MARINE BATTERY CHARGERS

FR Series Battery Chargers
Installation/Operation

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CE

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FR Series Battery Chargers

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⚠ *Warnings*

This manual contains essential information concerning the operation of your Sentry battery charger. It is very important that you read and understand the contents of this manual before using the equipment, and it should be kept on the boat for future reference.

Improper installation can cause serious injury or death, as well as damage or destruction of the vessel.

If you have any questions about the contents of this manual, contact your local Sentry dealer or the Linear Devices Corp. Service Department for assistance.

Design and Calibration

This charger is designed specifically for marine grade, deep cycle, lead acid (free) batteries. For other battery types, contact the factory for the proper calibration. "FR" series chargers can be ordered and built to charge your specific battery type.

NOTE: "Figures" referenced in the text of this manual can be found in the back of the book.

Spare Parts - Field Repairs

This charger may be field repaired. It is one of the few that is manufactured where this is possible. This feature reinforces the benefits of the charger's longevity and reliability.

Please refer to Fig. 7 under spare parts to order spare parts for long voyages or in case of emergencies.

Installation Instructions

Location

- Dry, well ventilated.
- Near batteries, but not above the batteries.
- Ventilation: Allow 7.6 cm (3 in) of clearance on all sides

Electrical Connections

- Wire size: see "Wiring Gauge and Grade Chart"
- AC Circuit breaker: see "Wiring Gauge and Grade Chart"
- DC Fuse: see "Wiring Gauge and Grade Chart"

Battery Connections

- Positive terminal of each battery - connect to individual studs labeled "+ BATTERY." See Figure 2 - AC & DC Connections.

- Negative terminals - Connect all terminals to the stud labeled "—BATTERY."
- Use "ring" terminals for all connections to the charger.

Sensing Wire Connections

- Locate the four (4) sensing wires - color RED - these are attached to the primary "+BATTERY" #1 bank terminal lug behind the DC fuse.
- Place one sensing wire on each battery bank stud to which a battery bank is connected.
- Those terminal lugs not connected to a battery bank should be left attached to the primary "+BATTERY" terminal lug. See Figure 3.

AC Voltage Selection 115vac or 230vac Switch

See the diagram "Interpreting Model Numbers." Locate the black rocker switch under the service cover with the 115V or 230V label. The charger is set from the factory to 230V. For 115V input voltage, push the rocker switch down to the 115V label.

Frequency Selection

See the diagram "Interpreting Model Numbers." Locate the red slide switch with 50 HZ or 60HZ labels. Slide the switch towards the label that matches your input frequency. The frequency is set to 60Hz from the factory.

Operating Instructions

Automatic/Manual Selector Switch

Automatic Mode: Locate the black rocker switch on the front cover of the charger with Auto/Manual Mode label. Switch the rocker towards Auto for fully automatic operation. The charger will charge the batteries to full charge and turn off to prevent overcharging in Auto Mode. The Amber color neon indicator will light when batteries are fully charged and the charger will turn off.

Manual Mode: Manual Mode may be selected for periodic equalization or desulfication of flooded lead-acid batteries. Batteries must be monitored continuously in Manual Mode to prevent overcharging or damaging batteries. Manual mode may be utilized if the charger will not function in Auto Mode to keep batteries charged until the control circuit can be replaced. During Manual Mode operation, turn charger circuit breaker off periodically to prevent overcharging or damaging batteries.

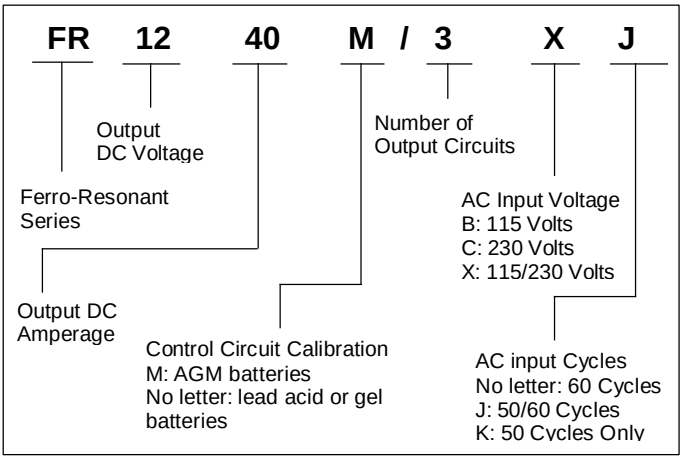
Charger Circuit Breaker at Ship's Panel

Activate the charger circuit breaker. The RED neon indicator on the charger indicates ac power has been applied to the charger when lit.

Ammeter Indications

All batteries fully charged: Ammeter needle shows "0". Batteries not fully charged: Ammeter shows output current in amperes.

Interpreting Model Numbers



Wiring Gauge, AC and DC Fuses

Sentry Model	Wire Gauge Sentry Unit to Batteries 0-10 Ft	10-25 Ft.	AC Cir. Bkr.	DC Fuse	AC Fuse*
FR1220/3B	10	8	10A	BAF30	5A
FR1240/3X	6	4	15A	ANL50	10A
FR1240A/3X	6	4	15A	ANL50	10A
FR1240/3XJ	6	4	15A	ANL50	10A
FR1260/3X	6	2	15A	ANL80	15A
FR1260/4X	6	2	15A	ANL80	15A
FR1260A/3X	6	2	15A	ANL80	15A
FR2425/3X	10	8	15A	ANL35	10A
FR2425A/3X	10	8	15A	ANL35	10A
FR2440/3X	8	6	15A	ANL50	15A
FR2440A/3X	8	6	15A	ANL50	15A
FR2440/3XJ	8	6	15A	ANL50	15A
FR2460/3XJ	6	2	20A	ANL80	20A
FR2460/4XJ	6	2	20A	ANL80	20A
FR3230/3X	8	6	20A	ANL40	20A

Note: All wire insulation should be rated for 105 C.
*AC Fuses rated slow blow at 250 VAC (uses implemented on Dec 2004, Serial#448*****

Troubleshooting

Warning: ***Only the following are recommended for an owner. All other work should be done by an authorized Sentry service representative.***

Always "de-energize" by turning "off" the AC circuit breaker at the ship's main panel before removing the cover or attempting to repair this charger.

If you have continued occurrence of the same problem, contact an authorized service representative or the Linear Devices Corp. factory.

System Troubleshooting

Situation: Will not charge in either manual or automatic position; ammeter indicates "0" amps

Solution

1. DC fuse has failed. Replace.
2. DC circuit breaker is tripped open (older "G" series chargers have round red button and push to reset. "FR" chargers have auto reset breaker)
3. AC circuit breaker has failed. Reset. Consult circuit breaker/ fuse chart.
4. AC fuse has failed. Replace.

Situation: Batteries do not stay fully charged or charger turns on and off rapidly.

Solution

1. Battery connections are "loose" or "corroded." Tighten and/ or clean connections.
2. DC fuse has failed. Replace. See circuit breaker/ fuse chart.1.
3. Failed battery. Test all batteries individually to locate failed battery and replace.
4. Charger control circuit is out of calibration or requires replacement.

Situation: Full charge light will not illuminate. Charger turns "on" and "off" properly.

Solution

1. Lamp defective. Replace lamp.

Situation: Charger does not turn "off" and the ammeter shows that charger is active.

Solution

1. Automatic/ Manual selector switch in "manual" position. Switch to "automatic."
2. Determine if battery connects are clean and tight.
3. Shorted cell in battery-replace battery.
4. Control circuit out of calibration—calibrate. See calibration procedures.

Control Calibration Procedures

1. Connect four (4) sensing wires (color - red) from the control to a single "+BATTERY" tab terminal, so loads may be added to adjust voltage.

2. Determine the voltage between this terminal (see above) and the "--- BATTERY" terminal. Use a digital voltmeter accurate to .1 volt.

3. See table (below) to understand correct "pull-in" and "drop- out" voltage.

4. FR type chargers - set "pull-in" first. Apply a small load (interior light, etc). Note the "pull-in" voltage.

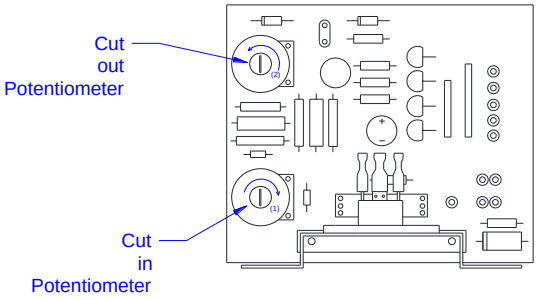
5. Locate "pull-in" potentiometer. If "pull-in" high - decrease - turn clockwise.

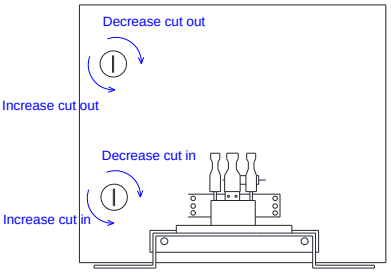
   - If "pull-in" low - increase - turn counter-clockwise.
   - Allow the charger to raise the battery voltage; note "drop- out" voltage.
   - Locate "drop-out" potentiometer.
   - If "drop-out" high - decrease differential - turn clockwise. If "drop-out" low - increase - turn counter-clockwise.
   - Repeat procedure - until the correct voltage is obtained.

6. Replace the sensing wires (color - red).

Note: do not attach a red wire where there is no battery. If extra wires, attach to a terminal with a battery (more than one sensing wire is acceptable). All red wires must be attached to a battery. See Figure 3.

Battery Voltage	Flooded Pull In vdc	Flooded Drop Out vdc		AGM/Gel Pull In vdc	AGM/Gel Drop Out vdc
12	12.6	14.25		12.9	14.25
24	25.2	28.5		25.8	28.5
32	33.7	38.2		34.5	38.2





Owner's Limited Warranty

As hereinafter described, Linear Devices Corporation limits the duration f any implied warranty to the duration of the underlying express warranty and also disclaims any liability for consequential or incidental damages arising from any application I, installation, use or malfunction of any warranted product.

Section I

What does the Limited Warranty cover?

Products manufactured by Linear Devices Corp. are under limited warranty to be free from defects in workmanship or materials under normal use and service with the obligation of Linear Devices Corp. under this limited warranty being limited to replacing or repairing any component(s) which shall disclose defects within the time limits defined in **Section III** and which, upon examination by Linear Devices Corp., shall appear to the satisfaction of Linear Devices Corp. to be defective or not up to specifications.

This Limited Warranty is made in lieu of all other express warranties, obligations, or liabilities on the part of Linear Devices Corp. In addition, Linear Devices Corp. shall not be responsible for any incidental or consequential damages. In those instances in which a cash refund is made, such refund shall effect the cancellation of the contract of sale without reservation of rights on the part of the purchaser. **Such refund shall constitute full and final satisfaction of all claims which purchaser has or may have against Linear Devices Corp. due to any actual or alleged breach of warranty, either express or implied, including, without limitation, any implied warranty of merchantability or fitness for a particular purpose.** Some states do not allow the exclusion or limitation of incidental or consequential damages so the above limitation may not apply to you. The terms and conditions of this warranty shall be governed by the laws of the Commonwealth of Virginia.

The Dealer is not an agent for Linear Devices Corp. except for the purpose of administering the above warranty to the extent herein provided, and Linear Devices Corp. does not authorize the dealer or any other person to assume for Linear Devices Corp. any liability in connection with such warranty, or any liability or expense incurred in the replacement or repair of its products other than those expressly authorized herein. Linear Devices Corp. shall not be responsible for any liability or expense except as is specifically authorized and provided in this section.

Linear Devices Corp. reserves the right to improve its products through changes in design or material without being obligated to incorporate such changes in products of prior manufacture, and to make changes at any time in design, materials, or part of units of any one year's model, without obligation or liability to owners of units of the same year's model of prior manufacture.

This warranty gives you, the purchaser, specific legal rights, and you may also have other rights which vary from state to state. You also have implied warranty rights, including an implied warranty of merchantability, which means that your product must be fit for the ordinary purposes for which such goods are used. The duration of any implied warranty rights is limited

to the duration of the express warranty as found in Section III. Some states do not allow limitations on how long an implied warranty lasts, so the above limitation may not apply to you.

Section II

What does this Limited Warranty not cover?

This Warranty Shall Not Apply to:

1. Failures resulting from improper installation or use contrary to instructions.
2. Failures resulting from abuse, misuse, accident, fire, or submergence.
3. Any part manufactured by Linear Devices Corp. which shall have been altered so as to impair its original characteristics.
4. Any parts which fail as a result of misuse, improper application or improper installation.
5. Items not manufactured by Linear Devices Corp., i.e., items which are purchased from another manufacturer and supplied as received by Linear Devices Corp. without alteration or modification except as any part of an Linear Devices Corp.-manufactured unit or component.
6. Components or parts used by or applied by the purchaser as an integral part of products not manufactured by Linear Devices Corp..

Installation and application of Linear Devices Corp. components is not warranted by Linear Devices Corp. because Linear Devices Corp. has no control or authority over the selection, location, application, or installation of these components.

Section III

What is the period of coverage?

See the Limited Warranty Periods, page 9, for the period of coverage.

All Linear Devices Corp. components bear a data plate on which there are model and serial numbers. The serial number is date coded. To determine whether or not any Linear Devices Corp. component is in warranty, proceed as follows:

1. Determine the manufacture date of the component from the serial number on the data plate. If you are not familiar with the date code, write or call the Linear Devices Corp. Customer Service Department at (804)368-8428, to obtain the manufacture date. The hours of the Customer Service Department are 8:00 am - 5:00 pm (USA, Eastern Time Zone) Monday through Friday excluding holidays.
2. It is possible that there might exist a considerable time lag between the date a component is manufactured and the date it is put in service. In such instances, the date of manufacture could indicate that the item is out of warranty. However, based on the

date the equipment is first put in service, the item may still be covered by the Linear Devices Corp. warranty described in **Section I**. For proof of date put in service, Linear Devices Corp. will require a copy of the bill of sale of the Linear Devices Corp. equipment from the installer or new boat dealer to the original owner.

Section IV

How do you get service? Please Read the following Warranty Procedure.

WARRANTY PROCEDURE

If the failure of a Linear Devices Corp. component is determined to be covered under the Linear Devices Corp. warranty and the time in service is determined to be within the warranty time limit, the owner has the following three options:

1. Preferred option: Have a Linear Devices Corp. authorized Servicing Dealer perform the work needed. The customer should call Linear Devices Corp.'s Service Department for a recommendation as to the closest dealer. If the customer already knows an authorized servicing dealer, the dealer should be contacted directly.

2. If the customer contacts Linear Devices Corp.'s Service Department for a Servicing Dealer and Linear Devices Corp. has no one in that particular area, Linear Devices Corp. will authorize the use of a local service company and Linear Devices Corp. will work with the local company to assist in any way possible.

3. The customer may send his equipment back to the factory to have the repair work done. Linear Devices Corp. will make every effort to return the equipment to the customer within a one week time period. If the claim represents a legitimate warranty problem, Linear Devices Corp. will pay the freight one way. Linear Devices Corp. prefers option one and two, if at all possible.

   The customer may contact the Linear Devices Corp. Service Department at (804) 368-8428.

WARNING

Linear Devices Corporation (Linear Devices Corp.) manufacturers of Sentry and Lectrotab Products, makes the following safety warnings concerning the application, installation, use and care of its products. Although these warnings are extensive, there may be specific hazards which may arise out of circumstances which we have not outlined herein. Use this as a guide for developing an awareness of potential hazards of all kinds. Such awareness will be a key factor in assuring your SAFETY and comfort.

ELECTRICITY - Many Linear Devices Corp. products operate on 115 or 230 volt AC power. Such voltages can be LETHAL; therefore, the chassis, cabinets, bases, etc., on all components must be grounded together and connected to the vessel's grounding system. Sparks can occur as switches, thermostats and relays open and close in the normal operation of the equipment. Since this is the case, ventilating blowers for the removal of

hazardous fumes or vapors should be operated at least 5 minutes before and during operation of any Linear Devices Corp. product or group of Linear Devices Corp. products. All electrical connections must be covered and protected so accidental contact cannot be made by persons using the equipment, as such contact could be LETHAL.

ELECTROLYSIS - Electrical leakage of any component can cause electrolytic deterioration (electrolysis) of thru-hull components which could result in leakage serious enough to sink a vessel which could result in loss of life. All Linear Devices Corp. components must be kept clean and dry and checked periodically for electrical leakage. If any electrical leakage is detected, the component should be replaced or the fault causing the leakage corrected before the component is put back into service.

Limited Warranty Periods

Please read and keep this document with your important paperwork. Use it as a reference in the future. If you have any questions, please contact the Linear Devices Corp. Environmental Corporation Service Department at (804)368-8428 for clarification.

Note: Any model or replacement part that has been installed due to a warranty failure will carry **only** the remainder of the original warranty. All warranties begin when the customer takes possession of the equipment. The warranty is extended to all owners of the equipment commencing the date the original owner takes possession of it. Proof of original purchase may be required. **Fuses** and **MOV's** are used as safety devices to protect equipment against over-current conditions caused by lightning or inductive switching environments. **These are not covered under warranty.** We reserve the right to change our warranty policies and procedures as well as our warranty allowances without notice.

Sentry Battery Chargers

New FR series installation

2 year warranty,
Parts and Labor

Replacement Parts

Replacement parts and components

90 day warranty,
Parts only

Description of Drawings

Fig. 1 Mounting Your Sentry FR Charger In The Engine Room

Fig. 2 AC and DC Connections

(1) Battery #1 "+" (pos) Connection

(2) Battery #2 "+" (pos) Connection

(3) Battery #3 "+" (pos) Connection

(4) AC Connection From Power Panel

(5) All "—" (neg) Battery Connections

(6) Metal Shunt

Fig. 3 DC Sensing Wires Connections

(1) Single Battery Operation

(2) Multiple Battery Operation

(3) To Battery Bank(s)

(4) Metal Shunt

Fig. 4 Battery Charger Components

(1) Ammeter

(2) Full Charge Indicator Light

(3) Auto/Manual Switch

(4) AC Input Power Indicator Light

(5) Transformer

(6) 50/60 Hz Input Selector Switch (if included)

(7) Control Circuit

(8) DC Output Fuses

(9) Rectifying Circuit & Heat Sinks

(10) Resonating Capacitor

(11) 115/230 Volt Input Selector Switch (if included)

(12) AC Power Connections

(13) Ground Lug

(14) DC Battery "—" (neg) Connections

(15) DC Battery "+" (pos) Connections

(16) AC Input Fuse

(17) Metal Shunt

Fig. 5 Control Circuit Calibration

(1) Triac

(2) Potentiometer Pull-In

(3) Potentiometer Drop-Out

Fig. 6 Wiring Diagram

(1) Fan

(2) Heat Sink

(3) Blocking Diodes

(4) Rectifying Diodes

(5) Transformer

(6) Resonating Capacitor

(7) AC Power Connections

(8) Ground Lug

(9) "—" (neg) Battery Connection

(10) "+" (pos) Battery Connection

(11) Battery Sensing Wires

(12) Control Circuit

(13) AC Power Indicator

(14) Auto/Manual Selector Switch

(15) Full Charge Indicator

(16) Ammeter

(17) Control Panel

Fig. 7 - Spare Parts

Fig. 1

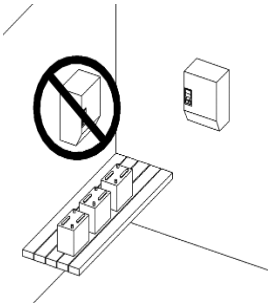


Fig. 2

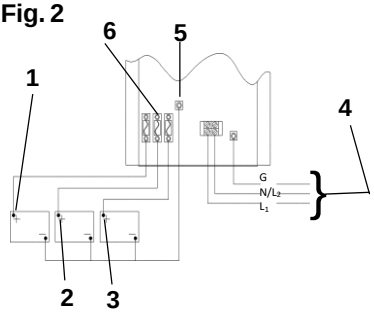
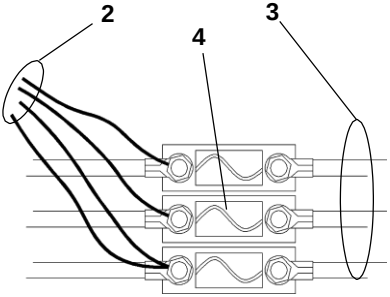


Fig. 3



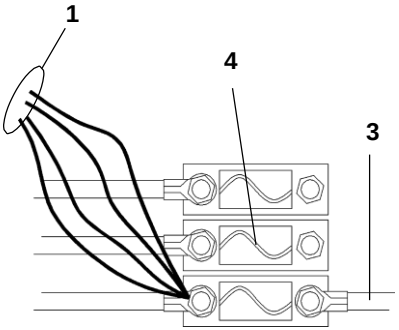
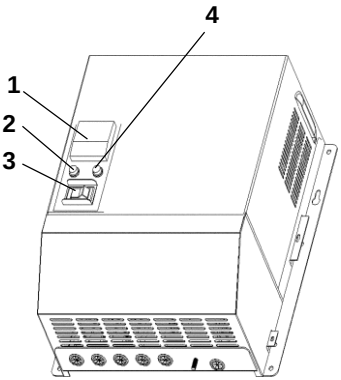


Fig. 4



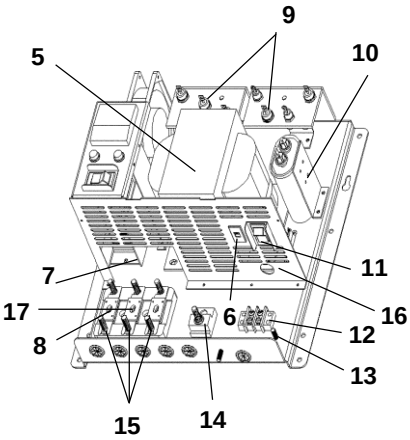


Fig.5

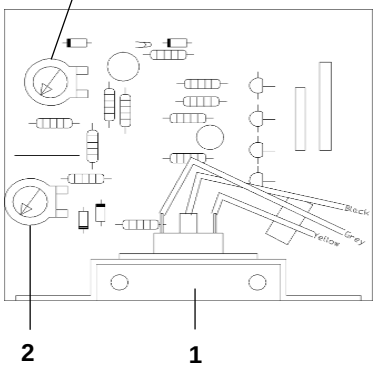


Fig.6

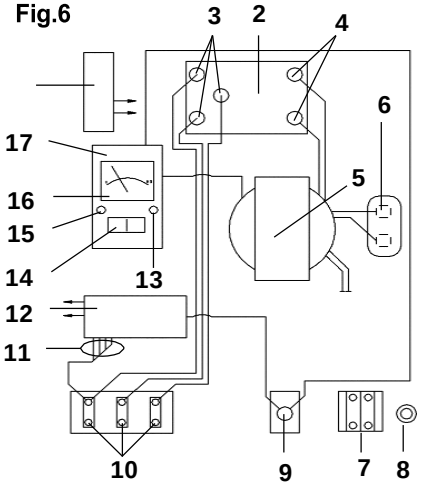


Fig.7 *Spare Parts*

Charger Model	Control Circuit	Cooling Fan	Rectifying Diode	Blocking Diode	Output Fuse	Auto Reset Circuit Breaker	AC Input Fuse
FR1220/3	FR12NX	4030575	4180340 (2)	4180440 (3)	4122330	4123335	4120305
FR1240/3X	FR12NX	4030575	4180340 (2)	4180440 (3)	4122050	4123350	4122810
FR1240A/3X	FR12ANX	4030575	4180340 (2)	4180440 (3)	4122050	4123350	4122810
FR1240/3XJ	FR12NX	4030575	4180440 (2)	4180440 (3)	4122050	4123350	4122810
FR1260/3X	FR12NX	4030575	4181060 (2)	4181160 (3)	4121780	4123480	4122815
FR1260/4X	FR12NX	4030575	4181060 (2)	4181160 (3)	4121780	4123480	4122815
FR1260A/3X	FR12ANX	4030555	4181060 (2)	4181160 (3)	4121780	4123480	4122815
FR2425/3X	FR24NX	4030575	4180340 (2)	4180440 (3)	4122740	4123340	4122810
FR2425A/3X	FR24ANX	4030575	4180340 (2)	4180440 (3)	4122740	4123340	4122810
FR2440/3X	FR24NX	4030555	4180340 (2)	4180440 (3)	4122050	4123350	4122815
FR2440A/3X	FR24NX	4030555	4180340 (2)	4180440 (3)	4122050	4123350	4122815
FR2440/3XJ	FR24NX	4030555	4180440 (2)	4180440 (3)	4122050	4123350	4122815
FR2460/3XJ	FR24NX	4030555	4181160 (2)	4181160 (3)	4121780	4123480	4122820
FR2460/4XJ	FR24NX	4030555	4181160 (2)	4181160 (3)	4121780	4123480	4122820
FR3230/3X	FR32NX	4030555	4180340 (2)	4180440 (3)	4122740	4123345	4122820

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Email: info@annapoliscruisair.com

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Fax: 586-778-6108
Email: sales@midwestmarinesupply.com
Web: www.midwestmarinesupply.com

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Web: www.nauticalair.com

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Chattanooga TN 37416
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Fax: 281-474-2714
Email: sales@aersupply.com
Web: www.aersupply.com