Expression

The difference between Test Step Setting and Expression:

Test Step Setting is for saving test build parameters and the invocation of following Test Step Settings and Expressions.

Expression is an user-made inequation as the cut-off condition of a Test Step. When the setting of the inequation is satisfied, the test will go to the assigned Test Step.

Remark: Expression only works in BTS8.0(middle machine version).

1 Setting

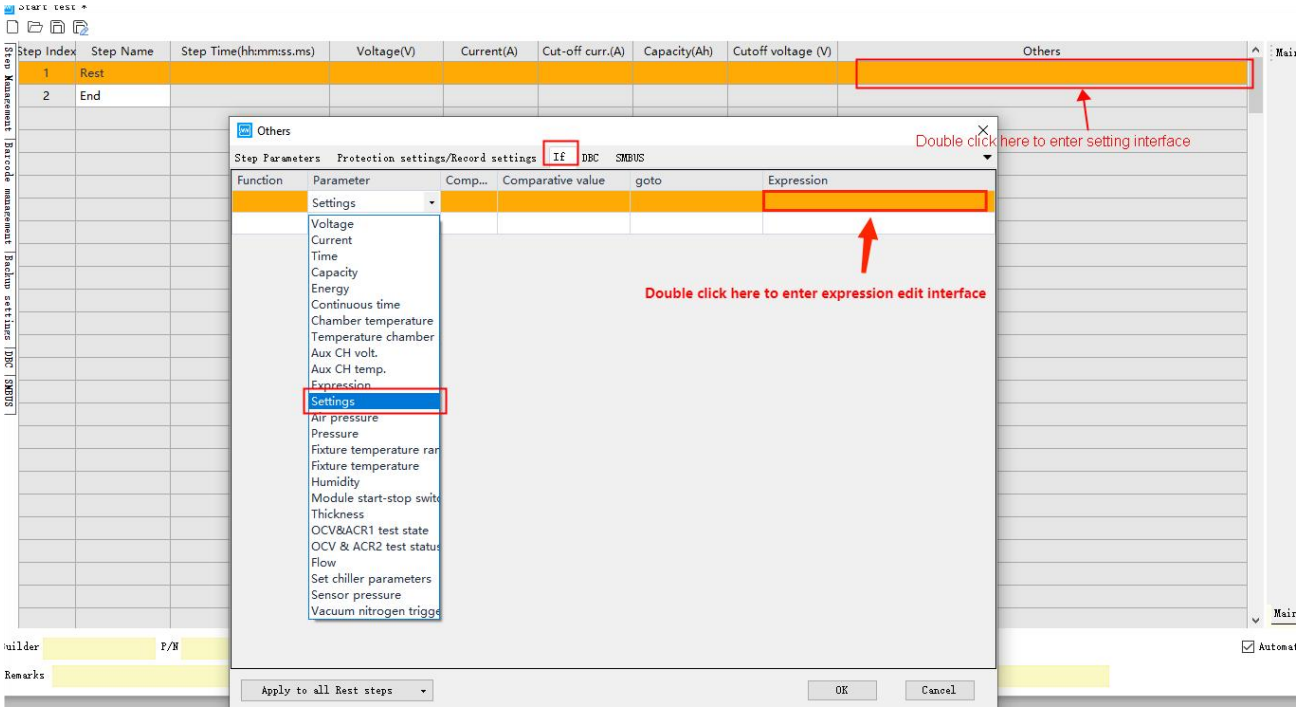
There are two types of setting, expression type and global variable type.

The name of Global variable means exactly the same as its function.

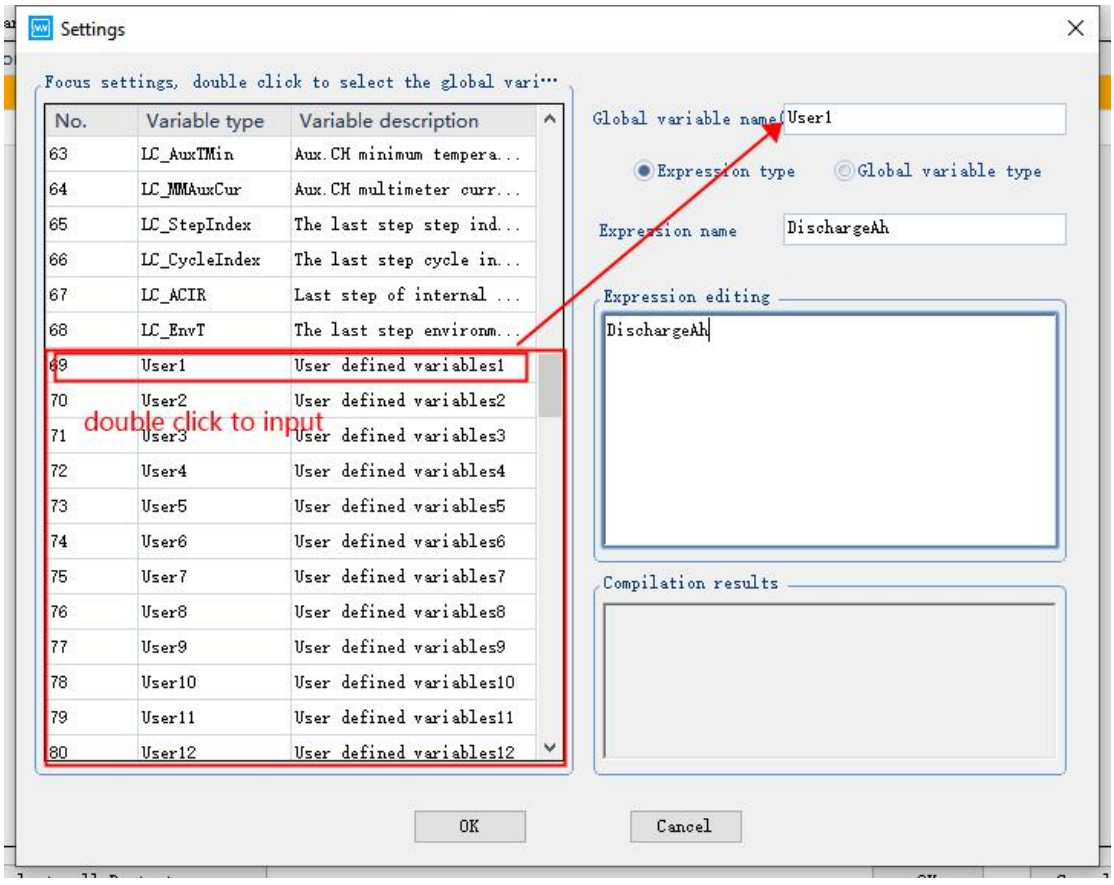
The Expression name which can be customized does not have an actual meaning.

Expression Setting Steps:

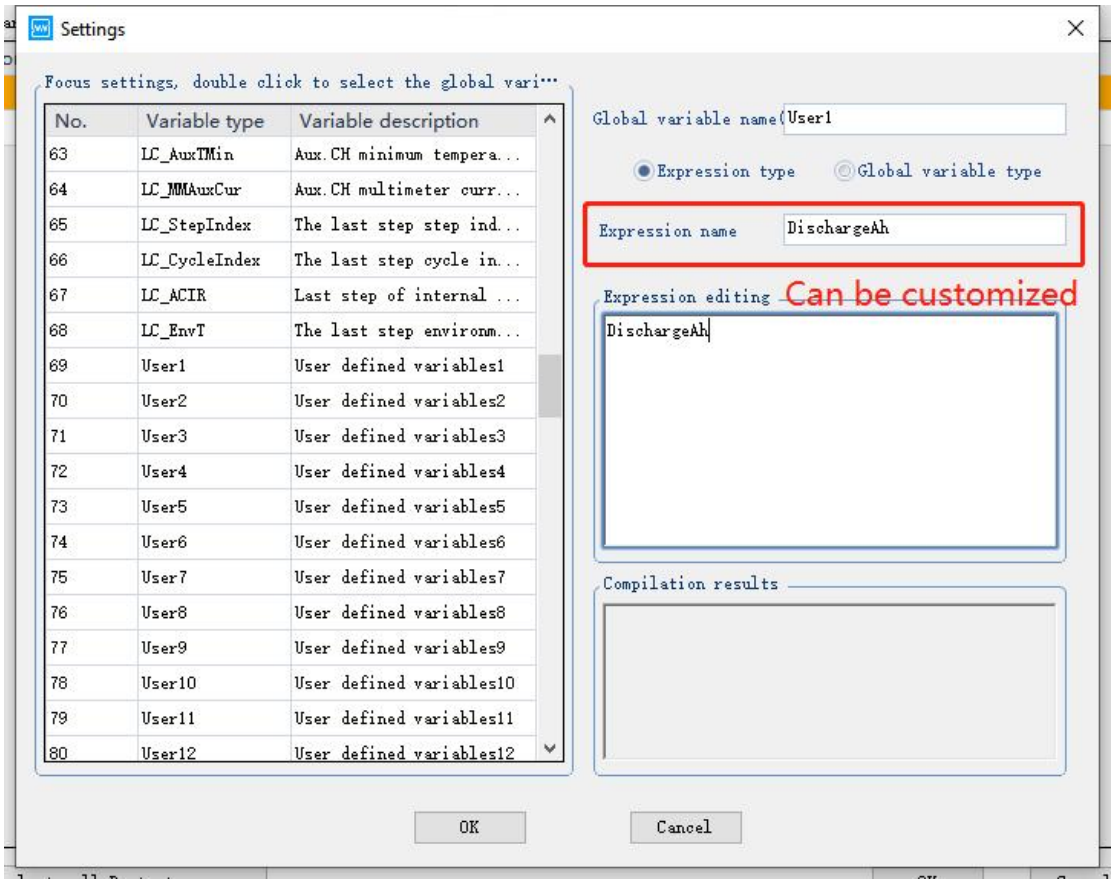
1. Click ‘other’ section for a certain test step → go to ‘if’ → select ‘settings’



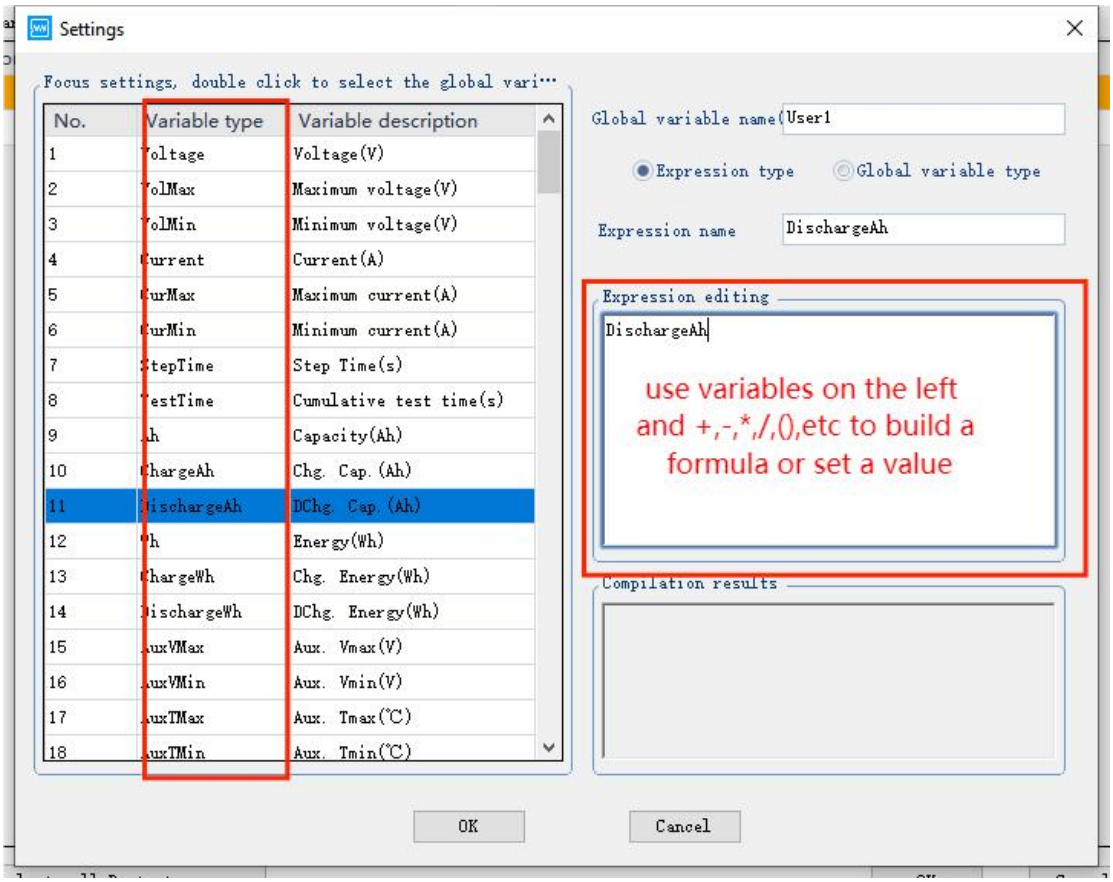
2. To customize the global variable name, selecting from User1~User50. Double click the parameter to input to avoid the manual input error.



3. Expression name can be customized



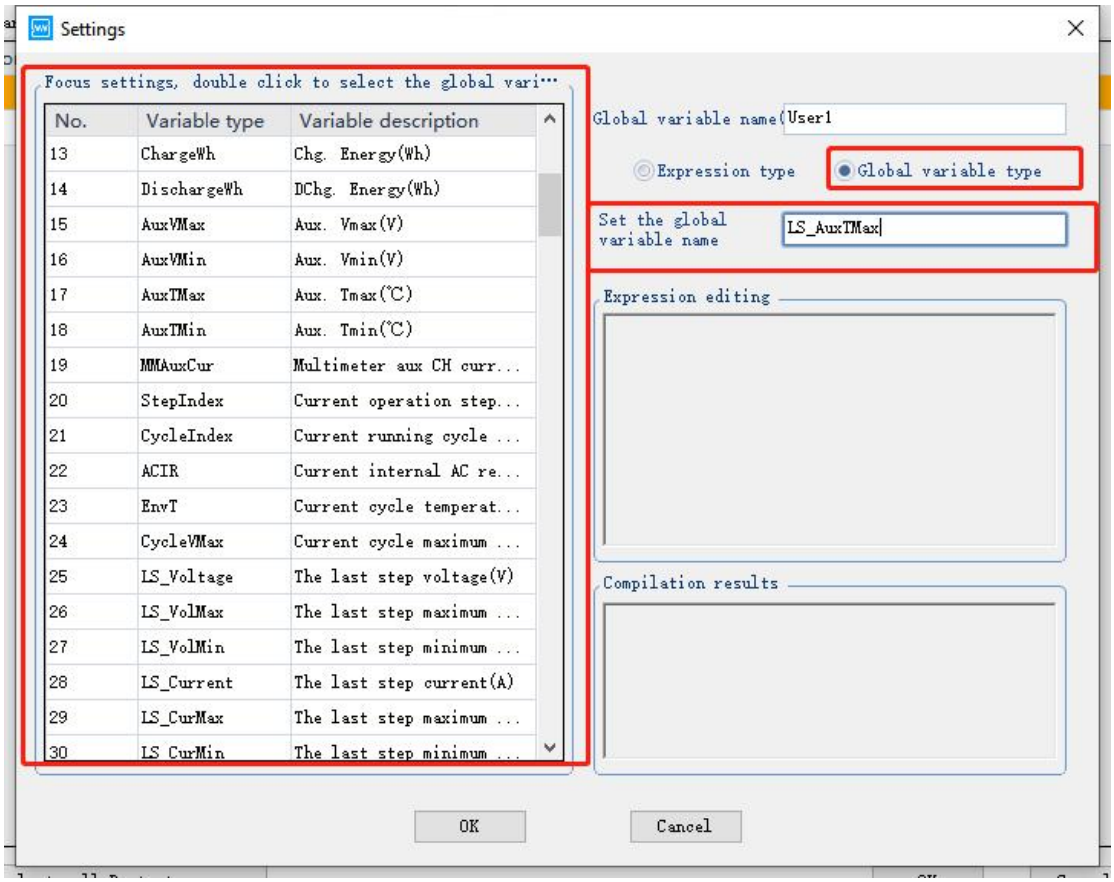
4. Expression editing



Notice:

1. Notice the unit of each variable
2. “0.75*Ah” can not be inputted as “0.75Ah”
3. For example, “3*Ah*(VolMax-VolMin)*(CurMax+CurMin)/User2” can not be inputted as “3Ah(VolMax-VolMin)(CurMax+CurMin)/User1” and “*” can not be missed while inputting.
4. When a expression has a customized variable like point 3 indicated, the “User2” has to be set a formula or a value

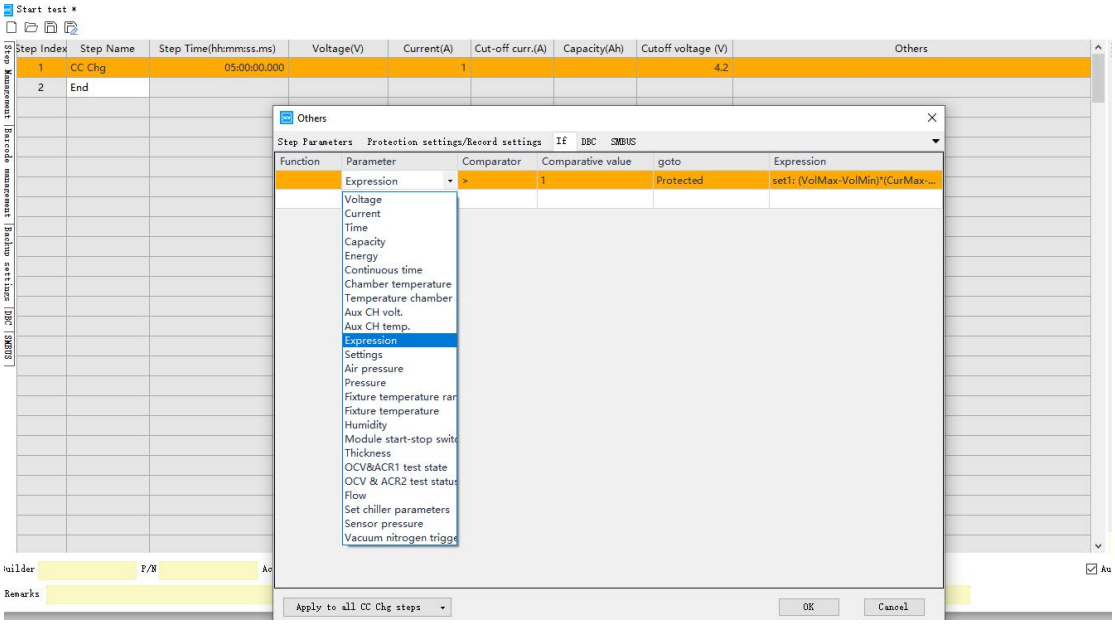
5. When select global variable type, the global variable name to be set can only be selected from the global variable.



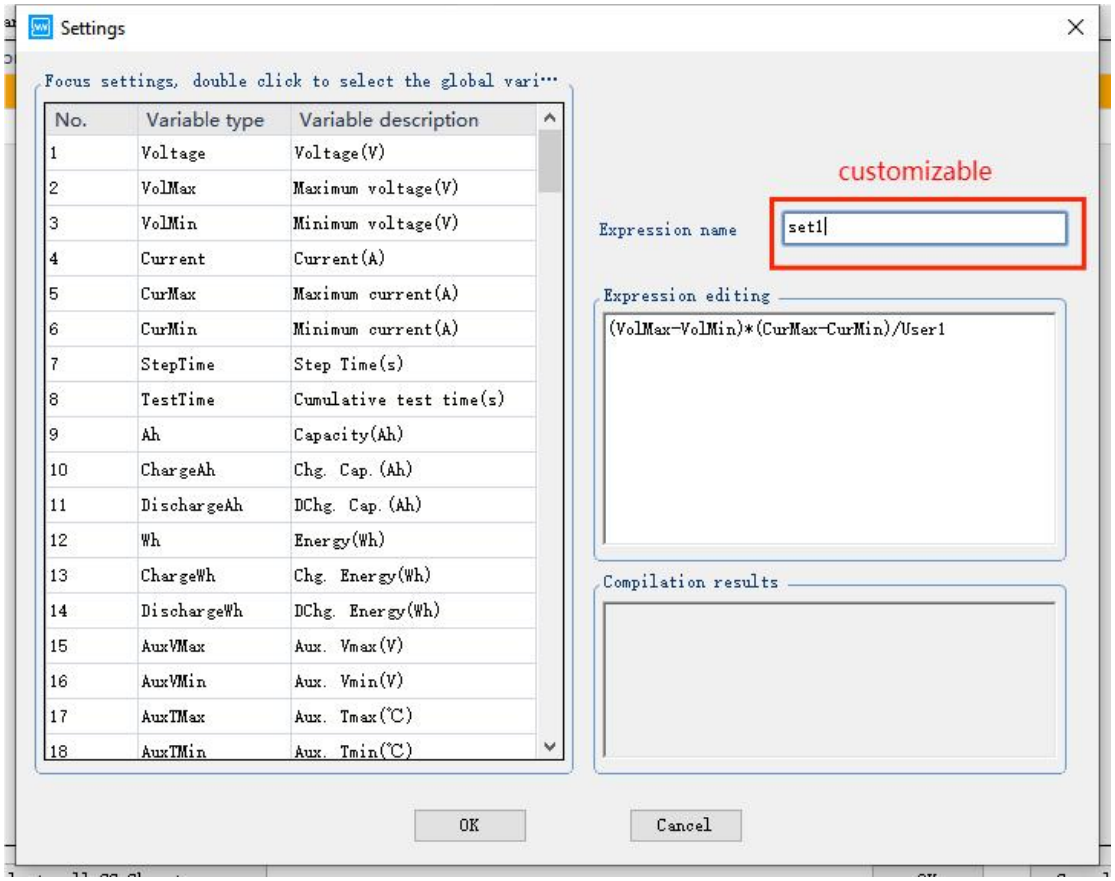
2. Add Expression

Add expression function is for user to edit the expression as the cut-off condition of certain test step.

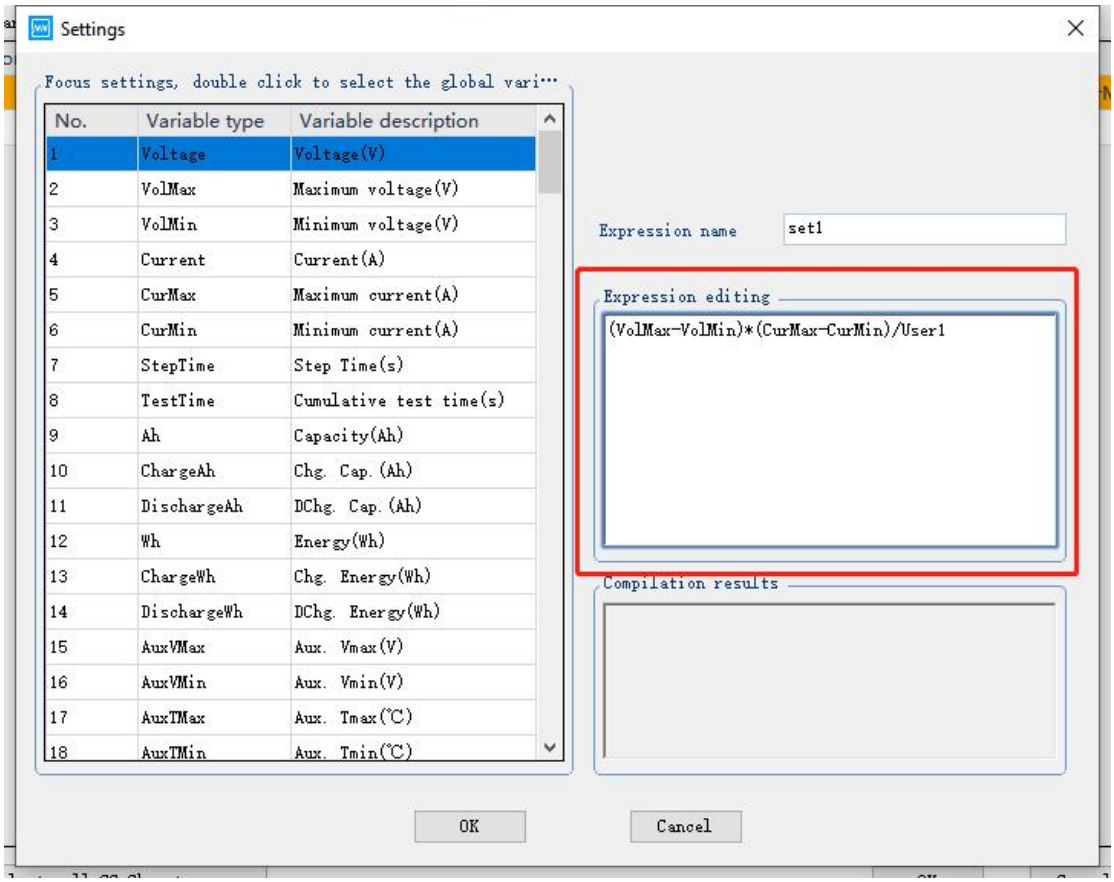
1. As picture below shows, it adds a expression for cc charge step, the comparator, comparative value and goto can be set based on the application.



2. The express name is named by the user.



3. Expression editing is customized expression.



Notice: "*" can not be missed, for example, "3*Ah*(VolMax-VolMin)*(CurMax+CurMin)/User2" is correct and "3Ah(VolMax-VolMin)(CurMax+CurMin)/User1" is wrong.

4. Expression meaning reference:

Voltage:Current voltage of the channel

VolMax:Highest voltage of the channel under current test step

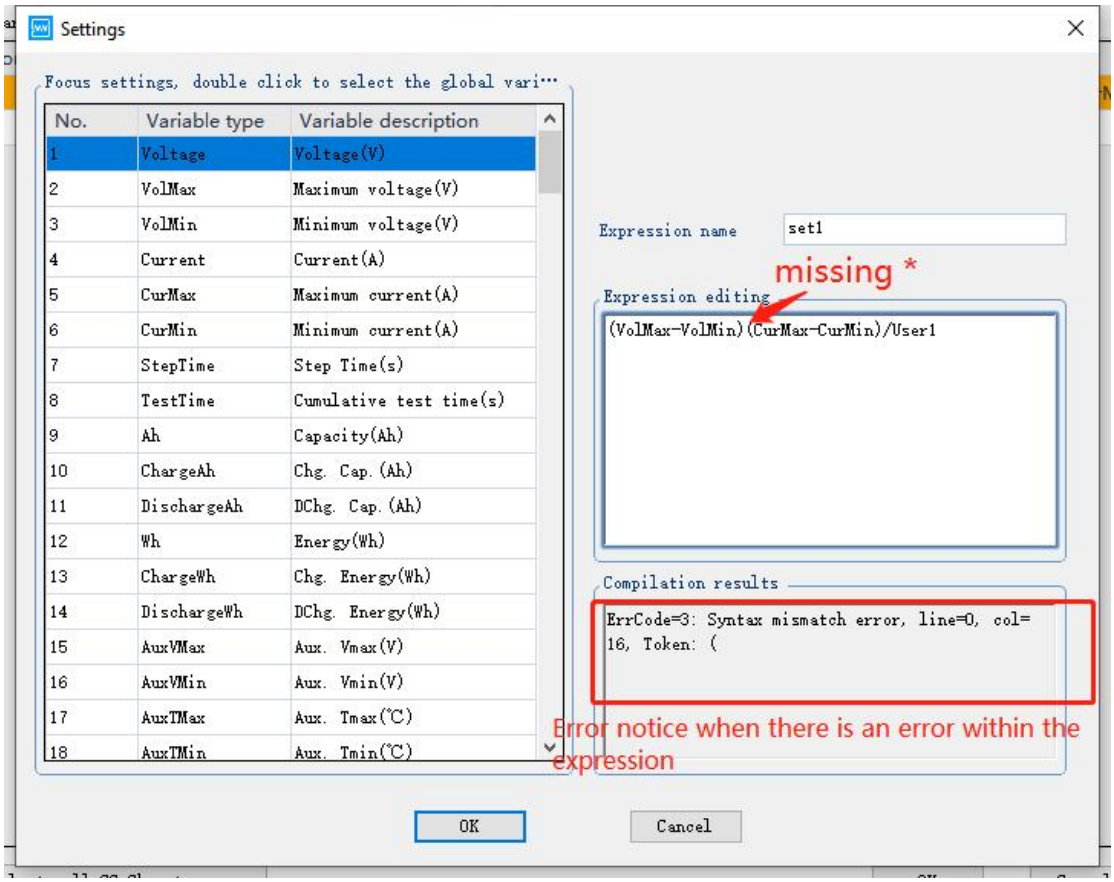
VolMin:Lowest voltage of the channel under current test step

StepTime: Running Time of current test step

Test Time: Time started from the start of the test

Ah:the accumulated capacity value start from the start of the test

Wh:the accumulated energy value start from the start of the test



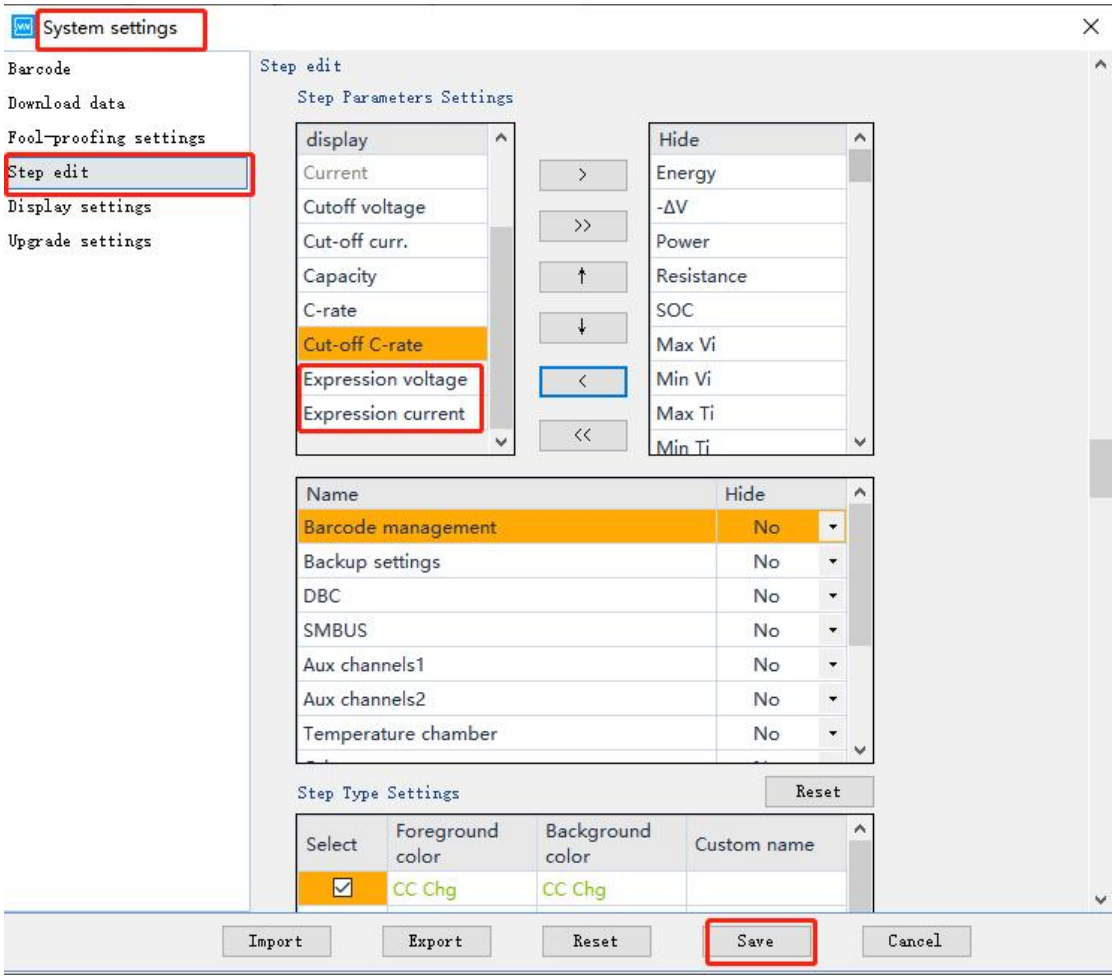
3.Expression Current and Expression Voltage

The steps supported by the expression current: constant current charge, constant current discharge, constant current constant voltage charge, constant current constant voltage discharge.

The steps supported by the expression voltage: constant voltage charge, constant voltage discharge, constant current constant voltage charge, constant current constant voltage discharge

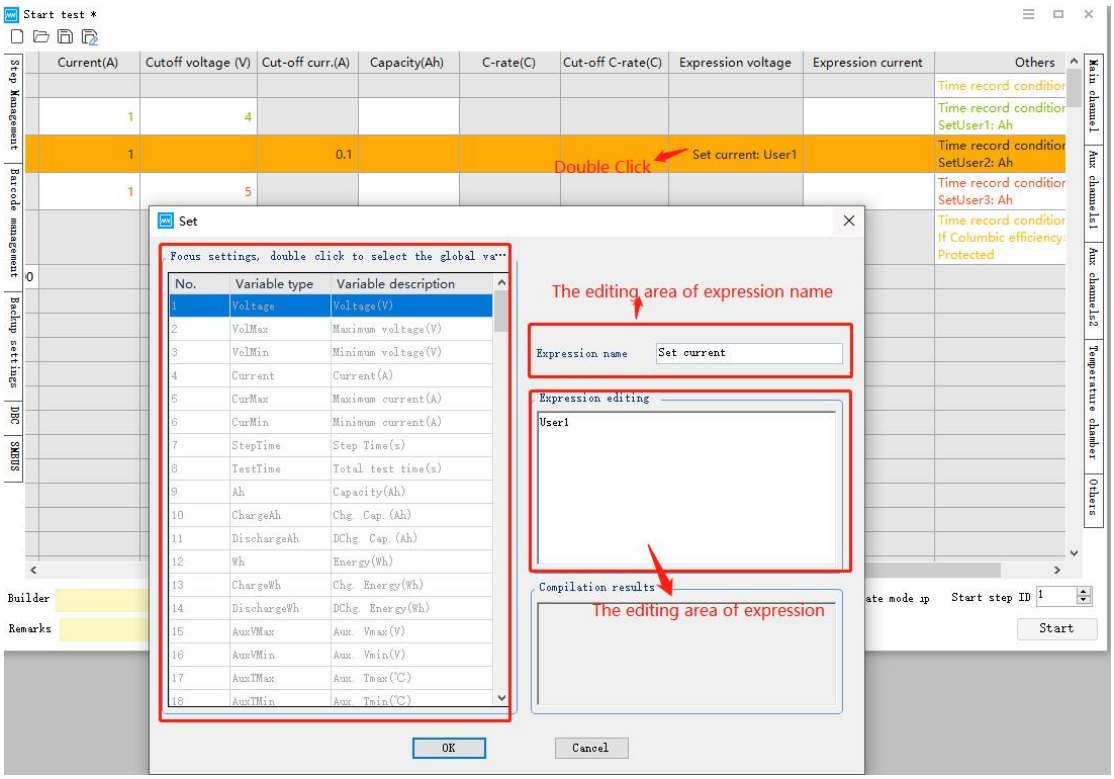
The expression current and expression voltage can be changed from hidden to displayed via <System settings>.

See the expression description for editing details on expression current and expression voltage



1. Expression current

Meaning: You can set the expression to limit the current value of the running step.



2. Expression voltage

Meaning: You can set the expression to limit the voltage value of the running step.

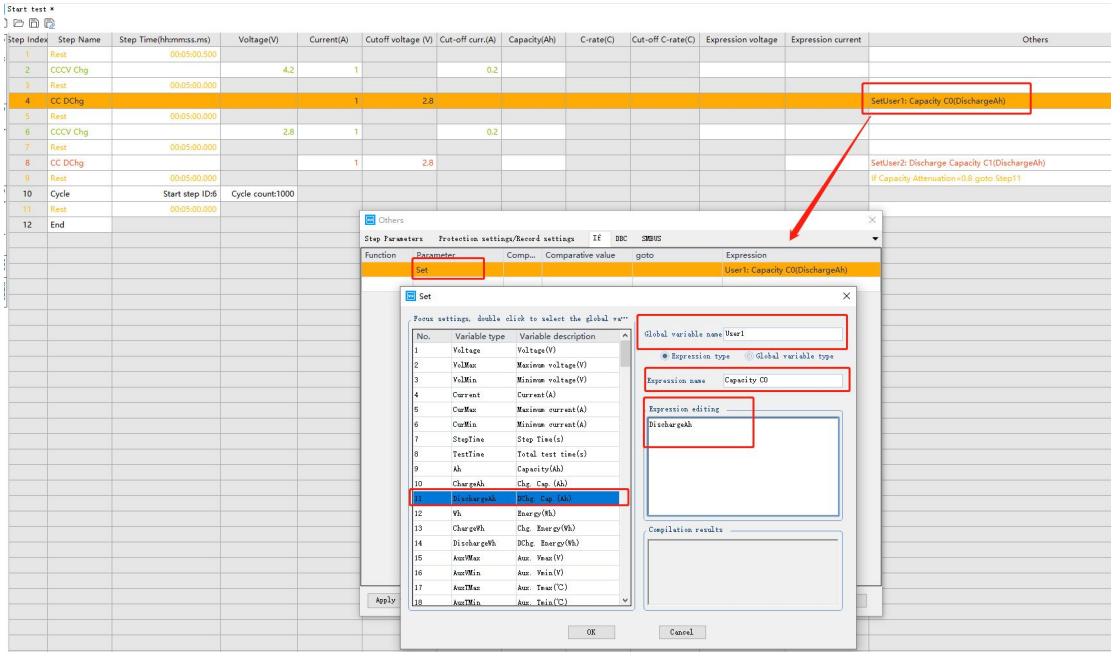
4.The meaning of variable of Expression

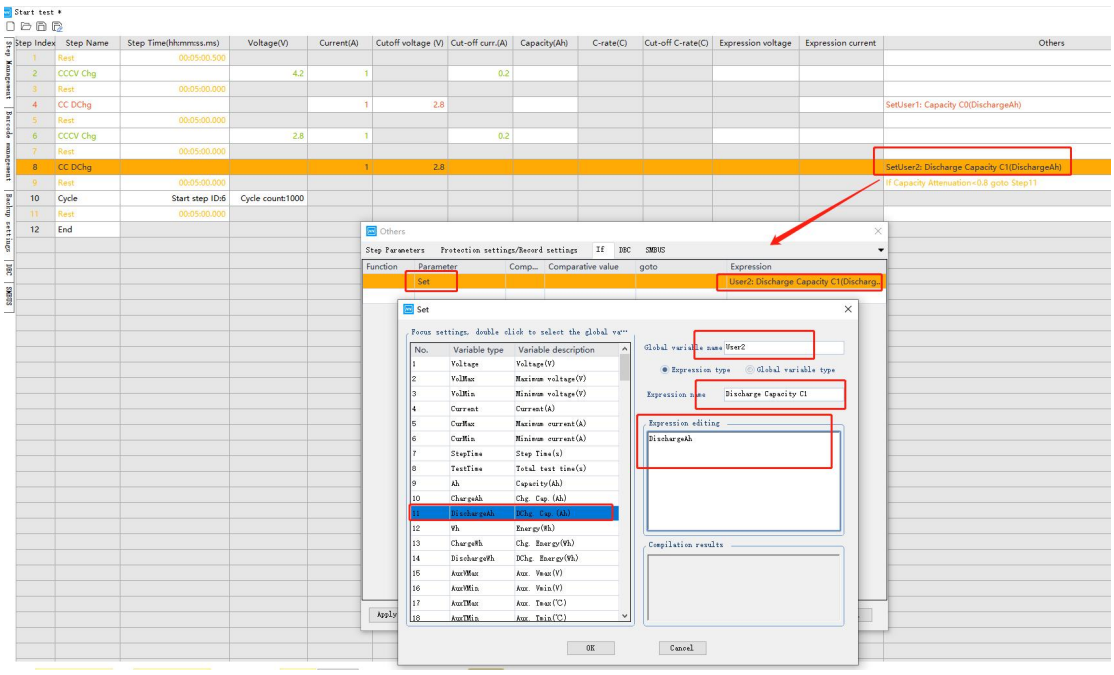
1. Voltage: Voltage(V)
2. VolMax: Maximum voltage(V)
3. VolMin: Minimum voltage(V)
4. Current: Current(A)
5. CurMax: Maximum current (A)
6. CurMin: Minimum current (A)
7. StepTime: Step Time(s)
8. TestTime: Total test time(s)
9. Ah: Capacity(Ah)
10. ChargeAh: Chg. Cap(Ah)
11. DischargeAh: DChg. Cap(Ah)
12. Wh: Energy(Wh)
13. ChargeWh: Chg.Energy(Wh)
14. DischargeWh: DChg.Energy(Wh)
15. AuxVMax: Aux.Vmax(V)
16. AuxVMin: Aux.Vmin(V)

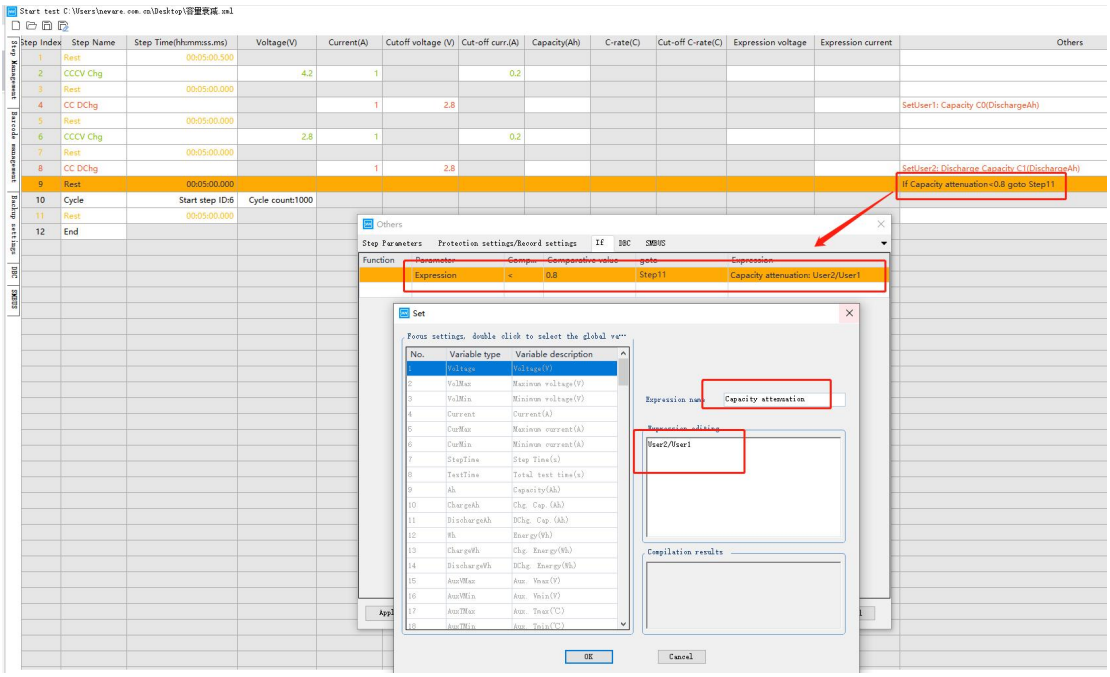
17. AuxTMax: Aux.Tmax(℃）
18. AuxTMin： Aux.Tmin(℃）
19. MMAuxCur: Multimeter aux CH curr.(A)
20. StepIndex: Current operation step index
21. CycleIndex: Current Running cycle index
22. ACIR: Current internal AC resistance(Ω）
23. EnvT：Current cycle temperature(℃）
24. CycleVMax: Current cycle maximum voltage(V)

5.Samples

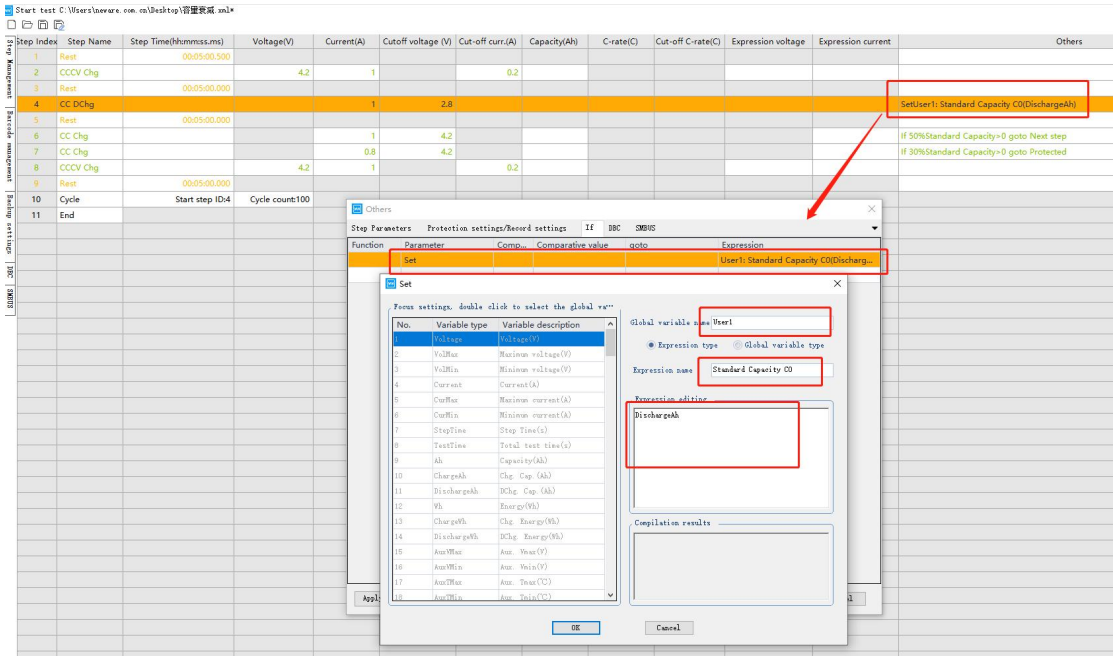
1. Capacity Attenuation

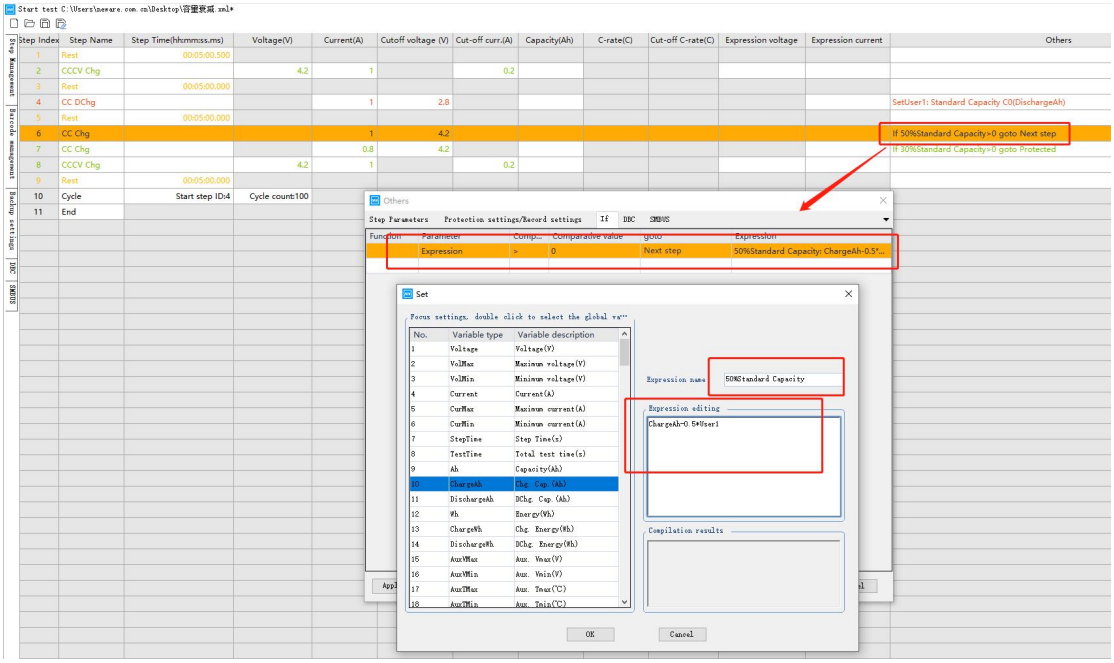


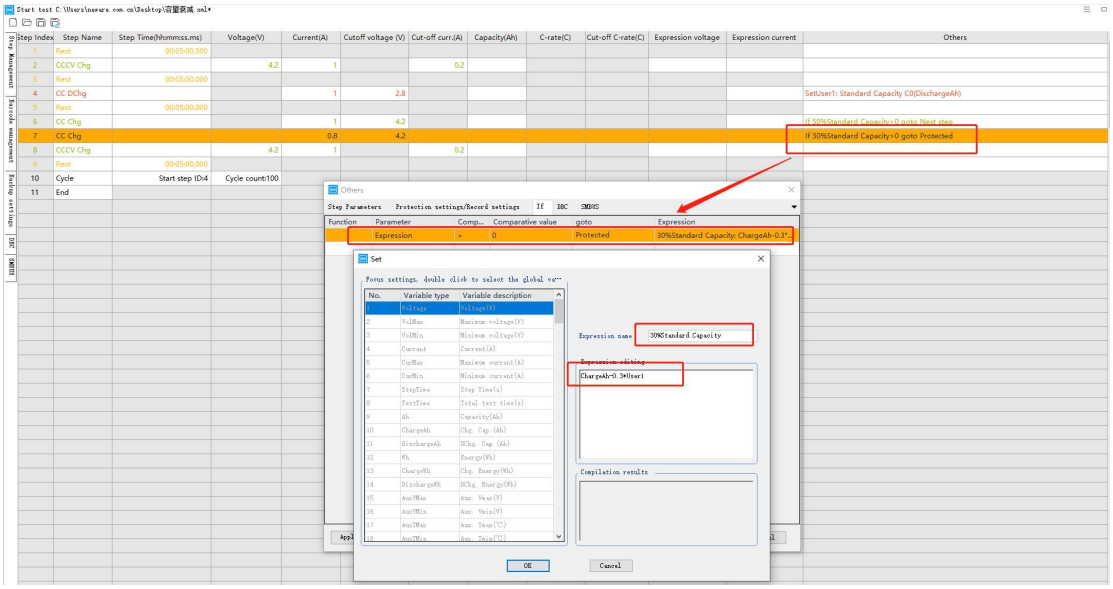



Start test C:\Users\neware.com.cn\Desktop\容量衰减.xml
Step Index
Step Name
Step Time(hhmmss.ms)
Voltage(V)
Current(A)
Cutoff voltage (V)
Cut-off curr.(A)
Capacity(Ah)
C-rate(C)
Cut-off C-rate(C)
Expression voltage
Expression current
Others
1 Rest 00:05:00.500
2 CCCV Chg 4.2 1 0.2
3 Rest 00:05:00.000
4 CC DChg 1 2.8 SetUser1: Capacity C0(DischargeAh)
5 Rest 00:05:00.000
6 CCCV Chg 2.8 1 0.2
7 Rest 00:05:00.000
8 CC DChg 1 2.8 SetUser2: Discharge Capacity C1(DischargeAh)
9 Rest 00:05:00.000 If Capacity attenuation<0.8 goto Step11
10 Cycle Start step ID:6 Cycle count:1000
11 Rest 00:05:00.000
12 End
Others
Step Parameters
Protection settings/Record settings
If
DBC
SMBUS
Function
Parameter
Comp...
Comparative value
goto
Expression
Expression < 0.8 Step11 Capacity attenuation: User2/User1
Set
Focus settings, double click to select the global var
No.
Variable type
Variable description
Expression name
Capacity attenuation
User2/User1
Compilation results
OK
Cancel

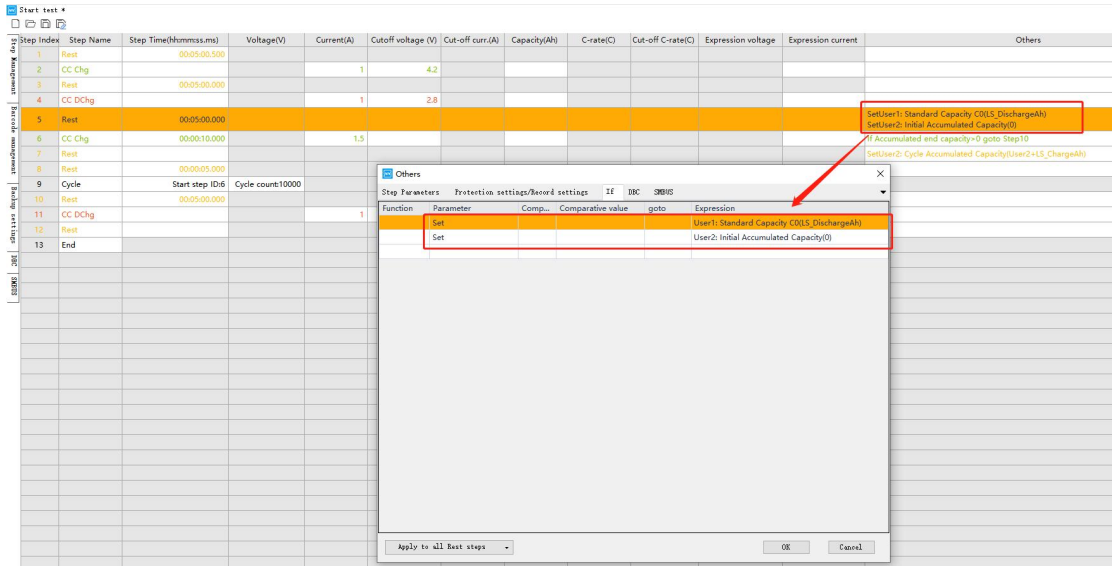
2. SOC

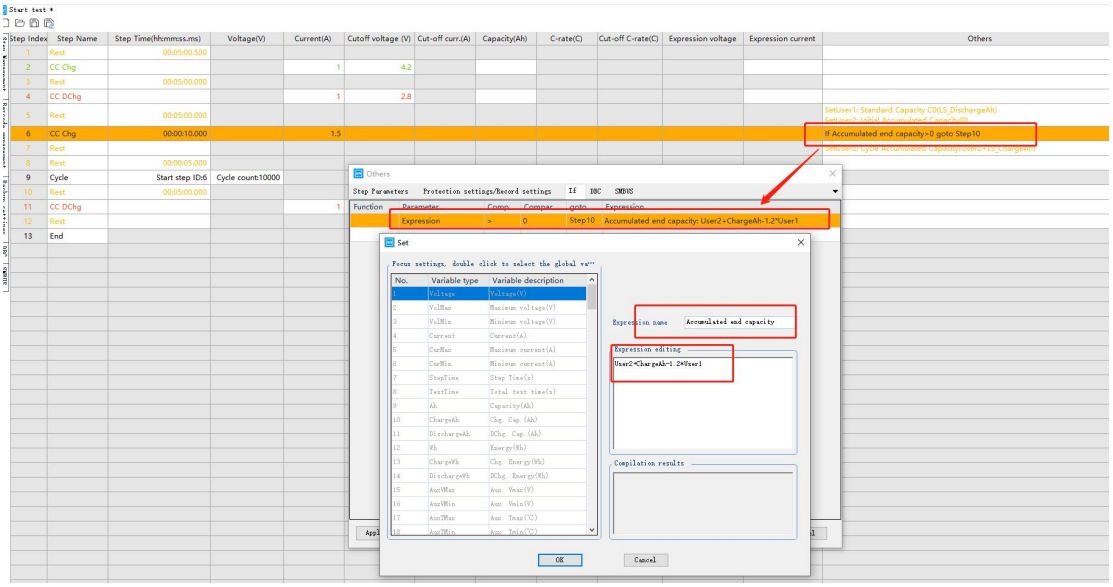

Start test C:\Users\neware.com.cn\Desktop\容量衰减.xml*
Step Index
Step Name
Step Time(hhmmss.ms)
Voltage(V)
Current(A)
Cutoff voltage (V)
Cut-off curr.(A)
Capacity(Ah)
C-rate(C)
Cut-off C-rate(C)
Expression voltage
Expression current
Others
1 Rest 00:05:00.500
2 CCCV Chg 4.2 1 0.2
3 Rest 00:05:00.000
4 CC DChg 1 2.8 SetUser1: Standard Capacity C0(DischargeAh)
5 Rest 00:05:00.000
6 CC Chg 1 4.2 If 50%Standard Capacity>0 goto Next step
7 CC Chg 0.8 4.2 If 30%Standard Capacity>0 goto Protected
8 CCCV Chg 4.2 1 0.2
9 Rest 00:05:00.000
10 Cycle Start step ID:4 Cycle count:100
11 End
Others
Step Parameters
Protection settings/Record settings
If
DBC
SMBUS
Function
Parameter
Comp...
Comparative value
goto
Expression
Set User1: Standard Capacity C0(Discharg...
Set
Focus settings, double click to select the global var
No.
Variable type
Variable description
Global variable name
User1
Expression type
Global variable type
Expression name
Standard Capacity C0
DischargeAh
Compilation results
OK
Cancel

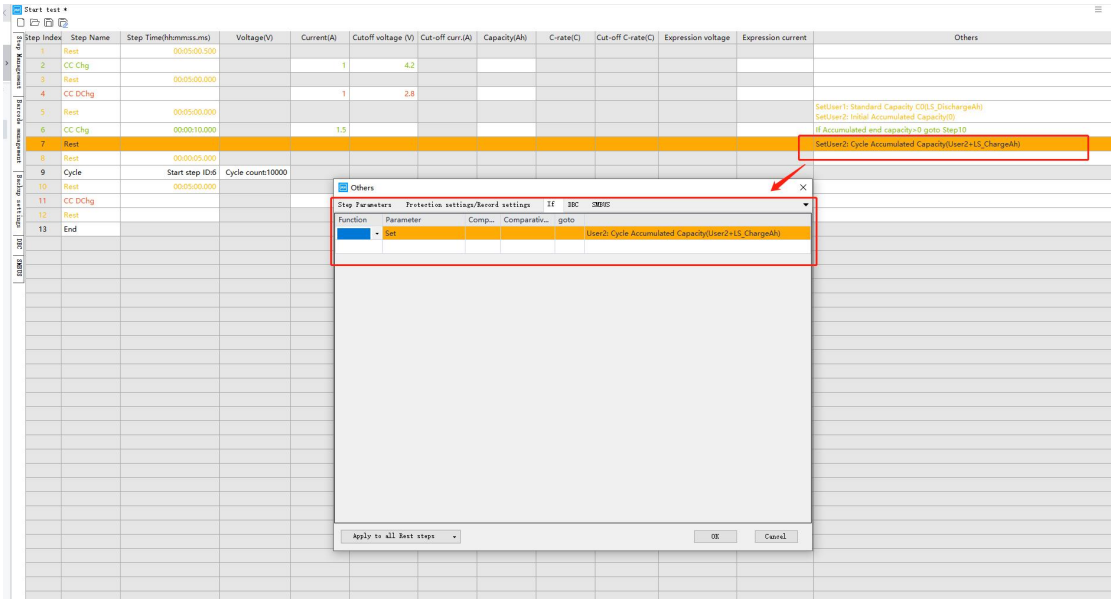




3. Accumulated capacity


Start test *
Step Index
Step Name
Step Time(hhmmss.ms)
Voltage(V)
Current(A)
Cutoff voltage (V)
Cut-off curr.(A)
Capacity(Ah)
C-rate(C)
Cut-off C-rate(C)
Expression voltage
Expression current
Others
SetUser1: Standard Capacity C0(LS_DischargeAh)
SetUser2: Initial Accumulated Capacity(0)
If Accumulated end capacity>0 goto Step10
SetUser2: Cycle Accumulated Capacity(User2+LS_ChargeAh)
Others
Step Parameters
Protection settings/Record settings
If
DBC
SMBUS
Function
Parameter
Comp...
Comparative value
goto
Expression
Set
User1: Standard Capacity C0(LS_DischargeAh)
Set
User2: Initial Accumulated Capacity(0)
Apply to all Rest steps
OK
Cancel


Start test *
Step Index
Step Name
Step Time(hhmmss.ms)
Voltage(V)
Current(A)
Cutoff voltage (V)
Cut-off curr.(A)
Capacity(Ah)
C-rate(C)
Cut-off C-rate(C)
Expression voltage
Expression current
Others
If Accumulated end capacity>0 goto Step10
Others
Step Parameters
Protection settings/Record settings
If
DBC
SMBUS
Function
Parameter
Comp...
Compar...
goto
Expression
Expression
>
0
Step10
Accumulated end capacity: User2+ChargeAh-1.2*User1
Set
Focus settings, double click to select the global va
No.
Variable type
Variable description
Expression name
Accumulated end capacity
Expression editing
User2+ChargeAh-1.2*User1
Compilation results
OK
Cancel


Start test *
Step Index
Step Name
Step Time(hhmmss.ms)
Voltage(V)
Current(A)
Cutoff voltage (V)
Cut-off curr.(A)
Capacity(Ah)
C-rate(C)
Cut-off C-rate(C)
Expression voltage
Expression current
Others
1 Rest 00:05:00.500
2 CC Chg 1 4.2
3 Rest 00:05:00.000
4 CC DChg 1 2.8
5 Rest 00:05:00.000 SetUser1: Standard Capacity C01LS_DischargeAh)
SetUser2: Initial Accumulated Capacity(0)
6 CC Chg 00:00:10.000 1.5 If Accumulated end capacity>0 goto Step10
7 Rest SetUser2: Cycle Accumulated Capacity(User2+LS_ChargeAh)
8 Rest 00:00:05.000
9 Cycle Start step ID:6 Cycle count:10000
10 Rest 00:05:00.000
11 CC DChg
12 Rest
13 End
Others
Step Parameters
Protection settings/Record settings
If
DOC
SMDMS
Function
Parameter
Comp...
Comparativ...
goto
Set
User2: Cycle Accumulated Capacity(User2+LS_ChargeAh)
Apply to all Rest steps
OK
Cancel