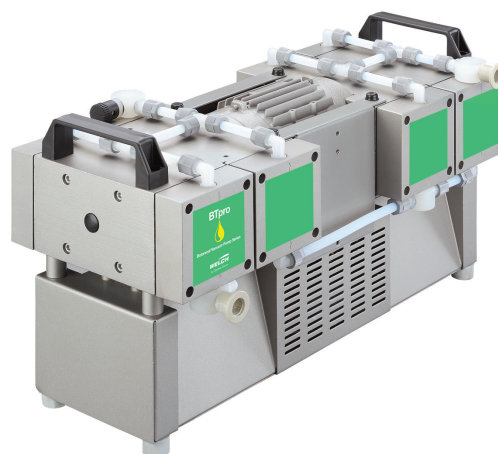


## Operation Manual

### BTpro Botanical Diaphragm Pumps

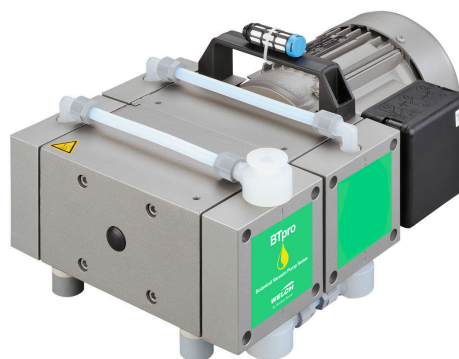
#### 8-Headed BTpro170

► Models: 7040, 7042



#### 4-Headed BTpro100

► Models: 7030, 7032



We are constantly working on the further development of all our product models.

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We reserve the right to make changes and amendments.

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# Diaphragm pumps BTpro170, BTpro100

## MAINTENANCE AND INSTALLATION INSTRUCTIONS

Read and understand the information and instructions included with this product before using. This information is for your safety and to prevent damage to this product. Failure to observe these safety precautions could result in severe bodily injury, including death in extreme cases.



### CAUTION: To reduce risk of electrical shock...

1. Do not disassemble. Disassembly or attempted repairs if accomplished incorrectly can create electrical shock hazard. Refer servicing to qualified service agencies only.
2. If this pump assembly is supplied with a three-pronged plug, connect unit to a properly grounded outlet only.



### WARNING: To reduce risk of electrocution...

1. This product should never be left unattended when plugged in.
2. Always unplug this product immediately after use and store in dry place.
3. Do not use this product in or near area where it can fall or be pulled into water or other liquids.
4. Do not reach for this product if it has fallen into liquid. Unplug immediately.
5. To Reduce the Risk of Electric Shock or Injury, Use Indoors Only.



### DANGER: To reduce risk of explosion or fire...

1. Do not use this product in or near explosive atmospheres or where aerosol (spray) products are being used.
2. Do not pump combustible liquids or vapors with this product or use in or near an area where flammable or explosive liquids or vapors may exist.
3. Do not use this product near flames.



### CAUTION: To prevent Injury...

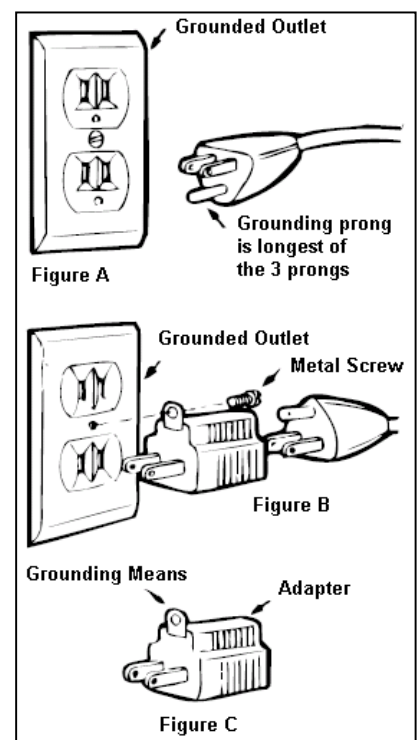
1. Close supervision is necessary when this product is used near children or invalids. Never allow children to operate unit.
2. Never operate this product if it has a damaged cord or plug, if it is not working properly, if it has been dropped or damaged, or if it has fallen into water. Return the product to a service center for examination and repair.
3. Keep the cord away from heated surfaces.
4. Never use while sleeping or drowsy.
5. Do not operate this product where oxygen is being administered.
6. This unit is thermally protected. See page 2 Thermal Switch Protection for full details.
7. Always disconnect power source before servicing.
8. Wear safety glasses or goggles when operating this product.
9. Use only in well ventilated areas.
10. All electrical products generate heat. To avoid serious burns never touch unit during or immediately after operation.

## Grounding Instructions

This product should be grounded. In the event of an electrical short circuit, grounding reduces the risk of electric shock by providing an escape wire for the electric current. This product is equipped with a cord having a grounding wire with an appropriate grounding plug. The plug must be plugged into an outlet that is properly installed and grounded in accordance with all local codes and ordinances.



**DANGER** – Improper installation of the grounding plug can result in a risk of electric shock. If repair or replacement of the cord or plug is necessary, do not connect the grounding wire to either flat blade terminal. The wire with insulation having an outer surface that is green with or without yellow stripes is the grounding wire. Check with a qualified electrician or serviceman if the grounding instructions are not completely understood, or if in doubt as to whether the product is properly grounded. Do not modify the plug provided; if it will not fit the outlet, have the proper outlet installed by a qualified electrician. This product is for use on a nominal 120-volt circuit, and has a grounding plug that looks like the plug illustrated in Fig. A. A temporary adapter that looks like the adapter illustrated in Fig. B and Fig. C may be used to connect this plug to a 2-pole receptacle as shown in Fig. B, if a properly grounded outlet is not available. The temporary adapter should be used only until a properly grounded outlet (Fig. A) can be installed by a qualified electrician.



The green colored rigid ear, lug, or the like extending from the adapter must be connected to a permanent ground such as a properly grounded outlet box cover. Whenever the adapter is used, it must be held in place by a metal screw. This adapter shown in Fig. B and Fig. C is not acceptable in Canada.

**Extension Cords** – Use only a 3-wire extension cord that has a 3-blade grounding plug, and a 3-slot receptacle that will accept the plug on the product. Make sure your extension cord is in good condition. When using an extension cord, be sure to use one heavy enough to carry the current your product will draw. For lengths less than 25 feet, No. 18 AWG extension cords should be used. For lengths less than 100 feet, No. 12 AWG extension cords should be used. An undersized cord will cause a drop in line voltage resulting in loss of power and overheating. If in doubt, use the next heavier gage. The smaller the gage number, the heavier the cord.

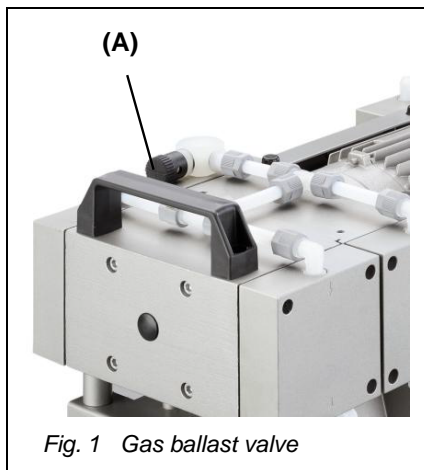
**Ambient Conditions** – This unit should be operated in a well-ventilated area where the surrounding air is relatively clean, dry and temperatures are consistently within the range of 41°F (5°C) and 104 °F (40°C). Adequate ventilation is required for proper operation.

**Thermal Switch Protection** - This unit is supplied with self-holding thermal protection. If the thermal protection were to trip from overheating the supply voltage needs to be disconnected and the unit allowed to cool down. Once the thermal protection resets only then reconnect the supply voltage. If the supply voltage is not disconnected the thermal protection will continue to stay open.

## Operation

The intended use for this vacuum pump is for general physical and chemical laboratory applications requiring vacuum ranging from atmospheric pressure down to an ultimate vacuum of 8 mbar.

1. The pump is equipped with an ON/OFF (I/O) power switch.
2. Gas Ballast – A gas ballast valve **(A)** is provided on the pump. When condensable vapors are pumped, they may be compressed above the saturated vapor pressure and condense in the pump. Opening the gas ballast valve admits air into the last stage of the vacuum pump thereby reducing the partial pressure of the condensable vapors and preventing condensation and flushing the pump clear. Gas ballast operation leads to increasing the ultimate pressure and operating temperature.



## Maintenance

### General Requirements

1. Check the pump daily for unusual running noises and heat building up on the surface of the pump.
2. Replace the diaphragm after 10,000 operating hours. The user may specify replacement be made earlier, depending upon the application process.
3. Check the electrical and vacuum connections daily.
4. When the unit is not in use, Unplug and wrap the cord securely and store in a dry place. Do not abuse cord or plug.
5. Inspect hose, plug and cord for signs of damage before use. Do not use if a deficiency is found. Contact your nearest service centre for replacement parts. Never operate a damaged unit.

### Maintenance Performed by the User

1. Warning! Be sure to unplug the pump before conducting any maintenance work.
2. Loosen and remove the hoses
3. Open and remove the pump heads
4. Inspect the pump chambers, diaphragms and valves
5. Deposits in the inside of the pump must be cleaned out
6. Change the diaphragms, valves and seals

## Tools required:

**Tool kit: Order no. 402106-US**, consists of:

- Order no. 826801 Pin type face wrench, adjustable, size 3,
- Order no. 826801-6 Hex wrench, size 4mm,
- Order no. 826801-5 Open spanner, size 17mm.

## Disassembly

1. Open the screw clamps **(9)** of the hoses **(10)** on the pump body with the size 17 open spanner.
2. Remove four machine screws **(1)** from each connection head with an Allan key, size 4.
3. Lift off the connection head **(2)** and the pump head **(5)**. The valves **(3)**, O-rings **(4)** and diaphragm **(7)** are now freely exposed.
4. Loosen the diaphragm **(7)** at the strain washer **(6)** by turning the size 3 pin type face wrench anticlockwise.
5. Clean the valves **(3)**, the pump head **(5)** and the diaphragm **(7)** with a soft cloth and acetone.
6. Check that the drive is in good working order.

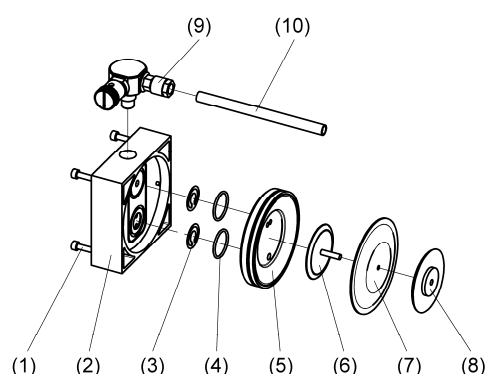


Fig. 2 Disassembly, assembly

## Assembly (see Fig. 2)

1. Place the pump so that the diaphragm is lying in a horizontal position.
2. Use the size 3 pin-type face wrench to tighten the pressure disc **(8)**, the diaphragm **(7)** and the strain washer **(6)** with the correct torque of 5 - 6 Nm.
3. Bring the piston rod (see Fig. 4,6) and the diaphragm **(7)** into the central position.
4. Replace the pump head **(5)**.
5. Insert the valves **(3)** and the O-rings **(4)**.  
Ensure that they are lying completely flat. Do not insert the burred side facing the sealing surface. Align the connection head flush with the pin.
6. Tighten the four machine screws **(1)** symmetrically with a torque of 3 to 4 Nm.
7. Reattach the hose connections **(10)** with clamping ring screw fittings **(9)**.

## Test

Connect a vacuum gauge to the intake connection and measure the ultimate pressure.

The pump must not make any abnormal noises. Moving parts must not touch each other. If the repair was successful and the pump is working properly, then a fully warm pump should attain the specified ultimate pressure stated in the specifications data.

## Maintenance by the Manufacturer

Repairs and maintenance going beyond the extent of the work described *above* or reconditioning or modification may only be performed by the manufacturer or authorized dealer.

## Service kits

Designation	Order no.
<b>Service kit</b> for model: BTpro170 BTpro100	402043-US 402042-01-US

The Service kit consists of:

Designation	Kit - Order no. 402043-US		Kit - Order no. 402042-01-US	
	for Model BTpro170		for Model BTpro100	
	Piece	Order no.	Piece	Order no.
O-Ring ø 12 x 2	36	829217-3	8	829217-3
O-Ring ø 25 x 2	16	829250-1	8	829250-1
Valve	16	400656	6	400656
Valve with hole	-	-	2	400656-4
Diaphragm	8	400732	4	400732

# Technical Data - BTpro170

## Dimensions

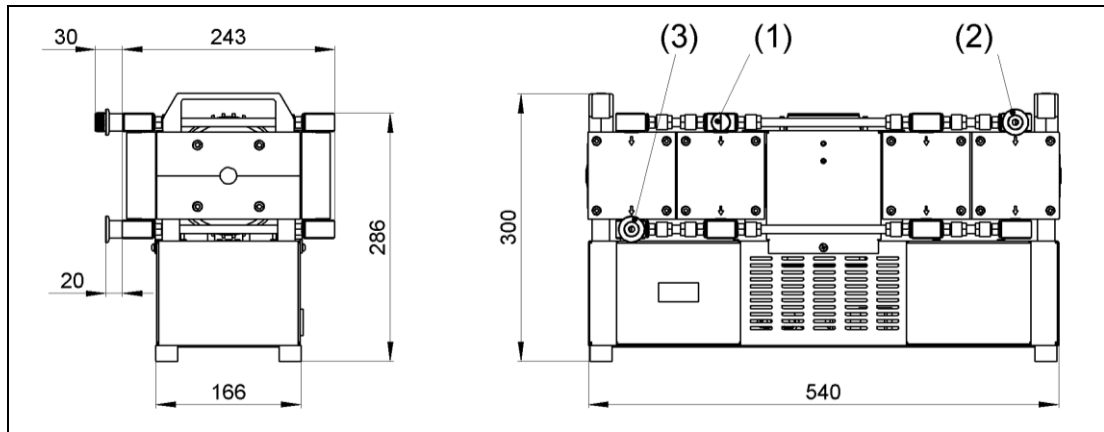


Fig. 3 Dimensions

## Device Data

Parameter	Unit	Diaphragm pump – BTpro170
		(two-stage)
Free Air Displacement @ 60 Hz	CFM	6.0
	L / min	170
Ultimate pressure	mbar	8
Max. inlet pressure	bar	1
Max. outlet pressure		1
IN - Intake (1) and EX - Exhaust (2) connections	standard	Small flange DN 16 KF
	option	Hose nozzle DN 8 for hose inside diameter 8 mm <i>(enclosed)</i>
Ambient temperature	°C	+ 10 to + 40
Max. operating gas temperature		+ 40
Bearing	-	maintenance-free
Voltage	V	230, 115
Frequency	Hz	50/60
Power	W	370 / 440
Motor protection	-	IP 54
Motor / Class of insulation		F
Dimensions (W/D/H)	mm	540 / 240 / 300
Weight	kg	32.8
Order numbers for Diaphragm pumps inclusive mains connection cables IEC with:	-	
		7042-01
		7040-01

The information presented in this material is based on technical data and test results of nominal units. It is believed to be accurate and reliable and is offered as an aid to help in the selection of products. It is the responsibility of the user to determine the suitability of the product for the intended use and the user assumes all risk and liability whatsoever in connection therewith. Gardner Denver Thomas GmbH does not warrant, guarantee or assume any obligation or liability in connection with this information.

## Spare Parts Overview

### Spare parts view - Basic structure – BTpro170

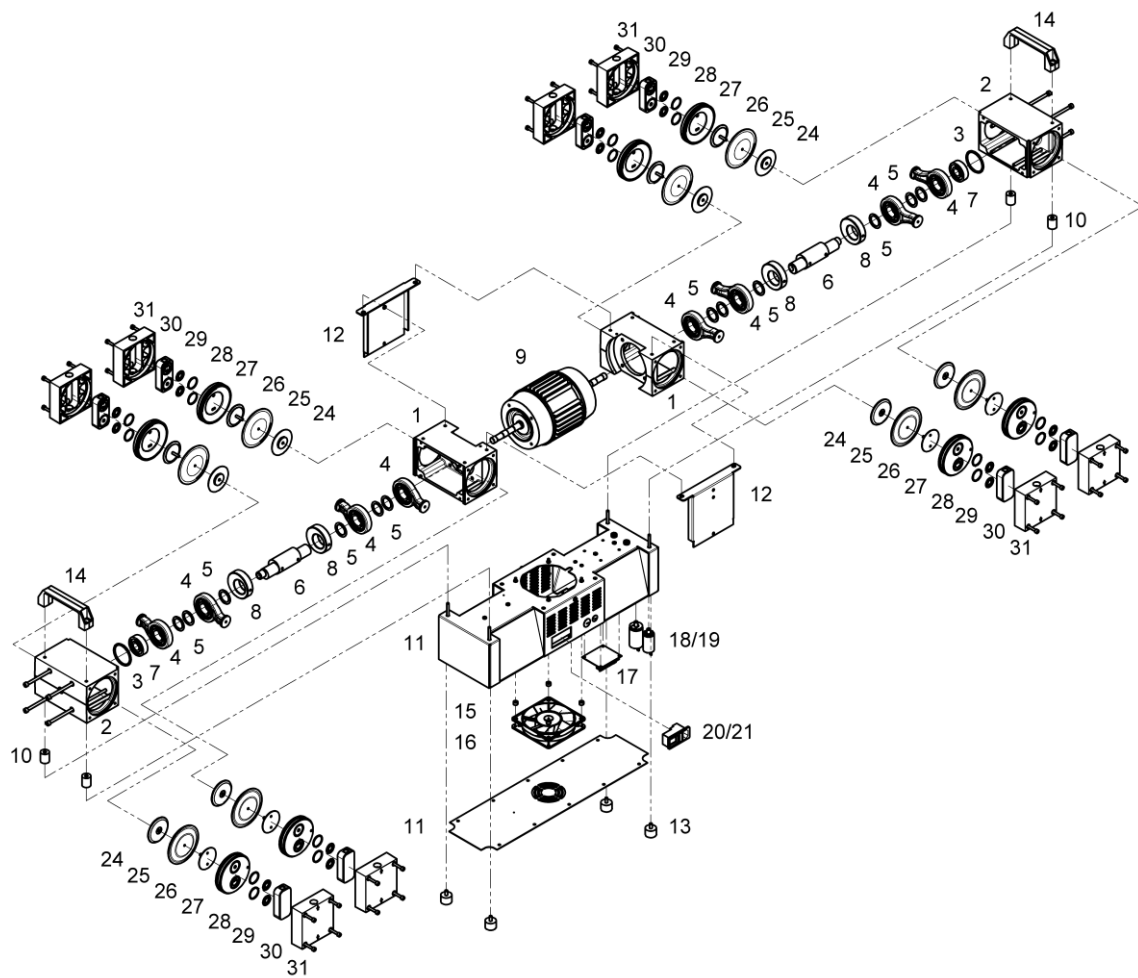


Fig. 4 Exploded view - Basic structure (Diaphragm pumps 8-headed)

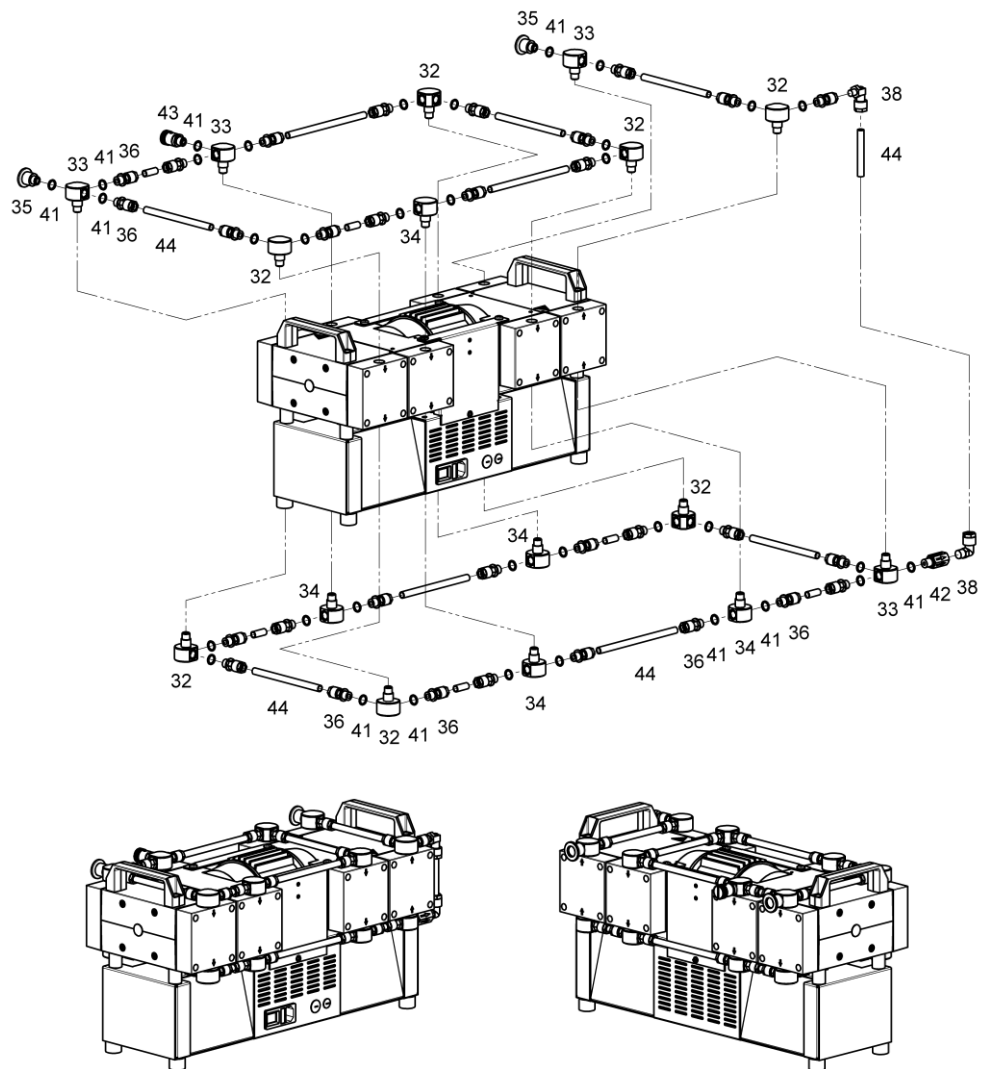


## Spare parts list - Basic structure – BTpro170

Item no.	Designation	Piece	BTpro170	
			230 V	115 V
			Order no. 7042-01	Order no. 7040-01
			Order no.	Order no.
- *)	Basic pump complete (consisting of position: 1 – 9)	1	-	-
		1	-	410404-07
1	- Pump casing 1	2	400640-01	400640-01
2	- Pump casing 2	2	400640-3	400640-3
3	- O-Ring ø 47.22 x 3.53	2	829269	829269
-	- Drive complete (consisting of position: 4 – 8)	1	400844	400844
4	- Piston rod with ball bearing	4	400647-01	400647-01
5	- Close tolerance spacer 25 x 35 x 1	6	824957-1	824957-1
6	- Eccentric shaft	1	400742-1	400742-1
7	- Ball bearing	1	824949-3	824949-3
8	- Mass balance	2	400678-1	400678-1
9	- Alternating-current motor	1	826390-5	826390-7
10	Spacer distance - Foot	4	410437	410437
11	Foot	1	410435	410435
12	Air duct	2	410438	410438
13	Rubber metal-pad	4	829141-2	829141-2
14	Handle	2	828670	828670
15	Spacer for fan	4	103521	103521
16	AC axial fan	1	829819-3	829819-5
17	Time controlling VAPU 0003	1	825681	825681-1
18	Motor operating condenser 20µF	1	-	825458
18	Motor operating condenser 16µF	1	-	-
19	Motor operating condenser 12µF	1	-	-
20	Device plug for non-heating apparatus - combination	1	825274	825274
21	Fine fuse T 6.3 A	1	825372	825372
24	Pressure washer	8	400680	400680
25	Diaphragm	8	400732	400732
26	Tightening washer	8	400707	400707
27	Pump head	8	400705-02	400705-02
28	O-Ring EPDM ø 25 x 2	16	829250-1	829250-1
29	Valve	16	400656	400656
30	PTFE insert	8	400902	400902
31	Connection head	8	410432	410432

\*) The "basic pump" module (items 1 – 9) can only be supplied complete under order number 410404-07.

## Spare parts view - Vacuum connection BTpro170



## Spare parts list - Vacuum connection BTpro170

Item no.	Designation	Piece	7042-01	7040-01
			230 V	115 V
			Order no.	Order no.
32	Manifold 2	7	400903	400903
33	Manifold 3	3	400904	400904
34	Manifold 4	6	400911	400911
35	Intake-/exhaust port PP, DN16KF – 1/4"	2	710116	710116
36	Straight threaded joint with seal edge PVDF, 10 – 1/4"	30	829931	829931
37	Threaded elbow joint PVDF, 10 – M 12 x 1	-	-	-
38	Threaded elbow joint PVDF, 10 – 1/4"	-	-	-
39	Threaded elbow joint with attitude taps PVDF, 10 – 1/4"	2	829913-1	829913-1
40	T - screw connection PP, 10 – 10 – 10	-	-	-
41	O-Ring EPDM ø 12 x 2	34	829217-3	829217-3
42	Check valve PVDF, 8	1	829909	829909
43	Gas ballast valve	1	400599-01	400599-01
44	Vacuum hose PTFE 10 / 8x1mm	1.5 m	828332	828332

## Technical Data - BTpro100

### Dimensions

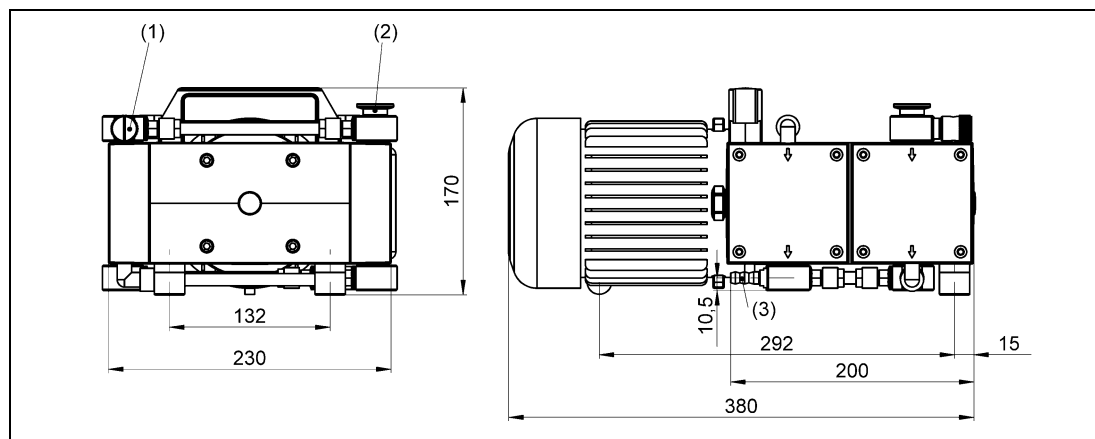


Fig. 5 Dimensions (Model BTpro100)

### Device Data

Parameter	Unit	Diaphragm pump – BTpro100
		(two-stage)
Free Air Displacement @ 60 Hz	CFM	3.5
	L / min	100
Ultimate pressure	mbar	8
Max. inlet pressure	bar	1
Max. outlet pressure		1
IN - Intake (1) and	standard	Small flange DN 16 KF
EX - Exhaust (2) connections	option	Hose nozzle DN 8 for hose inside diameter 8 mm ( <i>enclosed</i> )
Ambient temperature	°C	+ 10 to + 40
Max. operating gas temperature		+ 40
Bearing	-	maintenance-free
Voltage	V	230, 115
Frequency	Hz	50/60
Power	W	370
Motor protection	-	IP 54
Motor / Class of insulation		F
Dimensions (W/D/H)	mm	230 / 380 / 170
Weight	kg	18.3
Order numbers for Diaphragm pumps inclusive mains connection cables IEC with:	-	
- 230 V Schuko and UK plug		7032-01
- 115 V American plug		7030-01

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# Spare Parts Overview

## Spare parts view - Vacuum connection BTpro100

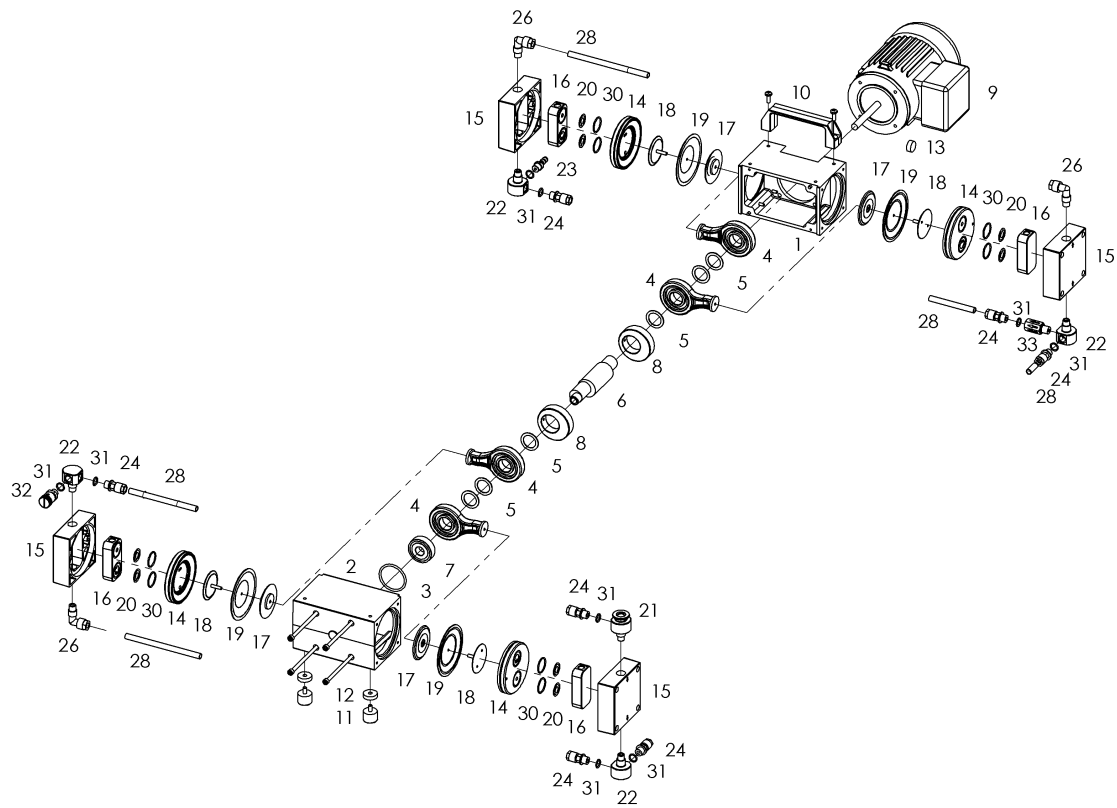


Fig. 6 Exploded view (BTpro100)

## Spare parts list - Diaphragm pump - BTpro100

Item no.	Designation	Piece	7032-01	7030-01
			230 V	115 V
			Order no.	Order no.
- *)	Basic pump complete <i>(consisting of position: 1 – 9)</i>	1	410403	410403-01
1	- Pump casing 1	1	410430-01	410430-01
2	- Pump casing 2	1	410430-3	410430-3
3	- O-Ring $\varnothing$ 47.22 x 3.53	1	829269	829269
-	- Drive complete <i>(consisting of position: 4 – 8)</i>	1	400844	400844
4	- Piston rod with ball bearing	4	400647-01	400647-01
5	- Close tolerance spacer 25 x 35 x 1	6	824957-1	824957-1
6	- Eccentric shaft	1	400742-1	400742-1
7	- Ball bearing	1	824949-3	824949-3
8	- Mass balance	2	400678-1	400678-1
9	- Alternating-current motor	1	826390-1	826446-1
10	Handle	1	828634	828634
11	Rubber metal-pad	2	829141-2	829141-2
12	Spacer distance PP, Foot	2	400784-01	400784-01
13	Rubber pad	1	400785-1	400785-1
14	Pump head	4	400705-02	400705-02
15	Connection head	4	410432	410432
16	PTFE insert	4	400902	400902
17	Pressure washer	4	400680	400680
18	Tightening washer	4	400707	400707
19	Diaphragm	4	400732	400732
20	Valve	8	400656	400656
	Valve with hole	2	400656-4	400656-4
21	Manifold 5	2	400917-01	400917-01
22	Manifold 2	2	400903	400903
	Manifold 4	1	400911	400911
23	Hose nozzle PP, DN 8 – 1/4" <i>(2x enclosed)</i>	2	710798	710798
24	Straight threaded joint with seal edge PVDF, 10 – 1/4"	6	829931	829931
25	T - screw connection PP, 10-10-10	2	829930-02	829930-02
26	Threaded elbow joint 10, PVDF, M12 x 1	3	829972	829972
27	Threaded elbow joint PVDF, 8 – 1/4"	1	829984	829984
28	Vacuum hose PTFE, 10 / 8 x 1 mm	0.7 m	828332	828332
29	Threaded elbow joint with attitude taps PVDF, 10 – A10	1	829913-1	829913-1
30	O-Ring EPDM, $\varnothing$ 25 x 2	8	829250-1	829250-1
31	O-ring EPDM, $\varnothing$ 12 x 2	8	829217-3	829217-3
32	Gas ballast valve	1	400599-01	400599-01
33	Check valve	1	829909	829909
-	Mains connection cable IEC with plug CEE (D)	1	825885	-
	Mains connection cable IEC with plug NEMA5-15 (US)	1	-	825903

\*) The "basic pump" module (items 1 – 9) can only be supplied complete under order numbers 410403 or 410403-01

## IMPORTANT NOTICE TO PURCHASER: WARRANTY

### UNPACKING

Inspect the pump carefully. If any damage has occurred, file claim with the carrier immediately. Save the shipping container for carrier to inspect.

### OPERATING PUMP

Refer to the enclosed Instruction/Operation Manual for all information to properly operate and maintain the pump.

### WARRANTY

This Welch Vacuum product is warranted to be free from defects in material and workmanship.

The liability of Welch under this warranty is limited to servicing, adjusting, repairing or replacing any unit or component part which in the judgment of Welch-Ilmvac has not been misused, abused or altered in any way causing impaired performance or rendering it inoperative. No other warranties are expressed or implied. The method of executing this warranty: servicing, adjusting, repairing or replacing shall be at the discretion of Welch. Vacuum pumps that have been used for any period, however short, will be repaired under this warranty rather than replaced.

The warranty is effective for one year from the date of original purchase when:

1. The warranty card has been completed and returned.
2. The product is returned to the factory or other designated service centers, freight prepaid.
3. The product in our judgment is defective through no action or fault of the user.

If the product has become defective through misuse, abuse, or alteration, repairs will be billed regardless of the age of the product. In this event, an estimate of the repair costs will be submitted and authorization of these charges will be required before the product is repaired and returned.

To obtain a return authorization number, please fill in the on-line request form on [www.welchvacuum.com](http://www.welchvacuum.com). Products without a return authorization number will be refused by our receiving department. Before shipping, properly pack the pump, insure it against loss or damage, and on the outside of the pump packaging and the packing slip write in the return authorization number. Pumps damaged due to improper packaging are the customer's responsibility.

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