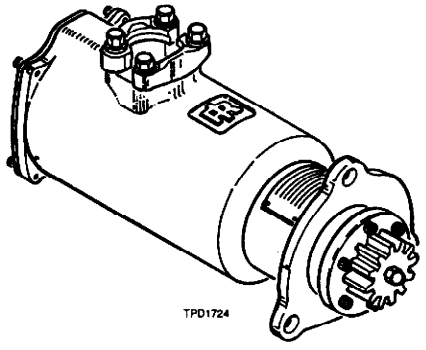
03539319

Form P7061
Edition 2

INSTALLATION AND MAINTENANCE MANUAL
for
MODEL ST400 TURBINE POWERED STARTER



⚠ WARNING

IMPORTANT SAFETY INFORMATION ENCLOSED.
READ THIS MANUAL BEFORE OPERATING STARTER.
FAILURE TO OBSERVE THE FOLLOWING WARNINGS COULD RESULT IN INJURY.

- For safety, top performance, and maximum durability of parts, do not operate ST400 Starters at air pressures over the pressure rating stamped on the nameplate. Use supply lines of adequate size as directed in the installation instructions in this manual.
- Always turn off the air supply and disconnect the air supply hose before installing, removing or adjusting any accessory on this starter, or before performing any maintenance on this starter.
- Operate Model ST400 Starters on compressed air only. They are not designed or sealed for operation on compressed gas.
- After assembling a ST400 Starter, always test it in accordance the procedures outlined in this manual. Never install a reassembled starter that has not been tested in accordance with the procedures outlined in this manual. This manual should be filed in a permanently available location.
- Operate this starter only when properly installed on the engine.
- Do not remove any labels. Replace any damaged label.
- Use accessories recommended by Ingersoll–Rand.

NOTICE

The use of other than genuine Ingersoll–Rand replacement parts may result in safety hazards, decreased starter performance and increased maintenance, and may invalidate all warranties.

Ingersoll–Rand is not responsible for customer modification of starters for applications on which Ingersoll–Rand was not consulted.

Repairs should be made only by authorized, trained personnel. Consult your nearest Ingersoll–Rand Authorized Servicenter.

It is the responsibility of the employer to place the information in this manual into the hands of the operator.

Refer All Communications to the Nearest Ingersoll–Rand Office or Distributor.

Printed in U.S.A.

INGERSOLL-RAND®
ENGINE STARTING SYSTEMS

WARNING LABEL IDENTIFICATION

⚠ WARNING

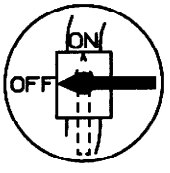
FAILURE TO OBSERVE THE FOLLOWING WARNINGS COULD RESULT IN INJURY.

⚠ WARNING

Always wear eye protection when performing maintenance on this starter.

⚠ WARNING

Always wear hearing protection when testing this starter.



⚠ WARNING

Always turn off the air supply and disconnect the air supply hose before installing, removing or adjusting any accessory on this starter, or before performing any maintenance on this starter.

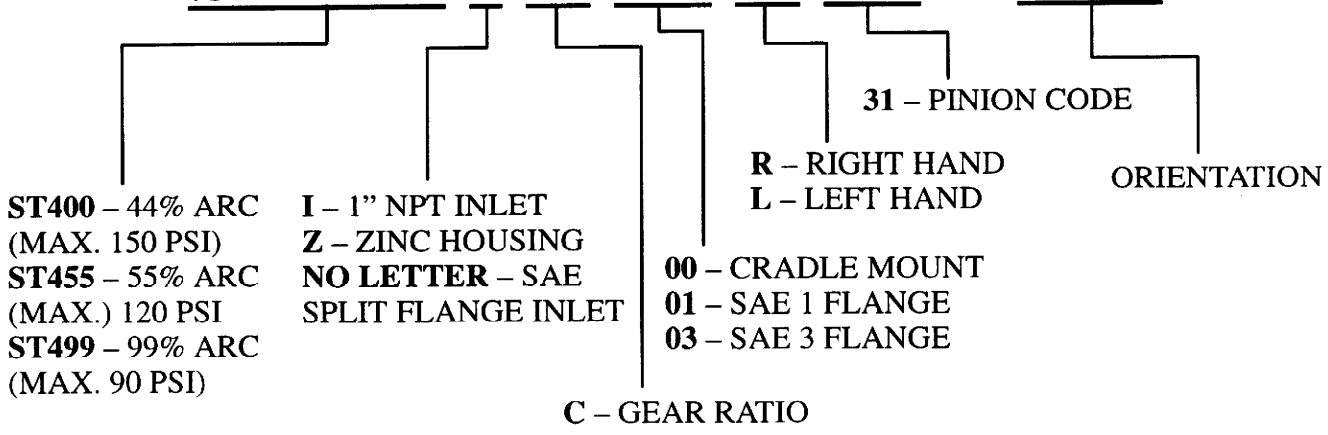
⚠ WARNING

Do not use damaged, frayed or deteriorated air hoses and fittings.

CONTENTS

HOW TO ORDER A STARTER

ST400 I C 03 R 31 – 030



When ordering a Starter, refer to table below for correct pinion data.

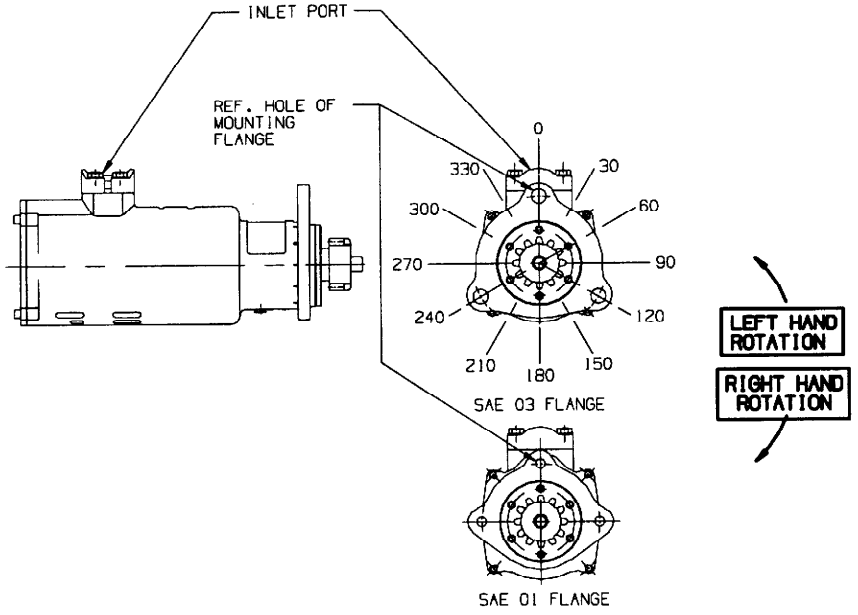
PINION DATA

TEETH	BLANK	D.P.	MOD.	P.A.	ROTATION	PINION
10	10	8/10		20 DEG	RIGHT	ST400–13–15
12	12	8/10		20 DEG	RIGHT	ST400–13–29
12	12	6/8		20 DEG	RIGHT	ST400–13–31
12	12	6/8		20 DEG	LEFT	ST400–13–32
9	9		3	15 DEG	RIGHT	ST400–13–77
11	11		3	15 DEG	RIGHT	ST400–13–85
11	12	8/10		20 DEG	RIGHT	SS350R–13–21
13	14		3.5	15 DEG	RIGHT	SS350R–13–895
24		12/14		12 DEG	LEFT	SS175L–13–1448
10	11	10/12		20 DEG	RIGHT	04335055
9	10		3.5	15 DEG	RIGHT	04595799
17	18		3.5	15 DEG	RIGHT	04334371
11			3.5	20 DEG	RIGHT	04333969
13	13		3.5	15 DEG	RIGHT	04332292
14	16		3.5	15 DEG	RIGHT	04595807
14			3.5	14.5 DEG	LEFT	04334363
12			4	14.5 DEG	LEFT	04331724
14	15		3.5	20 DEG	LEFT	04334389

For different models or special applications, contact your nearest Ingersoll–Rand Distributor or Ingersoll–Rand, Engine Starting Systems, Box 8000, Southern Pines, NC 28387 (910) 692–8700

HOW TO ORDER

STARTER ORIENTATION



(Dwg. TPD1670–1)

For customer orientation of the starter:

5. Loosen six Flange Cap Screws.
6. Turn Flange to desired orientation. Note the orientation marks on the exterior of the Housing. Each mark measures 30° of arch. There is a "O" mark which aligns with the starter inlet.
7. Tighten the six Flange Cap Screws to 3–4 ft–lbs (4–6 Nm) torque.

To purchase pre–oriented starter:

It is necessary to provide the orientation code which is the angle of the Mounting Flange relative to the starter inlet port ("O" mark on the Housing). **Therefore, the orientation code will be an angular measurement.** To obtain the orientation code, proceed as follows:

1. Orient the starter so that the inlet port is pointed straight up. The "O" mark on the Housing near the Mounting Flange should be visible and pointed straight up.
2. With the starter at this setting, position yourself so that the Drive Pinion (2) is facing you.
3. Rotate the Mounting Flange **clockwise** until the desired orientation is reached.
4. You will derive the orientation code from a clockwise measurement of the angle from the "O" mark (inlet port) to the reference hole of the Mounting Flange. The Housing has indicator marks every 30°. Example: ST400C03R31–060

HOW TO ORDER

The following diagrams give dimensions and specifications for the components used when installing a Model ST400 Engine Starting System

FILAMENT WOUND COMPOSITE AIR TANK (ST400)

											ELLIPTICAL HEADS	
GAL.	PART NO	A DIA.	B LGTH.	COLOR	WT.	BRACKETS	C LGTH.	D LGTH.	E LGTH.	F LGTH.	MAJ.AXIS	MINOR AXIS
45	AT45-14NB	14.00	72.0	BLACK	39					61.34	14.00	7.00
45	AT45-26	26.00	26.0	BLACK	40	1	13.7	6.0	7.1	12.0	26.00	13.0
53	AT53-14NB	14.00	84.0	BLACK	43					73.34	14.00	7.00
60	AT60-26	26.00	32.0	BLACK	45	1	13.7	10.0	7.1	18.0	26.00	13.0

*NOTE FOR A TANK W/O BRACKET PLACE "NB" AT END OF PART NO.

SPECIFICATION

1.VESSEL TO BE MANUFACTURED IN ACCORDANCE WITH SAE J10 LATEST REVISION. HOWEVER, TANK TO BE LEAK TESTED PER ASME SEC. 10 CODE: 1 1/2 TIMES RATED PRESSURE PNEUMATICALLY.

2. MAX. WORKING PRESSURE 150 PSIG.

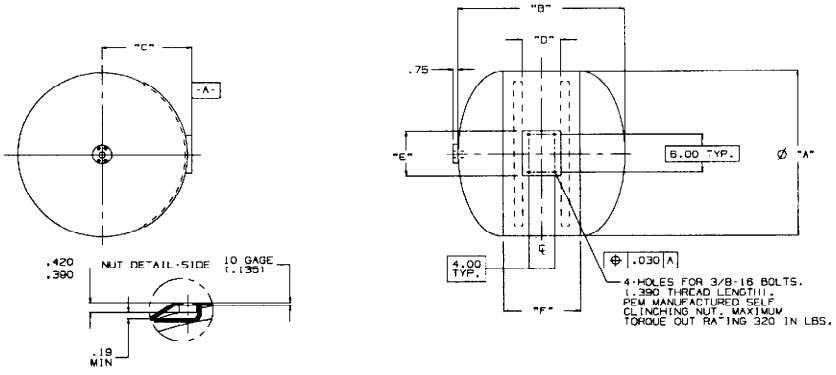
3. TEMPERATURE – MAX. 200 DEGREE FAHRENHEIT
MIN. –40 DEGREE FAHRENHEIT

NOTES:

1. HORIZONTAL TANKS CAN BE ROTATED 360 DEGREES WITHOUT AFFECTING PERFORMANCE OF INTERNAL DRAINING DEVICE.

2. VERTICAL TANKS – PORT MUST BE DOWN.

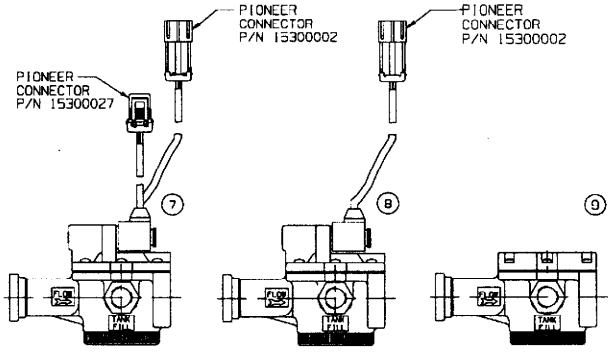
3. ALL FLANGE FITTINGS / NPT PORTS MOLDED AND WRAPPED INTO TANK INSURING COMPLETE AND PERMANENT ENCAPSULATION.



(Dwg. TPB979–1)

DIAPHRAGM VALVES

	PART NO.	DESCRIPTION
⑦	ST400 A339	ELECTRONIC VALVE
⑧	ST400-B339	ELECTRONIC VALVE
⑨	ST400-A339M	MANUAL VALVE

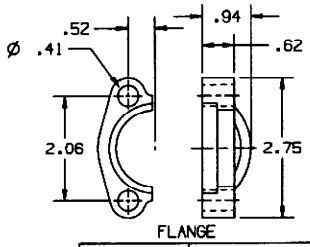


(Dwg. TPD1796–1)

HOW TO ORDER

System Components

Flange



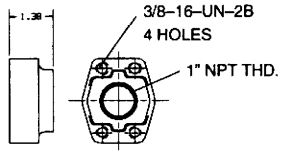
FLANGE

PART NO.	DESCRIPTION
ST400-16	FLANGE KIT

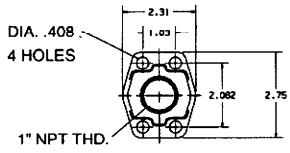
KIT INCLUDES: (4) BOLTS & WASHERS, O-RING & (2) FLANGE HALFS.

(Dwg. TPD1660–1)

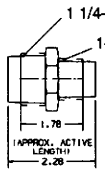
Fittings



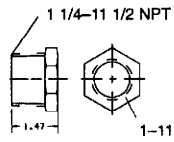
FLANGE
ST400–18
USED WITH
CLOSED NIPPLE



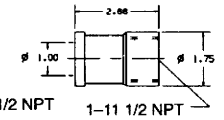
FLANGE KIT
ST400–K17
KIT INCLUDES:
FLANGE, O–RING (4)
BOLTS & WASHERS



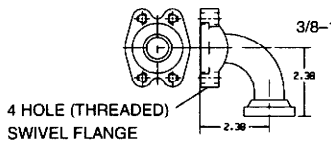
(–20 –16)
NIPPLE
ST400–83



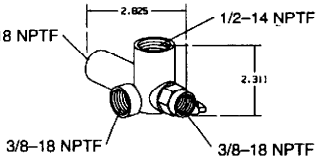
(–20 –16)
REDUCER BUSHING
ST400–81



(–16)
FLANGE HEAD
ST400–19



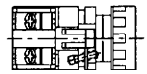
90 DEGREE TANK FLANGE
ST400–161



2–WAY CHECK VALVE
ST400–1052

(Dwg. TPD1664–1)

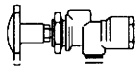
⑨



SWITCH

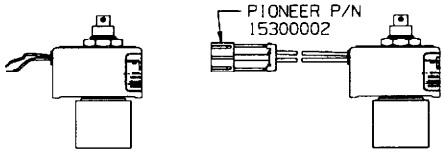
PART NO.	DESCRIPTION
ST400-A618	SWITCH

⑩



PUSH BUTTON CONTROL VALVE

PART NO.	DESCRIPTION
SMB-618	
SMB-G618	CHROME PLATE



SOLENOID ACTUATED CONTROL VALVE

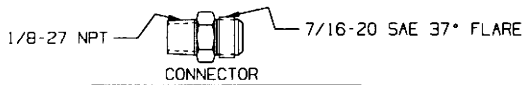
⑪

PART NO.	VOLTAGE	DESCRIPTION
150BMP-1051B	12 VDC	LOOSE WIRES
150BMP-A1051C	12 VDC	PIONEER CONNECTOR P/N 15300002
150BMP-2451B	24 VDC	LOOSE WIRES

PRESSURE GAUGES

⑫

PART NO.	DESCRIPTION
150BMP-1064	150 psi DASH MNT.
150BMP-1064L	150 psi TEE MNT.



CONNECTOR

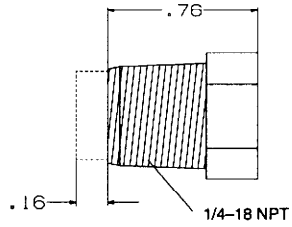
⑬

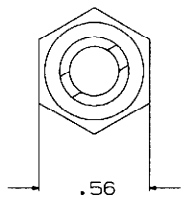
PART NO.	DESCRIPTION
ST400-52	MALE CONNECTOR

(Dwg. TPD1662)

DRAIN VALVE

ST400–1067



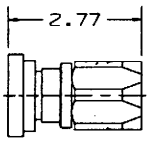


NOTE: THIS DRAIN VALVE HAS AN O–RING SEAL. TIGHTENING BY HAND WITH A LARGE SCREW-DRIVER WILL NORMALLY BE SUFFICIENT. EXCESSIVE TIGHTENING MAY DAMAGE THE SEAL. CLEARANCE NEEDED FOR PROPER OPERATION.

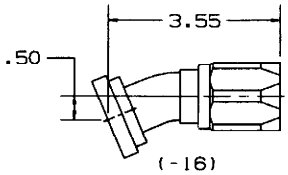
(Dwg. TPA1594)

HOW TO ORDER

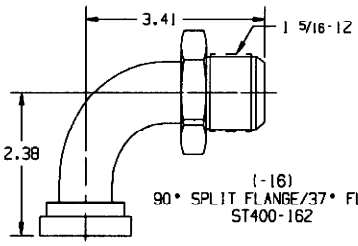
System Components



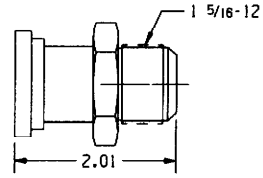
(-16)
STRAIGHT SPLIT FLANGE
ST400-775



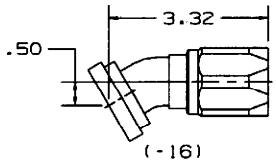
(-16)
22 1/2° SPLIT FLANGE
ST400-776



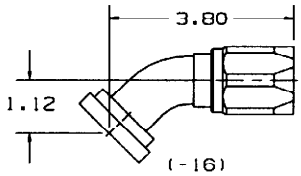
(-16)
90° SPLIT FLANGE/37° FLARE
ST400-162



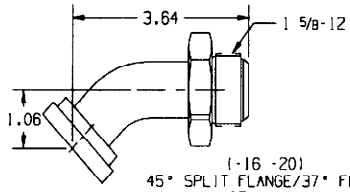
(-16)
SPLIT FLANGE/37° FLARE
ST400-25



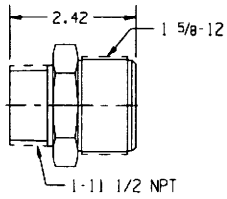
(-16)
30° SPLIT FLANGE
ST400-846



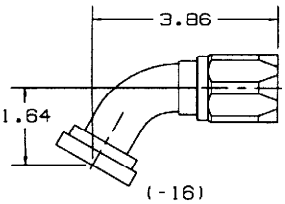
(-16)
45° SPLIT FLANGE
ST400-777



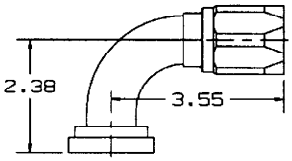
(-16 -20)
45° SPLIT FLANGE/37° FLARE
ST400-38



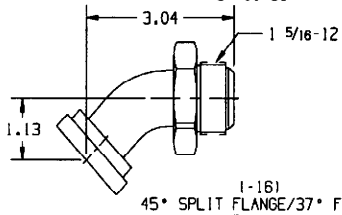
(-16 -20)
PIPE TO 37° FLARE
ST400-21



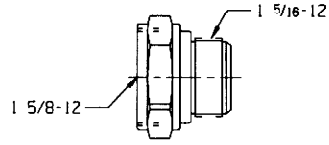
(-16)
60° SPLIT FLANGE
ST400-395



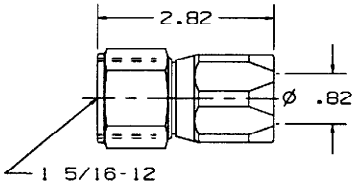
(-16)
90° SPLIT FLANGE
ST400-779



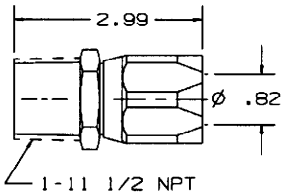
(-16)
45° SPLIT FLANGE/37° FLARE
ST400-23



(-20 -16)
37° FLARE SWIVEL
ST400-501



(-16)
37° SWIVEL FITTING
ST400-411



(-16)
MALE PIPE FITTING
ST400-412

PLACING SYSTEM IN SERVICE

SYSTEM INSTALLATION

Air Tank

NOTICE

When connecting the starter to an air receiver tank that is already in service, bleed off the air pressure in the tank prior to installation.

Surface cleaning prior to painting may be accomplished using any standard cleaning solvent, any questions or deviations should be discussed with Ingersoll–Rand.

Composite tank surfaces cannot exceed 200 degrees farenheit for longer than ten (10) minutes. Paint booth applications should be discussed with factory prior to installation.

Note: Because of heat transfer considerations between the composite tank and the paint booth environment, ambient tempeatures can exceed the rated temperature of the tank for certain periods of time. Contact Ingersoll–Rand prior to installation.

NOTICE

External Bracketing – Composite Tank

1. Select a bracket which provides stability and structural integrity. The bracket should be selected for the application based on environmental considerations such as vibrational loading, additional weighting, ease of installation and maintenance.
2. The bracket must contain a neoprene barrier of at least 1/8" thickness between the metal strap and the composite tank surface.
3 See **page 10** for compression analysis to determine the band strap fastening torque; the maximum allowable external compressive pressure is 100 psi.

Wound–in Bracketing – Composite Tank

1. Use grade 8 bolt (or greater) for lower four bolts with appropriate hardened plain washers. Apply grade 290 loctite or equivalent, and torque bolts to 45–50 ft–lbs.
2. Use grade 8 bolt (or greater) for upper four bolts with appropriate hardened plain washers under bolt head. Use a stover lock nut, and torque to 45– 50 ft–lbs.

Valve

1. Mount the ST400–A339 or ST400–B339 Electronic Valve or ST400–A339M Manual Valve to the air receiver as shown in the installation diagrams. The air flow arrow must point toward the starter.
2. Using the supplied flange fitting, tighten the four flange bolts to 28–35 ft–lbs (38–47 Nm) torque.
3. **For electrical installations,** install the ST400–A618 Electrical Switch on the dash panel.See Dwg. TPB973 or Dwg. TPB975 for making wire connections.
   For air installations, install the SMB–618 Starter Control Valve on the dash panel. Connect the air lines as shown in Dwg. TPB976.
4. Connect one –8 air line from the ST400–1052 2–way Check Valve to the ST400–A339 Relay Valve.

Mounting the Starter

1. To determine the exact length of #16 hose required, run a piece of hose or some other flexible tubing of the same diameter from the valve on the air receiver to the starter mounting location on the engine. After determining the hose length required, attach O–ring sealed flange fittings as required.
2. Attach the hose to the outlet side of the valve with the ST400–16 4 bolt split–flange provided. Tighten bolts to 28–35 ft–lbs (38–47 Nm) torque.
3. At this point, determine if it is convenient to attach the hose to the starter before actually mounting it on the engine.
4. If possible, liberally grease the teeth of the ring gear with a good, sticky gear grease or motorcycle chain lubricant. This will help to promote the life of the starter pinion and engine ring gear.
5. Mount the starter in position and bolt it to the engine. Refer to Dwg. TPB974.

System Actuation

Pressurize the complete starting system and using a soapy solution, check the following locations in the live air line for leaks:

- **Valve/tank connection**
- **Fill–line to check valve on ST400 valve**
- **Air supply line to 2–way check valve**

PLACING SYSTEM IN SERVICE

Composite Tank Compression Analysis
for Band Straps (J–Brackets or C–Brackets)

GIVENS...	P: Maximum Compression Pressure (psi) = 100 psi
	K: Lubrication Constant =
	0.15 lubricated threads
	0.20 dry threads (most common)
INPUTS...	D: Nominal Thread Pitch Diameter (inches)
	R: Nominal Tank Radius (inches)
	W: Minimum Strap Width (inches)
RESULTS...	F: Clamping Force (lbs)
	T: Nut Torque (ft–lbs)
Step #1 : F = (P)(R)(W)	Given maximum compression pressure not exceed 100 (psi), calculate clamping force (pounds)
Step #2 : $T = \frac{(K)(D)(F)}{12}$	Use clamping force to calculate bolt torque (ft–lbs)

Example #1

Compression Pressure (psi)	100
Tank Diameter (inch)	26
Band Width (inch)	4
Tension Force (pounds)	5200
Lube Coef.	0.2
Bolt Thread Nom. Diameter (inch)	0.625

Fastener Torque 650 (inch–lbs) 54.17 (ft–lbs)

Result: For a 4" wide 26" diameter strap the torque on a 5/8" threaded bolt should not exceed 54 ft–lbs.

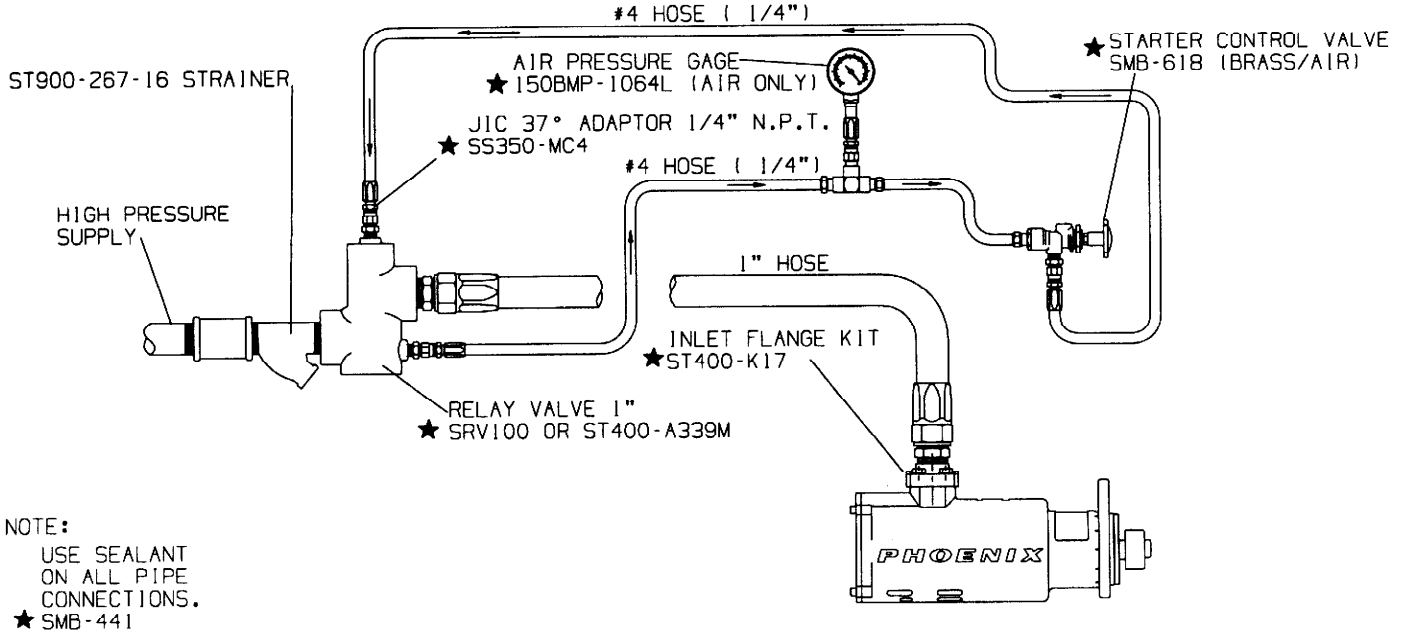
Example #2

Compression Pressure (psi)	100
Tank Diameter (inch)	14
Band Width (inch)	2.5
Tension Force (pounds)	1750
Lube Coef.	0.2
Bolt Thread Nom. Diameter (inch)	0.5

Fastener Torque 175(inch–lbs) 14.58 (ft–lbs)

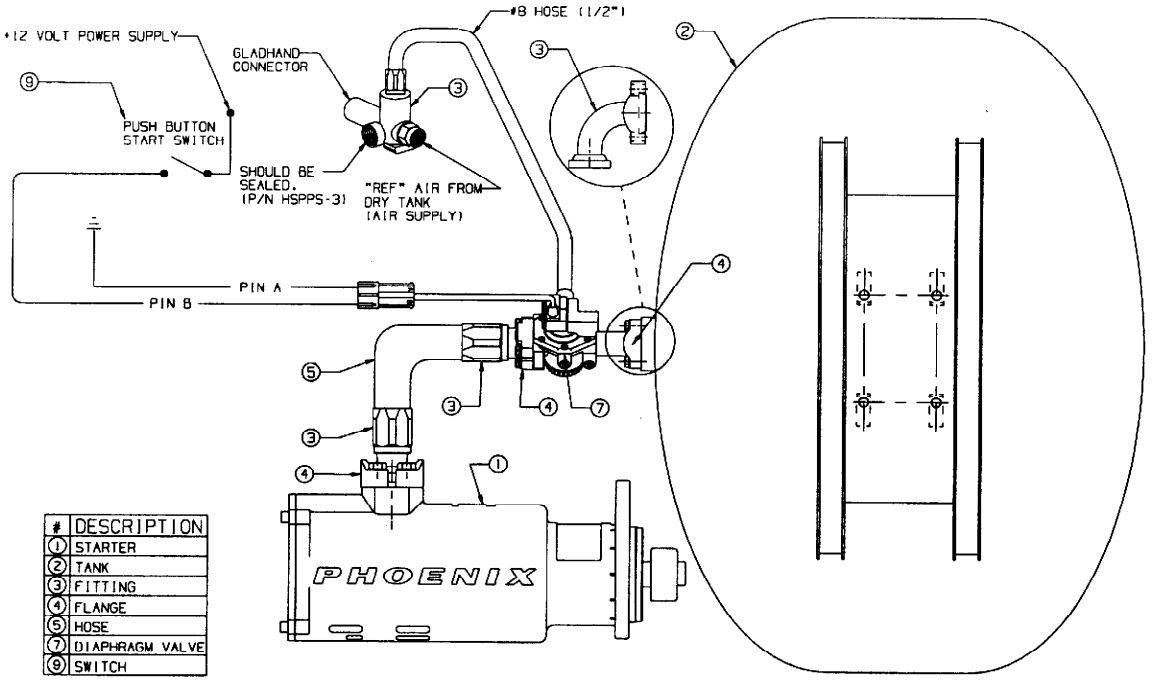
Result: For a 2.5" wide by 14" diameter strap the torque on a 1/2" threaded bolt should not exceed 14.5 ft–lbs.

ST400 Installation Diagram – Stationary Industrial



(Dwg. TPA1592–1)

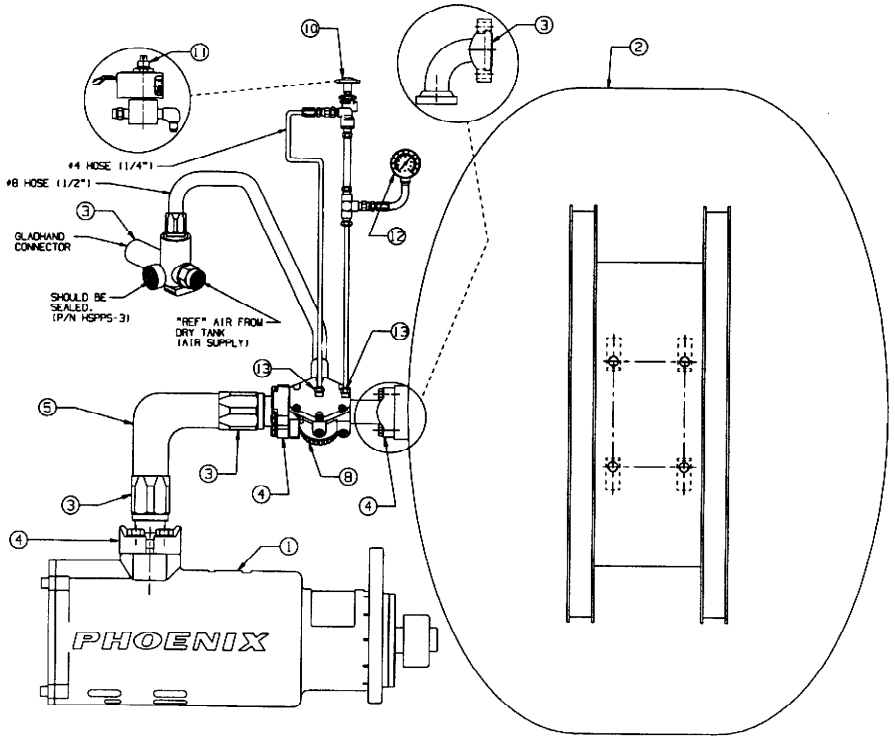
ST400 Installation Diagram – Electro – Mechanical



#	DESCRIPTION
1	STARTER
2	TANK
3	FITTING
4	FLANGE
5	HOSE
7	DIAPHRAGM VALVE
9	SWITCH

(Dwg. TPB973–1)

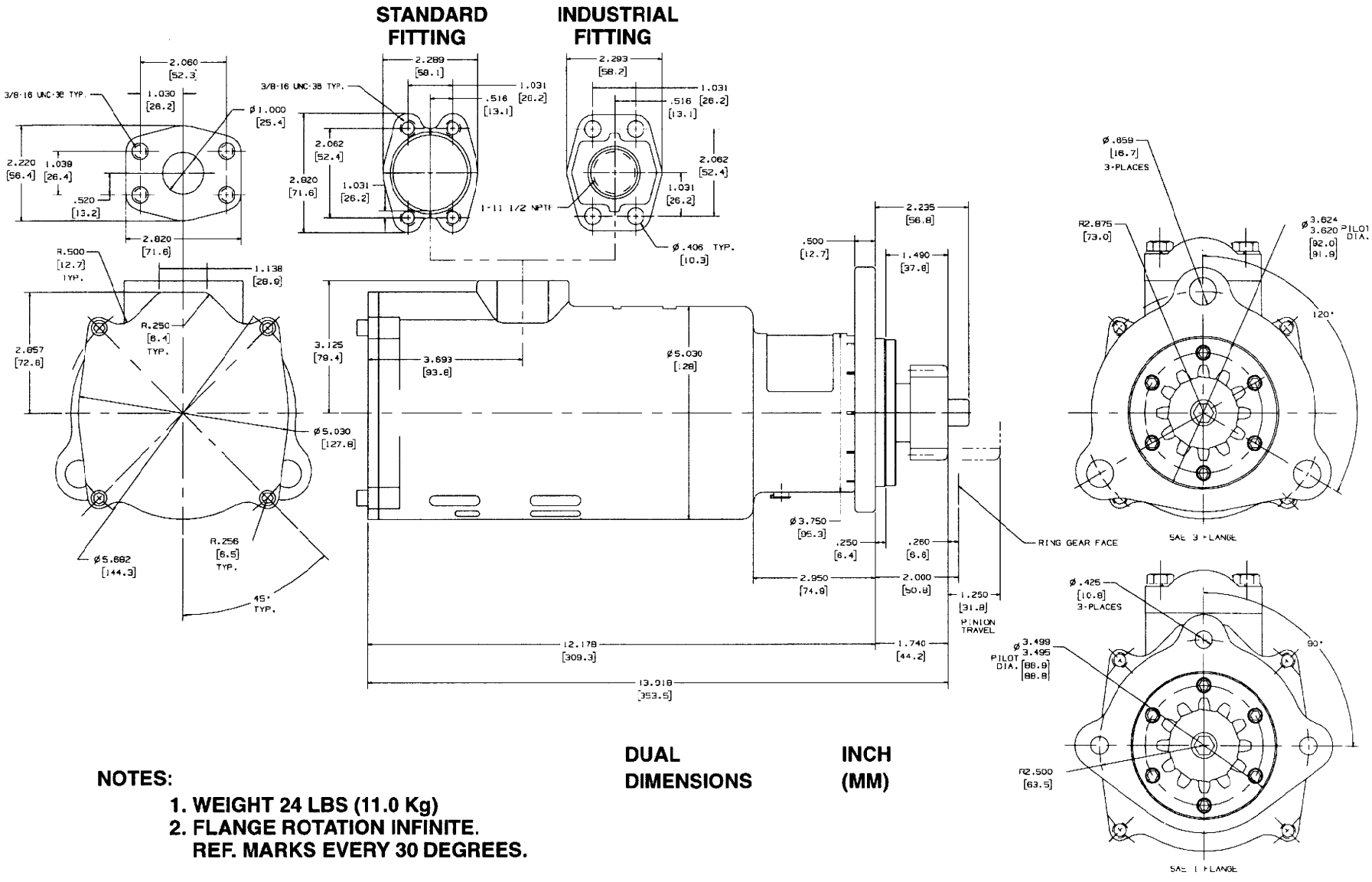
ST400 Installation Diagram – Manual



#	DESCRIPTION
1	STARTER
2	TANK
3	FITTING
4	FLANGE
5	HOSE
8	DIAPHRAGM VALVE
10	PUSH BUTTON VALVE
11	SOLENOID (OPTIONAL)
12	GAGE
13	CONNECTOR

(Dwg. TPB976)

ST400 Starter Dimensions



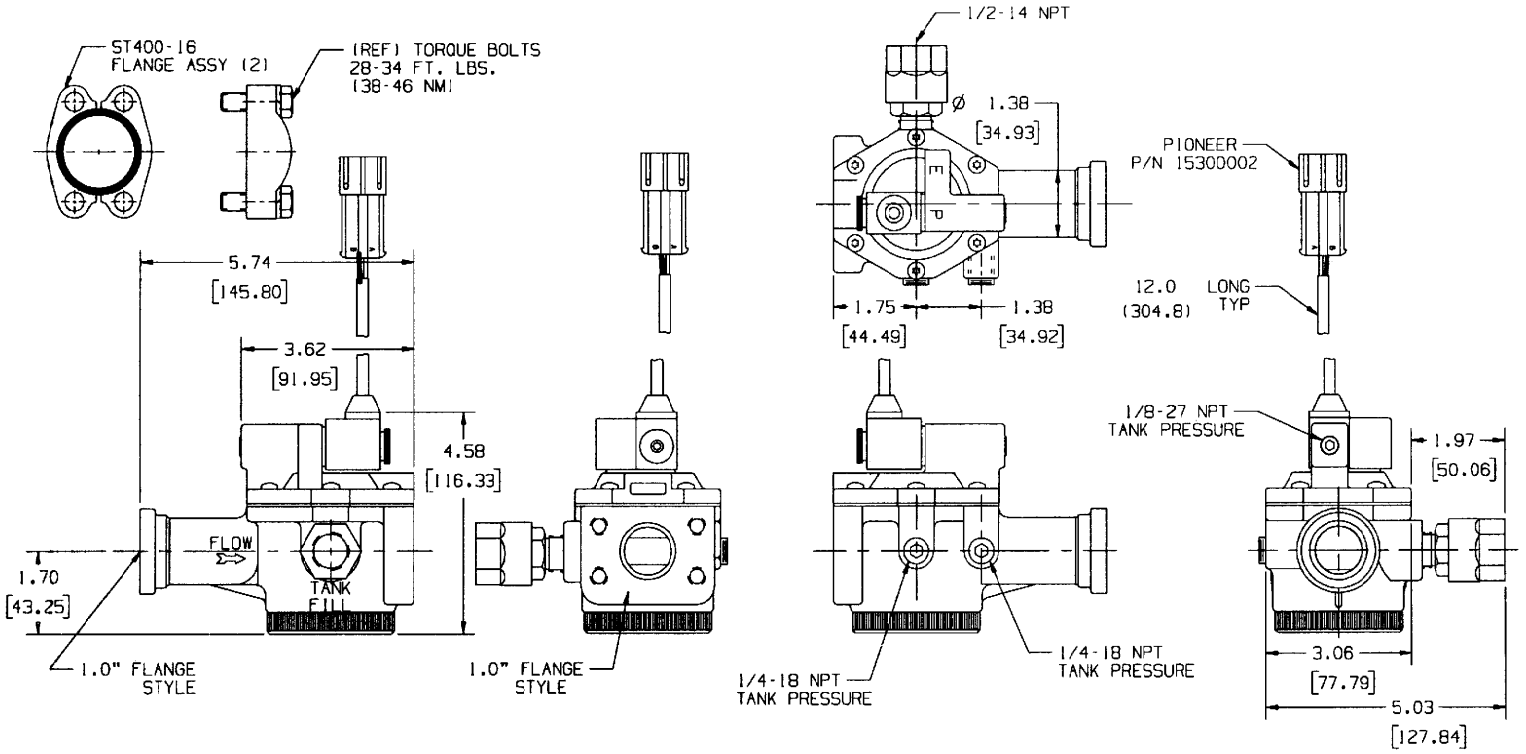
DUAL DIMENSIONS **INCH (MM)**

NOTES:

1. **WEIGHT 24 LBS (11.0 Kg)**
2. **FLANGE ROTATION INFINITE. REF. MARKS EVERY 30 DEGREES.**

(Dwg. TPA1400–1)

Electronic Valve ST400–B339



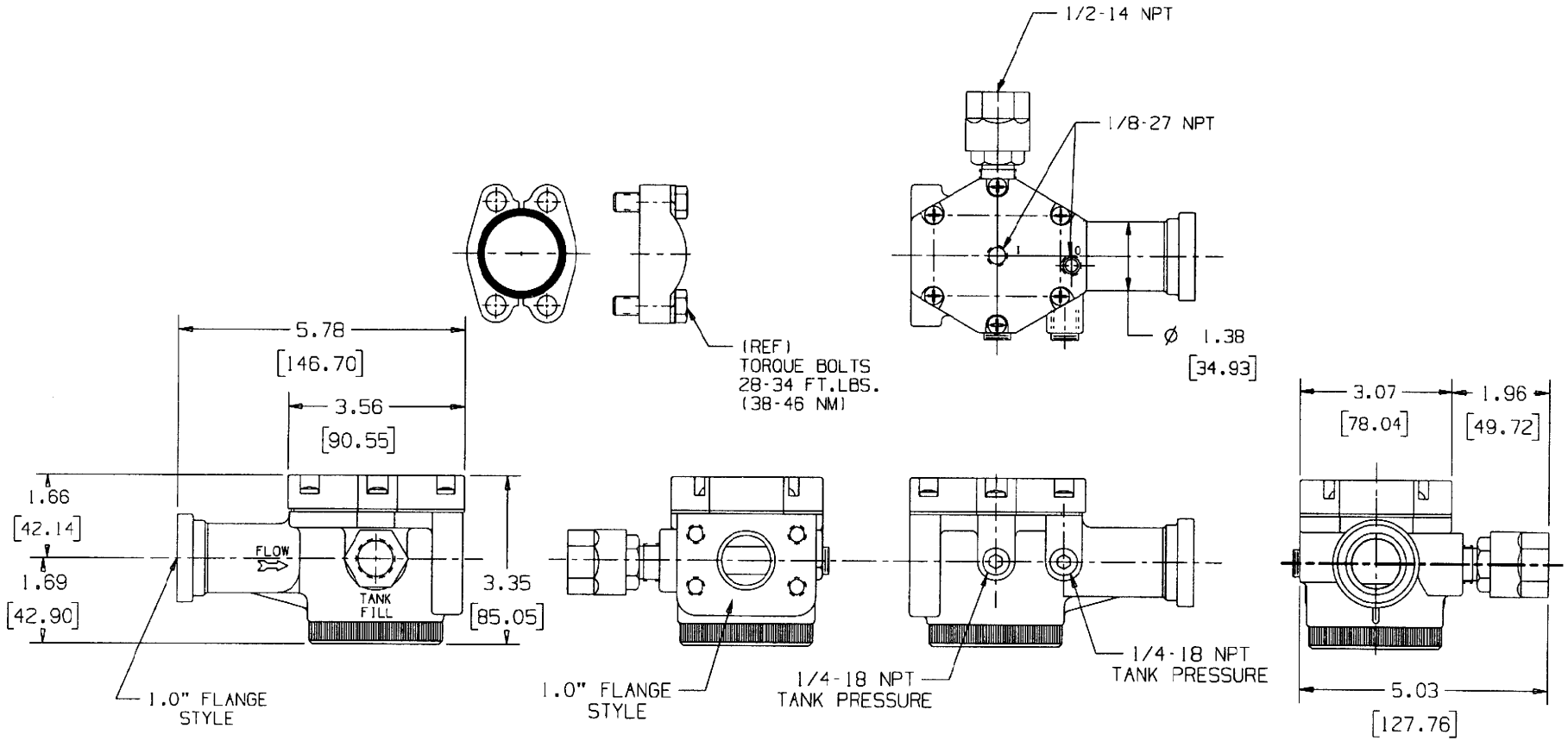
DUAL DIMENSIONS **INCH (MM)**

SPECIFICATIONS

1. **RATED OPERATING PRESSURE 150 PSIG.**
2. **RATED OPERATING VOLTAGE 12–24 VDC.**
3. **RATED CURRENT DRAW 750 mA.**

(Dwg. TPA1398–1)

Manual Valve ST400–A339M

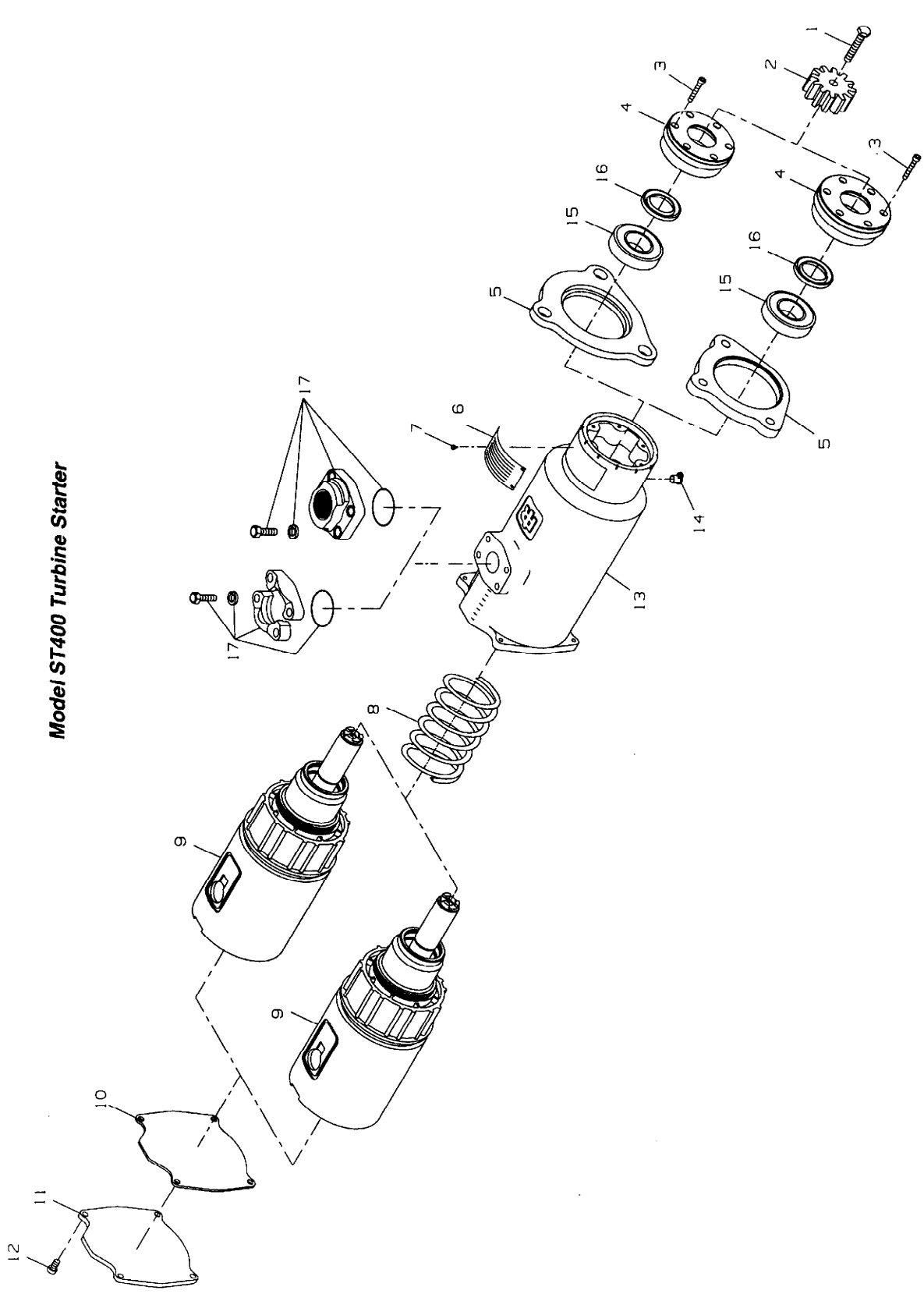


DUAL DIMENSIONS **INCH (MM)**

SPECIFCATION

1. RATED OPERATING PRESSURE 150 PSIG.

(Dwg. TPA1399–1)


Model ST400 Turbine Starter
(Dwg. TPA1374–1)
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		PART NUMBER FOR ORDERING
1	Drive Pinion Screw	SS350–394
2	Drive Pinion	
	for ST400CO1R15	ST400–13–15
	for ST400CO3R21	ST400–13–21
	for ST400CO3R29	ST400–13–29
	for ST400CO3R31	ST400–13–31
	for ST400CO3R071	04335055
	for ST400CO3R77	ST400–13–77
	for ST400CO3R79	04595799
	for ST400CO3R85	ST400–13–85
	for ST400CO3R91	04595807
	for ST400CO3R95	04334371
	for ST400CO3R832	04333969
	for ST400CO3R893	04332292
	for ST400CO3R895	SS350–13–895
	for ST400CO3L30	ST400–13–32
	for ST400CO3L32	ST400–13–32
	for ST400CO3L92	04334363
	for ST400CO3L101	04331724
	for ST400CO3L895	ST400–13–32
	for ST400CO3L942	04334389
	for ST400CO3L1448	SS175L–13–1448
3	Flange Cap Screws (6)	ST400–481
4	Flange Cover	
	for SAE 1 Flange	ST400–480–01
	for SAE 3 Flange	ST400–480–03
	for Cradle Mounting	04332334
5	Flange	
	SAE 1 Flange	ST400–300–01
	SAE 3 Flange	ST400–300–03
6	Nameplate	ST400–301
7	Nameplate Tack	ST400–100
8	Return Spring	ST400–700
9	Liner Assembly	
	Standard Arc Right Hand	ST400–A41R
	Standard Arc Left Hand	ST400–A41L
	55 % Arc Right Hand	ST455–A41R
	55 % Arc Left Hand	ST455–A41L
	Full Arc Right Hand	ST499–A41R
	Full Arc Left Hand	ST499–A41L
10	Housing Cover Gasket	ST400–283
11	Housing Cover	ST400–562
12	Housing Cover Bolts (4)	ST400–563
13	Housing	
	Aluminum	ST400–40
	Zinc	04595815
14	Vent Plug	ST400–546
15	Front Drive Shaft Bearing	ST400–363
16	Drive Housing Seal	ST400–271
17	Inlet Flange Assembly (includes Flange (2), Flange Mounting Bolts (4), Lock Washers (4) and O–ring)	ST400–16
	Starters with "I" in model number	ST400–K17

Always wear eye protection when performing any maintenance on this starter.

Always turn off the air supply and disconnect the air supply before installing, removing or adjusting any accessory on this starter or before performing any maintenance on this starter.

DISASSEMBLY

General Information

1. Do not disassemble the Starter any further than necessary to replace worn parts.
2. When grasping a part in a vise, always use leather–covered or copper–covered vise jaws to protect the surface of the part and help prevent distortion. This is particularly true of threaded members.
3. Do not remove any part which is a press fit in or on a subassembly unless the removal of that part is necessary for replacement or repairs.
4. Always have a complete set of seals and O–rings on hand before starting any overhaul of a Model ST400 Starter. Never reuse old seals or gaskets.
5. When disassembling, always mark adjacent parts so the members can be located in the same relative position when the starter is reassembled.
6. Never wash the Liner Assembly (8) in a solvent.

Disassembly of the Starter

1. Remove the Drive Pinion Screw (1) from the drive shaft and remove the Drive Pinion (2).
2. Remove the six Flange Cap Screws (3) from the Housing (13).
3. Remove the Flange Cover (4) and Flange (5) simultaneously by pulling up on the Flange.
4. Remove the Front Drive Shaft Bearing (15) from the Flange Cover.
5. Remove the Drive Housing Seal (16) from the Flange Cover.
6. Turn the starter over and secure it vertically in a fixture.

NOTICE

Use care when removing the Housing Cover Bolts (12) holding the Housing Cover (11) to the starter. The Liner (9) is spring loaded and will protrude approximately one inch beyond the Housing when released.

7. To remove the Housing Cover (11), slowly loosen the four Housing Cover Bolts (12) while holding the Housing Cover (11) in place.
8. Slide the Liner Assembly (9) out of the Housing.
9. Remove the Return Spring (8)

ASSEMBLY

General Instructions

1. Always press on the **inner** ring of a ball–type bearing when installing the bearing on a shaft.
2. Always press on the **outer** ring of a ball–type bearing when pressing the bearing into a bearing recess.
3. Whenever grasping a starter or part in a vise, always use leather–covered or copper–covered vise jaws. Take extra care with threaded parts or housings.

Assembly of the Starter

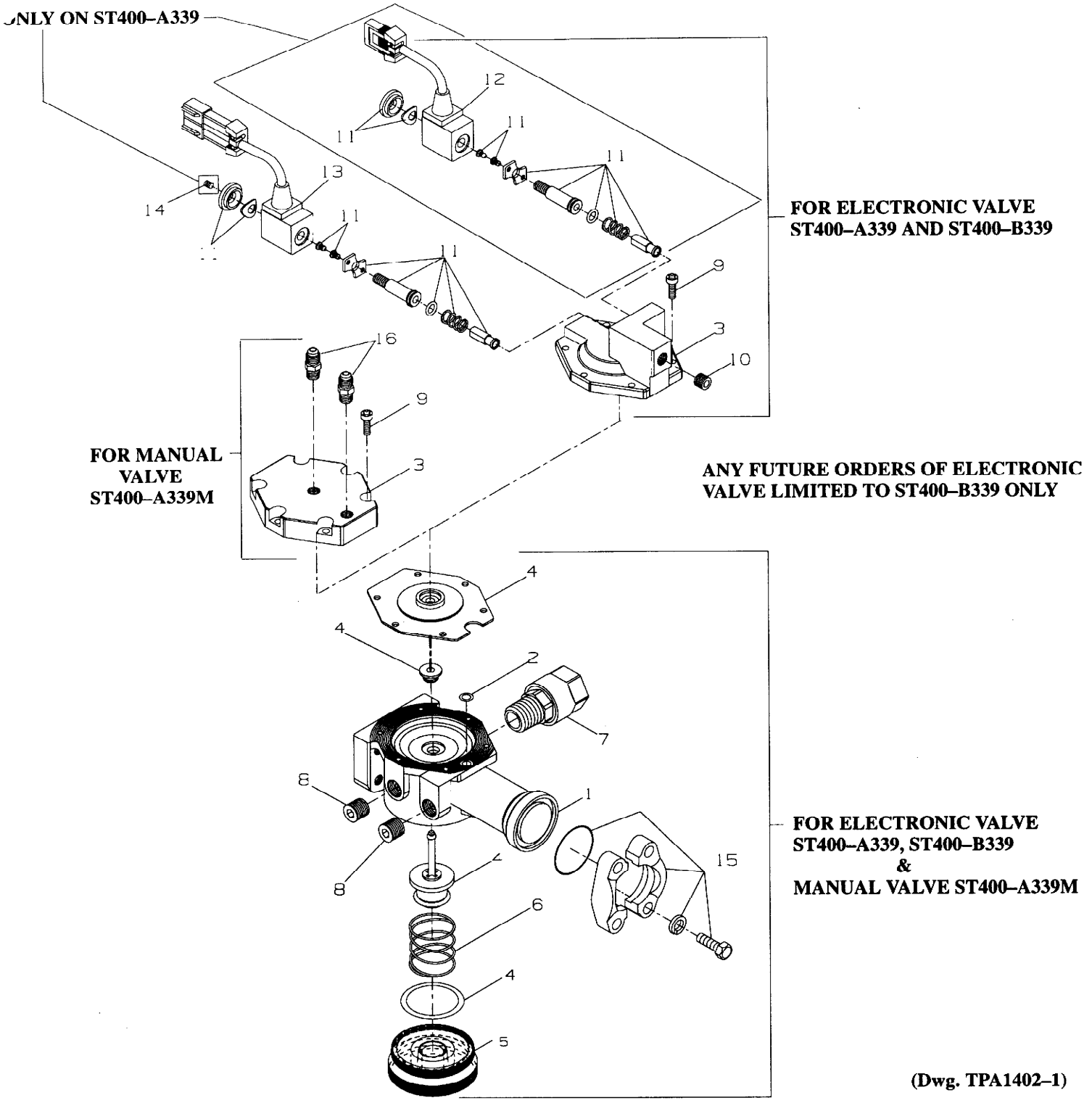
1. Place the Housing (13), front end down so that the Return Spring (8) can be placed into the Housing.
2. Slide the Liner Assembly (9) into the Housing. Orient the Liner so that the notch aligns correctly with the Housing inlet port and Liner air inlet port aligns with the Housing air inlet port. Attach Housing Cover Gasket (10) to Housing Cover.
3. Attach the Housing Cover (11) to the Housing with just one Housing Cover Bolt (12). Engage only a few threads so that the Housing Cover can be easily rotated.
4. While pushing the Liner Assembly down against the Return Spring, rotate the Housing Cover over the Liner to hold it down.
5. Tighten the Housing Cover Cap Screws to 5–6 ft–lb (6.7–8 Nm) torque.
6. Press the Drive Housing Seal (16) into the Flange Cover (4) with the sealing lip pointed down.
7. Press the Front Drive Shaft Bearing (15) into the Flange Cover.
8. Fit the Flange (5) onto the Flange Cover so that the counterbore of the Flange slides over the shoulder of the Flange Cover correctly.
9. Carefully slide this assembly over the drive shaft. Be careful not to tear the Seal lip. Orient the Flange correctly.
10. Tighten the six Flange Cap Screws (3) to 3–4 ft–lb (4–5.4 Nm) torque and apply Loctite.
11. Attach the Drive Pinion (2) to the drive shaft using the Drive Pinion Cap Screw (1) and tighten to 53–58 ft–lb (72–79 Nm) torque and apply loctite.

TEST AND INSPECTION PROCEDURE

⚠ WARNING

When 90 psig air pressure is applied to the starter, the Drive Pinion will be rotating at 2,800 rpm and Drive Shaft and Drive Pinion will move forward 1.25". Keep face and hands away from rotating Drive Pinion.

1. **Orientation:** Mounting Flange must be oriented per the customer's order or engineering drawing. If orientation is not specified by customer, standard orientation will be supplied.
2. **Free Speed (All Models):** Install Starter on a test fixture. Apply 90 psig to the starter motor. Minimum free speed is 2,800 RPM.
3. **Confirm Overrunning of Clutch:** Turn the Drive Pinion by hand in the direction of rotation. The clutch should ratchet smoothly.
4. **Confirm Drive Rotation:** Turn the Drive Pinion by hand in the direction opposite of rotation. The clutch should not ratchet.


ONLY ON ST400–A339
FOR ELECTRONIC VALVE ST400–A339 AND ST400–B339
FOR MANUAL VALVE ST400–A339M
ANY FUTURE ORDERS OF ELECTRONIC VALVE LIMITED TO ST400–B339 ONLY
FOR ELECTRONIC VALVE ST400–A339, ST400–B339 & MANUAL VALVE ST400–A339M
(Dwg. TPA1402–1)

		PART NUMBER FOR ORDERING
1	Valve Housing	ST400–339
2	O–ring	Y325–010
3	Housing Cover	
	for Electronic Valve	ST400–338
	for Manual Valve	ST400–338M
4	Valve Kit (includes O–ring, Plunger and Pin Assembly, Grommet Seal and Diaphragm Assembly)	ST400–K619
5	Cap	ST400–616A
6	Spring	ST400–615A
7	Check Valve	ST400–1056
8	Plug (2)	HSPPS–2
9	Cover Screws (6)	Y222–156–C
10	Plug (for Electronic Valve)	ST400–29
11	Solenoid Kit (for Electronic Valve) [includes Screw (2), Armature Assembly (1), Wave Washer (1), Nut (1) and Face Plate (1)]	119314
12	Coil (exhaust) (for Electronic Valve)	ST400–950E
13	Coil (pressure) (for Electronic Valve)	ST400–950P
14	Set Screw (for Electronic Valve)	Y23–102
15	Flange Assembly (includes Inlet Flange (2 halves), Flange Mounting Bolts (4), Lock Washers (4) and O–ring)	ST400–16
16	Male Connector (2)	ST400–52

TEST AND INSPECTION PROCEDURE

VALVE

Solenoids: Using a solenoid tester, apply 9 VDC minimum to 24 VDC maximum (+ or – .5 volts) to Solenoid. The Solenoid should activate the Armature with a minimum 9 volt charge and a "clicking" sound indicates that the Solenoid is functioning properly. Follow this procedure for both the Exhaust Solenoid and the Pressure Solenoid.

MAINTENANCE SECTION

Always wear eye protection when performing any maintenance on this valve.

Always turn off the air and electrical supply and disconnect the air and electrical supply before installing or removing any component on this valve, before making any adjustments on this valve or before performing any maintenance on this valve.

DISASSEMBLY

General Information

1. Do not disassemble the valve any further than necessary to replace worn parts.
2. When grasping a part in a vise, always use leather–covered or copper–covered vise jaws to protect the surface of the part and help prevent distortion. This is particularly true of threaded members.
3. Do not remove any part which is a press fit in or on a subassembly unless the removal of that part is necessary for replacement or repairs.
4. Always have a complete set of seals and O–rings on hand before starting any overhaul of the valve. Never reuse old seals or gaskets.

Disassembly of the Valve

1. **For Electronic Valve,** remove the Retaining Nuts (11) and Wave Washers (11) from the Armatures (11). Slide the Exhaust Coil (12) and Pressure Coil (13) off of the Armatures.
2. Unscrew the Check Valve (7) from the Valve Housing (1). Remove Plugs (8) from the Valve Assembly.
3. **For Electronic Valve,** unscrew the Set Screw (14) from the inside end of the Pressure Armature which is in the Pressure Coil (13).
4. **For the Electronic Valve,** remove the Armatures by unscrewing the two Screws (11) and lifting Face Plate.

NOTICE

The Armature is lightly spring loaded.

5. Remove the six Cover Screws (9) from the Cover and Valve Housing. Remove the Housing Cover (3) from the Valve Assembly.
6. Remove the Diaphragm (4) from the Valve Housing and the O–ring (2) from the pocket in the Valve Housing.
7. Unscrew the Cap (5) from the Valve Housing. Remove the O–ring (4) from the Cap. The Spring (6) and Plunger should come out with the Cap. If not, remove them from the Valve Housing.
8. Remove the Grommet (4) from the Valve Housing.

* Registered trademark of Mobil Oil Co.

ASSEMBLY

General Instructions

1. Whenever grasping a valve or part in a vise, always use leather–covered or copper–covered vise jaws. Take extra care with threaded parts or housings.
2. Apply a film of o–ring lubricant to all O–rings before final assembly.

Assembly of the Valve

1. Insert the rounded end of the Grommet (4) in the top of the Valve Housing (1) through the valve body hole. The top can be identified by the concentric raised rings.
2. Lubricate the O–rings on the Valve Stem (4) and Plunger (4) with Mobolith®* II. Push this assembly through the Grommet from the bottom of the Valve so that the Plunger seals on the valve seat.
3. Turn the Valve Housing over and place the Spring (6) on the Plunger with the smaller diameter of the Spring leading.
4. Place the large O–ring (40) on the Cap (5). Guide the Spring and Plunger into the Cap while screwing the Cap into the Valve Housing. Tighten the Cap until it seats snugly against the Valve Housing.
5. Place the O–ring (2) into the pocket of the Valve Housing.
6. Place the Diaphragm (4) on the Valve Housing, making sure that the punched hole of the Diaphragm is aligned over the O–ring and that the plastic disk of the Diaphragm is up.
7. Set the Housing Cover on the Valve Body so that the O–ring shoulder fits into the diaphragm hole.
8. Attach the six Cover Screws (9) through the Cover and Diaphragm and into the Housing. Alternately tighten the Screws to 45–55 in – lb (5.1 – 6.2 Nm) torque. Screw the Check Valve (7) into the Valve Body to 40–50 ft/lbs (54–67Nm).
9. **For Electronic Valve,** attach the Armature Assembly (11) to the Valve by placing the Plunger into the armature case so that the rubber face is visible. Slide the Armature Flange Plate (11) over the armature case and attach this assembly to the Cover using the two Screws (11). Tighten to 5–6 in–lb (.56–.67 Nm) torque. Repeat this procedure for the other armature assembly.
10. **For Electronic Valve**, screw the Plugs (8) into the Valve Housing.
11. **For the Electronic Valve,** slide the Pressure Coil (13) onto the Armature at the "P" marking on the Valve Housing. Slide the Wave Washer onto the same armature. Screw on the Retaining Nut and tighten. Repeat the above procedure to install the Exhaust Coil (12) on armature at the "E" marking. Apply IR #160 Grease to the exterior of the armature (11).

ST400 PHOENIX SYSTEM
ANNUAL PM CHECKLIST

*VISUALLY INSPECT SYSTEM FOR DEFECTS
(i.e. TANK, HOSE, FLANGES)._____

*VISUALLY INSPECT THE SOLENOID CONNECTIONS ON THE ST400–B339. IF NECESSARY, CLEAN AND RE–COAT WITH A CONDUCTIVE SEALANT TO PROMOTE POSITIVE CONTACT. (COMPOUND RECOMMENDED IS A TRUCK–LITE BRAND NYK–77)._____

*REMOVE TWIST–OFF CAP ON THE ST400–B339 CONTROL VALVE. IF NECESSARY, REPLACE WITH A VALVE TUNE–UP KIT IR PART NUMBER ST400–K619 AND LUBE PLUNGER._____

*TORQUE PINION CAP SCREW TO 53–58 ft–lb (72–79 Nm) – _____

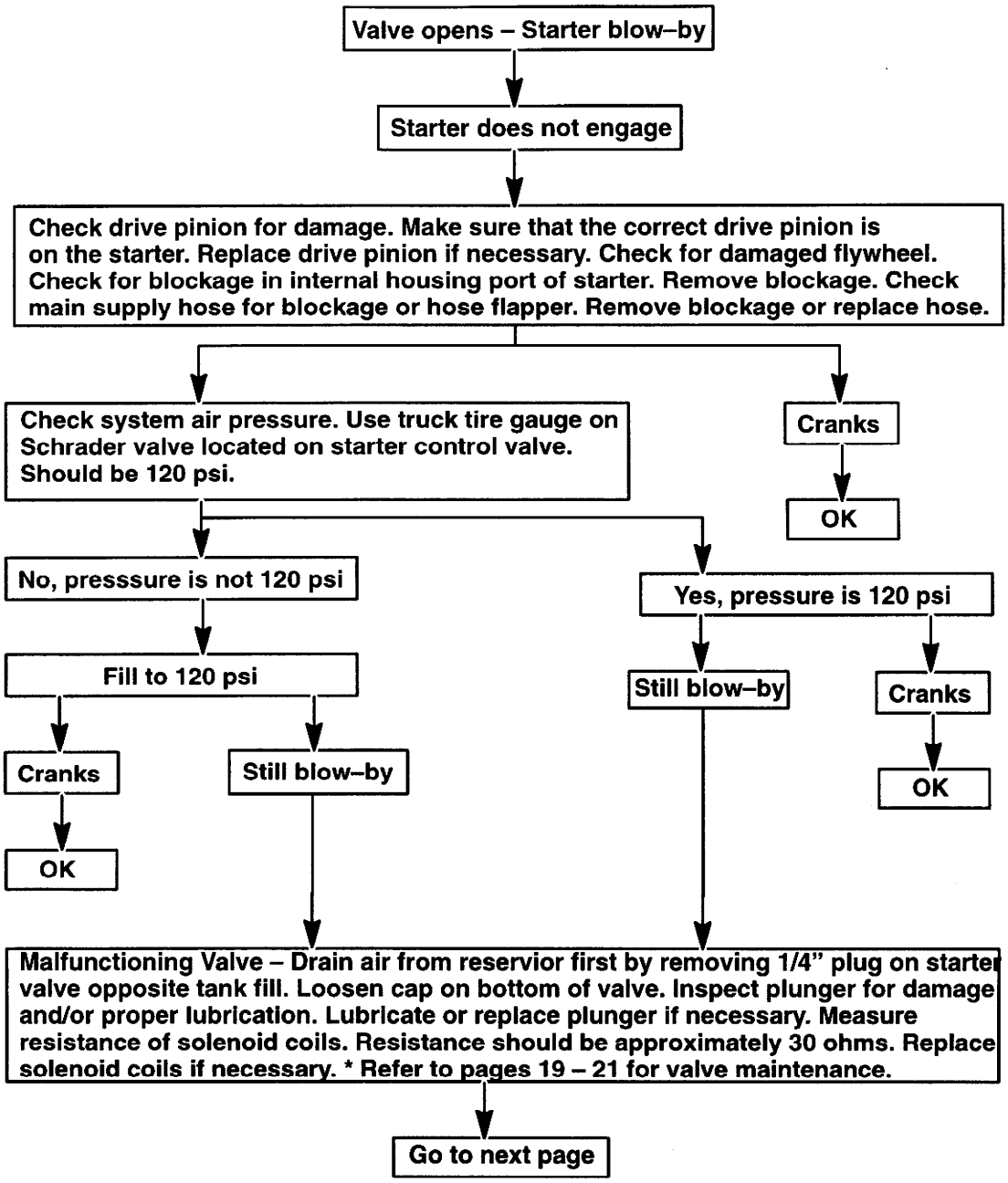
*TORQUE INLET FLANGE BOLTS TO 28–35 ft–lb (38–47 Nm) – _____

NOTE: THE OPTIMAL PERIOD TO PERFORM A PHOENIX SYSTEM PREVENTATIVE MAINTENANCE SCHEDULE IS IN THE FALL SEASON.

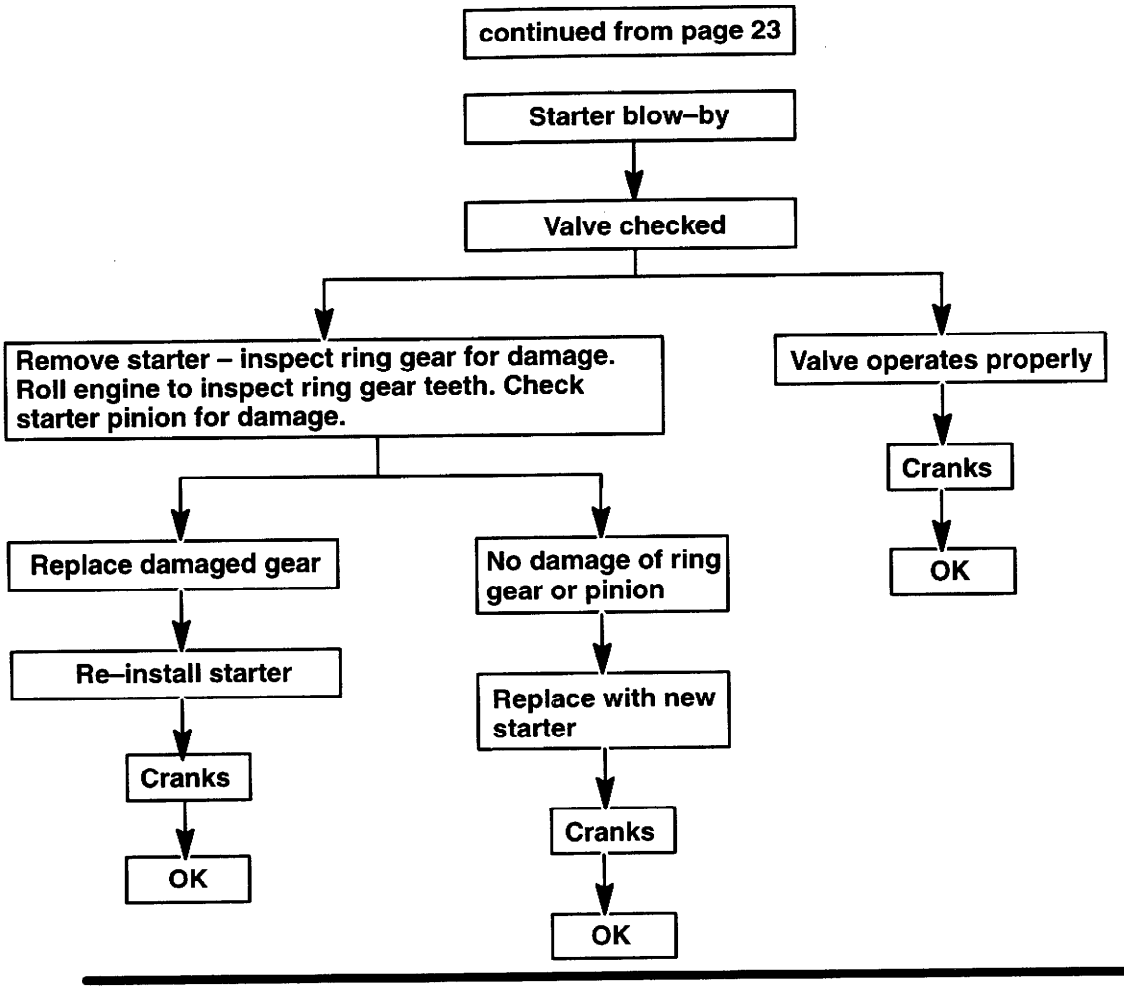
DATE COMPLETED: _____

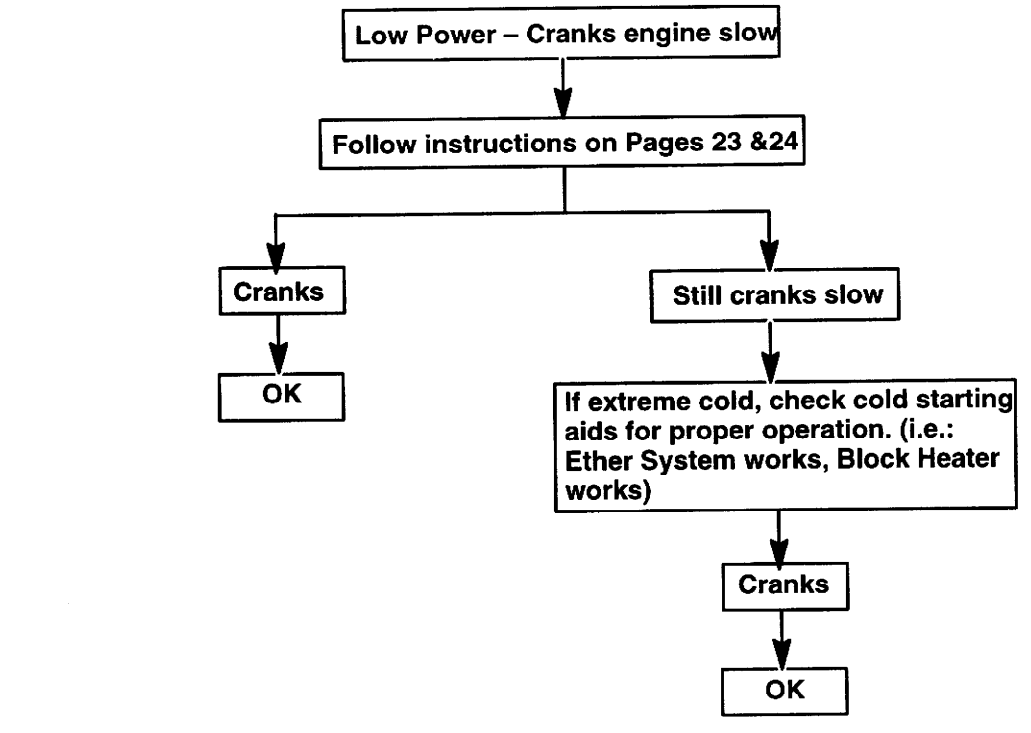
MECHANICS SIGNATURE: _____

Air Starter System Diagnosis
ST400 Phoenix Starter

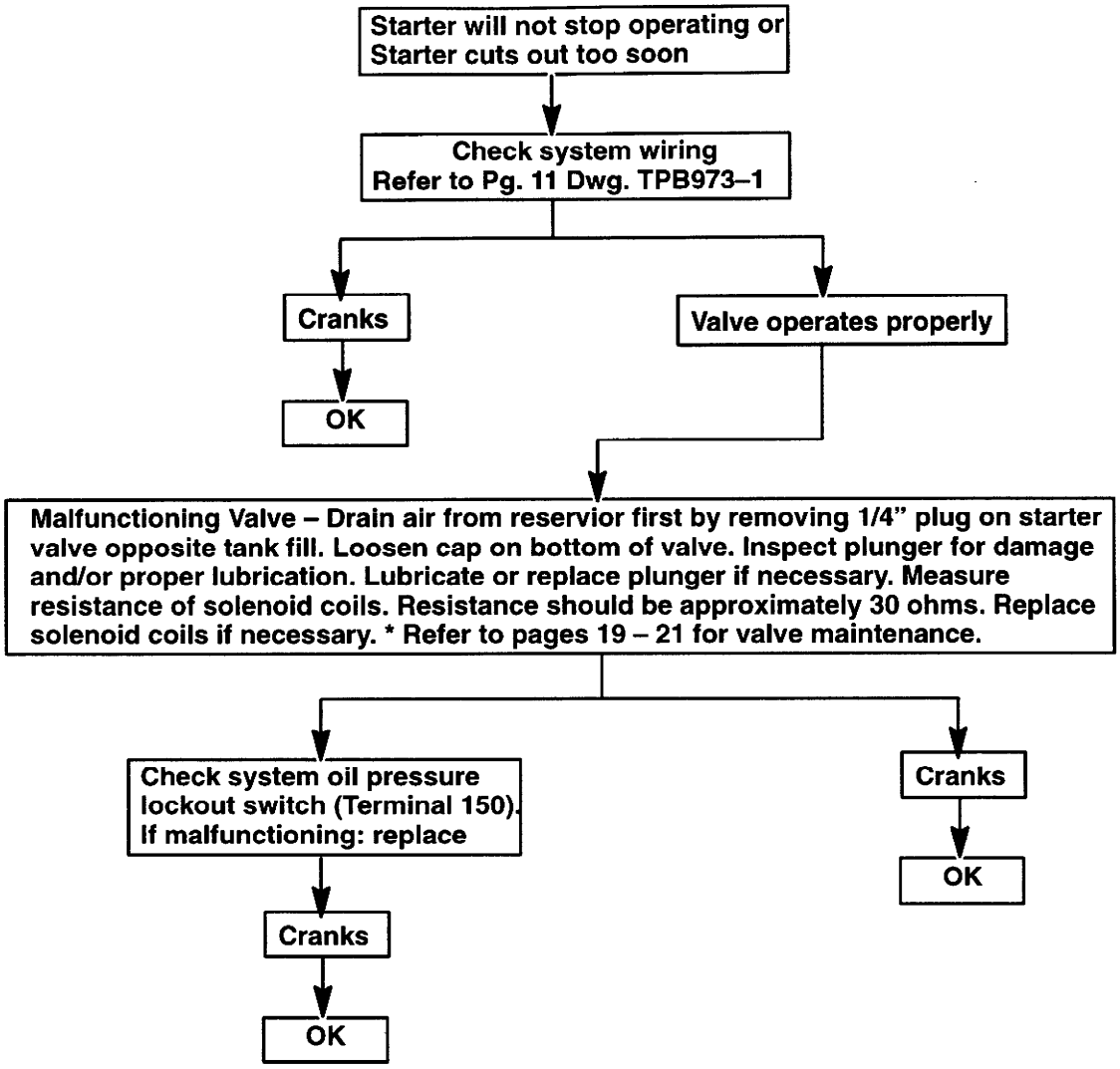


Air Starter System Diagnosis
ST400 Phoenix Starter





Air Starter System Diagnosis
ST400 Phoenix Starter



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