

CERN Summer Student Project Report

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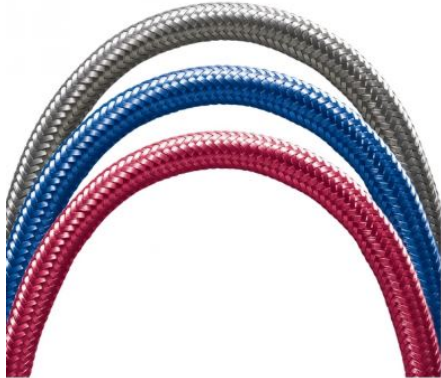
24th October 2018

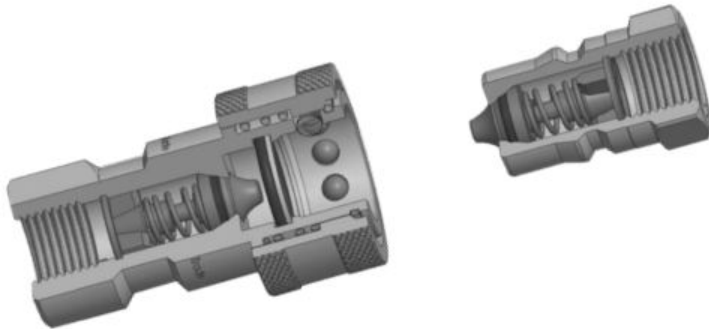
Introduction

My project revolved around the water cooling system for the beamline. Magnets and turbomolecular pumps need to be cooled in order to prevent them from overheating. The beamline consists of 6 individual modules, or sections of magnets/solenoids. Each module comprises one manifold for source and one manifold for return. The source is run at 3-6 bar depending on the required flow rate, while the return is fixed at 2 bar. These manifolds are connected to the wall manifold, which provide the system with water. The wall manifold provides up to 16 bar of pressure.

Materials

Tool name and purpose	Picture	Schematic Diagram
<u>Tool</u> Stainless steel manifold 1'' Feed/6 x 1/2'' BSP Circuits <u>Purpose</u> Acts as a breakout for each module		1
<u>Tool</u> Blanking Plug – 1'' for SS Manifolds <u>Purpose</u> Block one end of manifold		2
<u>Tool</u> Reducing Hexagon Nipple – Male BSPT x Male BSPT 3/8'' x 1/2'' Stainless Steel <u>Purpose</u> Connect valve to manifold		3

<u>Tool</u> Stainless steel Female 3/8'' Swivel x 3/8'' Hosetail <u>Purpose</u> Connect hose to wall manifold		4
<u>Tool</u> Hose Silicon <u>Purpose</u> Transport water		5
<u>Tool</u> Legris stainless steel hexagon straight reducer 1/2 inch male x 1/4 female <u>Purpose</u> Adapter to attach pressure sensor to manifold		6
<u>Tool</u> Pressure sensor, analogue <u>Purpose</u> Provide water pressure information		7
<u>Tool</u> Stainless steel Female 3/4'' Swivel x 3/4'' Hosetail <u>Purpose</u> Connect hose to quick connect		8

<u>Tool</u> Hand Crimper <u>Purpose</u> Crimp ferrule to hose		
<u>Tool</u> Ferrule stainless steel <u>Purpose</u> Secure swivel and hose connector to hose		9
<u>Tool</u> Quick connect <u>Purpose</u> Connect the hose to the manifold whilst allowing the module to be quickly rolled out of the beamline for servicing		10
Completed hose assembly		

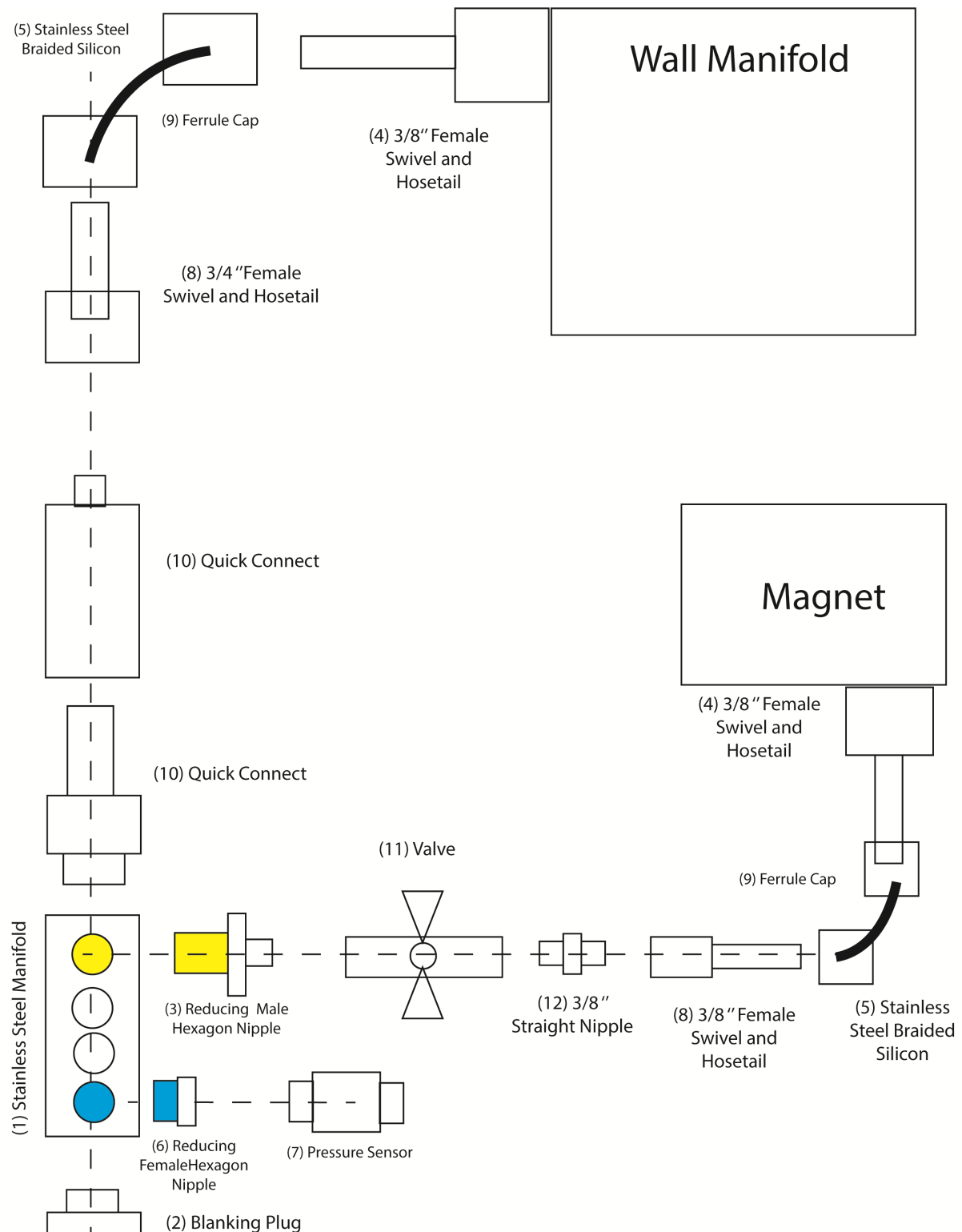
<u>Tool</u> Valve <u>Purpose</u> Control water flow		11
<u>Tool</u> Straight Nipple 3/8" <u>Purpose</u> Connect the Valve to the 3/4" Female Swivel and Hosetail		12

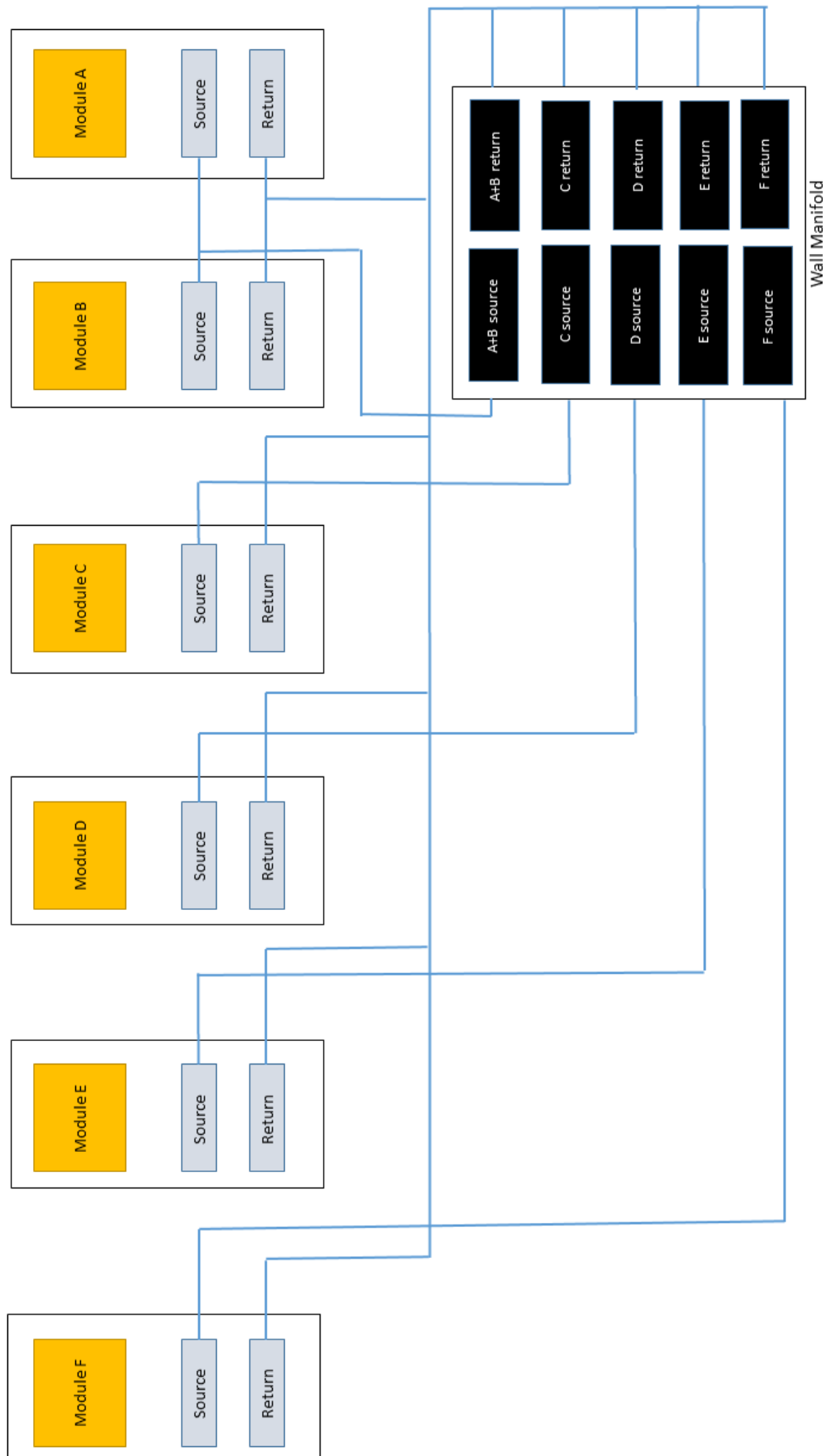
Images from Mouldshop catalogue: <http://mouldshop.co.uk/catalogues/>

Procedure

1. Mix Stycast epoxy (Loctite Stycast 2850 FT with catalyst 24 LV) in a 100:8 ratio by weight. Online datasheet for reference: <https://goo.gl/EepUM7>
2. Apply Stycast to valves and pressure gauges and insert them into the manifold so that the valve switches are facing the same direction.
3. Allow 24 hours for Stycast to cure.
4. Attach the blank cap to the desired side of the manifold.
5. Mount the manifolds to the modules using water-jet cut plates.
6. Measure out the length of the hose from the manifold to the respective location on the wall manifold. When cutting the hose wrap a piece of tape around it to prevent fraying of the fibers.
7. Remove the tape and trim the metal fibers.
8. Attach the socket to the hose.
9. Insert the hose connector with the 3/8" swivel inside the socket so that there is around 1 inch of space for the swivel to translate. Use the crimper to permanently secure the swivel into the cap. This side will be routed to the wall manifold.
10. Repeat step 5 for the 3/4" swivel. This side will be attached to the quick connect, which will be connected to the module manifold.

Schematic Diagrams





Final Assembly Images