# Technical Datasheet

Non-contact temperature measurement for the steel industry

Metis MW09, MW16, MW18

Ruggedized stainless steel constructed, non-contact infrared thermometer for temperature measurement of slabs, billets, blooms and steel strip. The Metis MW series pyrometer was designed specifically for use in the spray chamber of continuous casters and measurement of strip from beneath in hot-rolling mills.

Control of cooling efficiency in the spray chamber affects not only the metallurgical properties of the steel but also helps to avoid break outs.

Measurement of strip temperature from beneath insures that the temperature measurement is not influenced by loose scale, water puddles or steam.

Pyrometer Sensing Head
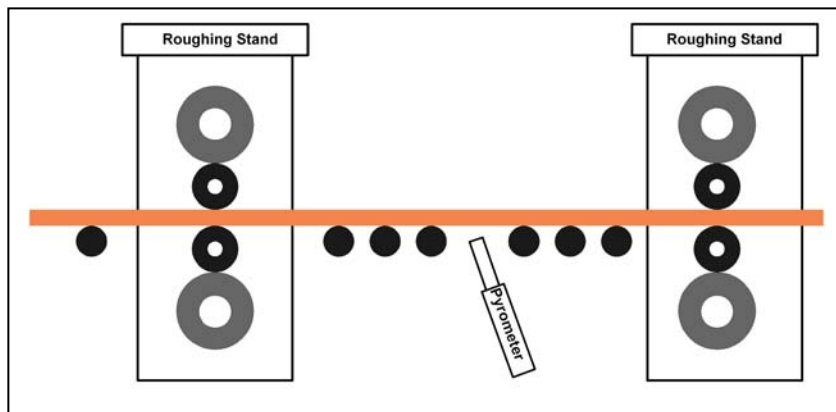
The robust sensing head employs a DC operated detector with direct digitalization of the temperature signal. This extremely insensitive to interference signal is transferred through a hermetically sealed flexible braided steel hose to the main electronic processor, which can be installed remotely in a less severe environment. The hose can be 30 m long and provides a conduit for air purging and cooling of the sensing head also.

The long small diameter steel sight tube is extremely effective in operating reliably in high ambient temperature / water spray environments. The sensor head is designed to view between the caster and mill rolls for acquiring the steel temperature.

Note: The Metis MW series offers a major advantage over conventional infrared fiber optic sensors which due to demanding steel industry conditions, have high failure rates associated with their fiber optic cables.

The standard sight tube length is either 225 mm or 630 mm. Based on these available lengths, the focus distance of the lens is either 315 mm or 720 mm respectively.

Chart 1: Temperature- & Spectral ranges including spot size diameter at 2 different fixed focus distances

MW09 / 0.7…1.1 µm			MW16 / 1.45…1.8 µm			MW18 / 1.65…2.1 µm		
Temperature range	Spot size diameter @		Temperature range	Spot size diameter @		Temperature range	Spot size diameter @	
	315 mm	**720 mm**		**315 mm**	**720 mm**		**315 mm**	**720 mm**
550...1400°C	0.8 mm	1.6 mm	**250...1000°C**	1.6 mm	3.3 mm	**120...550°C**	1.6 mm	3.3 mm
600...1600°C	0.8 mm	1.6 mm	**300...1300°C**	0.8 mm	1.6 mm	**160...800°C**	0.8 mm	1.6 mm
650...1800°C	0.8 mm	1.6 mm	**350...1800°C**	0.8 mm	1.6 mm	**180...900°C**	0.8 mm	1.6 mm

Accurate temperatures because smallest spot sizes and fastest response times:

The combination of a very small spot size diameter with extremely fast response time of less than 1 ms, insures accurate temperature measurement readings. With help from the integral peak picker setting, it is possible to detect even the smallest cracks within the scale of slabs which represent the "real" temperature to be measured.

Analog & digital temperature output signals for indication, recording, archiving and controlling:

- Isolated analog output signal is selectable from 0 – 20 mA or 4 to 20 mA. The 0 – 20 mA output signal can easily be converted to 0 – 10 V DC in the field, with use of a 500 Ω resistor.
- Zero- and full-scale temperatures are adjustable (i.e. sub-range) to cover any portion of the instrument's available temperature span (see Chart 1); also provides for better resolution of 0/4-20mA signal.
- Selectable RS232 / RS485 digital communication
- Optional Profibus DP

Signal Filtering: For measuring and holding of the highest instantaneous temperature value a **peak picker** (maximum value storage) is installed to compensate interruptions or attenuations in radiation caused by bursts of steam, smoke or dust. It can be either reset automatically or manually by an external contact closure or periodically by user preset clear time. In this last case the highest temperature will be held in a dual storage and will be reset in only one of the two storages after preset clear time to avoid a decrease of the temperature output, should a short cold period appear just at the reset moment.

The **response time** is the length of time it takes for the output signal to reach 90% of a step change in measured temperature. It can be used to filter out rapid variations in temperature and achieve a "more stable" signal for control or display purposes.

Software: The *SensorWin* **Software** is available for automatic or manual set up of the pyrometer, for recording and for saving of graphical or table files. At the same time these files can be used for quality assurance purposes because the parameter settings are recorded, too. Recording can be triggered externally.

Minimum computer requirements are: 1GHz clock frequency and current Windows operating systems.

Additional Specifications

Signal processing:	Immediately digitalized photocurrent
Measurement uncertainty: ($\varepsilon = 1$, $t_{90} = 1s$, $T_A = 23°C$)	MW09/MW16: up to 1500°C : 0,3% of measured value in °C + 1 K, MW18: 0,4% of measured value in °C + 1 K or 2°C, whichever is greater
Repeatability ($\varepsilon = 1$, $t_{90} = 1s$, $T_A = 23°C$)	MW09 / MW16: 0,1 % of measured value in °C + 1 K, MW18: 0,2% of measured value in °C + 1 K or 1,6°C, whichever is greater
Response time t_{90}:	1 ms, adjustable up to 10s
Emissivity adjustment range:	0,05 ... 1,00
Analog Output Signal:	0 or 4 – 20 mA selectable, 500 Ω max. load
Power Supply:	24 V AC/DC (12 – 30 V AC/DC), AC: 48 – 62 Hz, max. 2,5 VA
Digital Interface:	selectable RS 232 or RS 485, addressable, half duplex, max. 57,6 kBd (standard supply), Profibus (optional)
Temperature Resolution:	analog < 0.1% of adjusted temperature range, digital 0.1°C
Isolation:	power supply, analog and digital output are galvanically isolated against each other
Housing and Rating:	extruded aluminum profile, IP 65 per DIN 40 050 with rear plate and cable connector installed
Ambient Temperature Range:	Operation 0 – 70°C, /All parts including cable and electronic. Storage: -20 – 70°C,
Weight:	4,5 kg with 5 m long flexible steel hose
CE Label:	according to EU directives for electromagnetic immunity

Dimensions:
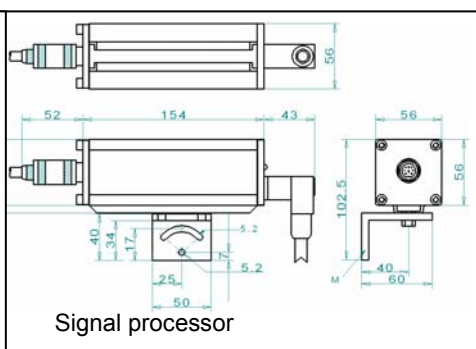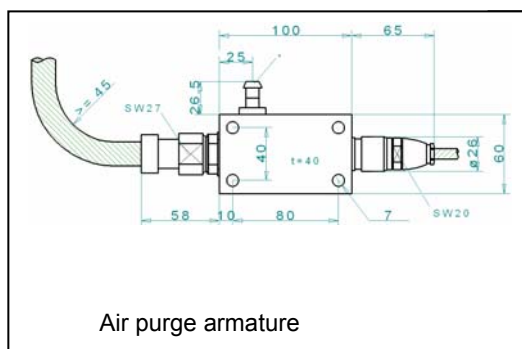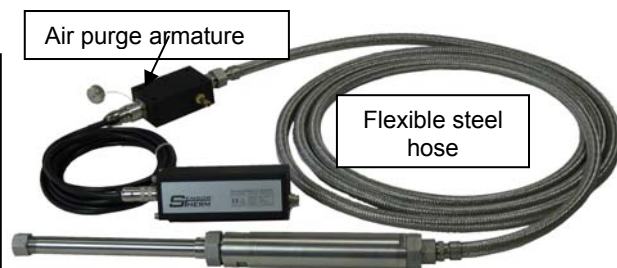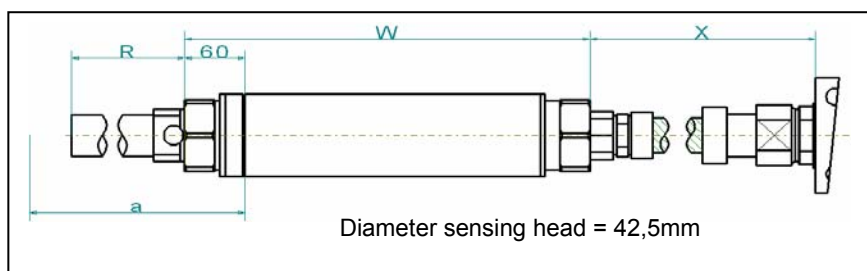
Diameter sensing head = 42,5mm

Air purge armature

Flexible steel hose

Air purge armature

Signal processor

X: Length of flexible stainless steel tube between sensing head and air purge armature per customer's requirement up to 25 m max.
W: Length of infrared sensing head = 249mm
R: Length sight tube
a: Measurement distance between lens and focused distance 315mm or 720 mm