HP34401A- IVI Driver per LabVIEW 6

- Aquest document conté les descripcions d'algunes funcions d'ús habitual del Driver
- Les descripcions s'han simplificat i particularitzat pel l'ús al laboratori d'Instrumentació Electrònica
- Les variables **error_in** i **error_out** 🔲 només es descriuen per la funció de inicialització
- Per una referència completa de cada funció cal imprimir la documentació de la funció des de LabVIEW

hp34401a Initialize With Options.vi

This VI performs the following initialization actions:

- Creates a new IVI instrument driver and optionally sets the initial state of the following session properties:

   hp34401a>>Inherent IVI Settings>>User Options>>Range Check
   hp34401a>>Inherent IVI Settings>>User Options>>Query Instrument Status
   hp34401a>>Inherent IVI Settings>>User Options>>Cache
   hp34401a>>Inherent IVI Settings>>User Options>>Simulate
   hp34401a>>Inherent IVI Settings>>User Options>>Record Value Coercions

- Opens a session to the specified device using the interface and address you specify for the Resource Name parameter.

- If the ID Query parameter is set to TRUE, this VI queries the instrument ID and checks that it is valid for this instrument driver.
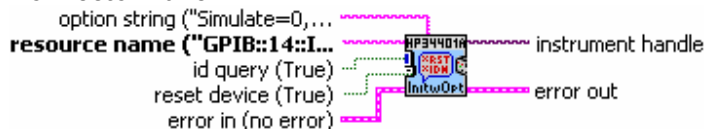
- If the Reset parameter is set to TRUE, this VI resets the instrument to a known state.

- Sends initialization commands to set the instrument to the state necessary for the operation of the instrument driver.

- Returns a instrument handle that you use to identify the instrument in all subsequent instrument driver VI calls.

Note: This VI creates a new session each time you invoke it. Although you can open more than one IVI session for the same resource, it is best not to do so. You can use the same session in multiple program threads.

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🔤 **resource name ("GPIB::14::INSTR")** Pass the resource name of the device to initialize.

Refer to the following table below for the exact grammar to use for this parameter. Optional fields are shown in square brackets ([]).

```
Syntax
----------------------------------------------------
GPIB[board]::<primary address>[::secondary address]::INSTR
```

If you do not specify a value for an optional field, the following values are used:

```
Optional Field - Value
----------------------------------------------------
board - 0
secondary address - none (31)
```

The following table contains example valid values for this parameter.

```
"Valid Value" - Description
----------------------------------------------------
"GPIB::22::INSTR" - GPIB board 0, primary address 22 no
            secondary address
"GPIB::22::5::INSTR" - GPIB board 0, primary address 22
            secondary address 5
"GPIB1::22::5::INSTR" - GPIB board 1, primary address 22
            secondary address 5
```

Default Value: "GPIB0::14::INSTR"

id query (True) Specify whether you want the instrument driver to perform an ID Query.

```
Valid Range:
TRUE  (1) - Perform ID Query (Default Value)
FALSE (0) - Skip ID Query
```

When you set this parameter to TRUE, the driver verifies that the instrument you initialize is a type that this driver supports.

Circumstances can arise where it is undesirable to send an ID Query command string to the instrument. When you set this parameter to FALSE, the VI initializes the instrument without performing an ID Query.

reset device (True) Specify whether you want the to reset the instrument during the initialization procedure.

```
Valid Range:
TRUE  (1) - Reset Device (Default Value)
FALSE (0) - Don't Reset
```

option string ("Simulate=0,RangeCheck=1,QueryInstrStatus=1,Cache=1") You can use this control to set the initial value of certain properties for the session. The following table lists the properties and the name you use in this parameter to identify the property.

```
Name            Attribute Defined Constant
-------------------------------------------
RangeCheck      hp34401a>>Inherent IVI Settings>>User Options>>Range Check
QueryInstrStatus  hp34401a>>Inherent IVI Settings>>User Options>>Query Instrument
```

Status
Cache   hp34401a>>Inherent IVI Settings>>User Options>>Cache
Simulate   hp34401a>>Inherent IVI Settings>>User Options>>Simulate
RecordCoercions   hp34401a>>Inherent IVI Settings>>User Options>>Record Value
Coercions

The format of this string is, "AttributeName=Value" where AttributeName is the name of
the property and Value is the value to which the property will be set. To set multiple
properties, separate their assignments with a comma.

If you pass NULL or an empty string for this parameter, the session uses the default
values for the properties.   You can override the default values by assigning a value
explicitly in a string you pass for this parameter. You do not have to specify all of the
properties and may leave any of them out. If you do not specify one of the properties, its
default value will be used.

The default values for the properties are shown below:

    Attribute Name   Default Value
    ---------------- -------------
    RangeCheck   TRUE
    QueryInstrStatus   TRUE
    Cache   TRUE
    Simulate   FALSE
    RecordCoercions   FALSE

The following are the valid values for ViBoolean properties:

    True: 1, TRUE, or TRUE
    False: 0, False, or FALSE

Default Value:
    "Simulate=0,RangeCheck=1,QueryInstrStatus=1,Cache=1"

error in (no error) The error in cluster can accept error information wired from VIs
previously called. Use this information to decide if any functionality should be bypassed
in the event of errors from other VIs.

The pop-up option Explain Error (or Explain Warning) gives more information about the
error displayed.

status The status boolean is either TRUE (X) for an error, or FALSE
(checkmark) for no error or a warning.

The pop-up option Explain Error (or Explain Warning) gives more information
about the error displayed.

code The code input identifies the error or warning.

The pop-up option Explain Error (or Explain Warning) gives more information
about the error displayed.

source The source string describes the origin of the error or warning.

The pop-up option Explain Error (or Explain Warning) gives more information about the error displayed.

instrument handle Returns a instrument handle that you use to identify the instrument in all subsequent instrument driver VI calls.

Notes:

(1) This VI creates a new session each time you invoke it. This is useful if you have multiple physical instances of the same type of instrument.

(2) Avoid creating multiple concurrent sessions to the same physical instrument. Although you can create more than one IVI session for the same resource, it is best not to do so. A better approach is to use the same IVI session in multiple execution threads.

error out The error out cluster passes error or warning information out of a VI to be used by other VIs.

The pop-up option Explain Error (or Explain Warning) gives more information about the error displayed.

status The status boolean is either TRUE (X) for an error, or FALSE (checkmark) for no error or a warning.

The pop-up option Explain Error (or Explain Warning) gives more information about the error displayed.

code The code input identifies the error or warning.

The pop-up option Explain Error (or Explain Warning) gives more information about the error displayed.

source The source string describes the origin of the error or warning.

The pop-up option Explain Error (or Explain Warning) gives more information about the error displayed.

hp34401a Single Point Measurement.vi

DESCRIPTION:
This VI uses immediate triggering to read a single measurement from the instrument. It shows how to use the HP 34401A VIs to take a single measurement.

INSTRUCTIONS:
1. Pass a valid instrument handle session into this VI.
2. Enter measurement function, resolution, and range values that are appropriate for the HP 34401A.
3. If an AC measurement is selected, set the ac min and ac max frequency.
4. Run the VI.

NOTES:
Notice the order of the HP 34401A component VIs in the block diagram. The first VI in this sequence accepts a valid instrument handle which provides a handle to the instrument driver. The instrument handle is generated by the hp34401a Initialize.vi. The last VI in the sequence passes the instrument handle out.
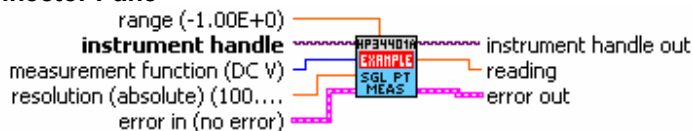
To take multiple readings, put the hp34401a Read.vi in a loop.

If you want to change the measurement trigger, change the constant passed into the hp34401a Configure Trigger.vi. Do not change the trigger source to Software Trigger VI as it requires low level measurement VIs (Initiate and Fetch).

I/O MODE:
This VI can be run in either simulation or non-simulation mode. The I/O mode is set when the instrument driver is initialized.

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Controls and Indicators

`I32` **measurement function (DC V)** Pass the measurement function you want the DMM to perform. The driver sets the hp34401a>>Basic Operation>>Function property to this value.

HP34401A_VAL_DC_VOLTS   - DC Volts (Default Value)
HP34401A_VAL_AC_VOLTS   - AC Volts
HP34401A_VAL_DC_CURRENT   - DC Current
HP34401A_VAL_AC_CURRENT   - AC Current
HP34401A_VAL_2_WIRE_RES   - 2-Wire Resistance
HP34401A_VAL_4_WIRE_RES   - 4-Wire Resistance
HP34401A_VAL_FREQ   - Frequency
HP34401A_VAL_PERIOD   - Period
HP34401A_VAL_DIODE   - Diode
HP34401A_VAL_CONTINUITY   - Continuity
HP34401A_VAL_DC_VOLTS_RATIO - DC Volts Ratio

Notes:

(1) HP34401A_VAL_DC_VOLTS_RATIO - The DMM calculates a ratio of the DC signal voltage over the DC reference voltage. The DC reference voltage is measured at the "Sense" terminals, and the DC signal voltage is measured at the "Input" terminals.

`DBL` **resolution (absolute) (100.00E-6)** Pass your desired measurement resolution in absolute units. The driver sets the hp34401a>Basic Operation>Resolution Absolute property to this value.

Setting this parameter to lower values increases the measurement accuracy. Setting this parameter to higher values increases the measurement speed.

The value must be in units appropriate for the Measurement Function as shown in the following table.

```
DC Volts          - volts
AC Volts          - volts
DC Current        - amperes
AC Current        - amperes
2-Wire Resistance  - ohms
4-Wire Resistance  - ohms
Frequency         - hertz
Period            - seconds
Diode             - volts
Continuity        - ohms
DC Volts Ratio    - volts
```

Valid Range: The resolution dependson the current measurement function and the current measurement range that you select with the hp34401a>Basic Operation>Function and the hp34401a>Basic Operation>Range properties.   The table below shows the minimum and maximum resolution values for each measurement type. The minimum resolution values are based on the maximum possible range for that measurement type. The maximum resolution values are based on the minimum possible range.

```
---------------------------------------------------------------
|   Function    | Min Resolution| Max Resolution   | Unit   |
---------------------------------------------------------------
| DC Volts      | 0.1       | 1E-7        | volts  |
| AC Volts      | 0.001     | 1E-7        | volts  |
| DC Current    | 1E-4      | 1E-8        | amps   |
| AC Current    | 1E-6      | 1E-6        | amps   |
| 2-Wire Res    | 10000     | 0.01        | ohms   |
| 4-Wire Res    | 10000     | 0.01        | ohms   |
| Frequency     | 10        | 0.1         | Hertz  |
| Period        | 1E-4      | 1E-6        | Seconds|
| Diode         | 1E-5      | 1E-5        | volts  |
| Continuity    | 0.01      | 0.01        | ohms   |
| DC Volts Ratio| 0.1       | 1E-7        | volts  |
---------------------------------------------------------------
```

Default Value: 0.0001 Volts

Notes:

(1) This parameter is ignored if the 'Range' parameter is set to IVIDMM_VAL_AUTO_RANGE_ON.

range (-1.00E+0) Pass the measurement range you want to use. The driver sets the hp34401a>>Basic Operation>>Range property to this value.

Use positive values to represent the absolute value of the maximum expected measurement. The value must be in units appropriate for the Measurement Function as shown in the following table. You must set the parameter to HP34401A_VAL_AUTO_RANGE_ON (-1.0) when the Measurement Function is set to diode, continuity, frequency, or period.

```
DC Volts          - volts
AC Volts          - volts
DC Current        - amperes
```

```
    AC Current       - amperes
    2-Wire Resistance  - ohms
    4-Wire Resistance  - ohms
    DC Volts Ratio     - volts
```

For example, when you set the Measurement Function to HP34401A_VAL_DC_VOLTS, you must specify the Range in volts. Setting this parameter to 10.0 configures the DMM to measure DC voltages from -10.0 to +10.0 volts.

The driver reserves special negative values for controlling the DMM's auto-ranging capability.

Defined Values:
HP34401A_VAL_AUTO_RANGE_OFF (-2.0) - Auto-range Off
HP34401A_VAL_AUTO_RANGE_ON   (-1.0) - Auto-range On

Valid Manual Range: The valid manual range depends on the Measurement Function. The table below shows the valid manual ranges.

```
-------------------------------------------------------------
|  Function   |  Min Value  |   Max Value   | Unit |
-------------------------------------------------------------
| DC Volts    | 0.1         | 1000.0        | volts |
| AC Volts    | 0.1         | 1000.0        | volts |
| DC Current  | 0.01        | 3.0           | amps  |
| AC Current  | 1.0         | 3.0           | amps  |
| 2-Wire Res  | 100.0       | 100.0E6       | ohms  |
| 4-Wire Res  | 100.0       | 100.0E6       | ohms  |
| Frequency   | Auto-range on| Auto-range on   | ----- |
| Period      | Auto-range on| Auto-range on   | ----- |
| Diode       | Auto-range on| Auto-range on   | ----- |
| Continuity  | Auto-range on| Auto-range on   | ----- |
| DC Volts Ratio | 0.1      | 1000.0        | volts |
-------------------------------------------------------------
```

Default Value: HP34401A_VAL_AUTO_RANGE_ON (-1.0)

Notes:

(1) Setting this parameter to HP34401A_VAL_AUTO_RANGE_ON (-1.0) configures the DMM to automatically calculate the range before each measurement.

(2) Setting this parameter to HP34401A_VAL_AUTO_RANGE_OFF (-2.0) configures the DMM to stop auto-ranging and keep the range fixed at the current maximum range.

(3) For the DC Volts Ratio measurement function, this parameter passes the voltage range of the signal connected to the 'Input' terminals. The signal connected to the 'Sense' terminals is always set to auto-range.

instrument handle The instrument handle that you obtain from the hp34401a Initialize or hp34401a Initialize With Options VI. The handle identifies a particular instrument session.

Default Value: None

reading Returns the measured value. The value you specify for the Measurement

Function parameter of the hp344041a Configure VI determines the units of this parameter as shown in the following table.

```
DC Volts          - volts
AC Volts          - volts
DC Current        - amperes
AC Current        - amperes
2-Wire Resistance - ohms
4-Wire Resistance - ohms
AC plus DC Volts  - volts
AC plus DC Current - amperes
Temperature (C)   - celcius
Temperature (F)   - Fahrenheit
Frequency         - hertz
Period            - seconds
Diode             - none
Continuity        - none
Siemens           - siemens
Coulombs          - coulombs
```

Notes:

(1) If an over-range condition occurs, the Reading parameter contains an IEEE defined NaN (Not a Number) value and the VI returns the HP34401A_WARN_OVER_RANGE(0x3FFA2001) warning code.

(2) You can test the measurement value for an over-range condirion by calling the hp344041a_IsOverRange VI.

[I/O] **instrument handle out** The instrument handle that you obtain from the hp34401a Initialize or hp34401a Initialize With Options VI. The handle identifies a particular instrument session.

Default Value: None

hp34401a Configure Measurement.vi

This function configures the common properties of the DMM. These properties include the measurement function, the maximum range, and the absolute resolution.

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Controls and Indicators

[I/O] **instrument handle** The instrument handle that you obtain from the Initialize or Initialize With Options VI. The handle identifies a particular instrument session.

Default Value: None

measurement function (DC V) Pass the measurement function you want the DMM to perform. The driver sets the hp34401a>Basic Operation>Function property to this value.

Valid Values:
HP34401A_VAL_DC_VOLTS   - DC Volts (Default Value)
HP34401A_VAL_AC_VOLTS   - AC Volts
HP34401A_VAL_DC_CURRENT   - DC Current
HP34401A_VAL_AC_CURRENT   - AC Current
HP34401A_VAL_2_WIRE_RES   - 2-Wire Resistance
HP34401A_VAL_4_WIRE_RES   - 4-Wire Resistance
HP34401A_VAL_FREQ   - Frequency
HP34401A_VAL_PERIOD   - Period
HP34401A_VAL_DIODE   - Diode
HP34401A_VAL_CONTINUITY   - Continuity
HP34401A_VAL_DC_VOLTS_RATIO - DC Volts Ratio

Notes:

(1) HP34401A_VAL_DC_VOLTS_RATIO - The DMM calculates a ratio of the DC signal voltage over the DC reference voltage. The DC reference voltage is measured at the "Sense" terminals, and the DC signal voltage is measured at the "Input" terminals.

range (-1.00E+0) Pass the measurement range you want to use. The driver sets the hp34401a>Basic Operation>Range property to this value.

Use positive values to represent the absolute value of the maximum expected measurement. The value must be in units appropriate for the Measurement Function as shown in the following table. You must set the parameter to HP34401A_VAL_AUTO_RANGE_ON when the Measurement Function is set to diode, continuity, frequency, or period.

  DC Volts   - volts
  AC Volts   - volts
  DC Current   - amperes
  AC Current   - amperes
  2-Wire Resistance - ohms
  4-Wire Resistance - ohms
  DC Volts Ratio   - volts

For example, when you set the Measurement Function to HP34401A_VAL_DC_VOLTS, you must specify the Range in volts. Setting this parameter to 10.0 configures the DMM to measure DC voltages from -10.0 to +10.0 volts.

The driver reserves special negative values for controlling the DMM's auto-ranging capability.

Defined Values:
HP34401A_VAL_AUTO_RANGE_OFF (-2.0) - Auto-range Off
HP34401A_VAL_AUTO_RANGE_ON (-1.0) - Auto-range On

Valid Manual Range: The valid manual range depends on the Measurement Function. The table below shows the valid manual ranges.

```
-------------------------------------------------------------
|  Function   |  Min Value  |   Max Value   | Unit |
-------------------------------------------------------------
| DC Volts    | 0.1         | 1000.0        | volts |
| AC Volts    | 0.1         | 1000.0        | volts |
| DC Current  | 0.01        | 3.0           | amps  |
| AC Current  | 1.0         | 3.0           | amps  |
| 2-Wire Res  | 100.0       | 100.0E6       | ohms  |
| 4-Wire Res  | 100.0       | 100.0E6       | ohms  |
| Frequency   | Auto-range on| Auto-range on | ----- |
| Period      | Auto-range on| Auto-range on | ----- |
| Diode       | Auto-range on| Auto-range on | ----- |
| Continuity  | Auto-range on| Auto-range on | ----- |
| DC Volts Ratio | 0.1      | 1000.0        | volts |
-------------------------------------------------------------
```

Default Value: HP34401A_VAL_AUTO_RANGE_ON

Notes:

(1) Setting this parameter to HP34401A_VAL_AUTO_RANGE_ON configures the DMM to automatically calculate the range before each measurement.

(2) Setting this parameter to HP34401A_VAL_AUTO_RANGE_OFF configures the DMM to stop auto-ranging and keep the range fixed at the current maximum range.

(3) For the DC Volts Ratio measurement function, this parameter passes the voltage range of the signal connected to the 'Input' terminals. The signal connected to the 'Sense' terminals is always set to auto-range.

DBL **resolution (absolute) (100.00E-6)** Pass your desired measurement resolution in absolute units. The driver sets the hp34401a>Basic Operation>Resolution Absolute property to this value.

Setting this parameter to lower values increases the measurement accuracy. Setting this parameter to higher values increases the measurement speed.

The value must be in units appropriate for the Measurement Function as shown in the following table.

```
  DC Volts        - volts
  AC Volts        - volts
  DC Current      - amperes
  AC Current      - amperes
  2-Wire Resistance  - ohms
  4-Wire Resistance  - ohms
  Frequency       - hertz
  Period          - seconds
  Diode           - volts
  Continuity      - ohms
  DC Volts Ratio    - volts
```

Valid Range: The resolution dependson the current measurement function and the current measurement range that you select with the hp34401a>Basic Operation>Function and the hp34401a>Basic Operation>Range properties.   The table

below shows the minimum and maximum resolution values for each measurement type. The minimum resolution values are based on the maximum possible range for that measurement type. The maximum resolution values are based on the minimum possible range.

```
-----------------------------------------------------------
|  Function    | Min Resolution| Max Resolution  | Unit  |
-----------------------------------------------------------
| DC Volts     | 0.1        | 1E-7         | volts |
| AC Volts     | 0.001      | 1E-7         | volts |
| DC Current   | 1E-4       | 1E-8         | amps  |
| AC Current   | 1E-6       | 1E-6         | amps  |
| 2-Wire Res   | 10000      | 0.01         | ohms  |
| 4-Wire Res   | 10000      | 0.01         | ohms  |
| Frequency    | 10         | 0.1          | Hertz |
| Period       | 1E-4       | 1E-6         | Seconds|
| Diode        | 1E-5       | 1E-5         | volts |
| Continuity   | 0.01       | 0.01         | ohms  |
| DC Volts Ratio | 0.1      | 1E-7         | volts |
-----------------------------------------------------------
```

Default Value: 0.0001 Volts

Notes:

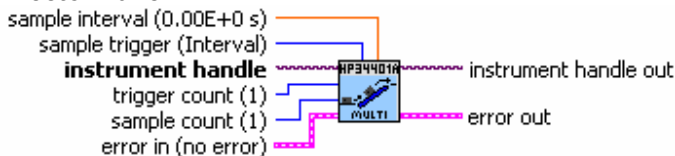(1) This parameter is ignored if the 'Range' parameter is set to IVIDMM_VAL_AUTO_RANGE_ON.

instrument handle out The instrument handle that you obtain from the Initialize or Initialize With Options VI. The handle identifies a particular instrument session.

Default Value: None

hp34401a Configure Multi-Point.vi

This VI configures the properties for multi-point measurements. These properties include the trigger count, sample count, sample trigger and sample interval.

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instrument handle The instrument handle that you obtain from the hp34401a Initialize or hp34401a Initialize With Options VI. The handle identifies a particular instrument session.

Default Value: None

I32 **trigger count (1)** Pass the number of triggers you want the DMM to receive before returning to the idle state. The driver sets the hp34401a>>Advanced Triggering>>Trigger Count property to this value.

Valid Range: 1 to 50000 (triggers)

Default Value: 1 (trigger)

Notes:

(1) This driver does not support the HP34401 infinite trigger count.

I32 **sample count (1)** Pass the number of measurements you want the DMM to take each time it receives a trigger. The driver sets the hp34401a>>Advanced Triggering>>Sample Count property to this value.

Valid Range: 1 to 50000 (samples)

Default Value: 1 (sample)

I32 **sample trigger (Interval)** Pass the type of sample trigger you want to use. The driver sets the HP34401A_ATTR_SAMPLE_TRIGGER attribute to this value.

When the DMM takes a measurement and the Sample Count parameter is greater than 1, the DMM does not take the next measurement until the event you specify in the Sample Trigger parameter occurs.

Valid Values:
HP34401A_VAL_INTERVAL   - Interval (Default)

Notes:

(1) HP34401A_VAL_INTERVAL - The DMM takes the next measurement after waiting the length of time you specify in the Sample Interval parameter.

DBL **sample interval (0.00E+0 s)** Pass the length of time you want the DMM to wait between samples. Express this value in seconds. The driver sets the hp34401a>>Advanced Triggering>>Sample Interval property to this value.

If the Sample Count parameter is greater than 1 and the Sample Trigger parameter is set to HP34401A_VAL_INTERVAL, the DMM waits between measurements for the length of time you specify in this parameter.

The trigger delay specifies the length of time the DMM waits after it receives the trigger and before it takes a measurement.

Use positive values to set the sample interval in seconds. The driver reserves negative values for configuring the DMM to calculate the sample interval automatically.

Defined Constant Values:
HP34401A_VAL_AUTO_INTERVAL_OFF - Auto-interval off
HP34401A_VAL_AUTO_INTERVAL_ON - Auto-interval on

Valid Positive Range: 0.0 to 3600.0 (seconds)

Default Value: 0.0 (seconds)

Notes:

(1) Setting this parameter to HP34401A_VAL_AUTO_INTERVAL_ON configures the DMM to calculate the sample interval before each measurement.

(2) Setting this parameter to HP34401A_VAL_AUTO_INTERVAL_OFF stops the DMM from calculating the sample interval and sets the sample interval to the last automatically calculated value.

(3) For the hp34401a instrument driver, the hp34401a>>Basic Operation>>Trigger Delay property and the hp34401a>>Advanced Triggering>>Sample Interval property represent the same delay mechanism. They are analogous to each other.

▶I/O   **instrument handle out** The instrument handle that you obtain from the hp34401a Initialize or hp34401a Initialize With Options VI. The handle identifies a particular instrument session.

Default Value: None

hp34401a Read Multi-Point.vi
This VI initiates the measurement, waits for the DMM to return to the Idle state, and returns an array of measured values. The number of measurements the DMM takes is determined by the values you specify for the Trigger Count and Sample Count parameters of the hp34401a Configure Multi-Point VI. This VI does not support more than 512 trigger count*sample count readings.
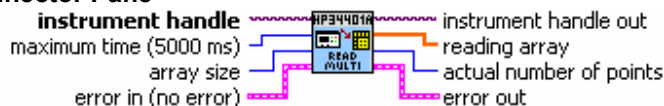
Notes:

(1) After this VI executes, each element in the Reading Array parameter is an actual reading or a value indicating that an over-range condition occurred.

(2) If an over-range condition occurs, the corresponding Reading Array element contains an IEEE defined NaN (Not a Number) value and the VI returns HP34401A_WARN_OVER_RANGE (0x3FFA2001).

(3) You can test the measurement value for over-range with the hp34401a Is Over-Range VI.

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Controls and Indicators
I/O   **instrument handle** The instrument handle that you obtain from the hp34401a Initialize or hp34401a Initialize With Options VI. The handle identifies a particular instrument session.

Default Value: None

`I32` **maximum time (5000 ms)** Pass the maximum length of time in which to allow the multi-point read operation to complete. Express this value in milliseconds.

If the operation does not complete within this time interval, the VI returns the HP34401A_ERROR_MAX_TIME_EXCEEDED (0xBFFA2003) error code. When this occurs, you can call hp34401a Abort to cancel the multi-point read operation and return the instrument to the Idle state.

Defined Values:
HP34401A_VAL_MAX_TIME_INFINITE (-1)
HP34401A_VAL_MAX_TIME_IMMEDIATE (0)

Default Value: 5000 (ms)

Notes:

(1) The Maximum Time parameter affects only this VI. It has no effect on other timeout parameters or properties.

`I32` **array size** Pass the number of elements in the Reading Array parameter.

Default Value: None

`I/O` **instrument handle out** The instrument handle that you obtain from the hp34401a Initialize or hp34401a Initialize With Options VI. The handle identifies a particular instrument session.

Default Value: None

`DBL` **reading array** Returns an array of the most recent measurement values. The value you specify for the Measurement Function parameter of the hp34401a Configure VI determines the units of this parameter as shown in the following table.

DC Volts	- volts, dB, or dBm
AC Volts	- volts, dB, or dBm
DC Current	- amperes
AC Current	- amperes
2-Wire Resistance	- ohms
4-Wire Resistance	- ohms
Frequency	- hertz
Period	- seconds
Diode	- volts
Continuity	- ohms
DC Volts Ratio	- unitless measurement

Notes:

(1) The size of the Reading Array must be at least the size you specify for the Array Size parameter.

(2) If an over-range condition occurs, the corresponding Reading Array element contains an IEEE defined NaN (Not a Number) value and the VI returns HP34401A_WARN_OVER_RANGE (0x3FFA2001).

(3) You can test the measurement value for over-range with the hp34401a Is Over-Range VI.

(4) For DC Volts and AC Volts measurement functions, the units depend on whether dB or dBm math operation is enabled.

I32 **actual number of points** Indicates the number of measured values the VI places in the Reading Array parameter.