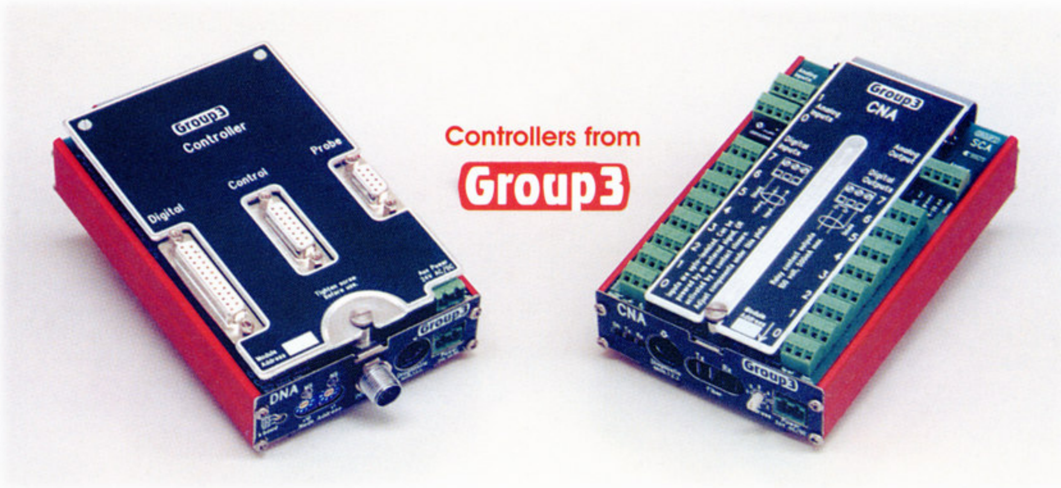
Closed Loop Magnet Control

Group3 Controller Module + Analog Hall Probe

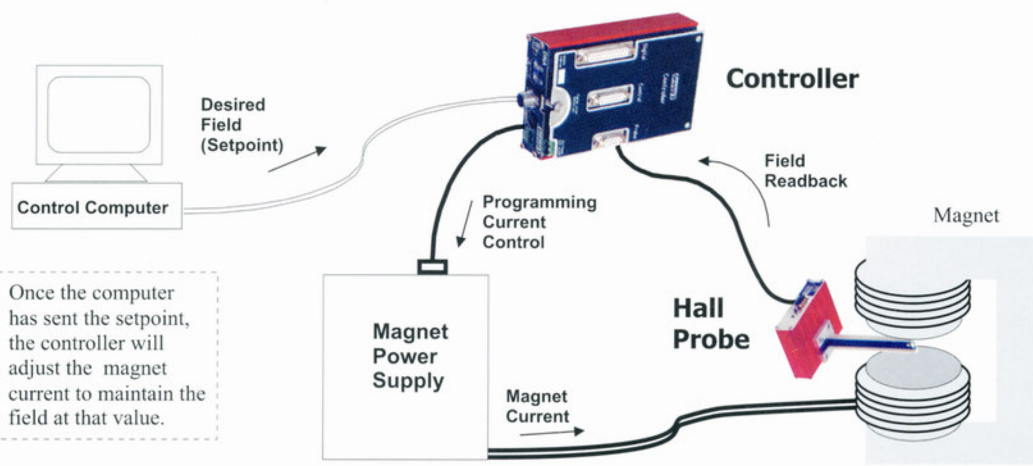
Enhance stability by employing closed loop magnet control



DNA Communications on DeviceNet - the industrial control standard.

CNA Communications on fiber optics - for high noise/high voltage areas.

The Group3 controllers - the CNA and DNA - have a built-in PID algorithm, that allows them to perform local closed loop control. A controller, combined with a Group3 analog Hall probe forms a compact, inexpensive way to implement closed loop magnet control. The computer only needs to send the desired field value - the controller will drive the power supply to steadily maintain that field setting. The magnet and power supply becomes a simple "set and forget" system, relieving the control computer and the communications network of any ongoing control or supervision.



Advantages of Closed Loop control - stability and repeatability

Closed loop control, with the appropriate sensor, provides much greater stability.

If the magnetic field is controlled by setting the current of the power supply, then as the magnet or supply temperature changes the current can vary - so the field will deviate from its desired setting. If you are measuring the field directly then you can hold the field constant, despite external influences.

This can have the big spin-off that you no longer need a very tightly regulated power supply, and you don't need very precise temperature stability in it either - reducing the cost of the power supply considerably. Stability is of particular interest in keeping a beam on target for a long period, and is vital for big ring magnet systems.

Closed loop control overcomes temperature and hysteresis effects.

If you ask for a particular field, that is what you get, no matter what the temperature is, or was, and no matter what the history of the magnet.

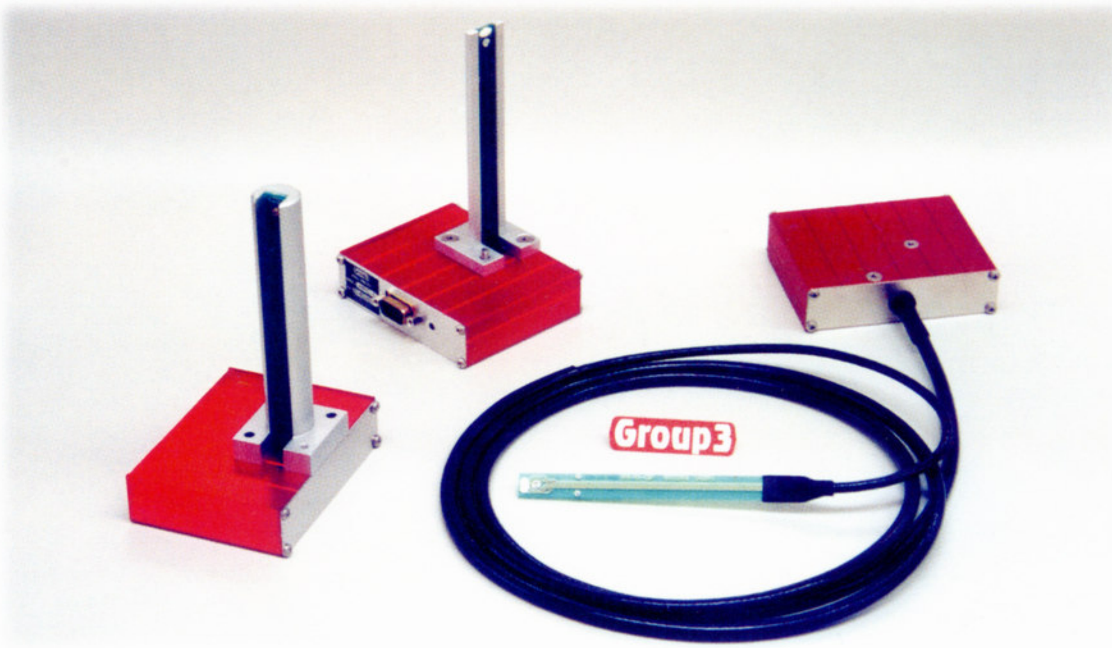
Closed loop control will also give much better repeatability.

In a production environment the repeatability of field can speed up switching between ion species or energies. If you ask for the same field as last time, you know the beam will be in the right place. It is almost vital if a machine wants to be able to operate on a "recipe" type system,

Analog Hall Probe

Corrected for linearity and temperature

Accurate to 0.05% over 10 to 50°C, -1 to +1 Tesla, 0 to 10 kHz

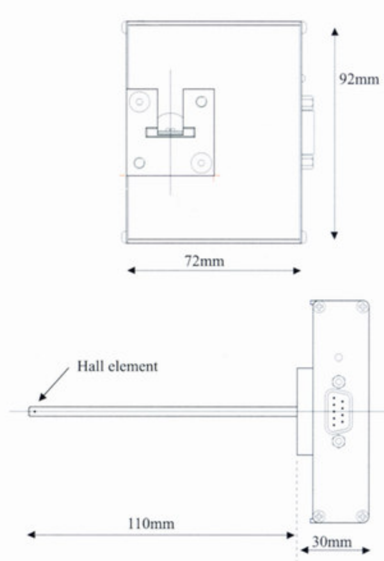


Fixed or Flexible Probes

- Fixed – Very robust probe housings for fixed use, standard products or special probes available to order.
- Flexible –130mm x 10mm circuit board with embedded Hall element, Cable lengths: 1m to 30m.

Model HPC-1-2

Probe support:	length cross section	108mm from mounting surface to Hall sensor 4mm thick (in field direction) x 20mm wide, Aluminum.
Operating conditions for full correction:		
	Magnetic field	-1.0 to +1.0 T, Temperature 10 to 50°C
Output:	Voltage	10 V/T
	Accuracy	±(0.02% of full scale + 0.03% of field) T i.e. ±0.2mT at zero, to ±0.5mT at full scale, over 10 to 50°C
	Monotonicity	±0.05mT
	Bandwidth	0 to 150kHz (-3dB point)
	Noise level	1mV p-p approx (over bandwidth 0 to 10kHz)
Power input requirement:		±15V DC nominal, 30mA from each. (±14.5V min., ±18V max.) Red LED indicator for "power on"
Over temperature output		Opto-coupled output indicates Hall device over-temperature
Connector:		D9 male



Other models available:

- full scale ranges from 0.1 T to 2 T
- different probe lengths, probe mounting methods and probe mounting materials to order.

Power supply units available:

- produces the required ±15V from either 24V AC/DC or 12V AC/DC input

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