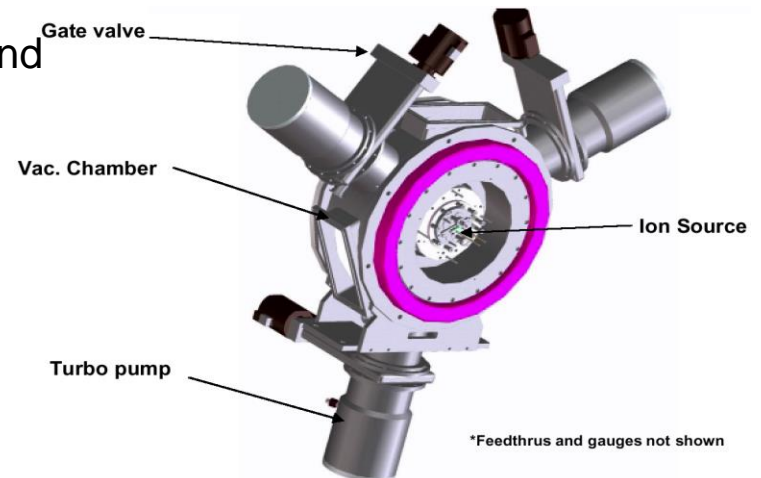


Ion Source Test Stand Vacuum Control System

Johnny Tang

Hot Spare Stand Vacuum Requirements

- (Purpose) To maintain a suitable pressure in the LEBT for conditioning and measuring the performance of the hot-spare ion source
- (Vacuum Requirements) Hydrogen gas load is 0.1-0.4 Torr l/s
- (Vacuum Requirements) To limit the charge-exchange to 10%, required 3 pump speed 1500 l/s in LEBT (not least)
- (Vacuum Requirements) LEBT vacuum pressure 10^{-6} Torr with no Gas and 10^{-4} Torr with H₂ Gas
- Estimated pump down time : < 20 Minutes
- (Control System Requirements)
 - Keep the Same Functionality as in Front End
 - Upgrade PLC5 to ControlLogix
 - Upgrade RIO to EtherNet/IP
 - Use R3.14 EPICS Base Release



Controlled and Controlling Device List

- 5 Convectron Gauges (CG)
 - 4 Ion Gauges (IG)
 - 3 Turbo Pumps (TMP)
 - 4 Rough Pumps (RP)
 - 3 Gate Valves (GV)
 - 4 Rough Valves (RV)
 - 1 Vent Valve (VV)
-
- 2 AB-Flex IO Boxes (FEE20 & FER08-26)
 - 1 ControlLogix PLC
 - 1 EtherNet/IP Module
 - 1 VME IOC
-
- FEE20: 2 IE8, 2 IB16, 1 IV16, 1 OB16 and 2 OW8 modules (76 IOs)
 - FER08-26: 1 IE8, 1 IB16, 1 OE4 and 3 OW8 modules (36 IOs)



Control Signal Name

| Device Type | Signals | Details | Signal Type |
|-------------|---------|----------|-------------|
| CVG | :Cmd | On/Off | bo |
| | :Sts | On/Off | bi |
| | :P | T | ai |
| | :Raw | mV | ai |
| IG | :Cmd | On/Off | bo |
| | :Sts | On/Off | bi |
| | :P | T | ai |
| | :Raw | V | ai |
| | :DG_Cmd | DGas/Off | bo |
| | :DG_Sts | DGas/Off | bi |
| | :EM_Cmd | HI/LO | bo |
| | :EM_Sts | HI/LO | bi |

Control Signal Name

| Device Type | Signals | Details | Signal Type |
|-------------|-----------|----------|-------------|
| TMP | :Cmd | Run/Stop | bo |
| | :Sts | On/Off | bi |
| | :Cmd_Stby | Run/Stby | bo |
| | :Spd | Hz | ai |
| | :Fault | Ok/Fault | bi |
| | :Lcl | LCL/REM | bo |
| | :Cmd_AC | On/Off | bo |
| | :Enable | ENA/DIS | bo |
| | :Spd_Set | Hz | ao |
| | :Reset | NORM/RST | bo |
| | :Vent_Rls | CLS/RLS | bo |
| | :H2O_flw | Ok/Low | bi |
| | :Other | Ok/Fault | bi |

Control Signal Name

| Device Type | Signals | Details | Signal Type |
|-------------|---------|----------|-------------|
| VV,RV,GV | :Cmd | OPN/CLS | bo |
| | :Opn | OPEN | bi |
| | :Cls | Closed | bi |
| | :Rdy | RDY/ILK | bi |
| RP | :Cmd | Run/Stop | bo |
| | :Sts | Run/Stop | bi |

| | |
|------------------|--------------------------|
| CVG | $5 \times 4 = 20$ |
| IG | $4 \times 8 = 32$ |
| TMP | $3 \times 13 = 39$ |
| RP | $4 \times 2 = 8$ |
| VV,RV,GV | $8 \times 4 = 32$ |
| Total PVs | 131 + VxStat and PLCStat |

Documentation List

| Doc Name | Description | Contact |
|-------------------|--|---|
| Pfeiffer TCM 1601 | The instruction manual for the Magnetic Bearing Controller TCM 1601 that serves to drive and monitor Pfeiffer turbomolecular pumps | www.pfeiffer-vacuum.de 1800-248-8254 |
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