

N100 Electromagnet

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Contents

1	Introduction.....	3
1.1	Safety.....	3
2	Electrical connections.....	4
3	Water Connections.....	5
4	Pole Tips.....	6
4.1	Changing pole tips.....	6
4.2	Adjusting the pole gap	6
5	Hall Controller operation	7
6	First time operation - check list	8
7	N100 Specifications	9

Important note

Please read this manual carefully before assembling or commissioning the system. It is possible to damage the system beyond repair if the correct procedures are not followed.

Oxford Instruments cannot accept responsibility for damage to the system caused by failure to observe the correct procedures laid down in this manual. The warranty may be affected if the system is misused, or the recommendations in this handbook are not followed.

Warning

Before you operate this equipment for the first time, please make sure that you are aware of the precautions that you must take to ensure your own safety.

1 Introduction

This *Oxford Instruments* electromagnet is supplied with a vertical 'U' shaped yoke inclined at 45°. A range of pole pieces is available, including plane, conical and Faraday. All are 100 mm in diameter. The pole tips are adjustable, so the pole gap may be adjusted between 0 and 110 mm.

Options for this magnet include a rotating base, providing 0-360° rotation with a scale and locking handle. In addition, the combined magnet and rotating base may be fitted to an optional low-loading trolley with floor mounted rails.

The magnet is designed to be operated with the K series power supply SCT-200-15 which can supply up to 15 amps at 200 volts and is fully described in a separate document.

1.1 Safety

- Warning** Under normal circumstances there should be no reason to gain access to the magnet terminals. If, however, this has been necessary, ensure they are secure and safe.
- Warning** With the safety cover removed, large DC voltages are accessible. Do not operate the magnet under these circumstances.
- Warning** Take care to prevent accidental disconnection of the magnet current. The magnetic energy stored in the system can be dissipated in dangerous arcs at the point of interruption.

2 Electrical connections

A suitable cable will be supplied with the K-series power supply.

Remove the plastic safety cover to gain access to the terminals. The coils should be connected in series as shown in the following diagram.

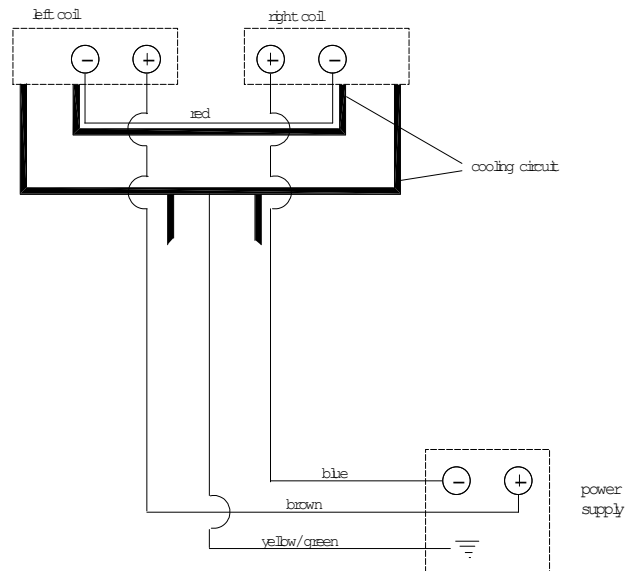


Figure 1 Electromagnet connections, rear view

Warning: Check that the current leads are secure and safe. Large DC voltages can be accessible so replace the safety cover before energising the magnet. Do not touch the terminals when the magnet is energised.

3 Water Connections

These are made to the rear of the magnet using suitable hose (e.g. polythene). Check for leaks before energising the magnet.

The magnet may be operated with or without water cooling. The operational limit is set by the coil resistance, which must not be allowed to rise more than 40% above its room temperature value.

Guides to the permissible current are given in the table below and in the magnet specifications at the end of this document.

Cooling option	Maximum permissible current (amps)
Air cooling	7.5
Water cooling 2.25 l/min	15

4 Pole Tips

4.1 Changing pole tips

Make sure that the power is off and that it cannot accidentally be switched on. Slacken and withdraw the axial bolts, which secure the pole tips. Withdraw each pole tip by moving it inwards until the shank is clear of the pole piece and then lift it clear of the magnet.

If the pole gap is less than 3 cm it will be necessary to increase it by moving the pole pieces outwards before you try to remove the first pole tip.

4.2 Adjusting the pole gap

Make sure that the power is off and that it cannot accidentally be switched on. Slacken the socket head 'locking screws' which secure the pole tips. Use the adjuster on each pole to set the gap. Great care should be taken whilst adjusting the pole gap to ensure that the pole tip faces are not damaged by accidental contact. Tighten the locking screws again.

Faraday pole tips should be positioned so that their leading edges are parallel and horizontal by rotation of the pole piece before tightening the axial bolt. We suggest that adjustments be made with a spirit level placed along the flat surface adjacent to the leading edge

5 Hall Controller operation

Computer control of the electromagnet is possible using an HC1 Hall Controller. A detailed description of this unit is given in a separate document. There will be a transverse Hall probe (Cryospares part number EQH0002) mounted in one of several ways on or between the pole tips, depending on the particular application. In every case the probe itself will be enclosed in a Tufnol housing in order to protect it.

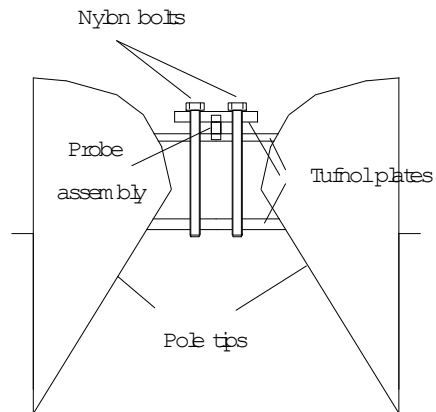


Figure 2 Front view of the Faraday pole tips, showing the optional Hall probe assembly

6 First time operation - check list

Before you operate the magnet for the first time, make the following checks:

- Ensure the pole tip retaining bolts are secure using the 10mm Allen key provided
- Check that the coil resistances are correct (refer to specifications)
- Check that the coils are wired correctly, that the connections are secure and the safety cover is in place.
- Check correct mains voltage for SCT-200-15 and HC1 Hall controller (if applicable) and connect power
- Connect the Hall probe to the HC1 and the HC1 to the SCT-200-15 (if applicable)
- Switch on the units **in the following order**
 - HC1 -check that the POWER ON LED lights and a display appears
 - SCT-200-15 -check that the MAINS ON lamp is illuminated.
- For local operation (no Hall control) turn the current/voltage controls on the front panel of the SCT-200-15 until the desired current/field is achieved. Please refer to the separate power supply manual for further details.

7 N100 Specifications

Pole diameter mm	100
Maximum current (air cooled) amps	7.5
Maximum current (water cooled) amps	15
Coil room temperature resistance (nominal) ohms	
Maximum permitted resistance of each coil (nominal) ohms	6.5
Water pressure bar	1
Water flow l/min	2.5
Hose diameter (nominal) mm	16
Minimum pole gap mm	0
Maximum pole gap mm	110
Recommended power supply	SCT-200-15
Weight Kg	306

Figure 3 on page 9 shows typical field/current characteristics for the N100 with various pole tips.

Curve number	Pole tips	Pole gap (mm)
1	38 mm conical 45°	55
2	38 mm conical 45°	10
3	58 mm conical 45°	10
4	58 mm conical 45°	20
5	100 mm plane	20
6	100 mm plane	30
7	100 mm plane	50
8	100 mm plane	100

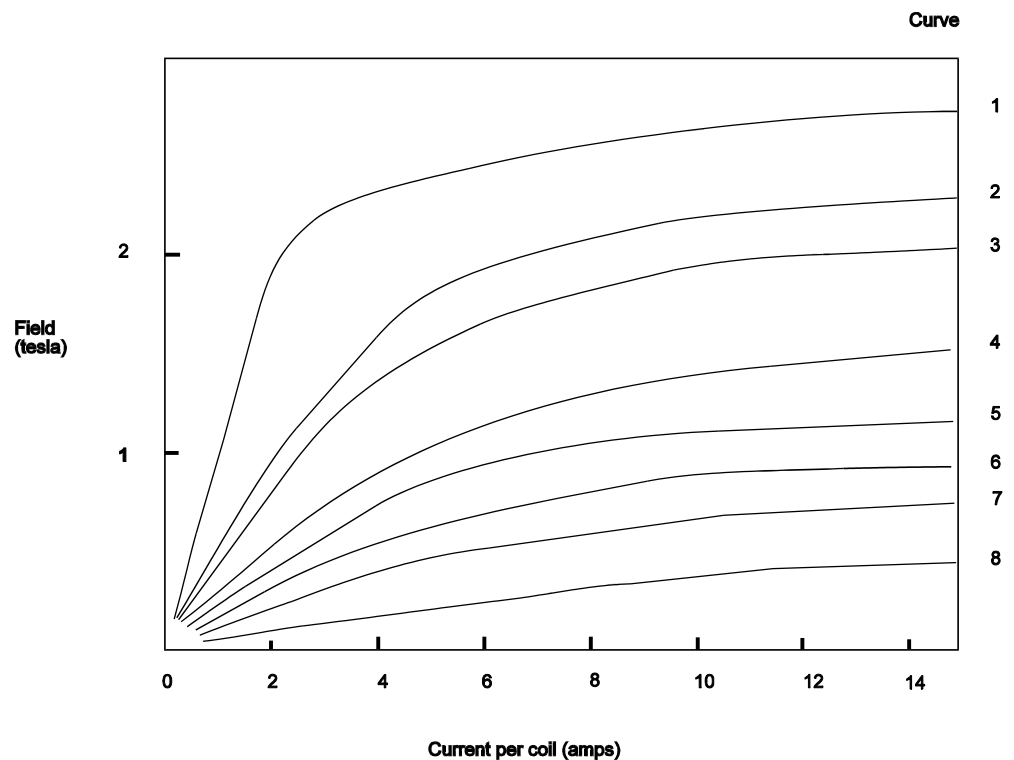


Figure 3 Field/current relationship for various pole tip configurations