

SYSTEM 3000 / 4000

**DUAL WAVELENGTH
PYROMETER
T1.1 / T1.2**

TECHNICAL DESCRIPTION

EDITION: TB T1.1 / T1.2-SZ1

DUAL WAVELENGTH PYROMETER T1.1 / T1.2

- Infrarot - Quotientenpyrometer
- Fault diagnosis
- Measurement range: 700 - 1400 °C (T1.1)
860° - 1800°C (T1.2)
- Protection IP 65
- 0/4 - 20 mA linear output signal
- Linear to temperature
- Accuracy: 1% (T1.1)
3% (T1.2)
- 24V DC operating voltage

Application

The **T1.x** is an infrared dual wavelength pyrometer for noncontact temperature measurement. It can be used to determine temperatures of fixed as well as moving targets. Under certain conditions it can also be used for flame temperature measurement.

The use of a non contact temperature measurement pyrometer is especially cost advantageous when regular thermocouples are frequently destroyed due to mechanical wear or fatigue.

The **T1.x** receives the infrared radiation emitted from a target. This is the basis for the calculation of its temperature. As there are no moving

parts inside the unit, it is free from any wear. Maintenance is reduced to the periodic cleaning of the lens.

All the required signal processing is accomplished inside the unit and therefore no external components are needed. After being connected to a power supply (24 Vdc), the instrument delivers an output current proportional to the temperature.

The instrument is contained in an IP 65 enclosure. It can operate in- and outdoors under the most adverse conditions up to an ambient temperature of 55 °C.

Function

All warm bodies emit electromagnetic radiation, which depending on its temperature, can have a maximum in the visible or infrared bands of the spectrum. The radiation intensity is a (non linear) function of the temperature.

By determining the emitted intensity, the temperature of a target can be derived. This is the principle of single wavelength or spectral pyrometers. However, absorption of radiation due, for example to dust or smoke, can lead to an incorrect temperature reading of the instrument. Often another problem is the unknown emissivity (the ability of a body to emit radiation) of the target which must be determined before reliable readings can be expected.

Dual wavelength pyrometers such as the **T1.x** eliminate these problems. The internal circuitry of the **T1.x** evaluates the ratio of the incoming ra-

diation on the two wavelength bands. Correcting for emissivity or absorption losses is not necessary. This facilitates commissioning and ensures a high measurement reliability.

Incoming radiation is filtered before being detected by a silicon sandwich photodiode. The detector is held at a constant temperature to avoid drift. Temperature compensated logarithmic amplifiers prepare the signal for input into a ratio forming instrumentation amplifier. The output is linearized and converted to the output current.

An insufficient level of incoming radiation will invalidate the output signal. A control logic determines this condition and sends an alarm to the operator. A potentiometer, which is accessible from the rear of the instrument, can be used to correct for abnormal emissivity variations.



Mounting:

Care must be taken that a unimpeded sight of the target is ensured. No lamps or sunlight should reflect off its surface. For best accuracy, the T1.x should aimed at 90° - 45° to the object, shallow angles are to be avoided.

If there is a window between the target and the pyrometer, it must be ensured that it has an even and high transmission in the wavelength range 750 - 1200 nm. Basically all glasses are acceptable.

Of the pyrometer is to fixed on a sight tube, it must be assured that it is wide enough so as not to limit the instrument's field of view. The sight tubes may be of length L with a diameter d:

d: 1" 1.5" 2"

L: 1.2m 1.8m 2.4m

The pyrometer is shipped with a quick mounting flange/air purge. The special construction of the flange ensures a clean lens when connected to an air supply.

Optimum alignment can be achieved if the instrument is mounted on a ball joint which is available as an accessory. A heat insulator and a cutoff valve add thermal protection and accessibility.

Installation

The connector contacts are given in the diagram.

As the photodiode detector is heated to a constant temperature, the instrument will draw an initial current of up to 600mA. Depending on ambient temperatures, the current will stabilize to about 200mA after a few minutes.

The outputs are on the same ground potential as the supply voltage. Should this be a problem, decoupling transformers can be delivered. The condition "low energy" is output as a 12V, short circuit proof signal.

Basic adjustment

The instrument is shipped with the output current range set to 4 -20 mA. This can be changed to 0 - 20 mA by removing the jumpers J10 and J12. To do this, the instrument must be opened. The jumpers are on the larger pcb opposite the lens.

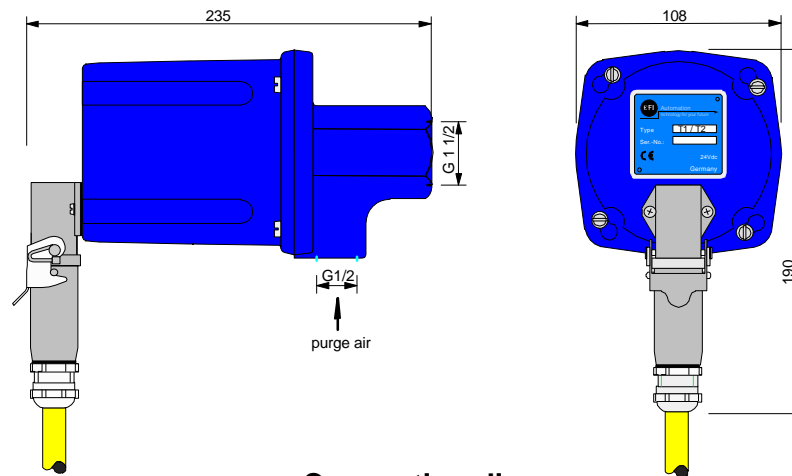
The alignment of the T1.x is best accomplished using the alignment aide (BFI Part No. P 106) in conjunction with a ball joint.

The pyrometer is shipped with the emissivity

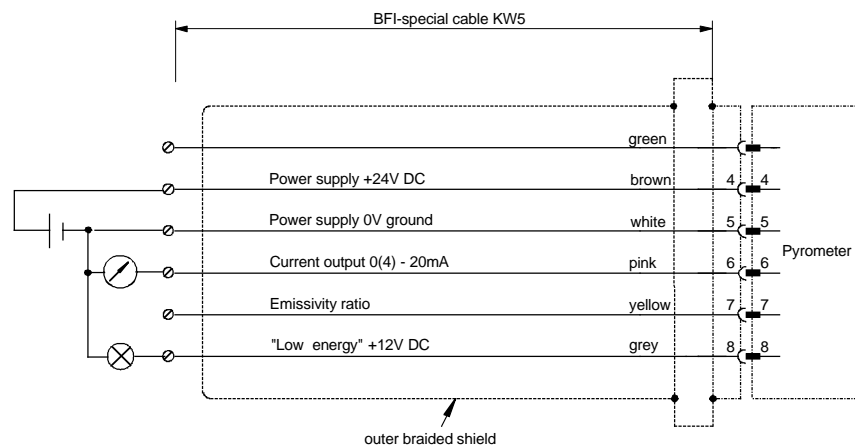
correction ratio in a neutral position. In rare cases where the temperature readings do not agree with another reference, the potentiometer may be adjusted. This adjustment should only be carried out if the reference has been found to accurate and reliable.

In applications where the highest possible accuracy must be achieved, it is recommended that the instrument be returned to the factory for recalibration in yearly intervals.

Dimensions



Connection diagram



Technical data

Measurement range	T1.1 : 700 - 1400°C T1.2 : 860 - 1800°C
Accuracy	T1.1 : ± 1% full scale T1.2 : ± 3% full scale
Repeatability	± 0,5% value
Response time	2s
Spectral sensitivity maxima	930 and 1030 nm
Viewing angle	1,1 °
Operating voltage	24 V DC +/-10% , 200 mA max. current approximate 600 mA
Operating temperature range	0...+55°C
Signal output	0(4)...20 mA (Ra < 500 Ohm)
Control outputs	emissivity ratio correction, low energy
Purging air connection	1/2" internal thread ISO 228.
Sight tube connection	1" internal thread
Electric connection	dust-proof plug connector
Protection	IP 65
Weight	approximate 1kg
Part No.	T1.1 : S 200.1 T1.2 : S 200.2

The T1.x is also available in explosion protected housing (EeX) or in LWL- technique.

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