NSLS-II

NATIONAL SYNCHROTRON LIGHT SOURCE II

BEAMLINE DI WATER SYSTEM BALANCING

Rev Date: 04/05/2016
Author: Russ O'Brien
Approved: 04/13/2016

Title	Name	Approval Date
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Serial No	Part No	Part Rev	ECN	Rev	ECN	Rev
	BL: 7-10 Hutch: FOE					
Deviation & Waiver:						

OP	Description	Name/Life #	Date	DR
10	Review the following for ES&H requirements: Follow the work planning and ESH requirements for the area. Safety glasses are required.	O'BRIEN 24021	1/31/18	
20	Verify measuring and test equipment used for this procedure contains a valid calibration label in accordance with NSLS-II Calibration Procedure PS-QAP-0901, where applicable. The technician is responsible for notifying the technical supervisor and/or the cognizant engineer of any discrepancies occurring during the performance of this procedure. All discrepancies shall be identified and reported in accordance with NSLS-II Discrepancy Reporting Procedure PS-QAP-0002.	O'BRIEN 24021	1/31/18	

Record the model, serial number, and calibration due date of the NIST Calibrated Flow to be used with this traveler:

Model#: FLEXIM FLUXUS F601

Serial#: 22126

Calibration Due Date: 5/24/18

OP	Description	Name/Life #	Date	DR
30	HUTCH INFORMATION - This step shall be performed by the mechanical utilities engineer.	O'BRIEN 24021	1/31/18	

A. Record the relevant Beamline name (BL) and Hutch (s) on this sheet, in the box for "Part No".

B. Record the relevant flow diagram.

Flow Diagram No.: PD-SST-UT-1500

C. Specify the following items & record in chart within Sequence 60:

- Flow meter tag ID
- Transmitter tag ID
- Target Flow (GPM)
- Alarm Trip Point (GPM)
- Check off for EPS or PPS
- Indicate the Upper Range Value (URV) in GPM

OP	Description	Name/Life #	Date	DR
40	VISUAL INSPECTION - This step shall be performed by the mechanical utilities engineer.	O'BRIEN 24021	1/31/18	

A. Verify system is configured per flow diagram, and specifically confirm the following is installed:

__✓__ Motorized Valves
__✓__ DIW main Isolation Ball valves
__✓__ DIWS filter assembly
__✓__ DIWR filter assembly
__✓__ Pressure gauges
__✓__ DIW supply manifold
__✓__ DIW return manifold
__✓__ DIWR needle valves
__✓__ DIW isolation ball valves
__✓__ Orifice plate type flow meters
__✓__ Capillary tubing
__✓__ Transmitters (Yokogawa/Siemens)

B. Verify the following:

__✓__ All DI supply and return water circuits are connected to their corresponding optical equipment inlet and outlet ports or all unused circuits with flow meters installed are looped to provide flow through the circuit.

__✓__ All filter and header bypass valves are 100% closed, and all main header isolation valves are 100% open.

__✓__ All motorized isolation valves on the header are 100% open.

__✓__ All circuits are flowing water.

__✓__ All pressure drops across filters are within 1-5 psig, as indicated on the upstream and downsteam pressure gauges.

__✓__ All transmitters and EPS flow meters are powered and bled off, prior to balancing the DIW circuits.

__✓__ All transmitters have been programmed with their upper range values for differential pressure and flow rate.

OP	Description	Name/Life #	Date	DR
50	EPS SYSTEM BALANCING - This step shall be performed by the mechanical utilities engineer. Adjust actual flow rates to meet target flow rates per the following procedure: A. Adjust the needle valve on the DI water return branch untill the transmitter readout (GPM) of the EPS circuit is equal to or no more than 10% of the URV above the target flow rate (GPM). Note: Step A may have to be repeated to obtain target values. Adjusting the main header bypass valve may be required. If the circuit is 100% open and the target flow rate is not achievable, write in "N/A" under the Transmitter Readout (GPM) column within the table of Sequence 60 and follow procedure PS-QAP-0002 on discrepancy reporting. B. Record transmitter readings (GPM) on chart. C. Check each flow meter reads zero by closing a manifold isolation valve on each circuit, one at a time, to confirm the circuit flow rate goes to zero. Once confirmed, reopen the valves.	O'BRIEN 24021	1/31/18	

OP	Description	Name/Life #	Date	DR
60	PPS SYSTEM BALANCING - This step shall be performed by the mechanical utilites engineer.	O'BRIEN 24021	2/5/18	

A. Install and setup the NIST calibrated ultrasonic flow meter onto the circuit to be measured according to "User Manual for Fluxus F601 UMFLUXUS_F6V4-0EN, 2010-05-03". Ensure the ultrasonic transmitter is set to store the measured values and configuration data.

Adjust actual flow rates to meet target flow rates per the following procedure:

B. Adjust the needle valve on the DI water return branch untill the ultrasonic transmitter readout (GPM) of the PPS circuit is equal to or no more than 10% of the URV above the target flow rate (GPM).

Note: Step B may have to be repeated to obtain target values. Adjusting the main header bypass valve may be required. If the circuit is 100% open and the target flow rate is not achievable, write in "N/A" under the Transmitter Readout (GPM) column within the table of Sequence 60 and follow procedure PS-QAP-0002 on discrepancy reporting.

C. Confirm the Yokogawa and Siemens transmitters display values that are equal to or no more than 10% of the URV above the NIST calibrated ultrasonic flow meter readout:

1. If the Yokogawa or the Siemens transmitters display values that are below the NIST calibrated ultrasonic flow meter readout, or more than 10% of the URV above the readout, then proceed to execute PS Traveler UT-002 FIELD CORRECTION OF DI WATER CIRCUITS. Once executed, repeat Sequence 60.

D. Record the NIST calibrated flow meter reading and the displayed reading of both the Yokogawa and Siemens differential pressure transmitters on chart under the Transmitter Readout (GPM) column.

E. Check each flow meter reads zero by closing a manifold isolation valve on each circuit, one at a time, to confirm the circuit flow rate goes to zero. Once confirmed, reopen the valves.

OP **Description** **Name/Life #** **Date** **DR**

WATER CIRCUIT #	FLOW METER TAG ID	TRANSMITTER TAG ID	PPS	EPS	TARGET FLOW (GPM)	ALARM TRIP POINT (GPM)	UPPER RANGE VALUE (GPM)	TRANSMITTER READOUT (GPM)	NIST FLOW METER READOUT (GPM)
1	___-CUR-FM-___	___-CUR-DPS-___			SEE ATTACHED TABLE FOR COMPLETE DATA				
2	___-CUR-FM-___	___-CUR-DPS-___							
3	___-CUR-FM-___	___-CUR-DPS-___							
4	___-CUR-FM-___	___-CUR-DPS-___							
5	___-CUR-FM-___	___-CUR-DPS-___							
6	___-CUR-FM-___	___-CUR-DPS-___							
7	___-CUR-FM-___	___-CUR-DPS-___							
8	___-CUR-FM-___	___-CUR-DPS-___							
9	___-CUR-FM-___	___-CUR-DPS-___							
10	___-CUR-FM-___	___-CUR-DPS-___							
11	___-CUR-FM-___	___-CUR-DPS-___							
12	___-CUR-FM-___	___-CUR-DPS-___							
13	___-CUR-FM-___	___-CUR-DPS-___							
14	___-CUR-FM-___	___-CUR-DPS-___							
15	___-CUR-FM-___	___-CUR-DPS-___							
16	___-CUR-FM-___	___-CUR-DPS-___							
17	___-CUR-FM-___	___-CUR-DPS-___							
18	___-CUR-FM-___	___-CUR-DPS-___							
19	___-CUR-FM-___	___-CUR-DPS-___							
20	___-CUR-FM-___	___-CUR-DPS-___							
21	___-CUR-FM-___	___-CUR-DPS-___							
22	___-CUR-FM-___	___-CUR-DPS-___							
23	___-CUR-FM-___	___-CUR-DPS-___							
24	___-CUR-FM-___	___-CUR-DPS-___							
25	___-CUR-FM-___	___-CUR-DPS-___							
26	___-CUR-FM-___	___-CUR-DPS-___							
27	___-CUR-FM-___	___-CUR-DPS-___							
28	___-CUR-FM-___	___-CUR-DPS-___							
29	___-CUR-FM-___	___-CUR-DPS-___							
30	___-CUR-FM-___	___-CUR-DPS-___							

70 Verify All Traveler Operations Complete
This step shall be performed by the cognizant beamline scientist/engineer.

CIERNO JAYE 06156	2/5/18	

7-ID SST DI WATER BALANCING TRAVELER TABLE -OPERATIONS 30, 50 & 60

WATER CIRCUIT #	FLOW METER TAG ID	TRANSMITTER TAG ID	PPS	EPS	TARGET FLOW (GPM)	ALARM TRIP POINT (GPM)	UPPER RANGE VALUE (GPM)	TRANSMITTER READOUT (GPM)	NIST FLOW METER READOUT (GPM)
1A	7IDA-CUR-FM-1068	7IDR-CUR-DPS-1075	X		1.65	1.30	4.91	1.67	1.67
1B	7IDA-CUR-FM-1072	7IDR-CUR-DPS-1071	X				5.18	1.72	
2	7IDA-CUR-FM-1064	N/A		X	1.25	0.80	2.80	1.31	N/A
3	7IDA-CUR-FM-1060	N/A		X	1.40	1.00	1.40	1.47	N/A
4	7IDA-CUR-FM-1056	N/A		X	1.50	1.00	1.40	1.51	N/A
5	7IDA-CUR-FM-1052	N/A		X	1.00	0.80	1.40	1.03	N/A
6	7IDA-CUR-FM-1048	N/A		X	1.00	0.80	1.40	1.03	N/A
7	7IDA-CUR-FM-1045	N/A		X	0.85	0.65	1.40	0.90	N/A
8	7IDA-CUR-FM-1042	N/A		X	0.90	0.65	1.40	0.95	N/A
9A	7IDA-CUR-FM-1036	7IDR-CUR-DPS-1035	X		0.60	0.50	1.00	0.59	0.63
9B	7IDA-CUR-FM-1032	7IDR-CUR-DPS-1039	X				1.00	0.59	
11	7IDF-CUR-FM-1119	N/A		X	0.90	0.50	1.40	0.91	N/A
12	7IDF-CUR-FM-1115	N/A		X	0.80	0.50	1.40	0.82	N/A
13A	7IDF-CUR-FM-1104	7IDR-CUR-DPS-1107	X		1.00	0.50	2.61	0.99	1.01
13B	7IDF-CUR-FM-1108	7IDR-CUR-DPS-1111	X				2.61	0.96	1.01
14	7IDF-CUR-FM-1101	N/A		X	0.50	0.30	1.40	0.51	N/A
15	7IDF-CUR-FM-1152	N/A		X	0.45	0.25	1.40	0.49	N/A
16A	7IDF-CUR-FM-1141	7IDR-CUR-DPS-1144	X		0.90	0.60	1.50	0.96	0.94
16B	7IDF-CUR-FM-1145	7IDR-CUR-DPS-1148	X				1.50	0.93	
17	7IDF-CUR-FM-1137	N/A		X	0.50	0.30	1.40	0.50	N/A
18	7IDF-CUR-FM-1133	N/A		X	0.50	0.30	1.40	0.50	N/A

OP	Description	Name/Life #	Date	DR
80	REVISION HISTORY (This step is informational and does not require signoff)			

Rev - Description - Date

C First Release 8/8/2014

D 8/7/2015

Added the following to Balancing Table flow rates:

*WARNING TRIP POINT (GPM)

*ALARM INTERLOCK POINT (GPM)

Under Description 60 D.1, UT-002 FIELD CALIBRATION will be replaced by UT-002 FIELD CORRECTION.

Author was changed from J. Moya to R. O'Brien

*Table in Sequence 60 was revised for legibility.

E 4/5/2016

Changed the person responsible for completing Sequence 30 from the cognizant beamline scientist or engineer to the mechanical utilties engineer.

Changed the verification steps in Sequence 40 to include valve position and flow confirmations.

Changed Sequence 50 to address ATS 8657.2.6 comments on allowable flow tolerance. Also added a zero check on instrumentation.

Changed the table in Sequence 60 by removing the "Warning Trip Flow" column and adding a column for transmitter tag IDs. This sequence was also edited to adress ATS 8657.2.6 comments on transmitter comparisons to NIST measurements and allowable flow tolerances. Other verbage was clarified on the table as well, and a zero check on the instrumentation was included.