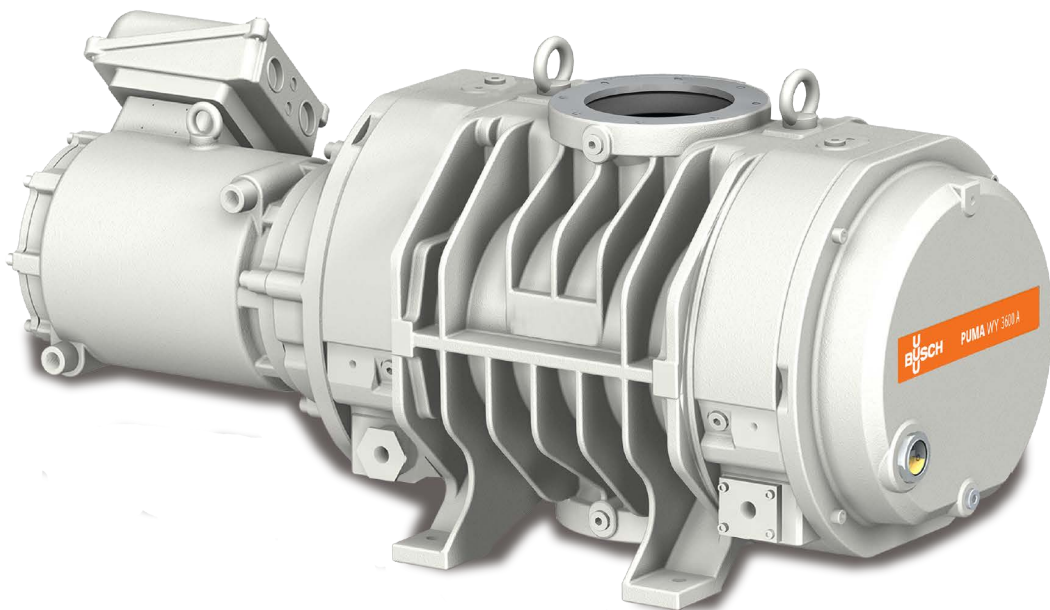


# PUMA

Vacuum Boosters  
WY 3600 A

## Instruction Manual



# Table of Contents

<b>1</b>	<b>Safety</b> .....	<b>3</b>
<b>2</b>	<b>Product Description</b> .....	<b>4</b>
2.1	Operating Principle .....	5
2.2	Intended Use .....	5
2.3	Standard Features.....	6
2.3.1	Water Cooling.....	6
2.3.2	Temperature Switch .....	6
<b>3</b>	<b>Transport</b> .....	<b>7</b>
<b>4</b>	<b>Storage</b> .....	<b>8</b>
<b>5</b>	<b>Installation</b> .....	<b>9</b>
5.1	Installation Conditions.....	9
5.2	Connecting Lines / Pipes .....	9
5.2.1	Suction Connection .....	10
5.2.2	Discharge Connection .....	10
5.2.3	Cooling Water Connection .....	11
5.3	Filling Oil.....	12
<b>6</b>	<b>Electrical Connection</b> .....	<b>14</b>
6.1	Machine delivered without Control Box or Variable Speed Drive (VSD).....	14
6.2	Wiring Diagram Three-Phase Motor .....	15
6.3	Electrical Connection of the Monitoring Devices .....	16
6.3.1	Wiring Diagram Temperature Switch.....	16
<b>7</b>	<b>Commissioning</b> .....	<b>17</b>
7.1	Pump Down Cycle .....	18
7.2	Compression Chamber Flushing .....	18
<b>8</b>	<b>Maintenance</b> .....	<b>20</b>
8.1	Maintenance Schedule .....	21
8.2	Oil Level Inspection .....	21
8.3	Oil Color Inspection .....	21
8.4	Oil Change.....	22
<b>9</b>	<b>Overhaul</b> .....	<b>25</b>
<b>10</b>	<b>Decommissioning</b> .....	<b>26</b>
10.1	Dismantling and Disposal .....	26
<b>11</b>	<b>Spare Parts</b> .....	<b>27</b>
<b>12</b>	<b>Troubleshooting</b> .....	<b>28</b>
<b>13</b>	<b>Technical Data</b> .....	<b>30</b>
<b>14</b>	<b>Maximum Permissible Differential Pressures</b> .....	<b>31</b>
<b>15</b>	<b>Oil</b> .....	<b>32</b>
<b>16</b>	<b>EU Declaration of Conformity</b> .....	<b>33</b>
<b>17</b>	<b>UK Declaration of Conformity</b> .....	<b>34</b>

# 1 Safety

Prior to handling the machine, this instruction manual should be read and understood. If anything needs to be clarified, please contact your Busch representative.

Read this manual carefully before use and keep for future reference.

This instruction manual remains valid as long as the customer does not change anything on the product.

The machine is intended for industrial use. It must be handled only by technically trained personnel.

Always wear appropriate personal protective equipment in accordance with the local regulations.

The machine has been designed and manufactured according to state-of-the-art methods. Nevertheless, residual risks may remain, as described in the following chapters and in accordance with the chapter *Intended Use* [→ 5]. This instruction manual highlights potential hazards where appropriate. Safety notes and warning messages are tagged with one of the keywords DANGER, WARNING, CAUTION, NOTICE and NOTE as follows:



## DANGER

... indicates an imminent dangerous situation that will result in death or serious injuries if not prevented.



## WARNING

... indicates a potentially dangerous situation that could result in death or serious injuries.



## CAUTION

... indicates a potentially dangerous situation that could result in minor injuries.



## NOTICE

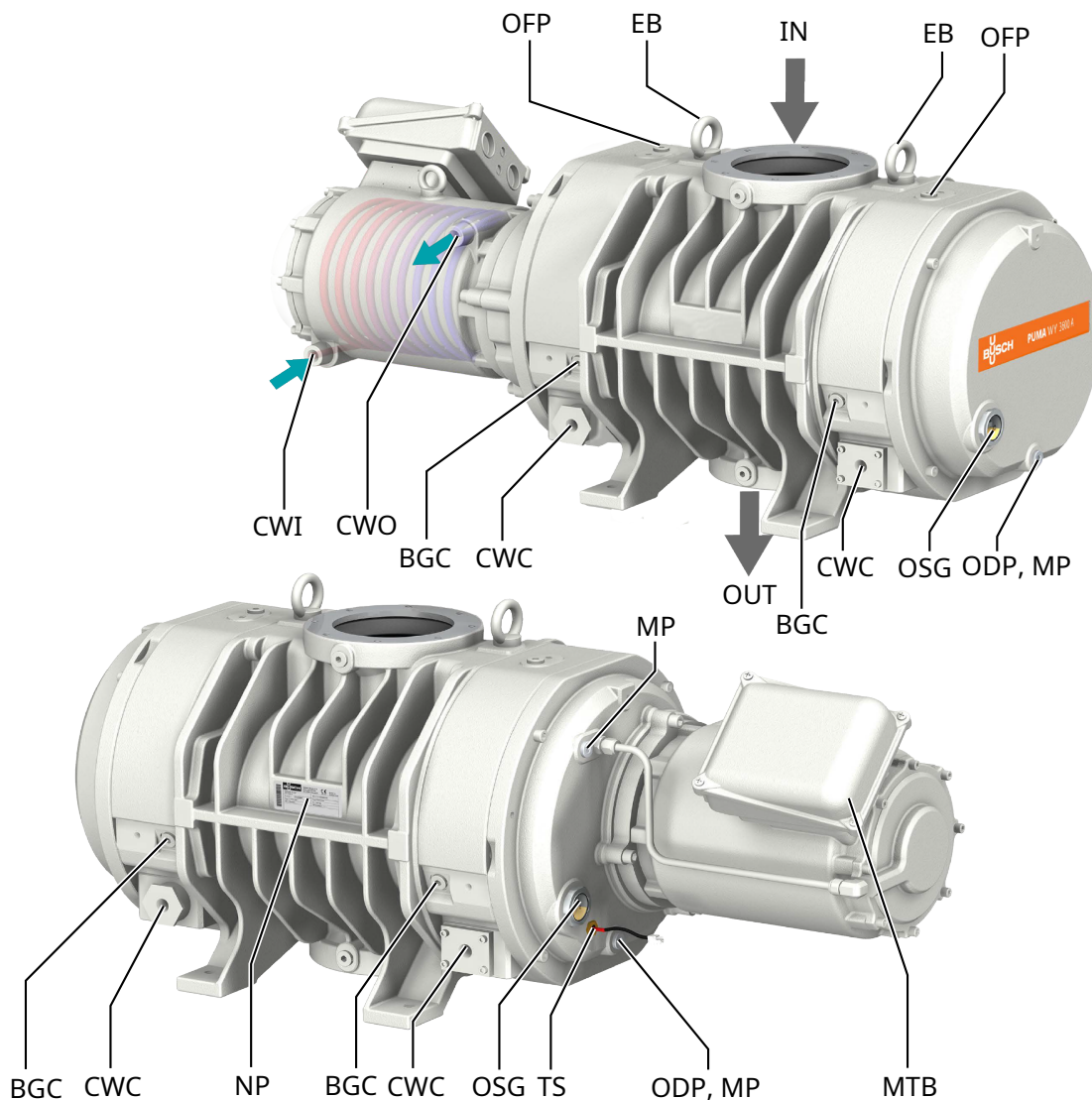
... indicates a potentially dangerous situation that could result in damage to property.



## NOTE

... indicates helpful tips and recommendations, as well as information for efficient and trouble-free operation.

## 2 Product Description



### Description

BGC	Barrier gas connection	CWO	Cooling water outlet
CWI	Cooling water inlet	EB	Eyebolt
CWC	Cooling water connection	MP	Magnetic plug
IN	Suction connection	NP	Nameplate
MTB	Motor terminal box	OFP	Oil fill plug
ODP	Oil drain plug	OUT	Discharge connection
OSG	Oil sight glass	TS	Temperature switch



### NOTE

Technical term.

In this instruction manual, we consider that the term 'machine' refers to the 'vacuum booster'.

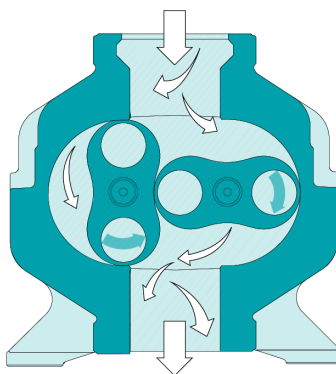


## NOTE

### Illustrations

In this instruction manual the illustrations may differ from the machine appearance.

## 2.1 Operating Principle



The machine works on the Booster blower principle.

The two oil housings (on each side) allow the lubrication of the gears and bearings.

## 2.2 Intended Use



### WARNING

**In case of foreseeable misuse outside the intended use of the machine.**

**Risk of injuries!**

**Risk of damages to the machine!**

**Risk of damages to the environment!**

- Make sure to follow all instructions described in this manual.

The machine is intended for the suction of air and other dry, non-aggressive, non-toxic and non-explosive gases.

Conveying of other media leads to an increased thermal and/or mechanical load on the machine and is permissible only after a consultation with Busch.

The machine is intended for the placement in a non-potentially explosive environment.

The machine is used in combination with a backing pump in vacuum system.

Permitted environmental conditions, see *Technical Data* [→ 30].



### NOTICE

**Start the backing pump first up to the allowed inlet pressure of the vacuum booster, see *Maximum Permissible Differential Pressures* [→ 31] or call Busch representative.**

**Risk of damage to the machine!**



## NOTICE

**Chemical compatibility of the process gases with the machine component materials.**

**Risk of corrosion inside the compression chamber which can reduce performance and its lifetime!**

- Check if the process gases are compatible with those following materials:
    - Cast iron
    - Steel
    - Aluminium
    - Epoxy resin
    - Fluoroelastomer (FKM/FPM)
  - In doubt, please contact your Busch representative.
- 

## 2.3 Standard Features

### 2.3.1 Water Cooling

The machine is driven by a water-cooled motor.

When operated with Variable Speed Drive (VSD), pump water cooling is mandatory, see *Cooling Water Connection* [→ 11].

### 2.3.2 Temperature Switch

The temperature switch monitors the oil temperature of the machine.

The machine must be stopped when the temperature switch trips (140 °C).

### 3 Transport



#### WARNING

**Suspended load.**

**Risk of severe injury!**

- Do not walk, stand or work under suspended loads.



#### WARNING

**Lifting the machine using the motor eye bolt.**

**Risk of severe injury!**

- Do not lift the machine using the eye bolt fitted to the motor. Only lift the machine as shown.

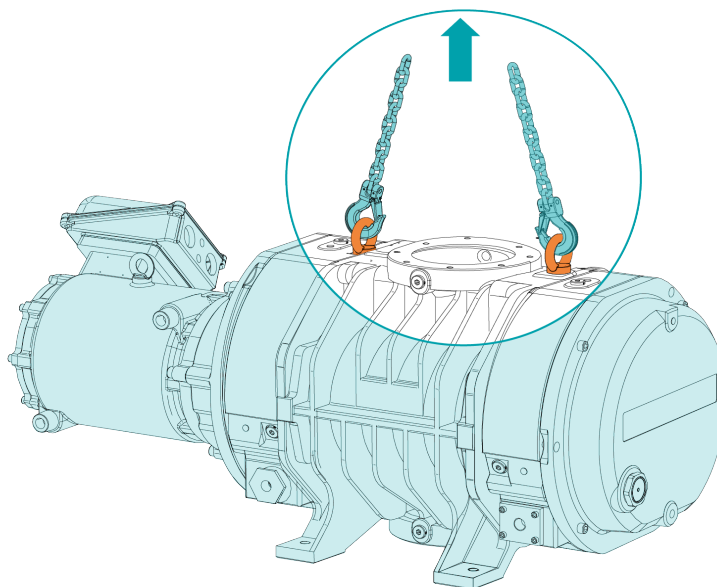


#### NOTICE

**In case the machine is already filled with oil.**

**Tilting a machine that is already filled with oil can cause large quantities of oil to ingress into the cylinder.**

- Drain the oil prior to every transport or always horizontally transport the machine.
- To find out the weight of the machine, refer to the chapter *Technical Data* [→ 30] or the name-plate (NP).



- Check the machine for transport damage.

If the machine is secured to a base plate:

- Remove the machine from the base plate.

## 4 Storage

- Seal all apertures with adhesive tape or reuse provided caps.
- Make sure that the cooling water has been completely removed, see *Decommissioning* [→ 26].

If the machine is to be stored for more than 3 months:

- Wrap the machine in a corrosion inhibiting film.
- Store the machine indoors, dry, dust free and if possible in original packaging preferably at temperatures between -20 ... 55 °C.



## 5 Installation

### 5.1 Installation Conditions



#### NOTICE

**Use of the machine outside of the permitted installation conditions.**

**Risk of premature failure!**

**Loss of efficiency!**

- Take care that the installation conditions are fully complied with.
- Make sure that the environment of the machine is not potentially explosive.
- Make sure that the ambient conditions comply with the *Technical Data* [→ 30].
- Make sure to use a suitable backing pump, if necessary seek advice from your Busch representative
- Make sure that the environmental conditions comply with the protection class of the motor and the electrical elements.
- Make sure that the installation space or location is protected from weather and lightning.
- Make sure that the installation space or location is vented such that sufficient cooling of the machine is provided.
- Make sure that the oil sight glass (OSG) remains easily visible.
- Make sure that enough space remains for maintenance work.
- Make sure that the machine is placed or mounted horizontally, a maximum of 1° in any direction is acceptable.
- Make sure that the machine is secured either from the four feet or from the discharge flange.
- Check the oil level, see *Oil Level Inspection* [→ 21].
- Make sure that all provided covers, guards, hoods, etc. are mounted.
- Make sure that the cooling water complies with the requirements, see *Cooling Water Connection* [→ 11].

### 5.2 Connecting Lines / Pipes

- Remove all protective covers before installation.
- Make sure that the connection lines cause no stress on the machine's connection; if necessary use flexible joints.
- Make sure that the line size of the connection lines over the entire length is at least as large as the connections of the machine.

In case of long connection lines it is advisable to use larger line sizes in order to avoid a loss of efficiency. Seek advice from your Busch representative.

## 5.2.1 Suction Connection



### WARNING

**Unprotected suction connection.**

**Risk of severe injury!**

- Do not put hand or fingers in the suction connection.



### NOTICE

**Ingress of foreign objects or liquids.**

**Risk of damage to the machine!**

If the inlet gas contains dust or other foreign solid particles:

- Install a suitable filter (5 micron or less) upstream from the machine.

Connection size(s):

- DN160, DIN 28404

Depending on the specific configuration ordered, other connection dimensions may apply.

## 5.2.2 Discharge Connection



### NOTICE

**Discharge gas flow obstructed.**

**Risk of damage to the machine!**

- Make sure that the discharged gas will flow without obstruction. Do not shut off or throttle the discharge line or use it as a pressurized air source.

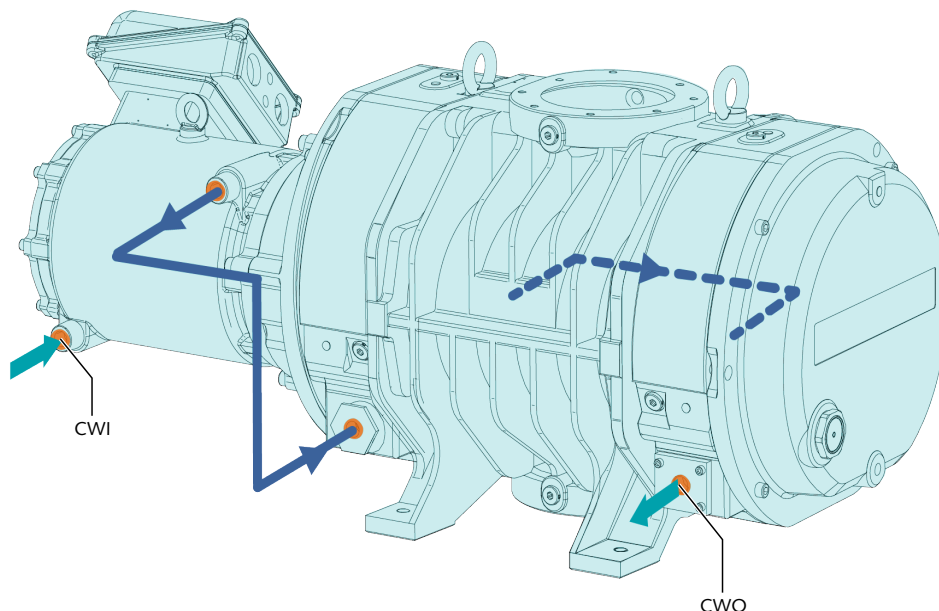
Connection size(s):

- DN160, DIN 28404

Depending on the specific configuration ordered, other connection dimensions may apply.

## 5.2.3 Cooling Water Connection

Motor + Booster cooling (Mandatory for operation with Variable Speed Drive (VSD))



### Description

CWI	Cooling water inlet	CWO	Cooling water outlet
-----	---------------------	-----	----------------------

The cooling connection type depends on the application. Seek advice from your Busch representative.

- Connect the cooling water connections (CWI / CWO) to the water supply.

Connection size:

- G1/2 for the cooling water inlet and outlet on the motor (CWI / CWO)
- G1/2 for the cooling water connections on the covers (CWC)

- Make sure that the cooling water complies with the following requirements:

Min. supply capacity	l/min	4
Water pressure	bar	2 ... 5
Supply temperature	°C	+5 ... +30
Required pressure differential across supply and return	bar	≥ 1

- To reduce the maintenance effort and ensure a long product lifetime we recommend the following cooling water quality:

Hardness	mg/l (ppm)	< 90
Properties	Clean & clear	
PH value		7 ... 8
Particle size	µm	< 200
Chloride	mg/l	< 100

Electrical conductivity	$\mu\text{S}/\text{cm}$	$\leq 100$
Free chloride	$\text{mg}/\text{l}$	$< 0.3$
Materials in contact with the cooling water	Stainless steel, copper and cast iron	

## **i** NOTE

**Water hardness unit conversion.**

**1 mg/l (ppm) = 0.056 °dh (german degree) = 0.07 °e (english degree) = 0.1 °fH (french degree)**

## 5.3 Filling Oil

### **!** NOTICE

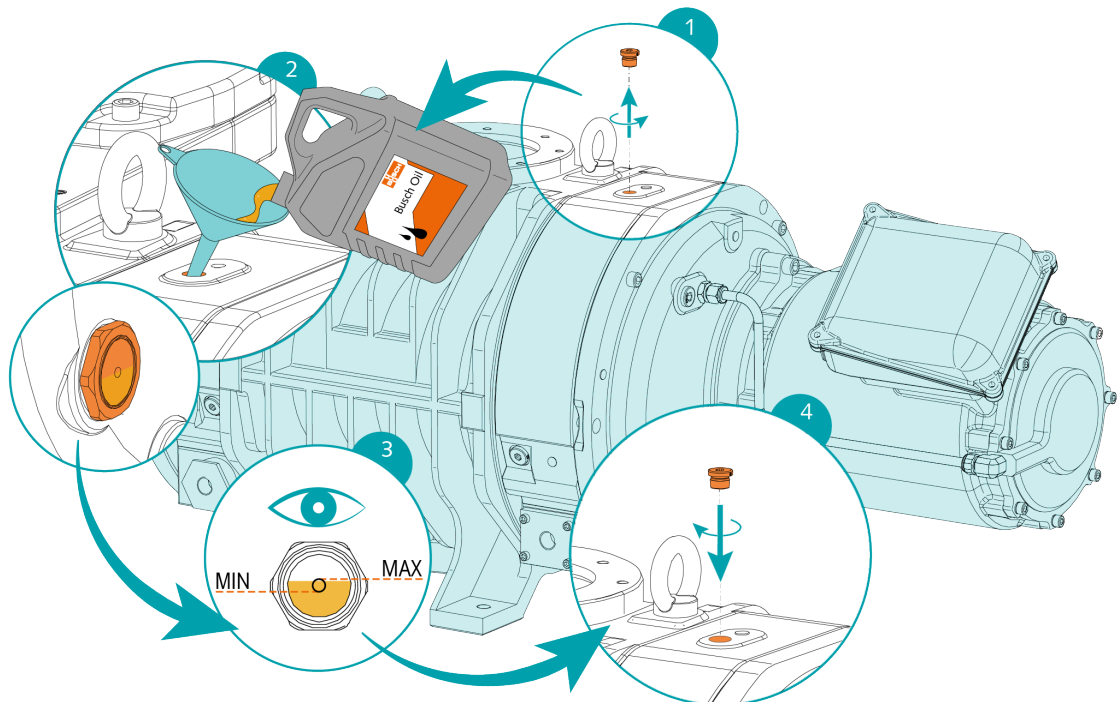
**Use of an inappropriate oil.**

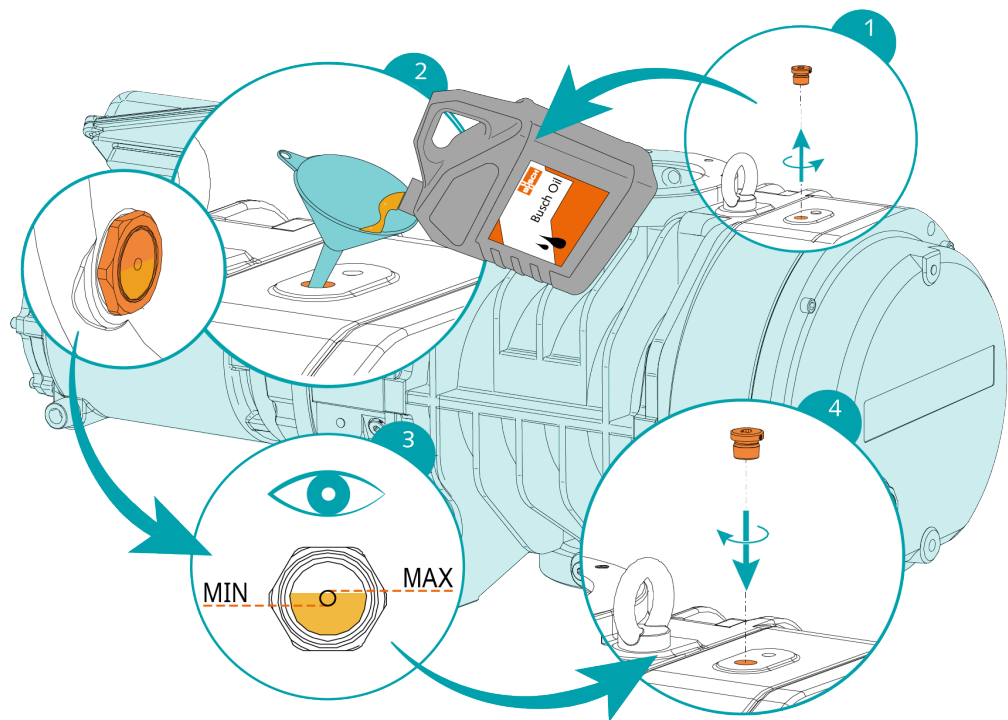
**Risk of premature failure!**

**Loss of efficiency!**

- Only use an oil type which has previously been approved and recommended by Busch.

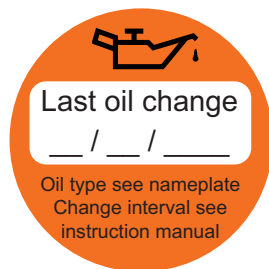
For oil type and oil capacity see *Technical Data* [→ 30] and *Oil* [→ 32].





When the oil filling is achieved:

- Write down the oil change date on the sticker.



If there is no sticker (part no. 0565 568 959) on the machine:

- Order it from your Busch representative.

## 6 Electrical Connection



### DANGER

Live wires.

Risk of electrical shock.

- Electrical installation work must only be executed by qualified personnel.

#### CURRENT PROTECTION OF THE CUSTOMER INSTALLATION:



### DANGER

Missing current protection.

Risk of electrical shock.

- Current protection according to EN 60204-1 must be insured by the customer on its installation.
- The electrical installation must comply with the applicable national and international standards.



### NOTICE

Electromagnetic compatibility.

- Make sure that the motor of the machine will not be affected by electric or electro-magnetic disturbance from the mains, if necessary seek advice from Busch.
- Make sure that the EMC of the machine is compliant with the requirements of your supply network system, if necessary provide further interference suppression (EMC of the machine, see *EU Declaration of Conformity* [→ 33] or *UK Declaration of Conformity* [→ 34]).

### 6.1 Machine delivered without Control Box or Variable Speed Drive (VSD)



### DANGER

Live wires.

Risk of electrical shock.

- Electrical installation work must only be executed by qualified personnel.



### NOTE

The operation with variable speed, i.e. with a variable speed drive or a soft starter unit, is allowed as long as the motor is capable and the permitted motor speed range is respected (see *Technical Data* [→ 30]).

Seek advice from your Busch representative.

- Make sure that the power supply for the motor is compatible with the data on the nameplate of the motor.
- If the machine is equipped with a power connector, install a residual current protective device to protect persons in case of isolation default.
  - Busch recommends installing a type B residual protective device suitable for the electrical installation.
- Provide a lockable disconnect switch or an emergency stop switch on the power line so that the machine is completely secured in case of an emergency situation.
- Provide a lockable disconnect switch on the power line so that the machine is completely secured during maintenance tasks.
- Provide an overload protection according to EN 60204-1 for the motor.
  - Busch recommends installing a D-curve circuit breaker.
- Connect the protective earth conductor.
- Electrically connect the motor.

## NOTICE

**Incorrect connection.**

**Risk of damage to the motor!**

- The wiring diagrams given below are typical. Check the inside of the terminal box for motor connection instructions/diagrams.

## 6.2 Wiring Diagram Three-Phase Motor

### NOTICE

**The tightening torque does not comply with the recommendation.**

**Risk of damage the connector threads!**

- When connecting up the wires into the terminal box, make sure the tightening torque of 3 Nm is applied and checked with a calibrated torque wrench.

### NOTICE

**Incorrect direction of rotation.**

**Risk of damage to the machine!**

- Operation in the wrong direction of rotation can destroy the machine in a short time! Prior to start-up, ensure that the machine is operated in the right direction.

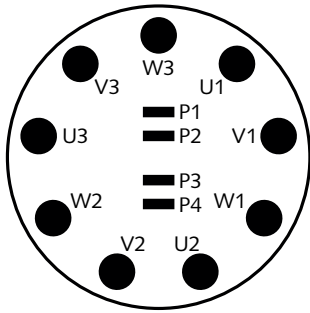
The intended rotation direction of the motor is defined by the specific instruction label stuck on the machine.

- Jog the motor briefly.
- With a phase rotation tester, check if the wiring corresponds to the correct direction of rotation.

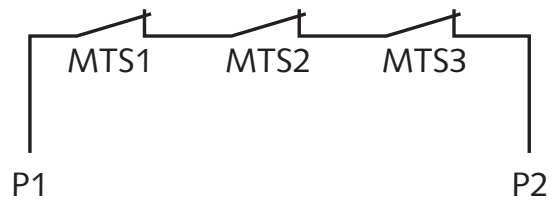
If the rotation of the motor must be changed:

- Switch any two of the motor phase wires.

Motor connectors:



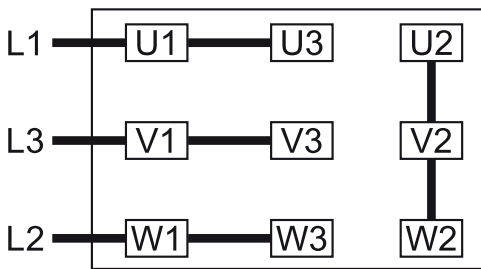
Connection of motor temperature switches (recommended):



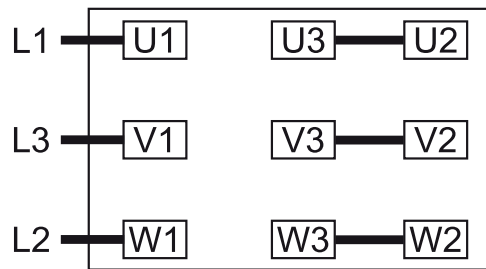
Control voltage:  $\leq 250\text{ V}$   
 Max current: 1.6 A

MTS = Motor temperature switch (in motor coil)

Double star connection (low voltage):



Star connection (high voltage):



## 6.3 Electrical Connection of the Monitoring Devices

### NOTE

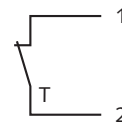
In order to prevent potential nuisance alarms, Busch recommends that the control system is configured with a time delay of at least 20 seconds.

### 6.3.1 Wiring Diagram Temperature Switch

AC ( $\cos\phi=1$ ):  $U = 250\text{ V}$  ;  $I = 2.5\text{ A}$   
 AC ( $\cos\phi=0.6$ ):  $U = 250\text{ V}$  ;  $1.6\text{ A}$   
 DC:  $U = 24\text{ V}$  ;  $I = 1.6\text{ A}$   
 DC:  $U = 48\text{ V}$  ;  $I = 1.25\text{ A}$

**Contact:** Normally closed

**Switch point (T):** pin 1 + 2 =  $140\text{ }^\circ\text{C}$



**Connector:** WAGO CAGE CLAMP®



## 7 Commissioning



### CAUTION

During operation the surface of the machine may reach temperatures of more than 70°C.

**Risk of burns!**

- Avoid contact with the machine during and directly after operation.



### CAUTION



**Noise of running machine.**

**Risk of damage to hearing!**

If persons are present in the vicinity of a non noise insulated machine over extended periods:

- Make sure that ear protection is being used.



### NOTICE

**The machine can be shipped without oil.**

**Operation without oil will ruin the machine in short time!**

- Prior to commissioning, the machine must be filled with oil, see *Filling Oil* [→ 12].



### NOTICE

**Lubricating a dry running machine (compression chamber).**

**Risk of damage to the machine!**

- Do not lubricate the compression chamber of the machine with oil or grease.



### NOTICE

**The machine is running at 90 Hz when starting a pump down cycle.**

**Risk of damage to the machine!**

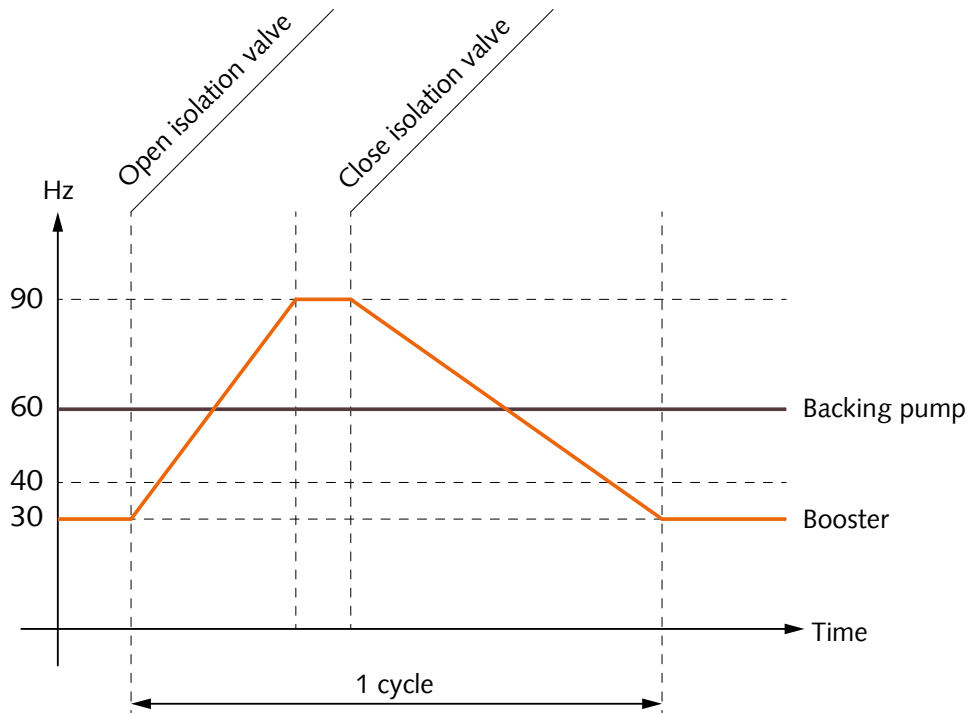
- Ensure no sudden ambient pressure while pump is running at 90 Hz.
- Ensure progressive transition to ambient pressure.
- Make sure that the installation conditions (see *Installation Conditions* [→ 9]) are met.
  - Turn on the water supply.
- Switch on the machine.
- Make sure that the maximum permissible number of starts does not exceed 6 starts per hour. Those starts should be spread within the hour.
- Make sure that the operating conditions comply with the *Technical Data* [→ 30].
- After a few minutes of operation, perform an *Oil Level Inspection* [→ 21].

As soon as the machine is operated under normal operating conditions:

- Measure the motor current and record it as reference for future maintenance and troubleshooting work.

## 7.1 Pump Down Cycle

Below the graph and the procedure to operate the machine for a pump down cycle.



- The machine must operate at a motor frequency of 30 Hz when opening the isolation valve.
- Gradually increase the motor frequency up to 90 Hz.
- As soon as the target pressure is reached, close the isolation and decrease the motor frequency to 30 Hz.

## 7.2 Compression Chamber Flushing

Depending on the process type (very demanding application), flushing through the compression chamber (cylinder + lobes) might need to be performed. Seek advice from your Busch representative.



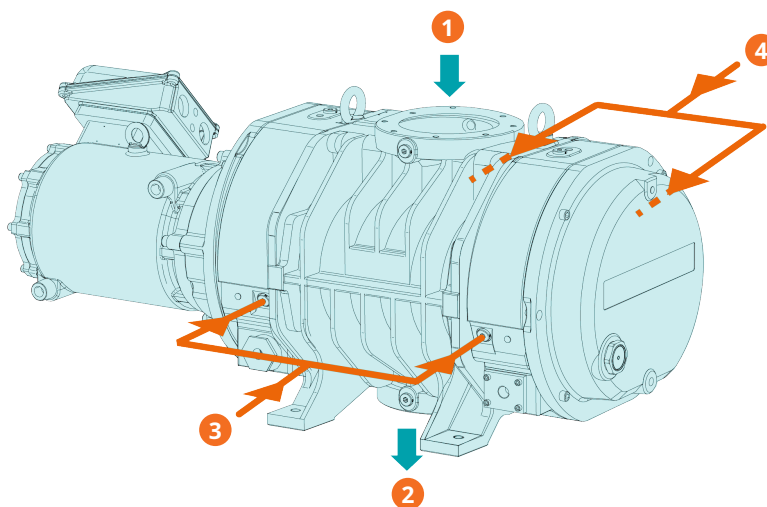
### NOTICE

**Flushing without barrier gas.**

**Risk of damage to the machine!**

- The flushing process can pass over into the bearings and the oil chambers!  
Do not perform flushing without using the barrier gas.

Beforehand, a barrier gas must be connected according to the following illustration and recommendations:



Description			
1	Process flow inlet (IN)	2	Process flow outlet (OUT)
3	Barrier gas connections (BGC)	4	Barrier gas connections (BGC)

Connection size:

- 4 x G3/8 (BGC)

Barrier gas requirements:

Gas type	Dry nitrogen, air or other suitable gas	
Gas temperature	°C	0 ... 60
Filtration	µm	≤ 5
Gas pressure	bar	≥ Pressure of flushing fluid + 1 bar
Recommended flow rate	SLM*	30

\* *standard liter per minute*

- Stop the machine.
- Open the gas supply.
- Flush the machine.

When the flushing is finished:

- Close the gas supply.
- Dry the machine of flushing fluid.

Do not operate the machine in normal operating conditions with the barrier gas opened. It might affect the ultimate pressure and the suction capacity.

## 8 Maintenance



### DANGER

**Live wires.**

**Risk of electrical shock.**

- Electrical installation work must only be executed by qualified personnel.



### WARNING



**Machines contaminated with hazardous material.**

**Risk of poisoning!**

**Risk of infection!**

If the machine is contaminated with hazardous material:

- Wear appropriate personal protective equipment.



### CAUTION

**Hot surface.**

**Risk of burns!**

- Prior to any action requiring touching the machine, let the machine cool down first.



### CAUTION

**Failing to properly maintain the machine.**

**Risk of injuries!**

**Risk of premature failure and loss of efficiency!**

- Maintenance work must only be executed by qualified personnel.
- Respect the maintenance intervals or ask your Busch representative for service.



### NOTICE

**Using inappropriate cleaners.**

**Risk of removing safety stickers and protective paint!**

- Do not use incompatible solvents to clean the machine.

- Shut down the machine and lock against inadvertent start up.
- Turn off the water supply.
- Vent the connected lines to atmospheric pressure.

If necessary:

- Disconnect all connections.

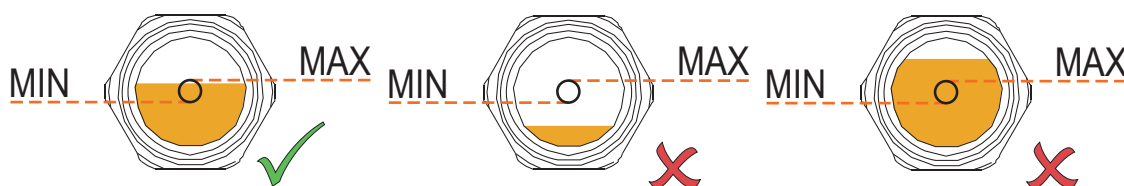
## 8.1 Maintenance Schedule

The maintenance intervals depend very much on the individual operating conditions. The intervals given below are considered as starting values which should be shortened or extended as appropriate. Particularly harsh applications or heavy duty operation, such as high dust loads in the environment or in the process gas, other contamination or ingress of process material, can make it necessary to shorten the maintenance intervals significantly.

Interval	Maintenance work
Monthly	<ul style="list-style-type: none"> <li>• Check the oil level, see <i>Oil Level Inspection</i> [→ 21].</li> <li>• Check the machine for oil leaks - in case of leaks have the machine repaired (contact Busch).</li> </ul>
Yearly	<ul style="list-style-type: none"> <li>• Perform an oil inspection; change it if the oil has changed its initial color, see <i>Oil Color Inspection</i> [→ 21].</li> </ul>
Every 16000 hours or after 4 years	<ul style="list-style-type: none"> <li>• Change the oil of the gear and bearing housings (both sides)</li> <li>• Clean the magnetic plugs (MP)</li> <li>• Have a major overhaul on the machine (contact Busch).</li> </ul>

## 8.2 Oil Level Inspection

- Shut down the machine.
- When the machine is stopped, wait 1 minute before checking the oil level.



- Fill up if necessary, see *Oil Filling* [→ 12].

## 8.3 Oil Color Inspection



### WARNING

Oil "YLC 250 B" contaminated chemically or by foreign bodies.

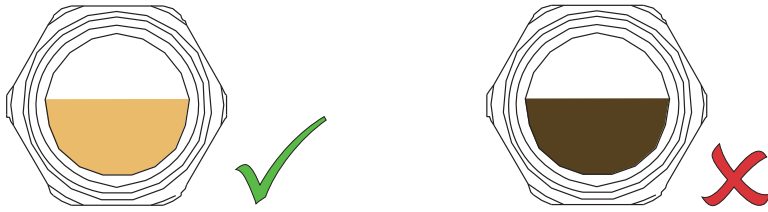
**Risk of explosion!**

If the oil becomes dark:

- Contact your Busch representative without delay.
- 
- Make sure that the oil is either light or transparent.

If the oil becomes dark or looks different from the initial color:

- Change the oil immediately, see *Oil Change* [→ 22].



You can consult your Busch representative in order to find out why this color change has occurred.

## 8.4 Oil Change

### ! NOTICE

**Use of an inappropriate oil.**

**Risk of premature failure!**

**Loss of efficiency!**

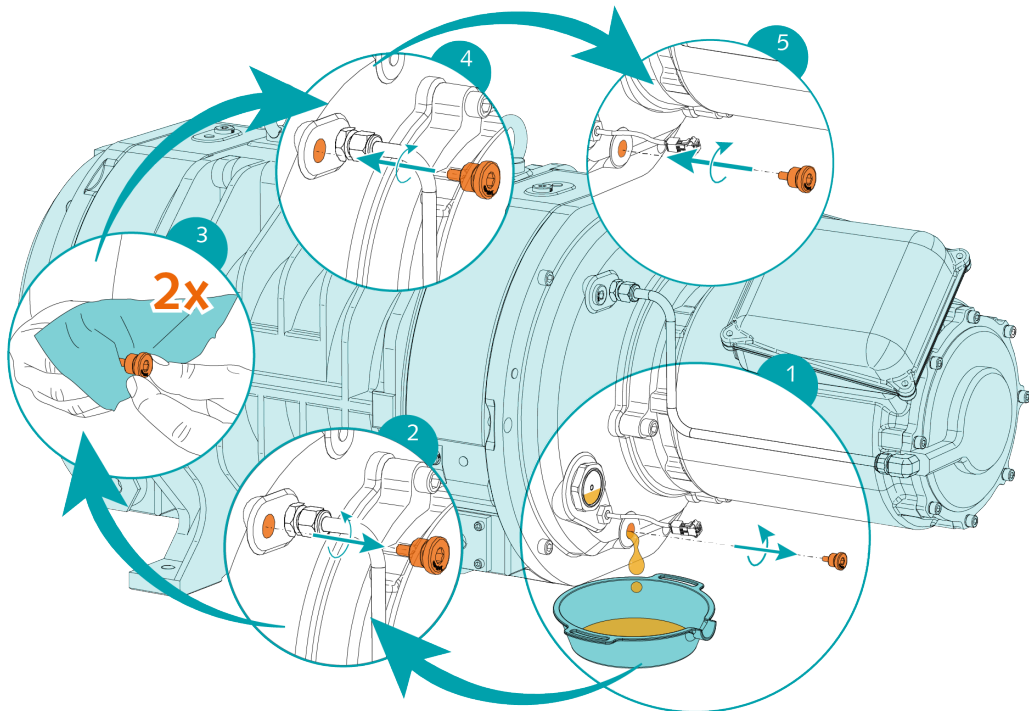
- Only use an oil type which has previously been approved and recommended by Busch.

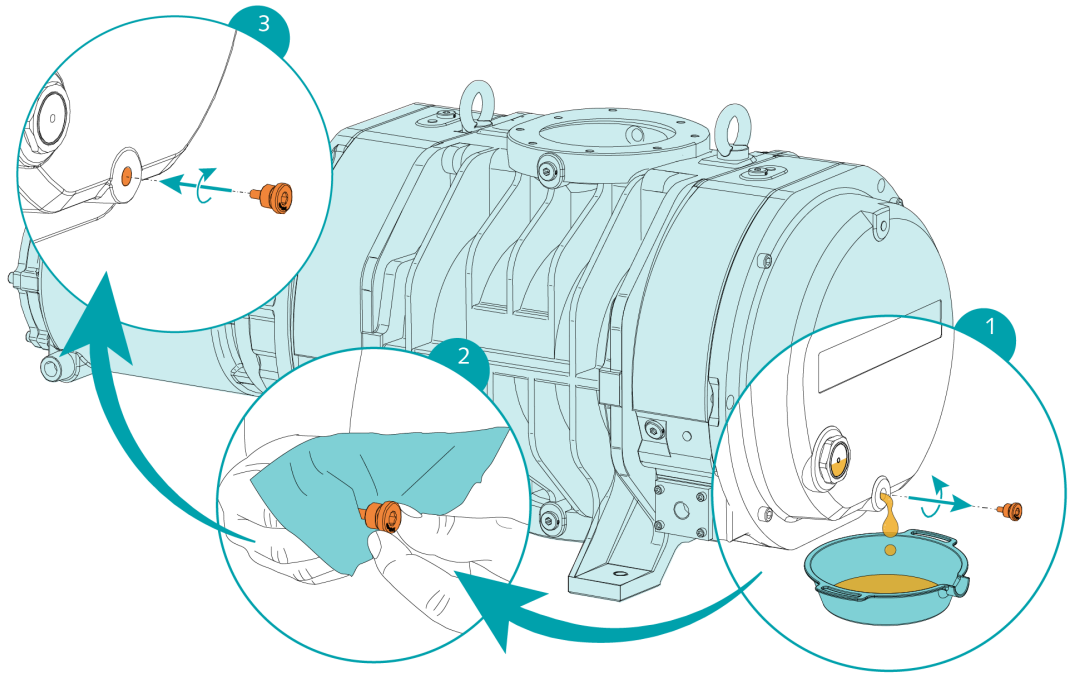
### ! NOTICE

**Replace the magnetic plug.**

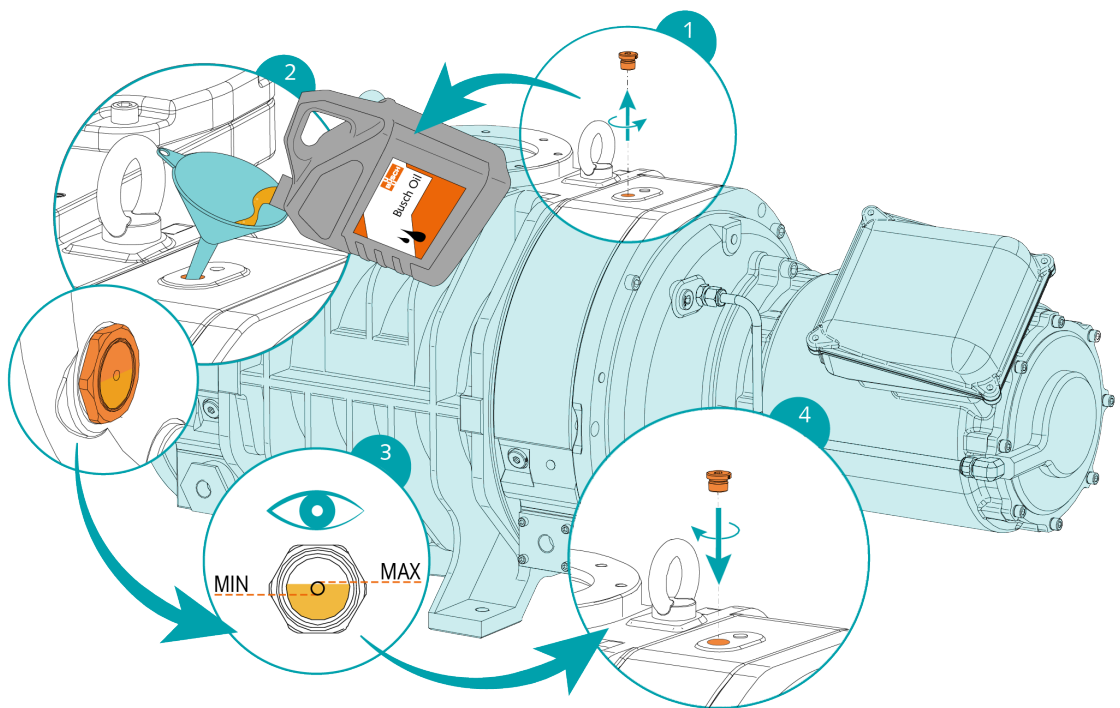
**Risk of damage to the motor bearing!**

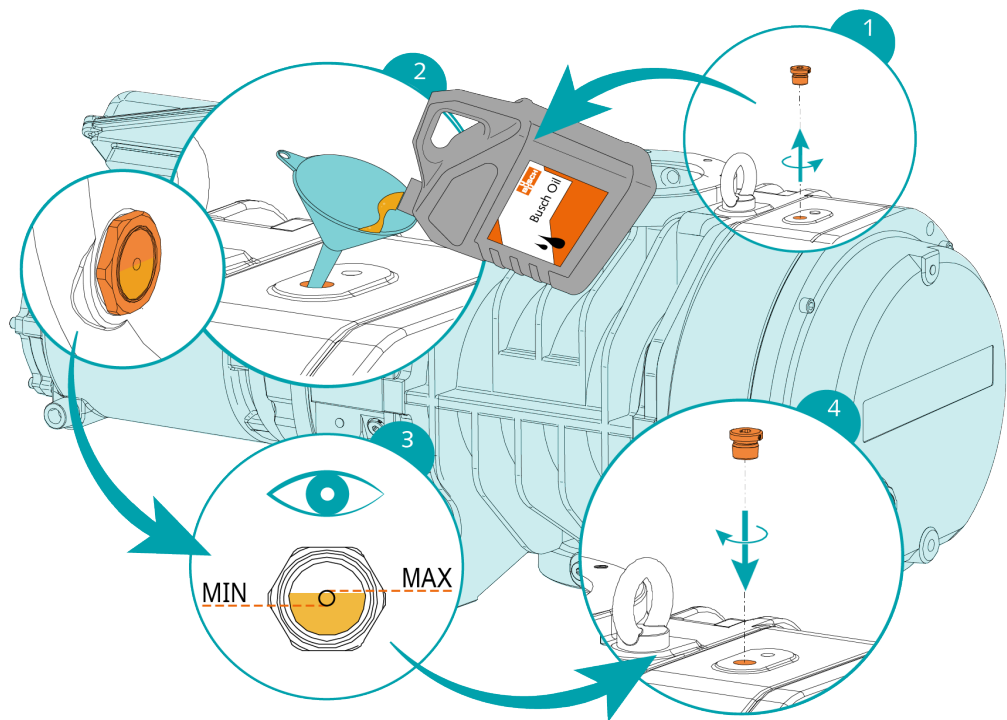
- At every oil change, it is necessary to replace the magnetic plug, due to wear and tear of the seal.





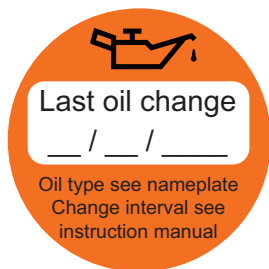
For oil type and oil capacity see *Technical Data* [→ 30] and *Oil* [→ 32].





When the oil filling is achieved:

- Write down the oil change date on the sticker.



If there is no sticker (part no. 0565 568 959) on the machine:

- Order it from your Busch representative.



## 9 Overhaul



### WARNING



**Machines contaminated with hazardous material.**

**Risk of poisoning!**

**Risk of infection!**

If the machine is contaminated with hazardous material:

- Wear appropriate personal protective equipment.



### NOTICE

**Improper assembly.**

**Risk of premature failure!**

**Loss of efficiency!**

- Any dismantling of the machine that goes beyond anything that is described in this manual should be done by Busch authorized technicians.

In case of the machine having conveyed gas that was contaminated with foreign materials which are dangerous to health:

- Decontaminate the machine as much as possible and state the contamination status in a 'Declaration of Contamination'.

Busch will only accept machines that come with a completely filled in and legally binding signed 'Declaration of Contamination' (form downloadable from [www.buschvacuum.com](http://www.buschvacuum.com)).

## 10 Decommissioning



### DANGER

**Live wires.**

**Risk of electrical shock.**

- Electrical installation work must only be executed by qualified personnel.



### CAUTION

**Hot surface.**

**Risk of burns!**

- Prior to any action requiring touching the machine, let the machine cool down first.

- Shut down the machine and lock against inadvertent start up.
- Disconnect the power supply.
- Turn off the water supply.
- Vent the connected lines to atmospheric pressure.
- Blow through the water cooling inlet with compressed air.
- Disconnect all connections.

If the machine is going to be stored:

- See *Storage* [→ 8].

### 10.1 Dismantling and Disposal

- Drain and collect the oil.
- Make sure that no oil drips onto the floor.
- Separate special waste from the machine.
- Dispose of special waste in compliance with applicable regulations.
- Dispose of the machine as scrap metal.

# 11 Spare Parts



## NOTICE

**Use of non-Busch genuine spare parts.**

**Risk of premature failure!**

**Loss of efficiency!**

- The exclusive use of Busch genuine spare parts and consumables is recommended for the correct functioning of the machine and to validate the warranty.

There is no standard spare parts kits available for this product, if you require Busch genuine parts:

- Contact your Busch representative.

# 12 Troubleshooting



## DANGER

**Live wires.**

**Risk of electrical shock.**

- Electrical installation work must only be executed by qualified personnel.



## CAUTION

**Hot surface.**

**Risk of burns!**

- Prior to any action requiring touching the machine, let the machine cool down first.

Problem	Possible Cause	Remedy
The machine does not start.	The motor is not supplied with the correct voltage.	<ul style="list-style-type: none"> <li>• Check the power supply.</li> </ul>
	The lobes are jammed or seized.	<ul style="list-style-type: none"> <li>• Lobes inspection or repair the machine (contact Busch).</li> </ul>
	Solid foreign matter has entered the machine.	<ul style="list-style-type: none"> <li>• Remove the solid foreign matter or repair the machine (contact Busch).</li> <li>• Equip the machine with a mesh screen at the suction connection.</li> </ul>
	The temperature switch (TS) reached the switch point.	<ul style="list-style-type: none"> <li>• Let the machine cool down.</li> <li>• See problem "The machine runs too hot".</li> </ul>
	The motor is defective.	<ul style="list-style-type: none"> <li>• Replace the motor.</li> </ul>
The machine does not reach the usual pressure.	Suction or discharge lines too long or section diameter too small.	<ul style="list-style-type: none"> <li>• Use larger diameter or shorter lines.</li> <li>• Seek advice from your local Busch representative.</li> </ul>
	The backing pump is not correctly defined.	<ul style="list-style-type: none"> <li>• Contact Busch.</li> </ul>
	The machine runs in the wrong direction.	<ul style="list-style-type: none"> <li>• Check the direction of rotation, see <i>Wiring Diagram Three-Phase Motor</i> [→ 15].</li> </ul>
	Internal parts are worn or damaged.	<ul style="list-style-type: none"> <li>• Repair the machine (contact Busch).</li> </ul>
The machine runs very noisily.	Wrong oil quantity or unsuitable oil type.	<ul style="list-style-type: none"> <li>• Use one of the recommended oils in the correct quantity, see <i>Oil</i> [→ 32].</li> </ul>
	Defective gears, bearings or coupling element.	<ul style="list-style-type: none"> <li>• Repair machine (contact Busch).</li> </ul>

<b>Problem</b>	<b>Possible Cause</b>	<b>Remedy</b>
The machine runs too hot.	Insufficient cooling.	<ul style="list-style-type: none"> <li>• Make sure to comply with the cooling water requirements, see <i>Cooling Water Connection</i> [→ 11].</li> </ul>
	Ambient temperature too high.	<ul style="list-style-type: none"> <li>• Observe the permitted ambient temperature, see <i>Technical Data</i> [→ 30].</li> </ul>
	Temperature of the process gases at the inlet too high.	<ul style="list-style-type: none"> <li>• Observe the permitted gas inlet temperature, see <i>Technical Data</i> [→ 30].</li> </ul>
	Oil level too low.	<ul style="list-style-type: none"> <li>• Top up oil.</li> </ul>
	The backing pump is not correctly defined.	<ul style="list-style-type: none"> <li>• Contact Busch.</li> </ul>
The oil is black.	Oil change intervals are too long.	<ul style="list-style-type: none"> <li>• Drain the oil and fill in new oil, see <i>Oil Change</i> [→ 22].</li> </ul>
	The machine runs too hot.	<ul style="list-style-type: none"> <li>• See problem "The machine runs too hot".</li> </ul>

For the solution of problems not mentioned in the troubleshooting chart contact your Busch representative.

# 13 Technical Data

WY 3600 A 90 Hz*		
Pumping speed	m <sup>3</sup> /h	3600
Nominal motor rating	kW	11
Nominal motor speed	min <sup>-1</sup>	5400
Nominal motor current (double star connection)	A	38 (200 V)
Nominal motor current (star connection)	A	18.9 (400 V)
Sound pressure level**	dB(A)	65
Uncertainty KpA	dB	3
Ambient temperature range	°C	5 ... 50
Max. gas inlet temperature (P <10 hPa, staging ratio of 4)	°C	200
Relative humidity	at 30°C	90%
Leak rate	mbar.l/s	≤ 1 x 10 <sup>-6</sup>
Oil capacity (Motor side)	l	1.3
Oil capacity (Gear side)	l	2.2
Weight approx.	kg	476

\* with variable speed drive, max. 90 Hz.

\*\* according to DIN EN ISO 2151. Operation under ultimate pressure. Pressure level above 10 mbar may result in higher noise levels.

# 14 Maximum Permissible Differential Pressures

WY 3600 A				
90 Hz*				
Blower nominal suction capacity	m <sup>3</sup> /h	3600		
Backing pump nominal suction capacity	m <sup>3</sup> /h	≥ 720	≥ 360	≤ 360
Delta P max. in continuous operation	hPa	30**	15**	On request
Delta P max. in 50% duty	hPa	30**	15**	On request
Volume max. for pump down cycles	l	1000 (every 2 min.)	1000 (every 10 min.)	On request

\* with variable speed drive, max. 90 Hz

\*\* require cooling water connected to the covers (CWC)

# 15 Oil

YLC 250 B	
Part number 0.5 L packaging (~1 kg)	0831 131 400
Part number 1.0 L packaging (~2 kg)	0831 108 878
Part number 5.0 L packaging (~10 kg)	0831 108 879

To know which oil has been filled in the machine, please refer to the nameplate (NP).



# 16 EU Declaration of Conformity

This Declaration of Conformity and the CE-markings affixed to the nameplate are valid for the machine within the Busch scope of delivery. This Declaration of Conformity is issued under the sole responsibility of the manufacturer.

When this machine is integrated into a superordinate machinery the manufacturer of the superordinate machinery (this can be the operating company, too) must conduct the conformity assessment process for the superordinate machine or plant, issue the Declaration of Conformity for it and affix the CE-marking.

The manufacturer is determined by the serial number:

Serial number starts with **CHM1...**

**Ateliers Busch S.A.**  
**Zone industrielle**  
**2906 Chevenez**  
**Switzerland**

Serial number starts with **KRM1...**

**Busch Manufacturing Korea, Ltd.**  
**189-51, Soicheon-ro, Majang-myun**  
**Icheon-si, Gyunggi-do, 467-813**  
**Republic of Korea**

declares that the machine: PUMA WY 3600 A

fulfill(s) all the relevant provisions from EU directives:

- 'Machinery' 2006/42/EC
- 'Electromagnetic Compatibility' (EMS) 2014/30/EU
- 'RoHS' 2011/65/EU Restriction of the use of certain hazardous substances in electrical and electronic equipment (incl. all related applicable amendments)

and comply(-ies) with the following designated standards that have been used to fulfill those provisions:

Standards	Title of the Standard
EN ISO 12100 : 2010	Safety of machinery - Basic concepts, general principles of design
EN ISO 13857 : 2019	Safety of machinery - Safety distances to prevent hazard zones being reached by the upper and lower limbs
EN 1012-2 : 1996 + A1 : 2009	Vacuum pumps - Safety requirements - Part 2
EN ISO 2151 : 2008	Acoustics - Noise test code for compressors and vacuum pumps - Engineering method (grade 2)
EN 60204-1 : 2018	Safety of machinery - Electrical equipment of machines - Part 1: General requirements
EN IEC 61000-6-2 : 2019	Electromagnetic compatibility (EMC) - Generic standards. Immunity for industrial environments
EN IEC 61000-6-4 : 2019	Electromagnetic compatibility (EMC) - Generic standards. Emission standard for industrial environments

Legal person authorized to compile the technical file and authorized representative in the EU (if the manufacturer is not located in the EU):

Busch Dienste GmbH  
 Schauinslandstr. 1  
 DE-79689 Maulburg

Chevenez, 12.10.2021

Icheon-si, 12.10.2021



**Christian Hoffmann**  
**General Manager**  
**Ateliers Busch S.A.**



**Seung-hwa Yoo**  
**General Director**  
**Busch Manufacturing Korea, Ltd**

# 17 UK Declaration of Conformity

This Declaration of Conformity and the UKCA-markings affixed to the nameplate are valid for the machine within the Busch scope of delivery. This Declaration of Conformity is issued under the sole responsibility of the manufacturer.

When this machine is integrated into a superordinate machinery the manufacturer of the superordinate machinery (this can be the operating company, too) must conduct the conformity assessment process for the superordinate machine or plant, issue the Declaration of Conformity for it and affix the UKCA-marking.

The manufacturer is determined by the serial number:

Serial number starts with **CHM1...**

**Ateliers Busch S.A.**  
**Zone industrielle**  
**2906 Chevenez**  
**Switzerland**

Serial number starts with **KRM1...**

**Busch Manufacturing Korea, Ltd.**  
**189-51, Soicheon-ro, Majang-myun**  
**Icheon-si, Gyunggi-do, 467-813**  
**Republic of Korea**

declares that the machine: PUMA WY 3600 A

fulfill(s) all the relevant provisions from UK legislations:

- Supply of Machinery (Safety) Regulations 2008
- Electromagnetic Compatibility Regulations 2016
- Restriction of the use of certain hazardous substances in Electrical and Electronic Equipment Regulations 2021

and comply(-ies) with the following designated standards that have been used to fulfill those provisions:

Standards	Title of the Standard
EN ISO 12100 : 2010	Safety of machinery - Basic concepts, general principles of design
EN ISO 13857 : 2019	Safety of machinery - Safety distances to prevent hazard zones being reached by the upper and lower limbs
EN 1012-2 : 1996 + A1 : 2009	Vacuum pumps - Safety requirements - Part 2
EN ISO 2151 : 2008	Acoustics - Noise test code for compressors and vacuum pumps - Engineering method (grade 2)
EN 60204-1 : 2018	Safety of machinery - Electrical equipment of machines - Part 1: General requirements
EN IEC 61000-6-2 : 2019	Electromagnetic compatibility (EMC) - Generic standards. Immunity for industrial environments
EN IEC 61000-6-4 : 2019	Electromagnetic compatibility (EMC) - Generic standards. Emission standard for industrial environments

Legal person authorized to compile the technical file and importer in the UK (if the manufacturer is not located in the UK):

Busch (UK) Ltd  
 30 Hortonwood  
 Telford - UK

Chevenez, 12.10.2021

Icheon-si, 12.10.2021




**Christian Hoffmann**  
**General Manager**  
**Ateliers Busch S.A.**

**Seung-hwa Yoo**  
**General Director**  
**Busch Manufacturing Korea, Ltd**

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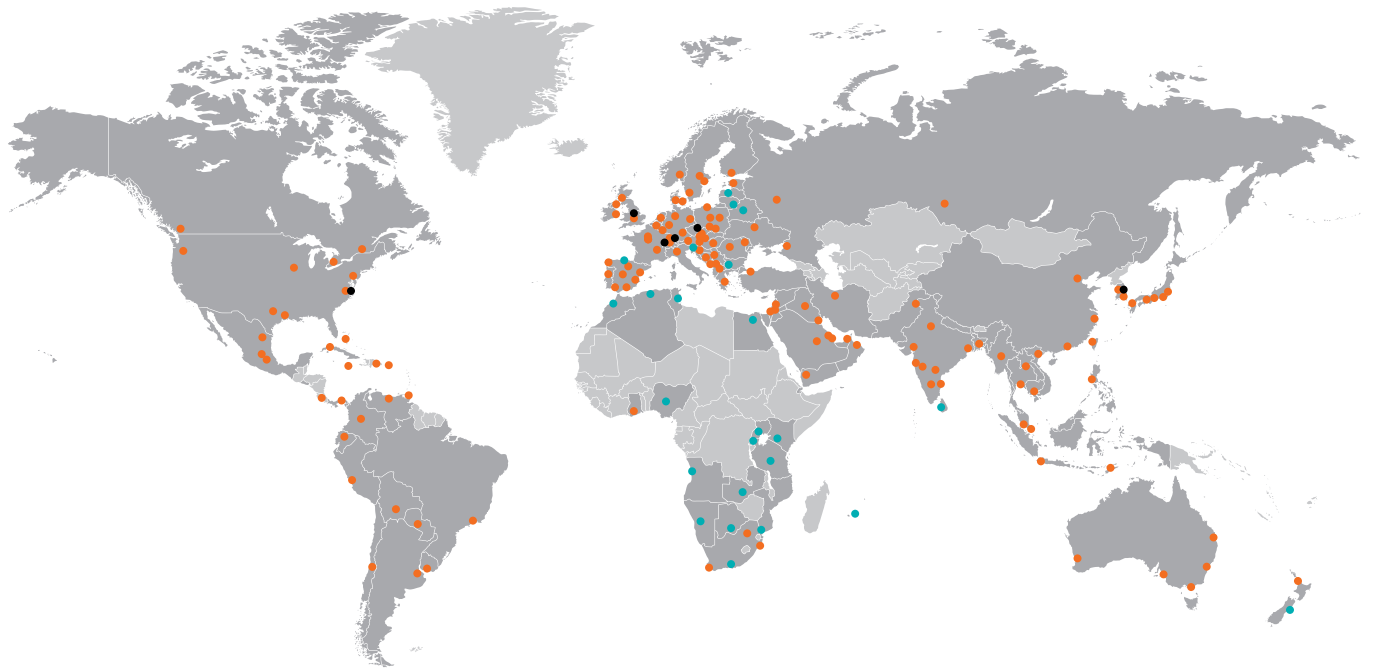
# Notes

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# Busch

## Vacuum Solutions

With a network of over 60 companies in more than 40 countries and agencies worldwide, Busch has a global presence. In every country, highly competent local personnel delivers custom-tailored support backed by a global network of expertise. Wherever you are. Whatever your business. We are there for you.



● Local representatives and distributors ● Busch companies and Busch employees ● Busch production site

[www.buschvacuum.com](http://www.buschvacuum.com)