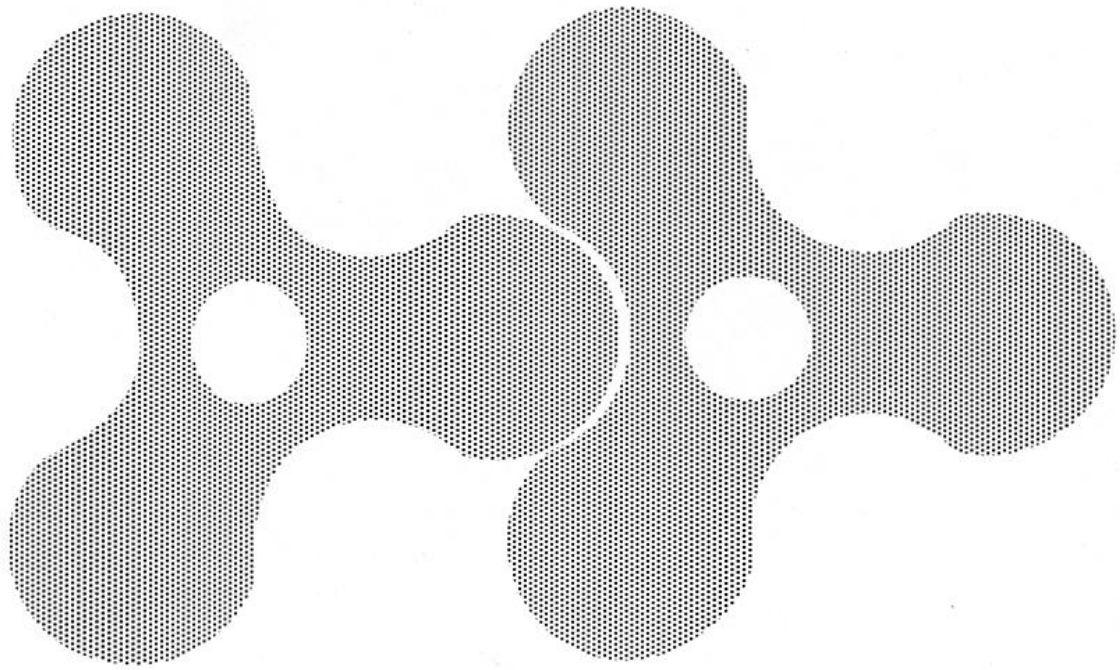
ابنیه پایدار سبز

BUSCH
Vacuum Pumps and Systems

Installation and Maintenance Instructions



Roots blowers
Tyr WT 0100 - 0730 BP / BV
PUMPS

CE

Busch Vyroba CZ s.r.o.
Svarovska 620
Liberec 11
Czech Republic
CZ 460 01

0870A00002 / 171107CZ / Modifications reserved

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INTRODUCTION

Congratulations on your new Busch Roots blower type Tyr. With great attention to the user's needs, with innovation and constant improvements Busch delivers modern vacuum and positive pressure solutions all over the world.

This installation and maintenance instruction applies to the following Roots blowers:

WT 0100 BP/BV
WT 0150 BP/BV
WT 0280 BP/BV
WT 0390 BP/BV
WT 0600 BP/BV
WT 0730 BP/BV

The installation and maintenance instruction contains information concerning:

- Product description
- Safety
- Transport
- Storage
- Installation and start-up
- Maintenance
- Repairs
- Troubleshooting
- Spare parts

The term "handling the Roots blower" covers transport, installation, start-up, operating conditions, maintenance, troubleshooting and overhaul of the blower.

NOTE
It is important that this installation and maintenance instruction is read and understood before any handling of the Roots pump. In case of doubt please contact your local Busch Company.

NOTE
Store this instruction and any accompanying manuals where they are accessible near the machine.

MANUFACTURER:

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phone: +420 487 070 200
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www.buschvacuum.com

PRODUCT DESCRIPTION

Use

Roots blower Tyr can be used for pumping dry air or gasses that are not aggressive, toxic or explosive. The Roots blowers are not designed for another media. The gas must be free from vapours that will condense in the temperature and pressure conditions in the Roots blower. The Roots blower is designed for installation in an environment that is not potentially explosive. In case of doubt please contact your local Busch Company.

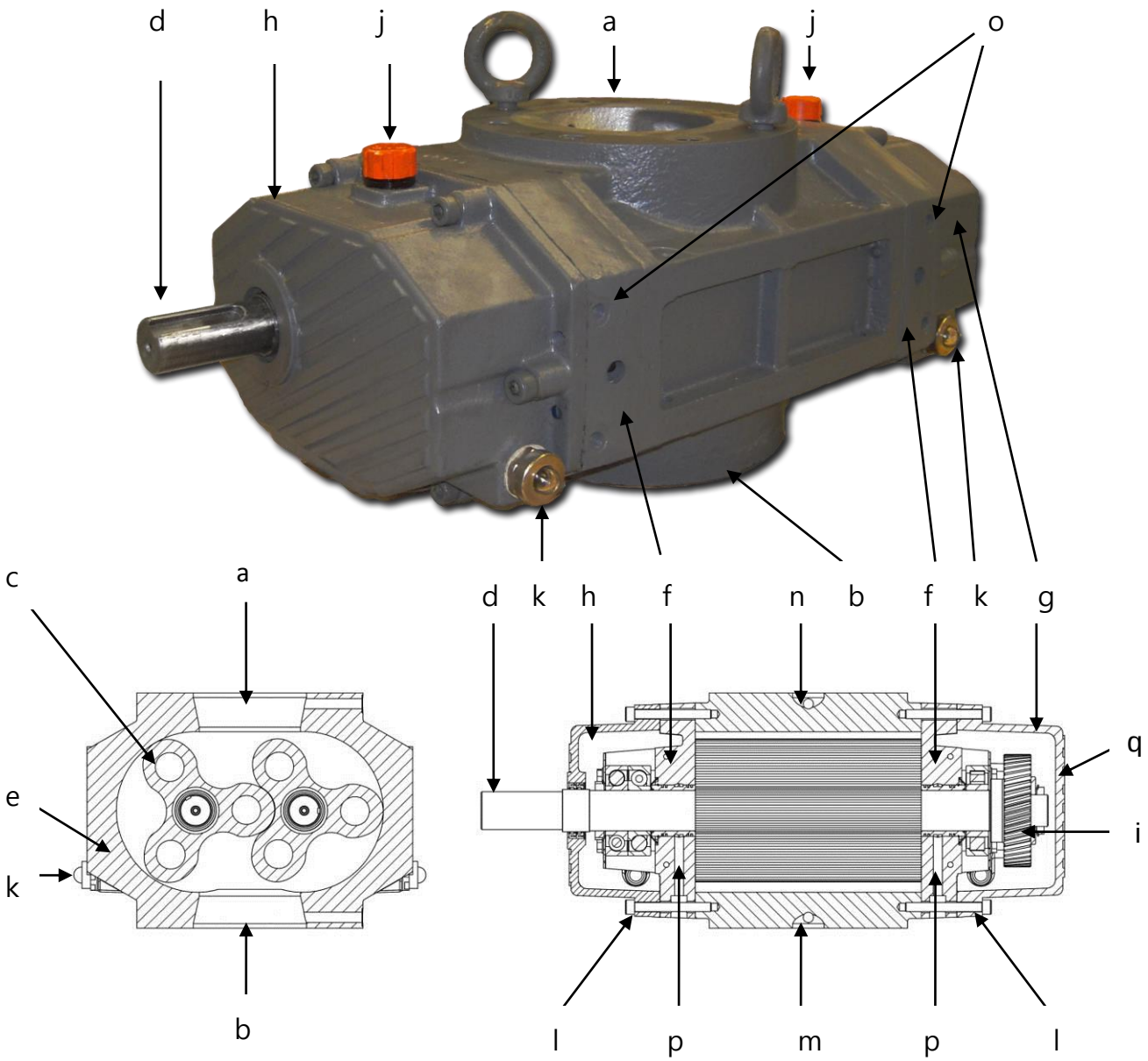
NOTE
Fluids and solid particles must not be sucked into the Roots blower. Use of media/gasses with a higher or lower mass and heat capacity than air leads to altered thermal and/or mechanical strain to the Roots blower, and is only allowed after prior consultation with Busch.

Operating principle

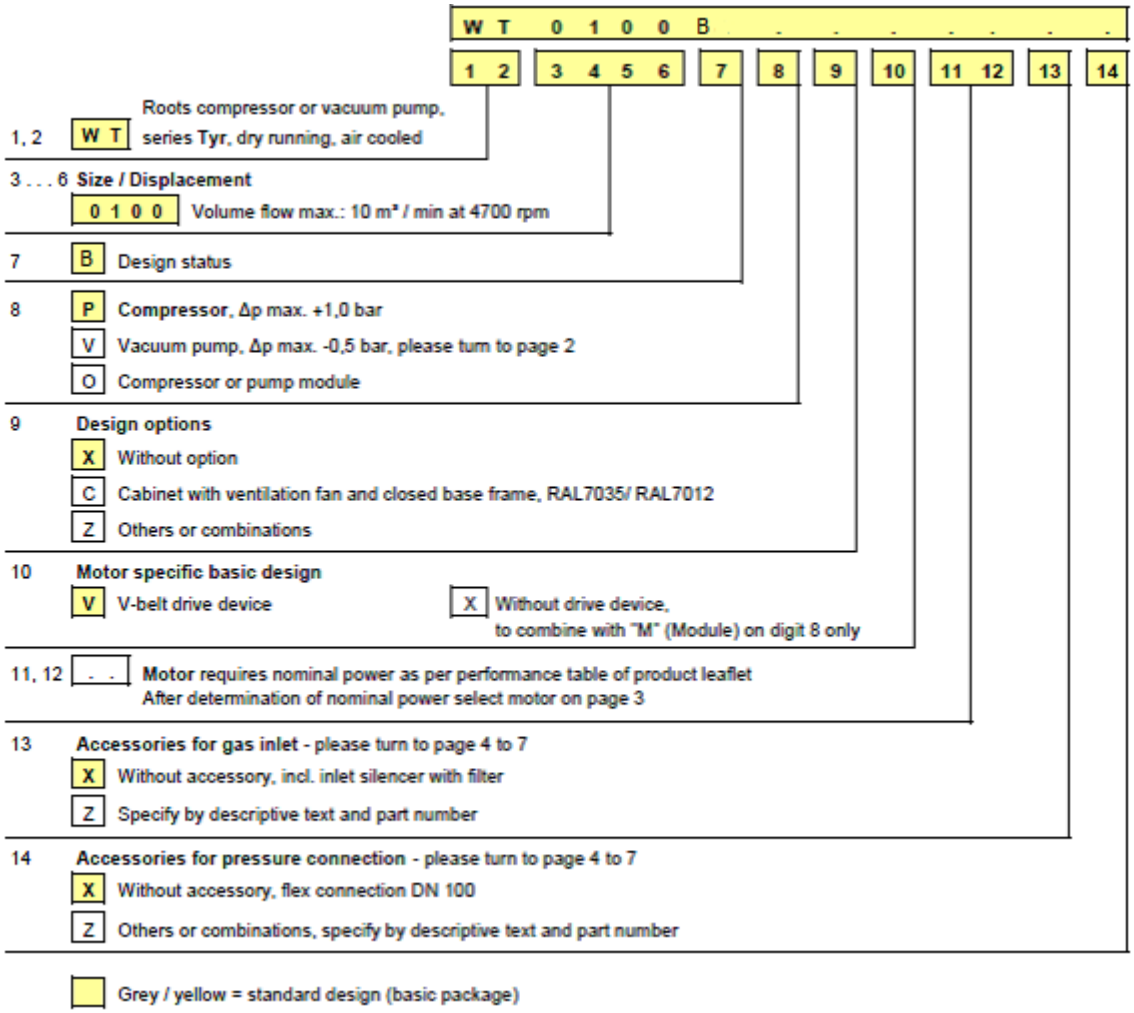
The three-lobe Roots blower type Tyr manufactured by Busch operates according to the acknowledged Roots principle. The operation is both simple and efficient. Two identical lobes rotate in opposite direction in the casing.
During the rotation air flows into the space between the lobes and the casing and is led through the pump to the outlet. When the tip of the lobe opens to the outlet there is a pressure equalisation backwards into the pump. This transport of air happens twice (there are two lobes) for each revolution of the lobes, thus six times for each revolution of the blower shaft. There is no mechanical contact between lobes and casing and bearing covers which is why it is not necessary to lubricate. This operation is contactless and oil-free. The components are dimensioned so there is very little backflow through the internal tolerances. The differential pressure over the pump stage equals the resistance in the system that the Roots blower is connected to at both the inlet side and outlet side. The Roots blower is primarily cooled by the transported air/gas.

Blower versions

Tyr Roots blowers are available in different sizes.
The type designation shows the type, version, size and if the pump is for pressure or vacuum.



a. Inlet
b. Outlet
c. Roots lobes
d. Drive shaft
e. Cylinder
f. Bearing cover
g. Gear wheel cover
h. Oil cover
i. Gear wheel
j. Oil filling plug
k. Oil sight glass
l. Oil drain magnetic plug
m. Connection for pressure gauge
n. Connection for vacuum gauge
o. Connection for coolant
p. Vents
q. Name plate


W T 0 1 0 0 B . . . . . .
1 2 3 4 5 6 7 8 9 10 11 12 13 14
1, 2 W T Roots compressor or vacuum pump, series Tyr, dry running, air cooled
3 . . . 6 Size / Displacement
0 1 0 0 Volume flow max.: 10 m³ / min at 4700 rpm
7 B Design status
8 P Compressor, Δp max. +1,0 bar
V Vacuum pump, Δp max. -0,5 bar, please turn to page 2
O Compressor or pump module
9 Design options
X Without option
C Cabinet with ventilation fan and closed base frame, RAL7035/ RAL7012
Z Others or combinations
10 Motor specific basic design
V V-belt drive device
X Without drive device, to combine with "M" (Module) on digit 8 only
11, 12 . . Motor requires nominal power as per performance table of product leaflet
After determination of nominal power select motor on page 3
13 Accessories for gas inlet - please turn to page 4 to 7
X Without accessory, incl. inlet silencer with filter
Z Specify by descriptive text and part number
14 Accessories for pressure connection - please turn to page 4 to 7
X Without accessory, flex connection DN 100
Z Others or combinations, specify by descriptive text and part number
Grey / yellow = standard design (basic package)

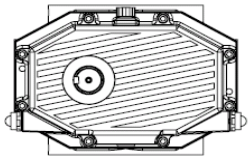
TECHNICAL DATA

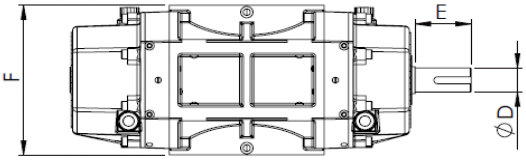
Blower data

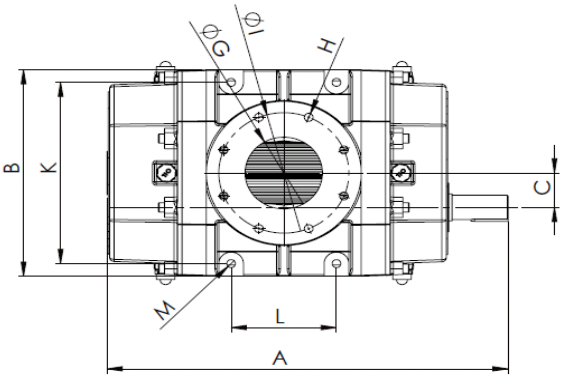
Nominal data

TYPE			WT 0100	WT 0150	WT 0280	WT 0390	WT 0600	WT 0730
Nominal air volume		m^3/min	2,5..10,0	3,7..15,0	5,1..28,0	7,1..39,0	12,0..64,0	15,4..73,0
Max. differential pressure pressure operation		mbar	1000	1000	1000	1000	1000	1000
Max. differential pressure vacuum operation		mbar	500	500	500	500	500	500
Nominal motor output		kW	1,5..22	3..37	3..55	3..55	11..90	11..90
Blower speed		rpm	1150..4700	1150..4700	850..4700	850..4700	750..3500	750..3500
Sealing type			Piston ring	Piston ring	Piston ring	Piston ring	Piston ring	Piston ring
*Indicative values - depending on the motor used	Weight pump stage	kg	75	92	167	193	336	375
	Weight unit without cabinet	kg	* 180	* 197	* 346	* 372	* 711	* 750
	Weight unit with cabinet	kg	* 295	* 312	* 535	* 561	* 1014	* 1053

Blower measurements

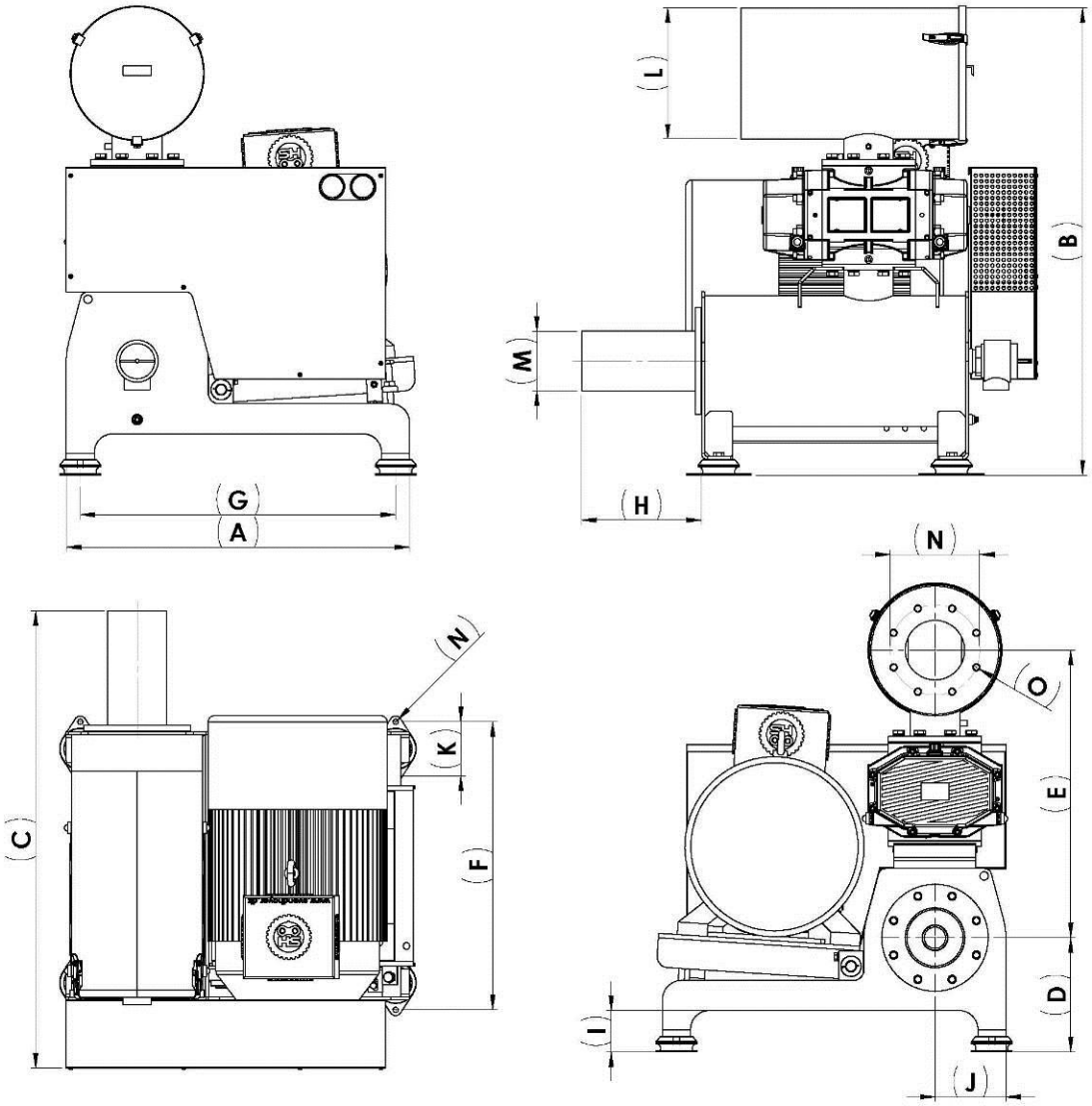






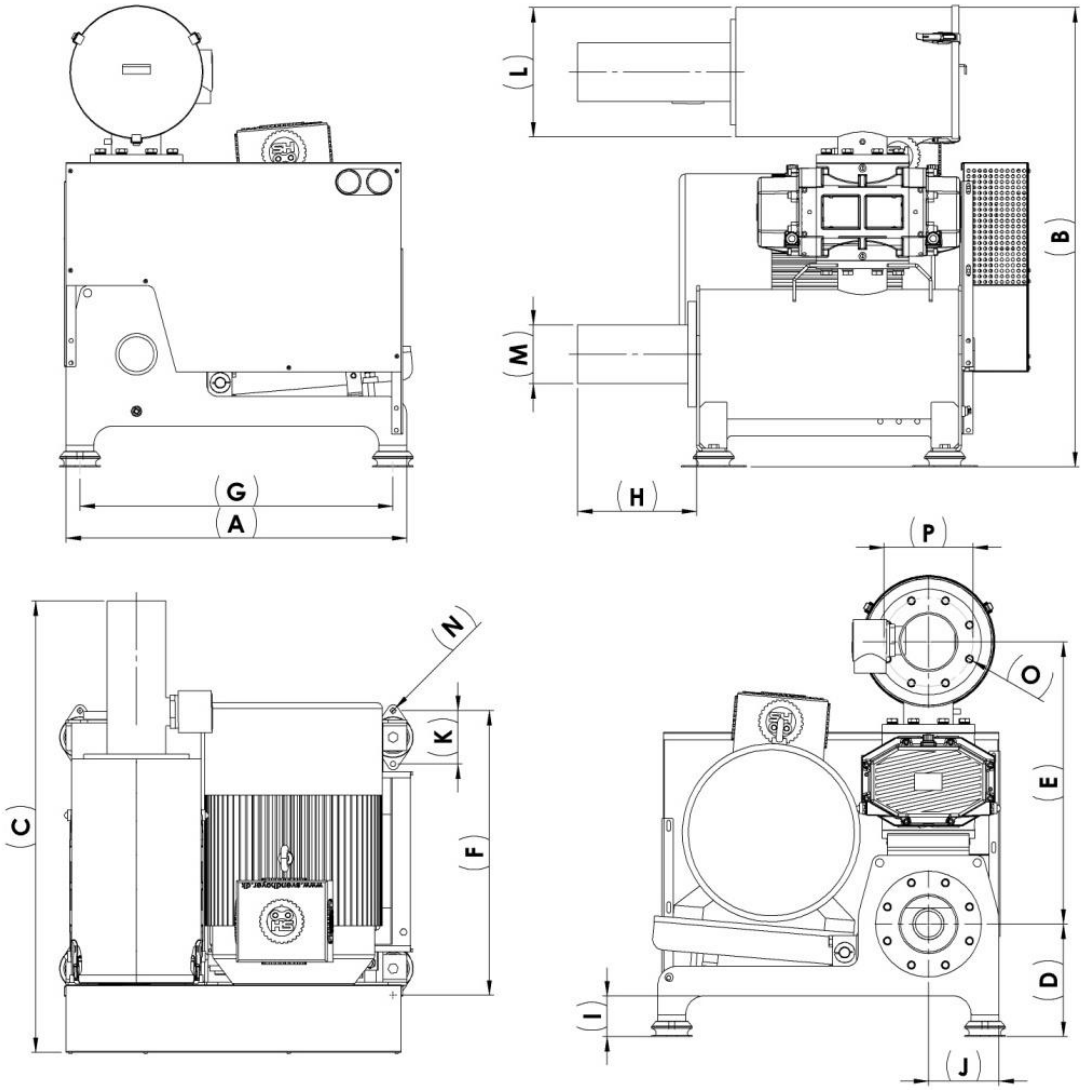
DIMENSION	A	B	C	D	E	F	G	H	I	K	L	M
WT 0100 BO	485	263	45	32	60	210	76	M16	145	244	101	M10
WT 0150 BO	569	263	45	32	60	210	114	M16	180	244	186	M10
WT 0280 BO	654	357	60	42	85	261	125	M16	210	316	170	M16
WT 0390 BO	754	357	60	42	85	261	159	M20	240	316	270	M16
WT 0600 BO	817	457	81	55	89	350	219	M20	295	420	292	M20
WT 0730 BO	927	457	80	55	89	350	219	M20	295	420	402	M20

Pressure unit measurements – without cabinet



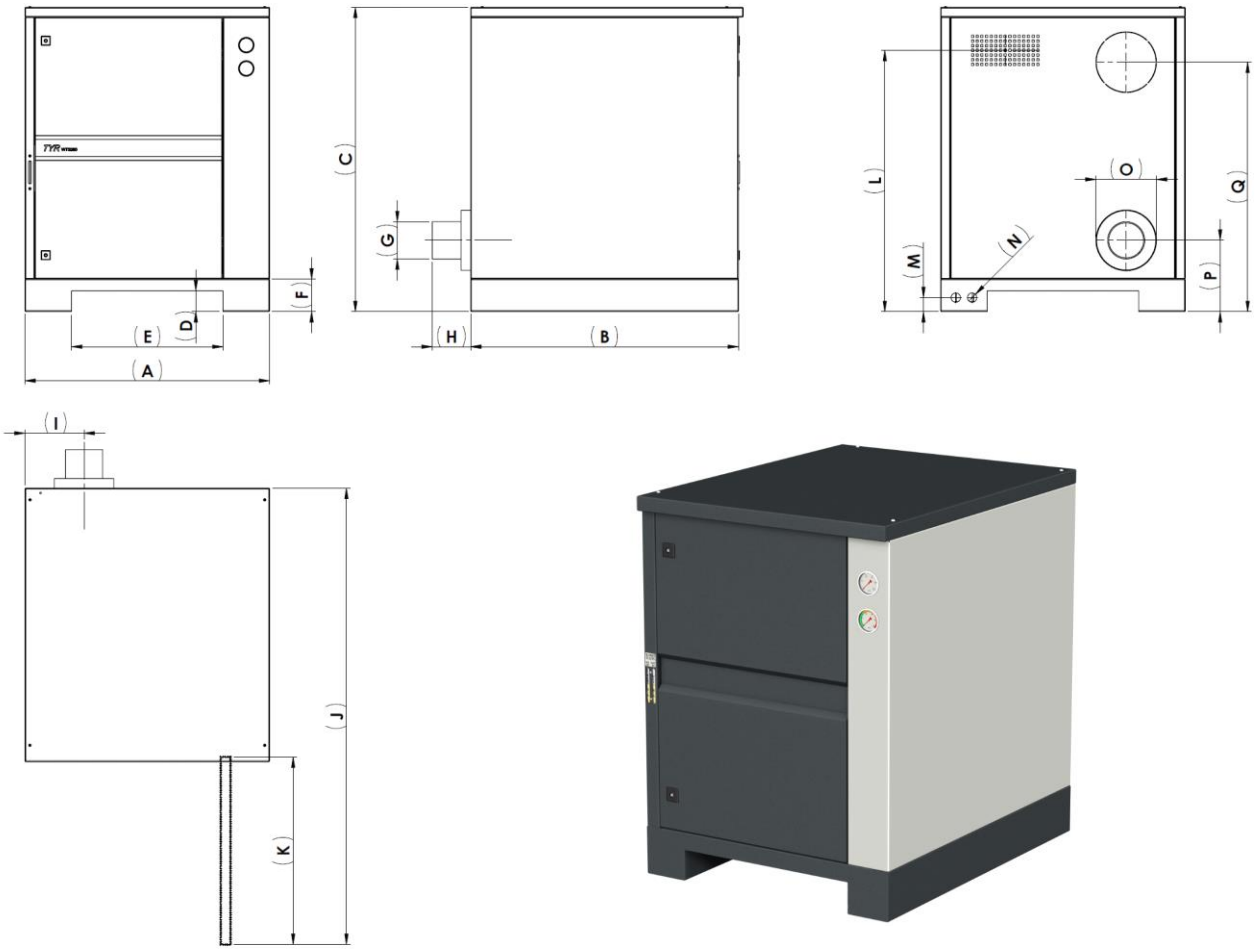
DIMENSION	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P
WT 0100-0150 BP	690	1028	1080	289	610	660	640	318	114	140	110	250	114	14	M16	180
WT 0280-0390 BP	920	1251	1218	310	761	756	845	321	116	190	134	350	159	14	M16	240
WT 0600-0730 BP	1250	1660	1705	381	1024	958	1175	563	116	265	134	500	219	14	M20	295

Vacuum unit measurements – without cabinet



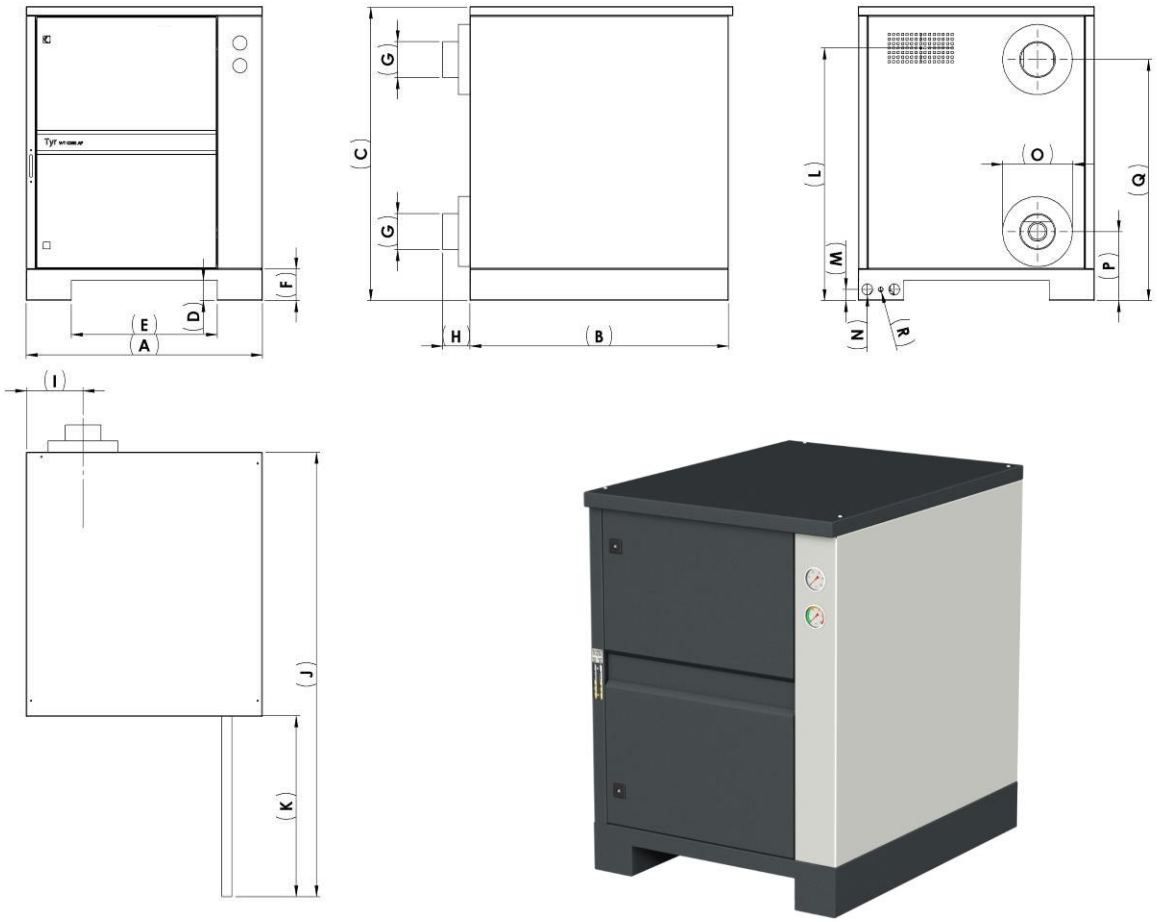
DIMENSION	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P
WT 0100-0150 BV	690	1028	1080	289	610	660	640	318	114	140	110	250	114	14	M16	180
WT 0280-0390 BV	920	1251	1218	310	761	756	845	321	116	190	134	350	159	14	M16	240
WT 0600-0730 BV	1250	1660	1705	381	1024	958	1175	563	116	265	134	500	219	14	M20	295

Pressure unit measurements – with cabinet



DIMENSION	WT 0100 BP	WT 0150 BP	WT 0280 BP	WT 0390 BP	WT 0600 BP	WT 0730 BP
A	800	800	1050	1050	1450	1450
B	1000	1000	1150	1150	1550	1550
C	1082	1082	1302	1302	1732	1732
D	90	90	90	90	90	90
E	540	540	650	650	850	850
F	140	140	140	140	140	140
G	114	114	159	159	219	219
H	157	157	119	119	210	210
I	195	195	254	254	365	365
J	1570	1570	1950	1950	2550	2550
K	620	620	800	800	1100	1100
L	750	750	1118	1118	1518	1518
M	60	60	50	50	50	50
N	21	21	40	40	40	40
O	225	225	295	295	380	380
P	279	279	306	306	375	375
Q	889	889	1067	1067	1395	1395
R	40	40	40	40	40	40
S	-	-	21	21	21	21

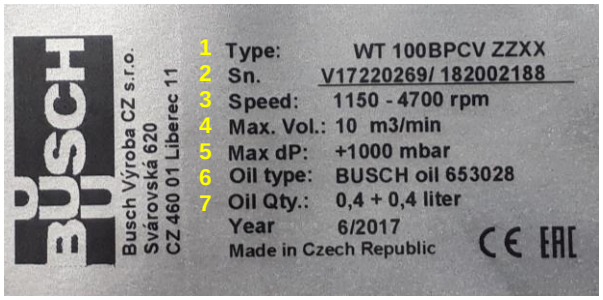
Vacuum unit measurements – with cabinet



DIMENSION	WT 0100 BV	WT 0150 BV	WT 0280 BV	WT 0390 BV	WT 0600 BV	WT 0730 BV
A	800	800	1050	1050	1450	1450
B	1000	1000	1150	1150	1550	1550
C	1082	1082	1302	1302	1732	1732
D	90	90	90	90	90	90
E	540	540	650	650	850	850
F	140	140	140	140	140	140
G	114	114	159	159	219	219
H	157	157	119	119	210	210
I	195	195	254	254	365	365
J	1570	1570	1950	1950	2550	2550
K	620	620	800	800	1100	1100
L	750	750	1118	1118	1518	1518
M	60	60	50	50	50	50
N	21	21	40	40	40	40
O	225	225	295	295	380	380
P	279	279	306	306	375	375
Q	889	889	1067	1067	1395	1395
R	40	40	40	40	40	40
S	-	-	21	21	21	21

Blower name plate

1. Type
2. Serial number
3. Rpm interval
4. Nominal max. air volume
5. Max. differential pressure
6. Oil type
7. Oil quantity



SAFETY

Specified use

The term ”handling the Roots blower” covers transport, installation, start-up, operating conditions, maintenance, troubleshooting and overhaul of the blower.

The Roots blower is meant for industrial use; it must only be handled by trained personnel.

Allowed means of operation and use (→ see section: Product description)
Preconditions for installation (→ see section: Preconditions for installation)
The preconditions for installation must be followed by both the manufacturer of the machine or the installation that the Roots blower is to be part of and the operator.

Maintenance directions must be obeyed.

NOTE
These Roots blowers are manufactured according to the latest technical standards and safety rules. If the blowers are not installed correctly or used in a wrong manner dangerous situations may occur.

Ambient temperature: **-15 to +45°C**
Ambient pressure: **atmospheric pressure**

Safety directions

The Roots blowers are constructed and manufactured with methods according to current technical level. There may still be danger connected with handling the Roots blowers. These directions give information about potential dangers. It is crucial that these directions are followed. Safety directions are marked with the key words: DANGER, WARNING and CAUTION as follows:

DANGER
Ignoring this safety direction will always lead to accidents with fatal or serious outcome

WARNING
Ignoring this safety direction can lead to accidents with fatal or serious outcome

CAUTION
Ignoring this safety direction can lead to accidents with minor injuries or damage to property

Sound pressure level

The sound pressure level very much depends on the individual installation and operation data. The norm data for sound pressure levels is found in the dimensioning data tables. The norm data is based on measurements according to DIN45635, and is a free field measurement at several points around the Roots blower at 1 meter distance. The norm data is according to the DIN-norm excl. exhaust noise.

CAUTION
The Roots blower emits high intensity noise in a narrow frequency band.

Danger of hearing damage.

People who are near a non-noise reduced Roots blower for longer periods of time must use a hearing protector.

TRANSPORT

Transport and packaging

Tyr Roots blowers go through a thorough operational test at the factory and are packaged. Inlet and outlet are covered in order to avoid dirt and dust getting into the blower during transport. The Roots blower is delivered packaged and fixed to a pallet. The pallet can be transported with a forklift truck or a pallet lifter. Please check for transport damage upon reception.

During transport the Roots blower must be protected against impacts.

- Open the packaging.
- Remove any foam, bubble wrap or corrugated cardboard around the Roots blower.
- Loosen and remove the tie bolts / straps that fix the Roots blower to the pallet.
- The blower can now be lifted off the pallet and be handled with appropriate lifting equipment.

CAUTION
Do not work, stand or walk underneath the lifted blower.

The packaging must be disposed of according to current environmental laws or recycled.

STORAGE

Short-term storage

Check that the flanges on inlet and outlet are closed with the supplied plugs, so that no dust or moisture can get into the blower.

Store the Roots blower:

- In the original packaging if possible
- In a closed room
- Dry
- Free from dust
- Free from vibrations

Long-term storage and preservation

Check that the flange connections are covered with plugs, so no dust can get into the blower.
Store the blower in the original packaging and place it indoors in dry surroundings free from dust and vibrations.

For long-term storage (more than 3 months) or storage in a warehouse with substantial fluctuations in temperature and/or an aggressiv atmosphere, the Roots blower must be preserved and all openings sealed with PTFE tape, seals or o-rings with tape. Wrap the Roots blower in VCI foil.

Preserving the Roots blower:

- Open the inlet flange and spray preservation oil into the cylinder while the lobes are turned. **NB!** Preserve only with oil, if the oil can later be accepted into the system that the Roots blower is connected to.
- Wrap the Roots blower in VCI foil.

VCI stands for ”volatile corrosion inhibitor”. VCI products (foil, cardboard, paper, foam) vaporises a substance that condenses in molecular thickness on the wrapped goods, and its electrochemical abilities prevent corrosion of metal surfaces. However, VCI products can attack synthetic materials and elastomers. Contact your local packaging dealer for guidance. Busch uses VCI foil for preservation.

Store the Roots blower:

- In the original packaging
- In a closed room
- Dry
- Free from dust
- Free from vibrations

Start-up after preservation:

- Check that all tape residue has been removed from the openings
- Start the blower as described in the section → Installation and start-up

INSTALLATION & START-UP

Preconditions for installation

CAUTION
If the preconditions for installation are not followed especially when it comes to insufficient cooling:

DANGER of damage to or destruction of the Roots blower and adjacent components and installation!
DANGER of damage to people!
The preconditions must be respected.

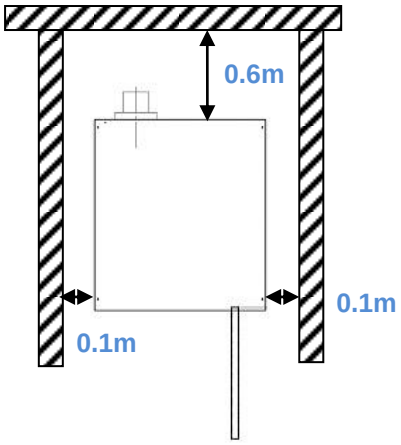
Check that the fitting of the Roots blower is performed so the basic safety requirements in Machine Directive 2006/42/EF are met.

It is important to perform the installation according to the below instructions in order to achieve a correct installation in terms of safety.
Start-up must only be performed by trained personnel.

1. Set-up

Tyr Roots blowers must be set up horizontally on a flat surface, place eventual supports under the machine shoes. The following operating conditions are required by the surroundings:

Ambient environment:	Not potentially explosive
Ambient temperature:	-10..+45°C
Ambient pressure:	atmospheric pressure
Placement:	horizontally, evenly on a solid foundation
Distance to walls:	minimum 0.6 m (backside) and 0.1 m (sidewalls) to ensure sufficient cooling



Ventilation:	sufficient to remove heat emissions from the Roots blower

Check that the requirements for the surroundings correspond to the motor's and any frequency converter's protection class.

In order to avoid overheating the Roots blower it is important to ensure sufficient supply of fresh air. When using a sound reducing cabinet it is important that the air locks are not covered.

Place the Roots blower so there is enough room to perform service on the blower, and prepare the surroundings in a way so necessary help equipment for handling the blower/motor etc. in case of repairs is close by. Make sure that the blower is not touched unintentionally during operation.

Check that the oil level indicators are visible, and that the oil fill and the oil drain plugs are easily accessible.

CAUTION
The surface of the Roots blower can reach temperatures above 70°C during operation. Danger of burns!

2. Inlet and outlet connection

The inlet and outlet should be connected to pipe installation with a flexible hose/flex tube or an axial compensator. The pipe installation must be made from conducting material in order to avoid build up of static electricity. Pipe installation on the exhaust side must be made from heat resistant material.

Vibrations in the pipe installation must not be able to influence the pump and vice versa.

In order, not to create unnecessary loss of pressure and thereby reduce the Roots blower's air output and increase its absorbed power, the pipe installation must be made in at least the same size as the connections on the Roots blower both before and after the Roots blower. If the length of the pipes before and after the blower is more than 2 metres, it may be sensible to use pipes with a larger diameter in order to avoid loss of capacity or overloading the pump. Consult your local Busch company.

Check and make sure that the blower is not started with a closed valve, neither at the inlet or outlet, and that the control does not allow closing automatic shut-off valves during operation.

When connecting several blowers to a common manifold the manifold must be made with flow joints, and each blower must be connected to the manifold with a check valve and automatic or manual shut-off valves that enable insulation and servicing of one blower during continuous operation with the other blowers. Adapt the pipe size in the manifold to the total amount of air for the blowers.

There must be no solid particles like solder residue or liquid in the suction hose as it can be sucked into the Roots blower and destroy it.

CAUTION
Infiltration of foreign bodies or liquid can damage the Roots blower.

In order to secure the Roots blower against dust and other dirt we recommend using an intake filter with a minimum filtration degree of EU4.

Check that there are no solid particles in the blower casing before start-up by turning the blower shaft manually.
Always connect the outlet so any condensed water cannot run back into the Roots blower.

3. Oil filling

The gear box and the bearings in the shaft side are oil lubricated.

NOTE
The Roots blowers are generally delivered with oil precharge!
Operation without oil will damage the Roots blower! Always check that there is oil on the blower before start-up. The oil level must be at the top of the oil level indicator!

The necessary amount of oil is filled on the Roots blower at delivery. See the table "Oil filling amounts". Check the oil level. When filling oil do the following:

Open the oil filling plug on the shaft side and fill oil until the oil level is at the top of the oil sight glasses on the blower and in the middle of the level indicator – gear oil side. Then close the plugs securely. Over filling will result in increased absorbed power, increased oil temperature and increased noise level and may result in oil leaks from the shaft seals.

Types and amounts of oil are stated in the section on ”Maintenance”.

4. Electrical connection

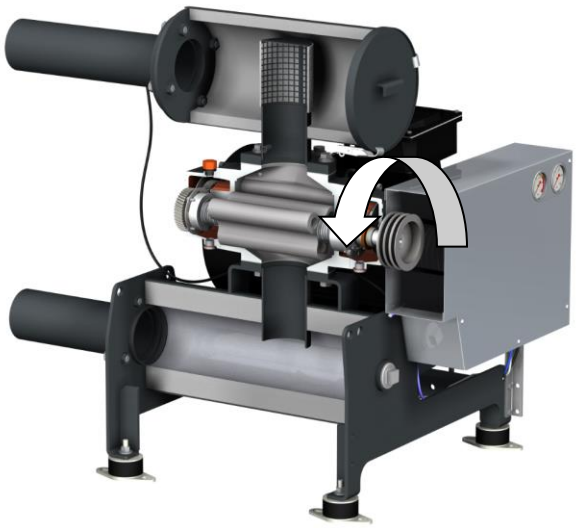
DANGER

Electrical connection must only be performed by a certified electrician.
The installation must be performed in accordance with current norms and regulations as well as local and national rules.
Read and follow the motor manual and the directions for installation of a cabinet ventilator in separate manufacturer manual.
The user must inform the manufacturer if electrical or electromagnetic disturbances are to be expected from the supply.

Check the direction of revolution for the blower by briefly activating the motor. If the direction of revolution is wrong, then two phases must be switched.

Looking at the blower shaft the direction of revolution must be anti-clockwise.

DIRECTION OF REVOLUTION:



The cabinet ventilation fan must be connected to a separate power supply and must run when the motor runs.

Start-up

Before start-up of the Roots blower measure and register the outdoor temperature and outdoor pressure as well as the temperature and pressure in the machine room where the blower is placed. After start-up and operation for about 10-20 hours; repeat the measurements outdoors and indoors. Relative changes to the temperatures and pressure indicate how well the machine room is ventilated. A fall in the ambient pressure in the machine room in relation to outdoors and/or increase in the ambient temperature in the machine room in relation to the outdoor temperature indicates the efficiency of the ventilation.

1. Start-up

Tyr Roots blowers can be used for air and gasses that are not aggressive, toxic or explosive.
Another media must not be used. In case of doubt contact your local Busch company.

Output and operating temperature of the blower is influenced by specific weight and heat capacity of the gas

NOTE

Must not be used for aggressive, toxic or explosive gasses, gas mixes or liquids.

The gas temperature at the inlet should not exceed 45°C. In case of doubt please contact your local Busch company

CAUTION

Hot surface!
Do not touch surfaces marked with this label.
Temperature: > 70°C

During the initial operating hours check regularly that the operation is flawless, notice signs like increased sound levels, increased exhaust temperature, increased power consumption, activated safety valve, etc.
Stop the Roots blower immediately in case of suspicion of a malfunction.

In order to protect the Roots blower Tyr from overloads from increased differential pressure the blower is equipped with a safety valve. Blowers supplied for pressure operation are equipped with a valve on the exhaust side, and blowers supplied for vacuum operation are equipped with a valve at the inlet side. Note that a pressure blower equipped with a pressure safety valve is NOT protected against unintentional differential pressure at an inlet manifold and inlet valves and/or intake filters, just like a vacuum blower is NOT protected against unintentional differential pressure in an exhaust manifold, exhaust valves or extra exhaust silencers. The safety valve must not be used as a regulation valve and therefore should always be fully closed during normal operation.

NOTE

The Busch safety valve is factory pre-set. Do not change the setting.

2. Check after 10-20 operating hours

DANGER
If the Roots blower sucks in gasses that are contaminated with harmful substances, then these harmful substances may be in the blower and the connected components.

Health hazards at test, cleaning, service, etc.

In connection with contaminated components you must use safety equipment in accordance with the safety data sheet for the contaminating medium.

Contaminated materials must be disposed of as special waste according to current local regulations.

Measure and register the blower's inlet and outlet pressure, use the measuring connectors on the blower flanges, and the blower's power absorption and exhaust temperature.

The Roots blower must be turned off at the service breaker and secured against wrongful re-activation during all service work.

The blower is delivered with V-belts with automatic belt tensioning during operation. Check the belt tension level, which should resemble the re-tension level on the belt calculation supplied as documentation with the blower, eventually adjust the tension with the belt stabiliser by tightening or loosening the spring tension. Also, check the pulley alignment and readjust if necessary.

Check and clean or change the inlet filter if necessary.

Check the oil level and colour (the blower must be turned off), the level must be at the top of the sight glasses on the blower-shaft oil room and at the middle of the level indicator in the cabinet-gear oil room, and the oil must be clean and clear. Perform an oil change if the oil shows signs of contamination.

Check and register outdoor and indoor temperatures and pressure and compare all measured data to previously measured data and to the original design data for the pump. Check deviations and look for the causes in the installation that the blower is connected to.

MAINTENANCE

NOTE
The Roots blower must be turned off at the service breaker and secured against wrongful re-activation during all service work.

MAINTENANCE	SERVICE WORK	PERFORMED	DESCRIPTION	INTERVAL
AFTER 10-20 operating hours	Oil level & colour	1. Check	Section 1	
	Inlet filter	1. Check, cleaning	Section 6	
	Belt drive	1. Check	Section 4	
WEEKLY	Oil level and colour	Check	Section 1	Weekly
MONTHLY	Inlet filter	Check and possible cleaning	Section 6	Monthly or more often depending on application
HALF-YEARLY	Belt drive	Check	Section 4+5	Half-yearly or more often depending on application
	Inlet filter	Cleaning	Section 6	
YEARLY	Oil	Oil change	Section 1+2+3	Every 8000 hours, min. once a year
	Inlet filter	Change	Section 6	Yearly or more often depending on application
EVERY 1 YEARS (cca 9000 operating hours)	V-belts	Change	Section 4+5	About every 1 years
	Motor	Check and lubrication	According to motor manual	According to motor manual
	Electrical connection	Check (performed by certified electrician)		Half-yearly

Note that the maintenance intervals vary a lot depending on operating conditions. The above values are start values that are shortened or prolonged depending on needs.

Especially at operation in unfavourable conditions like at high dust amount in the surroundings or the process gas, other contamination, infiltration of process materials, may lead to shortening of the maintenance intervals.

1. Oil level and colour

The oil must be checked for the first time after about 20 operating hours.

The oil level must be checked at least once a week.

During check of oil level through the blower's oil sight glass the blower must be turned off.

If the oil level in the sight glasses is below the top, oil must be topped up. Top up the oil until the level is at the top of the sight glasses on the blower.

If the oil appears discoloured or unclear it must be changed.

NOTE

Over filling can damage the Roots blower and will lead to increased operating temperature and increased absorbed power. DANGER of damaging the Roots blower.

Check that oil fill plugs, oil drain plugs and oil level indicator are sealed. At signs of leak tighten or replace.

2. Change of oil in gear box and bearings

The oil must be changed for the first time after 500 operating hours. Further oil changes depend on the operating conditions. The oil must at minimum be changed every 8000 operating hours or at least once a year.

If the oil appears unclear or black in the level indicator it should be changed more often.

Before oil change the Roots blower at operating temperature must be turned off and ventilated so the entire installation is at atmospheric pressure. Let the blower cool down for 20 minutes so the oil is warm, but not too hot when it is drained.

The oil is drained through two oil drain plugs. Close the oil drain plugs thoroughly and fill new oil through the oil fill plugs.

Fill new oil until the sight glass is full. Let the blower rest for 5 minutes to let the oil distribute into the oil chamber. Pour the oil slowly in order to get a correct reading of the oil level in the oil level indicators. There are two oil chambers to be filled – shaft side and gear side.

Check that the oil fill plug, oil drain plug, oil drain cock and the oil level indicator are sealed. At signs of leaks tighten or replace the plugs.

Used oil must be disposed of according to current environmental laws.

3. Oil types and quantities

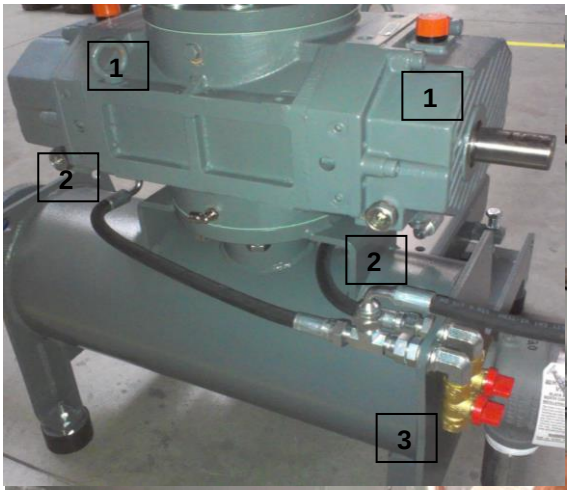
We recommend using PAO oil (Poly-α-Olefine), as listed in the below table "Recommended oil types".

Other oil types may only be used upon agreement with your local Busch company.

When changing between oil types Busch recommends to perform two oil changes within 24 hours' operation.

TYPE	Oil quantity (litres) GEAR SIDE with cab./without cab.	Oil quantity (litres) SHAFT with cab./without cab.
WT 0100	0,4 / 0,3	0,4 / 0,3
WT 0150	0,4 / 0,3	0,4 / 0,3
WT 0280	0,7 / 0,6	0,7 / 0,6
WT 0390	0,7 / 0,6	0,7 / 0,6
WT 0600	1,1 / 1,0	1,1 / 1,0
WT 0730	1,1 / 1,0	1,1 / 1,0

1. Oil fill plug
2. Oil level indicator
3. Oil drain cock



Recommended oil types	
T_{Oil} Temp.	-30..120°C
Texaco	
PAO	Meropa Synthetic EP 220/320
Foodgrade	Anderol 6220
Shell	
PAO	Omala S4 GX 220
Foodgrade	Cassida GL 220
Castrol	
PAO	Alphasyn T 220
Foodgrade	Optileb GT 220

NOTE

The use of incorrect oil leads to damage on seals, gear wheels and bearings and may lead to breakdown.

4. Tensioning and replacing V-belts

The V-belts are tensioned automatically by the weight of the motor and stabilized by the belt stabiliser during operation. Check the belt tension level, which should resemble the re-tension level on the belt calculation supplied as documentation with the blower, eventually adjust the tension with the belt stabiliser by tightening or loosening the spring tension. Also, check the pulley alignment and readjust if necessary.

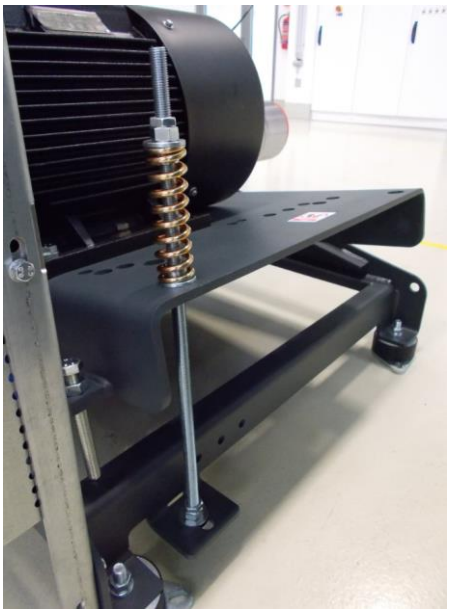
For replacing the V-belts dismount the top nuts of the belt stabiliser and lift the motor pivot by screwing the lifting bolt on the motor pivot in an upwards direction. When the motor pivot is lifted the V-belt can be replaced. Screw the lifting bolt all the way up again whereby the motor pivot is released. Mount the top nuts on the belt stabiliser again and tighten until the belt tensioning equals the data on the test certificate.

NOTE

When changing belts all belts must ALWAYS be changed at the same time!

5. Calculation of belt drive

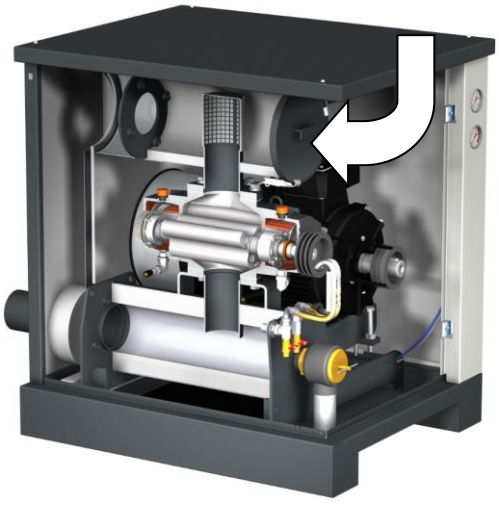
Each Roots blower is geared precisely to the current operating conditions specified by the customer.
If there are changes to the application or the operating conditions that require correction to the rpm. of the blower, then new belts can be calculated by and ordered at the manufacturer.

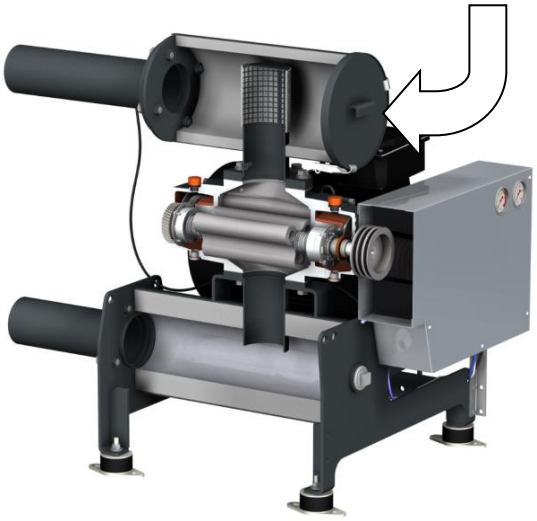


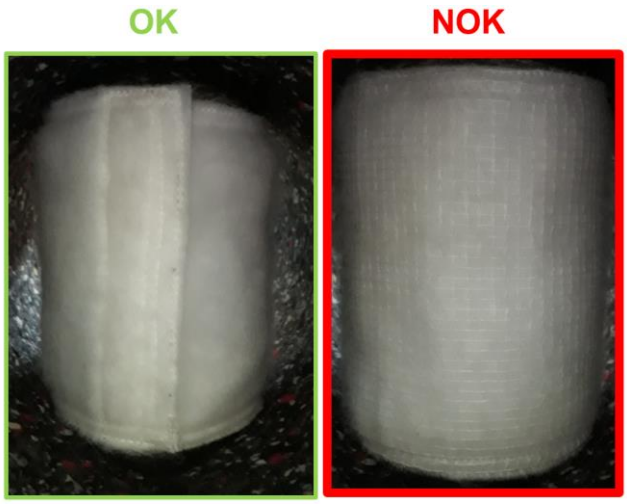
6. Cleaning and replacing inlet filter

The inlet filter must be cleaned regularly. The frequency depends on the application, but the filter must be cleaned at least once every six months. The filter's dirt level is monitored by the supplied filter gauge that is built into the v-belt cover or the cabinet front.

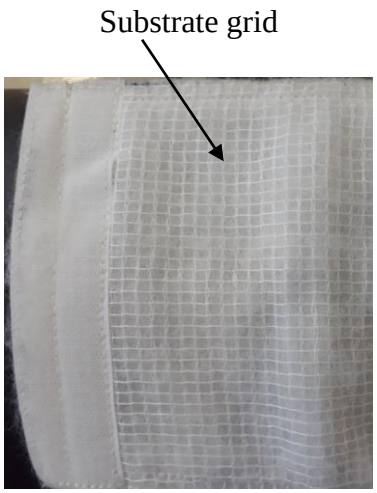
Vent the blower. Open the filter lid and take the filter element out. The element is cleaned with compressed air and/or washed. If the filter element is too dirty and cannot be cleaned it must be replaced. Put the filter element back and close the lid.







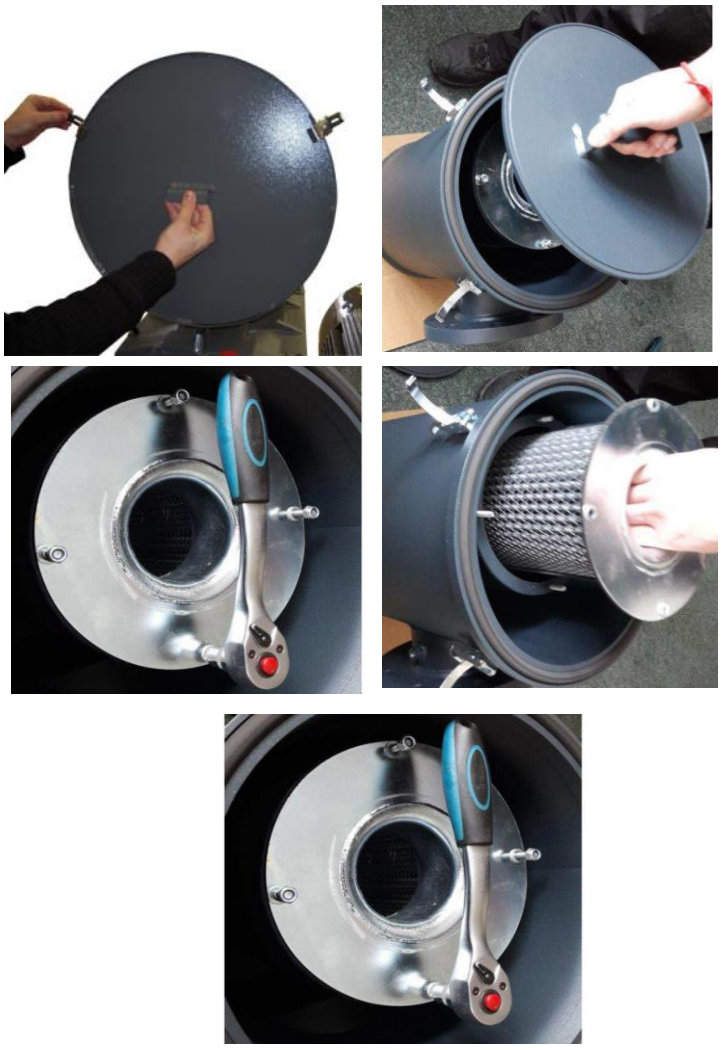
CAUTION
The orientation of the fabric must be a substrate grid (underlying fabric) inside



7. Cleaning and replacing of reactive filter

The inlet filter must be cleaned regularly. The frequency depends on the application, but the filter must be cleaned at least once every month. The filter's dirt level is monitored by the supplied filter gauge that is built into the v-belt cover or the cabinet front.

Vent the blower. Open the filter lid and take the filter element out. The element is cleaned with compressed air and/or washed. If the filter element is too dirty and cannot be cleaned it must be replaced. Put the filter element back and close the lid.



8. Maintenance of motor

See motor manual

9. Maintenance of ventilator

See ventilator manual

Overhaul

NOTE

The blower is assembled at our factory with precise internal tolerances in order to achieve the specified flow and operating efficiency. The internal tolerances must be set correctly manually again after dismantling and assembly. Wrongfully set tolerances can lead to breakdown. So, it is strongly recommended that the blower stage is sent to the nearest Busch service shop for overhaul. Overhaul performed at a non-authorised shop is not covered by Busch's warranty.

Generally we recommend planning a preventive overhaul for every 45000 hours operation.
A minimum level overhaul includes always exchange of bearings, seals and gaskets.

Busch Service shops will only receive Roots blowers that arrive with a completed "Declaration of contamination of pumps and components" with a legally binding signature. The form is found in Appendix 1.
When sending blowers in for repairs please also enclose "Repair and service licence". Form is found in Appendix 2.

Decommissioning blower

Electrical equipment connected to the blower like the motor and cabinet ventilator must be dismantled electrically by a licensed electrician.

Before dismantling the flange connections, the blower must be ventilated to atmospheric pressure.

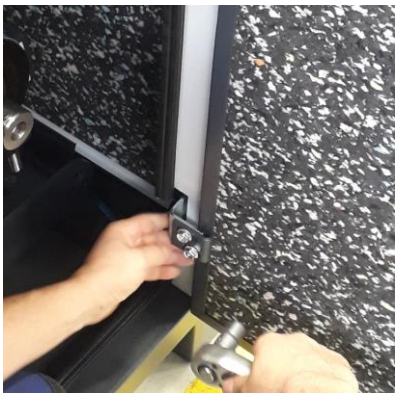
Busch recommends that the complete Roots blower unit is sent to Busch service shop in connection with overhaul. Then it is ensured that all components with an effect on the Roots blowers operation are checked and tested in connection with overhaul of the blower.

If only the bare shaft blower is to be checked, overhauled and tested, then the unit can be taken apart and the bare shaft blower dismantled according to the directions below.

Dismantling and assembling cabinet

1. Disconnect the power supply between motor and ventilator (performed by licensed personnel)
2. Vent pipe system and blower
3. Dismantle the pipe connections to the Roots pump at the silencers.
4. Loosen the four bolts that hold the cabinet lid.

5. Dismantle and pull the air hoses between blower and gauges out from under the cabinet lid's insulation and then lift the lid of the cabinet.

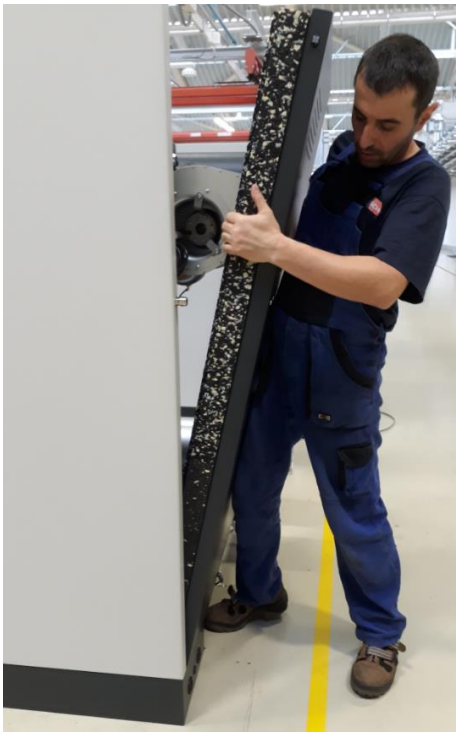


6. Dismantle the cabinet door with the 4 hinge bolts.

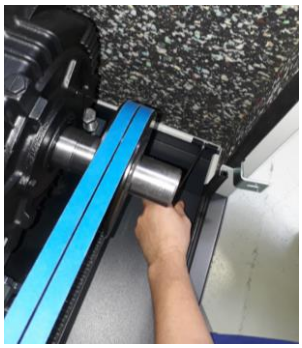
7. Dismantle the oil level indicator at the front of the cabinet with the 2 bolts and tie the oil level indicator to the side of the blower in a position where the vent plug in the level indicator is above oil level.

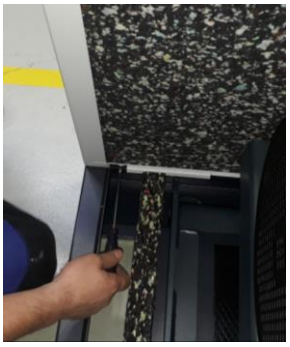
8. Loosen the bottom bolts at the front end of the left cabinet side and lift the cabinet side up and off.

9. Lift the cabinet back up and off.



10. Loosen the bottom bolts at the front and back of the right cabinet side.





11. Lift the cabinet side up and off.

12. The cabinet is now dismantled.

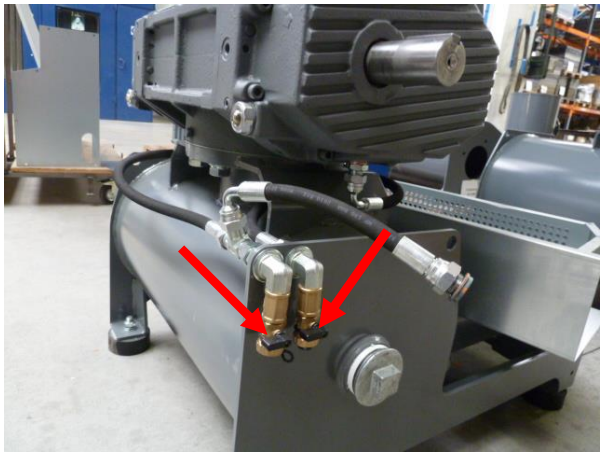
13. The cabinet can be put back together in reverse order.

Dismantling and assembling unit

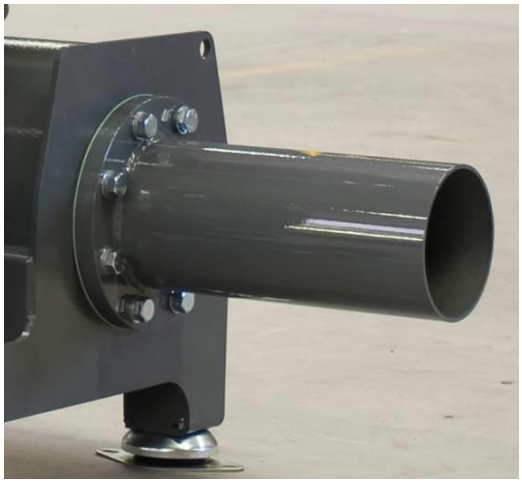
1. Disconnect the power supply between motor and ventilator (performed by licensed personnel)

2. Vent pipe system and blower

3. Drain oil through drain cock.



4. Dismantle the pipe connections to the Roots blower at the silencers.

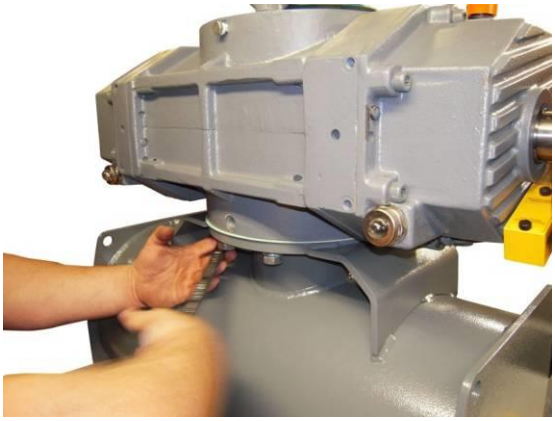


5. Dismantle inlet silencer with the flange bolts and plug the blower inlet.

6. Loosen and remove the nut on top of the belt stabiliser and lift the motor pivot with the lifting bolt. Dismantle the belts.

7. Dismantle the oil connection from the blower's front and rear oil chambers.

8. Dismantle the blower from the foundation silencer and plug the blower outlet flange.



9. The unit is put back together in reverse order.

Preparation of blower before transport

If the blower has been connected to a pipe system where there are or may be risky and/or toxic media, then the blower must be prepared specially before transport.

1. Definitions

Corrosive media can cause a lot of damage if it comes in contact with the skin
Risky media are defined as media that can

- Cause acute or chronic damage and even death through breathing, ingesting or in contact with the skin.
- Cause swelling at direct, prolonged or repeated contact with the skin or mucous membranes.

Toxic media can, even in small amounts, cause acute or chronic reactions and even death through breathing, ingesting or in contact with the skin.

2. Symbols

The below symbols apply to the described media (in accordance with EU directive 67/548/EWG).

 Corrosive  Risky  Toxic

3. Handling procedure

a. Before shipment the Roots blower must be decontaminated as well as possible.

b. All blower openings in contact with the surrounding environment must be sealed even after the blower has been cleaned. The blower contains hollow spaces that cannot be reached without dismantling the blower and which can contain residue.

c. Use as a minimum the below personal protective equipment when sealing.
   - Nitryl gloves
   - Full face mask with ABEK1 filter.

d. The inlet and outlet must be covered
   - With blind flanges for toxic and corrosive media
   - At least aluminium tape for risky media

e. Enclose a completed ”Declaration of contamination of pumps and components” for the blower as well as safety data sheets for the media. See Appendix 1.

f. The blower can now be transported. Sent with ”Repair and service licence”. See Appendix 2.

Busch service shops only receive blowers that are sent with a completed and with legally binding signature ”Declaration of contamination of pumps and components”.

Storage or scrapping

Decommissioning blower

Electrical equipment connected to the blower like the motor and cabinet ventilator must be dismantled electrically by a licensed electrician.

Before dismantling the flange connections, the blower must be ventilated to atmospheric pressure.

Preparation of blower before storage or scrapping

If the pump has been connected to a pipe system where there are or may be risky and/or toxic media, then the pump must be prepared specially before transport.

1. Definitions

Corrosive media can cause a lot of damage if it comes in contact with the skin
Risky media are defined as media that can

- Cause acute or chronic damage and even death through breathing, ingesting or in contact with the skin.
- Cause swelling at direct, prolonged or repeated contact with the skin or mucous membranes.

Toxic media can, even in small amounts, cause acute or chronic reactions and even death through breathing, ingesting or in contact with the skin.

2. Symbols

The below symbols apply to the described media (in accordance with EU directive 67/548/EWG).

 Corrosive  Risky  Toxic

3. Handling procedure

a. Before storage or scrapping the Roots, blower must be decontaminated as well as possible.

b. All blower openings in contact with the surrounding environment must be sealed even after the blower has been cleaned. The blower contains hollow spaces that cannot be reached without dismantling the blower and which can contain residue.

c. Use as a minimum the below personal protective equipment when sealing.
   - Nitryl gloves
   - Full face mask with ABEK1 filter.

d. The inlet and outlet must be covered
   - With blind flanges for toxic and corrosive media
   - At least aluminium tape for risky media

e. For storage enclose for internal use a completed ”Declaration of contamination of pumps and components” for the blower as well as safety data sheets for the media for later use for installation and start-up. See Appendix 1.

f. For scrapping drain the oil and dispose of it in accordance with current environmental laws. The blower must be disposed of in accordance with current environmental laws.

According to our knowledge when this manual was printed there are no materials used for manufacturing the Roots blower that will be a risk.
Dispose of the oil in accordance with current directions and scrap of the Roots blower.

TROUBLESHOOTING

DANGER

Live wires.
Risk of electrical shock.
Electrical installation work must only be executed by qualified personnel.

CAUTION

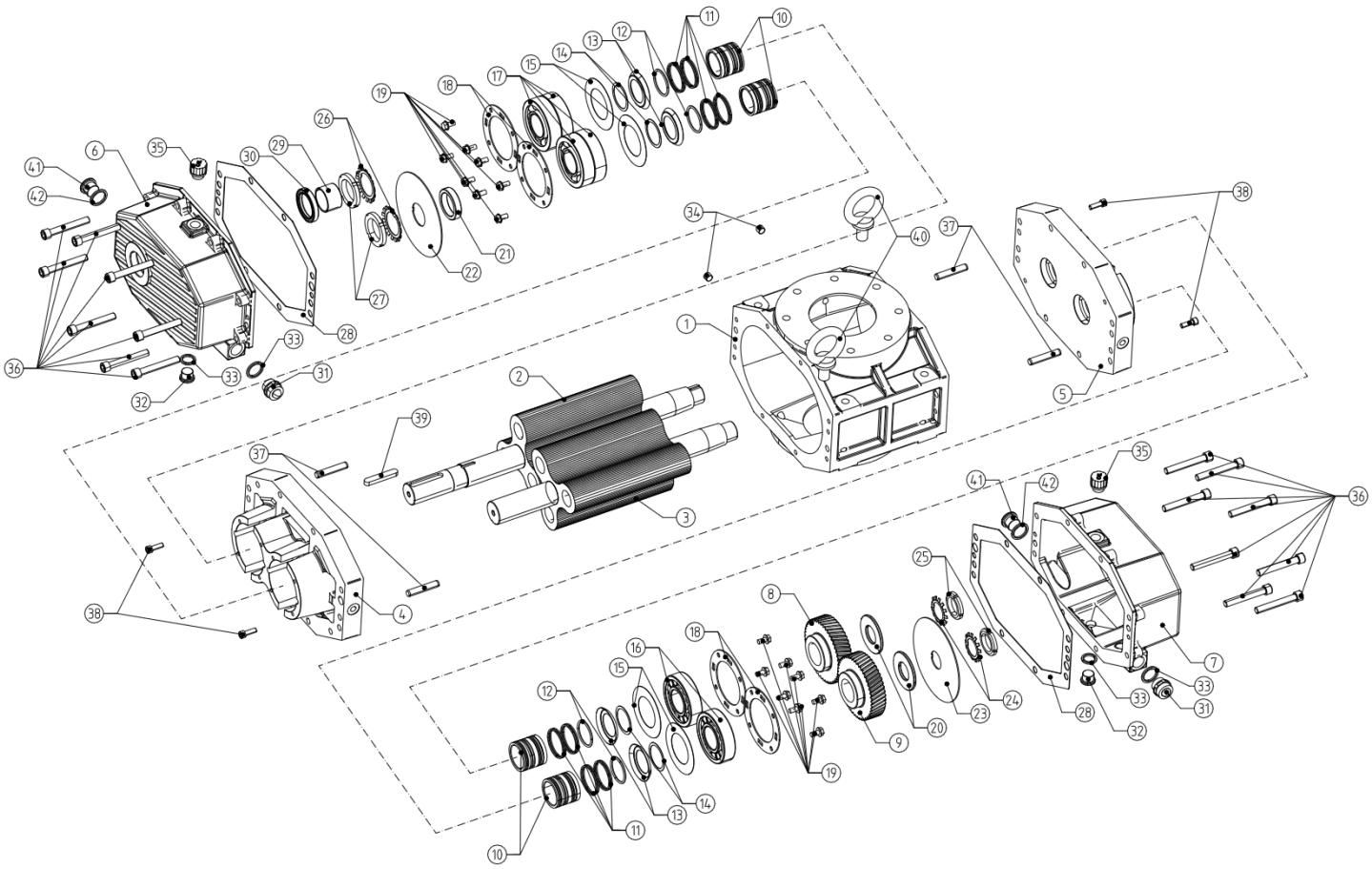
During operation the surface of the Roots blower may reach temperatures of more than 70°C.
Risk of burns!
Let the Roots blower cool down prior to a required contact or wear heat protection gloves.

PROBLEM	POSSIBLE CAUSE	SOLUTION
The blower is not running and the blower shaft can be turned in both directions.	Broken V-belts	Fit new V-belts
	Motor failure	Repair or replace motor
The blower is not running and the blower shaft cannot be turned manually.	The lobes touch the cylinder or the end covers	Check the blower for signs of overheating/ overloading and begin necessary repairs
		Check the lobes for signs of corrosion and dissolve with oil
	There are foreign bodies in the cylinder	Begin necessary repairs
Abnormal sounds or vibrations STOP THE BLOWER IMMEDIATELY!!	The pulleys are placed incorrectly. Either parallel-displaced or angle-displaced	Place the pulleys correctly
	Damaged bearings	Begin repair with bearing replacement
	Shortage of oil or dazed oil	Top up or change oil
	Too much oil in oil box	Drain oil and regulate oil level
	Too unstable foundation	Ensure stable foundation
	Resonance in pipe system	Pipe system must be connected to blower with flexible connections and supported if necessary
	Too high differential pressure*	Look for causes of increased differential pressure, e.g. blockage or damage. Check also for control system based causes. Repair
	Air leakage	Find the leakage spots and repair
	The lobes touch the cylinder or the end covers*	Begin repair in workshop
	There are foreign bodies in the cylinder	Begin repair in workshop
	Damaged check valve	Replace check valve
Abnormal heat development STOP THE BLOWER IMMDIATELY!!	Abnormal increase in exhaust temperature	See causes marked with *
	Too low rpm on blower (and/or motor with frequency regulation)	Check the minimum allowed rpm. and correct the setting
	Too high oil level	The oil level must be at the top of the level indicator when the blower is not running
	Under pressure in the machine room	Check the ventilation system and correct the ventilation amount or air lock sizes so there is not under pressure in the room
	Too high differential pressure*	Check, clean and replace the inlet filter. Check pipes and process system on both sides of the blower for blockages, obstructions, both mechanical and control system related
	Abnormal wear on the lobes after strain from solid media (e.g. dust from operation without inlet filter, CIP cleaning of the blower during operation with aggressive cleaning fluids or stress from aggressive gasses)	Install inlet filter to protect the blower and begin repairs of the blower

PROBLEM	POSSIBLE CAUSE	SOLUTION
Oil leakage *	Too high oil level (above max on level indicator in cabinet)	The oil level must be between MIN and MAX on level indicator on cabinet front
	Leaking or damaged shaft seals	Begin repair in workshop
	Blower has been tilted or is not mounted horizontally	Place on horizontal foundation
	Too high differential pressure*	Check, clean and replace the inlet filter. Check pipes and process system on both sides of the pump for blockages, obstructions, both mechanical and control system based
Loss of capacity	Leak in the system	Find the leaks and stop them
	Activated safety valve	Check differential pressure and see causes marked with * Possibly set the safety valve's opening pressure
	Dirty inlet filter or blocked pipes	Clean and possibly replace filters and pipes
	Loose V-belts	Replace v-belts
	Too high differential pressure*	See symptoms and causes marked with *
Abnormally high differential pressure* STOP THE BLOWER IMMEDIATELY!!	Safety valves do not open despite too high differential pressure	Dismantle and clean valve and possibly readjust
	Blockages on inlet side or outlet side of the blower	Clean the pipe system and look for mechanical or control system related blockages or obstructions that can lead to increased loss of pressure
	Fault on check valve	Replace check valve
Continuously activated safety valve	Too high rpm and thereby too high amount of air (concerns frequency controlled blowers)	Lower the rpm.
	Too high differential pressure*	Find the cause of the increased differential pressure and repair it
	The valve setting is below the actual operating point	Adjust the max limits of the valve within the blower. Monitor the absorbed power and ensure that the setting does not allow overloading of the pump
The motor is running the wrong way	Wrong power supply	Switch two phases to reverse the direction of revolutions
Abnormal motor temperature	Motor fault or fault in motor bearings	Repair or replace the motor
	The motor is incorrectly electrically wired	Check and reconnect
	Overloading	Look for causes of increased differential pressure in the system and repair
	Wrong power supply	The power supply must be consistent with data on motor's type sign
	Too high ambient temperature (+40°C)	Improve ventilation in the machine room
	Fault on motor fan	Replace/repair motor fan

EXPLOSION DRAWING AND SPARE PARTS

Bare-shaft blower



NOTE
Exclusive use of original spare parts and wear parts to maintain guarantee

WT 0100			
POS.	PART NAME	PART NUMBER	QTY.
1	HOUSE WT0100	0247A00013	1
2	ROTOR WT0100 - L	0210A00113	1
3	ROTOR WT0100 - S	0210A00013	1
4	BEARING HOUSE SH.S.	0240A00012	1
5	BEARING HOUSE G.S.	0240A00022	1
6	END COVER SH.S.	0246A00112	1
7	END COVER G.S.	0246A00012	1
8	GEAR WHEEL R	0517A00002	1
9	GEAR WHEEL L	0517A00007	1
10	PISTON RING BUSH	0460A00110	4
11	PISTON RING	0460A00132	16
12	O-RING	0486A00009	4
13	OIL WASHER	0460A00111	4
14	WASHER U.B. SMALL	310169	4
15	WASHER U.B. LARGE	310170	4
16	CYL. ROLLER BEARING	733024	2
17	ANG. CONT. BALL BEARING	731015	4
18	BEARING PLATE	0460A00505	4
19	SCREW M6x16	774202	16
20	DISK FOR GEAR	0460A00302	2
21	DISTANCE BUSH	0460A00202	1
22	OIL SPLASH SH.S.	0460A00112	1
23	OIL SPLASH G.S.	0460A00113	1
24	LOCK WASHER	741020	2
25	LOCK NUT	741006	2
26	LOCK WASHER	741022	2
27	LOCK NUT	741004	2
28	GASKET	753085	2
29	INNER RING	0484300001	1
30	SHAFT LIP SEAL	745109	1
31	OIL SIGHT GLASS	175012	2
32	MAGNETIC PLUG	310209	4
33	SEALING WASHER	310083	6
34	PLUG	773250	2
35	BREATHER PLUG	310062	2
36	SCREW M10x80	0413300005	12
37	PIN 8x50	0413300006	4
38	SCREW M8x45	0413300007	4
39	SHAFT KEY	0435300001	1
40	EYE BOLT M10	0413300004	2

WT 0150			
POS.	PART NAME	PART NUMBER	QTY.
1	HOUSE WT0150	0247A00014	1
2	ROTOR WT0150 - L	0210A00114	1
3	ROTOR WT0150 - S	0210A00014	1
4	BEARING HOUSE SH.S.	0240A00012	1
5	BEARING HOUSE G.S.	0240A00022	1
6	END COVER SH.S.	0246A00112	1
7	END COVER G.S.	0246A00012	1
8	GEAR WHEEL R	0517A00002	1
9	GEAR WHEEL L	0517A00007	1
10	PISTON RING BUSH	0460A00110	4
11	PISTON RING	0460A00132	16
12	O-RING	0486A00009	4
13	OIL WASHER	0460A00111	4
14	WASHER U.B. SMALL	310169	4
15	WASHER U.B. LARGE	310170	4
16	CYL. ROLLER BEARING	733024	2
17	ANG. CONT. BALL BEARING	731015	4
18	BEARING PLATE	0460A00505	4
19	SCREW M6x16	774202	16
20	DISK FOR GEAR	0460A00302	2
21	DISTANCE BUSH	0460A00202	1
22	OIL SPLASH SH.S.	0460A00112	1
23	OIL SPLASH G.S.	0460A00113	1
24	LOCK WASHER	741020	2
25	LOCK NUT	741006	2
26	LOCK WASHER	741022	2
27	LOCK NUT	741004	2
28	GASKET	753085	2
29	INNER RING	0484300001	1
30	SHAFT LIP SEAL	745109	1
31	OIL SIGHT GLASS	175012	2
32	MAGNETIC PLUG	310209	4
33	SEALING WASHER	310083	6
34	PLUG	773250	2
35	BREATHER PLUG	310062	2
36	SCREW M10x80	0413300005	12
37	PIN 8x50	0413300006	4
38	SCREW M8x45	0413300007	4
39	SHAFT KEY	0435300001	1
40	EYE BOLT M10	0413300004	2

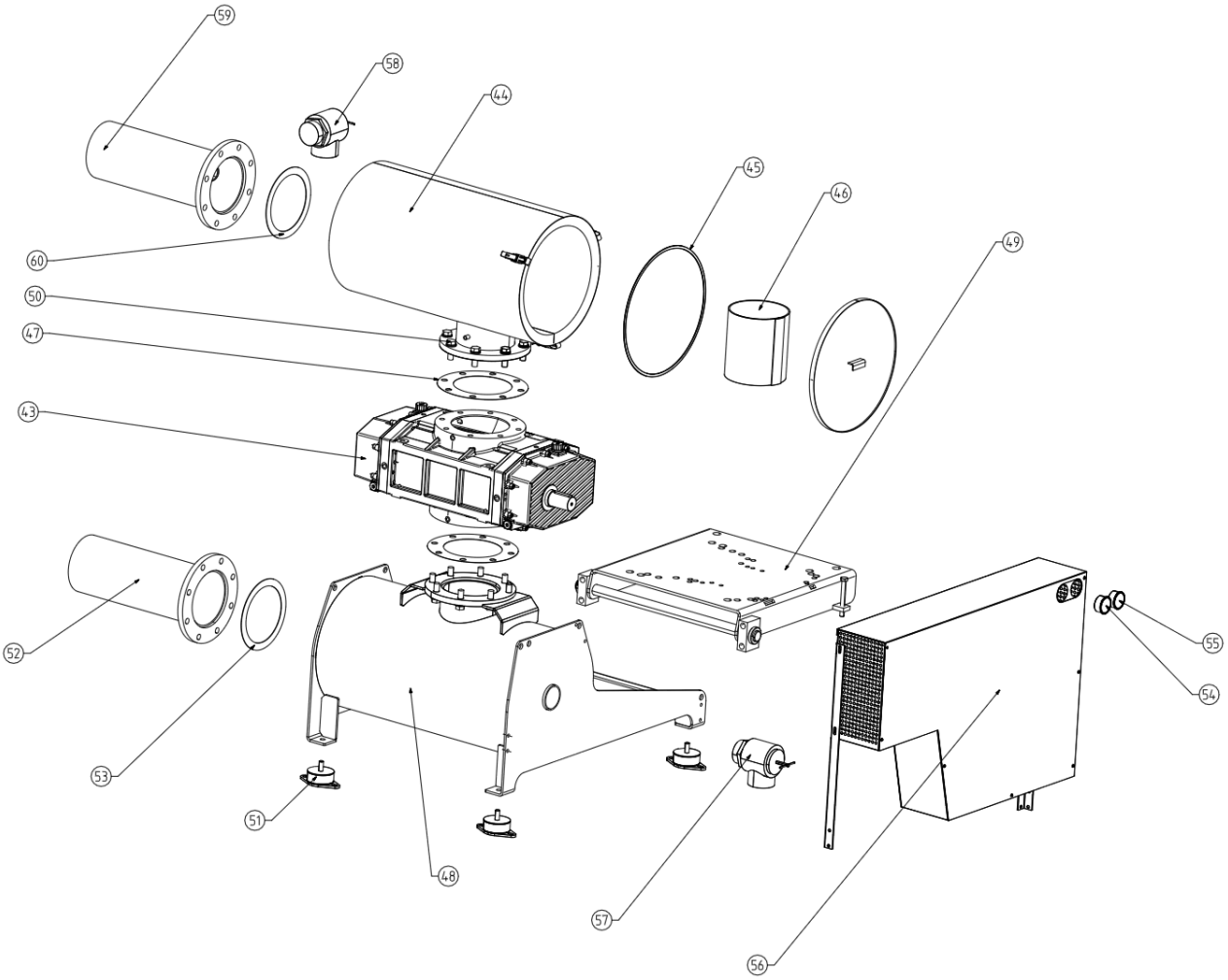
WT 0280			
POS.	PART NAME	PART NUMBER	QTY.
1	HOUSE WT0280	0247A00015	1
2	ROTOR WT0280 - L	0210A00115	1
3	ROTOR WT0280 - S	0210A00015	1
4	BEARING HOUSE SH.S.	0240A00013	1
5	BEARING HOUSE G.S.	0240A00023	1
6	END COVER SH.S.	0246A00113	1
7	END COVER G.S.	0246A00013	1
8	GEAR WHEEL R	0517A00003	1
9	GEAR WHEEL L	0517A00008	1
10	PISTON RING BUSH	0460A00109	4
11	PISTON RING	0460A00133	16
12	O-RING	0486A00010	4
13	OIL WASHER	0460A00108	4
14	WASHER U.B. SMALL	310167	4
15	WASHER U.B. LARGE	310168	4
16	CYL. ROLLER BEARING	733007	2
17	ANG. CONT. BALL BEARING	731016	4
18	BEARING PLATE	0460A00506	4
19	SCREW M8x16	774119	16
20	DISK FOR GEAR	0460A00303	2
21	DISTANCE BUSH	0460A00213	1
22	OIL SPLASH SH.S.	0460A00106	1
23	OIL SPLASH G.S.	0460A00107	1
24	LOCK WASHER	741022	2
25	LOCK NUT	741004	2
26	LOCK WASHER	741029	2
27	LOCK NUT	741007	2
28	GASKET	753082	2
29	INNER RING	0484300002	1
30	SHAFT LIP SEAL	0487300003	1
31	OIL SIGHT GLASS	175013	2
32	MAGNETIC PLUG	310209	2
33	SEALING WASHER	310097	6
34	PLUG	773250	2
35	BREATHER PLUG	310062	2
36	SCREW M10x85	0413300005	16
37	PIN 12x65	0413300009	4
38	SCREW M10x45	0413300001	4
39	SHAFT KEY	0435300002	1
40	EYE BOLT M16	0413300012	2
41	MAGNETIC PLUG	310210	2

WT 0390			
POS.	PART NAME	PART NUMBER	QTY.
1	HOUSE WT0390	0247A00016	1
2	ROTOR WT0390 - L	0210A00116	1
3	ROTOR WT0390 - S	0210A00016	1
4	BEARING HOUSE SH.S.	0240A00013	1
5	BEARING HOUSE G.S.	0240A00023	1
6	END COVER SH.S.	0246A00113	1
7	END COVER G.S.	0246A00013	1
8	GEAR WHEEL R	0517A00003	1
9	GEAR WHEEL L	0517A00008	1
10	PISTON RING BUSH	0460A00109	4
11	PISTON RING	0460A00133	16
12	O-RING	0486A00010	4
13	OIL WASHER	0460A00108	4
14	WASHER U.B. SMALL	310167	4
15	WASHER U.B. LARGE	310168	4
16	CYL. ROLLER BEARING	733007	2
17	ANG. CONT. BALL BEARING	731016	4
18	BEARING PLATE	0460A00506	4
19	SCREW M8x16	774119	16
20	DISK FOR GEAR	0460A00303	2
21	DISTANCE BUSH	0460A00213	1
22	OIL SPLASH SH.S.	0460A00106	1
23	OIL SPLASH G.S.	0460A00107	1
24	LOCK WASHER	741022	2
25	LOCK NUT	741004	2
26	LOCK WASHER	741029	2
27	LOCK NUT	741007	2
28	GASKET	753082	2
29	INNER RING	0484300002	1
30	SHAFT LIP SEAL	0487300003	1
31	OIL SIGHT GLASS	175013	2
32	MAGNETIC PLUG	310209	2
33	SEALING WASHER	310097	6
34	PLUG	773250	2
35	BREATHER PLUG	310062	2
36	SCREW M10x85	0413300005	16
37	PIN 12x65	0413300009	4
38	SCREW M10x45	0413300001	4
39	SHAFT KEY	0435300002	1
40	EYE BOLT M16	0413300012	2
41	MAGNETIC PLUG	310210	2

WT 0600			
POS.	PART NAME	PART NUMBER	QTY.
1	HOUSE WT0600	0247A00017	1
2	ROTOR WT0600-L	0210A00117	1
3	ROTOR WT0600-S	0210A00017	1
4	BEARING HOUSE SH.S	0240A00014	1
5	BEARING HOUSE G.S.	0240A00024	1
6	END COVER SH.S.	0246A00114	1
7	END COVER G.S.	0246A00014	1
8	GEAR WHEEL R	0517A00004	1
9	GEAR WHEEL L	0517A00009	1
10	PISTON RING BUSCH	0460A00119	4
11	PISTON RING	0460A00134	16
12	O-RING	0486A00011	4
13	OIL WASHER	0460A00116	4
14	WASHER U.B. SMALL	310201	4
15	WASHER U.B. LARGE	310200	4
16	CYL. ROLLER BEARING	733025	2
17	ANG. CONT. BALL BEARING	731019	4
18	BEARING PLATE	0460A00507	4
19	SCREW M8x16	774119	16
20	DISK FOR GEAR	0460A00304	2
21	DISTANC BUSH	0460300214	1
22	OIL SPLASH SH.S.	0460A00115	1
23	OIL SPLASH G.S.	0460A00114	1
24	LOCK WASHER	741021	2
25	LOCK NUT	741005	2
26	LOCK WASHER	741024	2
27	LOCK NUT	741008	2
28	GASKET	753083	2
29	INNER RING	0484300003	1
30	SHAFT LIP SEAL	745097	1
31	OIL SIGHT GLASS	175013	2
32	MAGNETIC PLUG	310210	4
33	SEALING WASHER	310097	6
34	PLUG	773250	2
35	BREATHER PLUG	310063	2
36	SCREW M12x90	0413300008	20
37	PIN 12x70	0413300009	4
38	SCREW M12x45	0413300010	4
39	SHAFT KEY	0435300003	1
40	EYE BOLT M20	0413300011	2

WT 0730			
POS.	PART NAME	PART NUMBER	QTY.
1	HOUSE WT0730	0247A00018	1
2	ROTOR WT0730-L	0210A00118	1
3	ROTOR WT0730-S	0210A00018	1
4	BEARING HOUSE SH.S	0240A00014	1
5	BEARING HOUSE G.S.	0240A00024	1
6	END COVER SH.S.	0246A00114	1
7	END COVER G.S.	0246A00014	1
8	GEAR WHEEL R	0517A00004	1
9	GEAR WHEEL L	0517A00009	1
10	PISTON RING BUSCH	0460A00119	4
11	PISTON RING	0460A00134	16
12	O-RING	0486A00011	4
13	OIL WASHER	0460A00116	4
14	WASHER U.B. SMALL	310201	4
15	WASHER U.B. LARGE	310200	4
16	CYL. ROLLER BEARING	733025	2
17	ANG. CONT. BALL BEARING	731019	4
18	BEARING PLATE	0460A00507	4
19	SCREW M8x16	774119	16
20	DISK FOR GEAR	0460A00304	2
21	DISTANC BUSH	0460300214	1
22	OIL SPLASH SH.S.	0460A00115	1
23	OIL SPLASH G.S.	0460A00114	1
24	LOCK WASHER	741021	2
25	LOCK NUT	741005	2
26	LOCK WASHER	741024	2
27	LOCK NUT	741008	2
28	GASKET	753083	2
29	INNER RING	0484300003	1
30	SHAFT LIP SEAL	745097	1
31	OIL SIGHT GLASS	175013	2
32	MAGNETIC PLUG	310210	4
33	SEALING WASHER	310097	6
34	PLUG	773250	2
35	BREATHER PLUG	310063	2
36	SCREW M12x90	0413300008	20
37	PIN 12x70	0413300009	4
38	SCREW M12x45	0413300010	4
39	SHAFT KEY	0435300003	1
40	EYE BOLT M20	0413300011	2

UNIT WITHOUT CABINET

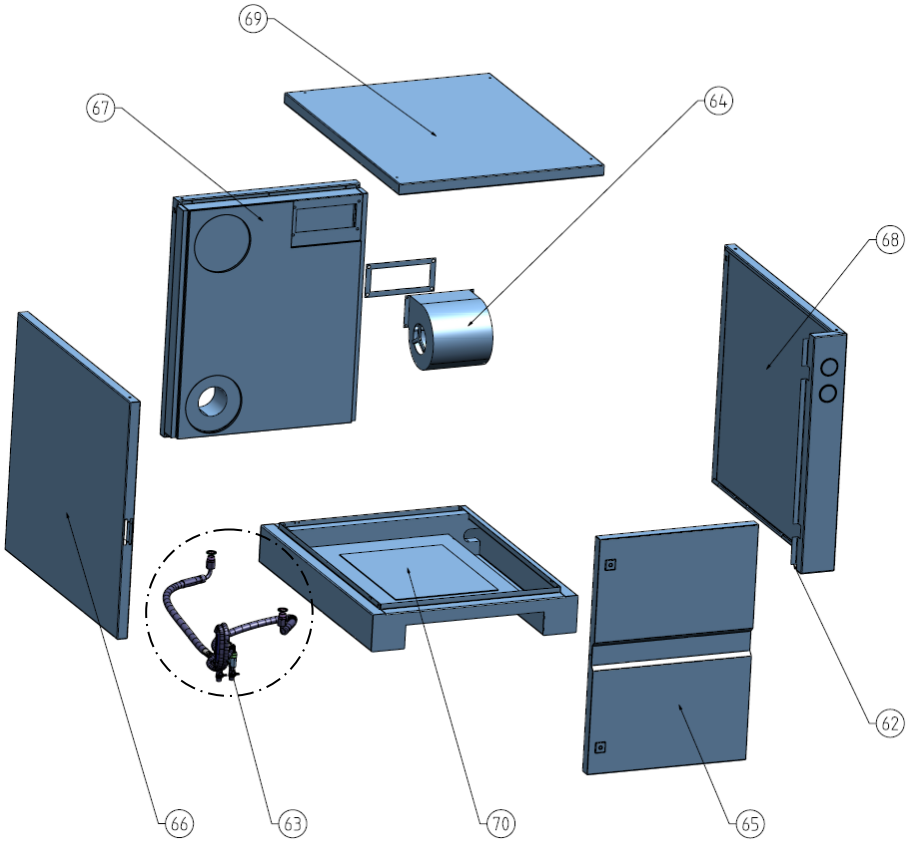


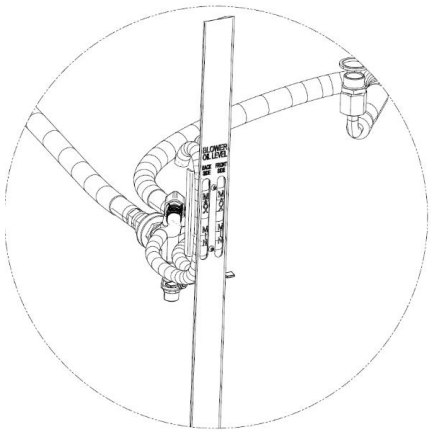
POS.	COMPONENT	WT 0100	WT 0150	WT 0280	WT 0390	WT 0600	WT 0730	QTY.
43	BLOWER BOH	1318A70013	1318A70014	1318A70015	1318A70016	1318A70017	1318A70018	1
44	INLET SILENCER	310150	310151	310152	310153	310154	310155	1
45	GASKET U 10x9x4	0736300002	0736300002	0736300002	0736300002	0736300002	0736300002	1
46	INLET FILTER	791184	791183	791181	791182	791180	791180	1
47	FLANGE GASKET DN125	753051	753052	753053	753054	753055	753055	2
48	FOUNDATION SILENCER	0947A40017	0947A40018	0947A40001	0947A40004	0947A40019	0947A40020	1
49	MOTOR PIVOT KIT	0928300002	0928300002	0928300003	0928300003	0928300004	0928300004	1
50	BOLT SET	381380	381380	381376	381376	381377	381377	1
51	MACHINE FOOT KIT	380185	380185	380187	380187	380187	380187	4
52	OUTLET PIPE	385647	385647	385643	385643	385645	385645	1
53	FLANGE GASKET	727102	727102	727104	727104	753024	753024	1
54	FILTER GAUGE	0545300001	0545300001	0545300001	0545300001	0545300001	0545300001	1
55	OPERATION PRESSURE GAUGE	718311	718311	718311	718311	718311	718311	1
56	BELT GUARD	0947300007	0947300007	0947300008	0947300008	0947300009	0947300009	1
POS.	PRESSURE UNIT	WT 0100	WT 0150	WT 0280	WT 0390	WT 0600	WT 0730	WT 0730
57	PRESSURE SAFETY VALVE	729060	729060	729060	729060	729061	729061	1
POS.	VACUUM UNIT	WT 0100	WT 0150	WT 0280	WT 0390	WT 0600	WT 0730	WT 0730
58	VACUUM SAFETY VALVE	729063	729063	729064	729064	729065	729065	1
59	INLET PIPE	385648	385648	385644	385644	385646	385646	1
60	FLANGE GASKET	727102	727102	727104	727104	753024	753024	1

NOTE

Exclusive use of original spare parts and wear parts to maintain guarantee

CABINET – standard (indoor design)





POS.	PART NAME	WT 0100	WT 0150	WT 0280	WT 0390	WT 0600	WT 0730	QTY.
61	Total cabinet	0972A70041	0972A70041	0972A70025	0972A70025	0972A70140	0972A70140	1
62	Sealing list	663082	663082	663082	663082	663082	663082	x
63	Oil drein kit	0940300001	0940300001	0940300002	0940300002	0940300003	0940300003	1
64	Ventilator 50Hz 230V	0919300003	0919300003	0919300003	0919300003	0919300003	0919300003	1
	Ventilator 50Hz 400V	0919300006	0919300006	0919300006	0919300006	0919300006	0919300006	
	Ventilator 60Hz 230V	0919300001	0919300001	0919300001	0919300001	0919300001	0919300001	
	Ventilator 60Hz 115V	0919300002	0919300002	0919300002	0919300002	0919300002	0919300002	
65	Front	0972A70131	0972A70131	0972A70117	0972A70117	0972A70200	0972A70200	1
66	Side 1	0972A70132	0972A70132	0972A70118	0972A70118	0972A70201	0972A70201	1
67	Back	0972A70133	0972A70133	0972A70119	0972A70119	0972A70202	0972A70202	1
68	Side 2	0972A70134	0972A70134	0972A70120	0972A70120	0972A70203	0972A70203	1
69	Top	0972A70135	0972A70135	0972A70121	0972A70121	0972A70204	0972A70204	1
70	Bottom	0972A70136	0972A70136	0972A70122	0972A70122	0972A70205	0972A70205	1

NOTE
Exclusive use of original spare parts and wear parts to maintain guarantee

+ Service kit

Each individual Busch Tyr Roots blower is geared specifically to meet the customer's specified airflow and differential pressure. So, when ordering service kits that contain V-belts the blowers' serial number must always be given.

V-belts and pulleys

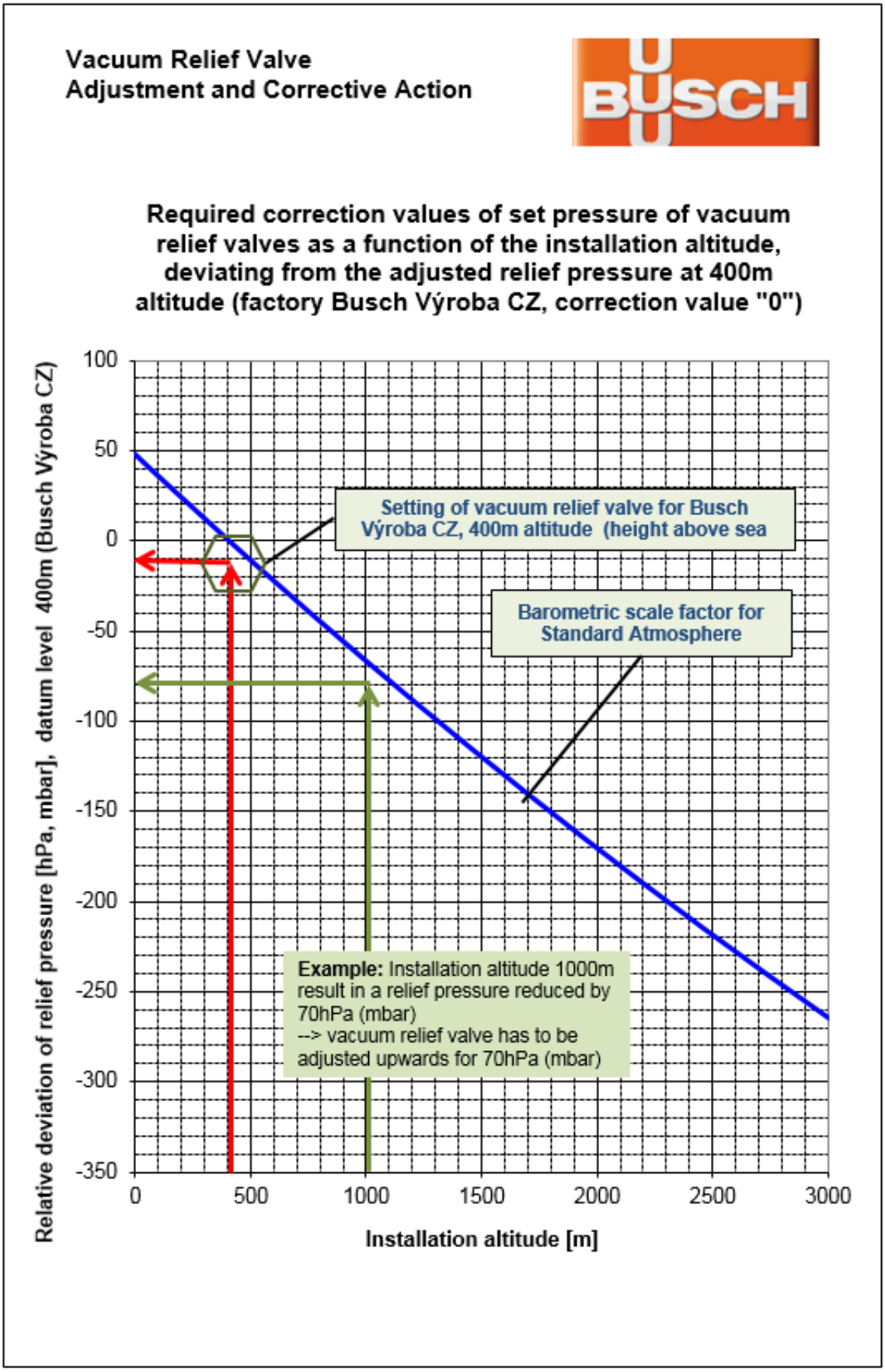
The belt drive is dimensioned specifically for each individual application. So, when ordering new belts and pulleys the Roots blower's serial number must be given.

SERVICE KIT	**Oil, inlet filter, V-belts (according to serial number)**					
Type	**WT 0100**	**WT 0150**	**WT 0280**	**WT 0390**	**WT 0600**	**WT 0730**
Item number	0999A50018	0999A50019	0999A50020	0999A50021	0999A50022	0999A50022

Overhaul kit

OVERHAUL KIT	POS: 5+6+7+9+10+14+20+22+26+27+28+29+32 Bearings, o-rings, seals, gaskets, plugs, innerring and oil					
Type	**WT 0100**	**WT 0150**	**WT 0280**	**WT 0390**	**WT 0600**	**WT 0730**
Item number	0993A00004	0993A00005	0993A00006	0993A00007	0993A00008	0993A00009

Vacuum relief valve adjustment and corrective action



EU DECLARATION OF CONFORMITY

It is hereby confirmed by the manufacturer

Busch Vyroba CZ s.r.o.
Svarovska 620
Liberec
Czech Republic
CZ 460 01

That the below described
Tyr Roots blower units:
WT 0100 B
WT 0150 B
WT 0280 B
WT 0390 B
WT 0600 B
WT 0730 B

Are manufactured in accordance with directive 2006/42/EF and all standards listed below:

STANDARD	TITLE OF STANDARD
Harmonised standards	
DS/EN ISO 12100-1:2005 DS/EN ISO 12100-2:2005	Machine safety; Basic terms, general principles for construction and design – Part 1: Basic terminology and methodology Machine safety – Basic terms and general principles for projecting, construction and design – Part 2: Technical principles
DS/EN ISO 13857:2008	Machine safety – Safety distances to prevent hands, arms, legs and feet getting into dangerous areas
EN 60204-1	Machine safety – Electrical equipment on machines – Part 1: General requirements
EN 1012-1 EN 1012-2	Compressors and vacuum pumps; Safety requirements, Part 1 and 2
DS/EN 61000-6-3:2007 DS/EN 61000-6-4:2007	Electromagnetic compatibility (EMC) – Part 6-3: generic standards – Emission standard for housing, business and light industrial environments Electromagnetic compatibility (EMC) - Part 6-4: Generic standards – Emission standard for industrial environments
DS/EN 61000-6-2:2005 DS/EN 61000-6-1:2007	Electromagnetic compatibility (EMC) - Part 6-2: Generic standards – Immunity standard for industrial environments Electromagnetic compatibility (EMC) - Part 6-1: Generic standards – Immunity for housing, business and light industry environments
EN ISO 11201	Acoustic: Noise from machines and equipment; Measurement of sound pressure level in test room and other fixed places; Method for measuring noise in free field above reflective surface
En ISO 3744	Acoustic: Determination of sound effect levels for sound sources based on sound pressure; Method for measuring noise in free field above reflective surface
DIN 45635, 13	Measuring airborne noise from machines. (displacement, turbo and ejector compressors)
EN ISO 14121-1: 2007:	Principles of risk assessment.

MANUFACTURER

Michael Dostalek, General Manager

Appendix 1. Declaration of contamination of pumps and components

Repairs and service will only be performed if this declaration has been filled out and completed.
Incomplete filled out or missing declaration can lead to delays in our delivery.
In case of process related contamination with dangerous media pumps and components must be cleaned by the user before shipment or performance of service. Exceptions require written confirmation from Busch. The declaration must be filled out by qualified personnel and signed by an authorised person.

Roots blower: _____ Serial no.: _____

Application: _____

1. CONDITION

Has the equipment been used?	☐ Yes	☐ No	(if no go to 5)
Has the equipment been in contact with dangerous media?	☐ Yes	☐ No	(if no go to 5)
Has the equipment been cleaned?	☐ Yes	☐ No	
The equipment is protected by an anti-bacterial filter?	☐ Yes	☐ No	(hospitals and clinics)

2. THE PROCESS WHICH HAS CAUSED THE CONTAMINATION IS:

Toxic	☐ Yes	☐ No	Malodorous	☐ Yes	☐ No
Micro-biological	☐ Yes	☐ No	Explosive	☐ Yes	☐ No
Corrosive	☐ Yes	☐ No	Radioactive	☐ Yes	☐ No
Irritant	☐ Yes	☐ No	Other dangerous substance	☐ Yes	☐ No

3. LIST OF ALL DANGEROUS MEDIA THAT THE EQUIPMENT HAS COME INTO CONTACT WITH:

Brand/product name/ manufacturer	Chemical name / designation	Risk class	Handling in case of spill	First aid in case of accident	Data sheet no. enclosed

4. DIRECTIONS FOR HANDLING

Cleaning already performed by user, residue of dangerous media cannot be expected: ☐ Yes ☐ No

Cleaning with water/steam up to 100°C not harmful ☐ Yes ☐ No

If no – the equipment can be cleaned with: _____

Components can be scrapped without risk ☐ Yes ☐ No, must be returned at user's expense

Handling in accordance with enclosed directions: _____

5. AUTHORISED SIGNATURE OF DECLARATION

I hereby declare that the information in this declaration is complete and correct.

Company: _____ Title: _____

Telephone: _____ Name: _____

Date: _____ Signature: _____

Appendix 2. Repair and service licence

CUSTOMER INFORMATION:

Customer name: _____

Delivery address: _____ Invoice address: _____

Post code / Town: _____ Post code/ Town: _____

Contact person: _____ Fax: _____

Telephone: _____ e-mail: _____

Req. number: _____ Date: _____

SHIPMENT INFORMATION:

Freight company: _____ Shipped date: _____

Packaging: _____

Enclosed documents: Declaration of contamination of pumps and components.

_____

PUMP INFORMATION:

Pump type: _____ Serial no.: _____

Purchase order: _____ Purchase year: _____

FAULT DESCRIPTION:

_____

_____

_____

_____

_____

Quote wanted ☐

Repair ☐

Exchange ☐

Adjustment/test ☐

Other ☐

FILLED OUT BY BUSCH:

Reception date: _____ Order no.: _____