GA-110

KONGSBERG

Thermocouple Amplifier

Features

- 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-110 Thermocouple Amplifier converts (amplifies) the low voltage output from a thermocouple (approximately 40 µV/ºC when using a K element) to a standard 4 to 20 mA signal with 2-wire connection.

The electronic circuitry is encapsulated 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-110 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.

Electrical design (see Fig. 4)

Voltage supply must be between 12 and 35 VDC, and the load resistance at the output must determine the lower voltage. 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).

Electrical connection (see Fig. 1 and 2)

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 x 0.5 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-110 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 µV).
5. A 4mA signal corresponds to 0 °C, while 20mA 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-110/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. 1 and 2
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):	25 x 84 x 79 mm
Weight:	70 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-110/E	K NiCr-NiAl	0 to 160 °C
GA-110/B	K NiCr-NiAl	0 to 300 °C
GA-110/A	K NiCr-NiAl	0 to 600 °C
GA-110/N	K NiCr-NiAl	0 to 900 °C
GA-110/G	J Fe-Constantan	0 to 300 °C
GA-110/F	J Fe-Constantan	0 to 600 °C

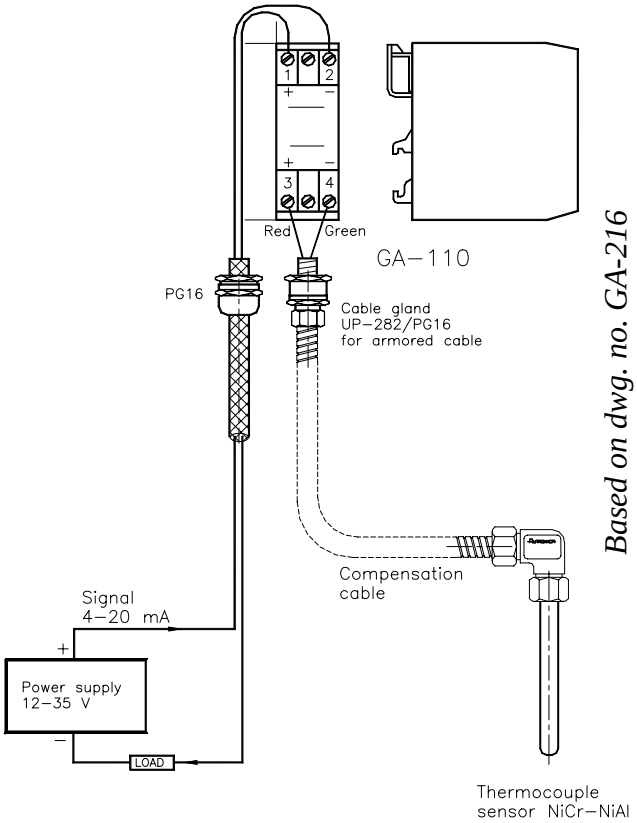

Fig. 1: The GA-110 connections

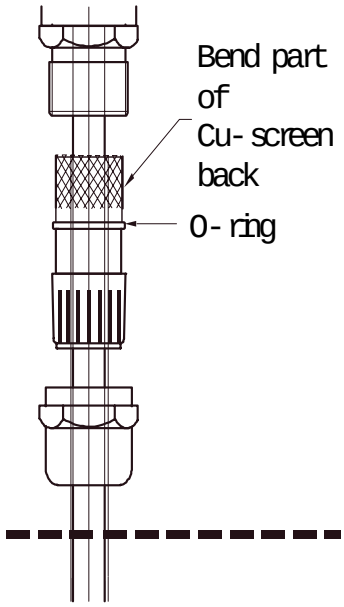

Fig. 2: Connection of screen in PG-gland

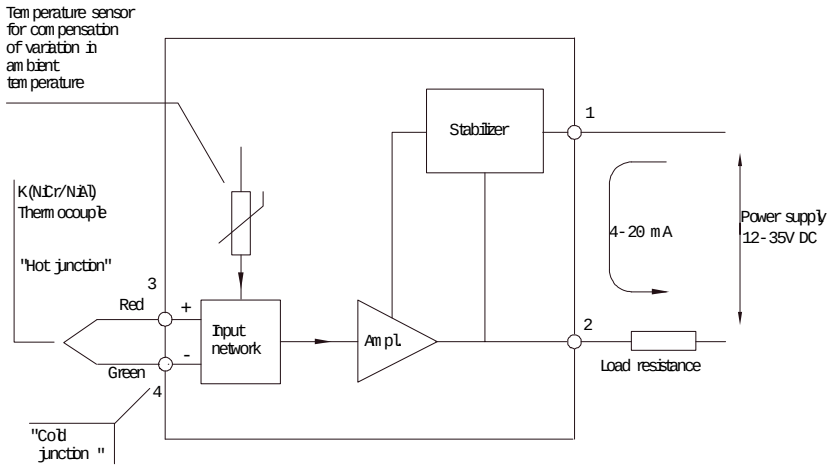

Fig. 4: The GA-110, electrical design

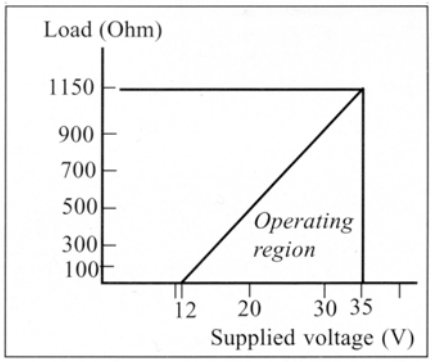

Fig. 3: Maximum permissible load

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