CAMILLE BAUER

Plug-in module SIRAX V 606, 1 or 2 channels
Programmable Temp. Transmitter for RTD and TC inputs

Application

The programmable **SIRAX V 606** transmitter (Fig. 1) is designed for **measuring temperature in combination with thermocouples or resistance thermometers.** Thermocouple non-linearities are automatically compensated. The output is an analog linear temperature value.

The analog output signal is either an impressed current or superimposed voltage which is processed by other devices for purposes of displaying, recording and/or regulating a constant.

The input variable and measuring range are programmed with the aid of a PC and the corresponding software.

The sensor circuit is monitored for open and short-circuits and the output responds in a defined manner if one is detected.

The transmitter fulfils all the important requirements and regulations concerning electromagnetic compatibility **EMC** and **Safety** (IEC 1010 resp. EN 61 010). It was developed and is manufactured and tested in strict accordance with the **quality assurance standard** ISO 9001.

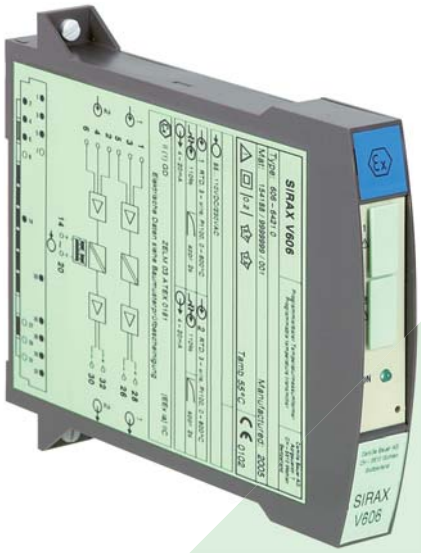

Fig. 1. Plug-in module SIRAX V 606 for plugging onto backplane BP 902.

Features / Benefits

- **Transmitter plugs onto backplane** (mechanically latched by fasteners), **all electric connections made to the backplane and not to the SIRAX V 606 / Thus no wiring when replacing devices**
- **Input variable and measuring range programmed using PC / Simplifies project planning and engineering, short delivery times, low stocking levels**

Measured variables	Measuring ranges		
	Limits	Min. span	Max. span
Temperatures with resistance thermometers for **two, three** or **four**-wire connection *)			
Pt 100, IEC 60 751	– 200 to 850 °C	50 K	850 K
Ni 100, DIN 43 760	– 60 to 250 °C	50 K	250 K
Temperatures with thermocouples *) Type B, E, J, K, N, R, S, T acc. to IEC 60 584-1 Type L and U, DIN 43 710 Type W5 Re/W26 Re, Type W3 Re/W25 Re acc. to ASTM E 988-90	acc. to type	2 mV	80 mV

*) *Restrictions at 2-channel version*

- **Electric isolation between input, output 2.3 kV and power supply 3.7 kV / Fulfils EN 61 010**
- **Wide DC, AC power pack tolerance / Universal**
- **Type of protection "Intrinsic safety" [EEx ia] IIC** (see "Table 3: Data of explosion protection")
- **Ex devices also directly programmable on site / No supplementary Ex interface needed**
- **Open and short-circuit sensor circuit supervision / Defined output response should the supervision pick-up**
- **Programmable with or without power supply connection**
- **Other programmable paramters: specific measured variable data** (e.g. **two, three** or **four**-wire connection for resistance thermometers, "internal" or "external" cold junction compensation of thermocouples etc.), **transmission mode, operating sense** (output signal directly or inversely proportional to the measured variable) **and open-circuit sensor supervision** (output signal assumes fixed preset value between – 5 and + 110%) **/ Highly flexible solutions for measurement problems**
- **Software calibration of beginning and end of output signal range**
- **Digital measured variable data available at the programming interface / Simplifies commissioning, measured variable and signals can be viewed on PC in the field**

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Programming

A PC, the programming cable PK 610 plus ancillary cable and the programming software V 600 *plus* are required to program the transmitter. (Details of the programming cable and the software are to be found in the separate data sheet: PK 610 Le.)

The connections between
"PC ↔ PK 610 ↔ SIRAX V 606" can be seen from Fig. 2. The transmitter can be programmed either with or without the power supply connected.

The software V 600 *plus* is supplied on one CD and runs under Windows 95 or higher.

The programming cable PK 610 adjusts the signal level between the PC and the transmitter SIRAX V 606.

The programming cable PK 610 is used for programming both standard and Ex versions.

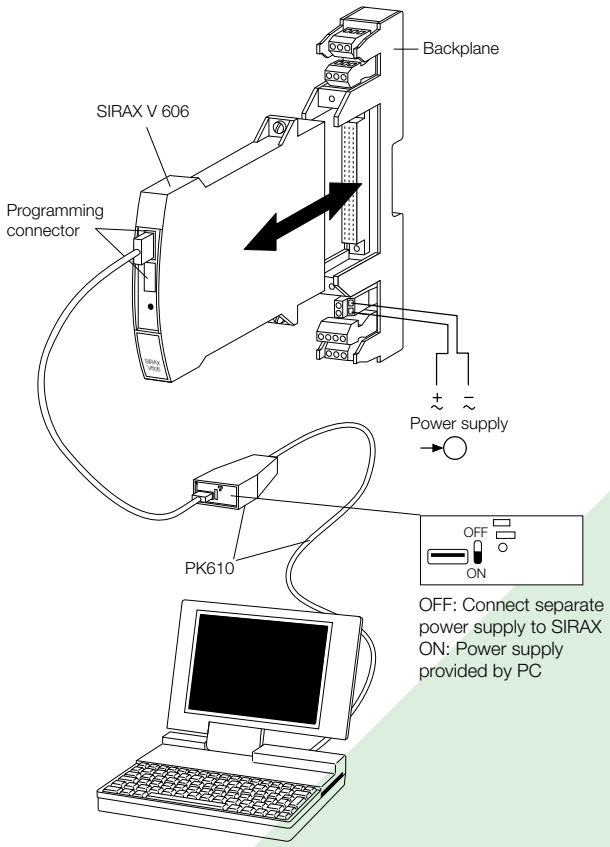

Fig. 2. Example of the set-up for programming a SIRAX V 606 in standard version without the power supply. For this case the switch on the interface must be set to "ON".

Technical data

Measuring input

Temperature with resistance thermometers

Measuring range limits:	See Table 7
Resistance types:	Type Pt 100 (IEC 60 751) Type Ni 100 (DIN 43 760) other sensor types configurables
Measuring current:	≤ 0.20 mA
Standard circuit:	1 resistance thermometer for **two**, **three** or **four-**wire connection
Input resistance:	R_i > 10 MΩ
Lead resistance:	≤ 30 Ω per lead

Temperature with thermocouple

Measuring range limits:	See Table 7
Thermocouple pairs:	Type B: Pt30Rh-Pt6Rh (IEC 584) Type E: NiCr-CuNi (IEC 584) Type J: Fe-CuNi (IEC 584) Type K: NiCr-Ni (IEC 584) Type L: Fe-CuNi (DIN 43710) Type N: NiCrSi-NiSi (IEC 584) Type R: Pt13Rh-Pt (IEC 584) Type S: Pt10Rh-Pt (IEC 584) Type T: Cu-CuNi (IEC 584) Type U: Cu-CuNi (DIN 43710) Type W5 Re/W26 Re (ASTM Type W3 Re/W25 Re E 988-90)
Standard circuit:	1 thermocouple, **internal** cold junction compensation with built-in Ni 100 or 1 thermocouple, **external** cold junction compensation
Input resistance:	R_i > 10 MΩ

Cold junction compensation

Internal:	With built-in Ni100
External:	Via cold junction thermostat 0...60 °C, configurable

Measuring output

DC current*:	Programmable between 0 and 20 resp. 20 and 0 mA minimum span 2 mA
Burden voltage:	12 V
Open-circuit voltage:	< 20 V
External resistance:	R_{ext} max. [kΩ] = $\frac{12\ V}{I_{AN}\ [mA]}$ I_{AN} = Output current end value
Residual ripple:	< 1.0% p.p., DC … 10 kHz
DC voltage*:	Programmable between 0 and 10 resp. 10 and 0 V minimum span 1 V
Short-circuit current:	≤ 50 mA
External resistance:	R_{ext} min. [kΩ] ≥ $\frac{U_{AN}\ [V]}{5\ mA}$ U_{AN}= Output voltage end value

**The output variable (current or voltage) is not re-programmed!*

Residual ripple: < 1.0% p.p., DC … 10 kHz

Table 1: Response time

Measuring mode	Open sensor circuit	Short circuit	Possible response times approx. [s]						
			*)	Optionally					
TC int. comp.	aktive	—	1.5	2.5	3.5	6.5	11	20.5	40
TC int. comp.	off	—	1.5	2.5	3.5	6.5	13.5	24.5	49.5
TC ext. comp.	aktive	—	1.5	2.5	3.5	6.5	11	20.5	40
TC ext. comp.	off	—	1.5	2.5	4	6.5	13.5	24.5	48.5
RTD 2L	aktive	—	2	2.5	3	5	9.5	17.5	33.5
RTD 3L,4L	aktive	aktive	2	2.5	4	6.5	11.5	21	40.5
RTD 2L,3L,4L	off	off	1.5	2.5	3.5	7.5	14	26.5	50.5

*) Standard values, also valid for the basic configuration

Programming connector

Interface: Serial interface

Accuracy data (acc. to EN/IEC 60 770-1)

Reference value: Measuring span

Basic accuracy: Error limits ≤ ± 0.2% at reference conditions

Reference conditions

Ambient temperature 23 °C

Power supply 24 V DC ± 10% and 230 V AC ±10%

Output burden Current: 300 Ω
Voltage: 4 kΩ

Settings Pt100, 3-wire, 0 to 600 °C

Additional errors (additive)

Low measuring ranges

Resistance thermometer ± 0.3 K at measuring spans < 400 °C

Thermocouple:

Type U, T, L, J, K, E ± 0.1 K at measuring spans < 200 °C

Type N ± 0.13 K at measuring spans < 320 °C

Type S, R ± 0.42 K at measuring spans < 1000 °C

Type B ± 0.6 K at measuring spans < 1400 °C

High initial value (Additional error = factor · initial value)

Factor:

Resistance thermometer ± 0.00075 K / °C

Thermocouple:

Type U, T, L, J, K, E ± 0.0006 K / °C

Type N ± 0.0008 K / °C

Type S, R ± 0.0025 K / °C

Type B ± 0.0036 K / °C

Influence of lead resistance at resistance thermometer: ± 0.01% per Ω

Internal cold junction compensation: ± 0.5 K at 23 °C, ± 0.25 K/10 K

Linearisation: ± 0.3%

If hardware output end value/ output span > 1.25

$$\pm \left(\frac{\text{20 mA resp. 10 V}}{\text{output span}} \cdot 0.07\% \right)$$

Example:
Hardware output end value 20 mA
New configuration 14 to 16 mA
Additional error =

$$\pm \left(\frac{\text{20 mA}}{\text{2 mA}} \cdot 0.07\% \right) = 0.7\%$$

Influencing factors

Temperature ≤ ± (0.15% + 0.15 K) per 10 K with temperature measurement

≤ ± (0.15% + 12 µV) per 10 K with voltage measurement

Long-time drift: ≤ ± 0.1%

Common and transverse mode influence: ≤ ± 0.2%

Open and short-circuit sensor circuit supervision

Signalling modes: Output signal programmable to…

… the value the output had immediately prior to the open or short-circuit (hold value)

… a value between –5 and 110% of the output span

Power supply →○

DC, AC power pack (DC or 45 to 400 Hz)

Table 2: Rated voltages and permissible variations

Nominal voltages U_N	Tolerance	Instruments version
24 … 60 V DC/AC	DC – 15…+ 33% AC ± 15%	Standard (Non-Ex)
85 … 230 V *) DC/AC		
24 … 60 V DC/AC	DC – 15…+ 33% AC ± 15%	Type of protection “Intrinsic safety” [EEx ia] IIC
85 … 230 V AC	± 10%	
85 … 110 V DC	– 15…+ 10%	

Power consumption: ≤ 1.0 W resp. ≤ 2.1 VA

*) An external supply fuse must be provided for DC supply voltages > 125 V.

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Installation data

Housing:	Transmitter in housing B17 for plugging onto backplane BP 902. Refer to section “Dimensional drawing” for dimensions
Material of housing:	Lexan 940 (polycarbonate) Flammability class V-0 acc. to UL 94, self-extinguishing, non-dripping, free of halogen
Designation:	SIRAX V 606
Mounting position:	Any
Electrical connections:	96-pin connector acc. to DIN 41 612, pattern C Layout see section “Electrical connections”
Coding:	Transmitter supplied already coded. Backplane: The rack is coded by the user by fitting the coding inserts supplied
Weight:	1 channel approx. 160 g 2 channels approx. 180 g
Electrical insulation:	All circuits (measuring input / measuring output / power supply) are electrically insulated.

Standards

Electromagnetic compatibility:	The standards EN 50 081-2 and EN 50 082-2 are observed
Intrinsically safe:	Acc. to EN 50 020
Protection (acc. to IEC 529 resp. EN 60 529):	Housing IP 40 Terminals IP 20
Electrical standards:	Acc. to IEC 1010 resp. EN 61 010
Operating voltages:	< 300 V between all insulated circuits
Pollution degree:	2
Installation category acc. to IEC 664:	III for power supply II for measuring input and output
Double insulation:	Power supply versus all circuits Measuring input versus measuring output
Test voltage:	Power supply versus: – all 3.7 kV, 50 Hz, 1 min. Measuring input versus: – Measuring output 2.3 kV, 50 Hz, 1 min.

Ambient conditions

Climatic rating:	IEC 60 068-2-1/2/3
Ambient temperature range:	–25 to + 40 °C, **Ex –20** to + 40 °C
Storage temperature range:	– 40 to + 70 °C
Annual mean relative humidity:	≤ 75%, no moisture condensation
Altitude:	2000 m max.
Indoor use statement!	

Table 3: Data on explosion protection ⟨Ex⟩ II (1) GD

Order Code	Type of protection «Intrinsic safety» Marking		Certificate	Mounting location of instruments
	Instrument	Measuring input		
606 – 63 / 64	[EEx ia] IIC	EEx ia IIC	ZELM 03 ATEX 0181	**Within** the hazardous area

Plug-in module SIRAX V 606, 1 or 2 channels
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Standard versions

The following versions are available as standard versions already programmed for the **basic** configuration. It is only necessary to quote the **Order No.:**

Table 4: Instruments in standard (non-Ex) version (measuring circuit not intrinsically safe)

Measuring input programmable for RTD and TC inputs	Measuring circuits	Measuring output *)	Power supply	Order Code	Order No.
RTD: Pt 100, Ni 100 TC: Types B, E, J, K, L, N R, S, T and U W5 / W26 Re W3 / W25 Re	2	**4…20 mA** programmable between 0 and 20 resp. 20 and 0 mA minimum span 2 mA	24 … 60 V DC/AC	606 – 6	152 827
			85 … 230 V DC/AC	606 – 6	152 835

Table 5: Instruments in [EEx ia] IIC version (measuring circuit intrinsically safe)

Measuring input programmable for RTD and TC inputs	Measuring circuits	Measuring output *)	Power supply	Order Code	Order No.
RTD: Pt 100, Ni 100 TC: Types B, E, J, K, L, N R, S, T and U W5 / W26 Re W3 / W25 Re	2	**4…20 mA** programmable between 0 and 20 resp. 20 and 0 mA minimum span 2 mA	24 … 60 V DC/AC	606 – 6	154 170
			85 … 110 V DC 85 … 230 V AC	606 – 6	154 188

**) The output variable (current or voltage) is not re-programmed.*

Basic configuration:

Measuring input:	Resistance thermometer Pt 100
Connection mode:	**Three-**wire connection
Measuring range:	0 … 600 °C
Measuring output:	4 … 20 mA resp. 0 … 10 V (acc. to order)
Open-circuit supervision:	Output 21.6 mA resp. 11 V (acc. to order)
Response time:	Approx. 1.5/2 s (Table 1)
Mains ripple suppression:	For frequency 50 Hz

Table 6: Specification and ordering information (see also Table 4 and 5: Standard versions)

Description	***Blocking code**	**no-go with blocking code**	**Article No./ Feature**
SINEAX V 606 **Order code 606 - xxxx xxxx xxxx xxxx x**			606 –
Features, Selection			
1. Housing			
SIRAX, in housing B17, for plugging onto backplane			6
2. Version / Power supply			
Standard / U_N 24 … 60 V DC/AC			1
Standard / U_N 85 … 230 V DC/AC			2
[EEx ia] IIC / U_N 24 … 60 V DC/AC			3
[EEx ia] IIC / U_N 85 … 110 V DC, 85 … 230 V AC			4
3. Number of measuring circuits			
1 channel	0		1
2 channels	X		2
4. Output variable			
Current, end value 20 mA			1
Voltage, end value 10 V			2
Same for both outputs			

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Description	*Blocking code	no-go with blocking code	Article No./ Feature
SINEAX V 606 **Order code 606 - xxxx xxxx xxxx xxxx x**			606 –
Features, Selection			
5. Configuration			
Basic configuration, (Pt 100, 3-wire, 0 to 600 °C, 4 to 20 mA / 0 to 10 V)	G		0
Configured to order			1
The following features 6 to 17 must only be specified at feature 1 “Configured to order”			
6. Channel 1: Measuring mode, input connection			
TC, thermocouple with internal cold junction compensation, with built-in Ni 100	T	GX	1
TC, thermocouple with external cold junction compensation Temperature t_K [°C] External cold junction temperature t_K between 0 and 60 °C	T	G	2
RTD, resistance thermometer 2-wire R_L [Ω] Total lead resistance R_L max. 60 Ω	R	G	3
RTD, resistance thermometer 3-wire	R	G	4
RTD, resistance thermometer 4-wire	R	GX	5
7. Channel 1: Sensor type / Measuring range start value; end value			
Pt 100 Range		GT	1
Ni 100 Range		GT	2
Pt … [Ω] Range		GT	3
Ni … [Ω] Range		GT	4
TC Type B Range		GR	B
TC Type E Range		GR	E
TC Type J Range		GR	J
TC Type K Range		GR	K
TC Type L Range		GR	L
TC Type N Range		GR	N
TC Type R Range		GR	R
TC Type S Range		GR	S
TC Type T Range		GR	T
TC Type U Range		GR	U
TC W5-W26Re Range		GR	W
TC W3-W25Re Range		GR	X
Specify measuring range in [°C], [°F] or [K]; refer to Table 7 for the operating limits for each types of sensors 7. Lines 3 and 4: Specify resistance in Ω at 0 °C, any value between 50 and 1000 Ω			
8. Channel 1: Output characteristics			
20 to 100% end value		G	1
0 to 100% end value		G	2
Inversely 100 to 20% end value		G	3
Inversely 100 to 0% end value		G	4

Continuation of Table 6: “Specification and ordering information” see on next page!

Description	*Blocking code	no-go with blocking code	Article No./ Feature
SINEAX V 606 **Order code 606 - xxxx xxxx xxxx xxxx x**			606 –
Features, Selection			
9. Channel 1: Open and short-circuit sensor signalling			
Set output at 110%		G	1
Set output (a range between – 5 and < 110% output span) [%]		G	2
Hold output at last value		G	3
No signal		G	A
The short-circuit signal is only active for three/four-wire connection of resistance thermometers up to 100 Ω at 0 °C			
10. Channel 1: Output time response			
Standard setting time, approx. 2 s		G	1
Setting time (admissible values see Table 1) [s]		G	9
11. Channel 2: Measuring mode, input connection			
Omitted at 1 channel version		GX	0
TC, thermocouple with internal cold junction compensation, with built-in Ni 100	D	GOX	1
TC, thermocouple with external cold junction compensation Temperature t_K [°C] External cold junction temperature t_K between 0 and 60 °C	D	GO	2
RTD, resistance thermometer 2-wire R_L [Ω] Total lead resistance R_L max. 60 Ω	S	GO	3
RTD, resistance thermometer 3-wire	S	GO	4
RTD, resistance thermometer 4-wire	S	GOX	5
12. Channel 2: Sensor type / measuring range start value; end value			
Does not apply for 1 channel version		GX	0
Pt 100 Range		GDO	1
Ni 100 Range		GDO	2
Pt … [Ω] Range		GDO	3
Ni … [Ω] Range		GDO	4
TC Type B Range		GSO	B
TC Type E Range		GSO	E
TC Type J Range		GSO	J
TC Type K Range		GSO	K
TC Type L Range		GSO	L
TC Type N Range		GSO	N
TC Type R Range		GSO	R
TC Type S Range		GSO	S
TC Type T Range		GSO	T
TC Type U Range		GSO	U
TC W5-W26Re Range		GSO	W
TC W3-W25Re Range		GSO	X
Specify measuring range in [°C], [°F] or [K]; refer to Table 7 for the operating limits for each types of sensors. Lines 3 and 4: Specify resistance in Ω at 0 °C, any values between 50 and 1000 Ω			6

Continuation of Table 6: “Specification and ordering information” see on next page!

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Description	*Blocking code	no-go with blocking code	Article No./ Feature
SINEAX V 606 Order code 606 - xxxx xxxx xxxx xxxx x			606 –
Features, Selection			
13. Channel 2: Output characteristics			
Does not apply for 1 channel version		GX	0
20 to 100% end value		GO	1
0 to 100% end value		GO	2
Inversely 100 to 20% end value		GO	3
Inversely 100 to 0% end value		GO	4
14. Channel 2: Open and short-circuit sensor signalling			
Does not apply for 1 channel version		GX	0
Set output at 110%		GO	1
Set output at (a range between – 5 to < 110% output span) [%]		GO	2
Hold output at last value		GO	3
No signal		GO	A
The short-circuit signal is only active for three/four-wire connection of resistance thermometers up to 100 Ω at 0 °C			
15. Channel 2: Output characteristics			
Does not apply for 1 channel version		GX	0
Response time standard, approx. 2 s		GO	1
Response time (admissible values see Table 1) [s]		GO	9
16. Mains ripple suppression			
For frequency 50 Hz		G	0
For frequency 60 Hz		G	1
17. Test certificate			
Without test certificate		G	0
Test certificate in German		G	D
Test certificate in English		G	E

**Lines with letter(s) under "no-go" cannot be combined with preceding lines having the same letter under "Blocking code".*

Table 7: Measuring range limits

Resistance thermometer		Thermocouples											
Pt100	Ni100	B	E	J	K	L	N	R	S	T	U	C [1]	D [2]
–200 to 850	–60 to 250	0 to 1820	–270 to 1000	–210 to 1200	–270 to 1372	–200 to 900	–270 to 1300	–50 to 1769	–50 to 1769	–270 to 400	–200 to 600	0 to 2315	0 to 2315
ΔR min. 15 Ω at final value [3] ≤ 400 Ω ΔR min. 150 Ω at final value > 400 Ω max. final value 4000 Ω $\frac{\text{start value}}{\Delta R} \leq 10$		ΔU min. 2 mV, max. 80 mV $\frac{\text{Start value}}{\Delta U} \leq 10$											

[1] W5 Re W26 Re (ASTM E 988-90)
[2] W3 Re W25 Re (ASTM E 988-90)
[3] For two-wire connection, the final value is made up of the measured final value [Ω] plus the total resistance of the leads.

Electrical connections

Version with 1 input and 1 output

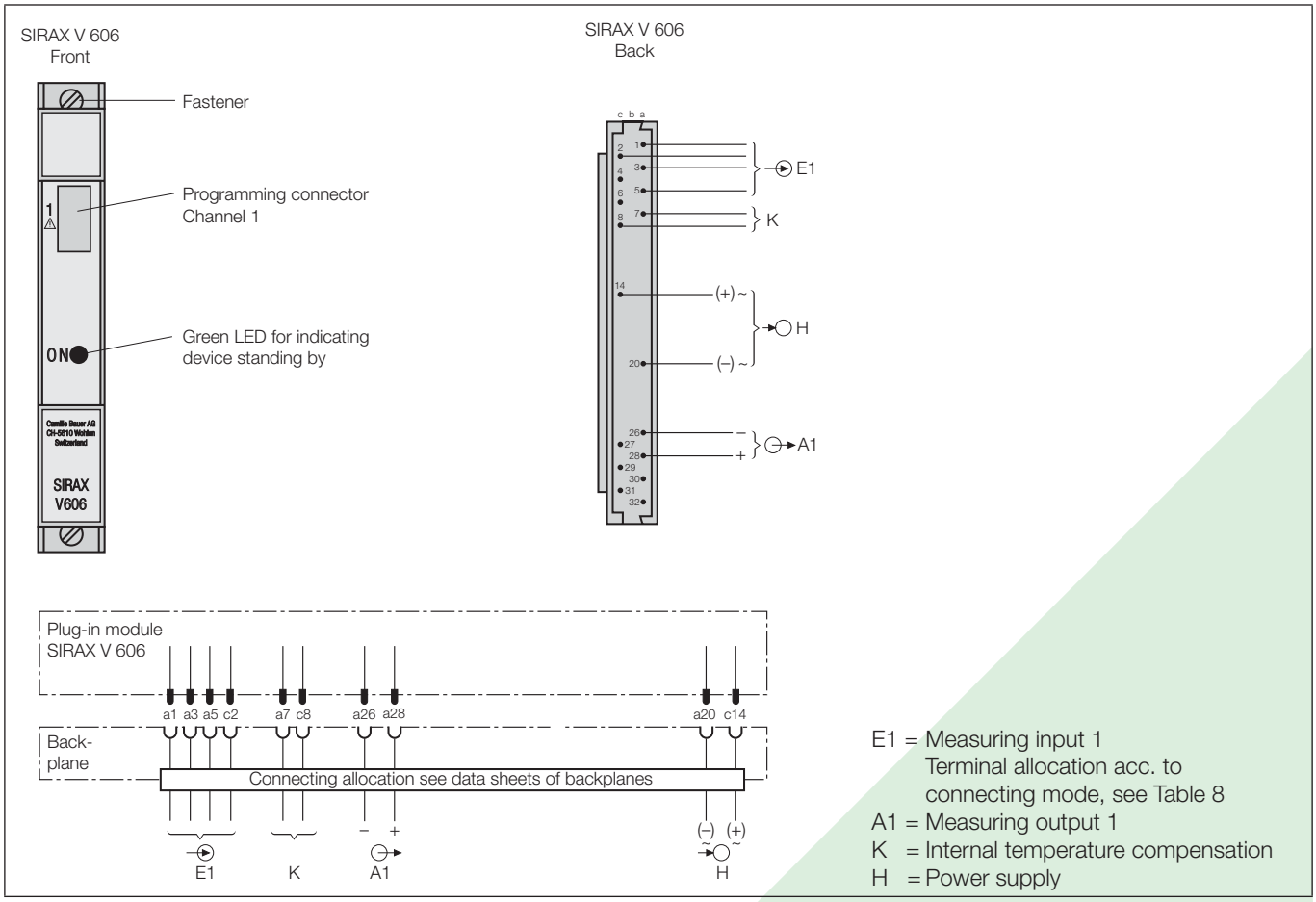
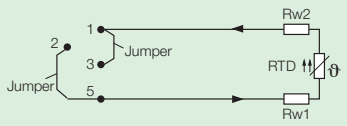
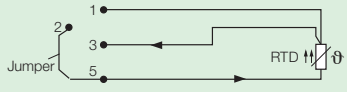
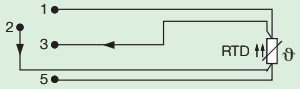
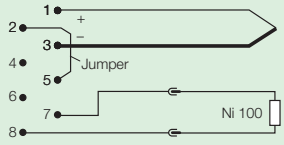


Table 8: Measuring input leads E1

Measuring input		Connection mode	Connecting diagram Plug wiring
Version with 1 input	Measuring input E1	TC ext. comp. *)	
		RTD **two-**wire connection *)	
		RTD **three-**wire connection *)	
		RTD **four-**wire connection *)	
		TC int. comp.	

*) The Ni 100 must be removed from the backplane.

Plug-in module SIRAX V 606, 1 or 2 channels
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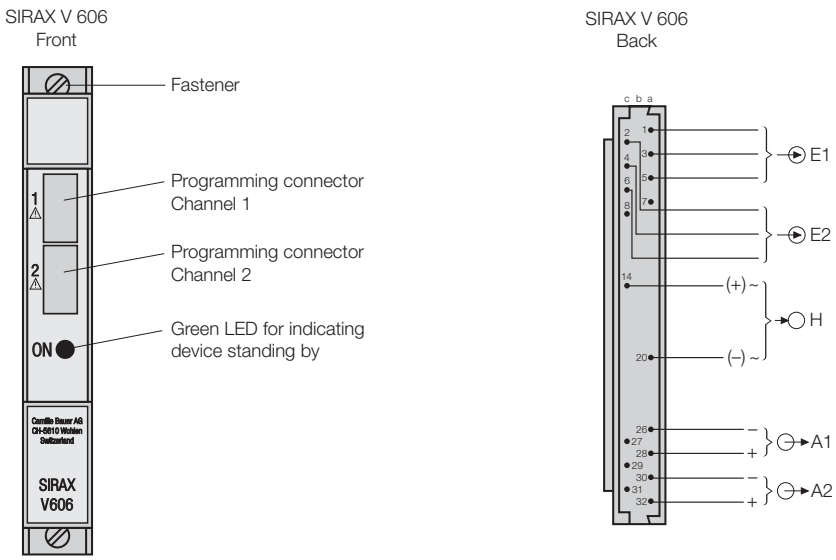
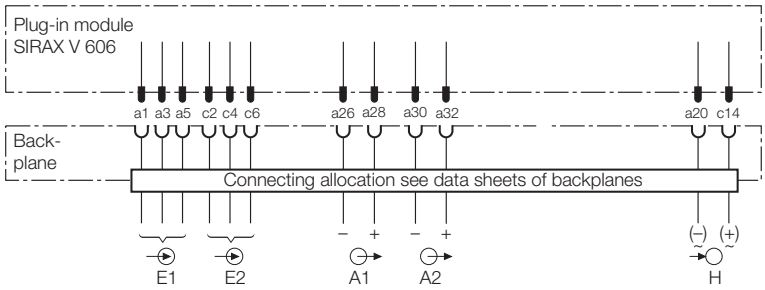
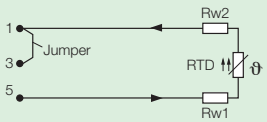
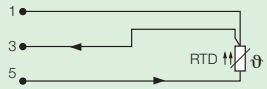
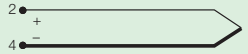
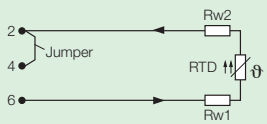
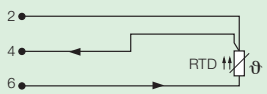
Version with 2 inputs and 2 outputs





E1 = Measuring input 1
E2 = Measuring input 2
Terminal allocation acc. to
connection mode, see Table 9
A1 = Measuring output 1
A2 = Measuring output 2
H = Power supply

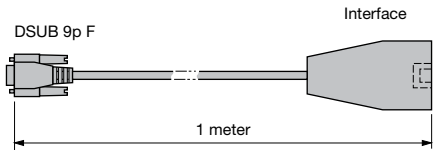
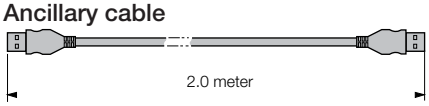
Table 9: Measuring input leads E1 and E2

Measuring inputs		Connection mode *)	Connecting diagram Plug wiring
Version with 2 inputs	Measuring input E1	TC ext. comp. **)	
		RTD **two-**wire connection **)	
		RTD **three-**wire connection **)	
	Measuring input E2	TC ext. comp. **)	
		RTD **two-**wire connection **)	
		RTD **three-**wire connection **)	

*) Since the SIRAX BP 902 backplane only has six input terminals, the two-channel version of the SIRAX V606 can only be used in **two** or **three-**wire measuring schemes.
**) The Ni 100 must be removed from the backplane.

Plug-in module SIRAX V 606, 1 or 2 channels
Programmable Temp. Transmitter for RTD and TC inputs

Table 10: Accessories and spare parts

Description	Order No.
Programming cable PK 610 	137 887
Ancillary cable 	141 416
PC software V 600 *plus* on CD (Download free of charge under http://www.camillebauer.com)	146 557
Operating instructions V 606-6 Bdfe in German, French and English	151 697
Coding comb with 12 sets of codes (for coding the backplane BP 902)	107 971

Dimensional drawing

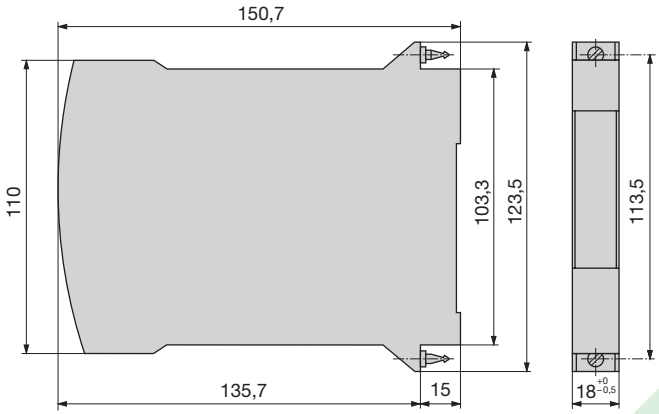


*Fig. 3. SIRAX V 606 in housing **B17**.*

Standard accessories

1 Operating Instructions in German, French and English
1 Coding comb with 12 sets of codes
1 Type test certificate
(only for instruments in type of protection “Intrinsically safe”)

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