VariTrans P 43000

Universal high-voltage isolator.
Input currents up to I_{in} = 5 A.

The Task
In high-voltage systems, unipolar or bipolar currents ranging from 100 mA to 5 A must be galvanically isolated and converted to standard ±20 mA, ±10 V or 4 ... 20 mA output signals.

The Problems
In the case of insufficient insulation, high voltages and harsh ambient conditions may overload the galvanic isolation. This can result in false measurement values or even personal injury or damage to the equipment. These risks have to be eliminated safely and over the long term by suitably designed high-voltage isolation amplifiers.

The Solution
The VariTrans P 43000 isolation amplifiers have been specially conceived for direct measurement of currents up to 5 A AC/DC. They reliably isolate high potentials at the input circuit.

The isolating distances are designed to withstand permanent voltages up to 3600 V AC/DC and fast transients up to 20 kV. Protection against electric shock is achieved through protective separation according to EN 61140 between input and output and power supply.

The Housing
A new 45 mm wide modular housing is used for the VariTrans P 43000 high-voltage isolators. It is snapped onto a standard DIN rail. The front panels of the adjustable models provide a rotary encoder switch for selecting the ranges.

The Advantages
The VariTrans P 43000 are available for any input currents from ±100 mA to ±5 A. Analog unipolar and bipolar (standard) signals are available at the output: ±20 mA, ±10 V and 4 … 20 mA. 16 input/output signal combinations can easily be selected with a rotary encoder switch on the front of the device.
Tedious on site adjustment using a screwdriver, calibrator or multimeter is no longer required. Drift problems due to unstable trimming components – e.g. potentiometers – are avoided. Thanks to the easy scalability of the range selection, the devices can easily be customized to individual customer solutions. Up to 16 customized signal combinations can be implemented in one device and configured optimally for the respective application.

The integrated 20 to 253 V AC/DC VariPower broad-range power supply offers maximum flexibility. This ensures trouble-free operation with alternating or direct voltages everywhere in the world and provides for maximum safety even in unstable power supply networks. Installation is also easy and safe: Incorrect connection of the mains supply is practically impossible. Expensive standstill times and repair work during commissioning are avoided.

Vacuum encapsulation provides maximum protection against aggressive environmental influences, shock and vibrations and ensures that the high disruptive strength required for working voltages up to 3600 V AC/DC is maintained over the long term. The isolation system meets the safety requirements of EN 61010-1 and EN 50124-1 (railway applications: insulation coordination).

Knick

The Technology

In this device series, Knick relies on the newly developed TransShield technology, which compared to conventional designs enables very compact high-voltage transformers with low leakage. Thanks to the resulting space savings, a just 45 mm wide modular housing is sufficient for input currents up to 5 A AC/DC.

Another substantial advantage of this technology: High transient overvoltages (common-mode interference) are reliably isolated and cause hardly any measurement errors at the output. To guarantee the specified isolation capabilities, 100 % of the devices are subjected to routine testing with 15 kV AC (fixed-range models) or 10 kV AC (switchable models).

Circuit design and device construction ensure excellent transmission characteristics, which are reflected in zero point stability, linearity, long-term stability, frequency response and immunity to interference. A cutoff frequency > 5 kHz and rise time < 0.1 ms guarantee distortion-free signal conversion. The output signal follows fast changes in the input signal almost without delay.

The Facts

– **Universal high-voltage isolators** for converting input currents up to 5 A to impressed ±20 mA, ±10 V or 4 ... 20 mA output signals.

– **New TransShield technology** allows for extremely compact modular housings

– **Working voltages up to 3600 V AC/DC**

– **Protection against electric shock** through protective separation up to 1800 V AC/DC according to EN 61140

– **Test voltages up to 15 kV AC**

– **Outstanding transmission properties:**
  – Gain error < 0.3 %
  – Cut-off frequency > 5 kHz (low-pass filtering possible)
  – Rise time T90 < 0.1 ms

– **Tremendous flexibility thanks to**
  – calibrated switching of up to 16 input/output ranges (working voltage up to 2200 V)
  – up to 16 customer-specific measuring ranges
  – 20 V to 253 V AC/DC broad-range power supply

– **Reliable function** even with unstable supply

– **No damage** in the case of erroneous power connection

– **Switchable models** minimize device variants and reduce inventory costs

– **Robust** thanks to vacuum encapsulation

– **Mechanically stable** for operation on ships, rail vehicles and land vehicles

– **5-year warranty**

Warranty
5 years!

Warranty
Defects occurring within 5 years from delivery date shall be remedied free of charge at our plant (carriage and insurance paid by sender).

VariTrans P 43000

Product Line

Devices	Input	Output	Working voltage	Test voltage	Order No.
VariTrans P 43000 Input and output adjustable	±1 / 1.5 / 2 / 3 / 5 A, switchable	±10 V, ±20 mA and 4 … 20 mA, switchable	≤ 2.2 kV AC/DC	10 kV AC	**P 43000 D2**
VariTrans P 43000 adjusted to customer requirements	±0.1 A ... 5 A, one or more ranges to customer requirements[1)]	±10 V, ±20 mA, 4 … 20 mA, one or more ranges to customer requirements[1)]	≤ 2.2 kV AC/DC	10 kV AC	**P 43000 D2-nnnn**
	±0.1 A … 5 A, fixed, to customer requirements[1)]	±10 V, ±20 mA, 4 … 20 mA, fixed, to customer requirements[1)]	≤ 3.6 kV AC/DC	15 kV AC	**P 43100 D2-nnnn**

Power supply

20 … 253 V AC/DC

[1)] Please specify the desired setting on the order

Specifications

Input

Inputs	P 43000 D2	±1 A, ±1,5 A, ±2 A, ±3 A, ±5 A, calibrated switching, default setting: ±5 A
	P 43000 D2-nnnn	0.1 A … 5 A, uni-/bipolar; 1 to 16 ranges to customer requirements, calibrated switching
	P 43100 D2-nnnn	0.1 A … 5 A, uni-/bipolar; fixed setting, to customer requirements
Input resistance	< 0.6 ohm	
Input capacitance	Approx. 1 nF	
Overload capacity	20 % full scale	

Output

Output	P 43000 D2	20 mA, 10 V uni-/bipolar and 4 … 20 mA; calibrated switching, default setting: ±10 V
	P 43000 D2-nnnn	20 mA, 10 V uni-/bipolar and/or 4 … 20 mA; calibrated switching, to customer requirements
	P 43100 D2-nnnn	20 mA, 10 V uni-/bipolar or 4 … 20 mA; fixed setting, to customer requirements
Offset	Up to ±150 % by default	
Load	With output current	≤ 12 V (600 ohms at 20 mA)
	With output voltage	≤ 10 mA (1000 ohms at 10 V)
Offset	20 µA or 10 mV	
Residual ripple	< 10 mV_{rms}	

Knick

Specifications *(continued)*

Transmission behavior		
Gain error	< 0.3 % meas. val.	
Cutoff frequency (–3 dB)	Approx. 5 kHz; optional factory setting: 10 Hz	
Common-mode rejection ratio	CMRR[1)]	DC: approx. 160 dB AC 50 Hz: approx. 120 dB
Temperature coefficient[2)]	< 0.005 %/K full scale	
Power supply		
Power supply	20 … 253 V AC/DC	AC 48 … 62 Hz, approx. 2 VA; max. approx. 1.2 W
Isolation		
Galvanic isolation	3-port isolation between input, output and power supply	
Test voltage	Calibrated switching	10 kV AC across input and output / power supply
	Fixed setting (model P43100D2-nnnn)	15 kV AC across input and output / power supply
	All models	4 kV AC across output and power supply
Working voltage (basic insulation) according to EN 61010-1	Calibrated switching	Up to 2200 V AC/DC across input, output and power supply with overvoltage category III and pollution degree 2 (fast transients: 13.5 kV)
	Fixed setting (model P43100D2-nnnn)	Up to 3600 V AC/DC across input, output and power supply with overvoltage category III and pollution degree 2 (fast transients: 20 kV)
Rated isolation voltage according to EN 50124-1	Calibrated switching	Up to 2200 V AC/DC across input, output and power supply with overvoltage category III and pollution degree 2
	Fixed setting (model P43100D2-nnnn)	Up to 3600 V AC/DC across input, output and power supply with overvoltage category III and pollution degree 2
Protection against electric shock	Calibrated switching	Protective separation according to EN 61140 by reinforced insulation according to EN 61010-1. Working voltages with overvoltage category III and pollution degree 2: – up to 1100 V AC/DC across input and output/ power supply – up to 300 V AC/DC across output and power supply
	Fixed setting (model P43100D2-nnnn)	Protective separation according to EN 61140 by reinforced insulation according to EN 61010-1. Working voltages with overvoltage category III and pollution degree 2: – up to 1800 V AC/DC across input and output/ power supply – up to 300 V AC/DC across output and power supply
For applications with high working voltages, ensure there is sufficient spacing or isolation from neighboring devices and protection against electric shocks.		

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Specifications *(continued)*

Standards and approvals

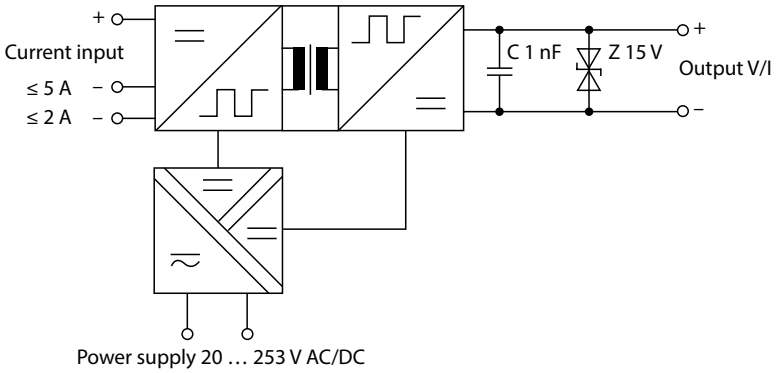
EMC[3]	Product family standard:	EN 61326
	Emitted interference:	Class B
	Immunity to interference:	Industry

Further data

MTBF[4]	Approx. 96 years	
Ambient temperature[5]	Operation:	-10 … +70 °C
	Transport and storage:	-40 … +85 °C
Design	Modular housing	D2 housing width: 45.0 mm
	with screw terminals	See dimension drawings for further measurements
Ingress protection	Housing: IP 40, terminals: IP 20	
Mounting	With snap-on mounting for 35-mm top-hat rail according to EN 60715	
Weight	Approx. 350 g	

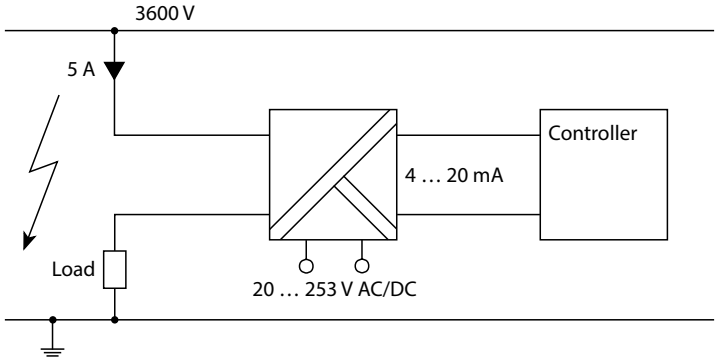
1) Common-Mode Rejection Ratio = Differential voltage gain : Common-mode voltage gain
2) Reference temperature for TC specifications = 23 °C, average TC
3) Slight deviations are possible while there is interference
4) Mean Time Between Failures – MTBF – according to EN 61709 (SN 29500) Conditions: stationary operation in well-kept rooms, average ambient temperature 40 °C, no ventilation, continuous operation
5) Extended temperature range –25 ... +85 °C on request

Block Diagram



Typical Application

Direct Measurement with a High Input Potential



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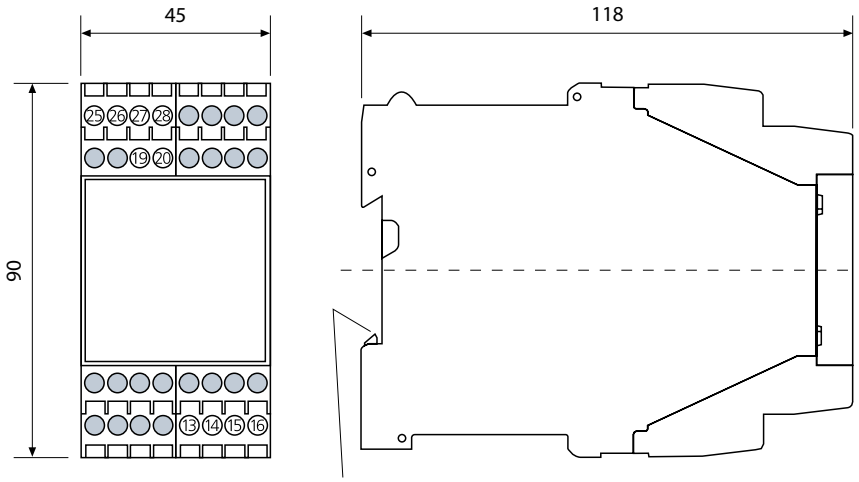
Dimension Drawings and Terminal Assignments



Snap-on mounting onto 35-mm
EN 50022 mounting rail

Terminal assignments

13	nc			
14	Input	+	current	
15	Input	–	current (≤5 A)	
16	Input	–	current (≤2 A)	
19	Power supply AC/DC			
20	Power supply AC/DC			
25	Output	+	current	
26	Output	+	voltage	
27	Output	–	current	
28	Output	–	voltage	

M 3.5 connecting screws with
self-releasing terminal housing
Conductor cross-section max. 1 x 4 mm² solid
or 1 x 2.5 mm² stranded with ferrule,
min. 1 x 0.5 mm² solid or stranded with ferrule

For voltage output, place jumper across
terminals 25 and 26.
Don't use a jumper for current output
(remove pre-installed jumper).

All dimensions in mm