

Strainers

Installation & 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



LIQUID CONTROLS®

An IDEX Energy & Fuels Business

M200-10

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Strainers

Congratulations on ownership of a Liquid Control Strainer. This manual provides the technical details on installation, hardware, setup, operation, and regulatory information for your meter.

Resources in this Guide

For convenience, you can easily download the [PDF edition of this guide](#). Liquid Controls recommends that you read through the introductory and safety information, and then proceed to the Installation chapter.



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.

Publication Updates

The most current versions of all Liquid Controls publications are available on the [Liquid Controls web site](#). If there are questions about the language or interpretation of any LC manuals, instructions, or specification sheets, please first contact your local distributor for help with your inquiry.

For service related issues that require further support from the Liquid Controls Service Team, please call the Liquid Controls Corporate Office:

Phone: +1 847 295-1050

Toll-free: 800 458 5262

Address: Liquid Controls LLC, 105 Albrecht Drive, Lake Bluff, IL 60044 USA

Website: www.LCmeter.com

Safety Procedures



BE PREPARED

- 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/boards, always use proper Electrostatic Discharge (ESD) equipment and follow 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 appropriate fire extinguishers for your product.
- Consult with your local fire department, state, and local codes to ensure adequate preparation.
- Read this manual and all the literature provided in your owner's packet.
- Save these instructions for future reference.
- Failure to follow the instructions in this publication could result in, personal injury, or death from fire and/or explosion, property damage, or other hazards that may be associated with this type of equipment.



SAFELY EVACUATE PIPING SYSTEM

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.

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.



OBSERVE NATIONAL & LOCAL CODES

Power, input, and output (I/O) wiring must be in accordance with the area classification for which it is used (Class I, Div 2). For North America, installations must be per the U. S. National Electrical Code, NFPA 70, or the Canadian Electrical Code in order to maintain Class I, Division 2 ratings. This may require using connections or other adaptations in accordance with the requirements of the authority having jurisdiction.

Peripheral equipment must be suitable for the hazardous location where it is installed. (L'équipement périphérique doit être adapté à la zone dangereux où il est installé.)

WARNING: Explosion Hazard

When in hazardous locations, turn power OFF before replacing or wiring modules. (Lorsque dans des endroits dangereux, coupler le courant avant de remplacer ou de câbler des modules.)

DO NOT disconnect equipment unless power has been switched OFF or the area is known to be Non-Hazardous. (NE PAS déconnecter l'équipement sans coupler l'alimentation ou sans s'assurer que la zone est non dangereuse.)

WARNING: Use 3.5 in • lb (0.4 N • m) torque when tightening terminal block screws.



IN THE EVENT OF A GAS FIRE

IN THE EVENT OF A LARGE FIRE 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 for the materials that have caught fire, such as a Class B fire extinguisher, water, or fog extinguisher.
- 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 building and notify your local 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.
- Ensure that the gas is dispersed before resuming business and operating motors.
- If in doubt, notify your local fire department.

Overview

The Purpose of Liquid Control Strainers

Strainers help to protect meters from serious damage caused by burrs dislodged from new piping, pipe scale or foreign material. The initial cost of the strainer 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 Liquid Controls 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

Liquid Controls 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 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 simplifies piping.
- Optional 45-degree 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.

WARNING: 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

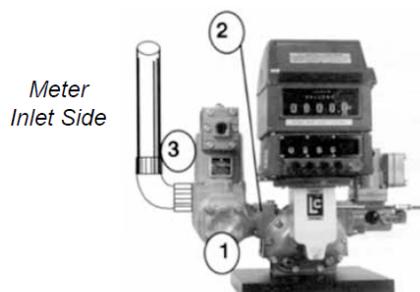
Follow these steps:

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 & Operation

Follow these steps to install and operate the strainer:

- 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 [Disassembly & Reassembly](#) for disassembly and reassembly instructions.
- 2. Plan a location for the strainer in the system providing for the following requirements** – Ensure there is no pipe strain imposed on the strainer or any other component part of the meter assembly. 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:**
 - (a) Install the strainer on the inlet side of the meter
 - (b) Bolt the strainer outlet to the inlet flanged connection of the meter.
 - (c) 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 in the Maintenance section below.



Maintenance

It's very important to follow preventive maintenance procedures to protect the strainer as well as the metering system. Foreign matter such as ice can build up inside the strainer and 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.

Disassembly & Reassembly

Disassembling a Strainer

Follow these steps 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 embedded particles cannot be removed, replace the basket.



NOTE: 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.

5. With a clean, soft cloth, clean the inner face of cover plate, mating face of the strainer body, and seal ring.
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.

Replace PTFE O-rings

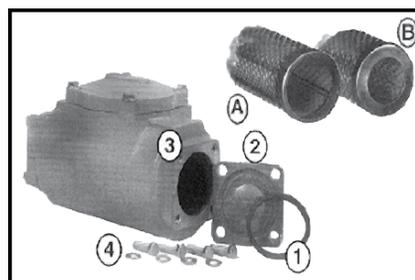
Never reuse PTFE O-rings. Always replace them even if they appear to be in good condition.

Reassembling a Strainer

F/FA Strainer

Follow these steps to disassemble 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 the **Torque Chart** below.



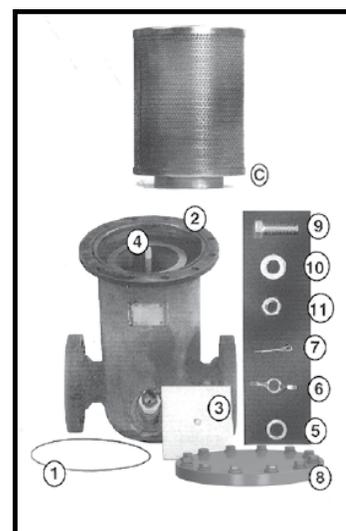
Tightening Screws and Nuts

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. Additional tightening will not stop the leakage.

FS/FSAA/FSA Strainer

Follow these steps to disassemble a 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 the **Torque Chart** below.



WARNING

Before refilling 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 $\pm 10\%$

Replacement Parts & Troubleshooting

How to Order Replacement Parts

Follow these steps 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 Owners 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

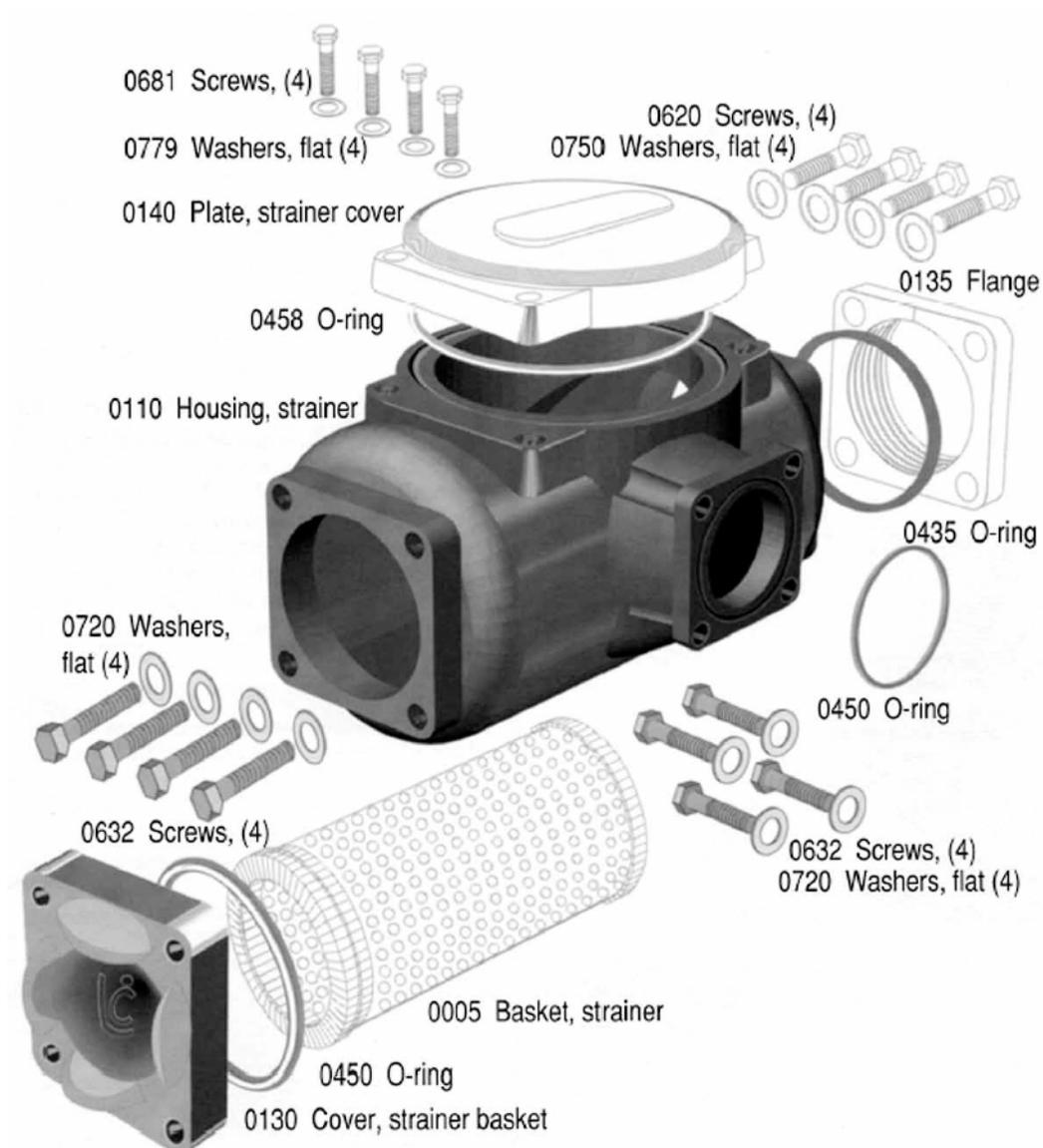
PROBLEM	PROBABLE CAUSES & SOLUTIONS
<p>Meter lockup / the rotors don't turn</p>	<p>CAUSE A – Strainer basket rupture possibly due to improper maintenance of the strainer basket. If this occurred in a new system, the system may have been improperly flushed.</p> <p>SOLUTION A – Replace the strainer basket 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 the Installation & Operation Guide for meter maintenance procedures, or contact your full service distributor.</p> <p>CAUSE B – Debris entered the metering chamber, possibly due to improper cleaning during strainer maintenance. (Dirt may have fallen into the strainer housing when the basket was removed for cleaning.)</p> <p>SOLUTION B – Properly clean the strainer housing as outlined in the Maintenance section in the Installation & Operation topic.</p>

	<p>The meter chamber will require cleaning and may require replacement of parts. Refer to the Installation & Operation Guide for meter maintenance procedures, or contact your full service distributor.</p> <p>CAUSE C – Denting or distortion of the strainer basket, which has 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.</p> <p>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 the Installation & Operation Guide for meter maintenance procedures, or contact your full service distributor.</p>
<p>Meter inspection due to meter inaccuracy reveals scoring of the meter chamber.</p>	<p>CAUSE – See the probable causes for the problem above.</p> <p>SOLUTION – See the solutions for the problem above. 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.</p>
<p>High pressure drop across the strainer or loss of flow rate.</p>	<p>CAUSE A – Strainer basket screen is partially blocked by foreign material such as dried material or salted out solid particles due to drying.</p> <p>SOLUTION A – Properly clean the strainer housing as outlined in the Maintenance section of the Installation & Operation topic. The meter chamber may require cleaning and replacement parts. Refer to the Installation & Operation Guide for meter maintenance procedures, or contact your full service distributor.</p> <p>CAUSE B – Inner mesh of the strainer basket is not properly sized for viscosity of the product.</p>

	<p>SOLUTION B – Replace the strainer basket with a basket correctly suited for the product.</p>
<p>Leaking at the strainer basket cover.</p>	<p>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.</p> <p>SOLUTION A – Replace the damaged seals. Replace PTFE seals if they were reused—even if they are in good condition.</p> <p>CAUSE B – Dirty areas that are preventing the seals from making complete contact.</p> <p>SOLUTION B – Clean the strainer housing as outlined in the Maintenance section of the Installation & Operation topic. Remember to replace PTFE seals and never to reuse them.</p>

Bill of Materials

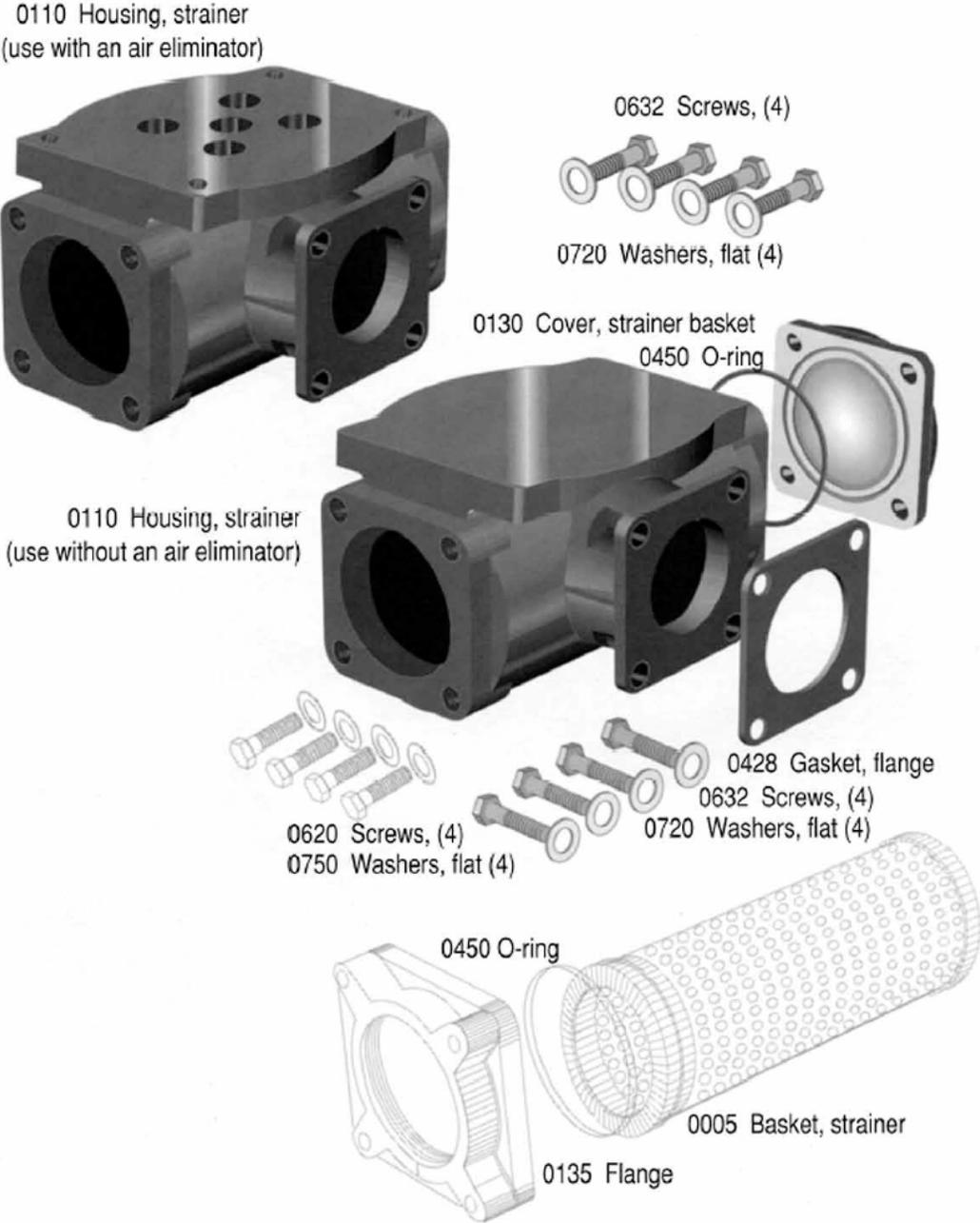
F-7 Aluminum



F-7 Brass

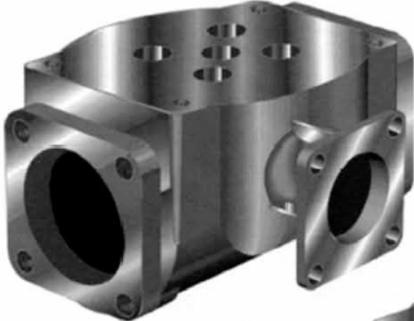


F-7 Cast Iron



F-7 Stainless Steel

0110 Housing, strainer
(use with an air eliminator)



0110 Housing, strainer
(use without an air eliminator)



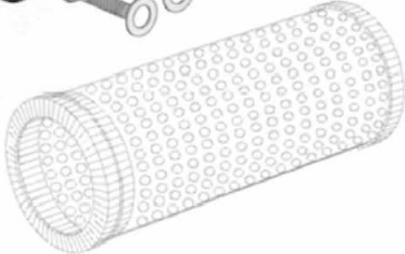
0620 Screws, (4)
0750 Washers, flat (4)
0435 Gasket
0135 Flange

0130 Cover, strainer basket



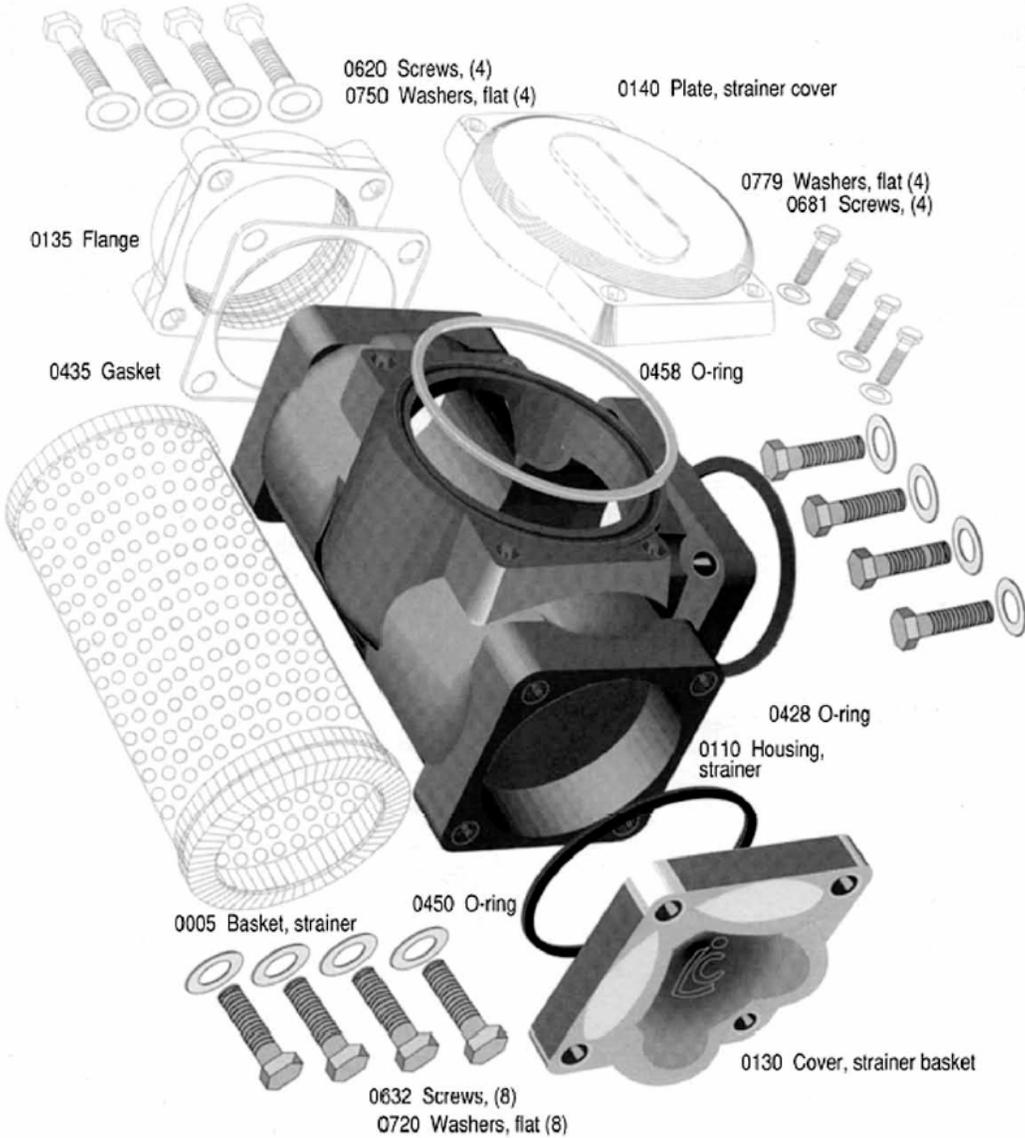
0428 Gasket, flange
0632 Screws, (4)
0720 Washers, flat (4)

0450 O-ring
0632 Screws, (4)
0720 Washers, flat (4)

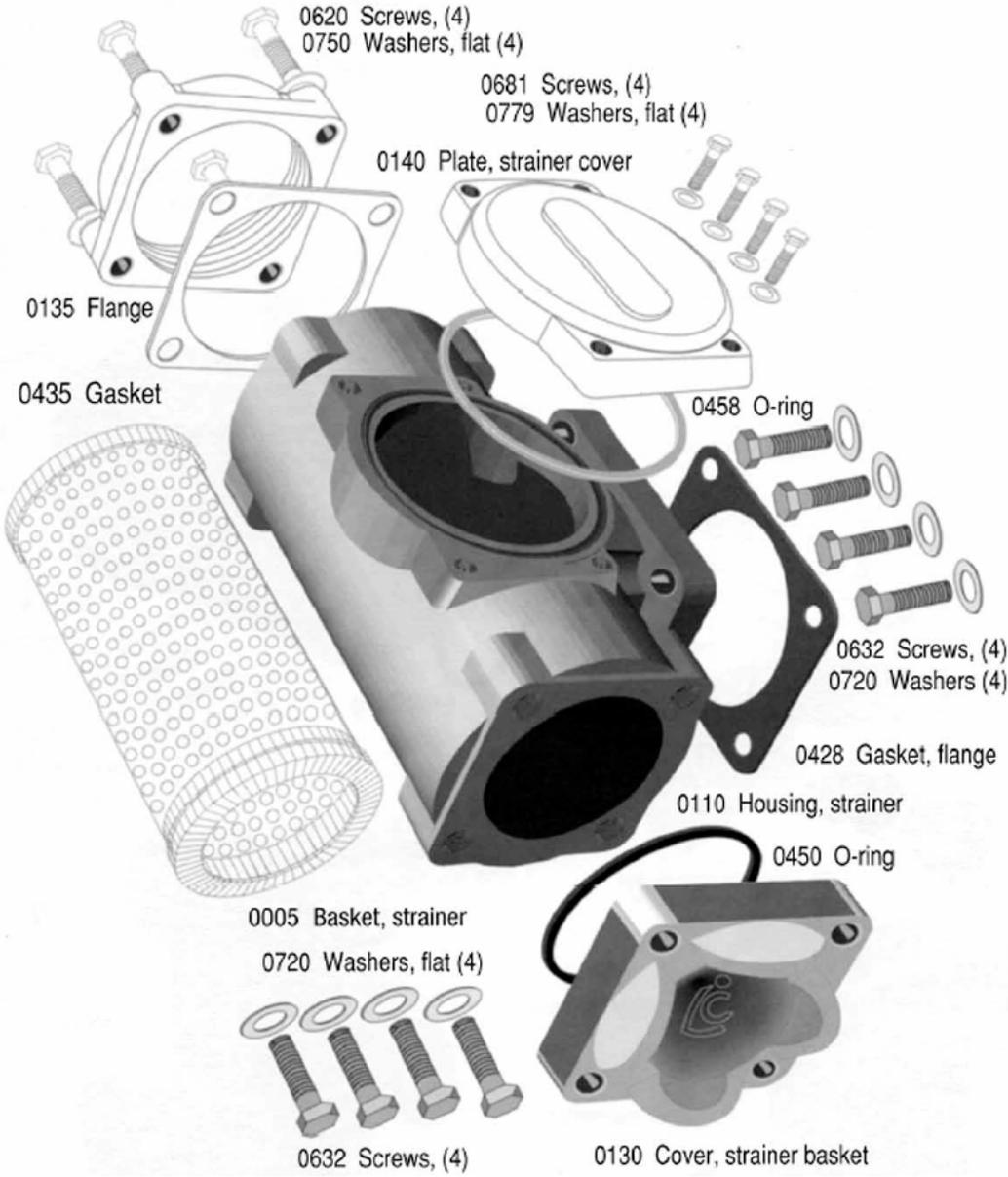


0005 Basket, strainer

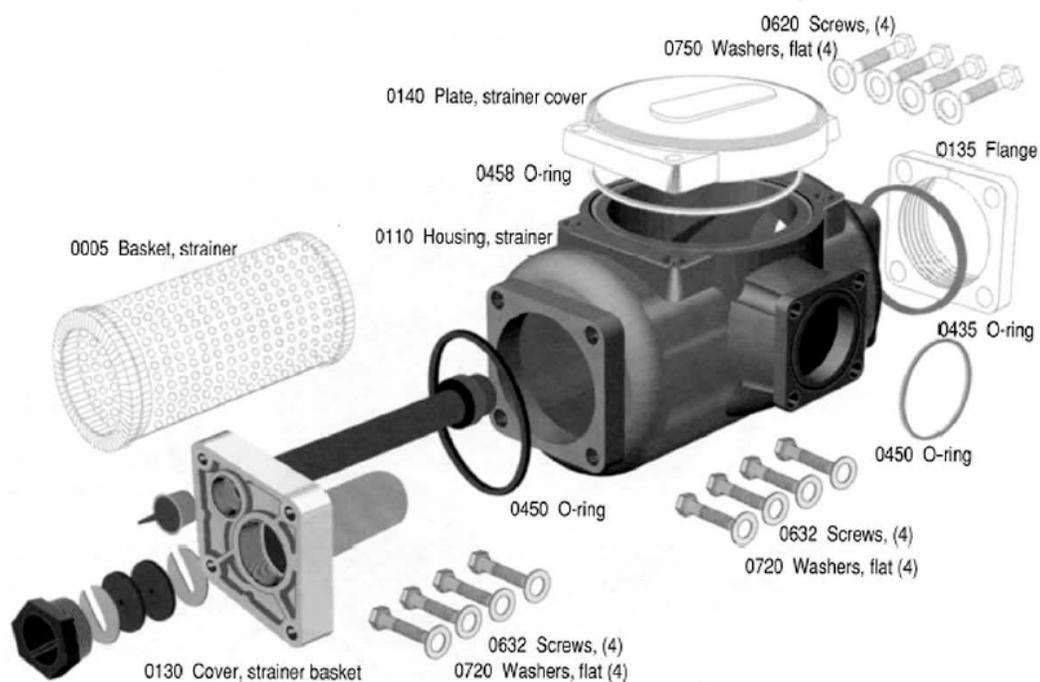
F-15 Aluminum



F-30 Aluminum

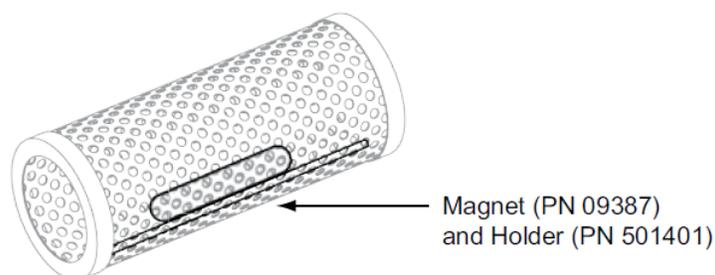


FA-7 Aluminum



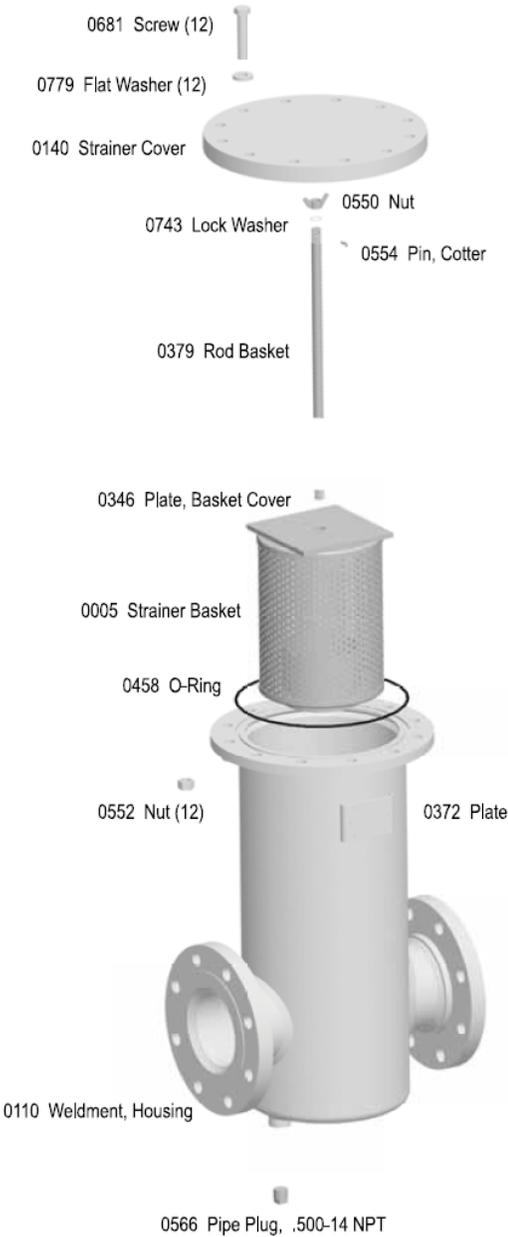
Addition of a Magnet and Holder to the FA-7 and FA-15 Strainer Assemblies

To help alleviate the problem of premature strainer plugging—and to prolong the life of the measuring chamber—Liquid Control has 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.

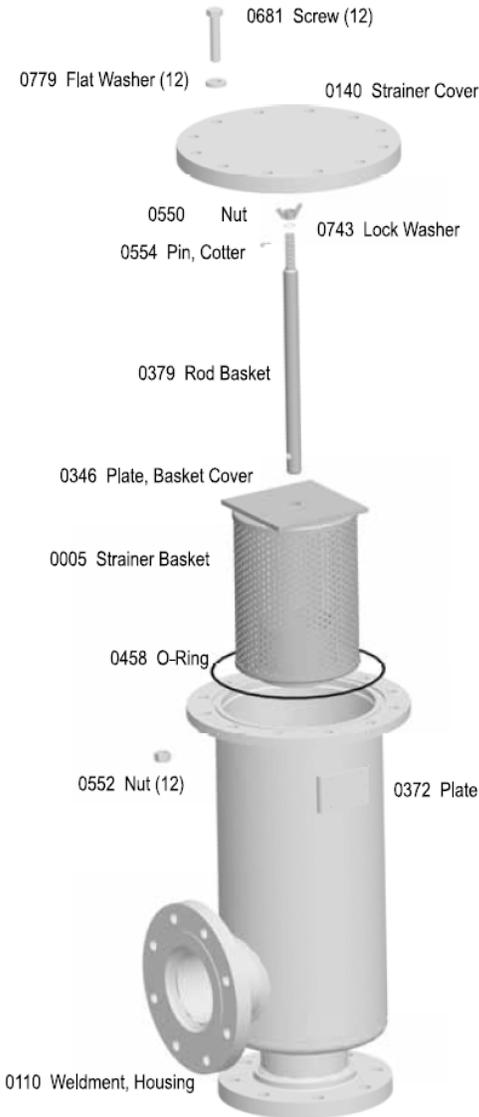


FS/FSAA/FSA Configurations

INLINE CONFIGURATION



BOTTOM INLET CONFIGURATION





LIQUID CONTROLS®

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