

## Thermophil<sup>®</sup> INFRAsmart R 300 / R 301 / R 302

- Contactless measurement of temperature for all applications.
- Sturdy and tight stainless steel housings to IP 64.
- Two-wire 4-20 mA technique
- HART<sup>®</sup> interface
- Choice of spectral ranges
- Variable measuring ranges
- Max. ambient temperature 70 °C



The **INFRAsmart R 300/301/302** family comprises stationary pyrometers for contactless measurement of temperature.

This technique is a big advantage, for example, if the object to be measured moves or is live. The contactless measuring principle also makes sense if the measured object is a poor conductor of heat (e.g. plastic films, paper or bulk materials) or if the measurement has to be completed quickly. This results in a very broad range of applications, such as:

Thermoforming machines for plastics,  
 Extruders for plastics,  
 Calendaring lines for plastic films,  
 Coating machines,  
 Glassworking,  
 Metalworking,  
 Supervision of products on conveyor belts,  
 Monitoring of plant overheating, etc.

With the R 301 and R 302 types, the infrared radiation is focused on the sensing element by a lens. The R 300 type works with a high-gloss, gold-plated cone.

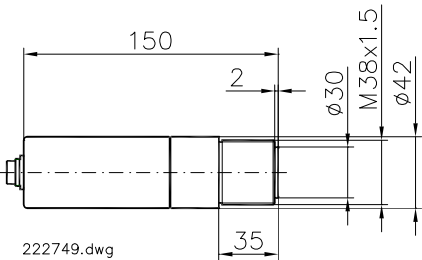
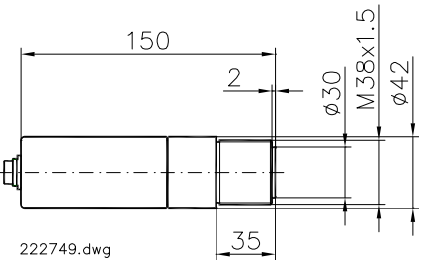
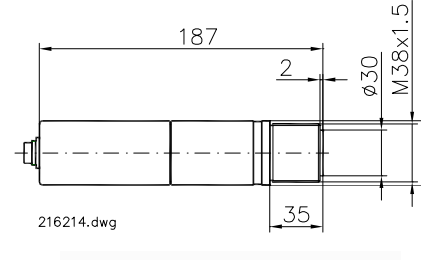
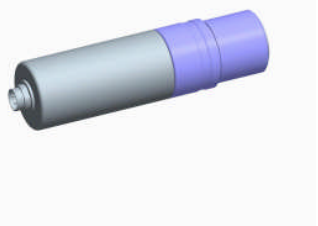
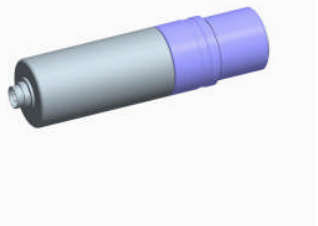
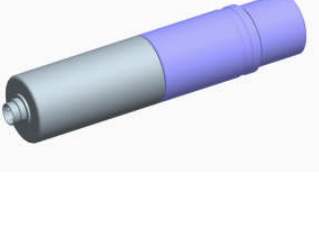
The pyrometers are extremely compact, with integrated electronic components that convert the measurement signal to 4...20 mA.

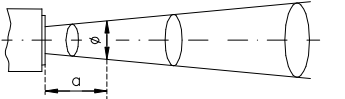
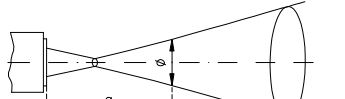
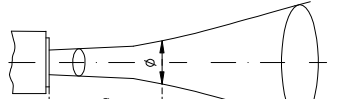
Cooling systems are available for operation at ambient temperatures higher than 70 °C.

An air purging nozzle can be supplied for dusty or damp environments to keep the lens or the cone clean.

Fixing brackets and various other accessories are also available.

- **Measuring ranges:**  
0...2000 °C in sub-ranges
- **Measurement signal:**  
4...20 mA, linear
- **Power supply:**  
12...30 V DC
- **Smallest measuring field:**  
5 mm Ø
- **Vibration-proof, no moving parts**
- **Interface: HART<sup>®</sup> protocol**
- **Cluster / category**  
II2G EEx ib IIC T6 ... T4  
for application in Ex zone 1 or zone 2
- **Cluster / category**  
II2G Ex ibD21 T<sub>100</sub> 105°C/160°  
C for application in Ex zone 21 or zone 22
- **IBExU06ATEX1089**
- **DTM and PDM for sensor management**
- **Temperature monitoring with ignition protection standard IPL 1, TÜV certificate no. 71332449**

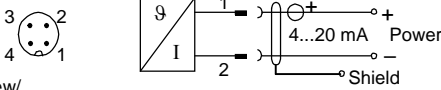
Technical data				
<b>Measuring range</b>				
Overall	max. 0...+400 °C with R 300 max. 0...+2000 °C with R 301/R 302			
Spectral response	8...14 µm; 2...2.7 µm; 4.9...5.5 µm; 7.9 µm (R 300)			
Emission factor	0.1 to 1, settable externally via the HART® interface			
Measuring field	Depending on distance (see "Distance ratio")			
<b>Interface</b>	HART® protocol (FSK BELL 202, 1.2 kbit/s)			
<b>Functions</b> (configurable via HART®-Interface)	Unit, Range limits, Emission factor, Transmission factor, Temperature alarm, Damping, Maximum and Minimum mode, Fault current, Fieldbus address			
<b>Output (current interface)</b>				
Output signal	4...20 mA, linear			
Permissible load	≤ 500 Ω for standard version/U <sub>H</sub> = 24 V			
	Intrinsically safe circuit EEx ib IIC			
	max. input voltage	U <sub>i</sub> = 28 V		
	max. input current	I <sub>i</sub> = 105 mA		
	max. power input	P <sub>i</sub> = 1,0 W		
	max. internal capacity	C <sub>i</sub> = 12 nF		
	max. internal inductance	L <sub>i</sub> = 0,2 mH		
<b>Accuracy</b>				
Measuring accuracy	≤ 1 % of measuring range (at 23 °C and for emission factor = 1)			
Temperature sensitivity	≤ 0.03 %/C°			
Response time	t <sub>0,9</sub> = 0.2 s			
<b>Ambient conditions</b>				
Ex	Type	Ambient Temperature	Temperature class	max. Surface Temperature
	R30x	-20°C ... +60°C	T6	T <sub>100</sub> 105°C
Permissible operating temperature	0...+70 °C			
Permissible storage temperature	-10...+70 °C			
Climatic class	KSF according to DIN 40040			
<b>Power supply</b>				
U <sub>H</sub> = 12...30 V DC, max. 25 mA, max. residual ripple ≤ 150 mV rms				
<b>Connection</b>				
4-pole plug connector, degree of protection IP 64				
<b>Mechanical data</b>				
<b>Type</b>	<b>R 300</b>	<b>R 301</b>	<b>R 302</b>	
Housing material	Stainless steel (material no. 1.4301)			
Degree of protection	IP 64			
Weight	1100 g	1100 g	1460 g	
<b>Dimensions</b>				
<b>R 300</b>	<b>R 301</b>		<b>R 302</b>	
				
222749.dwg	222749.dwg		216214.dwg	
				

Distance ratio R 300	R 301	R 302
 <p>measuring distance a</p> <p>field of view <math>\phi</math> (95 %)</p> <p>for field a : <math>\phi = 1.7</math></p> <p>215910.dwg</p>	 <p>measuring distance a</p> <p>field of view <math>\phi</math> (95 %)</p> <p>exact point at 100mm 20:1 for field 6:1</p> <p>215912.dwg</p>	 <p>measuring distance a</p> <p>field of view <math>\phi</math> (95 %)</p> <p>exact point at 1000mm 33:1 for field 25:1</p> <p>215913.dwg</p>

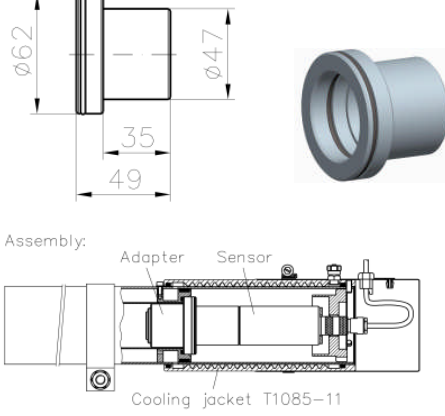
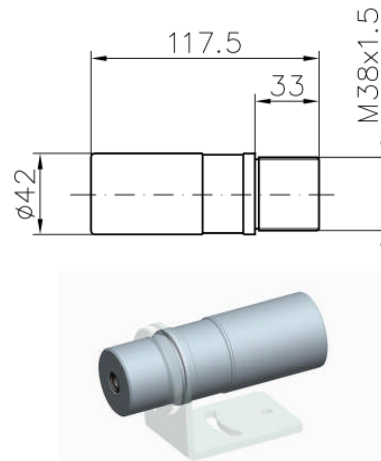
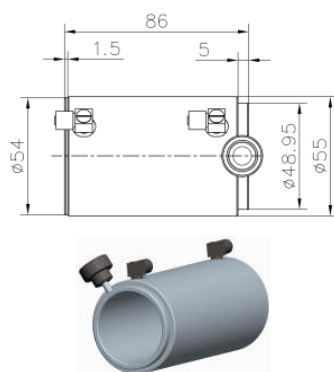
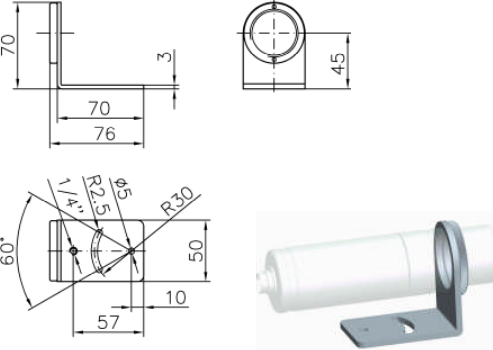
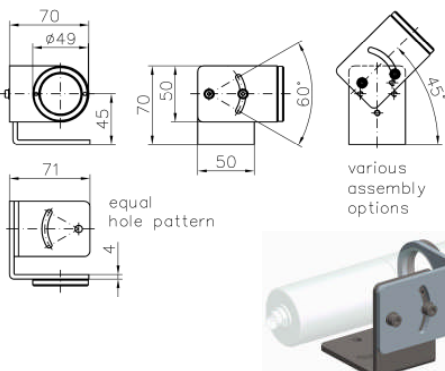
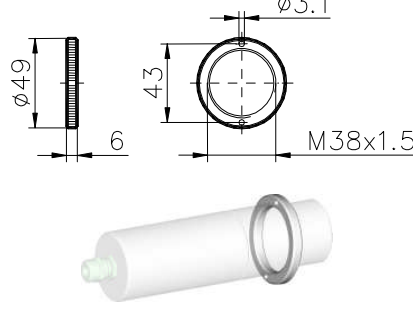
### Connection



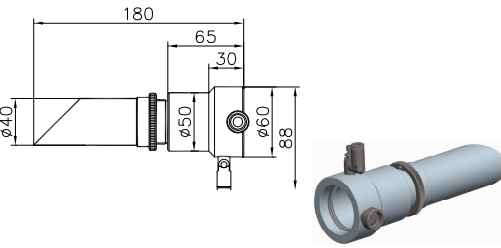
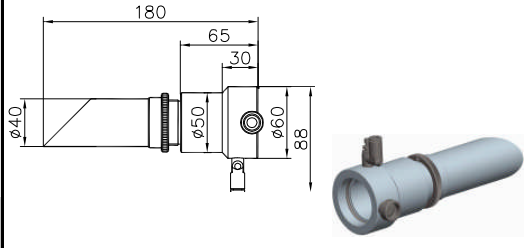
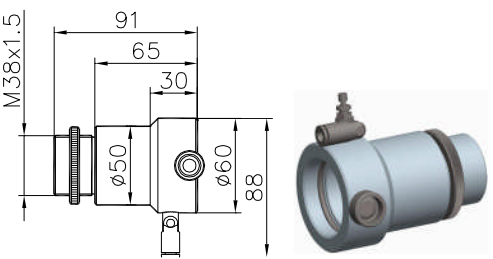
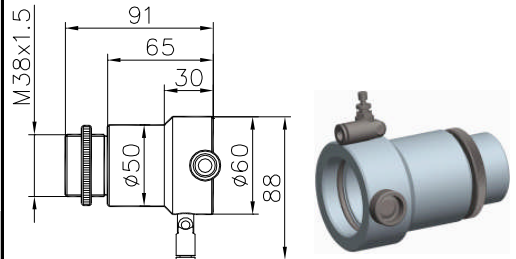
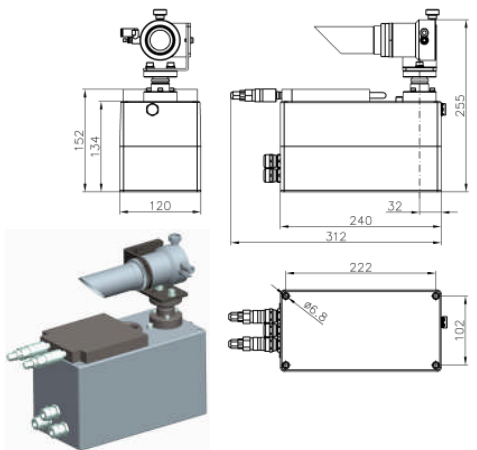
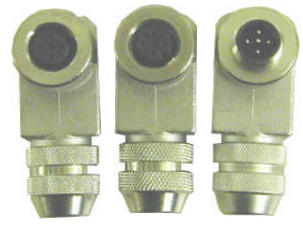

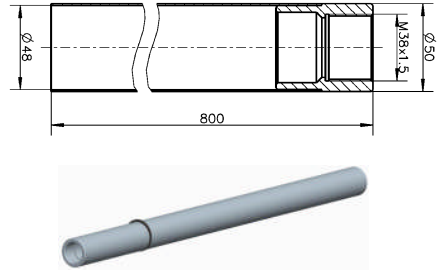
With plug connector

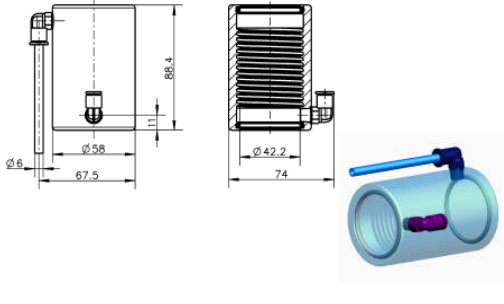
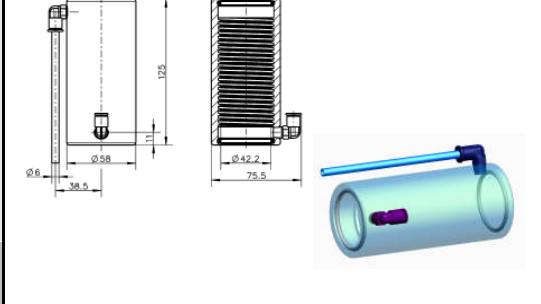
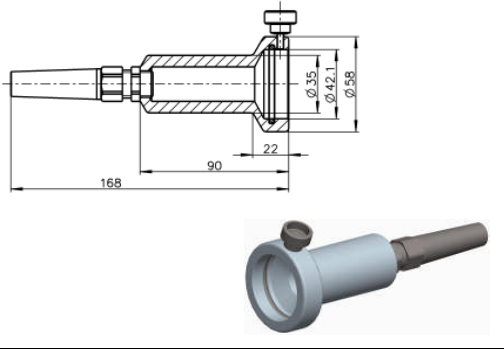
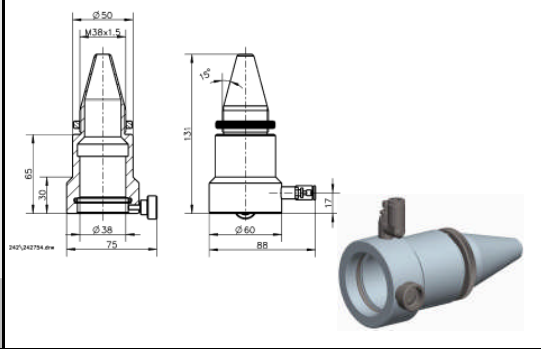



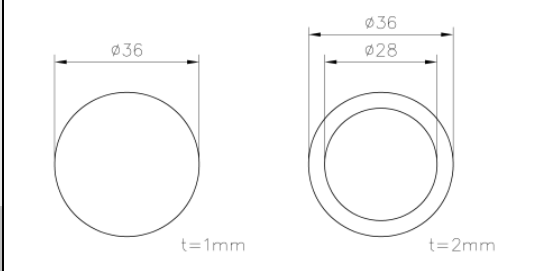
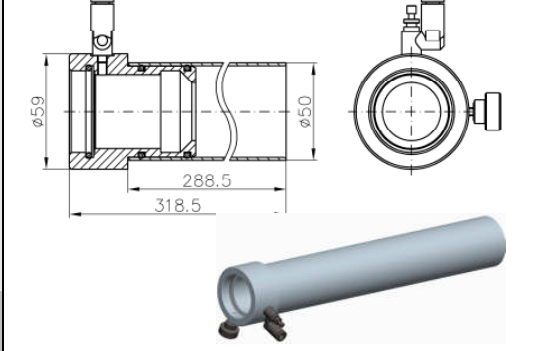
Plug connector R 300/301/302 Evaluator

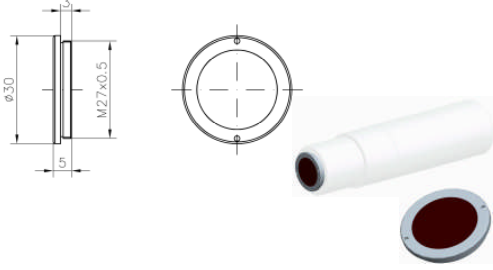




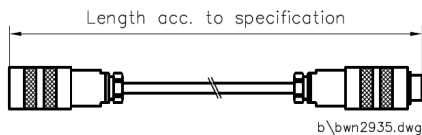
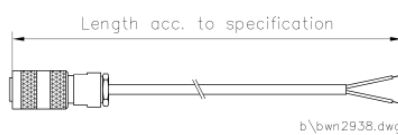

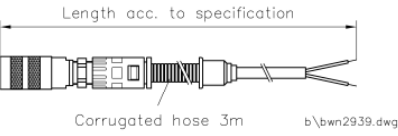
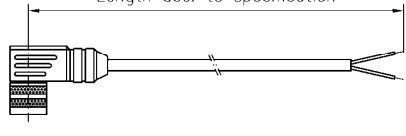


External view/  
connector soldering side

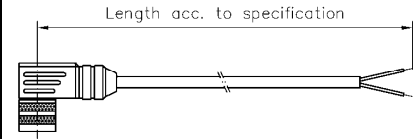
Accessories Adapter Type R 300-100 replacing R 20 with R 302	For sensor R 302	Laser pointer Type R 300-101	For sensor R 300 R 301 R 302
 <p>Assembly: Adapter Sensor Cooling jacket T1085-11</p> <p>mz108505.dwg</p>	<p>Order No. 216298</p>	 <p>Order No. 216299</p>	<p>Order No. 216975</p>
 <p>Order No. 216711</p>	<p>For sensor R 300 R 301 R 302</p> <p>Order No. 216711</p>	 <p>Order No. 216976</p>	<p>For sensor R 300 R 301 R 302</p> <p>Order No. 216975</p>
 <p>equal hole pattern</p> <p>various assembly options</p> <p>Order No. 216976</p>	<p>For sensor R 300 R 301 R 302</p> <p>Order No. 216976</p>	 <p>Order No. 216989</p>	<p>For sensor R 300 R 301 R 302</p> <p>Order No. 216989</p>

<p><b>RS 232/HART<sup>®</sup> modem incl. software Type R 300-107</b></p> 	<p><b>For sensor R 300 R 301 R 302</b></p> <p><b>Order No. 220930</b></p>	<p><b>Test set for testing pyrometers R30x Type R 300-110</b></p> 	<p><b>For sensor R 300 R 301 R 302</b></p> <p><b>Order No. 241933</b></p>
<p><b>Sensor bracket with air flush Type R 300-111</b></p> 	<p><b>For sensor R 301 R 302</b></p> <p><b>Order No. 242754</b></p>	<p><b>Sensor bracket with air flush (plastics) Type R 300-113</b></p> 	<p><b>For sensor R 301 R 302</b></p> <p><b>Order No. 246173</b></p>
<p><b>Sensor bracket with air flush (without cable protection) Type R 300-114</b></p> 	<p><b>For sensor R 300 R 301 R 302</b></p> <p><b>Order No. 247210</b></p>	<p><b>Sensor bracket with air flush (without cable protection) Type R 300-115</b></p> 	<p><b>For sensor R 300 R 301 R 302</b></p> <p><b>Order No. 247802</b></p>
<p><b>Pyrometer slewing device Type R 300-116</b></p> 	<p><b>For sensor R 302</b></p> <p><b>Order No. 277319</b></p>	<p><b>Connecting kit for pyrometer slewing de- vice Type R 300-117</b></p> 	<p><b>For sensor R 300-116</b></p> <p><b>Order No. 277409</b></p>
<p><b>Cooling water connecting kit for pyrome- ter Type R 300-132</b></p> 	<p><b>For sensor R 300-116</b></p> <p><b>Order No. 286185</b></p>	<p><b>Pyrometer Protection tube (stainless steel) Type R 300-118</b></p> 	<p><b>For sensor R 302</b></p> <p><b>Order No. 277420</b></p>

<p><b>Cooling jacket for pyrometer Type R 300-120</b></p> 	<p><b>For sensor R 301</b></p> <p><b>Order No. 279028</b></p>	<p><b>Cooling jacket for pyrometer Type R 300-121</b></p> 	<p><b>For sensor R 302</b></p> <p><b>Order No. 279027</b></p>
<p><b>Protective cap for pyrometer Type R 300-122</b></p> 	<p><b>For sensor R 300 R 301 R 302</b></p> <p><b>Order No. 279030</b></p>	<p><b>Sensor bracket with air nozzle (aluminium) Type R 300-123</b></p> 	<p><b>For sensor R 301</b></p> <p><b>Order No. 279031</b></p>
<p><b>USB/HART-modem incl. software Type R 300-125</b></p> 	<p><b>For sensor R 300 R 301 R 302</b></p> <p><b>Order No. 281175</b></p>	<p><b>USB/Profibus-modem incl. software Type R 300-126</b></p> 	<p><b>For sensor R 300 R 301 R 302</b></p> <p><b>Order No. 281176</b></p>
<p><b>Cleaning kit for pyrometer Type R 300-128</b></p> 	<p><b>For sensor R 300 R 301 R 302</b></p> <p><b>Order No. 282302</b></p>	<p><b>IR silicon slice with seal Type R 300-129 e.g. together with R 300-111, R 300-113</b></p> <p>silicon wafer      Flat gasket</p> 	<p><b>For sensor R 301 R 302</b></p> <p><b>Order No. 285141</b></p>
<p><b>Pyrometer protection tube D = 50 mm, L= 800 mm Type R 300-130</b></p> 	<p><b>For sensor R 302</b></p> <p><b>Order No. 285875</b></p>	<p><b>Pyrometer protection tube D = 50 mm, L= 300 mm Type R 300-131</b></p> 	<p><b>For sensor R 302</b></p> <p><b>Order No. 285876</b></p>

<p><b>IR silicon slice 8 - 14 <math>\mu</math>m Type R 300-133</b></p> 	<p><b>For sensor</b> R 301 R 302</p>	<p><b>Connection coupling 4-pole (axial)</b></p> 	<p><b>For sensor</b> R 300 R 301 R 302</p>
<p><b>Connection coupling 4-pole</b></p> 	<p><b>For sensor</b> R 300 R 301 R 302</p>	<p><b>Power supply 230 V, output 24 V DC in rail-mounting housing Type 5906-3</b></p> 	<p><b>For sensor</b> R 300 R 301 R 302</p>
<p><b>Power supply 230 V, output 24 V DC in surface housing Type 5906-4</b></p> 	<p><b>For sensor</b> R 300 R 301 R 302</p>	<p><b>Extension cable, 4 pole connector and 4 pole clip, Type WN 293-5</b></p> 	<p><b>For sensor</b> R 300 R 301 R 302</p>
<p><b>Connection cable, open ends Type WN 293-6</b></p> 	<p><b>For sensor</b> R 300 R 301 R 302</p>	<p><b>Connection cable Ex, open ends Type WN 293-8</b></p> 	<p><b>For sensor</b> R 300 R 301 R 302</p>
<p><b>Connection cable R3x, corrugated hose 3m, open ends Type WN 293-9</b></p> 	<p><b>For sensor</b> R 300 R 301 R 302</p>	<p><b>Connection cable, connection coupling 90° Type WN 293-10</b></p> 	<p><b>For sensor</b> R 300 R 301 R 302</p>
	<p><b>Order No.</b> 286282</p>		<p><b>Order No.</b> U233085</p>
	<p><b>Order No.</b> U266182</p>		<p><b>Order No.</b> U8901159063</p>
	<p><b>Order No.</b> U8901159064</p>	<p>5 m 8 m</p>	<p><b>Order No.</b> 314166 U01110822935</p>
	<p><b>Order No.</b> U01110322936 U01110622936 U01191022936 246691 290525 246596 246597 246598 246600 246601</p>	<p>3 m 6 m 10 m 15 m 20 m 30 m 40 m 50 m 60 m 70 m</p>	<p><b>Order No.</b> 245550 245551 245552 245546 280130 288916 288933 286613</p>
	<p><b>Order No.</b> 286186 286188 286189 286190 286191 286192 286193 286194</p>	<p>35 m</p>	<p><b>Order No.</b> 294041</p>

**Connection cable Ex, connection coupling 90° Type WN 293-11**



**For sensor**  
R 300  
R 301  
R 302

**Order No.**  
302936  
290261

**For sensor**

**Order No.**

## Order code

Model		Type	Spectral range	Measuring range
neutral	0	R 300	8...14µm	Default 00
Standard	1			0...200 °C 02
Ex zone 1/2/21/22	3			0...250 °C 03
				0...400 °C 04
				Setpoint 99
		R 301	8...14µm	Default 00
		R 302		-50...200 °C 52
				0...200 °C 02
				0...250 °C 03
				0...400 °C 04
				0...600 °C 06
				0...1000 °C 10
				Setpoint 99
			2...2,7µm	500...2000 °C 15
				Setpoint 99
			3,9µm	200...1000 °C 13
				Setpoint 99
			4,9...5,5µm	250...1400 °C 14
				Setpoint 99

743	30		100	
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## Meaning of the order code

Select the required configuration from each column and enter the corresponding code digits in the order number fields.

<b>Model</b>	Neutral:	Neutral rating plate
	Standard:	BARTEC rating plate
<b>Type</b>	R 300	INFRAsmart IR sensor in two-wire technique with cone 1.7 : 1, for ambient temperatures up to 70 °C The 7.9 µm spectral range is only available for the R 300 type.
	R 301	INFRAsmart IR sensor in two-wire technique with lens 20 : 1, for ambient temperatures up to 70 °C
	R 302	INFRAsmart IR sensor in two-wire technique with lens 33 : 1, for ambient temperatures up to 70 °C
<b>Spectral range</b>	8...14 µm	Possible measuring range: -50...200 °C 0...200 °C, 0...400 °C, 0...600 °C, 0...1000 °C
	2...2.7 µm	For steel; possible measuring range: 500...2000 °C
	3.9 µm	Medium temperature, glass, objects behind gases; possible measuring range: 200...1000 °C
	4.9...5.5 µm	For glass; possible measuring range: 250...1400 °C
	7.9 µm	For plastic; possible measuring range: 25...350 °C
<b>Measuring range</b>	Default:	Maximum measuring range, not programmable
	Setpoint:	Programmable according to customer requirement