



**TEMPTRONIC**  
*an inTEST Company*

4 Commercial Street, Sharon, MA 02067-1653 U.S.A.  
Tel: (781) 688-2300 Fax: (781) 688-2301  
<http://www.temptronic.com>

**Part Number:** LM02290

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## TP04300 Series ThermoStream®



## Service Manual

**Revision A.**  
**April 2005**

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# Preface

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## Copyright 2005 by Temptronic Corporation

### *Notice*

Patents have been granted and/or patent applications are pending or are in process of preparation on all our developments.

This product was manufactured under one or more of the following U.S. patents: 4,426,619; 4,491,173; 4,734,872 and 4,784,213.

The material in these instructions is for informational purposes and is subject to change without notice.

*Printed in U.S.A.*

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## To Our Customers

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### **This Manual**

The purpose of this manual is to help obtain the greatest return on your investment. Temptronic suggests that operators, supervisors, and technicians responsible for operating and maintaining this equipment become familiar with the contents of these manuals prior to using the equipment.

This Service Manual is for use on TP04300 Systems with serial number 05010840 and later. Systems manufactured earlier than this

The Manual includes safety information, a machine overview, process troubleshooting, remove and repair procedures, and a list of error messages.

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### **Other Manuals in the Set**

Following is the complete list of manuals which make up this information set

<b>Manual Name</b>	<b>Part Number</b>
<i>TP04300 Operator's Manual</i>	LM01970
<i>TP04300 Interface and Applications Manual</i>	LM01980
<i>TP04300 Service Manual</i>	LM02290

## Temptronic Support

### Introduction

Temptronic is committed to assisting end users and technicians to maintain operational systems which are highly reliable. Temptronic offers the following support services.

### Customer Training

Formal technical training courses are available. The training courses cover the theory of operation and the maintenance procedures for the System. For further information, contact the Temptronic Service Department.

### Repair Service

Temptronic maintains a fully equipped repair center at the factory plant for warranty and non-warranty repairs. For further information on module and circuit board repairs, our exchange program, and the availability of spare parts, contact the Temptronic Service Department.

Before returning any module or circuit board for repair, contact the Temptronic Service Department to obtain a return authorization (RA) number.

### Spare Parts

Electrical and mechanical replaceable parts for the System can be obtained through your local Temptronic representative, or directly from the Temptronic Service Department. When ordering, be sure to specify the:

- Quantity
- Temptronic part number
- Description
- Reference designation (if any)
- Complete model number and serial number of your system

For your convenience, Spare Parts Kits are available for different levels of service activity.

### Technical Support

Contact the Temptronic Service Department by one of the following means:

Temptronic Technical Support	
1-800 558-5080	Toll Free Telephone (service calls only)
service@temptronic.com	e-Mail Address
781 688-2302	Service FAX line
781 688-2300	Temptronic Corp. Main Telephone line



### ATTENTION

1. Please note that the 1-800 toll free telephone number is dedicated to Service Department calls only. It is not possible to dial this number and to transfer to other departments within Temptronic.
2. The main telephone number, 781 688-2300, should be used for non-service related calls.

## Before You Call

### Introduction

You can help us support your machine in timely fashion by having on hand specific information when calling in:

- Software Version
- System Model Number

### System Model Number

A modular system design allows the customer to select options or features as desired for a given installation or application

The System Model Number Designation, printed on the TP04300 nameplate, reflects the configuration at time of shipment:

### TP04300A Name Plate

#### System Configuration

**TP04300 A - 3 [ ] 3 2 - [ ]**

Feature	Code	Description
Temperature Range	A	-80° to +225°C (See Note 1)
Thermal Head	3	Quick Response
Arm Assembly	C	Fully articulated for wide range of motion, manual locking
	0	No arm, head with 4 foot hose
	1	No arm, head with 8 foot hose
Operator Console/Display	3	Full color graphic display with touch-screen control
Power Configuration (See Note 2)	2	235-250 VAC, 60 Hz, 30 amp
	4	200-214 VAC, 60 Hz, 30 amp
	6	215-224 VAC, 60 Hz, 30 amp
	8	225-234 VAC, 60 Hz, 30 amp

Note 1: Performance is affected by arm, supply air and power configuration.

Note 2: ACTUAL voltage and frequency must be defined at time of order ( 230 VAC nominal).

**TP04300B Name  
Plate**

**System Configuration**

**TP04300 B - 3 X 3 2 - □**

Feature	Code	Description
Head Option	B	Internal Head (See Note 1)
Heater	3	Quick Response
Arm Assembly	X	No arm
Operator Console/ Display	3	Full color graphic display with touchscreen control
Power Configuration (See Note 2)	2	235-250 VAC, 60 Hz, 30 amp
	4	200-214 VAC, 60 Hz, 30 amp
	6	215-224 VAC, 60 Hz, 30 amp
	8	225-234 VAC, 60 Hz, 30 amp

Note 1: Performance is affected by supply air and power configuration.

Note 2: ACTUAL voltage and frequency must be defined at time of order ( 230 VAC nominal ).



# Safety

## Chapter Overview

### Introduction

This Chapter covers all the safety Warnings and Cautions for the *TP04300 Series ThermoStream*.

### In this Chapter

This Chapter is divided into the following Sections:

Section	See Page
Safety Precautions, Warnings, Cautions	2
CONSIGNES DE SÉCURITÉ POUR LE PERSONNEL EXPLOITANT	7
RHEITSHINWEISE FÜR BEDIENUNGSPERSONAL	12
PRECAUCIONES DE SEGURIDAD PARA EL PERSONAL DE OPERACIONES	16
Säkerhets Föreskrifter och Varningar, Varsamhet	20

# Section A: Safety Precautions, Warnings, Cautions

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## Warnings



### **WARNING**

**WARNING:** Refer to Accompanying Documentation

---



### **Electrical Hazard**

**WARNING:** High Voltage, Electrical Shock Hazard

---



### **Hot Surface**

**WARNING:** Hot Surface

---



### **Cold Surface**

**WARNING:** Cold Surface

---

**WARNING 1:** The locations of potentially dangerous voltages and other hazards such as hot surfaces or cold surfaces or compressed air/gases/vapors at high pressures are identified and labeled on the equipment. Be careful to observe these warnings when installing, operating, maintaining, or servicing the equipment. Observe all warnings given in this manual. Only use the equipment for the intended usages specified by the manufacturer.

**WARNING 2:** The troubleshooting instructions contained in this manual can involve a possible contact with electrical power at high voltages, compressed air at high pressures, and refrigerants at high or vacuum pressures. These hazards can be injurious or dangerous to life. Do not perform these instructions unless you qualify to do them.

**WARNING 3:** To avoid shock hazard, the equipment must be grounded with an adequate earth ground per local electrical codes.

**WARNING 4:** When connecting thermocouple sensors to the Device Under Test (DUT), electrically isolate the sensors to protect operators from contact with any hazardous voltages which could be present at the DUT site.

**WARNING 5:** Parts inside the thermal head operate at extremely hot and cold temperatures and are dangerous to touch. Do not perform any maintenance inside the thermal head until the system is turned off. Wait until the head parts have reached a safe and stable temperature near ambient.

**WARNING 6:** Keep your fingers out of the space between the thermal cap on the head and the DUT site during the up/down motion of the System's thermal head.

**WARNING 7:** Per SEMI S2-93A, energized electrical work (“Hot Work”) is specified by Type as follows:

TYPE	DESCRIPTION (per SEMI S2-93A)	EXPOSURE THRESHOLD
1	Fully de-energized (electrically “cold.”)	n.a.
2	Live circuits, covered or insulated. Work performed at remote location to preclude accidental shock.	n.a.
3	Live circuits exposed. Accidental contact is possible.	<= 30v RMS, 42.2v peak, 240 volt-amps, and 20 Joules
4	Live circuits exposed. Accidental contact is possible.	> 30v RMS, 42.2v peak, 240 volt-amps, and 20 Joules
5	Energized. Measurements & adjustments require physical entry, or equipment configuration does not allow use of clamp-on probes.	n.a.

**WARNING 8:** Where equipment must be fully de-energized (electrically “cold”) to allow safe entry into system, the following Lockout/Tagout procedure is required per OSHA 29 CFR 1910: a) For devices with a power cord which “unplugs” from a service receptacle, the end user must supply and tag a Plug lockout shell which completely encloses the plug and prevents accidental reconnection; b) for devices hardwired to the electrical supply, the end user must install and tag a power disconnect switch with a lock out position, or install and tag a circuit breaker with a lock out position, to prevent accidental reconnection.

**WARNING 9:** To de-energize the System for safe replacement of a module, turn off the ac power (cease operations and power down), then turn off the System’s air pressure supply, then bleed all air from System by turning on ac power just long enough to exhaust all air from System. Now disconnect both the main power supply cord and disconnect the air supply line from air supply port fitting on the rear frame module. The only stored energy remaining in the System will then be that within some electrical capacitors. One large capacitor is near the System’s air-chiller compressor. Other large capacitors are in the System’s electrical power supplies.

**WARNING 10:** If service of the Air Chiller Module is required, only a licensed (and/or EPA Certified) refrigeration service person, authorized by the Temptronic Corporation, is qualified to perform any charging or handling of the refrigerants in the System.

**WARNING 11:** Under no circumstances (leak testing or any other purpose) is the Air Chiller Module to be charged with any gas at a pressure above 150 psig (10.34 bar).

**WARNING 12:** The Air Chiller Module acts as a counterbalance for the Thermal Head Assembly. Before removing the Air Chiller Module, make sure the horizontal arm is down on the vertical C-arm at its lower limit, and the thermal head is in next to the horizontal arm and stowed toward the rear of the machine. Use appropriate weight lifting equipment when removing/servicing the Air Chiller module.

**WARNING 13:** Two persons are required when removing (or installing) the thermal head assembly at the end of the horizontal arm. One person must lift the thermal head assembly by the head’s front handles, using both hands, while the other person loosens (or tightens) the pivot lock.

**WARNING 14:** To prevent high-pressure ejection of condensate (which may or may not contain injurious substances) when draining moisture from the air filter elements, first turn off the System's air pressure supply, second bleed all air from the System by turning on ac power to the System just long enough to exhaust air in the System, third disconnect the supply line from the air supply port fitting located on the rear panel.

**WARNING 15:** When cleaning condenser air inlet fins, (access fins by removing front panel) use soft brush and/or vacuum cleaner, taking care not to bend inlet fins; as fins have sharp edges, to prevent getting cut, wear protective gloves and/or do not touch inlet fins directly with fingers.

**WARNING 16:** Only use the coolants (heat transfer fluids) and refrigerants specified by the manufacturer: they are carefully engineered to be safe for operating personnel, to be friendly to the environment, to operate efficiently, and to not harm the equipment. Do not substitute unauthorized coolants and refrigerants, nor mix (add) in unauthorized coolants or refrigerants: doing so can cause warranties to be voided. Wear protective safety eye glasses, gloves, and apron when filling coolants and refrigerants. Temptronic assumes no liability for damages caused by use of unauthorized coolants and refrigerants.

---

## Cautions



### CAUTION

CAUTION: Refer to Accompanying Documentation



### Electrical Hazard

CAUTION: High Voltage, Electrical Shock Hazard



### Hot Surface

CAUTION: Hot Surface



### Cold Surface

CAUTION: Cold Surface

**CAUTION 1:** Observe the precautions given on the equipment and within this manual to prevent damage to the equipment. Only use the equipment for the intended usages specified by the manufacturer.

**CAUTION 2:** Unauthorized personnel should not remove from the equipment those panels which are provided for protection and/or cooling and/or require a tool to remove.

**CAUTION 3:** Use proper handling and packaging procedures for static-sensitive circuit boards. Assume that all circuit boards are the static-sensitive type.

**CAUTION 4:** Before connecting the equipment to its electrical source, check that the ~ (ac) voltage and frequency to be supplied to the system are correct for those listed on the system's data plate (located on the rear panel of the equipment).

**CAUTION 5:** Disconnect the system's power cord from its service supply before checking or replacing any back-up batteries.

**CAUTION 6:** Be very careful to avoid damaging the two thermocouples which go from the Head thermal cutout board into the main air stream through various connector/supports. These thermocouples are very delicate. Do not cut, twist, or bend them as internal connections can be broken.

**CAUTION 7:** The weight of the Air Chiller Module is about 175 pounds (79.5 kg), and counterbalances (is used to stabilize) the System's frame when the thermal head is extended on the horizontal arm. If removing the Air Chiller module: a) be careful that the system remains stable (upright) after the module is removed, b) use appropriate weight lifting equipment when removing/servicing the Air Chiller module.

**CAUTION 8:** When removing the flow control board, be extremely careful to avoid flexing the board when disconnecting the inlet and outlet air hoses. Even a slight flexing of the board can damage delicate components and/or wiring on the board.

**CAUTION 9:** When making the system air connection to the System, hold the AIR INPUT fitting with a second wrench while tightening the barb fitting to prevent the AIR INPUT fitting from rotating in the panel.

**CAUTION 10:** Use suitable Clean Dry Air (CDA) compressed air supply for the System: a) to prevent premature fouling of the filters/regulator assemblies provided with the System, b) to prevent ice forming from within the cooling module and possibly reducing or obstructing output air flow. Improper air supply quality can cause damage to System internal operating components.

**CAUTION 11:** Properly use and maintain the provided filters/regulator assemblies. Doing so prevents moisture and/or compressor oils from being introduced into System operating components. If left unchecked, moisture and/or compressor oil can cause damages to the System which are not covered under warranty.

**CAUTION 12:** To loosen the linear actuator assembly (approximately 3 feet long), first elevate the system high enough to allow the actuator to drop down clear (use a fork lift truck). Then loosen the actuator from the rear of the system. Do not position yourself beneath (it is not necessary to be under) the elevated system.

---

## Section B: CONSIGNES DE SÉCURITÉ POUR LE PERSONNEL EXPLOITANT

### AVERTISSEMENT



#### WARNING

AVERTISSEMENT: Attention



#### Electrical Hazard

AVERTISSEMENT: Haute tension



#### Hot Surface

AVERTISSEMENT: Surface chaude



#### Cold Surface

AVERTISSEMENT: Surface froide

**AVERTISSEMENT 1:** Des tensions potentiellement dangereuses ainsi que d'autres risques, tels que la présence de surfaces chaudes ou froides ou d'air comprimé/gaz/vapeurs sous forte pression existent à certains endroits du système. Ceux-ci sont identifiés et signalés sur le matériel. Observer soigneusement ces avertissements durant l'installation, l'exploitation, la maintenance et le dépannage du matériel. Respecter également tous les avertissements énoncés dans ce manuel. Utiliser le matériel uniquement aux fins spécifiées par le fabricant.

**AVERTISSEMENT 2:** Les instructions de dépannage contenues dans ce manuel peuvent exposer le personnel à des tensions élevées, à de l'air comprimé sous forte pression et à des réfrigérants sous forte pression ou pression négative. Ces dangers peuvent entraîner des blessures graves, voire mortelles. Ne pas exécuter ces instructions si l'on ne dispose pas des qualifications nécessaires.

**AVERTISSEMENT 3:** Pour éviter tout risque de choc électrique, le matériel doit être mis à la terre en utilisant une prise de terre adéquate, conformément aux codes électriques en vigueur.

**AVERTISSEMENT 4:** Lors du raccordement des capteurs de thermocouples à l'appareil à tester (DUT), isoler électriquement les capteurs de manière à protéger les opérateurs de toute tension dangereuse pouvant exister au niveau du DUT.

**AVERTISSEMENT 5:** Les pièces à l'intérieur de la tête thermique fonctionnant à des températures très élevées ou très basses, tout contact avec ces pièces est dangereux. N'effectuer aucune maintenance à l'intérieur de la tête thermique tant que le système n'est pas arrêté. Attendre que la température des pièces de la tête se soit stabilisée aux environs de la température ambiante.

**AVERTISSEMENT 6:** Pendant la montée ou la descente de la tête thermique du système, ne pas mettre les doigts dans l'espace compris entre le capuchon thermique de la tête et l'appareil à tester.

**AVERTISSEMENT 7:** Conformément au SEMI S2-93A, les installations électriques sous tension sont spécifiées par type comme suit:

TYPE	DESCRIPTION (per SEMI S2-93A)	EXPOSURE THRESHOLD
1	Hors tension	s.o.
2	Circuits sous tension, protégés ou isolés. Exécution des travaux à distance afin d'éviter tout choc électrique.	s.o.
3	Circuits sous tension exposés. Risque de contact accidentel	<= 30 V efficaces, 42,2 V crête, 240 VA, et 20 J
4	Circuits sous tension exposés. Risque de contact accidentel.	>30 V efficaces, 42,2 V crête, 240 VA, et 20 J
5	Sous tension. Les mesures et les réglages exigent un accès physique aux circuits ou l'agencement de l'équipement ne permet pas l'utilisation de sondes à pince.	s.o.

**AVERTISSEMENT 8:** Lorsqu'on doit mettre l'équipement hors tension pour pouvoir accéder sans danger aux circuits, l'OSHA 29 CFR 1910 prescrit la procédure de verrouillage et d'étiquetage suivante : a) Dans le cas des appareils comportant un cordon d'alimentation que l'on débranche d'une prise d'alimentation, l'utilisateur final doit fournir et étiqueter un boîtier verrouillable qui enveloppe complètement la prise et empêche tout rebranchement accidentel ; b) Dans le cas des appareils reliés par cordon à l'alimentation électrique, l'utilisateur final doit poser et étiqueter soit un sectionneur à position de verrouillage, soit un disjoncteur à position de verrouillage, afin d'empêcher tout rebranchement accidentel.

**AVERTISSEMENT 9:** Pour désactiver le système de manière à remplacer un module sans risques, couper l'alimentation alternative (arrêt du fonctionnement et mise hors tension), puis couper l'alimentation pneumatique et purger le système en rétablissant l'alimentation alternative juste le temps nécessaire pour évacuer tout l'air présent. Débrancher alors le cordon d'alimentation principal et déconnecter la conduite d'alimentation pneumatique du raccord d'alimentation pneumatique situé sur le module arrière du châssis. La seule énergie alors présente dans le système est celle emmagasinée dans des condensateurs électriques. Un gros condensateur est situé près du compresseur du refroidisseur d'air du système. D'autres gros condensateurs sont intégrés aux alimentations électriques du système.

**AVERTISSEMENT 10:** Si l'on doit intervenir sur le module du refroidisseur d'air, seul un dépanneur en réfrigération breveté (et/ou certifié par l'EPA) agréé par Temptronic Corporation est qualifié pour manipuler les réfrigérants et recharger le système.

**AVERTISSEMENT 11:** En aucun cas (essai d'étanchéité ou toute autre situation) on ne doit charger le module du refroidisseur d'air avec un gaz à une pression supérieure à 10,34 bars.

**AVERTISSEMENT 12:** Le module de refroidissement d'air sert de contrepoids à la tête thermique. Avant de déposer ce module, s'assurer que le bras horizontal est abaissé au maximum sur le bras vertical en « C » et que la tête thermique est à proximité du bras horizontal et repoussée vers l'arrière de la machine. Utiliser un matériel de levage adéquat pour la dépose et l'entretien du module de refroidissement d'air.

**AVERTISSEMENT 13:** Deux personnes sont requises pour déposer (ou installer) la tête thermique à l'extrême du bras horizontal. Une personne soulève la tête thermique en saisissant des deux mains les poignées situées à l'avant de la tête pendant que l'autre personne serre (ou desserre) le dispositif de blocage du pivot.

**AVERTISSEMENT 14:** Pour éviter une éjection violente du condensat (qui peut ou non contenir des substances nocives) lorsque l'on évacue l'eau accumulée dans les éléments filtrants du filtre à air, procéder comme suit : 1) couper l'alimentation pneumatique du système ; 2) purger complètement le système en le mettant sous tension juste le temps nécessaire pour évacuer tout l'air présent ; 3) déconnecter la conduite d'alimentation pneumatique du raccord d'alimentation pneumatique situé sur le panneau arrière du châssis.

**AVERTISSEMENT 15:** Lors du nettoyage des ailettes d'admission d'air du condenseur (accessibles en déposant le panneau avant), utiliser une brosse douce et/ou un aspirateur en veillant à ne pas déformer ces ailettes ; les ailettes ayant des bords acérés, porter des gants protecteurs pour ne pas se couper et/ou ne pas toucher les ailettes directement avec les doigts.

**AVERTISSEMENT 16:** N'utiliser que les liquides de refroidissement (fluides caloporteurs) et les réfrigérants spécifiés par le fabricant : ils sont spécialement conçus pour la sécurité du personnel et la protection de l'environnement et pour offrir un bon rendement d'exploitation et ne pas endommager le matériel. Ne pas leur substituer des liquides de refroidissement ou réfrigérants non autorisés, ni les mélanger avec de tels liquides ou réfrigérants : ceci entraînera une annulation des garanties. Porter des lunettes, des gants et un tablier de protection durant les remplissages avec ces liquides et réfrigérants. Temptronic n'accepte aucune responsabilité en cas de dommages dus à l'emploi de liquides de refroidissement et réfrigérants non autorisés.

## ATTENTION



### CAUTION

**ATTENTION:** Attention



### Electrical Hazard

**AVERTISSEMENT:** Haute tension



### Hot Surface

**AVERTISSEMENT:** Surface chaude



### Cold Surface

**AVERTISSEMENT:** Surface froide

**ATTENTION 1:** Se conformer aux mesures de sécurité figurant sur le matériel et dans ce manuel pour ne pas endommager le matériel. N'utiliser le matériel qu'aux fins spécifiées par le fabricant.

**ATTENTION 2:** Seul le personnel autorisé est habilité à déposer les panneaux de refroidissement et/ou de protection et/ou ceux dont la dépose exige l'emploi d'un outil.

**ATTENTION 3:** Respecter les procédures de manutention et d'emballage applicables aux cartes de circuit imprimé sensibles à l'électricité statique. Considérer a priori que toutes les cartes sont sensibles à l'électricité statique

**ATTENTION 4:** Avant de raccorder le matériel à son alimentation électrique, s'assurer que la tension alternative ~ et la fréquence fournies au système correspondent à celles indiquées sur la plaque signalétique (située sur le panneau arrière).

**ATTENTION 5:** Débrancher le cordon d'alimentation du système de sa source d'alimentation avant de vérifier ou de remplacer les batteries de secours.

**ATTENTION 6:** Veiller soigneusement à ne pas endommager les deux thermocouples allant de la découpe thermique de la tête au flux d'air principal par l'intermédiaire de différents supports et connecteurs. Ces thermocouples sont très fragiles. Ne pas les couper, les tordre ou les plier car cela risque de rompre leurs connexions internes.

**ATTENTION 7:** Le module de refroidissement d'air pèse environ 79,5 kg, et il sert de contrepoids (de stabilisation) au châssis du TP04200A lorsque la tête thermique est déployée sur le bras horizontal. Si l'on dépose le module de refroidissement d'air : a) veiller à ce que le système reste stable (vertical) une fois le module déposé, b) utiliser un matériel de levage adéquat pour faire la dépose/l'entretien du module de refroidissement d'air.

**ATTENTION 8:** Lors de la dépose de la carte de régulation du débit, éviter soigneusement de plier la carte lors du débranchement des tuyaux d'arrivée et de sortie d'air. Une légère flexion de la carte suffit pour endommager ses composants délicats et/ou son câblage.

**ATTENTION 9:** Lorsque l'on raccorde l'alimentation pneumatique au système, serrer le raccord cannelé tout en agrippant le raccord AIR INPUT (d'ALIMENTATION EN AIR) avec une seconde clé pour éviter qu'il ne tourne dans le panneau.

**ATTENTION 10:** Utiliser un air comprimé sec et propre (CDA) convenable : a) pour éviter un encrassement prématûr des filtres et détendeurs équipant le système, b) pour éviter tout givrage à l'intérieur du module de refroidissement, susceptible de réduire ou de bloquer même l'écoulement d'air en sortie. Une alimentation pneumatique de qualité inadéquate risque d'endommager les composants internes du système.

**ATTENTION 11:** Utiliser et entretenir comme il convient les filtres/détendeurs fournis. Ceci protège les composants du système d'une contamination éventuelle par de l'humidité et/ou les huiles de compresseur. Si l'on ne surveille pas la situation, cette humidité et ces huiles de compresseur peuvent endommager le système, les dommages n'étant pas couverts par la garantie.

**ATTENTION 12:** Pour desserrer l'actionneur linéaire (environ 92 cm de long), relever tout d'abord suffisamment le système pour faire descendre et dégager l'actionneur (utiliser un chariot élévateur). Puis desserrer l'actionneur de l'arrière du système. Ne pas se placer en dessous du système relevé, car cela n'est pas nécessaire.

**ATTENTION 19:** Si un assécheur d'air optionnel est installé, les filtres/détendeurs fournis doivent être utilisés et entretenus comme il convient, afin d'éviter une infiltration d'eau ou d'huile de compresseur dans les composants du système. Si l'on ne surveille pas la situation, l'humidité et/ou les huiles de compresseur peuvent endommager le système, ces dommages n'étant pas couverts par la garantie.

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## Section C: RHEITSHINWEISE FÜR BEDIENUNGSPERSONAL

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### WARNUNG



#### WARNING

WARNUNG: Attention

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#### Electrical Hazard

WARNUNG: Haute tension

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#### Hot Surface

WARNUNG: Surface chaude

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#### Cold Surface

WARNUNG: Surface froide

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**WARNUNG 1:** Potentielle Hochspannungsstellen und andere Gefahrenzonen, wie heiße oder kalte Oberflächen bzw. unter Hochdruck stehende Druckluft, Gase oder Dämpfe, sind am Gerät markiert und mit einer Kurzbeschreibung versehen. Diese Warnungen müssen bei der Installation, beim Betrieb, der Instandhaltung und Wartung des Geräts genau beachtet werden. Alle im vorliegenden Handbuch gegebenen Warnungen müssen beachtet werden. Das Gerät darf nur für die vom Hersteller angegebenen Verwendungszwecke benutzt werden.

**WARNUNG 2:** Die im vorliegenden Handbuch enthaltenen Anweisungen zur Störungsbehebung können u.U. zum Kontakt mit Hochspannungen, unter Hochdruck stehender Druckluft und unter Hoch- oder Vakuumdruck stehenden Kältemitteln führen. Dabei können Verletzungs- und Lebensgefahren entstehen. Diese Anweisungen dürfen daher nur von qualifiziertem Personal ausgeführt werden.

**WARNUNG 3:** Das Gerät muss lokalen Vorschriften entsprechend angemessen geerdet sein, um Elektroschockgefahren zu vermeiden.

**WARNUNG 4:** Beim Anschluss von Thermoelement-Sensoren an das Testgerät (DUT), die Sensoren elektrisch isolieren, um die Bediener vor einem Kontakt mit potentiell lebensgefährlichen Spannungen im DUT-Bereich zu schützen.

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**WARNUNG 5:** Im Thermalkopf befindliche Teile werden während des Betriebs extrem heiß und kalt; es besteht daher Berührungsgefahr. Wartungsarbeiten im Thermalkopf dürfen nur durchgeführt werden, wenn das System ausgeschaltet ist. Warten Sie, bis die Teile im Thermalkopf eine sichere und beständige Temperatur, nahe der Raumtemperatur erreicht haben.

**WARNUNG 6:** Während der Auf- und Abbewegung des Thermalkopfes TP04200A die Finger vom Zwischenraum zwischen der Thermalkappe am Kopf und dem DUT-Bereich fern halten.

**WARNUNG 7:** Gemäß SEMI S2-93A werden stromführende Elektroarbeiten („Hot Work“) wie folgt nach Typen eingestuft:

TYP	BESCHREIBUNG (gemäß SEMI S2-93A)	AUSSETZUNGSGRENZE
1	Vollkommen spannungsfrei (elektrisch „kalt“)	Unzutreffend
2	Spannungsführende Leitungen, bedeckt oder isoliert. Fernbetrieb zur Vermeidung von Unfällen.	Unzutreffend
3	Spannungsführende Leitungen, offenliegend. Unfallmöglichkeit.	<= 30V effektiver Mittelwert; 42,2V Spitze; 240 Volt-Amp und 20 Joules
4	Spannungsführende Leitungen, offenliegend. Unfallmöglichkeit.	> 30V effektiver Mittelwert; 42,2V Spitze; 240 Volt-Amp und 20 Joules
5	Stromführend. Messwerte und Einstellungen erfordern manuelle Eingabe, bzw. Gerätekonfiguration macht Benutzung von Strommesszangen unmöglich.	Unzutreffend

**WARNUNG 8:** Gerät, das vollkommen spannungsfrei (elektrisch „kalt“) sein muss, um sicheren Zugang zum System zu gewährleisten, erfordert nach den Vorschriften der U.S. Betriebssicherheits und -gesundheitsbehörde OSHA 29 CFR 1910 folgende Verschluss- und Markierungsvorgänge: a) Für Geräte mit einer Stromschnur, die von einer Steckdose abgezogen werden, muss der Endbenutzer eine Steckerhülle bereitstellen und markieren, die den Stecker vollkommen umschließt und einen versehentlichen Wiederanschluss verhindert; b) Für Geräte mit festverdrahtetem Stromanschluss muss der Endbenutzer einen Unterbrechungsschalter mit einer Verriegelungsposition installieren und markieren bzw. einen Sicherungsautomaten mit einer Verriegelungsposition installieren und markieren, um einen versehentlichen Wiederanschluss zu verhindern.

**WARNUNG 9:** Um das TP04300 System zum sicheren Auswechseln eines Moduls spannungsfrei zu schalten, die Netzspannung ausschalten (Betrieb beenden und abschalten), dann die Druckluftversorgung des Systems abdrehen; alle Luft aus dem System ablassen, indem die Spannung am Gerät gerade lang genug eingeschaltet wird, um alle Luft aus dem System zu evakuieren. Danach die Netzstromschnur abziehen und die Luftversorgungsleitung vom Luftversorgungsanschluss an der Rückwand des Rahmenmoduls abtrennen. Die einzige im System verbleibende Energie befindet sich jetzt in einigen elektrischen Kondensatoren. Ein großer Kondensator befindet sich in der Nähe des Luftkühlungskompressors. Weitere große Kondensatoren befinden sich in den Stromversorgungseinheiten des Systems.

**WARNUNG 10:** Wartungsarbeiten am Luftkühlungsmodul dürfen nur von (durch lokale Behörden) lizenzierten Kältetechnikern durchgeführt werden, die von der Temptronic Corporation zum Aufladen oder Handhaben von Kältemitteln für das TP04200A System zugelassen sind.

**WARNUNG 11:** Auf keinen Fall darf das Luftkühlungsmodul (zu Dichtheitsprüfungen oder anderen Zwecken) mit einem Gas geladen werden, das unter einem Druck von mehr als 10,34 Bar steht.

**WARNUNG 12:** Das Luftkühlungsmodul dient als Gegengewicht für den Thermalkopfaufbau. Vor Ausbau des Luftkühlungsmoduls sicherstellen, dass der Horizontalarm den vertikalen C-Arm als untere Grenze erreicht, und dass der Thermalkopf sich neben dem Horizontalarm befindet und zur Rückseite der Maschine weisend verstaut ist. Angemessene Hebevorrichtungen beim Ausbau bzw. Service des Luftkühlungsmoduls verwenden.

**WARNUNG 13:** Zum Ausbau (oder zur Installation) des Thermalkopfaufbaus am Ende des Horizontalarms sind zwei Mitarbeiter erforderlich. Einer muss den Thermalkopfaufbau an den Griffen an der Vorderseite des Kopfes (mit beiden Händen) anheben, während der andere den Drehverschluss lockert (bzw. anzieht).

**WARNUNG 14:** Um den Ausstoß von Kondensat (das u.U. Schadstoffe enthält) unter Hochdruck zu vermeiden, wenn Feuchtigkeit aus den Luftfilterelementen abgelassen wird, wie folgt vorgehen: Erstens, die Lufterdruckversorgung des Systems abstellen; zweitens, alle Luft aus dem System ablassen, indem die Wechselspannung zum TP04200 gerade lange genug wieder hergestellt wird, um die Luft aus dem System zu evakuieren; drittens, die Luftversorgungsleitung vom Luftversorgungsanschluss an der Rückwand des Rahmenmoduls abtrennen.

**WARNUNG 15:** Zum Reinigen der Lufteinlassrippen am Kondensator eine weiche Bürste bzw. einen Staubsauger verwenden (die Vorderwand abnehmen, um an die Rippen heranzukommen). Vorsichtig vorgehen, damit die Einlassrippen nicht verbogen werden. Die Rippen haben scharfe Kanten. Um Schnittgefahren zu vermeiden, Schutzhandschuhe tragen bzw. die Rippen nicht direkt mit den Fingern berühren.

**WARNUNG 16:** Nur die vom Hersteller angegebenen Kühl- (Wärmeübertragungsflüssigkeiten) und Kältemittel verwenden: Diese wurden besonders entwickelt, so dass sie sicher für das Bedienungspersonal, umweltfreundlich, leistungsfähig und unschädlich für das Gerät sind. Nur autorisierte Kühl- und Kältemittel (keinen Ersatz) verwenden bzw. hinzufügen (vermischen): Bestehende Garantien können sonst erlöschen. Beim Einfüllen von Kühl- und Kältemitteln Schutzbrillen, Handschuhe und eine Schürze tragen. Temptronic übernimmt keine Haftung für Schäden, die auf die Verwendung von nicht autorisierten Kühl- und Kältemitteln zurückzuführen sind.

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## VORSICHT

**VORSICHT 1:** Die am Gerät und in diesem Handbuch gegebenen Vorsichtsmaßregeln beachten, um Geräteschäden zu vermeiden. Das Gerät darf nur für die vom Hersteller angegebenen Verwendungszwecke benutzt werden.

**VORSICHT 2:** Schutz- und Kühlabdeckungen sowie Abdeckungen, die mit einem Werkzeug abgenommen werden müssen, dürfen nur von dazu befugtem Personal vom Gerät entfernt werden.

**VORSICHT 3:** Statikempfindliche Leiterplatten immer angemessen handhaben und verpacken. Alle Leiterplatten sollten als statikempfindlich angesehen werden.

**VORSICHT 4:** Vor Anschluss des Gerätes an die Stromversorgung sicherstellen, dass die Wechselspannung und Frequenz für das System richtig sind und den auf dem Datenschild (an der Rückwand des Gerätes) angegebenen Werten entsprechen.

**VORSICHT 5:** Vor Testen oder Auswechseln der Sicherheitsbatterien die Stromschnur des Systems von der Stromversorgung abziehen.

**VORSICHT 6:** Äußerst vorsichtig vorgehen, um eine Beschädigung der beiden Thermoelemente zu vermeiden, die vom thermischen Sicherungsautomaten des Kopfes durch verschiedene Anschlüsse bzw. Halterungen in den Hauptluftstrom führen. Die Thermoelemente sind sehr empfindlich. Sie dürfen nicht geschnitten, gedreht oder verbogen werden, weil dabei interne Verbindungen zerbrechen können.

**VORSICHT 7:** Das Luftkühlungs-Modul wiegt ungefähr 79,5 kg und dient als Gegengewicht (zur Stabilisierung) zum Systemrahmen, wenn der Thermalkopf auf dem Horizontalalarm ausgefahren ist. Beim Abnehmen des Luftkühlungsmoduls: a) Vorsichtig sein, damit das System stabil (aufrecht) bleibt, nachdem das Modul entfernt ist; b) zum Abnehmen oder zur Wartung des Luftkühlungsmoduls angemessene Hebevorrichtungen benutzen.

**VORSICHT 8:** Beim Entfernen der Durchflusswächter-Schaltplatte sehr vorsichtig vorgehen, um zu vermeiden, dass sie verbogen wird, wenn die Lufttein- und Luftauslass-Schläuche abgenommen werden. Selbst eine leichte Biegung der Platte kann die empfindlichen Bestandteile bzw. die Verdrahtung der Platte beschädigen.

**VORSICHT 9:** Beim Anschließen der Systemluft den AIR INPUT- (Lufteinlass-) Anschluss mit einem zweiten Schraubenschlüssel halten, während der Steckanschluss angezogen wird, um zu vermeiden, dass sich der Lufteinlass-Anschluss in der Wand dreht.

**VORSICHT 10:** Geeignete Clean Dry Air- (CDA, Reine Trockenluft) Druckluft für das System verwenden, um: a) eine vorzeitige Verschmutzung der mit dem System gelieferten Filter und Regulatoreinrichtungen und b) eine Eisbildung im Kühlmodul und eine potentielle Behinderung oder Blockierung des Auslass-Luftflusses zu vermeiden. Qualitätsmangel in der Luftversorgung kann Schäden an den internen Bestandteilen des Systems verursachen.

**VORSICHT 11:** Die mitgelieferten Filter und Regulatoreinrichtungen ordnungsgemäß verwenden und instand halten. Auf diese Weise wird verhindert, dass Feuchtigkeit bzw. Kompressoröle in die Bestandteile des Systems eindringen. Feuchtigkeit und Kompressoröl können sonst Schäden am System hervorrufen, die von der Garantie ausgeschlossen sind.

**VORSICHT 12:** Um den (etwa 1 Meter langen) Schubantrieb zu lösen, das System zuerst hoch genug heben, so dass der Schubantrieb frei nach unten geführt werden kann (einen Gabelstapler benutzen). Dann den Schubantrieb von der Rückseite des Systems ablösen. Dabei nicht unter dem angehobenen System stehen (es besteht keine Notwendigkeit dazu).

## Section D: PRECAUCIONES DE SEGURIDAD PARA EL PERSONAL DE OPERACIONES

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### ADVERTENCIA



#### WARNING

ADVERTENCIA: Precaución

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#### Electrical Hazard

ADVERTENCIA: Alta tensión

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#### Hot Surface

ADVERTENCIA: Superficie caliente

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#### Cold Surface

ADVERTENCIA: Superficie fría

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**ADVERTENCIA 1:** Los lugares donde existen posibles tensiones peligrosas y otros riesgos tales como superficies calientes o frías o aire comprimido/gases/vapores a altas presiones, están identificados y señalados con rótulos en el equipo. Observe cuidadosamente estas advertencias durante la instalación, operación, mantenimiento o al efectuar reparaciones del equipo. Observe todas las advertencias contenidas en este manual. Use el equipo únicamente para los fines indicados por el fabricante.

**ADVERTENCIA 2:** Las instrucciones de identificación y solución de problemas contenidas en este manual, pueden causar un posible contacto con energía eléctrica de altas tensiones, aire comprimido y refrigerantes a altas presiones o al vacío. Estos riesgos pueden causar lesiones o poner en peligro la vida. No efectúe esas instrucciones a menos que usted esté calificado para hacerlas.

**ADVERTENCIA 3:** Para evitar los riesgos de choques eléctricos, el equipo debe estar puesto a tierra con un conector a tierra física adecuado, de acuerdo con los códigos eléctricos locales.

**ADVERTENCIA 4:** Cuando se están conectando los sensores de termopar al Dispositivo En Prueba (DUT), aísle los sensores eléctricamente para proteger a los operadores del contacto con cualquier tensión peligrosa que podría haber en el sitio del DUT.

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**ADVERTENCIA 5:** Las piezas dentro de la cabeza térmica funcionan a temperaturas extremadamente calientes y frías y son peligrosas al tocarlas. No efectúe ningún mantenimiento dentro de la cabeza térmica hasta que el sistema no haya sido apagado. Espere hasta que las piezas de la cabeza hayan alcanzado una temperatura segura y estable, cerca a la temperatura ambiente.

**ADVERTENCIA 6:** Durante el movimiento de arriba/abajo de la cabeza térmica del sistema, mantenga sus dedos apartados del espacio entre la tapa térmica de la cabeza y el sitio del DUT (dispositivo en prueba).

**ADVERTENCIA 7:** Por la norma SEMI S2-93A, el trabajo eléctrico excitado ("Trabajo con corriente"), es especificado por Tipo como sigue:

TIPO	DESCRIPTION (por SEMI S2-93A)	UMBRAL DE EXPOSICION
1	Desexcitado completamente (eléctricamente "frío").	n.a.
2	Circuitos con corriente, forrados o aislados. Trabajo efectuado en lugar remoto para evitar choque accidental.	n.a.
3	Circuitos con corriente expuestos. Contacto accidental posible.	<= 30 V RMS (tensión eficaz), 42,2 V pico, 240 voltio amperios y 20 julios
4	Circuitos con corriente expuestos. Contacto accidental posible.	> 30 V RMS (tensión eficaz), 42,2 V pico, 240 voltio amperios y 20 julios
5	Excitado. Las mediciones y ajustes requieren introducción física, o la configuración del equipo no permite el uso de sondas tipo mordaza.	n.a.

**ADVERTENCIA 8:** Cuando el equipo tiene que estar completamente desexcitado (eléctricamente "frío"), para permitir la entrada segura dentro del sistema, se debe seguir el siguiente procedimiento de Bloqueo/Marcado con Etiquetas de acuerdo con la norma OSHA 29 CFR 1910: a) Para los dispositivos con cordón eléctrico que se "desenchufa" de un receptáculo de servicio, el usuario final debe proveer y poner una etiqueta en una envoltura de bloqueo del Enchufe que cubra completamente al mismo y evite la reconexión accidental; b) para dispositivos conectados directamente a la alimentación eléctrica, el usuario final deberá instalar y poner una etiqueta en un interruptor de desconexión de la corriente con una posición de desconectado y bloqueado o instalar y poner una etiqueta a un disyuntor con una posición de desconectado y bloqueado, para evitar la reconexión accidental.

**ADVERTENCIA 9:** Para cortar la corriente del Sistema para el reemplazo seguro de un módulo, desconecte la alimentación de CA (detiene el funcionamiento y corta la corriente), luego desconecte el suministro de presión de aire del Sistema, luego purge todo el aire del Sistema conectando la alimentación de CA sólo el tiempo suficiente para sacar todo el aire. Ahora desconecte el cordón de alimentación eléctrica principal y la línea de suministro de aire del conector del orificio en el módulo del bastidor posterior. La única energía que queda en el Sistema será la almacenada en algunos condensadores eléctricos. Un condensador grande está situado cerca del compresor del enfriador de aire del Sistema. Otros condensadores grandes están dentro de los suministros de energía eléctrica del Sistema.

**ADVERTENCIA 10:** Si se necesita hacer alguna reparación del Módulo del Enfriador de Aire, solamente un técnico de refrigeración con licencia (y/o certificado por EPA) y autorizado por Temptronic Corporation estará calificado para efectuar cualquier carga o manipulación de los refrigerantes en el Sistema.

**ADVERTENCIA 11:** Bajo ninguna circunstancia (prueba de fugas o cualquier otro propósito) se debe cargar el Módulo del Enfriador de Aire con cualquier gas a una presión superior a los 10,34 Bares (150 psig).

**ADVERTENCIA 12:** El Módulo del Enfriador de Aire actúa como un contrapeso del Conjunto de la Cabeza Térmica. Antes de desmontar el Módulo del Enfriador de Aire, asegúrese de que el brazo horizontal esté bajado sobre el brazo vertical C en su límite más bajo y que la cabeza térmica esté adentro al lado del brazo horizontal y guardada hacia la parte posterior de la máquina. Para desmontar o reparar el Módulo del Enfriador de Aire use un equipo apropiado para levantar pesos.

**ADVERTENCIA 13:** Para desmontar (o instalar) el conjunto de la cabeza térmica en el extremo del brazo horizontal se necesitan dos personas. Una persona debe levantar el conjunto de la cabeza térmica sujetando con sus dos manos los agarradores frontales de la cabeza, mientras que la otra persona afloja (o aprieta) la traba pivote.

**ADVERTENCIA 14:** Para evitar la expulsión a alta presión del condensado (que puede contener o no substancias peligrosas), cuando se está drenando la humedad de los elementos del filtro de aire, primero apague el suministro de presión del aire del sistema, segundo purgue todo el aire del Sistema conectando la alimentación de CA justo el tiempo suficiente para sacar todo el aire en el sistema, tercero desconecte la línea de suministro de aire del conector del orificio de suministro de aire situado en el panel posterior.

**ADVERTENCIA 15:** Cuando se están limpiando las aletas de la entrada de aire del condensador (para tener acceso a las aletas quite la tapa frontal) use una escobilla blanda y/o una aspiradora, teniendo cuidado de no doblar las aletas, debido a que las aletas tienen bordes afilados y para evitar cortarse use guantes protectores y/o no toque las aletas de entrada directamente con los dedos.

**ADVERTENCIA 16:** Use únicamente los líquidos enfriadores (líquidos de transferencia de calor) y refrigerantes especificados por el fabricante y desarrollados técnicamente para ofrecer seguridad para los operadores, no sean perjudiciales al medio ambiente, funcionen eficientemente y no dañen el equipo. No substituya con enfriadores y refrigerantes no autorizados, ni mezcle (agregar) con los mismos: el hacerlo puede anular las garantías. Cuando está llenando enfriadores y refrigerantes use gafas protectoras de seguridad, guantes y un delantal. Temptronic no asume ninguna responsabilidad por daños causados por el uso de enfriadores y refrigerantes no autorizados.

## PRECAUCION

**PRECAUCION 1:** Observe las precauciones indicadas en el equipo y en este manual, para evitar causar daños al equipo. Use el equipo únicamente para los fines especificados por el fabricante.

**PRECAUCION 2:** Personal no autorizado no deberá quitar del equipo los paneles de enfriamiento y/o protección, o aquellos que necesitan una herramienta para quitarlos.

**PRECAUCION 3:** Use los procedimientos correctos para la manipulación y empaque de placas de circuitos sensibles a la estática. Haga de cuenta que todas las placas de circuitos son del tipo sensibles a la estática.

**PRECAUCION 4:** Antes de conectar el equipo a su fuente de alimentación eléctrica, verifique que la tensión de ~ (CA) y la frecuencia a ser alimentada al sistema son las correctas de acuerdo con las listadas en su placa de datos (ubicada en el panel posterior del equipo).

**PRECAUCION 5:** Antes de verificar o reemplazar cualesquiera pilas de reserva, desconecte el cordón eléctrico del Sistema de su alimentación de servicio.

**PRECAUCION 6:** Tenga mucho cuidado para evitar daños a los dos termopares que van desde la placa de cortacircuito térmico de la Cabeza hasta dentro de la corriente de aire principal a través de varios conectores/soportes. Estos termopares son muy delicados. No los corte, retuerza ni doble porque se podrían romper conexiones internas.

**PRECAUCION 7:** El peso del Módulo del Enfriador de Aire es de aproximadamente 79,5 kg (175 libras) y actúa como contrapeso (para estabilizar) el bastidor del Sistema cuando la cabeza térmica está extendida sobre el brazo horizontal. Si se está desmontando el módulo del Enfriador de Aire: a) tenga cuidado que el sistema permanezca estable (derecho en posición vertical) después que se ha desmontado el módulo, b) para desmontar o reparar el Módulo del Enfriador de Aire use un equipo apropiado para levantar pesos.

**PRECAUCION 8:** Cuando se está desmontando la placa de control de flujo, tenga mucho cuidado de no doblar la placa al desconectar las mangueras de entrada y salida de aire. Aún una ligera flexión de la placa podría dañar componentes delicados y/o el alambrado de la placa.

**PRECAUCION 9:** Cuando se está haciendo la conexión de aire al Sistema, sujeté el conector de AIR INPUT (entrada de aire) con una segunda llave, mientras está apretando el conector de púa, para evitar que el conector de AIR INPUT gire dentro del panel.

**PRECAUCION 10:** Use un suministro adecuado de aire comprimido ASL (Aire Seco Limpio) para el Sistema: a) para evitar la obstrucción prematura de los conjuntos de filtros/regulador provistos con el Sistema, b) para evitar la formación de hielo dentro del módulo de enfriamiento y posiblemente reducir u obstruir el flujo del aire de salida. La calidad inadecuada del suministro de aire puede causar daños a los componentes operativos internos del Sistema.

**PRECAUCION 11:** Use y mantenga de la forma correcta los conjuntos suministrados de filtros/reguladores. Esto evitara la entrada de humedad y/o aceites del compresor dentro de los componentes operativos del Sistema. Si no se verifica esto, la humedad y/o aceite del compresor puede causar daños al Sistema, los mismos que no están cubiertos por la garantía.

**PRECAUCION 12:** Para aflojar el conjunto del actuador lineal (aproximadamente 92 cm de largo), primero suba el sistema a la altura necesaria para que el actuador baje sin obstáculos (use un montacargas de horquilla). Luego, afloje el actuador por la parte posterior del sistema. No se coloque debajo (no es necesario estar debajo) del sistema levantado.

## Section E: Säkerhets Föreskrifter och Varningar, Varsamhet

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### Varningar



#### **WARNING**

**Varningar:** Varningar

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#### **Electrical Hazard**

**Varningar:** Högspänning

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#### **Hot Surface**

**Varningar:** Varm yta

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#### **Cold Surface**

**Varningar:** Kall yta

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**VARNING 1:** Lokalisering av eventuellt farliga spänningar och andra farligheter som varma ytor eller kalla ytor eller höga tryck om luft/gas/ånga är identifierade av märkningar på utrustningen, enligt symbolerna ovan. Iakttag och lokalisera dessa varningar vid installation, användning och underhåll eller service av utrustningen. Läs och förstå alla varningar skrivna i utrustningens manual. Enbart använd utrustningen för sitt ändamål som specificerats från tillverkaren.

**VARNING 2:** Före varje försök att utföra underhåll på TP043XX, försäkra er om att komprimerad luftanslutning och spännings matningen är avslaget. Stäng först av luftanslutningen och låt det uppbyggda lufttrycket i den inbyggda lufttorkaren mynna ut (lufttorkaren behöver tillslagen spänning för att torka ut), därefter stäng av spännings matningen till utrustningen. Utför inte dessa rutiner om inte kvalifikation för ändamålet finnes.

**VARNING 3:** För att undvika strömstötar, skall utrustningen vara väl jordad genom att varje elektrisk kabel har härför avsedda jordanslutning.

**VARNING 4:** Vid anslutning av temperatur sensorer till komponent under test (DUT), isolera elektriskt sensorn för att undvika att operatören kommer i kontakt med farliga spänningar som kan finnas på och om testobjektet.

**VARNING 5:** Delar i det termiska huvudet arbetar i extrema varma och kalla temperaturer och är mycket farligt att vidröra. Utför inget underhåll på eller i det termiska huvudet innan utrustningen helt har stängts av. Vänta tills huvudets delar erhållit en säker temperatur i närbild till rumstemperaturen.

**VARNING 6:** Vid upp/ner rörelse av temperaturhuvudet på TP043XX, håll fingrar och föremål utanför den termiska koppen och komponenttest arean.

**VARNING 7:** I enlighet med SEMI S2-93A, elektriskt laddade arbeten är specificerade per typ enligt nedan.

TYP	BESKRIVNING (enl. SEMI S2-93A)	EXPONERBAR TRÖSKELNIVÅ
1	Fullständigt avslaget. (elektrisk kyla)	n.a.
2	Öppen krets, täckt eller isolerad. Arbete utförs på avstånd för undvikande av elektrisk stöt.	n.a.
3	Öppen krets exponering. Olycksrisk föreligger.	<=30v RMS, 42.2v topp, 240 volt-amp, och 20 svängningar.
4	Öppen krets exponering. Olycksrisk föreligger.	>30v RMS, 42.2v topp, 240 volt-amp, och 20 svängningar.
5	Uppladdad. Mätning och justering kräver fysisk kontakt, eller utrustningens konfiguration tillåter inte användandet av verktyg eller tänger.	n.a.

**VARNING 8:** Utrustningen måste vara fullständigt avslagen (elektrisk kyla) för att erbjuda ett säkert inträde i utrustningen, följande rutiner bör genomföras enligt OSHA 29 CFR 1910: a). För moduler med en spänningssmatningskabel som bortkopplas från ett spänningsuttag, måste slutanvändaren förse uttaget med tillräckligt skydd att ingen möjlighet finns att vidröra de spänningsledande kontaktstiften så länge anslutningen vidhålls. b) för moduler som handvirats till elektriska spänningsskällor, måste slutanvändaren installera en säkerhetsbrytare (på/av) för möjligheten att frånslaga spänningen eller installera en jordfelsbrytare.

**VARNING 9:** För att ”urladda” utrustningen för ett säkert utbyte av någon modul, slå först av utrustningens AC matningsspänning (utför SHUT DOWN ifrån menyn), sedan stäng av dess luft tillförsel, och låt systemet ”blöda” all kvarvarande luft genom att åter slå på spänningen tillräckligt länge för att få ut all luft ur systemet. Nu kan man koppla loss både AC anslutning och luft anslutning. Den enda laddade energin som kan finnas i systemet är nu eventuella uppladdade elektriska kondensatorer. En stor kondensator finns i närbild till systemets air-chiller kompressor. En annan stor kondensator finns i systemets spänningsaggregat.

**VARNING 10:** Om service är nödvändig i utrustningens Air Chiller modul eller kompressor delar, får denna service enbart utföras av ackrediterad (och/eller EPA Certifierad) kylservice personal eller auktoriserad och utbildad från Temptronic Corporation, som är kvalificerad att utföra laddning eller reparation av kylaggregat.

**VARNING 11:** Under inga omständigheter (läck-test eller annan hantering) får Air Chiller modulen laddas med någon gas eller tryck över 150 psi (10.34 bar).

**VARNING 12:** Hela Air Chiller modulen utgör en viktbalans för det termiska huvudet och dess arm. Om denna modul måste löstagas, försäkra er om att den horisontala armen är nere på den vertikala C-armen på sitt lägsta läge och det termiska huvudet är bredvid den horisontala armen och låsta intill maskinen. Använd tillgänglig viktklyftutrustning vid urtagning/service av Air Chiller modulen.

**VARNING 13:** Två personer behövs för borttagning (eller installation) av det termiska huvudet på den horisontala armen. En person måste lyfta huvudet med båda händer medan den andra personen lossar (eller drar åt) dess fästskruvar.

**VARNING 14:** För att undvika högtrycks utblås eller smällar (vilka kan eller inte oftast täckas av försäkringar) när utrustningens filter skall rengöras, stäng alltid först av lufttillförseln till utrustningen, sedan låt lufttrycket läckta ut genom att sätta på utrustningens PÅ/AV knapp och låt utrustningen vara igång tillräckligt länge tills all luft evakuerats från utrustningen. För det tredje, koppla loss luftanslutningen till utrustningen (SP1) lokaliseras på baksidan av utrustningen.

**VARNING 15:** Vid rengöring av utrustningens inre filter (kan utföras genom att avtaga skyddskåpan på framsidan av utrustning) använd en mjuk borste och/eller en dammsugare. Var försiktig att inte peta och bända på några delar inom maskinen, det kan vara skarpa kanter och viss skärningsrisk finns. Använd handskar och peta inte med fingrar inuti filtren.

**VARNING 16:** Använd enbart kylvätska (värme cirkulation) och köldmedier som specificerats av leverantören. Dessa är noggrant utprovade om säkerhet för användare och miljön samt arbetes effektivitet och ej skadliga för utrustningen. Byt inte ut köldmedier mot ospecificerad eller mixad media. Ett sådant handlande täcks inta av garantin. Temptronic har inget ansvar för skador uppkomna genom användning av felaktig köldmedia.

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## Försiktighet och Varsamhet

**VARSHAMET 1:** Observera den varsamhet och försiktighet som angivs på utrustningen och dess manual för att undvika skador på utrustningen. Använd enbart utrustningen såsom leverantören angivit och specificerat.

**VARSHAMET 2:** Personal som ej är aktualisering för ändamålet skall inte avlägsna skydd eller paneler på utrustningen som är avsedda för skydd eller kylning eller är behov av verktyg för borttagande.

**VARSHAMET 3:** Använd erkänd hantering och packnings rutin för statiskt känsliga kort. Alla elektroniska kort i maskinen är av statisk känslig typ.

**VARSHAMET 4:** Innan TP043XX anslutes till elektriskt spänningsuttag, kontrollera att rätt växelpänning (AC) och frekvens (Hz) överensstämmer med specifikationen noterad på utrustningens märkplatta, lokaliserad på baksidan av utrustningen.

**VARSHAMET 5:** Frikoppla systemets elektriska spänningsskabel innan kontroll eller utbyte av back-up batterier genomförs.

**VARSHAMET 6:** Var mycket försiktig att inte skada de två termistorer som går från det termiska huvudets avbrottskort och ut i munstycket med tempererad luftström genom varierande kopplingar eller uppsättningar. Dessa termistorer är mycket känsliga och får inte böjas, brytas eller kapas från sina kontaktorer.

**VARSHAMET 7:** Vikten på systemets Air Chiller modul är c:a 79,5 kg (175 lb), och utgör systemets viktbalans när det termiska huvudet är i sitt yttersta läge på den horisontala armen. Om Air Chiller'n måste borttagas: a) försäkra er om att utrustningen förblir stabil (upprätt) efter att modulen avlägsnats, b) använd lyftutrustning vid borttagning/montering av Air Chiller modulen.

**VARSHAMET 8:** Vid borttagning av kontrollkortet för luftflöde, var extra försiktig att inte bända eller vrida kortet vid borttagning av ingående och utgående luft anslutningar. Även en liten bändning av kortet kan skada dess komponenter och/eller virningar på kortet.

**VARSHAMET 9:** Var aktsam om att förankra utrustningens luftanslutnings munstycke vid montering och åtdragning av extern luftslang, så att inte munstycket vrides i panelen.

**VARSHAMET 10:** Använd enbart ren och torr tryckluft (CDA) för systemet: a) för att undvika förureningar av filter och regulatorer som finns i systemet, b) för att undvika isbildning och frost i utrustningens kylsystem vilket reducerar luftströmmen och dess kapacitet. Dålig luftkvalitet kan skada systemets ingående komponenter.

**VARSHAMET 11:** Ansvarsfullt användning och underhåll av ingående filter och regulatorer. Detta minskar förureningar och/eller kompressor olja att komma in i systemet och orsaka problem. Vid ej utfört underhåll, kan förureningar och kompressor olja orsaka sådana skador att de inte täcks av garantin.

**VARSHAMET 12:** För att lossa lyftarmens stång och motor (c:a 90 cm lång), först lyft upp systemet tillräckligt högt för att lyftstången kan falla ner (använd en lyft truck). Sedan lossa enheten från baksidan av systemet. Vistas ej under utrustningen när den är upplyft. (Det är inte nödvändigt att arbeta under ifrån).





# System Overview

## Chapter Overview

### Introduction

The Model *TP04300* ThermoStream System is a programmable temperature controlling air-flow system to support the testing and characterizing of electronic devices.

This air forcing system induces a thermal environment for the Device-Under-Test (DUT) over a very wide range of test temperatures.

A series of internal microcontrollers direct the *TP04300* System, permitting either local operation by a user or remote control by a host (prober/tester).

The touch screen display of the Operator Control Module (OCM) shows the air and DUT temperatures; programmed values including hot, ambient, and cold temperature setpoints, soak time; and cycle information.

In addition; the complete system operational status and any error messages are displayed. All data are shown in real-time format, keeping the user fully informed.

This chapter provides a general overview of the *TP04300* ThermoStream System.

### In this Chapter

This Chapter is divided into the following Sections:

Section	See Page
<a href="#">Related Manuals</a>	<a href="#">2</a>
<a href="#">User/Owner Documentation</a>	<a href="#">3</a>
<a href="#">Physical Requirements</a>	<a href="#">4</a>
<a href="#">Theory of Operation</a>	<a href="#">6</a>
<a href="#">Pictorial Overview</a>	<a href="#">8</a>
<a href="#">System Initialization</a>	<a href="#">18</a>
<a href="#">Calibrate System</a>	<a href="#">24</a>

## Section A: Related Manuals

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### Introduction

This manual (LM02290) is one in a series of three used with the *TP04300*. This section provides a description of the related manuals.

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### TP04300 Manuals

The following is a list of manuals related to the *TP04300*

Title	Part Number	Description
<i>TP04300 Interface and Applications Manual</i>	LM01980	<ul style="list-style-type: none"><li>• System Description, Physical Requirements/Dimensions, Site &amp; Clearances</li><li>• Initial Setup, Cable &amp; Air &amp; Input Power Interconnections, Interface Thermocouples, Passwords</li><li>• Compressor Voltage Requirements, Set Autotransformer Voltage</li><li>• Command Menus, Setup/Conduct Tests, Tune, Datalog, Configure, Utilities, System Errors</li><li>• Head Positioning; Operator Control Module; Heat/Cool &amp; Heat Only Modes</li><li>• Screens: Operator; Cycle; Test Setup; Access (permissions); Utilities; DataLog; Copy Setup</li><li>• DUT Mode Screens: DUT Sensor; Thermal Constant; AutoTune</li><li>• Remote Operation: RS-232C, IEEE-488, MCT, Commands, Responses, Remote Errors</li><li>• Routine Maintenance: Air Filters; Verify T, K, RTD Sensors; Calibrate; Defrost</li><li>• Materials Safety Data Sheets (MSDS)</li></ul>
<i>TP04300 Operator's Manual</i>	LM01970	<ul style="list-style-type: none"><li>• Power On/Off; Startup &amp; Shutdown in "Basic" level Access</li><li>• Run to Single Setpoint; Test Setups: Load; Cycle Screen; Jumbo Temperature Screen</li><li>• Run to Selected Segment Only; Cycle to Multi-Setpoints</li></ul>

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## Section B: User/Owner Documentation

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### Introduction

The following section details the owner's warranty and related forms for the *TP04300*.

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### User/Owner Registration Form

A User/Owner Registration fax form is supplied in the back pages of this manual.

Upon receipt of the system, this Registration form should be copied, the copy completed and then faxed to Temptronic.

Doing this assures the owner / enduser of receiving timely, important information pertinent to your system.

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### Performance Report Forms

A "User Interface Performance Report" is provided at the back of this manual. Use this report to submit any desired enhancements or functional discrepancies in the system. For prompt response, you may contact the Temptronic Service Department directly whenever a problem occurs.

Also, a "Reader Comments" form is included at the back of this manual. Use this form to feed back your suggestions and opinions regarding the effectiveness of the manual.

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### Warranty

A copy of Temptronic Corporation's standard Warranty is provided in the back portion of this manual.

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### Specifications

The system specifications are as published on the data sheet(s) which is (are) included in the front cover pocket of this manual, or inserted in the binder rings at the front of this manual, or inserted immediately after the end of this section.

Specifications typically include:

- Temperature range, Air flow, Vacuum
- Environmental, Service features
- Facilities requirements: Power, Dewpoint/humidity
- Air Standards: Supply Pressure, Oil Content, Filtration
- Dimensions

## Section C: Physical Requirements

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### Introduction

The *TP04300* System uses a modular design for its main functional parts. This design allows the customer to select optional modules and features for a given installation and application. Maintenance at the module level greatly reduces troubleshooting and downtime.

Start-up self-diagnostics and an automated electronic calibration mode make periodic maintenance less time consuming and assure optimum system performance.

See [TP04300, Front Full View](#) in this Chapter for a full, front view of the TP04300 system: it contains the Operator Control Module (OCM) touch screen, and diskette drive. From its top, the frame module supports the manipulator and thermal head. In addition, the frame module contains panels and components for the air and power distribution.

Interior are the pneumatic controls, and air chiller module.

The manipulator contains a vertical arm assembly and a hinged horizontal-arm assembly for positioning the thermal head at the DUT site. A thermal cap at the end of the thermal head contains and directs the air flow at the DUT site.

**NOTE:** For fixed site applications of the DUT, the *TP04300* is available without a manipulator. The *TP04300* can be supplied with the thermal head at the end of a 4-foot (122 cm) extender hose or an 8-foot (244 cm) extender hose.

To minimize system downtime, the PC boards, air chiller module, and OCM have simplified interconnections and mountings for quick replacement. A faulty item can then be moved to depot maintenance for troubleshooting or to be replaced.

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### Dimensions, Weights

Model	Height	Width	Depth	Weight
TP04300A	108cm (42.5 in.)	61.0cm (24 in.)	71.1cm (28 in.)	236 kg (520 lbs.)
TP04300B	Not Available at time of publication			

Maximum Operating Height: 130.5cm (51.5 in.) approximately

Minimum Operating Height: 71 cm (28 in.) approximately

## Environmental and Service Features

Over-Temperature Protection	+250° C (factory-set) (Also uses user-settable high and low air temperature limit)
Mobility	4 swivel caster wheels with locks 10.16cm (4 in.) diameter
Refrigerants	50 Hz systems: HCFC-free and CFC-free, non-toxic, non-flammable 60 Hz systems: CFC-free, non-toxic, non-flammable
Noise level	<65 dBA approximately

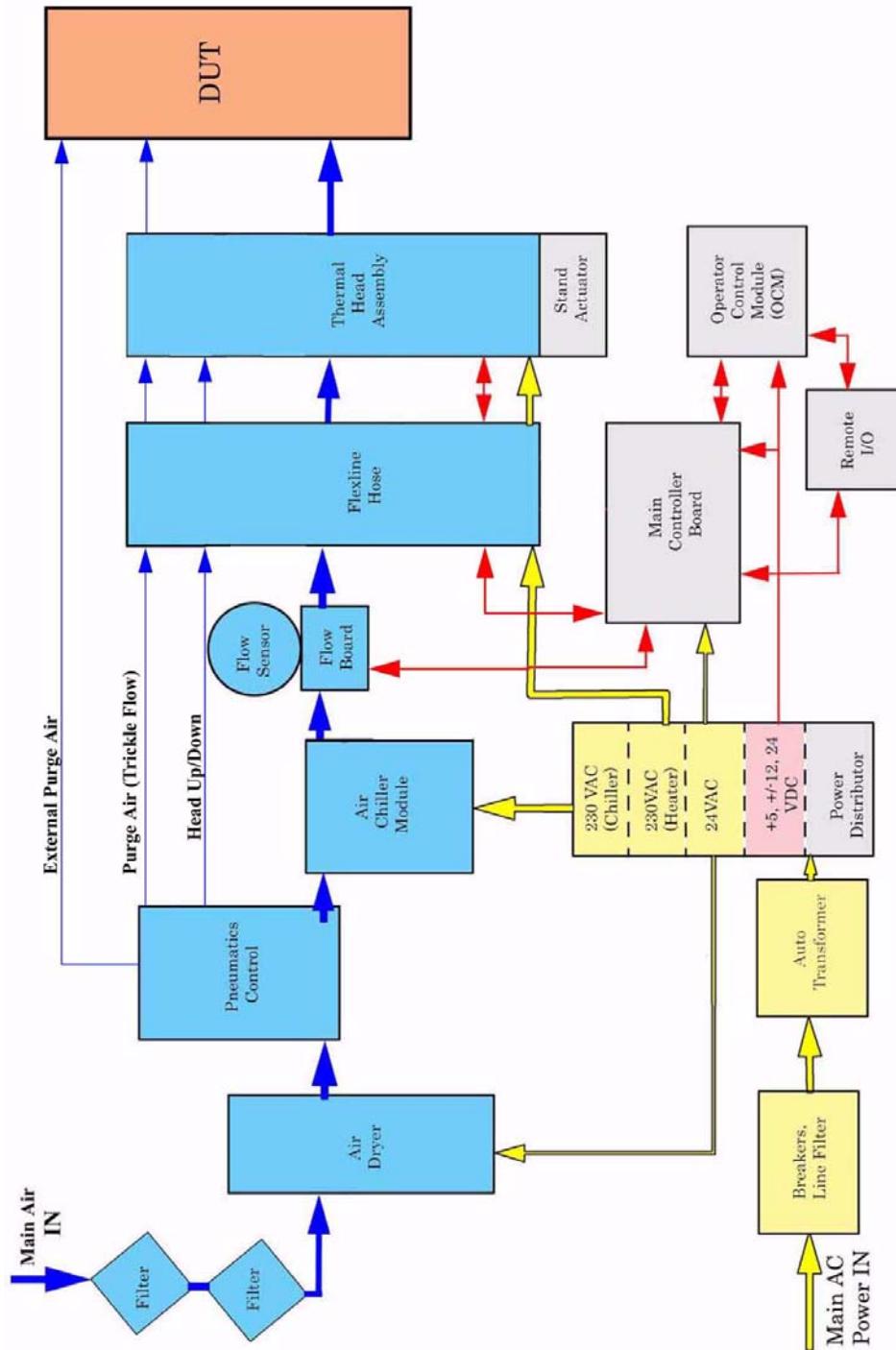
## Facility Requirements

Power Requirements	200-240 VAC (230V nominal), 50 Hz, 30 amp, 1 phase 200-240 VAC (230V nominal), 60 Hz, 30 amp, 1 phase
Compressed Air Requirements	Clean Dry Air: Filtered to 5 micron particulate contamination Oil content: <0.01 ppm by weight filtered to .01 micron oil contaminant Dewpoint: <10°C @ 6.2 BAR (90PSI)
Supply Pressure	6.2 to 7.6 BAR (90 to 110 PSIG)
Supply flow at minimum supply pressure	7.2 l/s to 14.3 l/s (9 to 30 scfm) (Nominal 25 scfm)
Air supply temperature	+20° to +25°C (+22°C nominal)
Operating Temperature	+20° to +28°C (+23°C nominal)
Humidity	0 to 60% (45% nominal)

## Section D: Theory of Operation

### System Block Diagram

The following diagram is a functional block diagram of the TP04300 System at a modular level. Air flow acts as the medium for establishing the temperature induced in the DUT.



LM02290\_208.jpg

**Description**

Program instructions entered by the local user or from the remote host (prober/tester) are stored in the OCM microcontroller. From these instructions, via a serial interface, the Main Controller board directs the Flow board to set the air flow through the thermal head at the programmed flow rate.

In turn, the Main Controller board controls both the air chiller module for cold temperature operation, and the heater in the thermal head, to output the required main air temperatures from the head nozzle.

Compressed air supplied to the input of the TP04300 at ambient temperature first passes through two filters to remove any foreign particles. A rear Input Air Gauge indicates the air pressure before the pressure drop caused by the two pre-filters.

The filtered air then goes through an air dryer module to remove moisture particles, and then passes through a post-filter. The dry air output is distributed to the rest of the system through the pneumatic controls.

The main air flow, purge air, and head up/down air each pass through the flexline hose and enter the thermal head. Note that the main air flow first passes through the air chiller module to cool the air, and then passes through the air heater in the head.

The purge flow (or trickle flow) uses ambient air to keeps the temperature within the thermal head (and any attached thermal cap) at a low working level.

The head up/down flow through the flexline hose provides pneumatic power to raise and lower the head on the manipulator, by programmed control or non-programmed operation (either moved up/down by pressing an electrical switch, or automatically up at the end of a test). The head can also be rotated by hand. These operations position the head with respect to the DUT.

The triple path structure within the thermal head allows fast temperature transitions between cold and hot extremes.

An "external purge" port, on the System's rear panel, supplies dry air which can be directed toward the DUT site to protect tester electronics from condensation.

An autotransformer allows the ac power to heavy duty *TP04300* components to be optimized for local voltage values as supplied by the facility ac power input service.

If input voltages are too low or too high, then the wiring connections on the autotransformer can be selected to obtain the correct voltage range required by system.

# Section E: Pictorial Overview

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## Section Overview

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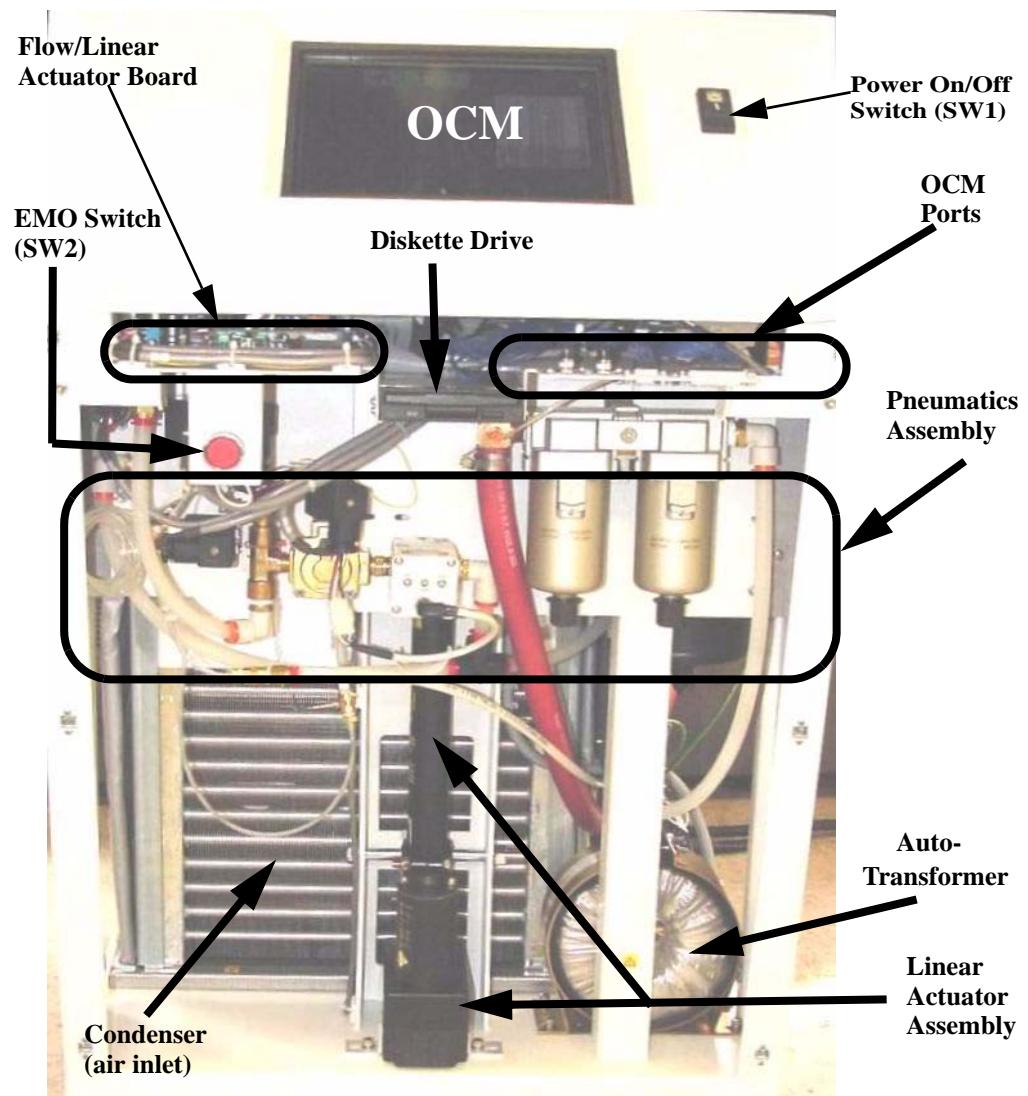
### Introduction

This Section is divided into the following topics:

Topic	See Page
TP04300, Front Full View	9
TP04300, Left Full View	11
TP04300, Right Full View	12
TP04300, Rear Full View	14
TP04300A, Thermal Head	16

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## TP04300, Front Full View



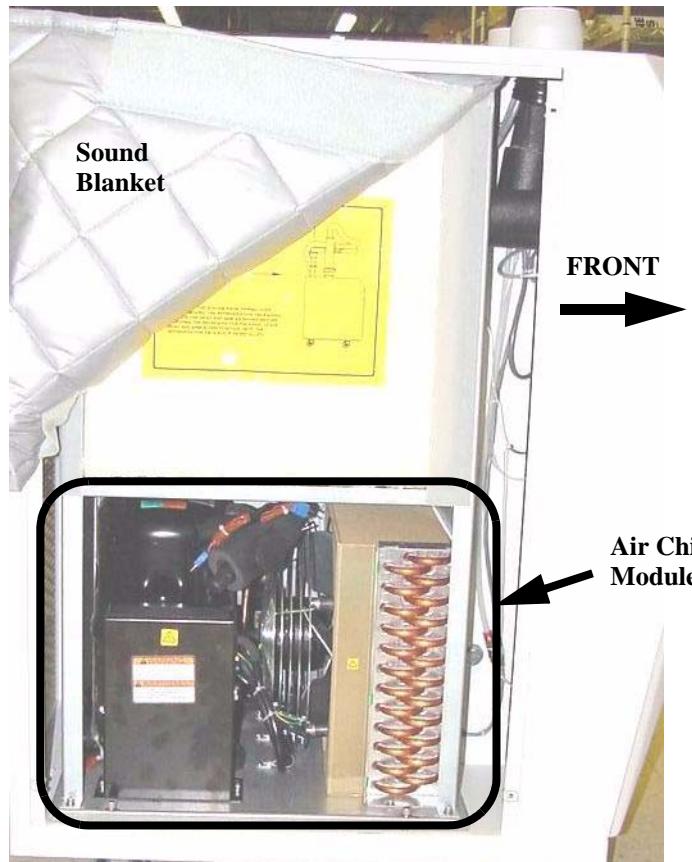
### Description

LM01990\_202.jpg

Part	Description
Flow/Linear Actuator Board	<p>Has two functions:</p> <ul style="list-style-type: none"> <li>Serves as a mass air flow meter. This board communicates flow volume to the Watlow board which then sets flow rate and volume according to OCM inputs.</li> <li>The actuator drive logic is integrated into the Flow/Linear Actuator board.</li> </ul> <p>For greater detail on the Flow/Linear Actuator board, see Chapter 4, <a href="#">Machine Interface</a>.</p> <p>P/N SA172090</p>

<b>Part</b>	<b>Description</b>
OCM	<p>Operator Control Module, an approximately 10.4 inch (diagonal size) color touch screen for operator inputs.</p> <p>This graphical user interface allows non-technical individuals, production operators, and test engineers optimum ease of use with minimum training time.</p> <p>For greater detail on the OCM, see Chapter 3, <a href="#">User Interface</a>.</p> <p>P/N SA173640</p>
Power On/Off Switch (SW1)	<p>The system's on/off switch (which contains an "On" indicator LED light).</p> <p>For greater detail on the Power On/Off Switch, see Chapter 3, <a href="#">User Interface</a>.</p> <p>P/N SS01840</p>
OCM Ports	<p>The OCM Cable Ports are installed on the system front panel, located within the top panel overhang, to the right side of the 3.5 inch diskette drive, consisting of ports for a keyboard, mouse, (2)USB, and printer.</p> <p>For greater detail on the OCM Cable Ports, see Chapter 3, <a href="#">User Interface</a>.</p>
Pneumatics Assembly	<p>Consists of the Flow/Linear Actuator Board, pneumatics valves, filters, regulators. The assembly controls and regulates all air flow within the <i>TP04300</i>.</p> <p>For greater detail on the Pneumatics Assembly, see Chapter 7, <a href="#">Pneumatics</a></p>
Auto-Transformer	<p>Adjusts voltage ranges for optimal performance in the <i>TP04300</i>.</p> <p>For greater detail on the transformer and voltage ranges, see Chapter 8, <a href="#">Power Control</a>.</p> <p>P/N TT00400</p>
Linear Actuator Assembly	<p>The linear actuator assembly is a motor driven lead screw that adjusts the height of the vertical Stand shaft and that of the attached horizontal arm assembly.</p> <p>For greater detail on the Linear Actuator Assembly, see Chapter 5, <a href="#">Arm and Manipulator (TP04300A)</a>.</p> <p>P/N EM00740</p>
Condenser (air inlet)	Cools and condenses the refrigerant. Air flows from the front to the back of the unit.
EMO Switch (SW2)	<p>Press the EMO to trip the back panel Circuit Breaker (CB1) and interrupt power input to the <i>TP04300</i> (shutting down the entire unit).</p> <p>P/N SS01830</p>
Diskette Drive	<p>A standard 3.5 inch, 1.44 megabyte, "floppy" diskette drive is located below the Touch Screen. It is used to record Datalogs of tests and/or test setup files (see <i>TP04300 Interface &amp; Applications Manual</i>).</p> <p>For greater detail on the Diskette Drive, see Chapter 3, <a href="#">User Interface</a>.</p> <p>P/N ZZ08500</p>

## TP04300, Left Full View

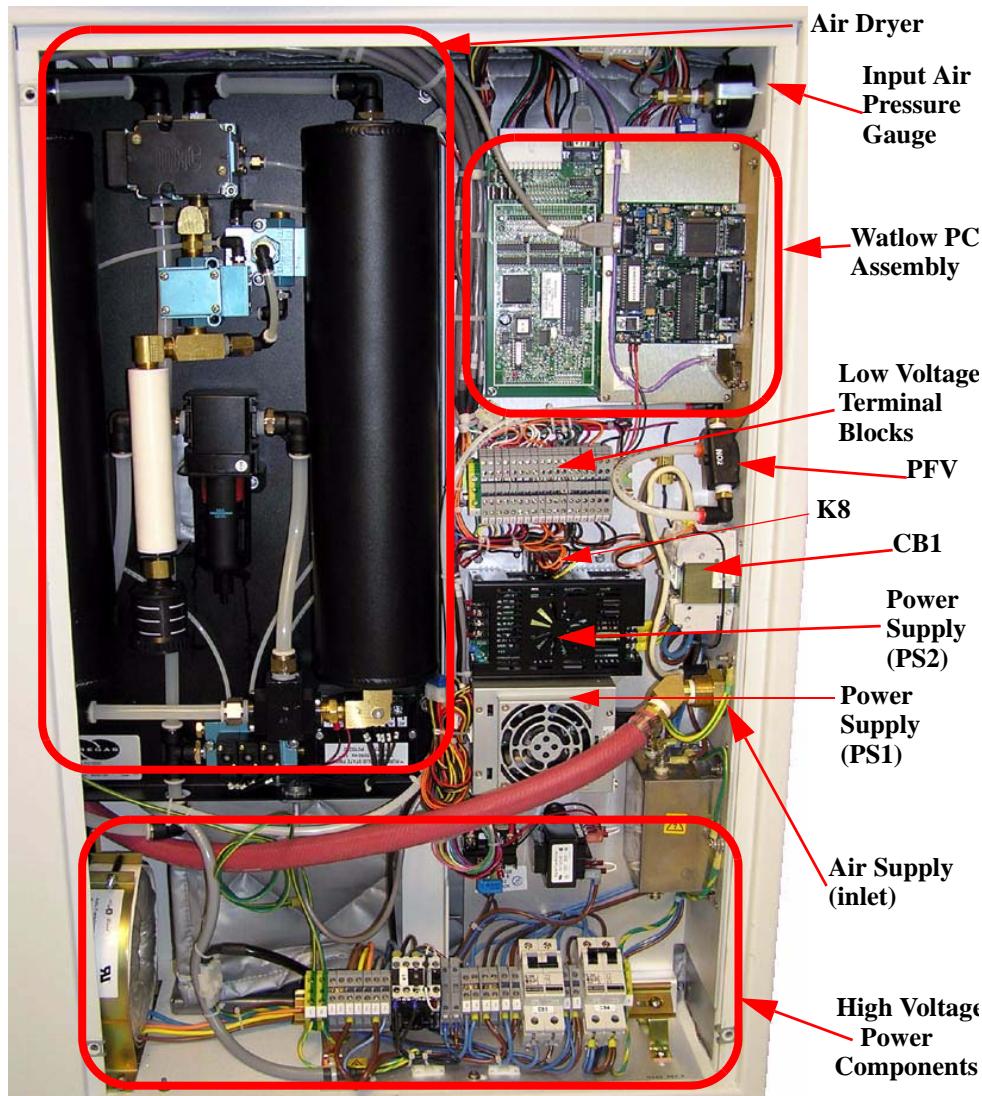


LM01990\_203.JPG

### Description

Part	Description
Sound Blanket	Secured to the frame with velcro, the blanket muffles noise from and protects the Air Chiller Assembly. P/N ZZ09680
Air Chiller Module	The <i>TP04300</i> refrigeration unit. For greater detail on the Air Chiller Module, see Chapter 10, <a href="#">Air Chiller Module</a> . P/N SA145211, 50hz Air Chiller Assembly P/N SA145210, 60hz Air Chiller Assembly

## TP04300, Right Full View

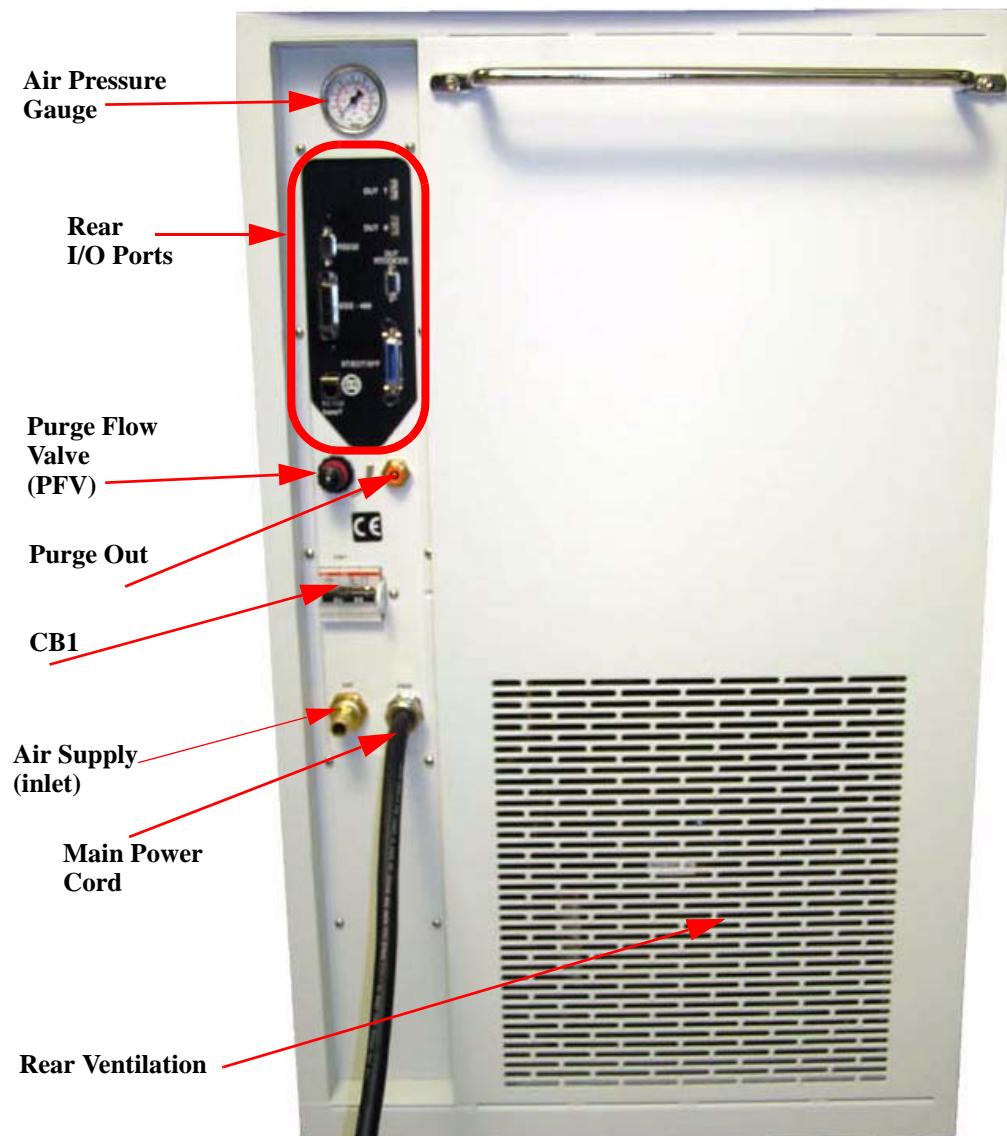


LM02290\_209.jpg

## Description

Part	Description
Air Dryer	The air dryer is fully integrated into the TP04300 pneumatics package. The dryer removes moisture from supplied air. See <a href="#">Facility Requirements</a> for "Clean Dry Air" supply requirements. The supply flow must be capable of the specified minimum SCFM: a supply pressure below the minimum results in reduced performance. P/N ZZ09470
Input Air Pressure Gauge	Monitors pressure (psi) of facility supplied air. P/N MM03400

<b>Part</b>	<b>Description</b>
Watlow PC Assembly	The Main Controller Board(s); an assembly of 3 PCBs, primarily responsible for temperature control.  For greater detail on the Watlow PC Assembly, see Chapter 4, <a href="#">Machine Interface</a> .  P/N EE00120
Terminal Blocks	Power connections for low voltages  For greater detail on the low voltage Terminal Block, see Chapter 10, <a href="#">Power Control</a> .
PFV	Purge Flow Valve, used to control the flow of purged air from the Purge Out (PO) port.  P/N VA00140
K8	The +24vdc, power supply relay.
CB1	Circuit Breaker 1, a 32amp circuit breaker equipped with a safety lockout bracket.  For greater detail on CB1, see Chapter 10, <a href="#">Power Control</a> .
Power Supply 2 (PS2)	The +24vdc power supply.  P/N PS00620
Power Supply 1 (PS1)	The +5, +/-12 vdc, ATX power supply.  P/N PS00610
Air Supply (inlet)	The input port for the facility air supply.
High Voltage Power Components	High Voltage power components, for greater detail on the high voltage Terminal Block, see Chapter 10, <a href="#">Power Control</a> .

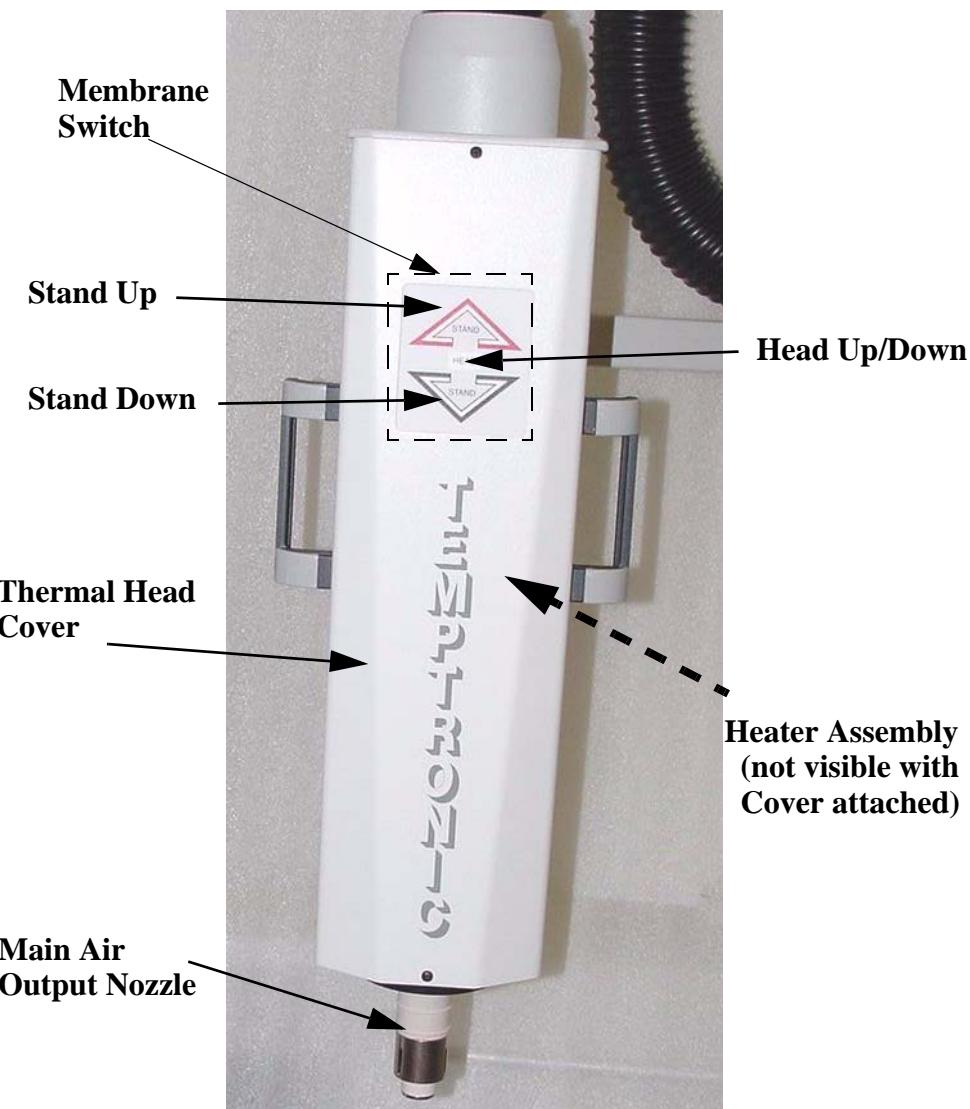
**TP04300, Rear Full View**

LM01990\_205.JPG

**Descriptions**

Part	Description
Air Pressure Gauge	Monitors the pressure (psi) of facility supplied air P/N MM03400
Rear I/O Ports	Communication (IEEE, RS232) and thermocouple I/O ports. For greater detail, see Chapter 5, <a href="#">Rear Input/Output (I/O) Ports</a> .
Purge Flow Valve (PFV)	Adjusts the flow of purged air through the Purge Out port. P/N VA00140

<b>Part</b>	<b>Description</b>
Purge Out	The Purge Out (PO) port supplies dry, ambient, purged air to protect the tester platform (test board, test cables, socket lead wires and related interconnections) from moisture related problems.  A 10' length of tube (P/N VV02280) is supplied for connecting the Purge Out air to the tester platform.
CB1	Circuit Breaker 1, a 32amp circuit breaker equipped with a safety lockout bracket.  For greater detail on CB1, see Chapter 10, <a href="#">Power Control</a> . P/N KK02740
Air Supply (inlet)	The input port for the facility air supply.
Main Power Cord	A 32 amp power cord, approximately 3 meters long.  For 60 Hz systems, the power cord is terminated in a standard 230 v plug.  For 50 Hz systems, the power cord is NOT terminated with a plug: attach a plug appropriate to the facility and local electrical power code.  P/N SA157460 (60Hz) P/N SA157470 (50Hz)
Rear Ventilation	The condenser fan exhausts air through the rear ventilation.  <b>NOTE:</b> 3ft. clearance at the rear of the TP04300 is needed for proper ventilation.

**TP04300A, Thermal Head**

LM01990\_601.JPG

**Descriptions**

Part	Description
Membrane Switch	The switch houses the Thermal Head Control buttons. P/N SA145510
Stand Up	When pressed, moves the linear actuator (and attached horizontal arm assembly) up a maximum of 16". <b>When the VERTICAL STAND LOCK is tightened, the STAND UP/Down buttons are disabled.</b>
Stand Down	When pressed, moves the linear actuator (and attached horizontal arm assembly) down a maximum of 16". <b>When the VERTICAL STAND LOCK is tightened, the STAND UP/Down buttons are disabled.</b>

Part	Description
Head Up/Down	Generally, the manipulator (with the thermal Head in the down position) is lowered until the Head's thermal cap covers the DUT site. <b>The Head must be down to initiate air flow to the DUT.</b>
Thermal Head Cover	Secured by (8) screws to the thermal head assembly. P/N 145350
Heater Assembly	a 230vac, 18 CFM, 250° C max. temp. heater. For greater detail, see Chapter 6, <a href="#">Thermal Head</a> . P/N SA149370
Main Air Output Nozzle	Main output for heated air, (3) Thermocouples monitor the temperature at the nozzle: (1) Type T, the main temperature sensor (2) Type K, overtemp cutout sensors For greater detail, see Chapter 6, <a href="#">Thermal Head</a> . P/N SA149360

# Section F: System Initialization

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## Section Overview

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### Introduction

This Section describes Initial System checkout procedures. These procedures assume that:

- a) the operator understands how to operate the System via the Operator Control Module (OCM) menu screens
- AND
- b) the main air sensor is properly calibrated (see for "Verification" and "Calibration," Section 5, *TP04300 Interface & Applications Manual*).

This Section is divided into the following topics:

Topic	See Page
<a href="#">Initializing Cold Flow</a>	<a href="#">19</a>
<a href="#">Initializing Hot Flow</a>	<a href="#">20</a>
<a href="#">Head and Arm Test (TP04300A)</a>	<a href="#">21</a>
<a href="#">Temperature Cycle Test</a>	<a href="#">22</a>
<a href="#">Remote Interface Test</a>	<a href="#">23</a>

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## Initializing Cold Flow

### Procedure

To initialize cold air flow:

1. Toggle the front panel switch to start the TP04300 System.
2. Wait for software to boot: the *System Startup Screen* displays, then a functional screen displays.
3. Press "Utility" tab to access *Utility Screen*, and select Heat/Cool (compressor on).
4. If the system has been off for more than 2 hours, the *Compressor Startup Screen* displays a 60 second countdown, for compressor initialization.
5. Check by listening that the compressor starts in the air chiller module.
6. Allow the compressor to run for 1/2 hour, waiting, while the refrigerants separate and produce a cold temperature output.
7. Press the "Setup" tab to access the *Setup Screen*, then set the maximum flow rate to 18 scfm and the maximum cold setpoint to -80 °C.
8. Press "Operator" tab to access *Operator Screen*, press "Change Setpoint" and set Cold to maximum cold, next press "Go To Setpoint" and then press Cold.
9. Observe that the system reaches At Temperature within 1 minute.
10. Press "Ambient" to return system to the ambient setpoint (+25 °C).
11. After the system reaches At Temperature, wait 3 minutes (for thermal cap and all handable components to return to a safe handling temperature), then toggle the front panel start/stop switch momentarily downward to stop the TP04300 System.

## Initializing Hot Flow

### Procedure

To initialize hot air flow:

1. Toggle the front panel switch to start the TP04300 System.
2. Wait for software to boot: the *System Startup Screen* displays, then a functional screen displays.
3. Press "Utility" tab to access *Utility Screen*, and select Heat Only (compressor off).
4. Press the "Setup" tab to access the *Setup Screen*, then set the maximum flow rate to 18scfm and the maximum hot setpoint to +230 °C.
5. Press "Operator" tab to access *Operator Screen*, press "Change Setpoint" and set Hot to +40 °C, next press "Go To Setpoint" and then press Hot.
6. Observe that the system reaches At Temperature within 1 minute
7. On the *Operator Screen*, press "Change Setpoint" and set Hot to +200 °C, next press "Go To Setpoint" and then press Hot.
8. Observe that the system reaches At Temperature within 1 minute.
9. Press "Ambient" to return system to the ambient setpoint (+25 °C).
10. Wait until the system reaches At Temperature and all handable components cool down.

## Head and Arm Test (TP04300A)

### Procedure

To test the head and arm:

1. Check the Head up and down movement,
  - Press and release the "**Head**" membrane switch (button) on the thermal head assembly for alternate up and down travel of the head over a 6-inch (15-cm) distance.
2. Check the horizontal arm rotation,
  - Unlock the vertical arm.
  - Manually sweep the Head and horizontal arm around the frame and check for a 330-degree freedom of movement.
  - Unlock the horizontal arm at its hinge
  - Manually sweep the Head and outer horizontal arm around the inner horizontal arm and check for a 300-degree freedom of movement.
  - Clamp the horizontal arm sections with the arm lock at the hinge.
3. Check the pivot and tilt movements of the thermal Head assembly with respect to the horizontal arm,
  - Loosen the two pivot locks at the rear of the head.
  - Manually pivot the thermal Head assembly  $\pm 90$  degrees in the horizontal plane
  - Manually pivot the thermal Head assembly  $\pm 180$  degrees in the vertical plane
  - Manually tilt the thermal Head assembly  $\pm 7$  degrees from the vertical.
  - With the thermal Head assembly oriented in the desired position, tighten both pivot locks at the rear of the head.
4. Check the electrically driven up and down movement of the horizontal arm, by using the upward and downward "**STAND**" membrane switches (buttons) on the front of the head:
  - Alternately press the "**STAND**" buttons to raise and lower the horizontal arm and head.
  - With the horizontal arm and head positioned at the desired horizontal and vertical positions, tighten the vertical arm lock.

**NOTE:** With the vertical arm locked, the **STAND** buttons are disabled

## Temperature Cycle Test

### Procedure

To perform a temperature cycle test:

1. Press "Utility" tab to access *Utility Screen*, and set Flow to "Safe" and Head to "Unlocked."
2. Press "Cycle" tab to access the *Cycle Screen*, then press "Cycles" and set to 2. Use the default setpoint ramp/soaks already set (enabled) in the Cycle Segments Table.
3. On the *Cycle Screen*, press "Start Cycling" and see if the system steps through the enabled segments for 2 cycles.
4. At end of second cycle, check that the Head raises to its up position (away from DUT site) and that the main air flow returns to "Safe" ambient
5. **Optional:** Repeat sequence, but in Step 1, set Flow to "RTS" (Return to Setpoint). At end of second cycle, check that Head goes up, and main air flow returns to most recent set-point.

## Remote Interface Test

### Procedure

To test the remote interface:

1. Connect the remote host (prober/computer) to the TP04300 at the appropriate IEEE-488 or RS232 connector in the system I/O panel, (see *TP04300 Interface & Applications Manual*, LM01980).
2. Press "Utility" tab, display *Utilities Screen*, set "GPIB Address" if necessary.
3. Load a typical ramp/cycle program at the remote host and start cycling the program.
4. Check that the system steps through each setpoint of the cycle(s) as programmed from the remote host.

## Section G: Calibrate System

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### Introduction

Calibration of the TP04300 System sensors should be verified every year, or more often if in question or required by user certification schedules, to determine the temperature control accuracy of the system.

Because of the stable and reliable characteristics of the sensors used, a two-point calibration assures accurate operation over the system temperature range.

Verification and any necessary recalibration should be performed as outlined in "Verification" and "Calibration," Section 5, *TP04300 Interface & Applications Manual*.

Calibration is performed semi-automatically with the aid of the calibration menu screens and an external Calibrator which provides output equivalent to the TP04300.

The accuracy of the external Calibrator shall have valid, and traceable calibrations to the National Institute of Standards and Technology (NIST), if traceability is required.

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# User Interface

## Chapter Overview

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### Introduction

This Chapter describes the *TP04300* User Interface.

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### In this Chapter

This Chapter is divided into the following Sections:

Section	See Page
Parts Pictorial	<a href="#">2</a>
Repair	<a href="#">7</a>
Parts List	<a href="#">23</a>

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# Section A: Parts Pictorial

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## Section Overview

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### In this Section

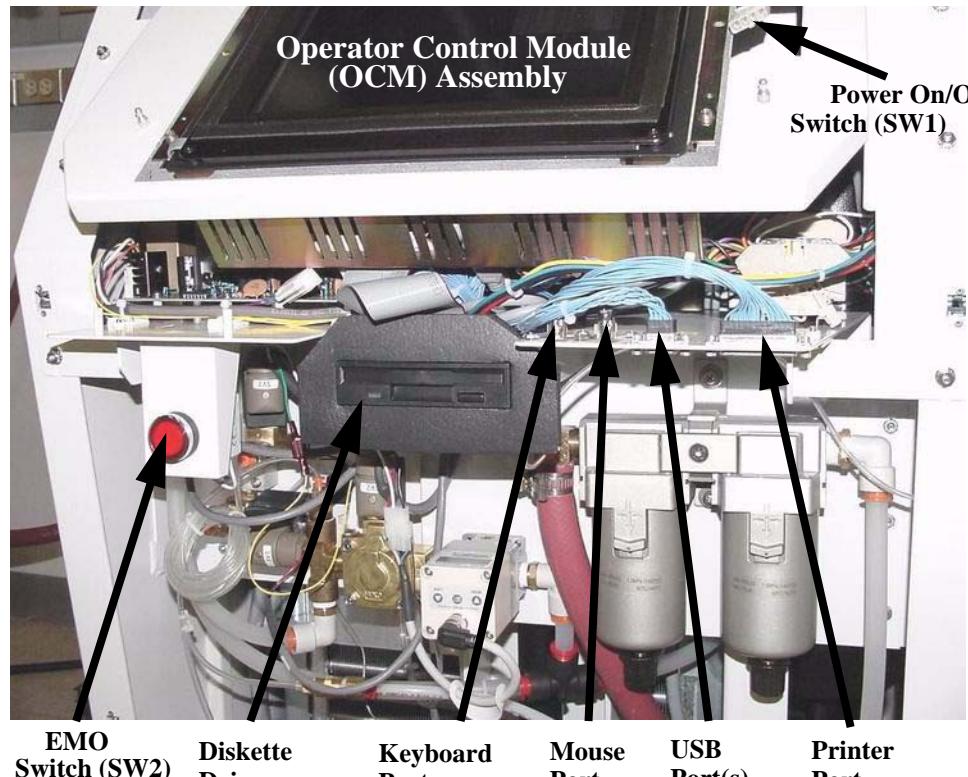
The following topics are covered in this Section:

Topic	See Page
User Interface Overview	3
Operator Control Module Assembly	5

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## User Interface Overview

### User Interface



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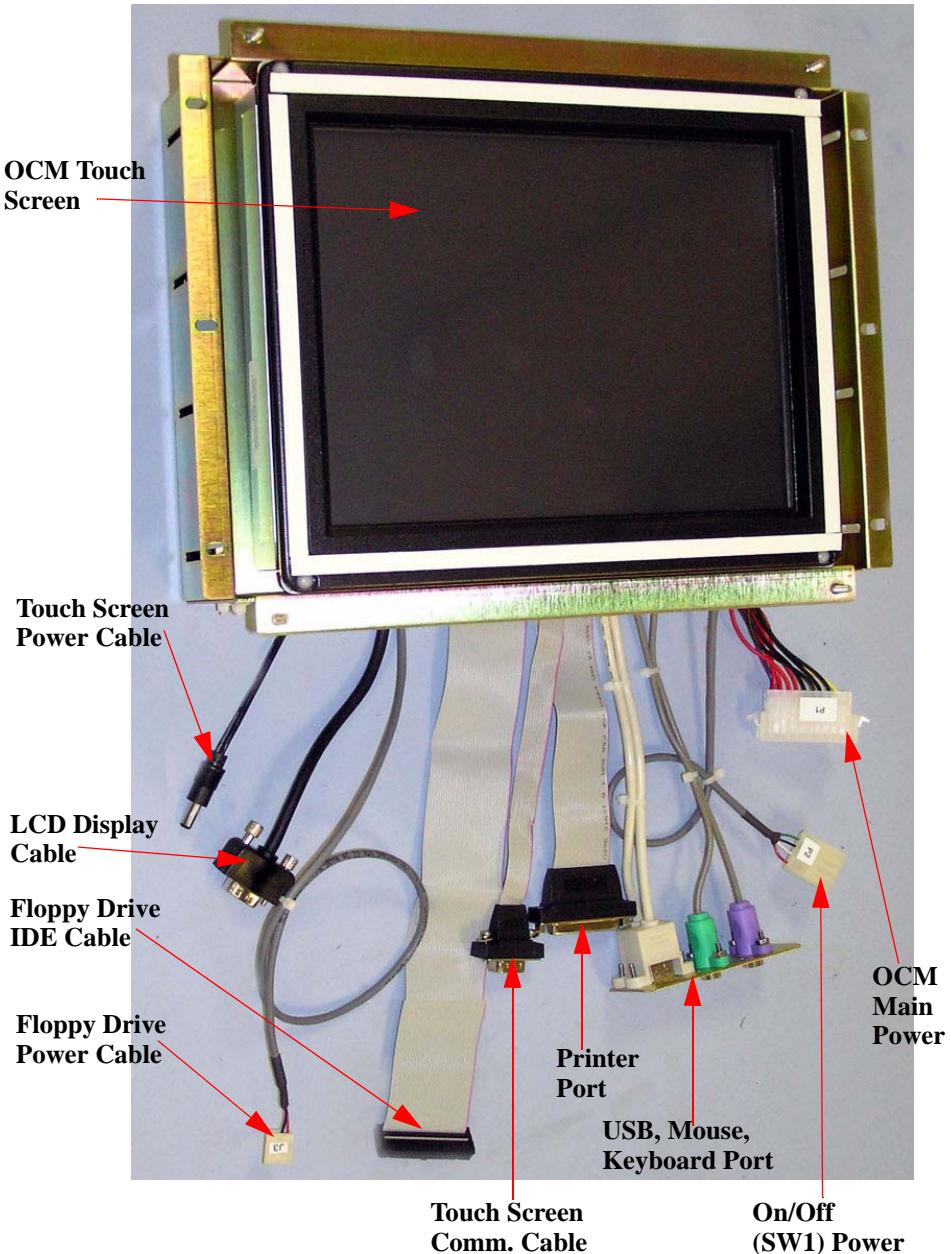
### User Interface Descriptions

PART	DESCRIPTION
Operator Control Module (OCM) Assembly	The OCM assembly consists of a hard drive, motherboard, and a touch screen display. The touch screen allows users to locally operate, program, and calibrate the system. P/N SA173640
Diskette Drive	The drive uses standard, high-density, 3-1/2 inch 1.44-MB diskettes <ul style="list-style-type: none"> <li>use drive to transfer files: datalog, test setup, test data</li> <li>use drive to load updated operating system files</li> </ul> P/N ZZ08500
Keyboard Port	a DIN port (recessed and facing down) used to interface a keyboard.
Mouse Port	a DIN port (recessed and facing down) used to interface a mouse.
USB Port(s)	(2) standard USB ports.
Printer Port	a DB 25 female port (recessed and facing down) used to interface a printer. For greater detail on printer installation, see the <i>TP04300 Interface and Applications Manual (LM01980)</i> .

PART	DESCRIPTION
Power On/Off Switch (SW1)	The system's on/off switch (which contains an "On" indicator LED light). P/N SS01840
EMO Switch (SW2)	Press the EMO to trip the back panel Circuit Breaker (CB1) and interrupt power input to the <i>TP04300</i> (shutting down the entire unit). P/N SS01830

## Operator Control Module Assembly

**OCM Assembly,  
Front View**



LM02290\_315.jpg

### OCM Assembly Descriptions

PART	DESCRIPTION
OCM Touch Screen	a 10.4 inch, 800 X 600 resolution, LCD Touch Screen Display. P/N EE00190

PART	DESCRIPTION
Touch Screen Power Cable	routes from the OCM Motherboard (JP3) to the 12vdc power input port of the Touch Screen.
LCD Display Cable	routes from the OCM Motherboard (VGA) to the display input port of the Touch Screen.
Floppy Drive IDE Cable	supplies communication signals from the OCM Motherboard to the Floppy Drive.
Floppy Drive Power Cable	supplies +5VDC power to the Floppy Drive
Touch Screen Comm. Cable	supplies communication signals from the OCM Motherboard to the Touch Screen.
Printer Port	standard printer I/O port
USB, Mouse, Keyboard Port	standard USB, Mouse, and Keyboard I/O ports
On/OFF (SW1) Power Cable	supplies +5, +24VDC from the OCM Motherboard to the Power On/Off Switch.
OCM Main Power	supplies +5, +12VDC

## Section B: Repair

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### Section Overview

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#### Introduction

The following topics are described in this Section:

Topic	See Page
OCM Assembly Replacement	8
OCM Touch Screen Replacement	11
OCM Motherboard Replacement	13
OCM Hard Drive Replacement	16
Diskette Drive Replacement	18
Power On/Off Switch (SW1) Replacement	19
EMO Switch (SW2) Replacement	21

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## OCM Assembly Replacement

### Procedure

To replace the OCM, use P/N SA173640.

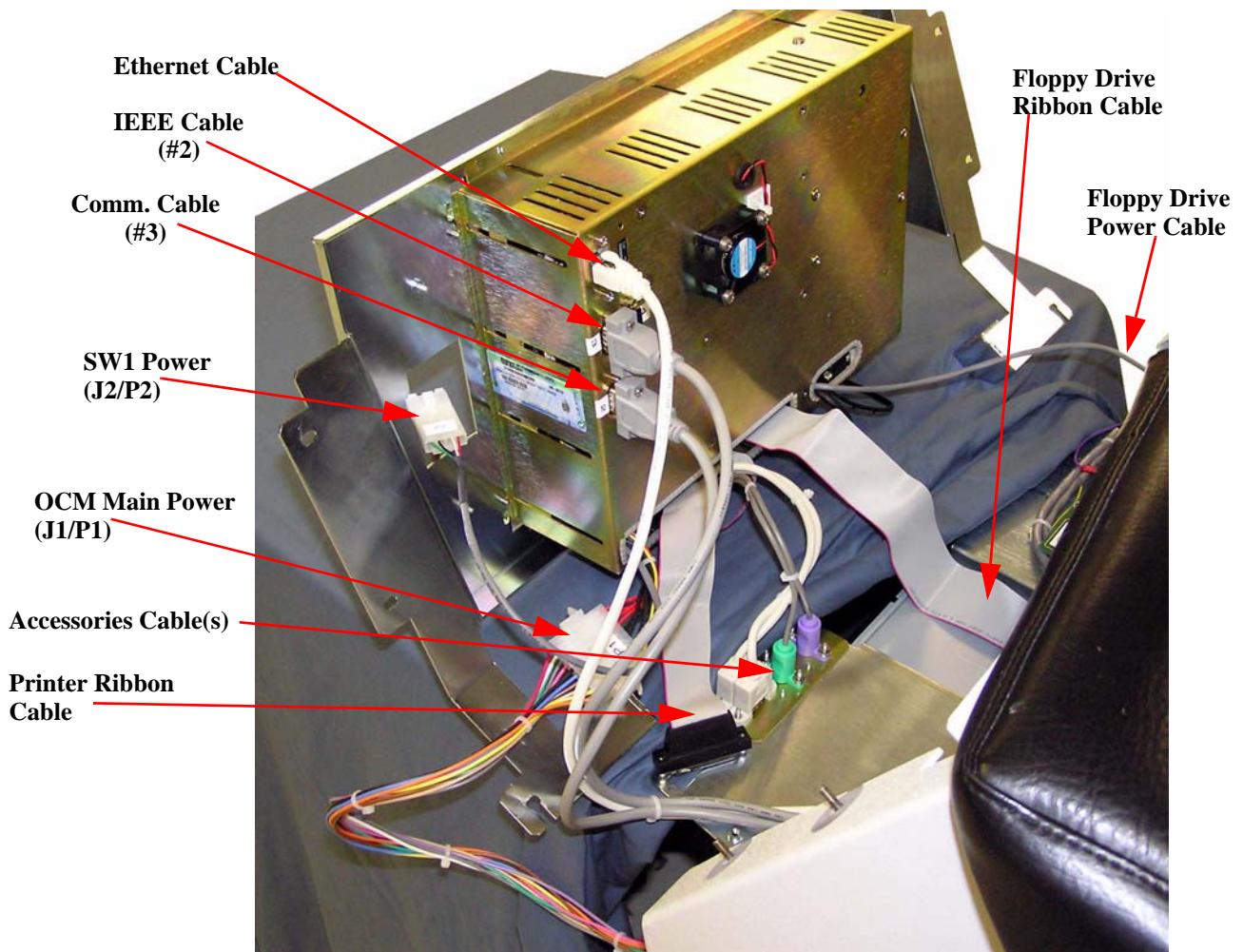


### WARNING

WARNINGS 1,2,3,7,9 in Chapter 1 Safety.

Step	Action
1	Power down the <i>TP04300</i> and disconnect power cord.
2	Remove facility supplied air connection from the <i>TP04300</i> .
3	Remove the front bezel by gently prying up the four corners and disconnect the Molex Connector on the power switch. Set the bezel aside.
	 <i>LM01990_301.jpg</i>
4	Remove the (6) nuts (3 on each side) and (2) screws (1 on each side) securing the OCM chassis to the frame.
5	Carefully place the OCM chassis and OCM assembly on a table in front of the system.

Step	Action
6	<p>Label and Disconnect the following:</p> <ul style="list-style-type: none"> <li>• OCM Main Power Cable</li> <li>• SW1 Power Cable</li> <li>• Printer Ribbon Cable (2 standoffs)</li> <li>• Accessories Cable(s), USB, Mouse, Keyboard (4 nuts)</li> <li>• Floppy drive Ribbon Cable</li> <li>• Floppy drive Power Cable</li> </ul> <p>On the back of the OCM, disconnect:</p> <ul style="list-style-type: none"> <li>• Ethernet Cable</li> <li>• IEEE Cable (port “2”)</li> <li>• Communications Board Cable (port “3”)</li> </ul>

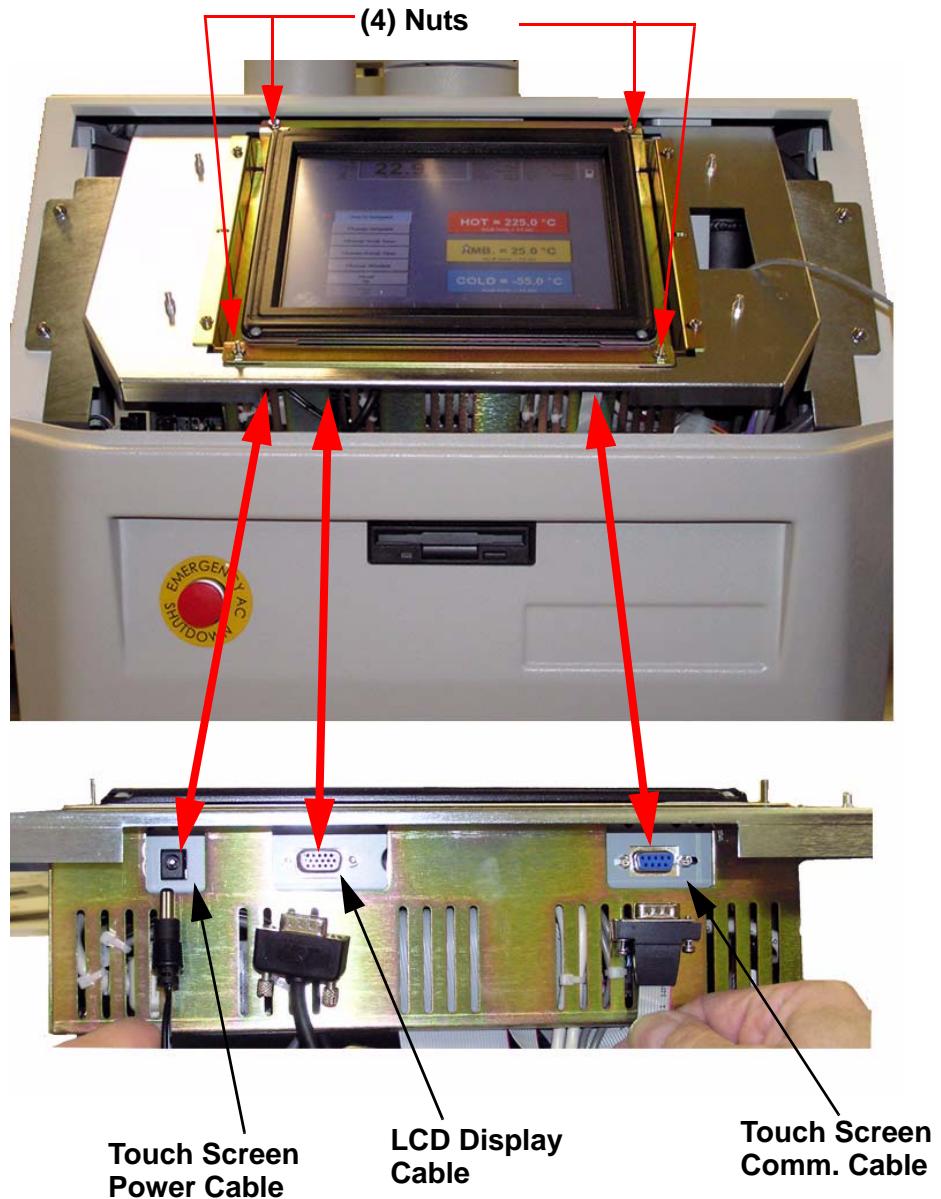


LM02290\_318.jpg

Step	Action
7	<p>Once all the cabling has been disconnected, the OCM Assembly can be removed from the OCM Chassis.</p> <p>Remove the (4) screws securing the OCM Assembly to the Chassis.</p> <p style="text-align: center;">(4) Screws</p>  <p>LM02290_319.jpg</p>
8	Store the OCM Assembly in a safe place.
9	Install the new OCM Assembly in the reverse order of the above procedure.

## OCM Touch Screen Replacement

### Touch Screen Replacement Detailed



LM02290\_317.jpg

### Procedure

To Replace the Touch Screen:

Step	Action
1	Power down the <i>TP04300</i> and disconnect power cord.
2	Remove facility supplied air connection from the <i>TP04300</i> .
3	Remove the top, front Bezel.

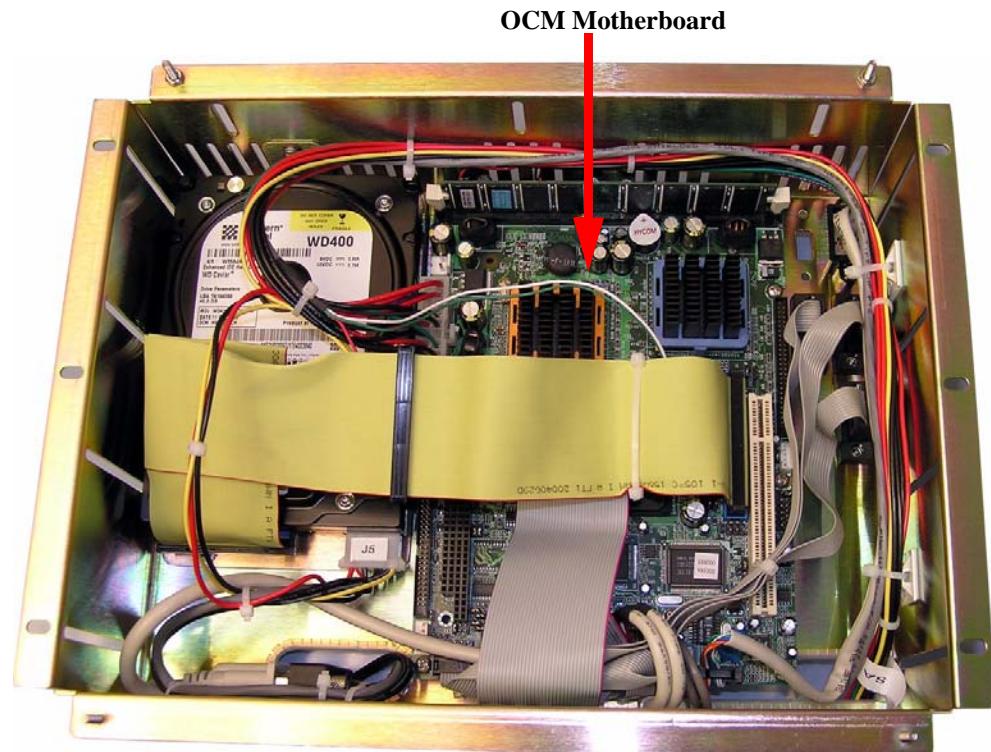
<b>Step</b>	<b>Action</b>
4	Disconnect the: <ul style="list-style-type: none"><li>• Touch Screen Power Cable</li><li>• LCD Display Cable</li><li>• Touch Screen Comm. Cable</li></ul>
5	Remove the (4) screws securing the Touch Screen to the OCM Assembly.
6	Remove the Touch Screen.
7	Install the new touch screen in the reverse order of the above procedure.

# OCM Motherboard Replacement

## Introduction

The OCM Motherboard is a non-repairable unit. It must be returned to the nearest sales representative or to the factory for depot maintenance repairs.

## Motherboard Replacement Detailed



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## Procedure

To replace the Motherboard use P/N EE00160.



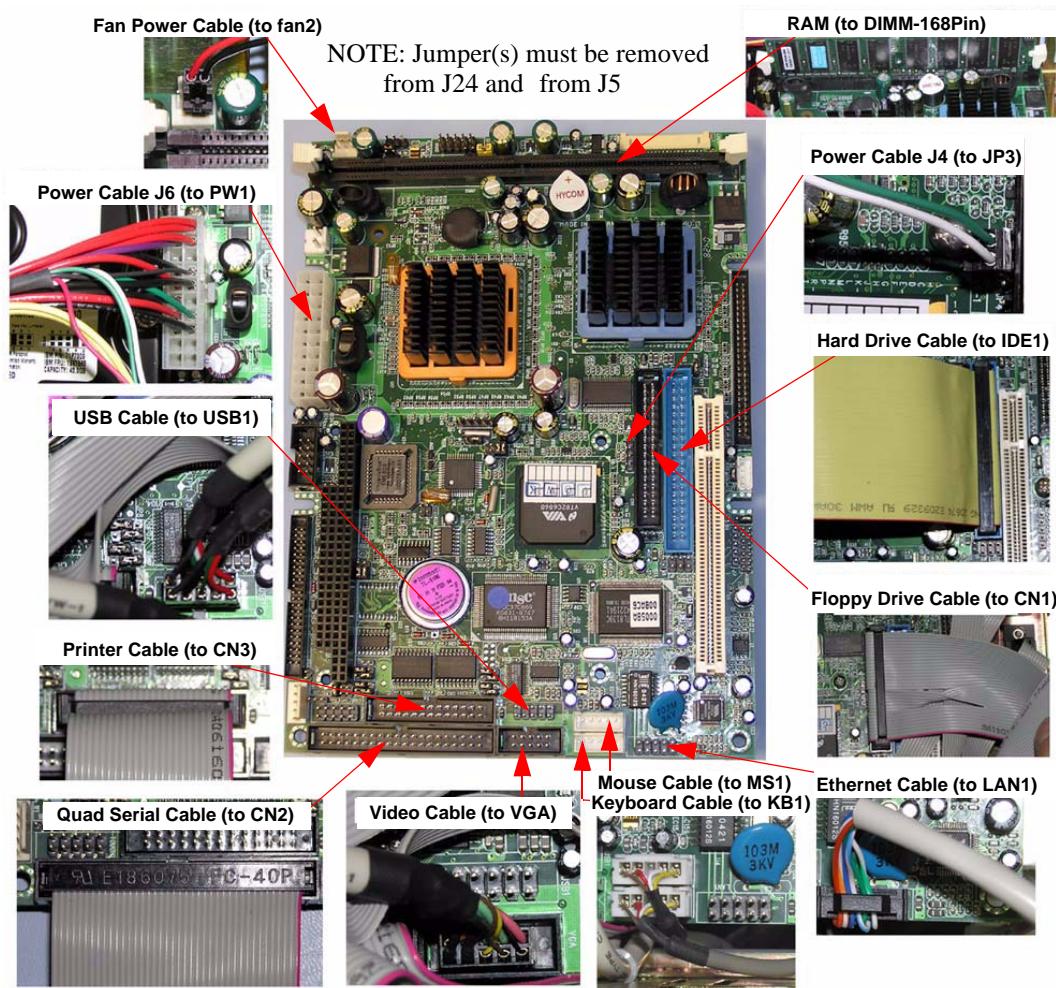
## WARNING

**WARNINGS 1, 2, 3, 8, 9** in Chapter 1, Safety.

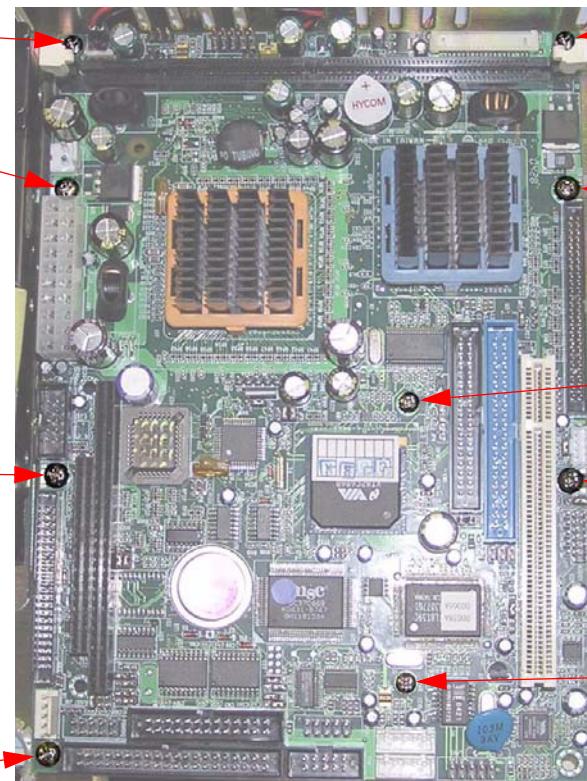
Step	Action
1	Power down the <i>TP04300</i> and disconnect power cord.
2	Remove facility supplied air connection from the <i>TP04300</i> .
3	Extract the OCM Assembly. Refer to <a href="#">OCM Assembly Replacement</a> , page 3-8. as needed.

Step	Action
4	Remove the Touch Screen to gain access to the OCM's internal components. Refer to <a href="#">OCM Touch Screen Replacement</a> , page 3-11 as needed.
5	<p>Disconnect the following from the Motherboard:</p> <ul style="list-style-type: none"> <li>• Fan Power Cable (fan2) <b>Note:</b> red to pin 1, black to pin 2, pin 3 not used.</li> <li>• RAM (retain hardware)</li> <li>• Power Cable J4 (JP3)</li> <li>• Hard Drive Cable (IDE1)</li> <li>• Floppy Drive Cable (CN1)</li> <li>• Ethernet Cable (LAN1)</li> <li>• Mouse Cable (MS1)</li> <li>• Keyboard Cable (KB1)</li> <li>• Video Cable (VGA)</li> <li>• Printer Cable (CN3)</li> <li>• USB Cable (USB1)</li> <li>• Power Cable J6 (PW1)</li> </ul> <p>Make a note of each connection's orientation on the Motherboard. Align as shown below.</p>

## Motherboard Cable Connections:



LM02290\_311.jpg

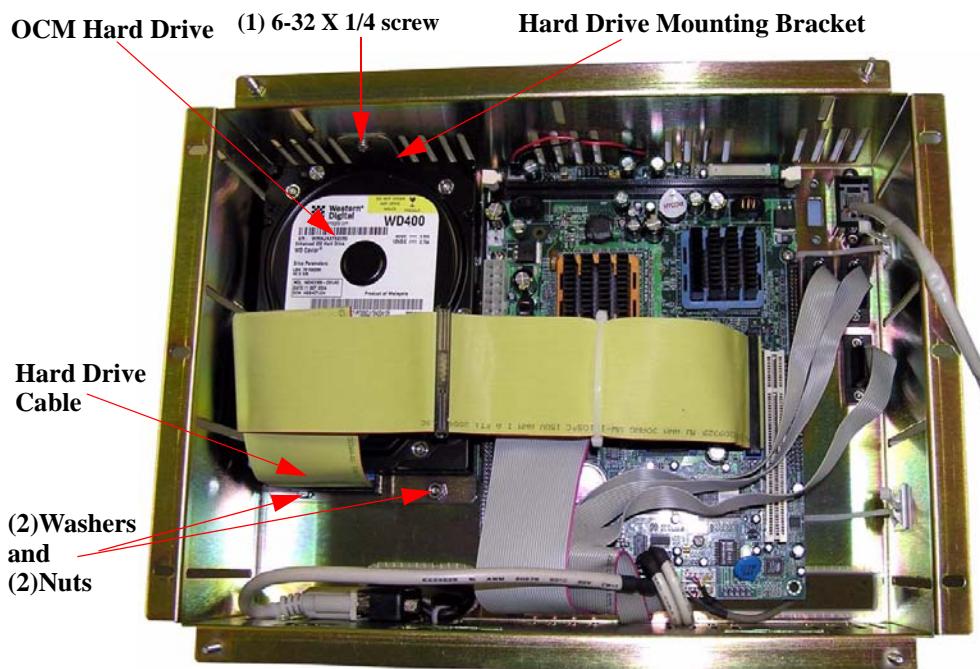
Step	Action
6	<p>Remove the (9) screws securing the board to the OCM frame</p> <ul style="list-style-type: none"> <li>- (7) #6 screws</li> <li>- (2) #4 screws</li> </ul> <p>Retain the Hardware</p> 
	LM02290_313.jpg
7	Remove the Motherboard.
8	Install the new Motherboard in the reverse order of the above procedure.

## OCM Hard Drive Replacement

### Introduction

The OCM Hard Drive is a non-repairable unit. It must be returned to the nearest sales representative or to the factory for depot maintenance repairs.

### Hard Drive Replacement Detailed



LM02290\_314.jpg

### Procedure

To replace the Hard Drive use P/N EE00180.



### WARNING

**WARNINGS 1, 2, 3, 8, 9** in Chapter 1, Safety.

Step	Action
1	Power down the <i>TP04300</i> and disconnect power cord.
2	Remove facility supplied air connection from the <i>TP04300</i> .
3	Extract the OCM Assembly. Refer to <a href="#">OCM Assembly Replacement</a> , page 3-8. as needed.
4	Remove the Touch Screen to gain access to the OCM's internal components. Refer to <a href="#">OCM Touch Screen Replacement</a> , page 3-11 as needed.
5	Make a note of the alignment and orientation of the Hard Drive Cable. Disconnect the cable from the Hard Drive.

<b>Step</b>	<b>Action</b>
6	Remove the (1) 6-32 X 1/4 screw securing the Mounting Bracket to the OCM Frame.  Retain the Hardware.
7	Remove the (2) Nuts and (2) Washers securing the Mounting Bracket to the frame's studs.  Retain the Hardware.
8	Remove the Hard Drive and Mounting Bracket as one assembly.
9	Remove the (4) screws and standoffs securing the Hard Drive to the Mounting Bracket.  Retain the Hardware.
10	Install the new Hard Drive in the reverse order of the above procedure.

## Diskette Drive Replacement

### Introduction

The floppy disk drive is a non-repairable unit. A faulty disk drive should be replaced by a new unit.

### Procedure

To replace the floppy disk drive, use P/N ZZ08500.



### WARNING

**WARNINGS 1,2,3,7,9** in Chapter 1 Safety.

Step	Action
1	Remove the right side panel from the frame module
2	Disconnect the OCM interface cable from the bottom rear of the floppy disk drive case.
3	Disconnect the grounding strap connection at the floppy disk drive case.
4	Remove the two front-panel screws (one screw near each end of the disk drive with nut and washer on inside of panel) that secure the disk drive in the front panel of the frame module.
5	Carefully pull the disk drive out from behind the front panel.
6	Do not disassemble faulty disk drive. Send to the Tempronic for any repairs or a replacement.
7	Install a new floppy disk drive in the reverse order of removal.

## Power On/Off Switch (SW1) Replacement

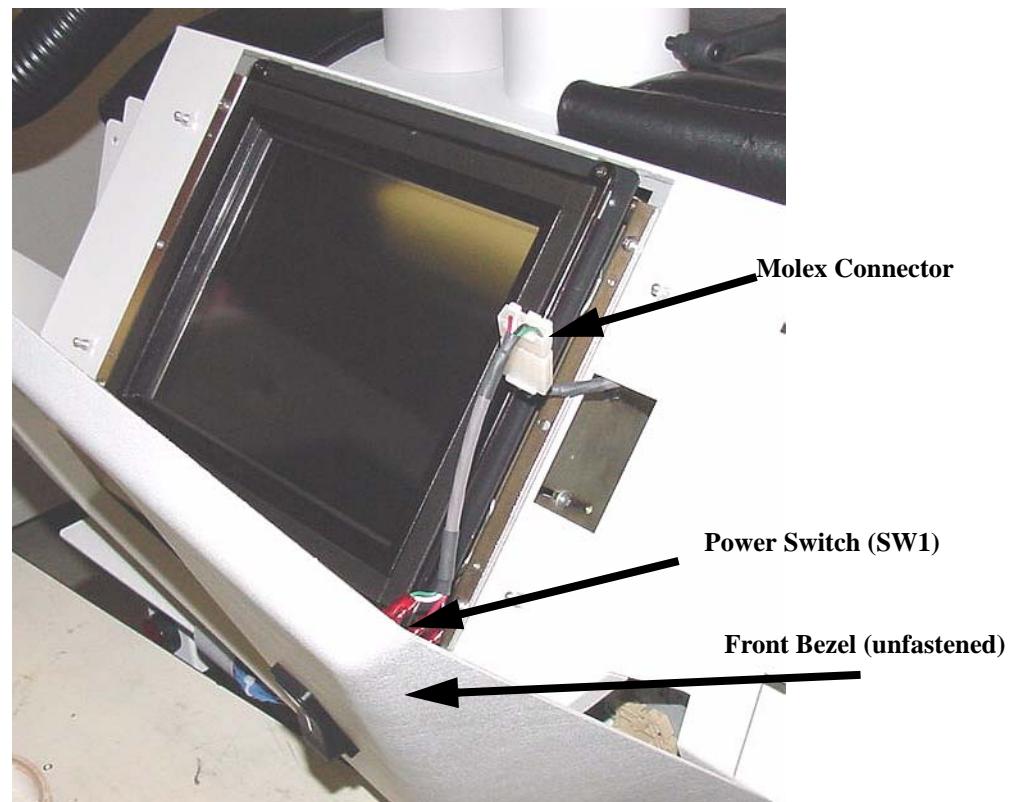
### Introduction

The following procedure gives instructions for removing and replacing the Power On/Off Switch (SW1).

### SW1 Replacement Detailed



LM01990\_301.jpg



LM01990\_304.jpg

**Procedure**

To replace SW1 use P/N SS01840.

**WARNING**

**WARNINGS 1,2,3,7,9** in Chapter 1 Safety.

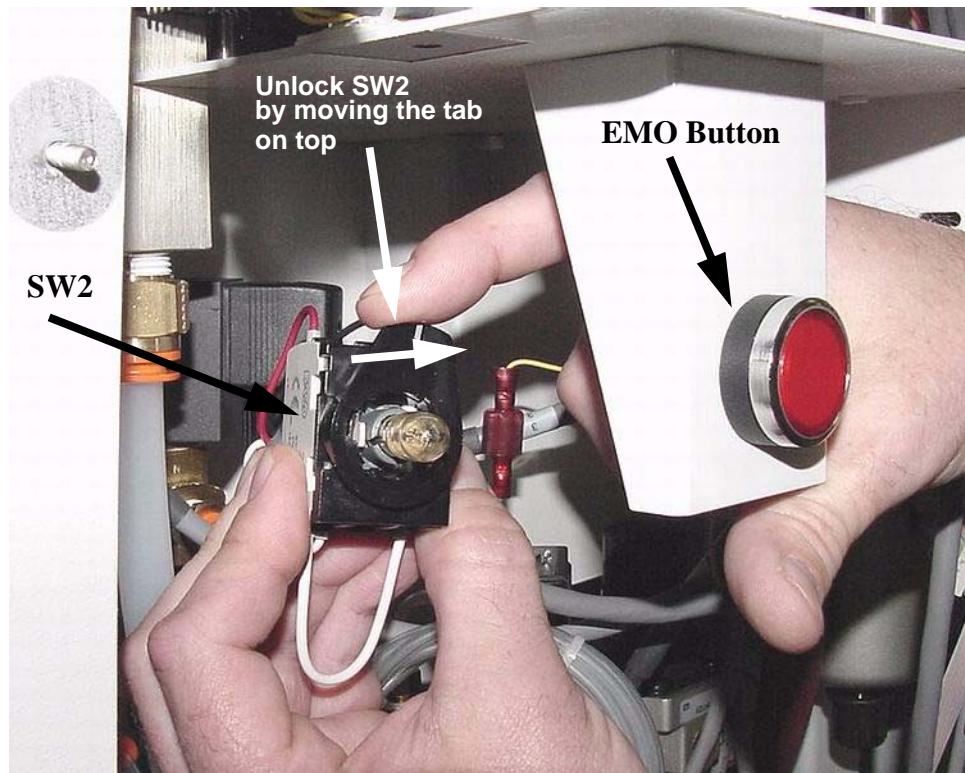
Step	Action
1	Turn off (power down) the <i>TP04300</i> , then disconnect power cord from facility power supply.
2	Unfasten the front bezel by gently prying up the four corners. Set the bezel aside.
3	Disconnect the Molex Connector on the power switch.
4	Press in on the sides of the switch (use a small screwdriver if necessary) and extract the switch through the front of the bezel.
<b>BEZEL REMOVED, REAR VIEW OF SW1</b>	
LM01990_305.jpg	
5	Install the new switch in the reverse order of the above procedure.

## EMO Switch (SW2) Replacement

### Introduction

The following procedure gives instructions for removing and replacing the EMO Switch (SW2).

### SW2 Replacement Detailed



LM01990\_306.jpg

### Procedure

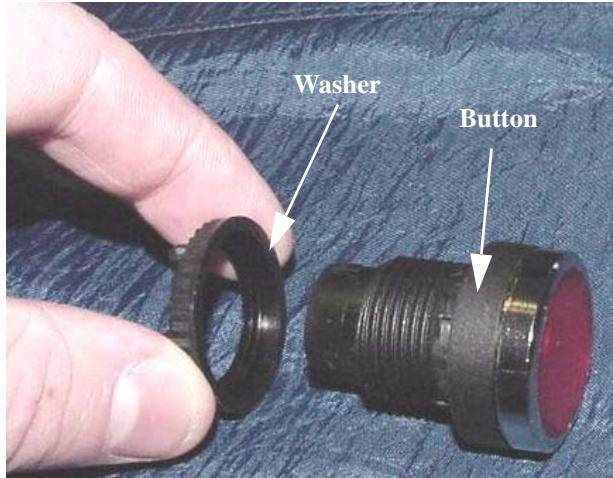
To replace SW2 use P/N SS01830.



### WARNING

WARNINGS 1,2,3,7,9 in Chapter 1 Safety.

Step	Action
1	Turn off (power down) the TP04300, then disconnect power cord from facility power supply.
2	Remove the lower front bezel.
3	Reach behind the Red Button EMO and unlock SW2 as shown above.
4	Label and remove the (4) electrical connections from the switch.

Step	Action
5	To remove the Red EMO Button, reach behind the button and remove the black plastic washer that secures the button to the frame.  <b>BUTTON AND WASHER (shown Removed from Frame)</b>  Washer Button
6	Install the new EMO Switch in the reverse order of the above procedure.

## Section C: Parts List

---

PART (Description)	STOCK#, (P/Ns)
OCM Assembly	SA173640
OCM Motherboard	EE00160
OCM Hard Drive	EE00180
OCM Touch Screen	EE00190
Diskette Drive	ZZ08500
Power On/Off Switch (SW1)	SS01840
EMO Switch (SW2)	SS01830

---





# Machine Interface

## Chapter Overview

### Introduction

The machine interface logic is burned to a Watlow board firmware prom.  
The System's internal communications is via serial communications.  
The user interface program is saved to the Operator Control Module hard drive.

### In this Chapter

This Chapter is divided into the following Sections:

Section	See Page
<a href="#">Parts Pictorial</a>	<a href="#">2</a>
<a href="#">Repair</a>	<a href="#">11</a>
<a href="#">Parts List</a>	<a href="#">18</a>

# Section A: Parts Pictorial

---

## Section Overview

---

### In this Section

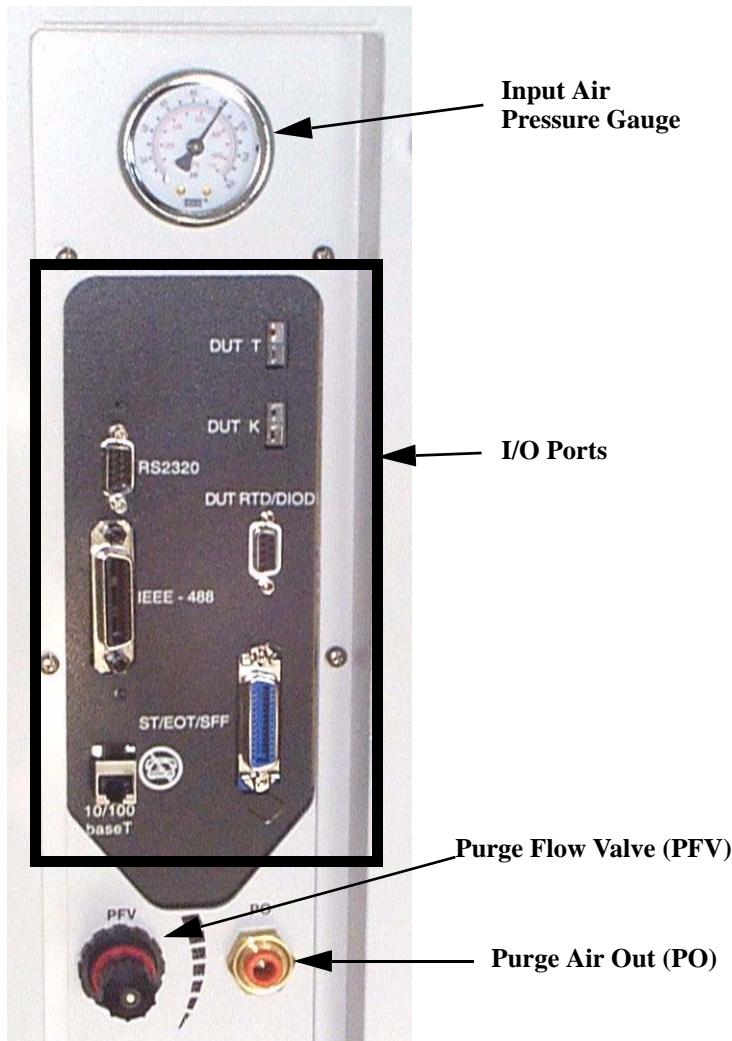
The following topics are covered in this Section:

Topic	See Page
Rear Input/Output (I/O) Ports	3
Flow/Linear Actuator Board	5
Cutout Board	6
Watlow PC Assembly	8
Communications Board	9

---

## Rear Input/Output (I/O) Ports

### Rear I/O Ports



LM01990\_404.JPG

### Descriptions

PART	DESCRIPTION
RS232C	RS232 Serial Communications I/O port
IEEE-488	IEEE General Purpose Interface Bus (GPIB)
10/100 BaseT	Ethernet Communications I/O port (RJ45)

**ATTENTION**

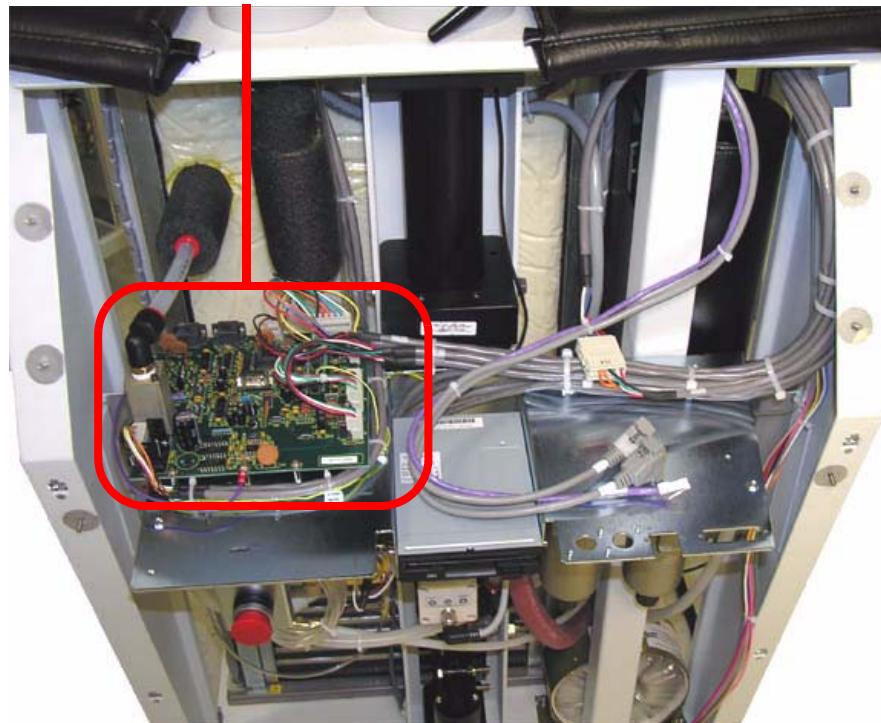
This port does NOT accommodate a standard telephone interface (RJ11, RJ12).

PART	DESCRIPTION
DUT T	Interface for a Type T thermocouple
DUT K	Interface for a Type K thermocouple
DUT RTD/Diode	Interface for an RTD/Diode sensor.
ST/EOT/SFF	Start Test/End of Test/Stop First Fail/ Communications port.
Input Air Pressure Gauge	Monitors the pressure of the compressed air being supplied to the system.
Purge Flow Valve (PFV)	Used to adjust the flow of the Purge Air Out.
Purge Air Out (PO)	Supplies clean, dry air to the Tester Platform. The purged air is used to protect platform components from moisture related problems.

## Flow/Linear Actuator Board

### Flow/Linear Actuator Board

Flow/Linear Actuator Board



FRONT VIEW

LM02290\_421.jpg



### ATTENTION

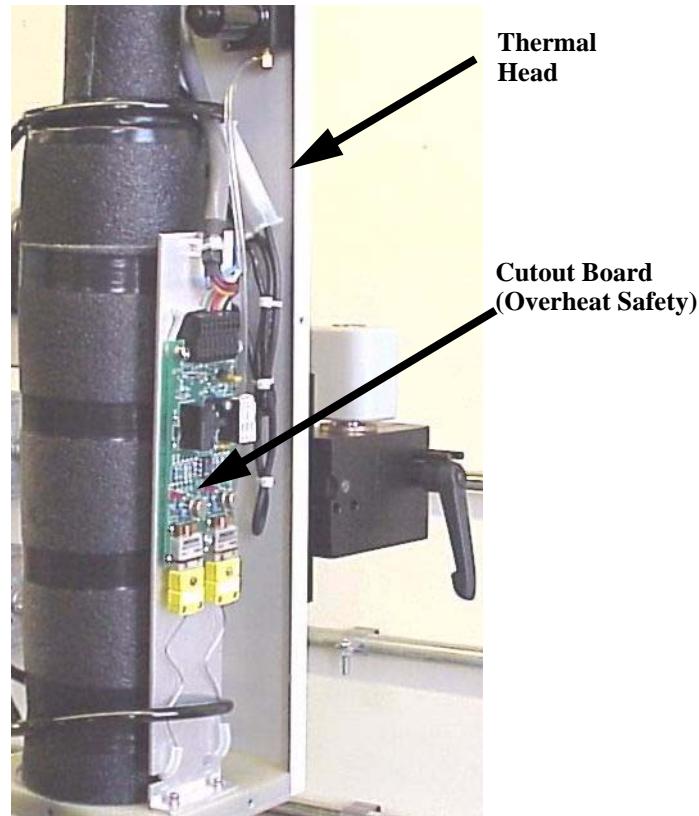
This graphic displays the latest version of the Flow/Linear Actuator Board. Older TP04300 models equipped with dual flow boards may be upgraded with Service Kit CS160070.

### Descriptions

PART	DESCRIPTION
Flow/Linear Actuator Board	<p>Has two functions:</p> <ul style="list-style-type: none"><li>• Serves as a mass air flow meter. This board communicates flow volume to the Watlow board which then sets flow rate and volume according to OCM inputs.</li><li>• The actuator drive logic is integrated into the Flow/Linear Actuator board.</li></ul> <p>P/N SA172090</p>

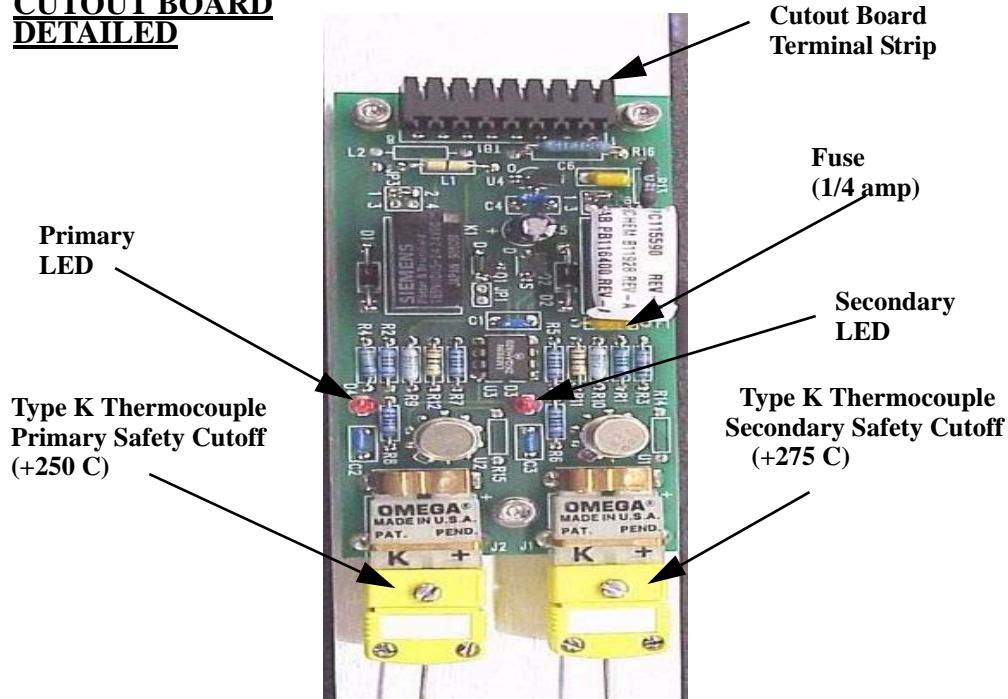
## Cutout Board

### Cutout Board



LM01990\_406.JPG

### CUTOUT BOARD DETAILED



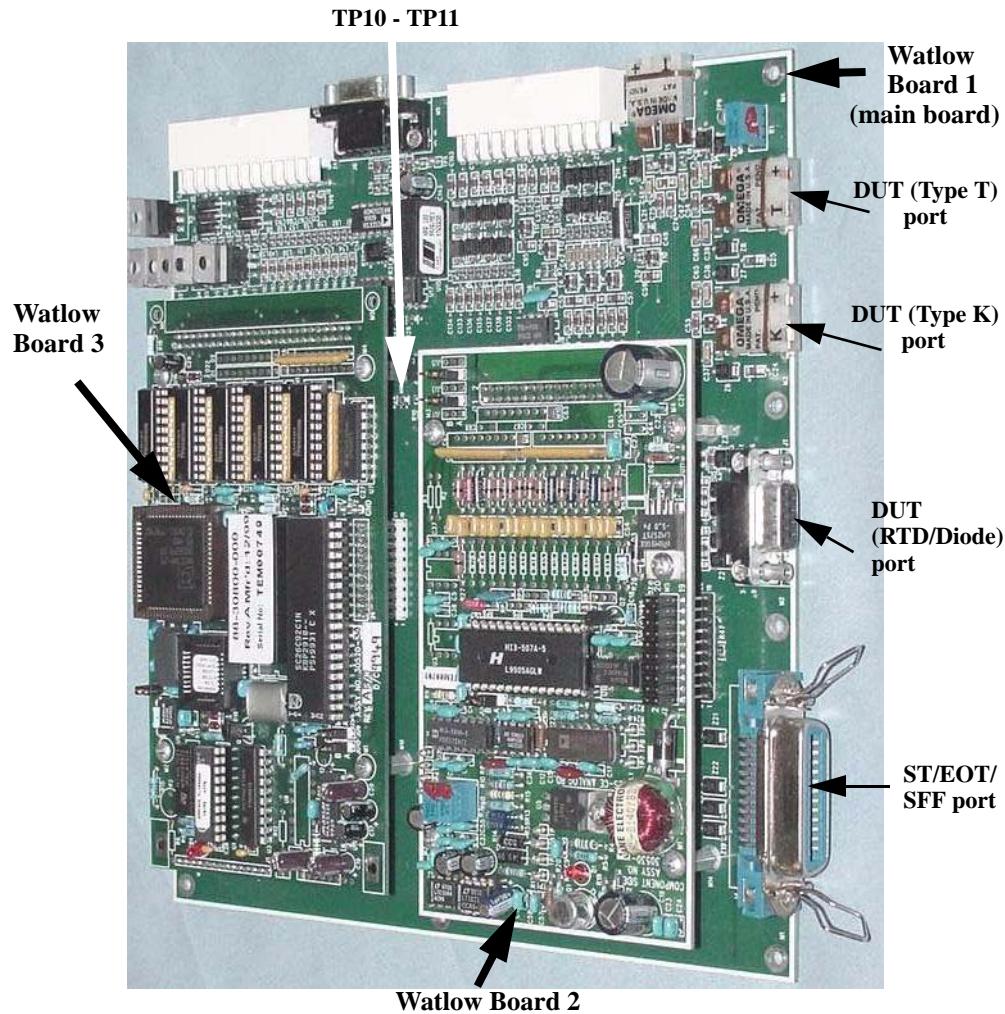
LM01990\_416.JPG

**Descriptions**

PART	DESCRIPTION
Cutout Board (Overheat Safety)	The Cutout Board, located in the Thermal Head, is used to prevent a main heater overtemperature condition, as a result of loss of programmed control.  The Cutout board has two identical safety circuits, primary and secondary, each connected to a Type K thermocouple, to sense the main air output temperature at the head nozzle.  Two LEDs (one on each Cutout circuit) indicate when the Cutout is enabled (LED lighted), that is, when heater function is disabled. P/N PC115590
Cutout Board Terminal Strip	an 8 pin terminal strip that connects to Relays K1 and K4 (24vdc).
Primary Safety Cutoff	the circuit will trip at 250 °C, open K1, and will reset to closed, upon re-start (after the cause of the overheat is repaired).
Primary LED	Illuminates when primary cutout is activated.
Secondary Safety Cutoff	If "primary safety" fails, and overheating continues, then the Cutout "secondary safety" circuit will trip at 275 °C, blow a Cutout board fuse, and open K4. After the cause of the overheat is corrected, then the Cutout board or fuse must be replaced to re-start.
Secondary LED	Illuminates when secondary cutout is activated
Fuse (1/4 Amp)	The fuse blows and must be replaced in the event of a Secondary Safety Cutout P/N FF00470
Type K Thermocouples	Monitor temperature at the Main Air Output Nozzle for overtemp/safety cutout. The primary cutout is 250° C, the secondary cutout is 250° C. P/N RT00230

## Watlow PC Assembly

### Watlow PC Assembly



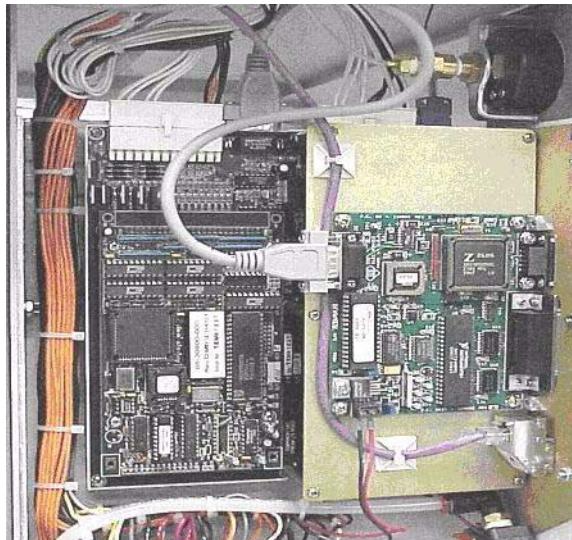
LM01990\_407.JPG

### Descriptions

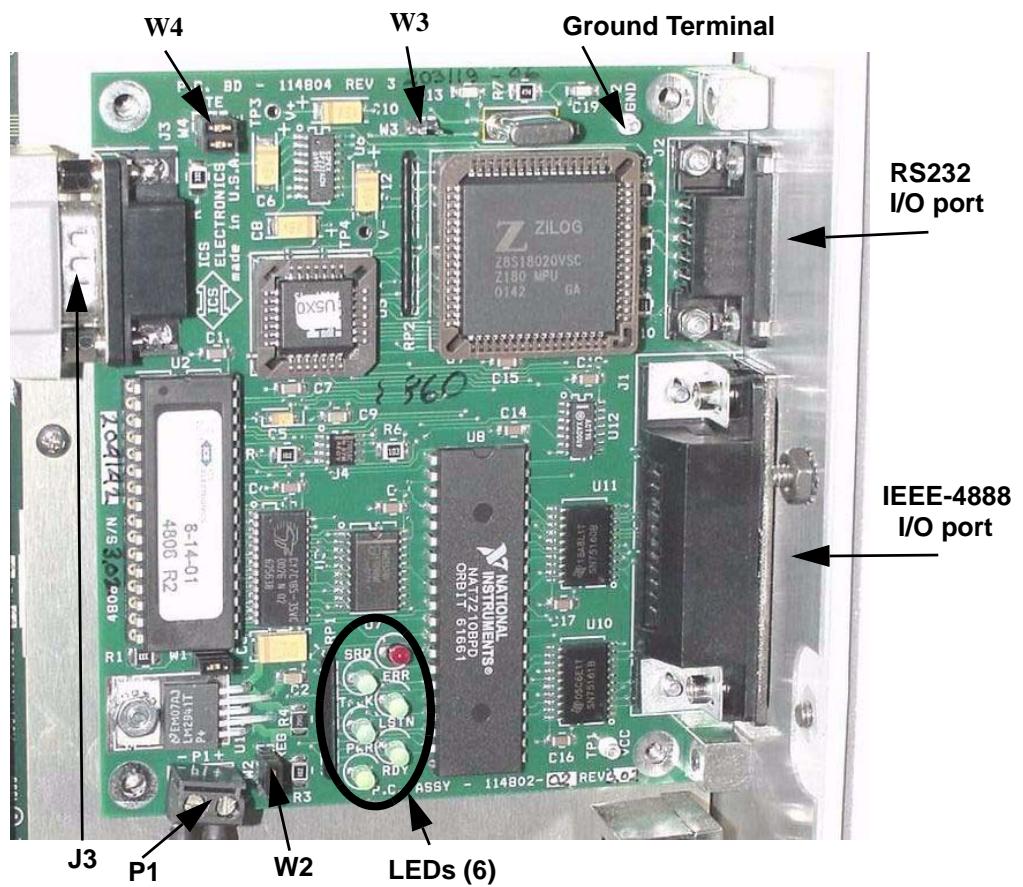
PART	DESCRIPTION
Watlow Board 1	Watlow main board, primarily responsible for temperature control. P/N EE00120
Watlow Board 2	part of the Watlow assembly, mounted via standoffs to board 1.
Watlow Board 3	part of the Watlow assembly, mounted via standoffs to board 1.
TP10 - TP11	jump to reset firmware
DUT (Type T) port	Type T thermocouple sensor port
DUT (Type K) port	Type K thermocouple sensor port
DUT (RTD/Diode)	Thermocouple sensor port
ST/EOT/SFF port	Start Test/End of Test/Stop First Fail/ Communications port.

## Communications Board

### Communications Board



LM01990\_408.jpg



LM01990\_409.jpg

## Descriptions

Communications Board, P/N EE00130.

PART	DESCRIPTION
W4	Must be jumpered east-west to enable DTE.
W3	Jump to reset firmware.
Ground Terminal	referenced here for troubleshooting.
RS232 I/O port	RS232 Serial Communications I/O port.
IEEE-4888 I/O port	IEEE General Purpose Interface Bus (GPIB).
LEDs (6)	listed from the top down: • ERR LED- (Error) • SRQ LED- (Service Requested) • LSTN LED- (Listen) • TALK LED- (Talk) • RDY LED- (Ready) • PAR LED- (Parity)
W2	Input Power Regulator. To enable for 5 VDC, do not jump W2 (hang jumper over 1 pin only).
P1	Power In, 5 VDC.
J3	connects via serial to OCM, COM3 port.

## Section B: Repair

---

### Section Overview

---

#### In this Section

The following topics are covered in this Section:

Topic	See Page
<a href="#">Flow/Linear Actuator Board Replacement</a>	<a href="#">12</a>
<a href="#">Cutout Board Replacement</a>	<a href="#">15</a>
<a href="#">Watlow PC Assembly Replacement</a>	<a href="#">16</a>
<a href="#">Comm Board Replacement</a>	<a href="#">17</a>

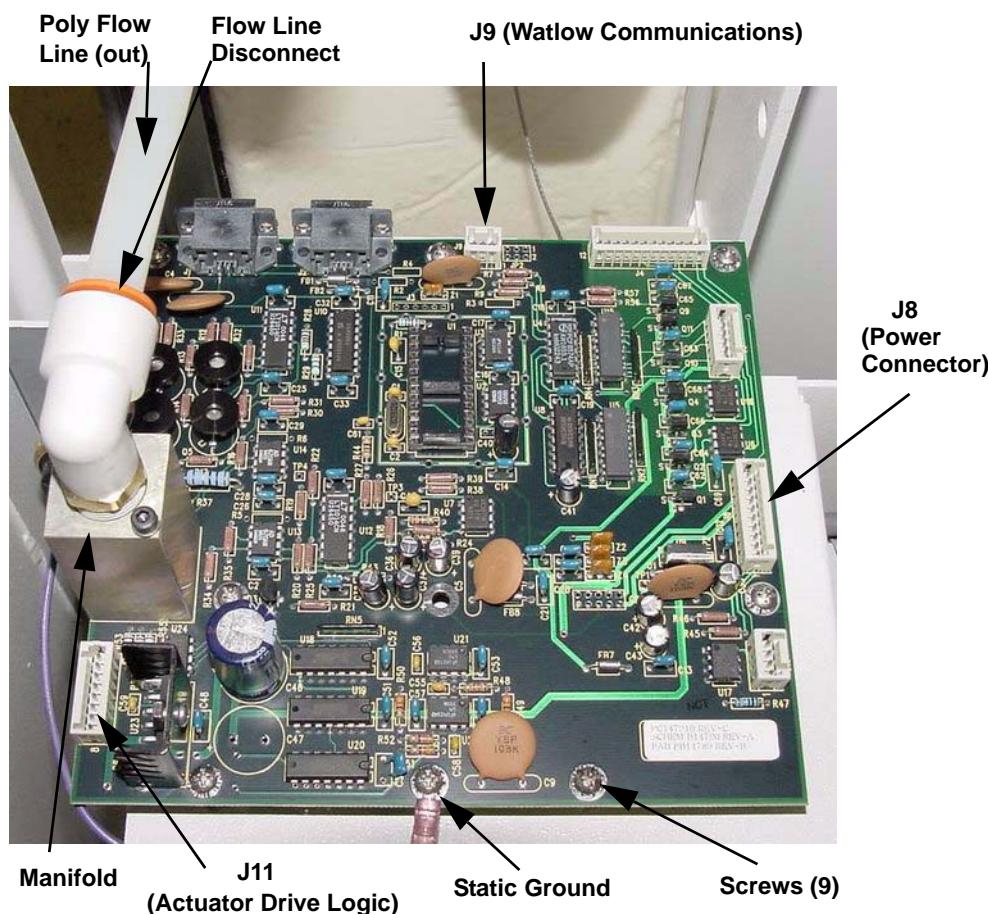
---

## Flow/Linear Actuator Board Replacement

### Introduction

The Flow/Linear Actuator Board is a non-repairable unit. It must be returned to the nearest sales representative or to the factory for depot maintenance repairs.

### Flow Board Replacement Detailed



LM01990\_417.JPG



### ATTENTION

This graphic displays the latest version of the Flow/Linear Actuator board.  
Older models may be upgraded with Service Kit CS160070.

### Procedure

To replace the Flow/Linear Actuator Board use P/N SA172090:



### WARNING

WARNINGS 1, 2, 3, 8, 9 in Chapter 1, Safety.

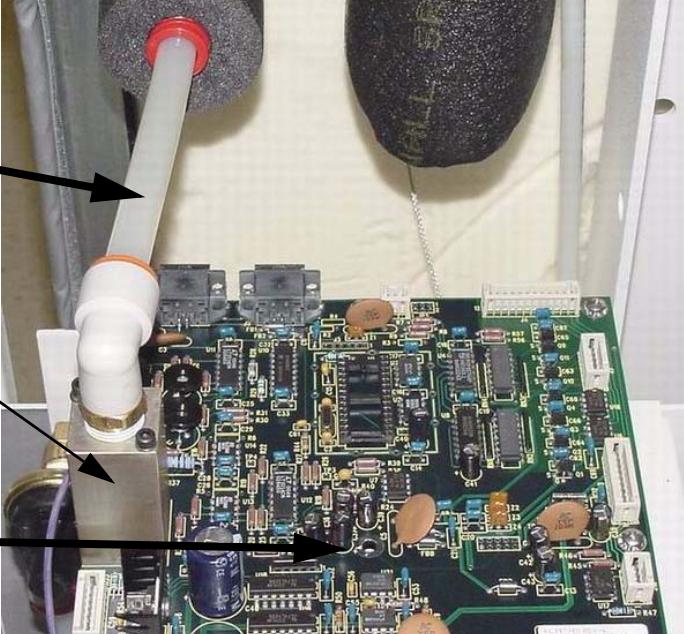


## CAUTION

**CAUTION 8:** When removing the flow control board, be extremely careful to avoid flexing the board when disconnecting the inlet and outlet air hoses. Even a slight flexing of the board can damage delicate components and/or wiring on the board.

Step	Action
1	Power down the <i>TP04300</i> and disconnect power cord.
2	Remove facility supplied air connection from the <i>TP04300</i> .
3	Disconnect the Poly Flow Line (in) from the under side of the Flow/Linear Actuator Board.

LM01990\_418.JPG

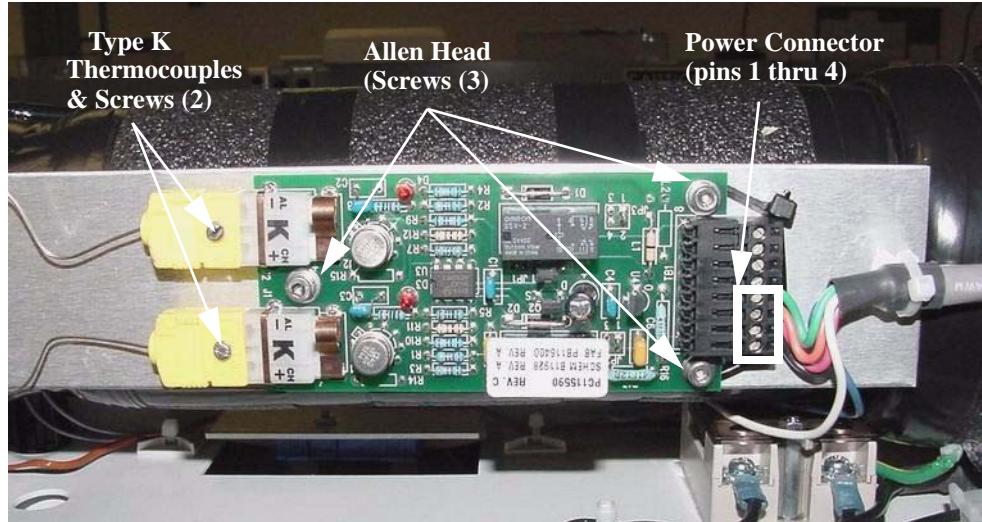
Step	Action
4	<p>Disconnect the Poly Flow Line (out) from the Flow/Linear Actuator Board.</p>  <p>Poly Flow Line (out)</p> <p>Manifold</p> <p>Flow Board</p> <p>LM01990_419.JPG</p>
5	<p>Remove the connections on:</p> <ul style="list-style-type: none"> <li>• J8 (a power connection)</li> <li>• J9 (used for Watlow Communications)</li> <li>• J11 (actuator drive logic communications)</li> </ul>
6	<p>Remove the (9) screws and Static Ground connection.</p>
7	<p>Remove the Flow Board and Manifold as one assembly.</p>
8	<p>Install the new Flow/Linear Actuator Board in the reverse order of the above procedure.</p>

## Cutout Board Replacement

### Introduction

The Cutout Board is a non-repairable unit. It must be returned to the nearest sales representative or to the factory for depot maintenance repairs.

### Cutout Board Replacement Detailed



LM01990\_420.JPG

### Procedure

To replace the Cutout Board use P/N PC115590:



### WARNING

**WARNINGS 1, 2, 3, 8, 9** in Chapter 1, Safety.

Step	Action
1	Power down the TP04300 and disconnect power cord.
2	Use a small screwdriver to disconnect the board's Power Connector (pins 1 thru 4).
3	Remove the screws (2) securing the Type K thermocouples. Carefully disconnect the thermocouples.
4	Remove the (3) Allen head screws securing the Cutout Board to the thermal Head.
5	Remove the Cutout Board.
6	Install the new board in the reverse order of the above procedure.

## Watlow PC Assembly Replacement

### Introduction

The Watlow PC Assembly is a non-repairable unit. It must be returned to the nearest sales representative or to the factory for depot maintenance repairs.

### Procedure

To replace the Watlow PC Assembly, use P/N EE00120.



### WARNING

**WARNING 9:** To de-energize the System for safe replacement of a module, turn off the ac power (cease operations and power down), then turn off the System's air pressure supply, then bleed all air from System by turning on ac power just long enough to exhaust all air from System. Now disconnect both the main power supply cord and disconnect the air supply line on the rear frame module. The only stored energy remaining in the System will then be that within some electrical capacitors.

Step	Action										
1	Power down the <i>TP04300</i> and disconnect power cord.										
2	Remove the right side panel from the frame module										
3	Remove the Comm Board as follows: <table border="1" data-bbox="586 1087 1418 1362"> <thead> <tr> <th>Step</th><th>Action</th></tr> </thead> <tbody> <tr> <td>a</td><td>On the rear I/O panel, disconnect the standoffs on the RS232 and IEEE ports.</td></tr> <tr> <td>b</td><td>Disconnect the OCM serial interface from port J3.</td></tr> <tr> <td>c</td><td>Remove the (5) screws securing the Comm Board to the mounting frame.</td></tr> <tr> <td>d</td><td>Remove the Comm Board</td></tr> </tbody> </table>	Step	Action	a	On the rear I/O panel, disconnect the standoffs on the RS232 and IEEE ports.	b	Disconnect the OCM serial interface from port J3.	c	Remove the (5) screws securing the Comm Board to the mounting frame.	d	Remove the Comm Board
Step	Action										
a	On the rear I/O panel, disconnect the standoffs on the RS232 and IEEE ports.										
b	Disconnect the OCM serial interface from port J3.										
c	Remove the (5) screws securing the Comm Board to the mounting frame.										
d	Remove the Comm Board										
4	Remove the (5) standoffs that separate the Comm board from the Watlow PC Assembly.										
5	On the rear I/O panel, disconnect the standoffs on DUT RTD/DIODE and the (2) screws securing ST/EOT/SFF.										
6	Remove connections on J6, J7, and J8.										
7	Remove the (5) Screws securing the Watlow PC Assembly to the mounting frame.										
8	Remove the Watlow PC assembly.										
9	Replace a new Watlow PC Assembly in the reverse order of disassembly.										

## Comm Board Replacement

### Introduction

The Comm Board assembly is a non-repairable unit. It must be returned to the nearest sales representative or to the factory for depot maintenance repairs.

### Procedure

To replace the Comm Board assembly, use P/N EE00130



### WARNING

**WARNING 9:** To de-energize the System for safe replacement of a module, turn off the ac power (cease operations and power down), then turn off the System's air pressure supply, then bleed all air from System by turning on ac power just long enough to exhaust all air from System. Now disconnect both the main power supply cord and disconnect the air supply line on the rear frame module. The only stored energy remaining in the System will then be that within some electrical capacitors.

Step	Action
1	Power down the <i>TP04300</i> and disconnect power cord.
2	On the rear I/O panel, disconnect the standoffs on the RS232 and IEEE ports.
3	Disconnect the OCM serial interface from port J3.
4	Remove the (5) screws securing the Comm Board to the mounting frame.
5	Remove the Comm Board.
6	Replace in the reverse order.

## Section C: Parts List

---

PART (Description)	STOCK#, (P/Ns)
Flow/Linear Actuator Board	SA172090
Cutout Board	PC115590
Fuse (1/4 Amp)	FF00470
Type K Thermocouples	RT00230
Watlow PC Assembly	EE00120
Communications (Comm) Board	EE00130

---



# Arm and Manipulator (TP04300A)

## Chapter Overview

The thermal head manipulator is a mechanical support for manually and electrically positioning the thermal head assembly to the DUT site.

The thermal head manipulator consists of

- a horizontal arm assembly
- a linear actuator assembly.

The thermal head assembly mounts on the end of the horizontal arm, enabling the head to sweep around a large area, tilt back and forth, and to be fixed mechanically by locks.

The linear actuator assembly drives the horizontal arm up and down, allowing the head to be positioned up and down in vertical travel.

The rugged design of the thermal head manipulator ensures a stable and repeatable positioning of the thermal head even when extended to the limits of thermal head manipulator travel.

---

### In this Chapter

This Chapter is divided into the following Sections:

Section	See Page
Parts Pictorial	2
Repair	7
Parts List	10

---

# Section A: Parts Pictorial

---

## Section Overview

---

### In this Section

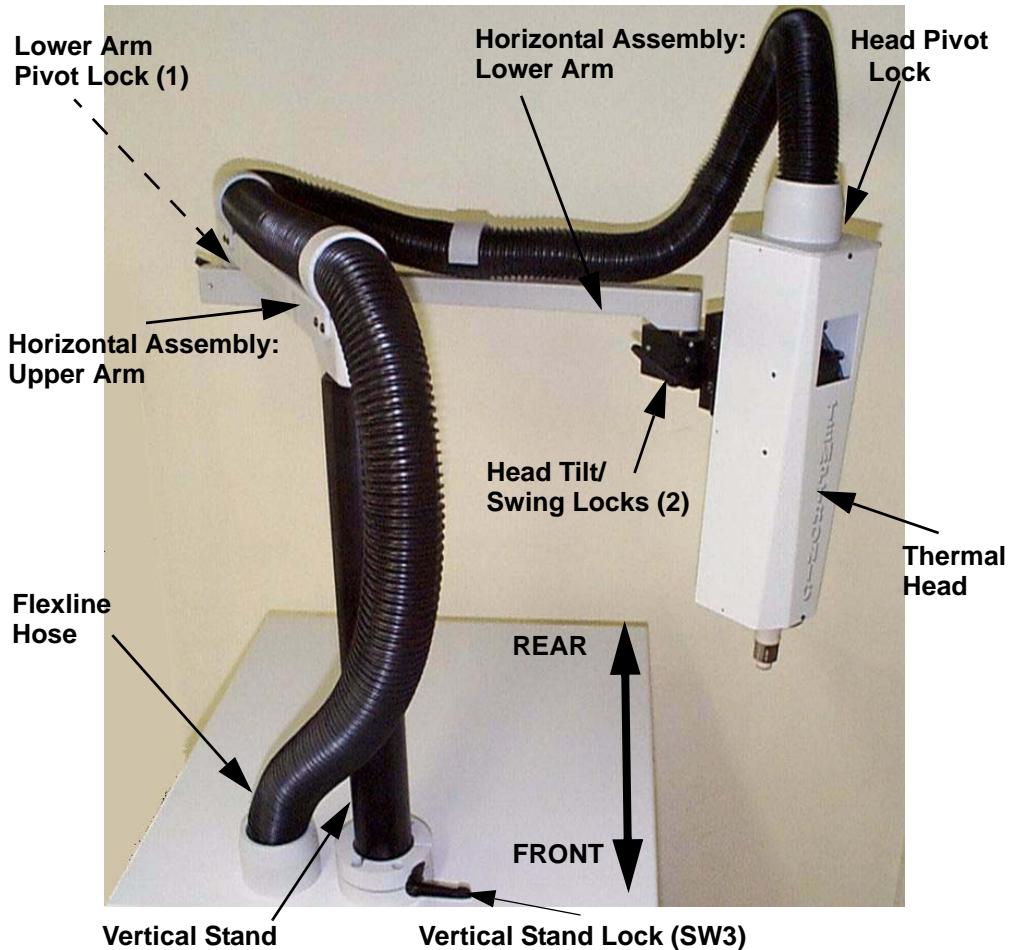
The following topics are covered in this Section:

Topic	See Page
Thermal Head Manipulator, Locks	3
Linear Actuator Assembly	4
Linear Actuator Motor	6

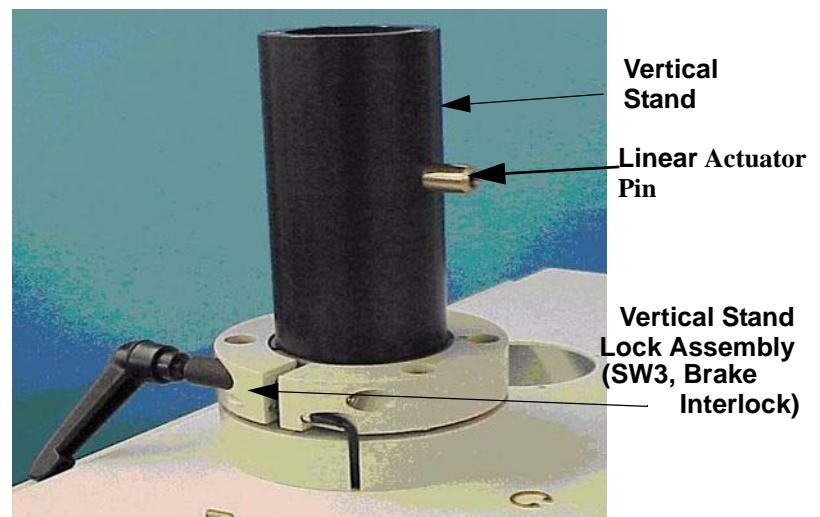
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## Thermal Head Manipulator, Locks

### Locks

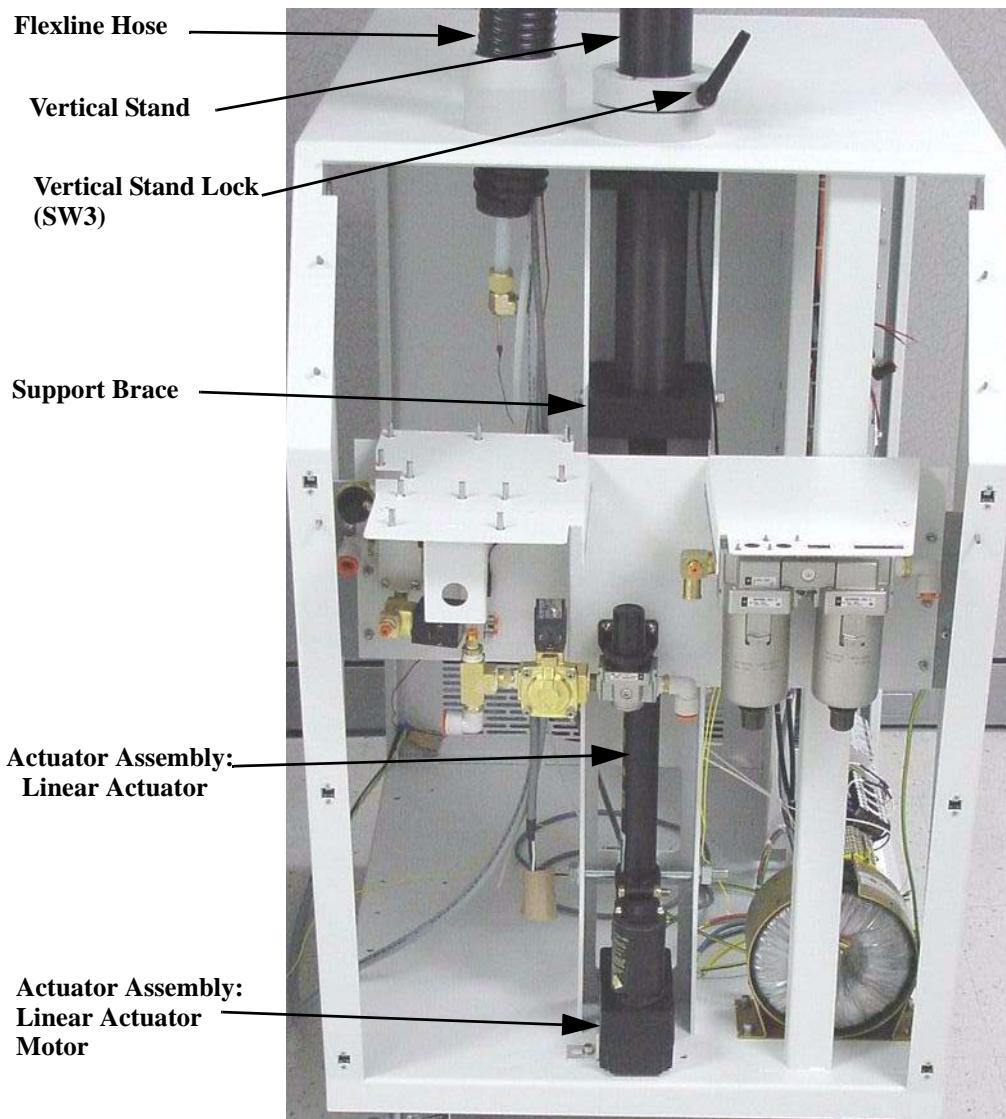


LM01990\_411.jpg



## Linear Actuator Assembly

### Linear Actuator



LM01990\_413.JPG

### Descriptions

PART	DESCRIPTION
Flexline Hose	Carries main air flow, and electrical connections for the Cutout Board and Heater
Vertical Stand Lock (SW3)	when locked prevents vertical stand motion and removes power from the flow board and linear actuator motor.
Vertical Stand	The linear actuator is secured inside the Vertical Stand. The Vertical Stand is used to adjust Thermal Head height. The linear actuator and vertical stand will move up or down when the STAND UP or STAND DOWN buttons are pressed.

PART	DESCRIPTION
Support Brace	secures and supports the vertical stand
Linear Actuator	fastened (by the actuator pin) inside the Vertical Stand. The Linear Actuator provides vertical motion for the vertical stand.
Linear Actuator Motor	a 15hp/24vdc motor P/N SA145220

## Linear Actuator Motor

### Motor, Front View



LM01990\_414.jpg

### Motor, Cover Removed



LM01990\_415.jp

### Descriptions

PART	DESCRIPTION
Linear Actuator Motor	Part of the actuator assembly, a 15hp/24vdc motor P/N SA145220

## Section B: Repair

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### Section Overview

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#### In this Section

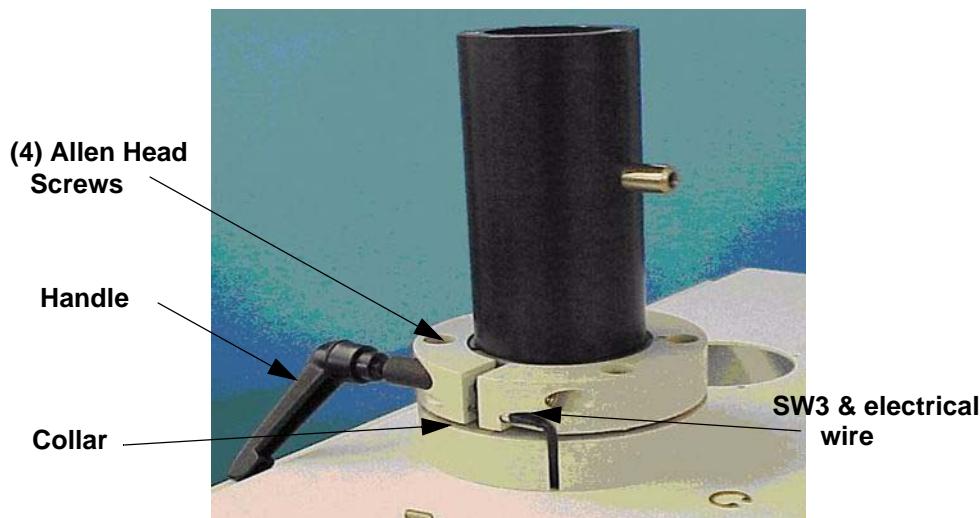
The following topics are covered in this Section:

Topic	See Page
<a href="#">Vertical Stand Lock Switch (SW3) Replacement</a>	8

---

## Vertical Stand Lock Switch (SW3) Replacement

### Vertical Stand Lock Detailed



LM01990\_412.jpg

### Procedure

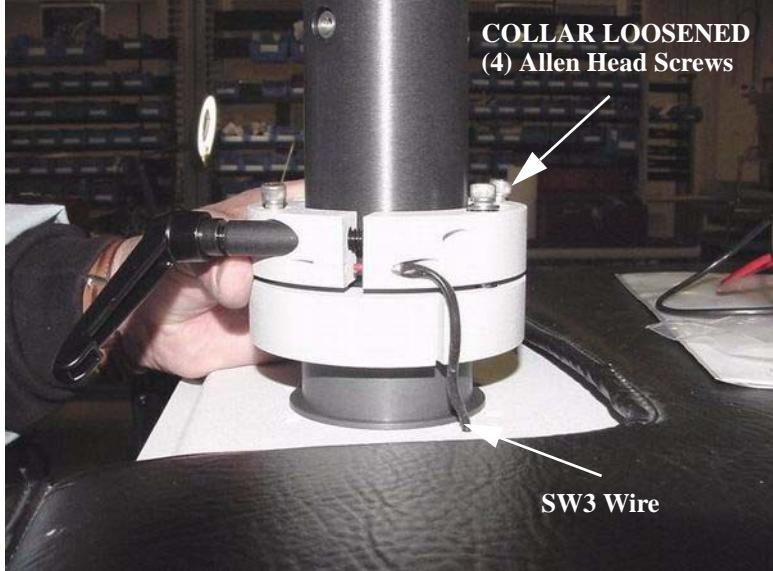
To replace the Vertical Stand Lock Switch (SW3), use P/N SA147870.



### WARNING

WARNINGS 1,2,3,7,9 in Chapter 1 Safety.

Step	Action
1	Turn off (power down) the TP04300A, then disconnect power cord from facility power supply.
2	Remove (2) electrical connections from the Flow/Linear Actuator Board. The (2) SW3 connections on the Flow/Linear Actuator Board are: <ul style="list-style-type: none"><li>• J8, pin 9 (yellow wire)</li><li>• J11, pin 3 (yellow wire)</li></ul>

Step	Action
3	<p>Remove the (4) Allen Head Screws securing the Collar to the frame. Loosen the Collar to gain access to the SW3 wire</p>  <p>COLLAR LOOSENERED (4) Allen Head Screws</p> <p>SW3 Wire</p>
4	Unscrew SW3 (and wire) from the Collar and remove the switch and wire as one assembly.
5	Install the new Switch in the reverse order of the above procedure.

## Section C: Parts List

---

PART (Description)	STOCK#, (P/Ns)
Linear Actuator Assembly	SA145220
Vertical Stand Lock Switch (SW3)	SA147870

---



# Thermal Head

## Chapter Overview

The thermal head assembly directs the temperature controlled air flow to the Device Under Test (DUT). It is a shoe-box shaped assembly mounted on the end of the horizontal arm.

Different air hoses and electrical lines enter through a flexline hose on the upper end.

An air nozzle at the lower end directs the main air flow out to the DUT at the test site.

Two handle grips (one at each side) permit manual positioning of the head with respect to the test site after the arm locks are first loosened.

The head assembly sits on a post pivot at the end of the thermal head manipulator. The manipulator's end pivot lock clamps the head in the desired orientation.

The thermal head assembly can be positioned in three directions with respect to the thermal head manipulator.

On the head front:

- is a membrane push button switch assembly, labeled STAND up/down
- is a push button, HEAD (toggle up/down) which allows vertical travel with respect to the DUT.
- pressing STAND moves the entire Manipulator up/down
- pressing HEAD moves only the Head, on the Head up/down slider.

At the main air nozzle, a plug-in universal mount adapts the head to different sized thermal caps. The thermal caps direct the air flow to the DUT and surround the immediate test site to confine the test environment. Three knurled thumbscrews spaced 120 degrees apart in the universal mount secure the thermal cap to the head.

---

### In this Chapter

This Chapter is divided into the following Sections:

Section	See Page
Parts Pictorial	2
Repair	10
Parts List	39

---

# Section A: Parts Pictorial

---

## Section Overview

---

### In this Section

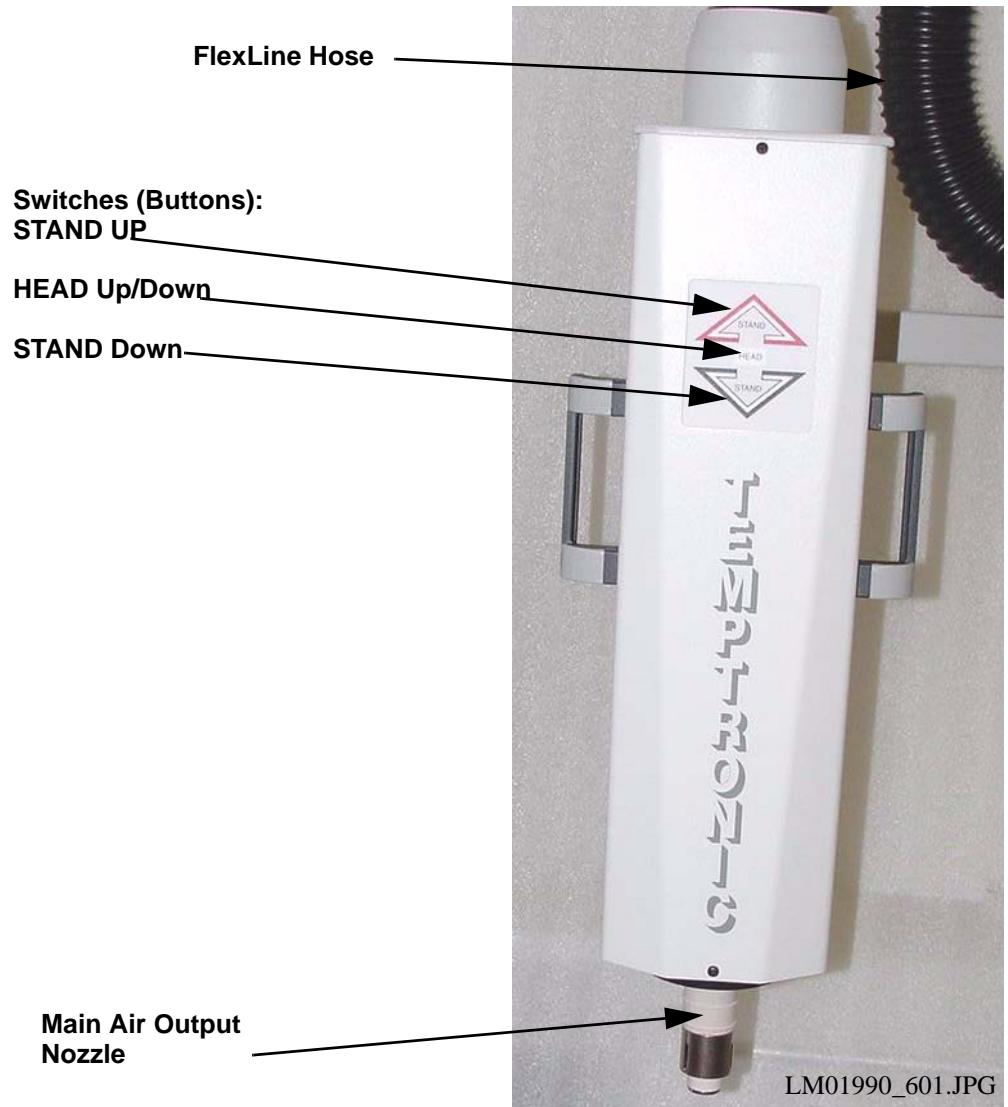
The following topics are covered in this Section:

Topic	See Page
Thermal Head, Front	3
Thermal Head, Left	5
Thermal Head, Right	7
Thermal Head, Rear	9

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## Thermal Head, Front

### Front View



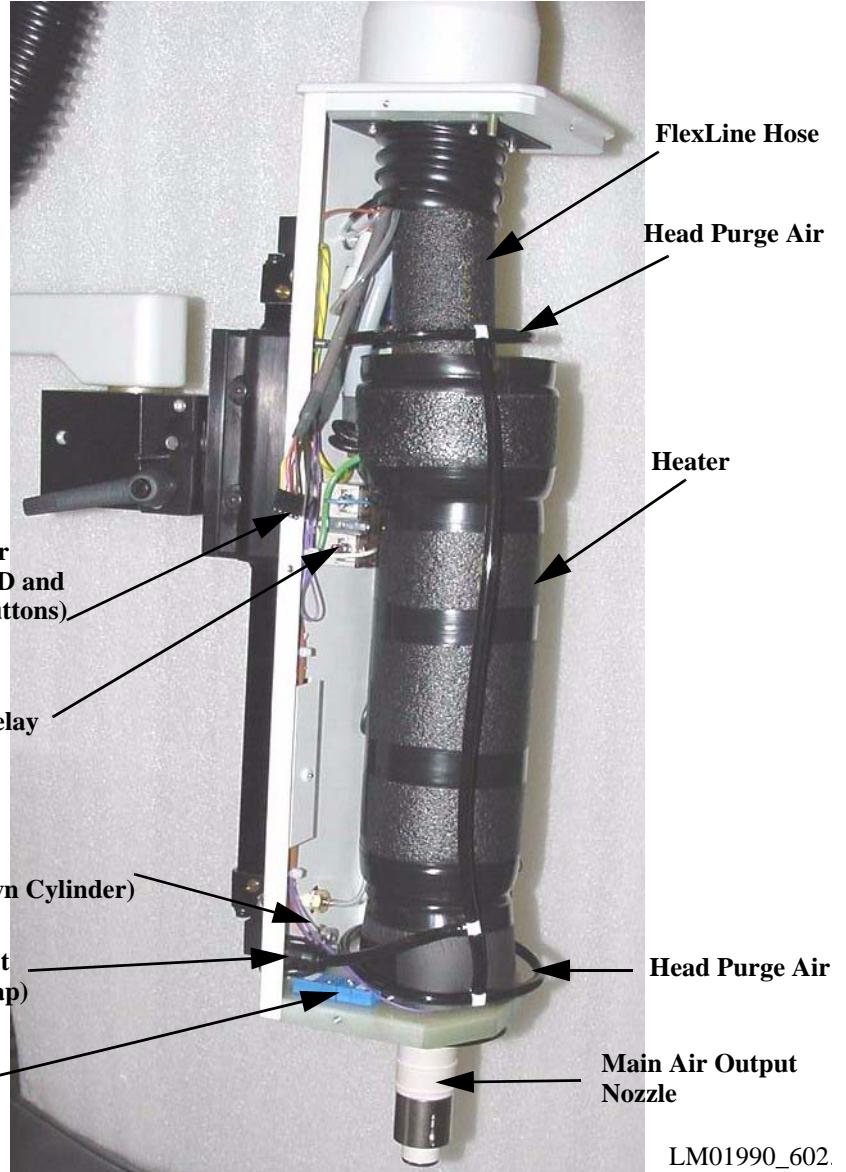
### Descriptions

PART	DESCRIPTION
FlexLine Hose	Carries main air flow, and electrical connections for the Cutout Board and Heater P/N VV04400
STAND Up	used to move the Vertical Stand Up
HEAD Up/Down	used to move the Thermal Head Up or Down.
STAND Down	used to move the Vertical Stand Down

PART	DESCRIPTION
Main Air Nozzle	main output for heated air, (3) Thermocouples monitor the temperature at the nozzle: (1) Type T, the main temperature sensor (2) Type K, overtemp cutout sensors P/N SA149360

## Thermal Head, Left

Left View, Cover Removed



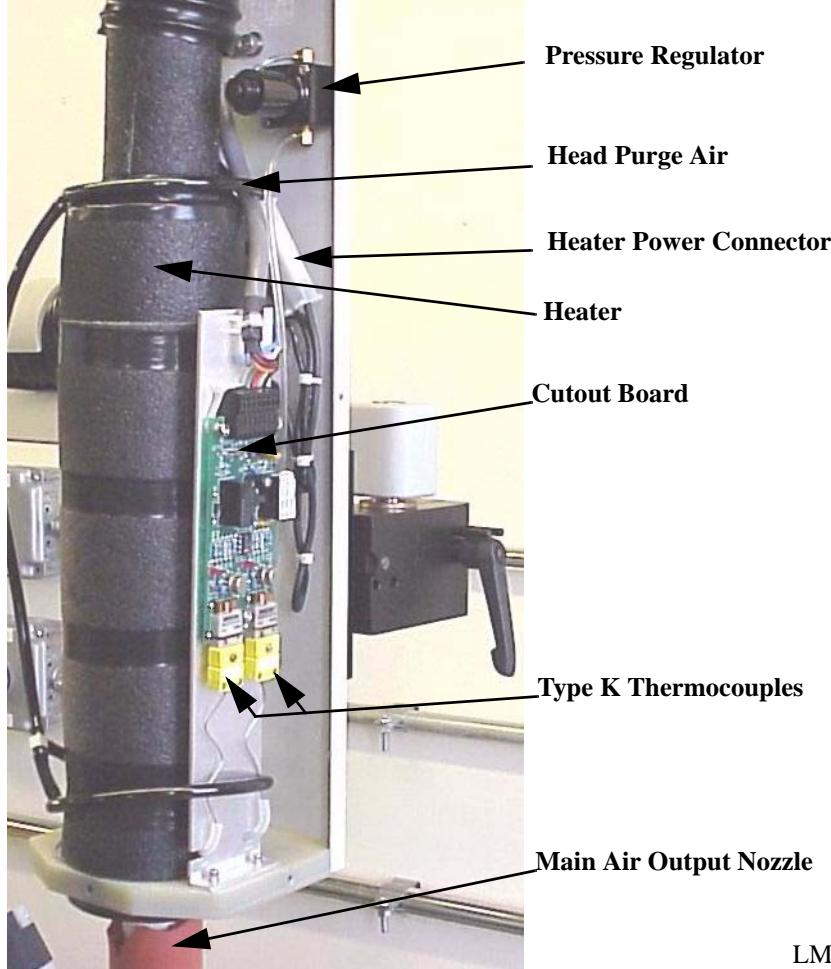
### Descriptions

PART	DESCRIPTION
Connector (to STAND and HEAD buttons)	a 5-pin connector that supplies power to the STAND and HEAD buttons.
K4 Contactor	the Main Relay (24vdc) for the Thermal Head, when energized (closed) turns the heater on. P/N KK02060

PART	DESCRIPTION
Air Lines	carry air flow to the main cylinder (for HEAD Up/Down)
Purge Air Out	Supplies purge air to the thermal cap to keep DUT moisture free. Flow is controlled by the PFV (Purge Flow Valve).
Type T Thermocouple	the main temperature sensor P/N SA151810
FlexLine Hose	Carries main air flow, and electrical connections for the Cutout Board and Heater P/N VV04400
Head Purge Air	A perforated line that circulates purged air through the thermal head. The purged air is used to keep thermal head components free of moisture.
Heater	a 230vac, 18 CFM, 250° C max. temp. heater. P/N SA149370
Main Air Output Nozzle	main output for heated air, (3) Thermocouples monitor the temperature at the nozzle: (1) Type T, the main temperature sensor (2) Type K, overtemp cutout sensors

## Thermal Head, Right

Right View, Cover Removed



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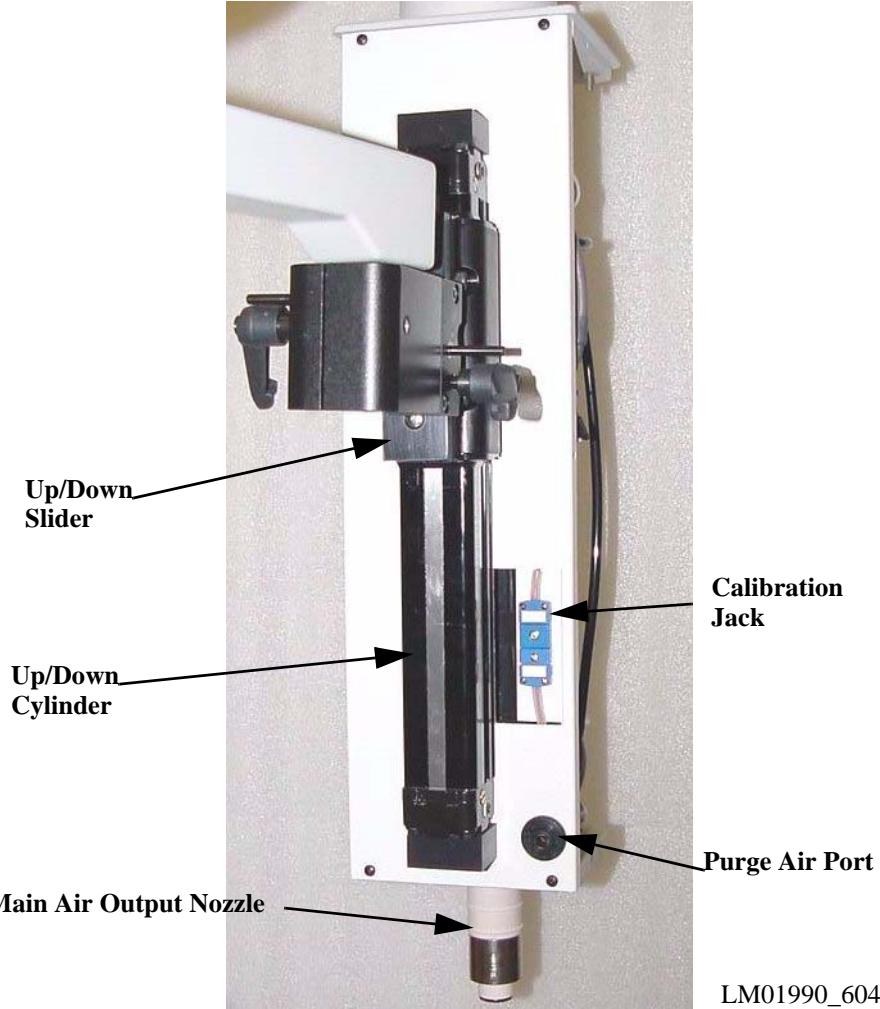
### Descriptions

PART	DESCRIPTION
Pressure Regulator	Regulates line pressure (15psi) to prevent excessive force when HEAD down is pressed.
Head Purge Air	A perforated line that circulates purged air through the thermal head. The purged air is used to keep thermal head components free of moisture.
Heater Power Connector	supplies 230vac to the heater
Heater	a 230vac, 18 CFM, 250° C max. heater.
Cutout Board	Provides a primary (250° C) and secondary (275° C) overtemp/safety cutout. For greater detail on the Cutout Board, see Chapter 4, <a href="#">Cutout Board</a> .

PART	DESCRIPTION
Type K Thermocouple	Monitor temperature at the Main Air Output Nozzle for overtemp/safety cutout. The primary cutout is 250° C, the secondary cutout is 275° C. For greater detail on the Cutout Board, see Chapter 4, <a href="#">Cutout Board</a> .
Main Air Output Nozzle	main output for heated air, (3) Thermocouples monitor the temperature at the nozzle: (1) Type T, the main temperature sensor (2) Type K, overtemp cutout sensors

## Thermal Head, Rear

Rear View, Cover Removed



### Descriptions

PART	DESCRIPTION
Up/Down Slider	Connects the Up/Down Cylinder to the Lower Arm and Locks.
Up/Down Cylinder	utilizes pneumatic pressure to move the Thermal Head Up and Down
Main Air Output Nozzle	main output for heated air, (3) Thermocouples monitor the temperature at the nozzle: (1) Type T, the main temperature sensor (2) Type K, overtemp cutout sensors
Calibration Jack	used for calibration or the main temperature sensor, type t thermocouple
Purge Air Port	Supplies purged air to the DUT. The purged air is used to keep components free of moisture.

# Section B: Repair

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## Section Overview

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### In this Section

The following topics are covered in this Section:

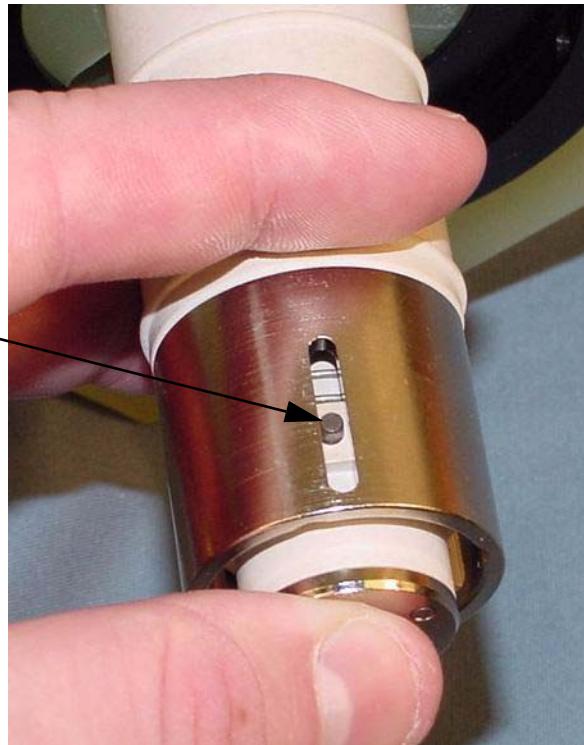
Topic	See Page
Nozzle Plunger Replacement	11
Heater Replacement (TP04300A)	13
Heater Replacement (TP04300B)	20
Membrane Switch Replacement	32
Relay K4 Replacement	34
Type "T", Main Thermocouple Replacement	36

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## Nozzle Plunger Replacement

### Nozzle Replacement Detail

Extract  
Pins (3)



LM01990\_620.JPG

### Procedure

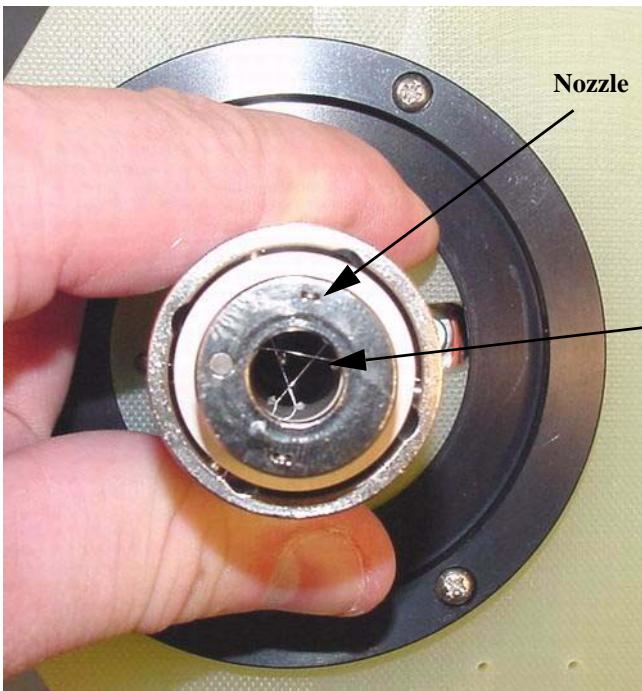
To replace the Nozzle Plunger, use P/N SS145510



### WARNING

WARNINGS 1, 2, 3, 5, 6, 7,9 in Chapter 1 Safety

Step	Action
1	Turn off (power down) the TP04300A, then disconnect power cord from facility power supply.
2	Remove the (8) screws securing the Thermal Head Cover to the Thermal Head Assembly.
3	Use needle nose pliers to remove the (3) pins holding the nozzle in the Thermal Head.
4	Remove the Nozzle and spring as one assembly.

Step	Action
5	<p>When installing the new Nozzle, use the thermocouple centering tool to align the thermocouple in the center of the positioning wires.</p> <p><b>ATTENTION</b></p> <p>The thermocouple should NOT touch the sides of the nozzle. For accurate temperature reading, the thermocouple must be centered in the positioning wires.</p>  <p>Nozzle</p> <p>Thermocouple Positioning Wires (thermocouple must be in center of triangle)</p> <p>LM01990_621.JPG</p>

## Heater Replacement (TP04300A)

### Procedure

To replace the Heater, use P/N SA149370.



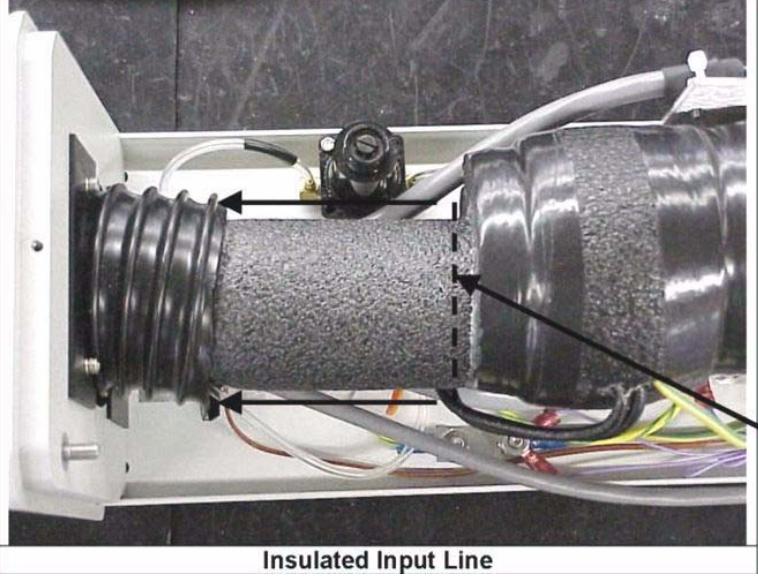
### WARNING

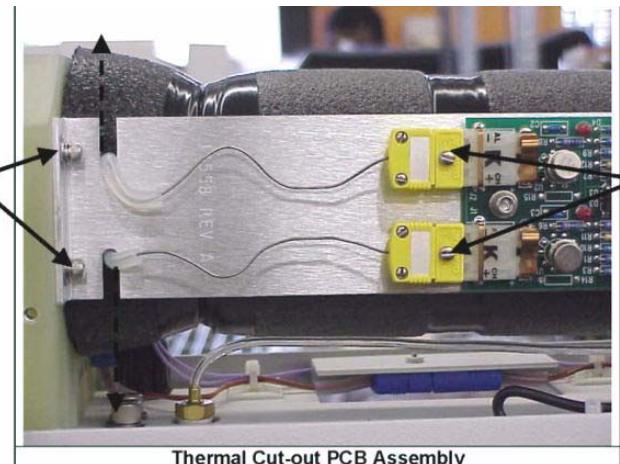
WARNINGS 1, 2, 3, 5, 6, 7,9 in Chapter 1 Safety.

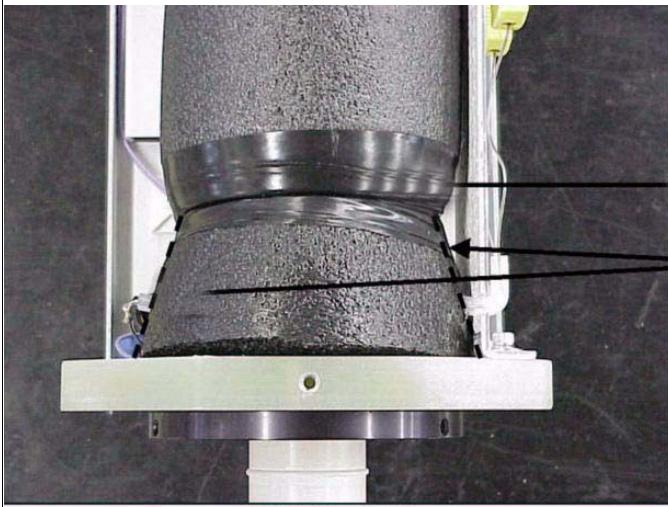
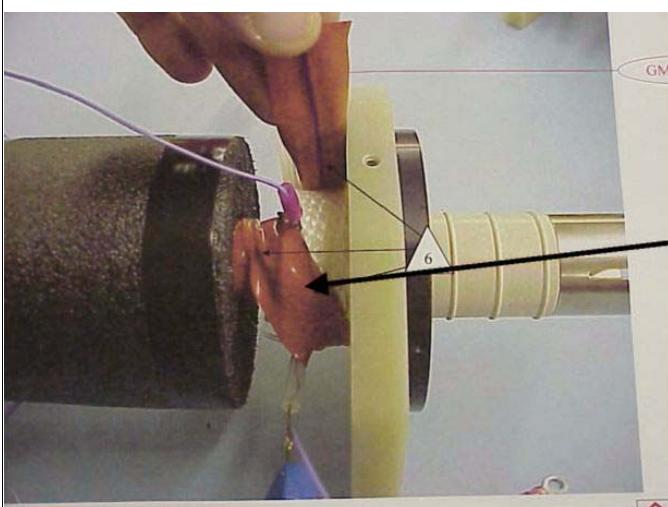
Step	Action
1	Turn off (power down) the <i>TP04300A</i> , then disconnect power cord from facility power supply.
2	Disconnect the facility air supply from the <i>TP04300A</i> .
3	Remove the eight Phillips head screws that hold the cover assembly to the head.

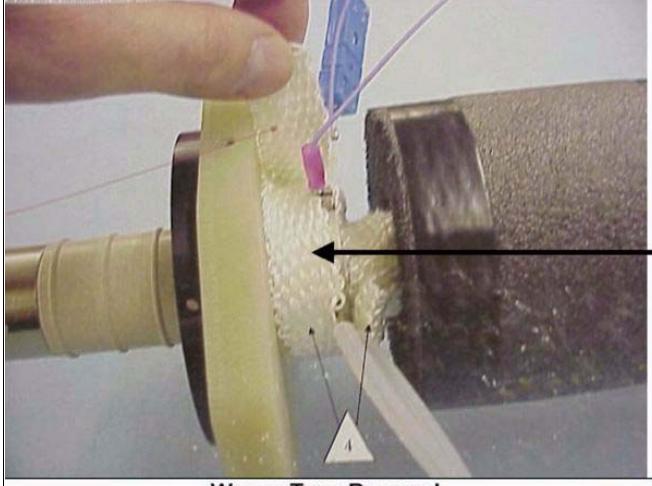
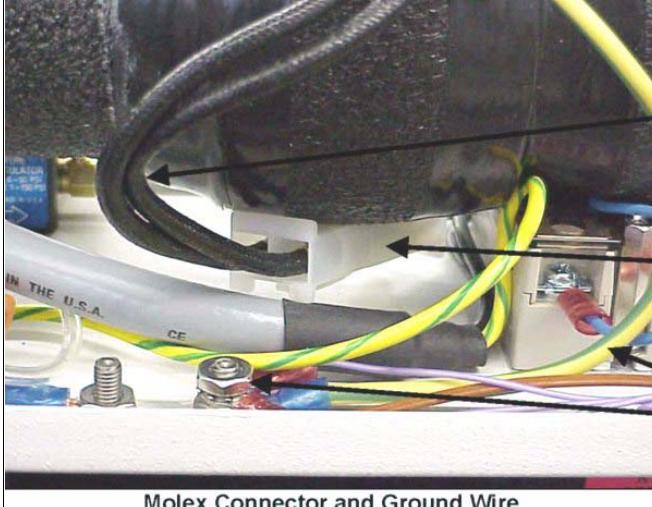
A photograph showing the side of the *TP04300A* machine. The cover assembly is white with a vertical label that reads "THERMAL HEAD". Two callout boxes point to the left and right sides of the assembly, each labeled "Philips Screws". A third callout box at the bottom points to the base of the assembly and is labeled "Head Cover Assembly".

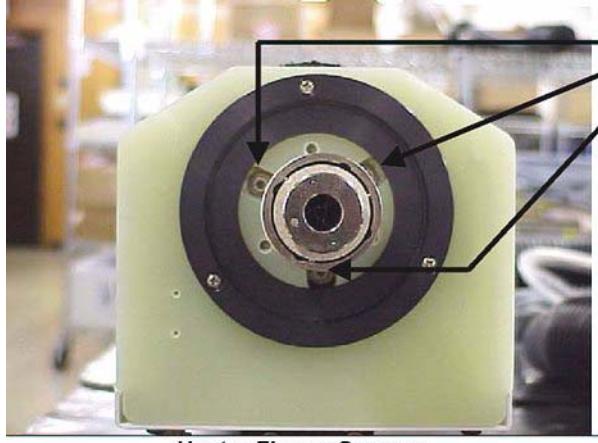
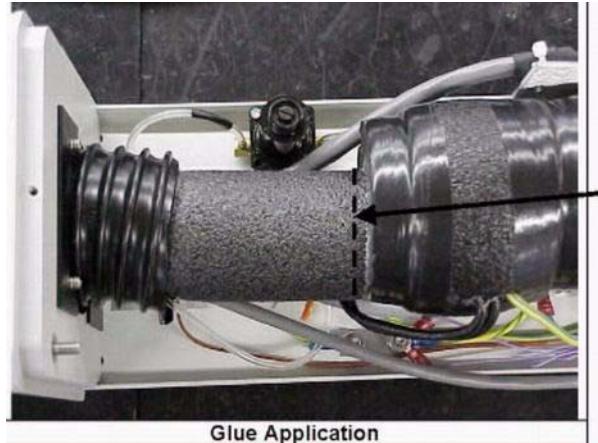
LM01990\_605.JPG

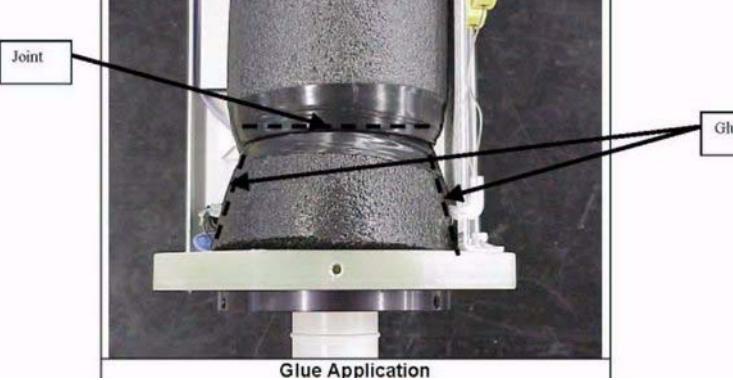
Step	Action
4	<p>Disconnect the membrane switch plug from the cover assembly. Loosen the nut that secures the ground wire to the frame of the head. Remove the ground wire.</p>  <p>Head With Cover removed</p> <p>LM01990_606.JPG</p>
5	<p>Cut the insulation along the dotted line. Use caution to not damage the Poly - Flow line inserted through the insulation. Slide the insulation away from the heater.</p>  <p>Insulated Input Line</p> <p>LM01990_607.JPG</p>

Step	Action
6	<p>Loosen the compression fitting that secures the Poly - Flow input airline. Slide the airline away from the heater.</p>  <p style="text-align: right;">LM01990_608.JPG</p>
7	<p>Remove the two slotted screws that hold the thermocouple connectors to the PCB. Disconnect the thermocouple connectors from their sockets.</p>  <p style="text-align: center;">Thermal Cut-out PCB Assembly</p> <p style="text-align: right;">LM01990_609.JPG</p>
8	Carefully spread the two thermocouple wires away from the mounting bracket.
9	Remove the two Allen head screws that secure the PCB mounting bracket to the frame. Move the mounting bracket aside.

Step	Action
10	<p>Remove the black tape from around the insulation. Cut the insulation vertically along the two dotted lines. Use caution not to damage the thermocouples.</p>  <p>Insulated Flange</p> <p>LM01990_610.JPG</p>
11	<p>Remove the red/orange tape from around the base of the Isolator Plate.</p>  <p>Red Heater Tape Removal</p> <p>Red Heater Tape</p> <p>LM01990_611.JPG</p>

Step	Action
12	<p>Remove the white fiber woven tape from around the base of the heater flange.</p>  <p style="text-align: center;"><b>Woven Tape Removal</b></p>
13	<p>Disconnect the Molex connector. Loosen the nut on the stud securing the ground wire.</p>  <p style="text-align: center;"><b>Molex Connector and Ground Wire</b></p>

Step	Action
14	<p>Remove the three Allen head screws from the bottom of the heater flange.</p>  <p>LM01990_614.JPG</p>
15	At this point the heater can be removed from the head assembly.
16	Install the new heater into the head assembly.
17	Re-install the three Allen head screws that were removed in step 14.
18	Insert the Poly - Flow line into the compression fitting that was removed in step 6. Tighten the fitting securely.
19	Apply glue to the insulation that was cut in step 5. Also apply glue to the top portion of the heater. Let the glue set for a few moments before attaching the two pieces.
	 <p>LM01990_615.JPG</p>
20	Wrap the heater flange with new white fiber woven tape.
21	Wrap over the white fiber woven tape with new red heater tape.

Step	Action
22	<p>Apply glue to the pieces of insulation that were cut in step 10. Allow the glue to set -up for a few moments before attaching the two pieces.</p>  <p style="text-align: center;">Glue Application</p>
23	Wrap the joint between the upper and lower pieces with some black electrical tape.
24	Align the PCB mounting bracket so that the two Allen head screws that were removed in step 9 can be replaced.
25	Reposition the thermocouples into the notches in the mounting bracket. Insert the thermocouples back into their sockets. Install the two slotted screws that were removed in step 7.
26	Re-connect the Molex connector that was disconnected in step 13.
27	Attach the ground wire and fasten the nut that was removed in step 13.
28	Re-connect the membrane switch plug that was disconnected in step 4.
29	Attach the ground wire and fasten the nut that was removed in step 4.
30	Replace the cover and eight Phillips screws that were removed in step 3.

## Heater Replacement (TP04300B)

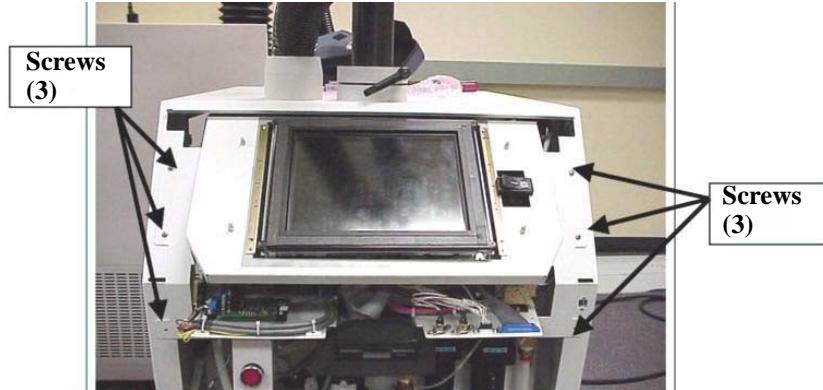
### Procedure

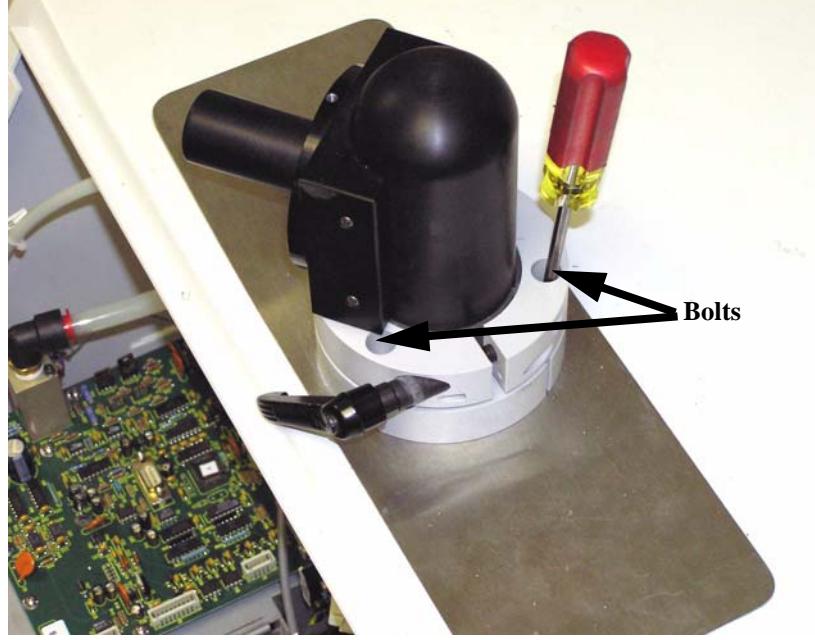
To replace the Heater, use P/N CS17530

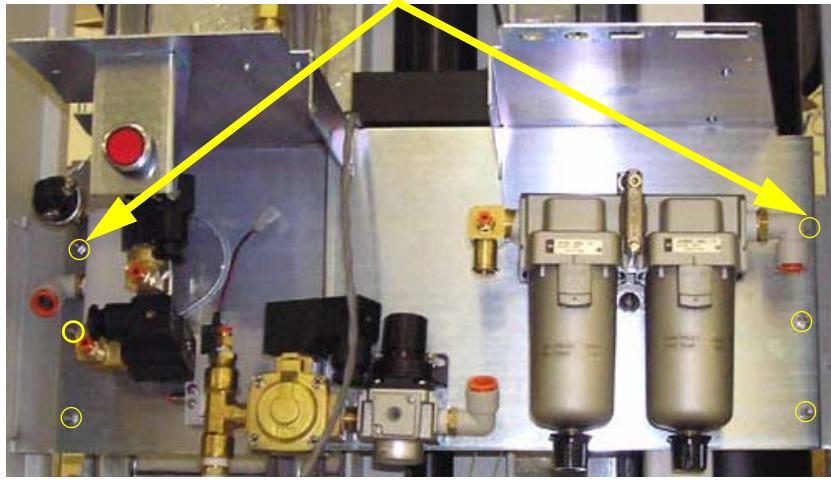


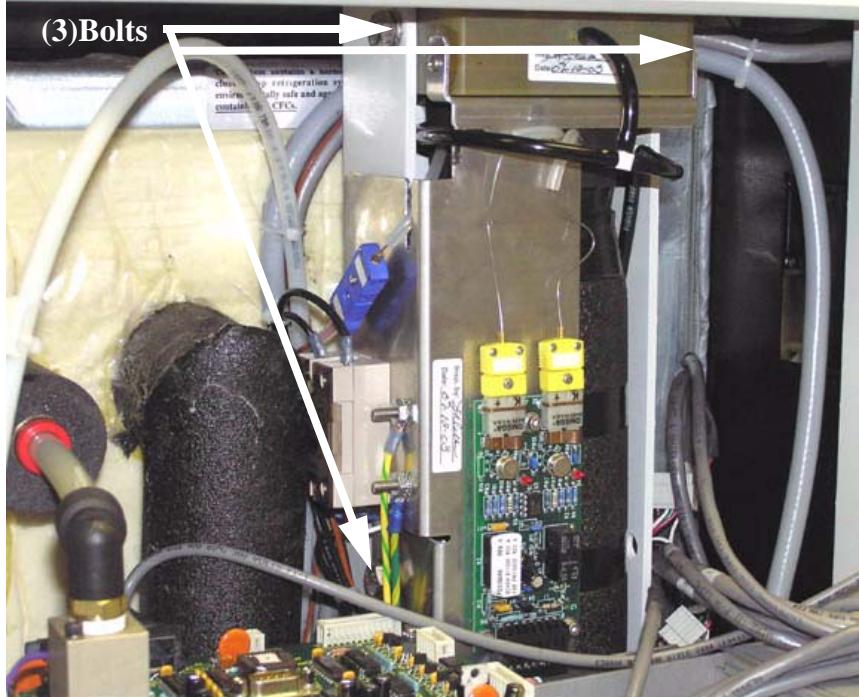
### WARNING

**WARNINGS 1, 2, 3, 5, 6, 7,9** in Chapter 1 Safety.

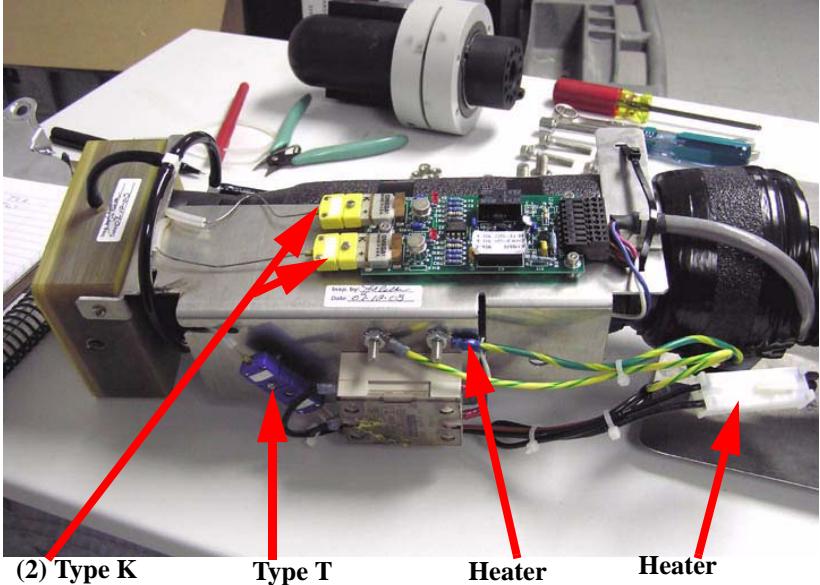
Step	Action
1	Turn off (power down) the <i>TP04300B</i> , then disconnect power cord from facility power supply.
2	Disconnect the facility air supply from the <i>TP04300B</i> .
3	Remove the front bezels (both upper and lower).
4	Remove the Touch Screen Chassis to gain access to the Internal Head Assembly:
	 LM01990_606.JPG
Step	Action
a	Remove the (6) screws securing the Touch Screen Chassis to the frame.
b	Gently pull forward the Touch Screen Chassis and OCM as one assembly. Set the Touch Screen Chassis on a table in front of the ThermoStream. <b>NOTE:</b> There should be enough of a service loop on the OCM wiring to leave all the connections in tact. If needed, label and remove connections from the rear of the OCM.

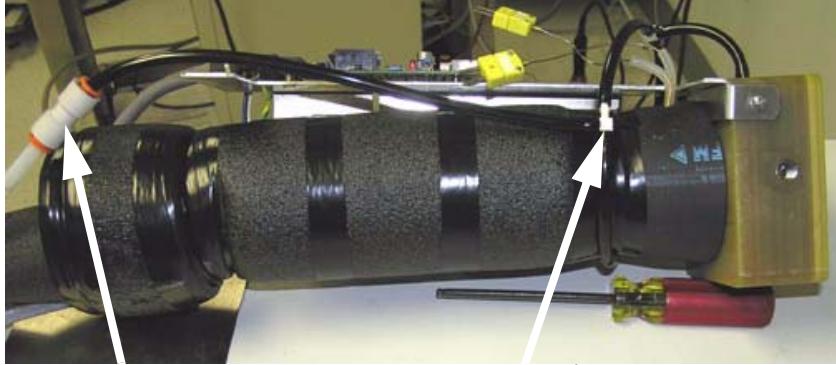
Step	Action
5	<p>Remove the (4) bolts securing the Turret Collar and Flex Extender Adapter.</p>  <p>turret and collar removal 4 bolts.jpg</p>
6	<p>Set the Turret Collar, Flex Extender Adapter, and (4) bolts aside:</p>  <p>turret and collar removed.jpg</p>

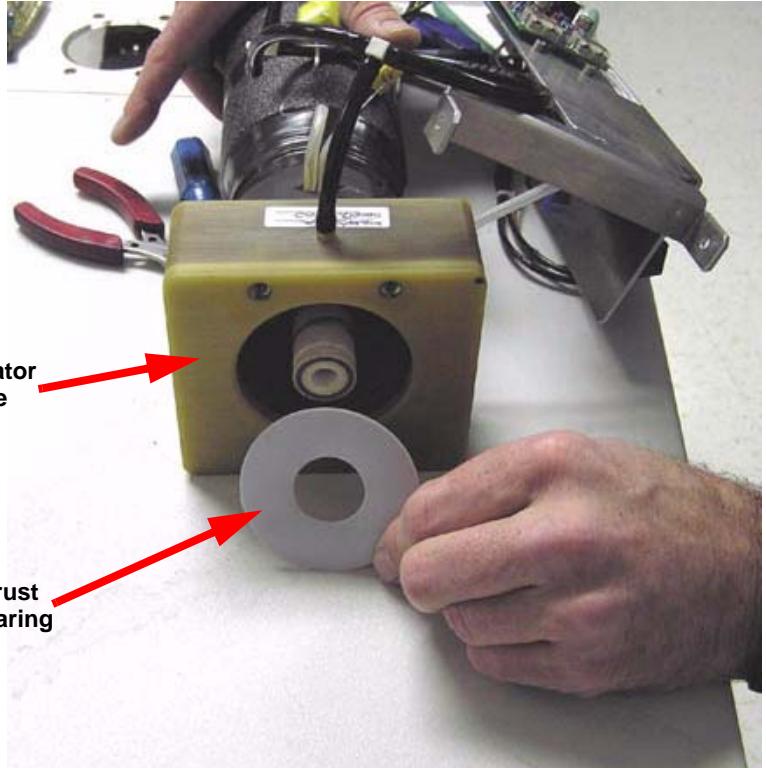
Step	Action								
7	<p>Loosen the Pneumatics Drive Shelf:</p> <p><b>(6) screws secure the Pneumatics drive shelf</b></p>  <p>loosen drive shelf.jpg</p>								
<table border="1"> <thead> <tr> <th>Step</th><th>Action</th></tr> </thead> <tbody> <tr> <td>a</td><td> <p>The Pneumatics Drive Shelf is secured by (6) screws (3 on each side).</p> <p>Remove and retain the top 4 screws (2 on each side)</p> <p>Loosen the bottom 2 screws (1 on each side).</p> </td></tr> <tr> <td>b</td><td>Disconnect the Flow Board outlet line at the quick disconnect.</td></tr> <tr> <td>c</td><td>Gently move the Pneumatics Drive Shelf forward.</td></tr> </tbody> </table>		Step	Action	a	<p>The Pneumatics Drive Shelf is secured by (6) screws (3 on each side).</p> <p>Remove and retain the top 4 screws (2 on each side)</p> <p>Loosen the bottom 2 screws (1 on each side).</p>	b	Disconnect the Flow Board outlet line at the quick disconnect.	c	Gently move the Pneumatics Drive Shelf forward.
Step	Action								
a	<p>The Pneumatics Drive Shelf is secured by (6) screws (3 on each side).</p> <p>Remove and retain the top 4 screws (2 on each side)</p> <p>Loosen the bottom 2 screws (1 on each side).</p>								
b	Disconnect the Flow Board outlet line at the quick disconnect.								
c	Gently move the Pneumatics Drive Shelf forward.								

Step	Action
8	<p>Remove and retain the (3) bolts that secure the Internal Head Assembly to the frame:</p> <p><b>CAUTION</b></p> <p>The Internal Head Assembly will no longer be secured once the (3) Bolts have been Removed. Do NOT let the assembly drop when you remove the bolts.</p>  <p>3 bolts securing head assembly 2.jpg</p>

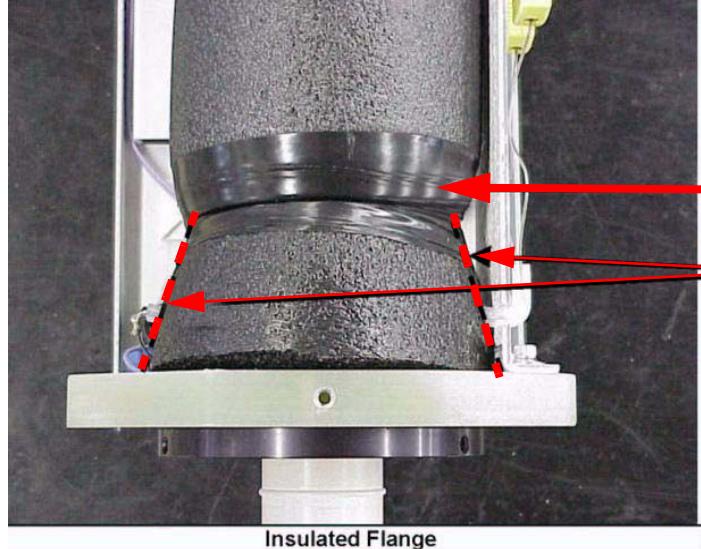
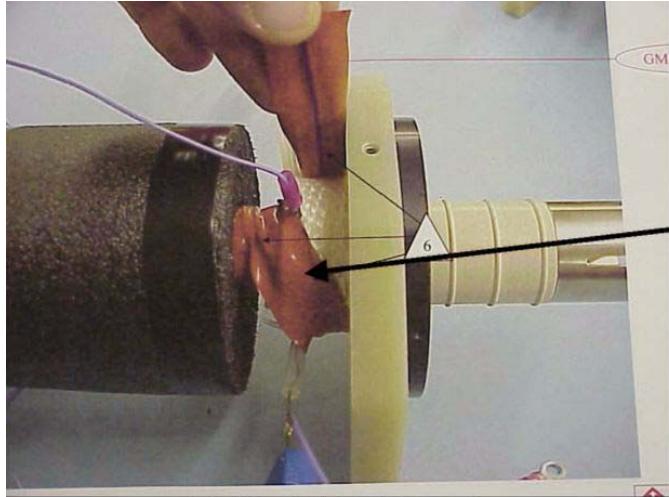
Step	Action
9	<p>With the drive shelf loosened and the Internal Head Assembly unbolted, extract the Internal Head Assembly as shown:</p> <p><b>NOTE:</b> cut tie wraps securing the flexline hose as needed.</p>  <p>Internal Head Assembly, remove thru top.jpg</p>

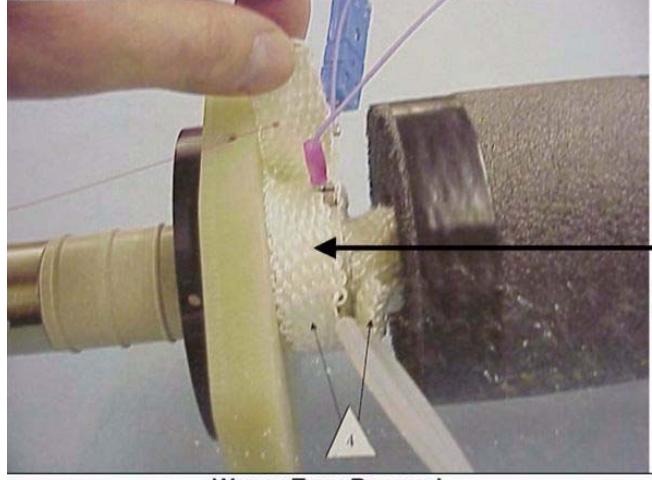
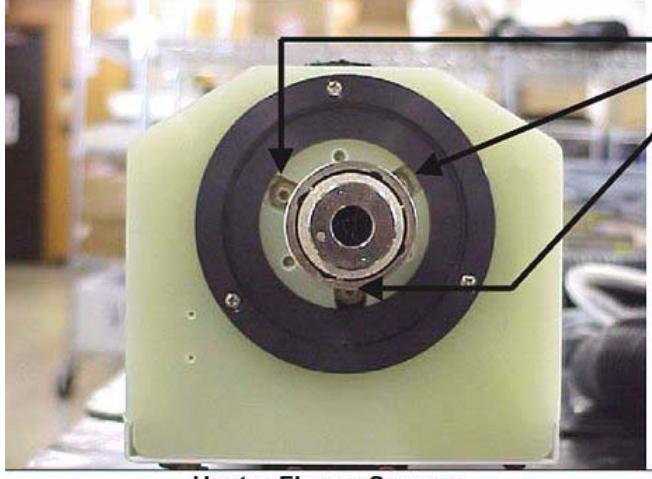
Step	Action
10	<p>Place the Internal Head Assembly on the top of the ThermoStream as shown:</p>  <p style="text-align: center;"> <b>(2) Type K Thermocouples</b>      <b>Type T Thermocouple (Main TC)</b>      <b>Heater Ground Wire</b>      <b>Heater Power Connector</b> </p> <p style="text-align: right;">Internal Head Assembly, extracted 3.jpg</p>
11	<p>Disconnect the following:</p> <ul style="list-style-type: none"> <li>• (2) yellow Type K Thermocouples</li> <li>• (1) blue Type T Thermocouple</li> <li>• (1) Heater Power Connector (Molex Connector)</li> <li>• (1) Heater Ground Wire</li> </ul> <p style="text-align: center;"><b>CAUTION</b></p> <p style="text-align: center;">Be very careful to avoid damaging the two thermocouples which go from the Head thermal cutout board into the main air stream through various connector/supports. These thermocouples are very delicate. Do not cut, twist, or bend them as internal connections can be broken.</p>

Step	Action
12	<p>Disconnect the Purge Flow tubing at the t-fitting and quick disconnect</p>  <p>Purge tubing quick disconnect      Purge tubing t-fitting</p> <p style="text-align: right;">disconnect purge ring.jpg</p>
13	<p>Remove the Cutout Board Mounting Bracket as follows:</p> <ol style="list-style-type: none"> <li>cut the tie wrap securing the mounting bracket to the Heater.</li> <li>remove the (2) screws securing the bracket to the Isolator Plate.</li> <li>carefully remove the mounting bracket</li> </ol> <p><b>NOTE: DO NOT</b> twist, bend, or damage the thermocouples when you remove the bracket.</p>  <p>(2) screws securing bracket to Isolator Plate      Cut the tie wrap</p> <p style="text-align: right;">Cutout Bracket, tie wrap.jpg</p>

Step	Action
14	<p>Using a flathead screwdriver, carefully remove the (white) Thrust Bearing from the Isolator Plate:</p>  <p>Isolator Plate</p> <p>Thrust Bearing</p> <p>Thrust Bearing.jpg</p>

Step	Action
15	<p>To gain access to the Main Air Compression Fitting, cut the insulation along the dotted line (shown below). Use caution to not damage the Poly - Flow line inserted through the insulation.</p> <p>Slide the insulation away from the heater and fitting.</p>  <p style="text-align: center;">cut insulation at compression fitting.jpg</p>
16	<p>Loosen the Main Air compression fitting that secures the Poly - Flow input airline. Slide the airline away from the heater.</p>  <p style="text-align: right;">LM01990_608.JPG</p>

Step	Action
17	<p>Remove the black tape from around the insulation. Cut the insulation vertically along the two dotted lines. Use caution not to damage the thermocouples.</p>  <p style="text-align: right;">Black Tape</p> <p style="text-align: right;">Cut vertically along dotted lines</p> <p style="text-align: center;">Insulated Flange</p> <p style="text-align: right;">LM01990_610.JPG</p>
18	<p>Remove the red/orange tape from around the base of the Isolator Plate.</p>  <p style="text-align: right;">Red Heater Tape</p> <p style="text-align: center;">Red Heater Tape Removal</p> <p style="text-align: right;">LM01990_611.JPG</p>

Step	Action
19	<p>Remove the white fiber woven tape from around the base of the heater flange.</p>  <p style="text-align: center;"><b>Woven Tape Removal</b></p> <p style="text-align: right;">LM01990_612.JPG</p>
20	<p>Remove the three Allen head screws from the bottom of the heater flange.</p> <p><b>CAUTION</b></p> <p><b>DO NOT</b> dislodge the thermocouple mounting rings from the nozzle.</p>  <p style="text-align: center;"><b>Heater Flange Screws</b></p> <p style="text-align: right;">LM01990_614.JPG</p>
21	<p><b>At this point the heater can be removed from the head assembly.</b></p>

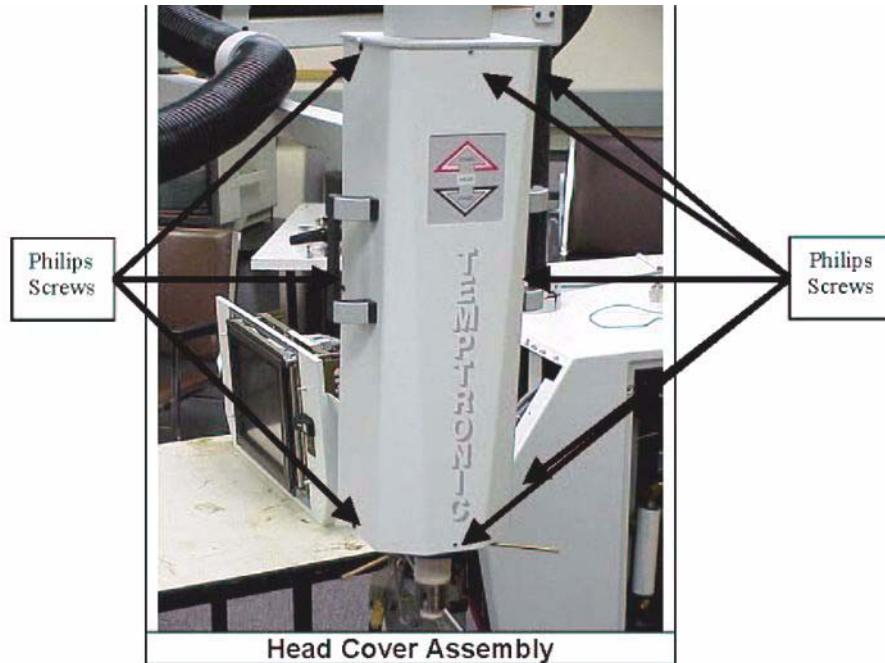
## Install the new Heater

Step	Action
22	<b>Install the new heater into the head assembly.</b>
23	Re-install the three Allen head screws that secured the Heater Flange.
24	Insert the Poly - Flow line into the Main Air Compression fitting. Tighten the fitting securely.
25	Apply glue to the insulation around the Main Air Compression Fitting. Also apply glue to the top portion of the heater. Let the glue set for a few moments before attaching the two pieces.
26	Wrap the heater flange with new white fiber woven tape.
27	Wrap over the white fiber woven tape with new red heater tape.
28	Apply glue to the pieces of insulation that were cut in step 15. Allow the glue to set -up for a few moments before attaching the two pieces.
29	Wrap the joint between the upper and lower pieces of insulation with black electrical tape.
30	Re-install the Thrust Bearing (removed in step 14).
31	Re-install the Cutout Board Mounting Bracket (removed in step13)
32	Re-connect the: <ul style="list-style-type: none"> <li>• (2) yellow Type K Thermocouples</li> <li>• (1) blue Type T Thermocouple</li> <li>• (1) Heater Power Connector (Molex Connector)</li> <li>(1) Heater Ground Wire.</li> </ul>
33	Re-connect the Purge Flow tubing (disconnected in step 12).
34	Secure the Internal Head Assembly to the Frame with the (3) bolts (removed in step 8).
35	Secure the Pneumatics Drive shelf (loosened in step 7)
36	Re-connect the Flow Board outlet line to the quick disconnect.
37	Secure the Turret Collar and Flex Extender Adapter. (removed in step 5)
38	Secure the Touch Screen Chassis. (removed in step 4)
39	Attach the upper and lower front Bezels.

## Membrane Switch Replacement

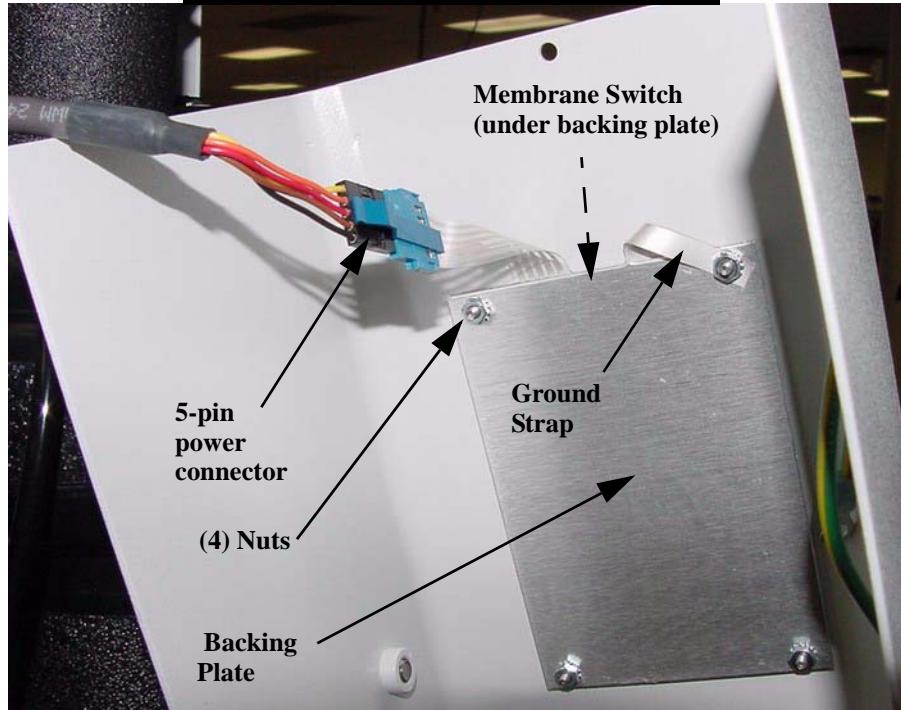
### Membrane Switch Detailed

#### Thermal Head Cover, Removal



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#### Thermal Head Cover, Inside View



LM01990\_207.JPG

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**Procedure**

To replace the Membrane Switch use P/N SS145510

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**WARNING**

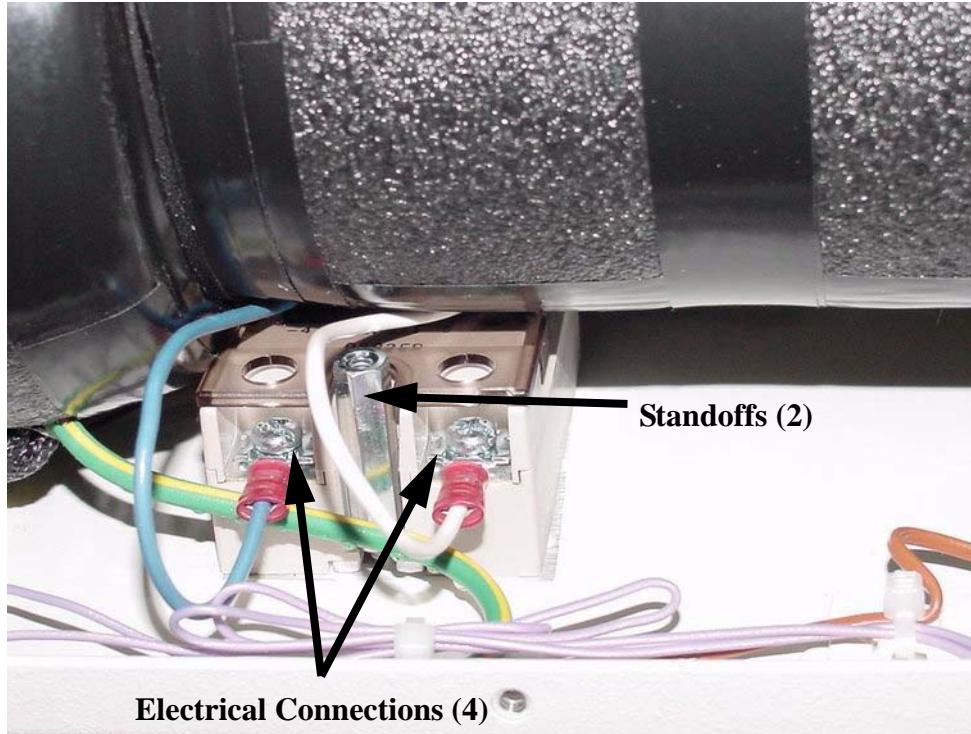
**WARNINGS 1, 2, 3, 5, 6, 7,9** in Chapter 1 Safety

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Step	Action
1	Turn off (power down) the <i>TP04300A</i> , then disconnect power cord from facility power supply.
2	Remove the (8) screws securing the Thermal Head Cover to the Thermal Head Assembly.
3	Carefully disconnect the Membrane Switch from the 5-pin power connector.  A blue circle with a white exclamation mark inside.
	<b>ATTENTION</b>  Make a note of the Power Connector's orientation. The black wire is pin 1, the yellow wire is pin 5. The Membrane Switch will not work properly if the Power Connector is plugged in backwards.
4	Loosen the (4) nuts on the Backing Plate.
5	Disconnect the Ground Strap.
6	Slide the Membrane Switch from under the Backing Plate.
7	Install new Membrane Switch in the reverse order of the above procedure.

## Relay K4 Replacement

### K4 Replacement Detailed



LM01990\_617.JPG

### Procedure

To replace Relay K4, use P/N KK02060.



### WARNING

WARNINGS 1, 2, 3, 5, 6, 7,9 in Chapter 1 Safety

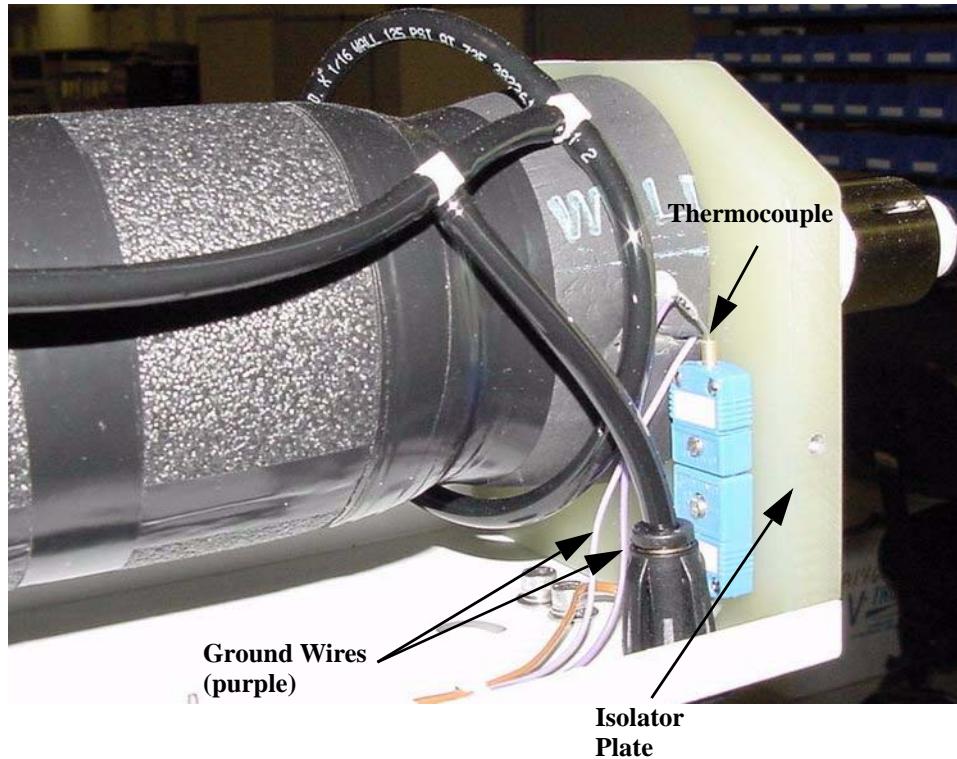
Step	Action
1	Turn off (power down) the <i>TP04300</i> , then disconnect power cord from facility power supply.
2	Remove the (8) screws securing the Thermal Head Cover to the Thermal Head Assembly and remove the cover.

Step	Action
3	<p>The Heater Assembly may be loosened for easier access to Relay K4.</p> <p>To loosen the Heater Assembly, remove the (4) screws on the back of the Thermal Head:</p>  <p style="text-align: right;">Screws (2)</p> <p style="text-align: left;">Screws (2)</p>
4	Remove the (2) Standoffs securing the relay to the thermal head.
5	Mark and remove the (4) electrical connections on the relay.
6	Remove the relay.
7	Install the new relay in the reverse order of the above procedure.

## Type "T", Main Thermocouple Replacement

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### Thermocouple Replacement Detailed



LM01990\_622.JPG

### Procedure

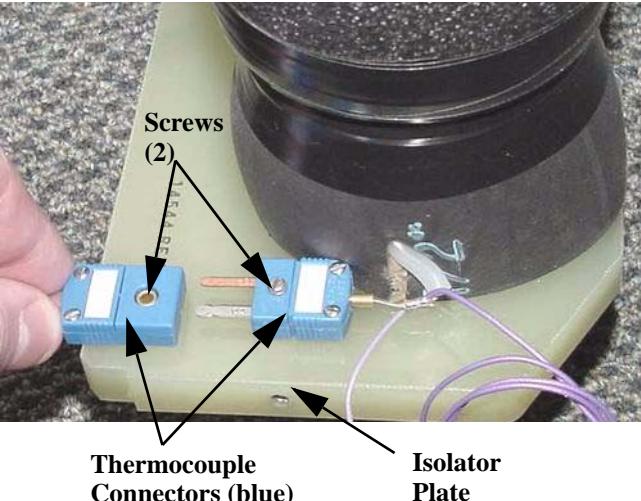
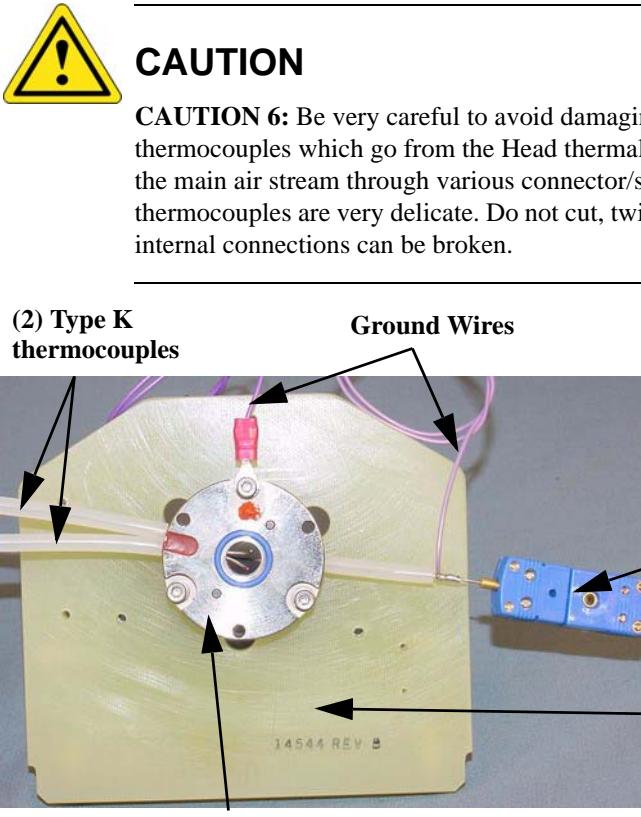
To replace the Type "T" Thermocouple, use P/N SA151810

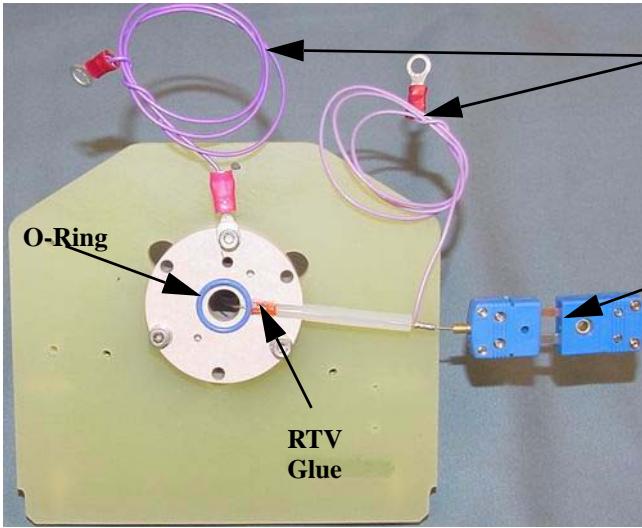


### WARNING

**WARNINGS 1, 2, 3, 5, 6, 7,9** in Chapter 1 Safety

Step	Action
1	Turn off (power down) the <i>TP04300</i> , then disconnect power cord from facility power supply.
2	Remove the Heater Assembly to gain access to the thermocouple. See <a href="#">Heater Replacement (TP04300A)</a> in this Section if needed.

Step	Action
3	<p>Disconnect the (blue) thermocouple connectors and remove the (2) screws securing them to the Isolator Plate</p> <p style="text-align: center;"><b>THERMOCOUPLE SHOWN WITH HEATER</b></p>  <p style="text-align: right;">LM01990_624.JPG</p>
4	<p>Use a small screwdriver to pry up the Stainless Thermal Disc and (2) attached Type K thermocouples.</p> <hr/> <p><b>CAUTION</b></p> <p><b>CAUTION 6:</b> Be very careful to avoid damaging the two thermocouples which go from the Head thermal cutout board into the main air stream through various connector/supports. These thermocouples are very delicate. Do not cut, twist, or bend them as internal connections can be broken.</p> <hr/>  <p style="text-align: right;">LM01990_623.JPG</p>

Step	Action
5	<p>Use a small screwdriver to remove the (blue) O-Ring (P/N OO00210)</p> <p><b>STAINLESS THERMAL DISC REMOVED</b></p>  <p>LM01990_625.JPG</p>
6	Gently pull up on the thermocouple to separate it from the (red) RTV Glue (P/N GM00380).
7	Remove the thermocouple, connector, and ground wire as one assembly.
8	<p>Install the new thermocouple assembly in the reverse order of the above steps.</p> <ul style="list-style-type: none"> <li>• Re-apply the RTV Glue (P/N GM00380)</li> <li>• use a new O-Ring on the assembly (P/N OO00210)</li> <li>• use a thermocouple centering tool to align the thermocouple in the nozzle (P/N XX120960)</li> </ul> <hr/> <p><b>WARNING</b></p> <p>The Red RTV Glue requires 24 hours to dry and seal properly. The machine must be inactive during this time period.</p> <hr/>

## Section C: Parts List

---

PART (Description)	STOCK#, (P/Ns)
Black Electrical Tape	GM00250
Red Thermal Tape	GM02460
White Woven Tape	VV02550
Red RTV Glue	GM00380
Main Air Nozzle	SA149360
Nozzle Plunger	SS145510
Heater	SA149370
Main Air Nozzle	SA149360
Nozzle Plunger	SS145510
Heater	SA149370
Membrane Switch	SS145510
Relay K4	KK02060
Type "T" Thermocouple	SA151810
O-Ring (used on Thermal Disc)	OO00210
Centering Tool	XX120960
Flexline Hose	VV04400

---





# Pneumatics

## Chapter Overview

The TP04300 Pneumatics consists of:

- a particulate pre-filter that blocks solid particles
- a coalescing pre-filter that removes oil and water particles prior to the air entering the air dryer towers
- a rear Input Air Gauge that monitors the system's air pressure after the pressure drop caused by the two pre-filters
  - for proper system performance, this Gauge should never read less than 80 psig (5.5 bar)
- a heatless, desiccant Air Dryer that removes moisture and allows frost free operation
- a particulate post-filter (located after the Air Dryer) that removes desiccant particles
- a Flow Board that controls pneumatics valves and air flow based on user inputs
- a Thermal Cutout Board located in the Thermal head to prevents overheating

---

### In this Chapter

This Chapter is divided into the following Sections:

Section	See Page
Parts Pictorial	2
Repair	7
Parts List	14

---

# Section A: Parts Pictorial

---

## Section Overview

---

### In this Section

The following topics are covered in this Section:

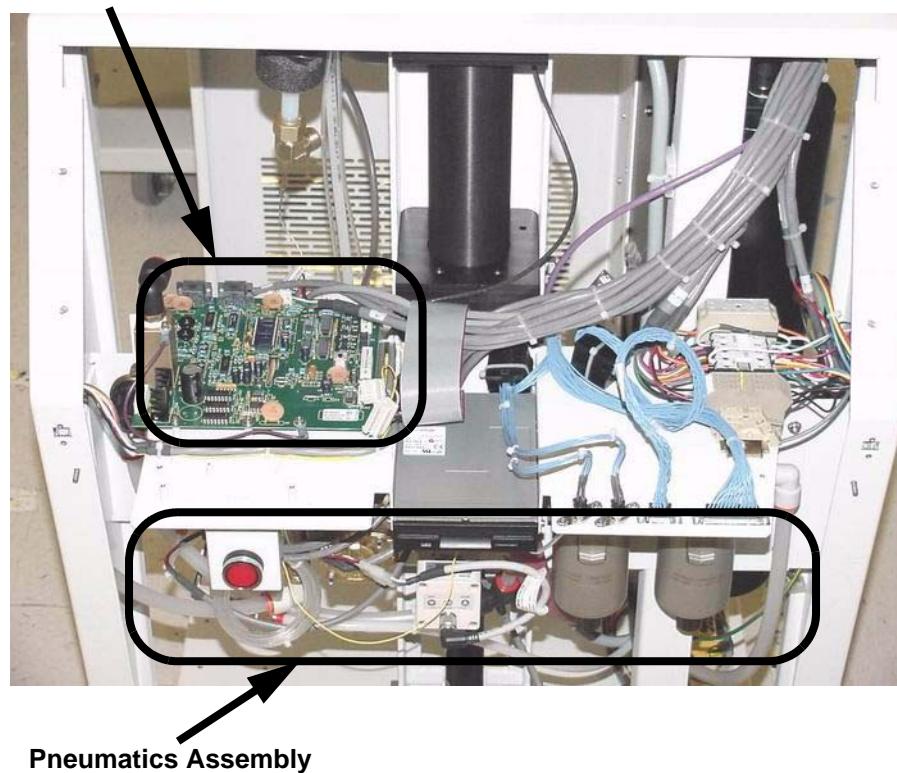
Topic	See Page
Flow/Linear Actuator Board	3
Pneumatics Assembly, Front View	4
Pneumatics Valves, Regulators	5

---

## Flow/Linear Actuator Board

### Flow/Linear Actuator Board

Flow/Linear Actuator Board



LM01990\_701.JPG

### Descriptions

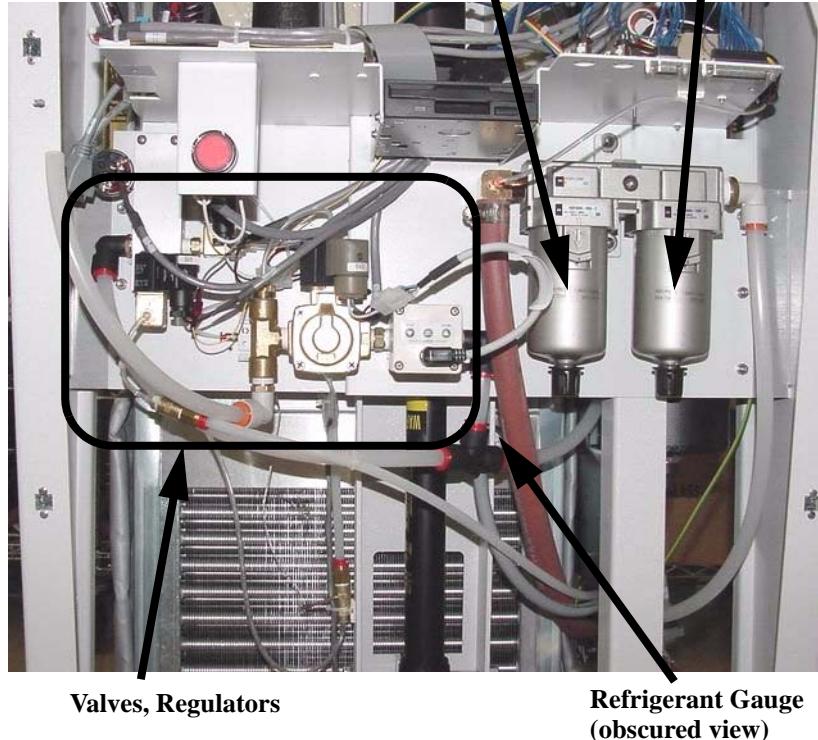
PART	DESCRIPTION
Flow/Linear Actuator Board	<p>Has two functions:</p> <ul style="list-style-type: none"> <li>Serves as a mass air flow meter. This board communicates flow volume to the Watlow board which then sets flow rate and volume according to OCM inputs.</li> <li>The actuator drive logic is integrated into the Flow/Linear Actuator board.</li> </ul> <p>P/N SA172090</p>
Pneumatics Assembly	Consists of the Flow/Linear Actuator Board, pneumatics valves, filters, regulators. The assembly controls and regulates all air flow within the TP04300.

## Pneumatics Assembly, Front View

Flow/Linear  
Actuator Board

Particle  
Filter

Coalescing  
Filter



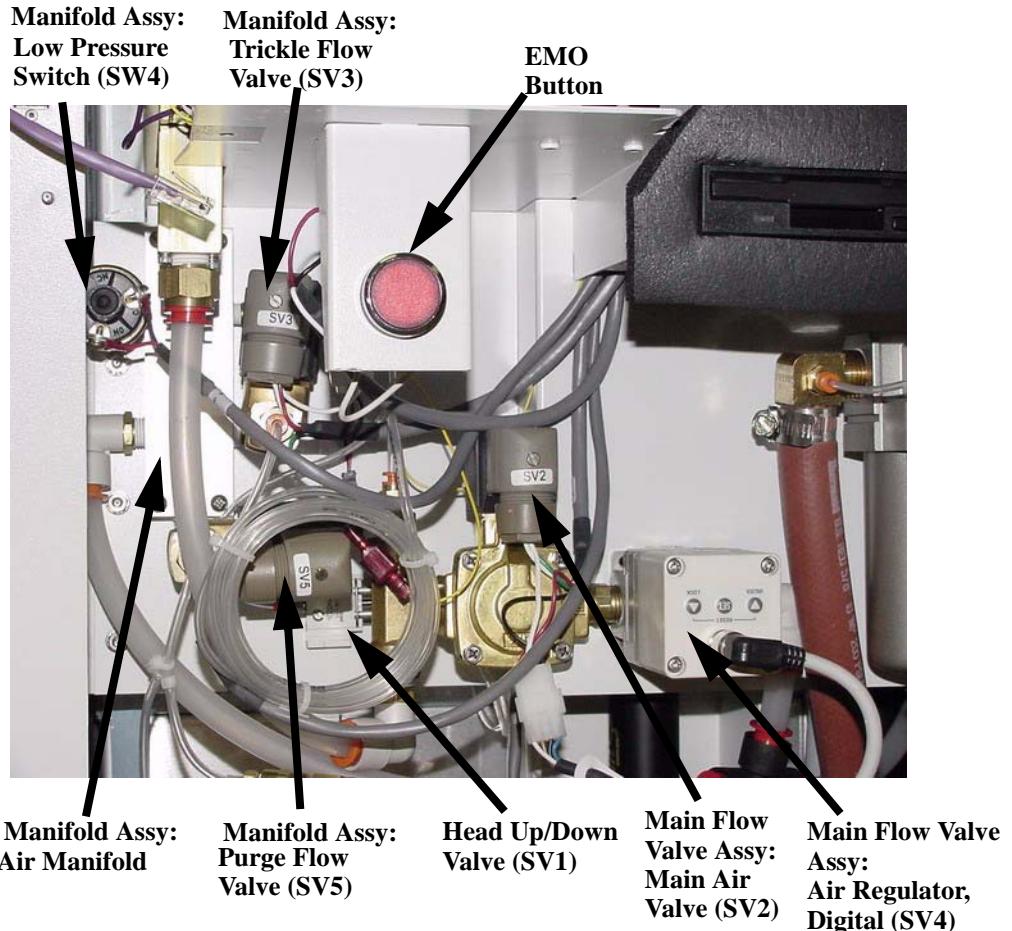
LM01990\_702.JPG

### Descriptions

PART	DESCRIPTION
Particle Filter	Removes larger particulate matter from the air flow. P/N CS158580
Coalescing Filter	Removes smaller particulate matter and moisture from the air flow. P/N CS158580
Valves, Regulators	Five solenoid valves, a digital pressure regulator (transducer), and low pressure switch. For greater detail, see <a href="#">Pneumatics Valves, Regulators</a> in this Section.
Refrigerant Gauge	Displays air pressure (psi) on the suction side of the Air Chiller Module. After being shut down for 12 hours, the balance pressure should be in the approximate range of 125-150 psi.

## Pneumatics Valves, Regulators

### Pneumatics Valves, Regulators, Front View



LM01990\_703.JPG



### ATTENTION

This graphic displays the latest version of the Main Flow Valve Assembly.  
Older models may be upgraded with Service Kit CS155490.

### Descriptions

PART	DESCRIPTION
Main Air Manifold Assembly	<p>A stainless steel assembly consisting of:</p> <ul style="list-style-type: none"> <li>• Air Manifold</li> <li>• Low Pressure Switch (SW4)</li> <li>• Trickle Flow Valve (SV3)</li> <li>• Purge Flow Valve (SV5)</li> </ul> <p>P/N SA147980</p>

PART	DESCRIPTION
Air Manifold	Part of the Main Air Manifold Assembly, a stainless steel air distribution block.
Low Pressure Switch (SW4)	Part of the Main Air Manifold Assembly Sends a low input air pressure signal/warning to the main board (and OCM display) if the main air pressure is less than 10psi. P/N SS01670
Trickle Flow Valve (SV3)	Part of the Main Air Manifold Assembly This valve opens and closes to allow a “trickle” of air flow through the Air Chiller Module and Thermal Head. This “trickle” flow keeps the flow line cool and allows for faster cooling transitions.
Purge Flow Valve (SV5)	Part of the Main Air Manifold Assembly This valve opens and closes to regulate purged air flow through the thermal head and to the DUT.
Main Flow Valve Assembly	The assembly consists of: <ul style="list-style-type: none"><li>• Main Air Valve (SV2)</li><li>• Digital Air Regulator (SV4)</li></ul> P/N SA147990
Main Air Valve (SV2)	Part of the Main Flow Valve Assembly This valve opens and closes to regulate main air flow to the air chiller module and thermal head.
Air Regulator, Digital (SV4)	Part of the Main Flow Valve Assembly. Digitally displays the percentage of supplied air being used in the Main Air line.
Head Up/Down Valve (SV1)	This valve controls the air flow that moves the Thermal Head up or down. P/N KK01810

## Section B: Repair

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### Section Overview

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#### In this Section

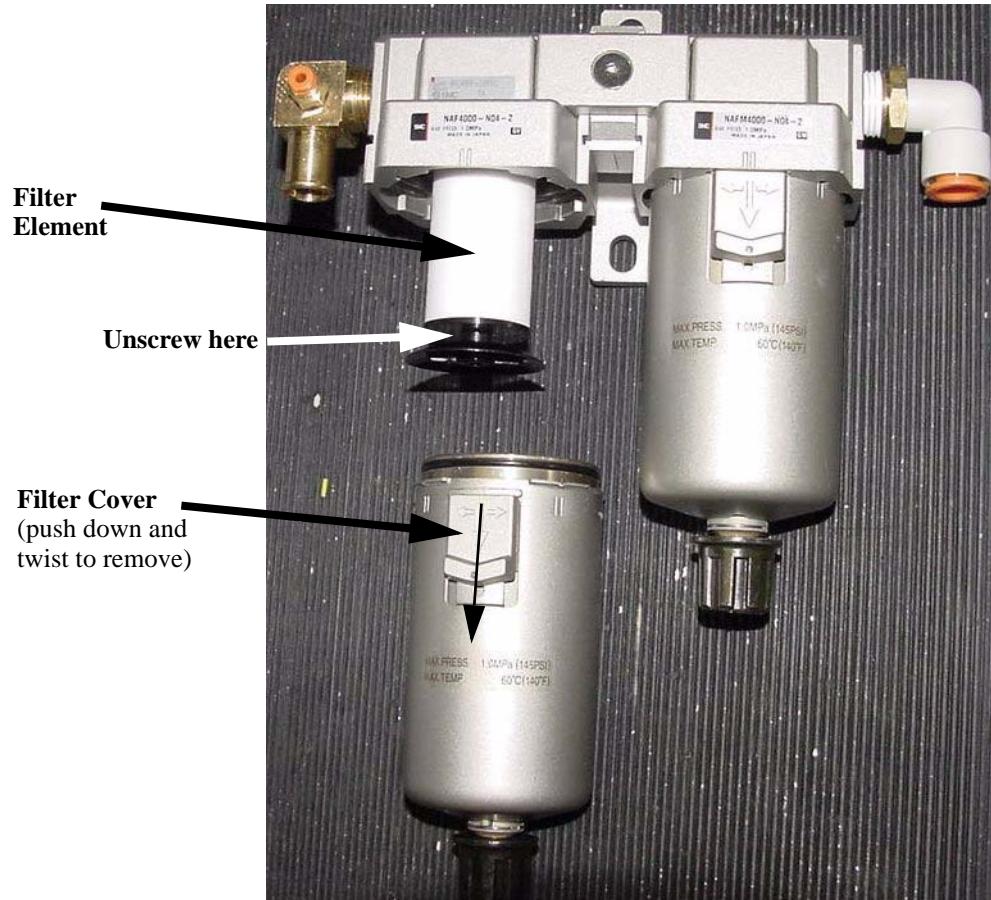
The following topics are covered in this Section:

Topic	See Page
<a href="#">Pneumatics Filter Element Replacement</a>	<a href="#">8</a>
<a href="#">Air Manifold Assembly (SV3, SV5, SW4) Replacement</a>	<a href="#">9</a>
<a href="#">Main Flow Valve Assembly (SV2, SV4) Replacement</a>	<a href="#">11</a>
<a href="#">SV1, Head Up/Down Valve Replacement</a>	<a href="#">13</a>

---

## Pneumatics Filter Element Replacement

### Filter Replacement Detail



LM01990\_704.JPG

### Procedure

To replace the Filter Element, use P/N CS158580.



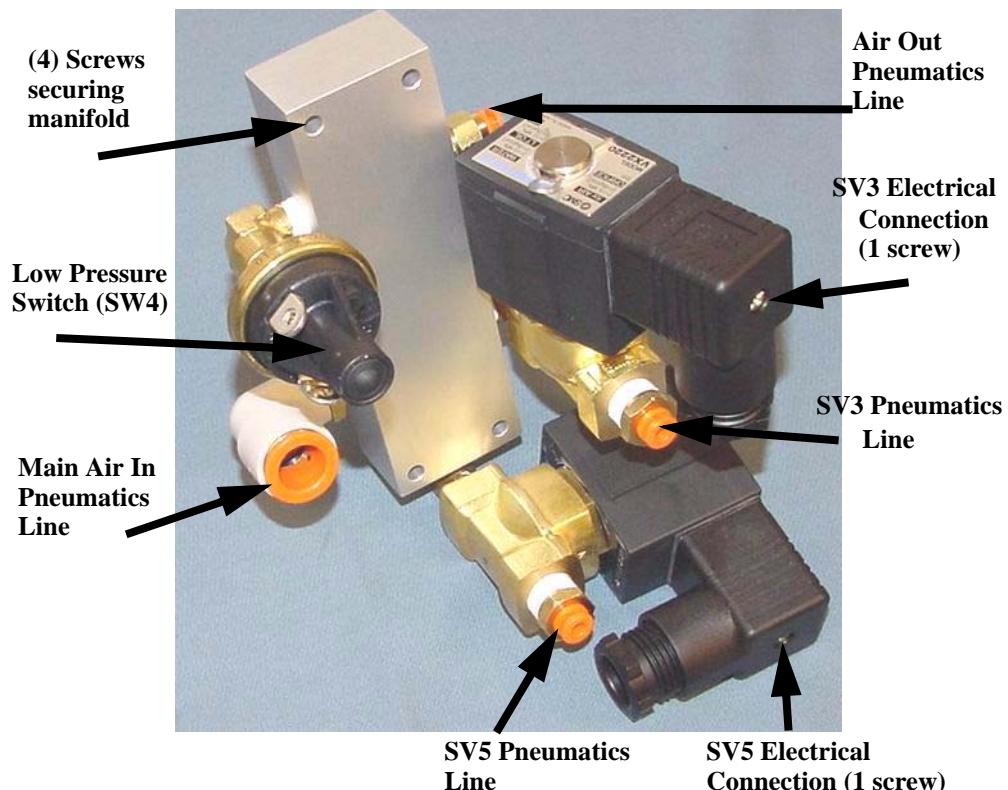
### WARNING

**WARNINGS 1, 2, 3, 8, 9** in Chapter 1, Safety.

Step	Action
1	Power down the <i>TP04300</i> and disconnect power cord.
2	Disconnect the facility air supply from the <i>TP04300</i> .
3	Remove the filter cover by pressing down and twisting
4	Unscrew and replace the filter.

## Air Manifold Assembly (SV3, SV5, SW4) Replacement

### Air Manifold Replacement Detail



LM01990\_706.JPG

### Procedure

To replace the Air Manifold Assembly, use P/N SA147980.



### WARNING

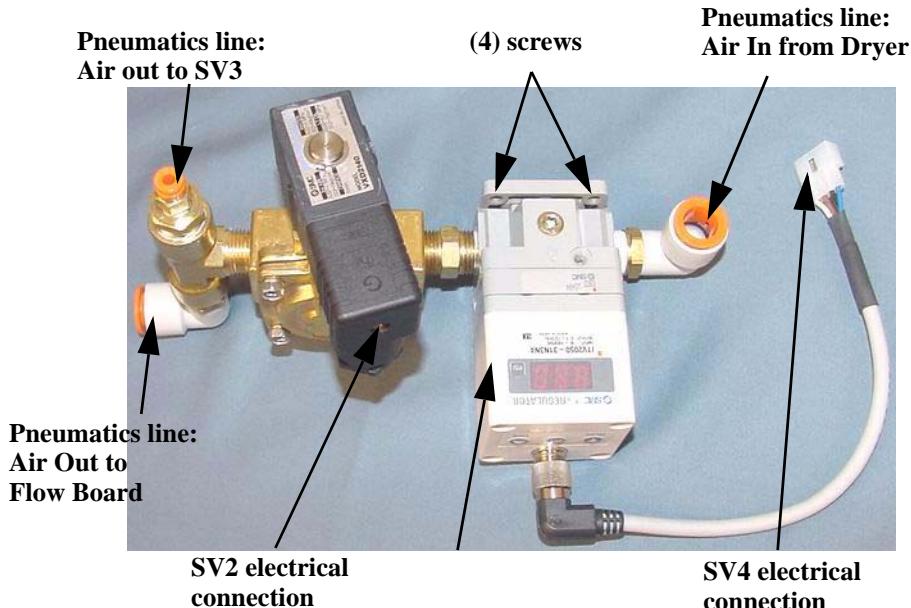
**WARNINGS 1, 2, 3, 8, 9** in Chapter 1, Safety.

Step	Action
1	Power down the TP04300 and disconnect power cord.
2	Disconnect the facility air supply from the TP04300.
3	Disconnect the Main Air In pneumatic line from the Air Manifold.
4	Mark and disconnect the (2) electrical connections on the Low Pressure Switch (SW4)
5	Unscrew and disconnect the electrical connection on SV5.
6	Mark and disconnect the Pneumatic line on SV5.
7	Unscrew and disconnect the electrical connection on SV3.
8	Mark and disconnect the Pneumatic line on SV3.
9	Remove the (4) screws securing the Air Manifold to the frame.

Step	Action
10	Remove the Air Manifold
11	Install the new manifold assembly in the reverse order of the above procedure.

## Main Flow Valve Assembly (SV2, SV4) Replacement

### Main Flow Valve Replacement Detail



LM01990\_707.JPG



### ATTENTION

This graphic displays the latest version of the Main Flow Valve Assembly. Older models may be upgraded with Service Kit CS155490.

### Procedure

To replace the Main Flow Valve Assembly, use P/N SA147990.



### WARNING

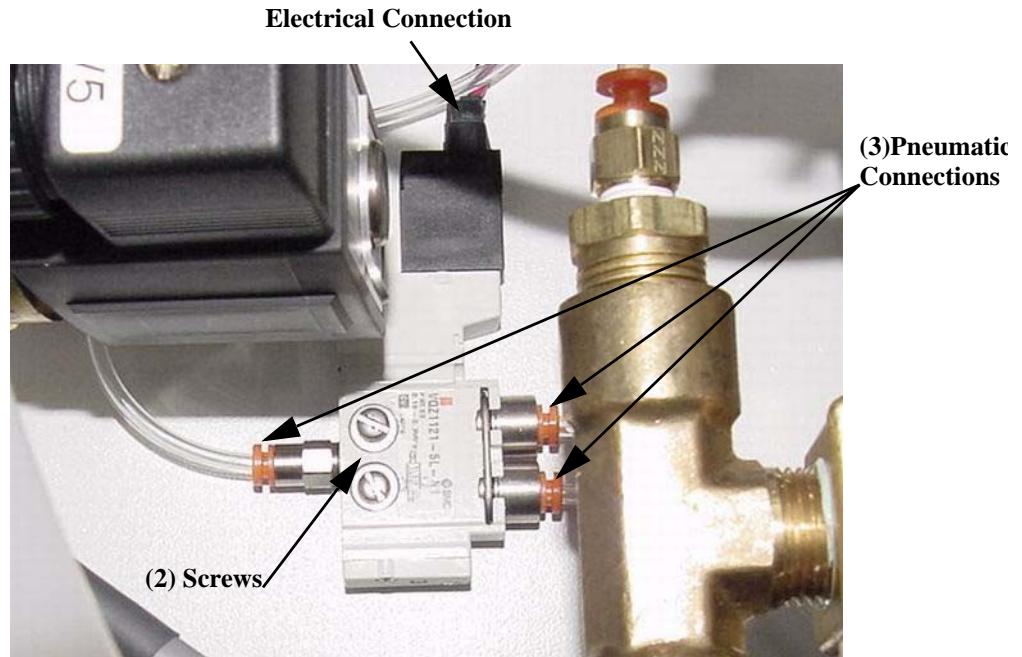
**WARNINGS 1, 2, 3, 8, 9** in Chapter 1, Safety.

Step	Action
1	Power down the TP04300 and disconnect power cord.
2	Disconnect the facility air supply from the TP04300.
3	Unscrew and remove the electrical connection to SV2.
4	Disconnect the electrical “quick disconnect” to SV4.
5	Disconnect the Air In from dryer pneumatics line.

Step	Action
6	Disconnect both Air Out (to SV3 and to Flow Board) pneumatics line.
7	Remove the (4) screws securing the Main Flow Valve Assembly to the frame. <b>NOTE:</b> the screw heads are on the back side of the frame.
8	Remove the assembly.
9	Install the new Main Flow Valve Assembly in the reverse order of the above procedure.

## SV1, Head Up/Down Valve Replacement

### SV1 Replacement Detail



LM01990\_705.JPG

### Procedure

To replace the SV1, use P/N KK01810.



### WARNING

**WARNINGS 1, 2, 3, 8, 9** in Chapter 1, Safety.

Step	Action
1	Power down the <i>TP04300</i> and disconnect power cord.
2	Disconnect the facility air supply from the <i>TP04300</i> .
3	Mark and Disconnect the (3) Pneumatics lines.
	 <b>ATTENTION</b> If the pneumatics lines are not re-connected properly, the Head Up/Down feature will not function correctly.
4	Remove the electrical connection at the top of the assembly.
5	Remove the (2) screws securing SV1 to the frame.
6	Install the new SV1 in the reverse order of the above procedure.

## Section C: Parts List

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PART (Description)	STOCK#, (P/Ns)
Flow/Linear Actuator Board	SA172090
Particle Filter	CS158850
Coalescing Filter	CS158850
Main Air Manifold Assembly	SA147980
Main Flow Valve Assembly	SA147990
SV1, Head Up/Down Valve	KK01810
SW4, Low Pressure Switch	SS01670

---



# Power Control

## Chapter Overview

### In this Chapter

This Chapter is divided into the following Sections:

Section	See Page
General Power Distribution	2
Parts Pictorial	3
Voltage Configurations	9
Repair	11

## General Power Distribution

---

### General Power Distribution Overview

General power distribution is as follows:

- Facility line voltage (AC) enters the system through CB1, the Line Filter, and the Auto Transformer.
- The Auto Transformer regulates the facility line voltage as needed to supply the system with 230vac.
- The 230vac then enters the high voltage Power Distribution Block.
- Within the Power Distribution Block, CB4 supplies:
  - 230vac to the Air Chiller Module
  - 230vac to Transformer T1
    - T1 then supplies 24vac to the Air Dryer Module
  - 230vac to Power Supplies (PS1 and PS2)
    - PS1 supplies +5, +/-12vdc to low voltage components
    - PS2 supplies +24vdc to the low voltage components
- Within the Power Distribution Block, CB5 supplies:
  - 230vac to the Heater (located in the Thermal Head)

### Power Safety Features

Power Safety Features include:

- A front panel EMO Switch (Emergency Off Switch). When pressed, the EMO switches CB1 into an off position and removes all power from the system.
  - A Thermal Cutout Sensor located in the Thermal Head. In the event of an overheat (+250 °C), the sensor disables Relay K1 and removes power from the Heater.
  - A Secondary Thermal Cutout Sensor located in the Thermal Head. In the event of an overheat (+275 °C), the secondary sensor disables Relay K4 and removes power from the Heater.
-

## Section A: Parts Pictorial

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### Section Overview

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#### In this Section

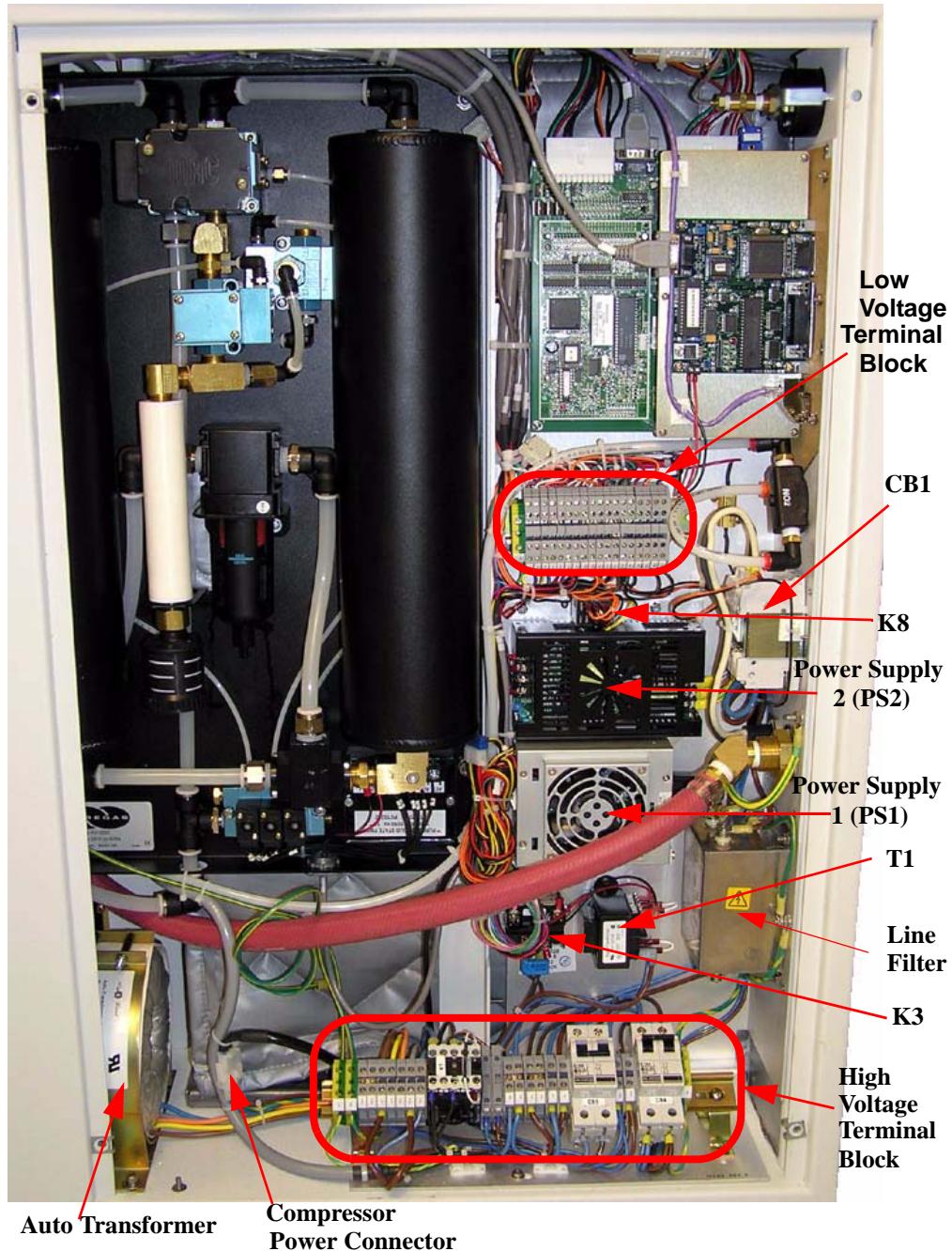
The following topics are covered in this Section:

Topic	See Page
<a href="#">Power Distribution: Right, Full View</a>	<a href="#">4</a>
<a href="#">Low Voltage Terminal Block</a>	<a href="#">6</a>
<a href="#">High Voltage Terminal Block</a>	<a href="#">7</a>

---

## Power Distribution: Right, Full View

### Power Distribution



LM02290\_211.jpg

### Descriptions

PART	DESCRIPTION
Low Voltage Terminal Block	TB7A through TB22, distributes low voltage DC and AC power. This is also called the Upper Terminal block. For greater detail, see <a href="#">Low Voltage Terminal Block</a> .

PART	DESCRIPTION
CB1	Circuit Breaker 1, a 32 amp circuit breaker, the Main Power breaker P/N KK02740
K8	a 12vdc relay, supplies 24vdc to the Low Voltage Terminal Block. P/N KK03060
Power Supply 2 (PS2)	The +24vdc power supply P/N PS00620
Power Supply 1 (PS1)	a +5, +/-12 vdc, ATX power supply. P/N PS00610
Line Filter	filters noise on the AC power line. P/N ZZ08160
T1	a 24vac transformer for the Air Dryer P/N TT00280
K3	a solid state 24 VDC relay, energizes the compressor. P/N KK03050.
High Voltage Terminal Block	the high voltage AC power distributor, also called the Lower Terminal Block. For greater detail, see <a href="#">High Voltage Terminal Block</a> .
Compressor Power Connector	a 3 pin “quick disconnect” from relay K3 to the Compressor.
Auto Transformer	Adjusts voltage ranges for optimal performance in the TP04300 System. P/N SA149260

## Low Voltage Terminal Block

### Low Voltage Terminal Block



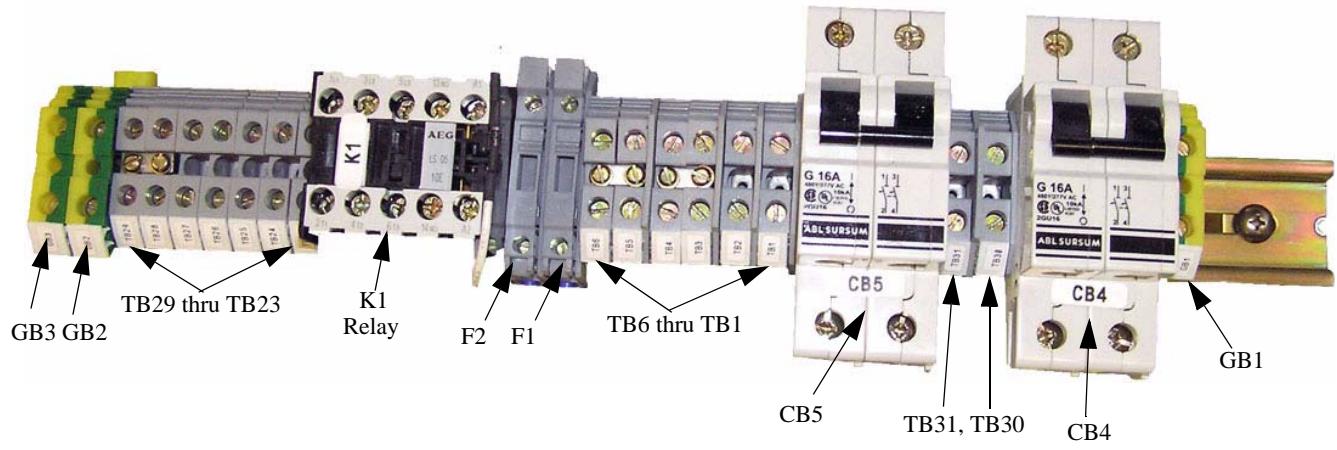
LM02290\_817.JPG

### Descriptions

Terminal Block	DESCRIPTION
TB7a	+24vdc, System Shutdown
TB7b	Ground
TB7c	+24vdc
TB8	+24vdc, EMO Shutdown
TB9	Ground (jumpered to TB10)
TB10	Ground (jumpered to TB9, TB11)
TB11	Ground (jumpered to TB0, TB12)
TB12	Ground (jumpered to TB11)
TB13	+24 vdc (jumpered to TB14, TB15)
TB14	+24vdc (jumpered to TB13, TB15)
TB15	+24vdc (jumpered to TB14, TB13)
TB16	24VAC(-)
TB17	24VAC(+)
TB18	+5 vdc (jumpered to TB19)
TB19	+5 vdc (jumpered to TB18)
TB20	-12vdc
TB21	+12vdc
TB22	+24 vdc, Heater Cutout (overtemperature, safety cutout)
GB4	Shield Ground

## High Voltage Terminal Block

### High Voltage Terminal Block



LM02290\_818.JPG

### Descriptions

PART	DESCRIPTION
GB3	Ground Block 3, chassis ground connection
GB2	Ground Block 2, chassis ground connection
TB29	bypass, no auto transformer (jumpered to TB28)
TB28	bypass, no auto transformer (jumpered to TB29)
TB27	230vac Tap
TB26	220vac Tap
TB25	208vac Tap
TB24	200vac Tap
TB23	0vac Tap (Neutral)
K1	Relay K1, 24vdc, Heater overtemperature safety P/N KK01980
F2	Fuse F2, 1 amp, 250v (T1 transformer) P/N FF00420
F1	Fuse F1, 1 amp, 250v (T1 transformer) P/N FF00420
TB6	bypass/transformer output voltage, 230vac (jumpered to TB5)
TB5	bypass/transformer output voltage, 230vac (jumpered to TB6)
TB4	bypass/transformer output voltage, 230vac (jumpered to TB3)
TB3	bypass/transformer output voltage, 230vac (jumpered to TB4)
TB2	Line input voltage
TB1	Line input voltage

PART	DESCRIPTION
CB5	Circuit Breaker 5, 16amp (Heater) P/N KK01950
TB31	extension block, CB4 output (Neutral)
TB30	extension block, CB4 output (Hot)
CB4	Circuit Breaker 4, 16 amp (Compressor and Power Supplies) P/N KK01950
GB1	Ground Block 1, chassis ground connection

## Section B: Voltage Configurations

### Introduction

The optimal voltage for the *TP04300* System is 230V.

When configured properly, the Auto-Transformer (T2) will “Boost” or “Buck” the line voltage as needed to supply the System with 230V.

### Wiring for Input Voltage of 235V to 250V:

Wire Marker #	Wire Color	From	To
110	Blue	T2	TB23-1
111	Gray	T2	TB24-1
112	Orange	T2	TB25-1
113	Yellow	T2	TB26-1
114	Brown	T2	TB27-1
104	Brown	TB4-2	TB29-1
107	Brown	TB1-2	TB28-1

### Wiring for Input Voltage of 200V to 214V:

Wire Marker #	Wire Color	From	To
110	Blue	T2	TB23-1
111	Gray	T2	TB24-1
112	Orange	T2	TB25-1
113	Yellow	T2	TB26-1
114	Brown	T2	TB27-1
104	Brown	TB4-2	TB27-2
107	Brown	TB1-2	TB24-2

## Wiring for Input Voltage of 215V to 224V:

Wire Marker #	Wire Color	From	To
110	Blue	T2	TB23-1
111	Gray	T2	TB24-1
112	Orange	T2	TB25-1
113	Yellow	T2	TB26-1
114	Brown	T2	TB27-1
104	Brown	TB4-2	TB27-2
107	Brown	TB1-2	TB25-2

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## Wiring for Input Voltage of 225V to 234V:

Wire Marker #	Wire Color	From	To
110	Blue	T2	TB23-1
111	Gray	T2	TB24-1
112	Orange	T2	TB25-1
113	Yellow	T2	TB26-1
114	Brown	T2	TB27-1
104	Brown	TB4-2	TB27-2
107	Brown	TB1-2	TB26-2

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## Section C: Repair

---

### Section Overview

---

#### In this Section

The following topics are covered in this Section:

Topic	See Page
<a href="#">Circuit Breaker CB1 Replacement</a>	<a href="#">12</a>
<a href="#">Circuit Breakers CB4, CB5 Replacement</a>	<a href="#">14</a>
<a href="#">Relay K1 Replacement</a>	<a href="#">15</a>
<a href="#">Relay K3 Replacement</a>	<a href="#">16</a>
<a href="#">Fuses F1, F2 Replacement</a>	<a href="#">17</a>
<a href="#">Transformer, T1 Replacement</a>	<a href="#">18</a>
<a href="#">Power Supplies (PS1 and PS2) Replacement</a>	<a href="#">19</a>
<a href="#">Line Filter Replacement</a>	<a href="#">21</a>

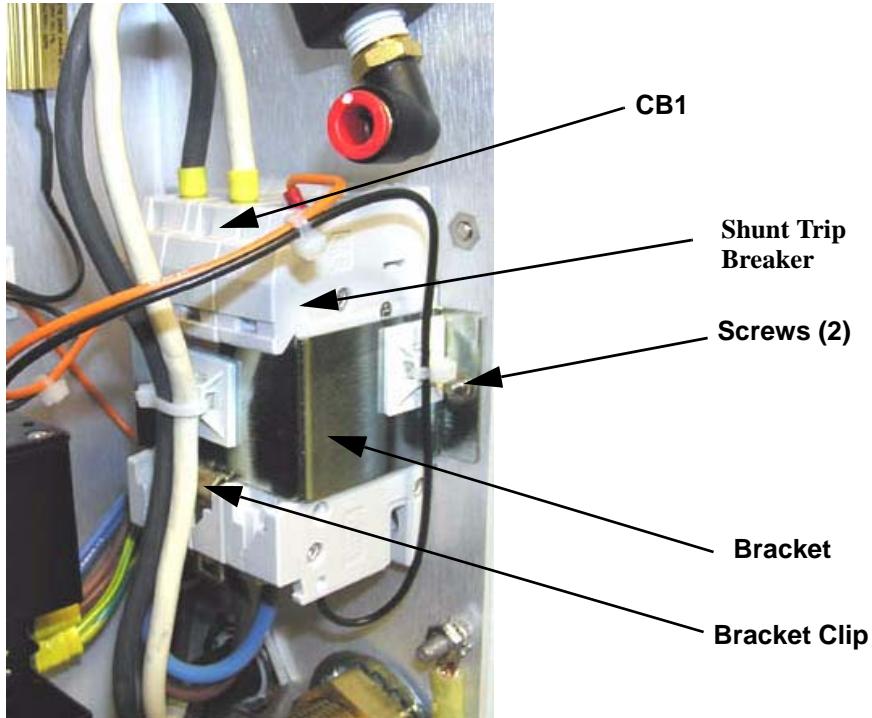
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## Circuit Breaker CB1 Replacement

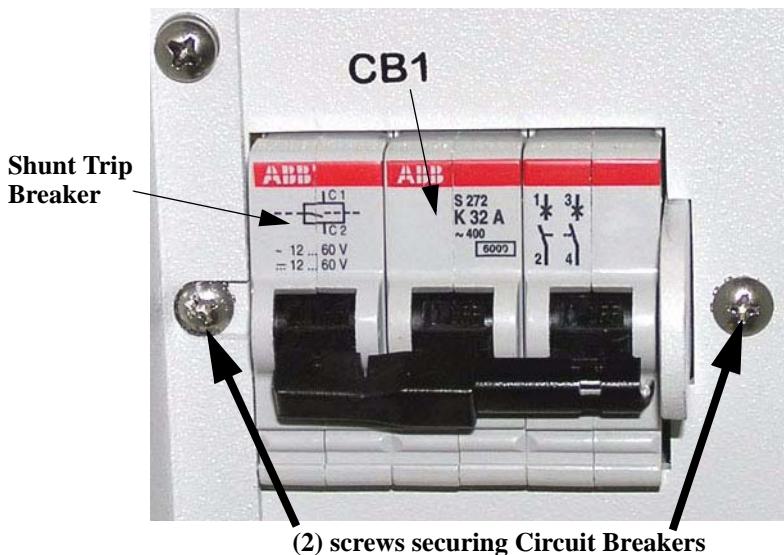
### Introduction

The following procedure gives instructions for removing and replacing the Circuit Breakers (CB1 and CB2).

### Circuit Breaker Detailed



LM02290\_819.jpg



LM02290\_820.jpg

### Procedure

To replace CB1 use P/N KK02740.

To replace the Shunt Trip Breaker, use P/N KK02750



## WARNING

WARNINGS 1,2,3,7,9 in Chapter 1 Safety.

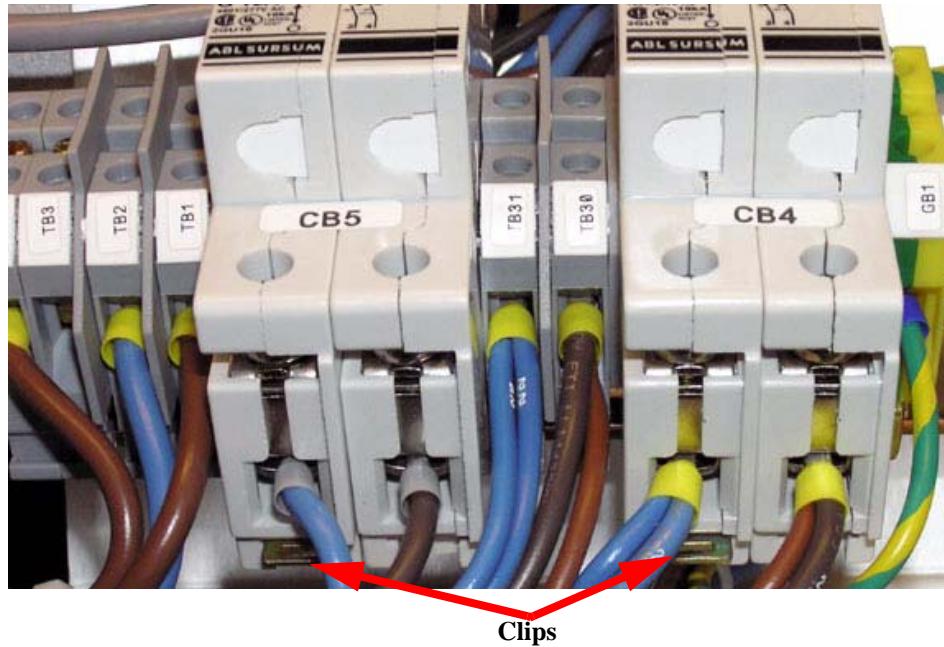
Step	Action
1	Turn off (power down) the <i>TP04300</i> , then disconnect power cord from facility power supply.
2	Mark and remove all electrical connections from the circuit breakers.
3	Remove the (2) screws securing the Circuit Breaker bracket to the frame.
4	Remove the bracket and circuit breakers as one assembly.
5	To remove the individual circuit breakers from the bracket, use a small screwdriver to unfasten the bracket clips.
6	Replace the circuit breaker.
7	Install the new circuit breaker in the reverse order of the above procedure.

## Circuit Breakers CB4, CB5 Replacement

### Introduction

The following procedure gives instructions for removing and replacing the Circuit Breakers (CB4, CB5) on the High Voltage Terminal Block.

### Circuit Breaker Bracket and Clips



LM01990\_808.JPG

### Procedure

To replace CB4 or CB5 use P/N KK01950.



### WARNING

**WARNINGS 1,2,3,7,9** in Chapter 1 Safety.

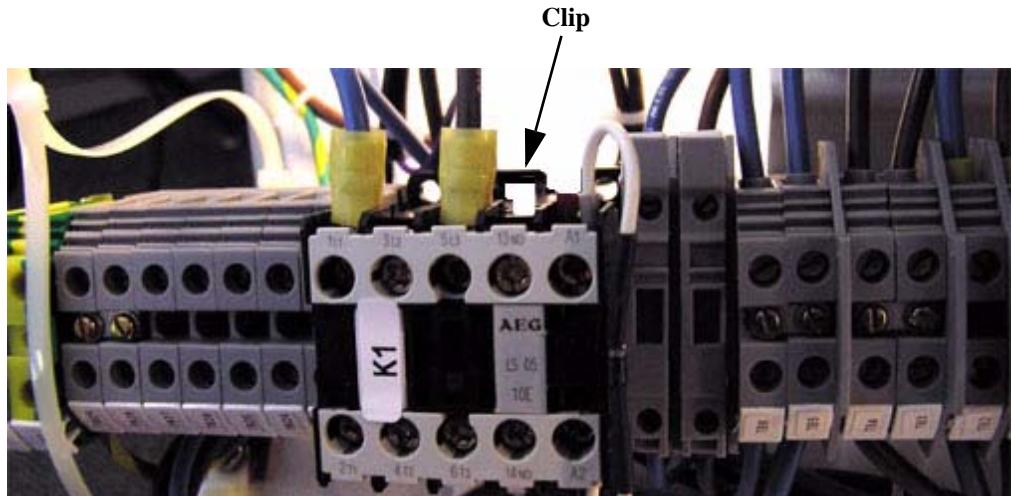
Step	Action
1	Turn off (power down) the TP04300, then disconnect power cord from facility power supply.
1	Mark and remove all electrical connections from the circuit breaker(s).
2	Using a small screwdriver, unfasten the clip(s) securing the Circuit Breaker(s) to the DIN rail.
3	Remove the circuit breakers.
4	Install the new circuit breaker in the reverse order of the above procedure.

## Relay K1 Replacement

### Introduction

The following procedure gives instructions for removing and replacing the Relays K1.

### K1 Removal Detailed



LM02290\_822.jpg

### Procedure

To replace K1, use P/N KK01980.



### WARNING

WARNINGS 1,2,3,7,9 in Chapter 1 Safety.

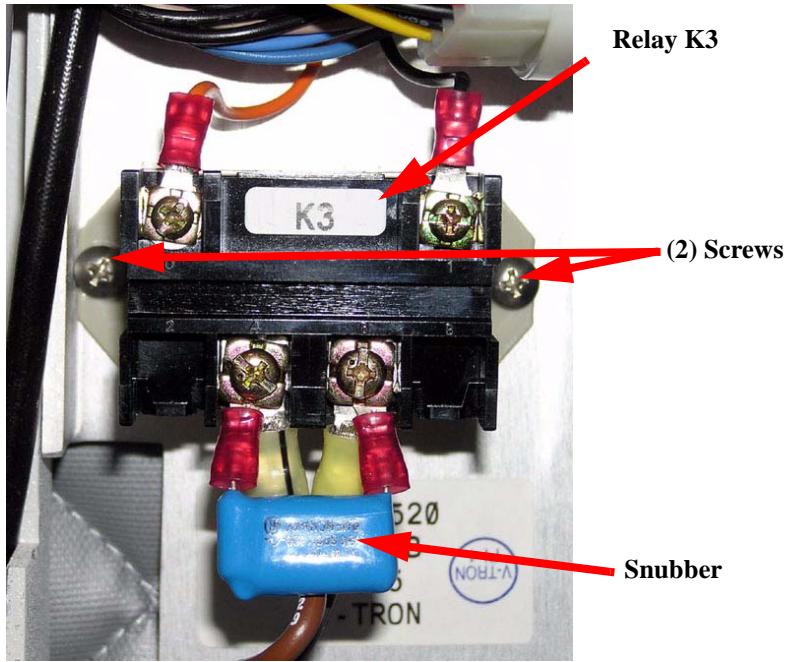
Step	Action
1	Turn off (power down) the TP04300, then disconnect power cord from facility power supply.
2	Locate K1 and make a note of its orientation on the High Voltage Terminal Block.
3	Mark and remove all electrical connections from the relay.
4	The relay is secured to the DIN rail by a clip. Use a small screwdriver to unfasten the clip from the DIN rail.
5	Remove the relay.
6	Install the new relay in the reverse order of the above procedure.

## Relay K3 Replacement

### Introduction

The following procedure gives instructions for removing and replacing Relay K3.

### Relay K3 Removal Detail



LM02290\_823.jpg

### Procedure

To replace K3, use P/N KK03050.

To replace the Snubber, use P/N ZZ10600



### WARNING

WARNINGS 1,2,3,7,9 in Chapter 1 Safety.

Step	Action
1	Turn off (power down) the <i>TP04300</i> , then disconnect power cord from facility power supply.
2	Make a note of the relay's orientation in the electrical shelf.
3	Remove (unsnap) the relay's snubber.
4	Identify and remove the electrical connections from the relay.
5	Loosen the (2) screws securing relay K3 to the frame.
6	Remove Relay K3.
7	Install the new relay and re-connect the electrical connections as noted in step 4.

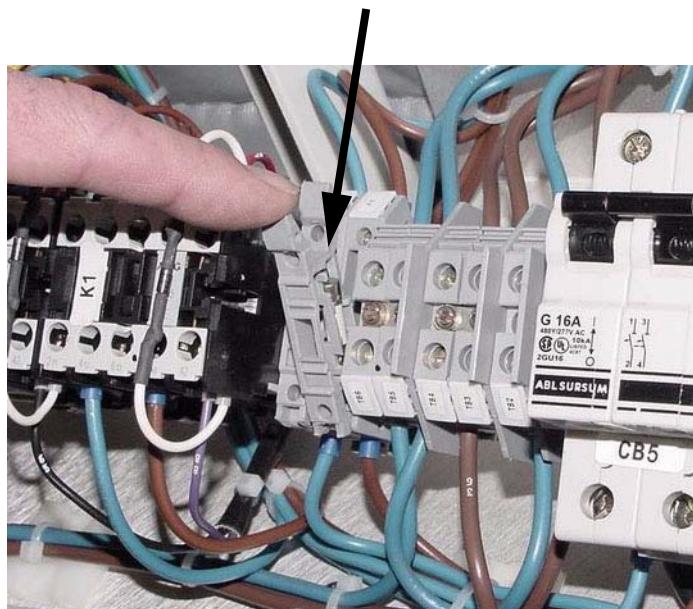
## Fuses F1, F2 Replacement

### Introduction

The following procedure gives instructions for removing and replacing the Fuses (F1, F2).

### Fuses Detail

#### Unfasten Clip from DIN Rail and Lift Fuse Holder



LM02290\_824.jpg

### Procedure

To replace F1 and F2, use P/N FF00420.

To Replace Fuse Holder, use P/N FH00120.



#### WARNING

WARNINGS 1,2,3,7,9 in Chapter 1 Safety.

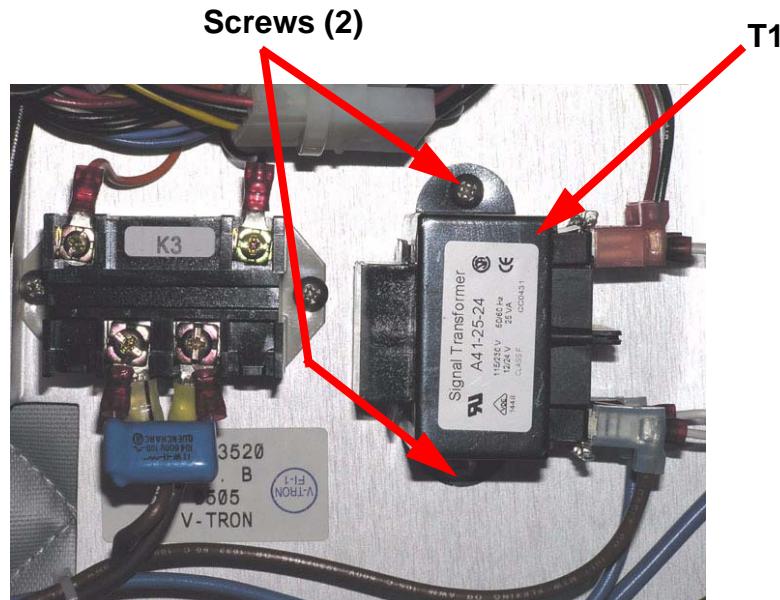
Step	Action
1	Turn off (power down) the <i>TP04300</i> , then disconnect power cord from facility power supply.
2	Locate the fuse you want to replace.
3	Press in on the fuse clip and rotate the fuse holder up.
4	To remove, gently push the fuse from the fuse holder.
5	Install the new fuse in the reverse order of the above procedure.

## Transformer, T1 Replacement

### Introduction

The following procedure gives instructions for removing and replacing Transformer T1.

### T1 Removal Detail



LM02290\_825.jpg

### Procedure

To replace T1, use P/N TT00280.



### WARNING

WARNINGS 1,2,3,7,9 in Chapter 1 Safety.

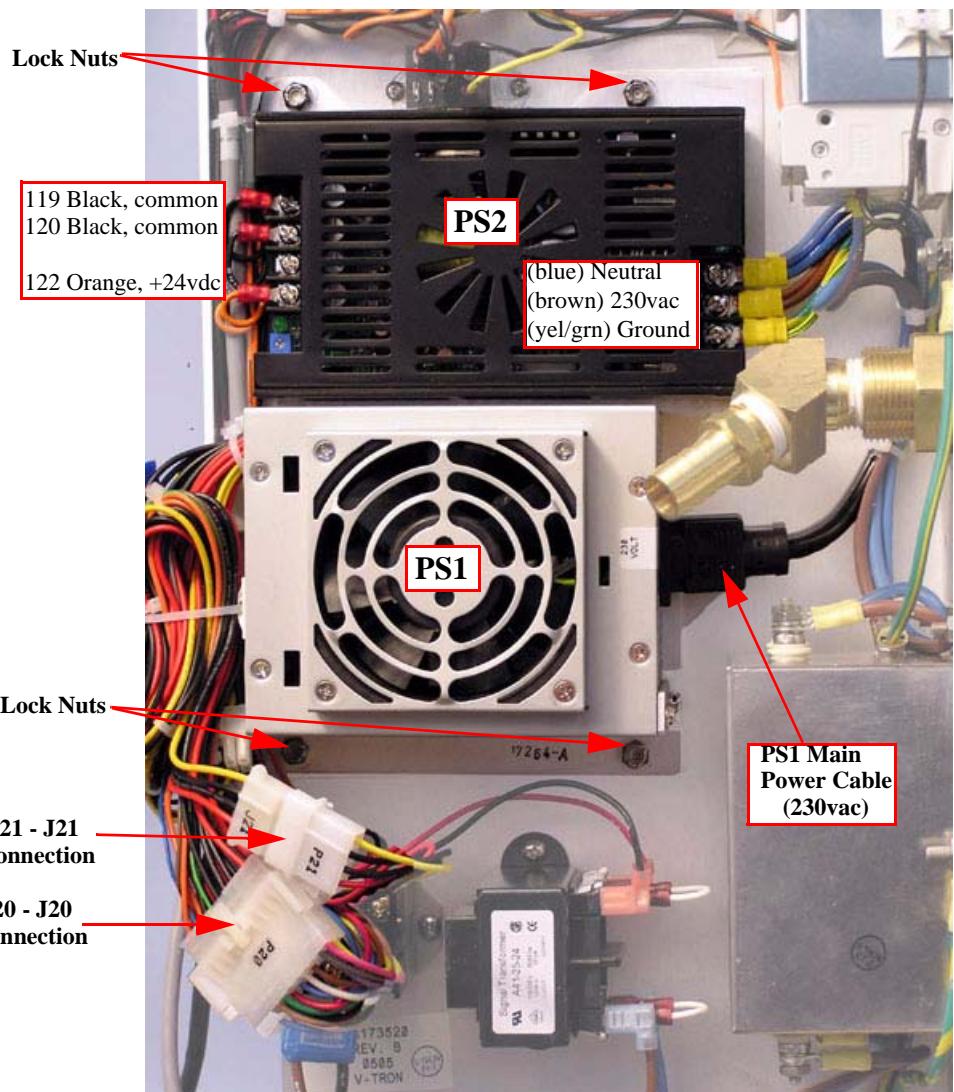
<b>Step</b>	Turn off (power down) the <i>TP04300</i> , then disconnect power cord from facility power supply.
1	Make a note of the transformer's orientation on the electrical shelf.
2	Label and remove the electrical connections from the transformer.
3	Loosen the (2) screws securing relay T1 to the panel.
4	Remove Transformer T1.
5	Install the new transformer and re-connect the electrical connections as noted in step 3.

## Power Supplies (PS1 and PS2) Replacement

### Introduction

The following procedure gives instructions for removing and replacing the Power Supplies.

### Power Supply Replacement Detailed



LM02290\_826.jpg

### Procedure

To replace the Power Supply 1(PS1), use P/N PS00610.

To replace the Power Supply 2(PS2), use P/N PS00620.



## WARNING

**WARNINGS 1,2,3,7,9** in Chapter 1 Safety.

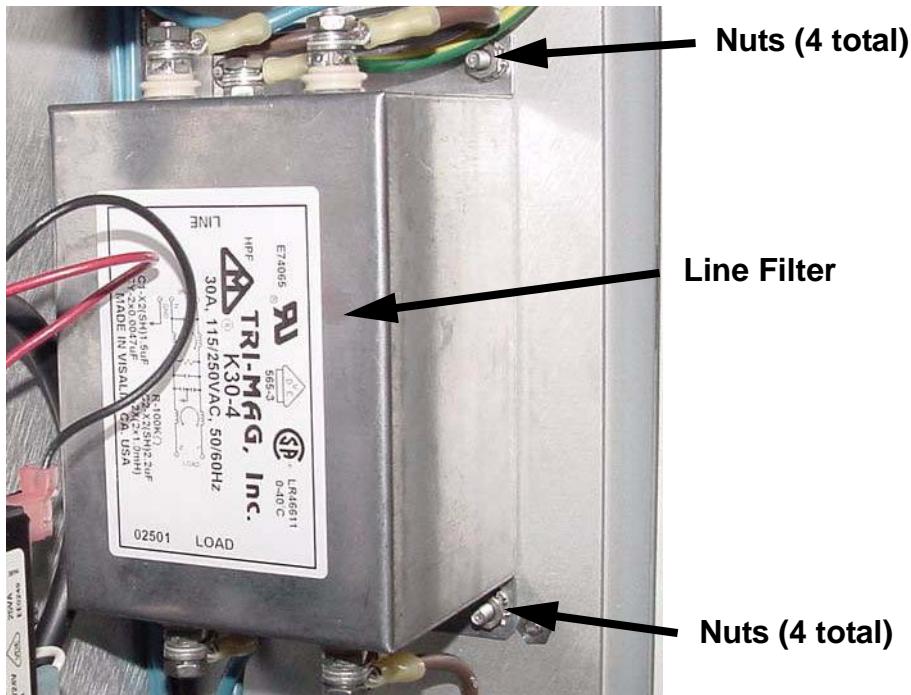
Step	Action
1	Turn off (power down) the <i>TP04300</i> , then disconnect power cord from facility power supply.
2	Make a note of each Power Supply's orientation on the electrical shelf.
3	On Power Supply 2, label and disconnect the following wires: <ul style="list-style-type: none"> <li>• (blue) Neutral wire</li> <li>• (brown) 230vac wire</li> <li>• (yellow/green) Ground wire</li> <li>• (black) #119, common wire</li> <li>• (black) #120, common wire</li> <li>• (orange) #122, +24vdc wire</li> </ul> <p><b>NOTE:</b> Cut tie wraps as needed</p>
4	On Power Supply 1, label and disconnect the following: <ul style="list-style-type: none"> <li>• the PS1 Main Power Cable</li> <li>• the P21 to J21 connection</li> <li>• the P20 to J20 connection</li> </ul> <p><b>NOTE:</b> Cut tie wraps as needed</p>
5	Remove the (4) Lock Nuts securing the Power Supplies and Mounting Plate to the electrical shelf.  Extract both power supplies and the mounting plate as one assembly.
6	Remove the (4) screws securing PS1 to the mounting plate.
7	Remove the (3) screws securing PS2 to the mounting plate.
8	Install the new power supply in the reverse order of the above procedure.

## Line Filter Replacement

### Introduction

The following procedure gives instructions for removing and replacing the Line Filter.

### Line Filter Removal Detail



LM01990\_816.JPG

### Procedure

To replace the Line Filter, use P/N ZZ08160.



### WARNING

**WARNINGS 1,2,3,7,9** in Chapter 1 Safety.

Step	Action
1	Turn off (power down) the TP04300, then disconnect power cord from facility power supply.
2	If needed, loosen the Line filter for easier access to the electrical connections. Use a nutdriver to loosen the (4) nuts securing the Line Filter to the frame.
3	Once accessible, identify and remove the electrical connections from the Line Filter.
4	Remove the Line Filter.
5	Install the new Line Filter and re-connect the electrical connections as noted in step 3.

## Section D: Parts List

---

PART (Description)	STOCK#, (P/Ns)
Circuit Breaker 1 (CB1)	KK02740
Shunt Trip Breaker	KK02750
Circuit Breaker 4 (CB4)	KK01950
Circuit Breaker 5 (CB5)	KK01950
Power Supply 1 (PS1)	PS00610
Power Supply 2 (PS2)	PS00620
Line Filter	ZZ08160
Transformer (T1)	TT00280
Auto Transformer (T2)	SA149260
Relay K1	KK01980
Fuses (F1 and F2)	FF00420
Fuse Holders	FH00120
Relay K1	KK01980
Relay K3	KK03050
Snubber	ZZ10600
Relay K6	KK02710
Relay K8	KK03060
Resistor (5 Ohm)	RR01370
Fly-Back Diode	SA149100

---



# Air Dryer Module

## Chapter Overview

### Introduction

The Air Dryer:

- is a heatless desiccant device
- is fully integrated into the system (at the factory)
- includes inlet/outlet air hoses and all related interconnection fittings
- enables frost free operation at low temperatures
- can dry facility air supply inflows which contain excessive moisture
- does not require any calibration
- issues a quiet “whoosh” from the muffler exhaust once every 60 to 90 seconds

The Air Dryer consists of two desiccant towers, with associated valves, and an exhaust muffler. A post air filter is added to the Air Dryer to prevent desiccant particles from entering the air path.

A solid-state timer controls three solenoid valves, which control the switching air flows between the two desiccant towers in a self-regenerative type of operation.

### In this Chapter

This Chapter is divided into the following Sections:

Topic	See Page
Parts Pictorial	2
Repair	7
Parts List	19

# Section A: Parts Pictorial

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## Section Overview

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### In this Section

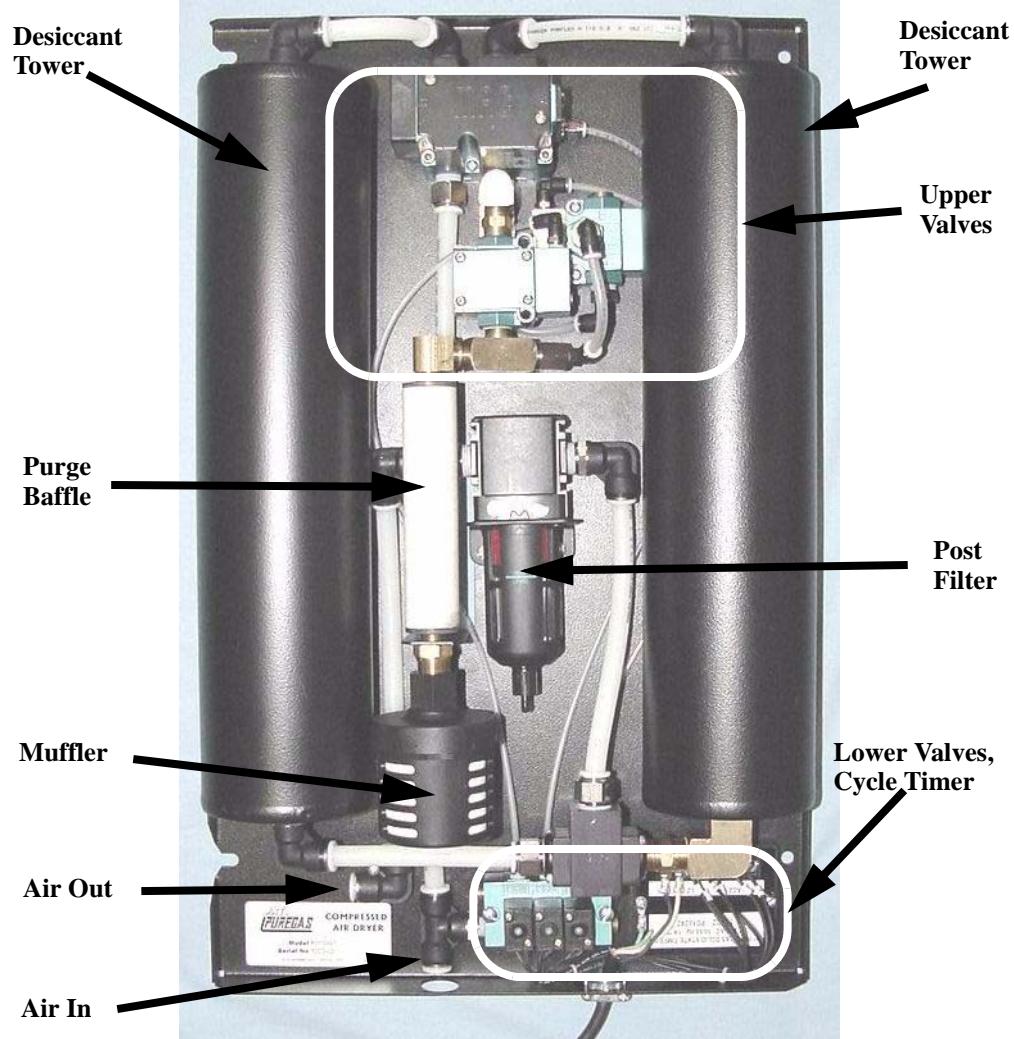
The following topics are covered in this Section:

Topic	See Page
Air Dryer Assembly, Full View	3
Air Dryer: Upper Valves	5
Air Dryer: Lower Valves, Cycle Timer	6

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## Air Dryer Assembly, Full View

### Air Dryer Assembly



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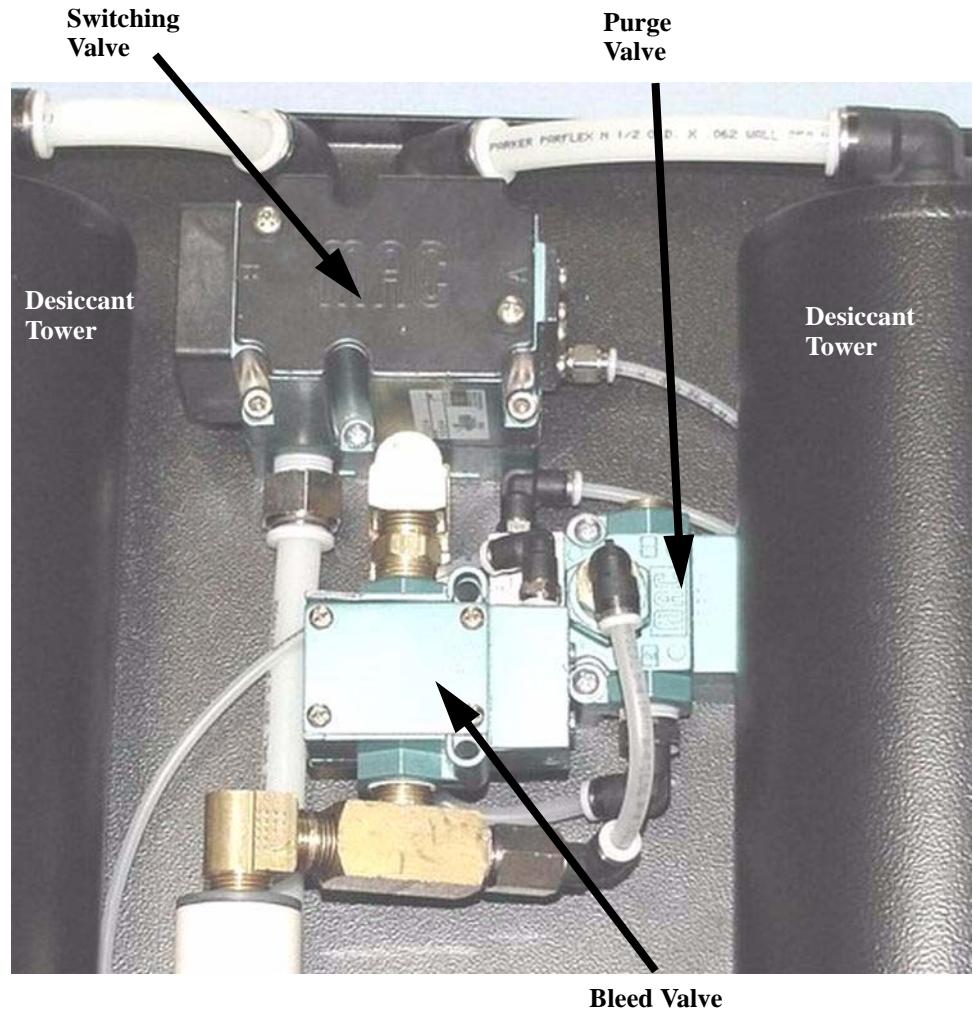
### Descriptions

PART	DESCRIPTION
Desiccant Tower	Remove moisture and particulate matter from supplied air. P/N ZZ10140
Upper Valves	Consists of the Switching Valve, Bleed Valve, and Purge Valve. For greater detail, see <a href="#">Air Dryer: Upper Valves</a> in this Section.
Purge Baffle	A PVC tube that muffles and routes purged air to the Muffler. P/N ZZ10130

PART	DESCRIPTION
Post Filter	Removes particulate matter and desiccant from the air supply. P/N ZZ10100
Muffler	Muffles the exhaust noise of purged air. P/N ZZ09300
Lower Valves, Cycle Timer	Cycle Timer and (3) Pilot Valves. For Greater Detail, see <a href="#">Air Dryer: Lower Valves, Cycle Timer</a> in this Section.
Air Out	Air OUT to the Main Flow Valve assembly
Air In	Main air IN from facility air supply and filters.

## Air Dryer: Upper Valves

### Upper Valves



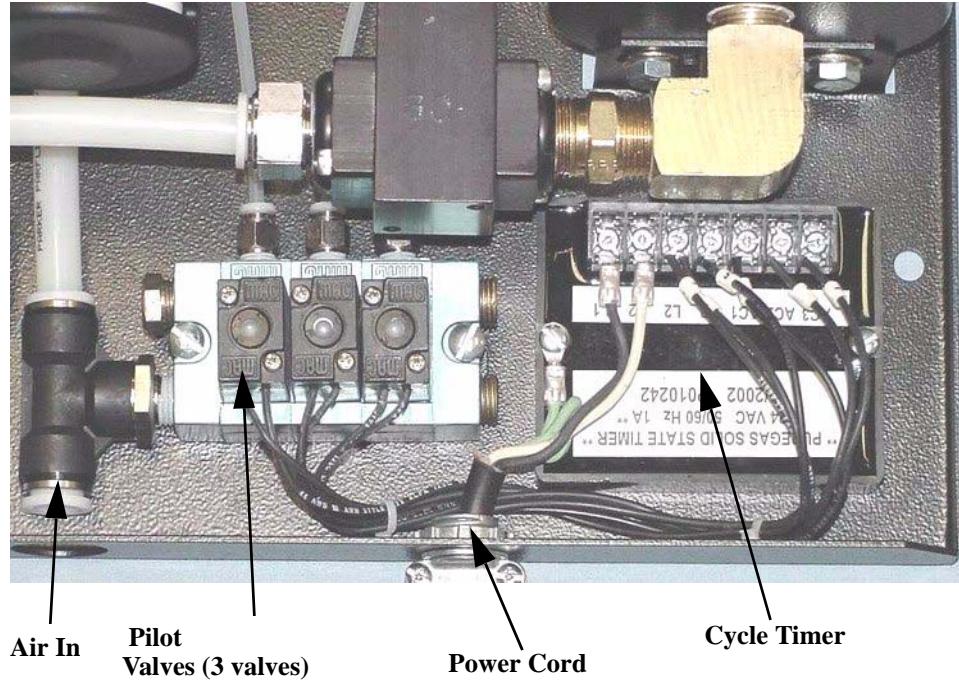
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### Descriptions

PART	DESCRIPTION
Switching Valve	Redirects the inlet air between each Desiccant Tower. P/N VA00650
Purge Valve	Opens to allow the exhaust of purged air from the Desiccant Tower. P/N VA00630
Bleed Valve	Opens to allow the alternating Desiccant Towers to regenerate. P/N VA00810

## Air Dryer: Lower Valves, Cycle Timer

### Upper Valves



LM01990\_903.JPG

### Descriptions

PART	DESCRIPTION
Air In	Main air IN from facility supply and filters.
Pilot Valves (3)	Control the Switching Valve, Bleed Valve, and Purge Valve. P/N KK02670
Power Cord	Main Power line for the Air Dryer.
Cycle Timer	A timer that controls the cycling of the Pilot Valves. P/N KK02680

## Section B: Repair

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### Section Overview

---

#### In this Section

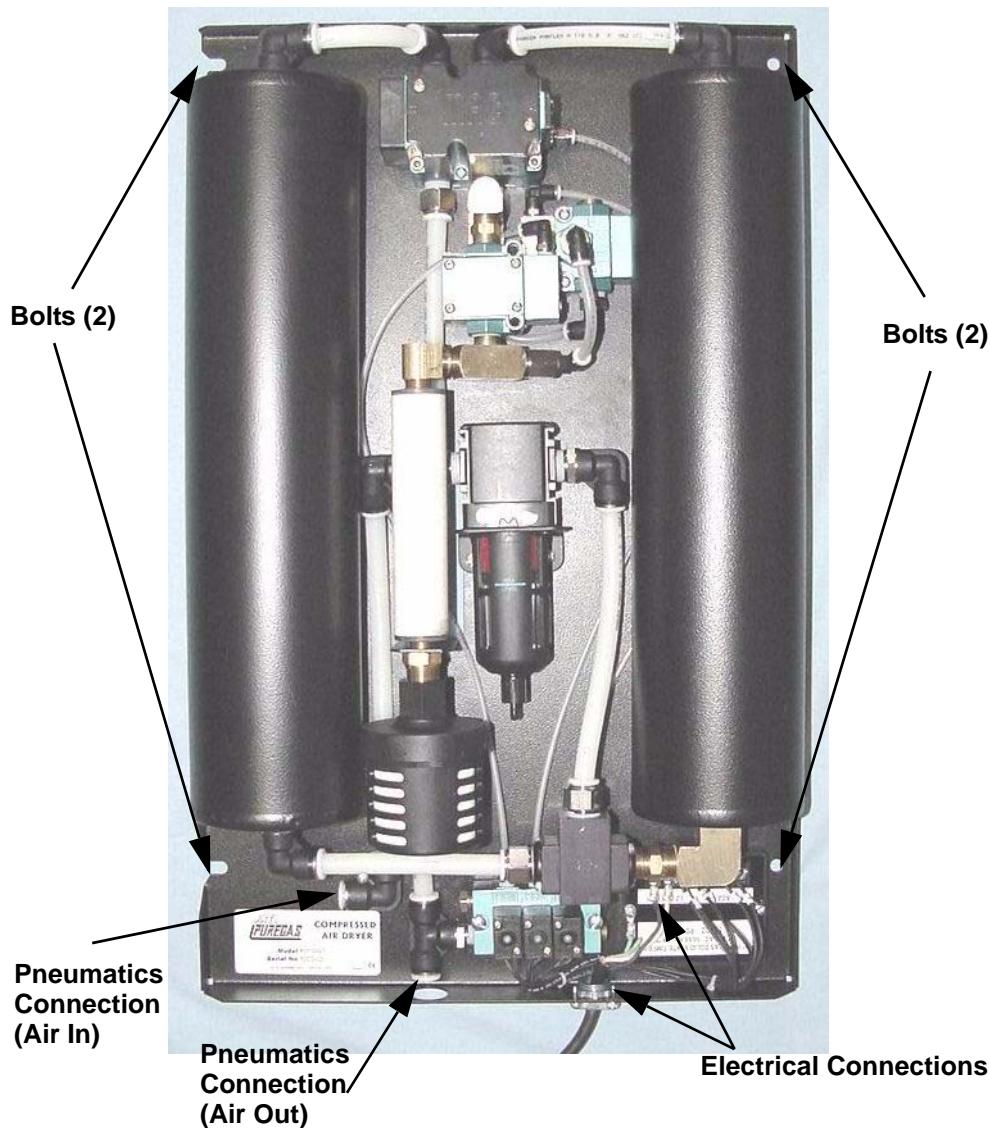
The following topics are covered in this Section:

Topic	See Page
<a href="#">Air Dryer Assembly Replacement</a>	8
<a href="#">Purge Baffle Replacement</a>	10
<a href="#">Switching Valve Replacement</a>	11
<a href="#">Pilot Valve Replacement</a>	12
<a href="#">Cycle Timer Replacement</a>	13
<a href="#">Bleed Valve Replacement</a>	15
<a href="#">Purge Valve Replacement</a>	16
<a href="#">Filter Replacement</a>	17
<a href="#">Muffler Replacement</a>	18

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## Air Dryer Assembly Replacement

### Air Dryer Assembly Replacement Detailed

**AIR DRYER ASSY. SHOWN REMOVED FROM TP04300**

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### Procedure

To replace the Air Dryer Assembly, use P/N ZZ9470.

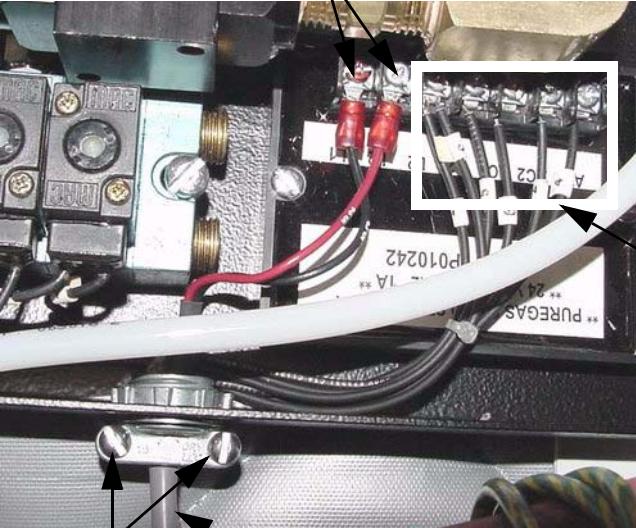


### **WARNING**

WARNINGS 1, 2, 3, 8, 9 in Chapter 1, Safety.

<b>Step</b>	<b>Action</b>
1	Power down the <i>TP04300</i> and disconnect power cord.
2	Disconnect the facility air supply from the <i>TP04300</i> .
3	Disconnect the Pneumatics Connections (Air In and Air Out).
4	Remove the electrical connections as follows:
<b>Step</b>	<b>Action</b>
a	Disconnect the Power Connections (2) on the Cycle Timer. <b>NOTE:</b> older models may also have a grounding connection to remove.
b	Remove the (2) Screws securing the Power In line to the Air Dryer.
c	Remove the power connections from the Air Dryer.

**Power Connections (2)**



**Cycle Timer Connections (Do Not Remove)**

**(2) Screws**

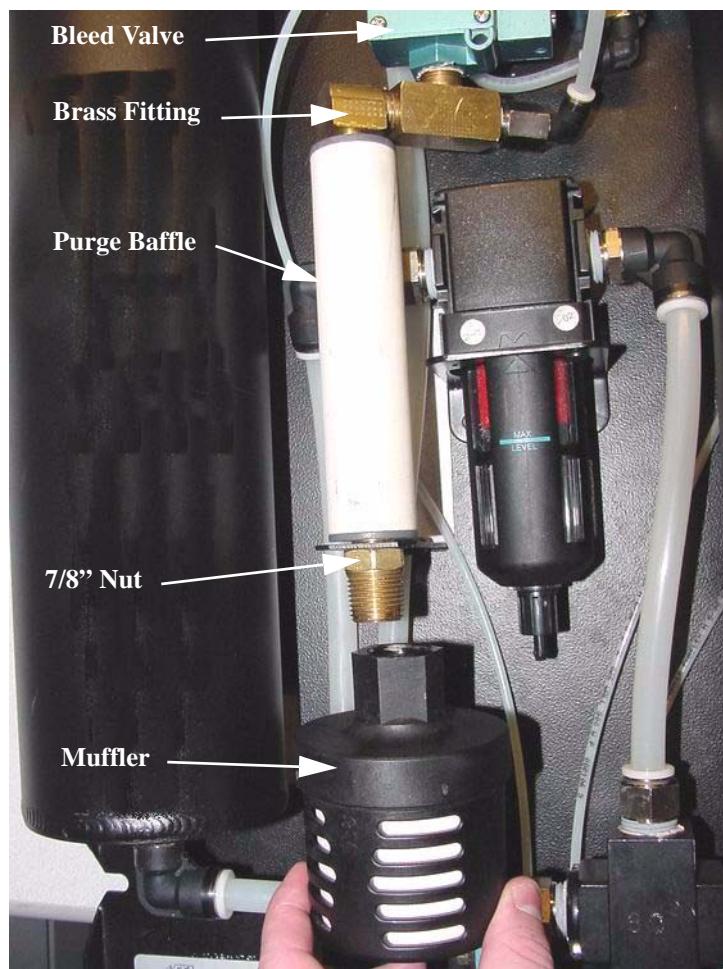
**Power In (To Air Dryer)**

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5	With the pneumatics and electrical connections removed, Unfasten the (4) bolts securing the Air Dryer Assembly to the frame.
6	Carefully remove the Air Dryer Assembly.
7	Install the new assembly in the reverse order of the above procedure.

## Purge Baffle Replacement

### Purge Baffle Replacement Detailed



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### Procedure

To replace the Purge Baffle, use P/N ZZ10130.



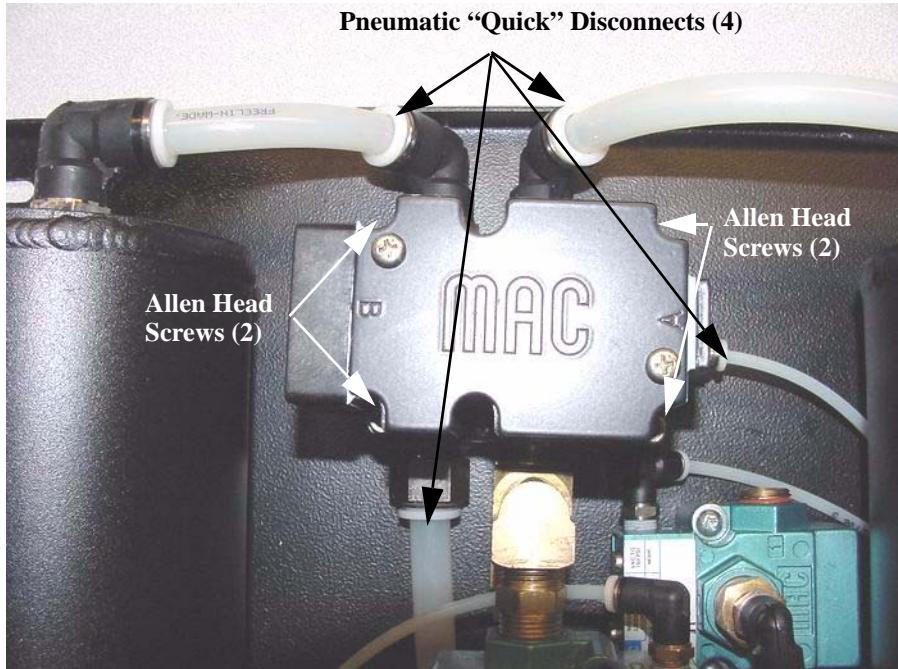
### WARNING

**WARNINGS 1, 2, 3, 8, 9** in Chapter 1, Safety.

Step	Action
1	Power down the <i>TP04300</i> and disconnect power cord.
2	Disconnect the facility air supply from the <i>TP04300</i> .
3	Remove the Muffler from the bottom of the Purge Baffle.
4	Remove the 7/8" nut from the bottom of the Purge baffle.
5	On the top of the Purge Baffle, Unscrew the Purge Baffle from the brass fitting.
6	Install the new Purge Baffle in the reverse order of the above procedure.

## Switching Valve Replacement

### Switching Valve Replacement Detailed



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### Procedure

To replace the Switching Valve, use P/N VA00650.



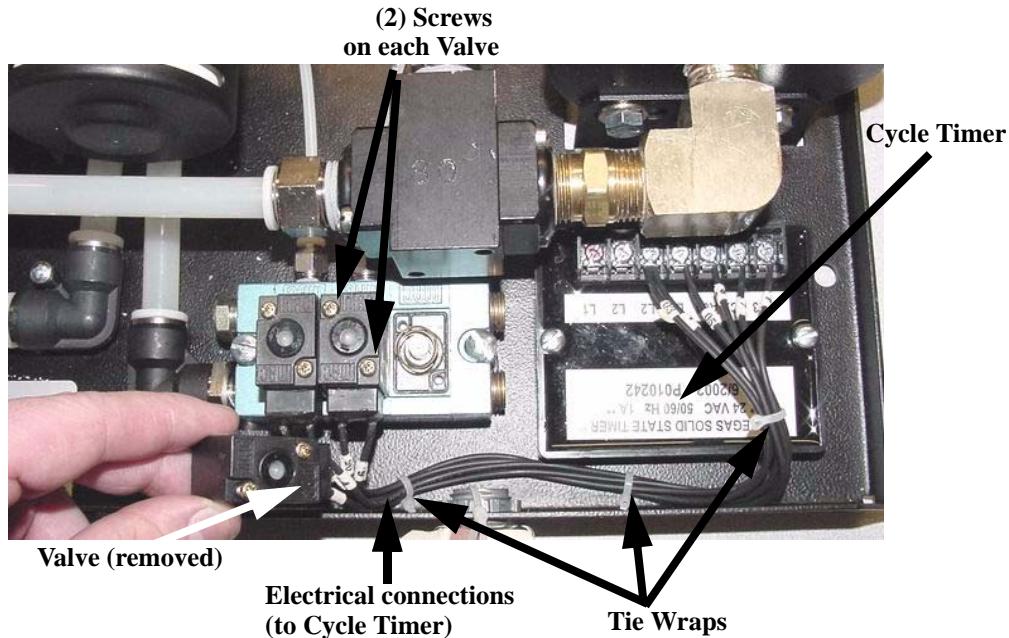
### WARNING

**WARNINGS 1, 2, 3, 8, 9** in Chapter 1, Safety.

Step	Action
1	Power down the <i>TP04300</i> and disconnect power cord.
2	Disconnect the facility air supply from the <i>TP04300</i> .
3	Disconnect the (4) Pneumatics lines ("Quick" disconnects).
4	Remove the (4) Allen Head screws securing the valve to the frame.
5	Remove the valve.
6	Replace in the reverse order of the above procedure.

## Pilot Valve Replacement

### Pilot Valve Replacement Detailed



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### Procedure

To replace the Pilot Valve, use P/N KK02670.



### WARNING

WARNINGS 1, 2, 3, 8, 9 in Chapter 1, Safety.

Step	Action
1	Power down the <i>TP04300</i> and disconnect power cord.
2	Disconnect the facility air supply from the <i>TP04300</i> .
3	Cut the cable tie wraps on the valves' wiring.
4	Label and disconnect the electrical connections on the cycle timer.
5	Remove the (2) screws securing the Pilot Valve.
6	Remove the valve.
7	Install in the reverse order of the above procedure.

## Cycle Timer Replacement

### Cycle Timer Replacement Detailed



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### Procedure

To replace the Cycle Timer, use P/N KK02680.



### WARNING

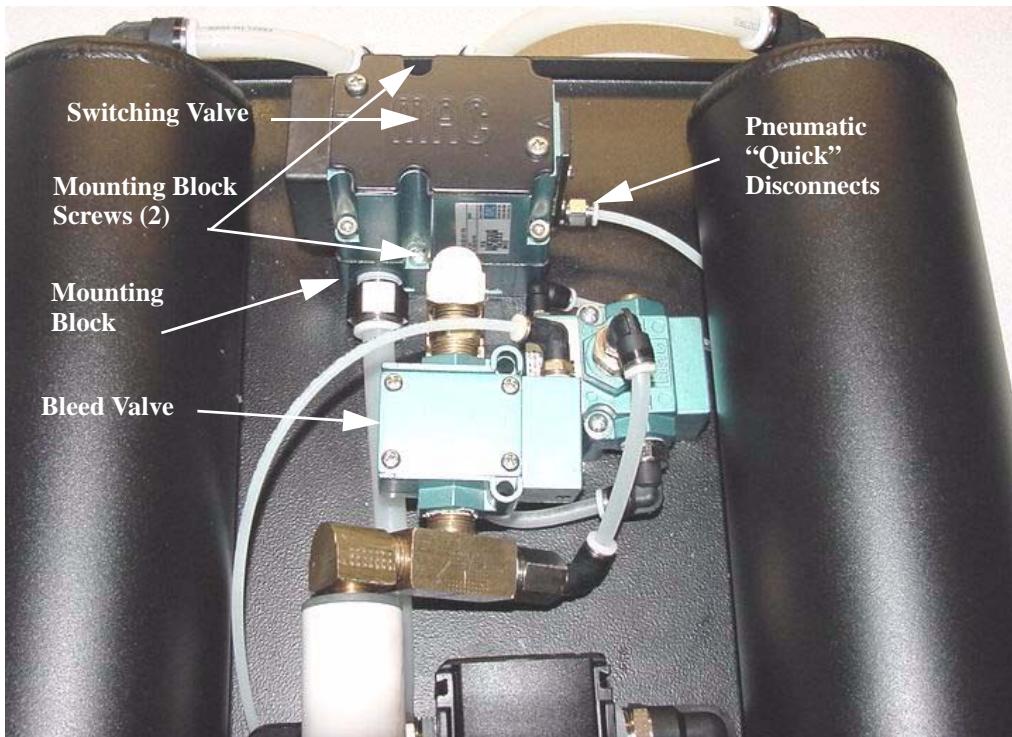
**WARNINGS 1, 2, 3, 8, 9** in Chapter 1, Safety.

Step	Action
1	Power down the <i>TP04300</i> and disconnect power cord.
2	Disconnect the facility air supply from the <i>TP04300</i> .
3	Disconnect the Pneumatics Connections (Air In and Air Out).
4	Mark and remove all the Pilot Valve and Main electrical connections. The connections from RIGHT to LEFT are as follows: AC3: pilot valve wire 4 AC2: pilot valve wire 2 AC1: pilot valve wire 6 L2: pilot valve wire 5 L2: pilot valve wire 1 and wire 3 L2: Main power to Air Dryer L1: Main power to Air Dryer

Step	Action
5	Remove the (2) screws securing the Cycle Timer to the frame.
6	Remove the Cycle Timer.
7	Install in the reverse order of the above procedure.

## Bleed Valve Replacement

### Bleed Valve Replacement Detailed



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### Procedure

To replace the Bleed Valve, use P/N VA00810.



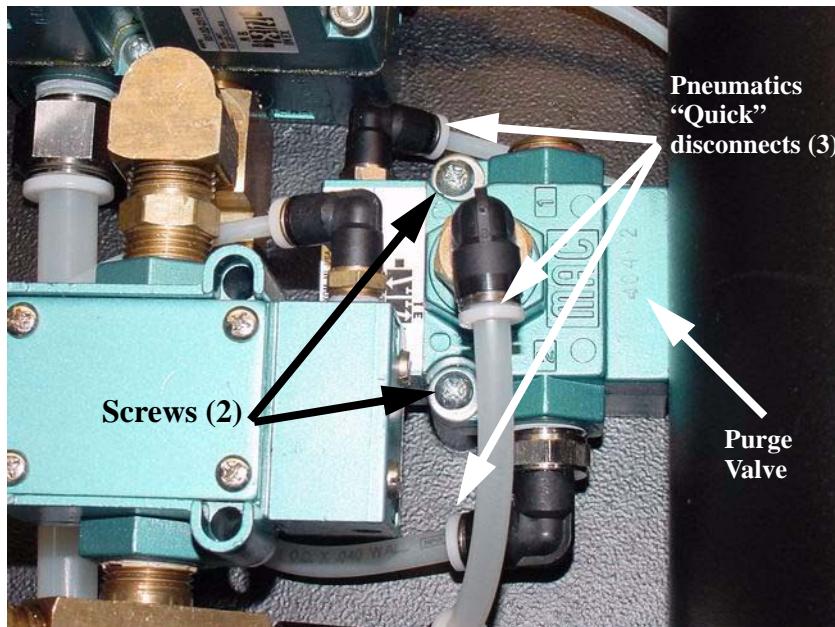
### WARNING

WARNINGS 1, 2, 3, 8, 9 in Chapter 1, Safety.

Step	Action
1	Power down the <i>TP04300</i> and disconnect power cord.
2	Disconnect the facility air supply from the <i>TP04300</i> .
3	Remove the Purge Baffle. See <a href="#">Purge Baffle Replacement</a> in this Section as needed.
4	Disconnect all Pneumatic "Quick" Disconnects from the Switching Valve and the Bleed Valve.
5	Remove the (2) Screws securing the Mounting Block to the frame.
6	Remove the Mounting Block, Switching Valve, and Bleed Valve as one assemble.
7	Disconnect the Bleed Valve from the bras fittings.
8	Install the new Bleed Valve in the reverse order of the above procedure.

## Purge Valve Replacement

### Purge Valve Replacement Detailed



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### Procedure

To replace the Purge Valve, use P/N VA00630.



### WARNING

WARNINGS 1, 2, 3, 8, 9 in Chapter 1, Safety.

Step	Action
1	Power down the <i>TP04300</i> and disconnect power cord.
2	Disconnect the facility air supply from the <i>TP04300</i> .
3	Disconnect the Pneumatics Connections (Air In and Air Out).
4	Disconnect the (3) Pneumatics lines ("Quick" disconnects).
5	Remove the (2) screws securing the valve to the frame.
6	Remove the valve.
7	Install the new valve in the reverse order of the above procedure.

## Filter Replacement

### Procedure

To replace the Filter, use P/N ZZ10110.



### WARNING

**WARNINGS 1, 2, 3, 8, 9** in Chapter 1, Safety.

Step	Action
1	Power down the <i>TP04300</i> and disconnect power cord.
2	Disconnect the facility air supply from the <i>TP04300</i> .
3	On the filter housing, push up, turn 1/4 turn counterclockwise, and then pull down. This will remove the housing and expose the filter element (red).
4	Unscrew the filter element.
5	Replace in the reverse order.

## Muffler Replacement

### Procedure

To replace the Muffler, use P/N ZZ09300.



### WARNING

**WARNINGS 1, 2, 3, 8, 9** in Chapter 1, Safety.

Step	Action
1	Power down the <i>TP04300</i> and disconnect power cord.
2	Disconnect the facility air supply from the <i>TP04300</i> .
3	Locate the faulty Air Muffler.
4	Unscrew by hand and discard the Muffler.
5	Screw in the new Muffler. Hand tighten. DO NOT over tighten.

## Section C: Parts List

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PART (Description)	STOCK#, (P/Ns)
Air Dryer Assembly	ZZ9470
Purge Baffle	ZZ10130
Pilot Valve	KK02670
Switching Valve	VA00650
Bleed Valve	VA00810
Purge Valve	VA00630
Post Filter	ZZ10110
Muffler	ZZ09300
Cycle Timer	KK02680

---





# Air Chiller Module

## Chapter Overview

### Introduction

The Air Chiller:

- cools the main air flow, down to the system's lowest setpoint limit
- contains a compressor, condenser, expansion device, and heat exchanger
- is a single compressor, mechanical refrigeration system (single stage vapor compression)
- uses a refrigerant mixture to achieve low output temperatures
- is contained in a rectangular cage of angle iron, mounted on a removable platform
- lower section is open to ventilate compressor and condenser
- upper section is a multi-tube copper coil heat-exchanger encased in foam insulation
- after a short compressor initialization (to stabilize refrigerants to maximum cold) the air chiller produces a continuous cold-flow air output
- compressor is hermetically sealed and lubricated for the life of the compressor
- air chiller does not require any calibration

Low temperature performance is effected by System configuration, input power voltage, and the temperature of the ambient operating environment.

### In this Chapter

This Chapter is divided into the following Sections:

Topic	See Page
Parts Pictorial	2
Repair	6
Parts List	22

# Section A: Parts Pictorial

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## Section Overview

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### In this Section

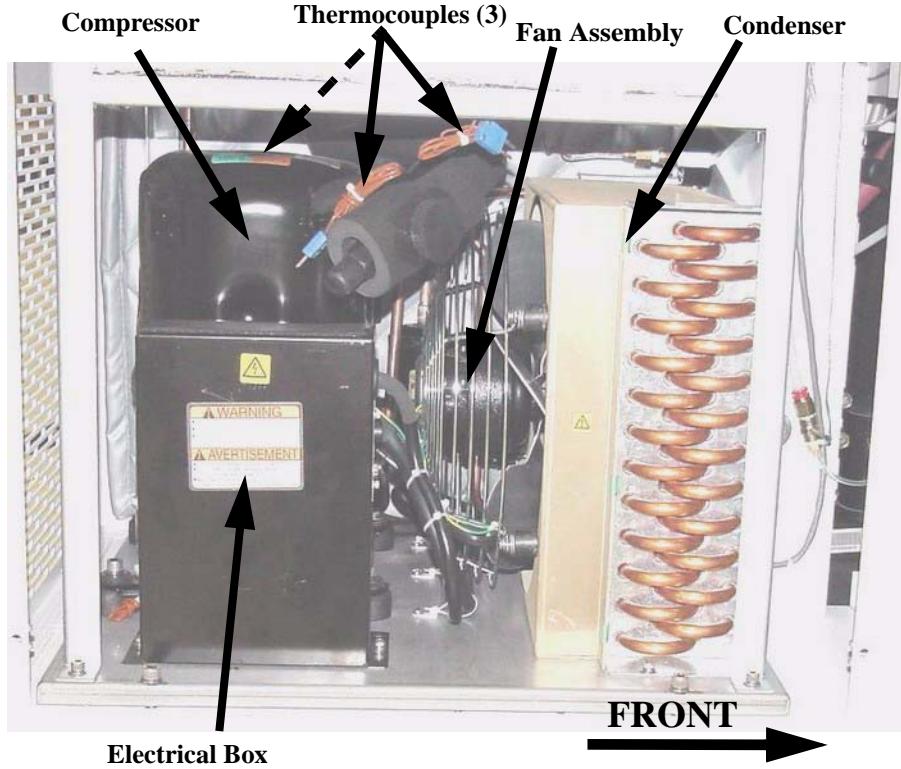
The following topics are covered in this Section:

Topic	See Page
Air Chiller, Left Side View	3
Air Chiller, Electrical Box	4

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## Air Chiller, Left Side View

### Chiller, Left Side



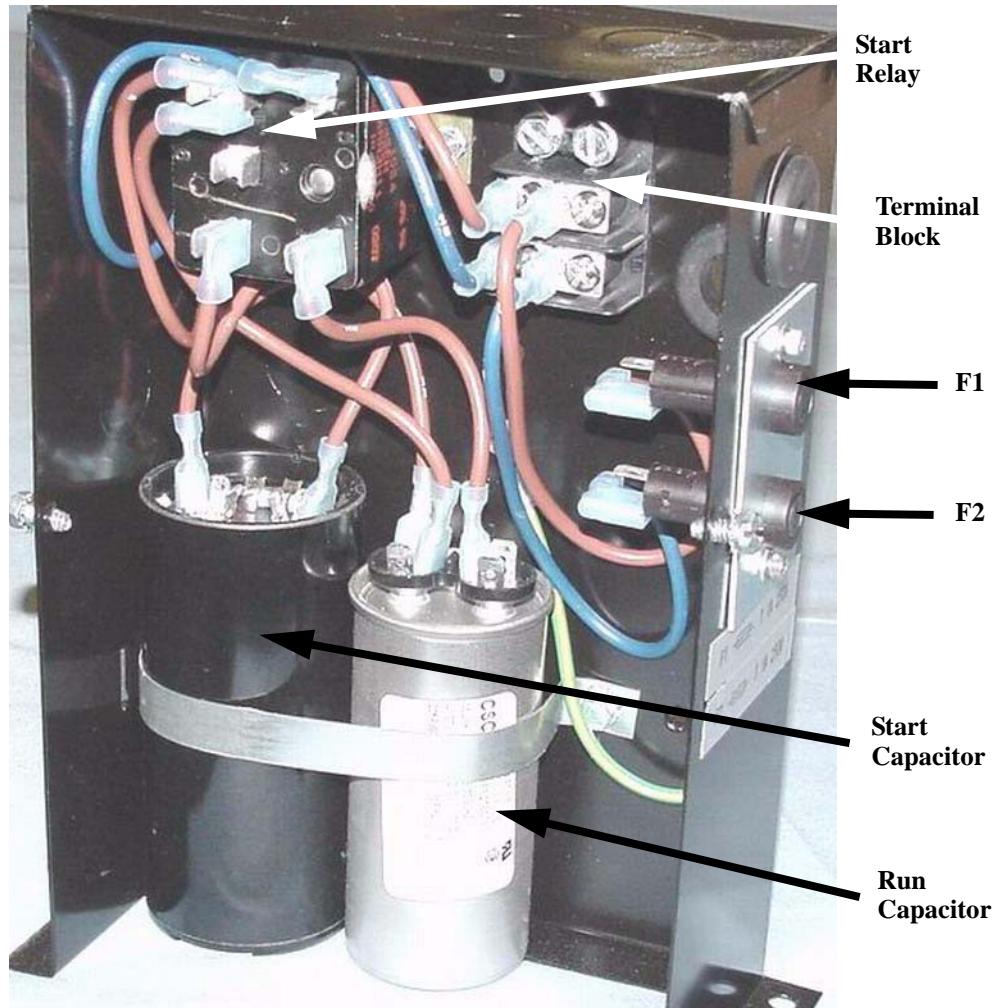
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### Descriptions

PART	DESCRIPTION
Compressor	The Air Chiller Module is equipped with either a 50 or a 60hz compressor that circulates the refrigerant. P/N ZZ09570, 50hz Compressor P/N ZZ09580, 60hz Compressor
Thermocouples	Three thermocouples can be used for diagnostics. They monitor temperature on the compressor suction line, the compressor discharge line, and the air out line.
Fan Assembly	The condenser Fan Assembly, circulates air from the front to back of the unit.
Condenser	An air cooled condenser for cooling and condensing the refrigerant. Air flows from the front to the back of the unit. P/N ZZ09580
Electrical Box	Houses the major electrical components for the Air chiller Module, including relays, fuses, and capacitors. For greater detail, see <a href="#">Air Chiller, Electrical Box</a> in this Section.

## Air Chiller, Electrical Box

**Electrical Box  
(Cover Removed)**



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### Descriptions

PART	DESCRIPTION
Start Relay	when energized, will start the compressor P/N ZZ09620, 50hz Electrical Kit P/N ZZ09790, 60hz Electrical Kit
Terminal Block	electrical connections for relay, fuses, and capacitors.
F1	a 1amp, 250v fuse for the fan P/N FF00450, Fuse P/N FF00180, Fuse Holder
F2	a 1amp, 250v fuse for the fan P/N FF00450, Fuse P/N FF00180, Fuse Holder

PART	DESCRIPTION
Start Capacitor	Compressor Start Capacitor P/N ZZ09620, 50hz Electrical Kit P/N ZZ09790, 60hz Electrical Kit
Run Capacitor	Compressor Run Capacitor P/N ZZ09620, 50hz Electrical Kit P/N ZZ09790, 60hz Electrical Kit

## Section B: Repair

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### Section Overview

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#### In this Section

The following topics are covered in this Section:

Topic	See Page
Refrigerant Charging Procedure	7
Air Chiller Module Replacement	9
Compressor Replacement	13
Filter Replacement	16
Fuse and Fuse Holder Replacement	18
Capacitor Replacement	19
Start Relay Replacement	21

---

## Refrigerant Charging Procedure

### Procedure



### **WARNING**

**WARNING 10:** If service of the Air Chiller Module is required, only a licensed (and/or EPA Certified) refrigeration service person, authorized by the Temptronic Corporation, is qualified to perform any charging or handling of the refrigerants in the System.

**WARNING 11:** Under no circumstances (leak testing or any other purpose) is the Air Chiller Module to be charged with any gas at a pressure above 150 psig (10.34 bar).

**WARNING 12:** The Air Chiller Module acts as a counterbalance for the Thermal Head Assembly. Before removing the Air Chiller Module, make sure the horizontal arm is down on the vertical C-arm at its lower limit, and the thermal head is in next to the horizontal arm and stowed toward the rear of the machine. Use appropriate weight lifting equipment when removing/servicing the Air Chiller module.

**WARNING 16:** Only use the coolants (heat transfer fluids) and refrigerants specified by the manufacturer: they are carefully engineered to be safe for operating personnel, to be friendly to the environment, to operate efficiently, and to not harm the equipment. Do not substitute unauthorized coolants and refrigerants, nor mix (add) in unauthorized coolants or refrigerants: doing so can cause warranties to be voided. Wear protective safety eye glasses, gloves, and apron when filling coolants and refrigerants. Temptronic assumes no liability for damages caused by use of unauthorized coolants and refrigerants.

To charge the system, use P/N CS168290 (HFC Refrigerant Blend):

Step	Action
1	<p>Connect the HFC Refrigerant Blend (P/N CS168290) cylinder to the refrigerant port of a 4-way manifold.</p> <ul style="list-style-type: none"> <li>• connect the vacuum port to the vacuum pump.</li> <li>• connect the low side port to the low side service access valve of the compressor.</li> <li>• connect the access control valve (P/N VA00090) to the end of the hose on the high side port of the manifold</li> <li>• connect the hose to the access service valve on the discharge line.</li> </ul> <p>The stem on the access control valve should be all the way out or backseated. The service valve on the low side of the compressor should be backseated.</p>
2	Evacuate manifold and all hoses.
3	Close the suction and vacuum ports on manifold.
4	Place the refrigerant cylinder upside down on top of the chiller assembly. frontseat (stem in) the access control valve and open the high side and refrigerant ports of the manifold.
5	Open refrigerant cylinder. Let refrigerant enter the high side of the system until the manifold gauge is balanced with the system gauge. approximately 5 minutes with a <b>balance reading between 60to 70psig</b> .
6	Backseat (stem out) access control valve.
7	Frontseat suction service valve and open low side port of manifold.

<b>Step</b>	<b>Action</b>
8	Plug in chiller to allow compressor to suck in remaining refrigerant from tank.
9	Monitor manifold gauges: <ul style="list-style-type: none"> <li>• close high side port of manifold when high side gauge reaches 0 psig (about 5 to 8 minutes).</li> <li>• when the suction gauge reads approximately 14 to 16 inches of mercury, close the low side port of manifold and the cylinder. (about 15 minutes)</li> </ul>
10	Turn off system.
11	Backseat suction service valve and then open 1 turn.
12	Turn system back on and monitor manifold suction gauge: <ul style="list-style-type: none"> <li>• gauge will approach 30 psig and hold there for a few seconds and then continue onto about 25 psig.</li> <li>• when suction pressure starts to rise backseat suction service valve.</li> <li>• feel the ends of the 3 cap tubes on coil. Refrigerant is flowing if they are getting cold.</li> </ul>
13	Turn off system. Remove manifold.
14	Install flare nut (P/N FG00150) and seal cap (FG00160) to the low and high side service valve.
15	System is now charged.

## Air Chiller Module Replacement

### Procedure

To remove and replace the Air Chiller Module:

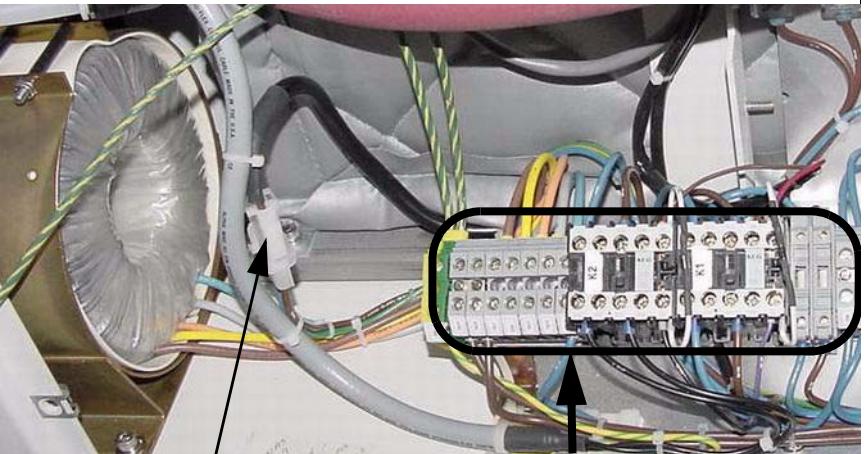
Use P/N SA145211, 50hz Air Chiller Assembly

Use P/N SA145210, 60hz Air Chiller Assembly



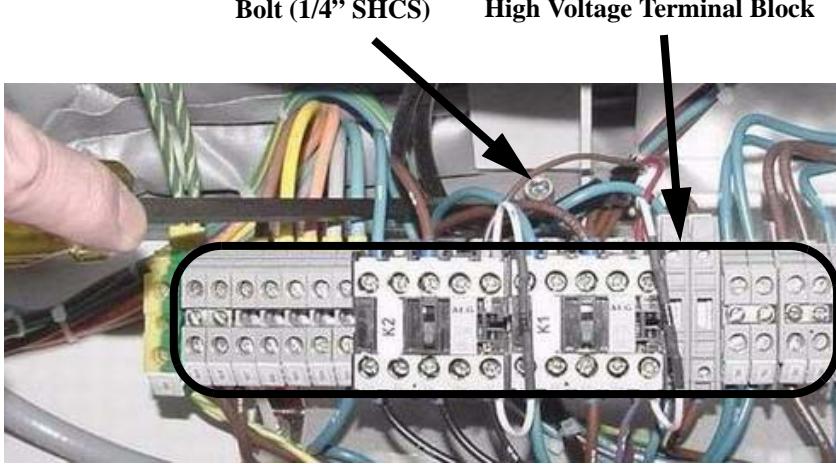
### WARNING

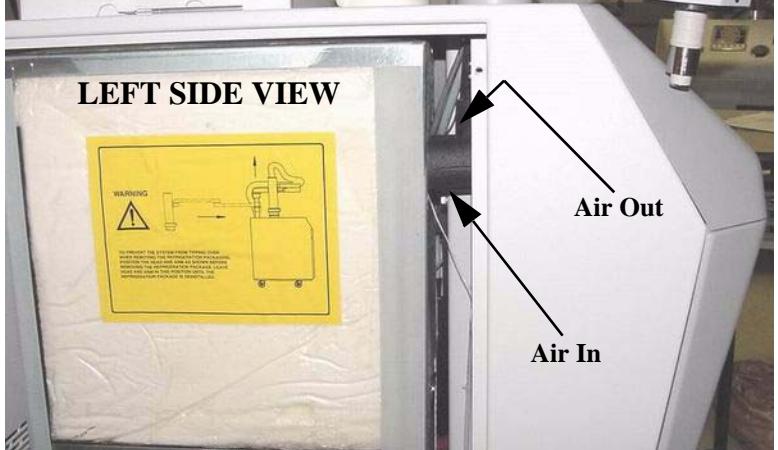
**WARNING 12:** The Air Chiller Module acts as a counterbalance for the Thermal Head Assembly. Before removing the Air Chiller Module, make sure the horizontal arm is down on the vertical C-arm at its lower limit, and the thermal head is in next to the horizontal arm and stowed toward the rear of the machine. Use appropriate weight lifting equipment when removing/servicing the Air Chiller module.

Step	Action
1	Turn off (power down) the <i>TP04300</i> , then disconnect power cord from facility power supply.
2	Remove left and right panels.
3	At the right side of the unit, disconnect the compressor power connector:   compressor power connector      High Voltage Terminal Block

LM01990\_1003.jpg

**10 AIR CHILLER MODULE**  
**Air Chiller Module Replacement**

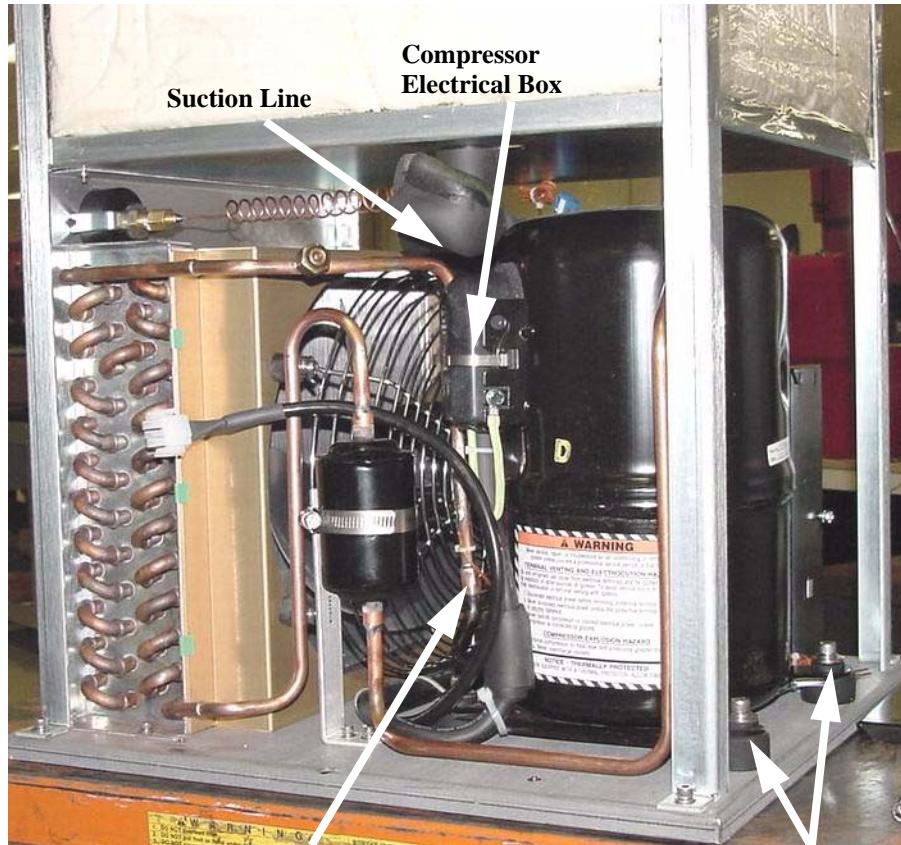
Step	Action
4	<p>At the right side of the unit, remove the bolt (1/4" SHCS) securing the Air Chiller Module to the unit's frame:</p> <div style="text-align: center; margin-top: 10px;">  </div> <p style="text-align: right;">LM01990_1004.jpg</p>
5	Unfasten the left side thermal blanket (fastened with Velcro).
6	<p>At the left side of the unit, remove the (2)bolts (1/4" SHCS) securing the Air Chiller Module to the unit's frame:</p> <div style="text-align: center; margin-top: 10px;">  </div> <p style="text-align: right;">LM01990_1005.jpg</p>

Step	Action
7	<p>Carefully remove the insulation from the Air In and Air Out lines:      NOTE: the insulation may be retained for use during installation of new Air Chiller Module.</p>  <p><b>LEFT SIDE VIEW</b></p> <p><b>Air Out</b></p> <p><b>Air In</b></p> <p style="text-align: right;">LM01990_1006.jpg</p>
8	<p>Using (2) 7/8" wrenches, disconnect the Air In line:</p>  <p><b>Air Out Line</b></p> <p><b>Air In Line (disconnected and insulation removed)</b></p> <p style="text-align: right;">LM01990_1007.jpg</p>

Step	Action
9	<p>Using (2) 7/8" wrenches, disconnect the Air Out line.</p> <p><b>CAUTION</b></p>  <p>when disconnecting the Air Out Line, DO NOT break the Static Ground Line.</p>
10	<p>Remove the Air Chiller Module as shown:</p> <p><b>CAUTION</b></p>  <p><b>CAUTION 7:</b> The weight of the Air Chiller Module is about 175 pounds (79.5 kg), and counterbalances (is used to stabilize) the System's frame when the thermal head is extended on the horizontal arm. If removing the Air Chiller module: a) be careful that the system remains stable (upright) after the module is removed, b) use appropriate weight lifting equipment when removing/servicing the Air Chiller module.</p>
11	 <p>LM01990_1008.jpg</p> <p>Install replacement Air Chiller Module in the reverse order of the above steps.</p>

## Compressor Replacement

Air Chiller Module,  
Right Side View



(4) 1/4" Allen Head Screws

LM01990\_1011.jpg

### Procedure

To replace the Compressor, use:

P/N ZZ09600 (50Hz Compressor)

P/N ZZ09570 (60Hz Compressor)

P/N ZZ09570 (Compressor Mounting Kit)



### **WARNING**

WARNINGS 1,2,3,7,9 in Chapter 1 Safety.

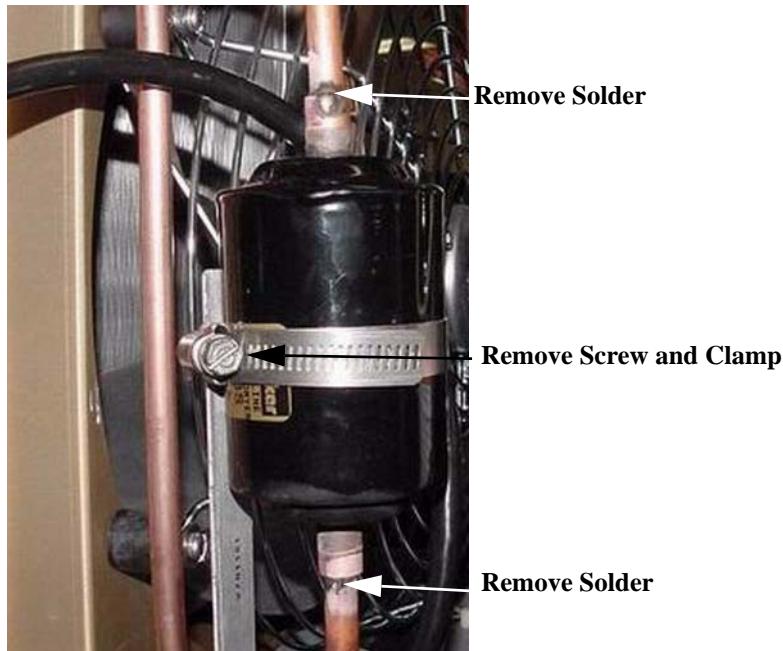
Step	Action
1	Turn off (power down) the TP04300, then disconnect power cord from facility power supply.

Step	Action				
2	Remove the Air Chiller Module from the <i>TP04300</i> . See <a href="#">Air Chiller Module Replacement</a> in this Section.				
3	Evacuate refrigerants from the system.				
	 <p><b>WARNING</b></p> <p><b>WARNING 10:</b> If service of the Air Chiller Module is required, only a licensed (and/or EPA Certified) refrigeration service person, authorized by the Temptronic Corporation, is qualified to perform any charging or handling of the refrigerants in the System.</p>				
4	<p>Remove the cover on the Compressor's electrical box and disconnect the (4) electrical connections (start, run, common, ground):</p> <p style="text-align: center;"><b>COMPRESSOR ELECTRICAL BOX (COVER REMOVED)</b></p> <table style="margin-left: auto; margin-right: auto;"> <tr> <td style="text-align: center;">Start (white)</td> <td style="text-align: center;">Common (black)</td> <td style="text-align: center;">Run (red)</td> <td style="text-align: center;">Ground (green/yellow)</td> </tr> </table>  <p style="text-align: right;">LM01990_1009.jpg</p>	Start (white)	Common (black)	Run (red)	Ground (green/yellow)
Start (white)	Common (black)	Run (red)	Ground (green/yellow)		
5	<p>Carefully remove the insulation and disconnect the compression fitting on the suction side of the compressor.</p> <p><b>NOTE:</b> The O-ring is crucial to sealing the compression fitting. Retain the O-ring for use in re-installation.</p>				

Step	Action
6	<p>Unsolder the joint on the Compressor's discharge line. Cut tie wraps and remove the thermocouple if needed.</p>  <p><b>Unsolder (discharge line)</b></p>
	LM01990_1010.jpg
7	Remove the (4) 1/4" Allen Head Screws securing the Compressor to the frame.
8	Remove the Compressor
9	Install the new Compressor in the reverse order of the above procedure.

## Filter Replacement

### Filter Replacement Detailed



LM01990\_1016.jpg

### Procedure

To replace the Filter use, P/N ZZ09480.



### WARNING

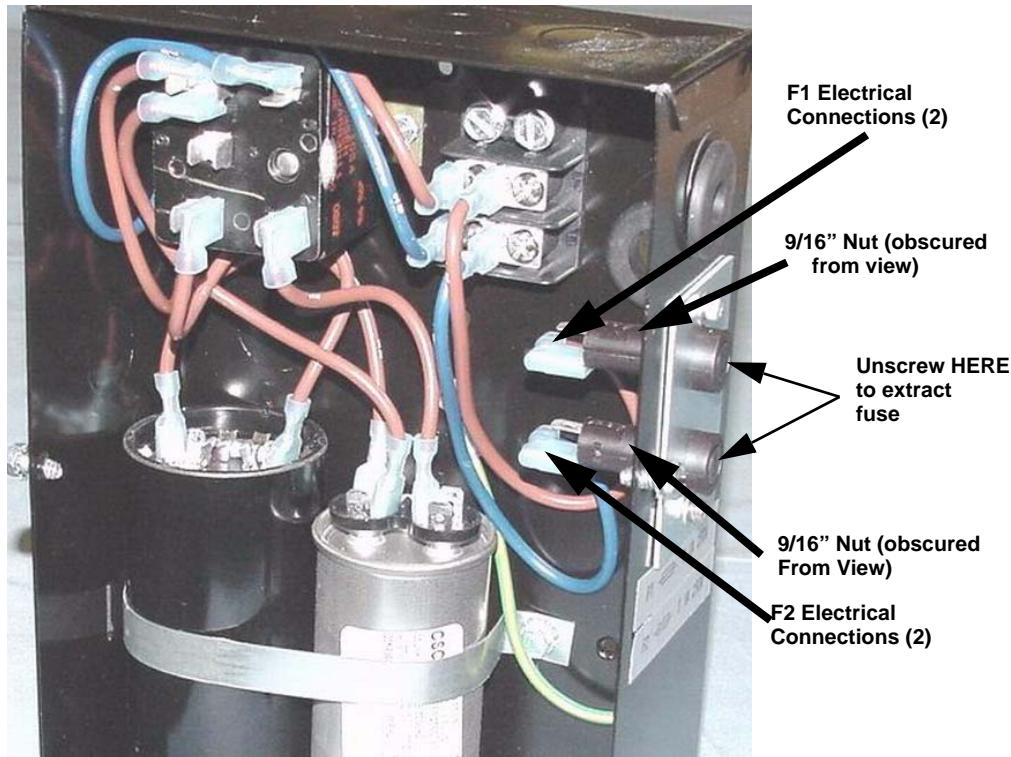
**WARNINGS 1,2,3,7,9** in Chapter 1 Safety.

Step	Action
1	Turn off (power down) the <i>TP04300</i> , then disconnect power cord from facility power supply.
2	Remove the Air Chiller Module from the <i>TP04300</i> . See <a href="#">Air Chiller Module Replacement</a> in this Section.
3	Evacuate refrigerants from the system.   <b>WARNING</b> <b>WARNING 10:</b> If service of the Air Chiller Module is required, only a licensed (and/or EPA Certified) refrigeration service person, authorized by the Tempronic Corporation, is qualified to perform any charging or handling of the refrigerants in the System.
4	Remove the Screw and Clamp securing the Filter to the mounting bracket.
5	Remove the (2) Solder Joints as shown above.
6	Remove the Filter.

Step	Action
7	Install the new Filter in the reverse order of the above procedure.

## Fuse and Fuse Holder Replacement

### Fuse Replacement Detailed



LM01990\_1002.JPG

### Procedure

To replace a Fuse, use P/N FF00450.

To replace the Fuse Holder, use P/N FH00180.



### WARNING

**WARNINGS 1,2,3,7,9** in Chapter 1 Safety.

Step	Action
1	Turn off (power down) the <i>TP04300</i> , then disconnect power cord from facility power supply.
2	To remove F1 or F2, use a screwdriver on the front of the Fuse Holder:
3	To remove the Fuse Holder: 1. Remove the Fuse. 2. Remove the (2) electrical connections 3. Unscrew the 9/16" nut
4	Install the new fuse/fuse holder in the reverse order of the above procedure.

## Capacitor Replacement

### Capacitor Replacement Detailed



LM01990\_1015.jpg

### Procedure

To replace a Capacitor, use:

P/N ZZ09620 (50Hz Electrical Kit)

P/N ZZ09790 (60 Hz Electrical Kit)



### WARNING

**WARNINGS 1,2,3,7,9** in Chapter 1 Safety.

Step	Action
1	Turn off (power down) the <i>TP04300</i> , then disconnect power cord from facility power supply.
2	Remove the 5/16" Nut and Clamp securing the Capacitors.
3	Mark and disconnect the electrical connections on the top of the Capacitor.

Step	Action
4	Remove the Capacitor.
5	Install the new Capacitor in the reverse order of the above procedure.

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## Start Relay Replacement

### Start Relay Replacement Detailed



LM01990\_102.jpg

### Procedure

To replace the Start Relay, use:

P/N ZZ09620 (50Hz Electrical Kit)

P/N ZZ09790 (60 Hz Electrical Kit)



### WARNING

WARNINGS 1,2,3,7,9 in Chapter 1 Safety.

Step	Action
1	Turn off (power down) the TP04300, then disconnect power cord from facility power supply.
2	Mark and remove all the electrical connections on the Relay.
3	Remove the (1) Screw securing the Relay to the Electrical box.
4	Remove the Relay.
5	Install the new Relay in the reverse order of the above procedure.

## Section C: Parts List

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PART (Description)	STOCK#, (P/Ns)
50Hz Air Chiller Assembly	SA145211
60Hz Air Chiller Assembly	SA145210
50hz Compressor	ZZ09570
60hz Compressor	ZZ09580
Compressor Mounting Kit	ZZ09570
Condenser	ZZ09580
50hz Electrical Kit	ZZ09620
60hz Electrical Kit	ZZ09790
Fuse F1	FF00450
Fuse F2	FF00450
Fuse Holder	FF00180
Filter	ZZ09480
HFC Refrigerant Blend	CS168290

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# Troubleshooting

## Chapter Overview

### Introduction

This Chapter details General Troubleshooting for the *TP04300*.

### In this Chapter

This Chapter is divided into the following Sections

Topic	See Page
Start Up Troubleshooting	2
Cooling Troubleshooting	4
Remote Communications Troubleshooting	6
Error Message: Controller Failure	8
Error Message AC Absent	9
Error Message Air Open Loop	10
Error Message Low Temp. Limit	12
Error Message High Temp. Limit	13
Error Message Main T/C Failure	14
Error Message Low Pressure	15
Error Message Low Flow Limit	16
Error Message High Flow Limit	17
Error Message DUT Sensor Failure	18
Error Message DUT Failure	19

## Section A: Start Up Troubleshooting

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Symptom	Possible Cause	Remedy
<i>TP04300</i> does NOT start	Proper power is not applied to the system	<ul style="list-style-type: none"> <li>Verify that <i>TP04300</i> is plugged in</li> <li>Verify facility line voltage</li> <li>Check the EMO button</li> <li>Verify that all Circuit Breakers are in an “On” position</li> </ul>
	Relay K8, improper voltage or faulty relay	<ul style="list-style-type: none"> <li>Check for loose or faulty wiring.</li> <li>Verify voltage on K8, pin3. Should be +5vdc before SW1 is pressed and 0vdc after SW1 is pressed and released (i.e. when the system is turned “On”)</li> <li>If the +5vdc to 0vdc is NOT present, first check SW1 then check the OCM Motherboard</li> <li>If the +5vdc to 0vdc is present, SW1 and Motherboard are OK.</li> <li>To verify the functionality of K8:           <ul style="list-style-type: none"> <li>- check for +24vdc on TB15 after verifying the +5vdc to 0vdc on K8, pin3.</li> </ul> </li> <li>Replace K8 as needed.</li> </ul>
	SW1 faulty	<ul style="list-style-type: none"> <li>Check for loose or faulty wiring.</li> <li>Verify that the switch illuminates when pressed. If the switch does not illuminate, check the Power Supplies (PS1, PS2)</li> <li>Check SW1 pins 3 &amp; 2 for +5vdc to 0vdc when the switch is pressed. If the +5vdc to 0vdc is not present on pins 3 &amp; 2, replace SW1.</li> </ul> <p>Refer to Chapter 3, <a href="#">Power On/Off Switch (SW1) Replacement</a> (page 3-19).</p>

Symptom	Possible Cause	Remedy
	OCM Motherboard faulty	<ul style="list-style-type: none"> <li>Verify voltages on K8 and SW1:           <ul style="list-style-type: none"> <li>- K8, pin3 (5vdc to 0vdc when SW1 pressed)</li> <li>- SW1, pins 3 &amp; 2 (5vdc to 0vdc when SW1 pressed)</li> </ul> </li> <li>If voltages are correct on K8 and SW1 and system does not start, replace the OCM Motherboard.</li> </ul> <p>Refer to Chapter 3, <a href="#">OCM Motherboard Replacement</a> (page 3-13)</p>
	SW1 (Power On/Off switch) is faulty.	<ul style="list-style-type: none"> <li>Verify that K5 latches when SW1 is pressed.</li> <li>Re-check K5 voltages with SW1 pressed</li> <li>Replace SW1 as needed. See Chapter 3, <a href="#">Power On/Off Switch (SW1) Replacement</a> (page 3-19)</li> </ul>
	Power Supplies (PS1, PS2) faulty	<ul style="list-style-type: none"> <li>Check PS1 and PS2 for proper voltages. Refer to Drawing 17353 in Appendix B as needed.</li> <li>If the voltages are incorrect (after SW1 is pressed), replace PS1 or PS2 as needed. Refer to <a href="#">Power Supplies (PS1 and PS2) Replacement</a> (page 8-19)</li> <li>If the voltages are correct, check the OCM.</li> </ul>
	OCM Assembly faulty	<ul style="list-style-type: none"> <li>Check for loose or faulty wiring.</li> <li>Verify voltages on the P1/J1 power connector. Refer to Drawing 17353 in Appendix B as needed.</li> <li>Replace the OCM Assembly as needed. Refer to Chapter 3, <a href="#">OCM Assembly Replacement</a> (page 3-8).</li> </ul>

## Section B: Cooling Troubleshooting

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Symptom	Possible Cause	Remedy
TP04300 does NOT Cool	Heat Only Mode selected in Utilities Menu	<ul style="list-style-type: none"> <li>Change to Heat/Cool Mode in Utilities Menu</li> </ul>
	Compressor “Quick” disconnect faulty (P12/J12 connection)	<ul style="list-style-type: none"> <li>Check connector pins 1 and 3 for 230VAC. - If 230VAC not present, Check CB4</li> <li>Check for loose wiring and replace connector as needed.</li> </ul>
	Improper voltage to CB4	<ul style="list-style-type: none"> <li>Check CB4 for 230VAC</li> <li>replace CB4 as needed, see Chapter 8 <a href="#">Circuit Breakers CB4, CB5 Replacement</a> (page 8-14)</li> </ul>
	Relay K3 faulty	<ul style="list-style-type: none"> <li>Check for loose or faulty wiring</li> <li>Check for 24VDC at pins 1 &amp; 0.</li> <li>If 24vdc Not present, check Watlow board functionality and replace as needed. Refer to <a href="#">Watlow PC Assembly Replacement</a> (page 4-16)</li> <li>If 24vdc present, check pins for 0VAC. - If AC voltage (230vac) is present at pins 4&amp;6, relay is faulty, refer to <a href="#">Relay K3 Replacement</a> (page 8-16).</li> <li>With the system “On” check K3, pins 4&amp;6 for 0VAC.</li> <li>check for 24 VDC on pins 3 and 4, if not present replace Watlow board, see Chapter 4, <a href="#">Watlow PC Assembly Replacement</a> - check for 0 VAC on pins 1 and 2, if not present, replace K3 as needed, see Chapter 8, <a href="#">Relay K3 Replacement</a>.</li> </ul>
	Fuses (F1 and F2) faulty	<ul style="list-style-type: none"> <li>Check fuses F1 and F2. Replace as needed, see Chapter 8, <a href="#">Fuses F1, F2 Replacement</a>.</li> </ul>

Symptom	Possible Cause	Remedy
	Leak in refrigeration	<ul style="list-style-type: none"> <li>• Check Balance Pressure. Should be approx. 135 to 155 psi.</li> <li>• Replace Air Chiller Module as needed, see Chapter 10, <a href="#">Air Chiller Module Replacement</a></li> </ul>
	Air Chiller Start/Run Capacitor faulty	<ul style="list-style-type: none"> <li>• Check resistances:  <b>50Hz:</b>            Run to Common, 1.8 Ohms            Start to Common, 3.4 Ohms   <b>60Hz:</b>            Run to Common, .68Ohms            Start to Common, 2.14 Ohms         </li> <li>• Replace Capacitors as needed, see Chapter 10, <a href="#">Capacitor Replacement</a></li> </ul>
	Air Chiller Start/Run Relay faulty	<ul style="list-style-type: none"> <li>• Replace relay as needed, see Chapter 10, <a href="#">Start Relay Replacement</a>.</li> </ul>
	Air Chiller Fuses faulty	<ul style="list-style-type: none"> <li>• Check for blown fuses, replace as needed, see Chapter 10, <a href="#">Fuse and Fuse Holder Replacement</a>.</li> </ul>
	Air Chiller Module Faulty	<ul style="list-style-type: none"> <li>• Check all breakers, relays, and capacitors.</li> <li>• Replace Air Chiller Module as needed, see Chapter 10, <a href="#">Air Chiller Module Replacement</a>.</li> </ul>

## Section C: Remote Communications Troubleshooting

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Symptom	Possible Cause	Remedy
System does NOT operate via remote control	Startup/Login error(s)	<ul style="list-style-type: none"> <li>Shutdown and restart system</li> <li>Confirm that remote host/prober CORRECTLY ISSUES "LGIN" (Log In) command (with related PASS password). See "Remote Commands" in <i>TP04300 Interface &amp; Applications</i> manual LM01980.</li> <li>Verify remote cable is connected to the correct I/O ports.</li> <li>Check cable CONTINUITY and PIN-OUTS as presented in above manual LM01980.</li> </ul>
	Host does not support RS232 Handshake	<ul style="list-style-type: none"> <li>tie cable pins 4 and 6 per "Serial Interface Connector" in <i>TP04300 Interface &amp; Applications</i> manual LM01980.</li> </ul>
	System Communications (COMM) Mode is not the same as Host COMM Mode	<ul style="list-style-type: none"> <li>Verify that the selected COMM Mode is the same for both <i>TP04300</i> and Host.</li> </ul>
RS232 not functioning	System Parameters not compatible with Host parameters	<ul style="list-style-type: none"> <li><i>TP04300</i> parameters are fixed. Set/Adjust the host parameters: <b>Baud Rate:</b> 300, 600, 1200, 2400, 4800, 9600, 19200, 38400, 67600 <b>Data Bits:</b> Fixed at 8 <b>Parity:</b> Fixed at No Parity <b>Stop Bits:</b> Fixed at One (1) See <i>TP04300 Interface &amp; Applications</i> manual LM01980 if needed.</li> </ul>
IEEE not functioning	System Parameters not compatible with Host parameters	<ul style="list-style-type: none"> <li>Verify GPIB Address</li> <li>Verify PROM revision. Pressing the Tempronic Logo on the display screen will provide software version.</li> </ul>
Login, Parameters, PROM are correct, but NO Remote Communications	Loose connections on ICS Board	<ul style="list-style-type: none"> <li>Check and secure all ICS Board connections.</li> </ul>

Symptom	Possible Cause	Remedy
	No Power to Comm Board	<ul style="list-style-type: none"><li>• Verify +5vdc at P1 connection</li><li>• Verify that W4 is jumped to enable DTE Mode</li><li>• Replace Comm Board, see <a href="#">Comm Board Replacement</a> (page 4-17)</li></ul>

## Section D: Error Message: Controller Failure

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Symptom	Possible Cause	Remedy
OCM displays Error Message: <i>Controller Failure</i>	Watlow Board (J6) faulty connector	<ul style="list-style-type: none"><li>Check for loose wires and connector.</li><li>Replace Watlow Board as needed. See Chapter 4, <a href="#">Watlow PC Assembly Replacement</a>.</li></ul>
Watlow Board replaced, Error Message does not clear	Faulty OCM	<ul style="list-style-type: none"><li>Replace OCM, see Chapter 3, <a href="#">OCM Assembly Replacement</a>.</li></ul>

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## Section E: Error Message AC Absent

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Symptom	Possible Cause	Remedy
OCM displays Error Message: <i>AC Absent</i>	Faulty Fuse (F1 or F2)	<ul style="list-style-type: none"><li>• Check fuses F1 and F2. Replace as needed, see Chapter 8, <a href="#">Fuses F1, F2 Replacement</a>.</li></ul>
	Transformer T1 faulty	<ul style="list-style-type: none"><li>• Check TB16 and TB17 for 24 VDC.</li><li>• Check T1 for 24 VDC</li><li>• Replace T1 as needed, see Chapter 8, <a href="#">Transformer, T1 Replacement</a>.</li></ul>
	Watlow Board faulty	<ul style="list-style-type: none"><li>• Check J8, pins 6 &amp; 17 for 24 VAC</li><li>• Check for loose connections</li><li>• Replace Watlow Board, see Chapter 4, <a href="#">Watlow PC Assembly Replacement</a>.</li></ul>

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## Section F: Error Message

### Air Open Loop

Symptom	Possible Cause	Remedy
OCM displays Error Message: <i>Air Open Loop</i>	CB5 faulty	<ul style="list-style-type: none"> <li>Verify 230VAC present at CB5</li> <li>Verify 230VAC present at CB1</li> <li>Replace CB5 as needed, see Chapter 8, <a href="#">Circuit Breakers CB4, CB5 Replacement</a>.</li> </ul>
	Contactor (K1) not pulled in	<ul style="list-style-type: none"> <li>Visually verify that the contactor is pulled in</li> <li>Check voltage on pins A1 &amp; A2 (24VDC), if not present, troubleshoot the Cutout Board</li> </ul>
	K1 faulty	<ul style="list-style-type: none"> <li>Check for 230VAC on pins 1L1 and 5L3.</li> <li>Check for loose wiring</li> <li>Check for open contactor</li> <li>Replace relay as needed, see Chapter 8, <a href="#">Relay K1 Replacement</a>.</li> </ul>
	Heater faulty	<ul style="list-style-type: none"> <li>Remove head cover and check Heater resistance at J3 to P3 connector (16 ohms).</li> <li>Replace Heater as needed, see Chapter 6, <a href="#">Heater Replacement (TP04300A)</a>.</li> </ul>

Symptom	Possible Cause	Remedy
	Relay K4 faulty	<ul style="list-style-type: none"> <li>Verify K4 LED is illuminated while heating (and OFF while in Error Mode)</li> <li>Check Voltage: <b>While Heating</b> pins 3 and 4 (24 VDC) <b>In Error Mode</b> pins 3 and 4 (0 VDC)</li> <li>Check for loose connections on Relay K4 (P3 to J3 and P5 to J5)</li> <li>Replace relay as needed, see Chapter 6, <a href="#">Relay K4 Replacement</a></li> </ul>
	Thermal Cutout Board faulty	<ul style="list-style-type: none"> <li>Check board output voltages: pins 4 &amp; 1, 24VDC pins 4 &amp; 2, 24 VDC pins 4 &amp; 3, 24VDC</li> <li>If pins 4 &amp; 1 have improper voltage, replace 1/4 Amp fuse on Cutout board and re-Check relay</li> <li>Replace cutout board as needed, see Chapter 4, <a href="#">Cutout Board Replacement</a>.</li> </ul>
	Thermocouples (Type K) faulty	<ul style="list-style-type: none"> <li>Power down and remove Cutout Board. Verify thermocouples and replace as needed.</li> </ul>

## Section G: Error Message Low Temp. Limit

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Symptom	Possible Cause	Remedy
OCM displays Error Message: <i>Low Temp. Limit</i>	Improper settings in OCM Utilities Menu	<ul style="list-style-type: none"><li>Verify Menu settings. Should be 5°C below Setpoint (to allow for overshoot)</li></ul>
	Main Thermocouple (Type T) faulty	<ul style="list-style-type: none"><li>Verify thermocouple and replace as needed. See Chapter 6, <a href="#">Type "T", Main Thermocouple Replacement</a>.</li></ul>

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## Section H: Error Message High Temp. Limit

Symptom	Possible Cause	Remedy
OCM displays Error Message: <i>High Temp. Limit</i>	Improper settings in OCM Utilities Menu	<ul style="list-style-type: none"><li>Verify Menu settings. Should be 5°C above Setpoint (to allow for overshoot)</li></ul>
	Main Thermocouple (Type T) faulty	<ul style="list-style-type: none"><li>Verify thermocouple and replace as needed. See Chapter 6, <a href="#">Type "T", Main Thermocouple Replacement</a>.</li></ul>

## Section I: Error Message

### Main T/C Failure

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Symptom	Possible Cause	Remedy
OCM displays Error Message: <i>Main T/C Failure</i>	Main Thermocouple (Type T) faulty	<ul style="list-style-type: none"><li>• Disconnect T/C from Watlow (J2) and verify</li><li>• Replace as needed, see Chapter 6, <a href="#">Type "T", Main Thermocouple Replacement</a>.</li></ul>
	Incorrect Calibration	<ul style="list-style-type: none"><li>• Re-calibrate the Watlow Board, see <i>Interface and Applications Manual</i> (LM01980), Chapter 5, Calibration.</li><li>• Replace the Watlow Board as needed, see Chapter 4, <a href="#">Watlow PC Assembly Replacement</a>.</li></ul>

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## Section J: Error Message Low Pressure

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Symptom	Possible Cause	Remedy
OCM displays Error Message: <i>Low Pressure</i>	Facility air supply faulty	<ul style="list-style-type: none"> <li>• Check facility air supply (min. 80psi)</li> </ul>
	SW4 faulty	<ul style="list-style-type: none"> <li>• Check resistance: should be 0 ohms with power off and proper air supplied.</li> <li>• Check for loose wiring or connections to SW4 (P6 to J6, pins 11 and 22).</li> <li>• Replace SW4 as needed, see Chapter 7, <a href="#">Air Manifold Assembly (SV3, SV5, SW4) Replacement</a>.</li> </ul>
	Watlow Board Faulty	<ul style="list-style-type: none"> <li>• If SW4 and all connections verified, replace Watlow Board, see Chapter 4, <a href="#">Watlow PC Assembly Replacement</a>.</li> </ul>

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## Section K: Error Message

### Low Flow Limit

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Symptom	Possible Cause	Remedy
OCM displays Error Message: <i>Low Flow Limit</i>	Air Chiller Module iced up	<ul style="list-style-type: none"> <li>• Run defrost cycle</li> <li>• Check for moisture in facility supplied air</li> <li>• Check for faulty Air Dryer Assembly.</li> </ul>
	Flow Board faulty	<ul style="list-style-type: none"> <li>• verify all Flow Board power and input connections.</li> <li>• Turn on Trickle Air Flow and verify approx. 4scfm. - If reading is accurate, troubleshoot SV2, Main Air Valve.</li> <li>- If inaccurate, replace the Flow board, see Chapter 4, <a href="#">Flow/Linear Actuator Board Replacement</a>.</li> </ul>
	Main Flow Valve Assembly (SV2 and SV4) faulty	<ul style="list-style-type: none"> <li>• Verify 24VDC present at SV2</li> <li>• Check for loose wiring and connections</li> <li>• Verify 24 VDC present at SV4</li> <li>• Verify 0 - 10 VDC from SV4 to Watlow board</li> <li>• Replace Main Flow Valve Assembly as needed. See Chapter 7, <a href="#">Main Flow Valve Assembly (SV2, SV4) Replacement</a>.</li> </ul>

## Section L: Error Message High Flow Limit

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Symptom	Possible Cause	Remedy
OCM displays Error Message: <i>High Flow Limit</i>	Improper settings in OCM Utilities Menu	<ul style="list-style-type: none"><li>Check Menu settings. Should be 2 scfm above desired flow.</li></ul>
	Flow Board faulty	<ul style="list-style-type: none"><li>Use external flow gauge and verify flow (at 25°C)</li><li>Replace Flow Board as needed, see Chapter 4, <a href="#">Flow/Linear Actuator Board Replacement</a>.</li></ul>

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## Section M: Error Message

### DUT Sensor Failure

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Symptom	Possible Cause	Remedy
OCM displays Error Message: <i>DUT Sensor Failure</i>	Incorrect DUT Type selected in Setup Menu	<ul style="list-style-type: none"> <li>Verify that DUT Type, Menu selection, and rear I/O port are all correct.</li> </ul>
	DUT Thermocouple /RTD /Diode faulty	<ul style="list-style-type: none"> <li>Check DUT thermocouple/RTD/Diode and replace as needed</li> </ul>
	Incorrect Thermocouple /RTD /Diode pin outs	<ul style="list-style-type: none"> <li>Verify pin outs. See <i>Interface and Applications Manual</i> (LM01980), Chapter 5, Verification: Air DUT: T, K, RTD, Diode Sensors.</li> </ul>
	Incorrect Thermocouple /RTD /Diode Calibration	<ul style="list-style-type: none"> <li>Verify calibration. See <i>Interface and Applications Manual</i> (LM01980), Chapter 5, Calibration.</li> </ul>

---

## Section N: Error Message DUT Failure

---



### ATTENTION

This Error Message is NOT a failure of the *TP04300*.

---

The System receives a command from the remote Host (Prober station tester) that the DUT has failed to pass a test: therefore temperature cycling is stopped (is incomplete) and the Error Message is displayed.

---





A

# Materials Safety Data Sheets

## MSDS Overview

### Introduction

The Materials Safety Data Sheets (MSDS) for storing, handling, or disposing the following fluids used in the System are presented in the *TP04300 Interface & Applications Manual LM01980*:

MSDS in TP04300 ThermoStream Interface & Applications (manual LM01980)		
50Hz Chiller	60Hz Chiller	Air Dryer Desiccants
POE Oil	POE Oil	Molecular Sieve 4A-50
HFC Refrigerant Blend	HFC Refrigerant Blend	Activated Aluminas



### WARNING

**WARNING A:** See the Material Safety Data Sheet (Appendix A) for safety precautions when storing, handling, or disposing any coolant fluids.

**WARNING B:** Dispose of any new or removed coolant fluid (or handle any related vapor discharge) in accordance with the established policies and procedures for that material.

**WARNING C:** If service of the Air Chiller Module is required, only a licensed refrigeration service person certified by the Temptronic Corporation is qualified to perform any charging or handling of the refrigerants in the System. Service by unqualified persons can cause warranties to be voided.

**WARNING D:** Charging or any other adjustment of the refrigerant charge in a Temptronic refrigeration system during the warranty period without prior written consent from the Temptronic Service Department may be considered a direct violation of the service warranty – at which point the service warranty may be considered null and void.

**WARNING E:** Only use the coolants (heat transfer fluids) and refrigerants specified by the manufacturer: they are carefully engineered to be safe for operating personnel, to be friendly to the environment, to operate efficiently, and to not harm the equipment. Do not substitute unauthorized coolants and refrigerants, nor mix (add) in unauthorized coolants or refrigerants: doing so can cause warranties to be voided. Wear protective safety eye glasses, gloves, and apron when filling coolants and refrigerants. Temptronic assumes no liability for damages caused by use of unauthorized coolants and refrigerants.





# Drawings

B

## Drawings Overview

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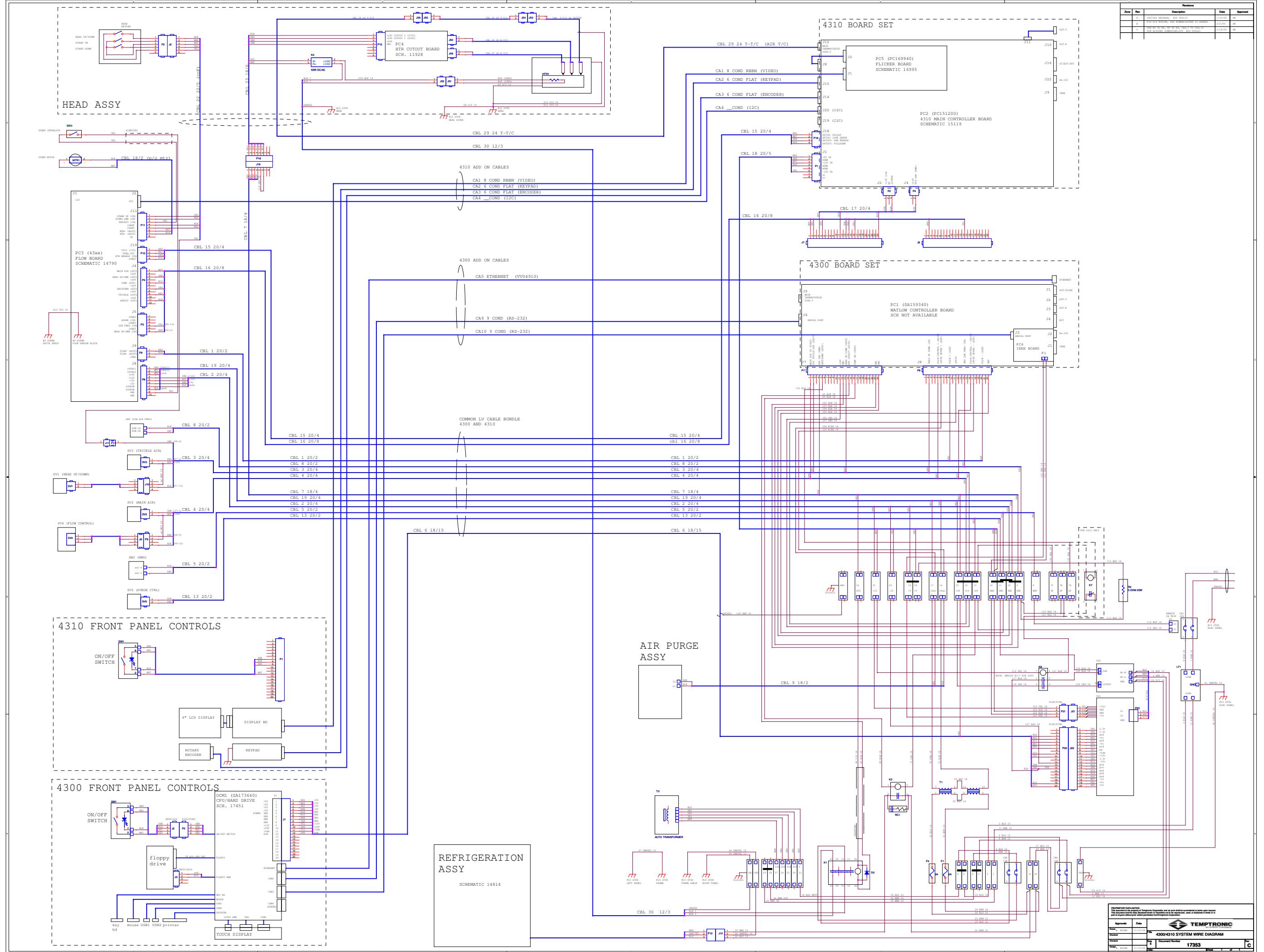
### In this Chapter

The following drawings and schematics are detailed:

Drawing/Schematic	Drawing #
4300/4310 System Wire Diagram	17353
PNEUMATIC, SCHEM. TP04300	14631

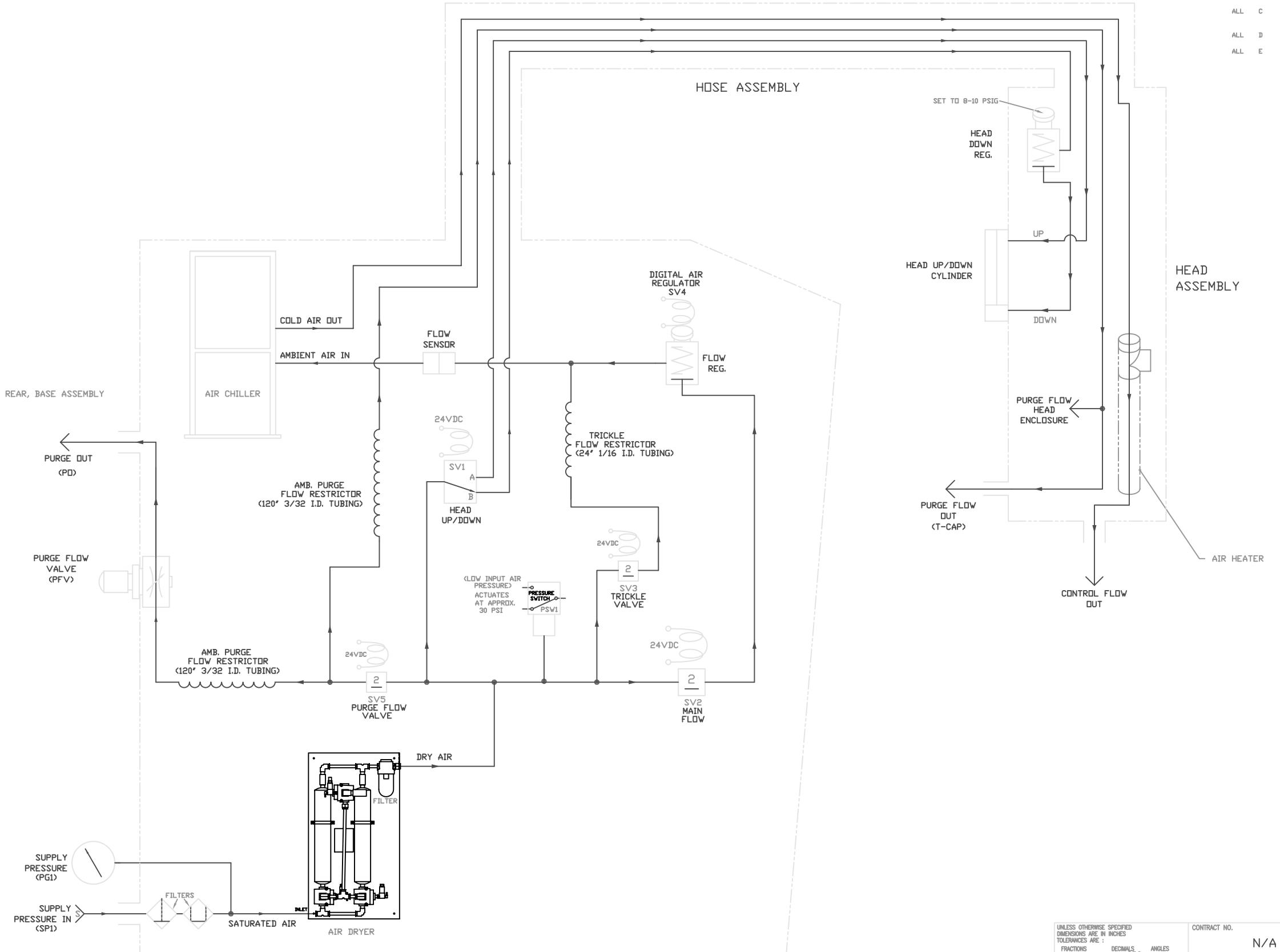
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Temptronic Corporation.

REVISIONS		DATE	APPROVED
ZONE	REV.	DESCRIPTION	
ALL	A	INITIAL RELEASE	05-11-00
ALL	B	RECONFIGURE HEAD UP/DOWN PLUMBING TO AVOID CONFUSION E.C.D. #14631B	09-20-00
ALL	C	CHG "HEATED PURGE OUT" TO "PURGE OUT" CHG "HEATED PURGE FLOW VALVE" TO "PURGE FLOW VALVE"	04-17-02 <i>Bill York</i>
ALL	D	CHANGES PER ECO 14631D	10-30-02
ALL	E	ADD SV5, RELOCATE PSW1	01-20-04



		CONTRACT NO.	
		N/A	
		APPROVALS	DATE
		N/A	
		DRAWN	S.PETROVICH 05-11-00
		CHECKED	
		ISSUED	
		DESIGN	
TP04300	APPLICATION	DO NOT SCALE DRAWING	
GENERAL NOTES: UNLESS OTHERWISE SPECIFIED	SCALE	N/A	14631
	SIZE	FSCM NO.	DIS. NO.
	D	N/A	14631
	REV.		E
		SHEET	1 OF 1



PNEUMATIC, SCHEM.  
TP04300A

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**TEMPTRONIC**  
an inTEST Company



Delivering Essential Solutions for the Semiconductor Test Floor

## Model TP04300A X-Stream

04300A

# Model TP04300A X-Stream

## The High Power ThermoStream

Maximize Thermal Capacity and Throughput

Easy Touch Screen Control

Advanced Thermal Precision

Create up to 18 Thermal Profiling Sequences at the Cycling Screen

View Real-Time Temperature Status Graphically

Document with Color Graphing and Data Logging Features

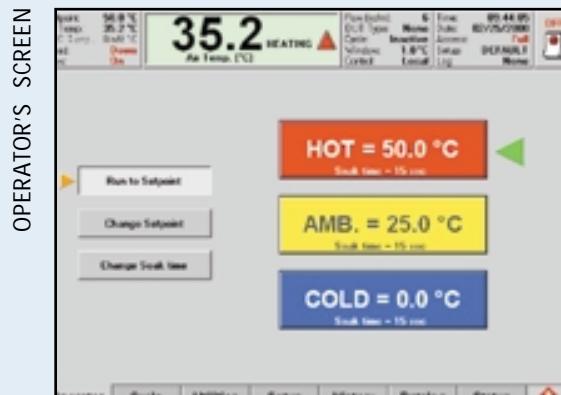
### User-Friendly Color Touch Screen

Simple, Efficient Setup and Thermal Testing

From **-80° to +225°C<sup>2</sup>**, select temperature setpoints to within +/- 0.1°C.

Select cold/ambient/hot temperatures quickly and easily for **high throughput**.

With intuitive Windows®-based menus and the real time Status Banner, system control is convenient and informed.



from -55° to +125° in <5 seconds approximately<sup>1</sup>

from +125° to -55° in <13 seconds approximately<sup>1</sup>

### Highest Capacity Continuous Airflow

Faster Temperature Transitions, Greater Throughput

Providing continuous airflow of **9 liters/second (18 scfm)**, the high power X-Stream is the **largest capacity airstream system available**.

Test DUTs to PCBs of **all types and power dissipations** from -80° to +225°C<sup>2</sup>.

Achieve and maintain set temperature for standard to **higher wattage devices**.

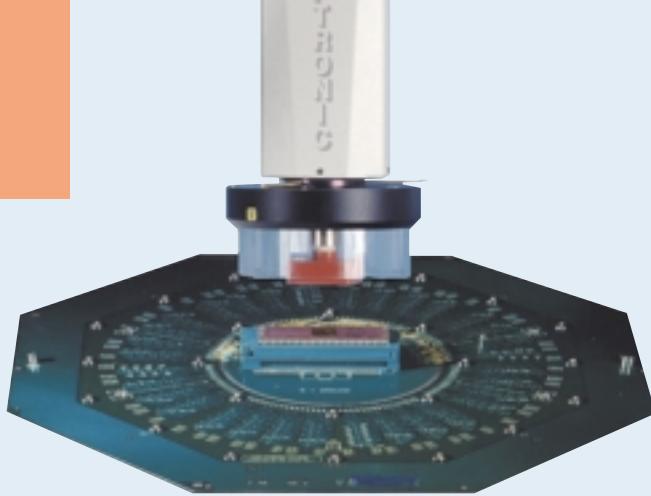
**DUTs of all size**—from devices to small subassemblies are cycled to temperature with speed, accuracy and control.

Ensure **thermal stability and repeatability throughout longer test times**.

" Temptronic  
has been an  
excellent partner—  
providing us with  
an easy-to-use,  
reliable test  
solution . . . "

<sup>1</sup> Reduced performance may be encountered under operating conditions less than or greater than nominal

<sup>2</sup> Due to our utilization of HCFC-free refrigerants for 50 Hz systems, the low temperature extreme for these systems will be approximately 5°C less cold than that of a 60 Hz unit.



Monitor temperature status from across the room

### Streamlined and Full-Featured Control

Flexibility to Adapt to Each Application

Perform production testing, design verification and characterization at precise temperature.

Create and then view up to **18 ramp/soak/cycle thermal profile routines** at one screen.

Control via front panel touch screen or remote interface (IEEE-488, RS232, ST/ET/SFF, Ethernet).

Customize ramp/soak/cycle, "At Temperature" Windows, air flow rate and air/DUT temperature control.

Select from four DUT sensor inputs (Type T, Type K thermocouples, 100 ohm RTD or NEW Internal Diode).

Four color touch screen displays: Cycle Screen Graphic Display, Operator's Screen (Hot/Ambient/Cold) Display, Data Logging Display and Expanded Temperature View Display.

For repeatability, save thermal profiling routines and data logging files to the hard disk or diskettes.

Add **printer, monitor, mouse and keyboard** via I/O ports.

Using the optional ThermoFixture enclosure with a turnkey tester interface, test PCBs, MCMs and subassemblies of all sizes in a moisture-free environment from -80° to +225°C.

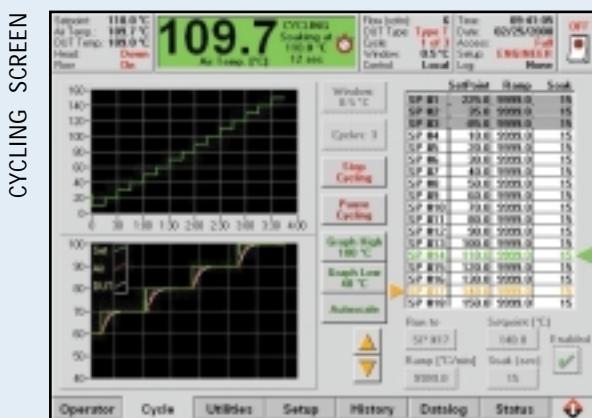
### Real-Time Thermal Test Status

Graphically and Numerically

View the **air, DUT and set temperatures simultaneously** on Cycling Screen Graphs.

Produce **brilliant graphs** of thermal test results using data logging and full color graphing features.

The **Status Banner** at the top of most screens displays the current air, DUT and set temperatures, "At Temperature" window and set test parameters.



PO4300A

## Patented DUT Thermal Precision

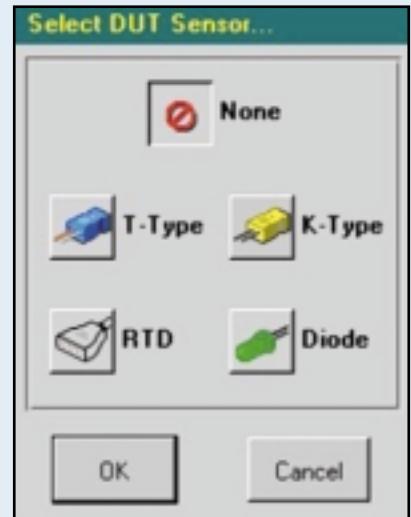
**+/- 0.1°C precision** is provided by Temptronic patented<sup>3</sup> DUT Dual Loop Control™ which performs direct temperature control at the device case.

Flexibility to choose from four DUT sensors: **new Internal Diode Sensor, Type T or Type K Thermocouple, or 100 ohm RTD.**

Temperature Sensors at the DUT (Device Under Test) assure optimum thermal accuracy<sup>4</sup> (to within 1.0°C) and efficiency.

Temperature is sensed at the device once every 250 milliseconds, to bring the DUT as close as possible to the required temperature.

**"At Temperature" Windows** enable the operator to specify a required temperature range at which testing may be performed, for maximum test efficiency.



<sup>3</sup> U.S. Patent No. 4,734,872

<sup>4</sup> Temperature accuracy is calibrated to an NIST-traceable standard.

## Full ATE Compatibility Plus

Interface to all major testers and rack and stack test equipment for a true and accurate tester interface.

Operate at the touch screen or via remote interface (**IEEE-488, RS232, ST/ET/SFF, Ethernet**).

Easily access input ports and drivers for **keyboard, mouse, printer and monitor** from the front panel.

## Proper Coupling Assures Precise Temperature Control

**Pneumatic control** for raising and lowering the thermal head assists in its proper positioning over the DUT for highly repeatable accuracy. The arm may be manually rotated, moved in/out, up/down and locked in place for the optimum alignment and stability at the test site.

The **thermal cap's** double-layer glass or metal surrounds the DUT, creating a frost-free thermal test environment. All thermal caps may be removed or replaced without tools.

The **Thermal Interface Kit** is used to ensure maximum heat transfer to the DUT while protecting the tester from temperature extremes. Comprised of five non-conductive shrouds plus sheets of non-conductive foam, the kit facilitates proper coupling to the test site. Additional conductive or non-conductive interface kits, consisting of shrouds of various sizes, are also available.

The TPO4300A provides ionically balanced air (free of static charge). When coupled with a standard metal thermal cap and the optional conductive shroud kit for interfacing to the tester socket, an **ESD protected environment** is assured.



The tester socket and test fixture are maintained at temperature close to ambient while testing at high or low temperatures by the **Purge Air** feature, which prevents moisture, frost and overheating of tester electronics.

## Automated Data Logging Enhances Documentation

Automated data logging is simple from Windows®-based menus.

View and store current and historical data and graphs.

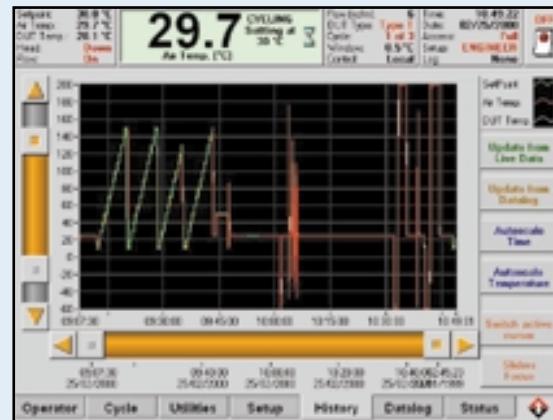
Adjust graph axes at the touch screen.

Save and recall thermal test routines and test results.

Save data logging of up to 75 sets of data (9 hours each) to the hard disk.

Additional data logging storage to diskettes is unlimited.

For software compatibility, data collection format is ASCII.



## High Reliability and Dependability

New **quiet** air dryer is ideal for lab environments.

High quality components ensure long term dependability and maximum up-time.

Repeatable precision and productivity for the **24 hour/7 day test environment** and the design laboratory.

Modular system design ensures ease of maintenance, serviceability and upgrades.

Temptronic's **network of local service depots**, exceptional in the industry, provides quick response service and long term support.

Warranty ensures customer satisfaction.

"...Product yield  
is way up.

Up-time on the  
Temptronic units is  
exceptional...."

## Safety First

A bright, highly visible EMO switch is located on the system for power OFF.

Recessed rear panel circuit breakers assure that the system meets required safety standards.

The TP04300A uses only **CFC-free**<sup>5</sup> refrigerants which are safe, non-toxic and non-flammable.

Large locking casters assure that the system is easily mobile between test sites and, when locked, the system is secured for safety and stability during testing.

The TP04300A is fully compliant and certified for the **European CE Mark**.

<sup>5</sup>50 Hz configuration TP04300 series system refrigerants are HCFC-free and CFC-free

# ThermoStream Accessories

## Expand Thermal Test Capabilities

Test Larger PCBs and Modules from -80° to +225°C

Perform Moisture-free Thermal Testing for Longer Test Times

Turnkey ATE Interface



### ThermoFixture® — The Complete Thermal Test Solution

Test the smallest device to the largest **PCB, MCM, hybrid, digital, high speed and high power devices** (from RF to microwave to 40 GHz) and **assemblies** from -80° to +225°C.

#### Interfaces to Any Major Tester

For True Tester Signals and Turnkey Convenience

Thermal, mechanical and electronic interface hardware and software ensure **true and accurate tester signals**.

Perform **frost-free** testing at cold temperatures over extended test times.

Achieve **precise DUT temperature control** directly at the device case.

Optimize DUT thermal transition time with thermally efficient design and heat sink technology.

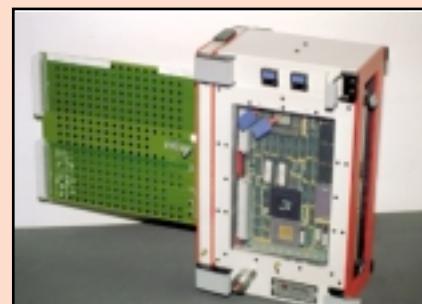
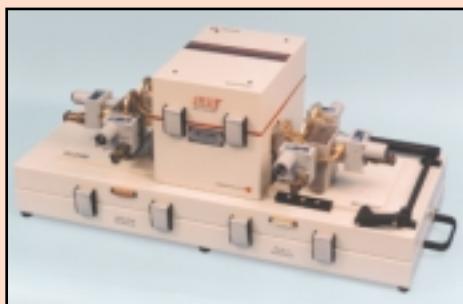
Clean, **ESD-free** test environment

All tester electronics are isolated from temperature extremes while the DUT is cycled to temperature.

Available in standard, application-specific and modular designs.

Optional **patented probe-through window**<sup>6</sup> permits viewing and probing the subject under test while at precise temperature to -55°C.

<sup>6</sup>U.S. Patent No. 4,426,619



TPO4300

## Precise DUT Thermal Control

Greater Thermal Test Accuracy and Reliability

Provides a moisture-free environment to -80°C in a 24/7 test setting with the ThermoStream thermal source.

**Improves load board performance and reliability,** maximizing your investment.

Prevents condensation at the test site, which can lead to erroneous test results.

For true and accurate testing, ThermoFixture isolates the DUT from surrounding devices which, if brought to temperature, could impair accurate test results.

Impedance-matched connections ensure high quality results when testing **digital, high speed (>40 GHz) and low noise DUTs.**

Design protects the DUT from any interference from external noise and other environmental factors for optimal test accuracy.



Provides greater design efficiency. Utilizing Tempronic's tester interface and frost-free enclosure technologies, the ThermoFixture is designed and constructed with turnkey compatibility assured.

Large customer base includes leaders in the military, aerospace, semiconductor and electronics industries worldwide.

Developed in cooperation with the major ATE manufacturers. Tempronic's expertise in tester interface design is unique in the industry.

Recognized by its customers with **awards for exceptional quality.**

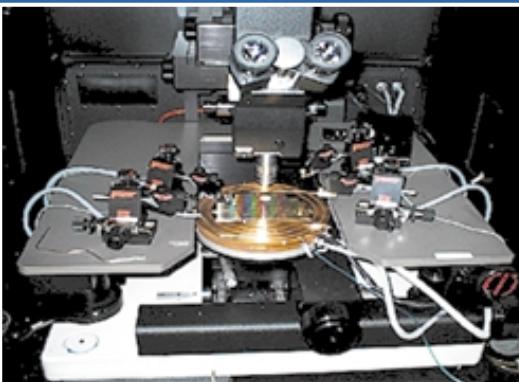
## ThermoWand™

Test individual components on a printed circuit board or tester using a thermal wand, transforming the X-Stream into a ThermoSpot.®

Provides the operator with the flexibility to isolate individual components using the thermal wand with a rubber shroud attached, surrounding the DUT for testing over the -80° to +225°C temperature range.



# ***Complete Thermal Test Solutions***



**ThermoChuck® Systems** for probing wafers, chips, hybrids and other flat devices at hot and cold temperature.



**ThermoSocket® Systems** for testing and locating micron size defects on chips in minutes, even at 30 microwatt power levels.



**ThermoFixture®** for testing hybrids, MCMs, modules, PCBs and other devices in a custom enclosure with fixturing for integration with ATE test systems.



**ThermoZone®** for testing in-circuit probing and troubleshooting component arrays, burn-in boards and small electronic and electromechanical subassemblies.



**ThermoSpot® Systems** for testing and fault isolation of individual components at precise hot and cold temperature at the tester socket or on a printed circuit board.



**TEMPTRONIC**  
*an inTEST Company*

4 Commercial Street  
Sharon, MA 02067 USA  
Tel: (781) 688-2300  
Fax: (781) 688-2301  
[www.tempronic.com](http://www.tempronic.com)



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*Delivering Essential Solutions for the Semiconductor Test Floor*



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POSITIONER AND  
DOCKING SOLUTIONS  
[www.intest.com](http://www.intest.com)



interface solutions  
[www.intest.com](http://www.intest.com)

# TP04.300A

Mobile Temperature System for testing components, parts, hybrids, modules, subassemblies and printed circuit boards at precise temperature.

## TEMPERATURE PERFORMANCE AND AIRFLOW CAPACITY

<b>Temperature Range:</b> <sup>1,3</sup>	-80° to +225°C (60 Hz System) -75° to +225°C (50 Hz System)
<b>Typical Temperature Transition Rate (air)</b> <sup>1,2</sup>	-55° to +125°C: approx. 10 seconds or less <sup>2</sup> +125° to -55°C: approx. 10 seconds or less <sup>2</sup>
System air flow output	2.4 l/s to 9 l/s (5 to 18 scfm) CONTINUOUS
Temperature accuracy	1.0°C (when calibrated against NIST transfer standard)
Temperature set, display and resolution	± 0.1°C
<b>Temperature Control:</b>	
DUT Sensor Ports	Internal diode, Type T and Type K Thermocouple and 100 ohm Platinum RTD
DUT Control	Control to within ± 0.1°C; SELF-TUNING available in DUT Control
Remote interface ports	IEEE-488, RS232C Serial, and Start Test/End of Test/Stop on First Fail (ST/ET/SFF) and Ethernet

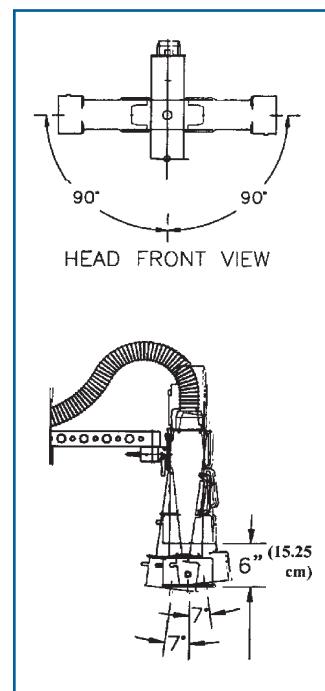
<sup>1</sup>Note: Ultimate low temperature and system performance may vary under operating conditions less than or greater than nominal.

<sup>2</sup>Note: Transition performed under nominal operating conditions. <sup>3</sup>Note: Low temperature extremes may be achieved at reduced airflow rates



## USER FEATURES

Modes of operation	Two: Operator Mode and Cycling Mode
Test set-up configurations	In Cycling Mode, an unlimited quantity may be created; save to hard disk/diskettes
Ramp/soak/cycle configurations	In Cycling Mode, up to 18 sequences per test set-up; table is displayed on-screen
Program and data storage	Data logging and program files may be stored on the hard drive or to a 3.5" floppy diskette
External Device Ports	Ports are located on the front of the system for connecting a mouse, printer and keyboard; plus a USB Port (for connecting a USB memory stick, USB mass storage drive, USB printer, etc.)
On-screen help	Included for both Cycling and Operator's Modes
DUT temperature control	Patented <sup>4</sup> Dual Loop Temperature Control
Status indicators	On-screen and remote I/O
Purge flow tester interface	Dry air purge protects tester electronics protection from condensation
Purge flow capacity	0.25 to 1.5 liters per second (0.5 to 3 scfm) airflow, manually adjustable
Calibration	Automated, simplified and accurate for all airflows and DUT types
Thermal head raising and lowering	Pneumatic control on thermal head, operated manually or via remote interface
Head positioner movement	Manual locking (4 locks), 360° head rotation; head can be manually pivoted, turned, tilted and vertically swung for ease of interface at tester site.
Manipulator (arm) movement	Motorized raising and lowering of arm; 330° positioning range around the base unit

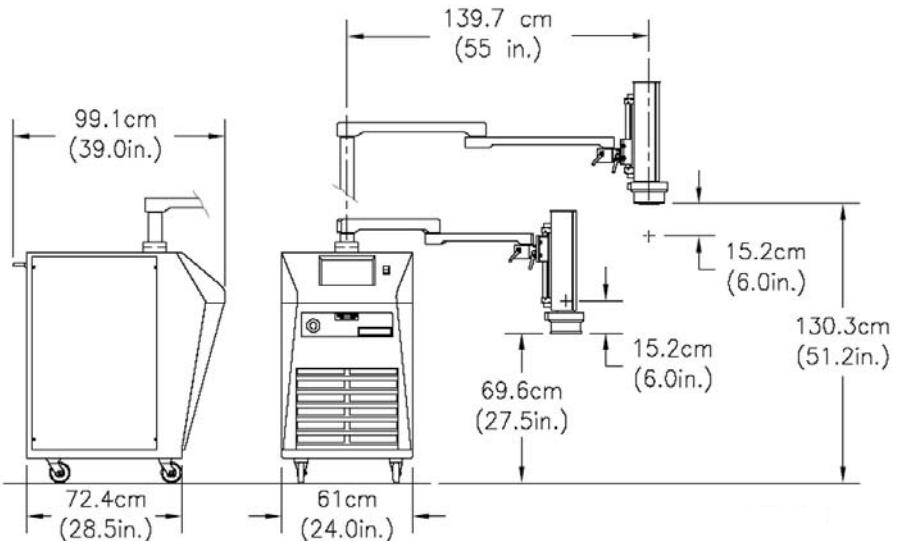


# Model TP04300A

## ThermoStream®

### System

### Specifications



## ENVIRONMENTAL AND SERVICE FEATURES

Over-Temperature Protection	+235°C (factory-set) (Also uses user-settable high and low air temperature limit)
Mobility	4 swivel caster wheels with locks (10.16 cm (4-inch) diameter, static dissipative); rear handle for ease of transport
Refrigerants	HCFC-free and CFC-free, non-toxic, non-flammable
Noise level	<65 dBA approximately
Serviceability	Field-replacement modules and printed circuit boards
<b>Weights and Dimensions</b>	Base: Width: 61.0 cm (24 in.) Depth: 72.4 cm (28.5 in.); Height: 108 cm (42.5 in.); System weight: 236 kg (520 lbs); Packed: 365 kg (805 lbs)
Maximum operating height	130.3 cm (51.25 in.) approximately
Minimum operating height	69.9 cm (27.5 in.) approximately

(An additional 20.3 cm (8 in.) rear clearance is required for supply connections and cabinet ventilation.)

ISO 9001-2000 Certified



## FACILITY REQUIREMENTS

<b>Power Requirements<sup>5</sup></b>	200-250 VAC (230V nominal), 50 Hz, 30 amp, 1 phase 200-250 VAC (230V nominal), 60 Hz, 30 amp, 1 phase
<b>Compressed Air Requirements</b>	
Clean, Dry Air	Filtered to 5 micron particulate contamination Oil content: <0.01 ppm by weight filtered to .01 micron oil contaminant Dewpoint: <10°C @ 6.2 BAR (90PSI)
Supply Pressure	6.2 to 7.6 BAR (90 to 110 PSIG)
Supply flow at minimum supply pressure	7.2 l/s to 14.3 l/s (15 to 30 scfm) (Nominal 25 scfm)
Air supply temperature	+20° to +25°C (+22°C nominal)
Operating Temperature	+20° to +28°C (+23°C nominal)
Humidity	0 to 60% (45% nominal)



**TEMPTRONIC**  
*an inTEST Company*

4 Commercial Street  
Sharon, MA 02067 USA  
Tel: (781) 688-2300  
Fax: (781) 688-2301  
[www.temptronic.com](http://www.temptronic.com)

Windows® is a registered trademark of Microsoft Corporation. Ethernet is a registered trademark of Xerox Corporation.

ThermoStream® and ThermoFixture® are registered trademarks of Temptronic Corporation.

Copyright 2000, 2002, 2005, Temptronic Corporation. These specifications are valid for the standard product and are subject to change without notice. Applications requiring modification of electrical, thermal or mechanical characteristics should be discussed with the factory for possible accommodation at an additional cost.  
Printed in USA.

<sup>5</sup>Note: System is configured for operation within voltages listed above using an internal transformer.  
Please specify power configuration with order.

\*Under operating conditions which are less or greater than nominal, performance may be less than specification provided.

# TP04300B

Mobile Temperature System for testing components, parts, hybrids, modules, subassemblies and printed circuit boards at precise temperature.

## TEMPERATURE PERFORMANCE AND AIRFLOW CAPACITY



**TP04300B with optional ThermoFixture**

### Temperature Range:<sup>1,3</sup>

-80° to +225°C (60 Hz System)  
-75° to +225°C (50 Hz System)

### Typical Temperature Transition Rate (air)<sup>1,2</sup>

-55° to +125°C: approx. 10 seconds or less<sup>2</sup>  
+125° to -55°C: approx. 10 seconds or less<sup>2</sup>

### System air flow output

2.4 l/s to 9 l/s (5 to 18 scfm) CONTINUOUS

### Temperature accuracy

1.0°C (when calibrated against NIST transfer standard)

### Temperature set, display and resolution

± 0.1°C

### Temperature Control:

#### DUT Sensor Ports

Internal diode, Type T and Type K Thermocouple and 100 ohm Platinum RTD

#### DUT Control

Control to within ± 0.1°C; SELF-TUNING available in DUT Control

#### Remote interface ports

IEEE-488, RS232C Serial, and Start Test/End of Test/Stop on First Fail (ST/ET/SFF) and Ethernet

<sup>1</sup>Note: Ultimate low temperature and system performance may vary under operating conditions less than or greater than nominal.

<sup>2</sup>Note: Transition performed under nominal operating conditions. <sup>3</sup>Note: Low temperature extremes may be achieved at reduced airflow rates.

## USER FEATURES

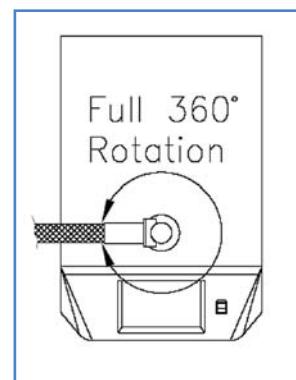
### System Configuration Options (Choice):

- Modular TP04300B base unit with Turret Assembly and Flexible Extender Air Transfer Hose

(Specify choice of Flexible Extender length -up to 6 ft. is included with system. Longer Flexible Extenders are also available- contact factory.)

- Modular TP04300B base unit with Adapter Kit for connecting a ThermoChamber™ Accessory (ThermoChamber enclosure is sold separately.)

Modes of operation	Two: Operator Mode and Cycling Mode
Test set-up configurations	In Cycling Mode, an unlimited quantity may be created; save to hard disk/diskettes
Ramp/soak/cycle configurations	In Cycling Mode, up to 18 sequences per test set-up; table is displayed on-screen
Program and data storage	Data logging and program files may be stored on the hard drive or to a 3.5" floppy diskette
External Device Ports	Ports are located on the front of the system for connecting a mouse, printer, keyboard; plus USB Port (for USB memory stick, USB mass storage drive, USB printer, etc.).
On-screen help	Included for both Cycling and Operator's Modes
DUT temperature control	Patented <sup>4</sup> Dual Loop Temperature Control
Status indicators	On-screen and remote I/O
Purge flow tester interface protection	Dry air purge protects tester electronics from condensation
Purge flow capacity	0.25 to 1.5 liters per second (0.5 to 3 scfm) airflow, manually adjustable
Calibration	Automated, simplified and accurate for all airflows and DUT types
Range of motion	Turret assembly (connecting Flexible Extender Hose) rotates 360° for full freedom of positioning of Flexible Extender Hose around base unit



Turret Assembly Rotation: 360° of freedom around system base.



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Part No. SL10420 R/A



<sup>4</sup>Note: US Patent no. 4,734,872

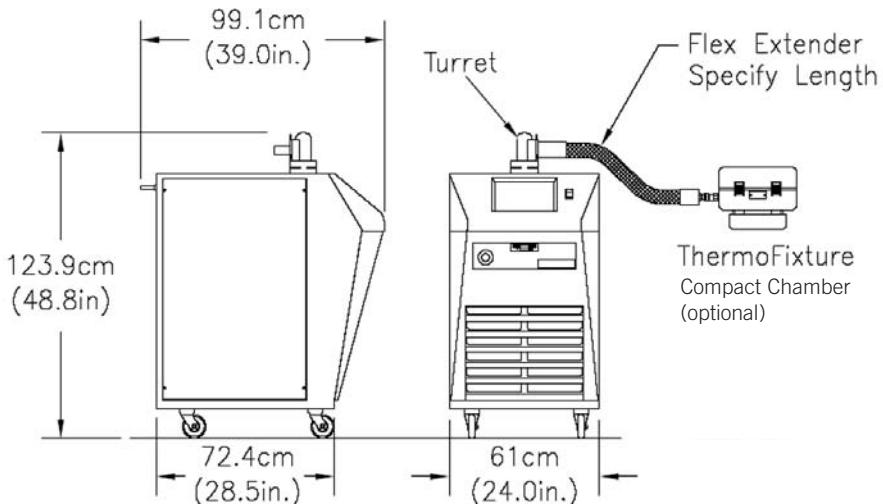
**TP04300B with optional ThermoChamber**

**Model TP04300B ThermoStream® System Specifications**

# Model TP04300B

## ThermoStream® System Specifications

TP04300B is shown with Turret Assembly connecting Base to Flexible Extender air transfer hose, to ThermoFixture® thermal enclosure. ThermoFixture, also available from Tempronic, is sold separately.



## ENVIRONMENTAL AND SERVICE FEATURES

Over-Temperature Protection	+235°C (factory-set) (Also uses user-settable high and low air temperature limit)
Mobility	4 swivel caster wheels with locks (10.16 cm (4-inch) diameter, static dissipative); rear handle for ease of transport
Refrigerants	HCFC-free and CFC-free, non-toxic, non-flammable
Noise level	<65 dBA approximately
Serviceability	Field-replacement modules and printed circuit boards
<b>Weights and Dimensions</b> <i>(Approximate)</i>	Base: <u>Width</u> : 61.0 cm (24 in.) <u>Depth</u> : 72.4 cm (28.5 in.); <u>Height</u> : 124 cm (49 in.); (height includes Turret Assembly) System weight: <u>unpacked</u> : 226 kg (500 lbs) approx.; <u>packed</u> : 341 kg (752 lbs) approx.

*(An additional 20.3 cm (8 in.) rear clearance is required for supply connections and cabinet ventilation.)*

## FACILITY REQUIREMENTS

<b>Power Requirements<sup>5</sup></b>	200-250 VAC (230V nominal), 50 Hz, 30 amp, 1 phase 200-250 VAC (230V nominal), 60 Hz, 30 amp, 1 phase
<b>Compressed Air Requirements</b>	
Clean, Dry Air	Filtered to 5 micron particulate contamination Oil content: <0.01 ppm by weight filtered to .01 micron oil contaminant Dewpoint: <10°C @ 6.2 BAR (90PSI)
Supply Pressure	6.2 to 7.6 BAR (90 to 110 PSIG)
Supply flow at minimum supply pressure	7.2 l/s to 14.3 l/s (15 to 30 scfm) (Nominal 25 scfm)
Air supply temperature	+20° to +25°C (+22°C nominal)
Operating Temperature	+20° to +28°C (+23°C nominal)
Humidity	0 to 60% (45% nominal)

<sup>5</sup>Note: System is configured for operation within voltages listed above using an internal transformer.  
Please specify power configuration with order.

\*Under operating conditions which are less or greater than nominal, performance may be less than specification provided.

ISO 9001-2000 Certified



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# FAX

To: Temptronic Corporation

**Fax to: 781-688-2301  
Attn: Customer Service Dept.**

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

## USER INTERFACE PERFORMANCE REPORT

To suggest any product enhancements or to report problems with the system hardware or software, please complete all pertinent information, including any additional information, and fax to **Temptronic, (781) 688-2301**, Attention: Customer Service Dept.

We recommend that you also copy this blank form and save it as a master to record all pertinent information.

If you require an immediate response, contact the Customer Service Department directly:

Tel: (800) 558-5080 (calling from USA only)  
Tel (781) 688-2341 (worldwide)

FAX: (781) 688-2541

Email: [service@temptronic.com](mailto:service@temptronic.com)

### Customer Information:

\_\_\_\_\_  
Name

\_\_\_\_\_  
Company

\_\_\_\_\_  
Street

\_\_\_\_\_  
Dept / Mail Stop

City                    State                    Zip Code

\_\_\_\_\_  
Telephone

\_\_\_\_\_  
Email

**Thank you for your participation in our  
Product Assurance Program!!**

### Product Information

System model number **TP** \_\_\_\_\_

System serial number \_\_\_\_\_

System code number \_\_\_\_\_

Software disk number **PG** \_\_\_\_\_

Software disk revision \_\_\_\_\_

ROM part number **PG** \_\_\_\_\_

ROM Revision \_\_\_\_\_

### Product Enhancement:

**Yes**      **No**

Is this a suggested product enhancement?    
(See page 2)

### Problem Determination:

Has service been requested?

Is the system useable?

Is the problem repeatable?

Does the problem occur with other identical units ( if available?)

Is the problem related to the front panel user interface?

Is the problem related to the system to tester interface?

Does the problem occur when the system is disconnected from all peripherals and operated in local mode?

**INTERNAL USE ONLY**

ORIGINATOR: \_\_\_\_\_

Date recorded \_\_\_\_\_ / \_\_\_\_\_ / \_\_\_\_\_

Copy to:

Manufacturing       Sales/Marketing  
 Quality Control       Engineering

**Additional Information**

Please provide a brief description of the suggested enhancement or problem condition:

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If you are reporting a problem, please provide the following:

1) Describe the operation being performed in detail:

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2) Provide keystroke sequence:

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3) Describe suspect module or component operation associated with the problem.

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Name \_\_\_\_\_

Date \_\_\_\_\_

Company \_\_\_\_\_





# FAX

To: Temptronic Corporation  
Attn: User Group Administrator  
Date: \_\_\_\_\_

**Fax to: 781-688-2301**

## USER / OWNER REGISTRATION CARD

Please help us to keep you up-to-date on all information regarding your system (feature updates, upgrades, and more..) by completing the following form and **faxing this to Temptronic at (781) 688-2301.**

**Thank you!**

User Name \_\_\_\_\_  
Title: \_\_\_\_\_  
Dept. \_\_\_\_\_ Mail Stop \_\_\_\_\_  
Company : \_\_\_\_\_  
Street: \_\_\_\_\_  
City : \_\_\_\_\_ State \_\_\_\_\_ Zip \_\_\_\_\_  
email : \_\_\_\_\_  
Telephone : \_\_\_\_\_ Fax: \_\_\_\_\_

**System model number(s) :** TP\_\_\_\_\_

ThermoStream®     ThermoFixture®     ThermoChuck®    Other \_\_\_\_\_

**System serial number(s)** \_\_\_\_\_

First Time User?     Yes     No

I also use Temptronic :

ThermoStream®    Model (s) \_\_\_\_\_  
 ThermoFixture®    Model (s) \_\_\_\_\_  
 ThermoChuck®    Model (s) \_\_\_\_\_  
 ThermoSocket® / Liquid Crystal Kit / Other \_\_\_\_\_

Other individuals who should also receive product updates:

Name \_\_\_\_\_ Dept. \_\_\_\_\_

Company and address ( if different from above) \_\_\_\_\_

*Thank you! We wish you great success in all your test endeavors. If you have any questions about your system, please call Temptronic at (781) 688-2300 and we will be happy to assist you.*

# *Warranty*

Temptronic warrants all equipment from its manufacture to be free from defects in materials and workmanship for a period of one year from the date of shipment to the original buyer. The liability under this warranty is limited to replacement parts and labor on equipment when the equipment is returned prepaid to the factory or its authorized service center with prior authorization from Temptronic Corporation, and upon examination by Temptronic Corporation, is determined to be defective. At Temptronic Corporation's option, a service representative may be dispatched to the equipment location.

As an additional protection, Temptronic warrants that for a period of 90 days from the date of shipment to the original buyer, there will be no charge for service-related shipping of parts and/or equipment or for authorized travel of a service representative to the equipment location. After 90 days, all costs incurred for shipping the equipment or parts thereof or for travel, are the responsibility of the buyer. Our warranty for this equipment is rendered void if the unit has been repaired, taken apart or modified, or attempted to be, unless such actions have been taken in accordance with written instructions received from Temptronic Corporation. The warranty is also void if the equipment has been subject to abuse, accident or other abnormal conditions.

**IF ANY FAULT DEVELOPS,  
THE FOLLOWING STEPS SHOULD BE TAKEN:**

1. Notify Temptronic by calling **781-688-2300**. (When calling from within the continental USA, call **800-558-5080**). Overseas customers should contact the local Temptronic authorized service center. Please be prepared with the model number, serial number and full details of the difficulty. Upon receipt of this information, service data or shipping instructions will be provided by Temptronic Corporation. Do not return the unit for repair without first contacting the factory or its representative for instructions.
2. After the initial 90 day period, on receipt of shipping instructions, forward the equipment prepaid to the factory or its authorized service center as instructed. If requested, an estimate of the charges will be made before work begins, especially with those cases where the Temptronic Corporation product is not covered by the warranty.
3. If the original carton and packing are not available, the product should be packed in a container with a strong exterior and surrounded by a protective layer of shock-absorbing material. Temptronic Corporation advises returning the equipment at full value to the carrier.

Temptronic reserves the right to make changes in design at any time without incurring any obligation to install the same changes on units previously purchased.

This warranty states the essence of the obligations and liabilities on the part of Temptronic Corporation. THE FORMAL, COMPLETE and EXCLUSIVE STATEMENT OF TEMPTRONIC CORPORATION'S WARRANTY IS CONTAINED IN ITS QUOTATIONS, ACKNOWLEDGEMENTS, AND INVOICES. Temptronic neither assumes nor authorizes any person to assume for it, any liability in connection with the sale of its equipment other than those set forth herein.

