Raymarine®
A FLIR COMPANY

Analogue Display

EMC Conformance

All Raymarine equipment is designed to the best industry standards for use in the recreational marine environment. The design and manufacture of Raymarine equipment conforms to the appropriate Electromagnetic Compatibility (EMC) standards. Correct installation is required to ensure that performance is not compromised.

Important

Due to the wireless communication systems used in Micronet instruments they are only recommended for use on boats up to 18 meters (60 ft.) ***Before installing to a boat of aluminum or steel construction, please contact your Raymarine dealer.***

Like any other Electronic instruments your Micronet system is designed to serve only as an aid to navigation and it remains the skippers responsibility to maintain a permanent watch and be aware of developing situations.

1 Information

1.1 Introduction

Your Micronet display is powered for life by the environment. Although feature packed and highly visible in all conditions, current demand is so low, and the supply so efficient, that the solar-powered display is self sufficient. Combined with other displays in the Micronet range this display becomes part of a complete navigational system.

1.2 Specifications

Height of digits: 7mm (0.28")
Backlighting: 3 levels with daylight shutoff
System-wide or local control
Power: Solar Powered
300 hrs autonomy by day, 7 nights at brightest backlighting, 20 nights at economy backlighting without charge
Units of display: Wind Speed (knots, meters per second, Beaufort)
Alarm: Audible Alarm for lost network
Weight: 285g (0.63lbs)
Operating Temp.: -10^{O} to +60^{O}C (14^{O} to 140^{O}F)
Frequency: 868 MHz or 916 MHz

This unit can be controlled using the T113 Remote Display

1.3 Power Management and Battery Life

What makes your mn100 display possible is Raymarine's revolutionary approach to power management. By reducing the amount of power being used by the electronics and maximizing the potential of the sun to provide power, a mn100 display becomes a virtually perpetual device. Power status is indicated by two icons on the display:

Battery Level  and  Charge Rate

Used together these icons will show the condition of the power supply.

Bright Sunny Day 		Battery is charged and being topped up by the sun. (see Note)
		Battery is low and being charged by the sun.
Overcast Day 		Battery is charged and requires no further charging.
		Battery is low but maintaining it's level.
Night 		Battery is charged but is not charging.
		Battery is low with no charging.
LOW Power		It is recommended that the instrument be left in daylight for some time for the battery to recover, or charge from an external 9-30V power source. A fully discharged battery will recharge in approximately 12 hours of direct bright sunlight.

If using the displays at night, power usage can be reduced dramatically by switching the backlighting to level 1 or Off. If backlighting is not required on displays located below decks it is best to set them to "Local" backlighting control (see page 15 –s9) so that power is not being wasted in displays which may not be visible from the one being viewed.

If the internal battery is fully charged then it does not matter how much the display is subjected to bright sunlight no further charging is required and the Charge Rate Indicator will remain low.

If the displays are to be stored for a long period of time before next use (over winter) ensure that the batteries are fully charged before storage. If necessary connect to a 9 to 30V DC power supply for 24 hrs prior to storage.

Sleep Mode

If there is no boat speed or change in heading registered on the system for a period of 12 hours your Micronet display will switch off to conserve power. A "POWER SAVE" alarm will sound before the system switches off. Pressing any button within 10 seconds of the alarm sounding will allow the system to remain switched on.

Backlighting will automatically shut down/off when operated in daylight.

Artificial light WILL NOT recharge the battery. Placing your Micronet display close to an artificial light will seriously damage the display. Only recharge in natural daylight.

Applying External Power

In cases where displays are mounted permanently below decks it will be necessary to apply an external power source to prevent complete discharge of the built in battery.
Connections on the rear of the display allow a 9V to 30V DC power source to be connected. Connections can be made to the vessels DC system or a 9V battery pack may be connected. It is recommended that permanent connection is only made when the displays are permanently fixed to the vessel and not when the clip brackets are used.

Connection to a 9V (PP3) battery will fully recharge the internal battery over a period of 24 hours.

1.4 Safety and Disposal

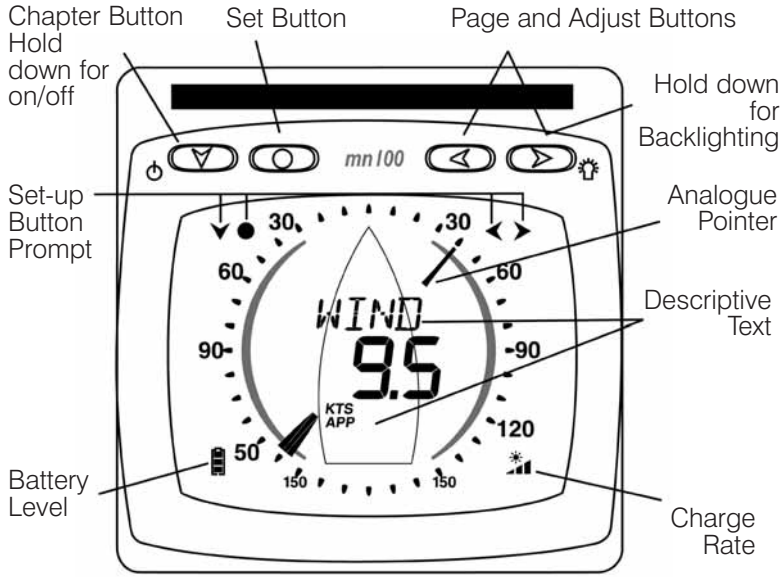
Your Micronet display contains Manganese Lithium Dioxide batteries which should be disposed of correctly. Do not dispose of any instrument in domestic waste. Refer to regulations in force in your country.
If in doubt return the instrument to Raymarine Ltd. for correct disposal.

2 Operation

Important:

Ensure that the "Auto Network" procedure described on the yellow instruction sheet and full Setup and Calibration has been performed correctly before attempting to use your Micronet system.

2.1 Display Information



Display Icons

The following icons are used to display information on the screen

KTS, **M/S** to display wind speed units

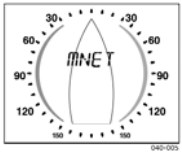
TRU, **APP** to indicate true or apparent wind

o to indicate degrees of angle

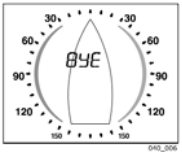
2.2 Switching the System On and Off

To switch your Micronet system on or off select any display and press the button for 2 seconds.

Switch On



Switch Off



2.3 Backlighting

At any stage of the display's operation press and hold for 2 seconds the button to access the lighting control.

Pressing the and buttons will scroll through the options: OFF, 1, 2 and 3 whilst changing the backlighting.
Depending on the display setup (see page 15 -s9), backlighting on the whole system or just the single display will be altered.

Backlighting is automatically switched off in daylight as part of the display's power saving feature and will not operate in daylight.

2.4 Audible Signals and Alarms

At stages during its operation your Micronet display will beep to indicate alarms or moments of importance.

Power-up Once operating as part of a network the display will issue a single beep as it is switched on by pressing the button for 2 second.

Button Press A single beep is issued each time a button is pressed. A second beep is issued after a 2 second hold down of the button.

Alarm Continuous bursts of three beeps indicates a lost network alarm. The alarm is indicated on the digital display. Pressing any button will silence the alarm. See fault finding section on p23.

2.5 Utilities

Keylock The Keylock feature protects from accidental key presses and is intended for use in high activity applications such as crewed race yachts. If your display is mounted in a position where keys may be pressed accidentally (eg the companionway of a race yacht), then you can enable keylock as follows:

Press and hold ● to enter set up
Press ▼ repeatedly to reach the **OPTS** chapter

Press ➤ repeatedly to reach the **Key Lock** page
Press ● to activate keylock.
Press and hold ● to exit setup.

Once keylock is activated, pressing a key causes the unit to give the unlock key prompt. Press ◄ followed by ➤ to unlock the keys (this will allow the keys to function for one minute, after which the keys will automatically relock).

Page Hiding To hide unwanted pages and configure an instrument to your needs:
Press and hold ● to enter set up
Press ▼ repeatedly to reach the **OPTS** chapter

Press ➤ repeatedly to reach the **Page Hiding** page
Press ● to activate page hiding for 5 minutes
Press and hold ● to exit setup.

Once page hiding is activated:
Press ◄ for 2 seconds to hide a page
A period of 5 minutes is allowed during which you can select pages to hide.

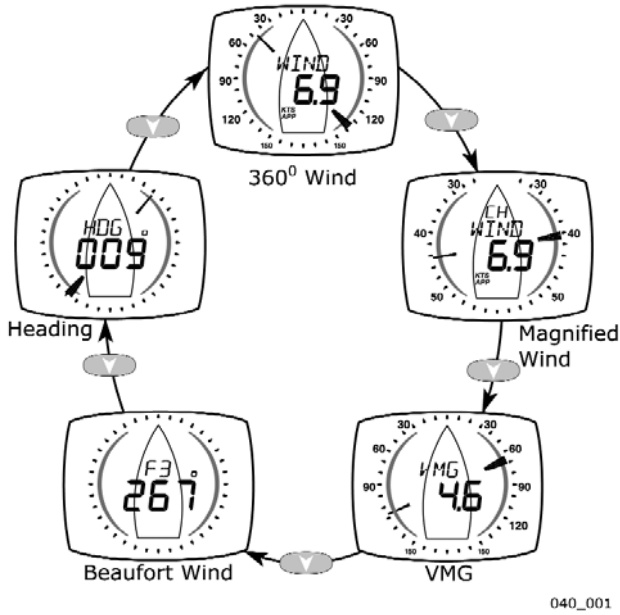
Page Unhide To clear Page Hiding and return to all pages visible:
Press and hold ● to enter set up
Press ▼ repeatedly to reach the **OPTS** chapter
Press ➤ repeatedly to reach the **Pages Hidden** page

The display shows the number of pages hidden
Press ● briefly to unhide the pages, the display counts down from 3
Press and hold ● to exit setup.

2.6 Chapter and Page Operation

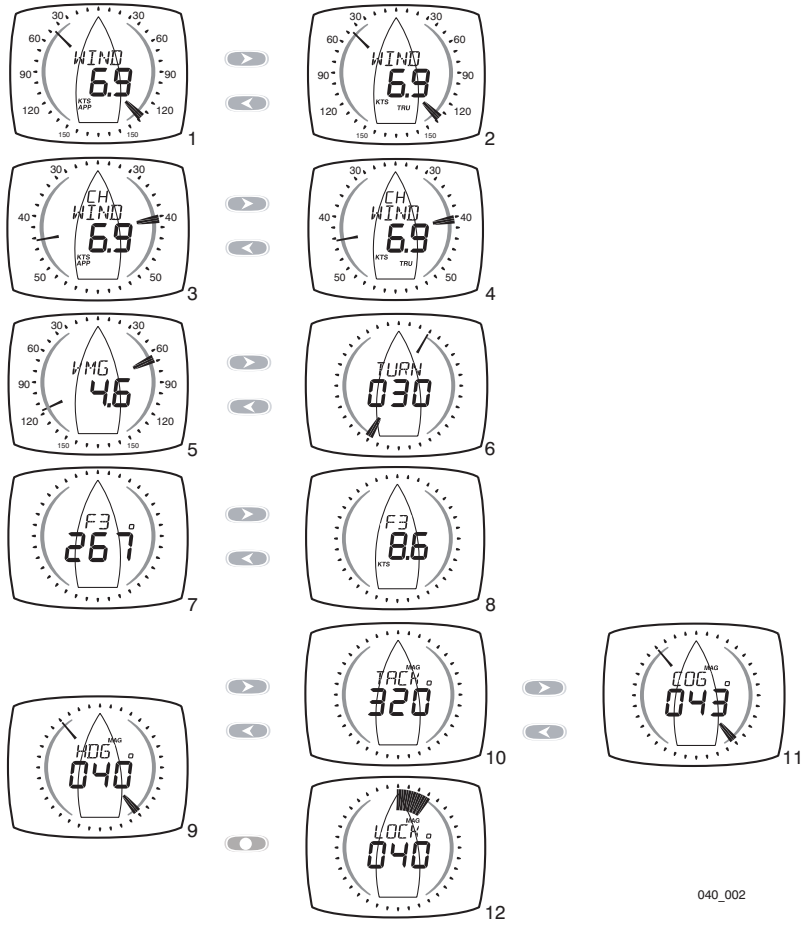
Information is displayed in a "Chapter and Page" format using the button to scroll through the chapters and the and buttons to move between pages.

The diagram below shows the information format.



Default Chapter Selection

Pressing the button at any time will move on to the next chapter and on scrolling through the chapters the page last selected in that chapter will be displayed. Both chapter and page selection will scroll back to the first page once a cycle has been completed.



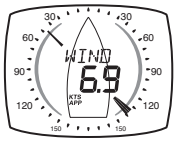
Page Selection

For a full description of each page refer to items 1 to 12 on the following pages.

2.7 Chapter and Page Descriptions

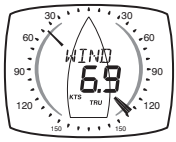
360 Degree Wind Chapter

1 Apparent Wind Angle and Speed



The apparent wind angle and speed with respect to the vessel as measured by the Wind Transmitter.
The wind angle is shown on a 360 degree scale.

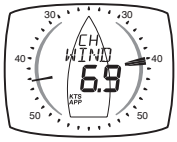
2 True Wind Angle and Speed



The true wind angle with respect to the vessel and the true wind speed calculated by the display taking into account the vessels speed through the water. Apparent wind speed, angle and boat speed must be available for this calculation.
The wind angle is shown on a 360 degree scale.

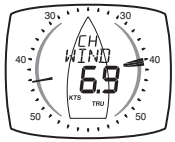
Magnified Wind Chapter

3 Magnified Apparent Wind Angle and Apparent Wind Speed



The apparent wind angle and speed with respect to the vessel as measured by the Wind Transmitter.
The wind angle is displayed on a 26 to 60 degree scale.
Downwind, the same scale is used to show the wind angle measured from the aft of the boat. The pointer will flash when outside of the 26-58 degree upwind/downwind range.

4 Magnified True Wind Angle and True Wind Speed



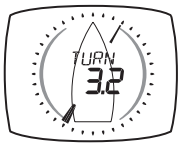
The true wind angle with respect to the vessel and the true wind speed calculated by the display taking into account the vessels speed through the water. Apparent wind speed, angle and boat speed must be available for this calculation
The wind angle is displayed on a 26 to 60 degree scale.
Downwind, the same scale is used to show the wind angle measured from the aft of the boat. The pointer will flash when outside of the 26-58 degree upwind/downwind range.

VMG Chapter

5 VMG - Velocity Made Good to Windward and True Wind Angle

True wind angle (see above) is displayed on a 360 degree scale.
The vessels speed directly upwind is shown in the text display. This value is calculated by the display from the boat speed and true wind angle.

6 Turn



The pointer shows the direction of the target waypoint relative to the bow of the boat.
The display shows the distance to the waypoint. The distance is displayed in the currently selected system distance units (default Nautical Miles).

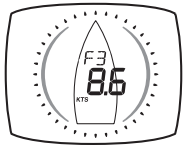
The Turn page uses GPS COG and BTW and therefore takes tide and set into account. With the pointer dead ahead, your course is directly to the waypoint, but you may not be pointing at the waypoint..

Beaufort Chapter

7 Beaufort Wind Speed and Direction

The true wind speed and direction over the ground are displayed using the Beaufort scale, calculated by the display taking into account the vessels speed through the water and compass heading.
Apparent wind speed, angle, boat speed and current heading must be available for this calculation.

8 Beaufort Wind Speed and wind speed in knots



The windspeed over the ground is displayed in the Beaufort scale and in knots.

Heading Chapter

Heading values will be displayed as either magnetic or true depending on the the system compass setting.
The heading value displayed will also be affected by the calibration routine for the compass.
The system compass setting and calibration can only be changed by a Digital or Dual Digital Display.

9 Heading.

The current compass heading of the vessel as measured by the Compass Transducer.
The pointer indicates the direction of North.

10 Tack

The compass heading that the vessel will follow should it tack through the wind, calculated by the display. Apparent wind angle and magnetic heading must be available for this calculation to be made.

11 COG

The vessel's course over the ground as calculated by the GPS Antenna.
The pointer points to the direction of North.

12 Locked heading

To help a helmsman steer to a target heading, press the button from the heading page to lock onto the current heading. The display will show the target heading in degrees and this can be increased or decreased with the and buttons. The heading deviation from target is shown as a fan, the larger the fan the further off course.
To return to the heading page, press the button

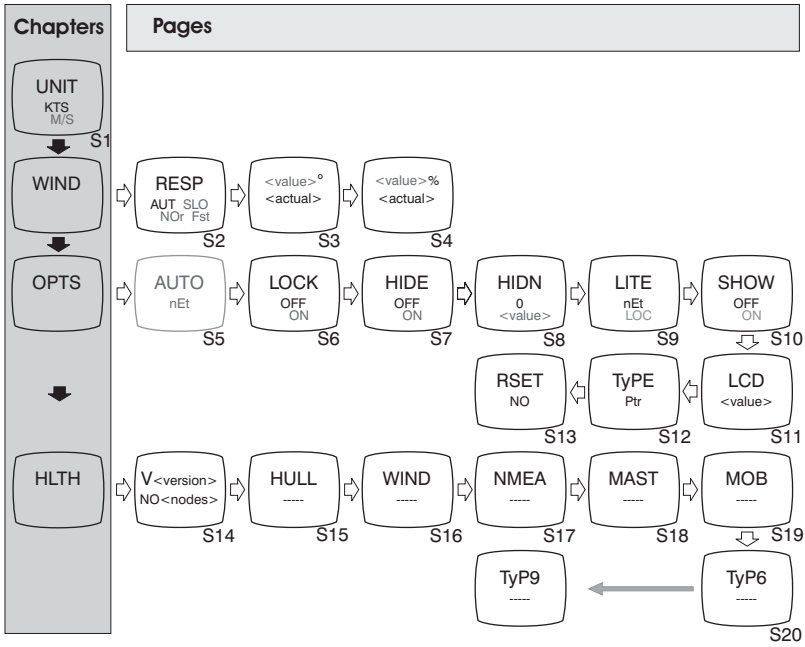
3 Setup and Calibration

3.1 Entering Setup and Calibration Mode

To enter the Setup and Calibration Menu press and hold for 2 seconds the button.

3.2 Chapter and Page Setup and Calibration

Setup and calibration functions are displayed in a "Chapter and Page" format using the button to scroll through the chapters and the and buttons to move between pages. The diagram below shows the information format.



Unlike normal operation you must scroll to the chapter heading page before moving to another chapter.

3.3 Editing Values

To adjust any settings press the button. The setting will start to flash and the and buttons will change the value. Then press the button again to save the new setting.

3.4 Setup Page Description

UNIT - Units Chapter

Press the button quickly to edit, press the or to change units and press the button quickly to select the chosen units. Default values are indicated in **bold.**

s1 Wind Speed

Sets the units in which all Wind Speed related information is displayed. **KTS (Knots)** or M/S (meters per second).

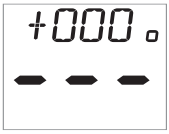
WIND - Wind Chapter

Press the button quickly to edit, press the or to change units and press the button quickly to select the chosen units. Default values are shown in **bold**.

s2 Response

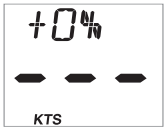
Sets the update period of the Wind display.
AUt (Auto) / SLO (Slow) / nOr (Normal) / FSt (Fast)

s3 Wind Angle



Aligns the displayed apparent wind angle with the actual wind direction with respect to the boat. See page 18 for calibration.

s4 Wind Speed



Adds a percentage factor which corrects the information from the Wind Transmitter and ensures the Apparent Wind Speed is displayed correctly. See page 18 for calibration.

OPTS - Options Chapter

Press the button quickly to toggle the values between settings or press the button quickly to edit, press the or to change values and press the button quickly to select the chosen value. Default values are shown in **bold**.

s5 **Auto Networking**

Only available on the display which was used to power up the system.
Refer to the "Auto Network" sheet for further information.

s6 **Key Lock**

Enables or disables the keylock function. See page 7, section 2.5.

s7 **Page Hiding**

Permits the hiding of unwanted pages.
See page 7, section 2.5.

s8 **Pages Hidden / Unhide Pages**

Shows the number of pages currently hidden and permits clearing of the page hiding function
See page 7, section 2.5.

s9 **Light**

Tells the display to control the system Backlighting or just its own Backlighting. **nEt (network)** / LOC (local).

s10 Boat Show

Allows the display of information when NOT installed as part of a Micronet system for demonstration purposes only.
Off / On.

s11 LCD Contrast

Adjusts the viewing angle and contrast of the LCD display to improve visibility under varied mounting possibilities.
Optional values 1 - 7, default **4**.

s12 Pointer Type

Toggles the width of the pointer.
If the viewing position is more than 1 metre away from the analogue display, then the viewability can be improved by selecting the wider pointer type.

s13 Factory Reset

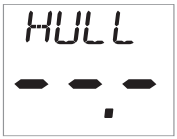
Returns all the calibration settings to the factory default values.

HLTH - Health Chapter

s14 Software Version / Network Nodes

Shows the display's software version, battery level and charge rate to assist in troubleshooting and fault finding.
If the display is the "Master" (the one used to switch on the system) then the number of items (nodes) in the system will be shown.
If the display is a "Slave" (was switched on by the system) then the signal strength to the "Master" will be shown.

s15 Hull Transmitter Signal Strength

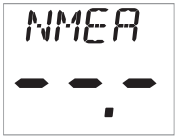


Shows the software version (before the decimal point), signal strength (after the decimal point) and battery condition (level and charge rate) of the Hull Transmitter to assist in trouble shooting and fault finding.

s16 Wind Transmitter Signal Strength

As above but for Wind Transmitter information.

s17 Wireless (NMEA) Interface Signal Strength

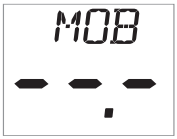


As above but for Wireless (NMEA) Interface information.

s18 Mast Angle Sensor Signal Strength

As above but for Mast Angle Sensor information.

S19 MOB Sensor Signal Strength



As above but for MOB sensor information.

S20 - Type 6 to Type 9

reserved for future use.

4 Seatrial and Calibration

Once the Micronet system has been Autonetworked and installation on the vessel has been completed it is necessary to carry out calibration.

It is not safe to use the displays for navigational purposes until calibration has been carried out correctly.

4.1 Wind Calibration

Both wind speed and direction can be calibrated to ensure that readings from the Wind Transmitter are displayed accurately.

Wind Angle Offset

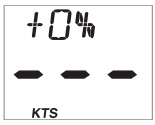
Motor the vessel directly into the wind.
Press and hold the button for 2 seconds to enter Setup
Press the button repeatedly to scroll to the **WIND** chapter

Press button to move to the **Wind Angle Offset** page
Press the button to enter Edit Mode
Press the and buttons to change the displayed value to 000.
The upper digits will indicate the number of degrees of offset entered.
Press the button to exit Edit Mode
Press and hold the button to exit Setup.

Wind Speed Correction

Wind speed reading is factory calibrated to display correctly and should not be altered unless external factors are thought to be causing incorrect readings. Correction should only be carried out if a known correct windspeed is available.

Press and hold the button for 2 seconds to enter Setup
Press the button repeatedly to scroll to the **WIND** chapter
Press the button to advance to the **Wind Speed** page



Press the button to enter Edit Mode
Press the and buttons to change the displayed value to the required percentage.
The lower digits will indicate the displayed wind speed.
Press the button to exit Edit Mode
Press and hold the button to exit Setup.

5 Installation

5.1 Tools list and Parts

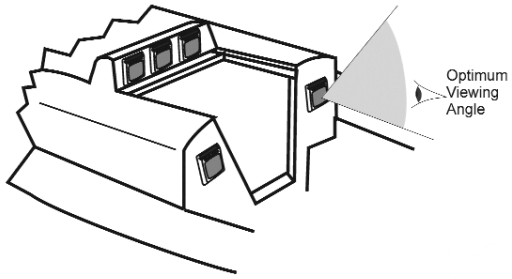
Tools Required 2.5mm or 5mm Drill Bit (7mm if power connection required)
Power Drill
Cross Head Screwdriver

Parts List
Mounting Template
Display Backplate and 2x Clip Brackets
Mounting Screws (3)
Mounting Bolts (3)
M4 Studs & Thumbnuts (3)
Sealing Gaskets (4)
Double Sided Tape

5.2 Precautions and Positioning Advice

Ensure mounting surface is flat.
Leave space between displays for sun covers.
Leave space to remove display from bracket (if used).
Avoid areas where damage may occur (winch handles, feet, warps etc.)
Select a flat, smooth, surface for mounting and use the template provided to select a suitable position for mounting your Micronet display. Check for clarity of vision and ease of access to the control buttons, it is recommended that displays are positioned such that your arm does NOT pass through the spokes of the steering wheel when operating the buttons.

Contrast is limited at night when a display is viewed from beneath. Avoid mounting displays in a position where you will look upwards to view them.



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5.3 Bracket Mounting (Preferred Method)

This method allows for the easy removal of a display as and when required, for either security reasons or to prevent damage or discomfort whilst not in use.

1. Using the three supplied M4 bolts attach the back plate to the rear of the display (Fig.1).
2. Drill three 2.5mm holes marked "A" on the Template and using the supplied self tapping screws, screw the clip bracket to the mounting surface (Fig.2).
3. Place the display flat against the bracket slightly higher than the final position and slide gently down into position. There will be a small click as the bracket secures the display into position (Fig.3).
4. To release the display press lightly on the bracket tab and slide the display upwards (Fig.4).

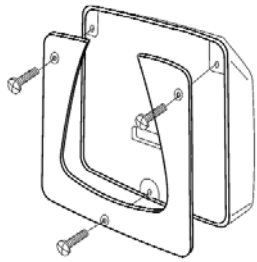


Fig. 1

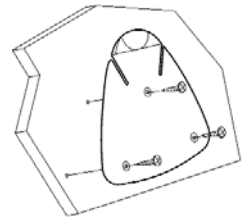


Fig. 2

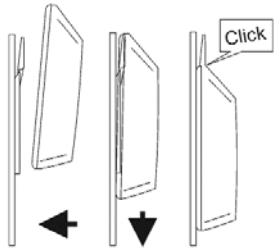


Fig. 3

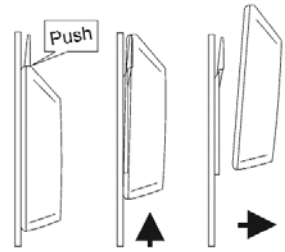


Fig. 4

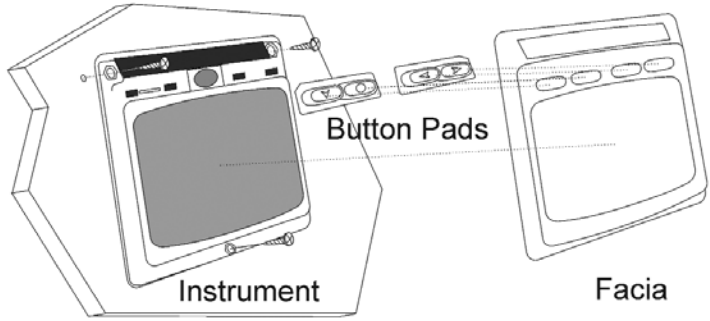
044-004

5.4 Surface Mounting

Where there is no access to the rear of the mounting surface

Easy installation but will allow removal without gaining access to the boat. Position the supplied Template carefully before starting.

1. Drill three 2.5mm holes marked "B" on the template.
2. Carefully snap the facia of the display off the main body taking care not to drop the button pads.
   HINT – It may be useful to place a piece of sticky tape across the front of the buttons before removing the facia to prevent them from falling out during the installation.
3. Remove the three captive M4 nuts from the plastic moulding and attach the display to the mounting surface using the three self tapping screws provided. Take care not to over tighten the screws as this may cause the moulding to crack.
4. Check the display is perfectly level; carefully position the button inserts into the correct slots and snap the facia back into position.



Temporary Mounting

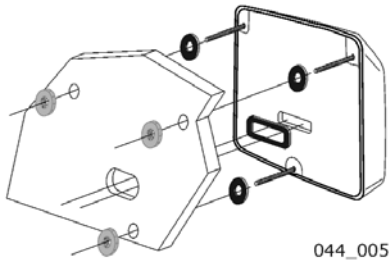
1. Use the double sided tape provided to secure the display to a suitable mounting surface. Press the display firmly against the surface until secure.

This method is recommended for temporary use only. For example, finding an appropriate location before drilling holes.

Where access is available to the rear of the mounting surface

This method allows for maximum security of a permanently mounted display. Position the supplied template carefully before starting.

1. Drill three 5mm holes marked "B" on the template.
2. Screw the four M4 brass studs into the rear of the display.
3. Place the display in position pushing the three studs through the newly drilled holes.
4. Using the three supplied thumb nuts, secure the display to the surface making sure it is level before final tightening.



5.5 External Power Connections

To connect an external 9 to 30V DC power supply to the display head from either a portable battery or the vessel's existing power system.

1. Drill two 7mm holes marked "P" on the mounting template and smooth them together with a sharp knife or small file.
2. Pass the supply cable through the new hole and attach the supplied crimp spade receptacles.
3. Remove the blanking plug from the rear of the display to expose the terminals.
3. Taking care to connect the correct polarity push the receptacles firmly onto the spades on the rear of the display.
4. Mount the display head securely in position.
5. Clamp the cable securely close to the display.

6 Maintenance and Fault Finding

6.1 Care and Maintenance

All Micronet products are totally sealed against water and are not serviceable. Any attempt to take a Micronet product apart will invalidate the warranty.

To clean, use only a damp, soft cloth. No detergents, solvents or abrasives should be used. To avoid damaging a Micronet display unit we recommend storing in the supplied soft pack when not in use.

If the displays are to be stored for a long period of time before next use (Over Winter) ensure that the batteries are fully charged before storage. If necessary connect to a 9 to 30V DC power supply for 24 hrs prior to storage.

6.2 Fault Finding and Technical Support

A single display flashes the battery symbol and then switches off.
The battery level is low on the particular display affected. Connect to a 9 to 30V DC power source or leave in bright sunlight for 12 hours minimum to fully recharge the display's internal battery. If the particular display is the system master* then the other displays will sound the Lost Network Alarm. To continue using the rest of the system power down and restart the system from another display.

Data is shown as dashes.
The information is not being transmitted to the displays. There may be lost communication between the Wind Transmitter or Hull transmitter and the displays. On any Digital display enter setup and calibration mode (page 13) and scroll through to the Health Chapter. Check the signal levels of the Hull and Wind Transmitters.

Wind speed reads 0.
Information being transmitted from the Wind Transmitter is being received with a Zero value. If the anemometer cups at the top of the mast are turning and the Wind Speed reads 0 then there is a problem with your Wind Transmitter.

No NMEA data showing on external displays.
From any display enter setup and calibration mode (page 13) and scroll through to the Health chapter. Check the signal level and battery status of the Wireless (NMEA) Interface box.

Lost Network Alarm Sounds

Indicates that the display has lost communication with the master. Either there is a problem with the master* or the display has been moved out of effective range. The display will power down shortly after sounding the alarm in order to conserve power.

The "Master Instrument" is the display which was used to power up the entire system. This display may be different each time the system is used. If you are fault finding and are uncertain which display is the master the switch off the system and switch on again. The display which you switched on is now the master.

7 Warranty Information

For warranty details for this product see the Raymarine website at www.raymarine.com.

This device complies with Part 15 of the FCC rules. Operation is subject to the following two conditions. (1) This device may not cause harmful interference, and (2) this device must accept any interference received, including interference's that may cause undesirable operation.
Note: the manufacturer is not responsible for any radio or TV interference caused by unauthorized modifications to this equipment. Such modifications could void the user's authority to operate the equipment.

CE 0889

Raymarine Ltd hereby declare that the mn100 Analogue Display is in compliance with the essential requirements and other relevant provisions of Directive 1999/5/EC.