MT3 LABVIEW LIBRARY
USER MANUAL

Rel. 01.00.0001
(Hardware code: MT3LIBRARY)

CONCEIVING
PLANNING
DEVELOPMENT
IN SCIENTIFIC
ELECTRONICS

This manual in English is the original version.

Printed in Italy

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WARNING!
ELECTRICAL DEVICES COULD DAMAGE EQUIPMENT OR PROPERTY OR CAUSE PERSONAL INJURY

This guide contains instructions and technical features of the MT3 LABVIEW LIBRARY.
Read with attention before attempting to install.
It is the responsibility of the technician to undertake all the safety rules provided by the law during the installation and the use of this device.
For any information which is not contained in this guide, please contact:

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REVISION HISTORY

Manual revision history

Revision/ Date	Change description	Author
01.00.0000 October, 2009	First release	Barbera D.
01.00.0001 June, 2015	Update document layout	Bottaccioli M.

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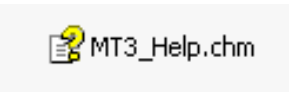
MT3 LabVIEW LIBRARY

LabVIEW development tool gives the feasibility of MT3 device remote control. This control can be achieved through the use of the eight functions implemented in *LabVIEW 7.1* and included in the library MT3_Library: thanks to these functions you do not have to know the details of the communication protocol and the application development is quick and easy.
The functions have two development levels: *MT3_Low_Level_Communication.llb* contains the four functions through which is possible to manage the connection with the MT3 card.
MT3_Application.llb contains the other four functions realized through the use of the previous ones: these higher level functions allow the assignment of the commands recognized by the device. Use *MT3_Application.llb* for application development, while *MT3_Low_Level_Communication* for maximize performances.

	Function	Properties
MT3_Low_Level_Communication.llb	*Close_Device.vi*	Closes the connection established with one of the available protocols.
	Open_Device.vi	Opens the connection with one of the available protocols.
	Write&Read.vi	Sends and receives ASCII characters.
	Write_Command.vi	Sends ASCII characters.
MT3_Application.llb	*Close_dialogue.VI*	Ends the communication with the MT3 card.
	Read.vi	Interprets characters sent by the device.
	Send_Command.vi	Imparts the commands implemented on the device.
	Start_dialogue.vi	Starts dialogue session with the MT3 card.

MT3_Library is provided with a help file, *MT3_Help.chm*.
The help explains deeper the functions in the library.



MT3_Help.chm, information of which are available in *LabVIEW* too, gives structural description of all the eight functions. Graphical representations are realized, so that the user may easily understand how they work in the tool in which they were build. Next figure displays the help of the library.

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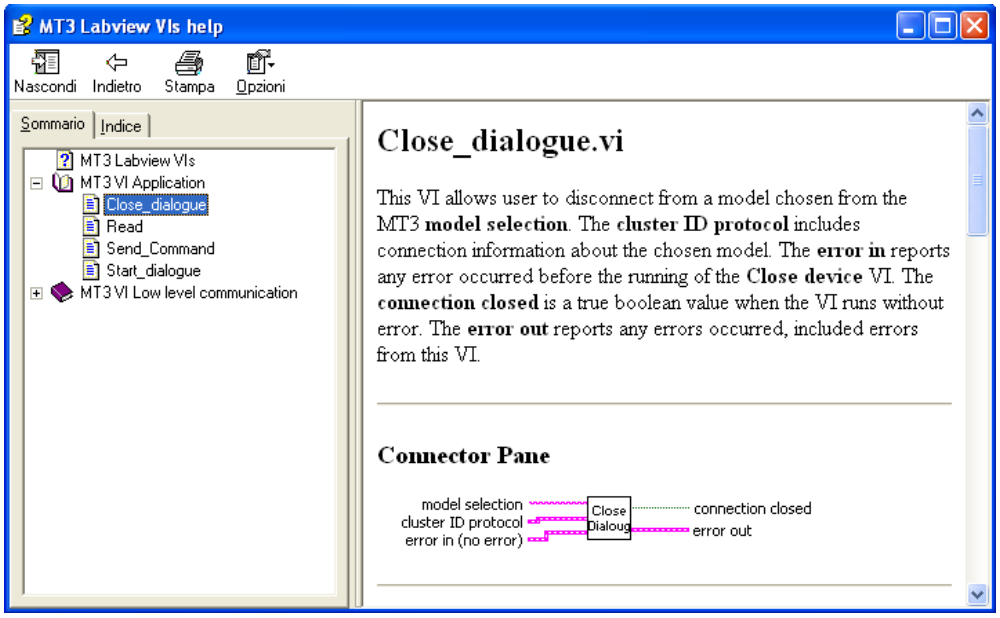
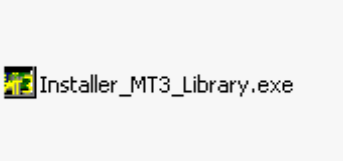


Figure 1: *LabView* functions help.

INSTALLATION

Run *Installer_MT3_Library.exe* to install all files of MT3_Library. By default, all these files will be placed in the folder *C:\IPSES_Lib*. Between these files you can find what figure 2 shows. To avoid any problem in the functions, do not move *MT3_Help.chm* and *FTD2XX.dll* from directory *C:\IPSES_Lib*.



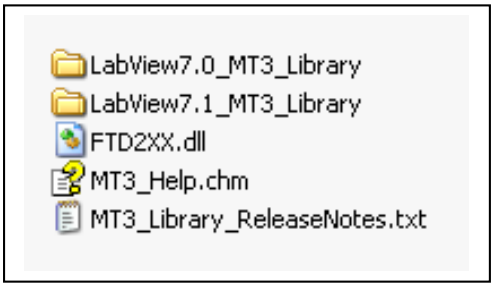


Figure 2: installed files.

The folder *LabView7.1_MT3_Library* contains *MT3_Low_Level_Communication.llb* and *MT3_Application.llb*. The installed folder *LabView7.0_MT3_Library* contains the analogous files to be used with the previous version *LabVIEW 7.0*. Copy and paste *LabView7.1_MT3_Library* in the folder *National Instruments\LabVIEW 7.1\user.lib* (or *LabView7.0_MT3_Library* in *National Instruments\LabVIEW 7.0\user.lib*): in this way, when you run *LabVIEW 7.1* (or *LabVIEW 7.0*) you can utilize MT3_Library from user libraries palette.

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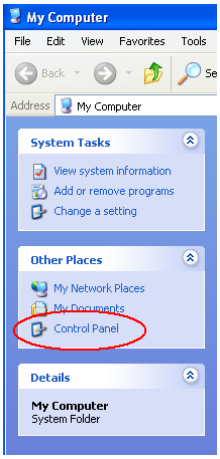
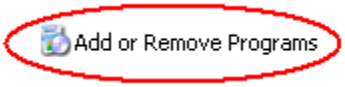
NI-VISA is a single library of functions you use to communicate with GPIB, serial, VXI, and computer-based instruments in *LabVIEW*. You no longer need to use separate I/O palettes to program an instrument. For example, some instruments ship with a choice for the type of interface. If the LabVIEW instrument driver was written with functions from the GPIB palette, those instrument driver VIs would not work for the instrument with the serial port interface. VISA solves this problem by providing a single set of functions that work for any type of interface. Therefore, VISA is used as the I/O language in all LabVIEW instrument drivers. NI-VISA is automatically installed.

REMOVAL

To correctly remove MT3_Library, follow the instructions listed below.



1. From Desktop, click “My Computer” icon and choose “Control Panel”.



2. Click “Add or Remove Programs” from the resource list displayed.

3. From program installed list select “MT3_Library” and proceed removal with “Change/Remove”.

4. Follow the instructions displayed.

5. Delete the folder *C:\IPSES_Lib*.

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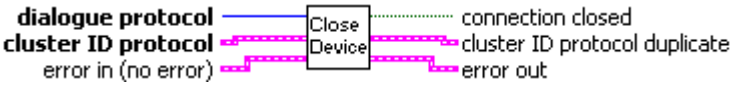
Close_Device.vi

This VI allows user to disconnect connection from MT3 devices. The connection is chosen by the **dialogue protocol** and its description is enclosed in the **cluster ID protocol**. The **error in** reports any error occurred before the running of **Close_device** VI. The **connection closed** is a true boolean value when the VI runs without error. The **error out** reports any errors occurred, included errors from this VI.

Connector Pane



Controls and Indicators

error in (no error)

The **error in** cluster can accept error information wired from VIs previously called. Use this information to select functionalities to be bypassed in case of errors from other VIs.
The pop-up option **Explain Error** (or Explain Warning) gives further 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 further information about the error displayed.

code

The **code** input identifies the error or warning.
The pop-up option **Explain Error** (or Explain Warning) gives further 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 further information about the error displayed.

cluster ID protocol

Handle

The **Handle** contains identification of connection via D2XX library.

VISA resource name

The **VISA resource name** specifies the resource to be opened. This control also specifies session and class. It is to be used with the serial protocol.

dialogue protocol

The **dialogue protocol** relates about the chosen communication standard.

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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 further 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 further information about the error displayed.

code
The **code** input identifies the error or warning.
The pop-up option **Explain Error** (or Explain Warning) gives further 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 further information about the error displayed.

cluster ID protocol duplicate

Handle
The **duplicate Handle** is a duplicate of input Handle.

duplicate VISA resource name
The **duplicate VISA resource name** is a duplicate of input VISA resource name.

connection closed
The **connection close** refers about correct ending of the connection.

Error code

Code	Description
310	Impossible to close MT3 USB D2XX

Open_Device.vi
This VI allows user to open connection to MT3 devices, chosen by the **dialogue protocol**. The **cluster ID protocol** encloses communication protocol description. The **error in** reports any error occurred before the running of **Open device** VI. The **working connection** is a true

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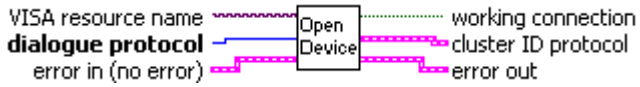
boolean value when the VI runs without error. The **error out** reports any errors occurred, included errors from this VI.

Connector Pane



Controls and Indicators

dialogue protocol

The **dialogue protocol** relates about the chosen standard of communication.

error in (no error)

The **error in** cluster can accept error information wired from VIs previously called. Use this information to select functionalities to be bypassed in case of errors from other VIs.
The pop-up option **Explain Error** (or Explain Warning) gives further 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 further information about the error displayed.

code

The **code** input identifies the error or warning.
The pop-up option **Explain Error** (or Explain Warning) gives further 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 further information about the error displayed.

VISA resource name

The **VISA resource name** specifies the resource to be opened. This control also specifies session and class. It is to be used with the serial protocol.

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 further information about the error displayed.

status

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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 further information about the error displayed.

code
The **code** input identifies the error or warning.
The pop-up option **Explain Error** (or Explain Warning) gives further 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 further information about the error displayed.

working connection
The **working connection** refers about correct working of the connection.

cluster ID protocol

Handle
The **Handle** contains identification of connection via D2XX library.

VISA resource name
The **VISA resource name** specifies the resource to be opened. This control also specifies session and class. It is to be used with the serial protocol.

Error code

Code	Description
320	Error to connect MT3 USB D2XX
321	Error to set D2XX baud rate
322	Error to set D2XX data characteristics
323	Error to set D2XX flow control
324	Error to set D2XX time out

Write&Read.vi

This VI allows user to send request to MT3 devices. Questions have to be defined in **string to write** to obtain answers in **answered string**. The **dialogue protocol** conveys communication protocol and the **cluster ID protocol** encloses communication protocol description. The **cluster ID protocol duplicate** is a duplicate of the **cluster ID protocol**. The **error in** reports any error occurred before the running of **Open device**. The **error out** reports any errors occurred, included errors from this VI.

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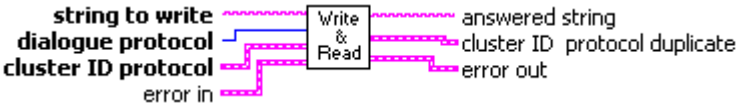
Connector Pane



Controls and Indicators

string to write

The **string to write** contains strings to be passed to MT3 device.

cluster ID protocol

Handle

The **Handle** contains identification of connection via D2XX library.

VISA resource name

The **VISA resource name** specifies the resource to be opened. This control also specifies session and class. It is to be used with the serial protocol.

dialogue protocol

The **dialogue protocol** relates about the chosen communication standard.

error in

The **error in** cluster can accept error information wired from VIs previously called. Use this information to select functionalities to be bypassed in case of errors from other VIs.
The pop-up option **Explain Error** (or Explain Warning) gives further 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 further information about the error displayed.

code

The **code** input identifies the error or warning.
The pop-up option **Explain Error** (or Explain Warning) gives further 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 further information about the error displayed.

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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 further 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 further information about the error displayed.

code

The **code** input identifies the error or warning.
The pop-up option **Explain Error** (or Explain Warning) gives further 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 further information about the error displayed.

answered string

The **answered string** contains strings from MT3 device.

cluster ID protocol duplicate

duplicate Handle

The **duplicate Handle** is a duplicate of input Handle.

duplicate VISA resource name

The **duplicate VISA resource name** is a duplicate of input VISA resource name.

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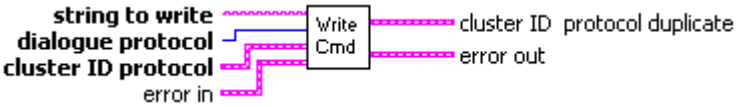
Error code

Code	Description
330	Write error to MT3 USB D2XX
331	Read error from MT3 USB D2XX

Write_Command.vi

This VI allows user to send command to MT3 devices. Commands have to be sent in the **string to write**. The **dialogue protocol** conveys communication protocol and the **cluster ID protocol** encloses communication protocol description. The **cluster ID protocol duplicate** is a duplicate of the **cluster ID protocol**. The **error in** reports any error occurred before the running of **Write_Command** VI. The **error out** reports any errors occurred, included errors from this VI.

Connector Pane



Controls and Indicators

string to write

The **string to write** contains strings to be passed to MT3 device.

error in

The **error in** cluster can accept error information wired from VIs previously called. Use this information to select functionalities to be bypassed in case of errors from other VIs. The pop-up option **Explain Error** (or Explain Warning) gives further 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 further information about the error displayed.

code

The **code** input identifies the error or warning.
The pop-up option **Explain Error** (or Explain Warning) gives further 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 further information about the error displayed.

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cluster ID protocol

Handle
The **Handle** contains identification of connection via D2XX library.

VISA resource name
The **VISA resource name** specifies the resource to be opened. This control also specifies session and class. It is to be used with the serial protocol.

dialogue protocol
The **dialogue protocol** relates about the chosen standard of communication.

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 further 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 further information about the error displayed.

code
The **code** input identifies the error or warning.
The pop-up option **Explain Error** (or Explain Warning) gives further 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 further information about the error displayed.

cluster ID protocol duplicate

duplicate Handle
The **duplicate Handle** is a duplicate of input Handle.

duplicate VISA resource name
The **duplicate VISA resource name** is a duplicate of input VISA resource name.

Error code

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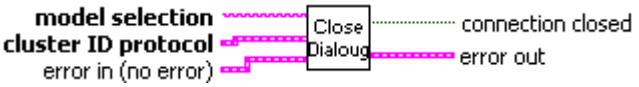
Code	Description
330	Write error to MT3 USB D2XX

Close_dialogue.vi

This VI allows user to disconnect from a model chosen from the MT3 **model selection**. The **cluster ID protocol** includes connection information about the chosen model. The **error in** reports any error occurred before the running of the **Close device** VI. The **connection closed** is a true boolean value when the VI runs without error. The **error out** reports any errors occurred, included errors from this VI.

Connector Pane



Controls and Indicators

error in (no error)

The **error in** cluster can accept error information wired from VIs previously called. Use this information to select functionalities to be bypassed in case of errors from other VIs.

status

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

code

The **code** input identifies the error or warning.

source

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

model selection

The **model selection** contains the list of MT3 models. Each model has its own standard dialogue.

cluster ID protocol

Handle

The **Handle** contains identification of connection via D2XX library.

VISA resource name

The **VISA resource name** specifies the resource to be opened. This control also specifies session and class. It is to be used with the serial protocol.

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error out

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

status

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

code

The **code** input identifies the error or warning.

source

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

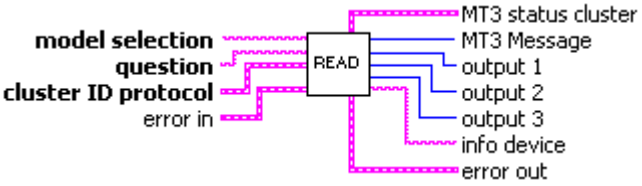
connection closed

The **connection close** refers about correct ending of the connection.

Read.vi

This VI allows user to send requests to MT3 devices. The **question** parameter contains a list of allowed request. The MT3 device model can be selected from **model selection** list. The **MT3 Message**, the **MT3 Status cluster**, the **ouput 1**, the **ouput 2**, the **output 3** and the **info device** are variables containing answers to requests sent about respectively: device status; X,Y, Z axes setting-out (output 1, output 2 and output 3) and information about connected device. The **cluster ID protocol** encloses communication protocol description. The **error in** reports any error occurred before the running of **Read** VI. The **error out** reports any errors occurred, included errors from this VI (i.e. illegal question).

Connector Pane



Controls and Indicators

model selection

The **model selection** contains the list of MT3 models. Each model has its own dialogue standard.

question

The **question** contains allowed request to the device.

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error in
The **error in** cluster can accept error information wired from VIs previously called. Use this information to select functionalities to be bypassed in case of errors from other VIs.

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

code
The **code** input identifies the error or warning.

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

cluster ID protocol

Handle
The **Handle** contains identification of connection via D2XX library.

VISA resource name
The **VISA resource name** specifies the resource to be opened. This control also specifies session and class. It is to be used with the serial protocol.

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

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

code
The **code** input identifies the error or warning.

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

MT3 Message
Through the **MT3 Message**, information about status of device are given.

output 1
The **output 1** gives information on X axis **question**.

output 2

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The **output 2** gives information on Y axis **question**.

info device
The **info device** gives information about MT3 device release.

output 3
The **output 2** gives information on Z axis **question**.

MT3 status cluster

BIT 0
The **BIT 0** is reserved.

BIT 1
The **BIT 1** means a known position has been reached after a home position command.

BIT 2
The **BIT 2** means movement along Z axis.

BIT 3
The **BIT 3** means movement along Y axis.

BIT 4
The **BIT 4** means movement along X axis.

BIT 5
The **BIT 5** is on in case of negative movements when limit switch has been reached along Z axis.

BIT 6
The **BIT 6** is on in case of negative movements when limit switch has been reached along Y axis.

BIT 7
The **BIT 7** is on in case of negative movements when limit switch has been reached along X axis.

BIT 8
The **BIT 8** is on in case of positive movements when limit switch has been reached along Z axis.

BIT 9
The **BIT 9** is on in case of positive movements when limit switch has been reached along Y axis.

BIT 10
The **BIT 10** is on in case of positive movements when limit switch has been reached along X axis.

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BIT 11
The **BIT 11** is reserved.

BIT 12
The **BIT 12** means Z axis position known.

BIT 13
The **BIT 13** means Y axis position known.

BIT 14
The **BIT 14** means X axis position known.

BIT 15
The **BIT 15** relates about an error.

Error code

Code	Description
360	Unknown request
361	No answer from device
362	Error answer from device

Send_Command.vi

This VI allows user to send command to MT3 devices. The **command** variable contains a list of allowed commands to MT3 devices. The **model selection** permits to choose a model from the list of MT3 devices. The **hexadecimalTime**, the **par X**, the **par Y** and the **par Z** variables allow to set X, Y and Z axes setting-out. The **cluster ID protocol** contains communication protocol description. The **error in** reports any error occurred before the running of **Send_Command** VI. The **error out** reports any errors occurred, included error from this VI.

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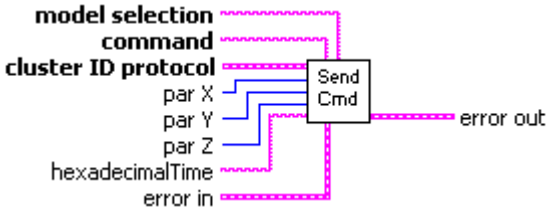
Connector Pane



Controls and Indicators

model selection

The **model selection** contains the list of MT3 models. Each model has its own dialogue standard.

command

The **command** contains allowed commands to the device.

error in

The **error in** cluster can accept error information wired from VIs previously called. Use this information to select functionalities to be bypassed in the case of errors from other VIs.

status

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

code

The **code** input identifies the error or warning.

source

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

cluster ID protocol

Handle

The **Handle** contains identification of connection via D2XX library.

VISA resource name

The **VISA resource name** specifies the resource to be opened. This control also specifies session and class. It is to be used with the serial protocol.

par X

The **par X** receives parameters to be used to command X axis.

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par Y
The **par Y** receives parameters to be used to command Y axis.

par Z
The **par Z** receives parameters to be used to command Z axis.

hexadecimalTime
The **hexadecimalTime** allows to set-out period in microseconds to have microstep movement.

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

- **status**
  The **status** boolean is either TRUE (X) for an error, or FALSE (checkmark) for no error or a warning.
- **code**
  The **code** input identifies the error or warning.
- **source**
  The **source** string describes the origin of the error or warning.

Error code

Code	Description
370	Unknown command
371	Invalid parameter

Start_dialogue.vi

This VI allows to start dialogue with a MT3 model chosen by a list housed in the **model selection**. In case of model selection that implies TCP/IP protocol dialogue, password has to be passed trough **TCP password?**. The **connect** is a boolean value with which the procedure of connection is started: if it works, **working connection** returns true value. The **dialogue protocol** indicates the protocol of dialogue related to the selected model. The **cluster ID**

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protocol encloses communication protocol description. The **error in** reports any error occurred before the **Start_dialogue** VI is running; possible errors that appear in this VI, like other occurred before, are reported in the **error out**.

Connector Pane

Controls and Indicators

error in (no error)

The **error in** cluster can accept error information wired from VIs previously called. Use this information to select functionalities to be bypassed in the event of errors from other VIs.

status

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

code

The **code** input identifies the error or warning.

source

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

model selection

The **model selection** contains the list of MT3 models. Each model has its own dialogue standard.

VISA resource name

VISA resource name specifies the resource to be opened. This control also specifies session and class. It is to be used with the serial protocol.

error out

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

status

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

code

The **code** input identifies the error or warning.

source

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

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working connection
The **working connection** refers about the correct working of connection.

dialogue protocol
The **dialogue protocol** relates about the model standard of communication.

cluster ID protocol

Handle
The **Handle** contains identification of connection via D2XX library.

VISA resource name
The **VISA resource name** specifies the resource to be opened. This control also specifies session and class. It is to be used with the serial protocol.

Error code

Code	Description
380	Impossible connection to the chosen device

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Using functions

Every VI in *LabVIEW* is constituted by a *Front Panel* and a *Block Diagram*. The *Front Panel* contains all elements linked together as described graphically in the *Block Diagram*. When *LabVIEW* is running, you can open MT3 library functions from the *Block Diagram*: select Window->Show Functions Palette (see figure 3).

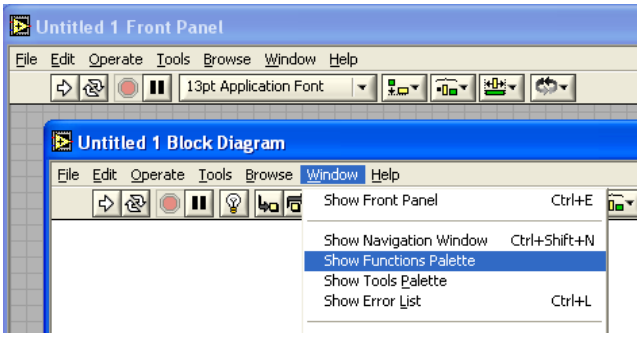

Figure 3: how to run *function palette*.

Click Select a VI.. button from the *Function Palette* and then insert the path *C:\IPSES_Lib*.

Figure 4: Select a VI.. button of *Function Palette*.

Next figure 5 shows an example VI to connect MT3 device (from *C:\IPSES_Lib* run *MT3_Library_example.vi*).

Figura 5: example VI *Front Panel*.

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This example VI has been implemented with the use of the functions included in MT3 library: figure 6 displays its *Block Diagram*.

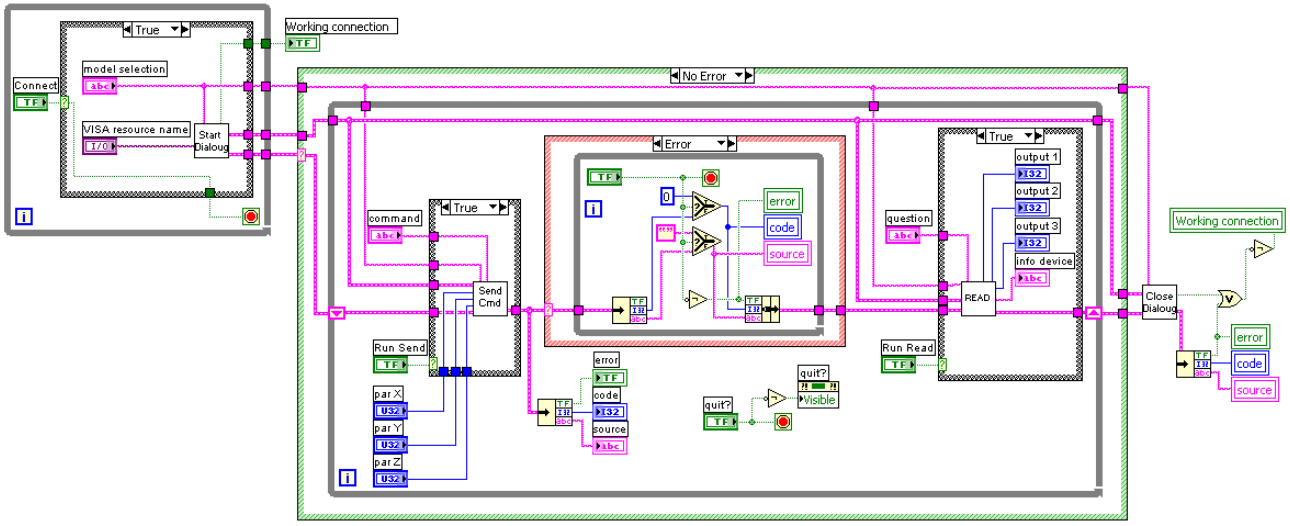

Figure 6: example VI *Block Diagram*.

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The customer is at liberty to contact the relevant engineer at IPSES S.r.l. directly.

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PROBLEM REPORT

The next page is a standard template used for reporting system problems. It can be copied and send as a fax. Alternative bugs may be reported by emails, in this case please insure that the mail contains similar information listed in the *Engineering Problem Report* form.

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ENGINEERING PROBLEM REPORT

Problem describer

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Company			
Date	Tel.	Fax	

Product

Name	Version	Serial No.

Report Type (bug, change request or technical problem)

Major bug	☐	Urgency:	
Minor bug	☐	High	☐
Change request	☐	Medium	☐
Technical problem	☐	Low	☐

Problem Description

Reproduction of Problem

IPSES s.r.l. Action notes

Received by	Date	Report No.	Action

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(Product code MT3LIBRARY Rel. 01.00.0001)

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