FRA5014 LabVIEW Driver

Instruction Manual

NF Corporation

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FRA5014 LabVIEW Driver

Instruction Manual

Preface

Thank you for purchasing the FRA5014 Servo Analyzer. The FRA5014 LabVIEW Driver is a LabVIEW measuring instrument driver dedicated to the FRA5014 Servo Analyzer.

● Before Reading This Manual

This instruction manual is provided in PDF format.

This manual assumes that you are familiar with the basic operations of the operating system that runs on your computer. For the basic operations of Windows and Windows-related terms such as “click” and “drag”, refer to the user’s guide or other related documents on Windows.

● This manual has the following chapter organization.

1. OVERVIEW

This chapter provides an overview of the FRA5014 LabVIEW Driver.

2. OPERATION VI

This chapter describes each operation vi.

Disclaimer

The **FRA5014 LabVIEW driver** (hereinafter, “this software”) was shipped after having undergone full testing and inspection by NF Corporation.
Should this product fail due to a manufacturing flaw or due to a mishap during shipping, contact NF Corporation or one of our distributor.

NF Corporation takes no responsibility for any damage caused by use of this software. In addition, we assume no obligation to modify the software or provide support in case this software contains flaws. Please use this software under your responsibility.

Contents

1. OVERVIEW

1.1 General

This driver is a LabVIEW measuring instrument driver for the NF Corporation FRA5014.

This driver allows application configuration without bothering with details of the FRA5014 program messages.

* During creation of this driver, operation under the following environments was confirmed:
  - OS: Windows7/8.1(32-bit/64-bit), Windows10 or later
  - NI-VISA: Ver. 2023Q3

With some versions of LabVIEW, VI may automatically be changed for inter-version consistency. In such a case, follow the instructions shown on the computer screen.

2. Operation VI

2.1 About VI

Error input and output are provided in every FRA5014 operation VI. Error cluster chains are generated by connecting an error output to the error input of the next VI. This allows a natural error I/O for the LabVIEW data flow architecture to be obtained. An application can monitor the intermediate error status as required.

FRA5014 operation VI, except for Close, has a VISA session input and a duplicated VISA session output. Use chain connections for these as well. Close has a VISA session input only, so the application forms a chain from Initialize to Close.

VI, of which input items contain Read, can output the contents set in the FRA5014. When outputting, set the bool controller to ON (True). The default setting is OFF (False).

Parentheses ( ) at the end of an item name indicate default setting. For example, “Read (F)” indicates that the default setting is “False”. In the same way, square brackets [ ] for numerical controllers or the display device indicate quantity units.

See the sample application for actual connections.

The following sections describe error I/O, VISA session, and I/O terminals except Read.

2.2 VI Tree

NF FRA5014 VI_Tree.vi

The VIs included in this driver are shown in a diagram.

2.3 Sample

NF FRA5014 sample_sweep.vi

Performs sweep measurements.

<Setting items>

- Upper limit frequency
- Lower limit frequency
- Number of measurement points
- Sweep interval
- Output voltage
- Output voltage unit
- Offset voltage

<Output results>

- Measurement frequency
- Each channel gain
- Each channel phase
- Error message

NF FRA5014 sample_spot.vi

Performs spot measurements.

<Setting items>

- Measurement frequency
- Output voltage
- Output voltage unit
- Offset voltage

<Output results>

• Measurement frequency • Each channel gain • Each channel phase • Error message

NF FRA5014 sample_result.vi

Checks the result of measurement performed by ***NF FRA5014 sample_spot.vi***. Note that this VI cannot be used as a sub VI.

<Setting items>

• Measurement frequency • Output voltage • Output voltage unit • Offset voltage

• Each channel gain range • Each channel phase range

<Output results>

• Measurement frequency • Each channel gain • Each channel phase

• Check result • Error message

2.4 VISA Initialization

NF FRA5014 Initialize.vi

Performs initialization. Internally executes NF FRA5014 Reset to return the various settings to those at memory initialization.

<Input>

ID Check(T)

Specify whether to check the ID. The default setting is “Yes (True)”.

Reset(T)

Specify whether to execute resetting. The default setting is “Yes (True)”.

RS232(F)

Specify to connect via RS232. The default setting is “No (False)”.

RS232parameter

Perform port settings for RS232 connection.

The default settings are shown below:

Parity: None

Stop bit: 1 bit

Baud rate: 9600

*** When connecting via RS232, always set flow control to “XON/XOFF”.**

Normal operation is not guaranteed with a setting other than “XON/XOFF”.

2.5 VISA Close

NF FRA5014 Close.vi

Stops using NF FRA5014 operation VI and closes the VISA session.

2.6 CALibration Subsystem

NF FRA5014 Cal.vi

Performs calibration.

<Output>

Calibration

Returns calibration execution result.

0: Normal completion

1: An error occurred

2.7 INPut Subsystem

NF FRA5014 INP_Over.vi

Sets or queries the over input detection level (Vrms).

<Input>

Ch(Ch 1)

Setting range: Ch 1 to Ch4

Level[Vrms](0.01)

Setting range: 0.01 to 19.99

<Output>

Query Level[Vrms]

When Read = True, returns the set value for the over input detection level (Vrms).

When Read = False, this vi is disabled and always returns “999.99”.

NF FRA5014 INP_Resp.vi

Sets or queries processing at overload detection.

<Input>

Parameter(Lamp)

0: Lamp

1: Lamp&Beep

2: Lamp&Beep&Stop

3: Lamp&Beep&Stop&Off

4: Lamp&Stop

5: Lamp&Stop&Off

<Output>

Query

When Read = True, returns the set processing at the overload detection.

When Read = False, this vi is disabled and always returns “999”.

NF FRA5014 INP_Gain.vi

Sets or queries the input weighting coefficient.

<Input>

Parameter(0)

CH 1 weighting coefficient: –1.00000E+06 to +1.00000E+06

CH 2 weighting coefficient: –1.00000E+06 to +1.00000E+06

CH 3 weighting coefficient: –1.00000E+06 to +1.00000E+06

CH 4 weighting coefficient: –1.00000E+06 to +1.00000E+06

<Output>

Query Parameter

When Read = True, returns the set value for the input weighting coefficient.

When Read = False, this VI is disabled and always returns “9999999.00000”.

2.8 MEASure Subsystem

NF FRA5014 Meas_Del.vi

Sets or queries the measurement delay time.

<Input>

Time(0)

Setting range: 0.00 to 999.99

<Output>

Query Time

When Read = True, returns the set value for the measurement delay time.

When Read = False, this vi is disabled and always returns “9999.99”.

NF FRA5014 Meas_Cyc.vi

Sets or queries the integration cycle.

<Input>

Cycle(1)

Setting range: 1 to 999

<Output>

Query Cycle

When Read = True, returns the set value for the integration cycle.

When Read = False, this vi is disabled and always returns “9999”.

NF FRA5014 Meas_Time.vi

Sets or queries the integration time.

<Input>

Time(0.01)

Setting range: 0.01 to 999.99

<Output>

Query Time

When Read = True, returns the set value for the integration time.

When Read = False, this vi is disabled and always returns “9999.99”.

2.9 SENSe Subsystem

NF FRA5014 SENS_SWE_All.vi

Outputs all items of SWEEP measurement results.

<Output>

Data

Outputs frequency, ch 2 gain (log), ch 2 phase, ch 3 gain (log), ch 3 phase, ch 4 gain (log), ch 4 phase, … (outputs data for up to the number of measurement points)

NF FRA5014 SENS_SWE_Sel.vi

Outputs the specified number of items (up to 7) of SWEEP measurement results.

<Input>

Parameter(T)

1st (frequency)	0: No output / 1: Output
2nd (ch 2 gain (log))	0: No output / 1: Output
3rd (ch 2 phase)	0: No output / 1: Output
4th (ch 3 gain (log))	0: No output / 1: Output
5th (ch 3 phase)	0: No output / 1: Output
6th (ch 4 gain (log))	0: No output / 1: Output
7th (ch 4 phase)	0: No output / 1: Output

<Output>

Data

Outputs the values specified by the parameter, for the number of measurement points, from among frequency, ch 2 gain (log), ch 2 phase, ch 3 gain (log), ch 3 phase, ch 4 gain (log), and ch 4 phase.

NF FRA5014 SENS_SWE_Poin.vi

Outputs the measurement points in the SWEEP measurement results.

<Output>

Query point

Returns the measurement points in the SWEEP measurement results.

NF FRA5014 SENS_SPOT.vi

Outputs all items of SPOT measurement results.

<Output>

Data

Frequency, ch 2 gain (log), ch 2 phase, ch 3 gain (log), ch 3 phase, ch 4 gain (log), and ch 4 phase

NF FRA5014 SENS_SPOT_Comp.vi

Outputs all items of SPOT measurement results (in complex formats).

<Output>

Data

Frequency, ch 2 real part of gain, ch 2 imaginary part of gain, ch 3 real part of gain, ch 3 imaginary part of gain, ch 4 real part of gain, and ch 4 imaginary part of gain

NF FRA5014 SENS_SPOT_Sel.vi

Outputs the specified number of items (up to 7) of SPOT measurement results.

<Input>

Parameter(T)

1st (frequency)	0: No output / 1: Output
2nd (ch 2 gain (log))	0: No output / 1: Output
3rd (ch 2 phase)	0: No output / 1: Output
4th (ch 3 gain (log))	0: No output / 1: Output
5th (ch 3 phase)	0: No output / 1: Output
6th (ch 4 gain (log))	0: No output / 1: Output
7th (ch 4 phase)	0: No output / 1: Output

<Output>

Data

Outputs the values specified by the parameter, from among frequency, ch 2 gain (log), ch 2 phase, ch 3 gain (log), ch 3 phase, ch 4 gain (log), and ch 4 phase

NF FRA5014 SENS_GAIN_Max.vi

Sets or queries the gain judgment upper limit value for SPOT measurement.

<Input>

Parameter(0)

1st: –199.99 to 199.99 (CH 2/CH 1)

2nd: –199.99 to 199.99 (CH 3/CH 1)

3rd: –199.99 to 199.99 (CH 4/CH 1)

<Output>

Query Parameter

When Read = True, returns the gain judgment upper limit value for SPOT measurement.

When Read = False, this vi is disabled and always returns “999.99”.

NF FRA5014 SENS_GAIN_Min.vi

Sets or queries the gain judgment lower limit value for SPOT measurement.

<Input>

Parameter(0)

1st: –199.99 to 199.99 (CH 2/CH 1)

2nd: –199.99 to 199.99 (CH 3/CH 1)

3rd: –199.99 to 199.99 (CH 4/CH 1)

<Output>

Query Parameter

When Read = True, returns the gain judgment lower limit value for SPOT measurement.

When Read = False, this vi is disabled and always returns “999.99”.

NF FRA5014 SENS_PHAS_Max.vi

Sets or queries the phase judgment upper limit value for SPOT measurement.

<Input>

Parameter(0)

1st: –180.00 to 180.00 (CH 2/CH 1)

2nd: –180.00 to 180.00 (CH 3/CH 1)

3rd: –180.00 to 180.00 (CH 4/CH 1)

<Output>

Query Parameter

When Read = True, returns the phase judgment upper limit value for SPOT measurement.

When Read = False, this vi is disabled and always returns “999.99”.

NF FRA5014 SENS_PHAS_Min.vi

Sets or queries the phase judgment lower limit value for SPOT measurement.

<Input>

Parameter(0)

1st: –180.00 to 180.00 (CH 2/CH 1)

2nd: –180.00 to 180.00 (CH 3/CH 1)

3rd: –180.00 to 180.00 (CH 4/CH 1)

<Output>

Query Parameter

When Read = True, returns the phase judgment lower limit value for SPOT measurement.

When Read = False, this vi is disabled and always returns “999.99”.

NF FRA5014 SENS_Rep.vi

Queries the SPOT judgment results. (All items are output.)

<Output>

Data

Data1 (CH 2/CH 1GAIN):

–1 (NG if below lower limit)/ 0 (SUCCESS)/ 1 (NG if above upper limit)

Data2 (CH 2/CH 1PHASE):

–1 (NG if below lower limit)/ 0 (SUCCESS)/ 1 (NG if above upper limit)

Data3 (CH 3/CH 1GAIN):

–1 (NG if below lower limit)/ 0 (SUCCESS)/ 1 (NG if above upper limit)

Data4 (CH 3/CH 1PHASE):

–1 (NG if below lower limit)/ 0 (SUCCESS)/ 1 (NG if above upper limit)

Data5 (CH 4/CH 1GAIN):

–1 (NG if below lower limit)/ 0 (SUCCESS)/ 1 (NG if above upper limit)

Data6 (CH 4/CH 1PHASE):

–1 (NG if below lower limit)/ 0 (SUCCESS)/ 1 (NG if above upper limit)

NF FRA5014 SENS_PEP_Sel.vi

Queries the SPOT judgment results (outputs specified items).

<Input>

Parameter(0)

1st (CH 2/CH 1 GAIN) 0: No output / 1: Output

2nd (CH 2/CH 1 PHASE) 0: No output / 1: Output

3rd (CH 3/CH 1 GAIN) 0: No output / 1: Output

4th (CH 3/CH 1 PHASE) 0: No output / 1: Output

5th (CH 4/CH 1 GAIN) 0: No output / 1: Output

6th (CH 4/CH 1 PHASE) 0: No output / 1: Output

<Output>

Data

–1 (NG if below lower limit)/ 0 (SUCCESS)/ 1 (NG if above upper limit)

2.10 SOURce Subsystem

NF FRA5014 SOUR_Freq.vi

Sets or queries oscillator frequency.

<Input>

Freq[Hz](1000)

Setting range: 0.10E – 03 (0.10 mHz) to 100.00E + 03 (100.00 kHz)

<Output>

Query Freq[Hz]

When Read = True, returns oscillator frequency.

When Read = False, this vi is disabled and always returns “9999999.00000”.

NF FRA5014 SOUR_Meas.vi

Sets or queries SWEEP/SPOT measurement.

<Input>

Parameter(STOP)

STOP

SPOT

UP

DOWN

<Output>

Query

When Read = True, returns SWEEP/SPOT measurement setting.

When Read = False, this vi is disabled and always returns a space.

NF FRA5014 SOUR_Spac.vi

Sets or queries the SWEEP measurement frequency axis.

<Input>

Parameter(LIN)

LINear

LOGarithmic

<Output>

Query

When Read = True, returns the set value for SWEEP measurement frequency axis.

When Read = False, this vi is disabled and always returns a space.

NF FRA5014 SOUR_Poin.vi

Sets or queries the number of SWEEP measurement points.

<Input>

Point (3)

Setting range: 3 to 1000

<Output>

Query

When Read = True, returns the set value for the number of SWEEP measurement points.

When Read = False, this vi is disabled and always returns “9999”.

NF FRA5014 SOUR_Max.vi

Sets or queries the upper limit frequency for SWEEP measurement.

<Input>

Freq [Hz](100000)

Setting range: 0.11E – 03 (0.11 mHz) to 100.00E + 03 (100.00 kHz)

<Output>

Query

When Read = True, returns the set upper limit frequency for SWEEP measurement.

When Read = False, this vi is disabled and always returns “999999.00000”.

NF FRA5014 SOUR_Min.vi

Sets or queries the lower limit frequency for SWEEP measurement.

<Input>

Freq [Hz](0.0001)

Setting range: 0.10E – 03 (0.10 mHz) to 99.999E + 03 (99.999 kHz)

<Output>

Query

When Read = True, returns the set lower limit frequency for SWEEP measurement.

When Read = False, this vi is disabled and always returns “9999999.00000”.

NF FRA5014 SOUR_Outp.vi

Sets or queries on/off of the oscillator.

<Input>

Parameter(AC/DC OFF)

0: (AC/DC OFF)

1: (AC OFF)

2: (AC/DC ON)

<Output>

Query

When Read = True, returns the set on/off value for the oscillator.

When Read = False, this vi is disabled and always returns “999”.

NF FRA5014 SOUR_Offs.vi

Sets and queries the DC bias (V) of the oscillator.

<Input>

Offset[V] (0)

Setting range: –10.00 to 10.00

<Output>

Query Offset[V]

When Read = True, returns the set DC bias (V) value of the oscillator.

When Read = False, this vi is disabled and always returns “999.99”.

NF FRA5014 SOUR_Volt.vi

Sets or queries the AC amplitude of the oscillator.

<Input>

Volt(0)

Setting range: 0.000 to 7.07 (Vrms)
0.000 to 10.00 (Vpk)

Unit(Vrms): Vrms
Vpk

<Output>

Query Volt

When Read = True, returns the set AC amplitude value of the oscillator.

When Read = False, this vi is disabled and always returns “999.99”.

NF FRA5014 SOUR_Unit.vi

Sets and queries the display unit for oscillator’s AC amplitude and response unit for query.

<Input>

Unit(Vrms)

Vrms

Vpk

<Output>

Query Unit

When Read = True, returns the set display unit for oscillator’s AC amplitude and response unit for query.

When Read = False, this vi is disabled and always returns a space.

2.11 STATus Subsystem

NF FRA5014 STAT_Oper_cond.vi

Queries the operation condition register (OPCR).

<Output>

Query

Returns the operation condition register (OPCR) value.

NF FRA5014 STAT_Oper_Enab.vi

Sets or queries the operation event enable register (OPEE).

<Input>

Parameter(0)

Setting range: 0 to 65535

<Output>

Query

When Read = True, returns the set value for the operation event enable register (OPEE).

When Read = False, this vi is disabled and always returns “99999”.

NF FRA5014 STAT_Oper_Even.vi

Queries the operation event register (OPER). Note that the operation event register is cleared after this query.

<Output>

Query

Returns the value of the operation event register (OPER).

NF FRA5014 STAT_Oper_Ntr.vi

NF FRA5014 STAT_Oper_Ptr.vi

Set or query the operation transition filter.

<Input>

Setting range: 0 to 65535

Parameter(0)

NTR(0)/PTR(0): OPER is not set when OPCR changes

NTR(0)/PTR(1): 1 is set to OPER when OPCR changes from 0 to 1

NTR(1)/PTR(0): 1 is set to OPER when OPCR changes from 1 to 0

NTR(1)/PTR(1): 1 is set to OPER when OPCR changes

<Output>

Query

When Read = True, return the set value for the operation transition filter.

When Read = False, these vis are disabled and always return “99999”.

NF FRA5014 STAT_Over_Enab.vi

Sets or queries the overload event enable register (OVEE).

<Input>

Parameter(0)

Setting range: 0 to 65535

<Output>

Query

When Read = True, returns the set value in the overload event enable register (OVEE).

When Read = False, these vis are disabled and always returns “99999”.

NF FRA5014 STAT_Over_Even.vi

Queries the overload event register (OVER). Note that the overload event register is cleared after this query.

<Output>

Query

Returns the value of the overload event register (OVER).

2.12 SYSTem Subsystem

NF FRA5014 SYST_Err.vi

Queries an error.

<Output>

Query Error

Returns the latest error message. When no error has occurred, “No Error” is displayed.

Error code

Returns the latest error code. When no error has occurred, “0” is displayed.

NF FRA5014 SYST_Over.vi

Clears an error caused by the input signal exceeding the operating voltage range or user-set overinput detection level.

2.13 Common Commands

NF FRA5014 CLS.vi

Clears the following registers and the like.

- Standard event register
- Operation event register
- Overload event register
- Error queue

NF FRA5014 ESE.vi

Sets or queries the standard event enable register.

<Input>

ESE(0)

Setting range: 0 to 255

<Output>

Query ESE

When Read = True, returns the set value for the standard event enable register.

When Read = False, this vi is disabled and always returns “999”.

NF FRA5014 ESR.vi

Queries the value of standard event register. Note that all bits of the standard event register are cleared to 0 after this query.

<Output>

Query ESR

Returns the value of the standard event register.

NF FRA5014 IDN.vi

Queries information, including model, etc.

<Output>

Query IDN

Returns the manufacturer, model, serial number, and firmware version.

NF FRA5014 OPC.vi

Sets the OPC bit (bit 0) of the standard event register when all synchronous commands complete. OPC returns 1 when all synchronous commands complete. Note that executing OPC does not clear the OPC bit of the standard event register.

<Output>

Query OPC

When Read = True, returns the set value for the standard event register.

When Read = False, this vi is disabled and always returns “999”.

NF FRA5014 RCL.vi

Recalls the status stored in the memory by SAV. Note that recalling is disabled while output is on.

NF FRA5014 Reset.vi

Resets the device to its factory settings (sets output to off while clearing all memory settings).

NF FRA5014 SAV.vi

Stores the current status information in the memory.

NF FRA5014 SRE.vi

Sets the service request enable register.

<Input>

SRE(0)

Setting range: 0 to 255

<Output>

Query SRE

When Read = True, returns the set value for the service request enable register.

When Read = False, this vi is disabled and always returns “999”.

NF FRA5014 STB.vi

Queries the status byte register value.

<Output>

Query STB

Returns the status byte register value.

NF FRA5014 TST.vi

Queries the self test results.

<Output>

Query TST

Always returns “0”.

NF FRA5014 WAI.vi

Prohibits additional command execution until all asynchronous commands complete.

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ABOUT CONTACT

If a problem occurs or if you have questions, contact NF Corporation or the NF Corporation sales representative where you purchased this product.
When contacting NF Corporation or an NF Corporation sales representative, provide the model name (or product name), version number, and information as detailed as possible about the nature of the problem, conditions of use, etc.

WABUN: (DA00019242-003)

NOTES

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- The contents of this manual may be revised without notice.
- Information provided in this manual is intended to be accurate and reliable.
  However, we assume no responsibility for any damage regarding the contents of this manual.
  We assume no responsibility for influences resulting from the operations in this manual.

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