

For non-contact temperature measurement of non-metallic surfaces or painted, coated or anodized metals with temperature ranges between -32 and 900°C.

Series

IN 5 • IN 5 plus



- Series IN 5: pyrometers in two wire form with analog output 4 to 20 mA, several temperature ranges available

Series IN 5 *plus*: pyrometers with analog output 0 or 4 to 20 mA, digital interface RS232 or RS485 and laser targeting light sighting system

- High accuracy due to digital linearisation of the output
- Small spot sizes, min. 1 mm
- Adjustable exposure time
- Compact housing



The pyrometers of series **IN 5** and **IN 5 plus** are specially designed for non-contact temperature measurements on non-metallic surfaces and also on painted, coated or anodized metals.

The instruments differ in their specification:

The **IN 5** is a digital pyrometer in two wire format. This format combines the high accuracy of the digital signal processing with the simple connection and operating with two wires.

Additionally to the analog output the **plus types** are digital pyrometers equipped with a digital interface, enabling temperature indication and

storage on a PC. Also a temperature sub range can be configured and the instrument parameters can be adjusted remotely.

The version **IN 5-L plus** is equipped with optics with better fields of view for the measurements of small objects.

The high-speed version **IN 5-H plus** has a shorter exposure time of only 10 ms and is suited for fast measuring tasks.

For optimal match of the instrument to the application (size of the measuring object, distance) different optics are available.

For a precise alignment of the pyrometers to the measuring object, *plus* types are equipped with a laser targeting light.

Typical applications are measurements on:

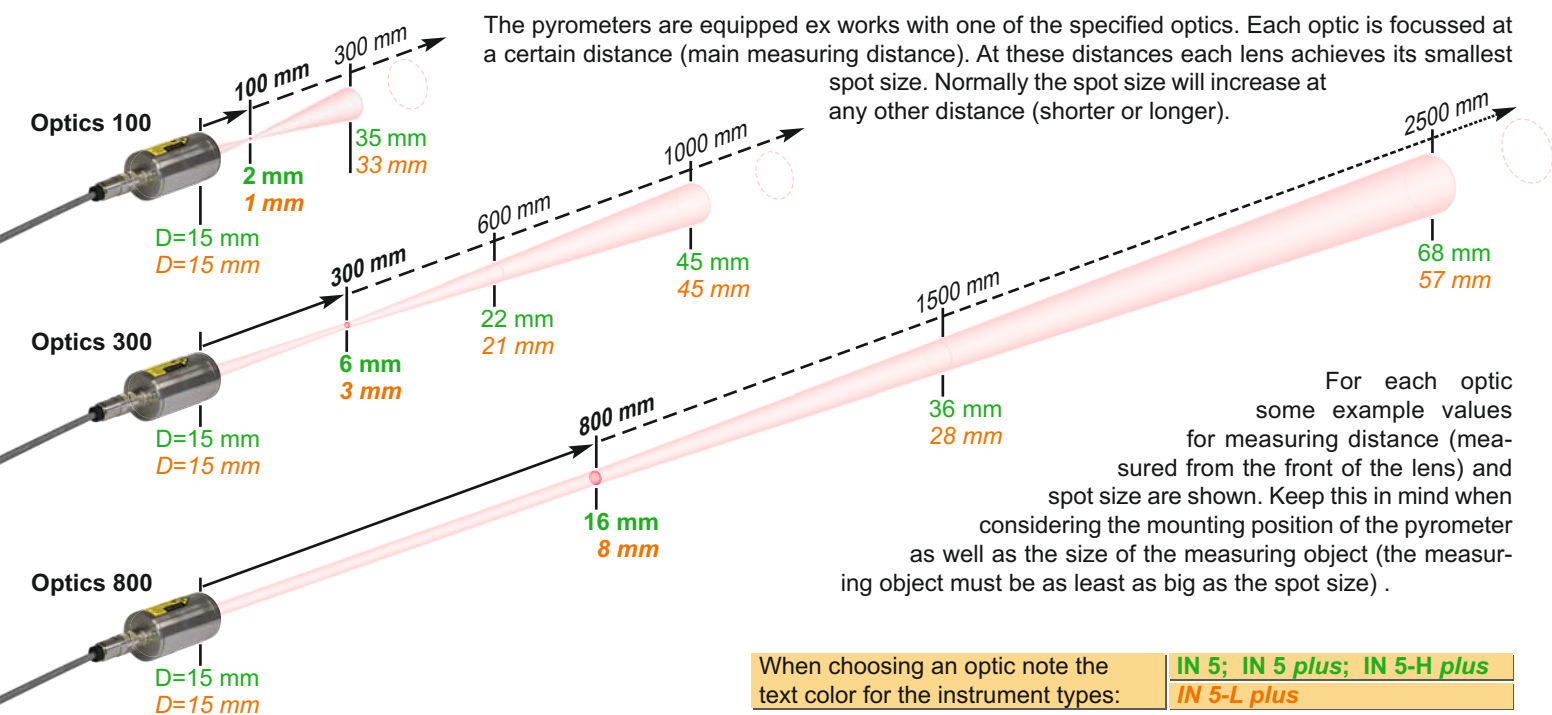
- | | |
|-----------------|-----------------|
| • Plastics | • Ceramics |
| • Fluids | • Wood |
| • Rubber | • Textiles |
| • Painted parts | • Glass |
| • Paper | • Food |
| • Asphalt | • Coated metals |

Technical Data

Temperature ranges:	IN 5: 0 to 100°C (MB 1) 0 to 500°C (MB 5) IN 5 plus; IN 5-H plus: -32 to 900°C (MB 9) 0 to 200°C (MB 2) 0 to 900°C (MB 9) IN 5-L plus 0 to 900°C (MB 9) 0 to 300°C (MB 3) -32 to 50°C (MB 0.5) 0 to 400°C (MB 4) (other MB on request)
Sub range:	The <i>plus</i> instruments are user adjustable with minimum span of 51°C
IR detector:	Thermopile
Data handling:	Digital
Spectral range:	8 to 14 µm
Optics:	IN 5: Germanium (Ge) IN 5 <i>plus</i> , IN 5-H <i>plus</i> : Zinc-Sulfide (ZnS) IN 5-L <i>plus</i> : Zinc-Selenide (ZnSe)
Power supply:	IN 5: 24 V DC (10 to 30 V); <i>plus</i> instruments: 24 V DC (18 to 30 V); nominal, ripple must be less than 0.5 V
Power consumption:	IN 5: max. 20 mA; <i>plus</i> instruments: max. 70 mA
Analog output:	IN 5: 4 to 20 mA (linear); <i>plus</i> instruments: 0 to 20 mA or 4 to 20 mA (linear), adjustable
Load:	IN 5: max. 700 Ω at 24 V (max. 100 Ω at 12 V) <i>plus</i> instruments: max. 500 Ω at 24 V (max. 200 Ω at 18 V)
Interface (<i>plus</i> instruments):	RS232 or RS485 (addressable, half duplex), baud rate 1.2 up to 19.2 kbd, resolution 0,1°C
Isolation (<i>plus</i> instruments):	Power supply, analog outputs and digital interfaces are electrically isolated from each other
Parameters:	Adjustable on the pyrometer: Emissivity, exposure time. Additionally on <i>plus</i> instruments: switch for selecting the analog output of 0 or 4 to 20 mA, online- / offline switch. Via interface / PC adjustable and readable (only <i>plus</i> instruments in online mode): Emissivity, exposure time, 0 or 4 to 20 mA analog output, sub temperature range, max./min value storage with different clear times or automatic or external clearing mode, address, baud rate, internal temperature, temperature display in °C or °F, activation of ambient temperature compensation
Maximum / minimum value storage (<i>plus</i> instruments):	Built-in single and double storage. clearing with clear time t_{clear} (0.1 s; 0.25 s; 0.5 s; 1 s; 5 s; 25 s), external contact or via interface or also automatically with each new item to be measured
Emissivity ϵ :	0.2 ... 1 adjustable
Exposure time t_{90} :	IN 5: 0.08 s; adjustable in the pyrometer: 0.5 s; 1 s; 2 s; 5 s, IN 5 <i>plus</i> : 0.08 s } adjustable in the pyrometer: 0.5 s; 1 s; 2 s; 5 s, IN 5-H <i>plus</i> : 0.01 s } adjustable via interface: 0.5 s; 1 s; 2 s; 5 s; 10 s; 30 s IN 5-L <i>plus</i> : 0.18 s }
Measurement uncertainty: Dependent on object temperature T and ambient temperature T_{amb} ($\epsilon = 1, t_{90} = 1$ s)	IN 5; IN 5 <i>plus</i> : T= -32 to 0°C: 1.5°C ($T_{amb} = 15...30°C$); 2°C ($T_{amb} = 0...15$ or $30...63°C$) T=0 to 300°C: 0.6% of reading in °C or 1°C ($T_{amb} = 15...30°C$) *) 1% of reading in °C or 1.5°C ($T_{amb} = 0...15$ or $30...63°C$) *) T=300 to 900°C: 1% of reading in °C ($T_{amb} = 15...30°C$) 1.3 % of reading in °C ($T_{amb} = 0...15$ or $30...63°C$) IN 5-H <i>plus</i> : T= -32 to 0°C: 3°C ($T_{amb} = 15...30°C$); 4°C ($T_{amb} = 0...15$ or $30...63°C$) T=0 to 300°C: 0.6% of reading in °C or 1.5°C ($T_{amb} = 15...30°C$) *) 1% of reading in °C or 2°C ($T_{amb} = 0...15$ or $30...63°C$) *) T=300 to 900°C: 1% of reading in °C ($T_{amb} = 15...30°C$) 1.3 % of reading in °C ($T_{amb} = 0...15$ or $30...63°C$) IN 5-L <i>plus</i> : T=0 to 300°C: 0.6% of reading in °C or 2°C ($T_{amb} = 15...30°C$) **) 1% of reading in °C or 3°C ($T_{amb} = 0...15$ or $30...63°C$) **) T=300 to 900°C: 1% of reading in °C ($T_{amb} = 15...30°C$) 1.5 % of reading in °C ($T_{amb} = 0...15$ or $30...63°C$) *) Whichever value is greater. The instrument must be at a const. amb. temp. for min. 15 min. and has to be connected to the power supply)*) Whichever value is greater. The instrument must be at a const. amb. temp. for min. 30 min. and has to be connected to the power supply
Repeatability: ($\epsilon = 1, t_{90} = 1$ s)	0.3 % of reading in °C or 0.6 °C (Whichever value is greater. The instrument must be at a constant ambient temperature for a minimum of 15 minutes (IN 5; IN 5 <i>plus</i> or IN 5-H <i>plus</i>) or 30 minutes (IN 5-L <i>plus</i>).
Noise Equivalent Temperature Difference (NETD): ($\epsilon = 1, T_{amb} = 23°C$)	IN 5; IN 5 <i>plus</i> : at $t_{90} = 80$ ms: 0.2°C (at 23°C measuring temperature) at $t_{90} = 1$ s: 0.05°C (at 23°C measuring temperature) IN 5-H <i>plus</i> : at $t_{90} = 10$ ms: 0.7°C (at 23°C measuring temperature) at $t_{90} = 1$ s: 0.1°C (at 23°C measuring temperature) IN 5-L <i>plus</i> : at $t_{90} = 180$ ms: 0.3°C (at 23°C measuring temperature) at $t_{90} = 180$ ms: 0.2°C (at 200°C measuring temperature) at $t_{90} = 1$ s: 0.15°C (at 23°C measuring temperature) at $t_{90} = 1$ s: 0.1°C (at 200°C measuring temperature)
Ambient temperature:	IN 5: 0 to 70°C; <i>plus</i> instruments: 0 to 63°C
Storage temperature:	-20 to 70°C
Weight:	410 g
Housing:	Stainless steel
Sighting (<i>plus</i> instruments):	Laser targeting light (max. power level < 1 mW, $\lambda = 630-680$ nm, CDRH class II)
Relative humidity:	Non condensing conditions
Protection class:	IP65 (DIN 40050)
CE-label:	According to EU directives about electromagnetic immunity



Optics

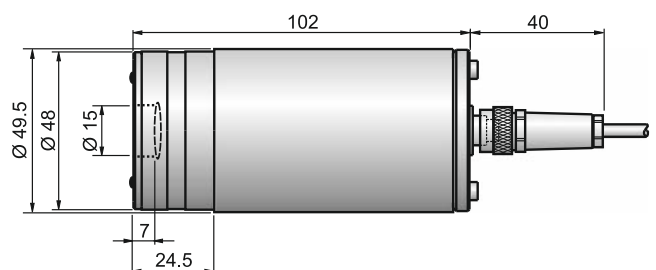
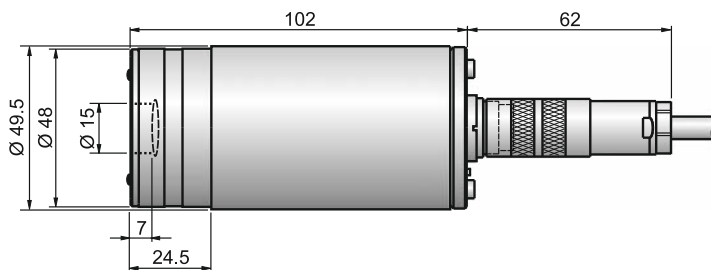


The determination of the main spot size "M" in the main measuring distance "a" occurs at 90% measuring signal.

Dimensions

IN 5 plus; IN 5-H plus; IN 5-L plus:

IN 5



All dimensions in mm

Instrument Settings

The most important parameters such as emissivity, exposure time and analog output can be set directly in the instrument. On *plus* instruments additionally the analog output can be selected. After removing the cover on the back side of the pyrometer, the corresponding adjustments are available.

IN 5:

Emissivity ϵ

Exposure time t_{90}



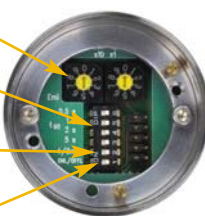
plus types:

Emissivity ϵ

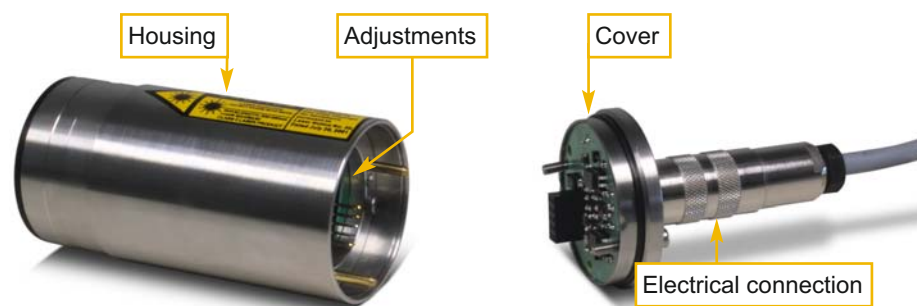
Exposure time t_{90}

Analog output
0 or 4 to 20 mA

Online / Offline



"plus" types can alternatively switched in online mode to enable the communication via serial interface and software *InfraWin* (in scope of delivery) on a PC. This allows additional setting options as well as the graphical temperature display combined with subsequent analysis of the measurement values.



Reference Numbers

Type	Optics	Temp. range *)	Ref. number	Type	Optics	Temp. range	Interface	
							RS232	RS485
IN 5	When ordering please select one optics (optics a = 100, 300 or 800).	0 to 100°C	3 869 010	IN 5 <i>plus</i>	100	-32 to 900°C (MB 9)	3 869 400	3 869 410
		0 to 200°C	3 869 020		300		3 869 420	3 869 430
		0 to 300°C	3 869 030		800		3 869 440	3 869 450
		0 to 400°C	3 869 040	IN 5-H <i>plus</i>	100	-32 to 900°C (MB 9)	3 871 200	3 871 210
		0 to 500°C	3 869 050		300		3 871 220	3 871 230
		0 to 900°C	3 869 090		800		3 871 240	3 871 250
				-32 to 50°C	3 869 100	IN 5-L <i>plus</i>	0 to 900°C (MB 9)	3 871 600
		-32 to 900°C	3 869 080	300	3 871 620			3 871 630
				800	3 871 640			3 871 650

*) Other temperature ranges on request

Scope of delivery: Instrument with selectable optics, works certificate, PC measurement and evaluation software *InfraWin*.

Ordering note: A connection cable is not included with the instrument and has to be ordered separately

Accessories:

	Connection cable for IN 5:	3 852 460	Protocol converter RS485 ↔ Profibus-DP for 32 instruments				
	2 m	5 m	10 m	15 m	30 m		
3 820 ...	... 210	... 560	... 570	... 580	... 590		
	Connection cable for <i>plus</i> instruments (straight plug):						
	5 m	10 m	15 m	20 m	25 m	30 m	
3 820 ...	... 330	... 500	... 510	... 810	... 820	... 520	
3 820 320	Connection cable for <i>plus</i> instruments, 5 m (angled connector, additional laser targeting light push button)					3 835 160	Air purge unit
3 820 740	Connection cable <i>plus</i> instruments, 5 m, (straight connector, temperature resistant up to 200°C)					3 835 440	Air purge unit, stainless steel
3 852 290	Power supply NG DC (100...240 V AC ⇒ 24 V DC, 1 A)					3 837 230	Water cooling jacket (heavy design) with integrated air purge unit (metric mounting threads) (same with UNC mounting threads)
3 890 640	DA 4000-N: LED digital display (specify 230 or 115 V AC)					5 837 230	Heavy water cooling jacket with protection window (with metric mounting threads)
3 890 650	DA 4000: as DA 4000-N, additionally with 2 limit switches (specify 230 or 115 V AC)					3 837 350	(same with UNC mounting threads)
3 890 560	DA 6000-N: LED digital display with digital input RS232 and possibility for pyrometer parameter settings					3 837 370	Water cooling jacket (lightweight design) with integrated air purge unit (metric mounting threads) (same with UNC mounting threads)
3 890 570	DA 6000-N with RS485					3 837 400	Lightweight water cooling jacket with protection window (with metric mounting threads)
3 890 520	DA 6000: LED digital display, digital and analog input, 2 limit switches, maximum value storage, analog output, RS232					5 837 400	(same with UNC mounting threads)
3 890 530	DA 6000 with RS485					3 846 100	Mounting tube
3 826 500	HT 6000: portable battery driven indicator and instrument for pyrometer parameter settings; RS232 and RS485 interface					3 846 120	Flange tube
3 826 510	PI 6000: programmable PID controller					3 846 630	Vacuum flange KF16 with protection window
3 852 430	Converter I-7520; RS485 ↔ RS232 (half duplex)					3 846 660	Spare protection window, Ø 25 x 3 with Viton-O-ring
3 852 440	Protocol converter RS485/RS232 (switchable) ↔ Profibus-DP for 1 instrument					Flange system: the flange system is a modular mounting system to fix the pyrometer on furnaces, vacuum chambers, etc. It can consist of e.g. mounting support, tube support with air purge and flange and an open or closed ceramic sighting tube. The mounting support can be equipped with a quartz window for vacuum applications	



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Compact pyrometer for temperature measurement of glass and quartz glass surfaces or measurements of glass if a small penetration into the glass is required.

Series

IN 5/5 • IN 5/5 plus • IN 5/4 plus



- Series IN 5/5: pyrometers in two wire form with analog output 4 to 20 mA, several temperature ranges available

Series IN 5/5 plus: pyrometers with analog output 0 or 4 to 20 mA, digital interface RS232 or RS485 and laser targeting light sighting system

- High accuracy due to digital linearisation of the output
- Small spot sizes, min. 1.1 mm
- Adjustable exposure time
- Compact housing



The pyrometer **IN 5/5** as well as the instruments of series **IN 5/5 plus** are specially designed for non-contact temperature measurement of glass surfaces and quartz surfaces.

The **IN 5/4 plus** is used if a small penetration into the glass is required (e.g. glass drop); a further application is the measurement of metal parts in flame heated furnaces i.e. through flames and flue gas.

The instruments differ in their specification:

The **IN 5/5** is a digital pyrometer in two wire technique. This technique combines the high accuracy of the digital signal processing with the simple connection and operating with two wires.

Additionally to the analog output the **plus types** are digital pyrometers equipped with a digital interface, enabling temperature indication and storage on a PC. Also a temperature sub range can be configured and the instrument parameters can be adjusted remotely.

The version **IN 5/5-L plus** is equipped with optics with better fields of view for the measurements of small objects.

The high-speed version **IN 5/5-H plus** has a shorter exposure time of only 10 ms and is suited for fast measuring tasks.

For optimal match of the instrument to the application (size of the measuring object, distance) different optics are available.

For a precise alignment of the pyrometers to the measuring object, most of the *plus* types are equipped with a laser targeting light.

Typical measurement materials and applications:

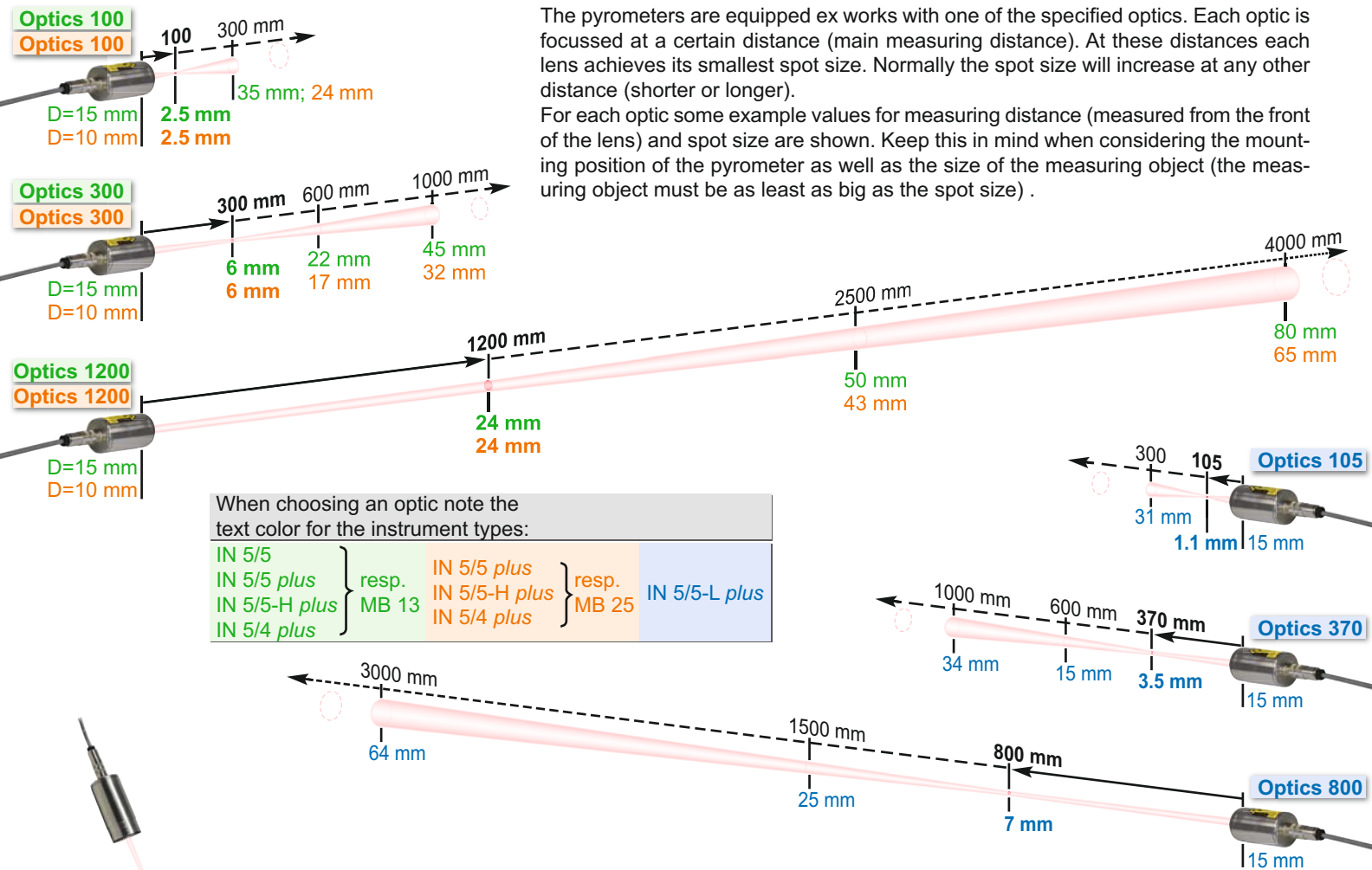
- Float glass
- Hollow glass
- Glass drop
- Glass hardening
- Glass bending
- Bulb production
- Heat treatment

Technical data

Temperature ranges:	IN 5/5: 100 to 600°C (MB 6) 200 to 800°C (MB 8) 100 to 1300°C (MB 13) 400 to 2500°C (MB 25) (further MB on request)	IN 5/5 plus: 100 to 1300°C (MB 13) 400 to 2500°C (MB 25) IN 5/5-H plus; IN 5/5-L plus: 200 to 1300°C (MB 13) 400 to 2500°C (MB 25) IN 5/4 plus: 300 to 1300°C (MB 13) 500 to 2500°C (MB 25)
Sub range:	The <i>plus</i> instruments are user adjustable with minimum span of 51°C	
IR detector:	Thermopile	
Data handling:	Digital	
Spectral range:	IN 5/5; IN 5/5 plus; IN 5/5-H plus; IN 5/5-L plus: 5.14 μm IN 5/4 plus: 3.9 μm	
Optics:	Zinc-Sulfide lens (ZnS)	
Power supply:	IN 5/5: 24 V DC (10 to 30 V); <i>plus</i> instruments: 24 V DC (18 to 30 V); nominal, ripple must be less than 0.5 V	
Power consumption:	IN 5/5: max. 20 mA; <i>plus</i> instruments: max. 70 mA	
Analog output:	IN 5/5: 4 to 20 mA (linear); <i>plus</i> instruments: 0 to 20 mA or 4 to 20 mA (linear), adjustable	
Load:	IN 5/5: max. 700 Ω at 24 V (max. 100 Ω at 12 V) <i>plus</i> instruments: max. 500 Ω at 24 V (max. 200 Ω at 18 V)	
Interface (<i>plus</i> instruments):	RS232 or RS485 (addressable, half duplex), baud rate 1.2 up to 19.2 kBd, resolution 0.1°C	
Isolation (<i>plus</i> instruments):	Power supply, analog outputs and digital interfaces are electrically isolated from each other	
Parameters:	Adjustable on the pyrometer: Emissivity, exposure time. Additionally on <i>plus</i> instruments: analog output to 0 or 4 to 20 mA, online- / offline switch. Via interface / PC adjustable and readable (only <i>plus</i> instruments in online mode): Emissivity, exposure time, 0 or 4 to 20 mA analog output, sub temperature range, max./min value storage with different clear times or automatic or external clearing mode, address, baud rate, internal temperature, display in °C or °F, activation of ambient temperature compensation	
Maximum / minimum value storage (<i>plus</i> instruments):	Built-in single and double storage. clearing with clear time t_{clear} (0.1 s; 0.25 s; 0.5 s; 1 s; 5 s; 25 s), external contact or via interface or also automatically with each new item to be measured	
Emissivity ϵ :	0.2 to 1 adjustable	
Exposure time t_{90} :	IN 5/5: 0.08 s; adjustable in the pyrometer: 0.5 s; 1 s; 2 s; 5 s, IN 5/5 plus: 0.08 s } adjustable in the pyrometer: 0.5 s; 1 s; 2 s; 5 s, IN 5/5-H plus: 0.01 s } adjustable via interface: 0.5 s; 1 s; 2 s; 5 s; 10 s; 30 s IN 5/5-L plus: 0.18 s }	
Measurement uncertainty:	T < 1300°C: 0.6% (IN 5/5-L <i>plus</i> : 0.8%) of reading in °C or 2°C ($T_{amb}=15$ to 30°C) *) 1% of reading in °C or 1.5°C ($T_{amb}=0$ to 15 or 30 to 63°C) *) T=1300 to 1800°C: 0.8% of reading in °C ($T_{amb}=15$ to 30°C) 1.2% of reading in °C ($T_{amb}=0$ to 15 or 30 to 63°C) T=1800 to 2500°C: 1% of reading in °C ($T_{amb}=15$ to 30°C) 1.4 % of reading in °C ($T_{amb}=0$ to 15 or 30 to 63°C)	
Dependent on object temperature T and ambient temperature T_{amb} ($\epsilon = 1, t_{90} = 1$ s)	*) Whichever value is greater. The instrument must be at a constant ambient temperature for a minimum of 15 minutes (30 min for IN 5/5-L <i>plus</i> for 200 to 1300°C at $T_{amb} = 0$ to 15 or 30 to 63°C) and has to be connected to the power supply.	
Repeatability: ($\epsilon = 1, t_{90} = 1$ s)	0.3% of reading in °C or 0.6°C (Whichever value is greater. The instrument must be at a constant ambient temperature for a minimum of 15 min. (30 min for IN 5/5-L <i>plus</i> for 200...1300°C at $T_{amb} = 0$ to 15 or 30 to 63°C))	
Noise Equivalent Temperature Difference (NETD): ($\epsilon = 1, T_{amb} = 23$ °C)	IN 5/5; IN 5/5 plus: at $t_{90} = 80$ ms: 0.7°C (at 110°C measuring temperature) at $t_{90} = 1$ s: 0.4°C (at 110°C measuring temperature) IN 5/5-H plus: at $t_{90} = 10$ ms: 0.5°C (at 500°C measuring temperature) at $t_{90} = 10$ ms: 0.3°C (at 1100°C measuring temperature) IN 5/5-L plus: at $t_{90} = 80$ ms: 1.5°C (at 300°C measuring temperature) at $t_{90} = 80$ ms: 0.6°C (at 500°C measuring temperature) at $t_{90} = 1$ s: 0.4°C (at 300°C measuring temperature) at $t_{90} = 1$ s: 0.2°C (at 500°C measuring temperature) IN 5/4 plus: at $t_{90} = 80$ ms: 0.6°C (at 500°C measuring temperature) at $t_{90} = 80$ ms: 0.2°C (at 1100°C measuring temperature)	
Dimensions [mm]:		
Ambient temperature:	IN 5/5: 0 to 70°C; <i>plus</i> instruments: 0 to 63°C; IN 5/5 plus MB 25: 0 to 60°C	
Storage temperature:	-20 to 70°C	
Protection class:	IP65 (DIN 40050)	
Weight:	410 g	
Housing:	Stainless steel	
Sighting (<i>plus</i> instruments):	Laser targeting light (max. power level < 1 mW, $\lambda = 630$ -680 nm, CDRH class II)	
Relative humidity:	Non condensing conditions	
CE-label:	According to EU directives about electromagnetic immunity	



Optics



When choosing an optic note the text color for the instrument types:

IN 5/5 IN 5/5 plus IN 5/5-H plus IN 5/4 plus	resp. MB 13	IN 5/5 plus IN 5/5-H plus IN 5/4 plus	resp. MB 25	IN 5/5-L plus
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The determination of the main spot size "M" in the main measuring distance "a" occurs at 90% measuring signal.

When measuring the temperature of very large and hot surfaces (for example by the float glass production), additional radiation is received by the pyrometer's detector due to unavoidable effects (diffraction, multiple reflection). These effects increase the temperature output.

To get correct temperature values in this case, the pyrometer must be prepared ex works. The effect will be compensated by the so-called **float glass calibration**.

Instrument settings

The most important parameters such as emissivity, exposure time and analog output can be set directly in the instrument. On *plus* instruments additionally the analog output can be selected. After removing the cover on the back side of the pyrometer, the corresponding adjustments are available.

IN 5:

Emissivity ϵ

Exposure time t_{90}



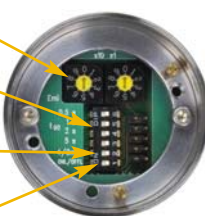
plus types:

Emissivity ϵ

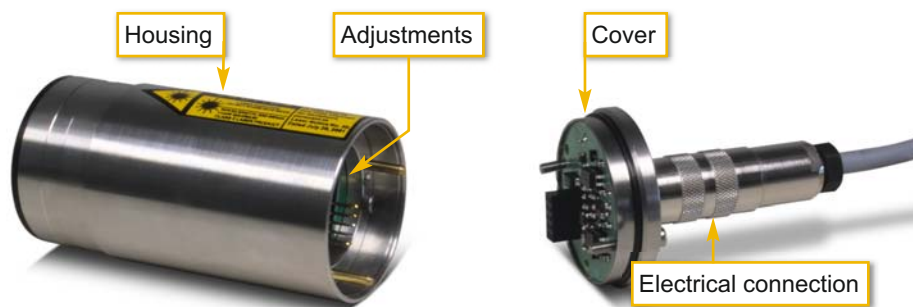
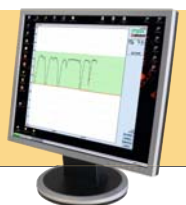
Exposure time t_{90}

Analog output
0 or 4 ... 20 mA

Online / Offline



"plus" types can alternatively switched in online mode to enable the communication via serial interface and software *InfraWin* (in scope of delivery) on a PC. This allows additional setting options as well as the graphical temperature display combined with subsequent analysis of the measurement values.



Reference numbers

	Optics	Temperature range	with laser targeting light		without laser targ. light		Optics	Temperature range	with laser targ. light		
			Interface RS232	Interface RS485	Interface RS232	Interface RS485			Interface RS232	Interface RS485	
IN 5/5 plus	100	100 to 1300°C	3 869 460	3 869 470	3 869 260	3 869 270	IN 5/5-H plus	100	200 to 1300°C	3 871 260	3 871 270
		400 to 2500°C	3 869 520	3 869 530	3 869 320	3 869 330			400 to 2500°C	3 871 320	3 871 330
	300	100 to 1300°C	3 869 480	3 869 490	3 869 280	3 869 290	300	200 to 1300°C	3 871 280	3 871 290	
		400 to 2500°C	3 869 540	3 869 550	3 869 340	3 869 350		400 to 2500°C	3 871 340	3 871 350	
	1200	100 to 1300°C	3 869 500	3 869 510	3 869 300	3 869 310	1200	200 to 1300°C	3 871 300	3 871 310	
		400 to 2500°C	3 869 560	3 869 570	3 869 360	3 869 370		400 to 2500°C	3 871 360	3 871 370	
IN 5/5	When ordering please select one optics (optics a = 100, 300 or 1200).	Temp. range *)			without laser targ. light		IN 5/5-L plus		Temp. range *)		
		100 to 600°C			3 869 110				200 to 1300°C	3 871 660	
		200 to 800°C			3 869 120				400 to 2500°C	3 871 720	
		100 to 1300°C			3 869 130				200 to 1300°C	3 871 680	
		400 to 2500°C			3 869 140				200 to 1300°C	3 871 690	
									400 to 2500°C	3 871 740	
									200 to 1300°C	3 871 700	
									400 to 2500°C	3 871 770	

*) Other temperature ranges on request

Scope of delivery: Instrument with selected optic, works certificate, PC measurement and evaluation software *InfraWin*.

Ordering note: - A connection cable is not included with the instrument and has to be ordered separately

- The float glass calibration has to be ordered additionally to the instrument with the reference number 3 891 050.

Accessories:

	Connection cable for IN 5/5:	3 852 440	Protocol converter RS485/RS232 (switchable) ⇔ Profibus-DP for 1 instrument
	2 m	3 852 460	Protocol converter RS485 ⇔ Profibus-DP for 32 instruments
	5 m	3 852 430	Converter I-7520; RS485 ⇔ RS232 (half duplex)
	10 m	3 890 610	Galvanic separator for IN 5/5 (DIN rail mounting)
	15 m	3 863 010	Converter IW 5-C (4 to 20 mA in 0 to 20 mA)
	20 m	3 834 210	Adjustable mounting support
	25 m	3 835 160	Air purge unit
	30 m	3 835 440	Air purge unit, stainless steel
3 820 ...	... 210	3 837 230	Water cooling jacket (heavy design) with integrated air purge unit (metric mounting threads)
	... 560	5 837 230	(same with UNC mounting threads)
	... 570	3 837 340	Heavy water cooling jacket with protection window (with metric mounting threads)
	... 580	5 837 340	(same with UNC mounting threads)
	... 590	3 837 370	Water cooling jacket (lightweight design) with integrated air purge unit (metric mounting threads)
	Connection cable for <i>plus</i> instruments (straight plug):		
	5 m	5 837 370	(same with UNC mounting threads)
	10 m	3 837 390	Lightweight water cooling jacket with protection window (with metric mounting threads)
	15 m	5 837 390	(same with UNC mounting threads)
	20 m	3 846 100	Mounting tube
	25 m	3 846 120	Flange tube
	30 m	3 846 620	Vacuum flange KF16 with protection window
3 820 ...	... 330	3 846 650	Spare protection window, Ø 25 x 3 with Viton-O-ring
3 820 320	... 500		
	... 510		
	... 810		
	... 820		
	... 520		
3 820 320	Connection cable for <i>plus</i> instruments, 5 m (angled connector, additional laser targeting light push button)		
3 820 740	Connection cable <i>plus</i> instruments, 5 m, (straight connector, temperature resistant up to 200°C)		
3 852 290	Power supply NG DC (100...240 V AC ⇒ 24 V DC, 1 A)		
3 890 640	DA 4000-N: LED digital display (specify 230 or 115 V AC)		
3 890 650	DA 4000: as DA 4000-N, additionally with 2 limit switches (specify 230 or 115 V AC)		
3 890 560	DA 6000-N: LED digital display with digital input RS232 and possibility for pyrometer parameter settings		
3 890 570	DA 6000-N with RS485		
3 890 520	DA 6000: LED digital display, digital and analog input, 2 limit switches, maximum value storage, analog output, RS232		
3 890 530	DA 6000 with RS485		
3 826 500	HT 6000: portable battery driven indicator and instrument for pyrometer parameter settings; RS232 and RS485 interface		
3 826 510	PI 6000: programmable PID controller		

Accessory overview:



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Stationary, digital pyrometers for non contact temperature measurement between 250°C and 3000°C

IS 5 • IGA 5



- Temperature ranges between 250 and 3000°C
- Very small spot sizes, min. 0.5 mm
- Different sightings available: laser targeting light, thru-lens view finder or video module
- Analog output adjustable
0 - 20 mA or 4 - 20 mA
- Built-in maximum value storage
- Digital interface
- Bus capable with RS485 interface
- Small dimensions



The pyrometers **IS 5** and **IGA 5** are digital, compact and fast infrared measuring instruments for non-contact temperature measurement on metals, ceramics or graphite.

For optimal match of the instrument to the application 2 different optics with extremely small spot sizes are available.

The response time of only 2 ms facilitates the measurement of fast heating processes or short temperature peaks.

For a precise alignment of the pyrometers to the measuring object, the instruments are optionally equipped with a laser targeting light, a view finder or a video module.

The most important parameters as emissivity, exposure time and analog output can be set directly in the instrument.


Additionally the pyrometer can be connected to a PC via serial interface, enabling adjustments of further parameters with the delivered

software *InfraWin*. This can be used for temperature indication, data logging and further analyzing of complete temperature processes.

Typical applications:

- Induction heating
- Casting
- Annealing
- Welding
- Forging
- Sintering
- Melting
- Rolling
- Hardening

Technical Data

	IS 5	IGA 5
Temperature range:	600 to 2000°C (MB 20) 800 to 2500°C (MB 25) 1000 to 3000°C (MB 30)	350 to 1800°C (MB 18) 250 to 2000°C (MB 20) 400 to 2500°C (MB 25) 500 to 3000°C (MB 30)
Sub range:	User adjustable (minimum span is 51°C)	
IR detector:	Silicon photo diode (Si)	Indium-Gallium-Arsenic photo diode (InGaAs)
Spectral range:	0.8 to 1.1 µm	1.45 to 1.8 µm
Power supply:	24 V DC ± 25%, stabilized, ripple must be less than 50 mV	
Power consumption:	≤ 3 W (incl. active laser targeting light)	
Analog output:	0 - 20 mA or 4 - 20 mA, switchable, linear in temperature, load independent DC	
Interface:	Optional RS232 or RS485 (addressable), half duplex, baud rate 1.2 up to 38.4 kBd	
Resolution:	0.1°C at the interface at the analog output < 0.1% of the adjusted temperature range but min. 0.1°C	
Isolation:	Power supply and digital output and analog output are galvanically isolated against each other	
Parameters:	Adjustable on the converter's rear side: emissivity, response time, analog output 0 - 20 mA or 4 - 20 mA, online / offline mode for settings via PC or pyrometer. Additionally via interface adjustable and readable: temperature sub range, settings for maximum value storage, address, baud rate. Via interface readable only: measured value, internal temperature of the unit Pyrometers with PID-controller via software adjustable: set point, proportional band, rate time / integral time, output delimitation.	
Maximum value storage:	Single or double storage, clear modes: time (off; 0.01 s; 0.05 s; 0.25 s; 1 s; 5 s; 25 s), external clear contact, via interface or automatic „hot object mode“, hold-function for freezing the current temperature reading (not at pyrometers with PID-controller)	
Emissivity ε:	0.2 to 1 adjustable in the instrument or with the software <i>InfraWin</i> in steps of 0.01	
Response time t_{90} :	≤ 2 ms, adjustable to 0.01 s; 0.05 s; 0.25 s; 1 s; 3 s; 10 s	
Measurement uncertainty: ($T_{amb.} = 25^\circ\text{C}$, $\varepsilon = 1$, $t_{90} = 1\text{ s}$)	< 350°C: 0.5% of reading in °C + 1°C 350 to 1500°C: 0.3% of reading in °C + 1°C > 1500°C: 0.5% of reading in °C + 1°C	
Repeatability:	0.2% of reading in °C + 1°C ($T_{amb.} = 25^\circ\text{C}$, $\varepsilon = 1$, $t_{90} = 1\text{ s}$)	
Noise equivalent temperature difference (NETD):	0.4°C ($t_{90} = \text{min}=2\text{ ms}$); 0.1°C ($t_{90} = 0.01\text{ s}$) ($\varepsilon = 1$, $T_{amb.} = 10\text{ to }40^\circ\text{C}$)	
Sighting system:	Laser targeting (max. power level < 1 mW, $\lambda = 630\text{-}680\text{ nm}$, CDRH class II) or thru-lens view finder or video module	
Protection class:	IP65 (DIN 40050)	
Ambient temperature:	0 to 70°C	
Storage temperature:	-20 to 70°C	
Weight:	550 g	
Housing:	Stainless steel, dimension see drawing on the right side	
CE-label:	According to EU directives about electromagnetic immunity	

Additional technical data for pyrometers with built-in video module:

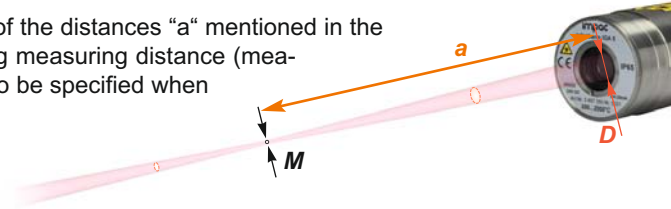
Video signal:	CCIR norm approx. 1 V _{pp} at 75 Ω, 50 Hz (special option: EIA norm 60 Hz, NTSC-M compatible)
Array size:	CCIR norm: 628 x 583 pixels, black & white (EIA norm: 510 x 492 pixels, black & white)
Exposure:	Automatic, additionally 3-levels controlled by the measuring temperature
Field of view:	Approx. 10% x 14% of focused distance
Date/time:	Real-time clock with at least 3 days spare run
Video output plug:	Separate round plug at the pyrometer, not galvanically separated to the pyrometers power supply
Picture insertions:	Target marking; unit number or user text (max. 12 characters), time and/or date; (individually switchable), measuring temperature, emissivity

Sighting



Optics

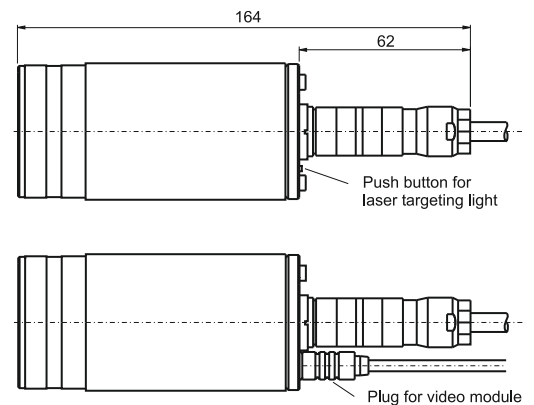
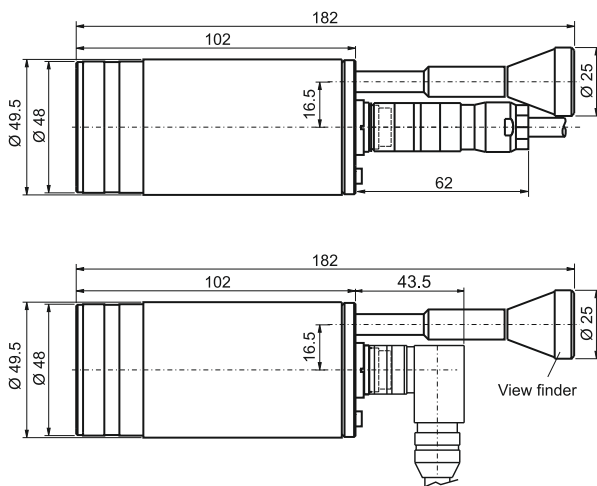
Two different optics are available. The optics are adjusted ex works to one of the distances "a" mentioned in the table below, to achieve the smallest possible spot size in the corresponding measuring distance (measured from the front of the housing). The required measuring distance has to be specified when ordering, other distances within the optics range are possible on request.



Optics F for long distances 220 ... ∞	Temperature range			
	IS 5		IGA 5	
	MB 20	MB 25 MB 30	MB 20	MB 18 MB 25 MB 30
Meas. distance a [mm]	Spot size M_{90} [mm]			
220 mm	2	1	2	1
300 mm	2.7	1.4	2.7	1.4
500 mm	4.8	2.4	4.8	2.4
800 mm	8	4	8	4
1300 mm	13	6.6	13	6.6
2000 mm	22	12	22	12
4000 mm	50	28	50	28
Aperture D [mm]	5	5 (MB 25) 3 (MB 30)	8	8 (MB 18, 25) 5 (MB 30)

Optics N for short distances 90 ... 250 mm	Temperature range			
	IS 5		IGA 5	
	MB 20	MB 25 MB 30	MB 20	MB 18 MB 25 MB 30
Meas. distance a [mm]	Spot size M_{90} [mm]			
90 mm	1	0.5	1.1	0.7
100 mm	1.1	0.6	1.3	0.8
150 mm	1.8	0.9	2	1.1
200 mm	2.6	1.4	2.6	1.4
250 mm	3.1	1.6	3.6	1.8
Aperture D [mm]	5	5 (MB 25) 3 (MB 30)	8	8 (MB 18, 25) 5 (MB 30)

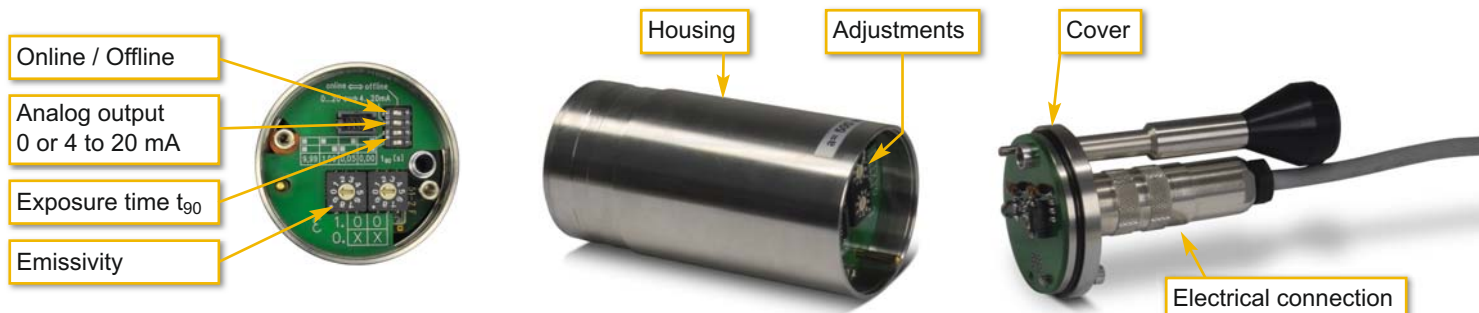
Dimensions



All dimensions in mm

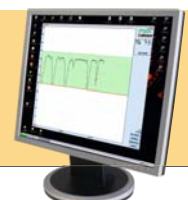
Instrument Settings

Offline mode: the most important parameters as emissivity, exposure time and analog output can be set directly in the instrument. After removing the cover on the back side of the pyrometer, the corresponding adjustments are accessible.



Online mode: switch to online mode to enable the communication via serial interface and software *InfraWin* (in scope of delivery) on a PC.

This allows additional setting options as well as the graphical temperature display combined with subsequent analysis of the measurement values.



Reference Numbers

Type	Temperature range	With laser targeting light		With thru-lens view finder		With video module *)	
		Interface		Interface		Interface	
		RS232	RS485	RS232	RS485	RS232	RS485
IS 5	MB 20: 600 to 2000°C	3 857 150	3 857 160	3 857 170	3 857 180	3 847 150	3 847 160
	MB 25: 800 to 2500°C	3 857 200	3 857 210	3 857 220	3 857 230	3 847 200	3 847 210
	MB 30: 1000 to 3000°C	3 857 250	3 857 260	3 857 270	3 857 280	3 847 250	3 847 260
IGA 5	MB 18: 350 to 1800°C	3 857 400	3 857 410	3 857 420	3 857 430	3 847 400	3 847 410
	MB 20: 250 to 2000°C	3 857 350	3 857 360	3 857 370	3 857 380	3 847 350	3 847 360
	MB 25: 400 to 2500°C	3 857 450	3 857 460	3 857 470	3 857 480	3 847 450	3 847 460
	MB 30: 500 to 3000°C	3 857 920	3 857 930	3 857 940	3 857 950	3 847 920	3 847 930

*) Standard in CCIR norm. Video module with EIA norm please order separately.

Scope of delivery: Converter, works certificate, PC operating and analyzing software *InfraWin*.

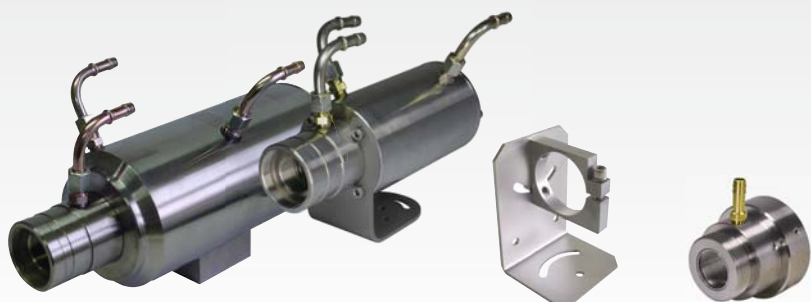
Ordering details: - When ordering please select optics N or F as well as the required measuring distance.
- A connection cable or video cable is not included in scope of delivery, it has to be ordered separately.

Accessories:

3 820 330	connection cable, 5 m, straight connector	3 837 370	Water cooling jacket (lightweight design, only pyrometers with laser targeting light) with integrated air purge unit
3 820 500	connection cable, 10 m, straight connector	3 846 590	Vacuum flange KF16 with quartz glass window
3 820 510	connection cable, 15 m, straight connector	3 852 290	Power supply NG DC for DIN rail mounting; 100 to 240 V AC ⇒ 24 V DC, 1 A
3 820 810	connection cable, 20 m, straight connector	3 852 540	Power supply NG 0D for DIN rail mounting (with 12 pin cable connector) (85 ... 265 V AC ⇒ 24 V DC, 600 mA)
3 820 820	connection cable, 25 m, straight connector	3 852 550	Power supply NG 2D, as NG 0D with 2 limit switches
3 820 520	connection cable, 30 m, straight connector	3 890 640	DA 4000-N: LED digital display (switchboard assembling)
3 820 740	connection cable, 5 m, straight connector, temperature resistant up to 200°C	3 890 650	DA 4000: as DA 4000-N, additionally with 2 limit switches
3 821 050	connection cable, 5 m, 90° connector	3 890 560	DA 6000-N: LED digital display with digital input RS232 and possibility for setting pyrometer parameters
3 821 060	connection cable, 10 m, 90° connector	3 890 570	DA 6000-N with RS485
3 821 330	connection cable, 12 m, 90° connector	3 890 520	DA 6000: LED digital display, digital- and analog input, 2 limit switches, maximum value storage, analog output, RS232
3 821 280	connection cable, 20 m, 90° connector	3 890 530	DA 6000 with RS485
3 820 430	Video cable with Cinch-/SCART plug 5 m (other length up to 30 m available)	3 826 500	HT 6000: portable battery driven indicator and instrument for pyrometer parameter settings; RS232 / RS485
3 821 220	Video cable with BNC plug 5 m (other length up to 20 m available)	3 826 510	PI 6000: programmable PID controller
3 834 210	Adjustable mounting support		
3 835 160	Air purge unit, aluminium		
3 835 440	Air purge unit, stainless steel		
3 837 230	Water cooling jacket (heavy design) with integrated air purge unit		

Overview Accessories

Mechanical:



Water cooling jackets (heavy and lightweight design)

Adjustable mounting support

Air purge unit, stainless steel

Electrical:



LED digital display DA 6000

Power supplies NG DC, NG 0D, NG 2D

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Stationary, digital ratio pyrometer for non contact temperature measurement between 600°C and 3000°C

ISQ 5



- Temperature ranges between 600 and 3000°C
- Very small spot sizes, min. 1.5 mm
- Sighting: laser targeting light, thru-lens view finder or video module
- Analog output adjustable 0 - 20 mA or 4 - 20 mA
- Built-in lens contamination control system
- Built-in maximum value storage
- Digital interface
- Small dimensions
- Bus capable with RS485 interface



The pyrometer **ISQ 5** is a digital, compact and fast 2-color pyrometer for non-contact temperature measurement.

The pyrometer measures in the 2-color method (ratio method) in which two adjacent wavelengths are used for the temperature determination.

This technique offers the following advantages compared to standard 1-color pyrometers:

The temperature measurement is independent of the object's emissivity in wide ranges and is unaffected by dust and other contaminants in the field of view. The measuring object can be smaller than the spot

size, measurements through dirty viewing windows are possible up to a certain contamination.

Additionally the pyrometer can be switched to 1-color mode and used like a conventional pyrometer in a spectral range near 0.9 µm.

The response time of only 10 ms facilitates the measurement of fast heating processes.

The ISQ 5 is equipped with a built-in lens contamination control system.

The most important parameters as emissivity slope, exposure time and analog output can be set directly in the instrument.

Additionally the pyrometer can be connected to a PC via serial interface, enabling adjustments of further parameters with the delivered software InfraWin. This can be used for temperature indication, data logging and further analyzing of complete temperature processes.

Typical Applications:

- Induction heating
- Annealing
- Welding
- Forging
- Sintering
- Melting
- Rolling mill
- Rotary kilns
- Crystal growing

Technical Data

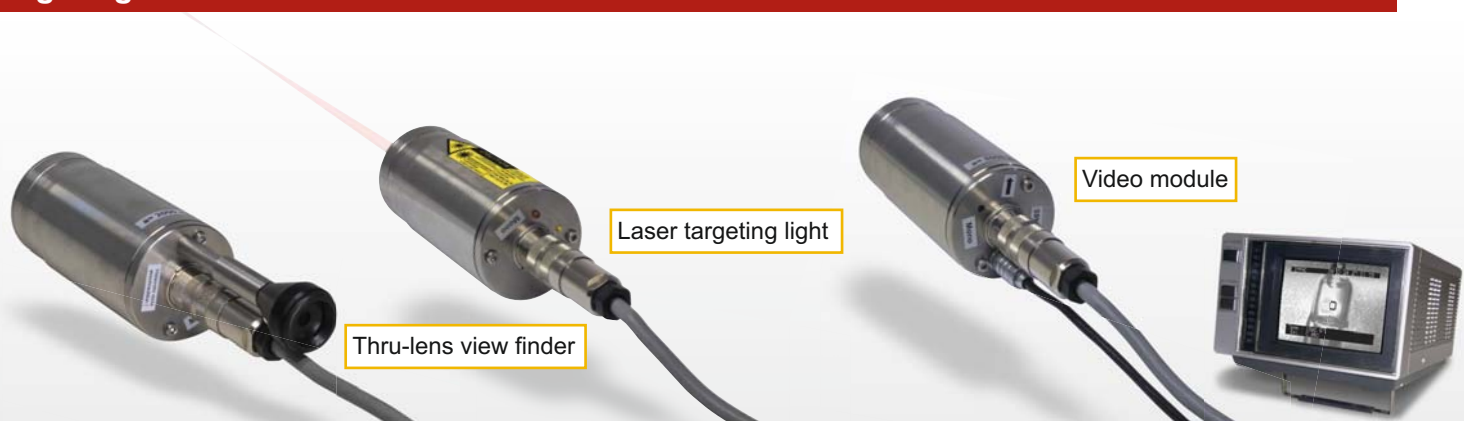
Temperature ranges:	600 to 1400°C (MB 14) 700 to 1800°C (MB 18) 800 to 2500°C (MB 25) 1000 to 3000°C (MB 30)
Sub range:	any range adjustable within the temperature range, minimum span 51°C
Spectral ranges:	channel 1: 0.9 µm; channel 2: 1.05 µm
Power supply:	24 V DC ± 25%, stabilised, ripple < 50 mV
Power consumption:	≤ 3 W (incl. active laser targeting light)
Analog output:	0 to 20 mA or 4 to 20 mA, switchable, linear in temperature, load independent DC
Interface:	optional RS232 or RS485 (addressable), half duplex, baud rate 1.2 up to 38.4 kBd
Resolution:	0.1°C at the interface at the analog output < 0.1% of the adjusted temperature range but min. 0.1°C
Isolation:	power supply and digital output and analog output are galvanically isolated against each other
Parameters:	adjustable on the converter's rear side: emissivity slope, response time, analog output 0 to 20 mA or 4 to 20 mA, online / offline mode additionally via interface adjustable and readable: 2-color / 1-color temperature signal, according to this emissivity slope or emissivity, temperature sub range, settings for maximum value storage, address, baud rate, switch off limit, warning level lens contamination monitoring system. via interface readable only: measured value, internal temperature of the unit
Maximum value storage:	single or double storage, clear modes: time (off; 0.01 s; 0.05 s; 0.25 s; 1 s; 5 s; 25 s), external clear contact, via interface or automatic „hot object mode“, hold-function for freezing the current temperature reading (not for ISQ 5-C)
Emissivity slope K:	(ε1 / ε2): 0.800 ... 1.250
Emissivity ε (in 1-color mode):	0.05 ... 1.00
Response time: t ₉₀ :	< 10 ms, adjustable to 0.01 s; 0.05 s; 0.25 s; 1 s; 3 s; 10 s
Switch off limit:	adjustable via interface: 2% to 50%
Contamination warning:	Relay contact, max. continuous current 0.4 A, setting of the switch level: 0 (off) ... 99%
Accuracy: (25°C, K=1, t ₉₀ =1 s)	< 1500°C: 0.5% of reading in °C + 2°C > 1500°C: 1% of reading in °C
Repeatability:	0.2% of reading in °C + 2°C
Noise equivalent temperature difference (NETD): (K=1, t ₉₀ =10 ms, T _{amb.} =10...40°C)	MB 14: 1°C (at 610°C meas. temperature) MB 25: 0.4°C (at 810°C meas. temperature) 0.1°C (at 800°C meas. temperature) 0.1°C (at 900°C meas. temperature) MB 18: 0.4°C (at 710°C meas. temperature) MB 30: 0.2°C (at 1010°C meas. temperature) 0.1°C (at 800°C meas. temperature) 0.1°C (at 1100°C meas. temperature)
Temperature dependence:	0.25°C per °C deviation of ambient temperature from 25°C
Sighting system:	Laser targeting light (max. power level < 1 mW, λ = 630-680 nm, CDRH class II) or thru-lens view finder or video module
Protection class:	IP65 (DIN 40050)
Ambient temperature:	0 to 70°C
Storage temperature:	-20 to 70°C
Weight:	550 g
Housing:	stainless steel, dimension see drawing on the right side
CE-label:	according to EU directives about electromagnetic immunity



Additional technical data for pyrometers with built-in video module:

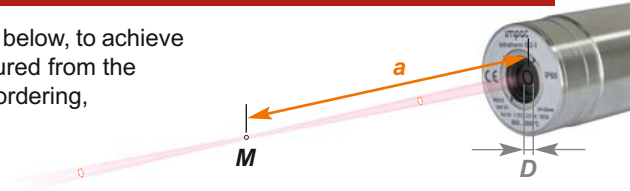
Video signal:	CCIR norm approx. 1 Vpp at 75 W, 50 Hz (special option: EIA norm 60 Hz)
Array size:	CCIR norm: 628 x 583 pixels, black & white EIA norm: 510 x 492 pixels, black & white
Exposure:	automatic, additionally 3-levels controlled by the measuring temperature
Field of view:	approx. 10% x 14% of focused distance
Date/time:	real-time clock with at least 3 days spare run
Video output plug:	separate round plug at the pyrometer, not galvanically separated to the pyrometers power supply
Picture insertions:	target marking; unit number or user text (max. 12 characters), time and/or date; (individually switchable), measuring temperature, emissivity slope or emissivity

Sighting



Optics

The optics is adjusted ex works to one of the distances “a” mentioned in the table below, to achieve the smallest possible spot size in the corresponding measuring distance (measured from the front of the housing). The required measuring distance has to be specified when ordering, other distances between 250 and 6000 mm on request.



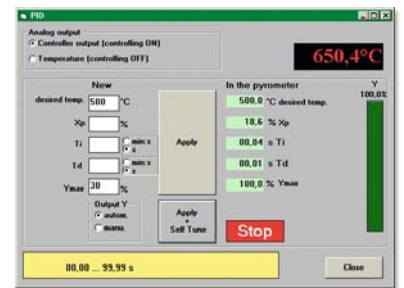
Distance a [mm]	Temperature range				
	600 to 1400°C (MB 14)	700 to 1800°C (MB 18)	800 to 2500°C (MB 25)	1000 to 3000°C (MB 30)	
Spot size M_{90} [mm]					
250 mm	6	3	1.5	1.5	
300 mm	8	4	2	2	
500 mm	11	5.5	2.8	2.8	
800 mm	16	8	4	4	
1300 mm	26	13	6.5	6.5	
2000 mm	40	20	10	10	
4000 mm	90	45	25	25	
6000 mm	150	80	45	45	
Aperture D [mm]	6	6	6	6	

ISQ 5-C: Special Version with Integrated PID Controller

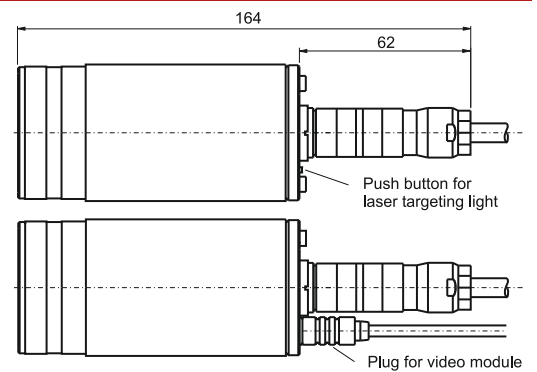
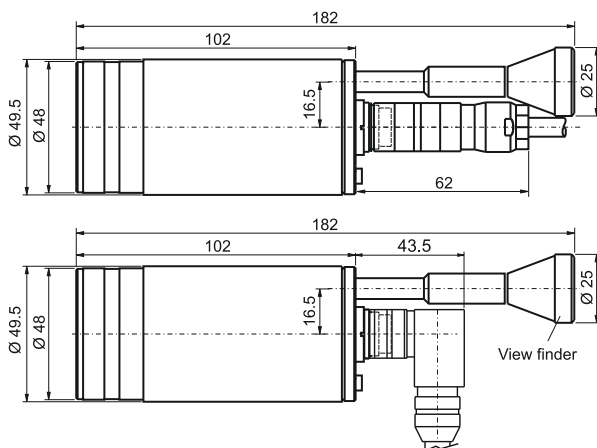
The **ISQ 5-C** is equipped with an integrated PID controller. This enables automatic controlling and monitoring of processes. The controller compares the current measuring temperature with the target temperature value, calculates the control signal and gives an output signal of 0 or 4 to 20 mA (instead of the temperature signal output). The controller is very fast and updates the signal with the pyrometer's response time (< 10 ms).

The built-in self-tuning algorithm determines automatically and a very good approximation of the controlling parts P, I and D.

Activating and deactivating of the controller as well as setting the parameters can be done via interface and software or via portable parametrizing device HT 6000 or the LED digital display DA 6000 or DA 6000-N.



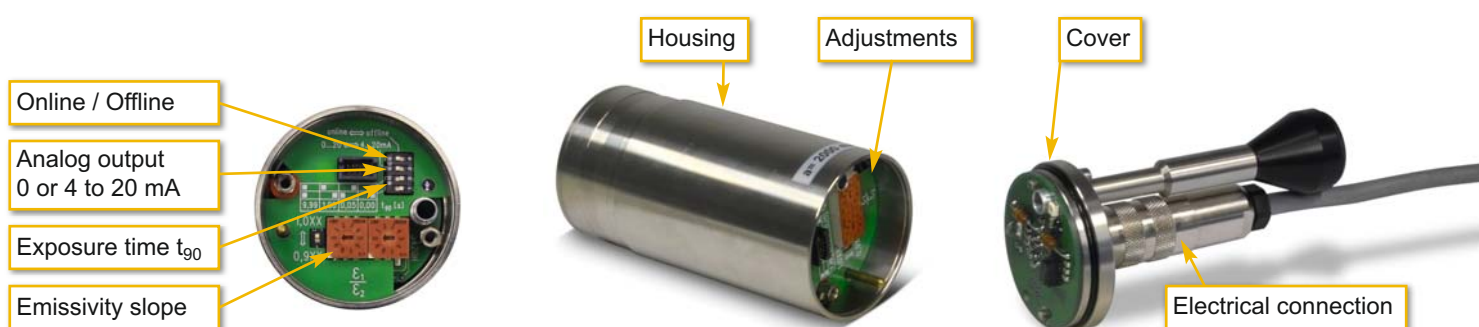
Dimensions



All dimensions in mm

Instrument Settings in Offline Mode

The most important parameters as emissivity slope, exposure time and analog output can be set directly in the instrument. After removing the cover on the back side of the pyrometer, the corresponding adjustments are available.



Reference Numbers

Type	Temperature ranges	with laser targeting light		with thru-lens view finder		with video module *)	
		Interface		Interface		Interface	
		RS232	RS485	RS232	RS485	RS232	RS485
ISQ 5	MB 14: 600 to 1400°C	3 853 100	3 853 110	3 853 120	3 853 130	3 847 500	3 847 510
	MB 18: 700 to 1800°C	3 853 200	3 853 210	3 853 220	3 853 230	3 847 600	3 847 610
	MB 25: 800 to 2500°C	3 853 300	3 853 310	3 853 320	3 853 330	3 847 700	3 847 710
	MB 30: 1000 to 3000°C	3 853 400	3 853 410	3 853 420	3 853 430	3 847 800	3 847 810
ISQ 5-C	MB 14: 600 to 1400°C	3 853 500	3 853 510	3 853 520	3 853 530	–	–
	MB 18: 700 to 1800°C	3 853 600	3 853 610	3 853 620	3 853 630	–	–
	MB 25: 800 to 2500°C	3 853 700	3 853 710	3 853 720	3 853 730	–	–
	MB 30: 1000 to 3000°C	3 853 800	3 853 810	3 853 820	3 853 830	–	–

*) Standard in CCIR norm. Video module with EIA norm please order separately.

Scope of delivery: Converter, works certificate, PC operating and analyzing software *InfraWin*.

Ordering details: - When ordering please select the required measuring distance.
- A connection cable or video cable is not included in scope of delivery, it has to be ordered separately

Accessories:

3 820 330	connection cable, 5 m, straight connector	3 837 370	Water cooling jacket (lightweight design, only pyrometers with laser targeting light) with integrated air purge unit
3 820 500	connection cable, 10 m, straight connector		Vacuum flange KF16 with quartz glass window
3 820 510	connection cable, 15 m, straight connector	3 846 590	Power supply NG DC for DIN rail mounting;
3 820 810	connection cable, 20 m, straight connector	3 852 290	100 to 240 V AC ⇒ 24 V DC, 1 A
3 820 820	connection cable, 25 m, straight connector		Power supply NG 0D for DIN rail mounting (with 12 pin cable connector) (85 ... 265 V AC ⇒ 24 V DC, 600 mA)
3 820 520	connection cable, 30 m, straight connector	3 852 540	Power supply NG 2D, as NG 0D with 2 limit switches
3 820 740	connection cable, 5 m, straight connector, temperature resistant up to 200°C	3 852 550	DA 4000-N: LED digital display (switchboard assembling)
3 821 050	connection cable, 5 m, 90° connector	3 890 640	DA 4000: as DA 4000-N, additionally with 2 limit switches
3 821 060	connection cable, 10 m, 90° connector	3 890 650	DA 6000-N: LED digital display with digital input RS232
3 821 330	connection cable, 12 m, 90° connector	3 890 560	and possibility for setting pyrometer parameters
3 821 280	connection cable, 20 m, 90° connector		DA 6000-N with RS485
3 820 430	Video cable with Cinch-/SCART plug 5 m (other length up to 30 m available)	3 890 570	DA 6000: LED digital display, digital- and analog input, 2 limit switches, maximum value storage, analog output, RS232
3 821 220	Video cable with BNC plug 5 m (other length up to 20 m available)	3 890 520	DA 6000 with RS485
3 834 210	Adjustable mounting support	3 890 530	HT 6000: portable battery driven indicator and instrument for pyrometer parameter settings; RS232 / RS485
3 835 160	Air purge unit, aluminium	3 826 500	PI 6000: Programmable PID controller
3 835 440	Air purge unit, stainless steel		
3 837 230	Water cooling jacket (heavy design) with integrated air purge unit	3 826 510	

Overview Accessories

Mechanical accessories:



Water cooling jacket (heavy design)



Adjustable mounting support



Air purge unit, stainless steel

Electrical accessories:



HT 6000 for pyrometer parameter settings



LED digital display DA 6000



Power supplies NG DC, NG 0D, NG 2D

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Stationary, digital 2-color pyrometer with fiber optics for non-contact temperature measurement between 700°C and 2500°C

ISQ 5-LO



- Very small spot sizes, min 0.45 mm
- Wide temperature ranges
- Laser targeting light
- Analog output
0 to 20 mA or 4 to 20 mA
- Digital interface RS232 or RS485 (bus control)
- Maximum value storage
- Fiber optic and optical head withstand temperatures up to 250°C
- Rugged mono fiber optic (max. length up to 30 m)



The **ISQ 5-LO** is a digital, accurate 2-color pyrometer with fiber optic for non-contact temperature measurement.

The pyrometer measures in the 2-color principle (ratio principle) in which two adjacent wavelengths are used to calculate the temperature. This technique offers the following advantages compared with the standard one-color pyrometers:

- The temperature measurement is independent of the emissivity of the object in wide ranges
- The measuring object can be smaller than the spot size
- Measurements are unaffected by dust and other contaminants in the field of view or by dirty viewing windows

Additionally the pyrometer can be switched to 1-color mode and used like a conventional pyrometer in the wavelength band near 0.9 μm.

The instrument is equipped with a fiber and an exchangeable optical head. The fiber and optical head are unaffected by electromagnetic interferences (e.g. induction) and can be used in high ambient temperatures up to 250°C without additional cooling.

The most important parameters as emissivity slope, exposure time and analog output can be set directly in the instrument.

Additionally the pyrometer can be connected to a PC via serial interface, enabling adjustments of further

parameters with the delivered software *InfraWin*. This can be used for temperature indication, data logging and further analyzing of complete temperature processes.

Typical applications:

- Induction heating
- Welding
- Casting
- Forging
- Annealing
- Sintering
- Rolling mill
- Rotary kilns
- Pouring stream

Technical Data

Temperature ranges:	700 to 1800°C (MB 18) 800 to 2500°C (MB 25)
Sub range:	Any range adjustable within the temperature range, minimum span 51°C
Spectral ranges:	Channel 1: 0.7 ... 1.15 µm; channel 2: 0.97 ... 1.15 µm
Power supply:	24 V DC ± 25%, stabilised, ripple < 50 mV
Max load:	≤ 3 VA (incl. active laser targeting light)
Analog output:	0 to 20 mA or 4 to 20 mA, switchable, linear in temperature, load independent DC
Interface:	RS232 or RS485 (adressable), half duplex, baud rate 1.2 up to 38.4 kBd
Resolution:	0.1°C at the interface at the analog output < 0.1% of the adjusted temperature range, but min. 0.1°C
Isolation:	Power supply and digital output and analog output are galvanically isolated
Parameters:	Adjustable on the converter's rear side: emissivity slope, response time, analog output 0 to 20 mA or 4 to 20 mA, offline / online mode for settings on the instrument or via PC Additionally via interface adjustable and readable: ratio / mono channel temperature signal, according to this setting emissivity slope or emissivity, temperature sub range, settings for the maximum value storage, address, baud rate, switch off limit, contamination level Via interface readable only: measured value, internal temperature of the unit.
Maximum value storage:	Built-in single or double storage, clear modes: time (off; 0.01 s; 0.05 s; 0.25 s; 1 s; 5 s; 25 s), external clear contact, via interface or automatic „hot object mode“, hold-function for freezing the current temperature reading (not for ISQ 5-LO-C)
Emissivity slope K:	0.800 to 1.250
Emissivity ε (mono channel mode):	0.05 to 1.00
Response time t ₉₀ :	< 10 ms, adjustable to 0.01 s; 0.05 s; 0.25 s; 1 s; 3 s; 10 s
Switch off limit:	Adjustable via interface: 2% ... 50%
Contamination warning:	Relay contact, max. continuous current 0.4 A, setting of the switch level: 0 (off) ... 99%
Accuracy:	< 1500°C: 0.5% of reading in °C + 2°C > 1500°C: 1.0% of reading in °C
(K = 1, t ₉₀ = 1 s, T _{amb.} = 25°C)	
Repeatability:	0.2% of reading in °C + 2°C (K = 1, t ₉₀ = 1 s, T _{amb.} = 25°C)
Noise equivalent temperature difference (NETD):	MB 18: 0.4°C (at 710°C meas. temperature) MB 25: 0.4°C (at 810°C meas. temperature) 0.1°C (at 800°C meas. temperature) 0.1°C (at 900°C meas. temperature)
(K = 1, t ₉₀ = 10 ms, T _{amb.} = 10...40°C)	
Temperature dependence:	± 0.25°C per °C deviation of ambient temperature from 25°C
Sighting system:	Laser targeting (max. power level < 1 mW, λ = 630-680 nm, CDRH class II)
Protection system:	IP65 (according to DIN 40050)
Operating temperature:	0 to 70°C at the converter housing, up to 250°C at optical head and fiber
Storage temperature:	-20 to 70°C
Weight:	Converter: approx. 550 g; optical head: approx. 140 g; fiber (2.5 m): approx. 250 g
Housing:	Stainless steel, for details see drawing on next page
CE-label:	According to EU directives about electromagnetic immunity

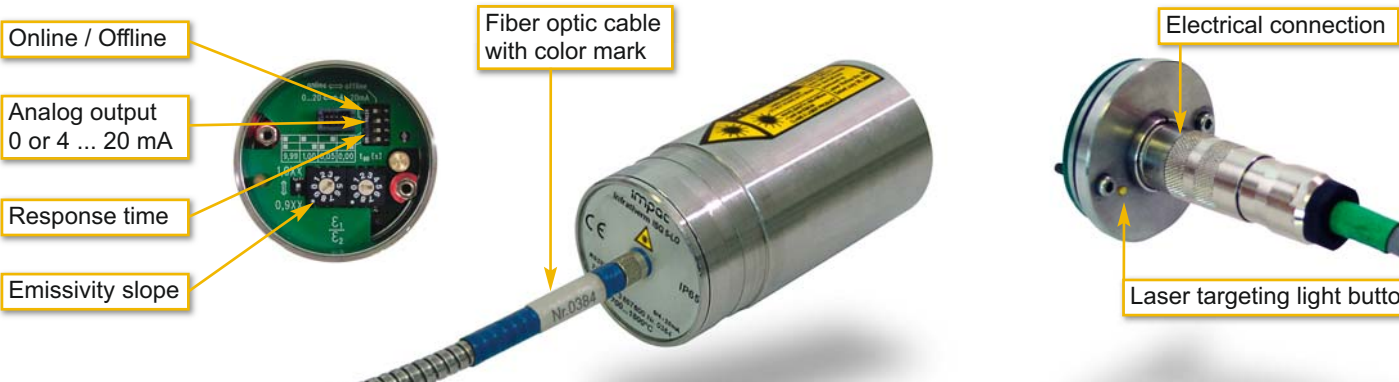


Option: ISQ 5-LO-C, Special Version with Integrated PID Controller

The ISQ 5-LO-C is equipped with an integrated PID controller. This enables automatic controlling and monitoring of processes. The controller compares the current measuring temperature with the target temperature value, calculates the control signal and gives an output signal of 0 or 4 to 20 mA (instead of the temperature signal output). The controller is very fast and updates the signal with the pyrometer's response time (< 10 ms). The built-in self-tuning algorithm determines automatically and a very good approximation of the controlling parts P, I and D. Activating and deactivating of the controller as well as setting the parameters can be done via interface and software or via portable parametrizing device HT 6000 or the LED digital display DA 6000 or DA 6000-N.



Details



Optical Head

Depending on the application the instrument will be delivered with a small or a large optical head. The selection of the optical head depends not only on its size but also on the required spot size (size of the measuring object) and the measuring distance.

Optical head I:

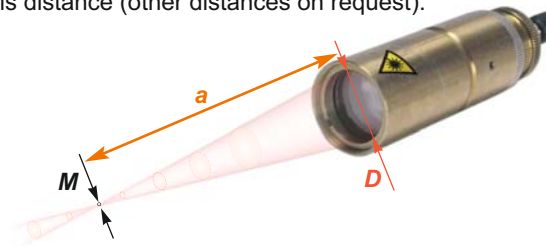
With the very small dimensions the optical head I is suited for use in confined spaces. The optics is adjusted to one of the measuring distances mentioned in the table. The mentioned spot size will be achieved in exactly this distance (other distances on request).

Optical head II:




The optics II is bigger, but smaller spot sizes can be achieved. Two designs are available, fixed adjusted or focusable:

Similar to optics I the fixed adjusted type is adjusted to one of the measuring distances mentioned in the table (other distances on request).

The focusable type is available for 6 different distance ranges. Each measuring distance can be adjusted within the mentioned limits to achieve the smallest spot size in the required distance.



from the front of the lens

Optical head	Measuring distance a [mm]	Spot size M_{90} [mm]		Aperture D [mm]
		700 ... 1800°C	800 ... 2500°C	
Optical head I: 	Adjusted to: 120	2.2	1.2	7
	Adjusted to: 260	5	2.6	7
	Adjusted to: 700	14	7.2	7
Optical head II: (fixed adjusted) 	Adjusted to: 87	0.75	0.45	17
	Adjusted to: 200	1.5	0.8	17
	Adjusted to: 600	5.3	2.7	15
	Adjusted to: 4500	42	22	15
Optical head II: (focusable) 	Range: 88 to 110	0.8 to 1.1	0.45 to 0.6	17
	Range: 95 to 129	0.9 to 1.3	0.5 to 0.75	16
	Range: 105 to 161	1.1 to 1.7	0.6 to 1	15
	Range: 200 to 346	1.5 to 2.8	0.8 to 1,5	17
	Range: 247 to 606	2 to 5.2	1.1 to 2.7	16
	Range: 340 to 4500	2.8 to 42	1.5 to 22	15

Fiber Optic

The radiation, coming in through the optical head, is transported via the lens system into the mono glass fiber with flexible stainless steel protection tube where it is transmitted along to the converter. As the optical head contains only the lens system and the sensor and the electronics are located in the converter box, fiber and optical head can withstand ambient temperatures up to 250°C without cooling. Depending on the measuring range two different fibers are used. They are marked red or blue.

Fiber: Monofiber in stainless steel, flexible protection tube with standardised FSMA-plugs.

Length: 2.5 m in scope of delivery; 5 m, 7.5 m, 10 m, 15 m, 30 m on request

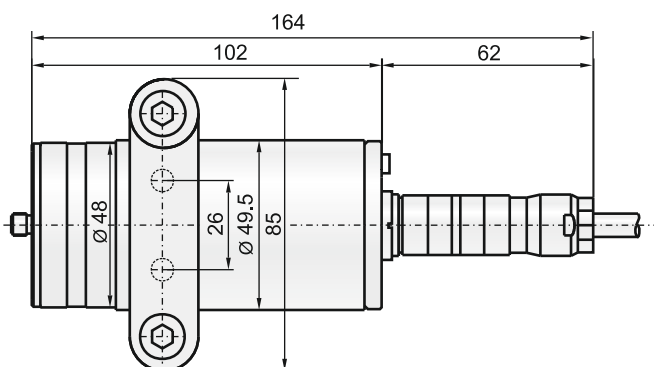
Color mark at the fiber: blue: for MB 18 (700 to 1800°C)
red: for MB 25 (800 to 2500°C)

Ambient temperature: max. 250°C (instrument's side with color mark max 125°C)

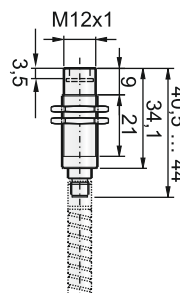
Minimum bending radius: blue: 100 mm for short time, 300 mm permanently
red: 50 mm for short time, 120 mm permanently

Dimensions

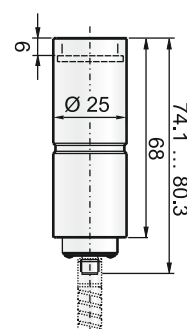
Converter:



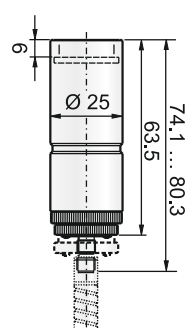
Optical head type I:



Optical head type II: (fixed adjusted)



Optical head type II: (focusable)



All dimensions in mm

Reference Numbers

Type	Temperature range	Interface		Type	Temperature range	Interface	
		RS232	RS485			RS232	RS485
ISQ 5-LO	MB 18: 700 ... 1800°C	3 853 940	3 853 950	ISQ 5-LO-C	MB 18: 700 ... 1800°C	3 853 680	3 853 690
	MB 25: 800 ... 2500°C	3 853 960	3 853 970		MB 25: 800 ... 2500°C	3 853 780	3 853 790

Scope of delivery: Converter, optical head I or II, optical fiber 2.5 m, mounting bracket for converter, works certificate, PC operating and analyzing software *InfraWin*.

A connection cable is not included in scope of delivery, it has to be ordered separately!

Ordering details: To process your order as fast as possible, please give us the following data:

- Instrument with reference number (e.g. ISQ 5-LO, 3 853 940)
- Optical head's design (I or II fixed adjusted or focusable) and the desired measuring distance (e.g. optical head I, a = 120 mm)
- Length of optical fiber (except standard length 2.5 m)
- Connecting cable (e.g. 3 820 330)

Accessories:

3 820 330	Connection cable, length 5 m, straight connector	3 835 510	Air purge unit with ceramic tube (large) for optical head I
3 820 500	Connection cable, length 10 m, straight connector	3 835 180	Air purge unit for optical head II
3 820 510	Connection cable, length 15 m, straight connector	3 852 290	Power supply NG DC for DIN rail mounting; 100 to 240 V AC ⇒ 24 V DC, 1 A
3 820 810	Connection cable, length 20 m, straight connector	3 852 540	Power supply NG 0D for DIN rail mounting (with 12 pin cable connector) 85 ... 265 V AC ⇒ 24 V DC, 600 mA
3 820 820	Connection cable, length 25 m, straight connector	3 852 550	Power supply NG 2D, as NG 0D with 2 limit switches
3 820 520	Connection cable, length 30 m, straight connector	3 890 640	LED digital display DA 4000-N
3 820 740	Connection cable, length 5 m, straight connector, temperature resistant up to 200°C	3 890 650	LED digital display DA 4000 with 2 limit switches
3 834 370	Mounting support for optical head I (fixed)	3 890 560	LED digital display DA 6000-N: with possibility for pyrometer parameter settings for digital pyrometers; RS232 interface
3 834 380	Mounting support for optical head I (adjustable)	3 890 570	LED digital display DA 6000-N with RS485
3 834 050	Ball and socket mounting with clamp for optical head I or II or air purge unit for optical head II	3 826 500	HT 6000, portable parametrizing device
3 834 230	Adjustable mounting support for optical head II		
3 835 170	Air purge unit for optical head I		
3 835 500	Air purge unit with ceramic tube (small) for optical head I		

Overview Accessories

Mechanical accessories:



Air purge units for optical head I



Adjustable mounting support for optical head II or air purge unit for optical head II



Ball and socket mounting for optical head I or II and for air purge unit for optical head II



Air purge unit for optical head II



Fixed or adjustable mounting support for optical head I

Note: all mechanical accessories are made from stainless steel

Electrical accessories:



LED digital display



Portable parametrizing device HT 6000



Power supplies NG DC; NG 0D; NG 2D

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IS 5/F

Digital flame pyrometers for non-contact temperature measurement of flames between 600°C and 3000°C

The compact, high exact, completely digital infrared converter

- highest accuracy
- wide ranges
- through lens sighting
- analog and digital output
- built-in maximum value storage
- bus control of all parameters about interface



for:

- shining flames
- flames with varying soot factor

Applications:

- burner plants
- incinerating plants
- coaldust plants
- oil heated plants

Technical Data:

Spectral range:	0.70...1.15 μm
Accuracy:	< 1500°C: 0.5% of the measured value in °C \pm 2K > 1500°C: 1.0% of the measured value in °C
Resolution:	< 1°C
Temperature dependence:	0.25 K per K deviation of the ambient temperature from 23°C
Repeatability:	0.2% of measured value in °C \pm 2K
Response time:	< 10 ms, adjustable up to 10 s
Soot factor:	n: 0,5 ... 2,5
Parameters:	<i>adjustable at the converter's rear side:</i> soot factor, response time, 0 or 4...20 mA analog output, switch to intensity output online/offline <i>adjustable and readable via interface:</i> soot factor, response time, parametrizing the analog output, temperature subrange, clear time and external clear of the maximum value storage, address, baud rate <i>only readable:</i> measured value, optical thickness, spectral temperature and internal temperature of the instrument
Sighting system:	through lens sighting
Maximum value storage:	single or dual storage, clear by time, external clear contact, interface or automatic „hot object mode“, RS 232
Max load:	\leq 3 VA (inclusive active laser-pilot light)
Interface:	RS 232 or RS 485 addressable, half duplex, baud rate up to 38,4 kBd
Power supply:	24 VDC \pm 25%, stabilised, ripple < 50 mV
Safety class:	I according VDE 0411
Safety system:	IP 65 (according to DIN 40050)
Storage temperature:	-20...70°C
Operating temperature:	0...70°C at housing
Isolation:	power supply and digital and analog output galvanically isolated
CE-Sign:	according to EU directives about electromagnetic immunity
Weight:	550 g

Basic measurement range:

		Ref.No.:			Ref.No.:
MB 14	600 ... 1400°C	3 853 160	MB 18	700 ... 1800°C	3 853 260
MB 25	800 ... 2500°C	3 853 360	MB 30	1000 ... 3000°C	3 853 460

Optics: Spot diameter M [mm] at the measuring distance a [mm] for 90% of the radiation.

Measuring range	MB 14: 600 ... 1400°C	MB 18: 700 ... 1800°C	MB 25: 800 ... 2500°C	MB 30: 1000 ... 3000°C
Apertur D [mm]	8.0	8.0	8.0	5.0
Distance a:				
250 mm	6.0	3.0	1.5	1.5
300 mm	8.0	4.0	2.0	2.0
500 mm	11.0	5.5	2.8	2.8
800 mm	16.0	8.0	4.0	4.0
1300 mm	26.0	13.0	6.5	6.5
2000 mm	40.0	20.0	10.0	10.0

The spot diameter between the above mentioned distances can easily be calculated by interpolation.

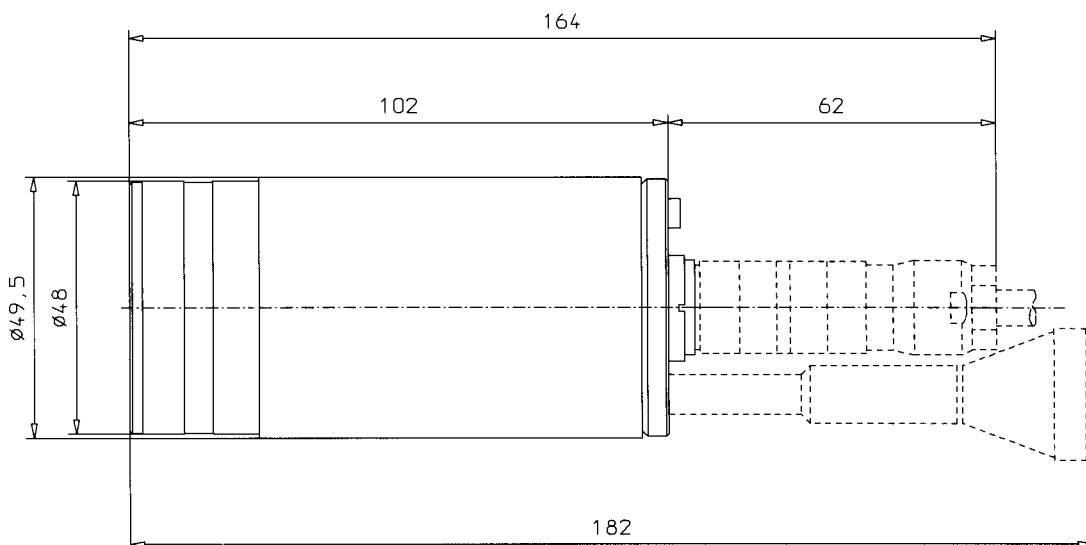
Options: RS 485 instead of RS 232: + 010
 add option number to the unit's ref. no.
 e.g.
 IS 5/F with RS 232, MB 18: 3 853 260
 IS 5/F with RS 485, MB 18: 3 853 270

Scope of delivery: Converter and objective,
 PC-software InfraWin
 The connecting cable is not included in the scope of delivery and has to be ordered separately with ref no. 3 820 330.

Details of order: To proceed your order quickly, please give us the following data:

- Measurement range or ref. no.
- Optics: requested measuring distance (e.g. "measurement distance 250 mm")
- Option RS 485 or RS 232
- Connection cable (3 820 330)

Dimensions:



Accessories:

3 820 330	Connection cable 5m
3 852 140	Power supply NG 0 in a standard carrier rail housing
3 834 210	Adjustable mounting support
3 890 640	LED-display DA 4000-N
3 890 650	LED-display DA 4000 with 2 limit switches
3 890 660	IP 65-front cover for DA 4000-N, DA 4000
3 835 160	Air purge unit
3 837 080	Cooling jacket for ambient temperature up to 170 °C
3 835 080	Mounting angle for cooling jacket 3 837 080
3 835 070	Mounting flange for cooling jacket 3 837 080
3 835 100	Coupling flange for cooling jacket 3 837 080
3 835 090	Mounting sleeve for cooling jacket 3 837 080
3 846 100	Installation tube
3 846 120	Flange tube

Please see also separate drawing 3 837 031 for mechanical accessories.

Service Guarantee: Our technical staff are always available to assist with your application.

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Temperature Measurement

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The logo for IMPAC Infrared GmbH, featuring the word "impac" in a lowercase, rounded, green font. The letters are stylized with thick strokes. A registered trademark symbol (®) is located to the upper right of the letter "c".

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