TL-S, TL-GA

USER MANUAL

INFRARED COMPACT SENSORS

-32 °C to 2500 °C

THE INTELLIGENT AND PRECISE 2-WIRE SERIES

NON-CONTACT TEMPERATURE MEASUREMENT - WORLDWIDE

2. Technical data

Pyrometer Type	Measuring range	Spectral range	Distance to Spot size
TL-S-18	650 ... 1800 °C 1202 ... 3272 °F	0.8-1.1 µm	100 : 1
TL-S-25	800 ... 2500 °C 1472 ... 4532 °F	0.8-1.1 µm	150 : 1
TL-GA-13	300 ... 1300 °C 572 ... 2372 °F	1.45-1.8 µm	100 : 1
TL-GA-18	350 ... 1800 °C 662 ... 3272 °F	1.45-1.8 µm	100 : 1

Response time t_{90} [1)]:	250 ms (Factory preset) (adjustable in steps between 20ms and 10s)
Accuracy:	0.5% of measuring value in °C + 1K (at 23°C; 73.4 °F)
Repeatability:	0.5% of measuring value in °C + 1K
Emissivity[1)]:	5...100%, adjustable (100% factory preset)
Measuring output:	4...20 mA, load independent DC current, linear to selected measuring subrange **Attention:** At ambient temperatures > 75°C the output is fixed to 3.9 mA!
Maximum load:	700 (24 V); 400 (18 V); 1000 (30 V)
Power supply:	24 V dc ± 25 %, stabilized, ripple <50 mV!
Power consumption:	1.5 VA
Safty system:	IP 65, acc. DIN 40 050
Operating temperature:	0 ... 70°C; 32 ... 158 °F
Storage temperature:	-20 ... 70°C; -4 ... 158 °F
Housing:	Stainless steel M40 x 1.5 mm, ca.120 mm long
Weight:	ca. 450 g
Connection cable:	2.5 m
EMC:	CE-Label in accordance with EU rules about electromagnetic immunity

[1)] Response time, emissivity and measuring subrange (minimum measuring subrange is 50 K) are adjustable via service-interface with a PC or the handheld configurator *HP 03*.

3. Measuring ranges and optics

The Infrared-Compact-Sensors are equiped with one of the optics shown below. It must be chosen - according to the application - when ordering. The optics can **not** be changed by the customer.

Pyrometer Type	Measuring Range	Available Optics	OrderNo.
TL-S-18	650 ... 1800 °C 1202 ... 3272 °F	I, II, III	IK21800-4(-1, -2, -3)
TL-S-25	800 ... 2500 °C 1472 ... 4532 °F	IS, IIS, IIIS	IK22500-4(-1-S), -1-S, -1-S)
TL-GA-13	300 ... 1300 °C 572 ... 2372 °F	I, II, III	IK31300-4(-1, -2, -3)
TL-GA-18	350 ... 1800 °C 662 ... 3272 °F	I, II, III	IK31800-4(-1, -2, -3)

Optical data:

Spot size diameter M (mm) at distance a (mm)
Note: The focus is marked in bold letters.

OPTICSTYP	*a = 0* (Aperture)	*600*	*1000*	*1500*	*2000*
OPTICS I	13	**6**	15	26	36
OPTICS II	16	10	**9**	15	22
OPTICS III	17	13	11	**11**	17
OPTICS IS	13	**4**	12	23	34
OPTICS IIS	16	7	**5**	12	19
OPTICS IIIS	17	10	7	**7**	14

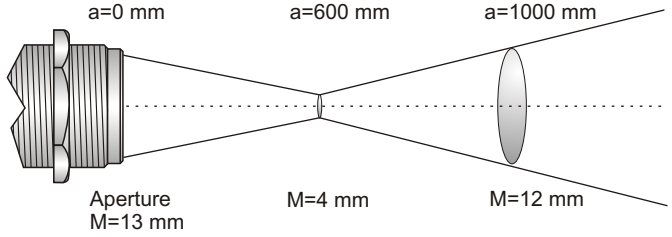


Fig. 1: Example for Optics IS

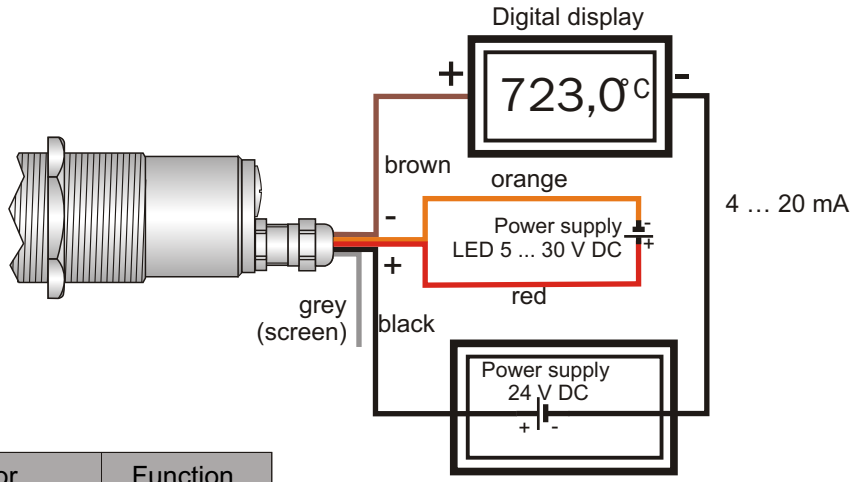
4. Electrical and mechanical installation

4.1. Electrical installation

The Infrared Compact Sensor series *TL-S* and *TL-GA* requires a power supply of 24 V dc ± 25%.
The maximum ripple on the dc supply voltage must be less than 50 mV.
If the pyrometer has been connected it is immediately ready for use.
For wire assignment please see drawing below.
When connecting the power supply, the polarity must be correctly observed.

Note: Factory presettings:
Response time t_{90}: 250 ms
Emissivity: 100 %
Measuring range: Maximum measuring range of the instrument
Peak Memory: OFF

With a PC and the software *IP-SERVICE* (optionally available) as well as the handheld configurator *HP 03* these parameters and the measuring subrange can be set individually.



Color	Function
Black	+24 V (18 ... 30 V)
Brown	0 V
Grey	Screen
Red	LED +5...30 V DC
Orange	LED 0 V

Fig. 2: Wire assignment

4.2. Electrical Accessories

Digital displays

To display the measured temperatures there are variours digital displays with integrated two-wire power supply from CALEX optional available:.

ID 50 digital display with integrated 2-wire power supply
ID 52 like *ID 50*, additionally with 2 internal limit switches
ID 54 digital display, large version, up to 500°C

4.3. Mechanical Installation:

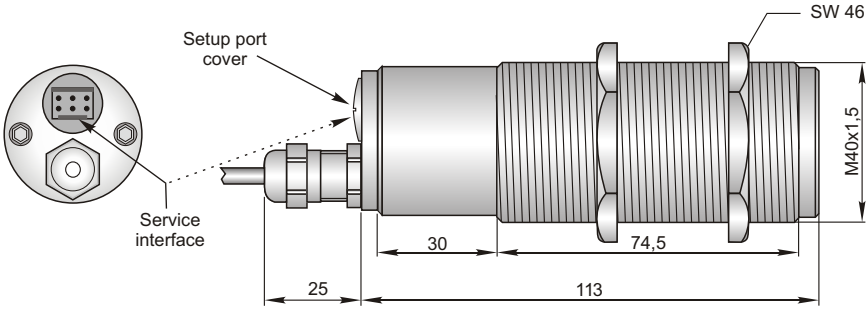
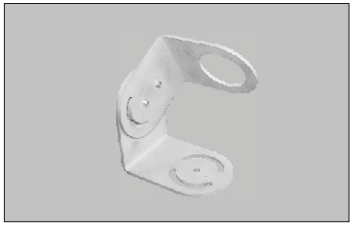


Fig. 3: Device dimensions

For more hostile environments or difficult mounting conditions a wide range of accessories is available!

4.3. Mechanical accessories



Mounting support, stainless steel
Mounting, adjustable, (Fig. 4)
Mounting, fixed
The mounting support enable adjustments (45°) in one, respectivly two dimensions.The monting support can be fixed on the pyrometer with two counternuts.

Fig. 4: Mounting, adjustable

Stainless steel air purge unit

Standard air purge unit
The air purge unit protects the lens of your pyrometer even in rough environments against dust, humidity or other suspended matters. The air flow rate is about 25 to 30l/min at a pressure of 0.2 to 0.5 bar.

Cooling jacket, stainless steel
(air- or watercooling)

The stainless steel housing protects the instrument in high temperature environments (above 70°C).
With this housing the instrument operates at ambient temperatures up to 170°C.
(Cooling water flow rate should be 4 l/min at 20°C)

Laser pilot light unit, stainless steel

The laser pilot light unit assists youb to target even smaller objects reliably with a laser point.
The unit is fitted out with a counterthread for screwing on the pyrometers front.

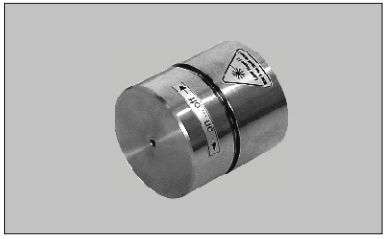
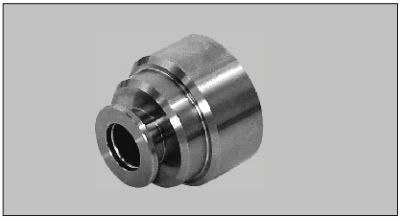


Fig. 7: Laser pilot light unit



Vacuumadapter, stainless steel:

The vacuumadapter enables the installation of the pyrometer to a vacuumchamber.
TYP A - Vacuumadapter with Quartzglass - window:

Fig. 8: Vacuumadapter

5. Setting the parameters via service-interface

The emissivity, the response time as well as the measuring subrange (within the full measuring range) may be adjusted with the optional PC-software and the PC-adapter cable .
The software is a PC-based application which will run under Windows (from WIN 95 on).
Another possibilty setting up this parameters is the *HP 03* from CALEX.
This handheld configurator enables you even at pyrometers which are installed to display the temperature or set the parameters.

Attention! The service-interface is not galvanically separated. For changing the instruments parameters via service interface only use the handheld set-up instrument *HP-03* or a **laptop** computer, which is not powered by a line voltage power supply and is **not** connected to other devices (e.g. printer). Otherwise the pyrometer could be damaged.

Connecting the pyrometer for configuration:
1. Remove the port cover (Fig. 3) from the pyrometers back side;
2. Connect the set up cable to the 6-pin connector inside the pyrometers set up port and the 9-pin connector to a serial PC-interface port;
3. Connect the pyrometer to a supply (e.g. *ID 50*);
4. Run IP_SERV.EXE from the disc (which is supplied with the cable), a copy from your harddisc or start the *HP 03.*

The program will start with the screen shown in Fig. 9:

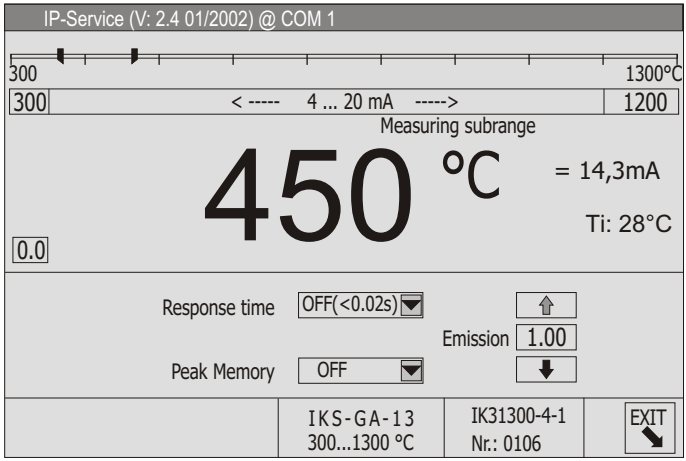


Fig. 9: Settings: =1; Response Time = OFF (<0,02s); Peak Memory: OFF
Measuring subrange: 300 ... 1200°C; Temperature display: 450 °C

The software dialogues can be configured to present information in several languages by clicking on the appropriate flag button.
The PC-program is self-explanatory, for operation from *HP 03* please read the user manual of these additional device.
If the pyrometers configuration is complete:
- Disconnect the pyrometer from the power supply
- Re-fit the port cover on the pyrometers back side.

6. To avoid errors at measuring process

- The diameter of the measured object may not be smaller than the spot size of the selected optics.
- The emissivity of the measured object should be set correctly on the pyrometer via software.
- Please take care, that no interfering sources between object and pyrometer can influence the measuring result . (e.g. dusty air)

7. Maintenance

The Infrared-Compact-Sensors have no internal parts which have to be cleaned.
If necessary the lens can be cleaned with oilfree, clean air or with a soft, dry cloth.

8. Warranty

CALEX offers a warranty of 24 month from the invoice date.

This warranty does not cover damage caused by inexpert cleaning or damage of the lens or use of force.

Warranty also is void if the sealed screws on the back of the pyrometer are loosened.

Appendix A:

Table of Emissivity at = 0,9 µm (Si); 1,6 µm (GA)

Material	Material	Emissivity 0,9 (Si)	1,6 (InGaAs)
Black Body	Schwarzer Körper	100	100
Ruß	Soot	95	95
Steingut, glasiert	Earthenware, glazed	86-90	80-90
Ziegel	Brick	85-90	80-90
Graphit	Graphite	80-92	80-90
Porzellan, glasiert	Porcelain, glaced	60	60
Porzellan, rauh	Porcelain, rough	80-90	80-90
Schamotte	Chamotte	45-60	45-60
Eisen, verzundert	Iron, scaled	93	85-90
Eisen, Walzhaut	Iron, rolling skin	88	80-88
Eisen, flüssig	Iron, molten	30	20-25
Schlacke	Slag	85	80-85
Kupfer, oxidiert	Copper, oxydized	88	70-85
Messing, oxidiert	Brass, oxydized	65-75	65-70
Zink	Zinc	58	45-55
Chrom, blank	Chromium, bright	28-32	25-30
Nickel	Nickel	22	15-20
Aluminium	Aluminium	15	10
Bronze	Bronce	3	3
Gold, blank	Gold, bright	2	2
Silber	Silver	2	2

The values apply for mean effective wavelenght =0.9 µm (Si) or =1.6 µm (InGaAs). Differences in surface finishes or roughness may cause deviations.

Accessories for *TL* - Series

AT - 301	Software “IP-Service” with interface cable
AT - 302	Cooling jacket (Air-or water cooling)
AT - 303	Stainless steel air-purge unit (standard model)
AT - 305	Mounting support, adjustable
AT - 306	Mounting support, fixed
AT - 307	Vaccuum adapter
AT - 308	Laser-pilotlight-unit

CALEX Electronics Ltd
PO Box 2
Harmill Industrial Estate
Leighton Buzzard, LU7 4AZ

Tel.: +44 01525 373178
Fax: +44 01525 851319
E-Mail: info@calex.co.uk
Web: www.calex.co.uk

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