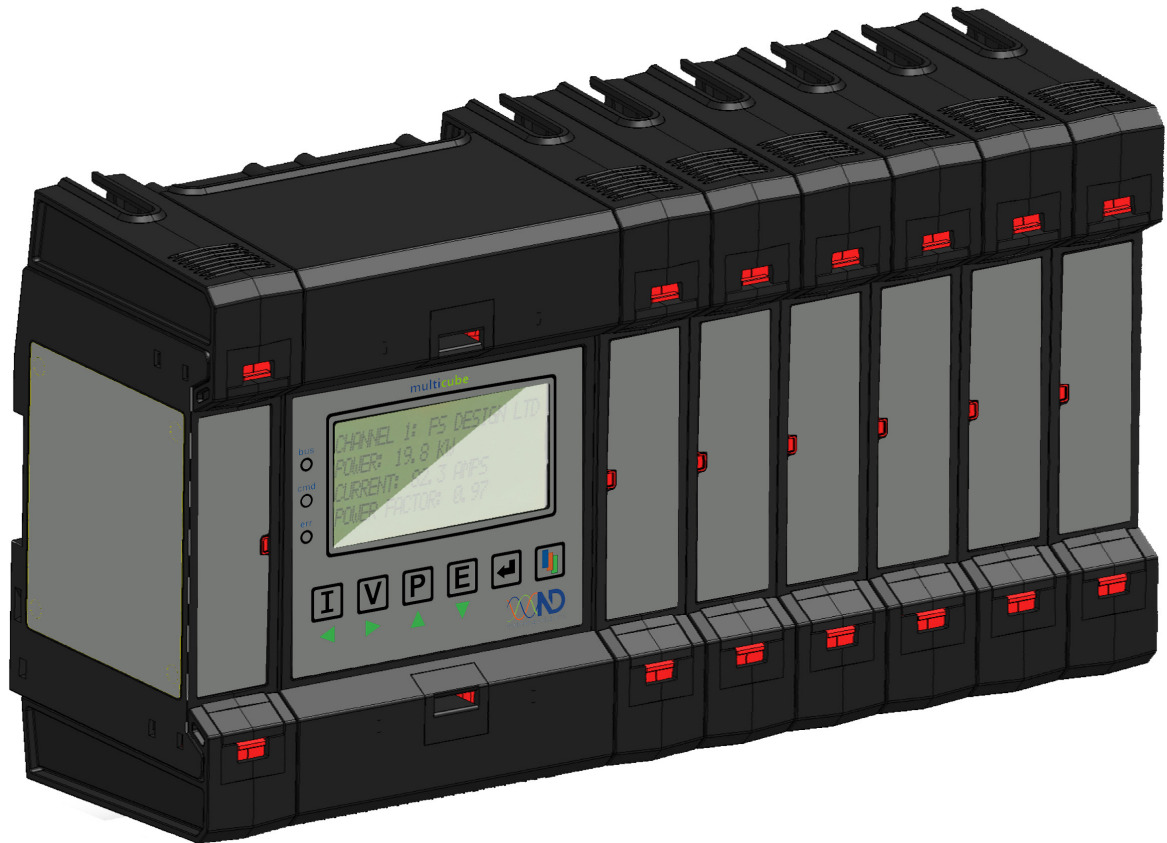# multicube

Modular Metering System
Pulse Output Module Operating Manual

Revision 2
Published October 2014
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1 Pulse Output Module

1.1 Description

The **multicube** pulse output module is a 12 channel relay board with one side of each relay connected to a common terminal. **The module connects as one or more of up to ten option modules to the right hand side of the multicube main display.** Each of the 12 channels can be configured to act as either a pulse output responding to changes in accumulating energy registers or as an alarm output responding to level changes of instantaneous registers.

The pulse output module has a Modbus ID determined by the ID of the main display unit and the position the unit is placed in the option modules. One pulse module replaces one meter module or two metering units. The Modbus tables described later are accessed on this ID. Multiple pulse modules can be connected to the **multicube** with corresponding reduction of the maximum number of meter modules.

2 Safety

This manual gives details of safe installation of pulse output modules for connection to the **multicube** electricity metering systems. Safety may be impaired if the instructions are not followed or the system is used in a manner not specified by the manufacturer. Labels give details of equipment ratings for safe operation. Take time to examine all labels before commencing installation. Safety symbols on the meter have specific meanings.

Caution Risk of Danger
Refer to Instructions

Danger
Risk of Electric Shock
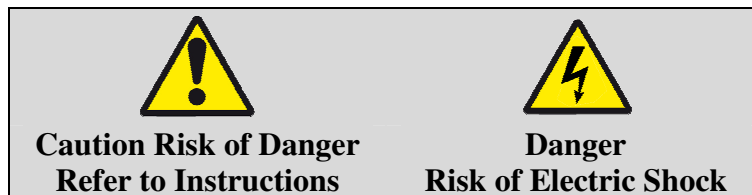
Safety may be impaired if the instructions are not followed or the module or metering system is used in a manner not specified by the manufacturer.

Contains no user serviceable parts. Field wiring and commissioning should only be carried out by qualified personnel, in compliance with applicable national regulations.
e.g. National Electrical Code (NEC) for US; Canadian Electrical Code for Canada

For further Information contact the manufacturer:

Address: Northern Design (Electronics) Ltd: 228 Bolton Road, Bradford, West Yorkshire, BD3 0QW. (UK)

Web: http://www.ndmeter.co.uk

2.1 Maintenance

The equipment should be maintained in good working order. Damaged equipment must be returned to the manufacturer (or his authorized agent) for repair. The meter may be cleaned by wiping lightly with a soft cloth. No solvents or cleaning agents should be used. All inputs and supplies must be isolated before cleaning any part of the equipment.
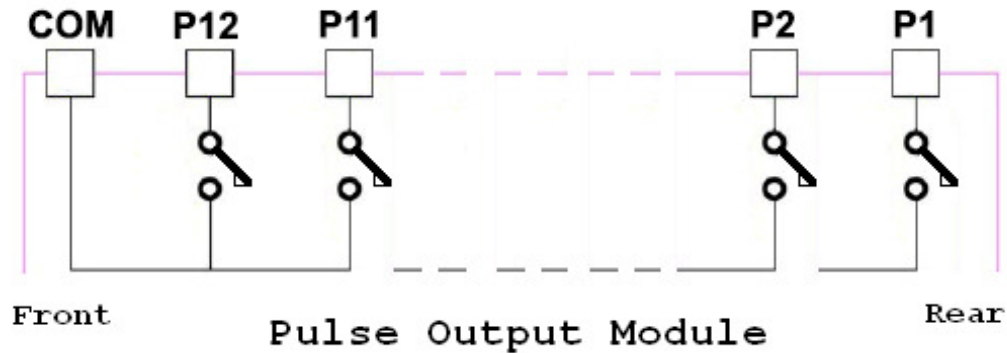
2.2 Installation

> ⚠️ For details for attaching modules to the multicube refer to the multicube Modular Metering system Installation Guide.

2.3 Schematics

2.4 Terminal Connections

The pulse module terminal connector shall only be connected to low voltage (SELV) circuits. The maximum operating voltage for the relays is 100V ac/dc and the maximum operating current for the relays is 100mA ac/dc.

Terminal Connector (supplied): 300Vac, 11A, 110 DegC; Tightening Torque < 0.25Nm.

Cables running within the electrical enclosure may come close to high voltages and therefore must be insulated to the following minimum specification:

Cables: UL 1015, 105 DegC , 600Vac.   30-14 AWG.

2.5 Accessing Module Wiring Terminals

Module wiring terminals are protected by terminal covers. The terminal covers are designed to slide towards the front of the module and are captive so they may not be removed and misplaced.

To access the terminals:

1. Push down the lower terminal cover release clip using a tool.
2. Slide the terminal cover forward to its full extent
3. Flip the terminal cover up to sit in front of the module while accessing the wiring terminals.

> **NOTE: The release clip may be covered with a tamper evident label (20mm x 18mm) to detect unauthorized access.**

Beneath the sliding cover on the bottom of the module is a 13-way terminal connector. The terminal nearest the front of the unit is common to each of the 12 configurable relay channels. These relays connect to the rest of the terminals with channel 1 connected to the rearmost terminal and channel 12 connected to the terminal nearest to the common.
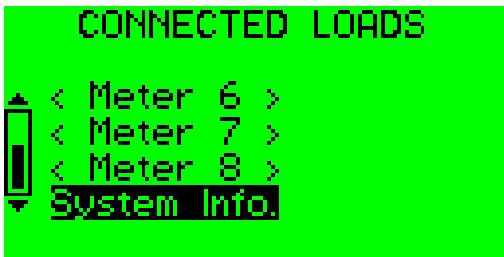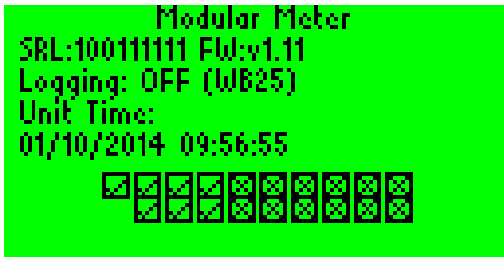
2.6 System Information Pages

The system information page provides the user with details of the connected modules at any time during operation of the **multicube** system. Information about the settings of any connected Pulse Output Module can be found here.

The boxes represent the position each module is connected to the main display unit and the elements in each module. The meter modules have two meters per module and are indicated by an upper and lower box, while a pulse module is only indicated by a single upper box.

2.6.1 Accessing Pulse Module Information

Select *System Info* From the *CONNECTED LOADS* View the **System Information page**	▲ ▼ ↵	**CONNECTED LOADS** ◄ Meter 6 ► ◄ Meter 7 ► ◄ Meter 8 ► System Info.
Select to View **Main display /Module(s) Information** **Return to Module List**	▯ ↵	Modular Meter SRL:100111111 FW:v1.11 Logging: OFF (WB25) Unit Time: 01/10/2014 09:56:55

✓	Module present and configured
✗	Module not present
?	Module present but position does not match ID

Pulse Module Information

SRL:100-9012058 FW:101
D 1-12: 000000000000
T 1-4: 1 1 1 1
T 5-8: 1 1 1 1
T 9-12: 1 1 1 1

P1(100) ID002

Selected Module: Serial Number Firmware Version
Channel Direction Setting: N/O = O, N/C = I (Output or Input)
Channel Pulse Duration Setting:
   Channel Numbers & their Pulse Durations (set duration = value displayed in this page x 0.1 seconds),   0 if set to Alarm

Module Status – Selected Module Highlighted

Module Position (Type)   Comms ID

3 Pulse Output Settings

3.1 Output Direction

Each channel can be set to act as a normally open (N/O) or as a normally closed (N/C) contactor although without power all channels are open circuit as follows.

3.1.1 Output Direction Summary

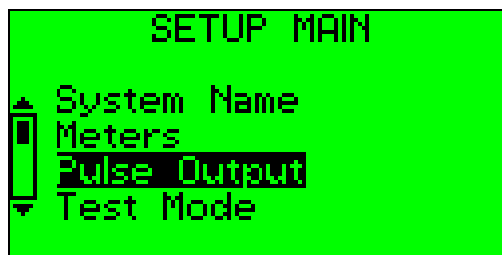| Direction	Output Function
0	N/O OFF = OPEN ON = CLOSED
1	N/C OFF = CLOSED ON = OPEN

3.1.2 Set the Output Direction

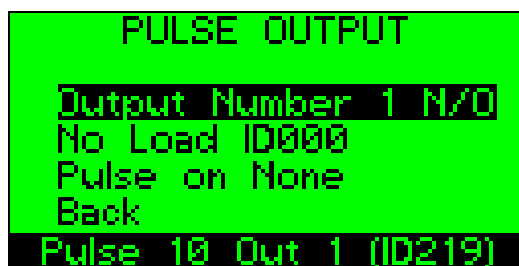**Enter Setup Mode** *Hold Setup Keys for 5 Seconds*

Select *Pulse Output*
From the Main Menu

View/Edit the Pulse Output Setup

```
        SETUP MAIN

 ▲ System Name
 ▯ Meters
   Pulse Output
 ▼ Test Mode
```

Select a Pulse Output Module
(in case of more than one pulse
output module connected)

```
       PULSE OUTPUT

 Output Number 1 N/O
 No Load ID000
 Pulse on None
 Back
 Pulse 10 Out 1 (ID219)
```

Select a Pulse Output Channel

Select Normally Open/Closed

```
       PULSE OUTPUT

 Output Number 1 N/C
 No Load ID000
 Pulse on None
 Back
 Pulse 10 Out 1 (ID219)
```

3.2 Associated Load ID

Any of the Modbus devices in a **multicube** system can be associated with an individual pulse output. For example, it may be required to provide a pulse output associated with a selected energy register measured by one of the metering modules. It is possible to set this value to the Modbus ID of any chosen meter or, if set to alarm, to that of any other module or the Main display unit.

To operate, each separate channel is required to be associated with a Modbus ID and a parameter. The ID can be that of the main display or one of the metering unit option modules. When the associated parameter is set to below the value 256, the channel is considered a pulse output otherwise the channel is set as an alarm.

When an individual channel parameter is selected as a pulse output, the Modbus ID must be associated with a corresponding meter for correct operation. When an alarm register is selected the Modbus ID can also be that of the main display unit or another pulse output module, but the Modbus register must be valid for the target unit selected.

For each of the output channels, in order to set the associated Modbus ID using the **multicube** display and keypad, the meters detected on the **multicube** are presented as a number of three phase and single phase loads for selection.
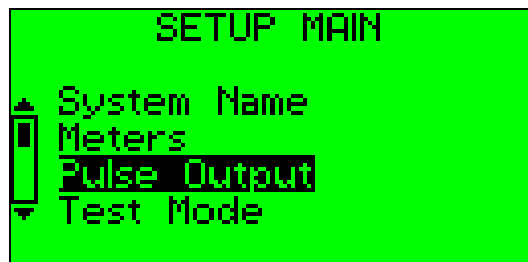
3.2.1 Set the Associated Load

Enter Setup Mode	↵ ▣	*Hold Setup Keys for 5 Seconds*

Select *Pulse Output* From the Main Menu **View/Edit the Pulse Output Setup**	△ ▽ ↵	**SETUP MAIN** System Name Meters **Pulse Output** Test Mode

Select a Pulse Output Module (in case of more than one pulse output module connected)	▣	**PULSE OUTPUT** Output Number 1 N/O No Load ID000 Pulse on None Back Pulse 10 Out 1 (ID219)
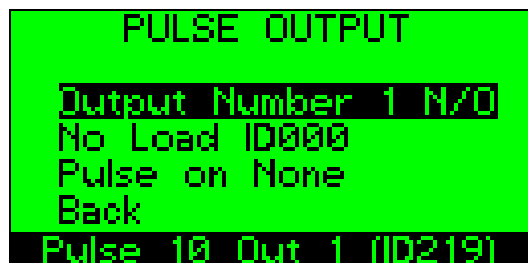
multicube
Modular Metering Pulse Output Module

Select a Pulse Output Channel
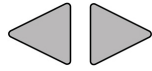
Select Normally Open/Closed

```
      PULSE OUTPUT

Output Number 1 N/C
No Load ID000
Pulse on None
Back
Pulse 10 Out 1 (ID219)
```

Choose the Load Selection Option

Enter Load Selection Menu

```
      PULSE OUTPUT

Output Number  1 N/O
No Load ID000
Pulse on None
Back
Pulse 10 Out 1 (ID219)
```

Choose Load

Enter to Select Load

```
     SELECT LOAD

  < Meter 1 >
  < Meter 2 >
  < Meter 3 >
  < Meter 4 >
```

Alternatively, a Modbus ID may be entered manually if, for instance, a register on the main display unit is required.

3.2.2 Set the Associated ID

Choose Manual ID Entry

Enter ID Input Menu
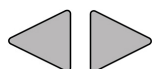
```
     SELECT LOAD

  < Meter 16 >
  < Meter 17 >
  < Meter 18 >
  Other Modbus ID
```

Edit Digit

Choose Digit or Button

```
   ENTER TARGET ID


         000
   [OK]    [ESC]
```

Pulse Output Module

Accept or Decline Value

↵

```
ENTER TARGET ID

      200
  OK      ESC
```

3.3 Output Type

Each of the output channels can be set for a pulse output or an alarm.

3.3.1 Set the Output Type
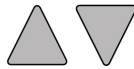
Select Pulse/Alarm	△ ▽	PULSE OUTPUT Output Number 1 N/O < Meter 1 > **Pulse on None** Back Pulse 10 Out 1 (ID219)
Choose Pulse or Alarm **Enter Pulse or Alarm Settings Menu**	◁ ▷ ↵	PULSE OUTPUT Output Number 1 N/O < Meter 1 > **Alarm on Sys kW Dmd** Back Pulse 10 Out 1 (ID219)
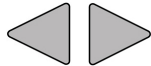
4 Pulse Output Settings

4.1 Associated Parameter

When this parameter is set to one of values in the table below, then the output behaves as a pulse output which is associated with the corresponding energy register selected. Three phase meters can select only the system energies, while single phase loads can only select the energies on their corresponding channel.

For three phase meters export energies are available only if the auto-rotate setting has been disabled. Some energies may not be available when functions such as dual source logging are enabled and will be read as zero. Refer to the **multicube** modular meter Modbus Comms manual for more information.

If the auto-rotate settings are changed or a meter is changed from a three phase to three single phase loads or vice-versa, then any relays that refer to that meter will be reset on all the installed pulse modules.

4.1.1 Pulse Parameter List

| Associated Parameter	3 Phase Energy	Channel 1 Energy	Channel 2 Energy	Channel 3 Energy
0	No function assigned (Output always OFF)	No function assigned (Output always OFF)	No function assigned (Output always OFF)	No function assigned (Output always OFF)
1	System kWh			
2		Channel 1 kWh		
3			Channel 2 kWh	
4				Channel 3 kWh
5	System kvarh			
6		Channel 1 kvarh		
7			Channel 2 kvarh	
8				Channel 3 kvarh
9	System Export kWh*			
10	System Export kvarh*			
11	System kVAh			
12-255	Unused	Unused	Unused	Unused

* Only available when auto-rotate is off.

To select the appropriate parameter, enter the pulse settings menu by highlighting the '**Pulse On …**' selection and pressing the Enter key. The associated parameter should be highlighted and can be selected to present the parameters listed in the above table. Choose the appropriate parameter using the up and down keys and press the Enter key.

4.1.2 Selecting Associated Pulse Parameter
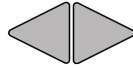
Choose Pulse	◁ ▷	PULSE OUTPUT Output Number 1 N/O < Meter 1 > **Pulse on None** Back Pulse 10 Out 1 (ID219)
Enter Pulse Settings Menu	↵	

Choose Pulse Parameter Selection	△ ▽	PULSE SETTINGS **None** Pulse every 1.0 Pulse Duration 0.1 secs Back Pulse 10 Out 2 (ID219)
Enter Associated Pulse Parameter Selection Menu	↵	

Choose Appropriate Parameter	△ ▽	SELECT PULSE ENERGY **None** Sys kWh Sys kvarh Sys kVAh Pulse 1 Out 1 (ID002)

Select Associated Parameter	↵	SELECT PULSE ENERGY None Sys kWh **Sys kvarh** Sys kVAh Pulse 1 Out 1 (ID002)

4.2 Pulse Rate

When an individual channel is set as a Pulse Output, this setting determines how many increments of the associated energy register are required before each pulse is triggered. The default value for this parameter is 1 and a single pulse occurs for each increment of the associated energy register. If, for example, this parameter is set to 10 then the pulses will occur only after each 10 increments of the associated energy register.

The value shown on the display is scaled and dimensioned according to the scale value stored for the corresponding parameter. The actual value set will be an integer number directly comparable with the reading obtained from the meters. When the target parameter has increased by the pulse rate since the previous pulse a new pulse is triggered to be output the next second. If the value has increased by a multiple of this value, a single pulse will be output each second until a pulse has occurred for each increase of the pulse rate.

4.2.1 Adjusting Pulse Rate

Choose Pulse Rate

Adjust Pulse Rate
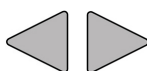
```
        PULSE SETTINGS

Sys kvarh
Pulse every 0.1kvarh
Pulse Duration 0.1 secs
Back
   Pulse 1 Out 1 (ID002)
```

4.3 Pulse On Time

When an individual channel is set as a Pulse Output, this setting determines how long the contacts will remain in the triggered condition after the pulse has occurred. This value is scaled in 0.1S (e.g. 1 = 0.1S, 2=0.2S etc). The triggered condition may be active when the relays are open then driven closed for this duration with a normally open output type, or active when the relays are closed then driven open for this duration with a normally closed output type.

4.3.1 Adjusting Pulse Duration

Choose Pulse Duration
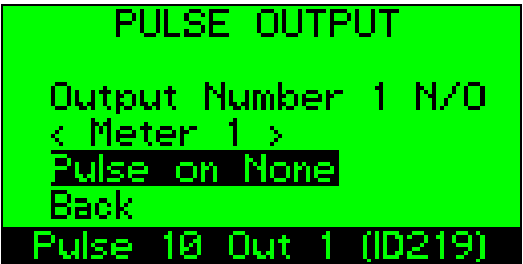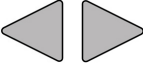
Adjust Pulse Duration
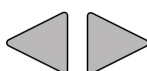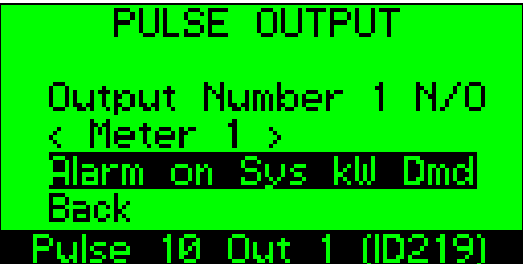
```
        PULSE SETTINGS

Sys kvarh
Pulse every 0.1kvarh
Pulse Duration 0.1 secs
Back
   Pulse 1 Out 1 (ID002)
```

5   Alarm Functionality

5.1 Use as Alarm Outputs

If the parameter value is greater than 255, then the output is set as an Alarm associated with the register which would normally be read from the equivalent Modbus data address. This parameter would normally be an instantaneous Modbus register such as system kW or phase amps but any Modbus data address could be selected.

5.1.1 Selecting Alarm

Choose Pulse/Alarm **Select Alarm**	▲ ▼ ◄ ►	PULSE OUTPUT Output Number 1 N/O < Meter 1 > Pulse on None Back Pulse 10 Out 1 (ID219)
Enter Alarm Menu	↵	PULSE OUTPUT Output Number 1 N/O < Meter 1 > Alarm on Sys kW Dmd Back Pulse 10 Out 1 (ID219)

5.2 Alarm Register Parameter

Each Alarm is associated with a single Modbus register, which in turn is linked to a measured parameter in the meter. From the Alarm Menu select the Alarm Parameter Selection Menu to show a list from which to choose the desired parameter. The lists of parameters differ between 3 phase loads and the phase a single phase load occupies.

5.2.1 3 Phase Alarm Parameter List

Associated 3 Phase Register	Measured Value
7691	Phase 1 Volts
7692	Phase 2 Volts
7693	Phase 3 Volts
7694	Line Volts 1-2
7695	Line Volts 2-3
7696	Line Volts 3-1
7717	Phase 1 V Dmd
7718	Phase 2 V Dmd
7719	Phase 3 V Dmd
7688	Phase 1 Amps
7689	Phase 2 Amps
7690	Phase 3 Amps
7732	Neutral Amps
7714	Phase 1 Amps Demand
7715	Phase 2 Amps Demand
7716	Phase 3 Amps Demand
7705	System kW
7702	Phase 1 kW
7703	Phase 2 kW
7704	Phase 3 kW
7709	System kVA
7713	System kvar
7710	Phase 1 kvar
7711	Phase 2 kvar
7712	Phase 3 kvar
7701	System Power Factor
7698	Phase 1 Power Factor
7699	Phase 2 Power Factor
7700	Phase 3 Power Factor
7726	System kW Demand

5.2.2 Single Phase Alarm Parameter List

Channel 1 Register	Channel 2 Register	Channel 3 Register	Measured Value
7966	7967	7968	Volts
7963	7964	7965	Amps
7954	7955	7956	kW
7957	7958	7959	kvar
7973	7974	7975	PF
7951	7952	7953	kW Dmd

5.2.3 Set Alarm Parameter

Choose Alarm Parameter
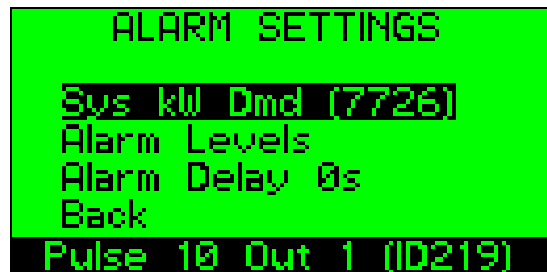
Enter Alarm Parameter Menu

```
ALARM SETTINGS

Sys kW Dmd (7726)
Alarm Levels
Alarm Delay 0s
Back
Pulse 10 Out 1 (ID219)
```

Choose Alarm Parameter

Select Alarm Parameter

```
SELECT ALARM READING

Ph2 PF
Ph3 PF
Sys kW Dmd
Other Modbus Register
Pulse 10 Out 1 (ID219)
```
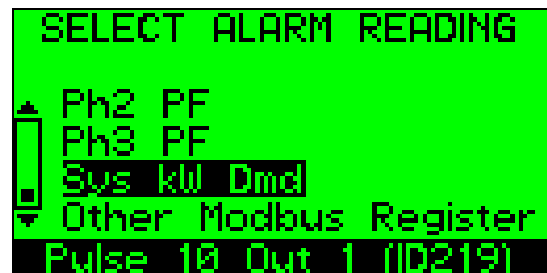
If the desired register is not in the list select Other Modbus Register and enter the register address manually. Ensure the register is available on the unit with the associated Modbus ID.

5.2.4 Set Alternative Alarm Parameter

Choose Other Modbus Register

Enter Register Entry Menu

```
SELECT ALARM READING

Ph2 PF
Ph3 PF
Sys kW Dmd
Other Modbus Register
Pulse 10 Out 1 (ID219)
```

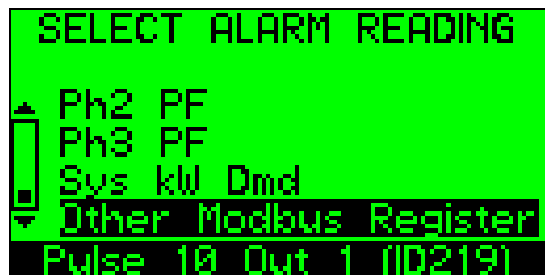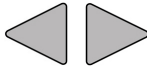|		
Edit Digit	△ ▽	ENTER TARGET REG ☐726 [OK] [ESC]
Choose Digit or Button	◁ ▷	
Accept or Decline Value	↵	ENTER TARGET REG 7726 [OK] [ESC]

If the desired register is not in the list, no specific phase will be attributed to the relay and so only the Modbus ID will be shown for the load. The values shown for a register not in the alarm parameter list will be without any scaling as it is read from the modbus register. Alarm set points will have to be in the same unscaled format and the values selected accordingly.

5.2.5 No Load Identified For Alternative Alarm Parameter

No Phase Associated With Register – Load Reverts To Modbus ID	PULSE OUTPUT Output Number 1 N/O No Load ID201 Alarm on reg 7726 Back Pulse 10 Out 1 (ID219)
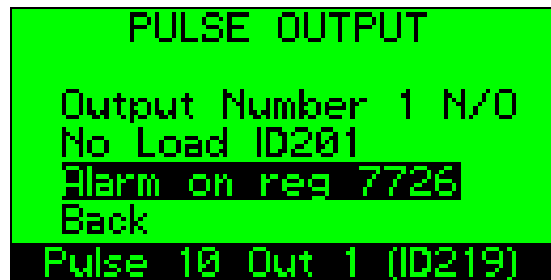
5.3 Alarm Levels

Each Alarm features High and/or Low settings with hysteresis. The levels can be in the range -32768 to 32767 (signed 16 bit numbers), except for some of the registers selected from the alarm parameter list that have known ranges. The high alarm trigger level must be above the low alarm trigger level. The high alarm reset level must not be higher than the high alarm trigger level and must be higher than the low alarm trigger level. The low alarm reset level must not be lower than the low alarm trigger level and must be lower than the high alarm trigger level.

5.3.1 Alarm Set Points
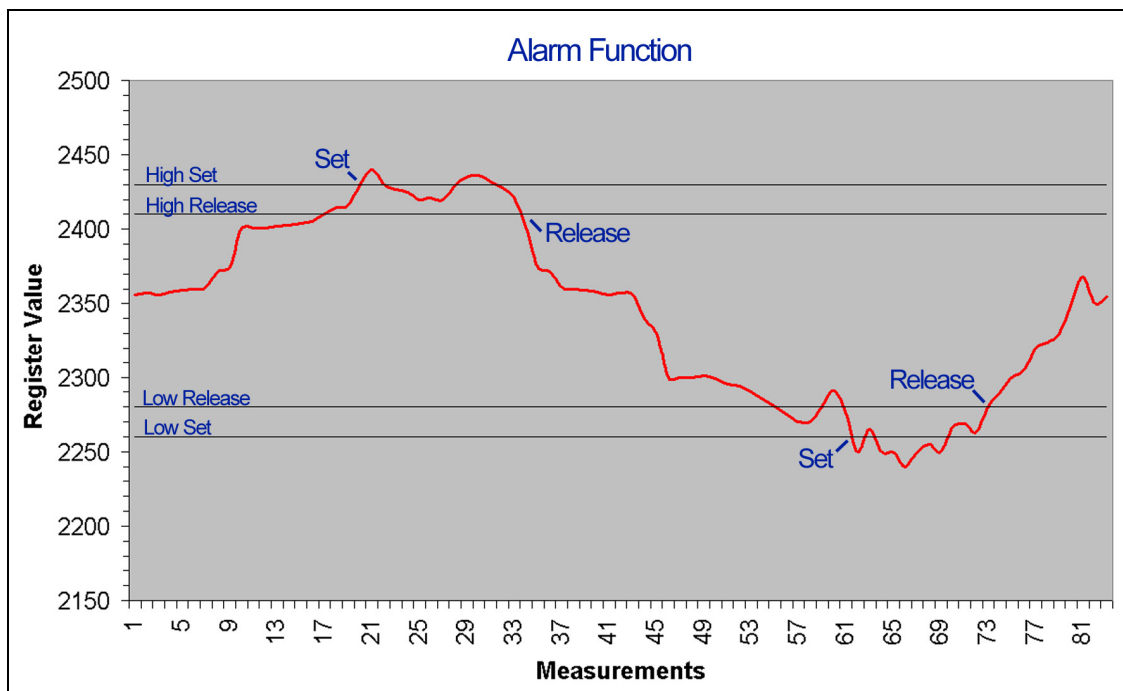
Set Delay – The consecutive period of time a *High Set* or *Low Set* point must be exceeded before an alarm output is ON. Alarms are released on detecting a release condition with no delay.

High Set Point – If the value in the selected Modbus register exceeds this value for a time period greater than the *Set Delay* the alarm is set (switched ON).

High Release Point – If the alarm is ON and the value in the selected Modbus register is lower than this value, for a single measurement period (1 second) the alarm is released (switched OFF).

Low Set Point – If the value in the selected Modbus register is lower than this value for a time period greater than the *Set Delay* the alarm is set (Switched ON).

Low Release Point – If the alarm is *Set Low* and the value in the selected Modbus register exceeds this value, for a single measurement period (1 second) the alarm is released (switched OFF).
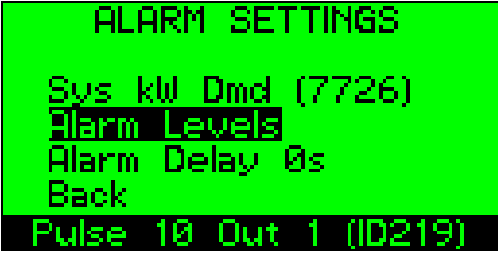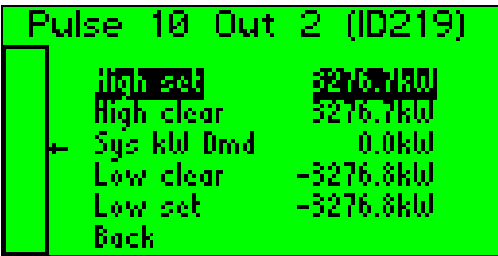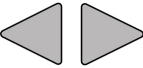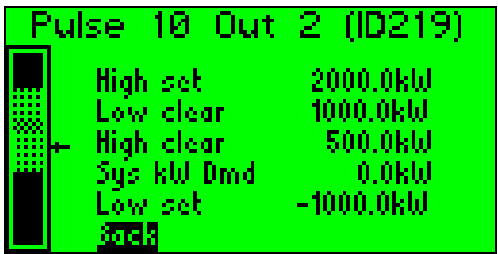
The Alarm Level Menu shows an ordered list of the level settings and the current value of the target parameter with values reducing from high to low. A bar at the side of the values shows the relative relationships between the settings. The areas above the high trigger level and below the low trigger setting are in black. The areas between the trigger levels and their respective reset points are shaded. If the reset points overlap, darker shading is employed. The current value of the target register is indicated by an arrow.

The scaling of the register value is the same as that provided over the Modbus link. A phase voltage display of 240.0 and a scale value of 2, for example would be represented by a Modbus register value of 2400. If the associated register is not recognised as one of the parameters in the lists then no scaling is performed.

5.3.2 Set Alarm Levels

Choose Alarm Levels	▲ ▼	ALARM SETTINGS Sys kW Dmd (7726) **Alarm Levels** Alarm Delay 0s Back **Pulse 10 Out 1 (ID219)**
Enter Alarm Levels Menu	↵	
Choose Level of Alarm	▲ ▼	Pulse 10 Out 2 (ID219) **High set 3276.7kW** High clear 3276.7kW ← Sys kW Dmd 0.0kW Low clear -3276.8kW Low set -3276.8kW Back
Edit Alarm Level	◀ ▶	
Choose Back	▲ ▼	Pulse 10 Out 2 (ID219) High set 2000.0kW Low clear 1000.0kW ← High clear 500.0kW Sys kW Dmd 0.0kW Low set -1000.0kW **Back**
Accept Values & Exit Menu	↵	

Note: The values shown are for illustrative purposes only and do not reflect those obtained from a real system.

5.4 Alarm Delay

An optional delay can be placed on an alarm condition to ensure it is valid for a set number of seconds. The first occurrence of an alarm condition will initiate the delay count for the set period. The alarm condition must be present for the complete duration of the delay period and the alarm will then trigger at the end of that period. If the alarm condition reverts to not being present, the delay count is reset and the alarm is not triggered.

5.4.1 Set Alarm Delay

Choose Alarm Delay

Edit Delay Period

```
     ALARM SETTINGS

  Sys kW Dmd (7726)
  Alarm Levels
  Alarm Delay 0s
  Back
   Pulse 10 Out 1 (ID219)
```
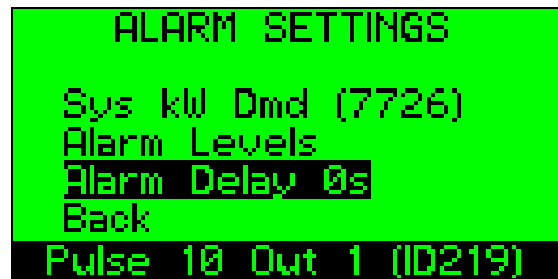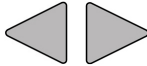
6 Pulse Output Test

6.1 Pulse Output Test Mode

Functions are included to test the operation of the outputs. When a pulse output module is selected for testing normal operation of that module is suspended.

6.1.1 Enter/Exit Pulse Output Test Mode

Enter Setup Mode	↵		*Hold Setup Keys for 5 Seconds*

Select Test Mode from the Main Menu	△ ▽	**SETUP MAIN** System Name Meters Pulse Output **Test Mode**
Enter Test Mode	↵	
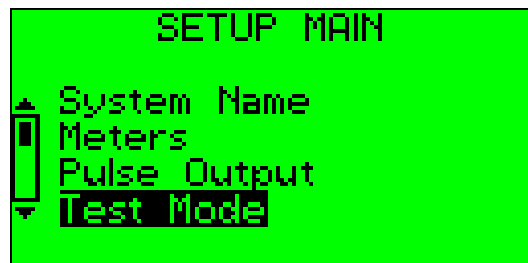
Select Pulse Output Test	△ ▽	**TESTS** Connection Test Meter Communications **Pulse Output Tests** Modbus Test **Test Pulses & Alarms**
Enter Pulse Output Test Mode	↵	
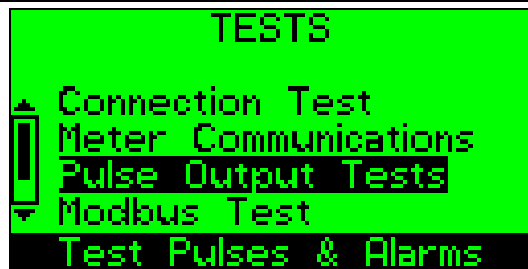
Select Pulse Output Module	▮	**PULSE OUTPUT TESTS** Test All **1 Pulse Count 0** 2 Alrm Lvl 0 OK 3 Pulse Count 0 **Pulse 10 Out 1 (10219**
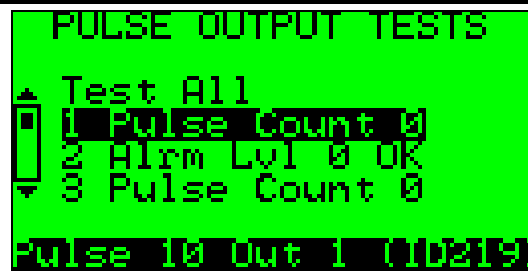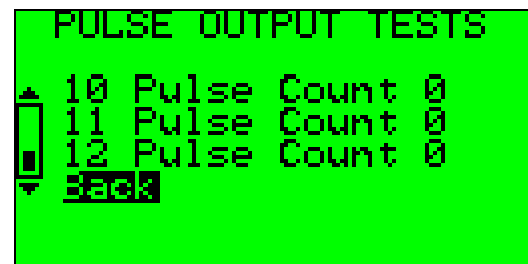
Select Back	△ ▽	**PULSE OUTPUT TESTS** 10 Pulse Count 0 11 Pulse Count 0 12 Pulse Count 0 **Back**
Exit Pulse Output Test Mode	↵	
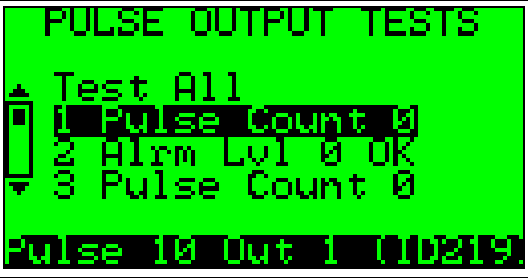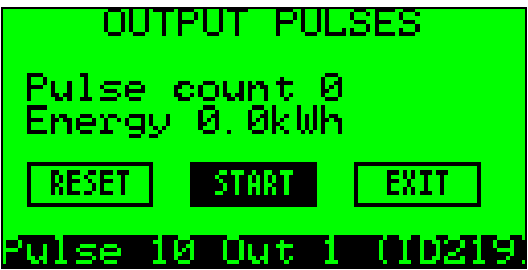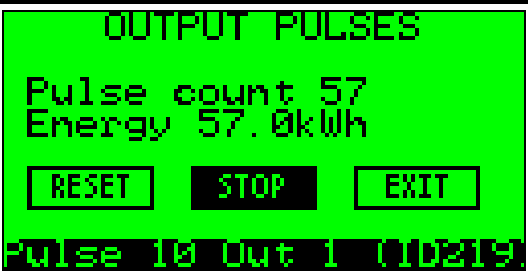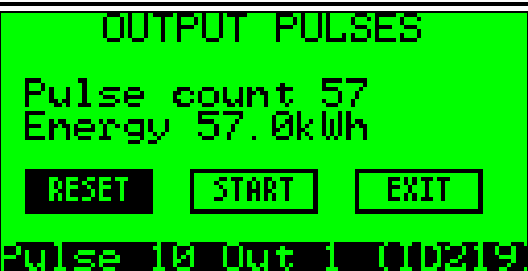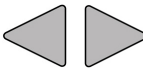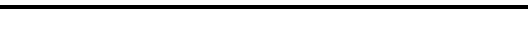
6.2 Pulse Output Count

An output channel that is set to pulse will show the current count for that channel. Once started the count will increase by 1 every second. For every count a pulse is triggered on the associated terminal of the channel according to the channel's settings.

The count is shown on the display along with energy that would be accumulated over the period, according the current settings. The count can be started, stopped and reset. No change is made to the target parameter. On exit of the channel's pulse count menu a running count will continue to increment.

Selecting another pulse module or exiting the pulse module test menus will end all tests on the current module and will return it to regular operation.

6.2.1 Set Pulses Counting

In Pulse Output Test Mode Select A Pulse Output Channel **Enter Pulse Channel Test Menu**	△ ▽ ↵	PULSE OUTPUT TESTS ▲ Test All 1 Pulse Count 0 2 Alrm Lvl 0 OK ▼ 3 Pulse Count 0 Pulse 10 Out 1 (10219)
Start a Pulse Channel Count	↵	OUTPUT PULSES Pulse count 0 Energy 0.0kWh [RESET] [START] [EXIT] Pulse 10 Out 1 (10219)
Stop a Pulse Channel Count	↵	OUTPUT PULSES Pulse count 57 Energy 57.0kWh [RESET] [STOP] [EXIT] Pulse 10 Out 1 (10219)
Select Reset Count **Reset Pulse Channel Count**	◁ ▷ ↵	OUTPUT PULSES Pulse count 57 Energy 57.0kWh [RESET] [START] [EXIT] Pulse 10 Out 1 (10219)
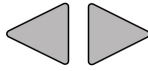
Select Start Count	◁ ▷	OUTPUT PULSES Pulse count 0 Energy 0.0kWh [RESET] [START] [EXIT] Pulse 10 Out 1 (10219)
Start a New Pulse Channel Count	↵	
Select Exit	◁ ▷	OUTPUT PULSES Pulse count 25 Energy 25.0kWh [RESET] [STOP] [EXIT] Pulse 10 Out 1 (10219)
Exit Pulse Channel Test Menu	↵	
Pulses Keep Counting		PULSE OUTPUT TESTS Test All 1 Pulse Count 28 2 Alrm Lvl 0 OK 3 Pulse Count 0 Pulse 10 Out 1 (10219)
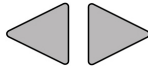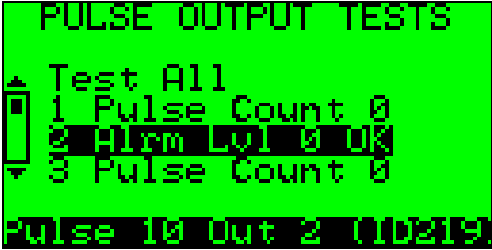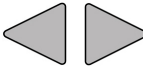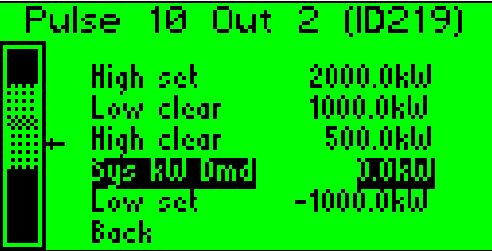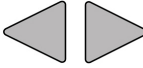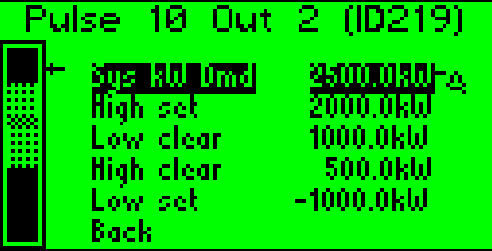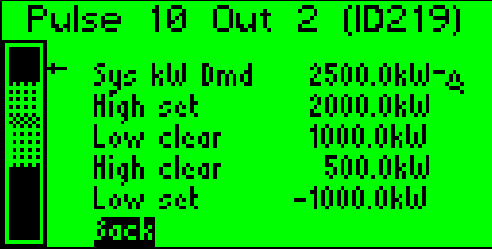
6.3 Alarm Level

An output channel that is set to alarm will show the current set input value and the alarm status of that channel. Entering the alarm test menu shows the alarm levels that have been set and the current value of the test value. The levels are ordered high to low down the screen.

The test value can be adjusted up and down, to check the alarm level outputs. A bell icon appears when the channel is in alarm using a small bar to indicate if the alarm is high or low. No change is made to the target parameter while the test value is adjusted.
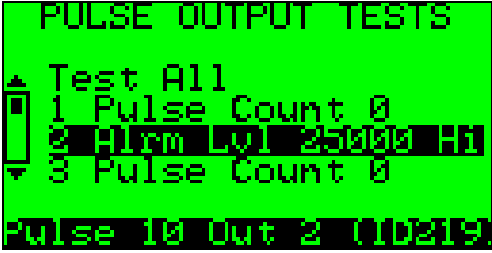
6.3.1 Change Alarm Test Level

In Pulse Output Test Mode Select An Alarm Output Channel **Enter Alarm Channel Test Menu**	△ ▽ ↵	PULSE OUTPUT TESTS Test All 1 Pulse Count 0 2 Alrm Lvl 0 OK 3 Pulse Count 0 Pulse 10 Out 2 (ID219)
Set Test Value	◁ ▷	Pulse 10 Out 2 (ID219) High set 2000.0kW Low clear 1000.0kW High clear 500.0kW Sys kW Dmd 0.0kW Low set -1000.0kW Back
Set Test Value	◁ ▷	Pulse 10 Out 2 (ID219) Sys kW Dmd 2500.0kW-△ High set 2000.0kW Low clear 1000.0kW High clear 500.0kW Low set -1000.0kW Back
Select Back **Exit Alarm Channel Test Menu**	△ ▽ ↵	Pulse 10 Out 2 (ID219) Sys kW Dmd 2500.0kW-△ High set 2000.0kW Low clear 1000.0kW High clear 500.0kW Low set -1000.0kW Back

Test Value & Alarm Status Shown

```
PULSE OUTPUT TESTS
  Test All
1 Pulse Count 0
2 Alrm Lvl 25000 Hi
3 Pulse Count 0

Pulse 10 Out 2 (ID219)
```

6.4 Test All

For a quick method to test the pulse module outputs a test all selection is included. When any of the channels set to pulse are not currently counting the display will show **"Test All"**. Selecting this will reset all pulse counters and start those counters not currently running and output a pulse every second on those channels set to pulse.

The alarm levels of any channels set to alarm will also be set to the maximum value. If the high alarm set level is below this value the channel output will be triggered for the period of the test. While all channels set to pulse are counting the display will show **"Stop All Tests"**. Selecting this will cease all pulse counting and return the alarm test levels to the value of their target parameter.

6.4.1 Testing All

In Pulse Output Test Mode Select Test All **Reset Counts & Start Tests**	▲ ▼ ↵	PULSE OUTPUT TESTS Test All 1 Pulse Count 0 2 Alrm Lvl 0 OK 3 Pulse Count 0 Pulse 10 (10219)
Stop Tests	↵	PULSE OUTPUT TESTS Stop All Tests 1 Pulse Count 7 2 Alrm Lvl 32767 Hi 3 Pulse Count 7 Pulse 10 (10219)
Counts Remain Static		PULSE OUTPUT TESTS Test All 1 Pulse Count 22 2 Alrm Lvl 0 OK 3 Pulse Count 22 Pulse 10 (10219)

6.5 Modbus Access to Pulse/Alarm Settings

Modbus access to the Pulse Output Modules is only available using their individual Modbus IDs. The settings of each individual relay is arranged as follows:

6.5.1 Modbus Table 25 Pulse Module Settings

Data address	Modbus Register	Pulse Output	Offset	Contents	Format	Access
6400	46401		0	Associated Parameter	Unsigned Integer	Read/Write
6401	46402		1	Associated Slave ID	Unsigned Integer	Read/Write
6402	46403		2	Output Direction	Unsigned Integer	Read/Write
6403	46404		3	Pulse ON Time	Unsigned Integer	Read/Write
6404	46405		4	Pulse Rate	Unsigned Integer	Read/Write
6405	46406	1	5	Alarm High Set Point	Signed Integer	Read/Write
6406	46407		6	Alarm High Release Point	Signed Integer	Read/Write
6407	46408		7	Alarm Low Release Point	Signed Integer	Read/Write
6408	46409		8	Alarm Low Set Point	Signed Integer	Read/Write
6409	46410		9	Alarm Set Delay (Seconds)	Signed Integer	Read/Write
6410	46411		10	Alarm Status	Signed Integer	Read Only
6411	46412		11	Alarm Parameter Value	Signed Integer	Read Only
6412	46413		0	Associated Parameter	Unsigned Integer	Read/Write
6413	46414		1	Associated Slave ID	Unsigned Integer	Read/Write
6414	46415		2	Output Direction	Unsigned Integer	Read/Write
6415	46416		3	Pulse ON Time	Unsigned Integer	Read/Write
6416	46417		4	Pulse Rate	Unsigned Integer	Read/Write
6417	46418	2	5	Alarm High Set Point	Signed Integer	Read/Write
6418	46419		6	Alarm High Release Point	Signed Integer	Read/Write
6419	46420		7	Alarm Low Release Point	Signed Integer	Read/Write
6420	46421		8	Alarm Low Set Point	Signed Integer	Read/Write
6421	46422		9	Alarm Set Delay (Seconds)	Signed Integer	Read/Write
6422	46423		10	Alarm Status	Signed Integer	Read Only
6423	46424		11	Alarm Parameter Value	Signed Integer	Read Only
6424	46425		0	Associated Parameter	Unsigned Integer	Read/Write
6425	46426		1	Associated Slave ID	Unsigned Integer	Read/Write
6426	46427		2	Output Direction	Unsigned Integer	Read/Write
6427	46428		3	Pulse ON Time	Unsigned Integer	Read/Write
6428	46429		4	Pulse Rate	Unsigned Integer	Read/Write
6429	46430	3	5	Alarm High Set Point	Signed Integer	Read/Write
6430	46431		6	Alarm High Release Point	Signed Integer	Read/Write
6431	46432		7	Alarm Low Release Point	Signed Integer	Read/Write
6432	46433		8	Alarm Low Set Point	Signed Integer	Read/Write
6433	46434		9	Alarm Set Delay (Seconds)	Signed Integer	Read/Write
6434	46435		10	Alarm Status	Signed Integer	Read Only
6435	46436		11	Alarm Parameter Value	Signed Integer	Read Only

6436	46437		0	Associated Parameter	Unsigned Integer	Read/Write
6437	46438		1	Associated Slave ID	Unsigned Integer	Read/Write
6438	46439		2	Output Direction	Unsigned Integer	Read/Write
6439	46440		3	Pulse ON Time	Unsigned Integer	Read/Write
6440	46441		4	Pulse Rate	Unsigned Integer	Read/Write
6441	46442		5	Alarm High Set Point	Signed Integer	Read/Write
6442	46443	4	6	Alarm High Release Point	Signed Integer	Read/Write
6443	46444		7	Alarm Low Release Point	Signed Integer	Read/Write
6444	46445		8	Alarm Low Set Point	Signed Integer	Read/Write
6445	46446		9	Alarm Set Delay (Seconds)	Signed Integer	Read/Write
6446	46447		10	Alarm Status	Signed Integer	Read Only
6447	46448		11	Alarm Parameter Value	Signed Integer	Read Only
6448	46449		0	Associated Parameter	Unsigned Integer	Read/Write
6449	46450		1	Associated Slave ID	Unsigned Integer	Read/Write
6450	46451		2	Output Direction	Unsigned Integer	Read/Write
6451	46452		3	Pulse ON Time	Unsigned Integer	Read/Write
6452	46453		4	Pulse Rate	Unsigned Integer	Read/Write
6453	46454		5	Alarm High Set Point	Signed Integer	Read/Write
6454	46455	5	6	Alarm High Release Point	Signed Integer	Read/Write
6455	46456		7	Alarm Low Release Point	Signed Integer	Read/Write
6456	46457		8	Alarm Low Set Point	Signed Integer	Read/Write
6457	46458		9	Alarm Set Delay (Seconds)	Signed Integer	Read/Write
6458	46459		10	Alarm Status	Signed Integer	Read Only
6459	46460		11	Alarm Parameter Value	Signed Integer	Read Only
6460	46461		0	Associated Parameter	Unsigned Integer	Read/Write
6461	46462		1	Associated Slave ID	Unsigned Integer	Read/Write
6462	46463		2	Output Direction	Unsigned Integer	Read/Write
6463	46464		3	Pulse ON Time	Unsigned Integer	Read/Write
6464	46465		4	Pulse Rate	Unsigned Integer	Read/Write
6465	46466		5	Alarm High Set Point	Signed Integer	Read/Write
6466	46467	6	6	Alarm High Release Point	Signed Integer	Read/Write
6467	46468		7	Alarm Low Release Point	Signed Integer	Read/Write
6468	46469		8	Alarm Low Set Point	Signed Integer	Read/Write
6469	46470		9	Alarm Set Delay (Seconds)	Signed Integer	Read/Write
6470	46471		10	Alarm Status	Signed Integer	Read Only
6471	46472		11	Alarm Parameter Value	Signed Integer	Read Only

6472	46473		0	Associated Parameter	Unsigned Integer	Read/Write
6473	46474		1	Associated Slave ID	Unsigned Integer	Read/Write
6474	46475		2	Output Direction	Unsigned Integer	Read/Write
6475	46476		3	Pulse ON Time	Unsigned Integer	Read/Write
6476	46477		4	Pulse Rate	Unsigned Integer	Read/Write
6477	46478	7	5	Alarm High Set Point	Signed Integer	Read/Write
6478	46479		6	Alarm High Release Point	Signed Integer	Read/Write
6479	46480		7	Alarm Low Release Point	Signed Integer	Read/Write
6480	46481		8	Alarm Low Set Point	Signed Integer	Read/Write
6481	46482		9	Alarm Set Delay (Seconds)	Signed Integer	Read/Write
6482	46483		10	Alarm Status	Signed Integer	Read Only
6483	46484		11	Alarm Parameter Value	Signed Integer	Read Only
6484	46485		0	Associated Parameter	Unsigned Integer	Read/Write
6485	46486		1	Associated Slave ID	Unsigned Integer	Read/Write
6486	46487		2	Output Direction	Unsigned Integer	Read/Write
6487	46488		3	Pulse ON Time	Unsigned Integer	Read/Write
6488	46489		4	Pulse Rate	Unsigned Integer	Read/Write
6489	46490	8	5	Alarm High Set Point	Signed Integer	Read/Write
6490	46491		6	Alarm High Release Point	Signed Integer	Read/Write
6491	46492		7	Alarm Low Release Point	Signed Integer	Read/Write
6492	46493		8	Alarm Low Set Point	Signed Integer	Read/Write
6493	46494		9	Alarm Set Delay (Seconds)	Signed Integer	Read/Write
6494	46495		10	Alarm Status	Signed Integer	Read Only
6495	46496		11	Alarm Parameter Value	Signed Integer	Read Only
6496	46497		0	Associated Parameter	Unsigned Integer	Read/Write
6497	46498		1	Associated Slave ID	Unsigned Integer	Read/Write
6498	46499		2	Output Direction	Unsigned Integer	Read/Write
6499	46500		3	Pulse ON Time	Unsigned Integer	Read/Write
6500	46501		4	Pulse Rate	Unsigned Integer	Read/Write
6501	46502	9	5	Alarm High Set Point	Signed Integer	Read/Write
6502	46503		6	Alarm High Release Point	Signed Integer	Read/Write
6503	46504		7	Alarm Low Release Point	Signed Integer	Read/Write
6504	46505		8	Alarm Low Set Point	Signed Integer	Read/Write
6505	46506		9	Alarm Set Delay (Seconds)	Signed Integer	Read/Write
6506	46507		10	Alarm Status	Signed Integer	Read Only
6507	46508		11	Alarm Parameter Value	Signed Integer	Read Only

6508	46509		0	Associated Parameter	Unsigned Integer	Read/Write
6509	46510		1	Associated Slave ID	Unsigned Integer	Read/Write
6510	46511		2	Output Direction	Unsigned Integer	Read/Write
6511	46512		3	Pulse ON Time	Unsigned Integer	Read/Write
6512	46513		4	Pulse Rate	Unsigned Integer	Read/Write
6513	46514	10	5	Alarm High Set Point	Signed Integer	Read/Write
6514	46515		6	Alarm High Release Point	Signed Integer	Read/Write
6515	46516		7	Alarm Low Release Point	Signed Integer	Read/Write
6516	46517		8	Alarm Low Set Point	Signed Integer	Read/Write
6517	46518		9	Alarm Set Delay (Seconds)	Signed Integer	Read/Write
6518	46519		10	Alarm Status	Signed Integer	Read Only
6519	46520		11	Alarm Parameter Value	Signed Integer	Read Only
6520	46521		0	Associated Parameter	Unsigned Integer	Read/Write
6521	46522		1	Associated Slave ID	Unsigned Integer	Read/Write
6522	46523		2	Output Direction	Unsigned Integer	Read/Write
6523	46524		3	Pulse ON Time	Unsigned Integer	Read/Write
6524	46525		4	Pulse Rate	Unsigned Integer	Read/Write
6525	46526	11	5	Alarm High Set Point	Signed Integer	Read/Write
6526	46527		6	Alarm High Release Point	Signed Integer	Read/Write
6527	46528		7	Alarm Low Release Point	Signed Integer	Read/Write
6528	46529		8	Alarm Low Set Point	Signed Integer	Read/Write
6529	46530		9	Alarm Set Delay (Seconds)	Signed Integer	Read/Write
6530	46531		10	Alarm Status	Signed Integer	Read Only
6531	46532		11	Alarm Parameter Value	Signed Integer	Read Only
6532	46533		0	Associated Parameter	Unsigned Integer	Read/Write
6533	46534		1	Associated Slave ID	Unsigned Integer	Read/Write
6534	46535		2	Output Direction	Unsigned Integer	Read/Write
6535	46536		3	Pulse ON Time	Unsigned Integer	Read/Write
6536	46537		4	Pulse Rate	Unsigned Integer	Read/Write
6537	46538	12	5	Alarm High Set Point	Signed Integer	Read/Write
6538	46539		6	Alarm High Release Point	Signed Integer	Read/Write
6539	46540		7	Alarm Low Release Point	Signed Integer	Read/Write
6540	46541		8	Alarm Low Set Point	Signed Integer	Read/Write
6541	46542		9	Alarm Set Delay (Seconds)	Signed Integer	Read/Write
6542	46543		10	Alarm Status	Signed Integer	Read Only
6543	46544		11	Alarm Parameter Value	Signed Integer	Read Only

6.6 Associated Parameter

To associate a measured parameter with a pulse output, write the associated parameter value from the list in section 4.1.1 in this field. For example: By writing 1 to Table 25 register 46401, this will configure Output 1 to Pulse with changes in System kWh measured by the Slave Module which has the Modbus ID set in register 46402.

To associate a measured parameter with an alarm output, write its Modbus Data Address from the list in section 5.2 in this field. For example: By Writing 7705 to Table 25 register 46401, this will configure Output 1 as an Alarm associated with System kW measured by the Slave Module which has the Modbus ID set in register 46402. The actual instantaneous System kW from this slave will then be copied to Modbus register 46412 for reference.

The **multicube** instantaneous parameters are updated once a second. Each new measurement value provides a true rms reading, which takes account of all short-term fluctuations and transient behaviour during that second. Alarm inputs reflect these values and therefore outputs react at the end of each second to the rms values and not to transients.

6.7 Associated Slave ID

To select a meter to compare an associated parameter for pulsing or alarming, write the Modbus ID of the meter in this field. For example: in a system where the display unit has a Modbus ID of 1, the first meter is given the address of 2. Writing this value to register 46402 in Table 25 will set Output 1 to use a register from meter 1. To act upon a register contained in the display unit or even a pulse unit, use their respective Modbus ID's.

6.8 Output Direction

Set a 1 in this field to enable the corresponding relay to be a normally closed contactor. The default zero will enable the corresponding relay to be normally open.

6.9 Pulse Settings

When the relay is set to pulse, the pulse on time field contains the duration of the pulse, where 1 = 0.1 seconds.

When the relay is set to pulse, the pulse rate field contains the duration number of increments of the target parameter before a pulse is issued. Equipment monitoring the number of pulses will be able to multiply by this value to obtain the original change in parameter.

When the relay is set to alarm these fields will show zero and will be read only.

6.10 Alarm Settings

When the relay is set to alarm, the alarm high set point field contains the level above which the set parameter value has to rise in order to trigger a high alarm. The alarm high reset point field contains the level below which the set parameter value has to fall in order to cease a high alarm that is in operation.

When the relay is set to alarm, the alarm low set point field contains the level below which the set parameter value has to fall in order to trigger a low alarm. The alarm low reset point field contains the level above which the set parameter value has to rise in order to cease a low alarm that is in operation. The alarm trigger points are input as the raw, unscaled values such as those read in the instantaneous Modbus tables.

When the relay is set to alarm, the set delay field contains the number of seconds an alarm condition must exist before an alarm is triggered.

When the relay is set to pulse these fields will show zero and will be read only.

6.11 Alarm Status

Each Alarm status is available at a Modbus register as:

0 = Alarm Released (OFF)

1 = Alarm Set (ON) High Alarm Condition

2 = Alarm Set (ON) Low Alarm Condition

When the relay is set to pulse this field will show zero and be read only.

6.12 Alarm Parameter Value

The instantaneous measured value associated with the alarm is copied here from the selected slave Modbus data table so that it may be read along with the other alarm data. This value will be updated each second as the load (or measured parameter) varies. When the relay is set to pulse this field will show zero.

7 Specification

7.1.1 Pulse Output Module Specifications

ENVIRONMENT		
Temperature	Operating	-10°C to +55°C
	Storage	-25°C to +70°C
Humidity	< 75% non-condensing	
Environment	IP54 standard	

MECHANICAL		
Enclosure	Material: Black ABS UL 94-V0	
Dimensions	Height :	164mm
	Depth: (Off Wall)	96mm
	Length:	29mm

SAFETY	
Conforms to	EN 61010-1 Installation Category III

POWER SUPPLY		
DC Power From Master Display	DC Power Supply:	3.3V DC
	Maximum Load Per Module :	150 mW

PULSE OUTPUTS	
Function	12 x 1 Pulse per unit of energy or High/Low level Alarm
Scaling	Settable between 1 & 1000 counts of kWh/kvarh registers
Pulse Period	0.1 sec. default; Settable between 0.1 and 1 sec
Rise & Fall Time	< 2.0ms
Type	Settable N/O-N/C Volt free contact. Optically isolated BiFET
Contacts	100mA ac/dc max., 100V ac/dc max. 5W Max Load
Isolation	2.5kV 50Hz 1 minute