嵌入式机柜空调操作及使用说明书

DTI 8000ES 系列

Operating and assembly instruction

For built-in cooling units

DTI 8000ES

Pfannenberg
ELECTRO-TECHNOLOGY FOR INDUSTRY

⚠	请在安装机组前完整仔细阅读此手册。本手册构成标准供货不可分割的一部分，必须保存至机组报废为止

1 手册提示

此手册为百能堡电气科技有限公司（以下简称百能堡）提供的门装或侧装螺栓固定，嵌入式机柜空调系列的安装运行指南。

提示：

每台机柜空调的技术规格及安装、连接和操作相关信息也可在随机附带的单独文件中查询。本手册中，安全提示和其他信息以下形式出现：

危险！

如果没有严格遵守所述的措施，将有生命危险或造成健康危害。

危险！

如果没有严格遵守所述的措施，将可能因电击造成生命或健康危害。

注意：

如果没有严格遵守所述的措施，将有可能造成生命财物损失。

提示：

提示包含关于所述措施或指导的额外信息。

2 搬运

2.1 运输

- 只能通过壳体或吊环来提升机柜空调（M8吊环不在供货范围）。
- 运输时保持机柜空调处于最终使用时相同的摆放状态。
- 如果整体机柜需要运输，请在运输前将机柜空调拆下并单独包装。

不按照这些指导操作，将导致保障条款失效。

2.2 储运

- 储存环境不应超过70℃。
- 储存时使机组处于最终使用时的摆放状态。

不按照这些指导操作，将导致保障条款失效。

2.3 开箱

- 开箱过程中应当仔细查看机柜空调，看是否存在因运输造成的破坏，尤其注意是否有部件松动、凹坑、擦伤和漏油等。任何损坏应当立即通知承运商（根据“损坏规则”指示），并且适用“百能堡产品售后服务声明“的最新版本。
- 在处理包装材料前，务必确认里面没有任何附加部件。

危险！

机组的钣金件边缘有可能残留金属毛刺，在维护或安装时务必带保护手套。

要求保障时，需要提供故障的确切信息（如有可能请提供照片），机种型号和序列号。

3 供货范围

供货范围包括：

- 机柜空调
- 附件包（包括紧固件，插头式电气连接器等）
- 特殊的附件（如适用）
- 技术规格书
- 使用说明书

4 一般信息

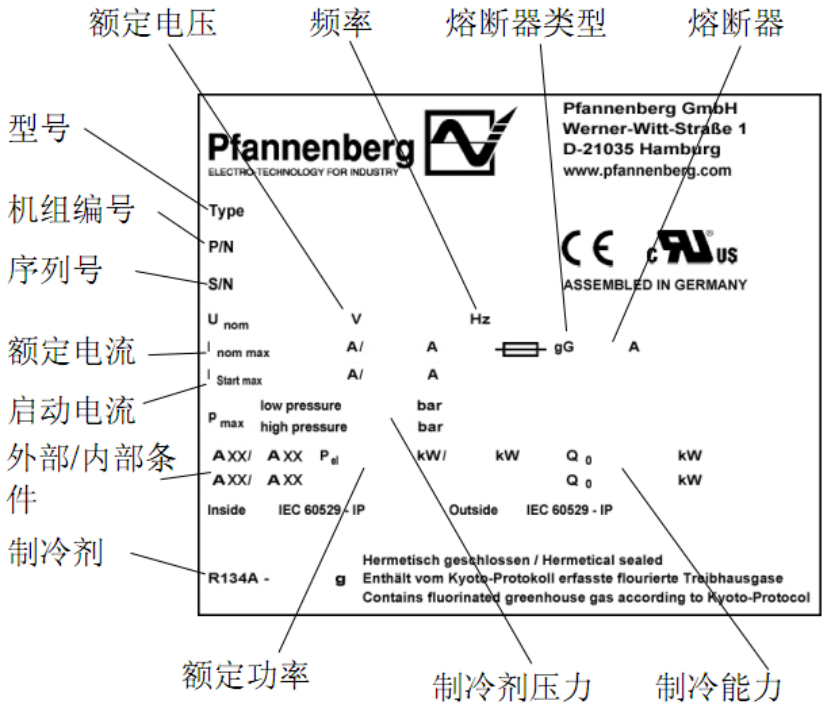
- 百能堡可以妥善处理旧设备,但客户需承担运输费用.
- 百能堡生产的机柜空调不含以下物质:

- 多氯三联苯
- 石棉
- 甲醛
- 镉
- 液态有害物质

- 对每台机柜空调进行检查以确保它是完全依照9.ProdSV的规定（德国事故预防法规）。
- 交货前百能堡已对每台空调在工厂进行电气安全检测。

5 铭牌

安装和维护，请注意机器背部铭牌标注的详细技术信息。



6 安全

- 由百能堡生产的机柜空调是专为机柜散热（IP54）而设计的。
- 该设备只适合在固定地点平稳运行。

- 该机柜空调只可用于所附说明书规定的环境条件。该机柜空调在很大程度上免维护（见章节13）
- 任何其他使用范围被视为非授权使用，并将不作保修承诺。电气设备应定期检查。任何异常如连接松脱或烧焦的电缆必须被立即修复。
- 只有专业技术人员才能对热交换系统和电气部件进行操作。
- 请务必遵守相应的安全和环保法规。

危险！

任何清洁或维护操作之前，需切断机柜空调电源。
只有原厂备件可以使用。

7 功能

7.1 配置与功能

设备配置：

1） 高品质关键零部件
2） 压缩机保护装置
3） 智能控制系统
4） 冷凝水蒸发器 （可选）
5） 2~400V交流供电（可选）

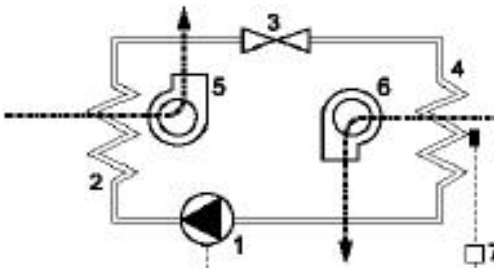
设备功能:

1） +15℃~+55℃外部环境温度
2） 内部控制温度 +25℃~+45℃
3） 上电自检和运行中实时自检
4） 冷凝水蒸发器（可选）
5） IP54/IP34防护
6） 2~ 400V交流供电（可选）

注意：

机柜空调的具体功能见技术规格书（见章节8）。

7.2 工作原理



1 压缩机
2 换热器（冷凝器）
3 截流装置
4 换热器（蒸发器）
5 风机，外循环
6 风机，内循环
7 带温度传感器的电子控制系统

压缩机（1）将制冷剂压缩到高压。在这个过程中温度升高。冷凝器（2）中，热量散失到周围环境空气中，制冷剂变成液体。冷凝器风扇（5）吸入并使空气通过冷凝器，然后排放出去。在截流装置（3）中，冷却液的压力下降。在蒸发器（4）中，冷却剂吸收机柜内空气中的热量并蒸发。因此，来自机柜中的空气被冷却下来；同时机柜内的空气被除湿。蒸发器风（6）吸出机柜内的空气并迫使其通过蒸发器，冷却空气吹回到机柜内。机柜空调是由电子系统控制的。温度传感器（7）记录了机柜内的空气温度。所使用制冷剂不损害臭氧层，而且不可燃。

7.3 冷凝物

在蒸发器上发生的冷却过程中，空气中的水分被凝聚成冷凝水。为了避免对电控柜及本制冷系统发生任何损害，必须排出冷凝水。

冷凝水排放方式如下：

• 带冷凝水蒸发器（可选）的制冷设备在正常情况下，可以蒸发掉水分。但为防止蒸发器故障后产生的冷凝水溢流，请连接冷凝水管路,然后再通过水管排出。始终确保冷凝水正确地排出。在特定情况下有可能会发生凝结水过量，例如，机柜不密封或机柜内部温度经常低于露点温度。

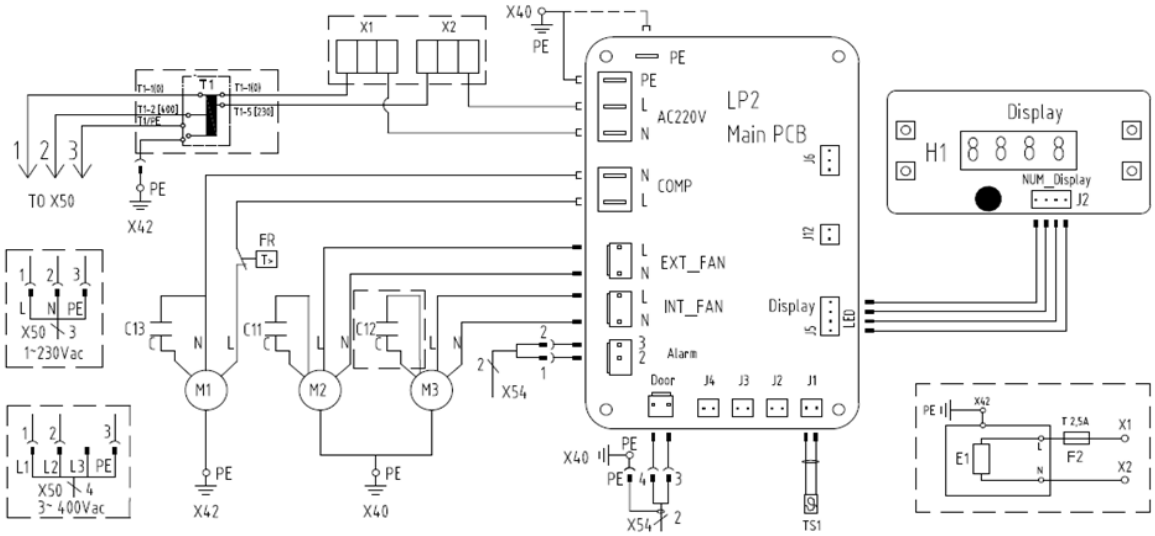
注意：

在正常运行过程中发生冷凝水过量,请检查机柜的密封。

我们建议安装一个门接触开关，当机柜门被打开时,机柜空调将自动关闭,以防止过度冷凝水。

8 技术规格书

8.1 电气原理图



C11	电容- 冷凝器风扇	M1	压缩机
C12	电容- 蒸发器风扇	M2	冷凝器风扇
C13	电容- 压缩机	M3	蒸发器风扇
E1	冷凝水蒸发器	T1	变压器
F2	熔断器	TS1	温度探头
FR	热保护器	X1/X2	短接端子
H1	指示器	X40/X42	接地
LP2	线路板	X50	电源连接
		X54	故障信号触点+门禁
			可选

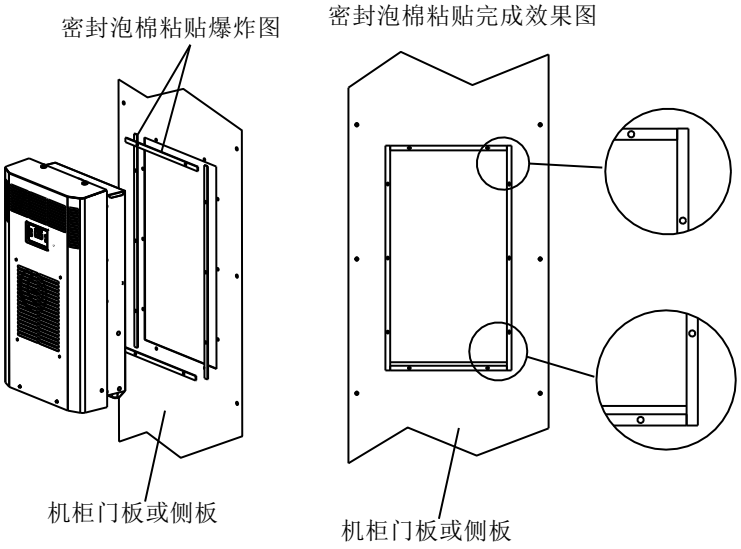
8.2 备品备件

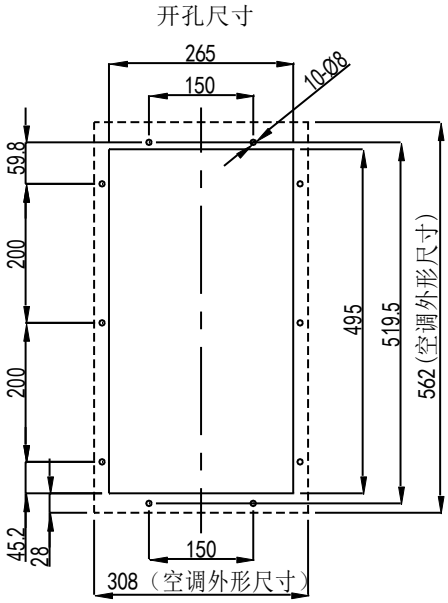
请使用百能堡物料号来采购备用件

备用件	8031ES	8041ES
内风机	18861100017	18861100018
外风机	18861100017	18861100019
压缩机	18861200003	18861200007
内风机电容	18864000004	18864000006
外风机电容	18864000004	18864000001
压缩机电容	18864000009	18864000013
过滤干燥器	18865000002	18865000002
控制器	物料号位于控制器上	

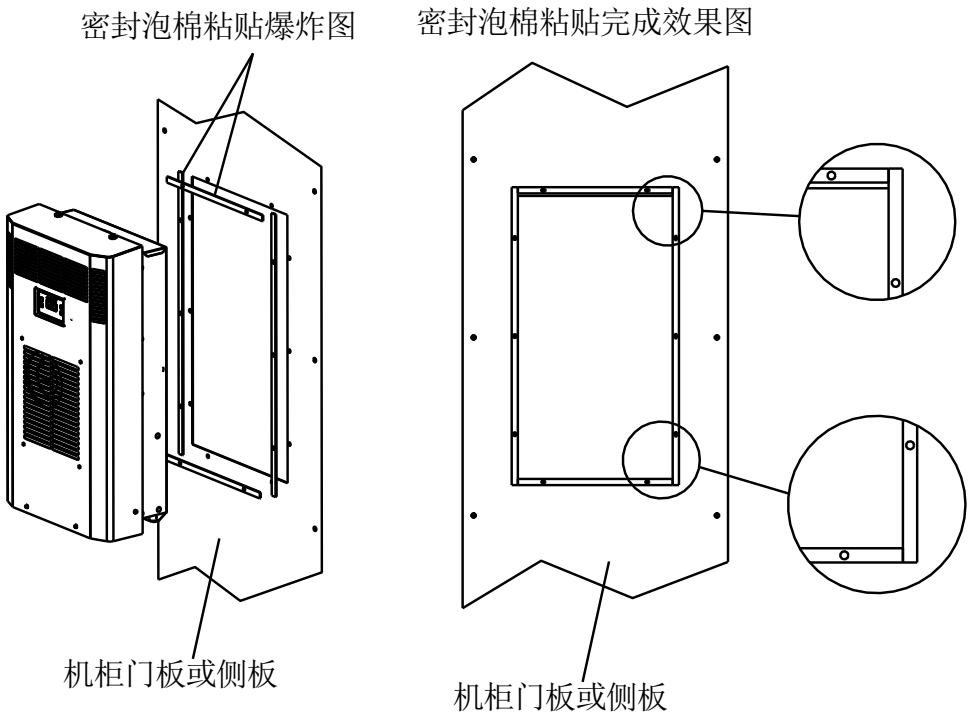
8.3 安装开孔

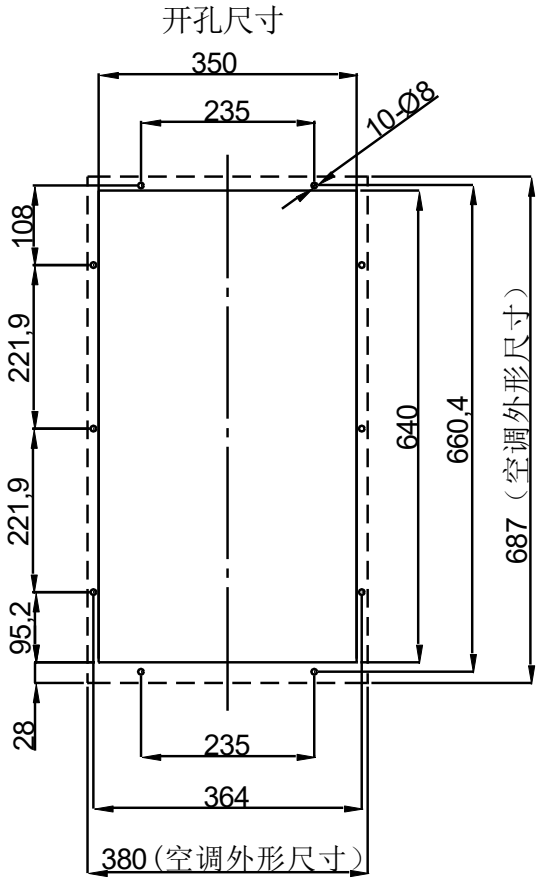
DTI 8031ES


密封泡棉粘贴爆炸图
密封泡棉粘贴完成效果图
机柜门板或侧板
机柜门板或侧板

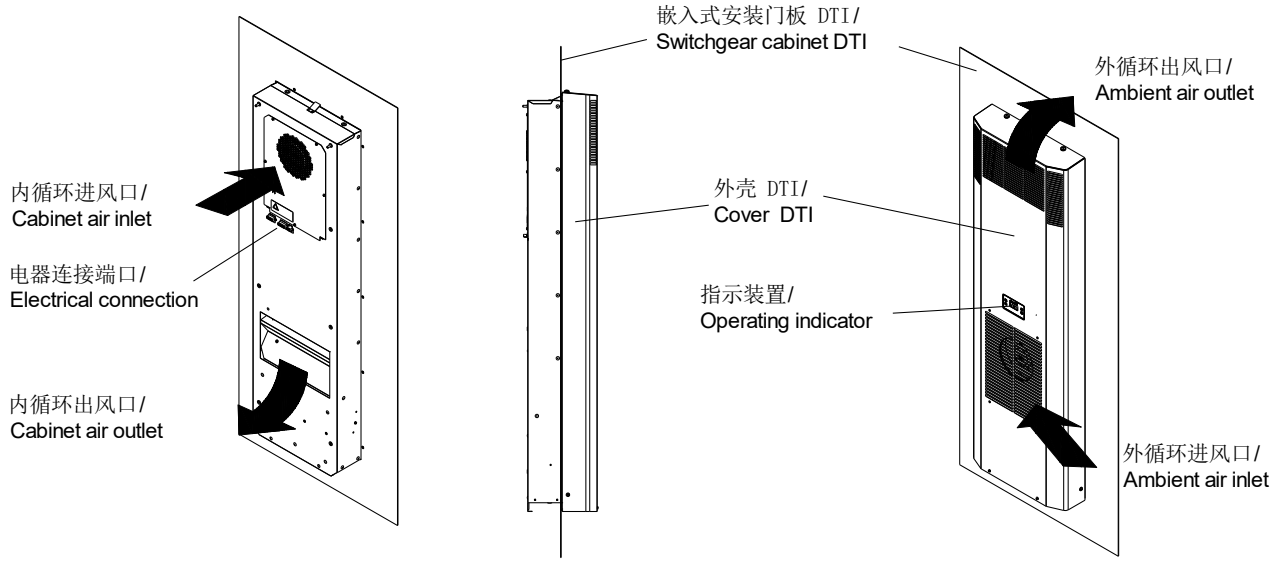

开孔尺寸
265
150
10-Ø8
59.8
200
200
45.2
28
495
519.5
562（空调外形尺寸）
150
308（空调外形尺寸）

DTI 8041ES


密封泡棉粘贴爆炸图
密封泡棉粘贴完成效果图
机柜门板或侧板
机柜门板或侧板


开孔尺寸
350
235
10-Ø8
108
221,9
221,9
95,2
28
640
660,4
687（空调外形尺寸）
235
364
380（空调外形尺寸）

8.4 气流原理



注意：

在安装此设备前应当完整仔细地阅读此说明。此说明是设备不可分割的一部分，在设备报废请前务必保留。

安装前，请确认设备间以及设备至墙体的距离至少有 200 毫米的间距；在柜子内部的进风口以及出风口没有干涉以及障碍。

8.5 技术参数

性能		DTI 8031ES
制冷能力 A35/A35 * **	Q_0	500 / 530 W
制冷能力 A50/A35 * **	Q_0	285 / 330 W
冷媒*		R 134a
冷媒量*		200 g
温控（工厂设置）		+35° C (+95° F)
内部温度报警指示（工厂设置）		> +50° C (+122° F)
环境温度		+15° C (+59° F) . . . +55° C (+131° F)
内部温度		+25° C (+77° F) . . . +45° C (+113° F)
外循环气流量 °)		280 m³/h
内循环气流量°)		280 m³/h
冷凝水排放		冷凝水管
噪音 (1m)		≤ 63 dB(A)
电气数据		
电源频率		50/60 Hz
工作范围		DIN IEC 60038
额定电压		230 V
电力消耗 *(A35/A35) :	P_{el}	260 / 290 W
电流 *	$I_{nom\ max}$	1.5 / 1.7 A
启动电流 *	$I_{Start\ max}$	3.5 / 3.5 A
尺寸		
高		562 mm
宽		310 mm
深，带壳体（标准）		212 mm
安装深度 DTI		85 mm
重量		15kg
安装状态		垂直
结构		标准：钢板 可选：不锈钢
防腐处理		标准：镀锌，静电喷粉 (200° C) 可选：不锈钢，铝
防护等级		IP 54 对机柜 (EN 60529)，正确安装操作为前提 IP 34 对环境 (EN 60529)，正确安装操作为前提,需安装前外壳

性能		DTI 8041ES	
制冷能力 A35/A35 * **	Q_0	800 / 900 W	
制冷能力 A50/A35 * **	Q_0	550 / 650 W	
冷媒 *		R 134a	
冷媒量*		300 g	
温控（工厂设置）		+35° C (+95° F)	
内部温度报警指示（工厂设置）		> +50° C (+122° F)	
环境温度		+15° C (+59° F) . . . +55° C (+131° F)	
内部温度		+25° C (+77° F) . . . +45° C (+113° F)	
外循环气流量 °)		620 m³/h	
内循环气流量 °)		535 m³/h	
冷凝水排放		冷凝水管.(可选: 冷凝水蒸发器)	
噪音 (1m)		≤ 65 dB(A)	
电气数据			
电源频率		50/60 Hz	
工作范围		DIN IEC 60038	
额定电压		230 V	400 V
电力消耗 *(A35/A35) :	P_{el}	386 / 420 W	380 / 410 W
电流 *	$I_{nom\ max}$	3.0 / 3.5 A	1.8 / 2.5 A
启动电流 *	$I_{Start\ max}$	6.0 / 6.0 A	6.0 / 6.0 A
冷凝水蒸发器 (CM)	P_{el}	可选: 30-110W (A35/A35 ca. 70W)	
尺寸			
高*宽*深，带壳体（标准）		687*380*198 mm	
安装深度 DTI		85 mm	
重量		DTI 8041ES 230V	DTI 8041ES 400V
		20 kg	28 kg
冷凝水蒸发器重量		可选: 0.5kg	
安装状态		垂直	
结构		标准：钢板 可选：不锈钢	
防腐处理		标准:镀锌，静电喷粉 (200° C) 可选: 不锈钢，铝	
防护等级		IP 54 对机柜 (EN 60529)，正确安装操作为前提 IP 34 对环境 (EN 60529)，正确安装操作为前提,需安装前外壳	

*　　铭牌信息

**　无过滤网（可选）情况下制冷量

°）　自由送风

°°）空调电器接口处另需电器端子空间40mm

9　安装

9.1 概述

- 正确选择机柜空调在机柜上的安装位置,保证良好的通风。
- 机柜空调之间或是机柜空调和墙壁的距离必须保证至少200毫米。
- 在机柜内部，空调的电器连接端子处需预留至少40mm空间.
- 在机柜内部，电气元件不得阻碍空气循环。
- 机柜空调在安装时，机柜空调的电源必须断开！
- 安装现场必须受到保护，免遭污染。

注意：

如果机柜空调是装在机柜门上，必须检查门的铰链能够支持机柜空调的重量或当门被打开机柜时,不会翻倒。

注意：

金属碎屑可能损坏机柜。

如果在安装现场开安装孔，确保使用保护罩,以免切屑进入机柜，损坏电气元件。

提示

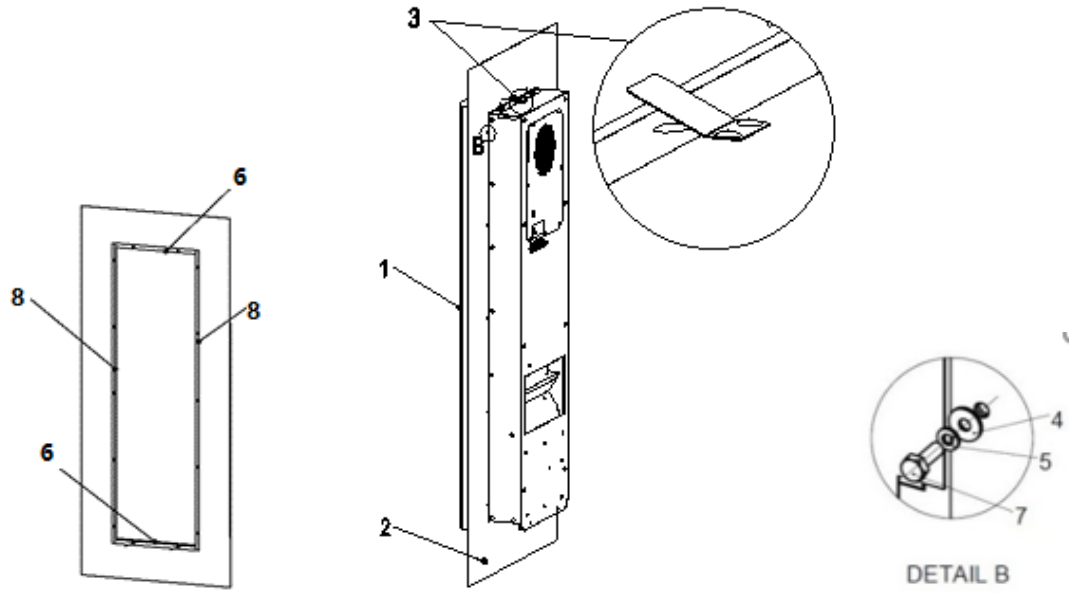
为方便机柜空调安装，M8的吊环可以旋入机柜空调顶部固定，方便吊装，简单“一人安装”就能实现。

9.2 安装工作

内嵌式空调安装

机柜安装面要开好空气通风口和螺栓安装固定孔，尺寸根据随机组所附图纸。所附图纸同时说明了电气连接接口位置和通风口位置。

1) 如机柜未预留机柜空调的开口，在机柜上切出开口（尺寸见随机组所附图纸），然后去除剪边毛刺。
2) 取出附件包内密封条（标号6,8），将密封条上的孔与门板圆孔同心后再按压在门板（如下图）。
3) 将空调（标号1）插入门板（标号2）开孔中，推到空调接触门板密封条（6,8）为止并压紧至听到顶部卡扣（标号3）闭合声。
4) 在机柜内侧，取出附件包内的平垫片、弹垫及螺栓（标号4,5,7）将空调锁紧。
5) 将出水管通过机柜空调底板，使冷凝水能自由流下，并将水管切至所需长度。



1 机柜空调组	5 弹簧垫片
2 机柜侧板或机柜门	6 密封条
3 安装卡扣	7 螺栓
4 平垫片	8 密封条

6）如果机柜空调在安装时拆下外壳顶部的M8螺母，需将其安装好。

7) 将电线按照接线图（见机柜空调背部）连接到连接头（附件包中），并连接到机柜空调。

- 导线尺寸：1.0 – 2.5平方毫米或AWG18 - AWG14

（在电缆的大小选择，应参照相关法规要求！）

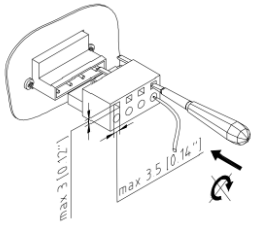
8) 将机柜空调插上电源（见9.3）

不同机器可能安装方式不同，请参考随机资料。

9.3 电气连接

注意：

- 机柜空调应当经由断路器连接到电源（请选择合适的断路器），断开断路装置时,其触点间隙应不少于3毫米。
- 电源线上不可以串接温度传感器。
- 电源线上需要串接铭牌注明的保险丝,作为线路保护。
- 电源连接和维修，如果适用，只能由授权的经过培训的电工来进行。



电源连接：

电源电压和频率必须符合铭牌标示值。

注意：

如果电压过高可能会导致器件损坏。

一般空调的额定电压230V或400V。

门触点：

为了避免任何破坏性的影响，建议使用一根带护线套的双绞线电缆。

警告

无需另接外部电源。

如果门触点开关未被使用，需将其短接。

故障指示

对于故障信号指示有1对连接触点可使用(见技术附页线路图）

故障信号线安装不受到任何特殊要求限制。

警告

故障指示连接最大容量为：230V，1A

10 运行条件

- 电压范围为额定电压的 ± 10%以内。
- 电源频率为额定频率的 ±3Hz以内。
- 环境温度必须低于55℃。
- 使用本机时注意使热交换量适合实际的需求。
- 只使用原装备件。

11 投入使用和功能

- 机柜空调包含的功能及可选项见章节 7.

11.1 概述

- 机柜空调配有温度控制系统。机柜内部温度通过温度传感器来测量。通过操作显示器可以设定不同的机柜内温度（见附表）。
- 机柜空调具有上电检测、运行时实时监测功能。上电检测过程中如果有故障，空调会发出相应的报警，这使得在进入工作模式之前更方便的排查设备故障。

警告

机柜空调只能在装有前盖的情况下运行，否则会因散热不良造成机柜空调被损坏。

11.2 操作显示器

机柜空调装有操作显示器。上电后操作显示器显示0.0℃,3S后显示柜内实时温度，表明机组在正常操作模式。如果发生故障或有报警输出时，操作显示器显示报警代码，警报灯点亮并伴随报警声，这使诊断机柜空调故障更容易（见章节15）。

11.3 启动测试模式

通电前，若门触点断开，则机柜空调不启动，直到门触点闭合后，机柜空调进入自测试模式,自测试模式将不受外部环境影响。机柜空调运行启动模式持续30秒, 之后是测试模式持续110秒。测试模式时，有故障设备继续运行，直到测试模式结束，产生相应的报警代码，如有故障则需解除故障后进入正常工作模式，如无故障，直接进入正常工作模式。

11.4 机组特性

模式	时间曲线	特征
启动模式	t=0s-3s t=3s-30s	无功能，操作显示器显示“0.0℃” 显示内部温度
测试模式	t=30s-40s t=40s-50s t=50s-80s t=80s-140s	内风机运行 外风机运行 内风机停止 压缩机运行 外风机停止 内风机、外风机、压缩机一起运行

11.5 门触点

确保安全门限位开关应连接到指定端口（见机壳上线路图或附件）当打开机柜门时门触开关即被断开，机柜空调所有马达延时依次关闭，之后产生报警。

11.6 设备故障

机柜空调故障触点X54—1,2脚为常闭触点，上电后无故障为闭合，有故障时将引起故障触点断开并显示告警代码(见章节15)。

11.7 自检功能

- 机柜空调具有开机自检和运行中实时自检功能。
- 开机自检即启动测试模式（见11.3、11.4）。
- 实时自检允许设备在正常运转中实时监测是否有异常发生，并及时上报。

11.8 设置的可能性

机柜空调可通过操作显示器来选择柜内不同设定温度以及参数。（见章节12）

⚠ **注意：**

机柜空调设定参数的改变需由授权的人来完成！

12 参数查看与设置

机柜空调可以通过操作显示器对参数进行监控设置。

- 机柜空调电子控制系统包括主控制系统、操作显示系统。面板上的指示灯从左到右排列的功能含义如下表：

指示灯	指示灯含义	长亮	闪烁
	上电自检	自检	-----
	制冷	正在制冷	-----
	制热	-----	-----
	除湿	-----	-----
	外风机	风机运转	-----
	告警	告警发生	-----

操作面板

1. 参数查看

主界面下，按“Select”键 3S，进入界面“SEE”，再按“Select”键确认进入，按 “▲”或“▼”键可循环选择柜内回风温度“Pb1”、空调启动温度“t1”、门禁开关状态“dor”、内风机运行状态“IFR”、外风机运行状态“EFR”、压缩机运行状态“Con”、报警输出状态“ALr”，在任意一个参数代码界面按“Select”键，显示相应参数的参数值，按“Mode”键返回上层菜单或者静置 5min 自动返回主界面。

具体代码意义详见（附表一）。

2. 参数设置

主界面下，按“Select”键 3S，进入界面“SEE”，再按“Select”键确认进入后，通过“▲”“▼”键选择“t1”，再按“Select”键显示具体参数值，长按“▲”键 6S 后即可调整参数值的大小，调整到正确的数值后再次按“Select”键确认修改，然后按“Mode”键返回上层菜单或者静置 5min 自动返回主界面。如果不需要修改，直接按“Mode”键返回上层菜单即可。

注意：

普通用户只使用“t1”，即机柜内设定温度，其他参数只供制造商使用。

注意：

任何画面下，无任何按键触发 300 秒后返回主画面。

参数修改成功后需要返回主界面，修改值才会生效。

注意：

请在规定的范围内设置参数，不正确的设置将导致机器不能正常工作！

13 清洁和维护

危险！

在任何清洁或维护操作前，请切断空调电源。

13.1 清洁

机柜空调在正确使用条件下做到了最大可能的免维护，即不需要定期检查维护。如果有条件定期对冷凝回路进行清洗，将提高设备的运转效率以及可靠性。

特别注意以下说明:

- 清洗外部风道，冷凝器以及外风机。
- 用软刷或高压空气进行作业。

步骤如下：

1）断开机柜空调电源。　2）打开外壳。

3）清洁风道。　4）清洁外风机。

5）清洁交换器。　6）装回外壳

7）接通电源并观察上电自检，确保设备运转正常。

⚠**注意：**防止电气元件漏电。不要使用任何尖锐或锋利的物体。

⚠**注意：**防止热交换器损坏。

⚠**注意：**防止外罩电气连接损坏。

在拆卸外罩时，应当手动拔去外罩里面的电气连接。安装时,不要忘插上该电气连接！

13.2 维护

设备出现故障后，会自动提示故障代码，主要故障代码对应的故障原因见章节 15。

在每一次维护后，请等待设备上电自检结束，查看自检情况，以确保设备能够正常运转。

14 停止使用

如果机柜空调在较长时间内未被使用，请切断电源。确保未经授权的人员不会擅自启动空调。

机柜空调需要报废处理时，需根据相关环保法规由专业人员进行处理。（见章节 4）

15 故障排除

尽管有精心维护,还是有可能产生故障。机柜空调的实时自检功能能够准确的自行诊断设备故障。

如果机器发生故障，操作显示器显示相关报警代码，用户可根据下表中的报警代码查找，使得诊断更容易。

报警列表

报警代码	描述	故障排除方法
AL01	Pb1 报警	1）检查感温头 Pb1； 2）检查连接线是否损坏； 3）检查接头是否插错位。
AL02	机柜门打开	1）检查门开关； 2）检查接线是否松动； 3）检查接线是否接错。
AL03	超温告警	1）查看是否 AL02 报警，此时设备停止工作； 2）检查内外风机是否正常工作； 3）检查压缩机是否正常工作； 4）检查冷凝器是否脏堵； 5）检查内部风口是否堵塞，风道是否顺畅； 6）检查热负荷。

⚠ **警告：**非授权人员不可检修此设备

16 保障条款

以下情况保障将失效：

· 机组的不恰当使用，不适宜的运行条件或不遵守操作指导；
· 在腐蚀或酸性空气环境下使用；
· 由脏污或脏堵的过滤垫造成的损坏；
· 非授权人员擅动温度控制回路，改动机组或更改机组序列号；
· 由运输或是事故造成的损坏；
· 由非授权组织更换部件；

为了维护您的质保权益，在退回机组时请遵守以下规定：

· 在包装中附上确切的故障描述。
· 附上发货单（百能堡发货单或发票复印件）。
· 随机将所有附件退回；使用原始包装或同规格的包装，运输时先垫付运费及足够的运输保险。

遵守章节 2提到的运输提示

附表 I

显示参数（操作显示器）

参数	描述	最小值	最大值	默认	单位
PB1	内循环回风温度	-30	60	-	℃
*T1	启动温度	20	45	35	℃
Dor	门开关，0 代表门开关断开，1 代表门开关闭合	0	1	-	-
IFR	内风机，0 代表停止工作，1 代表正在工作	0	1	-	-
EFR	外风机，0 代表停止工作，1 代表正在工作	0	1	-	-
Con	压缩机，0 代表停止工作，1 代表正在工作	0	1	-	-
ALr	故障报警，0 代表有故障输出，1 代表无故障，设备正常工作	0	1	-	-
AL01	Pb1 报警，0 代表有故障，1 代表无故障	0	1	-	-
AL02	机柜门打开，0 代表有故障，1 代表无故障	0	1	-	-
AL03	超温告警，0 代表有故障，1 代表无故障	0	1	-	-

* 为客户可改参数。

警告：

所有未提及参数请勿擅自更改，否则设备将不能正常

⚠	**Read this manual completely and carefully before installing the unit.** **This manual is an integral part of the scope of delivery and must be kept until is Disposed.**

1 Hints on the manual

This handbook contains instructions for the installation and operation of door and side-mounted, built-in Cooling Series Units provide by Pfannenberg (PCN).

Hint

The technical specifications for each machine along with additional information on assembly, connections and operation are contained in a separate sheet.

In this manual, safety recommendations and other information are structured as follows:

⚠ **Hazard!**

If the measures described in the following are not strictly observed there is danger to life and health.

⚠ **Hazard!**

If the measures described in the following are not strictly observed there is danger to life and health due to electrical shock.

⚠ **Caution:**

If the measures described in the following are not strictly observed material damage may be caused.

Hint

A hint contains additional information on the action or instruction described.

2 Handling

2.1 Transport

• Lift cooling unit only by the casing or with two jack rings (M8 jack rings is not included)

•Transport the cooling unit only in condition of usage.

•Prior to transport remove the cooling unit and pack it separately if the complete switch cabinet is to be transported.

Failure to observe these instructions will render the warranty provisions null and void.

2.2 Storage

• Never expose cooling units to temperatures exceeding +70 ℃ during storage.

• Store cooling unit only in condition of usage.

Failure to observe these instructions will render the warranty provisions null and void.

2.3 Unpacking

•During unpacking make a visual inspection of the cooling unit to see whether any damage has occurred during transport. Especially pay attention to loose parts, dents, scratches, visible loss of oil etc.
Any damage must be reported immediately to the forwarding agent (follow the instructions in "Rules for Damage Claims"). Moreover, the latest edition of the "Pfannenberg After Sales Service Declaration" shall apply.
•Before disposing of packing material ensure that it does not contain any loose components.

Hazard !

Burr caused by production may be present on the metal edges of the unit. Always wear protective gloves when carrying out maintenance work and installation.
In case of a warranty claim exact details on the fault (photograph, if possible) and the indication of type and serial number of the cooling unit are required.

3 Scope of delivery and options

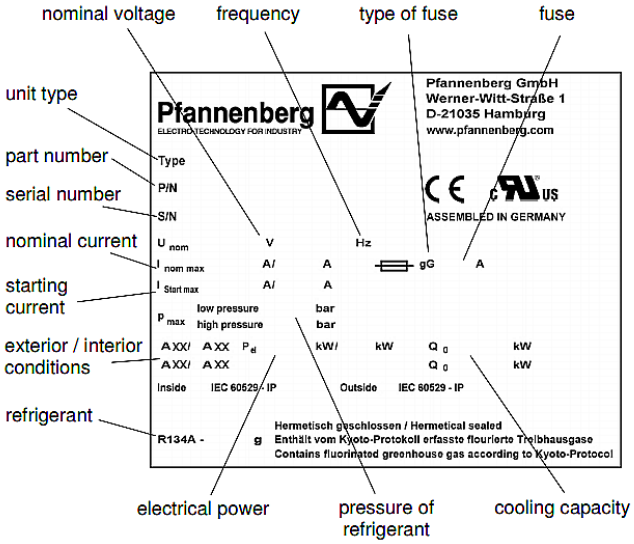
The Scope of delivery includes:
- Cooling unit
- Enclosed package (among other things, fastening material, electrical plug-type connectors)
- Special accessories, if applicable
- Technical Datasheet
- Manual

4 General Information

- Old devices can be properly disposed of by Pfannenberg.
They must be sent to one of our works shipment/postage paid.
- All cooling units produced by **Pfannenberg** are free from
  - PCT
  - Asbestos
  - Formaldehyde
  - Cadmium
  - Substances impairing wetting.
- Every cooling unit is checked to ensure that it is tight according to the provisions of 9.ProdSV (German regulations covering accident prevention).
- PCN has to do the electrical safety testing to every cooling before delivery.

5 Name plate

For the installation and maintenance, please notice the details technical data on the name plate which to be find on the back of the cooling unit casing.



6 Safety

Cooling units produced by **Pfannenberg** are designed for application dissipating heat from switch cabinets (IP 54).

The cooling unit is only suitable for installing on the stationary operation.

Only the authorized specialist can be work on the cooling system and electrical components.

Please make sure to comply with relevant safety and environmental regulations.

Hazard！

Cutting off cooling unit power supply before carrying out any cleaning or maintenance operations.

Only original spare parts may be used.

7 Function

7.1 Function and configuration

Equipment configuration:

1. High quality key components
2. Protection device for the compressor
3. Intelligent control system
4. Condensate evaporator (optional)
5. 2~Phase 400Vac power supply (optional)

Equipment function:

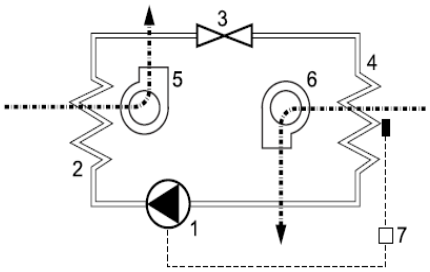
1. General external environment temperature: +15℃~+55℃
2. General inside control temperature: +25℃~+45℃
3. Start-up self-check and real-time self-check
4. IP54 / IP34 protection class
5. Condensate evaporator (optional)
6. 2~Phases 400Vac power supply (optional)

Caution：

Please refer to the attached technical specification for the details function of the cooling unit.

7.2 Operating principles

The compressor (1) compresses the refrigerant until high pressure is achieved. During this process temperature increases. In the condenser (2) heat is dissipated to ambient air, the coolant becoming liquid. The condenser fan (5) of the compensate takes ambient air in through the condenser, and then it releases the air.In the expansion valve (3) the pressure of the coolant drops. In the evaporator (4) the coolant absorbs heat from the air in the switch cabinet and evaporates. Thus, the air in the switch cabinet cools down. At the same time the air inside the switch cabinet is being dehumidified. The evaporator fan (6) sucks the air out of the switch cabinet via the evaporator, the cooled air flows back to the switch cabinet.
The cooling unit is electronically controlled. For that purpose a temperature sensor records the temperature of the air inside the switch cabinet (7).
The refrigerant is not detrimental to the ozonosphere; it is hardly combustible.



1 Compressor
2 Heat exchanger (condenser)
3 Expansion device
4 Heat exchanger (evaporator)
5 fan, exterior circulation
6 fan, inner circulation
7 Electronic control system with temperature sensor

7.3 Condensate

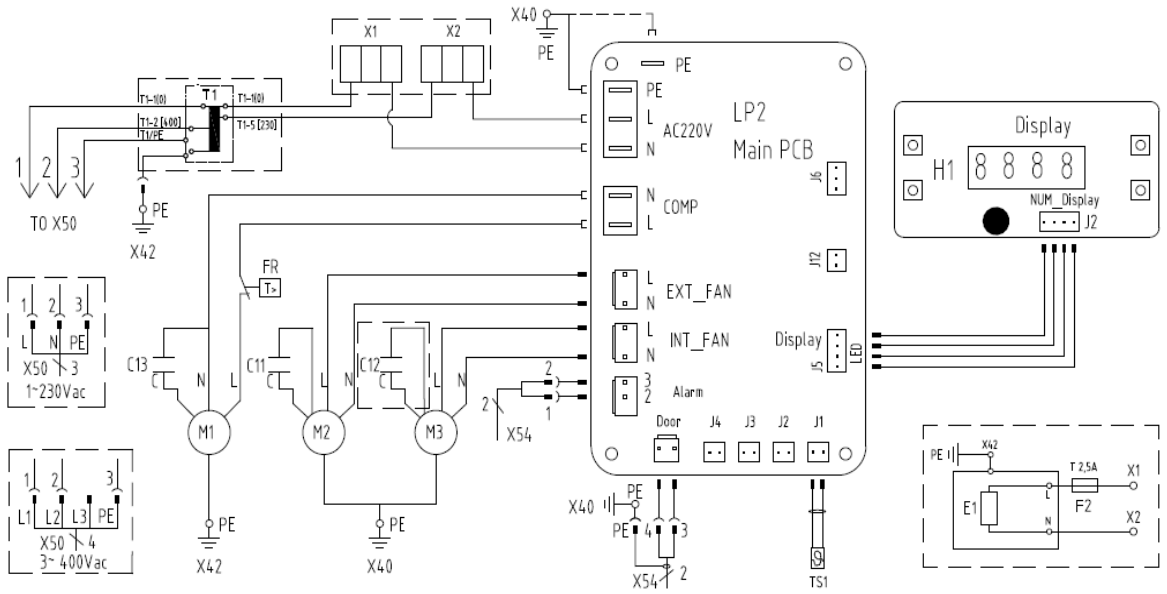
During cooling on the evaporator the moisture removed from the air is collected as condensate. In order to avoid any damage to the switch cabinet and the cooling unit, the condensate must be discharged.
The condensate is discharged in the following way:
In case of normal condensate drainage a reservoir (option) collects the condensate which is then drained by means of a hose.
Always ensure that the condensate is drained properly (safety- drainage).
Excessive condensation can occur if, for example, the switch cabinet is not sealed or if the internal temperature of the switch cabinet is frequently below the dew point.

Caution：

Please check the sealing of the switch cabinet, if there is excessive condensate during the normal operation.
In order to prevent the excessive condensate so we recommend to installed a door contact switch. It will switch off the cooling unit when the switch cabinet door is opened.

8 Technical data

8.1 Circuit Diagram



C11	Capacitors-condenser fan	M1	Compressor
C12	Capacitors-evaporator fan	M2	Condenser fan
C13	Capacitors-compressor	M3	Evaporator fan
E1	Condensate evaporation	T1	Control transformer
F2	Fuse	TS1	Temperature sensor
FR	Overheat protector	X1/X2	Sub terminal
H1	Operating indicator	X40/X42	Earthing connection
LP2	PCB	X50	Connection mains
		X54	Connection failure indication + door contact
		[---]	Option

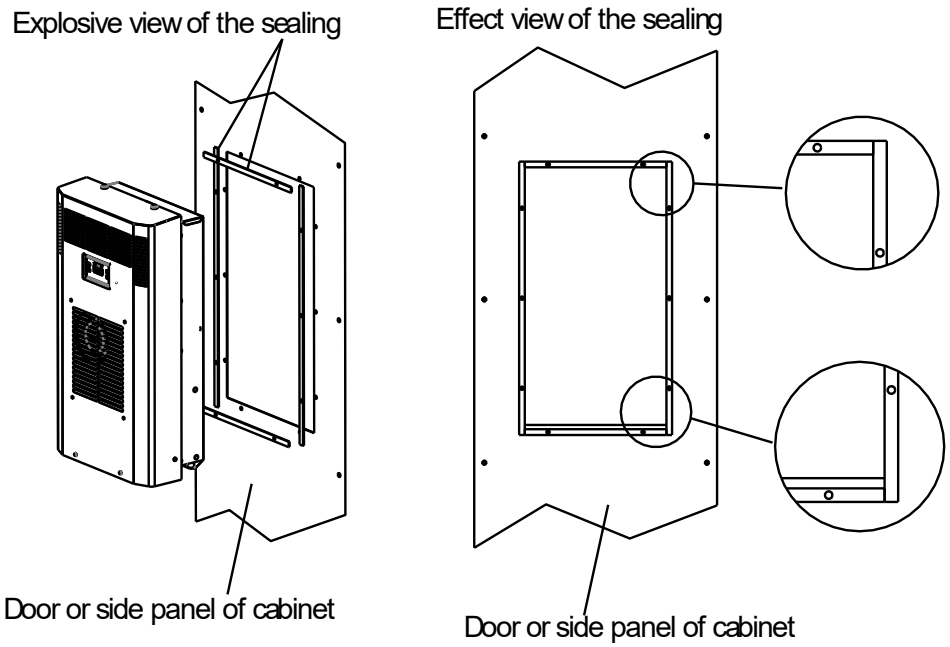
8.2 Spare parts

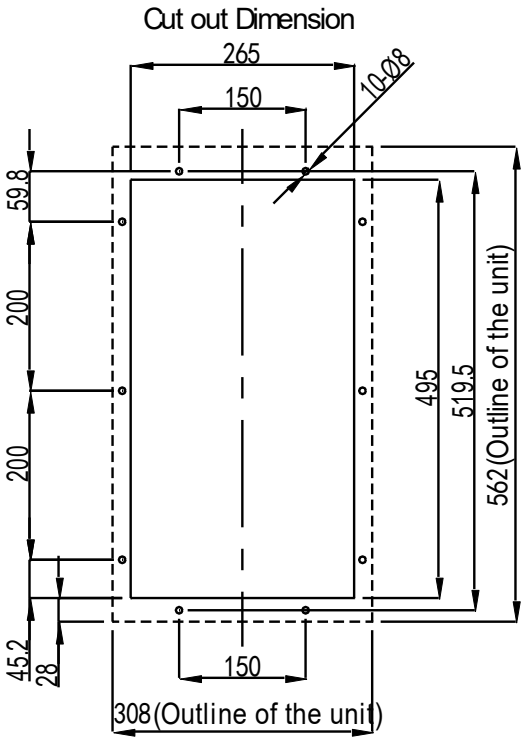
Please order your spare parts only with the Pfannenberg-parts-number.

Spare parts	8031ES	8041ES
Internal fan	18861100017	18861100018
External fan	18861100017	18861100019
Compressor	18861200003	18861200007
Internal fan capacitor	18864000004	18864000006
External fan capacitor	18864000004	18864000001
Compressor capacitor	18864000009	18864000013
Filter Dryer	18865000002	18865000002
Controller	Part number is located on the controller	

8.3 Installation Hole

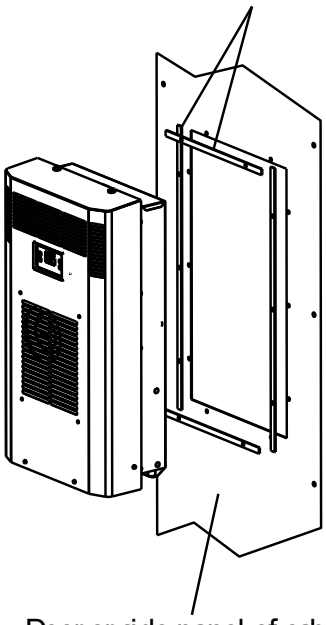
DTI 8031ES



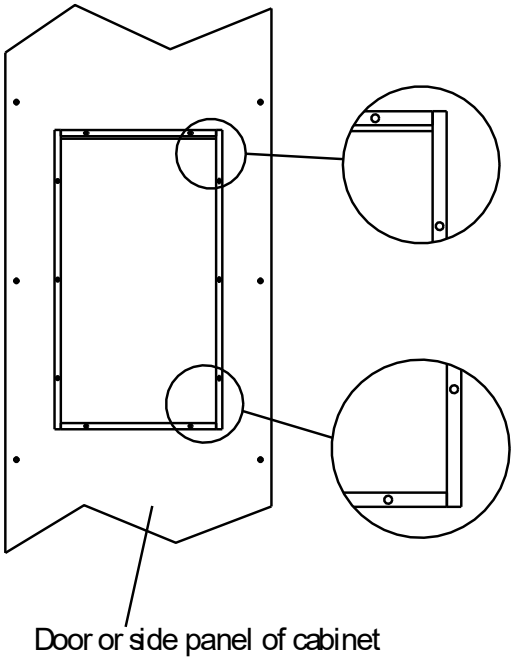


DTI 8041ES

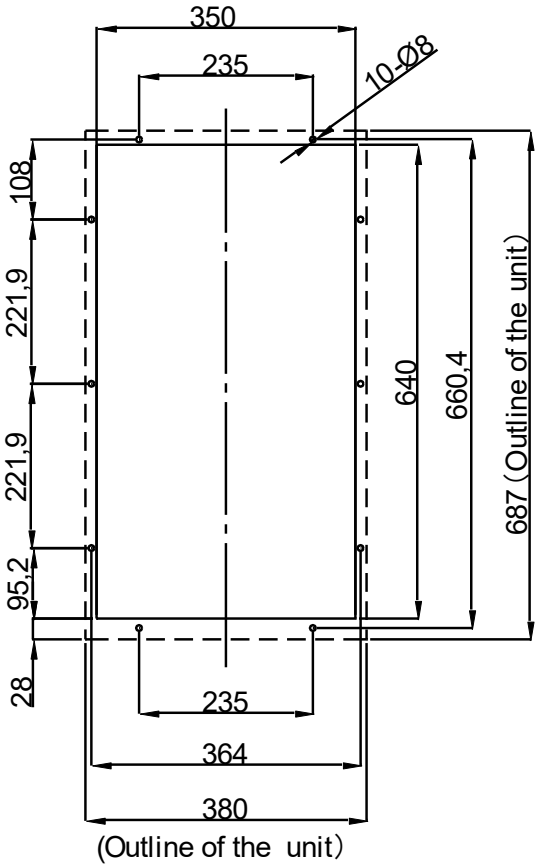
Explosive view of the sealing



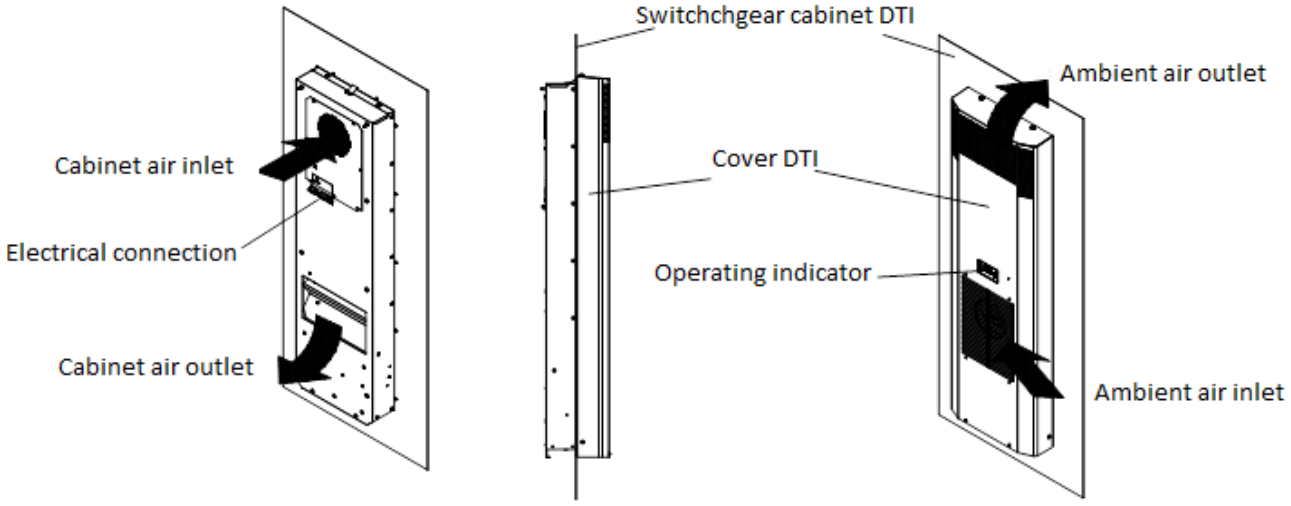
Effect view of the sealing



Cut out Dimension



8.4 Airflow principle



Caution：

Read this manual completely and carefully before installing the unit. This manual is an integral part of the scope of delivery and must be kept until the unit is disposed of.

Prior to mounting, ensure that the clearance of the units to each other and to the wall is at least 200mm; air inlet and outlet are not obstructed on the inside of the enclosure.

8.5 Technical Data

Cooling data		**DTI 8031ES**
Cooling capacity at A35/A35 * **	Q_0	500 / 530 W
Cooling capacity at A50/A35 * **	Q_0	285 / 330 W
Refrigerant type *		R 134a
Refrigerant amount *		200 g
Thermostat setting, (factory set)		+35°C (+95°F)
failure indication: Enclosure internal temp. (factory set)		> +50°C (+122°F)
Ambient air temperature		+15°C (+59°F) . . . +55°C (+131°F)
Enclosure internal temp.		+25°C (+77°F) . . . +45°C (+113°F)
Air volume, external circulation °)		280 m³/h
Air volume, internal circulation °)		280 m³/h
Condensation discharge		Condensate discharge pipe.
Noise level (1m)		≤ 66 dB(A)
Electrical data		
Mains frequency		50 / 60 Hz
Operating range		DIN IEC 60038
Rated voltage		230 V
Power consumption *(A35/A35) :	P_{el}	260 / 290 W
Current capacity *	$I_{nom\ max}$	1.5 / 1.7 A
Starting current *	$I_{Start\ max}$	3.5 / 3.5 A
Dimensions		
Height		562 mm
Width		310 mm
Depth with cover (standard) / Tiefe mit Haube (Standard)		212 mm
Einbautiefe DTI / Installation depth DTI °°)		85 mm
Weight		15 kg
Installation attitude		vertical
Unit construction		Standard:steel Option:Stainless
Corrosion protection		Standard:galvanized, electrostatically powder coated(200°C) Option: Stainless, Aluminium
Protection classification		IP 54 against the enclosure, under correct operating conditions. IP 34 against the environment, under correct operating conditions, With front cover on.

Cooling data		DTI 8041ES	
Cooling capacity at A35/A35 * **	Q_0	800 / 900 W	
Cooling capacity at A50/A35 * **	Q_0	550 / 650 W	
Refrigerant type */ Refrigerant amount *		R 134a/300 g	
Thermostat setting, (factory set)		+35°C (+95°F)	
failure indication: Enclosure internal temp. (factory set)		> +50°C (+122°F)	
Ambient air temperature		+15°C (+59°F) . . . +55°C (+131°F)	
Enclosure internal temp.		+25°C (+77°F) . . . +45°C (+113°F)	
Air volume, external circulation °)		620 m³/h	
Air volume, internal circulation °)		535 m³/h	
Condensation discharge		Condensate discharge pipe. Option: condensate evaporator	
Noise level (1m)		≤ 66 dB(A)	
Electrical data			
Mains frequency		50 / 60 Hz	
Operating range		DIN IEC 60038	
Rated voltage		230 V	400 V
Power consumption *(A35/A35) :	P_{el}	386 / 420 W	380 / 410 W
Current capacity *	$I_{nom\ max}$	3.0 / 3.5 A	1.8 / 2.5 A
Starting current *	$I_{Start\ max}$	6.0 / 6.0 A	6.0 / 6.0 A
Condensate evaporator(CM)	P_{el}	Option: 30-110W (A35/A35 ca. 70W)	
Dimensions			
Height*Width		687 mm*380 mm	
Depth with cover (standard) / Tiefe mit Haube (Standard)		198 mm	
Einbautiefe DTI / Installation depth DTI °°)		85 mm	
Weight		DTI 8041ES 230V	DTI 8041ES 400V
		20 kg	28 kg
CM Weight		Option: 0.5kg	
Installation attitude		vertical	
Unit construction		Standard:steel Option:Stainless	
Corrosion protection		Standard:galvanized, electrostatically powder coated(200°C) Option: Stainless, Aluminium	
Protection system according to EN 60529		IP 54 against the enclosure, under correct operating conditions. IP 34 against the environment, under correct operating conditions, With front cover on.	

*ID Plate Information, ** Cooling capacity without filter mats (option)

°) free-blowing, °°) need additional electrical terminal space 40mm

9 Installations

9.1 General

•In order to keep the cabinet's proper ventilation, it is important to select the correct installation place for the cooling unit.

•It must be keep the distance at 200mm at least for the single units or the unit and the wall.

•The cooling unit's electrical connection terminal to be reserved at least 40mm space and the electrical components shall not impede air circulation in the internal cabinet.

•It must be switch off the power supply when the cooling unit installed.

•The site of installation must be protected against contamination.

Caution：

If the cooling unit is mounted on an switch cabinet door, it must be confirmed that hinges can support the additional weight or that the switch cabinet will not topple over when the door's opened.

Caution:

Chips may damage the switch cabinet.It must be use a cover sheet to void the sward enter into the cabinet to damage the electrical components when you are installing a hole in the installation site.

Hint

To facilitate installation with heavy units, M8 lifting eyes can be screwed into the upper fixing on the equipment housing. Simple'' one man installation'' is thereby possible.

9.2 Installation work

The mounting surface of the switch cabinet is to be provided with cutout(s) and holes for air ventilation openings and for securing the unit according to the accompanying sheet.

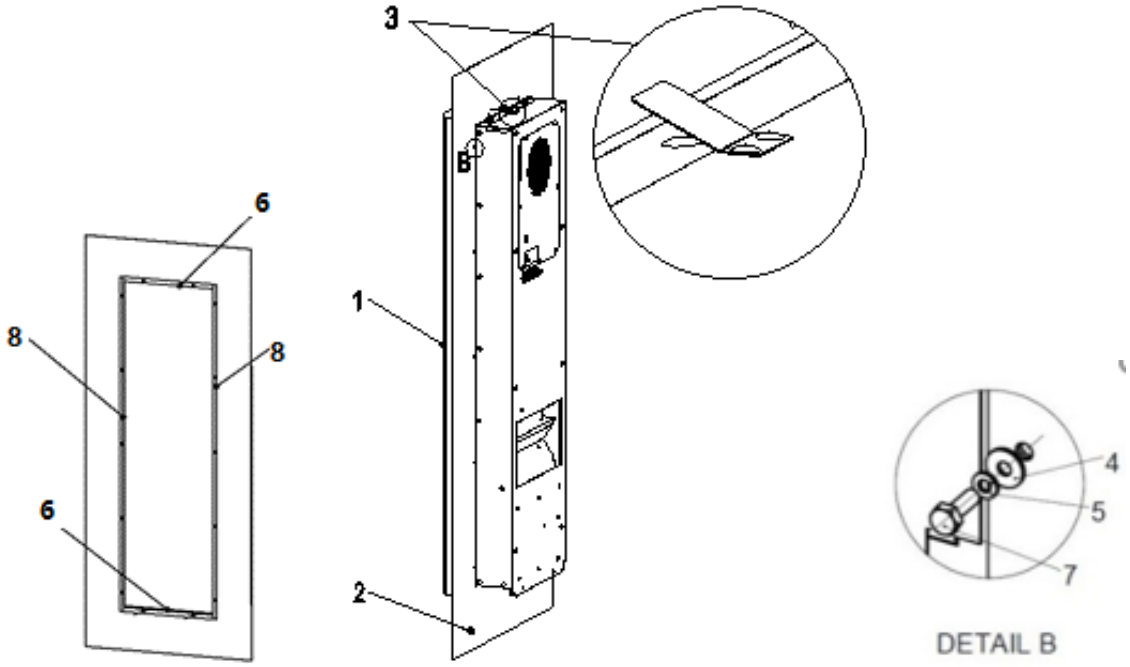
The drawing on the accompanying sheet also shows the location of the electrical connections and ventilation openings.

1) If the cabinet is not reserved for the opening hole of the cooling unit, please cut-out on the cabinet (refer to the drawing on accompany sheet), then remove burrs from the cut edge.

2) Please take out sealing strips (Pos.6,,8) on the outside of the cabinet， make sure the hole of sealing strip concentric with switch cabinet, then paste sealing strip on the swith cabinet.

3) From the outside,insert the cooling unit(Pos.1) into the cutout and push through the unit seal engages with the switch cabinet(Pos.6,8).Close the snap-fastener(Pos.3) with an audible click from the unit or upper side.

4) Please take out the flat gasket, spring washer and bolt (Pos. 4, 5, 7) on the inside of the cabinet and lock the cooling unit tightly.5) Feeding the condensate run-off tube through the opening in the base of the unit. Lay the tube with a downward fall. Shorten as required.



1 Cooling unit DTI
2 switch cabinet wall or door
3 snap-fastener
4 flat gasket
5 springs shim
6 sealing strip
7 bolts
8 sealing strip

5) It must fix the M8 nut when strike it on the top of housing during installing the tooling unit.

6) Clamp the cable as shown in the connection diagram (see back of unit) to the plug (component pack) and connect to the unit.

-cable size: 1.0-2.5mm^2 or AWG18-AWG14 (in the selection of cable size, the relevant regulations must be observed)

7) Plugging in the power supply on the cooling unit. (see Section 8.4)

For unit with different mounting method please refer to technical data sheet supplied in the accessory bag with the unit.

9.3 Electrical connection

⚠ Caution：

• The cooling unit must be connected to the mains by means of a disconnecting device with a contact gap of at least 3mm when switch off.

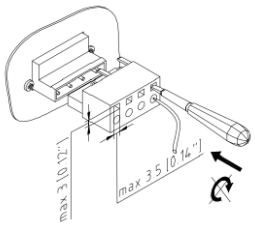
•No temperature sensor must be series-connected to the cooling unit feed.

•The fuse as indicated on the name plate must be series-connected as line protection.

• Power connection and repairs, if applicable, may only be carried out by authorized trained electricians.

Power supply connection:

Both mains voltage and frequency must correspond to the nominal values indicated on the name plate of the cooling unit.



Caution：

The cooling unit may be damaged if the voltage is too high. It's nominal voltage is 230V or 400V.

Door contact:

In order to avoid any disruptive influences, it is recommended that a sheathed cable with twisted pair leads be used.

Caution：

No external voltage may be applied

If no door contact switch is used, the connecting contacts are to be bridged.

Fault indication:

For connection of the fault signal line there are 1 connection contact and/or connection lines available (see circuit diagram on the technical supplementary sheet)

The installation of the fault signal line is not subject to any special requirement.

Caution：

The contact may be loaded with max230V, 1A

10 Operating condition

•The voltage must be within ± 10％ of the value indicated.
•The frequency must be within ±3Hz of the value indicated.
•Ambient temperature must be below 55℃.
•Use the unit such that the cooling capacity suits the actual demand.
•Use genuine spare parts only.

11 Putting into operation and function

Please refer to section 7 for the cooling unit which including the function and options.

11.1 General remarks

The cooling unit is provided with an electronic control system.The cooling unit's internal temperature is measured by temperature sensor.The cooling unit can be set at different internal temperature through operating console display, (See attached table) the system will Disallowed when exceeds the limit temperature.

The cooling unit has the function of power-on self-test, the run-time real-time monitoring. The cooling unit will generate an alarm when there is a failure during power-on self-test.

Caution:

The cooling unit can only run in the case of installing the front cover, otherwise it will be damaged by poor heat dissipation.

11.2 Operate the display

The cooling unit is provided with an operation display. “0.0℃” is displayed for 3s after the supply power is switched on, then internal temperature is shown. This indicates the unit works properly. If there is a failure or an alarm, the operation display’s alarm lamp will be light and accompanied by an alarm sound, which makes it easier to diagnose the cooling unit. (Refer to section 15)

11.3 Start-up / Test mode

The cooling unit will can’t work If on front of get supply power the door switch is open, The test mode is basically activated after renewed connection of the supply voltage and is independent of the instantaneous ambient conditions when the door contact is closed.First of all the unit runs though a start-up mode lasting 30 seconds which is followed by a test mode lasting 110 seconds. The unit will still running when there is an alarm during the test mode. After finishing the test mode, if have alarms, show the alarm code in the panel, must take off the alarm, it can enter into a normal working mode if there is no failure.

11.4 Unit characteristics

Mode	Time curve	Characteristics
Start-up mode	t=0s-3s t=3s-30s	No function， Operation display shows ‘’0.0℃’’ Shows internal temperature
Test mode	t=30s-40s t=40s-50s t=50s-80s t=80s-140s	Internal fan start up; External fan start up Internal fan stop; Compressor start up External fan stop; Internal fan, external fan, compressor all start up.

11.5 Door contact

For safety reasons, a door limit switch should be connected to the terminals provided on the cooling unit. (see the wiring diagram on housing cover or supplement). With the switch in place, when enclosure door is opened (thereby opening the switch), all of the motors are turned off with a time lag.

11.6 Equipment fault

Failure contact X54—1,2pin is NC, it close when power supply without alarm, a fault in the cooling unit will cause the breaking and show the alarm code. (See Section 15).

11.7 Self-check function

The cooling unit has functions of power-on self-check, and real-time self-check.
Power-on self-check function is power-on testing mode. (see Sections 11.3&11.4)
Real-time self-check function allows the cooling unit monitoring if there is an abnormal occurrence during operation and reporting timely.

11.8 Setting possibilities

By means of operation display, different cabinet temperature as well as parameters can be selected. (see Section 12)

Caution：

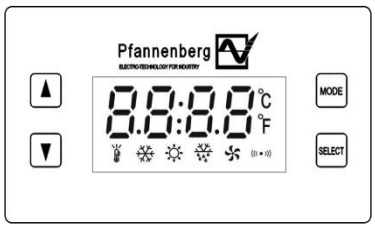
Changes to the operating parameters of the cooling unit should only be made by authorized personnel.

12 Parameters View and Settings

Parameters of cooling unit can be monitored and set by operation display.
•Cooling unit control system includes master control board, operation panel.

Light	Description	Lighting	Flash
	Self-check	Self-check	-----
	Cold	Cooling	-----
	Heat	-----	-----
	Huminity	-----	-----
	Fan	Running	-----
	Alarm	Alarm	-----

Operation panel



1. View Parameters

In the home page, press ”Select” for 3s, operation display shows “SEE”, press ”Select” again, using ”▲” “▼”, user can select following parameters in cycle: ”pb1”, ”t1”, ”dor”, “IFR”, “EFR”, “Con”, “ALr”, at any parameter, press ”Select” again, corresponding value will be shown, Press “Mode” to go back to previous menu, or wait 5min to go back to home page.
The codes means see (Appendix I)

2. Parameter setting

In the home page, into parameters “t1” value, then press ”▲” for 6S, user can press ”▲” or “▼” to get the desired value , then press “Select” again to confirm the change, Press “Mode” to go back to previous menu,
or
wait 5min to go back to home page. If no need to change, just press “Mode” to back to previous menu.

Caution:

Normal user only can use ‘’T1’’, it’s Internal setting temperature of the cabinet, other parameters only for manufacturer using.
After resetting, the unit must be return home page.
On any parameter interface, press “Mode” to go back to previous menu until home page.
On any interface, home page will be shown without pressing any button for 300s.

Caution：

Please set the parameter in the specified range and incorrect setting will cause the machine to be unable to work properly.

13 Cleaning and Maintenance

Hazard！

Please cut off the cooling unit’s power before carrying out any cleaning or maintenance operation.

13.1 Cleaning

The cooling unit is to achieve the maximum possible free maintenance in the correct using condition, that is mean no need for regular inspection and maintenance.
It will be improved the operation efficiency and reliability of the equipment if there are conditions for the periodic cleaning of the condensate.
Pay a special attention to the following instructions.
•Clean the pipe of the external fan, condenser and the external fan.
•Work with a soft brush or high pressure air.
Proceed as follows:
1) Cut off the cooling unit’s power.
2) Remove the external cover.
3) Clean the fan pipe.
4) Clean the external fan.
5) Clean the exchangers.
6) Put in back the external cover

7) Connect the power and observe the self-check function to make sure the equipment is running properly.

Caution：

Protect the electric components against leakage

Caution：

Protect the heater exchanger to damage

Don’t use any pointed or Sharp-edged objects.

Caution：

To prevent the damage to the electrical connection on the covering hood.

If the covering Hood is removed, the eclectic plug-in connections on the inside must be removed by hand.

13.2 Maintenance

After equipment malfunction, it will automatically prompt the fault code, please refer to Chapter 14 of the main fault code corresponding to the fault reason.

After each maintenance, please wait for finishing power-on self-test, check self-checking situation, in order to make sure the equipment can work properly.

14 Stopping using

Please disconnect the cooling unit when it is not in use for a longer period. Ensure that non-authorize persons cannot start the cooling unit.

When the cooling unit is no longer needed, it must be disposed of by authorized specialist personnel in accordance with all applicable environmental protection regulations. (See section 4)

15 Trouble shooting

In spite of careful maintenance, the equipment may still have a failure sometime in the future. The real-time self-check function can diagnose the failure.

If a fault occurs, the display will show the relevant alarm code, Below is the trouble shooting guide .

Alarm codes list:

Alarm code	description	Trouble shooting method
Al01	Sensor 1 error	1) Check sensor of Pb1; 2) Check the connection wire; 3) Make sure the connection is correct.
Al02	Cabinet door open	1) Check door switch; 2) Make sure the connection is not loose ; 3) Make sure the connection is correct.

AI03	High temperature	1) If alarm AL02, cooling until stop work; 2) Make sure internal fan and external fan work normally; 3) Make sure compressor work normally; 4) Check condenser if it's dirty and blocked; 5) Check internal fan air channel; 6) Check heat load.

Caution:

Non-authorized personnel cannot repair the equipment.

16 Warranty Conditions

Warranty becomes null and void:

•In case of improper usage of the unit, noncompliance with operating conditions or non observance of instructions;

•If operated in rooms in which corrosives or acids are present in the atmosphere;

•In case of damage caused by contaminated or jammed air filters;

•If a non-authorize person interrupts the cooling circulation, modifies the unit or changes the serial number;

•In case of damage caused by transport or by accidents;

•For the exchange of parts by unauthorized companies;

In order to maintain your warranty rights please observe the following when returning the unit;

•Enclose an exact description of the fault in the shipping package.

•Enclose proof of delivery (delivery note or copy of invoice).

•Return the unit together with all accessories;use the original packaging or packaging of equivalent quality, send the unit freight prepaid and covered by an adequate transport insurance. Observe the hints on transport mentioned in section 2

Appendix I

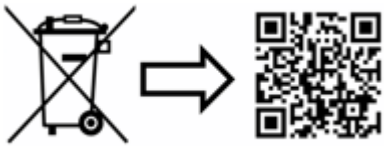
Shown parameters (operation display)

Parameter	Description	Min.	Max.	Default	Unit
Pb1	Air return of inner cycle	-30	60	-	℃
* T1	Internal setting temperature	20	45	35	℃
Dor	Door switch, 0 means open, 1means close	0	1	-	-
IFR	Internal fan, 0 means OFF, 1 means ON	0	1	-	-
EFR	External fan, 0 means OFF, 1 means ON	0	1	-	-
Con	Compressor, 0 means OFF, 1 means ON	0	1	-	-
ALr	Alarm, 0 means alarm output, 1 means units work normal	0	1	-	-
AL01	Sensor 1 error, 0 means alarm, 1 means normal	0	1	-	-
AL02	Cabinet door open, 0 means alarm, 1 means normal	0	1	-	-
AL03	High temperature, 0 means alarm, 1 means normal	0	1	-	-

* means the parameters can change by user.

Caution:

Please don't change any unmentioned parameter without authorization, otherwise the equipment will not work properly.



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