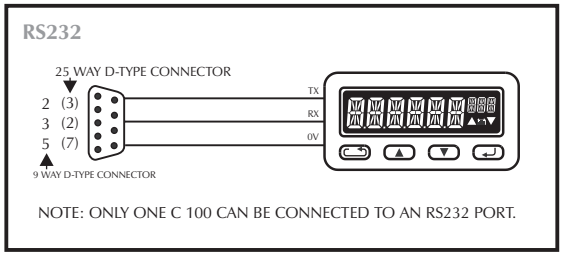
COMMUNICATIONS

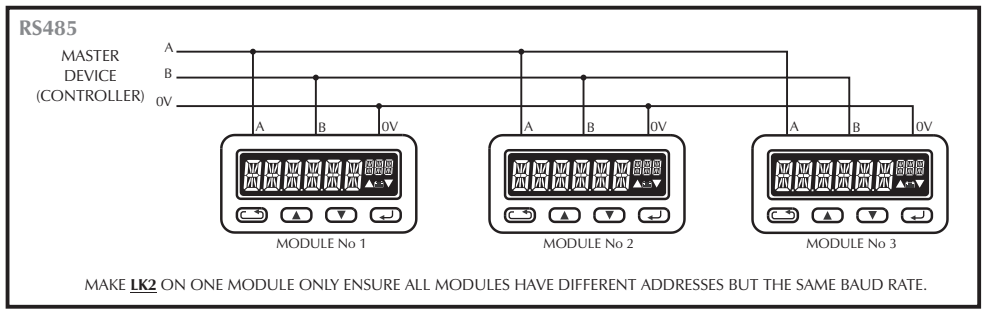
RS232

The RS232 port can be used to communicate with one module at a time. No more than one module must be connected to an RS232 port at any one time. To connect the C 100 to a host RS232 port, follow the diagram below.



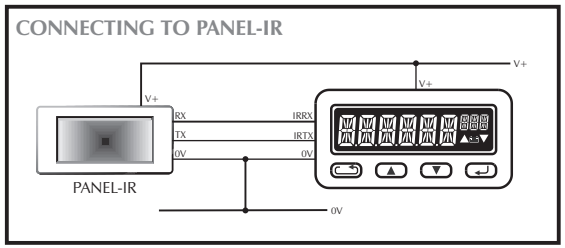
RS485

Multiple modules may be connected to the RS485 port at any one time. The RS485 port can be used to communicate with one module at a time. Ensure that all C 100 modules have different addresses but the same Baud rate. To connect the C 100 to a host RS485 port, follow the diagram below.



INFRARED

To add InfraRed communications capability to C 100, connect it to a PANEL-IR module. The InfraRed port can be used to communicate with one module at a time. Multiple modules may be connected to the InfraRed port at any one time. To connect the C 100 to a Lascar PANEL-IR, follow the diagram below



LASCAR ELECTRONICS LTD.
MODULE HOUSE, WHITEPARISH, WILTSHIRE SP5 2SJ UK
TEL: ++44 (1794) 884567 FAX: ++44 (1794) 884616
E-mail: sales@lascar.co.uk

LASCAR ELECTRONICS INC.
3750 West 26th Street, Erie, PA 16506 USA
TEL: +1 (814) 835 0621 FAX: +1 (814) 838 8141
E-mail: us-sales@lascarelectronics.com

LASCAR ELECTRONICS (HK) LIMITED
FLAT C, 5/FL., LUCKY FTY. bldg., 63-65 HUNG TO ROAD
KWUN TONG, KOWLOON, HONG KONG
TEL: +852 2797 3219 FAX: +852 2343 6187
E-mail: b4lascar@samsongroup.com.hk

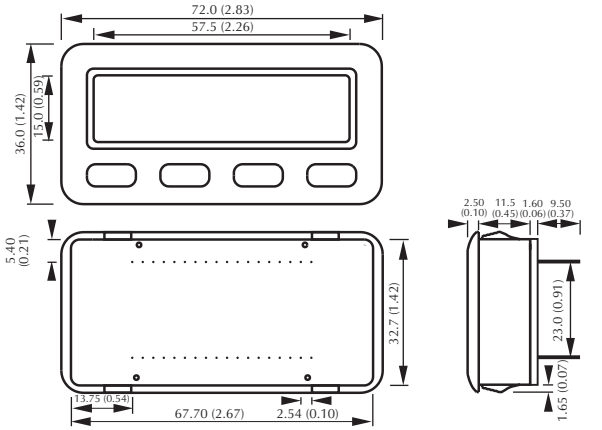
www.lascarelectronics.com

C 100 is the first module in a family of programmable LCD counter modules. This microcontroller-based module is designed round a 6+3 character alphanumeric starburst LCD. The LED backlit display shows the 6 digit counter readings as well as a comprehensive operator menu. Navigation through the menu, using the front keypad, is straightforward and allows the user to select the desired decimal point, as well as three alarm level settings. Besides displaying the measured input, the module can be made to control external events via its five open collector outputs.
C 100 can communicate with other intelligent systems via its built-in RS232 and RS485 communication ports. This module is compatible with Lascar's InfraRed communications products, such as PANEL-IR. To make assembly easy, the meter is housed in a snap-in DIN-sized enclosure.

- 6 Digit Up/Down Counting
- Password Protection
- 5 Open Collector Alarm Outputs
- Leading Zero Blanking
- Modules can be Networked
- Remembers Settings

Standard Meter			Stock Number C 100	
Specification	Min.	Typ.	Max.	Unit
Supply voltage	4.5	5	5.5	V d.c.
Supply current (Backlighting on)		40		mA
Supply current (Backlighting off)		25		mA
Maximum input frequency			15	kHz
Input voltage (Count input)	1		15	V d.c.
Input impedance (Fin = 0Hz)		10		kΩ
Minimum input pulse width	30			µs
Display reading	-99999		999999	
Operating temperature range	0		50	°C
Input transition rise or fall time			30	ms

DIMENSIONS All dimensions in mm (inches)



Panel cut-out
68 x 33 (2.68 x 1.30)

PANEL FITTING

Locate the meter by passing it through the front panel cut-out, gently pushing until the rear of the bezel is flush with the panel.
The snap-in lugs will now automatically hold the meter firmly in position.

WEBSITE: http://www.lascarelectronics.com/

PIN FUNCTIONS

V+	Positive supply voltage.
0V	Negative supply voltage.
COUNT IN	Count measurement input.
0V	Ground for the count input.
LAP IN	When taken High, the last displayed reading is held indefinitely. The internal counter continues to count input pulses. When left floating or taken Low, the display is normally updated.
STRT/STP	The counter starts when STRT/STP is taken High. The counter stops when STRT/STP is taken Low. The counter continues when STRT/STP is taken High again.
RES IN	Resets the display to the preset value.
UP-DN	Take High to count up. Take Low to count down.
HIGH	High Alarm output. Open collector output, capable of sinking up to 50mA. Goes Low when the reading is equal to or larger than the preset Hi Alarm value.*
LOW	Low Alarm output. Open collector output, capable of sinking up to 50mA. Goes Low when the reading is equal to or larger than the preset Lo Alarm value.*
232 TX	RS232 communications port (transmit line).
232 RX	RS232 communications port (receive line).
0V	Ground for the RS232 and RS485 communications ports.
485A	RS485 communications port.
485B	RS485 communications port.
RESET	Take Low to reset the module.**
IR RXD	InfraRed Receive connection.
IR TXD	InfraRed Transmit connection.
0V	Ground for InfraRed section.
NC5	Not connected.
NC4	Not connected.
NC3	Not connected.
NC2	Not connected.
NC1	Not connected.
ZERO	Zero output. Open collector output, capable of sinking up to 50mA. Goes Low when the reading is equal to zero.*
=	Equals output. Open collector output, capable of sinking up to 50mA. Goes High when the reading equals the preset value.*
C/O	Carry output. Open collector output, capable of sinking up to 50mA. Goes Low when the count exceeds 999999 or -99999 (overrange).
NC0	Not connected.
SW4	External switch input. Take Low momentarily to mimic the front panel ESC button.
SW3	External switch input. Take Low to mimic the front panel UP button.
SW2	External switch input. Take Low to mimic the front panel DOWN button.
SW1	External switch input. Take Low to mimic the front panel ENTER button.

Due to the interrupt driven nature of the inputs, there are small input response delays. These will only be significant at high input frequencies.

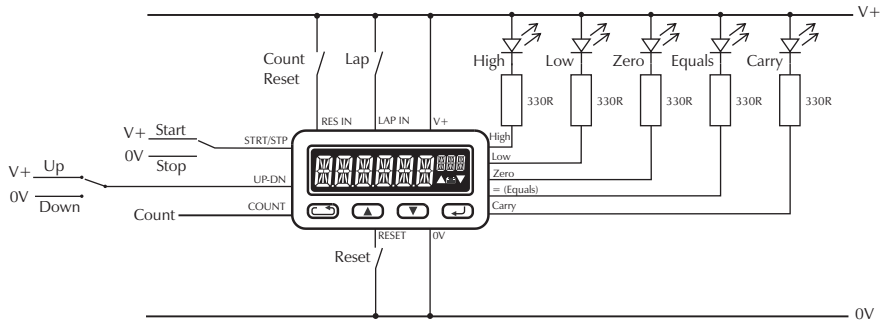
	↓	↑	Min. Pos. Pulse Width
Start/Stop	100µs	150µs	150µs
Lap	150µs	100µs	1ms
Up/Down	200µs	200µs	350µs
Reset	330µs	125µs	1ms

Any serial communications or key presses can affect these response times and induce additional errors.

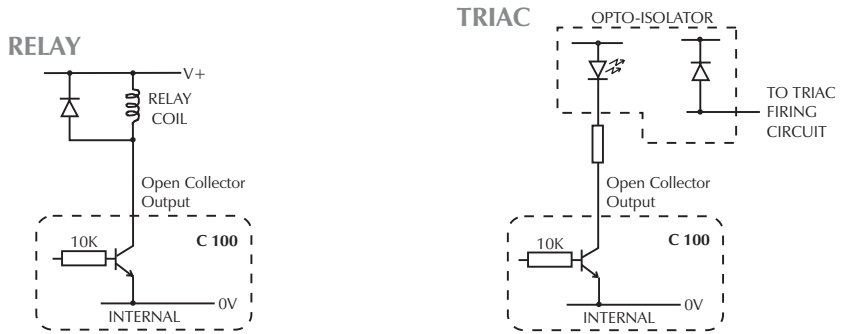
Low = 0V
High = +5V

Note:
*Alarms must be enabled. The alarms are activated every 0.1 second. If the Zero level or Equals level are passed within the evaluation period, the relevant alarm output and buzzer will be activated at the next evaluation point for a duration of 0.1 second.
* *When reset is taken Low, all the module's settings are reset to the last ***saved*** settings, otherwise the default values are used.

APPLICATIONS



Evaluation Circuit showing use of C100 inputs and outputs.

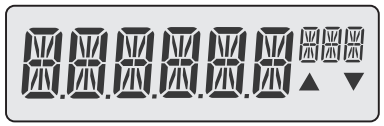


Using an Open Collector Output to drive a Relay or a Triac.
(HI AL, LO AL, ZERO, EQUALS, CARRY outputs)

IMPORTANT SAFETY INFORMATION

To comply with the Low Voltage Directive (LVD 93/68/EEC), input voltages to the module's pins must not exceed 60Vdc. If voltages to the measuring inputs do exceed 60Vdc, then fit scaling resistors externally to the module. The user must ensure that the incorporation of the C 100 into the user's equipment conforms to the relevant sections of BS EN 61010 (Safety Requirements for Electrical Equipment for Measuring, Control and Laboratory Use).

DISPLAY INDICATORS



6 Large Starburst Digits

- In Normal Mode, the 6 Large Starburst Digits are used to display the count value.
  In Menu Mode, the 6 Large Starburst Digits are used to display the menu options.

3 Small Starburst Digits

- In Normal Mode, the 3 Small Starburst Digits are used to display the chosen engineering symbol (Annunciator).
  In Menu Mode, the 3 Small Starburst Digits are used to display some of the menu options.

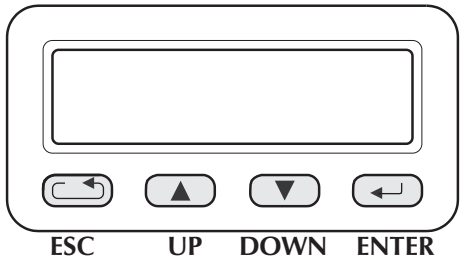
Up Arrow

- In Normal Mode, the Up Arrow indicates that the displayed reading has exceeded the High Alarm level.
  In Menu Mode, the Up Arrow indicates that one or more menu options are available by pressing the Up Arrow button.

Down Arrow

- In Normal Mode, the Down Arrow indicates that the displayed reading has exceeded the Low Alarm level.
  In Menu Mode, the Down Arrow indicates that one or more menu options are available by pressing the Down Arrow button.

FRONT KEYPAD FUNCTIONS



In NORMAL MODE

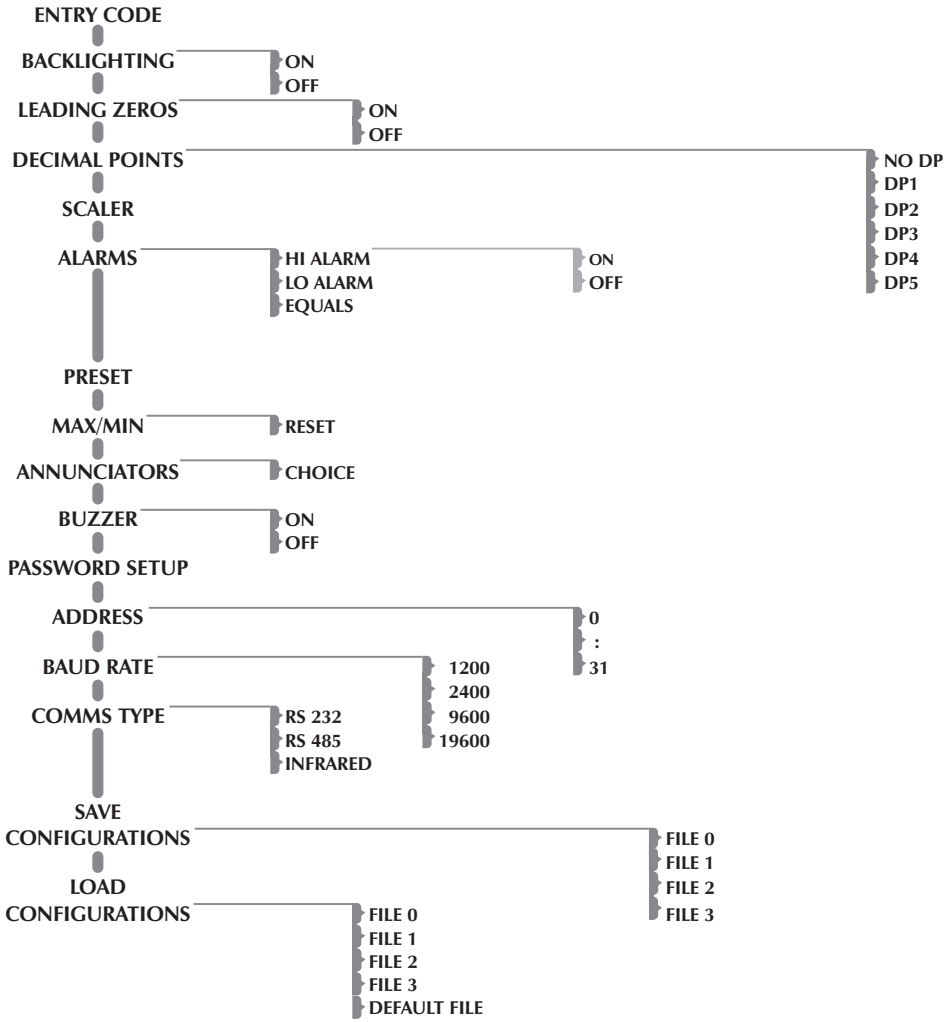
ESC	:	Toggles LED backlighting on and off and exits from MAX and MIN readings.
UP	:	Displays highest count value since power-up (MAX).
DOWN	:	Displays lowest count value since power-up (MIN).
ENTER	:	Enters operator menu at password level.

In MENU MODE

ESC	:	Escapes the operator to the previous menu level or progresses to the next digit when entering values.
UP	:	Scrolls upwards through the available options until the end of the options list has been reached. Only available if the Up Arrow is shown on the LCD.
DOWN	:	Scrolls downwards through the available options until the end of the options list has been reached. Only available if the Down Arrow is shown on the LCD.
ENTER	:	Toggles between available options or selects current option, depending on location in menu.

When using the keypad, input functions (i.e.: Start/Stop) and serial communications, this will cause the display update to be momentarily paused. However, no counts are missed.

THE MENU MAP



The module will remember the current configuration settings for as long as the module receives a correct supply voltage. When power is removed (or reduced below the "correct" supply voltage) and re-applied, all settings are lost, and the module powers up to the last saved settings. If none were saved, the module powers up to the factory default settings. To avoid losing your settings, save them in one of four "File" locations. See Saving on page SW5 for details on how to save configuration settings.

SERIAL PROTOCOL

Additional Command Details

"ALL"
Sends data about the setup of the meter to the master unit. The following data is sent.

FIRMWARE VERSION
ALARM ON/OFF
HIGH ALARM VALUE
LOW ALARM VALUE
EQUALS ALARM VALUE
SCALING VALUE
PRESET VALUE
LEADING ZEROS ON/OFF
DP SELECTION
ANNUNCIATORS
BACKLIGHT ON/OFF
BUZZER ON/OFF

Notes:
Do not try to link up more than one module to a RS232 serial bus as it is only designed for two devices (transmitter & receiver).

RS232 and RS485 communications require 8 Data Bits, 1 Stop Bit and No Parity.

All serial communications must be started with an address aa, the default value of which is "00". Two or more modules sharing the same RS485 serial bus cannot have the same address or all will try to reply at once, giving an error condition. If the address of the module is not known, then use **<command>, where ** is used as an 'any meter reply' command. To avoid device conflict when using this command, only one counter should be attached to an RS485 serial bus at any one time.

All commands must be followed by a CRLF (Carriage Return & Line Feed). The serial port has a certain amount of memory allocated which will loop around if too many characters are sent, therefore protecting against bad data.

A response of '1' shows that the module has responded.
A response of '0' usually shows that an illegal value has been input by the user, although a counter was attached at that address.
No response indicates that no meters are connected to that address.

SERIAL PROTOCOL

All commands are case-sensitive and must be preceded by a two digit address *aa*, corresponding to the meter's address. The default address is 00.

DESCRIPTION	ADDRESS	COMMAND	RESPONSE
ALARMS			
ALARMS ON	aa	A1	1
ALARMS OFF	aa	A0	1
SET LOW ALARM VALUE	aa	ALxxxx	1
SET HIGH ALARM VALUE	aa	AHxxxx	1
SET EQUALS VALUE	aa	AExxxx	1
COMMUNICATIONS			
NEW BAUD RATE (1200BPS)	aa	B0	1
NEW BAUD RATE (2400BPS)	aa	B1	1
NEW BAUD RATE (9600BPS)	aa	B2	1
NEW BAUD RATE (19200BPS)	aa	B3	1
NEW ADDRESS (00 - 31)	aa	Nxx	1
COMMS SELECTION (RS232)	aa	I0	1
COMMS SELECTION (RS485)	aa	I1	1
COMMS SELECTION (INFRARED)	aa	I2	1
(The response will be in the newly selected mode.)			
MAX/MIN, LEADING ZEROS, SCALER, PRESET			
READ MAX VALUE	aa	M0	MAX VALUE
READ MIN VALUE	aa	M1	MIN VALUE
RESET MAX/MIN VALUES	aa	M2	1
LEADING ZEROS ON	aa	Z1	1
LEADING ZEROS OFF	aa	Z0	1
SET SCALER	aa	Dxxxx	1
SET PRESET	aa	Cxxxx	1
DP SELECTION			
ALL DP'S OFF	aa	J0	1
DP1 SELECTION	aa	J1	1
DP2 SELECTION	aa	J2	1
DP3 SELECTION	aa	J3	1
DP4 SELECTION	aa	J4	1
DP5 SELECTION	aa	J5	1
GENERAL			
HELLO ?(Any meters attached?)	aa	R	1
READ MODULE SERIAL NUMBER	aa	F0	SER NO
BACKLIGHTING OFF	aa	G0	1
BACKLIGHTING ON	aa	G1	1
BUZZER ON	aa	Q1	1
BUZZER OFF	aa	Q0	1
CURRENT LCD READING	aa	V	LCD READING
"ALL"	aa	X	INFO (See next page for details.)
SET ANNUNCIATORS	aa	Exxxx	1
LOAD DEFAULT SETUP	aa	UD	1
LOAD SETUP FROM FILE n	aa	Uln (n=03)	1
SAVE EXISTING SETUP TO FILE n	aa	Usn (n=03)	1

THE OPERATOR MENU

The user can configure the C100 via the 4 push buttons on the front of the module. Alternatively, use the SW1 to SW4 pins on the rear.

MENU FUNCTIONS

Press ENTER, then enter the passcode. UP and DOWN change the digit to the required code. ESC progresses to the next digit. Press ENTER on the correct code to gain access to the configuration menu. The default code is 0000.

LCD Backlighting : BACK L

This module features LED Backlighting to illuminate the LCD under low light conditions.

- Default state: ON.
- Pressing ENTER will toggle the backlighting ON/OFF. (when saved, this determines the condition on power up) Note: in Normal Mode, ESC toggles the backlighting ON/OFF. While ESC is pressed, the reading update may be momentarily delayed.

Leading Zero: ZEROS

In applications where Leading Zeros (e.g. 000582) are not required, these can be blanked (e.g. 582).

- Default state: ON (all leading zeros are visible).
- Pressing ENTER will toggle the leading zeros ON/OFF.

Decimal Point Selection: DP

Choose the appropriate Decimal Point for your readout.

- Default state: No Decimal Points are displayed.
- Press ENTER to go to the Decimal Point submenu.
- UP and DOWN scroll through the available options (No DP, DP1 ... 5).
- Pressing ENTER selects the required Decimal Point.

Scaler Selection: SCALER

Choose the appropriate Scaling Factor for your count input.

- Default value: 0001 (divide by 1).
- Press ENTER to modify the scaling factor up to a maximum of 1999 (divide by 1999).
- UP and DOWN change the digits to the required Scaler. ESC progresses to the next digit.
- Pressing ENTER accepts the new Scaler.

Alarm Levels and Equals: ALARMS **(see note below PIN FUNCTIONS)**

When a HI Alarm, LO Alarm or the Equals (=) output is tripped, the corresponding output will go Low, the Up or Down arrow will be displayed (except at Equals) on the LCD and the buzzer will sound if it has been enabled in the menu.

- Default state: No Alarm or Equals levels set.
- Press ENTER to go into the Alarms menu. UP and DOWN scroll through the four programmable alarm options:
  - AL ON/OFF - Pressing ENTER will toggle the Alarms (HI AL and LO AL), EQUALS, ZERO and CARRY ON/OFF. The effect on the open collector outputs and buzzer is immediate.
  - HI AL Set a value for the high alarm level between -99999 and 999999.
    - Press ENTER and the display reads any previously set value (Default is 100000).
    - UP and DOWN change the polarity and digit values. ESC progresses to the next digit.
    - Pressing ENTER accepts the HI AL setting. The effect on the HI output and buzzer is immediate.
  - LO AL Set a value for the low alarm level between -99999 and 999999.
    - Press ENTER and the display reads any previously set value (Default is 10000).
    - UP and DOWN change the polarity and digit values. ESC progresses to the next digit.
    - Pressing ENTER accepts the LO AL setting. The effect on the LO output and buzzer is immediate.
  - EQUALS Set a value for the Equals level between -99999 and 999999.
    - Press ENTER and the display reads any previously set value (Default is 000000).
    - UP and DOWN change the polarity and digit values. ESC progresses to the next digit.
    - Pressing ENTER accepts the EQUALS setting. The effect on the EQUALS output and buzzer is immediate.

Presetting the Counter: PRESET

The counter can be preset with a value between -99999 and 999999 and can count up or down from that value onwards.
- Default value: 000000
- Press ENTER to select a new Preset value. The display reads 0000. UP and DOWN change the digits to the required value. ESC progresses to the next digit.
- Pressing ENTER accepts the new Preset value.

Maximum and Minimum Readings: MAXMIN

The module can memorise the highest and lowest encountered readings (MAX and MIN) since power-up.
- Note: In Normal Mode, UP displays the highest encountered reading since power-up,
  DOWN displays the lowest encountered reading since power-up.
  This has no effect on the status of the Alarm and Equals outputs and on the buzzer.
- Default state: Module remembers the highest and lowest encountered readings.
- Pressing ENTER in this part of the menu resets the MAX and MIN values to zero.

Annunciator Selection: ANNUN

Select one from a choice of preprogrammed Engineering Units.
- Default state: No annunciators displayed.
- UP and DOWN scroll through the available options (Current Selection, Hz, kHz, MHz, x10, 000, QTY, deg, kWh, m/s, l/m, l/s, None)
- Pressing ENTER selects the required Annunciator.

Audible Feedback: BUZZER **(see note below PIN FUNCTIONS)**

The module features a buzzer which emits a tone when a key is pressed or when an Alarm level or the Equals level has been reached.
- Default state: OFF
- Pressing ENTER toggles the buzzer ON/OFF. The effect of the HI, LO and EQUALS (=) alarm levels on the buzzer is immediate.

Passcode Protection: CODE

The module incorporates a four digit Passcode facility. This security feature allows a system administrator to ensure that the configurations set up via this menu cannot be changed, either by accident or malice.
- Default value: 0000
- Press ENTER to select a new Passcode. The display reads 0000.
  UP and DOWN change the digits to the required code. ESC progresses to the next digit.
- Pressing ENTER accepts the new Passcode.

DO NOT FORGET YOUR PASSCODE AS WITHOUT IT, YOU CANNOT ENTER THE MENU SYSTEM.

Module Address: ADDR

Each module in a networked system can be assigned its own unique address, ranging from 0 to 31 inclusive.
- Default address: 00
- Press ENTER to activate Address selection.
  UP and DOWN select the required module Address.
- Pressing ENTER accepts the new Address.

Note: To avoid communication conflicts in a networked system, no two modules must share the same address.

Baud Rate: BAUD

Select an appropriate Baud rate to communicate with the module over an RS232, RS485 or InfraRed link.
- Default value: 9600
- Press ENTER to activate Baud rate selection.
  UP and DOWN select the required Baud rate from 1200, 2400, 9600 and 19200 Baud.
- Pressing ENTER accepts the new Baud Rate.

Communications: COMMS

Select an appropriate communications link.
- Default state: RS232
- Press ENTER to activate Comms selection.
  UP and DOWN select between RS232 (232), RS485 (485) and InfraRed (IR).
- Pressing ENTER accepts the new Communications Link.

Configuration File Saving: SAVE

Save configuration settings to one of 4 memory files. This allows different set-ups to be easily Loaded from file without the need to set up a complete menu's worth of configurations. On power up, the module loads the last saved settings.
- Default file: File 0.
- Press ENTER to activate File selection.
  UP and DOWN select from Files 0, 1, 2, 3 or Default.
- Pressing ENTER accepts the new Save file.

Configuration File Loading: LOAD

Load a configuration file from memory.
- Default file: Default file.
- Press ENTER to activate File selection.
  UP and DOWN select from Files 0, 1, 2, 3 or Default
- Pressing ENTER accepts the new Configuration File.