

Polaris PS09 / PI16

Infrared Switching Unit

To satisfy the increasing demand of our customers, the *Polaris* line of infrared switching units was designed to meet the requirements for a cost-efficient but accurate switching device for the recognition of hot parts. For the precise detection of bright metal parts, the near end spectral sensitivity of the units is important because the infrared energy radiated by such surfaces grows weaker as wavelength increases. Simultaneously, the impact of emissivity deviation on accuracy is much lower in the near end infrared zone.

The units are exceptionally robust due to the fact that the measuring process is performed without mechanically moving parts and because the electronics are housed in a stainless steel cabinet. By utilizing the digital signal process, the *Polaris* line exceeds standard analog pyrometers in terms of precision and repeatability.

Model	PS09	PI16
Spectral Range	0.7 – 1.1 μm	1.45 – 1.8 μm
Temperature ranges	550 – 1400°C	250 – 1000°C
	650 – 1800°C	300 – 1300°C
		350 – 1800°C

Table 1: temperature range and spectral response of the models



Polaris Infrared switch in stainless steel housing

Lenses:

The infrared energy radiated by the target is centered directly on the detector by focusable lenses. Lenses are made of BK7, an optical glass. If additional windows are necessary, they should offer similar optical characteristics.

Table 2: Spot size diameter at lens (aperture) and at focused distance

Lens	Aperture \varnothing	Distance	Spot \varnothing 250-1000°C	Spot \varnothing above 300°C Zero Scale
OP09-A0	14 mm	170 mm	1.7 mm	1.3 mm
		200 mm	1.9 mm	1.4 mm
		245 mm	2.0 mm	1.5 mm
OP09-B0	14 mm	260 mm	2.1 mm	1.6 mm
		400 mm	3.3 mm	2.5 mm
		500 mm	4.3 mm	3.2 mm
OP09-C0	14 mm	480 mm	4 mm	3 mm
		1000 mm	8 mm	6 mm
		2000 mm	14,5 mm	11 mm

Table 2 describes the radiation behavior of the lens. The detector is sensitive to infrared radiation in an area called **cone of vision**. For the spot size diameter \varnothing of it at shortest, medium and widest distances, if focused, please refer to **Table 2**. The cone of vision diameter in front of the lens is about 14 mm (aperture diameter). This area has to be kept free of any interfering objects.

Optical Alignment:

The optical alignment of the switching device on the measured object is facilitated by precise laser marking which indicates the center of the measured spot. The optical axis is aligned with the mechanical axis of the sensor housing.

Switching Points:

The built-in detector within the infrared *Polaris* device creates a signal proportional to the infrared radiation which is converted by a microprocessor into a temperature reading and compared with the pre-set switching points. Two switching points can be set independent of each other. The hysteresis of the two switching points is programmable as well as is the switching behavior itself. One can determine therefore whether the switch is activated/deactivated when the temperature rises or when a certain temperature is exceeded, and whether this procedure is stored should the temperature fall short (temperature decline) of the same temperature value (or of a second, lower temperature value). *Polaris* supply voltage is available of the two output transistors. This means that there is an electrical connection between hot side of power supply and the individual switching points (if activated). This connection is **short-circuit-proof** and capable of carrying a maximum of 30mA. In addition, the switching position is indicated by two yellow LEDs on the rear side of the housing.

Digital Interface: Both RS 232 or RS 485 with a maximum of 57.6 kBd are available. This supports the exact and easily reproducible setting of individual parameters and switching points using *cfg Polaris Software*. Since the connection of the computer is done via a separate interface cable, which can be removed following the setup procedure, the unit normally operates in stand-alone mode. Should it be necessary to make frequent changes to individual parameters, e.g., the emissivity factor or switching temperature, due to process-related factors, then this can be automatically controlled via the program. Also, it is possible to simulate the temperature range via the SW program and to test the pre-set switching functions.

Technical Data

Spectral range:	0.7 – 1.1 μm (Polaris PS) and 1.45 - 1.8 μm (Polaris PI)
Temperature range:	can be positioned within the limits of the basic range
Signal conditioning:	digital
Measurement uncertainty:	$\pm 1\%$ of adjusted switching point temperature ($T_A = 23^\circ\text{C}$, $\epsilon = 1$, $t_{90} = 1\text{ s}$)
Repeatability:	0.5% of adjusted switching point temperature ($T_A = 23^\circ\text{C}$, $\epsilon = 1$, $t_{90} = 1\text{ s}$)
Response time t_{90} :	4 ms, adjustable to 10s
Emissivity adjustment:	20 - 100%
Power supply:	24 V DC (12 – 30 V DC)
Power consumption:	Max. 0.50 VA (without switching output current)
Switching output:	2 Transistors, switching to positive pole of power supply, 30 mA max.
Digital interface:	RS232C addressable, baud rate 57,6 kBd max., galvanically isolated
Parameter:	changeable and readable via serial interface: switching temperature, emissivity, exposition time, device temperature, address, baud rate, temperature range
Resolution:	0.1 $^\circ\text{C}$
Optical alignment:	laser targeting (laser class 2, max. output power 1 mW, 635 nm)
Operation indicator:	green LED
Weight:	300 g
Housing rated:	IP65 (refer to DIN 40 050) with power cable connected
Ambient temperature:	0 – $+70^\circ\text{C}$ on the housing
Storage temperature:	$-20 - +70^\circ\text{C}$
Rel. humidity:	No condensing conditions
CE label:	According to EU directives for electromagnetic immunity

Accessories:

Model	Description
AK30-05	Interconnecting cable 5 m
AK31-02	Digital communication cable 2 m, including PC – configuration software
BL11-00	Air purge
HA10-10	Adjustable mounting bracket to be used with cooling housing KG60
HA11-00	Stainless steel adjustable mounting bracket
KG60-00	Aluminum cooling housing for high ambient temperature up to 140°C

Polaris Mounting Bracket HA11



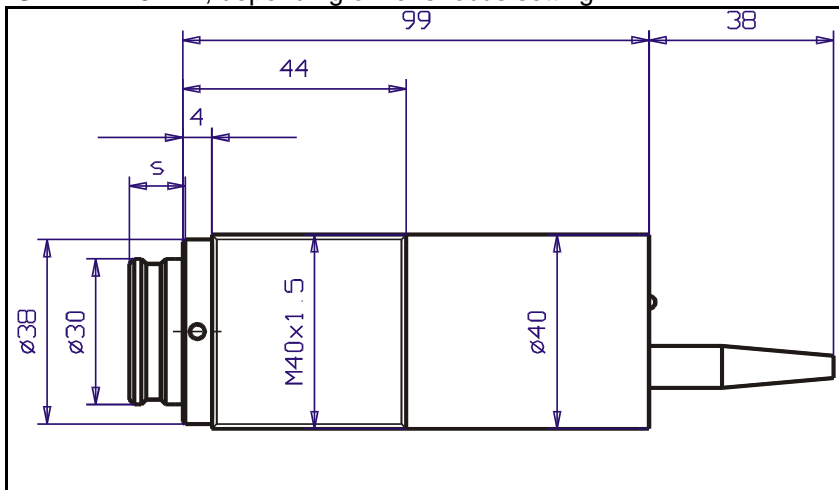
Polaris Cooling Housing KG60



Scope of supply: Sensor with lens, 2 mounting nuts M40 x 1.5 and manual. Connecting cable and communication cable with software have to be ordered separately.

Dimensions: Polaris PS and PI

S = 11 – 16 mm, depending on lens focus setting



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