOG POWER OUTPUT 1.2A<sub>dc</sub>**  
**WZM-F-(1.2A...0) AMPLIFIER with ANALOG POWER OUTPUT 1.2A<sub>dc</sub>**



rail housing 108mm width



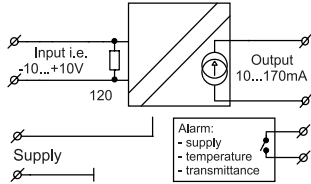
- application • regulation of valve driven by current source controlled by analog signal
- galvanic isolation • all circuits mutually separated
- input • any analog standard, e.g. from EMERSON DCS OVATION card
- output • O: 0 ... 1.2A F: 1.2A ... 0
- coil resistance  $R_{LOAD} \leq 22\Omega$
- "SHUTDOWN" • emergency shutdown O:  $I_{OUT}=0A$ ; F:  $I_{OUT}>1.2A$  other setting possible according to agreement
- accuracy • 0.2% of full scale
- supply • 24VDC
- isolation test voltage • 2kV

parameters modification is possible according to user needs

**WZM-MFAC AMPLIFIER with ANALOG POWER OUTPUT 0...200mA<sub>dc</sub>**



rail housing 108mm width



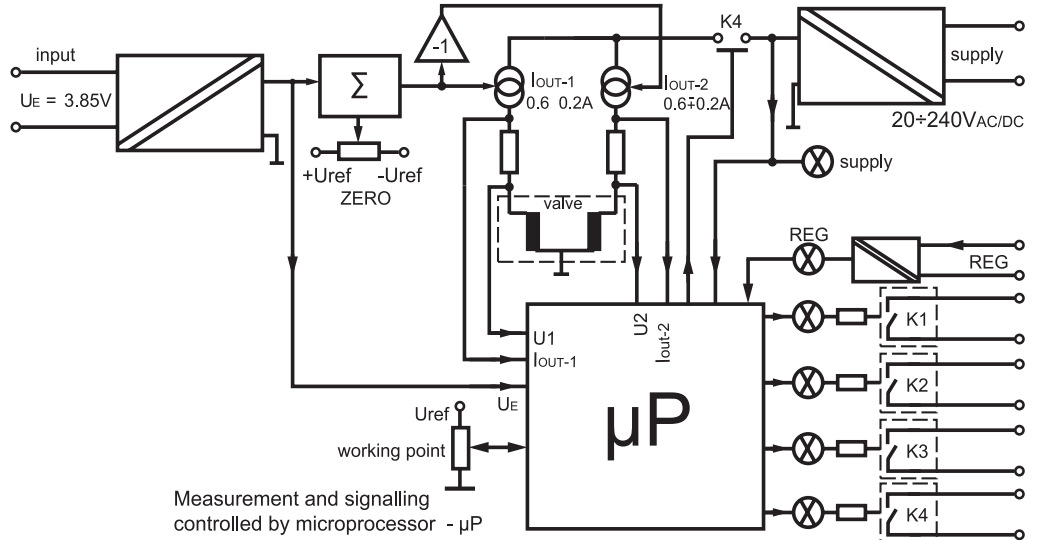
- application • regulation of valve driven by current source 10...170mA controlled by analog signal
- galvanic isolation • all circuits mutually separated
- input • any analog standard, e.g. from EMERSON DCS OVATION card
- output • 10...170mA
- coil resistance  $R_{LOAD} \leq 32\Omega$
- alarm • exceeding temperature inside the amplifier, lack of supply, transmittance error  $\Delta > 5\%$
- accuracy • 0.2% of full scale
- supply • 24VDC
- isolation test voltage • 2kV

parameters modification is possible according to user needs

**WZM-PP AMPLIFIER with ANALOG POWER OUTPUT  $I_{11}=0.4...0.8A$ ;  $I_{2}=0.8...0.4A$**



rail housing 108mm width



Measurement and signalling controlled by microprocessor - µP

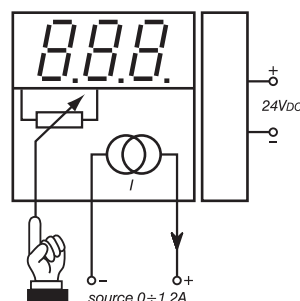
- application • regulation of valve driven by two current sources:  $I_{11}=0.4...0.8A$ ;  $I_{2}=0.8...0.4A$
- galvanic isolation • all circuits mutually separated
- input • any analog standard, e.g. from EMERSON DCS OVATION card
- output • push-pull with two current sources:  $I_{11}=0.4...0.8A$ ;  $I_{2}=0.8...0.4A$
- coil resistance  $R_{LOAD} \leq 19\Omega$
- accuracy • 0.2% of full scale
- supply • 24VDC/AC ÷ 230VDC/AC
- isolation test voltage • 2kV

parameters modification is possible according to user needs

**ZPM POWER CURRENT SETTING UNIT 0 ÷ 1.2A<sub>dc</sub> with separation from power supply**



rail housing 108mm width



- current setting • any subrange from range 0.00 ÷ 1.20A
- oad resistance •  $R_{max} \leq 32W / I_{range}^2$  e.g. for electrovalve coil  $R \leq 22\Omega$  for  $I \leq 1.2A$
- output power • maximum 32W
- display • 4 digits LED 14mm
- current setting • internal potentiometer knob
- accuracy • 0.2% ± 1 in the last digit
- supply • 24VDC, 230VAC or according to agreement
- isolation test voltage • 1.5kV

perfect for manual setting of high power electrovalves

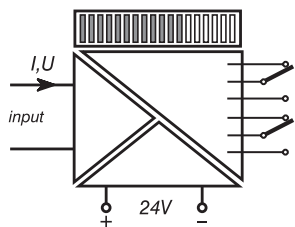


## WL-61 BAR INDICATOR 61 LEDs WITH EXTRA FUNCTIONS

### WL-31 BAR INDICATOR 31 LEDs



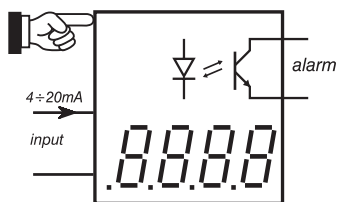
WL-61 board housing 192 x 24mm  
WL-31 board housing 96 x 24mm



- input • any standard signal
- outputs • 2 relay alarm outputs (WL61)
- accuracy • WL31 3.2% of full scale  
WL61 1.6% of full scale
- linearization • WL61 five-points or  $\sqrt{\quad}$
- galvanic isolation • all circuits mutually separated
- isolation test voltage • 2kV

WL-31 vertical or horizontal scale

## ML1-prog SELF-POWERED PROGRAMMABLE DIGITAL 4÷20mA LINE MONITOR

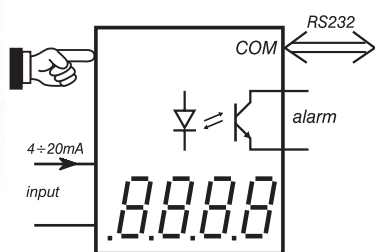


- input • 4÷20mA
- voltage dropout on terminals • 6V
- polarity • any
- display • 4 digits LED 13mm, with backlight
- accuracy • 0.1% of full scale  $\pm 1$  in the last digit
- time constant • programmable: 0.5÷32s
- range setting • programmable with buttons
- alarm • threshold value programmable with buttons
- alarm circuit • OC transistor with optoisolation, 60VAC/DC/100mA

board, rail or wall housing 72x72x61mm, display with backlight

fully programmable indicator

## ML4 SELF-POWERED PROGRAMMABLE DIGITAL 4÷20mA LINE MONITOR



- input • 4÷20mA
- voltage dropout on terminals • 5.6V
- display • 4 digits LED 13mm
- accuracy • 0.1% of full scale  $\pm 1$  in the last digit
- configuring parameters • programmable with buttons on the front panel or from AsSETUP program by RS232
- time constant • programmable: 0.5÷32s
- alarm • threshold value programmable with buttons
- alarm circuit • OC transistor with optoisolation, 60VAC/DC/100mA

board housing 72 x 36 x 85mm  
rail housing 75 x 75mm

two-wire, self-powered, glowing indicator

## ML3 DIGITAL LED INDICATOR

### ML7 INDICATOR WITH LED ARRAY 56x16 points



**LED14mm**  
board housing 72 x 72mm  
rail or wall housing,  
supply 24VDC



**LED57mm**  
wall housing 230 x 80 x 57mm,  
supply 24VDC or 230VAC



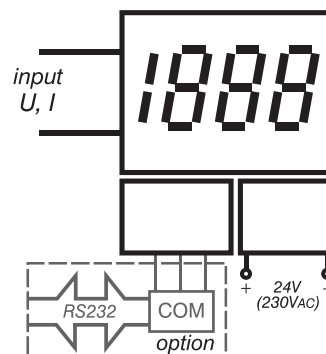
**LED76mm**  
board housing 288 x 144mm,  
supply 24VDC or 230VAC



**matryca LED array 56 x 16**  
wall housing 300 x 106 x 50mm,  
supply 24VDC

- input • any standard signal
- display ML3 • 3.5 digits
  - LED 14mm - board housing
  - LED 76mm - board housing
  - LED 57mm - wall housing
- display ML7 • LED array 56x16 points
  - wall housing - 7 characters 68mm or - 14 characters 31mm
- galvanic isolation • input, supply, RS232 - mutually separated
- isolation test voltage • 2kV

- optional - MODBUS RTU version of RS232 or RS485:
  - transferring digitalized input signal,
  - transferring digits to indicate

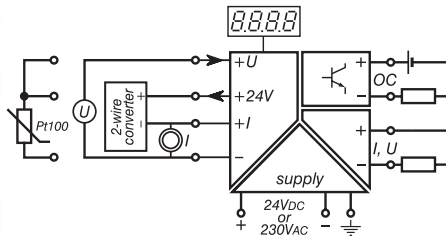


indication in physical units according to agreement

## S2-ML3 CIRCUIT SEPARATOR – TRANSMITTER WITH INDICATION Z-S2-ML3 CIRCUIT SUPPLY-SEPARATOR – TRANSMITTER WITH INDICATION



rail housing 75x75mm  
wall housing 130x130x35mm



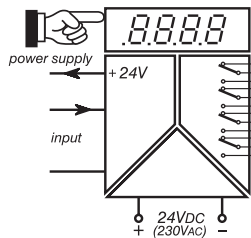
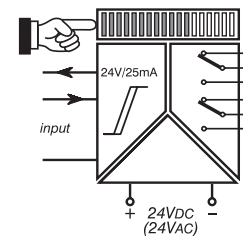
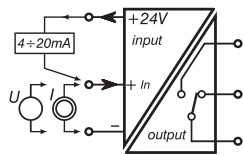
- input • 0/4÷20mA, 0÷10V or other according to agreement, Z-S2-ML3: 4÷20mA loop with supply 24V
- optional: Pt100, thermocouple, potentiometer
- analog output • any standard analog signal according to agreement
- alarm output • programmable, OC 36V/100mA
- indicator • programmable, LED 4 digits, 20mm
- RS485 output • MODBUS RTU (optional)
- galvanic isolation • all circuits mutually separated
- isolation test voltage • 2kV

mainly as an indicator  
in particular for use with two-wire transmitters

## SG2 LIMIT INDICATOR SG4 PROGRAMMABLE LIMIT INDICATOR WITH LED BAR SG5 PROGRAMMABLE LIMIT INDICATOR WITH DIGITAL LED INDICATOR



rail housing 75x75mm  
board housing 72x72x105mm



- input • 0/4÷20mA, 0÷10V or other according to agreement, 4÷20mA loop with supply 24V
- output • switching relay contacts; 8A/250VAC
- switching threshold • settable by potentiometer or button, constant hysteresis 3% of the output range
- galvanic isolation • all circuits mutually separated
- supply • 24VDC
- isolation test voltage • 2kV

- input • any standard signal, optional sensor: Pt, Cu, Ni, thermistor, potentiometer, thermocouple, input with current loop 4÷20mA/24V, isolation leakage measurement with AC voltage
- output • 2 alarm thresholds, OC or relay
- programming • with button on the front panel
- indicator • LED bar, 20 points
- accuracy • 0.5% of full scale
- setting accuracy • 1% of full scale
- output for sensor supply • 24VDC/25mA
- galvanic isolation • all circuits mutually separated
- supply • 24VDC or 24VAC
- isolation test voltage • 2kV

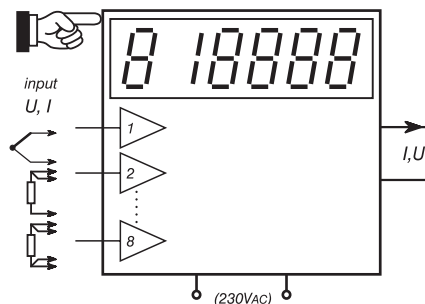
- input • ±20mA, ±10V, optional: Pt100, thermocouple, potentiometer or input with 4÷20mA/24V current loop supply
- output • 4 alarm thresholds, OC or relay
- digital indication • -9999 ÷ +9999, LED 14mm
- accuracy • 0.1% of full scale ±1 in the last digit
- galvanic isolation • all circuits mutually separated
- supply • 24VDC, 24VAC or 230VAC
- isolation test voltage • 2kV
- housing • board or rail

simple programming without a necessity of using a computer

## WT BOARD INDICATOR – 8 ANALOG CHANNELS



board housing 72x192x163mm



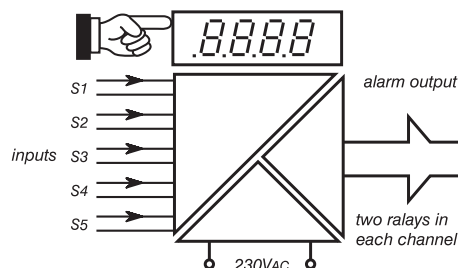
- inputs • 8 separated inputs:
  - voltage or current DC,
  - resistance sensors e.g. Pt100,
  - thermocouples
- indicator • 4.5 digits LED 14mm
- outputs • analog, RS232 or RS485
- alarms • 12 relay outputs
- accuracy • 0.1% of full scale ±1 in the last digit
- supply • 230VAC/14VA
- galvanic isolation • all circuits mutually separated
- isolation test voltage • 2kV

typical application – multipoint temperature measurement

## RSG-5 LIMIT INDICATOR (5 channels)



board housing 72x144x116mm



- inputs • 8 non-separated inputs:
  - voltage or current DC,
  - 5 current loops 4÷20mA,
  - sensors Pt, Ni, Cu
- indicator • 5 fields, 4 digits each, LE 14mm
- alarms • 2 relays on each channel
- output • RS485 MODBUS RTU
- accuracy • 0.1% of full scale ±1 in the last digit
- galvanic isolation • all circuits mutually separated
- supply • 230VAC/14VA
- isolation test voltage • 2kV

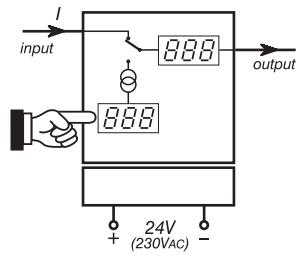
e.g. for controlling bearing temperature in a turbine or engine



## SZP NON-IMPACT CURRENT SETTING DEVICE



board housing 72x72x163mm



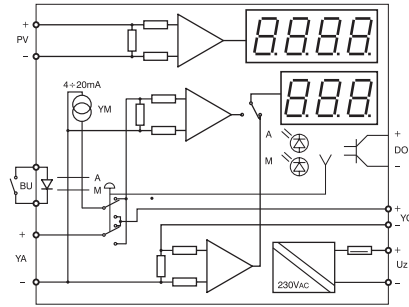
- input • 0÷20mA or 4÷20mA
- output • 0÷20mA or 4÷20mA
- accuracy • 0.1mA or ±0.4% (3 digits)
- indication • mA, %, V or according to agreement
- delay between measurements • 0.3s
- time between changing control from manual to automatic • programmable: 1s÷3min
- supply • 24VDC or 230VAC
- galvanic isolation • all circuits mutually separated
- isolation test voltage • 2kV

before changing to manual control from a setting device, SZP can automatically balance to process control

## As 550 MANUAL CONTROL SETTING DEVICE (with potentiometer)



board housing 72x72x116.5mm



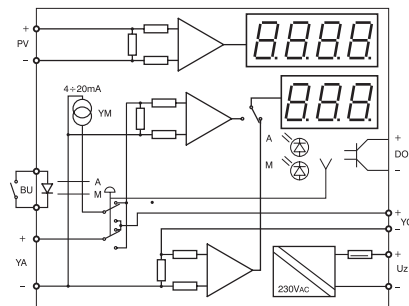
- setting signal level • by rotative potentiometer in range 4÷20mA
- indication of input PV signal • programmable in physical units, 4 digits; accuracy 0.1% of full range
- ind. of output current A and M • 3 digits
- resolution • 12 bits
- manual balancing • changing A→M, M→A
- indication of operation state • elevation + feedback to controller
- failover • BACKUP - switch to the last before failure control value
- supply • 230VAC or 24VDC

free AsSETUP software for setup using RS232

## As 560 MANUAL CONTROL SETTING DEVICE (with buttons)



board housing 72x72x116.5mm



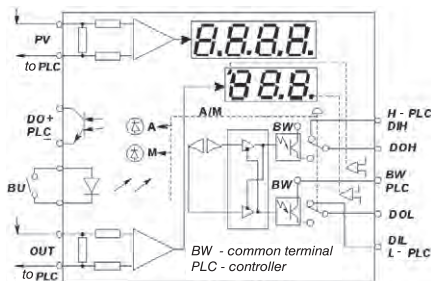
- setting signal level • by buttons in range 4÷20mA
- indication of input PV signal • programmable in physical units, 4 digits; accuracy 0.1% of full range
- ind. of output current A and M • 3 digits
- resolution • 12 bits
- non-impact switching • A→M
- manual balancing • M→A
- indication of operation state • elevation + feedback to controller
- failover • BACKUP - switch to the last before failure control value
- supply • 230VAC or 24VDC

free AsSETUP software for setup using RS232

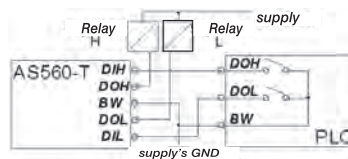
## As 560-T THREE-STATE SETTING DEVICE for actuators with feedback



board housing 72x72x116.5mm



- PV input • input signal measurement 0/4÷20mA
- indicator • programmable 4 digits; accuracy 0.1% of full range
- OUT input • measurement of the feedback signal 4÷20mA, 3 digits indicator
- DOH, DOL output • actuator control signals
- indication of operating state • elevation and to system
- failover • BACKUP - switch to the manual mode until failure discontinuation
- supply • 230VAC, 6A

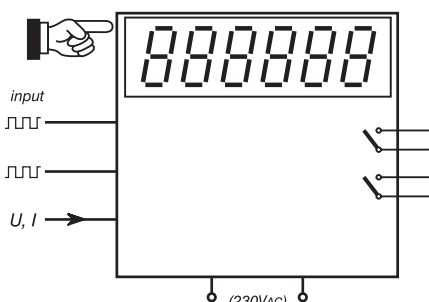


free AsSETUP software for setup using RS232

## LD COUNTER-DISPENSER



board housing 72x144x163mm



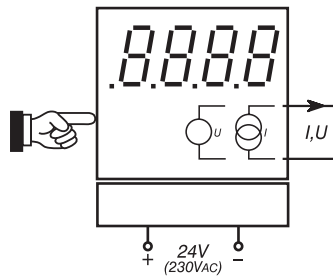
- inputs • analog or 2 pulse inputs e.g. from proximity sensors
- outputs • 2 alarm outputs (relays)
- counters • global 12 digits
- counter for dose measuring • 6 digits
- counter of doses number • 6 digits
- analog accuracy • 0.1% of full range ±1 in the last digit
- indicator • 6 LED digits 14mm
- supply • 230VAC/14VA

input analog signal is counted by integration  $\int y(t) dt$ , or pulse string is counted from proximity sensors (e.g. NAMUR type), contacts, flow-meters with pulse output etc., portions are measured and valves are controlled – BRAKE and STOP signals

## ZIU CURRENT OR VOLTAGE SETTING DEVICE



rail housing 75x75mm  
board housing 72x72x163mm



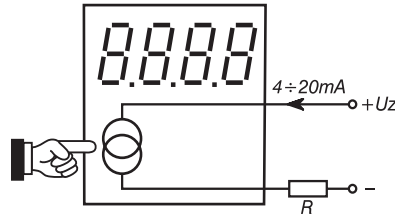
- current output • 0.00÷25.00mA
- voltage output • 0.00÷12.50V
- load resistance • 0÷800Ω – current output  
≥2kΩ – voltage output
- display • 4 LED digits 14mm
- accuracy • 0.1% of full scale ±1 in the last digit
- settings • keyboard
- settings memory • 5 cells for current  
5 cells for voltage
- galvanic isolation • output circuits separated from power supply circuit
- supply • 24VDC for board housing, also 230VAC
- isolation test voltage • 2kV

convenient device for system start-up or checking

## ZD TWO-WIRE 4÷20mA SETTING DEVICE



board housing 72x72x61mm  
rail housing 75x75mm



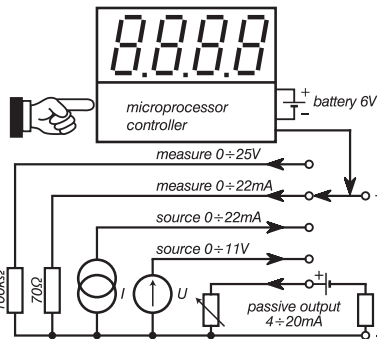
- current output • 3.00÷25.00mA, any polarization
- UZ voltage • 6÷36VDC
- display • 4 LED digits 13mm with backlight
- accuracy • 0.1% of full scale ±1 in the last digit
- settings • keyboard "up", "down"  
buttons programming indication and alarm
- settings memory • 8 cells of settings in non-volatile memory

convenient device for system start-up or checking powered from current loop

## PZM PORTABLE, BATTERY CURRENT OR VOLTAGE SETTING DEVICE AND METER



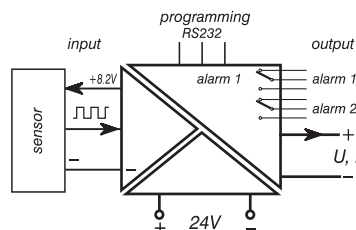
hand housing made of ABS plastic  
with usefull magnetic attachment



- current measurement • 0.00÷22.00mA (max 25mA)
- setting current • 0.00÷22.00mA; load  $R \leq 600\Omega$
- passive output 4÷25mA
- voltage measurement • 0.00÷25.00V (max 30V)
- voltage setting • 0.00÷11.00V;  $R_{LOAD} \geq 2k\Omega$
- display • LCD, 4 digits 10mm with backlight
- settings • incremental buttons
- functions programming • buttons
- accuracy • 0.05% of full scale ±1 in the last digit
- operation time • recommended 230mAh 4xAA 1.2V rechargeable batteries,  
depending on the selected function:  
min. 15h for setting current 20mA, max 500h
- batteries charging • internal, powered from external supplier,  
typical for devices USB 5VDC/1A

perfect for automation system diagnostic on site

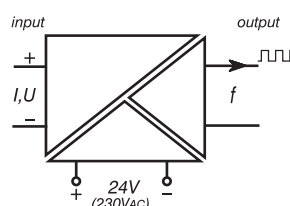
## FP-S2 PROGRAMMABLE FREQUENCY TO ANALOG SIGNAL CONVERTER



- input • pulses in frequency range 0.001Hz÷100kHz operation  
with proximity sensors, encoders etc.
- output • optional: 0÷20mA, 4÷20mA or 0÷10V
- alarms • two relay outputs
- programming • selection of frequency range,  
selection of output signal,  
two alarm thresholds
- output for sensor supply • 8.2V
- accuracy • 0.1% of full scale
- galvanic isolation • all circuits mutually separated
- supply • 24VDC
- isolation test voltage • 2kV

low cost, universal, programmable frequency converter  
free AsSETUP software for setup using RS232

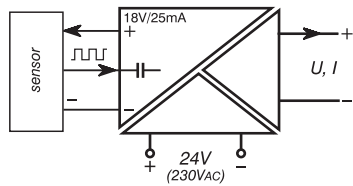
## SF-S2 ANALOG SIGNAL TO FREQUENCY CONVERTER with separation ZSF-S2 SELF-POWERED TWO-WIRE TRANSMITTERS TO FREQUENCY CONVERTER



- input • any standard (SF-S2)  
4÷20mA (ZSF-S2)
- output • square wave, 50% duty cycle
- frequency • any range 0÷10kHz
- output OC • NPN or PNP max 40V/100mA
- accuracy • 0.2% of full scale
- galvanic isolation • all circuits mutually separated
- supply • 24VDC/60mA or 230VAC/2VA
- isolation test voltage • 2kV



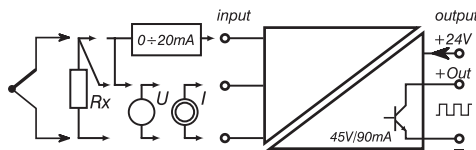
## F-S2 FREQUENCY TO STANDARD SIGNAL CONVERTER with full separation



- input • voltage - 1mV ÷ 100V
- current - 10µA ÷ 5A
- frequency band • 0 ÷ 10kHz
- output • any standard analog signal
- output for sensor supply • 18V/25mA
- accuracy • 0.2% of full scale
- galvanic isolation • all circuits mutually separated
- supply • 24VDC/60mA or 230VAC/2VA
- isolation test voltage • 2kV

easy to use due to separation,  
when paired with SF-S2 it can be used to transfer analog signal for long distances e.g. 5km

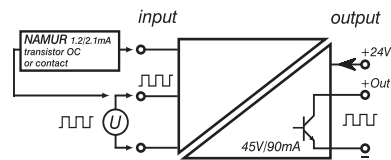
## SF-S2A STANDARD SIGNAL TO FREQUENCY CONVERTER with separation RF-S2A RESISTANCE (TEMPERATURE) TO FREQUENCY CONVERTER with separation



- SF-S2A input • 0/4 ÷ 20mA, 0 ÷ 10V or other according to agreement
- RF-S2A input • Pt100 ÷ 1000, Ni100, Cu, potentiometer, thermocouple
- output • OC, 45V/90mA, typically 1kHz, option: 10Hz, 100Hz, 2kHz, wave, 50% duty cycle or constant pulse width: 0.05ms; 0.1ms; 1ms; 10ms
- accuracy • 0.2% of full scale
- galvanic isolation • output and supply isolated from input, (common "-" of supply and output)
- supply • 18 ÷ 24Vdc
- isolation test voltage • 2kV

good price

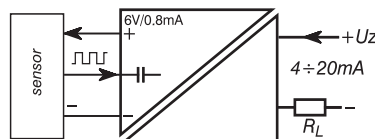
## IF-S2B FREQUENCY DIVIDER with separation



- input • pulse string e.g. 0/24V or NAMUR 1.2/2.1mA e.g. from proximity sensors
- output • OC, 45V/90mA, freq. 0 ÷ 20kHz according to agreement; square wave with 50% duty cycle or constant pulse width: 0.05ms, 0.1ms, 1ms, 10ms or according to agreement
- frequency divider • set by 4 switchers or according to agreement
- galvanic isolation • output and supply isolated from input, (common "-" of supply and output)
- supply • 18 ÷ 24VDC
- isolation test voltage • 2kV

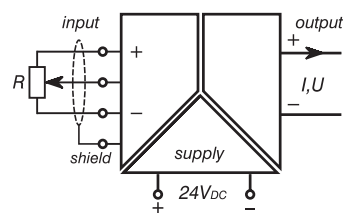
to operate with PLC drivers, good price

## F-S3 TWO-WIRE FREQUENCY CONVERTER with separation



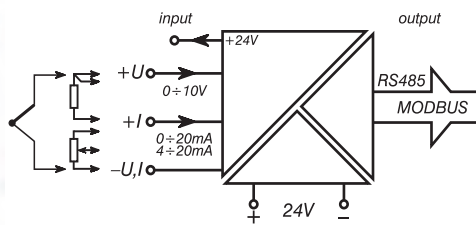
- input • voltage - 1mV ÷ 100V
- current - 10µA ÷ 5A
- frequency band • 1Hz ÷ 10kHz
- output • 4 ÷ 20mA
- load resistance • Rmax = (Uz - 12V)/20mA
- output for sensor supply • 6V/0.8mA
- accuracy • 0.2% of full scale
- galvanic isolation • all circuits mutually separated
- supply • 12 ÷ 36V
- isolation test voltage • 2kV

## PP-S2 POTENTIOMETER POSITION CONVERTER



- input • any potentiometer 50Ω ÷ 100kΩ
- output • any standard analog signal e.g. 0/4 ÷ 20mA, ROBC = 0 ÷ 850Ω, 0/1 ÷ 5mA, ROBC = 0 ÷ 3kΩ, 0/2 ÷ 10V, ROBC > 2kΩ
- accuracy • 0.1% of full scale
- galvanic isolation • all circuits mutually separated
- supply • 24VDC
- isolation test voltage • 2kV

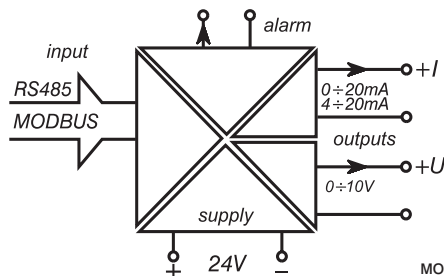
## S2-MOD ANALOG SIGNALS ⇒ MODBUS RTU



- input
  - voltage: 0 ÷ 10V, 0 ÷ 30mV, 0 ÷ 75mV
  - current: 0 ÷ 20mA
  - supply 24VDC for 4 ÷ 20mA loop
  - Pt100 ÷ 1000, Ni, Cu, thermocouple
- output
  - RS485 connection, half-duplex
- transmission protocol
  - MODBUS RTU (serial transmission RS-485 with MODBUS RTU protocol)
- transmission speed
  - 4800, 9600, 19200 bit/s
- galvanic isolation
  - all circuits mutually separated
- isolation test voltage
  - 2kV

for systems based on MODBUS RTU bus

## S2B-MOD MODBUS RTU ⇒ ANALOG SIGNAL TRANSLATOR (two analog outputs)



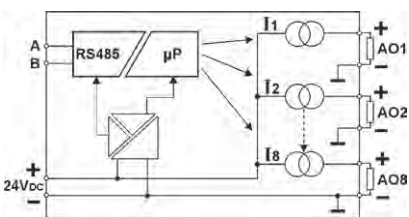
- input
  - RS485 MODBUS RTU, 50 ÷ 115200 b/s
  - possibility of connecting 254 devices in a network
- output
  - two independent standard outputs (0 ÷ 21mA, 0 ÷ 11V)
  - configurable by user
- alarm
  - loss of transmission
- transmission speed
  - 4800, 9600, 19200 bit/s
- accuracy
  - 0.1% of full scale
- galvanic isolation
  - full separation between RS485 interface, analog outputs and supply
- supply
  - 24VDC
- isolation test voltage
  - 2kV

**MODBUS RTU MASTER functions:**  
 - selection of standard analog signal  
 - retransmission from LABOR-ASTER devices  
 - retransmission and rescale of any register  
 - alarm when transmission or supply is lost  
 - setting the last value after start

**MODBUS RTU SLAVE functions:**  
 - conversion of register value to standard analog signal  
 - alarm when transmission or supply is lost  
 - setting the last value after start  
 - full standard realization

translation of digital value (written in register) to two mutually separated analog outputs: current or voltage

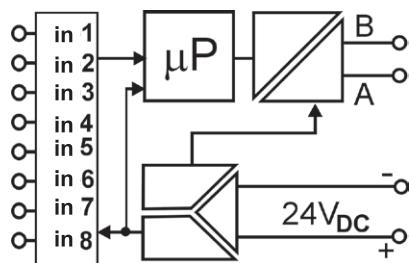
## As701 MODBUS RTU ⇒ 8 ANALOG OUTPUTS CONVERTER



- input
  - RS485 MODBUS RTU, max 19200 b/s
- outputs
  - 8 analog outputs: 0/4 ÷ 20mA, common ground for all 8 outputs (terminal „-“)
- repetition
  - 5 refreshes/s
- load resistance
  - ≤ 750Ω
- accuracy
  - 0.25% of full scale
- galvanic isolation
  - full separation between RS485 interface, analog outputs and supply
- supply
  - 24VDC
- isolation test voltage
  - 2kV

can operate as "SLAVE" in a set with As702 for systems based on MODBUS RTU bus

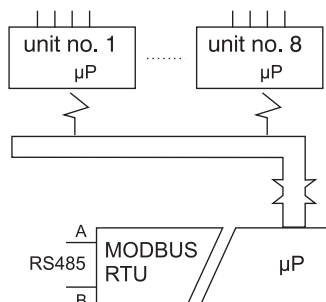
## As702 8 ANALOG INPUTS ⇒ MODBUS RTU CONVERTER



- input
  - 8 differential analog inputs: 0/4 ÷ 20mA or 0 ÷ 10V, high impedance separation between channels for voltages ≤ 66V
- output
  - RS485 MODBUS RTU, max 19200 b/s
- repetition
  - 5 refreshes/s
- accuracy
  - 0.25% of full scale
- galvanic isolation
  - full separation between RS485 interface, analog outputs and supply
- supply
  - 24VDC
- isolation test voltage
  - 2kV

can operate as "MASTER" in a set with As701 for systems based on MODBUS RTU bus

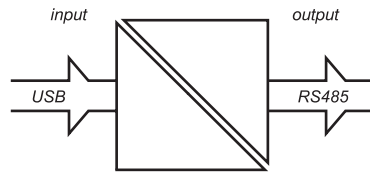
## As703 MODBUS RTU ⇒ INPUTS or OUTPUTS CONVERTER with separation



- RS485 MODBUS RTU
  - SLAVE, 300 ÷ 115200 b/s
  - inputs/outputs
    - 8 sets mutually separated galvanically
- As part of one set you can implement:
  - 1 or 2 analog outputs with separation, 3 outputs without separation,
  - 2 binary channels with separation, 3 binary channels without separation,
  - universal analog input; voltage 0 ÷ 10V, current 0/4 ÷ 20mA, current loop 4 ÷ 20mA/24VDC,
  - Pt100 3- or 4-wire input,
  - 2 analog outputs without separation.
- With 8 sets there can be maximum 4 different sets of input/output functions. It means that 2 sets always must have the same function.
- accuracy of analog processing
  - 0.1% of full scale
- galvanic isolation
  - full separation between RS485 interface, input/output sets and supply
- supply
  - 24VDC
- isolation test voltage
  - 1kV



## USB-RS485 CONVERTER WITH SEPARATION



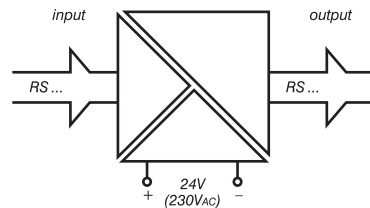
- application • safety connection of portable computer to a device with two-wire RS485 interface
- transmission speed • 50...115200 b/s
- number of devices • max 254 on one RS485 line
- maximum line length • 1200m
- galvanic isolation • all circuits mutually separated
- supply • from USB port; 5VDC/0.12A
- isolation test voltage • 2kV

RS485 connector with optoisolation

## ST-RS.../RS... TRANSLATOR WITH SEPARATION

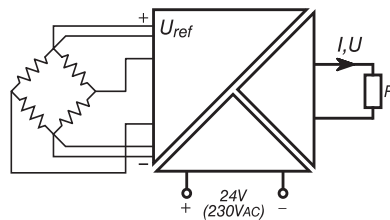


rail or wall housing



- | type           | signal conversion                |
|----------------|----------------------------------|
| ST-RS232/RS422 | RS232 ↔ RS422; RS485 full-duplex |
| ST-RS232/RS485 | RS232 ↔ RS485 half-duplex        |
| ST-RS422/RS422 | RS422 ↔ RS422                    |
|                | RS485 ↔ RS485 full-duplex        |
| ST-RS422/RS485 | RS422 ↔ RS485 half-duplex        |
| ST-RS232/RS232 | RS232 ↔ RS232                    |
| ST-RS232/TTY   | RS232 ↔ TTY                      |
| ST-RS232/M-Bus | RS232 ↔ M-Bus 300÷9600bps        |
| ST-RS485/M-Bus | RS485 ↔ M-Bus 300÷9600bps        |
- transmission speed • for RS485, RS 422 ≤115200bps  
for RS232, TTY ≤19200bps
- galvanic isolation • all circuits mutually separated
- supply • 24VDC/60mA, for wall housing also 230VAC
- isolation test voltage • 2kV

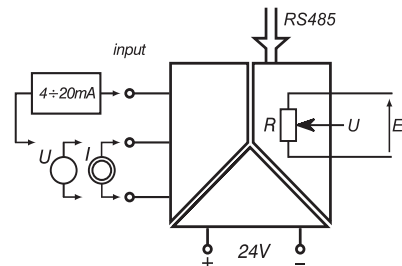
## T-S2 TENSOMETRIC CONVERTER with separation



- input • signal from strain gauge bridge  $\Delta U_{MIN}=2mV$
- bridge resistance • 50÷1000Ω
- output • any standard analog signal
- reference voltage • 2÷10V - according to order
- reference source load current • ≤50mA
- bridge connection • 4 or 6 wires
- settings • „ZERO” (TARA) and „RANGE” buttons
- time constant (averaging) - push both buttons
- accuracy • 0.1% of full scale
- galvanic isolation • all circuits mutually separated
- supply • 24VDC/70mA
- isolation test voltage • 2kV

for operating with bridge or half-bridge input  
signal does not have to start with zero

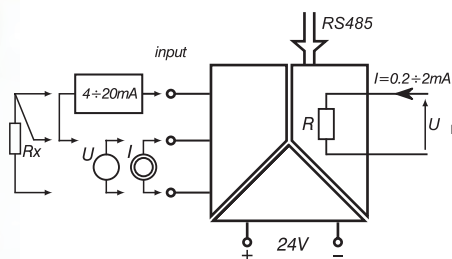
## POT-S2 POTENTIOMETER CONTROLLED BY STANDARD SIGNAL with separation



- input • any standard signal, according to order
- output • linear potentiometer divider proportional to the input signal
- voltage •  $E=2\div20V, U=(1\div100\%) \cdot E$
- „potentiometer” resistance •  $R=100\Omega\div35k\Omega$  - according to order
- time constant • 0.2s
- RS485 input • setting and reading the position from MODBUS RTU
- accuracy • 0.2% of full scale
- galvanic isolation • all circuits mutually separated
- supply • 24VDC/60mA
- isolation test voltage • 2kV

can replace mechanically driven potentiometer

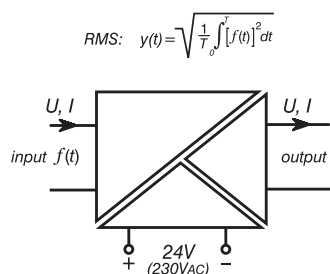
## SYMULATOR-R RESISTANCE SIMULATOR (including Pt100) with separation



- input • any standard signal - according to order, supplying for two-wire 4÷20mA loop, resistance sensor e.g. Pt100
- output • simulated input resistance 30Ω÷35kΩ - subranges according to agreement, simulator (repeater) of the input resistance according to agreement, including temperature sensor e.g. Pt100 emulator (repeater)
- measurement current on output •  $I=0.2\div2mA$
- voltage on output •  $U=0.2\div7V$
- accuracy • 0.1% of full scale
- time constant • 0.2s
- RS485 input • setting and reading the position from MODBUS RTU
- galvanic isolation • all circuits mutually separated
- supply • 24VDC/60mA
- isolation test voltage • 2kV

resistance sensors repeater  
e.g. Pt100 sensor in range (-200÷+400)°C

## RMS-S2 RMS CONVERTER WITH SEPARATION



- input • any signal e.g. from a shunt, frequency band 3Hz÷20kHz
- output • any standard analog signal, optional RS485 output
- accuracy • 0.1% of full scale
- galvanic isolation • all circuits mutually separated
- isolation test voltage • 2kV
- supply • 24VDC/70mA

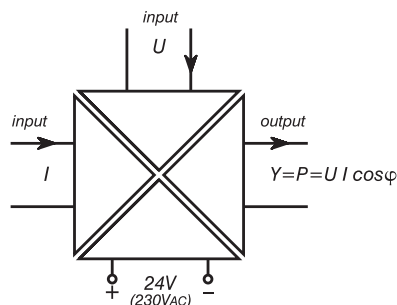
After agreement possibility of measuring average or rectified average value

used for current measurement from thyristor regulators

## MOC-S2A POWER CONVERTER WITH SEPARATION

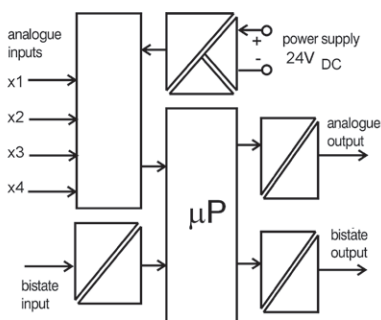


rail housing 22.5mm width



- voltage input • 0÷750VAC/DC
- current input • 0÷5AAC/DC
- input signal frequency 3Hz÷10kHz
- output • any standard analog signal representing the power
- accuracy • 0.4% of full scale
- supply • universal 24÷230VAC/DC
- galvanic isolation • all circuits mutually separated
- isolation test voltage • 2kV

## BF-S2 MATHEMATIC-LOGIC FUNCTION BLOC optionally with time relations



- a lot of arithmetic function from library to choose, any function on agreement
- maximum 4 analog, differential inputs with 0.025% resolution without separation
- 1 analog output of any standard with 0.025% resolution
- 1 bistate input type contact or OC
- 1 bistate output type OC
- analog inputs, bistate input, outputs and supply circuits mutually separated
- isolation test voltage 2kV

differential function  $df/dt$

$$\frac{Y(s)}{X(s)} = \frac{s \tau}{1 + s \tau}$$

integrator function  $\int X(t) dt$

$$\frac{Y(s)}{X(s)} = \frac{\tau}{s}$$

pulse integrator function:

converts the state of pulse counter to analog signal  $Y_D \rightarrow \square$

LEAD/LAG function:

$$\frac{Y(s)}{X(s)} = \frac{\tau_1 s + 1}{\tau_2 s + 1}$$

sum or difference function

$$Y = k_1 X_1 \pm k_2 X_2 \pm k_3 X_3 \pm k_4 X_4$$

product function  $Y = k_1 X_1 k_2 X_2$

including  $Y = k X^2$

quotient function  $Y = \frac{k_1 X_1}{k_2 X_2}$

square root function

$$Y = \Delta X_{max} \sqrt{\frac{\Delta X}{\Delta X_{max}}} + C$$

phase shift function

$$Y = Y_0 + \Delta Y_{max} \cos(\varphi_1, \varphi_2)$$

or  $Y = Y_0 + \Delta Y_{max} \varphi(X_1, X_2)/2\pi$

operation indication function

$$Y = 1 \text{ for } f \geq f_{upper}$$

$$Y = 0 \text{ for } f < f_{lower}$$

additional delays can be perform

the highest/lowest analog signal choosing function

$$Y = \text{the highest of signals } (X_1, X_2, X_3, X_4)$$

$$Y = \text{the lowest of signals } (X_1, X_2, X_3, X_4)$$

comparator function

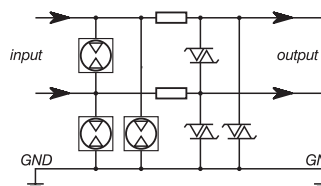
$$Y = 1 \text{ for } X_1 \geq X_2$$

this bloc performs one of chosen in the order function from above set, e.g. sum, product, comparison, choosing the highest signal etc.

## MZN VOLTAGE SECURE MODULE MZN-LT TRANSMISSION LINES VOLTAGE SECURE MODULE



rail or wall housing



- barrier voltage • between lines - 5.5V÷100V (according to order)
- between line and GND - 5.5V÷100V (according to order)
- serial resistance • each of both lines: 10Ω (or according to order)
- line leakage current to GND • ≤10μA
- current consumed in a pulse • ≤150A
- capacity between the lines and a line to GND • for MZN-LT - ≤90pF
- for MZN - ≤10000pF
- frequency band • for MZN-LT - 10MHz
- for MZN - 1MHz



# EXPLOSIONPROOF CONSTRUCTION DEVICES

Group I, category (M1) - designed to operate in mines underground in the presence of methane

Group II, category (1) - designed to operate in zone 0, 1, 2, 20, 21, 22

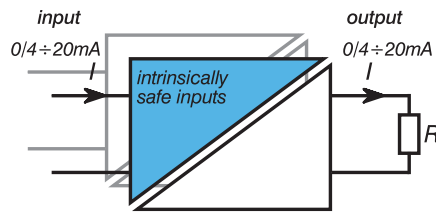
ATEX compliance

Marks according to explosionproof construction certificate of KDB BARBARA: <b>I (M1) [Ex ia] I</b>	<b>II (1) G [Ex ia] IIC</b>	<b>II (1) D [Ex ia] IIIC</b>
Appropriate EPL marks: <b>I (M1) [Ex ia Ma]</b>	<b>II (1) G [Ex ia Ga] IIC</b>	<b>II (1) D [Ex ia Da] IIIC</b>
Appropriate marks according to Russian certificates ГОССТАНДАРД <b>[Ex ia Ma] I</b>	<b>[Ex ia Ga] IIC</b>	<b>РОССИИ and Custom Union:                  [Ex ia Da] IIIC</b>

## S1-EXA SELF-POWERED SEPARATOR - receives 0/4÷20mA signal from Ex zone



one or two channels, 22.5mm width



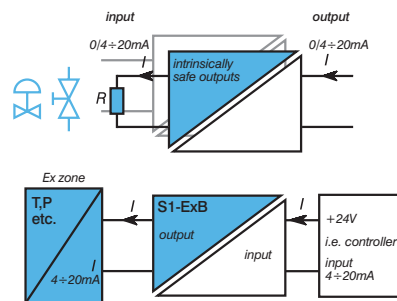
- intrinsically safe input
  - 0/4÷20mA (any  $I < 100\text{mA}$ )
- output
  - 0/4÷20mA ( $I_{OUT} = I_{IN}$ )
- load resistance
  - 0÷800Ω
- input voltage drop
  - $3\text{V} + R_{LOAD} \cdot I_{IN}$
- accuracy
  - $\pm 0.05\% - 0.05\% \cdot (R_{LOAD}/100\Omega)$
- safety parameters
  - $U_i = 30\text{V}$ ,  $I_i = 100\text{mA}$ ,  $P_i = 1\text{W}$ ,  $L_i = 0$ ,  $C_i = 0$ ,  $U_o = 0$ ,  $I_o = 0$
- isolation test voltage
  - 2.5kV

1 or 2 independent channels in one housing  
simplest separation for current inputs 0/4÷20mA

## S1-EXB SELF-POWERED SEPARATOR - sends 0/4÷20mA signal to Ex zone



one or two channels, 22.5mm width



- input
  - 0/4÷20mA (any  $I < 100\text{mA}$ )
- intrinsically safe output
  - 0/4÷20mA ( $I_{OUT} = I_{IN}$ )
- load resistance
  - 0÷700Ω
- input voltage drop
  - $2.5\text{V} + I_{IN} \cdot (300\Omega + R_{LOAD})$
- accuracy
  - $\pm 0.05\% - 0.05\% \cdot (R_{LOAD}/100\Omega)$
- safety parameters
  - $U_o = 25.2\text{V}$ ,  $I_o = 89\text{mA}$ ,  $P_o = 0.56\text{W}$
- isolation test voltage
  - 2.5kV

parameters for S1-ExBH3 for group IIC:  
 $L/R = 63\mu\text{H}/\Omega$ ,  $L_o = 1\text{mH}$ ,  $C_o = 0.064\mu\text{F}$

1 or 2 independent channels in one housing  
simplest separation for current outputs 0/4÷20mA

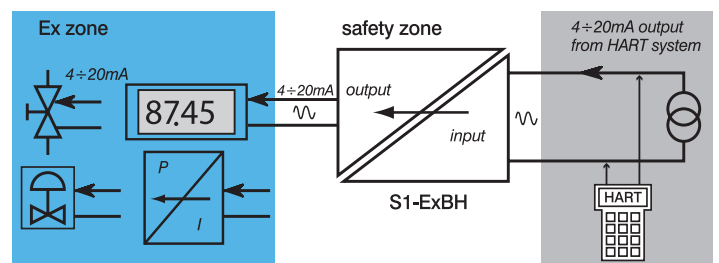
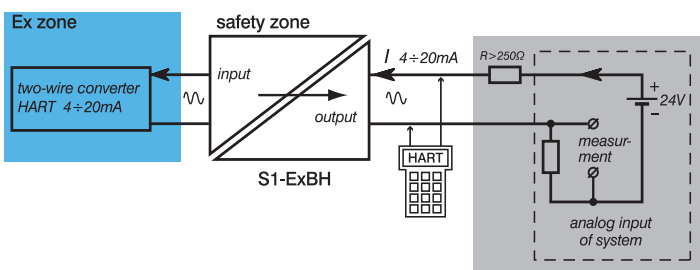
## S1-EXBH SELF-POWERED SEPARATOR - transparent for HART transmission, sends 0/4÷20mA signal to Ex zone or supplies two-wire transmitter



one channel, 22.5mm width

- input
  - 4÷20mA
- intrinsically safe output
  - 4÷20mA ( $I_{OUT} = I_{IN}$ )
- load resistance
  - 0÷700Ω
- input voltage drop
  - $2.5\text{V} + I_{IN} \cdot (300\Omega + R_{LOAD})$
- accuracy
  - $\pm 0.05\% - 0.05\% \cdot (R_{LOAD}/100\Omega)$
- safety parameters
  - $U_o = 25.2\text{V}$ ,  $I_o = 89\text{mA}$ ,  $P_o = 0.56\text{W}$
- isolation test voltage
  - 2.5kV

parameters for S1-ExBH3 for group IIC:  
 $L/R = 63\mu\text{H}/\Omega$ ,  $L_o = 1\text{mH}$ ,  $C_o = 0.064\mu\text{F}$



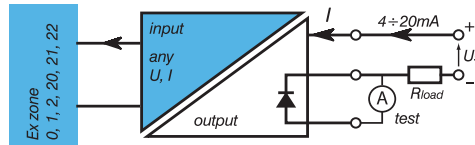
sends 0/4÷20mA signal to Ex zone

## S3Ex-S TWO-WIRE SEPARATOR

any standard signal from Ex zone  $\Rightarrow$  passive 4÷20mA



one channel, 22.5mm width



- intrinsically safe input • any standard analog signal
- output • two-wire (control of 4÷20mA current loop supplied from external source)
- input resistance • 50Ω or current input, 100kΩ or voltage signals
- load resistance •  $R_{max} = (U_z - 9V)/20mA$
- accuracy • 0.1% of full scale
- safety parameters •  $U_i = 30V, I_i = 100mA, P_i = 0.99W$
- supply •  $9V \leq U_z \leq 36V$
- isolation test voltage • 2kV

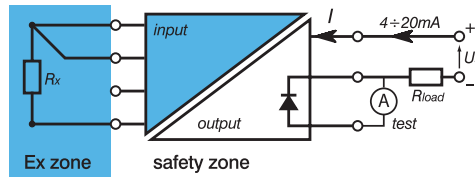
two-wire separator for measurement cards with active current inputs

## S3Ex-R TWO-WIRE RESISTANCE-TEMPERATURE CONVERTER

sensors e.g. Pt100, potentiometers from Ex zone  $\Rightarrow$  passive 4÷20mA



one channel, 22.5mm width



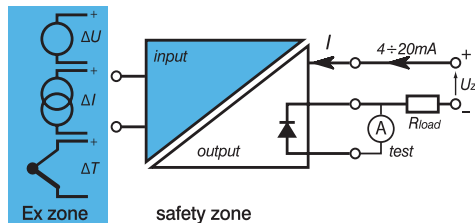
- intrinsically safe input • resistance change  $\Delta R = 4\Omega \div 5k\Omega$ , Pt100, Ni100, Cu100, Pt500, Pt1000, potentiometer position  $\Delta R = 10\Omega \div 10k\Omega$
- sensor connection • 3- or 4-wire line
- $R_{LINE}$  compensation • total
- sensor current • typically 0.4÷0.8mA
- output • two-wire (control of 4÷20mA current loop supplied from external source)
- load resistance •  $R_{max} = (U_z - 9V)/20mA$
- accuracy • 0.1% of full scale for span  $> 50^\circ C$
- safety parameters •  $U_o = 5.4V, I_o = 9.9mA, P_o = 17mW$
- supply •  $9V \leq U_z \leq 36V$
- isolation test voltage • 2kV

two-wire converter e.g. temperature from measurement cards with active current inputs

## S3Ex-U TWO-WIRE CURRENT, VOLTAGE including TEMPERATURE CONVERTER



one channel, 22.5mm width



- intrinsically safe input • voltage  $\Delta U_{min} = 2mV; \Delta U_{max} = 30V$ , current  $\Delta I_{min} = 1\mu A; \Delta I_{max} = 100mA$ , thermocouple J, K, R, S, T, B, N, L itd.
- output • two-wire (control of 4÷20mA current loop supplied from external source)
- load resistance •  $R_{max} = (U_z - 9V)/20mA$
- accuracy • see Technical Data Sheet
- safety parameters •  $U_i = 30V, I_i = 100mA, P_i = 1W$
- supply •  $9V \leq U_z \leq 36V$
- isolation test voltage • 2kV

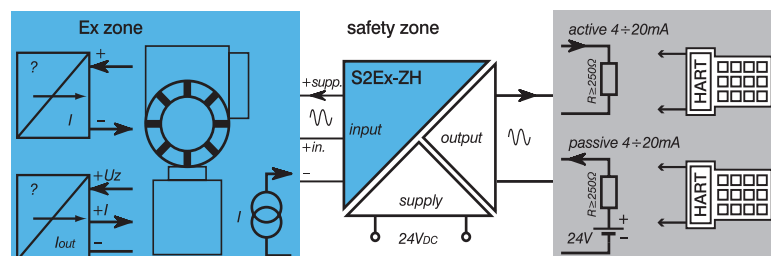
two-wire converter with separation for measurement of current, voltage increment and temperature with thermocouples

## S2Ex-ZH SUPPLIER-SEPARATOR of two-wire 4÷20mA converters installed in Ex zone with HART transmission



one channel, 22.5mm width

- active intrinsically safe input • converts 4÷20mA current and simultaneously supplies two-wire converter in Ex zone
- passive intrinsically safe input • 4÷20mA
- output • 4÷20mA
- load resistance • 0÷700Ω
- accuracy • 0.1% of full scale
- safety parameters • e.g. for S2Ex-ZH-24:  $U_o = 25.2V, I_o = 84mA, P_o = 0.53W$
- supply • 24VDC,  $I_{max} = 70mA$
- isolation test voltage • 2kV

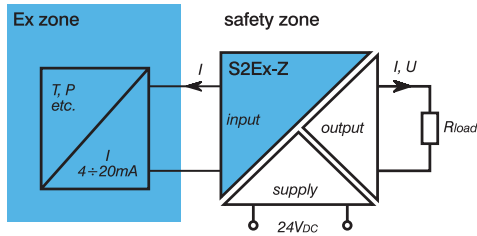




## S2Ex-Z SUPPLIER-SEPARATOR of two-wire 4÷20mA converters installed in Ex zone ⇒ any standard signal



one channel, 22.5mm width

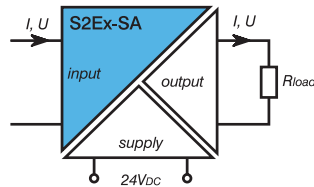


- intrinsically safe input
- output
- load resistance
- accuracy
- safety parameters
- supply
- isolation test voltage
- converts 4÷20mA current and simultaneously supplies two-wire converter installed in Ex zone
- any standard analog signal
- 0÷700Ω for current input, ≥2kΩ for voltage signals
- 0.1% of full scale
- e.g. for S2Ex-Z-24:  
U<sub>0</sub>=25.2V, I<sub>0</sub>=92mA, P<sub>0</sub>=0.62W
- 24VDC, I<sub>max</sub>=90mA
- 2kV

## S2Ex-SA CIRCUITS SEPARATOR any standard signal from Ex zone ⇒ any standard signal



one channel, 22.5mm width

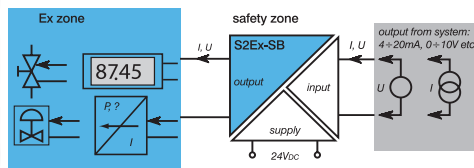


- intrinsically safe input
- input resistance
- output
- load resistance
- accuracy
- safety parameters
- supply
- isolation test voltage
- any standard signal
- 50Ω or current input, 100kΩ for voltage signals
- any standard signal
- 0÷700Ω for current input ≥2kΩ for voltage signals
- 0.1% of full scale
- U<sub>i</sub>=30V, I<sub>i</sub>=100mA, P<sub>i</sub>=0.99W
- 24VDC, I<sub>max</sub>=70mA
- 2kV

## S2Ex-SB CIRCUITS SEPARATOR any standard signal ⇒ any standard signal to Ex zone



one channel, 22.5mm width



zone: 0, 1, 2, 20, 21, 22  
indications: I (M1) [Ex ia] I,  
II (1) G [Ex ia] IIC,  
II (1) D [Ex ia] IIIC

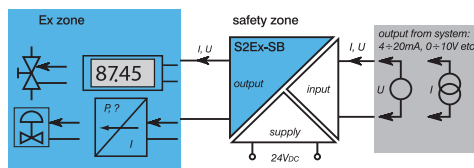
analog control of e.g. valve or indicator in hazardous zone maximum power 0.96W

- input
- input resistance
- intrinsically safe output
- load resistance
- accuracy
- safety parameters
- supply
- isolation test voltage
- any standard signal
- 50Ω or current input, 100kΩ for voltage signals
- current or voltage taking into account U<sub>0</sub>, I<sub>0</sub>
- to be agreed
- 0.1% of full scale
- e.g. for S2Ex-SB-24/70:  
U<sub>0</sub>=25.2V, I<sub>0</sub>=70mA, P<sub>0</sub>=0.47W
- 24VDC
- 2kV

## S2Ex[nL]-SB CIRCUITS SEPARATOR, only to zone 2 and 22



one channel, 22.5mm width



zone: 2, 22  
indications: II (3) G [Ex nL] IIC,  
II (3) G [Ex ia] IIC,  
II (3) D [Ex ia] IIIA or IIIB or IIIC

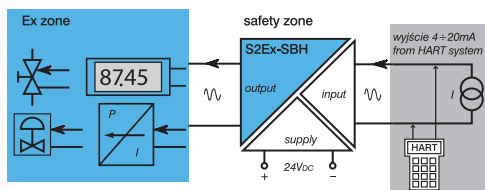
analog control of e.g. valve or indicator in hazardous zone maximum power 3.1W

- input
- input resistance
- intrinsically safe output
- load resistance
- accuracy
- safety parameters
- supply
- isolation test voltage
- any standard signal
- 50Ω or current input, 100kΩ for voltage signals
- category (3)
- current or voltage taking into account U<sub>0</sub>, I<sub>0</sub>, P<sub>0</sub>
- to be agreed
- 0.1% of full scale
- e.g. for S2Ex[nL]-SB, U<sub>wyj</sub>=24V:  
U<sub>0</sub>=25.2V, I<sub>0</sub>=120mA, P<sub>0</sub>=3.1W
- 24VDC
- 2kV

## S2Ex-SBH SUPPLIER-SEPARATOR – transparent for HART transmission active 4÷20mA input ⇒ active 4÷20mA output to Ex zone



one channel, 22.5mm width



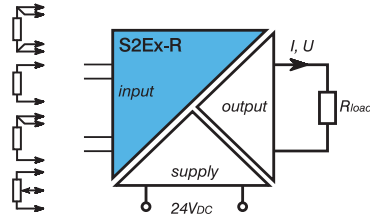
- passive input
- intrinsically safe output
- accuracy
- safety parameters
- supply
- isolation test voltage
- 4÷20mA
- 4÷20mA
- 0.1% of full scale
- e.g. for S2Ex-ZH-24:  
U<sub>0</sub>=25.2V, I<sub>0</sub>=84mA, P<sub>0</sub>=0.53W
- 24VDC, I<sub>max</sub>=70mA
- 2kV

## S2Ex-R RESISTANCE-TEMPERATURE CONVERTER

sensor e.g. Pt100, potentiometer from Ex zone → any standard signal



one channel, 22.5mm width



- intrinsically safe input • resistance change  $\Delta R = 4\Omega \div 5k\Omega$ , Pt100, Ni100, Cu100, Pt500, Pt1000, potentiometer position  $\Delta R = 10\Omega \div 10k\Omega$
- sensor connection • 3- or 4-wire line
- RLINE compensation • total
- sensor current • typically 0.4 ÷ 0.8mA
- output • any standard analog signal
- load resistance • 0 ÷ 700Ω for current inputs,  $\geq 2k\Omega$  for voltage signals
- accuracy • 0.1% of full scale for range span > 50°C
- safety parameters •  $U_o = 5.4V$ ,  $I_o = 9.8mA$ ,  $P_o = 42mW$
- supply • 20V ≤  $U_s$  ≤ 27V,  $I_{max} = 70mA$
- isolation test voltage • 2kV

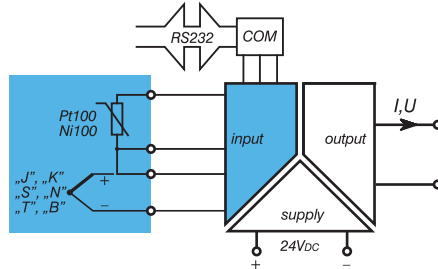
converter with separation for measurement of resistance increment, temperature with sensors e.g. Pt100 and potentiometer position

## S2Ex-TP PROGRAMMABLE TEMPERATURE CONVERTER

for thermocouples and resistance sensors → signal 0/4 ÷ 20mA, 0 ÷ 10V



one channel, 22.5mm width



- programmable selection • sensor type, range, output type, filter (time constant), cold ends compensation for thermocouples
- intrinsically safe input • thermocouples: J, K, S, N, T, B or other acc. to agreement; resistance sensors: PT100, Ni100, Cu100, Cu50 or other according to agreement
- sensor connection • 3-wire line of resistance sensor, 4-wire after agreement
- output • 4 ÷ 20mA, 0 ÷ 20mA, 0 ÷ 10V
- load resistance • 0 ÷ 700Ω for current inputs,  $\geq 2k\Omega$  for voltage signals
- accuracy • 0.1% of full scale for range span > 50°C
- measurement frequency • every 0.25s
- supply • 24VDC/80mA
- isolation test voltage • 2kV

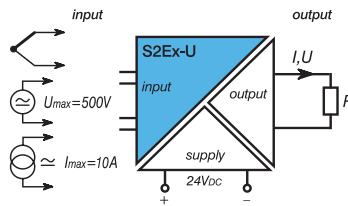
universal converter with separation for temperature measurement

## S2Ex-U CURRENT, VOLTAGE including TEMPERATURE CONVERTER

sensor e.g. thermocouple, alternator from Ex zone → any standard signal



one channel, 22.5mm width



- intrinsically safe input • voltage  $\Delta U_{min} = 2mV$ ;  $\Delta U_{max} = 30V$ , current  $\Delta I_{min} = 1\mu A$ ;  $\Delta I_{max} = 100mA$ , thermocouple J, K, R, S, T, B, N, L etc.
- output • any standard analog signal
- load resistance • 0 ÷ 700Ω for current inputs,  $\geq 2k\Omega$  for voltage signals
- accuracy • see Technical Data Sheet
- safety parameters •  $U_i = 30V$ ,  $I_i = 100mA$ ,  $P_i = 1W$
- supply • 24VDC,  $I_{max} = 70mA$
- isolation test voltage • 2kV

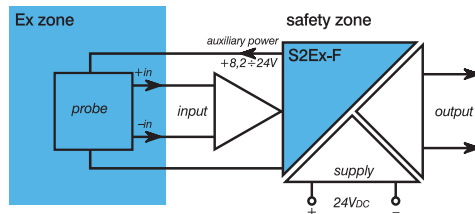
two-wire converter with separation for measurement of current, voltage increment and temperature with thermocouples

## S2Ex-F FREQUENCY CONVERTER

frequency (pulse string) from Ex zone Ex → any standard signal or pulse string



one channel, 22.5mm width



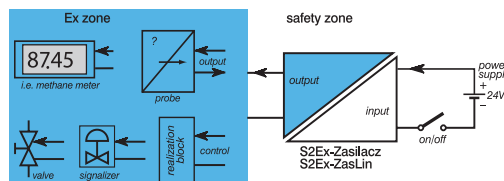
- intrinsically safe input • pulse string: voltage, current, NAMUR, etc. 0 ÷ 10kHz
- output • any standard analog signal, pulse string with OC output
- accuracy • 0.2% of full scale for  $f \Rightarrow$  analog conversion
- safety parameters • e.g. for S2Ex-F-8,2:  $U_o = 8.6V$ ,  $I_o = 19mA$ ,  $P_o = 0.11W$
- supply • 24VDC,  $I_{max} = 70mA$
- isolation test voltage • 2kV

## S2Ex-Zasilacz with output to Ex zone and trapezoidal characteristic

S2Ex-ZasLin with output to Ex zone and linear characteristic



one channel, 22.5mm width



- intrinsically safe input • 3 ÷ 24VDC
- zone • 0, 1, 2, 20, 21, 22 and mines undergrounds
- safety parameters • given in Technical Data Sheet and EC-Type Examination Certificate, e.g. for S2Ex-Zasilacz-24/139:  $U_o = 25V$ ,  $I_o = 139mA$ ,  $P_o = 0.92W$
- indications • I(M1)[Ex ia]I, II(1)G[Ex ia]IIC, II(1)D[Ex ia]IIC
- supply • 24VDC
- isolation test voltage • 2kV

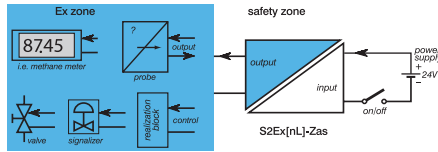
most common versions:  $U_{out} = 5V; 8.2V; 10V; 12V; 15V; 18V; 24V$



## S2Ex[nL]-ZAS OUTPUT CIRCUIT WITH LIMITED POWER, only to zone 2, 22 with maximum power $P_o \leq 3.1W$ to Ex zone



one channel, 22.5mm width



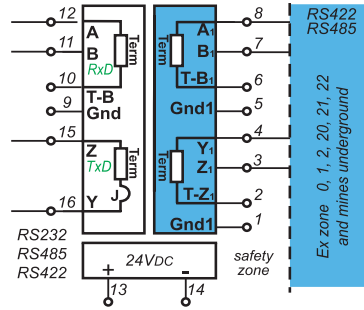
- intrinsically safe output • 3÷24VDC
- LED indication • supply operating
- safety parameters • given in datasheet, e.g. for S2Ex[nL]-ZAS-24V:  $U_o=25.2V$ ;  $I_o=120mA$ ;  $P_o=3.1W$
- zone • only 2, 22
- indications • II(3)G[Ex nL]IIC, II(3)G[Ex ia]IIC, II(3)D[Ex ia]IIIA lub IIIB lub IIC
- galvanic isolation • output and object 24VDC supply separated
- supply • 24VDC
- isolation test voltage • 2kV

most common versions:  $U_{OUT}=5V$ ; 8.2V; 10V; 12V; 15V; 18V; 24V

## S2Ex-RS TRANSMISSION LINES SEPARATOR RS232/RS485, RS232/RS422, RS422/RS485, RS422/RS422, RS485/RS485



one channel, 22.5mm width



### Separation and translation to zone:

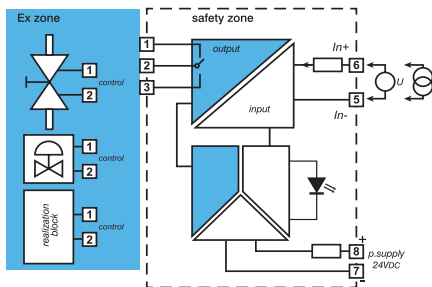
Safe zone	Explosion hazardous zone
RS232	RS485
RS485	RS422
RS422	

- transmission speed • 50÷115200b/s
- line length for RS485, RS422 • max 1200m
- line length for RS232 • 15m for 19200b/s; 5m for 115200b/s
- number of devices in line • max 32
- line terminators • internal
- LED indication • supply operating, transmission, line damage
- galvanic isolation • all circuits mutually separated
- supply • 24VDC
- isolation test voltage • 2kV

## S2Ex-SBS CONVERTER-LIMIT INDICATOR with relay output to Ex zone



one channel, 22.5mm width

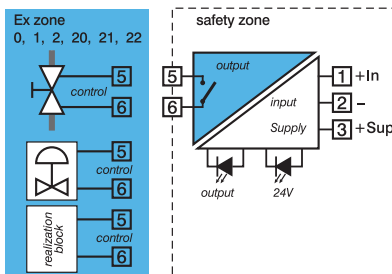


- input • any bistate signal or analog in case of operating as comparator
- intrinsically safe output • relay switching contact
- switching parameters • 1A/(24÷30VDC); 0.5A/(30÷60VDC); 5A/60VAC  $t_{on}=5ms$ ,  $t_{off}=3ms$  at 20Hz
- galvanic isolation • all circuits mutually separated
- supply • 24VDC
- isolation test voltage • 2kV

## SBEx-B BISTATE SEPARATOR – intrinsically safe output with relay contact



one channel, 22.5mm width



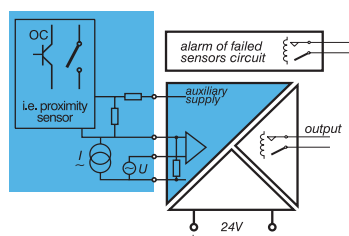
- input • any bistate signal, to operate with proximity sensors e.g. NAMUR, contacts, current or voltage signals e.g. 0/24V
- intrinsically safe output • NO relay contact:
  - current -  $\leq 0.5A$
  - voltage -  $\leq 200V$
  - resistance -  $\leq 0.15\Omega$
  - switching -  $t_{on}=2ms$ ,  $t_{off}=2.5ms$
- operating phase selection • to be agreed
- supply • 24VDC
- isolation test voltage • 1.5kV

note: input and supply have common "minus" - ground

## SBEx-2, SBEx-2S BISTATE SEPARATOR two-channel, intrinsically safe inputs (NAMUR signal, contacts, sensors) ⇒ output contacts



two channels, 22.5mm width



- intrinsically safe inputs • 2 mutually separated inputs: contacts, NAMUR signals, bistate sensors, voltage or current signals
- auxiliary supply • for SBEx-2: 8.2V for SBEx-2S: 16V
- outputs • 2 outputs plus ALARM, mutually separated
- alarm • short/opening connection line control
- supply • 24VDC
- isolation test voltage • 1.5kV

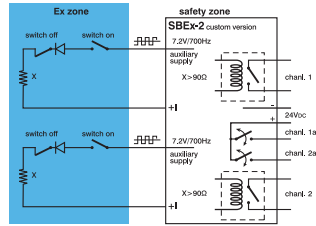
option 1: for one-channel version it is possible to have output with switching contact  
option 2: for two-channel version it is possible to have output with switching contact but without ALARM signal

note: on the next page are presented special versions to:  
- ground wire resistance testing  
- controlling line resistance testing

## SBEx-2, SBEx-2S BISTATE SEPARATOR two-channel in special version for protective conductor resistance control



two channels, 22.5mm width



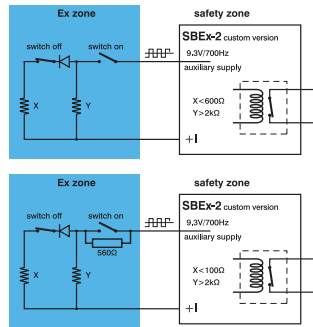
- intrinsically safe inputs • 2 mutually separated inputs for measurement of protective conductor resistance
- activation threshold •  $X < 100\Omega$  lub  $X < 50\Omega$ , including condition on connection line and serial diode operational
- auxiliary supply • for SBEx-2: 8.2V for SBEx-2S: 16V
- outputs • 2 main contacts plus 2 repetitive contacts
- galvanic isolation • all circuits mutually separated
- supply • 24VDC
- isolation test voltage • 1.5kV

note: SBEx-2S version is more immune to interferences, especially 50Hz

## SBEx-2, SBEx-2S BISTATE SEPARATOR two-channel in special version for control line resistance testing, also in version with maintaining 560Ω



one channel, 22.5mm width



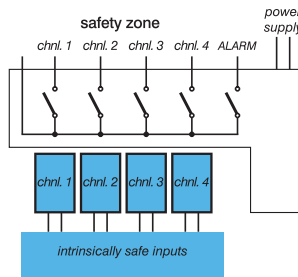
- intrinsically safe input • input for control line testing
- activation threshold •  $X < 600\Omega$  or  $Y > 2k\Omega$ , including condition on connection line and serial diode operational
- auxiliary supply • for SBEx-2: 8.2V for SBEx-2S: 16V
- output • relay contact
- galvanic isolation • all circuits mutually separated
- supply • 24VDC
- isolation test voltage • 1.5kV

note: SBEx-2S version is more immune to interferences, especially 50Hz

## SBEx-4 BISTATE SEPARATOR four-channel SBEx-4S BISTATE SEPARATOR two-channel, also in version SBEx-4S-SR as a machine movement indicator



22.5mm width  
SBEx-4: 1 to 4 channels  
SBEx-4S, SBEx-4S-SR: 1 or 2 channels



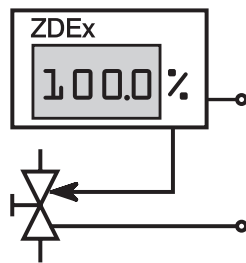
- intrinsically safe inputs • 4 mutually separated inputs: contacts, NAMUR signals, bistate sensors
- inputs supply • for SBEx-4: 8.2V for SBEx-4S: 16V
- outputs • 1 ÷ 4 outputs plus alarm with common terminal, relay or optorelay contacts
- alarm • short/opening connection line control
- galvanic isolation • all circuits mutually separated
- supply • 24VDC
- isolation test voltage • 2kV

in machine movement indicator version, pulse signal activates output relay

## ZDEX TWO-WIRE SETTING DEVICE 4 ÷ 20mA



board housing 72x72x61mm

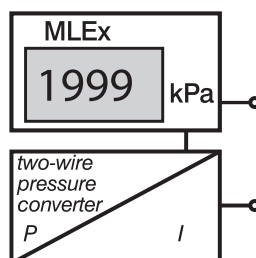


- ZDEXnL – currently to operate with hazardous zones: 2, 22 indication
- II 3G Ex nL IIC T6, II(3)G[Ex nL] IIC, II 3G Ex ia IIC T6, II 3G [Ex ia] IIC, II 3D Ex ia IIIA lub IIIB lub IIIC T85°C, II (3)D [Ex ia] IIIA lub IIIB lub IIIC
- ZDEX – after certification it is possible to operate with hazardous zones: 0, 1, 2, 20, 21, 22
- memory settings • 4 programmable memory cells
- current range • 3.00 ÷ 21.00mA
- display • programmable, e.g. in physical units, 4 digits 14mm LCD with backlight
- accuracy • 0.1% of full scale ± 1 in the last digit
- supply • 9.5 ÷ 30V

## MLEx TWO-WIRE 4 ÷ 20mA INDICATOR



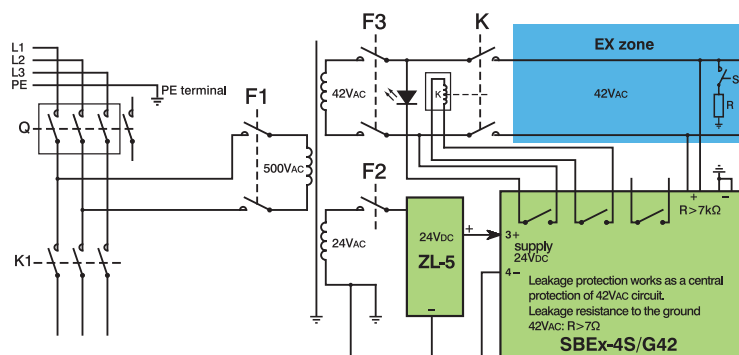
board housing 72x72x61mm



- MLExnL – currently to operate with hazardous zones: 2, 22 indication
- II 3G Ex nL IIC T6, II(3)G[Ex nL] IIC, II 3G Ex ia IIC T6, II 3G [Ex ia] IIC, II 3D Ex ia IIIA lub IIIB lub IIIC T85°C, II (3)D [Ex ia] IIIA lub IIIB lub IIIC
- MLEx – after certification it is possible to operate with hazardous zones: 0, 1, 2, 20, 21, 22
- current range • 3.00 ÷ 24.00mA
- voltage drop • 4.5V maximum
- alarm • programmable alarm threshold with separated OC output
- display • programmable, e.g. in physical units, 4 digits 14mm LCD with backlight
- accuracy • 0.1% of full scale ± 1 in the last digit



## SBEx-4S/G42 BISTATE SEPARATOR for earth fault protection



The separator SBEx-4S/G42 can operate as a leakage protection to protect not grounded electric installations with rated voltage  $U \leq 24VDC$ ;  $U \leq 42VAC$  and frequency  $50 \div 60Hz$  from earth fault protection. In a network disconnected from voltage works as a blocking protection and after turning on the voltage it works as a central protection.

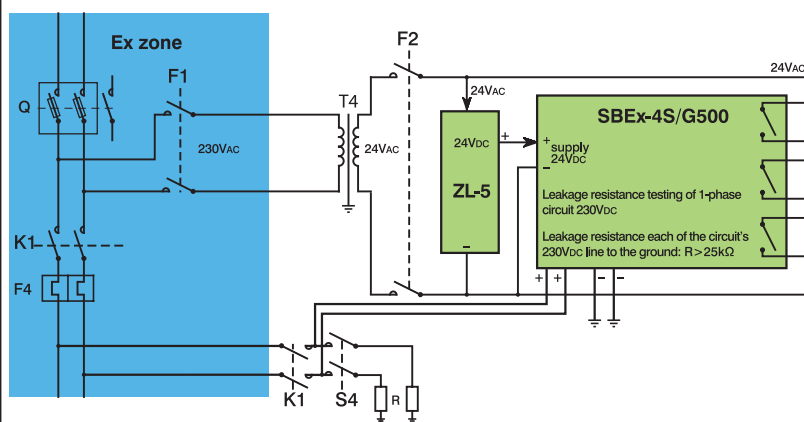
Measurement intrinsically safe circuits (terminals 13-14, 15-16) measures leakage in both conductors of power supply.

The separator is made as custom version after agreement with the customer.

The separator operates properly as a central protection for circuits with voltage  $U \leq 24VDC$  when the lines capacity to the ground is less than  $1\mu F$ . In the case of central protection, the measurement circuit does not have to be intrinsically safe and in this case it is suggested to choose separator SB-4S/G42. It can operate with circuits with  $U \leq 2VDC$ ,  $U \leq 42VAC$ . SB-4S/G42 identifies more accurately even with lines capacity to the ground  $C \leq 3\mu F$ .

The separator indicates (3 non-intrinsically safe contacts) resistance drop of controlled circuit below the value of  $R_x$  defined by the client (e.g.  $R_x = 7k\Omega$ ).

## SBEx-4S/G500 BISTATE SEPARATOR for leakage-blocking protection



The separator SBEx-4S/G500 has "ia" protection level. This allows the measurement channel can be powered with voltage (not bigger than  $U_i = 60V$ ) even after exceeding methane concentration above 2%. Power supply of the separator does not have to be turned off.

The separator SBEx-4S/G500 is designed to control the condition of isolation in isolated electrical networks.

Isolated networks marked with IT symbol characterizes with isolation of all active elements of the network to the ground potential. It allows higher shock protection because the shock current is limited with high capacity impedance to the ground. IT networks can have high ground resistance allowed.

The separator SBEx-4S/G500 can be used as:

- leakage-blocking protection designed to control the ground isolation resistance in non-voltage state in intrinsically safe as well as in non-intrinsically safe circuits,
- central-blocking leakage protection or central leakage protection for circuits in which after turning on the voltage does not exceed 238V. These circuits after turning on the power voltage are no longer intrinsically safe ( $U_i > 60V$ ),
- central-blocking leakage protection or central leakage protection for circuits in which after turning on the voltage does not exceed 60V. These circuits after turning on the power voltage can still be intrinsically safe in  $U_i \leq 60V$ .

The separator SBEx-4S/G500 in version for voltages 230VAC can operate as leakage blocking protection, central or central-blocking designed to test the ground isolation resistance in one-phase and isolated networks with rated voltage  $U = 230VAC$ .

	version 230VAC/15kΩ
blocking resistance	$15k\Omega \pm 20\%$
unblocking resistance	$\geq 22.5k\Omega$
reaction time	resistance step $15 \leftrightarrow 22.5k\Omega$ , $t < 1s$
operational after turning on the power	3s

Protection function is based on blocking turning on the power voltage on damaged part of the network or disconnecting the voltage when the leakage resistance drops below  $15k\Omega$ .

supply • 24Vdc  
isolation test voltage • 1.5kV

## Terms of use explosionproof devices:

Accompanying devices of: Group I, Category (M1) and Group II, Category (1) - ATEX compliance

Intrinsically safe circuits with ia protection level to operate with zones 0, 1, 2, 20, 21, 22

Explosionproof construction marks: I (M1) [Ex ia] I II (1) G [Ex ia] IIC II (1) D [Ex ia] IIIC

Protection level IP20. Operating temperature range ( $-30 \div +70$ )°C.

All circuits mutually separated - it allows intrinsically safe circuit in a zone to be galvanically connected to ground (grounding, GND, metal construction of a cabinet etc.).

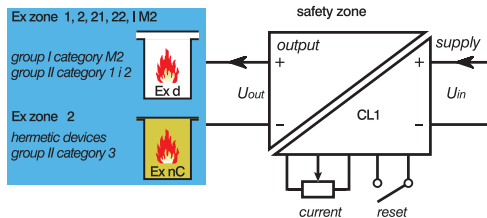
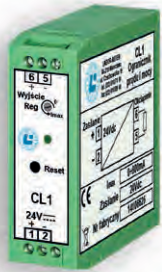
A few separated intrinsically safe circuits can be lead in one multi-core cable of type A or B according to IEC 60079-14. In other case they must be separated cables.

Installing outside the explosion hazardous zone or in a flameproof housing when installed in a hazardous zone. Using of the converters in flameproof housings in explosive group I does not required any additional warning on the flameproof housing cover, but for converters in flameproof housing used in explosive groups II (IIG, IID) or IIIC, opening of the housing can occurred only after 10 minutes delay after disconnecting the power supply.

If you need to install our devices in explosion hazardous zone 2 and 22 we can deliver our devices ZDEX and MLEx (setting device and indicator) in wall housing IP66 made of plastic (with glands).

If you need to install our devices in explosion hazardous zone 2 we can deliver our accompanying devices with intrinsically safe circuits in wall housings IP66 made of plastic (with glands) as hermetic sets. They will have then explosionproof housing marks, including marking an external circuits to the hazardous zone: II 3G Ex nC [nL] IIC T4 Gc.

## CL1 CURRENT AND POWER LIMITER



It is designed to supply a device (including electronic) installed in a hazardous zone, e.g. in housings:

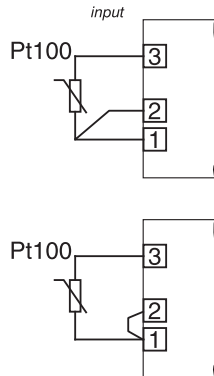
- flameproof Exd, oil Exo, sand Exq Exq → zone M2, 1, 2
- gas with hypertension Exp, hermetic Exmp → zone M2, 1, 2, 21, 22
- hermetic Exma → zone M1, 0, 1, 2, 20, 21, 22.

For hermetic device ExnC → zone 2.

The limiter is set up according to the requirements of EC-Type Examination Certificate of such equipment.

- input voltage • 20÷30VDC
- output voltage • approximately equals to the input voltage
- output current limiter • regulated by potentiometer 0÷0.8A

## TEMPERATURE SENSORS also together with 4÷20mA converter



- Pt100 • single or after agreement double measurement resistor
- accuracy • B or after agreement A
- connection • 2, 3 or 4 wires
- pressure sleeves • on request
- connection spigots • airtight welded or sliding
- screw • M20/1.5 or according to agreement
- measurement seatpost size • to be agreed
- connection head kind • to be agreed

Note: offered sensors as simple devices without EC-Type Examination Certificate can be installed in hazardous zones M1, M2, 1, 2, 21, 22 if operates with our S2Ex-R, S2Ex-TP, S3Ex-R converters.

All circuits are mutually separated so intrinsically safe circuit can be galvanically connected to ground (grounding, GND, metal construction of a cabinet, etc.). In general it is not recommended to ground in hazardous zone, but in this case it is allowed.

For group II EPL Ga and group II EPL Gb (zones 1, 2, 21, 22) sensors in housings made of stainless steel (for Ga is allowed: 10% of total aluminum, magnesium, titanium, zirconium and 7.5% of total magnesium, titanium and zirconium; for Gb is allowed: only 7.5% of total magnesium, titanium and zirconium; for I EPL Ma and Mb is allowed: 15% of total aluminum, magnesium, titanium, zirconium and 7.5% of total magnesium, titanium and zirconium) can be used.

In zones 2 and 22 are not such restrictions and sensors with aluminum alloy heads can be used.

### When you buy our products:

- you get 3 years warranty,
- you know that we are the manufacturer so you will get full and detailed information about the product,
- we guarantee technical support 24h,
- you will be advised about explosion hazardous zones,
- we can make untypical devices on request,
- we are flexible in time issues if needed,
- you can borrow a device for tests before purchase,
- if a product did not meet your expectations we can discuss about returning,
- if you made a mistake in specification you can change the product for a suitable one,
- you can send a product for parameters modification,
- you do not need the warranty card for reclamation,
- you can send a reclamation to us even if you bought the device from an agent,
- for efficient service each reclamation agree by phone,
- we can do service for devices after warranty date,
- ask about discount when buying again.

Our products have high reliability, we provide 3 years guarantee.

We also do untypical single orders. Short terms. After agreement we can do some modifications in offered products.

**We can send a CD with full catalogs of typical products and Ex.**



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