

ELEMENT REPLACEMENT

Field replacement of MD dryer elements longer than 48" is difficult without special equipment and is not recommended. The instructions below are for the 12", 24" and 48" length models

1. Hold the dryer end fitting assembly behind the rotating purge fitting carrier.



2. Grip the end nut and rotate counter-clockwise to remove. Repeat for the opposite end.



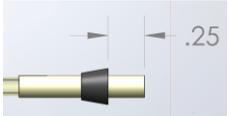
3. Gently pull the Nafion® tube element out of the housing just far enough to be able to remove the rubber ferrule. Remove the rubber ferrule.



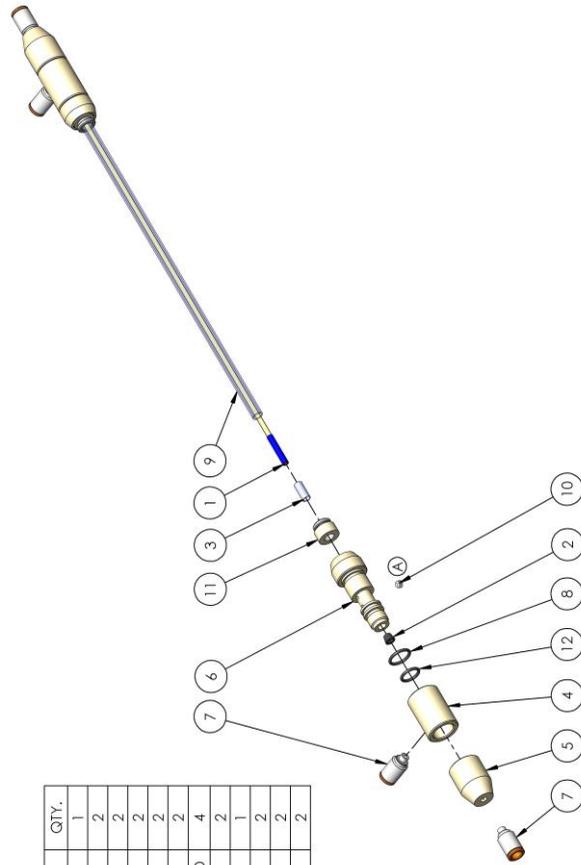
4. Remove the element by pulling the element out from the other end of the dryer housing.

5. When installing the new element, handle the membrane tubing with gloves to prevent contaminating the tubing surface.

6. Once the element is positioned with equal lengths protruding from each fitting, install the rubber ferrules about 1/4" from the end.



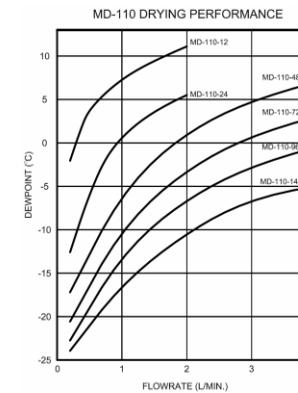
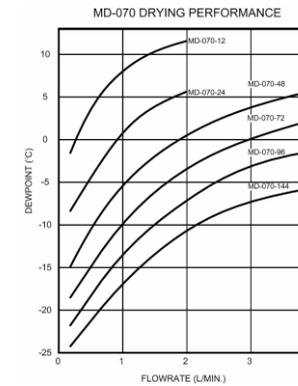
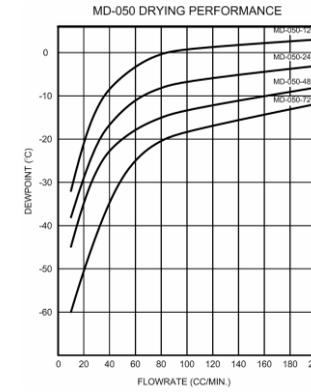
7. Install the end nuts and tighten as much as possible by hand.



ITEM NO.	PART NUMBER	DESCRIPTION	QTY.
1	MD-110-03-03	NAFION MEMBRANE ELEMENT ASSEMBLY	1
2	MD-110-02-21	FERRULE SEAL, VITON	2
3	MD-000-02-19	SUPPORT TUBE, SS	2
4	MD-000-02-13	PURGE FITTING CARRIER, KYNAR	2
5	MD-000-02-12	END NUT, KYNAR	2
6	MD-000-02-11	FITTING BODY, KYNAR	2
7	2FTS-021	INSTANT TUBE FITTING, 1/4" x 10-32 THREAD	4
8	102650	O RING, VITON, 9/16" OD X 1/16"	2
9	102628	SHELL TUBE, FEP - SEE NOTE 1	1
10	102553	SET SCREW, 8-32 x 1/8", 18-8SS	2
11	102445	TRUE SEAL CARTRIDGE, 1/4"	2
12	100015	O RING, VITON, 1/2" OD X 1/16"	2

PERFORMANCE

MD-R Series dryer's performance varies according to dryer lengths and flow rates.



Performance Curves

MD-R™ Series Gas Dryer

User Manual



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PRINCIPLE OF OPERATION

MD-R™ Series gas dryers are shell and tube moisture exchangers that transfer water vapor between two countercurrent flowing gas streams. The dryers consist of a Nafion® polymer tube surrounded by an outer tube.

Dry purge gas flowing over the exterior surface of the Nafion tubing continuously extracts water vapor from the gas stream inside the tubing. The driving force is the difference in water concentration on the opposite sides of the tubing wall. The purge gas then carries the water vapor away.

INSTALLATION SPECIFICATIONS

When installing MD-R Series gas dryers, the following rules apply:

1. Sample pressure equal to or greater than purge pressure.
2. Sample gas pressure not to exceed 80 psig.
3. Temperatures must not exceed 120°C.
4. Purge air of -40°C dew point at a flow rate of approximately two to times sample flow is required to achieve rated performance.
5. Sample and purge air must flow counter-current to each other.
6. If sample dew point is above ambient temperature, inlet of dryer must be heated. Call factory for details.

1. STANDARD METHOD

The most efficient way to set up MD-R Series dryers is to have sample gas enter through the Nafion tube (wet sample gas inlet) and purge gas flowing countercurrent to the sample (refer to Figure 1). Purge gas should be instrument air or other dry gas. If no dry purge gas is available, the reflux or split sample purging method shown to the right may be used.

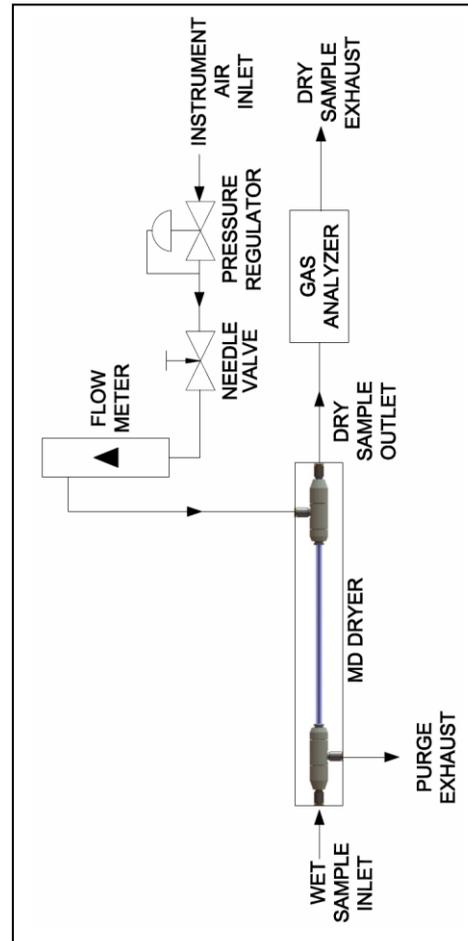


Figure 1 - Typical Setup

2. REFLUX METHOD

The reflux setup, shown in Figure 2, returns dry sample gas back to the dryer for use as the purge after it has gone through the analyzer. Since this method uses all of the dry sample gas as the purge gas, only the sample gas flow required for analysis passes through the dryer. This results in high drying efficiency.

The vacuum on the purge gas should be at least 15" of Hg, with a higher vacuum preferable. This vacuum level is necessary to provide the desired 2:1 purge-to-sample gas flow ratio.

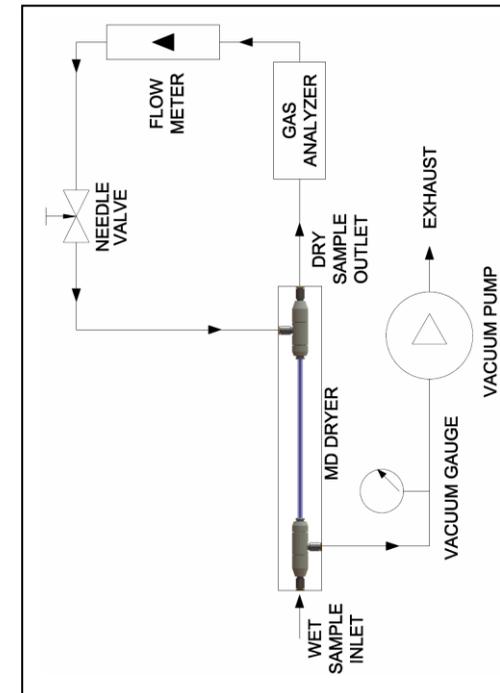


Figure 2 - Reflux Setup

3. SPLIT SAMPLE METHOD

The split sample method, shown in Figure 3, diverts some of the sample from the main stream to be used as the purge gas. More sample gas passes through the dryer than is required for the analysis, lowering the drying efficiency when compared to the reflux method. The following equation can be used to determine the purge flow rate required for the split sample method. Any units may be used as long as they are consistent.

$$V_p = \frac{V_s}{(P_s/2P_v) - 1}$$

Where:

- V_p = Purge flowrate (indicated on flowmeter)
- P_s = Sample pressure (in absolute units)
- V_s = Sample flowrate (indicated on flowmeter)
- P_v = Purge pressure (in absolute units)

NOTE: Pressure units must be in absolute terms. For proper operation, be sure that the pressure ratio, P_s/P_v is greater than 2. Vacuum pump on purge exhaust is optional.

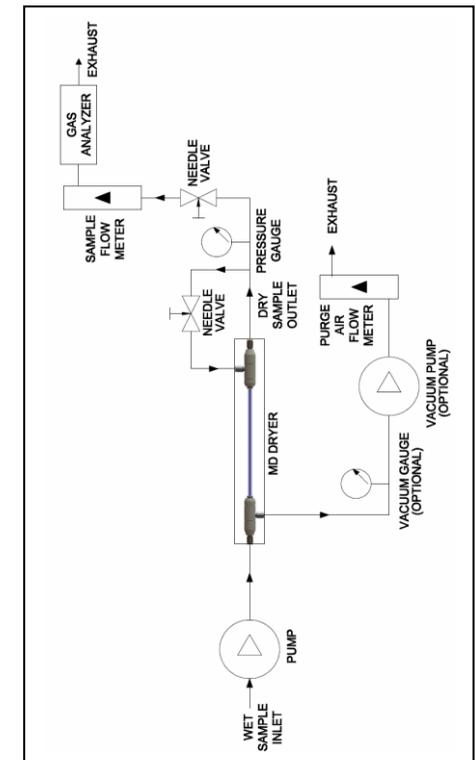


Figure 3 – Split Sample Setup