

TECHNICAL APPLICATION GUIDE

FOR MINI-REGULATOR WITH AND WITHOUT DRAIN CHECK OPTIONS



TABLE OF CONTENTS

1.0 REGULATING WATER PRESSURE & DRAIN CHECK

2.0 HOW IT WORKS

3.0 OPERATION DETAILS

- 3.1 MR (mini regulator)
- 3.2 MRDC/MDC drain check function
- 3.3 Low temperature caution

4.0 TYPICAL APPLICATIONS

- 4.1 Rotator orchard sprinkler
- 4.2 Overtree cooling
- 4.3 Drip lines
- 4.4 Rotator for wheel lines
- 4.5 Green house irrigation

5.0 TECHNICAL PERFORMANCE DETAILS

- 5.1 Pressure options
- 5.2 Flow effect on outlet pressure
- 5.3 Performance considerations
- 5.4 Minimal required pressure input
- 5.5 Design considerations
of pressure control
- 5.6 Flow limits
- 5.7 Filtration requirements

6.0 OPTIONAL MODELS

7.0 MATERIAL LIST OF PARTS

WARRANTY

1.0 REGULATING WATER PRESSURE AND DRAIN CHECK

The purpose of this regulator is to adjust varying water pressure on the irrigation sprinkler, rotator or drip irrigation system. The result is consistent flow and uniform irrigation. The MRDC also includes the drain-check benefit for retaining the water in the irrigation pipeline that would otherwise drain out through the lower sprinklers and create wet spots at the lowest area. The MDC model provides drain check as well but is used only when regulation is not required. Both the MRDC and MDC restricts operation until adequate pressure is available to irrigate properly.

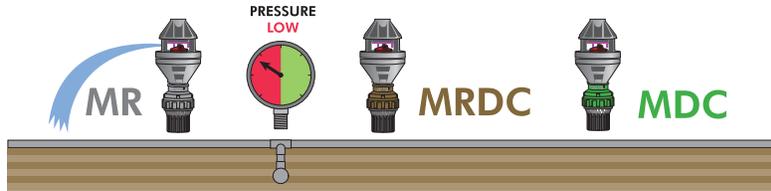
2.0 HOW IT WORKS

The mini-regulator (MR) is normally **open**. The water pressure output is regulated. By contrast the mini-regulator drain check (MRDC) and mini-drain-check (MDC) are normally **closed**. They will open only if minimum operating pressure is provided. The different effect on Rotators is shown by these drawings of three typical pressure conditions.

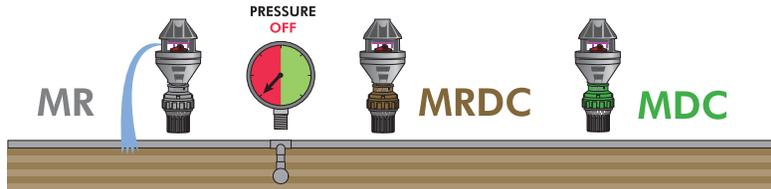
With adequate pressure, the MR and MRDC regulate to design pressure but the MDC is open fully and does not regulate.



With low pressure, the MR is open, the MRDC and MDC are closed to draining.



With no pressure, the MR is open, the MRDC and MDC are closed to draining.



MINI REGULATOR (MR) & MIN REGULATOR DRAIN CHECK (MRDC)



Outlet (regulated pressure)

Inlet (keep pressure above regulator rating)

MR/MRDC PRESSURE RATING OPTIONS:

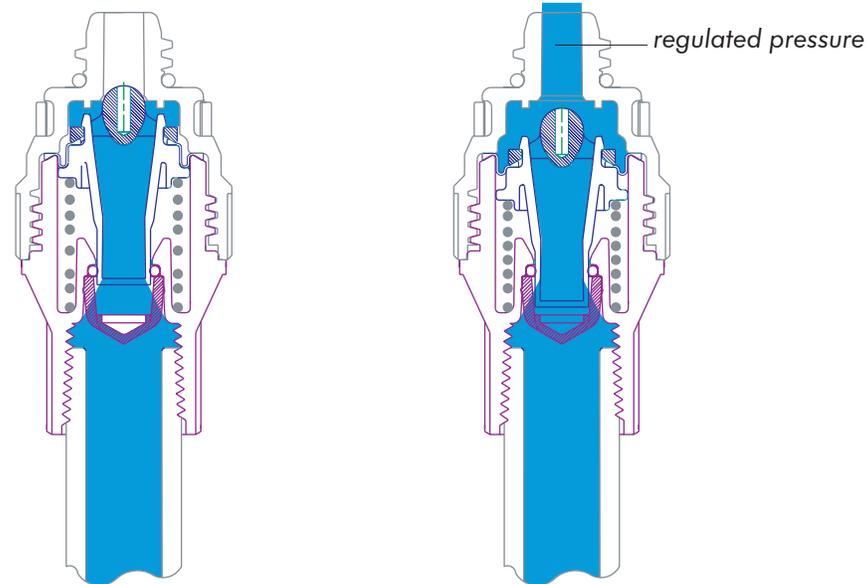
20 PSI (1.4 BAR); 30 PSI (2.0 BAR)
35 PSI (2.4 BAR); 40 PSI (2.8 BAR)
45 PSI (3.1 BAR); 50 PSI (3.4 BAR)

FLOW RANGE:

0.5 - 5 GPM (1.8-18.9 LPM)

3.0 OPERATION DETAILS

All models of the regulator work the same while regulating. The difference between the options is in the check operation. This cut-away drawing shows how the regulator and the check works.



**MRDC AND MDC
FUNCTION AS
A CHECK (NO FLOW)**

**MR AND MRDC OPERATING AS
A REGULATOR (REGULATED
FLOW) - THE MDC WILL BE FULLY
OPEN BUT DOES NO PRESSURE
REGULATION**

3.1 MR (MINI REGULATOR)

The MR regulator will allow water flow but does not provide any pressure control benefit until the rated inlet pressure is provided. Any additional pressure is then regulated to keep the irrigation constant. Provide a 5 PSI pressure margin to have the most accurate pressure regulation.

3.2 MRDC/MDC DRAIN CHECK FUNCTION

The check will not open until minimum pressure is provided to the base of the MRDC and MDC. Minimum pressure to open is approximately **13 psi** below rated pressure. For the MRDC, exact regulation will not take place until the minimum inlet pressure is reached. Provide an additional 5 psi pressure margin to have the most accurate pressure regulation. The MRDC and MDC work the same but the MDC does not regulate pressure.

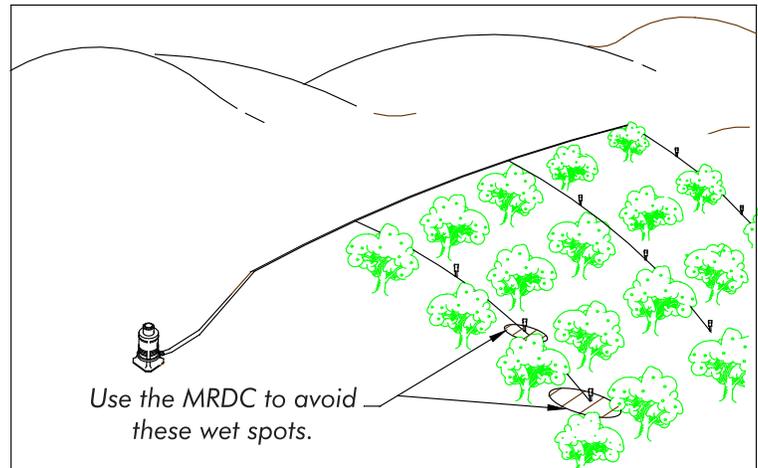
3.3 LOW TEMPERATURE CAUTION

The MRDC and MDC are not designed for operation below freezing. Remove the MRDC or MDC and drain the irrigation pipes during freezing conditions otherwise ice can damage the system. **THIS PRODUCT IS NOT RECOMMENDED FOR USE IN FREEZING CONDITIONS.**

4.0 TYPICAL APPLICATIONS

4.1 ROTATOR ORCHARD SPRINKLER.

Orchards are commonly planted on sloping terrain. The MR and MRDC are useful to deliver equal water top and bottom. The MRDC is additionally useful to keep the water in the pipe from draining to the low area to reduce wet spots in the low end of the field. The MDC is useful where pressure regulation is not required but holding the pipes full of water is necessary.



4.2 OVERTREE COOLING

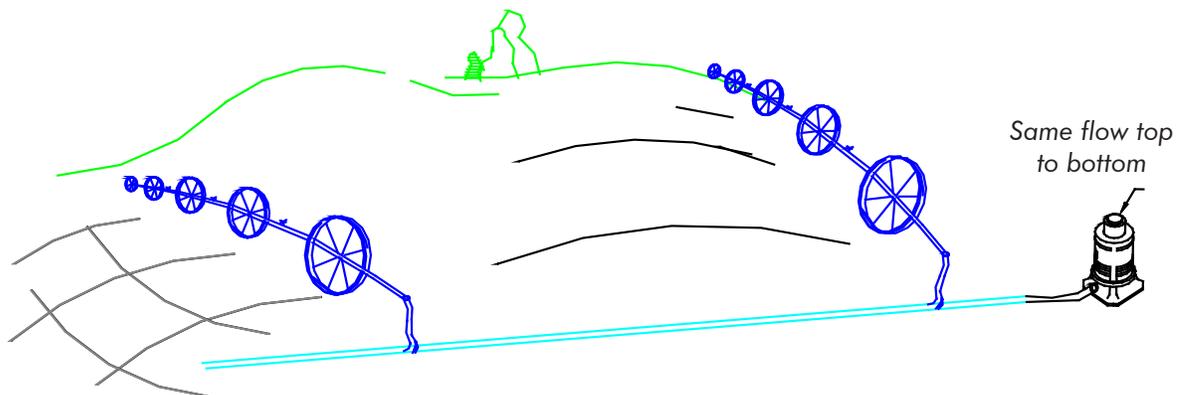
The spray of water over apples and other orchard crops is a common practice that can prevent damage due to heat and sunburn. The check feature of MRDC and the MDC prevents drainage of the system pipes in-between frequent on-and-off cycles of the cooling irrigation system. The result is more efficient on-off cooling cycles. Growers like the quick start-up of the sprinklers to rapidly wet the fruit.

4.3 DRIP LINES

The low pressure operation of drip lines requires exact pressure control. Slight variations caused by pump pressure or elevation can cause undesirable irrigation uniformity. The MR is very useful in controlling the pressure on the drip line. The MRDC and MDC are useful in keeping the submains full of water.

4.4 ROTATOR FOR WHEEL LINES

The adequate pressure on Rotator sprinklers is essential for uniform irrigation. Wheel lines are commonly put on undulating land. The pressure can also vary as adjacent wheel lines are turned on and off. In this condition, the regulator will keep the flow rate the same from each sprinkler (it is essential the minimum pressure is available).



Save power and water by being accurate in the amount of water out of each device. Caution: The drain-check feature of the MRDC or MDC is not good for wheel lines because the pipes must be empty in order to move the wheel lines. Use only the MR on wheel lines because pipe drainage is needed.

4.5 GREEN HOUSE IRRIGATION

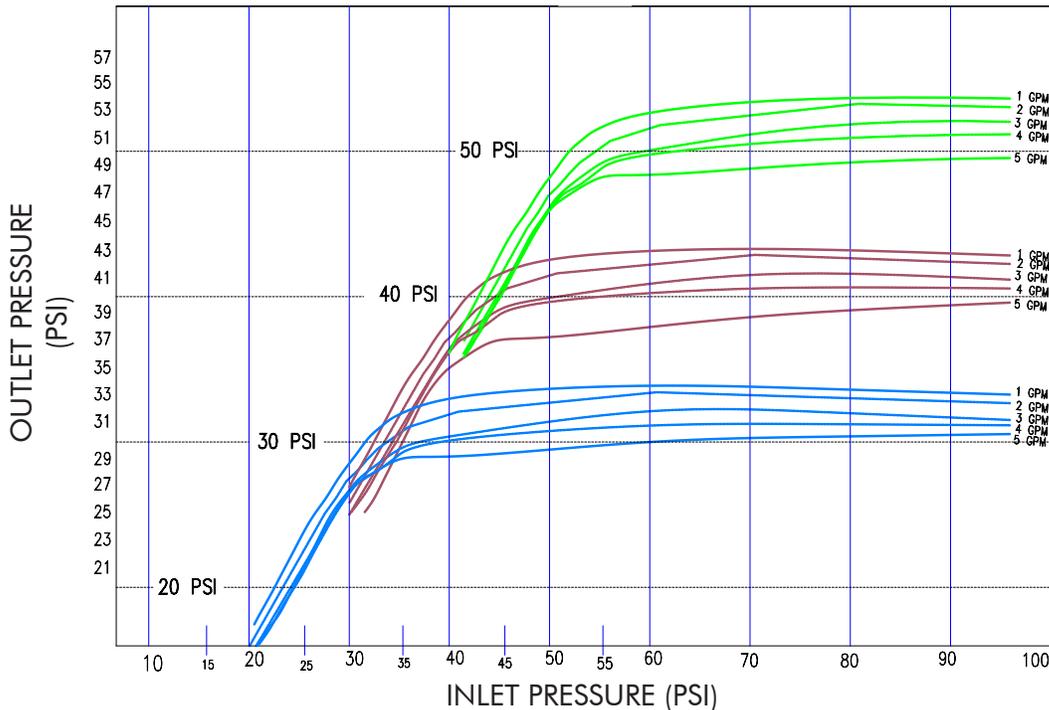
The drain check will keep the sprinklers from dripping or draining after shut off and quick start-up.

5.0 TECHNICAL PERFORMANCE DETAILS

5.1 PRESSURE OPTIONS

The regulator pressure options are for outlet pressure of 20 psi, 30 psi, 35 psi, 40 psi, 45 psi and 50 psi. The regulator pressure output is set by the spring installed at the factory. The regulator is not field adjustable.

MINI REGULATOR PERFORMANCE GRAPH (30, 40 and 50 PSI model)



5.2 FLOW EFFECT ON OUTLET PRESSURE

The above graph shows that the mini-regulator outlet pressure slightly decreases as the flow increases. This slight reduction in nozzle flow is typical for pressure regulators and is very small.

5.3 PERFORMANCE CONSIDERATIONS

The MR is always open and creates very little nozzle turbulence. The worst case for turbulence is for the MRDC or MDC to be in a partially open condition. The problem is avoided by operating above the recommended minimum pressure

SPECIAL WARNINGS!

1. Always maintain a minimum of 5 PSI above the nominal pressure rating to avoid severe distortion of sprinkler distribution patterns and decreased flow.
2. Remove the MRDC or MDC and drain the irrigation system during freezing conditions to prevent damage to the irrigation system. THIS PRODUCT IS NOT RECOMMENDED FOR USE IN FREEZING CONDITIONS.
3. Partial plugging of the MRDC inlet can cause severe distortion of distribution patterns and decreased flow.
4. The maximum recommended inlet pressure is 130 PSI.
5. This product requires flow through it to regulate pressure. IT IS NOT RECOMMENDED FOR USE IN CONTINUOUSLY STATIC CONDITIONS.
6. If subsurface application is needed then it is OK to bury the MR and MRDC but, consideration should be given to maintenance access and debris plugging before burying the regulator.

5.4 MINIMAL REQUIRED PRESSURE INPUT

The performance curves show the resulting outlet pressure for several rates of flow. The reason to be concerned about pressure loss is to know the minimum pressure required by the regulator to operate. On the MR the desired condition is on the flat portion of the performance curve. On the MRDC, always maintain 5 PSI above the rated pressure to have the best performance. The MRDC has a unique characteristic that requires adequate pressure to open. The regulator then maintains the correct outlet pressure as long as the necessary inlet pressure is provided. During transition (*in-between check and regulation*) the MRDC is partially open. Within this transition a lower than wanted outlet pressure and turbulence will result. The sprinkler may operate but at a very low pressure that could result in poor water distribution! A partially opened MRDC regulator can cause severe distortion of the stream and a poor sprinkler distribution pattern.

BE ALERT TO PRESSURE EFFECT UPON THE DRAIN CHECK!

Another unique feature about the MRDC is the difference in opening and closing. The graph shows performance depending upon if the pressure is increasing (green line) or decreasing (red line). When pressure is decreasing (like when a pump stops), the check shuts-off at a lower pressure than it opened. It is typical that sprinklers for the next irrigation set are turned on before the last set sprinklers are turned off. Thus the output will follow the increasing pressure performance line.

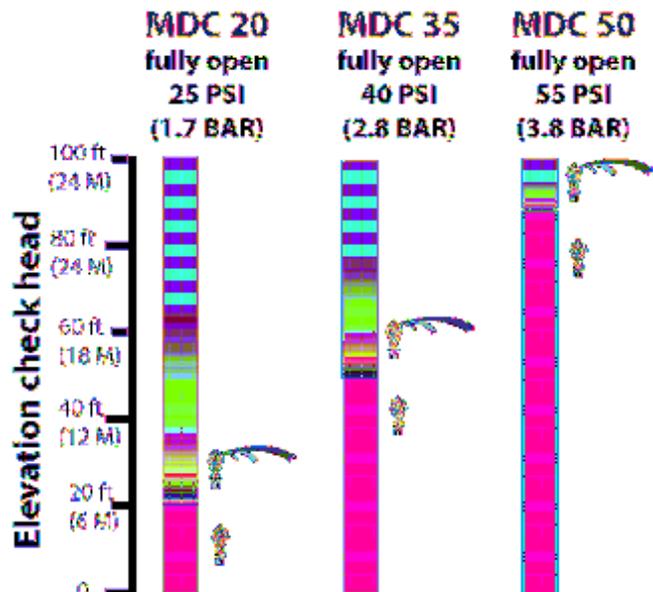
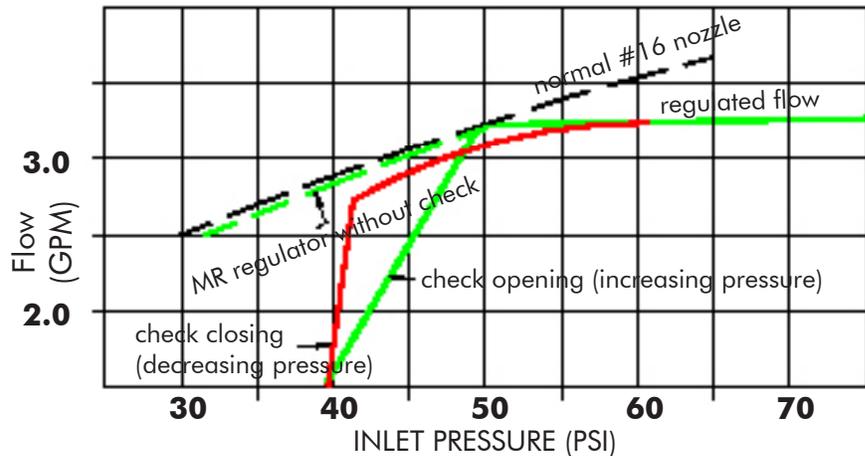
The graph for the MDC performance is shown here. The red means that the drain check is closed. Notice that there is a transition area between closed and fully open. Inlet pressure must be available to stay above the transition area.

SOLUTION: The solution is to always provide the necessary pressure to the MRDC and MDC.

CAUTION: Do not operate at a pressure lower than the minimum inlet pressure.

EXAMPLE: The 50 PSI MRDC should be operated at 55 PSI minimum inlet pressure to stay well above the check-transition zone.

EXAMPLE PERFORMANCE FOR 50 PSI MRDC

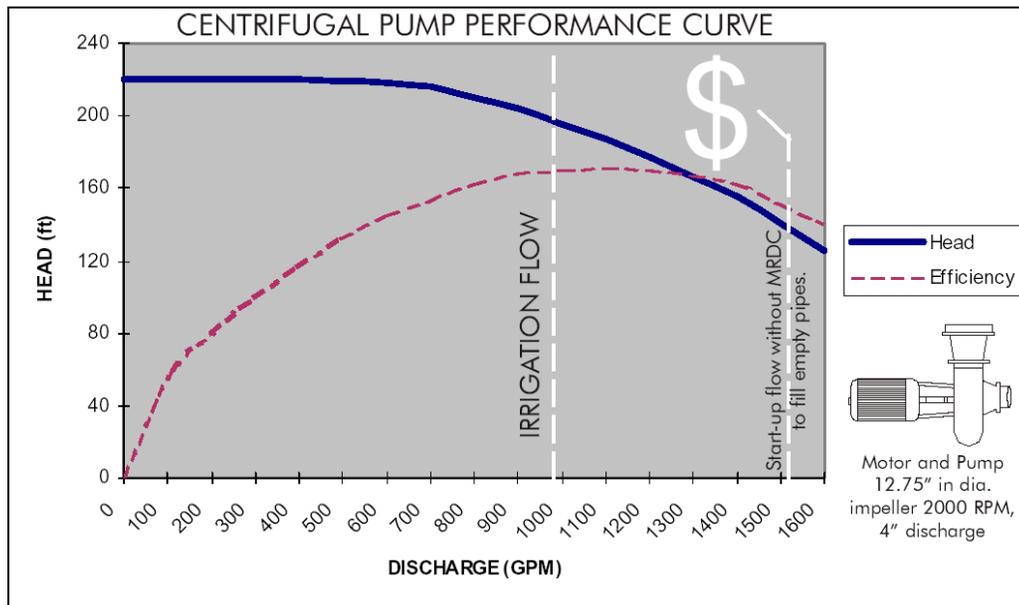
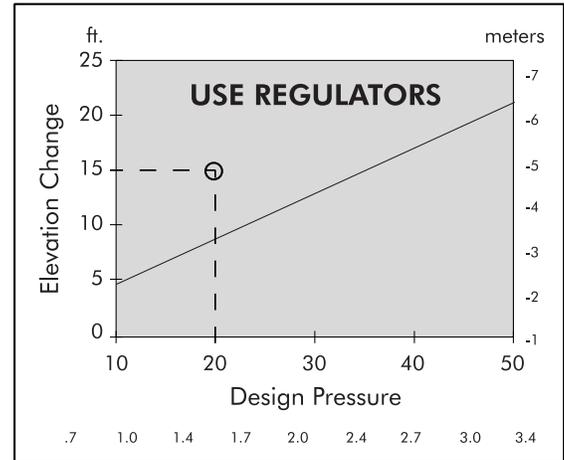


5.5 DESIGN CONSIDERATIONS OF PRESSURE REGULATOR CONTROL

You can use the pressure regulator for doing a better job of irrigation. Examine the design pressure and elevation to decide if regulators are needed. Look at uneven topography to decide if there is an advantage in reducing runoff caused by slope and draining of pipes. Regulators can be used under any condition but the purpose is gained by regulating the flow. Notice that if conditions are above the diagonal line on the graph then be certain to use pressure regulators. If adequate pressure is available then the regulator works otherwise it remains open.

Consider the savings for lower demand on pump power because of the reduced initial start-up flow surge. Some power rates are based upon the peak power demand. Keeping the pipe full will reduce the time of pumping to fill empty lines. The peak power is also reduced resulting in lower power charges.

EXAMPLE: A 15 ft. (4.6m) elevation change at 20 PSI (1.4 BAR) design pressure shows that pressure regulators should be used.



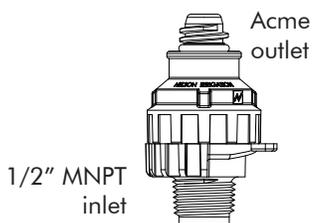
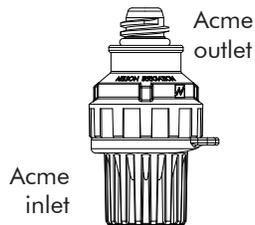
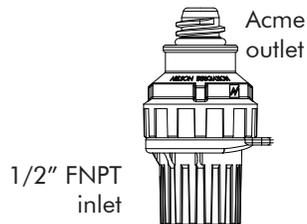
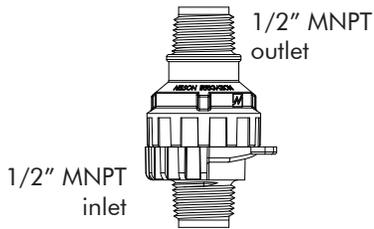
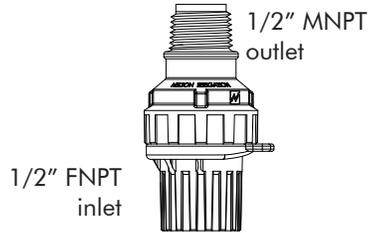
5.6 FLOW LIMITS

Don't use the mini-regulator for more than 5 GPM flow. The maximum flow through the regulator depends upon the acceptable pressure that can be burned up across the regulator. Always maintain 5 psi above the nominal pressure and keep the flow rate at 5 GPM or lower.

5.7 FILTRATION REQUIREMENTS

The regulator has small openings in the seat and plunger area. Debris smaller than 0.08" (1/16") may easily pass through the regulator. Larger material and stringy fibers (such as snail shells) can plug inside the regulator seat area. Access to remove the plug is gained through the inlet of the regulator.

6.0 CONNECTION OPTIONS



7.0 MATERIAL LIST OF PARTS

PART LABEL

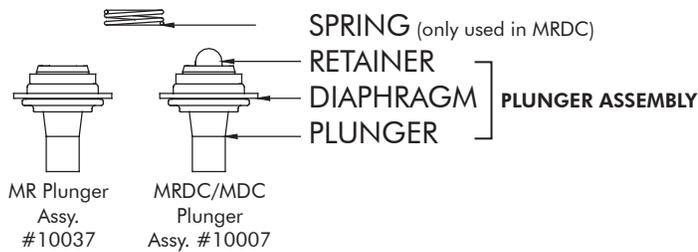
MATERIAL

OUTLET CAP (color-coded)

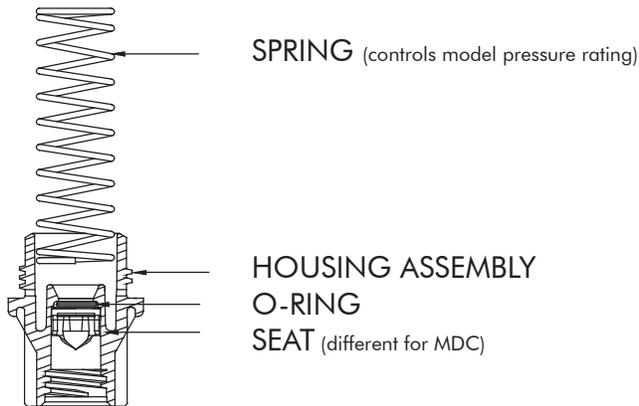
Polyester

	MRDC (brown outlet)	MR (gray outlet)	MDC (green outlet)
1/2" MNPT Male Acme	11102-0XX 10394-0XX	11102-1XX 10394-1XX	11102-2XX 10394-2XX

NOTE: XX denotes pressure option (i.e. 11102-130 is a 30 PSI 1/2" MNPT Mini Regulator)



302 Stainless
XENOY
Buna-N
XENOY



302 Stainless

Polyester
Buna-N
Polyester/
Glass

WARRANTY AND DISCLAIMER

The Nelson Mini Regulator, Mini Regulator Drain Check and Mini Drain Check are warranted for one year from date of original sale to be free of defective materials and workmanship when used within the working specifications for which the product was designed and under normal use and service. The manufacturer assumes no responsibility for installation, removal or unauthorized repair of defective parts. The manufacturer's liability under this warranty is limited solely to replacement or repair of defective parts and the manufacturer will not be liable for any crop or other consequential damages resulting from defects or breach of warranty. THIS WARRANTY IS EXPRESSLY IN LIEU OF ALL OTHER WARRANTIES, EXPRESS OR IMPLIED, INCLUDING THE WARRANTIES OF MERCHANTABILITY AND FITNESS FOR PARTICULAR PURPOSES AND OF ALL OTHER OBLIGATIONS OR LIABILITIES OF MANUFACTURER. No agent, employee or representative of the manufacturer has authority to waive, alter or add to the provisions of this warranty, nor to make any representations or warranty not contained herein. The Mini Regulator Drain Check is covered by the following U.S. Patents: 5875815, 5257646, and other pending US and Foreign Patents.