

Installation and Operation Manual
安装和操作手册

Thermo Scientific
Laboratory Refrigerators and Freezers
赛默飞世尔科技
实验室冰箱和冷冻柜

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Table 1 shows the model numbers covered by this manual. 表 1 列出了本手册所涵盖的所有产品型号。

Refrigerators 冰箱	Freezer 冷冻柜
Model Number 产品型号: PLR 221	Model Number 产品型号 PLF 276
Model Number 产品型号: PLR 386	
Model Number 产品型号: PLR 1006	

Table 1 Refrigerator and Freezer Model Numbers 表 1 冰箱和冷冻柜产品型号

Technical Data 技术资料

Model 型号	PLR 221	PLR 386	PLR 1006	PLF 276
Protective Earthing 保护接地	I	I	I	I
Capacity 容量(L)	221	386	1006	276
Input power 输入功率(w)	170	450	720	340
Rated voltage 额定电压(v~)	220	220	220	220 ~ 240
Rated Current (A)额定电流	1.1	3.6	5.2	
Ambient temperature 环境温度 (°C)	15 ~ 32	15 ~ 32	15 ~ 32	10 ~ 32
Inner temperature 内部温度 (°C)	0 ~ 10	0 ~ 10	0 ~ 10	-10 ~ -40
Net weight 净重 (kg)	58	94	170	120
Overall dimension 外形尺寸(mm)	500x520x1745	660x665x1980	1200x710x2235	717x710x1745

Table 2 Technical Data 表 2 技术资料

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1.0 Introduction 引言

This manual provides installation, operation, and service troubleshooting instructions for Thermo Scientific laboratory refrigerators and freezers. All three refrigerators have forced air evaporators. The PLR 221 evaporator is a pressed steel panel mounted to the back wall. Freezer model PLF 276 offers a shelf evaporator and fan cooled condenser 本手册对赛默飞世尔科技实验室冰箱和冷冻柜的安装、操作和维护故障排除等工作给予了说明。三种型号的冰箱都采用强制蒸发器。PLR 221 是压制钢面板式蒸发器，安装于后壁。冷冻柜型号 PLF 276 采用的是搁板式蒸发器和风扇制冷的冷凝器。

2.0 Safety Considerations 安全注意事项



WARNING! Do not modify or change system components. Replacement parts must be O.E.M. exact replacement equipment. Any modification or use of this equipment in a manner other than expressly intended may cause death or serious injury. This includes use of user-supplied components and materials not specifically designed for the equipment. Reconfiguring the controller may cause death or serious injury.

警告！ 请勿修改或更换系统组件。更换部件必须符合 O.E.M 标准。修改组件或将设备用于其明确用途以外的其他用途都可能导致死亡或严重伤害，例如将用户提供的组件和材料用于设备，而不是使用专为设备设计的组件和材料。重新配置的控制器可能会导致死亡或严重伤害。



Thermo Scientific shall not be liable for any damages, including incidental and/or consequential damages, regardless of the legal theory asserted, including negligence and/or strict liability.

不论斥诸任何法律理论（包括疏忽和/或严格责任），赛默飞世尔科技都将不承担任何损害赔偿，包括附带和/或间接性损害。

Before using, user shall determine the suitability and integrity of the product for the intended use and that the unit has not been altered in any way. User assumes all risk and liability whatsoever therewith.

使用前，用户应确定产品预定用途的适宜性和完整性，并确保设备未以任何方式改变。用户承担因此产生的所有风险和责任。



DANGER! For personal safety and trouble-free operation, this unit must be properly grounded before it is used. Failure to ground the equipment may cause personal injury or damage to the equipment. Always conform to local electrical codes. Do not connect unit to already overloaded power lines.

危险！为确保人身安全和无故障运行，设备使用前须进行妥善接地。接地故障的设备可能会导致人身伤害或设备损坏。务必遵守当地的电气规范。不要使用已经超负荷的电源线连接设备。



WARNING! Disconnect unit from main power before attempting any maintenance to equipment or controls.

警告！对设备或控制系统进行任何维护和修理工作前须断开设备的主电源。

3.0 Unpacking and Inspection 开箱检验

At delivery, examine the exterior for physical damage while the carrier's representative is present. If exterior damage is present, carefully unpack and inspect the unit and all accessories for damage. 设备运到后，应在承运人代表在场的情况下检查包装外表是否存在物理损伤。如果存在外部损伤，应小心地打开包装并检查设备和所有配件是否有损坏。

If there is no exterior damage, unpack and inspect the equipment within five days of delivery. If you find any damage, keep the packing materials and immediately report the damage to the carrier. Do not return goods to Thermo Scientific without written authorization. When submitting a claim for shipping damage, request that the carrier inspect the shipping container and equipment. 如果包装没有外部损伤，应在交货后五天内开箱检查设备。如果您在此时发现任何损坏，应保留好包装材料，并将损坏情况立即报告给承运人。未经书面授权不要将货物返回给赛默飞世尔科技。若需索赔运输损坏，应要求承运人检查装运集装箱和设备。

Model and serial numbers are important when requesting service parts from your dealer or the Technical Services Group. These numbers are found on the outside of the cabinet, bottom left, front corner or inside the cabinet on the left wall at about eye level. Record the identification numbers on the back page of this manual. 向经销商或技术服务部要求提供维护部件时须提供产品的型号和序列号。这些编号位于机柜外侧、左下角、前角或机柜内部左侧壁与视线高度持平处。将标识号记录在本手册背面。

4.0 Installation 安装



CAUTION: Improper operation of the equipment could result in dangerous conditions. To preclude hazard and minimize risk, follow all instructions and operate within design limits noted on the data plate.

小心：不正确的设备操作可能导致危险情况。为排除危害和最小化风险，请遵守

所有的指示，并按照铭牌上注明的设计范围进行操作。

4.1 Location安装位置

Install the unit in a level area free from vibration with a minimum of 10cm of space on the sides and top and 15cm at the back of the unit. See the install space dimensions below in section 4.2.将设备安装在一块平整的无振动场地，设备两侧及顶端应最少保留 10 厘米的空间，背面最少保留 15 厘米的空间。见下文第 4.2 条：安装空间尺寸。

Do not position the equipment in direct sunlight or near heating diffusers, radiators, or other sources of heat. The ambient temperature range must be between 15°C and 32°C.设备不要放置在阳光直射或靠近加热扩散器、散热器或其他热源的地方。环境温度范围必须在 15°C-32°C。

4.2 Install Space Dimensions安装空间尺寸

Allow adequate space around the unit after installation to provide for airflow. Be certain to allow for door swing, and doors with handles must be capable of opening at least 85 degrees from the closed position without touching an adjacent wall. The table below shows the required clearance dimensions.设备安装后周围须留有足够的空间允许气流通过。务必留出门的摆动空间，带把手的门须至少能够从关闭位置打开到 85 度且不会碰到相邻的墙面。下表显示了必需的间隙尺寸。

Minimum Clearance Areas 最小间隙区域	Model PLR 221 and PLR 1006 型号 PLR221 和 PLR 1006	Model PLR 386 型号 PLR 386	Model PLF 276 型号 PLF 276
Minimum Clearance – Top 顶部最小 间隙	10 cm (min) (最小 尺寸)	10 cm (min) (最 小尺寸)	10 cm (min) (最小尺寸)
Minimum Clearance – Side, 两侧最 小间隙	10 cm (min) (最小 尺寸)	10 cm (min) (最 小尺寸)	10 cm (min) (最小尺寸)
Minimum Clearance – Back, Free Standing, 自由站立时背面最小间隙	15 cm (min) (最小 尺寸)	15 cm (min) (最 小尺寸)	15 cm (min) (最小尺寸)

Table 3 Clearance Dimensions 表 3 间隙尺寸

4.3 Operational/Field Environment操作/现场环境

The table below displays the Operational/Field Environment 下表显示了显示操作/现场环境

Environment 环境	Units 单位	Nominal 标称值	Minimum 最小值	Maximum 最大值
Lab / Room Relative Humidity 实验室/室内相对湿度	% RH	50	30	95
Lab / Room Temperature 实验室/室内温度	°C	25	15	32
Voltage 电压	V _{AC}	230	-10%	+10%
Frequency 频率	Hz	50		

Table 4 Operational/Field Environment 表 4 操作/现场环境

4.4 Wiring 接线



Warning: Connect the equipment to the correct power source. Incorrect voltage can result in severe damage to the equipment.

警告：设备应连接到正确的电源。不正确的电压可能会导致严重损坏设备。



Danger: For personal safety and trouble-free operation, this unit must be properly grounded before it is used. Failure to ground the equipment may cause personal injury or damage to the equipment. Always conform to the local codes.

Do not connect unit to already overloaded power lines.

危险：为确保人身安全和无故障运行，设备使用前必须妥善接地。接地故障的设备可能会导致人身伤害或设备损坏。务必遵守当地的电气规范。不要使用已经超负荷的电源线连接设备。

Refrigerator and freezer units use 10 or 16 amp power cords. They are rated for 220/230 volts, AC, 50 Hz. Do not use extension cords, and always use a three prong, grounded wall outlet. Figure 1 shows the standard service cord plugs and wall outlets used for Thermo Scientific refrigerators and freezers. 冰箱和冷冻柜设备使用 10 或 16 安培电源线，它们的额定电压为 220/230 伏特，交流电压，50 赫兹。不要使用电源延长线，始终使用三叉且接地的壁装电源插座。图 1 显示了赛默飞世尔科技 冰箱和冷冻柜使用的标准电源线插头和壁装插座。



Figure1 Standard Service Cord and Outlet
图 1 标准连接线和插座

4.5 Leveling 调平

If the unit features leveling screws, rotate the leveling screws until the unit is level. If the floor is not level, shim the corners with thin sheets of metal. 如果设备配有调平螺钉，旋转调平螺钉，直到设备平稳。如果地面不平整，可在四个角下面加上垫片与金属薄片。

4.6 Door Seal门的密封

To check the door seal, complete the following steps:按照以下步骤检查门是否有效密封：

1. Open the door.打开门。
2. Insert a strip of paper (a couple of centimeters wide) between the door gasket and the cabinet flange and close the door.在门的密封条和机柜法兰之间插入一张纸条（2厘米宽），关闭门。
3. Slowly pull the paper strip from the outside. You should feel some resistance.慢慢地从外面抽出纸条，应感觉到一定的阻力。
4. Repeat this test at 10cm intervals around the door. If the door does not seal properly, replace the gasket.在门的周围每隔10厘米重复进行此试验，如果门密封不好，更换密封条。



CAUTION: Door seal integrity is critical for refrigerators and freezers. A loose fitting gasket allows moist air to be drawn into the cabinet, resulting in quicker frost buildup on the evaporator coil, longer running time, poor temperature maintenance, and increased operation cost.

小心：门的密封条的完整性对冰箱和冷冻柜的性能起着关键作用。封条密封不好会导致潮湿的空气进入机柜，使蒸发器盘管的结霜加快，运行时间变长，温度维护性能变差，并增加操作成本。

4.7 Defrosting除霜

Refrigerator models **PLR 221**, **PLR 386**, **PLR 1006** and freezer model number **PLF 276** may require manual defrost. Follow the instructions below to manually defrost a refrigerator unit.

PLR 221，**PLR 386**，**PLR 1006** 型号冰箱和 **PLF 276** 型号冷冻柜产品可能需要手动除霜。按照以下说明对设备进行手动除霜。

1. When frost on the plated evaporator in the back of the cabinet exceeds 6mm, turn the unit off and allow the ice to melt.
当机柜后面的电镀蒸发器结霜超过6mm时，关闭设备让冰融化。
2. After turning the unit off, place a pan of warm water in the refrigerated compartment to speed defrosting.
在冰箱隔层内放入盛有热水的容器以加快除霜。



CAUTION: Do not use an ice pick or other sharp object to dislodge the ice.
小心：不要使用冰凿或其他尖锐物除冰。

5.0 Operation操作

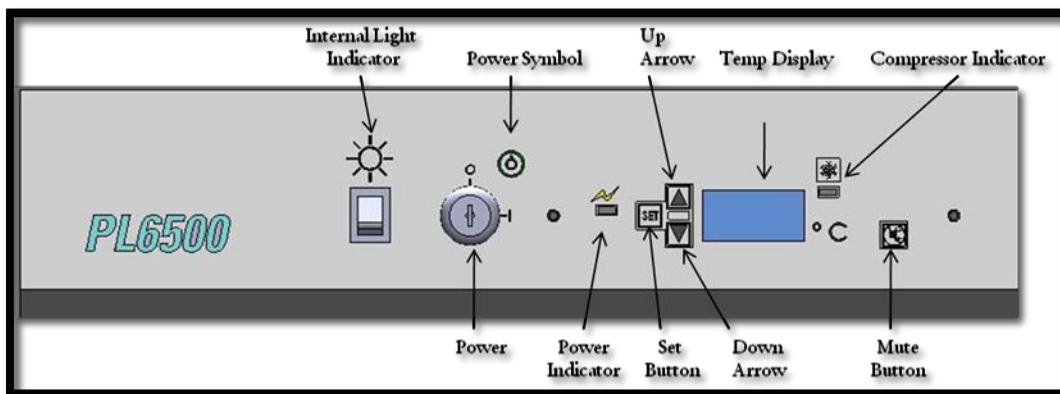
5.1 Temperature Control温度控制

Temperatures for refrigeration and freezer units are set at the factory. Plug the unit into an approved receptacle, for refrigerators insert key into the power lock and move to from the “O” to the “I” position, and allow 24 hours to achieve desired temperature.冷藏和冷冻柜设备的温度在出厂时设置。将设备插头插入核准的插座，或将冰箱钥匙插入电源锁并从“O”位转动到“I”位等待24小时，以达到理想的温度。

6.0 User Interface - Refrigerators用户界面- 冰箱

6.1 Custom User Interface - Refrigerators定制用户界面- 冰箱

The figure below shows the user interface for refrigerator models: **PLR 221; PLR 386; PLR 1006**. 下图显示了 **PLR 221; PLR 386; PLR 1006** 型号冰箱的用户界面。



- To operate the unit the key must be inserted into the “Power” lock and be turned to the “I” position. In the “O” position the internal fans will run but the controller is not on and the unit will not reach temperature.操作设备前，将钥匙插入“Power”锁，转动到“I”位。在“O”位时，内部风扇虽然运行，但控制器未打开，因此设备无法达到要求的温度。
- When the compressor indicator is on steadily the compressor is running. When the compressor indicator is flashing the compressor has been requested to turn on within compressor start delay time (parameter E4).当压缩机显示灯亮起并稳定后，表示压缩机正在运行。当压缩机显示灯持续闪烁时，表示须在压缩机启动的延迟时间内开启压缩机（参数E4）。

- Press the SET button to display the set point temperature. 按下 SET 按钮，显示设定温度。

Press and hold the SET button to enter configuration mode, press SET to step through the parameters. 持续按住 SET 按钮，进入配置模式，按下 SET 按钮，逐步设置参数。

- The UP and DOWN buttons are used to increase or decrease the value of the set point or configuration parameters. UP 和 DOWN 按钮用来增加或减少设定或配置参数的值。
- Pressing and holding the DOWN button for 6 seconds prevents changes from being made. 持续按住 DOWN 按钮 6 秒钟防止更改。
- Pressing the “Mute” button silences the alarm buzzer. 按下“Mute”按钮，静音报警蜂鸣器。
- The display will revert to normal operation after 6 seconds of inactivity. 闲置超过 6 秒钟，显示屏将恢复到正常运作。





6.2 User Interface Operation – Refrigerator 用户界面操作 – 冰箱

Follow the steps below to turn the unit power on or off. 按照以下步骤开启或关闭设备电源。



1. Make sure the unit is plugged in then turn the key to the ON position, the cabinet temperature will be displayed and the unit will begin to refrigerate. 确保设备插头已插入，转动钥匙到 ON 位置，将显示机柜温度，设备将开始制冷。

Turn the key to the OFF position, the display will be blank and refrigeration will stop; the evaporator fan will continue to run. 转动钥匙至 OFF 位置，显示屏将变为空白，制冷将停止；蒸发器风扇将继续运行。

To set temperature (compressor stop temperature) adjustment, follow the steps below. Note: Temperature is pre-set at the factory to 4°C. Changing the factory pre-set is not recommended.
请按照下列步骤调整温度设置值（压缩机停止温度）。注：温度在工厂预先设置为 4°C。不建议改变工厂的预先设定值。

1. Press **Set** button, the set temperature is displayed. 按下 **Set** 按钮，将显示设定的温度。
2. Press the up arrow button  or the down arrow button  to modify and store the displayed temperature. Press the **Set** button to exit the adjustment screen and display the cold room temperature. 按下向上箭头按钮  或向下箭头按钮  修改和存储显示的温度。按下 **Set** 按钮将退出调整显示屏，并显示冷藏室温度。
3. If no more buttons are pressed within 6 seconds, the cabinet temperature will be displayed. 如果 6 秒内没有按下更多的按钮，将显示机柜温度。

Follow the instructions below to display the Ambient Air Temperature of the Control Panel 按照下面的说明，显示控制面板的环境空气温度

1. Press the up arrow button  to show S2 first, and then display the temperature of ambient sensor.按下向上箭头按钮, 首先显示 S2 , 然后显示环境传感器的温度。

Refrigeration LED 制冷指示灯

- During refrigeration, the LED is on. 制冷过程中 , 该指示灯会亮。
- When the cold room temperature is constant, the LED is off.当冷藏室温度恒定后 , 指示灯熄灭。
- During the delay, the LED flashes.延时状态下指示灯将闪烁。

7.0 Service Parts Lists – Refrigerators 服务备件清单 – 冰箱

Below are the Service Parts Lists for refrigerator models PLR 221, PLR 386 and PLR 1006. 以下为 PLR 221 , PLR 386 和 PLR 1006 型号冰箱的服务备件清单。

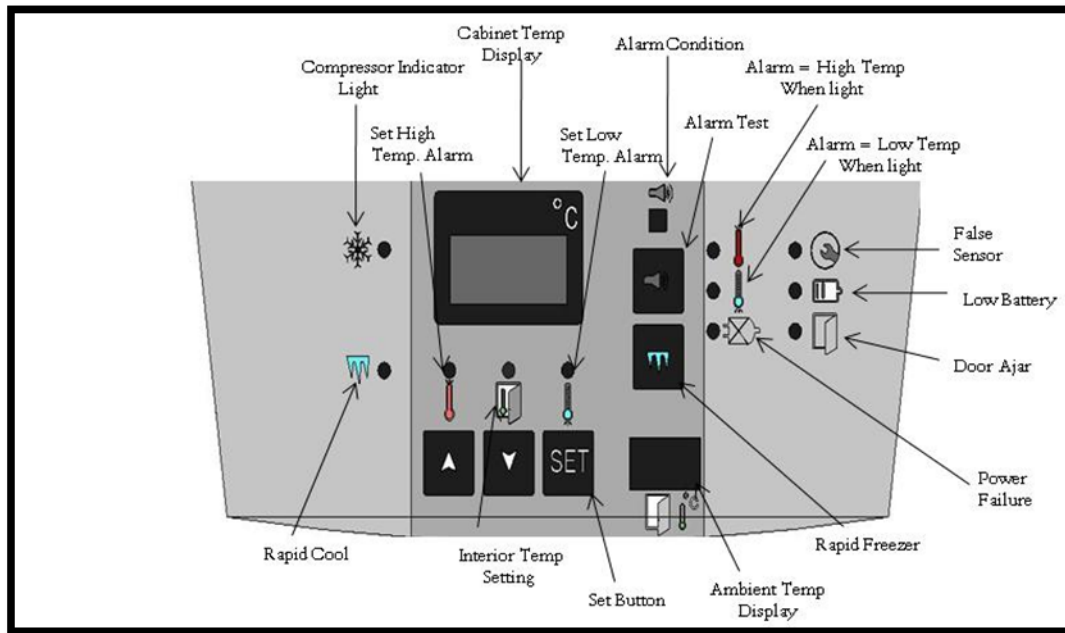
PLR 221 Service Parts List PLR 221服务备件清单		PLR 1006 Service Parts List PLR 1006服务备件清单	
Part # 备件编号	Description 说明	Part #备件编号	Part Description 备件说明
316516G01	Header Panel Weld Assembly 前面板焊接组件	316677G01	Header Panel Assembly 前面板组件
316504H01	Control Board Assembly 控制线路板组件	316504H01	Control Board Assembly 控制线路板组件
306300300	Keps Nuts Keps螺母	316520H01	Control Board Assembly Adapter Plate 控制线路板组件接线板
316524H01	Overlay 外罩	315524H01	Overlay 外罩
316496H01	Compressor relay harness 压缩机继电器线阻	316496H01	Compressor relay harness 压缩机继电器线阻
316671H01	Light Switch 照明开关	316671H01	Light Switch 照明开关
316536H01	Key Switch 钥匙开关	316536H01	Key Switch 钥匙开关
220769	Thermo Name Plate 赛默飞世尔铭牌	220769	Thermo Name Plate 赛默飞世尔铭牌
65921H01	Caps 盖帽	65921H01	Caps 盖帽
316535H01	Light switch extension Harness 照明开关延长线阻	ER3105030182	Compressor Start Relay 压缩机启动继电器
3000000230	Compressor 压缩机	3000000356	Condenser Fan 冷凝器风扇
ER3105030059	Compressor Start Relay 压缩机启动继电器	3000000357	Evaporator Fan 蒸发器风扇

3000000182	Condenser Fan 冷凝器风扇	3000000253	Compressor 压缩机
3000000202	Evaporator Fan 蒸发器风扇	3001000056	Control 控制
3001000018	Control 控制	3406000005	Casters 脚轮
3406000003	Directional Casters 定向脚轮	316808H01	Service Manual 服务手册
3406000015	Casters 脚轮	3406000092	Leveling Legs 调平支腿
3406000089	Leveling Legs 调平支腿	8204000245	Door Gasket 门封条
8204000245	Door Gasket 门封条	316689H01	Door Lock 门锁
316808H01	Service Manual 服务手册	306300300	Keps Nuts Keps 螺母
PLR 386 Service Parts List PLR 386服务备件清单			
Part # 备件编号	Description 说明		
316517G01	Header Panel Assy 前面板组件		
65921H01	Caps 盖帽		
306300300	Keps Nuts Keps 螺母		
3000000256	Compressor 压缩机		
316496H01	Compressor relay harness 压缩机继电器线阻		
PLR 386 Service Parts List PLR 386服务备件清单			
ERP105030300	Compressor Start Relay 压缩机启动继电器		
316504H01	Control Board Assembly 控制线路板组件		
3000000332	Condenser Fan 冷凝器风扇		
316536H01	Key Switch 钥匙开关		
316671H01	Light Switch 照明开关		
315524H01	Overlay 外罩		
306042H01	Plastic bottle 塑料瓶		
3000000AUCPW	Power Board 配电盘		
316657G01	Port Hole Assy 端口组件		
3000000331	Evaporation Fan 蒸发风扇		
3001000110	Control 控制		
3406000005	Casters 脚轮		
3406000092	Leveling Legs 调平支腿		
316808H01	Service Manual 服务手册		

220769	Thermo Name Plate 赛默飞世尔 铭牌		
8200000729	Door Gasket 门封条		

8.0 Application Information for Freezer 冷冻柜的应用信息

The figure below shows the user interface for freezer model PLF 276. 下图显示了 PLF 276 型号 冷冻柜的用户界面。



8.1 User Interface Operation – Freezer 用户界面操作 – 冷冻柜

Follow the steps below to set High Temperature Alarm. 按照以下步骤设置高温报警。

1. Press the Set button once and Set High Temperature icon lights. 按下 Set (设置) 按钮一次, “Set High Temperature” (设置高温) 图标亮起。
2. Press the Press the ▲ button or the ▼ button to set High Temperature Alarm 按下 ▲ 按钮或 ▼ 按钮来设置高温报警 (High Temperature Alarm)。

Complete the steps below to set the Low Temperature Alarm. 完成以下步骤设置低温报警 (Low Temperature Alarm)。

1. Press the Set button three times and the Set Low Temperature icon lights. 按下设置 (Set) 按钮 3 次, 设置低温 (Set Low Temperature) 图标亮起。
2. Press the ▲ button or the ▼ button to set the Low Temperature Alarm. 按下 ▲ 按钮或 ▼ 按钮, 设置低温报警 (Low Temperature Alarm)。

Follow the steps below to set the Interior Temperature. **Note: Temperature is pre-set at the factory to -40oC. Changing the temperature setting is not reccommended.** 按照以下步骤设置内部温度。
注：温度在工厂预设为-40oC。不建议改变温度设定。

1. Press the Set button twice.按下 Set (设置) 按钮 2 次
2. Press the ▲ button or the ▼ button to increase or decrease the Interior Temperature.按下 ▲ 按钮或 ▼ 按钮来提高或降低内部温度 (Interior Temperature)。

Complete the steps below to adjust the Control Temperature Adjustment limits 完成下面的步骤来改变“控制温度调整”的限值

1. Press the Set button once.按下 Set (设置) 按钮一次
 Note: The Control Temperature Confine and the “TEMPERATURE [°C]” window flash together.注：“控制温度限制” (Control Temperature Confine) 和 “温度[°C]” (TEMPERATURE) 窗口同时闪烁。
2. Press ▲ button or ▼ button to increase or decrease the Control Temperature Confine limits.按下 ▲ 按钮或 ▼ 按钮来提高或降低控制温度限值 (Control Temperature Confine)。

Battery backup charge switch location and dry contact location 备用电池充电开关的位置和干式接点位置

1. To charge the battery that is used to back up controller function only, toggle the switch located at the back bottom of the cabinet to the “I” position 如需给用于备份控制器的电池充电，将机柜背面底部的开关切换到“I”位。
2. Contacts are located at the back bottom of the cabinet.接点位于 机柜背面底部。

Note: When setting parameters, the display screen will return to default after 8 seconds with inactivity 注：设置参数时，8 秒闲置后显示屏将返回到默认设置

8.2 Parameter Defaults默认参数

The table below shows the parameter defaults for model number PLF 276 下表显示了 PLF 276 型号产品默认的参数

Parameter 参数	Value 值 (°C)	Parameter 参数	Value 值 (°C)
Inner temperature 内部温度	-40	High alarm temperature 高温报警	-26
Control temperature confine 控制温度限值	1.1	Low alarm temperature 低温报警	-45
Adjust sensor temperature 调整传感器温度	-2.5		

Table 5 Parameter Defaults PLF 276 表 5 PLF 276 默认参数

Note: Compressor works according to interior temperature and to adjust sensor temperature, for example:注：
压缩机根据内部温度来工作和调节传感器温度，例如：

Compressor Turns on at 压缩机启动温度： $-36+1.1=-34.9^{\circ}\text{C}$

Compressor Turns off at 压缩机关闭温度： $-36-1.1=-37.1^{\circ}\text{C}$

8.3 Set Mode of Adjust Sensor Temperature Parameter 调节传感器温度参数的设置模式

Follow the steps below to adjust Sensor Temperature.按照以下步骤来调整传感器温度。

1. Press the Rapid Freeze and Set buttons simultaneously for more that 3 seconds.同时按下快速冻结 (Rapid Freeze) 和设置 (Set) 按钮 3 秒。
2. Next, press the Set button to enter the adjust mode.然后，按下设置 (Set) 按钮，进入调整模式。
Note: Indicator light for Temperature Setting and the adjusting sensor temperature in the temperature window flash.注：温度窗口内的温度设定 (Temperature Setting) 和 调节传感器温度显示灯开始闪烁。
3. To adjust the Sensor Temperature, press the \blacktriangle button or the \blacktriangledown button.要调整传感器温度，按下 \blacktriangle 按钮或 \blacktriangledown 按钮。
4. After reaching the desired temperatur setting, press the Set button.在达到所需之温度设置后，按下设置 (Set) 按钮。

The indicator light for Temperature Setting and the Adjusted Sensor Temperature display in the Temperature [$^{\circ}\text{C}$] window.温度 (Temperature) 窗口内的温度设定 (Temperature Setting) 和 调节传感器温度 (Adjusted Sensor Temperature) 显示灯开始闪烁。

8.4 Alarm Function 报警功能

The table below describes the various alarm types.下表描述了各种报警类型。

Alarm Types 报警类型	Cause 原因	Light 指示灯	Buzzer 蜂鸣器	Remote Alarm Interface 远程报警接口
High temperature 高温	Inner temperature exceeds high alarm temperature 内部温度超过高温报警	Indicator light of "ALARM" and "HIGH TEMPERATURE" flash together."报警"和"高温"指示灯同时闪烁	Pulse noise 脉冲声报警	On 开启
Low temperature 低温	Inner temperature exceeds low alarm temperature 内部温度超过低温报警	Indicator light of "ALARM" and "LOW TEMPERATURE" flash together."报警"和"低温"指示灯同时闪烁	Pulse noise 脉冲声报警	On 开启
Power off 断电	Power off 断电	Indicator light of "ALARM" and "POWER OFF" flash together."报警"	Pulse noise (not less than	On 开启

Alarm Types 报警类型	Cause 原因	Light 指示灯	Buzzer 蜂鸣器	Remote Alarm Interface 远程报警接口
		和“关闭电源”指示灯同时闪烁	18 hours)脉冲声报警 (不少于 18 小时)	
Battery malfunction 电池故障	The volt of battery is lower, or the battery switch is off. 电池电压低, 或电池开关已关闭。	Indicator light of “ALARM” and “BATTERY” flash together, display “E5” in the “TEMPERATURE [°C]” window. “报警”及“电池”指示灯同时闪烁, “温度[°C]”窗口显示“E5”	Pulse noise 脉冲声报警	On 开启
Sensor malfunction 传感器故障	The sensor open-circuit or short-circuit. 传感器开路或短路	Indicator light of “ALARM” and “SENSOR” flash together, display “E0” in the “TEMPERATURE [°C]” window. “报警”和“传感器”指示灯同时闪烁, “温度[°C]”窗口显示“E0”	Pulse noise 脉冲声报警	On 开启

Table 6 Alarm Functions 表 6 报警功能

Note: Press the **Alarm Test** button to turn off the buzzer.

注：按下报警试验 (**Alarm Test**) 按钮可关闭蜂鸣器。

- The battery can supply power to the alarm for 18~24 hours in case of power outage. 停电情况下, 电池可以为报警器供电 18~24 小时。
- The battery completes charging in 24~48 hours. 电池完成充电需 24~48 小时。
- In case of a sensor malfunction, the compressor will operate for 15 minutes and then stop for 5 minutes. 在传感器出现故障的情况下, 压缩机将按照 15 分钟运行+5 分钟停止的方式继续运行。

8.5 Service Parts List – Freezer 服务备件清单 – 冷冻柜

Service Parts List – PLF 276 服务备件清单 PLF276	
Part # 备件编号	Part Description 部件描述
315542H01	Overlay 外罩
3005000047	Display Board 显示板
Service Parts List – PLF 276 服务备件清单 PLF276	
220769	Thermo Name Plate 赛默飞世尔铭牌
65921H01	Caps 盖帽

3006000087	Battery 电池
8204000297	Door and Gasket 门封条
3406000005	Control 控制
3406000005	Casters 脚轮
3406000051	Leveling Legs 调平支腿
3000000267	Condenser Fan 冷凝器风扇
3005000046	Power Board 配电盘
ER3105030115	Compressor Start Relay 压缩机启动继电器
3000000154	Compressor 压缩机
316808H01	Service Manual 服务手册

9.0 Cleaning and Maintenance 清洁和维护

9.1 Maintenance 维护

- Condensers should be cleaned at least every six months. In heavy traffic areas, condensers accumulate dirt more quickly. Failure to keep the condenser clean can result in equipment warm-up or erratic temperatures. 冷凝器至少每 6 个月应清洗一次。在交通繁忙区域，冷凝器藏污纳垢更快。如果不保持清洁冷凝器可导致设备太热或温度不稳定。

9.2 Cleaning 清洁

- Wash the inside of the cabinet with a solution of one liter of warm water and thirty milliliters of baking soda. 用一公升温水加三十毫升的小苏打溶液清洁机柜内部。
- Wash the outside with a mild detergent such as dishwashing liquid. Do not use harsh or abrasive cleaners. 使用洗碗液等温和洗涤剂清洗外部。不要使用刺激性或腐蚀性清洁剂。
- When the condenser is dirty, clean it according to approved process. 当冷凝器变脏，按照核准的程序进行清洁。

10.0 Troubleshooting故障排除

Trouble Shooting故障排除	
Symptom 症状	Possible Solution可能的解决方案
Unit does not operate 设备不工作	<ol style="list-style-type: none"> 1. Make certain the unit is connected to a grounded outlet and verify that the cord is securely plugged in. 确保设备连接到接地电源插座，并确认电源线已牢固地插入。 2. Make sure that the power light is on. 确保电源指示灯亮。 3. Verify that the building circuit breaker or fuse is not blown. 确保楼内的断路器或保险丝未烧断。
Unit runs continuously 设备连续运行	<ol style="list-style-type: none"> 1. Make certain that there is no heavy frost accumulation. If there is frost accumulation, follow the defrost instructions in this manual. 请确保没有厚霜积累。如果有霜冻积累，要按照本手册中的指示除霜。 2. Verify that the condenser is free of dust and lint. If necessary, clean the condenser with a dry brush or Vacuum. 确保冷凝器上无灰尘和绒毛。如有必要，请用干刷或真空吸尘器进行清洁。 3. Make certain the door gasket does not have gaps or leaks. Re-seat or replace the gasket if worn. 确保门封条无间隙或泄漏。如果有磨损重新装入或更换封条。 4. Make sure the optimum running temperature is set correctly and not set too low. 确保正确设置最佳运行温度，确保温度设置不会太低。 5. Verify that the ambient air temperature is not greater than 32°C and that the unit is not placed close to heat sources. 确保环境空气温度不大于 32°C，且设备没有放在靠近热源的位置。 6. Avoid opening the door too frequently. Unit should resume a normal sequence of operation as door openings decrease. 避免开门过于频繁。开门次数减少后设备应恢复为正常的工作顺序。 7. Make certain contents are not placed too closely together. If necessary, rearrange contents so there is space between contents. 确保设备内的材料不是放得太紧密。如有必要，重新安排内部材料的摆放，以便材料之间有足够的空间。 8. Allow ample time to recover from loading warm product. 载入温度高的产品后应留有充足的时间来恢复。
Unit is noisy 设备有	<ol style="list-style-type: none"> 1. Verify that the unit and the floor are level. 确认设备和地板为水平。 2. Fan noise is normal. 风扇噪音是正常现象。 3. Hissing and gurgling noises are caused by the circulation of refrigeration

Trouble Shooting故障排除	
Symptom 症状	Possible Solution可能的解决方案
噪音	fluid and are normal. 嘶嘶声和水流的声音是制冷流体循环造成的，是正常的现象。

Table 7 Trouble Shooting Table 表 7 故障排除表

11.0 Warranty保修

11.1 Thermo Scientific PL6500 Series Refrigerator and Freezer Warranty 赛默飞世尔科技 PL6500 系列冰箱和冷冻柜保修

Note: Warranty information for People's Republic of China Only

注：保修信息仅适用于中华人民共和国

The Warranty Period starts one week from the date your equipment is shipped from our facility. This allows shipping time so the warranty will go into effect at approximately the same time your equipment is delivered. The warranty protection extends to subsequent owners. 保修期限自设备从工厂发货之日起一周后开始，这样就排除了运输时间，因此保修生效的时间将与设备运到的时间大约相同。保修延伸到以后的业主。

During the first twenty-four (24) months, component parts proven to be non-conforming in material or workmanship will be repaired or replaced at Thermo Scientific's expense. Installation, calibration and certification are not covered by this warranty agreement. The Technical Services Department must be contacted for warranty determination and direction prior to performance of any repairs. 在前二十四 (24) 个月，若经赛默飞世尔科技证实零部件的材料或工艺存在缺陷，赛默飞世尔科技将负责免费修复或更换。此保修协议不包括安装、校准和认证。任何修理之前，必须联系技术服务部来进行保修确认和说明。

Please note the following: 请注意以下几点：

- Service performed by any company not authorized by Thermo Scientific will void the terms of the warranty. 不得由未经赛默飞世尔科技授权的任何公司进行维修，否则保修条款将无效。
- Moving the location of the temperature probe will void the warranty. 不得移动温度探头的位置，否则将导致保修失效。
- Expendable items such as light bulbs are excluded from this warranty. 灯泡等消耗品被排除在保修之外。

- Glass inside the doors that is broken due to customer negligence is not covered by this warranty. 由于客户疏忽而导致门内的玻璃破碎也不包括在本保修范围内。

Replacement or repair of component parts or equipment under this warranty shall not extend the warranty to either the equipment or to the component part beyond the original warranty period. The Technical Services Department must give prior approval for return of any component or equipment. 在保修期内更换或维修零部件或设备，并不能使设备或零部件延长至原保修期以外的时间。返回零部件或设备之前须获得技术服务部的批准。

THIS WARRANTY IS APPLICABLE ONLY TO CUSTOMERS LOCATED INSIDE OF MAINLAND CHINA AND IS EXCLUSIVE AND IN LIEU OF ALL OTHER WARRANTIES, WHETHER WRITTEN, ORAL OR IMPLIED. NO WARRANTIES OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE SHALL APPLY. Thermo shall not be liable for any indirect or consequential damages including, without limitation, damages to lost profits or loss of products.

本保证只适用于位于中国大陆的客户，本保修条款是唯一性的，将代替所有其他的保证，包括书面、口头或暗示的保证。不适用于特定用途的适销性或默示保证。赛默飞世尔将不承担任何间接或从属的损害赔偿，包括但不限于利润损失或产品损失的赔偿。

Your local Thermo Sales Office is ready to help with comprehensive site preparation information before your equipment arrives. Printed instruction manuals carefully detail equipment installation, operation and preventive maintenance. 您的设备到达之前，当地的赛默飞世尔销售处将为您提供全面的现场设备信息。说明书详细地描述了设备的安装、操作和预防性维护的信息。

If equipment service is required, please call your Technical Services Department at 400-650-5118 or 800-810-5118. We are ready to answer your questions on equipment warranty, operation, maintenance, service and special applications. 如果设备需要维修，请致电您的技术服务部：400-650-5118 或 800-810-5118。我们随时准备为您回答有关设备保修、操作、维修、服务和特殊应用的问题。

12.0 Service Appendix 服务附录

This appendix provides technical information such as a refrigeration diagrams and wiring schematics for Field Service Personnel. 本附录为现场服务人员提供了诸如制冷图和接线示意图等技术信息。

12.1 Application Information for Refrigerators 冰箱应用信息

The following is a description of how the controller is used. 以下说明了如何使用控制器。

The controller has three temperature probes, three relay outputs, a door switch and a door open alarm buzzer (independent of the general alarm buzzer). 控制器有三个温度探头，三个继电器输出，一个门开关和一个开门报警蜂鸣器（独立于一般报警蜂鸣器）。

- For refrigerator models only one probe and one relay will be used however the unused inputs and outputs must be present or configured such that they do not interfere with the normal operation. Moving probe location voids warranty or any performance claim. 对于冰箱型号，将只使用一个探头和一个继电器，然而，未使用的输入和输出端子必须备好或妥善安置，并使其不会干扰正常的运作。移动探头位置将导致保修或任何性能索赔无效。
- The control probe (cold-room sensor in the manufacturer's manual), port #6, will be installed in the cabinet interior to control the cycling of the compressor and maintain set point temperature. 控制探头（制造商手册中的冷冻室传感器），即端口 #6，将被安装在机柜内部，以控制压缩机的循环并维持设定温度。
- The compressor relay, port number 5, will be installed in the compressor circuit. 压缩机继电器，即端口号 5，将安装在压缩机电路内。
- The 12V AC power will be supplied into port #9 of the controller; a key switch is installed between the transformer and the controller to allow the controller to be completely disabled. 控制器的 9 号端口将接入 12V 交流电源，变压器和控制器之间将设有钥匙开关，使控制器能够完全禁用。

12.2 Input and Output Configuration - Refrigerators 输入和输出配置 - 冰箱

All other inputs and outputs are configured as follows. 所有其他的输入和输出配置如下。

Input and Output Configuration - Refrigerators 输入和输出配置 - 冰箱		
Port # 端口号	Description 说明	Configuration for Model Numbers PLR 221, PLR 386, PLR 1006, 型号 PLR 221, PLR 386, PLR 1006 的配置
1	Door switch input 门开关输入	Wires shorted together, insulated and bundled behind controller 电源线接头连接，绝缘，并绑在控制器后面
2	Door alarm	Connected to the buzzer which is mounted on the header

	buzzer 门报警蜂鸣器	panel 连接到安装于前面板上的蜂鸣器
Input and Output Configuration - Refrigerators 输入和输出配置 - 冰箱		
Port # 端口号	Description 说明	Configuration for Model Numbers PLR 221, PLR 386, PLR 1006, 型号 PLR 221, PLR 386, PLR 1006 的配置
3	Evaporator fan relay output 蒸发器风扇继电器输出	Connectors insulated and bundled behind controller. Fan relay is NOT installed 安装有接头，并绑在控制器后面。未安装风扇继电器
4	Defrost heater relay output 除霜加热器继电器输出	Connectors insulated and bundled behind controller. Defrost relay is not installed 安装有接头，并绑在控制器后面。未安装除霜继电器
5	Compressor relay output 压缩机继电器输出	Connected to compressor relay which is mounted on the header panel 连接到安装于前面板上的压缩机继电器
6	Control probe input 控制探头输入	Connected and installed in the interior of the cabinet 连接并安装于机柜内部
7	Evaporator probe input 蒸发器探头输入	Connected and bundled behind controller 连接并绑在连接器的背后
8	Condenser probe input 冷凝器探头输入	Connected and bundled behind controller 连接并绑在连接器的背后
9	12Vac power input 12Vac 电源输入	Connected to the transformer that is mounted on the header panel, A key switch is installed between this port and the transformer 连接到安装于前面板上的变压器。此端口和变压器之间安装有钥匙开关。

Table 8 Input and Output Configurations 表 8 输入和输出配置

12.3 Application Parameters - Refrigerators 应用程序参数 - 冰箱

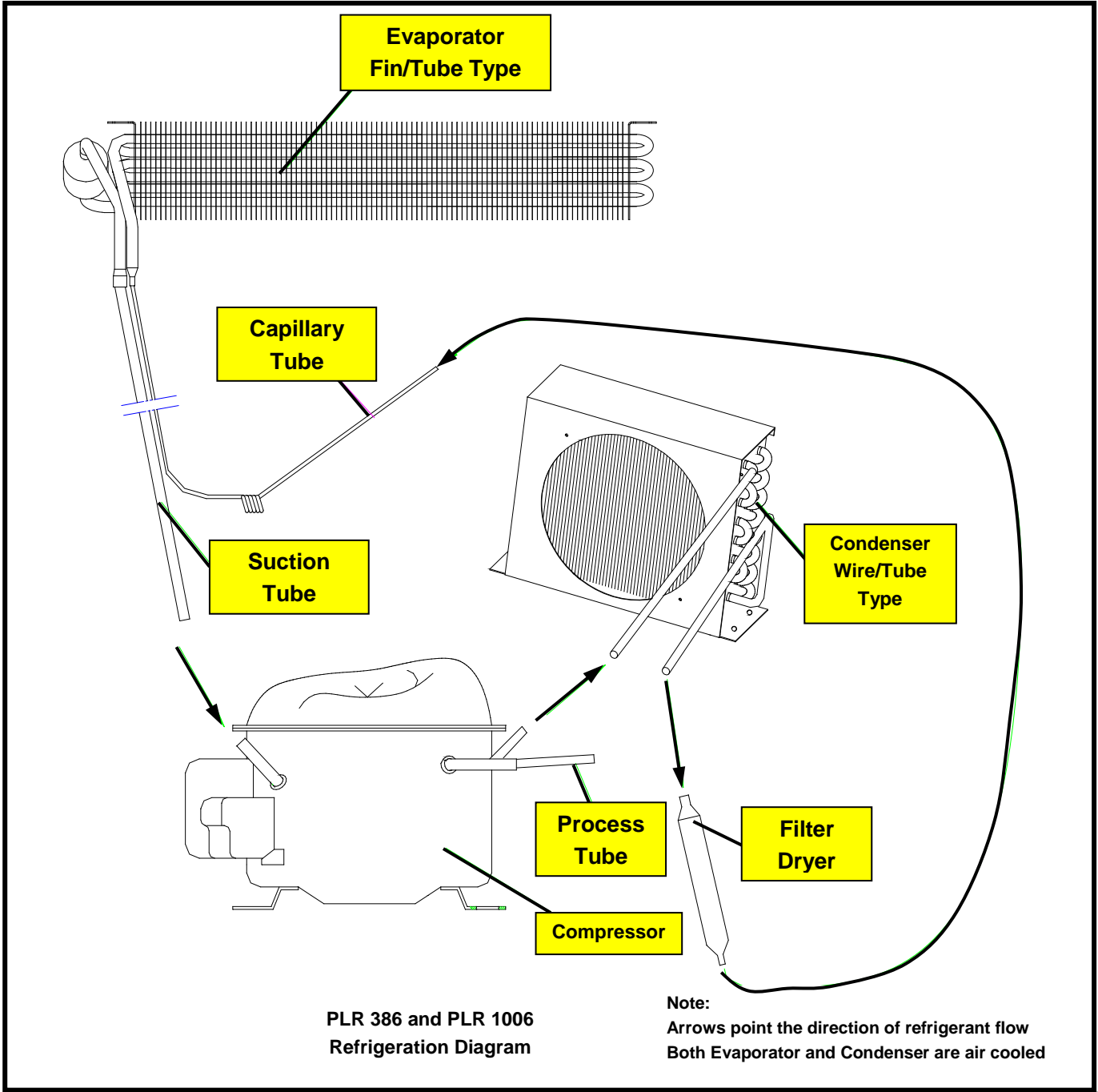
The table below details the application parameters for refrigerators. 下表详细介绍了冰箱的应用参数。

Parameter 参数	Function 功能	Value 值	Parameter 参数	Function 功能	Value 值
E1	Lower set point limit 下限值	00	F5	For Service Personnel Only 只可由服务人员操作	02
E2	Higher set point limit 上限值	10	H1	For Service Personnel Only 只可由服务人员操作	01
E3	Temperature hysteresis 温度迟滞	02	H2	For Service Personnel Only 只可由服务人员操作	00
E4	Compressor. start delay time 压缩机的启动延迟时间	02	H3	For Service Personnel Only 只可由服务人员操作	00
E5	Offset on cabinet temperature 机柜温度的补偿	00	C2	High temperature alarm 高温报警	07
E6	Offset on evaporator temperature 蒸发器温度的补偿	00	C3	Low temperature alarm 低温报警	01
F0	For Service Personnel Only 只可由服务人员操作	00	C4	For Service Personnel Only 只可由服务人员操作	10
F1	For Service Personnel Only 只可由服务人员操作	20	C5	For Service Personnel Only 只可由服务人员操作	80
F2	For Service Personnel Only 只可由服务人员操作	00	C6	For Service Personnel Only 只可由服务人员操作	05
F3	For Service Personnel Only 只可由服务人员操作	08	C7	For Service Personnel Only 只可由服务人员操作	05
F4	For Service Personnel Only 只可由服务人员操作	00			

Table 9 Application Parameters 表 9 应用参数

13.0 Refrigeration Diagrams 制冷图原理图

13.1 Refrigeration Diagram for PLR 386 and PLR 1006 型号PLR 386 和PLR 1006 的制冷图原理图



Evaporator 蒸发器

Fin/tube type 翅片式/管式

Capillary tube 毛细管

Suction tube 回气管

Condenser 冷凝器

wire/tube type 线式/管式

Process tube 工艺管

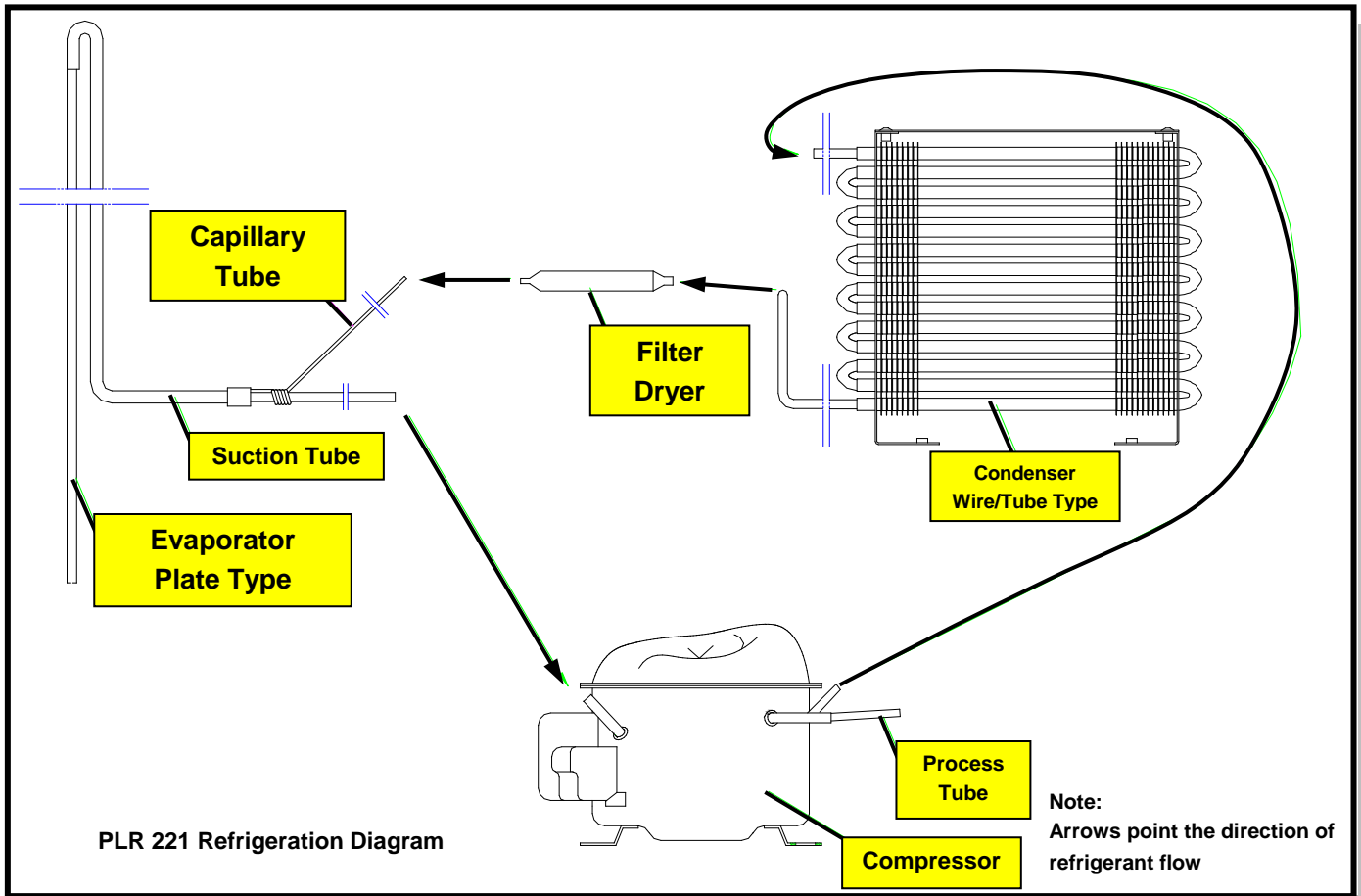
Filter dryer 过滤干燥机

Compressor 压缩机

Note: arrows point the direction of refrigerant flow.注:箭头指示制冷剂的流动方向。

Both evaporator and condenser are air cooled蒸发器和冷凝器都采用气冷方式。

13.2 Refrigeration Diagram for PLR 221 型号PLR 221 的制冷图原理图



Capillary tube 毛细管

Suction line 回气管

Evaporator 蒸发器

Plate Type 板式

Condenser 冷凝器

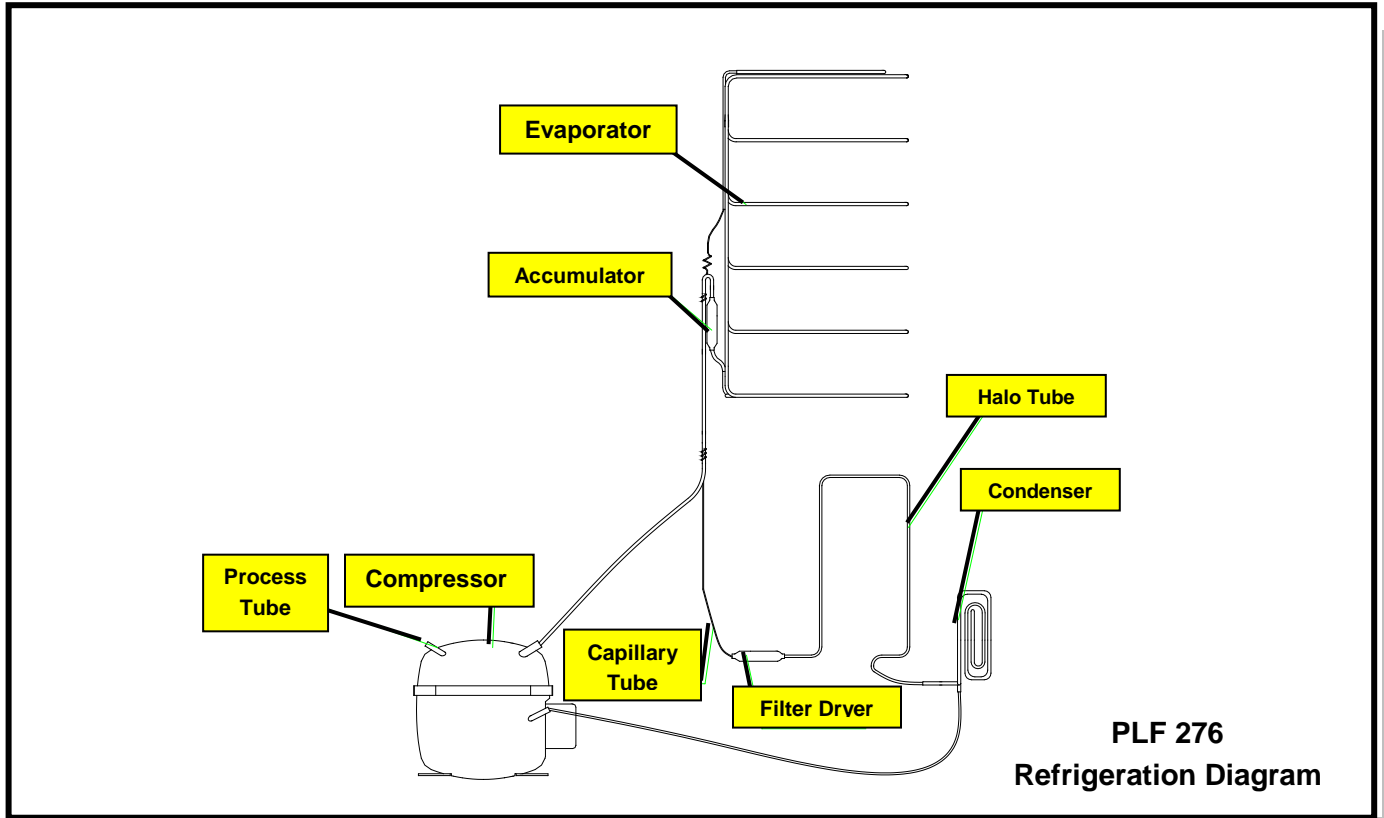
Filter dryer 过滤干燥机

Process tube 工艺管

Compressor 压缩机

Note: arrows point the direction of refrigerant flow.注:箭头指示制冷剂的流动方向。

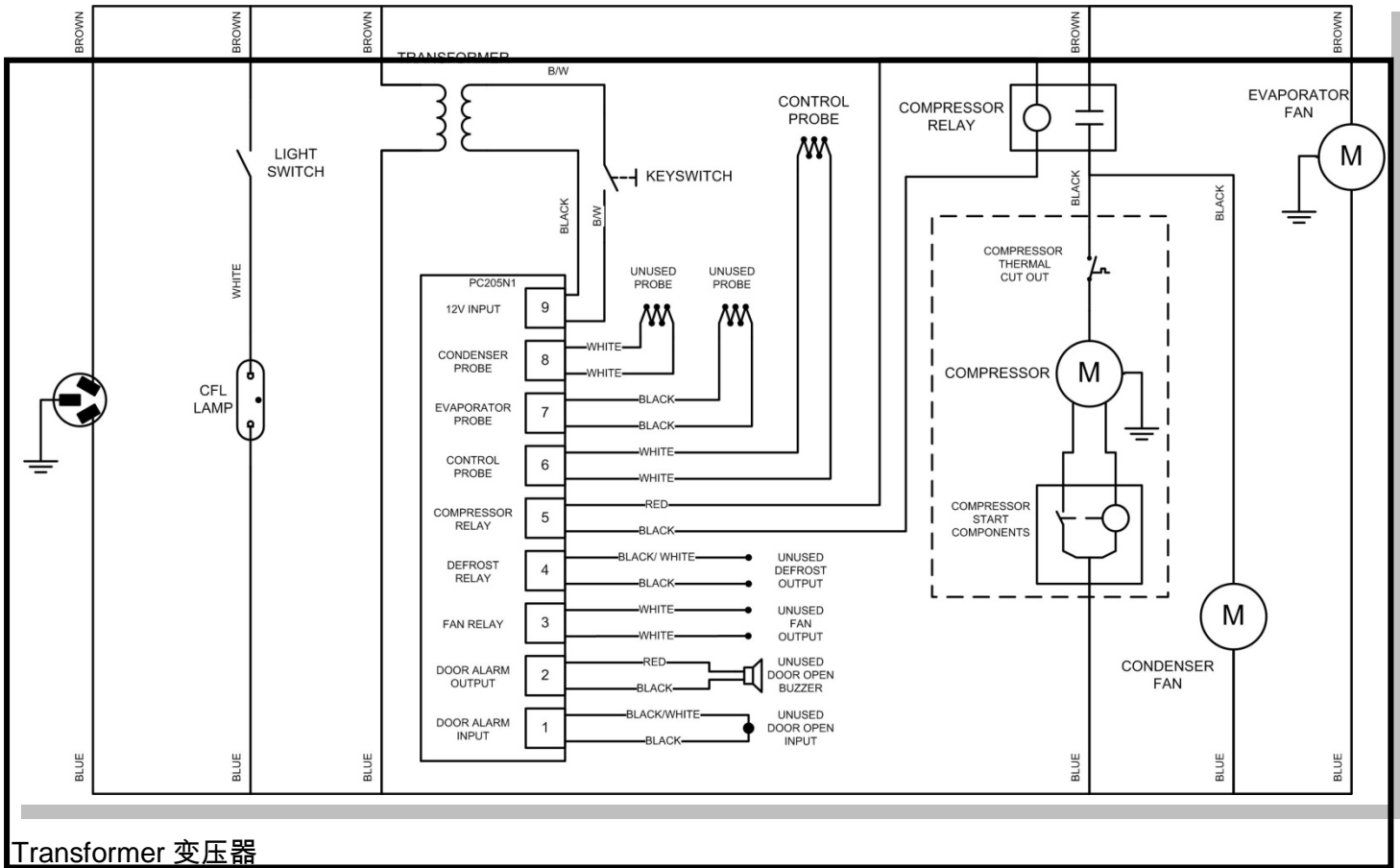
13.3 Refrigeration Diagram Model PLF 276 型号PLF 276 的制冷图原理图



- Evaporator 蒸发器
- Accumulator 集液器
- Halo Tube 防露管
- Condenser 冷凝器
- Filter dryer 过滤干燥机
- Process tube 工艺管
- Compressor 压缩机
- Capillary tube 毛细管

14.0 Wiring Schematics 接线示意图

14.1 Wiring Diagram for Model PLR 221. 型号PLR 221 的接线示意图



Transformer 变压器

Evaporator fan 蒸发器风扇

Compressor relay 压缩机继电器

Control probe 控制探头

Key switch 钥匙开关

Door alarm 门报警

Light switch 灯开关

Compressor 压缩机

Condenser fan 冷凝器风扇

Compressor thermal cut out 压缩机热断路器

12V input 12V 电源输入

Condenser probe 冷凝器探头

Evaporator probe 蒸发器探头

Defrost relay 除霜继电器

Fan relay 风扇继电器

Door alarm output 门报警输出

Door alarm input 门报警输入

Compressor start components 压缩机启动组件

Unused probe 闲置探头

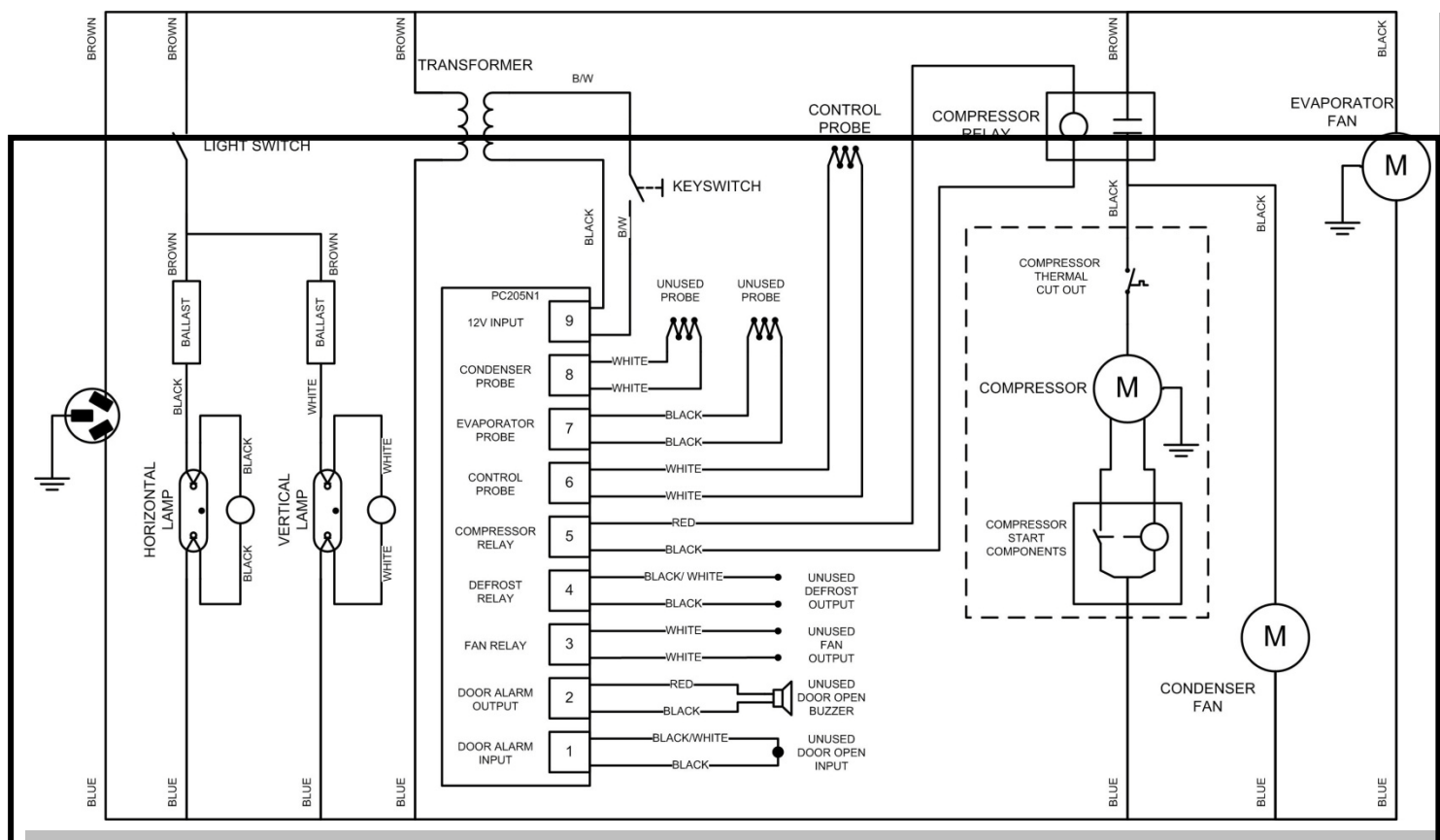
Unused defrost output 闲置除霜输出

Unused fan output 闲置风扇输出

Unused door open buzzer 闲置开门蜂鸣器

Unused door open input 闲置开门输入

14.2 Wiring Diagram for Model PLR 386 型号PLR386 的接线示意图



Transformer 变压器

Evaporator fan 蒸发器风扇

Compressor relay 压缩机继电器

Control probe 控制探头

Key switch 钥匙开关

Door alarm 门报警

Light switch 灯开关

Compressor 压缩机

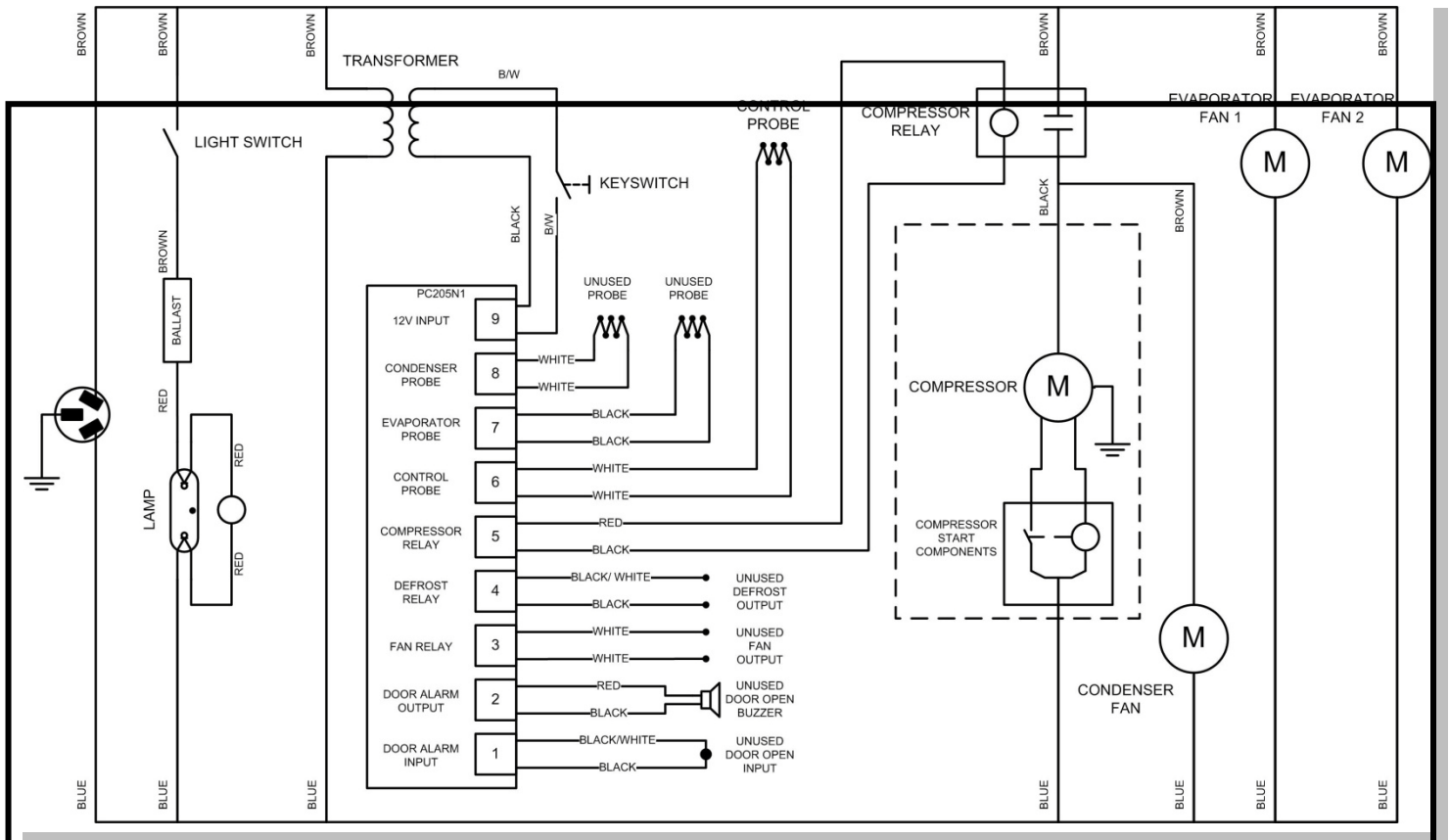
Condenser fan 冷凝器风扇

Compressor thermal cut out 压缩机热断路器

12V input 12V 电源输入

Condenser probe 冷凝器探头
Evaporator probe 蒸发器探头
Defrost relay 除霜继电器
Fan relay 风扇继电器
Door alarm output 门报警输出
Door alarm input 门报警输入
Compressor start components 压缩机启动组件
Unused probe 闲置探头
Unused defrost output 闲置除霜输出
Unused fan output 闲置风扇输出
Unused door open buzzer 闲置开门蜂鸣器
Unused door open input 闲置开门输入
Horizontal lamp 水平灯
Ballast 镇流器
Vertical lamp 垂直灯

14.3 Wiring diagram for model PLR 1006 型号PLR 1006 的接线示意图



Transformer 变压器

Evaporator fan 蒸发器风扇

Compressor relay 压缩机继电器

Control probe 控制探头

Key switch 钥匙开关

Door alarm 门报警

Light switch 灯开关

Compressor 压缩机

Condenser fan 冷凝器风扇

Compressor thermal cut out 压缩机热断路器

12V input 12V 电源输入

Condenser probe 冷凝器探头

Evaporator probe 蒸发器探头

Defrost relay 除霜继电器

Fan relay 风扇继电器

Door alarm output 门报警输出

Door alarm input 门报警输入

Compressor start components 压缩机启动组件

Unused probe 闲置探头

Unused defrost output 闲置除霜输出

Unused fan output 闲置风扇输出

Unused door open buzzer 闲置开门蜂鸣器

Unused door open input 闲置开门输入

15.0 Important Unit Information设备的重要信息

For your future reference when contacting the factory, please have the following information readily available:

为了便于您将来与厂家联系，请准备好以下信息以便随时可用：

Model Number产品型号:

Serial Number序列号:

Date Purchased购买日期:

The above information can be found on the data plate attached to the equipment. If available, please provide the date purchased, the source of purchase (Thermo or specific agent/rep organization), and purchase order number.

上述信息显示于设备的铭牌。如果可能，请提供购买日期、购买来源（赛默飞世尔科技或特定代理/代表机构）和采购订单编号。

16.0 Contact Information联系信息

For users in China, please dial toll-free number

在中国的客户请拨打全国免费服务电话

800-810-5118

400-650-5118

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