1. General Information

The warning symbol on the device (exclamation point in triangle) means: Observe instructions!
Warning!
Protection against electric shock
For applications with high working voltages, take measures to prevent accidental contact and make sure that there is sufficient distance or insulation between adjacent devices.

Caution!
Be sure to take protective measures against electrostatic discharge (ESD) when handling the devices!

Caution!
Only trained and qualified personnel should install the BasicLine BL 520 temperature transmitters.
Do not connect the device to power supply before it is professionally installed. Do not change the measuring range during operation.
Be sure to observe the national codes and regulations for installation and selection of cables and lines.
You must install a clearly identifiable two-pole circuit breaker between device and mains supply.
Mains supply must be protected by a fuse ≤ 20 A.

2. Intended Use

The BasicLine BL 520 temperature transmitters provide connection possibilities for most of the common thermocouples and resistance thermometers.
When a resistive sensor is connected, 2-, 3-, or 4-wire configuration is automatically recognized at device startup.
Note: When the configuration is changed from 2-wire to 3-wire (or 4-wire) or from 3-wire to 4-wire, this is only recognized after the device's next restart.
The output signal is adjustable to 0 / 4 ... 20 mA, or 0 … 5 / 10 V.
The calibrated range selection is performed using DIP and rotary encoder switches. The device provides a 24 V DC power supply and galvanic 3-port isolation.

Warning against misuse
Do not operate the device outside the conditions specified by the manufacturer, as this might result in hazards to operators or malfunction of the equipment.
Caution
The system installer is responsible for the safety of the system in which the device is integrated.

3. Configuration

Set the DIP and rotary encoder switches according to the table on the housing. An example is shown overleaf.
Sensor type:
Adjust the connected sensor using the switches DIP1 to DIP3.
Start value:
Adjust the number (00 ... 99) using the "Start" rotary switches.
Adjust the factor using the switches DIP4, DIP5.
To obtain a falling curve, adjust a start value which is higher than the end value.
End value:
Adjust the number (00 ... 99) using the "End" rotary switches.
Adjust the factor using the DIP6 switch.
Output signals:
Adjust the output signal using the switches DIP7, DIP8.

4. Mounting, Electrical Connection

The temperature transmitters are snapped onto TS 35 standard rails and are laterally fixed by suitable end brackets.
See dimension drawing for terminal assignments.
Wire cross-section: 0.2 mm² ... 2.5 mm² (AWG 24-14).

5. Specifications

Input data RTD

Sensor type	(Standard)	Range [°C]
Pt100	(EN 60751)	-200 ... +850
Pt1000	(EN 60751)	-200 ... +850

Connection	2-, 3- or 4-wire (automatic identification, LED signaling)
Resistance range (incl. line resistance)	Temperature measurement: 0 ... 5 kΩ
Max. line resistance	100 Ω
Supply current	Max. 500 µA
Line monitoring	Open circuits
Input error limits	For resistances < 5 kΩ: ± (50 mΩ + 0.05 % meas.val.) for spans > 15 Ω
Temperature coefficient at the input	0.005 %/K of adjusted end value (average TC in permitted operating temp range, reference temp 23 °C)

Thermocouple input data

Sensor type	(Standard)	Range [°C]
J	(EN 60584-1)	-210 ... +1200
K	(EN 60584-1)	-200 ... +1372

Input resistance	> 10 MΩ
Max. line resistance	1 kΩ
Line monitoring	Open circuits
Input error limits	± (10 µV + 0.05 % meas.val.) for spans > 2 mV
Temperature coefficient at the input	0.005 %/K of adjusted end value (average TC in permitted operating temp range, reference temp 23 °C)
Ref. junction compensation	Internal or external (Pt 100)
Error of external ref. junction compensation	Via Pt100 for T_{comp} = 0 ... 80 °C: ± (80 mΩ + 0.1 % meas.val.)
Error of internal ref. junction compensation	± 1.5 °C

Output data

Outputs	0 ... 20 mA, 4 ... 20 mA, 0 ... 10 V, or 0 ... 5 V, Calibrated switching
Control range	0 % to approx. 102.5 % span at 0 ... 20 mA, 0 ... 10 V or 0 ... 5 V output -1.25 % to approx. 102.5 % span at 4 ... 20 mA output
Resolution	16 bits
Load Current output Voltage output	 ≤ 10 V (≤ 500 Ω at 20 mA) ≤ 1 mA (≥ 10 kΩ at 10 V)
Output error limits Current output Voltage output	 ± (10 µA + 0.05 % meas.val.) ± (5 mV + 0.05 % meas.val.)
Residual ripple	< 10 mV_{rms}
Temperature coefficient at the output	0.005 ppm/K full scale (average TC in permitted operating temp range, reference temp 23 °C)
Error signaling	Output: 4 ... 20 mA: Current ≤ 3.6 mA or ≥ 21 mA (see table on back for more data)

Transmission behavior

Characteristic	Rising / falling linearly
Measuring rate	Approx. 3/sec
Response time t_{99}	300 ms

Power supply

Power supply	24 V DC (± 15 %), approx. 0.85 W

Isolation

Test voltage	1.5 kV AC, 50 Hz: power supply against input against output
Working voltage (basic insulation)	Up to 300 V AC/DC across all circuits with overvoltage category II and pollution degree 2 according to EN 61010-1. For applications with high working voltages, take measures to prevent accidental contact and make sure that there is sufficient distance or insulation between adjacent devices.

Standards and approvals

EMC	Product standard EN 61326

*) Slight deviations are possible while there is interference

See www.knick.de for Declaration of Conformity with Low Voltage and EMC Directive.

UL Recognized Component, File No. E220033, Standards: UL 508, CAN/CSA 22.2 No. 14-95

Further data

Ambient temperature during operation during storage	 0 ... +55 °C (mounted in row) - 25 ... +85 °C
Ambient conditions	Stationary application, weather-protected Relative air humidity 5 ... 95 %, no condensation Water or wind-driven precipitation (rain, snow, hail) excluded
Ingress protection	Terminal IP 20, housing IP 40
Mounting	For 35 mm mounting rail (EN 60715)
Weight	Approx. 60 g

6. LEDs and Error Signaling on Device

Note: Green and red LEDs flash momentarily at device startup.

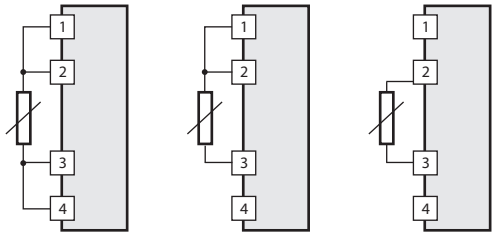
Green: Supply voltage provided

Yellow: The identified connection type is signaled once at the start of RTD measurement (2/3/4-time flashing corresponds to 2/3/4-wire measurement)

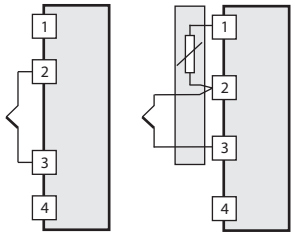
Red: Error status; LED blinking indicates error number

		Output [mA]		Output [V]	
No.	**Error**	4 ... 20	0 ... 20	0 ... 5	0 ... 10
1	Value below range limit	3.6	0	0	0
2	Value above range limit	21	21	5.25	10.5
3	Sensor short circuit	21	21	5.25	10.5
4	Sensor open	21	21	5.25	10.5
5	- not connected -				
6	- not connected -				
7	Identification of connection	21	21	5.25	10.5
8	Switch misadjusted	21	21	5.25	10.5
9	Adjustment error	21	21	5.25	10.5
10	Device error	3.6	0	0	0

7. Input Wiring

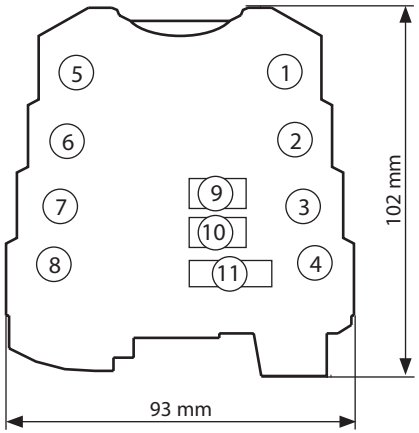


RTD: 4-wire | RTD: 3-wire | RTD: 2-wire



TC | TC with ext. reference junction compensation (Pt 100)

8. Dimension Drawing and Control Elements



1	Input 1 +	9	Start value (2 rotary switches)
2	Input 2 +	10	End value (2 rotary switches)
3	Input 3 -	11	DIP switches with the following assignments:
4	Input 4 -		1,2,3: Sensor selection
5	Output +		4,5,6: Factor for start/end value
6	Output -		7,8: Output signal selection
7	Power supply		
8	Power supply		

9. Typical Configuration

Sensor: Thermocouple type J
Measuring range: 200 ... 1200 °C
Output signal: 4 - 20 mA

Adjust sensor type:
TC Type J: DIP1 = 1, DIP2 = 0, DIP 3 = 0

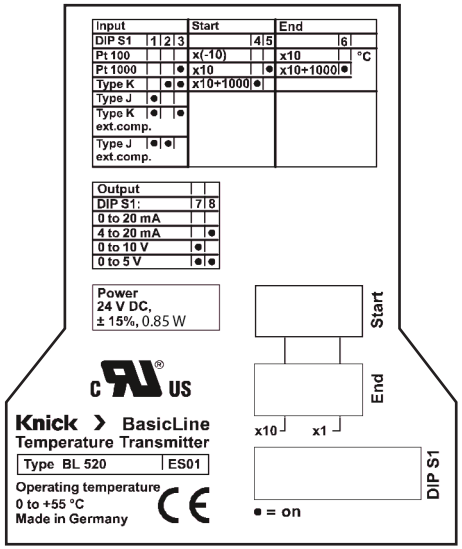
Adjust start value:
200 °C
This start value is composed of: numerical value = 20, factor = 10.

Adjust the numerical value at the rotary switches (see dimension drawing, pos. 9): 20
Adjust factor 10: DIP4 = 0, DIP5 = 1

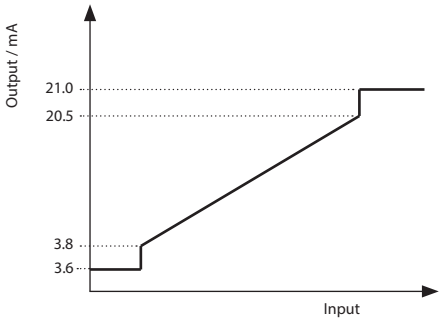
Adjust end value:
1200 °C
For end values above 1000 °C, adjust "factor 10+1000"

Adjust the numerical value at the rotary switches (see dimension drawing, pos. 10): 20
Adjust factor 10+1000: DIP6 = 1 (factor 10 + 1000)

Adjust output signal:
4 ... 20 mA: DIP 7 = 0, DIP 8 = 1



10. Response of Output Current (4 ... 20 mA) to Out-of-Range Conditions



11. Order Information

Type	Order No.
Temperature transmitter, adjustable	BL 520

12. Mounting on a DIN Rail

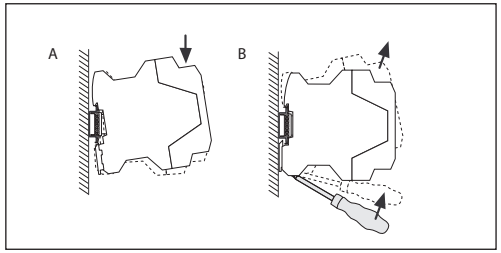
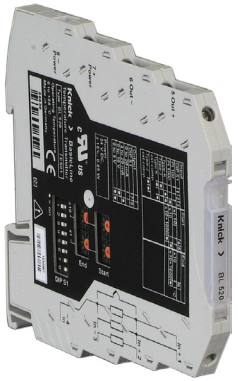


Fig.: A Snapping a transmitter onto a DIN rail
B Removing a transmitter from a DIN rail

Manual
English

BasicLine BL 520

Temperature Transmitter



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