

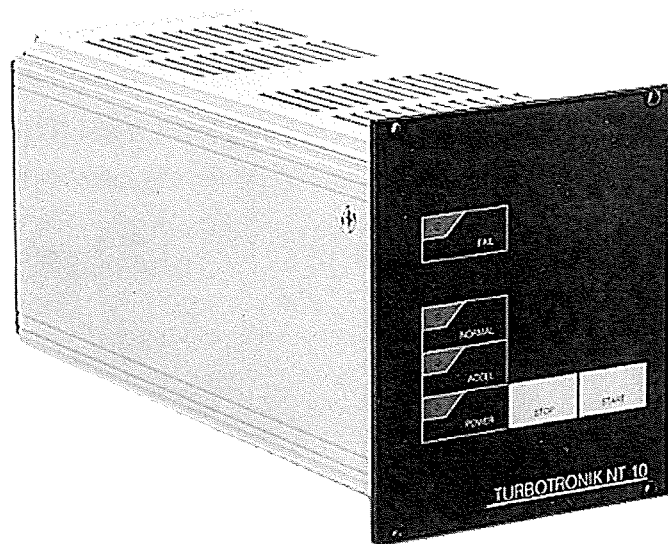
TURBOTRONIK NT 10

Electronic Frequency Converter

Operating Instructions 17200334_002_C0

Part Nos.

859 00
859 01



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Original operating instructions.

Safety Information

Obligation to Provide Information

Before installing and commissioning the equipment, carefully read these Operating Instructions and follow the information so as to ensure optimum and safe working right from the start.

The Leybold **TURBOTRONIK NT 10** has been designed for safe and efficient operation when used properly and in accordance with these Operating Instructions. It is the responsibility of the user to carefully read and strictly observe all safety precautions described in this section and throughout the Operating Instructions. The equipment must only be operated in the proper condition and under the conditions described in the Operating Instructions. It must be operated and maintained by trained personnel only. Consult local, state, and national agencies regarding specific requirements and regulations. Address any further safety, operation and/or maintenance questions to our nearest office.

DANGER indicates an imminently hazardous situation which, if not avoided, will result in death or serious injury.

WARNING indicates a potentially hazardous situation which, if not avoided, could result in death or serious injury.

CAUTION indicates a potentially hazardous situation which, if not avoided, could result in minor or moderate injury.

NOTICE is used to notify users of installation, operation, programming or maintenance information that is important, but not hazard related.

We reserve the right to modify the design and the specified data. The illustrations are not binding.

Retain the Operating Instructions for further use.

NOTICE



DANGER



WARNING



CAUTION



NOTICE



Safety Information

0 Important Safety Information

0.1 Electrical Hazards

DANGER



- 1 This unit has voltages at hazardous potentials! Death, severe bodily injury or significant material damage can occur if the instructions in this Instruction Manual are not observed. Only appropriately qualified personnel may work with this equipment.
This personnel must be knowledgeable about all of the warning information and measures which are specified in this Instruction Manual for the transport, installation, operator control and troubleshooting of the equipment. The successful and safe handling of this equipment requires that it is professionally transported, installed and handled.
- 2 During all connection work make absolutely sure that the mains power lines have been reliably deenergised. The electrical connections must only be provided by a trained electrician as specified in accordance with EN 50110-1, for example.
- 3 When connecting an external voltage of > 42 V to the terminals of the unit, the VDE safety regulations must be observed!

NOTICE



0.2 Danger of Equipment Damage

- 1 This device contains devices which can be destroyed by electrostatic discharge (ESD)!
-

1 Description

1.1 Design and Function

The electronic TURBOTRONIK NT 10 frequency converters are used to drive TURBOVAC 50.

The electronic frequency converters convert the single-phase supply voltage into a three-phase AC voltage to control the TURBOVAC induction motor.

The frequency converters operate according to a specific cycle: The motor is driven for approximately 1 second and the monitoring measurements are executed in the following 0.1 seconds.

The following operating statuses are displayed using LEDs:

- supply voltage present
- acceleration
- normal and
- fault operation

Various signals are available via 2 relay outputs.

After the start, the pump continuously accelerates with the maximum current. This is identified by the yellow LED ACCEL (acceleration) which is lit. The green NORMAL LED is lit and the ACCEL LED goes dark when approximately 90% of the rated speed is reached.

The speed is continuously monitored and controlled. When the speed cannot be maintained, even at the maximum current, as a result of external influences, e.g. excessive gas feed, the speed decreases and the pump continues to operate.

When a rotational frequency of approximately 500 Hz is fallen below, the ACCEL LED lights-up on the frequency converter. The TURBOTRONIK now attempts to accelerate the pump up to its reference frequency.

The frequency converter outputs are no-load- and short-circuit proof.

The electronic TURBOTRONIK frequency converters can be connected to external open-loop control- and monitoring devices with electrical isolation.

Operating statuses

Run-up and operation

Outputs

Description

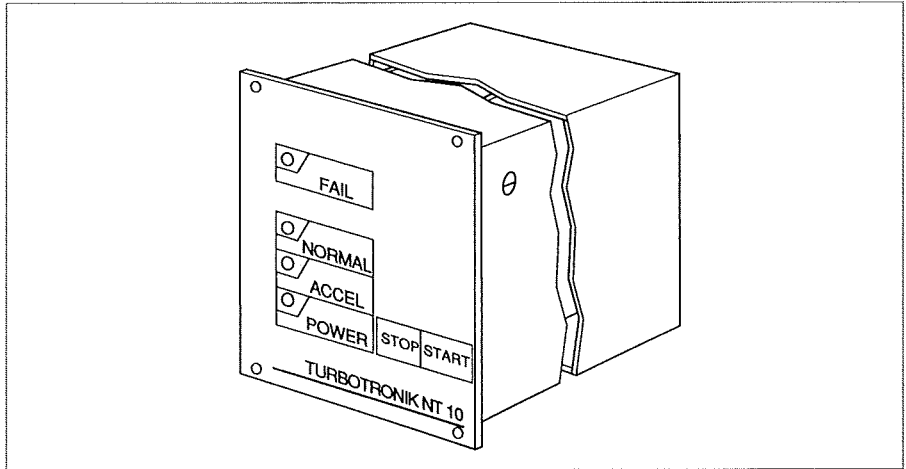


Fig. 1 TURBOTRONIK NT 10

The TURBOTRONIK NT 10 is a desktop unit or for mounting in a rack 1/4 19", 3 HU

Front panel: Membrane keypad, 4 LEDs, START and STOP keys

Housing: Extruded aluminum housing.

Rear panel: 10-pin Phönix connector for remote monitoring and control, 5-pin connector to connect the TURBOVAC, 3 m long power cable with protective contact connector and power switch

Resonance monitoring function

TURBOTRONIK NT 10 has a resonance monitoring function for the TURBOVAC 50D. The resonance monitoring function shuts down the drive and displays a fault if the pump remains in the speed range between 45,000 and 55,000 RPM for longer than approximately 1 minute. When shipped, the resonance monitoring function is active.

1.2 Supplied Equipment

TURBOTRONIK NT 10, miniature fuses, mating connector for the Phönix connector (control terminal strip X10), attachable feet for desktop operation, 4 adhesive feet, four M 3x8 screws, the power cable is permanently attached.

The connecting cable to the TURBOVAC is not included.

1.3 Technical Data

Supply voltage	
Part No. 859 00	200-240 V AC, $\pm 10\%$
Part No. 859 01	100-140 V AC, $-10\%/+16\%$
Supply frequency	50/60 Hz
Line fuse (F1 internal)	T 1A / 250 V
Rated speed of the TURBOVAC	72,000 RPM = 1200 Hz
Power consumption, briefly when accelerating	up to 94 VA
Outputs	
Voltage	3 x 150 V
Supply frequency	1200 Hz
Frequency range of the output voltage	220-1250 Hz
Ambient temperature	
in operation	0°C - 40°C
storage	-40°C to +85°C

Max. load capability of the relay contacts

Switching voltage	≤ 250 V AC, ≤ 30 V DC
Switching current	≤ 6 A AC, ≤ 5 V DC
Switching power for DC	≤ 150 W
Switching power for AC	≤ 1500 VA

The units have degree of protection IP20 in accordance with EN 60 529. An increased degree of protection, e.g. IP54 can only be realized by mounting the units in other housings.

Weight	1.5 kg
Housing dimensions	1/4 19", 3 HU

1.4 Ordering Information

TURBOTRONIK NT 10

200 V - 240 V	859 00
100 V - 120 V	859 01

Connecting cable from the TURBOVAC

to TURBOTRONIK NT 10

1 m long	200 11 609
3 m long	121 08
5 m long	121 09
15 m long	119 90
20 m long	80015V2000

Description

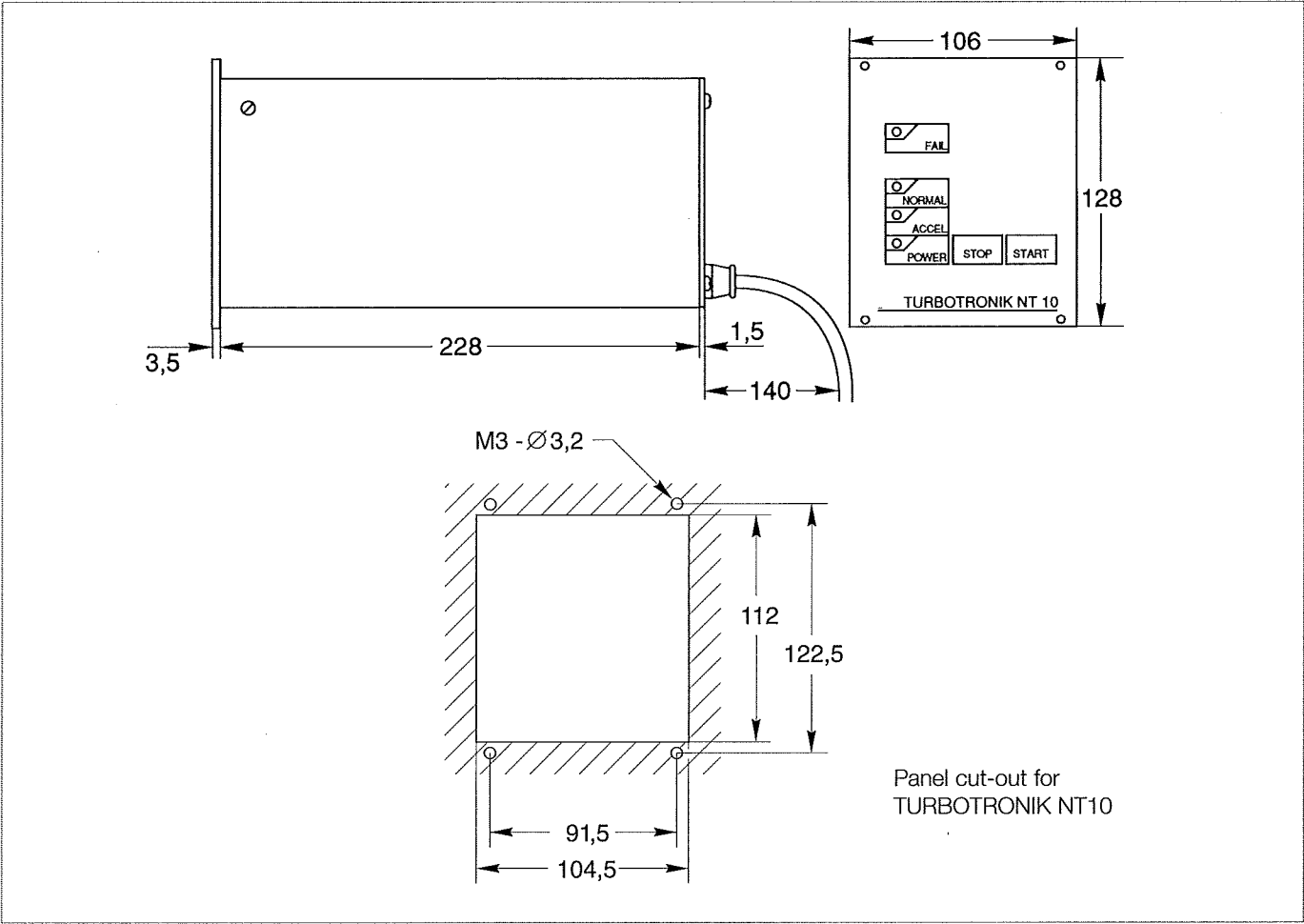


Fig. 2 Dimensions in mm

2 Installation

The equipment may only be connected-up by a suitably trained electrician or under his supervision in accordance with the valid IEC (international), EN (European) and/or domestic guidelines.

The TURBOTRONIK NT10 has parts and components at hazardous voltage levels. Before carrying out any work with the equipment open, it must be isolated from the line supply and lockedout against accidental re-closure.

2.1 Conforming Use

The electronic frequency converters NT 10 are exclusively used for feeding turbo-molecular pumps TURBOVAC 50 (Part Nos. 854 00, 854 01, 854 02 and 853 99).

The connecting cables, specified under Section 1.4 must be used to connect-up the above mentioned turbomolecular pumps.

It is not permissible to make changes or modifications on the equipment for safety reasons.

2.2 Installing

TURBOTRONIK NT 10 is supplied in a housing as desktop unit. When required, feet can be attached to the lower side. The feet can be attached by inserting them into the lowest groove of the corner strip from the back and pushing them towards the front until they lock-in. Attach the four adhesive feet to the lower side of the equipment feet and in the rear area of the unit.

TURBOTRONIK NT 10 can be installed in a rack. Ensure that it is adequately ventilated. In operation, it is not permissible that the ambient temperature exceeds 40°C.

Four holes in the front panel are used to install it in 19" racks.

2.3 Electrical Connection

Insert the connecting cable to the TURBOVAC at the socket (3/4) and at the TURBOVAC motor. The connector is secured using the screw provided.

TURBOTRONIK will be damaged if it is connected to the wrong line supply voltage.

High discharge currents! If the connecting cable between the TURBOVAC and TURBOTRONIK is longer than 10 m, protective ground must be connected to both units.

Connect the grounding cable (3/3) to the central grounding rail. Connect the supply using the power cable (3/1).

DANGER



NOTICE



DANGER



Installation

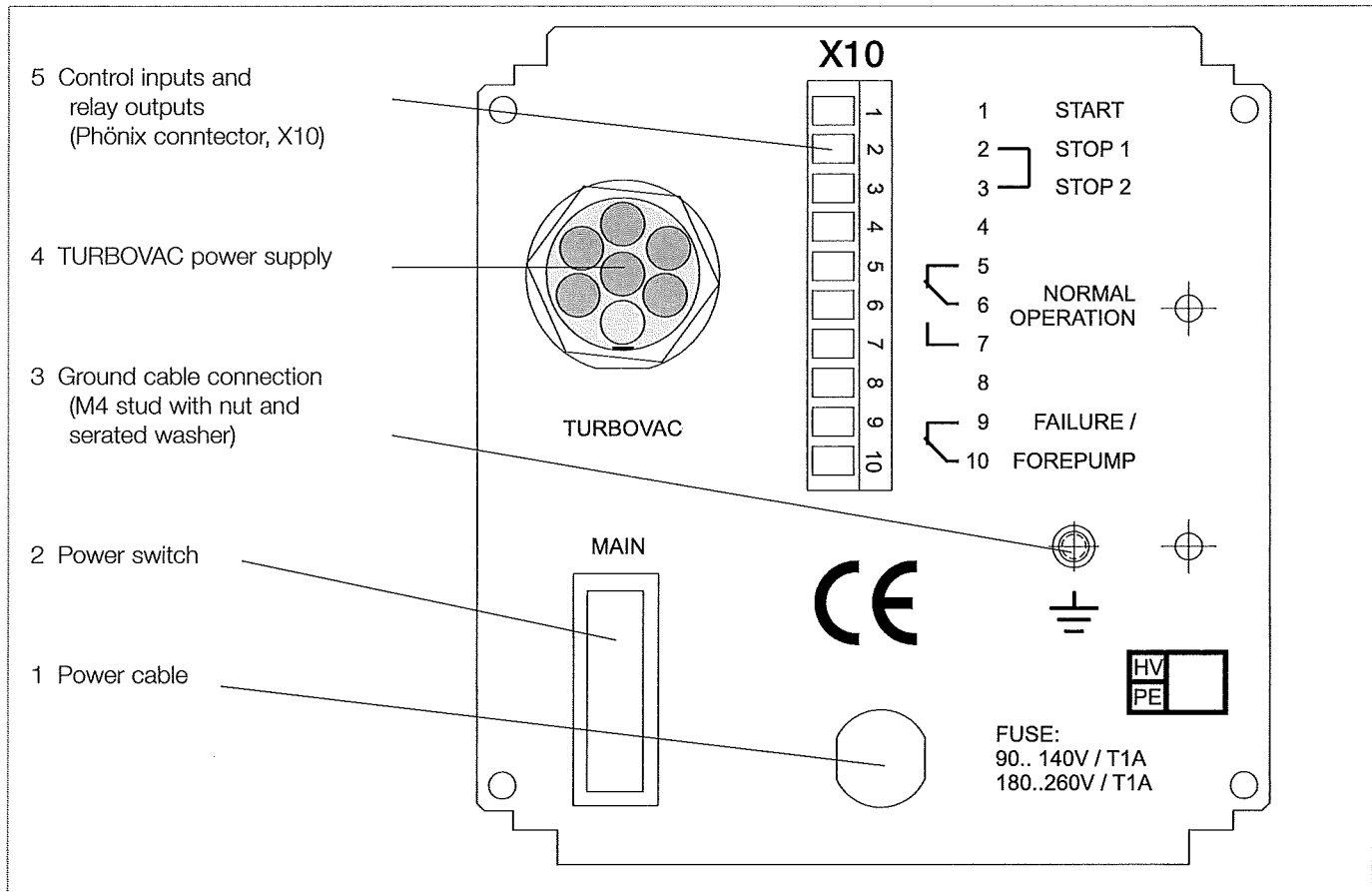


Fig. 3 Rear panel of the TURBOTRONIK NT10

Connecting the relay contacts

The NORMAL and ACCEL (acceleration) operating statuses can be interrogated at pins 5,6,7.

- Pins 6-7 closed: NORMAL
- Pins 5-6 closed: ACCEL, standstill or fault
- Pins 9 and 10: When a fault occurs, pins 9 and 10 are jumpered (NO contact).

The supply voltage or functional extra low voltage can be connected to the relay contacts. Observe the appropriate safety regulations.

Relay function	Operating status				
	Supply ON	ACCEL	NORMAL	FAIL	STOP
Relay K1 Normal	Off	Off	On	Off	Off
Relay K2 Fail (fault)	Off	Off	Off	On	Off

2.4 Operating Modes/Remote Control

When TURBOTRONIK NT 10 is shipped 4 operating modes are possible by appropriately connecting inputs 1, 2 and 3 of control connector X10 at the rear panel of the TURBOTRONIK.

Refer to Section 2.4.1 for circuit examples for remote control.

1. Operation via the START and STOP buttons

Jumper between pins 2 and 3 (status when shipped).

The TURBOVAC is started and stopped using the START and STOP buttons on the membrane keypad.

2. Remote control via 2 external pushbuttons

Wird START (Pin 1) mit einem Schließer mindestens 3 Sekunden mit Pin 2
The TURBOVAC starts if START (pin 1) is connected to the pin 2 for a minimum of 3 seconds using an NO contact.

The TURBOVAC stops in the connection between the two inputs, pin 2 and 3 STOP is disconnected using an NC contact.

3. Remote control via an external switch

Connect pins 1 and 2 (jumper).

The TURBOVAC starts if STOP2 (pin 3) is connected to the jumper, pin 1-2.
The TURBOVAC stops if this connection is interrupted.

4. Automatic start when the power is switched-on

Connect the three pins 1, 2 and 3 with one another. TURBOVAC starts automatically when the supply voltage is connected.

TURBOTRONIK can also be controlled via relays or optocouplers.

Installation

2.4.1 Connecting Examples for Remote Control

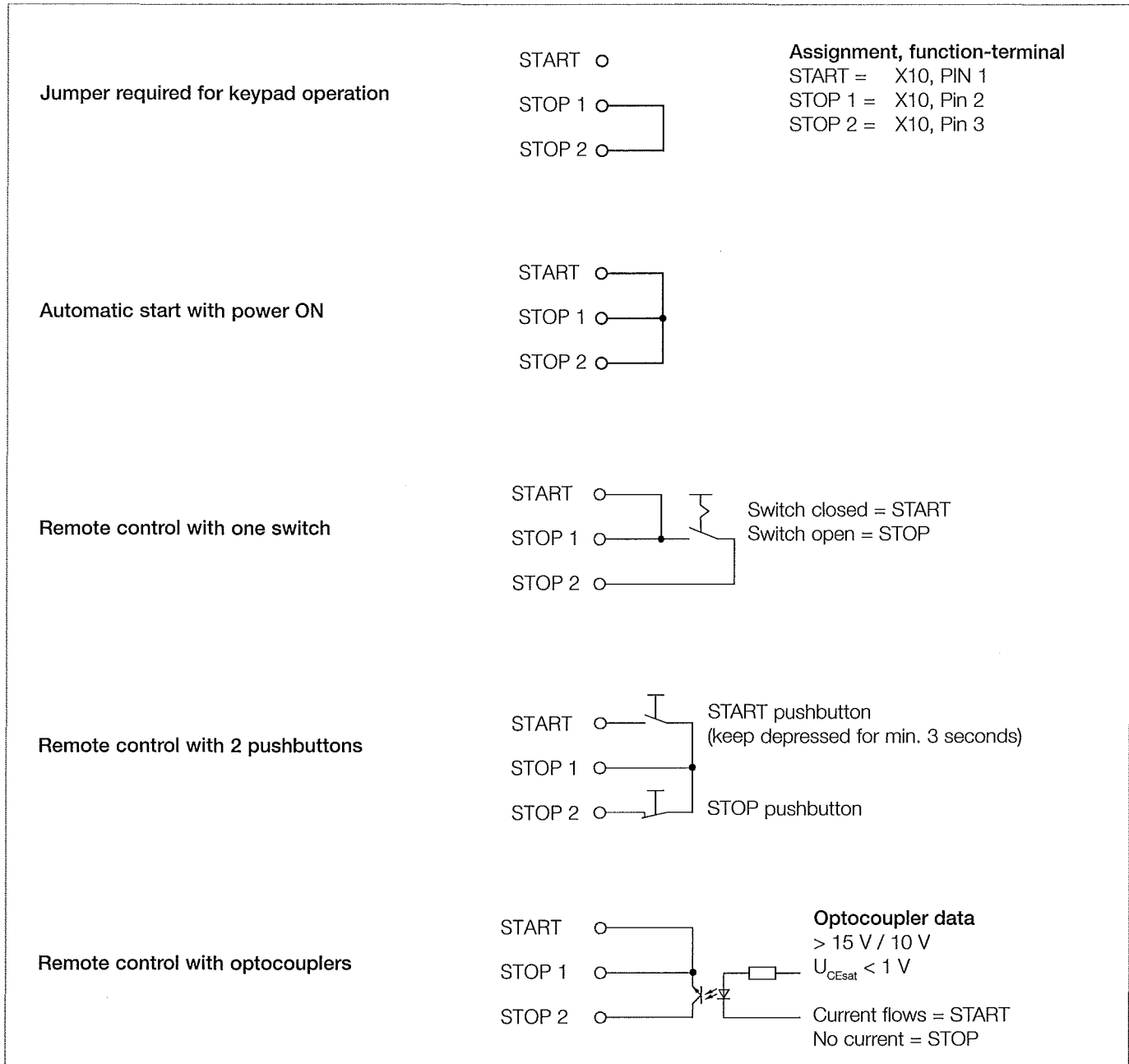


Fig. 4 Connecting examples for remote control

3 Operation

Starting TURBOVAC

Switch-on TURBOTRONIK, the POWER LED must light-up.

Depress the START button, or start TURBOVAC via remote control.

The pump runs-up. The ACCEL LED (acceleration) lights-up.

The NORMAL LED lights-up and the ACCEL LED goes dark when approximately 90% of the rated speed is reached.

Switching-off TURBOVAC

Depress the STOP button, or shutdown TURBOVAC via remote control.

Only the POWER LED is lit.

After a fault has been removed, also depress the STOP button, or shutdown TURBOVAC via remote control and then restart it.

4 Leybold Service

Whenever you send us in equipment, indicate whether the equipment is contaminated or is free of substances which could pose a health hazard. If it is contaminated, specify exactly which substances are involved. You must use the form we have prepared for this purpose.

A copy of the form has been reproduced at the end of these Operating Instructions: "Declaration of Contamination for Compressors, Vacuum Pumps and Components". Another suitable form is available from www.leybold.com
→ Documents → Download Documents.

Attach the form to the equipment or enclose it with the equipment.

This statement detailing the type of contamination is required to satisfy legal requirements and for the protection of our employees.

We must return to the sender any equipment which is not accompanied by a contamination statement.

Troubleshooting

5 Troubleshooting

Malfunction	Possible Cause	Corrective Action
Power LED not lit	TURBOTRONIK is not connected to the supply. Supply switch not switched-on. Fuse blown or device defective	Establish the connection to the supply. Switch-on the power switch at the rear panel of the TURBOTRONIK NT 10. Have the device repaired at Leybold
ACCEL LED lights, NORMAL LED does not light up even after an adequate acceleration time	Leak in the vacuum system so that the rated speed is not reached. Gas has leaked into the vacuum system, so that when the final speed is reached, it decreases as a result of the excessive gas friction.	Seal the vacuum system Gas leaks cause the speed to be reduced. If the speed falls below approximately 40% of the rated speed, TURBOTRONIK switches again to ACCEL. TURBOTRONIK automatically runs up again if the leak is not excessive.
FAIL LED is lit (FAIL relay is active, when the appropriate circuitry is available), and the TURBOVAC speed drops.	The TURBOVAC motor winding has exceeded the permissible limit temperature, e.g. due to an inadmissibly high ambient temperature, or inadequate cooling. The resonance monitoring has shutdown the drive, because the pump speed was within the speed range between 45,000 and 55,000 RPM for longer than one minute.	Let the TURBOVAC cool down. Improve the cooling! Reset the fault by actuating STOP. Power-down the TURBOVAC using the appropriate pushbutton or remote control and then restart it. Change the operating conditions so that the pump can rotate above 55,000 RPM.
FAIL LED is lit (the FAIL relay is active if the appropriate circuitry is available) and TURBOVAC does not run-up.	The connecting cable to the TURBOVAC or connector is defective or incorrectly connected. The TURBOVAC motor winding is inadmissibly hot.	Check the connecting cable and connector and if required, replace. Reset the fault by depressing STOP. Power-off the TURBOVAC either using the appropriate pushbutton or remote control and then restart it. Let the TURBOVAC cool down. Reset the fault by depressing STOP. Power-down using the appropriate pushbutton or remote control and then re-start the TURBOVAC.
The pump rotates normally, NORMAL LED is lit, but an adequate final pressure is not achieved.	Leak in the vacuum system. Pump rotates in the incorrect direction.	Remove the leak. Check the three motor connection phases; if applicable, interchange 2 phases.

6 Waste Disposal

The equipment may have been contaminated by the process or by environmental influences. In this case the equipment must be decontaminated in accordance with the relevant regulations. We offer this service at fixed prices. Further details are available on request.

Contaminated parts can be detrimental to health and environment. Before beginning with any work, first find out whether any parts are contaminated. Adhere to the relevant regulations and take the necessary precautions when handling contaminated parts.

Separate clean components according to their materials, and dispose of these accordingly. We offer this service. Further details are available on request.

When sending us any equipment, observe the regulations given in Section "4 Leybold service".

WARNING



EU Declaration of Conformity

(Translation of original Declaration of Conformity)

The manufacturer: Leybold GmbH
Bonner Strasse 498
D-50968 Köln
Germany

herewith declares that the products specified and listed below which we have placed on the market, comply with the applicable EU Council Directives. This declaration becomes invalid if modifications are made to the product without agreement of Leybold GmbH.

Product designation: Frequency Converter
Type designation: NT 10
Part numbers: 85900, 85901

The products complies to the following European Council Directives:

Low Voltage Directive (2014/35/EU)

Electromagnetic Compatibility (2014/30/EU)

The following harmonized standards have been applied:

EN 61010-1:2010 Safety requirements for electrical equipment for measurement, control, and laboratory use — Part 1: General requirements

EN 61326-1:2013 Electrical equipment for measurement, control and laboratory use — EMC requirements — Part 1: General requirements
Emissions: Group 1, Class B
Immunity: Industrial electromagnetic environment

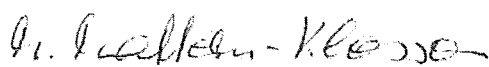
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Cologne, October 11, 2016

Cologne, October 11, 2016



ppa. Martin Tollner
Head of Product Lines



ppa. Dr. Monika Mattern-Klosson
Head of Quality & Business Process Management

Document No.: 300555046-002-A1

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 completed for each single component.

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

Customer/Dep./Institute : _____ Address : _____ _____ Person to contact: _____ Phone : _____ Fax: _____ End user: _____	Reason for return: <input checked="" type="checkbox"/> applicable please mark Repair: <input type="checkbox"/> chargeable <input type="checkbox"/> warranty Exchange: <input type="checkbox"/> chargeable <input type="checkbox"/> warranty <input type="checkbox"/> Exchange already arranged / received Return only: <input type="checkbox"/> rent <input type="checkbox"/> loan <input type="checkbox"/> for credit Calibration: <input type="checkbox"/> DKD <input type="checkbox"/> Factory-calibr. <input type="checkbox"/> Quality test certificate DIN 55350-18-4.2.1
--	--

A. Description of the Leybold product:

Material description : _____
 Catalog number: _____
 Serial number: _____
 Type of oil (ForeVacuum-Pumps) : _____

Failure description:

Additional parts: _____
 Application-Tool: _____
 Application- Process: _____

B. Condition of the equipment

	No ¹⁾	Yes	No
1. Has the equipment been used	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
2. Drained (Product/service fluid)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
3. All openings sealed airtight	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
4. Purged	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

If yes, which cleaning agent _____
 and which method of cleaning _____

¹⁾ If answered with "No", go to D. ←

Contamination :

	No ¹⁾	Yes
toxic	<input type="checkbox"/>	<input type="checkbox"/>
corrosive	<input type="checkbox"/>	<input type="checkbox"/>
flammable	<input type="checkbox"/>	<input type="checkbox"/>
explosive ²⁾	<input type="checkbox"/>	<input type="checkbox"/>
radioactive ²⁾	<input type="checkbox"/>	<input type="checkbox"/>
microbiological ²⁾	<input type="checkbox"/>	<input type="checkbox"/>
other harmful substances	<input type="checkbox"/>	<input type="checkbox"/>

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)

X	Tradename:	Chemical name:
a)		
b)		
c)		
d)		

2. Are these substances harmful ? No Yes ←
3. Dangerous decomposition products when heated ? No Yes
- If yes, which ? _____

²⁾ Components contaminated by microbiological, explosive or radioactive products/substances 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 authorized person (block letters) : _____



_____ Date

_____ signature of authorized person

 firm stamp

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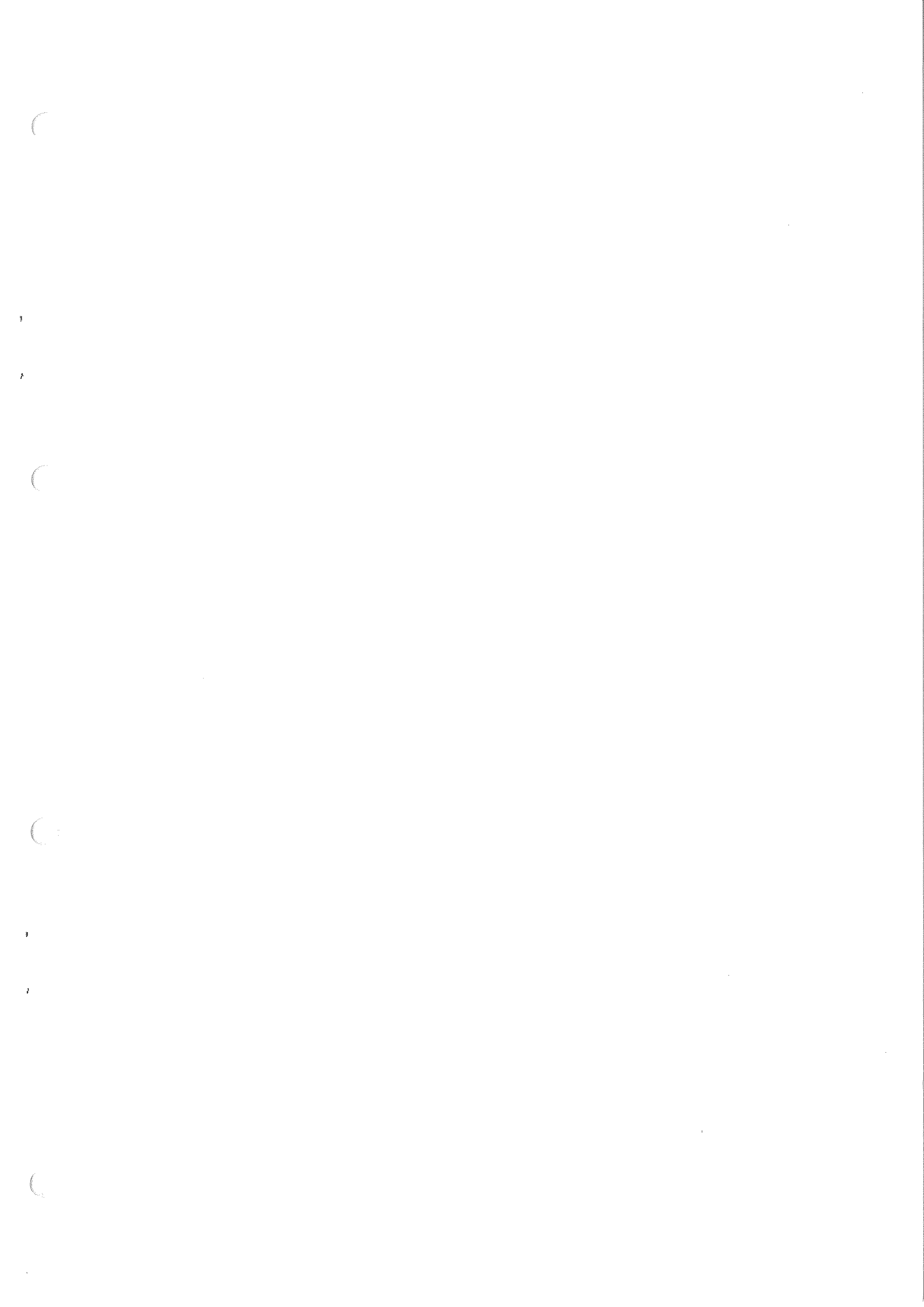
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Čeština (024)	Návod k použití přiložený k tomuto výrobku je standardně k dispozici v němčině a angličtině. Potřebujete-li návod k použití ve svém jazyce (v rámci EU), obraťte se prosím na některou z poboček Leybold.
Dansk (016)	Den medfølgende brugsvejledning til deres produkt fås på to sprog, engelsk og tysk. Hvis en brugsvejledning på eget europæiske sprog ønskes, bedes man tage kontakt til ens Leybold repræsentant.
Deutsch (001)	Die diesem Produkt beigefügte Gebrauchsanleitung liegt standardmäßig in den Sprachen Deutsch und Englisch vor. Für eine Gebrauchsanleitung in Ihrer Landessprache (EU) wenden Sie sich an die Leybold-Niederlassung.
Eesti (028)	Selle tootega kaasnev kasutusjuhend on standardset saksa ja inglise keeles. Kasutusjuhendi saamiseks teie riigikeeles (EL) pöörduge Leybold-filiaali poole.
Ελληνικά (017)	Οι οδηγίες χρήσης που συνοδεύουν αυτό το προϊόν είναι διαθέσιμες στα γερμανικά και στα αγγλικά. Για οδηγίες χρήσης στη γλώσσα σας (ΕΕ) απευθυνθείτε σε υποκατάστημα της Leybold.
English (002)	The instruction manual supplied with your product is available in two different standard European languages, English and German. If you wish to have a manual in your own European language, please contact your Leybold representative.
Español (006)	Las instrucciones de operación, adjuntas al presente producto, son en alemán e inglés. Para obtener las instrucciones en su idioma nacional (EU), póngase en contacto con su representante de Leybold.
Français (003)	Le mode d'emploi fourni avec ce produit est rédigé en anglais et en allemand. N'hésitez pas à contacter votre agence Leybold si vous avez besoin du mode d'emploi traduit dans la langue de votre pays (union européenne).
Hrvatski (029)	Uz ovaj proizvod standardno su priložena uputstva za upotrebu na njemačkom i engleskom jeziku. Za uputstva na jeziku Vaše zemlje (u EU), obratite se poslovnici Leybold-a.
Italiano (004)	Le istruzioni per l'uso allegate al presente prodotto sono disponibili di norma in lingua tedesca e inglese. Per le istruzioni per l'uso nella propria lingua (UE) si prega di rivolgersi alla filiale Leybold.
Íslenska (034)	Leiðarvísirinn sem fylgir vörinni er gefinn út á tveimur tungumálum, þýsku og ensku. Hafid samband við næsta útibú Leybold varðandi leiðarvísi á tungumáli ykkar (ESB).
Latviešu (030)	Kopā ar jūsu produktu piegādātā lietošanas instrukcija ir pieejama divās dažādās standartā Eiropas valodās, angļu un vācu. Ja jūs vēlaties saņemt instrukciju citā Eiropas valodā, sazinieties ar savu Leybold pārstāvi.
Lietuvių (031)	Prie šio produkto pridėdamos naudotojo instrukcijos paprastai pateikiamos dvejomis kalbomis - vokiečių ir anglų. Dėl instrukcijos jūsų valstybine kalba (ES), kreipkitės į Leybold atstovybę.
Magyar (033)	A termékhez mellékelni használati útmutató angol és német nyelvű. Ha a használati útmutatót a saját nyelvén (EU) szeretné megkapni, akkor kérjük forduljon az egyik Leybold képviselőhöz.
Nederlands (010)	De bij dit product bijgevoegde gebruiksaanwijzing is standaard in het Duits en Engels beschikbaar. Voor een gebruiksaanwijzing in uw taal (EU), neem dan contact op met het Leybold-filiaal.
Norsk (020)	Bruksanvisningen som medfølger dette produktet finnes som standard i språkversjonene engelsk og tysk. Ønsker du en bruksanvisning på ditt nasjonale språk (innen EU), henvender du deg til en Leybold-forhandler.
Polski (022)	Instrukcja obsługi załączona do tego produktu dostępna jest w języku niemieckim i angielskim. Po instrukcję obsługi w innym języku urzędowym Unii Europejskiej proszę zgłosić się do siedziby Leybold.
Português (005)	As Instruções de Uso anexas a este produto são fornecidas normalmente nas línguas alemã e inglesa. Para Instruções de Uso na sua língua (UE), queira dirigir-se à sucursal de Leybold.
Română (013)	Manualul de utilizare anexat acestui produs este disponibil în mod standard în limbile germană și engleză. Pentru a obține un manual de utilizare în limba țării dumneavoastră (EU), vă rugăm să vă adresați unei reprezentanțe Leybold.
Slovenčina (023)	Návod na používanie priložený k tomuto produktu je štandardne k dispozícii v nemeckom a anglickom jazyku. Ak potrebujete návod na používanie v jazyku svojej krajiny (EÚ), obráťte sa na pobočku Leybold.
Slovenščina (032)	Priložena navodila so na voljo v dveh različnih evropskih jezikih, angleščini in nemščini. Če želite navodila za uporabo v svojem jeziku (EU), se obrnite na predstavnika Leybold.
Suomi (019)	Tähän tuoteeseen liittyvä käyttöopas on saksan- ja englanninkielellä. Mikäli haluatte käyttöoppaan maanne kielellä (EU), voitte kääntää vastaavan Leybold-toimipisteen puoleen.
Svenska (009)	Den användarmanual som följer med denna produkt finns i standardutförandet på tyska och engelska. Vänd dig till en Leybold-återförsäljare för en användarmanual på ditt språk (gäller EU-språk).
Türkçe (018)	Bu ürünün ekinde bulunan kullanım kılavuzu, standart olarak Almanca ve İngilizce dillerinde bulunmaktadır. Kendi dilinizdeki (AB) kullanım kılavuzu için bir Leybold-Şubesine başvurun.
Български (027)	Приложените към този продукт указания за употреба в общия случай са налични на немски и на английски език. За указания на Вашия език (ЕС) можете да се обърнете към представителството на Leybold.
Русский (007)	В стандартную комплектацию изделия входит руководство по эксплуатации на немецком и английском языках. За руководством по эксплуатации на языке Вашей страны (ЕС), пожалуйста, обращайтесь в представительство Leybold.