OPERATING INSTRUCTIONS

GA08215_0102

PT 70 B Compact

Turbomolecular Pump System

Part Numbers

500 002 469

500 002 470

Leybold vacuum

Contents

1 Description

1.1 Ordering data

Standard System Part Numbers

PT70 B-Compact, 63 ISO-K Inlet.	500 002 469
PT70 B-Compact, 63 CF Inlet.	500 002 470

* NOTE: These standard part numbered pumps are supplied with a KF16 foreline port. The PT70 B-Compact system uses an 8mm OD tube fitting in place of the KF16 port. The part number of the 8mm OD tube fitting used for the foreline port of the TW70H is 72550105 (refer to the spare parts list). The KF16 port must be removed and this fitting used in its place to allow the foreline tubing to be connected.

Items Included

PT70 B-Compact System

Input Power Cord, 230 V/1ph/50 Hz, 2m Long

Operating Instructions (this manual)

Applicable Equipment (ref. Leybold Catalog)

Turbopump:	
TW70H-CF63	800002V2236*
TW70H-DN63ISO-K	800002V1236*
Forepump, DIVAC 0.8T (24VDC)	72292016
Vent valve, Leybold 24VDC	72053112

Accessories (ref. Leybold Catalog)

Turbopump Inlet Screen	
63 ISO-K	20017170
63 CF	20017171

System Sensors, inlet

ITR90 Combination Pirani/Hot Cathode Ionization:	
KF25, with integral display readout	12091
KF25, without display.	12090
CF40, with integral display readout	12094
CF40, without display	12092
Vent valve:, 24VDC, normally open	72053112

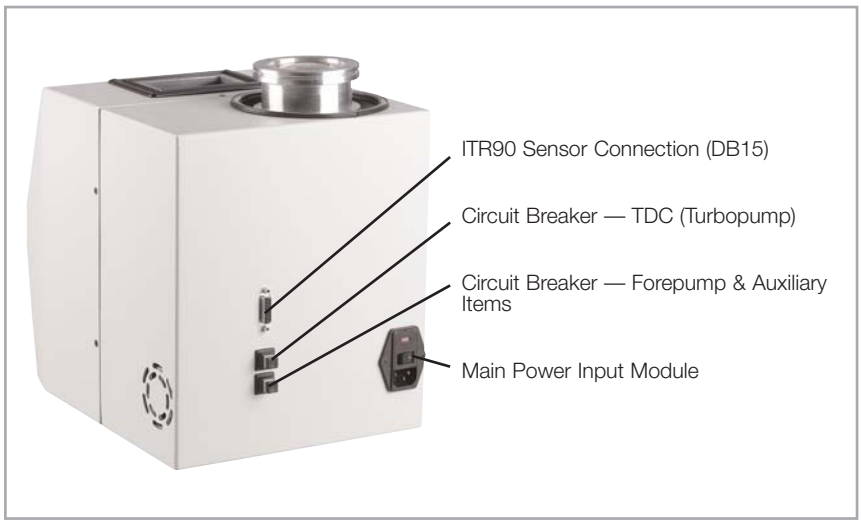
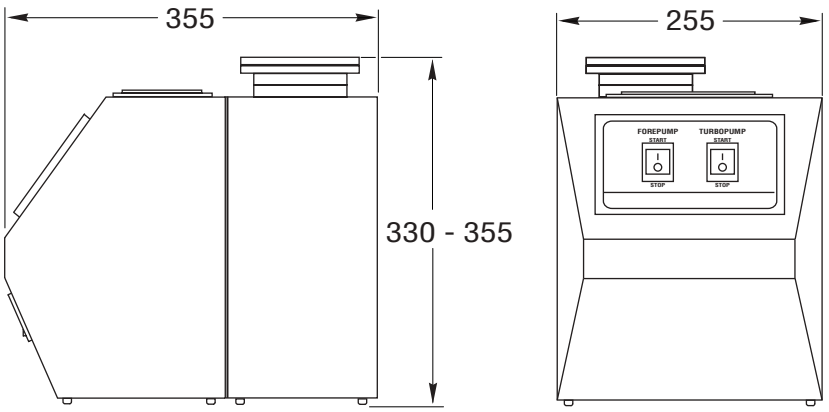


Fig. 1 Rear view

1.2 Technical Data

Power Input	88-132 or 176-264 V/1ph/50-60 Hz AC
Main fuses	5 or 10A depending on supply voltage
Auxiliary (24VDC) circuit breakers:	
TDC	10A
DIVAC	4A
Power/Current Consumption (24VDC):	
Turbopump (max.)	170W
Forepump (max.)	34VA
Vent valve	7W
ITR090 Sensor (max.)	20W
Control Outputs - Powered	
24VDC Vent valve	< 0.5A
Environment	
Temperature	0 - 45°C
Humidity.	5 - 95%, non-condensing
Weight	14.5 kg



The actual overall height depends on the type of the turbopump.

Fig. 2 Dimensional drawing, dimensions in mm

1.3 Background

The Leybold PT70 B-Compact system is an integrated unit that features a TW70H Turbopump and a DIVAC 0.8T diaphragm backing pump. There are two versions of the system: a Manual, Basic ("PT70 B-Compact") and a Full-Featured ("PT70 F-Compact") system. There are several differences between the two packages:

Controls

The PT70 B-Compact version allows only manual operation using rocker switches on the system's front control panel. The PT70 F-Compact version features a "one-button" automated control sequence as well as manual control plus informational feedback on the system's status and pump operations.

Pressure Display

The PT70 F-Compact version provides power and a readout for an ITR90 Combination Pirani and Bayard-Alpert Hot Cathode Ionization sensor. While the PT70 B-Compact version also powers an ITR90 sensor, it provides no display readout of the pressure on the control panel. It is recommended that the PT70 B-Compact version use the ITR90 sensor that includes the integral display. The PT70 F-Compact version may use either this sensor or one without the integral display. Some users require the local readout on the system controller due to the mounting location of the sensor while for others the sensor with the integral display is acceptable.

Foreline Sensor

The PT70 F-Compact version can also include an optional smart foreline sensor (Pirani — TTR 90) and will display the pressure from this sensor on the PT70 B-Compact's front control panel. The PT70 B-Compact version cannot accommodate a foreline sensor.

NOTE: To operate the PT70 F-Compact version in Automatic mode, either a foreline or inlet sensor must be installed!

While there are differences in the controls and display of pressures, the two versions include common features. Both systems use the TW70H turbopump and a 24VDC version of the DIVAC 0.8T diaphragm forepump. Both pumps are driven by 24VDC motors. The TW70H uses a Turbo.Drive controller ("TDC") to interface with the pump and the power supply.

The TDC also acts as a communication interface to provide a means for obtaining operational information from the turbopump. Information on the pump's rotational speed, current draw, temperatures, etc., is available via the system's front panel display (on the PT70 F-Compact system only — the PT70 B-Compact system has no display or readout). In addition, the last error experienced by the TW70H is available from the control panel.

The pumps are enclosed in a sturdy two-piece sheet metal housing. The turbopump is attached to the enclosure via four socket head screws at its bottom surface and may be removed for remote mounting. The foreline is 8 mm diameter polyethylene tubing. It is used with compact press-in fittings for ease of changing the foreline when the turbopump is moved to a remote mounting location. The forepump is mounted on vibration isolation mounting feet and includes an exhaust silencer to reduce noise levels during roughing of the volume to be pumped down.

The typical noise level of an operating system is < 55 dB(A).

A two meter power cord is supplied as standard. Longer lengths are available on request. The system is supplied for operation on a nominal 230 V/1ph/50 Hz supply. The power supply used in the PT70 B-Compact system is autoranging over two specific ranges: 88-132 and 176-264 volts. Since all of the items included in the PT70 B-Compact system operate at 24VDC, any supply voltage within either of these two ranges is suitable for powerin a PT70 B-Compact system.

2 Connections

Warning

Never expose any parts of the body to the vacuum.

The turbomolecular pump shall be solidly mounted. If the mounting is not sturdy enough, blockage could cause the pump to break loose; internal pump components could be thrown in all directions. Never operate the pump (in bench testing, for example) without proper flanging.

The pump system shall be operated only at the line voltage specified on the data plate.

After a mains power failure the pump can run up automatically once more.

If the pump has previously handled hazardous gases, implement the proper precautionary measures before opening the intake or exhaust connection.

If necessary, use gloves, a respirator and/or protective clothing and work under an exhaust hood.

Caution

The turbomolecular pump systems are not suitable for pumping dusty, aggressive or corrosive media.

Never operate the diaphragm pump with a sealed or narrowed exhaust port.

The turbomolecular pump may be moved only when not in operation.

Exposure of the pump to accelerating forces must be avoided or reduced to such an extent that the rotor unit will not be excited by vibrations. In the case of critical applications you must consult our Applications Dept. first.

The pump must only be opened by such persons who have been authorised by Leybold to do so.

2.1 Power

There is one connection point just above the right bottom edge of the rear of the enclosure that the power cor plugs into to provide main power to the system. This main power input connection is a recessed three-prong male connector. The system's power (On/Off) is controlled by the rocker switch just above the main power input receptacle on the rear of the enclosure. The fuses for short-circuit protection are contained in a module behind the drop-down cover on the power input module.

The power input for the PT70 B-Compact is nominally 230 V/1ph/50 Hz. Other supply voltages in the range of 88-132 or 176-264 are also suitable. The system's power cord is supplied as standard at a two meter length. Other lengths are available on request.

2.2 Accessories

ITR 90 Combination Pirani/Bayard Alpert Hot Cathode Ionization Sensor

There is a connection point on the rear of the PT70 B-Compact system enclosure for an inlet sensor. It is a DB15 female connection and is used to connect an ITR 90 Combination Pirani/Bayard Alpert Hot Cathode Ionization sensor. The connecting cable is available in various lengths from stock. The 5 meter cable length is shipped as standard. Other lengths are also available on request.

Vent Valve

An optional normally open vent valve may be installed in the foreline tee. (A blanking plug must first be remove from the 8mm tube diameter port. This is done by pressing down on the green ring around the outside of the fitting and pulling out on the plug. The vent valve is installed by pressing it into the fitting until it "bottoms out".) The mating connector and power cable for the valve are installed at the factory inside the unit for connection of the 24VDC power leads. The vent valve — ready for plug-in — may be purchased from Leybold. Refer to the accessory listing for part number information.

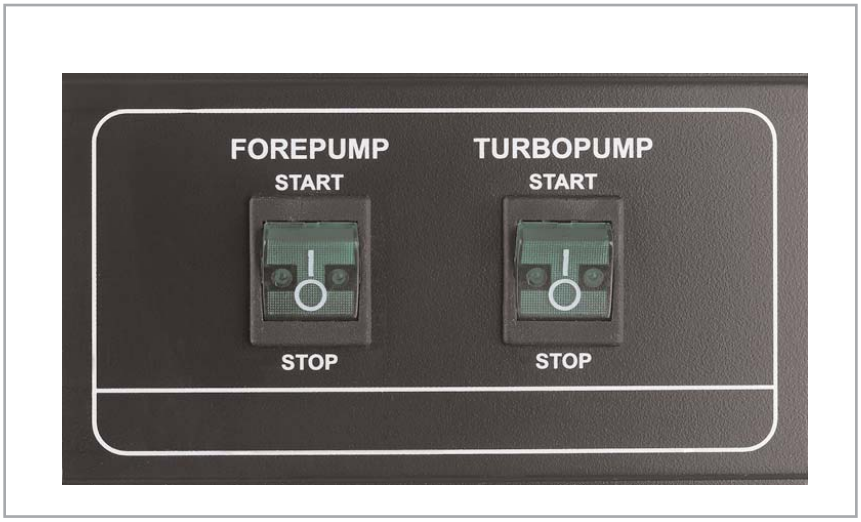


Fig. 3 Front panel

3 Operation

3.1 Operator Panel Overview

The front panel of the PT70 B-Compact system is shown above. It consists of a two switches: Forepump—Start/Stop and Turbopump—Start/Stop.

The PT70 B-Compact system is a manual system and, therefore, requires the operator to determine when the pumps are to be started and/or stopped. The pumps are then, obviously, controlled directly by these two switches.

3.2 System Startup & Shutdown

Startup

The PT70 B-Compact system is operated manually via the rocker switches on the system's front panel. Once the system is connected to the volume to be pumped down, the forepump should be started by pressing the "Forepump" rocker to the "Start" position. The forepump will start and begin roughing out the volume. If an optional normally open vent valve is installed, it will be closed at the same time. The light on the rocker switch is illuminated to indicate that the DIVAC fore/rough pump should be running.

Once the pressure drops to a suitable level, the turbopump can be started by pressing the “Turbopump” rocker switch to the “Start” position. If a vacuum sensor is not installed, then a suitable time delay should be used between starting the forepump and the TW70H to allow the pressure to drop to an acceptable level. This time delay will depend on the volume to be pumped down and must be determined by the end user.

Turbopump starting pressures up to atmospheric pressure are possible. The actual starting pressure to be used will depend on the size of the volume to be pumped down. Generally, if the foreline pressure can be brought down to less than about 10 mbar within the time it takes the turbopump to reach normal operating speed (1200 Hz/72000 rpm), then the turbopump can be started at the same time as the forepump. (The TW70H is required to reach normal operating speed within 6 minutes or it will shut itself down to protect itself.) A chart is provided in the TW70H Operating Instruction manual (GA 05.145) that can be used as a guide to determine its starting pressure.

The indicating light in the Turbopump rocker switch is illuminated when the turbopump reaches normal operation speed (nominally 1080 Hz).

Shutdown

The TW70H can be shut down by pressing the “Turbopump” rocker switch to the “Stop” position. The forepump can also be stopped at this time by pressing the “Forepump” rocker switch to the “Stop” position. If an optional vent valve is installed, it will be de-energized to its open position and vent the turbopump to atmospheric pressure in order to lessen the time it takes for the turbopump to come to a fully stopped state. If other than the standard Leybold vent valve is used, the rate of pressure rise should conform to the venting guidelines as noted in the TW70H’s Operating Instruction manual (GA 05.145).

The optional Leybold electromagnetic vent valve includes an orifice sized to meet these requirements when venting the turbopump and foreline. Venting of a connected volume at the same time will take longer, but the allowable rate of pressure rise will still be met. (A vent valve with a larger orifice can be offered as a special order item.)

3.3 Operation Considerations

Operation after a power failure

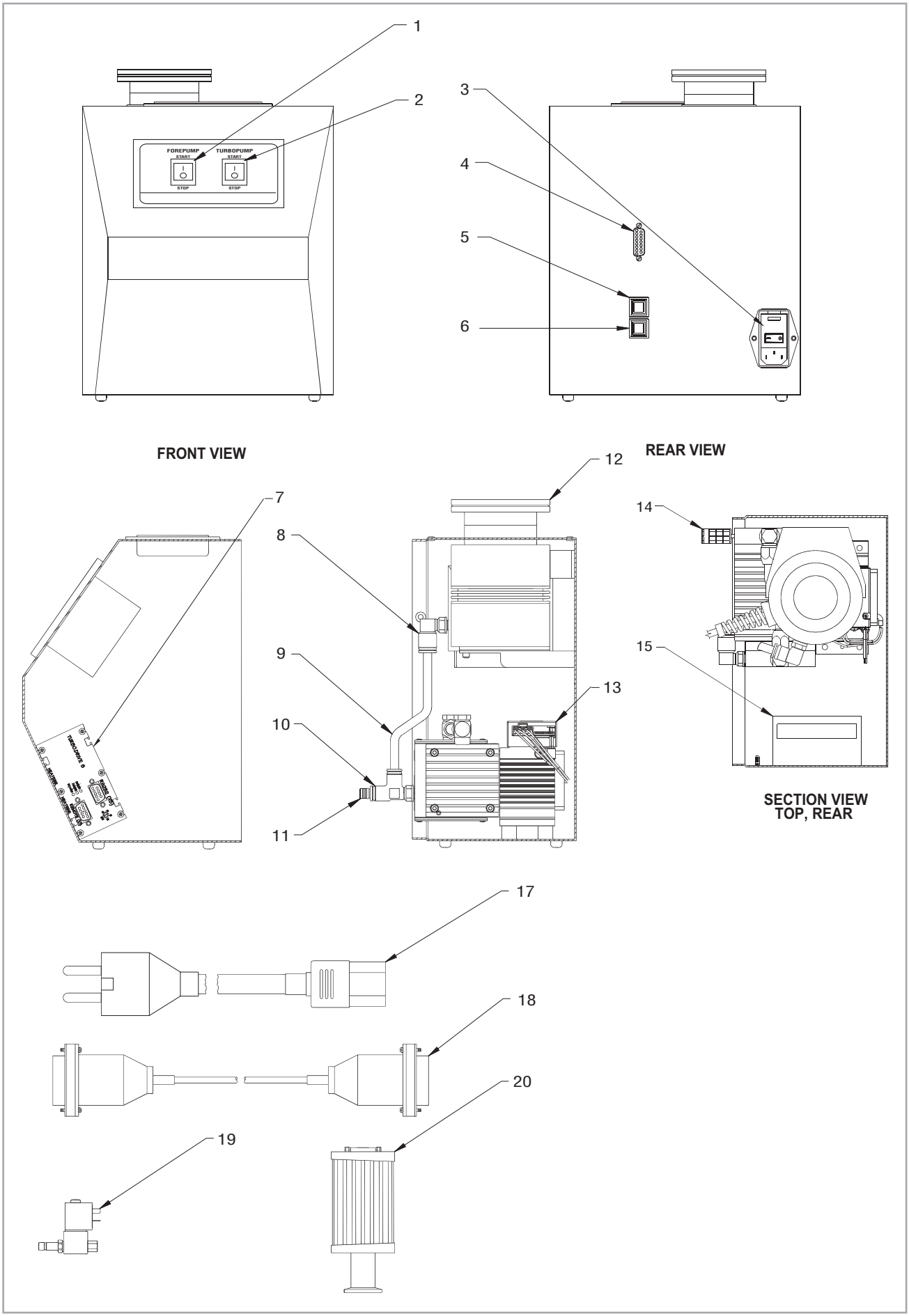
The PT70 B-Compact system will restart after a power loss. The rocker switches used are of a maintained type, so the system will restart after power is reestablished.

Resetting a fault condition

In order to clear an indicated error on the TDC (and allow the turbopump to be restarted), power must be completely removed from the turbopump. This means that the turbopump must come to a stop. This is due to the turbopump's tendency to act as a generator upon loss of power. When power is removed, the voltage generated internally by the turbopump keeps the frequency controller ("TDC") powered. Only when the frequency controller loses this power is the fault condition reset, allowing the turbopump to be restarted. (Note that the error condition is retained in non-volatile memory in the TDC and may be accessed via the PT70 B-Compact controller's "LAST ERROR" key.)

4 Spare parts

Item	Quantity	Description	Part Number
1	1	Rocker switch - maintained, lighted (Forepump)	190 322 170
2	1	Rocker switch - maintained, lighted, independent (Turbopump)	190 322 171
3	1	Power input module, 250 V, 10 A	722 90 128
4	1	DB 15 connector female: ITR 90 gauge sensor connection	721 38 359
5	1	Circuit breaker, 24 VDC, 10 A: Turbopump (TDC)	721 34 144
6	1	Circuit breaker, 24 VDC, 4 A: DIVAC	721 34 146
7	1	TDC = Turbopump Drive (frequency controller) included with pump	(Reference 800072V0001)
8	1	Connector, elbow, G 3/8 BSPP x 8 mm OD tube	725 50 105
9	2	Tubing, Plyethylene, 8 mm OD x 6 mm x 8“ (200 mm) long	722 35 047
10	1	Tee, male run, swivel, G 1/8 BSPP x 8 mm OD tube	725 50 110
11	1	Plug, 8 mm OD tube	725 50 111
12	1	Turbopump, TW 70 H (actual replacement part number depends on flange used; see catalog)	–
13	1	DIVAC diaphragm pump, 13 l/min, 24 VDC	722 92 016
14	1	Exhaust silencer, G 1/8 BSPP	724 77 547
15	1	Power supply, 88-132/176-264 VAC input, 24 VDC output, 240 W	190 295 029
16a (not shown)	2	Fuse 10 A (for 110 VAC power input), 1 1/4“ x 1/4“, time delay	72195 105
16b (not shown)	2	Fuse 5 A (for 230 VAC power input), 1 1/4“ x 1/4“, time delay	72195 106
17	1	Power cord, 230 VAC, 2 m long	190 127 896
18	1	ITR 90 sensor cable, DB 15 straight through, 5 m long (see catalog for available length)	124 55
19	1	Vent valve, normally open, 24 VDC, 8 mm OD tube connection	720 53 112
20	1	ITR 90 combination hot cathode / Pirani sensor (actual part number depends on flange type)	–
–	–	KF25, with integral display readout	12091
–	–	KF25, without display.	12090
–	–	CF40, with integral display readout	12094
–	–	CF40, without display	12092


1
2
FOREPUMP
START
STOP
TURBOPUMP
START
STOP
3
4
5
6
FRONT VIEW
REAR VIEW
7
8
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10
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SECTION VIEW
TOP, REAR
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19
20

EC Conformance Declaration

We, the Leybold Vacuum GmbH, declare herewith that the products listed below, on the basis of their design and engineering as well as in the embodiment which we have placed on the market, comply with the applicable safety and health requirements set forth in EC guidelines.

This declaration becomes invalid if modifications are made to the product without consultation with us.

Designation of the products: Turbomolecular pump system

Models: PT 70 B Compact, PT 70 F Compact,

Part Numbers: 500 002 469 /470 /471 /472

The products comply with the following guidelines:

- EC Machinery Guidelines (98/37/EC)
- EC Low-Voltage Guidelines (73/23/EEC)

Applicable, harmonized standards:

- EN 292-1 and -2 Machinery Safety – Basic Terminology
- EN 1012-2 Safety Requirements for Vacuum Pumps
- EN 60204: Electrical Equipment for Industrial Machinery

Applied national standards and technical specifications:

- DIN 31 001

Cologne, July 14, 2004

Schomisch, Leader CEAS

Cologne, July 14, 2004

Langner, Electrical Engineering

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Leybold vacuum

Declaration of Contamination of Compressors, Vacuum Pumps and Components

The repair and / or servicing of compressors, vacuum pumps and components will be carried out only if a correctly completed declaration has been submitted. **Non-completion will result in delay**. The manufacturer can refuse to accept any equipment without a declaration.

A separate declaration has to be copleted for every single component.

This declaration may be completed and signed only by authorised and qualified staff.

Customer/Dep./Institute: _____

_____

Address _____

_____

Person to contact: _____

Phone: _____ Fax: _____

Order number of customer: _____

Reason for returning ☒ applicable please mark

❑ repair ❑ chargeable ❑ warranty

❑ Austausch ❑ chargeable ❑ warranty

❑ DKD-calibration ❑ Factory calibration

restoring goods because of following reason:

❑ rent/loan ❑ for credit ❑ against exchange

❑ exchange already received/arranged

A. Description of the equipment (machine or component)

Ancillary equipment

Type: _____ _____

Part number: _____ _____

Serial number: _____ _____

Type of oil used: _____ _____

B. Condition of the equipment

	No	Yes	No
1. Has the equipment been used	❑	❑ →	
2. Drained (Product/service fluid)	↓	❑	❑
3. All openings sealed airtight		❑	
4. Purged		❑	❑

If yes which cleaning agent: _____

and which method of cleaning: _____

Contamination:	No	Yes
toxic	❑	❑
corrosive	❑	❑
mmicrobiological	❑	❑
explosive	❑	❑
radioactive	❑	❑
other harmful substances	❑	❑

C. Description of processed substances (Please fill in absolutely)

1. What substances have come into contact with the equipment:
Trade name and / or chemical term of service fluids and substances processed, properties of the substances; According to safety data sheet (e.g. toxic, inflammable, corrosive, radioactive)

	Tradename:	Chemical name:	Residues:
a)	_____	_____	❑ Yes ❑ No
b)	_____	_____	❑ Yes ❑ No
c)	_____	_____	❑ Yes ❑ No
d)	_____	_____	❑ Yes ❑ No

	Yes	No
2. Are these substances harmful?	❑	❑
3. Dangerous decomposition products when thermally loaded	❑	❑

Which:

Components contaminated by microbiological, explosive or radioactive products will not be accepted without written evidence of decontamination.

D. Legally binding declaration

I / we hereby declare that the information supplied on this form is accurate and sufficient to judge any contamination level.

Name of authorised person (block letters): _____

date _____ signatur of authorised person _____

firm stamp

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