USER'S, MAINTENANCE AND SPARE PARTS MANUAL

REFRIGERATED AIR DRYERS

TDF 145
TDF 185
TDF 210
TDF 285
TDF 340
TDF 420
TDF 520
TDF 680

AIR COOLED & WATER COOLED
ADS93 Controller & DMC20 Air Dryer Controller

2000 EDITION

MUMTDF145_680CAN Rev.01

THIS FORM MUST BE FILLED WHEN YOU PLACE AN ORDER OR REQUIRE FOR SPARE PARTS

MODELLO MODEL MODELE		DATA COLLAUDO TESTING DATE DATE ESSAI	
MATRICOLA SERIAL NO. NO. DE SERIE		TIPO REFRIGERANTE REFRIGERANT TYPE TYPE DE REFRIGERANT	
PORTATA l/min FLOW RATE l/min DEBIT l/min		CARICA REFRIGERANTE REFRIGERANT Q.TY CHARGE REFRIGERANT	
ASSORBIMENTO A AMPS RATE A COURANT A		MAX. TEMP IN °C MAX. INLET TEMP. °C TEMP MAX. ENTRÉE °C	
MAX. PRESS. IN bar MAX.INLET PRESS. bar PRESSION MAX.ENTRÉE bar		MAX. TEMP AMB. °C MAX. AMBIENT TEMP. °C TEMP MAX. AMBIANTE °C	
CODE		FASI/V/Hz PHASE/V/Hz PHASE/V/Hz	

Dear Customer,

thank you for choosing our product. In order to get the best performances in the use 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.

This manual refers to refrigerated air dryers model from TDF145 to TDF680 air cooled and water cooled, fitted with ADS93 Controller as standard and DMC20 Air Dryer Controller as option. As option an electronic level condensate drain system can be required.

Before packing for shipment each **TD** series refrigerated air dryer is subjected to 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 of the dryer is fully automatic, and maintenance is limited to few controls and some cleaning operations, as detailed in the following chapters.

This manual must be kept available for future reference and it should be considered as an integral part of the relevant dryer.

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

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

IDENTIFICATION PLATE

The product identification plate, on the back of the dryer, shows all the primary data of the machine.
Upon installation, fill in the table copying the data shown on the identification plate. This data must always be provided for the manufacturer or the dealer whenever information or spare parts are needed, including during the warranty period.
The removal or the alteration of the identification plate will void the warranty rights.

WARRANTY CONDITIONS

For 12 months from the installation date, but no longer than 14 months from the delivery date, the warranty covers faulty parts, which will be repaired or replaced free of charge. Travel, hotel and restaurant expenses of our engineer are excluded.
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 request repairs during the warranty period, the data shown on the identification plate must be provided.

1.1 DEFINITION OF THE SIGNS USED IN THIS MANUAL

Before attempting any intervention on the dryer, read carefully the instructions reported in this use and maintenance manual.

General warning sign. Risk of danger or possibility of damage to the machine. Read carefully the text related to this sign.

Electrical hazard. The relevant text outlines conditions which could result fatal. The related instructions must be strictly respected.

Danger hazard. Part or system under pressure.

Danger hazard. Component or system which during the operation can reach high temperature.

Danger hazard. It's absolutely forbidden to breath the air treated with this apparatus.

Danger hazard: It's absolutely forbidden to use water to extinguish fire on the dryer on in the surrounding area.

Danger hazard. It's absolutely forbidden to operate the machine when the panels are not in place.

Maintenance or control operation to be very carefully performed by qualified personnel [1].

Compressed air inlet connection point.

Compressed air outlet connection point.

Condensate drain connections point (evaporator).

Condensate drain connections point (condensate separator).

Cooling water inlet connection point (water cooled units).

Cooling water outlet connection point (water cooled units).

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 the environment protection:

- CFC free refrigerants
- Foamed insulation parts realised without CFC
- Energy saving design
- Limited acoustic emission
- Dryer and relevant packaging composed of recyclable materials

Not to spoil our commitment, the user should follow the few ecological suggestions marked with this sign.

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 parts under pressure.
Never point the compressed air or the condensate drain jet towards anybody.
The user is responsible for the installation of the dryer, which has to be executed on the basis of the instructions given in the "Installation" chapter. Otherwise, the warranty will be voided and dangerous situations for the personnel and/or damages to the machine could occur.

Only qualified personnel can use and service electrically powered devices. Before attempting any maintenance action, the following conditions must be satisfied :

- Be sure that any part of the machine is under voltage and that it cannot be connected to the mains.
- Be sure that any part of the dryer is under pressure and that it cannot be connected to the compressed air system.

Any change to the machine or to the relevant operating parameters, if not previously verified and authorised by the Manufacturer, in addition to create the possibility of dangerous conditions it will void the warranty.

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

1.3 PROPER USE OF THE DRYER

This dryer has been designed, manufactured and tested only to be used to separate 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 be in any case responsible for any resulting damage.
Moreover, the correct use requires the respectation of the installation conditions, in particular :

- Voltage and frequency of the mains.
- Pressure, temperature and flow-rate of the incoming air.
- Pressure, temperature and cooling water capacity (water cooling system).
- 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.

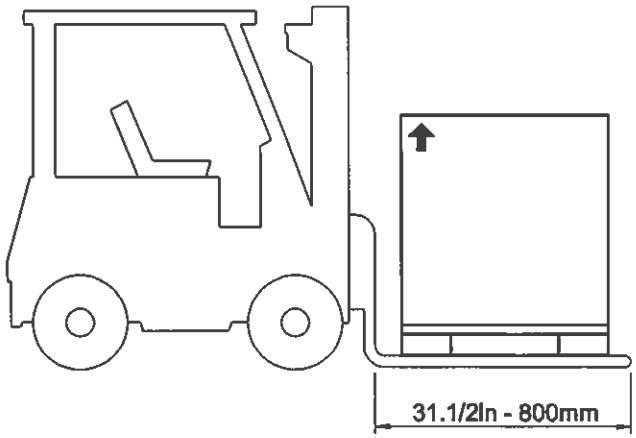
The purpose of the machine is the separation of water and eventual oil particles present in compressed air. The dried air cannot be used for respiration purposes or for operations leading to direct contact with foodstuff.
This dryer is nor suitable for the treatment of dirty air or of air containing solid particles.

2.1 TRANSPORT

Once verified the integrity of the packaging, place the unit near to the installation point and unpack the contents.

- Keep the dryer always in vertical position. Turning it upside down some parts could be irreparably damaged.
- Even when packaged, keep the machine protected from severity of the weather.

The packaging materials are recyclable. Each single material must be properly disposed in a manner complying with the rules in force in the destination country.



2.2 INSTALLATION SITE

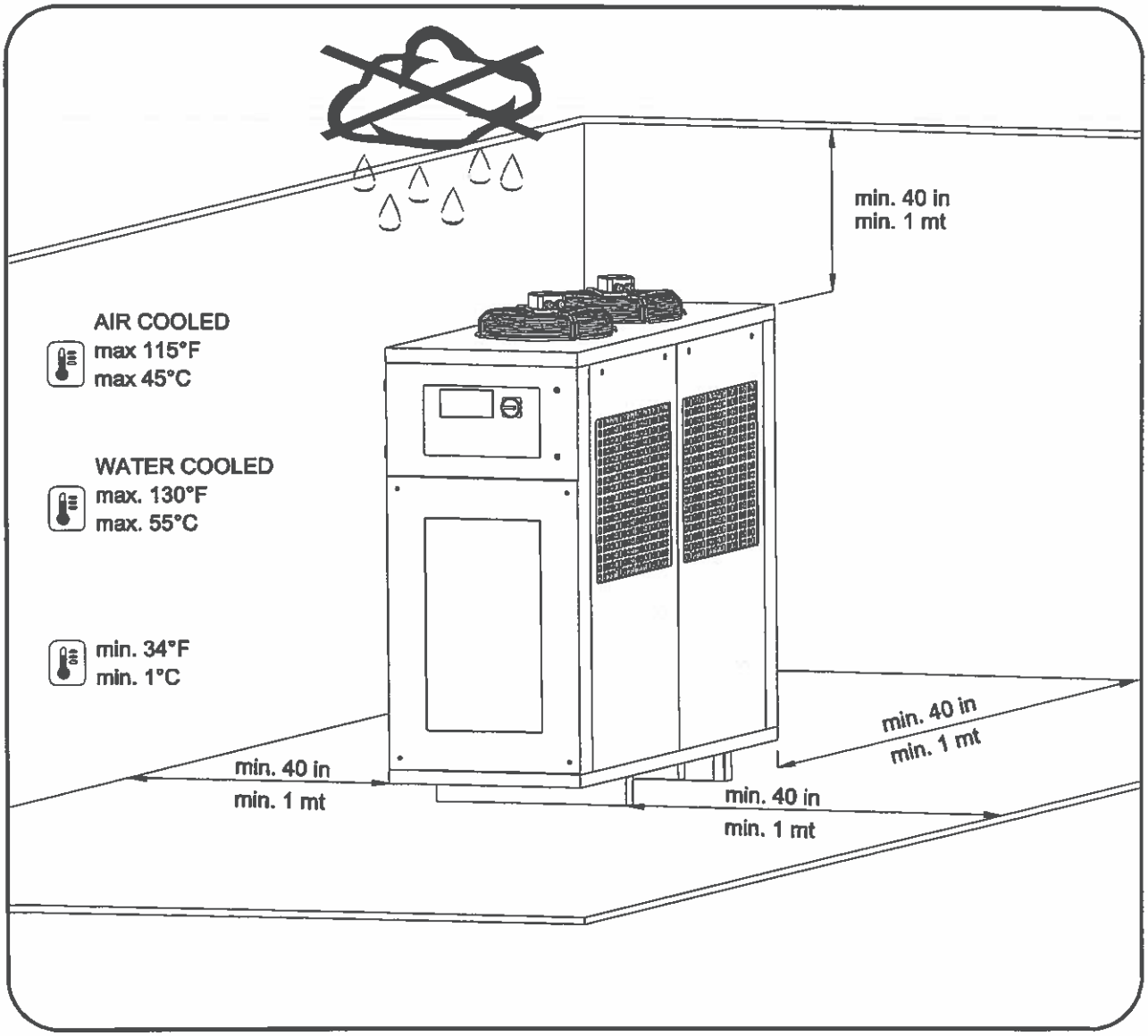
Particular care is required in selecting the installation site, as an improper location could jeopardise the proper operation of the dryer.
This unit is not suitable to be used in explosive atmosphere, where risk of fire could exist, or in presence of gaseous or solid polluting material.

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

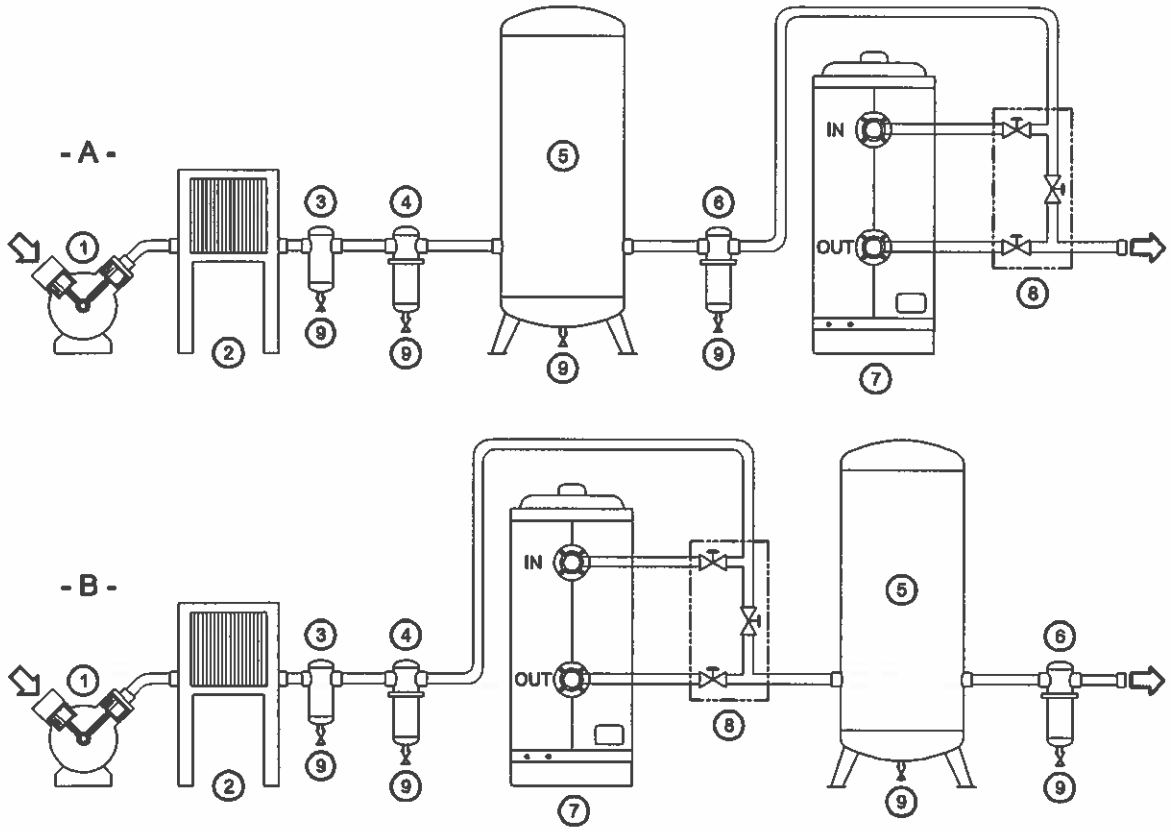
Minimal installation requirements :

- Select a clean room dry, free from dust, and protected from atmospheric disturbances.
- The supporting plate must be smooth, horizontal and able to hold the weight of the dryer.
- Minimum ambient temperature 34°F (+1°C), see the data plate for maximum temperature.
- Allow at list a clearance of 40in. (1mt) on each side of the dryer for proper ventilation and to facilitate eventual maintenance operations.

The dryer doesn't require to be fixed to the supporting surface.



2.3 INSTALLATION LAYOUT - CORRECTION FACTORS



1. Air compressor
2. Aftercooler
3. Condensate separator
4. Pre-Filter
5. Compressed air receiver
6. Final filter
7. Dryer
8. By-pass group
9. Condensate drain

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 receiver must be sized in order to compensate eventual instantaneous demanding conditions (peak air consumption).

Correction factor for inlet air pressure changes:									
Inlet air pressure psig	60	70	85	100	115	130	140	155	174
Factor	0.70	0.85	0.93	1.00	1.06	1.11	1.15	1.18	1.21

Correction factor for ambient temperature changes (Air cooled only) :					
Ambient temperature °F	80	90	100	110	115
Factor	1.09	1.06	1.00	0.90	0.83

Correction factor for inlet air temperature changes:				
Air temperature °F	90	100	110	115
Factor	1.15	1.00	0.82	0.75

Correction factor for DewPoint changes:					
DewPoint °F	38	40	44	47	50
Factor	1.00	1.05	1.10	1.15	1.20

Example: select the right dryer for the following conditions: 850 scfm, 100 psig inlet air pressure, 110 °F ambient temperature, 115 °F inlet air temperature, 44 °F pressure DewPoint, air cooled. Determine dryer model: 800 / 0.90 / 0.75 / 1.10 = 1145 scfm capacity dryer required
Selection TDF340 air cooled

2.7 CONNECTION TO THE MAINS

The connection to the mains, to be carried out by qualified personnel, and the safety systems must comply with local rules and laws.

Before connecting the unit to the electric power, verify that the voltage and the frequency available on the mains correspond to the data reported on the data plate of the dryer. In terms of voltage, a 5% tolerance is allowed.
The dryer comes with a box for the connection to the mains.
The mains socket must be provided with a **mains magneto-thermal differential breaker** (I n=0.03A), adjusted on the basis of the consumption of the dryer (see the nominal values on the data plate of the dryer).
The cross section of the power supply cables must comply with the consumption of the dryer, while keeping into account also the ambient temperature, the conditions of the mains installation, the length of the cables, and the requirements enforced by the local Power Provider.

It's mandatory ensure the connection to the ground terminal.

2.8 CONDENSATE DRAIN

The condensate is discharged at the same pressure of the air entering the dryer.
Never point the condensate drain jet towards anybody.

The dryer is supplied already featuring the connections to the condensate collection plant by means of two (one if optional electronic level drainer is installed) ports for 3/8in (10mm) in diameter flexible plastic tubing.
The condensate drain occurs through two solenoid valves. In order to avoid clogging of the solenoid valve, the condensate to be discharged is previously filtered by means of strainers. The solenoid valve coil is operated by ADS93 Controller or DMC20 Air Dryer Controller (optional electronic level drainer without strainer).
Connect and properly fasten the condensate drain to a collecting plant or container.
The drain cannot be connected to pressurised 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, receivers, filters, etc.

3.1 PRELIMINARY OPERATION

Verify that the operating parameters matches 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 will 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 their panels are not in place.

3.2 FIRST START-UP

At the first start-up, or for start-up after a long period of inactivity, or following maintenance operations, follow the instructions given below.

The start-up must be performed by qualified personnel.

Sequence of operations (refer to para. 5.1 Control Panel) :

ADS93 Controller

- 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 pipes are 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 valves of the condensate drain circuit are open.
- Remove any packaging and other material which could obstruct the area around the dryer.
- Activate the mains switch.
- Close the main switch - pos. 4 on the control panel.
- Check that the mains detection light of the ON/OFF button - pos. 1 of the control panel - is ON.
- Wait at least two hours before starting the dryer (compressor crankcase heater must heat the oil of the compressor).
- Ensure the cooling water flow and temperature is adequate (water cooled).
- Switch ON the dryer the button "I - ON" of the ON/OFF switch - pos. 1 of the control panel.
- Check that the display of the ADS93 Controller is ON.
- Wait a few minutes, then check that the ADS93 is indicating a correct DewPoint temperature and the condensate drains are regulary cycling
- Ensure the consumption matches with the values of the data plate.
- **Check that the rotation direction of the fan corresponds with the arrows on the condenser (air cooled).**
- 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.

DMC20 Air Dryer Controller

- 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 pipes are 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 valves of the condensate drain circuit are open.
- Remove any packaging and other material which could obstruct the area around the dryer.
- Activate the mains switch.
- Close the main switch - pos. 2 on the control panel.
- Check that "crankcase heater" and "Stand-by" leds on DMC20 are ON.
- Wait at least two hours before starting the dryer (compressor crankcase heater must heat the oil of the compressor).
- Ensure the cooling water flow and temperature is adequate (water cooled).
- Switch ON the dryer keeping the "Dryer Start-up" button on DMC20 pressed for at least 2 seconds.
- Check that "compressor ON" led on DMC20 is ON.
- Wait a few minutes, then check that the DMC20 is indicating a correct DewPoint temperature and the condensate drains are regulary cycling.
- Ensure the consumption matches with the values of the data plate.
- **Check that the rotation direction of the fan corresponds with the arrows on the condenser (air cooled).**
- Check the operation of the condensate drain circuit - wait for its first operation.
- 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.

3.3 OPERATION AND SWITCHING OFF

NOTE : For short periods of inactivity, (max 2 - 3 days) we recommend that power is maintained to the dryer and the control panel.This ensures the dryer is available for instant re-start without waiting for the compressor crankcase heater to heat the oil of the compressor.

☞ Operation (refer to para. 5.1 Control Panel) :

ADS93 Controller

- Check the condenser for cleanliness (air cooled).
- Ensure the cooling water flow and temperature is adequate (water cooled).
- Check that the mains detection light of the ON/OFF button - pos. 1 of the control panel - is ON.
- Press the button "I - ON" of the ON/OFF switch - pos. 1 of the control panel.
- Check that the display of the ADS93 Controller is ON.
- Wait a few minutes, then check that the ADS93 is indicating a correct DewPoint temperature and the condensate drains are regulary cycling.
- Switch ON the air compressor.
- The anti-freezing function is ensured by the operation of the hot gas by-pass solenoid valve, indicated by the glowing of the green light on the front panel of the ADS93 Controller.

DMC20 Air Dryer Controller

- Check the condenser for cleanliness (air cooled).
- Ensure the cooling water flow and temperature is adequate (water cooled).
- Check that "crankcase heater" and "Stand-by" leds on DMC20 are ON.
- Switch ON the dryer keeping the "Dryer Start-up" button on DMC20 pressed for at least 2 seconds.
- Check that "compressor ON" led on DMC20 is ON.
- Wait a few minutes, then check that the DMC20 is indicating a correct DewPoint temperature and the condensate drains are regulary cycling.
- Switch ON the air compressor.
- The anti-freezing function is ensured by the operation of the hot gas by-pass solenoid valve, indicated by the glowing of led on DMC20 Air Dryer Controller.

☞ Switching OFF (refer to para. 5.1 Control Panel) :

ADS93 Controller

- Check that the DewPoint indicated on the ADS93 is within range.
- Switch OFF the air compressor.
- After few minutes, switch OFF the dryer pressing the "O - OFF" button of the ON/OFF switch - pos. 1 of the control panel.

DMC20 Air Dryer Controller

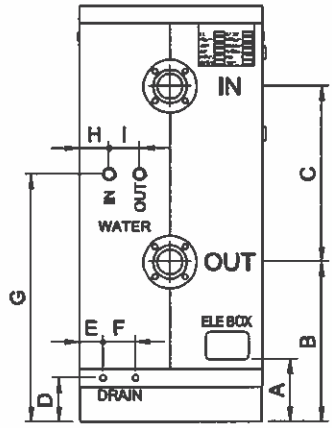
- Check that the DewPoint indicated on the DMC20 is within range.
- Switch OFF the air compressor.
- After few minutes, switch OFF the dryer keeping the "Dryer Stop" button on DMC20 pressed for at least 2 seconds.

NOTE : Taking into account possible varations of operating conditions (flow-rate, temperature of the incoming air, ambient temperature, etc.) a DewPoint temperature within 0°C and +10°C (32°F to 50°F) can be considered normal.

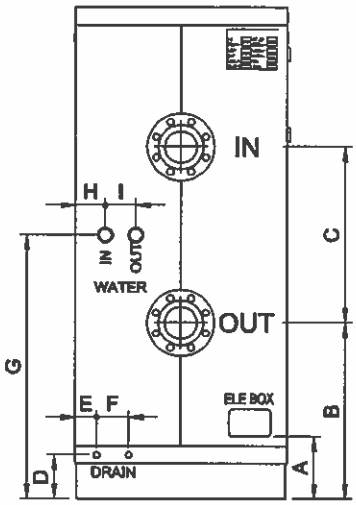
During the operation, the refrigeration compressor will run continuously.

The dryer must remain ON when ever compressed air is being used, even if the air compressor only loads intermittently.

2.4 DRYER CONNECTION LAY-OUT



TDF145 to TDF340



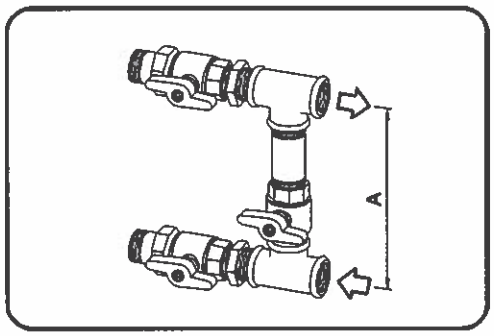
TDF420 to TDF680

	TDF145 to TDF340 [in - mm]	TDF420 to TDF680 [in - mm]
A	10.5/8 – 270	
B	19.1/4 – 490	21.1/4 – 540
C	19.11/16 – 500	
D	4.7/8 – 125	
E	3.7/8 – 100	
F	3.7/8 – 100	
G	28.3/4 – 730	33.1/2 – 850
H	3.7/8 – 100	
I	3.7/8 – 100	

2.5 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 temperature, the installation of an aftercooler 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 can be installed, as shown in the following illustration.



Dryers	Connections	A [in - mm]
TDF145 to TDF185	2.1/2" NPT - F	19.11/16 - 500
TDF210 to TDF340	Flange 3" #150	19.11/16 - 500
TDF420 to TDF680	Flange 4" #150	19.11/16 - 500

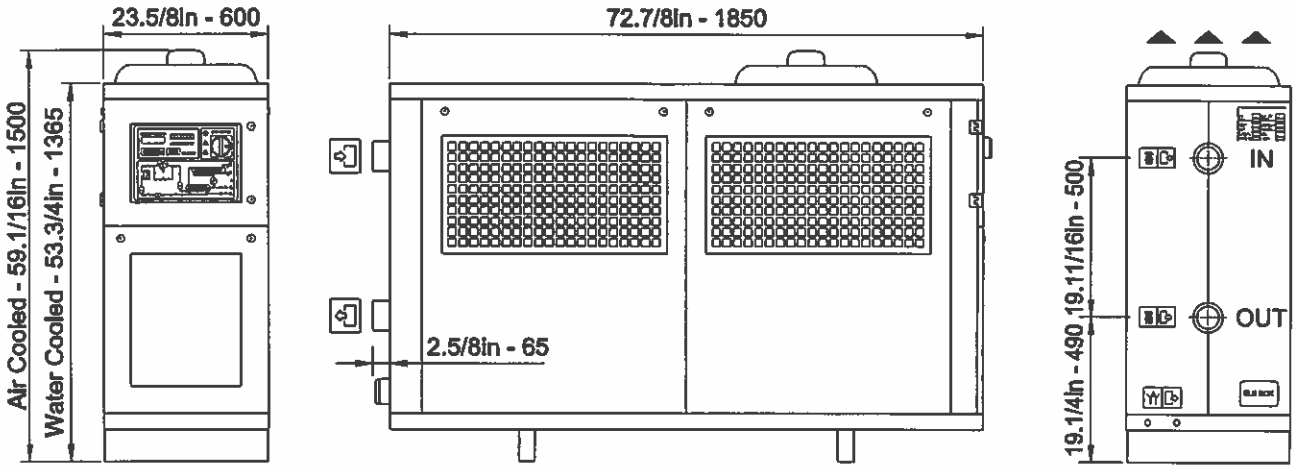
In realising the dryer, particular measures have been taken in order to limit the vibration which could occur during the operation. Therefore we recommend to use connecting pipes able to insulate the dryer from possible vibrations originating from the line (flexible hoses, vibration damping fittings,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

2.6 CONNECTION TO THE COOLING WATER NETWORK (water cooled units)

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 cooling water must comply with the limits indicated on the technical characteristics chart.
The cross section of the connection pipes, preferably flexible, must be free from rust, chips and other impurities. We recommend to use connecting pipes able to insulate the dryer from possible vibrations originating from the line (flexible hoses, vibration damping fittings, etc.).

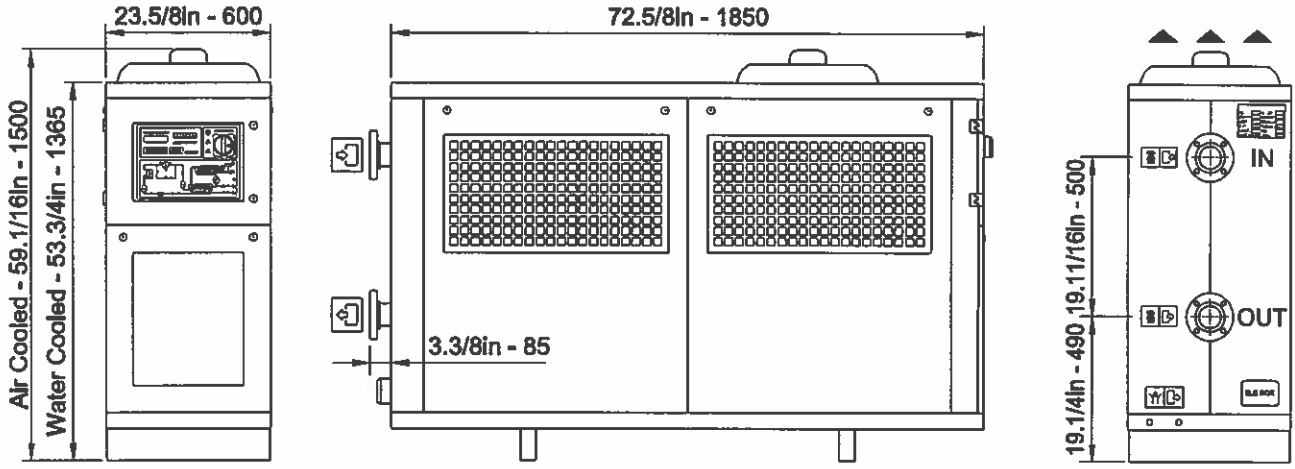
4.1 TECHNICAL FEATURES OF DRYERS SERIES TDF145 and TDF185



		Air cooled unit		Water cooled unit	
DRYER MODEL		**TDF145**	**TDF185**	**TDF145**	**TDF185**
Air flow rate at nominal condition[1]	[scfm]	510	650	510	650
	[Nl/min]	14500	18500	14500	18500
	[Nm³/h]	870	1110	870	1110
Pressure DewPoint at nominal condition[1]	[°F - °C]	38 – 3.3			
Nominal ambient temperature	[°F - °C]	100 - 37.8			
Max. ambient temperature	[°F - °C]	115 – 45		130 – 55	
Min. ambient temperature	[°F - °C]	34 – 1			
Nominal inlet air temperature	[°F - °C]	100 - 37.8			
Max. inlet air temperature	[°F - °C]	115 – 45			
Nominal inlet air pressure	[psig – barg]	100 - 6.9			
Max. inlet air pressure	[psig - barg]	174 – 12			
Max. outlet air pressure drop - Δp	[psi – bar]	4.4 - 0.3			
Inlet-outlet air connection		2.1/2" NPT-F			
Refrigerant type		R404A			
Refrigerant charging	[oz – kg]	125 – 3.5			
Cooling air capacity	[cfm - m³/h]	3240 - 5500		-	
Cooling water capacity at 60°F-15°C	[gpm - m³/h]	-		1.7/8 – 0.5	2.1/4 – 0.6
Cooling water capacity at 85°F-30°C	[gpm - m³/h]	-		5.7/8 – 1.6	6.5/8 – 1.8
Maximum water temperature	[°F - °C]	-		86 – 30	
Maximum water pressure	[psig – barg]	-		145 - 10	
Max. water pressure drop	[psi – bar]	-		4.4 - 0.3	
Cooling water connections		-		1" NPT-F	
Power supply	[Phase/V/Hz]	3/575/60			
Nominal electric consumption	[A]	5.2	5.8	4.1	4.7
Max. electric consumption	[A]	6.0	6.6	4.8	5.4
Compressor power	[HP]	2.3	2.7	2.3	2.7
Weight	[lbs - kg]	950-430	1100-500	900-410	1060-480
Max. noise level		> 70 dbA at 40in (1mt)			

[1] The nominal condition refers to an ambient temperature of 100°F with inlet air at 100 psig and 100°F.

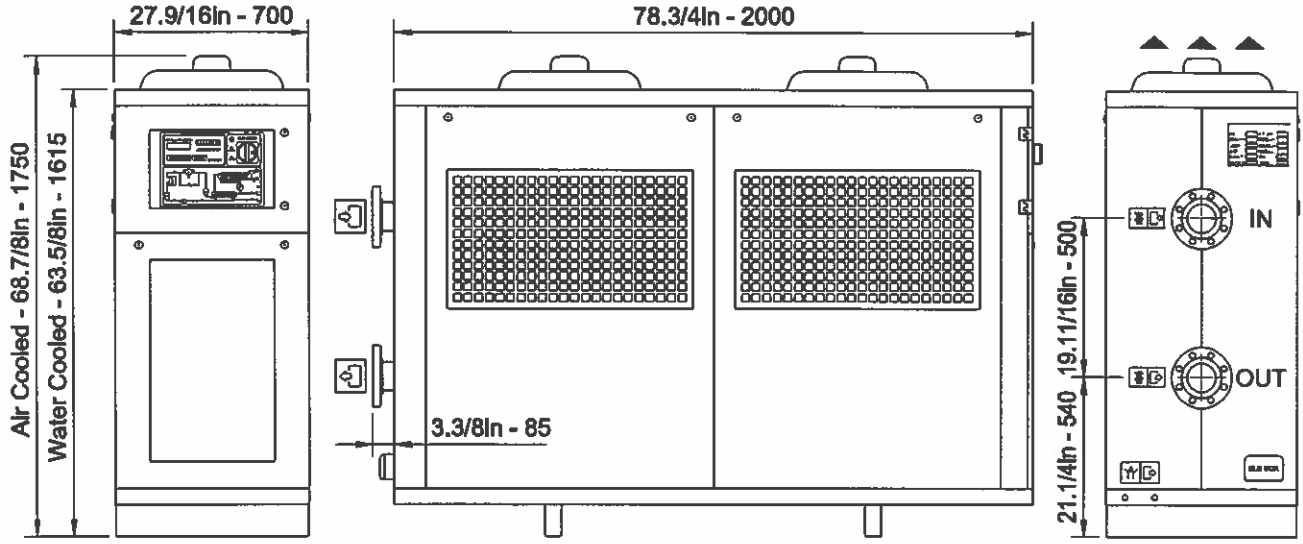
4.2 TECHNICAL FEATURES OF DRYERS SERIES TDF210, TDF285 and TDF340



		Air cooled unit			Water cooled unit		
DRYER MODEL		**TDF210**	**TDF285**	**TDF340**	**TDF210**	**TDF285**	**TDF340**
Air flow rate at nominal condition [1]	[scfm]	740	1000	1200	740	1000	1200
	[Nl/min]	21000	28500	34000	21000	28500	34000
	[Nm³/h]	1260	1710	2040	1260	1710	2040
Pressure DewPoint at nominal condition[1]	[°F - °C]	38 – 3.3					
Nominal ambient temperature	[°F - °C]	100 - 37.8					
Max. ambient temperature	[°F - °C]	115 – 45			130 – 55		
Min. ambient temperature	[°F - °C]	34 – 1					
Nominal inlet air temperature	[°F - °C]	100 - 37.8					
Max. inlet air temperature	[°F - °C]	115 – 45					
Nominal inlet air pressure	[psig – barg]	100 - 6.9					
Max. inlet air pressure	[psig - barg]	174 – 12					
Max. outlet air pressure drop - Δp	[psi - bar]	4.4 - 0.3					
Inlet-outlet air connection		Flange 3" #150					
Refrigerant type		R404A					
Refrigerant charging	[oz – kg]	180 – 5.0	245 – 7.0		180 – 5.0	245 – 7.0	
Cooling air capacity	[cfm - m³/h]	3240 5500	2830 – 4800		-		
Cooling water capacity at 60°F-15°C	[gpm - m³/h]	-			2.7/8 – 0.8	3.5/8 – 1.0	4 – 1.1
Cooling water capacity at 85°F-30°C	[gpm - m³/h]	-			8.3/4 – 2.4	11 – 3.0	12 1/8 – 3.3
Maximum water temperature	[°F - °C]	-			86 – 30		
Maximum water pressure	[psig – barg]	-			145 - 10		
Max. water pressure drop	[psi – bar]	-			4.4 - 0.3		
Cooling water connections		-			1" NPT-F		
Power supply	[Phase/V/Hz]	3/575/60					
Nominal electric consumption	[A]	7.2	8.1	9.0	6.0	7.0	7.9
Max. electric consumption	[A]	8.1	9.1	10.2	7.0	8.0	9.1
Compressor power	[HP]	3.5	4	4.6	3.5	4	4.6
Weight	[lbs - kg]	1120 - 510	1300 - 590	1320 - 600	1080 - 490	1260 - 570	1280 - 580
Max. noise level		> 70 dbA at 40in (1mt)					

[1] The nominal condition refers to an ambient temperature of 100°F with inlet air at 100 psig and 100°F.

4.3 TECHNICAL FEATURES OF DRYERS SERIES TDF420, TDF520 and TDF680



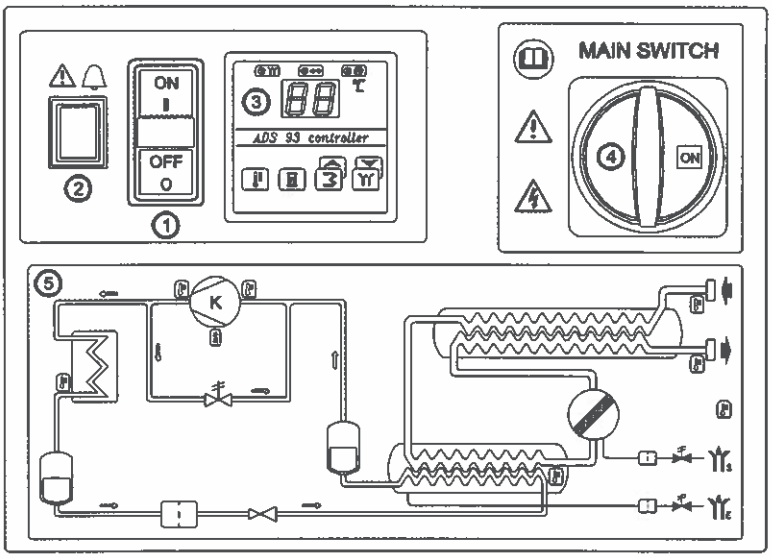
		Air cooled unit			Water cooled unit		
DRYER MODEL		**TDF420**	**TDF520**	**TDF680**	**TDF420**	**TDF520**	**TDF680**
Air flow rate at nominal condition [1]	[scfm]	1480	1830	2400	1480	1830	2400
	[Nl/min]	42000	52000	68000	42000	52000	68000
	[Nm³/h]	2520	3120	4080	2520	3120	4080
Pressure DewPoint at nominal condition[1]	[°F - °C]	38 – 3.3					
Nominal ambient temperature	[°F - °C]	100 - 37.8					
Max. ambient temperature	[°F - °C]	115 – 45			130 – 55		
Min. ambient temperature	[°F - °C]	34 – 1					
Nominal inlet air temperature	[°F - °C]	100 - 37.8					
Max. inlet air temperature	[°F - °C]	115 – 45					
Nominal inlet air pressure	[psig – barg]	100 - 6.9					
Max. inlet air pressure	[psig – barg]	174 – 12					
Max. outlet air pressure drop - Δp	[psi – barg]	4.4 - 0.3					
Inlet-outlet air connection		Flange 4" #150					
Refrigerant type		R404A					
Refrigerant charging	[oz – kg]	280 – 8.0	320 – 9.0	390 – 11.0	280 – 8.0	320 – 9.0	390 – 11.0
Cooling air capacity	[cfm - m³/h]	7060 - 12000		7180 12200	-		
Cooling water capacity at 60°F-15°C	[gpm - m³/h]	-			5.1/8 – 1.4	7 – 1.9	8.3/4 – 2.4
Cooling water capacity at 85°F-30°C	[gpm - m³/h]	-			15.3/4 – 4.3	20.7/8 – 5.7	26.3/4 – 7.3
Maximum water temperature	[°F - °C]	-			86 – 30		
Maximum water pressure	[psig – barg]	-			145 – 10		
Max. water pressure drop	[psi – bar]	-			4.4 - 0.3		
Cooling water connections		-			1.1/2" NPT-F		
Power supply	[Phase/V/Hz]	3/575/60					
Nominal electric consumption	[A]	12.3	14.4	18.2	10.1	12.1	14.9
Max. electric consumption	[A]	13.8	16.3	20.8	11.6	14.0	17.5
Compressor power	[HP]	6	8.5	10	6	8.5	10
Weight	[lbs - kg]	1600 - 730	1750 - 790	1980 - 900	1500 - 690	1650 - 750	1870 - 850
Max. noise level		> 70 dbA at 40in (1mt)					

[1] The nominal condition refers to an ambient temperature of 100°F with inlet air at 100 psig and 100°F.

5.1 CONTROL PANEL

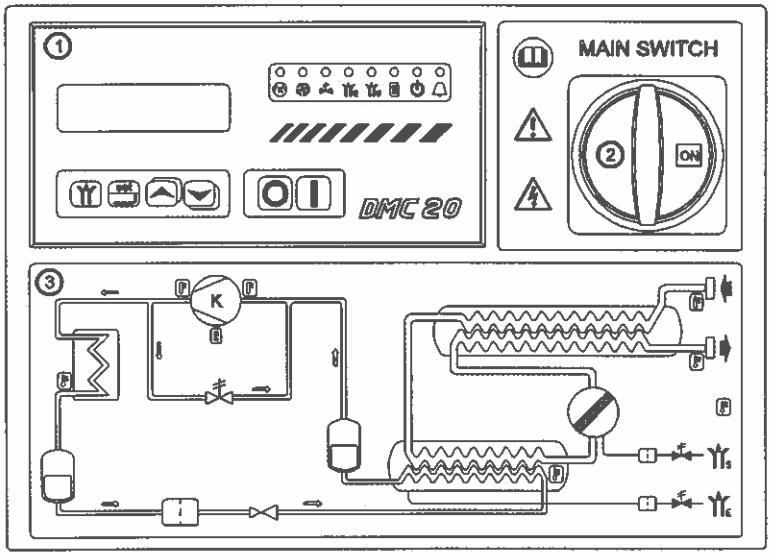
The control panels illustrated below are the only dryer-operator interface.

ADS93 Controller



1. ON/OFF switch with mains detecting light.
2. Alarm light
3. ADS93 Controller
4. Main switch
5. Air and refrigeration circuit flow diagram

DMC20 Air Dryer Controller

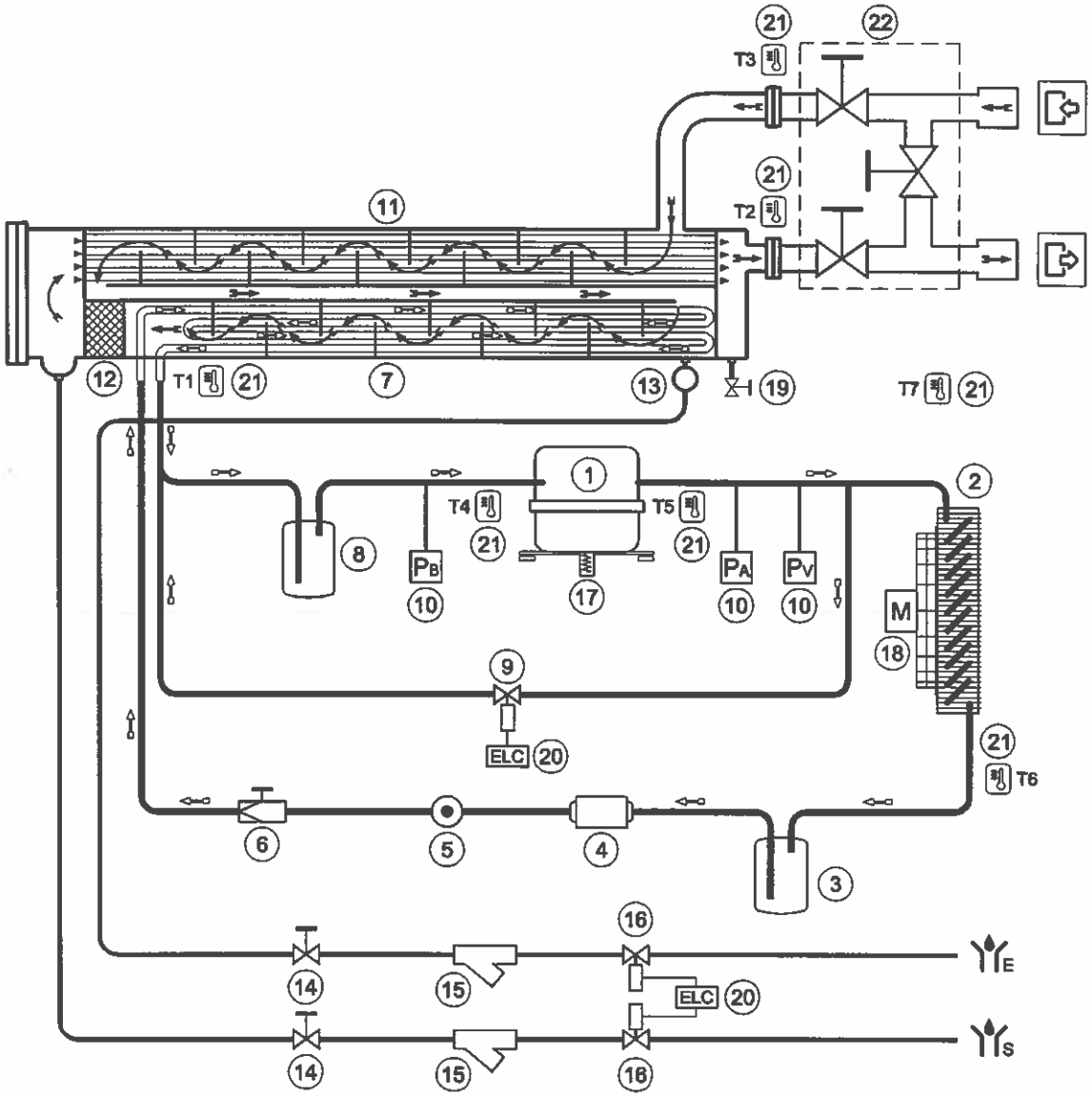


1. DMC20 Air Dryer Controller
2. Main switch
3. Air and refrigeration circuit flow diagram

5.2 OPERATION

The dryer described in this manual basically consists of two separated circuits: a compressed air circuit, divided into two heat exchangers, and a refrigeration circuit.
The warm and humid entering air goes through an air-to-air heat exchanger before entering the evaporator (air-to-refrigerant heat exchanger) where, due to the contact with the refrigeration circuit, it cools down to allow the condensation of the humidity it contains. The condensed humidity is partially expelled on the first part of the evaporator and partially discharged after the "demister" condensate separator.
The cooled air goes through the air-to-air heat exchanger, where it partially warms up in cooling down the entering warm air (pre-refrigeration).
The refrigeration circuit needed for these operations is basically composed of a refrigeration compressor, a condenser and an evaporator, also called air-to-refrigerant heat exchanger.

5.3 FLOW DIAGRAM (air cooled units)

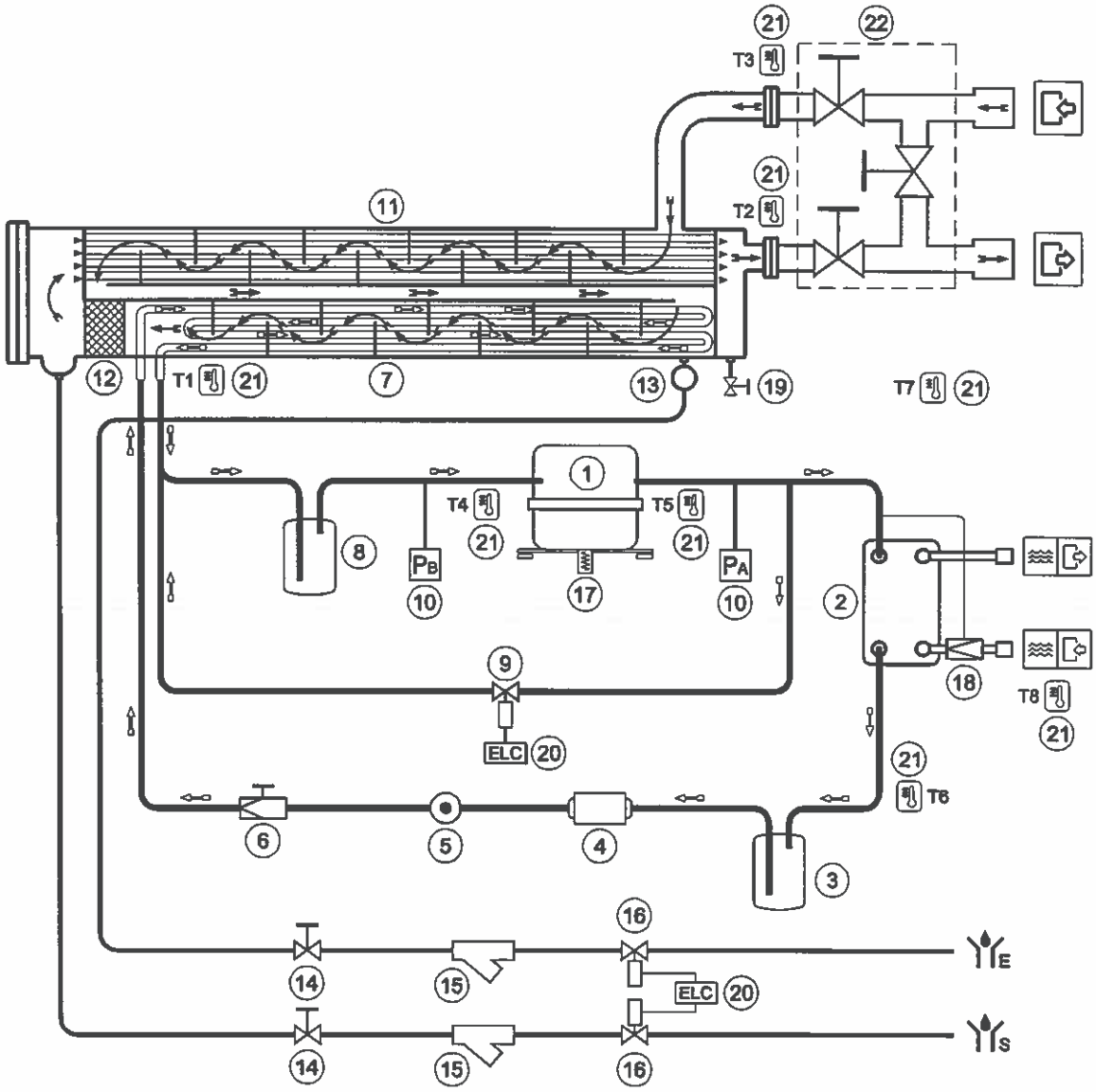


1. Compressor
2. Condenser unit
3. Liquid receiver
4. Solid filter dryer
5. Liquid sight-glass
6. Thermostatic expansion valve - TEX
7. Evaporator - Air-to-refrigerant heat exchanger
8. Liquid separator
9. Hot gas by-pass solenoid valve
10. Refrigerant pressure switch PA - PB - PV
11. Air-to-air heat exchanger
12. "Demister" condensate separator
13. Condensate accumulator
14. Condensate drain service valve
15. Condensate strainer
16. Condensate drain solenoid valve
17. Compressor crankcase heater
18. Condenser unit fan
19. Service valve
20. Electronic controller – ADS93 or DMC20
21. Temp.probes - T1 & T6 ADS93 - T1 to T7 DMC20
22. By-pass system (optional)

Air flow direction

Refrigerant flow direction

5.4 FLOW DIAGRAM (water cooled units)



1. Compressor
2. Condenser unit
3. Liquid receiver
4. Solid filter dryer
5. Liquid sight-glass
6. Thermostatic expansion valve - TEX
7. Evaporator - Air-to-refrigerant heat exchanger
8. Liquid separator
9. Hot gas by-pass solenoid valve
10. Refrigerant pressure switch P_A - P_B
11. Air-to-air heat exchanger
12. "Demister" condensate separator
13. Condensate accumulator
14. Condensate drain service valve
15. Condensate strainer
16. Condensate drain solenoid valve
17. Compressor crankcase heater
18. Condenser water regulating valve
19. Service valve
20. Electronic controller – ADS93 or DMC20
21. Temp.probes - T1 & T6 ADS93 - T1 to T8 DMC20
22. By-pass system (optional)

Air flow direction

Refrigerant flow direction

5.5 REFRIGERATION COMPRESSOR

The compressor is the pump of the system where the refrigerant coming from the evaporator (low pressure side) is compressed up to the condensation pressure (high pressure side).
All the compressor used are manufactured by primary companies and are designed for applications where high compression ratios and wide temperature changes are present.
The fully sealed construction is perfectly gas tight, so ensuring high energy efficiency and long useful life.
The pumping unit is supported by dumping springs, in order to consistently reduce the acoustic emission and the vibration diffusion.
The electric motor is cooled down by the aspirated refrigerant gas, which goes through the coils before reaching the compression cylinders. The internal type thermal protection protects the compressor from overloads. The protection is automatically restored as soon as the nominal temperature conditions are reached.

5.6 CONDENSER (air cooled units)

The condenser is the element in which the refrigerant gas coming from the compressor is cooled and condensed into a liquid. Mechanically, the condenser is a copper tube coil with aluminium fins to improve heat transfer. Cooling air flow is provided by high efficiency multi blade axial fan(s).
The coil and fan assembly are contained in a robust, pressed steel enclosure.
For correct operation of the condenser the temperature of the ambient air should not exceed the nominal values. It is important **TO KEEP THE UNIT FREE FORM DUST AND OTHER IMPURITIES**.

5.7 CONDENSER (water cooled units)

The condenser is the element in which the refrigerant gas coming from the compressor is cooled and condensed into a liquid. The condenser is a water/refrigerant heat exchanger comprised of a copper tube bundle contained in a carbon steel vessel.
The temperature of the inlet water must not exceed the nominal values. Reliable condenser performance is dependant on adequate water flow and **THAT THE WATER ENTERING THE EXCHANGER IS FREE OF IMPURITIES AND IS CHEMICALLY NEUTRAL**.
The condenser unit of each water cooled dryer is sized in order to satisfy the customer requirements (i.e. inlet water temperature, water temperature rise, etc). Due to this the water consumption indicated in technical features can be different from the real value. Do not hesitate to contact us and ask for the real water consumption at your condition. For ordering a condenser unit as spare part, it is necessary to specify the dryer label data and the condenser unit label data.

5.8 CONDENSER WATER REGULATING VALVE (water cooled units)

The condenser water valve regulates water flow to keep the condensing pressure/temperature constant under varying dryer load conditions.
When the dryer stops the valve automatically closes the cooling water flow.

The condenser water regulating valve is an operating control device.
The closure of the water regulating valve should not be used as a secure closure of the cooling water system during service operations on the dryer.

ADJUSTMENT
The condenser water regulating valve is adjusted during factory testing to a pre-set value that covers 90% of the applications. However, extreme operating conditions of the dryer may require a more accurate calibration. During start-up, a qualified technician should check the condensing pressure / temperature and if necessary adjust the valve by using the screws on the valve itself.
To increase the condensing temperature, turn the adjusting screws counter-clockwise; to lower it turn the screws clock-wise.
Adjust the valve in order to guarantee a condensing gauge temperature of 110-113°F (44-45°C).

5.9 LIQUID RECEIVER

As the volume of the refrigeration circuit and system components does not allow sufficient condensed refrigerant liquid to be stored, a liquid receiver is installed between the condenser and the evaporator.This makes available a reserve volume of refrigerant liquid able to handle sudden increases in thermal load on the evaporator.

5.10 DEHYDRATION FILTER

The function of the dehydration filter, located before the thermostatic expansion valve, is to remove impurities and moisture from the refrigerant stream, so avoiding their circulation within the system.

5.11 LIQUID SIGHT-GLASS

It is installed in the refrigerant piping system and it is used to check for the presence of moisture. It is fitted with a special chemical substance that changes colour according to the percentage of humidity in the refrigerant. It signals an unusual and dangerous increase in the moisture content of the refrigeration circuit.

5.12 THERMOSTATIC EXPANSION VALVE - TEX

The purpose of this valve is to regulate the refrigerant flow across the dryer relative to the heat load. It's operation is to maintain a constant condition in the evaporator, regardless of load variations, to provide the correct dew point and prevent liquid refrigerant returning to the compressor.

5.13 EVAPORATOR

Also called air-to-refrigerant heat exchanger, this range of dryers is of the type featuring a copper tubing package included in a steel shell. The refrigerant circulates inside the copper tubing, while the air to be cooled down, conveyed by a proper number of diaphragms, goes through the full length of the evaporator.
The evaporation of the liquid accumulated in the condenser takes place in this part of the circuit. During the evaporation phase, the refrigerant absorbs the heat of the compressed air in the other side of the exchanger.

5.14 LIQUID SEPARATOR

It prevents the return of liquid refrigerant to the compressor separating droplets not evaporated from the refrigerant flow.

5.15 HOT GAS BY-PASS SOLENOID VALVE

This valve is located between the pressure side of the compressor and the terminal side of the evaporator. Its purpose is to avoid that in conditions of low thermal charge in the dryer (low air flow or relatively cold air) the temperature inside the evaporator will drop below 32°F (0°C). Temperature below 32°F (0°C) would eventually allow the formation of ice inside the evaporator, with the consequent clogging of the air port and, in the worst of the cases, the rupture of the evaporator itself. The coil of the solenoid valve is piloted by the electronic controller.

5.16 AIR-TO-AIR HEAT EXCHANGER

All the dryers of this range are provided with an air-to-air heat exchanger featuring a copper tubing package included in a steel shell. The purpose of this exchanger is the transmission of the heat of the incoming air to the exiting cold air. The benefits of this solution are basically two : the incoming air is partially cooled down, therefore the chilling system can be sized for a lower thermal drop, thus allowing a 40÷50% energy saving; moreover, as cool air will never reach the compressed air circuit, no condensate will form on the external surface of the piping.

5.17 "DEMISTER" CONDENSATE SEPARATOR

The cold air exiting the evaporator goes through the "demister" type condensate separator featuring a stainless steel net. As the condensate transported by the air gets in contact with the metallic net of the "demister" it is separated and expelled by means of the draining device. The resulting cold and dry air is then conveyed into the air-to-air heat exchanger.
The "demister" type separator offers the benefit to be highly efficient even with variable flow rates and to not require special maintenance. It is also easily accessible by removing the blind flange located at he end of the exchanger group.

5.18 REFRIGERANT PRESSURE SWITCH PB - PA - PV

To provide operational safety and protection for the dryer, a series of pressure switches are installed in refrigerant circuit.

PB : Low pressure controller device on the suction side of the compressor. This switch operates if the pressure drops below the pre-set value. The values are automatically reset when the nominal conditions are restored.

Calibrated pressure : Stop 14.5psi (1.0bar) - Restart 72.5psi (5.0bar)

PA : This high pressure controller device, located on the delivery side of the compressor, is activated when the pressure exceeds the pre-set value. It features a manual resetting button mounted on the controller itself.

Calibrated pressure : Stop 420psi (29bar) - Manual Reset

PV : Condenser unit fan control pressure safety switch placed at the outlet side of condenser unit. It keeps the condensation temperature/pressure constant within preset limits (air cooled).

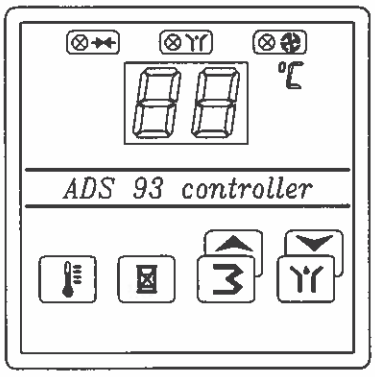
Calibrated pressure : Stop 260psi/104°F (18bar/40°C) - Restart 320psi/122°F (22bar/50°C)

5.19 COMPRESSOR CRANKCASE HEATER

At low temperatures, when the compressor starts, oil can be drawn into the refrigeration circuit and liquid hammering could occur.To prevent this, an electrical resistance heater is installed in the suction side of the compressor. When the system is powered and the compressor is not running, this heater keeps the oil at the correct temperature. This heater is controlled by a thermostat which prevents overheating the oil.

NOTE : The heater must be powered at least a couple of hours before the start up of the refrigeration compressor.

5.20 ADS93 CONTROLLER



Button - It displays the Set-Point (activation temperature of the hot gas by-pass solenoid valve).

Button - It displays the pause period of the condensate drain.

Button - It displays the condensing temp. / increments the displayed value.

Button - Condensate drain test / reduction of the displayed value.

Green LED - Hot gas by-pass solenoid valve ON.

Yellow LED - Condensate drain solenoid valve ON.

Green LED – Not used.

The ADS93 Controller controls all the functions of the dryer, allowing also the setting of all the parameters. A probe located at the end of the evaporator controls the activation of the hot gas by-pass solenoid valve. A second probe, located at the end of the condenser, reads condensing temperature. Moreover, the ADS93 Controller acts as a timer controlling the activation at regular intervals of the condensate drain solenoid valves. During the final test, the following values are factory set :

- The hot gas by-pass solenoid valve is activated when a temperature below the SetPoint (+1°C) is detected, and it is deactivated at a temperature equal to the SetPoint + Differential SetPoint (1 + 1 = +2°C). To modify the Set-Point (within the limits SL and Sh set while programming), hold down the button and change the value with the buttons and .
- Condensate drain solenoid valve: It remains ON for a period equal to dr (3 seconds) with a 60 seconds pause. To change the pause time between two successive drainage (within the limits rL and rh set while programming) hold down the button and modify the value with the buttons and .

At the start up, the dryer displays the current DewPoint temperature.

Pressing the button the condensing temperature will be displayed.

5.20.1 SET-UP

Holding down simultaneously the buttons and for at leas 5 seconds **the Set-Up is initiated** and on the display will appear SL .

To select the desired parameter, press sequentially the button .

To change the value of the selected parameter, use the buttons and .

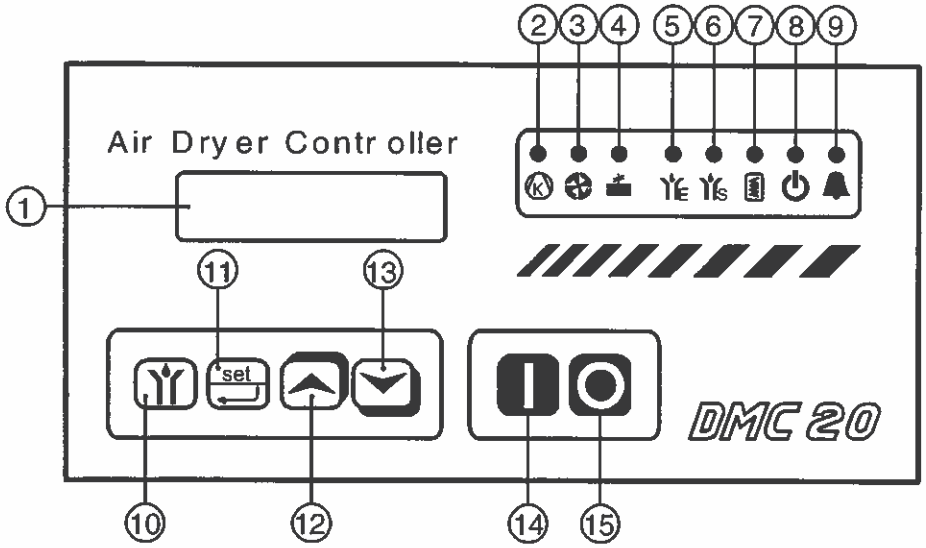
All the parameters can be modified referring the following table.

Display	Description	Adjustment Range	Pre-set value	Equal to
SL	Minimum limit of the Set-Point	-9 ÷ 30	01	+1 °C
Sh	Max. limit of the Set-Point	SL ÷ 30	05	+5 °C
SY	Differential value of the Set-Point	1 ÷ 7	01	1 °K
rL	Minimum limit for the condensate drain pause	01 ÷ 99	06	60 sec
rh	Max. limit for the condensate drain pause	rL ÷ 99	18	180 sec
dr	Duration of he condensate drainage	01 ÷ 99	30	3 sec
FS	Not in use	00 ÷ 99	-	-
FY	Not in use	00 ÷ 15	-	-
o1	Not in use	-9 ÷ 09	-	-
o2	Not in use	-9 ÷ 09	-	-

To exit the programming mode, press any time the key .

In case any entry is made within 10 seconds, the system exits automatically the programming mode.

5.21 DMC20 AIR DRYER CONTROLLER



1. Back-lighted LCD display
2. Led compressor ON
3. Led condenser fan(s) ON
4. Led hot gas by-pass solenoid valve ON
5. Led evaporator condensate drain solenoid valve ON
6. Led condensate separator drain solenoid valve ON
7. Led crankcase heater ON
8. Led dryer in Stand-by
9. Led alarm ON
10. Condensate drain test button
11. Set-up access button
12. Incremental button
13. Decrement button
14. Dryer start-up button
15. Dryer stop button

The DMC20 controls all the operations, the alarms and the operational setting of the dryer. By means of a 32 characters display it shows all the operating conditions. In case of abnormalities, a set of messages in the selected language allow a fast detection of the fault and the relevant solution.

5.21.1 DISPLAY MESSAGES

When the main switch is turned ON, all the characters of the DMC20 display are activated for 2 seconds. Afterwards, appears the software release, and finally the two lines of the display are ready for their normal functions.
When the dryer is in stand-by condition, the display shows "Stand-by", and the "crankcase heater" and "Stand-by" leds are ON. If the remote command is in use, the display shows "Stand-by Remote".
To switch ON the dryer, keep the button [14] "Dryer Start-up" pressed for at least 2 seconds. The upper line of the display will show the DewPoint. The following parameters can be selected and displayed on the lower line:

Air →O	- temperature of the incoming air in °C
Air ←O	- temperature of the outgoing air in °C
Compr.LP	- suction temperature of the compressor (low pressure side) in °C
Compr.HP	- discharge temperature of the compressor (high pressure side) in °C
Condens.	- condensing temperature in °C
Ambient	- ambient temperature in °C
Water →O	- inlet temperature of the cooling water (water cooled) in °C
Working	- operating time of the dryer in hours

The parameter to be displayed on the lower line is selected pressing the [12] or [13] keys.
In alarm condition, the list of the parameter to be displayed will include the DewPoint.
To switch OFF the dryer, keep the [15] button "Dryer Stop" pressed for at least 2 seconds.

- **DewPoint Set** : Selection of the intervention point of the hot gas by-pass solenoid valve. When the DewPoint falls below the pre-set temperature, the hot gas solenoid valve is activated. The range can be adjusted at level 2.
- **DewPoint Diff.** : This is the differential temperature to switch OFF the hot gas by-pass solenoid valve. For example, setting on 2 the "DewPoint Set" value and on 1 the "DewPoint Diff." value, the hot gas by-pass solenoid valve is activated when the DewPoint falls below 2°C and is switched OFF when the DewPoint rises over 3°C.
- **E Drain Time** : Setting of the condensate drainage time of the solenoid valve located before the evaporator.
- **E Drain Pause** : Setting of the pause of time between two successive condensate drainage of the solenoid valve located before the evaporator.
- **S Drain Time** : Setting of the condensate drainage time of the solenoid valve located on the condensate separator
- **S Drain Pause** : Setting of the pause time between two successive condensate drain cycles of the valve located on the condensate separator.
- **Display Contrast** : Adjustment of the contrast of the LCD display, depending on the observation angle, the illumination, the ambient temperature, etc.

LEVEL 2

- **Min DewPoint** : This is the minimum value of the adjustable range for "DewPoint Set" at level 1.
- **Max DewPoint** : This is the maximum value of the adjustable range for "DewPoint Set" at level 1.
- **Low DewPoint !** : Setting of the threshold activating the alarm for the low DewPoint.
- **Low DP ! Diff.** : This is the differential temperature to deactivate the low DewPoint alarm.
- **Low DP ! Delay** : Setting in minutes of the delay for the low DewPoint alarm. For example, setting the "Low DewPoint !" value on -5, the "Low DP ! Diff." value on 6, and the "Low DP ! Delay" value on 10, the alarm is activated when the DewPoint remains below -5°C for at least 10 minutes and goes off as soon as the DewPoint goes over +1°C.
- **Low DP ! Stop** : Selecting "YES", it is possible to enable the low DewPoint alarm to switch OFF the dryer, otherwise a simple alarm signal is displayed.
- **High DewPoint !** : Setting of the activation threshold for the high DewPoint.
- **High DP ! Diff.** : This is the differential temperature to deactivate the high DewPoint alarm.
- **High DP ! Delay** : Setting in minutes of the delay for the high DewPoint alarm. For example, setting the "High DewPoint !" value on 15, the "High DP ! Diff." value on -5, and the "High DP ! Delay" value on 10, the alarm is activated when the DewPoint remains over 15°C for at least 10 minutes an goes off as soon as the DewPoint goes below +10°C.
- **High DP ! Stop** : Selecting "YES", it is possible to enable the high DewPoint alarm to switch OFF the dryer, otherwise a simple alarm signal is displayed.
- **Condensation !** : Setting of the activation threshold for the condensing temperature too high.
- **Condens.! Diff.** : This is the differential temperature to deactivate the high condensing temperature alarm.
- **Condens.! Delay** : Setting in minutes of the delay for the alarm when the condensing temperature is too high. For example, setting the "Condensation !" value on 60, the "Condens.! Diff." value on -5, and the "Condens.! Delay" value on 10, the alarm is activated when the condensing temperature remains over +60°C for at least 10 minutes and goes off as soon as it falls, below +55°C. **NOTE:** the condensing temperature," too high alarm" will switch OFF the dryer.
- **Start at PowerUp** : At factory setting of "NO", each time the dryer is powered ON it will always enter the Stand-by condition; Selecting "YES", the dryer will continue the function it was performing at the moment of the power cut off (Stand-by if it was in Stand-by conditions, ON if it was ON).

SELECTING "YES" THE USER WILL BE RESPONSIBLE FOR THE INSTALLATION OF PROPER PROTECTION FOR POSSIBLE SUDDEN POWER RESTORATION TO THE DRYER.

- **Recovery After !** : Automatic alarms recovery. Selecting "NO", in case of the activation of an alarm that stopped the dryer, the operator will have to stop the alarm switching the dryer to stand-by condition

operational condition as soon as the nominal conditions will be restored.

5.21.2 ALARMS

Any alarm condition is indicated by the flashing of the [9] led "Alarm" and the DMC20 activates a buzzer tone in order to alert the operator. The operator can stop the buzzer by pressing any key.
The cause of the alarm will be displayed on the upper line of the LCD display

Alarm Message	Cause	Intervention Point	Intervention Delay	Remarks
Protection Comp.	Thermal/electrical protection of the compressor	-	No delay	The dryer is stopped
Protection Fan (air cooled)	Thermal/electrical protection of the fan	-	No delay	The dryer is stopped
STOP Compr.LP	Refrigerant low pressure switch (PB)	14.5psi (1.0bar)	No delay	The dryer is stopped
STOP Compr.HP	Refrigerant high pressure switch (PA)	420psi (29bar)	No delay	The dryer is stopped
Condens. HIGH	Condensation temperature too high (probe T6)	50 ÷ 70 °C	0.5 ÷ 20 min adjustable	The dryer is stopped
DewPoint LOW	DewPoint low (probe T1)	-10 ÷ 0 °C	0.5 ÷ 20 min adjustable	The operator can select to stop the dryer
DewPoint HIGH	DewPoint high (probe T1)	10 ÷ 20 °C	0.5 ÷ 30 min adjustable	The operator can select to stop the dryer
Probe Fault	One of the probes is faulty	-	No delay	The dryer does not stop

ALARMS MEMORY

When the **"Start at PowerUp"** and **"Recovery After !"** functions are deactived (Note, this is the standard factory setting, set at **"NO"**) any alarm causing the dryer to stop and any anomaly with one or more probes (Probe Fault) is stored in the memory of DMC20. To reset the alarm memory the dryer is to be switched OFF (keep the button [15] "Dryer Stop" pressed for at least 2 seconds). The dryer is then to be switched ON again (keep the button [14] "Dryer Start-up" pressed for at least 2 seconds). If the alarm is no longer in effect the dryer will run correctly, otherwise the alarm message will appear again.
When **"Start at PowerUp"** and **"Recovery After !"** functions are activated (customer selected setting **"yes"**) any alarm which has caused the stop of the dryer and any anomaly with one or more probes (Probe Fault) is automatically reset once nominal conditions return and the dryer will run again automatically.
Any alarm which is not causing the stop of the dryer is reset automatically when nominal working conditions return.

5.21.3 SET-UP

The DMC20 is adjusted during the final test of the dryer. Where particular requirements concerning the operation or the alarm management exist, the user can change the setting of the programmed parameters.
Set-up parameters are divided in two levels: anybody can access the level 1, while the access to level 2 is reserved to authorised personnel provided with the password. The password is specified in the last page of this manual.
To access to Set-up mode the [11] "Set-up access" button must be depressed for at least 2 seconds. Then it will be possible to display the desired parameter using the [12] and [13] keys. To modify the displayed parameter, use the [12] and [13] keys, while keeping the [11] key depressed.
During Set-up, the upper line of the display will display the selected parameter, while the lower line will show the current value of the same parameter.
To exit Set-up mode, press simultaneously the [12] and [13] keys, or wait 20 seconds.

NOTE : The character "!" means "Alarm"

DESCRIPTION OF SET-UP PARAMETERS

LEVEL 1

- **Pass Code?** : The system asks for the password to access the level 2 of the programming parameters. If the password is not modified or wrong, only the parameters of level 1 will be accessible. **NOTE:** The password can be modified only when the dryer is in stand-by; therefore during operation, only the level 1 will be accessible.
- **Language** : It is possible to select the language for the alarm and dialogue messages.

SET-UP PARAMETERS TABLE

	Parameter	Description	Adjustment Range	Std Value
LEVEL 1	Pass Code ?	Password to access level 2	0 ÷ 255	0
	Language	Selection of the language for dialogue and alarm messages	Italian - English German - French	
	DewPoint Set	Activation temperature of the hot gas solenoid valve	Min ÷ Max DewPoint	1.0 °C
	DewPoint Diff.	Differential temperature of the hot gas solenoid valve	0.2 ÷ 10.0 °K	0.2 °K
	E Drain Time	Evaporator discharge time	0 ÷ 50 sec	3 sec
	E Drain Pause	Pause between two Evaporator discharges	0.5 ÷ 10 min	1.0 min
	S Drain Time	Discharge time of the condensate separator	0 ÷ 50 sec	2 sec
	S Drain Pause	Pause between two condensate separator discharges	0.5 ÷ 10 min	2.0 min
	Display Contrast.	Adjustment of the Display contrast	0 ÷ 100	50
LEVEL 2	Min DewPoint	Minimum value for the DewPoint setting range	-19.9 ÷ 19.9 °C	1.0 °C
	Max DewPoint	Maximum value for the DewPoint setting range	Min DewPoint ÷ 19.9 °C	4.0 °C
	Low ! DewPoint	Temperature of interv. for the too low DewPoint alarm	-10.0 ÷ 0.0 °C	-5 °C
	Low DP ! Diff.	Differential temperature for the too low DewPoint alarm	1.0 ÷ 10.0 °K	6 °K
	Low DP ! Delay	Delay time for the too low DewPoint alarm	0.5 ÷ 20 min	10 min
	Low DP ! Stop	STOP enabled in case the DewPoint of the dryer is too low	YES/NO	NO
	High DewPoint !	Temperature of interv. for the too high DewPoint alarm	10.0 ÷ 20.0 °C	15 °C
	High DP ! Diff.	Differential temperature for the too high DewPoint alarm	-1.0 ÷ -10.0 °K	-5 °K
	High DP ! Delay	Delay time for the too high DewPoint alarm	0.5 ÷ 30 min	20 min
	High DP ! Stop	STOP enabled in case the DewPoint of the dryer is too high	YES/NO	NO
	Condensation !	Temp. of intervention for the too high condensation temperature alarm	50.0 ÷ 70.0 °C	60.0 °C
	Condens ! Diff.	Differential temp. for the too high condensation temperature alarm	-1.0 ÷ -10.0 °K	-5 °K
	Condens. ! Delay	Delay time for the too high condensation temp. alarm	0.5 ÷ 20 min	10 min
	Start at PowerUp	Machine enabled to restore its operation after a power black out	YES/NO	NO
	Recovery After !	Automatic alarms reset	YES/NO	NO
	Peripheral No.	Unit address for serial communication	01 ÷ 255	01

5.21.4 REMOTE COMMAND

It is possible to remotely switch the dryer ON and OFF by means of a simple switch connected with two wires to the DMC20 (see terminal 16 and 17 on the electric diagram). Closing the contact of the command switch, on the display appears the message "Stand-by Remote", and no functions will be selectable on the local panel; as soon as the contact is opened, the dryer returns to the previous condition (Stand-by if it was in Stand-by condition, ON if it was ON).

IF INSTALLED, THE REMOTE CONTROL HAS PRIORITY ON THE FRONTAL COMMANDS OF THE DMC20. THE USER WILL BE RESPONSIBLE FOR THE INSTALLATION OF PROPER PROTECTIONS FOR POSSIBLE SUDDEN POWER RESTORATION TO THE DRYER.

5.21.5 REMOTE ALARM SIGNAL

A voltage free contact is provided for remote annunciation of any alarm condition of the dryer (see terminal 18, 19 and 20 on the electric diagram).

5.21.6 ACCESS CODE

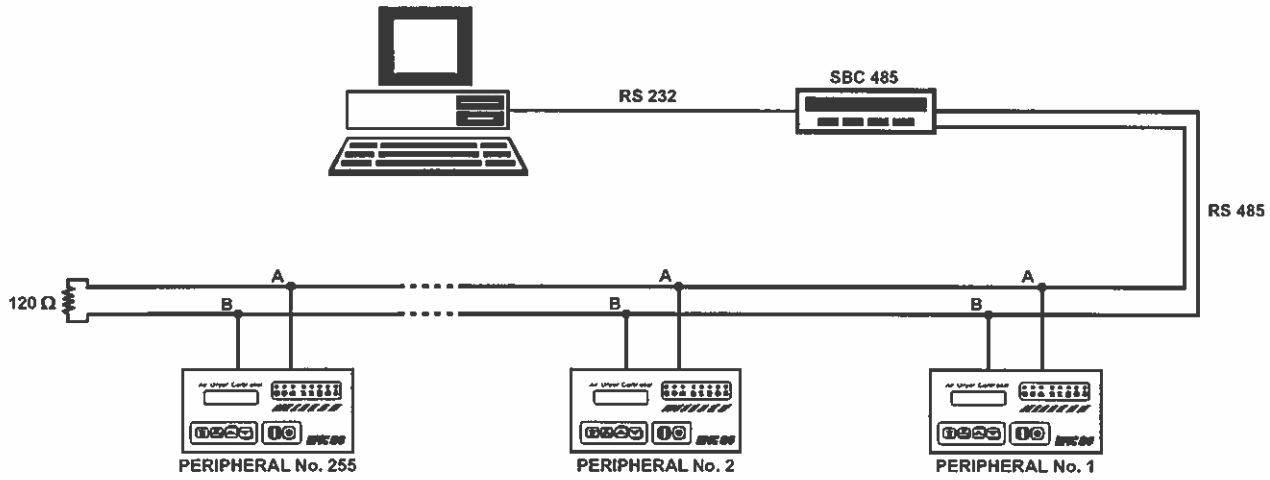
A serviceman's code is required to access level 2.

The manufacturer accepts no responsibility for damages due to the alteration of the operating parameters.

The password is specified in the last page of this manual.
The password must be kept by qualified personnel.

5.21.7 SERIAL COMMUNICATION

The DMC20 features a RS485 serial port (see terminal A and B on DMC20 back side) allowing the connection to a network managed by a PC or PLC controller.
A maximum of 255 DMC20 units can be connected to the same network.
If a PC is used, the connection between the PC and one or more DMC20 requires usage of an SBC485 interface adaptor (can be purchased as accessory - see spare parts list) to be interposed between RS232 serial port and the RS485 bus consisting of two polarized wires. The line can cover 2180yd (2000mt) maximum; for long distance (exceeding 109yd - 100mt) , it is advisable to use a shielded twisted pair polyethylene cable.
For good data transmission, it is imperative that at the cable end a 120 ohm resistor is placed in order to adapt line impedance, as shown in figure.



CONNECTIONS

COM # PC 25 pin RS232	SBC485 25 pin RS232
Shield - pin 1	n.c.
Tx - pin 2	Pin 2
Rx - pin 3	Pin 3
RTS - pin 4	Pin 4
CTS - pin 5	Pin 5
GND - pin 7	Pin 7

SBC485 9 pin RS485	DMC20 DATA connector
A - pin 1	A terminal
B - pin 2	B terminal
Shield - pin 4	n.c.

PROTOCOL

The data flow between PC and SBC485 is controlled by RTS signal. The protocol used for communication is a subset of MODICON MODBUS 1 (MB1), functions 03 and 06 only are supported. Data are exchanged in ASCII mode with the following format :

Baudrate : 9600 Data bit : 7 Stop bit : 1 Parity : even

DATABASE

Listed below are,parameter description, type and address of datas on DMC20 :

Data	Description	Type	Register Address
DewPoint	DewPoint temperature - T1 probe	Signed Integer	0000 - R
Air →O	Temperature of the incoming air - T2 probe	Signed Integer	0001 - R
Air ←O	Temperature of the outgoing air - T3 probe	Signed Integer	0002 - R
Compr.LP	Suction temperature of the compressor (low pressure side) - T4 probe	Signed Integer	0003 - R
Compr.HP	Outlet temperature of the compressor (high pressure side) - T5 probe	Signed Integer	0004 - R
Condens.	Condensing temperature - T6 probe	Signed Integer	0005 - R
Water →O	Inlet temperature of the cooling water (water cooled) - T8 probe	Signed Integer	0006 - R
Ambient	Ambient temperature - T7 probe	Signed Integer	0007 - R
Language [1)]	Selection of the language for dialogue and alarm messages	Signed Integer	0200 - R/W
DewPoint Set	Activation temp. of the hot gas by-pass solenoid valve	Signed Integer	0201 - R/W
DewPoint Diff.	Differential temp. of the hot gas by-pass solenoid valve	Signed Integer	0202 - R/W
E Drain Time	Evaporator discharge time	Signed Integer	0203 - R/W
E Drain Pause	Pause between two Evaporator discharges	Signed Integer	0204 - R/W
S Drain Time	Discharge time of the Condensate Separator	Signed Integer	0205 - R/W
S Drain Pause	Pause between two Condensate Separator discharges	Signed Integer	0206 - R/W
Display Contrast	Adjustment of the Display contrast	Signed Integer	0207 - R/W
Min DewPoint	Minimum value for the DewPoint setting range	Signed Integer	0208 - R/W
Max DewPoint	Maximum value for the DewPoint setting range	Signed Integer	0209 - R/W
Low DewPoint !	Temperature of intervention for the too low DewPoint alarm	Signed Integer	0210 - R/W
Low DP ! Diff.	Differential temperature for the too low DewPoint alarm	Signed Integer	0211 - R/W
Low DP ! Delay	Delay time for the too low DewPoint alarm	Signed Integer	0212 - R/W
High DewPoint !	Temperature of intervention for the too high DewPoint alarm	Signed Integer	0213 - R/W
High DP ! Diff.	Differential temp. for the too high DewPoint alarm	Signed Integer	0214 - R/W
High DP ! Delay	Delay time for the too high DewPoint alarm	Signed Integer	0215 - R/W
Condensation !	Temperature of intervention for the too high condensation temperature alarm	Signed Integer	0216 - R/W
Condens.! Diff.	Differential temperature for the too high condensation	Signed Integer	0217 - R/W
Condens.! Delay	Delay time for the too high condensation temp. alarm	Signed Integer	0218 - R/W
Peripheral No.	Unit address for serial communication	Signed Integer	0219 - R/W
Working	Operating time of the dryer	Signed Integer	0246 - R/W
Alarm STOP	Presence of an alarm that has stopped the dryer	bit - 1=Yes	0100.0 - R
Alarm Status	Presence of an alarm	bit - 1=Yes	0100.1 - R
Cond. Fan Switch	Status of the condenser fan control pressure switch	bit - 1=ON	0101.3 - R
Remorte ON/OFF Switch	Status of the Remote ON/OFF switch	bit - 0=Local 1=Remote	0101.6 - R
DewPoint LOW	Low DewPoint alarm ON	bit - 1=Yes	0102.0 - R
DewPoint HIGH	High DewPoint alarm ON	bit - 1=Yes	0102.1 - R
Condens. HIGH	High Condensation temperature alarm ON	bit - 1=Yes	0102.2 - R
STOP Compr.LP	Cooler low pressure switch (PB) alarm ON	bit - 1=Yes	0102.4 - R
STOP Compr.HP	Cooler high pressure switch (PA) alarm ON	bit - 1=Yes	0102.5 - R
Fan Protection	Fan thermal/electrical protections alarm ON (air cooled)	bit - 1=Yes	0102.6 - R
Protection Comp.	Compressor thermal/electrical protections alarm ON	bit - 1=Yes	0102.7 - R
Probe Fault	Probe faulty alarm ON	bit - 1=Yes	0102.8 - R

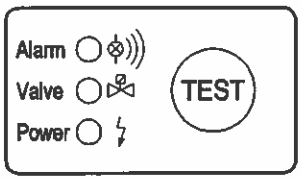
Data	Description	Type	Register Address
Low DP ! Stop	STOP enabled in case the DewPoint of the dryer is too low	bit - 1=Yes	0220.0 - R/W
High DP ! Stop	STOP enabled in case the DewPoint of the dryer is too high	bit - 1=Yes	0220.1 - R/W
Start at PowerUp	Machine enabled to restore its operation after a power black out	bit - 1=Yes	0220.2 - R/W
Recovery After !	Automatic alarms reset	bit - 1=Yes	0220.3 - R/W
ON/OFF DMC20	Status of DMC20 - ON or OFF (Stand-by)	bit - 1=Stand-by	0220.15 - R/W

Note : [1] Language selection : 00=Italian - 01=English - 02=German - 03=French
Note : R=Read - W=Write

5.22 ELECTRONIC LEVEL DRAINER - OPTIONAL

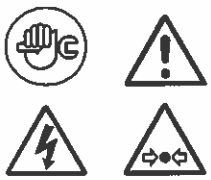
Instead of the usual drain system (a condensate accumulator plus two solenoid valves controlled by means of ADS93 Controller or DMC20 Air Dryer Controller), an electonic level controlled drain can be installed as option.
This drainer is located after the "demister" condensate separator, instead of standard EVDS. It consists of a condensate accumulator where a capacitive sensor continuosly checking liquid level is placed: as soon as the accumulator is filled, the sensor passes a signal to the electronic control and, with delay, a diaphragm solenoid valve will open to discharge the condensate.
For a complete condensate discharge the valve opening time will be adjusted exactly for each single drain operation. Right in time the discharge line will be closed again without wasting compressed air.
No condensate strainers are installed. No adjusting is required.
A service valve is installed before electronic drainer in order to make check and maintenance easily.
AT DRYER START-UP VERIFY THAT THIS VALVE IS OPEN.

CONTROL PANEL



The control panel here illustrated allows checking of drainer working.
Power : led - drainer ready to work / supplyed
Valve : led - membrane solenoid valve open / discharging
Alarm: blinking led - drainer in alarm condition
Test : button – discharge test

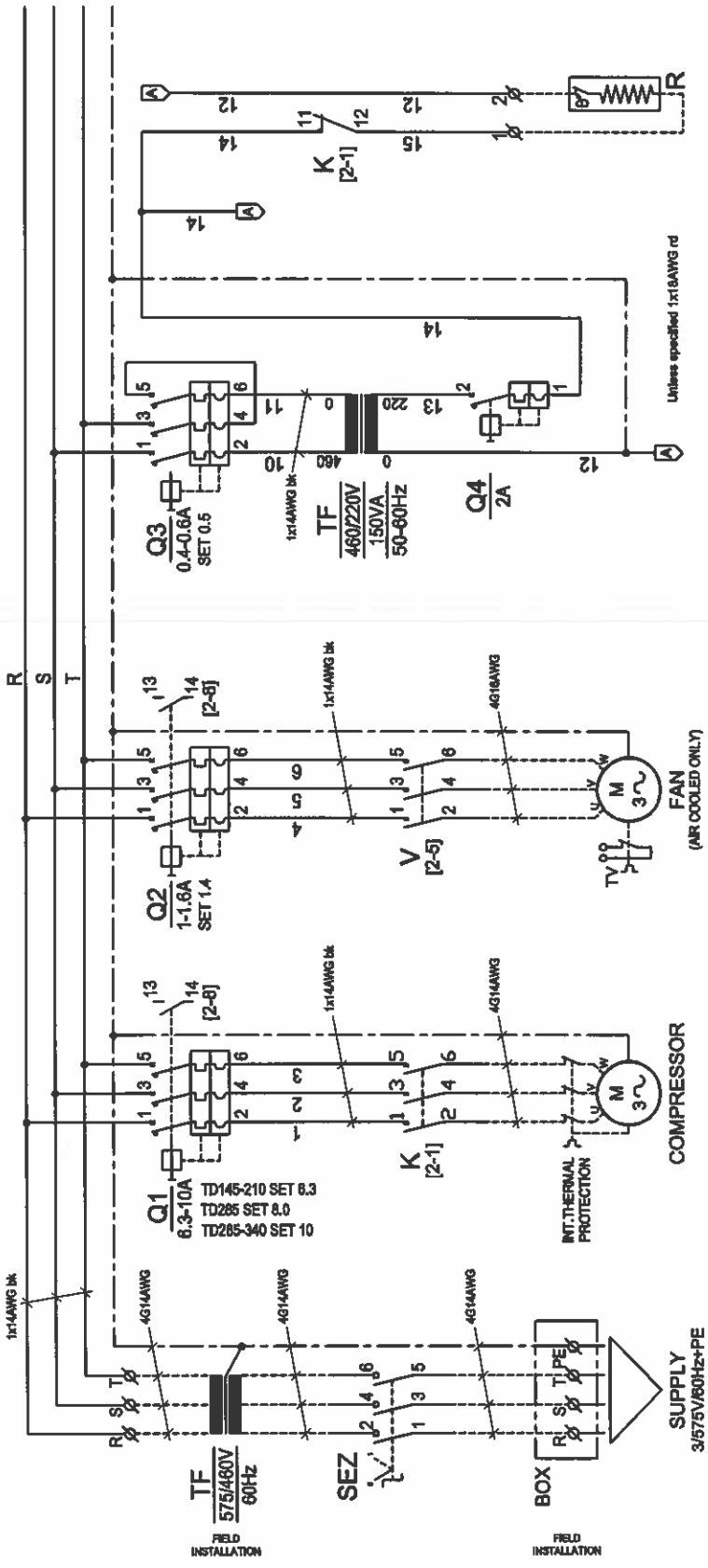
TROUBLE SHOOTING



The troubleshooting and resultant service work should be carried out by qualified personnel.
Before any intervention, be sure that :
- **any part of the drainer is powered** and that it cannot be connected to the mains supply.
- **any part of the drainer is under pressure** and that it cannot be connected to the compressed air system.

SYMPTOM	POSSIBLE CAUSE - SUGGESTED ACTION
◆No led lighting up.	➔Check for mains failure. ➔Verify the electric wiring (internal and/or external). ➔Check internal printed circuit board for possible damage.
◆Pressing of Test button, but no condensate discharge.	➔The service valve located before the drainer is closed – open it. ➔The dryer is not under pressure – restore nominal condition. ➔Solenoid valve defective – replace the drainer. ➔The internal printed circuit board is damaged – replace the drainer.
◆Condensate discharge only when Test button is pressed.	➔The capacitive sensor is too dirty – open the drainer and clean the sensor plastic tube.
◆Device keeps blowing off air.	➔The diaphragm valve is dirty - open the drainer and clean it. ➔The capacitive sensor is too dirty – open the drainer and clean the sensor plastic tube.

5.23.1 ELECTRIC DIAGRAM - POWER - TDF145 to TDF340 – ADS93 CONTROLLER

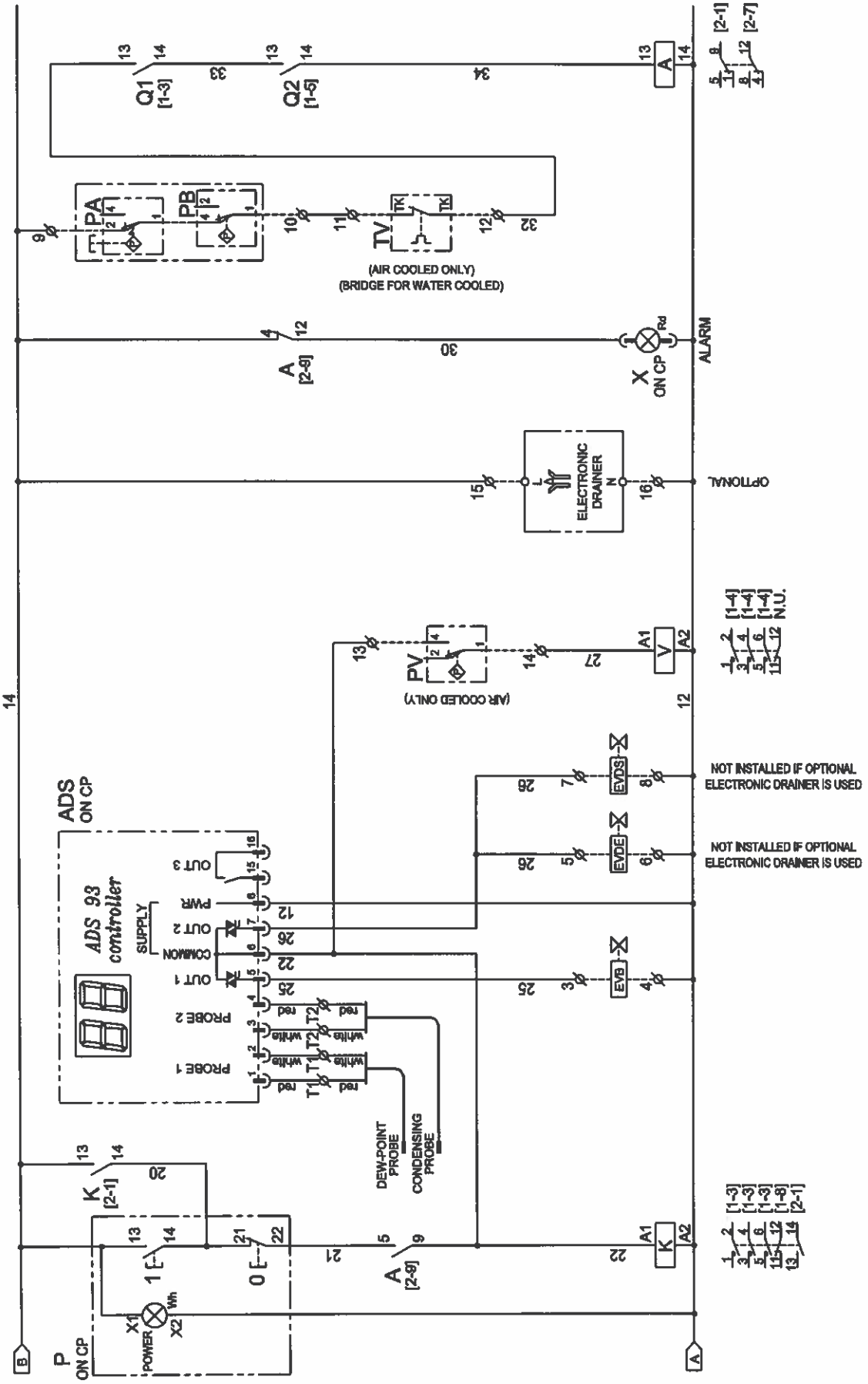


LEGEND

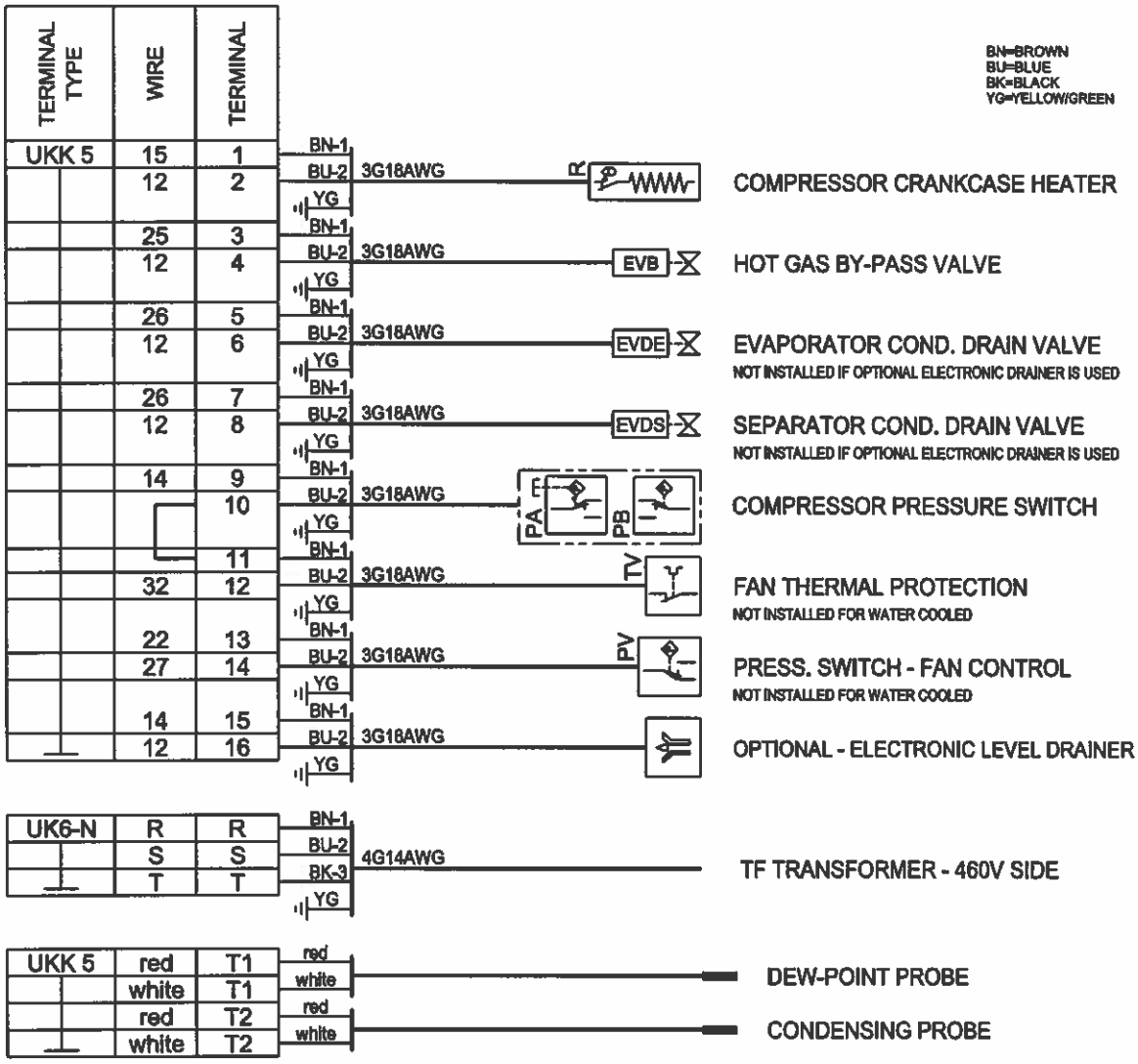
SEZ	: MAIN SWITCH WITH DOOR BLOCK
ADS	: ADS93 CONTROLLER
P	: START-STOP BUTTON - POWER ON LIGHT
X	: ALARM ON LIGHT
EVB	: HOT-GAS BY-PASS SOLENOID VALVE
EVDE	: EVAPORATOR COND. DRAIN SOLENOID VALVE
EVDS	: SEPARATOR COND. DRAIN SOLENOID VALVE
R	: COMPRESSOR CRANKCASE HEATER
BOX	: ELECTRIC SUPPLY BOX
PB	: PRESSURE SWITCH - COMPRESSOR INLET SIDE
PA	: PRESSURE SWITCH - COMPRESSOR OUTLET SIDE
PV	: PRESSURE SWITCH - FAN CONTROL
TV	: THERMAL PROTECTION INSIDE THE FAN
CP	: CONTROL PANEL

NOTE : see the electric diagram in the electric board.

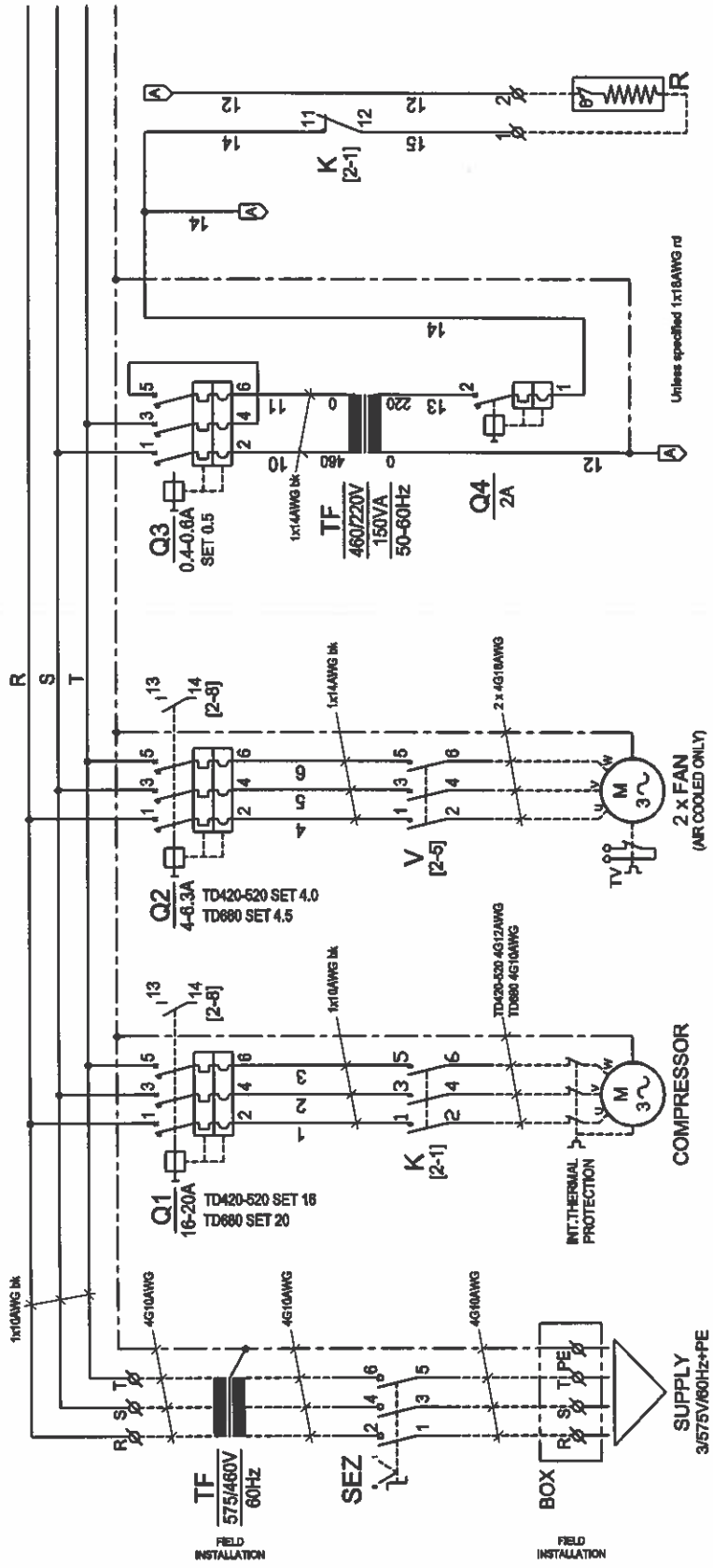
5.23.2 ELECTRIC DIAGRAM – AUXILIARY - TDF145 to TDF340 – ADS93 CONTROLLER



5.23.3 ELECTRIC DIAGRAM – CONNECTIONS - TDF145 to TDF340 – ADS93 CONTROLLER



5.24.1 ELECTRIC DIAGRAM - POWER – TDF420 to TDF680 – ADS93 CONTROLLER

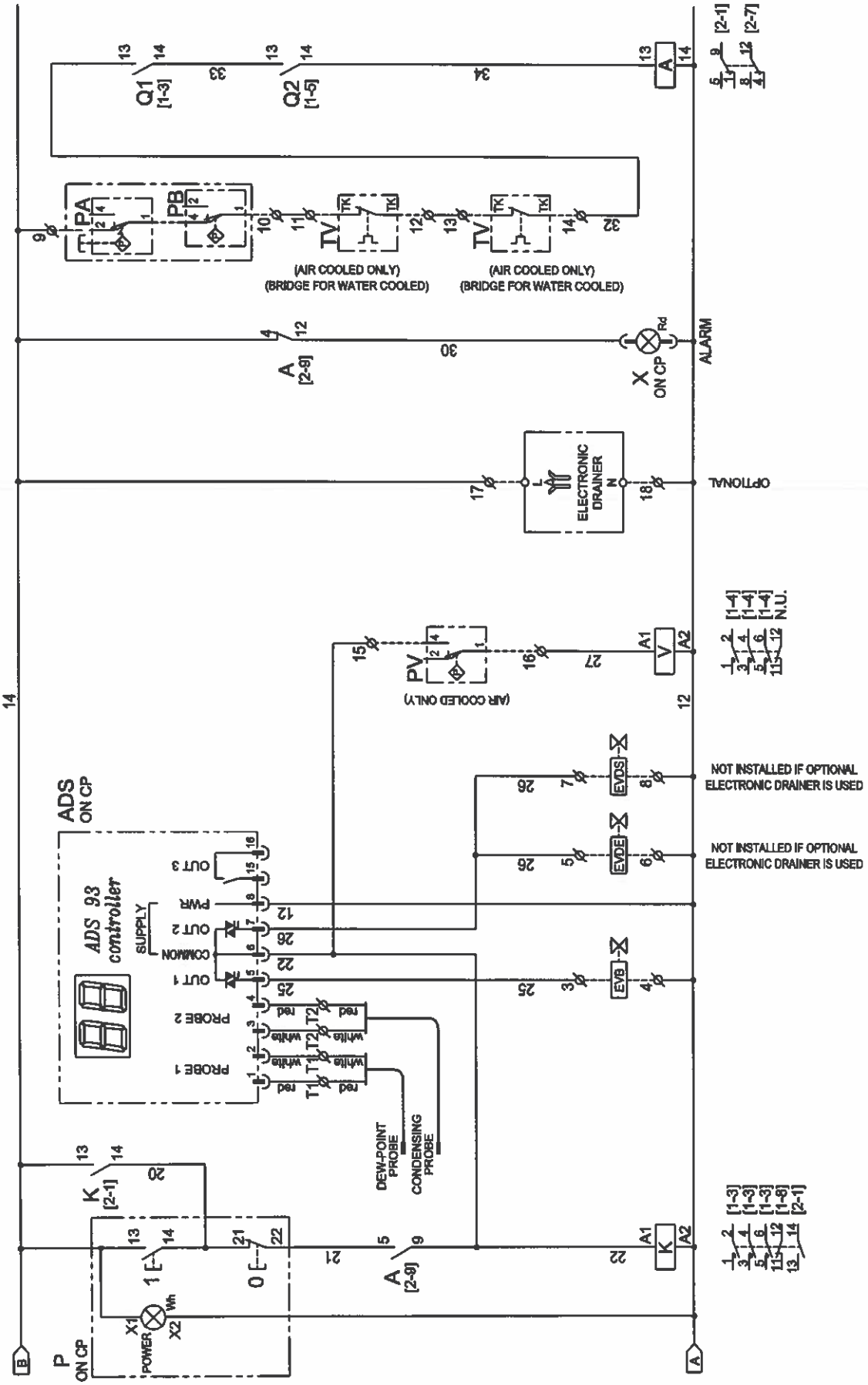


LEGEND

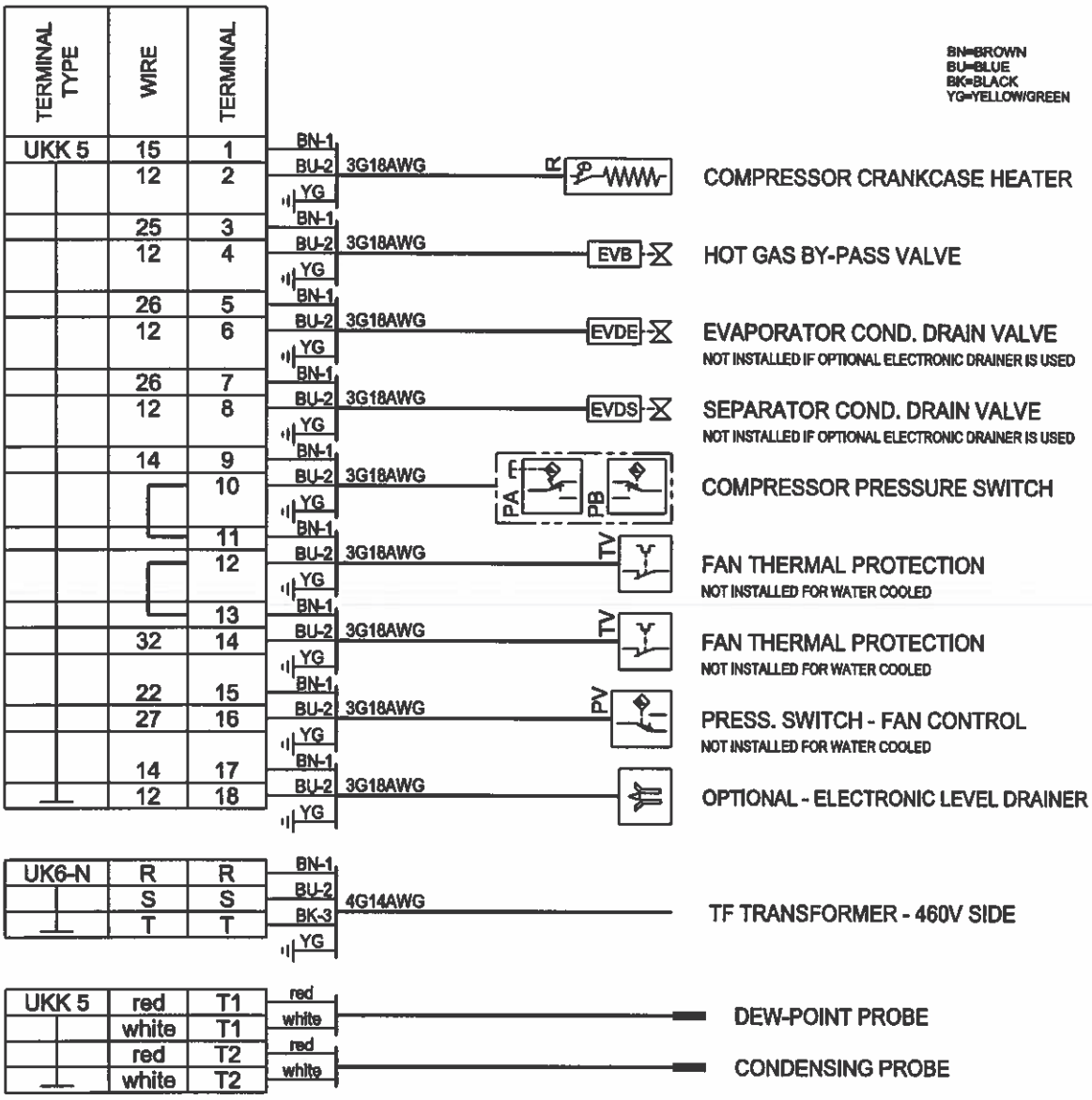
SEZ	: MAIN SWITCH WITH DOOR BLOCK	R	: COMPRESSOR CRANKCASE HEATER
ADS	: ADS93 CONTROLLER	BOX	: ELECTRIC SUPPLY BOX
P	: START-STOP BUTTON - POWER ON LIGHT	PB	: PRESSURE SWITCH - COMPRESSOR INLET SIDE
X	: ALARM ON LIGHT	PA	: PRESSURE SWITCH - COMPRESSOR OUTLET SIDE
EVB	: HOT-GAS BY-PASS SOLENOID VALVE	PV	: PRESSURE SWITCH - FAN CONTROL
EVDE	: EVAPORATOR COND. DRAIN SOLENOID VALVE	TV	: THERMAL PROTECTION INSIDE THE FAN
EVDS	: SEPARATOR COND. DRAIN SOLENOID VALVE	CP	: CONTROL PANEL

NOTE : see the electric diagram in the electric board.

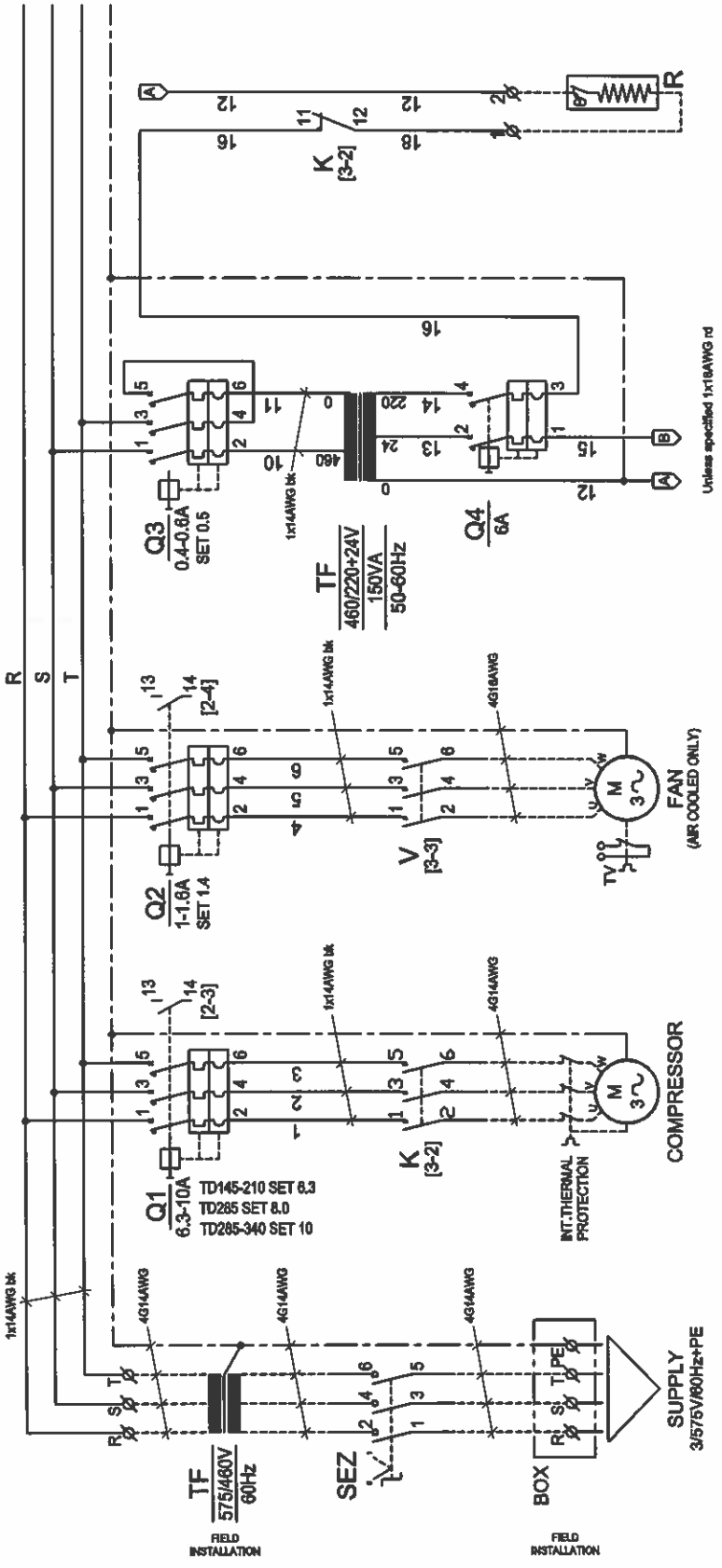
5.24.2 ELECTRIC DIAGRAM – AUXILIARY – TDF420 to TDF680 – ADS93 CONTROLLER



5.24.3 ELECTRIC DIAGRAM – CONNECTIONS – TDF420 to TDF680 – ADS93 CONTROLLER



5.25.1 ELECTRIC DIAGRAM - POWER - TDF145 to TDF340 - DMC20 AIR DRYER CONTROLLER

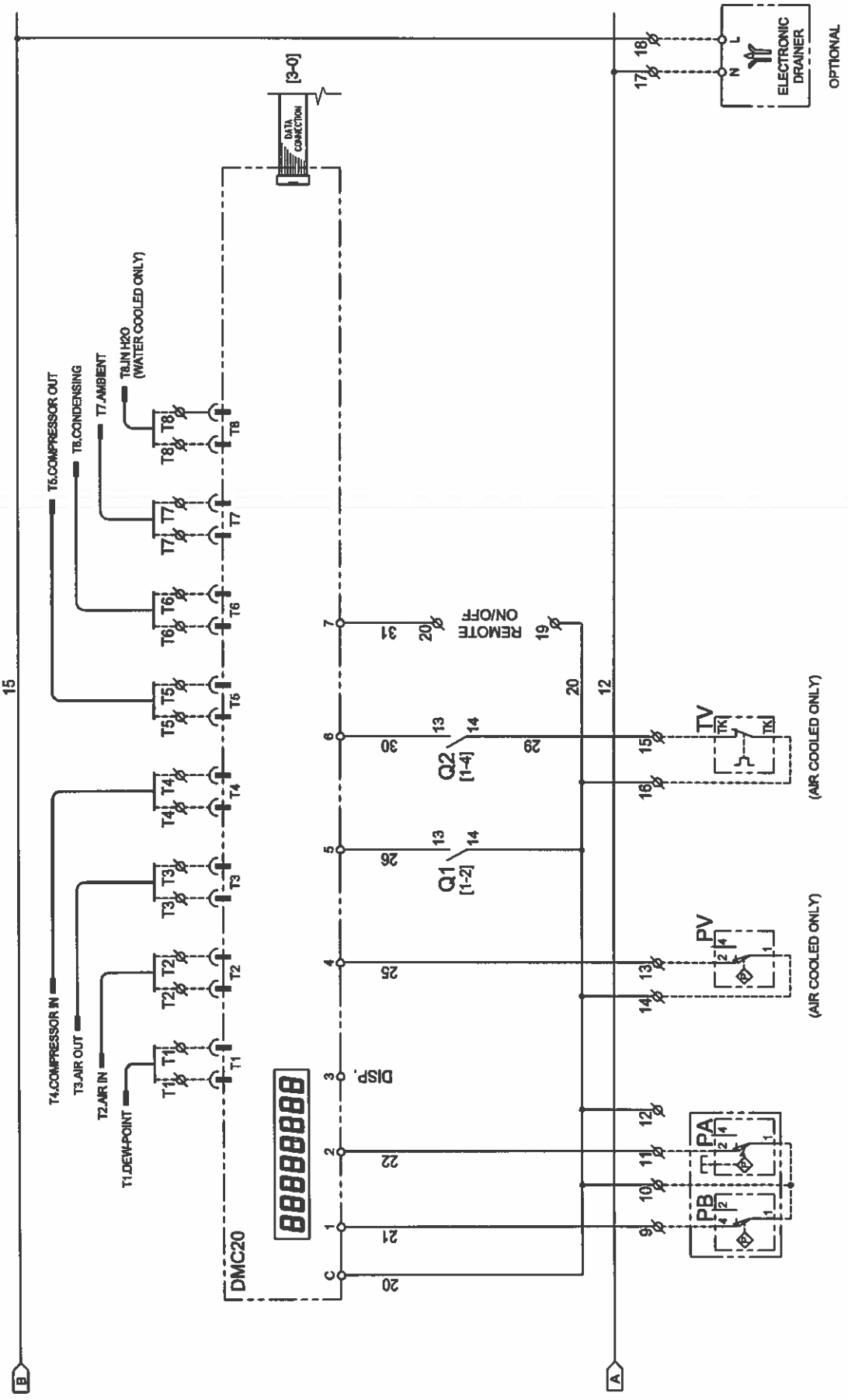


LEGEND

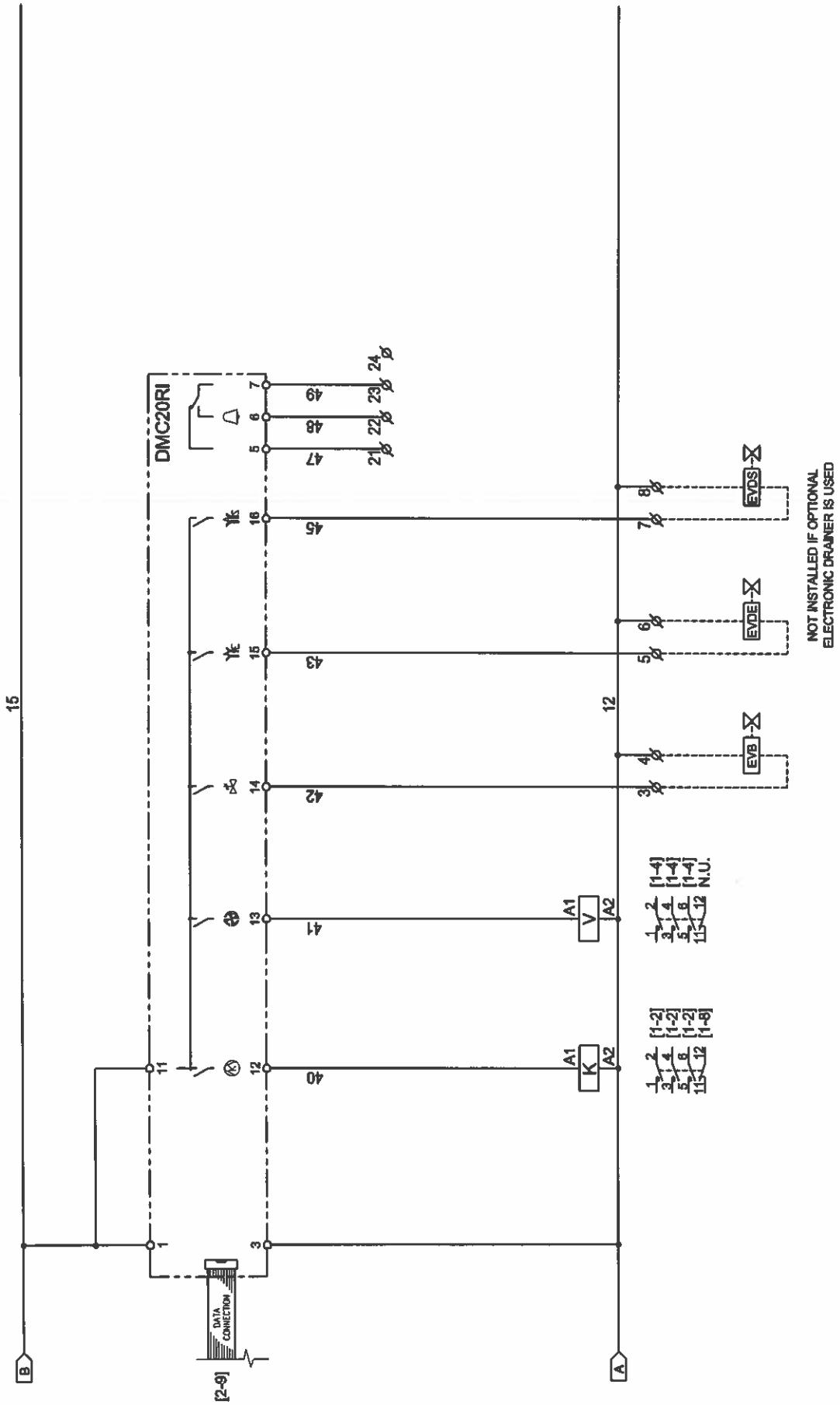
SEZ	: MAIN SWITCH WITH DOOR BLOCK
DMC20	: ELECTRONIC CONTROL PANEL
DMC20RI	: CONTROL PANEL INTERFACE CARD
EVB	: HOT-GAS BY-PASS SOLENOID VALVE
EVDE	: EVAPORATOR COND. DRAIN SOLENOID VALVE
EVDS	: SEPARATOR COND. DRAIN SOLENOID VALVE
BOX	: ELECTRIC SUPPLY BOX
R	: COMPRESSOR CRANKCASE HEATER
PB	: PRESSURE SWITCH - COMPRESSOR INLET SIDE
PA	: PRESSURE SWITCH - COMPRESSOR OUTLET SIDE
PV	: PRESSURE SWITCH - FAN CONTROL
TV	: THERMAL PROTECTION INSIDE THE FAN

NOTE : see the electric diagram in the electric board.

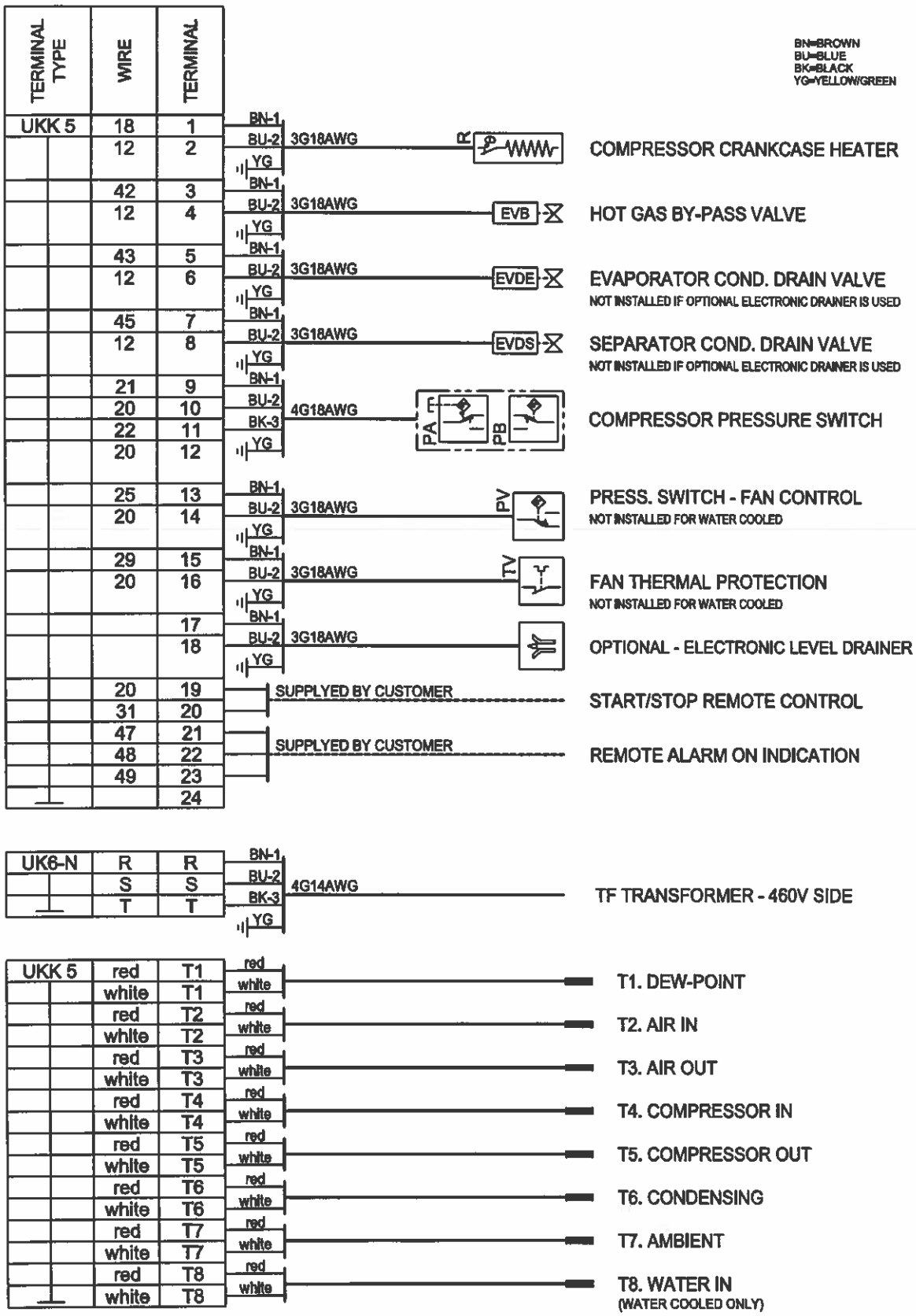
5.25.2 ELECTRIC DIAGRAM – AUXILIARY 1 - TDF145 to TDF340 - DMC20 AIR DRYER CONTROLLER



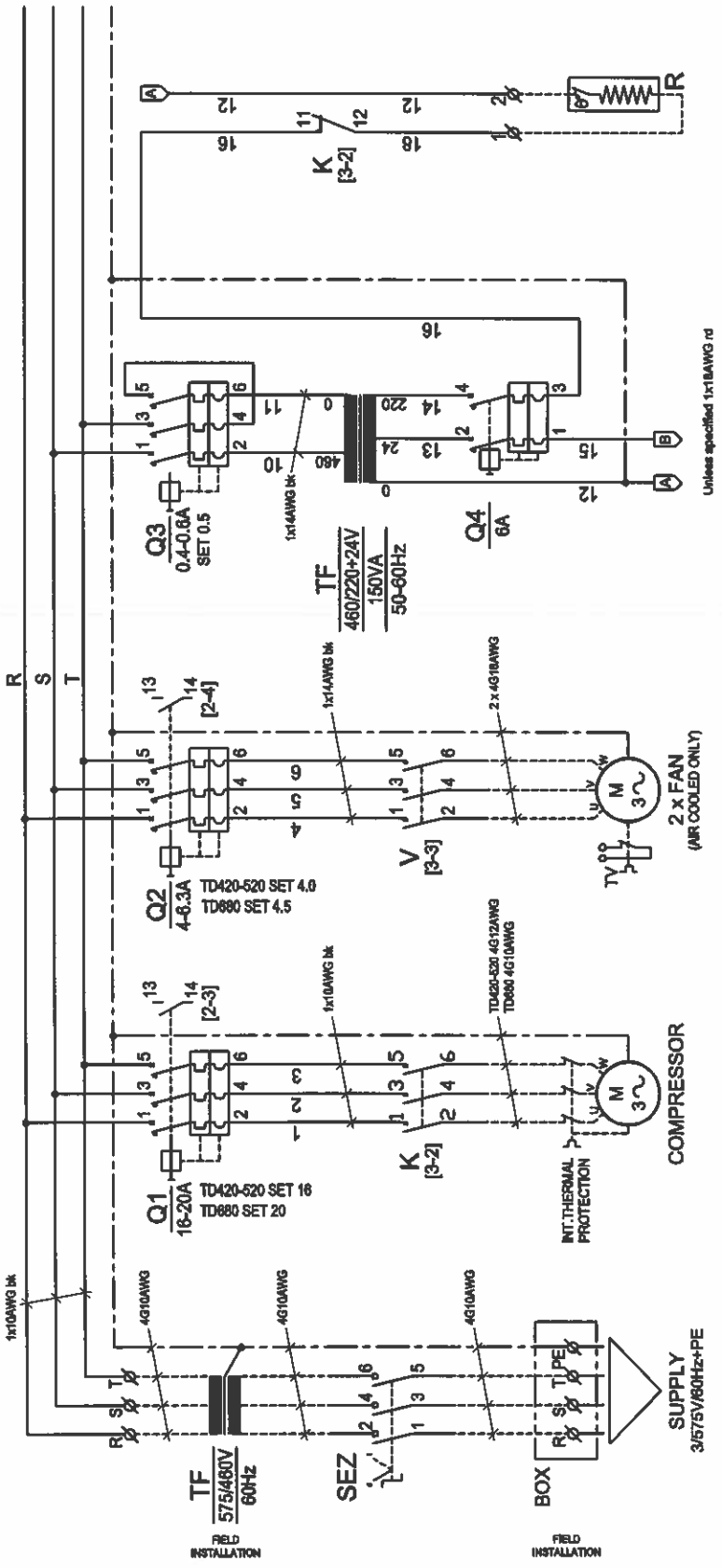
5.25.3 ELECTRIC DIAGRAM – AUXILIARY 2 - TDF145 to TDF340 - DMC20 AIR DRYER CONTROLLER



5.25.4 ELECTRIC DIAGRAM - CONNECTIONS - TDF145 to TDF340-DMC20 AIR DRYER CONTROLLER

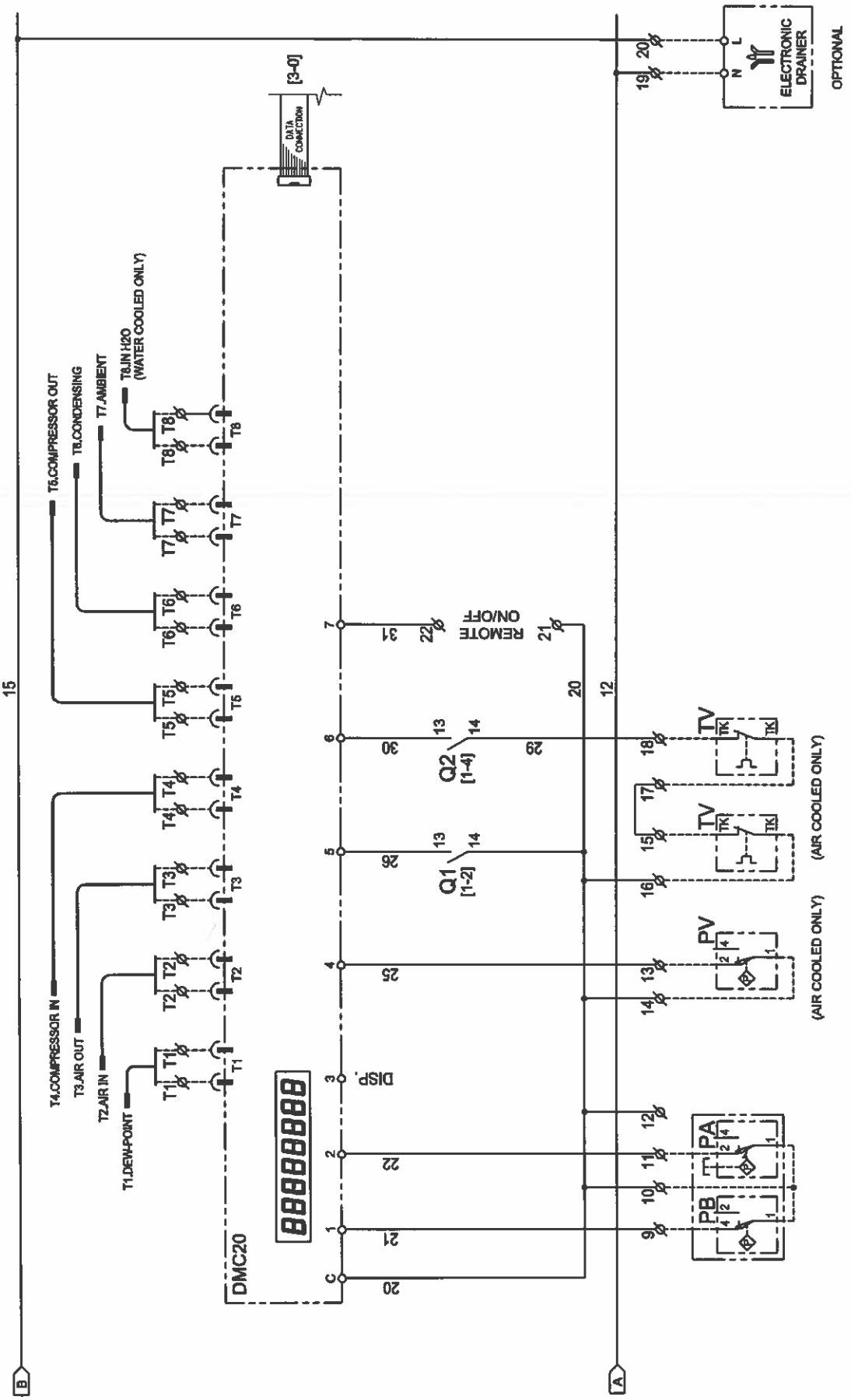


5.26.1 ELECTRIC DIAGRAM - POWER - TDF420 to TDF680 - DMC20 AIR DRYER CONTROLLER

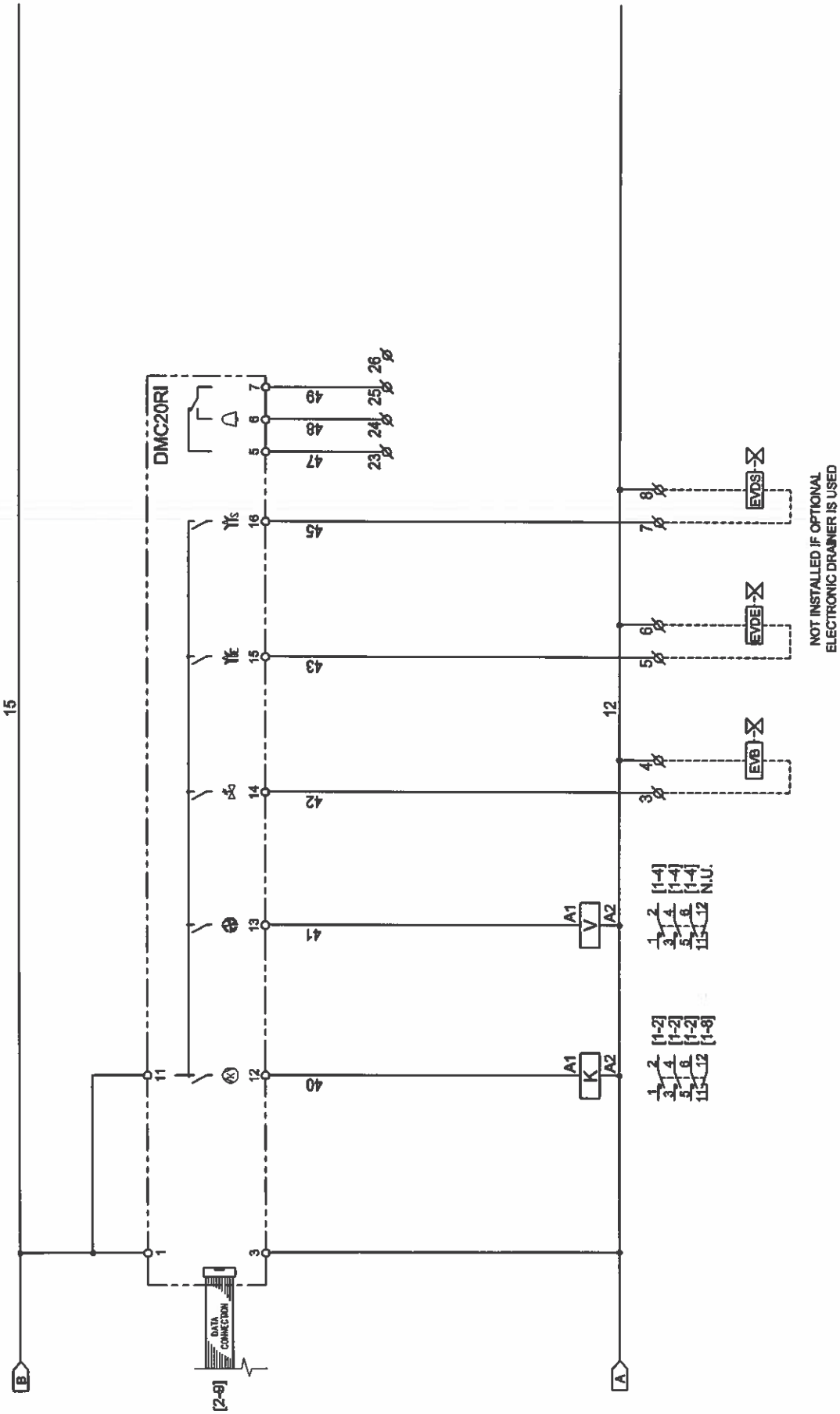


NOTE : see the electric diagram in the electric board.

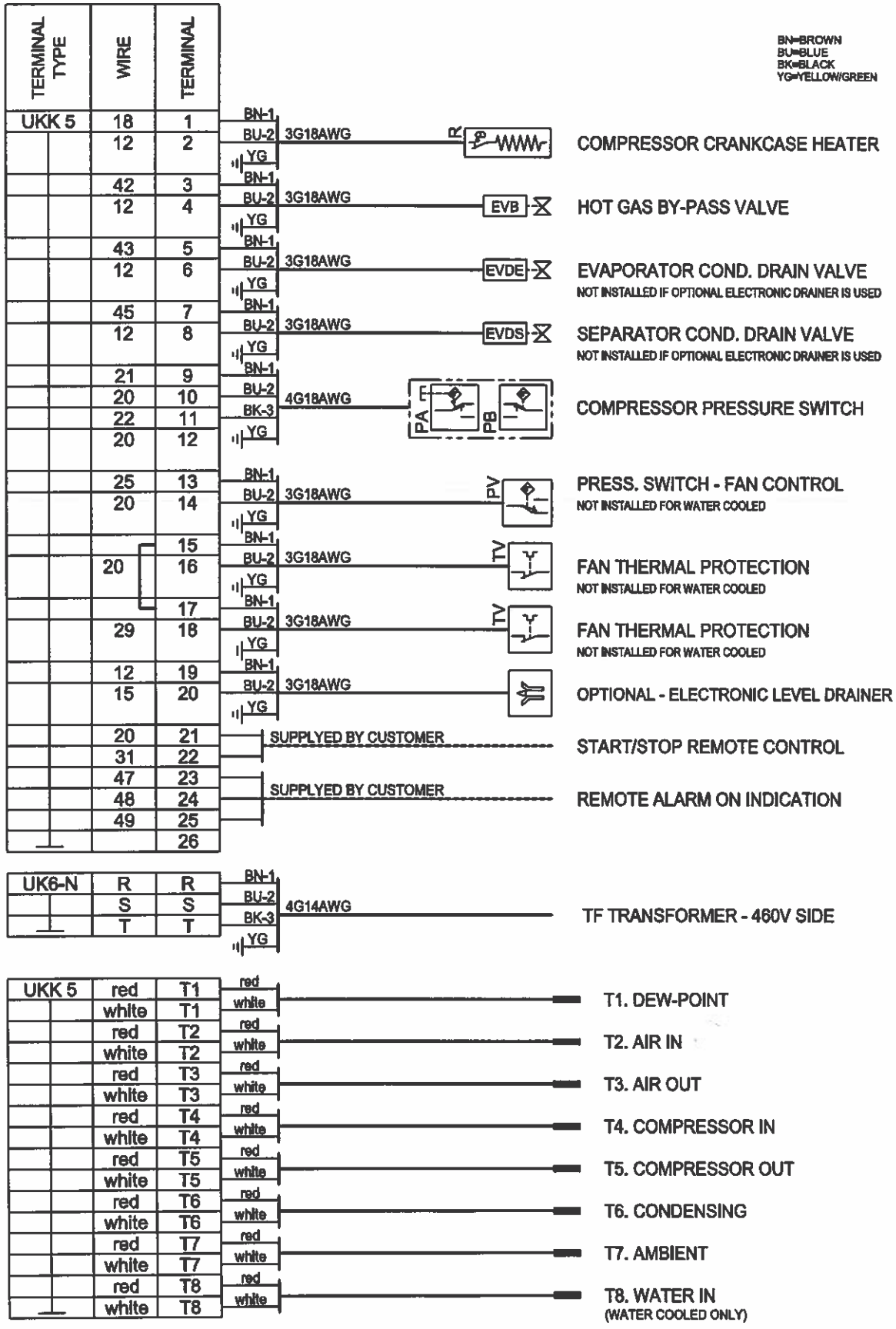
5.26.2 ELECTRIC DIAGRAM - AUXILIARY 1 - TDF420 to TDF680 - DMC20 AIR DRYER CONTROLLER



5.26.3 ELECTRIC DIAGRAM - AUXILIARY 2 - TDF420 to TDF680 - DMC20 AIR DRYER CONTROLLER



5.26.4 ELECTRIC DIAGRAM - CONNECTIONS - TDF420 to TDF680-DMC20 AIR DRYER CONTROLLER



6.1 CONTROLS AND MAINTENANCE

The maintenance operations must be worked out by qualified personnel.
Before any intervention, be sure that :

- **any part of the machine is powered** and that it cannot be connected to the mains supply.
- **any part of the machine is under pressure** and that it cannot be connected to the compressed air system.

Before attempting any maintenance operation on the dryer, switch it off and wait at least 30 minutes. During operation the copper piping connecting the compressor to the condenser can reach dangerous temperature able to burn the skin.

DAILY

- Make sure that the temperatures displayed by the electronic device complies with the plate data.
- Check the proper operation of the condensate drain systems.
- Verify the condenser for cleanliness (air cooled).

EVERY 200 HOURS OR MONTHLY

- With an air jet (Max. 2 bars) blowing from inside towards outside clean the condenser; repeat this operation blowing from outside towards inside; be careful not to damage the aluminium blades of the cooling package (air cooled).
- Close the manual condensate drain valve, unscrew the strainer and clean it with compressed air and a brush. Reinstall the filter properly tight, then open the manual valve.
- At the end, check the operation of the machine.

EVERY 1000 HOURS OR YEARLY

- Verify for tightness all the screws of the electric system and that all the spade (Faston) type connections are in their proper position.
- Check the conditions of the condensate drain flexible hoses, and replace if necessary.
- At the end, check the operation of the machine.

6.2 SUGGESTED SPARE PARTS

		TDF – ADS93 Controller								TDF – DMC20 Air Dryer Controller							
SPARE PARTS	CODE	145	185	210	285	340	420	520	680	145	185	210	285	340	420	520	680
Fan unit (Air cooled)	5250355090	1	1	1	1	1	2	2		1	1	1	1	1	2	2	
Fan unit (Air cooled)	5250355100								2								2
ADS93 Controller	5620110002	1♦	1♦	1♦	1♦	1♦	1♦	1♦	1♦								
Display module DMC20	5620100005									1♦	1♦	1♦	1♦	1♦	1♦	1♦	1♦
Power module DMC20RI	5620100006									1♦	1♦	1♦	1♦	1♦	1♦	1♦	1♦
Flat 16P for DMC20	5625NNN100									1♦	1♦	1♦	1♦	1♦	1♦	1♦	1♦
Probe T1	5625NNN037	1♦	1♦	1♦	1♦	1♦	1♦	1♦	1♦	1♦	1♦	1♦	1♦	1♦	1♦	1♦	1♦
Probe T2 - T3 - T4 - T5 - T6	5625NNN039	1♦	1♦	1♦	1♦	1♦	1♦	1♦	1♦	5♦	5♦	5♦	5♦	5♦	5♦	5♦	5♦
Probe T7	5625NNN033									1♦	1♦	1♦	1♦	1♦	1♦	1♦	1♦
Probe T8 (Water cooled)	5625NNN039									1♦	1♦	1♦	1♦	1♦	1♦	1♦	1♦
Extension for the probe	5625NNN029	2♦	2♦	2♦	2♦	2♦	2♦	2♦	2♦	8♦	8♦	8♦	8♦	8♦	8♦	8♦	8♦
Optional-SBC485 230VAC	5490SBC005									only for serial communication - 1 pcs for net							
Optional-SBC485 115VAC	5490SBC010									only for serial communication - 1 pcs for net							
ON/OFF lighted switch	5452PLS020	1	1	1	1	1	1	1	1								
Lamp for ON/OFF switch	5480NEN010	1♦	1♦	1♦	1♦	1♦	1♦	1♦	1♦								
Alarm red light	5452IND005	1	1	1	1	1	1	1	1								
Lamp for alarm red light	5480NEN005	1♦	1♦	1♦	1♦	1♦	1♦	1♦	1♦								

		TDF – ADS93 Controller								TDF – DMC20 Air Dryer Controller							
SPARE PARTS	CODE	145	185	210	285	340	420	520	680	145	185	210	285	340	420	520	680
Condensate drain strainer	64355FF011	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
Drain solenoid valve - body	64320FF011	2♦	2♦	2♦	2♦	2♦	2♦	2♦	2♦	2♦	2♦	2♦	2♦	2♦	2♦	2♦	2♦
Drain solen. valve-coil 230VAC	64N22MM021	2♦	2♦	2♦	2♦	2♦	2♦	2♦	2♦								
Drain solen. valve - coil 24VAC	64N22MM016									2♦	2♦	2♦	2♦	2♦	2♦	2♦	2♦
Optional-Elect. drainer 230VAC	2210BEK005A	1	1	1	1	1	1	1	1								
Optional-Elect. drainer 24VAC	2210BEK005L									1	1	1	1	1	1	1	1
By-pass solenoid valve – body	64120SS015	1	1	1	1	1	1			1	1	1	1	1	1		
By-pass solenoid valve – body	64120SS020							1	1							1	1
Bypass solen. valve - coil 230VAC	64N22MM060	1♦	1♦	1♦	1♦	1♦	1♦	1♦	1♦								
Bypass solen. valve - coil 24VAC	64N22MM045									1♦	1♦	1♦	1♦	1♦	1♦	1♦	1♦
Refrigeration compressor	5015340004	1								1							
Refrigeration compressor	5015340006		1								1						
Refrigeration compressor	5015340011			1								1					
Refrigeration compressor	5015340008				1								1				
Refrigeration compressor	5015340012					1								1			
Refrigeration compressor	5015340018						1								1		
Refrigeration compressor	5015340023							1								1	
Refrigeration compressor	5015340026								1								1
Thermostatic valve – TEX	64130SS220	1	1							1	1						
Thermostatic valve – TEX	64130SS222			1								1					
Thermostatic valve – TEX	64130SS226				1	1							1	1			
Thermostatic valve – TEX	64130SS250						1								1		
Thermostatic valve – TEX	64130SS255							1								1	
Thermostatic valve – TEX	64130SS260								1								1
Pressure switch PV (Air cooled)	5655NNN090	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Pressure switch PB – PA	5655NNN095	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Demister pad cond. separator	5856TD145005	1								1							
Demister pad cond. separator	5856TD185005		1	1							1	1					
Demister pad cond. separator	5856TD285005				1	1							1	1			
Demister pad cond. separator	5856TD420005						1	1							1	1	
Demister pad cond. separator	5856TD680005								1								1
SEZ - Main switch	5450SZN100	1	1	1	1	1				1	1	1	1	1			
SEZ - Main switch	5450SZN105						1	1	1						1	1	1
Q1 - Circuit breaker	54443SM050	1	1	1	1	1				1	1	1	1	1			
Q1 - Circuit breaker	54443SM060						1	1	1						1	1	1
Q2 - Circuit breaker	54443SM030	1	1	1	1	1				1	1	1	1	1			
Q2 - Circuit breaker	54443SM045						1	1	1						1	1	1
Q3 - Circuit breaker	54443ST020	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Q4 - Circuit breaker	54441C6005	1	1	1	1	1	1	1	1								
Q4 - Circuit breaker	54442C6015									1	1	1	1	1	1	1	1
Q1 & Q2 - Auxiliary contact	5490CAX050	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
K - Power contactor	5454TLT116	1	1	1	1	1											
K - Power contactor	5454TLT016									1	1	1	1	1			
K - Power contactor	5454TLT125						1	1	1								
K - Power contactor	5454TLT025														1	1	1
V - Power contactor	5454TLT111	1	1	1	1	1	1	1	1								
V - Power contactor	5454TLT011									1	1	1	1	1	1	1	1
K - Auxiliary contact NO	5490CAX011						1	1	1								
K - Auxiliary contact NC	5490CAX010						1	1	1						1	1	1
A - Auxiliary relay	5456REL110	1	1	1	1	1	1	1	1								
TF – Trasformer	5440TFM020	1	1	1	1	1	1	1	1								
TF – Trasformer	5440TFM021									1	1	1	1	1	1	1	1

Numbers refers to installed quantity. **♦ = Suggested spare part.** **FOR SPARE PARTS ORDERING SPECIFY DRYER LABEL DATA**

7.1 TROUBLE SHOOTING

The troubleshooting and resultant service work should be carried out by qualified personnel. Particular attention must be paid in case of service work on the refrigerating circuit. The refrigerating fluid, if under pressure, can cause serious injury to skin and eyes.

SYMPTOM	POSSIBLE CAUSE - SUGGESTED ACTION
◆The dryer doesn't start.	➔Check for mains failure. ➔**ADS93-**The alarm light is ON - see specific section. ➔**DMC20-**The led "alarm" is ON - see specific point. ➔Intervention of the electric protection (see Q3 and/or Q4 on the electric diagram) of the auxiliary circuit - restore it and check the proper operation of the dryer. ➔Verify the electric wiring.
◆The compressor doesn't work.	➔**ADS93-**The alarm light is ON - see specific section. ➔**DMC20-**The led "alarm" is ON - see specific point. ➔Activation of the compressor internal thermal protection - wait for 30 minutes, then retry. ➔Verify the electric wiring. ➔The compressor power contactor (see K on the electric diagram) is faulty - replace it. ➔If the compressor still doesn't work , replace it.
◆The fan(s) doesn't work. (air cooled).	➔**ADS93-**The alarm light is ON - see specific section. ➔**DMC20-**The led "alarm" is ON - see specific point. ➔Verify the electric wiring. ➔The fan(s) power contactor (see V on the electric diagram) is faulty - replace it. ➔PV pressure switch is faulty - contact a refrigeration engineer to replace it. ➔If the fan(s) still doesn't work , replace it.
◆**ADS93-**The alarm light is ON.	➔The PB low pressure-switch is activated – see specific point. ➔The PA high pressure-switch is activated - see specific point. ➔The thermal protection (see TV on the electric diagram) inside the fan is activated -wait 30 minutes and retry (air cooled). ➔The electric protection (see Q1 on the electric diagram) of the compressor is activated - restore it and retry. ➔The electric protection (see Q2 on the electric diagram) of the fan(s) is activated - restore it and retry (air cooled).
◆**DMC20-**The led "alarm" is ON.	➔One of the following appears on the upper line of the DMC20 display. 1. "Protection Comp." : Intervention of the electric protection (see Q1 on the electric diagram) of the compressor - restore it and check the proper operation of the dryer. 2. "Protection Fan" : (air cooled) Intervention of the electric protection (see Q2 on the electric diagram) of the fan - restore it and check the proper operation of the dryer or Intervention of the thermal protection (see TV on the electric diagram) inside the fan - wait 30 minutes and retry. 3. "STOP Compr.LP" : The PB low pressure-switch is activated - see specific point. 4. "STOP Compr.HP" : The PA high pressure-switch is activated - see specific point. 5. "Condens. HIGH" : condensing temperature is too high - see specific point. 6. "DewPoint LOW" : DewPoint is too low - see specific point. 7. "DewPoint HIGH" : DewPoint is too high - see specific point. 8. "Probe Fault" : one of the probes is faulty - see specific point.

◆The low pressure-switch PB has been activated.

➔There is a leak in the refrigeration circuit - contact a refrigeration engineer.
➔The pressure-switch resets automatically when normal conditions are restored - check the proper operation of the dryer.

◆The high pressure-switch PA has been activated.

➔Check which of the following has caused the activation :
1. The ambient temperature is too high or the room aeration is insufficient - provide proper ventilation (air cooled).
2. The condenser unit is dirty - clean it (air cooled).
3. The condenser fan(s) doesn't work - see specific point (air cooled).
4. The cooling water is too hot - restore the nominal condition (water cooled).
5. The cooling water flow is insufficient - restore the nominal condition (water cooled).
6. There is a refrigerant leak in the evaporator - contact a refrigeration engineer.

➔Reset the pressure-switch pressing the button on the controller itself - verify the dryer for correct operation.
➔The PA pressure-switch is faulty - contact a refrigeration engineer to replace it.

◆**DMC20-**The condensing temperature is too high.

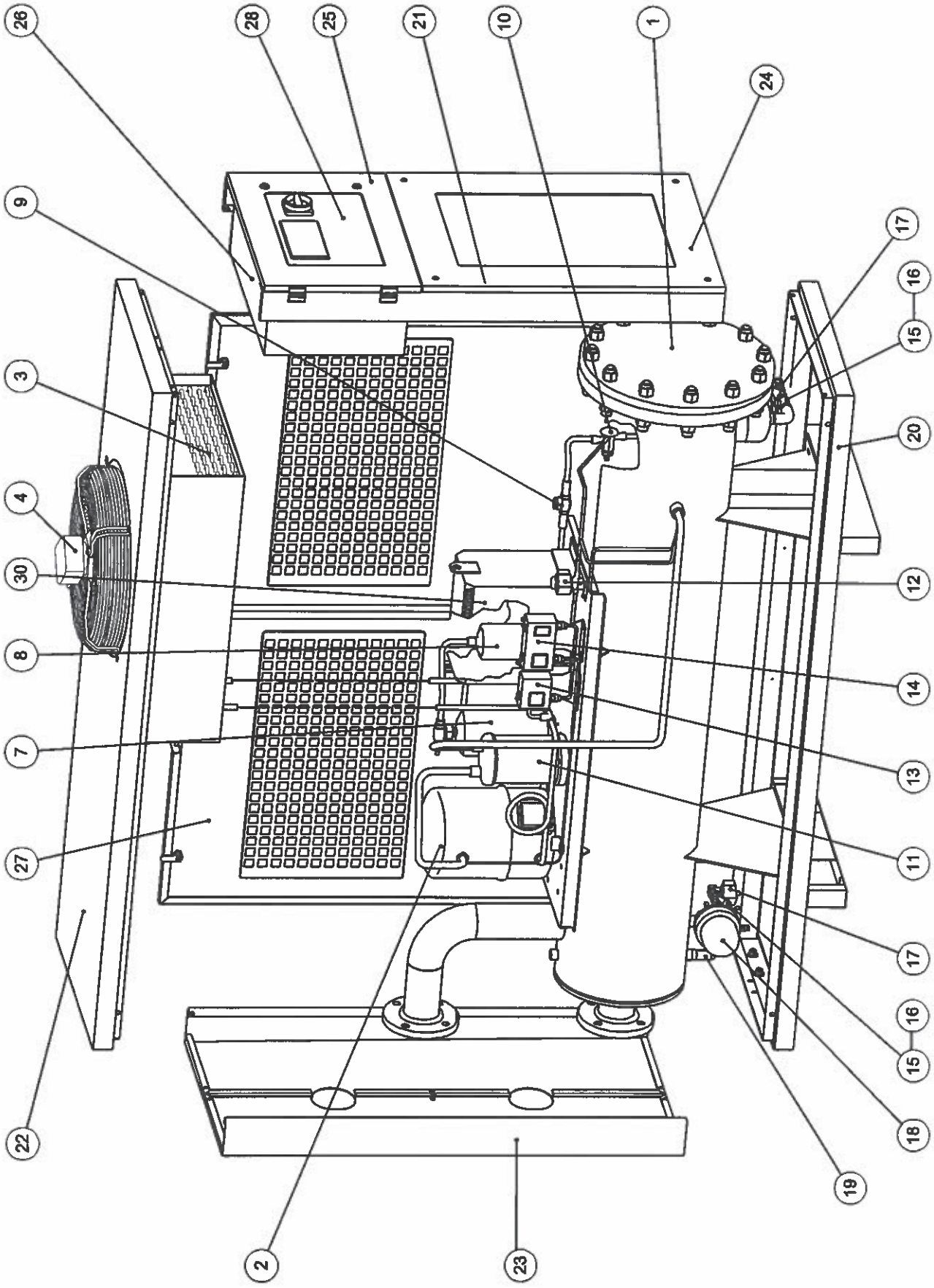
➔Check which of the following has caused the alarm:
1. The ambient temperature is too high or the room aeration is insufficient - provide proper ventilation (air cooled).
2. The condenser unit is dirty - clean it (air cooled).
3. The condenser fan(s) doesn't work - see specific point (air cooled).
4. The cooling water is too hot - restore the nominal condition (water cooled).
5. The cooling water flow is insufficient - restore the nominal condition (water cooled).

◆DewPoint is too high.

➔The dryer is OFF - switch it ON.
➔The refrigeration compressor doesn't work - see specific point.
➔The inlet air is too hot - restore the nominal conditions - install an aftercooler before the dryer.
➔The inlet air flow rate is higher than the capacity of the dryer - reduce the flow rate – restore normal conditions.
➔The fan(s) doesn't work - see the specific point (air cooled).
➔The ambient temperature is too high or the room aeration is insufficient - provide proper ventilation (air cooled).
➔The condenser unit is dirty - clean it (air cooled).
➔The cooling water is too hot - restore the nominal condition (water cooled).
➔The cooling water flow is insufficient - restore the nominal condition (water cooled).
➔The dryer doesn't drain the condensate - see specific point.
➔**ADS93-**The ADS93 Controller green led ⊗→ is always ON – see specific point.
➔**ADS93-**The ADS93 Controller is set at a DewPoint too high - see ADS93 "Set-Up" section.
➔**DMC20-**The led "alarm" is ON and DMC20 display "Probe Fault" message - see specific point.
➔**DMC20-**The DMC20 is set at a DewPoint too high - see DMC20 "Set-Up" section.
➔The hot gas by-pass solenoid valve is blocked - contact a refrigeration engineer.
➔There is a leak in the refrigeration circuit - contact a refrigeration engineer.

◆DewPoint too low.	→**ADS93-**Verify the wiring of the ADS93 Controller. →**DMC20-**Verify the wiring of the DMC20. →Verify the wiring of the hot gas by-pass solenoid valve. →The coil of the hot gas by-pass solenoid valve burned out - replace it. →The DewPoint probe (T1) doesn't correctly detect the temperature in the evaporator. Ensure the probe is pushed into the bottom of the copper tube immersion well. →**ADS93-**The ADS93 Controller is set at a DewPoint too low - see ADS93 "Set-Up" section. →**ADS93-**The ADS93 Controller is faulty - replace it. →**DMC20-**The DMC20 is set at a DewPoint too low - see DMC20 "Set-Up" section. →**DMC20-**The DMC20 is faulty- replace it. →The hot gas by-pass solenoid valve is blocked - contact a refrigeration engineer.
◆Excessive pressure drop within the dryer.	→The DewPoint is too low - the condensate is frozen and blocks the air flow - see specific point. →Check for throttling of any flexible connection hoses (if used). →The "Demister" condensate separator is clogged - clean or replace it.
◆The dryer continuously drains condensate.	→The drain solenoid valve(s) is jammed - remove and clean it. →Verify the electric wiring. →**ADS93-**The ADS93 Controller is faulty - replace it. →**DMC20-**The DMC20 is faulty - replace it.
◆The dryer doesn't drain the condensate.	→Verify the electric wiring. →The condensate drain service valve(s) is closed – open it. →The condensate drain strainer(s) is clogged - remove and clean it. →The drain solenoid valve(s) is jammed - remove and clean it. →The coil of the condensate drain solenoid valve(s) burned out - replace it. →**ADS93-**The ADS93 Controller is faulty - replace it. →**DMC20-**One or both drain times on DMC20 are set at zero seconds. - see DMC20 "Set-Up" section. →**DMC20-**The DMC20 is faulty - replace it. →The DewPoint is too low - the condensate is frozen - see specific point.
◆Water within the line.	→The dryer is OFF - switch it ON. →Untreated air flows through the by-pass system (if installed) - close the by-pass. →The dryer doesn't drain condensate - see specific point. →The DewPoint is too high – see specific point. **NOTE : Once the problem is solved, it is mandatory to drain the water collected in the exit chamber of the dryer – opening the service valve (see pos. 19 in the exploded view of the dryer's component).**
◆**ADS93-**The green led ⊗→← on the front of the ADS93 Controller is always ON and *or* appears on the display.	→Check the electric wiring of the T1 probe (DewPoint) of the ADS93 device. →Probe T1 (DewPoint) of the ADS93 electronic device doesn't work properly – replace it. →The ADS93 device doesn't work – replace it.
◆**ADS93-**The green led ⊗⊕ on the front of the ADS93 Controller is always ON and *or* appears on the display.	→Check the electric wiring of the T1 probe (DewPoint) of the ADS93 device. →Probe T2 (Condensing) of the ADS93 electronic device doesn't work properly – replace it. →The ADS93 device doesn't work – replace it.

8.2 EXPLODED VIEW - DRYERS TDF145 to TDF340 - AIR COOLED



◆**DMC20-**DMC20 display "Probe Fault" message.

➔One of the temperature probes is faulty - display in sequence all the temperatures - the pameter indicated with "?" corresponds to faulty probe.
➔Be sure that the probe-extension connector of faulty probe is correcly inserted in DMC20.
➔Check the probe-extension connection between DMC20 and terminal board.
➔Check connection between probe and terminal board.
➔If the fault persists, replace probe and/or probe-extension.
NOTE: If the faulty probe is T1 (DewPoint) the hot gas by-pass solenoid valve is always on. If any other probe is faulty the dryer will run correcly even if there is an alarm condition.

7.2 DISMANTELING OF THE DRYER

If the dryer is to be dismantled, it has to be split into homogeneous groups of materials.

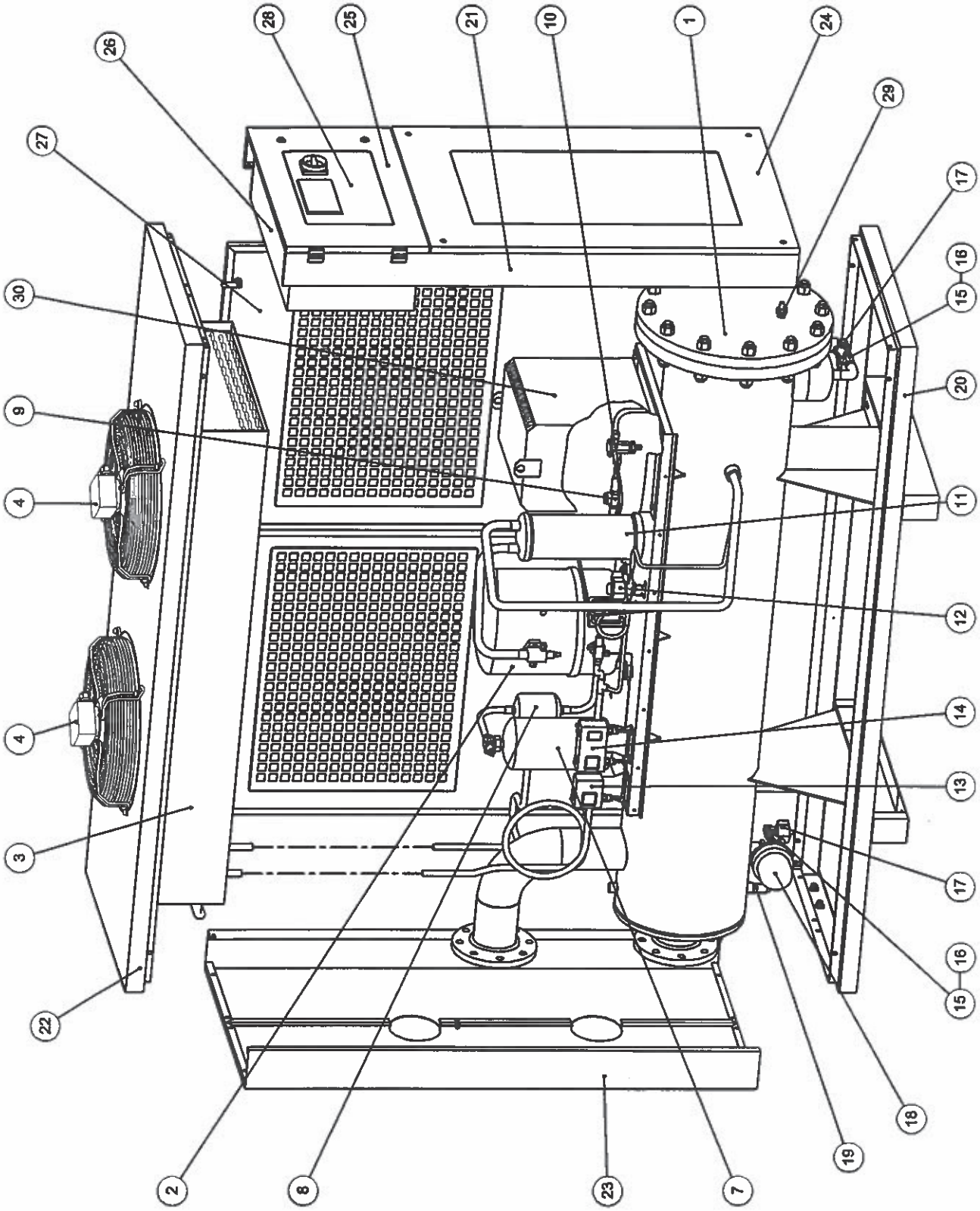
We recommend to comply with the safety rules in force for the disposal of each type of material.
The refrigerant fluid contains droplets of lubrication oil released by the refrigeration compressor. Do not dispose of this fluid in the environment. It has to be drained from the dryer with a suitable device and then delivered to a collection centre where it will be processed to make it reusable.

8.1 EXPLODED VIEW - TABLE OF COMPONENTS - DRYERS TDF145 to TDF680

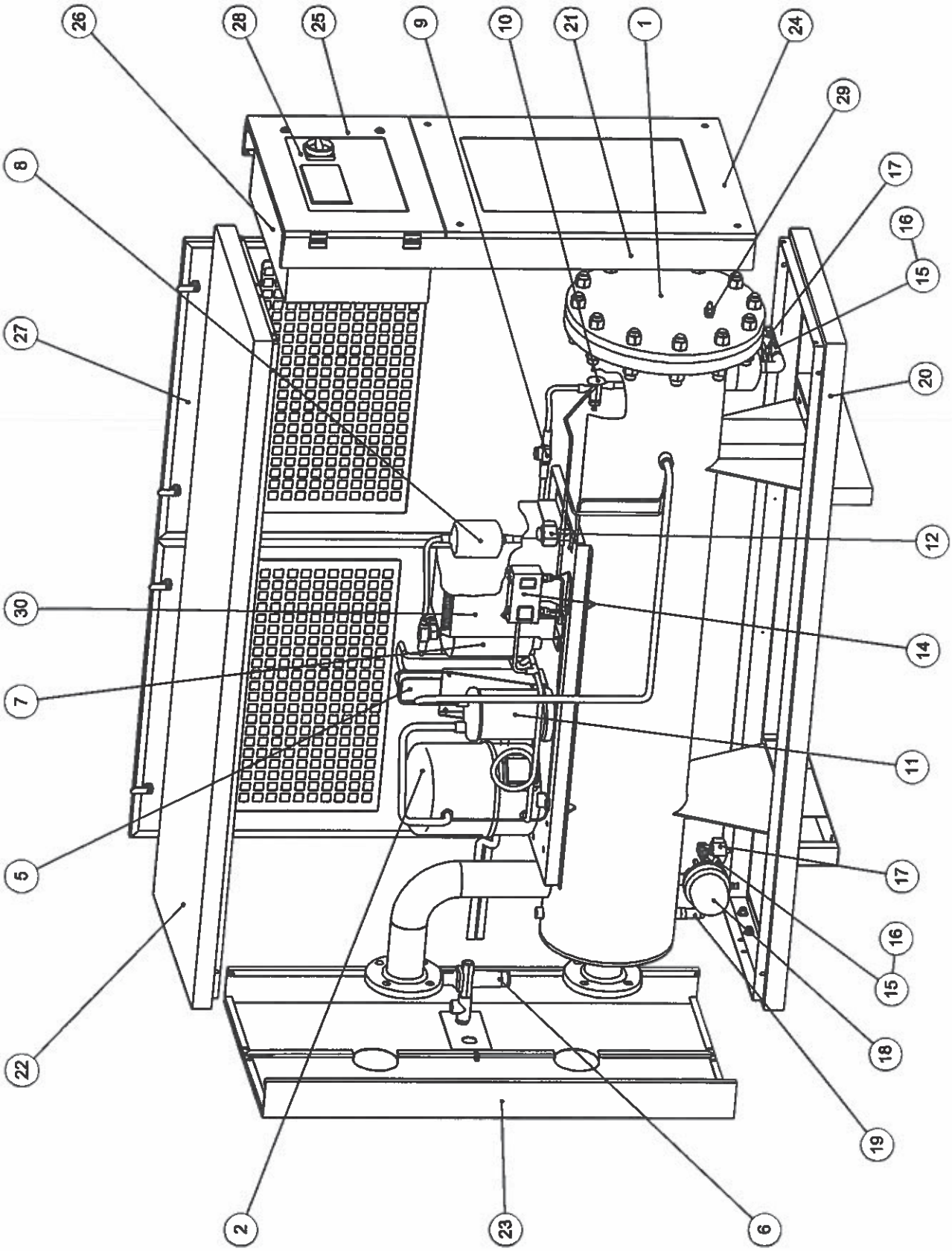
The components table given below refers to the relevant exploded views attached to this manual.

(1) Heat exchanger group
(2) Refrigeration compressor
(3) Condenser unit (air cooled)
(4) Condenser unit fan (air cooled)
(5) Condenser unit (water cooled)
(6) Condenser water regulating valve (water cooled)
(7) Liquid receiver
(8) Solid filter dryer
(9) Liquid sight - glass
(10) Thermostatic expansion valve - TEX
(11) Liquid separator
(12) Hot gas by-pass solenoid valve
(13) Refrigerant pressure-switch PV
(14) Refrigerant pressure-switch PA - PB
(15) Condensate drain service valve
(16) Condensate strainer
(17) Condensate drain solenoid valve
(18) Condensate accumulator
(19) Service valve
(20) Cabinet - Frame
(21) Cabinet - Post panel
(22) Cabinet - Cover panel
(23) Cabinet - Rear panel
(24) Cabinet - Front pad panel
(25) Cabinet - Electric board door
(26) Cabinet - Electric board box
(27) Cabinet - Lateral panel
(28) Control panel
(29) Copper tube immersion well - DewPoint probe (T1)
(30) 575/460 TF transformer

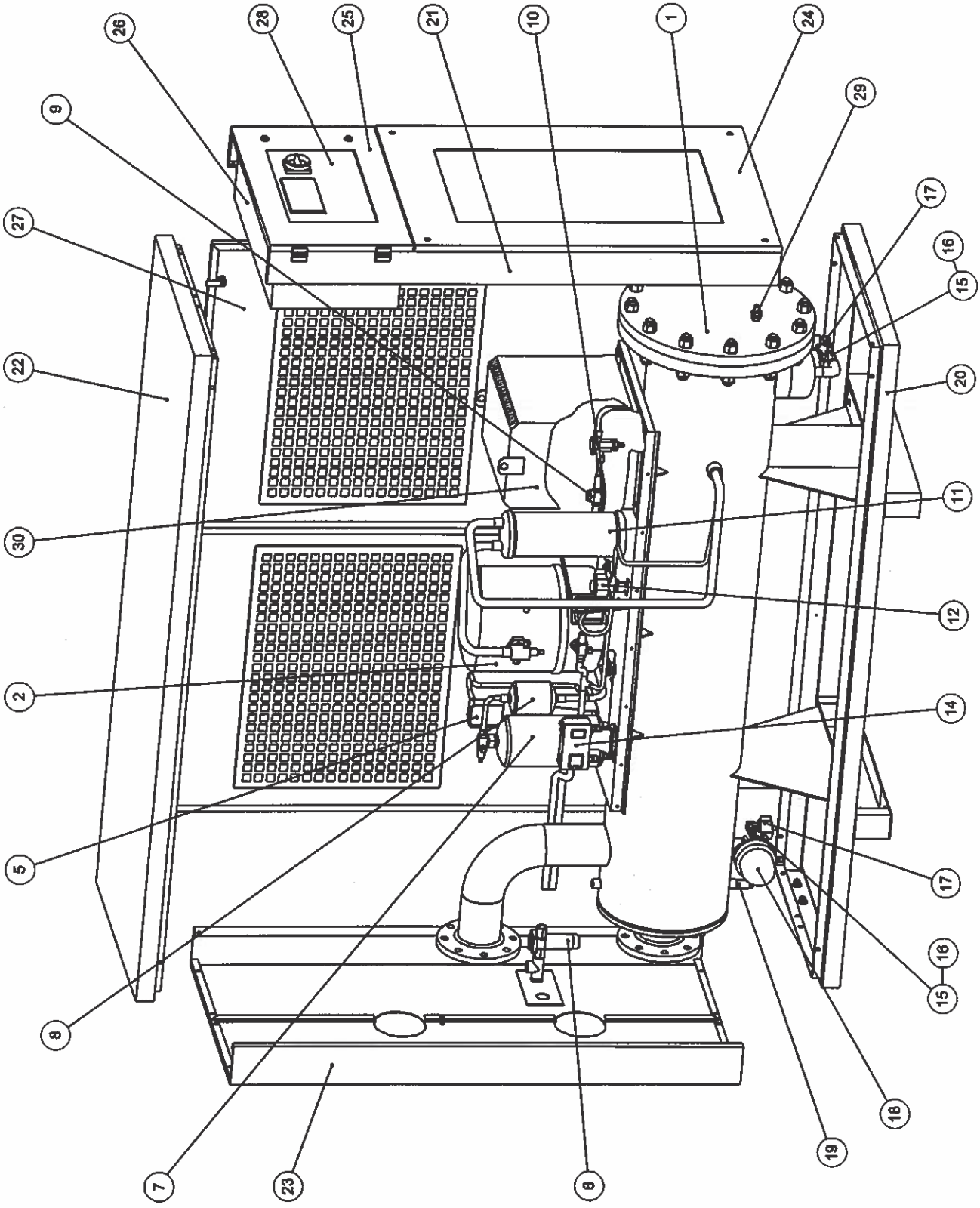
8.3 EXPLODED VIEW - DRYERS TDF420 to TDF680 - AIR COOLED



8.4 EXPLODED VIEW - DRYERS TDF145 to TDF340 - WATER COOLED



8.5 EXPLODED VIEW - DRYERS TDF420 to TDF680 - WATER COOLED



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