

# iMAG400 SQUID Electronics

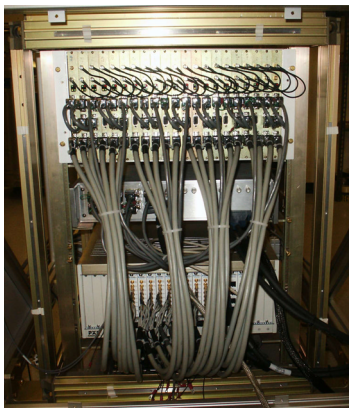


## Features:

- ◆ Easy Setup with AutoTuning
- ◆ Unlimited Channel Capability
- ◆ Light Weight
- ◆ Low Power
- ◆ Optional Computer Data Acquisition

Tristan's iMAG<sup>®</sup> SQUID electronics have been designed for the user who wants performance and flexibility.

Multiple slew rates and gains allow the user to fine tune the measurement process. Individual tuning of each channel gives optimum performance in multi-channel configurations.



84 channels of iMAG400 electronics in a standard 19" rack mount card cage. The power distribution hub is located in the middle of the rack. The AC/DC power supply is remotely located to minimize magnetic pickup of the AC mains. The lower electronics box contains 88 channels of 24 bit data acquisition cards.

Whether only a single channel or hundreds of channels, Tristan's iMAG400 SQUID electronics can meet the needs of even the most demanding user. The iMAG400 SQUID electronics have been specifically designed for high performance multi-channel applications such as biomagnetism, geophysics and non-destructive evaluation.

The iMAG400 SQUID electronics consist of one or more iMC-404 SQUID controllers and either iPS-400 Power Supply/Interface(s) or 19" rack mount card cage with an associated power supply and hub.

The iMAG400 electronics are provided with a communications application, developed under National Instruments LabVIEW<sup>™</sup>. This allows the user direct control of the working parameters of all installed channels within their system.



iMC-404 SQUID controller and iPS-400 power supply

## iMC-404 SQUID controller

Each iMC-404 SQUID controller is a 80C51 microcontroller-driven unit that provides the bias, modulation, and feedback signals necessary to operate up to four SQUID sensors in flux-locked loop (FLL) mode. The onboard intelligence of the microcontroller enables efficient autotuning and millisecond accuracy of heater drive duration for operation in vacuum. The user-friendly PC interface allows access to all tuning and operational parameters. Multiple iMC-404's can be combined allowing up to 110 channels on a single RS-485 port. By using multiple RS-485 ports, an unlimited number of channels can be used. A proprietary communication protocol allows individual addressing of any channel in the system despite a parallel connection to the communication bus for all channels. Groups of multiple channels may also be commanded in concert so that, for example, the hardware low-pass filter may be engaged for all channels simultaneously. For instances in which only one iMC-404 controller is required, the much simpler RS-232 communication bus may be employed.

## iPS-400 Power Supply

The iPS400 supplies conditioned power for up to two iMC-404 SQUID controllers. It also provides the user with front panel selectable analog output (100Ω) that can monitor the output of any of up to 8 SQUID channels. Connections at the rear panel transmit power and communication to the master iMC-404, and route the differential analog output signal from each FLL to a National Instruments compatible 68-pin connector for direct connection to any of their E-series data acquisition cards.

Two iMC-404 SQUID controllers can be used with a single iPS-400 Power Supply/interface box for a maximum of 8 channels/iPS-400. For higher channel count requirements, the iPS-400 is replaced by a 19" rack mounted power distribution hub with external AC/DC power supplies. A card cage houses the iMC-404 printed circuit assemblies in place of the individual aluminum enclosures.

**Sensitivity:**  $< 5 \mu\Phi_0/\sqrt{\text{Hz}}$  ( $< 5 \times 10^{-31}$  J/Hz energy sensitivity) when used with a Tristan Technologies model LSQ/20 LTS SQUID sensor or equivalent and model SP-1.5 cryocable.

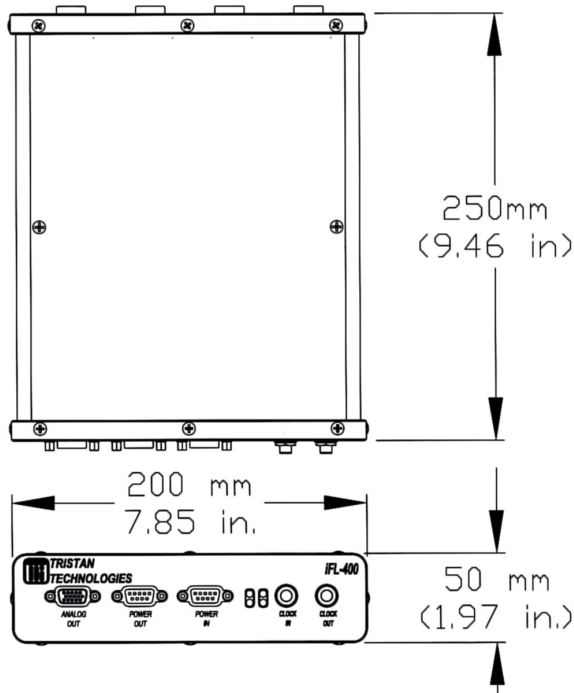
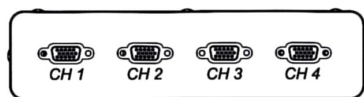
**Bandwidth:** dc – 40 kHz. Higher bandwidths are available upon special request.

**Gain:** Selectable gains of (1, 10, 100) corresponding to full-scale outputs ranging from approximately  $\pm 300 \Phi_0$  to  $\pm 3 \Phi_0$ .

**Autotune:** Autotuning of SQUID parameters is performed by a single command for each active SQUID channel. All adjustments may also be made manually via the communications application.

**FLL Reset:** Any channel may be reset manually or automatically when the output saturates. Additionally, all channels may be simultaneously rest by a hardware active low signal input to the iPS-400. In this mode, integrator resets can be accomplished within a few  $\mu\text{sec}$  of release of the external reset line.

**Remote Interfaces:** RS232 or RS485 remote control interfaces are configurable. All control settings may be via these interfaces. The system is settable to 1200 to 57,600 baud for RS485 or 9600 baud for RS-232



iMC-404 dimensions

## Data Acquisition

The iMAG400 series can also be supplied with National Instruments data acquisition hardware and a computer for automated control and acquisition. Upon request, Tristan can supply 24-bit acquisition cards.



iPS-400 front panel (with dc option)

The front panel switch allows selection of any of up to 8 channels to be output to the Monitor BNC connector. This allows for easy connection to an oscilloscope for monitoring output and tuning operations.



iPS-400 rear panel

Rear panel connectors (communications, power output, analog signal(s), 68-pin SCSI connector and external reset) allow easy connection to one or two iMC-404 SQUID controllers.

**iPS-400 Dimensions:** 215 mm wide, 87 mm high, 336 mm deep (8½" wide, 3½" high, 13¼" deep).

**Power Requirements:** 115 or 230 Volts AC, 50 or 60 Hz. Operating Voltage should be specified at time of order.

For remote applications or applications requiring minimal power draw, the iPS-400 can also be configured to operate off of  $\pm 6$  V dc ( $< 1$  mV ripple) power. Please contact Tristan for details.



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