EN

Operating manual
Maintenance manual
Spare parts

Refrigerating air dryer

DRYPOINT® RA 80-720

05-478

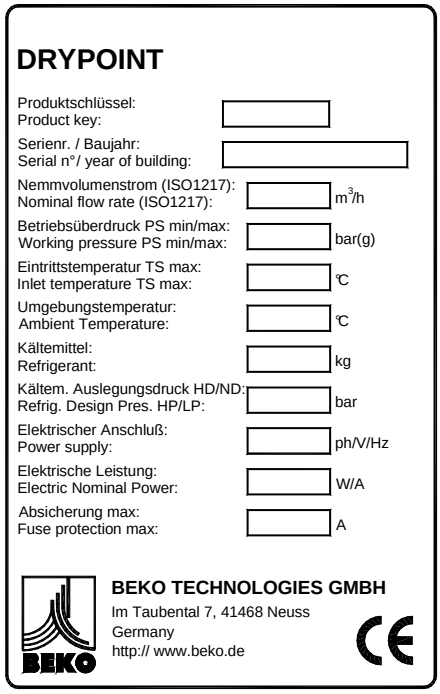
Dear Customer,
thank you for choosing our product. In order to get the best performances out of this product, please read this manual carefully.
To avoid incorrect operation of the equipment and possible physical risk to the operator, please read and strictly follow the instructions contained in this manual.
Note, these instructions are in addition to the safety rules that apply in the country where the dryer is installed. Before packing for shipment each **DRYPOINT RA** series refrigerated air dryer undergoes a rigorous test to ensure the absence of any manufacturing faults and to demonstrate that the device can perform all the functions for which it has been designed.
Once the dryer has been properly installed according to the instructions in this manual, it will be ready for use without any further adjustment. The operation is fully automatic, and the maintenance is limited to few controls and some cleaning operations, as detailed in the following chapters.
This manual must be maintained available in any moment for future references and it has to be intended as inherent part of the relevant dryer.
Due to the continuous technical evolution, we reserve the right to introduce any necessary change without giving previous notice.
Should you experience any trouble, or for further information, please do not hesitate to contact us.

DATA NAMEPLATE

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

Model ⇨

Product key ⇨
Serial n°. ⇨
Nominal Flow Rate ⇨
Working pressure PS min/max ⇨
Inlet temperature TS max ⇨
Ambient Temp. ⇨
Refrigerant ⇨
Refrig. Design Pres. HP/LP ⇨
Power supply ⇨
Electric Nominal Power ⇨
Fuse Max. ⇨



1. Safety rules

1.1. Definition of the Conventional Signs Used in This Manual

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

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

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

Danger hazard. Part or system under pressure.

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

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

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

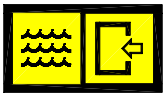
Danger hazard. Do not operate equipment with panels removed.

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

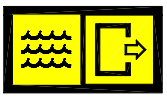
Compressed air inlet connection point

Compressed air outlet connection point

Condensate drain connection point



Cooling water inlet connection point (Water-Cooled)



Cooling water outlet connection point (Water-Cooled)

Operations which can be performed by the operator of the machine, if qualified [1].

NOTE: Text that specifies items of note to be taken into account does not involve safety precautions.

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

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

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

[1] Experienced and trained personnel familiar with national and local codes, capable to perform the needed activities, identify and avoid possible dangerous situations while handling, installing, using and servicing the machine. Ensuring compliance to all statutory regulations.

1.2. Warnings

DANGER!
Compressed air!
Compressed air is a highly hazardous energy source.
Never work on the dryer with pressure in the system.

Never point the compressed air or the condensate drain outlet hoses towards anybody.
The user is responsible for the proper installation of the dryer. Failure to follow instructions given in the "Installation" chapter will void the warranty. Improper installation can create dangerous situations for personnel and/or damages to the machine could occur.

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

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

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

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

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

1.3. Proper Use of the Dryer

This dryer has been designed, manufactured and tested for the purpose of separating the humidity normally contained in compressed air. Any other use has to be considered improper.
The Manufacturer will not be responsible for any problem arising from improper use; the user will bear responsibility for any resulting damage.
Moreover, the correct use requires the adherence to the installation instructions, specifically:

- Voltage and frequency of the main power.
- Pressure, temperature and flow-rate of the inlet air.
- Pressure, temperature and cooling water capacity (Water-Cooled).
- 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.

WARNING!
Improper use!

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

1.4. Instructions for the use of pressure equipment according to PED Directive 97/23/EC

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

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

WARNING!
Unauthorized interference!
Users of the equipment must comply with all local and national pressure equipment legislation in the country of installation.

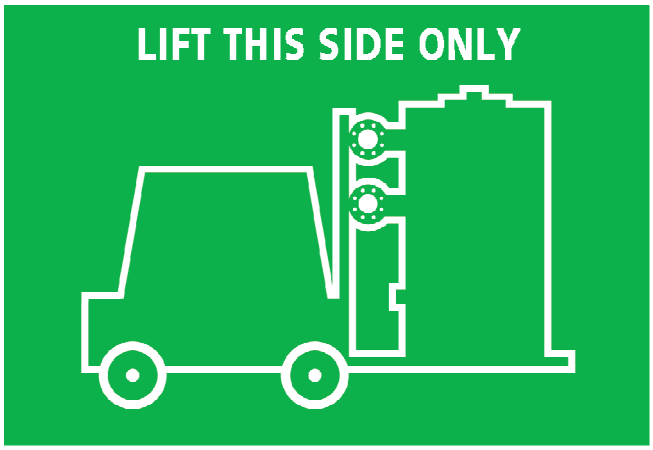
2. Installation

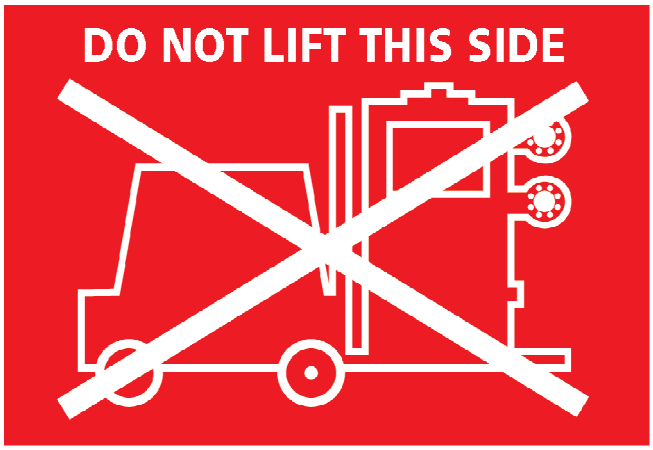
2.1. Transport

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

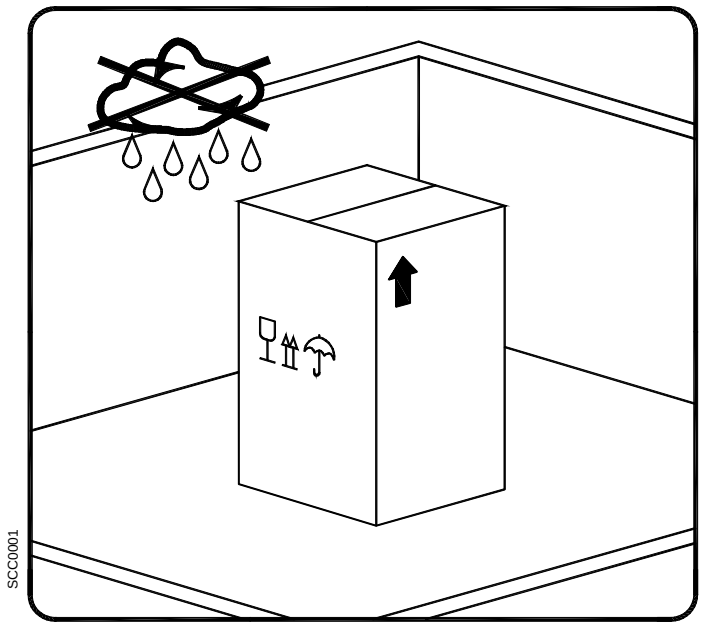
- Always keep the dryer in the upright vertical position. Damage to components could result if unit is laid on its side or if placed upside down.
- Store machine in a clean, dry environment, do not expose to severe weather environments.
- Handle with care. Heavy blows could cause irreparable damage.

400-720 only:





2.2. Storage



Even when packaged, keep the machine protected from severity of the weather.
Keep the dryer in vertical position, also when stored. Turning it upside down some parts could be irreparably damaged.
If not in use, the dryer can be stored in its packaging in a dust free and protected site at a maximum temperature of 50 ℃, and a specific humidity not exceeding 90%. Should the stocking time exceed 12 months, please contact the manufacturer.

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

2.3. Installation site

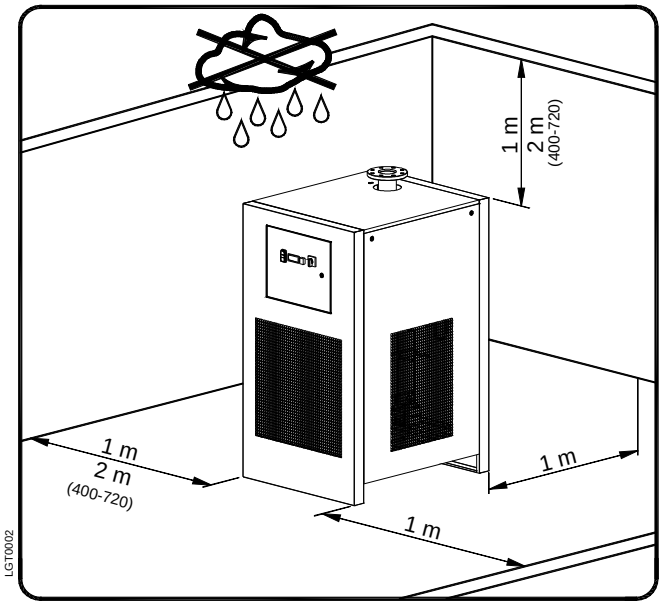
CAUTION!
Ambient conditions!
Failure to install dryer in the proper ambient conditions will affect the dryer's ability to condense refrigerant gas. This can cause higher loads on the compressor, loss of dryer efficiency and performance, overheated condenser fan motors, electrical component failure and dryer failure due to the following: compressor loss, fan motor failure and electrical component failure. Failures of this type will affect warranty considerations.
Do not install dryer in an environment of corrosive chemicals, explosive gasses, poisonous gasses; steam heat, areas of high ambient conditions or extreme dust and dirt.

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

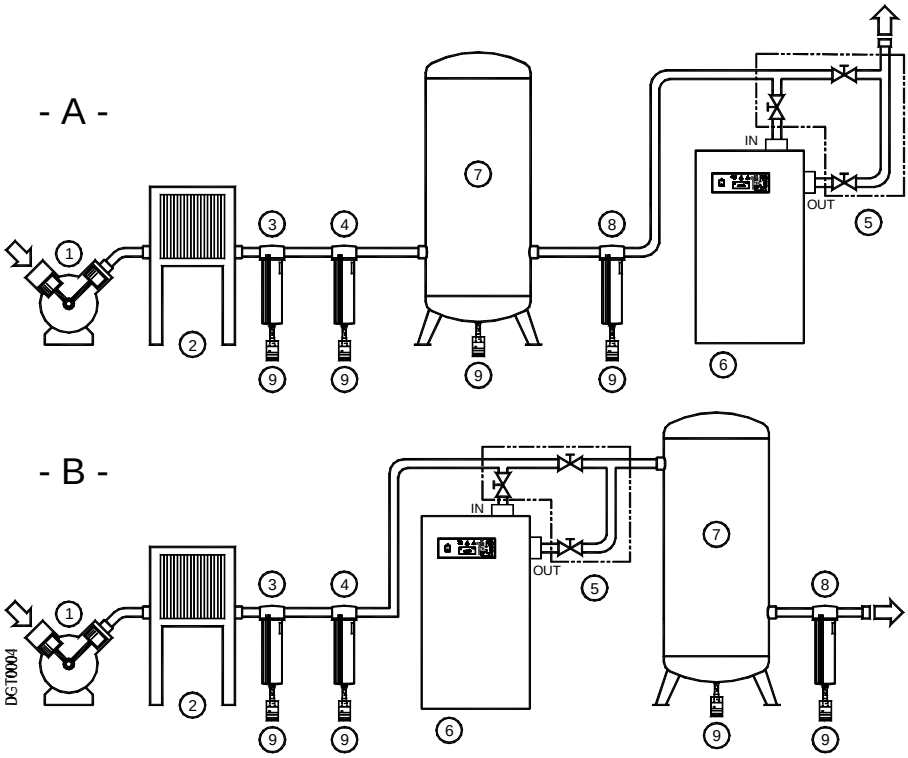
Minimum installation requirements:

- Select a clean dry area, free from dust, and protected from atmospheric disturbances.
- The supporting area must be smooth, horizontal and able to hold the weight of the dryer.
- Minimum ambient temperature +1℃.
- Maximum ambient temperature 50℃.
- Allow at least 1 meter of clearance on each side of the dryer (2m DRYPOINT RA 400-720 Air Cooled) for proper ventilation and circulation through the condenser. The space is also necessary to facilitate maintenance operations.

The dryer does not require attachment to the floor surface; however installations where the unit is suspended require an attachment to the hanging apparatus.



2.4. Installation layout



1. Air compressor
2. Aftercooler
3. Condensate separator
4. Pre-Filter (min. 5 micron)
5. By-pass group
6. Dryer
7. Compressed air tank
8. Final filter
9. Bekomat condensate drain

CAUTION!
Polluted inlet air!
In case of heavily polluted inlet air (ISO 8573.1 class 3.-.3 or worse quality), we recommend the additional installation of a pre-filter (f.e. CLEARPOINT F040) to prevent a clogging of the heat exchanger

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

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

2.5. Correction factors

Correction factor for operating pressure changes:									
Inlet air pressure	barg	4	5	6	7	8	10	12	14
Factor (F1)		0.77	0.86	0.93	1.00	1.05	1.14	1.21	1.27

Correction factor for ambient temperature changes (Air-Cooled):							
Ambient temperature	ºC	≤ 25	30	35	40	45	50
Factor (F2)		1.00	0.99	0.97	0.93	0.88	0.81

Correction factor for inlet air temperature changes:											
Air temperature	ºC	≤ 25	30	35	40	45	50	55	60	65	70
Factor (F3)		1.27	1.12	1.00	0.88	0.78	0.70	0.62	0.55	0.49	0.43

Correction factor for DewPoint changes:					
DewPoint	ºC	3	5	7	10
Factor (F4)		1.00	1.09	1.19	1.37

How to find the air flow capacity:

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

Example:

An **DRYPOINT RA 180** has a nominal duty of **1080 m³/h**. What is the maximum allowable flow through the dryer under the following operating conditions:

- Inlet air pressure = 8 barg ⇨ Factor (F1) = 1.05
- Ambient temperature = 45℃ ⇨ Factor (F2) = 0.88
- Inlet air temperature = 50℃ ⇨ Factor (F3) = 0.70
- Pressure DewPoint = 10℃ ⇨ Factor (F4) = 1.37

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

Air flow capacity = 1080 x 1.05 x 0.88 x 0.70 x 1.37 = 957 m³/h

957 m³/h This is the maximum flow rate that the dryer can accept under these operating conditions.

How to select a suitable dryer for a given duty:

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

Example:

With the following operating parameters:

- Design air flow = 1000 m^3/h
- Inlet air pressure = 8 barg ⇨ Factor (F1) = 1.05
- Ambient temperature = 45℃ ⇨ Factor (F2) = 0.88
- Inlet air temperature = 50℃ ⇨ Factor (F3) = 0.70
- Pressure DewPoint = 10℃ ⇨ Factor (F4) = 1.37

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

$$\textbf{Minimum std. air flow rate} = \frac{\textbf{1000}}{\textbf{1.05 x 0.88 x 0.70 x 1.37}} = \textbf{1128 m³/h}$$

Therefore the model suitable for the conditions above is **DRYPOINT RA 210** (**1260 m³/h** - nominal duty).

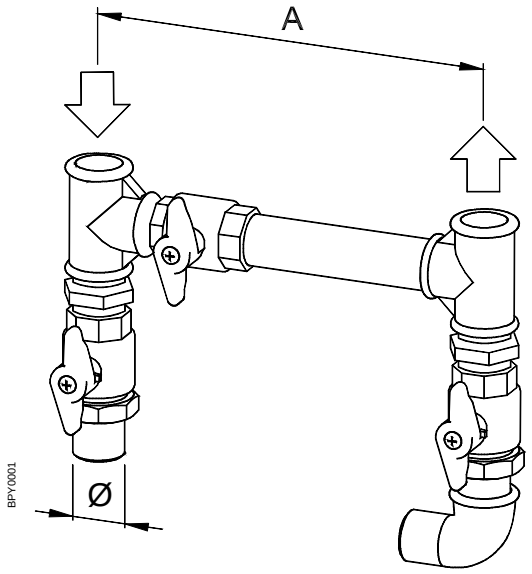
2.6. Connection to the Compressed Air System

DANGER!

Compressed air!

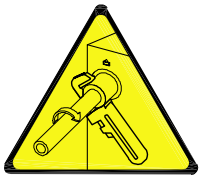
Operations to be performed by qualified personnel only.
Never work on compressed air system under pressure.
The user is responsible to ensure that the dryer will never be operated with pressure exceeding the maximum pressure rating on the unit data tag.
Over-pressurizing the dryer could be dangerous for both the operator and the unit.

The air temperature and the flow entering the dryer must comply within the limits stated on the data nameplate. The system connecting piping must be kept free from dust, rust, chips and other impurities, and must be consistent with the flow-rate of the dryer. In case of treatment of air at particularly high temperature, the installation of a final refrigerator could result necessary. In order to perform maintenance operations, it recommended that a dryer by-pass system be installed as shown in the following illustration.



Dryer	Ø [BSP-F]	A [mm]
DRYPOINT RA 80-100	2"	345
DRYPOINT RA 120-600	2.1/2"	410

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



CAUTION:

Piping the dryer, inlet/outlet connections must be supported as show in the diagram.
Failing will result in damage.

2.7. Connection to the Cooling Water Network (Water-Cooled)

DANGER!

Compressed air and unqualified personnel!

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.).

2.8. Electrical connections

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

Before connecting the unit to the electrical supply, verify the data nameplate for the proper electrical information. Voltage tolerance is +/- 5%.
Dryers are supplied with a junction box.
Be sure to provide the proper fuses or breakers based on the data information located on the nameplate.
The mains socket must be provided with a mains magneto-thermal differential breaker (IΔn=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.

DANGER!
Mains voltage and missing earthing!
Important: ensure that the plant is earthed.
Do not use any socket adapters at the mains plug.
If the mains plug needs to be replaced, this must only be done by a qualified electrician

2.9. Condensate Drain

DANGER!
Compressed air and pressurized condensate!
The condensate is discharge at the system pressure.
Drain line should be secured.
Never point the condensate drain line towards anybody.

The dryer comes already fitted with an electronically level controlled BEKOMAT condensate drain. Connect and properly fasten the condensate drain to a collecting plant or container.
The drain cannot be connected to pressurized systems.

Don't dispose the condensate in the environment.
The condensate collected in the dryer contains oil particles released in the air by the compressor.
Dispose the condensate in compliance with the local rules.
We suggest to install a water-oil separator where to convey all the condensate drain coming from compressors, dryers, tanks, filters, etc. We recommend ÖWAMAT oil-water separators for disperse compressor condensate, BEKOSPLIT emulsion splitters for emulsified condensate.

3. Start up

3.1. Preliminary Operations

CAUTION!
Exceeding of operating parameters!
Verify that the operating parameters match with the nominal values stated on the data nameplate of the dryer (voltage, frequency, air pressure, air temperature, ambient temperature, etc.).

This dryer has been thoroughly tested, packaged and inspected prior to shipment. Nevertheless, the unit could be damaged during transportation, check the integrity of the dryer during first start-up and monitor operation during the first hours of operation.

Qualified personnel must perform the first start-up.
When installing and operating this equipment, comply with all National Electrical Code and any applicable federal, state and local codes.

Who is operating the unit is responsible for the proper and safe operation of the dryer.
Never operate equipment with panels removed.

3.2. First start-up

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

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

DMC14 Electronic Instrument

- Ensure that all the steps of the “Installation” chapter have been observed.
- Ensure that the connection to the compressed air system is correct and that the piping is suitably fixed and supported.
- Ensure that the condensate drain pipe is properly fastened and connected to a collection system or container.
- Ensure that the by-pass system (if installed) is closed and the dryer is isolated.
- Ensure that the manual valve of the condensate drain circuit is open.
- Remove any packaging and other material which could obstruct the area around the dryer.
- Activate the mains switch.
- Turn on the main switch - pos. 1 on the control panel.
- Check that the mains detection light of the ON/OFF button - pos. 4 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) - only models RA 180-720.
- Ensure the cooling water flow and temperature is adequate (Water-Cooled).
- Switch ON the dryer pressing the button "I - ON" of the ON/OFF switch - pos. 4 of the control panel.
- Ensure that DMC14 electronic instrument is ON.
- 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.
- Ensure the drain is regularly cycling - wait for its first interventions.

DMC20 Electronic Instrument

- Ensure that all the steps of the “Installation” chapter have been observed.
- Ensure that the connection to the compressed air system is correct and that the piping is suitably fixed and supported.
- Ensure that the condensate drain pipe is properly fastened and connected to a collection system or container.
- Ensure that the by-pass system (if installed) is closed and the dryer is isolated.
- Ensure that the manual valve of the condensate drain circuit is open.
- Remove any packaging and other material which could obstruct the area around the dryer.
- Activate the mains switch.
- Turn on the main switch - pos. 1 on the control panel.
- Check that "crankcase oil 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) - only models RA 180-720.
- 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.
- 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.
- Ensure the drain is regularly cycling - wait for its first interventions.

3.3. Start-up and shut down

For short periods of inactivity, (max 2-3 days) we recommend that power is maintained to the dryer and the control panel. Otherwise, before re-starting the dryer, it is necessary to wait at least 2 hours for the compressor crankcase heater to heat the oil of the compressor (only models DRYPOINT RA 180-720).

Start-up (refer to paragraph 5.1 Control Panel)

DMC14 Electronic Instrument

- 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. 4 of the control panel - is ON.
- Switch ON the dryer pressing the button "I - ON" of the ON/OFF switch - pos. 4 of the control panel.
- Ensure that DMC14 electronic instrument is ON.
- Wait a few minutes; verify that the DewPoint temperature displayed on electronic instrument DMC14 is correct and that the condensate is regularly drained.
- Switch on the air compressor.

DMC20 Electronic Instrument

- Check the condenser for cleanliness (Air-Cooled).
- Ensure the cooling water flow and temperature is adequate (Water-Cooled).
- Check that "crankcase oil 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; verify that the DewPoint temperature displayed on electronic instrument DMC20 is correct and that the condensate is regularly drained.
- Switch on the air compressor.

Shut down (refer to paragraph 5.1 Control Panel)

DMC14 Electronic Instrument

- Check that the DewPoint temperature indicated on the DMC14 is within range.
- Shut down the air compressor.
- After few minutes, shut down the dryer pressing the button "0 - OFF" of the ON/OFF switch - pos. 4 of the control panel.

DMC20 Electronic Instrument

- Check that the DewPoint temperature indicated on the DMC20 is within range.
- Shut down the air compressor.
- After a few minutes, shut down the dryer keeping the “Dryer Stop” button on DMC20 pressed for at least 2 seconds.

NOTE : A DewPoint within 0°C and +10°C displayed on Air Dr yer Controller is correct according to the possible working conditions (flow-rate, temperature of the incoming air, ambient temperature, etc.).
During the operation, the refrigerating compressor will run continuously. The dryer must remain on during the full usage period of the compressed air, even if the air compressor works intermittently.

The **number of starts must be no more than 6 per hour.** The dryer must stop running for at least 5 minutes before being started up again.
The user is responsible for compliance with these rules. Frequent starts may cause irreparable damage.

4. Technical Specifications

4.1. Technical Specifications DRYPOINT RA 80-160 /AC

		Air-Cooled				
DRYPOINT RA MODEL		**80**	**100**	**120**	**140**	**160**
Air flow rate at nominal condition [1]	[l/min]	8100	10500	12500	14500	16000
	[m^3/h]	486	630	750	870	960
	[scfm]	286	371	441	512	565
Pressure DewPoint at nominal condition [1]	[℃]	+3 equal to 0.73 g/m^3 of H_2O				
Nom. ambient temperature. (max.)	[℃]	+25 (+50)				
Min. ambient temperature	[℃]	+1				
Nominal inlet air temperature. (max.)	[℃]	+35 (+70)				
Nominal inlet air pressure	[barg]	7				
Max. inlet air pressure	[barg]	14				
Air pressure drop - Δp	[bar]	0.09	0.13	0.07	0.13	0.15
Inlet - Outlet connections	[BSP-F]	G 2”		G 2.1/2”		
Refrigerant type		R404A				
Refrigerant quantity [3]	[kg]	1.25	1.30	1.85	2.10	2.30
Cooling air fan flow	[m^3/h]	2300			3400	
Cooling water flow at 15℃ (out 30℃)	[m^3/h]	-				
Cooling water flow at 30℃ (out 40℃)	[m^3/h]	-				
Control of cooling water flow		-				
Maximum water temperature [2]	[℃]	-				
Min. (Max) water pressure	[barg]	-				
Cooling water connections	[BSP-F]	-				
Standard Power Supply [3]	[Ph/V/Hz]	3/400-415/50				
Nomin	[W]	1300	1400	1500	1950	2100
	[A]	2.5	2.7	3.1	3.9	4.1
Max. electric absorption	[W]	1700	1780	1950	2400	3000
	[A]	3.0	3.2	4.0	5.0	5.2
Max. level noise at 1 m	[dbA]	< 70				
Weight	[kg]	100	102	149	158	169

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

[2] Other temperature on request.

[3] Check the data shown on the identification plate.

4.2. Technical Specifications DRYPOINT RA 180-720 /AC

DRYPOINT RA MODEL		Air-Cooled								
		180	**210**	**250**	**300**	**360**	**400**	**500**	**600**	**720**
Air flow rate at nominal condition [1]	[l/min]	18000	21000	25000	30000	36800	40000	50000	60000	73600
	[m^3/h]	1080	1260	1500	1800	2208	2400	3000	3600	4416
	[scfm]	636	742	883	1060	1300	1413	1766	2119	2600
Pressure DewPoint at nominal condition [1]	[°C]	+3 equal to 0.73 g/m^3 of H_2O								
Nom. ambient temperature. (max.)	[°C]	+25 (+50)								
Min. ambient temperature	[°C]	+1								
Nominal inlet air temperature. (max.)	[°C]	+35 (+70)								
Nominal inlet air pressure	[barg]	7								
Max. inlet air pressure	[barg]	14								
Air pressure drop - Δp	[bar]	0.17	0.21	0.13	0.19	0.26	0.21	0.14	0.20	0.26
Inlet - Outlet connections	[BSP-F]	DN80 PN16					DN100 PN16			DN125 PN16
Refrigerant type		R404A								
Refrigerant quantity [3]	[kg]	2.70	3.00	3.20	4.00	4.60	9.00	9.80	10.00	11.00
Cooling air fan flow	[m^3/h]	5300		6500			15500			
Cooling water flow at 15°C (out 30°C)	[m^3/h]	-								
Cooling water flow at 30°C (out 40°C)	[m^3/h]	-								
Control of cooling water flow		-								
Maximum water temperature [2]	[°C]	-								
Min. (Max) water pressure	[barg]	-								
Cooling water connections	[BSP-F]	-								
Standard Power Supply [3]	[Ph/V/Hz]	3/400-415/50								
Nominal electric absorption	[W]	3350	3500	4300	4400	5000	6500	6700	7500	8500
	[A]	5.6	6.3	8.1	8.7	9.0	11.1	11.5	12.8	14.6
Max. electric absorption	[W]	4700	5400	5500	5700	6500	8600	8900	9900	11000
	[A]	7.4	8.9	10.1	11.2	11.7	14.6	15.0	16.3	17.9
Max. level noise at 1 m	[dbA]	< 75					< 80			
Weight	[kg]	232	242	267	277	302	530	580	590	700

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

[2] Other temperature on request.

[3] Check the data shown on the identification plate.

4.3. Technical Specifications DRYPOINT RA 80-160 /WC

		Water-Cooled				
DRYPOINT RA MODEL		**80**	**100**	**120**	**140**	**160**
Air flow rate at nominal condition [1]	[l/min]	8100	10500	12500	14500	16000
	[m^3/h]	486	630	750	870	960
	[scfm]	286	371	441	512	565
Pressure DewPoint at nominal condition [1]	[°C]	+3 equal to 0.73 g/m^3 of H_2O				
Nom. ambient temperature. (max.)	[°C]	+25 (+50)				
Min. ambient temperature	[°C]	+1				
Nominal inlet air temperature. (max.)	[°C]	+35 (+70)				
Nominal inlet air pressure	[barg]	7				
Max. inlet air pressure	[barg]	14				
Air pressure drop - Δp	[bar]	0.09	0.13	0.07	0.13	0.15
Inlet - Outlet connections	[BSP-F]	G 2”		G 2.1/2”		
Refrigerant type		R404A				
Refrigerant quantity [3]	[kg]	0.95	1.00	1.15	1.30	1.40
Cooling air fan flow	[m^3/h]	-				
Cooling water flow at 15°C (out 30°C)	[m^3/h]	0.24	0.26	0.27	0.36	0.37
Cooling water flow at 30°C (out 40°C)	[m^3/h]	0.36	0.40	0.41	0.54	0.56
Control of cooling water flow		Automatic by valve				
Maximum water temperature [2]	[°C]	30				
Min. (Max) water pressure	[barg]	3 (10)				
Cooling water connections	[BSP-F]	G 1/2”		G 3/4”		
Standard Power Supply [3]	[Ph/V/Hz]	3/400-415/50				
Nominal electric absorption	[W]	1190	1290	1390	1790	1940
	[A]	2.2	2.4	2.8	3.5	3.7
Max. electric absorption	[W]	1590	1670	1840	2250	2850
	[A]	2.7	2.9	3.7	4.6	4.8
Max. level noise at 1 m	[dbA]	< 70				
Weight	[kg]	97	99	146	155	166

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

[2] Other temperature on request.

[3] Check the data shown on the identification plate.

4.4. Technical Specifications DRYPOINT RA 180-720 /WC

DRYPOINT RA MODEL		Water-Cooled								
		180	**210**	**250**	**300**	**360**	**400**	**500**	**600**	**720**
Air flow rate at nominal condition [1]	[l/min]	18000	21000	25000	30000	36800	40000	50000	60000	73600
	[m^3/h]	1080	1260	1500	1800	2208	2400	3000	3600	4416
	[scfm]	636	742	883	1060	1300	1413	1766	2119	2600
Pressure DewPoint at nominal condition [1]	[°C]	+3 equal to 0.73 g/m^3 of H_2O								
Nom. ambient temperature. (max.)	[°C]	+25 (+50)								
Min. ambient temperature	[°C]	+1								
Nominal inlet air temperature. (max.)	[°C]	+35 (+70)								
Nominal inlet air pressure	[barg]	7								
Max. inlet air pressure	[barg]	14								
Air pressure drop - Δp	[bar]	0.17	0.21	0.13	0.19	0.26	0.21	0.14	0.20	0.26
Inlet - Outlet connections	[BSP-F]	DN80 PN16					DN100 PN16			DN125 PN16
Refrigerant type		R404A								
Refrigerant quantity [3]	[kg]	1.35	1.45	1.70	1.80	2.40	4.00	4.70	6.20	8.80
Cooling air fan flow	[m^3/h]	-								
Cooling water flow at 15°C (out 30°C)	[m^3/h]	0.54	0.62	0.71	0.75	0.87	1.25	1.27	1.44	1.69
Cooling water flow at 30°C (out 40°C)	[m^3/h]	0.82	0.94	1.06	1.13	1.32	1.80	1.90	2.20	2.53
Control of cooling water flow		Automatic by valve								
Maximum water temperature [2]	[°C]	30								
Min. (Max) water pressure	[barg]	3 (10)								
Cooling water connections	[BSP-F]	G 3/4"					G 1”			
Standard Power Supply [3]	[Ph/V/Hz]	3/400-415/50								
Nominal electric absorption	[W]	2900	3050	3550	3650	4250	5800	6000	7100	7800
	[A]	4.8	5.6	6.3	6.9	7.2	9.9	10.3	12.0	13.4
Max. electric absorption	[W]	4200	4600	4800	5000	5800	7900	8200	9200	10300
	[A]	6.6	8.1	8.3	9.5	9.9	13.4	13.8	15.1	16.7
Max. level noise at 1 m	[dbA]	< 70					< 75			
Weight	[kg]	227	237	262	272	297	520	570	580	690

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

[2] Other temperature on request.

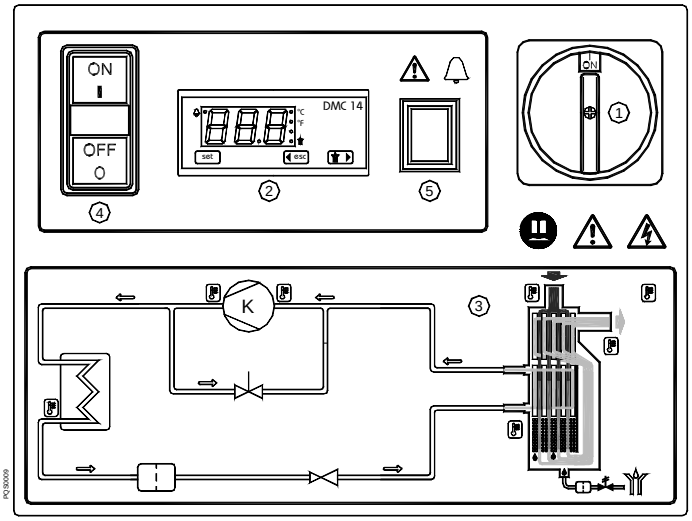
[3] Check the data shown on the identification plate.

5. Technical description

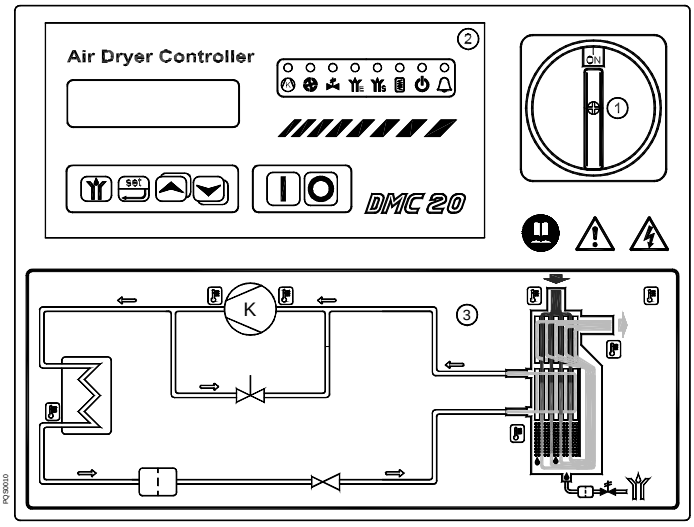
5.1. Control panel

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

DRYPOINT RA 80 - 720 – DMC14



DRYPOINT RA 80 - 720 - DMC20



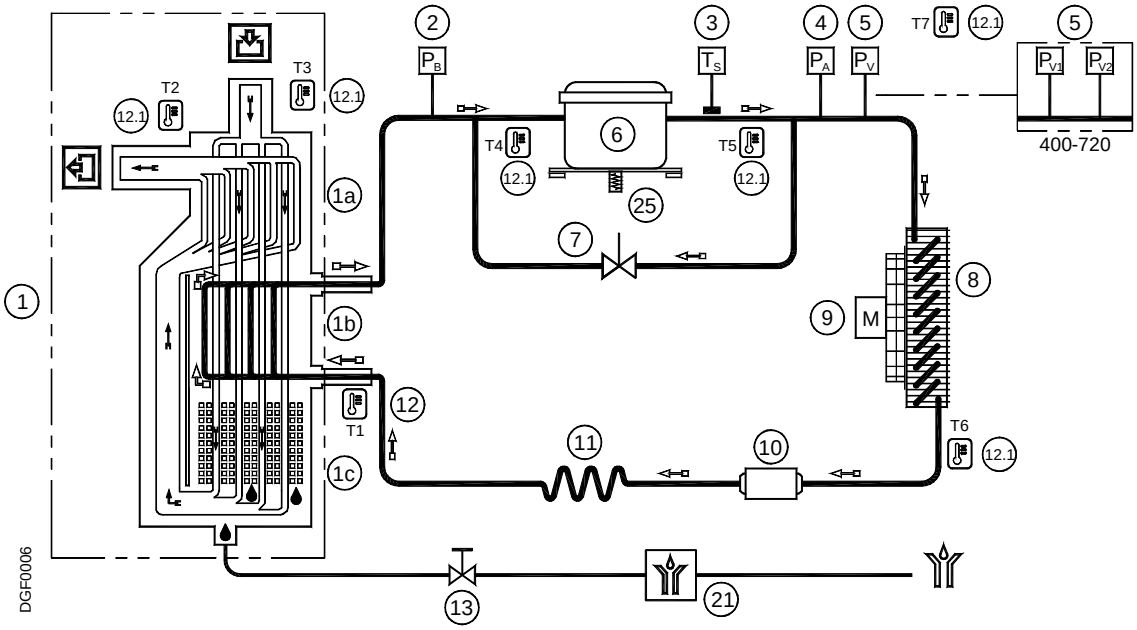
1. Main switch
2. Electronic control instrument (DMC14-DMC20)
3. Air and refrigerating gas flow diagram
4. ON/OFF switch with mains detecting light
5. Alarm light

5.2. Operation

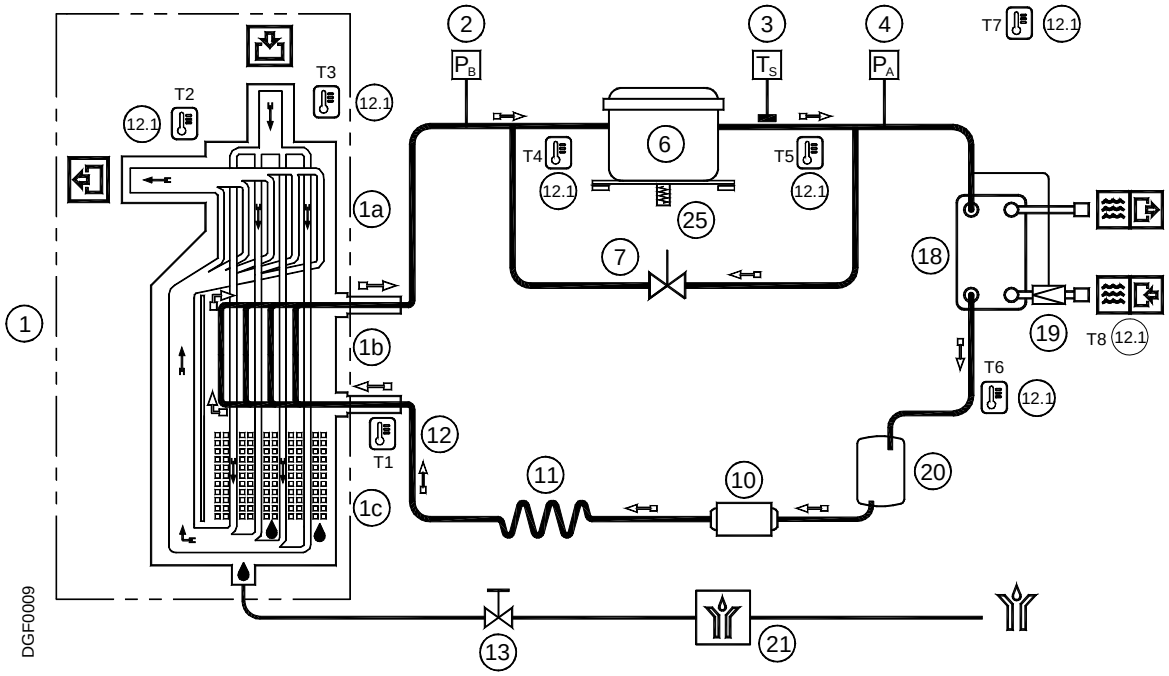
Operating principal - The dryer models described in this manual operate all on the same principal. The hot moisture laden air enters an air to air heat exchanger. The air then goes through the evaporator, also known as the air to refrigerant heat exchanger. The temperature of the air is reduced to approximately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

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

5.3. Flow Diagram (Air-Cooled)



5.4. Flow Diagram (Water-Cooled)



1. Alu-Dry Module
   a - Air-to-air heat exchanger
   b - Air-to-refrigerant exchanger
   c - Condensate separator
2. Refrigerant pressure switch P_B
3. Safety thermo-switch TS
4. Refrigerant pressure switch P_A
5. Refrigerant Fan pressure-switch P_V
   P_{V1} - P_{V2} (DRYPOINT RA 400-720)
6. Compressor
7. Hot Gas By-pass Valve
8. Condenser (Air-Cooled)
9. Condenser fan
10. Filter Dryer
11. Capillary tube
12. T1 Temperature probe (DewPoint)
12.1 Temp. Probes T2-T8 → DMC20 (if installed)
13. Condensate drain isolation valve
17. Air Dryer Controller
18. Condenser (Water-Cooled)
19. Condenser water regulating valve (Water-Cooled)
20. Liquid accumulator (Water-Cooled)
21. Bekomat drainer
25. Compressor crankcase heater (DRYPOINT RA 180-720)

Compressed air flow direction

Refrigerating gas flow direction

5.5. Refrigerating compressor

The refrigerating compressor is the pump in the system, gas coming from the evaporator (low pressure side) is compressed up to the condensation pressure (high pressure side). The compressors utilized are manufactured by leading manufacturers and are designed for applications where high compression ratios and wide temperature changes are present.
The hermetically sealed construction is perfectly gas tight, ensuring high-energy efficiency and long, useful life. Dumping springs support the pumping unit in order to reduce the acoustic emission and the vibration diffusion. The aspirated refrigerating gas, flowing through the coils before reaching the compression cylinders cools the electric motor. The thermal protection protects the compressor from over heating and over currents. The protection is automatically restored as soon as the nominal temperature conditions are reached.

5.6. Condenser (Air-Cooled)

The condenser is the component in which the gas coming from the compressor is cooled down and condensed becoming a liquid. Mechanically, a serpentine copper tubing circuit (with the gas flowing inside) is encapsulated in an aluminum fin package.
The cooling operation occurs via a high efficiency fan, creating airflow within the dryer, moving air through the fin package. It's mandatory that the ambient air temperature does not exceed the nominal values. It is also important to keep the condenser unit free from dust and other impurities.

5.7. Condenser (Water-Cooled)

The condenser is the component in which the gas coming from the compressor is cooled down and condensed becoming a liquid. Basically it is a water/refrigerating gas exchanger where the cooling water lowers the temperature of the refrigerating gas.
The temperature of the inlet water must not exceed the nominal values. It must also guarantee an adequate flow and that the water entering the exchanger is free from dust and other impurities.

5.8. Condenser water regulating valve (Water-Cooled)

The condenser water regulating valve is used to keep the condensing pressure/temperature constant when the Water-Cooled is being used. Thanks to the capillary tube, the valve detects the pressure in the condenser and consequently adjusts the water flow. When the dryer stops the valve automatically closes the cooling water flow.

CAUTION!
The condenser water regulating valve is an operating control device.
The closure of the water circuit from the pressure condenser water regulating valve cannot be used as a safety closure during service operations on the system.

ADJUSTMENT
The condenser water regulating valve is adjusted during the testing phase to a pre-set value that covers 90% of the applications. However, sometimes the 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 temperature of 42-45 °C.

5.9. Filter Drier

Traces of humidity and slag can accumulate inside the refrigerating circuit. Long periods of use can also produce sludge. This can limit the lubrication efficiency of the compressor and clog the expansion valve or capillary tube. The function of the Filter Drier, located before the capillary tubing, is to eliminate any impurities from circulating through the system.

5.10. Capillary Tube

It consists of a piece of reduced cross section copper tubing located between the condenser and the evaporator, acting as a metering device to reduce the pressure of the refrigerant. Reduction of pressure is a design function to achieve optimum temperature reached within the evaporator: the smaller the capillary tube outlet pressure, the lower the evaporation temperature.
The length and interior diameter of the capillary tubing is accurately sized to establish the performance of the dryer; no maintenance or adjustment is necessary.

5.11. Alu-Dry Module

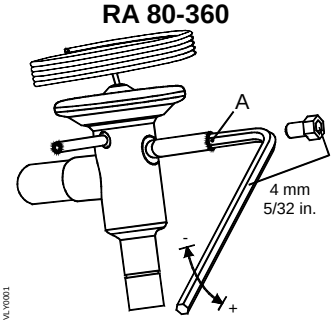
The heat exchanger module houses the air-to-air, the air-to-refrigerant heat exchangers and the demister type condensate separator. The counter flow of compressed air in the air-to-air heat exchanger ensures maximum heat transfer. The generous cross section of flow channel within the heat exchanger module leads to low velocities and reduced power requirements. The generous dimensions of the air-to-refrigerant heat exchanger plus the counter flow gas flow allows full and complete evaporation of the refrigerant (preventing liquid return to the compressor). The high efficiency condensate separator is located within the heat exchanger module. No maintenance is required and the coalescing effect results in a high degree of moisture separation.

5.12. Hot Gas By-pass Valve

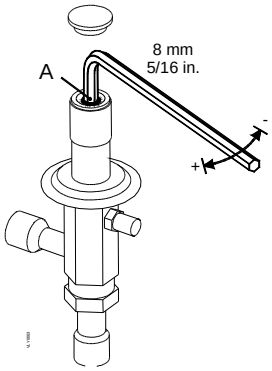
This valve injects part of the hot gas (taken from the discharge side of the compressor) in the pipe between the evaporator and the suction side of the compressor, keeping the evaporation temperature/pressure constant at approx. +2 °C. This injection prevents the formation of ice inside the dryer evaporator at every load condition.

ADJUSTMENT
The Hot Gas By-pass Valve is adjusted during the manufacturing testing phase. As a rule no adjustment is required; anyway if it is necessary the operation must be carried out by an experienced refrigerating engineer.
WARNING!
the use of ¼" Schrader service valves must be justified by a real malfunction of the refrigerating system. Each time a pressure gauge is connected, a part of refrigerant is exhausted.
Without compressed air flow through the dryer, rotate the adjusting screw (position A on the drawing) until the following value is reached:
Hot gas setting (R404A) : temperature 0.5 °C (+0. 5 / -0 °K)
pressure 5.2 barg (+0.1 / -0 bar)

RA 80-360



RA 400-720



5.13. Refrigerant Pressure Switches P_A-P_B-P_V

As operation safety and protection of the dryer a series of pressure switches are installed in the gas circuit.

PB : Low-pressure controller device on the suction side (carter) of the compressor, is enabled only if the pressure drops below the pre-set value. The values are automatically reset when the nominal conditions are restored.
Calibrated pressure : R 404 A Stop 1.0 barg - Restart 5.0 barg

PA : This high-pressure controller device, located on the pushing discharge side on 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 : R 404 A Stop 32 barg - Manual reset

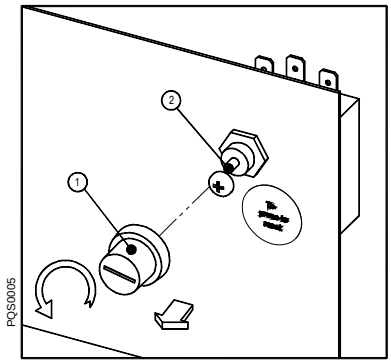
PV : **DRYPOINT RA 80-360** Fan control pressure switch located on the pushing side on the compressor. It keeps the condensation temperature/pressure constant within preset limits (Air-Cooled).
Calibrated pressure :

DRYPOINT RA 80-160	R 404 A	Start 20 barg (45°C) - Stop 16 barg (36°C) - Tolera nce ± 1 bar
DRYPOINT RA 180-360	R 404 A	Start 20 barg (45°C) - Stop 18 barg (40°C) - Tolera nce ± 1 bar

PV1 : **DRYPOINT RA 400-720** Fan control pressure switch located on the pushing side on the compressor. It keeps the condensation temperature/pressure constant within preset limits (Air-Cooled) – Low Speed.
Calibrated pressure : R 404 A Start 21 barg (47°C) - Stop 18 barg (41°C) - Tolera nce ± 1 bar

PV2 : **DRYPOINT RA 400-720** Fan control pressure switch located on the pushing side on the compressor. It keeps the condensation temperature/pressure constant within preset limits (Air-Cooled) – High Speed.
Calibrated pressure : R 404 A Start 23 barg (51°C) - Stop 20.5 barg (46°C) - Tole rance ± 1 bar

5.14. Safety thermo-switch T_s



To protect the operating safety and the integrity of the dryer, a thermo-switch (TS) is installed on the refrigerant gas circuit. The thermo-switch sensor, in case of unusual discharge temperatures, stops the refrigerating compressor before it is permanently damaged.

Manually reset the thermo-switch only after the nominal operating conditions have been restored. Unscrew the relative cap (see pos.1 in the figure) and press the reset button (see pos.2 in the figure).

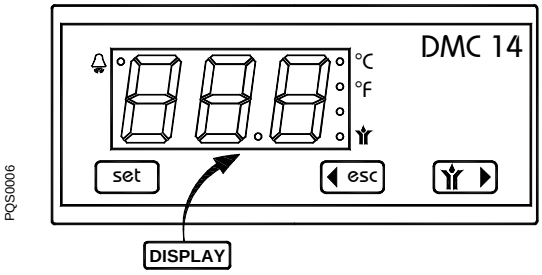
TS setting : temperature 100 °C (+2 / -2 °K)

5.15. Compressor crankcase heater (DRYPOINT RA 180-720)

At low temperatures oil can more easily be mixed with the refrigerant gas. So, 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 thermo-switch 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.

5.16. DMC14 Electronic Instrument (Air Dryer Controller)



set Button - access the set-up.
esc Button - Exit programming / decrease value.
Button - Value increment.
LED - Dryer in alarm status.
● °C LED - Display the set temperature scale (°C).
● °F LED - Display the set temperature scale (°F).
● LED - Not used

Through the digital thermometer with an alphanumerical display, the DMC14 controller shows the DewPoint detected by the probe in the evaporator.

The ● LED shows any alarm condition, it can happen when :

- pressure DewPoint is too high;
- pressure DewPoint is too low;
- the probe is faulty.

If the probe is faulty, the instrument also shows “PF” message (Probe Failure), and alarm activation is immediate. In case of “DewPoint too low” condition (ASL parameter, that is fix and equal to 28.5°F or -2°C), the ala rm signal is delayed of a fix time (AdL parameter) equal to 30 sec, while for “DewPoint too high” condition the value (ASH parameter) is set by the user and the signal is activated with AdH delay time, that can be also set up by the operator (the instrument is already adjusted during final test of the dryer, please see following values). When DewPoint returns into operating temperature (set range), the alarm condition is deactivated.

DMC14 allows also remote annunciation of the alarm condition of the dryer; this through a volt free contact on terminals 8 & 9 - please also see electric drawings into the attachments (max 250V 1A, min 5VDC 10mA)

with dryer off or in alarm conditions contact is open

with dryer on and correct operating DewPoint, contact is closed.

OPERATION - After dryer starting, the electronic controller displays current operating DewPoint : it shows the measured temperature in Celsius degrees (● °C) with a 0.5°C resolution, or in Fahrenheit degr ees (● °F) with a 1°F resolution.

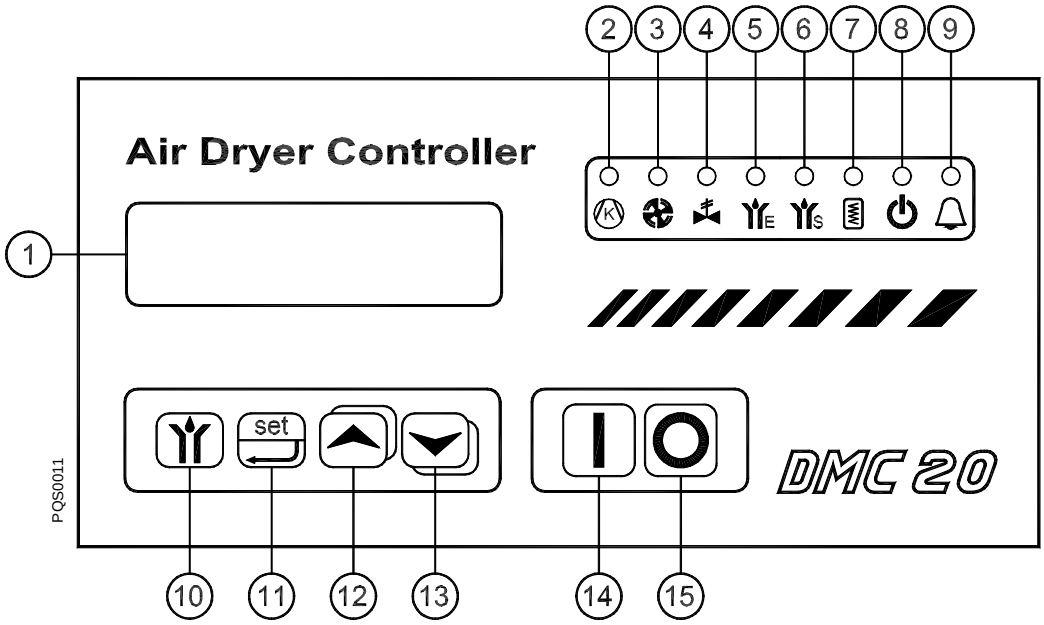
SET-UP (PROGRAMMING)

To access the set-up, keep pressed simultaneously both set and button for at least 5 seconds. In this way **programming operation** will be activated and the controller display shows the first parameter that can be set (Ton). After that, by pressing set button the display shows the value set for that parameter. If the value is correct press set button to conferm it and to give access on following parameters. To change the value of selected parameter, must be used esc and button, respectively to decrease or increase the value. All parameters that can be modified are indicated in following table:

Display	Description	Value range	Set value	Equal to
Ton	Not used	01 … 20	01	-
ToF	Not used	01 … 20	01	-
ASH	Alarm threshold for a high DewPoint .	0.0 … 20.0	15	15°C
AdH	ASH alarm time before signal	00 … 20	20	20 min
SCL	Temperature scale	°C … °F	°C	°Celsius
Fixe Parameter:	ASL (low DewPoint alarm) = -2°C	AdL (signal delay) = 30 sec		

It is possibile to exit from set-up conditon in any moment, by pressing simultaneously both esc and button. If any operations are not made during 30 seconds, the controller exits automatically from programming operation.

5.17. DMC20 Electronic Instrument (Air Dryer Controller)



1. Back-lighted LCD display
2. Led compressor ON
3. Led condenser fan(s) ON
4. Not Used
5. Not Used
6. Not Used
7. Led crankcase heater ON
8. Led dryer in Stand-by
9. Led alarm ON
10. Not used
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-character display it shows all the operating conditions. In case of abnormalities, a set of messages in the selected language allows a fast detection of the fault and the relevant solution.

5.17.1 DISPLAY MESSAGES

When the main switch is turned ON, all the characters of the DMC20 display are activated for 2 seconds. Afterwards, the software release appears, 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 oil 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.

NOTE : DMC20 has an internal timer that cannot allow to restart the compressor before 4 minutes after the switch off.

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 ℃
Air ←O	- temperature of the outgoing air ℃
Compr.LP	- suction temperature of the compressor (low pressure side) in ℃
Compr.HP	- discharge temperature of the compressor (high pressure side) in ℃
Condens.	- condensing temperature in ℃
Ambient	- ambient temperature in ℃
Water →O	- inlet temperature of the cooling water (Water-Cooled) in ℃
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 parameters to be displayed will include the DewPoint.
To Shut down the dryer, keep the [15] button "Dryer Stop" pressed for at least 2 seconds

5.17.2 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	PB Refrigerant low pressure switch	R404A = 1.0 barg	No delay	The dryer is stopped
STOP Compr.HP	PA Refrigerant high pressure switch	R404A = 32 barg	No delay	The dryer is stopped
Condens. HIGH	Condensation temperature too high (probe T6)	50 - 70 °C	0.5-20 adjustable	The dryer is stopped
DewPoint LOW	DewPoint low (probe T1)	-10 - 0 °C	0.5-20 adjustable	The operator chooses whether to stop dryer
DewPoint HIGH	DewPoint high (probe T1)	10 - 20 °C	0.5-30 min adjustable	The operator chooses whether to stop dryer
Probe Fault	One of the probes is faulty	-	No delay	The dryer does not stop

STORING ALARMS IN MEMORY

When the **"Automatic Start-Up" and "Reset ! Autom."** functions are deactivated (customer selected setting "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 the "**Automatic Start-Up" and "Reset ! Autom."** 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.

5.17.3 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 into two levels: anybody can access the level 1, while access to level 2 is reserved to authorised personnel provided with the password.
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

- **DewPoint Set** : Not Used.
- **Diff. DewPoint** : Not Used.
- **E Drain Time** : Not Used.
- **E Drain Pause** : Not Used.
- **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** : Not Used.
- **Max DewPoint** : Not Used.
- **! 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.
- **Stop ! Low DP**: Selecting “YES”, it is possible to enable the low DewPoint alarm to Shut down the dryer; otherwise a simple alarm signal is displayed.
- **! High DewPoint** : Setting of the threshold activating the alarm 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 a goes off as soon as the DewPoint goes below +10°C.
- **Stop ! High DP** : Selecting “YES”, it is possible to enable the high DewPoint alarm to Shut down 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 Shut down the dryer.
- **Automatic Start-Up** : 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.

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

- **Recovery After ! Autom.** : 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 (pressing the [15] button for at least 2 seconds); If “YES” is selected, the dryer will revert to its previous operational condition as soon as the nominal conditions will be restored.

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

- **Peripheral No :** Assignment of a physical address for the DMC20, in case this is connected to a data transmission network via a serial port.

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	Not Used	N.A.	-5 ºC
	DewPoint Diff.	Not Used	N.A.	0.2 ºK
	E Drain Time	Not Used	0 - 50 sec	3 sec
	E Drain Pause	Not Used	0.5 - 10 min	4.0 min
	S Drain Time	Not Used	0 - 50 sec	4 sec
	S Drain Pause	Not Used	0.5 - 10 min	1.0 min
	Display Contrast.	Adjustment of the Display contrast	0 - 100	50
LEVEL 2	Min DewPoint	Not Used	N.A.	-10 ºC
	Max DewPoint	Not Used	N.A.	0 ºC
	Low ! DewPoint	Temperature of interv. for the too low DewPoint alarm	-10.0 - 0.0 ºC	-5 ºC
	Low DP ! Diff.	Differential temperature for the too low DewPoint alarm	1.0 - 10.0 ºK	6 ºK
	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 ºC	15 ºC
	High DP ! Diff.	Differential temperature for the too high DewPoint alarm	-1.0 - -10.0 ºK	-5 ºK
	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 ºC	60.0 ºC
	Condens ! Diff.	Differential temp. for the too high condensation temperature alarm	-1.0 - -10.0 ºK	-5 ºK
	Condens. ! Delay	Delay time for the too high condensation temp. alarm	0.5 - 20 min	10 min
	Start at Power Up	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

5.17.4 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 20 and 21 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.

5.17.5 REMOTE ALARM SIGNAL

A voltage free contact is provided for remote signalling the sum of any alarm condition of the dryer.

5.17.6 ACCESS CODE

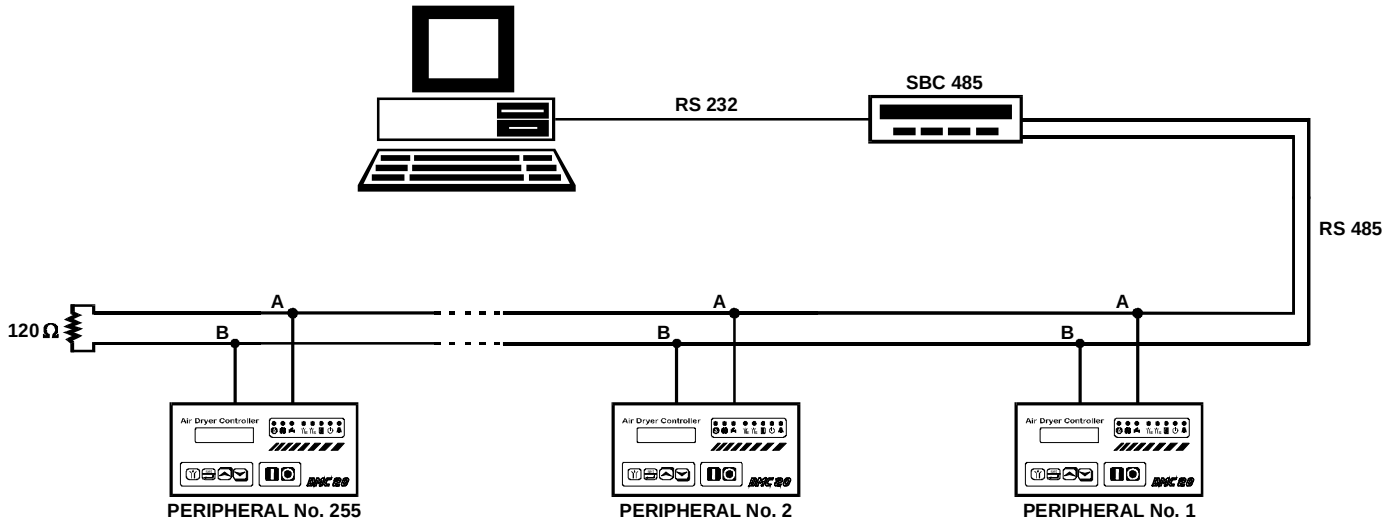
A serviceman's code is required to access level 2.

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.

5.17.7 SERIAL COMMUNICATION

The DMC20 features an 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 the DMC20 network requires usage of an SBC485 interface adaptor (can be purchased as accessory - see spare parts list) to convert the RS232 (PC) signal into an RS485 (DMS20) signal. The RS485 line is made of a two wire cable and can be up to max. 2000 meters long; for long distance (exceeding 100m), it is advisable to use a shielded twisted pair polyethylene cable.
For good data transmission, it is imperative that at the cable end of the RS485 line a 120 ohm ¼ watt resistor is placed, 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 an 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

Below is a list of the parameter description, type and address of data 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	Not Used	Signed Integer	0201 - R/W
Diff. DewPoint	Not Used	Signed Integer	0202 - R/W
E Drain Time	Not Used	Signed Integer	0203 - R/W
E Drain Pause	Not Used	Signed Integer	0204 - R/W
S Drain Time	Not Used	Signed Integer	0205 - R/W
S Drain Pause	Not Used	Signed Integer	0206 - R/W
Display Contrast.	Adjustment of the Display contrast	Signed Integer	0207 - R/W
Min DewPoint	Not Used	Signed Integer	0208 - R/W
Max DewPoint	Not Used	Signed Integer	0209 - R/W
Low DewPoint	Temperature of interv. 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 interv. for the too high DewPoint alarm	Signed Integer	0213 - R/W
High DP Diff.!	Differential temperature 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 DewPoint alarm	Signed Integer	0216 - R/W
Condens.Diff.!	Differential temperature for the too high DewPoint alarm	Signed Integer	0217 - R/W
Condens.Delay!	Delay time for the too high DewPoint alarm	Signed Integer	0218 - R/W
Peripheral No	Unit address for serial communication	Signed Integer	0219 - R/W
Working	Operating time of the dryer in hours	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
Remote 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 (P_B) alarm ON	bit - 1=Yes	0102.4 - R
STOP Compr.HP	Cooler high pressure switch (P_A) alarm ON	bit - 1=Yes	0102.5 - R
Protection Fan.	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
Stop ! Low DP	STOP enabled in case the DewPoint of the dryer is too low	bit - 1=Yes	0220.0 - R/W
Stop ! High DP	STOP enabled in case the DewPoint of the dryer is too high	bit - 1=Yes	0220.1 - R/W
Automatic Start-up	Machine enabled to restore its operation after a power black out	bit - 1=Yes	0220.2 - R/W
Recovery After ! Autom.	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
R=Read - W=Write

5.18. Electronic level controlled condensate drain BEKOMAT

The electronic level controlled drain BEKOMAT has a special condensate management that makes sure that condensate is drained safely without any unnecessary air-loss. This drain consists of a condensate accumulator where a capacitive sensor continuously checking liquid level is placed: as soon as the accumulator is filled, the sensor passes a signal to the electronic control and a diaphragm solenoid valve will open to discharge the condensate. Right in time the discharge line will be closed again without wasting compressed air.

ATTENTION!

These BEKOMAT condensate drains have been specially designed for the use in a refrigerant dryer **DRYPOINT RA**. Any Installation in other compressed air treatment units or the exchange against a different drain brand may lead to malfunction. Do not exceed the max. operating pressure (see type plate)!

Make sure when the dryer starts the upstream valve is open.

NOTE:

For detailed information on drainer functions, troubleshooting, service and replacement parts, please refer to the BEKOMAT drainer manual.

6. Maintenance, troubleshooting, spares and dismantling

6.1. Controls and Maintenance


DANGER!
Compressed air, mains voltage, unqualified personnel!
Only qualified personnel should perform troubleshooting and or maintenance operations.
Prior to performing any maintenance or service, be sure that:

- no part of the machine is powered and that it cannot be connected to the mains supply.
- no part of the machine is under pressure and that it cannot be connected to the compressed air system.
- Maintenance personnel have read and understand the safety and operation instructions in this manual.


Before attempting any maintenance operation on the dryer, shut it down and wait at least 30 minutes.

DANGER!
Hot surfaces!

Some components can reach high temperature during operation. Avoid contact until system or component has dissipated heat.

DAILY:
Verify that the DewPoint displayed on the electronic instrument is correct.
Check the proper operation of the condensate drain systems.
Verify the condenser for cleanliness.

EVERY 200 HOURS OR MONTHLY


With an air jet (max. 2 bar / 30 psig) blowing from inside towards outside clean the condenser; repeat this operation blowing in the opposite way; be careful not to damage the aluminum fins of the cooling package.

- 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 “Faston” type connections are in their proper position, inspect unit for broken, cracked or bare wires.
- Inspect refrigerating circuit for signs of oil and refrigerant leakage.
- Measure and record amperage. Verify that readings are within acceptable parameters as listed in specification table.
- Inspect condensate drain flexible hoses, and replace if necessary.
- At the end, check the operation of the machine.

6.2. Troubleshooting


Only qualified personnel should perform troubleshooting and or maintenance operations.
Prior to performing any maintenance or service, be sure that:

- no part of the machine is powered and that it cannot be connected to the mains supply.
- no part of the machine is under pressure and that it cannot be connected to the compressed air system.
- Maintenance personnel have read and understand the safety and operation instructions in this manual.



Before attempting any maintenance operation on the dryer, shut it down and wait at least 30 minutes.
Some components can reach high temperature during operation. Avoid contact until system or component has dissipated heat

SYMPTOM	POSSIBLE CAUSE - SUGGESTED ACTION
◆ The dryer doesn't start.	⇨ Verify that the system is powered. ⇨ Verify the electric wiring. ⇨ Intervention of the electric protection (see Q3/Q4 on the electric diagram) of the auxiliary circuit - restore it and check the proper operation of the dryer. ⇨ DRYPOINT RA400-720/AC - The back panel of the dryer is open (SD door interlock safety-switch has been activated) - make sure the back panel is correctly closed and the SD switch restored. ⇨ DMC14- The “alarm” led is ON - see specific point. ⇨ DMC20- The “alarm” led is ON - see specific point.
◆ The compressor doesn’t work.	⇨ Activation of the compressor internal thermal protection - wait for 30 minutes, then retry. ⇨ Verify the electric wiring. ⇨ The high pressure switch PA has been activated - see specific point. ⇨ The low pressure switch PB has been activated - see specific point. ⇨ The safety thermo-switch TS has been activated - see specific point. ⇨ DMC14- The “alarm” led is ON - see specific point. ⇨ DMC20- Internal delay device – wait at least 4 min from last shut-off. ⇨ DMC20- The “alarm” led is ON - see specific point. ⇨ If the compressor still doesn’t work, replace it.
◆ The fan of the condenser doesn’t work (Air-Cooled).	⇨ Verify the electric wiring. ⇨ DRYPOINT RA 80-360- PV pressure switch is faulty - contact a refrigeration engineer. ⇨ DRYPOINT RA 400-720- PV1-PV2 pressure switches are faulty - contact a refrigeration engineer. ⇨ The fan power contactor (see V / V1 / V2 on the electric diagram) is faulty - replace it. ⇨ DMC14- The “alarm” led is ON - see specific point. ⇨ DMC20- The “alarm” led is ON - see specific point. ⇨ There is a leak in the refrigerating fluid circuit - contact a refrigeration engineer. ⇨ If the fan still doesn't work, replace it.
◆ DewPoint too high.	⇨ The dryer doesn't start - see specific point. ⇨ The T1 DewPoint probe doesn’t correctly detect the temperature - ensure the sensor is pushed into the bottom of copper tube immersion well. ⇨ The Compressor doesn’t work - see specific point. ⇨ The ambient temperature is too high or the room aeration is insufficient - provide proper ventilation (Air-Cooled). ⇨ The inlet air is too hot - restore the nominal conditions. ⇨ The inlet air pressure is too low - restore the nominal conditions. ⇨ The inlet air flow rate is higher than the rate of the dryer - reduce the flow rate - restore the normal conditions. ⇨ The condenser is dirty - clean it (Air-Cooled). ⇨ The condenser fan doesn’t work - see specific point (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. ⇨ The Hot Gas By-pass Valve is out of setting - contact a refrigeration engineer to restore the nominal setting. ⇨ There is a leak in the refrigerating fluid circuit - contact a refrigeration engineer.

◆ DewPoint too low.	⇨ The fan is always ON - P_v pressure switch is faulty - replace it (Air-Cooled). ⇨ Ambient temperature is too low - restore de nominal condition. ⇨ The hot gas by-pass valve is out of setting - contact a refrigeration engineer to restore the nominal setting.
◆ Excessive pressure drop within the dryer.	⇨ The dryer doesn't drain the condensate - see specific point. ⇨ The DewPoint is too low - the condensate is frost and blocks the air - see specific point. ⇨ Check for throttling the flexible connection hoses.
◆ The dryer doesn't drain the condensate.	⇨ The condensate drain service valve is closed - open it. ⇨ Verify the electric wiring. ⇨ The DewPoint is too low - the condensate is frozen - see specific point. ⇨ Bekomat drainer is not operating correctly (see BEKOMAT MANUAL).
◆ The dryer continuously drains condensate.	⇨ Bekomat drainer is dirty (see BEKOMAT MANUAL).
◆ Water within the line.	⇨ The dryer doesn't start - see specific point. ⇨ **Where installed -** Untreated air flows through the by-pass unit - close the by-pass. ⇨ The dryer doesn't drain the condensate - see specific point. ⇨ DewPoint too high - see specific point.
◆ The safety thermo-switch T_s tripped.	⇨ Check which of the following has caused the activation : 1. Excessive thermal load – restore the standard operating conditions. 2. The inlet air is too hot - restore the nominal conditions. 3. The ambient temperature is too high or the room aeration is insufficient - provide proper ventilation. 4. The condenser unit is dirty - clean it. 5. The fan doesn't work - see specific point. 6. There is a leak in the refrigerating fluid circuit - contact a refrigeration engineer. 7. Reset the thermo-switch by pressing the button on the thermo-switch itself – verify the correct operation of the dryer. 8. The TS thermo-switch is faulty - replace it.
◆ The P_A high-pressure switch 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 is dirty - clean it (Air-Cooled). 3. The condenser fan 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. Reset the pressure-switch pressing the button on the controller itself - verify the dryer for correct operation. 7. The PA pressure switch is faulty - contact a refrigeration engineer to replace it.
◆ The P_B low-pressure switch has been activated.	⇨ There is a leak in the refrigerating fluid circuit - contact a refrigeration engineer. ⇨ The pressure switch restores automatically when normal conditions are restored - check the proper operation of the dryer.
◆ **DMC14-** The "alarm" led is ON.	⇨ The P_A high-pressure switch is activated - see specific point. ⇨ The P_B low-pressure switch is activated - see specific point. ⇨ 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). ⇨ The thermal protection (see TV on the electric diagram) inside the fan is activated - wait 30 minutes and retry. ⇨ The safety thermo-switch T_S has been activated - see specific point.
◆ **DMC14-** The LED 🔔 ● of the instrument is on or flashes to indicate alarm situations.	⇨ The LED 🔔 ● flashes because the DewPoint is too high – see specific point. ⇨ The LED 🔔 ● flashes because the DewPoint is too low - see specific point. ⇨ The LED 🔔 ● flashes because the probe is faulty or interrupted, the instrument displays the message "PF" (Probe Failure) – replace the probe.

◆ **DMC20-** The “alarm” lED is on.	⇨ One of the following appears on the upper line of the DMC20 display : 1. "Protection Comp." : The electric protection (see Q1 on the electric diagram) of the compressor is activated - restore it and retry. 2. "Protection Comp." : The safety thermo-switch TS has been activated - see specific point. 3. "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 4. "Protection Fan": (Air-Cooled) : Intervention of the thermal protection (see TV on the electric diagram) inside the fan - wait 30 minutes and retry. 5. “STOP Compr. LP” : The PB low pressure-switch is activated - see specific point. 6. “STOP Compr. HP” : The PA low pressure-switch is activated - see specific point. 7. “Condens. HIGH” : condensing temperature is too high - see specific point. 8. “LOW DewPoint” : The DewPoint is too low - see specific point. 9. “HIGH DewPoint” : The DewPoint is too high - see specific point. 10. “Probe Fault” : one of the probes is faulty - see specific point.
◆ **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 is dirty - clean it (Air-Cooled). 3. The condenser fan 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).
◆ **DMC20-** display “Probe Fault” message.	⇨ One of the temperature probes is faulty - display in sequence all the temperatures - the parameter indicated with “?” corresponds to faulty probe. ⇨ Verify that the probe-extension connector of faulty probe is correctly inserted in DMC20. ⇨ Check the probe-extension connection between DMC20 and terminal board. ⇨ Check electric connection between probe and terminal board. ⇨ If the fault persists, replace probe and/or probe-extension. **NOTE**: If any probe is faulty the dryer will run correctly even if there is an alarm condition.

6.3. Spare Parts

The suggested spare parts list will enable you to promptly intervene in case of abnormal operation, so avoiding to wait for the spares delivery. In case of failure of other parts, for example inside the refrigerating circuit, the replacement must be worked out by a refrigerating systems specialist or in our factory.

NOTE: To order the suggested spare parts or any other part, it's necessary to quote the data reported on the identification plate.

			DRYPOINT RA									
			Electronic Instrument DMC14					Electronic Instrument DMC20				
No.	DESCRIPTION OF THE SPARE PARTS	CODE	80	100	120	140	160	80	100	120	140	160
2	Refrigerant pressure switch P_B	XE RA 5655 NNN 085	1	1	1	1	1	1	1	1	1	1
3	Safety thermo-switch TS	XE RA 5614 1NN 005	1	1	1	1	1	1	1	1	1	1
4	Fan pressure switch P_A	XE RA 5655 NNN 087	1	1	1	1	1	1	1	1	1	1
5	Fan pressure switch P_V	XE RA 5655 NNN 170	1	1	1	1	1	1	1	1	1	1
6	Compressor	XE RA 5015 340 072	1					1				
6	Compressor	XE RA 5015 340 074		1	1				1	1		
6	Compressor	XE RA 5015340001				1					1	
6	Compressor	XE RA 5015 340 002					1					1
7	Hot Gas By-pass Valve	XE RA 6414 0SS 155	1	1	1	1	1	1	1	1	1	1
9	Complete fan	XE RA 5250 110 073	1	1	1			1	1	1		
9	Complete fan	XE RA 5250 340 070				1	1				1	1
10	Filter Drier	XE RA 6650SSN160	1	1	1	1	1	1	1	1	1	1
12	Temp. probe L=1200mm T1	XE RA 5625 NNN 035	1♦	1♦								
12	Temp. probe L=2000mm T1	XE RA 5625 NNN 037			1♦	1♦	1♦					
12.1	Temp. probe L=2000mm (connector)	XE RA 5625 NNN 038						8♦	8♦	8♦	8♦	8♦
17	DMC14 AIR DRYER CONTROLLER	XE RA 5620 110 103	1♦	1♦	1♦	1♦	1♦					
17.1	Display module DMC20	XE RA 5620 100 005						1♦	1♦	1♦	1♦	1♦
17.2	Power module DMC20	XE RA 5620 100 006						1♦	1♦	1♦	1♦	1♦
17.3	Flat cable 16P L=1200mm	XE RA 5625 NNN 100						1♦	1♦	1♦	1♦	1♦
21	BEKOMAT 31	BM31 BI (supply voltage)	1	1								
21	BEKOMAT 31	BM31 BI (supply voltage)						1	1			
21	BEKOMAT 32 Vario	BM32 V BI (supply voltage)			1	1	1					
21	BEKOMAT 32 Vario	BM32 V BI (supply voltage)								1	1	1
22	Main switch	XE RA 5450 SZN 120	1	1	1	1	1	1	1	1	1	1
60.1	Q1 - Circuit breaker	XE RA 5444 3SM 145	1	1	1	1	1	1	1	1	1	1
60.2	Q2 - Circuit breaker	XE RA 5444 3SM 130	1	1	1	1	1	1	1	1	1	1
60.3	Q3 - Circuit breaker	XE RA 5444 3C6 011	1	1	1	1	1	1	1	1	1	1
60.4	Q1-Q2 - Auxiliary contact for circuit breaker	XE RA 5490 CAX 060	1	1	1	1	1	1	1	1	1	1
60.5	K - V Power contact	XE RA 5454 TLT 110	2	2	2	2	2					
60.5	K - V Power contact	XE RA 5454 TLT 010						2	2	2	2	2
60.6	A - Auxiliary relay - 2 contacts	XE RA 5456 REL110	1	1	1	1	1					
60.7	A - Relay socket - 2 contacts	XE RA 5456 REL 015	1	1	1	1	1					
60.8	P - Double ON/OFF button with light	XE RA 5452 PLS 020	1	1	1	1	1					
60.9	P - Neon lamp for the double button	XE RA 5480 NEN 010	1	1	1	1	1					
60.10	X - Rectangular red indicator 18x24	XE RA 5452 IND 005	1	1	1	1	1					
60.11	X - Neon lamp for red indicator	XE RA 5480 NEN 005	1	1	1	1	1					
60.12	TF - Transformer	XE RA 5440 TFM 052	1	1	1	1	1					
60.12	TF - Transformer	XE RA 5440 TFM 050						1	1	1	1	1

◆ **Suggested spare part.**

			DRYPOINT RA									
			Electronic Instrument DMC14					Electronic Instrument DMC20				
No.	**DESCRIPTION OF THE SPARE PARTS**	**CODE**	**180**	**210**	**250**	**300**	**360**	**180**	**210**	**250**	**300**	**360**
2	Refrigerant pressure switch P_B	XE RA 5655 NNN 085	1	1	1	1	1	1	1	1	1	1
3	Safety thermo-switch TS	XE RA 5614 1NN 005	1	1	1	1	1	1	1	1	1	1
4	Fan pressure switch P_A	XE RA 5655 NNN 087	1	1	1	1	1	1	1	1	1	1
5	Fan pressure switch P_V	XE RA 5655NNN170	1	1	1	1	1	1	1	1	1	1
6	Compressor	XE RA 5015 340 006	1					1				
6	Compressor	XE RA 5015 340 003		1					1			
6	Compressor	XE RA 5015 340 011			1					1		
6	Compressor	XE RA 5015 340 007				1					1	
6	Compressor	XE RA 5015 340 008					1					1
7	Hot Gas By-pass Valve	XE RA 6414 0SS 155	1	1	1	1		1	1	1	1	
7	Hot Gas By-pass Valve	XE RA 6414 0SS 156					1					1
9	Complete fan	XE RA 5250 340 090	1	1				1	1			
9	Complete fan	XE RA 5250 340 100			1	1	1			1	1	1
10	Filter Drier	XE RA 6650 SSN 165	1	1	1	1	1	1	1	1	1	1
12	Temp. probe L=2000mm (T1-T4-T5-T8)	XE RA 5625 NNN 037	1◆	1◆	1◆	1◆	1◆	4◆	4◆	4◆	4◆	4◆
12.1	Temp. probe L=600mm (T7)	XE RA 5625 NNN 033						1◆	1◆	1◆	1◆	1◆
12.1	Temp. probe L=1200mm (T2-T3-T6)	XE RA 5625 NNN 035						3◆	3◆	3◆	3◆	3◆
12.2	Extension for probe L=1200mm	XE RA 5625 NNN 030	1	1	1	1	1					
12.2	Extension for probe L=1800mm	XE RA 5625 NNN 029						8◆	8◆	8◆	8◆	8◆
17	DMC14 Air Dryer Controller	XE RA 5620 110 103	1◆	1◆	1◆	1◆	1◆					
17.1	Display module DMC20	XE RA 5620 100 005						1◆	1◆	1◆	1◆	1◆
17.2	Power module DMC20	XE RA 5620 100 006						1◆	1◆	1◆	1◆	1◆
17.3	Flat cable 16P L=1200mm	XE RA 5625 NNN 100						1◆	1◆	1◆	1◆	1◆
21	BEKOMAT 32 Vario	BM32 V BI (supply voltage)	1	1	1	1	1					
21	BEKOMAT 32 Vario	BM32 V BI (supply voltage)						1	1	1	1	1
22	Main switch	XE RA 5450SZN100	1	1	1	1	1	1	1	1	1	1
60.1	Q1 - Circuit breaker	XE RA 54443SM152	1	1	1	1	1	1	1	1	1	1
60.2	Q2 - Circuit breaker	XE RA 54443SM135	1	1	1	1	1	1	1	1	1	1
60.3	Q3 - Circuit breaker	XE RA 54443C6011	1	1	1	1	1					
60.3	Q3 - Circuit breaker	XE RA 54444C6016						1	1	1	1	1
60.4	Q1-Q2 - Auxiliary contact x circuit breaker	XE RA 5490CAX060	2	2	2	2	2	2	2	2	2	2
60.5	K - Power contact	XE RA 5454TLT116	1	1	1	1	1					
60.5	K - Power contact	XE RA 5454TLT016						1	1	1	1	1
60.6	A - Auxiliary relay - 2 contacts	XE RA 5456REL110	1	1	1	1	1					
60.7	A - Relay socket - 2 contacts	XE RA 5456REL015	1	1	1	1	1					
60.8	P - Double ON/OFF button with light	XE RA 5452PLS020	1	1	1	1	1					
60.9	P - Neon lamp for the double button	XE RA 5480NEN010	1	1	1	1	1					
60.10	X - Rectangular red indicator 18x24	XE RA 5452IND005	1	1	1	1	1					
60.11	X - Neon lamp for red indicator	XE RA 5480NEN005	1	1	1	1	1					
60.12	TF - Transformer	XE RA 5440TFM025	1	1	1	1	1	1	1	1	1	1
60.13	K - Auxiliary contact	XE RA 5490CAX011	1	1	1	1	1					
60.14	V - Power contact	XE RA 5454TLT111	1	1	1	1	1					
60.14	V - Power contact	XE RA 5454TLT011						1	1	1	1	1

◆ **Suggested spare part.**

			DRYPOINT RA							
			Electronic Instrument DMC14				Electronic Instrument DMC20			
No.	DESCRIPTION OF THE SPARE PARTS	CODE	400	500	600	720	400	500	600	720
2	Refrigerant pressure switch P_B	XE RA 5655 NNN 085	1	1	1	1	1	1	1	1
3	Safety thermo-switch TS	XE RA 5614 1NN 005	1	1	1	1	1	1	1	1
4	Fan pressure switch P_A	XE RA 5655 NNN 087	1	1	1	1	1	1	1	1
5	Fan pressure switch P_V	XE RA 5655 NNN 170	2	2	2	2	2	2	2	2
6	Compressor	XE RA 5015 340 018	1	1			1	1		
6	Compressor	XE RA 5015 340 021			1				1	
6	Compressor	XE RA 5015 340 023				1				1
7	Hot Gas By-pass Valve	XE RA 6414 0SS 102	1	1			1	1		
7	Hot Gas By-pass Valve	XE RA 6414 0SS 105			1				1	
7	Hot Gas By-pass Valve	XE RA 6414 0SS 110				1				1
9	Complete fan	XE RA 5250 34 0105	1	1	1	1	1	1	1	1
10	Filter Drier	XE RA 6650 SSN 175	1	1	1	1	1	1	1	1
12	Temp. probe L=2000mm (T1)	XE RA 5625 NNN 037	1◆	1◆	1◆		1◆	1◆	1◆	
12.1	Temp. probe L=600mm (T7)	XE RA 5625 NNN 033					1◆	1◆	1◆	
12.1	Temp. probe L=1200mm (T4-T5-T6)	XE RA 5625 NNN 035					3◆	3◆	3◆	
12.1	Temp. probe L=3600mm (T2-T3)	XE RA 5625 NNN 039					2◆	2◆	2◆	
12.2	Extension for probe L=1200mm	XE RA 5625 NNN 030	1	1	1	1				
12.2	Extension for probe L=1800mm	XE RA 5625 NNN 029					8◆	8◆	8◆	8◆
17	DMC14 Air Dryer Controller	XE RA 5620 110 103	1◆	1◆	1◆	1◆				
17.1	Display module DMC20	XE RA 5620 100 005					1◆	1◆	1◆	1◆
17.2	Power module DMC20	XE RA 5620 100 006					1◆	1◆	1◆	1◆
17.3	Flat cable 16P L=1200mm	XE RA 5625 NNN 100					1◆	1◆	1◆	1◆
21	BEKOMAT 32 Vario	BM32 V BI (supply voltage)	2	2	2	2				
21	BEKOMAT 32 Vario	BM32 V BI (supply voltage)					2	2	2	2
22	Main switch	XE RA 5450 SZN 105	1	1	1	1	1	1	1	1
60.1	Q1 - Circuit breaker	XE RA 5444 3C6 026	1	1	1	1	1	1	1	1
60.2	Q2 - Circuit breaker	XE RA 5444 3SM 135	1	1	1	1	1	1	1	1
60.3	Q3 - Circuit breaker	XE RA 5444 4C6 016	1	1	1	1	1	1	1	1
60.4	Q1 - Auxiliary contact for circuit breaker	XE RA 5490 CAX 002	1	1	1	1	1	1	1	1
60.4	Q2 - Auxiliary contact for circuit breaker	XE RA 5490 CAX 060	1	1	1	1	1	1	1	1
60.5	K - Power contactor	XE RA 5454 TLT 125	1	1	1	1				
60.5	K - Power contactor	XE RA 5454 TLT 025					1	1	1	1
60.6	A - Auxiliary relay - 2 contacts	XE RA 5456 REL 110	1	1	1	1				
60.7	A - Relay socket - 2 contacts	XE RA 5456 REL 015	1	1	1	1				
60.8	P - Double ON/OFF button with light	XE RA 5452 PLS 020	1	1	1	1				
60.9	P - Neon lamp for the double button	XE RA 5480 NEN 010	1	1	1	1				
60.10	X - Rectangular red indicator 18x24	XE RA 5452 IND 005	1	1	1	1				
60.11	X - Neon lamp for red indicator	XE RA 5480 NEN 005	1	1	1	1				
60.12	TF - Transformer	XE RA 5440 TFM 025	1	1	1	1	1	1	1	1
60.13	K - Auxiliary contact	XE RA 5490 CAX 010	1	1	1	1	1	1	1	1
60.13	K - Auxiliary contact	XE RA 5490 CAX 011	1	1	1	1				
60.14	V1-V2 - Power contactor	XE RA 5454 TLT 111	2	2	2	2				
60.14	V1-V2 - Power contactor	XE RA 5454 TLT 011					2	2	2	2
60.15	V1-V2 - Interlock for power contact	XE RA 5490 INM 010	1	1	1	1	1	1	1	1

◆ **Suggested spare part.**

6.4. Maintenance operation on the refrigerating circuit

CAUTION!
Refrigerant!
Maintenance and service on refrigerating systems must be carried out only by certified refrigerating engineers only, according to local rules.
All the refrigerant of the system must be recovered for its recycling, reclamation or destruction.
Do not dispose the refrigerant fluid in the environment.

This dryer comes ready to operate and filled with R134a or R404A type refrigerant fluid.

In case of refrigerant leak contact a certified refrigerating engineers. Room is to be aired before any intervention.
If is required to re-fill the refrigerating circuit, contact a certified refrigerating engineers.
Refer to the dryer nameplate for refrigerant type and quantity.

Characteristics of refrigerants used:

Refrigerant	Chemical formula	TLV	GWP
R134a - HFC	CH2FCF3	1000 ppm	1300
R404A - HFC	CH2FCF3/C2HF5/C2H3F3	1000 ppm	3784

6.5. Dismantling of the Dryer

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

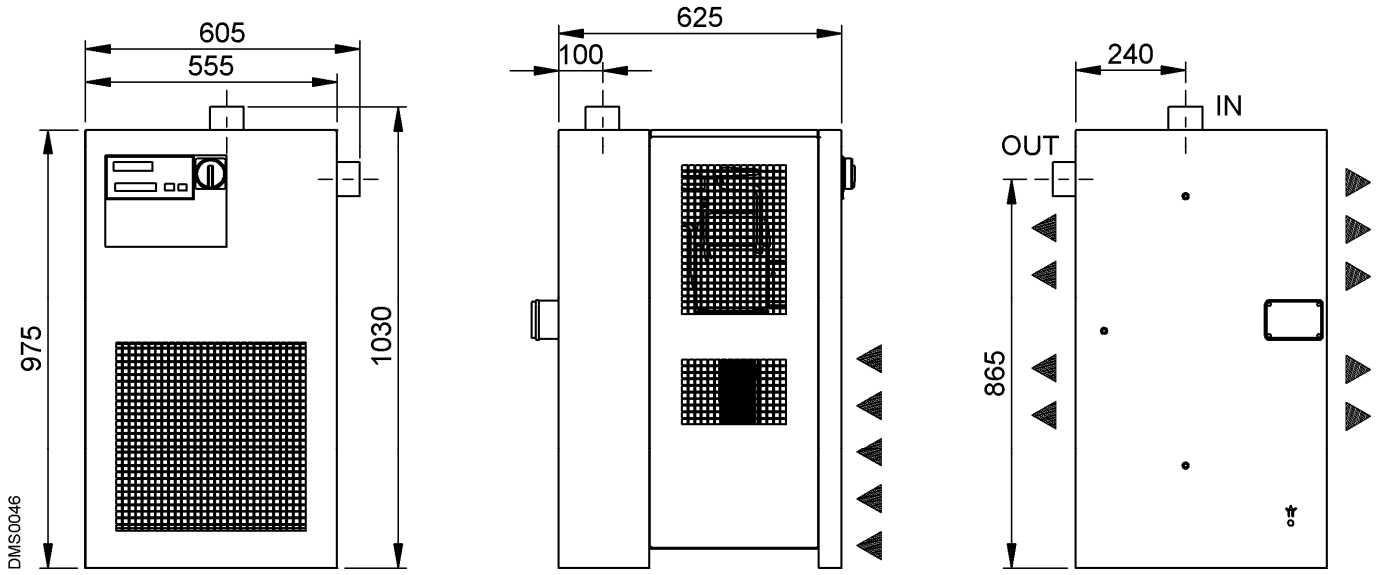
Part	Material
Refrigerant fluid	R404A, R134a, Oil
Canopy and Supports	Carbon steel, Epoxy paint
Refrigerating compressor	Steel, Copper, Aluminium, Oil
Alu-Dry Module	Aluminium
Condenser Unit	Aluminium, Copper, Carbon steel
Pipe	Copper
Fan	Aluminium, Copper, Steel
Valve	Brass, Steel
Electronic Level Drain	PVC, Aluminium, Steel
Insulation Material	Synthetic gum without CFC, Polystyrene, Polyurethane
Electric cable	Copper, PVC
Electric Parts	PVC, Copper, Brass

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

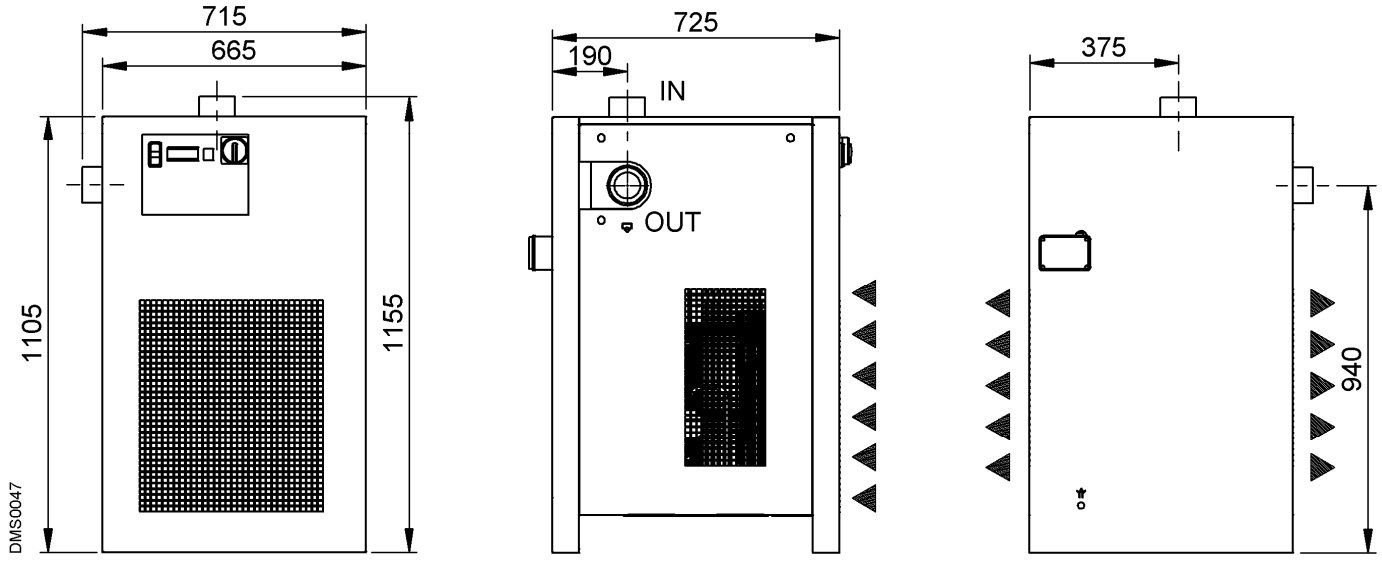
7. List of attachments

7.1. Dryers Dimensions

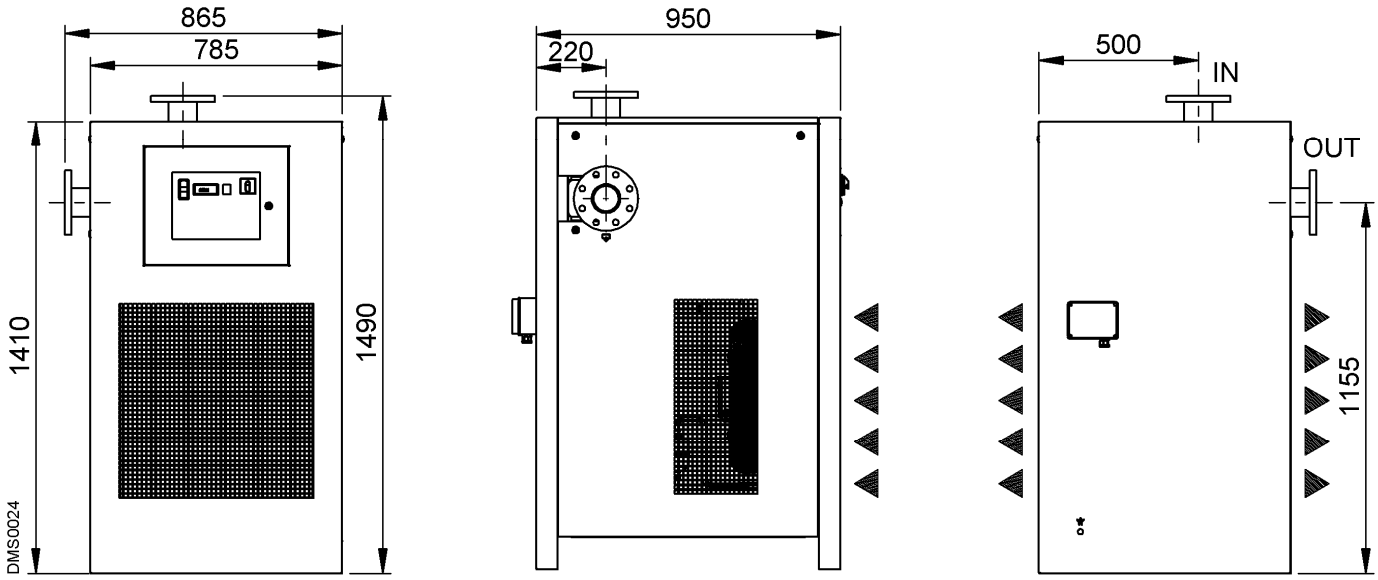
7.1.1. Dryers Dimensions DRYPOINT RA 80-100 /AC



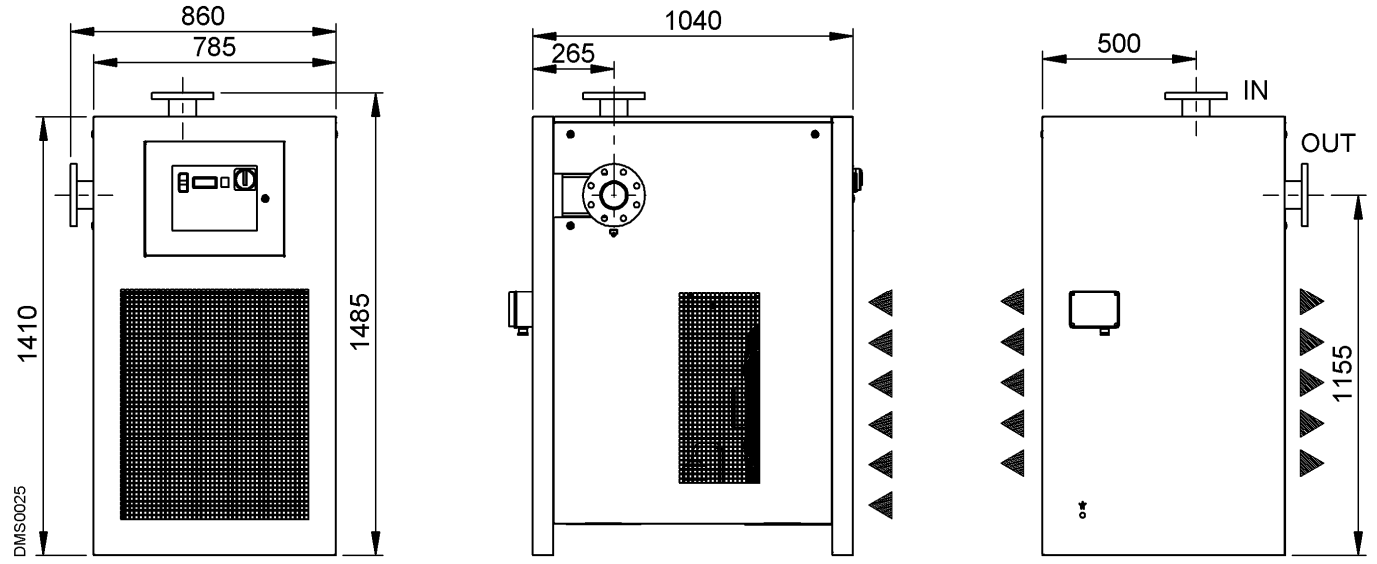
7.1.2. Dryers Dimensions DRYPOINT RA 120-160 /AC



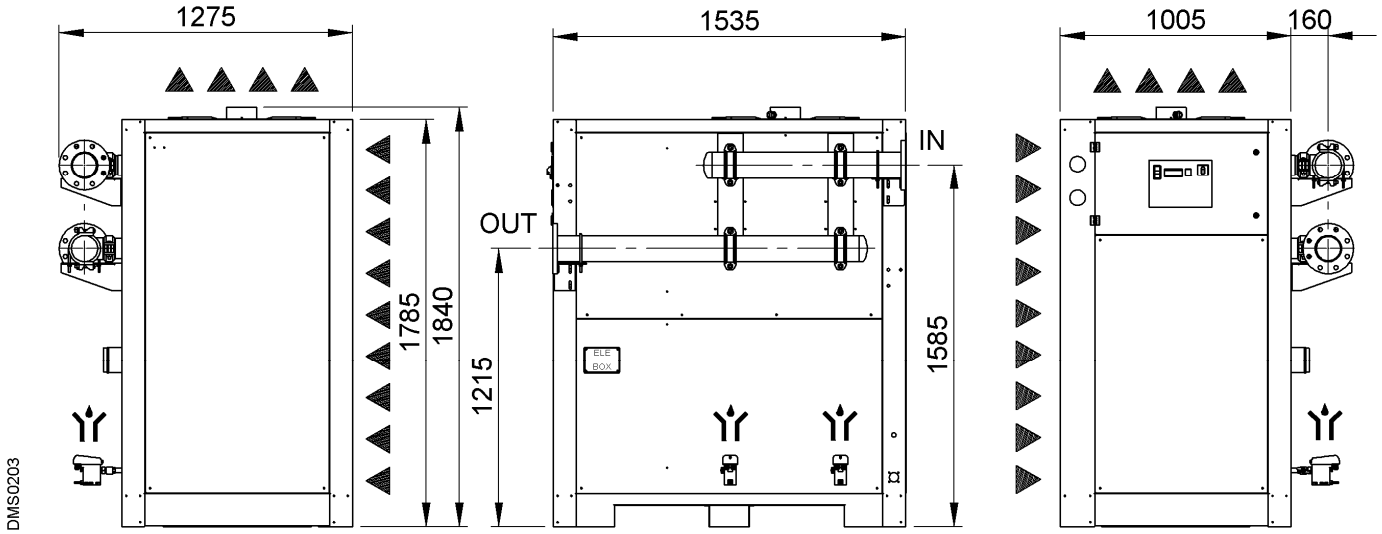
7.1.3. Dryers Dimensions DRYPOINT RA 180-300 /AC



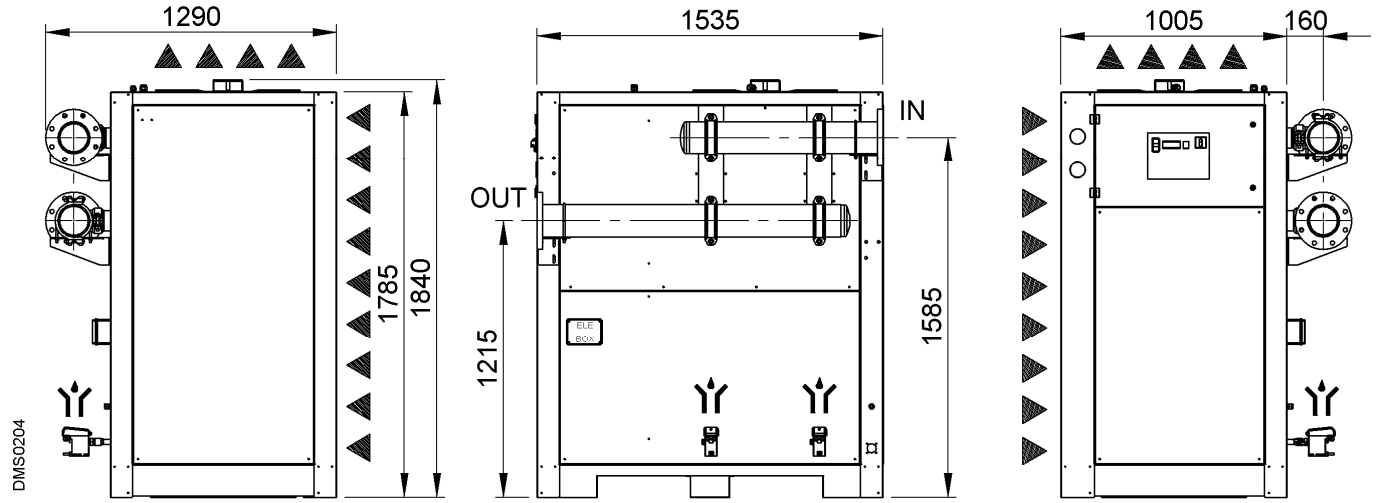
7.1.4. Dryers Dimensions DRYPOINT RA 360/AC



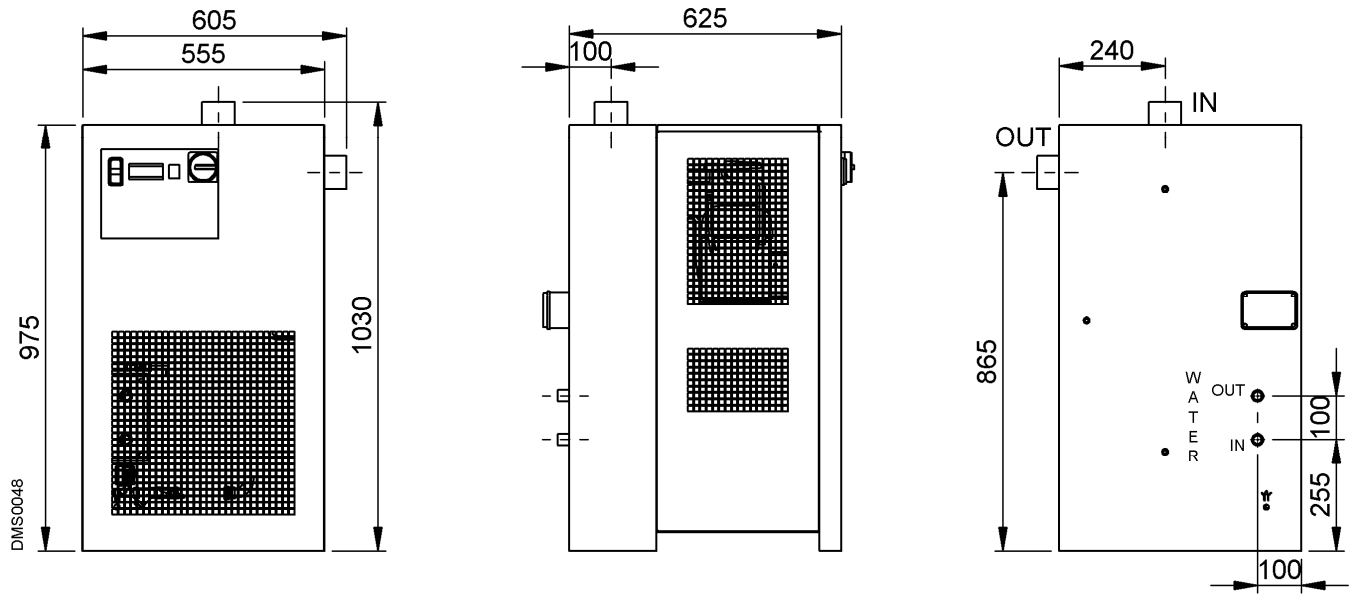
7.1.5. Dryers Dimensions DRYPOINT RA 400-600 /AC



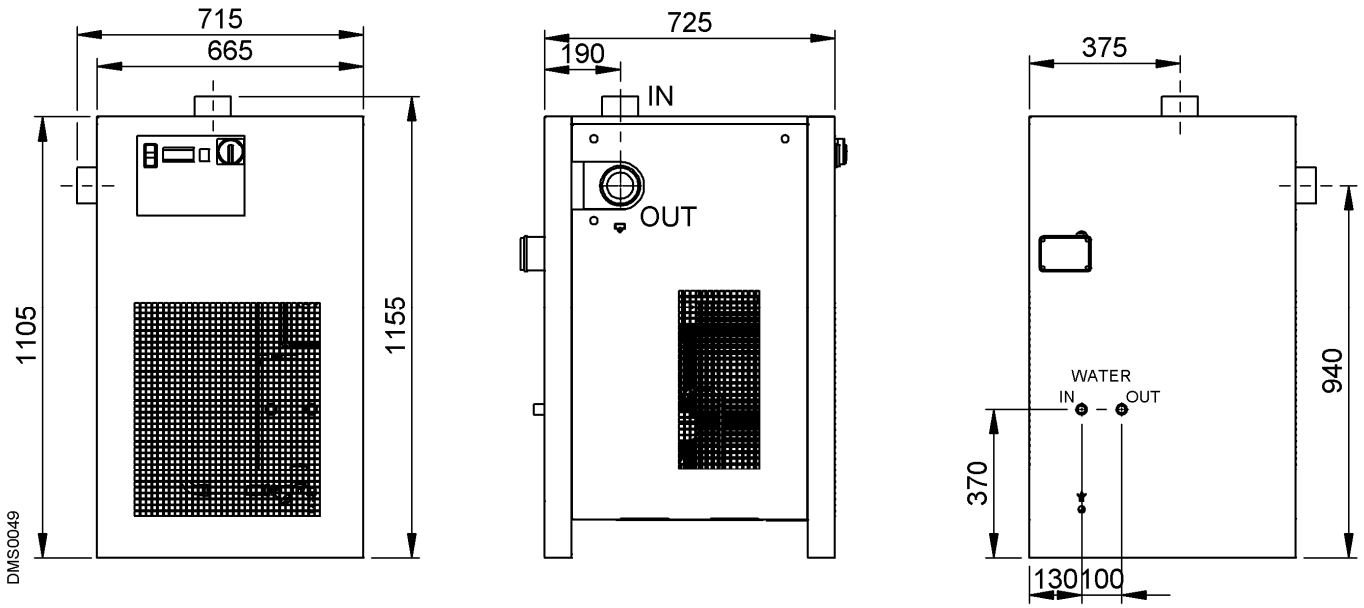
7.1.6. Dryers Dimensions DRYPOINT RA 720 /AC



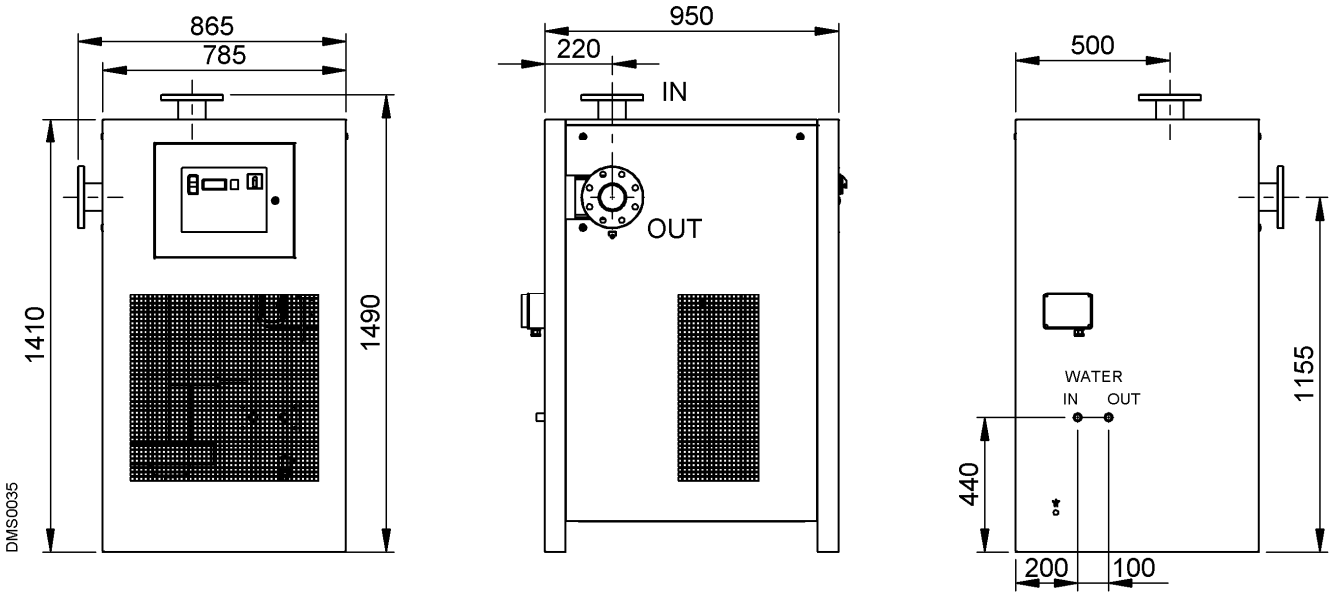
7.1.7. Dryers Dimensions DRYPOINT RA 80-100 /WC



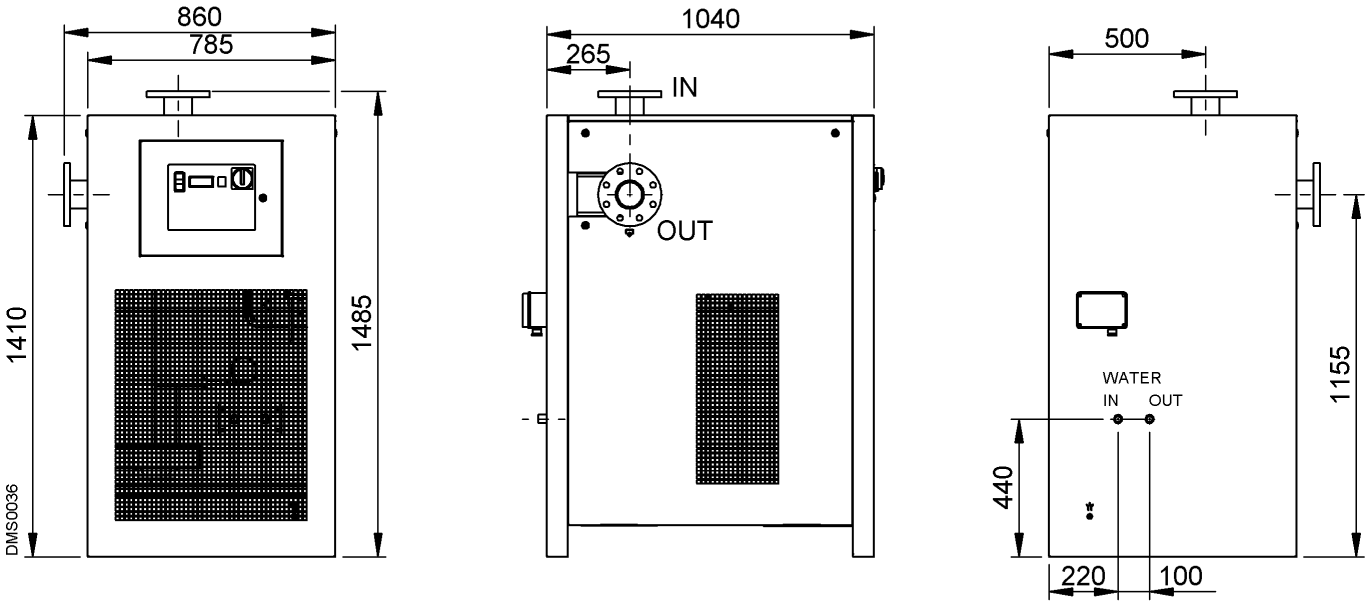
7.1.8. Dryers Dimensions DRYPOINT RA 120-160 /WC



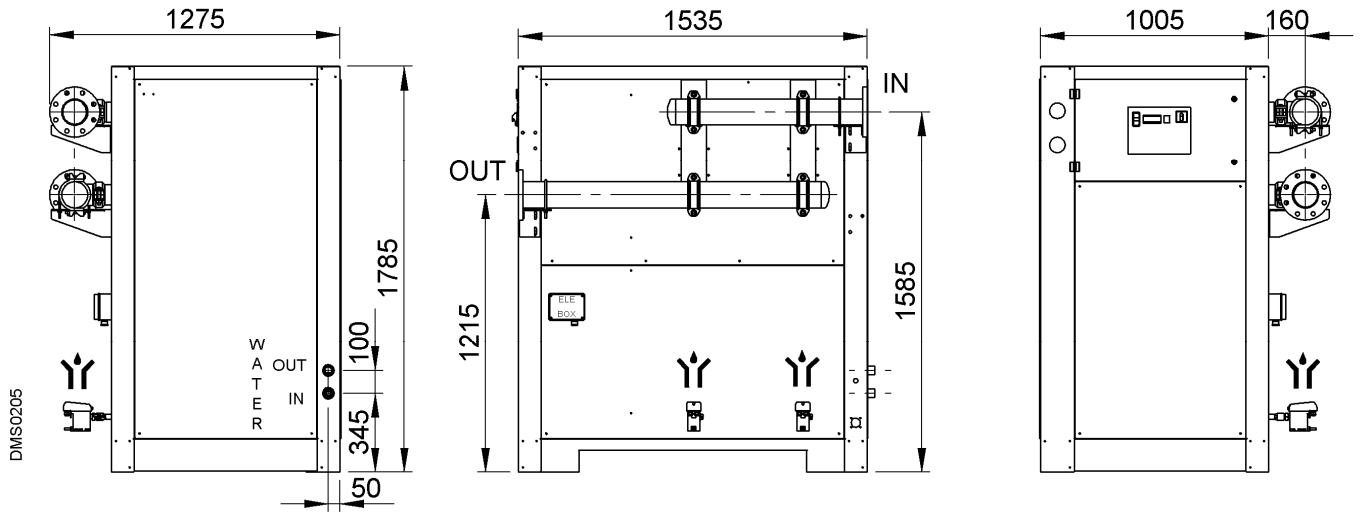
7.1.9. Dryers Dimensions DRYPOINT RA 180-300 /WC



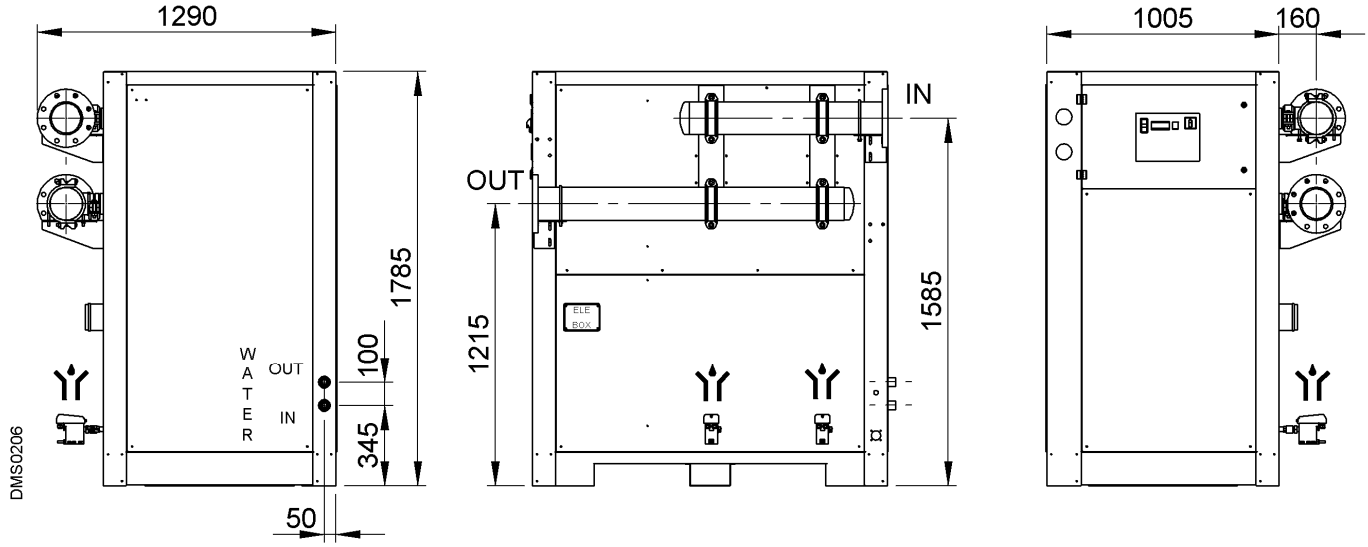
7.1.10. Dryers Dimensions DRYPOINT RA 360 /WC



7.1.11. Dryers Dimensions DRYPOINT RA400-600 /WC



7.1.12. Dryers Dimensions DRYPOINT RA 720 /WC

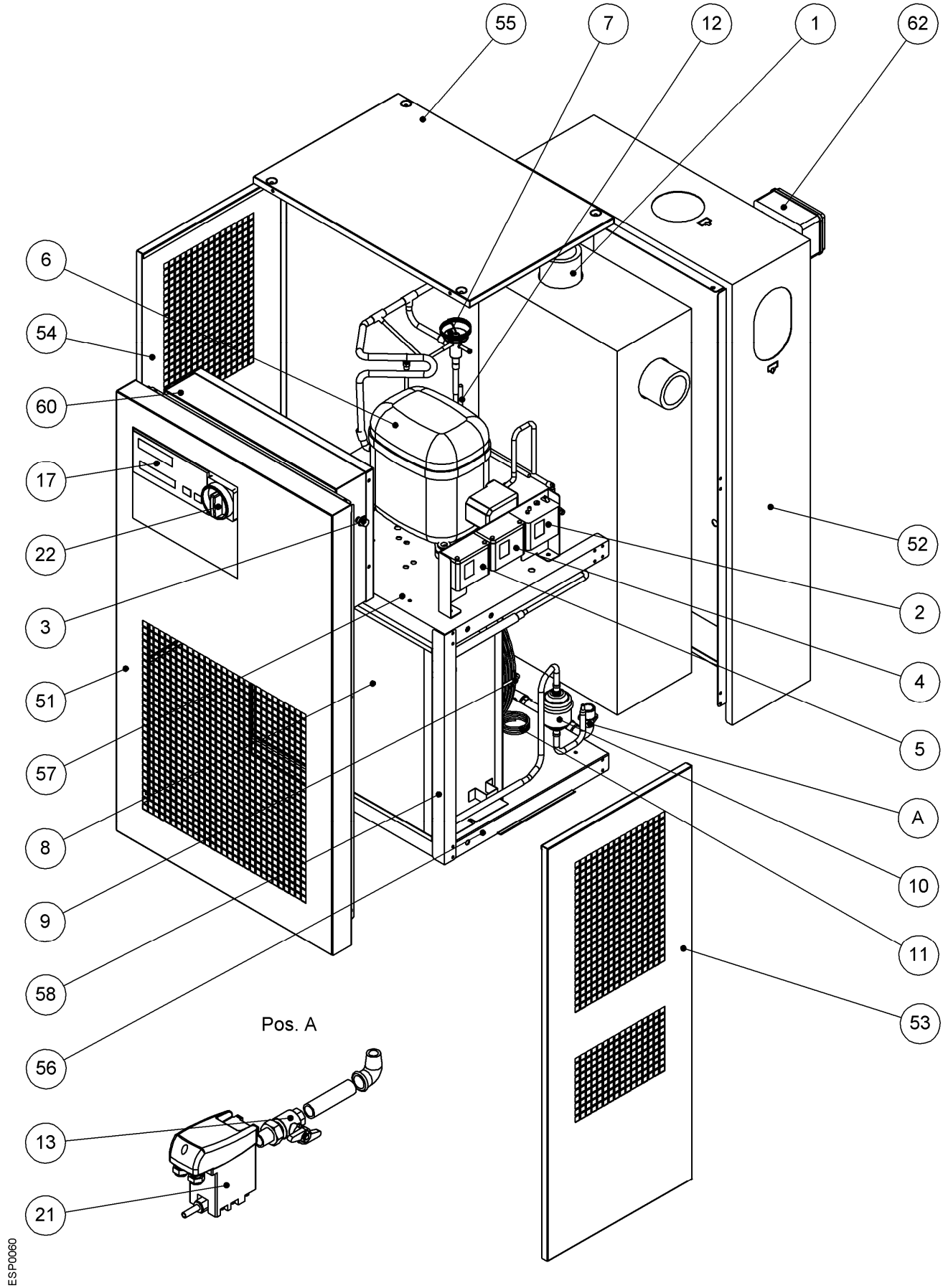


7.2. Exploded View

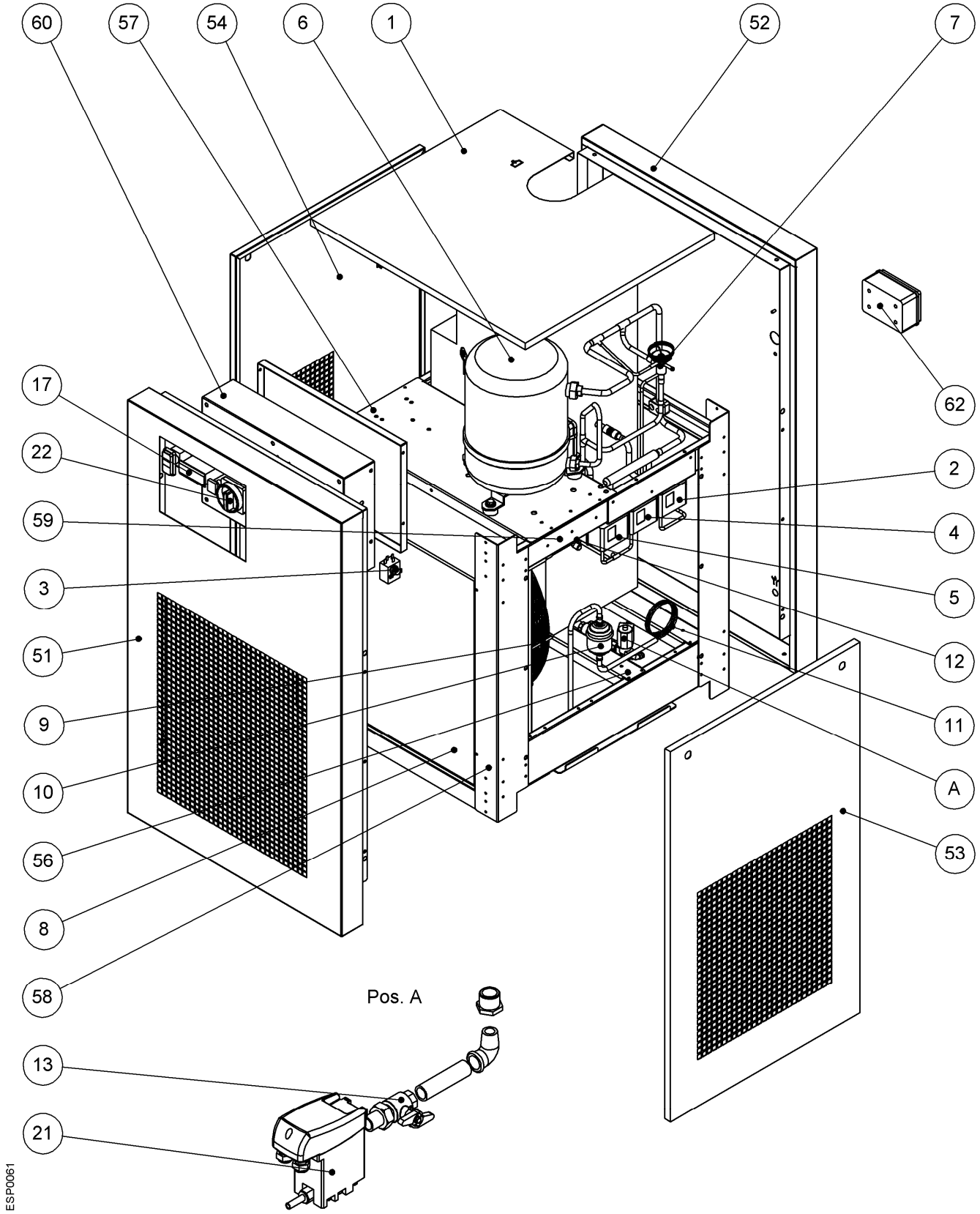
7.2.1. Exploded view table of components

(1) Alu-Dry Module
1.1 Insulation Material
(2) Refrigerant pressure-switch P_B
(3) Safety thermo-switch TS
(4) Refrigerant pressure-switch P_A
(5) Refrigerant Fan pressure-switch PV
P_{V1} - P_{V2} (DRYPOINT RA 400-720)
(6) Compressor
(7) Hot Gas By-pass Valve
(8) Condenser (Air-Cooled)
(9) Condenser fan
(10) Filter Drier
(11) Capillary tube
(12) T1 Temperature probe (DewPoint)
(13) Condensate drain isolation valve
(17) Air Dryer Controller
(18) Condenser (Water-Cooled)
(19) Condenser water regulating valve (Water-Cooled)
(20) Liquid accumulator (Water-Cooled)
(21) Bekomat drainer
(22) Main switch
(23) HP Refrigerant gauge (high-pressure)
(24) LP Refrigerant gauge (low-pressure)
(25) Compressor crankcase heater (DRYPOINT RA 180-720)
...
(51) Front panel
(52) Back panel
(53) Right lateral panel
(54) Left lateral panel
(55) Cover
(56) Base plate
(57) Upper plate
(58) Support beam
(59) Support bracket
(60) Control panel
(61) Electric connector
(62) Electric box
(63) SD Door interlock safety-switch
(64) Internal panel

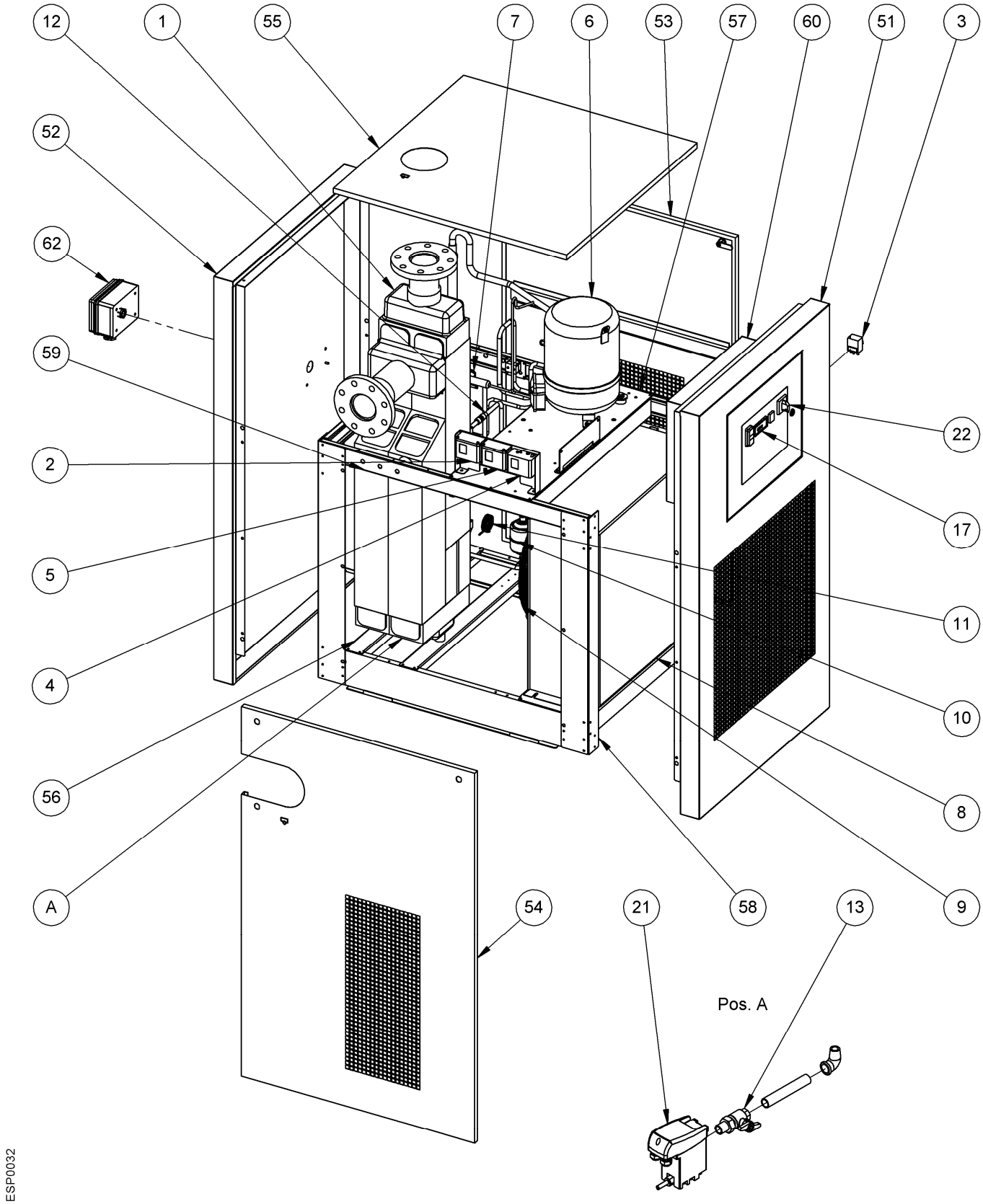
7.2.2. Exploded view DRYPOINT RA 80-100



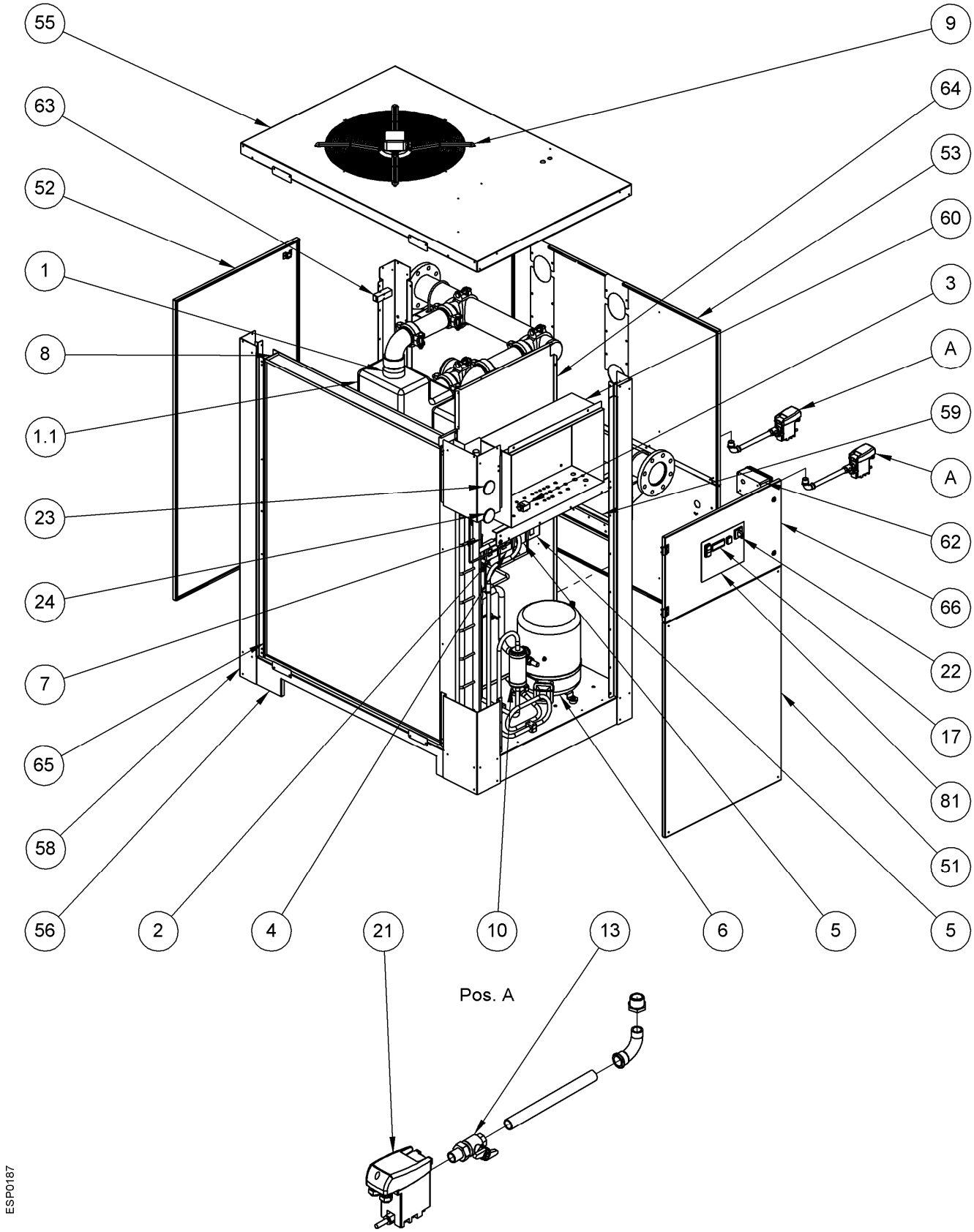
7.2.3. Exploded view DRYPOINT RA 120-160



7.2.4. Exploded view DRYPOINT RA 180-360



7.2.5. Exploded view DRYPOINT RA 400-720



7.3. Electrical Diagram

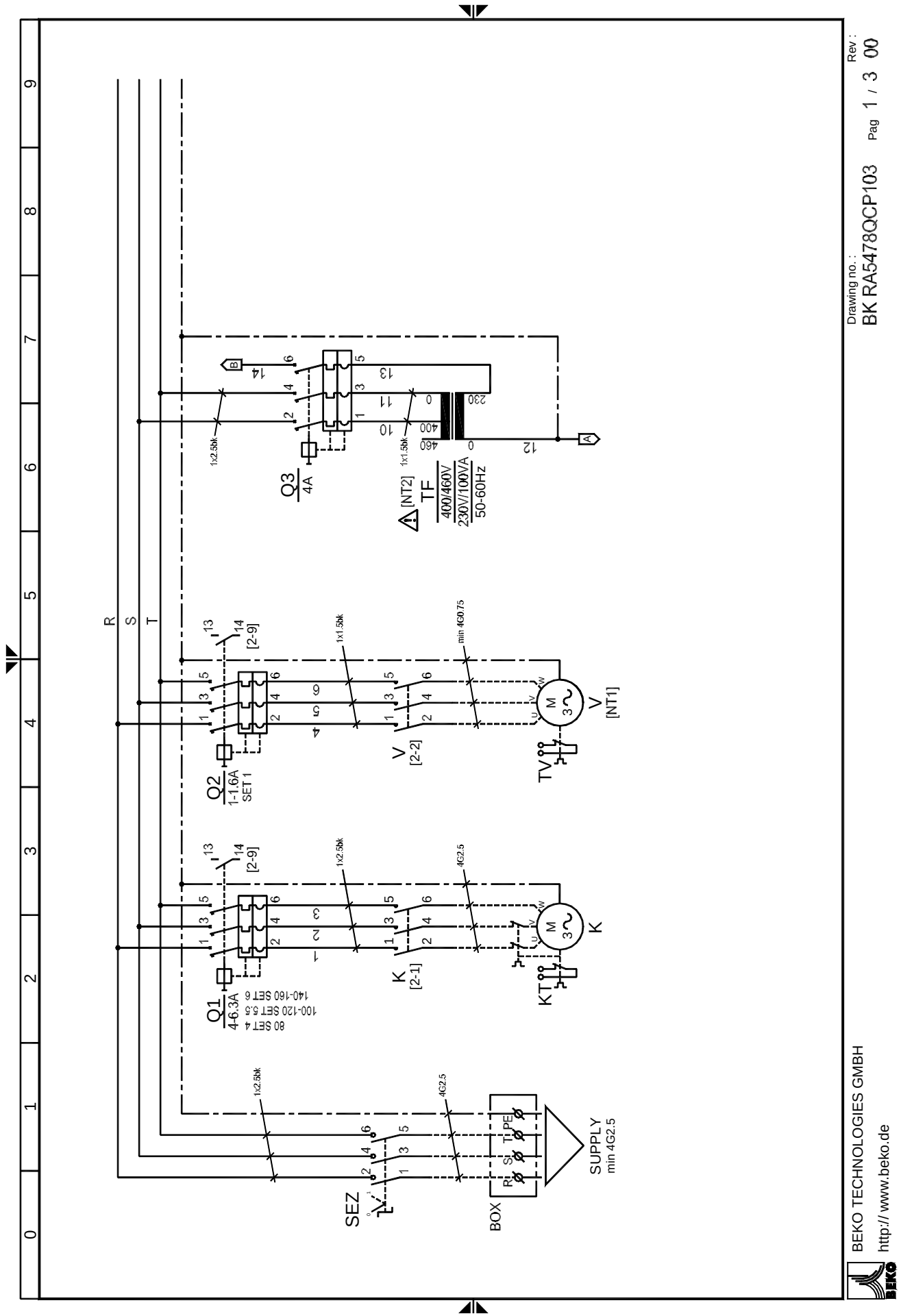
7.3.1. Electrical Diagram table of components

IG : Main switch
K : Compressor
  KT : Compressor thermal protection
V : Condenser fan
  TV : Fan thermal protection
DMC14 : DMC14 Electronic Instrument - Air Dryer Controller
DMC20 : DMC20 Display Module - Air Dryer Controller
DMC20RI : DMC20 Power Module - Air Dryer Controller
PR : Temperature probe (DewPoint)
  T1 : DewPoint temperature
  T2 : Temperature of the incoming air
  T3 : Temperature of the outgoing air
  T4 : Suction temperature of the compressor (low pressure side)
  T5 : Outlet temperature of the compressor (high pressure side)
  T6 : Condensing temperature
  T7 : Ambient temperature
  T8 : Cooling water inlet temperature (Water-Cooled)
PV : Pressure switch - Fan control
PV1 - PV2 : Pressure switch - Fan control
PA : Pressure switch - Compressor discharge side - (HIGH-pressure)
PB : Pressure switch - Compressor suction side (LOW pressure)
TS : Safety thermo-switch
BOX : Electric box
ELD : Bekomat drainer
SEZ : Main switch with door block
P : Start-Stop button - Power on light
X : Alarm on light
R : Compressor crankcase heater
SD : Door interlock safety-switch
CP : Control panel

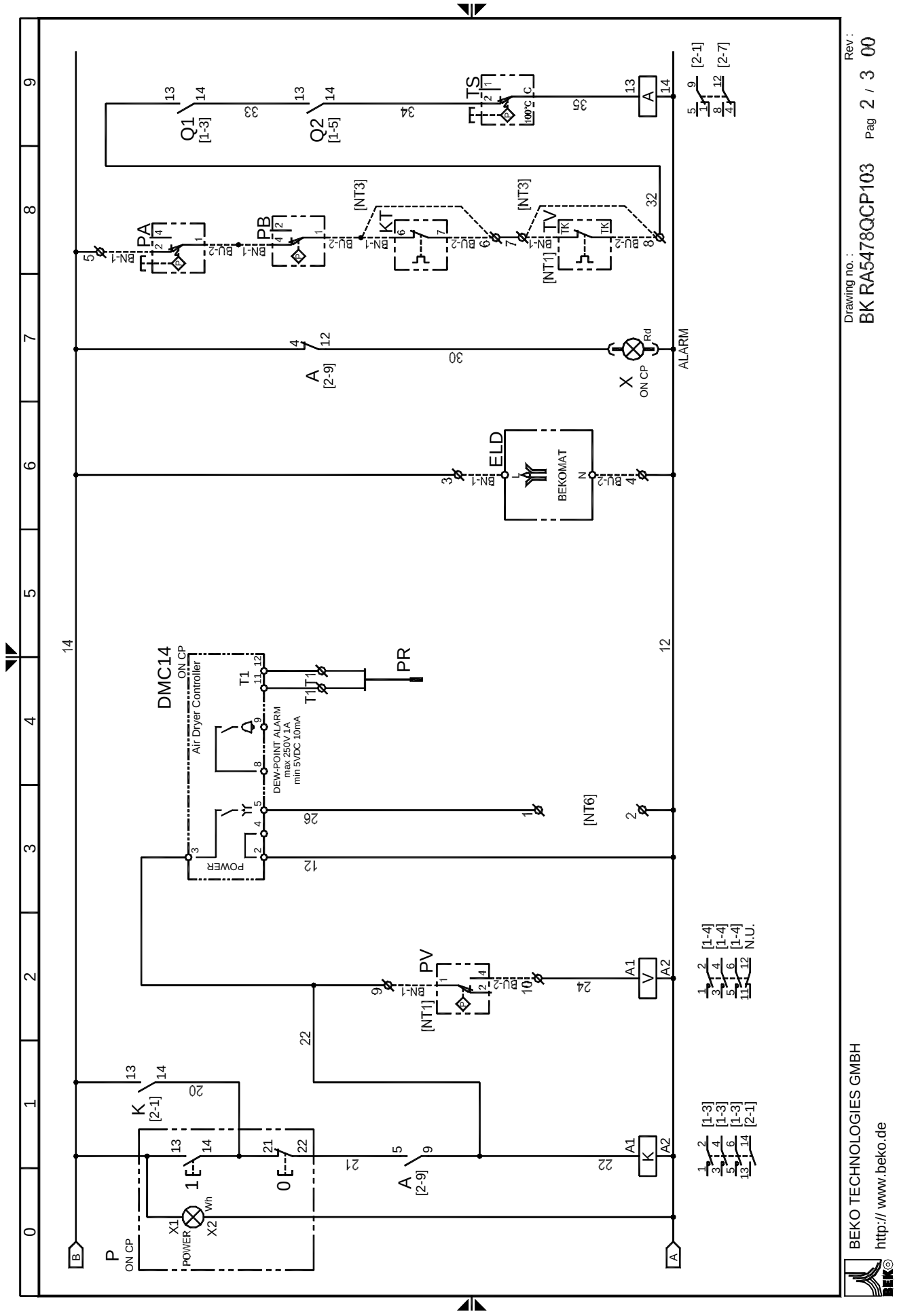
NT1 : Air Cooled only
NT2 : Verify transformer connection according to power supply voltage
NT3 : Jump if not installed
NT4 : Provided and wired by customer
NT5 : Limit of equipment
NT6 : Timed drain output – Not used
NT7 : Water Cooled only

BN	=	BROWN	OR	=	Orange
BU	=	BLUE	RD	=	Red
BK	=	BLACK	WH	=	White
YG	=	YELLOW/GREEN	WH/BK	=	White/Black

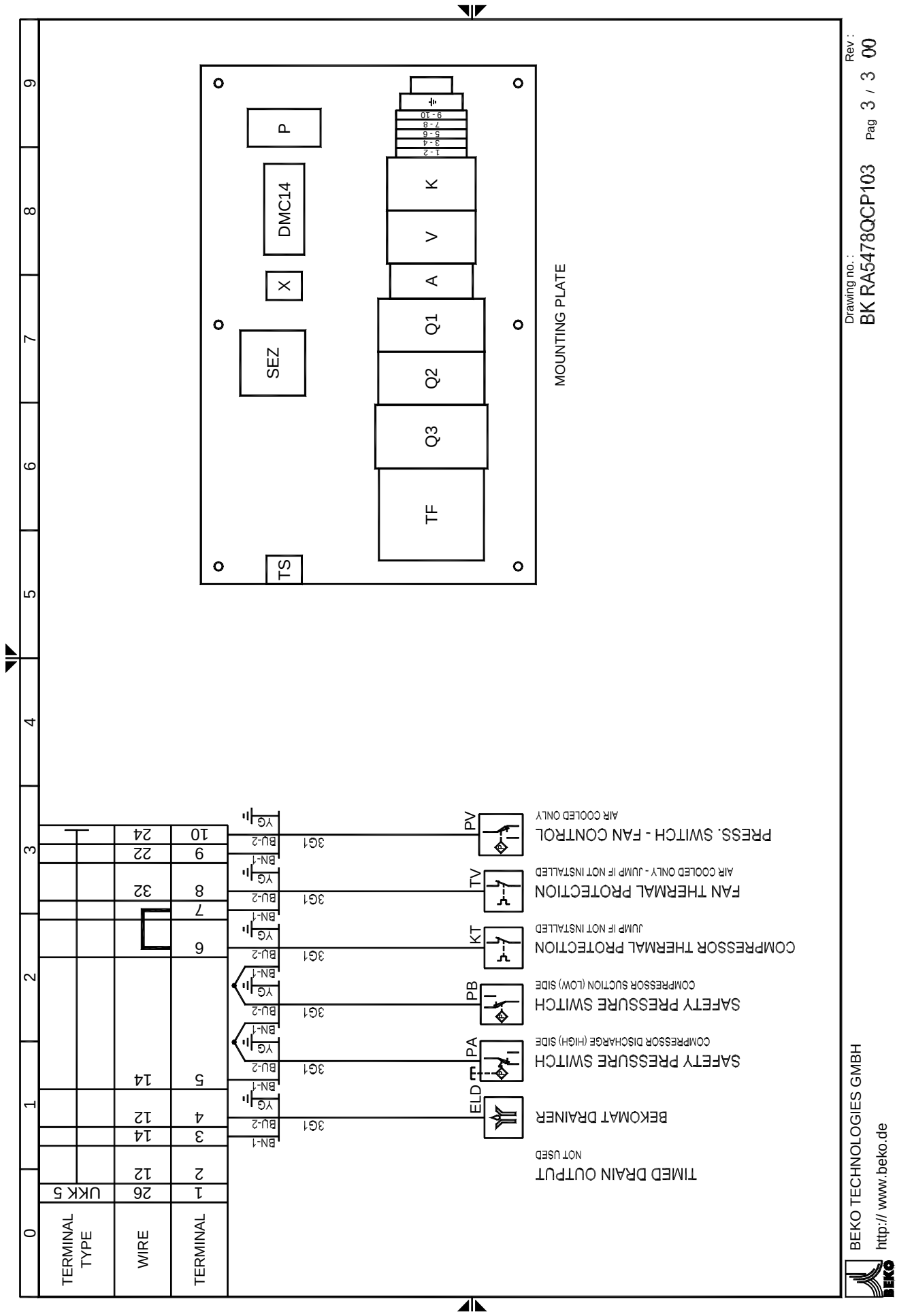
7.3.2. Electrical Diagram DRYPOINT RA 80-160 - Electronic Instrument DMC14



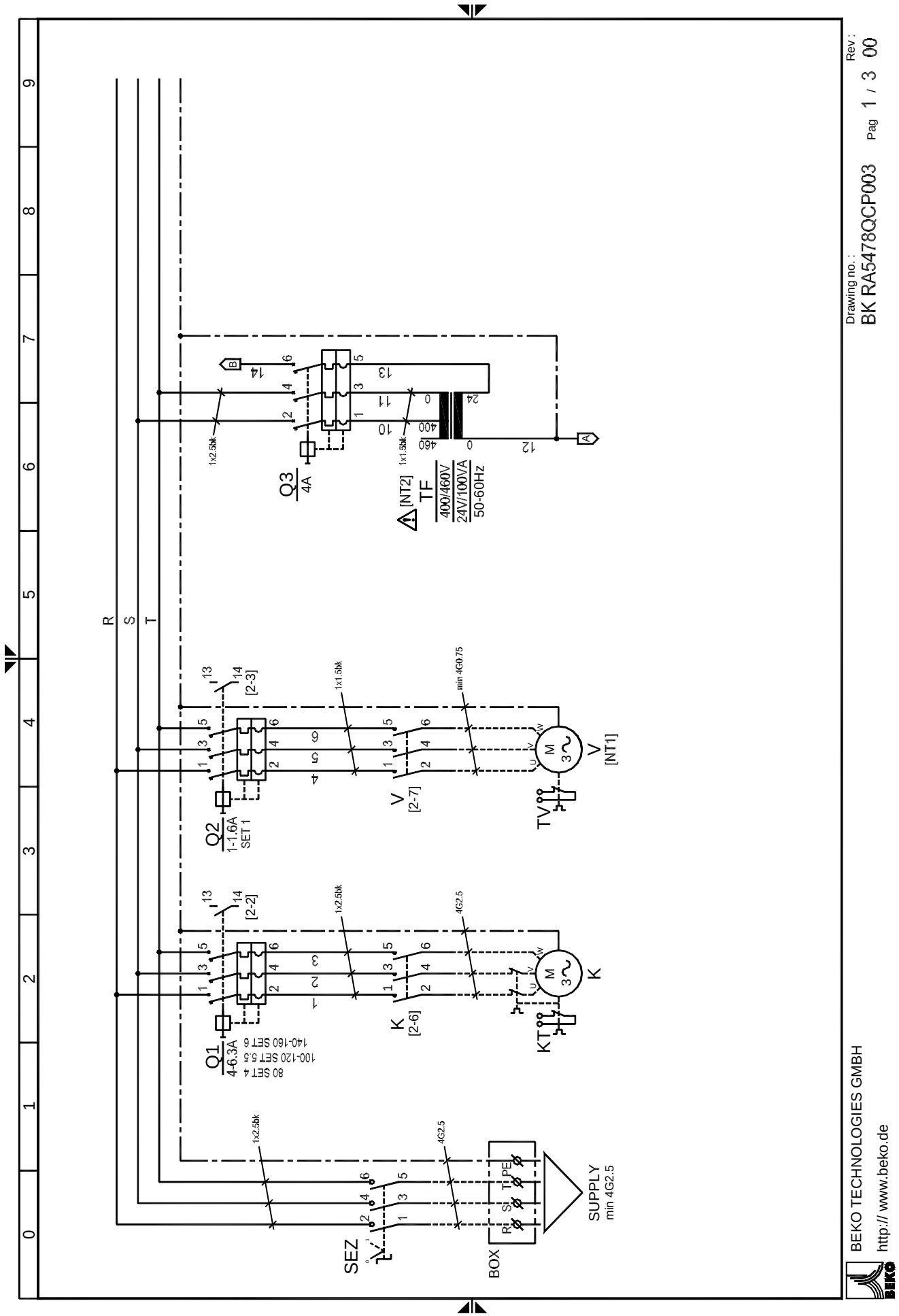
7.3.3. Electrical Diagram DRYPOINT RA 80-160 - Electronic Instrument DMC14



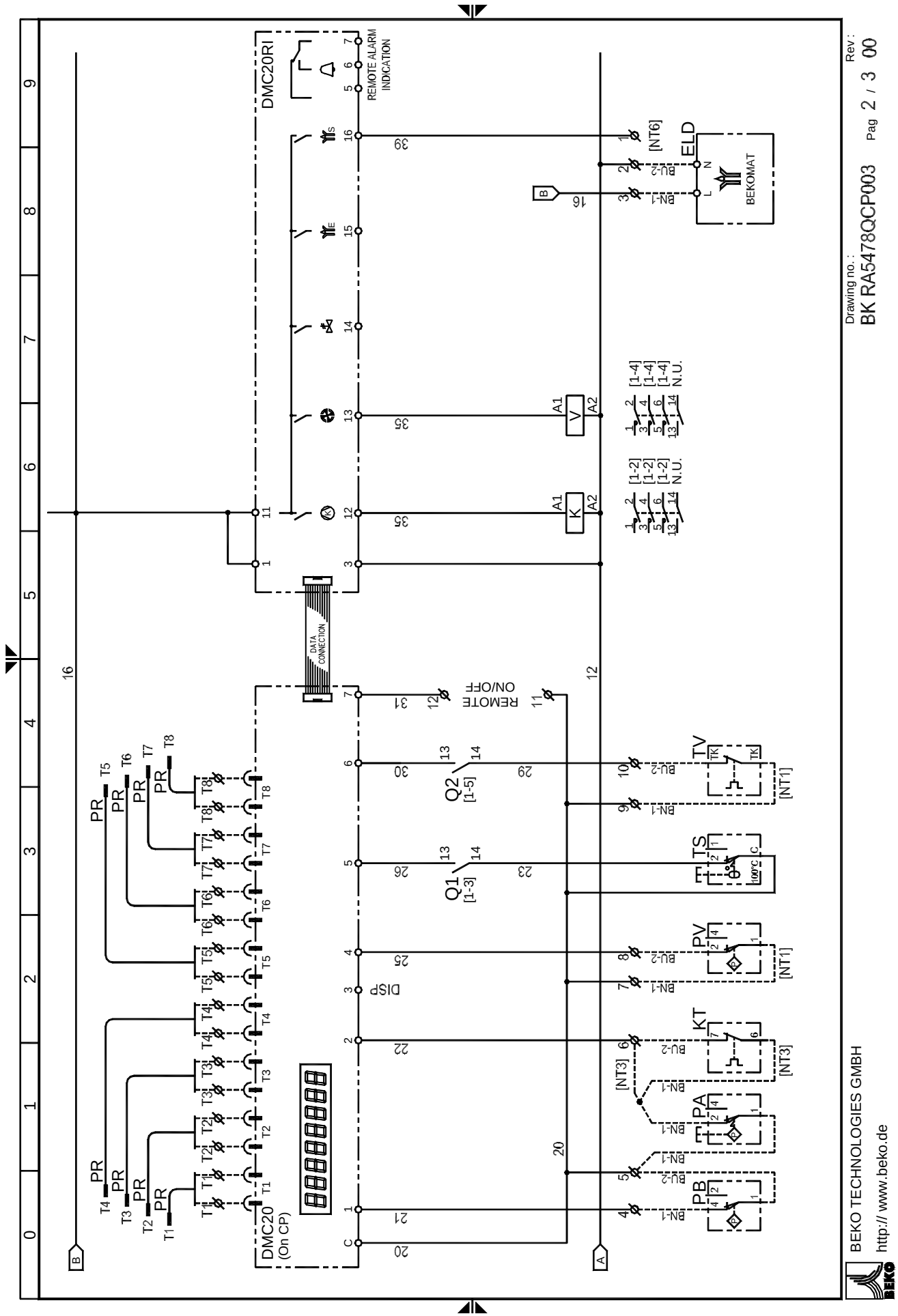
7.3.4. Electrical Diagram DRYPOINT RA 80-160 - Electronic Instrument DMC14



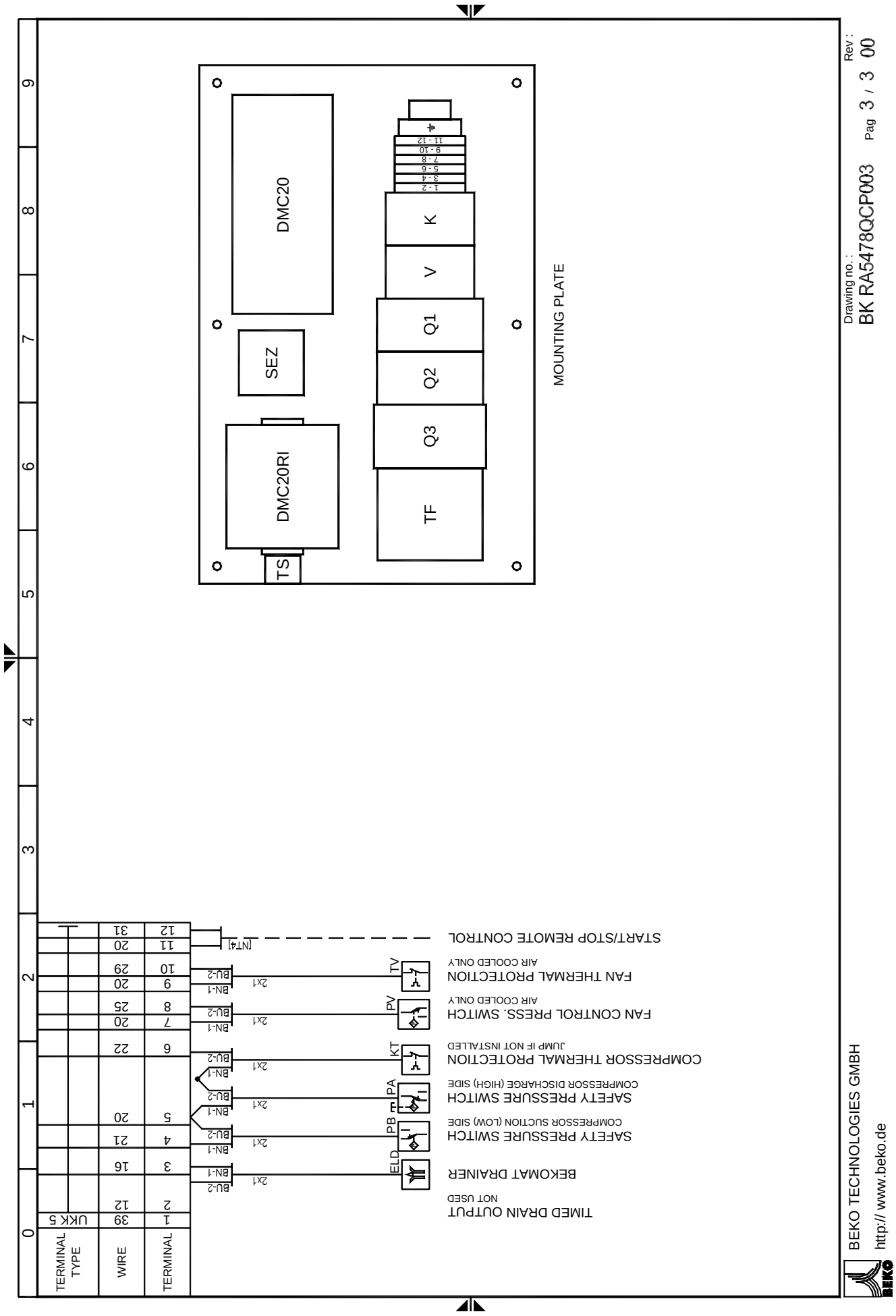
7.3.5. Electrical Diagram DRYPOINT RA 80-160 - Electronic Instrument DMC20



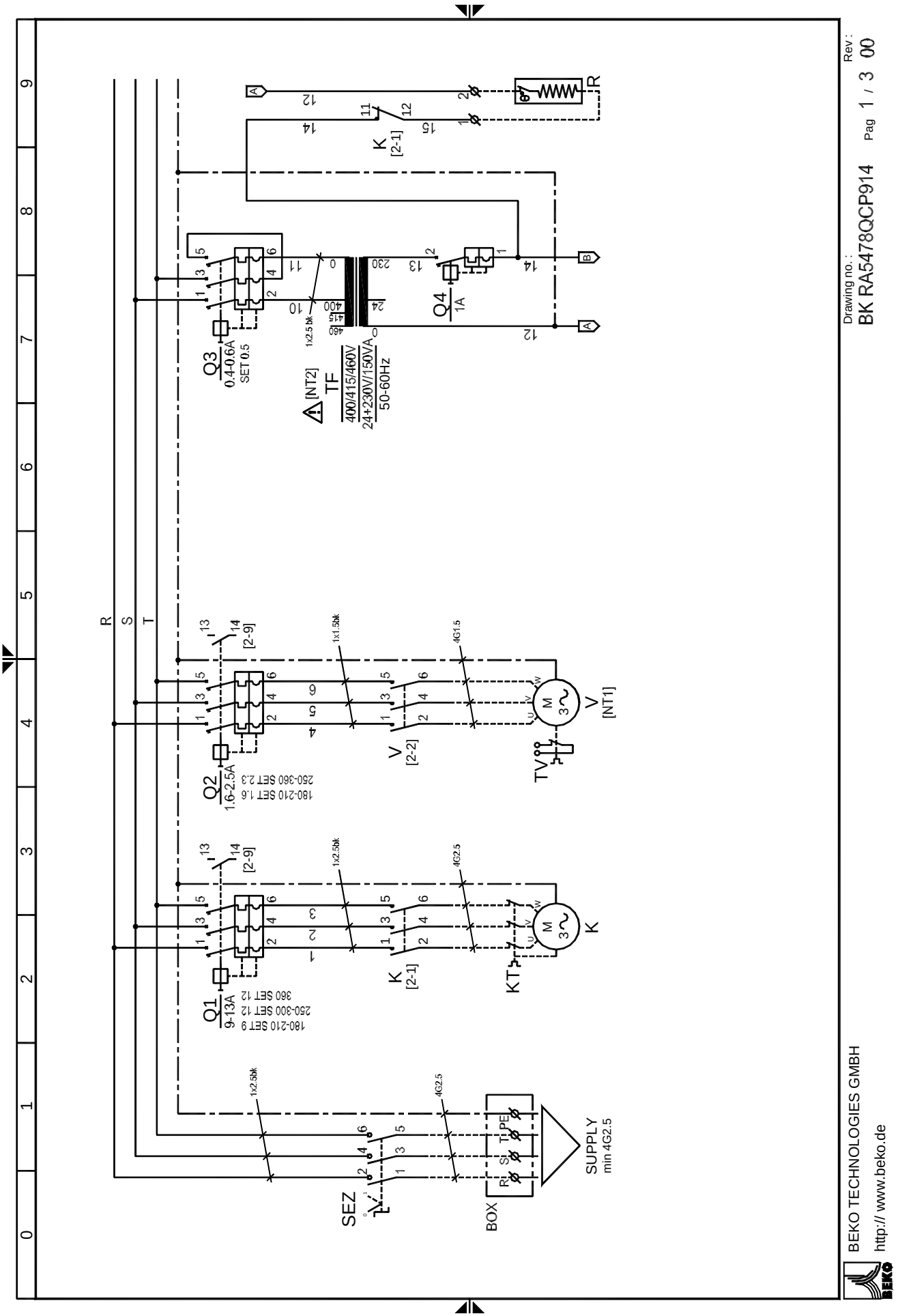
7.3.6. Electrical Diagram DRYPOINT RA 80-160 - Electronic Instrument DMC20



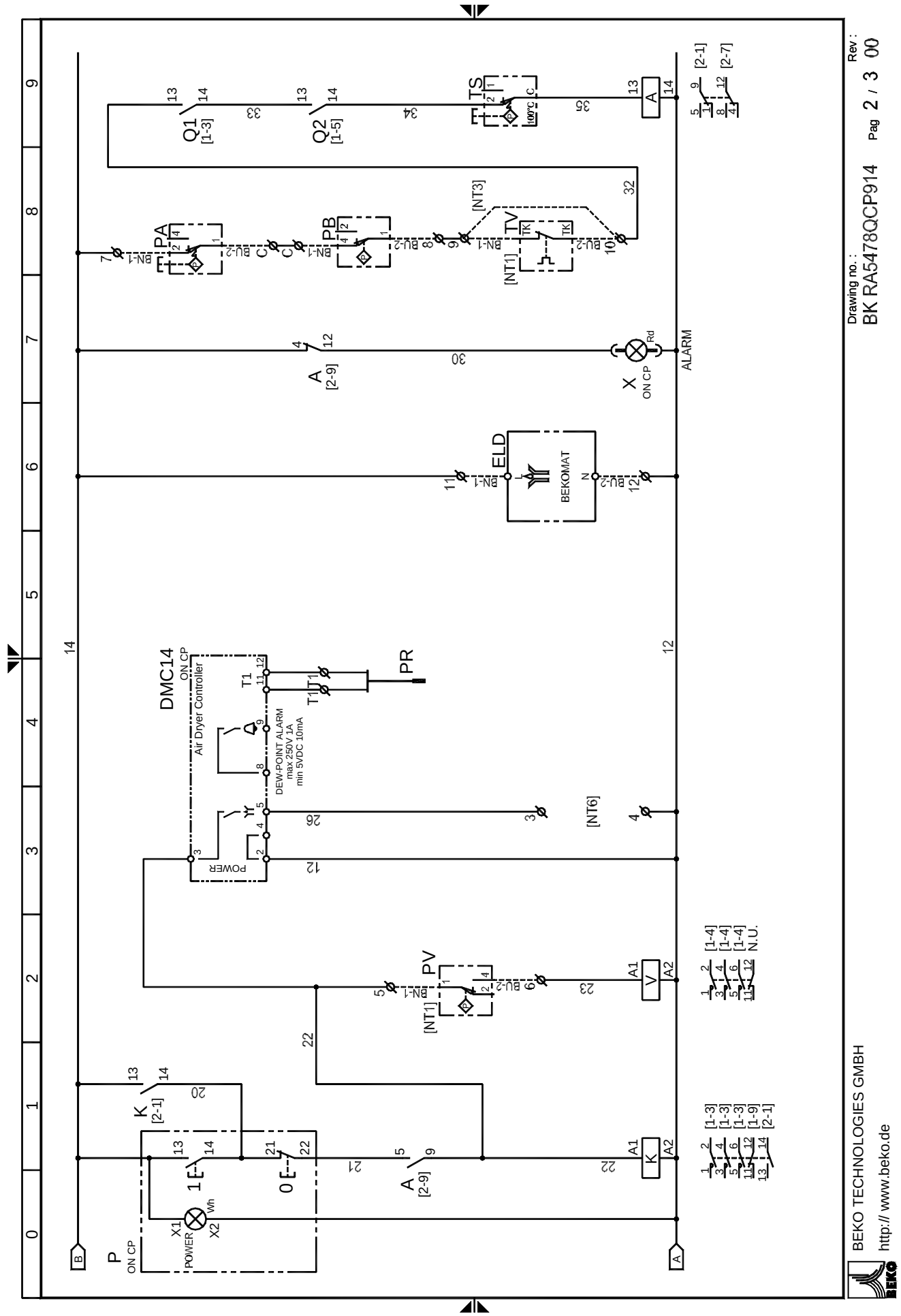
7.3.7. Electrical Diagram DRYPOINT RA 80-160 - Electronic Instrument DMC20



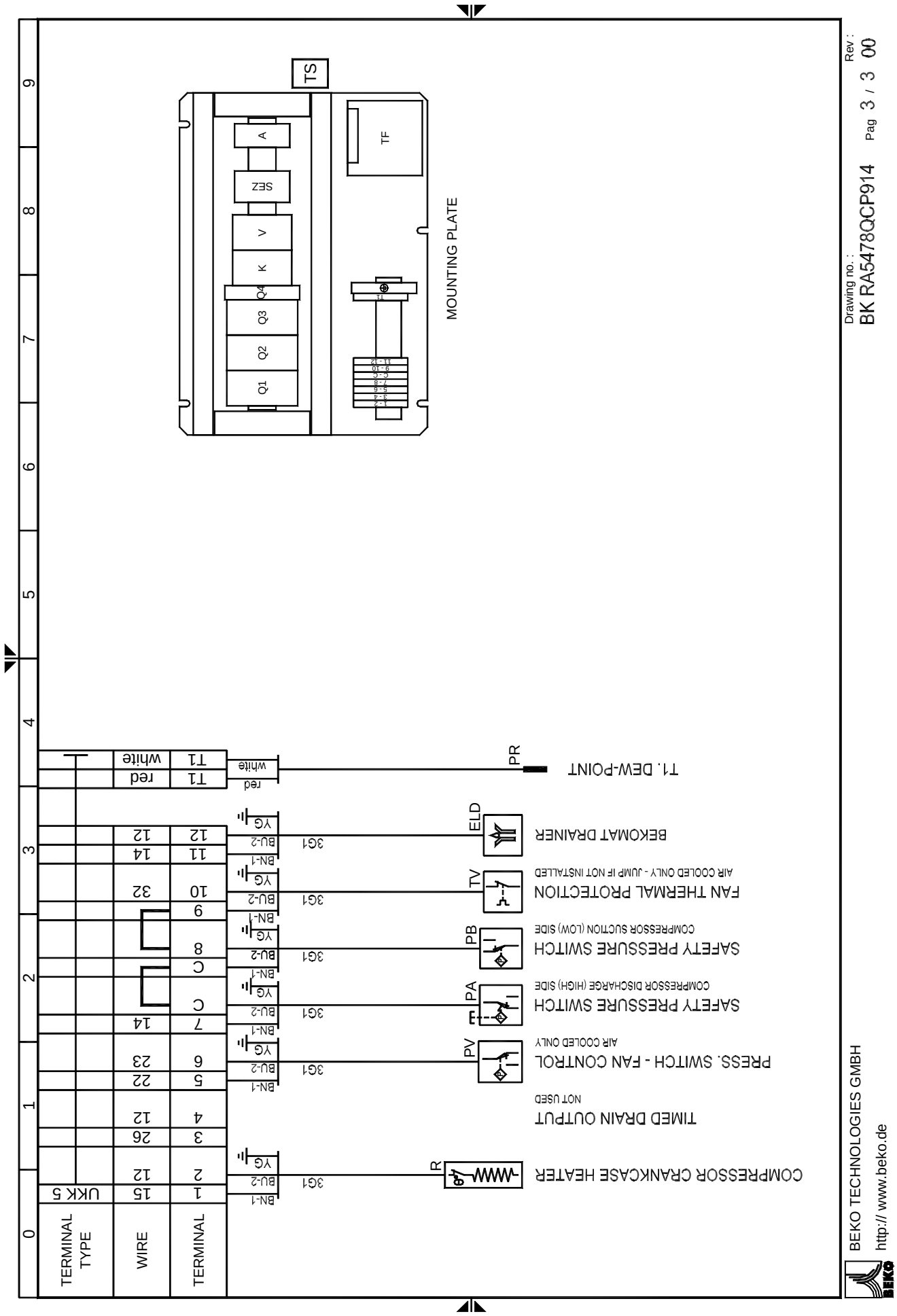
7.3.8. Electrical Diagram DRYPOINT RA 180-360 - Electronic Instrument DMC14



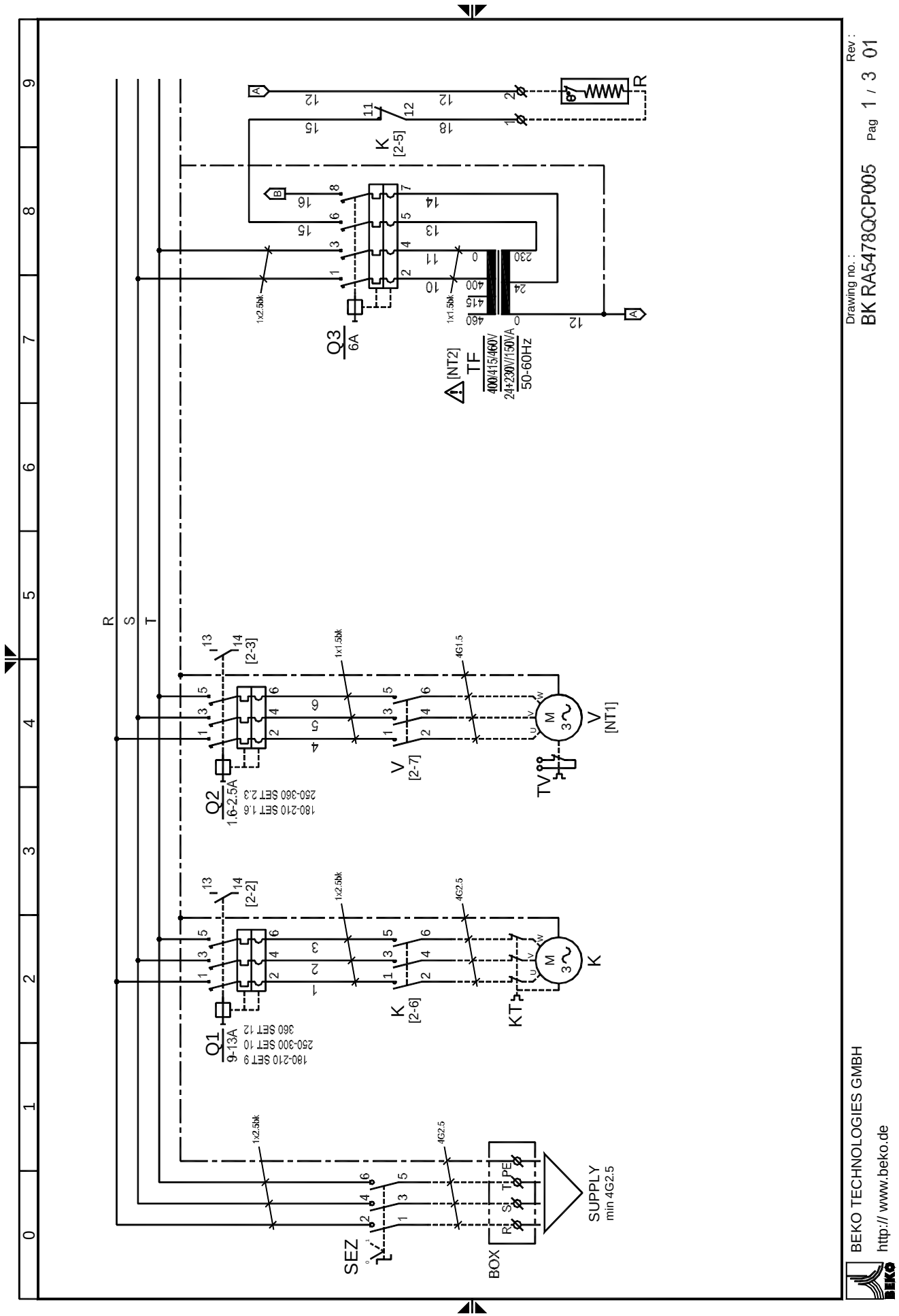
7.3.9. Electrical Diagram DRYPOINT RA 180-360 - Electronic Instrument DMC14



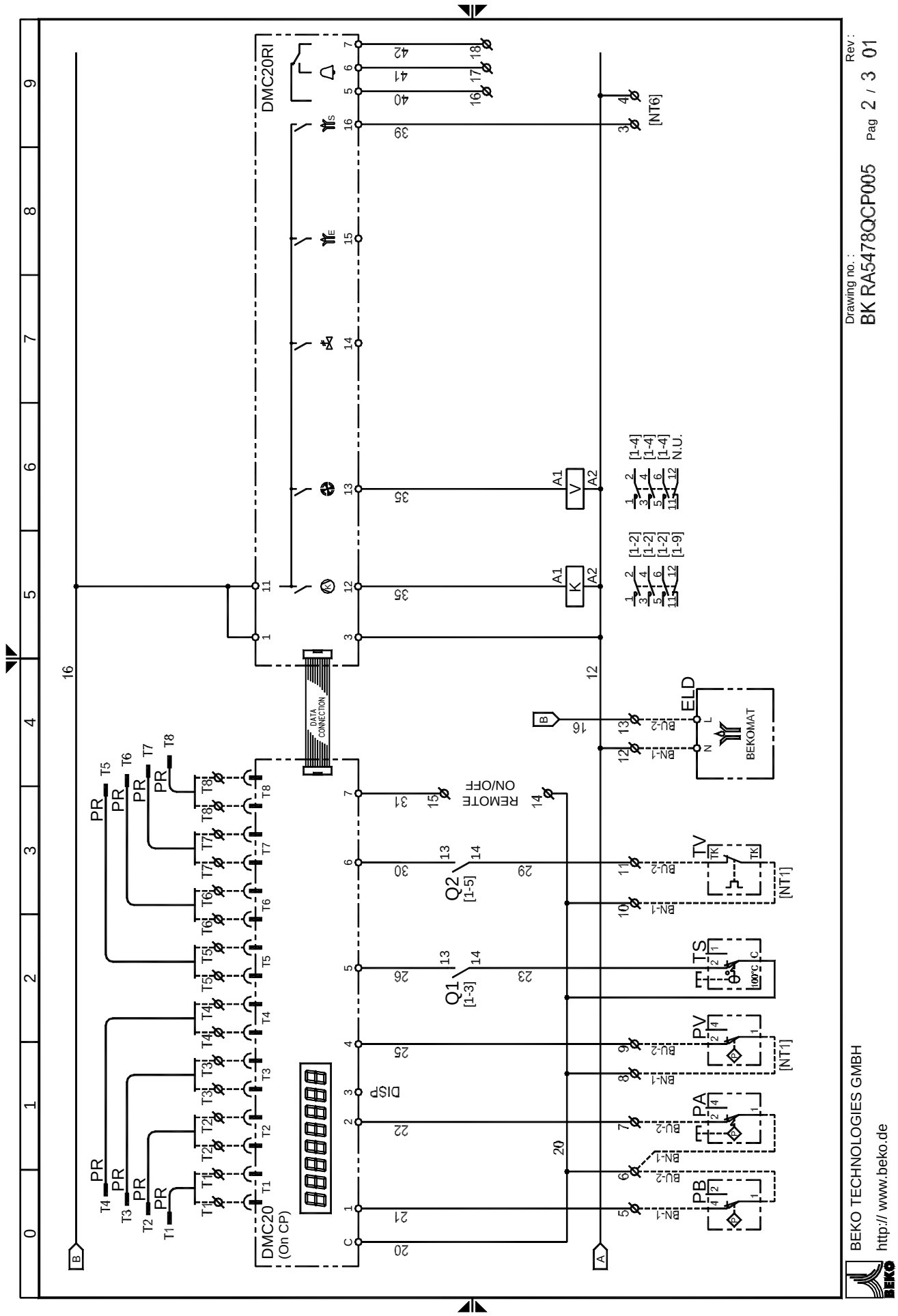
7.3.10. Electrical Diagram DRYPOINT RA 180-360 - Electronic Instrument DMC14



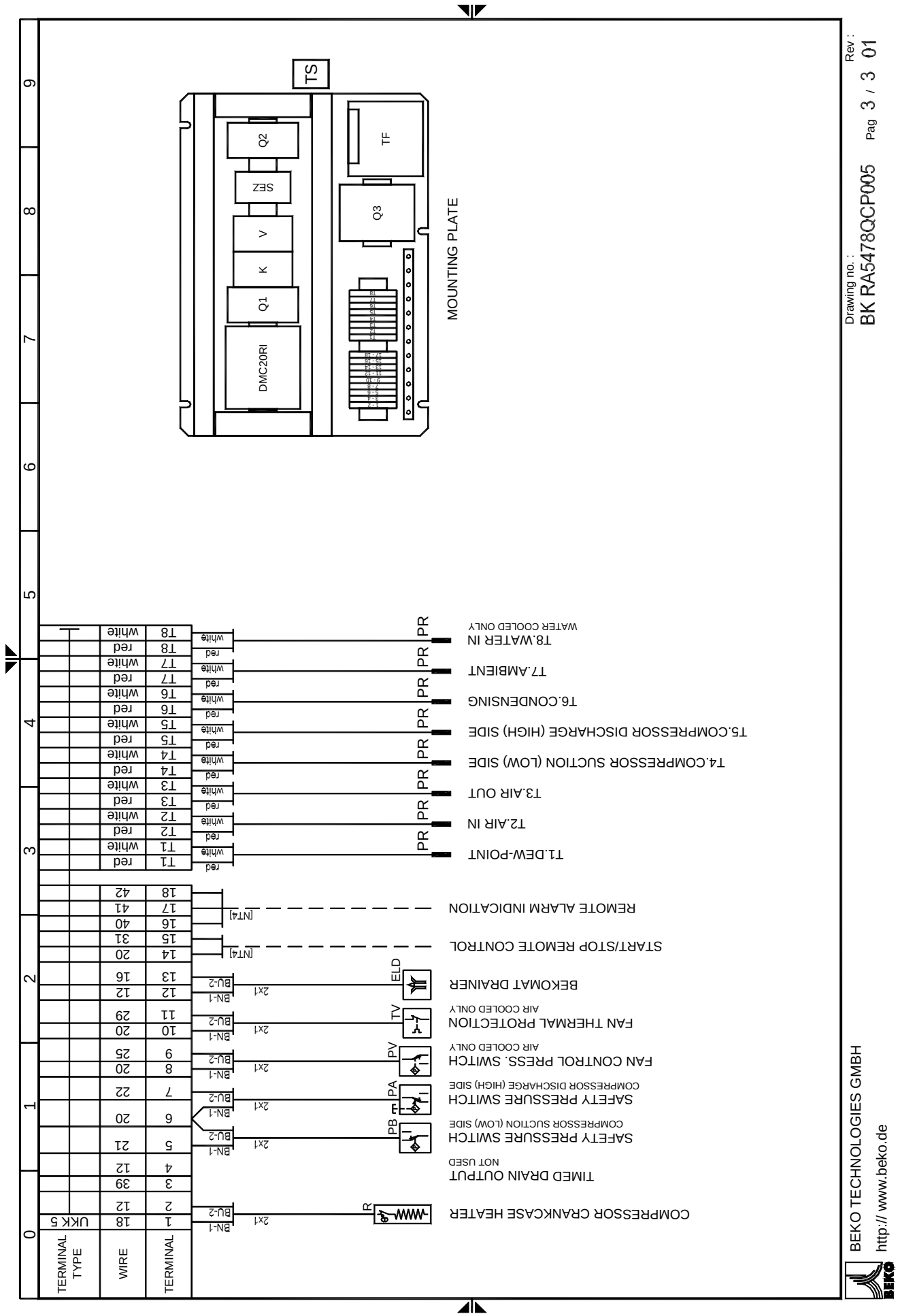
7.3.11. Electrical Diagram DRYPOINT RA 180-360 - Electronic Instrument DMC20



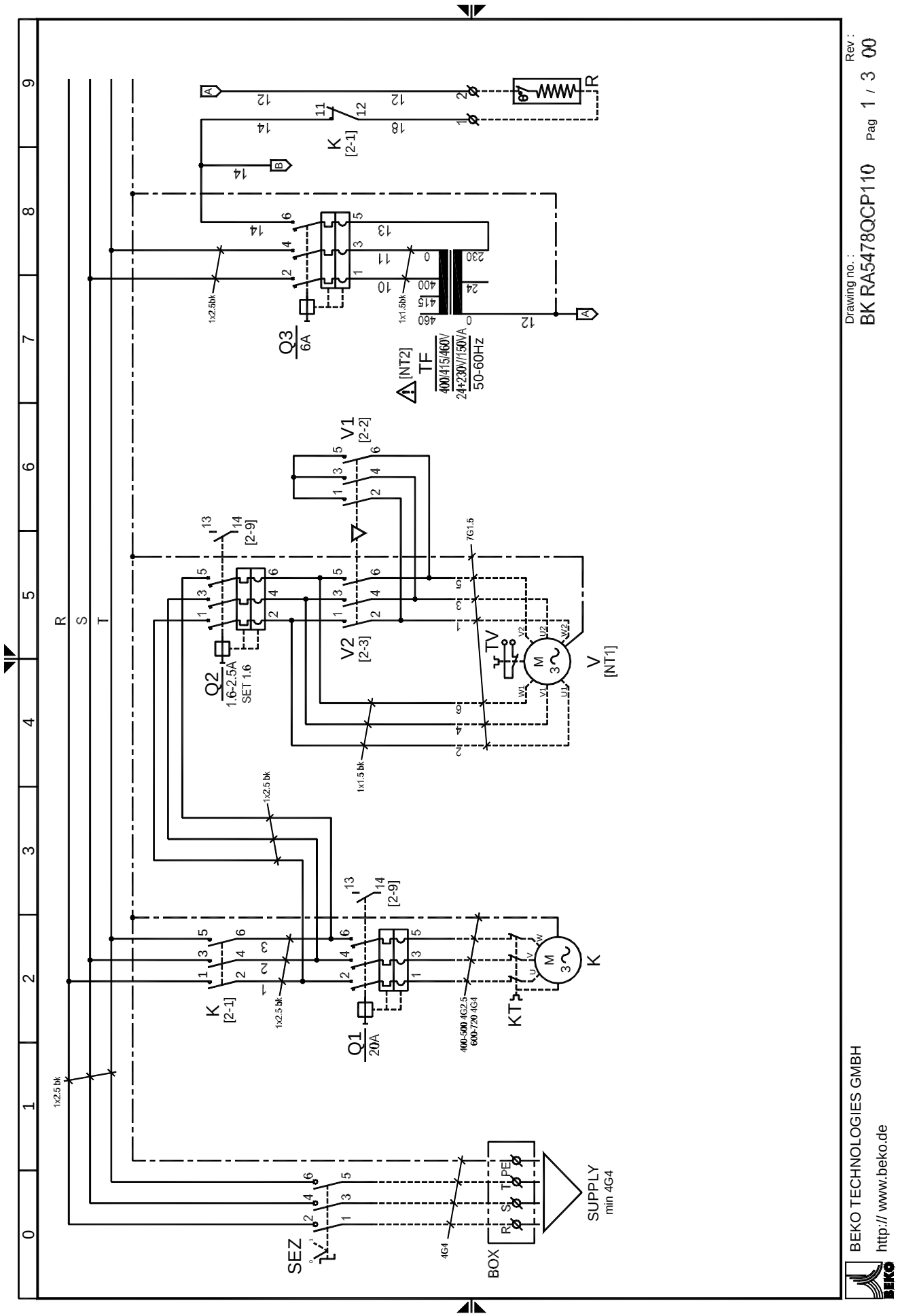
7.3.12. Electrical Diagram DRYPOINT RA 180-360 - Electronic Instrument DMC20



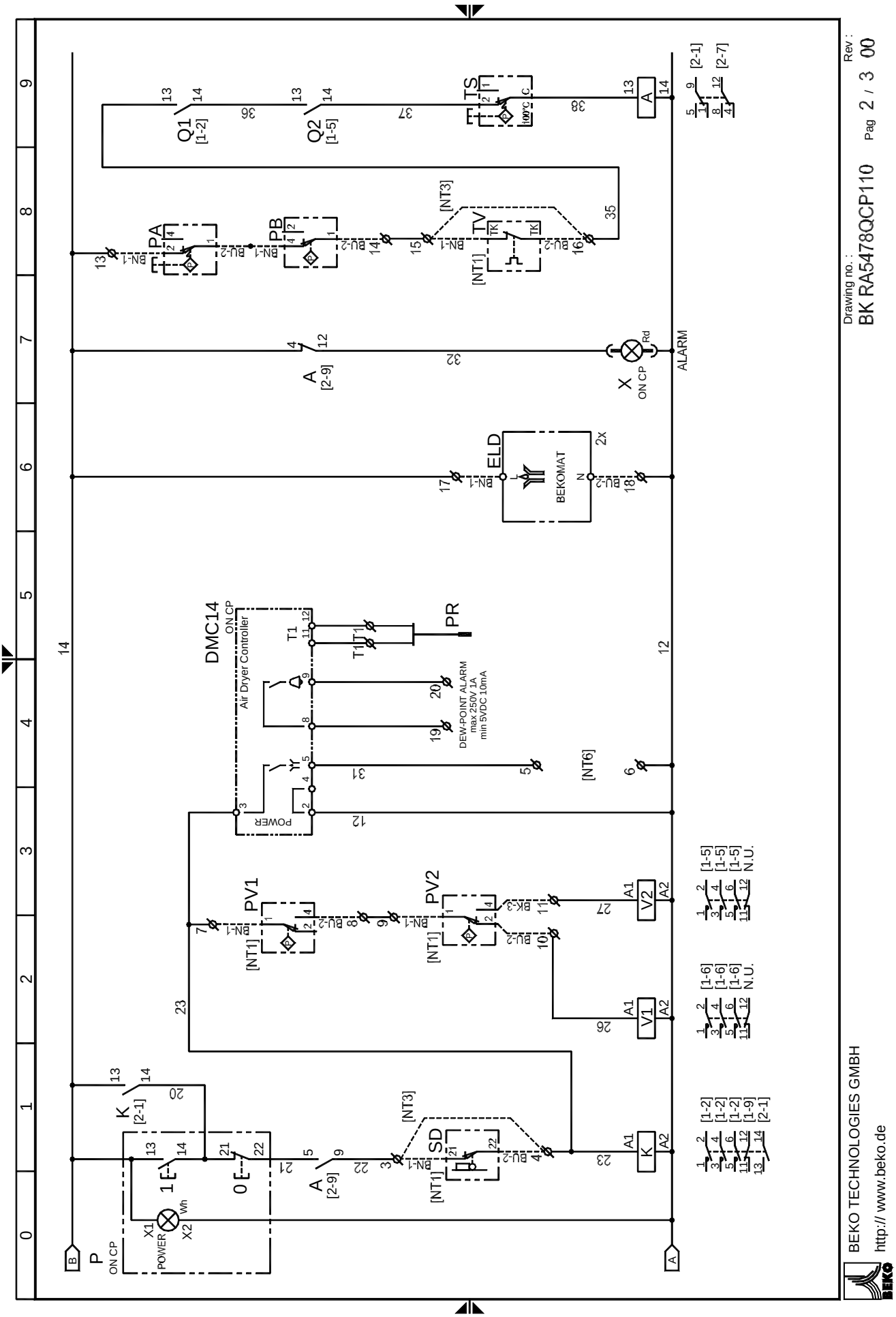
7.3.13. Electrical Diagram DRYPOINT RA 180-360 - Electronic Instrument DMC20



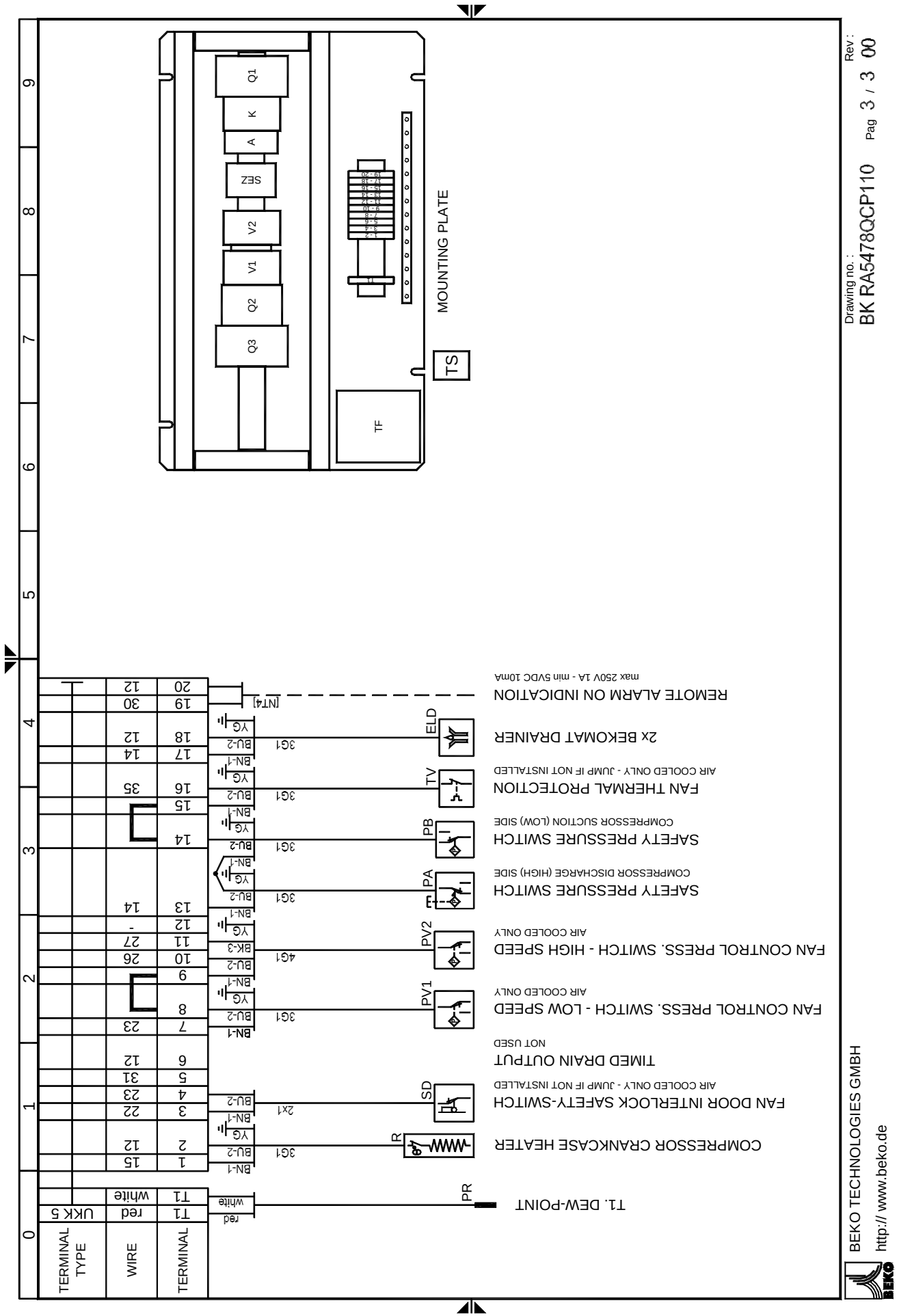
7.3.14. Electrical Diagram DRYPOINT RA 400-720 - Electronic Instrument DMC14



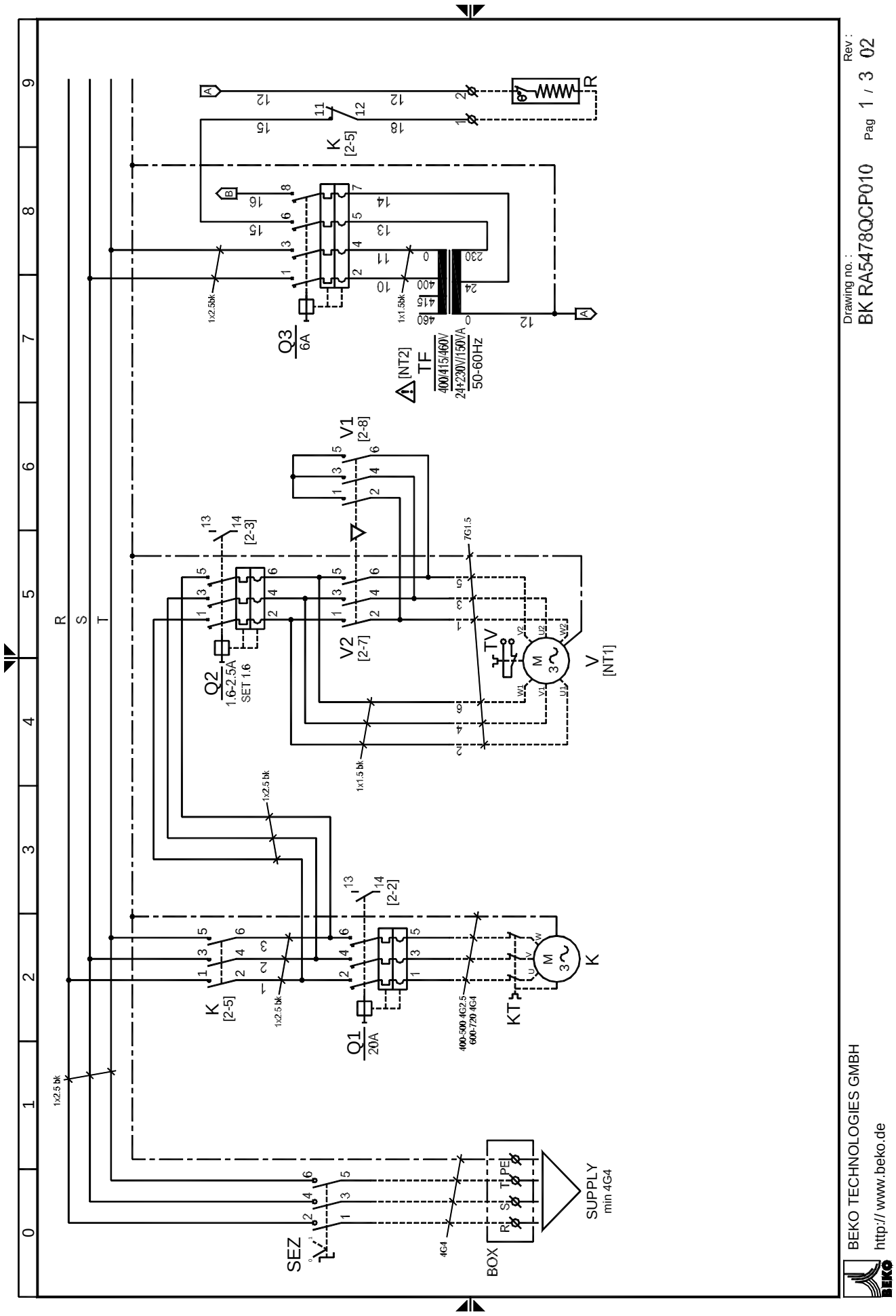
7.3.15. Electrical Diagram DRYPOINT RA 400-720 - Electronic Instrument DMC14



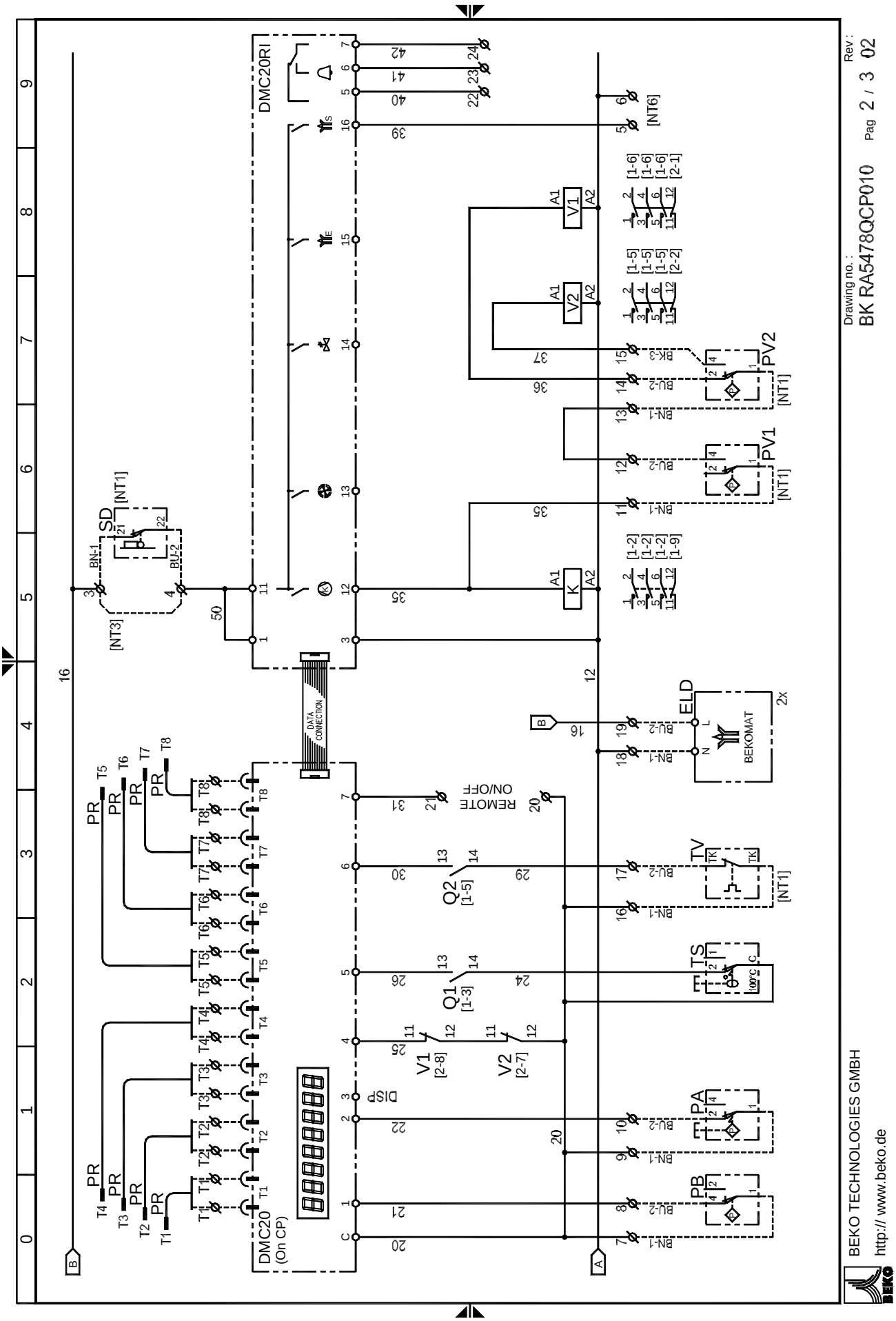
7.3.16. Electrical Diagram DRYPOINT RA 400-720 - Electronic Instrument DMC14



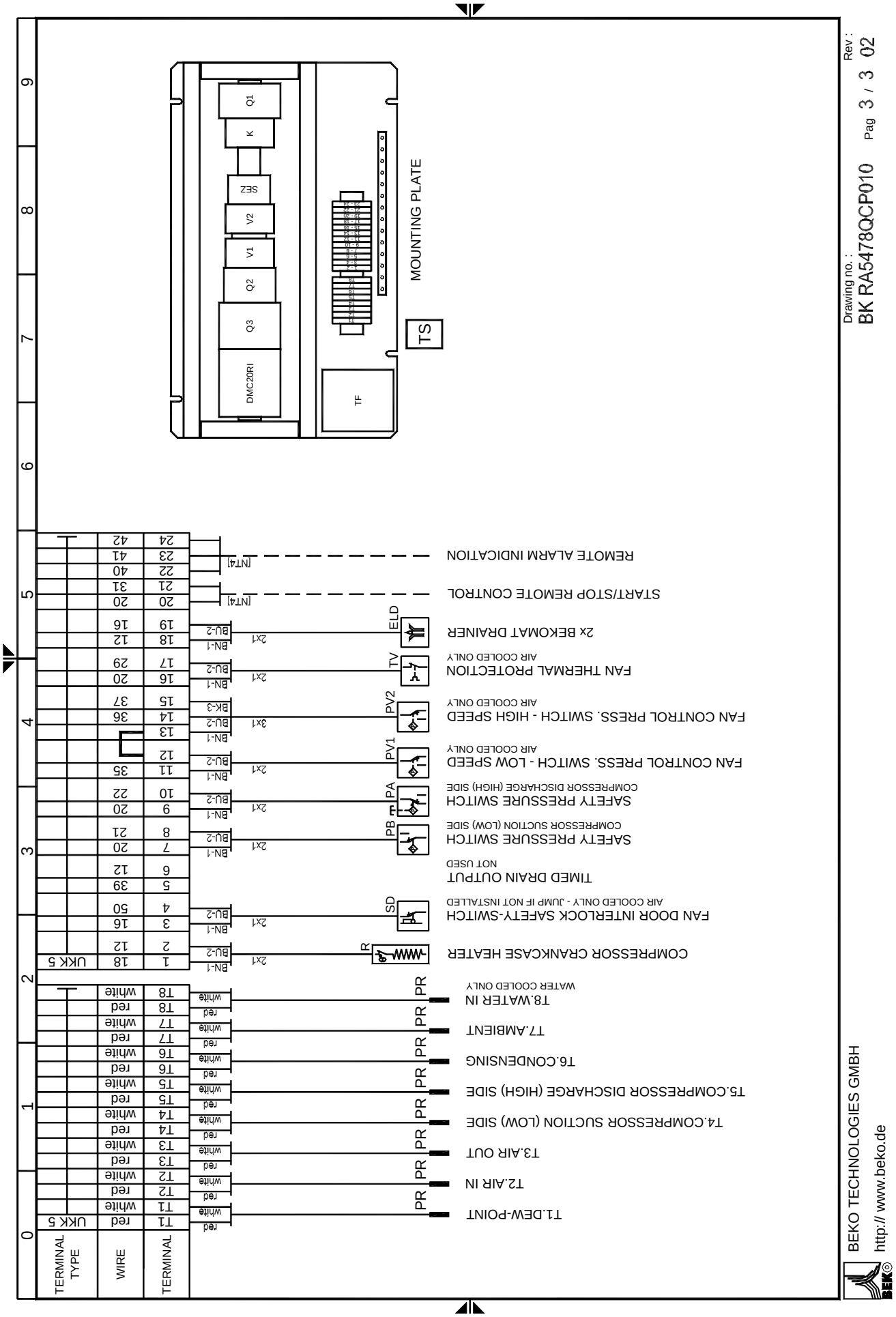
7.3.17. Electrical Diagram DRYPOINT RA 400-720 - Electronic Instrument DMC20



7.3.18. Electrical Diagram DRYPOINT RA 400-720 - Electronic Instrument DMC20



7.3.19. Electrical Diagram DRYPOINT RA 400-720 - Electronic Instrument DMC20



EN The access code to the 2 level is : 20

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DRYPOINT RA 80-720_manual_en_2009-11
Subject to technical changes without prior notice; errors not excluded.
Original instructions are in **ENGLISH.**