

Waveguide Dehydrators

Clean & Dry Air
For Clear Communications

Rugged & Reliable
Compressed Air Systems for:

- ★ TV and Radio Broadcast Applications
- ★ Satellite
- ★ Radar
- ★ Aerospace
- ★ Telecommunications
- ★ Military
- ★ Custom Applications



TSI

SOLUTIONS





TSI Solutions has been building rugged, no-maintenance waveguide dehydrators since 2004. Our core business is providing components and solutions for cleaning, drying, regulating and storage of compressed air. We have been in business since 1978.

Our experience with compressed air applications sets us apart from other providers of waveguide dehydrators, most of whom focus on manufacturing other components—mainly electrical—for the communications industry.

As an example, where most other manufacturers use desiccant dryers, which can get saturated with moisture or pass desiccant dust downstream into the waveguide, we have worked closely with our supplier to develop a high-efficiency membrane dryer. And because we put a 0.01 micron coalescing filter in front of it, the membrane dryer will last indefinitely, with zero maintenance.

We also pride ourselves on our ability to provide customized units for your particular application as well as meticulous attention to detail in our assembly process.

What is a waveguide dehydrator used for?

The WDH2 series dehydrator is an automatic, membrane-type dehydrator, designed specifically for the antenna and transmission line industry. The WDH2 series is recommended for use in any antenna waveguide or transmission line. Moisture within these systems can cause a variety of problems, including RF reflections and high return losses, arcing, oxidation, and corrosion. By applying a low pressure, dry air source to these devices, these negative effects of moisture can be significantly reduced or eliminated. The adjustable output pressure from the WDH2 is high enough to provide a positive pressure inside the transmission device, but low enough to be safe even for fragile, sensitive components within the system. This unit is designed to be a simple, low maintenance, “plug-&-play” unit. Both freestanding and rack-mount units are available.

Need A Custom Waveguide Dehydrator?

TSI can engineer a custom solution for your special application. We have designed and built small, space-saving units as well as large, multi-port dehydrators that can serve up to 20 waveguides.

What about remote monitoring via ethernet? High pressure units? Units for extreme temperature environments? Mil-spec connectors? No problem.

Military operations often take place in harsh and demanding environments and technical failures can Make the difference between winning and losing on the battlefield.

Our Harsh Duty waveguide dehydration and pressurization units are built to survive and function with miniMal maintenance in radar, microwave and satellite equipment.

Please contact Greg Coughlin at 770-580-1007 or gcoughlin@tsisolutions.us with your requirements, we will be glad to work with you on a custom dehydrator.

Maintenance Free System

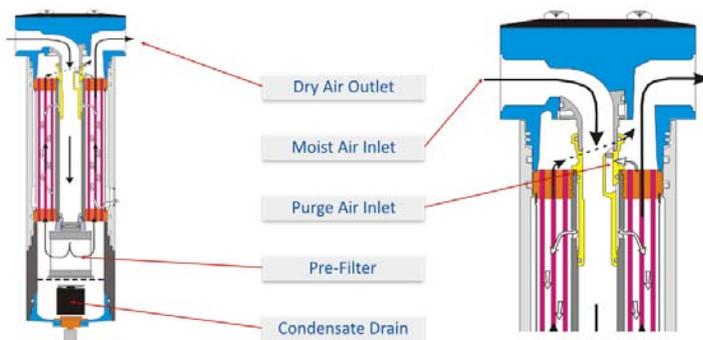
TSI Solutions' waveguide dehydrator system is virtually maintenance free, entirely self-sufficient, and produces clean, dry air. It is powered by an oil-less compressor and includes a pressure regulator, air filter, and membrane dryer that separates the water vapor from the oxygen and nitrogen molecules.

System Facts

- ◆ Unit is entirely self-sufficient
- ◆ Labor costs associated with maintenance are virtually eliminated
- ◆ Prefilter assembly eliminates water and hydrocarbons
- ◆ System utilizes a durable, oil-less compressor (resulting air is uncontaminated by oil)
- ◆ Provides clean, dry, pressurized air to ensure signal quality of antenna waveguide
- ◆ Air reservoir stores compressed air which reduces duty cycle of compressor, greatly extending the life of the compressor.
- ◆ Water vented out of membrane dryer in vapor form: No condensation
- ◆ No changing of desiccant required
- ◆ All standard systems come with a 2-year warranty

Basic Membrane Dryer Operation

The membrane drying process works by passing compressed air through the hollow fiber membranes. The water vapor molecules permeate through microscopic pores in the membrane leaving the oxygen and nitrogen molecules to exit the outlet as dry air. The water vapor is then swept away by a small amount of dry air directed over the outside of the membrane fibers and out through a purge orifice.



N_2 and O_2 molecules are too large to fit through the pores in the membrane. H_2O molecules, however, slip through and are purged out of the dryer.

Benefits & Features of the TSI Waveguide Dehydrators

- ◆ Membrane dryer – Instead of desiccant, we use a high efficiency, no-maintenance membrane dryer protected by a 0.01 micron coalescing filter
- ◆ Output fittings – 1/4" NPT port, 1/4" and 3/8" push to connect fittings also included
- ◆ Alarm contacts – Low pressure alarm (< 5psi), and excessive run time alarm are standard
- ◆ Air compressor – We use heavy duty Gast air compressors

Optional features include:

- ◆ Dual compressors for fail-safe operation
- ◆ Optional remote monitoring using "OPM" Output Pressure Monitoring with 0-10vDC or 4 - 20mA current or "ERM" Ethernet Remote Monitoring

Panel Components

- ◆ Power switch
- ◆ Hour meter – indicates total runtime of compressor
- ◆ High pressure gauge – indicates holding pressure in reservoir
- ◆ Low pressure gauge – indicates output pressure from dehydrator
- ◆ Regulator knob – allows user to adjust output pressure (rack mount units only – adjustment regulator on floor/shelf mount units is piped directly into the reservoir)

Alarms and Remote Monitoring

- ◆ Units come standard with relay-type, dry-contact alarms for Low Pressure and Excess Run Time.
- ◆ OPM (output pressure monitoring) option provides either a voltage (0-10VDC) or current (4-20mA) signal.
- ◆ ERM (ethernet remote monitoring) option allows for remote monitoring of output pressure and run time via ethernet. When ERM option is chosen, the standard dry contact alarms are omitted.

Meet the TSI family of Waveguide Dehydrators



3U Series — Rack Mounted, Adjustable Output 0.5 – 10 psig. This is our smallest and most compact dehydrator. The 3U is ideally suited for systems with a single waveguide application. Like all our units it comes standard with Low Pressure and Excess run time dry contact alarms. We also offer OPM and ERM monitoring options.



5U Series — Rack Mounted, Adjustable Outputs of 0.5 – 15 psig OR 0.5 – 30 psig. The 5U series is our most popular Rack Mounted dehydrator. With its higher flow capability of the 1/4hp compressor, it's ideally suited for systems with multiple waveguides. The extra flow also helps compensate for systems that experience high leak rates due to aging gaskets and seals. Just like our 3U series, the 5U can be offered with OPM and ERM monitoring options.



FS Series — Free Standing, Adjustable Outputs of 0.5 – 15 psig OR 0.5 – 30 psig. The standard Free Standing unit is our most popular unit. Like the 5U it utilizes the 1/4HP compressor for optimum flow. This design, though modified over time, has been the mainstay of our dehydrator offering. The fact they require virtually no maintenance and ease of installation make it ideal for remote locations. We have units that have been in the field for over 10 years!



FSE Series — Free Standing Enclosed, Adjustable Outputs of either 0.5-15 psig OR 0.5-30 psig. This is a modified version of our Free Standing unit. With the sides enclosed in a combination of Aluminum Composite Panels and Wire Mesh, the Free Standing Enclosed unit offers additional protection from accidental damage to critical components. This additional protection allows us to offer both OPM and ERM options for this unit.

3U Rack Mount Series



Output Pressure Range	Supply Voltage Max Amp Draw	Remote Monitoring & Connector	Part Number
0.5 - 10psig	115VAC 2.1 at 60hz	None	WDH2-3U-10-120
		Ethernet - RJ45	WDH2-3U-10-120-ERM
		Voltage (0-10VDC) 3wire M12, w/ 1m cable flying leads	WDH2-3U-10-120-OPM15V
		Current (4-20mA) 3wire M12, w/1m cable flying leads	WDH2-3U-10-120-OPM15C
	220/230VAC 1.0 at 60hz 1.3 at 50hz	None	WDH2-3U-10-240
		Ethernet	WDH2-3U-10-240-ERM
		Voltage (0-10VDC) 3wire M12, w/ 1m cable flying leads	WDH2-3U-10-240-OPM15V
		Current (4-20mA) 3wire M12, w/ 1m cable flying leads	WDH2-3U-10-240-OPM15C

Enclosure	Dimensions: Weight: Mounting:	17.625" x 15.25" x 5.25" (448 mm x 387 mm x 133 mm) 24 lbs (11.3 kg) Dual-post rack, flush mounted
Power	Power usage: Compressor type:	483 VA max Oil-less reciprocating diaphragm, 1/16 HP motor,
Output	Flow rate: Pressure rating: Factory default pressure setting: Output Port: Dewpoint:	.5 cfm @ 1 psig Regulated = 0.5 - 10 psig 1 psig 1/4" NPT 3/8" or 1/4" OD push to connect fittings (1 each included) 0° to -20°F
Environmental	Temperature rating: Noise Level:	40° to 104°F < 70 dB(A)



5U Rack Mount Series

Output Pressure range	Supply Voltage Max Amp Draw	Remote Monitoring & Connector	Part Number
0.5 - 15psig	120VAC 1.8 at 60hz 3.1 at 50hz	None	WDH2-5U-15-120
		Ethernet - RJ45	WDH2-5U-15-120-ERM
		Voltage (0-10VDC) 3wire M12, w/ 1m cable flying leads	WDH2-5U-15-120-OPM15V
		Current (4-20mA) 3wire M12, w/ 1m cable flying leads	WDH2-5U-15-120-OPM15C
	240VAC 1.0 at 60hz 1.5 at 50hz	None	WDH2-5U-15-240
		Ethernet - RJ45	WDH2-5U-15-240-ERM
		Voltage (0-10VDC) 3wire M12, w/ 1m cable flying leads	WDH2-5U-15-240-OPM15V
		Current (4-20mA) 3wire M12, w/1m cable flying leads	WDH2-5U-15-240-OPM15C
0.5 - 30psig	120VAC 1.8 at 60hz 3.1 at 50hz	None	WDH2-5U-30-120
		Ethernet - RJ45	WDH2-5U-30-120-ERM
		Voltage (0-10VDC) 3wire M12, w/ 1m cable flying leads	WDH2-5U-30-120-OPM30V
		Current (4-20mA) 3wire M12, w/1m cable flying leads	WDH2-5U-30-120-OPM30C
	240VAC 1.0 at 60hz 1.5 at 50hz	None	WDH2-5U-30-240
		Ethernet - RJ45	WDH2-5U-30-240-ERM
		Voltage (0-10VDC) 3wire M12, w/ 1m cable flying leads	WDH2-5U-30-240-OPM30V
		Current (4-20mA) 3wire M12, w/1m cable flying leads	WDH2-5U-30-240-OPM30C

Enclosure	Dimensions: Weight: Mounting:	17.625" × 15.25" × 8.75" (448 mm × 387 mm × 222 mm) 38.5 lbs (17.5 kg) Dual-post rack, flush mounted
Power	Power usage: Compressor type:	483 VA max Oil-less rocking piston, 1/4 HP motor,
Output	Flow rate: Maximum pressure: Dewpoint:	1.4 cfm @ 1 psig Regulated = 0.5 - 15 and 0.5 - 30 psig 0° to -20°F
Environmental	Temperature rating: Noise Level:	40° to 104°F < 65 dB(A)



Freestanding (FS)

Output Pressure Range	Supply Voltage Max Amp Draw	Remote Monitoring & Connector	Part Number
15psig	120VAC 1.8 at 60hz 3.1 at 50hz	Low pressure and excess run time Alarms: Dry contact terminal strip	WDH2-FS-15-120
	240VAC 1.0 at 60hz 1.5 at 50hz		WDH2-FS-15-240
30psig	120VAC 1.8 at 60hz 3.1 at 50hz		WDH2-FS-30-120
	240VAC 1.0 at 60hz 1.5 at 50hz		WDH2-FS-30-240

Enclosure	Dimensions Weight Mounting	17-3/4" (W) x 9-1/2" (D) x 18-1/4"(H) 36 lbs Free Standing
Power	Power usage Compressor Type	483 VA max Oil-less, diaphragm, 1/3 HP motor,
Output	Flow rate Maximum pressure Dewpoint:	1.4 cfm @ 1 psig Regulated = 0.5 - 15 psig and 0.5 - 30 psig 0° to -20°F
Environmental	Temperature rating: Noise Level	40° to 104°F < 65 dB(A)



Freestanding Enclosed (FSE)

Output Pressure Range	Supply Voltage Max Amp Draw	Remote Monitoring & Connector	Part Number
0.5 - 15psig	120VAC 1.8 at 60hz 3.1 at 50hz	None	WDH2-FSE-15-120
		Ethernet RJ45	WDH2-FSE-15-120-ERM
		Voltage (0-10VDC) 3wire M12, w/ 1m cable flying leads	WDH2-FSE-15-120-OPM15V
		Current (4-20mA) 3wire M12, w/1m cable flying leads	WDH2-FSE-15-120-OPM15C
	240VAC 1.0 at 60hz 1.5 at 50hz	None	WDH2-FSE-15-240
		Ethernet- RJ45	WDH2-FSE-15-240-ERM
		Voltage (0-10VDC) 3wire M12, w/ 1m cable flying leads	WDH2-FSE-15-240-OPM15V
		Current (4-20mA) 3wire M12, w/1m cable flying leads	WDH2-FSE-15-240-OPM15C
0.5 - 30psig	120VAC 1.8 at 60hz 3.1 at 50hz	None	WDH2-FSE-30-120
		Ethernet- RJ45	WDH2-FSE-30-120-ERM
		Voltage (0-10VDC) 3wire M12, w/ 1m cable flying leads	WDH2-FSE-30-120-OPM30V
		Current (4-20Ma) 3wire M12, w/1m cable flying leads	WDH2-FSE-30-120-OPM30C
	240VAC 1.0 at 60hz 1.5 at 50hz	None	WDH2-FSE-30-240
		Ethernet- RJ45	WDH2-FSE-30-240-ERM
		Voltage (0-10VDC) 3wire M12, w/ 1m cable flying leads	WDH2-FSE-30-240-OPM30V
		Current (4-20mA) 3wire M12, w/1m cable flying leads	WDH2-FSE-30-240-OPM30C

Enclosure	Dimensions Weight Mounting	18.25" (W) x 9.5" (D) x 18.75" (H) (20.75" with handles) 44 lbs Free Standing
Power	Power usage Compressor Type	483 VA max Oil-less rocking piston 1/4 HP motor,
Output	Flow rate Maximum pressure Dewpoint:	1.4 cfm @ 1 psig Regulated = 0.5 - 15 psig and 0.5 - 30 psig 0° to -20°F
Environmental	Temperature rating: Noise Level	40° to 104°F < 65 dB(A)

FAQ's

What is the effect of moisture inside a waveguide? (Why is a dehydrator necessary?)

The environment within a waveguide is under positive pressure. This pressurization serves to ensure that the waveguide leaks out rather than in and prevents vapor, dust and other particulates from entering the waveguide. Particulates in the waveguide can cause reflection, which can be measured as VSWR (voltage standing wave ratio) and cause signal loss or attenuation. In most communication applications, a dehydrator will maintain a clean, dry, particulate-free environment within the waveguide.

How large a unit do I need?

The size of your dehydrator depends on the volume of your waveguide, but even more so on the amount of leakage in the waveguide. A sealed system will require a small dehydrator because there is no need to replenish the air within it.

Our 5U, FS, and FSE series utilize high flow 1/4HP compressors which are well suited to help overcome air loss due to leakage.

What is the difference between a membrane dryer and a desiccant dryer?

A membrane dryer uses permeable straw-shaped membranes that allow water molecules to pass through them, but not the larger oxygen and nitrogen molecules, which make up 98% of the air in our atmosphere.

Advantages of membrane dryers include:

- ◆ Little or no maintenance is required—as they have no moving parts, if they are kept clean of particulate and oil mist, they will last indefinitely.
- ◆ No desiccant dust to escape the unit and foul downstream components

Disadvantages of membrane dryers include:

- ◆ Oil aerosols can coat the membrane filter element, rendering it useless if adequate pre-filtering is not maintained.
- ◆ Some purge air is required.
- ◆ The pressure dew point is not as low as can be obtained with a desiccant type dryer.

A desiccant dryer uses an adsorbent material, typically a silica gel, which causes water molecules to adhere or stick to it as the air passes through the desiccant sieve chamber

Advantages of regenerative desiccant type dryers include:

- ◆ Very low dew points can be achieved without potential freeze-up.
- ◆ Moderate cost of operation for the dew points achieved.
- ◆ Heatless type can be designed to operate pneumatically for remote, mobile or hazardous locations.

Disadvantages of regenerative desiccant type dryers include:

- ◆ Relatively high initial capital cost
- ◆ Periodic replacement of the desiccant bed (typically 3-5 years)
- ◆ Oil aerosols can coat the desiccant material, rendering it useless if adequate pre-filtering is not maintained.
- ◆ Desiccant dust can sometimes pass out of the chamber used to contain it, potentially causing problems in sensitive downstream components,
- ◆ Purge air is required.

Options

What is meant by pressure dew point?

The pressure dew point is the temperature at which the water vapor content of air condenses into liquid water. This becomes a factor at pressures higher than ambient atmospheric pressure. Increasing the pressure of your system increases the dew point temperature. In other words, air under pressure cannot maintain as much water in vapor form as atmospheric air.

What kind of routine maintenance will my TSI dehydrator require?

TSI dehydrators are equipped with membrane air dryers. The main advantage over desiccant dryers is that they do not require periodic replacement and should last for many years without maintenance. Likewise we use only high quality, rugged compressors with an expected lifespan of 8-10 years under normal operating conditions.

How long should I expect my TSI dehydrator to last before it will need to be replaced?

Standard TSI dehydrators are warranted for 2 years; we have some in the field with 8 years of no problems.

When would I want to specify a dual compressor dehydrator?

TSI's dual compressor dehydrator units are designed to provide redundancy in applications where this is specified. Our dual compressor unit is designed to provide an alarm should a compressor fail, while the other compressor maintains functionality. This creates a "never fail" condition on critical applications.

Remote Output Pressure Monitoring (OPM)

TSI's remote pressure monitoring package adds the components and hardware necessary to provide you the ability to remotely monitor the output pressure of your waveguide dehydrator. The dehydrator will be equipped with an analog 0 – 10 V or 4 - 20mA signal that will represent the output pressure.

Ethernet Remote Monitoring (ERM)

ERM provides the ability, using ethernet technology, to monitor output pressure and run time.

Manifolds

TSI Solutions can provide multi-channel distribution manifolds to use with our waveguide dehydrators. These manifolds offer the ability to bring air from a single source to supply multiple waveguide channels. Each manifold offers individual channel control of both on- or off- function as well as flow controls with visual indicators.

A perfect option for our manifolds is a manifold alarm kit. The alarm kit allows low pressure monitoring for each output leg of the manifold using switches with a dry contact. Use of the manifold and alarm kits provide better control and monitoring for systems with multiple waveguides. Standard manifolds come in 4-, 5- and 6-station outputs.

Waveguide Dehydrator Accessories



TUBING

Part Number

1J-151-01

1J-152-01

Description

Black 95A PUR 1/4 x .160 x 100'

Black 95A PUR 3/8 x .245 x 100'



FITTINGS

Part Number

3175-56-14

3175-60-14

Description

1/4" NPT x 1/4" push in fitting

1/4" NPT x 3/8" push in fitting

COMPRESSORS

Part Number

DOA-P701-AA

86R130-101-N270X

MOA-P101-AA

MOA-P101-CD

Description

Gast Compressor - 110/120 VAC – 1/8 HP
Used in Legacy Products

Gast Compressor – 110/120 or 220/240 – 1/4 HP
Used in WDH2 – 5U , FS & FSE Models
Can be wired for 110/120 or 220/240 VAC

Gast Compressor – 110/120 VAC – 1/16 H
Used in 3U Rack Mount Units

Gast Compressor – 220/240 VAC – 1/16 HP
Used in 3U Rack Mount Units



CHECK VALVES

Part Number

HAM-H400SSL1/41/3PSI

Description

1/4" x 1/4" Compression Check Valve



PRESSURE SWITCHES

Part Number

F-4200-100-PT-12D

F-4200-5-PT

Description

0-100 PSI Pressure Switch w/ 12 PSI deadband

0-5 PSI Pressure Switch



AIR FILTERS

Part Number

97-357

204-3000-2D

Description

0.01 Micron Coalescing Filter 1/4" NPT

5 Micron PreFilter 1/4" NPT