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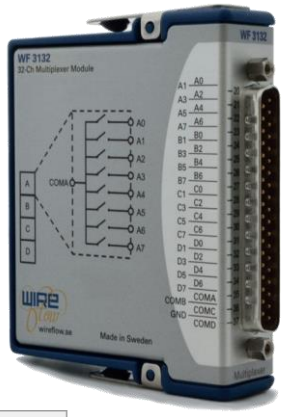
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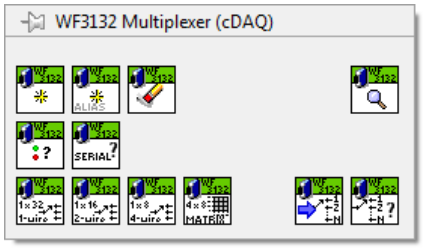
wireflow

AC0023-002, rev J

WF 3132
User Manual







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Support information

Technical support and Product information

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Please see appendix “Technical support and Services” for more information.

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Important information

Copyright

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High risk activities

The software and hardware is not designed, manufactured or intended for use or resale as on-line control equipment in hazardous environments requiring fail-safe performance, such as in (but not limited to) the operation of nuclear facilities, aircraft navigation or communication systems, air traffic control, direct life support machines, or weapons systems, in which the failure of the Software could lead directly to death, personal injury, or severe physical or environmental damage ("High Risk Activities"). WireFlow and its suppliers specifically disclaim any express or implied warranty of fitness for High Risk Activities.

Compliance

CE - European Union EMC and Safety Compliance CE

This product meets the essential requirements of applicable European Directives, as follows:

- Electromagnetic Compatibility (EMC) Directive 2004/108/EC
- RoHS Directive 2011/65/EU

Please contact WireFlow to get a copy of the Declaration of Conformity for the WF 3132 module

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Device information

Features

- 32 SPST relays
- Multiple configurations possible
  - 1 x 32 (1 wire)
  - 1 x 16 (2 wire)
  - 1 x 8 (4 wire)
  - Four banks of 1 x 8 (1wire)
  - 4 x 8 Matrix (1 wire)
- Standard 37-pin Dsub connector
- LabVIEW driver included
- Compatible with NI VeriStand

Specifications

Number of Relays	32
Max Voltage	60VDC/30VRMS
Max Current	0.5A
Max Power	10W
Max Resistance	0.3Ω
Update Rate	1500S/s
Bandwidth	>10MHz
Relay Debounce time	0.3ms
Maximum number of active relays[1]	16
Life expectancy of relays, ops typical[2]	10E8

1. Relevant only for mode Individual relay control
2. The life of a reed relay depends upon the switch load and end of life criteria. For example, for an 'end of life' contact resistance specification of 1 Ω, switching low loads (10 V at 10 mA resistive) or when 'cold' switching, typical life is approx. 2.5×10^8 ops. At the maximum load (resistive), typical life is 1×10^6 ops. In the event of abusive conditions, e.g. high currents due to capacitive inrushes, this figure reduces considerably.

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Pinout

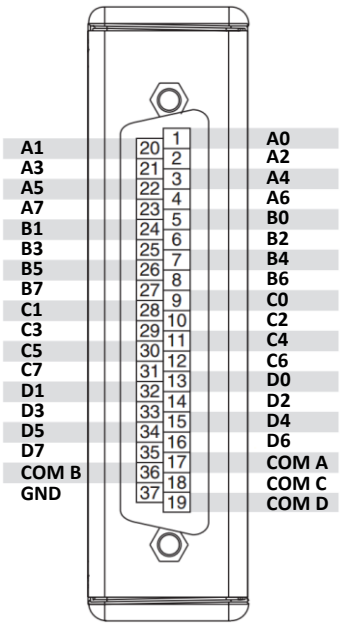


Figure 1 – WF 3132 D-sub pinout

Required external wiring

Depending on the selected mode of operation it might be necessary to perform some external wiring to get the desired operation. The standard modes are 1x16 (2-wire), 1x32 (1-wire), 4x8 Matrix (1-wire) and using the banks completely independent.

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1 x 32 (1 wire) mode

The 1 x32 (1 wire) mode requires that all the COM inputs are connected (A-B-C-D), according to Figure 2.

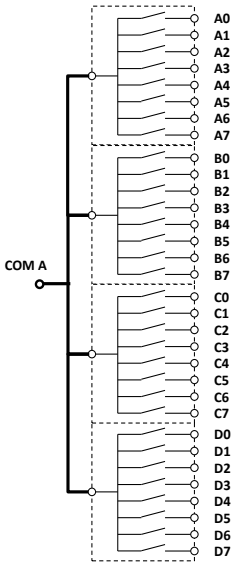


Figure 2 – 1x32 (1 wire)

1 x 16 (2 wire) mode

The 1 x16 (2 wire) mode requires that the COM inputs are connected in pairs; A-B and C-D.

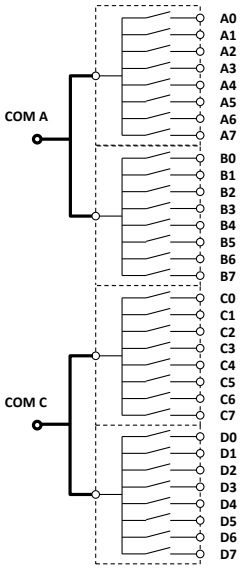


Figure 3 – 1x16 (2 wire)

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4 x 8 Matrix (1 wire)

The 4 x 8 Matrix (1 wire) mode requires the outputs to be connected according to

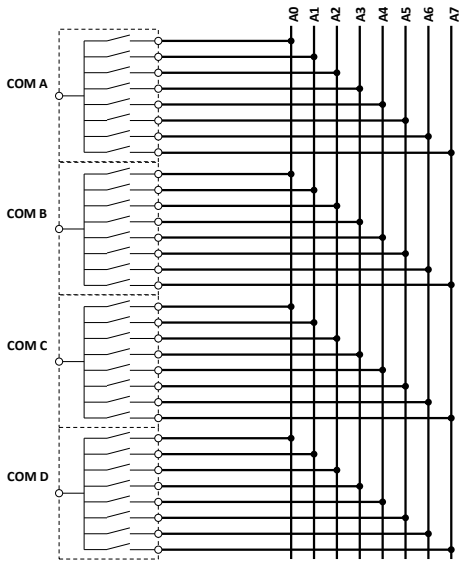


Figure 4 – 4x8 matrix (1 wire)

1 x 8 (4-wire) mode and 4 separate banks

With the module used in 1x8 (4-wire) mode, or used as independent banks, there is no need for external wiring.

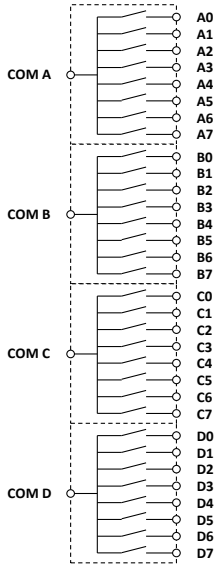


Figure 5 – Four banks of 1x8 (1 x8, 4 wire and individual relay control)

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Software

The module is delivered with drivers that are installed with VI Package Manager. There are two different drivers depending on if the module is to be used in a cRIO in FPGA mode or if it is to be used in a cDAQ chassis on Windows.

The requirements for the two software drivers are a bit different and described in more detail in the corresponding subchapters.

cRIO Software

The WF 3132 is delivered with a LabVIEW driver to manage the module using FPGA property nodes and IO nodes. This chapter describes the installation, requirements and basic usage on the FPGA platform.

Requirements

- LabVIEW Full (version >= 2017 SP1*)
- LabVIEW FPGA module
- NI RIO (version >= 17.6)
- VI Package Manager (for installation)

Previous version of this driver (v1.1.1) is available on www.wireflow.se and supports LabVIEW2011.

The WF 3132 RIO driver currently requires the LabVIEW FPGA toolkit. The software for the WF 3132 is delivered as a VIPM packet (.vip) and requires the free version of VI Package Manager (VIPM) to be installed (available at jki.net or from ni.com).*

Installation

The easiest way to install the WF 3132 software is (when VIPM is already installed);

1. Double click the *.vip package
2. Follow the instructions in VIPM to select LabVIEW version where to install the driver
3. Agree to the Software License Agreement to finish installation

Once installed the necessary files should be installed in the LabVIEW application folders, see the **API** section for details.

Supported Platforms

The WF 3132 module can be used in any C Series chassis, with LabVIEW FPGA programming enabled. This includes cRIO, EtherCAT and FPGA expansion chassis. For cDAQ support, please see chapter “cDAQ Software”

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API

Once the WF-3132 module has been added to the project the module can be controlled using property nodes and I/O nodes.

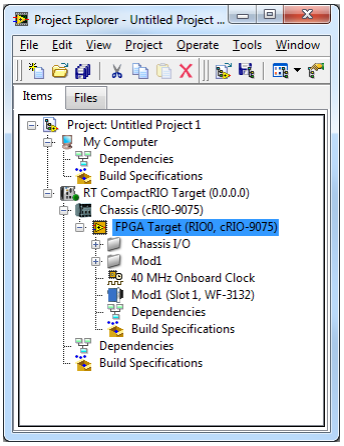
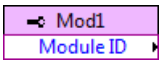
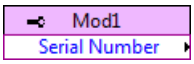
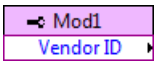


Figure 6 – The WF 3132 module added to the project

The property nodes return information about the current firmware, the information returned is;

- 

This is the identification number of the WF 3132 module
- 

Serial number of the module
- 

Vendor identification number (in this case WireFlow)

The active relays are set for each bank as an 8-bit pattern, using FPGA IO nodes.

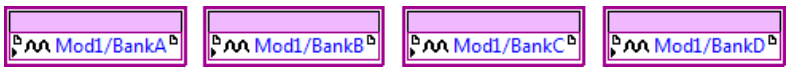


Figure 7 - IO nodes for normal operation mode

The driver checks that not more than 16 relays are activated at any given time (to make sure module does not exceed maximum current consumption provided by chassis).

If more relays are trying to be used, no activation will be done and an error code 358600 will be set. This is only relevant when using individual relay control, for example when using the module for simulating switches.

The relays are of the N.O kind and to set a relay a “1” must be set to that relay.

The additional code needed to get to a specific mode is listed in the sub-chapters.

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Four banks of 1 x 8 (1 wire) and individual relay control

Using four separate banks is the most basic usage, and in this case each bank is defined by an 8-bit pattern. (In Figure 8. below the relays A0, B1, C2 and D3 are activated)

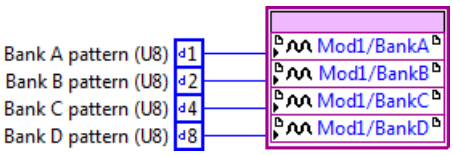


Figure 8 – Usage of four banks of 1x8 (1 wire) and individual relay control

1 x 32 (1 wire)

Requires all COM terminals to be wired together, and that we use a 32-bit pattern directly, or by shifting the lowest bit to the desired channel (In figure 9 relay A1 is activated).

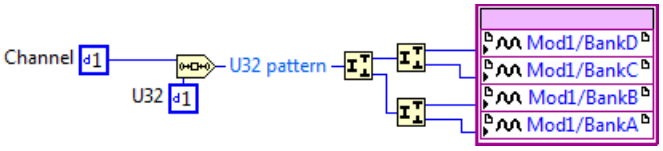


Figure 9 – Usage of 1x32 (1 wire) mode

1 x 16 (2 wire)

To get 1x16 (2 wire) we use a 16-bit pattern directly or by shifting the lowest bit to the desired channel (In Figure 10 the relays A1 and C1 are activated).

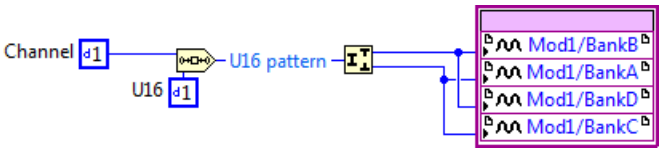


Figure 10 – Usage of 1x16 (2 wire) mode

1 x 8 (4 wire)

(In the Figure 11 the relays A1, B1, C1 and D1 are activated)

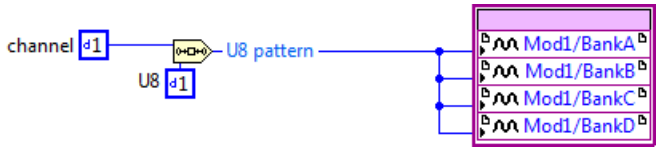


Figure 11 – Usage of 1x8 (4 wire mode)

4 x 8 Matrix (1 wire)

Essentially the same as using four separate banks, in this case each bank is defined by an 8-bit pattern (In Figure 12 the relays A0, B1, C2 and D3 are activated).

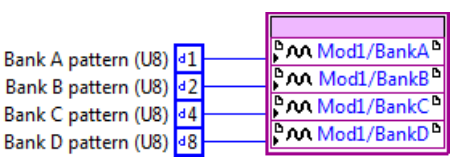


Figure 12 – Usage of 4x8 matrix (1 wire) mode

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cDAQ Software

This chapter describes the LabVIEW driver that enables the module to be used in a cDAQ chassis; both USB and Ethernet chassis are supported. This includes installation, requirements and basic usage.

Requirements

- LabVIEW (version >= 2013)
- DAQmx 14.1 or higher (recommended DAQmx 15.5 or higher))
- VI Package Manager (for installation)

The software for the WF 3132 is delivered as a VIPM packet (.vip) and requires the free version of VI Package Manager (VIPM) to be installed (available at jki.net or from ni.com).*

Supported operating systems

- Windows 10 (32-bit and 64-bit)
- Windows 8.1 (32-bit and 64-bit)
- Windows 7 SP1 (32-bit and 64-bit)
- Windows Embedded Standard 7 on CompactDAQ Controllers

Installation

The easiest way to install the WF 3132 software is (when VIPM is already installed);

1. Right click VIPM and select “Run as administrator” (you might have to close VIPM and LabVIEW before doing this)
2. Double click the *.vip package
3. Follow the instructions in VIPM to select LabVIEW version where to install the driver
4. Agree to the Software License Agreement to finish installation

Once installed the necessary files should be installed in the LabVIEW environment. This includes palette items, examples and manuals.

When deploying an application that contains the WF 3132 cDAQ driver, it is necessary to also include the NI-AMI runtime engine. This is a low-level dependency that is automatically included when building a LabVIEW Installer. If deploying using another Installer technology, the NI-AMI run-time installer can be found at <vi.lib>\addons\WireFlow_WF3132-Multiplexer(cDAQ)_AMI-installer.

Supported Platforms

The WF 3132 module can be used in any cDAQ chassis that is revision 2 or higher, this includes:

NI cDAQ-9171, NI cDAQ-9181, NI cDAQ-9191, NI cDAQ-9174, NI cDAQ-9184, NI cDAQ-9178, NI cDAQ-9188, NI cDAQ-9179, NI cDAQ-9188XT.

Note! In cRIO-chassis with cDAQ support (cRIO-904x), the WF 3132 must be used in FPGA mode with the cRIO driver (see chapter “cRIO Software”).

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API

The LabVIEW driver VIs are installed into addons/WireFlow/WF3132 Multiplexer (cDAQ).

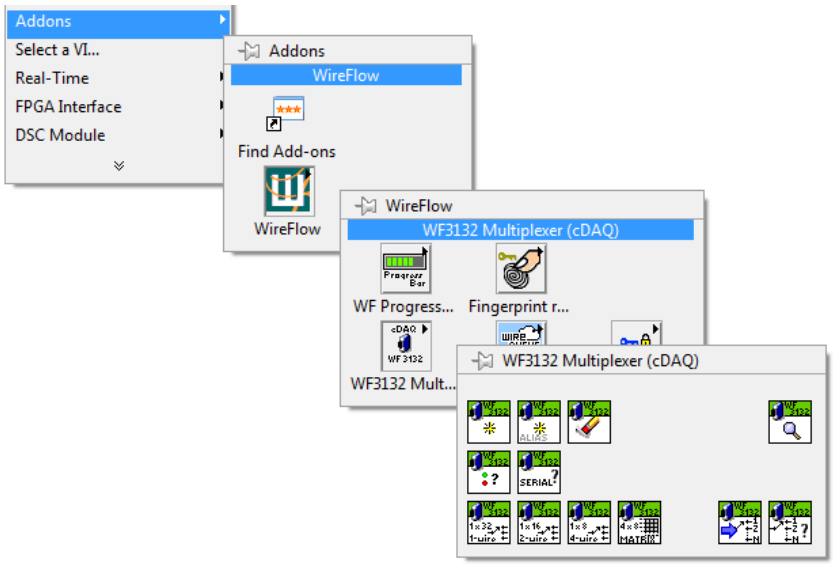
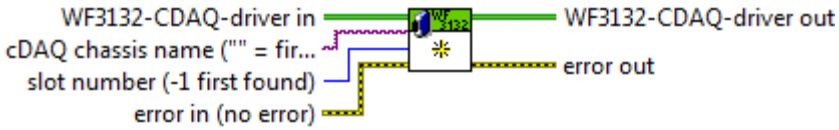


Figure 13 – Palette location

Init.vi



Initialize a WF-3132 cDAQ session using the cDAQ chassis name and the slot number to specify the module.

If chassis name is left empty, the first chassis in the system will be used

If slot number is <0 the first detected WF-3132 module will be used.

Init (By alias).vi



Initialize a WF-3132 cDAQ session using the cDAQ module alias to specify the module.

Close.vi



Close the WF-3132 cDAQ session.

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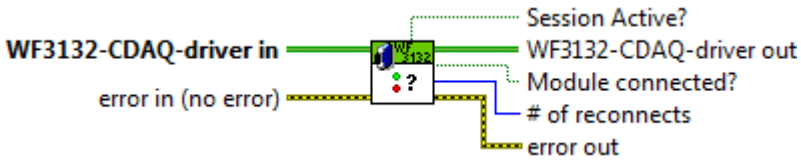
FindModules.vi



Locates all WF-3132 modules in the system.

If alias is specified only the matching module will be returned.

Status.vi



Returns the last known driver status:

- Session Active? indicates if the WF 3132-cDAQ session is active. If this is false the session has to be manually restarted.
- Module connected? indicates if the driver is correctly connected to the module. If the module is removed from the chassis while a session was active, the driver will automatically try to reconnect in the background, and this flag indicates the status of the module connection.
- # of reconnects indicates the number of connect tries that the driver has attempted during the session.

Get_SerialNumber.vi



Returns the serial number of the currently referenced module.

Mux_1x32(1-wire).vi



Specifies the connection if the WF-3132 module is used in 1x32 (1-wire) mode. The Mux channel specifies which single output pin to use on all banks. Set channel to -1 to leave all relays open.

- -1= no relays
- 0 = A0, … , 7 = A7
- 8 = B0, … , 15 = B7
- 16 = C0, … , 23 = C7
- 24 = D0, … , 31 = D7

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Mux_1x16(2-wire).vi



Specifies the connection if the WF-3132 module is used in 1x16 (2-wire) mode.

The Mux channel specifies which output pin to use for both the A-B and C-D bank. Set channel to -1 to leave all relays open.

- -1= no relays
- 0 = A0, C0
- ...
- 7 = A7, C7
- 8 = B0, D0
- ...
- 15 = B7, D7

Mux_1x8(4-wire).vi



Specifies the connection if the WF-3132 module is used in 1x8 (4-wire) mode.

The Mux channel specifies which output pin to use simultaneously for all banks. Set channel to -1 to leave all relays open.

- -1= no relays
- 0 = A0, B0, C0, D0
- ...
- 7 = A7, B7, C7, D7

Mux_4x8 Matrix.vi



Specifies the connection if the WF-3132 module is used in 4x8 (Matrix) mode. Each of the COM channels specifies which output pin to use for that specific bank. Set channel to -1 to leave all relays open.

GetRelayStates.vi

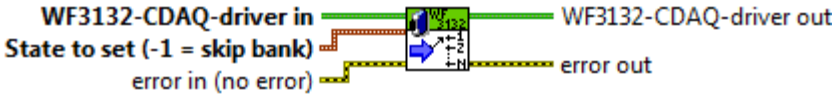


Returns the last known relay states for each bank.

The states are represented as an 8-bit pattern, where bit 0 is the 0-channel within each bank

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SetRelayStates.vi



Sets the individual relay states, by specifying a bit-pattern per bank.

If the pattern is <0 or greater than FF it will be ignored, this makes it possible to update a single bank, without touching the configuration of the other banks.

Use the Specific modes to get a simplified configuration for some common use-cases.

Examples

The shipping examples demonstrate the usage of the API driver methods. To find the examples, open LabVIEW example finder and search for WF 3132.

WF3132_cDAQ-ModeSelection.vi

This example initializes the driver, either by automatically finding the first WF 3132 module in a cDAQ chassis, or by opening a connection to the specified chassis/slot.

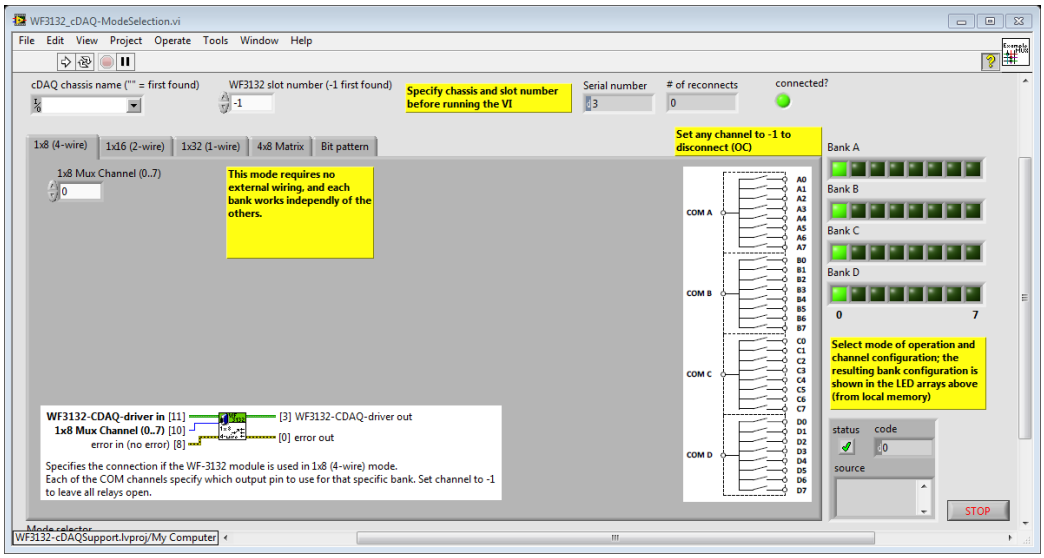


Figure 14 – Front panel of WF3132_cDAQ-ModeSelection.vi example

Each tab represents one way of using the driver, including display of the external wiring needed. The LED display to the right of the TAB control displays the actual pattern used for each of the four banks of the module.

The example continuously writes the values corresponding to the mode selected by the TAB control and displays the current bitpattern to the right.

Switching between TABs immediately changes the output to the value set on that TAB.

In case the module is removed, or if the connection is lost in any other way, a background process kicks in and tries to reconnect, the number of reconnects are monitored using the GetStatus method and is displayed in the upper right side of the example.

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Error codes

The cDAQ driver can generate a number of internal error codes, and these error codes are litsted in the following table.

Code	Description	Resolution
6600	General Error	Check description
6601	Driver is not initialized	Always call one of the Init methods before the other methods (except FindModules)
6602	Another session is already connected to the specified resource	Make sure other sessions are closed before initializing the driver
6603	The specified module is not a WF 3132 module	The module in the specified chassis/slot is not a WF 3132 module
6604	Driver is currently not connected, waiting for reconnect	Connection is lost, and driver attempts to reconnect in the background.
6605	Lost connection with module	The connection to the module was lost during the operation, driver will enter reconnection state.
6606	Maximum 16 relays can be set at any given time.	With low level control more than 16 relays can be set, but this generates this error. Please use less than 16 relays at any given time.
6607	No WF 3132 modules detected!	The driver didn't find any module to connect to, add module to the chassis and check that it is seen in MAX.

Troubleshooting

Installation

During the installation progress the program folder is modified (new files are added to the <LabVIEW> directory). On some operating systems or windows installations, it might therefore be necessary to install the driver package with administrator rights.

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Technical support and Professional services

If you need to contact support please include the following information for faster handling

- Product number
  printed on the side of the module, ACxxxx
- Serial number
  printed on the side of the module, s/n XXXXXX
- HW version
  printed on the side of the module, vX.X.X
- Driver version (as indicated in VIPM)
- LabVIEW version
- NI-RIO version
- NI-FPGA version
- Target platform
- General description of the problem.

If possible, please include sample code that exemplifies the problem.

Please send support questions to support@wireflow.se, and set the subject to "Support WF 3132"

Waste Electrical and Electronic Equipment (WEEE)



EU Customers At the end of the product life cycle, all products must be sent to a WEEE recycling center. For more information about how to, visit www.wireflow.se/weee.

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