



ENGINEERED FOR LIFE

ITT Engineered Valves, LLC

33 CENTERVILLE ROAD
LANCASTER, PA 17603-2064

TEL: (717) 509-2200

FAX: (717) 509-2336

www.engvalves.com

INSTALLATION, OPERATION AND MAINTENANCE INSTRUCTIONS

MODEL T2005 & T2006

SKOTCH[®] TRIFECTA[®] OIL VALVE SYSTEMS

WARNING

Valves and valve actuators supplied by ITT Engineered Valves, LLC are designed and manufactured using good workmanship and materials, and they meet the applicable industry standards. These valves are available with components of various materials, and they should be used only in services recommended herein or by a company valve engineer. Misapplication of the product may result in injuries or property damage. A selection of valve components of the proper material consistent with the particular performance requirement, is important for proper application.

Examples of the misapplication or misuse of a valve or valve actuator includes use in an application that exceeds the pressure/temperature rating, or failure to maintain the equipment as recommended.

Record of Revisions

Revision	Description	Date
-	First Issue	09/10/99
A	Revised format and text	08/31/18

TABLE OF CONTENTS

SECTION		PAGE
I.	Description	4
II.	Operation	5
III.	Installation	7
IV.	Maintenance & Disassembly Instructions	10
V.	Leak Testing	18
VI.	Proof of Closure Switch Testing	19
VII.	Miscellaneous Instructions for Special Options	21
VIII.	Spare Parts Ordering Information	21
IX.	Reference Information	21

DRAWINGS

03-005	Valve Assembly - Model T2000 Systems
117480	Valve and Actuator Assembly - Model T2000 Systems
117485	Pneumatic Schematic - Fail in Last Position
117486	Pneumatic Schematic - Fail Closed
60-003	Electrical Schematic - Fail in Last Position
60-004	Electrical Schematic - Fail in Closed Position
60-008	Wiring Diagram - AC Solenoids
60-009	Wiring Diagram - DC Solenoids

I. DESCRIPTION

The Model T2005 and T2006 Oil Valves are an integral valve system with all components housed within a single valve body. It is typically used on all oil-fired burners where mechanically atomization is required. The Scotch Trifecta's unique two-stem three-seat design enables it to perform all key functions, including fuel sequencing and purging of downstream piping by providing three distinct valve positions.

1. Closed - Both oil and purge media off
2. Fire - Oil flowing while purge is off
3. Purge - Purge media flowing while oil flow is off

The Model T2005 valve system, which is the Fail-in-Last Position model, utilizes a pair of dual coil momentary contact pilot solenoids for pneumatic operation and requires compressed air and electric power to open and close. The system fails in the last position on loss of pneumatic or electric power. It will not hold this position indefinitely if air is lost.

The Model T2006 valve system, which is the Fail Closed model, utilizes a pair of single coil maintain contact spring return pilot solenoids for pneumatic operation and requires compressed air and electric power to open. The system closes on a loss of pneumatic or electric power.

A single Scotch oil valve is typically installed in place of a multiple valve arrangement.

Consult order specification for detailed specifications of equipment supplied on each project.

II. OPERATION

Refer to Purchase Order Specification or solenoid valve assembly nameplate to determine proper line voltage. Operation is in accordance with reference drawings.

Check specific order options and wiring diagrams (60-008 for AC voltage or 60-009 for DC voltage) for electrical terminals supplied inside the junction box.

A. *Closed: Oil Flow Off and Purge Flow Off*

In this position the main valve plug is held against the main seat by the actuator return spring, blocking flow of the purge media. The oil valve plug is held in the oil seat by the oil valve return spring, blocking oil flow. The oil valve proof of closure (POC) switch is made. The valve closed limit switch is actuated and the valve open limit switch is deactuated.

Model T2005: Energizing both the fire and purge exhaust solenoids coils moves the system to the closed position.

Model T2006: De-energizing both the fire and purge solenoids moves the system to the closed position.

B. *Fire: Oil Flowing and Purge Off*

Pressurizing the Actuator's Fire cylinder causes the main stem to move downward towards the oil stem. As the main stem contacts the oil stem, it forces the oil plug out of its seat ring initiating oil flow while simultaneously seating in the purge seat. Prior to any oil flowing, the oil valve POC switch changes contact states. The valve open and close limit switches change states from the valve closed position (Valve open actuated & valve closed deactuated).

Model T2005: Energizing the fire solenoid coil moves the system to the Fire position.

Model T2006: Energizing the fire solenoid causes the valve to go to the Fire position.

Operational Note: While in the Fire position there is an operational advantage in leaving the Purge solenoid energized while in Fire. In this scenario both actuator cylinders will be pressurized. Doing so will prevent the valve from traveling back to the Closed position causing a momentary loss in Purge pressure. This will help in ensuring the burner flame stays lit as the oil valve closes and the slug of oil remaining in the down stream piping of the valve is evacuated by the purge media. Maintaining a constant pressure on this slug of oil will ensure it is burned completely. If the Purge cylinder was not energized with the Fire cylinder the main valve would close and then open back up for Purge. This will cause a momentary drop in purge pressure causing the flame to suck back or possibly extinguish before the remaining slug of oil is evacuated.

C. *Purge: Purge Media Flowing and Oil Off*

Energizing only the purge solenoid moves the main stem to the purge position. In this position the main plug is positioned between, but not in contact with the main and purge seats. Accordingly, the main stem is not in contact with the oil plug, therefore the oil valve remains in the closed position. The purge media flows from the oil outlet, purging or clearing any oil which, remains in the downstream oil piping. There is no oil flow in the purge position and the oil valve POC switch is made. Both the valve open and valve closed limit switches are deactivated.

D. *Notes*

Some installations may require tip warm up prior to light-off. This can be accomplished by commanding the valve to "Purge" for a period of time before commanding to "Fire". Purge steam then passes down the fuel line, warming up the tip in preparation for ignition. Due to the stacked tandem cylinder design of the actuator, when both "Fire" and "Purge" solenoids are energized, the "Fire" command will override and the assembly will shift to the full open or "Fire" position. The Fire Solenoid must be de-energized for the valve to move to the purge position.

Assemblies may include a speed control block (black in color) which is located between the Fire solenoid body (red anodize) and the manifold adapter (gold anodize). This is used to slow opening time of the assembly when moving to the "Fire" position. It has no impact on closing time. Factory setting prior to shipment is full open. Speed adjustments are made using a small flat blade screwdriver. The adjustment screw is located on the top end surface of the plate.

Model T2005: Solenoid operated pilot valves are momentary contact type. As such, upon loss of pneumatic supply pressure or electrical power, the system will hold last position for some period of time.

Model T2006: Solenoid operated pilot valves are maintained contact spring return type. As such, upon loss of pneumatic supply pressure or electrical power, the system will fail in the closed position.

III. INSTALLATION

WARNING

Prior to installation and/or start-up, inlet piping should be verified as being free of dirt, grit, welding slag, or other particulate contamination. Failure to do so may result in damage to valve internals.

A. Unpacking

Do not remove protective plugs from valve and solenoid until ready to install.

If plastic protective caps are missing, verify no debris or foreign objects are inside valve.

Transporting - Use proper hoisting procedures to avoid damage to valve. Do not lift by conduit, switches, etc.

Purge all air lines prior to connecting solenoids.

B. Valve Installation

The oil valve installation should be in accordance with standard practices for end connection selected. Valves with weld end connections are supplied with end connections of sufficient length to prevent thermal damage to valve internals. As a safety precaution, methods to thermally block the transfer of heat to the valve body should be employed during welding. ***The end connections should not be modified to a shorter length.*** The weight of the valve must be properly supported to prevent excessive piping stresses. The valve may be installed in any position, but the ***actuator should be supported when the valve is installed horizontally.*** ***Adequate clearance should be provided for valve maintenance and repair.***

CAUTION

Valve must be installed in proper flow direction, per valve flow tag. Improper installation will result in fuel contamination of purge piping, and improper valve operation.

CAUTION

Ensure piping upstream of fuel inlet DOES NOT include a check valve since this will cause hydraulic locking of the oil valve in the closed position.

C. Pneumatic/Electrical Hook Up

Electrical power and clean dry air are required to operate the T2005 & T2006 oil valve systems. Wiring should be in accordance with referenced drawings and all applicable codes. All wiring connections are on the main terminal board located inside the Junction Box. Supply air is to be connected to Solenoid Assembly manifold block (See Drawings 117485 & 117486). Pneumatic supply air should be clean, dry and between 70 to 120 PSIG (482.3 - 826.8 KPa) at all times. It is important for proper valve performance that this pressure is available at the valve at all times. Historically, many field problems can be associated with inadequate pneumatic supply requirements or contamination.

Warning

Make certain electrical supply is isolated and tagged out before proceeding with electrical connections.

Note: *Some assemblies may include a preset filter regulator installed in supply piping.*

Use suitable thread sealing compound for pneumatic connection. Do not use PTFE tape.

The exhaust side of the solenoid should not be restricted, as this will slow down the closing rate of the valve.

D. Start-Up

When valve is placed in service, stroke the main stem and oil stem two or three times (Fire cycles) and then check for packing leaks. If leakage is present, tighten adjusting nut 1/8 turn, stroke valve several times to ensure proper setting of packing and recheck. Repeat until leakage is stopped. This should occur before nut is completely tight. If leakage is present when nut is completely tight, packing must be replaced and the stem inspected for wear. Refer to instructions in Section V.

CAUTION

DO NOT OVER-TIGHTEN PACKING. Over-tightened packing may cause excessive stem friction, inhibiting stem movement.

IV. MAINTENANCE AND DISASSEMBLY INSTRUCTIONS**A. Maintenance**

The Scotch Trifecta Valve Systems requires periodic maintenance and adjustments in order to function properly. The following is a list of items which, must be inspected on a regular basis.

1. Testing Oil Valve Seal

Periodic leak testing should be performed per all applicable codes to verify proper operation of oil valve seal. See Section V for leak testing procedures.

2. POC Verification

Periodic testing should be performed per all applicable codes to verify proper operation of the oil valve POC switch. See Section VI for POC switch setting procedures.

3. Packing Inspection

Both the oil valve and the purge packing should be inspected regularly for leakage. If any leakage is noted the packing should be adjusted until the leakage has stopped. See Section III.D for instructions.

4. Pneumatic System Leaks

The pneumatic system (fittings, solenoid, actuator, etc.) should be inspected regularly for leakage or other damage. Any leakage or damage must be repaired or replaced immediately.

5. Body to End Flange Joint Inspection

Body end flange joints should be inspected regularly for leakage. Any leakage should be repaired immediately. See following Section for instructions.

CAUTION

Failure to repair the steam side end flange joint on steam purged systems may result in steam cutting of valve body, end flange assembly or both. This may result in serious damage to the valve.

B. Disassembly

All T2000 series Scotch Trifecta Valve Systems may be disassembled without removal from piping. It is recommended the work area be as clean as possible. Ensure all manual isolation valves are closed and tagged out, all electrical circuits are de-energized and isolate the pneumatic supply. BE SAFE!

The following instructions describe how to fully disassemble the valve system. Individual corrective tasks may not require complete disassembly. The user should judge what steps are appropriate for each task.

Special tools are needed to remove the valve seats. The following tools are available:

ITT P/N: 44425, T1000/T2000 seat ring tool. This tool will remove all three seats (main, purge and oil) from the oil valve body and is needed when servicing the purge side of the valve.

NOTE: Customers that do not feel comfortable with rebuilding and testing Skotch valves can have them rebuilt by the factory. Call the number located on the front cover or (800) 366-1111 and ask to speak to Skotch, Customer Service for quotation and instructions.

1. Actuator Removal

Note: *Pneumatic supply pressure is required for actuator removal.*

CAUTION

Valve system MUST be stroked to purge position prior to decoupling stem connector for actuator removal. Failure to do so may result in damage to upper seat ring and/or main stem subassembly.

Commence actuator removal by removing the Junction Box and Solenoid Manifold Adapter Block from the actuator. Allow components to hang by the conduit. Remove the screws securing the Yoke Lens to the Yoke. Loosen Set Screw in the Stem Connector. Loosen Stem Connector Jam Nut. Stroke system to "Purge" in accordance with operating instructions (Paragraph II.C). Unscrew Stem Connector from Actuator Output Shaft. After 6-7 turns, stroke system to "Closed" (Paragraph II.A) and continue to unscrew Stem Connector. Remove the four hex nuts holding the Actuator to the Yoke. Lift Actuator off of valve, being careful not to hit Valve Stem. The Yoke Box can be removed by removing the Yoke Lock Nut from the valve End Flange.

2. Purge Valve Disassembly

After completing Paragraph IV.B.1, unscrew Socket Head Cap Screws (Item 6) which retain End Flange (Item 2) to Body (Item 1). Remove End Flange and Body Gasket (Item 7). Be sure to thoroughly clean mating gasket surface, but do not damage it. Insert Seat Ring Wrench (P/N: 44425) into lugs on Upper Seat Ring (Item 9). Unscrew and remove Seat Ring (Item 9), Seat Ring Gasket (Item 21), and Main Stem (Item 8). Insert other end of wrench into holes in Purge Seat Ring (Item 10) and remove.

3. Oil Valve Disassembly

Remove Hex Nuts (Item 29) holding Limit Switch Box (Item 13) to End Flange (Item 39). Note: These two nuts must be removed uniformly. Remove Limit Switch Box (Item 13) and Oil Valve Return Spring (Item 19). Loosen Set Screw (Item 18) and unscrew Spring Seat (Item 17) from Oil Stem (Item 12). Remove the Socket Head Cap Screws (Item 6) securing End Flange (Item 39) to Body (Item 1), then remove End Flange (Item 39), Oil Stem (Item 12) and Body Gasket (Item 7). Insert Seat Ring Wrench in lugs of Oil Seat Ring (Item 11), and remove Oil Seat Ring and Seat Ring Gasket (Item 21).

CAUTION

To properly unload the Oil Valve Return Spring, make certain the nuts (Item 29) unthread from the studs. A hex wrench can be used to keep the studs from rotating.

4. Packing Removal

After removing end flanges in Paragraphs IV.B.2 and IV.B.3 above, unscrew Packing Nut (Item 3) and remove Packing (Item 4) and Packing Spring (Item 5).

5. Actuator Disassembly

The actuator should not be disassembled or repaired. Consult factory.

6. Inspection

After disassembly, inspect all sealing and bearing surfaces on valve and actuator parts for physical damage including nicks, scratches or corrosion. Be sure all gasket surfaces are thoroughly cleaned and free of old gasket material. Replace any damaged soft goods such as piston seals, o-rings and rod wipers. Replace packing. Inspect main/upper, oil and purge seat ring and the oil and main stem/plugs. If any visual damage is apparent, replace part.

C. Reassembly

1. Actuator Assembly to Yoke

Mount yoke to cylinder assembly with four hex nuts and lock washers. Replace switches, solenoid manifold, and junction box. Remake switch and solenoid wiring to terminal blocks per wiring diagram.

2. Packing/End Flange Reassembly

Place Packing Spring (Item 5) in stuffing box. Lubricate each individual packing component (Item 4) with KRYTOX[®] lubricant from DuPont. Individually install the components into the End Flange. The assembly order is male ring first, then chevrons, then female ring. Screw packing nut (Item 3) into end flange (Item 2 or 39) and snug up by hand. Do not tighten at this time. Take special precaution not to damage the packing when sliding over the stem threads. Some means of protecting the packing from damage during installation should be employed.

WARNING

Assure packing is installed in the correct orientation. See Drawing 03-005 for proper orientation. Failure to do so will cause the valve to leak severely from packing gland.

3. Oil Valve Reassembly

Lubricate the Oil Seat Ring (Item 11) soft seal sealing surface located on the inside diameter with Magnalube[®]-G from the Carleton-Stuart Corporation. Clean the body oil seat threads and gasket area. Apply Grafoil[®] GTS[®] sealant to both the Body (Item 1) and Oil Valve Seat Ring threads (Item 11), place the Seat Ring Gasket (Item 21) on the Oil Valve Seat Ring (Item 11) and thread into Body (Item 1). Torque to 130 Ft-Lbs (176.3 Nm). Lubricate the oil stem plug with Magnalube[®]-G and the shaft with antiseize lubricant. Carefully slide the oil stem (Item 12) into the End Flange (Item 39), making sure not to damage the Packing (Item 4). Slide the Body Gasket (Item 7) over the End Flange subassembly (Item 39). Lubricate the 4 end flange Screws (Item 6) with antiseize compound and fasten the End Flange assembly (Item 39) onto the Valve Body (Item 1), ensuring the limit switch box Studs (Item 14) are properly oriented (In line with piping). Torque the end flange Screws (Item 6) in two uniform increments. Torque screws initially in a crisscross pattern to 40 Ft-Lbs (54.2 Nm), repeat using 65-70 Ft-Lbs (88.1 - 94.9 Nm) and recheck. Push the Oil Stem (Item 12) up into the Valve Body (Item 1) until it seats in the Oil Valve Seat Ring (Item 11). This may require that the Oil Stem (Item 12) be lightly struck with a mallet until it is fully seated. Screw Spring Seat (Item 17) onto the Valve Stem (Item 12). Hold the Limit Switch Box (Item 13) in place, while adjusting the spring seat position to 2.05" (52.1 mm). This is measured from the inside surface of the Switch Box (Item 13) on which the spring rest to the spring seating surface on the Spring

Seat (Item 17). Tighten the Set Screw (Item 18) so the spring seat is secure. Remove the Limit Switch Box (Item 13). Place Oil Valve Return Spring (Item 19) into the Spring Seat (Item 17) and mount the Limit Switch Box (Item 13) using the 2 mounting Nuts (Item 29) with Lock Washers (Item 28). Tighten these fasteners in a uniform manner, so the box is not cocked during assembly. Item 29 should be torqued to approximately 150 In-Lbs (14.1 Nm). Mount the Oil Valve POC Switch (Item 20) to the Limit Switch Box (Item 13) using Washer (Item 23), Lock Washer (Item 24) and Screw (Item 22). Verify the Spring Seat (Item 17) dimension is set correctly. The Oil Valve POC Switch must be set per section VI.

4. Main/Purge Valve Reassembly

Clean the thread/surface area in the Body (Item 1) of both the Purge Seat (Item 10) and Seat Ring (Item 9). Apply Grafoil[®] GTS[®] sealant to both the Purge Seat (Item 10) and Body (Item 1) threads, and screw into the Valve Body (Item 1). Torque to 100 Ft-Lbs (135.6 Nm). Insert the Main Stem (Item 8) into the Valve Body (Item 1). Place the Seat Ring Gasket (Item 21) over the Seat Ring (Item 9), apply Grafoil[®] GTS[®] sealant to both the Seat Ring (Item 9) threads and body threads and screw into Valve Body (Item 1). Torque to 130 Ft-Lbs (176.3 Nm). Place Body Gasket (Item 7) on End Flange (Item 2). Carefully slide End Flange (Item 2) and Body Gasket (Item 7) over the Main Stem (Item 8) making sure not to damage the Packing (Item 4). Lubricate the 4 end flange Screws (Item 6) with antiseize compound and fasten the End Flange assembly (Item 2) onto the Valve Body (Item 1). Torque the end flange Screws (Item 6) in two uniform increments. Torque screws initially in a crisscross pattern to 40 Ft-Lbs (54.2 Nm), repeat using 65-70 Ft-Lbs (88.1 - 94.9 Nm) and recheck. Screw the stem connector onto the Main Stem (Item 8) and tighten set screws.

5. Actuator Reinstallation

Carefully place actuator onto valve. Screw yoke lock nut onto valve end flange (Item 2) hand tight. Slide valve stem up and thread stem connector onto actuator shaft. Rotate slowly until resistance is felt. Securely tighten yoke lock nut. Make pneumatic and electrical connections to assembly and stroke valve to "Purge" (Paragraph II.C). Rotate connector onto shaft one additional turn plus enough to line up switch trip bracket mounting holes. Tighten the jam nut, and fasten set screw located in the stem connector. Close valve (Paragraph II.A) and install switch trip bracket and indicator onto stem connector. The valve is now ready for testing.

6. Test

Conduct the following tests to assure system performance is satisfactory after rebuild.

a) Valve Stroke

Verify no oil stem movement occurs when the valve strokes from the Closed to Purge position. If the oil stem moves, thread stem connector onto actuator shaft an additional turn while the valve is in Purge and retest. Continue until no movement occurs.

b) Auxiliary Open/Close Switches

Using an electrical testing device verify the Valve Closed limit switch is actuated only when the valve is in the Closed position and the Valve Open limit switch is actuated only when the valve is in the Fire position. Ensure neither switch is actuated when in Purge. Limit switches are adjusted by repositioning the switch roller levers.

c) Oil Valve Proof of Closure

The oil valve Proof of Closure switch must be adjusted in accordance to Section VI.

V. Leak Testing

After assembly, the Skotch Trifecta Valve should be leak tested to verify proper operation as follows:

A. *Upper Seat Ring*

1. Place the valve in the Closed position.
2. The fuel inlet port must be plugged so that test media cannot escape for this port.
3. Pressurize the purge inlet to 50 PSIG (344.7 KPa) air while monitoring the leakage rate from the fuel outlet. The leakage rate should not exceed ANSI Class IV limits or 1254 cc/min.
4. If leakage is excessive, stroke the valve 10 to 20 times to allow the metal seat to wear in with the metal plug and retest the valve. If valve leakage is still excessive, the main stem and seat should be replaced and the valve retested.

Note: If the actuator was removed anytime prior to testing, the actuator/valve coupling nut should be checked for proper installation. The main stem closure force is due to the return spring located inside the actuator. If the coupling nut is not adjusted correctly it is possible for the actuator to reach its home position without the main plug contacting the seat. If this occurs main seat leakage will take place regardless of the plug and seat condition. The main seat and plug should limit the actuator travel in the Closed position.

B. *Purge Seat*

1. Stroke the valve to the Fire position using a control pressure between 70 and 120 PSIG (482.6 - 827.4 KPa).
2. The fuel inlet should be plugged to keep the test media from escaping from this port.

3. Pressurize the purge inlet to 50 PSIG (344.7 KPa) air while monitoring the fuel outlet port for leakage. The allowable leakage rate per ANSI Class IV is 439 cc/min.
4. If leakage is excessive, stroke the valve 10 to 20 times to allow the metal seat to wear in with the metal plug and retest the valve. If valve leakage is still excessive, the main stem and purge seat should be replaced and the valve retested.

C. Oil Seat

1. The valve should be in fully closed position.
2. The purge inlet should be plugged.
3. Pressurize the fuel inlet port to 50 PSIG (344.7 KPa) air while measuring the leakage rate from the fuel outlet. The allowable leakage rate is one bubble per minute or Class VI.
4. If leakage is excessive, stroke the valve 10 to 20 times to allow the soft seal in the oil seat to wear in with the metal plug and retest the valve. If valve leakage is still excessive the oil seat and/or stem should be replaced and the valve retested.

VI. PROOF OF CLOSURE (POC) SWITCH TESTING

The POC switches should be tested after the valve has been leak tested.

The intent of the Proof of Closure (POC) switch is to prove the valve is in the closed position. To accomplish this, the oil valve is designed with valve seal over-travel. That is, the seal will stop the flow of oil and continue to move in the valve seat bore until the metal seat is made. During this portion of valve stroke the oil valve is effectively sealed, the POC switch contacts must change state. That is, the POC Switch changes state before oil flows regardless of whether the valve moves from the Closed position to Fire or Fire to Closed (Purge).

1. Ensure the valve is in the closed position.
2. Wire the switch to a test device.

3. Loosen switch and push it towards the end flange (up - orientation assumes the valve actuator is on top) to edge of slot or until switch boot hits the edge of the hole. This will typically move the switch roller actuator past the tripping device.
4. Move the switch away from the end flange (down) until it trips. Try and keep the switch level.
5. Mark the limit switch box 0.14" (3.6 mm) from the switch surface opposite the end flange (bottom surface), for the entire length of the switch. This can be accomplished by placing a 0.14" (3.6 mm) thick metal plate on the switch and marking along the edge. Caution with how close the mark is to the plate. If the marking device is always 0.03" (0.8 mm) higher, the plate should then be 0.11" (2.8 mm), so the end result is always 0.14" (3.6 mm).
6. Move switch to the line and tighten the two screws to prevent movement.
7. Plug the purge inlet pipe.
8. With the oil valve fully closed, pressurize the oil inlet to 10 to 20 PSIG (68.9 - 137.9 KPa). While monitoring the outlet for leakage, slowly open the valve. The normally open contacts of the switch should change state before flow commences ($> 24 \text{ in}^3/\text{Hr}$ or 400 cc/Hr). If it does not, loosen the screws, securing the switch and move the switch downward 0.015" (0.4 mm). Tighten retaining screws and repeat test.
9. Pressurize the oil valve inlet between 10 and 20 PSIG (68.9 - 137.9 KPa) while monitoring the outlet for leakage. Stroke the valve to open position. Slowly close the valve while monitoring the normally open switch contacts. Flow should cease ($< 24 \text{ in}^3/\text{Hr}$ or 400 cc/Hr) before contacts change state. If it does not, loosen the screws, securing the switch and move the switch upward 0.015" (0.4 mm). Tighten retaining screws and repeat test. If any adjustments are made during this step, step 8 must be repeated.
10. Switches are properly set when both conditions in Step 8 and 9 are satisfied.

VII. MISCELLANEOUS INSTRUCTIONS FOR SPECIAL OPTIONS

Due to customer requirements, some T2000 Systems incorporate special options. Any special procedures not covered in the above material can be found in the Reference Section of this manual as addenda.

VIII. SPARE PARTS ORDERING INFORMATION

Orders for T2000 Systems Spare Parts should be placed with

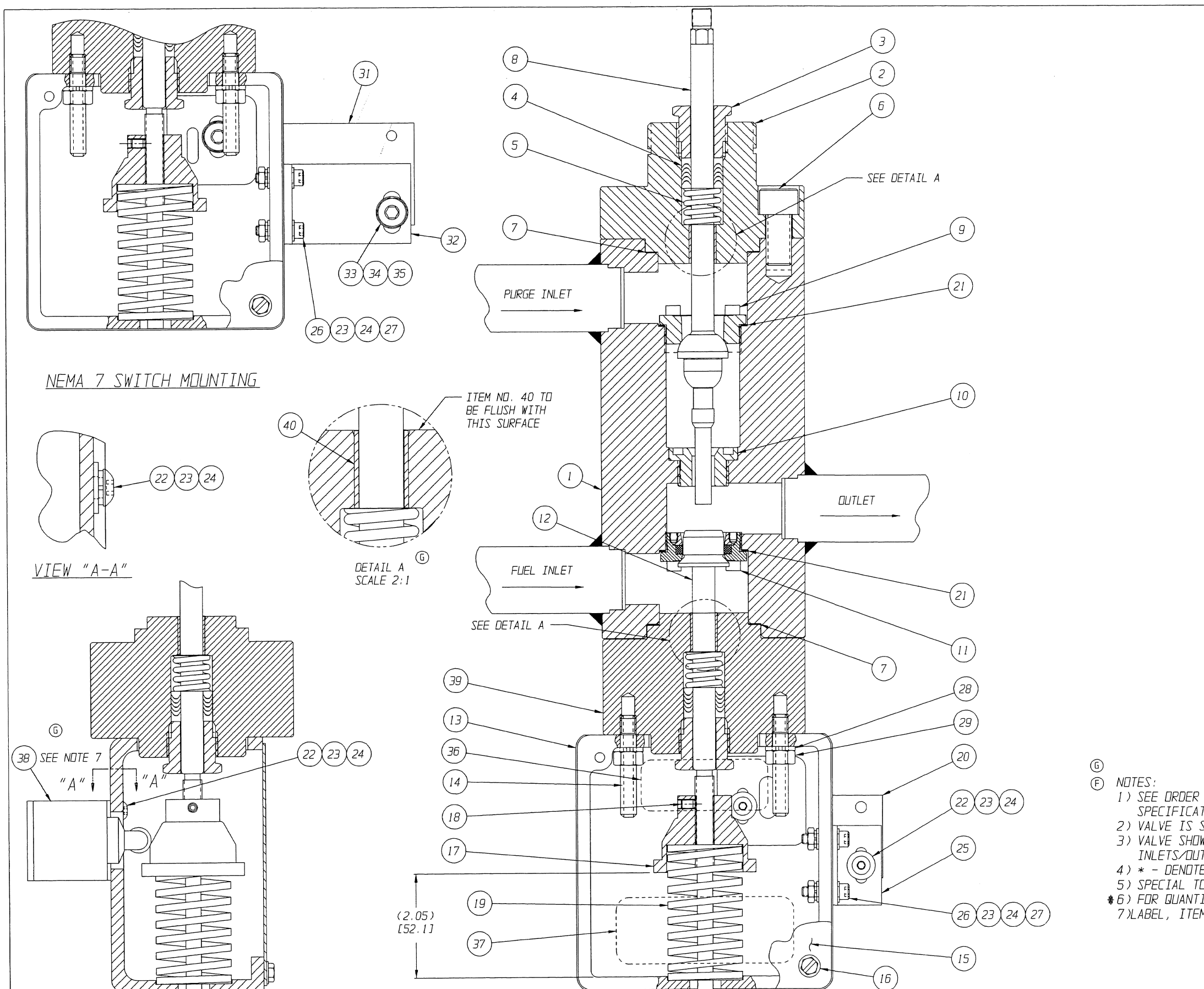
*ITT Engineered Valves, LLC
33 Centerville Road
Lancaster, PA 17603-2064*

*Phone: 717-509-2200
Fax: 800-348-9000*

Please be advised that spare parts should be ordered directly from ITT Engineered Valves, as such materials are specially designed for Scotch Trifecta Valve Systems. Other replacement parts, although they may be similar in function, will void the FM rating. To maintain FM Approval, FM also requires technicians servicing/repairing the Scotch Trifecta Valve Systems to be trained by ITT Engineered Valves.

IX. REFERENCE INFORMATION

The following pages contain drawings and reference information alluded to in above sections.



LIST OF PARTS			
ITEM	DWG. NO.	QTY.	DESCRIPTION
1	02-011	1	VALVE BODY SUBASSEMBLY
G 2	118060	1	END FLANGE STEAM SIDE
3	01-012	2	PACKING NUT
* 4	39-001	2	PACKING SET
F * 5	-	2	PACKING SPRING
F 6	-	8	0.50-13 X 1.00 LG. SOCKET HEAD CAP SCREW
* 7	40-001	2	BODY GASKET
* 8	116633	1	MAIN STEM
* 9	01-013	1	UPPER SEAT RING
* 10	01-011	1	PURGE SEAT RING
* 11	02-110	1	OIL VALVE SEAT RING ASSEMBLY
F * 12	02-107	1	OIL STEM
13	01-218	1	LIMIT SWITCH BOX
G 14	-	2	STUD (0.31-18 UNC)
15	01-016	1	LIMIT SWITCH BOX COVER
16	-	2	12-24 X 0.50 LG. HEX WASHER HEAD SCREW
17	01-224	1	SPRING SEAT
18	-	1	10-32 X 0.25 LG. SOCKET HEAD SET SCREW
* 19	-	1	OIL VALVE RETURN SPRING
* 20	25-007	1	OIL VALVE PROOF OF CLOSURE SWITCH NEMA 4
* 21	40-026	2	SEAT RING GASKET
* 22	-	-	10-32 X 0.50 LG. HEX SOC BTNHD CAP SCR
* 23	-	-	#10 FLAT WASHER
* 24	-	-	#10 LOCK WASHER
* 25	01-234	-	SWITCH MOUNTING BRACKET (NEMA 4)
26	-	2	#10-32 X 0.75 LG. HEX SOCKET HD CAP SCREW
27	-	2	#10-32 HEX NUT
G 28	-	2	0.31 LOCK WASHER
G 29	-	2	0.31-18 HEX NUT
G 30	-	-	-
* 31	25-017	1	OIL VALVE PROOF OF CLOSURE SWITCH NEMA 7
* 32	01-235	-	SWITCH MOUNTING BRACKET (NEMA 7)
* 33	-	-	0.31 FLAT WASHER
* 34	-	-	0.31 LOCK WASHER
* 35	-	-	0.31-18 X 0.75 LG. HEX SOC BTNHD CAP SCR
F 36	117504	1	LABEL - CAUTION STEM PACKING
F 37	90-018	1	LABEL - CAUTION SPRING
F 38	117500	1	LABEL - PROOF OF CLOSURE
G 39	118059	1	END FLANGE OIL SIDE
G 40	-	2	BEARING

ITEM NO.	QUANTITY	
	NEMA 4	NEMA 7
22	2	-
23	6	4
24	4	2
25	1	-
32	-	1
33	-	2
34	-	2
35	-	2

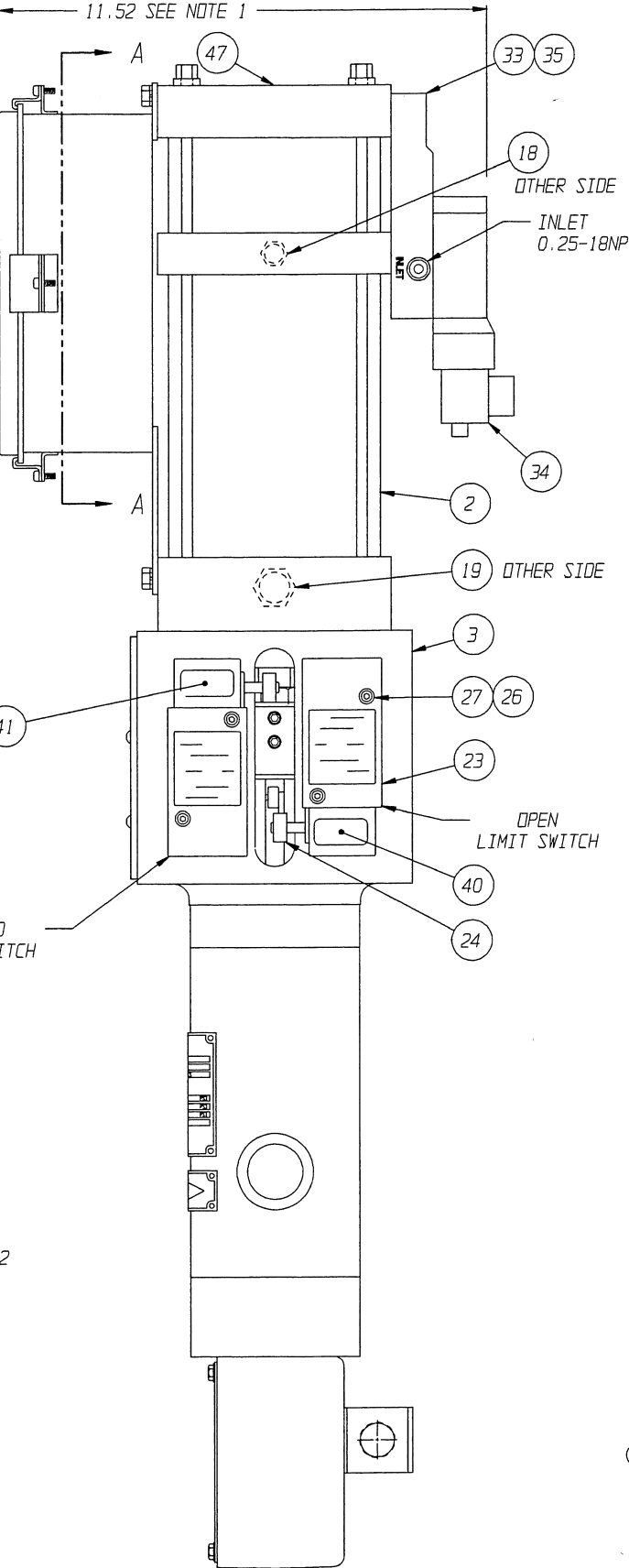
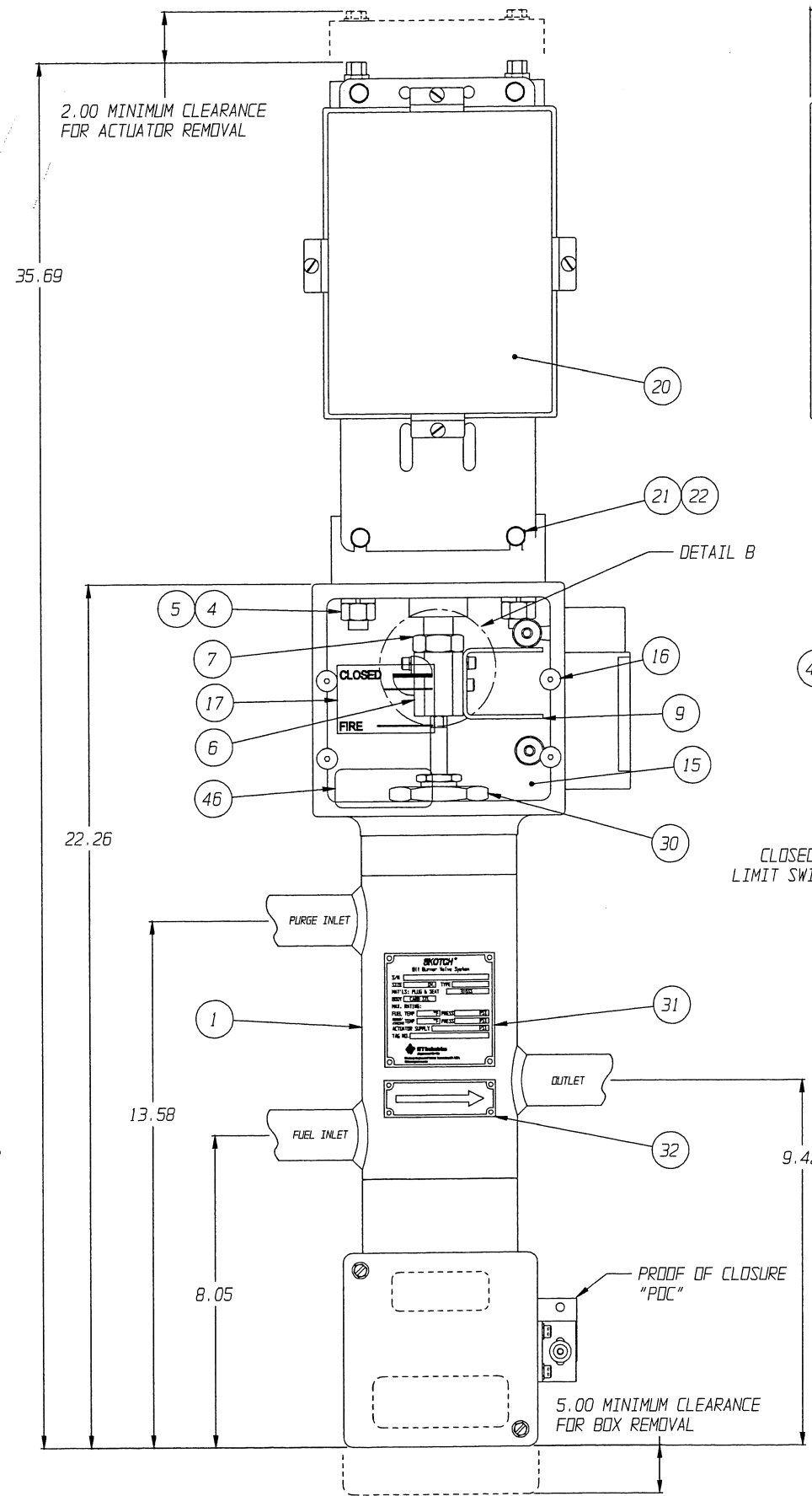
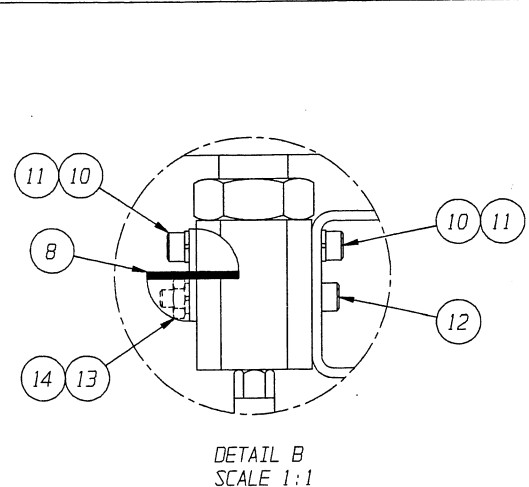
- NOTES:
- 1) SEE ORDER SPECIFICATION FOR MAIN VALVE AND ACCESSORY/OPTIONS SPECIFICATIONS.
 - 2) VALVE IS SHOWN IN CLOSED POSITION.
 - 3) VALVE SHOWN IS LEFT TO RIGHT FLOW. FOR RIGHT TO LEFT FLOW, INLETS/OUTLETS ARE REVERSED.
 - 4) * - DENOTES RECOMMENDED SPARE PART.
 - 5) SPECIAL TOOL IS REQUIRED TO REMOVE SEATS. CONSULT FACTORY.
 - 6) FOR QUANTITY SEE TABLE 1
 - 7) LABEL, ITEM 38, TO BE PLACED ON TOP OF SWITCH HEAD

ECN# 3158

THIS DOCUMENT IS THE PROPERTY OF ITT ENGINEERED VALVES AND IS LOANED SUBJECT TO RETURN. IT IS ISSUED IN STRICT CONFIDENCE AND SHALL NOT BE REPRODUCED, OR COPIED, OR DISCLOSED IN WHOLE OR IN PART, OR USED AS THE BASIS FOR THE MANUFACTURE OR SALES OF APPARATUS WITHOUT THE EXPRESS WRITTEN CONSENT OF ITT ENGINEERED VALVES.

TOLERANCES EXCEPT AS NOTED		WEIGHT	SCALE	MAIN VALVE ASSEMBLY		ITT Engineered Valves ITT Fluid Technology Corporation Lancaster, Pa
EXCEPT AS NOTED			1:1	OIL BURNER VALVE SYSTEM		
XX ±.02		DATE	BY	T2000		SHEET 1 OF 1
XXX ±.005		DWN	JON			
ANGLES ±0.50°		REV	DATE	SUPERSEDES:-		DRAWING NUMBER 03-005
REMOVE ALL BURRS AND SHARP EDGES ALL DIMENSIONS TO BE SURFACES TO BE UNLESS EXCEPT AS NOTED		12/10/97	3158			
		ECN	BY			REV G
		NBR	CHKD			

FILE COPY



LIST OF PARTS			
ITEM	DWG. NO.	QTY.	DESCRIPTION
1	-	1	VALVE BODY
2	117483	1	ACT PNEUM TANDEM CYLINDER
3	117602	1	YOE
4	-	4	NUT HEX .50-20
5	-	4	LOCKWASHER SPRING 0.50
6	06-015	1	STEM CONNECTOR
7	-	1	NUT HEX JAM .75-16
8	06-028	1	INDICATOR VISUAL
9	06-029	1	BRACKET SWITCH TRIP
10	-	2	CAPSCR HEXSKT 10-32X0.38
11	-	2	LOCKWASHER SPRING #10
12	-	1	CAPSCR HEXSKT 10-32X1.75
13	-	1	NUT HEX 10-32
14	-	1	LOCKWASHER SPRING #10
15	06-107	1	LENS YOKE
16	-	4	CAPSCR BUTHD 10-32X0.50
17	90-002	1	DECAL LENS
18	-	1	VENT BREATHER .25
19	-	1	VENT BREATHER .50
20	117481	1	BOX JUNCTION 8 X 6
21	-	4	CAPSCR HEX .25-20X0.38
22	-	4	LOCKWASHER EXT TOOTH 0.25
23	-	2	SWITCH
24	-	2	SWITCH LEVER
25	-	2	ADAPTER PLATE
26	-	4	CAPSCR HEXSKT 10-32X2.00
27	-	4	LOCKWASHER SPRING HI-COLLAR #10
28	-	4	CAPSCR BUTHD 10-32X0.50
29	-	4	CAPSCR HEXSKT 10-32X1.25
30	-	1	NUT YOKE LOCK
31	-	1	TAG
32	-	1	TAG FLOW
33	117484	1	MANIFOLD ADAPTER BLOCK
34	-	2	SOLENOID
35	-	2	O-RING #114
36	-	4	CAPSCR HEXSKT 0.25-20X1.00
37	-	4	LOCKWASHER SPRING HI-COLLAR 0.25
38	-	AR	CAPSCR HEXSKT #8-32X1.25
39	-	AR	LOCKWASHER SPRING HI-COLLAR #8
40	117498	1	LABEL - ACTUATOR OPEN SWITCH
41	117499	1	LABEL - ACTUATOR CLOSED SWITCH
42	117533	1	JUNCTION BOX SUBPLATE
43	117501	1	LABEL - FIRE SOLENOID
44	117502	1	LABEL - PURGE SOLENOID
45	117503	AR	LABEL - CAUTION CONDUIT
46	117504	2	LABEL - CAUTION STEM PACKING
47	90-018	1	LABEL - CAUTION SPRING
48	-	1	FLOW CONTROL PLATE
49	-	3	CAPSCR HEXSKT #8-32X1.75
50	-	AR	MOUNTING RAIL
51	-	AR	SCREW, TAPPING PAN HD #8X0.50
52	-	AR	TERMINAL CLIP
53	-	AR	TERMINAL
54	-	AR	END BARRIER
55	-	AR	FITTING CONDUIT 0.50 LQT STR
56	-	AR	FITTING CONDUIT 0.50 HUB
57	-	AR	FITTING CONDUIT 0.50 LQT 45
58	-	AR	FITTING CONDUIT 0.50 LQT 90
59	-	AR	FITTING CONDUIT 0.50 90 MXF CLI
60	-	AR	FITTING CONDUIT 0.50 90 FXF CLI
61	-	AR	FITTING CONDUIT 0.50 SEAL FXM V/H CLI
62	-	AR	VALVE CHECK INLET
63	-	AR	FITTING COUPLER 0.25FNPTX0.25FNPT
64	-	AR	NIPPLE 0.50
65	-	1	MUFFLER
66	-	AR	VENT BREATHER #10-32
67	-	AR	NIPPLE 0.50
68	-	AR	HEX, BUSHING 0.75 X 0.50

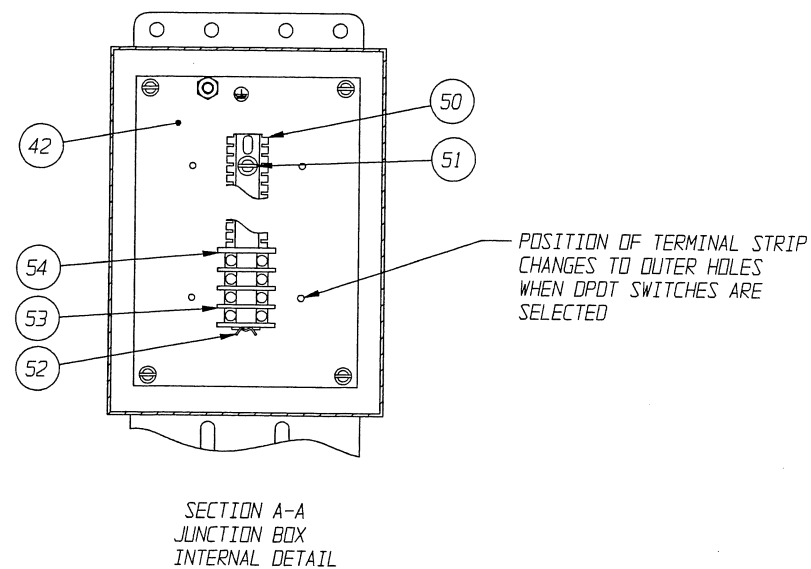
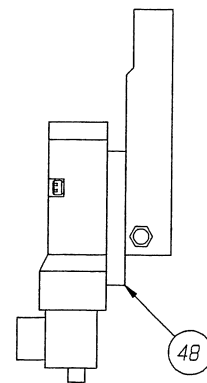
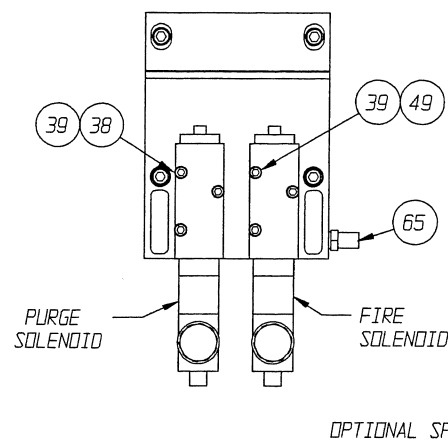
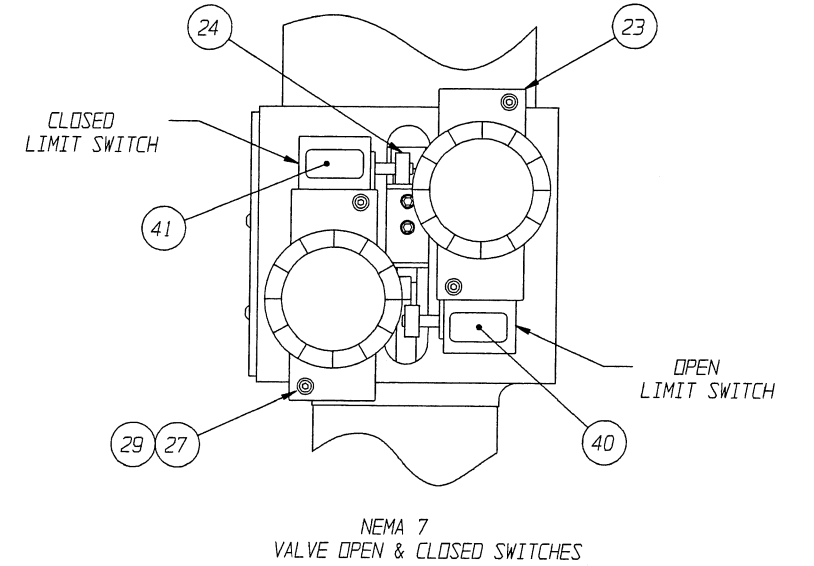
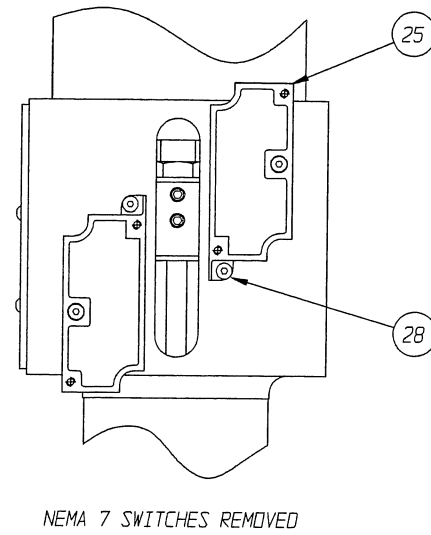
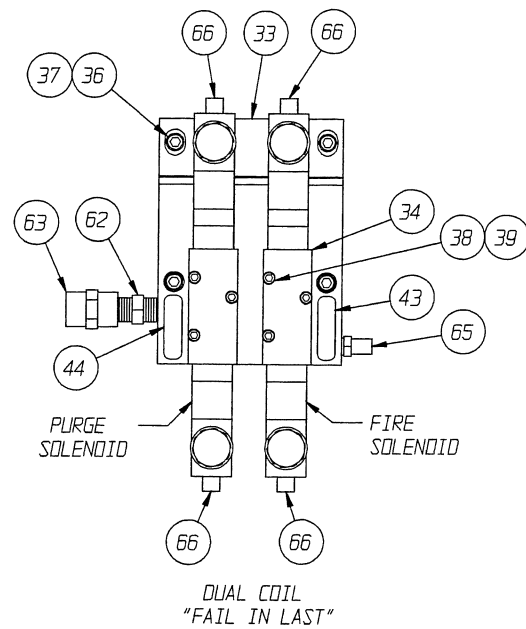
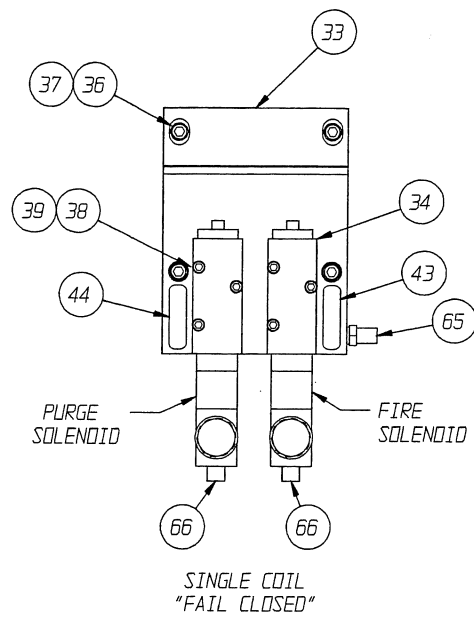
- NOTES:
1. STAINLESS STEEL JUNCTION BOX DIMENSION APPROXIMATELY 12.00
 2. CONDUIT NOT SHOWN FOR CLARITY
 3. CONDUIT FITTINGS MAY BE ROTATED AS REQUIRED
 4. SOME CONDUIT FITTINGS MAY NOT BE USED FOR SINGLE COIL SOLENOIDS
 5. LABEL, ITEM 45, TO BE WRAPPED AROUND CONDUIT
 6. ALL DIMENSIONS ARE FOR REFERENCE ONLY
 7. RECOMMENDED SPARE PARTS ARE MARKED WITH AN ASTERISK (*) ON THE LIST OF PARTS
 8. ITEM 68 TO BE USED FOR STAINLESS STEEL SWITCHES

ECN# 6135

THIS DOCUMENT IS THE SOLE PROPERTY OF ITT INDUSTRIES, INC., OR ITS SUBSIDIARY, AND IS PROVIDED SUBJECT TO RETURN. IT IS ISSUED IN STRICT CONFIDENCE AND SHALL NOT BE REPRODUCED, OR COPIED, OR DISCLOSED IN WHOLE OR IN PART, OR USED AS THE BASIS FOR THE MANUFACTURE OR SALES OF APPARATUS OR PARTS TO WHICH THE DOCUMENT RELATES, WITHOUT THE EXPRESS WRITTEN CONSENT OF ITT INDUSTRIES, INC., OR ITS SUBSIDIARY. THIS LEGEND SHALL BE MARKED ON ANY REPRODUCTION HEREOF, IN WHOLE OR IN PART. ALL RIGHTS TO THE INFORMATION AND DESIGN DISCLOSED HEREIN ARE RESERVED TO ITT INDUSTRIES, INC., OR ITS SUBSIDIARY.

THIRD ANGLE PROJECTION	UNLESS OTHERWISE NOTED X ± .06 (1.5mm) .X ± .03 (.75mm) .XX ± .02 (.5mm) .XXX ± .005 (.12mm) X.X ± 1/16 (.15mm) X ± .005 X ± .01	WEIGHT	SCALE	VALVE/ACTUATOR ASSEMBLY	<p>Engineered Valves Lancaster, PA USA</p>
	REMOVE ALL BURRS AND SWAMP EDGES ALL MACHINED SURFACES TO BE (25) EXCEPT AS NOTED	DATE	BY	T2000	
UNLESS OTHERWISE SPECIFIED, ALL DIMENSIONS ARE IN INCHES	APPROVED	DWN	CHKD	APV	SIZE 0 DRAWING NUMBER 117480 SHEET 1 OF 4 REV H

FILE COPY

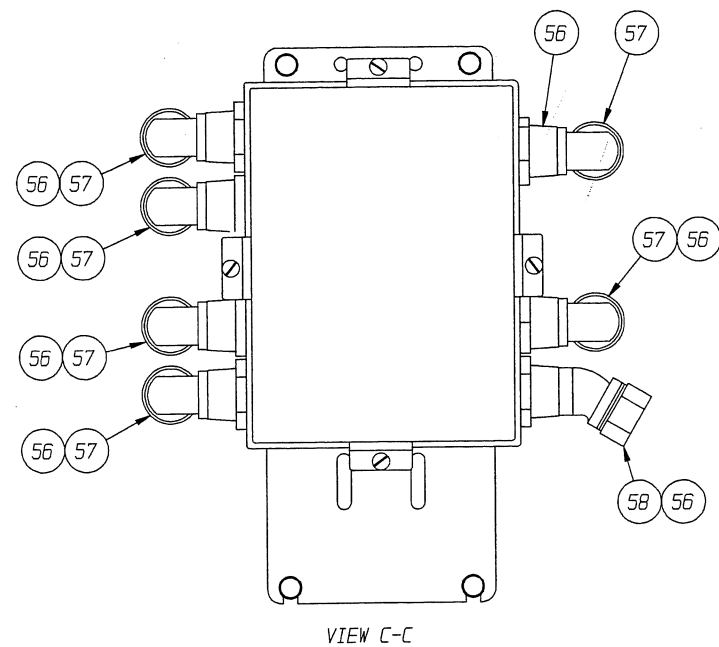


ECN# 6135

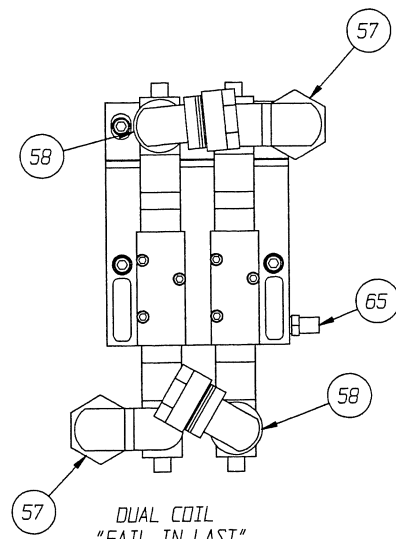
THIS DOCUMENT IS THE SOLE PROPERTY OF ITT INDUSTRIES, INC., OR ITS SUBSIDIARY, AND IS PROVIDED SUBJECT TO RETURN. IT IS ISSUED IN STRICT CONFIDENCE AND SHALL NOT BE REPRODUCED, OR COPIED, OR DISCLOSED IN WHOLE OR IN PART, OR USED AS THE BASIS FOR THE MANUFACTURE OR SALES OF APPARATUS OR PARTS TO WHICH THE DOCUMENT RELATES, WITHOUT THE EXPRESS WRITTEN CONSENT OF ITT INDUSTRIES, INC., OR ITS SUBSIDIARY. THIS LEGEND SHALL BE MARKED ON ANY REPRODUCTION HEREOF, IN WHOLE OR IN PART. ALL RIGHTS TO THE INFORMATION AND DESIGN DISCLOSED HEREIN ARE RESERVED TO ITT INDUSTRIES, INC., OR ITS SUBSIDIARY.

THIRD ANGLE PROJECTION	UNLESS OTHERWISE NOTED X ± .03 (1.5mm) .XX ± .03 (.76mm) .XXX ± .02 (.5mm) XXX ± .005 (.12mm) X/X ± 1/16 (1.5mm) X° ± 1°	WEIGHT	SCALE	VALVE/ACTUATOR ASSEMBLY	 ITT Industries Engineered Valves Lancaster, PA USA
	UNLESS OTHERWISE SPECIFIED, REMOVE ALL BURRS AND SHARP EDGES. ALL DIMENSIONS ARE IN INCHES EXCEPT AS NOTED.	DATE BY DWN 1/25/61 AJP CHKD 4/24/61 RCD APVD 4/24/61 RCD	1:2 T2000	SIZE DRAWING NUMBER D 117480	
				SHEET 2 OF 4	REV H

PATTERN NO. -

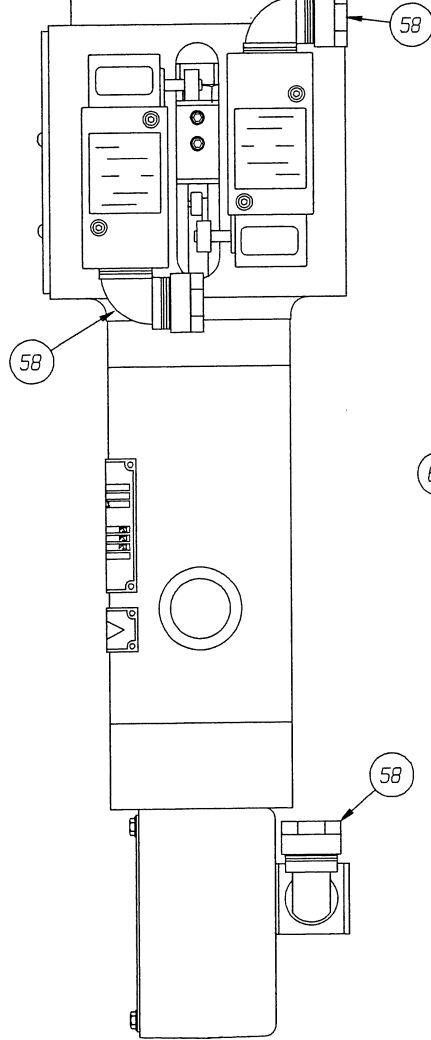
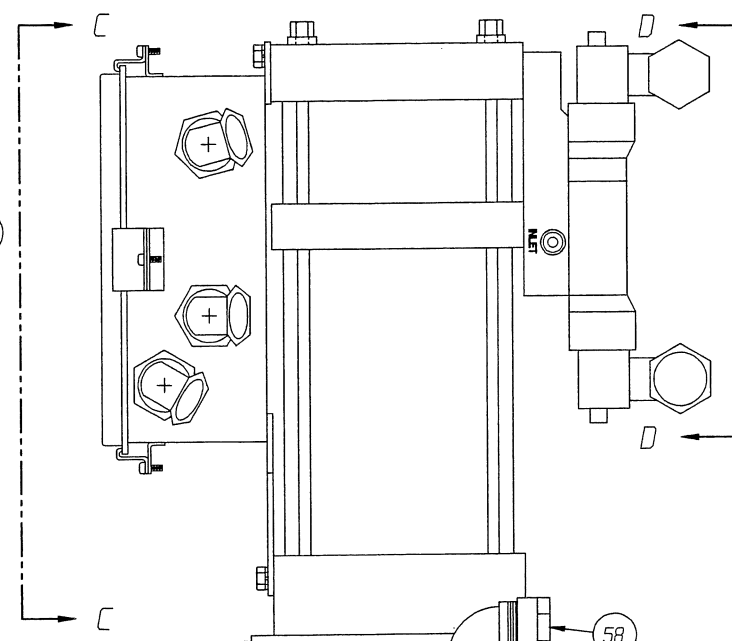


VIEW C-C

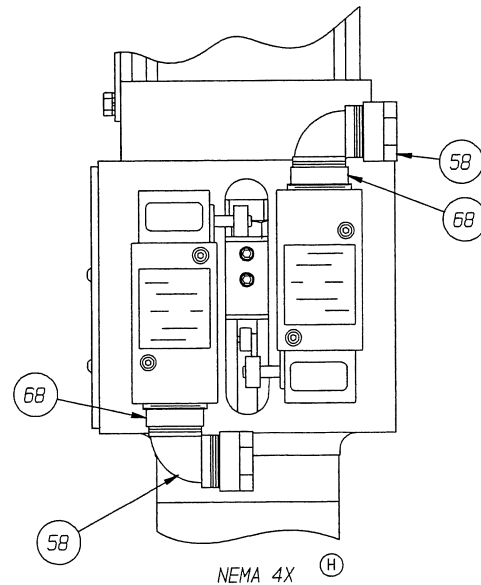


DUAL COIL
"FAIL IN LAST"

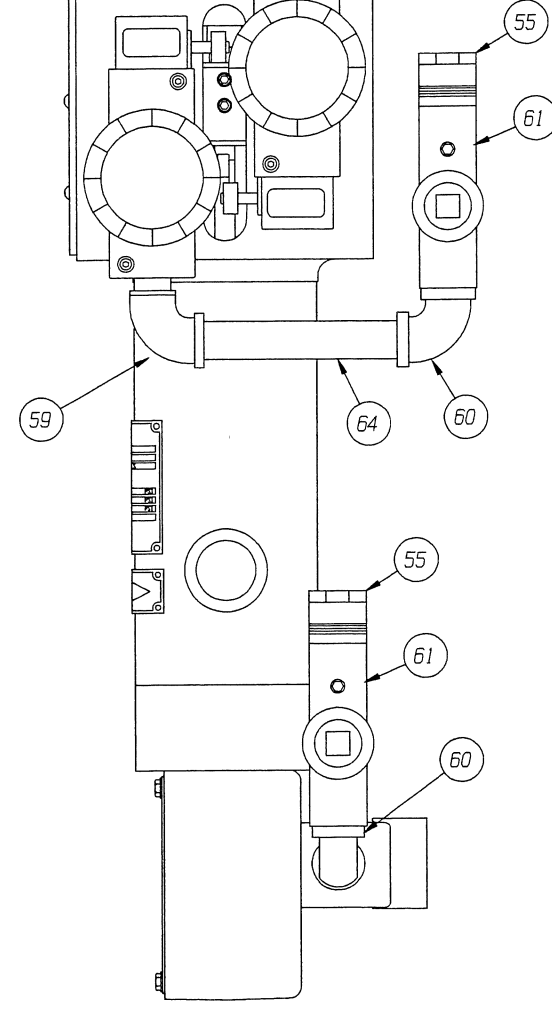
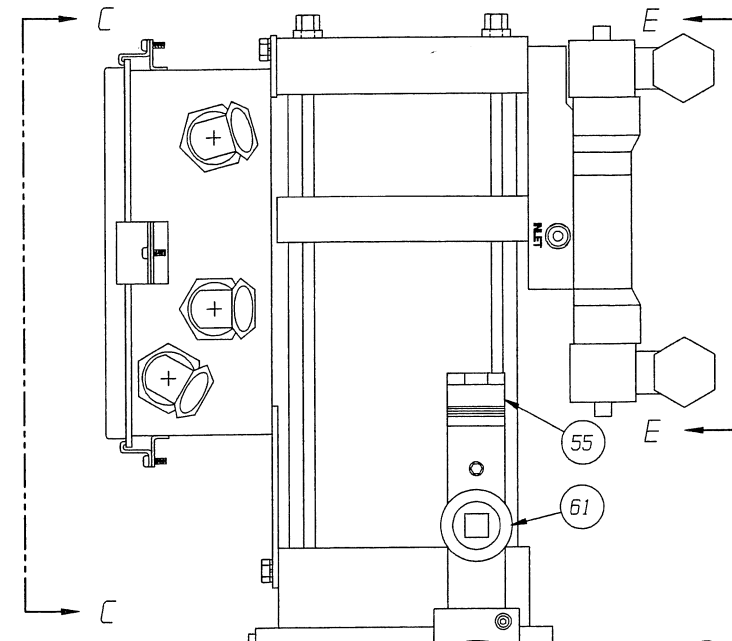
VIEW D-D



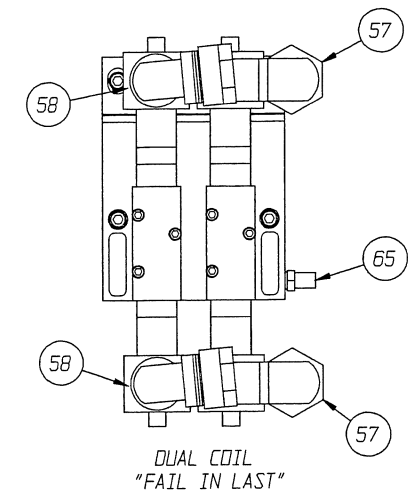
STANDARD



NEMA 4X



CLASS 1 DIV 2
LEFT TO RIGHT FLOW

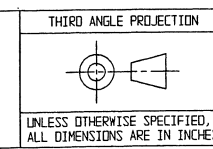


DUAL COIL
"FAIL IN LAST"

VIEW E-E

ECN# 6135

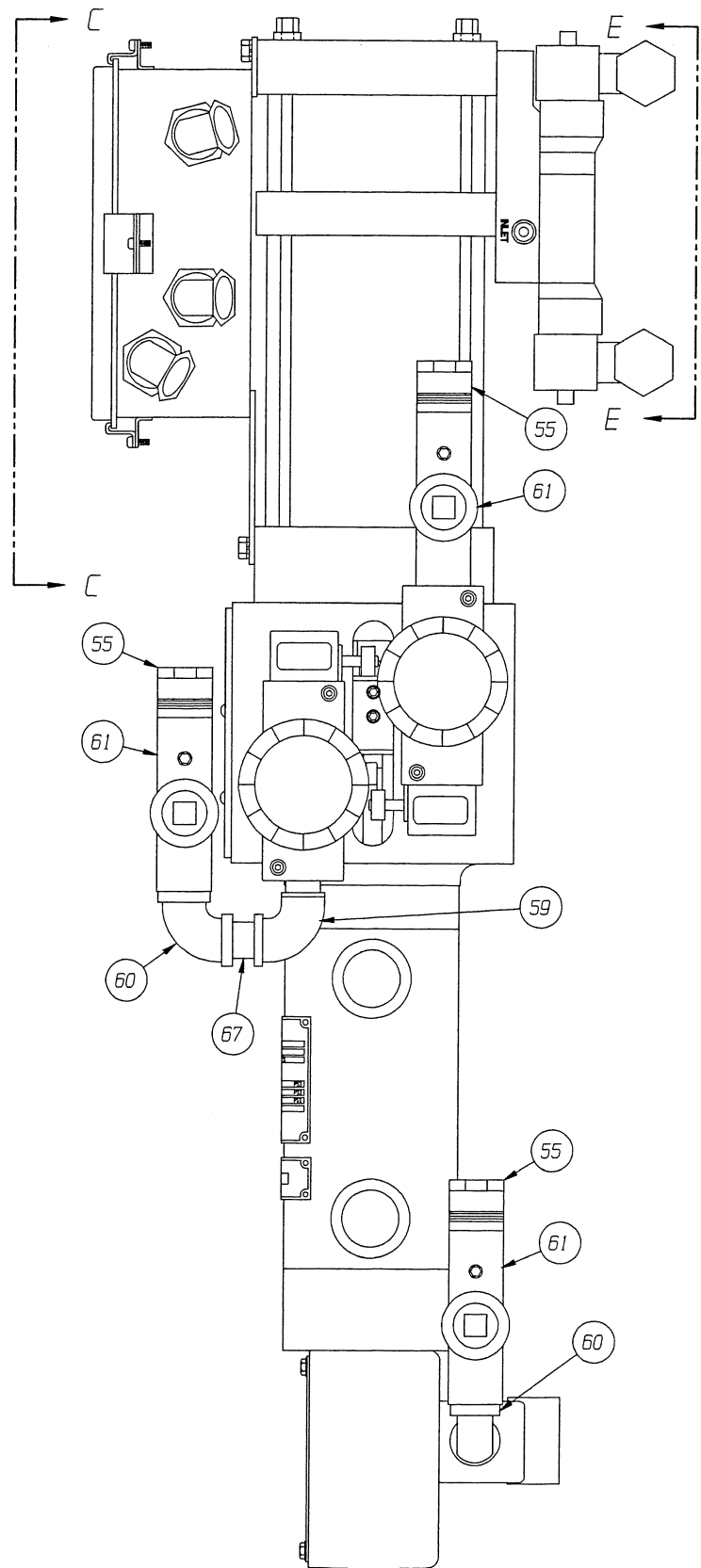
THIS DOCUMENT IS THE SOLE PROPERTY OF ITT INDUSTRIES, INC., OR ITS SUBSIDIARY, AND IS PROVIDED SUBJECT TO RETURN. IT IS ISSUED IN STRICT CONFIDENCE AND SHALL NOT BE REPRODUCED, OR COPIED, OR DISCLOSED IN WHOLE OR IN PART, OR USED AS THE BASIS FOR THE MANUFACTURE OR SALES OF APPARATUS OR PARTS TO WHICH THE DOCUMENT RELATES, WITHOUT THE EXPRESS WRITTEN CONSENT OF ITT INDUSTRIES, INC., OR ITS SUBSIDIARY. THIS LEGEND SHALL BE MARKED ON ANY REPRODUCTION HEREOF, IN WHOLE OR IN PART. ALL RIGHTS TO THE INFORMATION AND DESIGN DISCLOSED HEREIN ARE RESERVED TO ITT INDUSTRIES, INC., OR ITS SUBSIDIARY.



THIRD ANGLE PROJECTION	UNLESS OTHERWISE NOTED X ± .06 (1.5mm) XX ± .03 (.76mm) XXX ± .02 (.5mm) XXX ± .005 (.12mm) X/X ± 1/16 (1.5mm) X ± .5 X ± .25	WEIGHT SCALE VALVE/ACTUATOR ASSEMBLY T2000	DATE BY DWN CHKD APVD
UNLESS OTHERWISE SPECIFIED, ALL DIMENSIONS ARE IN INCHES	REMOVE ALL FILLS AND SHARP EDGES ALL MACHINED SURFACES TO BE 125 EXCEPT AS NOTED	1:2	11/24/11 RSC RSC RSC

PATTERN NO. -			
ITT Industries Engineered Valves Lancaster, PA USA			
SIZE	DRAWING NUMBER	SHEET	REV
D	117480	3 OF 4	H

FILE COPY

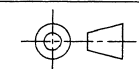


CLASS 1 DIV 2
RIGHT TO LEFT FLOW

ECN# 6135

THIS DOCUMENT IS THE SOLE PROPERTY OF ITT INDUSTRIES, INC., OR ITS SUBSIDIARY, AND IS PROVIDED SUBJECT TO RETURN. IT IS ISSUED IN STRICT CONFIDENCE AND SHALL NOT BE REPRODUCED, OR COPIED, OR DISCLOSED IN WHOLE OR IN PART, OR USED AS THE BASIS FOR THE MANUFACTURE OR SALES OF APPARATUS OR PARTS TO WHICH THE DOCUMENT RELATES, WITHOUT THE EXPRESS WRITTEN CONSENT OF ITT INDUSTRIES, INC., OR ITS SUBSIDIARY. THIS LEGEND SHALL BE MARKED ON ANY REPRODUCTION HEREOF, IN WHOLE OR IN PART. ALL RIGHTS TO THE INFORMATION AND DESIGN DISCLOSED HEREIN ARE RESERVED TO ITT INDUSTRIES, INC., OR ITS SUBSIDIARY.

THIRD ANGLE PROJECTION



UNLESS OTHERWISE SPECIFIED,
ALL DIMENSIONS ARE IN INCHES

UNLESS OTHERWISE NOTED

X ± .06 (1.5mm)
X ± .03 (.75mm)
.XX ± .02 (.5mm)
.XXX ± .005 (.12mm)
X/X ± 1/16 (.5mm)
X ± .5°
X ± .5°

WEIGHT

-

SCALE

1:2

VALVE/ACTUATOR ASSEMBLY

T2000

DATE

BY

DWN 7/23/61

CHKD 1/12/46

APVD 1/12/46

DATE

BY

-

-

-

PATTERN NO. -

ITT Industries
Engineered Valves
Lancaster, PA USA

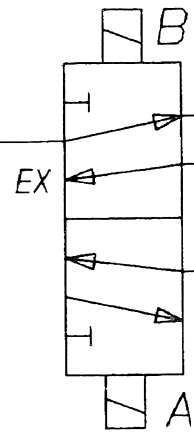
SIZE	DRAWING NUMBER	SHEET	REV
D	117480	4 OF 4	H

F COPY

DRY, CLEAN
REGULATED
PNEUMATIC SUPPLY
(70-120 PSIG)

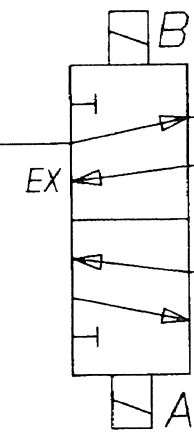
CHECK VALVE

INLET



INTERNAL TO PURGE CYLINDER

SV-1 (PURGE SOLENOID)



INTERNAL TO FIRE CYLINDER

SV-2 (FIRE SOLENOID)

NOTES:

1. SV-1 AND SV-2 ARE MANIFOLDED, DUAL COIL, MOMENTARY CONTACT SOLENOID VALVES.
2. VALVES SHOWN WITH COIL "B" LAST ENERGIZED.
3. PORT IDENTIFICATION REFERENCES MANIFOLD BLOCK

ECN#3158

PART NO. -

PATTERN NO. -

THIS DOCUMENT IS THE PROPERTY OF ITT ENGINEERED VALVES AND IS LOANED SUBJECT TO RETURN. IT IS ISSUED IN STRICT CONFIDENCE AND SHALL NOT BE REPRODUCED, OR COPIED, OR DISCLOSED IN WHOLE OR IN PART, OR USED AS THE BASIS FOR THE MANUFACTURE OR SALES OF APPARATUS WITHOUT THE EXPRESS WRITTEN CONSENT OF ITT ENGINEERED VALVES.

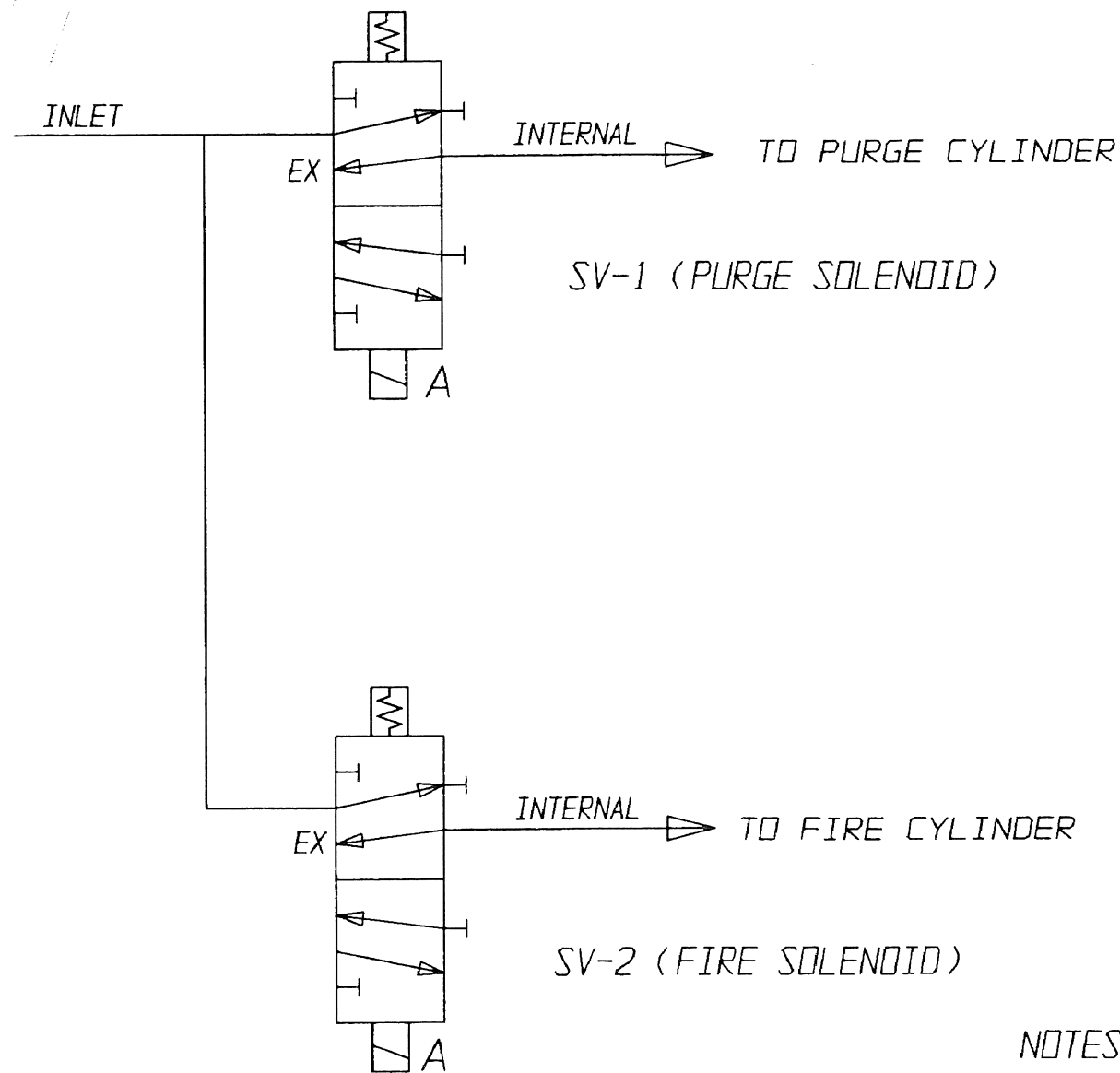
TOLERANCES
EXCEPT AS NOTED
DECIMALS
.XX ± .02
.XXX ± .005
ANGLES ±0.50°
REMOVE ALL BURRS
AND SHARP EDGES
ALL MACHINED
SURFACES TO BE
125 EXCEPT AS
NOTED

WEIGHT	SCALE	
-	-	
OWN	DATE	BY
CHKD	DATE	BY
APVD	DATE	BY

PNEUMATIC SCHEMATIC
OIL BURNER VALVE
FAIL IN LAST POSITION
-
-
-
SUPERSEDES: -

ITT Engineered Valves		
ITT Fluid Technology Corporation Lancaster, Pa		
SHEET 1 OF 1		
SIZE	DRAWING NUMBER	REV
B	117485	-

DRY, CLEAN
REGULATED
PNEUMATIC SUPPLY
(70-120 PSIG)



NOTES:

1. SV-1 AND SV-2 ARE MANIFOLDED, SINGLE COIL, SPRING RETURN MAINTAINED CONTACT SOLENOID VALVES.
2. VALVES SHOWN WITH COIL "A" DE-ENERGIZED.
3. PORT IDENTIFICATION REFERENCES MANIFOLD BLOCK

THIS IS A FACTORY MUTUAL CONTROLLED DOCUMENT. CHANGES MUST BE APPROVED BY FM PRIOR TO IMPLEMENTING.

ECN#3158

PART NO. -

PATTERN NO. -

THIS DOCUMENT IS THE PROPERTY OF ITT ENGINEERED VALVES AND IS LOANED SUBJECT TO RETURN. IT IS ISSUED IN STRICT CONFIDENCE AND SHALL NOT BE REPRODUCED, OR COPIED, OR DISCLOSED IN WHOLE OR IN PART, OR USED AS THE BASIS FOR THE MANUFACTURE OR SALES OF APPARATUS WITHOUT THE EXPRESS WRITTEN CONSENT OF ITT ENGINEERED VALVES.

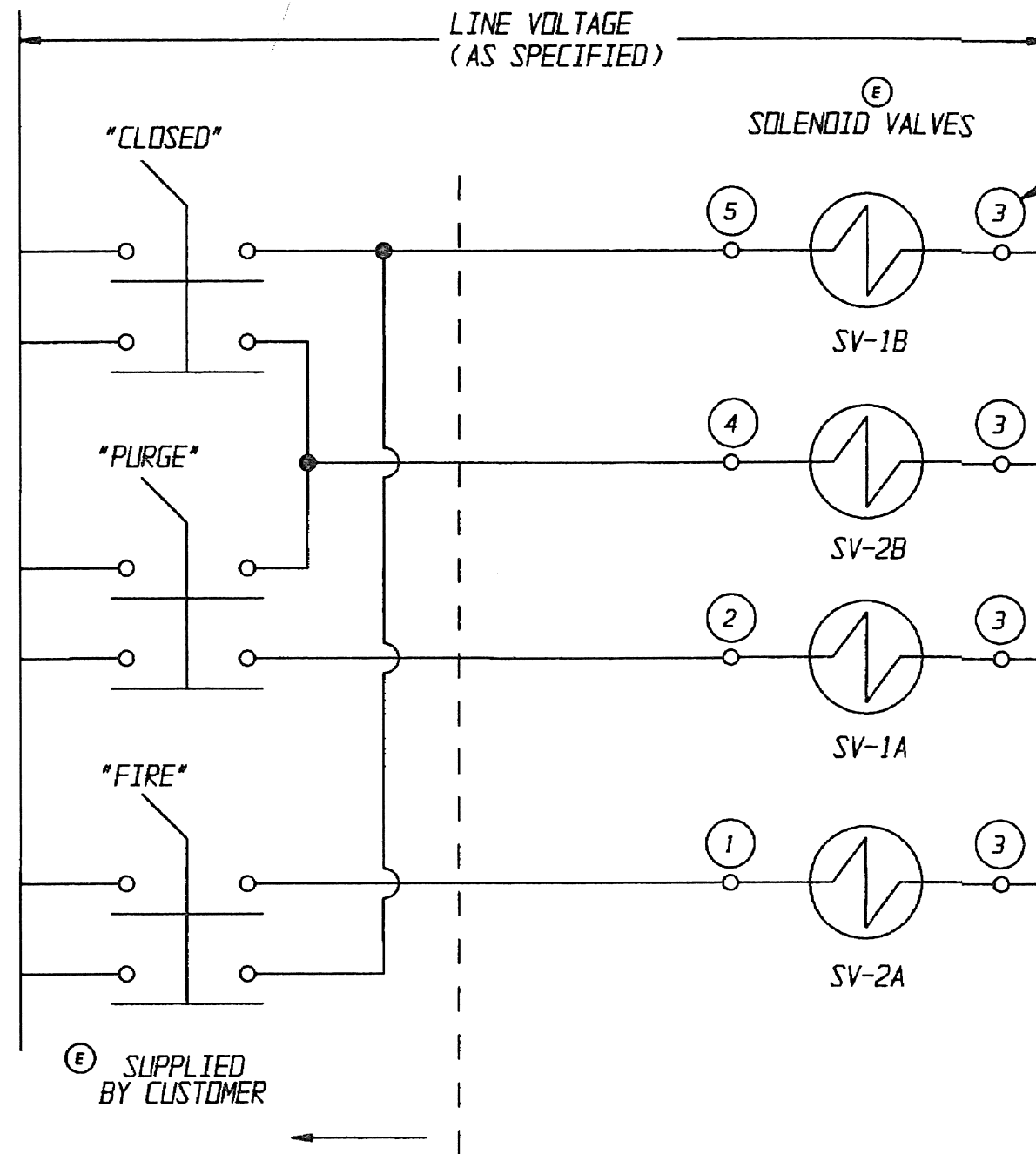
TOLERANCES
EXCEPT AS NOTED
DECIMALS
.XX ± .02
.XXX ± .005
ANGLES ±0.50°
REMOVE ALL BURRS
AND SHARP EDGES
ALL MACHINED
SURFACES TO BE
125 EXCEPT AS
NOTED

WEIGHT	SCALE	
-	-	
	DATE	BY
DWN	11/6/97	JDN
CHKD	1/21/98	MJC
APVD	1/21/98	MJC

PNEUMATIC SCHEMATIC
OIL BURNER VALVE
FAIL CLOSED
-
-
-
SUPERSEDES: -

ITT Engineered Valves
ITT Fluid Technology Corporation
Lancaster, Pa
SHEET 1 OF 1

SIZE	DRAWING NUMBER	REV
B	117486	-



SEE NOTE 8

(E) NOTES:

1. COILS SV-1A AND SV-1B FORM A DUAL COIL SOLENOID VALVE CONTROLLING PURGE FLOW.
2. COILS SV-2A AND SV-2B FORM A DUAL COIL SOLENOID VALVE CONTROLLING FUEL FLOW.
3. SWITCHES ARE MOMENTARY CONTACT TYPE.
4. O - REPRESENTS A WIRE NUMBER.
5. SEE ORDER SPECIFICATION FOR SOLENOID VOLTAGE RATING.
6. APPLICATION: ALL FAIL IN LAST OIL VALVES.
7. DO NOT ENERGIZE SOLENOID COILS SV-1A AND SV-1B OR SV-2A AND SV-2B SIMULTANEOUSLY OR SOLENOID DAMAGE CAN OCCUR.
8. WIRE MARKER NUMBERS SHOWN ARE FOR AC SOLENOIDS. SEE DRAWING 60-009 FOR DC WIRE MARKER NUMBERS.

FILE COPY

WR# -

PART NO. -

PATTERN NO. -

THIS DOCUMENT IS THE PROPERTY OF ITT ENGINEERED VALVES AND IS LOANED SUBJECT TO RETURN. IT IS ISSUED IN STRICT CONFIDENCE AND SHALL NOT BE REPRODUCED, OR COPIED, OR DISCLOSED IN WHOLE OR IN PART, OR USED AS THE BASIS FOR THE MANUFACTURE OR SALES OF APPARATUS WITHOUT THE EXPRESS WRITTEN CONSENT OF ITT ENGINEERED VALVES.

-	-	-	-	-	-
-	-	-	-	-	-
-	-	-	-	-	-
E	4/27/95	-	ZSS	MAD	MAD
D	10/90	-	JRB	-	-
REV	DATE	W.R. NBR	BY	CHKD	APVD

TOLERANCES EXCEPT AS NOTED DECIMALS
 .XX ± .02
 .XXX ± .005
 ANGLES ± 0.50°
 REMOVE ALL BURRS AND SHARP EDGES
 ALL MACHINED SURFACES TO BE 125 EXCEPT AS NOTED

WEIGHT	SCALE
-	-
DATE	BY
10/90	GCS
CHKD	JRB
10/90	JRB
APVD	

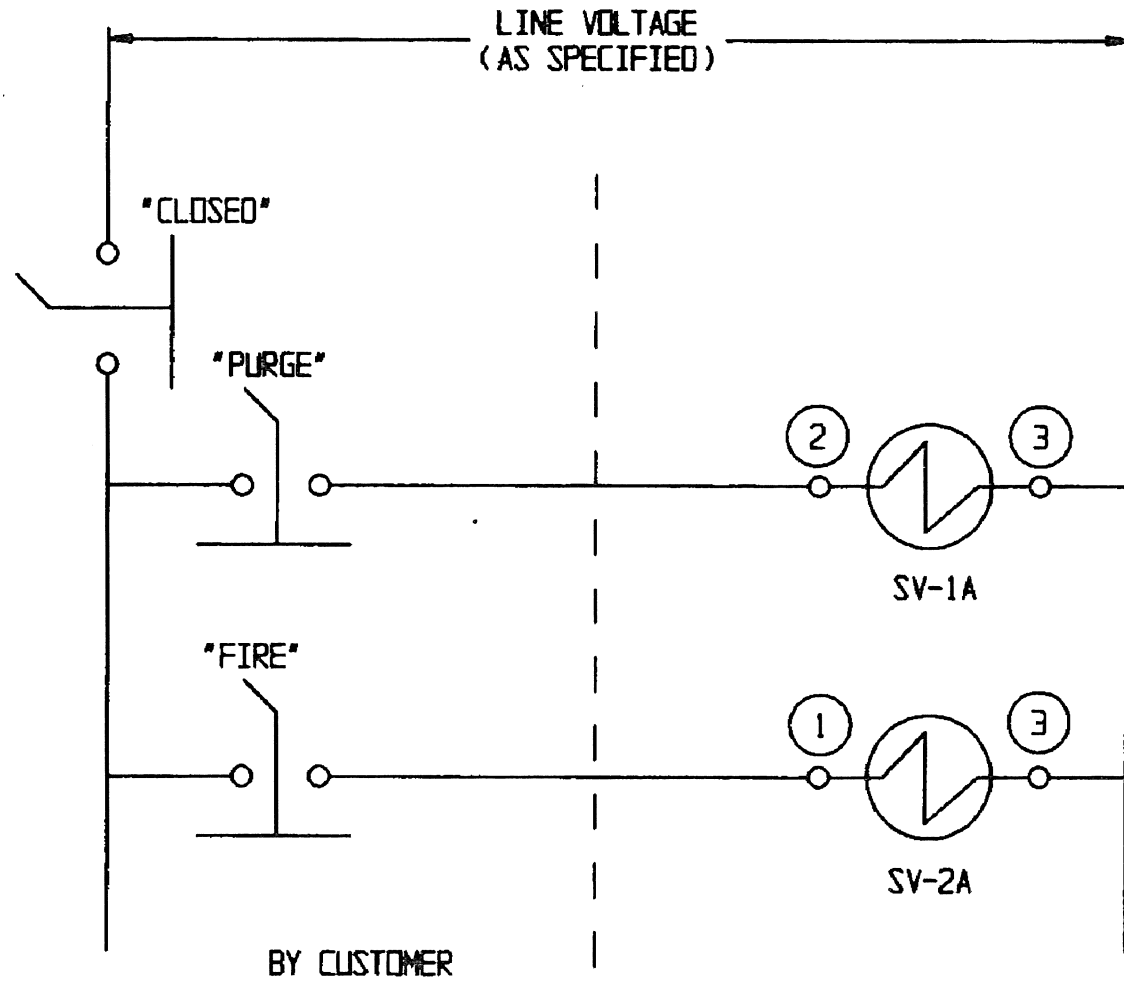
ELECTRICAL SCHEMATIC
 OIL BURNER VALVE
 PNEUMATIC - FAIL IN LAST

SUPERSEDES: -

Engineered Valves
 ITT Fluid Technology Corporation
 Lancaster, Pa
 SHEET 1 OF 1

SIZE	DRAWING NUMBER	REV
B	60-003	E

THIS DOCUMENT IS THE PROPERTY OF ITT ENGINEERED VALVES AND IS LOANED SUBJECT TO RETURN. IT IS ISSUED IN STRICT CONFIDENCE AND SHALL NOT BE REPRODUCED, OR COPIED, OR DISCLOSED IN WHOLE OR IN PART, OR USED AS THE BASIS FOR THE MANUFACTURE OR SALES OF APPARATUS WITHOUT THE EXPRESS WRITTEN CONSENT OF ITT ENGINEERED VALVES.



- NOTES: 1) SV-1A AND SV-2A ARE MANIFOLDED SINGLE COIL SPRING RETURN SOLENOID VALVES.
 2) SWITCHES ARE MAINTAINED CONTACT TYPE.
 3) ○ REPRESENTS A WIRE NUMBER.
 4) WIRE NUMBERS ARE FOR A.C. SOLENOIDS. SEE 60-009 FOR D.C. SOLENOID WIRE NUMBERS.
 5) SV-1A CONTROLS PURGE FLOW. SV-2A CONTROLS FUEL OR FUEL AND ATOMIZING FLOW.
 6) SEE ORDER SPECIFICATION FOR SOLENOID VOLTAGE RATING.

FILE COPY

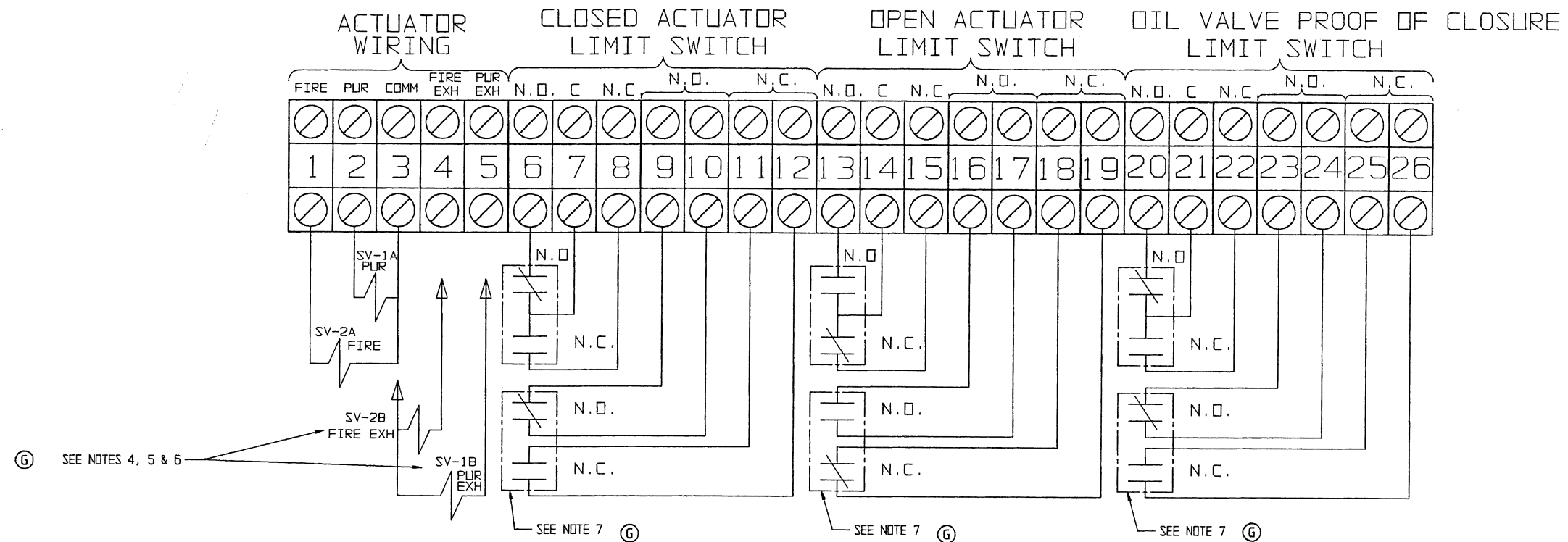
Ⓐ THIS IS A FACTORY MUTUAL CONTROLLED DOCUMENT, CHANGES MUST BE APPROVED BY FM PRIOR TO IMPLEMENTING.

WR# -

PART NO. 60-004

PATTERN NO. -

-	-	-	-	-	-	TOLERANCES EXCEPT AS NOTED DECIMALS .XX ± .02 .XXX ± .005 ANGLES ±0.50° REMOVE ALL BURRS AND SHARP EDGES ALL MACHINED SURFACES TO BE 125/ EXCEPT AS NOTED	WEIGHT N/A	SCALE N/A	ELECTRICAL SCHEMATIC OIL BURNER VALVE PNEUMATIC - FAIL CLOSED SUPERSEDES:-	ITT Engineered Valves ITT Fluid Technology Corporation Lancaster, Pa SHEET 1 OF 1	
-	-	-	-	-	-		DATE	BY			
-	-	-	-	-	-		10/90	GCS			
-	-	-	-	-	-		10/90	JRB			
A	11/03/94	1057	WRH	MMD	MMD	APVD			SIZE A	DRAWING NUMBER 60-004	REV A
REV	DATE	ECN NBR	BY	CHKD	APVD	APVD					



SWITCH LOGIC

SWITCH TYPE	CLOSED ACTUATOR (SPDT)		CLOSED ACTUATOR (DPDT)				OPEN ACTUATOR (SPDT)		OPEN ACTUATOR (DPDT)				P.D.C. (SPDT)		OIL VALVE P.D.C. (DPDT)			
TERMINALS	6-7	7-8	6-7	7-8	9-10	11-12	13-14	14-15	13-14	14-15	16-17	18-19	20-21	21-22	20-21	21-22	23-24	25-26
POSITION: CLOSE																		
POSITION: PURGE																		
POSITION: FIRE																		

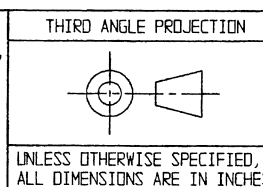
NOTES:

- SOLENOID VOLTAGE IS A.C.
- ALL SWITCHES SHOWN WITH MAIN VALVE IN CLOSED POSITION.
- SEE ORDER SPECIFICATION FOR SOLENOID VOLTAGE RATING.
- FOR T506, T1006 & T2006 DELETE SV-1B & SV-2B.
- FOR T505, T1005 & T2005 INCORPORATE SV-1B & SV-2B.
- FOR T1007 INCORPORATE SV-2B, DELETE SV-1B.
- WIRING SHOWN FOR DPDT SWITCHES. FOR SPDT SWITCHES, DELETE WIRE NO.'S 9, 10, 11, 12, 16, 17, 18, 19, 23, 24, 25 & 26.
- FOR PURGE INDICATION, WIRE N.C. CONTACTS OF OPEN ACTUATOR AND CLOSED ACTUATOR LIMIT SWITCHES IN SERIES.
- PUR = PURGE.

THIS IS A FACTORY MUTUAL CONTROLLED DOCUMENT, CHANGES MUST BE APPROVED BY FM PRIOR TO IMPLEMENTING.

ECN#8319

THIS DOCUMENT IS THE SOLE PROPERTY OF ITT INDUSTRIES, INC., OR ITS SUBSIDIARY, AND IS PROVIDED SUBJECT TO RETURN. IT IS ISSUED IN STRICT CONFIDENCE AND SHALL NOT BE REPRODUCED, OR COPIED, OR DISCLOSED IN WHOLE OR IN PART, OR USED AS THE BASIS FOR THE MANUFACTURE OR SALES OF APPARATUS OR PARTS TO WHICH THE DOCUMENT RELATES, WITHOUT THE EXPRESS WRITTEN CONSENT OF ITT INDUSTRIES, INC., OR ITS SUBSIDIARY. THIS LEGEND SHALL BE MARKED ON ANY REPRODUCTION HEREOF, IN WHOLE OR IN PART. ALL RIGHTS TO THE INFORMATION AND DESIGN DISCLOSED HEREIN ARE RESERVED TO ITT INDUSTRIES, INC., OR ITS SUBSIDIARY.



UNLESS OTHERWISE SPECIFIED, ALL DIMENSIONS IN BRACKETS ARE MILLIMETERS. PATTERN NO. -

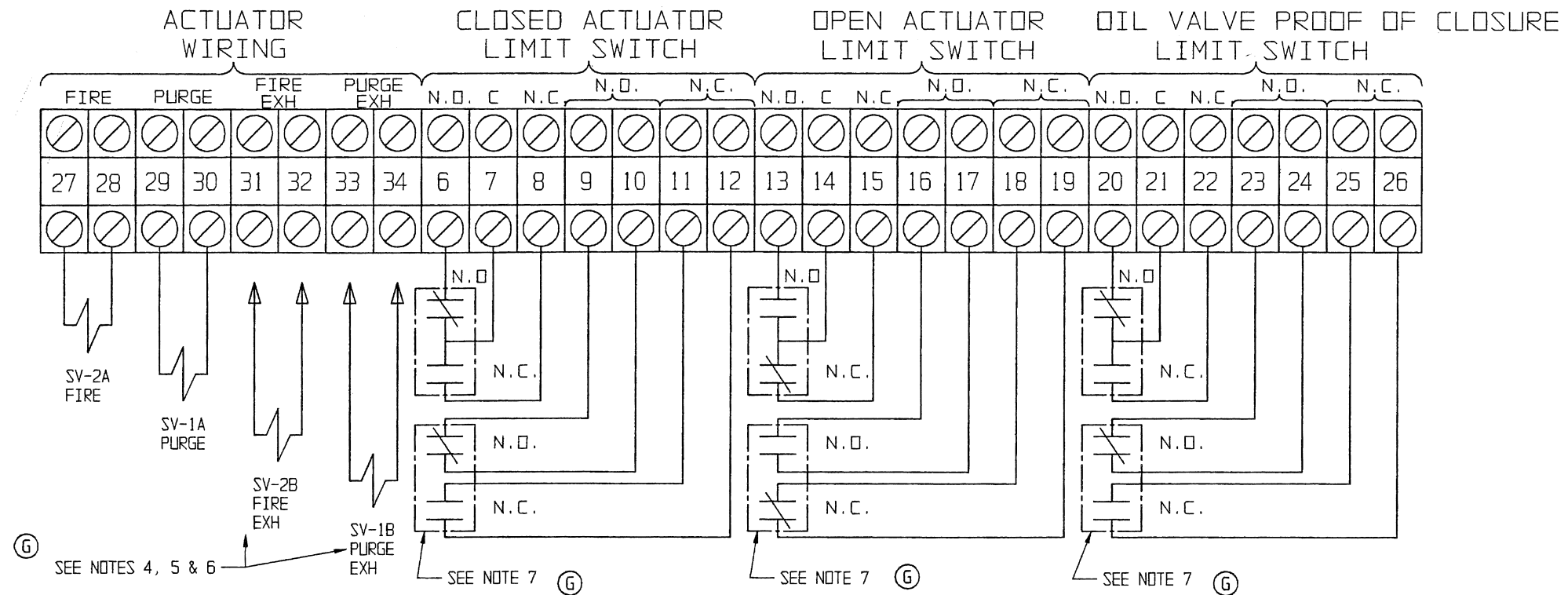
UNLESS OTHERWISE NOTED	WEIGHT	SCALE	DATE		BY
INCH	-	NTS	3-17-04	AS	
MILLIMETER			3-18-04	ACA	
APVD	3-18-04	ACA	SUPERSEDES:-		

WIRING DIAGRAM
OIL BURNER VALVE
PNEUMATIC - AC SOLENOIDS

ITT Industries
Engineered Valves
Lancaster, PA USA

SIZE	DRAWING NUMBER	SHEET	REV
C	60-008	1 OF 1	G

FILE COPY



SWITCH LOGIC

SWITCH TYPE	CLOSED ACTUATOR (SPDT)		CLOSED ACTUATOR (DPDT)				OPEN ACTUATOR (SPDT)		OPEN ACTUATOR (DPDT)				P.O.C. SPDT		OIL P.O.C. (DPDT)			
	6-7	7-8	6-7	7-8	9-10	11-12	13-14	14-15	13-14	14-15	16-17	18-19	20-21	21-22	20-21	21-22	23-24	25-26
POSITION: CLOSE	⌘	⌘	⌘	⌘	⌘	⌘	⌘	⌘	⌘	⌘	⌘	⌘	⌘	⌘	⌘	⌘	⌘	⌘
POSITION: PURGE	⌘	⌘	⌘	⌘	⌘	⌘	⌘	⌘	⌘	⌘	⌘	⌘	⌘	⌘	⌘	⌘	⌘	⌘
POSITION: FIRE	⌘	⌘	⌘	⌘	⌘	⌘	⌘	⌘	⌘	⌘	⌘	⌘	⌘	⌘	⌘	⌘	⌘	⌘

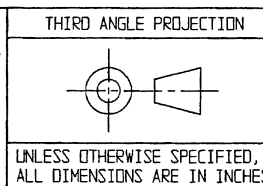
NOTES:

- SOLENOID VOLTAGE IS D.C.
- ALL SWITCHES SHOWN WITH MAIN VALVE IN CLOSED POSITION.
- SEE ORDER SPECIFICATION FOR SOLENOID VOLTAGE RATING.
- FOR T506, T1006 OR T2006, FAIL CLOSED, SV-1B & SV-2B (EXHAUST COILS) ARE NOT SUPPLIED. SOLENOIDS REQUIRE MAINTAINED CONTACT SWITCHES.
- FOR T505, T1005 OR T2005, FAIL IN LAST POSITION, SV-1B & SV-2B (EXHAUST COILS) ARE SUPPLIED. SOLENOIDS REQUIRE MOMENTARY CONTACT SWITCHES.
- ⓐ FOR T1007, FAIL IN LAST FIRE, FAIL CLOSED PURGE, SV-1B (EXHAUST COIL) IS NOT SUPPLIED. PURGE SOLENOID REQUIRES MAINTAINED CONTACT SWITCH, FIRE SOLENOID REQUIRES MOMENTARY CONTACT SWITCH.
- ⓑ WIRING SHOWN FOR DPDT SWITCHES FOR SPDT SWITCHES DELETE WIRE NO'S 9, 10, 11, 12, 16, 17, 18, 19, 23, 24, 25, 26.
- ⓒ FOR PURGE INDICATION, WIRE N.C. CONTACTS OF OPEN ACTUATOR AND CLOSED ACTUATOR LIMIT SWITCHES IN SERIES.

THIS IS A FACTORY MUTUAL CONTROLLED DOCUMENT. CHANGES MUST BE APPROVED BY FM PRIOR TO IMPLEMENTING.

ECN#8319

THIS DOCUMENT IS THE SOLE PROPERTY OF ITT INDUSTRIES, INC., OR ITS SUBSIDIARY, AND IS PROVIDED SUBJECT TO RETURN. IT IS ISSUED IN STRICT CONFIDENCE AND SHALL NOT BE REPRODUCED, OR COPIED, OR DISCLOSED IN WHOLE OR IN PART, OR USED AS THE BASIS FOR THE MANUFACTURE OR SALES OF APPARATUS OR PARTS TO WHICH THE DOCUMENT RELATES, WITHOUT THE EXPRESS WRITTEN CONSENT OF ITT INDUSTRIES, INC., OR ITS SUBSIDIARY. THIS LEGEND SHALL BE MARKED ON ANY REPRODUCTION HEREOF, IN WHOLE OR IN PART. ALL RIGHTS TO THE INFORMATION AND DESIGN DISCLOSED HEREIN ARE RESERVED TO ITT INDUSTRIES, INC., OR ITS SUBSIDIARY.



UNLESS OTHERWISE NOTED

INCH	MM
X = ± 0.06	[X] = ± [.76]
.X = ± 0.03	[.X] = ± [.5]
.XX = ± 0.02	[.XX] = ± [.25]
.XXX = ± 0.005	[.XXX] = ± [.125]
X° = ± 1/16	X° = ± 1/16
X° = ± 5°	X° = ± 5°

REMOVE ALL BURRS AND SHARP EDGES. MACHINED SURFACES TO BE 15° EXCEPT AS NOTED.

UNLESS OTHERWISE SPECIFIED, ALL DIMENSIONS IN BRACKETS ARE MILLIMETERS. PATTERN NO. -

WEIGHT	SCALE	DATE	BY
-	NTS	3-17-04	AS
CHKD	APVD	3-18-04	AL

WIRING DIAGRAM
OIL BURNER VALVE
PNEUMATIC - DC SOLENOIDS

ITT Industries
Engineered Valves
Lancaster, PA USA

SIZE	DRAWING NUMBER	SHEET	REV
C	60-009	1 OF 1	G

SUPERSEDES: -

FILE COPY