MODULOC SENSOR ENTERPRISES

MSE

MSE-FMD95 REMOTE FIBER HOT METAL DETECTOR

- **Fully Digital "All-in-One" Design**
- **LED Bar Display of % IR Input Signal**
- **Programmable 270°C to 1000°C Trip Level**
- **Operates from 24 VDC supply.**
- **Optional operation from 80-240 VAC or 24 VDC Supply**
- **Interchangeable Remote Lenses:**
  Spot Lenses: 1° or 7° FOV
  Rectangular Lenses: ½° x 5°, ½° x 15°, or ½° x 25° FOV
- **High Temp lens ratings of 160°C, 300°C, 500°C or 1000°C.**
- **Programmable response time from 1 to 250 ms**
- **Control Relay Output.**
- **Optional Fast Reed Relay Output, with 2 ms response**
- **Both NPN and PNP Transistor Outputs**
- **Remote Self-Check facility**
- **Robust lens mounts are available including air purged and air cooled.**

General Description

The MSE-FMD95 is a fully digital "All-in-One" Hot Metal Detector uniquely incorporating a bar display showing the %IR input signal relative to the pre-set trip level as well as selected programmable thresholds and response times via simple external programming switch action. Operating via highly sensitive and stable InGaAs Photodiode, detection is assured via the heaviest water and steam.

The MSE-FMD95 utilizes a modular digital signal process controller unit supplied in a protective mounting channel, flexible armored stainless steel sheathed fiber optic leads, and interchangeable remote lenses. As the controller unit can be used in conjunction with any lens option one standard controller can be used throughout the mill. Now there is no need to stock a detector for each requirement. Costly multiple inventory can be replaced with one controller.

A wide variety of remote lenses impervious to water & steam are built to withstand the harshest environments are available. Used in conjunction with flexible armored stainless steel sheathed fiber optic leads, these lenses provide a high level of optical accuracy by allowing the selection of the ideal lens arrangement for the installation. Robust lenses with temperature ratings of 180°C, 300°C, 500°C and 1000°C can be mounted close to the hot product. The robust lenses are available with cooling and purging including air purged, air purged with air cooling and air purged with water cooling.

The remote lenses incorporate filters to minimize sensitivity to extraneous light. For general tracking, spot lenses are commonly used. Where high accuracy is required or the product deviates about the center line (i.e. Rod Mill) a ½° x 5°, ½° x 15° or ½° x 25° precision slit rectangular lens should be utilized. This lens is also highly suited to Strip Mills. Also available is a 1000°C Shrouded Quartz Rod Lens, specifically engineered for mounting in the harsh and high ambient environment below the line or inside the mill stand.

Additional Information

To accommodate variations in bar temperature and background IR, various precise thresholds are programmable via covered switches from 270°C to 1000°C to ensure reliable switching with reference to both the displayed background and product IR signal.

Furthermore, the response time is programmable from 1 ms to 250ms to accommodate black spots on the hot material.

The MSE-HMD85 incorporates a remote self-check facility remotely energized by closed contacts that illuminate an internal IR LED to switch the Detector and verify its' outputs operate correctly.

The MSE-FMD95 operates from 24 VDC or with Optional Input from either a 80-240 VAC or 24 VDC power input. Standard outputs include a cradle relay, and both an NPN and PNP transistor outputs. An Optional fast a reed relay is also available.

LED Bar Display (Shown above)

The LED Bar Display allows the user to clearly establish the amount of received IR both from the background metalwork and the bar being detected and thereby establishing the correct trip level required. This display also allows the user to align the Detector from a low energy source such as an IR Bar or a flashlight, which normally would be insufficient to switch the detector. Adjustment of both the threshold and the response time is also clearly defined by this bar display.

Housing Specifications

Housing: Aluminum AL6, Oven baked blue paint
Housing Rating: IEC IP66, DIN 89011
Weight w/o Cable: 1.7 Kg
Connector: IP65 Plug/Socket
Cable Length: 2 m (standard) - Optional: 5m, 10m & 15M

Remote Lenses

Precision Rectangular Slit: FOV: ½° x 5°, ½° x 15° & ½° x 25°; rated 160°C .
Stainless Tubular Spot: FOV: 1°, or 7°; rated 400°C .
High Temperature Quartz Rod: FOV: 1°; rated 1000°C.

Fiber Optic Cables

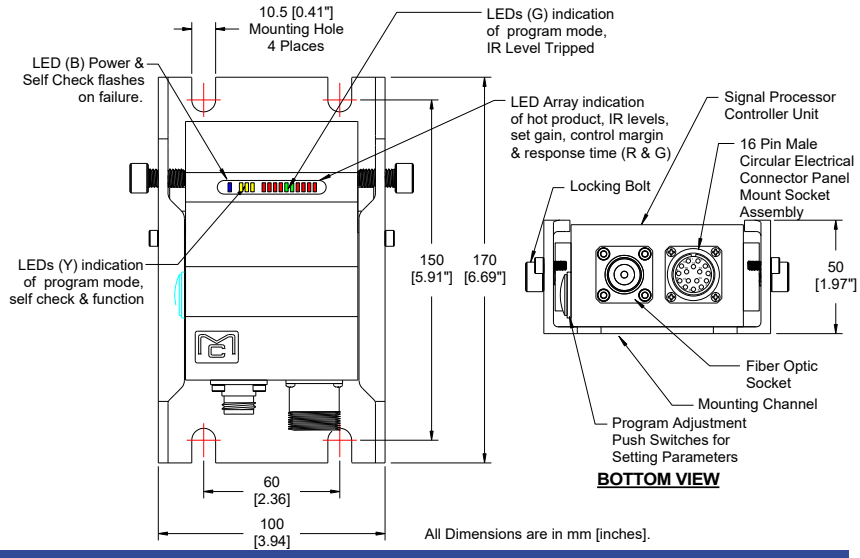
Flexible Armored Stainless Sheathed available in lengths of 5, 6, 7, 8, 9, and 10m; rated 300°C. Options are available.

Part Number Specifications

Example: MSE-FMD95-98-RR
80-240 VAC/24VDC Supply Voltage, with Optional Reed Relay Output & Standard Outputs of a Cradle Relay and NPN/PNP Transistors.

Supply Voltage:	**-94**	24 VDC
	-98[6]	Optional 80-240 VAC & 24 VDC
Outputs: (Standard Outputs[7] are always supplied)	**-RR**[6]	Optional Fast Reed Relay Output & with Standard Outputs[7]
	No Suffix	With Standard Outputs[7]

Dimensions



All Dimensions are in mm [inches].

General Specifications

Sensing Element	InGaAs Photodiode	Supply Voltage	Standard:24 VDC ± 10% Optional[6]: 80-240VAC 50/60 Hz and 24 VDC[1] ± 15%[1]
Power Indication	Blue LED, flashes with Self-Check Fault	Power Consumption	5 VA
Function Indication	Yellow LED's in Bar Display	Operating Temperature	-20°C (-4°F) to +55°C (131°F)
% I.R. Signal	Red/Green/Red Bar Display	Storage Temperature	-25°C to +75°C (-13°F to 167°F)
Remote Self-Check	Single wire to +24 VDC (Pin 2), Middle Yellow LED	Output (#1)[7]	Cradle Relay Output (SPNO) 250 VAC, 7A, 20 ms response.
Min/Max I.R. Threshold settings	Down to 270°C (518°F) and up to 1000°C (1832°F) via programming switch	Optional Output (#2)[6]	Optional[6]: Fast Reed Relay Output, SPNO, 240VAC, 0.5A 2 ms response time.
Response Time	1 to 250 ms, via Program Adjustment Push Switch	Output (#3) and (#4)[7]	PNP and NPN Outputs, N.O., 0.5A, 24 V, 2A peak, Reverse/Thermal protected

For dimensional information, specifications, and options on remote lenses, and on fiber optic cables please see additional Data Sheets.

Indicative Preset Thresholds

Steel Temp.	Nominal 350°C Preset Trip	Nominal 450°C Preset Trip
400°C	10%	Not Detectable
450°C	5%	100%
500°C	1%	60%
600°C	1/2%	20%
800°C	Less than 1/2%	Less than 5%

Smallest Detectable Product when utilizing a 0.5° x 25° Lens
The above table identifies the minimum % of vertical field of view required with hot steel at stated temperature for it to be repetitively detected.

Terminal Connections - Wire Colors - Function

Pin	Color	Function
1	Pink	Self-check single wire to 24VDC (Pin 2)
2	Red	+ 24VDC[1] Supply (And used for NPN Transistor Output)
3	Black	80-240VAC[1] Supply Hot (L1) (Option)[6]
4	White	80-240VAC[1] Supply Neutral (L2) (Option)[6]
5	Violet	PNP Transistor Output, 24VDC, 0.5A, Output (#3)
6	Blue	0VDC (For 24VDC Supply & used for PNP Transistor Output)
7	Green	Ground
8	Brown	Relay Output, SPNO 250 VAC/7A, 20 ms response time, Output (#1)
9	Grey/Pink [2]	Relay Output, SPNO, 250 VAC/7A, 20 ms response time, Output (#1)
10	Red/Blue [3]	NPN Transistor Output, 24VDC, 0.5A, Output (#4)
11	Yellow [4]	Reed Relay, SPNO, 250 VAC/0.5A, 2 ms response time[4], Optional Output (#2)[6]
12	Grey[4]	Reed Relay, SPNO, 250 VAC/0.5A, 2 ms response time[4], Optional Output (#2)[6]

Notes:
1) = Connect to either VAC or VDC Input Power but not to both.
2) = Wire color could also be Orange instead of Grey/Pink.
3) = Wire color could also be Light Blue instead of Red/Blue.
4) = Used only when Reed Relay option is chosen.
5) = Vortex Air cooling is also an option.
6) = Optional Items must be specified at time of order placement.
7) = Standard Outputs include Cradle Relay, PNP & NPN Transistors.

This MSE sensor is manufactured by Moduloc System Engineering Ltd. Yantai Shandong, China P.R. which was established 2007. The MSE-FMD95 is a direct replacement for the Model No. MD95100 previously manufactured by Moduloc Control Systems Ltd of the United Kingdom. This sensor can be also used as a direct replacement for the Model MD9100. Please contact MSE for additional questions on other replacement model numbers .

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