



# HSD Series Dispenser

## OWNERS MANUAL

### Warranty

Our products are guaranteed against defective materials and workmanship, we will repair or replace such items as may prove defective at our option. Warranty period is one year on items manufactured by INDSCO. On items not manufactured by INDSCO, the manufactures warranty applies. All component parts of our products are covered by this warranty, except for normal wear items such as belts or impellers. We cannot be responsible for damage or abuse to equipment caused by improper installation or operation. Warranties can also be voided by unauthorized disassembly of equipment. For warranty repairs, equipment is returned to INDSCO at the customer's expense; we will repair and return to customer at our expense. Under no circumstances will we allow labor charges or other expense to repair defective merchandise. This warranty is exclusive and is in lieu of all other warranties, whether express or implied. INDSCO shall not be liable for any other damages, whether consequential, indirect, or incidental, arising from the sale or use of its products.



## HSD SERIES DISPENSER

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**Dispersers - Variable Speed Air**

**Model:** \_\_\_\_\_

**Serial No.:** \_\_\_\_\_

**Date:** \_\_\_\_\_

**Order No.:** \_\_\_\_\_

## Safety

Please read this complete manual before trying to operate your mixer. Failure to follow these instructions could result in serious injury or death.

- Never move the unit without a suitable lifting device.
- Never run the unit in open air.
- Always lockout the power when working on the unit.
- Always use the container holder to restrain the container during operation.

## General

### HSD 01 / 02 / 05 / 06 Series

1/2 horsepower air motor powered high-speed dispersers are designed for bench top use to process batches up to one-gallon. They are ideal for use in labs, pilot plants, or small-scale production.

Models HSD01, HSD02

- Two, 3/8" diameter x 12" impeller shafts.
- One, 2" diameter Design 'A' dispersion blade.
- One, 2.5" diameter 3-blade Propeller.
- Manual lift, raises and lowers 12".

Models HSD05, HSD06

- One, 3/8" diameter x 12" impeller shaft.
- One, 2" diameter Design 'A' dispersion blade.
- Support stand, 30" tall.

### HSD15A / 16A / 40A / 41A Series

1.5 & 4 horsepower air motor powered high-speed dispersers are designed for bench top use to process batches up to five-gallons. They are ideal for use in labs, pilot plants, or small-scale production. Each model comes complete with following standard features:

- 300 to 3000 rpm speed range.
- 1" diameter x 15" stainless steel shaft.
- Needle valve for speed control.
- One, 4" diameter Design 'A' dispersion blade.
- Air lift cylinder with 15" travel.
- Container holder with capacity up to a five-gallon pail.
- Optional tachometer.

## Installation

### Receiving:

*Before removing any packing, visually inspect the exterior of the shipment for any sign of damage. Should there be any damage, bring it to the attention of the delivering UPS or truck line and note the same on the receiving ticket. Should there be damage you must place a claim with the truck line. They are the only ones who will pay for the damage done and you are the only one who can place that claim.*

### Mounting:

Ensure the unit is securely bolted to your bench top, floor, etc. and is level, square, and plumb. Leave room around the unit for cleaning, inspection and maintenance.

## Installation, continued

### Connect Air Supply:

Before connecting your air supply hose to the disperser ensure that all valves are in the off position. (motor speed control valve and air lift cylinder valve)

When connecting air supply hose to the speed control valve allow enough slack in the hose to permit raising the disperser to the maximum height.

### Pre-Start Up Check List:

1. Are all mounting bolts tight?
2. Is disperser blade mounting bolt tight?
3. Slowly start motor and check rotation, looking down into the container, shaft should rotate clock-wise. If direction is incorrect reverse motor as explained on the air motor data pages.

## Operation

### CAUTION:

- **Never run mixer without an impeller.**
- **Never run the impeller in open air.**
- **Never run impeller outside a container.**

In general the disperser is run at blade tip speeds of 2500 to 5000 feet per minute. The lower ranges are used for agitation or blending operations while the upper ranges are used for dispersions of difficult materials. The middle range is adaptable to a great many solutions and easier dispersions. Experience by the operator will be the best key as to what speed to try first on materials handled at your facility.

Under normal operation the blade is located from 1 to 1.5 blade diameters from the bottom. If this results in an excessive vortex, the blade may be lowered. If the action is a little slow at the above location, the blade may be raised to a limit of 2.5 diameters to obtain a good flow providing the amount of material over the blade is greater than the amount of material beneath. At this point, good action is usually assured in the bottom of the container.

The size of the batch to be processed is generally a function of the viscosity or apparent viscosity and flow characteristics of the material. These models of dispersers will generally handle batches up to 5-gallons depending on the viscosity. For maximum batch sizes at intermediate viscosity's, we recommend that you try different batches of the material involved.

When adding materials to the container for a test, always introduce the liquid phase first. In most cases, the disperser should be started and solid phase added. However, on some formulations such as enamel, particularly those of colored pigments, it has been found most satisfactory to add vehicle in tank and then add all pigments before turning on motor.

## Operation, continued

### Air Cylinder Operation:

Before connecting your air supply make sure the lift control valve is in the center (off) position. Connect your air supply to the quick connector at the 4-way air valve. Maximum air pressure is 100 PSI. Note that air pressure is used to both raise and lower the cylinder. The following will enable you to adjust the height of the impeller or to install and remove your batch container:

**CAUTION:** After the air line is installed and before operating the machine for the first time, move the lift control valve to the downward position. This will charge the air cylinder and prevent surging when the lift control valve is moved to the upward position.

#### • Lifting:

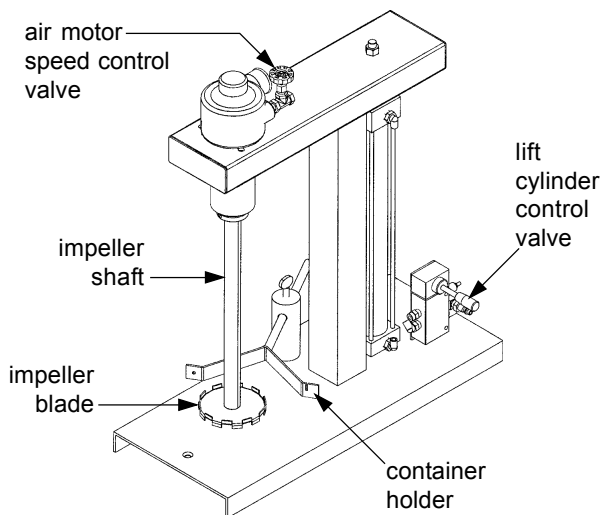
1. Move the lift control valve to the up most position. To stop upward motion move valve to center (off) position.

#### • Hold:

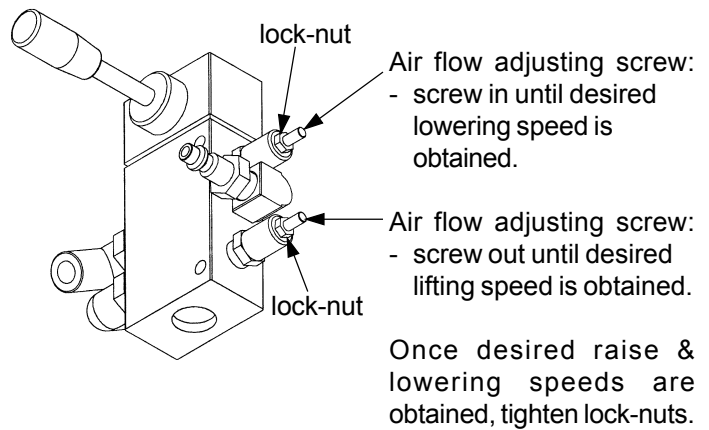
2. To hold the impeller at any height move the lift control valve to the center (off) position.

#### • Lowering:

3. Move the lift control valve to the down most position. To stop downward motion move valve to center (off) position.



- Air Valve ~ Cylinder speed control adjustment:



## Maintenance

Maintaining your mixer is not difficult if you follow these guidelines:

The Bearing Housing Assembly has sealed bearings that do not require lubrication.

- Keep the mixer clean.
- Ensure air supply is maintained in accordance with the information listed in the Air Motor Data section, see next several pages.
- Check impeller blade bolt to ensure it is tight.
- Never move the unit without a suitable lifting device.
- Never run the unit in open air.
- Always lockout the power when working on the unit.
- Always use the container holder to restrain the container during operation.

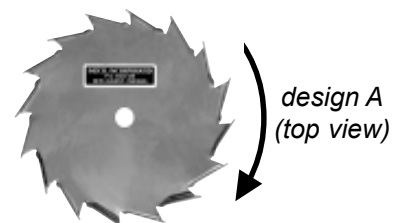
### Blade Changing:

ENSURE POWER TO UNIT IS OFF OR DISCONNECTED!

Remove the bolt from the bottom of the shaft, remove and replace the blade and replace the bolt.

### Blade Rotation:

Ensure the mixer shaft is rotating in a clock-wise direction, looking downward into the container. Care must be taken to ensure blade is rotating in the correct direction. Look for arrow on blade or consult factory.



## Air Motor Data

### General:

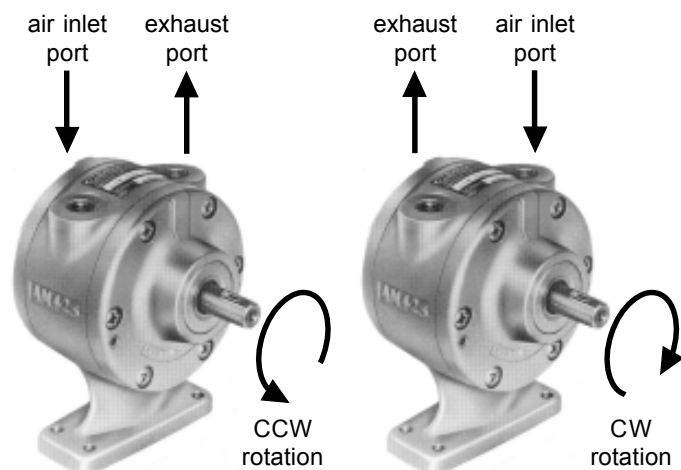
Inlet air pressure is not to exceed 100 PSIG maximum. It is recommended to use an air filter and moisture trap on inlet air supply, to avoid contamination being fed into air motor. The air motor is designed to be driven by compressed air only. Fluids, particles, solids or any substance mixed with air, particularly combustible substances likely to cause explosions, must not drive air motor.

- **NEVER** use Teflon tape on port connection fittings. Use of Teflon tape will void the warranty.
- Do not drive with flammable or explosive gases or operate unit in an atmosphere containing them.
- Air motor is designed for air only. Do not allow corrosive gases or particulate material to enter motor. Water vapor, oil-based contaminants, or other liquids must be filtered out.
- Do not use a hammer or force shaft coupling or drive pulley onto shaft when installing drive onto air motor. This causes end thrust that could damage air motor.
- Ambient temperature should not exceed 250°F.

### Installation:

For efficiency of output and control of speed, use a supply line size equal-to or one size greater-than the motor port size. (example: 1/4" motor port = use 1/4" or 3/8" air hose).

All air models are supplied with a muffler. The muffler is shipped with mixer air motor, but not installed. Remove the plastic plugs from inlet & exhaust ports, then install the muffler and inlet air supply line in accordance with the rotational information shown below. All ports are female pipe threaded.



### Starting:

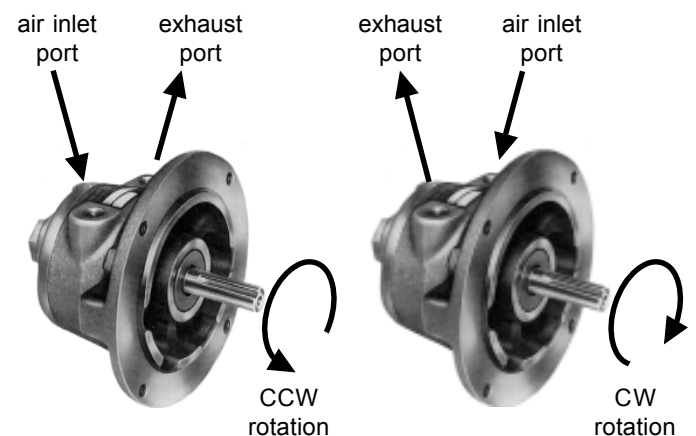
Starting torque is less than running torque and could vary depending on position at which vanes stop in relation to air intake port. Using a pressure regulator or a simple shut-off valve to obtain desired power and conserve air can regulate speed and torque.

### Shutdown Procedure: (storage)

1. Turn off air supply and remove plumbing.
2. Remove air motor from connecting machinery.
3. Use clean, dry air at low pressure to "flush out" condensation.
4. Re-lubricate air motor with a squirt of oil in chamber. Rotate shaft by hand several times.
5. Plug or cap each port. Unit is ready for storage.

### Rotation:

A single rotation motor will operate properly in only one direction. A reversible motor will work equally in both directions. Air motor direction of rotation is shown below. Air drive motor mixers are designed operate in a Clockwise rotation, viewed from top of mixer looking downward into mixing container. NOTE: Not all air motors are bi-rotational. The ones that are reversible can be reversed by simply switching the exhaust muffler and air supply line.



## Air Motor Data (continued)

### Lubrication:

Lubrication is necessary for all-internal moving parts and rust prevention. Excessive moisture in air line can cause rust formation in motor and might also cause ice to form in muffler due to expansion of air through motor. Moisture problems can be corrected by installing a moisture separator in line and also by installing an after cooler between compressor and air receiver.

Use a detergent SAE #10 automotive engine oil. It is recommended that an automatic air line lubricator be installed in airline just ahead of air motor. Lubricator should be adjusted to feed one drop of oil for every 50-75 CFM of air going through motor.

**Manual Lubrication** – Add 10-20 drops of oil every 8 hours of operation to motor through inlet port while motor is shut down.

**Automatic Lubrication** – In-line oiler should be adjusted to feed 1 drop per minute for high speed or continuous duty use. Do not overfeed oil as contamination of exhaust air may result.

### Maintenance:

If motor is sluggish or inefficient, try flushing with solvent. The following are recommended solvents for air motors:

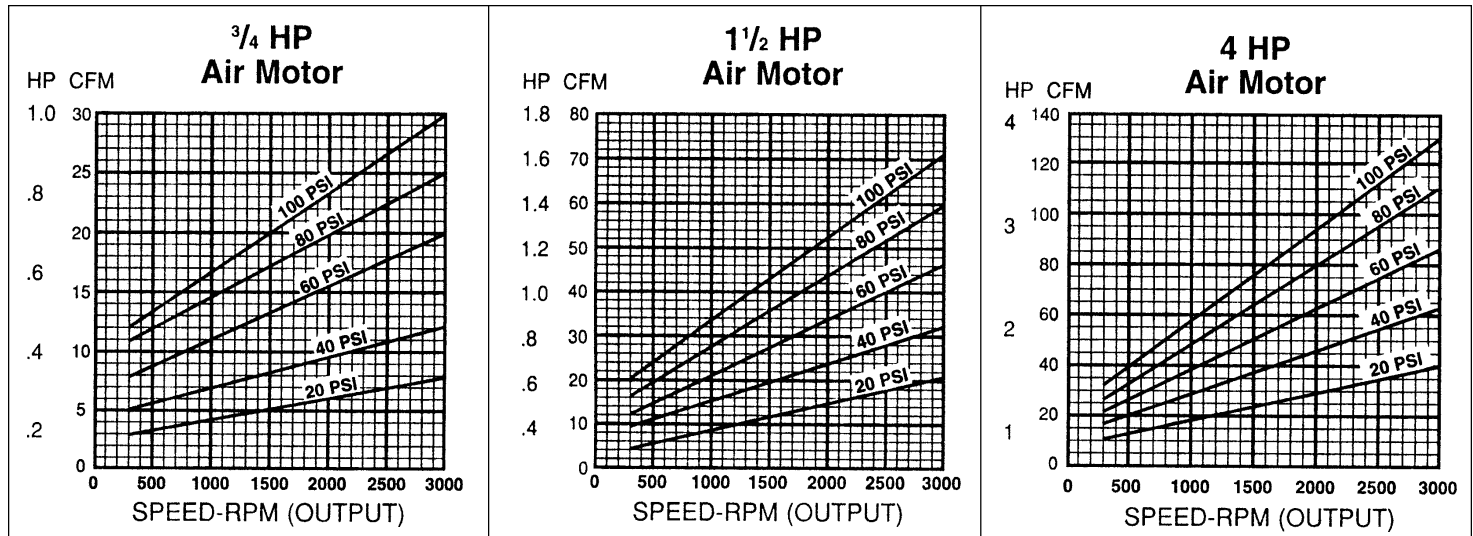
- Gast Flushing solvent #AH255 or AH255A
  - Loctite Safety Solvent
  - Inhibisol Safety Solvent
1. To flush a unit, disconnect airline and muffler.
  2. Add several teaspoons or spray solvent directly into motor.
  3. Rotate shaft by hand in both directions for a few minutes.
  4. Reconnect airline and slowly apply pressure until there is no trace of solvent in exhaust air.
  5. Flush unit in a well-ventilated area.
  6. Re-lubricate motor with a squirt of oil in chamber.

### Performance:

The charts below provide the air volume requirement with air pressure and speed data.

Air motor supply requirements:

Motor	Air Volume	Air Pressure
1/2-HP	27CFM	80 PSI (chart not available)
3/4-HP	30 CFM	100 PSI
1.5-HP	70 CFM	100 PSI
4-HP	130 CFM	100 PSI



## Air Motor - Troubleshooting

Problem or Complaint	Possible Cause	Remedy
<p>Air motor is <b>NEW</b> (or basically new) and does not perform up to speed, or seems to have no power.</p>	<ol style="list-style-type: none"> <li>1. Air line coming to motor could be <b>blocked</b> or <b>too small</b>, and therefore not enough CFM of air would get to the motor to operate properly.</li> <li>2. Air compressor might be <b>too small</b> or <b>underpowered</b> to provide enough CFM or PSI of air to run motor properly.</li> <li>3. Air line bringing air to motor may be too long. A reduction of efficiency or loss of RPM's will result from line being too long.</li> <li>4. May have too large a propeller or blade on the motor, which would overload the motor. Easily possible if installing own impellers on unit.</li> </ol>	<ol style="list-style-type: none"> <li>1. Clean out blockage, or replace line with larger size (<b>TIP:</b> Air line should be same size or larger than the port size on the motor – e.g. 1/4" NPT port on motor, use 1/4" or bigger air line).</li> <li>2. <b>This is common</b>, people overestimate the capability of their compressors. Check the nameplate on the compressor and verify that it will produce enough CFM and PSI to run not <b>ONLY</b> the air motor, but every <b>other</b> air tool they have on the line as well. If needed, talk to the plant maintenance people or the compressor manufacturer for information.</li> <li>3. Reduce length of line coming to motor. Optimum length is as short as possible.</li> <li>4. Properly size a blade or propeller for the customer's application, or refer them to a Sales Engineer for assistance.</li> </ol>
<p>Air motor is <b>NEW</b> and when hooked up to air supply it just "hisses" and does not turn.</p>	<ol style="list-style-type: none"> <li>1. Probably a piece of packing material or other contaminant has gotten into the motor and lodged between a vane and the motor chamber wall while in shipment. The air is passing straight thru and exiting the motor without turning the rotor (the "hissing" sound).</li> <li>2. If motor is a <b>NON-REVERSIBLE</b> one, it could have the muffler and inlet in the wrong ports. If this is the case, the motor would turn manually but the air would be going past the vanes without turning the rotor (causing "hissing").</li> </ol>	<ol style="list-style-type: none"> <li>1. Remove muffler and Speed Control Valve. Blow out motor with clean air to remove contaminants. If necessary, flush motor out with solvent to remove particulates, then put a few drops of oil in port and spin motor a few times to re-lubricate. Replace muffler and valve.</li> <li>2. Switch the muffler and air inlet to the respective opposite ports.</li> </ol>
<p>Air motor is <b>NEW</b> and does not turn at all, or turns only with force.</p>	<ol style="list-style-type: none"> <li>1. Probably a piece of packing material or other contaminant has gotten into motor port and lodged against a vane while in shipment.</li> <li>2. If motor runs without incident for a few minutes or hours, and <b>THEN</b> this occurred, <b>Teflon Tape</b> was probably used on the air connections somewhere. Teflon tape is fibrous, and will come apart and get into the air line. When this happens the fibers can get lodged inside the air motor and lock up the rotor.</li> <li>3. Motors are <b>sometimes</b> shipped with disposable plugs in the motor ports to keep contaminants out until the motor is ready to install. Installer may have forgotten to remove the plugs.</li> <li>4. Motor could have been dropped or struck. A hard blow will sometimes cause air motor rotor assembly to lock up.</li> </ol>	<ol style="list-style-type: none"> <li>1. Remove muffler and Speed Control Valve. Blow out motor with clean air to remove contaminants. If necessary, flush motor out with solvent to remove particulates, then put a few drops of oil in port and spin motor a few times to re-lubricate. Replace muffler and valve.</li> <li>2. <b>NEVER USE TEFLON TAPE ON AIR LINE CONNECTIONS IF THERE IS AN AIR MOTOR INVOLVED! The warranty is voided.</b> May be able to blow/wash out the air motor and remove the tape particles. If not, rebuild or replace motor.</li> <li>3. Remove plugs and discard. Install muffler in appropriate port and Speed Control Valve (or direct air line) in the other, consistent with direction of motor rotation.</li> <li>4. Can NOT be repaired by user. You may <b>attempt</b> to tap downward on the motor shaft or on the housing to loosen it up, but unless that frees up motor it will have to be replaced.</li> </ol>

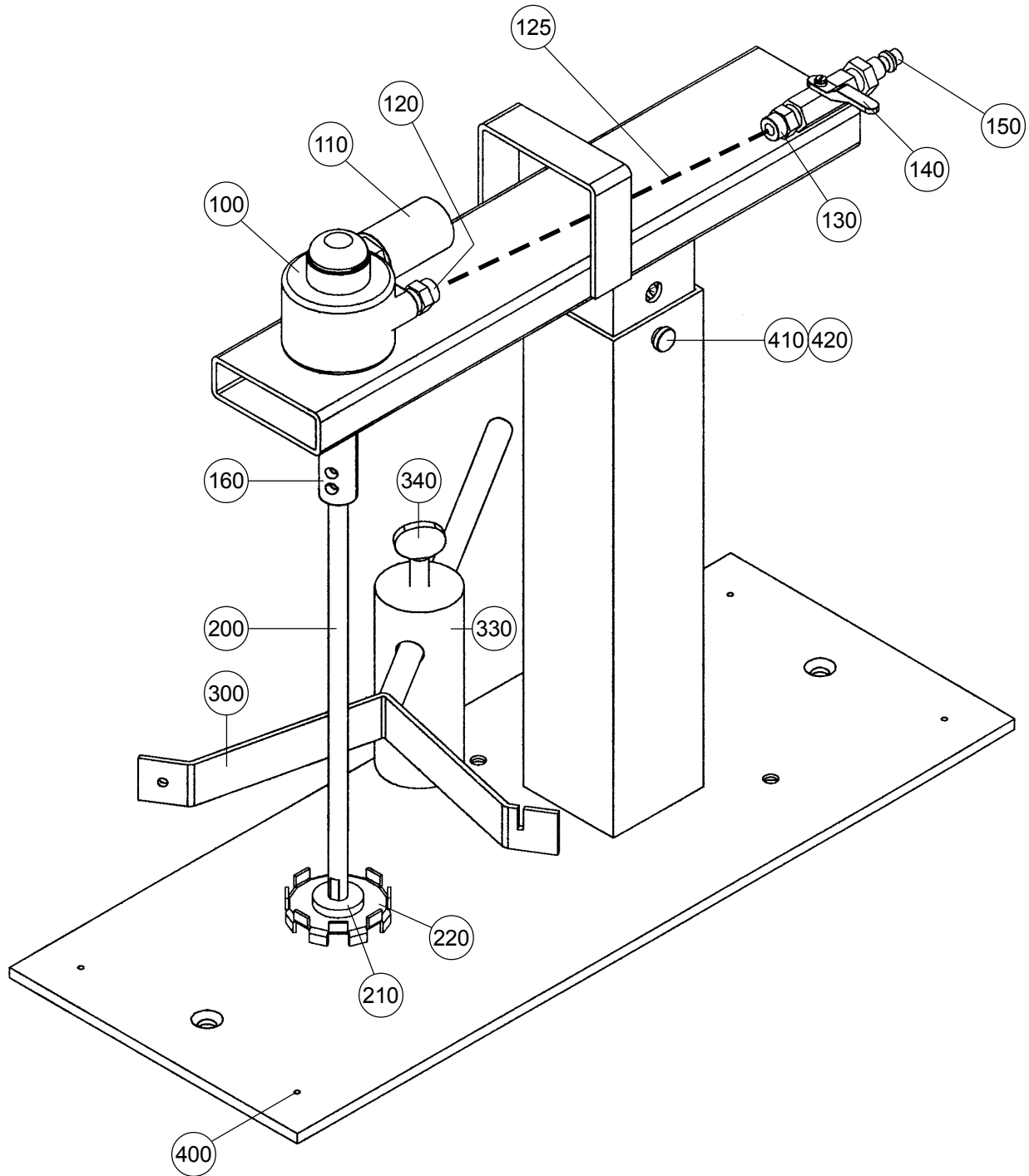
## Air Motor - Troubleshooting (continued)

Problem or Complaint	Possible Cause	Remedy
Air motor exhaust is filled with ice; ice crystals are forming on the muffler; water is dripping from the muffler.	1. There is nothing wrong with the <b>air motor</b> , the <b>compressor</b> needs to be maintained. There is too much water present in the compressor tank. Air motors exhaust whatever goes into them – if water goes <b>in</b> the motor it has to come <b>out</b> . The expansion of the air as it leaves the motor <u>cools</u> it, causing the water in the air to freeze.	1. Clean the Filter portion of the F/R/L. Drain the water from the compressor tank. Install a dryer to remove excess water from the air.
Air motor has rust on the inside of the ports, visible when the muffler or air inlet valve are removed.	1. There is too much water in the air supply, causing the inside of the motor to rust (the body of the motor is cast iron). Customer needs to maintain their compressor.	1. Clean the Filter portion of the F/R/L. Drain the water from the compressor tank. Install a dryer to remove excess water from the air.
Exterior of air motor is rusting.	1. If the paint has chipped or worn off of the motor, this is <u>normal</u> . Much of the air motor body is cast iron. The paint used by Gast is a gray vinyl-based lacquer, which is pretty durable, but could eventually come off.	1. Clean or buff rust off, and re-paint the motor (if it is a problem). It will not affect operation of the motor.
Seal on either top or bottom of air motor is leaking.	1. Operating pressure (PSI) could be too high. The type of lip seal used on these motors has a operating limit of 100 PSI. Too high a pressure can blow out the seal.  2. If motor has been well-used, seals are probably just worn out.	1. Replace the seals. Turn down the air pressure in the line to no more than 100 PSI to prevent reoccurrence. (Seals are part of the Air Motor Repair Kits).  2. Replace the seals. Should probably consider rebuilding the motor while they are at it (vanes & bearings are probably about worn out, too). Buy and install Air Motor Repair Kit.
Air motor runs inconsistently at low RPM's. May be described as "rough" or "choppy." May even <b>stall</b> at low RPM's.	1. This is normal. Air motors do not run smoothly at speeds under 200 to 300 RPM; they are somewhat erratic due to the very small amount of air which must be let into the motor in order to get it to run at low speeds. ( <b>NOTE:</b> This refers to <b>actual motor RPM</b> , not necessarily the speed the shaft might be turning if it was gear-reduced!)	1. Speed the <u>motor</u> up to at least 300 RPM. The faster you run an air motor the smoother they run. You will also see much more consistent speed and HP output at higher RPM's.
Air motor appears to vibrate at more than normal levels.	1. Could be above-mentioned "rough" operating characteristics if problem is seen <b>only</b> or <b>particularly</b> at low speeds. Condition would be amplified by having a shaft & impeller on the motor, <b>especially</b> if running the mixer dry (out of liquid, in free air).  2. Could be a bad <b>chuck</b> or <b>coupler</b> attached to the air motor, could be a <b>bent mixing shaft</b> , or could be a <b>propeller/blade</b> which needs to be balanced better.  3. Possible that <b>motor shaft</b> is bent. Would <u>probably</u> only happen if motor was brand new and would have taken a blow during shipping to bend it, or <u>dropped</u> .	1. <b>DO NOT OPERATE A MIXER WITH THE SHAFT &amp; IMPELLER OUT OF LIQUID!</b> Damage to motor, shaft, bearings, etc. will result! Try increasing the motor speed to over 300 RPM and see if the operation becomes smoother.  2. Replace the faulty part. Can test to see if <u>shaft</u> is bent by removing and rolling it across a flat table or floor. <u>Chuck or coupler</u> <b>could</b> be visibly off-center or wobbling. May have to switch out parts until problem is solved.  3. Replace motor or motor shaft with rotor.
Air motor is loud	1. Muffler is cracked, broken, missing, or element inside muffler is missing or damaged.  2. May <b>NOT</b> actually be a "problem", may be normal air motor noise. Air motors are loud by nature.	1. Replace muffler or element inside muffler.  2. Can suggest that customer attempt to "pipe" the exhaust out of the area by using an air line similar to the one bringing the air <b>TO</b> the motor. Install the muffler at the end of the air line. The exhaust noise will then be elsewhere.



## Air Motor - Troubleshooting (continued)

Problem or Complaint	Possible Cause	Remedy
<p>Air motor is <b>OLDER</b> (or has been used for some time) and does not perform up to speed, or seems to have no power.</p>	<ol style="list-style-type: none"> <li>1. Muffler could be clogged. Element will eventually get filled with dirt, oil, or other contaminants – at which point air cannot get thru it anymore.</li> <li>2. Air line or F/R/L coming to motor could be <b>blocked</b> or <b>clogged</b>, and therefore not enough CFM or PSI of air would get to the motor to operate properly.</li> <li>3. Motor could have sludge or other buildup accumulated inside the air motor. Would <b>probably</b> be caused by insufficient cleaning of air prior to entry into the motor. Could also be caused by having <b>too much oil</b> in the air supply, which would make the inside of the motor extra-sticky and tend to trap any dirt, etc. which made it past the Filter.</li> <li>4. Vanes or other internal parts of motor could be worn out. (Vanes are made of fiberboard and <b>do</b> wear, and will wear especially quickly if the motor has been run with an air supply which is not adequately CLEAN and LUBRICATED.</li> </ol>	<ol style="list-style-type: none"> <li>1. Replace muffler or element in muffler. (Can test to see if muffler is the problem by REMOVING it for a minute, and running motor to see if speed/power picks up.</li> <li>2. Remove and clean F/R/L or air line. Most Filters can be washed out with solvent and reused, but may need to be replaced.</li> <li>3. Remove muffler and Speed Control Valve. Flush motor out with solvent to remove oil and particulates; may need to blow out traces of solvent with air. Then put a few drops of oil in port and spin motor a few times to re-lubricate. Replace muffler and valve. If necessary, adjust oil flow on Lubricator to equal approx. one drop of oil every 50-75 CFM, as per Gast recommendations.</li> <li>4. Rebuild air motor. INDCO stocks Air Motor Repair Kits for most Gast motors, and instructions are included for installing them.</li> </ol>
<p>Air motor appears to be “smoking”.</p>	<ol style="list-style-type: none"> <li>1. There is nothing in an air motor that can cause “smoke” on its own. It is <b>PROBABLY</b> water vapor coming out the exhaust, which is really steam from the natural expansion of air as it exits the air motor</li> <li>2. If it <b>IS</b> truly smoke and not steam, the only thing it can really be is the lubricating oil “burning” because the air entering the motor is too hot.</li> </ol>	<ol style="list-style-type: none"> <li>1. Clean the Filter portion of the F/R/L. Drain the water from the compressor tank. (Compressors naturally “create” water during operation; they actually just concentrate the water vapor or humidity naturally present in all air. This water then settles to the bottom of their compressor tank and must be periodically drained).</li> <li>2. The customer must be using an air dryer of some sort which heats the air to evaporate the water in it. They probably have the heat set too high. They should consult their owners manual for the dryer for proper settings, or consult with the dryer manufacturer.</li> </ol>

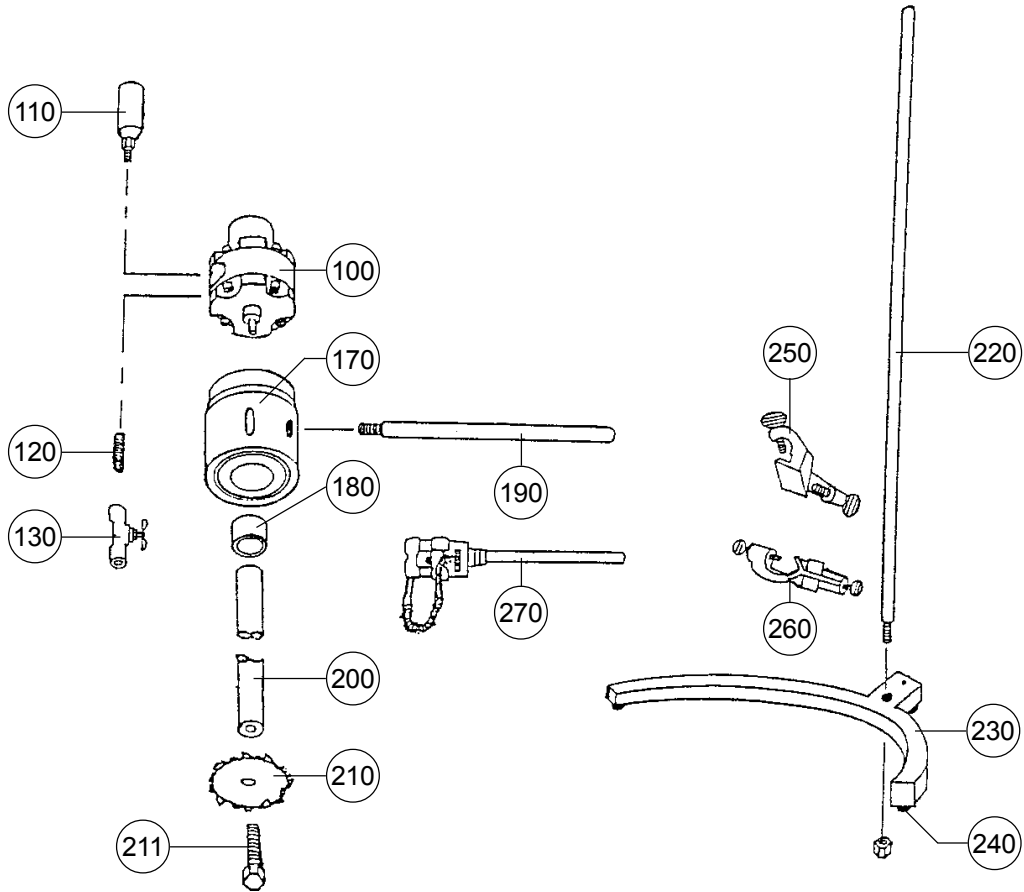


**Parts List**

HSD01, HSD02

Item	Description	Part No.	Qty.
100.	Motor, air - 1/2 HP (1UP-NCC-1A) - hub mount, CCW rotation only	MTR-1/2-HUB-AIR	1
101.	Repair Kit - (1UP-NCC-1A)      Repair Kit includes: Vaness, shaft seal, o-rings, DE & NDE bearings, body & end cap gaskets.	N-K285	1
110.	Muffler, metal	N-AF350	1
120.	Push lock ftg., straight - 1/8" MNPT x 1/4" tube	HDW-W68ML-4-2	1
125.	Tube, air line - 1/4"	HDW-EB-43-050	1-FT
130.	Push lock ftg., straight - 1/4" MNPT x 1/4" tube	HDW-W369ML-4-4	1
140.	Needle valve, brass - 1/4"	HDW-BRS025	1
150.	Adapter, Quick-Connect x 1/4" MNPT	HDW-1/4-M-QCPLUG	1
160.	Coupler - shaft, 3/8" x 3/8" with set-screws - stainless	C-CPL-3737	1
200.	Shaft, 3/8" dia. x 12" long - with threaded end & nut - stainless	C-TS038	1
210.	Blade adapter, 2-piece (dispersion blade to shaft) - stainless	C-SA300	1
220.	Dispersion Blade, 2" dia. design 'A' - stainless	C-DB2A	1
230.	Shaft, 3/8" dia. x 12" long - stainless (not shown)	SHF-24	1
240.	Propeller, 2.5" dia., 3-blade, 3/8" bore w/set-screws - ss (not shown)	C-MP303	1
300.	Container holder "Y" bracket	HDW-CH-14	1
310.	Chain, 32" (not shown)	HDW-CH-CHAIN	1
320.	Spring (not shown)	HDW-E42C	1
330.	Mount for "Y" holder	HDW-CH006	1
340.	Thumb screw, 3/8"-16 x 1.5"	N-HARDWARE	1
400.	Feet, rubber with 8-32 x 3/8" screw	HDW-75MSB	4
410.	Clevis pin	N-HARDWARE	1
420.	Clip (not shown)	N-HARDWARE	1

**NOTE:** Tachometer components shown on page 16.

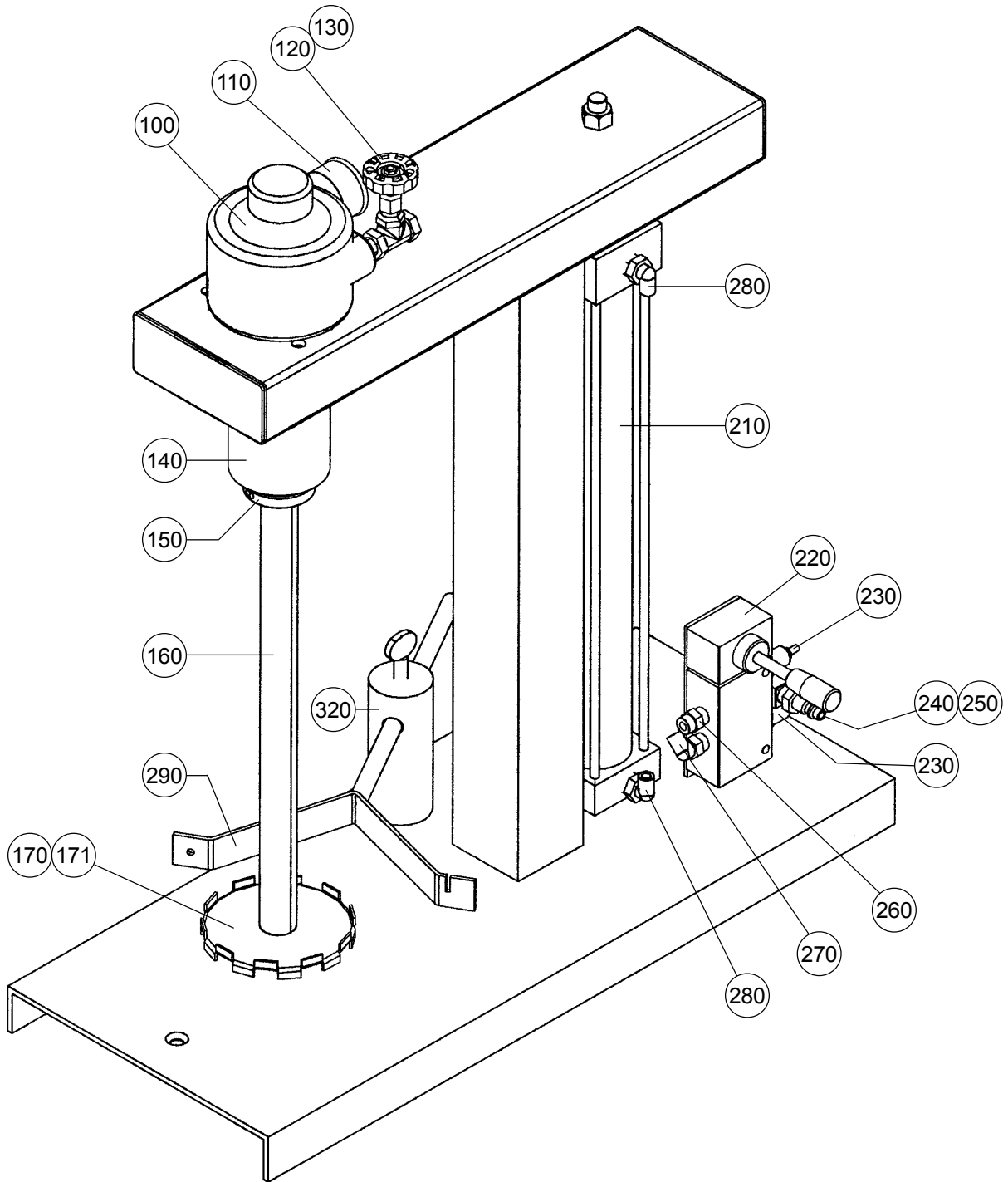


**Parts List**

HSD05, HSD06

<b>Item</b>	<b>Description</b>	<b>Part No.</b>	<b>Qty.</b>
100.	Motor, air - 1/2 HP (1UP-NCC-1A) - hub mount, CCW rotation only	MTR-1/2-HUB-AIR	1
101.	Repair Kit* - (1UP-NCC-1A) Repair Kit includes: Vaness, shaft seal, o-rings, DE & NDE bearings, body & end cap gaskets.	N-K285	1
110.	Muffler, metal	N-AF350	1
120.	Pipe nipple, steel - 1/8"	HDW-175-CNG	1
130.	Needle valve, brass - 1/8"	HDW-1/8-VALVE	1
170.	Motor mount	MNT-HSD56	1
180.	Bearing, Sealmaster	HDW-ER16T-AS	1
190.	Mounting rod - 5/8" dia. x 10" long	HDW-AS4AM-S	1
200.	Shaft, 1" dia. x 15" long with female threaded end & bolt	SHF-I-15	1
210.	Dispersion Blade, 2" dia. design 'A' - stainless	C-DB2A	1
211.	Bolt, 1/2"-20 x 1" hex head	N-HARDWARE	1
220.	Support rod	HDW-SS400R	1
230.	Support base	HDW-SS400b	1
240.	Feet, rubber with 8-32 x 3/8" screw	HDW-75MSB	3
250.	Clamp, Jumbo - for air motor drive ass'y	C-CH632J	1
260.	Clamp, standard - for container holder ass'y	C-CH632	1
270.	Container holder	C-DC103	1

**NOTE:** Tachometer components shown on page 16.



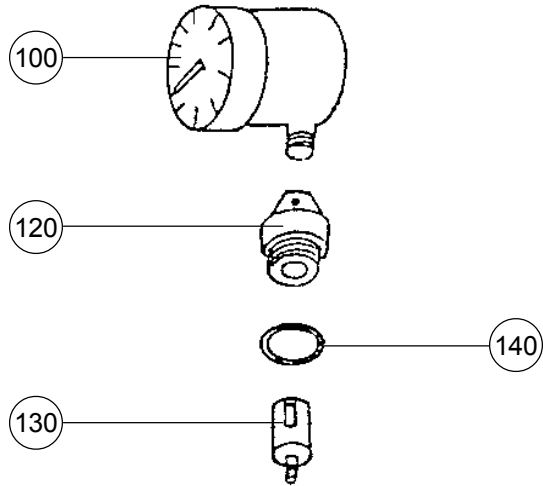
**Parts List**

HSD15A, HSD16A and HSD40A, HSD41A

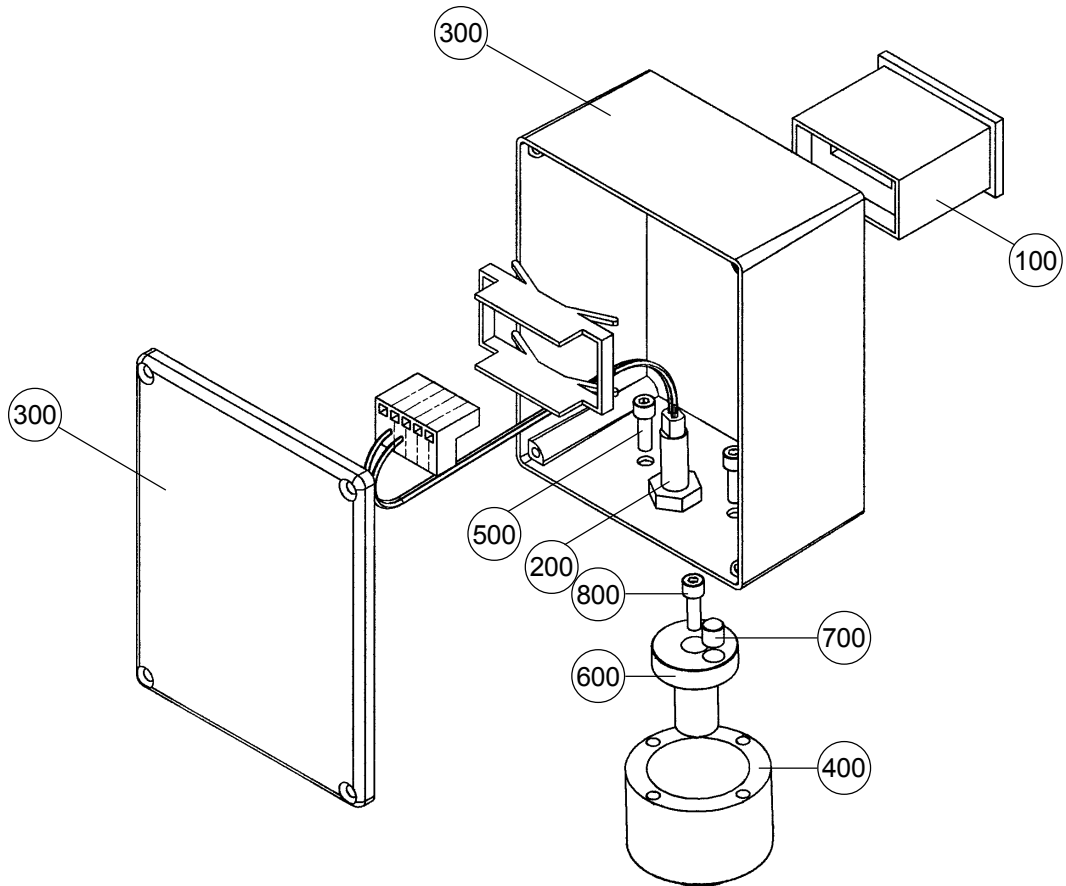
Item	Description	Part No.	Qty.
<b>• HSD15A, HSD16A ( 1.5 HP motor )</b>			
100.	Motor, air - 1.5 HP (4AM-NRV-22B) - hub mount, bi-rotational	MTR-1.5-HUB-AIR	1
101.	Repair Kit - (4AM-NRV-22B) Repair Kits include: Vaness, shaft seal, o-rings, DE & NDE bearings, body & end cap gaskets.	N-K205	1
110.	Muffler, metal	N-AC980	1
120.	Needle valve, brass - 1/4"	HDW-1/4-VALVE	1
130.	Pipe nipple, steel - 1/4" X 7/8"	HDW-25-CNG	1
140.	Bearing housing	CPL-HSD15	1
150.	Bearing, Sealmaster	HDW-ER16T	1
160.	Shaft, 1" dia. x 19.875" long, machined	SHF-HSD15	1
170.	Dispersion blade, 4" dia. design 'A' - stainless	C-DB4A	1
171.	Bolt, 1/2"-20 x 1" hex head	N-HARDWARE	1
<b>• HSD40A, HSD41A ( 4HP motor )</b>			
100.	Motor, air - 4 HP (6AM-NRV-7A) - hub mount, bi-rotational	MTR-4-HUB-AIR	1
101.	Repair Kit - (6AM-NRV-7A) Repair Kits include: Vaness, shaft seal, o-rings, DE & NDE bearings, body & end cap gaskets.	N-K208	1
110.	Muffler, metal	N-AC990	1
120.	Needle valve, brass - 1/2"	HDW-1/2-VALVE	1
130.	Pipe nipple, steel - 1/2" X 1-1/8"	HDW-50-CNG	1
140.	Bearing housing	CPL-HSD40	1
150.	Bearing, Sealmaster	HDW-ER16T	1
160.	Shaft, 1" dia. x 19.875" long, machined	SHF-HSD40	1
170.	Dispersion blade, 4" dia. design 'A' - stainless	C-DB4A	1
171.	Bolt, 1/2"-20 x 1" hex head	N-HARDWARE	1
<b>• HSD15A, HSD16A, HSD40A, HSD41A</b>			
210.	Air cylinder, 15" travel	HDW-HSD-ACYL	1
220.	3-Position spool valve	HDW-E2181-1000	1
230.	Brass muffler for spool valve	HDW-SPCMUF	2
240.	Elbow, 90° street, brass - 1/4"	HDW-2202P-4-4	1
250.	Quick release coupler, 1/4" MNPT x male connection	HDW-1/4-M-QCPLUG	1
260.	Push lock ftg., straight - 1/4"MNPT x 1/4" tube	HDW-W68ML-4-4	1
270.	Push lock ftg., 90° elbow - 1/4"MNPT x 1/4" tube	HDW-W369ML-4-4	1
280.	Push lock ftg., 90° elbow - 3/8"MNPT x 1/4" tube	HDW-W369ML-4-6	2
281.	Air line tube - 1/4" (not shown)	HDW-EB-43-050	2-FT
290.	Container holder "Y" bracket	HDW-CH-14	1
300.	Chain, 32" long (not shown)	HDW-CH-CHAIN	1
310.	Spring (not shown)	HDW-E42C	1
320.	Mount, container holder	HDW-CH006	1

**NOTE:** Tachometer components shown on page 16.

MECHANICAL - DIAL



DIGITAL DISPLAY





**Parts List****TACHOMETERS**

<b>Item</b>	<b>Description</b>	<b>Part No.</b>	<b>Qty.</b>
<u>MECHANICAL DIAL</u>			
<b>• HSD02 &amp; HSD05 ( 1/2 HP motor - 1AM-UP )</b>			
100.	tachometer dial, 500 to 6000-rpm (100's increments)	HDW-5202-11	1
120.	adapter mount - metal	HDW-2001-1600A	1
130.	drive coupler, small thread, 10-24 left-hand (aluminum)	HDW-2001-1600B	1
140.	end cap gasket	N-AC229	1
<b>• HSD15A ( 1.5 HP motor - 4AM )</b>			
100.	tachometer dial, 500 to 6000-rpm (100's increments)	HDW-5202-11	1
120.	adapter mount - metal	HDW-1863-14301	
130.	drive coupler, large thread, 5/16-18 left-hand (aluminum)	HDW-2001-1600C	1
140.	end cap gasket	N-AA46	1
<b>• HSD40A ( 4HP motor - 6AM )</b>			
100.	tachometer dial, 500 to 6000-rpm (100's increments)	HDW-5202-11	1
120.	adapter mount - metal	HDW-2001-1600A	1
130.	drive coupler, large thread, 5/16-18 left-hand (aluminum)	HDW-2001-1600C	1
140.	end cap gasket	N-AD644	1

<b>Item</b>	<b>Description</b>	<b>Part No.</b>	<b>Qty.</b>
<u>DIGITAL DISPLAY</u>			
100.	digital tachometer with plug and mounting clip	HDW-5330-0000	1
200.	pick-up sensor with mounting nuts & wires	HDW-59065-010	1
300.	box, enclosure with cover (aluminum)	HDW-1590C	1
<b>• HSD02 &amp; HSD05 ( 1/2 HP motor )</b>			
<b>• HSD40A ( 4HP motor )</b>			
400.	mounting hub, SMALL (aluminum)	HDW-MH	1
401.	adapter for 4HP motors (not shown)	TBA	1
<b>• HSD15A ( 1.5 HP motor )</b>			
400.	mounting hub, LARGE (aluminum)	HDW-MH-LG	1
500.	hex head cap screws, 10-32 x 1/2"	N-HARDWARE	2
600.	rotating spool (white plastic)	HDW-RS	1
700.	magnet, 1/4" dia. x 1/4" long	HDW-57065-000	1
800.	socket head cap screw, 10-32 x 3/4"	N-HARDWARE	1