



www.IetLtd.com Proudly serving laboratories worldwide since 1979

CALL +847.913.0777 for Refurbished & Certified Lab Equipment



UltraShield™ NMR Magnet System

UltraShield™ 500 MHz/54 mm

**3 UltraShield™ Superconducting NMR Magnet**

**500/70C**

**3 1 Characteristic Data**

*196/ 500/70C*

Proton Frequency	500 MHz
Central Field	11 70 Tesla
Coil Inductance	159 8 Henry
Magnetic Energy	640 kJoule
Magnetic center from top flange *)	820 5 mm
Main Coil Heater Current	<i>120</i> mA
Shim Coil Heater Current	<i>150</i> mA

		Magnet-Test	System Test	Customer Site
Magnet Current	A	88,95	88,76	88.885
X Shim Current	A	+1,32	+1,51	+0,909
Y Shim Current	A	-0,57	-1,66	-1,133
Z Shim Current	A	-5,85	-5,52	-5,253
XZ Shim Current	A	+0,58	-	-
YZ Shim Current	A	+2,64	-	-
XY Shim Current	A	-1,46	-	-
X <sup>2</sup> Y <sup>2</sup> Shim Current	A	-0,47	-	-
Z <sup>2</sup> Shim Current	A	-3,15	-3,15	-3,15
Z <sup>3</sup> Shim Current	A	-0,2	-1,2	-0,2
Frequency change due to Z <sup>2</sup> Shim and Cycling of Shims	kHz	-35,6		
Magnetic center from top flange	mm	816		
RT Shim System Angle **)	Deg	-		
Visa		LEP		
<b>Important: During charging Z and Z<sup>2</sup> shim heaters must be permanently ON</b>				
<b>Remarks:</b>				

A2  
7/26/07

\*) Approximate values (mechanical drawings) after cool down

\*\*) Measured from the right hand He stack to the cable innut of the RT shim system



3 3 Resistance Measurements

196/50070C

Measurements at room temperature with the current lead mounted in the cryostat:					
from	A	Connector A	76,4	OHM	Main Heater
to	L	Connector B			
from	C	Connector A	19,9	OHM	Z Heater
to	L	Connector B			
from	E	Connector A	20,3	OHM	X Heater
to	L	Connector B			
from	F	Connector A	21,6	OHM	Y Heater
to	L	Connector B			
from	H	Connector A	20,1	OHM	XZ Heater
to	L	Connector B			
from	J	Connector A	20,2	OHM	YZ Heater
to	L	Connector B			
from	K	Connector A	19,9	OHM	XY Heater
to	L	Connector B			
from	L	Connector A	20,3	OHM	X <sup>2</sup> Y <sup>2</sup> Heater
to	L	Connector B			
from	D	Connector A	38,7	OHM	Z <sup>2</sup> Heater
to	L	Connector B			
from	K	Connector B	20,1	OHM	Z <sup>3</sup> Heater
to	L	Connector B			
from	A B	Connector B	30,6	OHM	Shim Coils +/-
to	D,E	Connector B			
from	+	High Curr Conn	0,9	OHM	High Current to Sense +
to	H	Connector B			
from	+	High Curr Conn	2,7	OHM	Main Coil
to		High Curr Conn			
from		High Curr Conn	0,8	OHM	High Current to Sense
to	J	Connector B			
from	H	Connector B	2,9	OHM	Sense + Sense
to	J	Connector B			
from	A B	Connector B	7 30M	OHM	Shim Coil to Heater common
to	L	Connector B			
from	D E	Connector B	7 30M	OHM	Shim Coil to Maincoil
to	H	Connector B			
from	H	Connector B	7 30M	OHM	Sense to Heater common
to	L	Connector B			
from		the Connectors	7 30M	OHM	Insulation Magnet to Dewar
to		the Ground			
At room temperature with connection lead for the ACD* mounted in the cryostat:					
from	K	Connector ACD*	109,8	OHM	Upper Temperature Sensor PT100
to	J	Connector ACD*			
from	A	Connector ACD*	109,5	OHM	Lower Temperature Sensor PT100
to	B	Connector ACD*			



**3.5 Charging Rates**

*196/500/70C*

**Charging record** To prevent quenching the magnet strictly follow the charging table. Keep a charging record with time table magnet current and helium level. These informations are very helpful in case of problems.



**Shim heaters** To prevent inducing currents in the shim coils during the charging procedure all shim heaters must be periodically heated. **Always put Heater Automatic to the ON position!** Due to the strong action of the Z and Z<sup>2</sup> shims these two shim heaters should be quenched permanently. **Always put Z and Z<sup>2</sup> shim heaters to the ON position!**

MAGNET CURRENT				SENSE VOLTAGE
0	to	50	Ampere	3000 mV
50	to	70	Ampere	2000 mV
70	to	86	Ampere	500 mV
86	to	<i>88,95</i>	Ampere	100 mV
			<i>0,25</i> % Overshoot	50 mV
<b>10 Minutes Pause at Overshoot Current</b>				0 mV
Back to final field				50 mV

**Charging time** Calculated charging time (without pause) 4 hours 9 minutes



**Minimum helium level** Keep the helium level above 80% while charging or shimming the magnet

**Persistent mode** For persistent operation a shorting plug must be mounted in place of the current lead



**After a quench** After a quench and after having refilled the helium vessel the coil should be allowed to cool down for **12 hours** before energizing it again



3.6 Cycling of Shims and Shimming

196 500/70C

**Time between charging and shimming** After having charged the magnet, the coil needs some time to reach stable conditions. During the first hours in the persistent mode rather high drift rates may be observed due to internal stabilisation of the current densities in the superconducting wires



**Important Note:** Leave the **Shim Heater Automatic ON** during the first night after charging the magnet

**Stable conditions** During the first hours after having the magnet persistent it is not recommended to change any shim currents

Before shimming the magnet the operator should charge all the shims at least two times with the given shim currents and allow the shims some minutes to hold these currents **Change these currents slowly!**

X Shim Current	✓✓	+5/-5	A
Y Shim Current	✓✓	+3/-3	A
Z Shim Current	✓✓	+2/-8	A
Z <sup>2</sup> Shim Current	✓✓	+5/-5	A
Z <sup>3</sup> Shim Current	✓✓	+3/-3	A
XZ Shim Current	✓✓	+5/-5	A
YZ Shim Current	✓✓	+5/-5	A
XY Shim Current	✓✓	+5/-5	A
X <sup>2</sup> Y <sup>2</sup> Shim Current	✓	+3/-3	A
Approximate frequency shift during cycling of shims		-35,6	kHz



**Shimming of cryo shims** With this type of magnet **wait overnight** before starting the shimming procedure!



[www.IetLtd.com](http://www.IetLtd.com) Proudly serving laboratories worldwide **since 1979**

**CALL +847.913.0777 for Refurbished & Certified Lab Equipment**