

The Task

Isolation and transmission of 0(4) ... 20 mA and 0 ... 10 V standard signals in two 0(4) ... 20 mA output channels with galvanic isolation between input, outputs and power supply.

The Problems

Measuring and control engineering frequently requires an analog standard signal to be processed at two points, i.e., by two devices, with both devices needing to receive the same signal. To prevent falsified signals and in particular, in the event of errors, interaction or even damage, it makes sense to isolate signals and devices galvanically from one another.

The Solution

The VariTrans A 20300 signal doubler is an extremely compact product which also provides a cost-effective solution to the problem. In this module, the input, both outputs, and the power supply are safely decoupled from one another (four-port isolation).

VariTrans A 20300

Signal doublers with two switchable calibrated outputs in a 6 mm housing, also for applications with high output loads.

The Housing

Measuring only 6 mm, the ultra-slim, closed 8-pin modular housing of the VariTrans A 20300 takes up only a little space on the DIN rail and, if necessary, can be installed at a later date.

The Advantages

As a Signal Doubler:

In addition to “doubling” the analog signal, the VariTrans A 20300 can also convert signals if required. If, for example, the signal source only has a voltage output but current signals are used in the system, then the signal doubler converts the voltage signal (0 ... 10 V) proportionally into the required current signals (0 ... 20 mA or 4 ... 20 mA). Conversion from “Dead Zero” (0 ... 20 mA) to “Live Zero” (4 ... 20 mA) is also possible. The corresponding input and output signals are calibrated and can be selected using DIP switches, with the two outputs being switched over together.

To Increase the Load:

The VariTrans A 20300 can also be used when a particularly high output load is required. Standard signal sources can often drive a load of up to 500 ohms, i.e., supply 10 V at 20 mA. Sometimes certain devices – e.g., actuators – require a higher voltage; i.e., their input resistance is higher. The signal doubler can also solve this problem:

Both output signals are not used separately in this case, but are connected in series to form one signal. This doubles the available voltage, making it possible to drive a higher load of up to 1000 ohms (20 V at 20 mA). Of course, the signal-defining 0/4 to 20 mA current is retained in the series configuration.

The Technology

To implement the high level functionality of an A 20300 in the smallest of spaces – in a 6-mm wide modular housing with correspondingly small volume – a patent-pending circuit design is used. The energy balance (two active outputs) in particular must be optimized for all operating conditions. A patent application has been filed for the circuit principles of the VariTrans A 20300. Like all VariTrans A 20xxx series products, the signal doubler also provides protective separation according to EN 61140 to ensure high-level protection of personnel and equipment. This is achieved by means of increased insulation in compliance with EN 61010-1. In spite of being only 6 mm wide, the VariTrans A 20300 makes no compromises regarding its insulation properties.

VariTrans A 20300

Facts and Features

- **Safety in the smallest space**
4-port isolation in 6 mm modular housing

– **Signal doubling**
combined with signal conversion

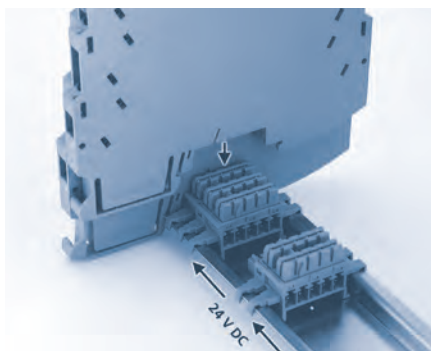
– **Load increase**
up to 1000 ohms possible for inputs with high input impedances
- **Standards-compliant personal protection**
through protective separation according to EN 61140

– **Flexible use**
with DIP switches accessible from the outside

– **Calibrated range selection**
without complicated trimming
- **Low-cost solution**
Only one compact, low-cost device is required instead of two conventional isolators

– **International use**
UL/CSA approvals

– **5-year warranty**



The power supply can be routed from one device to another via DIN rail bus connectors.



Product Line

Device	Input	Output	Order no.
VariTrans A 20300	0 ... 20 mA	0 ... 20 mA, 10 V	A 20300 P0
calibrated switching	4 ... 20 mA	4 ... 20 mA, 10 V	
(both outputs together)	0 ... 10 V		

Power supply

24 V DC

Accessories		Order no.
ZU 0628 DIN rail bus connector	Power supply bridging for 2 isolators, A 20xxx P0 or P 32xxx P0	ZU 0628
IsoPower A 20900	Power supply, 24 V DC, 1 A (see page 212)	A 20900 H4
ZU 0677 power terminal block	For connecting the 20 ... 30 V DC supply voltage to the ZU 0628 DIN rail bus connector	ZU 0677
DIN rail bus connector	for tapping of supply voltage (2 units required if on right side of IsoPower A 20900)	ZU 0678

Specifications

Input data

Input	0 ... 20 mA, 4 ... 20 mA, 0 ... 10 V switchable (default setting 0 ... 20 mA)	
Input resistance	Current input:	voltage drop ≤ 0.1 V at 20 mA (with power failure approx. 350 mV)
	Voltage input:	approx. 100 k Ω
Overload capacity	Current input:	self-resetting overcurrent protection (PTC characteristic)
	Voltage input:	voltage limited to 30 V by suppressor diode, max. permitted continuous current: 3 mA

Output data

Outputs 1 and 2	0 ... 20 mA, 4 ... 20 mA jointly switchable (default setting 0 ... 20 mA)	
Load	≤ 10 V (≤ 500 Ω at 20 mA), ≤ 20 V (both outputs in series)	
Offset	< 30 μ A	
Residual ripple	< 10 mV _{rms} (at 500 Ω load)	

Transmission behavior

Gain error ¹⁾	< 0.2 % meas. val. with direct current transmission 1:1 < 0.3 % meas. val. with voltage input	
Cutoff frequency	> 100 Hz	
Response time	T ₉₀ : approx. 1 ms; T ₉₉ : approx. 1.5 ms	
Temperature coefficient ²⁾	< 0.01 %/K full scale (reference temp. 23 °C)	

Power supply

Power supply	24 V DC (± 15 %), approx. 1.2 W The power supply can be routed from one device to another via DIN rail bus connectors.	
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Isolation

Galvanic isolation	4-port isolation between input, outputs and power supply	
Test voltage	1.5 kV AC, 50 Hz : power supply against input 2.5 kV AC, 50 Hz: outputs against each other and against input/power supply	
Working voltage (basic insulation)	Up to 300 V AC/DC across all circuits with overvoltage category II and pollution degree 2. For applications with high working voltages, take measures to prevent accidental contact and make sure that there is sufficient distance or insulation between adjacent devices.	
Protection against electric shock	Protective separation to EN 61140 by reinforced insulation according to EN 61010-1. Working voltage up to 300 V AC/DC across each output and all other circuits with overvoltage category II and pollution degree 2. For applications with high working voltages, take measures to prevent accidental contact and make sure that there is sufficient distance or insulation between adjacent devices.	

VariTrans A 20300

Specifications (continued)

Standards and approvals

EMC ³⁾	Product family standard: EN 61326 Emitted interference: Class B Immunity to interference: Industrial environment
Approval	cURus, file no. E 220033, standards: UL 508 and CAN/CSA 22.2 No. 14-95
RoHS conformity	According to directive 2011/65/EU

Further data

MTBF ⁴⁾	Approx. 243 years
Ambient conditions	Indoor use ⁵⁾ ; Relative humidity 5 ... 95 %, no condensation; max. altitude 2000 m (air pressure: 790 ... 1060 hPa) ⁶⁾
Ambient temperature	During operation: 0 ... +55 °C when mounted in row During storage: -25 ... +85 °C
Design	Modular housing with screw terminals, width 6.2 mm
Conductor cross sections	Single wire 0.2... 2.5 mm ² Stranded wire 0.2... 2.5 mm ² 24-14 AWG
Tightening torque	0.6 Nm
Ingress protection	IP 20
Mounting	For 35-mm DIN rail according to EN 60715
Weight	Approx. 50 g

¹⁾ Additional error for live-zero operation 20 µA

²⁾ Average TC in the specified operating temperature range 0°C ... +55 °C

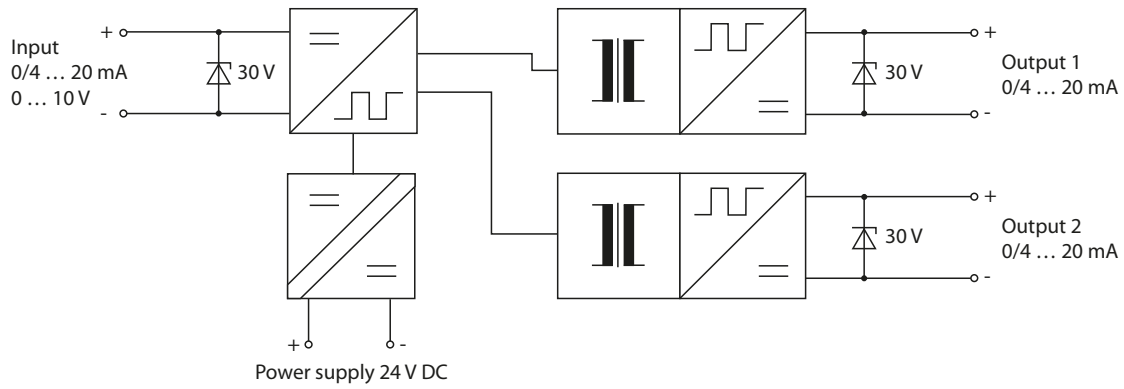
³⁾ Slight deviations are possible while there is interference

⁴⁾ Mean time between failures – MTBF – according to EN 61709 (SN 29500). Conditions: stationary operation in well-kept rooms, average ambient temperature 40°C, no ventilation, continuous operation

⁵⁾ Closed, weather-protected operating areas (stationary operation), water or wind-driven precipitation (rain, snow, hail, etc.) excluded

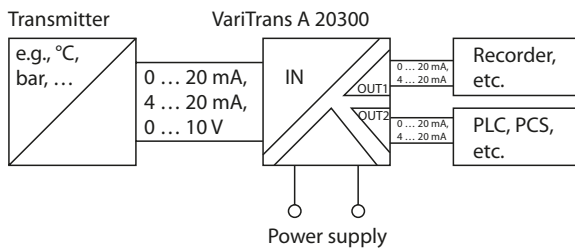
⁶⁾ Lower air pressure reduces the allowable working voltages.

Block Diagram

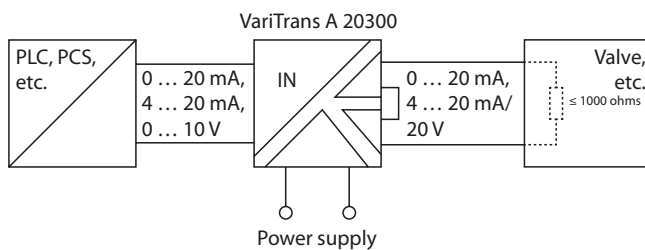


Typical Applications

Signal doubling

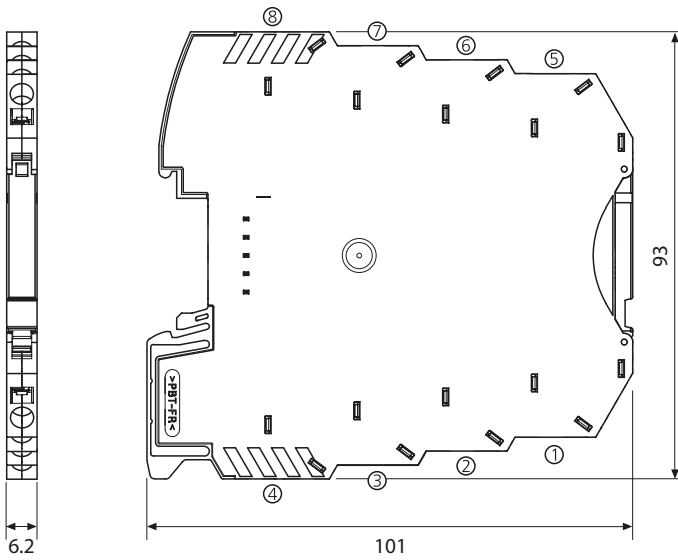


Load increase



VariTrans A 20300

Dimension Drawing and Terminal Assignments



Terminal assignments

- 1 Output 2 +
- 2 Output 2 -
- 3 Input +
- 4 Input -
- 5 Output 1 +
- 6 Output 2 -
- 7 Power supply +
- 8 Power supply -

Conductor cross-sections:
 single wire 0.2 ... 2.5 mm²
 stranded wire 0.2 ... 2.5 mm²
 24-14 AWG

All dimensions in mm