INSTRUCTION MANUAL

Aqua Jet Water Pressure Systems

WPS 2.9, 3.5, 4.0 & 5.2, 12/24 V DC

IB-215 R03 (05/2012)

ORIGINAL INSTRUCTIONS/TRANSLATION OF ORIGINAL INSTRUCTIONS
READ AND UNDERSTAND THIS MANUAL PRIOR TO OPERATING OR SERVICING THIS PRODUCT

Johnson Pump®

Water Pressure Systems mounted to DC motor 12/24 V

Typical applications
The WPS pump is a five chamber positive displacement diaphragm pump. This pump is the ideal choice for pressurizing water in a closed system such as that found in a boat or in a recreational vehicle.
It can easily build the pressure required for a pressurized water supply system.

Features
- Quiet operation
- Smooth flowing
- Self priming
- Integrated pressure switch turns pump on and off automatically when tap is opened and closed
- Built-in by-pass valve which reduces the need for storage tank (only WPS 3.5)
- Dry running without damage
- Low power consumption
- Quick disconnect fittings

Working principle
As the pump runs, pressure is increased until it reaches the pre-defined pressure level, see p. 37. When the pre-defined pressure level is reached the integrated pressure switch automatically shuts the pump off.
The pump is equipped with positively checking outlet valves which ensure that the pressure is maintained after the pump shuts off.
When water is demanded (at the faucet, shower et.c.) the pressure decreases. After a moderate drop in pressure, the integrated pressure switch automatically turns the pump back on.
Due to it's durable construction and thoughtful design, the pump will provide many years of service.
Important! The pressure setting of this pump is made at the factory. Warranty invalidated by pressure switch interference.

Technical description

Body:	Nylon/Polypropylene
Valve housing:	Polypropylene/Polyamide
Valves:	Santoprene/EPDM
Diaphragm:	Santoprene
Connection:	3/8" BSP, 1/2" hose (ø 13 mm) and 1/2" BSP, 3/4" hose (ø 18 mm) or US 3/8" NPT, 1/2" hose (ø 13 mm) and US 1/2" NPT, 3/4" hose (ø 18 mm)
Max. liquid temperature:	Max +50°C/+120°F
Fasteners:	Stainless steel
Max. suction lift:	WPS 2.9 – 2 m/6.5 ft WPS 3.5 – 2 m/6.5 ft WPS 4.0 – 2 m/6.5 ft WPS 5.2 – 2,5 m/8.2 ft
Cut in pressure:	see page 37
Cut-off pressure:	see page 37
(Other pressure settings see page 37)	
Duty cycle:	Intermittent, max 20 min
Motor:	WPS 2.9 – 85 W WPS 3.5 – 85 W WPS 4.0 – 100 W WPS 5.2 – 150 W 12/24 V DC with built in thermal protection

The motor is ignition protected according to ISO 8846 (Small craft – Electrical devices – Protection against ignition of surrounding flammable gases).

Type designation

(See page 37)

Pressure and capacity data

(based on water at +20°C/68°F and at full voltage of the motor)

WPS 2.9

Pressure			Flow		Amp. draw	
Bar	kPa	Psi	l/min	USGPM	12V	24V
0	0	0	9,4	2,4	2,5 A	1,1 A
0,4	40	5,8	8,8	2,3	3,3 A	1,4 A
0,8	80	11,6	8,1	2,1	4,0 A	1,8 A
1,2	120	17,4	7,3	1,9	4,6 A	2,1 A
1,6	160	23,2	6,7	1,8	5,2 A	2,4 A
2,0	200	29	5,8	1,5	5,8 A	2,7 A
2,4	240	29	4,9	1,3	6,4 A	3,0 A
2,8	280	40,6	4,1	1,1	6,9 A	3,2 A
Fuse required					10 A	5 A

WPS 3.5

Pressure			Flow		Amp. draw	
Bar	kPa	Psi	l/min	USGPM	12V	24V
0	0	0	11,8	3,1	2,3 A	1 A
0,5	50	7,3	10,8	2,9	2,7 A	1,3 A
1,0	100	14,5	10,4	2,8	3,5 A	1,6 A
1,5	150	21,8	9,1	2,4	4,2 A	2,0 A
2,0	200	29	7,4	2	4,5 A	2,3 A
2,5	250	36,3	5,8	1,5	5,8 A	2,7 A
2,65	265	38,4	5,2	1,4	6,0 A	2,9 A
Fuse required					10 A	5 A

WPS 4.0

Pressure			Flow		Amp. draw	
Bar	kPa	Psi	l/min	USGPM	12V	24V
0	0	0	13	3,4	2,3 A	1A
0,4	40	5,8	12,2	3,2	3,1 A	1,3 A
0,8	80	11,6	11,4	3	4,0 A	1,7 A
1,2	120	17,4	10,6	2,8	4,8 A	2,1 A
1,6	160	23,2	9,9	2,6	5,4 A	2,5 A
2,0	200	29	9,1	2,4	6,2 A	2,8 A
2,4	240	29	8,5	2,2	7 A	3,1 A
2,8	280	40,6	7,7	2	8,1 A	3,6 A
Fuse required					10 A	5 A

WPS 5.2

Pressure			Flow		Amp. draw	
Bar	kPa	Psi	l/min	USGPM	12V	24V
0	0	0	19,4	5,1	3,9 A	1,6 A
0,4	40	5,8	18,2	4,8	4,9 A	2,1 A
0,8	80	11,6	17	4,5	6 A	2,5 A
1,2	120	17,4	15,8	4,2	7,1 A	3,1 A
1,6	160	23,2	14,7	3,9	8 A	3,6 A
2,0	200	29	13,5	3,6	9,2 A	4,1 A
2,4	240	29	12,2	3,2	10,3 A	4,7 A
2,8	280	40,6	11,2	3	11,2 A	5,1 A
Fuse required					15 A	8 A

Installation and maintenance

Installation

Locate the pump in a dry location.
If the pump is mounted vertically, the motor shall face up.
Mark screw positions and drill pilot holes (see drilling template page 49). Mount the pump using stainless steel screws and with the accompanying washers (over the rubber feet); taking care not to over compress the vibration dampening rubber feet.
Reinforced, high pressure flexible tubing is recommended. If rigid pipe is used, a length (225 mm/9 inches minimum) of flexible tubing shall be installed between the pump and the rigid pipe. This will address noise and/or damage caused by vibration transmitted to rigid pipe. Use stainless steel hose clamps to secure tubing to quick disconnect fittings and other hose barbs in the system.
A strainer must be installed in line before the pump intake, to prevent debris from entering pump and interfering with proper functioning of valves.

Electrical installation

The pump must be installed according to SS-EN ISO 10133 (Small craft – Electrical system – Extra low voltage DC installation for continuous current).
Note: The fuse must be ignition protected.
The motor is equipped with built in thermal protection to prevent the motor from overheating. The protection is automatically restored when the motor is cooled.
If the pump is connected with separate earth lead, this should be yellow/green and connected to the motor base.
See the wiring table for correct installation. Negative wire must be black.
Choose wire size in accordance with total wire lenght.

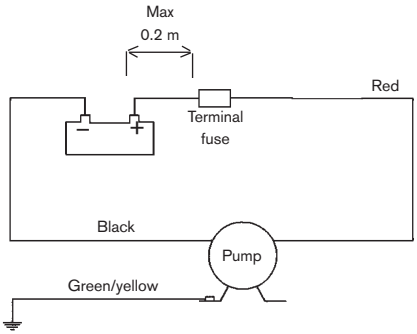
The wire connections must be sealed with a marine sealant.
Note: Before installation with electrical control systems, check that equipment to be used is of sufficient rated capacity to accept amperage draw of motor. Low voltage will cause motor to overheat.

Maintenance

The system shall be periodically sanitized using the following procedure:

1. Fill the tank with a solution of household bleach and potable water – 1 ml (.03 oz.) bleach/1 l (32 oz.) water.
2. Open all faucets and run until water flowing smells of bleach.
3. Close all fauces.
4. Drain solution from tank.
5. Refill tank with potable water.
6. Open all faucets and run until bleach has been purged.

Wiring table



Other electrical devices, eg switch, circuit breaker, must be installed between the pump and the positive (+) lead on the battery (on the red wire).

Wiring dimensions

(based on 3% voltage drop)

WPS 2.9

Wire size		Max wire lenght* in m 12 V	24 V
1,5 mm²	# 16 AWG	5	21
2,5 mm²	# 14 AWG	8	34
4,0 mm²	# 12 AWG	13	55
6,0 mm²	# 10 AWG	19	82

WPS 3.5

Wire size		Max wire lenght* in m 12 V	24 V
2,5 mm²	# 14 AWG	5	21
4,0 mm²	# 12 AWG	8	34
6,0 mm²	# 10 AWG	13	52
10 mm²	# 6 AWG	19	82

WPS 4.0

Wire size		Max wire lenght* in m 12 V	24 V
2,5 mm²	# 14 AWG	7	30
4,0 mm²	# 12 AWG	11	49
6,0 mm²	# 10 AWG	16	73
10 mm²	# 6 AWG	27	122

WPS 5.2

Wire size		Max wire lenght* in m 12 V	24 V
2,5 mm²	# 14 AWG	5	22
4,0 mm²	# 12 AWG	8	34
6,0 mm²	# 10 AWG	12	52
10 mm²	# 6 AWG	20	86
16 mm²	# 4 AWG	31	138

* The wire length is the total distance from the ©battery to the pump and back to the battery. It is recommended to use a relay with a light wire from main cable to switch to shorten the main leaders.

Start-up procedure
After pump installation, the system can be started by using the following procedure:
- Fill water tank
- Open one tap
- Turn on pump
- Close tap once water begins flowing
- Open each additional tap until all air has been purged from system
- Pump will shut off after taps are closed and pressure builds to the setpoint of the pressure switch

Self-priming
The pump is self-priming up to 2m for WPS 2.9 and WPS 4.0, 2,5m for WPS 5.2 and 2m for WPS 3.5. The inlet pipe must be airtight to ensure self-priming.

Dry running
Pump will not be damaged by shorter period of dry running. It will, however, unnecessary reduce your battery power.

Caution
Do not use pump for any other liquids than fresh-water and sea-water.

Temperature
Max liquid temperature: +50°C/+120°F
Max ambient temperature: +60°C/+140°F

Winterizing
If water is not drained from the system during freezing temperatures, damage is likely to be sustained in the plumbing and in the pump. To prevent damage follow the instructions beneath:
1. Drain water storage tank.
2. Open all taps.
3. Run pump until remaining water is expelled.
4. Disconnect inlet and outlet tubes.
5. Run pump briefly to confirm that water has been expelled.
6. Taps shall remain open and pump fittings shall remain disconnected until temperatures are above freezing

Never start a frozen pump. Even if it is drained it might contain a small amount of frozen water that locks the rotor.

Service instructions (see page 42-47)

Change of Switch (pos A) WPS 2.9/3.5
1. Remove the cables from the power source.
2. Remove the screws (27) and then remove the complete switch including diaphragm (18).
3. Cut the connection to the motor (red).
4. Locate the new diaphragm (18) and then the new complete switch.
5. Take the new switch and attach the cables to motor and power source. Use the attached jointing sleeve to connect the motor cable.

Change of Switch (pos A) WPS4.0/5.2 1.
Remove the cables from the power source.
2. Remove the screws (28) and then remove the complete switch including diaphragm (19).
3. Cut the connection to the motor (red).
4. Locate the new diaphragm (19) and then the new complete switch.
5. Take the new switch and attach the cables to motor and power source. Use the attached jointing sleeve to connect the motor cable.

Accessories
(See page 41)

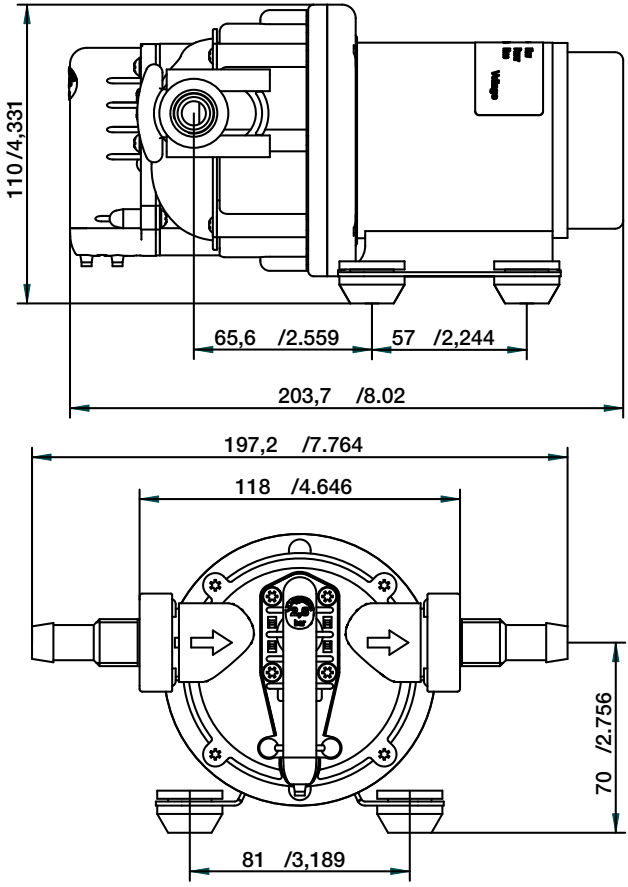
Trouble-shooting chart

Symptom	Cause	Remedy
1. Pump does not run.	1.1 Tripped thermal protector or blown fuse.	1.1.1 Check fuse. If motor is overheated let it cool down prior to restart.
	1.2 Faulty wire connection or power source.	1.1.2 Check battery/power supply, main switch and wiring.
	1.3 Pressure switch malfunctioning.	1.1.3 Change pressure switch.
	1.4 Motor malfunctioning.	1.1.4 Change pump.
	1.5 Pump/motor frozen.	1.1.5 Thaw pump and system and check for damage. The pump/motor is liable to damage when a frozen pump is started
2. Pump does not prime.	2.1 Water tank empty.	2.1.1 Fill up tank.
	2.2 Debris under valves.	2.1.2 Carefully flush pump with tap water at nominal pump flow. Note! Flush in nominal flow direction.
	2.3 Perforated diaphragm.	2.1.3 Replace diaphragm kit.
	2.4 Leak on inlet side of pump.	2.1.4 Check tightness of hose connections at pump, filter and tank.
	2.5 Inlet or outlet plumbing restricted.	2.1.5 Check plumbing.
3. Pump cycles on and off rapidly while water is demanded.	3.1 Restriction on outlet side of pump/too high pressure.	3.1.1 Outlet hose too small, must be of same diameter as pump connection.
4. Pump cycles on and off rapidly while water is not demanded.	4.1 Leak on outlet side of pump.	4.1.1 Check tightness of hose connections, check hose for possible damage.
5. Pump will not stop running when water is not demanded.	5.1 Leak on inlet side of pump.	5.1.1 Check tightness of hose connections, check hose for possible damage.
	5.2 Leak on outlet side of pump.	5.1.2 Check tightness of hose connections, check hose for possible damage.
	5.3 Perforated diaphragm.	5.1.3 Replace diaphragm kit.
	5.4 Water tank empty	5.1.4 Fill up tank.
	5.5 Pressure switch malfunctioning.	5.1.5 Change pressure switch.
	5.6 Low voltage to pump.	5.1.6 Change battery/power supply.
6. Low flow/pressure.	6.1 Leak on inlet side of pump.	6.1.1 Check tightness of hose connections, check hose for possible damage.
	6.2 Leak on outlet side of pump.	6.1.2 Check tightness of hose connections, check hose for possible damage.
	6.3 Perforated diaphragm.	6.1.3 Replace diaphragm kit.
	6.4 Motor malfunction.	6.1.4 Change pump.
	6.5 Debris under valves.	6.1.5 Carefully flush pump with tap water at nominal pump flow. Note! Flush in nominal flow direction.
7. Pump is excessively noisy.	7.1 Pump is plumbed directly to rigid tubing.	7.1.1 Install flexible tubing according to installation recommendation, see page 9.
	7.2 Pump head loose on motor.	7.1.2 Tighten screws.
	7.3 Pump mounting is loose.	7.1.3 Tighten screws.
	7.4 Pump mounting is too rigid.	7.1.4 Use flexible tubing and make sure the dampening rubber feet are used.
	7.5 Defective motor.	7.1.5 Change pump.

Part No	Pump type	cut in/cut out	Switch complete	Pumpbody	Fittings x2	Fitting retainer x2
10-13405-01/03	WPS 2.9 12V BSP	1.7/2.8 bar	09-47028-01	09-47282	09-46783	09-47278
10-13405-02/04	WPS 2.9 24V BSP	1.7/2.8 bar	09-47028-01	09-47282	09-46783	09-47278
10-13405-09/11	WPS 2.9 12V BSP	1.4/2.1 bar	09-47028-03	09-47282	09-46783	09-47278
10-13405-10/12	WPS 2.9 24V BSP	1.4/2.1 bar	09-47028-03	09-47282	09-46783	09-47278
10-13405-17/19	WPS 2.9 12V BSP	0.8/1.4 bar	09-47028-04	09-47282	09-46783	09-47278
10-13405-18/20	WPS 2.9 24V BSP	0.8/1.4 bar	09-47028-04	09-47282	09-46783	09-47278
10-13395-01/03	WPS 3.5 12V BSP	1.7/2.8 bar	09-47277-01	09-47283	09-46783	09-47278
10-13395-02/04	WPS 3.5 24V BSP	1.7/2.8 bar	09-47277-01	09-47283	09-46783	09-47278
10-13395-05/07	WPS 3.5 12V BSP	1.4/2.1 bar	09-47277-03	09-47283	09-46783	09-47278
10-13395-06/08	WPS 3.5 24V BSP	1.4/2.1 bar	09-47277-03	09-47283	09-46783	09-47278
10-13395-09/11	WPS 3.5 12V BSP	0.8/1.4 bar	09-47277-04	09-47283	09-46783	09-47278
10-13395-10/12	WPS 3.5 24V BSP	0.8/1.4 bar	09-47277-04	09-47283	09-46783	09-47278
10-13406-01/03	WPS 4.0 12V BSP	1.7/2.8 bar	09-46781-01	09-47284	09-46783	09-47278
10-13406-02/04	WPS 4.0 24V BSP	1.7/2.8 bar	09-46781-01	09-47284	09-46783	09-47278
10-13406-09/11	WPS 4.0 12V BSP	1.4/2.1 bar	09-46781-03	09-47284	09-46783	09-47278
10-13406-10/12	WPS 4.0 24V BSP	1.4/2.1 bar	09-46781-03	09-47284	09-46783	09-47278
10-13406-17/19	WPS 4.0 12V BSP	0.8/1.4 bar	09-46781-04	09-47284	09-46783	09-47278
10-13406-18/20	WPS 4.0 24V BSP	0.8/1.4 bar	09-46781-04	09-47284	09-46783	09-47278
10-13406-05/07	WPS 5.2 12V BSP	1.7/2.8 bar	09-46781-01	09-47284	09-46783	09-47278
10-13406-06/08	WPS 5.2 24V BSP	1.7/2.8 bar	09-46781-01	09-47284	09-46783	09-47278
10-13406-13/15	WPS 5.2 12V BSP	1.4/2.1 bar	09-46781-03	09-47284	09-46783	09-47278
10-13406-14/16	WPS 5.2 24V BSP	1.4/2.1 bar	09-46781-03	09-47284	09-46783	09-47278
10-13406-21/23	WPS 5.2 12V BSP	0.8/1.4 bar	09-46781-04	09-47284	09-46783	09-47278
10-13406-22/24	WPS 5.2 24V BSP	0.8/1.4 bar	09-46781-04	09-47284	09-46783	09-47278
10-13405-101/103	WPS 2.9 12V NPT	1.7/2.8 bar	09-47028-01	09-47282	09-46957	09-47278
10-13405-102/104	WPS 2.9 24V NPT	1.7/2.8 bar	09-47028-01	09-47282	09-46957	09-47278
10-13395-101/103	WPS 3.5 12V NPT	1.7/2.8 bar	09-47277-01	09-47283	09-46957	09-47278
10-13395-102/104	WPS 3.5 24V NPT	1.7/2.8 bar	09-47277-01	09-47283	09-46957	09-47278
10-13406-101/103	WPS 4.0 12V NPT	1.7/2.8 bar	09-46781-01	09-47284	09-46957	09-47278
10-13406-102/104	WPS 4.0 24V NPT	1.7/2.8 bar	09-46781-01	09-47284	09-46957	09-47278
10-13406-105/107	WPS 5.2 12V NPT	1.7/2.8 bar	09-46781-01	09-47284	09-46957	09-47278
10-13406-106/108	WPS 5.2 24V NPT	1.7/2.8 bar	09-46781-01	09-47284	09-46957	09-47278

Dimensions and weights

WPS 2.9

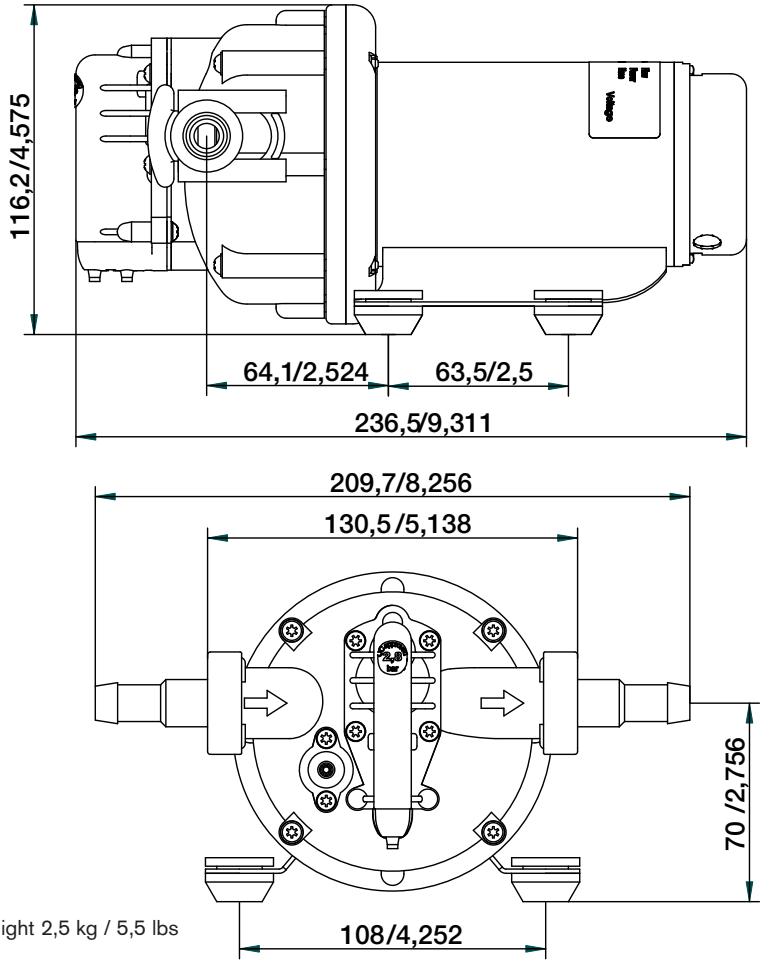


Weight 1,6 kg / 3,5 lbs

Dim. mm/inches

Dimensions and weights

WPS 3.5

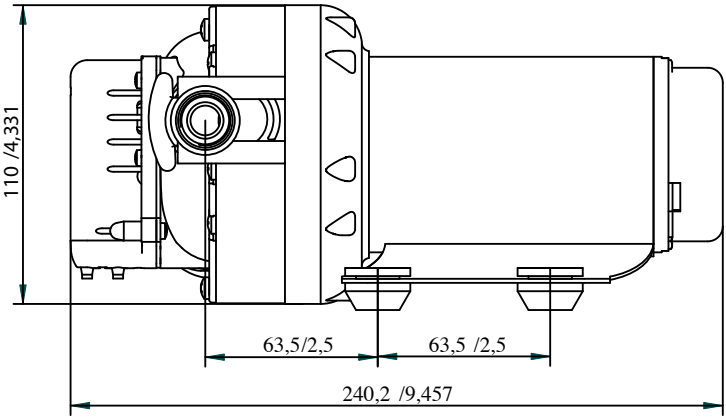


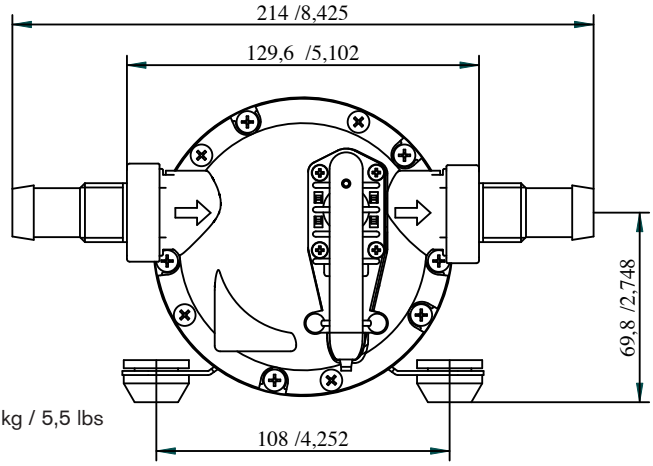
Weight 2,5 kg / 5,5 lbs

Dim. mm/inches

Dimensions and weights

WPS 4.0 & 5.2





Weight 2,5 kg / 5,5 lbs

Dim. mm/inches

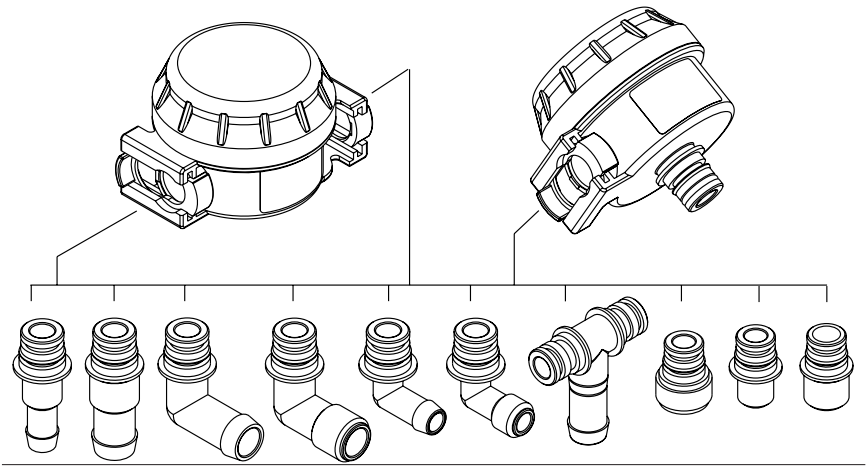
Accessories

PUMProtector™ Universal Strainer

Part. No	Mesh	KlickTite™ Connector
09-24652-01	40	2x 1/2" barb / 3/8" BSP
		2x 3/4" barb / 1/2" BSP
09-24652-02	40	2x 1/2" barb / 3/8" NPT
		2x 3/4" barb / 1/2" NPT
09-24652-03	20	2x 1/2" barb / 3/8" BSP
		2x 3/4" barb / 1/2" BSP
09-24652-04	20	2x 1/2" barb / 3/8" NPT
		2x 3/4" barb / 1/2" NPT

PUMProtector™ Inlet Strainer

Part. No	Mesh	KlickTite™ Connector
09-24653-01	40	Built-in KlickTite™
		1x 1/2" barb / 3/8" BSP
		1x 3/4" barb / 1/2" BSP
09-24653-02	40	Built-in KlickTite™
		1x 1/2" barb / 3/8" NPT
		1x 3/4" barb / 1/2" NPT
09-24653-03	40	Built-in KlickTite™
		Bulk pack w/o connectors



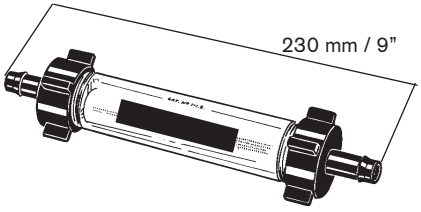
KlickTite™ port connectors available

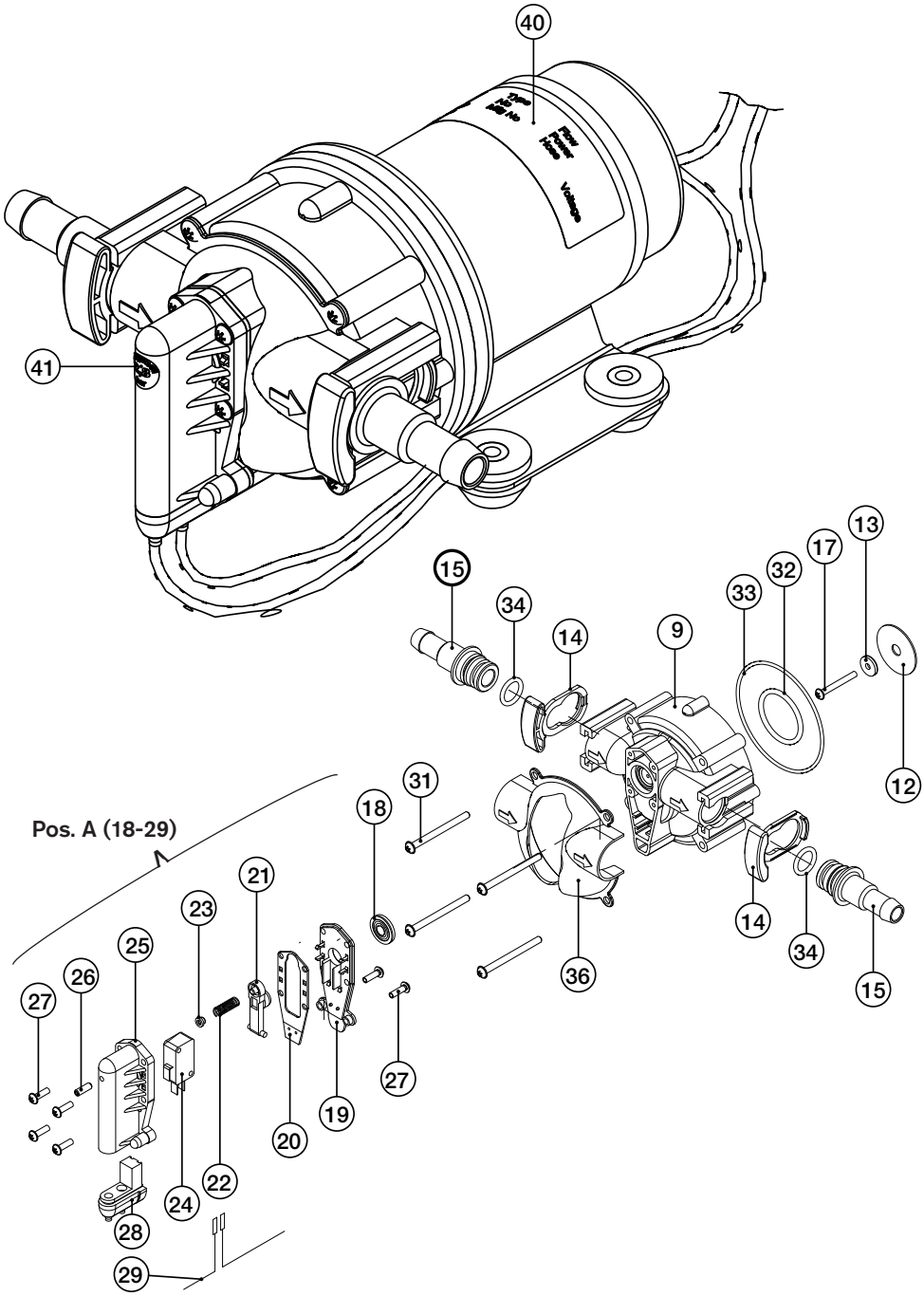
Part. No.	
09-46783	2 x 1/2" barb and 3/8" BSP
09-46784	2 x 3/4" barb and 1/2" BSP
09-46939	2 x 90°, 3/4" barb
09-47087	2 x 90°, 1/2" BSP
09-46938	2 x 90°, 1/2" barb
09-47026	2 x 90°, 3/8" BSP
09-46957	2 x 1/2" barb and 3/8" NPT

KlickTite™ port connectors available

Part. No.	
09-46958	2 x 3/4" barb and 1/2" NPT
09-47088	2 x 90°, 1/2" NPT
09-47089	2 x 90°, 3/8" NPT
09-47092	1 x T-connection, 3/4" barb
09-47094	2 x Garden hose adapter
09-47096	2 x 3/8" BSP
09-47098	2 x 1/2" BSP

Inline-strainer

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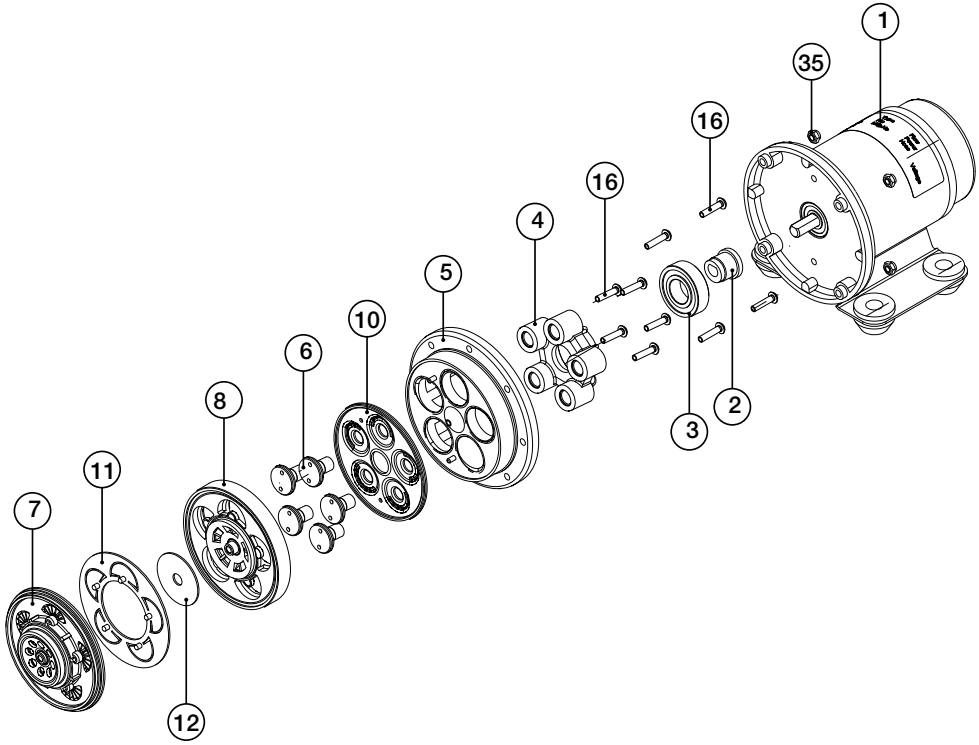
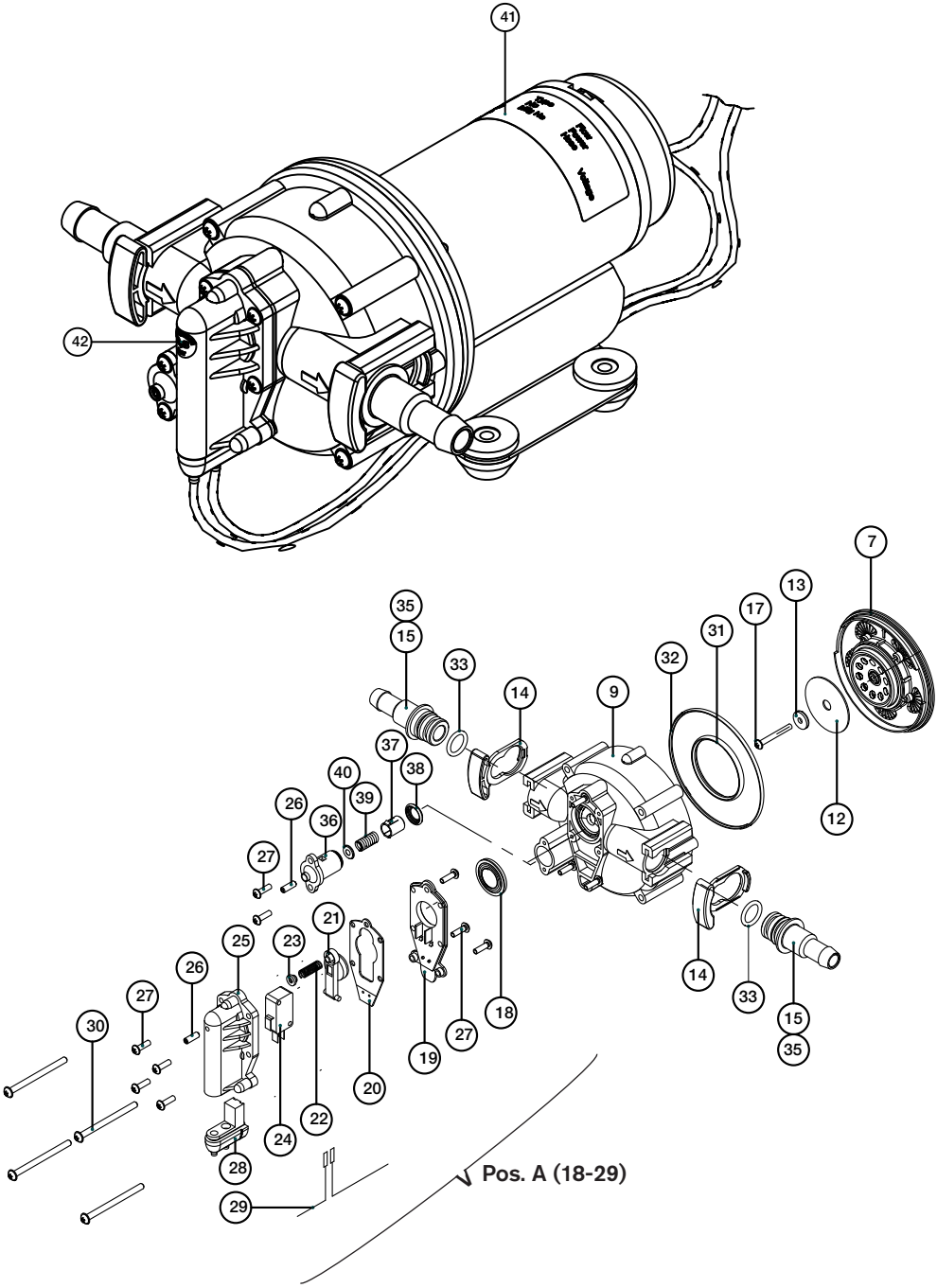


WPS 2.9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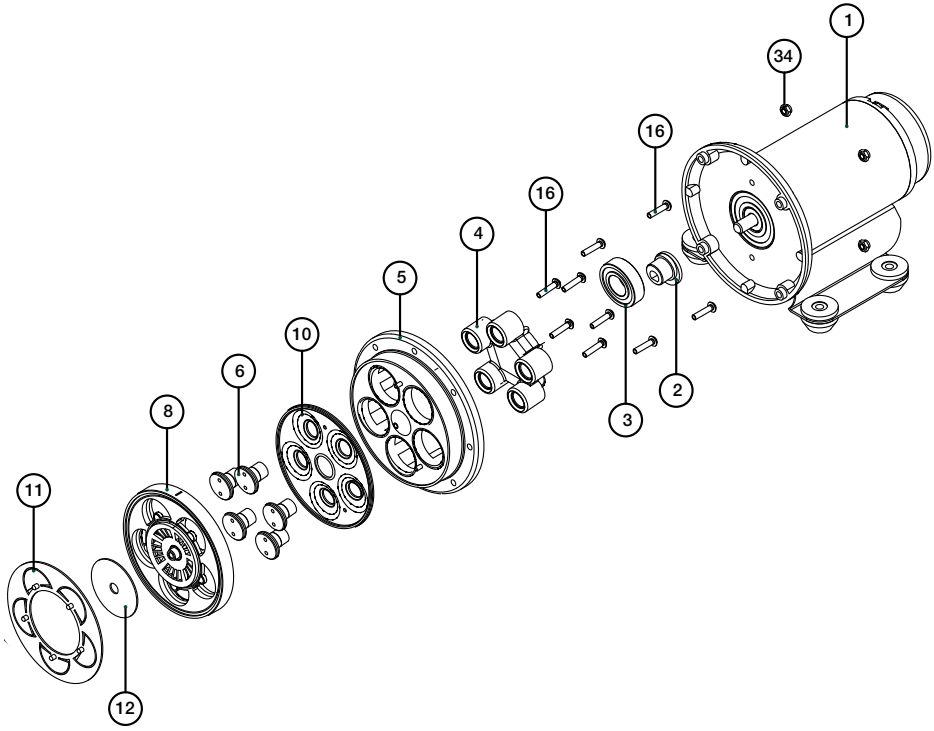
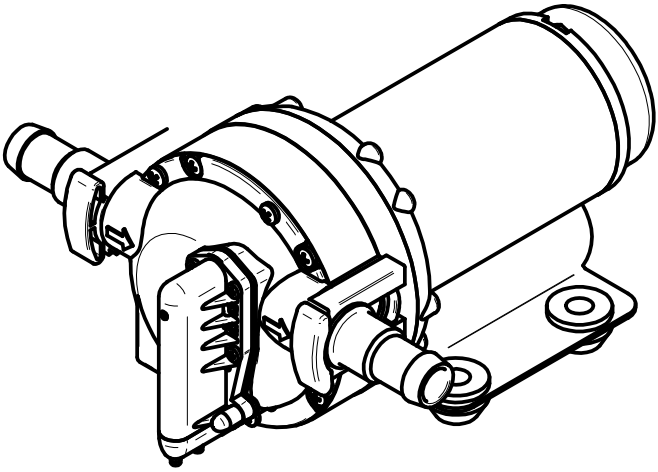
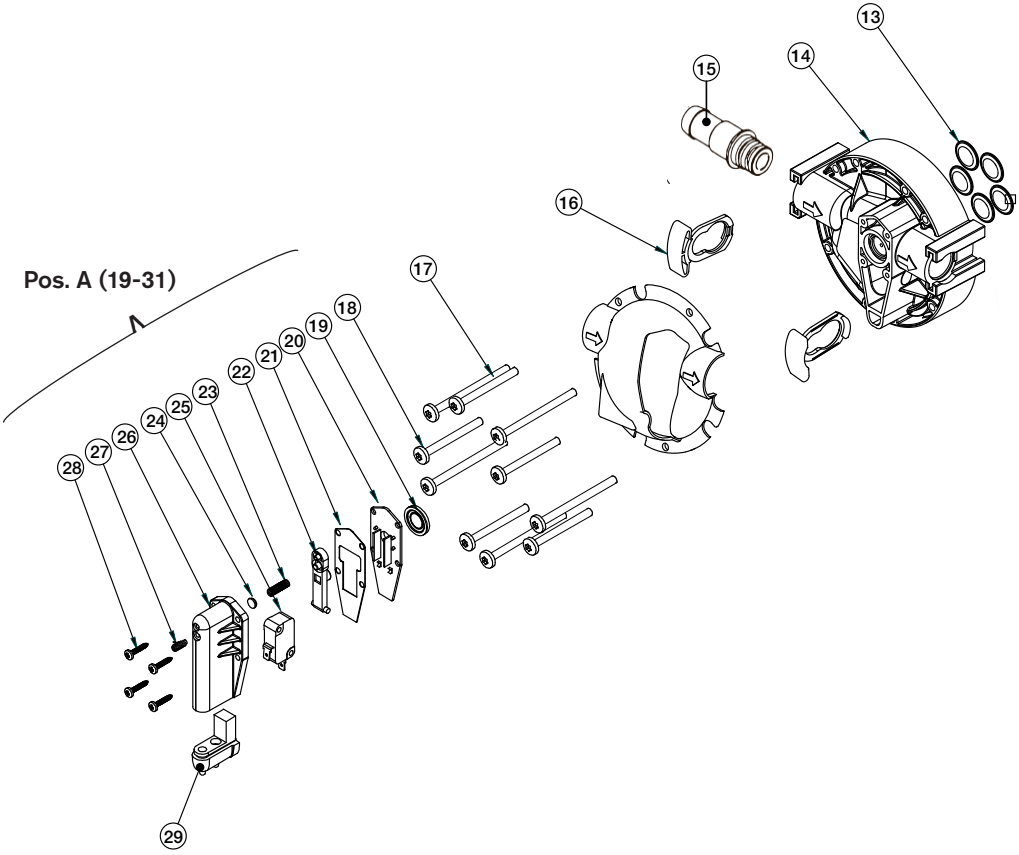
Pos. A (18-29)



WPS 3.5




Pos. A (19-31)
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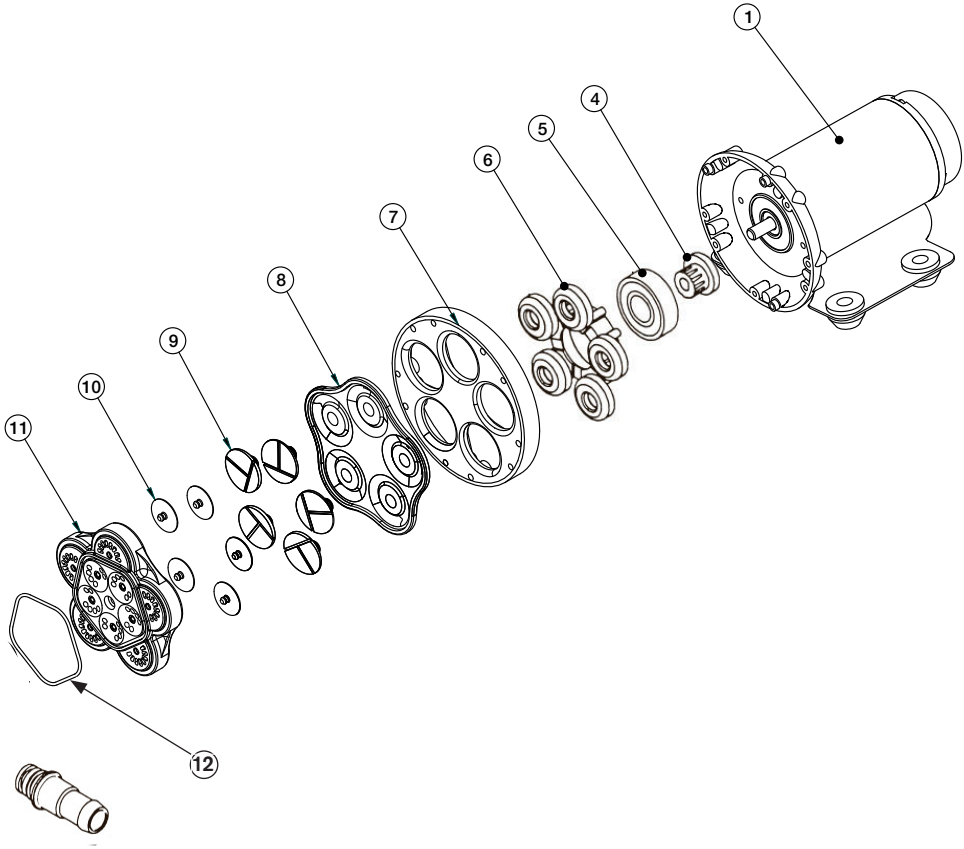
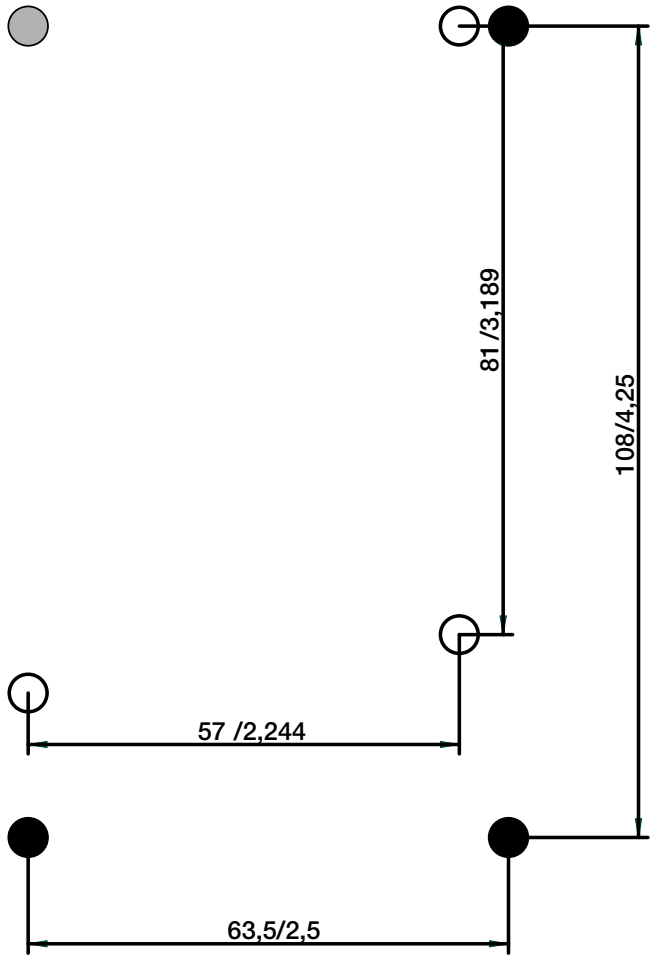


WPS 4.0 & 5.2

Waste handling & material recycling

At the products end of life, please dispose of the product according to applicable law. Where applicable, please disassemble the product and recycle the parts material.

Hole layout 1:1



WPS 2.9, WPS 3.5, WPS 4.0 and WPS 5.2

WPS 2.9

WPS 3.5, WPS 4.0 and WPS 5.2