

### Magnetic Field Probe System



#### Features

- Precision magnetic field measurements using choice of interchangeable probes
- Integrated digitization, fiber-optic data communications to host computer.
- MFP-2.5 probe option with
  - coincident Hall element and pickup loop integrated in probe
  - B field direct measurement range +/- 0.25 T with automatic temperature compensation and dynamic drift compensation
  - dB/dt direct measurement range +/- 200 Ts<sup>-1</sup>.
- MFP-25 probe option with:
  - B field direct measurement range +/- 2.5 T with temperature compensation
  - very low drift and noise

<b>Applications</b>	<ul style="list-style-type: none"><li>• Field measurement in DC and AC electromagnets.</li><li>• Feedback element for closed loop field control, for scanning and ramped magnet systems.</li></ul>
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**Specifications - H10 with MFP-2.5 probe**

Hall probe	Sensitive area	0.508 mm square (0.258 mm <sup>2</sup> )
	Field polarity	Field vector entering the marker on the top surface of the probe gives a negative reading (with +ve gain set)
	Full scale	+/-0.25 T (2500 Gauss) on x1 gain +/-0.025 T (250 Gauss) on x10 gain
	External accuracy	< 0.8% of full scale of selected range at 25 C.
	Linearity	0.1% maximum deviation over 0 to 80% of full scale
	Temperature coeffi-	< 100 ppm C-1
	Temperature coeffi-	< 0.2 Gauss C-1
	Noise	< 5e-5 T (0.5 Gauss) RMS on x1 gain < 5e-6 T (0.05 Gauss) RMS on x10 gain
	Step response	Better than 250 usec to within 0.1% of full scale deviation from target setting for any instantaneous field step. Observed step depends on selected downsampling.
	Resolution	Smallest increment of field 0.08 Gauss (0.25 Tesla range), 0.008 Gauss (0.025 Tesla range) before averaging.
Linearity	0.05 % maximum deviation relative to full scale of any point from linear fit to all points over full span.	

Pickup loop	Sensitive area	150 mm <sup>2</sup> approx on each of 5 turns
	Full scale	200 Ts <sup>-1</sup> (2000 kGauss s <sup>-1</sup> ) on x1 gain 20 Ts <sup>-1</sup> (200 kGauss s <sup>-1</sup> ) on x10 gain
	External accuracy	0.2% maximum deviation over full scale
	Linearity	0.1% maximum deviation over full scale
	Gain stability	< 0.2% maximum deviation over operating temperature range
	Noise	< 1e-5 Ts-1 (0.5 Gauss) RMS
	Bandwidth	DC to 50 kHz (-3dB)

Materials	Glass reinforced polycarbonate, polycarbonate, epoxy potting (probe)
Weight	0.09 kg (0.20 lb) (probe)



**Specifications - H10 with MFP-25 probe**

Hall probe	Sensitive area	1 mm square (1 mm <sup>2</sup> )
	Field polarity	Field vector entering the marker on the top surface of the probe gives a positive reading (with +ve gain set)
	Full scale	+/- 2.5 T (25000 Gauss)
	External accuracy	Better than 0.01% of full scale at 25 C
	Temperature coefficient of gain	< 200 ppm C-1 (temperature compensation disabled)
	Temperature coefficient of offset	< 0.05 Gauss C-1 (temperature compensation disabled) < 0.01 Gauss C-1 (temperature compensation enabled)
	Noise	< 0.005 % rms relative to full scale with lowest downsampling setting.
	Step response	Better than 100 usec to within 0.1% of full scale deviation from target setting for any instantaneous field step. Observed step depends on selected downsampling.
Linearity	0.05 % maximum deviation relative to full scale of any point from linear fit to all points over full span.	

Materials	Glass reinforced polycarbonate, polycarbonate, epoxy potting (probe)
Weight	0.09 kg (0.20 lb) (probe)



**Specifications - H10 control unit**

Digitization	16 bits successive approximation over full span 50 kSa/s, with adjustable digital averaging
Downsampling	Averaging from 4 to 50,000 conversions per reading
Calibration	Gain and offset values for each analog signal and each range stored in EEPROM. Temperature coefficients for MFP=25 probe stored in EEPROM and linked to probe serial number.
Controls	16 position rotary switch for address selection
Displays	Status LEDs green (power, processor status, comms status)
Power input	+24V (+/- 2V) DC, 250mA maximum. Probes are powered from the H10 control unit.
Case Material	Stainless steel sheet (H10 control unit)
Weight	0.24 kg (0.55 lb) (H10 control unit)
Operating environment	15 to 35C, < 80% humidity, non-condensing, vibration < 0.2g all axes, 1 to 100Hz Maximum magnetic field at H10 control unit +/-2 T
Storage environment	0 to 50C, < 80% humidity, non-condensing, vibration < 2g all axes, 1 to 100Hz

**Interfacing and control**

Interfaces	Fiber-optic loop, 10 Mbit/sec serial, 9 bit asynchronous binary.
Data rate	Typical read/write rate $\geq 1$ kHz, depending upon loop configuration. Rate to A500 host memory (special applications) $\geq 10$ kHz.
	Fibre-optic loop to host system interfacing available using loop controllers: A200 (USB), A360 (Ethernet), A500 / A560 (Real-time controllers)
Host computer	Diagnostic host program provided for PC. Embedded software DLLs available for Microsoft® .NET, Labview and C++.



**Connectors**

Fiber optics	Two 1mm Avago ST bayonet. To suit 1 mm plastic fiber or 200 um HCS glass fiber.																																								
Power in	2.1mm threaded jack. Mates with Switchcraft S761K or equivalent.																																								
Probe connection (on H10 and probe)	10 way Lemo EXG.1B.310 socket MFP-2.5 probe <table border="1"><tr><td>1</td><td>Shield</td><td>6</td><td>Pickup loop signal</td></tr><tr><td>2</td><td>Analog ground</td><td>7</td><td>Analog ground</td></tr><tr><td>3</td><td>Hall probe signal</td><td>8</td><td>Analog ground</td></tr><tr><td>4</td><td>Hall probe gain select</td><td>9</td><td>+15 VDC</td></tr><tr><td>5</td><td>Pickup loop gain select</td><td>10</td><td>- 15 VDC</td></tr></table> MFP-25 probe <table border="1"><tr><td>1</td><td>Shield</td><td>6</td><td>Temperature / voltage signal</td></tr><tr><td>2</td><td>Analog ground</td><td>7</td><td>Analog ground</td></tr><tr><td>3</td><td>Hall probe signal</td><td>8</td><td>Analog ground</td></tr><tr><td>4</td><td>Hall probe gain select</td><td>9</td><td>+15 VDC</td></tr><tr><td>5</td><td>MUX control</td><td>10</td><td>- 15 VDC</td></tr></table>	1	Shield	6	Pickup loop signal	2	Analog ground	7	Analog ground	3	Hall probe signal	8	Analog ground	4	Hall probe gain select	9	+15 VDC	5	Pickup loop gain select	10	- 15 VDC	1	Shield	6	Temperature / voltage signal	2	Analog ground	7	Analog ground	3	Hall probe signal	8	Analog ground	4	Hall probe gain select	9	+15 VDC	5	MUX control	10	- 15 VDC
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**Cable**

Type	Supplied cable multiway screened terminated in Lemo connector at each end.
Length options	9' (2.67 m) and 22' (6.27 m) standard. Other lengths available on request to special order.



**Ordering information**

H10-SYS9	H10 system comprising H10 control unit, MFP-2.5 magnetic field probe and 9' (2.7 m) cable.
H10-SYS22	H10 system comprising H10 control unit, MFP-2.5 magnetic field probe and 22' (6.7 m) cable.
H10-SYS9-2T	H10 system comprising H10 control unit, MFP-25 magnetic field probe and 9' (2.7 m) cable.
H10-SYS22-2T	H10 system comprising H10 control unit, MFP-25 magnetic field probe and 22' (6.7 m) cable.
MFP-2.5	Integrated Hall probe and pickup loop probe, DC field range +/- 0.25 T (+/- 2500 Gauss),
MFP-25	Precision Hall probe , DC field range +/- 2.5 T (+/- 25 kGauss),

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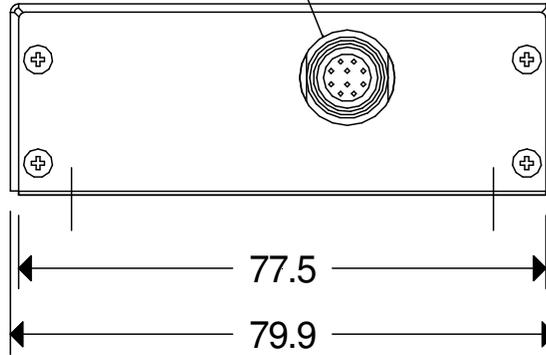
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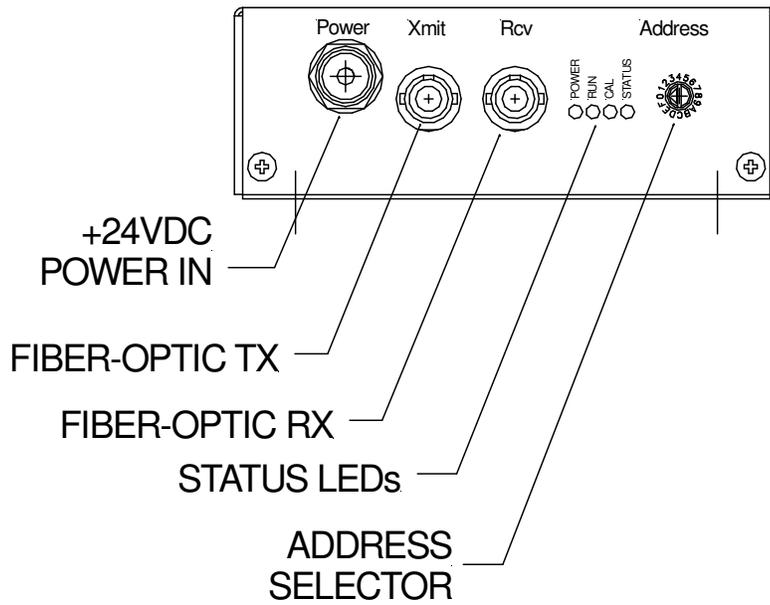


H10 control unit

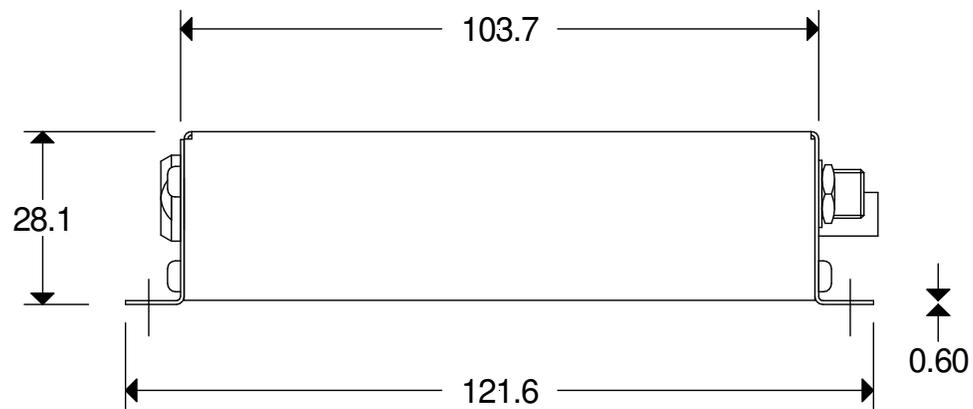
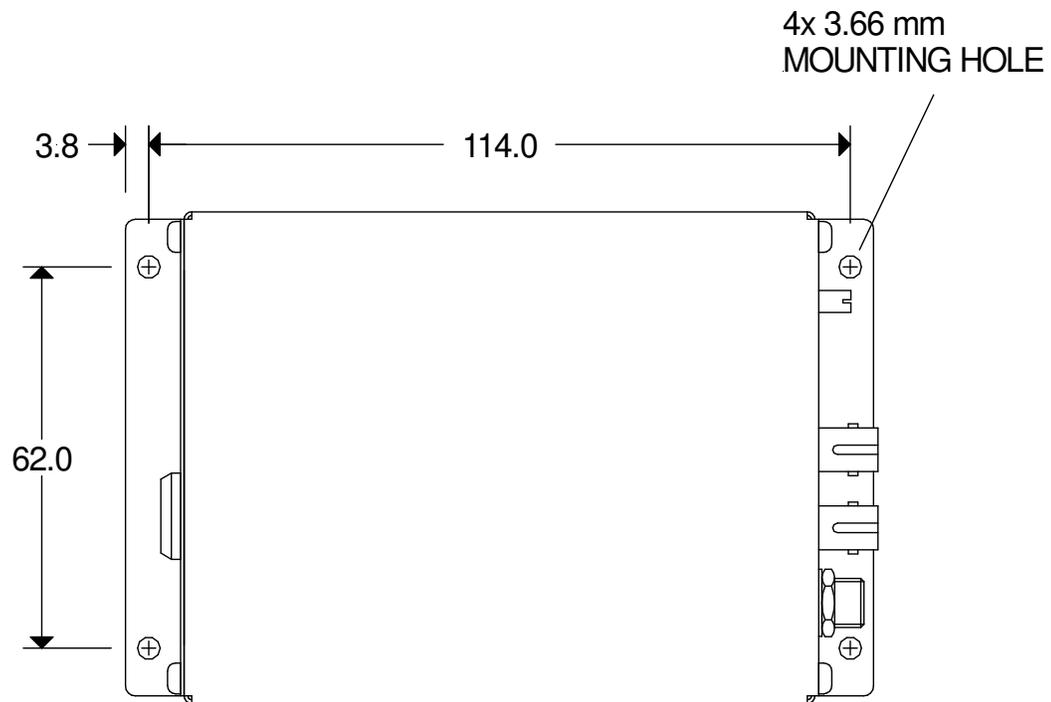
HALL PROBE INPUT



Dims mm



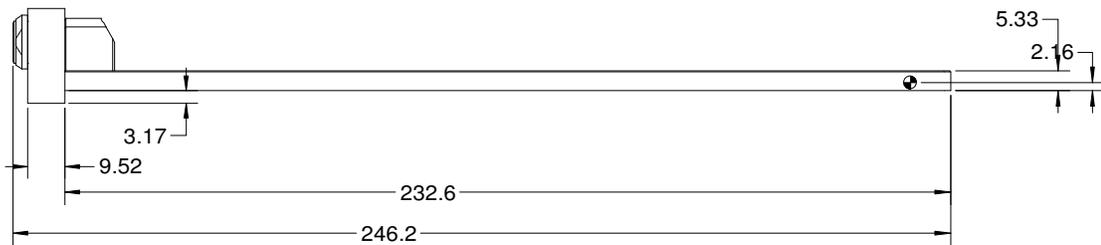
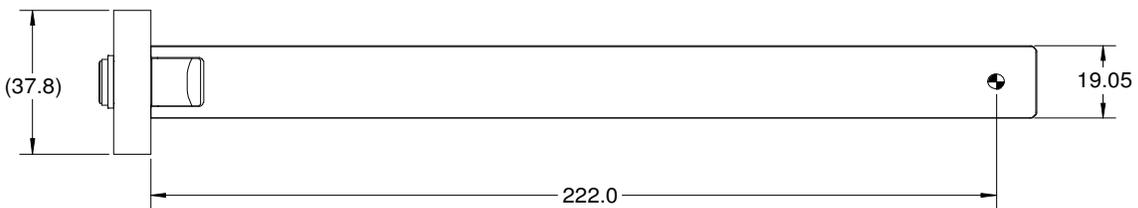
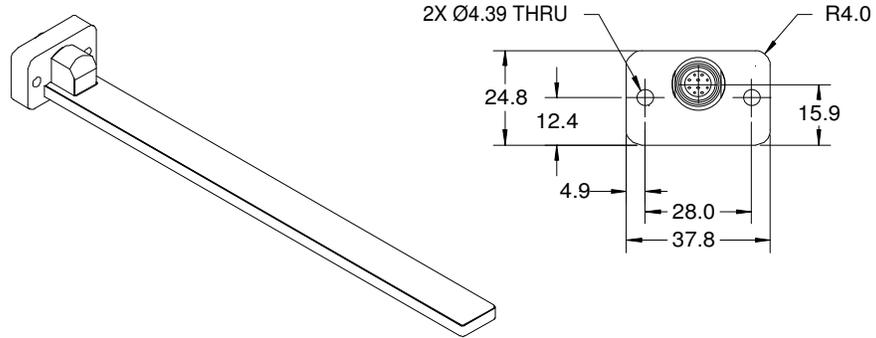
**H10 control unit**



Dims mm



MFP-2.5 and MFP-25 probes



Dims mm

MFP-2.5: Positive (N to S) field vector into marker gives negative reading (for positive gain)  
MFP-25: Positive (N to S) field vector into marker gives positive reading (for positive gain)

