

Analog signal converters

Benefits and advantages

Product range for analog signal processing

CC-U range

- 8 different standard signal outputs on one device
- Input and output side universally configurable
- Also available with 2 threshold relay outputs
- Adjustment and operating elements on the front side
- Safe operation by electrical 3-way isolation
- Plug-in connecting terminals, unambiguously and clearly marked

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Conversion, measurement and separation of

- Standard signals
- Signals of RTD sensors (PT10, PT100, PT1000)
- Thermocouple signals
- TRMS values of currents and voltages

Characteristics

- The required input and output ranges can be configured for all devices by means of directly accessible DIP switches positioned on the side.
- Due to the wide input range of the gain and offset stages all input signals between the minimum and the maximum input value can be universally converted to all common output signals.
- Devices for DC or AC (50/60 Hz) supply available.

CC-E range

- Universally configurable devices and single-function devices
- Adjustment and operating elements on the front side
- Safe operation by electrical 3-way isolation
- Unambiguous and clear connecting terminal markings

Conversion, measurement and separation of

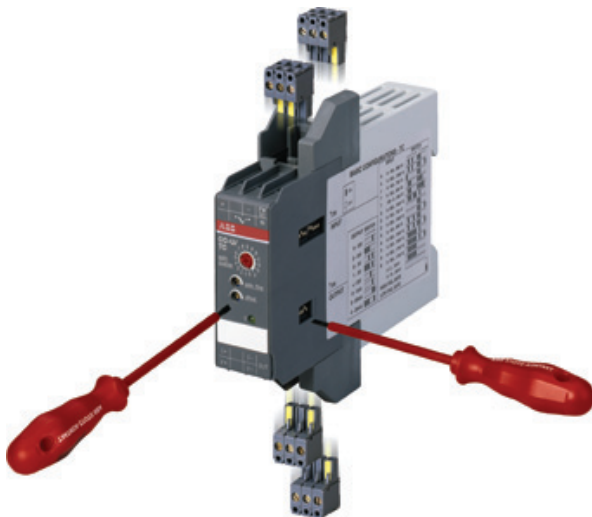
- Standard signals (0-5 V, 0-10 V, 0-20 mA, 4-20 mA)
- Temperature signals of RTD sensors (PT 100)
- Thermocouple signals (types J and K)
- Current measurement signals (0-5 A, 0-20 A AC/DC)

Characteristics of single-function devices

- No adjustment or balancing necessary.

Characteristics of universal devices

- The required input and output ranges can be configured by means of directly accessible DIP switches positioned on the side
- Gain adjustment of $\pm 5\%$ by means of an adjustment potentiometer on the front-side
- Offset adjustment of $\pm 5\%$ by means of adjustment potentiometers on the front-side



2CDC 283 016 F0b03

Analog signal converters

Application, Approvals and marks

Applications for analog signal processing and correct solution using CC-E and CC-U converters

Nearly every process includes a control system that receives data by means of analog signals and then evaluates the data and sets the respective parameters correspondingly.

When transmitting analog signals numerous problems may arise which can disturb or even block an ideal behavior of the process.

Below we have listed some processing problems together with the respective solutions to solve these problems:

Signal conversion

Sometimes the available signals cannot be processed by the controller or the actuator. In this case, signal converters are required to convert the input signal (or different input signals) to the desired output signal.

Signal amplification

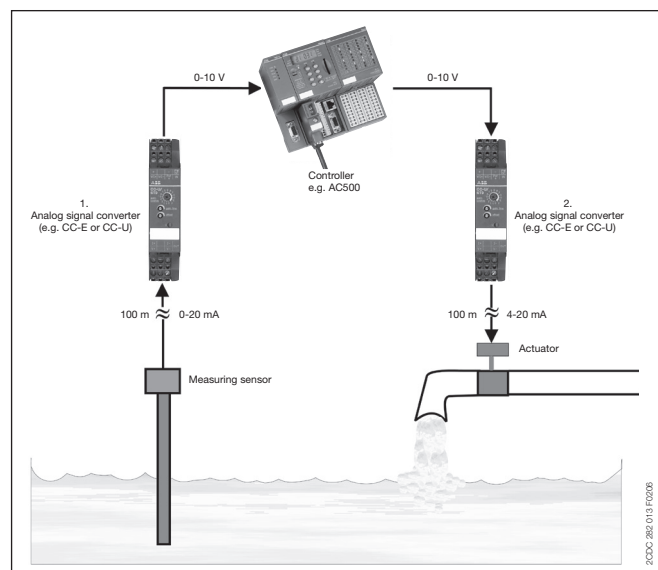
If long lines or high burdens have to be operated, it may be necessary to amplify the signal. CC analog signal converters require only low input power and provide high output power.

Thus, there are no restrictions for the converter's position on the line, i.e. it can be used

- for signal refreshing ① at the end of the line (low input power)
- or for signal amplification ② at the beginning of the line (high output power).

Signal filtering

Particularly on long lines or in rough industrial environments the signals are exposed to high electromagnetic interferences. The frequency of the coupled interference signals may be in the range of the common mains frequency (50 Hz) or even much higher (in case of frequency converters). According to the specific requirements, analog signal converters are available which provide reliable suppression of those interferences by means of an input low-pass filter.



Signal separation

■ Protection against overvoltage

The increased use of micro-electronics make controls much more sensitive against overvoltages, resulting from lightning discharges or switching processes. Suppression diodes are incorporated in the input of the CC analog signal converters which enable the converters to arrest overvoltages with low energy level (resulting from switching processes) by themselves. The products furthermore provide electrical isolation between input, output and supply circuit for protection of the controller connected to the output.

■ Protection against ground loops

If components are used which refer to ground, the measuring signals can be falsified by a so-called ground loop. In this case, certain parts of the signal are transmitted via earth and not via the analog transmission line, thus causing incorrect evaluation of the signal. The electrical isolation between the input and the output disconnects these ground loops and thus enables correct signal transmission.

- existing
- ▲ existing for some devices
- pending

		CC-E/STD	CC-E/I	CC-U/STD	CC-U/STDR	CC-E/RTD	CC-U/RTD	CC-U/RTDR	CC-E/TC	CC-U/TC	CC-U/TCR	CC-E/I	CC-E _{Ac} /L/PO	CC-U/I	CC-U/V
Approvals															
	UL 508, CAN/CSA C22.2 No.14	■	■	■	■	■	■	■	■	■	■	■	■	■	■
	UL 1604 (Class I, Div 2, hazardous locations), CAN/CSA C22.2 No.213	▲		■		▲	■		▲	■		▲		■	■
	CB scheme				■			■			■				
	CCC				■			■			■				
Marks															
	CE	■	■	■	■	■	■	■	■	■	■	■	■	■	■
	C-Tick	■	■	■	■	■	■	■	■	■	■	■	■	■	■

Analog signal converters

Overview

CC-E/STD analog signal converter with 3-way electrical isolation

- 2 universally configurable devices (type CC-E/STD)
- 2x10 single-function devices
- "Plug and Work", no adjustment of single-function devices required

Loop-powered current/current isolator without external power supply for analog current signals of 0-20 mA and 4-20 mA

- Electrical isolation between input and output
- Very low internal voltage drop ≤ 2.5 V
- Available with one or two independent channels
- Width only 18 mm (1 and 2 channels)

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CC-U/STD universal signal converter with 3-way electrical isolation

- More than 120 configurations possible
- Configurable output signal response on input voltage signal interruption (low fail safe / high fail safe)
- Adjustment and operating elements on the front
- Short-circuit proof signal outputs
- Plug-in connecting terminals for inputs, outputs and supply
- Very fast signal transmission enables use in control systems

CC-U/STDR universal signal converter for standard signals, with 2 threshold relay outputs and with 3-way electrical isolation

- Standard signal converter with 7 setting ranges
- 2 threshold relay outputs with one c/o contact each (threshold and respective hysteresis can be adjusted independently from each other)
- Open-circuit or closed-circuit principle configurable by means of a DIP switch
- 2 yellow LEDs for clear status indication of the output relays
- Plug-in connecting terminals for inputs, outputs and supply

CC-E/RTD temperature signal converter for RTD sensors, linearized with 3-way electrical isolation

- 2 universally configurable devices (type CC-E/RTD)
- 2x12 single-function devices
- "Plug and Work", no adjustment of single-function devices required
- Temperature signal converter for PT100 sensors
- 2- or 3-wire connection

CC-U/RTD universal signal converter for PT10, PT100, PT1000 temperature sensors (acc. to IEC 751 and JIS C 1604¹⁾, linearized with 3-way electrical isolation)

- Configurable output signal response on input signal interruption (low / high fail safe)
- Adjustment and operating elements on the front-side
- Short-circuit proof signal outputs
- Plug-in connecting terminals for inputs, outputs and supply
- 2- or 3-wire connection

¹⁾ Japanese standard

CC-U/RTDR universal signal converter for temperature and resistance signals, with 2 threshold relay outputs and 3-way electrical isolation

- Temperature signal converter for PT100 signals (5 ranges up to 800 °C) and variable resistances from 0-380 Ω
- 2 threshold relay outputs with one c/o contact each (threshold and respective hysteresis can be adjusted independently from each other)
- Open-circuit or closed-circuit principle configurable by means of a DIP switch
- 2 yellow LEDs for clear status indication of the output relays
- Plug-in connecting terminals for inputs, outputs and supply
- 2- or 3-wire connection

Analog signal converters

Overview

CC-E/TC analog signal converter for thermocouple signals of the types J and K with 3-way electrical isolation

- 2 universally configurable devices (type CC-E/TC)
- 2x6 single-function devices
- "Plug and Work", no adjustment of single-function devices required

CC-U/TC universal signal converter for thermocouples with 3-way electrical isolation

- Temperature signal converter for thermo-couples of the types K, J, T, S, E, N, R, B
- Continuously adjustable voltage signal input 0-10 mV and 0-50 mV
- Differential temperature meas. possible (see wiring instructions page 4/17)
- Configurable output signal response on input signal interruption (low fail safe / high fail safe)
- Adjustment and operating elements on the front-side
- Short-circuit proof signal outputs
- Plug-in connecting terminals for inputs, outputs and supply

CC-U/TCR universal signal converter for thermocouples, with 2 threshold relay outputs and 3-way electrical isolation

- Temperature signal converter for thermocouples of the types K, J, T, S
- 2 threshold relay outputs with one change-over contact each (threshold and respective hysteresis can be adjusted independently from each other)
- Open-circuit or closed-circuit principle configurable by means of a DIP switch
- 2 yellow LEDs for clear status indication of the output relays
- Plug-in connecting terminals for inputs, outputs and supply

CC-E/I measuring converter for current signals 0-5 A, 0-20 A, AC/DC with 3-way electrical isolation

- 2 universally configurable devices (type CC-E/I)
- 2x6 single-function devices
- "Plug and Work", no adjustment of single-function devices required

CC-E I_{AC} /ILPO measuring converter without auxiliary power for sinusoidal currents 0-1 A, 0-5 A, output 4-20 mA

- Measuring converter for sinusoidal currents (0-1 A, 0-5 A)
- Measuring range selection by front-face sliding switch
- 4-20 mA output current in proportion to input current
- no additional power supply required

CC-U/I universal measuring converter for RMS values of 0-1 A and 0-5 A, with 3-way electrical isolation

- RMS converter for current signals up to 1 A and up to 5 A of any wave form (DC, DC with superimposed AC components, pure sinusoidal, triangular, phase-angle controlled, etc. in a measuring range of 0-600 Hz)
- Adjustment and operating elements on the front
- Short-circuit proof signal outputs
- Plug-in connecting terminals for inputs, outputs and supply

CC-U/V universal measuring converter for RMS values of 0-600 V, with 3-way electrical isolation

- RMS converter for voltage signals up to 600 V of any wave form (DC, DC with superimposed AC components, pure sinusoidal, triangular, phase-angle controlled, etc. in a measuring range of 0-600 Hz)
- Adjustment and operating elements on the front
- Short-circuit proof signal outputs
- Plug-in connecting terminals for inputs, outputs and supply

Standard signal converters

Ordering details



CC-E/I

2CDC 281 010 F0003

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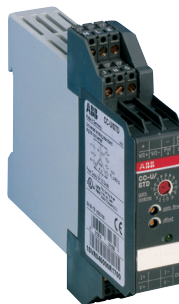
CC-E V/V

2CDC 281 001 F0003



CC-E I/I-2

2CDC 281 041 F0003



CC-U/STD

2CDC 281 002 F0003

Description

Standard signal converters of the CC-E range are designed to convert all kind of input standard signals (V, mA) into output standard signals (V, mA).

Ordering details - Standard Signal Converters

Supply voltage range	Input signal	Output signal	Type	Order code	Price 1 pce	Weight (1 pce) kg (lb)	
24 V DC	0-5 V, 0-10 V 0-20 mA, 4-20 mA	0-5 V, 0-10 V 0-20 mA, 4-20 mA	CC-E/STD ^{1) 3)}	1SVR011700R0000		0.088 (0.194)	
	0-10 V	0-10 V	CC-E V/V	1SVR011710R2100		0.083 (0.183)	
		4-20 mA	CC-E V/I	1SVR011712R1700		0.084 (0.185)	
	0-20 mA	0-10 V	CC-E I/V	1SVR011713R1000		0.082 (0.181)	
		0-20 mA	CC-E I/I	1SVR011714R1100		0.084 (0.187)	
		4-20 mA	CC-E I/I	1SVR011715R1200		0.084 (0.185)	
		4-20 mA	0-10 V	CC-E I/V	1SVR011716R1300		0.084 (0.185)
	4-20 mA	0-20 mA	CC-E I/I	1SVR011717R1400			
		4-20 mA	CC-E I/I	1SVR011718R2500		0.084 (0.187)	
	-10...+10 V	-10...+10 V	CC-E V/V	1SVR011719R2600		0.082 (0.181)	
110-240 V AC	0-5 V, 0-10 V 0-20 mA, 4-20 mA	0-5 V, 0-10 V 0-20 mA, 4-20 mA	CC-E/STD ³⁾	1SVR011705R2100		0.090 (0.198)	
	0-10 V	0-10 V	CC-E V/V	1SVR011720R2300		0.096 (0.212)	
		0-20 mA	CC-E V/I	1SVR011721R1000		0.087 (0.192)	
	0-20 mA	4-20 mA	CC-E V/I	1SVR011722R1100		0.091 (0.200)	
		0-10 V	CC-E V/V	1SVR011723R1200		0.091 (0.200)	
	4-20 mA	0-20 mA	CC-E V/I	1SVR011724R1300		0.088 (0.194)	
		4-20 mA	CC-E V/I	1SVR011725R1400			
		0-10 V	CC-E V/V	1SVR011726R1500		0.096 (0.212)	
		0-20 mA	CC-E V/I	1SVR011727R1600		0.087 (0.192)	
	4-20 mA	4-20 mA	CC-E V/I	1SVR011728R2700		0.088 (0.194)	
-10...+10 V		-10...+10 V	CC-E V/V	1SVR011729R2000		0.086 (0.190)	
loop powered	0-20 mA, 4-20 mA	0-20 mA, 4-20 mA	CC-E I/I-1 ²⁾	1SVR010200R1600		0.038 (0.084)	
			CC-E I/I-2 ²⁾	1SVR010201R0300		0.044 (0.097)	
24-48 V DC, 24 V AC	refer to table	refer to table 2 c/o	CC-U/STD	1SVR040000R1700		0.125 (0.276)	
110-240 V AC, 100-300 V DC				1SVR040001R0400		0.126 (0.278)	
24-48 V DC, 24 V AC			CC-U/STDR ⁴⁾	1SVR040010R0000		0.142 (0.313)	
110-240 V AC, 100-300 V DC				1SVR040011R2500			

¹⁾ 1604 Class I, Div.2 (universal device)

²⁾ CC-E-I/I-1 has 1 channel, CC-E-I/I-1 has 2 channels

³⁾ 3-way electrical isolation

⁴⁾ with relay output

Analog signal converters

Technical data

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Type	CC-E/STD / CC-E x/x	CC-E/RTD ³⁾	CC-E/TC
Input circuits - Analog inputs	J-G-H	Current	Voltage
Input signal	Standard signals		PT100
Rated input range	0...20 mA / 4...20 mA	0...5 V / 0...10 V / -10...+10 V	-50...+500 °C
Limitation of input signals	+55 mA	± 11 V	
Influence of line resistance	-	< 0.01 %/Ω	< 0.5 % / 100 Ω
Gain adjustment range	± 5 % (universal devices)		
Offset adjustment range	± 5 % (universal devices)		
Input impedance	50 Ω	1 MΩ	-
Suppression at 50 Hz	-	-	> 35 dB
Common-mode rejection	-	-	100 dB
Output circuits - Analog outputs	D-F, A-C	Current	Voltage
Output signal	0-20 mA, 4-20 mA		0-5 V, 0-10 V
Output burden	≤ 500 Ω		≥ 1.0 KΩ
Accuracy ¹⁾	± 0.5 % of full-scale		
Residual ripple	< 0.5 %		
Response time	200 μs	10 ms	
Transmission frequency	2 kHz	80 Hz	2 Hz (up to -3 dB)
Reaction to input circuit interruption	High fail safe: Output voltage > 115 % of measuring range ²⁾ Low fail safe: Output voltage < -0.6 V, output current = 0 mA		
Supply circuits	K-M	DC versions	AC versions
Supply voltage	24 V DC		110-240 V AC - 50/60 Hz
Supply voltage tolerance	-15...+15 %		-15...+10 %
Power consumption	1.5 W typ.		1.5 VA typ.
Indication of operational states	U: green LED		
Rated control supply voltage U _s	U: green LED		
General data	0...+60 °C / -20...+80 °C		
Ambient temperature range operation / storage	± 500 ppm/°C		
Temperature coefficient	IP20		
Degree of protection (DIN 40050)	ventilation slots on top and bottom		
Mounting position	DIN rail (IEC/EN 60715), snap-on mounting		
Mounting			
Electrical connection	0.2-4 mm ² (24-12 AWG)		
Wire size	rigid	0.2-2.5 mm ² (24-14 AWG)	
	fine-strand with(out) wire end ferrule	7 mm (0.28 inch)	
Stripping length	0.5 Nm (4.4 lb.in)		
Tightening torque			
Electromagnetic compatibility	EN 61000-6-2		
Interference immunity	Level 3 (±6 kV / ±8 kV)		
electrostatic discharge (ESD)	IEC/EN 61000-4-2	10 V/m	
electromagnetic field (HF radiation resistance)	IEC/EN 61000-4-3	Level 3 (±2 kV / 5 kH)	
fast transients (Burst)	IEC/EN 61000-4-4	±2 kV / ±1 kV	
powerful impulses (Surge)	IEC/EN 61000-4-5	10 V	
HF line emission	IEC/EN 61000-4-6	Class B	
Interference emission	EN 61000-6-4		
Isolation data	2.5 kV AC		
Test voltage between all isolated circuits			
Rated insulation voltage	-	-	-

¹⁾ Includes non-linearity and factory setting, influenced by supply voltage and output load.

²⁾ Only -/RTD and -/TC: Single-function devices respond with Low fail safe to input signal interruptions.

³⁾ When connecting a 2-wire sensor, the terminals J and H have to be jumpered.

Approvals on page 4/4.