Preventive Maintenance Report

 　　　1/4

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| Customer**Wellington University** | Customer'sstamp or signature |
| DepartmentChemistry and Physics department |  |
| Contact personJan Vorster |
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| ModelJNM-ECZ600R/S1 |
| Serial number NM1665000270027  |
| Contract number  |
| Working period  |
| 2023/10/27 ~ 2023/11/04 |
| EngineerJan Vorster and Watanabe Yuki |
| Remarks |
| Adjusted needle at back of console to load sample slower down magnet. (6 seconds) |
| Clean SC probe. Adjust ASC belt tension. Re align z axis ASC sample tray. |
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2/4

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| 　　　 | Model |  |
| No. | Item | Conditions and Details | Pass criteria | Result |
| 1 | The exterior of the instrument | NMR console | No damages or dents | PASSED |
| Super Conducting Magnet(SCM) | No damages or dents | PASSED |
| Attachments(ex. ATUN,ASC) | No damages or dents | PASSED |
| 2 | Electrical Power | Console | 240V, within ±10% | UPS |
| Data System | AC240V within ±10% | UPS |
| Air compressor | 240V, within ±10% | UPS |
| Power board | No loosening and damageat terminals and cables | PASSED |
| No abnormal heating in cables | PASSED |
| Tight the terminal screws | PASSED |
| \*For Power board part, check both the main body and related instruments and all attachments). |
| Breaker switch of the console | No loosening and damageat terminals and cables | PASSED |
| No abnormal heating in cables | PASSED |
| Tight the terminal screws | PASSED |
| Data System work station | No falling out of AC cables | PASSED |
| No dust in plug part | PASSED |
| No abnormal heating in cables | PASSED |
| Terminal in theair Compressor | No loosening and damageat terminals and cables | NA |
| No dust in plug part | NA |
| No abnormal heating in cables | NA |
| Work procedure　 \*Visual inspection is not permitted” |
| 1) Check terminal or cable on the power board. (Loosening, damage, heat) |
| 2) Grasp the cable (covering part), confirm not abnormal heating. |
| 3) TURN OFF with correct procedure for the instrument to be checked. |
| 4) TURN OFF the breaker switch on the power board. |
| 5) Tight the breaker switch’s terminal screw. |
| 6) Check the JEOL attachments (NR, NS, ASC, etc..) as well. |
| 3 | SuperConductingMagnet(SCM) | Cleaning | To remove dirt from SCM | PASSED / FAILED |
| Evaporation rate  | Liquid helium\*Use Conversion formula | Day 1 | 210 ml/min |
| Day 2 |  250ml/min |
| Liquid nitrogen\*Use Conversion formula | Day 1 | 3.0 l/min |
| Day 2 | 3.5 l/min |
| NR | Applicable / NONE |
| Liq He conversion formula: | Flow meter value(mL/min)÷751×60＝　　　　  | 18.37ml/h |  |
| Liq N2 conversion formula: | Flow meter value(L/min)×1000÷694×60＝　 | 281ml/h |  |
| \*In case NR (Nitrogen Replenishment System) is attached, evaporation rate check of Liquid N2 should be one day. If there is any abnormality in measuring value, check 2nd day as well. |
| Ice blockage | To remove the ice blockage of each N2 port | PASSED |
| \*In case NR (Nitrogen Replenishment System) is attached, check the ice blockage after removing one-way valve.  |

3/4

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| 　　　 | Model |  |
| No | Item | Conditions and Details | Pass criteria | Result |
| 4 | Cooling FAN | Console (back side) | Performance check and cleaning | PASSED |
| cPCI RACK (inside) | Performance check and cleaning | PASSED |
| PS UNIT (back side) | Performance check and cleaning | PASSED |
| PFG UNIT (back side) | Performance check and cleaning | PASSED |
| SHIM DRIVER (back side) | Performance check and cleaning | PASSED |
| PA UNIT (back side) | Performance check and cleaning | PASSED |
| AIR/VT UNIT (back side) | Performance check and cleaning | PASSED |
| 5 | Air lineconsumable parts | Filter element | Exchange or Cleaning | EXCHANGED |
| Air intake filterin the air compressor | Exchange or Cleaning | EXCHANGED |
| Air hoses | No wound and dirt | PASSED |
| Air tank | No water in the air tank | PASSED |
| Filter cleaningon the console (front panel) | Exchange or Cleaning | EXCHANGED |
| 6 | Air System | Record | Model name | N/A |  |
| Serial number | N/A |  |
| Operating time | N/A | hr |
| Air leak　\*Only for SLP series | Arrival time from 0[MPa] to 0.8[MPa] | N/A | sec |
| Time from “auto stop’ to “re-start” | N/A | sec |
| \*Checking method of arrival time from 0[MPa] to 0.8[MPa]1. TURN OFF operation switch of the air compressor. 2. Release the air of the compressor.3. Close outlet valve of the compressor. (Not use air tank) 4. TURN ON the compressor, measure the time from 0(zero)MPa to 0.80MPa |
| \*Re-start check1. When the compressor pressure reached 0.8[MPa], it will stop automatically.2. Measure the time from “automatic stop” to “re-start”.  |
| Air leak check of each part Check breakage/loosening of each parts/joints. | Compressor | each valve | N/A |
| Air tank | inlet part | N/A |
| outlet part | N/A |
| Regulator | each joint parts | N/A |
| Air pressure & Flow rate | Console | 0.25MPa | 0.25MPa |
| Air/Vt unit (in console) | 0.1 ±0.01MPa | 0.1MPa |
| VT air (in console) | 14.5 | +0.5 | L/min | 17L/min |
| -2.5 |
| Shim Cool | Press. | 0.15MPa (small meter on side) | 0.15MPa |
| Flow. | 30.0L/min | No meter |
| 7 | Cables | Each unit inside the console | No breakage and loosening | PASSED |
| Back side of the console | No breakage and loosening | PASSED |
| Head Amplifier Chassis | Front | No breakage and loosening | PASSED |
| Rear | No breakage and loosening | PASSED |

4/4

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| 　　　 | Model |  |
| No. | Item | Conditions and Details | Pass criteria | Result |
| 8 | Operating voltage | Head Amplifieroperatingvoltage | HA CONTboard | TP18 | －TP22(GND) | + 6V | ±0.30V | 5.887V |
| TP19 | +15V | ±0.75V | 14.64V |
| TP20 | -15V | ±0.75V | -14.97V |
| TP21 | -30V | ±1.50V | -30.05V |
| LOAD/EJECTcontrol | HA CONTboard | TP3 | －TP22(GND) | +2.5 to 2.7V | Adjusted to 2.518V |
| TP4 | +2.5 to 2.7V | Adjusted 2.529V |
| 9 | Indicators | Tuning mode 10% EB | When tuning, display shows the value | PASSED  |
| Switch from value to DIP mode | PASSED |
| He / N2 filling mode | When Helium Filing, display shows the value | PASSED  |
| When Nitrogen Filing, display shows the value | PASSED |
| LOADED signal | When sample loaded,“LOADED” LED is light | PASSED |
| EJECTED signal | When sample ejected,“EJECTED” LED is light | PASSED |
| ACTIVE signal | When measurement, “ACTIVE” LED is light | PASSED |
| 10 | Spinning Control- probe | Cleaning | Cleaning the stator of liquid probe | PASSED & Cleaned |
| Performance | Spinning is stable at 15Hz setting | PASSED |
| 11 | RF power | Check the RF power( To Probe power) | 1H | <30W single\_90\_pulse |  27.2W=5dB |
| 13C | < 80~125W single\_90\_pulse |  111W=11dB |
| LOCK | < 15W single\_pulse\_2H | 11.5W=16.5dB |
| 12 | Auto Tuning | Performance \*Only for attachment purchaser | Correctly | 1H | PASSED |
| 13C / 15N | PASSED |
| 13 | Pulse width*Update Hi, Lo, Softpulse* | 90° pulse width check Sample: standard sample | Almost same as previous check2) | 1H 0.1%EB ft\_1h90\_pulse. |  10.9μs |
| 13C 10%EB ft\_13c90\_pulse |  10.7μs |
| Lock 1%CHCl3 ft\_2h\_lock\_90\_pulse | 470μs |
| 14 | Sensitivity | Sensitivity check Sample: standard sample | Almost same as previous check2) | 1H S/N 0.1%EB ft\_1h\_sensitivity | 1447:1 |
| 13C S/N 10%EB ft\_13c\_sens\_Royal\_normal\_tube | 425:1 |
| 15 | LOCK control\*each shims has a limit | AUTOLOCK operating | AUTOLOCK operates correctly | PASSED |
| Field value (lineshape sample) | Field(Z0) is within the shim range | Z0 = | -20.99 kHz |
| 16 | Variable Temperature | High temperature range (60C) | Temperature control is correctly operated | PASSED |
| Probe heater | No abnormal heating during VT | PASSED |
| Low temperature range\*Only for attachment purchaser | Alarm control is operated without liquid nitrogen in Dewar when 0 deg C setting. | PASSED |
| Dewar heater | No breakage in Dewar heater | PASSED |
| 17 | Resolution (3%CDCl3 in Acetone D6)25C | Adjustment Sample: standard sample | Perform resolution adjustment | PASSED  |
| Gradient Shim operating | PASSED |
| Shim file | Update System Shim | PASSED |
| 18 | File maintenance | Edit probe file | Optimize Probe Tool parameters | PASSED |
| 19 | PFG Offset |  |  | Done |
| Remarks:1. Draw a diagonal line into “Result” where the units not included in the configuration.2. Refer the values of installation when 1st maintenance.3. “N/A” means “not applicable”. |

3.Check for JASTEC Installation File Standard values ​​are written

6: Sample must be ejected for Air pressure & Flow rate

8: Eject sample. Balance VR3 and VR4 to reduce voltage if VR3 max out. If both VR3 is max and VR4 is max clean sample barrel (Spinner/sample holder).

TP3 identifies the spin. Voltage change when spin on or off.

10: Clean probe.

11. Input power (W) varies depending on the type of probe.

Frequency depends on the type of SCM

13: Also set shapeviewer. (Probe file & Probe tool chap. 5)

14: Shim is important for resolution.

15: Check Z0 from lineshape test in 17.

17: lineshape test 45 degree relaxation 60 sec.ft\_1h\_lineshape0h. If lineshape is bad calculate 80% from Lock Meter, switch of spin and adjust X, XZ, YZ… manually or use 3D gradient shimming. Check stddev is <1. Record lineshape values.

Please save shim values ​​before adjustment

The value on the lock meter will go up and down as the lock gain changes, so be careful with the gain.

For manual sims, move the shims in the following order.

X→Y→XZ→YZ→X→Y→X2→Y2→X→Y

Adjust the same terms as the 3D gradient shim if necessary.

Recommend running it on ±5.

After completing the adjustment, spin it and perform 1D gradient sim. 90 degree 5 sec relaxation.

If the line shape does not improve, it may be better to re-map the gradient sim.

Check the gradient shim settings. This varies for each solvent.

→Z1～Z6☑,　scan-4, Italation-3 ,x-offset-once,….

If the customer desires, please adjust the pulse width and S/N of 19F, 31P, 15N....

If the resolution cannot be improved sufficiently with the 1D gradient sim, it is necessary to set the sim map again.

Shim maps

Console maintenance

Interactive

Upgrade Delta 6.3

PW90 Checks

Lock – 1/3% CHCl3

1H – 0.1% EB

13C – 10% EB

Tuning adjustments 1H use 0.1%EB

Manual tune -n Done

Update tune file freq +50