



KONGSBERG

GA-112

Dual Thermocouple Amplifier

Features

- Dual type, space saving
- Built-in temperature sensor for compensation of cold-point-junction variations
- Available in different standard temperature ranges adjusted by producer

Description

Application and general description

The GA-112 Dual Thermocouple Amplifier converts (amplifies) the low voltage output from a thermocouple (approximately $40 \mu\text{V}/^\circ\text{C}$ when using a K element) to a standard 4 to 20 mA signal with 2-wire connection. Two, independent, electronic circuitry are designed in a terminal block (see Fig. 1) and can be mounted on a standard TS-32 or TS-35 rail. The TS-35 is recommended. The GA-112 Dual Thermocouple Amplifier can be mounted side by side on the rail. End clamps to support the amplifiers must be installed at both sides. The amplifiers must be installed in a steel cabinet with cable glands. KONGSBERG supplies such cabinets with the correct number of amplifiers and glands. The dual-type design is space saving and reduces the size of the cabinet for a fixed number of measuring points.

Electrical design (see Fig. 5)

Voltage supply must be between 12 and 35 VDC, and the load resistance at the output must determine the lower voltage (see Fig. 3). The thermocouple voltage is connected to an input network. The input voltage is dependent upon the temperature difference between the sensor element (hot junction) and the amplifier (cold



junction). A built-in temperature sensor will compensate for variations in the amplifiers ambient temperature (cold junction). Two independent amplifiers are built in the same terminal block housing.

Electrical connection (see Fig. 4)

A screened cable must always be used from the sensor to the amplifier and from the amplifier to the monitoring system. Minimum cross section cable is $2 \times 0.5 \text{ mm}^2$. The amplifiers are normally mounted on a rail inside a steel cabinet, and the screen must be connected to the steel cabinet in a cable gland designed for this purpose (see Fig. 2) or to an earth bar inside the cabinet. The monitoring screen must be connected to ground as close as possible to the inlet of the cabinet. Thermocouples can be delivered with armoured cables, which also function as an electrical screen.

The GA-112 Functional Control

Fabric adjusts the amplifier and further adjustment is normally not required. Functional control is carried out according to the following procedure:

1. Disconnect one of the sensor leads from terminal no. 3 and 4.
2. Short circuit the sensor input, terminal no. 3 and 4.
3. Connect a mA-meter in series with one of the leads to the power supply.
4. The signal current will correspond to the ambient temperature of the amplifier (the thermo voltage is 0 μ V).
5. A 4 mA signal corresponds to 0 °C, while 20 mA corresponds to full range.

The correct signal current can be calculated as follows:

$$I_{out} = 4 + \frac{(20 - 4) * T_{amb}}{\text{Range}} \text{ (mA)}$$

Example:

GA-112/A, range 0 to 600 °C. $T_{amb} = 30$ °C.

$$I_{out} = 4 + \frac{(20 - 4) * 30}{600} = 4.8 \text{ mA}$$

Potentiometer for zero adjustment is accessible inside cover. This potentiometer cover approximately ± 1 % of FRO and should be adjusted by fabric. Further adjustments are not recommended.*

Technical specifications

Power supply:	24 VDC (12 to 35 VDC).
Current consumption/output signal:	4 to 20 mA, 2-wire connection, compensated for variations in ambient temperature.
I_{out} at broken sensor leader:	2.5 to 3.0 mA.
Maximum current consumption:	30 mA.
Load resistance:	0 to 1150 Ω (see Fig. 3).
Electrical connections:	See Fig. 2 and 4.
Ambient temperature, operation:	-25 to +80 °C.
Compensated temperature range:	0 to +70 °C.
Accuracy:	< ± 1.0 % of FRO* (incl. non linearity, hysteresis and repeatability at 22 °C).
Repeatability:	< ± 0.2 % of FRO*.
Thermal zero and sensitivity shift:	< 0.05 °C/°C ambient temperature shift.
Vibrations:	Maximum 4 g at 2 to 100 Hz.
Quality standard:	ISO 9001.
Generic EMC standard:	
Emission:	EMC 50081-1.
Immunity:	EN 50082-2.
Performance degradation during immunity test:	± 2.0 % of FRO*.
Dimensions (H x W x D):	22.5 x 79 x 95 mm.
Weight:	80 g.
Housing material:	Polyamide terminal block.
Mounting:	TS-32 or TS-35 rail.
Encapsulation:	IP40.

*FRO = Full Range Output

Standard types	Element type	Range
GA-112/E	K NiCr-NiAl	0 to 160 °C
GA-112/B	K NiCr-NiAl	0 to 300 °C
GA-112/A	K NiCr-NiAl	0 to 600 °C
GA-112/N	K NiCr-NiAl	0 to 900 °C
GA-112/G	J Fe-Constantan	0 to 300 °C
GA-112/F	J Fe-Constantan	0 to 600 °C

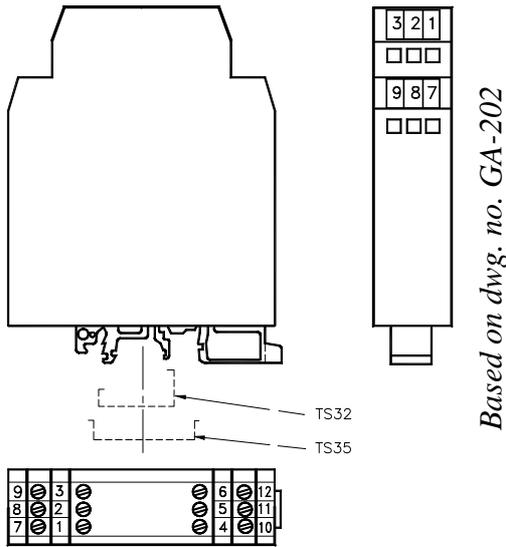


Fig. 1: The GA-112

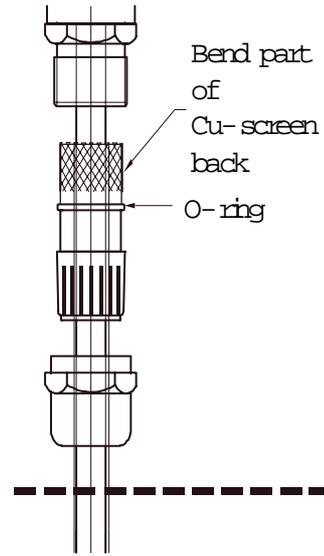


Fig. 2: Connection of screen in PG-gland

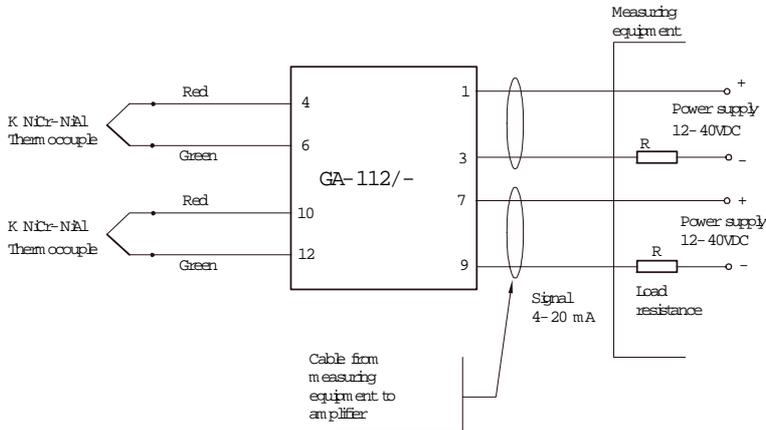


Fig. 4: The GA-112, electrical connection

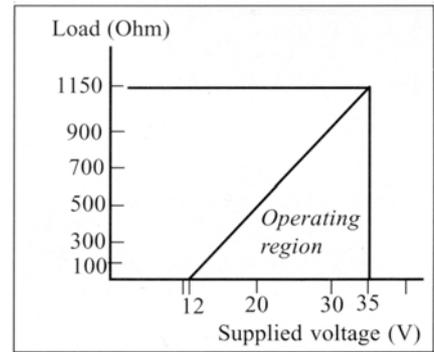


Fig. 3: Maximum permissible load

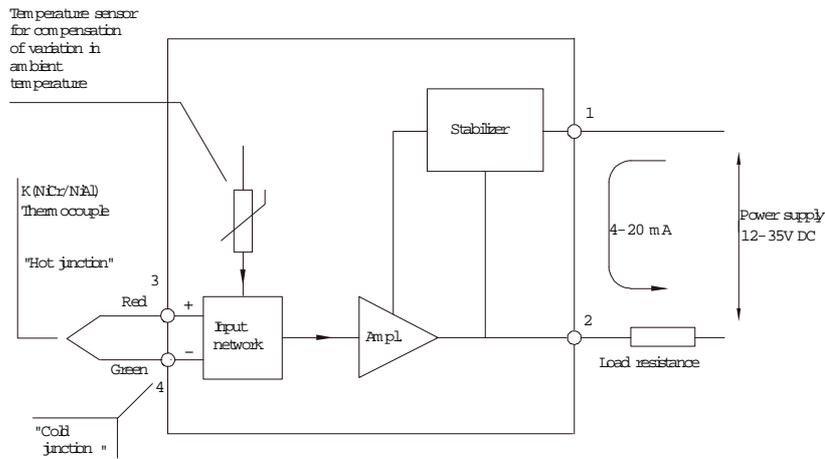


Fig. 5: The GA-112, electrical design