

High Pressure Dryer HDK-MT 4/100-70/350



Operating Instructions

Revision 04-2014/EN

CE 0525

Declaration of Conformity

Parker Hannifin Manufacturing Germany GmbH & Co. KG Hiross Zander Division

Im Teelbruch 118

D – 45219 Essen Kettwig

hereby declares with sole responsibility, that the products

high pressure dryer

series HDK-MT 4/100 to 70/350

assembly type: assembly acc. to Art. 3 No. 2.2,

which this declaration refers to, conform to Directive **97/23/EG** and were subjected to a conformity assessment according to Annex III Modules B+D (for assembly assessment).

For the assembly, the EG type approval certificate DTM0506108 by Lloyd's Register Quality Assurance GmbH, Hamburg, is available.

The quality assurance system is monitored by the service provider stated below *Lloyd's Register Quality Assurance GmbH (identification number 0525) Am Sandtorkai 41, D - 20457 Hamburg.*

The assembly consists of pressure appliances according to the classification list (attached to the technical documentation provided by the manufacturer).

- The following standards / technical specifications were used:
- harmonized standards: DIN EN ISO 12100:2010, DIN EN 60204, DIN EN 61000-6-3, DIN EN 61000-6-4

The following other EG directives were used:

- 2004/108/EG
- 2006/95/EG

Essen,

19.08.2014

Datum / Date

i. V. Dr. Jürgen Timmler Leiter Technik und Entwicklung / Manager Engineering and Development

Machine passport

Type designation	HDK-MT
Order no.	
Project no.	
Build no.	
Vessel no.	
Vessel no.	
Year of manufacture	

It is the responsibility of the owner,

- to enter for the first time any appliance data not stated above,
- to keep these appliance data up to date.

The above-stated appliance data provide for a clear identification of the dryer and its components, and significantly facilitate any service measures.

Further important data on the dryer such as the details on the permissible operating pressure and the electrical connection are found on the type plate (for position of the type plate see page 9).

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General information

Manufacturer's details

Name and address



Parker Hannifin Manufacturing Germany GmbH & Co. KG Hiross Zander Division

Im Teelbruch 118 D-45219 Essen

Phone	++49 (0) 2054 934-0
Fax	++49 (0) 2054 934-164
Internet	www.parker.com/hzd
E-Mail	zander@parker.com

Details on the dryer

Standard equipment

Dryer, comprising

- 2 vessels, filled with desiccant
- 1 upstream filter
- 1 downstream filter
- 1 muffler
- Control system
- 1 upper and 1 lower valve block

Associated documents

- Operating instructions (present)
- Technical documentation (see annex)
- Circuit diagrams (see separate document)

Warranty notes

In the following cases, the warranty shall be void:

- If aggressive media in the compressed air and in the environment cause corrosion damage and functional faults on the dryer.
- If the dryer is used without prior approval and confirmation in writing by the manufacturer for purposes other than those specified in these operating instructions or contractually agreed.
- If preset parameters (e. g. on the control system etc.) are changed without prior approval and confirmation in writing by the manufacturer.
- If the dryer is transported or stored incorrectly.
- If the dryer is sited and installed incorrectly.
- If the dryer is repaired or maintained incorrectly.
- If the dryer is operated by personnel that does not have the requisite qualifications.
- If modifications are carried out on the dryer, the manufacturer did not approve that.

In the event of non-compliance the manufacturer will not accept any liability for any consequential damage whatsoever.

About these operating instructions

These operating instructions contain basic information on the safe use of the dryer.

Characters and symbols used

- Work steps that you have to carry out in the sequence stated are marked by black triangles.
- Lists are marked by a small box.

Note:

These notes provide you with hints and information on the safe and efficient handling of machines and devices.



Warning!

These safety notes warn against damage to property and help you to avoid such damage.



Danger!

These danger notes with a grey background warn against personal injury and/or danger to life and limb; danger notes help you to avoid serious or life-threatening situations for yourself and/or third parties.

Target group of these operating instructions

These operating instructions are intended for all persons working on and using the dryer. We assume that all such persons are specialist personnel, e.g. fitters or electricians.

Operating instructions: handling

These operating instructions must be continuously available at the site where the dryer is used. We recommend to prepare a copy and to keep the same in a safe and freely accessible place next to the dryer. Keep the original document in a safe place.

For your own safety

The dryer has been built in accordance with the state of the art and the recognized technical safety regulations. Nevertheless, there is a risk of personal injury and damage to property when the dryer is used, if

- it is operated by non-qualified personnel,
- not used within its intended design specifications,
- is repaired or maintained incorrectly.

Note:

For your own safety and to prevent machine damage, please note the information and safety notes in these operating instructions when working with the dryer.

Signs, instruction plates and danger zones at the dryer

Signs and instructions



Front view

Please note the above plates and instructions attached to the dryer. Ensure that they are not removed and are always readable.



Hazard areas on the dryer

Hazard area

Warning against hazardous electrical voltage

Different parts of the dryer carry electrical current. These parts may be connected, opened, and maintained by authorized specialist personnel only.

Warning against overpressure

The entire dryer is under pressure. Before commencing any work, the plant must be depressurised.

Warning against sudden air ejection

When the vessels are depressurised, air flows suddenly out of the sound absorber:

orber:

- This causes a loud expansion noise.
- Due to particles carried in the air flow, there is a very considerable risk of eye injury.

When working on the dryer, always wear eye and ear protection equipment.

Skid risk

When emptying and filling the vessels with drying agent, there is a risk of skidding caused by spilt drying agent.

Symbol in operating instructions









Intended use of the dryer

The dryer is exclusively intended for drying compressed air. Depending on defined input conditions, it dries compressed air for industrial use.

The dryer is designed for compressed air, which is free from aggressive water, oil, and solid matter constituents.

The dryer may be operated only in accordance with the data on the type plate and in accordance with the contractual conditions.

Suspected misuse

The dryer must not be misused as a climbing aid! Pipes, valves, and similar fittings have not been designed for such loads. They could fracture, tear off, or become damaged in another way.

General safety notes



For your own safety, when carrying out any work on the dryer comply with all applicable national safety regulations!

Personnel qualification

Only authorized and qualified specialist personnel may be tasked with the work on the dryer described in these operating instructions.

Conversions and modifications

Without prior approval by the manufacturer, no conversions and modifications must be made to the dryer! Any non-approved modifications may restrict the operational safety of the dryer and cause damage to property or personal injury.

Handling drying agents

The drying agents are perfectly safe when in an unused condition. However, when filling and emptying the vessels with drying agents, increased dust generation may occur. Please comply with the following instructions:

- When filling drying agents into the vessels, wear a dust mask and eye protection!
- If a spillage occurs, any spilt drying agent must be taken up immediately. There is a risk of skidding!

Safety notes on specific operating phases

Transportation and siting

- Only use suitable and technically perfect lifting gear with a sufficient carrying capacity.
- Carefully secure the dryer during transportation.

Start-up



Warning against sudden air ejection!

During expansion the pressure is released suddenly through the muffler:

A loud expansion noise is caused which may damage your hearing.
 Particles carried in the air can injure your eyes or skin

Particles carried in the air can injure your eyes or skin.

Always wear eye and ear protection, therefore, when you are in the vicinity of the dryer!



Hazard due to a sudden release of pressure!

Never remove any parts of the dryer, or manipulate the same in any way, for as long as the plant is still pressurised! A sudden escape of pressure may cause serious injuries. Before carrying out any work on the dryer, first depressurise the plant.

- Carry out all prescribed tests and checks.
- The factory settings on the control board in the switchbox must not be changed on any account without prior approval by the manufacturer.
- Before start-up, ensure that no tools or other foreign parts have been left lying in a part of the dryer where they might pose a hazard to the dryer being started up.

Emergency shutdown

In any emergency, proceed as described in the section on page 35.

Monitor operation



Warning against sudden air ejection!

During expansion the pressure is released suddenly through the muffler:

- A loud expansion noise is caused which may damage your hearing.
- Particles carried in the air flow act like bullets and can injure your eyes or skin.

Always wear eye and ear protection, therefore, when you are in the vicinity of the dryer!

- Only operate the dryer within the permissible limits (see type plate). By operating the dryer in conditions that go beyond the defined values, the dryer is subjected to loads for which it has not been designed. This may cause functional defects.
- The more powerful the dryer is, the more noise may be generated during operation. Therefore, the operator must provide suitable protective equipment (e. g. ear protection).
- Check the dryer regularly for externally visible damage and defects. Any changes, even in its operating behaviour, must be reported immediately to the competent office or person.
- In the event of an emergency or if a safety-relevant disruption occurs (e.g. escaping compressed air, defective component), the dryer must be shut down immediately as described in the section on page 35). The unit may only be restarted after all defects have been eliminated.

Maintenance of the dryer and fault removal



Hazard due to a sudden release of pressure!

Never remove any parts of the dryer, or manipulate the same in any way, for as long as the plant is still pressurised! A sudden escape of pressure may cause serious injuries.

Before carrying out any work on the dryer, first depressurise the plant.

- Carry out maintenance work only when the plant has been shut down and depressurised!
- The factory settings on the control board in the switchbox must not be changed on any account without prior approval by the manufacturer.
- Bolt connections must be undone with care! Note ram pressure values! Otherwise emerging media may cause personal injury.
- Never carry out any welding on a vessel or change the same in any other way!
- Never use pipes and fittings as steps or holding points! The components might fracture, or the distortions which occur may cause internal damage on the dryer. There is a risk of injury by slipping off the components, components breaking off, and expanding compressed air!
- Never leave tools, loose parts or cloths in, at or on the dryer.
- Following maintenance work always test all flange and bolt connections for leak tightness and secure seating.
- Only use replacement parts that are suitable for the relevant function and meet the technical requirements stipulated by the manufacturer. This is always the case, if you use original replacement parts only.

Disassembly and disposal



Hazard due to a sudden release of pressure!

Never remove any parts of the dryer, or manipulate the same in any way, for as long as the plant is still pressurised! A sudden escape of pressure may cause serious injuries. Before carrying out any work on the dryer, first depressurise the plant.

Dispose all parts of the dryer, the drying agent, and all other operating materials in an environmentally safe way and in accordance with all current statutory regulations. The waste code numbers of the drying agents can be obtained from the manufacturer (for the manufacturer's address see page 6).

Technical product description

Summary drawing



Function description

The dryer dries the compressed air supplied by the compressor and makes it available for industrial use. Upstream filters clean the compressed air and remove dust, dirt, oil, and water droplets, before the compressed air reaches the dryer. Thus, an upstream filter is also used for extending the service life of the drying agent. Downstream filters clean the compressed air from drying agent abrasions, before it is fed into the compressed air system.

The two vessels contain an extremely porous drying agent by means of which humidity is removed from the compressed air and stored just as in a sponge.

The stored humidity is then removed again from the drying agent and reintroduced into the ambient environment. To this end, the two vessels alternate between different operating modes. Whilst in one vessel, compressed air is dehumidified (adsorption), in the other vessel the humid drying agent is prepared for another charge (regeneration). These two states, which run in parallel during compressed air preparation, are described below.



Functional scheme

Adsorption

Damp and contaminated compressed air is firstly delivered by a compressor to the upstream filter where the water and oil content is removed. The filtered content is removed from the system by a condensation drain valve. The compressed air then flows through the adsorbing vessel which is under pressure from the bottom upwards. In the process the drying agent takes the moisture out of the air. The downstream filter at the exit to the dryer filters any remaining solids from the flow of compressed air. The dry compressed air is then supplied to the consumers via the network.

Regeneration (running in parallel to the adsorption)

At the same time the other vessel is prepared for a renewed take-up of humidity. This process is called regeneration. Dry compressed air is branched off before the exit to the network. A needle valve generates a partial current so that this regenerated gas flows through the vessel at ambient pressure. The moisture stored in the drying agent is taken by the current of air and let out into the air via the sound absorber.

Switchover

When the drying agent in the adsorbing vessel has taken up a sufficient level of humidity, then the switchover between the vessels will be effected between the vessels. Following switchover, the above-described process is repeated, with the adsorption and regeneration now taking place in the respective different vessel.

Available options

The following options are available for the dryer:

- Start-up device
- Auxiliary heater
- Bypass line
- Signalling contacts of control system
- Compressor synchronisation
- Dewpoint-sensing control
- Condensate drain pipe for preliminary and afterfilter

Pressure maintaining valve (also: start-up device)

A pressure maintaining valve is implemented downstream of the dryer. It ensures fast pressure build-up and prevents pressure spikes in the drying agent bed. This also prolongs the drying agent service life. A pressure maintaining valve must be installed. The operator can either purchase and have the pressure maintaining valve installed from the manufacturer or assign installation to an authorised fitter.

Auxiliary heater

For installation sites with temperatures under +1 $^{\circ}$ C (33,8 $^{\circ}$ F), the wet side of the dryer must be equipped with an auxiliary heater to prevent valves, cocks, flaps, and other components from freezing up.

Bypass line

The bypass line is a "detour line", which allows the compressed air system to continue operating even whilst maintenance of the dryer is in progress. However, during this time the air is not dried but flows through the bypass line past the dryer and through to the actual loads. Filters in the bypass line are meaningful so that the actual loads are largely protected against dirt, water, and oil droplets even whilst maintenance is in progress.

Signalling contacts of the control system

The control system is equipped with a digital input for the synchronised operation with a compressor. This feature allows for synchronised and thus efficient dryer operation with discontinuous compressor operation. The control system can also be equipped with an optional operation signalling contact with which the dryer operation can be monitored from an external device.

Compressor synchronisation

Compressor synchronisation helps reduce energy costs, as the dryer can be operated independently of the compressor. When the compressor is switched off, the regeneration gas return ensures that regeneration is continued, as soon as a certain compressed air volume is reached behind the dryer. The regeneration process must be continued and ended so that the drying agent does not become unusable prematurely.

The compressor synchronisation controller is a higher-level controller than the pressure dew point controller (see below). When both options are in place, the compressor synchronisation controller is treated as the prime controller.

Dewpoint-sensing control

With a dewpoint-sensing control system, you can operate the dryer in fixed or variable cycles. In the fixed cycle, switchover is effected after a fixed time period (usually after 10 minutes). In the variable cycle, the switchover is effected in relation to the dew point reached and the charging of the drying agent. The adsorption time in the variable cycle is preset to 60 minutes.

Condensate drain systems for preliminary and afterfilter

Condensate drain systems are installed to drain water that has collected in the preliminary or afterfilter from the filter. There are two distinct types of condensate drain system, namely level-controlled systems and time-controlled systems.

Transportation, installation and storage



Danger due to incorrect transportation!

The dryer must be transported by authorized and qualified specialist personnel only. During transportation all applicable national regulations for accident prevention must be complied with. Otherwise there is a risk of personal injury.

- Only use suitable and technically perfect lifting gear with a sufficient carrying capacity.
- During transportation the dryer must be carefully secured against falling over.

The manufacturer will not be liable for any damage caused by incorrect storage or incorrect transportation. Please note therefore the following instructions as well as the storage instructions on page 20.

Information on transportation packaging

Depending on the type of transportation, the dryer is delivered in different types of packaging:

- All transportation types: the apertures of the dryer are closed off by means of plugs.
- In addition, when transportation is effected by air: the dryer is packaged in a wooden box.
- In addition, when transportation is effected by ship: the dryer is packaged in a film material and in a wooden box.

If the packaging is undamaged

► The undamaged packaging should be removed only at the final installation site, as it offers protection against any weather influences.

What to do in the case of transport damage occurring?

- Check whether only the packaging or the dryer itself were damaged.
- ► Inform the haulier immediately in writing of any damages.
- Contact the manufacturer urgently in order to report the damage. You will find the telephone number on page 6.



Warning!

A damaged dryer must not be taken into operation! Damaged components may lead to functional faults and possibly cause further damage.

Transporting and installing the dryer

Requirements for the installation site

The conditions at the installation site have a large influence on the functional capability of the dryer and the service life of the drying agent. In order to ensure a mode of operation, which is as continuous as possible, and low maintenance, the installation site must meet the following requirements:

- The installation site must be located within a building protected against humidity.
- The ambient temperature must not drop below +1 °C (33,8 °F). If necessary, an auxiliary heater is to be provided (for information on the auxiliary heater, see page 16).
- When selecting the installation site, the noise emission of the dryer should be taken into account (for further information on the noise emission, see also page 49).
- The installation area must be level, firm and free of vibrations. It must have the necessary carrying capacity for the weight of the dryer. The weight of the dryer is specified in the technical data section of the annex.
- The dryer should be installed with sufficient spacing at the top, sides, and rear, in order to be able to carry out maintenance work and change the drying agent without any hindrances (see figure).



Necessary spacing at the top and sides = min. 1 m

If in doubt, the installation site must be inspected by specialists. If you have any queries in this regard, please contact the manufacturer (for details see page 6).

Transportation using lifting or forklift trucks



Warning against damage to property!

The dryer is delivered lying flat on a pallet. Always transport the dryer when it is lying on the pallet using a pallet truck or fork-lift truck.

- Secure the dryer on the lifting or forklift truck against sliding movements.
- ► Transport the dryer to its installation site.

Installing and anchoring

Installing

- Remove the packaging of the dryer.
- Screw the enclosed ring bolts into the drilled holes on the upper valve block.
- Attach suitable lifting gear to the ring bolts.
- Place the dryer at its installation site.



Transport by crane

Anchoring the dryer

The upright stand profiles of the dryer are provided with four pre-drilled anchorage bores.

- Use suitable attachment material to anchor the dryer to the floor (see figure).
- In the case of vibrating floors: place the dryer on suitable vibration dampers.



Bores at the foot of the dryer

Storing the dryer

If the dryer is to be stored for an extended period of time, the storage location must meet the following conditions:

- The dryer must not be stored in the open air.
- The storage room must be dry.
- The storage room must be free from dust or the dryer must be covered by a protective sheet.
- The storage room must have an ambient temperature of at least +1 °C (33,8 °F).

In order to store the dryer proceed as follows:

- Take dryer out of operation as described on page 35.
- Ensure that the compressed air inlet valve installed by the owner, and the installed compressed air outlet valve installed by the owner, are both closed, and that the dryer is depressurised.
- Disconnect dryer from the compressed air system.
- ▶ Disconnect the dryer from the electrical power supply and all external lines.
- Use film material or similar to close the compressed air inlet apertures and compressed air outlet apertures on the dryer in order to protect them against contamination.
- ► If possible cover dryer with a protective sheet.

The dryer can now be stored for long periods.

Note:

If you wish to take the dryer back into service after an extended period of storage, please proceed as described for its first commissioning and start-up (see page 31).

Store drying agents

- ▶ Do not store drying agents in the open air.
- Protect drying agents against humidity.

Installation



Only authorized and qualified specialist personnel may carry out work on pipes and electrical systems.

As soon as the dryer has been set up at its installation location, you can install the compressed air infeed and outlet lines make the electrical connections.

Preconditions for installation

For a correct installation the following preconditions must be met on the part of the owner.

- Connections and lines for the infeed and outfeed of compressed air must be provided.
- A compressed air inlet valve as well as a compressed air outlet valve must be installed by the owner, so that the dryer can be installed and maintained in a depressurised condition (see also the installation example on page 23).
- A pressure maintaining valve must be installed downstream of the dryer (see also page 16). Adjust the pressure maintaining valve to 10–15 bar below operating pressure.
- Make sure the following minimum input pressures are permanently applied to the dryer:
 - HDK-MT of pressure level 100 bar: at least 50 bar
 - HDK-MT of pressure level 250 bar and 350 bar: at least 100 bar
- All pipes, couplings, and connections must have the correct diameter and match the operating pressure.



Hazard caused by exceeding the limit values!

A safety device must be provided in order to protect against the maximum permissible operating pressure from being exceeded.

The safety device must be installed so that the dryer is reliably protected from exceeding the maximum permitted operating pressure even when the temperature of the compressed gas increases.

The data required to meet these preconditions are contained in the technical documentation attached in the annex.



Warning!

If the above preconditions are not complied with, a safe operation of the dryer cannot be assured. Also, the functionality of the dryer may be detrimentally affected.

Connect piping

In order to ensure that the dryer operates optimally, the dryer must be assembled into the compressed air system free of all stresses.

- Ensure before connection that all infeed and outfeed compressed air lines and valves are clean and undamaged.
- Check the bolt connections and retighten if necessary, as they could have worked loose during transportation.
- Remove plugs on the pressure inlet and outlet.



All piping must be free from any stress and tension whatever! Pipes subject to stress may burst due to the load placed on them during operation. This may cause damage to property and personal injury.

▶ Use steel pipes to connect the dryer to the compressed air system.

The following figure shows an installation example.



Example of an installation with bypass line

- The connection lines for the upstream filter (3) are to be installed at a slight incline in the direction of the upstream filter.
- One shutdown valve each (2, 6) is to be installed at the compressed air inlet and outlet ends of the dryer.
- ► A pressure maintaining valve must be installed upstream of the dryer. Adjust the pressure maintaining valve to 10–15 bar below operating pressure.

Installing the electrical connection



Warning against electrical voltage

Only qualified specialist personnel may carry out work on the electrical system!

Installing the supply cable

The components of the dryer have been connected to the control cabinet at the factory. You only need to connect the control cabinet to the electrical supply cable.

The switchbox is provided with a connector where electrical power must be connected.

- Ensure that the cross-section of the electrical supply cable corresponds to the power rating of the dryer and the electrical voltage provided by the customer.
- ▶ Make the electrical supply cable to the dryer voltage-free.
- ► Secure the electrical supply cable to the dryer against switch-on.
- Undo bolt (1) on the connector and withdraw connector with seal from the switchbox.
- Use a suitable tool to remove the terminal block from the connection box.
- Undo the PG union and pull the cable through the aperture (3). The exposed phase ends should not be longer than 35 mm max.



- Now make the cable connection as follows:
 - Earth to terminal PE
 - L1 to terminal 1
 - N to terminal 2

Terminal 3 is not used.

- Fit terminal block into the connector and use bolt to remount the connector with seal on the switchbox.
- In all phases the dryer must be protected against short circuits by means of fuses.
- ► In order to relief cable strain, re-tighten the PG union.

adapter

Connecting the external signalling lines

For compressor synchronisation

The controller is fitted as standard with a digital input which makes the dryer regeneration dependent on operation of the compressor (switch S1 on the controller's circuit board, see also figure below).

If switch S1 is in the ON position, operation of the compressor and dryer regeneration run synchronously: When the compressor is stopped, the dryer regeneration also stops. When the compressor is restarted, regeneration also restarts.

If switch S1 is in the OFF position, any regeneration process which has been started, is always continued until completed.



To install the external line, proceed as follows:

Connect the signalling line to the potential-free busbar connection of the compressor to terminals 1 and 2 on the control board (see circuit diagram).

Check bolt connections

Before the initial start-up:

Check all unions and bolt connections as well as the terminals in the control cabinet for secure seating; re-tighten if necessary.

Start-up

Note:

You can order the initial commissioning and start-up from the manufacturer and have your personnel trained by the manufacturer. For telephone number, see page 6.

- Carry out all prescribed tests and checks.
- Before start-up, ensure that no tools or other foreign parts have been left lying in a part of the dryer where they might pose a hazard to the dryer being started up.

Requirements for initial start-up

For the first start-up the following preconditions must have been met:

- The pipe system is free from contaminations.
- All shutdown valves of the compressed air inlet and outlet valves installed by the owner are closed.
- The dryer is correctly sited and installed.

Checks before start-up

Ensure that

- all pipe, cable and bolt connections on the dryer have been retightened,
- no pipes chafe against body edges,
- all mountings are perfectly secure,
- the electrical connections are in safe contact and in good condition,
- owner-end and pressurised parts such as safety valves or other devices are not blocked up by dirt or paint,
- all compressed air system parts which are pressurised (valves, hoses etc.) are free from wear symptoms and defects.

Setting times of the operating phases

In its standard version the dryer is delivered with a time-dependent control system. The phase sequence occurs in a fixed cycle.

With the optional dewpoint-sensing control, the dryer can also be operated at variable cycles (depending on the dewpoint).

The following table provides information on the duration of the individual phases.

Phase duration	Fixed cycle Variable cycle		le cycle	
Adsorption	10	min	60	min, maximum
Regeneration, total	10	min	10	min
 of which: expansion time 	~ 0.2	min	~ 0.2	min
- of which: dehumidification time	~ 8	min	~ 8	min
 of which: pressure build-up 	~ 2	min	~ 2	min
Standby			~ 50	min, maximum

Overview of operating and control elements

ON/OFF switch

The ON/OFF switch (2) is located to the side of the control cabinet and above the mains plug (1, see figure):

- If it is set to 0, the power supply is disconnected and the dryer is switched off. The main and expansion valves are normally closed. This ensures that the main flow direction is blocked when the dryer is switched off.
- If the switch is set to I, the dryer is switched on and begins to operate in fixed cycle mode (i.e. time-controlled).
- If the switch is set to position II, the dryer is switched on and begins to operate
 - with compressor synchronisation
 - in variable cycle mode (i.e. dew-pointcontrolled).

Position **II** is only relevant for operation with the optional *compressor synchronisation* and/or *dewpoint-sensing control*.



Control cabinet with ON/OFF switch

Display panel

The display panel at the switchbox is equipped with LEDs (light emitting diodes) and a digital display, indicating the operating status of the dryer:



Display panel at the switchbox

LED Power (1)

LED is on when dryer is switched on.

Flow diagram (2)

The current operating phases of the dryer are indicated by means of 4 LEDs:



Depending on the operating phase, the following LEDs might be on simultaneously:

Adsorption B1 and regeneration B2 or regeneration B1 and adsorption B2.

Digital display (3)

The digital display shows the individual programme steps and the respective remaining time. For details regarding the sequence of the individual processing steps and their duration, please refer to the logic control diagram, page 52.

Dis	play	Explanation
2	215	Default display: The figure to the left indicates the current processing step; the figure to the right shows the remaining time in seconds. In this example, step 2 is being completed, whereby there are 215 seconds remaining.
SE	Er.	After 8000 operating hours, " <i>SEr.</i> " (service) is displayed for periods of 1 minute, alternating with the default display. Notify the service personnel of the manufacturer, as a routine service is now due.
-:	25	With the <i>dewpoint-sensing control</i> option, the display shows the currently measured dewpoint instead of the default data. The range of display is -100 °C (-148 °F) to +20 °C (68 °F). If the measured dewpoint exceeds the preset alarm limit (5 °C (41 °F) above the switchover value), the displayed dewpoint value is flashing.

With the optional *dewpoint-sensing control*, the following error messages might be displayed:

Display	Cause
+20	Upper measuring range limit exceeded
999	Dewpoint sensor defective
sens	Dewpoint sensor not powered
or	Cable defective or disconnected
-999	Sensor defective

LED Economy cycle (4)

This LED is only relevant in units that are equipped with the optional *dewpoint-sensing control*. The diode lights up when the dryer is switched on and in the standby phase and no regeneration air is required.

Pressure gauges

Pressure gauges are assigned to both vessels and show the operating overpressure. The operating overpressure indicates the operating phase of the relevant vessel:

- During adsorption the pressure gauge should indicate the nominal operating overpressure.
- During regeneration the indication of the pressure gauge on the regenerating vessel
 - should decrease in the expansion phase from operating overpressure to 0 bar overpressure,
 - indicate an overpressure of 0 bar in the dehumidification phase.

If the overpressure does not drop to 0 bar after a vessel has been depressurised, the vessel contains residual pressure, or "back pressure". Back pressure can also cause an increase in noise on the sound absorber.

Emergency shutdown

In the event of an emergency, shut down the dryer as described on page 35.

Start up dryer



Warning against sudden air ejection!

During expansion the pressure is released suddenly through the muffler:

- A loud expansion noise is caused which may damage your hearing.
- Particles carried in the air flow act like bullets and can injure your eyes or skin.

Always wear eye and ear protection, therefore, when you are in the vicinity of the dryer!



Hazard due to a sudden release of pressure!

Never remove any parts of the dryer, or manipulate the same in any way, for as long as the plant is still pressurised! A sudden escape of pressure may cause serious injuries.

Before carrying out any work on the dryer, first depressurise the plant.

- The more powerful the dryer is, the more noise may be generated during operation. Therefore, the operator must provide suitable protective equipment (e. g. ear protection).
- Only operate the dryer within the permissible limits. By operating the dryer in conditions for which it has not been designed, functional faults may be caused.
- Depending on the size of the dryer and the compressed air network and the respective legal requirements in your country, it may be necessary to perform initialisation according to the directive for pressure equipment 97/23/EC.
- Check the dryer regularly for externally visible damage and defects. Any changes, even in its operating behaviour, must be reported immediately to the competent office or person.
- In the event of an emergency or if a safety-relevant disruption occurs (e.g. escaping compressed air, defective component), the dryer must be shut down immediately as described in the section on page 35). The unit may only be restarted after all defects have been eliminated.

Open compressed air supply and switch on dryer

For start-up, please proceed in the sequence shown here.

- Ensure that the compressed air inlet and outlet valves installed by the owner are closed (see installation example on page 23).
- Ensure that the compressed air system upstream of the dryer is pressurised. If necessary, pressurise (switch on compressor).



Slowly open compressed air inlet valve!

Avoid sudden pressure build-up in any circumstance! If pressure builds up too fast, this may cause damage to the dryer. Therefore, the compressed air inlet valve must always be opened quite slowly!

- Slowly open the compressed air inlet valve, installed by the owner, upstream of the dryer.
- Switch on dryer: to this end, set the ON/OFF switch to I.



ON/OFF switch

If the dryer is taken into operation for the first time, or after a change of drying agent, the following intermediate step is meaningful. In the case of a restart situation, the following intermediate step can be skipped.

Operating the dryer for the first time (or after a change of drying agent) separately Depending on the transportation and storage conditions, the drying agent in the vessels can already be loaded with humidity from the environment. At each first start-up it makes sense therefore to operate the dryer from some time separately from the compressed air system. This causes the drying agent in each vessel to be regenerated repeatedly and thus to be prepared optimally for the take-up of humidity.

Note:

Depending on the pressure dew point to be achieved, we recommend to operate the dryer at first start-up without compressed air consumption:

- for at least 4 hours at a pressure dew point of -25 to -40 °C or
- for approx. 3 to 5 days at a pressure dew point of -70 °C.

If you wish to take the dryer into operation in accordance with our recommendation, proceed as follows:

- Ensure that the compressed air outlet valve installed by the owner is closed.
- Keep the compressed air outlet valve closed for the time period recommended above.

Then the dryer can be taken into service in the compressed air system as described in the following section:

Operate dryer immediately in the compressed air system

Ensure that the compressed air system downstream of the dryer is pressurised or that a start-up device (option, see page 16) was installed into the compressed air system directly downstream of the dryer. The importance of this increases with the size of the compressed air system downstream of the dryer. Smaller compressed air systems can be pressurised also by means of compressed air fed through the dryer.



Slowly open compressed air outlet valve!

Avoid a sudden drop in pressure in any circumstance! If pressure drops too fast, this may cause damage to the dryer. Therefore, the compressed air outlet valve must always be opened quite slowly!

Slowly open the compressed air outlet valve installed by the owner. Observe the vessel pressure gauge of the pressurised vessel. The pressure should not drop below the operating pressure (if poss.). If necessary, keep the compressed air outlet valve in a slightly open position until the compressed air system downstream of the dryer has filled up completely; only then should the valve be opened fully.

The dryer has then be taken into operation within the compressed air system.

In the event of a fault

In the event of an emergency or if a safety-relevant disruption occurs (e.g. escaping compressed air, defective component), the dryer must be shut down immediately as described in the section on page 35). Then proceed as follows:

Remedy fault

- Look up possible cause of the fault, and how to remedy the same, in the table on page 42.
- Remedy fault.
- ► Repeat the start-up procedure.

Changing cycle mode (optional)

When can I change cycle mode?

If the dryer has been successfully commissioned and is equipped with one of the following options:

- compressor synchronisation or
- dewpoint-sensing control

it can be set to economy cycle mode.

When should I change cycle mode?

Cycle changes should be made during the pressure build-up phase and prior to switchover; during this phase, the pressure in both vessels is just below operating pressure so that a fast pressure build-up is prevented when the vessels are switched. During this period, only the adsorption LED is on in the diagram, and the digital display shows step 4 or step 9 for the duration of 1 minute (see logic control diagram; not displayed with dewpoint sensing).

Which cycle modes can I choose?

If the dryer is connected to a *compressor synchronisation system* and is equipped with the *dewpoint-sensing control* option, these two optional devices can only started together. The compressor synchronisation has thereby precedence over the dewpoint-sensing control.

Compressor synchronisation (optional)

If compressor synchronisation is enabled, the dryer can only be operated in conjunction with the compressor. As soon as the compressor is switched off, the dryer is automatically set to standby mode.

In standby mode, the control system remains on, and the dryer is ready for the next switchover, which is made as soon as the compressor is switched on.

With dewpoint-sensing control (optional)

Dryers equipped with dewpoint-sensing control operated in variable cycle mode, based on the measured dewpoint of the dried air at the compressed air outlet. As soon as a certain dewpoint is reached, as the drying agent in the absorbing vessel is saturated, the vessels are switched.

The dewpoint at which a switchover is made is preset at the factory.

How do I change cycle mode?

 Wait until the dryer has reached the pressure build-up phase (phase prior to switchover).

One LED for Adsorption B1/B2 is on in the flow diagram.

Set the ON/OFF switch to position II.



ON/OFF switch

The programme continues the cycle.

Monitoring dryer operation

The dryer operates fully automatically. However, you should carry out the regular checks described in the Chapter *Maintenance and repair of the dryer*.



Warning against sudden air ejection!

During expansion the pressure is released suddenly through the muffler:

- A loud expansion noise is caused which may damage your hearing.
- Particles carried in the air flow act like bullets and can injure your eyes or skin.

Always wear eye and ear protection, therefore, when you are in the vicinity of the dryer!

With dewpoint-sensing control (optional)

Display of dewpoint

If the dryer is equipped with a dewpoint-sensing control system, the digital display at the front of the switchbox shows the currently measured dewpoint. The range of display is -100 °C (-148 °F) to +20 °C (68 °F).

If the set dewpoint is exceeded, the system automatically completes a switchover between the vessels. The dewpoint at which a switchover is made is preset at the factory.

 After commissioning or extensive maintenance work, check the dewpoint display at the dryer.

Under certain circumstances, the desired dewpoint is only reached after prolonged operation.

Error messages

If the measured dewpoint exceeds the preset alarm limit (5 °C (41 °F) above the switchover value), the displayed dewpoint value is flashing. Error codes and their causes:

Display	Cause
+20	Upper measuring range limit exceeded
999	Dewpoint sensor defective
sens or –999	Dewpoint sensor not poweredCable defectiveSensor defective
SEr.	After 8000 operating hours, " <i>SEr.</i> " (service) is displayed for periods of 1 minute, alternating with the default display. Notify the service personnel of the manufacturer, as a routine service is now due.

For instructions on how to eliminate faults, see chapter *Identify and eliminate faults*

Shutdown and restart dryer

In the following cases, the dryer must be fully shut down and depressurised:

- In the event of an emergency or malfunction
- For maintenance work
- For dismantling



Risk of injury from escaping compressed air!

Never remove any parts of the dryer, or manipulate the same in any way, as long as the unit is pressurised! Suddenly escaping compressed air might cause serious injuries. Prior to any work, release all pressure from the unit.

Note:

If the unit is equipped with a compressor synchronisation system, first switch off the compressor and then wait until the dryer has reached the standby phase before switching it off with the ON/OFF switch. This ensures that the regeneration cycle is completed, and that the pressure in both vessels is at the same level. As soon as the dryer is switched on again, the programme continues the cycle from the point at which it has been stopped.

Emergency shutdown

In any emergency proceed as described in the next section.

Depressurising and shutting down the dryer

In order to make the dryer safe, follow the instructions in the next three sections:

Disconnect dryer from compressed air system

- Close the compressed air outlet valve (provided by operator).
- Close the compressed air inlet valve (provided by operator).

Depressurise dryer

- Leave the dryer on until the expansion phase in both vessels has been completed.
- During the expansion phase, the vessels are completely depressurised.
- Check the pressure in the dryer at both vessel pressure gauges. The pressure gauges should show value "0".

Disconnect voltage supply

Switch off the dryer by setting the ON/OFF switch to position 0.



ON/OFF switch

If work is to be carried out on the electrical system

 Depressurise and shut down the dryer, following the instructions in the above chapter.



Risk of injury due to voltage-carrying parts!

The electrical supply cable and external power lines are live even after the dryer is switched off and, in the event of body contact, may cause serious injury! Before carrying out any work on the electrical system, the electrical supply cable and all external power lines must be made voltage-free!

- ► Make the electrical supply cable to the dryer voltage-free.
- Secure the electrical supply cable to the dryer against switch-on.

Restart

Depending on the fittings installed by the operator and the actual pressure conditions, the unit might have to be restarted at operating pressure. The following general rules apply:

- When switched off, the dryer is blocked in the main flow direction.
- The pressure in the vessel drops (provided that the compressed air outlet valve provided by the operator is opened), if compressed air can escape to the compressed air system and the dewpoint-sensing control is implemented.

If compressed air system and dryer have remained at operating pressure

- Ensure that the compressed air inlet valve (provided by the operator) is open.
- Set ON/OFF switch to I. The programme continues the cycle from the point at which it was interrupted.



ON/OFF switch



Slowly open compressed air outlet valve!

Avoid a sudden drop in pressure in any circumstance! If pressure drops too fast, this may cause damage to the dryer. Therefore, the compressed air outlet valve must always be opened quite slowly!

Slowly open the compressed air outlet valve installed by the owner. Observe the vessel pressure gauge of the pressurised vessel. The pressure should not drop below the operating pressure (if poss.). If necessary, keep the compressed air outlet valve in a slightly open position until the compressed air system downstream of the dryer has filled up completely; only then should the valve be opened fully.

The dryer is now in operation again and operates fully automatically.

If compressed air system and dryer have not remained at operating pressure

- ▶ If disconnected, reconnect the voltage supply of the dryer.
- Pressurise and switch on the dryer as described in the section Open compressed air supply and switch on dryer on page 31.

The dryer is now in operation again and operates fully automatically.

Maintenance and repair of the dryer

In order to allow maintenance work on the dryer to be carried out efficiently and without danger for maintenance personnel, you should comply with the following instructions.

Notes on maintenance



Warning!

Maintenance tasks may be carried out only by authorized and qualified specialist personnel, and only with the plant in a switched off and depressurised condition.



Danger!

There is a very considerable risk of personal injury, when carrying out work on the activated and pressurised dryer.

Before commencing any maintenance tasks always shut down the dryer as described on page 35!

Note:

According to national regulations an inspection of the pressure vessel could be required periodically by an independent monitoring body.

- Carry out all maintenance work only when the plant has been shut down and depressurised!
- Bolt connections must be undone with care! Note ram pressure values! Otherwise emerging media may cause personal injury.
- Do not modify the factory settings of the control system in any way without prior consultation with the manufacturer.
- Never carry out welding work on a vessel or modify the same in any way!
- Following maintenance work, always check all flange and bolt connections for leakage and secure seating.
- Never use pipes and fittings as steps or holding points! The components might fracture, or the distortions which occur may cause internal damage on the dryer. There is a risk of injury by slipping off the components, components breaking off, and expanding compressed air!
- Never leave tools, loose parts or cloths in, at or on the dryer.
- Only use replacement parts that are suitable for the relevant function and meet the technical requirements stipulated by the manufacturer. This is always the case, if you use original replacement parts only.

Regular maintenance intervals

The table provides an overview of the maintenance work to be carried out. The following pages describe some of these tasks. Maintenance work requiring the dryer to be largely disassembled is not described. We recommend to have this work to be performed by authorised specialists.

			Maintenance interval				
Component	Maintenance tasks to be carried out	weekly	12 months	24 months	see page		
Complete dryer	Carry out visual and function checks.	•			40		
Pressure gauge	If the display does not drop to 0 bar after regeneration of a vessel. – Check muffler.	•			40		
Muffler	Renew muffler.		•		40		
Dew point sensor (with optional dew point sensing-control)	Renew.		•		41		
Pilot valves	Renew.			•	41		
Main valves	Renew.		•		41		
Solids filters in the vessels, seals, drying agent	Renew.			•	41		
Upstream and downstream filter	With the <i>differential pressure gauge</i> option: Check differential pressure on the upstream and downstream filters.	•			39		
	Please see the enclosed operating instruction filters. Maintenance work has to be carried or document.	ns for ut as s	the at specifi	tacheo ed in t	l his		
Nete							

Note:

In order to ensure perfect maintenance and reliable operation we recommend that you conclude a maintenance contract (telephone number see page 6). When carrying out any maintenance work, comply with the following safety instructions:



Danger!

There is a very considerable risk of personal injury, when carrying out work on the activated and pressurised dryer.

Before commencing any maintenance tasks always shut down the dryer as described on page 35!



Warning against electrical voltage!

Only qualified specialist personnel may carry out work on the electrical system!

Instructions for use of the dongle

If the message *SEr.* is displayed on the display of the Multitronic controller, the dryer is due for servicing. The message appears, flashing every 60 seconds, once the preset number of operating hours (e. g. 8000 oh) has been reached. After maintenance has been carried out, you can use the dongle to reset the counter to 0 and delete the message from the display. A dongle is enclosed with every service kit. Each dongle can only be used once.

- Switch off the controller. Caution! The electric line is still live. Do not touch live parts!
- Open the lid to the Multitronic controller. The circuit board in housed underneath it.
- ► Slot the dongle into the dongle interface X9 PC.
- Press and hold the reset key S3.

Switch on the controller. The following appears in the display:	for a short time then flashing	0.SET OFF
The service counter is then reset to 0.		
If the following appears in the display:	for a short time then flashing	FAIL OFF

this means that the dongle has already been used once and cannot be used again.

- Switch off the controller again and remove the dongle.
- ► Dispose of the unusable dongle and use a new one.

Carrying out weekly visual checks

Clean dryer

- Remove any loose dust by means of a dry cloth, and, if required, also by means of a moist and well wrung cloth.
- Clean the surfaces with a moist well wrung cloth.

Carry out visual and function check on the complete dryer

- Check dryer for external damage or unusual noise generation.
- ► Duly eliminate any defects found.
- If message **SEr.** is displayed, a routine service must be completed:
- Contact the service department of the manufacturer.

Checking back pressure

If the overpressure does not drop to 0 bar after a vessel has been depressurised, e.g. after the expansion phase, the vessel contains residual pressure, or "back pressure". Back pressure can be caused by a jammed silencer.

► After expansion, check the vessel pressure gauge to establish whether the overpressure has dropped to 0 bar.

If not, inform a service technician and check and replace the silencer as necessary.

Check differential pressure on the filters (with differential pressure gauge option)

• Check the differential pressure on the pressure gauge of the filter.

The differential pressure should be 0.6-0.8 bar max. If the differential pressure exceeds 0.6-0.8 bar, we recommend that you replace the filter element (see page 40). The filter elements must be replaced in any case every year.

Maintenance work to be completed every 12 months

Renew filter elements on the filters

The filter elements must be replaced if the differential pressure is more than 0.6-0.8 bar or at the latest, after 1 year of operation.

Renew muffler

The dryer is equipped with a muffler. If the muffler becomes blocked, a dam pressure is generated which in extreme cases may cause the muffler to burst. Back pressure can also cause an increase in noise on the sound absorber.



Hazard caused by blocked muffler!

Blocked mufflers can cause a dangerous overpressure to build up which may cause the mufflers to burst. Flying fragments may cause personal injury and damage to property. Therefore, the mufflers must be replaced every 12 months and after each change of desiccant.



Warning against sudden air ejection!

During expansion the pressure is released suddenly through the muffler:

- A loud expansion noise is caused which may damage your hearing.
- Particles carried in the air flow act like bullets and can injure your eyes or skin.

Always wear eye and ear protection, therefore, when you are in the vicinity of the dryer!

Renew dewpoint sensor

In order to ensure accurate dewpoint measuring, we recommend renew the dewpoint sensor annually.



Dewpoint sensor



Warning!

The dew point sensor is a sensitive measuring device. It can be damaged if subjected to forceful vibrations or shocks. Therefore, please handle the dew point sensor with great care at all times.

In order to limit the impact on the dryer operation to a minimum, we recommend that you contact the manufacturer well in advance.

Replacing main valves

Main valves are expendable parts and should be replaced every 12 months as a precautionary measure.

Maintenance work to be completed every 24 months

Replacing pilot valves

Pilot valves are expendable parts and should be replaced every 24 months as a precautionary measure.

Replacing drying agent, seals and solid filters



Risk of skidding!

If drying agent has been spilt on the floor, there is a risk of skidding caused by the drying agent beads.

The service life of the drying agent is usually approx. 2 years. However, in favourable installation conditions, the change of drying agent may be carried out at a later date (for notes on the installation site, see also page 19). The change interval depends very significantly from the degree of contamination in the compressed air (or the quality of the compressed air upstream filters). Oil, dust, and dirt particles cover the drying agent surface and reduce its effective surface, in part quite irreversibly. If in doubt, have a sample of your drying agent assessed by specialists. The seals and solid filters in the vessels should also be replaced together with the drying agent.

Identify and eliminate faults

The following table provides information on what designatory abbreviations are to be used for the various components. These designations are also found in the technical documentation.

Used abbreviation	Component
PI	Pressure gauge
Y1–Y2	Main valves (Solenoid valves)
Y3–Y4	Expansion valve (Solenoid valves)
Y5	Pressure build-up valve (Solenoid valve)
V1–V4	Check valves

Summary of faults

There are different fault types. In the case of most electrical faults (e. g. short circuit, defective fuse etc.) the expansion valves Y3/Y4 close and the program stopps. In the case of some process faults, the dryer will continue to operate for some time. Faults on the dryer become noticeable e.g. due to unusual noises and dam pressures.

The following table shows who is allowed to remedy a fault: the owner's specialist personnel or the manufacturer's service engineer.

Table of possible faults

Certain faults must be due to valves that are not properly opened/closed. For measures to be taken in such cases, please refer to the bottom of the table.

Fault	Possible cause	Remedy	Specialised personnel	Service technician
Dewpoint is not	Operating pressure too low	Increase operating pressure	•	
reached	Excessive differential pressure at upstream filter	Check differential pressure at the upstream filter; replace filter element, if necessary.	•	•
	Compressed air volume flow too high	Reduce compressed air volume flow.	•	
	Inlet temperature of compressed air too high	Reduce inlet temperature of compressed air or install preliminary compressed air cooler.	•	•
	Condensate trap (optional) at the upstream filter is not working properly	Check condensate trap (optional); clean or replace, if necessary.	•	•
	Drying agent contaminated or out of date	Inspect upstream filter for contamination; replace filter element, if necessary.	•	•
		Inspect drying agent for contamination; replace, if necessary.	•	•
	Sensor defective	Replace the sensor.		•
	Control board defective	Check fuses (switchbox, supply line); replace board, if necessary.		•

Fault	Possible cause	Remedy	Specialised personnel	Service technician
	Insufficient regeneration gas	Check function of valve Y3/Y4 and muffler; replace filter element of muffler, if necessary.	•	•
Pressure in vessel too low	Excessive differential pressure at upstream filter	Check differential pressure at the upstream filter; replace filter element, if necessary.	•	
Backpressure during regeneration	Muffler contaminated	Check muffler for contamination; clean or replace, if necessary.	•	•
too high	Valve Y3/Y4 does not open properly	see *		
	Solid filter soiled.	Clean or replace the solid filter.	•	•
No pressure build- up	o pressure build- p Compressed pressure system upstream from the dryer is not pressurised Check whether the compressed pressure system upstream from the dryer is pressurised. Eliminate any faults in the compressed air system.		•	
	Valve Y1/Y2 or Y5 does not open properly.	see *		
Excessive compressed air	Condensate trap (optional) at the upstream filter is not working properly	Check condensate trap (optional); clean or replace, if necessary.	•	•
consumption	Regeneration air setting too high.	Have adjusted.		•
Dryer fails to switch	Compressor is switched off	Check compressor synchronisation.	•	
over	Power supply interrupted, cable broken.	Reconnect the unit to the power supply.	•	•
	Valve Y1/Y2 does not open properly	see *		
	Error in control programme	Restart programme.		•
	Control board defective	Check fuses (switchbox, supply line); replace board, if necessary.	•	•
No expansion in	Valve Y3/Y4 does not open properly	see *		
chamber	Operating pressure too low.	Increase the operating pressure.	•	
Dryer is continuously bled	Valve Y3/Y4 does not close properly Valve Y1/Y2 does not close properly	see *		
	1	Check supply voltage.	•	•
		Check whether coil is properly mounted.	•	•
* Valve fails to open	or close properly	Inspect valve for contamination; clean or replace, if necessary.	•	•
		Check voltage at cables, contacts and coils;		•
		replace defective parts as necessary.		_

With dewpoint-sensing control (optional)

Fault code	Description of fault	Possible cause	Remedy	Specialised personnel	Service technician
+20	Upper measuring range	Drying capacity	See instructions for commissioning.	•	
	limit exceeded	exceeded.	If the drying agent is wet, replace it.		
	Deversion	Error in programme.	Restant programme.		•
999	defective	irreversibly contaminated.	Replace sensor.	•	•
sens	Sensor not powered, or	Sensor, sensor cable	Visual inspection; check power		
or	cable or sensor defective	or sensor adapter	supply (24 V to terminals 4 and 6).	•	•
-999		defective.	Replace defective component(s).		
SEr	Display for service interval. Regular maintenance tasks must be carried out.	The display appears after every 8000 operating hours.	Inform the manufacturer's service staff and order the appropriate service kit. The package includes a dongle with which you can reset the operating hours counter after maintenance has been carried out. For instructions on how to use the dongle see the enclosed information sheet (in the service kit).	•	•

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Annex with technical documentation

This annex comprises the following information and technical documentation:

- Technical data
- Replacement and wear parts list
- Logic control diagram
- Flow diagram
- Dimensional drawing

Technical data

	Capacity*	Length A	Height B	Width C	Weight, approx.	Amount of drying agent per dryer
Туре	m³/h	mm	mm	mm	kg	kg
			100 bar			
HDK-MT 4-100	40	570	1015	340	83	6,6
HDK-MT 6-100	65	570	1025	340	85	7,0
HDK-MT 10-100	90	570	1035	340	87	7,4
HDK-MT 15-100	120	570	1045	340	90	7,7
HDK-MT 20-100	180	570	1245	340	105	11,6
HDK-MT 25-100	240	570	1445	340	120	15,6
HDK-MT 30-100	300	570	1645	340	130	19,4
HDK-MT 40-100	400	570	1645	340	155	26,4
HDK-MT 50-100	520	570	1845	340	170	31,8
HDK-MT 60-100	590	570	2020	340	190	36,2
HDK-MT 70-100	650	570	2145	340	210	39,6
			250 bar			
HDK-MT 4-250	60	570	1015	340	115	3,8
HDK-MT 6-250	85	570	1025	340	120	4,0
HDK-MT 10-250	120	570	1035	340	125	4,2
HDK-MT 15-250	150	570	1045	340	130	4,4
HDK-MT 20-250	230	570	1245	340	160	6,8
HDK-MT 25-250	300	570	1445	340	195	9,0
HDK-MT 30-250	430	570	1645	340	220	11,2
HDK-MT 40-250	530	570	1645	340	270	17,8
HDK-MT 50-250	600	570	1845	340	295	21,4
HDK-MT 60-250	720	570	2020	340	335	24,5
HDK-MT 70-250	910	570	2145	340	360	26,8

		Capacity*	Length A	Height B	Width C	Weight, approx.	Amount of drying agent per	
Туре		m³/h	mm	mm	mm	kg	kg	
350 bar								
HDK-MT	4-350	70	570	1015	340	125	3,8	
HDK-MT	6-350	95	570	1025	340	130	4,0	
HDK-MT	10-350	145	570	1035	340	135	4,2	
HDK-MT	15-350	200	570	1045	340	140	4,4	
HDK-MT	20-350	300	570	1245	340	170	6,8	
HDK-MT	25-350	400	570	1445	340	205	9,0	
HDK-MT	30-350	500	570	1645	340	230	11,2	
HDK-MT	40-350	780	570	1645	340	280	17,8	
HDK-MT	50-350	940	570	1845	340	310	21,4	
HDK-MT	60-350	1080	570	2020	340	350	24,5	
HDK-MT	70-350	1180	570	2145	340	380	26,8	

* relative to 1 bar (abs.) and 20 $^\circ$ C (68 $^\circ$ F) at operating pressure and a feed temperature of 35 $^\circ$ C (95 $^\circ$ F).

Туре НDК-МТ 4/100–70/350	
Fluid group (acc. to PED 97/23/EG)	2
max. operating overpressure	100/250/350 bar
 Required permanent minimum input pressure HDK-MT of pressure level 100 bar: HDK-MT of pressure level 250 bar and 350 bar: 	at least 50 bar at least 100 bar
min. ambient temperature	≥+1 °C (33,8 °F)
max. ambient temperature	≤+50 °C (122 °F)
Noise level: Typical noise level (based on free-field measurement, 1 m surrounding field) Possible noise level deviation from free-field measurement due to conditions at the location for installation on the customer's premises.	72–118 dB(A)
Mains voltage	(see type plate)
Protection class	IP 65

Replacement and wear parts list

For both the 12 month and 24 month maintenance, you can order complete service kits from the manufacturer with all the necessary replacement parts.

Mufflers and filter elements must always be ordered separately from the service kit.

Note:

When exchange or replacement parts are ordered, always state the dryer type and the build no. of the dryer. These data are found on the type plate.

Service-Kits

Туре	Designation	Order number				
Spare part packages, 100 bar						
HDK-MT 4/100-70/100	Spare part package for 12 months	HDK-MT12A				
	Spare part package for 24 months	HDK-MT24A				
	Repair set	RKV-HDK-MT-230				
Spare part packages, 250/350 bar						
HDK-MT 4/250-70/350	Spare part package for 12 months	HDK-MT12A				
	Spare part package for 24 months	HDK-MT24A				
	Repair set	RKV-HDK-MT-230				

Drying agent packages

Туре	DESPAC01MS	DESPAC04MS	DESPAC015MS
HDK-MT 4/100/250-350		2x	
HDK-MT 6/100/250-350		2x	
HDK-MT 10//250–350		2x	
HDK-MT 15/100		2x	
HDK-MT 15/250–350	1x	1x	
HDK-MT 20/100		3x	
HDK-MT 20/250–350	2x	1x	
HDK-MT 25/100	1x		1x
HDK-MT 25/250–350	2x	2x	
HDK-MT 30/100	1x	1x	1x
HDK-MT 30/250–350		3x	
HDK-MT 40/100	1x	3x	1x
HDK-MT 40/250–350	2x		1x
HDK-MT 50/100		1x	2x
HDK-MT 50/250–350	2x	1x	1x
HDK-MT 60/100	1x	2x	2x
HDK-MT 60/250–350		3x	1x
HDK-MT 70/100		3x	2x
HDK-MT 70/250–350	1x	3x	1x

Additional Spare parts

Designation	Order number			
Muffler	SDD-15/600/AL			
Filter elements	s. enclosed Filter manual			

Logic control diagram

Adsorption in B1 and regeneration in B2





Regeneration in B1 and adsorption in B2

Flow diagram



ltem	Designation
1	Vessel
2	Upstream filter
3	Downstream filter
4	Solid filter
5	Lower valve block
6	Upper valve block

Item	Designation
7	Pressure gauge
8	Check valves
9	Solenoid valves
12	Control cabinet
21	Muffler
22	Pressure maintaining valve

Dimensional drawing



	Type HDK-MT 100/250/350 bar							
Dimensions (mm)	15/	20/	25/	30/	40/	50/	60/	70/
A	570							
В	1045	1245	1445	1645	1645	1845	2045	2145
C	340							
Connection	G 3/4							