

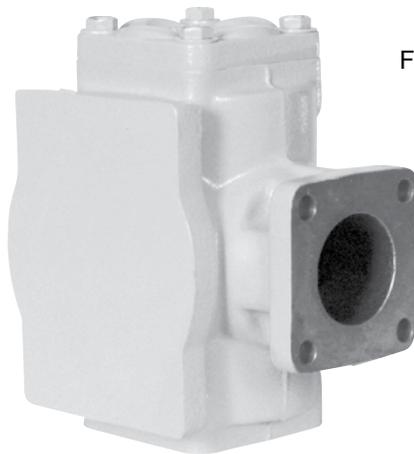


Strainers F-7, FA-7, F-15, F-30 & Steel Series

Installation and Parts



F and FA Series Aluminum
Body Strainers



F Series Cast Iron, Stainless
Steel and Brass Body
Strainers



FS, FSA and FSAA Steel
Body Strainers

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Publication Updates and Translations

The most current English versions of all Liquid Controls publications are available on our web site, www.lcmeter.com. It is the responsibility of the local distributor to provide the most current version of LC manuals, instructions, and specification sheets in the required language of the country, or the language of the end user to which the products are shipping. If there are questions about the language of any LC manuals, instructions, or specification sheets, please contact your local distributor.

Be Prepared

⚠ WARNING

- Before using this product, read and understand the instructions.
- All work must be performed by qualified personnel trained in the proper application, installation, and maintenance of equipment and/or systems in accordance with all applicable codes and ordinances.
- When handling electronic components and boards, always use proper Electrostatic Discharge (ESD) equipment and follow the proper procedures
- Make sure that all necessary safety precautions have been taken.
- Provide for proper ventilation, temperature control, fire prevention, evacuation, and fire management.
- Provide easy access to the appropriate fire extinguishers for your product.
- Consult with your local fire department, state, and local codes to ensure adequate preparation.
- Read this manual as well as all the literature provided in your owner's packet.
- Save these instructions for future reference.
- Failure to follow the instructions set forth in this publication could result in property damage, personal injury, or death from fire and/or explosion, or other hazards that may be associated with this type of equipment.

⚠ DISCLAIMER

Liquid Controls disclaims all liability for damage to meter or accessories because of corrosion, salting out of product, or separation of chemicals whether occurring during periods of use or storage.

NOTICE

This manual provides warnings and procedures that are intended to inform the owner and/or operator of the hazards present when using the Liquid Controls Meter on LP-Gas and other products. The reading of these warnings and the avoidance of such hazards is strictly in the hands of the owner-operators of the equipment. Neglect of that responsibility is not within the control of the manufacturer of the meter.

Safely Evacuate Piping System

⚠ WARNING

Before disassembly of any meter or accessory component:

- **All internal pressures must be relieved and all liquid drained from the system in accordance with all applicable procedures.**
- **Pressure must be 0 (zero) psi.**
- **Close all liquid and vapor lines between the meter and liquid source.**

For Safety Rules Regarding LPG, refer to NFPA Pamphlet 58 and local authorities.

Failure to follow this warning could result in property damage, personal injury, or death from fire and/or explosion, or other hazards that may be associated with this type of equipment.

In the Event of a Gas Fire



IN THE EVENT OF LARGE FIRES OR FIRES THAT ARE SPREADING

- Evacuate the building and notify your local fire department.
- Stop the leakage only if you can safely reach the equipment.

IN THE EVENT OF SMALL, CONTAINED FIRES THAT YOU CAN SAFELY CONTROL

- Stop the leakage if you can safely reach the equipment.
- Use the appropriate extinguisher: Class B fire extinguisher, water, fog, etc., depending on the materials.
- If in doubt, call your local fire department.

In the Event of a Gas Leak



IN THE EVENT OF A LARGE GAS LEAK

- Evacuate the area and notify the fire department.

IN THE EVENT OF A SMALL, CONTAINED GAS LEAK

- Stop the leak and prevent accidental ignition.
- Prevent the entrance of gas into other portions of the buildings. Some gases, such as LPG, seek lower levels, while other gases seek higher levels.
- Evacuate all people from the danger zone.
- See that the gas is dispersed before resuming business and operating motors. If in doubt, notify your local fire department.

INSTALLATION AND OPERATION

LC Strainers Overview

WHAT LC STRAINERS DO

Strainers help to protect meters from serious damage caused by burrs dislodged from new piping, pipe scale or foreign material. The strainer's initial cost is good insurance against the cost of down time and replacement parts incurred from a damaged meter. A meter strainer installed on the inlet side is necessary even when a coarse strainer on the upstream side of the pump is included in the system. Strainers are not meant to be used as a system filter but as limited protection for the meter element itself.

HOW LC STRAINERS WORK

As a liquid product enters the strainer housing from the supply line, it is routed through the strainer basket. The strainer basket is a two-ply screen. The inner screen is made of fine mesh of either 20, 40, 80, 100, or 200 squares per inch. The outer screen works as a backing. It gives reinforcement and support to the fine mesh inner screen. Liquid passes through the strainer and into the inlet of the meter. Any debris that is larger than the mesh in the basket is trapped in the basket. THE STRAINER IS NOT A FILTER, and the size of the mesh in the basket selected will determine the particle size that can pass through the strainer. Basket mesh selection is generally based on maximum fluid viscosity at minimum ambient operating temperature.

FEATURES

LC markets a wide variety of strainers to fit most meters in terms of capacity, pipe size, working pressure and metallurgical compatibility.

The design advantages of a Liquid Controls strainer include:

- Strainer baskets with an unusually high open basket area to pipe area ratio, resulting in minimum restriction of flow and low pressure loss.
- Choice of 20, 40, 80, 100 or 200 mesh cadmium plated steel or stainless steel strainer baskets.
- Installation in a variety of positions, that simplify piping.
- Optional 45 accessory elbows for indexing strainer inlet positions other than right angle flow. *Available for 2" F-7 Aluminum strainers only.*

⚠ WARNING

Relieving Internal Pressure

All internal pressure must be relieved to zero pressure before disassembly or inspection of the strainer, vapor eliminator, any valves in the system, the packing gland, and the front or rear covers.

Serious injury or death from fire or explosion could result in performing maintenance on an improperly depressurized and evacuated system.

Relieving Internal Pressure Procedure for LPG and NH₃ Meters

1. Close the belly valve of the supply tank.
2. Close the valve on the vapor return line.
3. Close the manual valve in the supply line on the inlet side of the meter. If no manual valve exists on the inlet side, consult the truck manufacturer for procedures to depressurize the system.
4. Slowly open the valve/nozzle at the end of the supply line.
5. After product has bled off, close the valve/nozzle at the end of the supply line.
6. Slowly crack the fitting on top of the differential valve to relieve product pressure in the system. Product will drain from the meter system.
7. As product is bleeding from the differential valve, slowly reopen and close the valve/nozzle on the discharge line. Repeat this step until the product stops draining from the differential valve and discharge line valve/nozzle.
8. Leave the discharge line valve/nozzle open while working on the system.

Installation and Operation

1. Flush all new systems

Flushing the system before the meter has been installed is the preferred first step. Thoroughly flush the lines until the system is purged of all foreign materials. See *Strainer Maintenance* for disassembly and reassembly instructions.

2. Plan a location for the strainer in the system providing for the following requirements:

Make sure there is no pipe strain imposed upon the strainer or any other component part of the meter assembly. This means that the meter and its accessories must not support the weight of the piping. Plan for enough space to allow clearance so that the strainer basket cover and strainer basket can be easily removed.

3. Install the strainer

- (1) Install the strainer on the inlet side of the meter
- (2) Bolt the strainer outlet to the inlet flanged connection of the meter.
- (3) Then bolt the inlet piping to the inlet flanged connection of the strainer.

4. Check the strainer daily during the first 100 hours of operation

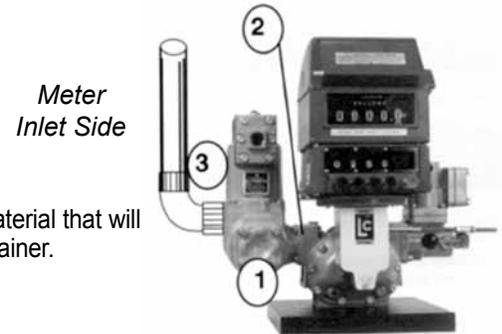
New or repaired piping can be the source of welding slag or other foreign material that will block or rupture the strainer screen. or until no more debris is found in the strainer.

5. Inspect and clean the strainer basket regularly

To ensure proper operation.

6. Follow Strainer Maintenance

Follow the steps outlined in the *Strainer Maintenance* section of this manual.



Maintenance

It is very important to follow the strainer preventive maintenance procedures to protect the strainer as well as the metering system. Foreign matter that builds up inside the strainer, including ice, can cause damage to the strainer and the metering system. When foreign matter builds up inside the strainer, it can cause pressure to build up inside the strainer. This pressure can cause the strainer screen to rupture. Foreign matter can then enter the metering chamber. This can cause serious damage to the meter resulting in failure of the meter.

The following strainer preventive maintenance procedures will keep your strainer functioning properly, keep strainer repair costs to a minimum, and insure the protection of your metering system.

NEWLY INSTALLED OR REPAIRED SYSTEMS

- Check the strainer daily during the first 100 hours of operation or until no more debris is found in the strainer.
- New or repaired piping can be the source of welding slag or other foreign particles that can block or rupture the strainer screen.
- Once a system is cleaned out, the strainer should be checked several times every season. The frequency depends on the specific service conditions, through put and product cleanliness.

Air Eliminators & Strainers

When an air eliminator is used with the strainer, it must be installed vertically on the strainer.

Disassembling a Strainer

To disassemble a strainer

1. Carefully clean strainer basket cover plate to remove all foreign matter, and remove the four bolts and washers from the end cover plate.
2. Remove the end cover plate (cover plate is on the top of FS/FSAA/FSA strainers) and o-ring from the strainer housing.
3. Remove the strainer basket. This may dislodge dirt and particles into the strainer housing. Check inside the strainer housing for any foreign material. Be sure to wipe the housing clean, using a soft cloth.
4. Clean the strainer basket by flushing the basket with a liquid cleaning agent suited for your application. A soft brush may be used to dislodge imbedded particles. If the imbedded particles cannot be removed, replace the basket.
5. Clean the inner face of cover plate, mating face of the strainer body, and seal ring with a clean, soft, cloth.
6. Make sure the o-rings are cleaned of all dirt and grime. Check the o-rings for damage. If the o-rings cannot be cleaned or are damaged or frayed, replace them.



Never tap the basket ends on a hard surface to dislodge particles. This may dent the basket and make reassembly difficult or cause improper sealing.

Replace PTFE O-rings

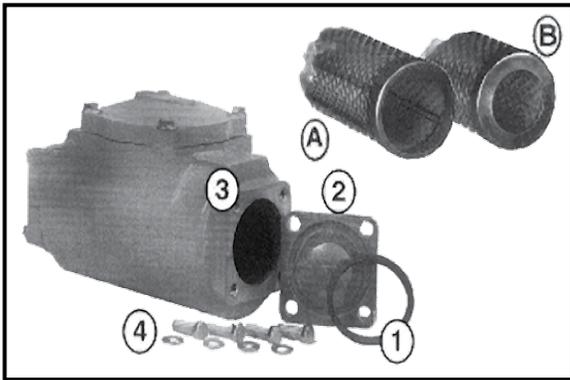
Never reuse PTFE O-rings. Always replace them even if they appear to be in good condition.

MAINTENANCE

Reassembling a Strainers

To reassemble a F/FA strainer

1. Replace the strainer basket (A) or (B) into the housing.
2. Place the end cover o-ring (1) in the groove in the end cover (2).
3. Place the end cover (2) with the o-ring installed, on the strainer housing end (3).
4. Fasten the end cover with the 4 washers and screws (4). Evenly tighten all screws. See *Torque Chart* below.

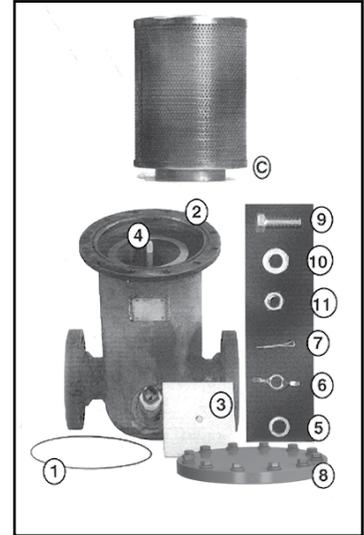


Tightening Screws and Nuts

Leakage that occurs after tightening the fasteners indicates a damaged seal, or distortion to the surface of the cover. In either case, the seals or cover must be replaced. Excessive tightening will not stop the leakage.

To Reassemble an FS/FSAA/FSA Strainer

1. Strainer baskets have an extended collar, or lip on the bottom end of the basket (C). Insert this end into the strainer housing first.
2. Place the o-ring (1) in the groove on top of the strainer housing (2).
3. Place the center hole of the basket cover plate (3) over the basket rod (4) that extends from the center of the housing. The plate should now rest on top of the basket.
4. Install the washer (5) and the wing-nut (6) on the basket rod (4).
5. Place the cotter pin (7) through the hole at the top of the basket rod (4).
6. Place the cover (8) on top of the strainer housing.
7. Insert the 12 or 16 screws (9) into the cover holes (8). Attach the flat washer (10) and nuts (11) to the screws (9) from below. Evenly tighten all nuts and screws. See *Torque Chart* below.



⚠ WARNING

Before re-filling or re-pressurizing your meter/strainer assembly, all seal gaskets and bolts must be in place and fully tightened to prevent leakage of product out of the system. See *Torque Chart* below. Failure to follow this procedure may result in a hazardous condition and possible serious injury or death.

Torque Chart

| Bolt Size | Grade 5 Fasteners | | Grade 8 Fasteners | |
|---------------------------|-------------------------|--------------------------|-------------------------|--------------------------|
| | Foot-Pounds NOMINAL* | Newton-Meter NOMINAL* | Foot-Pounds NOMINAL* | Newton-Meter NOMINAL* |
| #8 (.164) - 32 UNC-2A | 2.54 (30.5 in/lb) | 3.4 | | |
| #10 (.190) - 24 UNC-2A | 3.75 (45 in/lb) | 5.1 | | |
| 1/4" (.250) - 20 UNC-2A | 7.3 | 9.9 | 12.5 | 16.9 |
| 5/16" (.3125) - 18 UNC-2A | 15.3 | 20.7 | 26 | 35.3 |
| 3/8" (.375) - 16 UNC-2A | 27 | 37 | 44 | 59.7 |
| 7/16" (.4375) - 14 UNC-2A | 43 | 58 | 68.5 | 92.9 |
| 1/2" (.500) - 13 UNC-2A | 66 | 90 | 112 | 152 |
| 5/8" (.625) - 11 UNC-2A | 132 | 179 | 222 | 301 |
| 3/4" (.750) - 10 UNC-2A | 233 | 316 | 395 | 535 |

*Torque Tolerance is $\pm 10\%$

HOW TO ORDER REPLACEMENT PARTS & TROUBLESHOOTING

How to Order Replacement Parts

1. Refer to the exploded view drawings on pages 8-15. Find the four-digit item number of the part that needs replaced. Item numbers are listed on the exploded drawings.
2. In the red Owner's Information Packet, you will find a computer printout titled Parts List. The Parts List lists each item number alongside a five-digit part number. The part number identifies the specific individual piece, kit, or complete assembly used to assemble that particular meter.
3. Contact your distributor and give them the five-digit part number. Your distributor will use it to find the correct part for your strainer.

Troubleshooting

PROBLEM 1

Meter lockup; rotors do not turn.

PROBABLE CAUSE A

Strainer basket rupture possibly due to improper maintenance of the strainer basket. If this occurred in a new system, the system may have been improperly flushed.

SOLUTION A

Replace the strainer basket and follow proper strainer maintenance procedures. New systems should be flushed. In all systems, the meter chamber will require cleaning and may require replacement of parts. Refer to your meter Installation, Operation and Maintenance Manual for meter maintenance procedures or contact your full service distributor.

PROBABLE CAUSE B

Debris entered the metering chamber possibly due to improper cleaning during strainer maintenance. (i.e. dirt dislodged into the strainer housing when the basket was removed for cleaning.)

SOLUTION B

Properly clean the strainer housing as outlined in the Maintenance section of this book. The meter chamber will require cleaning and may require replacement of parts. Refer to your meter Installation, Operation and Maintenance Manual for meter maintenance procedures or contact your full service distributor.

PROBABLE CAUSE C

Denting or distortion of the strainer basket which opened gaps and allowed foreign particles to pass through to the meter chamber. This is usually caused by improper handling of the strainer basket during maintenance.

SOLUTION C

Replace the strainer basket and follow proper strainer maintenance procedures. The meter chamber will require cleaning and may require replacement of parts. Refer to your meter Installation, Operation and Maintenance Manual for meter maintenance procedures or contact your full service distributor.

PROBLEM 2

Meter inspection due to meter inaccuracy revealed scoring of the meter chamber.

PROBABLE CAUSE A

See the probable causes for Problem 1.

SOLUTIONS A

See the solutions for Problem 1. However, if inspection does not reveal a ruptured strainer basket and it is known that proper maintenance cleaning procedures were followed, contact your full service distributor.

PROBLEM 3

High pressure drop across the strainer or loss of flow rate.

PROBABLE CAUSE A

Strainer basket screen is partially blocked by foreign material such as dried material or salted out solid particles due to drying.

SOLUTION A

Properly clean the strainer housing as outlined in the Maintenance section. The meter chamber may require cleaning and replacement parts. Refer to your meter Installation, Operation and Maintenance Manual for meter maintenance procedures or contact your full service distributor.

PROBABLE CAUSE B

Inner mesh of the strainer basket is not properly sized for viscosity of the product.

SOLUTION B

Replace the strainer basket with a basket correctly suited for the product.

PROBLEM 4

Leaking at the strainer basket cover.

PROBABLE CAUSE A

The seals are allowing product to leak. This is caused by a damaged o-ring or gasket seal, or reusing a PTFE seal after strainer maintenance.

SOLUTION A

Replace the damaged seals. Replace PTFE seals if they were reused even if they are in good condition.

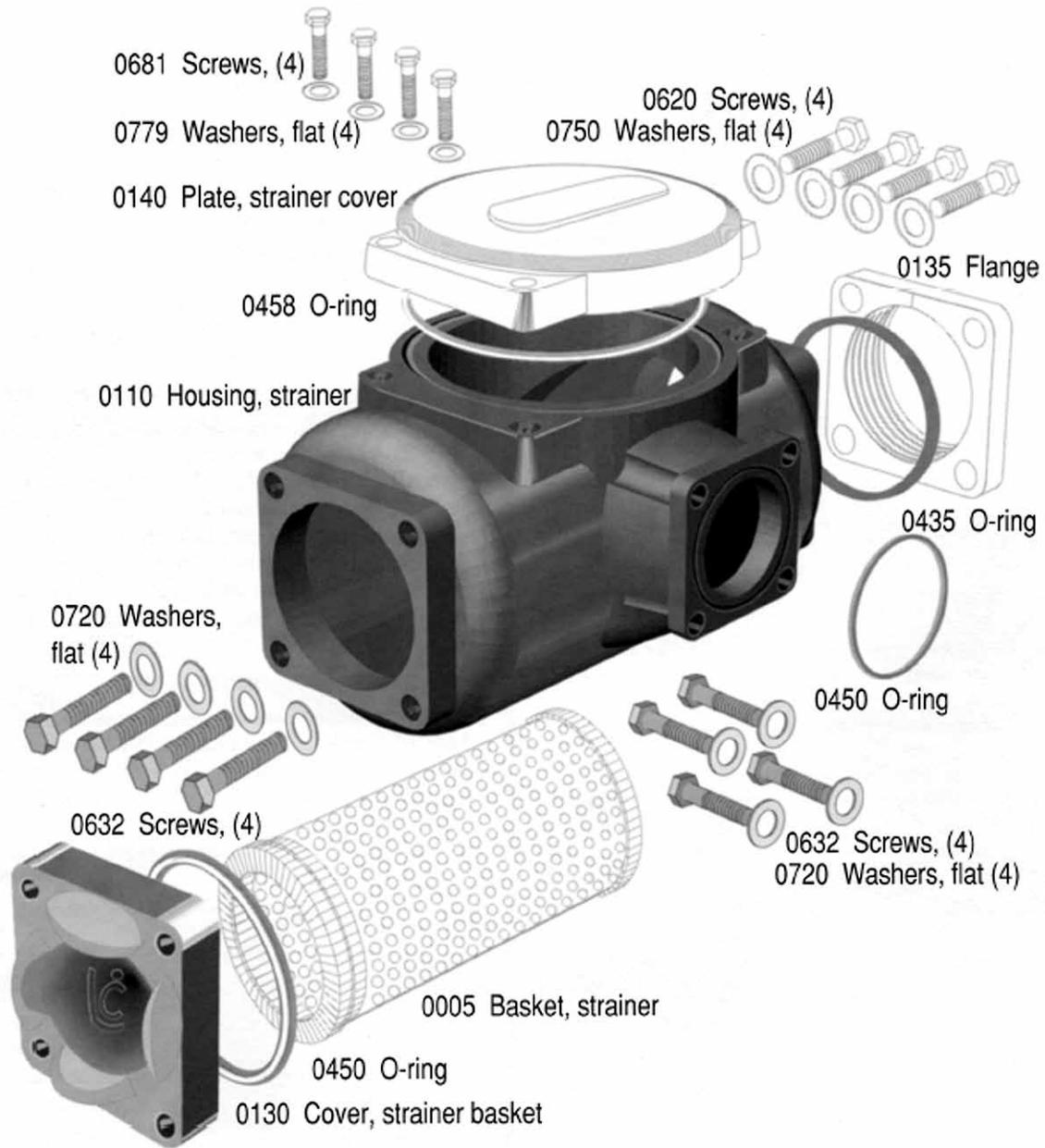
PROBABLE CAUSE B

Dirty areas that are preventing the seals from making complete contact.

SOLUTION B

Clean the strainer housing as outlined in the Maintenance section. Remember to replace PTFE seals and never to reuse them.

F-7 ALUMINUM





F-7 CAST IRON

0110 Housing, strainer
(use with an air eliminator)



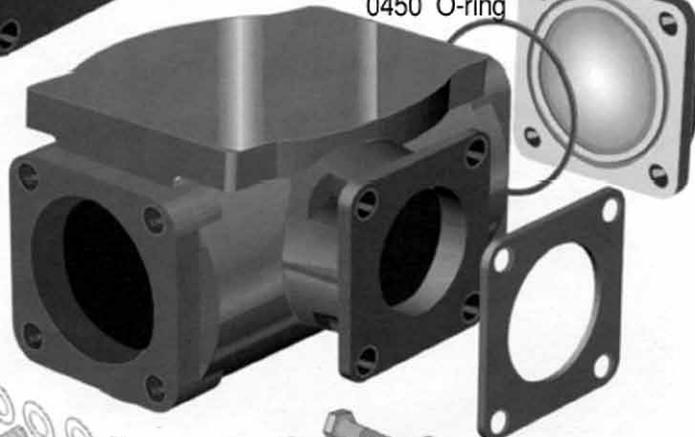
0632 Screws, (4)



0720 Washers, flat (4)

0130 Cover, strainer basket

0450 O-ring



0110 Housing, strainer
(use without an air eliminator)



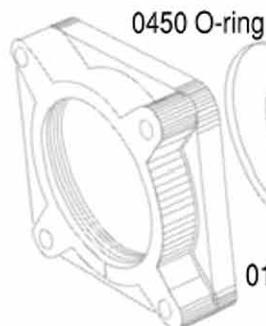
0620 Screws, (4)
0750 Washers, flat (4)



0428 Gasket, flange

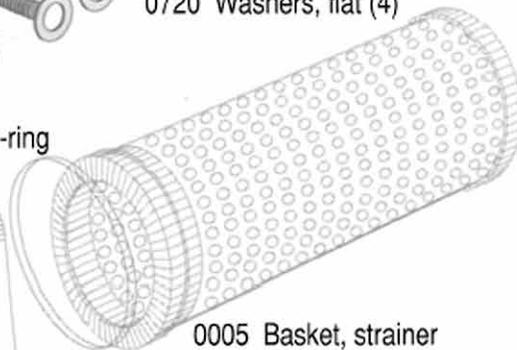
0632 Screws, (4)

0720 Washers, flat (4)



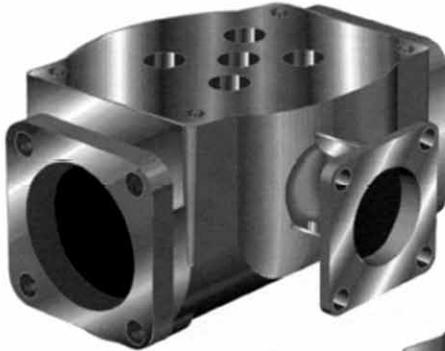
0450 O-ring

0135 Flange

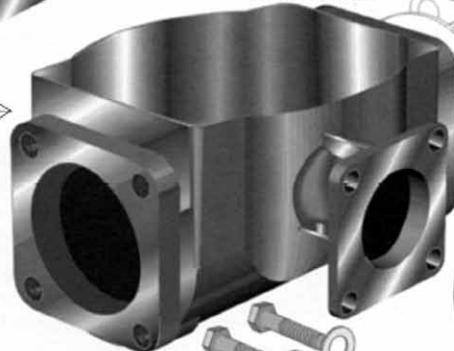


0005 Basket, strainer

0110 Housing, strainer
(use with an air eliminator)



0110 Housing, strainer
(use without an air eliminator)



0620 Screws, (4)
0750 Washers, flat (4)

0435 Gasket

0135 Flange

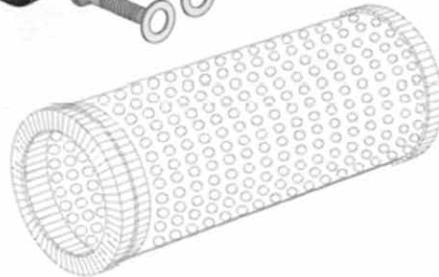
0130 Cover,
strainer basket

0428 Gasket, flange

0632 Screws, (4)
0720 Washers, flat (4)

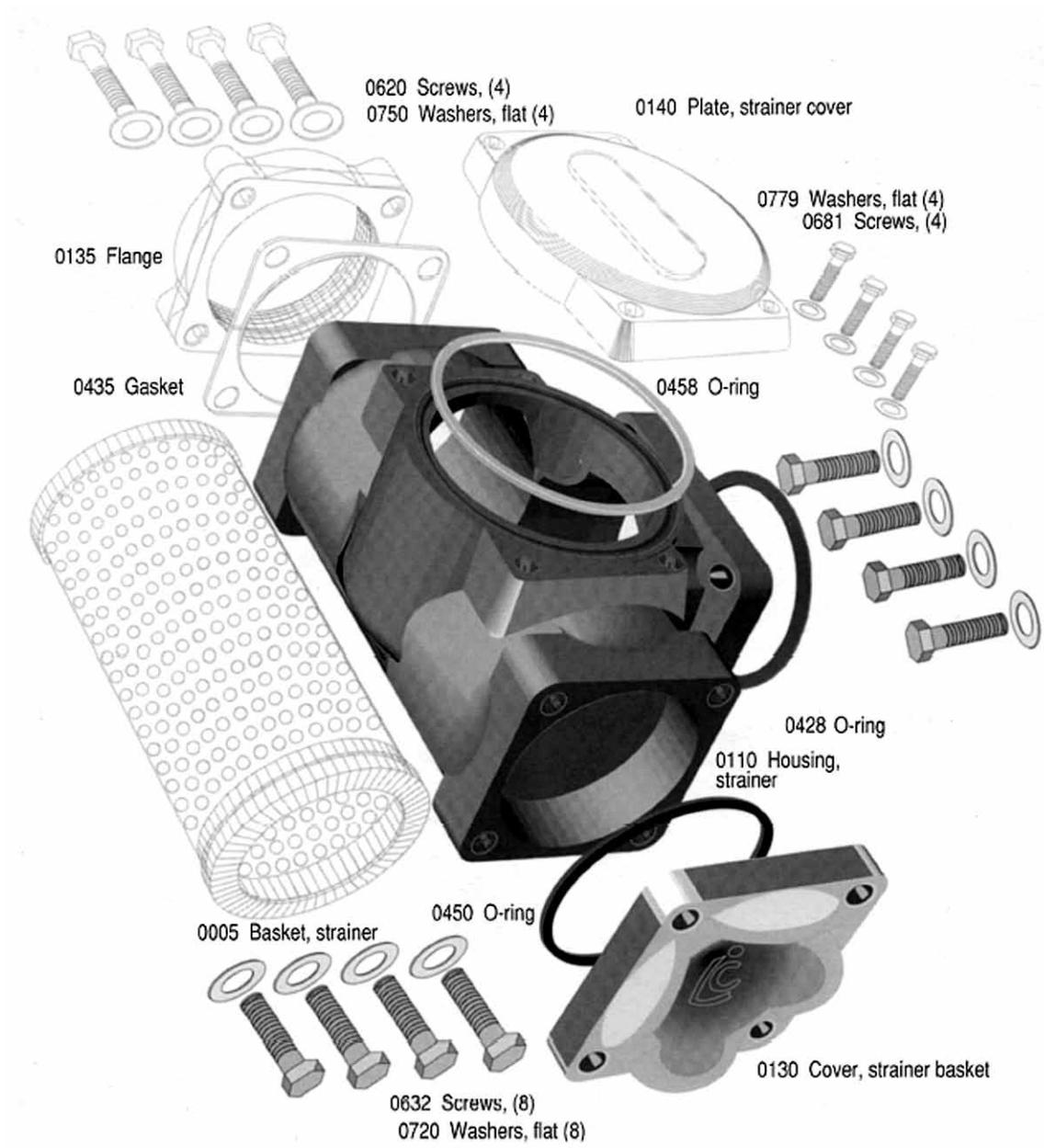
0450 O-ring

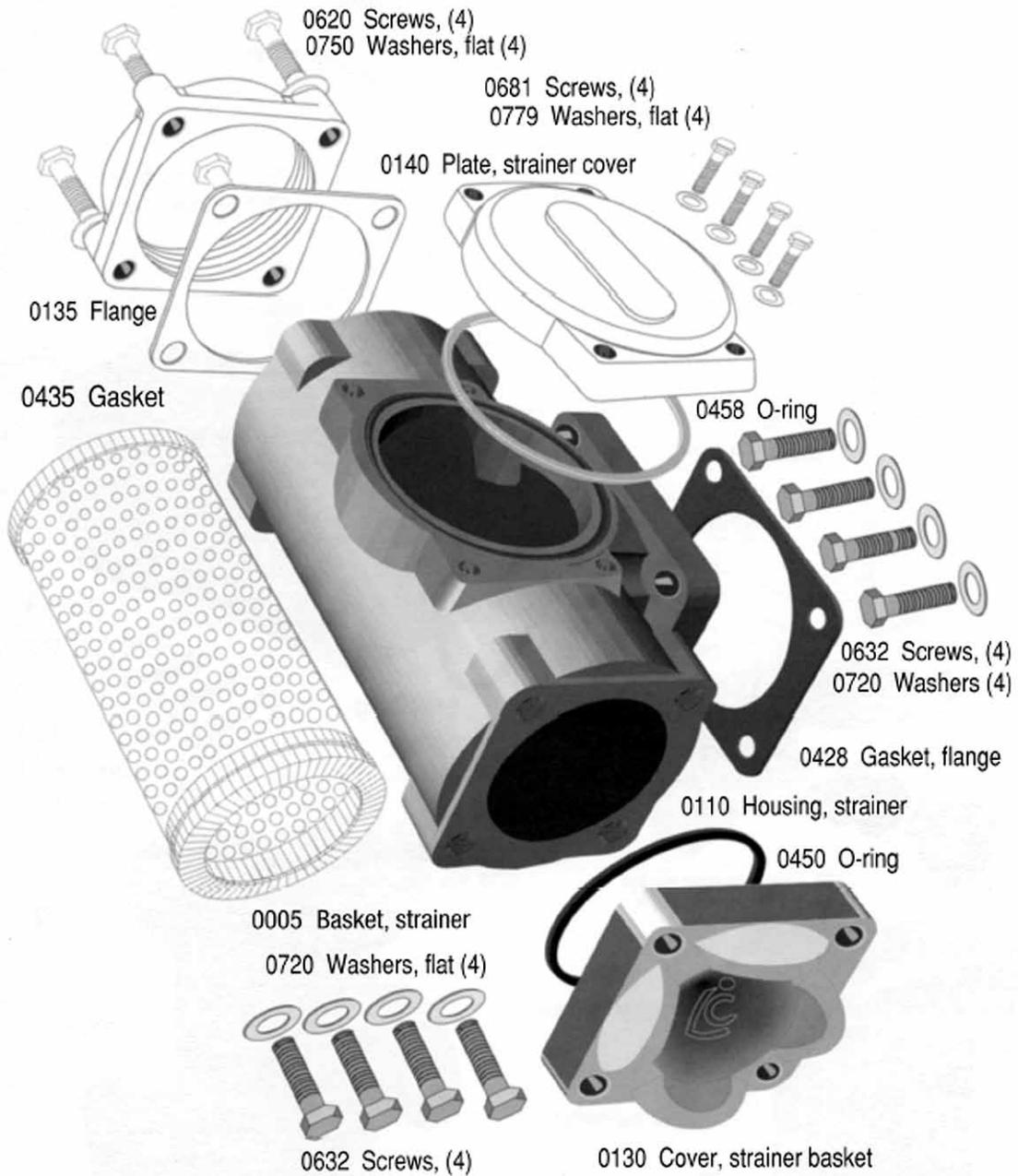
0632 Screws, (4)
0720 Washers, flat (4)



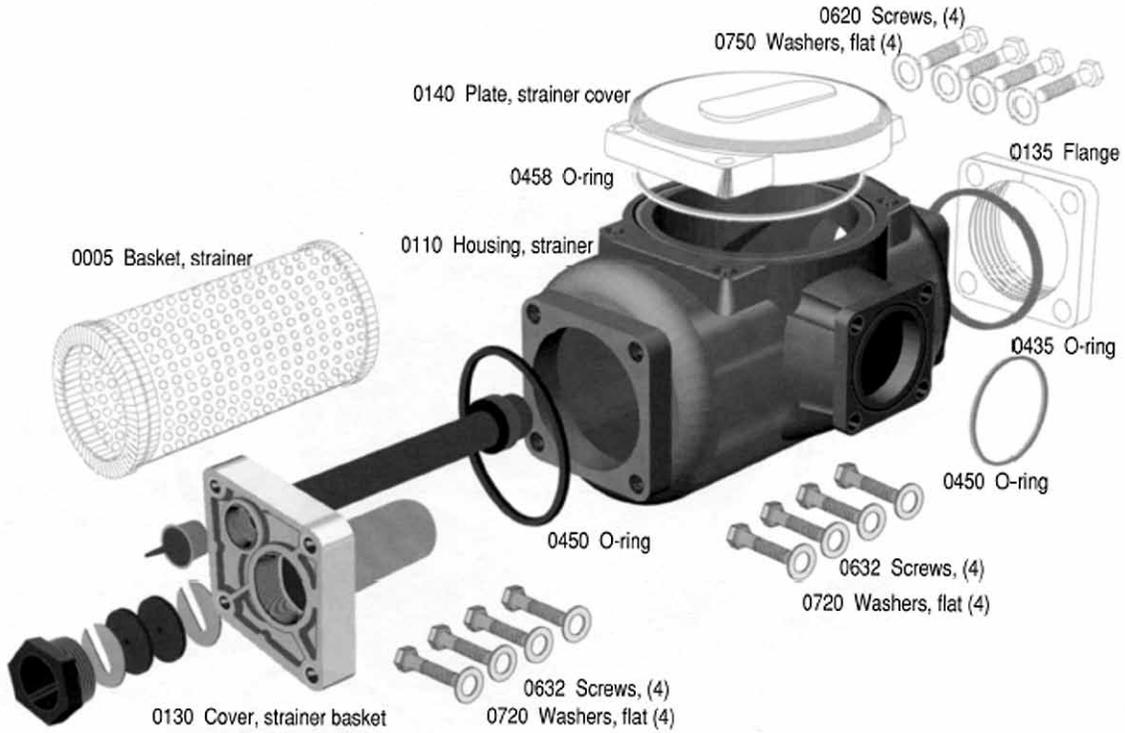
0005 Basket, strainer

F-15 ALUMINUM



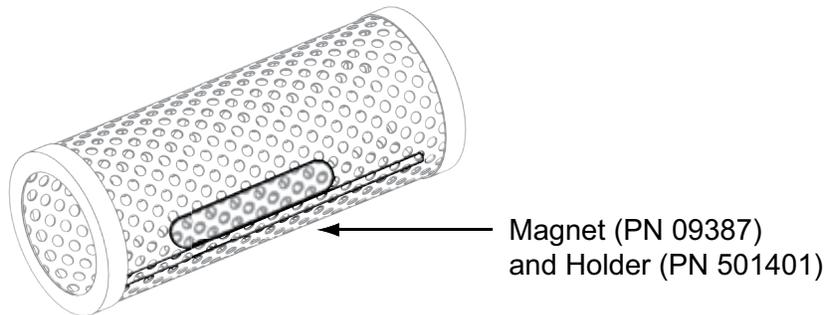


FA-7 ALUMINUM

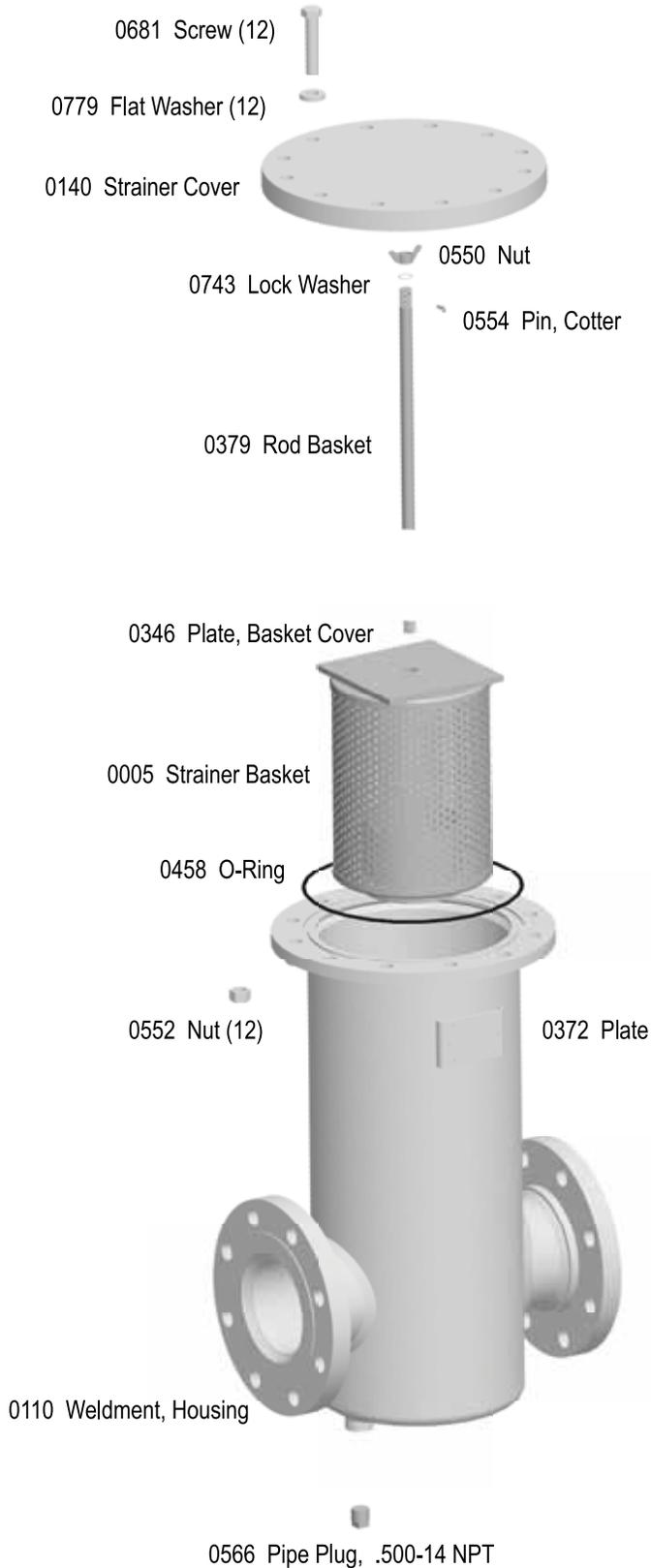


ADDITION OF A MAGNET AND HOLDER TO THE FA-7 AND FA-15 STRAINER ASSEMBLIES

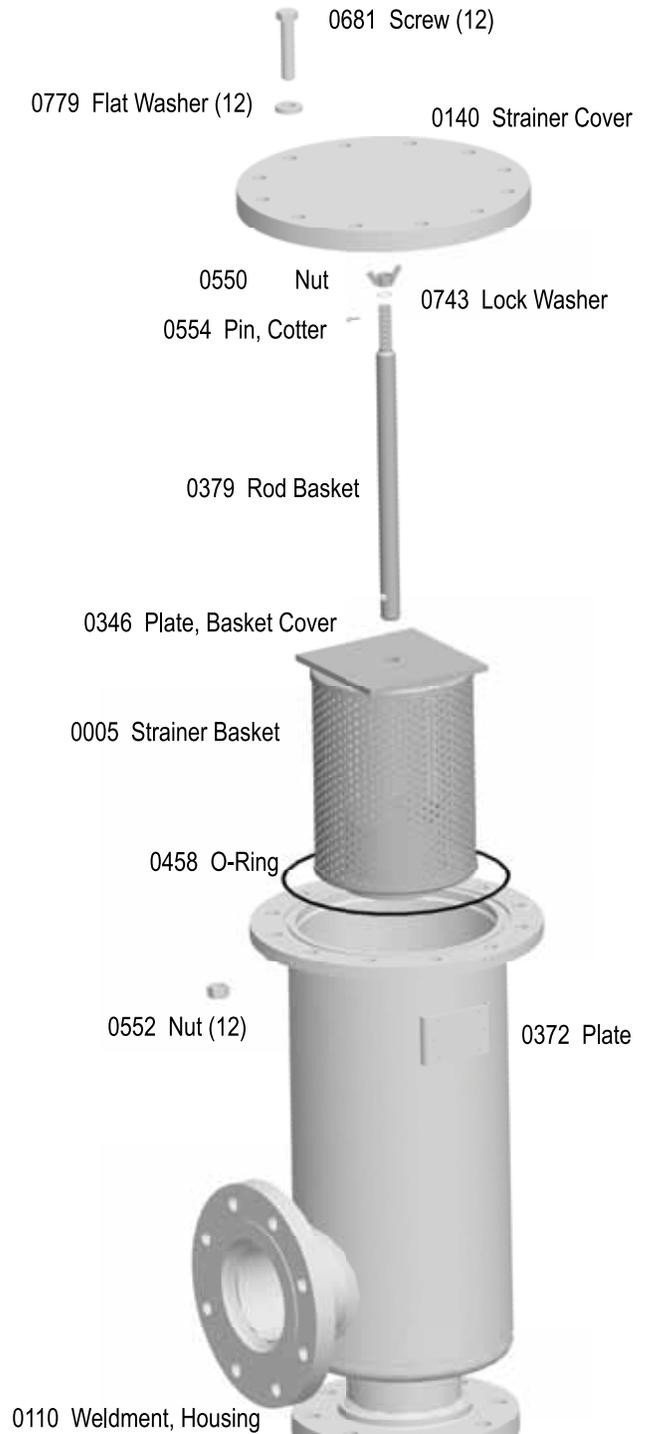
To help alleviate the problem of premature strainer plugging and to prolong the life of the measuring chamber, we have added a cylindrical magnet and magnet holder as standard in all FA-7 and FA-15 strainers supplied with MA-5, MA-7, and MA-15 Series LPG meters starting September 15, 2004.



INLINE CONFIGURATION



BOTTOM INLET CONFIGURATION



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