RDT
Refrigerated compressed air dryers

OMEGA
AIR

RDT series - Refrigeration compressed air dryers

Background

Compressed air contains contaminants such as water, oil and particulates which must be removed or reduced to the acceptable level based on specific application requirements.

Standard ISO 8573-1 specifies air purity/quality classes for these contaminants. Humidity (water vapour content) is expressed in the terms of Pressure Dew Point (PDP) where Dew point is the temperature at which air is 100% saturated with moisture.

When the temperature of the air reduces to or below the dew point, condensation will occur. Reduction of water content down to pressure dew point +3°C is usually achieved with refrigeration dryers.

Performance

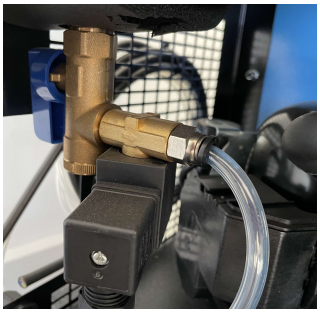
RDT refrigeration dryers have been designed to effectively separate water from the compressed air thus lower pressure dew point all the way down to +3°C.

Drying is achieved on the principle of cooling which takes place inside highly efficient and ultra compact 3 stage heat exchanger. In the first stage (air-air heat exchanger) hot and humid inlet air is being precooled by the cold outgoing air. In the second stage (air-refrigerant heat exchanger) intensive water condensation takes place due to cooling the air.

All condensed water is separated from the main compressed air stream in the third stage by integrated demister. A proven and robust design enables efficient and reliable operation, fast installation and simple maintenance.

Controller

The control panel contains all the information necessary for the management of refrigeration dryer RDP. It also contains the installed main power button to turn off the refrigerated dryer, dew point display and alarm mode.

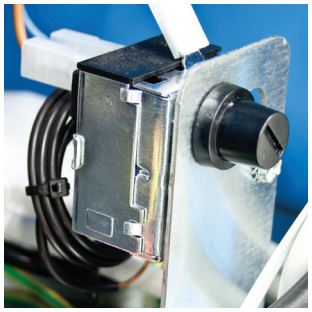


Electronic condensate drain

Integrated electronic condensate drain TD16M is designed for fully automatic discharging of condensate at timed intervals. The intergrated ball valve/strainer insures reliable operation.

Low/high pressure switch

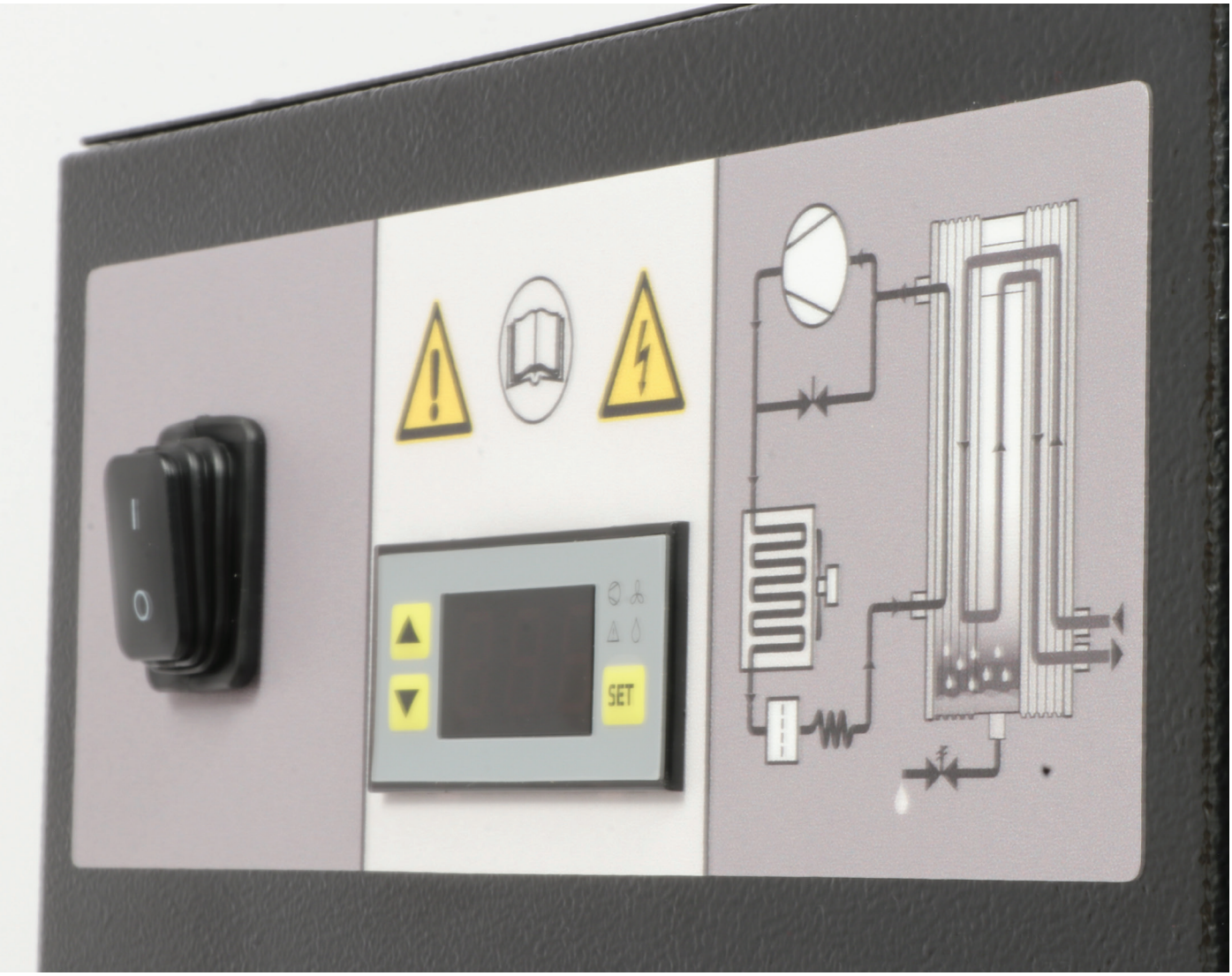
Low/high pressure switch are control devices which are used as safety control. The compressor is stopped by cutting the power supply of the motor of the compressor whenever the refrigerant pressure becomes excessive. This is necessary to prevent the possible damage of equipment. Presence of switch depends on dryer size.



Thermal switch

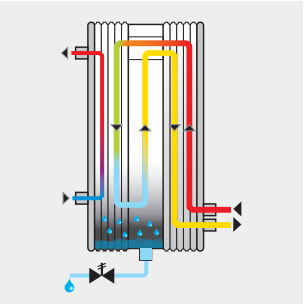
Thermal switch monitors the compressor discharge temperature. If this temperature is too high, it means, that the compressor is overheating, which may cause damage to its internal components.

Depending on the temperature, preventive actions are taken, resulting in cutting the power supply to the compressor.



Hot gas by-pass valve

The main purpose of hot gas bypass valve is to prevent condensate from freezing on the surface of the evaporator coil when the system is operating at reduced load conditions.



Integrated heat exchanger

The incoming air enters into an air-to-air pre-cooler, where incoming air is cooled by output air. Then air passes through a refrigerant heat exchanger where the air is cooled by the cold evaporating refrigerant. This process causes moisture to condense in demister into liquid water. Condensate is drained from the system by condensate drain.

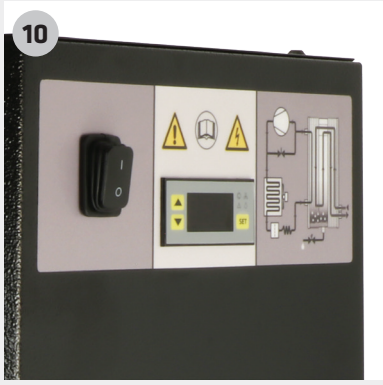
Efficent cooling system

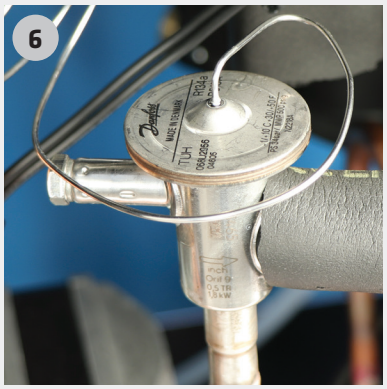
The refrigeration compressor pumps hot high pressure gas refrigerant into the condenser which transfers the heat from the refrigerant gas to the ambient air as the gas condenses into a liquid.

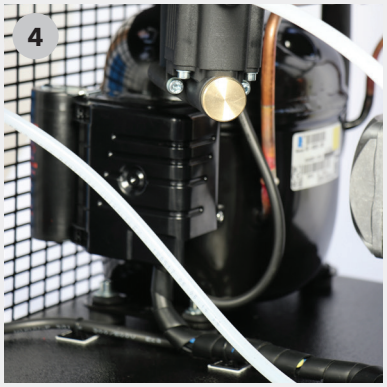
Compressor

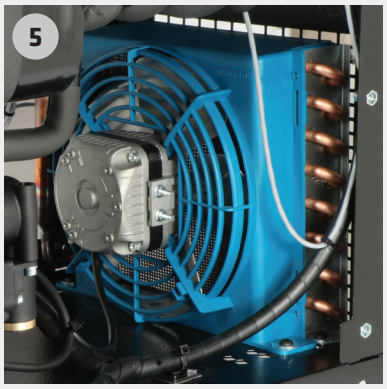
High efficiency piston and scroll refrigerant compressors assure the circulation of system refrigerant. Compressors have the innovative construction with reduced energy consumption and high reliability levels.

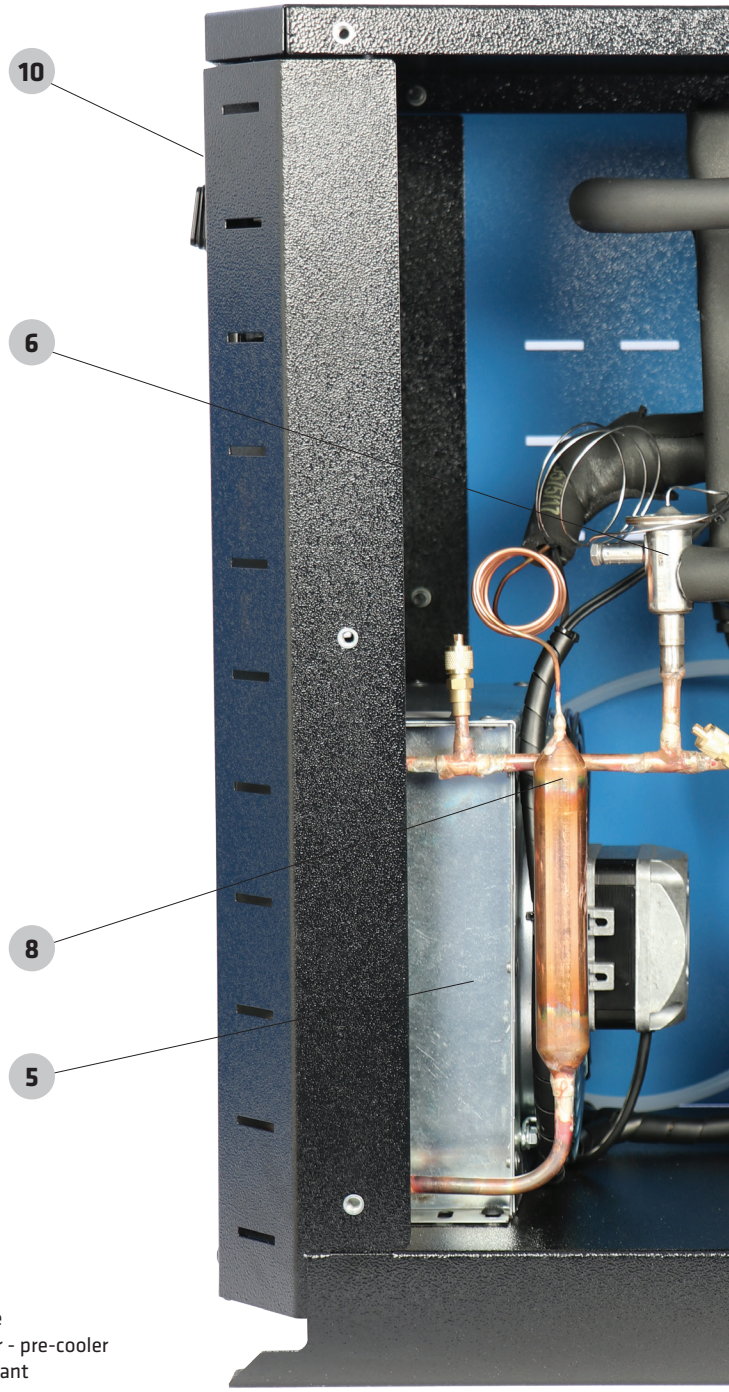
Main components



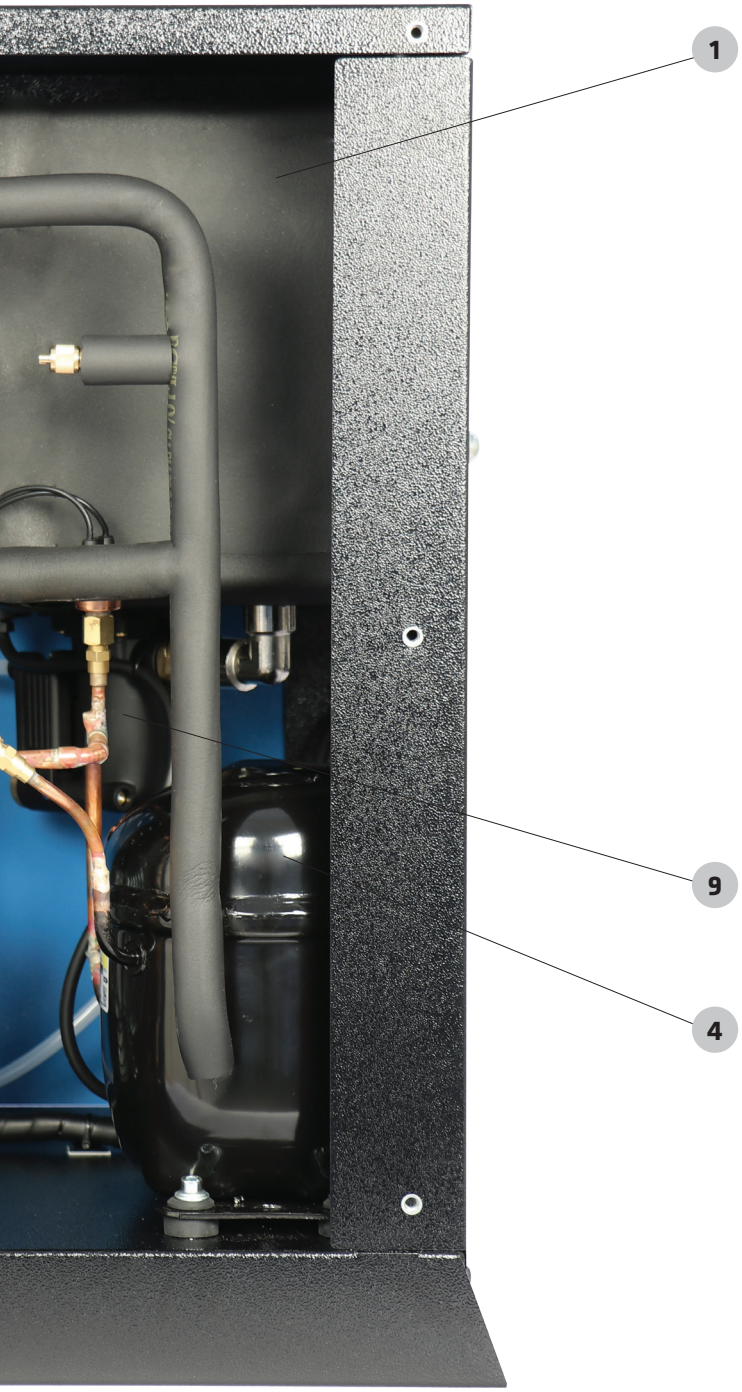








1 Heat exchanger module
  a Heat exchanger air/air - pre-cooler
  b Evaporator air/refrigerant
  c Demister
2 Compressed air input - wet
3 Compressed air output - dry
4 Compressor
5 Condenser
6 Hot gas by-pass valve
7 Gas filter
8 Expansion valve or capillary tube
9 Electronic condensate drain
10 Controller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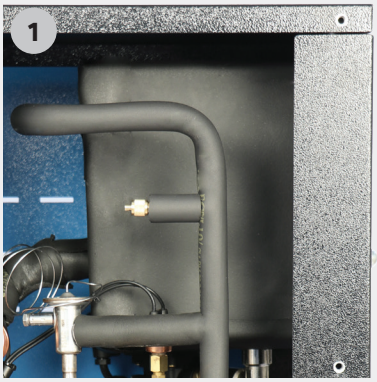
OUT
IN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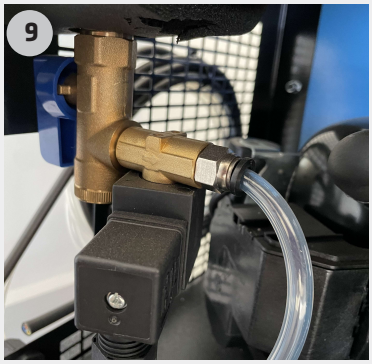
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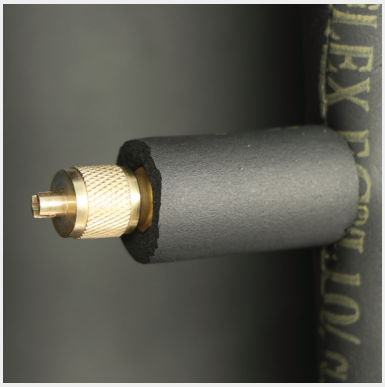
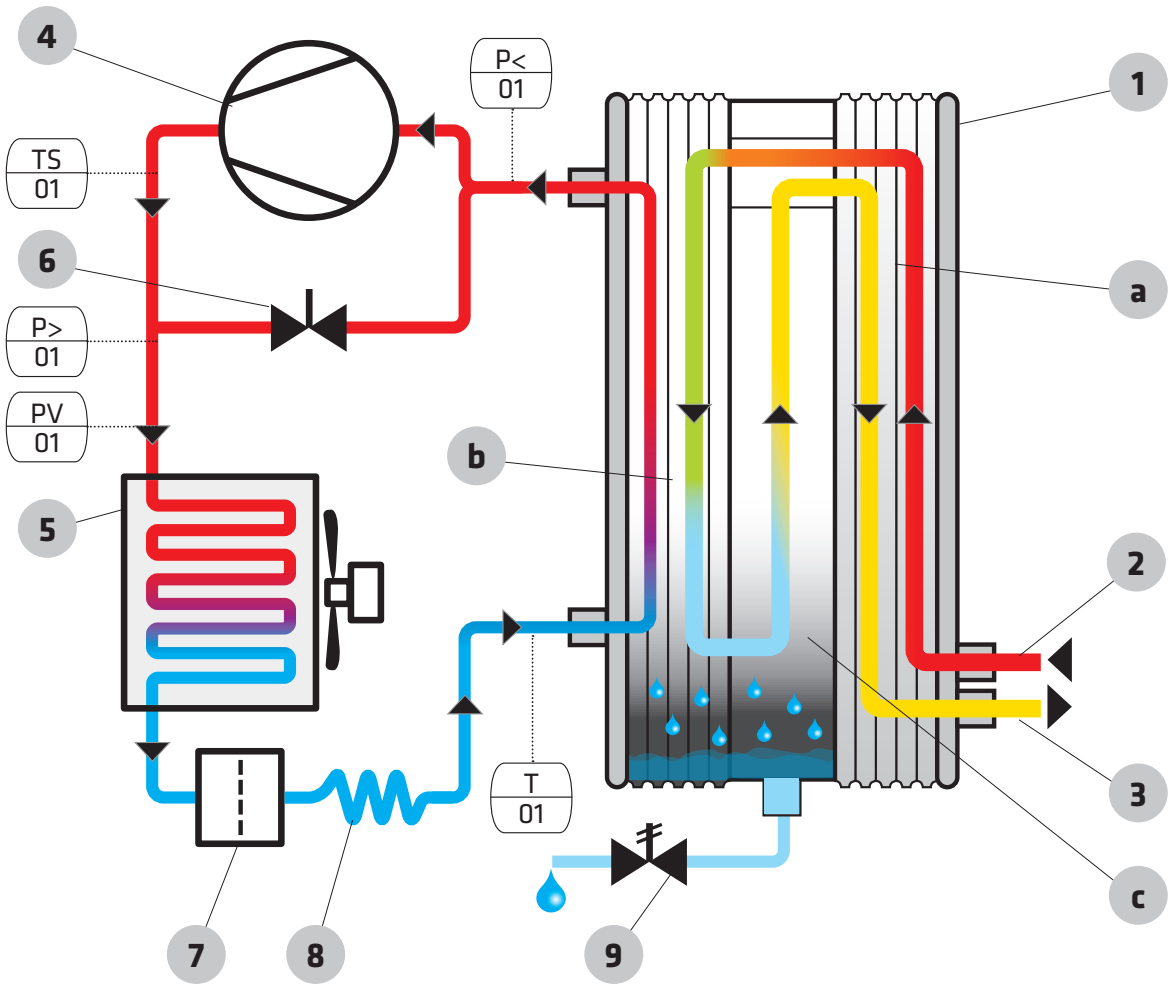


Operating scheme



Operation

Operation of refrigeration compressed air dryer can be divided into two independent circuits:

COMPRESSED AIR CIRCUIT
Warm and humid compressed air enters into three-stage heat exchanger. In the first stage "air-air" (a) incoming air is precooled by cold outlet air. This stage is important from energy saving point of view as well as for stable operation of entire system. In the second stage "air-refrigerant" (b) the air is cooled by the cold refrigerant. In this stage water vapour condenses into liquid water. In the third stage "demister" (c) separates all the liquid water from the air stream. Cold dry air then enters "First stage" (a) again where it is re-heated by the hot inlet air. Besides energy saving feature this stage also makes sure that dry air leaving the dryer is warm enough to prevent condensation on the external side of downstream piping. Condensed water is discharged from the system via electronic condensate drain.

REFRIGERANT CIRCUIT
Circulation of the refrigerant gas in the circuit is provided by highly efficient hermetically sealed compressor (4). Compressor rises the pressure of the gas which is then cooled down and liquified in the condenser (5). Electric fan on the condenser can be controlled by temperature or pressure sensor. Liquid refrigerant then flows through capillary tube or thermostatic expansion valve (8) which acts as a metering device to reduce the pressure of the refrigerant. Reduction of the pressure is a design function to achieve target temperature inside the evaporator (lower pressure = lower temperature). Filter (7) which is installed upstream the metering device intercepts impurities and assures reliable operation of the system. Low pressure refrigerant in gas form then re-enters the compressor.

RDT dryers operate based on "non-cycling" operating principle which means that when the dryer is without load (e.g. no or low inlet flow of compressed air) "hot gas by-pass valve" (6) will release part of the hot refrigerant gas (from discharge side of the compressor) back to the suction side of the compressor. As a result evaporation pressure/ temperature will be constant at the factory pre-set value.

In case of high discharge temperature controller stops the compressor before permanent damage occurs. Depending on size of the dryer additional safety/protection devices (e.g. low pressure switch, high pressure switch) are installed in on the refrigerant gas circuit.

All of our dryers are equipped with good control mechanisms. This allows for a very stable dew point. From the smallest dryer sizes on we offer excellent communication possibilities. Larger dryers are equipped with more powerful controllers offering advanced control and monitoring features.

Technical data

TECHNICAL DATA									
Type	Air flow	Pressure	Power supply	Dimensions			Power input	Mass	Air connection
	Nm³/h	bar	Ph / V / Hz	W [mm]	L [mm]	H [mm]	W	kg	
RDT 20	20	16	1/230/50	352	485	499	0,160 / 0,135	25	G 3/8" BSP-F
RDT 35	35	16	1/230/50	352	485	499	0,170 / 0,135	25	G 3/8" BSP-F
RDT 50	50	16	1/230/50	352	485	499	0,20 / 0,18	26	G 3/4" BSP-F
RDT 75	75	16	1/230/50 - 230/60	352	485	499	0,40 / 0,25	27	G 3/4" BSP-F
RDT 100	100	16	1/230/50 - 230/60	352	485	499	0,45 / 0,32	32	G 3/4" BSP-F
RDT 140	140	16	1/230/50 - 230/60	356	552	684	0,50 / 0,38	50	G 1" BSP-F
RDT 180	180	16	1/230/50	356	552	684	0,60 / 0,45	52	G 1" BSP-F
RDT 235	235	16	1/230/50	356	552	684	0,73 / 0,60	56	G 1" BSP-F
RDT 300	300	16	1/230/50 - 230/60	495	589	827	1,20 / 0,95	84	G 1 1/4" BSP-F
RDT 380	380	16	1/230/50 - 230/60	495	589	827	1,40 / 1,08	90	G 1 1/4" BSP-F
RDT 480	480	16	1/230/50 - 230/60	495	589	827	1,45 / 1,20	99	G 1 1/2" BSP-F
RDT 600	600	16	1/230/50 - 230/60	491	708	973	1,50 / 1,25	110	G 2" BSP-F
RDT 750	750	16	3/400/50 - 440/60	491	708	973	2,2 / 1,6	120	G 2" BSP-F
RDT 950	950	16	3/400/50 - 440/60	491	708	973	2,7 / 2,1	150	G 2" BSP-F
RDT 1150	1.150	16	3/400/50 - 440/60	662	856	1.534	2,8 / 2,2	250	G 2 1/2" BSP-F
RDT 1300	1.300	16	3/400/50 - 440/60	662	856	1.534	3,2 / 2,6	280	G 2 1/2" BSP-F
RDT 1500	1.500	16	3/400/50 - 440/60	662	856	1.534	3,3 / 2,7	290	G 2 1/2" BSP-F
RDT 1900	1.900	16	3/400/50 - 440/60	662	856	1.534	4,2 / 4,0	310	G 2 1/2" BSP-F
RDT 2600	2.600	14	3/400/50	1.044	1.477	1.797	8,0 / 3,3	500	DN100
RDT 3400	3.400	14	3/400/50	1.044	1.477	1.797	12,0 / 4,9	550	DN100
RDT 4400	4.400	14	3/400/50	1.522	1.357	1.907	16,0 / 6,6	767	DN125
RDT 5400	5.400	14	3/400/50	1.628	1.455	1.907	18,0 / 8,1	787	DN125
RDT 6600	6.600	14	3/400/50	1.628	1.367	1.897	20,0 / 9,9	920	DN150
RDT 7200	7.200	14	3/400/50	1.603	1.944	1.864	23,0 / 10,6	1.200	DN150
RDT 8800	8.800	14	3/400/50	1.579	1.945	1.872	26,3 / 13,2	1.237	DN200
RDT 10800	10.800	14	3/400/50	1.579	1.945	1.872	30,6 / 16,2	1.350	DN200
RDT 13200	13.200	14	3/400/50	1.808	2.599	2.000	35,0 / 19,8	1.443	DN200

CORRECTION FACTOR FOR OPERATING PRESSURE CHANGES									
Operating pressure [bar]	4	5	6	7	8	10	12	14	16
Operating pressure [bar]	58	72	87	100	115	145	174	203	232
Correction factor	0,77	0,86	0,93	1,00	1,05	1,14	1,21	1,27	1,32

CORRECTION FACTOR FOR DEW POINT CHANGES				
Temperature [°C]	3	5	7	10
Temperature [°F]	37,4	41	44,6	50
Correction factor	1,00	1,099	1,209	1,385

CORRECTION FACTOR FOR INLET TEMPERATURE CHANGES							
Temperature [°C]	≤25	30	35	40	45	50	55
Temperature [°F]	77	86	95	104	113	122	131
Correction factor	1,2	1,12	1	0,83	0,69	0,59	0,5

CORRECTION FACTOR FOR AMBIENT TEMPERATURE CHANGES					
Temperature [°C]	≤25	30	35	40	45
Temperature [°F]	77	86	95	104	113
Correction factor	1	0,96	0,9	0,82	0,72

Data refer to the following nominal condition:
Ambient temperature of 25°C, with inlet air at 7 barg and 35°C and 3°C pressure Dew Point (-20,5°C atmospheric pressure Dew Point).

Max. working condition: Ambient temperature 45°C, inlet air temperature 55°C and inlet air pressure 14 barg.