

## Application note

### Quality control and inspection of permanent magnet assemblies

#### IFM06 integrating Fluxmeter and custom fixtures

##### Objectives

A custom sensing coil of the required sensitivity can be added to the Hirst IFM06 integrating fluxmeter this allows for a fast, accurate and a low-cost measuring technique to monitor the quality of permanent magnet assemblies prior to final assembly into the motor. Sample batch testing can be used to verify specifications of the magnet assemblies prior to assembly. Many strategies exist on sample strategy from 100% testing to random 1% of batch tests.



Custom sense coil for a 2 pole PMDC magnet assembly connected to a IFM06 fluxmeter

##### Instrumentation

- Hirst IFM06 integrating fluxmeter
- Custom sense coil fixture designed to the part under test

##### Key benefits

- Easy to use and low-cost measurement technique
- Precise and accurate within a few % if the correct custom design is implemented
- Non-destructive method of testing magnet assemblies
- Measurements the magnetic flux are used as the reference criteria for cross-comparison between suppliers and for statistical process control (SPC) and quality control (QC) purposes.

##### Applications

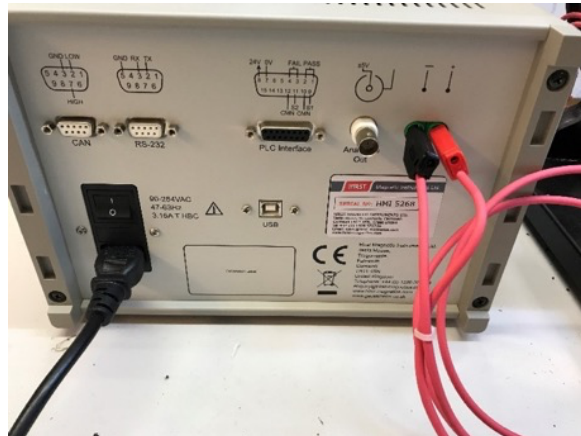
- Production Quality Control (QC) of permanent magnet assemblies such as magnetised sensor components, loudspeakers and permanent magnets assemblies prior to final assembly into PM DC motors.

## Measurement basics

As the sense coil is custom this approach will give a comparative measurement of assembly performance. The fixture has been designed to hold the rotor in place accurately whilst the measurement is taking place.

## Method

Connect the IFM06 to the Helmholtz coil using 4mm banana plug leads.



Switch the IFM06 unit on, press the yellow button on the front panel of the IFM06 (auto drift correction is engaged) and allow to warm up for at least 5 minutes.

A repeatable measurement can be achieved by ensure the calibration constants are correctly entered into the IFM06 and not changed. The IFM06 has an admin passcode lock to prevent accidental operator changes.

In addition, the resistance (R) of the coil is entered as 8.000 Ohms (displayed as 8.000e+00). This value is also from the calibration certificate supplied with the custom fixture. Although in this application an absolute measurement may not be required.

## Measurement approach

1. With no sample in place on the coil the reset (red button) on the flux meter.
2. Move the sample into place and press measure on the IFM06 (green button)
3. Note the reading say 0.48T
4. The reading can be compared to a known good value or pass / fail limits can be set and programmed into the IFM06 to reduce operator effort.



Note in the picture below a non-magnetised sample is being used.



## Conclusions

The test took less than 30seconds making it the perfect quality control measurement for batch testing or random testing prior to final motor assembly. The IFM06 can be set with Pass / Fail limits and can provide electronic data logging.

The measurements of the magnetic flux can be used as the reference criteria for cross-comparison between suppliers for statistical process control (SPC) and quality control (QC) purposes.



Hirst Magnetic Instruments has been active in providing solutions for 60 years in magnetics and magnetic measurement. Hirst manufacture precision hand-held gaussmeters, Fluxmeters, de-magnetisers, bench top & workstation industrial magnetisers, industrial production-line magnetisers, pulse field magnetometers (PFMs) for developing and characterising magnetic materials.

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