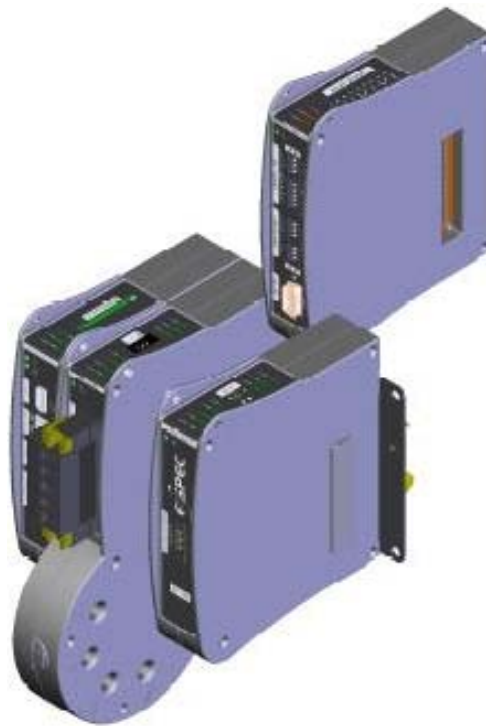


# G4400 Series

# BLACKBOX Multi I/O

## *User Guide*



Issue 2.0

October 2009

Cat. #: SMM-2012-1009

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# I Introduction

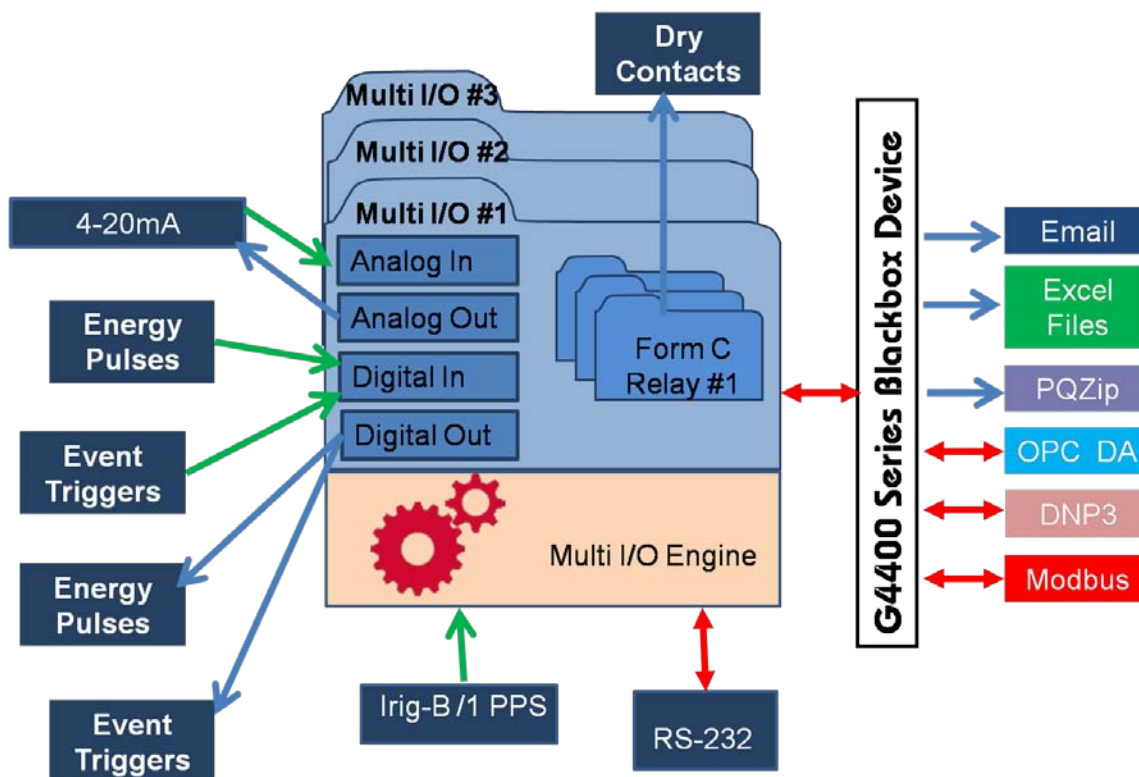
## Safety Information



To avoid electrical shock or fire:

- Review the entire manual before using the instrument and its accessories.
- Observe all warnings and cautions.
- Do not operate the instrument around explosive gas or vapor.
- Avoid working alone.
- Before use, inspect the instrument, leads and accessories for mechanical damage, and replace when damaged. Pay special attention to the insulation surrounding the connectors and plugs.
- Remove all accessories that are not in use.
- Make sure the instrument is properly grounded to a protective earth ground.
- Do not apply input voltages above the rating of the Instrument as shown on the name plate.
- Do not insert metal objects into connectors and openings.
- Never open the instrument's enclosure during operation; dangerous voltages are present.
- Use the instrument only as specified in this manual, or the protection provided by the instrument may be impaired.
- Do not expose the instrument to extreme moisture and or rain.
- Do not operate the instrument or its accessories when found wet for any reason.

## Overview



The Multi I/O is an optional module available for the BLACKBOX. The Multi I/O Expansion module extends the monitoring capabilities of the BLACKBOX with additional digital and analog I/O ports.

There are several types of input signals for the I/O module:

- Discrete Digital Inputs
- Analog Inputs
- GPS synchronization Information (IRIG-B or 1PPS)
- Serial Port RS-232

The I/O Engine periodically checks the inputs and sets the outputs accordingly.

Energy pulses, Digital Inputs and Analog Inputs are logged continuously along side with the Voltage and Current channels and stored in the PQZip files.

Events may be defined by the user to alert (send notification) when they cross user defined levels.

The triggered events may be sent through email to notify of certain situations and scenarios.



The Discrete Digital Inputs are also used for Energy metering by counting pulses.

The status of the Digital Inputs and Analog Inputs may be monitored through the Modbus RTU, Modbus TCP, OPC and DNP3 protocols, while Digital Outputs and Analog Outputs can only be monitored via Modbus RTU and Modbus TCP.

## Features

- Enables the gathering of Real Time digital and Analog readings.
- Enables Discrete Digital Outputs and 4-20mA Analog Outputs.
- Enables overseeing temperatures or virtually any measurable levels and statuses via external adapters.
- Synchronous signals input readings from pulsed outputs (including TOU).
- Status determination of switches, protection relays, breakers, etc..
- Conditional operation and control of devices and equipment interfacing with digital signals.
- Allows Triggering of loggable events, based on the Digital or Analog inputs.
- High rate I/O ports signal sampling and compression in method similar to that used in continuous logging of voltage and currents.
- Expandable up to three I/O modules per device.
- The full high resolution logged waveform data is synchronized with logged I/O signals without gaps.
- Provides DFR (Digital Fault Recorder) Functionality.



*For a detailed listing of technical specifications, refer to [Specifications on page II—1](#).*

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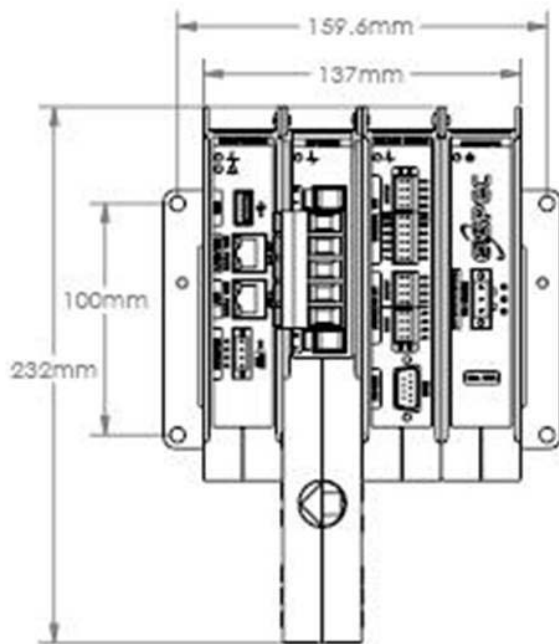
## II The Hardware

### Specifications

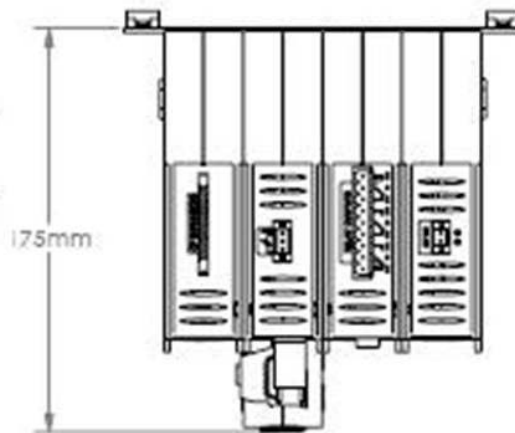
<b>Environmental Conditions</b>	
Operating Temperature	-20°C-70°C (-4°F-158°F)
Storage Temperature	-40°C-85°C (-40°F-185°F)
Humidity	Max 95% non-condensing
Pollution Degree	2
Insulation Category	II
<b>Port Specifications</b>	
<b>RS232 Connections</b>	
Baud Rate	Configurable:1200, 2400, 4800, 9600, 14400, 19200, 38400, 57600, 115200
Duplex	Full
Supported Protocols	GPS
Connector Type	DB9 male
Max. Cable allowed	50 feet (15.2m)
<b>Multi I/O Module</b>	
<b>Digital Inputs</b>	
Channels	<b>8</b>
Sampling	800Hz@ 50Hz;(16 spc) 960Hz@ 60Hz (16 spc)
Range	0 - 220Vdc <sup>[1]</sup>
Triggers	Edge, Level, Trigger ( <b>debounce</b> )
Isolation Connector	125V
	<sup>[1]</sup> 48V; 110V; 220V(via serial resistor)
<b>Irig-B Input</b>	
Time Synchronizing	IRIG-B (GPS) to 1ms ec 1PPS (GPS) – better than 100µs
<b>Digital Outputs</b>	
Channels	<b>4</b>
Max Voltage	<b>100V</b>
Functionality	Edge, Level, Trigger, KYZ Pulse Out
<b>Analog Inputs</b>	
Channels	<b>4</b>
Signal	<b>4-20mA (continuous DC)</b>
Impedance	<b>25Ω</b>
<b>Max.Voltage (common mode)</b>	<b>270 V</b>
<b>Analog Outputs</b>	
Channels	<b>4</b>
Signal	<b>4-20mA (continuous DC)</b>
Accuracy	<b>0.1% (10 bit D to A resolution)</b>

<b>Relay Output Module</b>	
Channels	<b>3 x Change Over</b>
Max voltage	277 Vac
Max current	5 A/250 Vac 10A/110 Vac 5 A/30 Vdc
Max. reaction time	10 ms
Max. drop-out time	4 ms
Output Resistance	50mΩ
<b>Dimensions (Overall)</b>	
Dimensions w/Multi I/O (d x h x w)	175mm x 232mm x 160mm

### Physical Dimensions

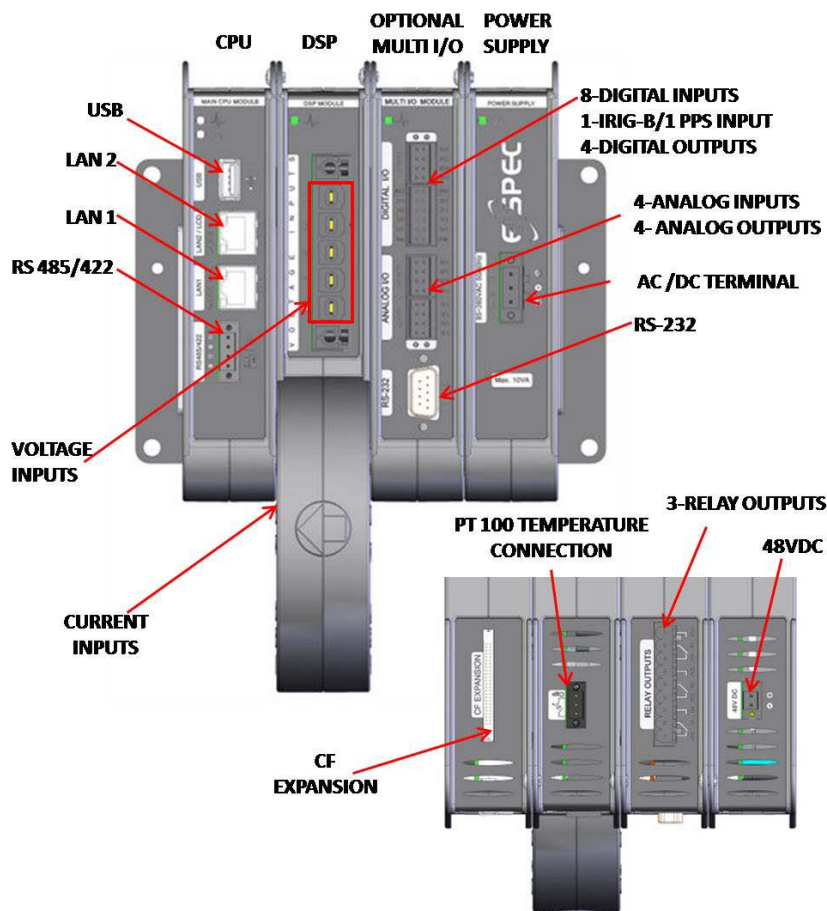


Front View



Top View

## The BLACKBOX Unit



The Blackbox w Multi I/O is configured with the following:

- Digital Inputs
  - Option 1: 8 x Digital inputs (3.3 VDC-48VDC)(default option)
  - Option 2: 8 x Digital Inputs (110VDC)
  - Option 3: 8 x Digital Inputs (220VDC) (requires addtl. Resistor)
- 4 x Digital Outputs (Max 100 VDC, 70 VAC, 600mA)
- 3 x Change Over (Form C) Relays (Max 250 VAC, 6A)
- 4 x Analog (4-20mA) Outputs (Max 600  $\Omega$ ,  $\pm$  12 VDC)
- 4 x Analog (4- 20mA) Inputs
- 1 x IRIG-B / 1PPS Input
- 1 x RS232 (9 pin) (DTE)



### III Web Interface

The BLACKBOX's internal Website is designed to serve as a main user interface with the instrument, providing enhanced management, configuration, and real-time monitoring functionality.

#### Login Page



Choose the interface language. The supported languages are:

- English (Default)
- Russian
- German
- Spanish
- French
- Chinese

**(For other languages – please contact your local Elspec distributor.)**

The Password field defines user level/privileges. Two user levels are supported:

User level	Password	Role
Viewer	123	Read only, can choose interface language only, no operations related changes are allowed
Admin	12345	Administration, setup, and full control

The passwords above are factory default values. You are advised to modify Admin password if extended security measures are required.



*In order to modify or configure any system settings including I/O, you must be logged in as system administrator.*

## The Site Structure

The BLACKBOX's embedded website is organized into five subsections:

- **Monitoring:** Real time monitoring of a variety of electrical parameters
- **Energy:** Integrated energy metering readings
- **Power Quality:** Power Quality standard compliance monitoring and setup
- **Configuration:** Main entry for setup and device status monitoring
- **Multi-IO:** Setup and monitoring of the Multi I/O module (this heading will only appear if the optional hardware is present. Please refer to Multi I/O in a separate document)

Summary	
Frequency	50.016 Hz
$I_{avg}$	0.0012 A
$V(LL)_{avg}$	396.05 V
$V(LN)_{avg}$	228.67 V

- **R/O** - Read Only mode when logged in as user.
- **R/W** - Read/Write mode when logged in as administrator



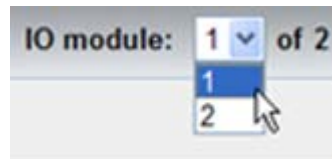
## Multi I/O Section

The Multi I/O can be configured through the Web Interface of the G44xx unit that the module is attached to. The Multi I/O configuration consists of the following

MULTI-I/O	CONFIGURATION
Digital in status	Digital in setup
Relay status	Relay setup
Digital out status	Digital out setup
Analog in status	Analog in setup
Analog out status	Analog out setup
	Relay setup
	UART setup

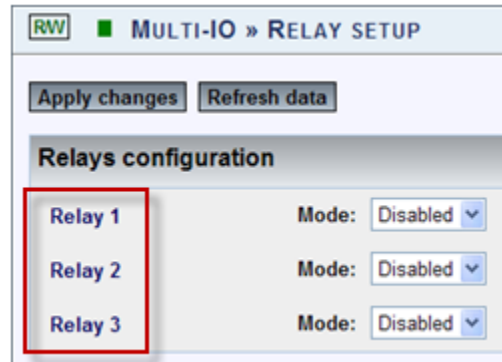


*In each of the Setup procedures to follow, you need to select the specific I/O module to be setup if multiple modules exist.*

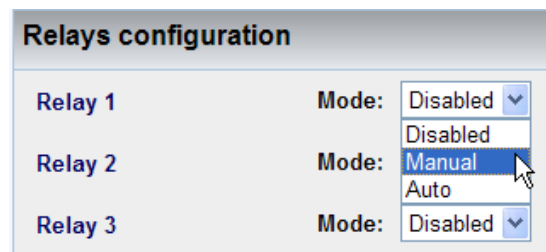


## Relay Setup

There are three Change Over (C-Form) type relays per I/O module.

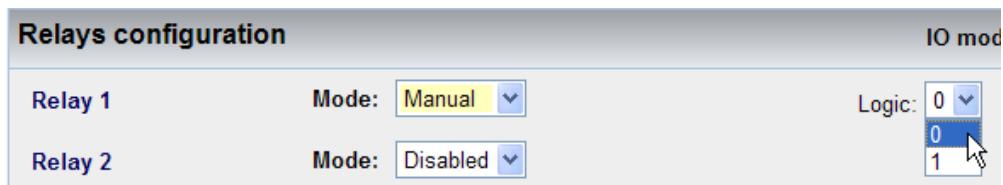


1. From the **Multi I/O** → **Relay Setup** menu, select the desired relay to configure (each relay needs to be configured individually).
2. Select the desired **Mode**.



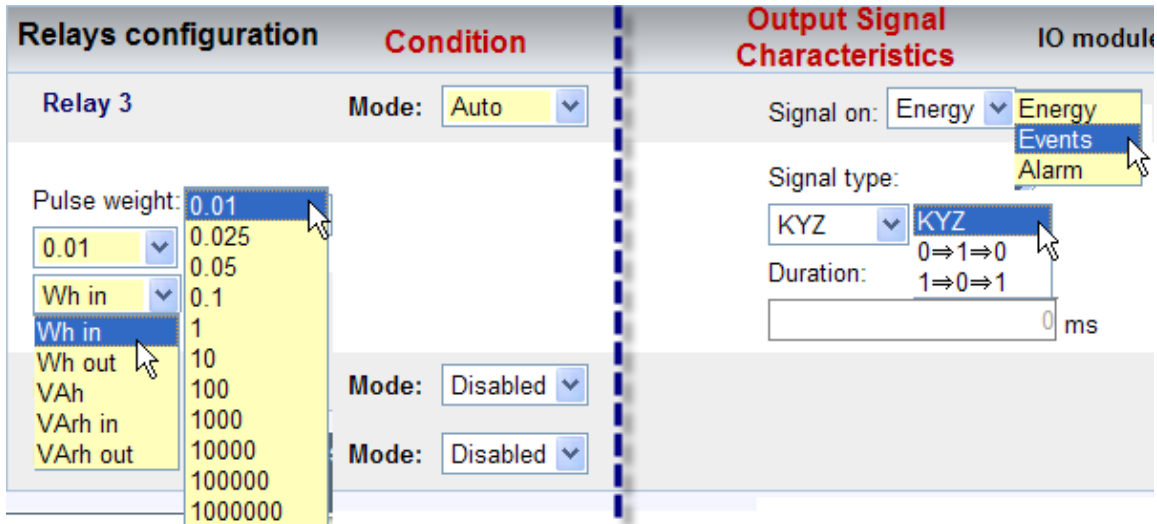
- **Disabled:** Default state. The specific relay is disabled.
- **Manual:** Static output, either '0' or '1'
- **Auto:** Conditional output.

3. Configure each relay accordingly with the desired functionality.



- **Manual:** by selecting the **Manual** mode, the relay's Normally Open output can be set either as Open (**0**) or Closed (**1**).
- **Auto:** By selecting Auto, the relay's output is a function of the following:

- Energy
- Events
- Alarm



Energy Signal

Energy Signal	Description
Pulse Weight	<p><b>Quantity:</b> the amount of energy (quotient) for which a pulse is generated. (Every time another energy quotient is measured – a preset number of pulses is generated). May contain values from 0.01 to 100000.</p> <p><b>Energy parameter:</b> the measurement unit of reference</p> <ul style="list-style-type: none"> <li>• Wh In – Active Energy flowing from Utility to Customer</li> <li>• Wh out – Active Energy flowing from Customer to Utility</li> <li>• VAh – Total Energy measured by the Meter</li> <li>• VArh In – Reactive Energy flowing from Utility to Customer</li> <li>• VArh Out - Reactive Energy flowing from Customer to Utility</li> </ul>
Signal Type:	<p>The output signal type selection.  <b>KYZ:</b> Output toggles its current state.</p> <p><b>0→1→0:</b> The Relay changes its output status from the steady position (Open) to Closed, holds this state for a predefined period of time (Duration parameter) and then reverts to its original state (Open).</p> <p><b>1→0→1:</b> The Relay's steady position is Closed. For this signal type the Relay changes it's state to Open, holds this state for a predefined period of time (Duration parameter) and then reverts to its original status back to Closed.</p>
Duration	<p>The duration is not relevant for KYZ output signals since every time the relay state is toggled it remains in that position's state until it is required to toggle again.</p>

## Events Signal

The screenshot shows the configuration for Relay 3. The Mode is set to 'Auto' and Signal on is set to 'Events'. Under Event class, 'Code based' is selected. The Numeric event code is 0, and the Event code field is empty. The Signal type is 'KYZ', with a legend showing '0⇒1⇒0' and '1⇒0⇒1'. A duration field is set to 0 ms.

## Event Class:

The type of event that is going to trigger the relay's output.

- **Code based:** This option is for internal use only at this time.
- **Custom events:** Custom events defined by the user. Refer to the Custom Events section in the G4400 Series Blackbox User Guide.
- **Power Quality:** The I/O output Relay is triggered in accordance to the Compliance type selected.

## Signal Type

The relay output signal has several format options:

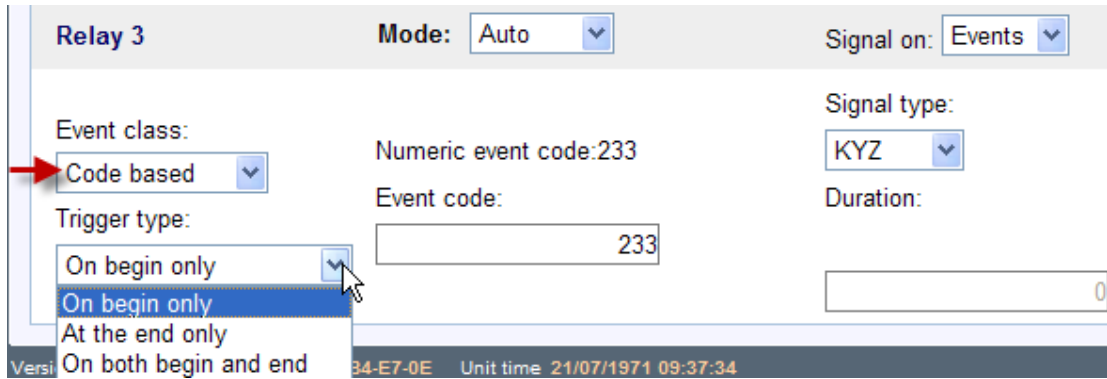
- **KYZ** – Changes the state of the relay (Toggle) – If the Normally Open contact is closed it will switch to Open and if it is open it will switch to closed.
- **0->1->0** – The steady state of the Relay is “Not Energized”, meaning that the Normally Open terminal is open. Once this output signal commences, the relay will close its Normally Open terminal for a predefined period and then return to the initial state (where the “Normally Open” terminal returns to “Open”). The period of time the Relay will stay energized is set by the “Duration” parameter under the Relay Setting field of that particular relay.
- **1->0->1** – In this case, the Steady state of the Relay is “Energized”. The “Normally Open” terminal of the relay is constantly closed. Once the output signal commences, the Relay will open its “Normally Open” terminal for a predefined period and then return to the initial state (where “Normally Open” terminal is closed). The period of time the Relay will stay energized is set by the “Duration” parameter under the Relay Setting field of that particular relay.

### Trigger Type

A condition which occurs over a period of time. The Relay signal may be synchronized to begin either at the time the condition **begins**, either at the time the condition **ends** or both for **the beginning and the end of a condition**.

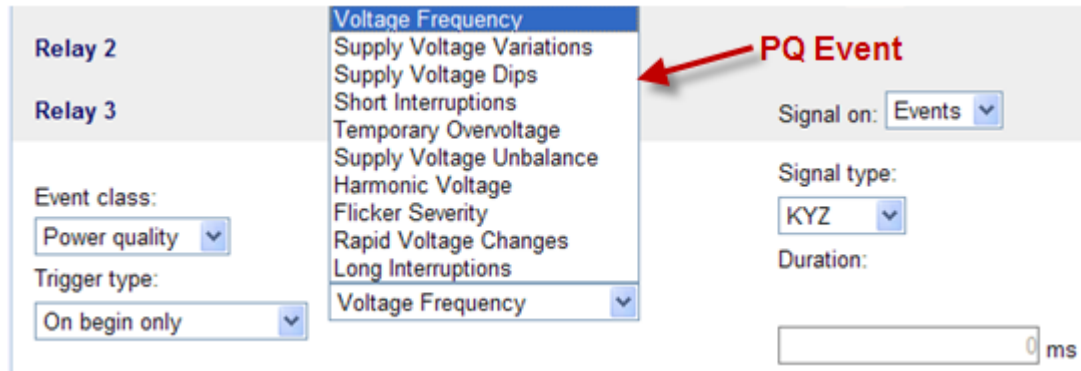
### Code Based

The Relay signal can be set to perform based on the Event Codes of the G4400 unit. This option is for internal use only at this time.



### Power Quality

The Relay can be conditioned to provide a signal based on the Power Quality Event Codes of the G4400 unit. A list of the different PQ Events is displayed in the pull down Menu under the **PQ Event** field.



### Alarm Signal

The Alarm Signal function allows the conditioning of the Relay Output Signal on the internal alarm of the G4400 unit. There is only one Alarm code available at this time; the one that lights the RED light on the Panel of the CPU unit.



### Alarm Types

Relay 3      Mode:       Signal on:

Alarm type:      Parameter code:

- **Binary Normal:** means that if the value (Alarm Flag) of the alarm is 0 then the output is 0 (Relay Not Energized) and if the value (Alarm Flag) of the alarm is 1, then the output is 1 (Relay is Energized).
- **Binary Reverse:** means that if the value (Alarm Flag) of the alarm is 0, the output is 1 (Relay is Energized) and if the value (Alarm Flag) is 1, the output is 0 (Relay Not Energized).
- **Parameter Code:** Currently there is only one alarm parameter called “General status “which is also represented by illuminating a red Indication Light on the front Panel of the Main CPU Module. It’s Parameter Code is 4616.

## Relay Status

The relay status screen displays the setup status of the relays.

RW ■ MULTI-IO » RELAY STATUS	
<b>Relay summary</b>	
<b>Relay 1</b>	Mode: Auto; Logic: 0; Signal on: Events; Signal type: 0⇒1⇒0; Duration: 100ms; Event 201: 201; Trigger type: At the end only;
<b>Relay 2</b>	Mode: Auto; Logic: 0; Signal on: Alarm; Alarm type: Binary normal; Parameter code: 0
<b>Relay 3</b>	Mode: Manual; Logic: 0;

- **Relay 1:** configured to **Auto mode**, signalled on **Events**, using **0->1->0** as the signal type for a duration of 100ms. Relay signal is synchronized to begin at the time the condition ends.
- **Relay 2:** configured to **Auto mode**, signalled on **Alarm**, using **Binary Normal** as the alarm type.
- **Relay 3:** configured to **Manual** mode and the state is **Open**.

## Digital In Setup

RW MULTI-IO » DIGITAL IN SETUP

Apply changes Refresh data

Digital inputs configuration IO module: 1 of 2

IRIG-B/PPS Signal status: No Signal

Digital input 1	Mode: Disabled	Counter: 31	Reset
Digital input 2	Mode: Normal	Logic: 0	
Digital input 3	Mode: DI pulse	Counter: 0	Reset
Factor: 1 × pulses = 1	Unit: kWatth	Pulse type: KYZ	Debounce: 1000 ms
Digital input 4	Mode: Normal	Logic: 0	
Digital input 5	Mode: Normal	Logic: 0	
Digital input 6	Mode: Normal	Logic: 0	
Digital input 7	Mode: Normal	Logic: 0	
Digital input 8	Mode: Normal	Logic: 0	

DI default state

Digital input	1	2	3	4	5	6	7	8
Default state	0	0	0	0	0	0	0	0

1. Choose the module to configure if multiple modules exist.
2. From the eight available digital inputs, choose the one you want to configure.
3. Select the **Mode and Default State** for each input.
4. Configure each Input using the following table as a reference.



Parameter	Description
Disabled Mode	not active
Normal Mode	Input data is sampled and stored in PQZip.
Di Pulse Mode	Input data is sampled and stored in PQZip as in Normal mode In addition, the number of input pulses is counted inside the unit for Energy Metering Functionality.
	<b>Factor:</b> the number of pulses that equal one unit.
	<b>Unit:</b> The measuring unit (distance, active energy, reactive energy, total energy).
	Pulse Type: A signal is detected when: <ul style="list-style-type: none"> <li>• <b>KYZ</b> –the input changes its state from 0 to 1 or from 1 to 0.</li> <li>• <b>0→1→0; 1→0→1</b> –the status changes from one status to another, then returns to the original status.</li> </ul>
	<b>Debounce:</b> the minimum amount of time the input must be constant after a change. (for example: a debounce of 1000 ms means that a change in duration of less than 1000ms will not be counted. This function was implemented in order to prevent the system from interpreting undesired fast changing signals as valid signals (e.g. When a button is pushed by hand it will generate fast changing signals before signal stabilizes).
Default State	This Setup defines what the default state is for every discrete Digital Input line (0 or 1). A valid signal will only be detected when the signal will change from the default State, according to the defined Pulse Mode selected (0->1->0; 1->0->1 or KYZ).

## Digital In Status

The Digital In Status screen displays the setup status of the Digital inputs.

RW ■ MULTI-IO » DIGITAL IN STATUS	
<b>Digital input summary</b>	
IRIG-B/PPS Signal status: No Signal	
Digital input 1	Mode: DI pulse; Logic: 0; Factor: 1; Pulse type: 0⇒1⇒0; Debounce: 1000ms; Aggregated counter: 31.000 [ ] ( 31 pulse(s) )
Digital input 2	Mode: Normal; Logic: 0;
Digital input 3	Mode: Disabled;

This status of all Digital Inputs is explained below:

- **The IRIG-B/PPS:** input not currently active. (see [GPS Enhanced Synchronization w/\(IRIG-B / 1PPS\) on page III—18](#)).
- **Digital Input 1:** configured to **DI Pulse mode**, each pulse is equal to **1** unit, using **KYZ** as a pulse type, and Debounce is equal to **1000 ms**.
- **Digital Input 2:** configured to Normal mode and the State is **Open**.
- **Digital Input 3:** Disabled

## Digital Output Setup

**RW** ■ MULTI-IO » DIGITAL OUT SETUP

Apply changes Refresh data

**Digital output configuration** IO module:

<b>Digital output 1</b>	Mode: Auto	Signal on: Alarm
Alarm type:	Parameter code:	
Binary normal	201	
<b>Digital output 2</b>	Mode: Manual	Logic: 0
<b>Digital output 3</b>	Mode: Auto	Signal on: Energy
Pulse weight:	Signal type:	
0.01	KYZ	
Wh in	Duration:	100 ms
<b>Digital output 4</b>	Mode: Disabled	

1. Choose the module to configure if multiple modules exist.
2. From the four available discrete (1 Bit) “Digital Output” interfaces, select the one to configure.

Each Digital Output interface has 3 states:

- **Disabled** - if no functionality is required from it
  - **Manual** – if the user wishes to switch a Digital Output On or Off manually.
  - **Auto** – allows the user to switch a Digital Output conditionally.
3. Configure the digital outputs using the same parameters used in [Relay Setup on page III—4](#).

## Digital Output Status

The Digital Output Status screen displays the setup status of the Digital Outputs.

RW ■ MULTI-IO » DIGITAL OUT STATUS	
Digital output summary	
Digital output 1	Mode: Auto; Logic: 0; Signal on: Alarm; Alarm type: Binary normal; Parameter code: 201
Digital output 2	Mode: Manual; Logic: 0;
Digital output 3	Mode: Auto; Logic: 0; Signal on: Energy; Signal type: KYZ; 0.01 undefined
Digital output 4	Mode: Disabled;

- **Digital Output 1:** configured to **Auto** mode, signalled by an **Alarm** using **Binary Normal** as a signal type and a **Parameter code #201**.
- **Digital Output 2:** configured to Manual mode.
- **Digital Output 3:** configured to **Auto** mode, signalled by **Energy** using **KYZ** as a signal type and pulse weight of **.01 Wh In**.
- **Digital Output 4:** disabled.

## Analog In Setup

RW ■ MULTI-IO » ANALOG IN SETUP		
<input type="button" value="Apply changes"/> <input type="button" value="Refresh data"/>		
Analog input configuration		IO module:
<b>Analog input 1</b>	Mode: <input type="button" value="Disabled"/>	
<b>Analog input 2</b>	Mode: <input type="button" value="Normal"/>	Unit: <input type="button" value="Ft/sec"/>
Min value( $\approx$ 4mA)	Max value( $\approx$ 20mA)	Input value(NaNmA)
<input type="text" value="4"/> Ft/sec	<input type="text" value="20"/> Ft/sec	NaN[Ft/sec]
<b>Analog input 3</b>	Mode: <input type="button" value="Normal"/>	Unit: <input type="button" value="m/sec"/>
Min value( $\approx$ 4mA)	Max value( $\approx$ 20mA)	Input value(NaNmA)
<input type="text" value="4"/> m/sec	<input type="text" value="20"/> m/sec	NaN[m/sec]
<b>Analog input 4</b>	Mode: <input type="button" value="Normal"/>	Unit: <input type="button" value="°C"/>
Min value( $\approx$ 4mA)	Max value( $\approx$ 20mA)	Input value(-InfmA)
<input type="text" value="4"/> °C	<input type="text" value="20"/> °C	4.0000[°C]

1. Choose the module to configure if multiple modules exist.
2. From the four available inputs, choose the one you want to configure.
3. Select the **Mode**.
  - **Disabled** – The particular Analog In channel will NOT be read.
  - **Normal** – The particular Analog In channel is read and available to be read via the different protocols from the device and in the WEB interface under “Analog In Status” screen. By setting the Minimum and Maximum Values, the current read from that particular Analog Input is displayed within the Min and Max range defined. The units displayed along the read data can be set from the pull-down menu named “Units”.

## Normal Configuration

You must set the minimum and maximum values. The Analog readings are presented as values within the minimum and maximum range.

## Analog In Status

The Analog In Status screen displays the setup status of the Analog inputs.

RW ■ MULTI-IO » ANALOG IN STATUS	
Analog in summary	
Analog input 1	Mode: Disabled;
Analog input 2	Mode: Normal; Min value(≐4mA): 4 Ft/sec; Max value(≐20mA): 20 Ft/sec; Read value(NaN mA): NaN Ft/sec;
Analog input 3	Mode: Normal; Min value(≐4mA): 4 m/sec; Max value(≐20mA): 20 m/sec; Read value(Inf mA): 20.000 m/sec;
Analog input 4	Mode: Normal; Min value(≐4mA): 4 °C; Max value(≐20mA): 20 °C; Read value(-Inf mA): 4.0000 °C;

- **Analog Input 1:** disabled.
- **Analog Input 2** configured to **Normal mode** with a logic range of **4 to 20**. The measurement units have been set as “**Ft/sec**”.
- **Analog Input 3** configured to Normal mode with a logic range of 4 to 20, and an output value of 20.000. The units have been set as “**m/sec**”.
- **Analog Input 4** configured to Normal mode with a logic range of 4 to 20, and an output value of 4.0. The units have been set as “**Celsius**” (degrees).

## Analog Out Setup

The screenshot displays the 'Analog output configuration' window for 'IO module: 1 of 1'. It contains four rows for 'Analog output 1' through '4'. Each row has a 'Mode' dropdown, a 'Unit' dropdown, and three input fields: 'Min value(≅4mA)', 'Max value(≅20mA)', and 'Output value'. Channel 2 is in 'Manual' mode, and its 'Unit' dropdown is open, showing a list of units with 'm/sec' highlighted. A red arrow points to this selection. Channel 1 is 'Disabled', Channel 3 is 'Manual' with an output of 22, and Channel 4 is 'Manual' with an output of 31.5.

1. Choose the module to configure if multiple modules exist.
2. From the four available outputs, choose the one you want to configure.
3. Select the **Mode**.
  - **Disabled** – The particular Analog Out channel is not active.
  - **Manual** – The particular Analog Out channel will provide (to an external circuit) a current in the range of 4mA to 20mA according to the value set by the user in the “Output Field”. This value has to be within the range on the Minimum and Maximum values. This value is also available to be read via the different protocols from the device and in the WEB interface under the “Analog Out Status” screen. The current may represent a reading of some particular parameter. The units of this parameter may be set through the pull-down menu.

## Configure Manually

The values that need to be assigned when mode is manual.

- **Unit:** The unit of signal that the analog out channel represents.
- **Minimum Value:** minimum value assigned to a logical scale representing the 4mA (lowest available output current from an Analog Out channel).

- **Maximum Value:** maximum value assigned to a logical scale representing the 20mA (highest available output current from an Analog Out channel).
- **Output Value:** The actual output value according to the logical scale (within the boundaries of the Minimum and Maximum values).

## Analog Out Status

The Analog Out Status screen displays the setup status of the Analog outputs.

RW ■ MULTI-IO » ANALOG OUT STATUS	
<b>Analog out summary</b>	
<b>Analog output 1</b>	Mode: Disabled;
<b>Analog output 2</b>	Mode: Manual; Min value(≡4mA): 4 ; Max value(≡20mA): 20 ; Set value(4.0000 mA): 4.0000 ;
<b>Analog output 3</b>	Mode: Manual; Min value(≡4mA): 10 ; Max value(≡20mA): 30 ; Set value(13.600 mA): 22.000 ;
<b>Analog output 4</b>	Mode: Manual; Min value(≡4mA): 15 ; Max value(≡20mA): 40 ; Set value(14.560 mA): 31.500 ;

- **Analog Output 1:** disabled
- **Analog Output 2** configured to **Manual** mode with a logic range of **4 to 20** and an output value of **4.0**.
- **Analog Output 3** configured to **Manual** mode with a logic range of **10 to 30** and an output value of **22.0**.
- **Analog Output 4** configured to **Manual** mode with a logic range of **15 to 40** and an output value of **31.5** and a physical output value of **14.560 mA**. [Representing the “31.5” value within the Minimum of 15 (physical 4mA) and Maximum 40 (physical 20mA)].

## UART Setup

The UART Setup screen allows setting of the parameters of the RS-232 interface from the Multi IO module.

The RS-232 interface can be used only for interfacing with GPS at this stage. If a GPS receiver is connected to this interface, set the serial communication parameters accordingly (as stated by the GPS manufacturer), and select the “UART mode” as GPS.

## GPS Enhanced Synchronization w/(IRIG-B / 1PPS)

The Multi IO module includes an additional digital port designated for GPS Enhanced Synchronization standards: IRIG-B 1PPS.

This input recognises automatically which one of the two inputs is connected to it and synchronizes the internal clock (RTC) with this signal.



*In GPS mode, the unit will synchronize automatically to the GPS and the communication parameter is detected automatically, therefore there is no configuration necessary.*





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