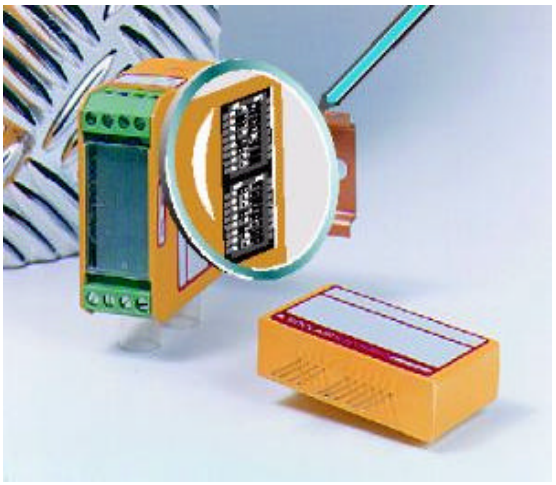
Transducer for Currents, Voltages



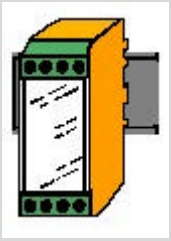
Transmitters for currents and voltages, housing for DIN-rails and printed circuit boards. Programmable and fixed range types.

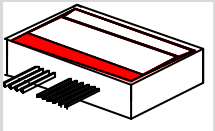
General Description

These transducers convert an input current or voltage in a normalized output signal (e.g., 0-10 V or 4-20 mA). The measurement range and zero-point (offset) of the programmable transducers are selected by DIL-switches in steps of 10, 100, 1000 mV (standard version) using simple binary codes (10, 20, 40, ...). Various operating modes can also be selected via DIL-switches (current- or voltage input, current or voltage output, voltage dividers). All settings are calibrated.

- With optional inductive galvanic isolation between the input and the output, 1kV test voltage.
- Input range from 10 mV to ±40 V, input currents from uA to 100 mA
- Programmable without a computer, all settings calibrated
- Interference and destruction protection, secure against short-circuits and terminal reversal up to 30 VDC overvoltage, fulfills all EMC-EC norms for hostile industrial environments (EN50082/IEC801).

Overview

For DIN-Rails	Typ	Output	Supply	Range	Special Features
 **Dimensions 55x60x23mm**	**SIGV/I 70**	V	21-32V/±15V	fixed	Voltage output
	SIGV/I 82	0/4-20mA	21-32V/±15V	fixed	Current output
	SIGV/I 90	V, 0/4-20mA	19-32V	progr.	Programmable via DIL Switches
	SIGV/I 80	4-20mA	2-D, 12-32V	fixed	4-20 mA 2-wire connection
	SIGV/I 100	4-20mA	2-D, 13-32V	progr.	Programmable via DIL Switches
	ISOV/I 70	V/Iso.	21-32V/ ±15V	fixed	Voltage output
	ISOV/I 90	V/Iso.	19-32V	progr.	Programmable via DIL Switches
	ISOV/I 80	4-20mA/ Iso.	2-D, 13.5-32V	fixed	4-20 mA 2-wire connection
	ISOV/I 100	4-20mA/ Iso.	2-D, 13.5-32V	progr.	Programmable via DIL Switches

For Printed Circuit Boards	Typ	Output	Supply	Range	Special Features
 **Dimensions 55x32x15mm**	**SIGV/I 10**	V	14-32V/ ±15V	fixed	Voltage output
	SIGV/I 32	0/4-20mA	14-32V	fixed	Current output
	SIGV/I 15	V, 0/4-20mA	16-32V	progr.	Programmable via DIL Switches
	SIGV/I 30	4-20mA	2-D, 9-32V	fixed	4-20 mA 2-wire connection
	SIGV/I 35	4-20mA	2-D, 10-32V	progr.	Programmable via DIL Switches
	ISOV/I 10	V/Iso.	14-32V/ ±15V	fixed	Voltage output
	ISOV/I 30	4-20mA/ Iso.	2-D, 12-30V	fixed	4-20 mA 2-wire connection

Iso.: Isolating transducer (isolation between input and output/supply, 1kV test voltage), 2-D: 4-20mA 2-wire technology (supply and output signal on same wire)

Technical Data

Specifications for accuracy classes A, C, und D (Max. values at 23°C, unless otherwise stated)

General	A	C	D	Unit
Conversion error (linearity)[1]	0.01	0.02	0.04	%
Calibration error (factory calibrated, only fixed ranges)	0.03	0.05	0.1	%
3 dB-Bandwidth, typ.	20	20	20	Hz
Input impedance, voltage (min.)	200	200	200	kOhm
Input impedance, current, 20 mA range (typ.)	100	100	100	Ohm
Influence of supply voltage[1]	0.005	0.01	0.02	%/V

Output	A	C	D	Unit
Output impedance, voltage, typ.[3]	50	50	50	Ohm
Output current (voltage output), max.	5	5	5	mA
Burden, current output, min.[3]	400	400	400	Ohm

Input Offset stability regarding:	A	C	D	Unit
Temperatuer[1]	0.2	0.5	2	µV/K
Ageing, 1 year[1]	5	10		µV
Ageing, 10 years[1]	20	40		µV

Gain stability regarding:	A	C	D	Unit
Temperatur[1]	30	70	150	ppm/K
Ageing, 1 year[1]	400	800		ppm
Ageing, 10 years[1]	1200	2500		ppm

[1] The typical error is two to four times smaller than the quoted max. error..
[2] Bandwidth up to 100 Hz with large ranges (e.g. 10V), down to some Hz with very small ranges (mV). On request, we deliver every technically feasible bandwidth.

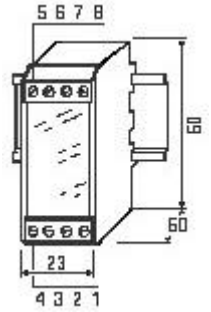
Temperature range °C: recommended: 0/60 °C functional: -20/90 °C

Note

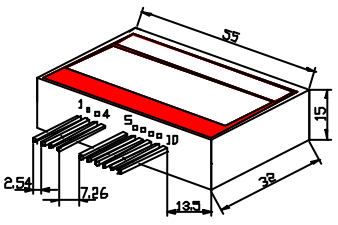
The errors quoted are only valid for a measurement range where the start of the range (zero-point or offset) is not more than 50% of the range end (e.g. 20 to 100 mV).
If the zero-point is shifted considerably (e.g. measurement range of 400 to 500 mV), then the quoted error refers to the range calculated to have begun at zero (0 to 500 mV).

Dimensions and Connections

DIN-Rail Module

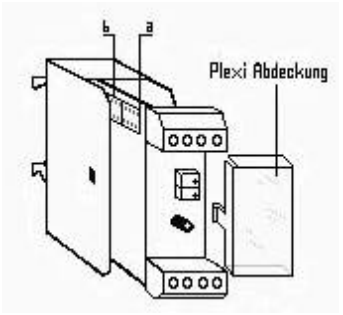


For Printed Circuits

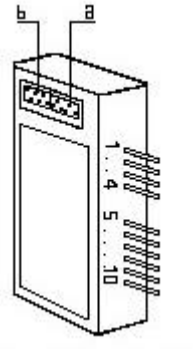


DIL – Range Switches

DIN-Rail Module



For Printed Circuits



Programmable Modules

Input

Current Input: DC-currents from uA up to 100 mA, input impedance approx. 100 Ohm (up to 300kOhm for uA). Overvoltage protection up to 30 VDC (self resetting fuse), surge/burst impulse protection up to 3 kV.

Voltage Input: standard up to 40 VDC, negative voltages (down to –40 VDC) as option. Overvoltage protection up to 30 VDC, surge/burst protection up to 3 kV.

Power Supply

All modules are suited for unregulated, noisy industrial power supplies; nominal value is 24 VDC (min. 19 V, max. 32 V). Other supply voltages on request (e.g. 15 V). Current consumption without load is between 3 and 15 mA. AC power supply on request.

Negative outputs (down to –10V) do not require a negative power supply (built in DC-DC-converter) in case of programmable modules.

Input Ranges (programmable versions)

Measuring range (span): selection in steps of 10, 100 or 1000 mV between 10 mV and 40 V, using a simple binary code (1,2,4,8,16,32 and a 1:10:100 voltage divider). Currents are measured via a 10 Ohm shunt, 10 mA corresponds to 100 mV. Intermediate values are set by a potentiometer.

Offset: selection in steps of 10/100/1000mV from ±0.16/1.6/16 V using a binary code: -16, 1, 2, 4, 8 and 1:10/100 voltage divider. A potentiometer can be used for intermediate values.

Other Settings (programmable Modules)

Input: Selection current or voltage input. For current measurements, a 10 Ohm shunt is used, all mV setting divided by 10 results in mA.

Output: Adjustable between -5 and 10 V (eg. 0-10 V) or between 0 and 20 mA (eg. 4-20 mA). With help of the internal DC-DC-converter (no isolation) the output can reach –5V (not possible for ISOVI90).

Output

Voltage Output: Output impedance typ. 50 Ohm, max. 5 mA output current. Standard between 0 und 10 V, on request also negative values (down to –10V, a negative power supply or the optional DC-DC-converter must be used for fixed range modules). The output is short circuit proof and protected against overvoltages. The technical data (specs) are valid for the current output; the voltage output is usually slightly more accurate and stable (no voltage-to-current conversion).

Min. output voltage with unipolar power supply (fixed range modules): approx. 10 mV. Using the optional DC-DC-converter one can obtain also exactly 0 mV.

Current Output: Burden min. 400 Ohm. Standard 0-20 mA or 4-20 mA, short circuit proof and protected against overvoltages). Other output ranges on request.

Option: Frequency output (max. 20 kHz), for more info, see „Analog to Frequency Transducers“.

Accuracy (programmable versions)

The transducers are delivered with the following setting: 0-200 mV = 0-10 V Output, 0.1% calibration error. The calibration error is approx. 0.1% when switching to another range (max. 0.3% for span and offset). ISOV/I-types can show a greater error using certain ranges.

Options

DC-DC converter (integrated in the DIN-rail module) for galvanic isolation of the power supply, 1 kV test voltage (3 kV available on request),

Adjustable limit switch (integrated in the DIN-rail module), 2.8mm flat connectors on the side (for built in relay) for monitoring and control.

Frequencies output (max. 20 kHz), galvanically isolated, see " Analog to Frequency Transducers " for more information. For new application please use the modules IVI 2XXF or IVI 1XXF.

Other versions (ranges, inputs, outputs, time behaviour/filters, noise) and special versions

When ordering, please specify:

Module type

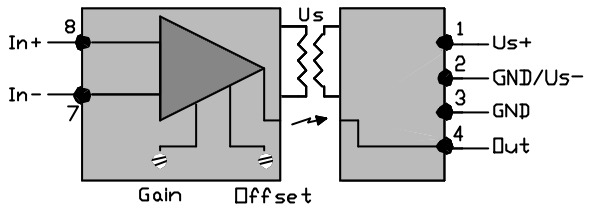
Accuracy class (A, C or D)

Input range (in mV, V or mA) and **output range** (in V or mA, in Hz for frequency output) for fixed range modules or if an accurate adjustment prior to delivery is required

Power supply (24 V standard, 15 V or ±15 V on request).

Other versions (ranges, inputs, outputs, time behaviour/filters, noise) and special versions.

Block Diagram and Connections, 2-Port-Isolation, DIN-Rail Modules



Terminal 1: Pos. power supply, 24 VDC nominal
Terminal 2: Power supply ground or neg. power supply
Terminal 3: Signal ground, power ground (with neg. supply)
Terminal 4: Signal output (plus)

Terminal 7: Signal input (minus)
Terminal 8. Signal input, voltage or current (plus)

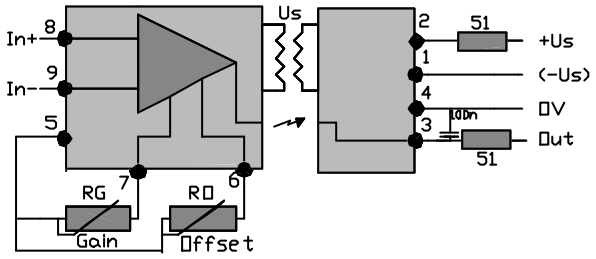
The input of an isolation module (ISO XXX) behaves like a true differential amplifier

SIGV/I 70-100, ISOV/I 70-100

Modules with no isolation (SIGV/I70-90) do not have the isolation barrier shown in the figure

Connection of supply, 4-20mA 2-wire-modules Module (SIGV/I80,100, ISOV/I80,100): 3,4 open; 1,2: see below

Block Diagram and Connections, 2-Port-Isolation, Modules for Printed Circuits



Terminal 1: Power supply ground
Terminal 2: Pos. power supply, 24 VDC nominal
Terminal 3: Signal output (plus)
Terminal 4: Signal ground, power ground (with neg. supply)

Terminal 5: Ground
Terminal 6, 7: Potentiometer (option)
Terminal 8: Signal input, voltage or current (plus)
Terminal 9. Signal input (minus)

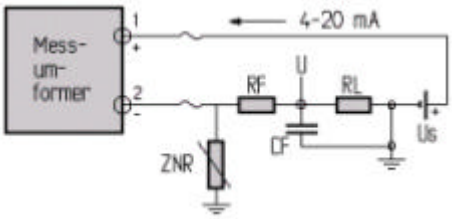
If HF-noise can't be excluded, we recommend to add filters (e.g. 50 Ohm/100nF).

External Potentiometer: 1Kohm each, adjustment range approx. 5%
The input of an isolation module (ISO XXX) behaves like a true differential amplifier

SIG10-35, ISOV/I 10-35

Modules with no isolation (SIGV/I70-90) do not have the isolation barrier shown in the figure
Connection of supply, 4-20mA 2-wire-modules Module (SIGV/I30/35, ISOV/I30): 3,4 open; 1,2: see below

Connection of Power Supply and Output of a 4-20 mA Module



DIN-rail module SIGVI 80,100, ISOVI80, 100.
Exchange 1 and 2 with printed circuit modules (SIGVI30/35, ISOVI30)
Connection 3,4: leave open

Terminal 1: Pos. power supply
Terminal 2: Neg. power supply, 4-20 mA output

The resistor RL converts the current (4-20 mA) to a voltage signal, U. Where HF interference cannot be excluded, it is recommended that a filter (CF and RF) be installed in front of the shunt resistor (RL). RF is typically approx. 100 Ohm and CF 100 nF up to several mF. Such a filter is generally required (usually together with an overvoltage arrester, e.g., a ZNR) in order to fulfil EC-EMC standards.

Programming of Modules XXX 15, XXX 90 und XXX100

The programming switches 1a to 8a and 1b to 8b are located inside the module. Carefully remove the plexiglas cover. The printed circuit board can now be removed by pulling gently on the screw terminals.

Switch a

	off	on	Function
1a	Uin	Iin	Selects Input (voltage or current)
2a	Iout	Uout	Selects output (voltage or current)
3a	:1	:10	Input voltage divider (:10, if on)
4a	:1	:100	Input voltage divider (:100, if on)
5a	-	-	No function
6a	0	-160 mV	Offset adjustment, shifts input -160mV if on
7a	0	+80 mV	Offset adjustment, shifts input 80 mV if on
8a	0	+40 mV	Offset adjustment, shifts input 40 mV if on

Switch b

Nr.	off	on	Function
1b	0	+20 mV	Offset adjustment, shifts input 20 mV if on
2b	0	+10 mV	Offset adjustment, shifts input 10 mV if on
3b	0	+320 mV	Span adjustment, adds 320 mV to span
4b	0	+160 mV	Span adjustment, adds 160 mV to span
5b	0	+80 mV	Span adjustment, adds 80 mV to span
6b	0	+40 mV	Span adjustment, adds 40 mV to span
7b	0	+20 mV	Span adjustment, adds 20 mV to span
8b	0	+10 mV	Span adjustment, adds 10 mV to span

The offset is adjusted via switches 6a-8a and 1b,2b (add all values with switch on)

The span is adjusted via switches 2b-8b using a binary code (addition of all values with switch on). Example: for a range of 0-10 mV= 0-10V the switches 5b and 7b (8 + 2 = 10 mV) must be on.

Other output voltages or currents:

The values in the table are for an output of 0-10 V or 0/4-20 mA. For other output values (eg 0-50mV = 0-2 V), one must calculate the corresponding span for 0-10 V: In the example (0-50 mV = 0-2 V) the corresponding range is 0-250 mV = 0-10 V. If the setting is done for this range, one gets automatically 0-50 mV = 0-2 V.

Rule: Always calculate first the range for a standard output.

Adjustment of Measurement Range and Zero Point (Offset)

The modules with a fixed measurement range are precisely calibrated at the factory (error usually less than 0.05%), further calibration is generally unnecessary. If the output values are not correct, first of all check the connections, the power supply (is the supply voltage correct ?), the experimental arrangement and all instruments in use.
We recommend that when working with programmable or configurable modules, the calibration should be checked after each new adjustment.
Adjustment is performed using a calibrator or a calibrated sensing device. The zero point (offset) is adjusted via the "Offs" potentiometer and the full scale value is adjusted via the "gain" potentiometer. The zero point is adjusted first and then the full scale. Where large adjustments are necessary, the procedure should be carried out several times. For additional reliability, the output value should be measured at half the measurement range (linearity test).
The output of modules with a unipolar supply voltage can't reach exactly 0. In such cases, zero point adjustment must be performed with an input value which produces a non-zero output value.

Important note:

Soclair Electronics is continually working to improve the quality and reliability of its products. MTBF (using MIL217) is well above 10 years (in most cases even more than 100 years). Nevertheless, electronic devices in general can malfunction or fail due to their inherent physical and chemical properties. It is the responsibility of the buyer, when utilizing Soclair Electronic products, to observe standards of safety and to avoid a situation in which a malfunction or failure of a Soclair Electronic device could cause loss of human life, injuries or damage to properties. Soclair Electronic products are not authorized for use in life support systems.