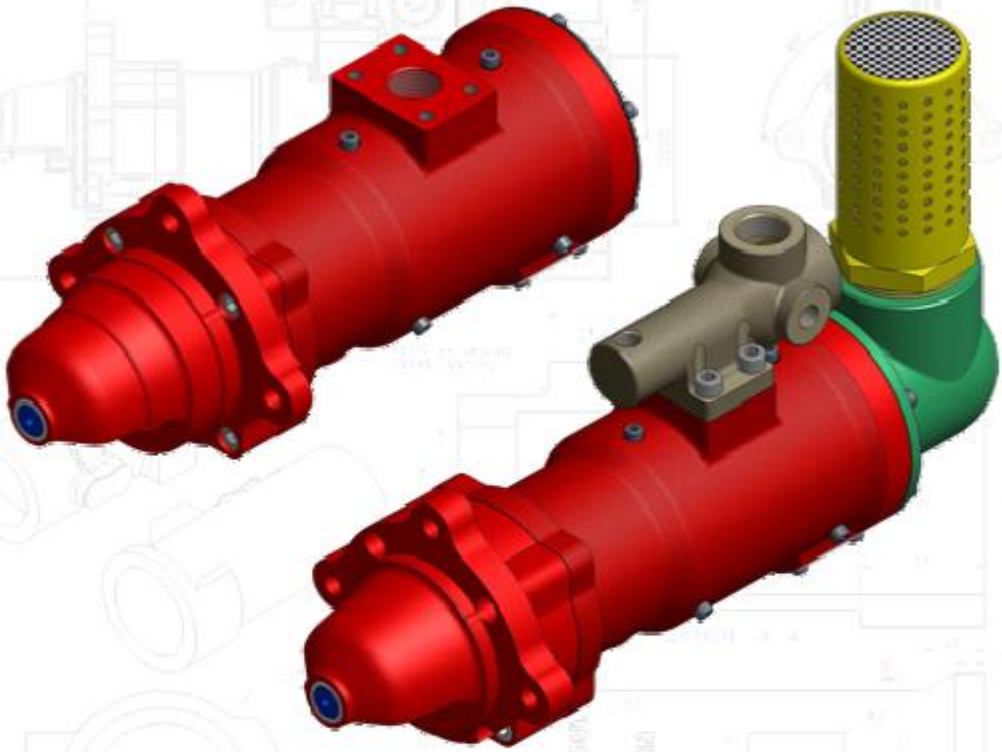
Jetstream Inertia Turbine Starters



Installation and Operating Instructions

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SAFETY FIRST

- **IMPORTANT SAFETY INFORMATION ENCLOSED**
- **Read and understand this manual before operating this starter.**
- **Failure to properly install or operate the starter may result in damage to the starter and/or engine, cause personal severe injury and invalidate the warranty.**

- Always install, operate and maintain this product in accordance with all applicable standards, regulations and laws.
- Do not exceed the starter pressure rating as specified on the nameplate.
- Do not work on any starter or starter installation unless all pressure has been drained from reservoirs or other pressure vessels.
- Always wear ear protection when operating the starter.
- Never use damaged fittings or frayed hoses.
- Repairs should only be undertaken by authorised and trained personnel.
- The use of non genuine Powerstart spares or the servicing by unauthorised personnel may result in safety hazards, affect performance and invalidate all warranties.
- Maximum inlet pressure ratings are as follows:
  - Low Pressure starters: 4 bar (60 psi)
  - Medium Pressure starters: 8 bar (120 psi)
  - High Pressure starters: 30 bar (435 psi)

1. General

This installation manual should be read and fully understood prior to installation and commissioning of your Powerstart turbine starter.

The Powerstart Jetstream turbine starter is an inertia engaged turbine starter which is unaffected by moderate amounts of liquid in the air stream and it should be installed with no lubrication in the supply line.

WARNING – The Powerstart Jetstream turbine starter must be installed and operated in accordance with the instructions given in this document. Failure to properly install or operate the starter may result in damage to the starter and/or the engine, cause personal severe injury and invalidate the warranty.

2. Orientation of flange and exhaust

The starter can be oriented to suit the engine configuration and ancillary equipment by removing the four M8 socket head screws which hold the flange to the starter body. This will enable the flange to be indexed by 90° increments. These screws should be retightened to 35Nm (25.9 lb.ft.) once the correct positioning has been achieved.

If slight orientation adjustment of the starter relative to the mounting flange is necessary, i.e. less than 90°, then a different flange may need to be used. In that event, please consult Powerstart or your authorised distributor.

The exhaust elbow (if fitted) can be indexed in 60° increments by removing the six M5 socket head screws and realigning the elbow. It is advisable not to totally remove the elbow, but rather to simply rotate it after unseating it slightly. This will help prevent the o-ring from being pinched when reassembling the elbow onto the starter. When replacing the socket head screws, it is advisable to clean them with acetone and apply a drop of Loctite™ 222 mild strength retainer to the screws prior to refitting. These screws should be tightened to 9.5Nm (84.1 lb.in)

CAUTION – The M5 socket head screws which hold the gearbox and the turbine sections are treated at the factory with a high strength retention compound. They should not be removed.

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3. Installing the starter onto the engine

Prior to mating the starter to the engine, perform a quick check of the distance from the flange mounting face to the ring gear and compare this to the distance from the starter flange to the end of the pinion gear. The flange to pinion gear distance should be approximately 12.5mm (0.5 in.) longer than the flange to ring gear when the pinion is wound all the way forward.

NOTE – The starter is supplied with the drive in the forward position. The drive cannot be retracted manually since the detents which hold it in the forward position only move in under centrifugal force above a certain rotational speed. This is normal and the drive will retract after the first start.

Mate the starter flange to the engine mounting and check that spigot diameters and mounting holes are correct and line up. There should not be excessive play between the starter and the starter pocket on the engine when the starter is mated. A maximum of 0.25mm (0.01") is permitted. Ensure that the correct mounting bolts are used so as not to protrude into the bell housing and touch the flywheel. In particular, if another starter is being replaced which is different from this one, the flange thickness may differ and the bolts may need to be replaced accordingly.

Tighten the mounting bolts as indicated by the engine manufacturer and observe any thread locking or flange sealing procedures which may be specified.

4. Piping Up

Two typical installation layouts are shown in fig. 1 and fig. 2 depending on where the relay valve is mounted. For simplicity and compactness of installation it is recommended that the Jetstream relay valve be ordered mounted on the starter. The components may vary in shape or size, but there should be an air receiver, a start valve (manual or electric) and a pilot operated relay valve.

4.1 Relay Valve

The relay valve ports should not be smaller than 1" if the Jetstream valve is not used. The piloting of the relay valve is done by a smaller pushbutton or solenoid valve as shown.

4.2 Hoses and pipes

Because turbine air starters are sensitive to flow restrictions, ensure that all hoses and fittings have a bore of at least 25mm (1") in diameter and that one size is maintained throughout the installation.

If the relay valve is mounted further than 3m (9.8 ft.) from the starter, the next size of hose will need to be used, i.e. 30mm (1 ¼") bore. Pilot lines should be at least 6mm (¼") in diameter.

The working pressure rating of the hoses and fittings must match the starter working pressure and be rated above the maximum possible pressure that the system can achieve. Keep the use of elbows to a minimum.

4.3 Lubrication

The Powerstart turbine starters do not require lubrication in the supply air, therefore if an old technology vane type starter is being replaced, it is recommended that all lubrication devices be removed in order to minimise flow restrictions and environmental unfriendliness.

4.4 Mufflers and Exhaust Elbows

If a muffler is installed onto the starter, ensure that the muffler points away from the engine and downwards since there could be airline moisture being expelled during starting operation and this could be sprayed onto the engine or accumulate inside the starter.

If a hose is being installed to pipe exhaust gases away from the starter, ensure that the internal diameter of the hose and all fittings and adaptors is at least 50mm (2").

WARNING – Do not operate the Powerstart turbine starter with air pressure greater than the pressure rating on the nameplate. Failure to observe this may result in damage to the starter and/or the engine, cause personal severe injury and invalidate the warranty.

NOTE – The air inlet port is ¾" NPT fitting and the exhaust elbow (if fitted) has a port size of 2" NPT.

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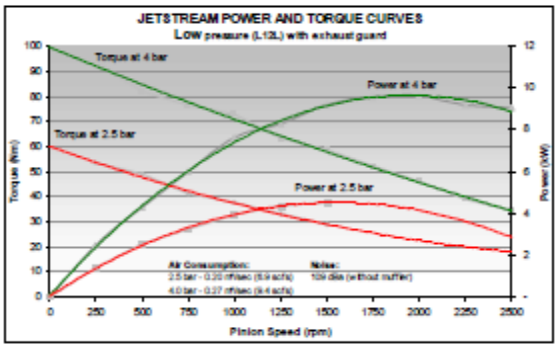
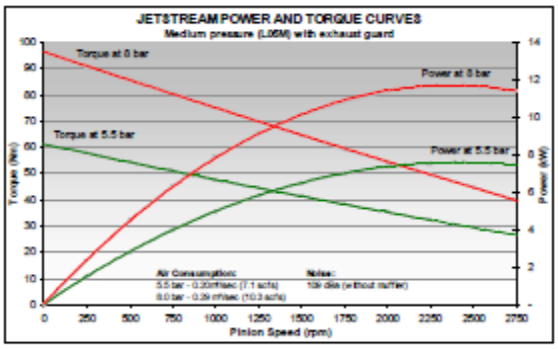
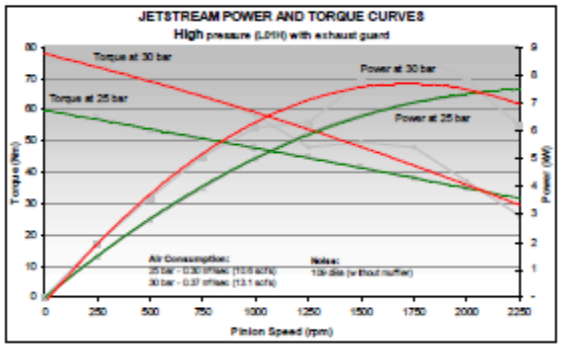
5. Performance Curves







6. Warranty

Powerstart warrants to the original user of the Jetstream starter that the starters are free from defects in material and workmanship for a period of one year from the date of purchase by such user. The conditions of this warranty are: (a) That Powerstart is notified within this period by return of such product to Powerstart or its authorised distributor or dealer, transportation prepaid by such user; (b) Such product has been installed and used according to Powerstart's specifications; (c) Such product has not been misused, abused or improperly maintained by the user; (d) The defect is not the result of normal wear and tear, and (e) such starter product has only been repaired by authorised Powerstart service centres and with parts manufactured or authorised by Powerstart.

Powerstart shall, at its option, either replace or repair, without charge, any such starter product found upon Powerstart's examination to be so defective. Repairs or replacements under this warranty are warranted for the remainder of the original warranty period.

Powerstart makes no other warranty, and implied warranties, including any warranty or merchantability or fitness for a particular purpose are hereby disclaimed.

This warranty constitutes the entire obligation of Powerstart relating to the sale and use of this product and Powerstart's maximum liability is limited to the purchase price of such product at the date of purchase. In no event shall Powerstart be liable for incidental, indirect, consequential or special damages of any nature arising from the sale or use of such engine starter product.

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BORE BOSS POLY BOSS MiTi PUMPS MiTi BLAST

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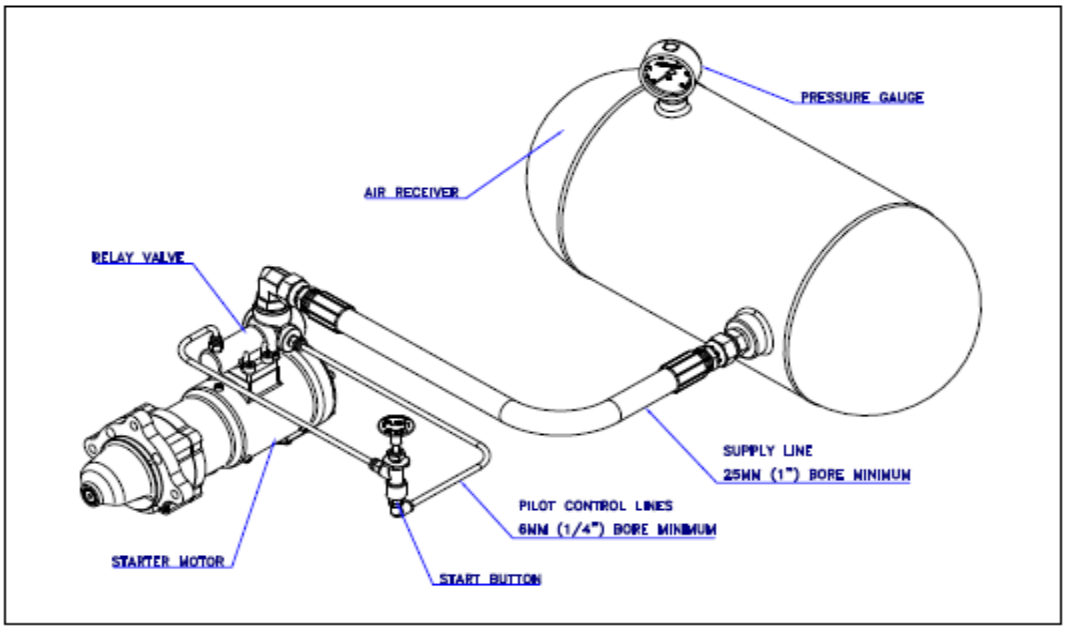

Fig. 1 – Jetstream inertia starter with relay valve mounted on starter

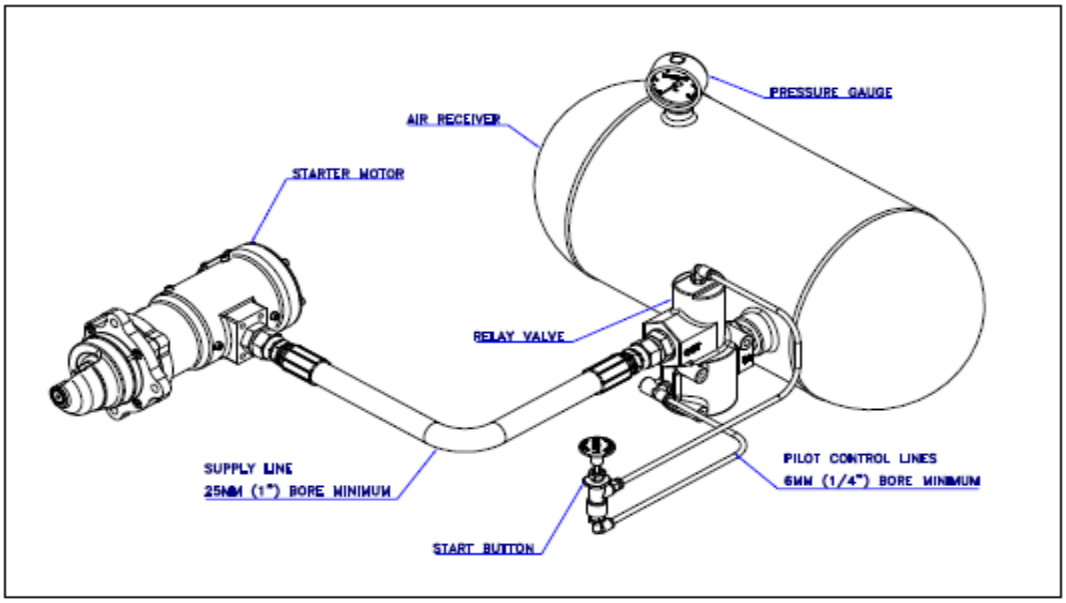

Fig. 2 – Jetstream inertia starter with relay valve remote mounted

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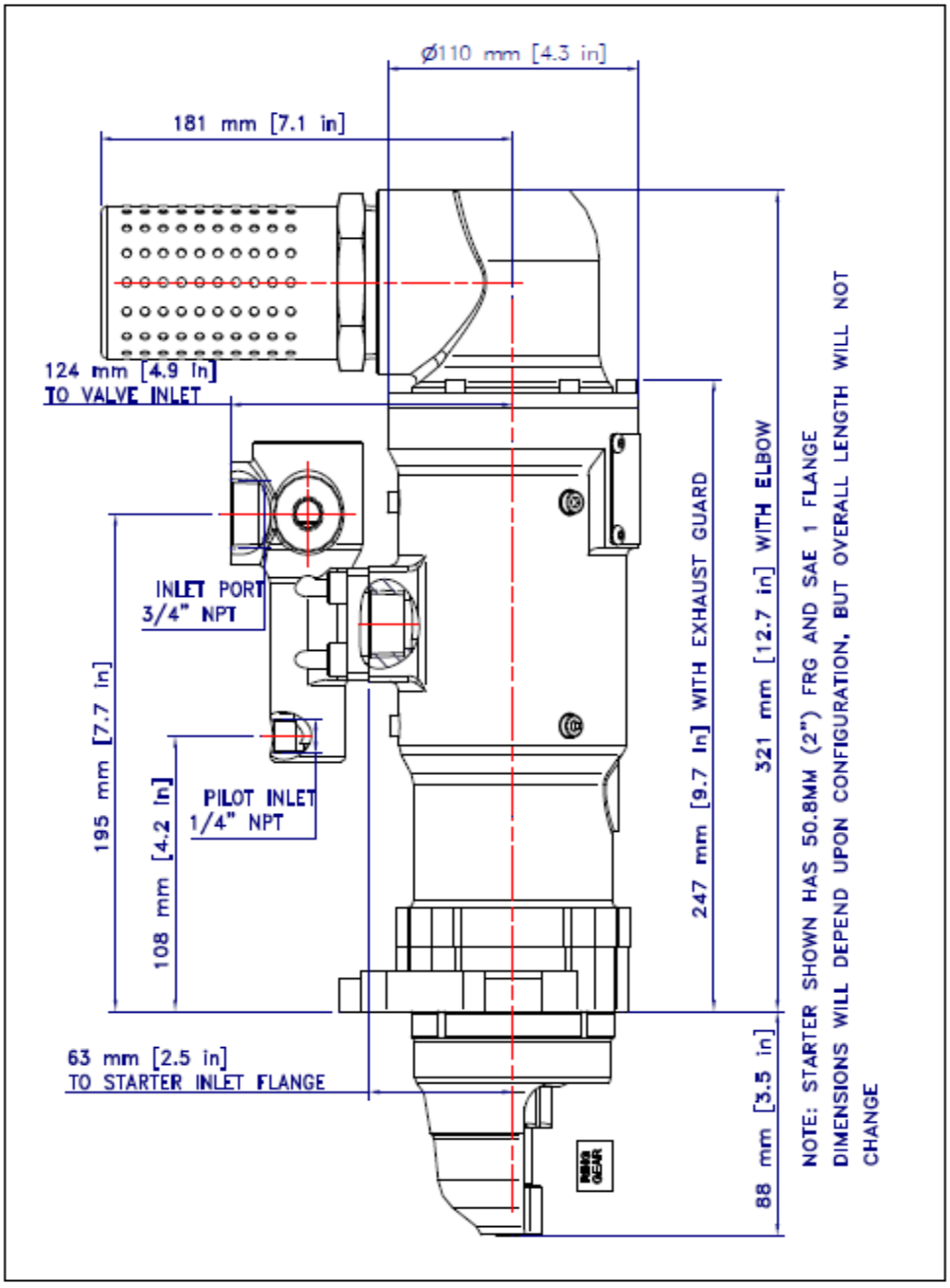

Fig. 3 – Jetstream inertia overall dimension

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