

Quality System Registration



IRISH
ENGINEERING
SERVICES

This is to certify that:

Friulair srl.
Via Cisis #36
Frazione Strassoldo
33050 Cervignano del Friuli (UD)
Italy

Friulair srl.
In. Est. 49/5 Moo 5
Tungsukhla
Sriracha Chonburi 20230
Thailand

Friulair srl.
Viale Europa SN
33041 Aiello del Friuli (UD)
Italy

Has been granted Registration Certificate No: **ICAT000530940/PED/v2.0**

In respect of a Quality Management System which has been assessed and found to comply with the requirements of module **D1, E1 & H** of Annex III of the Pressure Equipment Directive 2014/68/EU for the following:

SCOPE:

Design, Manufacture and Assembly of Pressure Vessels, Air Dryers, Water Chillers, Heat Exchangers and other Pressure equipment for the Chemical, Petro-Chemical, Pharmaceutical, Food, Textile and other other industries.

For Irish Engineering Services:

Certification Services Scheme Leader (ROI)



First registered: **20/12/2020**

Valid from: **19/04/2021**

Expiry: **18/04/2024**

- When module D or E is used in conjunction with module B see the latest issue of the Type Examination Schedule issued to the certificate holder.
- For pressure equipment in categories II, III and IV – permanent joining procedures and personnel shall be approved by an EU – 27 Notified Body/RTPO.
- For pressure equipment in categories III and IV – non-destructive testing personnel qualifications shall be approved by an EU – 27 Notified Body/RTPO.

Issued by:

Irish Engineering Services

RSA House, Dundrum Town Centre, Sandyford Road, Dublin 16, D16 FC92, Ireland



This certificate remains the property of Irish Engineering Services and is bound by the terms of the Certification Agreement.

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Friulair srl.
Viale Europa SN
33041 Aiello del Friuli (UD)
Italy

Has been granted Registration Certificate No: **BES/21/CAT000513373/PESR/1**

In respect of a Quality Management System which has been assessed and found to comply with the requirements of modules D, D1, E1 & H of Part 3 of the Pressure Equipment (Safety) Regulations 2016 (Inc. Brexit amendments 2021) for the following:

SCOPE:

Design, Manufacture and Assembly of Pressure Vessels, Air Dryers, Water Chillers, Heat Exchangers and other Pressure equipment for the Chemical, Petro-Chemical, Pharmaceutical, Food, Textile and other industries.

For British Engineering Services:

Certification Services Scheme Leader

First registered: **28th May 2002**

Valid from: **29th July 2021**

Expiry: **15th May 2024**

When module D or E is used in conjunction with module B see the latest issue of the Type Examination Schedule issued to the certificate holder

Issued by:
British Engineering Services
Unit 718 Eddington Way
Birchwood Park
Warrington
WA3 6BA

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and is bound by the terms of the Certification Agreement***

Quality System Registration



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Italy,

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Tungsukhla
Sriracha Chonburi 20230
Thailand

Friulair srl.
Viale Europa SN
33041 Aiello del Friuli (UD)
Italy

Has been granted Registration Certificate No: **BES/21/CAT000513373/9001/2**

In respect of a Quality Management System which has been assessed and found to comply with the requirements of ISO 9001:2015 for the following:

SCOPE:

Design, Manufacture and Assembly of Pressure Vessels, Air Dryers, Water Chillers, Heat Exchangers and other Pressure equipment for the Chemical, Petro-Chemical, Pharmaceutical, Food, Textile and other other industries.

For British Engineering Services:

First registered: **28 May 2002**

Valid from: **07 May 2021**

Expiry: **15 May 2024**

Issued by:
British Engineering Services
Unit 718 Eddington Way
Birchwood Park
Warrington
WA3 6BA



BRITISH
ENGINEERING
SERVICES



*This certificate remains the property of British Engineering Services
and is bound by the terms of the Certification Agreement*

Certificate No. IT285800

**Cepas S.r.l. certify that
FRIULAIR S.R.L**

Registered Site: Via Cisis, 36 – 33052 CERVIGNANO DEL FRIULI (UD)

*has been audited and found to be in conformity
with the requirements of the management system standards detailed below :*

“Installation, maintenance and repair of stationary refrigeration, air conditioning and heat pump equipment containing certain fluorinated greenhouse gases”.

Standard:

D.P.R. 27 January 2012 n. 43

Reg. (CE) 303/2008 and ACCREDIA Document RT-29

**Certification cycle start date
16/10/2013**

**Expiration date
15/10/2023**

Technical Manager CEPAS srl

Rosa Anna Favorito
Rosa Anna Favorito

The validity of this certificate is subject to compliance with the annual maintenance audits

This certificate has been issued in electronic form and it is valid only if present in the Telematic Register www.fgas.it

Further clarifications regarding the scope of this certificate may be obtained by contacting Cepas Srl.

Certification body address: Cepas Srl, Via Mario Bianchini, 13/15, 00142 Roma, Italia E-mail: comunicazioni@cepas.bureauveritas.com Web: www.cepas.it



CEPAS

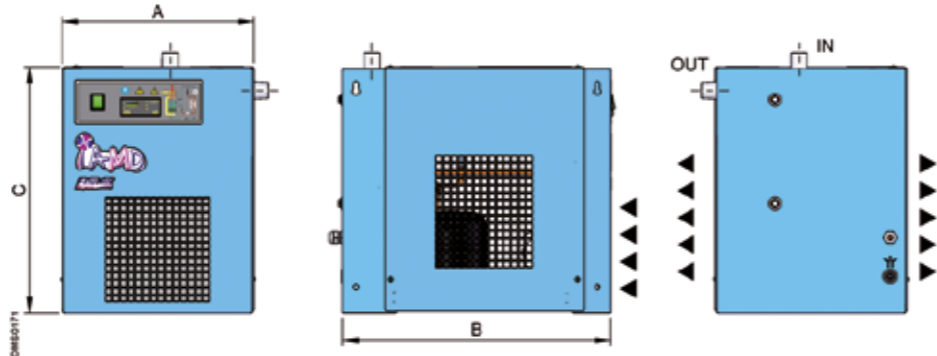


PRD N° 152B
Signatory of EA, IAF and ILAC
Mutual Recognition Agreements

CARATTERISTICHE TECNICHE
TECHNICAL FEATURES

I dati riportati sono riferiti alle seguenti condizioni nominali: Temperatura ambiente 25°C, con aria in ingresso a 7barg e 35°C, e un punto di rugiada in pressione di 5°C (punto di rugiada a pressione atmosferica -20.5°C).
Max. condizioni di esercizio: Temp. ambiente 45°C, temp. ingresso aria 55°C e pressione ingresso aria 14barg (16barg per AMD 3...18).

Data refer to the following nominal condition: Ambient temperature of 25°C, with inlet air at 7barg and 35°C and 5°C pressure Dew Point (-20.5°C atmospheric pressure Dew Point).
Max. working condition: Ambient temperature 45°C, inlet air temperature 55°C and inlet air pressure 14barg (16barg for AMD 3...18).



Edizione Gennaio 2014

iAMD
Dryer Series

Modello Model	Abbinamento compressore Compressor combination	Portata Flow-Rate			Caduta di pressione Pressure drop	Attacchi Connections	Alimentazione Power supply	Dimensioni [mm] Dimensions [mm]			Peso Weight
		[l/min]	[m³/h]	[scfm]				A	B	C	
AMD 3	3kW - 4HP	350	21	12	0.15	G 3/8" BSP-F	1/230/50-60	310	345	435	21
AMD 6	4kW - 5.5HP	600	36	21	0.04	G 1/2" BSP-F	1/230/50-60	370	515	475	25
AMD 9	5.5kW - 7.5HP	950	57	34	0.09	G 1/2" BSP-F	1/230/50-60	370	515	475	26
AMD 12	7.5kW - 10HP	1.200	72	42	0.14	G 1/2" BSP-F	1/230/50-60	370	515	475	28
AMD 18	11kW - 15HP	1.800	108	64	0.32	G 1/2" BSP-F	1/230/50-60	370	515	475	32
AMD 25	15kW - 20HP	2.500	150	88	0.24	G 1" BSP-F	1/230/50-60	345	420	740	34
AMD 32	18.5kW - 25HP	3.200	192	113	0.16	G 1.1/4" BSP-F	1/230/50	345	445	740	39
AMD 43	22kW - 30 HP	4.300	258	152	0.24	G 1.1/4" BSP-F	1/230/50	345	445	740	40
AMD 52	22+kW - 30+HP	5.200	312	184	0.34	G 1.1/4" BSP-F	1/230/50	485	455	825	49
AMD 61	30kW - 40 HP	6.100	366	216	0.19	G 1.1/2" BSP-F	1/230/50	555	580	885	54
AMD 75	37kW -50 HP	7.500	450	265	0.25	G 1.1/2" BSP-F	1/230/50	555	580	885	56
AMD 105	55kW - 75 HP	10.500	630	371	0.14	G 2" BSP-F	1/230/50	555	625	975	94
AMD 130	55+kW - 75+HP	13.000	780	459	0.20	G 2" BSP-F	1/230/50	555	625	975	96
AMD 168	90kW - 120 HP	16.800	1.008	594	0.15	G 2.1/2" BSP-F	1/230/50	665	725	1.105	144
AMD 190	90+kW - 120+HP	19.000	1.140	671	0.21	G 2.1/2" BSP-F	3/400/50	645	920	1.100	189
AMD 220	110kW - 150HP	22.000	1.320	777	0.28	G 2.1/2" BSP-F	3/400/50	645	920	1.100	212

Su richiesta modelli AMD 32...220 con alimentazione a 60Hz - On request models AMD 32...220 with 60Hz power supply

FATTORE DI CORREZIONE AL VARIARE DELLA PRESSIONE DI ESERCIZIO: / CORRECTION FACTOR FOR OPERATING PRESSURE CHANGES:									
Pressione aria entrata/Inlet air pressure	barg	4	5	6	7	8	10	12	14
Fattore/Factor		0.77	0.86	0.93	1.00	1.05	1.14	1.21	1.27

FATTORE DI CORREZIONE AL VARIARE DELLA TEMPERATURA AMBIENTE: / CORRECTION FACTOR FOR AMBIENT TEMPERATURE CHANGES:						
Temperatura ambiente/Ambient temperature	°C	≤ 25	30	35	40	45
Fattore/Factor		1.00	0.95	0.88	0.79	0.68

FATTORE DI CORREZIONE AL VARIARE DELLA TEMPERATURA ARIA IN ENTRATA: / CORRECTION FACTOR FOR INLET AIR TEMPERATURE CHANGES:						
Temperatura aria/Air temperature	°C	≤ 30	35	40	45	50
Fattore/Factor		1.11	1.00	0.81	0.67	0.55

FATTORE DI CORREZIONE AL VARIARE DEL PUNTO DI RUGIADA (DEW POINT): / CORRECTION FACTOR FOR DEW POINT CHANGES:					
Punto di rugiada/Dew Point	°C	3	5	7	10
Fattore/Factor		0.91	1.00	1.10	1.26

"La Friulair S.r.l. si riserva il diritto di apportare modifiche tecniche senza alcun preavviso, errori ed omissioni non esclusi"
"Friulair S.r.l. reserves the right to make technical changes without prior notice, errors and omissions excepted"



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ESSICCATORI A REFRIGERAZIONE SERIE "QUADRIFOGLIO" REFRIGERATED AIR DRYERS - "FOUR-LEAF CLOVER" SERIES

Gli essiccatori **AMD (Aluminium Modular Dryer)** sono simbolicamente rappresentati da un **quadrifoglio**, portafortuna per eccellenza, ma anche simbolo di ricchezza e di svolta decisiva. Infatti la progettazione non è stata tradizionale, ma pensata e gestita in maniera moderna, rispondente ad un insieme di esigenze ormai inalienabili.

I **"quattro petali del quadrifoglio"** che costituiscono gli essiccatori AMD sono una combinazione di soluzioni tecniche che hanno portato a risultati innovativi suffragati da test di laboratorio tali da consentire uno sviluppo avveniristico.

La serie AMD è stata progettata e costruita per agevolare eventuali operazioni di ispezione e manutenzione. Le cofanature, di facile rimozione, offrono l'immediato accesso ai componenti del sistema. Le operazioni di pulizia dell'elettrovalvola di scarico condensano non richiedono l'impiego di alcun attrezzo o strumento grazie all'innesto rapido "a baionetta" ed all'innovativo serraggio della bobina.

AMD dryers (Aluminium Modular Dryer) are represent by a four-leaf clover which symbolises good luck, wealth and of reaching a point of evolution. The planning and design of this dryer range were not carried out in the conventional way but all inalienable requirements were listed and then satisfied. The "four clover leaves" that form the AMD dryers are a combination of applying technical solutions to original designs supported by extensive laboratory testing and achieving the goal of innovative development.

The AMD series has been designed and built to expedite inspection and maintenance operations. The easily removed panels offer immediate access to the operating components of the unit. The cleaning of the solenoid drain valve does not require the usage of service tools thanks to the quick "bayonet" valve stem and the innovative coil clamp.



1 - PRESTAZIONI

L'essiccatore AMD assicura prestazioni eccellenti anche in condizioni ambientali sfavorevoli, abbinate ad elevate temperature dell'aria in ingresso. Lo scambiatore modulare ultracompatto in alluminio, grazie all'elevata efficienza, è in grado di funzionare correttamente con temperatura ambiente fino a 45°C e con temperatura in ingresso di 55°C, con perdite di carico ridottissime dell'aria compressa in transito.

1 - PERFORMANCE

AMD dryers achieve excellent performance even in instances of high ambient and high inlet temperatures. The highly efficient and ultra compact heat exchanger is able to operate effectively in ambient temperatures up to 45°C and inlet temperatures of 55°C, ensuring a reduced compressed air pressure drop.



2 - ECONOMICITA'

Gli essiccatori AMD sono stati progettati per combinarsi alle portate standard dei compressori d'aria. Per esempio : un compressore da 15 kW (20 HP), con una resa teorica di 2400 l/min a 7 bar, va abbinato ad un essiccatore AMD 25 con portata nominale di 2500 l/min. Non è necessario consigliare taglie superiori: l'abbinamento essiccatore - compressore è testato e garantito da FRIULAIR, entro i limiti operativi indicati nelle caratteristiche tecniche.

2 - ECONOMICITA'

AMD dryers are sized to match standard compressor outputs. E.g. a 15 kW (20 HP) air compressor with theoretical output of 2400 l/min at 7 bar matches the AMD 25 rated at 2500 l/min. It is therefore unnecessary to select a larger model: air compressor - dryer combination is tested and certified by FRIULAIR, within operating limits shown on technical features.



3- FUNZIONALITA'

Il corretto funzionamento dell'essiccatore AMD viene monitorato attraverso lo strumento elettronico di controllo DMC15, che in un display digitale visualizza la temperatura del Punto di Rugiada (DewPoint), con un timer ciclico comanda l'elettrovalvola di scarico condensato, con una sonda rileva la temperatura di condensazione ed attiva un ventilatore di raffreddamento del condensatore. Dal modello AMD 43 il ventilatore viene azionato da un pressostato. Una valvola di by-pass gas caldo permette di adattare le potenzialità del compressore frigorifero al carico sull'evaporatore evitando così la formazione di ghiaccio in qualsiasi condizione operativa.

Il Modulo di essiccazione ALU-DRY in alluminio ha l'esclusività di dirigere completamente il flusso dell'aria umida lungo un percorso verticale discendente, quindi con scarico della condensa naturalmente facilitato.

La circolazione del refrigerante nel sistema è affidata a compressori frigoriferi a pistoni e rotativi ad alta efficienza che, grazie alle caratteristiche costruttive, permettono una forte riduzione dei consumi ed offrono un'elevata affidabilità.



3- FUNCTIONALITY

Operation of the AMD dryer is monitored by DMC15 electronic controller which indicates the DewPoint temperature digitally, controls the condensate drain valve via a timer and the condenser fan via a probe. From model AMD 43 the fan is activated by a pressure switch. A hot gas by-pass valve allows the dryer to operate at part load and prevent the evaporator from freezing. The ALU-DRY aluminium Module has a vertical flow layout ensuring the wet compressed air flows down to the automatic drain.

The circulation of the refrigerant in the system is by high efficiency piston and rotary refrigerant compressors which, thanks to their innovative construction, have reduced energy consumption and high reliability levels.

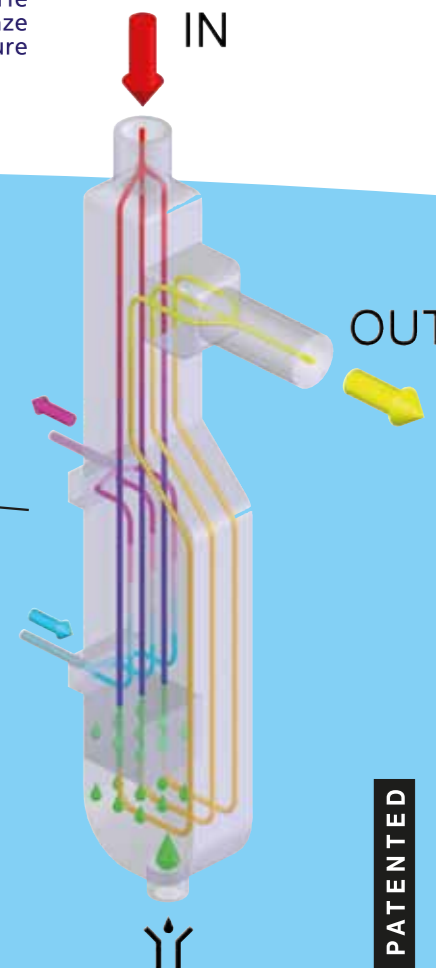


4- ECOLOGICO

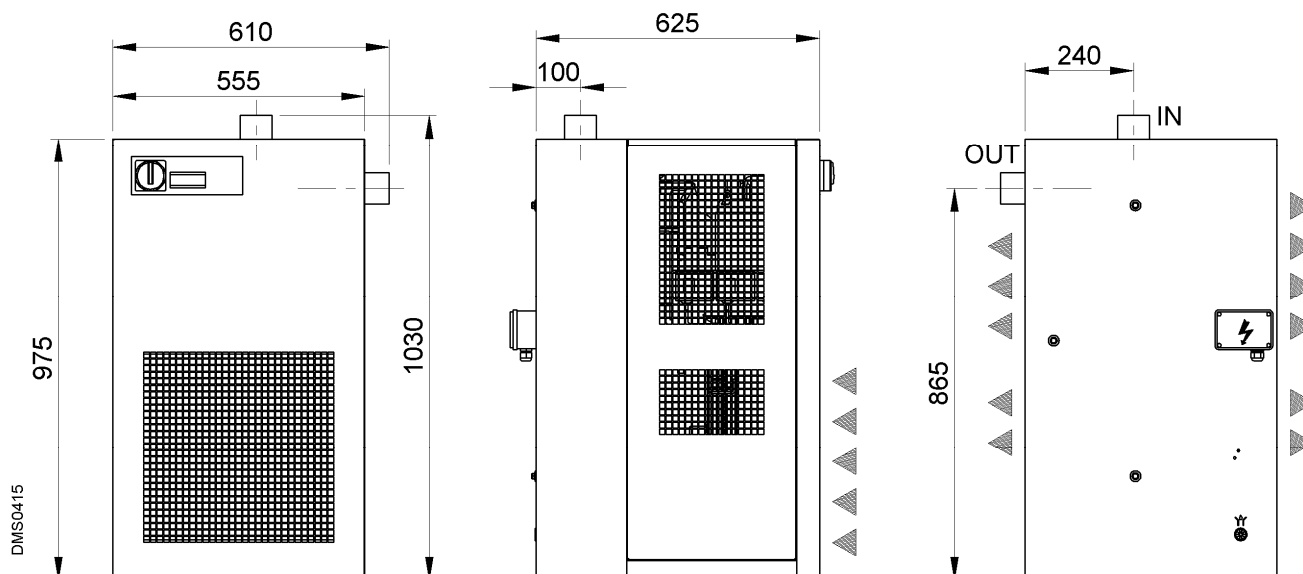
I materiali che compongono l'essiccatore AMD sono ad alto grado di riciclabilità. FRIULAIR da diversi anni persegue una politica ambientale finalizzata ad una continua ricerca di materiali eco-compatibili, all'utilizzo di refrigeranti ecologici e all'adeguamento della componentistica alle Direttive Comunitarie 2002/95/CE "RoHS" (Restrizione nell'impiego di sostanze pericolose) e 2002/96/CE "RAEE" (Rifiuti da Apparecchiature Elettriche ed Elettroniche).

4- ECOLOGY

All materials used in the construction of AMD dryers have a high recycling factor and in compliance with the FRIULAIR environmental policy, only environmentally friendly refrigerants are used. Components conform with 2002/95/CE "RoHS" (Restriction of Hazardous Substances) and 2002/96/CE "WEEE" (Waste Electrical and Electronic Equipment) European Directives.



PATENTED



Air flow at nominal condition ¹	13000 l/min - 780 m ³ /h - 459 Scfm
Pressure DewPoint at nominal condition ¹	5 °C
Nominal ambient temperature	25 °C
Max. ambient temperature	45 °C
Min. ambient temperature	1 °C
Nominal inlet air temperature	35 °C
Max. inlet air temperature	55 °C
Nominal inlet air pressure	7 barg
Max. inlet air pressure	14 barg
Air pressure drop at nominal conditions - Δp	0.20 bar
Inlet-outlet air connection	G 2" BSP – F
Refrigerant type and quantity	R407C – 1.20 kg
Cooling air flow	1900 m ³ /h
Heat rejection	6610 W
Power supply	1/230V/50Hz
Nominal electric consumption	1400 W – 6.7 A
Full Load Amperage FLA	11.2 A
Max. noise level at 1m	< 70 dbA
Weight net - gross	96 – 109 kg

¹ The nominal condition refers to an ambient temperature of +25°C with inlet air at 7barg and 35°C.

Correction factor for operating pressure changes :									
Inlet air pressure	barg	4	5	6	7	8	10	12	14
Correction factor		0.77	0.86	0.93	1.00	1.05	1.14	1.21	1.27
Correction factor for ambient temperature changes :									
Ambient temperature	°C	≤ 25	30	35	40	45			
Correction factor		1.00	0.95	0.88	0.79	0.68			
Correction factor for inlet air temperature changes :									
Air temperature	°C	≤ 30	35	40	45	50	55		
Correction factor		1.11	1.00	0.81	0.67	0.55	0.45		
Correction factor for DewPoint changes :									
DewPoint	°C	3	5	7	10				
Correction factor		0.91	1.00	1.10	1.26				

Subject to technical modification without notice. Errors not excluded.

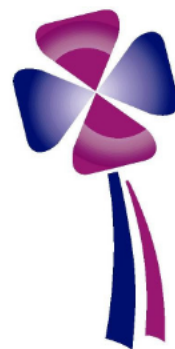
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AMD 3-168



REFRIGERATING AIR DRYER



EN

USER'S MAINTENANCE AND SPARE PARTS MANUAL

Dear Customer,

thank you for choosing our product. In order to get the best performances out of this product, please read this manual carefully.

To avoid incorrect operation of the equipment and possible physical risk to the operator, please read and strictly follow the instructions contained in this manual.

Note, these instructions are in addition to the safety rules that apply in the country where the dryer is installed. Before packing for shipment each **AMD** series refrigerated air dryer undergoes a rigorous test to ensure the absence of any manufacturing faults and to demonstrate that the device can perform all the functions for which it has been designed.

Once the dryer has been properly installed according to the instructions in this manual, it will be ready for use without any further adjustment. The operation is fully automatic, and the maintenance is limited to few controls and some cleaning operations, as detailed in the following chapters.

This manual must be maintained available in any moment for future references and it has to be intended as inherent part of the relevant dryer.

Due to the continuous technical evolution, we reserve the right to introduce any necessary change without giving previous notice.

Should you experience any trouble, or for further information, please do not hesitate to contact us.


DATA NAMEPLATE

The data nameplate is located on the back of the dryer and shows all the primary data of the machine. Upon installation, fill in the table on the previous page with all the data shown on the data nameplate. This data should always be referred to when calling the manufacturer or distributor.

The removal or alteration of the data nameplate will void the warranty rights.

Model ⇨
 Serial No. ⇨
 Code ⇨
 Nominal Flow Rate ⇨
 Max Air Pressure ⇨
 Max Inlet Air Temp. ⇨
 Ambient Temp. ⇨
 Refrigerant (Type and qty) ⇨
 Refrig. Design Pres. HP/LP ⇨
 Electric Supply ⇨
 Electric Nominal Power ⇨
 Fuse Max. ⇨
 Manufactured ⇨

Model	<input type="text"/>
Serial No.	<input type="text"/>
Code	<input type="text"/>
Nominal Flow Rate	<input type="text"/> NI/min
Max Air Pressure	<input type="text"/> barg
Max Inlet Air Temp.	<input type="text"/> °C
Ambient Temp.	<input type="text"/> °C
Refrigerant	<input type="text"/> type/kg
Refrig. Design Pres. HP/LP	<input type="text"/> barg
Electric Supply	<input type="text"/> ph/V/Hz
Electric Nominal Power	<input type="text"/> W/A
Fuse Max.	<input type="text"/> A
Manufactured	<input type="text"/>



TAD0006

WARRANTY CONDITIONS

For 12 months from the installation date, but no longer than 14 months from the delivery date, the warranty covers eventual faulty parts, which will be repaired or replaced free of charge, except the travel, hotel and restaurant expenses of our engineer.

The warranty doesn't cover any responsibility for direct or indirect damages to persons, animals or equipment caused by improper usage or maintenance, and it's limited to manufacturing faults only.

The right to warranty repairs is subordinated to the strict compliance with the installation, use and maintenance instructions contained in this manual.

The warranty will be immediately voided in case of even small changes or alterations to the dryer. To require repairs during the warranty period, the data reported on the identification plate must be notified.

1. SAFETY RULES

- 1.1. Definition of the Conventional Signs Used in This Manual
- 1.2. Warnings
- 1.3. Proper use of the dryer
- 1.4. Instructions for the use of pressure equipment according to ped directive 97/23/ec

2. INSTALLATION

- 2.1. Transport
- 2.2. Storage
- 2.3. Installation site
- 2.4. Installation layout
- 2.5. Correction factors
- 2.6. Connection to the compressed air system
- 2.7. Electrical connections
- 2.8. Condensate drain

3. START UP

- 3.1. Preliminary operation
- 3.2. First start-up
- 3.3. Start-up and shut down

4. TECHNICAL SPECIFICATIONS

- 4.1. Technical specifications AMD 3-25 / 230V / 50-60 Hz
- 4.2. Technical specifications AMD 32-168 / 230V / 50Hz
- 4.3. Technical specifications AMD 32E-168E / 230V / 60 Hz
- 4.4. Technical specifications AMD 3P-25P / 115V / 60 Hz
- 4.5. Caratteristiche tecniche AMD 32P-75P / 115V / 60 Hz

5. DESCRIZIONE TECNICA

- 5.1. Control panel
- 5.2. Operation
- 5.3. Flow diagram
- 5.4. Refrigerating compressor
- 5.5. Condenser
- 5.6. Filter drier
- 5.7. Capillary tube
- 5.8. Alu-dry module
- 5.9. Hot gas by-pass valve
- 5.10. Refrigerant pressure switches Pa- Pb- Pv
- 5.11. Safety thermo-switch T_s
- 5.12. DMC15 Electronic instrument (Air Dryer Controller)
- 5.13. Electronic level drain

6. MAINTENANCE, TROUBLESHOOTING, SPARES AND DISMANTLING

- 6.1. Controls and maintenance
- 6.2. Troubleshooting
- 6.3. Spare parts
- 6.4. Maintenance operation on the refrigerating circuit
- 6.5. Dismantling of the dryer

7. LIST OF ATTACHMENTS

- 7.1. Dryers dimensions
- 7.2. Exploded view
- 7.3. Electric diagrams

1. SAFETY RULES

1.1. DEFINITION OF THE CONVENTIONAL SIGNS USED IN THIS MANUAL



Carefully read instruction manual before attempting any service or maintenance procedures on the dryer.



Caution warning sign. Risk of danger or possibility of damage to equipment, if related text is not followed properly.



Electrical hazard. Warning message indicates practices or procedures that could result in personal injury or fatality if not followed correctly.



Danger hazard. Part or system under pressure.



Danger hazard. High temperature conditions exist during operation of system. Avoid contact until system or component has dissipated heat.



Danger hazard. Treated air is not suitable for breathing purposes; serious injury or fatality may result if precautions are not followed.



Danger hazard: In case of fire, use an approved fire extinguisher, water is not an acceptable means in cases of fire.



Danger hazard. Do not operate equipment with panels removed.



Maintenance or control operation to be performed by qualified personnel only ¹.



Compressed air inlet connection point.



Compressed air outlet connection point.



Condensate drain connection point.



Operations which can be worked out by the operator of the machine, if qualified ¹.

NOTE : Text to be taken into account, but not involving safety precautions.



In designing this unit a lot of care has been devoted to environmental protection:

- CFC free refrigerants
- CFC free insulation parts
- Energy saving design
- Limited acoustic emission
- Dryer and relevant packaging composed of recyclable materials

This symbol requests that the user heed environmental considerations and abide with suggestions annotated with this symbol.

¹ Experienced and trained personnel acquainted with the relevant rules and laws, capable to perform the needed activities and to identify and avoid possible dangerous situations while handling, installing, using and servicing the machine.

1.2. WARNINGS



Compressed air is a highly hazardous energy source.

Never work on the dryer with pressure in the system.

Never point the compressed air or the condensate drain outlet hoses towards anybody.

The user is responsible for the proper installation of the dryer. Failure to follow instructions given in the "Installation" chapter will void the warranty. Improper installation can create dangerous situations for personnel and/or damages to the machine could occur.



Only qualified personnel are authorized to service electrically powered devices. Before attempting maintenance, the following conditions must be satisfied :

- Ensure that main power is off, machine is locked out, tagged for service and power cannot be restored during service operations.
- Ensure that valves are shut and the air circuit is at atmospheric pressure. De-pressurize the dryer.



These refrigerating air dryers contain R134a or R404A HFC type refrigerant fluid. Refer to the specific paragraph - maintenance operation on the refrigerating circuit.



Warranty does not apply to any unit damaged by accident, modification, misuse, negligence or misapplication. Unauthorized alterations will immediately void the warranty.



In case of fire, use an approved fire extinguisher, water is not an acceptable means in cases of electrical fire.

1.3. PROPER USE OF THE DRYER

This dryer has been designed, manufactured and tested for the purpose of separating the humidity normally contained in compressed air. Any other use has to be considered improper.

The Manufacturer will not be responsible for any problem arising from improper use; the user will bear responsibility for any resulting damage.

Moreover, the correct use requires the adherence to the installation instructions, specifically:

- Voltage and frequency of the mains.
- Pressure, temperature and flow-rate of the incoming air.
- Ambient temperature.

This dryer is supplied tested and fully assembled. The only operation left to the user is the connection to the plant in compliance with the instructions given in the following chapters.



The purpose of the machine is the separation of water and eventual oil particles present in compressed air. The dried air cannot be used for breathing purposes or for operations leading to direct contact with foodstuff.



This dryer is not suitable for the treatment of dirty air or of air containing solid particles.

1.4. INSTRUCTIONS FOR THE USE OF PRESSURE EQUIPMENT ACCORDING TO PED DIRECTIVE 97/23/EC

To ensure the safe operation of pressure equipments, the user must conform strictly to the above directive and the following :

1. The equipment must only be operated within the temperature and pressure limits stated on the manufacturer's data nameplate.
2. Welding on heat-exchanger is not recommended.
3. The equipment must not be stored in badly ventilated spaces, near a heat source or inflammable substances;
4. Vibration must be eliminated from the equipment to prevent fatigue failure.
5. Automatic condensate drains should be checked for operation every day to prevent a build up of condensate in the pressure equipment.
6. The maximum working pressure stated on the manufacturer's data nameplate must not be exceeded. Prior to use, the user must fit safety / pressure relief devices.
7. All documentation supplied with the equipment (manual, declaration of conformity etc.) must be kept for future reference.
8. Do not apply weights or external loads on the vessel or its connecting piping.



TAMPERING, MODIFICATION AND IMPROPER USE OF THE PRESSURE EQUIPMENT ARE FORBIDDEN. Users of the equipment must comply with all local and national pressure equipment legislation in the country of installation.

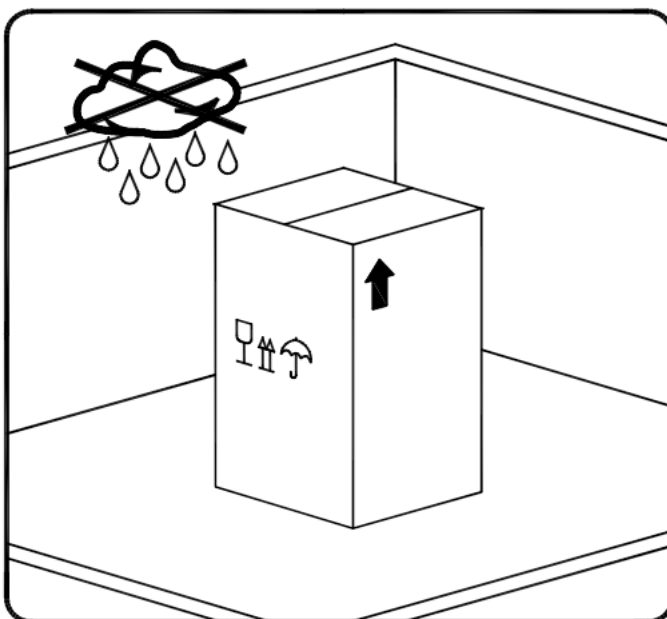
2. INSTALLATION

2.1. TRANSPORT

Check for visible loss or damage, if no visible damage is found place the unit near to the installation point and unpack the contents.

- Always keep the dryer in the upright vertical position. Damage to components could result if unit is laid on its side or if placed upside down.
- Store machine in a clean, dry environment, do not expose to severe weather environments.
- Handle with care. Heavy blows could cause irreparable damage.

2.2. STORAGE



Even when packaged, keep the machine protected from severity of the weather.

Keep the dryer in vertical position, also when stored. Turning it upside down some parts could be irreparably damaged.

If not in use, the dryer can be stored in its packaging in a dust free and protected site at a maximum temperature of 50 °C, and a specific humidity not exceeding 90%. Should the stocking time exceed 12 months, please contact the manufacturer.



The packaging materials are recyclable. Dispose of material in compliance with the rules and regulations in force in the destination country.

2.3. INSTALLATION SITE



Failure to install dryer in the proper ambient conditions will affect the dryer's ability to condense refrigerant gas. This can cause higher loads on the compressor, loss of dryer efficiency and performance, overheated condenser fan motors, electrical component failure and dryer failure due to the following: compressor loss, fan motor failure and electrical component failure. Failures of this type will affect warranty considerations.

Do not install dryer in an environment of corrosive chemicals, explosive gasses, poisonous gasses; steam heat, areas of high ambient conditions or extreme dust and dirt.

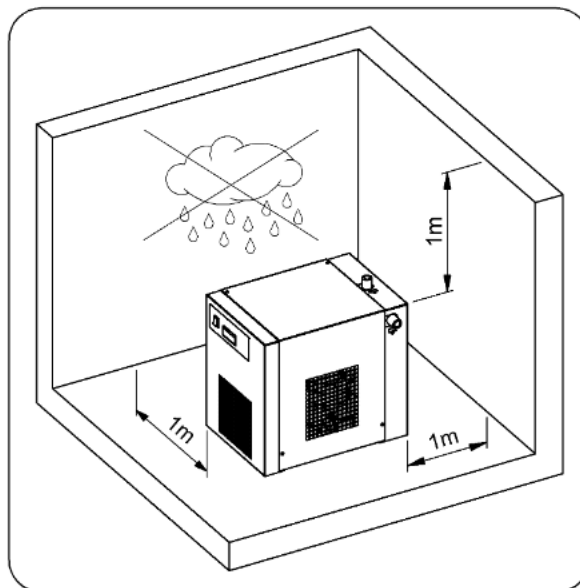


Don't use water to extinguish fire on the dryer or in the surrounding area.

Minimal installation requirements :

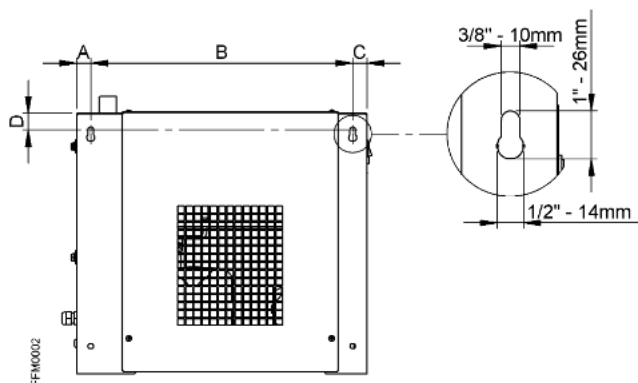
- Select a clean room dry, free from dust, and protected from atmospheric disturbances.
- The supporting area must be smooth, horizontal and able to hold the weight of the dryer.
- Minimum ambient temperature +1 °C.
- Maximum ambient temperature +45 °C.
- Leave at least 1 meter of free space on every side of the drier for ventilation purposes and maintenance operations.

The dryer doesn't require to be fixed to the supporting surface. The dryer needs to be fixed to the supporting surface only with particular installation procedures (dryer on brackets, hanging units, etc.)



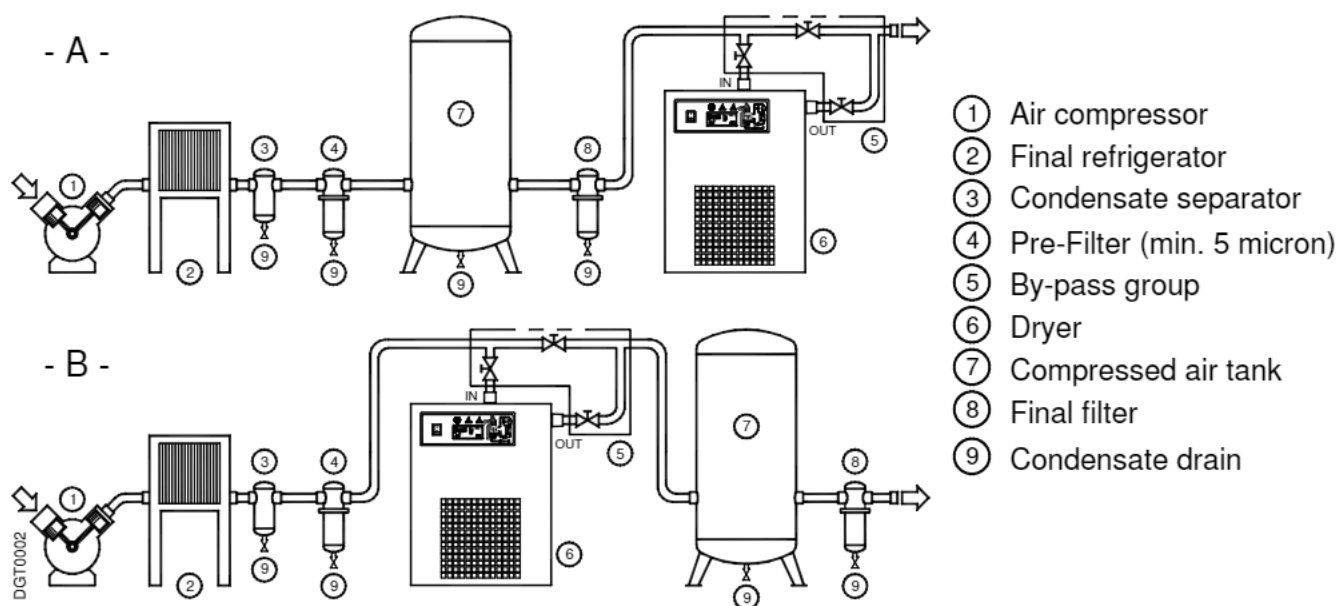
LOT0005

Dryer hanging (AMD 3-32 only):



Dryer	A [mm]	B [mm]	C [mm]	D [mm]
AMD 3	20	305	20	30
AMD 6-18	25	465	25	30
AMD 25	40	360	20	30
AMD 32	40	385	20	30

2.4. INSTALLATION LAYOUT



In case of heavily polluted inlet air (ISO 8573.1 class 3.-3 or worse quality), we recommend the additional installation of a pre-filter (5 micron minimum) to prevent a clogging of the heat exchanger.

Type A installation is suggested when the compressor operates at reduced intermittence and the total consumption equals the compressor flow rate.

Type B installation is suggested when the air consumption can consistently change with peak values highly exceeding the flow rate of the compressors. The capacity of the tank must be sized in order to compensate eventual instantaneous demanding conditions (peak air consumption).

2.5. CORRECTION FACTORS

Correction factor for operating pressure changes :

Inlet air pressure barg	4	5	6	7	8	10	12	14	15	16
Factor (F1)	0.77	0.86	0.93	1.00	1.05	1.14	1.21	1.27	1.30	1.33

Correction factor for ambient temperature changes (Air-Cooled):

Ambient temperature °C	≤ 25	30	35	40	45
Factor (F2)	1.00	0.98	0.95	0.88	0.80

Correction factor for inlet air temperature changes:

Air temperature °C	≤ 30	35	40	45	50	55
Factor (F3)	1.15	1.00	0.84	0.71	0.59	0.50

Correction factor for DewPoint changes:

DewPoint °C	3	5	7	10
Factor (F4)	0.91	1.00	1.10	1.26

How to find the air flow capacity:

Air flow capacity = Nominal duty x Factor (F1) x Factor (F2) x Factor (F3) x Factor (F4)

Example:

An **AMD 18** has a nominal duty of **1800 l/min**. What is the maximum allowable flow through the dryer under the following operating conditions:

- Inlet air pressure = 7 barg
- Ambient temperature = 35°C
- Inlet air temperature = 40°C
- Pressure DewPoint = 3°C
- Factor (F1) = 1.00
- Factor (F2) = 0.95
- Factor (F3) = 0.84
- Factor (F4) = 0.91

Each item of data has a corresponding numerical factor which multiplied by the design air flow is as follows:

Air flow capacity = 108 x 1.00 x 0.95 x 0.84 x 0.91 = 1307 l/min

1307 l/min This is the maximum flow rate that the dryer can accept under these operating conditions.

How to select a suitable dryer for a given duty:

Minimum std. air flow rate = $\frac{\text{Design air flow}}{\text{Factor (F1) x Factor (F2) x Factor (F3) x Factor (F4)}}$

Example:

With the following operating parameters:

- Design air flow = 1100 l/min
- Inlet air pressure = 7 barg
- Ambient temperature = 35°C
- Inlet air temperature = 40°C
- Pressure DewPoint = 3°C
- Factor (F1) = 1.00
- Factor (F2) = 0.95
- Factor (F3) = 0.84
- Factor (F4) = 0.91

In order to select the correct dryer model the required flow rate is to be divided by the correction factors relating to above mentioned parameters:

Minimum std. air flow rate = $\frac{1100}{1.00 \times 0.95 \times 0.84 \times 0.91} = 1515 \text{ l/min}$

Therefore the model suitable for the conditions above is **AMD 18 (1800 l/min - nominal duty)**.

2.6. CONNECTION TO THE COMPRESSED AIR SYSTEM

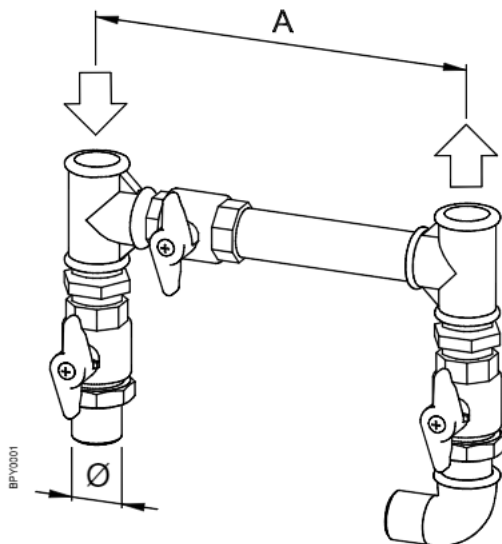


Operations to be performed by qualified personnel. Never operate with plants under pressure. The user is responsible to ensure that the dryer will never be operated with pressure exceeding the nominal values.

Eventual over-pressure could be dangerous both for the operator and the machine.

The temperature and the amount of air entering the dryer must comply with the limits reported on the data plate. In case of treatment of air at particularly high temperatures, the installation of a final refrigerator could result necessary. The cross section of the connecting piping, which must be free from dust, rust, chips and other impurities, must be consistent with the flow-rate of the dryer.

In order to facilitate the maintenance operations, a by-pass group has been installed, as shown in the following illustration.



Dryer	Ø [BSP-F]	A [mm]	By-Pass Code
AMD 3	G 3/8" BSP-F	40	2240GBP019
AMD 6-18	G 1/2" BSP-F	210	2240GBP021
AMD 25	G 1" BSP-F	205	2240GBP022
AMD 32-52	G 1.1/4" BSP-F	205	2240GBP023
AMD 61-75	G 1.1/2" BSP-F	235	2240GBP024
AMD 105-130	G 2" BSP-F	345	2240GBP025
AMD 168	G 2.1/2" BSP-F	410	2240GBP026

In realising the dryer, particular measures have been taken in order to limit the vibration which could occur during the operation. Therefore we recommend to use connecting pipes able to insulate the dryer from possible vibrations originating from the line (flexible hoses, vibration damping fittings, etc.).



CAUTION:

**PIPING THE DRYER, INLET/OUTLET CONNECTIONS MUST BE SUPPORTED AS SHOW IN THE DIAGRAM.
FAILING WILL RESULT IN DAMAGE**

2.7. ELECTRICAL CONNECTIONS



Qualified personnel should carry out connecting unit to the main power. Be sure to check the local codes in your area.

Before connecting the unit to the electrical supply, verify the data nameplate for the proper electrical information. Voltage tolerance is +/- 5%.

AMD 3-75 dryers are supplied with a standard VDE 16A - Shucko power cord and plug assembly (two poles and a ground). **AMD 105-168** dryers are supplied with a junction box.

Be sure to provide the proper fuses or breakers based on the data tag information located on the back of the unit. The main power receptacle must be protected with a **thermal overload/differential relay** ($I_{\Delta n}=0.03A$), rated to the power consumption of the dryer (refer to data nameplate for nominal values). The power supply cord must meet or exceed ratings for the total amp draw of the unit.



Connect to a properly grounded outlet. Improper connection of the equipment-grounding conductor can result in risk of electric shock.

Do not use adapters on the plug receptacle - if it does not fit the outlet, have a proper outlet installed by a qualified electrician.

2.8. CONDENSATE DRAIN



The condensate is discharge at the system pressure.

Drain line should be secured

Never point the condensate drain line towards anybody.

The dryer comes with a flexible plastic drain tube.

The condensate drain occurs through a solenoid valve protected with a mechanical strainer.

The condensate coming from the separator is previously filtered, then discharged.

The solenoid valve coil is operated by electronic instrument (dryer controller).

If an electronic drainer is installed, the intervention times are determined by the internal capacitive sensor (see specific paragraph).

The drainers cannot be connected to pressurized systems.



Don't dispose the condensate in the environment.

The condensate collected in the dryer contains oil particles released in the air by the compressor.

Dispose the condensate in compliance with the local rules.

We suggest to install a water-oil separator where to convey all the condensate drain coming from compressors, dryers, tanks, filters, etc.

3. START UP

3.1. PRELIMINARY OPERATION



Verify that the operating parameters match with the nominal values reported on the data plate of the dryer (voltage, frequency, air pressure, air temperature, ambient temperature, etc.).

Before delivery, each dryer is submitted to accurate tests simulating real operating conditions. Nevertheless, the unit could be damaged during transportation. We therefore suggest to check the integrity of the dryer upon arrival and to keep it under control during the first hours of operation.



The start-up must be performed by qualified personnel.

It's mandatory that the engineer in charge adopt safety operational conditions complying with the local safety and accident prevention requirements.



The same engineer will be responsible for the proper and safe operation of the dryer.

Never operate the dryer if the panels are not in place.

3.2. FIRST START-UP



This procedure should be followed on first start-up, after periods of extended shutdown or following maintenance procedures.

Qualified personnel must perform the start-up.

Sequence of operations (refer to paragraph 5.1 Control Panel) :

- Ensure that all the steps of the "Installation" chapter have been observed.
- Ensure that the connection to the compressed air system is correct and that the piping is suitably fixed and supported.
- Ensure that the condensate drain pipe is properly fastened and connected to a collection system or container.
- Ensure that the by-pass system (if installed) is open and the dryer is isolated
- Ensure that the manual valve of the condensate drain circuit is open.
- Remove any packaging and other material which could obstruct the area around the dryer.
- Activate the mains switch.
- Turn on the main switch - pos. 1 on the control panel.
- Ensure that the DMC15 electronic instrument is ON.
- Ensure the consumption matches with the values of the data plate.
- **Ensure the fan work properly - wait for its first interventions.**
- Allow the dryer temperature to stabilise at the pre-set value.
- Slowly open the air inlet valve.
- Slowly open the air outlet valve.
- Slowly close the central by-pass valve of the system (if installed).
- Check the piping for air leakage.
- Ensure the drain is regularly cycling - wait for its first interventions.

3.3. START-UP AND SHUT DOWN



Start-up (refer to paragraph 5.1 Control Panel) :

- Check the condenser for cleanliness.
- Verify that the system is powered.
- Turn on the main switch - pos. 1 on the control panel.
- Ensure that DMC15 electronic instrument is ON.
- Wait a few minutes; verify that the DewPoint temperature displayed on DMC15 electronic instrument is correct and that the condensate is regularly drained.
- Switch on the air compressor.



Shut down (refer to paragraph 5.1 Control Panel) :

- Verify that the DewPoint temperature displayed on DMC15 electronic instrument is correct.
- Switch OFF the air compressor.
- After a few minutes, switch off the main switch on the control panel of the dryer (pos. 1).

NOTE : A DewPoint included in the green operating area of the electronic controller is correct according to the possible working conditions (flow-rate, temperature of the incoming air, ambient temperature, etc.)

During the operation, the refrigerating compressor will run continuously. The dryer must remain on during the full usage period of the compressed air, even if the air compressor works intermittently.



The number of starts must be no more than 6 per hour. The dryer must stop running for at least 5 minutes before being started up again.

The user is responsible for compliance with these rules. Frequent starts may cause irreparable damage.

4.2. TECHNICAL SPECIFICATIONS AMD 32-168 / 230V / 50HZ

		Air-Cooled							
AMD MODEL		32	43	52	61	75	105	130	168
Air flow rate at nominal condition ¹	[l/min]	3200	4300	5200	6100	7500	10500	13000	16800
	[m³/h]	192	258	312	366	450	630	780	1008
	[scfm]	113	152	184	216	265	371	459	594
Pressure DewPoint at nominal condition ¹	[°C]	+5 equal to 0.85 g/m³ di H₂O							
Nominal ambient temperature (max.)	[°C]	+25 (+45)							
Min. ambient temperature	[°C]	+1							
Nominal inlet air temperature (max.)	[°C]	+35 (+55)							
Nominal inlet air pressure	[barg]	7							
Max. inlet air pressure	[barg]	14							
Air pressure drop - p	[bar]	0.16	0.24	0.34	0.19	0.25	0.14	0.20	0.15
Inlet - Outlet connections	[BSP-F]	G 1.1/4"			G 1.1/2"		G 2"		G 2.1/2"
Refrigerant type		R134.a	R404A						
Refrigerant quantity ²	[kg]	0.44	0.40	0.42	0.57	0.70	1.10	1.30	1.90
Cooling air flow	[m³/h]	350	380	600	400	450	1900		
Standard Power Supply ²	[Ph/V/Hz ₁]	1/230/50							
Nominal electric absorption	[W]	480	750	930	950	740	940	1550	1590
	[A]	2.9	3.3	4.6	4.7	3.6	4.3	7.4	7.5
Max. electric absorption	[W]	700	1150	1350	1400	1050	1350	2100	2350
	[A]	3.8	5.4	6.6	6.8	4.8	6.3	9.8	11.3
Max. level noise at 1 m	[dbA]	< 70							
Weight	[kg]	39	40	41	54	56	94	96	144

¹ The nominal condition refers to an ambient temperature of +25 °C with inlet air at 7 barg and +35 °C.

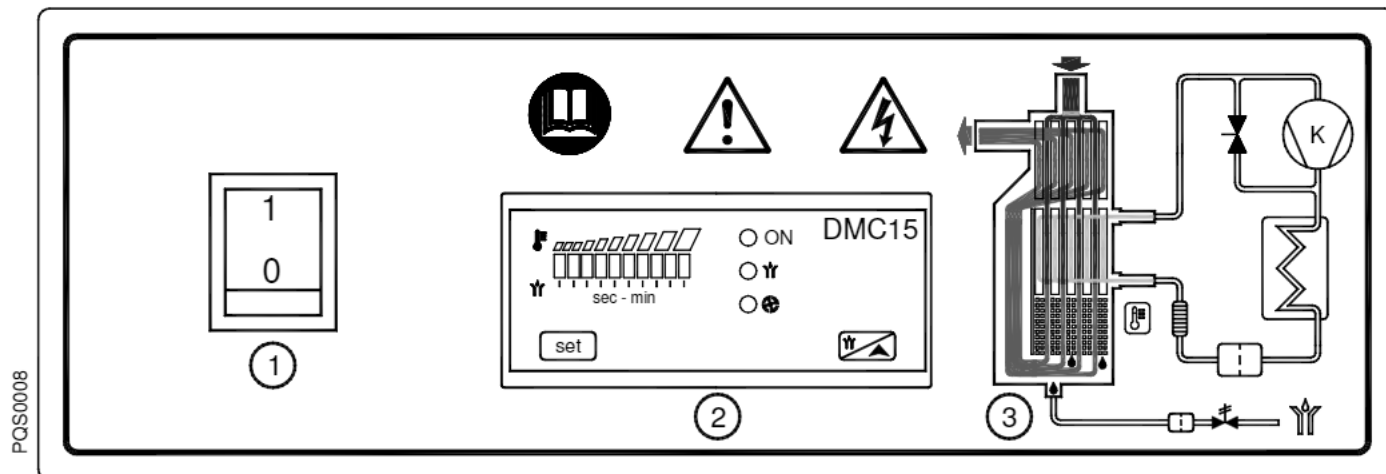
² Check the data shown on the identification plate.

5. DESCRIZIONE TECNICA

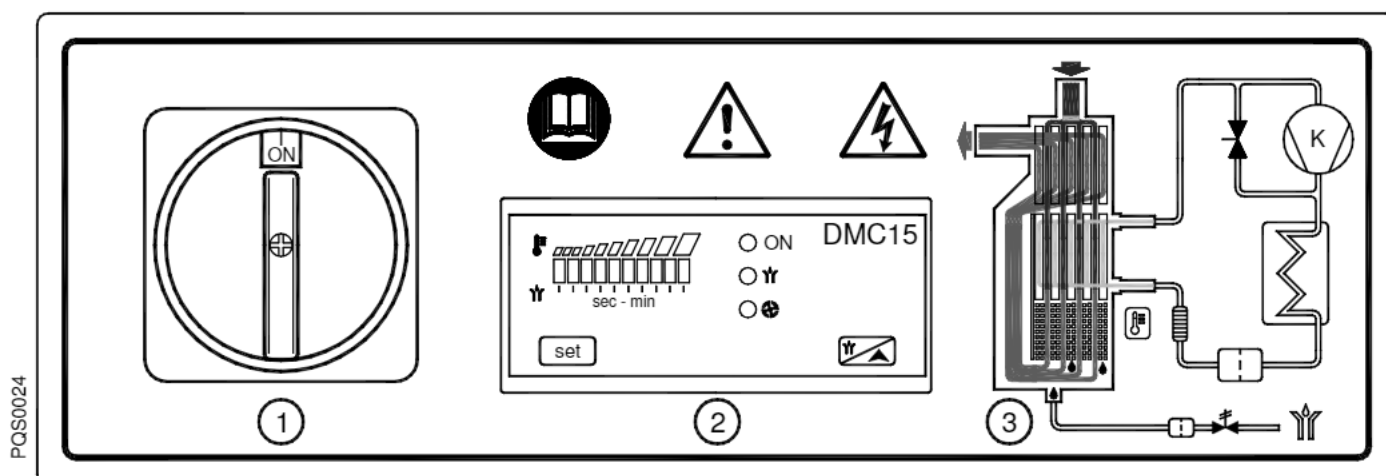
5.1. CONTROL PANEL

The control panel illustrated below is the only dryer-operator interface.

AMD 3-61



AMD 75-168



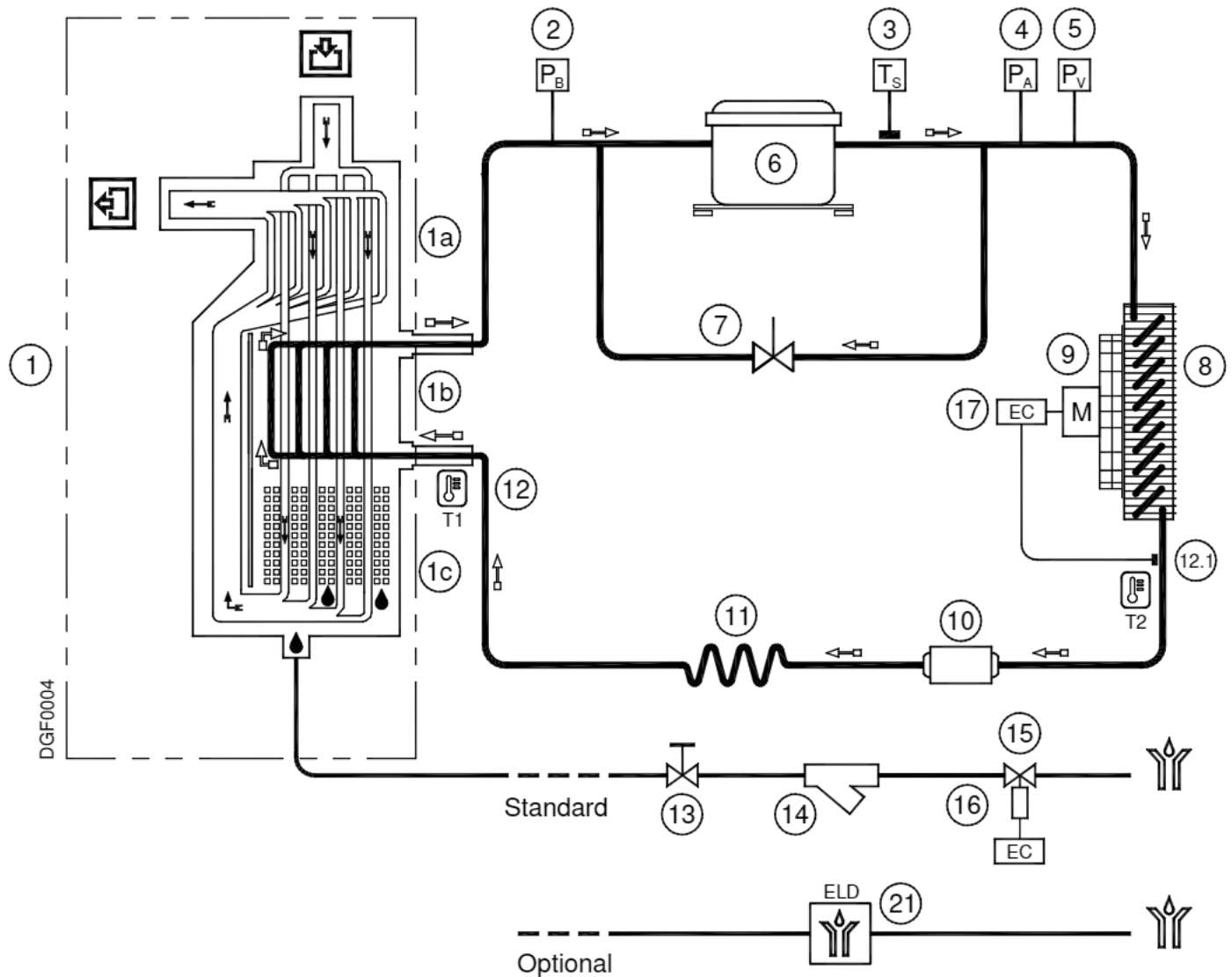
- ① Main switch
 ② Air Dryer Controller DMC15
 ③ Air and refrigerating gas flow diagram

5.2. OPERATION

Operating principal –The dryer models described in this manual operate all on the same principal. The hot moisture laden air enters an air to air heat exchanger. The air then goes through the evaporator, also known as the air to refrigerant heat exchanger. The temperature of the air is reduced to approximately 2°C, causing water vapor to condense to liquid. The liquid is continuously coalesced and collected in the separator for removal by the condensate drain. The cool moisture free air then passes back through the air to air heat exchanger to be reheated to within 8 degrees of the incoming air temperature as it exits the dryer.

Refrigerant circuit - Refrigerant gas is cycled through the compressor and exits at high pressure to a condenser where heat is removed causing the refrigerant to condense to a high-pressure liquid state. The liquid is forced through a capillary tube where the resulting pressure drop allows the refrigerant to boil off at a predetermined temperature. Low-pressure liquid refrigerant enters the heat exchanger where heat from the incoming air is transferred causing the refrigerant to boil; the resulting phase change produces a low pressure, low temperature gas. The low-pressure gas is returned to the compressor, where it is re-compressed and begins the cycle again. During those periods when the compressed air load is reduced the excess refrigerant is by-passed automatically back to the compressor via the Hot Gas By-pass Valve circuit.

5.3. FLOW DIAGRAM

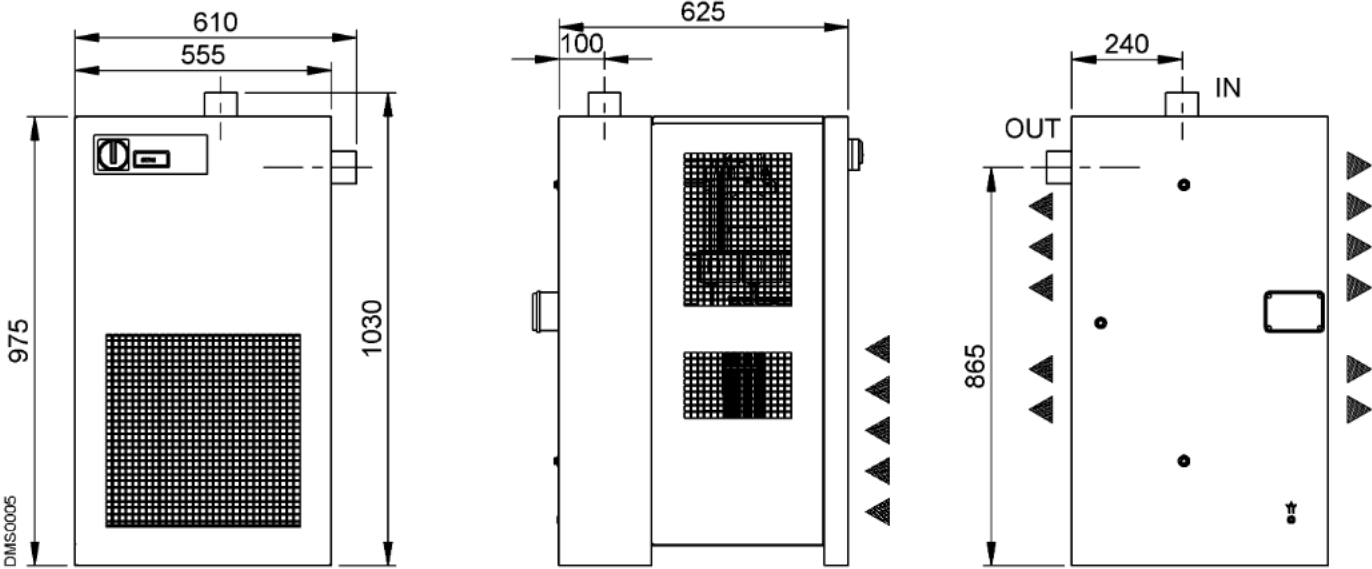


- | | |
|--|--|
| ① Alu-Dry Module | ⑨ Condenser fan |
| a - Air-to-air heat exchanger | ⑩ Filter drier |
| b - Air-to-refrigerant exchanger | ⑪ Capillary tube |
| c - Condensate separator | ⑫ T1 Temperature probe (DewPoint) |
| ② Refrigerant pressure-switch P_B (AMD 168) | 12.1 T2 Temperature probe (fan control) (AMD 3-32) |
| ③ Safety thermo-switch T_S (AMD 43E-168E) - (AMD 43P-168P) | ⑬ Condensate drain isolation valve |
| ④ Refrigerant pressure-switch P_A (AMD 105-168) | ⑭ Condensate drain strainer |
| ⑤ Refrigerant Fan pressure-switch P_V (AMD 43-168) | ⑮ Condensate drain solenoid valve |
| ⑥ Refrigeration compressor | ⑯ Coil for cond. drain solenoid valve |
| ⑦ Hot gas by-pass valve | ⑰ Air Dryer Controller |
| ⑧ Condenser | ... |
| | ⑳ Electronic level drain |

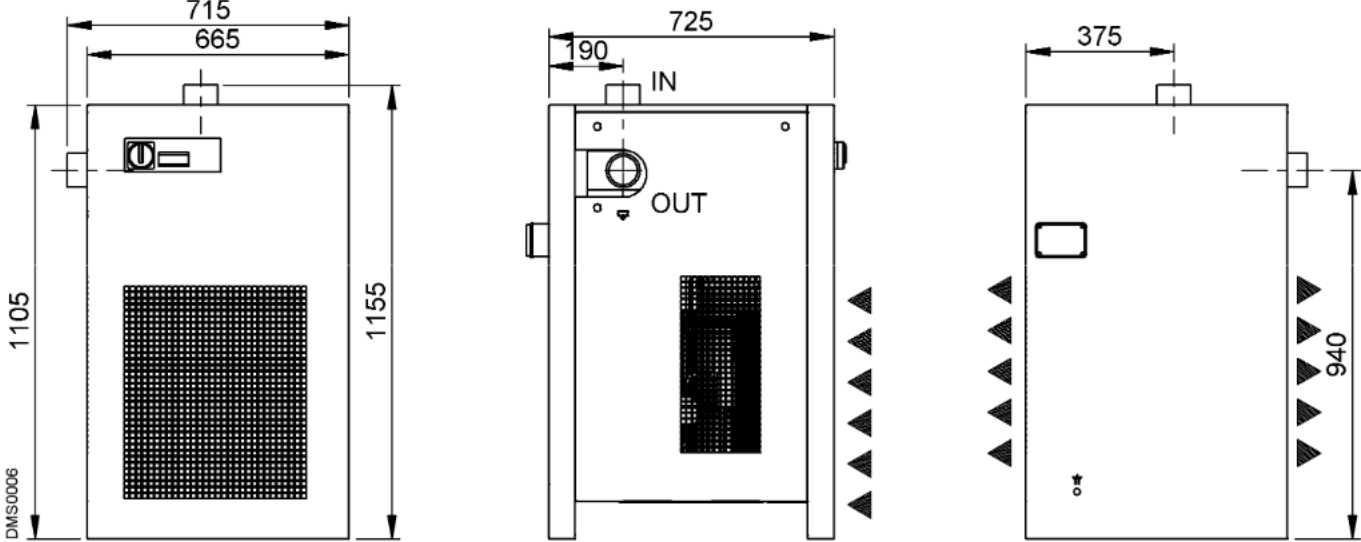
→ Compressed air flow direction

⇨ Refrigerating gas flow direction

7.1.4 AMD 105-130



7.1.5 AMD 168



7.1.3 AMD 105-130 / 105E-130E

