multitek

MULTIDIN

M800-MD
OPERATING
MANUAL

CONTENTS

Revision 3

Date 3-4-1998

1.1 General

The MultiDin M800 is a compact 96 x 96 mm Din case 3 phase power meter, with the ability to measure Volts, Amps, Frequency, Active Power, Reactive Power, Apparent Power, Active Energy, Reactive Energy and Power Factor.

Power Systems :-

	Product code
Single Phase	***M800-MD1***
3 Phase 3 wire unbalanced load	***M800-MD4***
3 Phase 4 wire unbalanced load	***M800-MD9***

The MultiDin is designed to be user friendly and simple to use. All operations are controlled by the two push buttons  ***&***  ***on the front of the M800.***

All necessary programming is also carried out via the front two control buttons. The MultiDin units are fully programmed by the factory and no further programming is necessary. If required, the User can reprogram parameters to individual requirements, such as the nominal current and voltage inputs, relay output etc. These programming operations are covered in this manual (see section 4).

The MultiDin uses a high speed microprocessor and analogue to digital conversion circuitry. Each phase current and voltage is measured continuously and all other parameters are derived from these measurements in the software. Voltage and current measurements are true RMS.

1.2 Memory

All data including energy registers, current and voltage ratios and the calibration data is stored in a non volatile e^2prom memory. In power down (power loss) conditions all the information is retained. The e^2prom requires no battery or other circuitry to maintain the stored data.

1.3 Relay Output

The relay output provides a pulse output corresponding to either Watt hour (W.h, kW.h or MW.h) or VAr hour (VAr.h, kVAr.h or MVAr.h) consumption. The relay can be assigned to either Watt hour or VAr hour (see programming section 4.3.1).

The MultiDin automatically calculates the pulse rate and whether the units are W.h, kW.h or MW.h (VAr.h, kVAr.h or MVAr.h) from the nominal voltage and current inputs.

The relay is a normally open contact. Every time the MultiDin registers a Watt hour or VAr hour reading the relay closes.

Pulse widths can be programmed into the MultiDin, between 20 msec and 200 msec in steps of 20 msec. (see section 4.3.3).

1.4 Communications

The MultiDin has the option of providing RS232 output of all measured parameters. The RS232 output is via two terminals at the rear of the instrument. The RS232 allows the MultiDin to be connected to a standard serial communication port, for example on a host computer, data logger PLC etc.

2. OPERATION

The MultiDin is designed to be user friendly and simple to use.

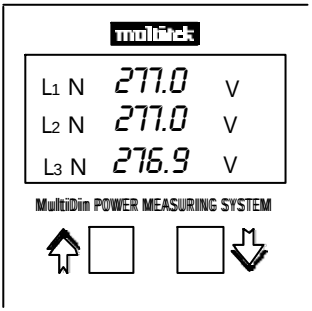
There are only two control buttons on the front of the instrument. All MultiDins are fully programmed by the factory. The MultiDin is ready for use once it has been installed (see section 5) and connected to the system that's to be measured (see section 6) and power applied. The Right Hand  ***button scrolls down through the Display Screens and Left Hand***  ***button scrolls up through the Display Screens. See section 3 for display screen options.***

The two front control buttons are also used to program the MultiDin (see section 4) and for calibration (see section 7).

3. DISPLAY SCREENS

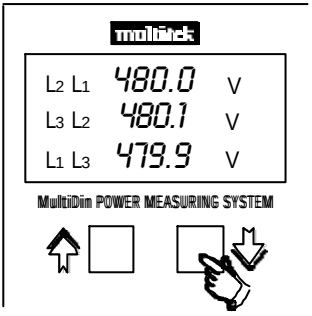
3.1 The MultiDin can be programmed for either single phase, 3 phase 3 wire unbalanced load or 3 phase 4 wire unbalanced load. The sequence of the parameters displayed are dependant on the system that has been programmed into the MultiDin.

3.1.1 When the MultiDin is powered up the following screens are shown if the MultiDin has been programed for 3 phase 4 wire unbalanced :-



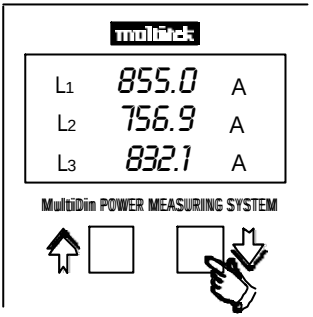
ACTION :
Switch on power

COMMENTS :
The MultiDin is programmed to 3 phase 4 wire unbalanced load. The first screen shows 3 phase line to neutral voltage.



ACTION :
Press ⇩

COMMENTS :
The second screen shows 3 phase line to line voltage L1/L2, L2/L3, L3/L1. If the ⇧ ***button is pressed the MultiDin goes back to the previous screen.***

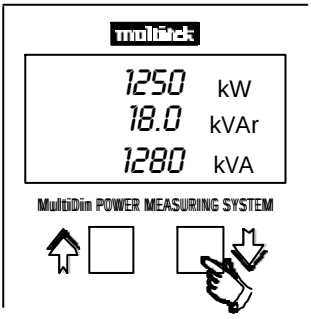


ACTION :

Press ⇩

COMMENTS :

The third screen shows 3 phase current L1, L2, L3. If the ⇧ button is pressed the MultiDin goes back to the previous screen.

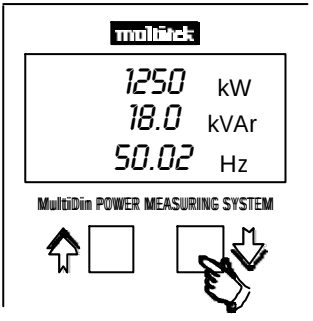


ACTION :

Press ⇩

COMMENTS :

The fourth screen shows total Watt, VAr and VA of the 3 phase system.

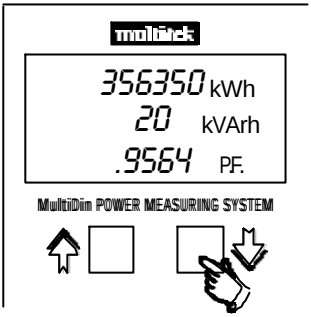


ACTION :

Press ⇩

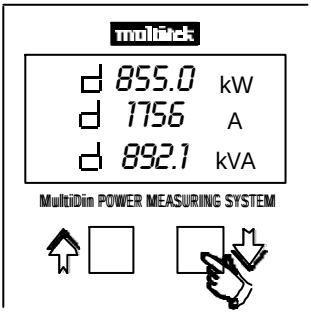
COMMENTS :

The fifth screen shows total Watt, VAr and Hz of the 3 phase system.



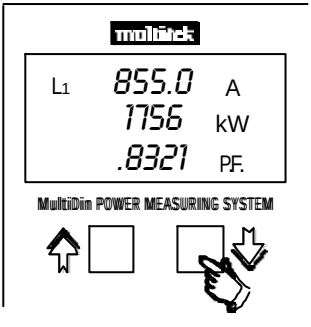
ACTION :
Press

COMMENTS :
The sixth screen shows total kW.h kVar.h and P.F. of the 3 phase system.



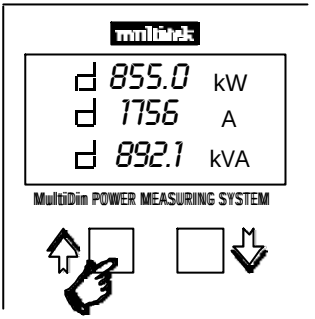
ACTION :
Press

COMMENTS :
The seventh screen shows the maximum demand for Watts, Amps and VA, of the system being measured.



ACTION :
Press

COMMENTS :
The eighth screen is the custom screen. This allows the user to define the 3 parameters to be displayed. (see programming section 4.1)



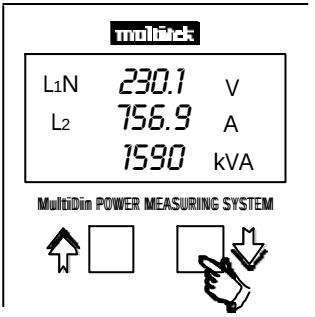
ACTION :
Press ⇧

COMMENTS :
Pressing ⇧ ***returns MultiDin to the previous screen.***

3.1.2 3 phase 3 wire unbalanced load screen sequence.

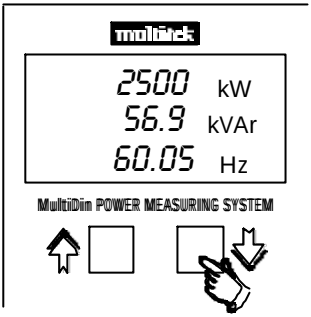
For 3 phase 3 wire systems the screen sequence is identical to the 3 phase 4 wire unbalanced load, as shown apart from the first screen where the voltage shown is the line to line voltage. The second screen is Amps (There is no line to neutral voltage shown)

3.1.3 Single phase screen sequence.



ACTION :
Press ⇩

COMMENTS :
The first screen in single phase set up, displays Volts, Amps, VA.

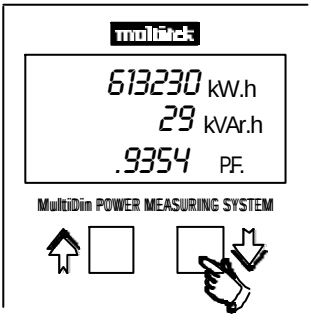


ACTION :

Press ⇩

COMMENTS :

The second screen shows Watts, Vars and Frequency.

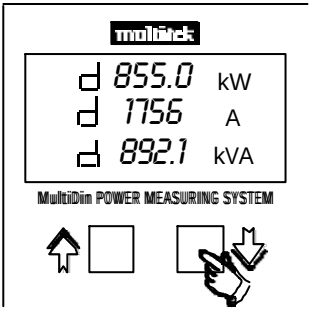


ACTION :

Press ⇩

COMMENTS :

The third screen shows Watt hour, Var hour and Power Factor.

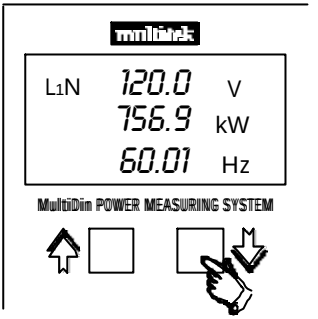


ACTION :

Press ⇩

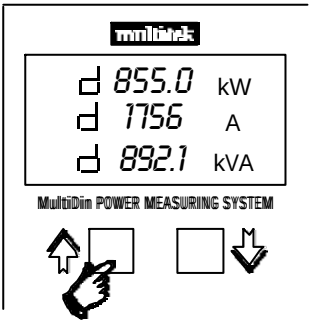
COMMENTS :

The fourth screen shows the maximum demand for Watts, Amps and VA, of the system being measured.



ACTION :
Press ⇩

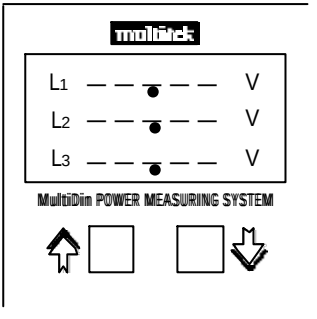
COMMENTS :
The fifth screen is the custom screen. This allows the user to define the 3 parameters to be displayed. (see programming section 4.1)



ACTION :
Press ⇧

COMMENTS :
Pressing ⇧ ***returns MultiDin to the previous screen.***

3.2 If the input measuring voltage and current signals are lost but the auxiliary supply is still present the MultiDin indicates this by displaying the following.



COMMENTS :
This indicates that measuring signals are not present but MultiDin is still functioning correctly. Check input signal condition and connections etc.

3.3 Export Watt and Var measurements

The MultiDin displays Export Watt and VAr readings by using the letter E in front of the Watt or VAr reading. e.g. E 1720 kW signifies 1720 kW is being exported from the load. E 3201 kVAr signifies 3201 kVAr is being exported from the load. No letter in front of Watt and VAr reading indicates importing.

3.4 Leading and Lagging Power Factor (Capacitive and Inductive loads).

3.4.1 Leading Power Factor.

A negative sign in front of the power factor reading indicates a Leading Power Factor. i.e. The current is leading, the load is capacitive. Example - .5000 P.F. indicates a Leading Power Factor of 0.5 (capacitive load).

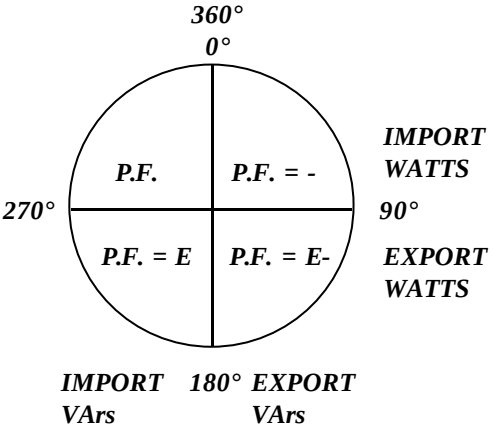
3.4.2 Lagging Power Factor.

No sign in front of the power factor reading indicates a Lagging Power Factor. i.e. The current is lagging, the load is inductive. Example 0.5000 P.F. Lagging Power Factor of 0.5 (inductive load).

3.4.3 Quadrant indication.

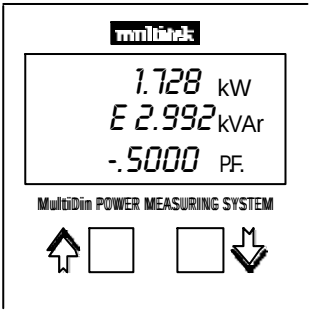
E in front of the power factor indicates power factor is in a negative quadrant. No letter indicates the power factor is in a positive quadrant.

3.4.4 Quadrant / Power Diagram



3.4.5 Examples of Import and Export Lag and Lead power factors.

3.4.5.1 Power factor at 0.5 lead (60deg).

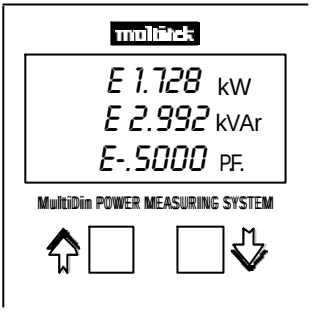


Line 1 = Importing kW

Line 2 = Exporting kVar

Line 3 = Leading Power Factor (capacitive load) in positive quadrant

3.4.5.2 Power factor at 0.5 lead (120 deg) negative quadrant.

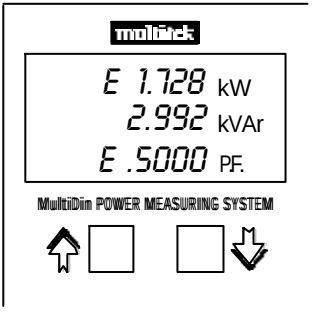


Line 1 = Exporting kW

Line 2 = Exporting kVAr

Line 3 = Leading Power Factor (capacitive load) in negative quadrant

3.4.5.3 Power Factor at 0.5 lag (240 deg) negative quadrant.

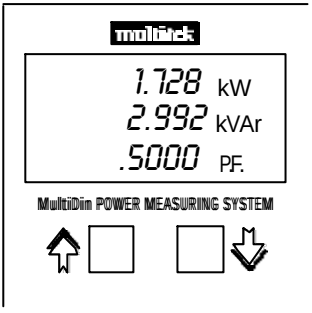


Line 1 = Exporting kW

Line 2 = Importing KVAr

Line 3 = Lagging Power Factor (inductive load) in negative quadrant

3.4.5.4 Power Factor at 0.5 lag (300 deg) positive quadrant.



Line 1 = Importing kW

Line 2 = Importing KVAr

Line 3 = Lagging Power Factor (inductive load) in positive quadrant

4. PROGRAMMING

All units are fully programmed by the factory but there are many features that can be programmed by the User to suit individual applications and needs.

Programmed values and parameters are stored in non volatile memory and are therefore retained in power down situations.

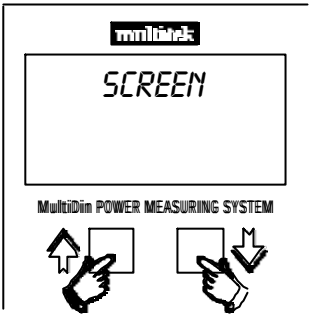
4.1 To enter the programming mode the two front buttons  ***&***  ***have to be pressed simultaneously and held for 5 seconds. The MultiDin now enters the screen setup mode and the display shows SCREEN. This mode allows the User to customise the display to specific parameter requirements, rather than using the standard parameters as shown in section 3. (If you do not wish to alter Screen page set up mode then Press***  ***again and the MultiDin display moves to the next programming mode :- SUPPLY set up).***

For example

Standard page	***Line 1 = L_1 N Volts***
	Line 2 = L_2 N Volts
	Line 3 = L_3 N Volts
Custom page	***Line 1 = L_1 Amps***
	Line 2 = Watts
	Line 3 = Power Factor

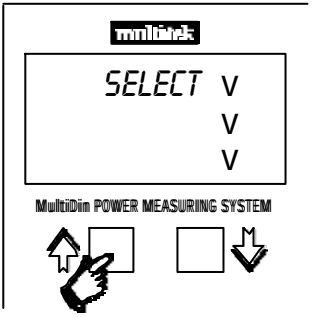
NOTE
When in programming mode if the control buttons are not used for more than 3 minutes the MultiDin returns to the measuring mode and displays the first screen.

4.1.2 Customising display



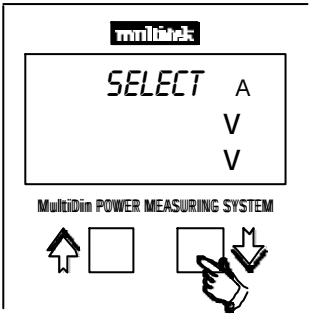
ACTION :
Press ⇧ & ⇩ simultaneously, and hold for 5 seconds

COMMENTS :
MultiDin is now in screen set up mode.



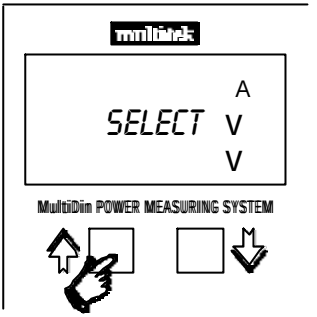
ACTION :
Press ⇧

COMMENTS :
Screen is now in set up mode for the 1st line.



ACTION :
Press ⇩

COMMENTS :
Pressing ⇩ scrolls through the different parameters options available on line 1. e.g. V, A, VA, VAr, W, W.h. When required parameter is displayed press ⇧

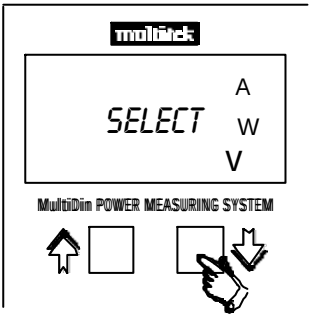


ACTION :

Press ⇧

COMMENTS :

Screen is now in set up mode for the 2nd line.

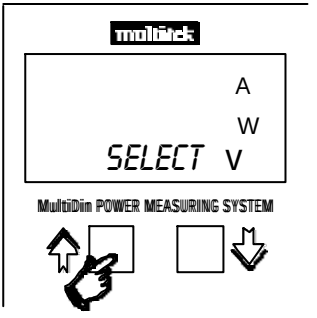


ACTION :

Press ⇩

COMMENTS :

Pressing ⇩ ***scrolls through the different parameter options available on line 2. e.g. V, A, VA, VAr, W, VAr.h. When required parameter is displayed press*** ⇧

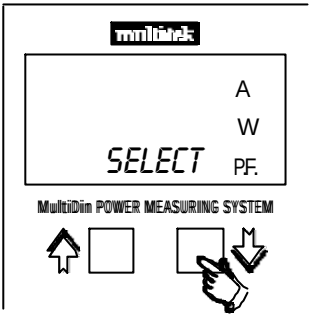


ACTION :

Press ⇧

COMMENTS :

Screen is now in set up mode for 3rd line.

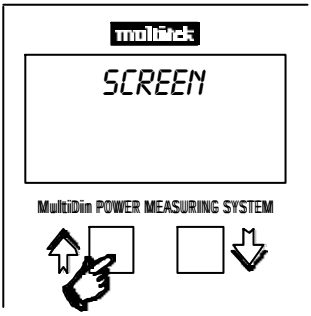


ACTION :

Press ⇩

COMMENTS :

Pressing ⇩ ***scrolls through the different parameter options available on line 3. e.g. V,A,Hz,P.F. When required parameter is displayed press*** ⇧



ACTION :

Press ⇧

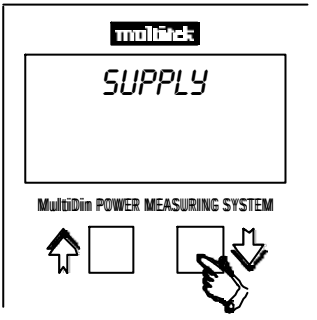
COMMENTS :

This indicates programming of customised screen is complete.

4.2 Programming of nominal voltage and current inputs and ratios. The SUPPLY programming mode allows the user to program the nominal voltage and current inputs and ratios. Please note the ratios can be changed as long as the secondary (the input to the MultiDin) stays as shown on the data label which is on the side of the product. For example if the MultiDin had been set by the factory to have a C.T. ratio 200/5A and the change required was for input C.T. ratio to be 500/5A this can achieved by program changes. But if the change required was for a C.T. ratio 500/1A then the unit would have to be returned to the factory or distributor to have the internal C.T. changed from 5A to 1A. The same applies to the voltage if the MultiDin input

voltage is 230 Volts L.N. then an external voltage transformer ratio can be programmed as long as the nominal input to the MultiDin remains at 230 Volts L.N.

4.2.1 Programming nominal voltage inputs.

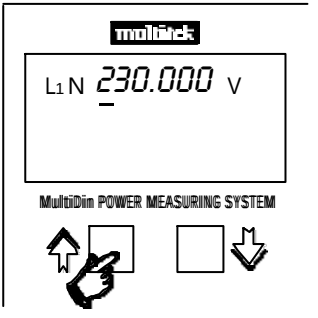


ACTION :

Press ⇩

COMMENTS :

MultitDin is now in supply set up mode.



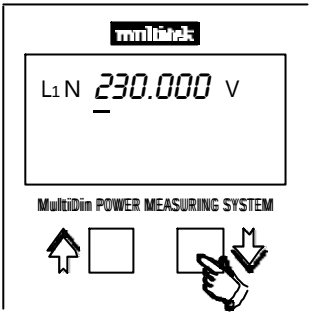
ACTION :

Press ⇧

COMMENTS :

Display shows nominal voltage programmed by the factory. In this example 230 volts L.N. The cursor flashes under the 1 st digit.

To change from 230 volts to for example 11kV :-

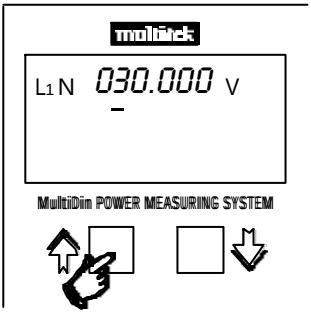


ACTION :

Press ⇩

COMMENTS :

Pressing ⇩ ***scrolls the digit with the cursor flashing below it from 0 to 9. When the digit required is displayed Press*** ⇧ ***to store. In this example 0 is required so Press*** ⇧ ***when zero is displayed.***

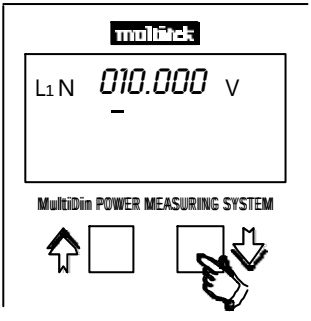


ACTION :

Press ⇧

COMMENTS :

Cursor moves to the 2nd digit.

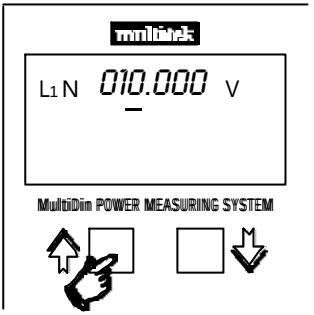


ACTION :

Press ⇩

COMMENTS :

Press ⇩ ***and scroll until 2nd digit shows 1.***

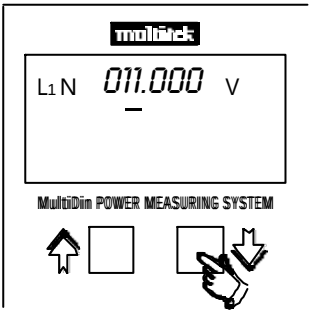


ACTION :

Press ⇧

COMMENTS :

Cursor moves to 3rd digit.

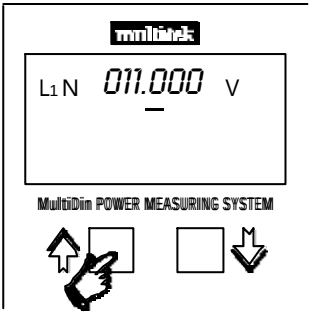


ACTION :

Press ⇩

COMMENTS :

Press ⇩ ***and scroll until 3rd digit shows 1.***

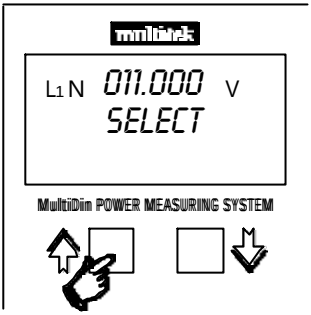


ACTION :

Press ⇧

COMMENTS :

Cursor moves to the 4th digit. In this example the 4th, 5th and 6th digits require 0 so if ⇧ ***is pressed 3 times the cursor moves along the 4th, 5th and 6th digit without altering them.***

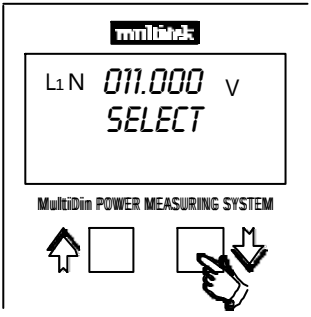


ACTION :

Press ⇧

COMMENTS :

Display shows either V, kV, MV, depending on which was programmed by the factory, and the message SELECT. Pressing ⇩ ***scrolls through these 3 options V, kV, MV i.e. SELECT the option.***

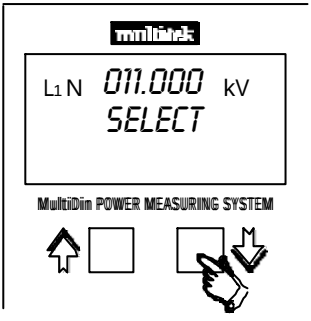


ACTION :

Press ⇩

COMMENTS :

Press ⇧ ***if input required is V.***

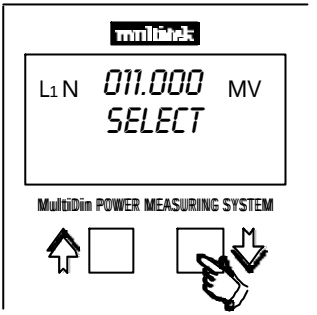


ACTION :

Press ⇩

COMMENTS :

Press ⇧ ***if input required is kV.***



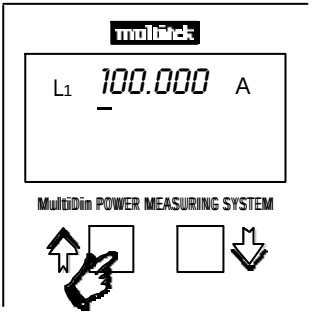
ACTION :

Press ⇩

COMMENTS :

Press ⇧ ***if input required is MV.***

4.2.2 Programming current inputs. Once the voltage input has been set and ⇧ ***is pressed the screen goes to the currrent setting.***



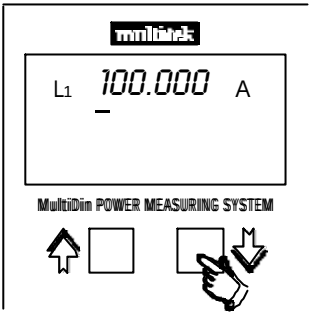
ACTION :

Press ⇧

COMMENTS :

This shows the input set for 100 Amp input. The cursor flashes under the 1st digit.

To change to 250 amp input :-

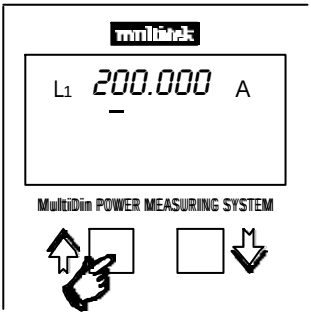


ACTION :

Press ⇩

COMMENTS :

Continue pressing ⇩ ***until the 1st digit shows 2.***

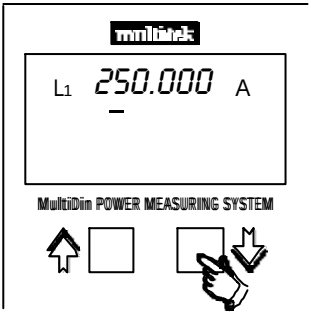


ACTION :

Press ⇧

COMMENTS :

The cursor moves to the 2nd digit.

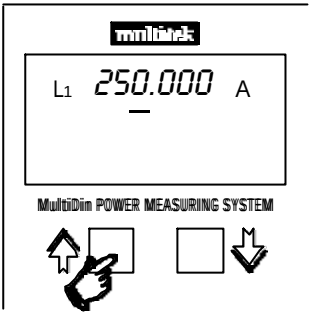


ACTION :

Press ⇩

COMMENTS :

Continue pressing ⇩ ***until the 2nd digit shows 5.***

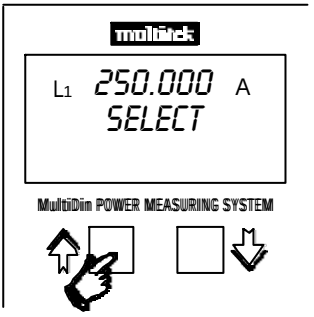


ACTION :

Press ⇧

COMMENTS :

The cursor will move to the 3rd digit. In this example 3rd,4th,5th and 6th digit require 0 so if ⇧ ***is pressed 4 times the cursor moves along the 3rd,4th,5th and 6th digit without altering them.***

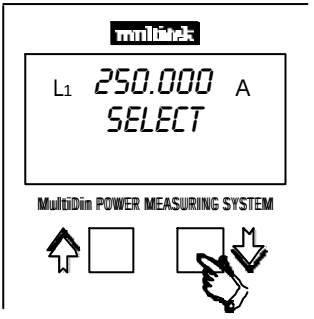


ACTION :

Press ⇧

COMMENTS :

The display shows either A, kA, MA depending on which was programmed by the factory and the message SELECT. Pressing ⇩ ***scrolls through these 3 options. i.e. SELECT the option.***

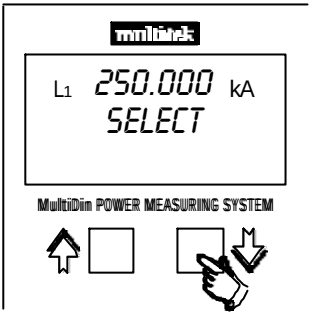


ACTION :

Press ⇩

COMMENTS :

Press ⇧ ***if input required is A.***

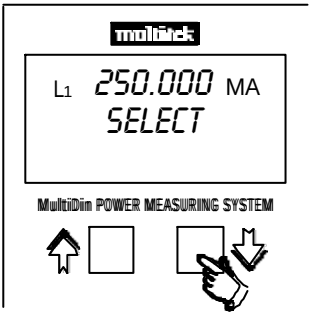


ACTION :

Press ⇩

COMMENTS :

Press ⇧ ***if input required is kA.***

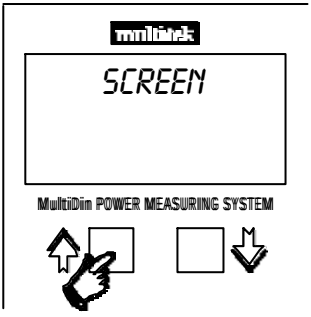


ACTION :

Press ⇩

COMMENTS :

Press ⇧ ***if input required is MA.***



ACTION :

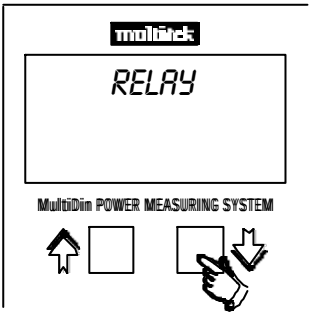
Press ⇧

COMMENTS :

This indicates that the nominal voltage and current have been programmed.

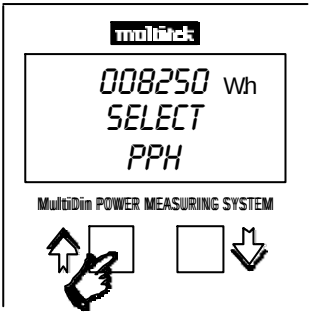
4.3 Programming relay output. The RELAY programming mode allows the User to assign the relay pulsed output to represent either Watt hour or VAr hour. The MultiDin automatically calculates the pulse per hour from the nominal voltage and current input values and will also calculate whether they are W.h, kW.h or MW.h (VAr.h, kVAr.h or MVAr.h) Additionally there is the facility to change the pulse rates in multiples of 10 and the pulse width between 20 msec and 200 msec in multiples of 20 msec.

4.3.1 Assigning relay to either Watt Hour or VAr Hour



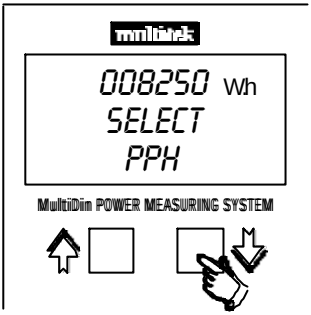
ACTION :
Press ⇩ twice

COMMENTS :
MultiDin is now in relay programming mode.



ACTION :
Press ⇧

COMMENTS :
This shows 8250 pulse per hour. Each pulse = 1 W.h
The SELECT message indicates relay output can be assigned to either W.h or VAr.h. Pressing ⇩ scrolls between W.h or VAr.h

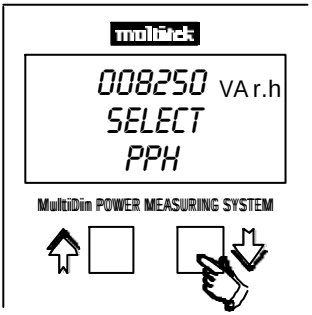


ACTION :

Press ⇩

COMMENTS :

Press ⇧ ***if pulse output required is W.h (The MultiDin will automatically select whether to use W.h, kW.h or MW.h)***



ACTION :

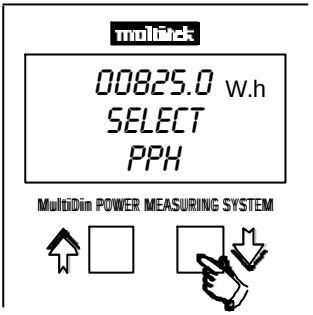
Press ⇩

COMMENTS :

Press ⇧ ***if pulse output required is VAr.h (The MultiDin will automatically select whether to use VAr.h kVAr.h or MVAr.h)***

4.3.2 Selecting Relay Divisor

This allows the user to set the relay to pulse every 1, 10 or 100 counts. i.e. If the divisor is set to 1 every time MultiDin registers stores and displays 1 count relay pulses once. If set to 100, relay only pulse once after MultiDin has registered displayed and stored 100 counts. The MultiDin always displays the number of counts regardless of what the relay divisor is set to. i.e. If the kilowatt consumption was 500 kW per hour and relay divisor was set to 100. After one hour the MultiDin would display 500kW.h but the relay would of only given 5 pulses during that hour.

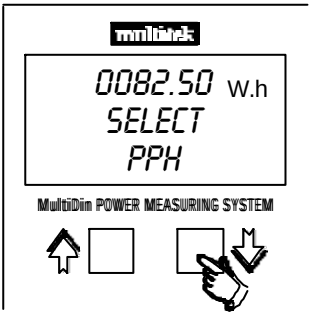


ACTION :

Press ⇩

COMMENTS :

Press ⇩ ***activates the decimal point. So with decimal point in this position divisor is set to 1. So every count MultiDin registers and stores the relay pulses.***

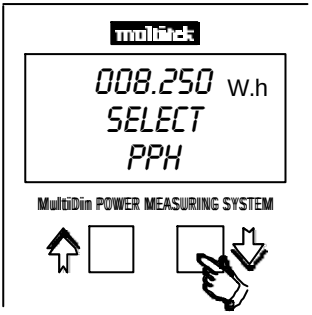


ACTION :

Press ⇩

COMMENTS :

Pressing ⇩ ***scrolls the decimal point. In this position divisor is set to 10 so relay will pulse once after MultiDin has registered and stored 10 counts. Press*** ⇧ ***if this is relay rate required.***



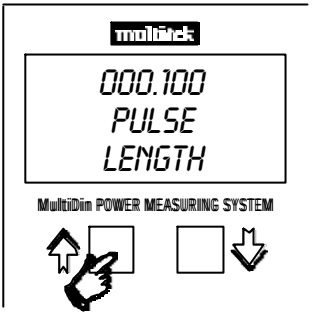
ACTION :

Press ⇩

COMMENTS :

With decimal point in this position divisor is set to 100 so relay will pulse once, after MultiDin has registered and stored 100 counts. Press ⇧ ***if this is relay rate required.***

4.3.3 Setting pulse width.

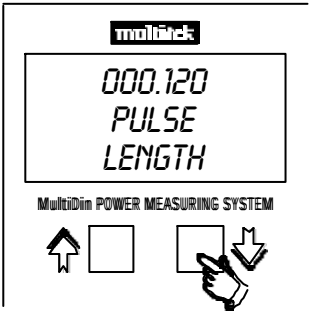


ACTION :

Press ⇧

COMMENTS :

The MultiDin is now in the pulse width (LENGTH) setting mode. Pulse widths can be set between 20 msec & 200 msec. In this example the pulse width has been set at 100 msec. Pressing ⇩ ***scrolls in steps of 20 msec***

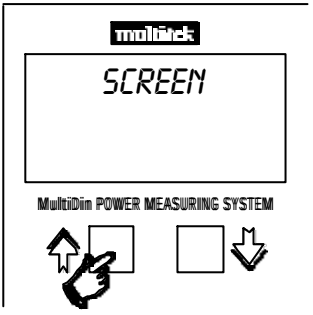


ACTION :

Press ⇩

COMMENTS :

The pulse width has now been changed to 120 msec. Press ⇧ ***if this is the required value. If not press*** ⇩ ***to scroll until required value is displayed, then Press*** ⇧



ACTION :

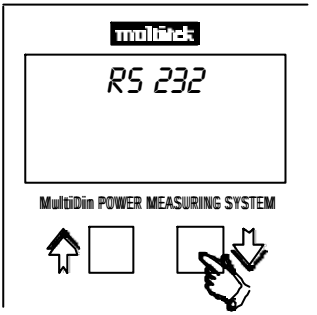
Press ⇧

COMMENTS :

Indicates the relay has been assigned, the pulse rate set and the pulse width set.

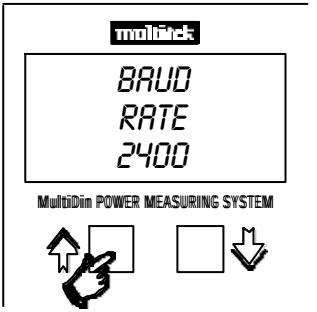
4.4 RS232 data output port setting. The RS232 programming mode allows the user to set Baud Rate, Parity and Stops.

4.4.1 Setting Baud Rates



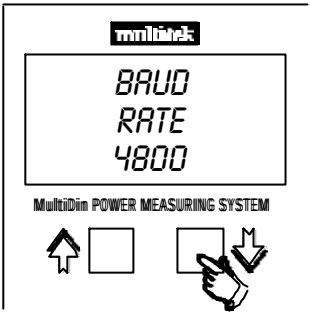
ACTION :
Press ⇩ 3 times.

COMMENTS :
The MultiDin is now in the RS 232 port setting mode .



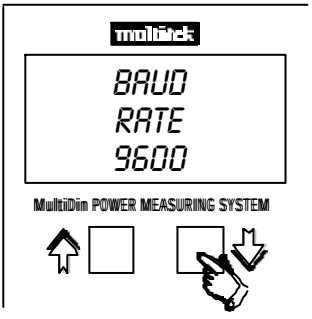
ACTION :
Press ⇧

COMMENTS :
The baud rate is displayed, in this case it is set at 2400. Pressing ⇩ scrolls through the 4 baud rate available, 2400, 4800, 9600 and 19200.



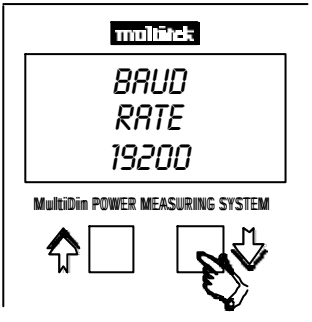
ACTION :
Press ⇩

COMMENTS :
Press ⇧ ***if the baud rate required is 4800.***



ACTION :
Press ⇩

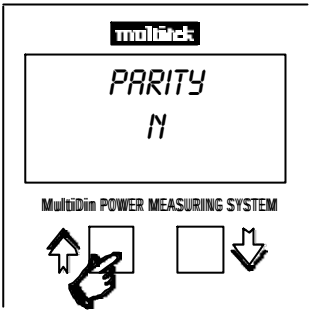
COMMENTS :
Press ⇧ ***if the baud rate required is 9600.***



ACTION :
Press ⇩

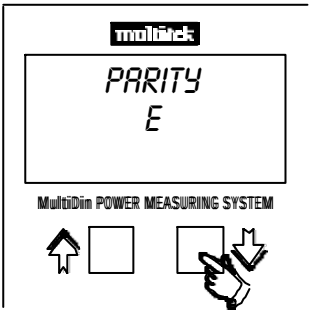
COMMENTS :
Press ⇧ ***if the baud rate required is 19200.***

4.4.2 Setting Parity



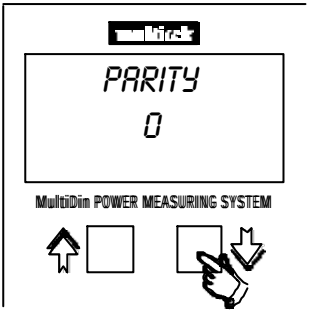
ACTION :
Press ⇧

COMMENTS :
The MultiDin is now in the parity setting mode. The n= no parity. Press ⇧ ***if no parity is required.***



ACTION :
Press ⇩

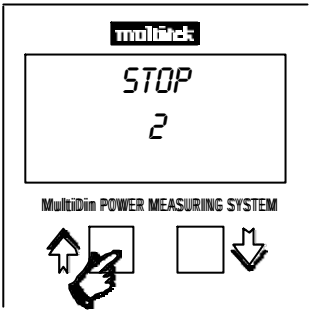
COMMENTS :
The E = even parity. Press ⇧ ***if even parity is required.***



ACTION :
Press ⇩

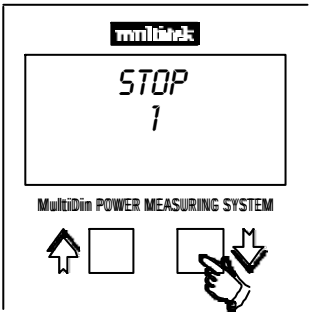
COMMENTS :
The O = odd parity. Press ⇧ ***if odd parity is required.***

4.4.2 Setting Stops



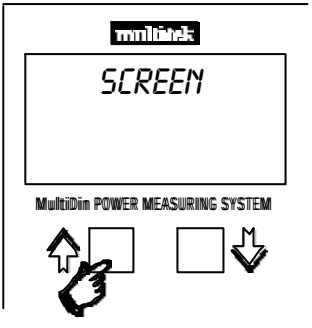
ACTION :
Press ⇧

COMMENTS :
The MultiDin is now in the stop setting mode. The 2= two stops. Press ⇧ ***if 2 stops are required.***



ACTION :
Press ⇩

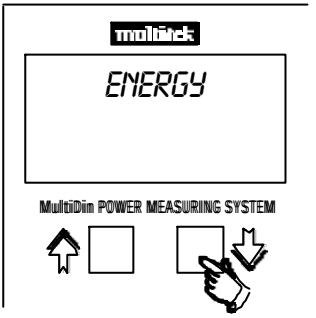
COMMENTS :
The 1 = One stop. Press ⇧ ***if one stop is required.***



ACTION :
Press ⇧

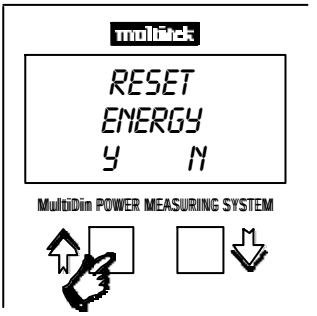
COMMENTS :
Indicates the baud rate, parity and stops have been set.

4.5 Resetting of energy registers. The ENERGY programming mode allows the User to reset both the Watt hour register (W.h, kW.h, MW.h) and the VAr hour register (VAr.h, kVAr.h, MVAr.h) to zero.



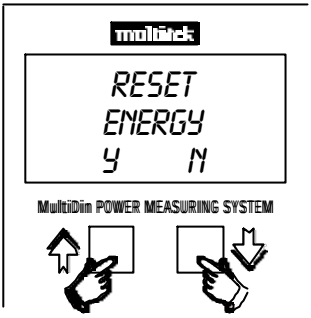
ACTION :
Press ⇩ 4 times.

COMMENTS :
The MultiDin is now in the energy register reset mode.



ACTION :
Press ⇧

COMMENTS :
The screen now display's the option to either reset energy register (Y) yes or do not reset energy registers (N) no.

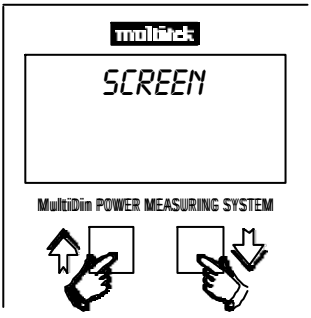


ACTION :

Press ⇧ or ⇩

COMMENTS :

Press ⇧ (Y) to reset Watt Hour and VAr Hour registers or Press ⇩ (N) if resetting of registers is not required.



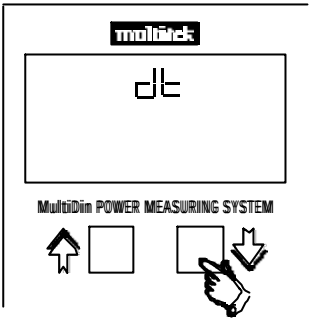
ACTION :

Press ⇧ or ⇩

COMMENTS :

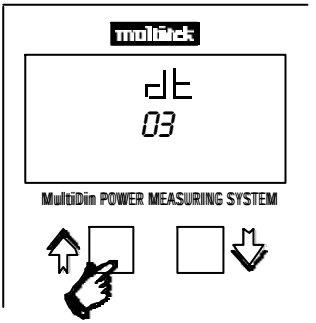
Once ⇧ or ⇩ have been pressed the display shows SCREEN indicating the registers have been set.

4.6 The MultiDin measures Average Demand of Amps Watts and VA. Demand times between 3 and 30 minutes can be programmed when in dt (demand time) programming mode. The MultiDin samples the instantaneous values for 1 minute then takes the average of these samples and updates the reading. This sampling and updating ever minute continues until the time period selected is reached. e.g. If time period is 15 minutes then after 15 minutes the average of 15 minute demand is displayed. When the 16th minute is reached the MultiDin takes the average of minute 2 to 16 and displays the reading.



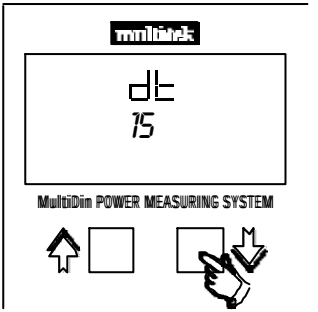
ACTION :
Press ⇩ 5 times

COMMENTS :
The MultiDin is now in the demand time period setting mode.



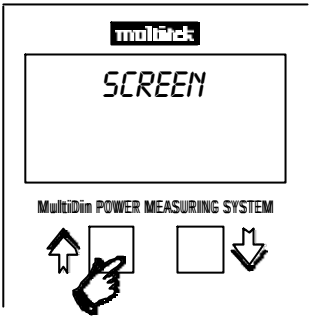
ACTION :
Press ⇧

COMMENTS :
The MultiDin is now in the time period setting mode. The time period shown in this example is 3 minutes. If this is period required press ⇧



ACTION :
Press ⇩

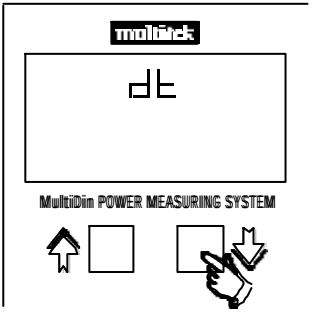
COMMENTS :
Pressing the ⇩ increments the time period by 1 minute, up to the maximum of 30 minutes (min. period 3 minutes). So in this example time period shown is 15 minutes. If this is period required press



ACTION :
Press ⇧

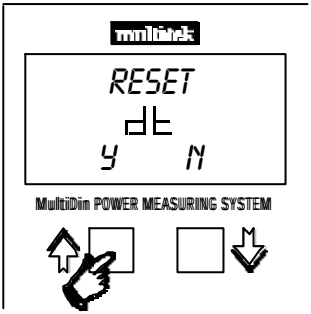
COMMENTS :
Indicates that demand time period has been set. Note when a time period has been set the MultiDin automatically resets the time to zero. The new time period starts once MultiDin is returned to the measuring mode.

4.6.1 To reset demand time period to zero.



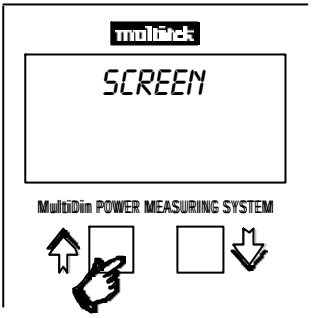
ACTION :
Press ⇩ ***5 times***

COMMENTS :
The MultiDin is now in the demand time period setting mode.



ACTION :
Press ⇧ ***twice***

COMMENTS :
The screen now display's the option to either reset demand time period to zero (Y) yes or do not reset time period (N) no.

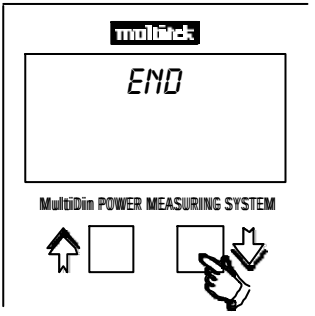


ACTION :
Press ⇧

COMMENTS :
Indicates that demand time period has been reset to zero,. Demand period will start when MultiDin is returned to measuring mode.

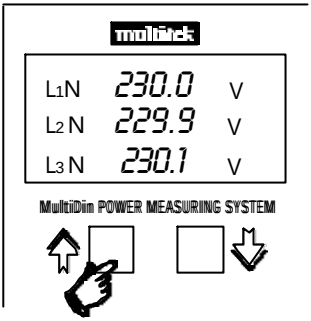
4.7 To terminate programming. Once the programming has been completed there are two options available either to end (END) programming and return to the measuring function or to cancel (CANCEL) all the data entered whilst in the programming mode.

4.7.1 To end programming.



ACTION :
Press ⇩ ***6 times.***

COMMENTS :
Press ⇧ ***to end programming and return to measuring mode. (If you wish to cancel all data entered during programming Press*** ⇩ ***to enter CANCEL mode).***



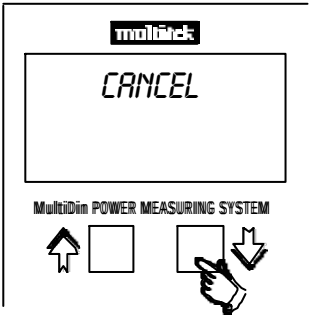
ACTION :

Press ⇧

COMMENTS :

All data that has been entered during programming is stored and MultiDin has now returned to measuring mode.

4.7.2 To cancel data entered.

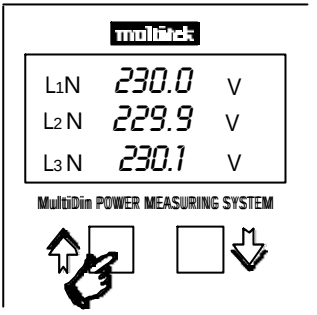


ACTION :

Press ⇩ ***7 times***

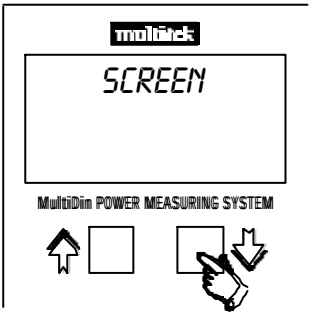
COMMENTS :

The MultiDin is now in the CANCEL mode. This enables the user to cancel all data that has been entered whilst in the programming mode. Press ⇧ ***to cancel Press*** ⇩ ***to return to the beginning of programming. i.e. SCREEN mode.***



ACTION :
Press ⇧

COMMENTS :
All the information entered whilst in the programming mode has been cancelled and the MultiDin has returned to the measuring mode.



ACTION :
Press ⇩
COMMENTS :
None of the data entered has been cancelled and you are now at the beginning of the programming mode. Pressing ⇩ ***will scroll through all of the programming modes.***

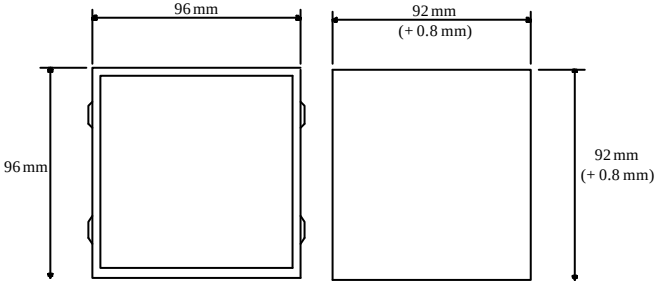
5. INSTALLATION

5.1 Case

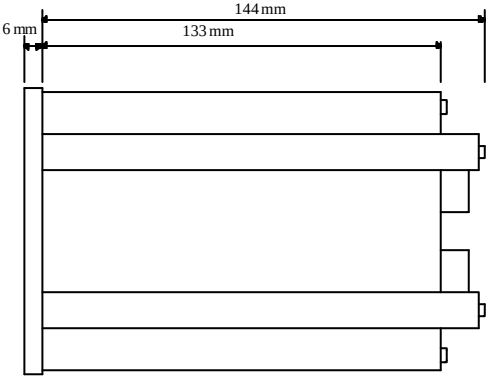
The MultiDin M800-MD* is designed for panel mounting and uses a standard 96 x 96 DIN case.

CASE DIMENSIONS

FRONT ***PANEL CUTOUT***



SIDE



5.2 Auxiliary Supply

The auxiliary supply can be connected in parallel with the measuring input voltage, but this restricts the measuring range of the input voltage to ± 15% of nominal. If auxiliary is separate the measuring range of the voltage input is 5-120%.

5.3 Protective Fuses

It is good practice for the user to provide fuse protection to all input circuits and the auxiliary supply.

5.4 Current Transformers

Internally the MultiDin has current transformers fitted which are either 5 Amp or 1 Amp. The current circuit is designed for connection to the secondary of external current transformers. These transformers should conform to at least Class 1 as per BS7626 (IEC 185) or equivalent. The secondary of these external transformers must have the same nominal current input as that specified on the data label on the side of the MultiDin. e.g. If the MultiDin has a current ratio specified as 500/5A, then the current transformer could be changed to 800/5A (or any ratio with secondary 5A) and used once the current ratio has been programmed into the MultiDin, (see section 4.2.2.) But if the ratio change was 800/1A the MultiDin would have to be returned to the factory to have the internal current transformer changed to 1 amp.

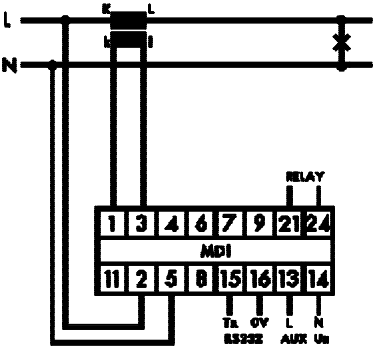
Warning. The secondary of a current transformer must never be allowed to be in an open circuit condition when the primary is energized. In the open circuit condition high voltage may be present. Each current transformer secondary should be short-circuited when not connected to the meter.

5.5 Voltage Transformers

Connection of voltages higher than the rated voltage, that is specified on the MultiDin data label, is possible using external voltage transformers. These transformers must be at least Class 1 accuracy. The secondary of these transformers must have the same nominal voltage as that specified on the data label on the side of the MultiDin. e.g. If the MultiDin has voltage specified as 110 Volts Line to Line, then a Transformer with Ratio of 6600/110 volt can be used, once this ratio has been programmed into the MultiDin (See section 4.21.) But if the ratio was 6600/400V the unit would have to be returned to the factory or distributor to have internal component changes to cater for the 400 Volt input.

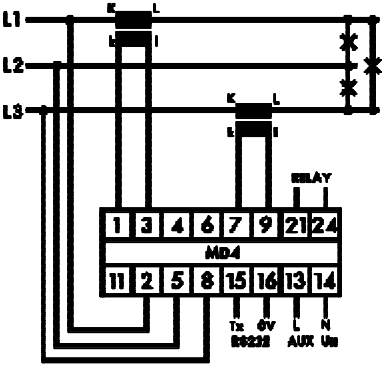
6. CONNECTION DIAGRAMS

6.1 All connections must be made as shown ensuring, all starts and finshes of current and voltage transformers are connected as shown.



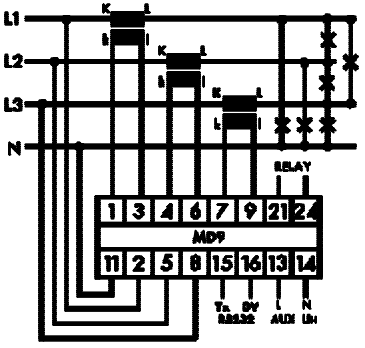
M800MD1

SINGLE PHASE



M800MD4

3 PHASE 3 WIRE UNBALANCED LOAD

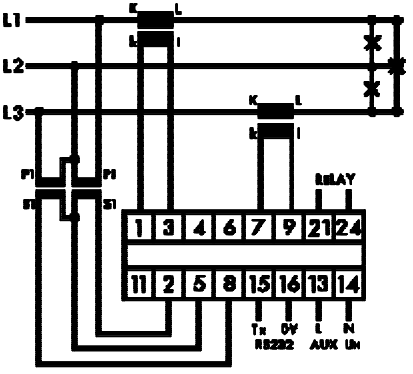


M800MD9

3 PHASE 4 WIRE UNBALANCED LOAD

6.1.1 Note RS485 or RS232 are options. If RS485 is fitted terminals will be in positions 15 & 16 and the shield (screen) connection stud will be fitted. For RS232 terminals 15 & 16 are fitted but the shielding stud is not fitted as this in not required.

6.2 It is possible to connect the MultiDin to external voltage transformers (P.T.s) (see programming section 4.2.1) The diagram below shows a M800-MD4 3 phase 3 wire unbalanced load connected to external voltage transformers.



7. CALIBRATION

The MultiDin is self calibrating. Calibration should only be carried out by authorised Multitek distributors or users that have highly stable and accurate voltage and current sources. Both the current and voltage sources must have accuracy greater than 0.02%.

7.1 Calibrating MultiDin

7.1.1 Program nominal voltage and current inputs (see section 4)

7.1.2 Switch off auxiliary supply.

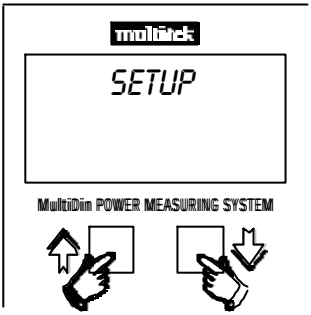
7.1.3 Remove the front cover by removing the 2 side screws.

7.1.4 On the bottom left hand side of the exposed printed circuit board next to the left hand push button there are two solder pads. Link these pads together.

7.1.5 Switch on auxiliary supply.

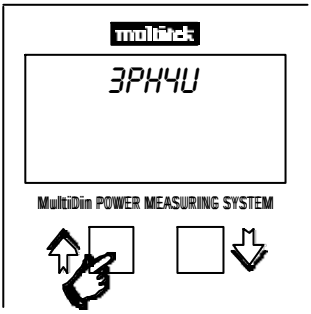
7.2 Setting up measuring system. Simultaneously press both front buttons ⇧ & ⇩ and the MultiDin enters the set up mode and display shows SETUP. This mode allows setting of the three measuring systems that are available :- Single phase, 3 phase 3 wire unbalanced load, 3 phase 4 wire unbalanced load.

7.2.1 Programming the measuring system.



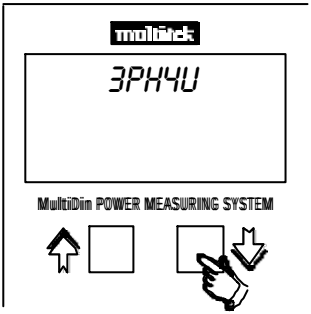
ACTION :
Press ⇧ & ⇩ simultaneously, and hold for 3 seconds

COMMENTS :
MultiDin is now in set up mode.



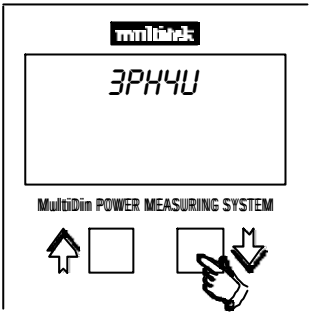
ACTION :
Press ⇧

COMMENTS :
Display shows either 1ph or 3ph 3 wire or 3ph 4 wire depending on which system has been programmed into the MultiDin by the factory. Pressing ⇩ scrolls through the 3 options.



ACTION :
Press ⇩

COMMENTS :
Press ⇧ if 3 phase 4 wire unbalanced load is required.

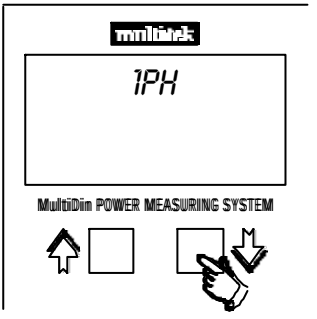


ACTION :

Press ⇩

COMMENTS :

Press ⇧ ***if 3 phase 3 wire unbalanced load is required.***

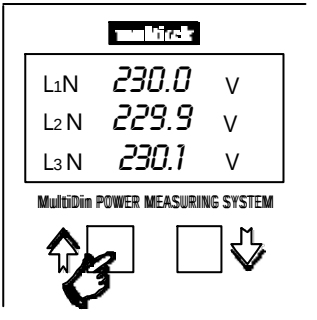


ACTION :

Press ⇩

COMMENTS :

Press ⇧ ***if single phase is required.***



ACTION :

Press ⇧

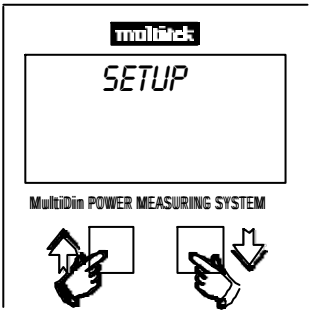
COMMENTS :

Indicates the system has been programmed.

Please note it is possible to change from a MultiDin that is programmed and manufactured as a 3 phase 4 wire

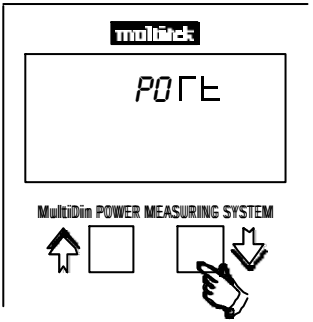
unbalanced to a single phase unit as long as the nominal input voltage remains the same. If the required change is from 3 phase 4 wire unbalanced load to 3 phase 3 wire unbalanced load or 3 phase 3 wire unbalanced load to a single phase unit, internal components have to be changed and the MultiDin must be returned to the factory or an authorised dealer.

7.3 Setting up RS output port. Note the RS output is an option and requires the RS pcb to be fitted either pcb 350 for RS 232 or pcb 352 for RS 485 refer to product manual.



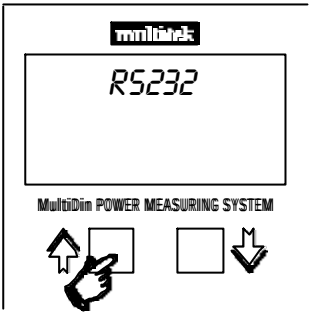
ACTION :
Press ⇩ & ⇧ simultaneously and hold for 5 seconds.

COMMENTS :
MultiDin is now in set up mode.



ACTION :
Press ⇩

COMMENTS :
MultiDin is now in port setting mode. Note if RS pcb is not fitted it is not necessary to set the port. Press ⇩ again and CAL will be displayed. Now refer to section 7.4 Calibration.

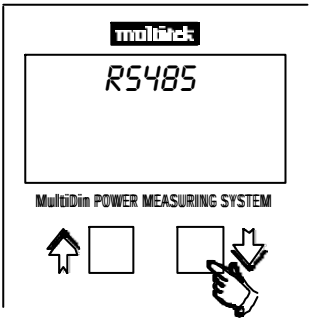


ACTION :

Press ⇧

COMMENTS :

MultiDin is now in the RS232 mode. Press ⇧ ***if RS232 is required.***

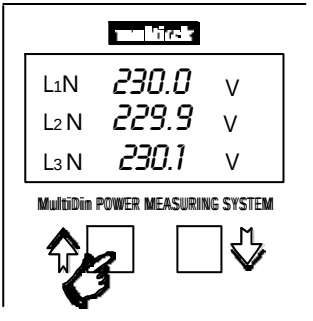


ACTION :

Press ⇩

COMMENTS :

MultDin is now in the RS485 mode. Press ⇧ ***if RS485 is required.***



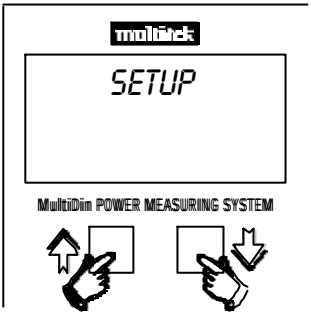
ACTION :

Press ⇧

COMMENTS :

Indicates the RS port has been programmed.

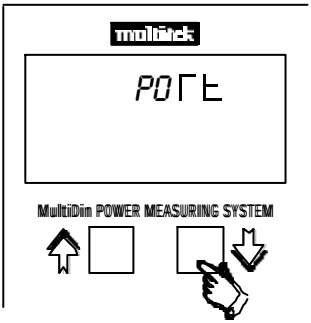
7.4 Calibrating the MultiDin. Before calibrating ensure both voltage and current inputs are set at nominal input values and the supply is stable with an accuracy of 0.02%.



ACTION :

Press ⇩ & ⇧ simultaneously and hold for 5 seconds.

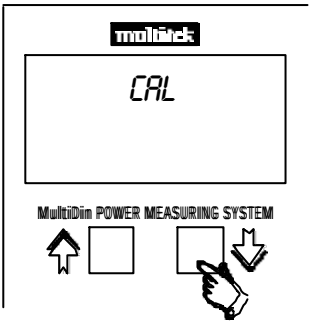
COMMENTS :
MultiDin is now in set up mode.



ACTION :

Press ⇩

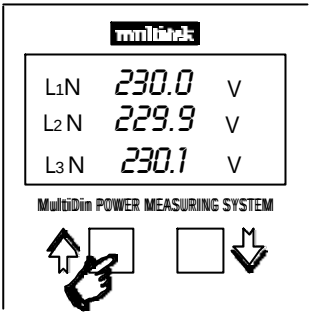
COMMENTS :
MultiDin is now in port setting mode.



ACTION :

Press ⇩

COMMENTS :
MultiDin is now in calibration mode.



ACTION :

Press ⇧

COMMENTS :

Screen blanks momentarily then returns to measuring mode and MultiDin is now fully calibrated.

7.4.1 Switch off auxiliary.

7.4.2 Remove link.

7.4.3 Replace cover and the 2 side screws.

7.4.4 Switch on auxiliary. The MultiDin is now calibrated and will stay calibrated even in power down conditions.

7.5 Contrast / Viewing angle adjustment. It is possible to adjust the MultiDin display contrast / viewing angle if the product is to be mounted in an unusual position. The MultiDin is calibrated to give the best contrast and viewing with the product mounted in a panel with product at a height of 1.6 metres and viewed square on (12 o'clock). This allows the display to be seen over a wide viewing angle looking squarely at the display, down at display or at up at the display.
If for example the MultiDin was to be mounted in a control desk that has the MultiDin mounted at an angle of 45 degrees with the operator looking down at the MultiDin it may be necessary to adjust the contrast control. This is simply performed by adjusting an internal variable resistor.

7.5.1 Remove the front cover by removing the 2 side crews.

7.5.2 In the middle of the exposed printed circuit board below the display a variable resistor can be seen.

7.5.3 Power up the MultiDin and using a screw driver adjust variable resistor to achieve optimum clarity , contrast and viewing angle of the display, in the required mounting position.

7.5.4 Replace the front cover and the two side screws.

8. RS 485 COMMUNICATION

8.1 As detailed in section 4.4 page 31 of this manual the option of RS 232 is offered, also available is the option of RS 485 communication.

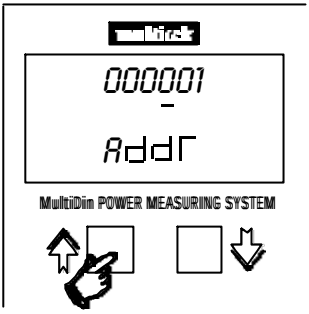
The RS 485 allows remote reading and programming of the MultiDin via a host computer. The communication protocol used is a subset of Modicons Modbus, (see section 8.3) enabling the use of standard host computer, PLC and scada programs. Up to 32 MultiDins can be connected in parallel to a single communication bus.

8.2 Setting Baud Rates, Parity, Stops and Node Addresses.

8.2.1 The setting of the Baud Rate and Parity is identical to the RS 232 output as detailed in section 4.4 of this manual see pages 31 to 34. There are two differences to the sequence shown :-
i) The first message on the screen, as shown in section 4.4.1 is RS485 instead of RS232.
ii) With RS485 once the parity is set the MultiDin automatically sets the stop bits so sequence 4.4.2 does not appear.

8.2.2 Setting of Node Addresses.

Once the parity has been set as on page 33 the following sequence must be completed to set the node address. The number of node addresses available is 1 to 247. Each individual MultiDin that is to be connected to a common bus must have its own unique node address.
Note : It is possible to set the node address on the MultiDin screen or through the RS485 link to values above 247. If this is done the RS485 communication link will not operate.

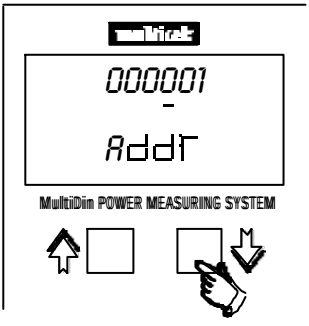


ACTION :

Press ⇧

COMMENTS :

The MultiDin is now in the node address setting mode. Node addresses between 1-247 can be set. In this example the MultiDin is set to node address 1.
i.e. 000001 = Node address 1.



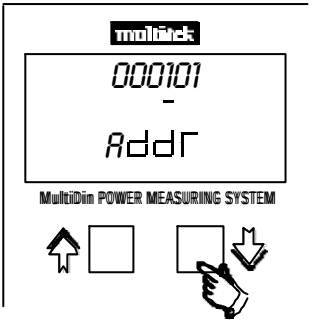
ACTION :

Press ⇩

COMMENTS :

Pressing ⇩ ***scrolls the digit with the cursor flashing below it from 0 to 9. When the required number is displayed Press*** ⇧ ***to store.***

Example to set node address to 182 :-

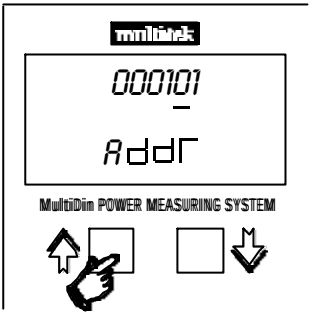


ACTION :

Press ⇩

COMMENTS :

Press ⇩ ***until the 4th digit shows 1.***

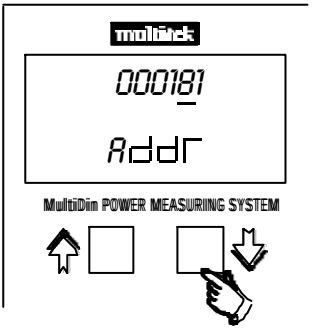


ACTION :

Press ⇧

COMMENTS :

The cursor now moves to the 5th digit.

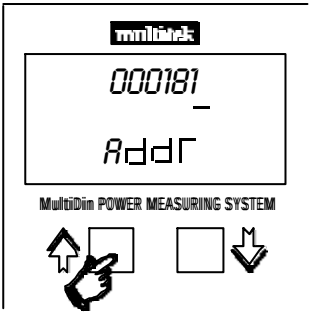


ACTION :

Press ⇩

COMMENTS :

Press ⇩ ***until the 5th digit shows 8.***

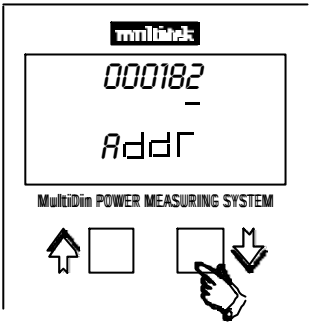


ACTION :

Press ⇧

COMMENTS :

The cursor now moves to the 6th digit.

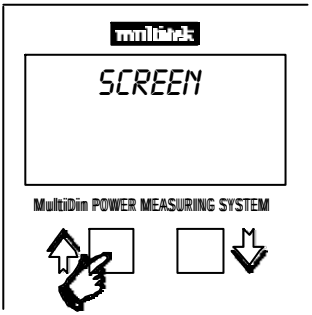


ACTION :

Press ⇩

COMMENTS :

Press ⇩ ***until the 6th digit shows 2.***



ACTION :

Press ⇧

COMMENTS :

This indicates that the address is programmed.

Now continue programming as shown on page 35 of this manual section 4.5.

8.3 MultiDin Modbus Protocol

8.3.1 Physical Connections

The interface to the Modbus network is via RS485 connection. This takes the form of a twisted pair cable preferably screened, onto which up to 32 devices may be connected, one of which will the host PC or controller node. The devices on the network are connected in parallel + to +, - to - and shield to shield (screen to screen). The shield should be connected to earth at one point of the network only. Other manufacturers of devices intended for use on the Modbus network may have different + and - designations : some have Hi, Lo or A ,B. In any case reversing the + and - connections may have the desired results if the device fails to communicate with the master node.
The maximum length of the twisted pair cable specified by the RS standard is 1.2km. Any length over 200m should be terminated at each end with a resistor equal to the cable's characteristic impedance in series with a 0.1µF capacitor.
A typical network cable is Beldon 8761.

8.3.2 Communication Format

Baud rate : 2400, 4800, 9600, 19200

Low level character format :
With Odd or Even parity = 1 start bit, 8 data bits, 1 parity bit, 1 stop bit
With NO parity = 1 start bit , 8 data bits, 2 stops bits.

8.3.4 Modbus Format

Data format :
RTU
32 bit, floating point format to IEEE-754 standard, exponent bias 127, most significant byte transmitted first. There is no word reversal.

Address range: 1-247

Error Check :
Cyclic Redundancy Check (CRC), Polynomial exclusive OR value A001h Low byte sent first.

8.3.5 Modbus Protocol

Only the RTU (Remote Terminal Unit) form of the Modbus protocol will be supported and all references in this sheet refer to RTU format.

Typically, the master or controller requests data from its slaves by polling them one at a time and waiting for a pre-defined amount of time for a response. If a node doesn't respond within this time period the master will try accessing it a further two times before indicating to the Scada system that the node has gone off-line or there is a fault with it. If all is well the node will respond with the data requested.

A typical communication 'packet' will be in the form : [Node Address] [Function] [Byte count, Data etc.] [Error check].

Because Modbus is a word (2 byte) orientated protocol, floating point (4 byte) register numbers are counted in multiples of two.
viz register 1 = start address 0
register 2 = start address 2
register 3 = start address 4
register 4 = start address 6
Formula = (register required -1) x2
This also applies to the number of registers requested. If 2 registers are requested the number of WORDS in the packet's [Number of registers] slot should equal 4. (See examples in the following sections.

CRC-16 (Cyclic Redundancy Check)

The step by step procedure to form the CRC-16 check bytes is as follows :

1. *Load a 16-bit register with all 1's.*
2. *Exclusive OR the first 8-bit byte with the high order byte of the 16-bit register, putting the result in the 16-bit register.*
3. *Shift the 16-bit register one bit to the right.*

4a. If the bit shifted out to the right (flag) is one, exclusive OR the generating polynomial 1010 0000 0000 0001 with the 16-bit register.

4b. If the bit shifted out to the right is a zero; return to step 3

5. *Repeat steps 3 and 4 until 8 shifts have been performed.*
6. *Exclusive OR the next 8 bit byte with the 16-bit register.*
7. *Repeat step 3 through 6 until all bytes of the message have been exclusive OR with the 16-bit register and shifted 8 times.*
8. *The contents of the 16-bit register are the 2 byte CRC error check and is added to the message most significant bits first.*

See table below

	16-BIT REGISTER			*MBS*	*FLAG*
(Exclusive or)	*1111*	*1111*	*1111*	*1111*	
0			*0000*	*0010*	
	1111	*1111*	*1111*	*1101*	
Shift 1	*0111*	*1111*	*1111*	*1110*	*1*
Polynomial	*1010*	*0000*	*0000*	*0001*	
	1101	*1111*	*1111*	*1111*	
Shift 2	*0110*	*1111*	*1111*	*1111*	*1*
Polynomial	*0101*	*0000*	*0000*	*0001*	

	1100	*1111*	*1111*	*1110*	
Shift 3	*0110*	*0111*	*1111*	*1111*	*0*
Shift 4	*0011*	*0011*	*1111*	*1111*	*1*
Polynomial	*1010*	*0000*	*0000*	*0001*	
	1001	*0011*	*1111*	*1110*	
Shift 5	*0100*	*1001*	*1111*	*1111*	*0*
Shift 6	*0010*	*0100*	*1111*	*1111*	*1*
Polynomial	*1010*	*0000*	*0000*	*0001*	
	1000	*0100*	*1111*	*1110*	
Shift 7	*0100*	*0010*	*0111*	*1111*	*0*
Shift 8	*0010*	*0001*	*0011*	*1111*	*1*
Polynomial	*1010*	*0000*	*0000*	*0001*	
07	*1000*	*0001*	*0011*	*1110*	
			0000	*0111*	
	1000	*0001*	*0011*	*1001*	
Shift1	*0100*	*0000*	*1001*	*1100*	*1*
Polynomial	*1010*	*0000*	*0000*	*0001*	
	1110	*0000*	*1001*	*1101*	
Shift 2	*0111*	*0000*	*0100*	*1110*	*1*
Polynomial	*1010*	*0000*	*0000*	*0001*	
	1101	*0000*	*0010*	*1111*	
Shift 3	*0110*	*1000*	*0010*	*0111*	*1*
Polynomial	*1010*	*0000*	*0000*	*0001*	
	1100	*1000*	*0010*	*0110*	
Shift 4	*0110*	*0100*	*0001*	*0011*	*0*
Shift 5	*0011*	*0010*	*0000*	*1001*	*1*
Polynomial	*1010*	*0000*	*0000*	*0001*	

	1001	*0010*	*0000*	*1000*	
Shift 6	*0100*	*1001*	*0000*	*0100*	*0*
Shift 7	*0010*	*0100*	*1000*	*0010*	*0*
Shift 8	*0001*	*0010*	*0100*	*0001*	*0*

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Transmitted message with CRC-16 (Message shifted to right to transmit)

12		*41*		*07*		*02*	
0001	*0010*	*0100*	*0001*	*0000*	*1111*	*0000*	*0010*

Last bit Transmitted ***TRANSMISSION ORDER*** ***First Bit Transmitted***

8.3.6 Timing

RTU frame timing :
The message start with an interval of at least 3.5 character times.
Following the last transmitted character, a similar interval of a least 3.5 character times marks the end message.
The entire message frame must be transmitted as a continuous stream.

8.3.6 Response time.

Modbus response time from receptition of the last character to the transmittion of the 1st character in its reply is less than 200 msec.

8.3.7 Codes Supported

Function 3 (03 hex) *Read holding registers. (4X)*

Function 4 (04 hex) *Read input registers. (3X)*

Function 16 (10 hex *Preset Multiple register. (4X)*

Function 17 (11 hex) *Report slave ID*

BROADCAST is not supported and this command does not cause the slave to respond to the master.

An EXCEPTION error will be generated if the node cannot fulfil the task set by the Master or the Slave receives invalid data in its data slot.

Exception code table

Code	*Name*
01	*Illegal Function*
02	*Illegal Data Address*
03	*Illegal Data Value*

8.3.8 Modbus Codes Reference

Function 4 (04 hex) - read input registers. (3X)
These registers contain the measured and calculated values of the instrument. Register addresses in the instrument start at 0 but in keeping with Modicon Modbus codes, are designated addresses starting at 40001.

Packet from master format :
[Node Addr][04][reg start addr(2 bytes)][No. of reg (2 bytes)] [CRC(2 bytes)]
Response from slave format:
[Node Addr][04](Byte count][Data (byte count bytes)][CRC(2 bytes)]

The table below lists the parameter with the Modbus equivalent address and its address within the MultiDin. Any data requested that isn't applicable to the conditions column will return the value -ve infinity (FFFFFFFFh)

3X REGS

Registers name	*Modbus Addr, (dec)*	*Reg, Start Addr. (hex)*	*MultiDin Type*
Volts L2-L1	*30001*	*0000*	*MD9&MD4*
Volts L3-L2	*30002*	*0002*	*MD9&MD4*
Volts L1-L3	*30003*	*0004*	*MD9&MD4*
*System Volts L1**	*30004*	*0006*	*All types*
*System Volts L2**	*30005*	*0008*	*MD9&MD4*
*System Volts L3**	*30006*	*000A*	*MD9&MD4*
System Amps L1	*30007*	*000C*	*All types*
System Amps L2	*30008*	*000E*	*MD9&MD4*
System Amps L3	*30009*	*0010*	*MD9&MD4*
System W	*30010*	*0012*	*All types*
System VA	*30011*	*0014*	*All types*
System VAr	*30012*	*0016*	*All types*
System P.F.	*30013*	*0018*	*All types*
*System W.h **	*30014*	*001A*	*All types*
*System VAr.h **	*30015*	*001C*	*All types*
System Frequency	*30016*	*001E*	*All types*
Watts L1	*30017*	*0020*	*MD9 only*
Watts L2	*30018*	*0022*	*MD9 only*
Watts L3	*30019*	*0024*	*MD9 only*
VAr L1	*30020*	*0026*	*MD9 only*
VAr L2	*30021*	*0028*	*MD9 only*
VAr L3	*30022*	*002A*	*MD9 only*
Sys. W Demand	*30023*	*002C*	*All types*
Sys VA Demand	*30024*	*002E*	*All types*
Sys A Demand	*30025*	*0030*	*All types*

**** In 3 wire mode system V1, V2, V3 will have the same value as volts L2-L1, L3-L2, L1-L3.***
*****MultiDin only measures import W.h and VAr.h***

Example
To obtain all 3 line powers in a 4 wire system on Node 23h
Packet from master :

Start at Power L1 (0020), request 3 regs (0006 words)
[23][04][0020][0006][CRC(2bytes)]
Response from slave format :
[23][04][12 bytes of data(3 regs x 4 bytes)][CRC(2 bytes)]

<u>Function 3 (03 hex)</u> - read holding registers (4X)
These registers contain the system setting and controls. Register addresses in the instrument start at 0, but in keeping with Modicon Modbus codes, are designated addresses starting at 30001.

<u>Read</u>
Packet from master format :
[Node addr][03][Register start addr.(2 bytes)][No of reg(2 bytes)][CRC (2 bytes)]
Response form Slave format :
[Node addr][03][Byte count][Data(byte count bytes)][CRC(2 bytes)]

<u>Function 16 (10 hex)</u> - Preset Multiple registers (4X)
These registers contain the system settings and controls. Register addresses in the MultiDin at 0, but in keeping with Modicon Modbus codes, are designated addresses starting 30001.

<u>Write</u>
Packet from master :
[Node addr][10][Register start address(2 bytes)][No of registers(2 bytes)][Byte count][Data (byte count bytes)][CRC

(2 bytes)]
Response from slave format :
[Node addr][10][Register start addr.(2 bytes)][No of registers(2 bytes)][CRC (2 bytes)]

The table below lists the parameter, its Modbus equivalent address and its address within the MultiDin. Any Illegal operation will return an Error code

4X REGS

Reg Name	*Modbus Addr. (dec)*	*Reg Start Addr. (hex)*	*Read (code 3)*	*Write (code 16)*
Sys. V	*40001*	*0000*	*Get the system voltage*	*Set the system voltage*
Sys. I	*40002*	*0002*	*Get the system current*	*Set the system current*
Sys. Type	*40003*	*0004*	*Get the sys. type 1= Single phase 2= 3 ph 3 wire 3= 3 ph 4 wire*	*Set the sys. type 1 = Single phase 2 = 3ph 3 wire 3 = 3 ph 4 wire*
Sys. Power	*40004*	*0006*	*Get the sys power*	*Illegal operation*
Demand time	*40005*	*0008*	*Get the demand time (3-30min.)*	*Set the demand time (3-30min.)*
Demand period	*40006*	*000A*	*Get the No. of sub -intervals left to integrate in the 1st demd. period*	*Illegal operation*
Relay divisor	*40007*	*000C*	*Get relay divisor 1, 10 or 100*	*Set relay divisor 1, 10 or 100*
Relay pulse width	*40008*	*000E*	*Get the No. of 20mS in the relay pulse width 0 to 10= off to 200mS*	*Set the No. of 20 mS in the relay pulse width 0 to 10 = off to200mS*
Reset energy counters	*40009*	*0010*	*Illegal operation*	*Initialise energy counters Write 0 to this register*
Reset demand counters	*40010*	*0012*	*Illegal operation*	*Initialise energy counters Write 0 to this register*

Example. To obtain System Volts & System Amps on Node 23h
Packet from master format :
Start at system voltage (0000), request 2 regs (0004 words)
[23][03][0000][0004][CRC(2 bytes)]

Response from slave format ;
[23][03][08][8 bytes of data(2 regs x 4 bytes)] [CRC (2 bytes)]

To set both System Volts and System Amps on Node 23h
Packet from the master format :
Start at system voltage (0000), set 2 regs (0004 words)
[23][10][0000][0004][08][8 bytes of data (2 regs x 4 bytes)] [CRC (2 bytes)]
Response from slave format :
[23][10][0000][0004][CRC(2 bytes)]

<u>Function 17 (11hex)</u> - Report Slave ID
This function returns 10 floating point values.

To obtain ID on Node 23h
Packet from master format :
[23][11][CRC(2 bytes)]
Response from slave format :
[23][11][28][40 bytes of data (10 regs x 4 bytes)][CRC(2 bytes)]

The table on the next page lists the various names, their register position in the data portion of the return packet and their usage.

Report Slave ID

Register Name	*Packet Position (register No.)*	
Slave ID	*0000*	*Always 800 (dec)*
Internal use only	*0001*	
Parity Errors	*0002*	*0-255 counter. Resets to zero on count 256*
CRC Errors	*0003*	*0-255 counter. Resets to zero on count 256*
I.D. software Rev.	*0004*	
Spare	*0005*	*Future use*
Spare	*0006*	*Future use*
Spare	*0007*	*Future use*
Spare	*0008*	*Future use*
Spare	*0009*	*Future use*

9. MULTIDIN SPECIFICATIONS

INPUT	
Rated Un	***Direct connected voltages between 57.8 and 600 v. Standard voltages offered :- 63.5/110 V, 69.3 / 120 V, 120 / 208 V, 220/380 V, 230 / 400 V, 240 / 415 V, 277 / 480 V, for 3 ph 4 w 110 V, 120 V, 380 V, 400 V, 415 V, 440 V, 480 V, 3 ph 3 w***
Range	***5-120% Un***
Burden	***0.5VA per phase***
Overload	***1.5 x Un continuous 4 x Un for 1 second***
Rated In	***1 or 5 amp***
Range	***5-120%***
Burden	***0.5VA per phase***
Overload	***4 x In continuous 50 x In for 1 second***
Frequency	***50 / 60 Hz nominal range 45/65Hz***
SYSTEMS	
	Single phase 3 phase 3 wire unbalanced load 3 phase 4 wire unbalanced load
ACCURACY	
Volt	***0.5% of reading ± 2 digit***
Amps	***0.5% of reading ± 2 digit***
Frequency	***0.1Hz ± 1 digit***
Power Factor	***1% of reading ± 2 digit***
Active Power	***1% of reading ± 2 digit***
Reactive Power	***1% of reading ± 2 digit***
Active Energy	***1% of reading (IEC 1036)***
Reactive Energy	***1% of reading (IEC 1036)***
Apparent power	***1% of reading ± 2 digit***
Demands	***1% of reading ±2 digit***

PARAMETERS DISPLAYED

Volts	***L1-L2,L2-L3,L1-L3 (3 ph 3 & 4 wire)*** ***L1-N,L2-N,L3-N (1 ph & 3ph 4wire)***
Amps	***L1,L2,L3***
Frequency	***System frequency L1-N or L1-L3***
Power Factor	***P.F. of system.***
Active power (W, kW, MW)	***Total watts of system.***
Reactive power (VAr, kVAr, MVAr)	***Total VAr's of system.***
Active energy (kW.h)	***Total kW.h of system.***
Reactive energy (kVAr.h)	***Total kVAr.h of system***
Apparent power (VA, kVA, MVA)	***Total VA of system***
Demands	***Total Amps, Watts and VA of system***

OUTPUT RELAY

kW.h pulse output	***Normally open volt free contact 50V 150mA 5W ac/dc***
Pulse rate	***Standard 1 pulse per W.h or kW.h or MW.h depending on input values.***
Pulse duration	***Programmable in steps of 20msec from 20 msec to 200 msec.***

APPLIED STANDARDS

General	***IEC 688 BSEN60688, BS4889, IEC 359***
EMC	***Emissions BSEN50081/2 Immunity BSEN50082/2***
Safety	***IEC 1010, BSEN601010***

INSULATION

Test Voltage	***4 kV RMS 50 Hz for 1 min between inputs / case / relay output. (2.5kV between RS232 output / inputs / case / relay)***
Impulse Test	***EMC 5kV transient comply with IEC 801 / EN 55020***
HF interference	***EHF 2.5 kV 1 MHz comply with IEC 255-4***
Protection Class	***II complying with IEC348 / BS4753 / DIN 57411 / VDE 0411***

AUXILIARY

AC Voltage	***115 / 230 / 400 volts (± 15%) 45 to 65 Hz. burden < 7 VA***

DISPLAY

LCD	***Custom 6 digit plus parameter displayed 7mm high characters Characters black, green backlighting.***

CONTROLS

Two front controls	***Controls for scrolling up or down through parameters being displayed. Used for programming.***

ENVIRONMENTAL

Working Temperature	*0 to +50 deg C*
Function Temperature	*-5 to + 60 deg C*
Storage Temperature	*-10 to +65 deg C*
Temperature Coefficient	*0.01% per deg C*
Relatively Humidity	*0-95% non condensing*
Warm up time	*1 min.*
Shock	*30g in 3 planes*

ENCLOSURE

Standard DIN case	*DIN 96 x 96 x 98mm*
Panel mount	*Via 4 corner brackets and thumb tensioning screws.*
Panel cutout	*92 + 0.8mm x 92 + 0.8mm*
Material	*Black Polycarbonate complying with UL 94 VO*
Terminals	*Screw terminal for 2 x 0.5-3.5mm*
Weight	*0.6kg*

OPTION

Pulsed output	*W.h or VAr.h User programable*
Serial communication	*RS 232 or RS 485 output*
Baud rate programmable	*19200, 9600, 4800, 2400*
Parity programmable	*Odd, even or none*
Stops programmable	*1 or 2*
Addresses programmable	*1 to 247 (RS485 only)*
Transmission distance	*15 metres RS 232*
Transmission distance	*1.2kM RS 485*
Connections	*RS232 + & --* *RS485 + , -- & Sheild (screen)*

Note Shield connection on RS485 units only.