SINEAX V620
Universal Signal Converter
for mA, V, TC, RTD, Ω

CAMILLE BAUER

163 022 10.14

General characteristics

- Universal input: voltage, current, thermocouples, thermoresistences, potentiometer, rheostat.
- Sensor powered by 2-wire technique: 20 V DC stabilised, 20 mA max. with short-circuit protection.
- Measurement and re-transmission on isolated analog output, with voltage and current output.
- DIP-switch for selecting: type of input, START-END, output mode (zero elevation, scale inversion), output voltage type (mA or V).
- Front panel indicating: power on, off scale or setting error, alarm status.
- Relay (spst) output, programmable through PC.
- STROBE input to activate the analog output on PLC command (alternatively to alarm contact).
- Facility for programming the following with a PC: beginning and end scale, additional input types, square root extraction, filter, burn-out etc.
- 3-point insulation: 1500 V AC.

Technical data

Power supply	10…40 V DC, 19…28 V AC, 50…60 Hz, max. 2.5 W; 1.6 W at 24 V DC with 20 mA output			
Voltage input	Bipolar from 75 mV up to 20 V in 9 scales, input impedance 1 MΩ, resolution max. 15 bits + sign			
Current input	Bipolar up to 20 mA, input impedance 50 Ω, resolution max. 1 µA			
Thermoresistance (RTD) input PT100, PT500, PT1000, Ni100, KTY81, KTY84, NTC	2, 3 or 4 wires measurement, energising current 0.56 mA, resolution 0.1 °C, automatic detection of cable interruption or RTD. Resistive value for NTC: < 25 kΩ. KTY81, KTY84 and NTC may be set only via software			
Thermocouple input	Type J, K, R, S, T, B, E, N; resolution 2.5 µV, automatic detection of TC interruption, input impedance >5 MΩ			
Rheostat input	Full scale min. 500 Ω, max. 25 kΩ			
Potentiometer input	Excitation voltage 300 mV, input impedance > 5 MΩ, potentiometer value from 500 Ω to 100 kΩ (with the aid of a parallel resistence equal to 500 Ω)			
Sampling frequency	Variable from 240 sps with 11 bits resolution + sign to 15 sps with 15 bits + sign resolution (typical values))			
Response time	35 ms with 11 bits resolution, 140 ms with 16 bits resolution (measurement of voltage, current, potentiometer)			
Output	I: 0…20/4…20 mA, max. load resistance 600 Ω V: 0…5/0…10/1…5/2…10 V, min. load resistance 2 kΩ Resolution 2.5 µA / 1.25 mV			
Relay output (spst)	Capacity: 1 A … 30 V DC / V AC			
Environmental conditions	Temperature: -20…60 °C, humidity min. 30%, max. 90% at 40 °C non condensing (see «Installation instructions»)			
Errors referred to max. measuring range	Calibration error	Thermal coefficient	Linearity error	Others
Input for voltage/current	0.3%	0.01% / °K	0.05%	EMI: < 1%
Input for PTCs J, K, E, T, N	0.5%		0.2 °C	+(2) EMI: <1%
Input for PTCs R, S	0.5%		0.5 °C	
Input for PTC B (4)	0.5%		1.5 °C	
Cold junction compensation	2 °C in ambient range 0 to 50 °C			
Potentiometer/resistor	0.3%	0.01% / °K	0.1%	EMI: < 1%
Input for thermoresistance (5)	0.3%		t > 0°C 0.02% t < 0°C 0.05%	(1) EMI: < 1%
Voltage output (3)	0.3%		0.01%	
Data memory	EEPROM for all configuration data; storage time: 40 years			

Standards:

EN 61000-6-4/2007 (electromagnetic emission, industrial environment)
EN 61000-6-2/2005 (electromagnetic immunity, industrial environment)
EN 61010-1/2001 (safety)

All circuits are to be safety isolated from hazardous live by double insulation. The power supply transformer must comply with EN 60742: Isolating transformers and safety isolating transformers requirements.

Notes:

– Use with copper conductor
– Use in pollution degree 2 environment
– Power supply must be Class 2
– When supplied by an isolated limited voltage/limited current power supply a fuse rated max. 2.5 A shall be installed in the field.

(1) Influence of cable resistance 0.005%/Ω, max. 20 Ω
(2) Influence of cable resistance 0.1 µV/Ω
(3) Values to be added to the errors of the selected input
(4) Output zero if t < 400 °C
(5) All the values have to be calculated on the resistive value

Selection input / measuring scale

The type of input is selected by setting the SW1 DIP-switch group at the side of the module.
Every type of input is matched to a certain number of scale beginnings and ends values which can be selected with the SW2 group.
The table below lists possible **START** and **END** values according to the type of input selected.
Note for all following tables:
The indication ● indicates that the DIP-switch is set in position ON.
No indication is provided when the DIP-switch is set in position OFF!

SW1: INPUT TYPE

1	2	3	4	Input type
				V
●				Ω/Rheostat
	●			mA
●	●			Ni100
		●		PT100
●		●		PT500
	●	●		PT1000
●	●	●		Tc J

1	2	3	4	Input type
			●	Tc K
●			●	Tc R
	●		●	Tc S
●	●		●	Tc T
		●	●	Tc B
●		●	●	Tc E
	●	●	●	Tc N
●	●	●	●	Potentiometer

SW2: START and END

START 1	2	3		END 4	5	6	
			1				1
		●	2			●	2
	●		3		●		3
	●	●	4		●	●	4
●			5	●			5
●		●	6	●		●	6
●	●		7	●	●		7
●	●	●	8	●	●	●	8

SW2

				Voltage		Resistance/ Rheostat		Current		Potentiometer	
				START	END	START	END	START	END	START	END
			1	(*)	(*)	(*)	(*)	(*)	(*)	(*)	(*)
		●	2	0 V	100 mV	0 Ω	1 kΩ	0 mA	1 mA	0%	40%
	●		3	400 mV	200 mV	0.5 kΩ	2 kΩ	1 mA	2 mA	10%	50%
	●	●	4	1 V	500 mV	1 kΩ	3 kΩ	4 mA	3 mA	20%	60%
●			5	2 V	1 V	2 kΩ	5 kΩ	-1 mA	4 mA	30%	70%
●		●	6	-5 V	5 V	5 kΩ	10 kΩ	-5 mA	5 mA	40%	80%
●	●		7	-10 V	10 V	10 kΩ	15 kΩ	-10 mA	10 mA	50%	90%
●	●	●	8	-20 V	20 V	15 kΩ	25 kΩ	-20 mA	20 mA	60%	100%

				Ni100 (RTD)		PT100 (RTD)		PT500 (RTD)		PT1000 (RTD)	
				START	END	START	END	START	END	START	END
			1	(*)	(*)	(*)	(*)	(*)	(*)	(*)	(*)
		●	2	-50 °C	20 °C	-200 °C	50 °C	-200 °C	0 °C	-200 °C	0 °C
	●		3	-30 °C	40 °C	-100 °C	100 °C	-100 °C	50 °C	-100 °C	50 °C
	●	●	4	-20 °C	50 °C	-50 °C	200 °C	-50 °C	100 °C	-50 °C	100 °C
●			5	0 °C	80 °C	0 °C	300 °C	0 °C	150 °C	0 °C	150 °C
●		●	6	20 °C	100 °C	50 °C	400 °C	50 °C	200 °C	50 °C	200 °C
●	●		7	30 °C	150 °C	100 °C	500 °C	100 °C	300 °C	100 °C	300 °C
●	●	●	8	50 °C	200 °C	200 °C	600 °C	150 °C	400 °C	200 °C	400 °C

				Thermocouple J		Thermocouple K		Thermocouple R		Thermocouple S	
				START	END	START	END	START	END	START	END
			1	(*)	(*)	(*)	(*)	(*)	(*)	(*)	(*)
		●	2	-200 °C	100 °C	-200 °C	200 °C	0 °C	400 °C	0 °C	400 °C
	●		3	-100 °C	200 °C	-100 °C	400 °C	100 °C	600 °C	100 °C	600 °C
	●	●	4	0 °C	300 °C	0 °C	600 °C	200 °C	800 °C	200 °C	800 °C
●			5	100 °C	400 °C	100 °C	800 °C	300 °C	1000 °C	300 °C	1000 °C
●		●	6	200 °C	500 °C	200 °C	1000 °C	400 °C	1200 °C	400 °C	1200 °C
●	●		7	300 °C	800 °C	300 °C	1200 °C	600 °C	1400 °C	600 °C	1400 °C
●	●	●	8	500 °C	1000 °C	500 °C	1300 °C	800 °C	1750 °C	800 °C	1750 °C

				Thermocouple T		Thermocouple B		Thermocouple E		Thermocouple N	
				START	END	START	END	START	END	START	END
			1	(*)	(*)	(*)	(*)	(*)	(*)	(*)	(*)
		●	2	-200 °C	50 °C	0 °C	500 °C	-200 °C	50 °C	-200 °C	200 °C
	●		3	-100 °C	100 °C	500 °C	600 °C	-100 °C	100 °C	-100 °C	400 °C
	●	●	4	-50 °C	150 °C	600 °C	800 °C	0 °C	200 °C	0 °C	600 °C
●			5	0 °C	200 °C	700 °C	1000 °C	100 °C	300 °C	100 °C	800 °C
●		●	6	50 °C	250 °C	800 °C	1200 °C	150 °C	400 °C	200 °C	1000 °C
●	●		7	100 °C	300 °C	1000 °C	1500 °C	200 °C	600 °C	300 °C	1200 °C
●	●	●	8	150 °C	400 °C	1200 °C	1800 °C	400 °C	800 °C	500 °C	1300 °C

(*) START or END are set in the memory with the PC or with the programming push-buttons.

N.B.: DIP-switches must be set while the module is powered down, otherwise, the module may be damaged!

Setting START and END at will

The START and END push-buttons under the SW2 DIP-switch group allow to set the beginning and end scale at will within the scale pre-set through the DIP-switches. To obtain this facility it is necessary to use a suitable signal generator, able to furnish the desidered values of beginning and end scale.

The procedure is following:

1. Set through DIP-switches, the type of input, START and END measurement which include the required beginning and end values.
2. Power up the module.
3. Supply a calibrator or simulator of the signal you wish to measure and retransmit.
4. Set the required START value on the calibrator (or other instrument).
5. Press the START push-button for at least 3 sec. The green LED on the front panel flashes to indicate the value has been stored.
6. Repeat points 4 and 5 for the required END value.
7. Cut power to the module and set to OFF position the DIP-switches of group SW2, correspondent to the settings of START and END values.

The module is now configured for the required start and end scale. To reprogram it (e.g. for a different type of input) repeat the whole procedure.

Selecting output

DIP-switches numbers 7 and 8 of the SW2 group enable you to set the output with or without zero elevation, or as a normal or reversed output. The SW3 DIP-switch group enables you to select the output type.

N.B.: DIP-switches must be set while the module is powered down, avoiding electrostatic discharges, otherwise the module may be damaged.

SW2	Output mode
7	
	0…20 mA / 0…10 V
●	4…20 mA / 2…10 V
8	
	Normal
●	Reversed

SW3 1	2	Output
●		Voltage
	●	Current

Setting with a PC

By using a PC and V620/V622-C software, it is possible to set other normally fixed parameters in addition to start and end scale.

- Additional input types
- Digital filter (normally disabled)
- Square root extraction (normally disabled)
- Negative burn-out (normally positive)
- Alarm (normally set as error signalling)
- Start and end scale of the analog output
- Value of the analog output in case of error
- Rejection programmable for 50 or 60 Hz mains frequency (normally set to 50 Hz)
- Sampling frequency/resolution (normally set to 15 sps/16 bits)
- 3 or 4 wires measure for thermal resistance (normally set to 3 wires)
- Action of the digital output alarm in case of fault.

Instructions for setting and for the connection cable are supplied with the software (to be requested as an accessory item).

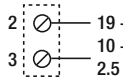
LED indication on the front

Green LED	Meaning
Flashing (freq: 1 flash/s)	Out range, burn-out or internal fault
Flashing (freq = 2 flashes/s)	Error on DIP-switches setting
Steady ON	Indicates the presence of power supply

Yellow LED	Meaning
Steady ON	Alarm signalling (relay contact opened)
OFF	No alarm (relay contact closed)

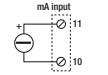
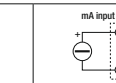
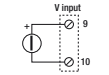
Electrical connections

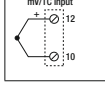
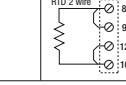
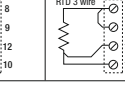
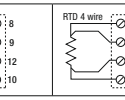
Power supply

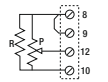
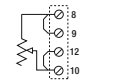
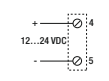


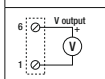
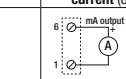
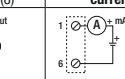
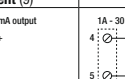
19 ÷ 28 VAC
10 ÷ 40 VDC
2.5 W max.

Power supply voltage must be in the range 10 to 40 V DC (at any polarity), 19 to 28 V AC; also see section "Installation instructions".
The upper limits must not be exceeded, to avoid serious damage to the module. Protect the power supply source against possible damage of the module by using a fuse of suitable size.

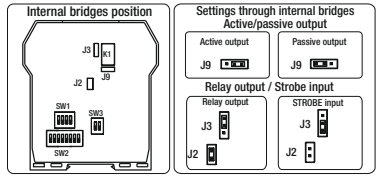
Current input		Voltage input
		
The loop is powered by the sensor	The loop is powered by the module	

Thermocouple input	Thermoresistance input	
	NTC, KTY81, KTY84	PT100, Ni100, PT500, PT1000
		 

Potentiometer/rheostat input		Strobe input (7)
		
With resistance R = 500 Ω (not provided), P = 500 Ω ÷ 100 kΩ		

Re-transmitted output				Relay output (10)
Voltage	Generated current (8)	External power supply current (9)		
				

(7) As alternative to the relay output. It is isolated from the other circuits and enables the current analog output. It may be used to multiplex a PLC input on an V620. To enable it see "Settings through internal bridges".
(8) Active output (powered) to connect to passive inputs.
(9) Unpowered passive output to be connected to active inputs. To enable it, see "Settings through internal bridges"
(10) As alternative to STROBE input; relay contact normally closed, opened in event of alarm.



Installation instructions

The module was designed for fitting to guide 46277, in a vertical position. For optimum operation and long life, make sure adequate ventilation is provided for the module/s, avoiding placing raceways or other objects which could obstruct the ventilation grilles. Do not install the modules above appliances generating heat we advise you to install in the lower part of the panel.

Severe operating conditions

Severe operating conditions are as follows:
- High power supply voltage (> 30 V DC / > 26 V AC).
- Power supply of the sensor at input.
- Use of the output on generated current.

When modules are installed side by side, it may **by necessary to separate them by at least 5 mm** in the following cases:
- If panel temperature exceed 45 °C and at least one of the severe operating conditions exists.
- If panel temperature exceed 35 °C and at least two of the severe operating conditions exists.

Electrical connections

We advise you to use shielded cables for connecting signals. The shield must be connected to an earth wire used specifically for instrumentation. Moreover, it is good practice to avoid routing conductors near power appliances such as inverters, motors, induction ovens, etc.

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