

REFORM OF THE PNEUMATIC INSTALLATION OF WILLIAM HERSCHEL TELESCOPE AND ISAAC NEWTON TELESCOPE



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1. - Objective of the reform of the compressed air system of the WHT and INT.

The original installation of the telescope is the 6x4 mm section pipe in all stations where dry air is required. These tubes are connected to a single 10x8 mm sub-tube through the base of the telescope from the WHT building. When a large demand for dry air is required, the installation can not supply it, resulting in high pressure losses, generating problems of malfunction of the instruments with pneumatic components.

To correct the defects of the installation, an audit was requested in 2015 for the company REITEC Servicios de Ingeniería, which identified the most important points that should be modified.

The changes that have been made in the WHT are the following:

- Installation of a main distributor of 40 mm dry air at the outlet of the accumulator tank with independent outputs for 16x13 mm tube, with this configuration the accumulator tank if it will perform its function.
- Installation of a 16x13 mm tube from the main distributor to the GRACE consumption station.
- Installation of a 16x13 mm tube from the main distributor to the GHRIL consumption station, through the cable rotator of Altitude CASSEGRAIN and PRIME
- Installation of 0.01 micron filters at the end of the supply tubes in each consumption station.
- Installation of 5 micron filters at the end of the supply pipes with discharge valves in each non-essential consumption station.
- Installation of electronic flow meters, pressure and dew point at the compressor outlet before the accumulator tank. Connection of the sensors to the PLC installed in the oil pump room.
- Identification of the valves of the installation with a number and documentation.

The changes that have been made in the INT are the following:

- The changes made to the INT have only been in the compressor area, passing from the configuration:

Compressor---> accumulator tank---> air dryer---> supply

to the new configuration:

Compressor--->air dryer---> accumulator tank---> supply

All changes made with 16/13 mm plastic tube and SMC accessories, a 3 micron filter has also been added to the tank outlet before the distributor.

3. - List of valves and components in the WHT.

Valves.

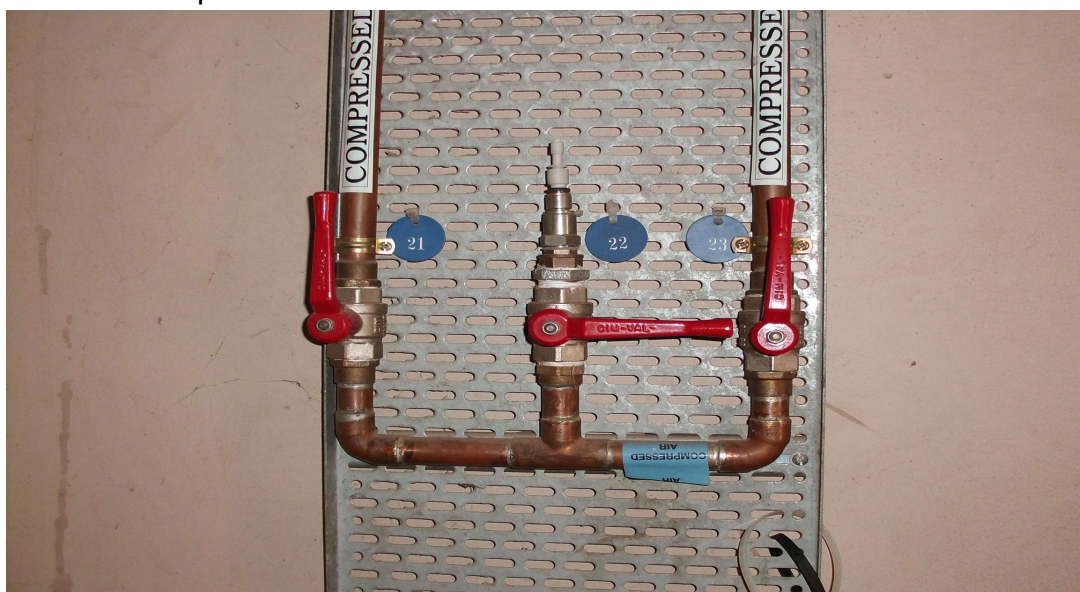
Valve 17:	Valve ¾"	nitrogen plant, INT air pressure line.
Valve 18:	Valve ¾"	nitrogen plant, INT air pressure line.
Valve 19:	Valve ¾"	aluminising plant air pressure line.
Valve 20:	Valve ¾"	WHT building air pressure line.
Valve 21:	Valve ¾"	output pumps room.
Valve 22:	Valve ¾"	auxiliary output pumps room.
Valve 23:	Valve ¾"	output pumps room.
Valve 24:	Valve ½"	output after water separator.
Valve 25:	Valve ½"	output after sensors.
Valve 26:	Valve 1 ½"	main output accumulator tank.
Valve 27:	Valve ¾"	main input accumulator tank.
Valve 28:	Valve ½"	output after compressor.
Valve 29:	Valve ½"	output to Grace fork pipe.
Valve 30:	Valve ½"	output to Ghril fork, Cass, Prime pipe.
Valve 31:	Valve ½"	output to telescope base pipe.
Valve 32:	Valve ½"	output to test focal station pipe.
Valve 33:	Valve ½"	bottom venting accumulator tank.
Valve 34:	Valve ½"	output work area aluminization room.
Valve 35:	Valve ½"	output work area aluminization room.
Valve 36:	Valve ½"	output work area telescope base.
Valve 37:	Valve ½"	output Liris Park room.
Valve 38:	Valve ½"	output Floor Latch Control.
Valve 39:	Valve ½"	output Grace distribution fork.
Valve 40:	Valve ½"	output Ghril distribution fork.
Valve 41:	Valve ½"	output lateral side Mirror Cell.
Valve 42:	Valve ½"	output Cassegrain distribution area.
Valve 43:	Valve ½"	output Prime in top mirror cell.
Valve 44:	Valve ½"	output Prime distribution area.
Valve 45:	Valve ½"	output General Purpose valve.
Valve 46:	Valve ½"	output Cassegrain instrumentation.
Valve 47:	Valve ½"	output Detectors Laboratory 2 ^o floor.
Valve 48:	Valve ½"	output WHT dome corridor from base corridor.
Valve 49:	Valve ½"	output Observing Floor area distribution.
Valve 50:	Valve ½"	output Observing Floor area distribution.
Valve 51:	Valve ½"	output Ghril door.

4. - Description and details of the situation of valves and components.

Valves 17, 18, 19, 20 in the aluminization room for the supply of air to the WHT building, aluminized plant, and interconnection with the liquid nitrogen plant and INT Telescope.



Valves 21, 22, 23 distribution panel behind the door of the oil pump room of the WHT telescope.



Valves 24, 25, 26, 27, 28, 29, 30, 31, 32, 33 in the area of the compressor, dryer, storage tank and main distributor of air supply outlets to the telescope, test room and spare outlets.



Valves 34, 35 air supply in the working area of the aluminization room with output pressure regulators. Valve 34 with circuit discharge when closed.



Valves 36 air supply in the working area of the base of telescope with output pressure regulator. Valve 36 with circuit discharge when closed.



Valve 37 air distributor in the Liris Park room with 1 micron particle filter.



Valve 38 for supply to the Floor Latch Control System in the entrance area to the Azimut movement.



Valve 39 for air supply to the GRACE area with 1 micron particle filter, from the Altitude movement motor space (Grace fork).



Valve 40 for air supply to the GHRIL area with 1 micron particle filter, from the Altitude cable rotator space (Ghril fork).



Valve 41 supply air to the area of the mirror cube and Cassegrain.



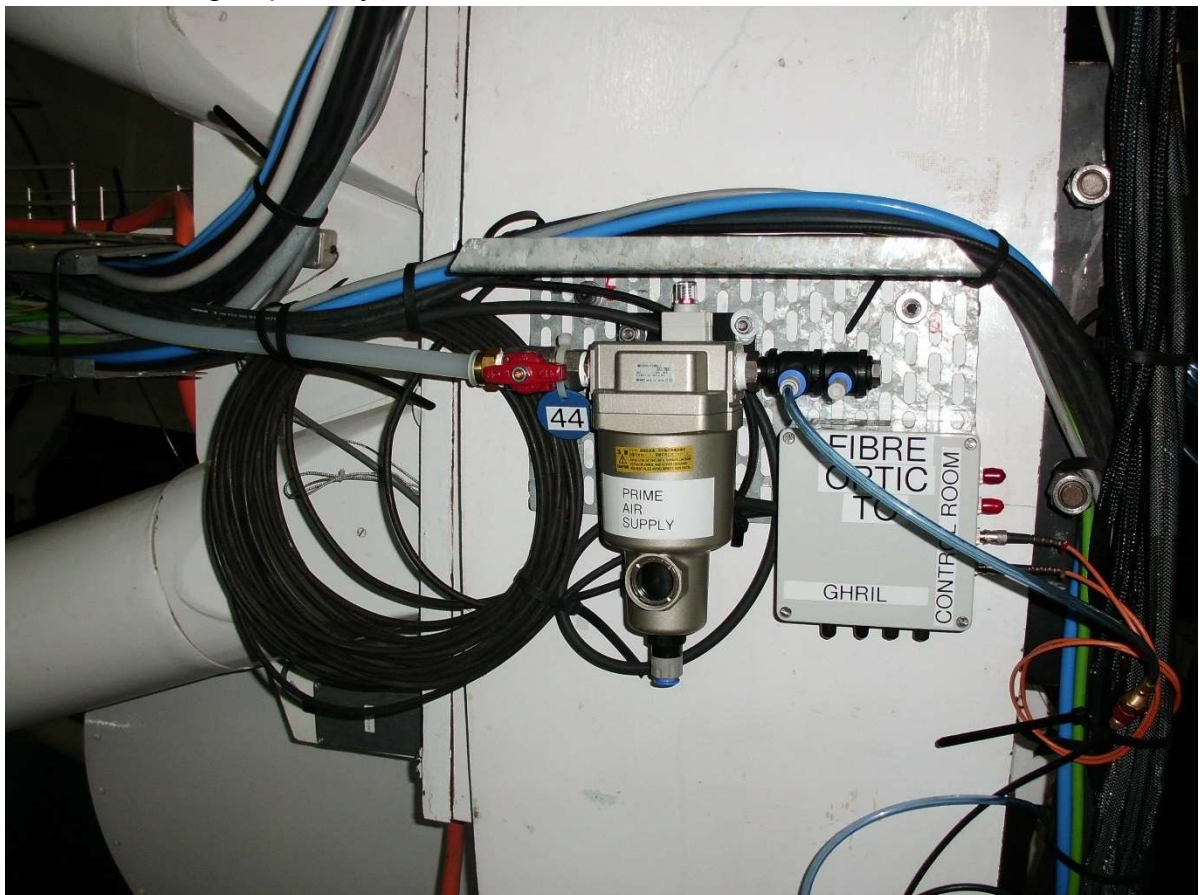
Valve 42 air supply to the mirror support system, Cassegrain through the Cass cable wrap and spare connections of the old air system with 1 micron particle filter.



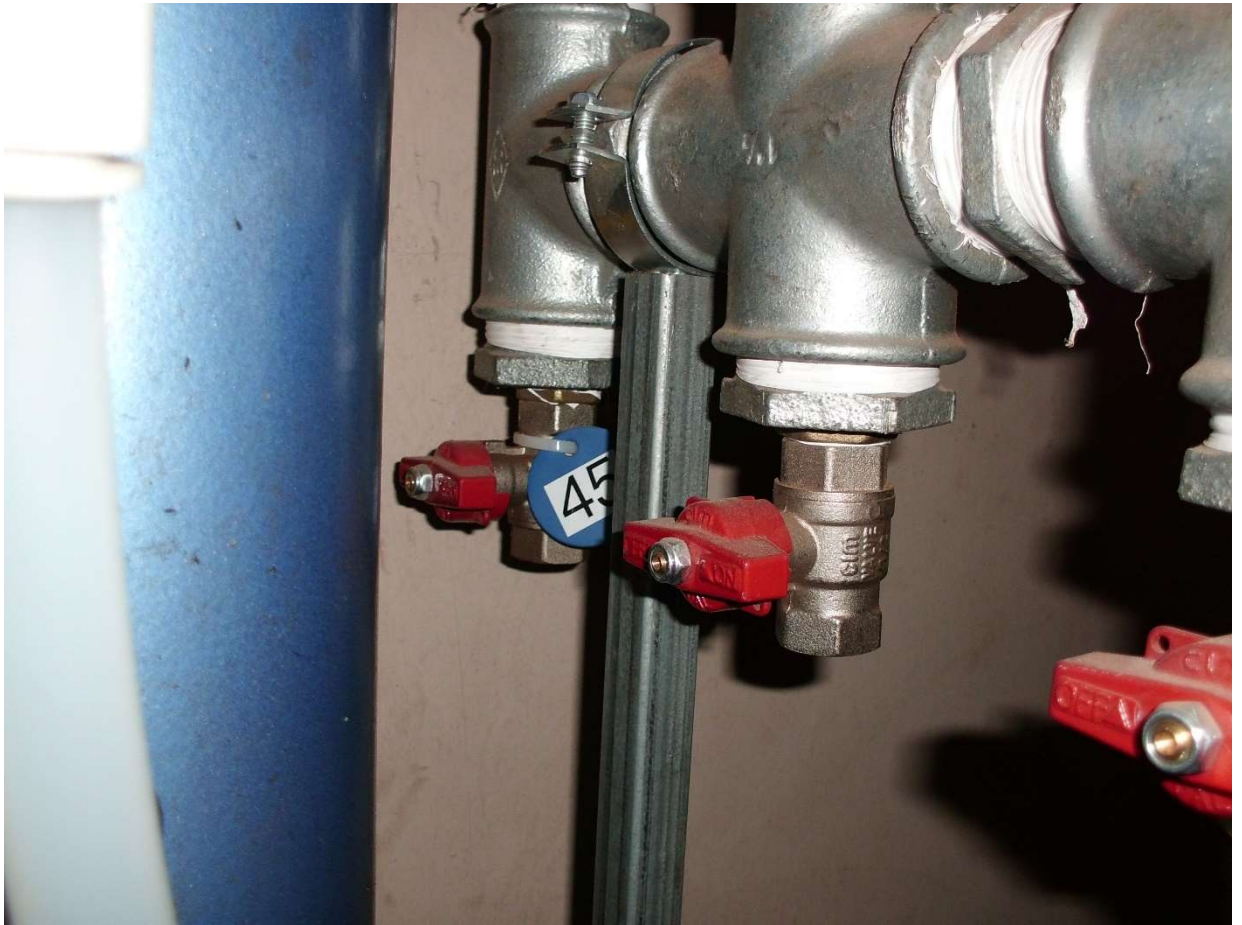
Valve 43 air supply for primary focus, is located on top of the primary mirror cube next to the cable channel for prime.



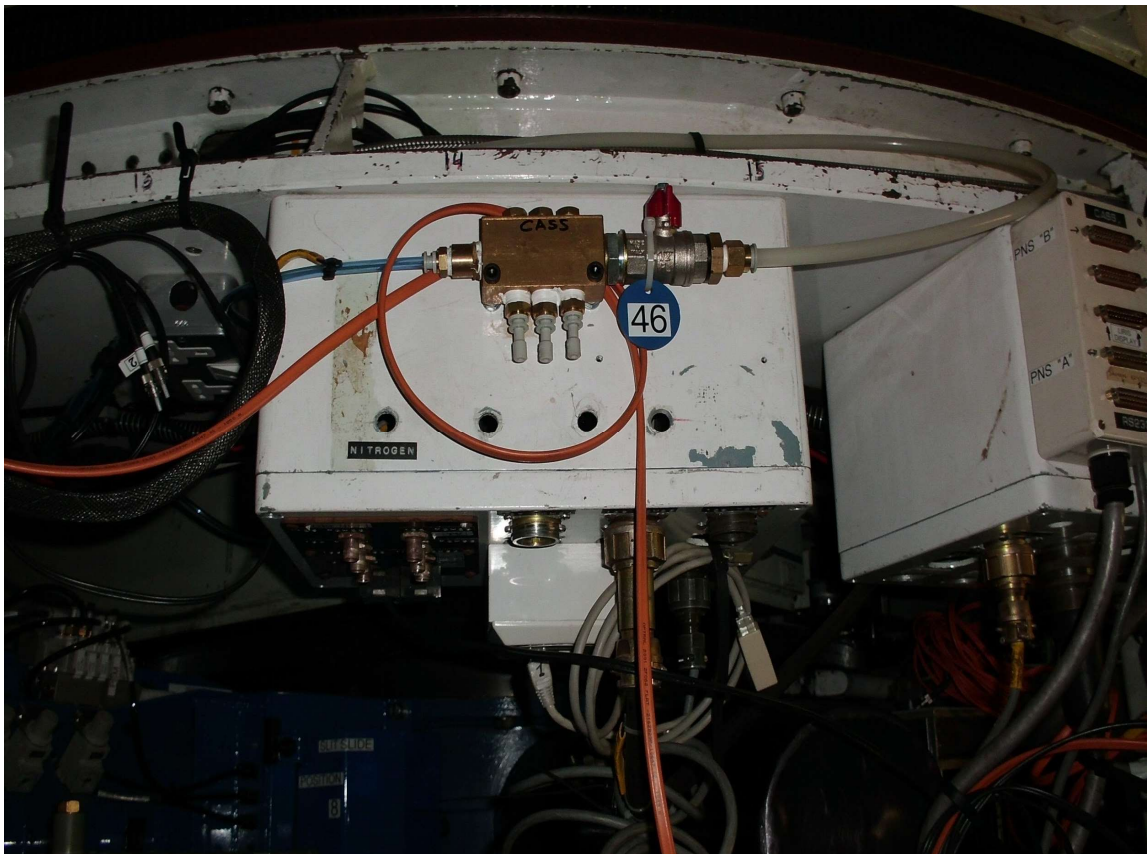
Valve 44 of air supply for primary focus with 1 micron particle filter, is located in the fixed ring of primary focus.



Valve 45 for air supply to the Focal Station Test Room with one micron filter.
(Pending installation)



Valve 46 for air supply for instruments in Cassegrain.



Valve 47 for air supply to the Detector Laboratory on the 2nd floor.



Valve 48 for air supply to the dome corridor from the base corridor of the WHT.



Valve 49 of air supply to the observation floor area of Cassegrain and rolling hose.



Valve 50 of air supply to the observation floor area of Cassegrain and rolling hose.



Valve 51 of air supply to the Ghril door



5. - Description of electronic sensors, diagrams and Connections in the WHT

Group of sensors at the compressor outlet, composed of flow sensor, pressure sensor and dew point sensor.

These sensors are connected to the PLC of the pump room through the metallic grey interconnection box that is on top of them.

Digital flow sensor: SMC PF2A7034-F10-69

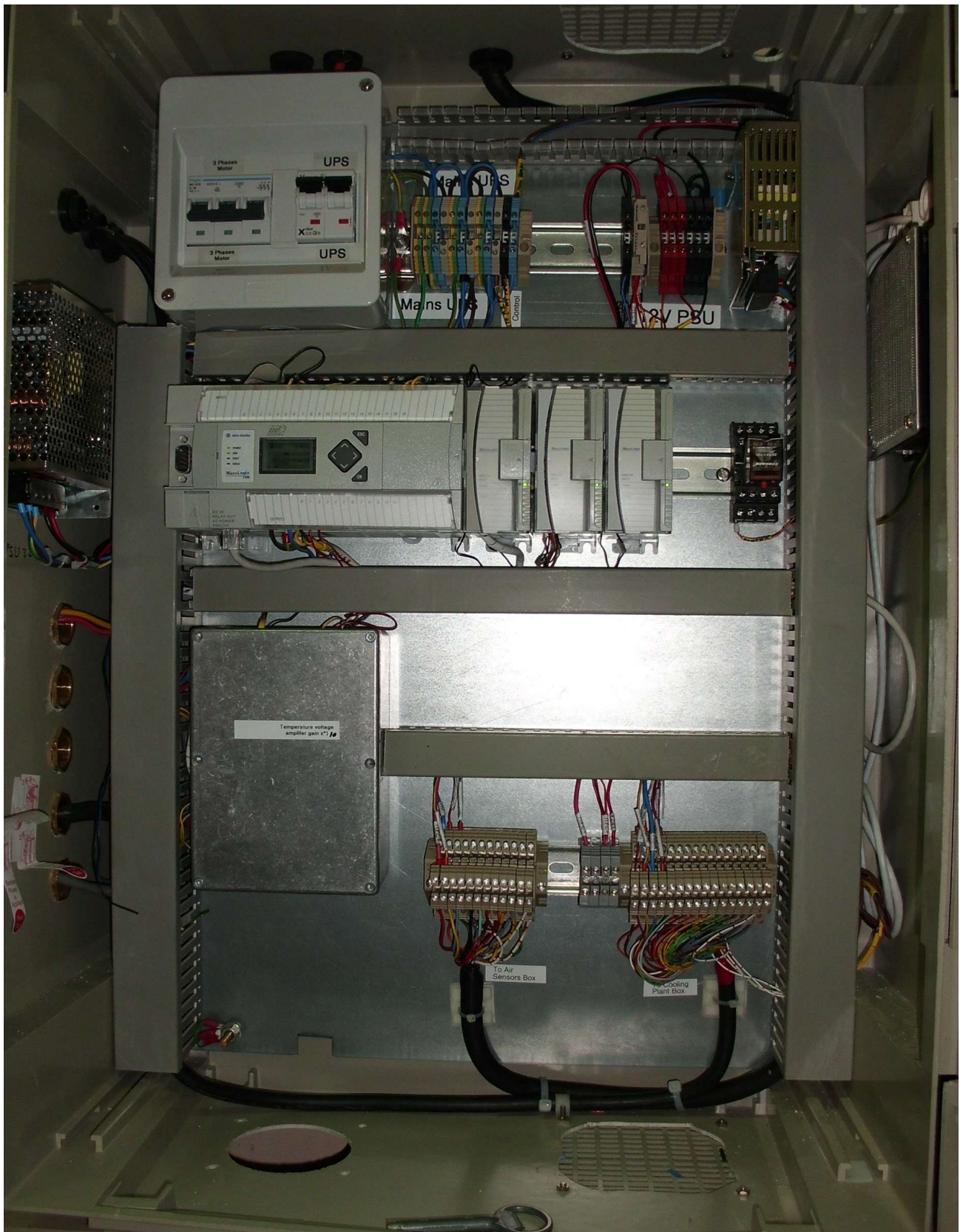
Pressure sensor: SMC PSE560-01-28

Dew point sensor: HUMITRANS 900



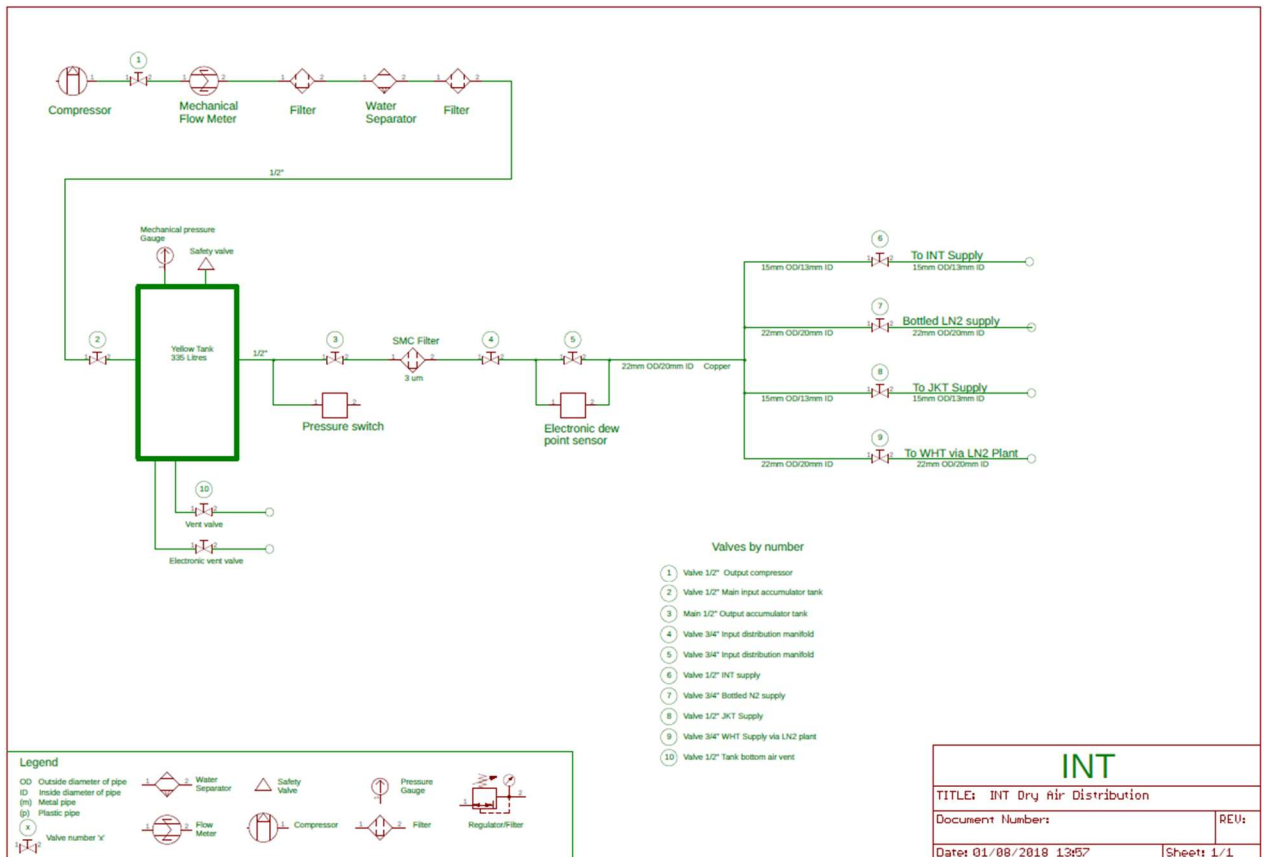
Big grey box is where the PLC of the pump room where the sensor cables arrive from the compressor, also arrive other temperature sensor cables of the oil pumps, oil coolers, etc.





In this box in the oil pump room of the WHT , is the Micrologix 1400 PLC, 24 Vcc power supply and interconnection strips between the pressure, flow and dew point sensors of the compressed air system. Other temperature sensors, etc. are also connected from the oil cooling system room, air conditioning, etc. of the telescope.

6. - Diagram of the compressed air installation of the INT telescope, the building is not included, only the compressor area.



<http://www.ing.iac.es/~eng/detectors/INTAir.pdf>

7. - List of valves and components in the INT.

Valves.

- Valve 1: Valve 1/2" Output compressor.
- Valve 2: Valve 1/2" Main input accumulator tank.
- Valve 3: Valve 1/2" Output accumulator tank.
- Valve 4: Valve 3/4" Input distribution manifold.
- Valve 5: Valve 3/4" Input distribution manifold.
- Valve 6: Valve 1/2" INT supply.
- Valve 7: Valve 3/4" Bottled N2 supply.
- Valve 8: Valve 1/2" JKT supply.
- Valve 9: Valve 3/4" WHT supply via LN2 plant.
- Valve 10: Valve 1/2" Tank bottom air vent.

8. - Description and details of the situation of valves and components in the INT.

General image after the reform at the INT in the compressor area.
You can see the new grey SMC filter and the new plastic pipes.



Valve 1 1/2" compressor output.



Valve 2 1/2" inlet to the storage tank.



Valve 3 of 1/2" from the accumulator tank.



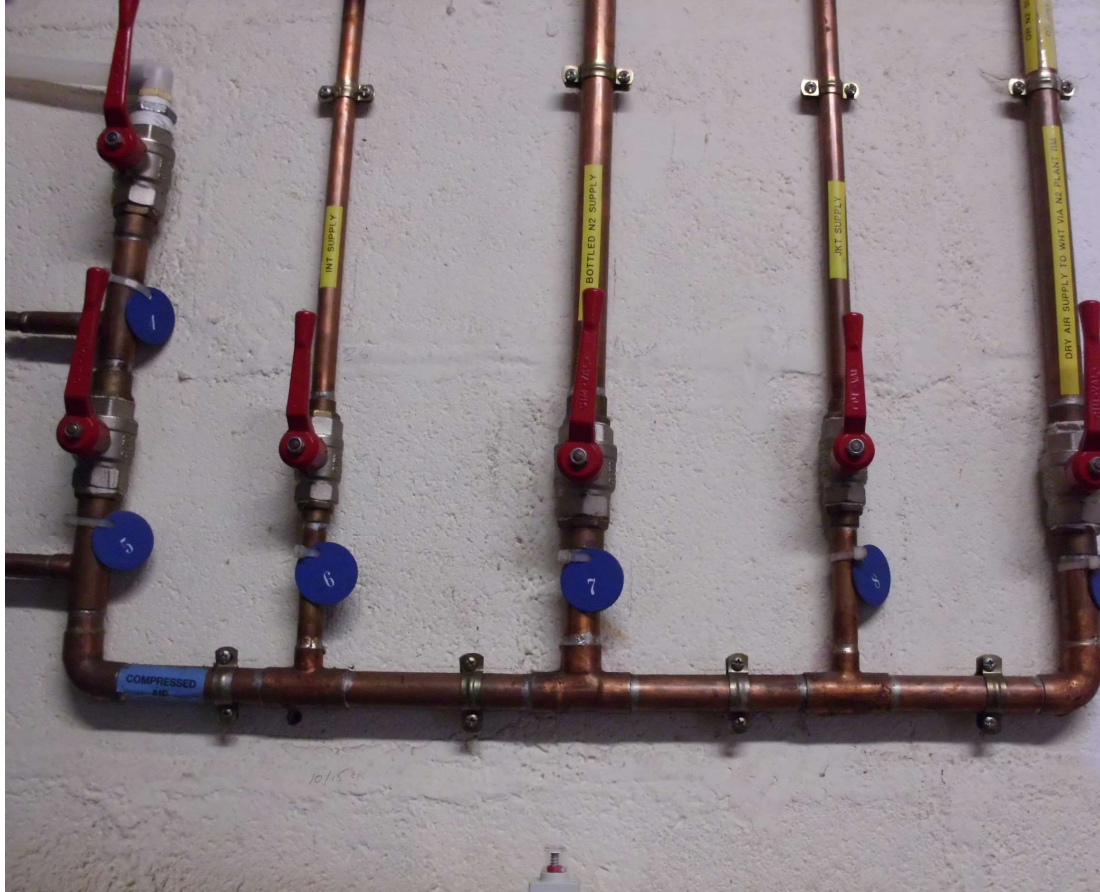
Valve 4,5 of 3/4" inlet to manifold.

Valve 6 of 1/2" INT supply.

Valve 7 of 3/4" Bottle N2 supply.

Valve 8 of 1/2" JKT supply.

Valve 9 of 3/4" WHT supply via LN2 plant.



Valve 10 of 1/2" Tank bottom air vent.

