

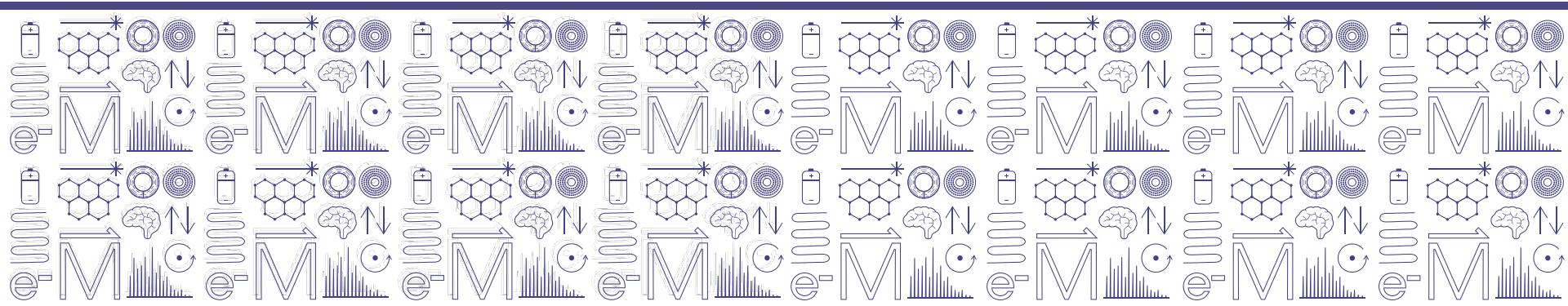
SCHMPS Client

“How To” Manual



Julia H. Smith & Scott T. Hannahs

The SCHMPS hardware and firmware/software
are still under construction – so is this manual !



Contents

- What is the SCHMPS ?
- Installing the Client
- How to use the Client
 - Start Up
 - Shut Down
 - Operation



SCHMPS in a Nutshell

High-Speed protection system.

Processing

Resistive Magnet: Monitors resistance of coils.

- Current, coil voltages, MCW pressure in/out, MCW temperature in/out.
→ Compares resistance of each of 4 coil with predicted value based on current, resistance fits, water temperature, LdI/dt .

SC Magnet: Seeks normal (resistive) voltage in conductor

- 1) Compares each layer voltage to two adjacent layers ($n-1$, $n+1$).
- 2) Compares voltage over entire coil with that of co-wound inductor (redundant).
- 3) Checks voltage on LTS bus-bars, HTS/resistive leads.

Output

Resistive Magnet: Monitors resistance of coils.

If needed:

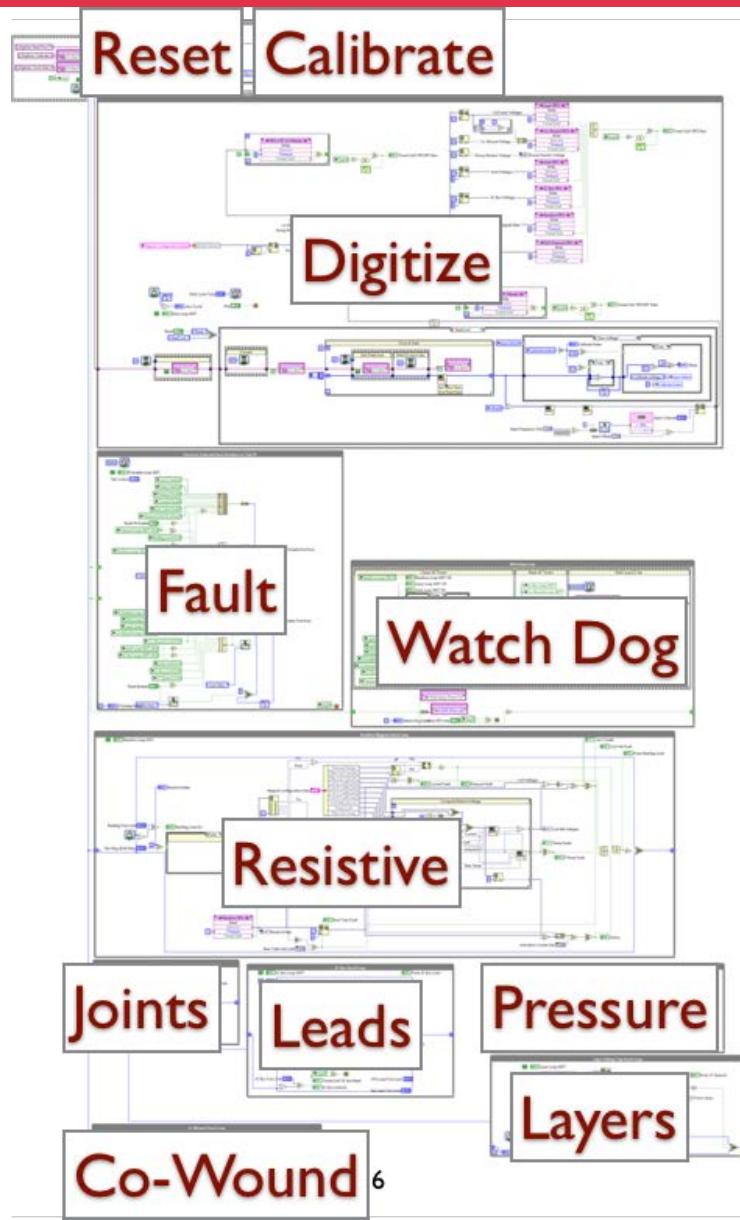
- Disables gating of thyristors in the power supply.
- Exponential decay with 7.6 sec time-constant.
- Energy stored in inductance of outsert deposited in insert.

SC Magnet: Seeks normal (resistive) voltage in conductor

- If normal (resistive) voltage too high, disables breaker closing.
- Exponential decay with ~2 sec time-constant.
- Energy stored in inductance of outsert deposited in dump resistor.



Implementation: Firm-/Software



FPGA

- Robust (used for safety systems)
- Loops run simultaneously
- No OS (*i.e.* no variation in timing)
- Timing precision of 25 ns
- Protection independent of RT system

Real Time (RT) System

- Linux based
- Guaranteed response time
- Industrial quality



SCHMPS Hardware



SCHMPS cabinet in
Cell 14



SCHMPS Hardware



SCHMPS digitizer power supplies



SCHMPS cabinets
the pipe chase



SCHMPS digitizers



Both cabinets are locked; HV danger.



Getting Ready to Run the Client

Steps:

1) Check if you have LabVIEW (or a LabVIEW Run-Time Engine) installed on your computer.

→ If yes, go to Step 3.

→ If no, proceed with Step 2.

2) Install LabVIEW Run-Time engine.

Windows: <http://www.ni.com/download/labview-run-time-engine-2015/5507/en/>

Mac: <http://www.ni.com/download/labview-run-time-engine-2015-sp1/5840/en/>

3) Copy the latest version of the client software “SCHMPS Network Client LV15” from the Operations Group’s server “**afp://opsserver/Groups/operations/Drop Folders/Scott**” to your computer.

4) Unzip the “SCHMPS Network Client LV15.zip”.

5) In the “SCHMPS Network Client LV15”-folder, go to “Builds” and locate

Windows: SCHMPS Network Client.exe

Mac: SCHMPS Network Client.app

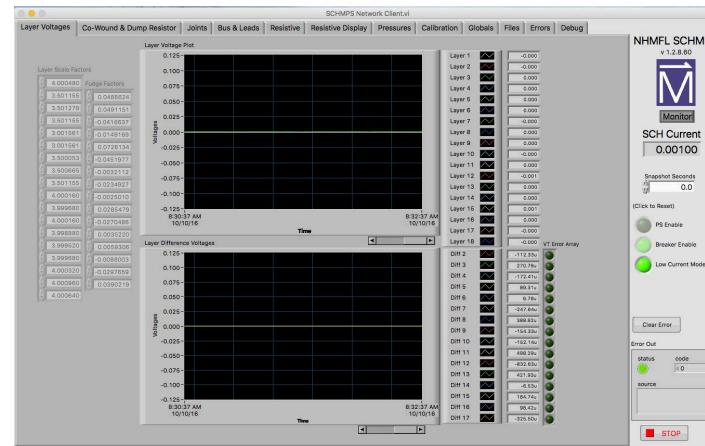
6) Run the client by double-clicking the executable (Windows)/applicaton (Mac) file.



How to Start Up the Client

Steps:

- 1) Make sure your computer is on the NHMFL network (hardwired or wifi).
- 2) Run Client by double-clicking the executable (Windows)/application (Mac) file. Your computer might prompt you to allow the Client to access the network (if so allow this). The SCHMPS Client will open.



- 3) Click the “Monitor” button to start monitoring the SCHMPS channels.

NOTE: Several users can start a client at the same time. Every user with editing privileges can send commands to the SCHMPS. The SCHMPS will execute commands from all clients.

How to Use the Client: SCH Start Up

For operators/advanced users only !!

Steps:

- 1) Start up SCHMPS Client before setting up the magnet.
- 2) Check status of SCH – warning lights etc.
→ There should be a Resistive Magnet Error (since the MCW is not turned on yet).
- 3) Log in to obtain operator privileges.
- 4) Click on breaker enable button (switch 125 V power supply on if needed).
- 5) Click on PS enable button.
- 6) Reset the SCHMPS (physical switch on SCHMPS) → PS enable light on SCHMPS lights up.
- 7) System should be ready to go.

NOTE: The PS Enable on the SCHMPS Client and the Reset/PS Enable on the SCHMPS electronics rack are independent.



How to Use the Client: SCH Shut Down

For operators/advanced users only !!

Steps:

- 1) Leave the SCHMPS as is, i.e. DO NOT DO ANYTHING 😊.
- As the magnet cell is shut down by the operator, the magnet cooling water pressure will decrease and hence the Δ MCW pressure will drop below the set limit. As a result, the “PS Enable” indicator light/button on the SCHMPS interface will turn off, i.e. the PS is no longer enabled.
 - The “Breaker Enable” indicator light/button on the SCHMPS interface will stay on, i.e. the in-cell breakers remain closed.



How to Use the Client: After a Trip/Dump

For operators/advanced users only !!

Steps:

- 1) Check status of SCH – warning lights etc.
→ Note Errors for trip/dump analysis.
- 2) If not yet logged in, log in to obtain operator privileges.
- 3) Click on breaker enable button.
- 4) Click on PS enable button.
- 5) Reset the SCHMPS (physical switch on SCHMPS)
→ Breakers will close (you will hear this).
→ PS enable light on SCHMPS lights up.
- 6) System should be ready to go.



How to Use the Client: Upload/update RMPS configuration file I

Steps:

- 1) Go to: <http://schprotect.ad.magnet.fsu.edu/#Home>
- 2) Log in using the “normal” ops login credentials.



How to Use the Client: Upload/update RMPS configuration file II

3) Go to: /usr/local/shared/Magnet Calibrations



Click the “Remote File Browser” icon to maneuver to the “Magnet Calibrations” folder.

It will look similar to this.

SCHProtect : Remote File Browser

/usr/local/shared/Magnet Calibrations

File Name	File Size (bytes)	Modification Time
/	226	16:18:19 2/11/2013
> C	31973	16:14:48 2/11/2013
> bin	1734	00:25:05 8/13/2016
> boot	1778	18:11:11 11/10/2016
> c	1813	00:25:05 8/13/2016
> dev	223	01:31:20 2/09/2016
> etc	32851	22:12:37 9/04/2014
> home	237	01:31:20 2/09/2016
> lib	33205	01:31:20 2/09/2016
> lib64	1813	00:25:05 8/13/2016
> lost+found	222	01:31:20 2/09/2016
> media	413693	18:10:28 7/05/2012
> mnt	1732	00:25:05 8/13/2016
> proc	202	20:06:55 1/03/2012
> run	27752	19:08:32 8/19/2010
> sbin	1813	00:25:05 8/13/2016
> sys	221	01:31:20 2/09/2016
> tmp	27653	19:06:39 8/19/2010
> user	1732	00:25:05 8/13/2016
> > bin	221	01:31:20 2/09/2016
> > games	220	01:31:20 2/09/2016
> > include	30653	21:10:38 4/29/2011
> > lib	1733	00:25:05 8/13/2016
> local	221	01:31:20 2/09/2016
> > bin	221	01:31:20 2/09/2016
> > lib	31476	17:55:50 9/29/2014
> > natinst	1733	00:25:05 8/13/2016
> > sbin	221	21:35:51 11/04/2014
> shared	31062	21:33:00 11/04/2014
> > Data	1733	00:25:05 8/13/2016
Magnet Calibrations	1671	01:31:20 2/09/2016
None Coil Fit.txt		



How to Use the Client: Upload/update RMPS configuration file III

4a) To upload a new RMPS configuration file: Drag the new file into the Remote File Browser window.

The screenshot shows the SCHProtect : Remote File Browser interface. On the left is a sidebar with various icons for file operations like upload, download, search, and refresh. The main area shows a file tree under '/user/local/shared/Magnet Calibrations' and a detailed file list table. The table has columns for 'File Name', 'File Size (bytes)', and 'Modification Time'. A red arrow points from the text 'Drag the new RMPS configuration file here. This will replace the existing RMPS file.' to the empty space above the file list table, indicating where a new file should be dropped.

File Name	File Size (bytes)	Modification Time
Cell 12 Calibration Fit.txt	226	17:18:19 2/11/2013
Cell 12 Calibration.pdf	31973	16:14:48 2/11/2013
Cell 12 Seq 27 Coil Fit.txt	1734	00:25:05 8/13/2016
Cell 14 Seq 3 Coil Fit.txt	1778	18:11:11 11/10/2016
Cell 15 Both Ins_Out Coil Fit.txt	1813	00:25:05 8/13/2016
Cell 15 Calibration Fit.txt	223	01:31:20 2/09/2016
Cell 15 Calibration.pdf	32851	22:12:37 9/04/2014
Cell 15 Insert Calibration Fit.txt	237	01:31:20 2/09/2016
Cell 15 Insert Calibration.pdf	33205	01:31:20 2/09/2016
Cell 15 Ins_Only Coil Fit.txt	1813	00:25:05 8/13/2016
Cell 2 Calibration Fit.txt	222	01:31:20 2/09/2016
Cell 2 Calibration.pdf	413693	18:10:28 7/05/2012
Cell 2 Seq 3 Coil Fit.txt	1732	00:25:05 8/13/2016
Cell 5 Calibration Fit.txt	202	20:06:55 1/03/2012
Cell 5 Calibration.pdf	27752	19:08:32 8/19/2010
Cell 5 Seq 17 Coil Fit.txt	1813	00:25:05 8/13/2016
Cell 6 Calibration Fit.txt	221	01:31:20 2/09/2016
Cell 6 Calibration.pdf	27653	19:06:39 8/19/2010
Cell 6 Seq 4 Coil Fit.txt	1732	00:25:05 8/13/2016
Cell 6-3 Calibration Fit.txt	221	01:31:20 2/09/2016
Cell 7 Calibration Fit.txt	220	01:31:20 2/09/2016
Cell 7 Calibration.pdf	30653	21:10:38 4/29/2011
Cell 7 Seq 12 Coil Fit.txt	1733	00:25:05 8/13/2016
Cell 8 Calibration Fit.txt	221	01:31:20 2/09/2016
Cell 8 Calibration.pdf	31476	17:55:50 9/29/2014
Cell 8 Seq 20 Coil Fit.txt	1733	00:25:05 8/13/2016
Cell 9 Calibration Fit.txt	221	21:35:51 11/04/2014
Cell 9 Calibration.pdf	31062	21:33:00 11/04/2014
Cell 9 Seq 23 Coil Fit.txt	1733	00:25:05 8/13/2016
None Coil Fit.txt	1671	01:31:20 2/09/2016

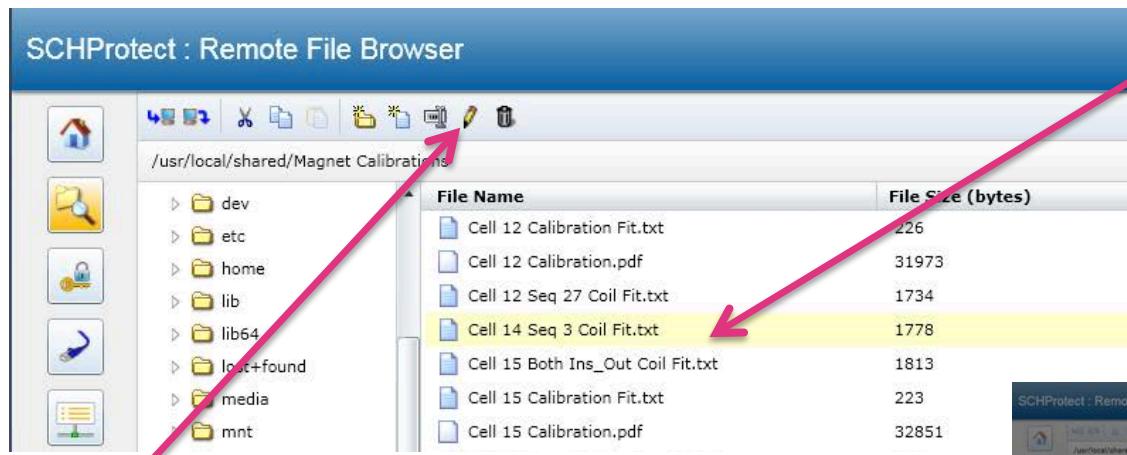
Drag the new RMPS configuration file here. This will replace the existing RMPS file.

NOTE: You will NOT be asked if you really want to replace the existing file. It will just be replaced.



How to Use the Client: Upload/update RMPS configuration file IV

4b) To update the existing RMPS configuration file: Click on the file in the Remote File Browser. Then, click the edit icon (pencil), which will open the file in an editor window. Make changes, click “save changes”.

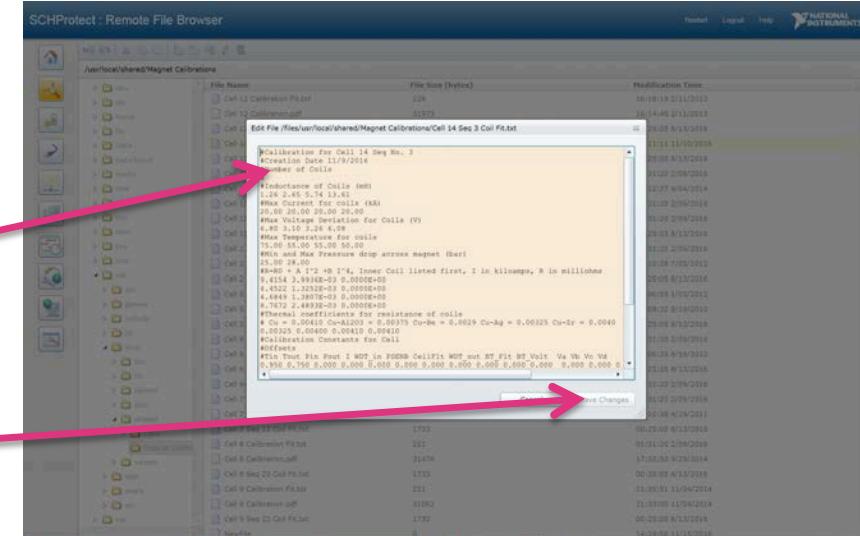


Click edit icon.

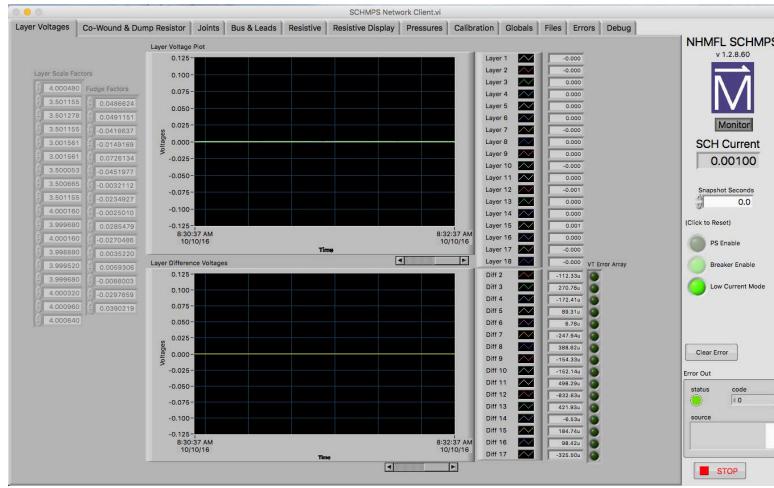
RMPS configuration file is opened in editor.

Click save changes.

- Click on the Cell 14 file. This enables editing.



SCHMPS Client - General



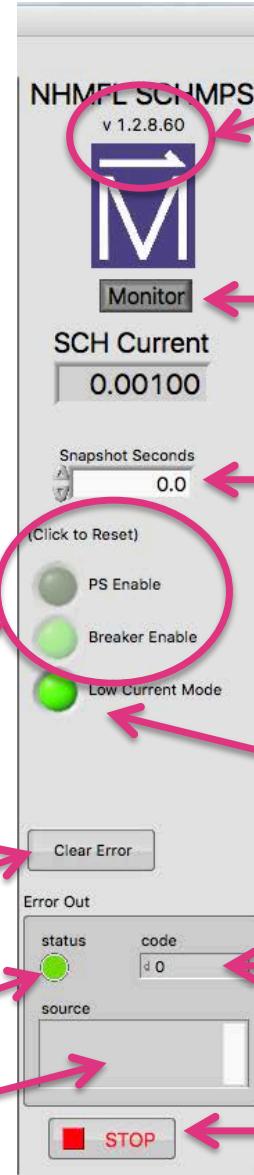
Breaker & Power Supply Enable, these are indicator lights AND push-buttons. If all conditions are fulfilled, you can turn on the PS Enable and the Breaker Enable by pushing these buttons.

NOTE: You CANNOT turn off the PS Enable or the Breaker Enable using the button.

Hit this button to clear errors and see if error persists.

Status light is GREEN if there is no internal LabVIEW error. It is RED if there is an error.

Displays error message.



Version number

Press monitor to start monitoring SCHMPS channels.

Snapshot tool.

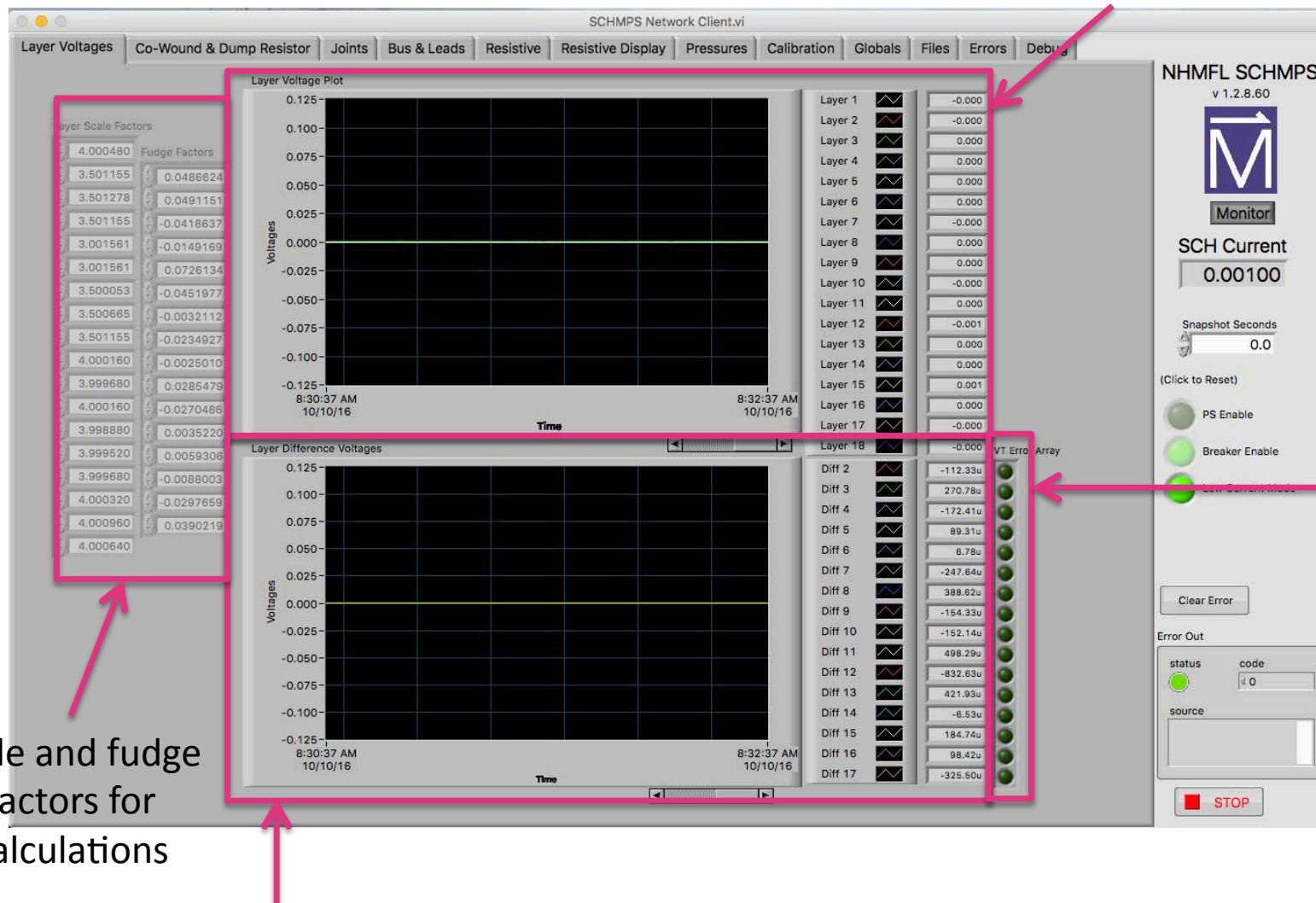
Low Current Mode indication: If this light is on, the “low current mode” limits apply.

Outputs error code.

Stop program with this button.



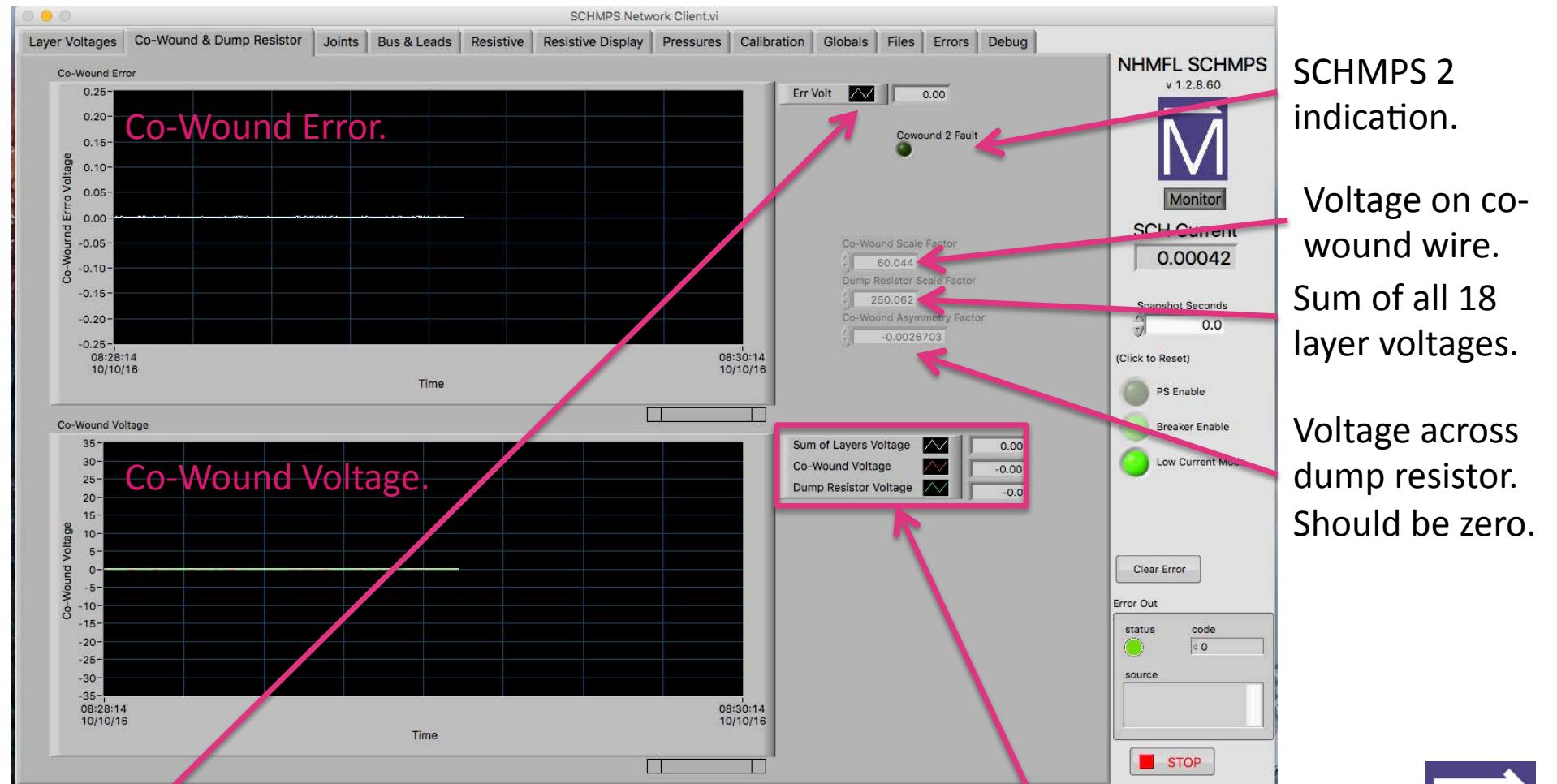
Tab: “Layer Voltages”



$$\text{Diff}(i) = V(i+1) + V(i-1) - 2 \cdot V(i)$$



Tab: “Co-Wound & Dump Resistor”

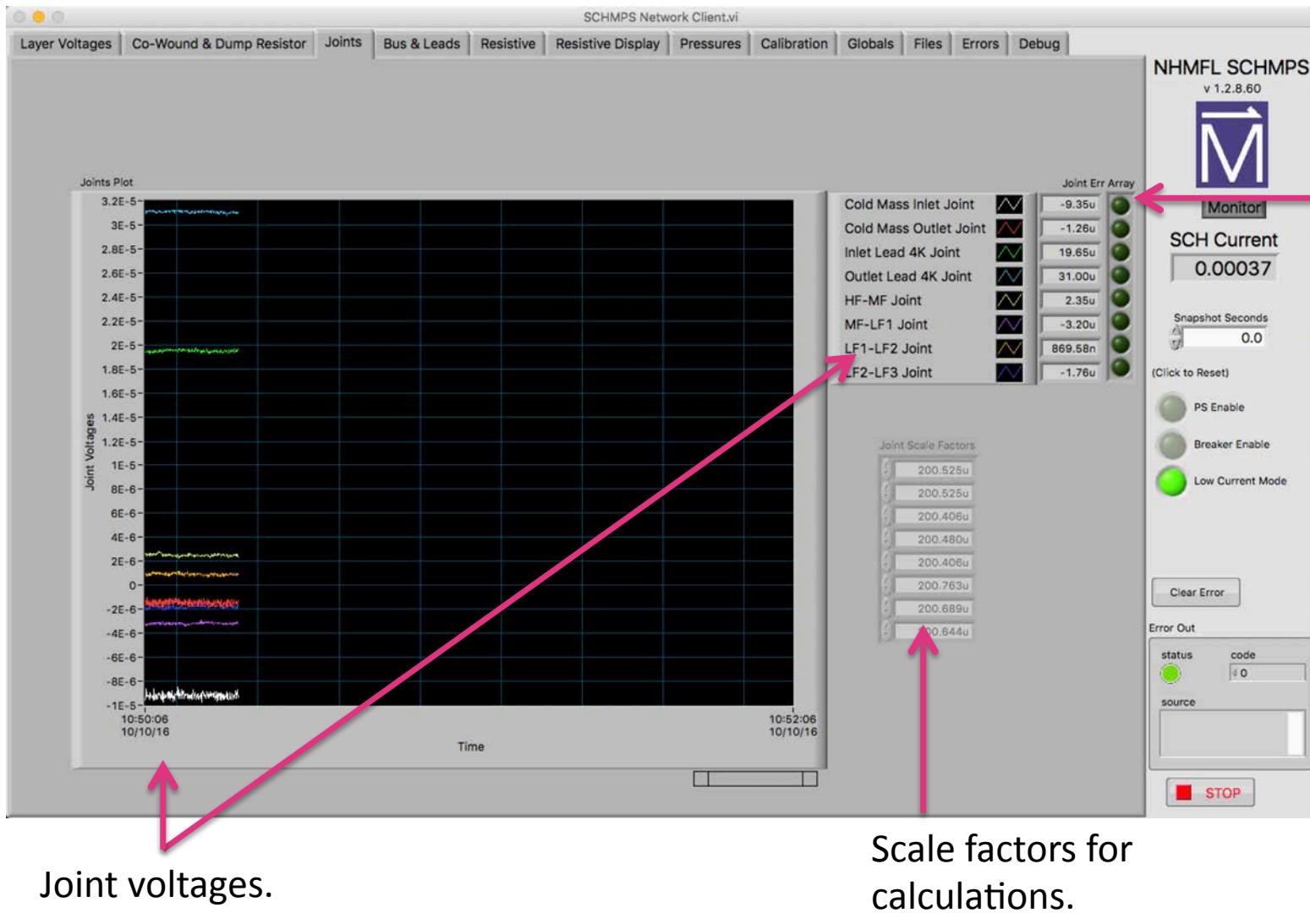


Co-Wound Error: Difference between sum of all 18 layer voltages and the co-wound wire voltage.

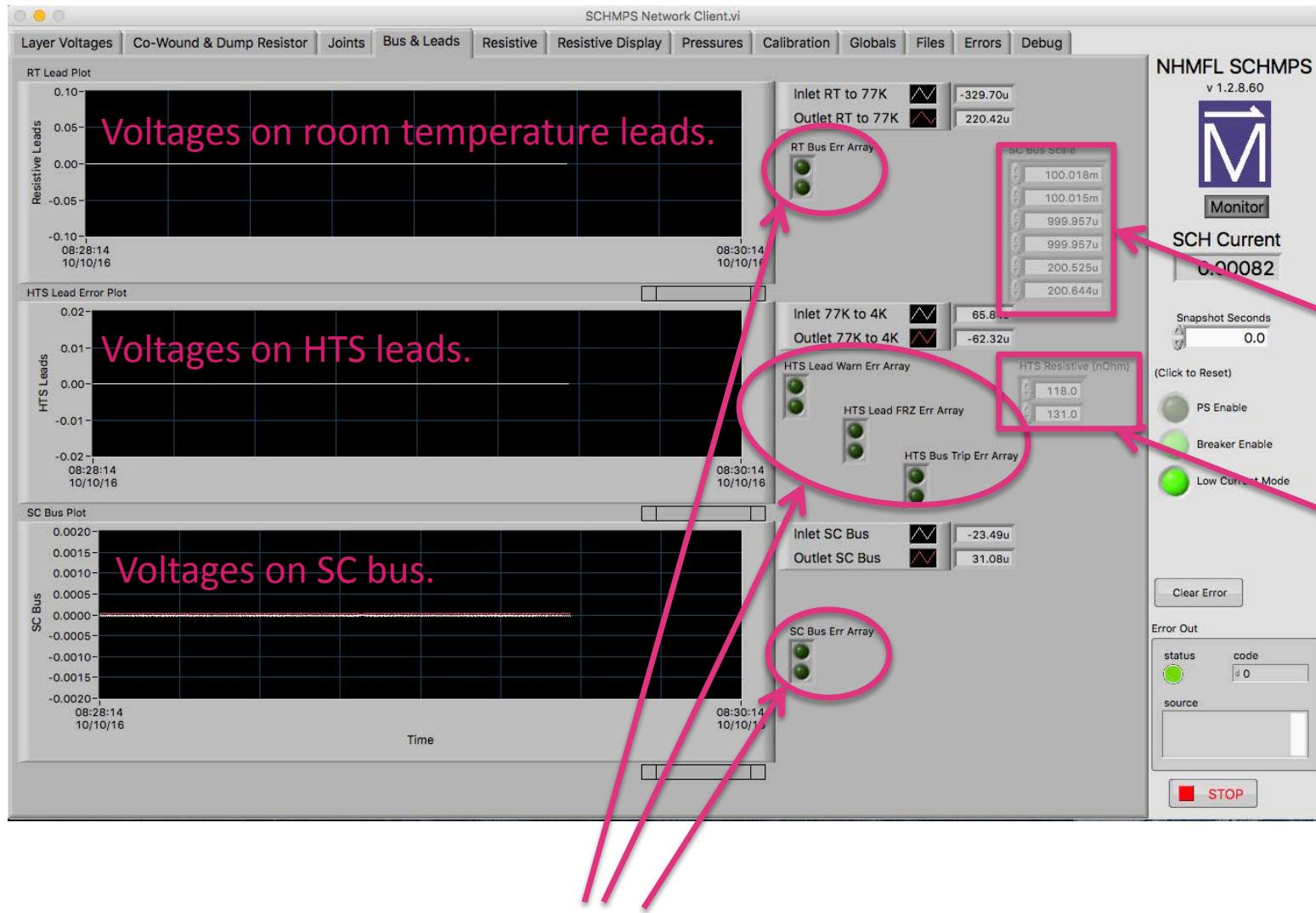
Display of: Sum of Layers Voltage, Co-Wound Voltage and Dump Resistor Voltage.



Tab: “Joints”



Tab: “Bus & Leads”



Scale factors for calculations.

HTS resistive.

Light up if limit is exceeded.

Tab: “Resistive”

Light up if limit is exceeded.

Push button to read RMPS configuration from RMPS configuration file.

Resistive magnet status.

SCHMPS Network Client.vi

Resistive Data

Resistive Inlet Temperature	20.3051
Resistive Outlet Temperature	20.1916
Resistive Inlet Pressure	1.7865
Resistive Outlet Pressure	1.8161
Current (kA)	0.0014
Watchdog Timer Input	0.5225
Power Supply Enable	0.0000
Breaker Enable	1.0000
Cell Fault	1.0000
Watchdog Timer Output	1.0000
Bore Tube Fault	0.0000
Bore Tube Voltage	-0.0008
Resistive Coil A Voltage	-0.0024
Resistive Coil B Voltage	-0.0016
Resistive Coil C Voltage	-0.0008
Resistive Coil D Voltage	0.0001

Resistive Status

Current Fault	On
Coil Volt Fault	Off
I*Temp Fault	Off
Bore Tube Fault	Off
Pressure Fault	On
Coil V Faults	Off
Temp Faults	Off
Dump File Enable	Off

Read RMPS Config

Disabled

Magnet Configuration Data

#Coils	4
Coil Inductances	1.26000 2.65000 5.74000 13.6100 mH
Max Coil Currents	20.3000 20.3000 20.3000 20.3000 kA
Max Coil Volt Dev	6.67000 3.05000 3.21000 6.00000 V
Max Coil Temp	60.0 50.0 50.0 60.0 Deg C
Pressure Range	25.10 28.10 bar
Temp Coef	0.00330 0.00400 0.00410 0.00410 1/Deg C
Offsets	Tin Tout Pin Pout I WDTin PSEnb CellFLT WDtout BTfit BTvolt Va Vb Vc Vd
Scale Factors	0.950 0.750 0.000 0.000 0.000 0.000 0.000 0.000 0.000 0.000 0.000 0.000 0.000 0.000 0.000

NHMFL SCHMPS
v 1.2.8.60

SCH Current
0.00136

Snapshot Seconds
0.0

(Click to Reset)

PS Enable

Breaker Enable

Low Current Mode

Clear Error

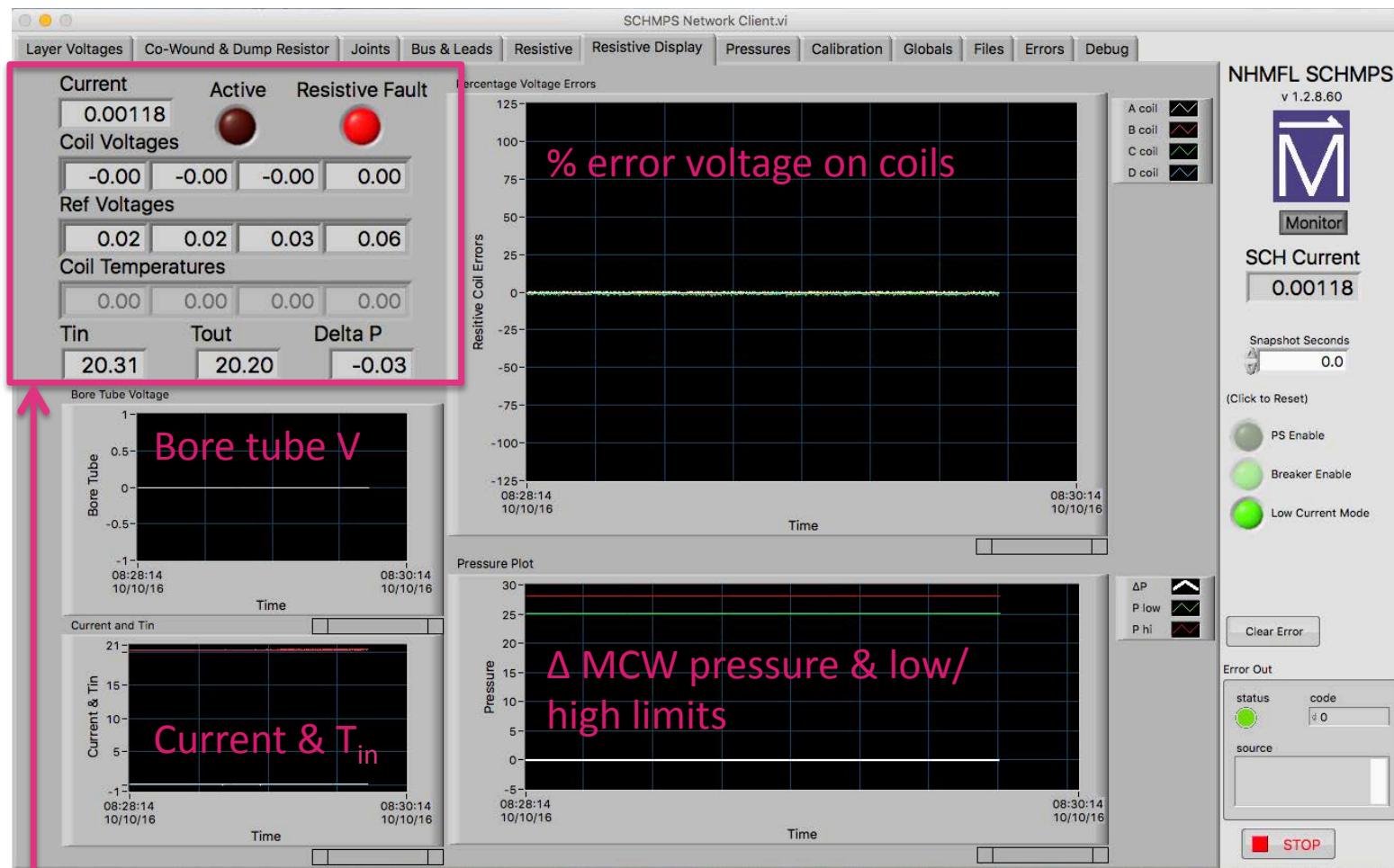
Error Out

status code
source

STOP

If current > value set in “Globals” tab, dump files are enabled; light comes on.

Tab: “Resistive Display”

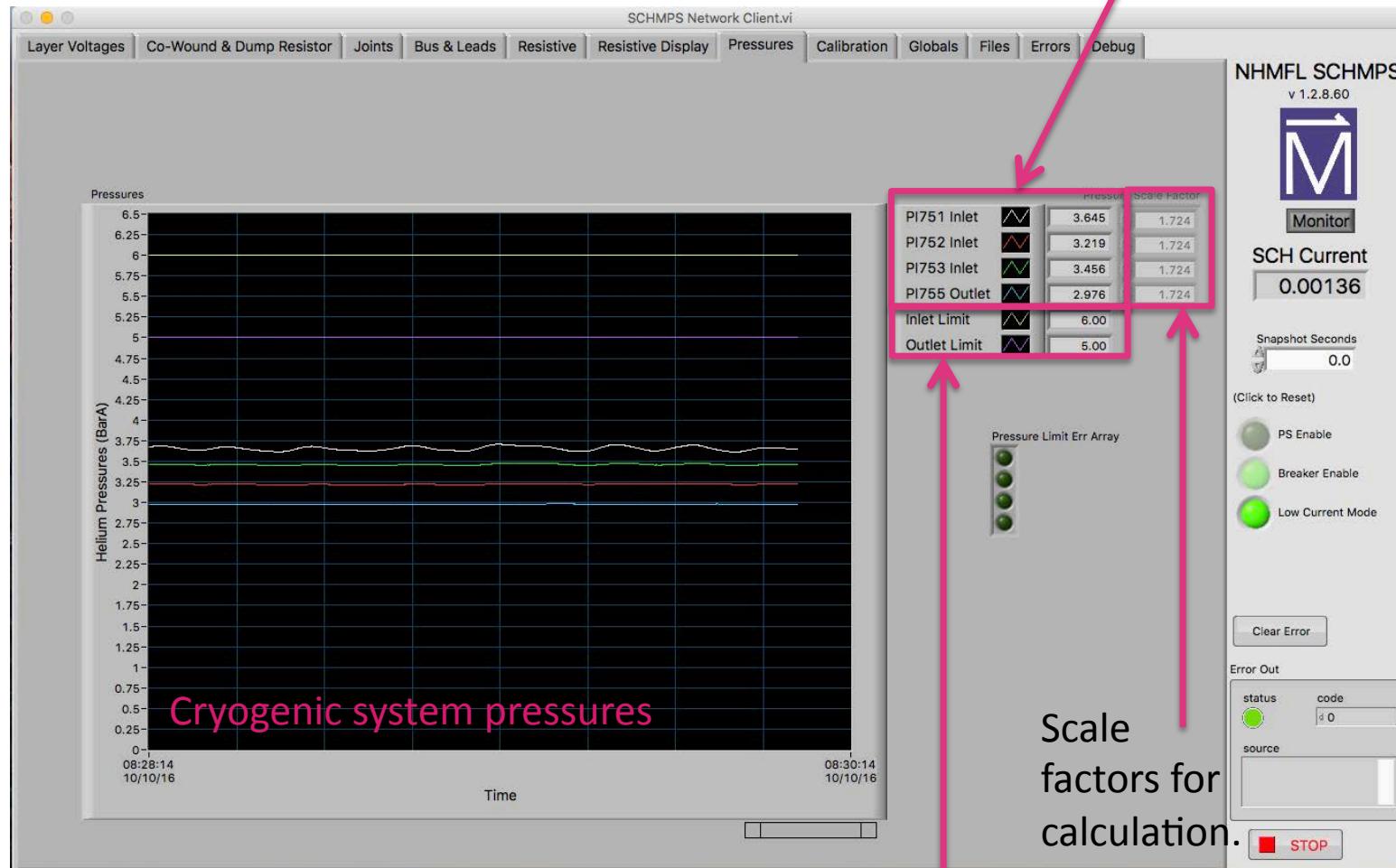


Resistive magnet status.



Tab: “Pressures”

3x inlet P, 1x outlet P.



Helium P limits on inlet/outlet.

Tab: “Calibration”

SCHMPS Network Client.vi

Layer Voltages Co-Wound & Dump Resistor Joints Bus & Leads Resistive Resistive Display Pressures Calibration Globals Files Errors Debug

Offset Scale

0	-2
1	1
2	1
3	1
4	-1
5	29505
6	-2
7	29516
8	0
9	29513
10	3
11	29505
12	1
13	29523
14	1
15	0
16	0
17	29504
18	1
19	0
20	126
21	28763
22	10
23	28765
24	252
25	29439
26	486
27	29944
28	32
29	27120
30	-56
31	26747
32	30
33	27609
34	15
35	27649
36	2
37	29450
38	-2
39	29481
40	30
41	28983
42	-52
43	28958
44	-31
45	29455
46	52
47	29476
48	0
49	29497
50	0
51	29510
52	0
53	29500
54	-1
55	29601

Hit “reset” button to reset prior calibration to offset = 0 and scale = 0.

Hit “calibrate” button to calibrate digitizers PRIOR to magnet run, i.e. when system is still off.

offset scale

Offsets should all be < 1000; sets “zero” for digitizers; scale is just a visual check and should be $25000 < \text{scale} < 30000$.

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M Monitor

SCH Current 0.00135

Snapshot Seconds 0.0

(Click to Reset)

PS Enable

Breaker Enable

Low Current Mode

Clear Error

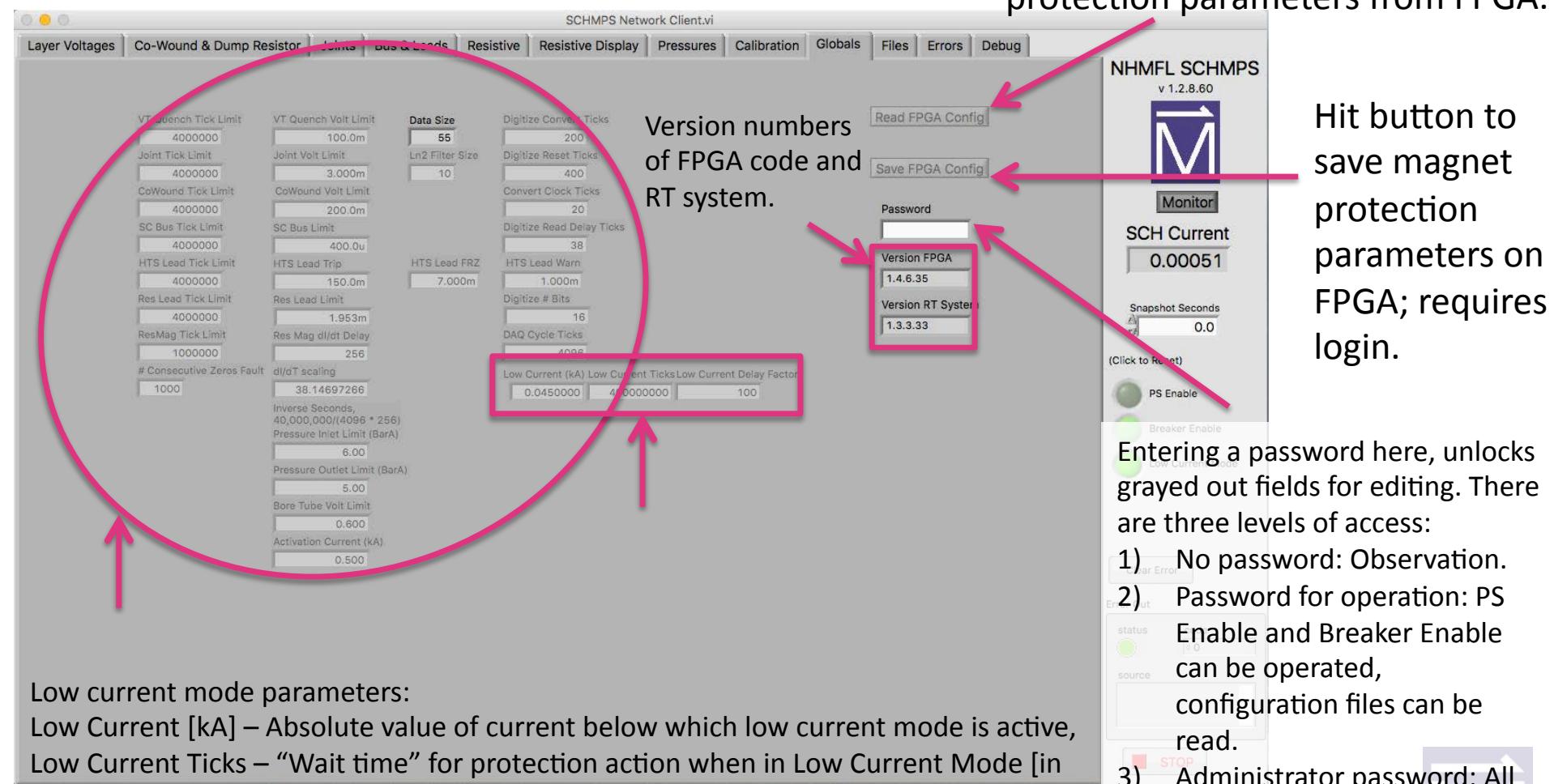
Error Out

status code
source

STOP



Tab: “Globals”



Low current mode parameters:

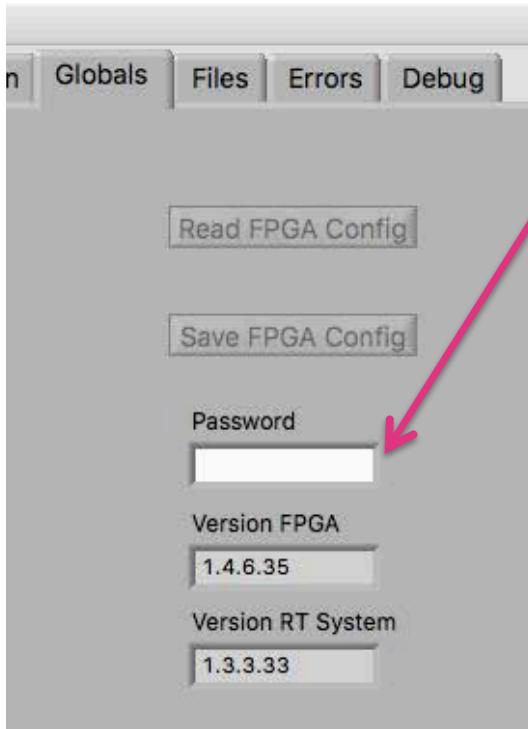
Low Current [kA] – Absolute value of current below which low current mode is active,

Low Current Ticks – “Wait time” for protection action when in Low Current Mode [in ms]

clock ticks of 40 MHz clock],

Low Current Delay Factor – Factor by which Low Current Mode “Wait Time” for magnet protection is longer than during normal (“higher current”) operation.

Password Details



Entering a password here, unlocks grayed out fields for editing. There are three levels of access:

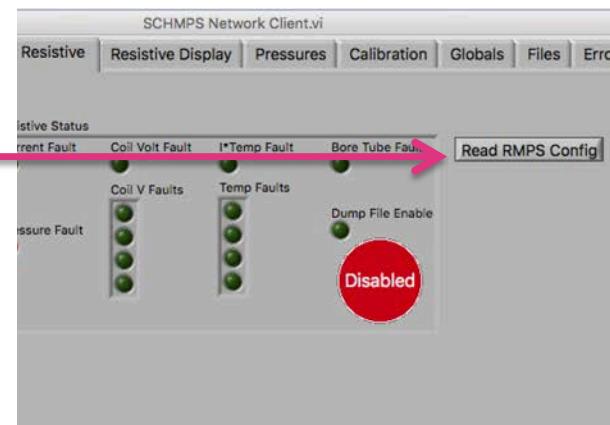
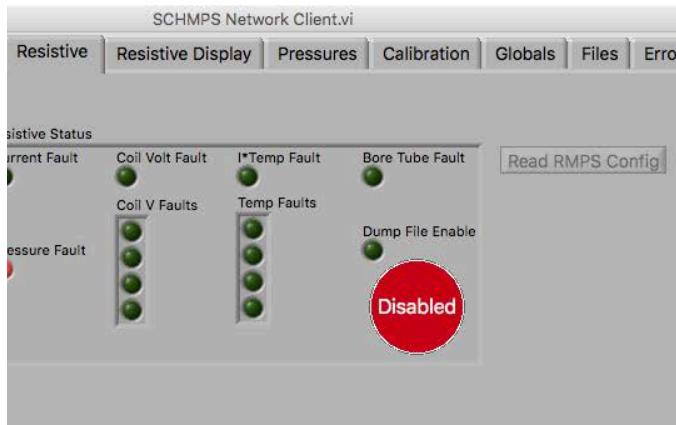
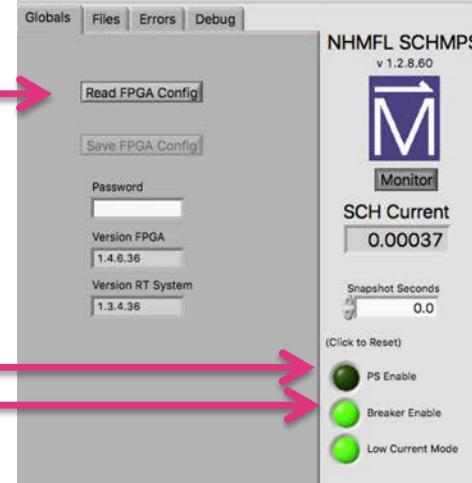
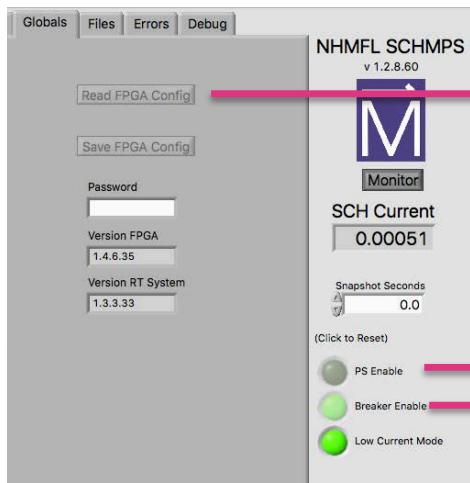
- 1) No password: Observation.
- 2) Password for operation: PS Enable and Breaker Enable can be operated, configuration files can be read.
- 3) Administrator password: All parameters can be edited, configuration files can be saved.

To lock the SCHMPS Client: Type anything (but the password) in the password box.



Password Details: For Operation

Password for operation: PS Enable and Breaker Enable can be operated, configuration files can be read.



Password Details: For Administrator

Password for administrator: All parameters can be edited, configuration files can be saved.

Globals tab

Joints tab

Joint Scale Factors	
✓	200.525u
✓	200.525u
✓	200.406u
✓	200.480u
✓	200.406u
✓	200.763u
✓	200.689u
✓	200.644u

Pressures tab

Pressure Scale Factor		
PI751 Inlet	0000.000	1.724
PI752 Inlet	1860.000	1.724
PI753 Inlet	-0.000	1.724
PI755 Outlet	0000.000	1.724
Inlet Limit	6.00	
Outlet Limit	5.00	

Resistive tab

Magnet Configuration Data											
#Coils 4											
Coil Inductances	1.26000	2.65000	5.74000	13.6100	mH						
Max Coil Currents	20.3000	20.3000	20.3000	20.3000	kA						
Max Coil Volt Dev	6.67000	3.05000	3.21000	6.00000	V						
Max Coil Temp	60.0	50.0	50.0	60.0	Deg C						
Pressure Range	25.10	28.10	bar								
Temp Coef	0.00330	0.00400	0.00410	0.00410	1/Deg C						
Tin	Tout	Pin	Pout	I	WDTin	PSEnb	CellFLT	WDTout	BTFit	BTvolt	Va
Offsets	0.950	0.750	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	Vb
Scale Factors	10.130	10.100	3.400	3.415	2.000	1.000	1.000	1.000	-0.502	30.927	Vc
											Vd

Globals tab

Read FPGA Config
Save FPGA Config

Calibration tab

Reset
Calibrate

Debug tab

Signal Injection On
Inject Frequency (Hz)
0.000
Inject Offset
0.000
Inject Channel
1

Co-Wound and Dump Resistor tab

Co-Wound Scale Factor
60.044
Dump Resistor Scale Factor
250.062
Co-Wound Asymmetry Factor
-0.0026703

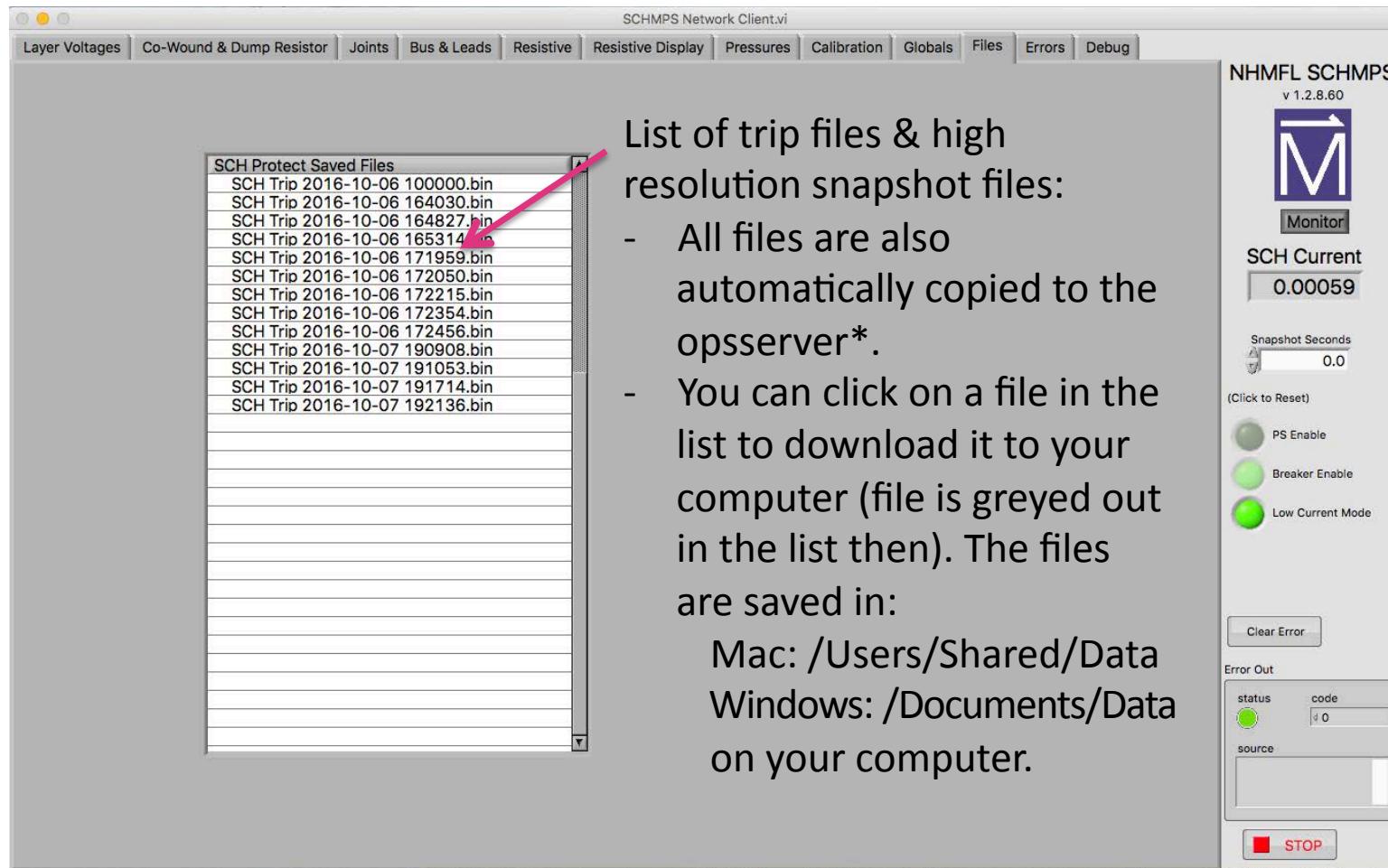
Layers tab

Layer Scale Factors	
4.000480	Fudge Factors
3.501155	0.0486624
3.501278	0.0491151
3.501155	-0.0418637
3.001561	-0.0149169
3.001561	0.0726134
3.500053	-0.0451977
3.500665	-0.0032112
3.501155	-0.0234927
4.000160	-0.0025010
3.999680	0.0285479
4.000160	-0.0270486
3.999880	0.0035220
3.999520	0.0059306
3.999680	-0.0088003
4.000320	-0.0297659
4.000960	0.0390219



Tab: “Files”

/Users/Shared/Data



SCHMPS Network Client.vi

Layer Voltages | Co-Wound & Dump Resistor | Joints | Bus & Leads | Resistive | Resistive Display | Pressures | Calibration | Globals | **Files** | Errors | Debug

NHMFL SCHMPS v 1.2.8.60

SCH Protect Saved Files

- SCH Trip 2016-10-06 100000.bin
- SCH Trip 2016-10-06 164030.bin
- SCH Trip 2016-10-06 164827.bin
- SCH Trip 2016-10-06 165314.bin** (highlighted by a pink arrow)
- SCH Trip 2016-10-06 171959.bin
- SCH Trip 2016-10-06 172050.bin
- SCH Trip 2016-10-06 172215.bin
- SCH Trip 2016-10-06 172354.bin
- SCH Trip 2016-10-06 172456.bin
- SCH Trip 2016-10-07 190908.bin
- SCH Trip 2016-10-07 191053.bin
- SCH Trip 2016-10-07 191714.bin
- SCH Trip 2016-10-07 192136.bin

List of trip files & high resolution snapshot files:

- All files are also automatically copied to the opsserver*.
- You can click on a file in the list to download it to your computer (file is greyed out in the list then). The files are saved in:
 - Mac: /Users/Shared/Data
 - Windows: /Documents/Data on your computer.

Monitor

SCH Current
0.00059

Snapshot Seconds
0.0
(Click to Reset)

PS Enable

Breaker Enable

Low Current Mode

Clear Error

Error Out

status code
source

STOP

* <afp://opsserver/Groups/operations/Magnet Data/Trip Data Files/2016/Cell 14>



Tab: “Errors”

SCHMPS Network Client.vi

Layer Voltages | Co-Wound & Dump Resistor | Joints | Bus & Leads | Resistive | Resistive Display | Pressures | Calibration | Globals | Files | Errors | Debug

Overall Errors

- Pwr ±15V Pri Err
- Pwr ±15V Aux Err
- Pwr 5V Pri Err
- Pwr 5V Aux Err
- Pwr 24V Pri Err
- Pwr 24V Aux Err
- Pwr 125V Err
- RT Bus Limit Err
- HTS Bus Limit Err
- Pressure Limit Err
- ResMag Limit Err
- SC Bus Limit Err
- Co-Wound Limit Err
- Joint Limit Err
- VT Quench Err

PS Enable First Error

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- Coil A Voltage Error
- Coil B Voltage Error
- Coil C Voltage Error
- Coil D Voltage Error
- Coil A Temperature High
- Coil B Temperature High
- Coil C Temperature High
- Coil D Temperature High
- Water Pressure Error
- Over Current
- Bore Tube Voltage Errro
- Helium Pressure PI751 Inlet High
- Helium Pressure PI752 Inlet High
- Helium Pressure PI753 Inlet High
- Helium Pressure PI755 Outlet High
- Positive Lead Voltage High
- Negative Lead Voltage High
- Breaker Positive #1 Open
- Breaker Positive #2 Open
- Breaker Positive #3 Open
- Breaker Negative #4 Open
- Breaker Negative #5 Open
- Breaker Negative #6 Open
- Pressure Loop Watchdog Failure
- Resistive Loop Watchdog Failure
- Breaker Enable False
- Power 24V Primary Error
- Power 24V Auxiliary Error

Breaker First Error

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- Voltage Tap 2 Error
- Voltage Tap 3 Error
- Voltage Tap 4 Error
- Voltage Tap 5 Error
- Voltage Tap 6 Error
- Voltage Tap 7 Error
- Voltage Tap 8 Error
- Voltage Tap 9 Error
- Voltage Tap 10 Error
- Voltage Tap 11 Error
- Voltage Tap 12 Error
- Voltage Tap 13 Error
- Voltage Tap 14 Error
- Voltage Tap 15 Error
- Voltage Tap 16 Error
- Voltage Tap 17 Error
- Co-Wound Voltage Error
- Cold Mass Inlet Joint Error
- Cold Mass Outlet Joint Error
- Inlet Lead 4K Joint Error
- Outlet Lead 4K Joint Error
- HF-MF Joint Error
- MF-LF1 Joint Error
- LF1-LF2 Joint Error
- LF2-LF3 Joint Error
- Inlet RT to 77K Lead Error
- Outlet RT to 77K Lead Error
- Inlet SC Bus Error
- Outlet SC Bus Error
- PS Enable Loop Watchdog Failure
- DAQ Loop Watchdog Failure
- Layer Loop Watchdog Failure
- Co-Wound Loop Watchdog Failure
- Joint Loop Watchdog Failure
- SC Bus Loop Watchdog Failure
- DAQ Loop Too Many Consecutive Os
- SCHMPS #2 Co-Wound Error
- Power 24V Failure Both Supplies

DAQ Zero Fault Channel

0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37

NHMFL SCHMPS
v 1.2.8.60

M Monitor

SCH Current
0.00101

Snapshot Seconds
0.0

(Click to Reset)

PS Enable

Breaker Enable

Low Current Mode

Clear Error

Error Out

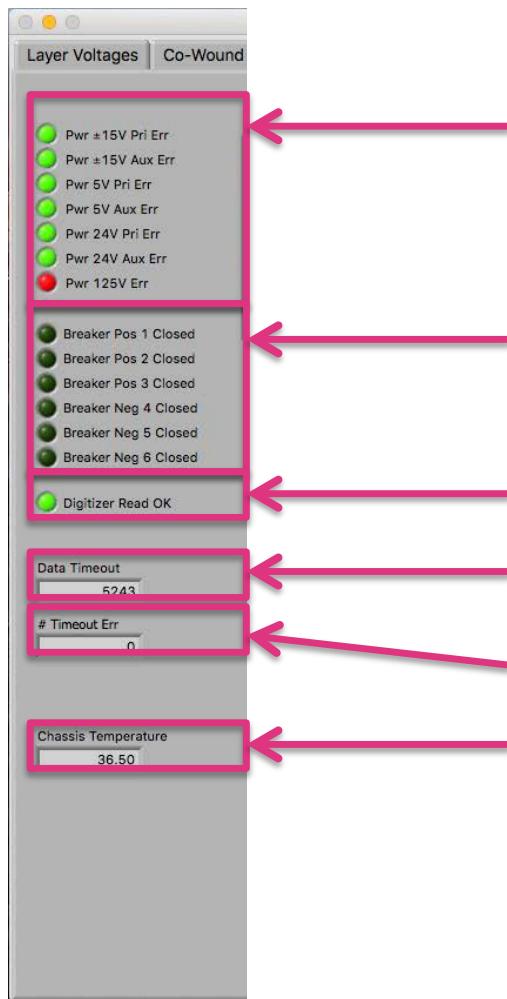
status	code
<input type="button" value="0"/>	= 0
source	
<input type="text"/>	

STOP

If everything is OK, there is no red light !



Tab: “Errors”



Status of SCHMPS power supplies:
GREEN light ON → PS OK.
GREEN light OFF → PS off or failed.

GREEN light ON → Breakers closed.
GREEN light OFF → Breakers open.
GREEN light ON → Digitizer read OK.
GREEN light OFF → Digitizer NOT OK.

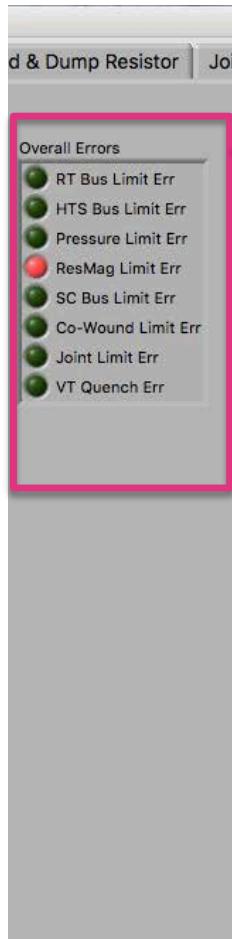
Indicates wait time for receiving data from server over network.

Indicates number of times network data receiving timed out.

Temperature of SCHMPS chassis in degrees Celsius.



Tab: “Errors”



Overall Errors Overview:

Light OFF → Limit not exceeded.

Light ON/RED → Limit exceeded.

RT Bus Limit Err: Room temperature bus limit error

HTS Bus Limit Err: High temperature super conducting bus limit error

Pressure Limit Err: Pressure limit error

ResMag Limit Err: Resistive magnet limit error

SC Bus Limit Err: Superconducting bus limit error

Co-Wound Limit Err: Co-wound limit error

Joint Limit Err: Joint limit error

VT Quench Err: Voltage tab quench error



Tab: “Errors”



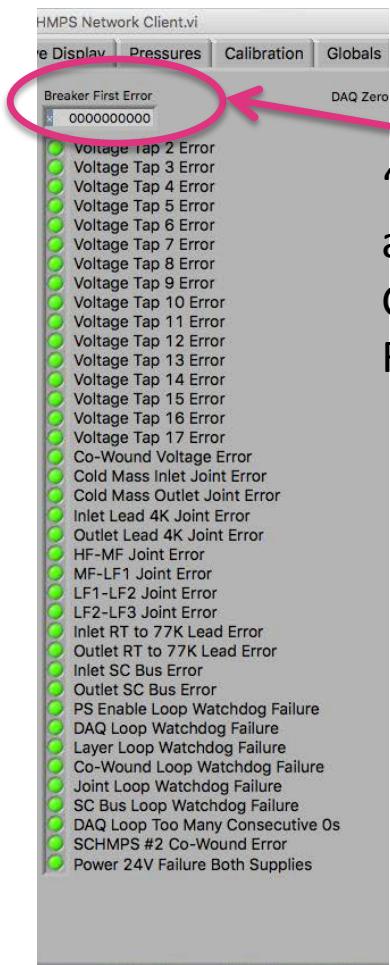
“Who first ?” Indication when power supplies are disabled.

GREEN light ON → Error did NOT occur.

RED light ON → Error occurred.



Tab: “Errors”



“Who first ?” Indication when breakers are opened.
GREEN light ON → Error did NOT occur.
RED light ON → Error occurred.

If everything is OK, there is no red light !

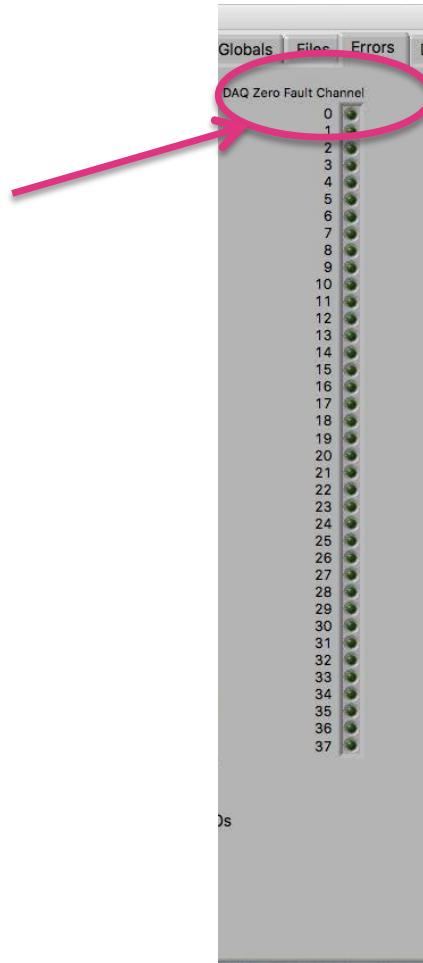


Tab: “Errors”

Indicates if a digitizer channel is dead, causing “DAQ Loop too many consecutive zeros” in “Breaker First Error” column.

NO LIGHT → No digitizer fault.

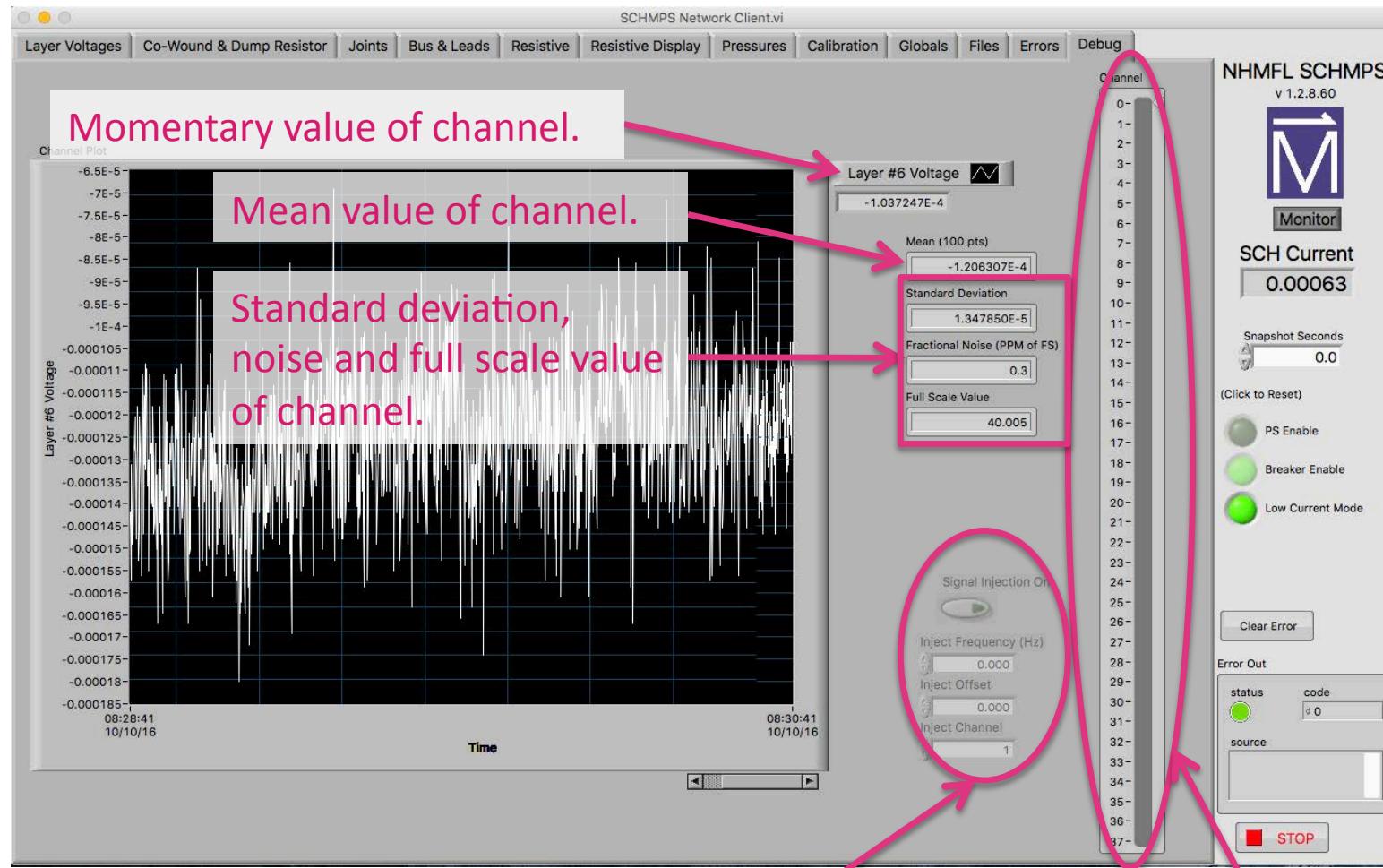
RED light ON → Digitizer fault.



If everything is OK, there is no red light !



Tab: “Debug”



Inject debug signal into channel.

Choose digitizer channel to debug.



Only displays 38 digitizer channels (see SCHMPS manual for list). The signal injection allows any of the 55 values being monitored to be substituted with a sine wave + an offset.

Manual Version #: 1.

Documents software version #: 1.2.8.60

Questions, suggestions & corrections are WELCOME 😊 !

Contact:

Julia H. Smith, jsmith@magnet.fsu.edu

Scott Hannahs, sth@magnet.fsu.edu

