

μChiller 用于冷却器与热泵的电气控制/ Electronic control for chiller and heat pump



设备描述

μChiller是Carel用于全面管理空气/水冷却器、水/水冷却器和热泵的理想解决方案。最大配置为每条回路（开启/关闭或BLDC）管理2台压缩机，最多管理2条回路（使用一张扩展卡来管理回路2上的输入输出）。μChiller的独特之处在于能够通过电子膨胀阀（ExV）和无刷直流压 缩机的组合管理，对高效装置进行全面控制，从而确保压缩机的保护 和可靠性更高，装置效率高。用户端允许与移动设备进行无线连接。客户端整合到面板安装的机型上，而对于DIN导轨机型，可单独订购。从安卓操作系统Google Play下载的CAREL“Applica”应用软件使现场的参数配置和装置调试更为容易。用户手册+0300053EN对μChiller的操作进行了说明，购买之前可以从网站www.carel.com下载。

产品代码					
代码	安装方式	连接	压缩机管理	类型	电子膨胀阀（ExV）管理
UCHBP00000190	面板	NFC	On-Off	S	双极：带EVDevo驱动器
UCHBP00000200	面板	NFC,BLE	On-Off	S	双极：带EVDevo驱动器
UCHBD00001230	DIN导轨	-	On-Off	S	双极：带EVDevo驱动器
UCHBDE0001150	DIN导轨	-	On-Off	E	单极：内置双极：带EVDevo驱动器
UCHBDH0001150	DIN导轨	-	On-Off, BLDC	HE	单极：内置双极：带EVDevo驱动器
UCHBE00001230: 二级回路扩展	DIN导轨	-	On-Off, BLDC	-	双极：带EVDevo驱动器
UCHBE00001150: 二级回路扩展	DIN导轨	-	On-Off, BLDC	-	单极：内置双极：带EVDevo驱动器

(*) 类型: S=标准版, E = 增强版, HE = 高效版

用户终端	
	图例 1 键盘 2 主区域 3 图标: 设备状态 & 操作模式

图标	功能	开启	闪烁
	系统泵	启动	手动操作
	源设备状态（泵/风扇）	启动	手动操作
	压缩机状态	启动	手动操作 (带 ExV)
	防冻加热器	启动	-
	操作模式	加热	-
		冷却	高温温警报
		除霜	除霜之后滴水
	服务	自然冷却	-
		要求超过运行时间的服务	严重警报，有资质人员要求的启动

键盘	
按键	功能
	UP向上
	DOWN
	功能 导航：上一个参数 参数设置：增加值 导航：下一个参数 参数设置：显示的增加值 MAIN MENU主菜单： 短按：显示装置概述 长按（3秒）：访问用户配置文件参数（设置点、装置启动-关闭）
	Alarm报警 短按：显示实时警报和静音蜂鸣器 长按（3秒）：重新启动警报
	PRG编程 导航期间：访问参数设置菜单 参数设置期间： • 短按：确认值 • 长按（3秒）：返回主菜单

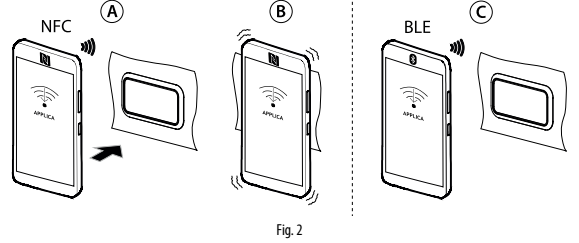
移动设备

“Applica”应用软件可用于通过近场通信(NFC)或低功耗蓝牙(BLE)，从移动设备（智能手机、平板电脑）上配置μChiller控制器。步骤如下（修改参数）：
1. 从安卓或iOS应用市场下载CAREL“Applica”应用软件；
2. （在移动设备）激活NFC/蓝牙通信和数据连接；
3. 打开Applica；

使用 NFC
• 将移动设备靠近用户终端，最近距离10毫米，以便识别配置（图2-参考A）；
• 输入密码（*）；
• 按照需要设置参数；
• 再次将移动设备靠近用户终端，以便上传配置数据（图2-参考B）；

使用蓝牙
• 将移动设备靠近用户终端，最近距离10毫米，以便识别配置（图2-参考C）；
• 输入密码（*）；
• 按照需要设置参数。
(*) 由冷却器制造商预先指定，仅供已授权的技术服务人员维修之用。

重要事项: 第一次连接期间，Applica通过云端连接，使其匹配μChiller控制器上的软件版本；这意味着至少在所述第一次连接中，需要移动数据连接。



（1）符合“微功率短距离无线电发射设备目录和技术要求”的具体条款和使用场景，采用的天线类型和性能，控制、调整及开关等使用方法；

（2）不得擅自改变使用场景或使用条件、扩大发射频率范围、加大发射功率（包括额外加装射频功率放大器），不得擅自更改发射天线；

（3）不得对其他合法的无线电台（站）产生有害干扰，也不得提出免受有害干扰保护；

（4）应当承受辐射射频能量的工业、科学及医疗（ISM）应用设备的干扰或其他合法的无线电台（站）干扰；

（5）如对其他合法的无线电台（站）产生有害干扰时，应立即停止使用，并采取措施消除干扰后方可继续使用；

（6）在航空器内和依据法律法规、国家有关规定、标准划设的射电天文台、气象雷达站、卫星地球站（含测控、测距、接收、导航站）等军

民用无线电台（站）、机场等的电磁环境保护区域内使用微功率设备，应当遵守电磁环境保护及相关行业主管部门的规定；

（7）禁止在以机场跑道中心点为圆心、半径5000米的区域内使用各类模型遥控器；

（8）微功率设备使用时温度和电压的环境条件。

调 试

注意：更多信息，请参阅用户手册（编码：+0300053EN）安装并打开Carel“Applica”应用软件后（见“移动设备”章节），继续以下操作：

所有机型
1. 对于带蓝牙的设备，点击右下的图标，访问“服务”菜单。对于带 NFC 的设备，已默认显示“服务”菜单；
2. 点击“设置”->“配置”->“默认”；



Fig. 3

机型：高效版（参见产品代码）

3. 选择装置使用的压缩机类型：



所有机型

4. 通过NFC或蓝牙应用已选择的配置。制冷剂类型已正确配置（标准版、增强版）/BLDC压缩机类型和制冷剂都已经正确配置（高效版）；
5. 选择“Unit set-up”菜单继续配置机组，按PREV（上一个）/NEXT（下一个）键可以滚动所有参数配置页面；
6. 将通过NFC/蓝牙配置的参数应用于控制器。

报警代码表			
代码	说明		
机组			
A001	非永久性内存写入	A002	永久性内存写入
A003	数字量输入远程报警	A004	远程设点探头
A005	用户侧回水温度探头	A006	用户侧出水温度探头
A008	用户侧泵1过载	A009	用户侧泵2过载
A10	流量开关（用户侧泵1启用）	A11	流量开关（用户侧泵2启用）
A12	用户侧泵组	A13	用户侧泵1维护
A14	用户侧泵2维护	A15	冷却水温度过高
A16	室外回水/空气温度探头	A17	室外侧泵1维护
A18	自然冷却报警	A19	回路1: 冷凝压力探头
回路1			
A20	冷凝温度探头	A21	蒸发压力探头
A22	蒸发温度探头	A23	排气压力探头
A24	吸气温度探头	A25	高压开关
A26	高压传感器	A27	低压传感器
A28	防冻蒸发温度	A30	压缩机1过载
A31	压缩机2过载	A32	压缩机1维护
A33	压缩机2维护	A34	源风扇维护
EVD 回路1			
A35	低过热度	A36	低蒸发温度报警
A37	高蒸发温度报警	A38	电机出错
A39	紧急关闭阀中	A40	阀关闭不完全
A41	离线	A42	压缩机运行区间保护 + 区

BLDC 回路1	
A43	启动时的高压差
A45	吹气压力差报警
A46	高排气温度

Speed Drive 速度驱动器回路1

A47	离线	A48	警报+错误代码
从机组			
A49	离线	A50	非永久性内存写
A51	永久性内存写入		
回路2			
A52	排气压力探头	A53	冷凝温度探头
A54	吸气压力探头	A55	蒸发温度探头
A56	排气温度探头	A57	吸气温度探头
A58	高压开关	A59	高压传感器
A60	低压传感器	A61	防冻蒸发温度
A63	压缩机1过载	A64	压缩机2过载
A65	压缩机1维护	A66	压缩机2维护
A67	室外侧风扇维护		

EVD 回路2	
A68	低过热度
A70	高蒸发温度报警
A72	紧急关闭
A74	离线
A69	低蒸发温度报警
A71	电机出错
A73	阀门未完全关闭
A75	回路2: 压缩机运行区间保护 + 区域报警

BLDC 回路2	
A76	启动时的高压差
A78	低压差
速度驱动器回路2	
A80	离线
A81	警报+错误代码
A87	EVD Evolution 不兼容

技术规范（两种机型）

技术规范，适用于μChiller PANEL 和 DIN两种机型

机身规格	
尺寸	见图纸
壳体	聚碳酸酯
组装	UCHBP*: 面板安装型; UCHBD*: DIN导轨安装型
球压测试温度	125°C
防护等级	IP20 (后端，面板安装型) IP65 (前端，面板安装型) IP00 (DIN导轨安装型)
前端清洁（面板）	使用柔软的非研磨布和中性清洁剂或水

环境条件	
工作温度	-20至60°C, <90%相对湿度 无冷凝
储存温度	-40至85°C, <90%相对湿度 无冷凝

电气特性	
标称电源电压	24 Vac/dc (由 SELV 或 PELV 2级电源供电)
工作电源电压	24Vac/dc +10%-15%;
输入频率 (AC)	50/60Hz
最大消耗电流	不带ExV阀门驱动器的面板安装型及DIN导轨安装型: 600 mA
	带ExV阀门驱动器的DIN导轨安装型: 1.25 A
	不带ExV阀门驱动器的面板安装型及DIN导轨安装型: 30 VA
变压器额定值	带ExV阀门驱动器的DIN导轨安装型: 60 VA
时钟	精度 ±50ppm; 停机后保持日期/时间: 72h
软件类别和结构	A
环境污染等级	3
防电击等级	整合为I类或II类器械
启动和断开类型	I.C
额定冲击电压	继电器输出: 4kV; 输入 24 V: 0.5 kV
浪涌抗扰度类别	继电器输出: III; 输入 24 V: II
控制装置构造	待整合到设备
接线端子	插入式公-母接头。
控制器的用途	电缆尺寸：参见接口表 电气操作控制

用户界面	
蜂鸣器	面板安装型：集成 DIN导轨安装型：未包含在控制器中，集成到用户终端
显示屏	LED 2行，小数点及多功能图标

连接	
NFC	最大距离为10毫米，根据所使用的移动设备而不同

低功耗蓝牙	
IBMS串行接口	最大距离为10米，根据所使用的移动设备而不同
FieldBUS串行接口	通过RS485的Modbus，非光电隔离
HMI接口	通过RS485的Modbus，非光电隔离

模拟输入（Lmax=10m）	
Rif.	
J2	S1, S2, S3: NTC S5: 0...5Vrat / 4-20mA / NTC S4: 0...5Vrat / 4-20mA / NTC S6: NTC / 0...5Vrat / 0...10V / 4...20mA
J3	NTC: 分辨率 0.1 °C; 10kΩ@25°C; error: -50至50°C范围内为±1°C, 50至90°C范围内为±3°C 0...5Vrat: 误差 2% fs, 典型值 1% 4...20mA: 误差 5% fs, 典型值 1%
J9	S7: NTC - 仅DIN版可用 0...10V: 误差 2% fs, 典型值 1%

数字输入	
Rif.	
J2	ID1(*) ID2 ID3(*), ID4, ID5,
J9	ID6 - 仅DIN版可用 (*) 快速数字输入: 0-2kHz; 误差 2% fs

阀门输出	
Rif.	
J14	仅DIN版可用 CAREL E*V单极阀电源: 13Vdc, 最小绕组电阻 40Ω

模拟输出	
Rif.	
J2	Y1, Y2 0...10V: 最大10mA

数字输出	
Rif.	
J6	NO1 (5A), NO2 (5A), NO3 (5A), NO4 (5A), NO5 (5A)
J7	5A: EN60730: 5A 电阻, 250Vac, 50k 个周期; 4(1), 230Vac, 100k 个周期; 3(1), 230Vac, 100k 个周期
J11	NO6 (5A) - 仅DIN版可用 UL60730: 5A 电阻, 250Vac, 30k 个周期; 1FLA, 6LRA, 250Vac, 30k 个周期; 导向器负载 C300, 30k 个周期

注释：NO1, NO2, NO3 和 NO4电流消耗总量不得超过8A。

应急电源	
Rif.	
J10	ultracap机型 (可选，仅在DIN版本上可用) 13 Vdc +/-10%

探头及终端电源	
5V	5 Vdc ± 2%为0...5V比例式探头供电。最大交付电流：35 mA，防短路保护
+V	8...11V为4...20mA比例式探头供电。最大交付电流：80 mA，防短路保护
VL	未使用
J8	13 Vdc ±10%为用户终端供电

电缆长度	
模拟输入/输出，数字输入/输出，探头功率	<10m (*) (*) 面板安装版中，如果在VL居家环境中使用，则最大电缆长度为2米。
阀门	<2m, <9m 带屏蔽电缆
BMS和Fieldbus现场总线串行电缆	<500m 带屏蔽电缆

合规性	
电气安全	EN/UL 60730-1, EN/UL 60335-1
电磁兼容性	EN 61000-6-1, EN 61000-6-2, EN 61000-6-3, EN 61000-6-4
易燃制冷剂气体的应用	EN/UL 60079-15, EN/UL 60335-2-34, EN/UL 60335-2-40, EN/UL 60335-2-89
无线合规：	RED, FCC, IC

ENG Description

μChiller is the Carel solution for complete management of air/water and water/water chillers and heat pumps. The maximum configuration manages 2 compressors per circuit (On/Off or BLDC), up to a maximum of 2 circuits (using an expansion card for the inputs and outputs on circuit 2). The distinctive element of μChiller is complete control of high-efficiency units through integrated management of electronic expansion valves (ExV) and brushless DC compressor, thus ensuring greater compressor protection and reliability, together with high unit efficiency. The user terminal allows wireless connectivity with mobile devices and is integrated into the panel-mounted models, or purchased separately on DIN rail mounted models. The CAREL “APPLICA” app, facilitates configuration of the parameters and unit commissioning in the field. The operation of μChiller is described in the user manual + 0300053EN downloadable, even prior to purchase, from the website www.carel.com.

CODES					
Cod.	Assembly	Connectivity	Compressor management	Type (*)	Electronic expansion valve (ExV) management
UCHBP00000190	panel	NFC	On-Off	S	bipolar: with EVDevo driver
UCHBP00000200	panel	NFC, BLE	On-Off	S	bipolar: with EVDevo driver
UCHBD00001230	DIN rail	-	On-Off	S	bipolar: with EVDevo driver
UCHBDE0001150	DIN rail	-	On-Off	E	unipolar: built-in bipolar: with EVDevo driver
UCHBDH0001150	DIN rail	-	On-Off, BLDC	HE	unipolar: built-in bipolar: with EVDevo driver
UCHBE00001230: 2nd circuit expansion	DIN rail	-	On-Off, BLDC	-	bipolar: with EVDevo driver
UCHBE00001150: 2nd circuit expansion	DIN rail	-	On-Off, BLDC	-	unipolar: built-in bipolar: with EVDevo driver

(*) Type: S=standard, E = enhanced, HE = high efficiency

USER TERMINAL	
	key 1 Keypad 2 Main field 3 Icons: device status & operating mode

Icon	Function	On	Flashing
	System pump	Active	Manual operation
	Source device status (pump/fan)	Active	Manual operation
	Compressor status	Active	Manual operation (with ExV)
	Frost protection heater	Active	-
	Operating mode	Heating	-
		Cooling	High water temperature alarm
		Defrost	Dripping after defrost
		Free cooling	-
	Service	Service request on exceeding operating hours	Serious alarm, action required by qualified personnel

Keypad	
Button	Function
UP	Navigation: previous parameter Parameter setting: increase value
DOWN	Navigation: next parameter Parameter setting: decrease value displayed.
	MAIN MENU: Pressed briefly: unit overview display Pressed and held (3 s): access user profile parameters (set point, unit on-off, ...)
Alarm	Pressed briefly: display active alarms and mute buzzer. Pressed and held (3 s): reset alarms.
PRG	During navigation: access the parameter setting menu During parameter setting: • pressed briefly: confirm the value • pressed and held (3 s): return to the main menu

MOBILE DEVICE

The "Applica" app can be used to configure the µChiller controller from a mobile device (smartphone, tablet), via NFC (Near Field Communication) or BLE (Bluetooth Low Energy). Procedure (modify parameters):

1. download the CAREL "Applica" app for Android and o iOS devices;
2. (on the mobile device) activate NFC/Bluetooth communication and data connection;
3. open Applica;

Using NFC

- move the mobile device near to the user terminal, maximum distance 10 mm, so as to recognise the configuration (Fig. 2 - ref. A);
- enter the password (*);
- set the parameters as needed;
- move the mobile device near to the user terminal again to upload the configuration parameters (Fig. 2 - ref. B);

Using BLE

- move the mobile device near to the user terminal, maximum distance 10 m, to recognise the configuration (Fig. 2 - ref. C);
- enter the password (*);
- set the parameters as needed.

(*) pre-assigned by the chiller manufacturer to allow maintenance only by authorised service technicians.

Important: during the first connection, Applica aligns itself with the software version on the µChiller controller via a cloud connection; this means a mobile data connection is needed at least for this first connection.

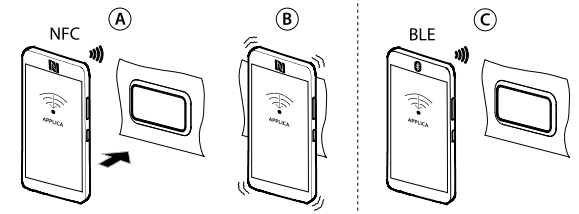


Fig. 2

COMMISSIONING

Note: for further information see user manual cod. +0300053EN. Once the Carel "Applica" app has been installed and opened (see the paragraph "Mobile device", proceed as follows:

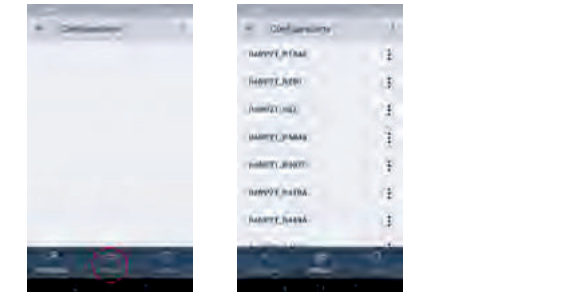
ALL MODELS:

1. With Bluetooth devices, access the Service menu by clicking the icon at the bottom right. With NFC devices, the Service menu is already displayed by default;
2. click "Set-up"--> "Configurations"--> "Defaults" (figure);



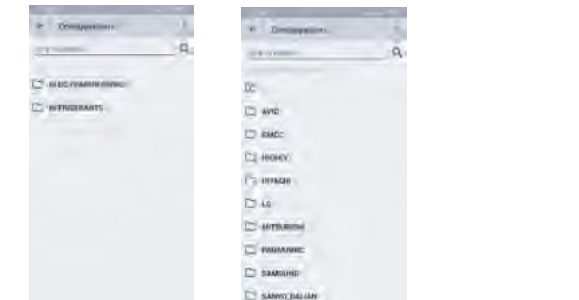
MODELS: STANDARD, ENHANCED (Note: see the code table)

3. select the refrigerant used in the unit;



MODELS: HIGH EFFICIENCY (Note: see the code table)

3. select the compressor used in the unit;



ALL MODELS:

4. apply the selected configuration via NFC or Bluetooth. *The refrigerant has now been correctly configured (models: Standard, Enhanced)/ the model of BLDC compressor and the refrigerant have been correctly configured (models: High Efficiency);*
5. continue configuring the unit by selecting the "Unit set-up" menu, pressing the PREV / NEXT buttons to scroll through all of the configuration parameter pages;
6. apply the parameters configured via NFC / Bluetooth to the controller.

ALARM TABLE

Code	Description
Unit	
A001	no. permanent memory writes
A003	remote alarm from digital input
A005	user return water temperature probe
A008	user pump 1 overload
A10	flow switch (with user pump 1 active)
A12	user pump group
A14	user pump 2 maintenance
A16	source return water/air temperature probe
A18	free cooling warning
A002	permanent memory writes
A004	remote set point probe
A006	user delivery water temperature probe
A009	user pump 2 overload
A11	flow switch (with user pump 2 active)
A13	user pump 1 maintenance
A15	high chilled water temperature
A17	source pump 1 maintenance
A19	Circuit 1: condensation pressure probe

Circuit 1	
A20	condensing temperature probe
A22	evaporation temperature probe
A24	suction temperature probe
A26	high condensing pressure/temperature transducer
A28	frost protection evaporation temperature
A31	compressor 2 overload
A33	compressor 2 maintenance
A32	compressor 1 maintenance
A34	source fan maintenance
A35	LowSH
A37	MOP
A39	emergency closing
A41	offline
A42	envelope alarm + zone alarm
A21	evaporation pressure probe
A23	discharge temperature probe
A25	high pressure switch
A27	low pressure transducer
A30	compressor 1 overload
A36	LOP
A38	motor error
A40	incomplete valve closing
A44	failed start-up
A46	high gas discharge temp.
A48	alarm + error code

BLDC Circuit 1	
A43	high pressure differential at start-up
A45	Low pressure differential
A47	offline
A49	offline
A51	permanent memory writes

Speed Drive Circuit 1	
A52	condensation pressure probe
A54	evaporation pressure probe
A56	discharge temperature probe
A58	high pressure switch

Slave unit	
A53	condensing temperature probe
A55	evaporation temperature probe
A57	suction temperature probe
A59	high condensing pressure/temperature transducer
A61	frost protection evaporation temperature
A63	compressor 1 overload
A65	compressor 1 maintenance
A67	source fan maintenance
A64	compressor 2 overload
A66	compressor 2 maintenance

EVD Circuit 2	
A68	LowSH
A70	MOP
A72	emergency closing
A74	offline
A69	LOP
A71	motor error
A73	incomplete valve closing
A75	circuit 2: envelope alarm + zone alarm

BLDC Circuit 2	
A76	high pressure differential at start-up
A78	low pressure differential
A79	High gas discharge temperat.

Speed Drive Circuit 2	
A80	offline
A87	EVD Evolution not compatible
A81	alarm + error code

BLDC Circuit 1	
A52	condensing temperature probe
A54	evaporation temperature probe
A56	discharge temperature probe
A58	high pressure switch
A60	low pressure transducer
A61	frost protection evaporation temperature
A63	compressor 1 overload
A65	compressor 1 maintenance
A67	source fan maintenance
A64	compressor 2 overload
A66	compressor 2 maintenance

EVD Circuit 2	
A68	LowSH
A70	MOP
A72	emergency closing
A74	offline
A69	LOP
A71	motor error
A73	incomplete valve closing
A75	circuit 2: envelope alarm + zone alarm

BLDC Circuit 2	
A76	high pressure differential at start-up
A78	low pressure differential
A79	High gas discharge temperat.

Speed Drive Circuit 2	
A80	offline
A87	EVD Evolution not compatible
A81	alarm + error code

TECHNICAL SPECIFICATIONS (for both models)

Technical specifications, µChiller PANEL and DIN

Dimensions	See figures
Case	Polycarbonate
Assembly	UCHBP*: panel models; UCHBD*: DIN rail models
Ball test temp.	125°C
Ingress protection	IP20 (rear, panel model) IP65 (front, panel model) IP00 (DIN version)
Front cleaning	Use soft, non-abrasive cloth and neutral detergent or water

Environmental conditions

Operating conditions	-20T60°C, <90% RH non-condensing.
Storage conditions	-40T85°C, <90% RH non-condensing.

Electrical characteristics	
Rated power supply voltage	24 Vac/dc (provided by SELV or PELV Class 2 power supply)
Oper. power sup. voltage	24 Vac/dc, +10% -15%;
Input frequency (AC)	50/60Hz
Max current draw	Panel and DIN without ExV valve driver: 600mA Arms DIN with ExV valve driver: 1.25 Arms Panel and DIN without ExV valve driver: 15 VA DIN with ExV valve driver: 30 VA
Absorbed power for transformer sizing	precision ± 50ppm; date/time retention after shutdown: 72h
Clock	
Software class and struc.	A
Environmental pollution	3
Class of protection	To be incorporated into class I or II appliances
against electric shock	
Type action and discon.	1.C
Rated impulse voltage	relay output: 4kV; 24 V input: 0.5 kV
Surge immunity category	relay output: III; 24 V input: II
Control device construc.	Device to be incorporated
Terminal block	Plug-in male-female. Wire sizes: see the connector table
Purpose of the control	Electrical operating control

User interface

Buzzer	Panel: integrated DIN: not included on the controller, integrated on the user terminal
Display	LED 2 rows, decimal point, and multi-function icons

Connectivity

NFC	Max distance 10mm, variable according to the mobile device used
Bluetooth Low Energy	Max distance 10m, variable according to the mobile device used
BMS serial interface	Modbus over RS485, not opto-isolated
FieldBUS serial interface	Modbus over RS485, not opto-isolated
HMI interface	Modbus over RS485, not opto-isolated

Analogue inputs (Lmax=10m)

Ref.	
J2	S1, S2, S3: NTC S5: 0-5V rat /4-20 mA / NTC S4: 0-5V rat /4-20 mA / NTC S6: NTC /0-5Vrat /0-10V /4-20mA
J3	S7: NTC - avail. only on DIN version
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