



FIRST COMPRESSOR
MANUFACTURER IN THE
WORLD ACCREDITED **ISO 50001**
ENERGY MANAGEMENT

COMPRESSED AIR DRYER
HIGH EFFICIENCY AIR DRYER

METALPLAN



METALPLAN IS NUMBER ONE IN ENERGY EFFICIENCY

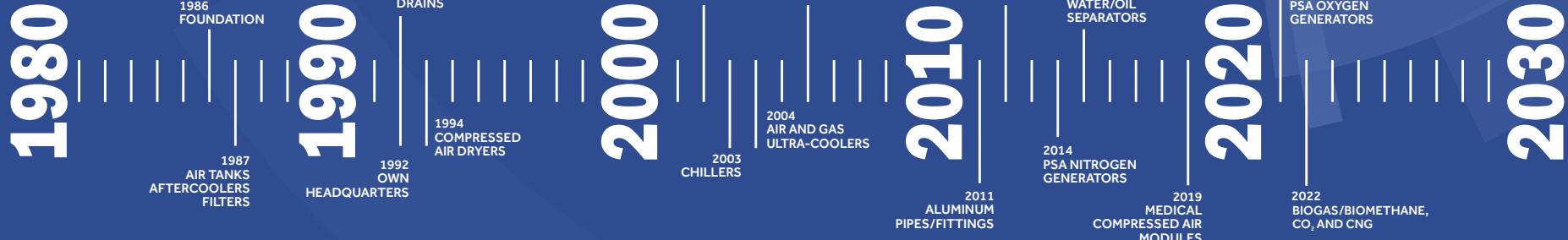
As the absolute leader in screw compressors up to 25 hp in Brazil, Metalplan is the world's first* compressor manufacturer accredited in ISO 50001 - Energy Management, demonstrating its commitment to energy efficiency, the foundation for sustainability and competitiveness of companies.

Founded in 1986, Metalplan has a production area of 6.000 m², developing innovative equipment with a high level of nationalization, exporting to over 20 countries.

Its network of authorized distributors and service centers includes over 300 highly specialized companies with extensive geographic coverage, capable of servicing over 100.000 operating equipment.

In recent years, Metalplan has been expanding its horizons to disruptive technologies in gases and renewable energies, such as on-site generation and compression of nitrogen, oxygen, biogas, biomethane, CO₂ and CNG.

*In the compressed air, gases and industrial refrigeration segment.





*The production of **EMBRAER's** E190-E2 jets relies on three **Energy Plus** dryers and six **Hyperfilter** coalescing filters (4000 m³/h each) in uninterrupted operation for over fifteen years, ensuring the necessary safety for the aerospace industry.*

Among the reasons for this high performance is the fact that Metalplan was the first manufacturer of filters and dryers in Latin America to certify its quality system according to ISO-9001.





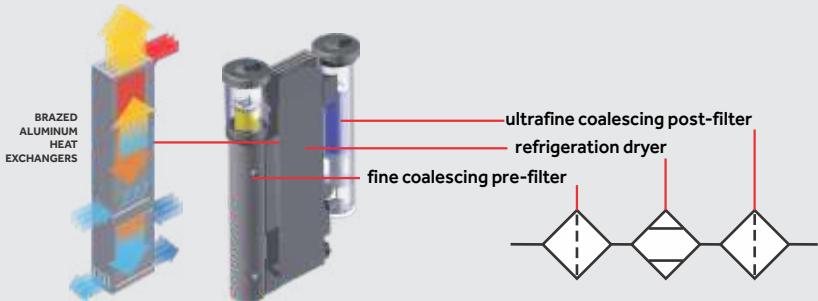
ABSOLUTE LEADERSHIP IN COMPRESSED AIR TREATMENT



Metalplan is the leading manufacturer of dryers in Latin America, a position held since 1998. We have already delivered over thirty thousand of these devices to companies of all sizes in various countries. Our dryers are recognized for their durability, low pressure drop, and excellent performance, due to the standard use of brazed aluminum heat exchangers, integrated filters, and cold coalescing filter, ensuring extremely reliable operation, in full compliance with ISO 8573 standards.



UNIQUE WITH PRE-FILTER & POST-FILTER
IN THE SEQUENCE DETERMINED BY ISO:
BEFORE AND AFTER THE DRYER, AT THE
COLDEST POINT:



COMPRESSED AIR DRYER

ENERGY PLUS

HIGH EFFICIENCY AIR DRYER



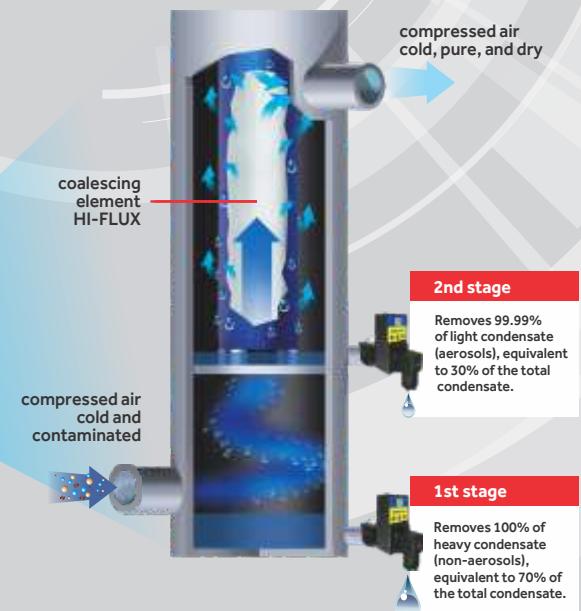
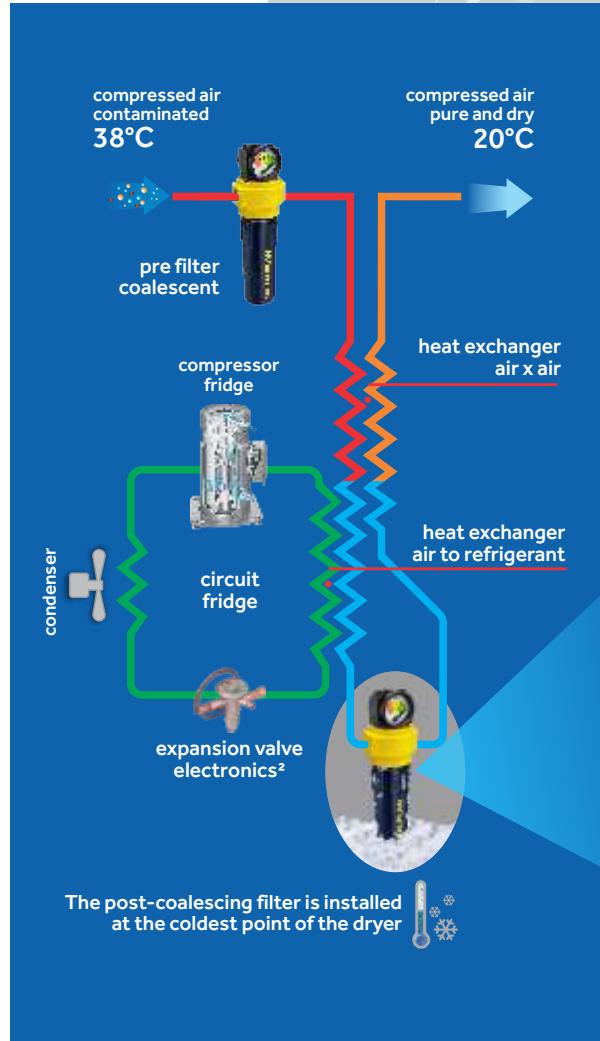
ENERGY PLUS

HIGH EFFICIENCY AIR DRYER

OPERATING PRINCIPLE

In Energy Plus dryers, compressed air is cooled in stages until it reaches 3°C, according to ISO 8573 class [.:4:_.]. This temperature corresponds to the dew point of the compressed air. Upon entering the dryer, the air temperature should not exceed 38°C¹ to prevent the refrigeration circuit from overheating. At this point, the first coalescing filtration stage occurs, eliminating pre-existing condensate harmful to equipment performance. Next, to save energy, the air passes through an air-to-air heat exchanger (recuperator), where it is cooled to 20°C by the cold compressed air exiting the dryer. The next cooling phase is the air passing through the air-to-refrigerant heat exchanger (evaporator), where the temperature reaches 3°C, its coldest point, and the separation/filtration stage by coalescence – cold coalescing – essential for the high efficiency of the system occurs. Additionally, the Energy Plus features sophisticated controls² that prevent excessive cooling of the compressed air, avoid the risk of freezing, and stabilize the dew point. To complete the drying cycle, after leaving the cold coalescing post-filter, the air returns to the air-to-air heat exchanger, where it is reheated to about 20°C by the hot compressed air entering the dryer.

1- ISO 7183-B Standard 2- Optional electronic expansion valve



COLD COALESCING FILTRATION IS UNBEATABLE

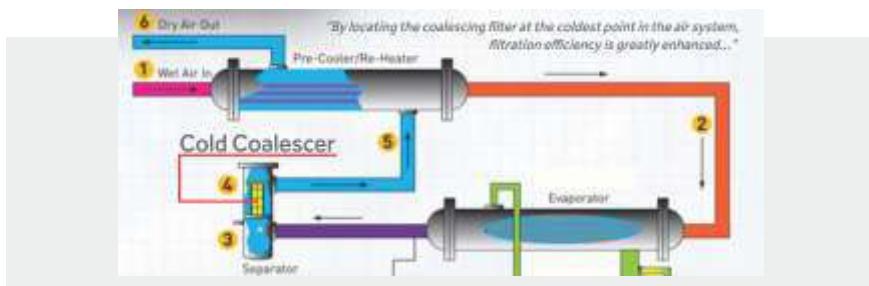
See what three global manufacturers of refrigeration dryers have to say about the condensate separation efficiency with coalescing filters at the coldest point of the dryer.

Alongside Metalplan, they are the only ones in the world adopting this technology. In Brazil, only Metalplan provides this benefit to users.

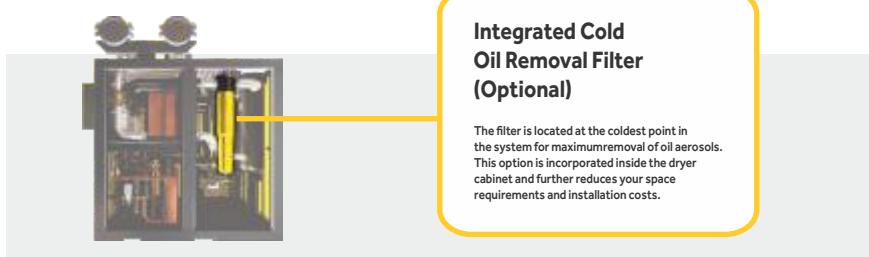
Manufacturer A (USA)



Manufacturer B (UK)



Manufacturer C (Germany)



All Energy Plus dryers are designed for high temperatures, according to ISO 7183, option A2. This means maximum operational reliability even under the most severe operating conditions.

Conventional dryers, designed for temperate climates, lose 20% of their capacity when exposed to tropical and equatorial temperatures

ISO 7183	Option A1	Option A2
Ambient Temperature	25°C	38°C
Compressed Air Temperature (at dryer inlet)	35°C	38°C

The user should note that overlapping some critical parameters, such as flow and temperature, alters the dew point and may compromise dryer operation.

ISO 7183 Correction Factors (A2)

AMBIENT TEMPERATURE						
°C	25	35	38	40	42	43
factor	1	1	1	0,93	0,86	0,79
COMPRESSED AIR TEMPERATURE						
°C	30	35	38	40	45	48
factor	1,1	1,05	1	0,9	0,8	0,68
OPERATING PRESSURE						
bar(e)	5	6	7	8	10	12
factor	0,9	0,95	1	1,03	1,07	1,11



FILTRATION DEGREES	M40 fine coalescing	M20 ultrafine coalescing
Oil Residual (mg/m³)	0,5	0,01
Particle Retention (µm)	1,0	0,01
D.O.P. Efficiency (%)	99,9	99,99



MASTERCONTROL

The MASTERCONTROL oversees and monitors the primary functions of the high-efficiency Energy Plus dryer to ensure maximum reliability with low energy consumption. Additionally, it automatically drains the condensate retained in the pre and post-filters.

PREVENTIVE MAINTENANCE ALERT

- Time countdown and text messages to communicate all preventive maintenance on the dryer.
- Indicates the ideal time to replace the coalescing elements in the pre and post-filters.

GENERAL DIAGNOSTICS & SPECIAL FUNCTIONS

- History of alerts and faults from the last 50 events:
 - High dew point temperature
 - Overcurrent in the refrigeration compressor
 - High pressure in the refrigeration circuit
 - Low pressure in the refrigeration circuit
 - Phase inversion or lack of phases
 - High compressed air inlet temperature
 - High condensation temperature
 - High superheat temperature
- Calibration of temperature and pressure sensors
- Remote Start/Stop (via cable)
- Remote fault signal (via cable)
- Serial communication (Modbus)
- Unit conversion (°C / °F)
- Purge time calibration
- Local date and time adjustment



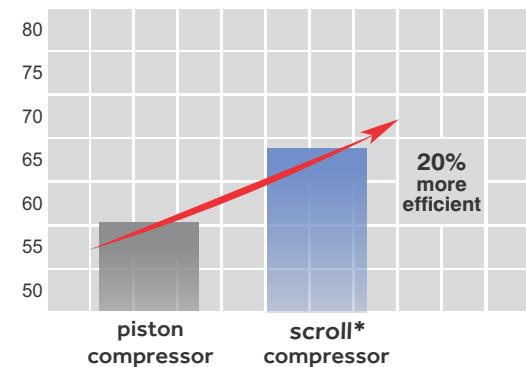
HUMAN/MACHINE INTERFACE TOUCHCONTROL

- Dew Point Temperature
- Compressed air inlet temperature
- Condensation temperature
- Superheat temperature
- Hourmeter
- Maintenance alerts
- Fault alerts
- Audible and visual alarm for faults and maintenance



SCROLL REFRIGERATION COMPRESSOR

- Silent and vibration-free operation.
- Permanent balancing.
- Supports higher liquid return rates.
- Dispenses with suction and discharge valves.
- Volumetric efficiency ~100%.
- Much more compact.
- Compresses under any pressure condition.



SIMPLIFIED MAINTENANCE

The removal of only one side door allows quick and easy access for replacing filter elements and for all types of maintenance, preventive or corrective.



OTHER FEATURES*

- Eco-friendly gases R134a, R404, R407, R410, and R22.
- Pre-selected filters: facilitates installation, prevents specification errors, and eliminates the need for piping and labor.
- Hot gas bypass valve, anti-freezing.
- Powder electrostatic painting.
- **AVAILABLE FOR HIGH PRESSURE: 35 bar**

check availability by model

Integrated pre-coalescing filter M40 grade	Dryer	Integrated post-coalescing filter M20 grade	Flow rate		Connection (inches)	Dimensions (mm)			Weight (kg)	Energy ¹	condensation
			pcm	m ³ /h		length	height	width			
MFCi-300-M40	MDR-300	MFCi-300-M20	300	510	L2	1250	1600	490	210		
MFCi-400-M40	MDR-400	MFCi-400-M20	400	680	L2	1250	1600	490	215		
MFCi-500-M40	MDR-500	MFCi-500-M20	500	850	L2	1250	1600	490	221		
MFCi-600-M40	MDR-600	MFCi-600-M20	600	1020	L2 1/2	1605	1840	560	321		
MFCi-800-M40	MDR-800	MFCi-800-M20	800	1360	L2 1/2	1605	1840	560	551		
MFCi-1000-M40	MDR-1000	MFCi-1000-M20	1000	1700	F4	1704	2050	915	614		
MFCi-1500-M40	MDR-1500	MFCi-1500-M20	1500	2550	F4	1704	2050	915	970		
MFCi-2250-M40	MDR-2250	MFCi-2250-M20	2250	3825	F4	1186	2200	1473	1090		
MFCi-3000-M40	MDR-3000	MFCi-3000-M20	3000	5100	F6	2150	2090	1473	1850		
MFCi-3600-M40	MDR-3600	MFCi-3600-M20	3600	6120	F6	2150	2090	1473	2050		
MFCi-4800-M40	MDR-4800	MFCi-4800-M20	4800	8160	F6	2150	2090	1473	2560		
MFCi-5800-M40	MDR-5800	MFCi-5800-M20	5800	9860	F8	2230	2090	1473	3100		
MFCi-7200-M40	MDR-7200	MFCi-7200-M20	7200	12240	F8	2860	2090	1473	3920		
MFCi-9600-M40	MDR-9600	MFCi-9600-M20	9600	16320	F8	3280	2090	1473	4860		

220/3/60
380/3/60
440/3/60

AIR

AIR OR
WATER

WATER

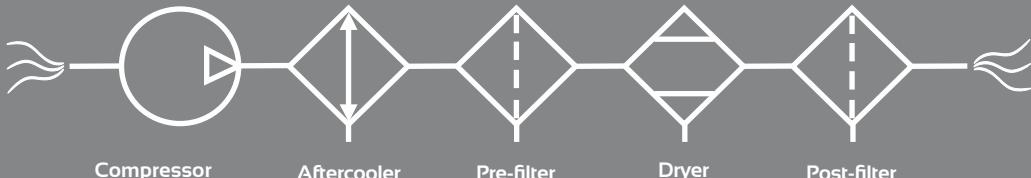
L = NPT sleeve F = ANSI B 16.5 #150 flange

1 - Also available in 50Hz

COMPRESSED AIR FUNDAMENTALS



ISO 8573 STANDARD INSTALLATION



CONTAMINANTS & QUALITY CLASSES

class	SOLID PARTICLES maximum number of particles per m ³ (d = particle size)			class	WATER moisture dew point (°C)	class	OIL - total concentration (liquid/aerosol/vapor) (mg/m ³)	
0	CLASS ZERO - as specified by the user or equipment supplier and stricter than Class 1							
1	≤ 20.000	≤ 400	≤ 10	1	-70	1	≤ 0,01	
2	≤ 400.000	≤ 6.000	≤ 100	2	-40	2	≤ 0,1	
3	-	≤ 90.000	≤ 1.000	3	-20	3	≤ 1	
4	-	-	≤ 10.000	4	+3	4	≤ 5	
5	-	-	≤ 100.000	5	+7	5	-	
Mass concentration - C _p (mg/m ³)			6	+10	6	-		
6	0 < C _p ≤ 5		Liquid Water C _w g/m ³)					
7	5 < C _p ≤ 10		7	C _w ≤ 0,5	7	-		
8	-		8	0,5 < C _w ≤ 5	8	-		
9	-		9	5 < C _w ≤ 10	9	-		
X	C _p > 10		X	C _w > 10	X	> 5		

ISO 8573 COMPRESSED AIR FOR GENERAL USE

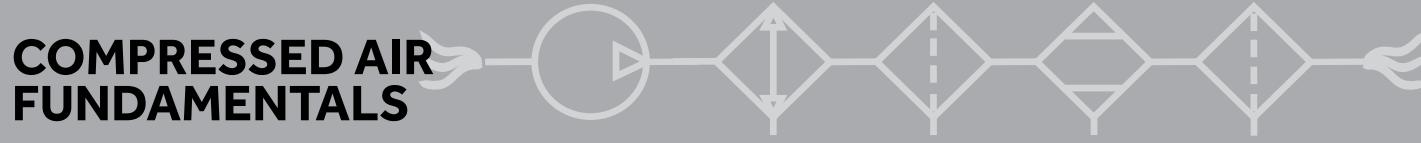
ISO 8573 is the international reference for compressed air systems, focusing on contamination levels.

The standard has various quality classes that serve multiple applications in industry and services, excluding human breathing and medicinal use.

Published in 1991, it was translated by Metalplan in 1992, positioning Brazil at the forefront of its utilization.

Its 3rd edition is from 2010, when Class Zero was introduced, with purity levels stricter than those found in Class One.

COMPRESSED AIR FUNDAMENTALS



ISO 8573 TYPICAL SYSTEMS	quality class	APPLICATIONS
	[1:6:1]²	Dry air, with dew point between 5°C and 15°C. Ideal for low flows and protection of valves, cylinders, pneumatic tools, automation, blasting, painting, etc.
	[1:6:1]² [1:6:0]²	Activated carbon filter eliminates odors, with residual oil of 0.003 mg/m³, suitable for dental clinics and similar applications, except for human breathing.
	[1:4:1]	This is the most used treatment system in the industry. Its level of protection meets various sectors such as automotive, plastic, textile, paper, mechanical, metallurgical, etc.
	[1:4:0]	Quality similar to the previous system, with odor elimination and lower residual oil (0.003 mg/m³), important in N2 and O2 generation and in the food, chemical, pharmaceutical industries, etc.
	[1:4:0]	Quality similar to the two previous systems, in terms of "water" and "solid particles". Meets Class Zero for the "oil" contaminant with total safety.
	[1:2:1] [1:1:1]	Prevents vapor absorption when air comes into direct contact with hygroscopic materials (cement, resins, powdered or freeze-dried foods and pharmaceuticals). Prevents freezing when air is subjected to negative temperatures. Applied in the generation of gases of very high purity.
	[1:2:1] [1:1:1]	Low dew point and maximum particle retention are essential in the manufacture of optical fibers, chips, critical instrumentation, steelmaking, nuclear reactors, etc.
	[1:2:0] [1:1:0]	Quality similar to the two previous systems, in terms of "water" and "solid particles". Meets Class Zero for the "oil" contaminant with total safety.

1 Energy Plus and Titan Plus dryers have integrated pre and post-filters

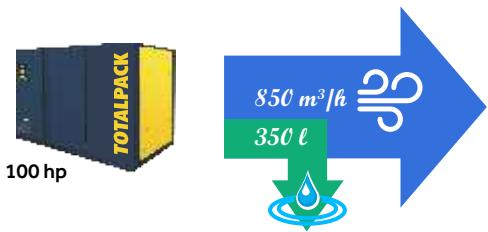
2 only if the compressed air inlet temperature is < 25°C

Install an AQUA + condensate treatment system.

COMPRESSED AIR FUNDAMENTALS



WATER CONTENT IN COMPRESSED AIR



Above the dew point, compressed air contains only water vapor. Below the dew point, the air contains both water vapor and liquid water (condensate).

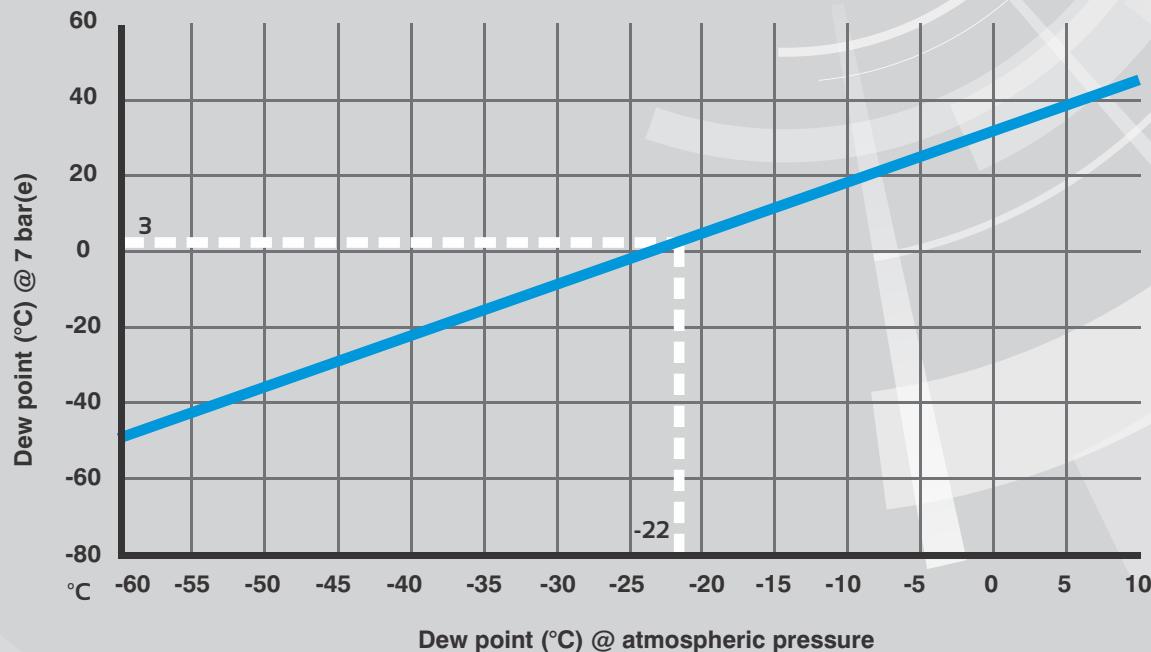
In an environment at 25°C and 75% relative humidity, a 100 hp compressor ($850 \text{ m}^3/\text{h}$) introduces 350 liters of water per day into the system, in both liquid and vapor forms. After treatment with a refrigeration dryer (dew point = $+3^{\circ}\text{C}$), approximately 15 liters per day of water vapor will remain in the compressed air (4.4%). If the treatment is done using an adsorption dryer (dew point = -40°C), the residual water vapor in the compressed air will be around 0.3 liters per day (0.08%).

DEW POINT EXPLAINED



Though expressed in $^{\circ}\text{C}$, the dew point measures the moisture level of compressed air, indicating the temperature at which the water vapor in the air will begin to condense.

In other words, above this temperature, the air is dry, with no liquid water present, and below this temperature, the water vapor starts to condense. The lower the dew point, the drier the compressed air.



COMPRESSED AIR FUNDAMENTALS



THE FORMS OF WATER IN COMPRESSED AIR

Ambient air, by definition, is a gas mixture made up of nitrogen (~79%), oxygen (~21%), and small amounts of other gases. Alongside these gases, there are other substances, such as water vapor, which we refer to as 'relative humidity.'

As air is compressed, the water vapor in the air tends to condense.

WATER VAPOR



As the temperature of the compressed air decreases, the water vapor starts to condense, turning into two types of condensate: light and heavy.

The lower the air temperature, the greater the amount of condensate formed.

HEAVY (DROPLETS)



70% of the condensate is of the "heavy" type, with a fall velocity $> 0.25 \text{ m/s}$, according to ISO 8573 standards.

Due to its larger mass, this type of condensate is easily captured by inertial separators.

LIGHT (AEROSOLS)



30% of the condensate is of the "light" type (aerosols), with a fall velocity $< 0.25 \text{ m/s}$ and diameters ranging from 0.01 to 0.8 microns.

Due to its very small mass, aerosol behavior is similar to that of a gas, and it does not respond to the action of inertial separators.

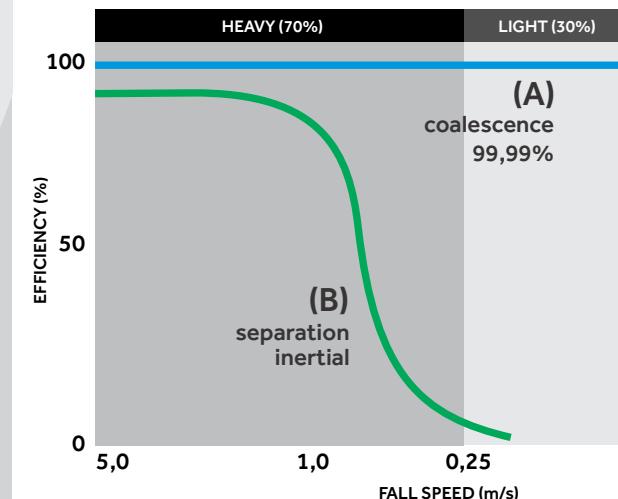
Only diffusion, promoted by the borosilicate nanofibers in coalescing filters, can capture these tiny droplets.

COALESCENCE VS. INERTIAL SEPARATION

Condensate separators are always installed at the coldest point of the refrigeration dryer, between the air-to-refrigerant heat exchanger (evaporator) and the air-to-air heat exchanger (heat recovery), where the majority of condensate is formed. For the same reason, the post-filter should also be installed at the coldest point of the dryer. However, since this is a coalescing filter and not an inertial separator, the efficiency in removing condensate increases from 70% to 99.99%.

IMPORTANT: Installing the post-filter at the outlet of the air-to-air heat exchanger is ineffective because the compressed air has already been reheated, and no condensate is present at this point - only water vapor - thus compromising the dew point.

CONDENSATE VOLUME



MARKS OF OUR HISTORY





AFTER-SALE SERVICES



**96% OF CUSTOMERS
FULLY SATISFIED**

In an Annual ISO 9001 Audited Survey, we achieved a 96% customer satisfaction rate for Technical Assistance. This percentage corresponds to the evaluations above 7 (seven), on a scale of 0 (zero) to 10 (ten).

This success is due to over 70 authorized workshops and 200 accredited technicians throughout American continent, supported by an exclusive partnership with National Service for Industrial Training for mechanic training, making our After-Sales Service the most acclaimed in the market.

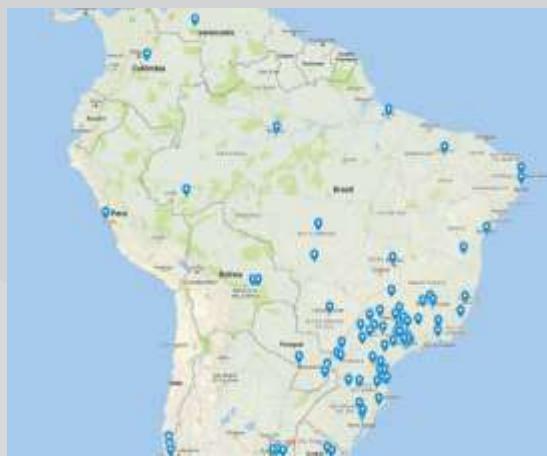


Typical facade

**COMPREHENSIVE INVENTORY
OF ORIGINAL PARTS**



**MAXIMUM EFFICIENCY
IN AFTER-SALES SERVICE**



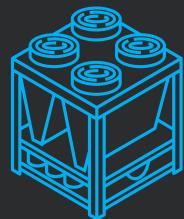
70 CERTIFIED WORKSHOPS **200 SPECIALIZED TECHNICIANS**

OUR SOLUTIONS



COMPRESSED AIR

- COMPRESSORS
- DRYERS AND FILTERS
- RESERVATÓRIOS
- PIPES & FITTINGS
- 100% ALUMINUM
- NITROGEN GENERATORS AND OXYGEN



INDUSTRIAL REFRIGERATION

- WATER CHILLERS
- ULTRA AIR AND GAS COOLERS (-35°C)
- THERMOCHILLERS
 - DRY COOLERS
 - PUMPING



BIOGAS & CNG

- COMPRESSORS FOR BIOGAS, BIOMETHANE AND CNG
- BOOSTERS
- CHILLERS
- DISPENSERS

e-line

ROTARY SCREW COMPRESSORS



4 to 25 hp

REFRIGERATION DRYERS



20 to 250 pcm

ABSORPTION DRYERS



6 to 32 pcm

COALESCING FILTERS



25 to 300 pcm

AUTOMATIC DRAIN VALVES



electronic & magnetic

METALPLAN

www.metalplan.com.br
metalplan@metalplan.com.br
55 11 4448-6900 |

FIRST COMPRESSOR
MANUFACTURER IN THE
WORLD ACCREDITED

ISO 50001
ENERGY MANAGEMENT