

Thermo Scientific ThermoFlex™ Recirculating Chillers (Deluxe Controller)

Thermo Scientific Manual P/N U00939
Rev. 07/22/2015



Multilingual Quick Start Guides Installation Operation Basic Maintenance

Visit our Web site at:

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Declaration of Conformity

WARRANTY



This quick start guide is intended for initial start up only. For all other procedures you must refer to the manual. Also, if any of these steps are not clear download the manual before proceeding.

- The chiller is designed for indoor use only. Never place the chiller in a location with excessive heat, moisture, inadequate ventilation, or corrosive materials.
- Connect the chiller to a properly grounded outlet.
- Refrigerants used are heavier than air and will replace the oxygen causing loss of consciousness. Contact with leaking refrigerant will cause skin burns. Refer to the chiller's nameplate and the manufacturer's most current MSDS.
- Move the chiller with care. Sudden jolts or drops can damage its components. Always turn the equipment off and disconnect it from its supply voltage before moving it.
- Never operate damaged or leaking equipment.
- If your chiller is equipped with a positive displacement pump (P1 or P2), ensure your application plumbing lines and fittings are rated to withstand a minimum of 185 psi.
- Do not use a Deionization (DI) filter cartridge with Inhibited EG or Inhibited PG. A DI filter will remove inhibitors from the solution rendering the fluid ineffective against corrosion protection.
- Use only the approved fluids shown in Table 1. Before using any fluid or performing maintenance where contact with the fluid is likely, refer to the manufacturer's MSDS for handling precautions.
- To prevent freezing/glazing of the plate exchanger, ThermoFlex7500-10000 chillers require the use of 50/50 EG/water or 50/50 PG/water below 10°C process temperature.

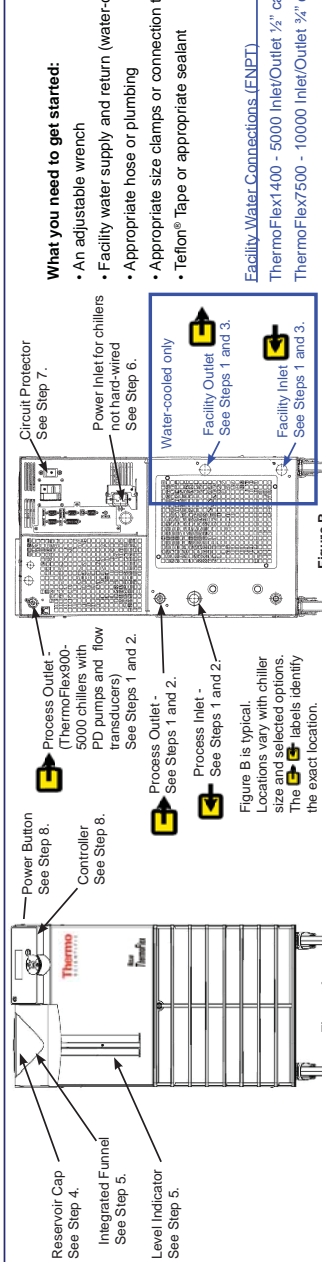


Figure B

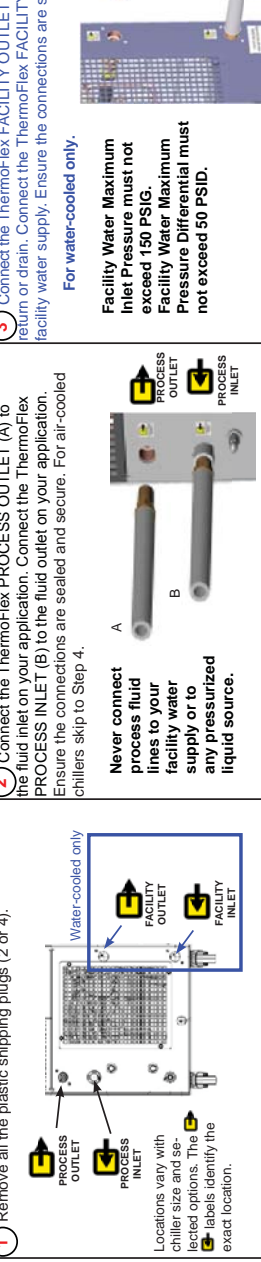


Table 1 - Approved Fluids:
Use of any other fluid will void the manufacturer's warranty.

High Temp Chillers
Filtered/single distilled water (pH 7-8)*
0 - 50% Laboratory Grade Ethylene Glycol/Water
0 - 50% Laboratory Grade Propylene Glycol/Water
*to 88°C for chillers with P1 and P2 pumps
*to 90°C for all other chillers

Standard Temp Chillers
Filtered/single distilled water (pH 7-8)
Deionized water (1-3 MΩ-cm, compensated)
Distilled water with Nalco biocide and inhibitor
Distilled water with chlorine (5 ppm)
0 - 75% Laboratory Grade Ethylene Glycol/Water
0 - 75% Laboratory Grade Propylene Glycol/Water

Process Fluid Connections (FNPT) Outlet	ThermoFlex9000 - 10000	P1 P2 T0 T1	1/2" cast bronze
	ThermoFlex3500 - 5000	P3 P4	3/4" cast bronze
	ThermoFlex7500 - 10000	P3 P5 T5	1" wrought copper
Inlet - Same size as outlet	all chillers stainless steel		
Supplied Adapters			
P1 P2 T0 T1	1/2" x 3/8" Polyethylene and 1/2" x 1/2" Nylon		
P3 P4	3/4 MPT x 1/2 barb PVC		
P3 P5 T5	1" MPT x 1" barb PVC and 1" MPT x 3/4" barb PVC		

What you need to get started:

- An adjustable wrench
- Facility water supply and return (water-cooled chillers)
- Appropriate hose or plumbing
- Appropriate size clamps or connection type
- Teflon® Tape or appropriate sealant

Facility Water Connections (ENPT)
ThermoFlex1400 - 5000 Inlet/Outlet 1/2" cast bronze
ThermoFlex7500 - 10000 Inlet/Outlet 3/4" cast bronze

1 Remove all the plastic shipping plugs (2 or 4).

Locations vary with chiller size and selected options. The labels identify the exact location.

2 Connect the ThermoFlex PROCESS OUTLET (A) to the fluid inlet on your application. Connect the ThermoFlex PROCESS INLET (B) to the fluid outlet on your application. Ensure the connections are sealed and secure. For air-cooled chillers skip to Step 4.

3 Connect the ThermoFlex FACILITY OUTLET (A) to a facility water return or drain. Connect the ThermoFlex FACILITY INLET (B) to a facility water supply. Ensure the connections are sealed and secure. For water-cooled only.

4 Refer to the name plate on the rear of the chiller and verify the appropriate voltage. For chillers supplied with a line cord, insert female end of line cord into chiller and then insert male end of line cord into power outlet. (The line cord is located under the shipping crate's lid. Do not discard the lid until the cord is located.)

Never operate the chiller with a damaged line cord.
Note: ThermoFlex9000-5000 chillers equipped with the Variable Voltage or Global Voltage option have a voltage configuration panel. Refer to the Voltage Instruction Sheet shipped with the chiller, or see manual Appendix B.

Note: For chillers requiring hard wiring see Section 3 in the manual.

5 If equipped, place the optional GFCI breaker located on the rear to the up position. For ThermoFlex9000 through 10000 chillers, place the circuit protector to the on (I) position.

The circuit protector is not intended to act as a disconnecting means.

6 Never operate the chiller without process fluid in the reservoir or without the fluid filter bag installed. Gently pull up on the plastic funnel housing to remove it and install the supplied filter bag. Reinstall the housing. Remove the reservoir cap from the housing by unscrewing it counterclockwise.

7 Slowly fill reservoir with clean process fluid (see Table 1), utilizing the reservoir cap, hand tight. Since the reservoir capacity may be small compared to your application and air may need to be purged from the lines, have extra fluid on hand to keep the system topped off when external circulation is started. If the fluid level drops too low the chiller will shut down to prevent the pump from running dry. Acknowledge the alarm and re-start the priming process.

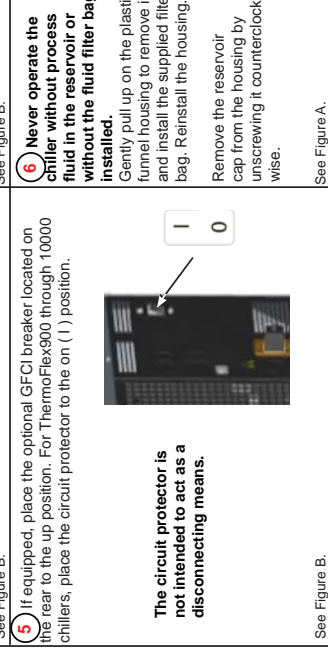
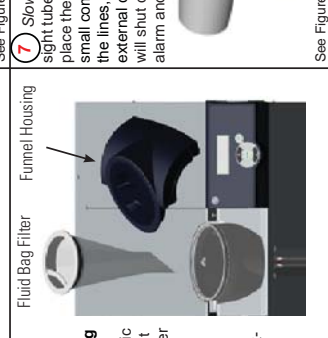
Note: Be careful not to fill the reservoir above MAX LEVEL fill line. This will result in a unit over flow error (Over Flow) which will cause the chiller to shut down.

8 Press

The controller will display **QUICK START**.

Note: Before proceeding, if the chiller is equipped with a deionization filter cartridge, refer to Section 5 in the manual for installation procedure.

Please see reverse side for additional information.



See Figure B.

See Figure B.

See Figure A.

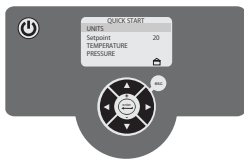
See Figure A.

See Figure B.

See Figure B.

See Figure A.

See Figure B.



QUICK START	
UNITS	
Setpoint	20
TEMPERATURE	
PRESSURE	
FLUID LEVEL	
AUTO REFILL*	
FLOW*	
Line Frequency*	60HZ
<input type="checkbox"/> Auto Restart	
<input type="checkbox"/> Audible Alarms	
RA FAN SPEED MODE*	
Care Level	1
SERIAL COMM - DCOM*	
ANALOG COMM - ACOM*	
RESISTIVITY*	
mm/dd/yy	hh:mm:ss
◀ Quick Start Done	
*Displays only on chillers equipped with the option.	

NOTE Any setting can be changed after the chiller is started.

The controller can display only six lines of the QUICK START menu at a time.

Use the down arrow to scroll through and highlight each line. If a change to any of the default settings is needed, with the desired line highlighted press the enter button.

If the text on any setting is all capital letters, the setting has a sub-menu. Pressing enter will bring up the sub-menu. The sub-menus allow you to view/change the applicable values.

After pressing enter the line will start to flash indicating the value can be changed using the up/down arrow buttons. Once the desired value is displayed, press enter again to stop the flashing and accept the new value. When all the desired changes are made press the left arrow or esc key to return to the QUICK START menu.

If the chiller exceeds the fault value it will shut down, the controller will display a fault message and, if enabled, sound the alarm. If the chiller exceeds the warning value the chiller will continue to run, the controller will display a warning message and, if enabled, sound the alarm.

Lines that are not all capital letters indicate the changes can be made directly on the QUICK START menu, i.e. Setpoint and Line Frequency. Use the same procedure to change these values.

If the line has a blank box, i.e. Auto Restart, pressing enter with that line highlighted will turn the box black. A black box indicates the feature is enabled. Press enter again to turn the box blank. A blank box indicates the feature is disabled.

Display	Indication	Range	Default
UNITS	Controller temperature, pressure and flow display scales. (Flow display is optional.)	C or F psi, bar or kPa gpm or lpm	C psi gpm
Setpoint	Setpoint value.	+5°C to +40°C (+90° for high temp chillers)	+20°C
TEMPERATURE	Temperature fault and warning values.	+2°C to +43°C (+93°C for high temp chillers)	High +42°C (+92°C for high temp chillers) Low +3°C
PRESSURE	Pressure fault, warning and time delay values. (The delay sets the length of time needed after a pressure fault before the chiller shuts down.)	Pump dependent - refer to Table 1 Time Delay: 0 to 30 seconds	Pump dependent - refer to Table 1 High Time Delay: 0 seconds (60 seconds for P3 - P5 pumps) Low Time Delay: 10 seconds
FLUID LEVEL	Reservoir low level fault and warning values.	Heater dependent - refer to Table 3	Heater dependent - refer to Table 3
AUTO REFILL	Optional auto refill values. (On is the % of fluid level in the reservoir needed to turn refill on. Time Out is the maximum time the option will operate. Setting the time to 0 disables the option.)	On: 70%- 100% Time Out: 0 - 900 seconds	Heater dependent, see manual
FLOW	Process fluid flow fault and warning values.	Pump dependent - refer to Table 2	Pump dependent - refer to Table 2
Line Frequency	The incoming frequency (Chillers with a P3 - P5 pump and the capability to run on either 50 Hz or 60 Hz only. The selected frequency automatically adjusts the firmware's fixed high pressure default setting.)	50 Hz or 60 Hz	60 Hz
Auto Restart	Enables the auto restart.	<input type="checkbox"/> or <input checked="" type="checkbox"/>	<input type="checkbox"/>
Audible Alarms	Enables the audible alarm.	<input type="checkbox"/> or <input checked="" type="checkbox"/>	<input type="checkbox"/>
RA FAN SPEED MODE	Fan speed. ThermoFlex2500 air-cooled chillers only (Auto allows the fan to run under the conditions listed in the manual, see Section 3. On allows the fan to run at high speed all the time.)	On or Auto	Auto
Care Level	The preventive care cleaning frequency reminder for the unit's air and fluid filters.	off, 1(1000 hours), 2(2000 hours) 3(3000 hours)	1
SERIAL COMM - DCOM	Optional serial communications. (See manual for additional information.)	Off, RS232, RS485	Off
ANALOG COMM - ACOM	Optional analog communications. (See manual for additional information.)	Refer to manual	
RESISTIVITY	Enables/configures the resistivity option. (See manual for additional information.)	<input type="checkbox"/> or <input checked="" type="checkbox"/> Setpoint: 0.2 to 3.0 MΩ-cm Interval: 0.1 to 0.5 MΩ-cm Warning High: 0.0 to 3.5 MΩ-cm Warning Low: 0.0 to 3.5 MΩ-cm	<input type="checkbox"/> Setpoint: 1.0 MΩ-cm Interval: 0.1 MΩ-cm Warning High: 3.0 MΩ-cm Warning Low: 0.5 MΩ-cm
mm/dd/yy	Sets the date. Some error messages display the date of occurrence.		
hh:mm:ss	Sets the time. Some error messages display the time of occurrence.		
Quick Start Done	To end the quick start procedure and save changes press the enter button. To leave the quick start and not save press the left arrow or esc button. In either case the screen will go blank.		

Table 1	Fault Range	High Default	Low Default
T0 T1 P1 P2 Pumps:	3 to 105 PSI	105 PSI	3 PSI
T5 Pumps:	2 to 105 PSI	105 PSI	2 PSI
P3 P4 P5 Pumps:	See Manual	See Manual	4 PSI

Table 2	Range	High Default	Low Default
T0 T1 P1 P2 Pumps:	0.0 to 10.5 GPM	0.0 GPM	0.0 GPM
T5 Pumps:	0.0 to 15.0 GPM	0.0 GPM	0.0 GPM
P3 P4 P5 Pumps:	0.0 to 30.0 GPM	0.0 GPM	0.0 GPM

Table 3	Warning Range	Default
Heater		
None	6 - 100%	6%
1 kW:	58 - 100%	58%
2.3 kW:	93 - 100%	93%
5.0 kW:	87 - 100%	87%
4.6 kW:	87 - 100%	87%
Heater		
None	0 - 100%	0%
1 kW:	52 - 100%	52%
2.3 kW:	87 - 100%	87%
5.0 kW:	81 - 100%	81%
4.6 kW:	81 - 100%	81%



Ce guide de démarrage rapide est destiné à la mise en marche initiale uniquement. Pour toute autre procédure, merci de vous référer au manuel. De plus, si l'une de ses étapes ne vous paraît pas claire, téléchargez le manuel avant de commencer.

Sécurité :

- Les refroidisseurs ont été conçus pour fonctionner uniquement à l'intérieur. Ne jamais exposer le refroidisseur à une chaleur ou une humidité excessive, à une ventilation inadéquate ou à des matières corrosives.
- Brancher le refroidisseur à une prise correctement reliée à la terre.
- Les réfrigérants utilisés sont plus lourds que l'air et peuvent remplacer l'oxygène, provoquant ainsi une perte de conscience. Tout contact avec des réfrigérants qui fument peut provoquer des brûlures cutanées. Pour plus d'informations, se reporter à la plaque signalétique du refroidisseur et à la Fiche de données de sécurité (MSDS) du fabricant la plus couramment utilisée.
- Déplacer le refroidisseur avec soin. Les secousses soudaines et les chutes peuvent endommager ses composants. À chaque déplacement de l'équipement, toujours le mettre hors tension et le débrancher de son alimentation.
- Ne jamais utiliser un équipement endommagé ou qui présente des fuites.

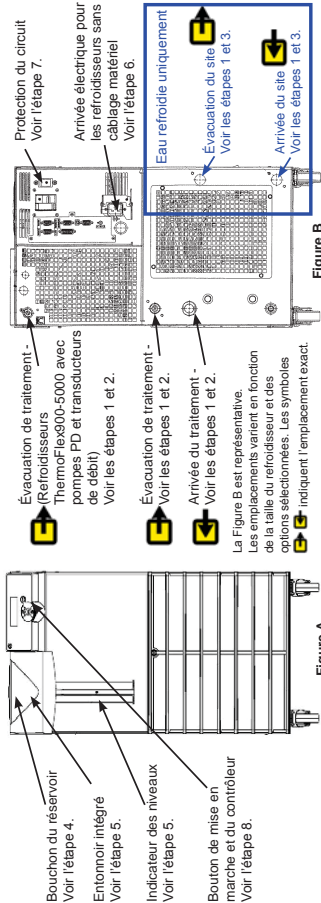


Figure A

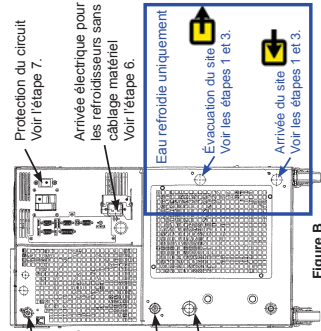


Figure B

- Si le refroidisseur est équipé d'une pompe à déplacement positif (P1 ou P2), s'assurer que les conduites de plomberie et les raccords de l'application peuvent supporter au moins 185 psi.
- Ne pas utiliser de cartouche de filtre de déionisation (DI) avec EG ou PG inhibés. Un filtre DI retiendra les inhibiteurs de la solution, rendant le liquide inefficace sur la protection contre la corrosion. Les inhibiteurs augmenteront également la conductivité du liquide.
- Utiliser uniquement les liquides approuvés et énumérés dans le Tableau 1. Avant d'utiliser un quelconque liquide ou d'effectuer des travaux d'entretien susceptibles d'entraîner un contact avec le liquide, se reporter à la Fiche de données de sécurité du fabricant.
- Pour éviter toute congélation/glaçage de l'échangeur à plaques, les refroidisseurs ThermoFlex7500-10000 requièrent l'utilisation d'EG/eau 50/50 ou de PG/eau 50/50 à une température inférieure de 10°C à celle du traitement.

Matériel nécessaire pour commencer :

- Une clé à molette
- Alimentation et évacuation d'eau du site (pour les refroidisseurs refroidis par eau)
- Tuyau et accessoires de plomberie appropriés
- Colliers de serrage ou raccords de connexion de dimension appropriée
- Ruban adhésif au Teflon® ou produit étanchéifiant approprié

Raccordements à l'eau du site (FNPT)

ThermoFlex1400 - 5000 Arrivée/Sortie fonte de bronze 0,5" ThermoFlex7500 - 10000 Arrivée/Sortie fonte de bronze 0,75"

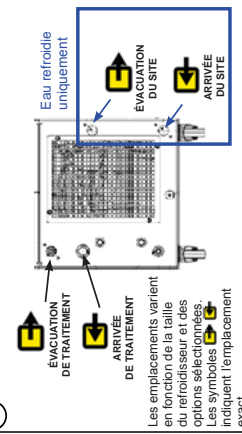
Raccordements du fluide de traitement (FNPT)

Sortie
TFlex900 - 10000 P1 P2 TO T1
TFlex3500 - 5000 P3 P4
TFlex7500 - 10000 P3 P5 T5

Adaptateurs fournis
P1 P2 TO T1 Polyéthylène 0,5" x 0,375" et Nylon 0,5" x 0,5"
P3 P4 MPT 0,75 x PVC cannelé 0,5
P3 P5 T5 MPT 1" x PVC cannelé 1" et MPT 1" x PVC cannelé 0,75"

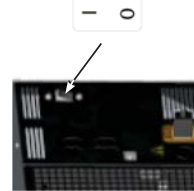
Tableau 1 - Liquides approuvés :	
Tout autre liquide annule la garantie du fabricant.	
Refrigérateurs température standard	
Eau filtrée/mono-distillée (pH 7-8)	
Eau déionisée (1 à 3 MΩ-cm, compensée)	
Eau distillée avec biocide Nalco et ses inhibiteurs	
Eau distillée avec chlore (5 ppm)	
Ethylène glycol de qualité laboratoire/eau 0 à 75 %	
Propylène glycol de qualité laboratoire/eau 0 à 75 %	
Refrigérateurs haute température	
Eau filtrée (pH 7-8)	
Ethylène glycol de qualité laboratoire/eau 0 à 50%	
Propylène glycol de qualité laboratoire/eau 0 à 50%	
Jusqu'à 88°C pour les refroidisseurs équipés des pompes P1 et P2	
Jusqu'à 90°C pour les refroidisseurs équipés d'autres pompes	

1 Retirer tous les bouchons d'expédition en plastique (2 ou 4).



Voir la Figure B.

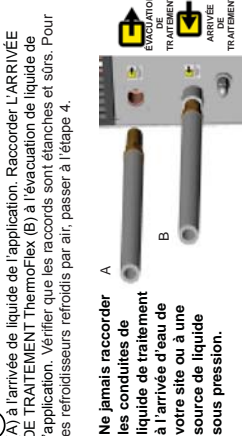
5 Si le refroidisseur en est équipé, armer le disjoncteur GFCI en option et situé à l'arrière de l'appareil en position haute. Pour les refroidisseurs ThermoFlex900 jusqu'à 10000, mettre le dispositif de protection du circuit sur la position (1).



Le dispositif de protection du circuit n'a pas été conçu pour déconnecter les appareils.

Voir la Figure B.

2 Raccorder l'ÉVACUATION DE TRAITEMENT ThermoFlex (A) à l'arrivée de liquide de l'application. Raccorder L'ARRIVÉE DE TRAITEMENT ThermoFlex (B) à l'évacuation de liquide de l'application. Vérifier que les raccords sont étanches et sûrs. Pour les refroidisseurs refroidis par air, passer à l'étape 4.



Voir la Figure B.

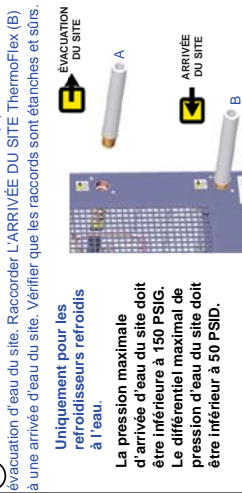
6 Ne jamais utiliser le refroidisseur sans l'installer dans le réservoir et/ou sans avoir installé le filtre sac.



Merci de tirer avec précaution sur la partie plastique du cache type entonnoir pour le lever et ensuite installer le filtre sac fourni. Une fois cette opération achevée, merci de repositionner le cache type entonnoir.

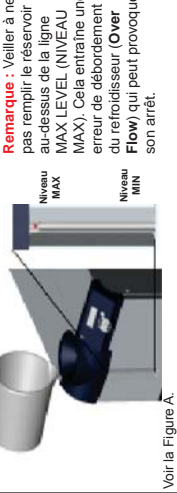
Voir la Figure A.

3 Raccorder L'ÉVACUATION DU SITE ThermoFlex (A) à une évacuation d'eau du site. Raccorder L'ARRIVÉE DU SITE ThermoFlex (B) à une arrivée d'eau du site. Vérifier que les raccords sont étanches et sûrs.



Voir la Figure B.

7 Remplir lentement le réservoir avec du liquide de traitement propre (voir le Tableau 1) en utilisant le regard pour contrôler facilement le niveau de liquide. Une fois le réservoir rempli, remettre le bouchon en le serrant à la main. La capacité du réservoir pouvant être réduite par rapport à l'application, et l'air devant être purgé des conduites, garder du liquide supplémentaire à portée de la main pour faire l'appoint du système une fois la circulation externe démarrée.



Remarque : Veiller à ne pas remplir le réservoir au-dessus de la ligne MAX LEVEL (NIVEAU MAX). Cela entraîne une erreur de débordement du refroidisseur (Over Flow) qui peut provoquer son arrêt.

Voir la Figure A.

4 Se reporter à la plaque signalétique située à l'arrière du refroidisseur et vérifier que la tension est correcte. Pour les refroidisseurs fournis avec un cordon d'alimentation, insérer l'extrémité femelle de ce dernier dans le refroidisseur, et l'extrémité mâle dans la prise électrique. (Le cordon d'alimentation se trouve sous le couvercle de la caisse d'expédition. Ne pas jeter le couvercle avant d'avoir localisé le cordon).

Ne jamais faire fonctionner un refroidisseur dont le cordon d'alimentation est endommagé.

Remarque : Les refroidisseurs ThermoFlex900-5000 équipés des options de tension variable ou de tension globale possèdent un panneau de configuration de la tension. Se référer à la fiche d'instructions relative à la tension livrée avec le refroidisseur ou consulter l'annexe B du manuel.

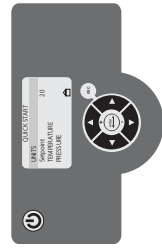
Remarque : Pour les refroidisseurs exigeant un câblage matériel, consulter la Section 3 du manuel.

8 Appliquer sur

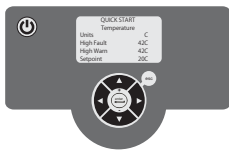
Le contrôleur affiche QUICK START.

Remarque : Si le refroidisseur est équipé d'une cartouche de filtre de déionisation, consulter le manuel, Section 5, pour l'installation.

Voir au dos les étapes supplémentaires.



Voir la Figure A.



MISE EN ROUTE RAPIDE	
UNITS (UNITÉS)	
Point de consigne	20
TEMPÉRATURE	
PRESSURE (PRESSION)	
FLUID LEVEL (NIVEAU DE LIQUIDE)	
REMPLISSAGE AUTOMATIQUE*	
DÉBIT*	
Fréquence de ligne*	60 Hz
<input type="checkbox"/> Auto Restart (Redémarrage automatique)	
<input type="checkbox"/> Alarmes sonores	
MODE DE VITESSE DE VENTILATION PR*	
Care Level (Niveau d'entretien)	1
COM SÉRIE - DCOM*	
COM ANALOGUE - ACOM*	
RÉSISTIVITÉ*	
mm/jj/aa	hh:mm:ss
◀ Quick Start Done (Mise en route rapide effectuée)	
*Uniquement sur les refroidisseurs équipés de l'option.	

REMARQUE Tous les réglages peuvent être modifiés une fois que le refroidisseur a démarré.

Le contrôleur ne peut afficher que six lignes du menu QUICK START à la fois.

Utiliser la flèche bas pour faire défiler et mettre en surbrillance chaque ligne. S'il est nécessaire de modifier l'un des réglages par défaut, mettre la ligne souhaitée en surbrillance puis appuyer sur le bouton Enter (Entrée).

Si le texte d'un réglage est complètement en majuscules, le réglage comporte un sous-menu. Appuyer sur le bouton Enter (Entrée) pour afficher le sous-menu. Les sous-menus vous permettent de visualiser/modifier les valeurs applicables.

Dès que l'on a appuyé sur le bouton Enter (Entrée), la ligne se met à clignoter pour indiquer que la valeur peut être modifiée à l'aide des flèches haut/bas. Une fois que la valeur souhaitée est affichée, appuyer de nouveau sur Enter (Entrée) pour faire cesser le clignotement et accepter la nouvelle valeur. Lorsque toutes les modifications souhaitées sont effectuées, appuyer sur la flèche gauche ou sur la touche Esc (Échap) pour revenir au menu QUICK START.

Si le refroidisseur dépasse la valeur de défaillance, il s'éteindra, le contrôleur affichera un message d'erreur et, si elle activée, l'alarme sonore se déclencherà. Si le refroidisseur dépasse la valeur d'avertissement, il continuera de fonctionner, le contrôleur affichera un message d'avertissement et, si elle activée, l'alarme sonore se déclencherà.

Les lignes qui ne comportent pas que des majuscules indiquent que les modifications peuvent être effectuées directement dans le menu QUICK START (exemple : Setpoint et Line Frequency). Suivre la même procédure pour modifier ces valeurs.

Si une ligne comporte une case vide (exemple : Auto Restart), le fait d'appuyer sur le bouton Enter (Entrée) avec la ligne concernée mise en surbrillance rendra la case noire. Une case noire indique que la fonction est activée. Appuyer de nouveau sur Enter (Entrée) pour que la case soit vide. Une case vide indique que la fonction est désactivée.

Affichage	Instructions	Plage	Valeur par défaut
UNITS	Échelles d'affichage du débit, de la pression et de la température du contrôleur. (L'affichage du débit est en option.)	C ou F psi, bar ou kPa gpm ou lpm	C psi gpm
Setpoint	Valeur du point de consigne.	De +5°C à +40°C (De +5°C à +90°C pour les refroidisseurs haute température)	+20°C
TEMPERATURE	Valeurs de défaillance de la température et d'avertissement.	De +2°C à +43°C (+93°C pour les refroidisseurs haute température)	Élevée +42°C (+92°C pour les refroidisseurs haute température) Faible +3°C
PRESSURE	Valeurs de défaillance de la pression, d'avertissement et de laps de temps. (Le délai est défini par le temps nécessaire avant l'arrêt du refroidisseur suite à une défaillance de pression.)	En fonction de la pompe ; se référer au Tableau 1 Laps de temps : de 0 à 30 secondes	En fonction de la pompe ; se référer au Tableau 1 Laps de temps élevé : 0 secondes (60 secondes pour les pompes P3 à P5) Laps de temps faible : 10 secondes
FLUID LEVEL	Valeurs d'avertissement et de niveau faible dans le réservoir.	En fonction du chauffage ; se référer au Tableau 3	En fonction du chauffage ; se référer au Tableau 3
AUTO REFILL	Valeurs de remplissage automatique en option. (On correspond au pourcentage de niveau de liquide dans le réservoir nécessaire pour lancer le remplissage. Le délai d'expiration est la durée maximale pendant laquelle l'option va fonctionner. Paramétrer la durée sur 0 désactive l'option.)	On : de 70 % à 100 % Time Out : de 0 à 900 secondes	En fonction du chauffage, consulter le manuel
FLOW	Valeurs d'avertissement et de défaillance du processus de débit de liquide.	En fonction de la pompe ; se référer au Tableau 2	En fonction de la pompe ; se référer au Tableau 2
Line Frequency	Fréquence d'entrée (Refroidisseurs équipés d'une pompe P3 à P5 et ayant la capacité de fonctionner à 50 Hz ou à 60 Hz uniquement. La fréquence sélectionnée ajuste automatiquement le réglage de haute pression par défaut fixe du microprogramme.)	50 Hz ou 60 Hz	60 Hz
Auto Restart	Active le redémarrage automatique.	<input type="checkbox"/> ou <input checked="" type="checkbox"/>	<input type="checkbox"/>
Audible Alarms	Active l'alarme sonore.	<input type="checkbox"/> ou <input checked="" type="checkbox"/>	<input type="checkbox"/>
RA FAN SPEED MODE	Vitesse de ventilation. Refroidisseurs refroidis par air ThermoFlex2500 uniquement (Auto permet au ventilateur de fonctionner dans les conditions énumérées dans le manuel, voir la section 3. On permet au ventilateur de fonctionner tout le temps à vitesse élevée.)	On ou Auto	Auto
Care Level	Rappel de nettoyage d'entretien préventif pour les filtres à air et à liquide du refroidisseur.	Off, 1 (1 000 heures), 2 (2 000 heures) 3 (3 000 heures)	1
SERIAL COMM - DCOM	Communications série en option. (Consulter le manuel pour toute information complémentaire.)	Off, RS232, RS485	Off
ANALOG COMM - ACOM	Communications analogues en option. (Consulter le manuel pour toute information complémentaire.)	Se reporter au manuel	
RESISTIVITY	Active/Configure l'option de résistivité. (Consulter le manuel pour toute information complémentaire.)	<input type="checkbox"/> ou <input checked="" type="checkbox"/> Point de consigne : de 0,2 à 3,0 MΩ-cm Intervalle : de 0,1 à 0,5 MΩ-cm Avertissement élevé : de 0,0 à 3,5 MΩ-cm Avertissement faible : de 0,0 à 3,5 MΩ-cm	<input type="checkbox"/> Point de consigne : 1,0 MΩ-cm Intervalle : 0,1 MΩ-cm Avertissement élevé : 3,0 MΩ-cm Avertissement faible : 0,5 MΩ-cm
mm/dd/yy (mm/jj/aa)	Paramètre la date. Certains messages d'erreur affichent la date d'apparition.		
hh:mm:ss	Paramètre l'heure. Certains messages d'erreur affichent l'heure d'apparition.		
Quick Start Done	Pour terminer la procédure de mise en route rapide et enregistrer les modifications, appuyer sur le bouton Enter (Entrée). Pour quitter la mise en route rapide et ne pas enregistrer, appuyer sur la flèche gauche ou sur le bouton Esc (Échap). Dans les deux cas, l'écran deviendra vide.		

Tableau 1	Plage de défaillance	Valeur par défaut élevée	Valeur par défaut faible
Pompes			
T0 T1 P1 P2 :	de 3 à 105 PSI	105 PSI	3 PSI
Pompes T5 :	de 2 à 105 PSI	105 PSI	4 PSI
Pompes			
P3 P4 P5 :	Consulter le manuel	Consulter le manuel	4 PSI

Tableau 2	Plage	Valeur par défaut élevée	Valeur par défaut faible
Pompes			
T0 T1 P1 P2 :	de 0,0 à 10,5 GPM	0,0 GPM	0,0 GPM
Pompes T5 :	de 0,0 à 15,0 GPM	0,0 GPM	0,0 GPM
Pompes			
P3 P4 P5 :	de 0,0 à 30,0 GPM	0,0 GPM	0,0 GPM

Tableau 3	Plage d'avertissement	Valeur par défaut
Chauffage		
Aucun	6 - 100 %	6 %
1 kW :	58 - 100 %	58 %
2,3 kW :	93 - 100 %	93 %
5,0 kW :	87 - 100 %	87 %
4,6 kW :	87 - 100 %	87 %

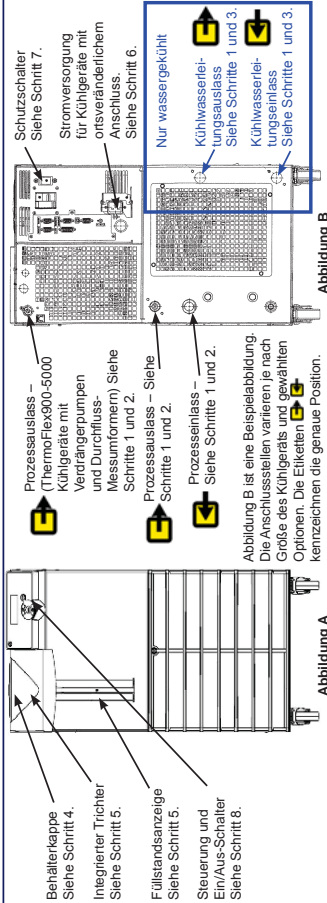
Tableau 3	Plage de défaillance	Valeur par défaut
Chauffage		
Aucun	0 - 100 %	0 %
1 kW :	52 - 100 %	52 %
2,3 kW :	87 - 100 %	87 %
5,0 kW :	81 - 100 %	81 %
4,6 kW :	81 - 100 %	81 %



Diese Kurzanleitung ist nur für die erste Inbetriebnahme vorgesehen. Für alle anderen Verfahren müssen Sie im Handbuch nachsehen. Auch wenn irgendwelche Schritte unverstandlich sind, laden Sie das Handbuch herunter, bevor Sie fortfahren.

Sicherheit:

- Das Kuhlerat darf nur in geschlossenen Raumen betrieben werden. Stellen Sie das Kuhlerat niemals an Orten auf, wo es ubermaiger Hitze, Feuchtigkeit, unzureichender Beluttung oder korrosiven Stoffen ausgesetzt ist.
- Schlieen Sie das Kuhlerat an eine ordnungsgema geerdete Steckdose an.
- Da die verwendeten Kuhlmittel schwerer als Luft sind und den Sauerstoff verdrangen, kann es zu Bewusstlosigkeit kommen. Der Kontakt mit ausatmendem Kuhlmittel kann Hautverbrennungen verursachen. Weitere Informationen finden Sie zur dem Typenschild des Kuhlerates sowie im aktuellen Sicherheitsdatenblatt (SDS) des Herstellers.
- Bewegen Sie das Kuhlerat vorsichtig. Plotzliche Erschutterungen oder Sturze konnen seine Bauteile beschadigen. Schalten Sie das Kuhlerat immer ab und trennen Sie es von der Versorgungsspannung, bevor Sie das Gerat bewegen.
- Betreiben Sie niemals beschadigte oder undichte Gerate.



- Falls Ihr Kuhlerat mit einer Verdrangerpumpe (P1 oder P2) ausgestattet ist, stellen Sie sicher, dass die Leitungen und Anschlusse einem Druck von mindestens 185 psi/12,8 bar standhalten.
- Verwenden Sie keine Deionisierungs (DI)-Filterkartusche bei inibitriertem EG oder inibitriertem PG. Mit einem DI-Filter werden Inhibitoren aus der Losung entfernt und dadurch wird die Korrosionsschutzwirkung der Flussigkeit aufgehoben. Inhibitoren erhohen auch die Leitfahigkeit der Flussigkeit.
- Verwenden Sie nur die in Tabelle 1 gezeigten zugelassenen Flussigkeiten. Beachten Sie die im Sicherheitsdatenblatt des Herstellers beschriebenen Vorsichtsmanahmen, bevor Sie Flussigkeiten einsetzen oder eine Wartung durchfuhren, bei der Sie moglicherweise mit Flussigkeiten in Beruhrung kommen...
- Um ein Einfrieren bzw. Vereisen des Plattenwarmetauschers zu vermeiden, mussen bei Betriebstemperaturen unter 10 °C fur ThermoFlex7500-10000 Kuhlerate 50/50 EG-Wasser oder 50/50 PG-Wasser verwendet werden.

Sie benotigen fur die Inbetriebnahme:

- Einen verstellbaren Schraubenschlussel
- Leitungswasserzu- und -ablauf (wassergekuhlte Kuhlerate)
- Passende Schlauche bzw. Leitungen
- Passende Klemmen oder Anschlussstucke
- Teflon®-Band oder geeignete Dichtungen

Kuhlwasserleitungsanschlusse (FNPT)

- ThermoFlex1400 - 5000 Einlass/Auslass 1/2" Gussbronze
- ThermoFlex500 - 10000 Einlass/Auslass 3/4" Gussbronze

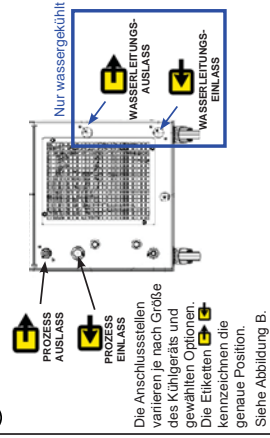
Tabelle 1 - Zugelassene Flussigkeiten:	
Jede andere Flussigkeit fuhrt zum Verlust der Herstellergarantie.	
Standardtemperaturkuhlerate	Filtriertes/einfach desilliertes Wasser (pH 7-8) Desilliertes Wasser (1-3 MQ-cm, kompensiert) Desilliertes Wasser mit Nalco Biozid und Inhibitor Desilliertes Wasser mit Chlor (5 ppm) 0 - 75 % Ethylenglykol/Wasser in Laborqualitat 0 - 75 % Propylenglykol/Wasser in Laborqualitat
Hochtemperaturkuhlerate	Filtriertes Wasser (pH 7-8) 0 - 50% Ethylenglykol/Wasser in Laborqualitat 0 - 50% Propylenglykol/Wasser in Laborqualitat *bis 88 °C fur Kuhlerate mit P1- und P2-Pumpen *bis 90 °C fur Kuhlerate mit anderen Pumpen

Anschlusse fur Prozessflussigkeiten (FNPT)

- TFlex900 - 10000 P1 P2 TO T1
 - TFlex3500 - 5000 P3 P4
 - TFlex7500 - 10000 P3 P5 T5
- 1" geschmiedetes Kupfer
 1" migeliertes Edelstahl
 Migeliertes Adapter

- P1 P2 TO T1 1/2" x 3/8" Polyethylen und 1/2" x 1/2" Nylon
- 3/4" Außengewinde x 1/2" PVC-Verbindungsstuck
- P3 P5 T5 1" Außengewinde x 1" PVC-Verbindungsstuck und 1" Außengewinde x 3/4" PVC-Verbindungsstuck

1 Entfernen Sie alle Kunststoff-Versandstopfen (2 oder 4).



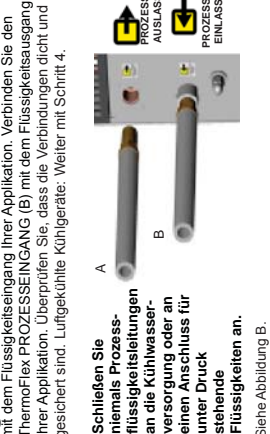
5 Falls vorhanden, stellen Sie den optionalen FI-Schutzschalter in die obere Position. Bei ThermoFlex900 bis 10000 Kuhleraten stellen Sie den Schalter in die Position Ein (I).



Der Schutzschalter ist nicht zum Ausschalten des Gerates vorgesehen.

Siehe Abbildung B.

2 Verbinden Sie den ThermoFlex PROZESSAUSGANG (A) mit dem Flussigkeitsausgang Ihrer Applikation. Verbinden Sie den ThermoFlex PROZESS-EINGANG (B) mit dem Flussigkeitsausgang Ihrer Applikation. Uberprufen Sie, dass die Verbindungen dicht und gesichert sind. Luftgekuhlte Kuhlerate: Weiter mit Schritt 4.



6 Bereiten Sie niemals den Kuhler ohne Prozessflussigkeit im Behalter oder ohne installiertem Flussigkeit Filterbeutel.

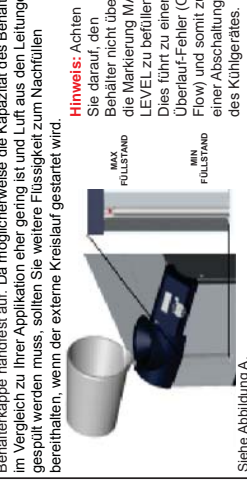


Siehe Abbildung A.

3 Verbinden Sie den ThermoFlex KUHLWASSERLEITUNGS-AUSLASS (A) mit Ihrem Wasserrucklauf oder -abfluss. Verbinden Sie den ThermoFlex KUHLWASSERLEITUNGS-EINLASS (B) mit einer Wasserleitung. Uberprufen Sie, dass die Verbindungen dicht und gesichert sind.



7 Befullen Sie den Behalter langsam mit sauberer Prozessflussigkeit (siehe Tabelle 1) und kontrollieren Sie den Fullstand uber die Fullstandsanzeige. Wenn der Behalter voll ist, schrauben Sie die Behalterkappe handfest auf. Da moglicherweise die Kapazitat des Behalters im Vergleich zu Ihrer Applikation eher gering ist und Luft aus den Leitungen gespult werden muss, sollten Sie weitere Flussigkeit zum Nachfullen bereithalten, wenn der externe Kreislauf gestartet wird.



Siehe Abbildung A.

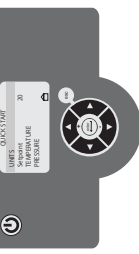
4 Kontrollieren Sie, ob die korrekte Spannung eingestellt ist. Sie auf dem Typenschild auf der Ruckseite des Kuhlerates finden. Stecken Sie bei Kuhleraten mit Stromkabel zunachst das gerateneigene Ende in das Kuhlerat und anschlieend den Stecker in eine Steckdose. (Das Stromkabel befindet sich unter dem Deckel der Transportkiste. Werfen Sie den Deckel nicht weg, bevor Sie das Stromkabel gefunden haben.)



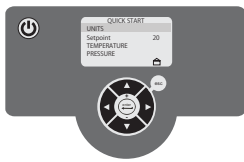
8 Drucken Sie auf Daraufhin zeigt die Steuerung Quick Start (SCHNELLSTART) an.

Hinweis: Falls das Kuhlerat mit einer Deionisierungs-Filterkartusche ausgestattet ist, fuhren Sie bitte die weitere Flussigkeit zum Einstellen in Abschnitt 5 des Handbuchs.

Weitere Schritte siehe Ruckseite.



Siehe Abbildung A.



QUICK START (SCHNELLSTART)	
UNITS (EINHEITEN)	
Setpoint (Sollwert)	20
TEMPERATURE (TEMPERATUR)	
PRESSURE (DRUCK)	
FLUID LEVEL (FÜLLSTAND)	
AUTO REFILL (AUTOM. NACHFÜLLUNG)*	
FLOW (FLUSS)*	
Line Frequency (Netzfrequenz)*	60HZ
<input type="checkbox"/> Auto Restart (Autom. Neustart)	
<input type="checkbox"/> Audible Alarms (Akustische Alarme)	
RA FAN SPEED MODE (RA-LÜFTERDREHZAHLMODUS)*	
Care Level (Wartungserinnerung)	1
SERIAL COMM – DCOM (SERIELLE KOMMUNIKATION – DCOM)	
ANALOG COMM – ACOM (ANALOGUE KOMMUNIKATION – ACOM)*	
RESISTIVITY (WIDERSTAND)*	
mm/dd/yy (mm/tt/jj)	hh:mm:ss
◀ Quick Start Done (Schnellstart beenden)	
* Wird nur auf Kühlern angezeigt, die mit dieser Option ausgestattet sind.	

HINWEIS Alle Einstellungen können nach dem Starten des Kühlers geändert werden.

Auf dem Regler werden maximal sechs Zeilen des Menüs QUICK START (SCHNELLSTART) gleichzeitig angezeigt.

Mit dem Pfeil nach unten können Sie die Zeilen durchblättern und markieren. Wenn eine Standardeinstellung geändert soll, markieren Sie die gewünschte Zeile, und drücken Sie ENTER.

Ist eine Einstellung in Großbuchstaben geschrieben, steht ein Untermenü zur Verfügung. Mit ENTER öffnen Sie das Untermenü. In den Untermenüs können Sie die entsprechenden Werte abrufen bzw. ändern.

Sobald Sie ENTER drücken, beginnt die Zeile zu blinken. Dies bedeutet, dass der Wert nun mit dem Pfeil nach oben und unten geändert werden kann. Blättern Sie zum gewünschten Wert, und drücken Sie erneut ENTER. Die Einstellung blinkt nicht mehr, und der neue Wert ist festgelegt. Wenn Sie alle gewünschten Änderungen vorgenommen haben, drücken Sie den Pfeil nach links oder ESC. Damit gelangen Sie zum Menü QUICK START (SCHNELLSTART) zurück.

Überschreitet der Kühler den Fehlerwert, wird das Gerät ausgeschaltet. Auf dem Regler wird eine Fehlermeldung angezeigt, und ein akustischer Alarm ertönt (sofern dieser aktiviert ist). Überschreitet der Kühler den Warnwert, bleibt das Gerät weiterhin eingeschaltet. Auf dem Regler wird eine Warnmeldung angezeigt, und ein akustischer Alarm ertönt (sofern dieser aktiviert ist).

Bei Zeilen, die nicht vollständig in Großbuchstaben angezeigt werden, können Sie die Änderungen direkt im Menü QUICK START (SCHNELLSTART) vornehmen. Dies gilt für die Optionen „Setpoint“ (Sollwert) und „Line Frequency“ (Netzfrequenz). Diese Werte lassen sich auf dieselbe Weise wie die anderen Einstellungen ändern.

Ist in der Zeile ein leeres Kästchen sichtbar, z. B. bei „Auto Restart“ (Autom. Neustart), wird das Kästchen schwarz, sobald Sie die betreffende Zeile markieren und ENTER drücken. Ein schwarzes Kästchen bedeutet, dass die zugehörige Funktion aktiviert ist. Wenn Sie erneut ENTER drücken, wird wieder ein leeres Kästchen angezeigt. Ein leeres Kästchen bedeutet, dass die zugehörige Funktion deaktiviert ist.

Anzeige	Inhalt	Bereich	Standardwert
UNITS (EINHEITEN)	Einheiten für die Temperatur-, Druck- und Flussanzeige auf dem Regler. (Die Flussanzeige ist optional.)	C oder F psi, bar oder kPa gpm oder lpm	C psi gpm
Setpoint (Sollwert)	Sollwert.	+5 °C bis +40 °C (+90 °C bei Hochtemperaturkühlern)	+20 °C
TEMPERATURE (TEMPERATUR)	Fehler- und Warnwerte für die Temperatur.	+2 °C bis +43 °C (+93 °C bei Hochtemperaturkühlern)	High (Obergrenze): +42 °C (+92 °C bei Hochtemperaturkühlern) Low (Untergrenze): +3 °C
PRESSURE (DRUCK)	Fehler-, Warn- und Zeitverzögerungswerte für den Druck. (Die Verzögerung bestimmt den Zeitraum, nach dessen Ablauf der Kühler ausgeschaltet wird, wenn ein fehlerhafter Druck vorliegt.)	Je nach Pumpe; siehe Tabelle 1 Time Delay (Zeitverzögerung): 0–30 Sekunden	Je nach Pumpe; siehe Tabelle 1 High Time Delay (Obergrenze für Zeitverzögerung): 0Sekunden(60Sekunden bei P3- bis P5-Pumpen) Low Time Delay (Untergrenze für Zeitverzögerung): 10 Sekunden
FLUID LEVEL (FÜLLSTAND)	Fehler- und Warnwerte für niedrigen Füllstand im Behälter.	Je nach Heizung; siehe Tabelle 3	Je nach Heizung; siehe Tabelle 3
AUTO REFILL (AUTOM. NACHFÜLLUNG)	Optionale Werte für die automatische Nachfüllung. („On“ [Ein] bezeichnet den Prozentsatz des Füllstands im Behälter, bei dem die Nachfüllung eingeschaltet wird. „Time Out“ [Zeitüberschreitung] bezeichnet den maximalen Zeitraum, über den diese Option aktiv sein soll. Wird dieser Zeitraum auf 0 gesetzt, so wird die Option deaktiviert.)	On (Ein): 70–100 % Time Out (Zeitüberschreitung): 0–900 Sekunden	Je nach Heizung; siehe Handbuch
FLOW (FLUSS)	Fehler- und Warnwerte für den Fluss der Prozessflüssigkeit.	Je nach Pumpe, siehe Tabelle 2	Je nach Pumpe, siehe Tabelle 2
Line Frequency (Netzfrequenz)	Eingangsfrequenz (Kühler mit P3- bis P5-Pumpe und Möglichkeit zum Betrieb mit 50 Hz oder 60 Hz. Über die gewählte Frequenz wird die festgelegte Überdruck-StandardEinstellung der Firmware automatisch justiert.)	50 Hz oder 60 Hz	60 Hz
Auto Restart (Autom. Neustart)	Ermöglicht den automatischen Neustart.	<input type="checkbox"/> oder <input checked="" type="checkbox"/>	<input type="checkbox"/>
Audible Alarms (Akustische Alarme)	Aktiviert akustische Alarme.	<input type="checkbox"/> oder <input checked="" type="checkbox"/>	<input type="checkbox"/>
RA FAN SPEED MODE (RA-LÜFTERDREHZAHLMODUS)	Lüfterdrehzahl. Nur für luftgekühlte Kühler Modell ThermoFlex2500. (Ermöglicht den automatischen Betrieb des Lüfters gemäß den im Handbuch aufgeführten Bedingungen; siehe Abschnitt 3. Bei „On“ [Ein] läuft der Lüfter durchgängig mit der höchsten Drehzahl.)	„On“ (Ein) oder „Auto“	Auto
Care Level (Wartungserinnerung)	Erinnerung an die Reinigung der Luft- und Flüssigkeitsfilter des Geräts im Rahmen der vorbeugenden Wartung.	Off (Aus), 1 (1000 Stunden), 2 (2000 Stunden), 3 (3000 Stunden)	1
SERIAL COMM – DCOM (SERIELLE KOMMUNIKATION – DCOM)	Optionale serielle Kommunikation. (Weitere Informationen siehe Handbuch.)	Off (Aus), RS232, RS485	Off (Aus)
ANALOG COMM – ACOM (ANALOGUE KOMMUNIKATION – ACOM)	Optionale analoge Kommunikation. (Weitere Informationen siehe Handbuch.)	Siehe Handbuch.	
RESISTIVITY (WIDERSTAND)	Aktiviert/konfiguriert die Option für den Widerstand. (Weitere Informationen siehe Handbuch.)	<input type="checkbox"/> oder <input checked="" type="checkbox"/> Setpoint (Sollwert): 0,2–3,0 MΩ-cm Interval (Intervall): 0,1–0,5 MΩ-cm Warning High (Obere Warngrenze): 0,0–3,5 MΩ-cm Warning Low (Untere Warngrenze): 0,0–3,5 MΩ-cm	<input type="checkbox"/> Setpoint (Sollwert): 1,0 MΩ-cm Interval (Intervall): 0,1 MΩ-cm Warning High (Obere Warngrenze): 3,0 MΩ-cm Warning Low (Untere Warngrenze): 0,5 MΩ-cm
mm/dd/yy (mm/tt/jj)	Stellt das Datum ein. In einigen Fehlermeldungen wird das Datum des Fehlers angezeigt.		
hh:mm:ss	Stellt die Uhrzeit ein. In einigen Fehlermeldungen wird die Uhrzeit des Fehlers angezeigt.		
Quick Start Done (Schnellstart beenden)	Zum Beenden des Schnellstartverfahrens und zum Speichern der Änderungen drücken Sie ENTER. Um den Schnellstart abzubrechen ohne zu speichern, drücken Sie den Pfeil nach links oder ESC. In beiden Fällen schaltet sich die Bildschirmanzeige aus.		

Tabelle 1	Fehlerbereich	Standard-Obergrenze	Standard-Untergrenze
T0-, T1-, P1-, P2-Pumpe:	3–105 psi	105 psi	3 psi
T5 Pumpe:	2–105 psi	105 psi	4 psi
P3-, P4-, P5-Pumpe	Siehe Handbuch	Siehe Handbuch	4 psi

Tabelle 2	Bereich	Standard-Obergrenze	Standard-Untergrenze
T0-, T1-, P1-, P2-Pumpe:	0,0–10,5 gpm	0,0 gpm	0,0 gpm
T5 Pumpe:	0,0–15,0 gpm	0,0 gpm	0,0 gpm
P3-, P4-, P5-Pumpe:	0,0–30,0 gpm	0,0 gpm	0,0 gpm

Tabelle 3	Heizung	Warnbereich	Standardwert
Keine	6–100 %		6 %
1 kW:	58–100 %		58 %
2,3 kW:	93–100 %		93 %
5,0 kW:	87–100 %		87 %
4,6 kW:	87–100 %		87 %

Heizung	Fehlerbereich	Standardwert
Keine	0–100 %	0 %
1 kW:	52–100 %	52 %
2,3 kW:	87–100 %	87 %
5,0 kW:	81–100 %	81 %
4,6 kW:	81–100 %	81 %



Scopo di questa guida rapida è facilitare la messa in funzione iniziale. Per tutte le altre procedure è necessario fare riferimento al manuale. Se alcuni dei passaggi qui riportati non risultano chiari, scaricare il manuale prima di proseguire.

Sicurezza:

- Il refrigeratore è progettato esclusivamente per l'uso al chiuso. Non posizionare mai il refrigeratore in un ambiente a temperature eccessivamente alte, umido, con ventilazione inadeguata o materiali corrosivi.
- Attaccare il refrigeratore a una presa correttamente collegata a massa.
- I refrigeranti utilizzati sono più pesanti dell'aria e sostituiranno l'ossigeno causando la perdita di coscienza. Il contatto con refrigeranti fuoriusciti causa ustioni della pelle. Per ulteriori informazioni, fare riferimento alla targhetta identificativa del refrigeratore e alla scheda di sicurezza dei materiali (MSDS) più recente.
- Spostare il refrigeratore con cautela. Cadute o urti improvvisi possono danneggiare i componenti. Spegnerne sempre l'apparecchiatura e scollegarla dalla tensione di alimentazione, prima di spostarla.
- Non azionare apparecchiature danneggiate o che presentano perdite.

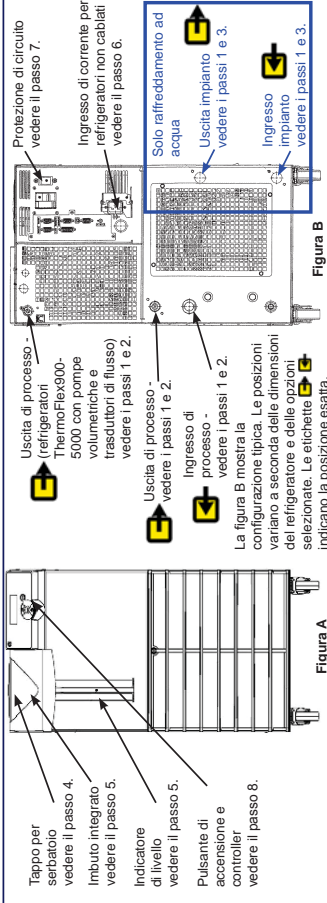
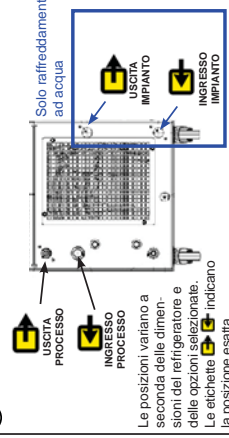


Figura A

Figura B

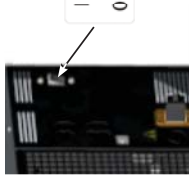
1 Rimuovere tutti i tappi di spedizione (2 o 4).



Le posizioni variano a seconda delle dimensioni del refrigeratore e delle opzioni selezionate. Le etichette A e B indicano la posizione esatta.

vedere la figura B.

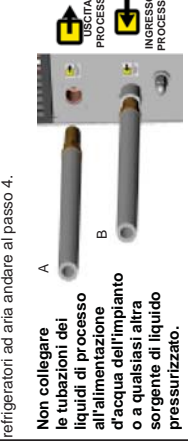
5 Se in dotazione, portare l'interruttore GFCI opzionale situato sul retro nella posizione sollevata. Per i refrigeratori compresi tra ThermoFlex900 e 10000, portare la protezione di circuito nella posizione attiva (1).



La protezione di circuito non è progettata per agire come strumento di scollegamento.

vedere la figura B.

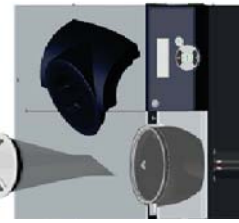
2 Collegare l'USCITA DI PROCESSO ThermoFlex (A) all'ingresso liquidi per l'applicazione. Collegare l'INGRESSO DI PROCESSO ThermoFlex (B) all'uscita liquidi per l'applicazione. Verificare che i raccordi siano ben saldi e sigillati. Per i refrigeratori ad aria andare al passo 4.



Non collegare le tubazioni dei liquidi di processo all'alimentazione d'acqua dell'impianto o a qualsiasi altra sorgente di liquido pressurizzato.

vedere la figura B.

6 Non utilizzare mai il chiller senza il liquido di raffreddamento nel serbatoio o senza avere installato il sacchetto filtro.



Estrarre con cautela l'alloggiamento in plastica dell'imbuto per rimuoverlo e installare il sacchetto filtro in dotazione. Reinstallare nuovamente l'alloggiamento.

vedere la figura A.

Elementi necessari per la messa in funzione:

- Una chiave regolabile
- Alimentazione e ritorno acqua dell'impianto (refrigeratori ad acqua)
- Tubazioni rigide o flessibili idonee
- Tipo di raccordi o dimensioni fascette adeguate
- Nastro adesivo Teflon® o sigillante idoneo

Raccordi acqua dell'impianto (FNPT)
ThermoFlex 1400 - 5000 Ingressi/uscite in bronzo fuso da 1/2"
ThermoFlex 7500 - 10000 Ingressi/uscite in bronzo fuso da 3/4"

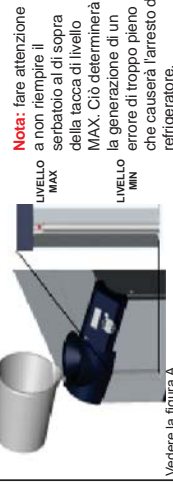
3 Collegare l'USCITA IMPIANTO ThermoFlex (A) a una tubazione di ritorno o scarico dell'acqua dell'impianto. Collegare l'INGRESSO IMPIANTO ThermoFlex (B) all'alimentazione acqua dell'impianto. Verificare che i raccordi siano ben saldi e sigillati.



Solo per il raffreddamento ad acqua.
La pressione di ingresso massima dell'acqua dell'impianto non deve superare i 150 PSIG. Il differenziale di pressione massimo dell'acqua dell'impianto non deve superare i 50 PSID.

vedere la figura B.

7 Riempire lentamente il serbatoio con liquido di processo pulito (vedere la tabella 1), utilizzando il tubo spia per controllare facilmente il livello del liquido. Quando il serbatoio è pieno, riapplicare il tappo e serrare a mano. Poiché la capacità del serbatoio potrebbe essere inferiore al necessario per l'applicazione interessata e l'aria potrebbe essere spurgata dalle tubazioni, tenere a portata di mano del liquido extra per rabboccare il sistema all'avvio del riciclo esterno.



vedere la figura A.

Tabella 1 - Liquidi approvati:
L'uso di qualsiasi altro liquido annullerà la garanzia del produttore.
Refrigeratori a temperature standard
Acqua distillata/filtrata (pH 7-8)
Acqua deionizzata (1-3 MQ-cm, compensata)
Acqua distillata con biocida o inibitore NaClO
Acqua distillata con cloro (5 ppm)
0 - 75% etilenglicole/acqua per laboratorio
0 - 75% propilenglicole/acqua per laboratorio
Refrigeratori a temperature elevate
Acqua filtrata (pH 7-8)*
0 - 50% etilenglicole/acqua per laboratorio
0 - 50% propilenglicole/acqua per laboratorio
* a 88°C per refrigeratori con pompe P1 e P2
* a 90°C per refrigeratori con altre pompe

Raccordi per liquidi di processo (FNPT) - Uscita	P1 P2 TO T1
TFlex900 - 10000	in bronzo fuso da 1/2"
TFlex3500 - 5000	P3 P4
TFlex7500 - 10000	P3 P5 T5
Ingresso - stessa dimensione dell'uscita, in acciaio inossidabile per tutti i refrigeratori	
Adattatori forniti	
P1 P2 TO T1	in polietilene da 1/2" x 3/8" e in nylon da 1/2" x 1/2"
P3 P4	MPT 3/4 x raccordo dentato in PVC 1/2"
P3 P5 T5	MPT 1" x raccordo dentato in PVC 1" e MPT 1" x raccordo dentato in PVC 3/4"

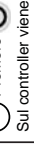
4 Fare riferimento alla targhetta identificativa sul retro del refrigeratore e verificare la tensione corretta. Per i refrigeratori forniti con un cavo di alimentazione, inserire l'estremità femmina del cavo nel refrigeratore e l'estremità maschio nella presa di corrente. (Il cavo di alimentazione si trova sotto il coperchio della cassa per la spedizione. Non gettare il coperchio fino a quando non si trova il cavo.)



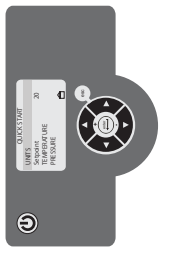
vedere la figura B.

Non azionare il refrigeratore con un cavo di alimentazione danneggiato.
Nota: i refrigeratori ThermoFlex900-5000 dotati dell'opzione di tensione variabile o globale hanno un pannello di configurazione della tensione. Fare riferimento al foglio delle istruzioni relative alla tensione specificato con il refrigeratore o vedere l'Appendice B al manuale.
Nota: per i refrigeratori che richiedono il cablaggio vedere la sezione 3 del manuale.

8 Premere

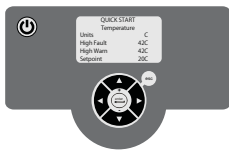


Sul controller viene visualizzato **QUICK START**.
Nota: se il refrigeratore viene dotato di una cartuccia filtro per deionizzazione fare riferimento alla sezione 5 del manuale per informazioni sull'installazione.



Consultare il retro per ulteriori procedure.

vedere la figura A.



QUICK START	
UNITS	
Setpoint	20
TEMPERATURE	
PRESSURE	
FLUID LEVEL	
AUTO REFILL*	
FLOW*	
Line Frequency*	60HZ
<input type="checkbox"/> Auto Restart	
<input type="checkbox"/> Audible Alarms	
RA FAN SPEED MODE*	
Care Level	1
SERIAL COMM - DCOM*	
ANALOG COMM - ACOM*	
RESISTIVITY*	
mm/dd/yy	hh:mm:ss
◀ Quick Start Done	
*Vengono visualizzati solo i refrigeratori dotati di tale opzione.	

NOTA Le impostazioni possono essere modificate solo dopo l'avvio del refrigeratore.

Sul controller possono essere visualizzate solo sei righe del menu QUICK START alla volta.

Utilizzare la freccia giù per scorrere ed evidenziare ciascuna riga. Per modificare un'impostazione predefinita, evidenziare la riga interessata e premere il pulsante Enter.

Se il testo di un'impostazione è tutto in maiuscolo, è presente un sottomenu. Premendo il pulsante Enter viene visualizzato il sottomenu. I sottomenu consentono di visualizzare/modificare i valori applicabili.

Dopo aver premuto il pulsante Enter, la riga inizia a lampeggiare a indicare che il valore può essere modificato tramite le frecce su/giù. Una volta visualizzato il valore desiderato, premere nuovamente il pulsante Enter per non far lampeggiare più la riga e accettare il nuovo valore. Una volta apportate tutte le modifiche desiderate, premere la freccia sinistra o il tasto Esc per tornare al menu QUICK START.

Se il valore di guasto viene superato, il refrigeratore viene spento, sul controller viene visualizzato il messaggio di errore e, se abilitato, viene emesso l'allarme acustico. Se il valore di avviso viene superato, il refrigeratore continua a funzionare, sul controller viene visualizzato il messaggio di avviso e, se abilitato, viene emesso l'allarme acustico.

Le righe che non sono tutte in maiuscolo indicano che le modifiche possono essere apportate direttamente nel menu QUICK START (ad esempio, Setpoint e Line Frequency). Utilizzare la stessa procedura per modificare questi valori.

Se la riga contiene un quadratino bianco (ad es., Auto Restart), premendo il pulsante Enter con quella riga evidenziata, il quadratino diventa nero. Un quadratino nero indica che la funzione è abilitata. Premere nuovamente Enter per visualizzare nuovamente il quadratino bianco. Un quadratino bianco indica che la funzione è disabilitata.

Display	Significato	Intervallo	Impostazione predefinita
UNITS	Scale di visualizzazione di temperatura, pressione e flusso del controller. (La visualizzazione del flusso è opzionale.)	C o F psi, bar o kPa gpm o lpm	C psi gpm
Setpoint	Valore di impostazione.	Da +5°C a +40°C (Da +5°C a +90° per refrigeratori a temperature elevate)	+20°C
TEMPERATURE	Valori guasto o avviso temperatura.	Da +2°C a +43°C (+93°C per refrigeratori a temperature elevate)	Valore alto +42°C (+92°C per refrigeratori temp. elevate) Valore basso +3°C
PRESSURE	Valori guasto, avviso e ritardo pressione. (Il ritardo imposta il tempo ammesso dopo un guasto di pressione prima che il refrigeratore venga spento.)	Variabile in base alla pompa - fare riferimento alla tabella 1 Time Delay: Da 0 a 30 secondi	Variabile in base alla pompa - fare riferimento alla tabella 1 High Time Delay: 0 secondi (60 secondi per pompe P3 - P5) Low Time Delay: 10 secondi
FLUID LEVEL	Valori guasto e avviso basso livello di liquido nel serbatoio.	Variabile in base al riscaldatore - fare riferimento alla tabella 3	Variabile in base al riscaldatore - fare riferimento alla tabella 3
AUTO REFILL	Valori di rabbocco automatico opzionale. (On è la % di livello del liquido nel serbatoio necessaria per attivare il rabbocco. Time Out è il tempo massimo di esecuzione dell'opzione. Impostando il tempo su 0 l'opzione viene disabilitata.)	On: 70% - 100% Time Out: 0 - 900 secondi	Variabile in base al riscaldatore, vedere il manuale
FLOW	Valori guasto e avviso flusso liquido di processo.	Variabile in base alla pompa - fare riferimento alla tabella 2	Variabile in base alla pompa - fare riferimento alla tabella 2
Line Frequency	La frequenza in entrata (refrigeratori con una pompa P3 - P5 e capacità di funzionamento solo a 50 Hz o 60 Hz. La frequenza selezionata regola automaticamente l'impostazione predefinita dell'alta pressione fissa del firmware.)	50 Hz o 60 Hz	60 Hz
Auto Restart	Consente il riavvio automatico.	<input type="checkbox"/> o <input checked="" type="checkbox"/>	<input type="checkbox"/>
Audible Alarms	Attiva l'allarme acustico.	<input type="checkbox"/> o <input checked="" type="checkbox"/>	<input type="checkbox"/>
RA FAN SPEED MODE	Velocità ventola. Solo refrigeratori ThermoFlex2500 raffreddati ad aria (Auto consente il funzionamento della ventola nelle condizioni indicate nel manuale, vedere la sezione 3. On consente il funzionamento della ventola sempre ad alta velocità.)	On o Auto	Auto
Care Level	Il promemoria di frequenza manutenzione preventiva di pulizia per i filtri aria e liquido del refrigeratore.	off, 1 (1000 ore), 2 (2000 ore) 3 (3000 ore)	1
SERIAL COMM - DCOM	Comunicazioni seriali opzionali. (Per ulteriori informazioni, vedere il manuale.)	Off, RS232, RS485	Off
ANALOG COMM - ACOM	Comunicazioni analogiche opzionali. (Per ulteriori informazioni, vedere il manuale.)	Fare riferimento al manuale	
RESISTIVITY	Attiva/configura l'opzione di resistività. (Per ulteriori informazioni, vedere il manuale.)	<input type="checkbox"/> o <input checked="" type="checkbox"/> Setpoint: Da 0,2 a 3,0 MΩ-cm Interval: Da 0,1 a 0,5 MΩ-cm Warning High: Da 0,0 a 3,5 MΩ-cm Warning Low: Da 0,0 a 3,5 MΩ-cm	<input type="checkbox"/> Setpoint: 1,0 MΩ-cm Interval: 0,1 MΩ-cm Warning High: 3,0 MΩ-cm Warning Low: 0,5 MΩ-cm
mm/dd/yy	Consente di impostare la data nel formato mm/gg/aa. Alcuni messaggi di errore mostrano la data in cui si è verificato l'evento.		
hh:mm:ss	Consente di impostare l'ora. Alcuni messaggi di errore mostrano l'ora in cui si è verificato l'evento.		
Quick Start Done	Per terminare la procedura di avvio rapido e salvare le modifiche premere il pulsante Enter. Per chiudere la procedura di avvio rapido senza salvare, premere la freccia sinistra o il pulsante Esc. In entrambi i casi, lo schermo si spegnerà.		

Tabella 1	Intervallo guasto	Imp. predefinita max	Imp. predefinita min
Pompe T0 T1 P1 P2:	Da 3 a 105 PSI	105 PSI	3 PSI
Pompe T5:	Da 2 a 105 PSI	105 PSI	4 PSI
Pompe P3 P4 P5:	Vedere il manuale	Vedere il manuale	4 PSI

Tabella 2	Intervallo	Imp. predefinita max	Imp. predefinita min
Pompe T0 T1 P1 P2:	Da 0,0 a 10,5 GPM	0,0 GPM	0,0 GPM
Pompe T5:	Da 0,0 a 15,0 GPM	0,0 GPM	0,0 GPM
Pompe P3 P4 P5:	Da 0,0 a 30,0 GPM	0,0 GPM	0,0 GPM

Tabella 3	Intervallo di avviso	Imp. predefinita
Riscaldatore		
Nessuno	6 - 100%	6%
1 kW:	58 - 100%	58%
2,3 kW:	93 - 100%	93%
5,0 kW:	87 - 100%	87%
4,6 kW:	87 - 100%	87%
Riscaldatore		
Nessuno	0 - 100%	0%
1 kW:	52 - 100%	52%
2,3 kW:	87 - 100%	87%
5,0 kW:	81 - 100%	81%
4,6 kW:	81 - 100%	81%



Scopo di questa guida rapida è facilitare la messa in funzione iniziale. Per tutte le altre procedure è necessario fare riferimento al manuale. Se alcuni dei passaggi qui riportati non risultano chiari, scaricare il manuale prima di proseguire.

Sicurezza:

- Il refrigeratore è progettato esclusivamente per l'uso al chiuso. Non posizionare mai il refrigeratore in un ambiente a temperature eccessivamente alte, umido, con ventilazione inadeguata o materiali corrosivi.
- Attaccare il refrigeratore a una presa correttamente collegata a massa.
- I refrigeranti utilizzati sono più pesanti dell'aria e sostituiranno l'ossigeno causando la perdita di coscienza. Il contatto con refrigeranti fuoriusciti causa ustioni della pelle. Per ulteriori informazioni, fare riferimento alla targhetta identificativa del refrigeratore e alla scheda di sicurezza dei materiali (MSDS) più recente.
- Spostare il refrigeratore con cautela. Cadute o urti improvvisi possono danneggiare i componenti. Spegnerne sempre l'apparecchiatura e scollegarla dalla tensione di alimentazione, prima di spostarla.
- Non azionare apparecchiature danneggiate o che presentano perdite.

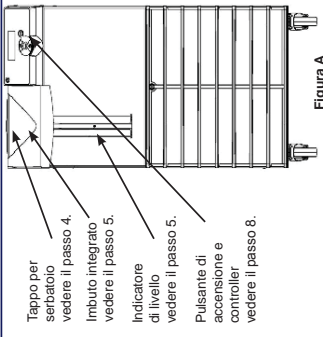


Figura A

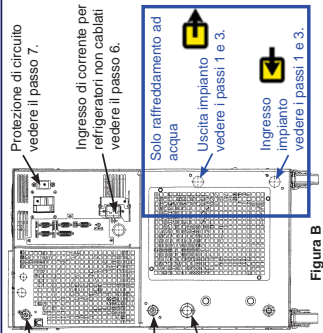


Figura B

- Se il refrigeratore è dotato di pompa volumetrica (P1 o P2), verificare che le tubazioni idrauliche e i raccordi previsti per l'applicazione siano progettati per sostenere una pressione minima di 185 psi.
- Non utilizzare una cartuccia filtro per deionizzazione (DI) con etilenglicole o propilenglicole inibito. Il filtro di rimozione gli inibitori dalla soluzione rendendo il liquido inefficace contro la protezione dalla corrosione. Inoltre, gli inibitori aumentano la conduttività del liquido.
- Utilizzare solo i liquidi approvati riportati nella tabella 1. Prima di utilizzare liquidi o eseguire eventuali interventi di manutenzione che potrebbero implicare il contatto con il liquido, fare riferimento alle schede di sicurezza dei materiali (MSDS) del produttore per le precauzioni d'uso.
- Per impedire il congelamento dello scambiatore di calore a piastre, i refrigeratori ThermoFlex7500-10000 richiedono l'uso di 50/50 di etilenglicole/acqua o propilenglicole/acqua per temperature di processo inferiori a 10°C.

Elementi necessari per la messa in funzione:

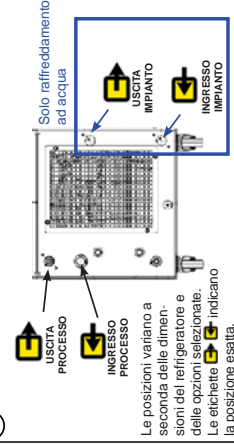
- Una chiave regolabile
- Alimentazione e ritorno acqua dell'impianto (refrigeratori ad acqua)
- Tubazioni rigide o flessibili idonee
- Tipo di raccordi o dimensioni fascette adeguate
- Nastro adesivo Teflon® o sigillante idoneo

Raccordi acqua dell'impianto (FNPT)
ThermoFlex 1400 - 5000 Ingressi/uscite in bronzo fuso da 1/2"
ThermoFlex 7500 - 10000 Ingressi/uscite in bronzo fuso da 3/4"

Tabella 1 - Liquidi approvati:
L'uso di qualsiasi altro liquido annullerà la garanzia del produttore.
Refrigeratori a temperature standard
Acqua distillata/filtrata (pH 7-8)
Acqua deionizzata (1-3 MQ-cm, compensata)
Acqua distillata con bicioda o inibitore Naïco
Acqua distillata con cloro (5 ppm)
0 - 75% etilenglicole/acqua per laboratorio
0 - 75% propilenglicole/acqua per laboratorio
Refrigeratori a temperature elevate
Acqua filtrata (pH 7-8)*
0 - 50% etilenglicole/acqua per laboratorio
0 - 50% propilenglicole/acqua per laboratorio
* a 88°C per refrigeratori con pompe P1 e P2
* a 90°C per refrigeratori con altre pompe

Raccordi per liquidi di processo (FNPT) - Uscita
P1 P2 TO T1 in bronzo fuso da 1/2"
TFlex900 - 10000
P3 P4 in bronzo fuso da 3/4"
TFlex3500 - 5000
P3 P5 T5 in rame lavorato da 1"
TFlex7500 - 10000
Ingresso - stessa dimensione dell'uscita, in acciaio inossidabile per tutti i refrigeratori
Adattatori forniti
P1 P2 TO T1 in polietilene da 1/2" x 3/8" e in nylon da 1/2" x 1/2"
P3 P4 MPT 3/4 x raccordo dentato in PVC 1/2"
P3 P5 T5 MPT 1" x raccordo dentato in PVC 1" e MPT 1" x raccordo dentato in PVC 3/4"

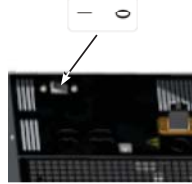
1 Rimuovere tutti i tappi di spedizione (2 o 4).



Le posizioni variano a seconda delle dimensioni del refrigeratore e delle opzioni selezionate. Le etichette A e B indicano la posizione esatta.

Vedere la figura B.

5 Se in dotazione, portare l'interruttore GFCI opzionale situato sul retro nella posizione sollevata. Per i refrigeratori compresi tra ThermoFlex900 e 10000, portare la protezione di circuito nella posizione attiva (1).



La protezione di circuito non è progettata per agire come strumento di scollegamento.

Vedere la figura B.

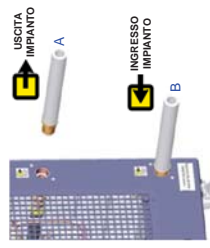
2 Collegare l'USCITA DI PROCESSO ThermoFlex (A) all'ingresso liquidi per l'applicazione. Collegare l'INGRESSO DI PROCESSO ThermoFlex (B) all'uscita liquidi per l'applicazione. Verificare che i raccordi siano ben saldi e sigillati. Per i refrigeratori ad aria andare al passo 4.



Non collegare le tubazioni dei liquidi di processo all'alimentazione d'acqua dell'impianto o a qualsiasi altra sorgente di liquido pressurizzato.

Vedere la figura B.

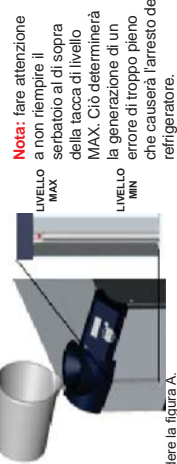
3 Collegare l'USCITA IMPIANTO ThermoFlex (A) a una tubazione di ritorno o scarico dell'acqua dell'impianto. Collegare l'INGRESSO IMPIANTO ThermoFlex (B) all'alimentazione acqua dell'impianto. Verificare che i raccordi siano ben saldi e sigillati.



Solo per il raffreddamento ad acqua.
La pressione di ingresso massima dell'acqua dell'impianto non deve superare i 150 PSIG. Il differenziale di pressione massimo dell'acqua dell'impianto non deve superare i 50 PSID.

Vedere la figura B.

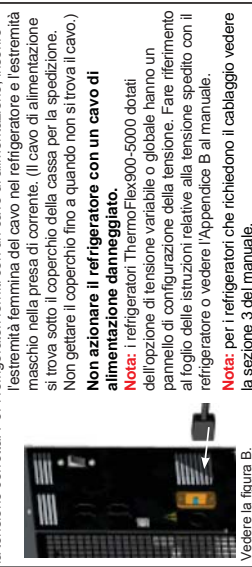
7 Riempire lentamente il serbatoio con liquido di processo pulito (vedere la tabella 1), utilizzando il tubo spia per controllare facilmente il livello del liquido. Quando il serbatoio è pieno, riapplicare il tappo e serrare a mano. Poiché la capacità del serbatoio potrebbe essere inferiore al necessario per l'applicazione interessata e l'aria potrebbe essere spurgata dalle tubazioni, tenere a portata di mano del liquido extra per rabboccare il sistema all'avvio del riciclo esterno.



Nota: fare attenzione a non riempire il serbatoio al di sopra della tacca di livello MAX. Ciò determinerà la generazione di un errore di troppo pieno che causerà l'arresto del refrigeratore.

Vedere la figura A.

4 Fare riferimento alla targhetta identificativa sul retro del refrigeratore e verificare la tensione corretta. Per i refrigeratori forniti con un cavo di alimentazione, inserire l'estremità femmina del cavo nel refrigeratore e l'estremità maschio nella presa di corrente. (Il cavo di alimentazione si trova sotto il coperchio della cassa per la spedizione. Non gettare il coperchio fino a quando non si trova il cavo.)



Non azionare il refrigeratore con un cavo di alimentazione danneggiato.
Nota: i refrigeratori ThermoFlex900-5000 dotati dell'opzione di tensione variabile o globale hanno un pannello di configurazione della tensione. Fare riferimento al foglio delle istruzioni relative alla tensione specificato con il refrigeratore o vedere l'Appendice B al manuale.
Nota: per i refrigeratori che richiedono il cablaggio vedere la sezione 3 del manuale.

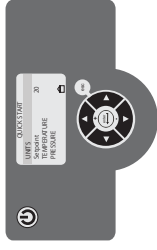
Vedere la figura B.

8 Premere

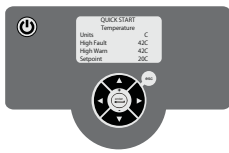


Sul controller viene visualizzato **QUICK START**.
Nota: se il refrigeratore viene dotato di una cartuccia filtro per deionizzazione fare riferimento alla sezione 5 del manuale per informazioni sull'installazione.

Consultare il retro per ulteriori procedure.



Vedere la figura A.



QUICK START	
UNITS	
Setpoint	20
TEMPERATURE	
PRESSURE	
FLUID LEVEL	
AUTO REWILL*	
FLOW*	
Line Frequency*	60HZ
<input type="checkbox"/> Auto Restart	
<input type="checkbox"/> Audible Alarms	
RA FAN SPEED MODE*	
Care Level	1
SERIAL COMM - DCOM*	
ANALOG COMM - ACOM*	
RESISTIVITY*	
mm/dd/yy	hh:mm:ss
◀ Quick Start Done	
*Se muestra solo en los enfriadores equipados con esta opción.	

NOTA: Se puede modificar la configuración de cualquiera de los parámetros una vez que el enfriador comienza a funcionar.

En el controlador solo se pueden mostrar seis líneas del menú PUESTA EN MARCHA RÁPIDA al mismo tiempo.

Utilice la flecha abajo para desplazarse y resaltar las líneas. En caso de que se requiera cambiar alguno de los parámetros predeterminados, resalte la línea que desea modificar y pulse el botón Enter.

Si el texto del parámetro está escrito con letras mayúsculas, el parámetro tendrá un menú secundario. Si pulsa el botón Enter, aparecerá el menú secundario. Los menús secundarios le permiten visualizar/cambiar los valores correspondientes.

Después de pulsar el botón Enter (Intro), la línea comenzará a parpadear, lo que indicará que el valor puede cambiarse con las flechas arriba/abajo. Cuando se muestre el valor que desea, vuelva a pulsar el botón Enter para detener el parpadeo y aceptar el valor nuevo. Cuando haya realizado todos los cambios que desee, pulse la flecha izquierda o la tecla Esc para volver al menú PUESTA EN MARCHA RÁPIDA.

Si el enfriador excede el valor de error predeterminado, este se cerrará, en el controlador se mostrará un mensaje de error y, si está activada, se oirá la alarma. Si el enfriador excede el valor de alerta predeterminado, este continuará funcionando, en el controlador se mostrará un mensaje de alerta y, si está activada, se oirá la alarma.

Las líneas en las que el texto no está escrito con letras mayúsculas indican que los cambios pueden hacerse directamente en el menú PUESTA EN MARCHA RÁPIDA (por ejemplo, Valor de referencia y Frecuencia de línea). Siga el mismo procedimiento para cambiar estos valores.

Si la línea tiene una casilla en blanco (por ejemplo, Reinicio automático), resalte la línea y pulse el botón Enter para que la casilla se muestre de color negro. Una casilla negra indica que la función está activada. Vuelva a pulsar el botón Enter para volver a poner en blanco la casilla. Una casilla en blanco indica que la función está desactivada.

Texto en pantalla	Indicación	Intervalo	Valor predeterminado
UNIDADES	Escalas de visualización de temperatura, presión y flujo del controlador. (La visualización del flujo es opcional).	C o F psi, bar o kPa gal/min o l/min	C psi gal/min
Valor de referencia	Valor de referencia.	De + 5 °C a + 40 °C (de + 5 °C a + 90 °C en enfriadores de alta temperatura)	+ 20 °C
TEMPERATURA	Valores de error y alerta de temperatura.	De + 2 °C a + 43 °C (+ 93 °C en enfriadores de alta temperatura)	Superior: + 42 °C (+ 93 °C en enfriadores de alta temperatura) Inferior: + 3 °C
PRESIÓN	Valores de error, alerta y tiempo de retardo de presión (el tiempo de retardo es el periodo de tiempo que debe transcurrir para que el enfriador se apague tras un error de presión).	Según la bomba (consulte la tabla 1) Tiempo de retardo: de 0 a 30 segundos	Según la bomba (consulte la tabla 1) Tiempo de retardo superior: 0 segundos (60 segundos con bombas P3 - P5) Tiempo de retardo inferior: 10 segundos
NIVEL DE LÍQUIDO	Valores de alerta y error de nivel bajo del depósito.	Según el calentador (consulte la tabla 3)	Según el calentador (consulte la tabla 3)
RECARGA AUTOMÁTICA	Valores de recarga automática opcionales. (Activado es el % de nivel de líquido que se necesita en el depósito para activar la recarga. Tiempo de espera es el tiempo máximo durante el cual funcionará la opción. Al establecer el tiempo en 0, se desactivará la opción).	Activado: del 70 % al 100 % Tiempo de espera: de 0 a 900 segundos	Según el calentador; consulte el manual
FLUJO	Valores de alerta y error del flujo del líquido del proceso.	Según la bomba (consulte la tabla 2)	Según la bomba (consulte la tabla 2)
Frecuencia de línea	Frecuencia entrante (solo enfriadores con una bomba P 3 - P 5 y la capacidad de funcionar a 50 Hz o 60 Hz. La frecuencia seleccionada ajusta automáticamente la configuración predeterminada de presión alta fija del firmware).	50 Hz o 60 Hz	60 Hz
Reinicio automático	Activa el reinicio automático.	<input type="checkbox"/> o <input checked="" type="checkbox"/>	<input type="checkbox"/>
Alarmas sonoras	Activa las alarmas sonoras.	<input type="checkbox"/> o <input checked="" type="checkbox"/>	<input type="checkbox"/>
MODO RÁPIDO DE VELOCIDAD DE VENTILADOR	Velocidad del ventilador. Solo para enfriadores refrigerados por aire ThermoFlex2500 (La opción Automático permite que el ventilador funcione con las condiciones enumeradas en el manual; consulte la sección 3. La opción Activado permite que el ventilador funcione a alta velocidad todo el tiempo).	Activado o Automático	Automático
Nivel de cuidados	Recordatorio de la frecuencia de limpieza como cuidado preventivo de los filtros de aire y líquidos del enfriador.	DESACTIVADO, 1 (1000 horas), 2 (2000 horas), 3 (3000 horas)	1
COMUNICACIONES EN SERIE - DCOM	Comunicaciones en serie opcionales (para obtener información adicional, consulte el manual).	DESACTIVADO, RS232, RS485	DESACTIVADO
COMUNICACIONES ANALÓGICAS - ACOM	Comunicaciones analógicas opcionales (para obtener información adicional, consulte el manual).	Consulte el manual.	
RESISTIVIDAD	Activa/configura la opción de resistividad (para obtener información adicional, consulte el manual).	<input type="checkbox"/> o <input checked="" type="checkbox"/> Valor de referencia: de 0,2 a 3,0 MΩ-cm Intervalo: de 0,1 a 0,5 MΩ-cm Alerta superior: de 0,0 a 3,5 MΩ-cm Alerta inferior: de 0,0 a 3,5 MΩ-cm	<input type="checkbox"/> Valor de referencia: 1,0 MΩ-cm Intervalo: de 0,1 MΩ-cm Alerta superior: 3,0 MΩ-cm Alerta inferior: 0,5 MΩ-cm
mm/dd/aa	Establece la fecha. En algunos mensajes de error se muestra la fecha en la que se produjeron.		
hh:mm:ss	Establece la hora. En algunos mensajes de error se muestra la hora en la que se produjeron.		
Finalización de la puesta en marcha rápida	Para finalizar el procedimiento de puesta en marcha rápida y guardar los cambios, pulse el botón Enter. Para salir de la puesta en marcha rápida y descartar los cambios, pulse la flecha izquierda o pulse el botón Esc. En ambos casos, la pantalla se quedará en blanco.		

Tabla 1	Intervalo de error	Valor predet. superior	Valor predet. inferior
Bombas T0 T1 P1 P2:	De 3 a 105 PSI	105 PSI	3 PSI
Bombas T5:	De 2 a 105 PSI	105 PSI	4 PSI
Bombas P3 P4 P5:	Consulte el manual	Consulte el manual	4 PSI

Tabla 2	Intervalo	Valor predet. superior	Valor predet. inferior
Bombas T0 T1 P1 P2:	De 0,0 a 10,5 GPM	0,0 GPM	0,0 GPM
Bombas T5:	De 0 a 15,0 GPM	0,0 GPM	0,0 GPM
Bombas P3 P4 P5:	De 0,0 a 30,0 GPM	0,0 GPM	0,0 GPM

Tabla 3	Intervalo de alerta	Valor predeterminado
Calentador	Del 6 al 100 %	6 %
Ninguno		
1 kW:	Del 58 al 100 %	58 %
2,3 kW:	Del 93 al 100 %	93 %
5,0 kW:	Del 87 al 100 %	87 %
4,6 kW:	Del 87 al 100 %	87 %
Calentador	Intervalo de error	Valor predeterminado
Ninguno	Del 0 al 100 %	0 %
1 kW:	Del 52 al 100 %	52 %
2,3 kW:	Del 87 al 100 %	87 %
5,0 kW:	Del 81 al 100 %	81 %
4,6 kW:	Del 81 al 100 %	81 %

Preface

Compliance Third Party:

CSA Listed - Laboratory equipment-electrical

File # 105974_C_000

CLASS: 8721-05 CAN/CSA-C22.2 No. 61010-1-04

CLASS: 8721-85 ANSI/UL Standard 61010-1



European Union (EU) LVD & EMC

Our evaluation has demonstrated compliance with EU directives, as indicated by the CE Mark located on the chiller's nameplate and the Declaration of Conformity in the back of this manual.



WEEE

This product is required to comply with the European Union's Waste Electrical & Electronic Equipment (WEEE) Directive 2002/96/EC. It is marked with the following symbol:



Thermo Fisher Scientific has contracted with one or more recycling/disposal companies in each EU Member State, dispose of or recycle this product through them. Further information on Thermo Fisher Scientific's compliance with these Directives is available at:
www.thermoscientific.com/WEEERoHS

After-sale Support

Thermo Fisher Scientific is committed to customer service both during and after the sale. If you have questions concerning the chiller operation, or questions concerning spare parts or Service Contracts, call our Sales, Service and Customer Support phone number, see this manual's inside cover for contact information.

When calling, please refer to the labels on the inside cover. These labels list all the necessary information needed to properly identify your chiller.

Feedback

We appreciate any feedback you can give us on this manual. Please e-mail us at tcmanuals@thermofisher.com. Be sure to include the manual part number and the revision date listed on the front cover.

Warranty

Thermo Scientific ThermoFlex chillers have a warranty against defective parts and workmanship for 24 months (**excluding MD1/MD2 Magnetic Drive and P1/P2 Positive Displacement pumps which are warranted for 12 months**) from date of shipment. See back page for more details.

Unpacking

If the chiller has a line cord it is located under the shipping crate's lid. Do not discard the lid until the cord is located.

Locate the reservoir fluid filter bag and ensure it installed before the chiller is operated. See Section 3.

Retain all cartons and packing material until the chiller is operated and found to be in good condition. If it shows external or internal damage contact the transportation company and file a damage claim. Under ICC regulations, this is your responsibility.

Out of Box Failure

An Out of Box Failure is defined as any product that fails to operate in conformance with sellers published specifications at initial power up. Install the chiller in accordance with manufacturer's recommended operating conditions within 30 days of shipment from the seller.

Any Temperature Control product meeting the definition of an Out of Box Failure must be packed and shipped back in the original packaging to Thermo Fisher Scientific for replacement with a new chiller; seller to pay the cost of shipping. Customer must receive a Return Material Authorization (RMA) from Thermo Fisher prior to shipping.

Section 1 Safety

Safety Warnings

Make sure you read and understand all instructions and safety precautions listed in this manual before installing or operating your chiller. If you have any questions concerning the operation or the information in this manual, please contact us. See inside cover for contact information.



DANGER indicates an imminently hazardous situation which, if not avoided, *will* result in death or serious injury.



WARNING indicates a potentially hazardous situation which, if not avoided, *could* result in death or serious injury.



CAUTION indicates a potentially hazardous situation which, if not avoided, may result in minor or moderate injury. It is also be used to alert against unsafe practices.



The lightning flash with arrow symbol, within an equilateral triangle, is intended to alert the user to the presence of non-insulated "dangerous voltage" within the chiller's enclosure. The voltage magnitude is significant enough to constitute a risk of electrical shock.



This label indicates read the manual.

Observe all warning labels. ▲

Never remove warning labels. ▲

The chiller's construction provides protection against the risk of electrical shock by grounding appropriate metal parts. The protection will not function unless the power cord is connected to a properly grounded outlet. It is the user's responsibility to assure a proper ground connection is provided. ▲

The circuit protector located on the rear of the chiller is not intended to act as a disconnecting means. ▲

If the chiller's power cord is used as the disconnecting device, it must be easily accessible at all times. ▲

Never operate the chiller with damaged cords. ▲

Never place the chiller in a location or atmosphere where excessive heat, moisture, or corrosive materials are present. ▲

Many refrigerants which may be undetectable by human senses are heavier than air and will replace the oxygen in an enclosed area causing loss of consciousness. Refer to the chiller's nameplate and the manufacturer's most current MSDS for additional information. ▲

Never connect the process fluid inlet or outlet fittings to your building water supply or any water pressure source. ▲

Never operate the chiller without fluid in the reservoir. ▲

Other than water, before using any fluid, or when performing maintenance where contact with the fluid is likely, refer to the manufacturer's MSDS and EC Safety Data sheet for handling precautions. ▲

Ensure, that no toxic gases can be generated by the fluid. Flammable gases can build up over the fluid during usage. ▲

Do not use automotive antifreeze. Commercial antifreeze contains silicates, or any Organic Acid Technologies (OATs), that can damage the pump seals. Use of automotive antifreeze will void the manufacturer's warranty. ▲

To prevent freezing/glazing of the plate exchanger, ThermoFlex7500 through ThermoFlex24000s require the use of 50/50 EG/water or 50/50 PG/water below 10°C process temperature. ▲

When using a process fluid mixture of ethylene glycol and water or propylene glycol and water, check the fluid concentration and pH on a regular basis. Changes in concentration and pH can impact system performance. See Section 3. ▲

Never operate damaged or leaking equipment. ▲

Never operate the chiller or add fluid to the reservoir with panels removed. ▲

Do not clean the chiller with solvents, only use a soft cloth and water. ▲

Drain the chiller before it is transported and/or stored in, near or below freezing temperatures. Store it in the temperature range -25°C to 60°C (with packaging), and <80% relative humidity. ▲

Always turn the chiller off and disconnect the supply voltage from its power source before moving or before performing any service or maintenance procedures. ▲

Transport the chiller with care. Sudden jolts or drops can damage the its components. ▲

Refer service and repairs to a qualified technician. ▲

Performance of installation, operation, or maintenance procedures other than those described in this manual may result in a hazardous situation and will void the manufacturer's warranty. ▲

Section 2 General Information

Description

The Thermo Scientific ThermoFlex™ recirculating chillers are designed to provide a continuous supply of fluid at a constant temperature and flow rate. The chiller consists of an air-cooled or water-cooled refrigeration system, heat exchanger, recirculating pump, reservoir and a microprocessor controller.

Specifications

	ThermoFlex900	ThermoFlex1400	ThermoFlex2500
Standard Chiller Process Fluid Temperature/Setpoint Range	+5°C to +40°C +41°F to +104°F	+5°C to +40°C +41°F to +104°F	+5°C to +40°C +41°F to +104°F
High-Temperature Chiller Process Fluid Temperature/Setpoint Range	Not Available Not Available	+5°C to +90°C +41°F to +194°F	+5°C to +90°C +41°F to +194°F
Ambient Temperature Range All Chillers	+ 10°C to +40°C + 50°F to +104°F	+10°C to +40°C +50°F to +104°F	+10°C to +40°C +50°F to +104°F
Temperature Stability	±0.1°C	±0.1°C	±0.1°C
Cooling Capacity at 20°C	60 Hz 50 Hz	900 W (3074 BTU) 750 W (2561 BTU)	1400 W (4781 BTU) 1170 W (3996 BTU)
			2500 W (8538 BTU)* 2200 W (7513 BTU)
	*To meet this specification, the ThermoFlex2500 air-cooled chillers require the fan to be operating in the high-speed mode, see Section 3.		
Heater Size 208V/230V	Not Available	1.0kW/1.2kW or 2.3kW/2.8kW	2.3kW/2.8kW
Refrigerant	R134A	R134A	R134A
Reservoir Volume	Gallons Liters	1.9 7.2	1.9 7.2
Footprint or Dimensions (H x W x D)	Inches Centimeters	27.3 x 14.2 x 24.6 69.2 x 36.0 x 62.4	27.3 x 14.2 x 24.6 69.2 x 36.0 x 62.4
Weight P2 Pump (empty)	lb kg	130.5 59.2	130.5 59.2
Pumping Capacity			
P 1/MD 1 - Positive Displacement	60 Hz 50 Hz	2.1 gpm @ 60 psig (7.9 lpm @ 4.1 bar) 1.7 gpm @ 60 psig (6.4 lpm @ 4.1 bar)	
P 2/MD 2 - Positive Displacement	60 Hz 50 Hz	4.0 gpm @ 60 psig (15.1 lpm @ 4.1 bar) 3.3 gpm @ 60 psig (12.5 lpm @ 4.1 bar)	
T 0 - Turbine	60 Hz* 50 Hz*	2.0 gpm @ 60 psid (7.6 lpm @ 4.1 bar) 1.3 gpm @ 60 psid (4.9 lpm @ 4.1 bar)	
T 1 - Turbine	60 Hz* 50 Hz*	3.5 gpm @ 60 psid (13.3 lpm @ 4.1 bar) 2.5 gpm @ 60 psid (9.5 lpm @ 4.1 bar)	

* Pumping capacity pressure values for turbine pumps are differential pressures between the inlet and the outlet of the chiller.

- Cooling capacity based on P2 pumps with no backpressure. Heat input from the pump will result in a reduction in cooling capacity. The cooling capacity reduction will vary based on the pump chosen as well as pump backpressure and flow.
- Specifications obtained at sea level using water as the recirculating fluid, at a 20°C process setpoint, 25°C ambient condition, at nominal operating voltage. Other fluids, fluid temperatures, ambient temperatures, altitude or operating voltages will affect performance. See Section 3.
- Additional dimensions are at the end of this section, add 1/8" (3 mm) to height for SEMI.
- Add 5 pounds (2 kilograms) for global voltage chillers.
- Thermo Fisher Scientific reserves the right to change specifications without notice.

Specifications

	ThermoFlex3500	ThermoFlex5000
Standard Chiller Process Fluid Temperature/Setpoint Range	+5°C to +40°C +41°F to +104°F	+5°C to +40°C +41°F to +104°F
High-Temperature Chiller Process Fluid Temperature/Setpoint Range	+5°C to +90°C +41°F to +194°F	+5°C to +90°C +41°F to +194°F
Ambient Temperature Range All Chillers	+10°C to +40°C +50°F to +104°F	+10°C to +40°C +50°F to +104°F
Temperature Stability	±0.1°C	±0.1°C
Cooling Capacity at 20°C 60 Hz 50 Hz	3500 W (11953 BTU) 3050 W (10416 BTU)	5000 W (17076 BTU) 4400 W (15027 BTU)
Heater Size 208V/230V	2.3kW/2.8kW	2.3kW/2.8kW
Refrigerant	R407C	R407C
Reservoir Volume Gallons Liters	1.9 7.2	1.9 7.2
Footprint or Dimensions (H x W x D) Inches Centimeters	38.9 x 19.3 x 30.9 98.7 x 48.8 x 78.4	38.9 x 19.3 x 30.9 98.7 x 48.8 x 78.4
Weight P 1/ P 2/P 3/P 4 (empty) lb kg	264/264/270/303 120/120/123/138	NA/264/270/303 NA/120/123/138
Pumping Capacity		
P 1/MD 1 - Positive Displacement 60 Hz 50 Hz	2.1 gpm @ 60 psig (7.9 lpm @ 4.1 bar) 1.7 gpm @ 60 psig (6.4 lpm @ 4.1 bar)	Not Available Not Available
P 2/MD 2 - Positive Displacement 60 Hz 50 Hz	4.0 gpm @ 60 psig (15.1 lpm @ 4.1 bar) 3.3 gpm @ 60 psig (12.5 lpm @ 4.1 bar)	4.0 gpm @ 60 psig (15.1 lpm @ 4.1 bar) 3.3 gpm @ 60 psig (12.5 lpm @ 4.1 bar)
T 1 - Turbine 60 Hz* 50 Hz*	3.5 gpm @ 60 psid (13.3 lpm @ 4.1 bar) 2.5 gpm @ 60 psid (9.5 lpm @ 4.1 bar)	3.5 gpm @ 60 psid (13.3 lpm @ 4.1 bar) 2.5 gpm @ 60 psid (9.5 lpm @ 4.1 bar)
P 3 - Centrifugal Pump 60 Hz* 50 Hz*	10 gpm @ 32 psid (37.9 lpm @ 2.2 bar) 10 gpm @ 20 psid (37.9 lpm @ 1.4 bar)	10 gpm @ 32 psid (37.9 lpm @ 2.2 bar) 10 gpm @ 20 psid (37.9 lpm @ 1.4 bar)
P 4 - Centrifugal Pump 60 Hz* 50 Hz*	15 gpm @ 57 psid (56.8 lpm @ 3.9 bar) 15 gpm @ 34 psid (56.8 lpm @ 2.3 bar)	15 gpm @ 57 psid (56.8 lpm @ 3.9 bar) 15 gpm @ 34 psid (56.8 lpm @ 2.3 bar)

* Pumping capacity pressure values for turbine and centrifugal pumps are differential pressures between the inlet and the outlet of the chiller.

- Cooling capacity based on P2 pumps with no backpressure. Heat input from the pump will result in a reduction in cooling capacity. The cooling capacity reduction will vary based on the pump chosen as well as pump backpressure and flow.
- Specifications obtained at sea level using water as the recirculating fluid, at a 20°C process setpoint, 25°C ambient condition, at nominal operating voltage. Other fluids, fluid temperatures, ambient temperatures, altitude or operating voltages will affect performance. See Section 3.
- Additional dimensions are at the end of this section, add 1/8" (3 cm) to height for SEMI.
- Add 30 pounds (14 kilograms) for global voltage chillers.
- Thermo Fisher Scientific reserves the right to change specifications without notice.

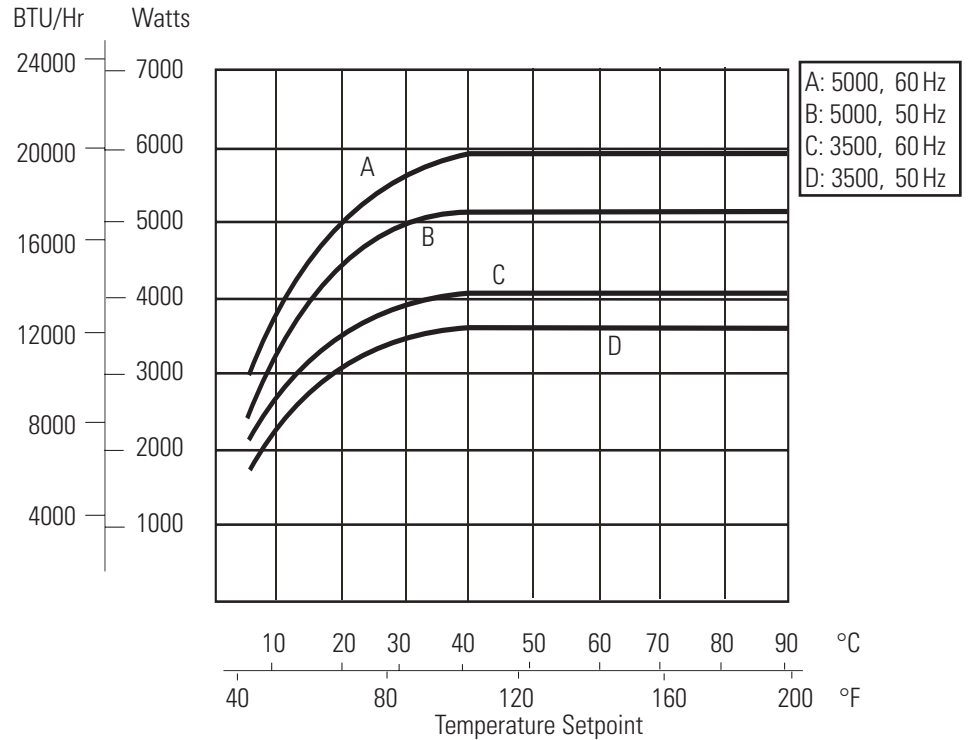
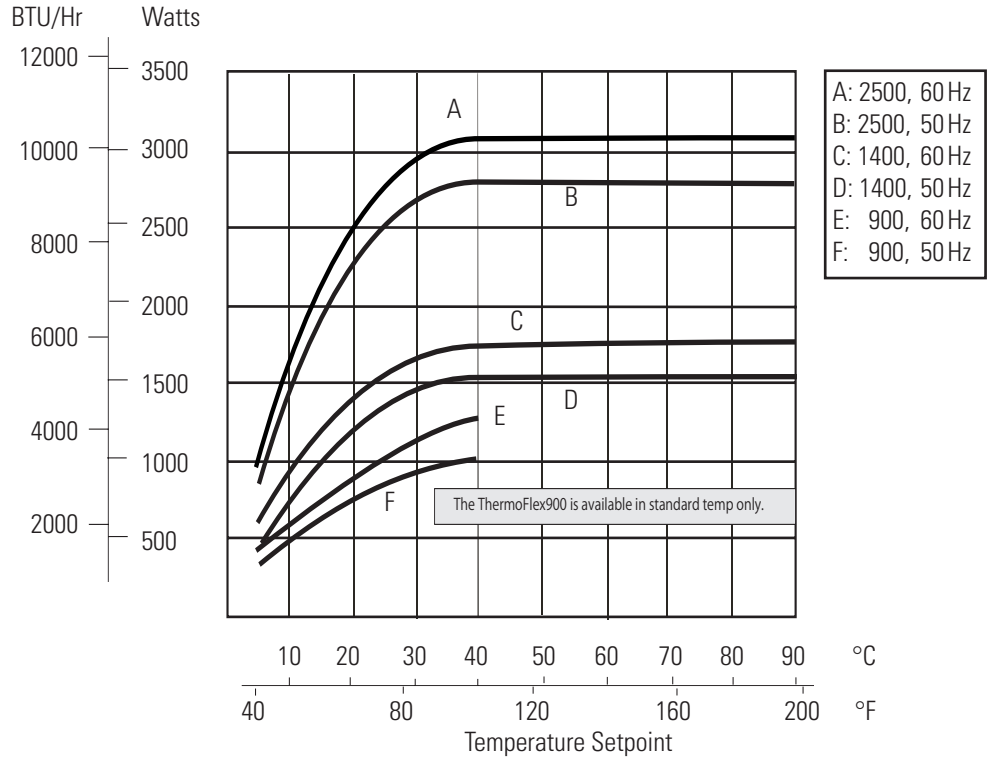
Specifications

	ThermoFlex7500	ThermoFlex10000
Standard Chiller Process Fluid Temperature/Setpoint Range	+5°C to +40°C +41°F to +104°F	+5°C to +40°C +41°F to +104°F
High-Temperature Chiller Process Fluid Temperature/Setpoint Range	+5°C to +90°C +41°F to +194°F	+5°C to +90°C +41°F to +194°F
Ambient Temperature Range All Chillers	+10°C to +40°C +50°F to +104°F	+10°C to +40°C +50°F to +104°F
Temperature Stability	± 0.1°C	± 0.1°C
Cooling Capacity at 20°C		
60 Hz	7500 W (25575 BTU)	10000 W (34100 BTU)
50 Hz	6425 W (21910 BTU)	8500 W (28985 BTU)
Heater Size	5.0kW at 208V/6.1kW at230V 4.6kW at 400V/6.1kW at460V	5.0kW at 208V/6.1kW at230V 4.6kW at 400V/6.1kW at460V
Refrigerant	R407C	R407C
Reservoir Volume		
Gallons	4.75	4.75
Liters	17.9	17.9
Footprint or Dimensions (H x W x D)		
Air-Cooled Inches	52.3 x 25.2 x 33.8	52.3 x 25.2 x 33.8
Centimeters	132.7 x 63.9 x 85.6	132.7 x 63.9 x 85.6
Water-Cooled Inches	45.9 x 25.2 x 33.8	45.9 x 25.2 x 33.8
Centimeters	116.6 x 63.9 x 85.6	116.6 x 63.9 x 85.6
Weight P2/P3/P5 (empty)		
Air-Cooled lb	356/372.5/405.5	356/372.5/405.5
kg	161.5/169/184	161.5/169/184
Water-Cooled lb	315/331.5/364.5	315/331.5/364.5
kg	143/150/165	143/150/165
Pumping Capacity		
P2/MD2 - Positive Displacement 60 Hz	4.0 gpm @ 60 psig (15.1 lpm @ 4.1 bar)	4.0 gpm @ 60 psig (15.1 lpm @ 4.1 bar)
50 Hz	3.3 gpm @ 60 psig (12.5 lpm @ 4.1 bar)	3.3 gpm @ 60 psig (12.5 lpm @ 4.1 bar)
P3 - Centrifugal Pump 60 Hz*	10 gpm @ 32 psid (37.9 lpm @ 2.2 bar)	10 gpm @ 32 psid (37.9 lpm @ 2.2 bar)
50 Hz*	10 gpm @ 20 psid (37.9 lpm @ 1.4 bar)	10 gpm @ 20 psid (37.9 lpm @ 1.4 bar)
P5 - Centrifugal Pump 60 Hz*	20 gpm @ 60 psid (75.7 lpm @ 4.1 bar)	20 gpm @ 60 psid (75.7 lpm @ 4.1 bar)
50 Hz*	20 gpm @ 35 psid (75.7 lpm @ 2.4 bar)	20 gpm @ 35 psid (75.7 lpm @ 2.4 bar)
T 5 - Turbine Pump 60 Hz*	8.0 gpm @ 52 psid (30.3 lpm @ 3.6 bar)	8.0 gpm @ 52 psid (30.3 lpm @ 3.6 bar)
50 Hz*	8.0 gpm @ 20 psid (30.3 lpm @ 1.4 bar)	8.0 gpm @ 20 psid (30.3 lpm @ 1.4 bar)

* Pumping capacity pressure values for centrifugal and turbine pumps are differential pressures between the inlet and the outlet of the chiller. P5 pumping capacity in high temperature chillers is slightly lower, see P5 Pumping Capacity curves in this Section.

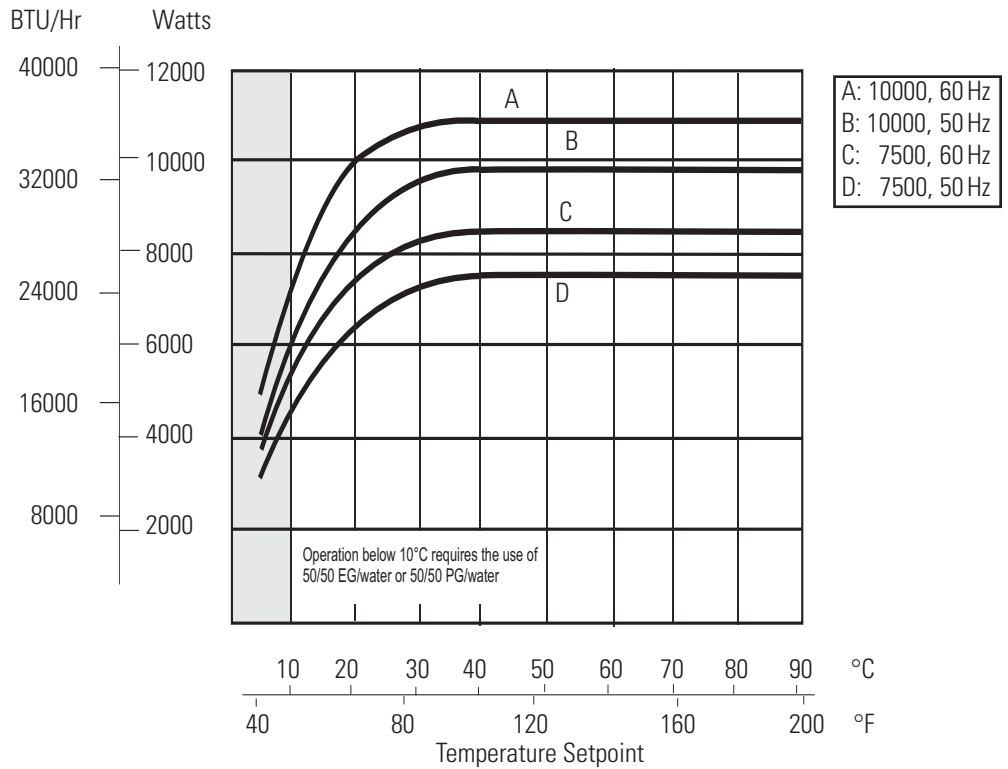
- Cooling capacity based on P 2 pumps with no backpressure. Heat input from the pump will result in a reduction in cooling capacity. The cooling capacity reduction will vary based on the pump chosen as well as pump backpressure and flow.
- Specifications obtained at sea level using water as the recirculating fluid, at a 20°C process setpoint, 25°C ambient condition, at nominal operating voltage. Other fluids, fluid temperatures, ambient temperatures, altitude or operating voltages will affect performance. See Section 3.
- Additional dimensions are at the end of this section.
- Add 30 pounds (14 kilograms) for global voltage chillers with a P 2 pump. Add 10 pounds (4.5 kilograms) for chillers with a P 3 or P 5 pump.
- Thermo Fisher Scientific reserves the right to change specifications without notice.

Cooling Capacity



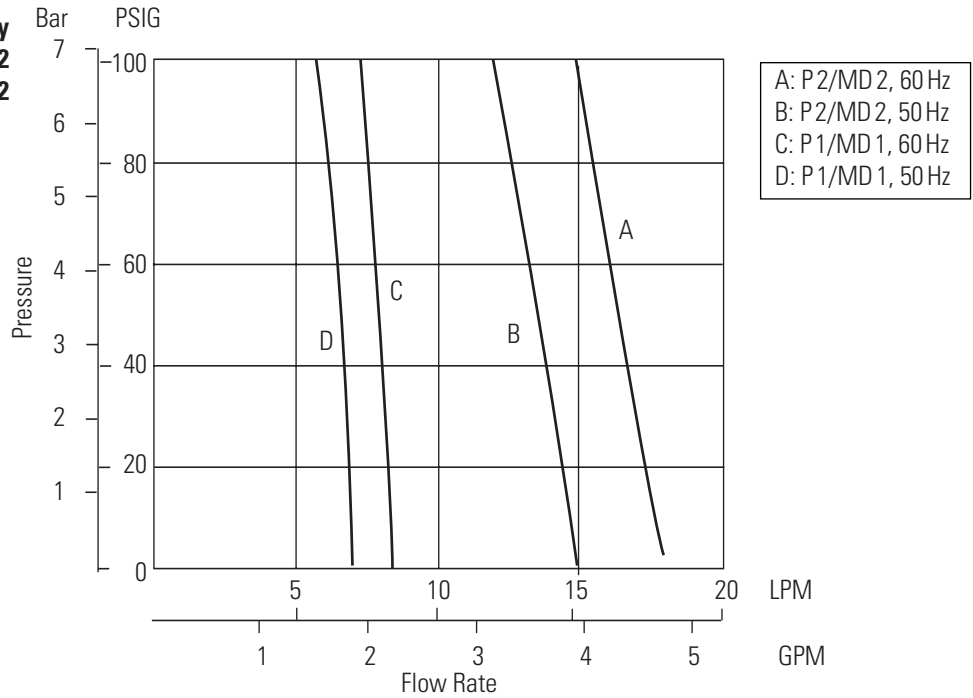
- Specifications obtained at sea level using water as the recirculating fluid, at a 20°C process setpoint, 25°C ambient condition, at nominal operating voltage, on chillers with P2 pumps with no back pressure. Other fluids, fluid temperatures, ambient temperatures, altitude, operating voltages or pumps will affect performance. See Section 3.
- Thermo Fisher Scientific reserves the right to change specifications without notice.

Cooling Capacity

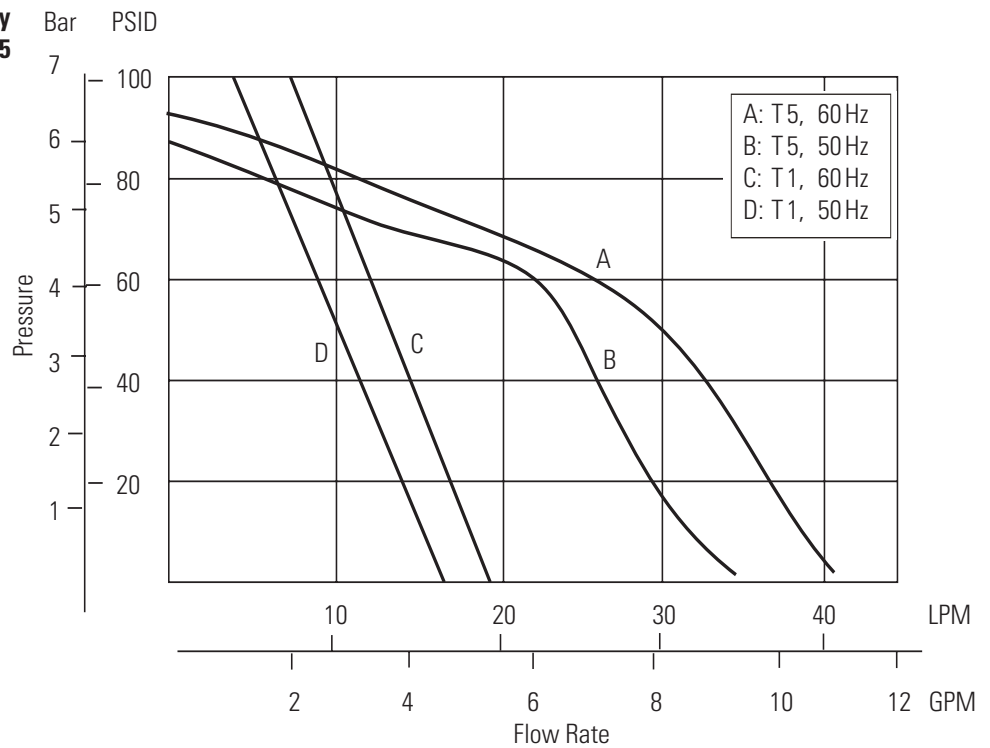


- Specifications obtained at sea level using water as the recirculating fluid, at a 20°C process setpoint, 25°C ambient condition, at nominal operating voltage, on chillers with P2 pumps with no back pressure. Other fluids, fluid temperatures, ambient temperatures, altitude, operating voltages or pumps will affect performance. See Section 3.
- Chillers require the use of 50/50 EG/water or 50/50 PG/water below 10°C process temperature to prevent freezing/glazing of the plate exchanger.
- Thermo Fisher Scientific reserves the right to change specifications without notice.

**Pumping Capacity
Positive Displacement Pump P1/P2
Magnetic Drive Pumps MD1/MD2**

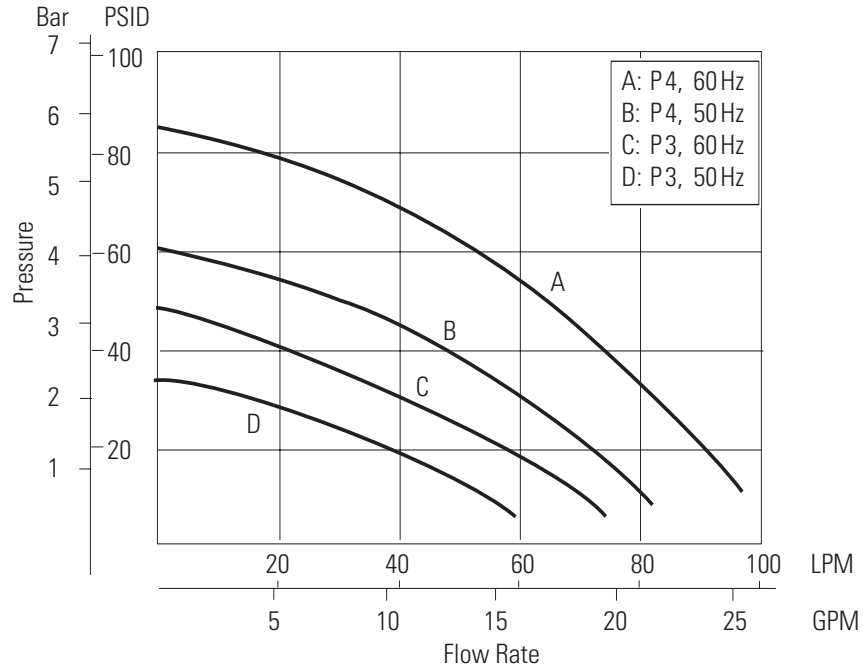


**Pumping Capacity
Turbine Pump T1/T5**

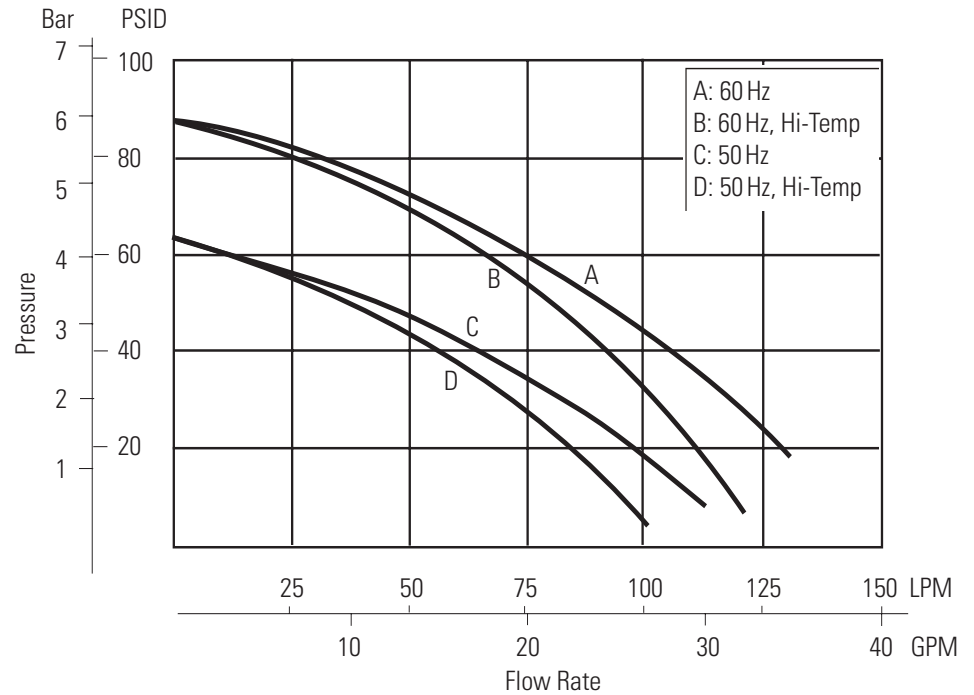


- Pump curves are nominal values. Pressure values for turbine pumps are differential pressures between the inlet and the outlet of the chiller.
- Pump performance results were obtained with no restrictions on the return to the system or with any options installed. For example, utilizing the DI option will result in a 0.5 gpm flow reduction.
- Specifications obtained at sea level using water as the recirculating fluid, at a 20°C process setpoint, 25°C ambient condition, at nominal operating voltage. Other fluids, fluid temperatures, ambient temperatures, altitude or operating voltages will affect performance. See Section 3.
- Thermo Fisher Scientific reserves the right to change specifications without notice.

**Pumping Capacity
Centrifugal Pump P3/P4**

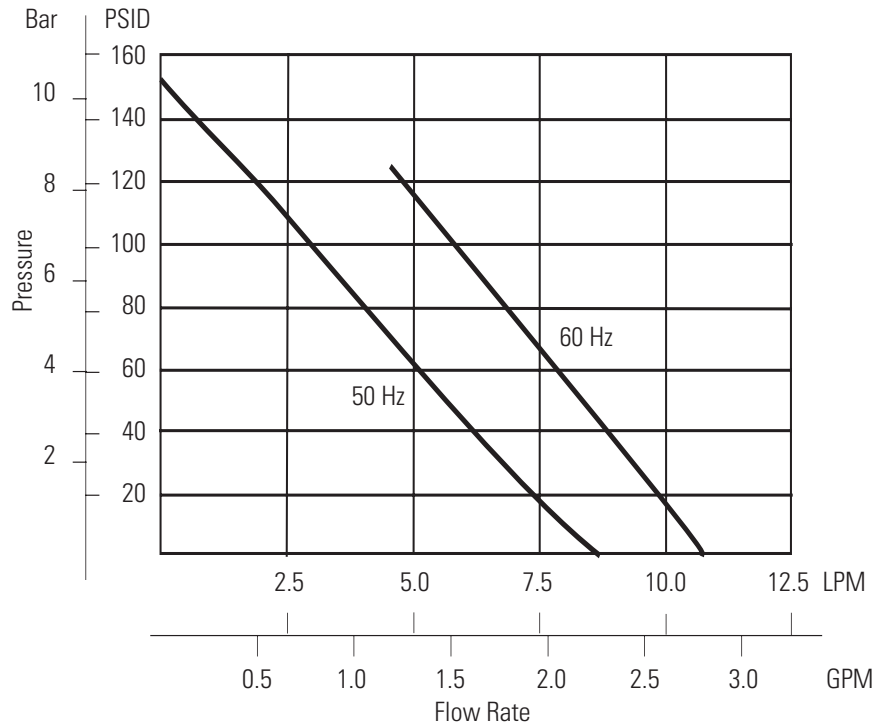


**Pumping Capacity
Centrifugal Pump P5**



- Pump curves are nominal values. Pressure values for centrifugal pumps are differential pressures between the inlet and the outlet of the chiller.
- Pump performance results were obtained with no restrictions on the return to the system or with any options installed. For example, utilizing the DI option will result in a 0.5 gpm flow reduction.
- Specifications obtained at sea level using water as the recirculating fluid, at a 20°C process setpoint, 25°C ambient condition, at nominal operating voltage. Other fluids, fluid temperatures, ambient temperatures, altitude or operating voltages will affect performance. See Section 3.
- Thermo Fisher Scientific reserves the right to change specifications without notice.

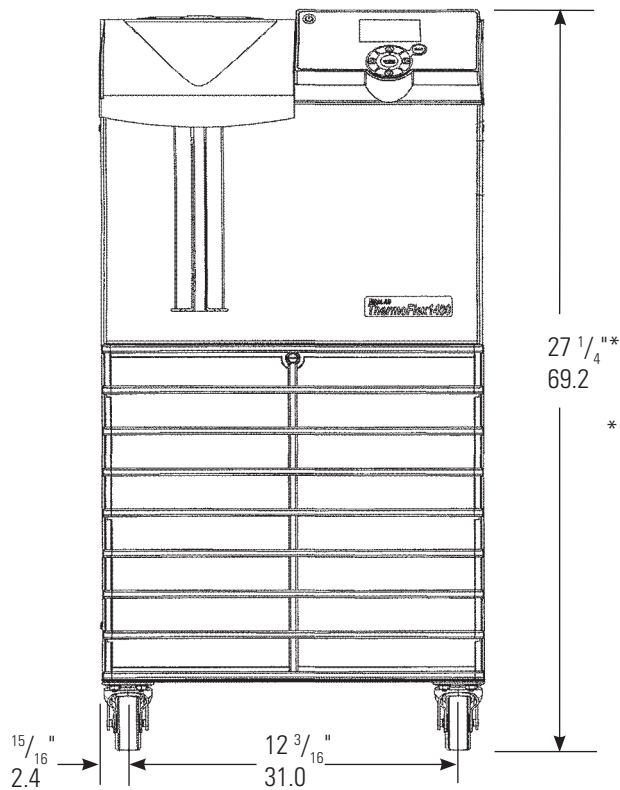
**Pumping Capacity
Turbine Pump T0**



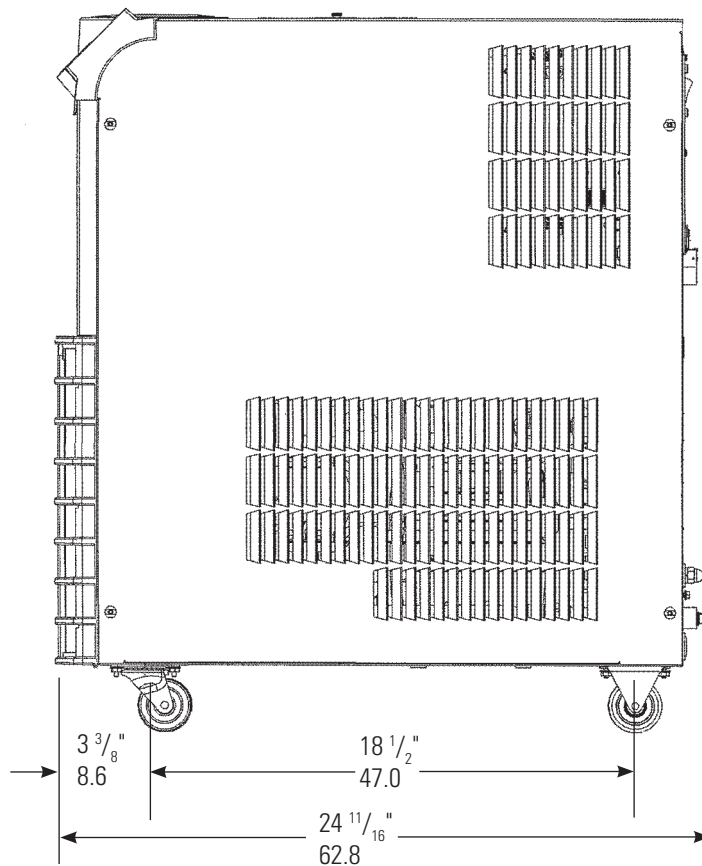
- Pump curves are nominal values. Pressure values for turbine pumps are differential pressures between the inlet and the outlet of the chiller.
- Pump performance results were obtained with no restrictions on the return to the system or with any options installed. For example, utilizing the DI option will result in a 0.5 gpm flow reduction .
- Specifications obtained at sea level using water as the recirculating fluid, at a 20°C process setpoint, 25°C ambient condition, at nominal operating voltage. Other fluids, fluid temperatures, ambient temperatures, altitude or operating voltages will affect performance. See Section 3.
- Thermo Fisher Scientific reserves the right to change specifications without notice.

ThermoFlex900/1400
Dimensions
 (inches/centimeters)

Front View



Side View



ThermoFlex900/1400

Process discharge for chillers with optional flow transducer or Internal pressure regulator adjustment (Optional)
1/2" FNPT Stainless Steel



Rear View

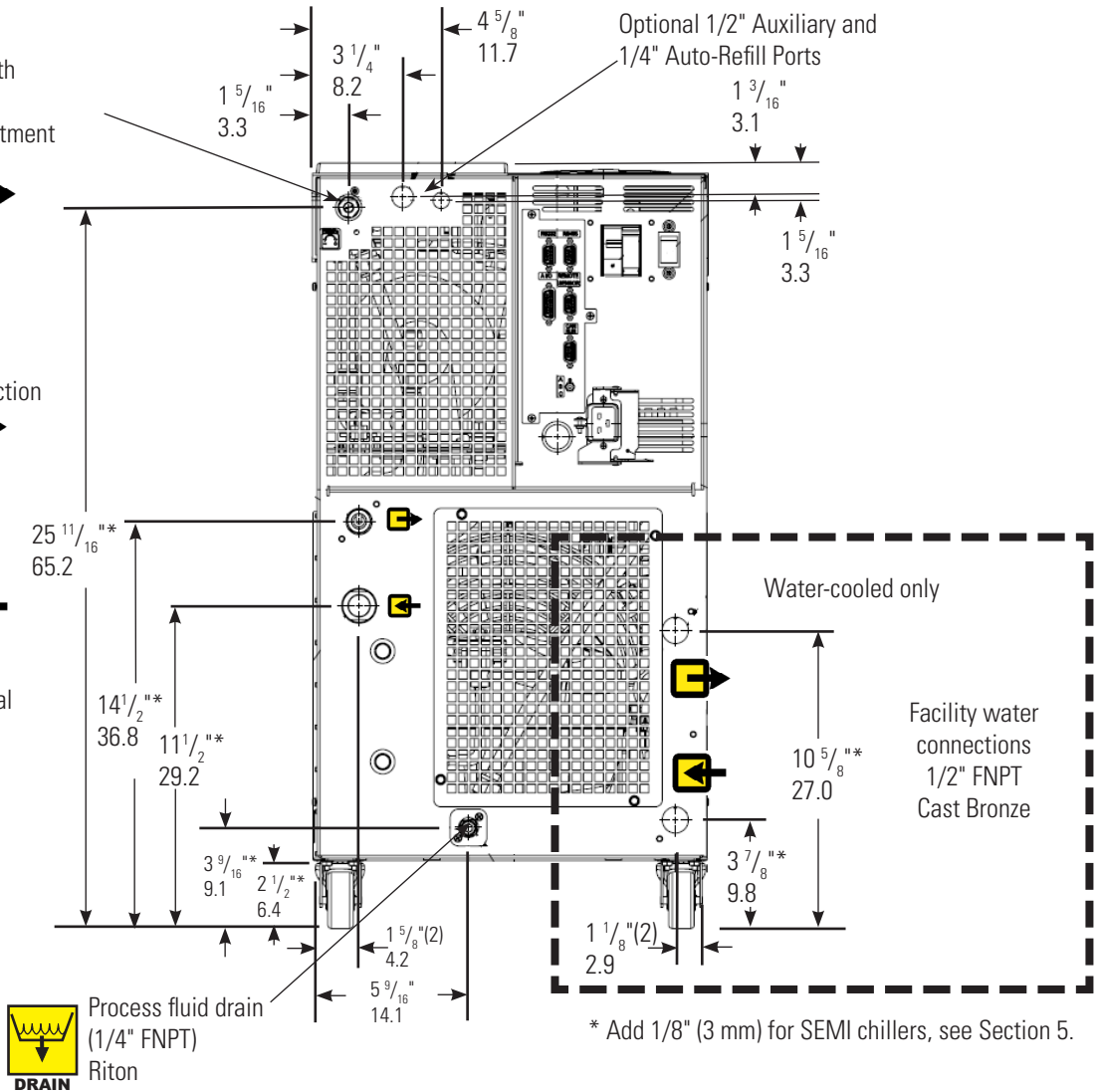
Process discharge fluid connection
1/2" FNPT Cast Bronze



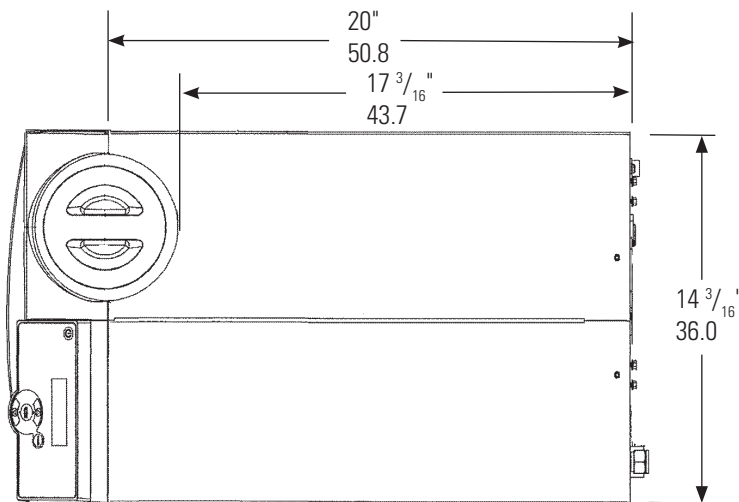
Process fluid return connection
1/2" FNPT Stainless Steel



See Section 3 for additional plumbing information.



Top View



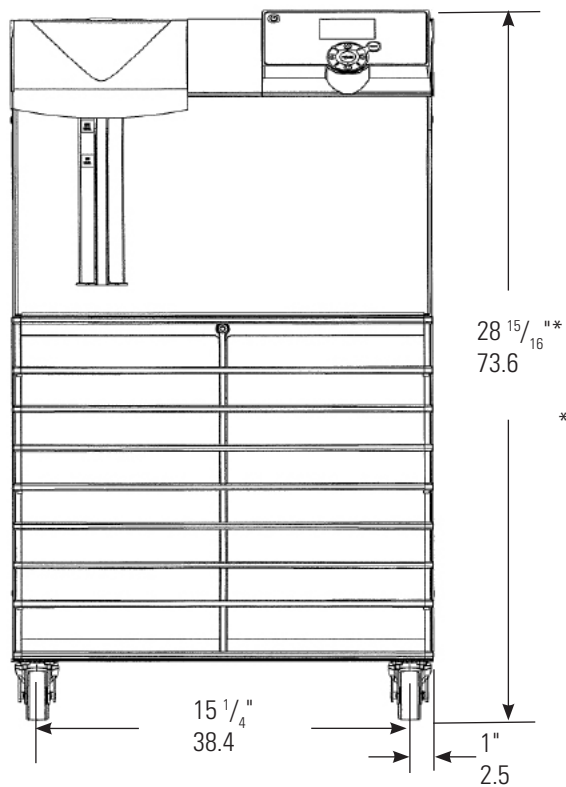
Shipping crate dimensions (approximate):

- 21" (53 cm) wide
- 35" (89 cm) tall
- 40" (102 cm) deep

• Thermo Fisher Scientific reserves the right to change specifications without notice.

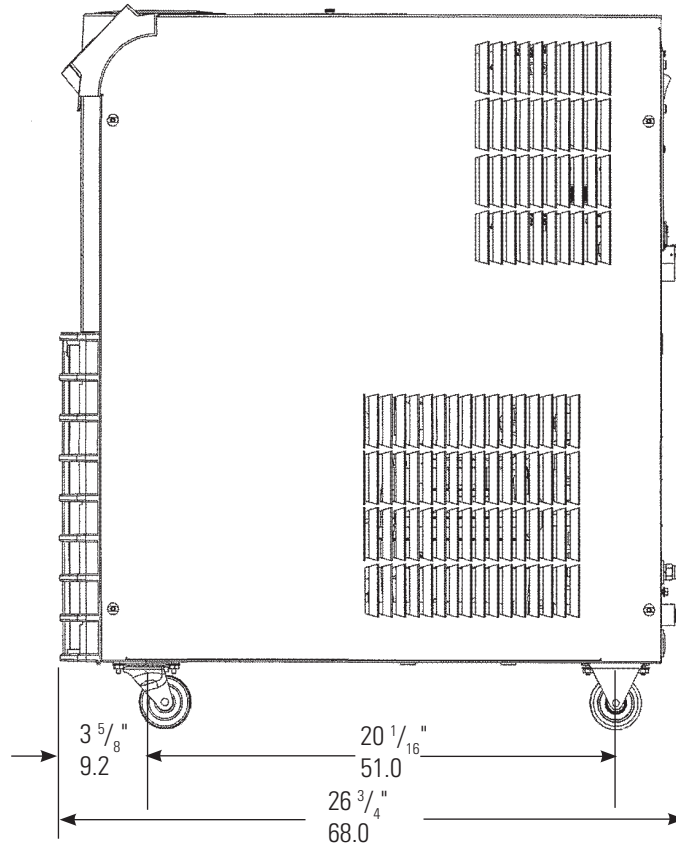
ThermoFlex2500
Dimensions
 (inches/centimeters)

Front View



* Add 1/8" (3 mm) for SEMI chillers , see Section 5.

Side View



ThermoFlex2500

Process discharge for chillers with optional flow transducer or Internal pressure regulator adjustment (Optional)
1/2" FNPT Stainless Steel

Process discharge fluid connection
1/2" FNPT Cast Bronze

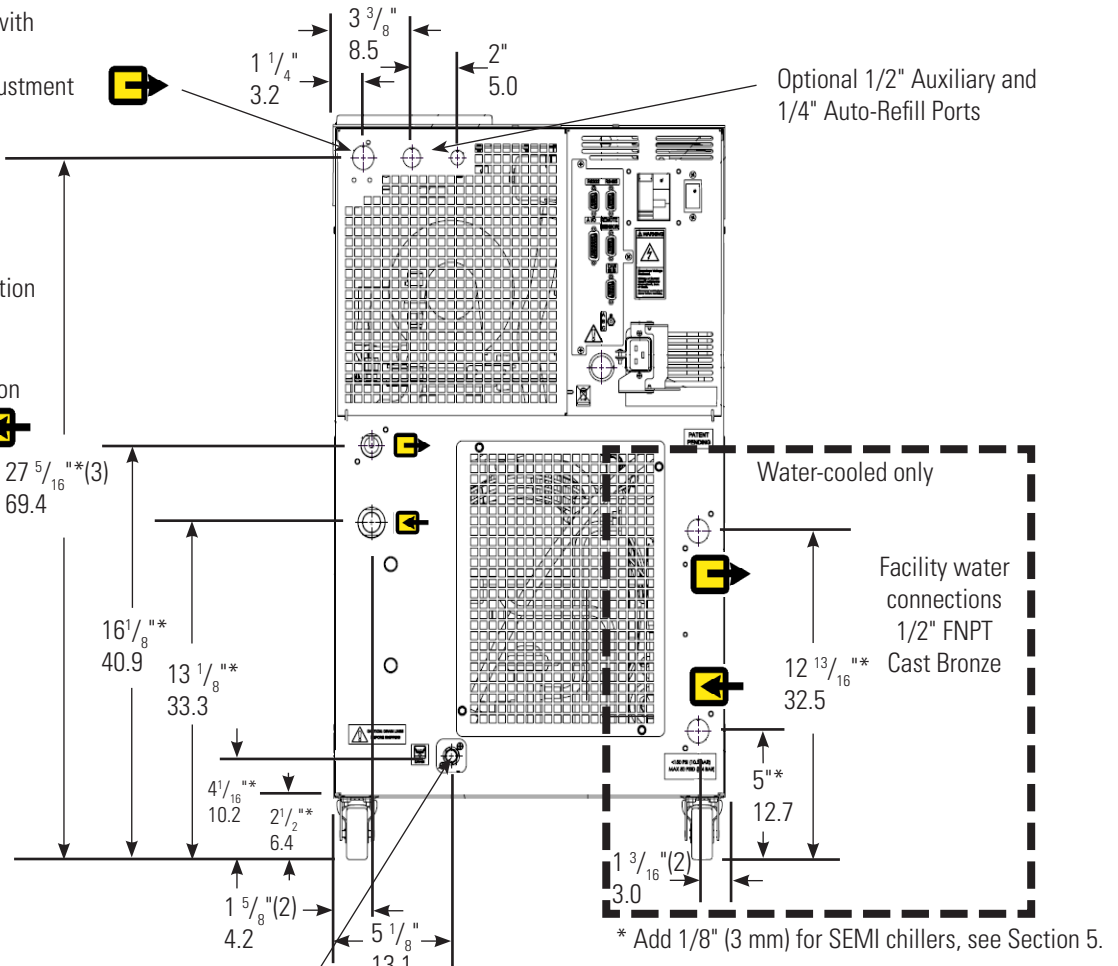
Process fluid return connection
1/2" FNPT Stainless Steel

Rear View

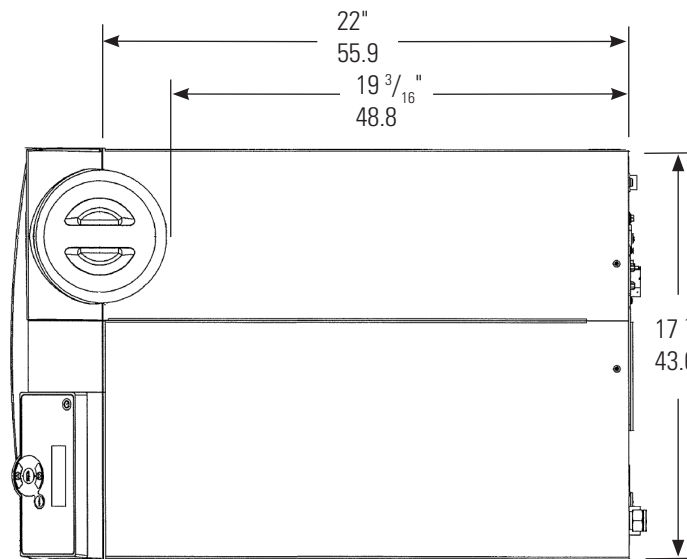
See Section 3 for additional plumbing information.



Process fluid drain (1/4" FNPT) Riton



Top View

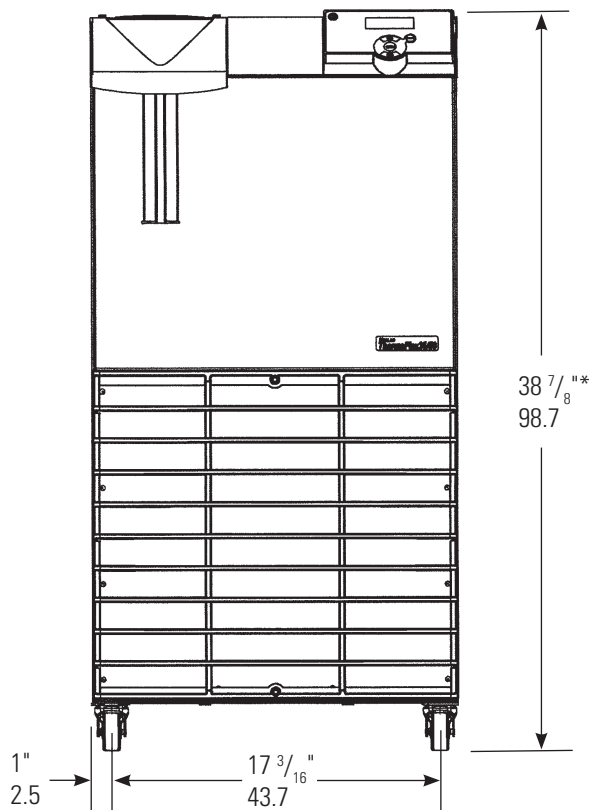


Shipping crate dimensions (approximate):
23" (58 cm) wide
36" (91 cm) tall
40" (102 cm) deep

• Thermo Fisher Scientific reserves the right to change specifications without notice.

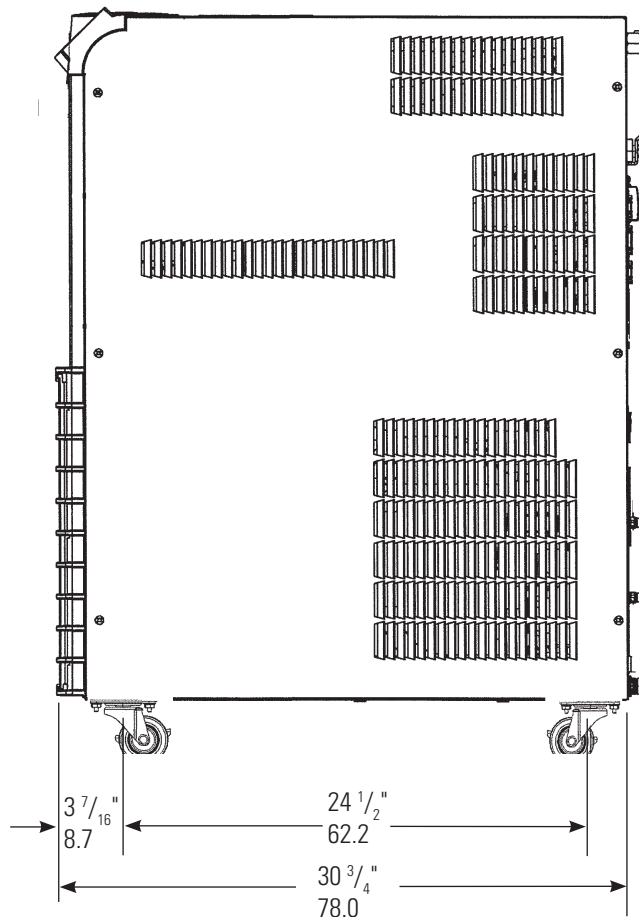
ThermoFlex3500/5000
Dimensions
 (inches/centimeters)

Front View



* Add 1/8" (3 mm) for SEMI chillers, see Section 5.

Side View



ThermoFlex3500/5000

Process discharge for chillers with optional flow transducer and P1, P2 & T1 pumps

or
Internal pressure regulator adjustment (Optional P1/MD1, P2/MD2 & T1 only)
1/2" FNPT Stainless Steel

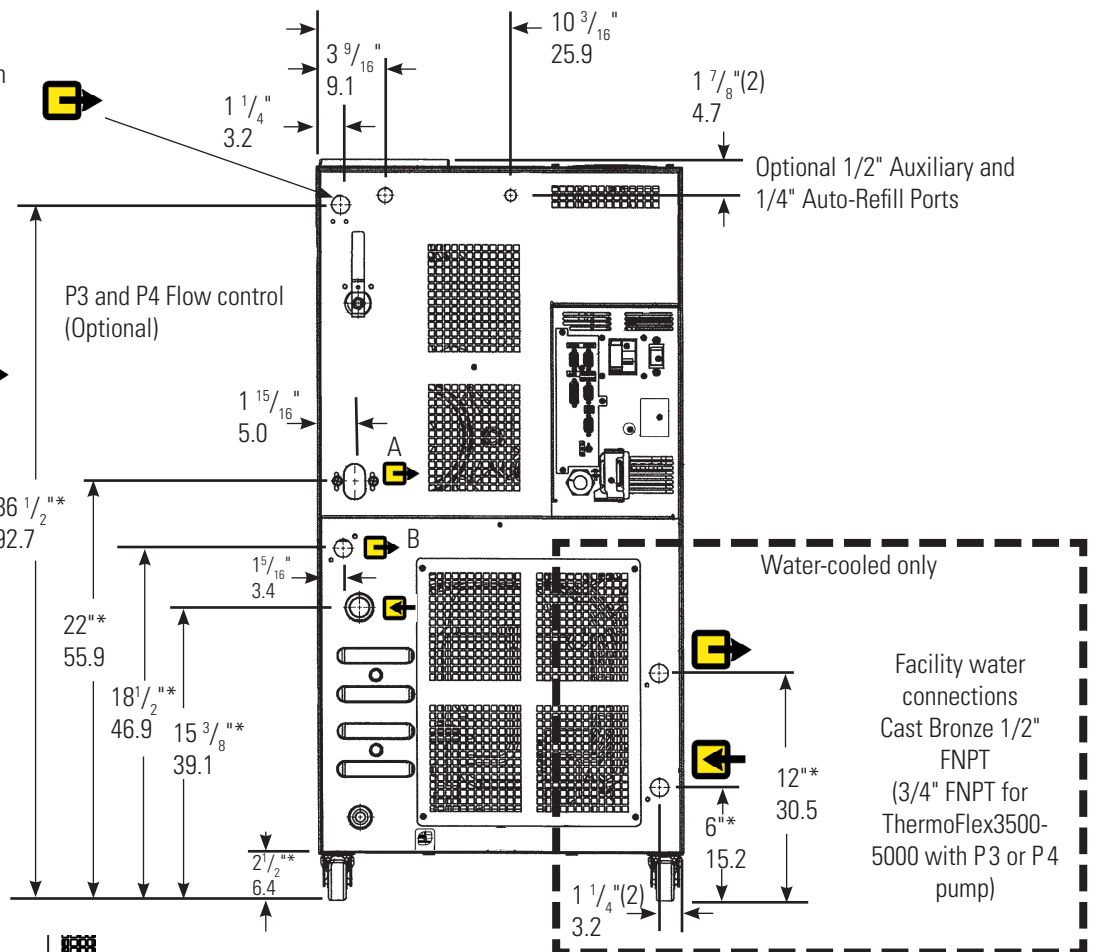
Process discharge connection
Cast Bronze

A P3, P4 pumps 3/4" FNPT
B P1/MD1, P2/MD2, T1 pumps
1/2" FNPT

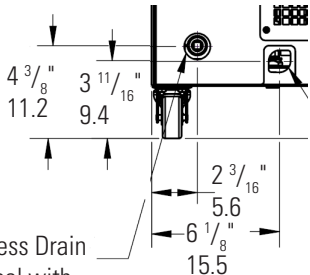
Process return connection
Stainless Steel
P3, P4 pumps 3/4" FNPT
P1/MD1, P2/MD2, T1 pumps
1/2" FNPT

See Section 3 for additional plumbing information.

Rear View



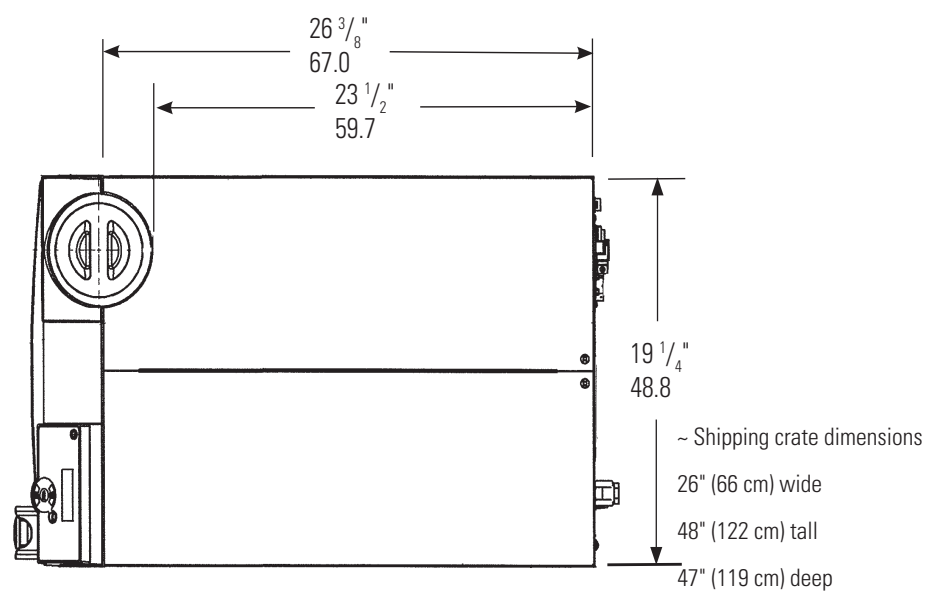
* Add 1/8" (3 mm) for SEMI chillers, see Section 5.



1/4" MPT Riton connector
(P1/MD1, P2/MD2 and TU1 pumps only)

1/4" FPT Process Drain
Stainless Steel with Brass plug
(P3, P4 pumps only)

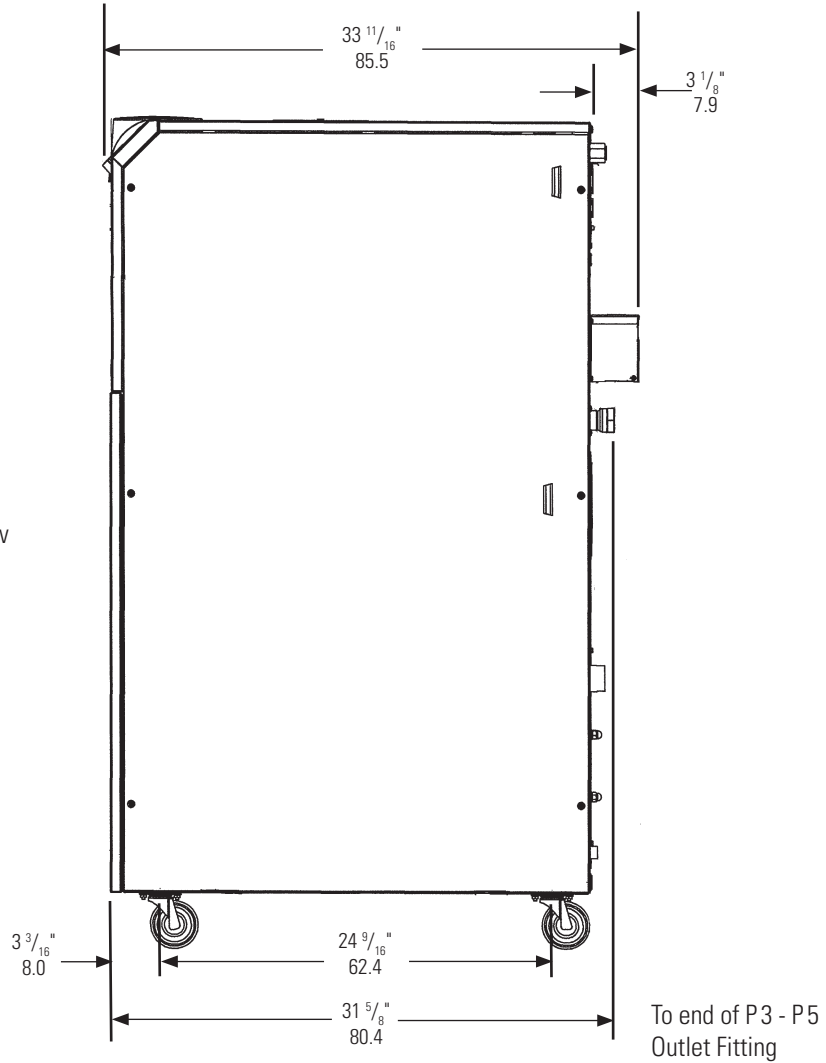
Top View



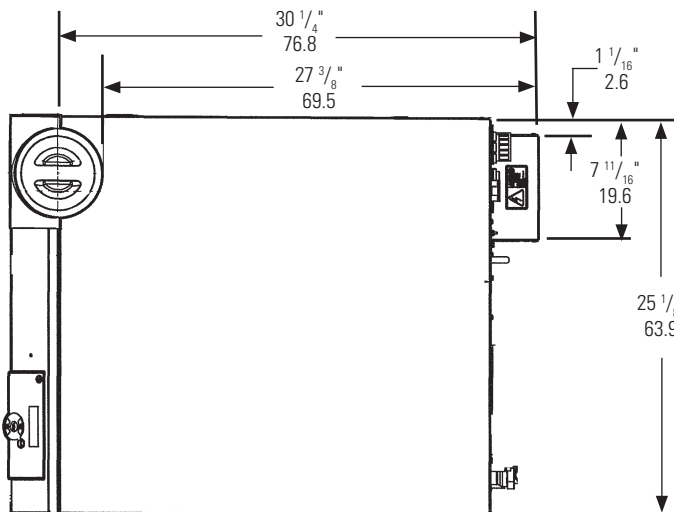
• Thermo Fisher Scientific reserves the right to change specifications without notice.

ThermoFlex7500/10000
Dimensions
 (inches/centimeters)

Side View



Top View



Air-cooled shipping crate dimensions (approximate):

35 3/4" (91 cm) wide

61 1/2" (156 cm) tall

46 3/8" (118 cm) deep

Water-cooled shipping crate dimensions (approximate):

35 3/4" (91 cm) wide


55 1/2" (141 cm) tall


46 3/8" (118 cm) deep

- Thermo Fisher Scientific reserves the right to change specifications without notice.

ThermoFlex7500/10000

Rear View
(Air-Cooled)

Process Discharge 
P2/MD2 = 1/2" FNPT
Cast Bronze
P3 - P5, T5= 1" FNPT
Wrought Copper

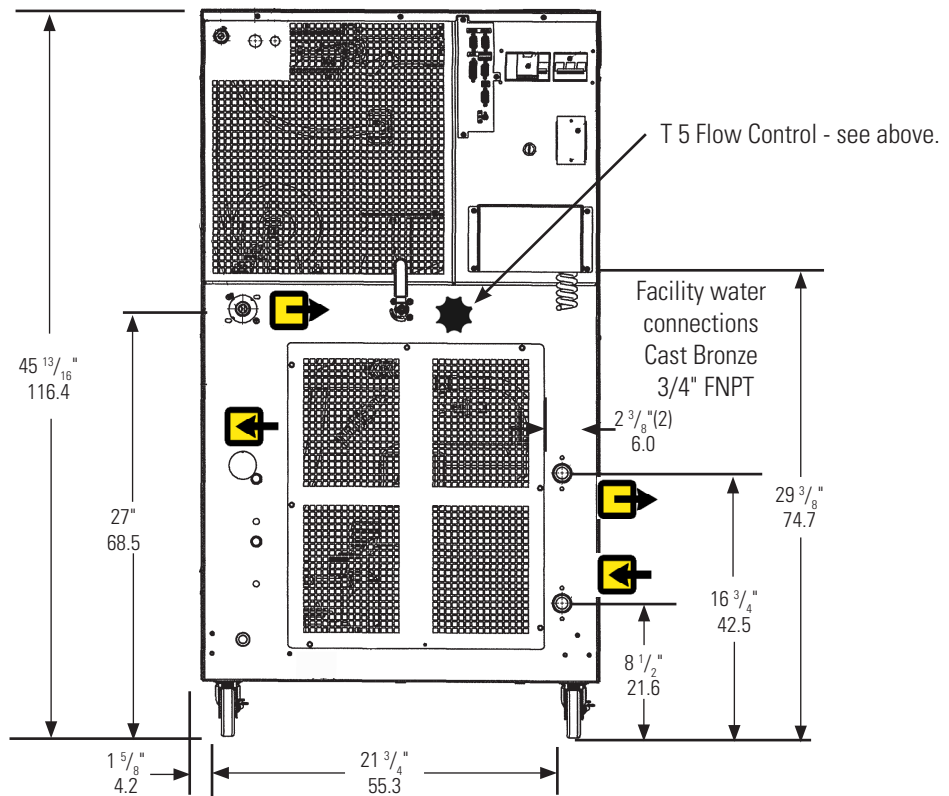
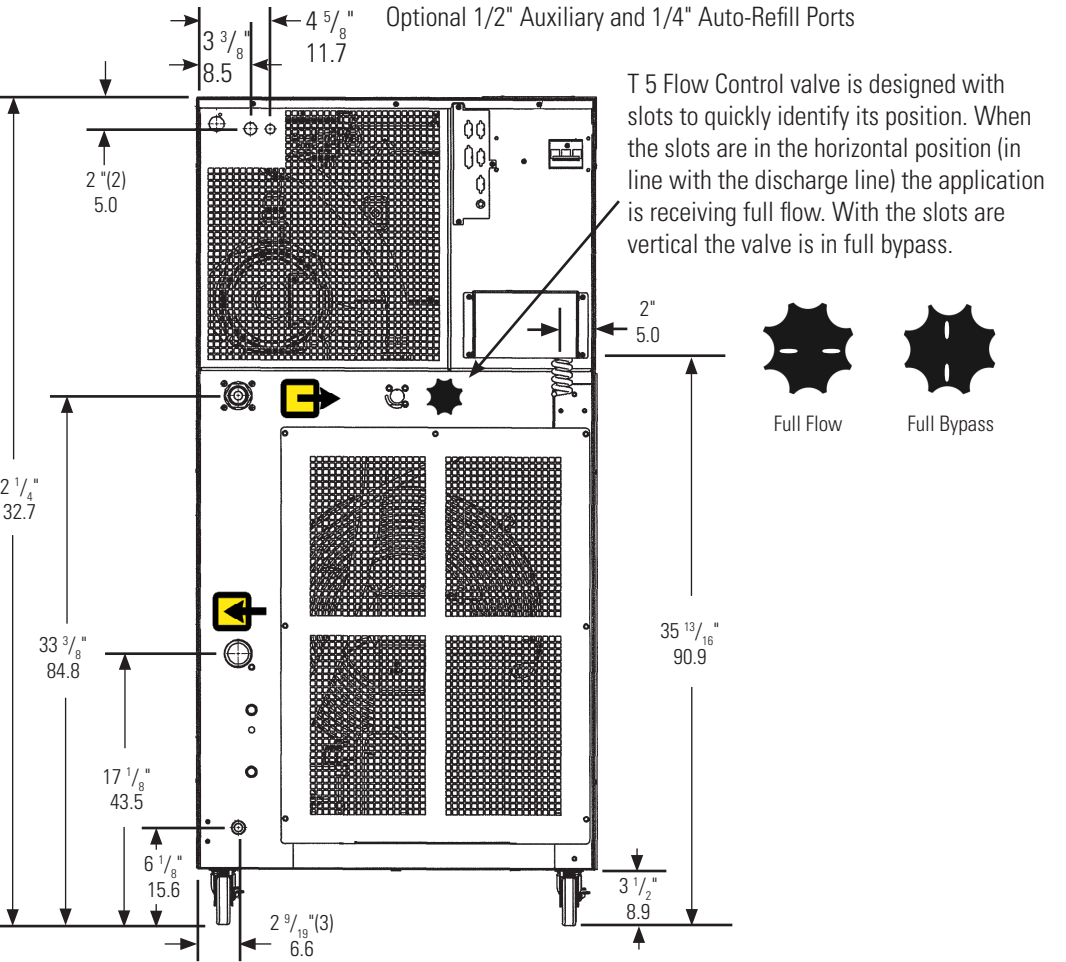
Process Return
Stainless Steel
P2/MD2 = 1/2" FNPT
P3 - P5, T5 = 1" FNPT 

See Section 3 for
additional plumbing
information.

Process fluid drain (1/4" FNPT)
Stainless Steel with Brass plug or
a Riton connector



Rear View
(Water-Cooled)



Section 3 Installation

Site Requirements

Ambient Temperature Range*	10°C to 40°C (50°F to 104°F)
Relative Humidity Range	10% to 80% (non-condensing)
Operating Altitude*	Sea Level to 8000 feet (2438 meters)
Overvoltage Category	II
Pollution Degree	2
Degree of Protection	IP 20

*Because of the decrease in air density, maximum temperature for the air entering an air-cooled ThermoFlex is reduced by 1°C per 1,000 feet above sea level. In addition, cooling capacity is reduced 1.2% per 1,000 feet above sea level.



Never place the chiller in a location where excessive heat, moisture, inadequate ventilation, or corrosive materials are present. ▲

Note Refer to the nameplate information on the rear of the chiller. ▲

Air-cooled chillers retain their full rated capacity at 20°C setpoint in ambient temperatures up to 25°C (77°F). For ambient temperatures above 25°C please de-rate the cooling capacity 3% for every 1°C above 25°C (77°F), up to a maximum ambient temperature of 40°C (104°F). Note that when operating at a process temperature lower than 20°C the de-rate percentage may increase due to additional gains from losses to ambient.

Note Depending on the setpoint and ambient temperatures, there may be a heat gain or loss through the plumbing resulting in a variation from setpoint temperature at the application inlet. Applications with large temperature variations between ambient and setpoint temperatures, and/or long plumbing lengths, may require additional insulation. ▲

ThermoFlex2500 air-cooled chillers are equipped with a two-speed fan. Should the chiller's internal ambient temperature reach 50°C for 30 seconds, or reach 53°C, the fan speed switches from slow speed to high speed to maintain internal temperatures within acceptable limits. When the temperature reaches 44°C or below for at least 15 minutes the speed returns to low. When in high speed the chiller's decibel level increases significantly.

Note High speed is required for the chiller to achieve its 2500 watt cooling capacity. At high-end operating conditions the fan can be set to run at high speed all the time using the controller's **SETTINGS** display, see Section 4. ▲

Chillers installed below the end-user application may enable system fluid to drain back into the chiller and cause spillage. Thermo Fisher offers an anti-drainback kit to prevent any spillage, see Section 5.

Air-cooled chillers can be installed with both sides blocked, or one side and the rear. See Figure 3-1. The front needs a minimum clearance of 24". Air enters the front of the system and exits through the sides and rear.

Having two sides blocked can impact the chiller's performance due to changes in air flow. If your installation requires two blocked sides please ensure that the following requirements are met:

Process Setpoint Temperature: Below 30°C (86°F)

Ambient: Below 40°C (104°F)

Before operating the chiller in conditions outside any of those listed in this manual please contact Thermo Fisher Scientific's Sales, Service and Customer Support to review your installation.

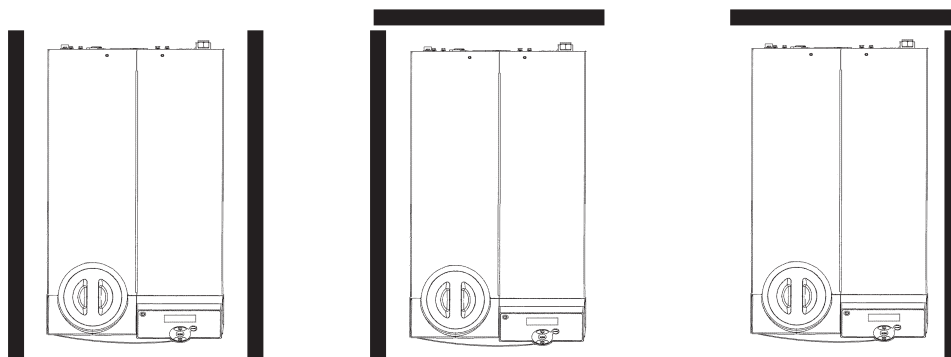


Figure 3-1 Minimum Clearance

Electrical Requirements



The chiller's construction provides protection against the risk of electrical shock by grounding appropriate metal parts. The protection will not function unless the power cord is connected to a properly grounded outlet. It is the user's responsibility to assure a proper ground connection is provided. ▲

The chiller must be installed in accordance with the National Electrical Code and the with reference to the information on the chiller's nameplate located on the rear.

Locate the chiller so it is near, and has easy access to, its disconnecting device.

The user is responsible to ensure that the line cord provided meets local electrical codes. If not, contact qualified installation personnel.

The chiller is intended for use on a dedicated outlet. The ThermoFlex has an internal circuit protection that is equivalent (approximately) to the branch circuit rating. This is to protect the ThermoFlex, and is not intended as a substitute for branch circuit protection.

Electrical Service Requirements (Standard temperature chillers):

ThermoFlex900	Voltage ±10%	Frequency	Phase	Branch Circuit Requirements	Line Cord Plug
	100 VAC	50 Hz	1Ø	15A	5-15P
	115 VAC	60 Hz	1Ø	15A	5-15P
	200 VAC	50 Hz	1Ø	15A	6-15P
	208-230 VAC	60 Hz	1Ø	15A	6-15P
	230 VAC	50 Hz	1Ø	*16A ¹ , 15A ² , 13A ³	-
ThermoFlex1400	Voltage ±10%	Frequency	Phase	Branch Circuit Requirements	Line Cord Plug
	100 VAC	50 Hz	1Ø	20A	5-20P
	115 VAC	60 Hz	1Ø	20A	5-20P
	200 VAC	50 Hz	1Ø	15A	6-15P
	208-230 VAC	60 Hz	1Ø	15A	6-15P
	230 VAC	50 Hz	1Ø	*16A ¹ , 15A ² , 13A ³	-
ThermoFlex2500	Voltage ±10%	Frequency	Phase	Branch Circuit Requirements	Line Cord Plug
	200 VAC P 1, P 2 Pump	50 Hz	1Ø	15A	6-15P
	208-230 VAC P 1, P 2 Pump	60 Hz	1Ø	15A	6-15P
	200 VAC T 1 Pump	50 Hz	1Ø	20A	6-20P
	208-230 VAC T 1 Pump	60 Hz	1Ø	20A	6-20P
	230 VAC	50 Hz	1Ø	*16A ¹ , 15A ² , 13A ³	-

* Refer to Appendix A for country specific ratings.

Continued on next page.

Electrical Service Requirements (Standard temperature chillers):

ThermoFlex3500/5000	Voltage ±10%	Frequency	Phase	Branch Circuit Requirements	Line Cord Plug
	200 VAC P 1, P 2 Pump	50 Hz	1Ø	15A	6-15P
	200 VAC T 1, P 3 Pump	50 Hz	1Ø	20A	6-20P
	200 VAC P 4 Pump	50 Hz	1Ø	30A	6-30P
	208-230 VAC P 1, P 2 Pump	60 Hz	1Ø	15A	6-15P
	208-230 VAC T 1, P 3 Pump	60 Hz	1Ø	20A	6-20P
	208-230 VAC P 4 Pump	60 Hz	1Ø	30A	6-30P
	230 VAC P 1 - P 4 Pump	50 Hz	1Ø	*16A ¹ , 15A ² , 13A ³	-

ThermoFlex7500/10000 (Air-cooled)	Voltage ±10%	Frequency	Phase	MCA	MOPD	Line Cord Plug
	200 VAC P 2 Pump	50 Hz	3Ø	16.5	30	L15-20P
	200 VAC P 3 Pump	50 Hz	3Ø	18.7	30	L15-30P
	200 VAC P 5 Pump	50 Hz	3Ø	22.3	35	L15-30P
	200 VAC T 5 Pump	50 Hz	3Ø	17.3	30	L15-20P
	208-230 VAC P 2 Pump	60 Hz	3Ø	16.5	30	L15-20P
	208-230 VAC P 3 Pump	60 Hz	3Ø	18.7	30	L15-30P
	208-230 VAC P 5 Pump	60 Hz	3Ø	22.3	35	L15-30P
	208-230 VAC T 5 Pump	60 Hz	3Ø	17.3	30	L15-20P
	400 VAC P 2 Pump	50 Hz	3Ø	10.9	20	IEC309
	400 VAC P 3 Pump	50 Hz	3Ø	9.6	15	IEC309
	400 VAC P 5 Pump	50 Hz	3Ø	11.8	15	IEC309
	400 VAC T 5 Pump	50 Hz	3Ø	8.7	15	IEC309

ThermoFlex7500/10000 (Water-cooled)	Voltage ±10%	Frequency	Phase	MCA	MOPD	Line Cord Plug
	200 VAC P 2 Pump	50 Hz	3Ø	16.2	30	L15-20P
	200 VAC P 3 Pump	50 Hz	3Ø	18.4	30	L15-30P
	200 VAC P 5 Pump	50 Hz	3Ø	22.0	35	L15-30P
	200 VAC T 5 Pump	50 Hz	3Ø	17.0	30	L15-20P
	208-230 VAC P 2 Pump	60 Hz	3Ø	16.2	30	L15-20P
	208-230 VAC P 3 Pump	60 Hz	3Ø	18.4	30	L15-30P
	208-230 VAC P 5 Pump	60 Hz	3Ø	22.0	35	L15-30P
	208-230 VAC T 5 Pump	60 Hz	3Ø	17.0	30	L15-20P
	400 VAC P 2 Pump	50 Hz	3Ø	10.6	20	IEC309
	400 VAC P 3 Pump	50 Hz	3Ø	9.3	15	IEC309
	400 VAC P 5 Pump	50 Hz	3Ø	11.5	20	IEC309
	400 VAC T 5 Pump	50 Hz	3Ø	8.4	15	IEC309

MCA = Minimum Current Ampacity

MOPD = Maximum Overcurrent Protective Device

Values reflect those on the nameplate located on the rear of the chiller.

Continued on next page.

Electrical Service Requirements (Variable voltage chillers):

ThermoFlex900	Voltage $\pm 10\%$	Frequency	Phase	Branch Circuit Requirements	Line Cord Plug
	115 VAC	60 Hz	1 \emptyset	15A	5-15P*
100 VAC	50/60 Hz	1 \emptyset	15A	5-15P*	
ThermoFlex1400	Voltage $\pm 10\%$	Frequency	Phase	Branch Circuit Requirements	Line Cord Plug
	115 VAC	60 Hz	1 \emptyset	20A	-
100 VAC	50/60 Hz	1 \emptyset	20A	-	

* United States and Japan only. All other plugs are country specific.

Electrical Service Requirements (Global voltage chillers):

ThermoFlex900	Voltage $\pm 10\%$	Frequency	Phase	Branch Circuit Requirements	Line Cord Plug
	200/208/230 VAC	60 Hz	1 \emptyset	15A	-
200/230 VAC	50 Hz	1 \emptyset	**16A ¹ , 15A ² , 13A ³	-	
ThermoFlex1400	Voltage $\pm 10\%$	Frequency	Phase	Branch Circuit Requirements	Line Cord Plug
	200/208/230 VAC	60 Hz	1 \emptyset	15A	-
200/230 VAC	50 Hz	1 \emptyset	**16A ¹ , 15A ² , 13A ³	-	
ThermoFlex2500	Voltage $\pm 10\%$	Frequency	Phase	Branch Circuit Requirements	Line Cord Plug
	200 VAC T 1 Pump	60 Hz	1 \emptyset	15A	-
	208-230 VAC T 1 Pump	60 Hz	1 \emptyset	20A	-
230 VAC	50 Hz	1 \emptyset	*16A ¹ , 15A ² , 13A ³	-	
ThermoFlex3500/5000	Voltage $\pm 10\%$	Frequency	Phase	Branch Circuit Requirements	Line Cord Plug
	200/208-230 VAC P 1 P 3 Pump	50/60 Hz	1 \emptyset	15A	-
	200/208-230 VAC T 1 P 3 Pump	50/60 Hz	1 \emptyset	20A	-
200/208-230 VAC P 4 Pump	50/60 Hz	1 \emptyset	30A	Hard wired	

** Chillers selected for 230 VAC operation have a range of -10% to +7%. Refer to Appendix A for country specific ratings.

For installation information on Variable Voltage and Global Voltage chillers refer to Appendix B. Refer to the nameplate label located on the rear of the chiller for specific electrical requirements.

Continued on next page.

Electrical Service Requirements (Global voltage chillers):

ThermoFlex7500/10000 (Air-cooled)	Voltage ±10%	Frequency	Phase	MCA	MOPD	Line Cord Plug
	400 VAC P2 Pump	50 Hz	3Ø	8.8	15	Hard wire
	400 VAC P3 Pump	50 Hz	3Ø	10.1	20	Hard wire
	400 VAC P5 Pump	50 Hz	3Ø	12.3	20	Hard wire
	400 VAC T5 Pump	50 Hz	3Ø	9.1	15	Hard wire
	460 VAC P2 Pump	60 Hz	3Ø	8.8	15	Hard wire
	460 VAC P3 Pump	60 Hz	3Ø	10.1	20	Hard wire
	460 VAC P5 Pump	60 Hz	3Ø	12.3	20	Hard wire
	460 VAC T5 Pump	60 Hz	3Ø	9.1	15	Hard wire

ThermoFlex7500/10000 (Water-cooled)	Voltage ±10%	Frequency	Phase	MCA	MOPD	Line Cord Plug
	400 VAC P2 Pump	50 Hz	3Ø	8.4	15	Hard wire
	400 VAC P3 Pump	50 Hz	3Ø	9.7	20	Hard wire
	400 VAC P5 Pump	50 Hz	3Ø	11.9	20	Hard wire
	400 VAC T5 Pump	50 Hz	3Ø	8.8	15	Hard wire
	460 VAC P2 Pump	60 Hz	3Ø	8.4	15	Hard wire
	460 VAC P3 Pump	60 Hz	3Ø	9.7	20	Hard wire
	460 VAC P5 Pump	60 Hz	3Ø	11.6	20	Hard wire
	460 VAC T5 Pump	60 Hz	3Ø	8.8	15	Hard wire

Electrical Service Requirements (High temperature chillers):

ThermoFlex1400	Voltage ±10%	Frequency	Phase	Branch Circuit Requirements	Line Cord Plug
	200 VAC 1KW	50 Hz	1Ø	20A	6-20P
	200-230 VAC 1KW	60 Hz	1Ø	20A	6-20P
	200 VAC 2KW	50 Hz	1Ø	30A	6-30P
	208-230 VAC 2KW	60 Hz	1Ø	30A	6-30P
	230 VAC 2KW	50 Hz	1Ø	32A	-
	230 VAC 1KW	50 Hz	1Ø	*16A ¹ , 15A ² , 13A ³	-

ThermoFlex2500	Voltage ±10%	Frequency	Phase	Branch Circuit Requirements	Line Cord Plug
	200 VAC P1 P2 Pump	50 Hz	1Ø	30A	6-30P
	208-230 VAC P1 P2 Pump	60 Hz	1Ø	30A	6-30P
	200 VAC T1 Pump	50 Hz	1Ø	40A	Hard wire
	208-230 VAC T1 Pump	60 Hz	1Ø	40A	Hard wire
	230 VAC	50 Hz	1Ø	32A	-

* Refer to Appendix A for country specific ratings.

Continued on next page.

Electrical Service Requirements (High temperature chillers):

ThermoFlex3500/5000	Voltage ±10%	Frequency	Phase	Branch Circuit Requirements	Line Cord Plug
	200 VAC P1 P2 Pump	50 Hz	1Ø	30A	6-30P
	200 VAC T1 P3 P4 Pump	50 Hz	1Ø	40A	Hard wire
	208-230 VAC P1 P2 Pump	60 Hz	1Ø	30A	6-30P
	208-230 VAC T1 P3 P4 Pump	60 Hz	1Ø	40A	Hard wire
	230 VAC P1- P4, T1 Pump	50 Hz	1Ø	32A	IEC309

ThermoFlex7500/10000 (Air-cooled)	Voltage ±10%	Frequency	Phase	MCA	MOPD	Line Cord Plug
	200 VAC P2 Pump	50 Hz	3Ø	35.7	45	Hard wire
	200 VAC P3 Pump	50 Hz	3Ø	37.9	45	Hard wire
	200 VAC P5 Pump	50 Hz	3Ø	41.5	50	Hard wire
	200 VAC T5 Pump	50 Hz	3Ø	36.4	45	Hard wire
	208-230 VAC P2 Pump	60 Hz	3Ø	35.7	45	Hard wire
	208-230 VAC P3 Pump	60 Hz	3Ø	37.9	45	Hard wire
	208-230 VAC P5 Pump	60 Hz	3Ø	41.5	50	Hard wire
	208-230 VAC T5 Pump	60 Hz	3Ø	36.4	45	Hard wire
	400 VAC P2 Pump	50 Hz	3Ø	19.2	25	Hard wire
	400 VAC P3 Pump	50 Hz	3Ø	17.9	25	Hard wire
	400 VAC P5 Pump	50 Hz	3Ø	20.1	25	Hard wire
	400 VAC T5 Pump	50 Hz	3Ø	17.0	25	Hard wire

ThermoFlex7500/10000 (Water-cooled)	Voltage ±10%	Frequency	Phase	MCA	MOPD	Line Cord Plug
	200 VAC P2 Pump	50 Hz	3Ø	35.3	45	L15-20P
	200 VAC P3 Pump	50 Hz	3Ø	37.5	45	L15-20P
	200 VAC P5 Pump	50 Hz	3Ø	41.1	50	L15-30P
	200 VAC T5 Pump	50 Hz	3Ø	36.1	45	L15-30P
	208-230 VAC P2 Pump	60 Hz	3Ø	35.3	45	L15-20P
	208-230 VAC P3 Pump	60 Hz	3Ø	37.5	45	L15-20P
	208-230 VAC P5 Pump	60 Hz	3Ø	41.1	50	L15-30P
	208-230 VAC T5 Pump	60 Hz	3Ø	36.1	45	L15-30P
	400 VAC P2 Pump	50 Hz	3Ø	18.8	25	IEC309
	400 VAC P3 Pump	50 Hz	3Ø	17.5	25	IEC309
	400 VAC P5 Pump	50 Hz	3Ø	19.7	25	IEC309
	400 VAC T5 Pump	50 Hz	3Ø	16.7	25	IEC309

MCA = Minimum Current Ampacity

MOPD = Maximum Overcurrent Protective Device

Values reflect those on the nameplate located on the rear of the chiller.

Continued on next page.

Electrical Service Requirements (High temperature global voltage chillers):

ThermoFlex1400	Voltage ±10%	Frequency	Phase	Branch Circuit Requirements	Line Cord Plug	
	200/208/230 VAC 1KW	60 Hz	1Ø	20A	6-20P	
	200/208/230 VAC 2KW	60 Hz	1Ø	30A	Hard wire	
	200/230 VAC 2KW	50 Hz	1Ø	32A	Hard wire	
	200/230 VAC 1KW	50 Hz	1Ø	**16A ¹ , 15A ² , 13A ³	Hard wire	
ThermoFlex2500	Voltage ±10%	Frequency	Phase	Branch Circuit Requirements	Line Cord Plug	
	200/208/230 VAC P 1 P 2 Pump	60 Hz	1Ø	30A	Hard wire	
	200/208/230 VAC T 1 Pump	60 Hz	1Ø	40A	Hard wire	
	200/230 VAC	50 Hz	1Ø	32A	Hard wire	
ThermoFlex3500/5000	Voltage ±10%	Frequency	Phase	Branch Circuit Requirements	Line Cord Plug	
	200/208-230 VAC P 1 P 2 Pump	50/60 Hz	1Ø	30, 32A	Hard wire	
	200/208-230 VAC T 1 P 3 P 4 Pump	50/60 Hz	1Ø	32, 40A	Hard wire	
ThermoFlex7500/10000 (Air-cooled)	Voltage ±10%	Frequency	Phase	MCA	MOPD	Line Cord Plug
	400 VAC P 2 Pump	50 Hz	3Ø	18.3	25	Hard wire
	400 VAC P 3 Pump	50 Hz	3Ø	19.6	25	Hard wire
	400 VAC P 5 Pump	50 Hz	3Ø	21.8	30	Hard wire
	400 VAC T 5 Pump	50 Hz	3Ø	18.7	25	Hard wire
	460 VAC P 2 Pump	60 Hz	3Ø	18.3	25	Hard wire
	460 VAC P 3 Pump	60 Hz	3Ø	19.6	25	Hard wire
	460 VAC P 5 Pump	60 Hz	3Ø	21.8	30	Hard wire
	460 VAC T 5 Pump	60 Hz	3Ø	18.7	25	Hard wire
ThermoFlex7500/10000 (Water-cooled)	Voltage ±10%	Frequency	Phase	MCA	MOPD	Line Cord Plug
	400 VAC P 2 Pump	50 Hz	3Ø	18.0	25	Hard wire
	400 VAC P 3 Pump	50 Hz	3Ø	19.3	25	Hard wire
	400 VAC P 5 Pump	50 Hz	3Ø	21.5	30	Hard wire
	400 VAC T 5 Pump	50 Hz	3Ø	18.4	25	Hard wire
	460 VAC P 2 Pump	60 Hz	3Ø	18.0	25	Hard wire
	460 VAC P 3 Pump	60 Hz	3Ø	19.3	25	Hard wire
	460 VAC P 5 Pump	60 Hz	3Ø	21.5	30	Hard wire
	460 VAC T 5 Pump	60 Hz	3Ø	18.4	25	Hard wire

** Chillers selected for 230 VAC operation have a range of -10% to +7%. Refer to Appendix A for country specific ratings.

For installation information Global Voltage chillers refer to Appendix B.

Refer to the nameplate on the chiller's rear for specific electrical requirements.

Hard Wire Installation



For personal safety and equipment reliability, only a qualified technician should perform the following procedure. ▲

Note The technician is responsible for installing circuit protection for incoming power. Before wiring consult the nameplate on the rear of the chiller. Ensure installation is in accordance with the National Electrical Code and any other applicable country and local codes. ▲

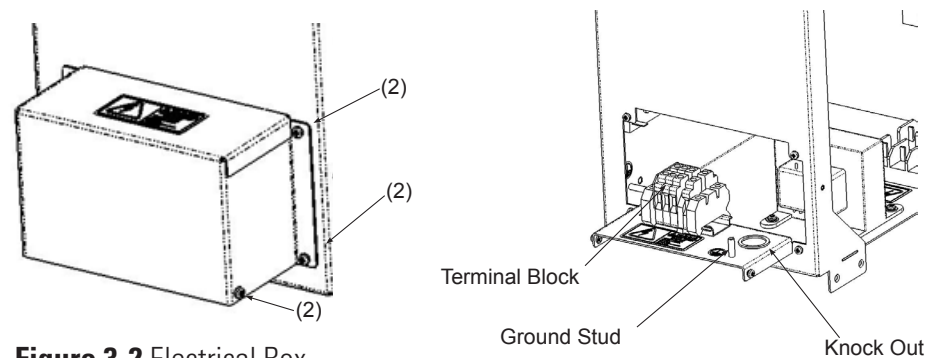


Figure 3-2 Electrical Box

- Remove the six screws securing the electrical box cover to the rear of the chiller.
- Remove the double knock out ($\frac{7}{8}$ " and $1\frac{3}{32}$ ").
- Insert the cable through the hole.
- Refer to the label in the electrical box to configure your chiller, see Figure 3-3.
- Secure the cable's ground wire to the ground stud.
- Reinstall the cover.

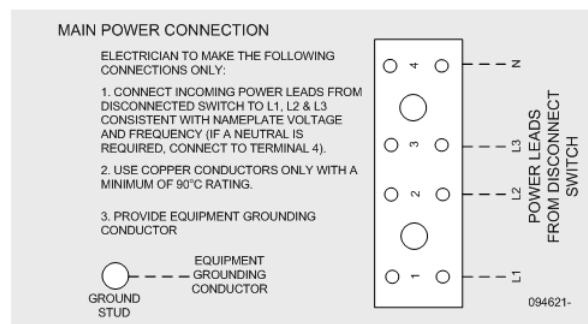


Figure 3-3 Sample Label

Plumbing Requirements



Ensure that all shipping plugs are removed before installation.

Never connect the process fluid lines to your facility water supply or any pressurized liquid source. ▲

To prevent damage to the chiller's plate exchanger, centrifugal pumps require a 4.0 gpm (15.1 lpm) minimum flow rate. ▲

P1 and P2 pumps are capable of producing 185 psig. Ensure your plumbing is rated to withstand this pressure at your operating temperature. An external pressure relief valve is available, see Section 5. ▲

Note Ensure your plumbing installation will develop a back pressure to the ThermoFlex greater than 3 PSIG. Lower pressure will shut down the chiller. ▲

The process fluid connections are located on the rear of the chiller and are labeled (PROCESS OUTLET) and (PROCESS INLET).

Process Fluid Connections (FNPT)

Outlet

ThermoFlex900 - 10000	P 1 P 2 T 0 T 1	1/2" cast bronze
ThermoFlex3500 - 5000	P 3 P 4	3/4" cast bronze
ThermoFlex7500 - 10000	P 3 P 5 T 5	1" wrought copper
Inlet - Same size as outlet		all chillers stainless steel

Supplied Adapters Standard Temperature Chillers

P 1 P 2 T 0 T 1	1/2" x 3/8" Polyethylene and 1/2" x 1/2" Nylon
P 3 P 4	3/4 MPT x 1/2 barb PVC
P 3 P 5 T 5	1" MPT x 1" barb PVC and 1" MPT x 3/4" barb PVC

The supplied adapters for high temperature chillers are brass.

See Section 2 for the specific locations on your chiller.

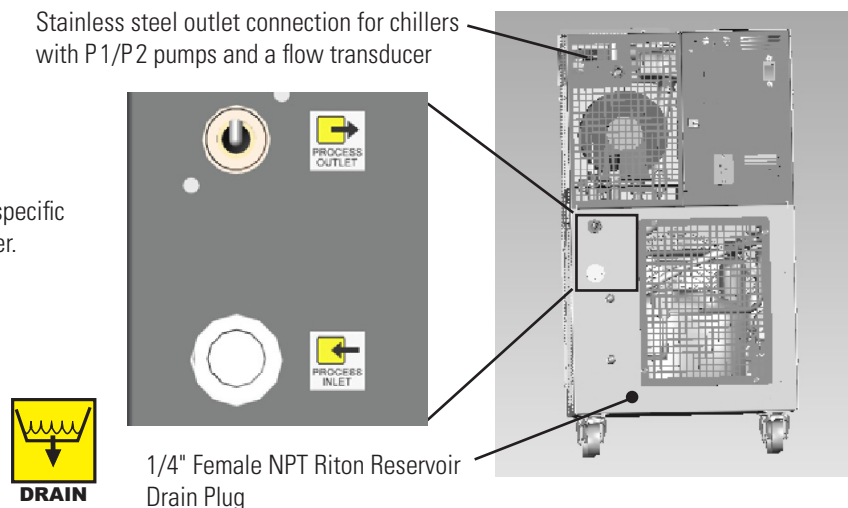


Figure 3-4 Typical Plumbing Connections (1 of 2)

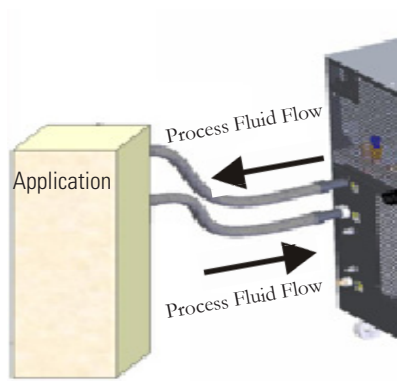








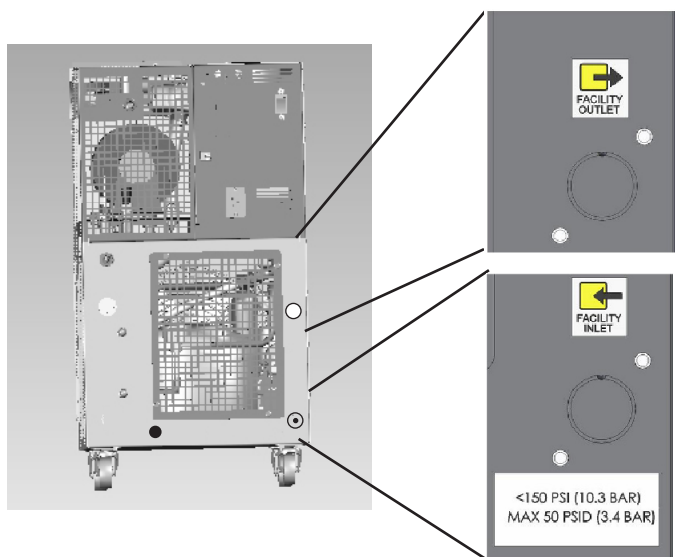
Figure 3-4 Typical Plumbing Connections (2 of 2)

Connect the PROCESS OUTLET  to the fluid inlet on your application. Connect the PROCESS INLET  to the fluid outlet on your application. Ensure all connections are secure and that the proper sealant/lubricant for the fitting material is used. (If Teflon[®] tape is used, ensure the tape does not overhang the first thread as it could shred and get into the fluid.) Keep the distance between the chiller and the instrument being cooled as short as possible. Ensure tubing is straight and without bends. If diameter reductions are required, make them at the inlet and outlet of your application, not at the ThermoFlex.

Water-cooled Chillers

For water-cooled chillers the facility water plumbing connections are also located on the rear and are labeled  FACILITY INLET and  FACILITY OUTLET. The connections are 1/2" Female NPT for ThermoFlex900 - 5000, 3/4" Female NPT for ThermoFlex7500 - 10000. Both connections for ThermoFlex900 to 10000 are cast bronze.

Connect the  FACILITY INLET to your facility water supply. Connect the  FACILITY OUTLET to your facility water return or drain. Ensure all connections are secure and that the proper sealant/lubricant for the fitting material is used. (If Teflon[®] tape is used, ensure the tape does not overhang the first thread as it could shred and get into the fluid.)



See Section 2 for the specific locations on your chiller.

Figure 3-5 Typical Plumbing Connections, Water-cooled Chillers

Process Fluid Requirements



Use of any fluid not listed below will void the manufacturer’s warranty. ▲

Standard Temp Chillers	High Temp Chillers
Filtered/Single Distilled water 0 - 75% Laboratory Grade Ethylene Glycol/Water 0 - 75% Laboratory Grade Propylene Glycol/Water Deionized water (1 - 3 MΩ- cm, compensated)* *For applications requiring resistivity greater than 1 MΩ- cm please call and speak to an applications engineer for additional information.	Filtered water* 0 - 50% Laboratory Grade Ethylene Glycol/Water* 0 - 50% Laboratory Grade Propylene Glycol/Water* *to 88°C for chillers with P1/P2 pumps, to 90°C for chillers with other pumps (when fluid properly maintained)



Ethylene glycol (EG) is poisonous and flammable. Before using any fluid or performing maintenance where contact with the fluid is likely refer to the manufacturer’s MSDS for handling precautions. ▲



EG is also hygroscopic, it absorbs water from its environment. This can affect the freezing point and boiling point of the fluid over time and may result in system failure. ▲



To prevent freezing/glazing of the plate exchanger, all ThermoFlex7500 and 10000s require the use of 50/50 EG/water or 50/50 PG/water below 10°C process temperature. ▲



When using a process fluid mixture of ethylene glycol and water or propylene glycol and water, check the fluid concentration and pH on a regular basis. Changes in concentration and pH can impact system performance. ▲



When using EG/water or PG/water, top-off with plain water. After top-off check the fluid concentration. ▲



Do not use a Deionization (DI) filter cartridge with Inhibited EG or Inhibited PG. A DI filter will remove inhibitors from the solution rendering the fluid ineffective against corrosion protection. Also, inhibitors increase fluid conductivity. ▲

Compatibility with Approved Fluids

Filtered Tap Water/Single Distilled Water

Filtered drinking water and single distilled water are good choices for use in a recirculating chiller because the filtering/distilling process used removes microorganisms that could create biological fouling as well as harmful particulates and excessive minerals that could cause harmful deposits and scaling.

Chlorine

Short term usage of tap water may not cause any adverse affects on the chiller or your application, but in the long term problems may arise. To help alleviate these problems Thermo Fisher Scientific recommends the use of chlorine.

The duration of time that chlorine remains in solution depends on factors such as water temperature, pH and availability of direct sunlight. We recommend maintaining chlorine levels at proper levels using chlorine test strips, generally 1 to 5 ppm is adequate.

For best results, maintain the pH of the fluid between 6.5 and 7.5. Do not add additional chlorine without first determining the concentration ratio that already exists in the fluid supply. Corrosion and degradation of the circulation components can result from concentration ratios that are too high. Contact our customer support for additional information.

Deionized Water

Deionized water is water that has had its mineral ions removed using ion exchange resins. The purpose of this process is to remove the ions that allow electrical current to flow more easily through water. This helps to prevent electrical leaks to ground through the recirculating fluid. Deionized water is classified by the electrical resistance of the water, usually measured in MΩ-cm, with pure water having a resistance of 18 MΩ-cm.

Deionized water is in an unbalanced state and will leach the missing ions from the materials it comes in contact with. The aggressive nature of this leaching can cause pitting on metal surfaces. Note that the deionizing process does not remove microorganisms. Because of this, we recommend deionized water only with applications that have it as a specified requirement.

In any case, only deionized water with a 1 - 3 MΩ-cm resistivity is approved for use in Thermo Fisher Scientific recirculating chillers. For applications requiring resistivity greater than 1 MΩ- cm please call and speak to an applications engineer for additional information.

Recommended Biocides and Inhibitors

Thermo Fisher Scientific offers a biocide and inhibitor package Thermo 200 (NALCO) premixed with 5 gallons of water or as a kit to be added to water. No other biocide or inhibitor is recommended for use in our chillers.



Biocides are corrosive and can cause irreversible eye damage and skin burns. They are harmful if inhaled, swallowed or absorbed through the skin. Refer to the manufacturer's most current MSDS. ▲



To prevent freezing/glazing of the plate exchanger, ThermoFlex7500 and 10000 chillers require the use of 50/50 EG/water or 50/50 PG/water below 10°C process temperature. ▲

Uninhibited Ethylene Glycol/Water

Ethylene glycol is used to depress the freezing point of water and should only be used at temperatures where freeze point suppression is required. Ethylene glycol does not improve heat transfer and is not recommended for use as a biocide. Because glycols lower the surface tension of water and do not evaporate as readily as water, they may cause visible weepage past the pump seals. If weepage cannot be tolerated use seal-less, magnetically driven pumps where available.

Uninhibited simply means that the glycol does not contain any additives to prevent corrosion. While uninhibited ethylene glycol is acceptable for use, the pH level must be closely monitored and the fluid may need to be replaced more often. Since all glycols produce acids in the presence of air and the fluid change the glycol if the pH falls below 8. Note that litmus paper will not work to test the pH of ethylene glycol/water.

Inhibited Ethylene Glycol/Water

Inhibited glycol can help protect the wetted metals within the cooling circuit from corrosion caused by poor water quality, ethylene glycol oxidation (low pH) and mixed metals (electrolysis). The inhibitor works by either leaving a barrier coating on metal surfaces to buffer them from the corrosive fluid or by creating an oxidized layer that protects the underlying metal (passivating).

Inhibited automotive glycols are never acceptable. They use either silicates or Organic Acid Technology (OAT) as the inhibitor and these components are not compatible with the polymers used in recirculating chillers including the pump seals and internal hoses.

Inhibitors may also accelerate pump seal wear and seal-less, use magnetically driven pumps where available.

Uninhibited Propylene Glycol/Water

Propylene glycol does not transfer heat as well as ethylene glycol, but can be used when freeze point suppression is required as well as lower toxicity.

Propylene glycol does not function as a biocide and the pH needs to be maintained the same as with ethylene glycol as it also produces acid when oxidized.

Inhibited Propylene Glycol/Water

Inhibited propylene glycol has the same properties as uninhibited propylene glycol and the same concerns as inhibited ethylene glycol.

Additional Fluid Information

When using the ThermoFlex chiller to circulate through aluminum, use a compatible corrosion inhibitor to prevent galvanic corrosion.

Ensure fluid viscosity is 50 cSt or less at the lowest temperature used.

Visible pump weepage may occur when compatible glycols, oils or other additives are used. Pump weepage is considered as a normal operating condition of mechanical seal pumps.

Process Water Quality and Standards

Process Fluid	Permissible (PPM)	Desirable (PPM)
Microbiologicals (algae, bacteria, fungi)		
	0	0
Inorganic Chemicals		
Calcium	<25	<0.6
Chloride	<25	<10
Copper	<1.3	<1.0
	0.020 ppm if fluid in contact with aluminum	
Iron	<0.3	<0.1
Lead	<0.015	0
Magnesium	<12	<0.1
Manganese	<0.05	<0.03
Nitrates/Nitrites	<10 as N	0
Potassium	<20	<0.3
Silicate	<25	<1.0
Sodium	<20	<0.3
Sulfate	<25	<1
Hardness	<17	<0.05
Total Dissolved Solids	<50	<10
Other Parameters		
pH	6.5-8.5	7-8
Resistivity	0.01*	0.05-0.1*

* MΩ-cm (compensated to 25°C)

Unfavorably high total ionized solids (TIS) can accelerate the rate of galvanic corrosion. These contaminants can function as electrolytes which increase the potential for galvanic cell corrosion and lead to localized corrosion such as pitting. Pitting may become so extensive that it causes a breach in the cooling system resulting in a refrigerant leak into the fluid system.

As an example, raw water in the United States averages 171 ppm (of NaCl). The recommended level for use in a water system is between 0.5 to 5.0 ppm (of NaCl).

Recommendation: Initially fill the reservoir with distilled or 1-3 MΩ-cm deionized water. (It is acceptable to have the fluid drop to the other levels over-time.) Do not use untreated tap water as the total ionized solids level may be too high. This will reduce the electrolytic potential of the water and prevent or reduce the galvanic corrosion observed.

Facility Water Quality and Standards (water-cooled chillers)

Facility Water	Permissible (PPM)	Desirable (PPM)
Microbiologicals (algae, bacteria, fungi)	0	0
Inorganic Chemicals		
Calcium	<40	<0.6
Chloride	<250	<25
Copper	<1.3 0.020 ppm if fluid in contact with aluminum	<1.0
Iron	<0.3	<0.1
Lead	<0.015	0
Magnesium	<12	<0.1
Manganese	<0.05	<0.03
Nitrates\Nitrites	<10 as N	0
Potassium	<20	<0.3
Silicate	<25	<1.0
Sodium	<20	<0.3
Sulfate	<250	<50
Hardness	<17	<0.05
Total Dissolved Solids	<50	<10

Note A corrosion inhibitor is recommended if mixed metals are in the facility water loop. ▲

Facility Water Requirements (water-cooled chillers)



Facility Water Maximum Inlet Pressure must not exceed 150 PSIG.

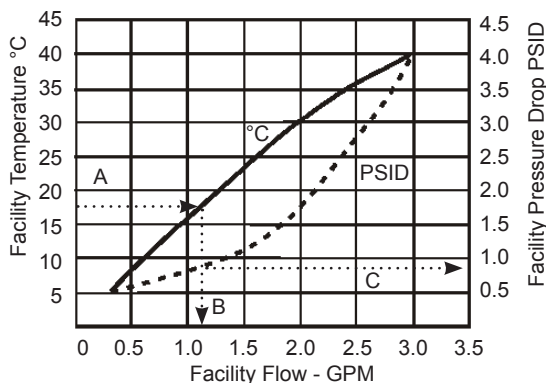
Facility Water Maximum Pressure Differential must not exceed 50 PSID.

(Pressure Differential = Inlet Pressure - Outlet Pressure)

Before using facility water that is above 35°C contact Thermo Fisher Scientific.

ThermoFlex1400

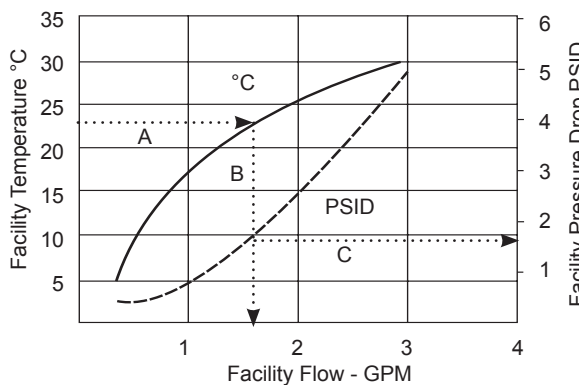
The facility water must meet the following conditions for the chillers to maintain their full rated capacity.



Example:
Follow the ... ► lines.
Start with a known, e.g., facility water temperature.
A - go across to temperature curve
B - drop down to determine the minimum required facility flow.
C - Where B crosses the PSID curve, go across to determine the minimum required PSID.

ThermoFlex2500

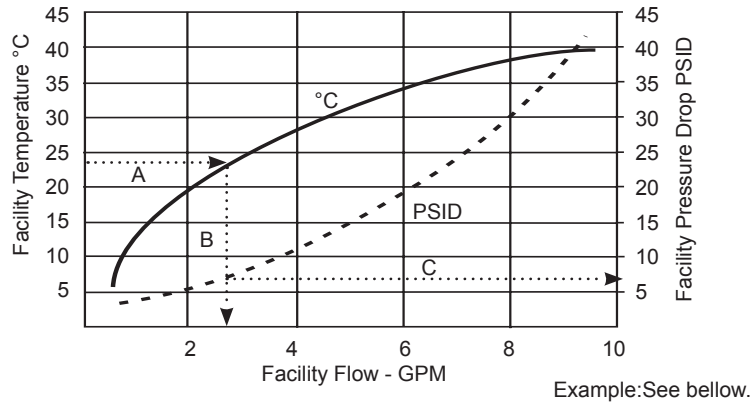
The facility water must meet the following conditions for the chillers to maintain their full rated capacity.



Example:
Follow the ... ► lines.
Start with a known, e.g., facility water temperature.
A - go across to temperature curve
B - drop down to determine the minimum required facility flow.
C - Where B crosses the PSID curve, go across to determine the minimum required PSID.

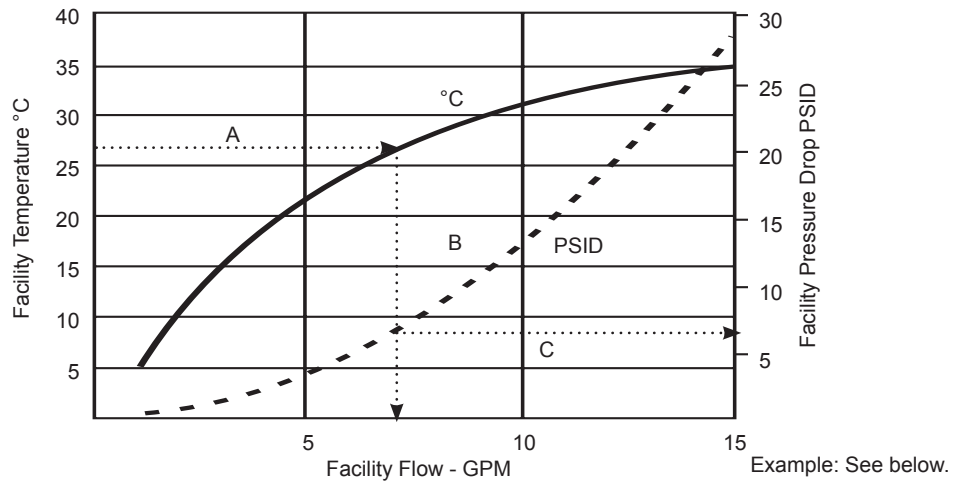
ThermoFlex3500/5000

The facility water must meet the following conditions for the chillers to maintain their full rated capacity.



ThermoFlex7500/10000

The facility water must meet the following conditions for the chillers to maintain their full rated capacity.



Example:
 Follow the► lines.
 Start with a known, e.g., facility water temperature.
 A - go across to temperature curve
 B - drop down to determine the minimum required facility flow.
 C - Where B crosses the PSID curve, go across to determine the minimum required PSID.

Fluid Filter Bag



The reservoir has a fluid bag filter designed to prevent the introduction of particulates into the system.

Install the filter bag before starting the chiller. ▲

Place your fingers below the front of the housing and push up on the housing to remove it.



Install the bag.

Replace the housing. Slide its back edge under the lip of the chiller's top panel and then press down until the housing snaps into place.


Figure 3-6 Fluid Filter Bag

Priming

If able, pre-fill the process fluid lines. The chiller is designed to shut down if not properly primed.

Ensure that there is enough fluid prepared to fill both the chiller and your application. If able, pre-fill the process fluid lines to reduce the setup time.

Fill the reservoir to the max fill line on the reservoir sight tube. To prevent the introduction of particulates into the system, fill the chiller with the reservoir bag filter in place.

Start the chiller using the power button  on the control panel.

As the pump fills your application add fluid to the reservoir to maintain the fluid level.

Repeat this process until the fluid level no longer drops in the reservoir.

If you need to pause priming use the power button to turn the chiller off.



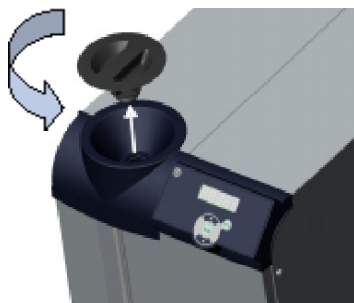
Not completely filling the chiller and process fluid lines could damage the chiller's pump. ▲

Initial Filling Requirements



Ensure the reservoir drain plug on the back of the chiller is in place, or the Riton fitting is closed, and that all plumbing connections are secure.

Before using any fluid refer to the manufacturer’s MSDS for handling precautions. ▲



Locate and remove the reservoir cap by unscrewing it counterclockwise.

To prevent the introduction of particulates into the system, fill with the reservoir bag filter in place.

Figure 3-7 Reservoir Cap

The reservoir has a sight tube and ball for easy fluid level monitoring. *Slowly* fill the reservoir with clean process fluid through the funnel only, failure to comply may result in internal spillage.

Note Filling the reservoir above MAX LEVEL fill line will result in a over flow error (**Over Flow**) causing the chiller to shut down. Also, fluids expand when heated. ▲

Since the reservoir capacity may be small compared to your application and air may need to be purged from the lines, have extra cooling fluid on hand to keep the system topped off when external circulation is started.

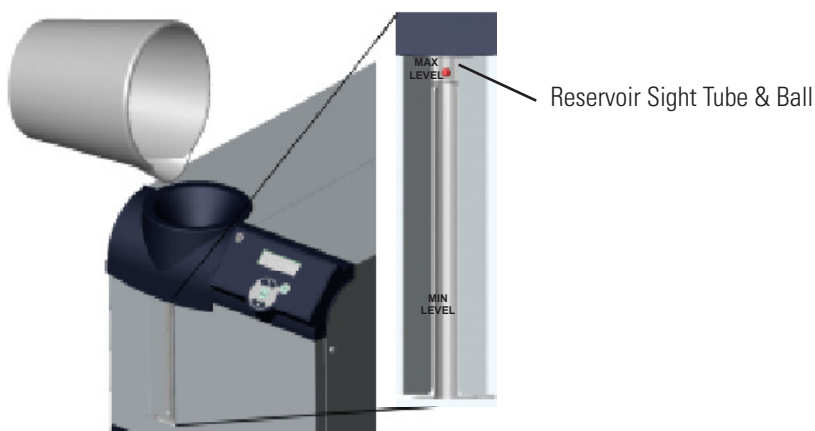


Figure 3-8 Reservoir Sight Tube & Ball



Before replacing the reservoir cap ensure the reservoir sight tube ball stopper is securely in place. ▲

Replace the reservoir cap by screwing it clockwise. Cap should be hand tight.

Fluid Top Off



Ensure the reservoir cap is at a safe handling temperature before removing. ▲

Remove the reservoir cap by unscrewing it counterclockwise.

To prevent the introduction of particulates into the system, fill the chiller with the reservoir bag filter in place.

The reservoir has a sight tube and ball for easy fluid level monitoring. *Slowly* fill the reservoir with clean process fluid through the funnel only, failure to comply may result in internal spillage.

Note Filling the reservoir above MAX LEVEL fill line will result in a over flow error (**Over Flow**) causing the chiller to shut down. Also, fluids expand when heated. ▲

Note Adding fluid that has a temperature differential with the fluid already in the reservoir will temporarily affect the chiller's stability performance. ▲



Before replacing the reservoir cap ensure the reservoir sight tube ball stopper is securely in place. ▲

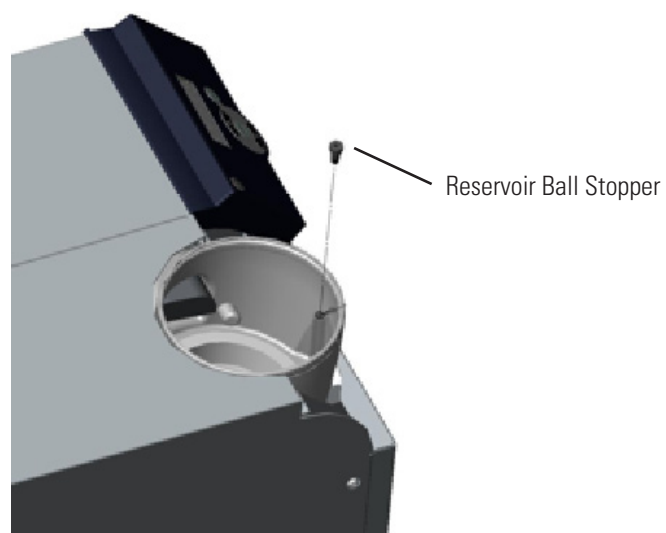


Figure 3-9 Reservoir Ball Stopper

Section 4 Operation

Deluxe Controller

The controller changes temperature using a Proportional-Integral-Derivative (PID) algorithm, and is designed with easy to use operator interface.

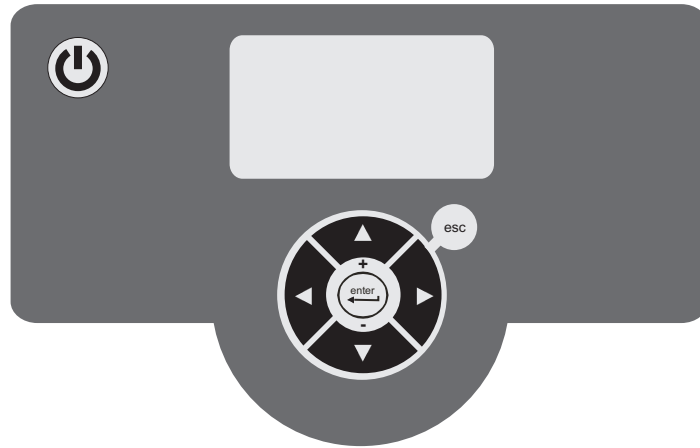


Figure 4-1 Deluxe Controller



This button is used to start and stop the chiller.



This button is used to navigate through the displays and to increase adjustable values.



This button is used to navigate through the controller displays and to decrease adjustable values.



These buttons are used to navigate through the controller displays.



This button has four functions. Pressing it once allows changes to be made to the display, pressing it again saves the change and allows you to continue to other displays. It is also pressed to clear messages.

Depressing and holding the enter button for two seconds before starting the chiller allows you to view and to make changes to the controller settings.

esc

This button is used to abort any changes and at the same time return the controller to its previous display. Aborting a change can only be made before the change is saved.

Setup

Before starting the chiller, double check all electrical and plumbing connections. Have extra recirculating fluid on hand. If the chiller will not start refer to Section 7 Troubleshooting.


Do not run the chiller until fluid is added.



Ensure the chiller's castors are locked. ▲

If the chiller is equipped with a deionization filter cartridge refer to Section 5 for installation.

Initial Start Up

- Place the circuit protector located on the rear of the chiller to the up position.
- Press the  button on the controller.

The Controller will display the quick start screen that will allow you to configure the chiller. Refer to the Quick Start Guide supplied with the chiller or the copy located after the Table of Contents.

Use the arrow buttons to scroll through and highlight each line of the display. If a change is needed from the factory default value press the enter button.



If the auto restart is enabled and the chiller shuts down as a result of a power failure, when power is restored the chiller will automatically restart. ▲


If satisfied with all the entries, press enter when the last line - **Quick Start Done** - is highlighted. If not satisfied, press the left arrow or esc button to leave the quick start display.

In either case the screen will go blank.

If enter was pressed, press  on the controller to bring up the **Daily Start Up** displays and start the chiller. See next page.

Note After start up, check the plumbing connections for leaks. ▲

Daily Start Up

- Ensure the circuit protector located on the rear of the chiller is in the up position.
- Press the  button on the controller, the pump and the refrigeration system will automatically start.

The controller automatically sequences through the following displays:

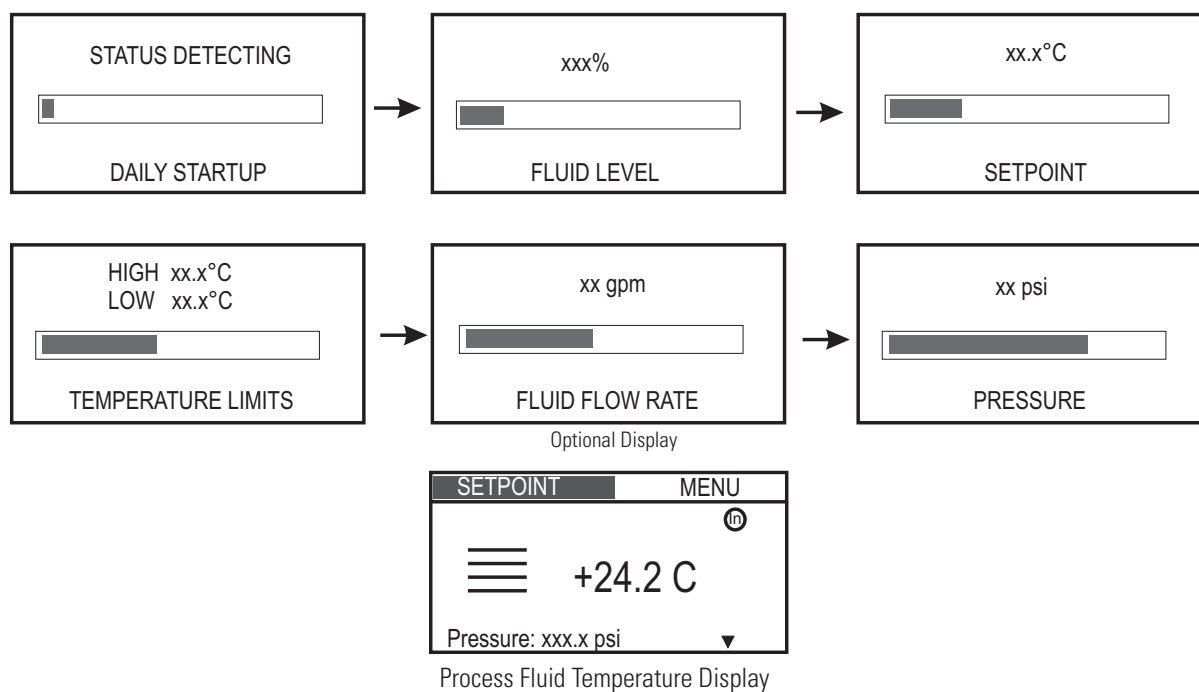


Figure 4-2 Daily Start Up Displays

Process Fluid Temperature Display

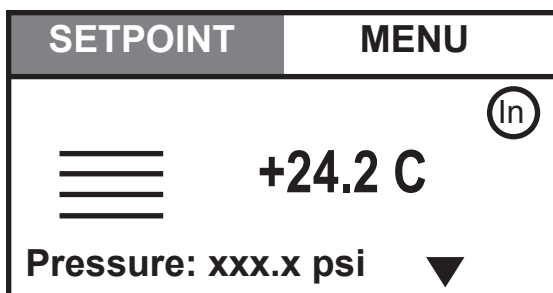







Figure 4-3 Process Fluid Temperature Display

The **SETPOINT** and **MENU** portions on the top of the display are used to view and/or change the controller's settings. They are explained in detail later in this Section.

The bars on the left of the display indicate the chiller's operating status.

-  Indicates the chiller is either not running or the ThermoFlex is at the desired setpoint.
-  Indicates the chiller is heating up to the setpoint.
-  Indicates the chiller is cooling down to the setpoint.

The small circle indicates which sensor is controlling the chiller.

-  When displayed, indicates the ThermoFlex is responding to the chiller's internal temperature sensor.
-  When displayed, indicates the ThermoFlex is responding to an external temperature sensor. See **Analog Comm - ACOM** in this Section to enable the external sensor.

The chiller is always in internal or external control. The default setting is internal.

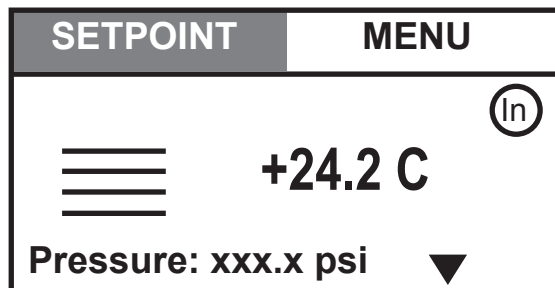
The temperature displayed is the current process fluid temperature.

The message on the bottom is used to display the chiller's operational status. The status displays are explained later in this Section.

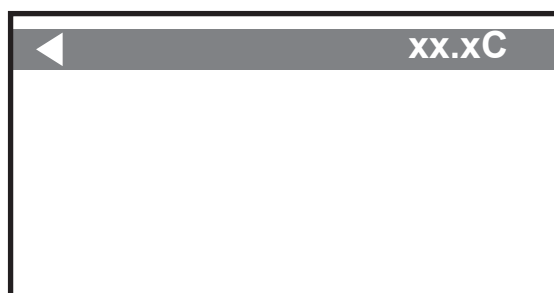
SETPOINT

Note Depressing and holding the enter button for two seconds before starting the chiller allows you to view, as well as make changes to, the setpoint. ▲

Use the arrow buttons to highlight **SETPOINT**.



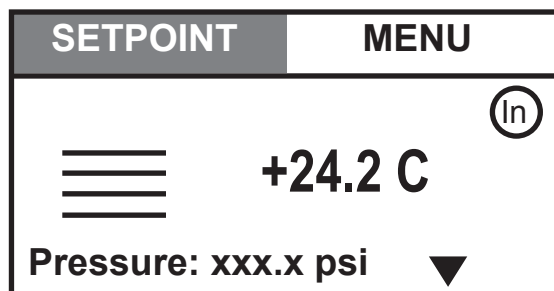
Press enter and the setpoint value appears. If needed, press enter again and the value starts flashing indicating the setpoint can be changed.



The setpoint range for standard temperature chillers is +5°C to +40°C, the range for high temperature chillers is +5°C to +90°C. Use the up and down arrow buttons to change the setpoint to the desired value.

Once the desired value is displayed press the enter button again to accept the change and to stop the flashing.

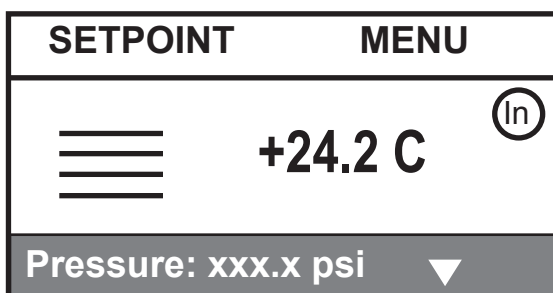
Return to the Process Fluid Temperature Display by pressing the left arrow or esc button.



Status Displays

The controller can show up to four different messages. Use the down arrow button to highlight the bottom of the display.

Press enter to get the displayed message to flash.



Use the arrow buttons to scroll through the available displays. Once the desired display is showing press enter again.

Available Displays:

Pressure: Indicates pump discharge pressure

Level %: Indicates reservoir fluid level

Flow: Indicates the process fluid flow rate (Optional)

Resistivity: Indicates the process fluid resistivity level (Optional)

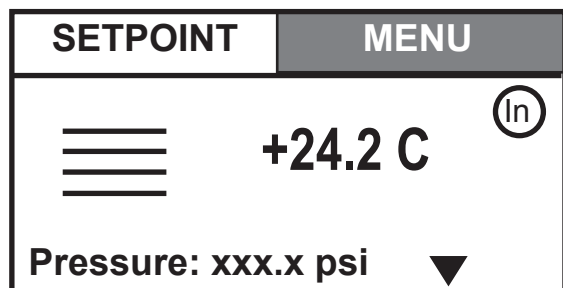
The arrow at the end of the display indicates which direction you can scroll to get to another display. A ▼ means you can only scroll down to the next display. A ▲ means you can only scroll up to the next display. ▲▼ means you can scroll up or down.

MENU Displays

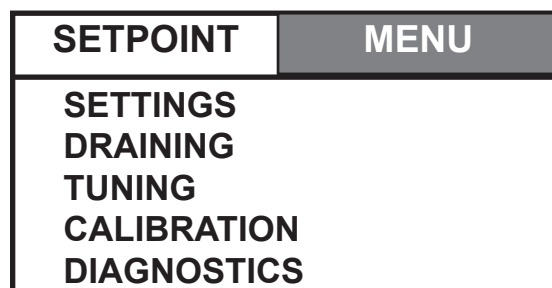
The ThermoFlex controller uses menus to view/change the controller's settings.

Note Depressing and holding the enter button for two seconds before starting the chiller allows you to view and to make changes to the settings. ▲

1. Use the arrow buttons to highlight MENU.

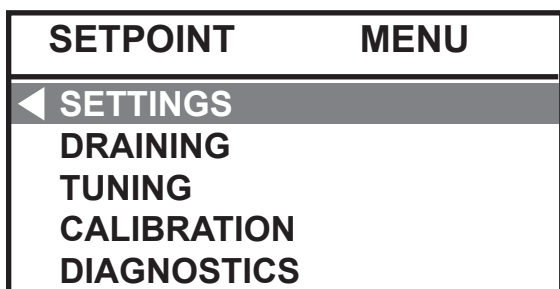


2. The controller brings up the Main Menu Display.

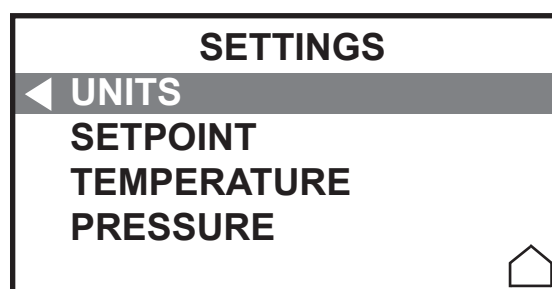


Main Menu Display

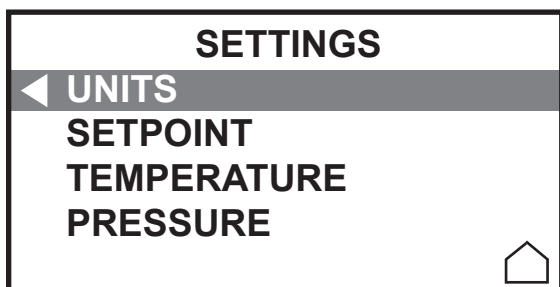
3. Use the up and down arrow buttons to highlight the desired option.



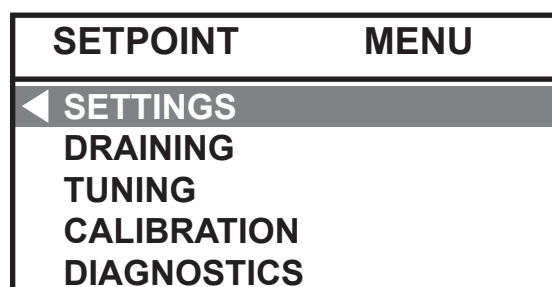
4. With the desired option highlighted, press enter to display various sub-menus.



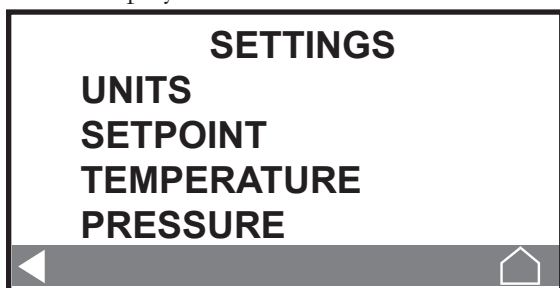
5. There are various ways to navigate through all the menu options.



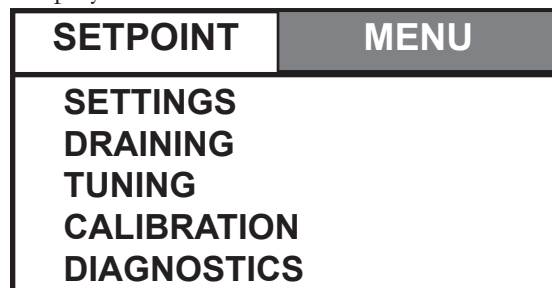
6. In the example in step 5, pressing the left arrow button or the esc button on the controller will return you to the previous display.



7. Or, highlight the home icon at the bottom of the display.

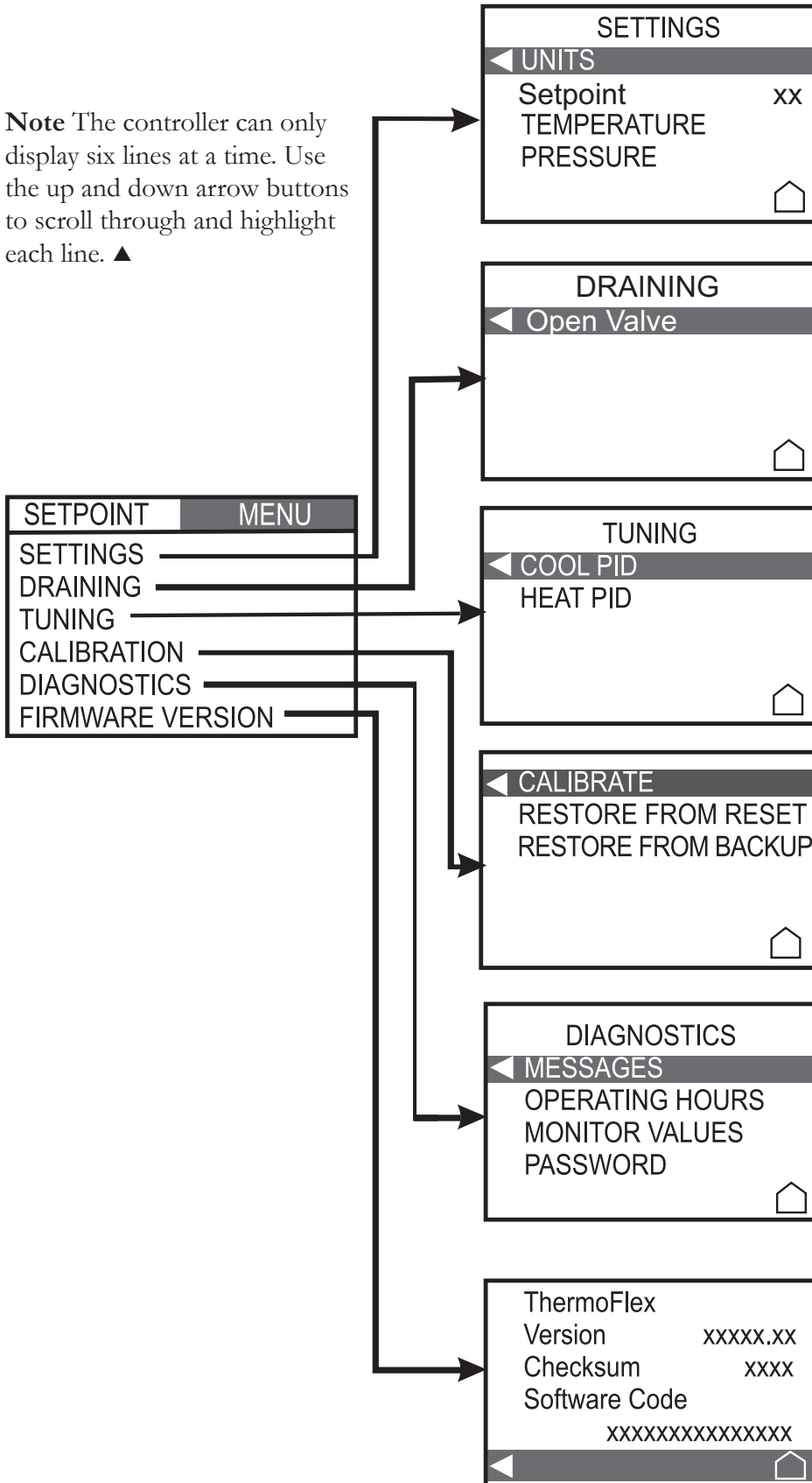


8. Then press enter to return to the Main Menu Display.



Main Menu Tree

Note The controller can only display six lines at a time. Use the up and down arrow buttons to scroll through and highlight each line. ▲



SETTINGS allows you to view/change the more commonly used settings, see next page.

DRAINING opens/closes the optional anti drainback valve, see page 4-20 .

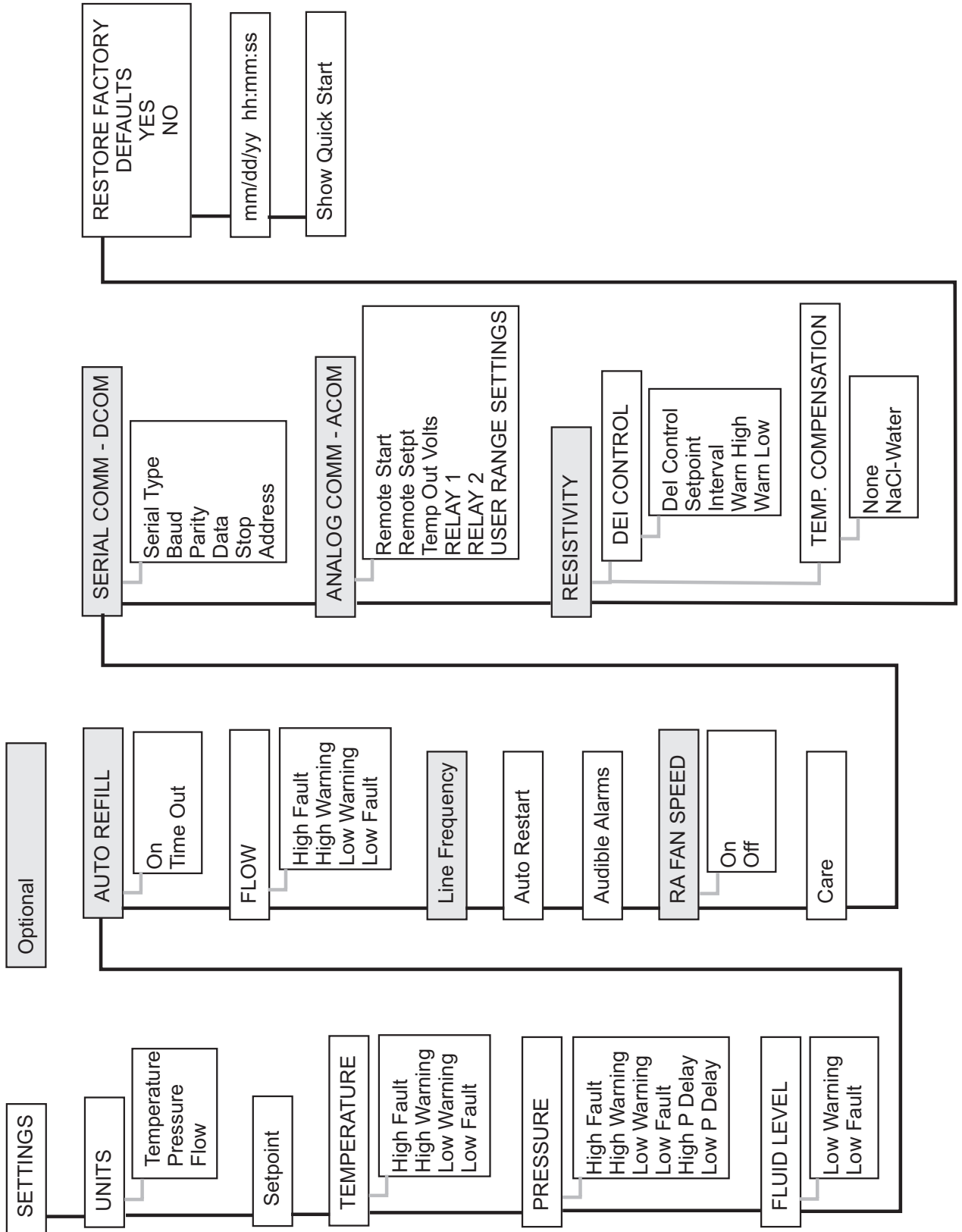
TUNING allows you to view/change the controller's **PID** values, see Section 7.

CALIBRATE calibrates the chiller's temperature, pressure and optional fluid flow sensors, see Section 8.

DIAGNOSTICS is used to display alarm messages, see Section 7, and also to display the chiller, filter and optional DI cartridge operating hours, see Section 6. **MONITOR VALUES** and **PASSWORD** are used only by qualified technicians.

FIRMWARE VERSION is used to display the controller's firmware information. Press the esc button to return to the Main Menu Display.

SETTINGS Menu Tree



SETTINGS

SETTINGS allows you to view/change the more commonly used settings.

Note The controller can only display six lines at a time. Use the up and down arrow buttons to scroll through and highlight each line. ▲

If a change to a setting is needed, highlight the desired line and then press the enter button. The highlight will start to flash.

If the text on a line is all capital letters, e.g., **UNITS** and **TEMPERATURE**, the setting has a sub-menu. Pressing enter will bring up the sub-menu. The sub-menus, shown on the following pages, allow you to view/change the applicable settings.

Lines that are not all capital, e.g., **Setpoint** and **Line Frequency**, indicate the changes can be made directly on the **SETTINGS** display.

If the line has a box, **Auto Restart**, pressing enter will turn the box black. A black box indicates the feature is enabled. Pressing enter again blanks the box and disables the feature.

SETTINGS	
◀	UNITS
Setpoint	xx
TEMPERATURE	
PRESSURE	
	🏠
<hr/>	
FLUID LEVEL	
AUTO REFILL*	
FLOW*	
Line Frequency*	60HZ
<input type="checkbox"/> Auto Restart	
<input type="checkbox"/> Audible Alarms	
RA FAN SPEED MODE*	
Care Level	1
SERIAL COMM - DCOM*	
ANALOG COMM - ACOM*	
RESISTIVITY*	
RESTORE DEFAULTS	
mm/dd/yy	hh:mm:ss
<input type="checkbox"/> Show Quick Start	

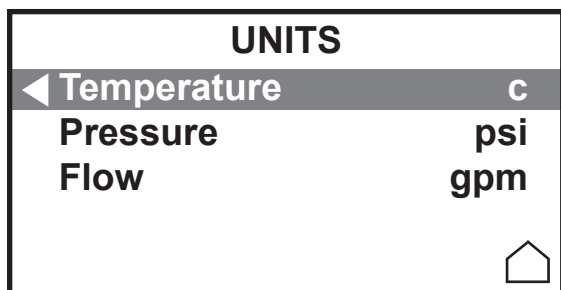
*Only displays on chillers equipped with the option.

UNITS

UNITS is used to view/change the controller's temperature, pressure and fluid flow (only chillers with an optional flow transducer) scales.

If a change to the setting is needed, highlight the desired scale and then press the enter button. The highlight will flash. Use the up/down arrow keys to bring up the desired scale. Once the desired scale is displayed press enter to accept the change and stop the flashing.

When the desired changes are made use the left arrow or esc key to return to the **SETTINGS** display.

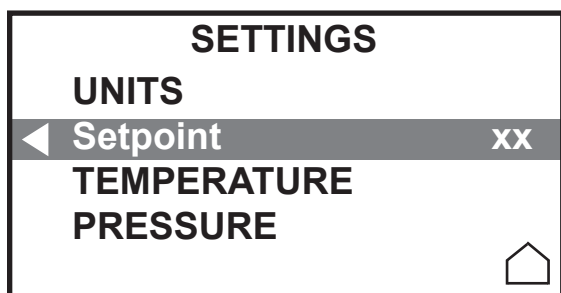


Scales: °C or °F Defaults: °C
 PSI, Bar or kPa PSI
 GPM or LPM GPM

Setpoint

Setpoint can be used to view/change the controller's setpoint temperature.

If a change to the setpoint is needed, highlight **Setpoint** and then press the enter button. The highlight will flash. Use the up/down arrow keys to bring up the desired setpoint. Once the desired setpoint is displayed press enter to accept the change and stop the flashing.



Setpoint Range:
+5°C to +40°C for standard temperature chillers
+5°C to +90°C for high temperature chillers,
+5°C to +88°C for P1 and P2 high temp chillers

Setpoint Default:
+20°C for all chillers

TEMPERATURE

TEMPERATURE is used to view/change the chiller's high and low temperature fault and warning settings. If the chiller exceeds the fault setting it will shut down, the controller will display a fault message and, if enabled, sound the alarm. If the chiller exceeds the warning setting the chiller will continue to run, the controller will display a warning message and, if enabled, sound the alarm.

If a change is needed, use the arrow keys to highlight the desired setting and then press the enter button. The highlight will flash. Use the up/down arrow keys to change the setting. Once the desired setting is displayed press enter to accept the change and stop the flashing.

Note You cannot set the **High Warning** value higher than the **High Fault** value. You cannot set the **Low Warning** value lower than the **Low Fault** value. ▲

When the desired changes are made use the left arrow or esc key to return to the **SETTINGS** display.

TEMPERATURE	
◀High Fault	xxC
High Warning	xxC
Low Warning	xxC
Low Fault	xxC

High Fault/Warning Range:

+2°C to +43°C for standard temperature chillers

+2°C to +93°C for high temperature chillers

High Fault/Warning Default:

+42°C for standard temperature chillers

+92°C for high temperature chillers

Low Fault/Warning Range:

+2°C to +43°C for all chillers

Low Fault/Warning Default:

+3°C for all chillers

PRESSURE

PRESSURE is used to view/change the chiller's high and low pressure fault and warning settings and set a delay time. If the chiller exceeds the fault setting it will shut down, the controller will display a fault message and, if enabled, sound the alarm. If the chiller exceeds the warning setting the chiller will continue to run, the controller will display a warning message and, if enabled, sound the alarm. The delay sets the length of time needed after a pressure fault before the chiller shuts down.

Note Since the controller can only display six lines at a time, keep pressing the down arrow until the **High P Delay** and **Low P Delay** lines are visible. ▲

If a change to the setting is needed, use the arrow keys to highlight the desired pressure and then press the enter button. The highlight will flash. Use the up/down arrow keys to change the setting. Once the desired setting is displayed press enter to accept the change and stop the flashing.

Note You cannot set the **High Warning** value higher than the **High Fault** value. You cannot set the **Low Warning** value lower than the **Low Fault** value. ▲

When the desired changes are made use the left arrow or esc key to return to the **SETTINGS** display.

PRESSURE	
◀ High Fault	xxpsi
High Warning	xxpsi
Low Warning	xxpsi
Low Fault	xxpsi
High P Delay	xsec
Low P Delay	xsec

High/Low Fault/Warning Range:

Pump dependent - see below

High/Low Pressure Time Delay Range:

0 to 30 seconds (0 to 60 for P3 - P5 pumps)

High Time Pressure Delay Default:

0 seconds (60 seconds for P3 - P5 pumps)

Low Time Pressure Delay Default:

10 seconds

Pump	Fault Range	High Default	Low Default
P1 P2 T0 T1:	3 to 105 PSI	105 PSI	3 PSI
P3 60 Hz:	3 to 46 PSI	46 PSI	3 PSI
P3 50 Hz:	3 to 32 PSI	32 PSI	3 PSI
P4 60 Hz:	3 to 85 PSI	85 PSI	3 PSI
P4 50 Hz:	3 to 60 PSI	60 PSI	3 PSI
P5 60 Hz:	3 to 87 PSI	87 PSI	3 PSI
P5 50 Hz:	3 to 56 PSI	56 PSI	3 PSI
T5 60 Hz:	2 to 105 PSI	105 PSI	2 PSI
T5 50 Hz:	2 to 105 PSI	105 PSI	2 PSI

Pump	Warning Range	High Default	Low Default
P1 P2 T0 T1:	4 to 100 PSI	100 PSI	4 PSI
P3 60 Hz:	4 to 46 PSI	46 PSI	4 PSI
P3 50 Hz:	4 to 32 PSI	32 PSI	4 PSI
P4 60 Hz:	4 to 85 PSI	85 PSI	4 PSI
P4 50 Hz:	4 to 60 PSI	60 PSI	4 PSI
P5 60 Hz:	4 to 87 PSI	87 PSI	4 PSI
P5 50 Hz:	4 to 56 PSI	56 PSI	4 PSI
T5 60 Hz:	4 to 105 PSI	105 PSI	4 PSI
T5 50 Hz:	4 to 105 PSI	105 PSI	4 PSI

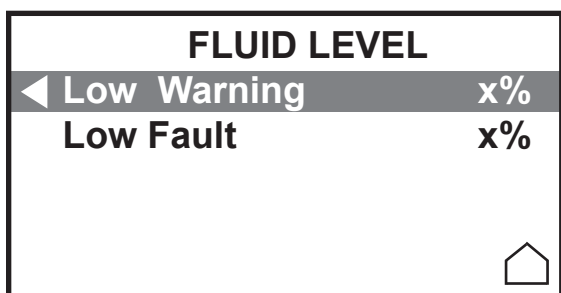
FLUID LEVEL

FLUID LEVEL is used to view/change the chiller's reservoir level fault and warning settings. If the chiller exceeds the fault setting it will shut down, the controller will display a fault message and, if enabled, sound the alarm. If the chiller exceeds the warning setting the chiller will continue to run, the controller will display a warning message and, if enabled, sound the alarm.

If a change to the setting is needed, use the arrow keys to highlight the desired line and then press the enter button. The highlight will flash. Use the up/down arrow keys to change the setting. Once the desired setting is displayed press enter to accept the change and stop the flashing.

Note You cannot set the **Low Warning** value lower than the **Low Fault** value. ▲

When the desired changes are made use the left arrow or esc key to return to the **SETTINGS** display.



Low Warning/Fault Range/Default:

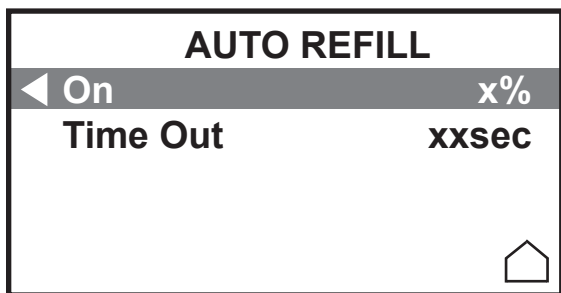
Heater dependent - see below

Heater	Warning Range	Default
None	6 - 100%	6%
1 kW:	58 - 100%	58%
2.3 kW:	93 - 100%	93%
5.0 kW:	87 - 100%	87%
4.6 kW:	87 - 100%	87%
Heater	Fault Range	Default
None	0 - 100%	0%
1 kW:	52 - 100%	52%
2.3 kW:	87 - 100%	87%
5.0 kW:	81 - 100%	81%
4.6 kW:	81 - 100%	81%

AUTO REFILL (Optional)

AUTO REFILL is used to view/change the chiller's optional auto refill settings. **On** is the % of fluid level in the reservoir needed to turn the option on. **Time Out** is the maximum time the option will operate. Setting the time to **0** disables the option.

When the desired changes are made use the left arrow or esc key to return to the **SETTINGS** display.



On % Default: Heater dependent - see below

Heater	Range	Default
None	70 - 100%	70%
1 kW:	70 - 100%	70%
2.3 kW:	93 - 100%	93%
5.0 kW:	87 - 100%	87%
4.6 kW:	87 - 100%	87%

Time Out Range: 0 - 900 seconds

Time Out Default: 45 seconds

80 seconds for ThermoFlex7500/10000

Setting the time to **0** disables the option.

FLOW (Optional)

FLOW is used to view/change the chiller's process fluid fault and warning settings. If the chiller exceeds the fault setting it will shut down, the controller will display a fault message and, if enabled, sound the alarm. If the chiller exceeds the warning setting the chiller will continue to run, the controller will display a warning message and, if enabled, sound the alarm.

If a change to the setting is needed, use the arrow keys to highlight the desired line and then press the enter button. The highlight will flash. Use the up/down arrow keys to change the setting. Once the desired setting is displayed press enter to accept the change and stop the flashing.

Note You cannot set the **High Warning** value higher than the **High Fault** value. You cannot set the **Low Warning** value lower than the **Low Fault** value. ▲

When the desired changes are made use the left arrow or esc key to return to the **SETTINGS** display.

FLOW	
◀ High Fault	xxgpm
High Warning	xxgpm
Low Warning	xxgpm
Low Fault	xxgpm

High/Low Flow Fault/Warning Range/Defaults:

Pump	Range	High/Low Defaults
P1 P2 T1 T0:	0.0 to 10.5 GPM	0.0 GPM
P3 P4 P5:	0.0 to 30.0 GPM	0.0 GPM
T5	0.0 to 15.0 GPM	0.0 GPM

This feature is not enabled until the value is changed to something other than 0.0. If the feature is not enabled and the low flow rate drops below the flow rate listed below the chiller will continue to run and the controller, if displaying flow, will display **FLow: Low FLOW**.

P1, T0, T1 and T5 Pump 0.3 GPM

P2 Pump 1.0 GPM

P3, P4 and P5 Pump 4.0 GPM

Line Frequency (Optional)

Line Frequency is used to identify the incoming frequency for chillers with a P3 - P5 pump and the capability to run on either **50 Hz** or **60 Hz**. The selected frequency automatically adjusts the firmware's *fixed* high pressure default setting.

◀ Line Frequency	60Hz
<input type="checkbox"/> Auto Restart	
<input type="checkbox"/> Audible Alarms	
RA FAN SPEED MODE	
Care Level	1
SERIAL COMM - DCOM	

Frequency Range: **50 Hz** or **60 Hz**

Frequency Default: **60 Hz**

Auto Restart

Auto Restart is used to turn the auto restart feature on/off.



If the auto restart is enabled and the chiller shuts down as a result of a power failure, when power is restored the chiller will automatically restart and operate at the saved values. Consider any possible risks before enabling this mode of operation. ▲

Line Frequency	60Hz
<input checked="" type="checkbox"/> Auto Restart	
<input type="checkbox"/> Audible Alarms	
RA FAN SPEED MODE	
Care Level	1
SERIAL COMM - DCOM	

With **Auto Restart** highlighted press enter. The box will turn black indicating the feature is enabled.

Audible Alarms

Audible Alarms is used to turn the audible alarm on/off

Line Frequency	60Hz
<input type="checkbox"/> Auto Restart	
<input checked="" type="checkbox"/> Audible Alarms	
RA FAN SPEED MODE	
Care Level	1
SERIAL COMM - DCOM	

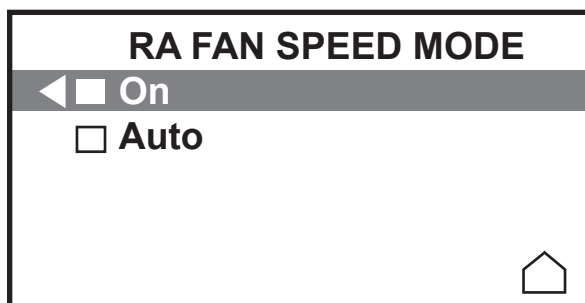
With **Audible Alarms** highlighted press enter. The box will turn black indicating the feature is enabled.

RA FAN SPEED MODE (ThermoFlex 2500 air-cooled chillers only)

RA FAN SPEED MODE controls the fan speed. **Auto** allows the fan to run under the conditions listed in Section 3. Selecting **On** allows the fan to run at high speed all the time.

Note **On** is required for the chiller to achieve its full cooling capacity specification. ▲

When the desired changes are made use the left arrow or esc key to return to the **SETTINGS** display.



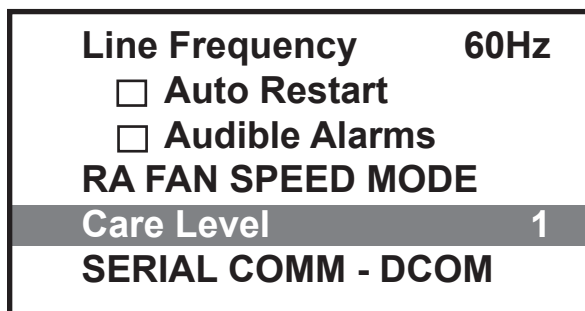
Fan Speed Range: **On** or **Auto**

Fan Speed Default: **Auto**

Care Level

Care Level sets the preventive care cleaning frequency reminder for the chiller's air and fluid filters.

If a change to the level is needed, highlight **Care Level** and then press the enter button. The highlight will flash. Use the up/down arrow keys to bring up the desired level. Once the desired level is displayed press enter to accept the change and stop the flashing.



Care Level Range: **off**
1 (1000 hours)
2 (2000 hours)
3 (3000 hours)

Care Level Default: **1** (1000 hours)

SERIAL COMM - DCOM (Optional)

SERIAL COMM - DCOM is used to configure/enable the chiller's optional serial communications feature. If a change to the setting is needed, use the arrow keys to highlight the desired line and then press the enter button. The highlight will flash. Use the up/down arrow keys to change the setting. Once the desired setting is displayed press enter to accept the change and stop the flashing.

Note None of the controller's other menu displays are available when serial comm is enabled. ▲

SERIAL COMM - DCOM	
Serial Type	off
Baud	xxx
Parity	xxx
Data Bits	8
Stop Bits	X
Address	xx

Note Keypad operation is still available with serial communications enabled. ▲

Serial Type: **RS232, RS485, off**

Baud Range: **9600, 4800, 2400, 1200, 600 or 300**

Parity: **even, odd or none**

Data Bits: Fixed at **8**

Stop Bits: **2 or 1**

Unit ID: **1 to 99** (RS 485 only)

If serial communications is enabled a general message will appear.



Press enter to extinguish the message.

Refer to Appendix C for additional information.

ANALOG COMM - ACOM (Optional)

ANALOG COMM - ACOM is used to configure/enable the chiller's optional analog communications feature. Use the arrow keys to highlight the desired option and then press the enter button. The box will turn black indicating that option is enabled. Press enter again to turn it off.



When operating a ThermoFlex7500-10000 with the remote sensor enabled ensure the chiller's response to lowering the setpoint does not result in operation below 10°C process temperature. Operation below 10°C requires the use of 50/50 EG/water or 50/50 PG/water. ▲

ANALOG COMM - ACOM	
<input checked="" type="checkbox"/> Remote Sensor	
<input type="checkbox"/> Remote Start	
<input type="checkbox"/> Remote Setpt	volts
<input type="checkbox"/> Temp Out	volts
RELAY 1	
RELAY 2	
USER RANGE SETTINGS	

When an option is enabled a general message will appear, for example:



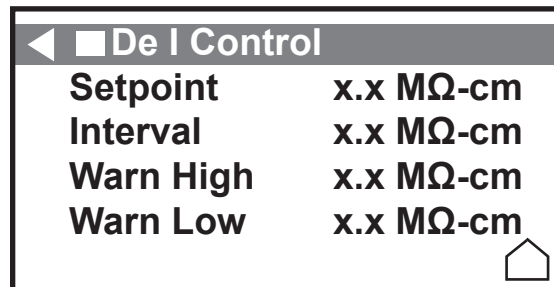
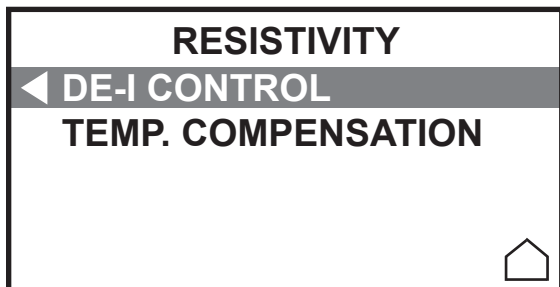
Press enter to extinguish the message.

Refer to Appendix D for additional information.

RESISTIVITY (Optional)

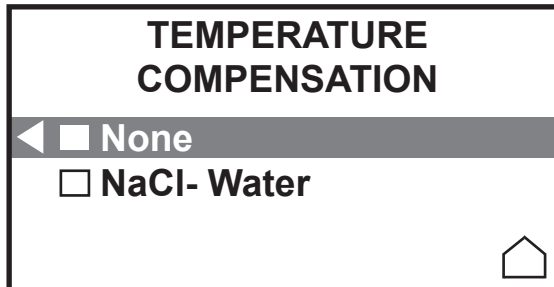
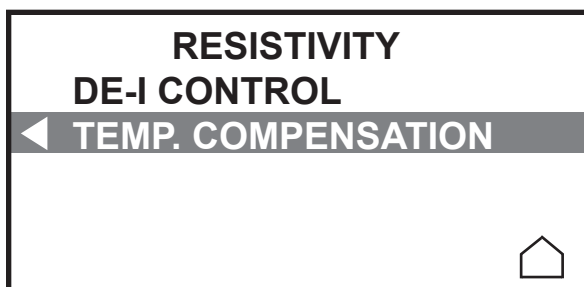
Note This option is available on standard-temp chillers. ▲

RESISTIVITY enables/configures the resistivity option. With **DE-I CONTROL** highlighted press enter to enable the feature. Next set the limits to the desired values.



Resistivity	Range	Default
Setpoint:	0.2 to 3.0	1.0 MΩ-cm
Interval	0.1 to 0.5	0.1 MΩ-cm
Warning High:	0.0 to 3.5	3.0 MΩ-cm
Warning Low:	0.0 to 3.5	0.5 MΩ-cm

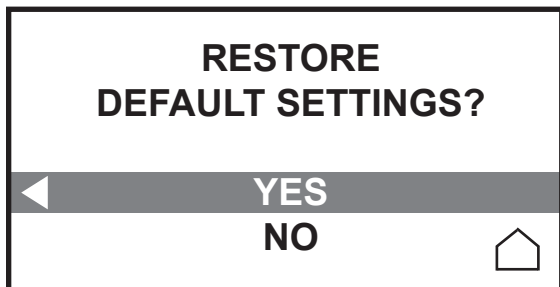
With **TEMP. COMPENSATION** highlighted press enter to turn compensation off or on.



When the desired changes are made use the left arrow or esc key to return to the **SETTINGS** display.

RESTORE DEFAULTS

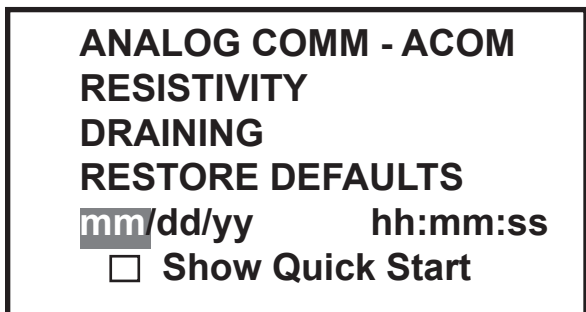
RESTORE DEFAULTS restores the controller back to factory default values. A reset is automatically performed whenever new firmware is installed.



Use the left arrow or esc key to return to the **SETTINGS** display.

mm/dd/yy hh:mm:ss

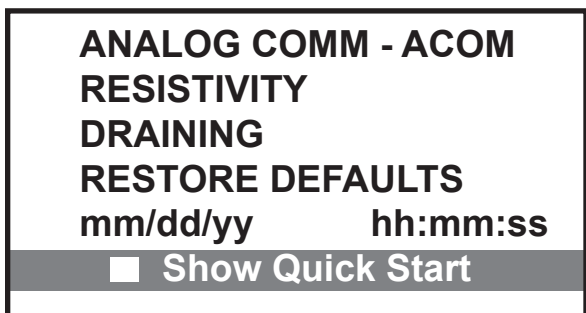
mm/dd/yy hh:mm:ss sets the date and time. Some error messages can display the date and time of occurrence, see Section 7.



Use the arrow keys to highlight the desired setting. Press enter to start the highlight flashing. Use the arrow keys to change the setting. Press enter to accept the change and stop the flashing.

Show Quick Start

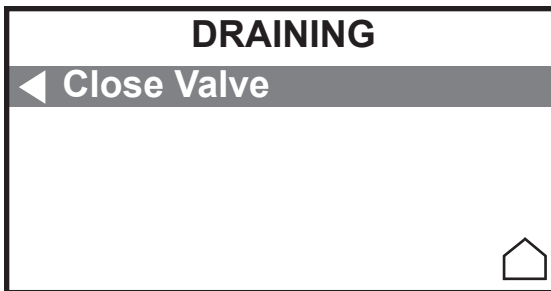
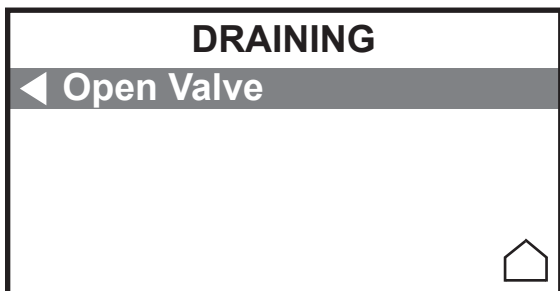
Show Quick Start reruns the initial start up menu. The Quick Start menu will appear the next time the chiller is started.



With **Show Quick Start** highlighted press enter. The box will turn black indicating the feature is enabled.

DRAINING (Optional)

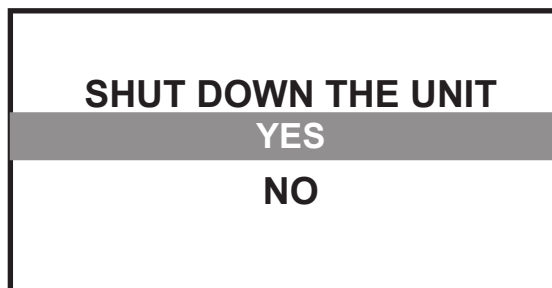
DRAINING opens/closes the optional anti drainback valve. The chiller must be off to drain the valve. Press enter to start the draining. The display will change to **Close Valve**. When the draining is complete press enter again to close the valve.



Shut Down

Press the  button.

The controller displays:



With **YES** highlighted, press enter.

To protect the compressor the chiller will enter a 5 to 20 second shut down cycle (colder process fluids take longer) before the refrigeration system and pump shut down.



The display then goes blank.



Using any other means to shut the chiller down can reduce the life of the compressor. ▲



Always turn the chiller off and disconnect it from its supply voltage before moving. ▲



The circuit protector located on the rear of the chiller is not intended to act as a disconnecting means. ▲

Section 5 Options/Accessories

Auto Refill

The auto refill provides makeup fluid to replace any fluid lost to evaporation, etc. It requires a pressurized fluid source connection to the ¼" Female Pipe Thread fitting on the rear of the chiller. (If Teflon[®] tape is used, ensure the tape does not cover the connection's starting-end thread.)

Note ThermoFlex7500s and 10000s with a P3, P5 or T5 pump have a ¼" Male brass plug installed in the connection, remove the plug before connecting the makeup fluid. ▲



Figure 5-1 Auto Refill Fitting

The auto refill fluid must also meet water quality standards or the valve may fail to operate as designed, see Section 3.

The auto refill valve input pressure must be < 80 PSI to ensure the valve functions properly.

Note Adding fluid that has a temperature differential with the fluid already in the reservoir will temporarily affect temperature stability performance. ▲

The auto refill operates when all of the following conditions are met:

- Fluid is available
- The chiller is turned on
- The fluid reaches a low level condition.

The auto refill shuts off when:

- The fluid reaches the correct operating level.
- The delay timer exceeds user fill time entered in the Quick Start or **SETTINGS** menu.
- The chiller shuts down for any reason.

Note Setting the fill time to 0 disables auto refill. ▲

Internal DI Cartridge

Note This option is not available on high-temp chillers. ▲

A partial flow DI filter cartridge is designed to maintain water resistivity between 1 and 3 MΩ-cm.

Note The DI option results in a 0.5 gpm reduction of available flow. ▲



Do not use a Deionization (DI) filter cartridge with Inhibited EG or Inhibited PG. A DI filter will remove inhibitors from the solution rendering the fluid ineffective against corrosion protection. Also, inhibitors increase fluid conductivity. ▲

The controller will display a **High Resistivity** or a **Low Resistivity** warning message when the process fluid resistivity exceeds the limit set in the controller's **RESISTIVITY SETTINGS** display, see Section 4.

Remove the two thumbscrews securing the DI access panel to the top of the chiller.

If there is a cartridge in place, first undo the hose fitting by pressing on the quick disconnect located on the top white connection.

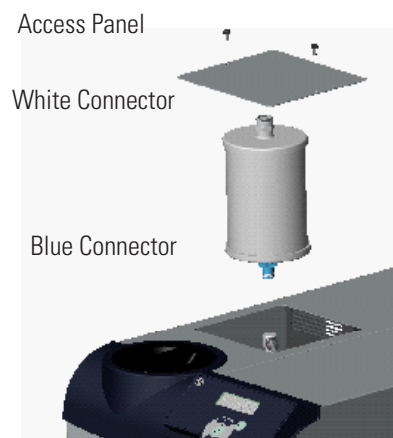


Figure 5-2 Internal DI Cartridge



The DI Cartridge will overpressurize if it is removed from the chiller before removing the hose fitting. ▲

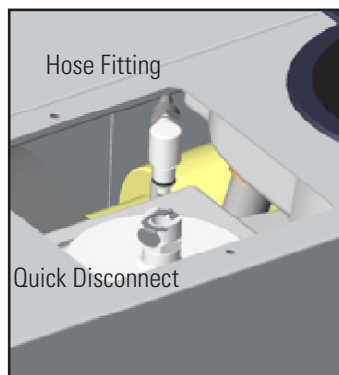


Figure 5-3 DI Fittings

Next rotate the cartridge ¼ turn counter-clockwise and then pull the cartridge straight up to remove it.

Remove the new cartridge from the shipping bag. The cartridge has a blue and a white connector. Lower the cartridge into the chiller with the blue connector facing downward. Press down on the cartridge lightly to engage and then rotate it ¼ turn clockwise (do not over rotate) or until you feel the filter click into place.

Push the hose fitting into the quick disconnect located on the white end of the cartridge. Replace the access panel and thumbscrews.

Note The cartridge can be changed with the chiller running, however, since the cartridge runs in a parallel arrangement, disconnecting the cartridge adds 0.5 gpm to the main flow. The additional flow will cause an increase in system pressure which may cause a high fluid pressure fault. ▲

P1 P2 T0 T1 Pump Pressure Relief Valve (Internal Configuration)

The pressure relief valve, located on the top left rear of the chiller, is used to set the desired system back pressure to your application. The valve is factory preset to 80 ± 5 psi (5.5 ± 0.4 bar).

If the chiller is not plumbed to an application, set the pressure by installing a loop of hose equipped with a shut-off valve between the supply and return fittings. Start the chiller and allow it to prime, then close the valve.

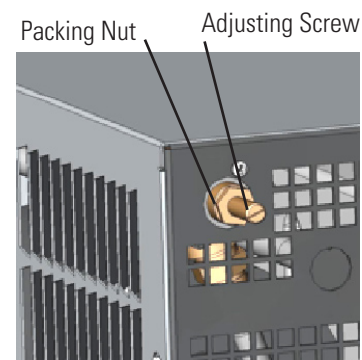


Figure 5-4 Nut and Screw

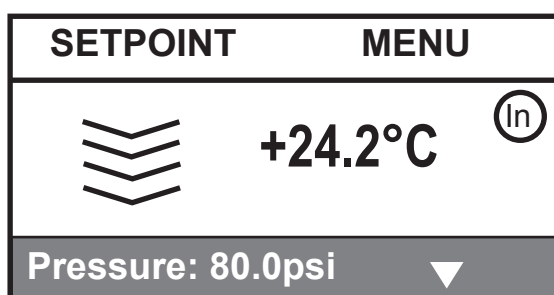


Figure 5-5 Pressure Status Display

Use the Status Display to display P 1, it should display 80 ± 5 psi.

Use a screwdriver to turn the adjusting screw (counterclockwise to reduce pressure) until the controller displays the desired setting.



Note Due to internal back pressure, the minimum pressure setting for a deadheaded pump is 32 psi (2.2 bar) for a P2 pump, and 8 psi (0.6 bar) for a P1 (these settings prohibit external flow from the chiller). ▲

If the chiller is plumbed to an application, ensure the chiller is off. Then back out the adjusting screw counterclockwise to reduce pressure. Turn the chiller on. Ensure that there is back pressure in the system. Turn the adjusting screw until the controller displays the desired setting.



Do not exceed 100 psi (6.9 bar). ▲

When complete, inspect the area around the $\frac{5}{8}$ " packing nut for fluid. If fluid is present, slightly tighten the nut and reinspect.

Note Should the chiller start to vibrate the valve setting may be the cause. Changing the pressure setting ± 5 psi (0.3 bar) will eliminate the vibration. ▲

P1 P2 T0 T1 Pump Pressure Relief Valve (External Configuration)

The pressure relief valve is used to set the desired system back pressure (P1) to your application. The valve is factory preset to 80 ± 5 psi (5.5 ± 0.4 bar).

The valve's inlet/outlet connections are $\frac{1}{2}$ " FNPT.

If the chiller is not plumbed to an application, set the pressure by installing a loop of hose equipped with a shut-off valve between the supply and return fittings. Start the chiller and allow it to prime, then close the valve.

Adjusting Screw

Packing Nut

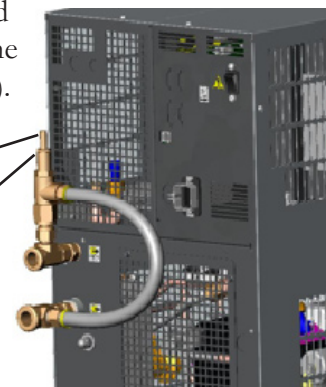


Figure 5-6 Nut and Screw

Use the Status Display to display P1, it should display 80 ± 5 psi.

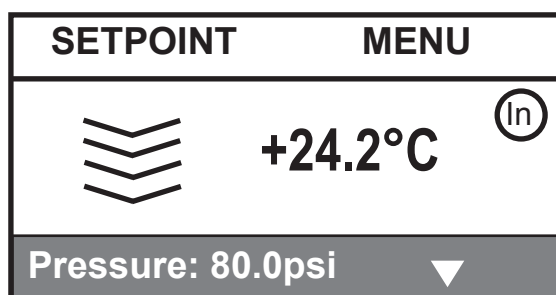


Figure 5-7 Pressure Status Display

Use a screwdriver to turn the adjusting screw (counterclockwise to reduce pressure) until the controller displays the desired setting.

Note Due to internal back pressure, the minimum pressure setting for a deadheaded pump is 40 psi (2.8 bar) for a P2 pump, and 22 psi (1.5 bar) for a P1 (these settings prohibit external flow from the chiller). ▲

If the chiller is plumbed to an application, ensure the chiller is off. Then back out the adjusting screw counterclockwise to reduce pressure. Turn the chiller on. Ensure that there is back pressure in the system. Turn the adjusting screw until the controller displays the desired setting.



Do not exceed 100 psi (6.9 bar). ▲

When complete, inspect the area around the $\frac{5}{8}$ " packing nut for fluid. If fluid is present, slightly tighten the nut and reinspect.

Flow Control with Flow Readout

Flow control for P1, P2, T0 and T1 pumps on ThermoFlex900s - 5000s is achieved using a 3-way valve plumbed between the standard process outlet and the process inlet on the rear of the chiller. Use the auxiliary process outlet at the top left of the rear of the chiller as a connection point. The connections are 1/2" FNPT. See Figure 5-8.

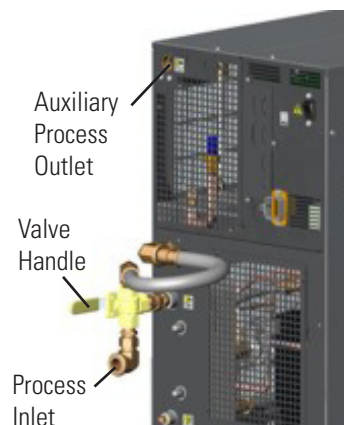


Figure 5-8 Flow Control

ThermoFlex3500s and 5000s with P3 and P4 pumps use a 2-way valve located on the rear of the chiller. The connections are 3/4" FNPT. See Figure 5-9.

ThermoFlex7500s and 10000s with P2 - P5 and T5 (see next page) pumps use a valve located on the rear of the chiller. The connections are 1/2" for P2, 1" FNPT for P3 and P5. See Figure 5-9.

Use the controller's Status Display to view the flow rate. Turn the valve handle until the desired rate is displayed.

Note The valve is sensitive to slight adjustments. ▲

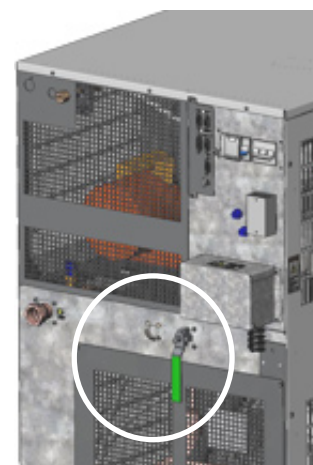


Figure 5-9 Flow Control Handle (Typical)

P1 P2 T0 T1 Pump Pressure Relief with Flow Readout

The pressure relief with flow readout works just like the pressure relief Valve discussed on the previous page. It allows you to control the pressure going to your application.

This valve is plumbed into the chiller's auxiliary port, allowing you to also monitor the flow rate to your application using the controller's Status Display.

The valve's outlet connection is 1/2" FNPT. See Figure 5-10.

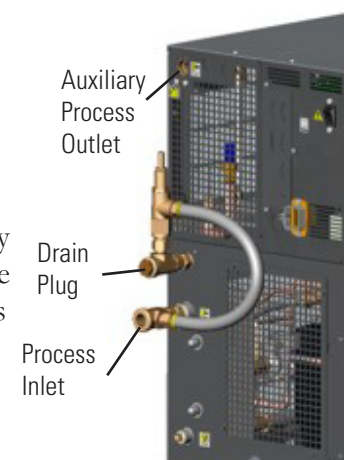
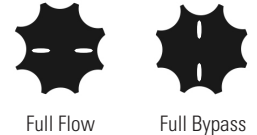


Figure 5-10 Pressure Relief

T 5 Pump Flow Control

T 5 Flow Control valve is designed with slots to quickly identify its position. When the slots are in the horizontal position (in line with the discharge line) the application is receiving full flow. With the slots are vertical the valve is in full bypass.



Anti Drainback

Chillers installed below the end-user application may allow system fluid to drain back into the chiller and cause spillage. The anti-drainback valve is designed to prevent any such spillage.

The valve opens just before the pump is turned on and it closes just after the pump shuts off.

This option is required if your chiller is more than 24 feet below your application, or if there is a possibility of drain back due to the occasional opening of the process lines for either application swaps or chiller servicing.

Semiconductor Equipment and Materials International (SEMI) Chillers

Compliance

SEMI chillers are compliant with:

SEMI S2-0703 Product Safety Assessment

SEMI S8-0705 Ergonomic Assessment

SEMI S14-0704 Fire Risk Assessment

SEMI F47-0706

Emergency Off (EMO)

A guarded red mushroom shaped push-button switch with twist-to-reset is provided on the chiller's front to turn it off in case of an emergency. The button head is engraved with "EMO" in large white filled letters.

Note The EMO is controlled by a safety circuit and is not influenced by the chiller's firmware/software. ▲

Activation of the EMO button will remove power from the main contactor coil stopping operation of the chiller. The controller will display **External EMO**.

Resetting the EMO button will not restart the chiller. After all hazards have been removed reset the chiller by pushing the enter key on the controller. In the local mode, the chiller will restart by pressing the START STOP button again. In the serial communications mode, send the appropriate start command. In the analog I/O mode, the chiller starts when the error is cleared.

Chiller Circuit Breaker Interrupt Rating

The main power circuit breaker located on the rear of the chiller has an Interrupting Capacity (AIC) of 10,000 amps.

Lockout/Tagout (LOTO)

Before performing Chiller maintenance, the energy sources associated with the chiller system must be lockedout and tagged out (LOTO). Hazard control features added to the system (e.g., safety interlocks, EMO) are not a substitute for turning off and locking out electrical or fluid energy.

For chillers rated 20 Amps or less, electrical LOTO is accomplished by removing the power cord on the rear of the chiller then closing and locking the power receptacle locking device. For other chillers, electrical LOTO is the responsibility of the user and can be provided by:

- Using the main disconnect (knife switch at system control cabinet).
- Disconnecting main power at the facility power source prior to the system controller cabinet.
- In addition, follow all OSHA and local facility LOTO directives.

Drip Pan and Drain

The chiller is equipped with a secondary containment (drip pan) in case there is a leak. The drip pan drain is located on the rear of the chiller. Install the supplied nylon 1/4 turn quick disconnect (QD) fitting into the drain fitting. The QD is barbed for a 1/2" ID hose.

Since the drip pan will not hold more than 110% of the reservoir volume, connect the drain to guide the fluid to an appropriate spillage location.

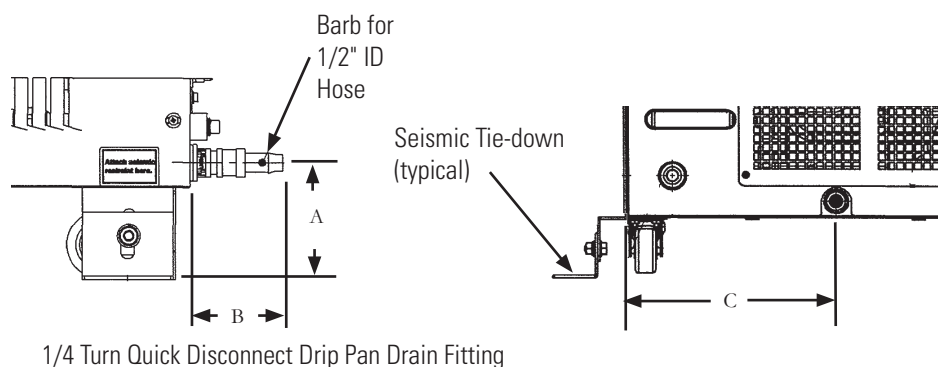


Figure 5-11 Drip Pan Drain

	900/1400		2500		3500/5000		7500/10000	
A	3 1/2"	8.8 cm	4"	10.1 cm	3 3/8"	11.3 cm	4 1/4"	10.8 cm
B	2 3/4"	7.0 cm	2 11/16"	6.8 cm	2 3/4"	7.1 cm	2 5/8"	6.6 cm
C	6 15/16"	17.7 cm	6 9/16"	16.7 cm	9 9/16"	24.3 cm	7 11/16"	19.5 cm

Seismic Tie-Downs

Install the seismic tie-downs to the chiller as shown below. Then secure the chiller to the floor with user-supplied hardware.

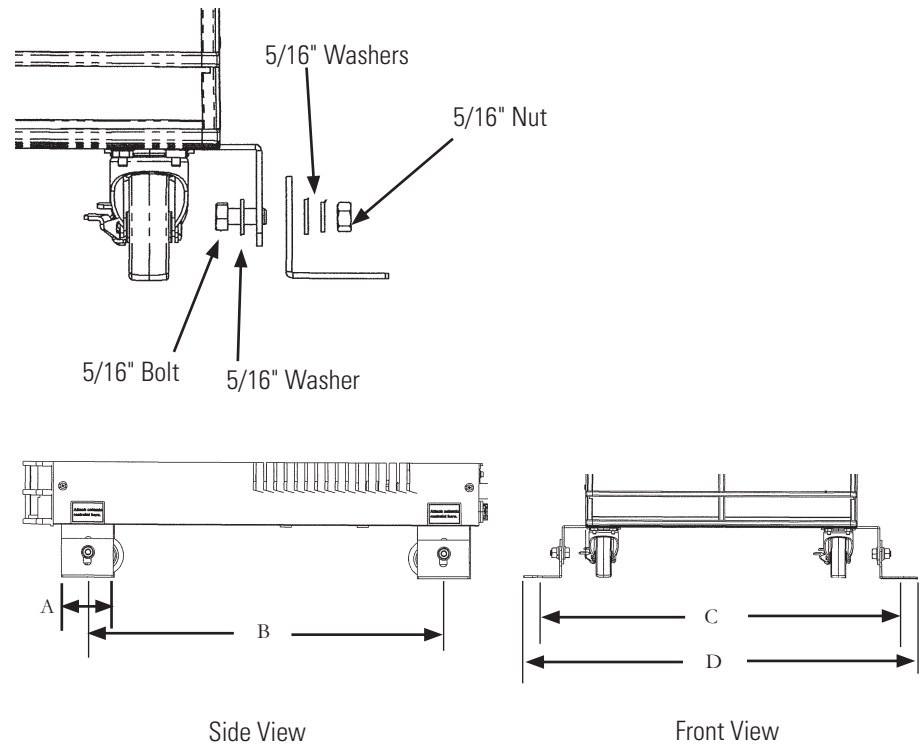


Figure 5-12 Seismic Tie-Downs

	900/1400		2500		3500/5000		7500/10000	
A	2 11/16"	6.8 cm	2 11/16"	6.8 cm	2 11/16"	6.8 cm	2"	5.1 cm
B*	18 1/2"	47.0 cm	20 1/16"	51.0 cm	24 1/2"	62.2 cm	17"	43.1 cm
C*	19 11/16"	50.0 cm	22 3/4"	57.8 cm	24 3/4"	62.9 cm	27 7/16"	69.6
D	21 3/16"	53.8 cm	24 1/4"	61.5 cm	26 1/4"	66.7 cm	28 15/16"	73.4

* Distance between Ø.53 Seismic mounting holes

Center of Gravity

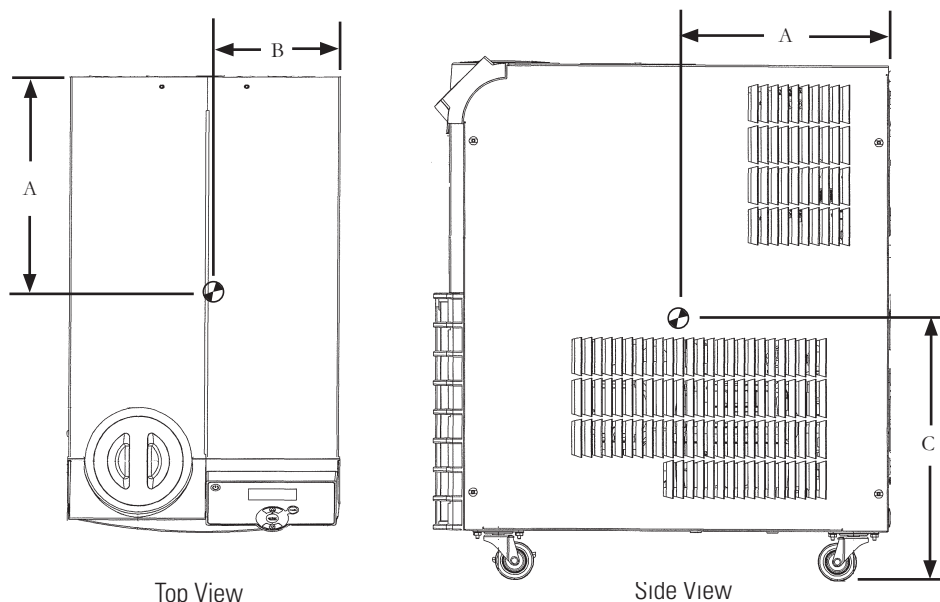


Figure 5-13 Center of Gravity

Center of Gravity $\pm \frac{1}{2}$ ", air-cooled chiller, no fluid in tank

	900/1400 P2 Pump		2500 P2 Pump		3500/5000 P2 Pump		7500/10000 P3 Pump	
A	10 ³ / ₄ "	27.3 cm	12"	30.5 cm	13 ³ / ₈ "	34.0 cm	14 ⁷ / ₈ "	37.8 cm
B	6 ³ / ₄ "	17.2 cm	8 ³ / ₈ "	21.3 cm	9"	22.9 cm	13 ¹ / ₈ "	33.3 cm
C	13 ¹ / ₂ "	34.3 cm	13 ¹ / ₂ "	34.3 cm	17"	43.2 cm	26"	66.0 cm

3500/5000 P4 Pump Global Voltage

A	12 ³ / ₈ "	31.4 cm
B	9 ³ / ₄ "	24.8 cm
C	19 ¹ / ₂ "	49.5 cm

Center of Gravity $\pm \frac{1}{2}$ ", water-cooled chiller, no fluid in tank

3500/5000 P2 Pump

A	13"	33.0 cm
B	9 ¹ / ₂ "	24.1 cm
C	16"	40.6 cm

Weight Distribution ± 2 lbs, air-cooled chillers

	900/1400 P2		2500 P2		3500/5000 P2		7500/10000 P3	
Left Front	27.1 lbs	12.3 kg	40.7 lbs	18.5 kg	62.0 lbs	28.1 kg	97.8 lbs	44.4 kg
Left Rear	29.8 lbs	13.5 kg	42.0 lbs	19.1 kg	63.7 lbs	28.9 kg	99.9 lbs	45.3 kg
Right Front	32.9 lbs	14.9 kg	45.7 lbs	20.7 kg	68.2 lbs	30.9 kg	89.2 lbs	40.5 kg
Right Rear	36.2 lbs	16.4 kg	47.1 lbs	21.4 kg	70.0 lbs	31.8 kg	91.1 lbs	41.3 kg

Other Accessories

Installation kit - includes replacement air and fluid filters

Maintenance kit - includes a set of hoses, adaptor fittings and Teflon[®] tape

Fluids

Fluid treatment kit designed to minimize the effects of corrosion, scale, fouling, and microbial contamination. It allows the system to continue providing reliable service with optimal efficiency for the life of the chiller.

The kit includes a biocide and corrosion inhibitor capable of treating up to ten gallons of application water and is designed to provide protection for a period of six months. This kit is compatible with the following fluids:

- Filtered/Single Distilled Water
- Uninhibited Ethylene Glycol/Water
- Uninhibited Propylene/Water
- Deionized (DI) Water*
- Reverse Osmosis (RO) Water

*Do not use the Thermo Fisher Water Treatment Kit with a DI filtered system; the filter will remove a portion of the reagent's active ingredients limiting its effectiveness.

Please contact Thermo Fisher Scientific's Sales, Service and Customer Support to assist you with questions that you may have regarding accessories for your ThermoFlex, see inside front cover for contact information.

Section 6 Preventive Maintenance

Preventive Maintenance Timer (Care Level)


Only Thermo Fisher should provide any required replacement parts.

The ThermoFlex chiller has an integrated preventive maintenance timer that will alert you when it is time to perform preventive maintenance. This unique feature will remind you to change your air and fluid filters.

Based on the environment in which your chiller is located, you can choose from four levels of preventive maintenance off, L1, L2, and L3:

- off – Disables the alert
- L1 – 1,000 hours - default setting
 - Heavy manufacturing environment
 - Airborne particulate created during manufacturing process
- L2 – 2,000 hours
 - Typical production environment
- L3 – 3,000 hours
 - Clean environment – filtered air
 - Typically laboratory or research environment

Change/set the level using the controller's **DIAGNOSTICS** menu, see next page. When the chiller exceeds the chosen limit, the controller will flash **Filter PM** and, if enabled, an audible alarm will sound.

To clear this message press . This will automatically restart the preventive maintenance timer for your filters. Each time the chiller exceeds the chosen time, the controller will remind you that it is time to change your filters.

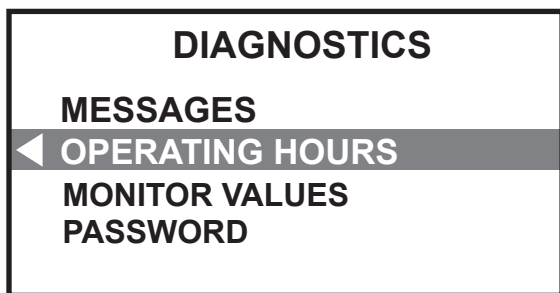
If you change your filters before the preventive timer trips, you can clear the timer by using the controller's **DIAGNOSTICS** menu, see next page.

Note For air-cooled chillers, both the air and fluid filters in the ThermoFlex can be changed while the chiller is running. For water-cooled chillers, only the fluid filter can be changed while it is running. ▲

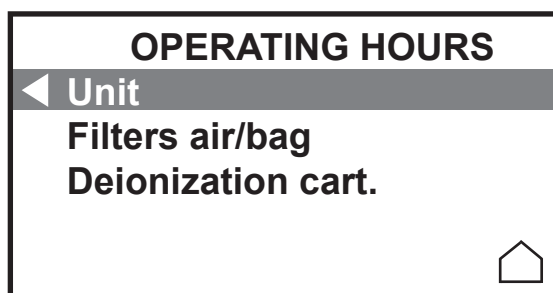
DIAGNOSTIC - OPERATING HOURS

OPERATING HOURS displays the chiller (**Unit**), filter and optional DI cartridge operating hours. The display is also used to select the preventive maintenance schedule (**Care Level** and optional **De-I Period**).

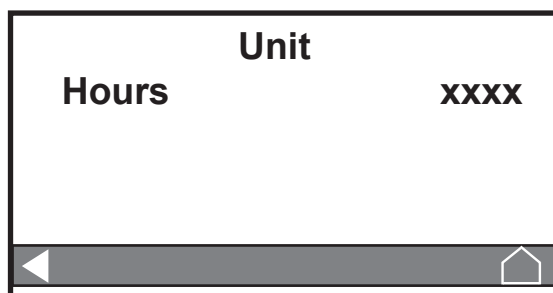
1. Use the arrow buttons to highlight **OPERATING HOURS**.



2. Press enter to display:



3. Highlight the desired item and press enter to bring up one of the displays shown on the right:

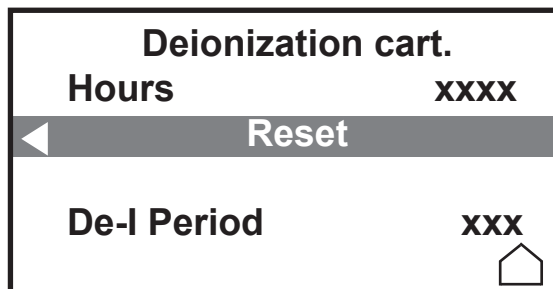


4. With **Reset** highlighted, press enter to reset the filter and cartridge operating hours to zero. You cannot reset the chiller's operating hours.



5. Use the arrow buttons to highlight **Care Level**. Press enter and the display will flash. Use the arrow buttons to display the desired care level and then press enter again to stop the flashing and accept the new value.

6. The optional **De-I Period** is the operating time needed to display the **DI** message. Use the arrow buttons to highlight **De-I Period**. Press enter and the display will flash. Use the arrow buttons to display the desired time, from 0 to 9999 hours. Press enter again to stop the flashing and accept the new value.



(Optional Display)

Fluid Filter Bag

The reservoir has a fluid bag filter designed to prevent the introduction of particulates into the system.

Note The fluid bag filter can be removed with the chiller operating. ▲



Before using any fluid or performing maintenance where contact with the fluid is likely refer to the manufacturer's MSDS for handling precautions. ▲



For high-temperature chillers, ensure the fluid is at a safe temperature (below 40°C) before handling. ▲

Fluid Bag Filter



When it is time to replace the bag, gently pull up on the plastic funnel housing to remove it and simply pull the bag out of the chiller. Replacement bags are available from Thermo Fisher Scientific.

Figure 6-1 Fluid Filter Bag



Before replacing the reservoir housing ensure the reservoir sight tube ball stopper is securely in place, see next page. ▲

Fluid Diffuser

On ThermoFlex900-5000s, when you remove the bag you will notice a wire mesh fluid diffuser inside the reservoir supply line, see Figure 6-2. The diffuser is used to help streamline the flow into the reservoir. After several bag replacements turn the chiller off and remove the diffuser to inspect it for debris/damage.



The fluid velocity into the reservoir will rapidly increase with the diffuser removed and cause splashing. Turn the chiller off before removing the diffuser. This is especially critical when using ethylene or propylene glycol. ▲

Note To prevent particulates from entering the reservoir, ensure the fluid bag filter is in place before removing the diffuser. ▲



Do not operate the chiller unless the diffuser is installed. ▲

Fluid Maintenance

An effective recommended maintenance plan would include changing the fluid every six months to optimize chiller reliability, see Section 3 for additional information.

Reservoir Cleaning

The user is responsible for maintaining reservoir fluid quality. Check the fluid on a regular interval. Start with frequent checks until a regular interval (based on your application) is established.

If cleaning is necessary, flush the reservoir with a fluid compatible with the process fluid and the chiller's wetted parts, see Section 8.



Before using any fluid or performing maintenance where contact with the fluid is likely refer to the manufacturer's MSDS for handling precautions. ▲



For high-temperature chillers, ensure the fluid is at a safe temperature (below 40°C) before handling. ▲

Reservoir Sight Tube

Clean the sight tube by gently pulling up on the plastic funnel housing to remove it (see illustration on previous page) and then gently pulling out the black sight ball stopper from the tube. Use a long soft-bristle 1/4" brush. Use caution not to scratch the glass.



Before replacing the reservoir housing ensure the reservoir sight tube ball stopper is securely in place. ▲

For easier replacement, wet the stopper first and then use a twisting motion to install it in the sight tube.

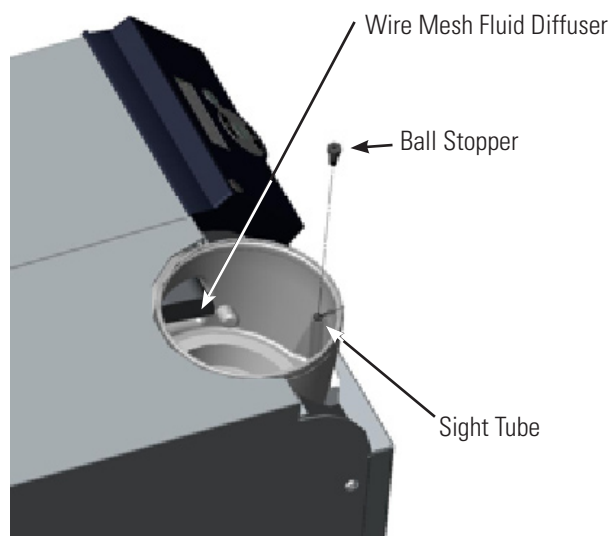


Figure 6-2 Reservoir Cleaning and Diffuser

Condenser Filter



Failure to clean/replace the condenser filter will cause a loss of cooling capacity and lead to premature failure of the cooling system. ▲

ThermoFlex900s - 5000s

Clean the filter through the grill using a vacuum with a soft-bristle brush.

When it is time for a more thorough cleaning, remove the one-piece grill assembly by first pulling the bottom of the assembly away from the chiller and then pulling it away from the top.



The condenser framing and fins located behind the grill assembly are very sharp. Use caution when removing the assembly. ▲

Note ThermoFlex900s - 5000s water-cooled chillers have an embedded screw(s) located at the top (and bottom) of the grill securing it to the chiller. Loosen the screw(s) to remove the grill. ▲



Water-cooled chillers also have a fan with sharp blades, ensure the chiller is off before removing the assembly. ▲

Shake off as much of the excess water as possible before reinstalling. Press the grill back into place.

For water-cooled chillers, tighten the screw(s) at the top (and bottom) of the grill.

Replacement grill assemblies are available from Thermo Fisher.

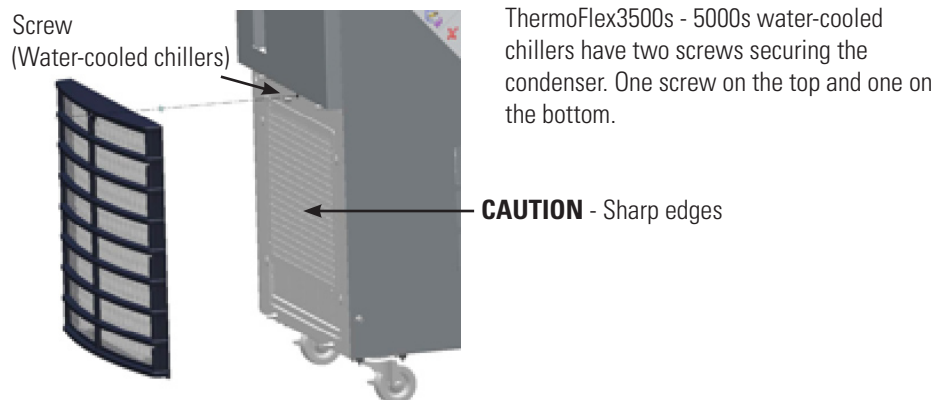


Figure 6-3 ThermoFlex900s - 5000s Condenser Grill Removal

ThermoFlex7500s - 10000s

For air-cooled chillers, remove the one-piece grill assembly by pulling the assembly away from the chiller.

Water-cooled chillers do not have a filter.

The filter goes over four studs and plastic "fast nuts" that hold it in place.

Replace it or vacuum the old filter with a soft-bristle brush, or wash it. Shake off as much of the excess water as possible before reinstalling.

Tuck the filter around the perimeter of the grill and over the four studs, use the plastic "fast nuts" to hold it in place.

Replacement grills are available from Thermo Fisher.

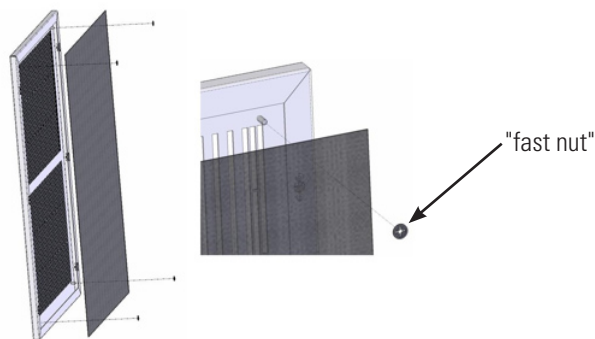


Figure 6-4 Filter Removal/Replacement ThermoFlex7500s - 10000s Air-Cooled

Chiller Surface

Clean the chiller's surface with a soft cloth and warm water only.

Hoses

Inspect the chiller's external hoses and clamps on a daily basis.

Testing the Alarm Features

Using the Setup Loop, adjust each temperature alarm limit towards the setpoint and ensure the chiller reacts accordingly. Reset each alarm limit to the desired value. See Section 4.

We recommend slowly draining the chiller to ensure the low level warning and fault messages activated. See Section 8.

For chillers equipped with auto refill switch we recommend slowly draining and ensure the auto refill activates.

DI Filter (Optional)

Establish a preventive maintenance schedule for the DI filter cartridge based on your specific application.

The controller will display a **High Resistivity** or a **Low Resistivity** warning message when the process fluid resistivity exceeds the limit set in the controllers **RESISTIVITY SETTINGS** display, see Section 4.

The chiller also has an integrated alarm. The alarm is based on chiller run hours that will alert you when it is time to change your filter. The alarm is enabled using the controller's **DIAGNOSTICS** menu.

If you already know how often your DI filter needs changing, you can input the number of hours into the menu. When the time is reached, the controller will flash **DEI PM** and the audible alarm, if enabled, will sound.

To clear this message and stop the audible alarm press  .

Preventive Maintenance Messages

The controller also displays Preventive Maintenance Messages. These messages are based on the component run time and are established to avoid unplanned failures. The chiller will continue to run.

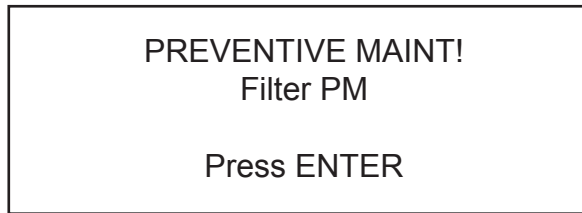


Figure 6-5 Sample PM Message

Filter PM	Fluid Filter Bag and Condenser Filter
DEI PM	Optional DI Filter
XXXXX Run Hours	Chiller operating hours (appears every 20,000 hours)

You can press the enter key to clear any message. Note the message because once the Filter or DEI PM message is cleared it will not reappear.

Section 7 Troubleshooting

Messages

WARNING and FAULT Messages are a result of exceeding one of the controller's SETTINGS, see Section 4, exceeding a sensor factory preset safety value, or a safety switch is activated. An ERROR Message indicates an unusual condition. In the case of an ERROR or WARNING Message the chiller, if running, will continue to run. Press **enter** to see if the message clears, a limit may have been only temporarily exceeded. In the case of a FAULT Message the chiller will shut down and the controller will continue to flash the message. Press **enter** to clear the display and, if enabled, silence the alarm. Once the cause of the shut down is identified and corrected, restart the chiller. If the cause was not corrected the message will reappear.

<p>WARNING! Low Level</p> <p>Press ENTER</p>	<p>FAULT! High Temp</p> <p>Press ENTER</p>	<p>ERROR! CAN Bus</p> <p>Press ENTER</p>
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Figure 7-1 Sample Messages

Faults and Warnings

Message	Reaction	Cause	Actions
Auto Refill	The chiller will continue to run. Auto refill, if installed, will shut down. (Optional display - only chillers equipped with auto refill.)	The auto refill did not reach the minimum operating level within the time chosen for the customer adjustable <i>fill</i> setting. The auto refill successfully filled within the time frame chosen for the customer adjustable <i>fill</i> setting, but the chiller tries to refill 5 times in 40 hours.	<ul style="list-style-type: none"> • Check for leaks. • Check the supply pressure on the auto refill supply line. With low pressure the auto refill time span setting may be set too low and the reservoir does not have time to fill. Verify controller's SETTINGS, see Section 4. • Add fluid to the tank. • Contact our Sales, Service and Customer Support.
Bad Calibration Data	Chiller continues to run.	Bad sensor calibration detected several seconds after performing a calibration.	<ul style="list-style-type: none"> • Redo calibration, see Section 8. • Contact our Sales, Service and Customer Support.

Faults and Warnings

Message	Reaction	Cause	Actions
Drip Pan	Chiller will shut down. (SEMI chillers only)	Fluid in the drip pan.	<ul style="list-style-type: none"> • Check for leaks. • Remove the fluid from the drip pan and reset the fault. • Contact our Sales, Service and Customer Support. • When able, reset external EMO..
External EMO	Chiller will shut down. (SEMI chillers only)	External EMO depressed.	<ul style="list-style-type: none"> • Allow chiller to cool down. • For air-cooled chillers, clean air filter, see Section 6. • Contact our Sales, Service and Customer Support.
Fan Motor Overload	Chiller will shut down. (3- Φ chillers only)	Fan motor overload activated.	<ul style="list-style-type: none"> • Check all application and plumbing shut off valves for correct position. • Adjust flow, if chiller is equipped with an optional flow control valve, see Section 5. • If flow transducer was recently calibrated double check calibration, see Section 8. • Contact our Sales, Service and Customer Support.
High Fixed Flow	Chiller will shut down. (Optional display - only chillers equipped with a flow transducer.)	The process fluid flow exceeded the <i>factory preset</i> high value.	<ul style="list-style-type: none"> • Check application valves and ensure that they have not changed or been closed. Note If routine shut-off of the process flow is required then add an external pressure regulator accessory - contact Thermo Fisher. ▲ • May occur as a result of changing the internal DI cartridge. Disconnecting the cartridge adds an additional 0.5 GPM to the main flow, see Section 5. • Check for debris in the application or clogged external filters. • Double check fluid lines. Excessive bends, long tubing and diameter reductions can affect the pump's discharge pressure. Note If diameter reductions must be made, make them at the inlet and outlet of your application, not at the chiller. ▲ • Contact our Sales, Service and Customer Support.
High Fixed Pressure	Chiller will shut down. This error code has priority over High Pressure error code.	Process pressure (P1) exceeded <i>factory preset</i> value for greater than 30 seconds. Preset Values: P1, P2 and T1- 105 psi P3 60 Hz - 48 psi P3 50 Hz - 32 psi P4 60 Hz - 85 psi P4 50 Hz - 60 psi P5 60 Hz - 87 psi P5 50 Hz - 56 psi	<ul style="list-style-type: none"> • Check application valves and ensure that they have not changed or been closed. Note If routine shut-off of the process flow is required then add an external pressure regulator accessory - contact Thermo Fisher. ▲ • May occur as a result of changing the internal DI cartridge. Disconnecting the cartridge adds an additional 0.5 GPM to the main flow, see Section 5. • Check for debris in the application or clogged external filters. • Double check fluid lines. Excessive bends, long tubing and diameter reductions can affect the pump's discharge pressure. Note If diameter reductions must be made, make them at the inlet and outlet of your application, not at the chiller. ▲ • Contact our Sales, Service and Customer Support.

Faults and Warnings

Message	Reaction	Cause	Actions
High Fixed Temp	<p>Chiller will shut down.</p> <p>This error code has priority over High Temp error code.</p> <p>Note Chiller will not restart until process fluid temperature is below +43°C (+93°C for high-temp chillers). ▲</p>	Reservoir fluid temperature exceeded the <i>factory preset</i> value of +43°C (+93°C for high-temp chillers).	<ul style="list-style-type: none"> • Ensure all environmental requirements are met, see Section 3. • Ensure chiller has adequate ventilation, see Section 3. • Clean air filter. Dirt and debris on filter can prevent the chiller from functioning at full capacity, see Section 6. • Ensure that the heat load being applied to the chiller is not too high. Contact Thermo Fisher for assistance on calculating heat loads. • Bring cooler air in from another area or exhaust the hot air into another location using an auxiliary fan. • Verify/adjust controller PID values, see TUNING in this Section. • Contact our Sales, Service and Customer Support.
High Flow	<p>With a warning message the chiller will continue to run.</p> <p>With a fault message the chiller will shut down.</p> <p>(Optional display - only chillers equipped with a flow transducer.)</p>	The process fluid flow rate has exceeded the adjustable setting's high value.	<ul style="list-style-type: none"> • If the chiller is still running press enter to see if the code clears, the limit may have been only temporarily exceeded. • Verify SETTINGS, see Section 4, and adjust setting if necessary. • Check all application and plumbing shut off valves for correct position. • Adjust flow, if chiller is equipped with an optional flow control valve, see Section 5. • If flow transducer was recently calibrated double check calibration, see Section 8. • Contact our Sales, Service and Customer Support.

Faults and Warnings

Message	Reaction	Cause	Actions
High Pressure	With a warning message the chiller will continue to run. With a fault message the chiller will shut down.	The pump's discharge pressure exceeded the adjustable high value.	<ul style="list-style-type: none"> • If the chiller is still running press enter to see if the message clears, the limit may have been only temporarily exceeded. • Verify controller's SETTINGS, see Section 4. • Check application valves and ensure that they have not changed or been closed. Note If routine shut-off of the process flow is required then add an external pressure relief valve, see Section 5. ▲ • Check for debris in the application or external filters. • May occur as a result of changing the internal DI cartridge. Disconnecting the cartridge adds an additional 0.5 gpm to the main flow, see Section 5. • Double check fluid lines. Excessive bends, long tubing and diameter reductions can affect the pump's discharge pressure. Note If diameter reductions must be made, make them at the inlet and outlet of your application, not at the chiller. ▲ • Contact our Sales, Service and Customer Support. • Make sure supply voltage matches the chiller's nameplate rating $\pm 10\%$. • Contact our Sales, Service and Customer Support.
High RA Temperature	Chiller will shut down.	Refrigeration suction gas temperature exceeded 50°C.	<ul style="list-style-type: none"> • Press enter to see if the message clears, the limit may have been only temporarily exceeded. • Verify controller's SETTINGS, see Section 4. • Replace DI filter and/or process fluid. • Contact our Sales, Service and Customer Support.
High Resistivity	Chiller will continue to run. (Optional display)	The process fluid resistivity exceeded the upper adjustable value.	<ul style="list-style-type: none"> • Press enter to see if the message clears, the limit may have been only temporarily exceeded. • Verify controller's SETTINGS, see Section 4. • Replace DI filter and/or process fluid. • Contact our Sales, Service and Customer Support.

Faults and Warnings

Message	Reaction	Cause	Actions
High Temp	With a warning message the chiller will continue to run. With a fault message the chiller will shut down. Note If the chiller does shut down it can be restarted provided the temperature is still within the factory-set high fixed temperature limit. However, the error will reoccur if the temperature goes below the adjustable setting and then again exceeds it. ▲	The process fluid temperature exceeded the adjustable high value.	<ul style="list-style-type: none"> • If the chiller is still running press enter to see if the message clears, the limit may have been only temporarily exceeded. • Verify controller's SETTINGS, see Section 4. • Ensure all environmental requirements are met, see Section 3. • Ensure chiller has adequate ventilation, see Section 3. • Clean air filter. Dirt and debris on filter can prevent the chiller from functioning at full capacity, see Section 6. • Ensure that the heat load being applied to the chiller is not too high. Contact Thermo Fisher for assistance on calculating heat loads. • Bring cooler air in from another area or exhaust the hot air into another location using an auxiliary fan. • Verify/adjust controller PID values, see TUNING in this Section. • Contact our Sales, Service and Customer Support.
HPC	Chiller will shut down.	High refrigeration pressure cutout activated.	<p>Air-cooled chillers</p> <ul style="list-style-type: none"> • Ensure that the ambient temperature is not exceeding the recommended range, see Section 3. • Ensure chiller has adequate ventilation, see Section 3. • Clean air filter, see Section 6. • Bring cooler air in from another area or exhaust the hot air into another location using an auxiliary fan. • Contact our Sales, Service and Customer Support. <p>Water-cooled chillers</p> <ul style="list-style-type: none"> • Ensure facility water is on and connected. • Check facility water flow rate and pressure. • Contact our Sales, Service and Customer Support.
HTC	Chiller will shut down.	High heater temperature.	<ul style="list-style-type: none"> • Allow heater to cool and then remove the small black plastic cap(s) on the rear of the chiller, press the reset node(s) until you hear a “click?” See Checklist in this Section. • Contact our Sales, Service and Customer Support.

Faults and Warnings

Message	Reaction	Cause	Actions
Invalid Level	Chiller will shut down.	Invalid level fault. Chiller sensed both a high level and low level reservoir fluid level.	<ul style="list-style-type: none"> Contact our Sales, Service and Customer Support.
Invalid rem setpt	Chiller will continue to run using the last valid setpoint received. (Optional display - only chillers equipped with Analog I/O).	Analog remote setpoint is enabled and the chiller receives a voltage or current level that is outside the chiller's set point range.	<ul style="list-style-type: none"> The error can be cleared only after a valid set point is received, or the remote analog setpoint is turned off.
LLC	Chiller will shut down.	Low Level Cutout activated.	<ul style="list-style-type: none"> Check for leaks. Contact our Sales, Service and Customer Support.
Local EMO	Chiller will shut down. (Optional display)	Chiller's EMO button depressed.	<ul style="list-style-type: none"> When able, reset chiller's EMO.
Low Fixed Flow	Chiller will shut down. (Optional display - only chillers equipped with a flow transducer) (This error code has priority over Low Flow .)	Low flow fault. For chillers with a P1, P2 or T1 pump the flow dropped below 0.8 GPM for more than 15 seconds. For chillers with a P3, P4 or P5 pump the flow dropped below 3.8 GPM for more than 15 seconds.	<ul style="list-style-type: none"> Adjust flow, if chiller is equipped with an optional flow control valve, see Section 5. Check all valves in your application and plumbing lines to ensure that they have not changed or closed. If flow transducer has recently been calibrated, double check calibration to ensure it was done properly, see Section 4. Contact our Sales, Service and Customer Support.
Low Fixed Pressure	Chiller will shut down. (This error code has priority over Low Pressure .)	Process pressure (P1) below <i>factory preset</i> low limit of 2 psi for greater than 15 seconds.	<ul style="list-style-type: none"> Ensure that the chiller reservoir is not empty. Chiller requires >2 PSIG application pressure drop. If a bypass valve has been installed, some restriction may need to be added to the bypass line. Contact our Sales, Service and Customer Support.

Faults and Warnings

Message	Reaction	Cause	Actions
Low Fixed Temp	<p>Chiller will shut down.</p> <p>Note Chiller will not restart until process fluid temperature exceeds +2°C.</p> <p>▲ (This error code has priority over Low Temp.)</p>	Reservoir fluid temperature below the <i>factory preset</i> low value of +2°C.	<ul style="list-style-type: none"> • Check ambient temperature. Chiller may not be able to reach setpoint at low ambient temperatures. If your load is constant, then turn your chiller on. Chiller will control setpoint when sufficient heat is added. • Verify/adjust controller PID values, see TUNING in this Section. • Add insulation to external plumbing lines to reduce the heat-loss to the environment. • Ensure that the ambient temperature is not exceeding the recommended range, see Section 3. • For water-cooled chillers check facility water temperature. • Contact our Sales, Service and Customer Support.
Low Flow	<p>With a warning message the chiller will continue to run. With a fault message the chiller will shut down.</p> <p>(Optional display - only chillers equipped with a flow transducer.)</p>	The process fluid flow rate has gone below the adjustable setting's low value.	<ul style="list-style-type: none"> • If the chiller is still running press enter to see if the code clears, the limit may have been only temporarily exceeded. • Verify controller's SETTINGS, see Section 4. • Adjust flow, if chiller is equipped with an optional flow control valve, see Section 5. • Check all valves in your application and plumbing lines to ensure that they have not changed or closed. • If flow transducer has recently been calibrated, double check calibration to ensure it was done properly, see Section 4. • Contact our Sales, Service and Customer Support.
Low Level	<p>With a warning message the chiller will continue to run. With a fault message the chiller will shut down.</p>	Reservoir fluid level too low for normal operation.	<ul style="list-style-type: none"> • Excessive evaporation. Ensure the chiller is operating with the funnel and cap in place. • Check for leaks. • Check auto refill operation, see Section 5. • Check the supply pressure on the auto refill supply line. With low pressure the auto refill time span setting may be set too low and the reservoir does not have time to fill. Verify controller's SETTINGS, see Section 4. • Contact our Sales, Service and Customer Support.

Faults and Warnings

Message	Reaction	Cause	Actions
Low Pressure	With a warning message the chiller will continue to run. With a fault message the chiller will shut down.	Pump's discharge pressure is below adjustable low setting.	<ul style="list-style-type: none"> • If the chiller is still running press enter to see if the message clears, the limit may have been only temporarily exceeded. • Verify controller's SETTINGS, see Section 4. • Ensure that chiller reservoir is not empty. • Chiller requires >3 PSIG application pressure drop. If a bypass valve has been installed, some restriction may need to be added to the bypass line. • Contact our Sales, Service and Customer Support.
Low Resistivity	Chiller will continue to run. (Optional display)	The process fluid resistivity exceeded the lower adjustable value.	<ul style="list-style-type: none"> • Press enter to see if the message clears, the limit may have been only temporarily exceeded. • Verify controller's SETTINGS, see Section 4. • Replace DI filter and/or process fluid. • Contact our Sales, Service and Customer Support.
Low Temp	With a warning message the chiller will continue to run. With a fault message the chiller will shut down. Note If the chiller does shut down it can be restarted provided the temperature is still above the factory-set low fixed temperature limit. However, the error will reoccur if the temperature goes above the adjustable setting and then again drops below it. ▲	Process fluid temperature is below adjustable low value.	<ul style="list-style-type: none"> • If the chiller is still running press enter to see if the code clears, the limit may have been only temporarily exceeded. • Verify controller's SETTINGS, see Section 4. • Ensure that the ambient temperature is not exceeding the recommended low-range, see Section 3. If your application load is constant and/or the lower temperature can be temporarily tolerated, then continue operation. (The ThermoFlex will control setpoint when sufficient heat is added.) • Add insulation to external plumbing lines to reduce the heat-loss to the environment. • For water-cooled chillers check facility water temperature. • Contact our Sales, Service and Customer Support.
LPC	Chiller will shut down.	Low refrigeration pressure cutout switch activated.	<ul style="list-style-type: none"> • Check for refrigerant leak. • Contact our Sales, Service and Customer Support.

Faults and Warnings

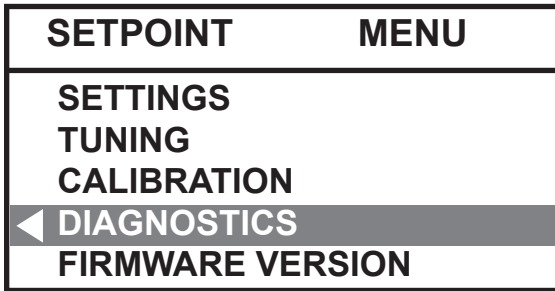
Message	Reaction	Cause	Actions
Open RTD	Chiller will shut down.	Internal sensor open.	<ul style="list-style-type: none"> Contact our Sales, Service and Customer Support.
Open Remote RTD	Chiller will shut down.	Remote temperature sensor not connected or open.	<ul style="list-style-type: none"> Check the connections on the rear of the chiller. Contact our Sales, Service and Customer Support.
Over Flow	Chiller will shut down.	There is an overflow condition in the reservoir.	<ul style="list-style-type: none"> Ensure the reservoir was not filled above the MAX LEVEL line. Check for clogged reservoir filter. Contact our Sales, Service and Customer Support.
Shorted Remote RTD	Chiller will shut down.	Remote temperature sensor shorted.	<ul style="list-style-type: none"> Check the connections on the rear of the chiller. Contact our Sales, Service and Customer Support.
Shorted RTD	Chiller will shut down.	Internal sensor shorted.	<ul style="list-style-type: none"> Contact our Sales, Service and Customer Support.
Motor Overload	Chiller will shut down. (Chiller equipped with 3- Φ pump motor overload)	Pump motor exposed to excessive current due to high pressure, flow or ambient temperature.	<ul style="list-style-type: none"> Allow pump to cool down. Contact our Sales, Service and Customer Support.
Phase Monitor	Chiller will shut down. (3- Φ chillers only)	Phase rotation is wrong.	<ul style="list-style-type: none"> Disconnect chiller from power source and reverse any two line conductors on the line side of the main circuit breaker. Contact our Sales, Service and Customer Support.
UNIT FAULT	Chiller will shut down.	Critical error.	<ul style="list-style-type: none"> Contact our Sales, Service and Customer Support.

Error

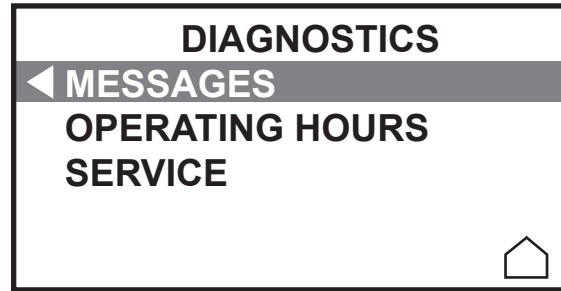
Message	Reaction	Cause	Actions
Async Rec Err Int	Chiller will continue to run.	Communication error between display and main control board.	<ul style="list-style-type: none"> • Check the serial communication connection. • Cycle circuit protector on the rear of the chiller off and on. • Contact our Sales, Service and Customer Support.
CAN Bus	Chiller will continue to run.	Internal communications error.	<ul style="list-style-type: none"> • Contact our Sales, Service and Customer Support.
I2C Bus	Chiller will continue to run.	Internal communications error.	<ul style="list-style-type: none"> • Contact our Sales, Service and Customer Support.
NO 5V CAL	Chiller will continue to run.	No 5V calibration stored in controller memory.	<ul style="list-style-type: none"> • Contact our Sales, Service and Customer Support.
NO PRES CAL	Chiller will continue to run.	No pressure calibration stored in controller memory.	<ul style="list-style-type: none"> • Perform a pressure calibration, see Section 8. • Contact our Sales, Service and Customer Support.
NO RTD CAL	Chiller will continue to run.	No temperature calibration stored in controller memory.	<ul style="list-style-type: none"> • Perform a temperature calibration, see Section 8. • Contact our Sales, Service and Customer Support.
NVS 3 4 RESET	Chiller will not start.	Bad checksum when chiller is started. (Normal when new software is installed.)	<ul style="list-style-type: none"> • Press enter to try and clear the message. • Try a restart. • Contact our Sales, Service and Customer Support.
SENSE 5V	Chiller will continue to run.	Voltage out of tolerance.	<ul style="list-style-type: none"> • Contact our Sales, Service and Customer Support.

MESSAGES displays the ten most recent warnings and faults. The date and time each error occurred is shown. The alarm value is also displayed. Use the arrow buttons to scroll through the list of messages. Press the enter key to show the deletion options, **Single** or **All**. Choose **Single** to delete the selected error or **All** to delete all errors in the category. Press the enter key to show the delete confirmation screen. Finally, press the enter key again to make the deletion.

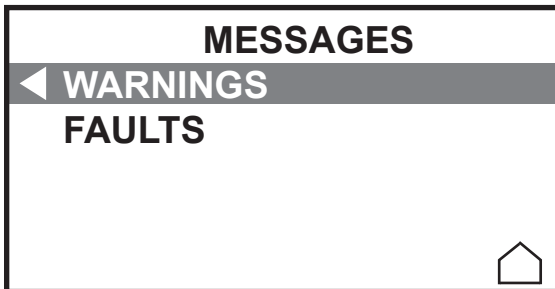
1. From the Main Menu display use the arrow buttons to highlight **DIAGNOSTICS**.



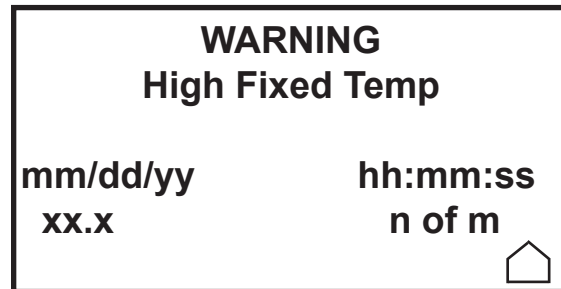
2. Press enter and use the arrow buttons to highlight **MESSAGES**.



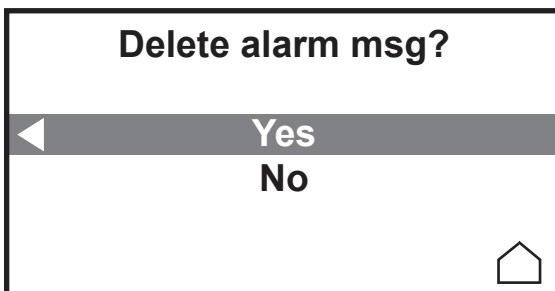
3. Press enter to display:



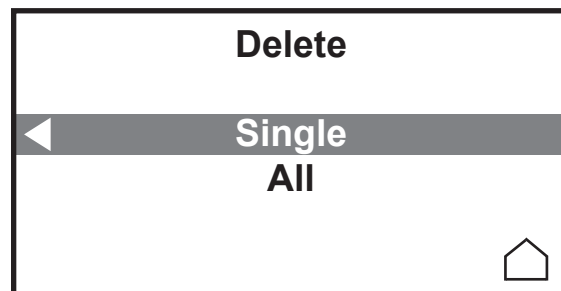
4. Highlight the desired type message and press enter again to display:



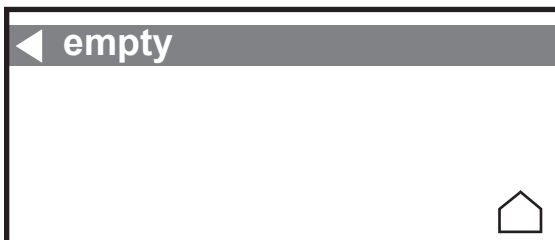
5. If desired, press enter again to display:



6. If **Yes** is selected press enter again to display:



For either message type, if there aren't any messages the display will indicate:



Checklist

Chiller will not start

Check the electrical connections.

For first time use, please refer to the quick start instructions included with your chiller or the copy in this manual. The manual's copy follows the Table of Contents.


Check the controller for messages, see Messages in this Section.

Ensure the circuit protector is in the on (**I**) position.

Make sure supply voltage is connected and matches the chiller's nameplate rating $\pm 10\%$

Chiller shuts down

Check the electrical connections.

Ensure  button wasn't accidentally pressed.

Ensure the circuit protector is in the on (**I**) position.

Check the controller for messages, see Messages in this Section.

The chiller is designed to shut down if not properly primed, refer to Section 3 for priming instructions.

Make sure supply voltage is connected and matches the chiller's nameplate rating $\pm 10\%$.

Restart the chiller.

Clearing Messages

Note the code in case it clears before you are done troubleshooting.

If desired, silence the audible alarm by pressing enter.

If the chiller shut down the controller will continue to display the message. Press **enter** to clear the display and silence any alarm. Refer to Messages in this section. Once the cause of the shut down is identified and corrected, start the chiller. If the cause was not corrected the message will reappear.

If the chiller is still running press **enter** to see if the message clears, a limit may have been only temporarily exceeded. If the message does not clear refer to Messages in this Section.

Inadequate pump pressure

Ensure any user installed in-line valves are in the desired position.

Ensure the chiller's process fluid outlet is connected to the application's fluid inlet and not the application's fluid outlet, see Section 3.

Ensure all connections are secure and that the proper sealant/lubricant for the fitting material is used.

Keep the distance between the chiller and the instrument being cooled as short as possible.

Ensure tubing is straight and without bends. If diameter reductions are required, make them at the inlet and outlet of your application, not at the chiller.

Chiller will not circulate process fluid

Check the reservoir level. Fill, if necessary.

Ensure the reservoir bag filter is not clogged.

Check the application for restrictions in the cooling lines.

Chiller requires >3 PSIG application pressure drop. If a bypass valve has been installed, a restriction may need to be added to the bypass line.

The pump motor overloaded. The pump's internal overtemperature overcurrent device will shut off the pump causing the flow to stop. This can be caused by low fluid, debris in system, operating chiller in a high ambient temperature condition or excessively confined space. Allow time for the motor to cool down.

Make sure supply voltage matches the chiller's nameplate rating $\pm 10\%$.

Inadequate temperature control

Adding fluid that has a temperature differential with the fluid already in the reservoir will temporarily affect temperature stability performance.

Verify the setpoint.

For high-temperature chillers check the heater's high temperature safety. Remove the two small black plastic covers on the rear of the chiller and press on each of the black stems. If the safety activated you should hear a "click." If it activates again contact us.



If the chiller is over-cooling, recycle the power.

Make sure the condenser/air filter is free of dust and debris.

Check the fluid concentration, see Section 3.

Ensure your chiller's installation complies with the site requirements listed in Section 3.

Make sure supply voltage matches the chiller's nameplate rating $\pm 10\%$. For ThermoFlex900 - 5000 Global Voltage chillers ensure it is properly configured, see Appendix B.

If the temperature continues to rise, make sure your application's heat load does not exceed the rated specifications.

Check for high thermal gradients (i.e., the application load is being turned on and off or rapidly changing).

If operating at high altitude note that heat removal capacity decreases 1.2% per 1,000 feet above sea level. Also, reduce the maximum temperature for the air entering the ThermoFlex by 1°C per 1,000 feet above sea level.

Verify/adjust controller PID values, see next page. Ensure the chiller was shut down properly, see Section 4. If not the compressor may be damaged.

Chiller vibration

The optional pressure relief valve setting may be the cause. If it is, change the pressure setting ± 5 psi to eliminate the vibration.

Please contact Thermo Fisher Scientific Sales Service and Customer Support if you need any additional information, see inside cover for contact instructions.

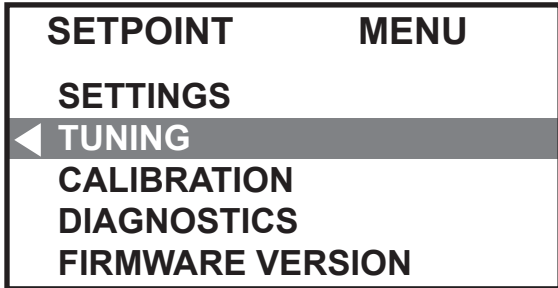
TUNING

Verifying/ Adjusting the Controller PID Values

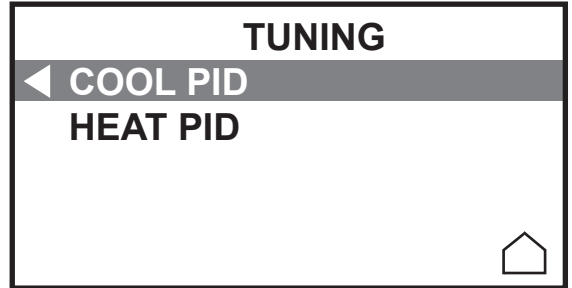
The controller controls temperature using a Proportional-Integral-Derivative (PID) algorithm. Should your chiller experience temperature control issues, verifying/adjusting the controller's PID values may correct the condition.

Note Thermo Fisher recommends that only a qualified technician adjust the PID values. Incorrect values will hamper chiller performance. ▲

1. From the Main Menu display use the arrow buttons to highlight **TUNING**.

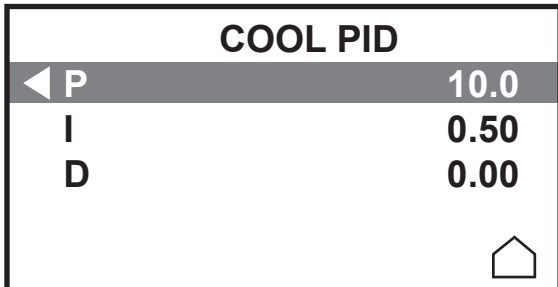


2. Press enter and highlight **COOL PID** or **HEAT PID**.



Note HEAT PID only appears on chillers equipped with a heater. ▲

3. Highlight and change the desired values as required.



COOL

P proportional value, % of span (100°C)

Range: 0.0 to 99.9

Factory Preset: ThermoFlex900-5000 10.0
ThermoFlex7500-10000 20.0

I integral value, repeats/minute

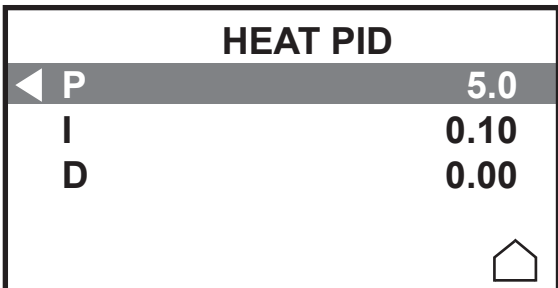
Range: 0.00 to 9.99

Factory Preset: ThermoFlex900-10000 0.50

D derivative value, minutes

Range: 0.0 to 9.9

Factory Preset: ThermoFlex900-10000 0.0



HEAT

P proportional value, % of span (100°C)

Range: 0.0 to 99.9

Factory Preset: ThermoFlex900-10000 5.0

I integral value, repeats/minute

Range: 0.00 to 9.99

Factory Preset: ThermoFlex900-10000 0.10

D derivative value, minutes

Range: 0.0 to 9.9

Factory Preset: ThermoFlex900-10000 0.0

Section 8 Additional Information

Draining



Before using any fluid or performing maintenance where contact with the fluid is likely refer to the manufacturer's MSDS for handling precautions. ▲

Ensure the fluid is below the safe-handling temperature (below 40°C) before draining the chiller. ▲

There are two different types of drain port, a 1/4" brass Male NPT pipe plug or a 1/4" MPT Riton fitting. If your chiller has both use the Riton fitting.

Position a suitable pan beneath the drain port at the rear of the chiller. The drain pan must be shallow (under 3 1/2" in height) and have a volume of approximately 3 gallons (6 gallons for ThermoFlex7500 - 10000). Remove the 1/4" Male NPT pipe plug from drain port or open the Riton fitting by turning either counter clock wise. For ThermoFlex7500-10000, open the drain valve. This will drain the return line, reservoir, plate exchanger, and the suction side of the pump.

To drain the discharge side of the pump disconnect the Female NPT outlet connection on the rear of the chiller.

Note Internally the chiller does not contain a large quantity of fluid on the discharge side however take care to contain what fluid does drain, a wet-vac can be employed to minimize the potential for spillage. ▲

If the chiller is equipped with the flow control or pressure relief with flow control option, open the valve or remove the drain plug in order to drain the discharge line, see Section 5.

If the chiller is equipped with the anti drainback option, use the controller's **SETTINGS** menu to open the valve, see Section 4. Opening the valve allows the fluid to drain out of the chiller.

Reinstall 1/4" Male NPT pipe plug using a sealant suitable for the wetted materials or close the Riton filling prior to refilling the chiller.



Do not overtighten the fitting. ▲

For ThermoFlex7500-10000, close the drain valve.

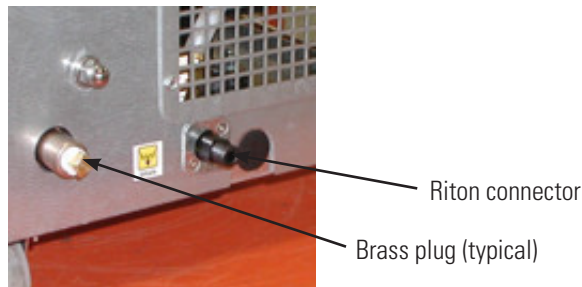


Figure 8-1 Drains

Water-Cooled

Draining ThermoFlex1400 - 2500 water-cooled chillers is accomplished by removing the right side panel. Use a Phillips head screwdriver to remove the five screws indicated in the illustration below. Slide the panel back approximately one inch, then lift slightly from the rear to disengage the panel's two tabs from their slots.

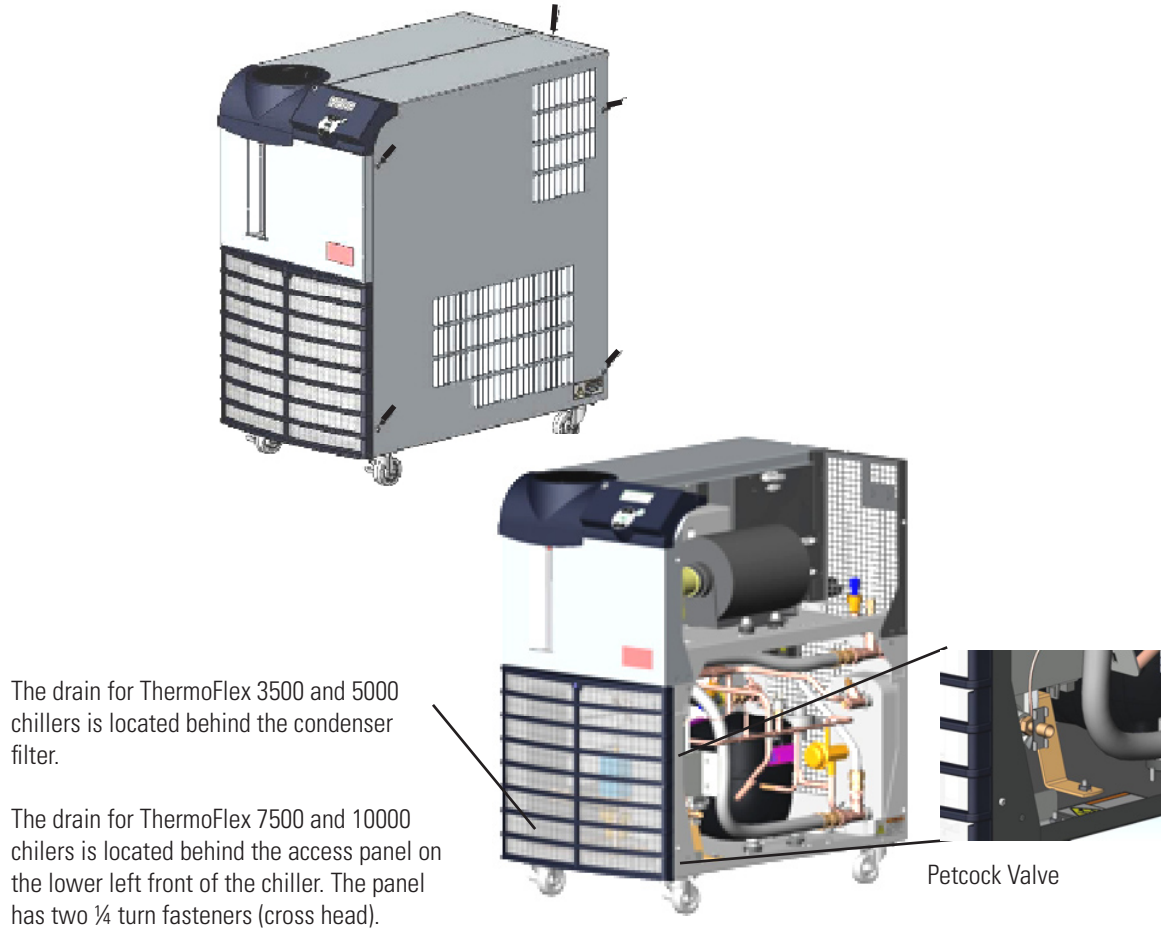


Figure 8-2 Water-Cooled

Install a $\frac{7}{16}$ " ID tube on the drain petcock valve located on the lower end of the exchanger. Open the valve to allow fluid to drain into an external device. When draining is complete close the valve and replace the panel.

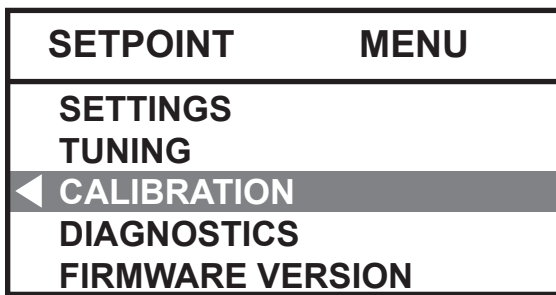
A wet-vac is needed on the facility water inlet connection to thoroughly drain any remaining fluid from the lines.

CALIBRATION

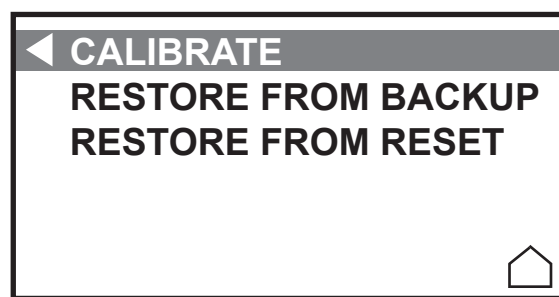
The ThermoFlex has been designed to minimize the need for calibration. However, if calibration is desired or recommended by our Sales, Service and Customer Support, please use the following procedure.

CALIBRATION calibrates the chiller's temperature (**t1**), pressure (**p2**) and optional fluid flow (**flow1**) sensors. Each calibration requires a running chiller and a calibrated reference device. Typically, a 2-point calibration is used. Select which point to calibrate, **Low** or **High**. Press enter and enter the value as read by the reference device. Press enter. Select **Cal.** to the right of the value just entered by pressing the down key. Press enter and note that the **Current** value now equals the value just entered.

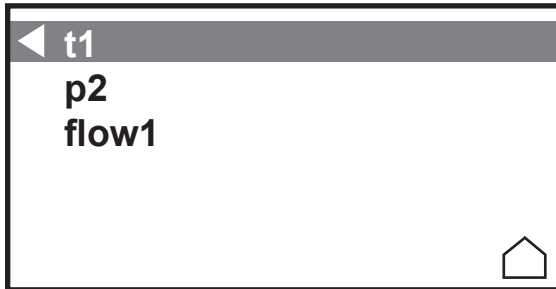
1. Highlight **CALIBRATION**.



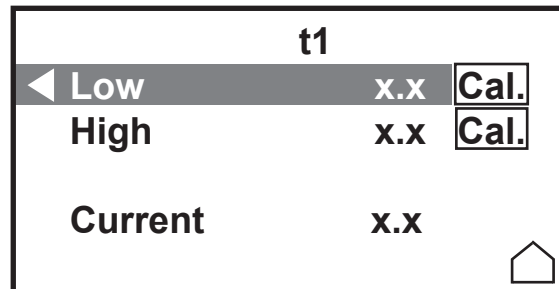
2. Press enter and highlight **CALIBRATE**.



3. Press enter to display:



4. Highlight the desired sensor then press enter to display:



For **t1**, run the chiller to a suitable high-end calibration point. Place a calibrated reference thermometer in the reservoir. Ensure the fluid temperature is stabilized before performing the calibration. If it is more convenient, perform the low-end calibration before doing the high-end. Do not pick calibration points that are outside the safe operating limits of the fluid in your application. For example, with water, 40°C and 5°C are typical high and low calibration points (90°C and 5°C for high-temperature chillers).

For **p2**, connect a calibrated reference pressure gauge to the outlet line. Use an external flow control valve to adjust the pressure to suitable calibration points. Ensure the pressure is stabilized before calibrating.

For **flow1**, connect a calibrated reference flow meter to the outlet line. Use an external flow control valve to adjust the flow to suitable calibration points. Ensure the flow is stabilized before calibrating.

To restore a selected sensor to the factory values you have two options, **BACKUP** and **RESET**. **BACKUP** restores both the controller board and sensor calibration, **RESET** only restores the board calibration.

Wetted Materials

P1, P2, MD1 and MD2 Pumps

303 Stainless Steel

Ultem®

Carbon Graphite

Ceramic

Fluorocarbon (Viton®)

Brass

P3 Pumps

316 Series Stainless Steel

Carbon

Silicon Carbide

Fluorocarbon (Viton®)

P4 Pumps

304 Stainless Steel

Carbon Ceramic

Fluorocarbon (Viton®)

P5 Pumps

304, 316 Series Stainless Steel

Carbon Ceramic

Fluorocarbon (Viton®)

T0 Pumps

Stainless Steel AISI 304

Stainless Steel 316, 18-8

Bronze ASTM B62 and B12

Buna N

Buna/Ceramic and Carbon

Fluorocarbon (Viton®)

Silicon Brass

Filter bag

Polypropylene

Mono-filament nylon

Cap and Funnel

Acetal Copolymer

T1 Pumps

Stainless Steel AISI 304

Stainless Steel 316, 18-8

Bronze ASTM B62 and B16

Buna N

Silicon Carbide and Brass

Fluorocarbon (Viton®)

T5 Pumps

Silicon Brass

Stainless Steel AISI 304

Stainless Steel 316, 18-8

Bismuth Bronze

Buna N

Carbon/Ceramic

Viton

Plumbing

300 Series Stainless Steel

Bronze

Fluorocarbon (Viton®)

Nickel

Polypropylene

EPDM

Brass

Copper

Teflon®

PPS (flow transducer)

Nitrile (Buna-n®)

Riton® (optional drain fitting)

Tank

Polyethylene (standard temp)

Polyvinylidene Difluoride (hi temp)

Brass

EPDM

Pyrex®

Decommissioning/ Disposal



Decommissioning prepares equipment for safe and secure transportation.

Laboratory Grade Ethylene glycol (EG) is poisonous and flammable. Before disposing refer to the manufacturer's most current MSDS for handling precautions. ▲



Decommissioning must be performed only by qualified dealer using certified equipment. All prevailing regulations must be followed. ▲

Consider decommissioning the chiller when:

- It fails to maintain desired specifications
- It no longer meets safety standards
- It is beyond repair for its age and worth

Refrigerant and compressor oil must be recovered from equipment before disposal.

Note Keep in mind any impact your application may have had on the chiller. ▲

Direct questions about chiller decommissioning or disposal to our Sales, Service and Customer Support.



Handle and dispose in accordance with the manufacturers specification and/or the MSDS for the material used. ▲

Shipment/Storage



Follow the manufacturer's MSDS instructions if decontamination is required. ▲



Transporting and/or storing the chiller in near or below freezing temperatures requires draining, see Draining in this Section. Store the chiller in the temperature range of -25°C to 60°C (with packaging), and <80% relative humidity. ▲



If the chiller is stored for more than 90 days it must be flushed with clean fluid before operating. ▲

Appendix A Country Specific

230 VAC, 50 Hz, 1Ø Requirements

Refer to the nameplate label located on the rear of the chiller for specific electrical requirements.

1. Chillers shipped to the following locations require a **16 Amp service**:

Afghanistan, Albania, Algeria, Andorra, Angola, Argentina, Armenia, Austria, Azerbaijan, Belarus, Belgium, Benin, Bolivia, Bosnia and Herzegovina, Brazil, Bulgaria, Burkina Faso, Burundi, Cambodia, Cameroon, Cape Verde, Central African Republic, Chad, Chile, Comoros, Congo, Croatia, Czech Republic, Denmark, Djibouti, DR Congo, Ecuador, Egypt, Eritrea, Estonia, Ethiopia, Finland, France, French Guiana, Gabon, Georgia, Germany, Greece, Guinea, Hungary, Iceland, Indonesia, Iran, Iraq, Israel, Italy, Ivory Coast, Jordan, Kazakhstan, Kyrgyzstan, Latvia, Lebanon, Liberia, Libya, Liechtenstein, Lithuania, Luxembourg, Madagascar, Mali, Mauritania, Moldova, Monaco, Mongolia, Morocco, Mozambique, Namibia, Nepal, Netherlands, Niger, North Korea, Norway, Paraguay, Peru, Poland, Portugal, Romania, Russia, Rwanda, Saint Vincent and the Grenadines, San Marino, Sao Tome and Principe, Saudi Arabia, Senegal, Serbia, Slovakia, Slovenia, Somalia, South Africa, South Korea, Spain, Sweden, Switzerland, Syria, Tajikistan, Thailand, Togo, Tunisia, Turkey, Turkmenistan, Ukraine, Uruguay, Uzbekistan, Vanuatu, Vatican City, Vietnam.

2. Chillers shipped to the following locations require a **15 Amp service**:

Australia, China, Fiji Islands, Nauru, New Zealand, Papua New Guinea, Solomon Island, Tonga, Tuvalu.

3. Chillers shipped to the following locations require a **13 Amp service**:

Abu Dhabi, Bahrain, Bangladesh, Botswana, Brunei, Cyprus, Dominica, Gambia, Ghana, Gibraltar, Grenada, Hong Kong, India, Ireland, Kenya, Kiribati, Kuwait, Lesotho, Malawi, Malaysia, Maldives, Malta, Mauritius, Myanmar, Nigeria, Oman, Pakistan, Qatar, Saint Lucia, Seychelles, Sierra Leone, Singapore, Sri Lanka, Sudan, Swaziland, Tanzania, Uganda, United Arab Emirates, United Kingdom, Yemen, Zambia, Zimbabwe.

Appendix B Voltage Configuration Instructions

ThermoFlex 900 and 1400 chillers equipped with the 115V 60Hz, 100v 50/60Hz Variable Voltage option and ThermoFlex 900 to 5000 chillers equipped with 200-230V 50/60Hz Global Voltage option have a voltage configuration panel located on the rear of the chiller behind an access panel, see Figure B-1.

- Use a 1/4” socket to remove the four screws securing the access panel to the chiller.
- The configuration panel has two 3-position toggle switches, one for voltage and one for frequency. All chillers are shipped with the toggle switch in the center **SHIP** position. Place each switch to the settings that match the voltage/frequency supplied to the chiller.

Note For ThermoFlex900-2500 global voltage chillers, the compressor and fan will not operate when the switch is in the **SHIP** position. ▲

- Reinstall the access panel.

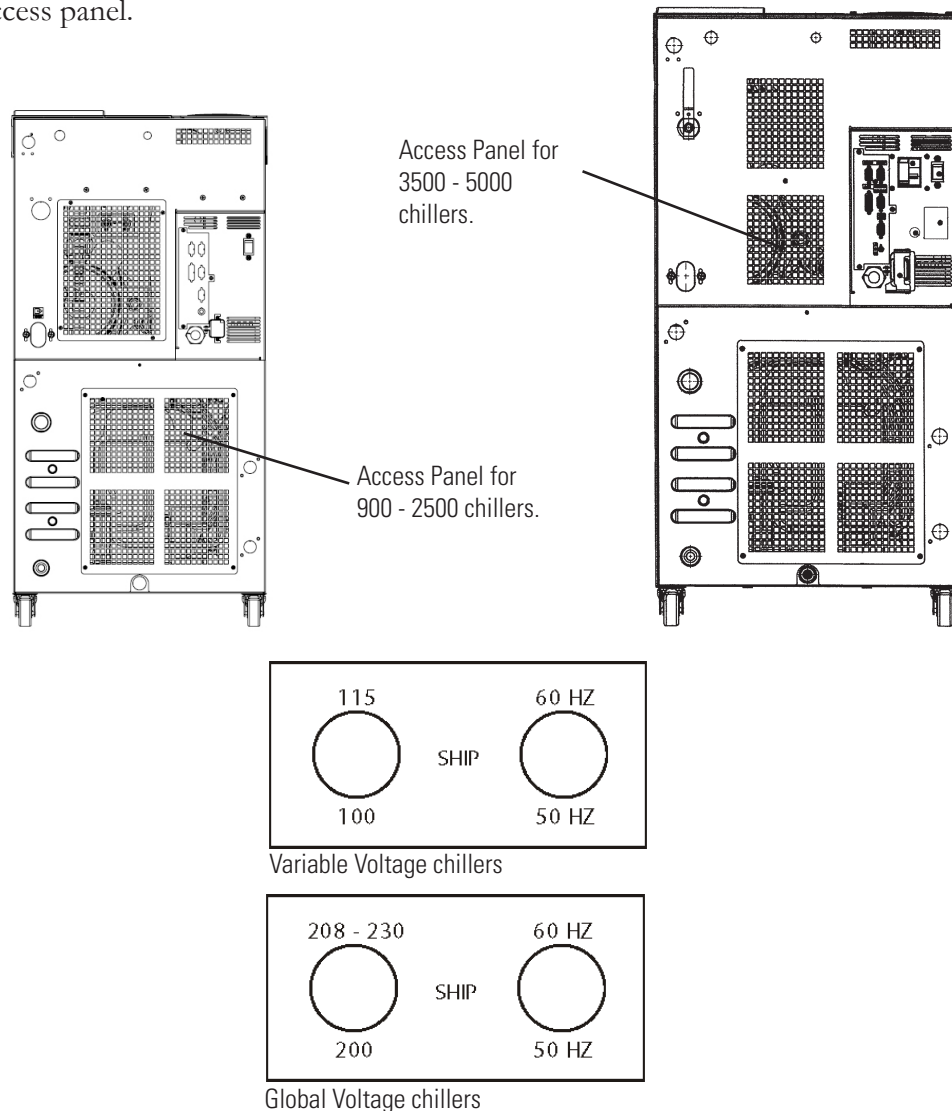
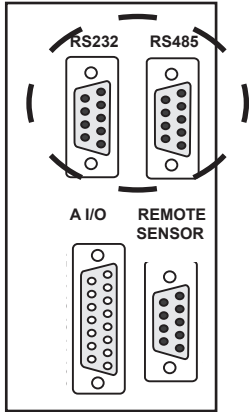


Figure B-1 Variable/Global Voltage Chillers

Appendix C NC Serial Communications Protocol



Note Appendix C assumes you have a basic understanding of communications protocols. ▲

Connect your PC to the applicable connector on the rear of the chiller. Use the controller, see Section 4, to enable serial communications.

Note Keypad operation is still available with serial communications enabled. ▲



WARNING Never apply line voltage to any of the connections. ▲

Figure C-1 Connectors

All data is sent and received in binary form, do not use ASCII. In the following pages the binary data is represented in hexadecimal (hex) format.

The NC Serial Communications Protocol is based on a master-slave model. The master is a host computer, while the slave is the chiller's controller. Only the master can initiate a communications transaction (half-duplex). The slave ends the transaction by responding to the master's query. The protocol uses RS-232/RS-485 serial interface with the default parameters: 9600 baud, 8 data bits, 1 stop bit, and no parity. RS-485 offers a slave address selection, default parameter: 1.

The chiller can be controlled through your computer's serial port by using the chiller's standard female 9-pin connection.

RS-232 COMM

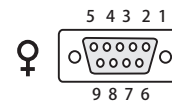
Pin #	Function
1	No connection
2	TX
3	RX
4	No connection
5	GND = Signal ground
6 - 9	No connection

TX = Transmitted data from controller
RX = Received data to controller.

RS-485 COMM

Pin #	Function
1-7	No connection
8	T+
9	T-

Hardware Mating Connector
AMP Part# 745492-2 or equivalent



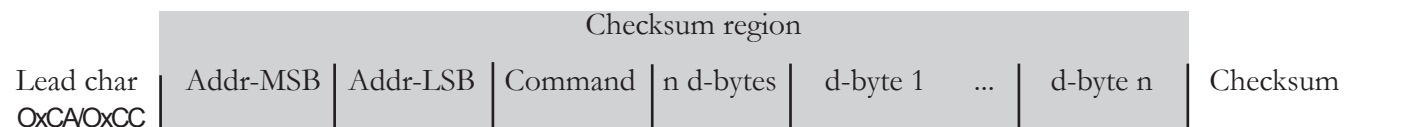
Communication cables are available from Thermo Fisher. Contact us for additional information.

All commands must be entered in the exact format shown in the tables on the following pages. The tables show all commands available, their format and responses. Controller responses are either the requested data or an error message. The controller response *must* be received before the host sends the next command.

The host sends a command embedded in a single communications packet, then waits for the controller's response. If the command is not understood or the checksums do not agree, the controller responds with an error command. Otherwise, the controller responds with the requested data. If the controller fails to respond within 1 second, the host should resend the command.

Note All byte values are shown in hex, hex represents the binary values that must be sent to the chiller. **Do not use ASCII.** ▲

The framing of the communications packet in both directions is:



<i>Lead char</i>	0xCA (RS-232) 0xCC (RS-485)
	Device address is 1 (RS-232)
<i>Addr-msb</i>	Most significant byte of slave address (RS-232: 0)
<i>Addr-lsb</i>	Least significant byte of slave address (RS-232: 1)
<i>Command</i>	Command byte (see Table of Commands)
<i>n d-bytes</i>	Number of data bytes to follow
<i>d-byte 1</i>	1 st data byte (the qualifier byte is considered a data byte)
...	...
<i>d-byte n</i>	n th data byte.
<i>Checksum</i>	Bitwise inversion of the 1 byte sum of bytes beginning with the most significant address byte and ending with the byte preceding the checksum. (To perform a bitwise inversion, "exclusive OR" the one byte sum with FF hex.)

When a command has no value associated with it, (e.g., REQ ACK), "n d-bytes" will be set to 0. Values such as temperature and flow are sent as either 2 or 4 byte signed integers, depending on how they are stored in the controller RAM.

When the controller sends a value, a qualifier byte is sent first, followed by a 2 or 4 byte integer (the least significant byte is sent last). The qualifier indicates the precision and units of the value. The host does not send the qualifier byte; it must send the value using the correct precision, units and number of bytes. The host first inquires about a value it wants to change, then uses the number of data bytes and the qualifier byte it receives to generate the proper integer to send.

Analog Values

*Qualifier Byte	
b.7	Precision of measurement
b.6	
b.5	
b.4	
b.3	Unit of measure index
b.2	
b.1	
b.0	

Unit of Measure	
Index	Unit
0	NONE
1	Temperature in °C
2	Temperature in °F
3	Flow liters per minute
4	Flow in gallons per minute
5	Time in seconds
6	Pressure in PSI
7	Pressure in bars
8	Resistivity in MΩ-cm
9	%
10	Volts
11	Pressure in K Pascals
12	Conductivity in μs/cm

E.g., the integer 986 preceded by a qualifier byte of 0x12 is 98.6°F.

Example to set setpoint to 25°C:

If the temperature units are unknown, before changing the setpoint send a command to request setpoint. The response will include both the precision and units. Precision is fixed at 0.1 and units can be either °C or °F. If the units are already known skip to step 3.

1. Master sends: CA 00 01 70 00 8E (REQ SETPOINT1)
2. Slave responds: CA 00 01 70 03 11 00 C8 B2 (0.1°C x 200)
Response indicates:
uses a 2 byte integer (nn=03)
precision and units are 0.1°C (d1=11)
3. Master sends: CA 00 01 F0 02 00 FA 12 (Set Setpoint 1 to 25.0°C)
4. Slave responds: CA 00 01 F0 03 11 00 FA 00 (0.1°C x 250)

See Additional Command Examples in this Appendix.

Set Commands – When a Set Command is received and the value is within the allowable limits, the new value will take affect immediately and the new value will be returned as part of the response to the command. If the value is outside of the allowable limits, the value will be rejected and the old value will be returned as part of the response to the command.

Error Response F0 - The "Bad Data" and "Bad Checksum" error responses will not be used. Reject out of range values and return old settings. Do not reply to message frames with bad checksums. This behavior is compatible with existing implementations of the protocol.

Table of Commands

Command	M: Master Sends S: Slave Responds	Notes
REQUEST STATUS		
REQ ACK	M: lc a1 a2 00 00 cs S: lc a1 a2 00 02 v1 v2 cs	protocol version v1=0; v2=1
REQ CONTROLLER SW VER	M: lc a1 a2 02 01 d1 cs S: lc a1 a2 02 nn d1 ... dn cs	d1 = 0 Controller SW version in ASCII d1 = 1 Controller SW checksum
REQ DISPLAY MSG	M: lc a1 a2 07 00 cs S: lc a1 a2 07 nn d1 ... dn cs	Display message in ASCII
REQ STATUS	M: lc a1 a2 09 00 cs S: lc a1 a2 09 nn d1 ... dn cs	see Request Status Table in this Appendix
ERROR	M: S: lc a1 a2 0F 02 en ed cs	Response Only! ed = Error Data en = Error Number 1: Bad Command See Error in this Appendix
REQUEST MEASUREMENTS		
REQ FLOW1	M: lc a1 a2 10 00 cs S: lc a1 a2 10 03 d1 d2 d3 cs	Process Fluid Flow
REQ TEMP1	M: lc a1 a2 20 00 cs S: lc a1 a2 20 03 d1 d2 d3 cs	Process Fluid Supply Temperature (RTD1)
REQ TEMP2	M: lc a1 a2 21 00 cs S: lc a1 a2 21 03 d1 d2 d3 cs	Process Fluid Return Temperature (RTD2)
REQ TEMP4	M: lc a1 a2 23 00 cs S: lc a1 a2 23 03 d1 d2 d3 cs	Entering Air/Facility Water (RTD4)
REQ TEMP7	M: lc a1 a2 26 00 cs S: lc a1 a2 26 03 d1 d2 d3 cs	ThermoFlex 2500 Air-cooled Fan Speed
REQ ANALOG1	M: lc a1 a2 28 00 cs S: lc a1 a2 28 03 d1 d2 d3 cs	Process Fluid Supply Pressure (P2)
REQ ANALOG2	M: lc a1 a2 29 00 cs S: lc a1 a2 29 03 d1 d2 d3 cs	Refrigeration Suction Pressure (P5)
REQ ANALOG3	M: lc a1 a2 2A 00 cs S: lc a1 a2 2A 03 d1 d2 d3 cs	Process Fluid Return Pressure (P1)
REQ ANALOG4	M: lc a1 a2 2B 00 cs S: lc a1 a2 2B 03 d1 d2 d3 cs	Condensing Pressure (P6)

REQ ANALOG5	M: lc a1 a2 1C 00 cs S: lc a1 a2 1C 03 d1 d2 d3 cs	Facility Inlet Pressure (P7)
REQ ANALOG6	M: lc a1 a2 1D 00 cs S: lc a1 a2 1D 03 d1 d2 d3 cs	Facility Outlet Pressure (P8)
REQ ANALOG7	M: lc a1 a2 1E 00 cs S: lc a1 a2 1E 03 d1 d2 d3 cs	Analog Level (LEV4)
REQ ANALOG9	M: lc a1 a2 2F 00 cs S: lc a1 a2 2F 03 d1 d2 d3 cs	+5V Sense
REQ REMOTE RTD	M: lc a1 a2 1B 00 cs S: lc a1 a2 1B 03 d1 d2 d3 cs	Remote Temperature from Optional Analog Board
REQ RES1	M: lc a1 a2 2C 00 cs S: lc a1 a2 2C 03 d1 d2 d3 cs	Process Fluid Resistivity
REQUEST LOW ALARM VALUES		
REQ LO FLOW1	M: lc a1 a2 30 00 cs S: lc a1 a2 30 03 d1 d2 d3 cs	Process Warning
REQ LO FLOW3	M: lc a1 a2 32 00 cs S: lc a1 a2 32 03 d1 d2 d3 cs	Process Fault
REQ LO ANALOG1	M: lc a1 a2 48 00 cs S: lc a1 a2 48 03 d1 d2 d3 cs	Pressure Process Supply Warning
REQ LO ANALOG2	M: lc a1 a2 49 00 cs S: lc a1 a2 49 03 d1 d2 d3 cs	Pressure Process Supply Fault
REQ LO ANALOG7	M: lc a1 a2 3E 00 cs S: lc a1 a2 3E 03 d1 d2 d3 cs	Level Warning
REQ LO ANALOG8	M: lc a1 a2 3F 00 cs S: lc a1 a2 3F 03 d1 d2 d3 cs	Level Fault
REQ LO TEMP1	M: lc a1 a2 40 00 cs S: lc a1 a2 40 03 d1 d2 d3 cs	Process Warning
REQ LO TEMP2	M: lc a1 a2 41 00 cs S: lc a1 a2 41 03 d1 d2 d3 cs	Process Fault
REQ AUTO REFILL ON	M: lc a1 a2 45 00 cs S: lc a1 a2 45 03 d1 d2 d3 cs	Auto Refill On Setting
REQ LO RES1	M: lc a1 a2 4C 00 cs S: lc a1 a2 4C 03 d1 d2 d3 cs	Process Warning

REQUEST HIGH ALARM VALUES

REQ HI FLOW1	M: lc a1 a2 50 00 cs S: lc a1 a2 50 03 d1 d2 d3 cs	Process Warning
REQ HI FLOW3	M: lc a1 a2 32 00 cs S: lc a1 a2 32 03 d1 d2 d3 cs	Process Fault
REQ HI TEMP1	M: lc a1 a2 60 00 cs S: lc a1 a2 60 03 d1 d2 d3 cs	Process Warning
REQ HI TEMP2	M: lc a1 a2 61 00 cs S: lc a1 a2 61 03 d1 d2 d3 cs	Process Fault
REQ HI ANALOG1	M: lc a1 a2 68 00 cs S: lc a1 a2 68 03 d1 d2 d3 cs	Pressure Process Supply Warning
REQ HI ANALOG2	M: lc a1 a2 69 00 cs S: lc a1 a2 69 03 d1 d2 d3 cs	Pressure Process Supply Fault
REQ HI ANALOG7	M: lc a1 a2 5E 00 cs S: lc a1 a2 5E 03 d1 d2 d3 cs	Level Warning
REQ HI ANALOG8	M: lc a1 a2 5F 00 cs S: lc a1 a2 5F 03 d1 d2 d3 cs	Level Fault
REQ AUTO REFILL OFF	M: lc a1 a2 65 00 cs S: lc a1 a2 65 03 d1 d2 d3 cs	Auto Refill Off Setting
REQ HI RES1	M: lc a1 a2 6C 00 cs S: lc a1 a2 6C 03 d1 d2 d3 cs	Process Warning
REQUEST PID SETTINGS		
REQ SETPT1	M: lc a1 a2 70 00 cs S: lc a1 a2 70 03 d1 d2 d3 cs	Process Fluid Setpoint
REQ COOL P	M: lc a1 a2 74 00 cs S: lc a1 a2 74 03 d1 d2 d3 cs	
REQ COOL I	M: lc a1 a2 75 00 cs S: lc a1 a2 75 03 d1 d2 d3 cs	
REQ COOL D	M: lc a1 a2 76 00 cs S: lc a1 a2 76 03 d1 d2 d3 cs	
REQ HEAT P	M: lc a1 a2 71 00 cs S: lc a1 a2 71 03 d1 d2 d3 cs	Only on chillers equipped with optional heater
REQ HEAT I	M: lc a1 a2 72 00 cs S: lc a1 a2 72 03 d1 d2 d3 cs	
REQ HEAT D	M: lc a1 a2 73 00 cs S: lc a1 a2 73 03 d1 d2 d3 cs	

SET STATUS SETTINGS

SET KEYSTROKE	M: lc a1 a2 80 01 d1 cs S: lc a1 a2 80 01 d1 cs	See Set Keystroke in this Appendix
SET ON/OFF ARRAY	M: lc a1 a2 81 nn d1 ... dn cs S: lc a1 a2 81 nn d1 ... dn cs	See Set On/Off Array in this Appendix di: 0 = OFF, 1 = ON, 2 = no change

SET LOW ALARM VALUES

SET LO FLOW1	M: lc a1 a2 B0 02 d1 d2 cs S: lc a1 a2 B0 03 d1 d2 d3 cs	Process Warning
SET LO FLOW3	M: lc a1 a2 B2 02 d1 d2 cs S: lc a1 a2 B2 03 d1 d2 d3 cs	Process Fault
SET LO TEMP1	M: lc a1 a2 C0 02 d1 d2 cs S: lc a1 a2 C0 03 d1 d2 d3 cs	Process Warning
SET LO TEMP2	M: lc a1 a2 C1 02 d1 d2 cs S: lc a1 a2 C1 03 d1 d2 d3 cs	Process Fault
SET LO ANALOG1	M: lc a1 a2 C8 02 d1 d2 cs S: lc a1 a2 C8 03 d1 d2 d3 cs	Pressure Process Supply Warning
SET LO ANALOG2	M: lc a1 a2 C9 02 d1 d2 cs S: lc a1 a2 C9 03 d1 d2 d3 cs	Pressure Process Supply Fault
SET LO ANALOG7	M: lc a1 a2 BE 02 d1 d2 cs S: lc a1 a2 BE 03 d1 d2 d3 cs	Level Warning
SET LO ANALOG8	M: lc a1 a2 BF 02 d1 d2 cs S: lc a1 a2 BF 03 d1 d2 d3 cs	Level Fault
SET AUTO REFILL ON	M: lc a1 a2 C5 02 d1 d2 cs S: lc a1 a2 C5 03 d1 d2 d3 cs	When level % drops below this, turn on auto refill
SET LO RES1	M: lc a1 a2 CC 02 d1 d2 cs S: lc a1 a2 CC 03 d1 d2 d3 cs	Process Warning
SET LO RES2	M: lc a1 a2 CD 02 d1 d2 cs S: lc a1 a2 CD 03 d1 d2 d3 cs	Process Fault

SET HIGH ALARM VALUES

SET HI FLOW1	M: lc a1 a2 D0 02 d1 d2 cs S: lc a1 a2 D0 03 d1 d2 d3 cs	Process Warning
SET HI FLOW3	M: lc a1 a2 D2 02 d1 d2 cs S: lc a1 a2 D2 03 d1 d2 d3 cs	Process Fault
SET HI TEMP1	M: lc a1 a2 E0 02 d1 d2 cs S: lc a1 a2 E0 03 d1 d2 d3 cs	Process Warning

SET HI TEMP2	M: lc a1 a2 E1 02 d1 d2 cs S: lc a1 a2 E1 03 d1 d2 d3 cs	Process Fault
SET HI ANALOG1	M: lc a1 a2 E8 02 d1 d2 cs S: lc a1 a2 E8 03 d1 d2 d3 cs	Pressure Process Supply Warning
SET HI ANALOG2	M: lc a1 a2 E9 02 d1 d2 cs S: lc a1 a2 E9 03 d1 d2 d3 cs	Pressure Process Supply Fault
SET HI ANALOG7	M: lc a1 a2 DE 02 d1 d2 cs S: lc a1 a2 DE 03 d1 d2 d3 cs	Level Warning
SET HI ANALOG8	M: lc a1 a2 DF 02 d1 d2 cs S: lc a1 a2 DF 03 d1 d2 d3 cs	Level Fault
SET AUTO REFILL OFF	M: lc a1 a2 E5 02 d1 d2 cs S: lc a1 a2 E5 03 d1 d2 d3 cs	When level % drops below this, turn off auto refill
SET HI RES1	M: lc a1 a2 EC 02 d1 d2 cs S: lc a1 a2 EC 03 d1 d2 d3 cs	Process Warning
SET HI RES2	M: lc a1 a2 ED 02 d1 d2 cs S: lc a1 a2 ED 03 d1 d2 d3 cs	Process Fault
SET PID SETTINGS		
SET SETPT1	M: lc a1 a2 F0 02 d1 d2 cs S: lc a1 a2 F0 03 d1 d2 d3 cs	Process Fluid Setpoint
SET COOL P	M: lc a1 a2 F4 02 d1 d2 cs S: lc a1 a2 F4 03 d1 d2 d3 cs	Cool P Term
SET COOL I	M: lc a1 a2 F5 02 d1 d2 cs S: lc a1 a2 F5 03 d1 d2 d3 cs	Cool I Term
SET COOL D	M: lc a1 a2 F6 02 d1 d2 cs S: lc a1 a2 F6 03 d1 d2 d3 cs	Cool D Term
SET HEAT P	M: lc a1 a2 F1 02 d1 d2 cs S: lc a1 a2 F1 03 d1 d2 d3 cs	Heat P Term only for chillers equipped with optional heater
SET HEAT I	M: lc a1 a2 F2 02 d1 d2 cs S: lc a1 a2 F2 03 d1 d2 d3 cs	Heat I Term
SET HEAT D	M: lc a1 a2 F3 02 d1 d2 cs S: lc a1 a2 F3 03 d1 d2 d3 cs	Heat D Term

Request Status Table

nn	4				
	b0	Chiller Running		b0	HTC (High Temperature Cutout)
	b1	Chiller Faulted		b1	LLC (Low Level Cutout)
	b2	Process Supply RTD open or shorted		b2	MOL (Motor Overload)
d1	b3	Process Return RTD open or shorted	d3	b3	Phase Monitor
	b4	Suction RTD open or shorted		b4	HPC (High Pressure Cutout)
	b5	Entering Air or Facility Water RTD open or shorted		b5	LPC (Low Pressure Cutout)
	b6	High Temp Error		b6	EMO
	b7	Low Temp Error		b7	External EMO
	b0	High Pressure Error		b0	RA T_MAX (High Temperature)
	b1	Low Pressure Error		b1	Not used
	b2	High Flow Error (user set able)		b2	Auto Refill Valve Open
d2	b3	Low Flow Error (user set able)	d4	b3	Anti Drainback Valve Open
	b4	High Level Error		b4	Clogged Fluid Filter Fault
	b5	Low Level Error		b5	Temp Fault Startup Bypass
	b6	Drip Pan fault		b6	System Low Flow
	b7	Auto Refill fault		b7	Not used

Error

The slave detected an error in the message it received from the master, so it returns this command instead of echoing the command sent by the master. The slave returns the command it received from the master in the ed byte, and an error code in the en byte.

en	Error
1	Bad command – not recognized by slave
2	Reject value and return old setting
3	Do not respond at all

Some errors may not result in any response. The slave ignores incoming bytes until it sees the valid lead character and its slave address. Then it must receive the correct number of bytes (determined by the length byte) before it can respond. If an incomplete frame is received, the slave will time out and clear its input buffer without responding.

Set On/Off Array

This command is used to set the state of the chiller on or off. Sending a 0 in the array turns off the chiller while sending a 1 turns it on. Sending a 2 does not change the state of the feature. The array is returned showing the state of each feature after the command has been carried out. Sending a 2 effectively turns this command into a request status command.

nn	1
d1	Chiller On/Off

Set Keystroke

This command is used to affect a keystroke remotely as if someone pressed the key on the controller.

Value	
0	Null
1	Enter
2	Up/Yes
3	Down/No
4	Esc
5	On/Off
6	Left
7	Right

Set Special Command

Used for product specific commands, in the ThermoFlex this command configures the analog options (DAC out, Analog in and turns on and off DAC output)

CA 00 01 8D nn d1...dn cs

Set Special Command

Byte		Notes
d1	Command Byte	Indicates what command
d2	Description Byte	See description below
d3	Entered Value if necessary	

Command Byte

Command	Description
00	Set Analog Option
01	Set Resistivity Control (for basic derivatives)
02	Unused

Description Byte

Byte	Notes	
b.7 - b.6	Unused	
b.5 and b.4	Remote DAC output enable	00 = Off, 01 = On, 1x = No Change
b.3 - b.2	Configure DAC Output	00h = Volt, 01h = millivolt, 02h = milliamp, 03h = No Change
b.1 - b.2	Configure Analog Input	00h = Volt, 01h = millivolt, 02h = milliamp, 03h = No Change

The following command string example enables the DAC output, configures the DAC for millivolts and configures the analog input for voltage:

CA 00 01 8D 02 00 14 cs

Appendix D Analog I/O and Remote Sensor

Analog I/O Connector Pinout ♀

Install your analog input/output device to the 15-pin female connector on the rear of the chiller. Analog I/O is activated using the controller, see Section 4.

PIN	NAME	NOTES	DEFINITION
1	DIGITAL GROUND		Common round connection for pins 12, 13 and 14
2	RESISTIVITY OUT	Optional	Analog voltage output 0v = 0 MΩ - cm 10v = 20 MΩ - cm
3	LOW LEVEL (Only if option chosen)	Note 1	<u>Dry Relay Contact</u> : Reference to pin 11. Closes if either level switch is in the "low" position for more than 1 second.
4	CONFIGURABLE RELAY 2	Note 1	<u>Dry Relay Contact</u> : Reference to pin 11. Closes when any configured fault or warning occurs.
5	PUMP ON	Note 1	<u>Dry Relay Contact</u> : Reference to pin 11. Closes when pump is turned on. Opens when pump is turned off.
6	ANALOG GROUND		Common for analog signals (pins 2, 7 and 15)
7	RESERVOIR TEMP OUT OR EXTERNAL SENSOR TEMPERATURE IF EXTERNAL SENSOR ENABLED	Note 2	Analog Voltage Output 0-10VDC, 10mV/°C, or 4-20mA: Reference to pin 6. This voltage output is proportional to the reservoir fluid temperature: Default scale= 0–10V (where: 0V = Low Temp Span, 10V = Hi Temp Span) Optional Range = 10mV/ °C. (Ex: 200mV = 20°C) (Max Load @ 10V = 5mA) or 4-20mA, 4mA = low temp span, 20 mA = high temp span (maximum output current = 5mA @10VDC.
8	LOW FLOW (Only if option chosen)	Note 1	<u>Dry Relay Contact</u> : Reference to pin 11. Closes when a low flow occurs while the pump is on. Note: To allow the pump to get up to speed at startup, the pump runs for 3 - 5 seconds before the low flow sensor is read.
9	CONFIGURABLE RELAY 1 (Normally Open)	Note 1	<u>Dry Relay Contact</u> : Reference to pin 11. Closes when any of the configured faults occur.
10	CONFIGURABLE RELAY 1 (Normally Closed)	Note 1	<u>Dry Relay Contact</u> : Reference to pin 11. Complement of pin 9 (open when pin 9 is closed).
11	RELAY COMMON		Common for all relay contacts (pins 3, 4, 5, 8, 9, 10).
12	REMOTE START ENABLE	Note 3	Connect to pin 1 to allow chiller to be remotely turned on/off through pin 14 REMOTE START.

Note 1: All relay contacts (except for Pin 10) are normally OPEN when power is off. Pin 10 contacts are normally CLOSED when power is off. Relay contacts are rated: 24V AC/DC, 2A, <= 0.08 Ohm maximum each or 5A total for all relays combined, 1mA minimum, switching capacity: 48VA/48W (Resistive load only).

Note 2: Default = 0-10VDC. These ranges are set by the user.

Note 3: Connect to digital ground (pin 1) using a low resistance connection (gold contact relay).

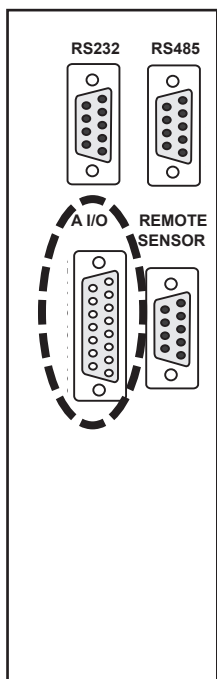
PIN	NAME	NOTES	DEFINITION
13	REMOTE SETPOINT ENABLE	Note 3	Connect to pin 1 to allow the setpoint to be changed remotely through pin 15 REMOTE SETPOINT.
14	REMOTE START	Note 3	Connect to pin 1 to turn chiller on. Disconnect to turn chiller off. Note: Pins 1 and 12 must be connected to allow operation from this pin.
15	REMOTE SETPOINT	Note 2, 4	Analog Voltage Input 0-10VDC, 10mV/°C, or 4-20mA: Reference to pin 6. Apply a DC voltage to this pin to adjust the setpoint: Default Range = 0 – 10V (where: 0V = Low Temp Span, 10V = Hi Temp Span) (Input Impedance > 600K) Optional Range = 10mV/ °C. (Ex: 200mV = 20°C) (Max Input Voltage = 10VDC, or 4-20mA, 4mA = low temp span, 20 mA = high temp span.

Note 1: All relay contacts (except for Pin 10) are normally OPEN when power is off. Pin 10 contacts are normally CLOSED when power is off. Relay contacts are rated: 24V AC/DC, 2A, <= 0.08 Ohm maximum each or 5A total for all relays combined, 1mA minimum, switching capacity: 48VA/48W (Resistive load only).

Note 2: Default = 0-10VDC. These ranges are set by the user.

Note 3: Connect to digital ground (pin 1) using a low resistance connection (gold contact relay).

Note 4: Remote setpoint must be enabled, pin 13



WARNING Never apply line voltage to any of the connections. ▲

When making your connection to the ThermoFlex Analog I/O connector, in order to comply with the EMC directive:

- Use a shielded I/O cable
- Connect the remote end of the cable shield to earth ground.
- Connect cable shield to ThermoFlex end connector.

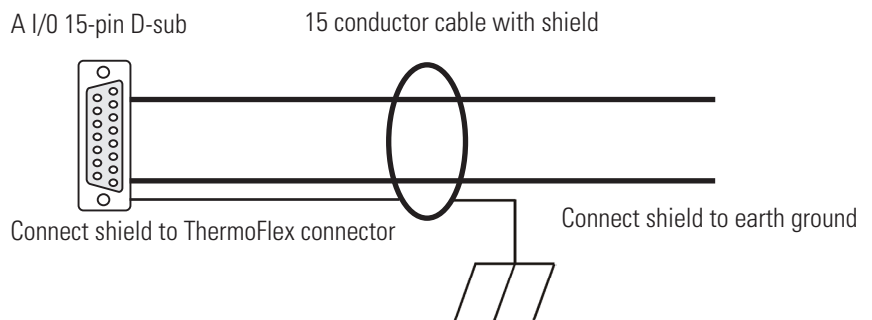


Figure D-1 Analog I/O Connector

Analog Comm and Configurable Relays

Use the up/down arrows to scroll through the entire menu (only six lines are displayed at a time). When any desired feature is highlighted press enter to select it. Enabled features are indicated by **■**.

ANALOG COMM - ACOM	
<input type="checkbox"/> Remote Sensor	
<input type="checkbox"/> Remote Start	
<input type="checkbox"/> Remote Setpt	volts
<input type="checkbox"/> Temp Out	volts
⏠	

Remote Start	
Remote Setpt	volts

To change the **Remote Setpoint** or **Temp Out** input type use the up and down arrows until the input is highlighted. (The left and right arrows have no affect in moving the highlight.)

ANALOG COMM - ACOM	
<input type="checkbox"/> Remote Sensor	
<input type="checkbox"/> Remote Start	
<input type="checkbox"/> Remote Setpt	volts
<input type="checkbox"/> Temp Out	volts
⏠	

Note Enabling analog I/O remote start/stop disables the chiller's local controller start/stop capability. Enabling analog I/O remote also overrides serial communications start/stop commands. ▲

Press enter to get the input type to flash. Use the up and down arrows to bring up the desired input: **volts**, **mv** or **ma**. With the desired input displayed press enter again to accept the change.

With **RELAY1** or **RELAY2** highlighted press enter to bring up the corresponding **RELAY** display. Highlight the desired error(s) and press enter. Enabled errors are indicated by are indicated by **■**.

RELAY 1	
<input checked="" type="checkbox"/> Low Level	
<input type="checkbox"/> Tank Overflow	
<input type="checkbox"/> Drip Pan Full	
<input type="checkbox"/> Low Temperature	
⏠	

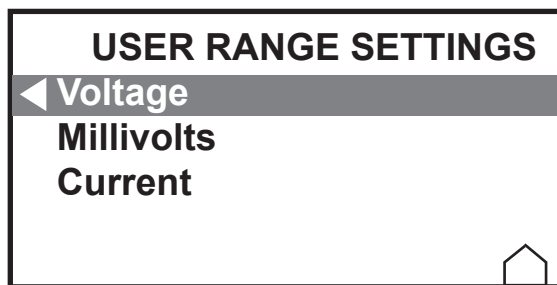
<input type="checkbox"/> High Temperature	
<input checked="" type="checkbox"/> Low Flow	
<input type="checkbox"/> High Flow	
<input type="checkbox"/> Low Resistivity	
<input type="checkbox"/> High Resistivity	
<input type="checkbox"/> High Pressure	
<input type="checkbox"/> Low Pressure	
<input checked="" type="checkbox"/> Unit Fault	
<input type="checkbox"/> Pump/Unit Shut Off	
<input type="checkbox"/> Refrig. Shut Off	
<input checked="" type="checkbox"/> Limit Fault	
<input type="checkbox"/> Sensor Fault	

RELAY 2	
<input type="checkbox"/> Low Level	
<input type="checkbox"/> Tank Overflow	
<input type="checkbox"/> Drip Pan Full	
<input type="checkbox"/> Auto Refill Error	
⏠	

<input checked="" type="checkbox"/> Low Temperature	
<input checked="" type="checkbox"/> High Temperature	
<input type="checkbox"/> Low Flow	
<input type="checkbox"/> High Flow	
<input type="checkbox"/> Low Resistivity	
<input checked="" type="checkbox"/> High Resistivity	
<input type="checkbox"/> High Pressure	
<input type="checkbox"/> Low Pressure	
<input type="checkbox"/> Warning	
<input type="checkbox"/> PM Timer	
<input type="checkbox"/> Comm Error	
<input checked="" type="checkbox"/> Sensor Fault	

USER RANGE SETTINGS

This menu allows the you to customize the scaling of the analog input and DAC output to meet the application needs. With **USER RANGE SETTINGS** highlighted press enter to display:



The ThermoFlex supports three standard analog interface types and defaults to the following scaling:

Voltage	0v – 10v = the operating range of the chiller (5° – 40° in standard chillers, 5° – 90° in high temp chillers)
MilliVolts	10mv/°C
Current	4ma – 20ma = the operating range of the chiller

The following values reflect the standard scaling and are the factory defaults:

Voltage (0v – 10v = the operating range of the chiller)

High volts	10.0v
Low volts	0.0v
High temp	40.0° (<i>standard temp chillers</i>), 90.0° (<i>high temp chillers</i>)
Low temp	5.0°

With **Voltage** highlighted press enter to display:

USER VOLTAGE	
◀ High Volts	10.0
Low Volts	0.0
High Temp	40.0
Low Temp	5.0

Highlight the desired value and then press enter, the high-light will flash. Use the up and down arrows to change the value. Once the desired value is displayed press enter to accept the change and stop the flashing.

These values are used to calculate a gain and offset and are applied to the setpoint input voltage.

$$\text{VoltageInputGain} = (\text{high temp} - \text{low temp}) / (\text{high volt} - \text{low volt})$$

$$\text{VoltageInputOffset} = \text{high temp} - (\text{high volt} * \text{VoltageInputGain})$$

The default settings for a high temp chiller will yield the following gain and offset for setpoint input:

$$\text{VoltageInputGain} = (90 - 5) / (10 - 0) = 8.5$$

$$\text{VoltageInputOffset} = 90 - (10 * 8.5) = 5$$

Now 10v will yield a setpoint of 90°. $(10 * \text{gain}) + \text{offset}$

$$(10v * 8.5) + 5 = 90^\circ$$

It could just as easily be configured for other ranges such as:

$1v - 9v = 5^\circ - 150^\circ$. However the chiller will only recognize a set point between $5^\circ - 90^\circ$.

A separate gain and offset is also be calculated and are applied to the DAC temperature output value.

$$\text{VoltageOutputGain} = (\text{high volt} - \text{low volt}) / (\text{high temp} - \text{low temp})$$

$$\text{VoltageOutputOffset} = \text{high volt} - (\text{high temp} * \text{VoltageOutputGain})$$

The default settings for a high temp chiller will yield the following gain and offset for temperature output:

$$\text{VoltageOutputGain} = (10 - 0) / (90 - 5) = 0.117647$$

$$\text{VoltageOutputOffset} = 10 - (90 * 0.117647) = -0.58823$$

Now 90° will output 10v. $(90 * \text{gain}) + \text{offset}$

$$(90^\circ * 0.117647) + (-0.58823) = 10.0v$$

The following values are the factory defaults for the millivolt setting that will effectively yield 10mv/°C:

MilliVolts (10mv/°C)

High mv	1000.0mv
Low mv	0.0mv
High temp	100.0°
Low temp	0.0°

With **Millivolts** highlighted press enter to display:

USER MV	
High MV	1000.0
Low MV	0.0
High Temp	100.0
Low Temp	0.0

Highlight the desired value and then press enter, the highlight will flash. Use the up and down arrows to change the value. Once the desired value is displayed press enter to accept the change and stop the flashing.

These values are used to calculate a gain and offset and are applied to the set point input voltage.

$$\text{MilliVoltInputGain} = (\text{high temp} - \text{low temp}) / (\text{high mv} - \text{low mv})$$

$$\text{MilliVoltInputOffset} = \text{high temp} - (\text{high mv} * \text{MilliVoltInputGain})$$

So that the default settings will yield the following gain and offset for set point input:

$$\text{MilliVoltInputGain} = (100 - 0) / (1000 - 0) = 0.1$$

$$\text{MilliVoltInputOffset} = 100 - (1000 * 0.1) = 0$$

Now 100mv will yield a set point of 10° ((100 * gain) + offset)

$$(100\text{mv} * 0.1) + 0 = 10.0^\circ = 10\text{mv}/^\circ\text{C}$$

Just like voltage the mv range can be set for other ranges.

A separate gain and offset will also be calculated and are applied to the DAC temperature output value.

$$\text{MilliVoltOutputGain} = (\text{high mv} - \text{low mv}) / (\text{high temp} - \text{low temp})$$

$$\text{MilliVoltOutputOffset} = \text{high mv} - (\text{high temp} * \text{MilliVoltOutputGain})$$

So that the default settings will yield the following gain and offset for temperature output.

$$\text{MilliVoltOutputGain} = (1000 - 0\text{mv}) / (100 - 0) = 10$$

$$\text{MilliVoltOutputOffset} = 1000 - (100 * 10) = 0$$

Now 10° will output 100mv ((10 * gain) + offset)

$$(10^\circ * 10) + 0 = 100\text{mv} = 10\text{mv}/^\circ\text{C}$$

The following values reflect the standard scaling and are the factory defaults:

Current (4ma – 20ma = the operating range of the chiller)

High ma	20.0ma
Low ma	4.0ma
High temp	40.0° (standard temp chillers) 90.0° (high temp chillers)
Low temp	5.0°

With **Current** highlighted press enter to display:

USER MA	
◀ High MA	20.0
Low MA	4.0
High Temp	40.0
Low Temp	5.0

Highlight the desired value and then press enter, the highlight will flash. Use the up and down arrows to change the value. Once the desired value is displayed press enter to accept the change and stop the flashing.

Calculating the default gain and offset for set point input for a high temp chiller:

$$\begin{aligned} \text{MilliAmpInputGain} &= (\text{high temp} - \text{low temp}) / (\text{high ma} - \text{low ma}) \\ \text{MilliAmpInputOffset} &= \text{high temp} - (\text{high ma} * \text{MilliAmpInputGain}) \end{aligned}$$

The default settings for a high temp chiller will yield the following gain and offset for setpoint input:

$$\begin{aligned} \text{MilliAmpInputGain} &= (90.0 - 5.0) / (20.0 - 4.0) = 5.3125 \\ \text{MilliAmpInputOffset} &= 90 - (20 * 0.188235) = -16.25 \end{aligned}$$

Now 20ma will represent a setpoint of 90°

$$(20.0 * 5.3125) + (-16.25) = 90.0^\circ$$

A separate gain and offset will also be calculated and are be applied to the DAC temperature output value.

$$\begin{aligned} \text{MilliAmpOutputGain} &= (\text{high ma} - \text{low ma}) / (\text{high temp} - \text{low temp}) \\ \text{MilliAmpOutputOffset} &= \text{high ma} - (\text{high temp} * \text{MilliAmpOutputGain}) \end{aligned}$$

The default settings for a high temp chiller will yield the following gain and offset for temperature output:

$$\begin{aligned} \text{MilliAmpOutputGain} &= (20.0 - 4.0) / (90 - 5) = 0.188235294 \\ \text{MilliAmpOutputOffset} &= 20 - (90 * 0.188235) = 3.058823529 \end{aligned}$$

Now 90° = 20ma temperature output.

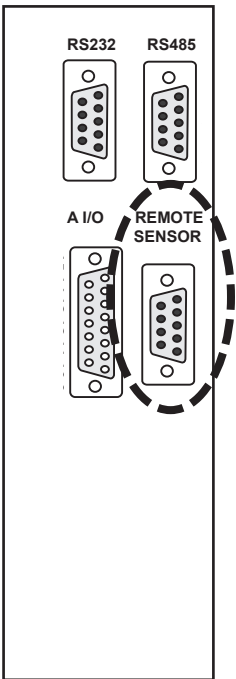
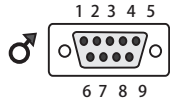
$$(90 * 0.188235294) + 3.058823529 = 20\text{ma}$$

Note: Ensure that there is sufficient range in the voltage or current to provide enough resolution of temperature. For example a voltage range of 0v – 1v to represent a temperature range of 0° - 150° would not have enough resolution to provide stable readings.

Remote Sensor Connector Pinout

Table 1

Pin	Color
1	White
2	NA
3	NA
4	White
5	NA
6	NA
7	Red
8	NA
9	Red (4th wire not connected to the control board)



Never apply line voltage to any of the connections. ▲



When operating a ThermoFlex7500-10000 with the remote sensor enabled ensure the chiller's response to lowering the setpoint does not result in operation below 10°C process temperature. Operation below 10°C requires the use of 50/50 EG/water or 50/50 PG/water. ▲

Figure D-2 Remote Sensor Connector

DECLARATION OF CONFORMITY

Manufacturer: Thermo Fisher Scientific
Address: 25 Nimble Hill Road
Newington, NH 03801 USA



Products: Refrigerated chillers and heat exchangers.

Year of inception 2013

We declare that the following products conform to the Directives and Standards listed below:

Unit has a 16 digit part number consisting of UU TVPC XXXXXXXX defined as follows:

UU = Unit type can be:

10 = TF 900 11 = TF 1,400 12 = TF 2,500 13 = TF 3,500 14 = TF 5,000
15 = TF 7,500 16 = TF 10,000 17 = TF 15,000 18 = TF 20,000 19 = TF 24,000

T = Type of unit cooling and Temperature Range can be 1-4 inclusive, where:

1 = Air Cooled Standard Temp (5-40°C) 2 = Air Cooled Hi Temp (5-90°C)
3 = Water Cooled Standard Temp (5-40°C) 4 = Water Cooled Hi Temp (5-90°C)

V = Unit voltage rating:

1 = 115V, 60Hz 1Ph 17 = 200/208/230V, 60Hz 3Ph 17 = 208/230V, 60Hz 3Ph
100V, 50Hz 1Ph 200V, 50Hz 3Ph
2 = 100/115V, 60Hz 1Ph 18 = 400V, 50Hz 3Ph 18 = 400V, 50Hz 3Ph
100/115V, 50Hz 1Ph 20 = 200/208/230V, 60Hz 3Ph
3 = 208/230V, 60Hz 1Ph 200-230V, 50Hz 3Ph
200V, 50Hz 1Ph 21 = 460V, 60Hz 3Ph 21 = 460V, 60Hz 3Ph
4 = 230V, 50Hz 1Ph 400V, 50Hz 3Ph 400V, 50Hz 3Ph
7 = 200/208/230V, 60Hz 1Ph
200/230V, 50Hz 1Ph

P = Pump type, can be 0 through 9 inclusive or B, C or F.

C = Unit controller type, can be any digit 1-6, inclusive.

X = Any digit 0-9 inclusive, used as sequential numbering only.

Equipment Class: Measurement, control and laboratory

Directives and Standards:

2004/108/EC – Electromagnetic Compatibility (EMCD):

EN 61326-1: 2006 – Electrical equipment for measurement, control, and laboratory use – EMC requirements, EMC Class A

2006/95/EC – Low Voltage Directive (LVD):

EN/IEC 61010-1: 2010 – Safety Requirements For Electrical Equipment For Measurement, Control, And Laboratory Use: General Requirements.

EN 61010-1: 2001 – Safety Requirements For Electrical Equipment For Measurement, Control, And Laboratory Use: General Requirements.

EN 61010-2-010: 2003 – Safety Requirements For Electrical Equipment For Measurement, Control, And Laboratory Use – Part 2-010: Particular Requirements For Laboratory Equipment For The Heating Of Materials.

Additional EMC Evaluations with Certificates:

EN 61000-3-2: 2006 Harmonics

EN 61000-3-3: 2008 Flicker

Manufacturer's Authorized Representative:

Date:

20 Sept. 2013

Robin Wiley Compliance Engineering

RoHS DECLARATION OF CONFORMITY

Manufacturer: Thermo Fisher Scientific

Address: 25 Nimble Hill Road
Newington, NH USA 03801

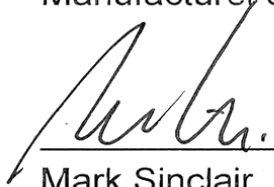
Product: Refrigerated chillers and heat exchangers. ThermoFlex models with Bill of Material Numbers:

133201930000001	134201940000001	143201930000001	144201940000002
163172030000002	164173140000000	164173140000001	112123020000011

Thermo Fisher Scientific certifies that ThermoFlex Bill of Material numbers above meet the requirements of DIRECTIVE 2002/95/EC, Restriction of Hazardous Substances Directive (RoHS). Thermo Fisher Scientific certifies that ThermoFlex Bill of Material numbers above contain less than the following amounts of the six RoHS banned substances with the exemption stated in Note 2 below:

Substance	Threshold Level
Lead... Pb	Less than 0.1% ^{1 & 2}
Mercury... Hg	Less than 0.1% ¹
Hexavalent Chromium ... Cr (VI)	Less than 0.1% ¹
Polybrominated Biphenyls ... PBB	Less than 0.1% ¹
Polybrominated Diphenyl Ethers ... PBDE	Less than 0.1% ¹
Cadmium ... Cd	Less than 0.01% ¹
<p>Notes:</p> <ol style="list-style-type: none"> 1. Tolerated maximum concentration value by weight in homogeneous materials. 2. Exemptions - Lead as an alloying element in steel containing up to 0.35% lead by weight, aluminum containing up to 0.4% lead by weight and as a copper alloy containing up to 4% lead by weight. 	

Manufacturer's Authorized Representative:



Mark Sinclair
R & D Manager

Date:

23 January 2012

WARRANTY

Thermo Fisher Scientific warrants for 24 months (**excluding MD1/MD2 Magnetic Drive and P1/P2 Positive Displacement pumps which are warranted for 12 months**) from date of shipment the Thermo Scientific ThermoFlex chiller according to the following terms.

Any part of the chiller manufactured or supplied by Thermo Fisher Scientific and found in the reasonable judgment of Thermo Fisher to be defective in material or workmanship will be repaired at an authorized Thermo Fisher Repair Depot without charge for parts or labor. The chiller, including any defective part must be returned to an authorized Thermo Fisher Repair Depot within the warranty period. The expense of returning the chiller to the authorized Thermo Fisher Repair Depot for warranty service will be paid for by the buyer. Our responsibility in respect to warranty claims is limited to performing the required repairs or replacements, and no claim of breach of warranty shall be cause for cancellation or rescission of the contract of sales of any chiller. With respect to chillers that qualify for field service repairs, Thermo Fisher Scientific's responsibility is limited to the component parts necessary for the repair and the labor that is required on site to perform the repair. Any travel labor or mileage charges are the financial responsibility of the buyer.

The buyer shall be responsible for any evaluation or warranty service call (including labor charges) if no defects are found with the Thermo Scientific product.

This warranty does not cover any chiller that has been subject to misuse, neglect, or accident. This warranty does not apply to any damage to the chiller that is the result of improper installation or maintenance, or to any chiller that has been operated or maintained in any way contrary to the operating or maintenance instructions specified in this Instruction and Operation Manual. This warranty does not cover any chiller that has been altered or modified so as to change its intended use.

In addition, this warranty does not extend to repairs made by the use of parts, accessories, or fluids which are either incompatible with the chiller or adversely affect its operation, performance, or durability.

Thermo Fisher Scientific reserves the right to change or improve the design of any chiller without assuming any obligation to modify any chiller previously manufactured.

THE FOREGOING EXPRESS WARRANTY IS IN LIEU OF ALL OTHER WARRANTIES, EXPRESSED OR IMPLIED, INCLUDING BUT NOT LIMITED TO WARRANTIES OR MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE.

OUR OBLIGATION UNDER THIS WARRANTY IS STRICTLY AND EXCLUSIVELY LIMITED TO THE REPAIR OR REPLACEMENT OF DEFECTIVE COMPONENT PARTS AND Thermo Fisher Scientific DOES NOT ASSUME OR AUTHORIZE ANYONE TO ASSUME FOR IT ANY OTHER OBLIGATION.

Thermo Fisher Scientific ASSUMES NO RESPONSIBILITY FOR INCIDENTAL, CONSEQUENTIAL, OR OTHER DAMAGES INCLUDING, BUT NOT LIMITED TO LOSS OR DAMAGE TO PROPERTY, LOSS OF PROFITS OR REVENUE, LOSS OF THE CHILLER, LOSS OF TIME, OR INCONVENIENCE.

This warranty applies to chillers sold by Thermo Fisher Scientific. (Refer to the warranty for chillers sold by the affiliated marketing company of Thermo Fisher Scientific for any additional terms.) This warranty and all matters arising pursuant to it shall be governed by the law of the State of New Hampshire, United States. All legal actions brought in relation hereto shall be filed in the appropriate state or federal courts in New Hampshire, unless waived by Thermo Fisher Scientific.

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