

## Network-ready Precision Hall Probe System



### Features

- Compact control unit with direct Ethernet connectivity
- Very low drift, noise and temperature coefficients from state of the art precision Hall device.
- Matching active HP-1 probe
- DC and AC fields up to +/- 2.8 T (28 kGauss) with standard probe, DC up to 25 kHz
- Probe tips slim yet rigid for stable field measurements
- Choice of probe cable lengths and flex probe options for hard to reach locations
- Factory calibrations traceable to NMR measurements
- Calibrations stored in probes for easy interchangeability
- Fast analog output for real time field monitoring
- Integrated temperature compensation and digitization
- Web browser user interface
- Field control servo option with input field target values delivered via the host computer

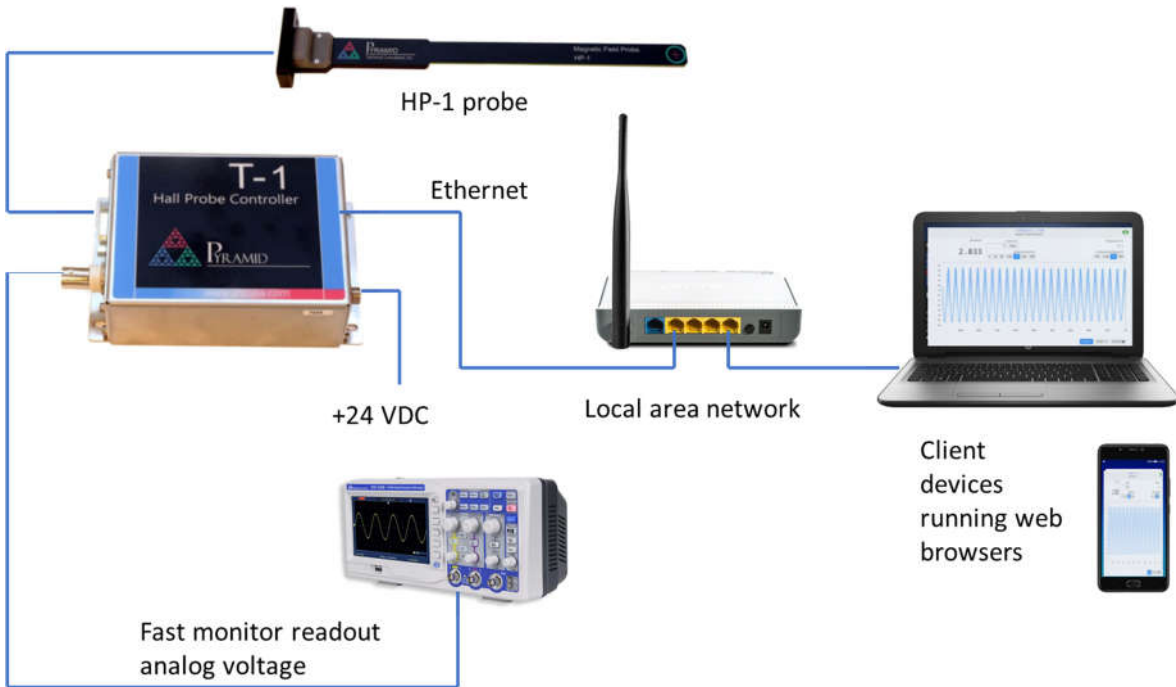
### Applications

- Magnetic field measurements from 0 to 2.8 T
- Field measurement in DC and AC electromagnets
- Field control of electromagnets
- Control and monitoring of X-Y scan magnet systems
- Accelerator beamline magnet setting and monitoring
- Beam energy validation systems

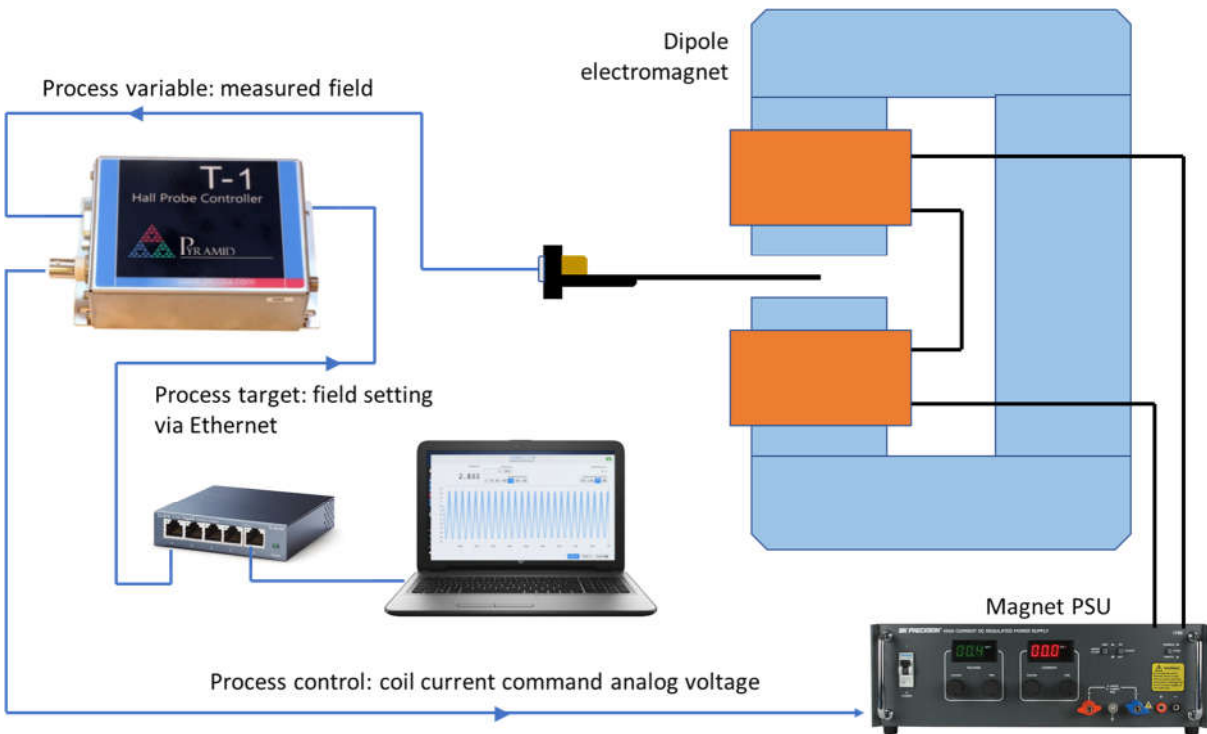


Example configurations

T-1 connected to PC and wireless clients



Field control option



## Web browser interface

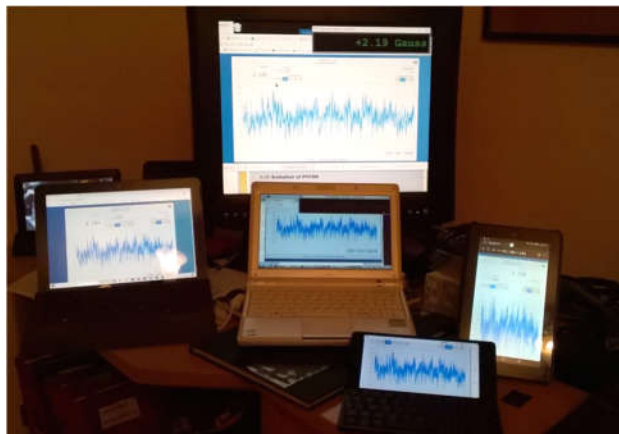
- Compatible with all popular web browsers
- Compatible with PC, tablet and smartphone displays
- Static and DHCP IP address allocation
- Allows data to display on multiple host systems simultaneously
- Simple access to multiple T-1 units in a networked system
- Numeric and graphical display of real time data
- Zero subtraction function
- Control of range, measurement rate and network settings



Example of a single T1 connected to multiple hosts simultaneously.

Windows, Linux and Android operating systems.

PC, tablet, PDA and smartphone devices.



**Specifications - T1 control unit with HP-1 probe***Measurement performance*

Measurement ranges	Range 1: +/- 28 kGauss (+/- 2.8 T) Range 2: +/- 7 kGauss (+/- 0.70 T ) Range 3: +/- 2.8 kGauss (+/- 0.28 T ) Range 4: +/- 0.70 kGauss (+/- 0.07 T )
Measurement rate	25 kHz, 10 kHz, 1 kHz, 100 Hz, 10 Hz, 1 Hz software selectable
Resolution	16 bit ADC with averaging. Range 1: 1.03 Gauss per bit Range 2: 0.26 Gauss per bit Range 3: 0.10 Gauss per bit Range 4: 0.026 Gauss per bit
Noise	Standard deviation of repeat readings at two readout rates at typical measurement field 6.6 kGauss Range 1: 0.55 Gauss at 10 kHz, 0.14 Gauss at 1 kHz, 0.031 Gauss at 10 Hz Range 2: 0.40 Gauss at 10 kHz, 0.079 Gauss at 1 kHz, 0.021 Gauss at 10 Hz.
Calibration	Factory calibration traceable to NMR measurements, stored in HP-1 probe non-volatile memory.
Accuracy	< +/- (0.1% of field + 2.5 Gauss) over 0.0 T to 1.6 T range. Factory calibrated against a reference probe having calibration to < 0.01% error relative to NMR measurement at 1 T.
Linearity	0.05 % maximum deviation relative to full scale of any point from linear fit to at least 10 points over a 10 kGauss span.
Temperature compensation	Temperature sensor in probe tip for gain change compensation.
Residual temperature coefficient of gain	< 100 ppm C-1 within +10C / -5C of the calibration temperature.

*Analog output*

Function	Analog voltage representation of the measured field. Process control value (field servo option)
Resolution	16 bits with low transition noise over +/- 10 V span. Transition noise < 25 mV.
Update rate	Same as measurement rate (field monitor) Servo loop rate (servo process control)



**Specifications (continued)***HP-1 Probe*

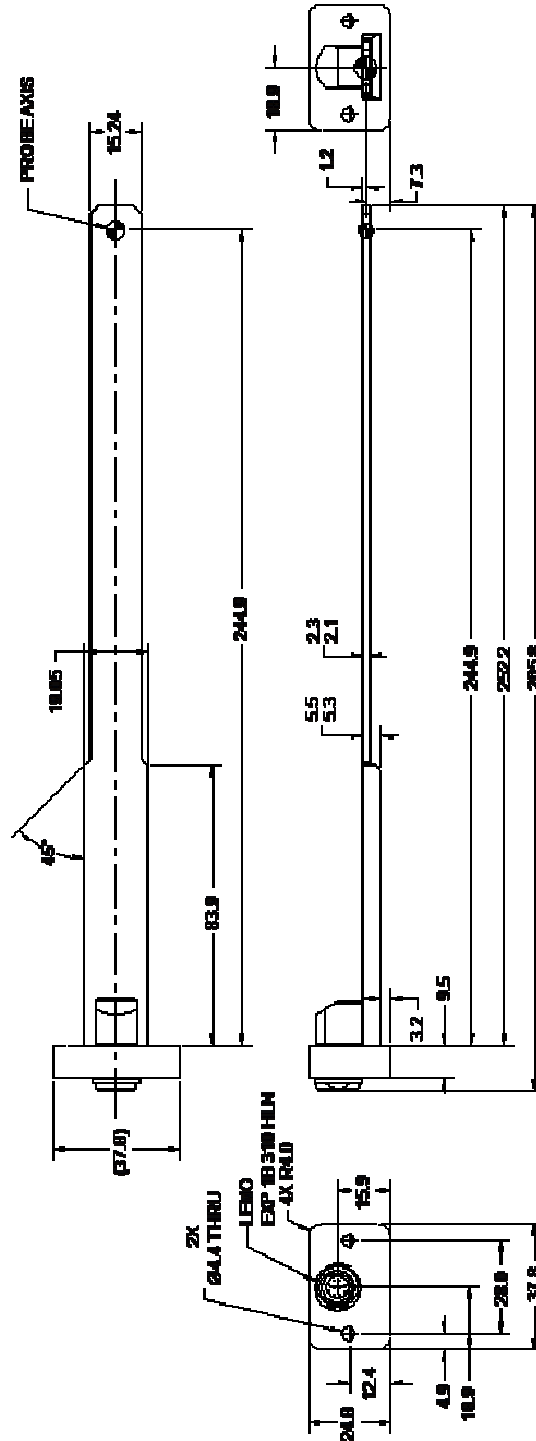
Sensitive area	1 mm square (1 mm <sup>2</sup> )
Hall sensor position	7.3 mm from probe tip, 1.2 mm below probe top surface, position marked on casing.
Field direction	North to south field vector entering the marker on the top surface of the probe gives a positive reading
Temperature sensor	Thermistor, calibrated measurement range 5C to 60C
Probe tip thickness	< 2.3 mm (0.091"). See drawings.
AC field compatibility	Designed for use in AC fields. All probe body materials non-conductive. Hall voltage and current source leads small-pitch twisted pairs.
Radiation resistance	Only passive components are located at the probe tip. Tested with 0.75 mC of 230 MeV protons delivered to a neutron producing target close to the probe, with no measurable change in performance. Corresponds to 1-2 years of typical particle therapy beamline dose.
Operating environment	15 to 35C, < 80% humidity, non-condensing, vibration < 0.1g all axes, 1 to 100Hz. 18 to 25 C recommended for best accuracy.
Connector	9-way micro-D
Materials	Glass reinforced polycarbonate, polycarbonate, epoxy potting
Weight	35 g (1.23 oz)

*T1 control unit*

Power input	+24V (+/- 2V) DC, 160 mA typical. 1.1 A TCR fuse. PSU24-25-1 universal power supply included, IEC C8 line inlet.
Connectors	Probe connection: 9-way DSub female Analog voltage output: BNC Data connection: RJ-45 Power inlet: Switchcraft L722RA threaded jack (mates with S761K).
Materials	Stainless steel case
Weight	335 g (0.74 lb)
Operating environment	15 to 35C, < 80% humidity, non-condensing, vibration < 0.1g all axes, 1 to 100Hz



HP-1 probe

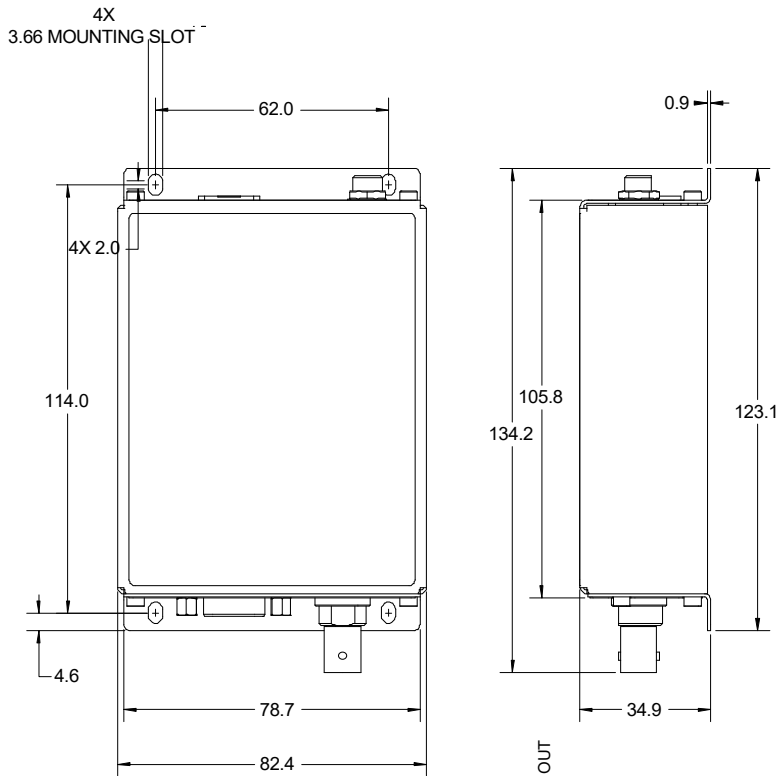
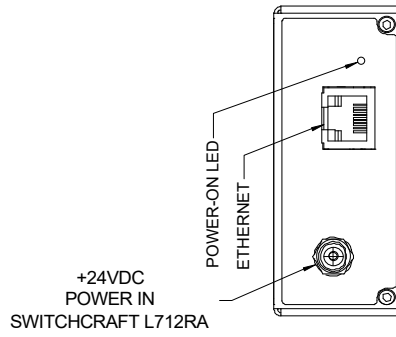


Dims mm

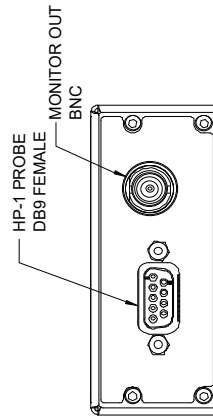
Positive (N to S) field vector into probe axis marker gives positive field reading



T1 control unit



Dims mm



## Ordering information

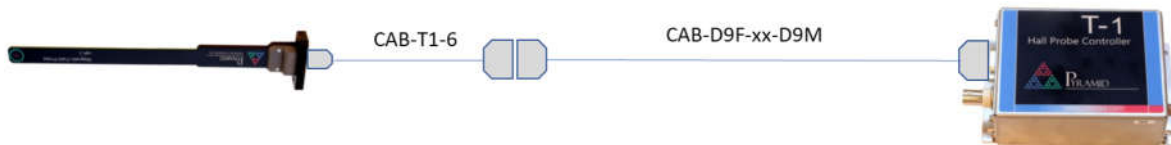
T1-CTRL	T1 control unit only
T1-CTRL-S	T1 control unit only with field control servo feature
HP-1	HP-1 field probe, > +/- 2.8 T range
PSU24-25-1	Power supply universal, 24 VDC, 25W for T1
CAB-T1-6	Connection cable between T1 and HP-1, 6' (1.8 m)

## Preconfigured and calibrated system examples

T1-SYS-6	T1 system comprising T1 control unit, one HP-1 magnetic field probe and 6' (1.8 m) cable, PSU24-25-1 power supply.
T1-SYS-S-6	T1 system comprising T1 control unit with field control servo feature, one HP-1 magnetic field probe and 6' (1.8 m) cable, PSU24-25-1 power supply.

## Cable length

The probe cable can be extended up to a recommended maximum length of 33' (10 m) by use of a good quality DSub nine pin female to male screened cable in series with the supplied probe cable.



## Custom probe configurations

Probes are available to special order with alternative dimensions, angled probe shafts and different full scale range. Enquire for details.

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