

The instrument should be adjusted by a qualified engineer at a qualified facility with sufficient precision. The adjustment feature of the instrument can be used to adjust the voltage, current, and frequency outputs. The adjustment values are retained even when the instrument is initialized, but they may be reset if the instrument is adjusted at a YOKOGAWA factory. If you need to adjust the instrument more than that is possible with the adjustment feature or if you want calibration and adjustment to be performed at a YOKOGAWA factory, contact your nearest YOKOGAWA dealer.

Equipment Used

- Digital power meter WT3000E (YOKOGAWA) or equivalent
- Frequency counter TC110 (YOKOGAWA) or equivalent
- Current sensor CT200 (YOKOGAWA) or equivalent

Each piece of equipment must be calibrated and with sufficient precision.

Adjustment Procedure and Conditions

- Ambient temperature 23°C ± 3°C; humidity 20%RH to 80%RH; at least 30 minute warm-up
- Permitted supply voltage range: 90 VAC to 132 VAC and 180 VAC to 264 VAC, permitted supply frequency range: 48 Hz to 63 Hz
- Use the default settings for settings that are not specified.
- Set LS3300 LO TO EARTH to ON, switch to adjustment mode, and set the range.
- For the wiring procedure, see "Description."

Deviation

The output is adjusted using deviation. The output after adjustment is calculated with the following equation.

Output after adjustment = Output when the deviation is 0% / (1 + deviation)

Procedure



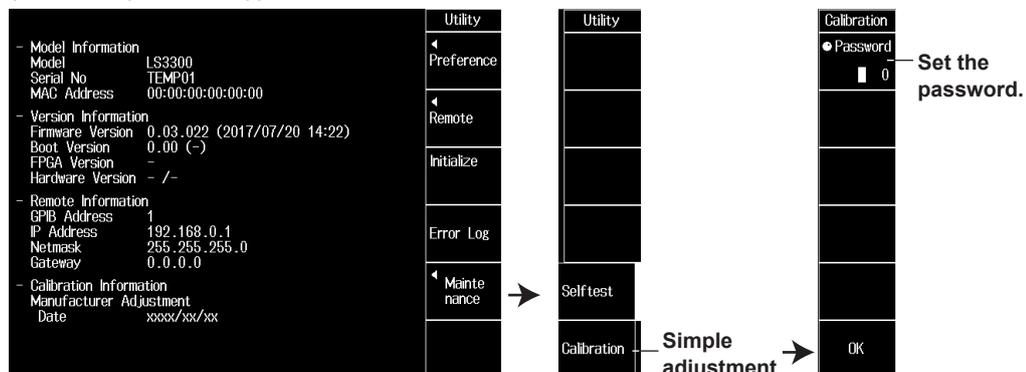
WARNING

Never touch the terminals or cables when the instrument's output is on. Doing so may cause electric shock.

Switching to Adjustment Mode

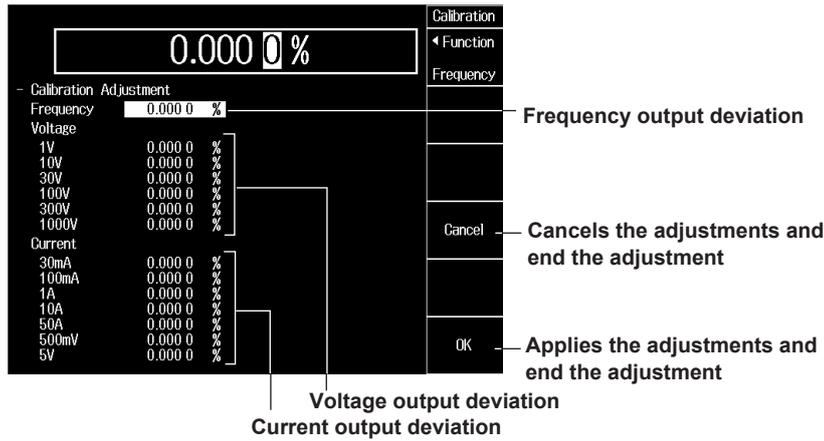
1. On the top menu, press the **UTILITY** soft key or the **UTILITY** key.
2. Press the **Maintenance** soft key.
3. Press the **Calibration** soft key.

A password input screen appears.



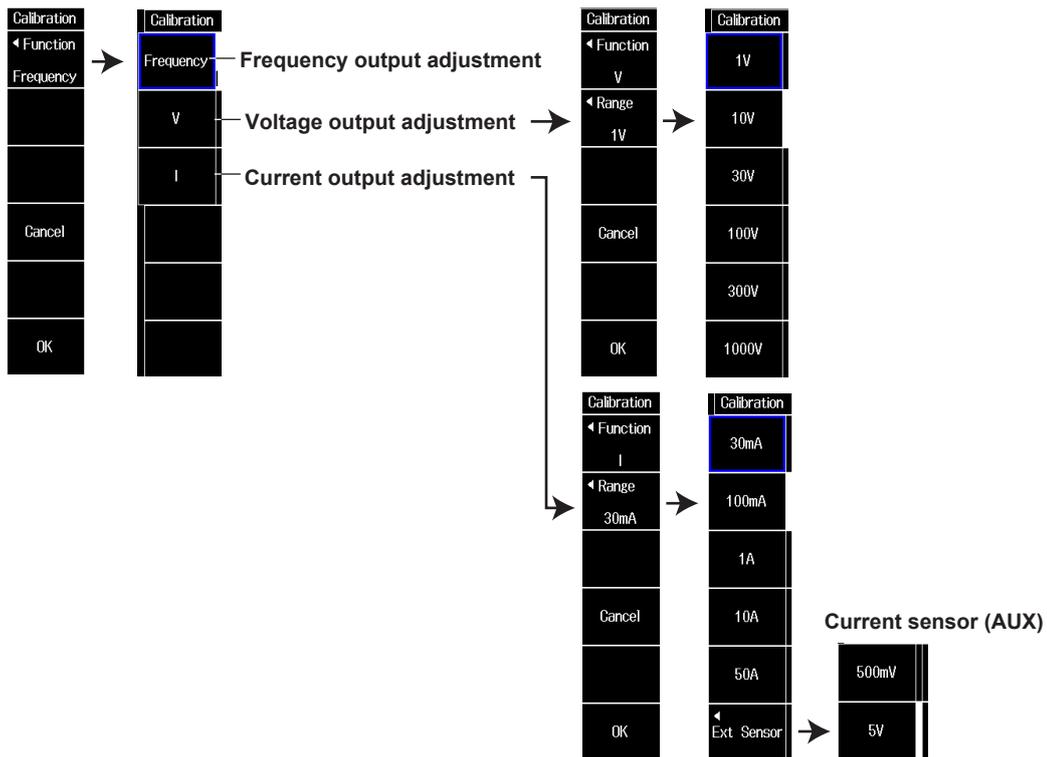
4. Using the arrow keys and know, enter "1111" for the password.

5. Press the **OK** soft key.
The simple adjustment screen appears.



Selecting a Range and Adjusting the Output

6. Press the **Function** soft key.
A menu for selecting the adjustment item (frequency, voltage, current) appears.
7. Press the **Frequency**, **V**, or **I** soft key.
 Frequency: To frequency output adjustment
 V: To voltage output adjustment
 I: To current output adjustment



Frequency Output Adjustment

8. Press **OUTPUT**.
A 10 V, 1 kHz signal is output.
9. Set the deviation so that the measurement on the frequency counter connected to the instrument (the value obtained by correcting the value displayed on the frequency counter using the calibration value) is 1 kHz.

Voltage Output Adjustment

- 8.** Press the **Range** soft key.
- 9.** Press the soft key corresponding to the range you want to adjust.
- 10.** Press **OUTPUT**.
A voltage at 100% of the set range is output.
Because the output value immediately after starting the output is unstable, wait at least 30 s after you turn the output on before adjusting the LS3300.
- 11.** Set the deviation so that the output matches the calibration value of the WT3000E connected to this instrument.
The larger the deviation, the smaller the output.
- 12.** To adjust another range, repeat steps 8 to 11.

Current Output Adjustment

- 8.** Press the **Range** soft key.
- 9.** Press the soft key corresponding to the range you want to adjust.
- 10.** Press **OUTPUT**.
A current at 100% of the set range is output.
Because the output value immediately after starting the output is unstable, wait at least 30 s after you turn the output on before adjusting the LS3300.
- 11.** Set the deviation so that the output matches the calibration value of the WT3000E connected to this instrument.
The larger the deviation, the smaller the output.
For the 50 A range, use the CT ratio of the calibrated CT200 and the WT3000E calibration value to adjust the instrument so that the reading is 50 A.
- 12.** To adjust another range, repeat steps 8 to 11.

Current Sensor Output (AUX) Adjustment

- 8.** Press the **Range** soft key.
- 9.** Press the **Ext Sensor** soft key and then the soft key corresponding to the range you want to adjust.
- 10.** Press **OUTPUT**.
A voltage equivalent to the output signal is output from the AUX terminal.
Because the output value immediately after starting the output is unstable, wait at least 30 s after you turn the output on before adjusting the LS3300.
- 11.** Set the deviation so that the output matches the calibration value of the WT3000E connected to this instrument.
The larger the deviation, the smaller the output.
- 12.** To adjust another range, repeat steps 8 to 11.

Ending Adjustment Mode

- 13.** Press the **OK** soft key.
The adjustment values are saved, and the top screen appears.

Canceling Adjustment

- 13.** To discard the adjustment values and end the adjustment, press the **Cancel** soft key.
A confirmation message appears.
- 14.** Press the **OK** soft key. The adjustment values are discarded, and the top screen appears.

Explanation

Voltage, Current, and Frequency Outputs

The following signals are output during simple adjustment.

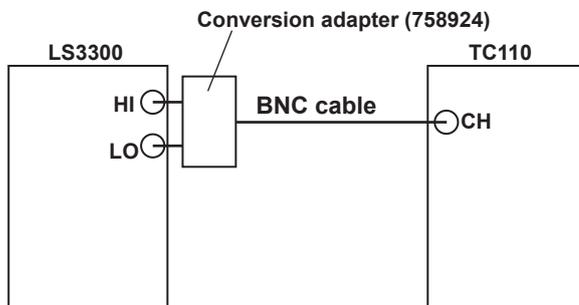
- Frequency output (10 V)
1 kHz
- Voltage output (60 Hz)
100% output at the following ranges: 1 V, 10 V, 30 V, 100 V, 300 V, 1000 V
- Current output (60 Hz)
100% output at the following ranges: 30 mA, 100 mA, 1 A, 10 A, 50 A
- AUX output (60 Hz)
100% output at the following ranges: 500 mV, 5 V

If you change the range, the output turns off.

Connection and Adjustment Procedure

Output Frequency

- Connect the LS3300 voltage output terminal to the TC110 frequency counter.



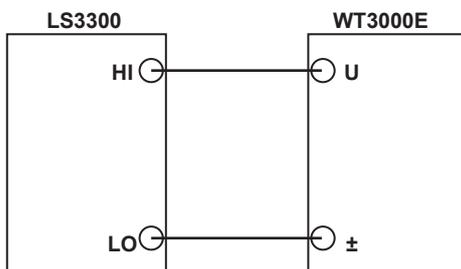
- Set LS3300 LO TO EARTH to ON, switch to adjustment mode, and set the range to frequency.
- Configure the TC110 frequency counter to 1 s gate period, x10 attenuation, AC coupling, and filter ON.
- Set the LS3300 frequency as shown in the following table, turn the output on, and adjust the LS3300 so that the TC110 reading is 1 kHz.

LS3300		
Range	(Output voltage)	(Frequency)
Frequency	10V	1kHz

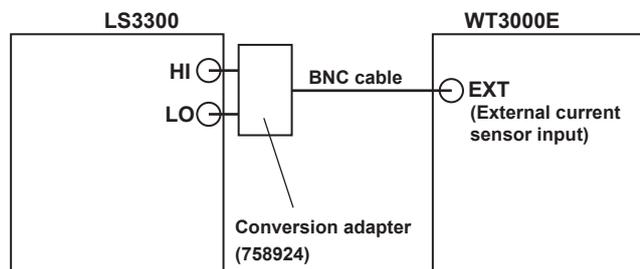
AC Voltage Output

- Connect the LS3300 voltage output terminals to the WT3000E. If the LS3300 output is 100 V or greater, connect the Uin terminal. If the LS3300 output is 10 V or less, connect the EXT terminal.

If the output is 100 V or greater



If the output is 10 V or less



- Set LS3300 LO TO EARTH to ON, switch to adjustment mode, and set the range.
- Set the WT3000E UPDATE RATE to 500 ms.

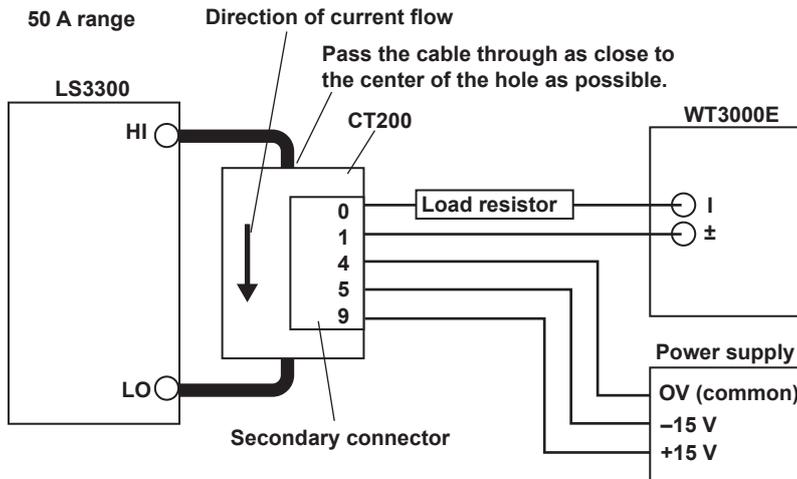
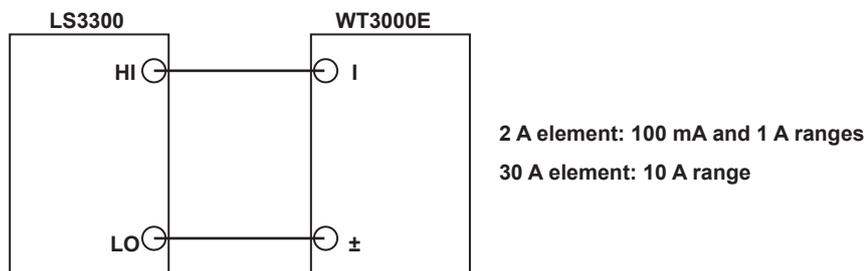
- Set the LS3300 voltage range and output value and the WT3000E 2 A element input and measurement conditions as shown in the following table, turn the output on, and adjust the LS3300 so that the WT3000E calibration value is achieved.

LS3300		WT3000E		
Range	Output Value	Range	Terminal	Average
1 V	1.00000 V	1 V	lin(EXT)	8
10 V	10.0000 V	10 V	lin(EXT)	8
30 V	30.0000 V	30 V	Uin	8
100 V	100.000 V	100 V	Uin	8
300 V	300.00 V	300 V	Uin	8
1000 V	1000.00 V	1000 V	Uin	8

AC Current Output

- Connect the LS3300 current output terminals to the WT3000E. For the 50 A range and 50 A output, connect the cable connected to the LS3300 current output terminal through the primary current hole of a CT200, and connect the secondary side of the CT200 to the WT3000E current input terminal.

100 mA, 1 A, and 10 A ranges



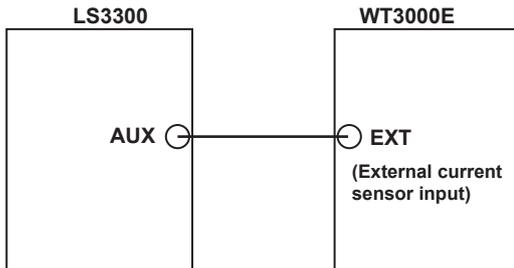
Load resistance: Resistance used to calibrate the WT3000

- Set LS3300 LO TO EARTH to ON, switch to adjustment mode, and set the range.
- Set the WT3000E UPDATE RATE to 500 ms.
- Set the LS3300 current range and output value and the WT3000E 2 A and 30 A element inputs and measurement conditions as shown in the following table, turn the output on, and adjust the LS3300 so that the WT3000E calibration value is achieved. For the 50 A range, use the CT ratio of the calibrated CT200 and the WT3000E calibration value to adjust the instrument so that the reading is 50 A.

LS3300		WT3000E		
Range	Output	Range	Terminal (Element)	Average
30 mA	30.0000 mA	50 mA	lin(2A)	16
100 mA	100.000 mA	100 mA	lin(2A)	16
1 A	1.00000 A	1 A	lin(2A)	8
10 A	10.0000 A	10 A	lin(30A)	8
50 A	50.000 A	50 mA	lin(2A)	16

Current Sensor Signal Generation (AUX)

- Connect the LS3300 AUX output terminal to the WT3000E lin (EXT) terminal.



- Set LS3300 LO TO EARTH to ON, switch to adjustment mode, and set the range.
- Set the WT3000E UPDATE RATE to 500 ms.
- Set the LS3300 voltage range and output value and the WT3000E 2 A element input and measurement conditions as shown in the following table, turn the output on, and adjust the LS3300 so that the WT3000E calibration value is achieved.

LS3300		WT3000E		
Range	Output Value	Range	Terminal	Average
Ext Sensor 500 mV	500.00mV	500 mV	lin(EXT)	16
Ext Sensor 5 V	5.0000 V	5 V	lin(EXT)	8

Communication Commands

CALibrate Group

:CALibrate:ADJust

Function Sets or queries the calibration value.

Syntax :CALibrate:ADJust <Adjustment>
:CALibrate:ADJust?
<Adjustment>
= When the :CALibrate:FUNCTION command is used to specify voltage or current
±2.0000%
=When the :CALibrate:FUNCTION command is used to specify frequency
±0.2000%

Example :CALIBRATE:ADJUST 0.1000
:CALIBRATE:ADJUST?
-> :CALIBRATE:ADJUST 0.1000

Description If a value outside the adjustment range is specified, a "222:Data out of range" error will occur.

:CALibrate:FUNCTION

Function Sets or queries the item to be calibrated (voltage, current, or frequency).

Syntax :CALibrate:FUNCTION
{VOLTage|CURRent|FREQuency}
:CALibrate:FUNCTION?
VOLTage: Voltage
CURRent: Current
FREQuency: Frequency

Example :CALIBRATE:FUNCTION VOLTAGE
:CALIBRATE:FUNCTION?
-> :CALIBRATE:FUNCTION VOLTAGE

:CALibrate:INITialize

Function Initializes the 2558A calibration values.

Syntax :CALibrate:INITialize

Example :CALIBRATE:INITIALIZE

:CALibrate:PASSword

Function Enters the password for switching to calibration mode.

Syntax :CALibrate:PASSword {<String>}
<String>: Password

Example :CALIBRATE:PASSWORD "1111"

Description You must enter a password to use the commands in the CALibrate group.
Enter a character string for the password.
To exit from calibration mode, enter an empty string (two consecutive double quotation marks).

:CALibrate:RANGE

Function Sets or queries the range to be calibrated.

Syntax :CALibrate:RANGE {<Voltage>|<Current>
|AUX,<Voltage>}
:CALibrate:RANGE?
<Voltage> = 1, 10, 30, 100, 300, 1000 (V)
<Current> = 30 (mA), 100 (mA), 1, 10, 50 (A)
AUX,<Voltage> = 500 m, 5 (V)

Example :CALIBRATE:RANGE 1V
:CALIBRATE:RANGE?
-> :CALIBRATE:RANGE 1.0E+00
30.0E-03 (30 mA range)
100.0E-03 (100 mA range)
500.0E-03 (AUX 500 mV range)
1.0E+00 (1 V or 1A range)
5.0E+00 (AUX 5 V range)
10.0E+00 (10 V or 10 A range)
30.0E+00 (30 V range)
50.0E+00 (50 A range)
100.0E+00 (100 V range)
300.0E+00 (300 V range)
1.0000E+03 (1000 V range)

Description To use <Voltage>, use the :CALibrate:FUNCTION command in advance to set the item to be calibrated to voltage.
To use <Current>, use the :CALibrate:FUNCTION command in advance to set the item to be calibrated to current.
If a calibration range of a different item is specified, a "131:Invalid suffix" error will occur.
If the item to be calibrated is set to frequency, this command is ignored.

:CALibrate:STATE

Function Sets or queries the output on/off status in calibration mode.

Syntax :CALibrate:STATE <Boolean>
:CALibrate:STATE?
ON|1: Enabled
OFF|0: Disabled

Example :CALIBRATE:STATE ON
:CALIBRATE:STATE?
-> :CALIBRATE:STATE 1

Description If voltage or current has been specified with the :CALibrate:FUNCTION command, when the output is set to on, a rated value at the range specified by the :CALibrate:RANGE command is output at 60 Hz.
If frequency has been specified with the :CALibrate:FUNCTION command, when the output is set to on, a rate value at 10 V range is output at 1 kHz.

:CALibrate:WRITE

Function Writes the adjustment value to the instrument's internal memory.

Syntax :CALibrate:WRITE

Example :CALIBRATE:WRITE

Aufgrund laufender Weiterentwicklungen sind Änderungen der Spezifikationen vorbehalten. Alle Angaben vorbehaltlich Satz- und Druckfehler.

nbn Austria GmbH

Riesstraße 146, 8010 Graz

Tel. +43 316 40 28 05 | Fax +43 316 40 25 06

nbn@nbn.at | www.nbn.at

