Dehydration Methods

Elliptical waveguide, air dielectric coaxial and rigid line should be pressurized with dry air or dry inert gas in order to prevent moisture condensation and the resultant degradation in electrical performance and possible damage to the transmission line. Radio Frequency Systems offers a comprehensive range of dehydration systems designed to meet both the technical and economic needs of our global customers.

Thermodynamic background

The air is a gas mix of dry air and water. The water can occur as overheated steam, liquid or ice. At the triple point these three variants are balanced. The triple point lies at +0.01°C and a partial pressure of the water of 611.2 Pa.

The highest partial pressure possible for the water in the mixture is the corresponding saturation pressure of the relevant temperature. This pressure is shown in the steam pressure curve (Fig.1).

The point where the air pressure equals the saturation pressure of the water, determines the temperature of ebullition.

If the partial pressure pp lies below the saturation pressure ps(T), all the water is present as overheated steam in the mixture.

Cooling lowers the saturation pressure of the water together with the temperature, while the partial pressure remains constant. Supposing a constant ratio in the mixture of the quantities of water and dry air, the temperature at which ps(T) = pp is quickly reached. This temperature is the temperature of dew point.

A further cooling causes a part of the water to separate as liquid (T > 0.01°C) or ice (T < 0.01°C). Up to this point, where all the water is present as overheated steam, the equations of the ideal gas are valid at a sufficient accuracy, as long as the changes of pressure and temperature lie within the range of atmospheric values and the physical characteristics are nearly constant.

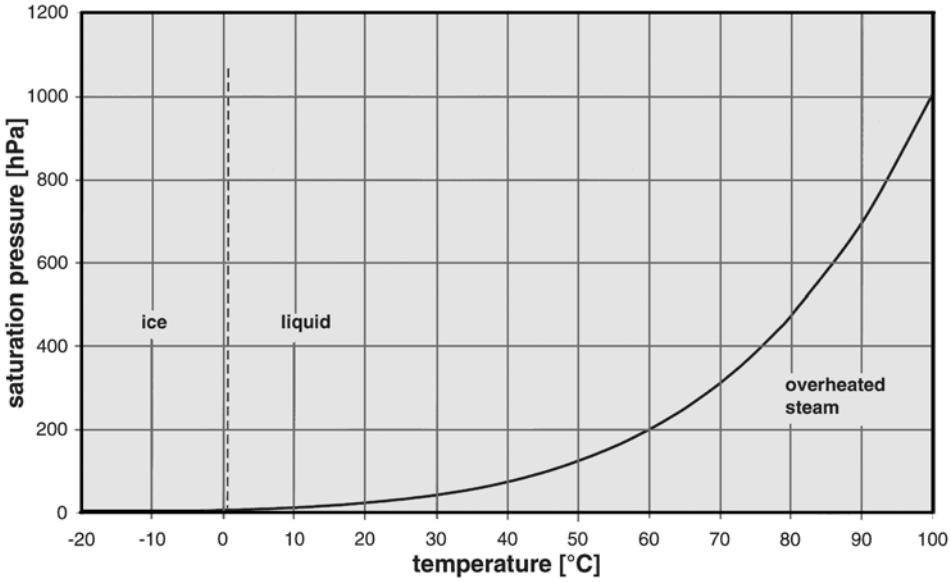


Figure 1. Steam pressure curve of the water

Increasing use of higher frequency ranges, particularly in mobile communication networks, has resulted in greater use of smaller cross sections of elliptical FLEXWELL® transmission lines and shorter feeder runs.

This, together with the decreasing costs of microwave links, has led RFS to develop less expensive dehydrators.

Dehydration Methods

However, in many cases these solutions are not economical for the microwave systems, which are used to link mobile radio base stations. For these low cost systems a simpler but equally effective dehydration system is required.

The results of long term investigations have led RFS to consider different methods of dehydration suitable for all possible installations

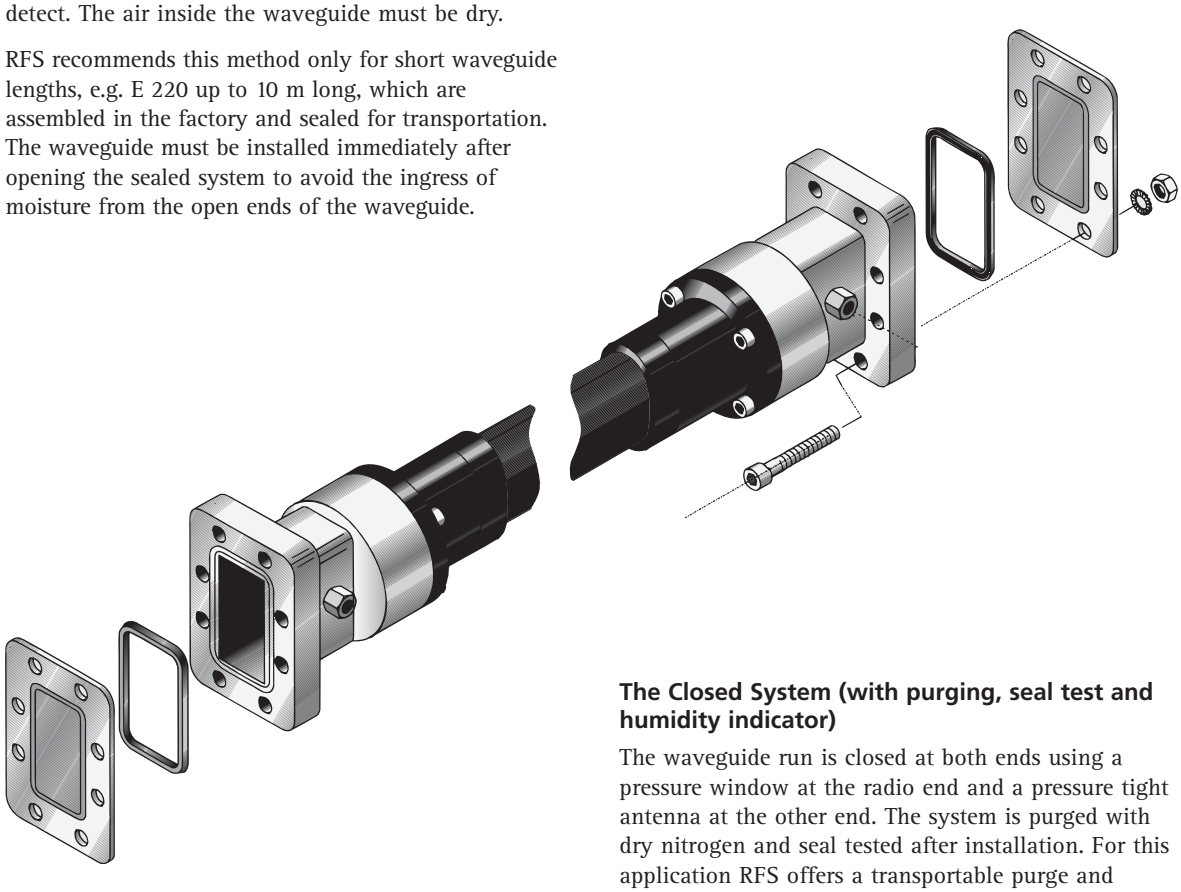
The Closed System (without additional measures)

Both ends of the waveguide run are closed by use of a pressure window at the radio end and a pressure tight antenna at the other end.

This method prevents the ingress of humidity over a long period of time It requires highly trained installation staff because incorrect installation is difficult to detect. The air inside the waveguide must be dry.

RFS recommends this method only for short waveguide lengths, e.g. E 220 up to 10 m long, which are assembled in the factory and sealed for transportation. The waveguide must be installed immediately after opening the sealed system to avoid the ingress of moisture from the open ends of the waveguide.

FLEXWELL® WAVEGUIDE	LENGTH
E380	≤ 30 m
E300	≤ 15 m
E250	≤ 12 m
E220	≤ 10 m
EO38	≤ 10 m
E185	≤ 7 m
E150	≤ 4 m
E130	≤ 2.5 m
EO22	≤ 2.5 m



The Closed System (with purging, seal test and humidity indicator)

The waveguide run is closed at both ends using a pressure window at the radio end and a pressure tight antenna at the other end. The system is purged with dry nitrogen and seal tested after installation. For this application RFS offers a transportable purge and sealing device.

This method ensures that, after correct installation and purging with dry nitrogen, moisture is eliminated from the waveguide even where extreme temperature variations are experienced.

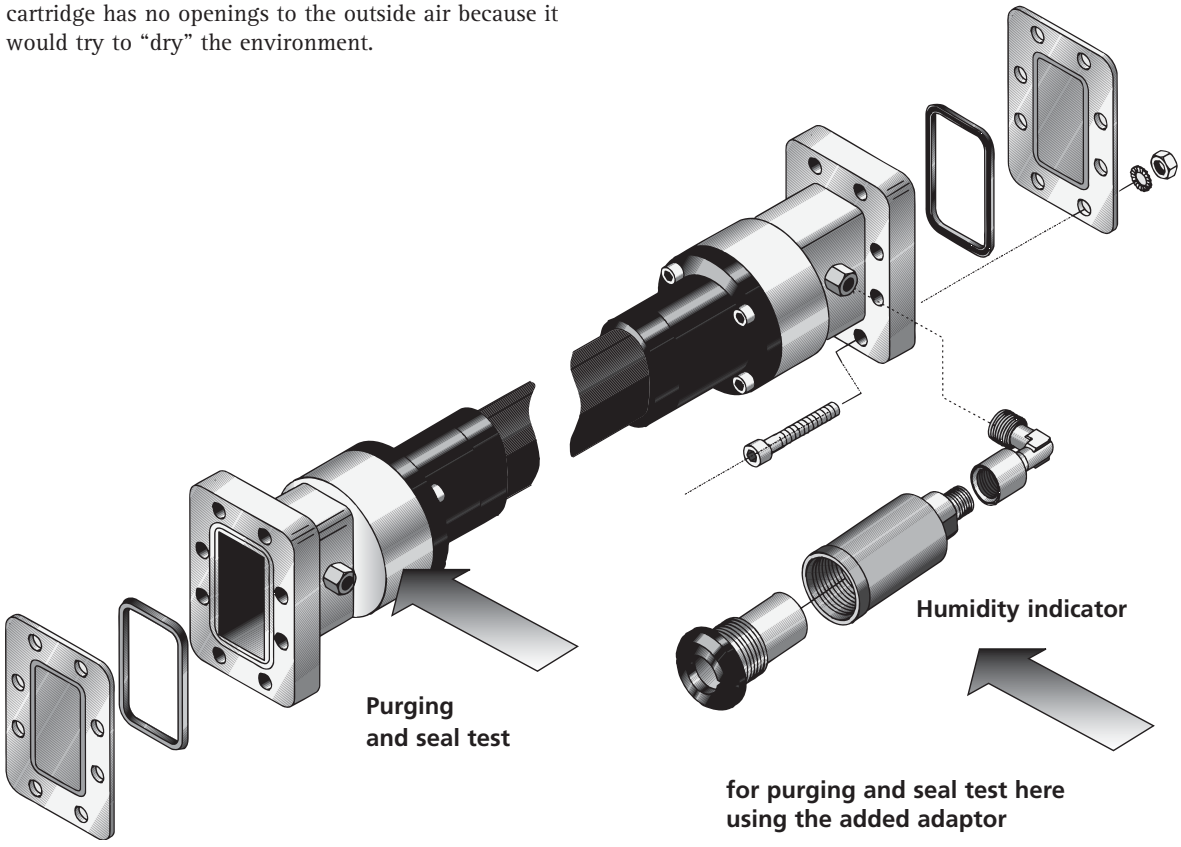
Dehydration Methods

The maximum waveguide volume is determined by the size of the nitrogen bottle, which must be brought close to the waveguide for the purging and seal test operation. RFS provides a case containing all the necessary items for these tasks.

A desiccant cartridge is connected to the system and the humidity indicator will provide an early warning (long before link failure) if moisture has entered the system in spite of all the precautionary measures taken.

It is very important to ensure that the desiccant cartridge has no openings to the outside air because it would try to “dry” the environment.

FLEXWELL® WAVEGUIDE	LENGTH
E380	≤ 75 m
E300	≤ 40 m
E250	≤ 30 m
E220	≤ 25 m
EO38	≤ 25 m
E185	≤ 16 m
E150	≤ 10 m
E130	≤ 8 m
EO22	≤ 8 m
E105	≤ 6 m



The system with dehydrator and low pressure alarm

The waveguide run is closed with pressure windows at both ends (or at one end by the pressure tight antenna). A dehydrator is used to remove any moisture from the system.

This is the classical method used for dehydrating a waveguide feeder system. A dehydrator must be used if a system with remote alarm is required or if the waveguide run has become leaky due to mechanical effects.

In a pressure tight system the dehydrator will operate very infrequently and intervals of 3 month are possible.

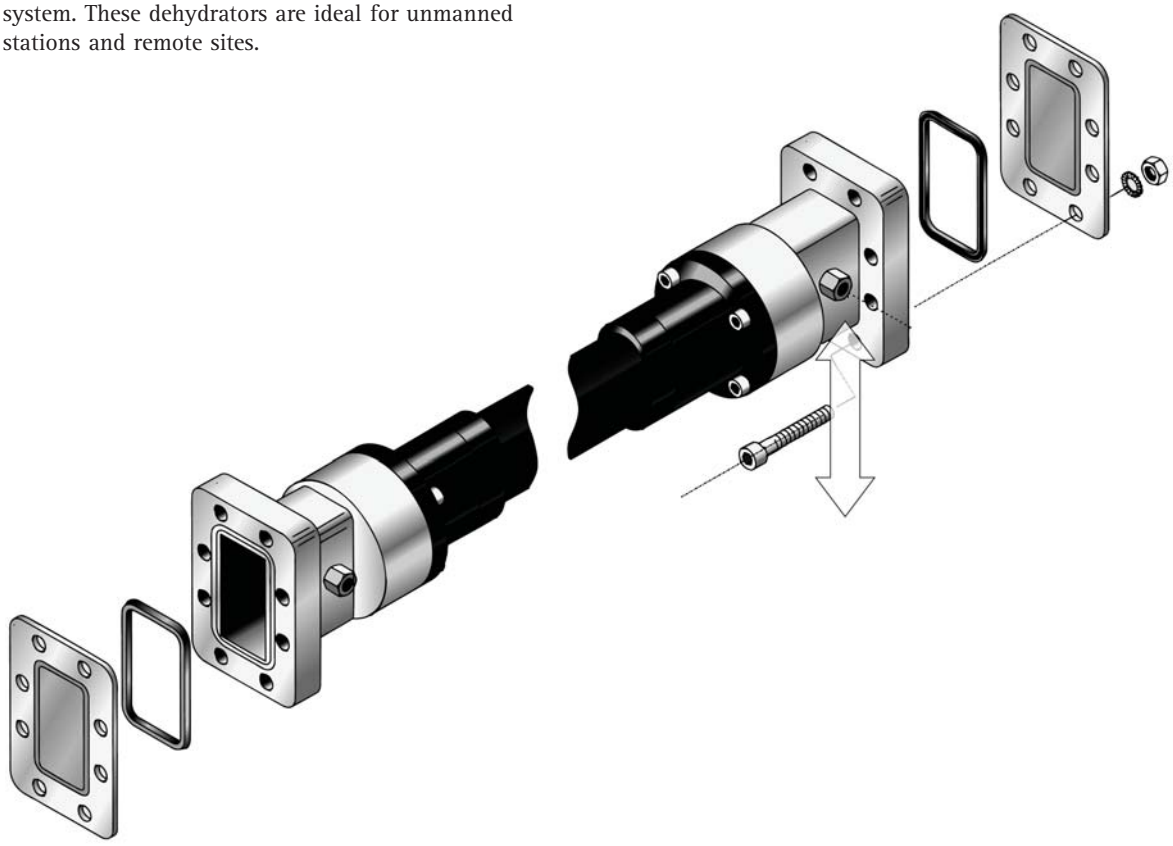
In spite of over pressure, this can lead to an accumulation of humidity that has entered the system by steam diffusion through the connecting hose or sealing disks. This can be remedied by purging the waveguide with dry air at fixed intervals, e.g. annual maintenance periods for the radio equipment.

There are no limitations on waveguide length in the range of technical interest with this method of dehydration.

RFS offers automatic as well as semi-automatic dehydrators.

Dehydration Methods

The automatic series APD and LAB4 utilize a twin chamber system completely automated air drying system. These dehydrators are ideal for unmanned stations and remote sites.



Transportable purge and sealing device

RFS offers a handy check fitting to carry out the purging and the check for pressure tightness.

This fitting can be conveniently used for waveguide runs with up to approx. 2 liters of volume, as for instance (see table below).

In all such cases time for purging and for pressure tightness checking are of the areas of a few minutes. For larger and longer waveguides, having a much greater volume, the nitrogen bottles become less handy, and the purge and checking times become much longer, and therefore we recommend to use dehydrators for these waveguides.

- E220 up to 25 m
- E250 up to 30 m
- E300 up to 40 m
- E380 up to 75 m

Fittings to refill the nitrogen bottle are depending on local standards and therefore not part of the device.

Model Purge/SealtestDevice (PSD-T)

Product Overview

PRODUCT OVERVIEW				
			Output Capacity Liters/sec (SCFM)	
Model Number	Type	Power	60Hz	50Hz
LAB4AC	Automatic	230V 50/60Hz	0.03 (0.06)	0.03 (0.06)
LAB4DC	Automatic	36-72VDC	0.03 (0.06)	0.03 (0.06)
LAB2AC-B	Semi-Automatic	230V 50/60Hz	0.03 (0.06)	0.03 (0.06)
LAB2DC-B	Semi-Automatic	24-72VDC	0.03 (0.06)	0.03 (0.06)
APD-20	Automatic	115V 50/60 Hz	0.09 (0.2)	0.08 (0.17)
APD-22	Automatic	230V 50/60 Hz	0.09 (0.2)	0.08 (0.17)
APD-70	Automatic	115V 60 Hz	0.32 (0.7)	0.27 (0.58)
APD-72	Automatic	230V 50 Hz	0.32 (0.7)	0.27 (0.58)
APD-73	Automatic	230V 60 Hz	0.32 (0.7)	0.27 (0.58)
DC-KIT-B	Desiccant Cartridge	Not applicable	Not applicable	Not applicable
DC-KIT-220-B	Desiccant Cartridge	Not applicable	Not applicable	Not applicable
DC-KIT-260-B	Desiccant Cartridge	Not applicable	Not applicable	Not applicable
DC-KIT-320-B	Desiccant Cartridge	Not applicable	Not applicable	Not applicable

Desiccant Cartridge

The RFS desiccant cartridge is a compact and economical solution designed to protect antenna/feeder systems against moisture. The desiccant cartridge is connected to the system and the humidity indicator will provide an early warning (long before link failure) if moisture has entered the system in spite of all the precautionary measures taken. In this case, the capacity of the cartridge will be reached sooner. This is indicated by the desiccant changing it's color from blue to violet. It is very important to ensure that the desiccant cartridge has no opening to the outside air because it would try to dry the environment.

The cartridge is installed at the waveguide connector in general. For installation on small-size waveguides the kit includes an additional waveguide component.

ORDERING INFORMATION FOR DESICCANT CARTRIDGE KITS	
Model Number	Product Information
DC-KIT-B	Desiccant Cartridge Kit
DC-001	Replacement Cartridge for DC-Kit
DC-KIT-220-B	Desiccant Cartridge Kit for R220
DC-KIT-260-B	Desiccant Cartridge Kit for R260
DC-KIT-320-B	Desiccant Cartridge Kit for R320

Dehydrator Series LAB4

The LAB4 dehydrator supplies continuous dry air up to 100 Nl/h with a dew point better than –40°C, and an output pressure programmable from 0 to 6 kPa.

Two drying towers operating an alternate cycles contain the desiccant which dries the air through chemical absorption; while the first tower dries, the second one regenerates the desiccant by heating and backwashing with a reverse dry air flow.

The amount of air supplied determines the exchange interval between the two drying towers, thereby reducing the power consumption.

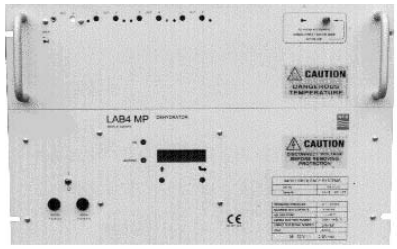
The operating pressure is set by the keys located on the front panel.

A fundamental characteristic of this dehydrator is the automatic flow rate regulation by the two pumps due to feed-back control of the output pressure. The dehydrator's flow rate is controlled according to the plant's requirements by the control and operating logic which maintains the output pressure at set point value by adjusting the pump's speed. This limits to a minimum the pump's duty, reduces wear and tear, power consumption and noise level, makes the dehydrator flexible enough to meet the plant's requirements and, lastly increases the system's overall reliability.

Automatic control of the pump's speed eliminates mechanical pressure regulators that introduce undesirable pressure losses and a worse response to flow rate regulations.

The following devices are located on the front panel:

- Power switch and fuses
- Function keys
- Led indications (power on, failure, warning)
- On/off outlet valves



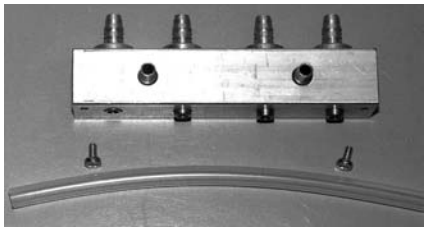
LAB 4

The actual output pressure and the elapsed time are available on the liquid crystal display on the front panel.

On the top of the panel are located: the power connector, the outlets with hose-tail fittings and the remote alarm connector.

The version comes with power failure, low pressure and humidity warning. All of the alarms are signalled locally and can be remoted as option.

LAB4 series dehydrators are prepared for the addition of a 4-outlet extension kit, model number ADD-ON4, which increases the number of outlets to 8. The outlet extension kit has a 6mm (1/4") hose tube outlet fitting.



ADD-ON 4

PRODUCT SPECIFICATIONS	
Operating Voltage	
LAB4DC	36-72VDC
LAB4AC	230V 50/60Hz
Number of outlets	4
Power consumption, maximum	110 watts
60Hz output capacity, liters/min (SCFM)	0.03 (0.06)
50Hz output capacity, liters/min (SCFM)	0.03 (0.06)
Output dew point	-40°C (-40°F) dew point at 20°C (68°F) 80% RH
Factory set output pressure, kPa (psig)	2 (0.3)
Field adjustable output pressure, kPa (psig)	Programmable up to 6 (0.9)
High pressure safety relief Valve, kPa (psig)	6.0 (0.9) ± 15%
Low pressure alarm	Programmable up to output
Low pressure alarm contacts	All local alarms are remoted
Output fitting	7mm (1/4") for 6mm (1/4") hose tube fitting
Dimensions H x W x D, mm (in)	
Wall mounting	311 x 486 x 135 (12.2 x 19.2 x 5.3)
19" rack	310 x 482 x 110 (12.2 x 18.9 x 4.3)
N3 rack according to ETS 300 119-(1-4)	310 x 533 x 110 (12.2 x 20.9 x 4.3)
Net weight, rack mounting, kg (lb)	11 (24.25)
Net weight, wall mounting, kg (lb)	14 (25.77)

Dehydrator Series LAB2

The LAB2 dehydrator is designed for a continuous duty and capable for supplying dry air up to 100 Nl/h with a dew point better than –40°C, and an adjustable pressure range from 0 to 4 kPa.

The air is dried through chemical absorption by granular substances contained in a disposable cartridge accessible from the front panel.

The cartridge must be replaced when the color of the detector integrated in the desiccant cartridge, visible on the front panel, changes color from blue to pink. At the same time, when saturation occurs, an electronic humidity probe in the output air flow triggers an alarm so that continuous check by the operator is not necessary.

The liquid crystal display shows the actual output pressure measured by a digital manometer.

The unit has all the outlets with hose-tail fittings on the rear panel and on-off valves operable from the front panel.

The basic version comes with power off and low pressure alarm. The alarm is signalled locally and can be remote as an option.

The unit is a 19" standard, 2 units high and is either wall or rack-mountable. A wall mounting rack and ETSI N3 brackets are provided. Two brackets, that can be shifted according to the type of mounting required are provided.

Lab 2

A fundamental characteristic of this dehydrator is its pump's automatic flow rate regulation due to feedback control of the output pressure. The dehydrator's flow rate is controlled according to the plant's requirements by the control and operating logic which maintains the output pressure at set point value by adjusting the pump's speed. This limits to a minimum the pump's activity, reduces wear and tear, absorption and noise level, makes the dehydrator flexible enough to meet the plant's requirements and, lastly increases the system's overall reliability.

Automatic control of the pump's speed eliminates mechanical pressure losses and a worse response to flow rate regulations.

The standard power supply may be in direct current or in alternating current.

PRODUCT SPECIFICATIONS	
Operating Voltage	
LAB2DC-B	24-72VDC
LAB2AC-B	230V 50/60Hz
Number of outlets	4
Power consumption	5 watts
60Hz output capacity, liters/min (SCFM)	0.03 (0.06)
50Hz output capacity, liters/min (SCFM)	0.03 (0.06)
Output dew point	-40°C (-40°F) dew point at 20°C (68°F) 80% RH
Factory set output pressure, kPa (psig)	2 (0.3)
Field adjustable output pressure, kPa (psig)	Programmable up to 4 (0.6)
High pressure safety valve, kPa (psig)	Factory set
Low pressure alarm	Programmable up to output
Output fitting	7mm (1/4") for 6mm (1/4") hose tube fitting
Dimensions H x W x D, mm (in)	88 x 482 x 208 (3 x 19 x 8.2)
Net weight, kg (lb)	5 (11.1)

.2 SCFM Automatic Dehydrators APD-20 Series

The APD-20 Automatic Pressurization Dehydrator is designed for reliable pressurization of elliptical waveguide, coaxial cable and rigid transmission line systems. The dehydrator includes a self contained completely automated air drying system that utilizes a pressure swing moisture absorption cycle to provide pressurized dry air while continuously purging the collected moisture to the atmosphere. This eliminates the need for replacement or manual reactivation of the desiccant and makes our APD-20 and APD-70 series dehydrators ideal for unattended operation at even remote sites. Dehydrators are also suitable for the average manned working environment since they typically run less than 5% of the time. In most normal applications, APD series dehydrators can be expected to operate for up to five years before any maintenance activities are required.

The APD-20 is rated at .09 liter/sec.(2 SCFM) and -40°C (-40°F) dry air dew point output at a 35°C (95°F) 95% relative humidity input. For normal room environments the dehydrator output air has a typical dew point of -46°C (-55°F). System pressure is controlled by the dehydrator pressure switch settings. Normally, this is factory adjusted to 20.7kPa (3 psig) "on" and 34.5 kPa (5 psig) "off", but may be readjusted in the field to operate anywhere between 13.8 kPa and 103.4 kPa (2 and 15 psig). An internal 40 psig check valve guarantees that the customer system stays isolated from the dehydrator's internal system and prevents loss of system pressure due to leakage in the dehydrator. For additional safety, a standard low pressure alarm switch factory-set at 6.9 kPa (1 psig), is installed in the dehydrator. The alarm switch contains a set of SPST contacts that can be used for both local and remote monitoring or alarming.

Additional standard features include a 0-15 psig pressure gauge, indicating power light, and a visual moisture monitor which is dark blue when dry and turns pink when wet.

The units may be shelf mounted or placed in a 19" EIA relay rack. A vented back cover for the dehydrator may be ordered as an optional accessory.

Series APD-20

ORDERING INFORMATION	
Accessories/ Items Supplied	**Model Number**
20 ft. of 3/8" plastic tubing	913348-240
Connector, 3/8" tubing to 1/8" MPT	913344
Optional Accessories	
Maintenance Parts Kit for APD-20 or APD-22	920641
High Pressure Alarm (0.5 lbs.)	920184
Floor Stand (31 lbs.)	914710
Dehydrator Rack Mount	913907
Wall Shelf	940008
Pressure and Humidity Monitor for APD-20	920717-001
Pressure and Humidity Monitor for APD-22	920717-003
Vented Back Cover Kit (wt. 1.5 lbs.)	933639

.2 SCFM Automatic Dehydrators APD-20 Series

PRODUCT SPECIFICATIONS	
Power Source	
APD-20 P/N 920635	115 V 50/60 Hz
APD-22 P/N 920637	230 V 50/60 Hz
Output Ratings	
60 Hz	0.09 liters/sec. (0.2 SCFM)
50 Hz	0.08 liters/sec. (0.17 SCFM)
Output Dew Point	-40°C (-40°F)
Ambient Inlet Temperature	1°C - 49°C (33°F -120°F)
Ambient Humidity	95% maximum
Output Pressure (on/off)	
Factory Set	20.7-34.5 kPa (3/5 psig)
Field Adjustable	13.8-103.4 kPa (2-15 psig)
Output Differential	13.8 kPa (2 psig) minimum
Compressor Rating	1/12 hp
Power Consumption	
Pumping	350 watts
Idle	10 watts
Low Pressure Alarm	Factory set for 1 psig
P/N 916814-001	0.5 psig differential
Output Fitting	1/8" FPT to 3/8" plastic tube fitting
Dimensions, H x W x D mm (Inches)	355 x 450 x 203 (14 x 17-11/16 x 8)
Net Weight	22 kg (47 lbs.)
Shipping Weight	25 kg (55 lbs.)

APD-20 MAXIMUM DEHYDRATOR CAPACITY RATINGS	
Transmission Line m (ft)	**Approximate Length**
7/8"	6,400 (21,000)
1-5/8"	2,100 (7,000)
3-1/8"	600 (2,100)
6-1/8"	150 (500)
6 to 12 GHz Waveguide	2,400 (8,000)
4 to 5 GHz Waveguide	1,200 (4,000)

Based on 2 psi leakage in 24 hours and 5% running time for 60 Hz operation.
For 50 Hz operation, multiply capacity ratings by 5/6 (a reduction of 17%).

ORDERING INFORMATION	
Spare Parts for APD Series	**Model Number**
Amber Light**	913654-002
Color-Change Moisture Indicator Gel (1 lb.)	913632
Filter Assembly**	914714
Male Connector 3/8" Tubing to 1/8" MPT**	913344
Maintenance Parts Kit	920641
Pressure Switch	913481
Red Light**	913654-001
1/4" Polyethylene Tubing (black)**	913566
3/8" Polyethylene Tubing (black)**	913348
3/8" Nylon Tubing (white)**	913928

**Included in APD-20 and APD-70 Series Maintenance Parts Kit

.7 SCFM Automatic Dehydrators APD-70 Series

The APD-70 is similar in design and features to the APD-20 series, except that the APD-70 has the larger 0.7 SCFM capacity and includes a protective metal rear cover as standard equipment. Like the APD-20 dehydrator, the APD -70 systems utilizes a pressure swing moisture absorption drying system that provides pressurized dry air to the system and continuously purges the collected moisture to the atmosphere. This eliminates the need for replacement or manual reactivation of the desiccant and makes our APD-20 and APD-70 series dehydrators ideal for unattended operation at even remote sites. In most normal applications, APD series dehydrators can be expected to operate for up to five years before any maintenance activities are required.

Series APD-70

The APD-70 Automatic Pressurization Dehydrator is rated at 0.7 SCFM at 115 volts 60 Hz and is designed for operation in larger systems with up to 1,700 ft. of 6-1/8" diameter transmission line. From normal room environments the output air has typical dew points of -60°F (-53°C). System pressure is controlled by the dehydrator pressure switch settings. Normally, this is factory adjusted to 3 psig (20.7kPa) "on" and 5 psig (34.5 kPa) "off", but may be readjusted in the field to operate anywhere between 2 and 15 psig (13.8 kPa and 103.4 kPa). An internal 40 psig check valve guarantees that the customer system stays isolated from the dehydrator's internal system and prevents loss of system pressure due to leakage in the dehydrator. For additional safety, a standard low pressure alarm switch , factory-set at 1 psig (6.9 kPa), is installed in the dehydrator. The alarm switch contains a set of SPST contacts that can be used for both local and remote monitoring or alarming. Additional standard features include a 0-15 psig pressure gauge, indicating power light, and a visual moisture monitor which is dark blue when dry and turns pink when wet.

The units may be shelf mounted or placed in a 19" EIA relay rack.

ORDERING INFORMATION	
Accessories/ Items Supplied	**Model Number**
20 ft. of 3/8" plastic tubing	913348-240
Connector, 3/8" tubing to 1/8" MPT	913344
Optional Accessories	
Maintenance Parts Kit for APD-70, APD-72, or APD-73	920641
High Pressure Alarm (0.5 lbs.)	920184
Floor Stand (31lbs.)	914710
Dehydrator Rack Mount	913907
Wall Shelf	940008
Pressure and Humidity Monitor for APD-70	920717-001
Pressure and Humidity Monitor for APD-72 or APD-73	920717-003

.7 SCFM Automatic Dehydrators APD-70 Series

PRODUCT SPECIFICATIONS	
Power Source	
APD-70 P/N 940019	115 V 60 Hz
APD-72 P/N 940020	230 V 50 Hz
APD-73 P/N 940022	230 V 60 Hz
Output Ratings	
60 Hz	0.7 SCFM (0.32 liters/sec.)
50 Hz	0.58 SCFM (0.27 liters/sec.)
Output Dew Point	-40°F (-40°C)
Ambient Inlet Temperature	33°F -120°F (1°C - 49°C)
Ambient Humidity	95% maximum
Output Pressure (on/off)	
Factory Set	3/5 psig (20.7-34.5 kPa)
Field Adjustable	2-15 psig (13.8-103.4 kPa)
Output Differential	2 psig (13.8 kPa) minimum
Compressor Rating	1/4 hp
Power Consumption	
Pumping	600 watts
Idle	10 watts
Low Pressure Alarm	Factory set for 1 psig
P/N 916814-001	0.5 psig differential
Output Fitting	1/8" FPT to 3/8" plastic tube fitting
Dimensions, H x W x D Inches (mm)	14 x 17-11/16 x 8 (355 x 450 x 203)
Net Weight	54 lbs. (25 kg)
Shipping Weight	64 lbs. (29 kg)

APD-70 MAXIMUM DEHYDRATOR CAPACITY RATINGS	
Transmission Line Feet (m)	**Approximate Length**
7/8"	73,000 (22,200)
1-5/8"	24,000 (7,300)
3-1/8"	7,300 (2,200)
6-1/8"	1,700 (500)
6 to 12 GHz Waveguide	28,000 (8,500)
4 to 5 GHz Waveguide	14,000 (4,300)

Based on 2 psi leakage in 24 hours and 5% running time for 60 Hz operation.
For 50 Hz operation, multiply capacity ratings by 5/6 (a reduction of 17%).

ORDERING INFORMATION	
Spare Parts for APD Series	**Model Number**
Amber Light**	913654-002
Back Cover Kit for APD Series	933639
Color-Change Moisture Indicator Gel (1 lb.)	913632
Filter Assembly**	914714
Male Connector 3/8" Tubing to 1/8" MPT**	913344
Pressure Switch	913481
Red Light**	913654-001
1/4" Polyethylene Tubing (black)**	913566
3/8" Polyethylene Tubing (black)**	913348
3/8" Nylon Tubing (white)**	913928

**Included in APD-20 and APD-70 Series Maintenance Parts Kit

Accessories

Run Timer Alarm Kit

The Run Timer Alarm is an adjustable timer/alarm system designed to signal a warning in the event of excessive dehydrator operation. Dehydrator operation in excess of 5 hours or more (dependent on system volume) usually indicates abnormal system leakage.

The electronic Run Timer starts its programmed timing sequence when the dehydrator compressor is turned on, and automatically resets when the compressor is turned off. In the event that the timer is run to its programmed limit, a relay within the timer module activates a SPST switch to signal a remote alarm- supplied by user. The Run Timer does not control dehydrator operation, but is meant only as a device to signal excessive run time.The Run Timer may be programmed by the user for an activation delay of up to 10 hours. The relay switch contacts are rated for 110 VAC, 10 Amp.

Run Timer Alarm Kit

ORDERING INFORMATION	
Description	**Model Number**
Run Timer Alarm	914976

Pressure & Humidity Monitor Kit for APD series Dehydrators

The Pressure and Humidity Monitor Kit is designed for reliable monitoring of pressurized waveguide, coaxial cable and rigid line transmission systems. The humidity monitor features remote alarm relay contacts configured as normally open SPDT rated at 3 amps, 120 VAC or 1.5 amps, 240 VAC. Sensor threshold is factory set for 10% relative humidity.

Pressure Alarm thresholds of 1 psig (low) and 10 psig (high) activate SPST alarm contacts rated at 4 amps 24 VDC. All necessary assembly components have been supplied. Some drilling is required. Tools: Drill (5/32 inch), Screwdriver (1/4 inch blade), Pliers, 7/16 inch wrench.

Pressure & Humidity Monitor Kit

Principle of Operation

The Humidity Monitor controller provides on/off control of alarms, dialers and other signaling devices when system humidity exceeds a fixed set point. The controller also provides an analog output (0-100uA DC) that can be used to monitor humidity conditions.

ORDERING INFORMATION	
Description	**Model Number**
Pressure and Humidity Monitor Kit for APD-20 and APD-70	920717-001
Pressure & Humidity Monitor Kit for APD-22, APD-72 and APD-73	920717-003

Needle Release Valve

ORDERING INFORMATION	
Description	**Model Number**
1/8" MPT each end	913302

Pipe Nipple

ORDERING INFORMATION	
Description	**Model Number**
1 inch Long,1/8 inch MPT each end	920126
1-1/2 inch Long, 1/8 inch MPT each end	913438

Accessories

Gas Distribution Manifold Kit GDM- (*) (0-15 psig gauge)

Used for pressure distribution to several transmission lines. Allows easy maintenance checks of individual lines. Includes 1/8" FPT input, distribution manifold block and one needle release valve. 0-15 psig pressure gauge, 15 ft. (4.5m) 3/8" plastic tubing for each outlet.

Also included are four 3/8" plastic tubing racks (10 slots per rack), one roll of teflon tape and 24 nylon ties. Designate number of outlets by suffix number, i.e., GDM-2 for two outlets, GDM-3 for three outlets, etc.

ORDERING INFORMATION

Type (suffix number designates number of outlets)	Model Number	Approx wt. kg (lbs)
GDM-1	920201	1.7 (3.7)
GDM-2	920202	1.9 (4.2)
GDM-3	920203	2.2 (4.8)
GDM-4	920204	2.8 (6.2)
GDM-5	920205	4.1 (9.0)
GDM-6	920206	4.4 (9.6)
GDM-7	920207	4.8 (10.5)
GDM-8	920208	5.0 (11.0)
GDM-9	920209	5.7 (12.5)
GDM-10	920210	5.9 (13.0)

Low Pressure Distribution Manifold Kit LDM-(*) (0-5 psig gauge)

ORDERING INFORMATION

Type	Model Number	Approx wt. (lbs)
LDM-1	920211-001	4.9
LDM-2	920211-002	5.7
LDM-3	920211-003	7.1
LDM-4	920211-004	8.0
LDM-5	920211-005	9.2
LDM-6	920211-006	10.5
LDM-7	920211-007	12.0
LDM-8	920211-008	13.0
LDM-9	920211-009	14.2
LDM-10	920211-010	15.0

High & Low Pressure Alarms

The high pressure alarm is suitable for field installation or may be ordered factory installed. The alarm sensor is set at 10 psig (68.9 kPa). May be special ordered for any pressure between 7 and 30 psig (48.2 and 206.7 kPa). Provides SPST contact rated at 4 amps 24 VDC.

The low pressure alarm is factory installed on all dehydrators or may be ordered separately for field installation to GDM gas distribution manifold. Pressure end mounts to 1/8 inch FPT. Sensor factor set for 1 psig (6.9 kPa). May be special ordered for any value between 1psig and 7 psig. Provides SPST contact rated at 4 amps 24 VDC.

High Pressure Alarm

ORDERING INFORMATION

Description	Model Number
High Pressure Alarm	920184
Low Pressure Alarm	916814-001

Accessories

Nitrogen Tank Regulator Kit

Used with locally obtained nitrogen tank. Includes a reliable single stage regulator, high pressure gauge (0-4,000 psig), low pressure gauge (0-30 psig) and 10 ft. (3 m) 3/8 inch plastic tubing with 1/8 inch MPT fitting. Regulator fits CGA 580 (0.965 right hand internal) nitrogen tank connection, which is standard for most US sources (Approx. wt. 4 lbs)

Nitrogen Tank Regulator kit

ORDERING INFORMATION	
Model Number	920188

Plastic Tubing Support Rack

For securing plastic tubing to wall. Rack will support up to 10 tubes.

ORDERING INFORMATION	
Description	Model Number
3/8″	913368
1/4″	914063

Low Pressure Gauge

0-5 PSIG

1/4 inch MPT, indoor use only

Low Pressure Gauge

ORDERING INFORMATION	
Model Number	514857

Pressure Gauge 0-15 psig

Pressure Gauge 0-15 psig

ORDERING INFORMATION	
Description	Model Number
1/8″ MPT, indoor use only	511675
1/8″ MPT, outdoor use only	915965