MERCURY

Mercury Instrumentation

Intelligent control of cryogenic and magnetic environments

OXFORD INSTRUMENTS

The Business of Science®

MercuryiTC Intelligent Temperature Controller

Accurate, intelligent, upgradable

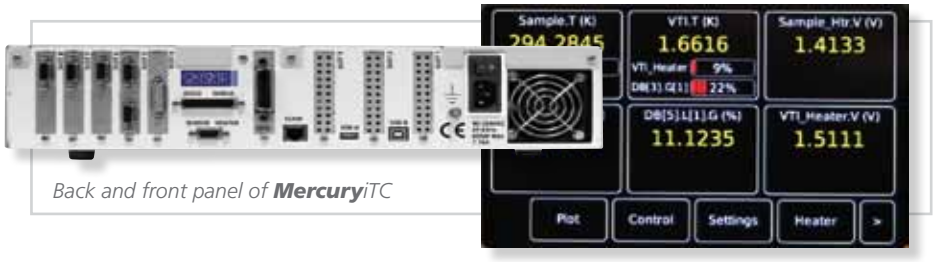
Accurate Measurements

- Measures and controls temperatures to below 250 mK with a precision of 0.1 mK. (24 bit A to D resolution)
- Heater output up to 80 W per channel
- Uses a true constant voltage source for sensor excitation, preventing self-heating and allowing for high quality measurements at the lowest temperature
- Supports all standard cryogenic sensors (ruthenium oxide, cernox, silicon diodes, platinum, thermocouple and RhFe)
- Base system includes a single temperature sensor input and 80W heater output for precise temperature PID control

Expandable

Customization is possible through the addition of plug and play expansion cards. The controller features 9 expansion slots (8 multi-function slots and a dedicated GPIB slot) which can be used to extend its capability.

Expansion cards include additional temperature sensor inputs and heater outputs, pressure transducer inputs, stepper motor drive allowing gas flow regulation and efficient use of liquid helium in flow cryostats and cryogen level metering of both helium and nitrogen.



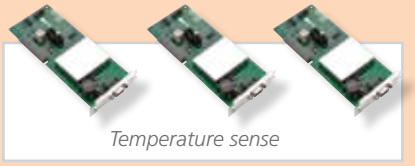
Back and front panel of ***Mercury****iTC*

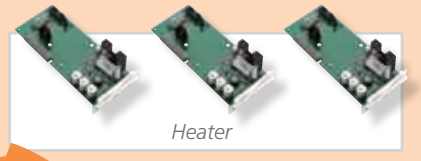
** Base system includes thermometer and heater control as standard.*
Additional configuration to a maximum of 8 options can be installed.

8 expansion cards slots to expand the capability of your Mercury instruments

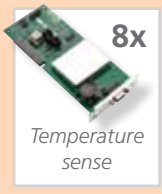
Example of configurations

Simultaneous temperature control of 4 stages (4 independent PID control loops)





Monitoring of up to 9 independent temperature channels



Level metering with temperature sense at magnet

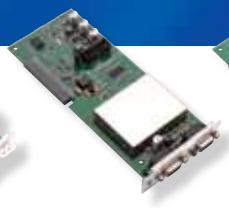
Monitor cryogen level and any heating of the magnet as it sweeps ensuring safe operation.

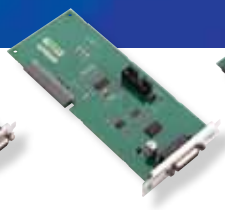
MercuryiPS Intelligent Magnet Power Supply

Accurate, intelligent, upgradable


Temperature sense


Heater


Level meter


Gas flow control

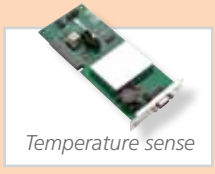

GPIB

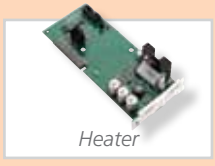
MercuryiTC

Variable temperature insert control (simultaneous control of needle valve, helium level and second PID loop at sample)

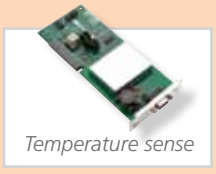

Level meter


Gas flow control


Temperature sense


Heater

Microstat™He optical cryostat (simultaneous control of automated transfer tube and temperature on the sample)


Temperature sense


Gas flow control

Vector rotate magnet control

Example: 6-2-2 Tesla Vector rotate:
Using 120 A (master and slave) for 6 T z-axis and two slave units (60 A) for x and y axis

Stable Measurements

- Bi-polar, four quadrant magnet power supply
- ± 60 A and ± 10 V output
- Highly accurate and stable, better than 2.8 mA current stability at 120 A
- Low noise
- iSense intelligent magnet monitoring and quench protection. Auto-rundown allowing the **Mercury**iPS to be programmed to run magnet down safely in event of over temperature or low cryogen levels
- Supports vector rotate magnets

Configurable

- Design based on 60 A master and slave units
- Configurable in series or parallel combinations up to 600 A output. For example 180 A with ± 20 V output or 600 A with ± 10 V


*Back panel of **Mercury**iPS*


***Mercury**iPS 600 600 A power supply.*

System control

Intelligent control of magnet and cryogenic environments

The intuitive touch screen user interface facilitates easy monitoring, control and configuration of your experimental system. The Mercury instruments are also linked by a common software: the OxsoftIDK (Instrument Development Kit) offering:

- Easy connection to your Mercury instrument via multiple remote interfaces: Ethernet, GPIB, or serial
- Easy integration within your data acquisition programs and direct and remote control of your cryogenic and superconducting magnet system

The **Mercury**iTC has also a number of custom control modes:

For instance, the Heliox mode is used to control a single shot helium-3 refrigerator

The **Mercury**iTC and iPS can monitor variable temperature inserts and superconducting magnets, control sample temperature and magnetic field remotely.

*Front panel of **Mercury**iTC in Heliox mode.*

***Heliox**VL Helium- 3 refrigerator*

Technical Specifications

MercuryiTC Temperature Controller

Thermometry

Number of inputs	1 incl. as standard, up to 8 extra
A/D Resolution	24-bit analog to digital
Maximum reading rate	Up to 10 readings per sec
Isolation	All sensors independantly isolated
Supported sensor types	All standard types for diode/RTD and thermocouple

Heater

Number of inputs	1 incl. as standard, up to 3 extra
A/D Resolution	16-bit
Max heater power	80 W
Max current	2 A
Max voltage	40 V
Heater load range	20 Ohms to 120 Ohms
Heater noise (0 - 2MHz)	2 mV

Configuration Options*

Sensor input	Up to 9
Heater output	Up to 4
N2 / He level meter	Up to 2
Auxillary control (stepper motor)	Up to 4
GPIB	1

Control

Number of loops	1 incl. as standard, up to 3 extra
PID control	Fixed or zonal
Set point	Programmable
Proportional gain	0 to 200 K (resolution 0.1)
Integral time	0 to 200 mins (resolution 0.001)
Derivative rate	0 to 300 mins (resolution 0.001)

MercuryiPS Magnet power supply

Configurable Module Specifications (typical)

Output current	± 60 A via rear panel busbar per module
Output voltage	± 10 V
Output polarity	Bi-polar
Current resolution	0.15 mA
Current stability	± 2 mA or 0.005% per °C
Current ripple	<0.001%
Max sweep rate	1200 A/min
Resolution	0.01 A/min
Load inductance	Up to 1000H
Switch heater output	0 to 120 mA into 0 – 100 ohms. 12 V max
Max steady state power	600 W

Input

Mains input	3 pin UL/CSA compliant. Auto range setting
Supply voltage	90 to 264 VAC
Frequency	47 to 63Hz

Interface

RS232	With isobus support. Configured as DCE
Ethernet	10/100 RS422 IEE802.3
USB	Serial port
GPIB	IEEE-488 (Option)
RS485 Modbus	Control between Master and Slave

Ordering Information

MercuryiTC Standard configurations

MERC-TC_V	**Mercury**iTC temperature controller
MERC-TC_G	**Mercury**iTC temperature controller with gas flow control
MERC-TC_2G	**Mercury**iTC temperature controller with gas flow control and 2 PID Loops (gas flow, extra sensor card, extra heater card)

MercuryiPS Standard configurations

MERC-PS120	**Mercury**IPS 120A superconducting magnet power supply and slave
MERC-PS120L	**Mercury**IPS 120A superconducting magnet power supply and slave with level meter
MERC-PS60	**Mercury**IPS 60A superconducting magnet power supply
MERC-PS_S	**Mercury**IPS 60A superconducting magnet power supply slave only

Expansion cards

MERC-CD_S	Temperature sensor card for Mercury electronics
MERC-CD_H	80W Heater card for **Mercury**iTC temperature controller
MERC-CD_A	Auxilliary card for **Mercury**iTC temperature controller
MERC-CD_G	GPIB card for Mercury electronics
MERC-CD_L	Level meter card for Mercury electronics

Options

MERC-OXIDK	OxsoftIDK - Oxford Instruments Instrument Development Kit software