THERMAL PRODUCTS Inc.

MMD SERIES

MODULAR DESICCANT DRYERS

mattei
EXPERIENCE THE REVOLUTION

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MMD SERIES
MODULAR DESICCANT DRYER
Moisture is a big problem for compressed air users

Moisture is one of the major contaminants in compressed air systems. It occurs because water vapor present in the atmosphere is drawn into the compressor, where its' concentration can rise dramatically as temperature increases. Of the ten contaminants commonly found in a compressed air system, water vapor, liquid water and aerosols account for the majority of problems experienced by the compressed air user.

Unseen water vapor condenses into liquid water

Large volumes of atmospheric air enter the compressed air system through the compressor intake. As the air is compressed, its temperature increases significantly, causing it to become fully saturated with water vapor. Water vapor retention in air is dependent upon its temperature and pressure; the higher the temperature, the more water vapor that can be retained; the higher the pressure, the greater the amount of condensed water that will be released.

After the compression stage, the now saturated air is cooled to a usable temperature by an aftercooler, causing the retained water vapor to be condensed into liquid water which is then removed by a condensate drain. The air leaving the aftercooler is now 100% saturated with water vapor. As the compressed air moves downstream to storage vessels and through piping, its temperature falls and concentrated vapor will sublimate as droplets of liquid water.

If not removed, this will cause corrosion of the distribution system, blocked or frozen valves and machinery, as well as providing an ideal breading ground for micro-organisms and bacteria.

To eliminate these moisture problems, all viable water vapor must be removed by desiccant dryers, before it can enter the compressed air system.

How much water can be found in a typical compressed air system?

The amount of water in a compressed air system is staggering. A small 100 cfm (2.8 m^3/min) compressor and refrigerated air dryer combination, operating for 4000 hours in typical Northern American climatic conditions can produce approximately 2,200 gallons or 10,000 liters of liquid condensate per year.

Oil is often perceived to be the most prolific contaminant as it is can be seen emanating from open drain points and exhausting valves. In the majority of instances, it is actually oily condensate (oil mixed with water) that is being observed. In reality, oil accounts for less than 0.1% of the overall volume.

This example illustrates the use of a small compressor to highlight the large volume of condensate produced. Up to 99.9% of the total liquid contamination found in a compressed air system is water.

If a compressed air system was operated in warmer, more humid climates, with larger compressors, or run for longer periods, the volume of condensate would increase significantly.

99.9% of the total liquid contamination in a compressed air system is water.

GET MATTEI FILTRATION.

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Mattei modular compressed air dryers - a dedicated solution for every application

By combining the proven benefits of desiccant drying with modern design, Mattei has produced an extremely compact and reliable system to totally dry and clean compressed air.

Mattei MMD Series

Flowrates from 24 cfm> (49m³/hr >)

Mattei MMD Series

Flowrates from 240 cfm> (408m³/hr >)

The Mattei ranges of heatless and heat regenerative dryers have proven to be the ideal solution for many thousands of compressed air users worldwide in a wide variety of industries.

Compressed air purification equipment must deliver uncompromising performance and reliability while providing the right balance of air quality with the lowest cost of operation.

Benefits:

Highest quality air
- Clean, oil-free and dry compressed air in accordance with all editions of ISO8573-1, the international standard for compressed air quality

Energy efficient
- Giving maximum savings

Dry air eliminates microbiological growth
- Preventing product spoilage, recall and litigation

Dry air means zero corrosion
- Preventing product spoilage and damage

Smaller, more compact and lightweight -
Modular construction means less than half the size of conventional dryers

Modular design
- 100% standby at a fraction of the cost of twin tower designs
- 10 year guarantee on pressure envelope
- Corrosion resistance due to alochroming and epoxy painting
- Constant dewpoint performance thanks to snowstorm filling

Approvals to international standards
- UL, CSA, CRN, PED, CE

Easy and flexible installation
- Minimal space required

Simple maintenance
- Giving reduced downtime

Reduced noise pollution
- Less than 85 dBA

Clean, dry air improves production efficiency and reduces maintenance costs and downtime.

Only an desiccant dryer can provide the highest levels of dry compressed air.

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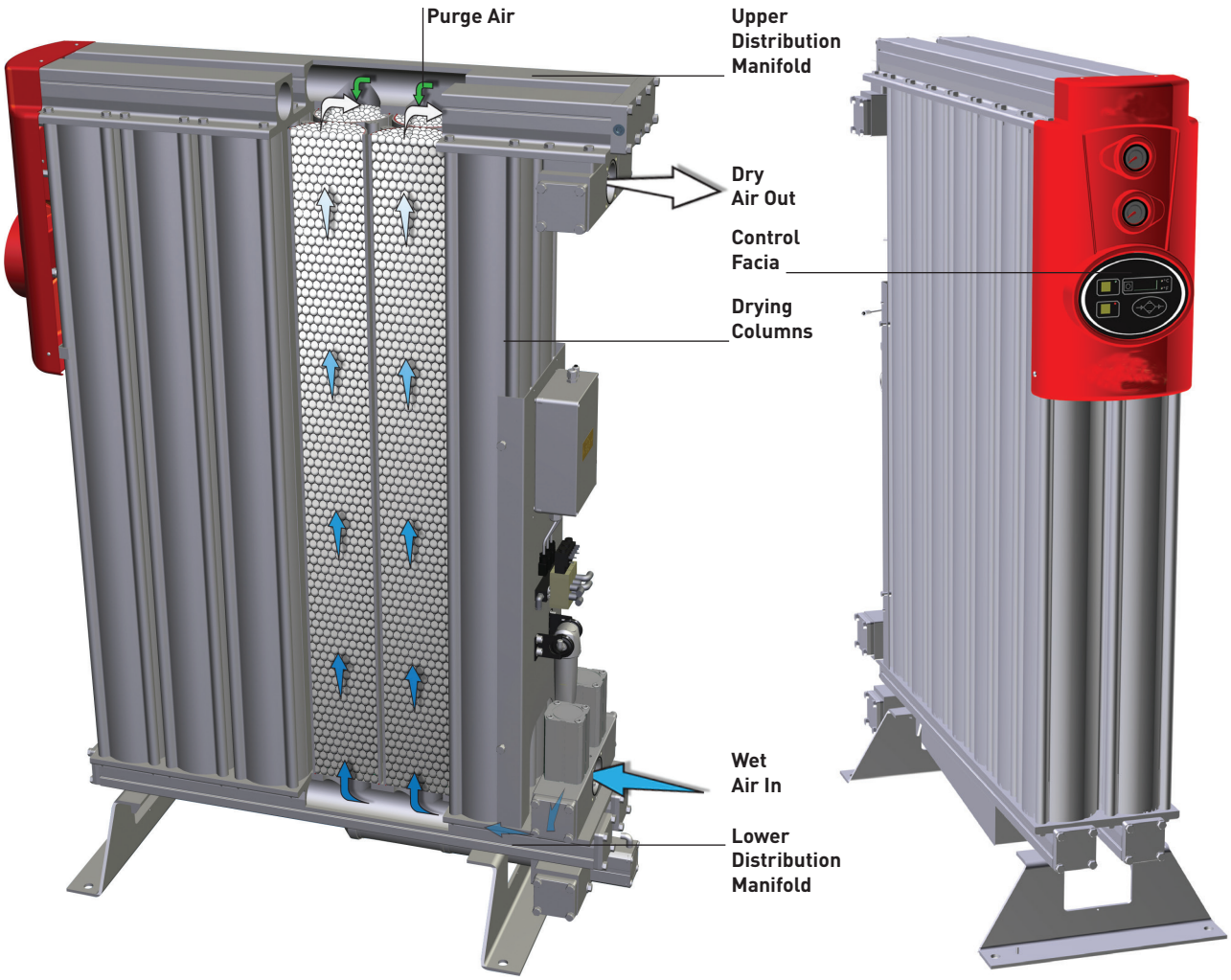
MMD SERIES
MODULAR DESICCANT DRYER
How it works

Mattei MMD Series comprises of high tensile extruded aluminum columns each containing twin chambers filled with desiccant material which dries the compressed air as it passes through.



One chamber is operational (drying), while the opposite chamber is regenerating using either the Pressure Swing Desiccant (PSA) (heatless) or Thermal Swing Desiccant (TSA) (heat regenerative) method of drying.

A small volume of the dried compressed air is used to regenerate the saturated desiccant bed by expanding air from line pressure to atmospheric pressure, removing the water vapor adsorbed by the desiccant material, and therefore regenerating the dryer. Heat regenerative models have electric heaters built into the desiccant beds to further reduce purge air consumption and increase operating efficiency.

Modular design eliminates the need for complex valves and interconnecting piping which are used in conventional twin tower designs.

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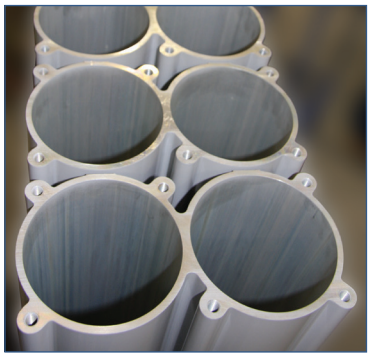
Mattei - The world's most advanced modular drying system

With the proven benefit of advanced aluminum forming technology, Mattei has developed a desiccant dryer that is typically 60% of the size and weight of conventional designs.

These advanced desiccant dryers include ranges of heatless and heat-regenerative Mattei dryers which provide one of the most simple and cost effective compressed air drying solutions.

Engineers at Mattei have developed innovative aluminum forming technology, resulting in units that are typically 60% of the size and weight of conventional welded steel desiccant air dryers. Using a single, high tensile extruded aluminum column, the Mattei modular design eliminates the need for complex valves or interconnecting piping.

Also, the length to diameter ratio of the internal voids and non-welded construction means that Mattei does not require periodic inspections for insurance purposes, unlike traditional twin-tower air dryers that require out of service periods which can severely disrupt production schedules.



Drying Columns

Distribution Manifold

Greater flexibility with multi-banking

Multi-banking
Unlike traditional twin tower dryer designs, Mattei MAXI models can be multi-banked to provide extra compressed air drying capacity should demand increase in the future. There is no need to replace the dryer with a larger unit, additional capacity can be covered by simply adding extra bank(s), a feature only available with Mattei .

Flexibility during maintenance
Multi-banking allows individual dryer banks to be easily isolated for routine service work, while maintaining your clean, dry air supply.

100% stand-by
Compared to traditional twin tower designs, 100% standby is available at a fraction of the cost as only one extra dryer bank is required.

Fits through a standard doorway
Unlike traditional twin tower designs, Mattei dryers will fit through a standard doorway, eliminating the need for special access or facility structural dismantling during installation.

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MODULAR DESICCANT DRYER
Four key features guarantee air quality

Mattei filtration

Desiccant dryers are designed for the removal of water vapor and not liquid water, water aerosols, oil, particulates or micro-organisms. Only by using Mattei Mattei pre and after filtration can the removal of these contaminants be assured and air quality in accordance with all editions of ISO8573-1 be guaranteed.

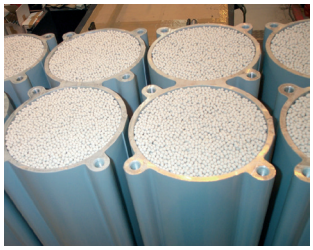
Modular aluminum design

Aluminum extrusions are used throughout for drying chambers and distribution manifolds. This design allows the desiccant material to be retained within the drying chambers.'Snowstorm' filling, prevents movement of the desiccant material during operation and also eliminates desiccant attrition and breakdown which could lead to a loss of pressure dewpoint.

Adsorbent desiccant material

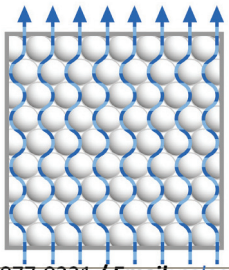
Specially selected desiccant materials provide:

- **Optimum desiccant and regeneration capacity - to ensure consistent dewpoint**
- **Low dusting - to prevent blockage of downstream filtration**
- **High crush strength - to prevent breakdown of the desiccant during operation**
- **High resistance to aggressive and oil-free condensate - for compatibility with all types of air compressor, their lubricants and condensate**



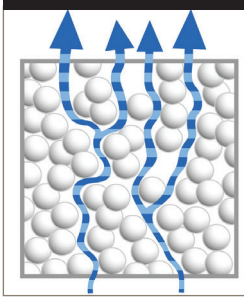
'Snowstorm' filling ensures consistent dewpoint performance

Snowstorm filled bed



Consistent drying with no desiccant attrition

Loose filled bed



Inconsistent drying and desiccant attrition

'Snowstorm' filling method

Unique to Mattei modular dryers is the snowstorm filling technique used to charge the drying chambers with adsorbent desiccant material.
The benefits are:

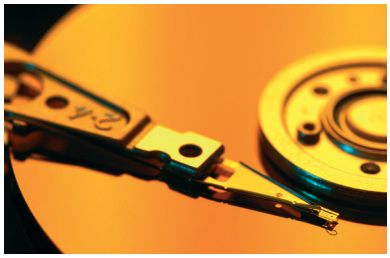
- **Achieves maximum packing density for the desiccant material, fully utilizing all of the available space envelope**
- **Prevents air channelling through the desiccant as experienced with twin tower designs. Due to channelling, twin tower designs require more desiccant to achieve an identical dewpoint, increasing physical size, operational and maintenance costs**
- **Prevents desiccant attrition which can lead to dusting, blocked filters and loss of dewpoint**
- **Allows 100% of the available desiccant material to be used for drying, therefore reducing the amount of desiccant required and maintenance costs**
- **100% of the desiccant is regenerated ensuring consistent dewpoint**
- **Provides a low, equal resistance to air flow allowing multiple drying chambers and multiple dryer banks to be used, a feature only available with Mattei**

What air quality do I need?

The compressed air PDP should not only be selected to prevent condensation and freezing in the piping, consideration must also be given to the requirements of the application.

Typically, refrigerated air dryers are employed for general purpose plant air. However, a significant amount of water vapor still remains in the compressed air, much more than is tolerable for most applications (air after a desiccant dryer with -40˚F (-40˚C) Pressure Dewpoint (PDP) is around 60 times dryer than air after a refrigerated air dryer with a +37.4˚F (+3˚C) PDP). Many critical applications require a PDP well below those offered by refrigerated dryers, for example, compressed air with a PDP better than -14.8˚F (-26˚C) will inhibit growth of micro-organisms, which is well beyond the capabilities of a refrigerated dryer. Preventing the growth of these microbiological contaminants is crucial to industries such as food, beverage, pharmaceutical, medical, dental, electronics, cosmetics and any application where compressed air is used to provide breathable air.

The quality of air required throughout a typical compressed air system will vary depending upon the application for which it is used.



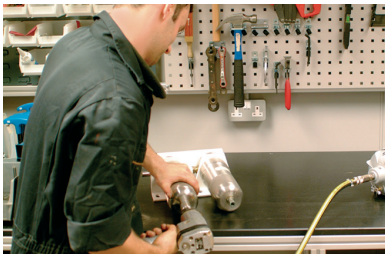
Critical Applications

- Pharmaceutical products
- Silicon wafer manufacturing
- TFT / LCD screen manufacturing
- Memory device manufacturing
- Optical storage devices (CD, CD/RW, DVD, DVD/RW)
- Optical disk manufacturing (CDs/DVDs)
- Hard disk manufacturing
- Foodstuffs
- Dairies
- Breweries
- CDA systems for electronics manufacturing

For ultra-critical applications which require the driest possible air, -100˚F (-70˚C) PDP must be specified.

High Quality Oil-Free Air

- Blow molding of plastics e.g. P.E.T. bottles
- Film processing
- Critical instrumentation
- Advanced pneumatics
- Air blast circuit breakers
- Decompression chambers
- Cosmetic production
- Medical air
- Dental air
- Robotics
- Spray painting
- Air bearings
- Measuring equipment
- Pre-treatment for on-site gas generation



General Purpose Oil-Free Air

- General ring main protection
- Plant automation
- Air logistics
- Pneumatic tools
- General instrumentation
- Metal stamping
- Forging
- General manufacturing (no external piping)
- Air conveying
- Air motors
- Workshop (tools)
- Temperature control systems
- Blow guns
- Gauging equipment
- Raw material mixing
- Sand / bead blasting
- Yard air

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MODULAR DESICCANT DRYER
Selecting the right dryer for your compressed air system

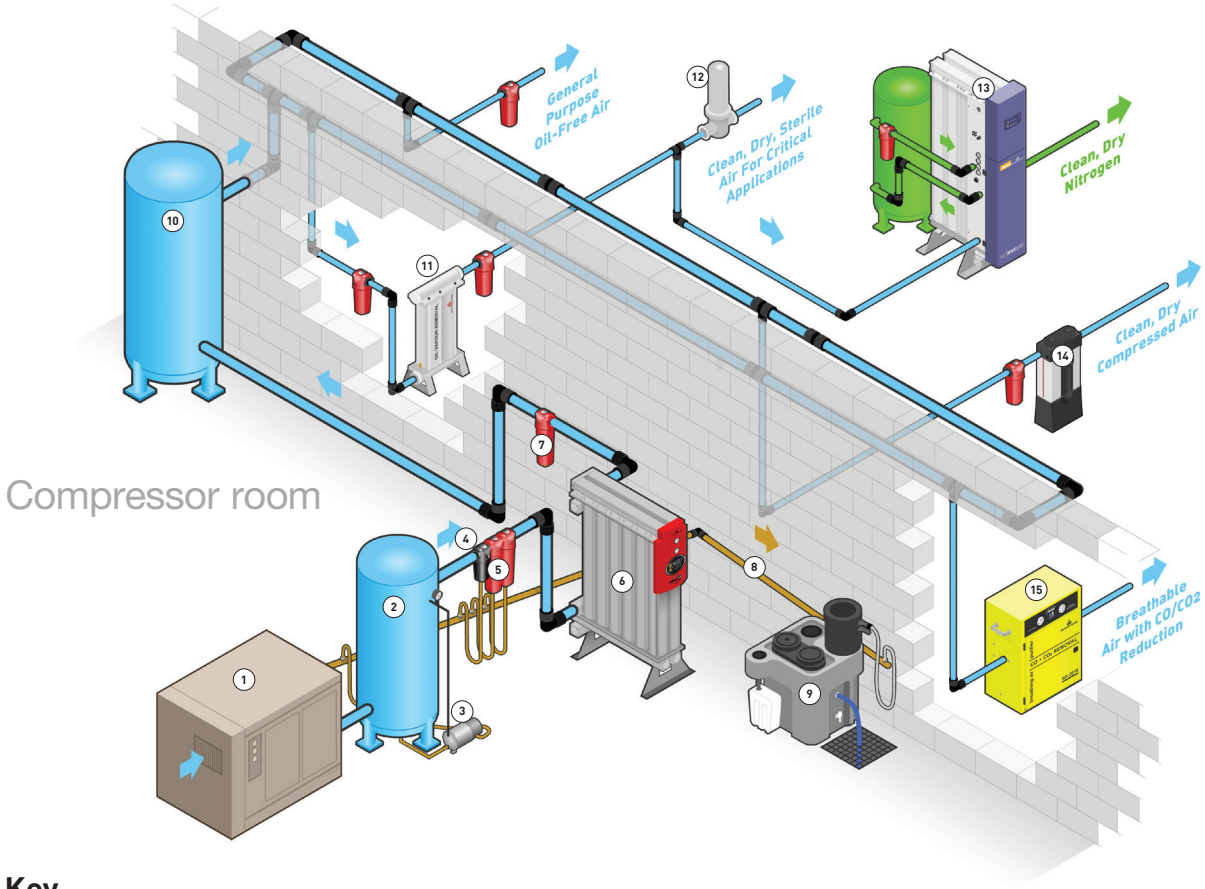
To achieve the degree of air quality specified by ISO8573-1:2010, a careful approach to system design, commissioning and operation must be adopted.

Mattei recommends that compressed air is treated:

- **Prior to entry into the distribution system**
- **At critical usage points and applications**

This ensures that contamination already in the distribution system is removed.

Purification equipment should be installed where the air is at the lowest possible temperature (i.e. downstream of after-coolers and air receivers). Point-of-use purification equipment should be installed as close as possible to the application.



Key

1	Air Compressor	6	Modular Desiccant Dryer	11	Oil Vapor Removal
2	Wet Air Receiver	7	Dust Filter	12	Sterile Air Filter
3	Condensate Drain	8	Condensate Drainage	13	On-site Nitrogen Gas Generator
4	Water Separator	9	Oil / Water Separator	14	Point of use Desiccant Dryer
5	Coalescing Filters	10	Dry Air Receiver	15	Breathing Air Purifier

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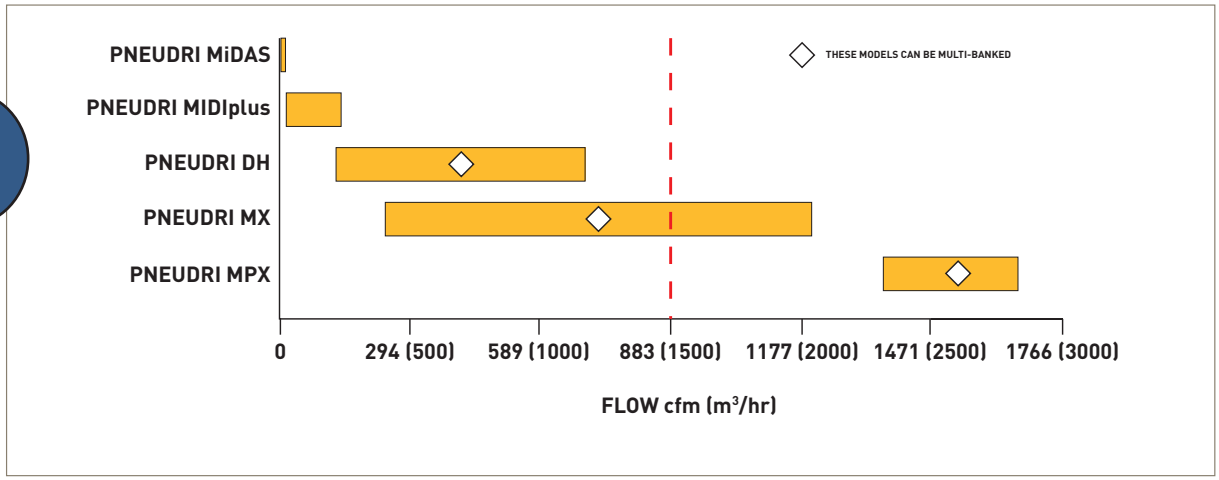
What size Mattei do I require?

Dryer Selection
To correctly select a dryer model, the flow rate of the dryer must be adjusted for the minimum operating pressure and maximum operational temperature of the system. If the dewpoint required is different to the standard dewpoint of the dryer then the flow rate must also be adjusted for the required outlet dewpoint.

Selection Example

Selecting a dryer for a compressor producing at full load 883 cfm (1500 m^3/hr) at 120 psi g (8.3 bar g) with 100°F (38°C) air inlet temperature and a pressure dewpoint of -40°F (-40°C).



Step 1
Select the correction factor for maximum inlet temperature from the CFT table Correction Factor for 100°F (38°C) (round up to 104°F (40°C) = 1.04

Temperature Correction Factor CFT		
Maximum Inlet Temperature	°F	104
	°C	40
	CFT	1.04

Step 2
Select the correction factor for minimum operating pressure from the CFP table Correction Factor for 116 psi g (8 bar g) (round down to 8 bar g) = 0.89

Pressure Correction Factor CFP		
Minimum Inlet Pressure	psi g	116
	bar g	8
	CFP	0.89

Step 3
Select the correction factor for the required dewpoint from the CFD table Correction Factor for -40°F (-40°C PDP) = 1.00

Dewpoint Correction Factor CFD		
Required Dewpoint	PDP °F	-40
	PDP °C	-40
	CFD	1.00

Step 4
Calculate the minimum drying capacity
Minimum drying capacity = Compressed air flow rate x CFT x CFP x CFD
Minimum drying capacity = 883 cfm (1500 m^3/hr) x 1.04 x 0.89 x 1.00 = 817 cfm (1388 m^3/hr)
Model selected = MX106

Step 5
Which controller is required?
SMART controller is required therefore model selected = MXS106

Step 6
Is DDS Energy Management System required?
DDS Energy Management system is required therefore model selected = MXS106DS

If the minimum drying capacity exceeds the maximum values of the models shown within the tables, please contact Mattei for advice regarding larger multi-banked dryers.

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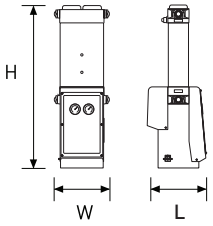
MMD SERIES
MODULAR DESICCANT DRYER

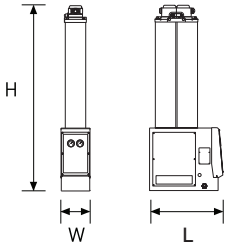
Product Selection - MMD Series (24 - 1,200 scfm)

Heatless - Standard Modular Design						
Model	Nominal Capacity (scfm) -40°F*	Air Conection (NPT)	Length (in.)	Width (in.)	Height (in.)	Weight Per Bank (lbs.)
MMD-024-0.5NPT	24	1/2"	11.9	11.2	32.9	70
MMD-034-0.5NPT	32	1/2"	11.9	11.2	47	115
MMD-042-0.5NPT	42	1/2"	11.9	11.2	56	143
MMD-053-0.5NPT	53	1/2"	11.9	11.2	52.5	103
MMD-065-0.5NPT	65	1/2"	11.9	11.2	59	114
MMD-088-0.75NPT	88	3/4"	11.9	11.2	68.8	132
MMD-106-1NPT	106	1"	22.3	8.7	56.4	176
MMD-130-1NPT	130	1"	22.3	8.7	62.9	198
MMD-176-1NPT	176	1"	22.3	8.7	72.7	229
MMD-240-2NPT	240	2"	27.4	21.65	64.8	518
MMD-360-2NPT	360	2"	34.1	21.65	64.8	696
MMD-450-2NPT	450	2"	34.1	21.65	74.5	782
MMD-600-2NPT	600	2"	40.7	21.65	74.5	992
MMD-750-3NPT	750	3"	47.4	21.65	74.5	1197
MMD-900-3NPT	900	3"	54	21.65	74.5	1404
MMD-1050-3NPT	1050	3"	60.7	21.65	74.5	1611
MMD-1200-3NPT	1200	3"	67.3	21.65	74.5	1818

MMD 024 - 088



MMD 106 - 1200



Nominal Capacity based on: Ambient temperature 100°F, Inlet temperature 100°F, Inlet pressure 100 psi g.

* Consult Factory for -100°F pressure dew points

NOTES

1. Pre & After filters with differential pressure gauge and drain ARE included in the unit price

2. Standard electrical requirement of 115V/1Ph/60Hz. 0.21 kW

3. Standard design pressure: MMD-024 thru MMD-176 of 232 psi g. MMD-240 thru MMD-1200 of 190 psi g

4. If MATTEI MCF Series filters are not used for protection of the dryer, warranty may be invalid

***ATEX compliant option available.**

For hazardous environments, a fully pneumatic ATEX compliant version of Mattei is available.

ATEX Directive 94/9/EC
Group II, Category 2GD, T6.

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Product Selection - MMD Series (24 - 1,200 scfm)

Heatless - Modular Design with Energy Management System (EMS)						
Model	**Nominal Capacity (scfm) -40°F***	**Air Conection (NPT)**	**Length (in.)**	**Width (in.)**	**Height (in.)**	**Weight Per Bank (lbs.)**
MMD-024-0.5NPT-EMS	24	1/2"	11.9	11.2	32.9	70
MMD-034-0.5NPT-EMS	32	1/2"	11.9	11.2	47	115
MMD-042-0.5NPT-EMS	42	1/2"	11.9	11.2	56	143
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MMD-088-0.75NPT-EMS	88	3/4"	11.9	11.2	68.8	132
MMD-106-1NPT-EMS	106	1"	22.3	8.7	56.4	176
MMD-130-1NPT-EMS	130	1"	22.3	8.7	62.9	198
MMD-176-1NPT-EMS	176	1"	22.3	8.7	72.7	229
MMD-240-2NPT-EMS	240	2"	27.4	21.65	64.8	518
MMD-360-2NPT-EMS	360	2"	34.1	21.65	64.8	696
MMD-450-2NPT-EMS	450	2"	34.1	21.65	74.5	782
MMD-600-2NPT-EMS	600	2"	40.7	21.65	74.5	992
MMD-750-3NPT-EMS	750	3"	47.4	21.65	74.5	1197
MMD-900-3NPT-EMS	900	3"	54	21.65	74.5	1404
MMD-1050-3NPT-EMS	1050	3"	60.7	21.65	74.5	1611
MMD-1200-3NPT-EMS	1200	3"	67.3	21.65	74.5	1818

Nominal Capacity based on: Ambient temperature 100°F, Inlet temperature 100°F, Inlet pressure 100 psi g.

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NOTES

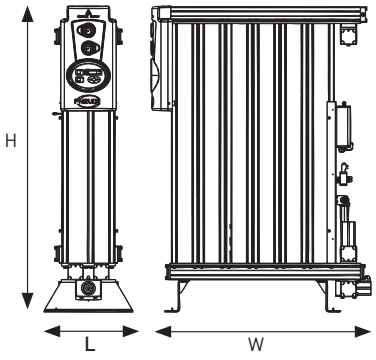
1. Pre & After filters with differential pressure gauge and drain ARE included in the unit price

2. Standard electrical requirement of 115V/1Ph/60Hz. 0.21 kW

3. Standard design pressure: MMD-024 thru MMD-176 of 232 psi g. MMD-240 thru MMD-1200 of 190 psi g

4. If MATTEI MCF Series filters are not used for protection of the dryer, warranty may be invalid

MMD024 - 1200



***ATEX compliant option available.**

For hazardous environments, a fully pneumatic ATEX compliant version of Mattei is available.

ATEX Directive 94/9/EC
Group II, Category 2GD, T6.

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Coalescing Filters
Inline Filtration to 17,065 CFM

Refrigerated Air Dryers
Pressure Dew Points to 35°F

Desiccant Air Dryers
Pressure Dew Points to -100°F

World Class Rotary Air Compressors - Flows to 1254 CFM. Pressures to 190 PSI.

Genuine Mattei Parts
Sustainable Efficiency & Performance

mattei
EXPERIENCE THE REVOLUTION

COMPANY WITH QUALITY MANAGEMENT SYSTEM CERTIFIED BY DNV
= ISO 9001 : 2001 =

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