

## SIRIUS 3RS70 signal converters

Signal converters perform the coupling function for analog signals on both the input side and the output side. They are indispensable when processing analog values with electronic controls. Under harsh industrial conditions in particular, it is often necessary to transmit analog signals over long distances. Electrical separation is then needed as a result of the different power supplies. The resistance of the wiring causes potential differences and losses which must be prevented.

Electromagnetic disturbance and overvoltages can affect the signals on the input side in particular or even destroy the analog modules. All terminals of the 3RS70 signal converters are safe up to a voltage of 30 V DC and protected against reverse polarity. Short-circuit protection is an important function for the outputs above all.

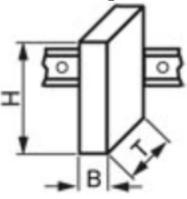
The devices are EMC-tested according to

- IEC 61000-6-4 (generic standard for emitted interference)
- IEC 61000-6-2 (generic standard for interference immunity)

The analog signals comply with

- IEC 60381-1/2

### Technical specifications

Article number		3RS7000-.AE00	3RS7002-.AE00 3RS7003-.AE00	3RS7000-.CE00 3RS7000-.DE00	3RS7002-.CE00 3RS7002-.DE00 3RS7003-.CE00 3RS7003-.DE00	3RS7020-.1ET00
Product designation		Single-range converters				
Design of the product		active				passive
<b>General technical data</b>						
Width x Height x Depth	mm	6.2 × 93 × 72.5				6.2 × 93 × 71
						
Ambient temperature						
• during operation	°C	-25 ... +60				
• during storage	°C	-40 ... +80				
Relative humidity during operation	%	10 ... 95				
Insulation voltage for overvoltage category III according to IEC 60664 with degree of pollution 3 rated value	V	50				
Consumed active power	W	0.29				--
Protection class IP		IP20				
<b>Input</b>						
Input voltage maximum	V	30				
Input impedance						
• of current input maximum	Ω	--	100	--	100	
• of voltage input minimum	kΩ	330	--	330	--	
<b>Output</b>						
Load						
• at the current output maximum	Ω	--		500		1 000
• at voltage output minimum	kΩ	2		--		
Relative metering precision	%	0.1				
Short-circuit proof		Yes				No

Product versions		Article number								
<b>Signal converters</b>		<b>3RS70</b>	<input type="checkbox"/>	<input type="checkbox"/>	-	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<b>0</b>	<b>0</b>
Product function/type of input signal	Single-range converters, active	<b>0</b>	<b>0</b>							3-way separation, input 0 ... 10 V
		<b>0</b>	<b>2</b>							3-way separation, input 0 ... 20 mA,
		<b>0</b>	<b>3</b>							3-way separation, input 4 ... 20 mA,
	Multi-range converters, active, switchable	<b>0</b>	<b>5</b>							3-way separation, 3 standard signals can be switched 0 ... 10 V, 0/4 ... 20 mA
	Universal converters, active, switchable	<b>0</b>	<b>6</b>							3-way separation, 16 signals can be switched
	Single-range converters, passive	<b>2</b>	<b>0</b>							2-way separation, 4 ... 20 mA
	Multi-range converters, active, switchable	<b>2</b>	<b>5</b>							3-way separation, with manual/automatic switch and setting potentiometer
Connection type	Screw terminals								<b>1</b>	
	Spring-loaded terminals (push-in)								<b>2</b>	
Type of output signal	0 ... 10 V									<b>A</b>
	0 ... 20 mA									<b>C</b>
	4 ... 20 mA									<b>D</b>
	Loop power isolator 4 ... 20 mA									<b>E</b>
	3 standard signals can be switched									<b>F</b>
	4 frequencies can be switched									<b>K</b>
Supply voltage	24 V AC/DC									<b>E</b>
	None									<b>T</b>
	24 ... 240 V AC/DC									<b>W</b>
Example		<b>3RS70</b>	<b>0</b>	<b>0</b>	-	<b>1</b>	<b>A</b>	<b>E</b>	<b>0</b>	<b>0</b>

## Application

Signal converters are used in analog signal processing for

- Electrical separation
- Conversion of normalized and non-normalized signals
- Amplification and impedance adaptation
- Conversion to a frequency for processing by a digital input
- Overvoltage and EMC protection
- Short-circuit protection of the outputs



### Active signal converters

Active signal converters provide maximum flexibility for the application by the use of an external control supply voltage. Configuration with active signal converters is extremely easy because input and output resistances and voltage drops are compensated by the auxiliary supply. They support electrical separation as well as conversion from one signal type to another or reinforcement. The load of the measured value transmitter is negligible.

### Passive signal converters

Passive signal converters do not require an external power supply. This advantage can only be used by current signals that are converted 1:1. Reinforcement or conversion is not possible. The converters are used for complete electrical separation of current signals and to protect the inputs and outputs. Passive signal converters do not operate reaction-free, i.e. any load on the output produces an equal load on the input signal. When the passive converter is to be used, the output power of the sensor and the input resistance of the analog input must be analyzed.

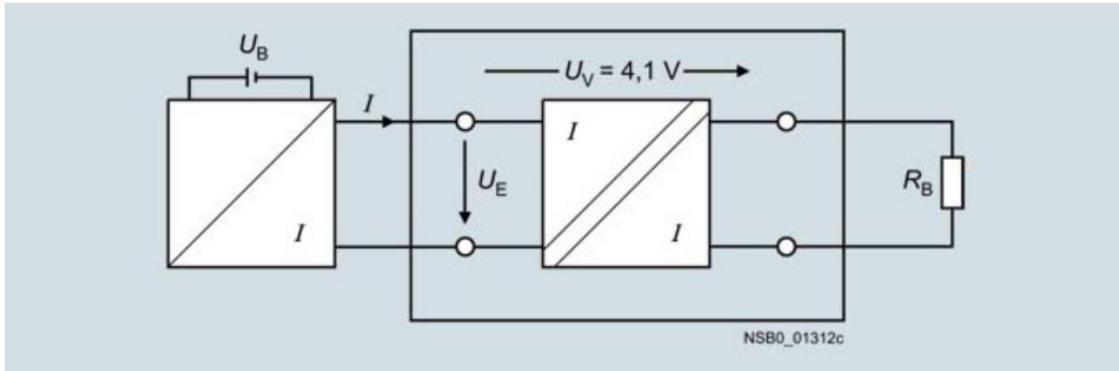
### Calculation guide for passive converters

Important: Please note the following when using passive signal converters:

When the output is open, the input becomes high impedance, and the current-driving voltage of the measuring transducer  $U_E$  must be sufficient to drive the maximum current of 20 mA over the passive converters with a voltage loss of  $U_V = 4.1$  V and the load  $R_B$ .

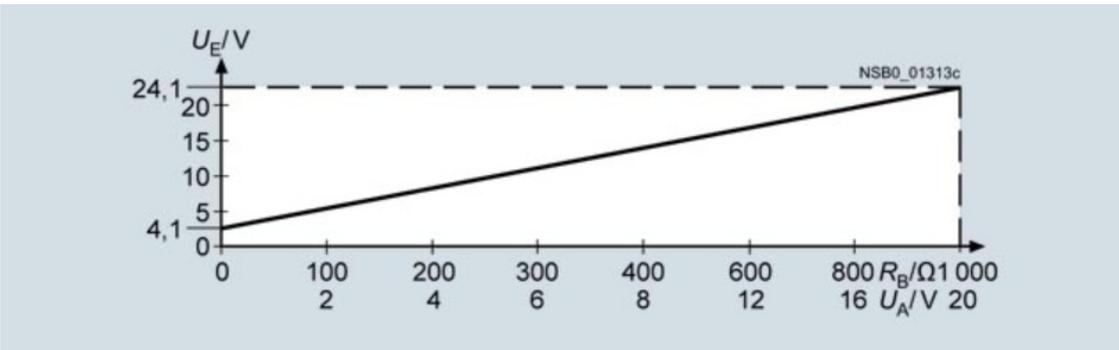
This means:

$$U_B \geq U_E = 4.1 \text{ V} + 20 \text{ mA} \times R_B$$



Distribution of the voltages in the case of passive signal converters

The following figure shows the input voltage  $U_E$  as a function of the load  $R_B$  taking into account the voltage loss  $U_V$ . If the load is known, the y-axis shows the minimum voltage that has to be supplied by the current source in order to drive the maximum current of 20 mA over the passive signal converter and load.



Input voltage depending on the load at  $I_a = 20$  mA

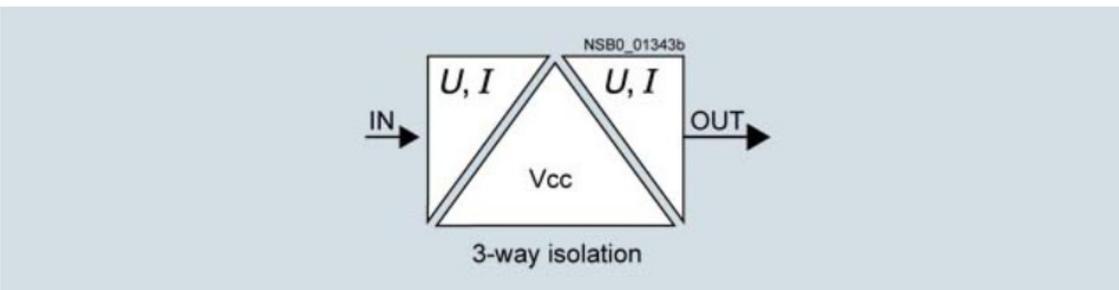
### Load rating of the outputs

A maximum output load is specified for current signals. This resistance value specifies how large the input resistance of the next device connected in series can be as a result of the power of the converter.

For voltage signals, the maximum current that can be drawn from the output is the decisive factor.

### 3-way separation

For the 3-way separation, each circuit is electrically separated from the other circuits, i.e. input, output, and control supply voltage do not have equipotential bonding.



3-way separation

Product No. / Product Description



> **3RS7000-1AE00**  
Separation amplifier 24 V AC/DC, 3-way separation  
input: 0-10 V output: 0-10 V screw terminal



> **3RS7000-2CE00**  
Separation amplifier 24 V AC/DC, 3-way separation  
input: 0-10 V output: 0-20 mA Spring-type terminal (push-in)



> **3RS7000-1CE00**  
Separation amplifier 24 V AC/DC, 3-way separation  
input: 0-10 V output: 0-20 mA screw terminal



> **3RS7000-2DE00**  
Separation amplifier 24 V AC/DC, 3-way separation  
input: 0-10 V output: 4-20 mA Spring-type terminal (push-in)



> **3RS7000-1DE00**  
Separation amplifier 24 V AC/DC, 3-way separation  
input: 0-10 V output: 4-20 mA screw terminal



> **3RS7002-1AE00**  
Separation amplifier 24 V AC/DC, 3-way separation  
input: 0-20 mA output: 0-10 V screw terminal



> **3RS7000-2AE00**  
Separation amplifier 24 V AC/DC, 3-way separation  
input: 0-10 V output: 0-10 V Spring-type terminal (push-in)



> **3RS7002-1CE00**  
Separation amplifier 24 V AC/DC, 3-way separation  
input: 0-20 mA output: 0-20 mA screw terminal



> **3RS7002-1DE00**  
Separation amplifier 24 V AC/DC, 3-way separation  
input: 0-20 mA output: 4-20 mA screw terminal



> **3RS7002-2CE00**  
Separation amplifier 24 V AC/DC, 3-way separation  
input: 0-20 mA output: 0-20 mA Spring-type terminal (push-in)



> **3RS7002-2AE00**  
Separation amplifier 24 V AC/DC, 3-way separation  
input: 0-20 mA output: 0-10 V Spring-type terminal (push-in)



> **3RS7002-2DE00**  
Separation amplifier 24 V AC/DC, 3-way separation  
input: 0-20 mA output: 4-20 mA Spring-type terminal (push-in)



> **3RS7003-1AE00**  
Separation amplifier 24 V AC/DC, 3-way separation  
input: 4-20 mA output: 0-10 V screw terminal



> **3RS7003-2AE00**  
Separation amplifier 24 V AC/DC, 3-way separation  
input: 4-20 mA output: 0-10 V Spring-type terminal (push-in)



> **3RS7003-1CE00**  
Separation amplifier 24 V AC/DC, 3-way separation  
input: 4-20 mA output: 0-20 mA screw terminal



> **3RS7003-2CE00**  
Separation amplifier 24 V AC/DC, 3-way separation  
input: 4-20 mA output: 0-20 mA Spring-type terminal (push-in)



> **3RS7003-1DE00**  
Separation amplifier 24 V AC/DC, 3-way separation  
input: 4-20 mA output: 4-20 mA screw terminal



> **3RS7003-2DE00**  
Separation amplifier 24 V AC/DC, 3-way separation  
input: 4-20 mA output: 4-20 mA Spring-type terminal (push-in)



> **3RS7005-1FE00**

Separation amplifier 24 V AC/DC, 3-way separation input: 0-10 V, 0/4-20 mA output: 0-10 V, 0/4-20 mA screw terminal



> **3RS7005-1KE00**

Separation amplifier 24 V AC/DC, 3-way separation input: 0-10 V, 0/4-20 mA output: 0-50/100 Hz/1/10 kHz screw terminal



> **3RS7005-1FW00**

Signal converter 24-240 V AC/DC, 3-way separation Input: 0-10 V, 0/4-20 mA Output: 0-10 V, 0/4 - 20 mA Screw terminal



> **3RS7005-1KW00**

Signal converter 24-240 V AC/DC, 3-way separation Input: 0-10 V, 0/4 - 20 mA Output: 0-50/100 Hz/1/10 kHz Screw terminal



> **3RS7005-2FE00**

Separation amplifier 24 V AC/DC, 3-way separation input: 0-10 V, 0/4-20 mA; output: 0 - 10 V, 0/4 - 20mA Spring-type terminal (push-in)



> **3RS7006-1FE00**

Separation amplifier 24 V AC/DC, 3-way separation input: 0-60 mV, 0-100 mV 0-300 mV, 0-500 mV, 0-1 V 0-20 V, 0-5 V, 0-10 mA, 0-20 V 2-10 V, 0-5 mA, 0-10 mA 0-20mA, 4-20 mA, +5 mA, +20 mA output: 0 - 10 V, 0/4 - 20 mA screw terminal



> **3RS7005-2FW00**

Signal converter 24-240 V AC/DC, 3-way separation Input: 0-10 V, 0/4 - 20 mA; Output: 0 - 10 V, 0/4 - 20 mA Spring-type terminal (push-in)



> **3RS7006-1FW00**

Separation amplifier 24-240 V AC/DC, 3-way separation input: 0-60 mV, 0-100 mV 0-300 mV, 0-500 mV, 0-1 V 0-20 V, 2-10 V, 0-5 mA, 0-10 mA 2-10 V, 0-5 mA, 0-10 mA 0-20mA, 4-20 mA, +5 mA, +20 mA output: 0 - 10 V, 0/4 - 20 mA screw terminal



> **3RS7005-2KE00**

Separation amplifier 24 V AC/DC, 3-way separation input: 0-10 V, 0/4-20 mA; output: 0-50/100 Hz/1/10 kHz; Spring-type terminal (push-in)



> **3RS7006-2FE00**

Separation amplifier 24 V AC/DC, 3-way separation input: 0-60 mV, 0-100 mV 0-300 mV, 0-500 mV, 0-1 V 0-20 V, 2-10 V, 0-5 mA, 0-10 mA 2-10 V, 0-5 mA, 0-10 mA 0-20mA, 4-20 mA, +5 mA, +20 mA output: 0 - 10 V, 0/4 - 20 mA Spring-type terminal (push-in)



> **3RS7005-2KW00**

Signal converter 24-240 V AC/DC, 3-way separation Input: 0-10 V, 0/4 - 20 mA; Output: 0-50/100 Hz/1/10 kHz; Spring-type terminal (push-in)



> **3RS7006-2FW00**

Separation amplifier 24-240 V AC/DC, 3-way separation input: 0-60 mV, 0-100 mV 0-300 mV, 0-500 mV, 0-1 V 0-20 V, 2-10 V, 0-5 mA, 0-10 mA 2-10 V, 0-5 mA, 0-10 mA 0-20mA, 4-20 mA, +5 mA, +20 mA output: 0 - 10 V, 0/4 - 20 mA Spring-type terminal (push-in)



> **3RS7020-1ET00**

Separation amplifier Loop power isolator, 1-channel input: 4-20 mA output: 4-20 mA Width 6.2 mm screw terminal



> **3RS7025-1FW00**

Signal converter with Manual-Auto switch 24-240 V AC/DC, 3-way separation input: 0-10 V, 0/4-20 mA output: 0-10 V, 0/4-20 mA screw terminal



> **3RS7020-2ET00**

Separation amplifier Loop power isolator, 1-channel input: 4-20 mA output: 4-20 mA Width 6.2 mm Spring-type terminal (push-in)



> **3RS7025-2FE00**

Signal converter with Manual-Auto switch 24 V AC/DC, 3-way separation input: 0-10 V, 0/4-20 mA output: 0-10 V, 0/4-20 mA Spring-type terminal (push-in)



> **3RS7025-1FE00**

Separation amplifier with Manual-Auto switch 24 V AC/DC, 3-way separation input: 0-10 V, 0/4-20 mA output: 0-10 V, 0/4-20 mA screw terminal



> **3RS7025-2FW00**

Separation amplifier with Manual-Auto switch 24-240 V AC/DC, 3-way separation input: 0-10 V, 0/4-20 mA output: 0-10 V, 0/4-20 mA Spring-type terminal (push-in)