

1000 V. Safe and Sound.

VariTrans[®] P 29000

Compact high-voltage isolation amplifiers with safe galvanic isolation, VariPower[®] broad-range power supply and genuine calibrated range selection.

Isolation Amplifiers
Transmitters

Indicators

Process Analytics

Portable Meters

Laboratory Meters

Sensors

Fittings



Knick 

High-voltage isolation amplifiers for voltages up to 1000 volts.



VariTrans® P 29000

Working voltages up to 1000 V AC/DC and test voltages up to 5.4 kV AC, high performance and compact modular housing – with the VariTrans® P 29000 series, Knick is consistently expanding the VariTrans® range.

The new high-voltage amplifiers from Knick also present a globally unique combination of properties with substantial advantages in installation, configuration and operation:

- Safe galvanic isolation with high isolation
- Precise calibrated range selection (gain error 0.1 or 0.2 %)
- Simple configuration without additional tools
- Signal quality not influenced by control elements
- Integrated broad-range power supply 20 to 253 V AC/DC

■ Genuine calibrated range selection

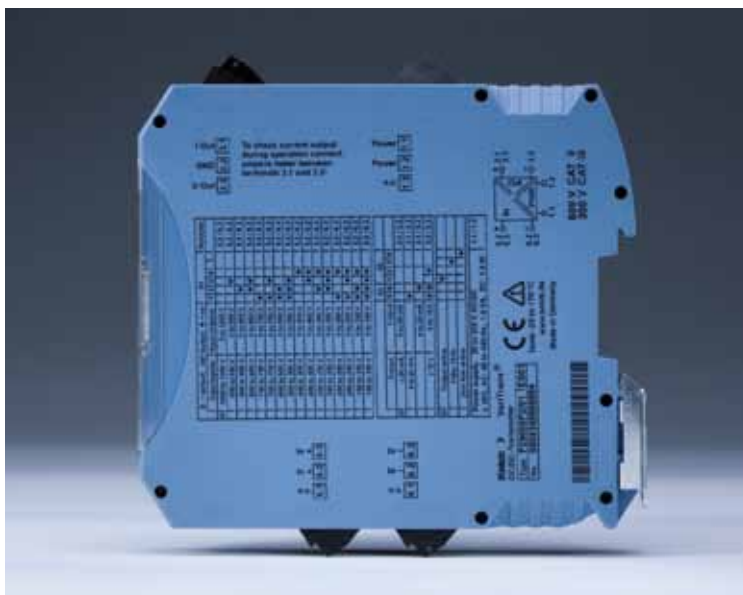
VariTrans® P 29000 sets the measuring ranges via DIP switches on the front side of the modular housing. Selection is then regulated by a micro-controller, meaning that no calibrators or other instruments are required for on-site con-

figuration. LEDs visualize correct functioning or any errors.

The simple implementation of special measuring ranges supports solutions tailored to your application.

■ Optimized housing

With a width of only 17.5 mm, the modular housings of the P 29000 series strike an optimum balance between compactness and safety. The minimum clearance between inputs and outputs, in conformance with standards, is reliably met in the P 29000 series; additional isolation measures are not required.





Original size
99 x 114.5 x 17.5 mm
(length x height x width)

Facts

Universal usability: input 20 mV up to 1000 V as well as ± 100 mA

Working voltages up to 1000 V AC/DC

Protective separation according to EN 61140 – protection of the maintenance staff and the subsequent devices against non-permitted high voltages up to 600 V AC/DC

Test voltage 5.4 kV AC across input and output

Excellent transmission properties:
– gain error 0.2 %
– cut-off frequency > 10 kHz
– rise time T99 < 200 μ s

High load capability at output:
14 V (current output),
10 mA (voltage output)

High immunity to transient common-mode interference:
T-CMR > 100 dB

Exceptional flexibility with calibrated range selection; reduction of device variants and thus of storage costs

World-wide usability with VariPower® broad-range power supply 20 V to 230 V AC/DC ± 10 %; reliable function even with unstable supply

No destruction in the event of incorrect mains voltage

Switchable output inversions

Rectifier in signal path (absolute-value forming); optional

Rangelimit, adjustable lower or higher limit at output; optional

Test jacks for measuring output current and voltage

Low space consumption in enclosure with only 17.5 mm wide modular housing

Low-cost assembly – quick mounting, convenient connection of power supply through DIN-rail bus connectors (with 24 V DC supply)

5-year warranty

5-year warranty

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

High-voltage isolation amplifiers for voltages up to 1000 volts.

Knick >



■ Versatile applications

The high-voltage isolation amplifiers in the VariTrans® P 29000 series are available with three input variants for various requirements: high voltage, mV, or current input. The devices are ideal for monitoring and controlling electrical drive systems operated with DC voltages and feature a passive output for direct connection to a supplying SPC.

Input voltages of ± 100 V to ± 1000 V DC are galvanically isolated and reproduced as a 0/4 ... 20 mA or 0 ... 10 V standard signal, or as a bipolar signal in the -20 ... 20 mA or -10 ... 10 V range at the output. Typical applications are direct current and servo drives, generators etc, alongside with power supplies for welding units and inverters for solar or wind power systems. The extraordinary performance and flexibility of the isolation amplifiers supports the user in the development of the most diverse product or system solutions.

■ Practical test jacks

For direct measurement of the output power, the isolation amplifiers feature test jacks which enable measurement of output current and voltage. An optional RangeLimit function allows setting lower and upper output limits. In addition, versions with full-wave rectifiers in the signal path are available. The user can invert the output. A connectable potentiometer enables adjustment of up to 5 % on the measuring section.

■ Integrated broad-range power supply

Maximum flexibility and direct added value for the user is also provided by the integrated VariPower® broad-range power supply (20 ... 253 V AC/DC), suitable for the power-engineering frequency range of 45 ... 440 Hz. 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 simple and safe – incorrect assignment of the mains voltage is practically excluded; expensive downtimes and repairs during commissioning are avoided.

The 24 V DC supply voltage for the VariTrans® P 29000 can be conveniently and inexpensively looped by using mounting rail connectors.

■ Superior functionality

In the VariTrans® P 29000 series, the circuit design and device construction ensure excellent transmission quality which is reflected in the zero stability, linearity, long-term stability, frequency response and immunity to interference. Thanks to the high cut-off frequency of the devices, the signal form on the input is reproduced on the output without distortion. Fast changes in the input signal are converted almost without delay into a corresponding change in the output signal. In the input signals, the new Knick high-voltage isolators provide a wide measuring range: from the millivolt range all the way to high voltages, currents of up to ± 100 mA can be directly measured. Analog unipolar and bipolar (standard) signals are available at the output. The user can select from 224 switchable calibrated ranges and thus take into account the individual operating conditions.

Subject to change!



VariTrans® P 29000 standard measuring ranges

Input, bipolar	Output, active	Output, passive
-1000 ... 1000 V	-20 ... 20 mA	4 ... 20 mA
-950 ... 950 V	20 ... -20 mA	
-900 ... 900 V	4 ... 20 mA	
-800 ... 800 V	-4 ... -20 mA	
-750 ... 750 V	-10 ... 10 V	
-700 ... 700 V	10 ... -10 V	
-600 ... 600 V		
-500 ... 500 V		
-450 ... 450 V		
-400 ... 400 V		
-350 ... 350 V		
-300 ... 300 V		
-250 ... 250 V		
-200 ... 200 V		
-150 ... 150 V		
-100 ... 100 V		

Input, unipolar	Output, active	Output, passive
0 ... 1000 V	0 ... 20 mA	0 ... 20 mA
0 ... 950 V	0 ... -20 mA	4 ... 20 mA
0 ... 900 V	4 ... 20 mA	
0 ... 800 V	-4 ... -20 mA	
0 ... 750 V	0 ... 10 V	
0 ... 700 V		
0 ... 600 V		
0 ... 500 V		
0 ... 450 V		
0 ... 400 V		
0 ... 350 V		
0 ... 300 V		
0 ... 250 V		
0 ... 200 V		
0 ... 150 V		
0 ... 100 V		

VariTrans® P 29001 standard measuring ranges

Input, bipolar	Output, active	Output, passive
-100 ... 100 V	-20 ... 20 mA	4 ... 20 mA
-80 ... 80 V	20 ... -20 mA	
-60 ... 60 V	4 ... 20 mA	
-50 ... 50 V	-4 ... -20 mA	
-30 ... 30 V	-10 ... 10 V	
-20 ... 20 V	10 ... -10 V	
-10 ... 10 V		
-5 ... 5 V		
-300 ... 300 mV		
-200 ... 200 mV		
-150 ... 150 mV		
-120 ... 120 mV		
-100 ... 100 mV		
-90 ... 90 mV		
-60 ... 60 mV		
-30 ... 30 mV		

Input, unipolar	Output, active	Output, passive
0 ... 100 V	0 ... 20 mA	0 ... 20 mA
0 ... 80 V	0 ... -20 mA	4 ... 20 mA
0 ... 60 V	4 ... 20 mA	
0 ... 50 V	-4 ... -20 mA	
0 ... 30 V	0 ... 10 V	
0 ... 20 V		
0 ... 10 V		
0 ... 5 V		
0 ... 300 mV		
0 ... 200 mV		
0 ... 150 mV		
0 ... 120 mV		
0 ... 100 mV		
0 ... 90 mV		
0 ... 60 mV		
0 ... 30 mV		

VariTrans® P 29000

Product Line

Order No.

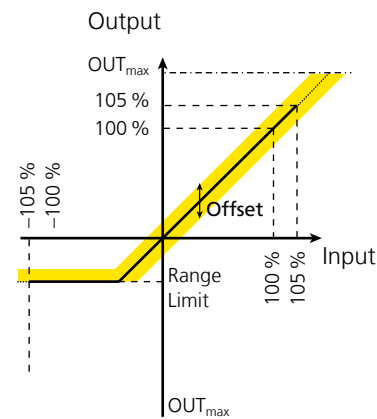
		Order No.							
		P29000P2/	0	<input type="checkbox"/>	-	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
24 V	Broad range	Standard device to customer requirements	0						
Variant			1			n	n	n	n
		P29001P2/	0	<input type="checkbox"/>	-	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
24 V	Broad range	Standard device to customer requirements	0						
Variant			1			n	n	n	n

Special versions

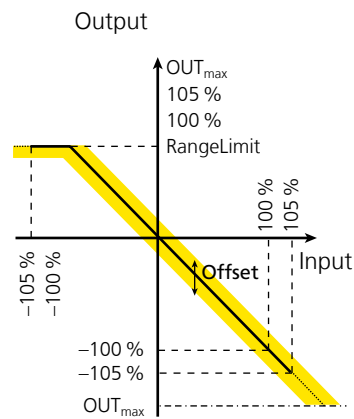
- Shunt break detection (In case of an open input, the output will be at maximum.)
 - Absolute-value function (Output cannot be negative.)
 - RangeLimit (A lower or upper limit value can be specified for the output range.)
- All special versions apply to all measuring ranges.

Characteristic Curves

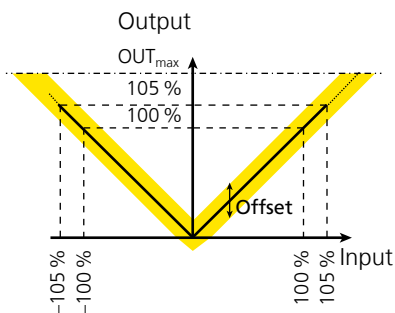
Normal characteristic with adjustable RangeLimit (min) and adjustable offset



Inverse (reciprocal) characteristic with adjustable RangeLimit (max) and adjustable offset



Built-in full-wave rectifier with absolute-value function (V-shape curve) and adjustable offset



■ Specifications

Input data

Input range	Max. ± 1000 V DC	
Overload capacity (permanent)	Input: 0 ... 2 V	max. ± 30 V
	Input: 2 ... 100 V	max. ± 500 V
	Input: 100 ... 500 V	max. ± 600 V
	Input: 500 ... 1000 V	max. ± 1200 V
Input resistance	Input: 0 ... 2 V	approx. 10 k Ω
	Input: 0 ... 100 V	approx. 400 k Ω
	Input: 100 ... 500 V	approx. 1 M Ω
	Input: 500 ... 1000 V	approx. 4 M Ω
Input capacitance	Input: 0 ... 2 V	<1 nF
	Input: 0 ... 100 V	<10 pF
	Input: 100 ... 500 V	<10 pF
	Input: 500 ... 1000 V	<10 pF
Shunt break detection (optional)	<10 μ A	

Output data

Output, active	0/4 ... 20 mA or 0 ... 10 V, resp., or -20 ... 20 mA or -10 ... 10 V, resp. V	
Output, passive	0/4 ... 20 mA, max. load 14 ... 26 V	
Overload capacity with externally applied voltage	± 30 V	
Displacement	Up to ± 150 % as default	
Max. load with:		
Current	≤ 14 V (700 Ω at 20 mA)	
Voltage	≤ 10 mA (1 k Ω at 10 V)	
Overload range	Current output: > 22 mA (max. 26 mA) Voltage output: < 15 V	
Offset adjustment range	± 5 %	
Residual ripple	<10 mV _{rms}	
Voltage drop when measuring the output current at test jacks 3.1 and 3.3	max. 150 mV	

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Specifications (continued)

Transmission behavior

Gain error	Input ≤ 2 V	≤ 0.1 % meas. val.
	Input > 2 V	≤ 0.2 % meas. val.
	Input ≤ 100 mA	≤ 0.1 % meas. val.
Offset	≤ 0.1 % full scale	
Linear dynamic range	-5 % to approx. 102.5 % of input span	
Overload signaling	Red LED on the front	
Load error signaling	Red LED on the front	
Response time T_{99}	< 200 ms or < 200 μ s	
Cutoff frequency	10 Hz or 10 kHz	
Common-mode rejection ¹⁾ CMRR	DC:	approx. 150 dB
	AC 50 Hz:	approx. 130 dB
	Transients ²⁾ :	approx. 100 dB
Temperature influence ³⁾	Input ≤ 2 V	< 50 ppm/K full scale
	Input > 2 V	< 80 ppm/K full scale
	Input ≤ 100 mA	< 80 ppm/K full scale

Power supply

Power supply	P29000P2/00	24 V DC ± 25 %
	P29000P2/01	20 ... 230 V AC/DC ± 10 %; AC: 45 Hz to 440 Hz
Power consumption	1.3 W at 24 V DC 1.5 VA at 115 V AC 60 Hz 1.8 VA at 230 V AC 50 Hz	

Isolation

Galvanic isolation	3-port isolation between input, output, and power supply	
Test voltage	5.4 kV AC input against output and power supply 4.3 kV AC power supply against input and output	
Basic insulation acc. to EN 61010-1:2001 for circuits of CAT II and CAT III	Working voltage	
	CAT II:	1000 V
	CAT III:	1000 V
Double insulation for circuits of CAT II and CAT III	Working voltage	
	CAT II:	600 V
	CAT III:	300 V

Specifications (continued)

Standards and approvals

EMC ⁴⁾	Product standard EN 61326-1 Emitted interference: Class B Immunity to interference: Industry
USA / Canada (approvals pending)	cULus listed, Industrial control equipment File: E220033, standard: ANSI / UL 508

Further data

Ambient temperature	Operation: -25 ... +70 °C (min. start temp.: -40 °C) Operation with passive output: -25 ... +65 °C Transport and storage: -40 ... +85 °C
Design	Modular housing Housing width: 17.5 mm with screw terminals
Diameter of test jacks	2.1 mm
Ingress protection	Housing: IP 40, terminals: IP 20
Ambient conditions	Stationary application, weather-protected relative humidity: 5 ... 95 %, no condensation barometric pressure: 790 ... 1060 hPa (at p ₀ =1013.25 hPa, height: 0 ... 2000 m); with heights >2000 m the permissible working voltages are reduced water or wind-driven precipitation (rain, snow, hail, etc.) excluded
Mounting	With snap-on mounting for 35-mm top-hat rail according to EN 60715
Weight	Approx. 180 g
Accessories	DIN-rail bus connector ZU 0678 Power supply A20900H4 Power terminal block ZU 0677

1) Common-Mode Rejection Ratio = Differential voltage gain : Common-mode voltage gain

2) Transients with 1.2 µs/kV rise time

3) Reference temperature for TC specifications = 23 °C, average TC

4) Slight deviations are possible during interference.

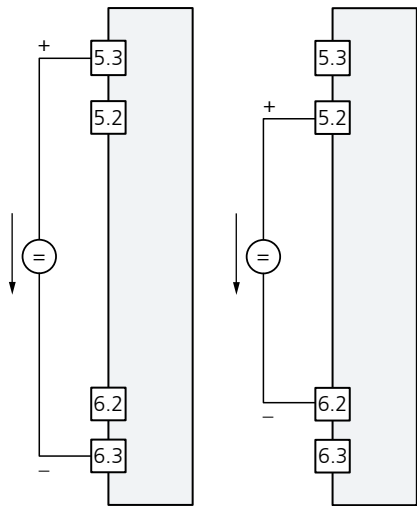
VariTrans® P 29000

■ Typical Wiring Diagrams

Typical wiring (input)

VariTrans® P 29000:
500 ... 1000 V
VariTrans® P 29001:
0 ... 100 V

VariTrans® P 29000:
100 ... 500 V
VariTrans® P 29001:
0 ... 300 mV

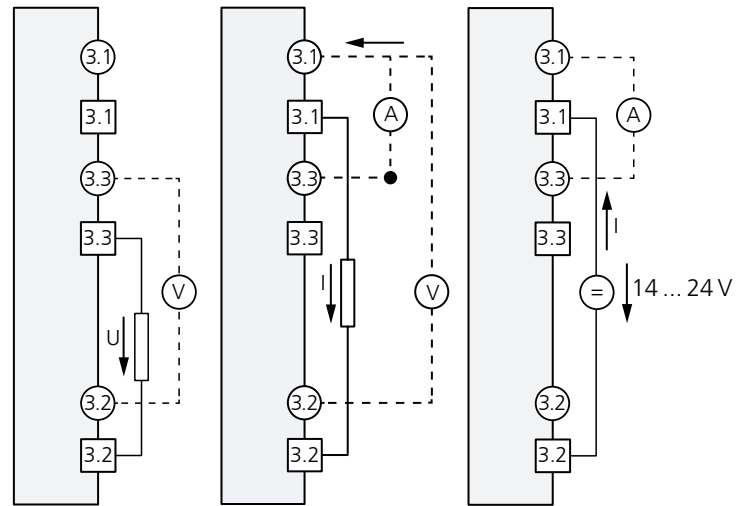


Typical wiring (output)

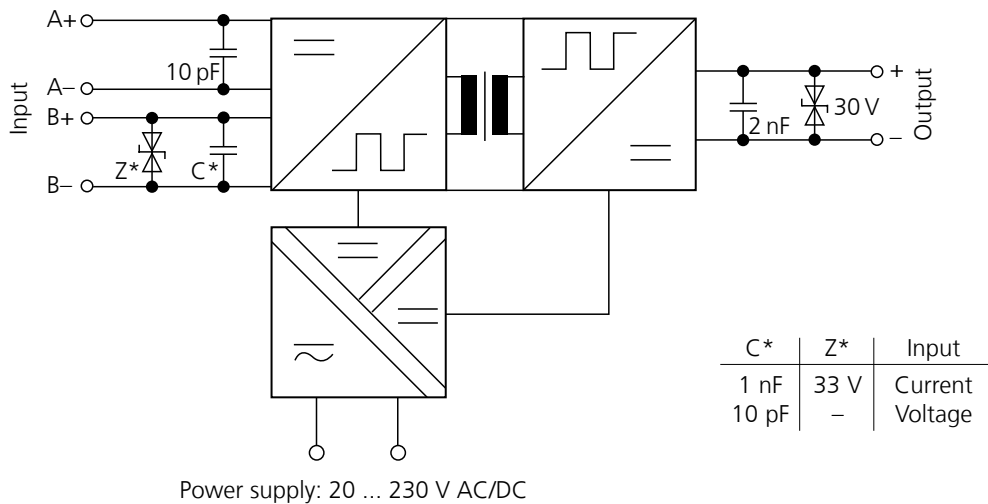
Voltage output
with optional
measurement

Current output,
active, with opt.
measurement

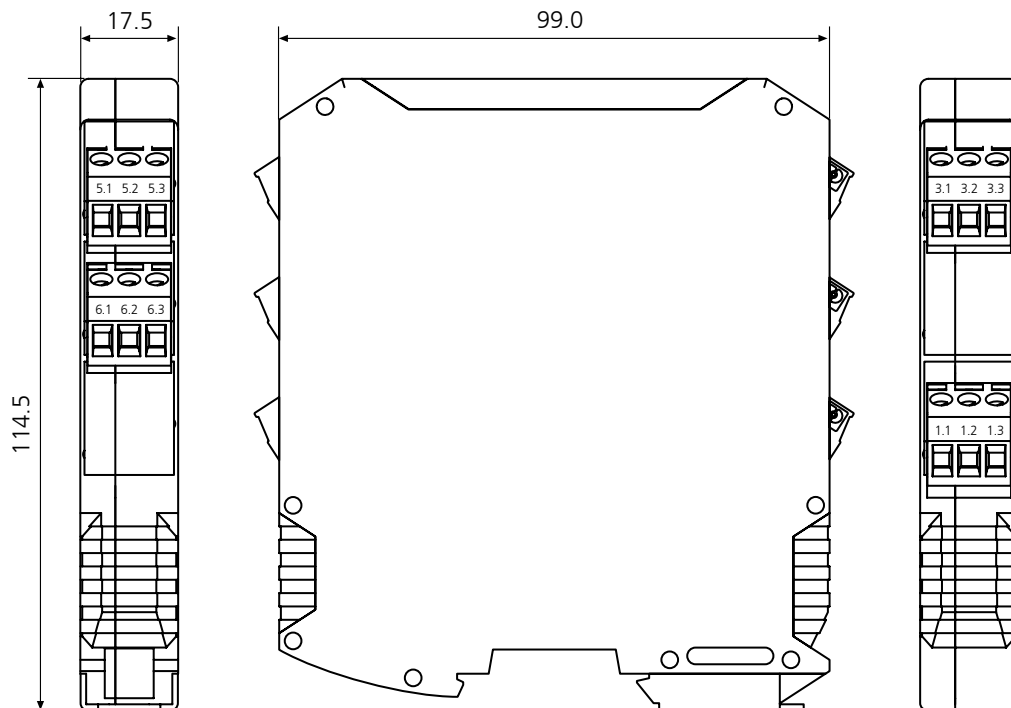
Current output,
passive, with opt.
measurement



■ Block Diagram



■ Dimension Drawings and Terminal Assignments



1.1	Power Supply	1.2	Power Supply	1.3	n.c.
2.1	n.c.	2.2	n.c.	2.3	n.c.
3.1	Current output (passive/active)	3.2	GND output	3.3	Voltage output
4.1	n.c.	4.2	n.c.	4.3	n.c.
5.1	n.c.	5.2	Input, positive	5.3	Input, positive
6.1	n.c.	6.2	Input, negative	6.3	Input, negative

n.c. = not connected

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