

Indoor Installation

NFPA 58 permits the second stage regulator to be installed inside a building if:

- The first stage regulator is installed outside the building
- The pressure to the second stage does not exceed 20 psig.
- The relief valve of the second stage regulator is piped outdoors and the vent discharge pipe terminates in a location previously discussed in this manual.

Vent lines should not restrict gas flow and should be 3/4" – NPT pipe thread size and cannot interfere with the proper function of the relief valve. To install the vent line, remove the vent screen. Vent lines should have a minimum number of bends, with maximum recommended vertical height of 39 inches and horizontal length piped to the outdoors of 31 inches. See section 1.3 (Figure #3) in catalog. Place a vent screen at the end of the drip lip of the vent assembly, to aid in preventing the vent from becoming plugged.

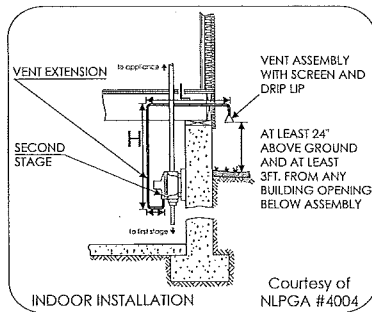


Figure 2

Underground Installation

! WARNING !

Regulators installed in the dome of an underground tank require a vent tube. The end of the regulator vent tube must be located at the very top of the inside of the housing dome, above any potential water level, at the installation site. See section 1.2 (Figure#1) in catalog. FAILURE TO DO SO MAY RESULT IN AN EXPLOSION AND/OR FIRE, CAUSING PROPERTY DAMAGE, PERSONAL INJURY OR DEATH.

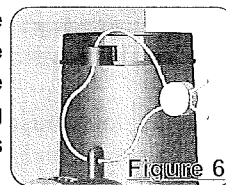
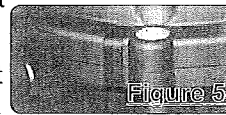
Hazards can occur if regulators are not installed properly in underground systems. Make sure the regulator adjustment bonnet cap is closed tightly to eliminate water, mud, and insects etc, from entering the regulator. Grade the ground downward and away from around the housing dome. This prevents water from collecting and running into the dome. Replace any regulator that has been flooded or has been submersed below the water table of an underground tank, or shows evidence thereof.

Tamper Evident Features / Regulator Adjustment

Regulators that have the bonnet secured with screws, incorporate a "Tamper Evident Clip" to ensure that no attempt has been made to disassemble the regulator bonnet from the regulator body, without evidence of doing so. See section 1.5 (Figure # 5) in the catalog. If the tamper evident clip is missing, replace the regulator immediately.

Adjustable regulators have a black colored removable bonnet cap, which incorporate a feature to secure the cap with a "Tamper Evident cable". If outlet pressure requires adjustment, this cable needs to be securely re-fastened once the outlet pressure has been set and the bonnet cap has been tightened. If the cable is missing or broken, this feature alerts the technician of unauthorized access to the adjustment screw. If the cable appears to have been compromised, the regulator must be rechecked for the proper outlet setting. See section 1.5 (figure #6)

Each regulator is factory set to the outlet setting pressures described in this manual. The pressure taps are restricted, and the plugs can be removed with pressure on the outlet of the regulator. Install a pressure gauge to determine the proper setting during adjustment and reinstall the plugs after setting. Check the plug for leaks.



! WARNING !

Failure to perform the tasks below may result in an explosion and/or fire, causing property damage and personal injury or death.

- To avoid personal injury or damage to the equipment, never attempt any maintenance or disassembly without isolating the regulator from system pressure and relieving all internal pressure.
- Regulators that have been disassembled for repair must be tested for proper operation before being returned to service. Use only parts manufactured by Cavagna, for repairing Cavagna regulators.
- Because of normal wear due to the environment, these regulators must be periodically inspected and maintained. Frequency of inspection and regulator replacement depends on various environmental conditions and location or local, state and federal regulations.

The following items should be checked during each gas delivery:

- Check for leaks
- Proper vent orientation
- Obstructed, plugged or frozen vents
- Internal / external corrosion
- Regulator submersed in water for underground installations
- Improper installation/Incorrect regulator Type(s) for the required LP-Gas system

! WARNING ! LP-GAS IS EXTREMELY FLAMMABLE AND EXPLOSIVE

Improper installation / maintenance and failure to read and follow these instructions may result in an explosion and /or fire, causing property damage and personal injury or death.

Regulators and equipment must be installed in strict conformance with NFPA Pamphlets 58 and 54 and all other applicable codes and regulations. Become familiar with NPGA Safety Pamphlet 306-88 "LP-Gas Regulator and valve Inspections and Maintenance, and follow the guidelines and recommendations.

Only qualified persons, who are properly trained, should install, adjust or service LP-Gas Regulators.



Important items to advise the customer:

Point out the location of the vent or vent tube opening and stress that this opening must remain unobstructed at all times. Advise them that they need to check the vent opening after a freezing rain, sleet or snow event, to ensure that no ice has formed on the vent.

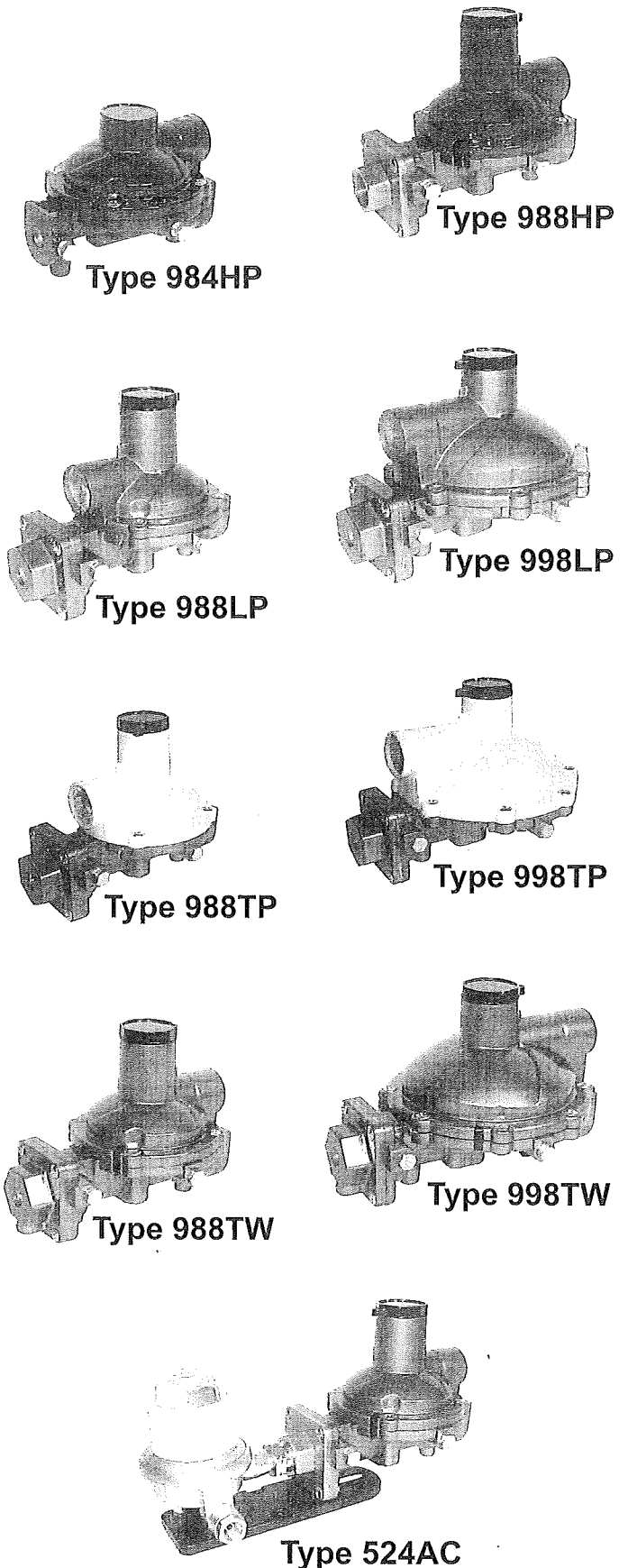
Point out the location of the container shut off valve. Advise the customer that they should immediately close the container shut off valve, if it is safe to do so, if they hear or smell escaping gas; pilot lights fail to stay ignited, or appear to project an abnormal flame.

Report the leak. Do so away from the gas leak, from a neighbor's home or other nearby building. Call your propane retailer right away, or call 911 / local fire department.

Introduction

Overview of the manual

This manual provides instructions for installation and maintenance of the followings types of regulators: first stage, second stage, integral, 2 psig and automatic changeover regulators used on LP-Gas "vapor only" service applications.



Regulator Description

First Stage Service Regulators

Type 984HP and 988HP regulators are designed for outdoor high pressure vapor service, with high capacity relief valve construction. Type 984 HP reduces the container pressure to 10 psig (0.69 bar) at the outlet and is non adjustable. The 988 HP reduces the container pressure to either 5 psig or 10 psig at the outlet, depending on the 988 HP model type. The 988 HP also has an adjustable outlet pressure spring range of 4 to 6 psig (0.28 to 0.41 bar) or 8 to 12 psig (0.55 to 0.83 bar).

Second Stage and 2 PSI (0.14 bar) Service Regulators

Second Stage - Type 988LP and 998LP regulators are designed for vapor service and provide low (inches of water) delivery pressure and have high capacity internal relief valves. See section 1.3 in catalog regarding "indoor installation". They are set to deliver 11 inches water column (27 mbar) delivery pressure. Both types also have an adjustable outlet pressure spring range of 9 to 13 inches water column (22 to 32 mbar). There are also three additional configurations of the inlet and outlet fittings for the 998LP model.

- Straight inlet with 90° outlet
- Side inlet with 90° outlet
- In-line inlet and outlet flange

2 PSI – Types 988TP, 998TP 2 Psig service regulators are designed for 2 psig (0.14 bar) LP-Gas systems and are not suitable for first stage service. These units are installed downstream from a first-stage regulator to reduce an inlet pressure of 10 psig (0.7 bar) to a normal 2 psig (0.14 bar) outlet pressure. The 2 PSI Service Regulators are designed for domestic applications that supply 2 psig (0.14 bar) LP-Gas to a line regulator located inside the building. The 998TP model also offers an in-line inlet and 90° outlet.

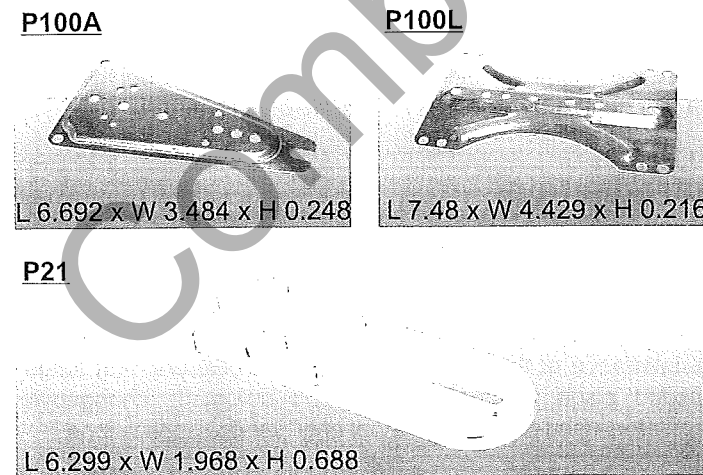
Integral Twin-Stage Regulators

Type 988TW and 998TW regulators are designed for outdoor two-stage LP-Gas systems, to reduce the cylinder or tank pressure through an integral twin-stage system to 11 inches w.c. (27 mbar). The second stage has high capacity internal relief valve construction. Both models have an adjustable outlet pressure spring range of 9.5 to 13 inches w.c (24 to 32 mbar) or 9 to 13 inches w.c (22 to 32 (mbar).

Automatic Changeover Regulators

Type 524 AC regulators change from the supply cylinder (when gas is exhausted) to the reserve cylinder automatically. The regulator is designed for low pressure vapor service (inches of w.c.) and is not to be used for liquid service. The type 524AC regulator is composed of the automatic changeover working as a 1st stage connected to the inlet of a Type 988 LP Series second stage regulator.

WARNING Due to the zinc alloy regulator body material of the 524 AC series, only use manufacturers recommended plastic mounting brackets (see section 1.6 in catalog) when performing a wall mount installation. See section 6 in catalog, regarding manufacturer's instructions on proper operation and indicator reading of the automatic changeover function. Failure to do so may result in an explosion and/or fire, causing property damage, personal injury or death.



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!WARNING!
LP Gas is extremely flammable and explosive.
Improper installation may result in an explosion and/or fire causing property damage, personal injury or death.

- Vents must be clear and fully open at all times. An obstructed vent may prevent the pressure relief valve from operating properly and can cause an abnormal high pressure condition which may result in property damage and personal injury.
- Regulators must be installed in the correct mounting position with the vent-hole pointing downwards. This allows moisture and condensation to drain and minimizes the potential of water entry into the vent.
- Protect vent openings from intrusion of rain, snow, freezing rain, ice formation, sleet, insects, mud, paint or any other foreign objects or debris, that could obstruct or plug the vent or vent line.
- This product contains an integral pressure relief valve that may discharge large volumes of LP-Gas into the atmosphere through the vent. Failure to use a vent line directed outdoors, for indoor installations, could result in an accumulation of gas which may result in property damage or personal injury.
- Never use a Type 984HP, 988HP, 988TP or 998TP (pounds to pounds) regulator in low pressure (inches w.c) service. Doing so could result in property damage or personal injury. The Types 988TP and 998TP are not suitable for use as a "First Stage" regulator.
- Regulators are not to be used on liquid LP-Gas service systems.

General Installation Guidelines

All regulators must be installed in conformance with NFPA Pamphlets 54 and 58 and all other applicable federal, state, and local codes and regulations. Failure to follow these standards, codes and regulations could result in hazardous installations. Check the regulator and installation for leaks according to NFPA Pamphlet # 54 and NPGA Bulletin 403 "Pressure testing and leak checking LP-Gas Piping Systems".

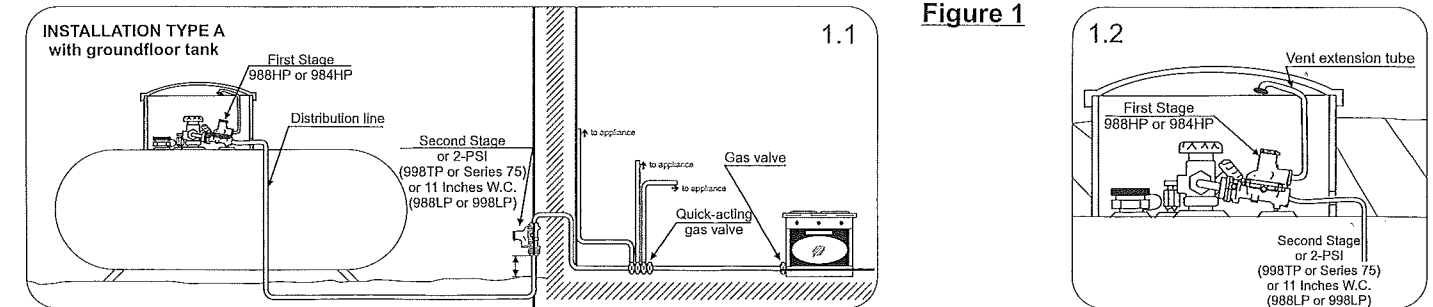
Make sure that an appropriate piping system (length and diameter) from the first stage regulator, is properly calculated (pressure drop), to ensure minimum supply pressure (5 psig) to the second stage regulator in order to allow the maximum capacity to gas appliances.

Make sure piping is clean and free from foreign material (such as dirt, corrosion, debris, pipe joint compound, etc). Purging lines before installing the regulator will help reduce the possibility of dirt, chips or scale imbedding itself in the regulator seat. Always replace the pigtail when replacing a regulator. Thread sealant used on piping must be compatible with LP-Gas.

Apply the thread sealant on the male threads of the pipe and not the female threads of the regulator outlet or vent.

Horizontally mounted regulators such as found in ASME tanks and single cylinder installations, must be installed well under the ASME tank housing dome, hood or beneath a protective cover. The first stage (Type 984HP and 988HP) and twin stage (Type 988TW and 998TW) regulators must be mounted with the cover turned upwards, with a slight down slope, to allow any moisture or water to drain out of the vent hole. See Installations section 1.2 (Figure #1) in the catalog.

Second stage regulators must have their vent (outdoor installation) or vent discharge pipe (indoor installation) pointed vertically downwards and terminate in a location so that any gas discharge through the vent or vent discharge pipe is at least 3 feet horizontally from any building opening below the level of the vent. The vent or vent discharge pipe must also terminate at least 24 inches (45 cm) above ground level and 5 feet from sources of ignition.



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