

MCH200*03 - μC²SE: 用于带2/4压缩机的冷水机组(一个或两个回路) 控制器/ Electronic controller for chillers with 2/4 compressors (one and two circuits)



配置图示例 / Configuration example

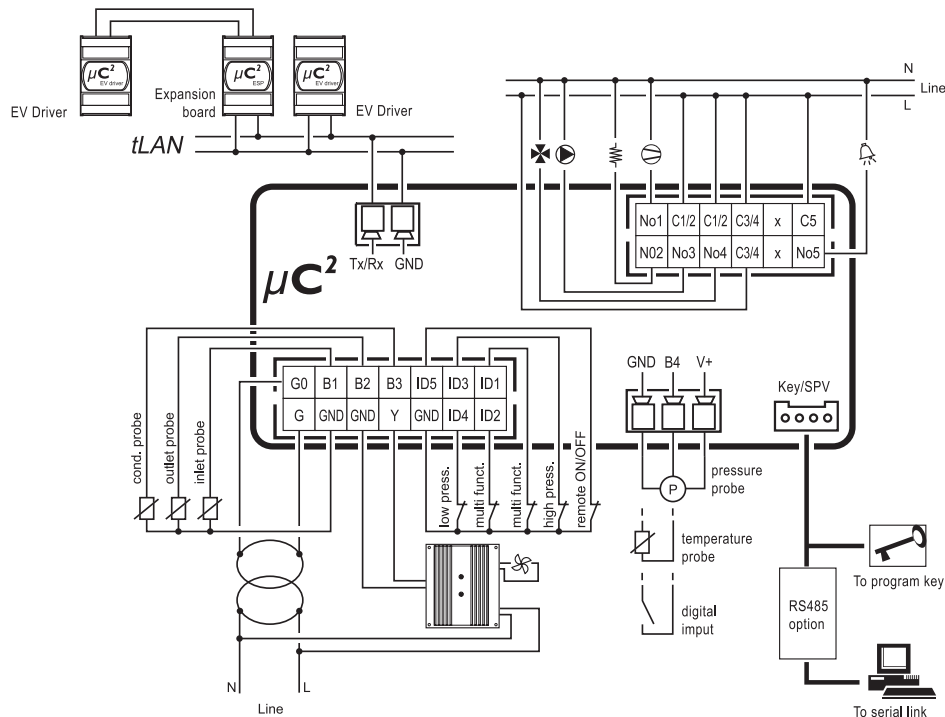


Fig.1

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前言

μC²SE是可编程电子控制器，用于全面管理一个回路(两台封闭式压缩机)的冷水机组、热泵、冷凝机组和风/风机组。使用扩展卡 (代码MCH200002*) 可管理多达两个回路和四台封闭式压缩机。

连接器的特点

阴性接头(MCH2CON0**)*及线缆可以从CAREL单独购买或者从厂商Molex购买：

Molex端子代码	插针数量	Molex触点代码	允许的线缆横截面积
39-01-2120	12	39-00-0077	AWG16 (1.25 mm²)
39-01-2140	14	39-00-0038	AWG18-24 (0.90-0.35 mm²)
		39-00-0046	AWG22-28 (0.22-0.06 mm²)

最大通/断数： 25个循环。

卡乐可提供预先压好的线材组件，代码是MCHSMLC***。

装配说明

NTC/公制比例传感器的最大长度：	10 m
开关量输入连接线缆的最大长度：	10 m
电源输出连接线缆的最大长度：	5 m
风扇控制输出连接线缆的最大长度：	5 m
电源线的最大长度：	3 m
tLAN连接线的最大长度：	10 m

某些输入输出的使用是由参数的配置来确定的。

配置图示例

连接端子排	连接端口	描述
14针	G-G0	μC²SE电源
	B1-GND	环境温度传感器（风-风机组），蒸发器进水温度传感器（水冷机组），送风温度传感器
	B2-GND	蒸发器出水温度传感器，防冻加热器控制
	B3-GND	水冷压力传感器，辅助电加热
	ID1-GND	通过参数P8设置输入功能（参考用户手册）
	ID2-GND	通过参数P9设置输入功能（参考用户手册）
	ID3-GND	高压开关
	ID4-GND	低压开关
	ID5-GND	来自外部触点的开机/待机信号，或作为冷凝机组逆向循环运行信号
	Y-GND	PWM信号输出，用作冷凝风机控制
12针	No1- C1/2	压缩机1
	No2- C1/2	辅助电加热/四通阀1（参数H11）
	No3- C3/4	蒸发器水泵/（风机）（风/风机组）（参数H11）
	No4- C3/4	压缩机2/压缩机1能级控制/四通阀1（参数H11）
	No5- C5	报警
可拆卸2针端子(tLAN)	TxRx - GND	配有一个扩展板可以连接到μC2上用于控制第二回路（代码MCH00002*）和电子膨胀阀驱动模块EVD000040*
可拆卸3针端子(B4/IDB4)	B4-GND(V+ 公制有源压力传感器的电源端)	开关量输入IDB4（参数P13）/公制冷凝压力传感器/室外温度传感器。通过参数*/4"进行配置

参数化编程钥匙选件

在断开控制器电源的情况下，把PSOPZKEY00插入KEY/SPV 接口。使用可拆卸12针接头（继电器）连接或断开串行选件和编程钥匙。

注意：配置跳线必须插在A位置（参考MCH200485*的技术文档）

监控选件

连接串行选件（MCH200485*）至接口 KEY/SPV

警告：

- 如果使用寿命单个变压器给μC²SE 和其附件供电，为了避免损坏设备，把不同控制器或主控制板上的所有G0端口连接到变压器的次线圈的同一端口上；所有G端口连接到变压器次圈的另一个端口上。
- 对于居住环境中使用，需要使用屏蔽电缆用于tLAN连接（EN 55014-1）。
- 避免V+和GND间短路，不要损坏设备。
- 把电力电缆与传感器，开关量输入和串行电缆分开。
- 使用单独的变压器给电子控制器供电。

抗电击保护和维护注意

在装配，维护和更换设备前需要断开电源。系统由控制板（MCH200*03*）和其它的选件卡（MCH200002*，MCH200485*，MCHRTF****，CONVONOFF*，CONV0/10a*，EVD000040*），这些设备是整合到I类或II类设备内。抗电击防护等级由制造商根据系统的控制设备整合。为避免因错误的接线引起短路；制造商必须确保设备内的控制内置含有该方面的保护。

Thank you for your choice. We trust you will be satisfied with your purchase !

Introduction

The μC² SE is an electronic controller for the complete management of chillers, heat pumps, condensing units and air/air units with one circuit and 2 hermetic compressors. The expansion board (code MCH200002*) allows the management of up to 2 circuits and 4 hermetic compressors.

Characteristics of the connectors

The connectors can be purchased separately from CAREL (MCH2CON0**) or from the manufacturer, Molex:

Molex connector code	number of pins	Molex contact code	Cross-section of the cables allowed
39-01-2120	12	39-00-0077	AWG16 (1.25 mm²)
39-01-2140	14	39-00-0038	AWG18-24 (0.90-0.35 mm²)
		39-00-0046	AWG22-28 (0.22-0.06 mm²)

Maximum number of connections/disconnections: 25 cycles. The pre-wired kits MCHSMLC*** are also available.

Assembly instructions

Maximum connection cable length, NTC/Ratiometric probes:	10 m
Maximum connection cable length, digital inputs:	10 m
Maximum connection cable length, power outputs:	5 m
Maximum connection cable length, fan control output:	5 m
Maximum length, power cables:	3 m
Maximum length of tLAN connection cables:	10 m

The use of some inputs/outputs depends on the configuration of the parameters.

Configuration example

Connector	Connection	Meaning
14 pin	G-G0	μC2 power supply
	B1-GND	Ambient air probe (air-air units), evaporator water inlet probe (water chillers), outlet air probe
	B2-GND	Evaporator water outlet probe, anti-freeze heater control
	B3-GND	Condensing pressure control probe, auxiliary heater
	ID1-GND	Multifunction input configured by parameter P8 (see user manual)
	ID2-GND	Multifunction input configured by parameter P9 (see user manual)
	ID3-GND	High pressure switch
	ID4-GND	Low pressure switch
	ID5-GND	ON/STANDBY from external contact, reverse cycle in operation as condensing unit
	Y-GND	PWM output for condenser fan module operation
12 pin	No1- C1/2	Compressor 1
	No2- C1/2	Auxiliary heater/ reversing valve 1 (parameter H11)
	No3- C3/4	Evaporator pump /(fan) (air/air units) (parameter H11)
	No4- C3/4	Compressor 2 / capacity-control comp. 1 / reversing valve 1 (parameter H11)
	No5- C5	Alarm
removable 2 pin (tLAN)	TxRx - GND	It allows connecting μC2 with the expansion board for the management of the second circuit (code MCH00002*) and valve driver module EVD000040*
removable 3 pin (B4/IDB4)	B4 - GND (V+ power supply ratiometric probe)	Digital input IDB4 (parameter P13)/ Ratiometric condensing pressure probe / Outside temperature probe Can be configured by parameter */4"

Parameter programming key option

With the controller OFF, insert the key PSOPZKEY00 in the connector KEY/SPV. Connect and disconnect the serial and programming key options with the 12-pin connector (relay) removed.

Note: the configuration jumper must be inserted in position A (technical leaflet MCH200485*)

Supervisor option

Connect the serial option (code MCH200485*) to the connector KEY/SPV.

Warnings

- If using a single power transformer for the μC²SE and the accessories, connect all the G0 terminals on the various controllers or boards to the same terminal on the secondary, and all the G terminals to the other terminal on the secondary, to avoid damaging the instrument;
- For use in residential environments, a shielded cable (conductor + shield) is required for the tLAN connections (EN 55014-1);
- Avoid short-circuits between V+ and GND so as to not damage the instrument;
- Separate the power cables (relay outputs) from the probe, digital input and serial cables;
- Use the power transformer exclusively dedicated to the electronic controllers.

Protection against electric shock and warnings for maintenance

Disconnect the power supply before working on the board during the assembly, maintenance and replacement operations. The system made up of the control board (MCH200*03*) and the other optional cards (MCH200002*, MCH200485*, MCHRTF****, CONVONOFF*, CONV0/10A*, EVD000040*) represents a control device to be incorporated in class I or class II equipment. The class of protection against electric shock depends on how the control device is integrated into the unit made by the manufacturer. The protection against short-circuits, due to defective wiring, must be guaranteed by the manufacturer of the equipment that the control device is built into.

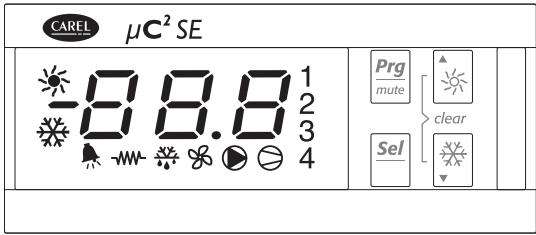


Fig.2

尺寸和安装(mm) / Dimensions and positioning (mm)

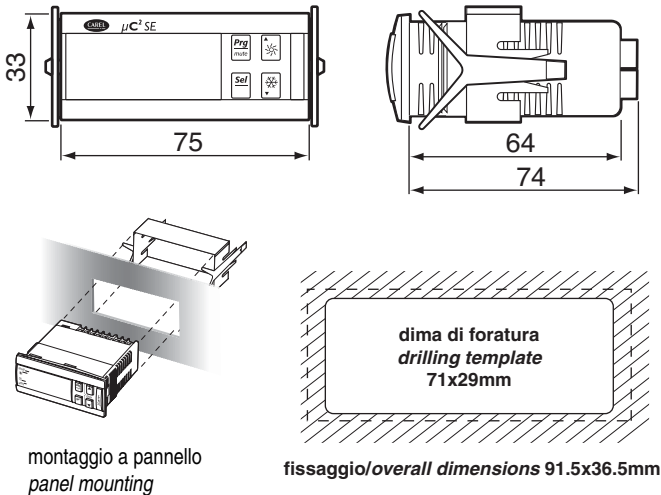


Fig. 3

继电器触点电气特性

Electrical specifications of the relay contacts

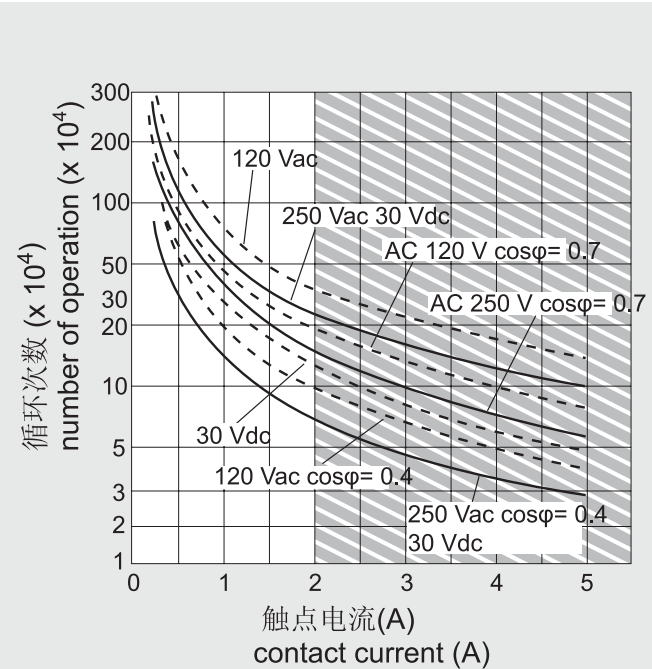


Fig. 4

用户界面

三位数码显示（有正负号和小数点），黄色运行信号和红色报警信号。

图标	颜色	含义	参考回路
1,2	黄色	LED灯亮	
3,4	黄色	压缩机1和/或2开机	启动请求
☉	黄色	至少有一个压缩机开机	启动请求
🌀	黄色	水泵/出风风机开启	1和/或2
❄️	黄色	冷凝风机开机	1和/或2
❄️	黄色	除霜动作	启动请求
🔥	黄色	电加热工作	1和/或2
🔥	红色	报警动作	1和/或2
❄️	黄色	热泵模式 (P6=0)	1和2
❄️	黄色	制冷模式 (P6=0)	1和2

按键功能

按键	机组状态	按键按压模式
Prg mute	上载默认值 可进入编程区域，直到退出（保存更改至E2PROM） 在报警事件中，蜂鸣器消音（如存在），取消报警继电器 访问直接参数	机组上电时按压 按压一次 按压一次 按压5秒
Sel	选择编程项，显示直接参数的值/确认参数的更改 输入口令后的编程参数	按压一次 按压5秒
Prg mute + Sel		
▲ ❄️	在编程区域选择高级项目 增加数值 从待机状态转成制冷状态（P6=0）和相反	按压一次或一直按 按压一次或一直按 按压5秒
❄️ ▼	在编程区域选择低级项目 减少数值 从待机状态转成热泵状态（P6=0）和相反	按压一次或一直按 按压一次或一直按 按压5秒
▲ ❄️ + ▼	手动报警复位 立即复位小时计时器	按压5秒 按压5秒
Sel + ▲ ❄️	两个回路强制手动除霜	按压5秒

技术参数

“A组”在下面的技术参数中定义成如下输出组：阀，水泵，压缩机，电加热器。

电源	24 Vac, -15% ~ +10%; 50/60 Hz 最大电流输出: 3 W μC2回路上的所配保险丝为: 315 mA
12针接头 继电器	每一个继电器输出的最大电流为2A; 有一个输出可扩大为3 A 在250 Vac情况下: EN60730: 电阻: 3 A; 电感: 2 A cosφ= 0.4 60000次循环 UL: 电阻: 3 A, 1 FLA, 6 LRA cos φ= 0.4 30000次循环 对于更多信息参看图5特性图 开关循环间（每一个继电器）的最小间隔: 12秒 继电器的微型开关类型: 1 C 继电器A组间的绝缘: 基本型 继电器A组与低压绝缘部间的绝缘: 增强型 继电器A组与信号继电器间的绝缘: 初级 信号继电器与低压绝缘部间的绝缘: 增强型 继电器与前面板间的绝缘: 增强型
开关量输入ID1~ID5, IDB4	电气标准: 无源干触点 对地闭合电流: 5 mA 最大闭合电阻: 50 W
模拟量输入	B1, B2, B3, B4: 卡乐NTC型温度传感器（25 °C时10 kW） 反应时间取决于所使用的元件，典型数值是90秒 B4: NTC型传感器（25 °C时10 kW）或卡乐0~5 V电源温度传感器或无源触点型公制压力传感器
风机输出	卡乐MCHRTF****, CONVONOFF*和CONVO/10A*的控制信号 脉冲信号调节（设置振幅）或值日循环调节，参考用户手册的配置参数部分 无负载电压: 5V ± 10% 短路电流: 30 mA 最小输出负载: 1 kW
前面板防护等级	IP55
存储条件	-10~70°C - 湿度80% r.H. 无凝露
运行条件	-10~50°C - 湿度<90% r.H. 无凝露
污染等级	正常
阻燃特性	D (UL94 V0)
绝缘材料的PTI	≥ 250 V
软件结构和等级	A
绝缘部件抗电击周期	长

注意：所有继电器的公共端（C1/2, C3/4）必须连接在一起，参看图1。

功能方面技术参数

模拟量输入精度	温度传感器: 范围-40~80°C, 0.1 °C
温度测量误差	范围 -20~20 °C, ±0.5 °C (不包括传感器) 范围 -40~80 °C, ±1.5 °C (不包括传感器)
压力测量误差	输入范围为0.5~4.5 Vdc的电压误差为± 2%(不包括传感器)。根据参数的设置/9,/10,/11,/12, 转换的数值可能有变化（参考用户手册）

User interface

Green 3 digit display (plus sign and decimal point), amber operating signals and red alarm signal.

Symbol	Colour	Meaning with LED on	with LED flashing	Reference refrigerant circuit
1,2	Amber	Compressor 1 and/or 2 On	Start request	1
3,4	Amber	Compressor 3 and/or 4 On	Start request	2
☉	Amber	At least one compressor on		1 and/or 2
🌀	Amber	Pump/air outlet fan on		1 and/or 2
❄️	Amber	Condenser fan on		1 and/or 2
❄️	Amber	Defrost active	Defrost request	1 and/or 2
🔥	Amber	Heater on		1 and/or 2
🔥	Red	Alarm active		1 and/or 2
❄️	Amber	Heat pump mode (P6=0)		1 and 2
❄️	Amber	Chiller mode (P6=0)		1 and 2

Functions of the buttons

Button	Unit status	Button press mode
Prg mute	Loading default values Go up a sub-group inside the programming area, until exiting (saving changes to E2PROM) In the event of alarms, mute the buzzer (if present) and deactivate the alarm relay	Press at power on Press once Press once
Sel	Access the direct parameters Select item inside the programming area and display value of direct parameters / confirm the changes to the parameter Program parameters after entering password	Press for 5 s Press once
Prg mute + Sel		Press for 5 s
▲ ❄️	Select top item inside the programming area Increase value Switch from standby to chiller mode (P6=0) and vice-versa	Press once or press and hold Press once or press and hold Press for 5 s
❄️ ▼	Select bottom item inside the programming area Decrease value Switch from standby to heat pump mode (P6=0) and vice-versa	Press once or press and hold Press once or press and hold Press for 5 s
▲ ❄️ + ▼	Manual alarm reset Immediately reset the hour counter (inside the programming area)	Press for 5 s Press for 5 s
Sel + ▲ ❄️	Force manual defrost on both circuits	Press for 5 s

Technical specifications

“Group A” is defined in the following specifications as the grouping of the following outputs: valve, pump, compressor, heater.

Power supply	24 Vac, range -15% ~ +10%; 50/60 Hz Maximum current output: 3 W Fuse to be fitted in series with the power supply of the μC2: 315 mA
12-pin connector	Max current 2 A for each relay output, extendable to 3 A for one output
Relays	Max current at 250 Vac: EN60730: Resistive: 3 A, Inductive: 2 A cosφ= 0.4 60000 cycles UL: Resistive 3 A, 1 FLA, 6 LRA cos φ= 0.4 30000 cycles For further information, refer to the characteristic shown in Fig. 5 Minimum interval between switching cycles (each relay): 12 s (the manufacturer of the unit that the device is built into must ensure the correct configuration to respond to this specification) Type of micro-switching of the relay: 1 C Insulation between relays in group A: functional Insulation between relays in group A and the very low voltage parts: reinforced Insulation between relays in group A and the signal relay: primary Insulation between the signal relay and the very low voltage parts: reinforced Insulation between relays and the front panel: reinforced
Digital inputs ID1 to ID5, IDB4	Electrical standard: voltage-free contact Closing current to ground: 5 mA Maximum closing resistance: 50 W
Analogue inputs	B1, B2, B3, B4: CAREL NTC temperature probes (10 kW at 25 °C) The response time depends on the component used, typical value 90 s B4: NTC temp. probes (10 kW at 25 °C) or CAREL 0 to 5 V or free contact ratiometric pressure probes
Fan output	Control signal for CAREL MCHRTF****, CONVONOFF* and CONVO/10A* modules Modulation of impulse position (set amplitude) or modulation of the duty-cycle. Refer to the user manual for the configuration of the parameters Loadless voltage: 5V ± 10% Short-circuit current: 30 mA Minimum output load: 1 kW
Front panel index of protection	IP55
Storage conditions	-10/70°C -- humidity 80% r.H., non-condensing
Operating conditions	-10/50°C - humidity <90% r.H., non-condensing
Degree of pollution	normal
Cat. of resist. to heat and fire	D (UL94 V0)
PTI of the insulating materials	≥ 250 V
Class and structure of the software	A
Period of electrical stress across the insulating parts	long

Note: All the relays must have the commons (C1/2, C3/4) connected together, as shown in Fig. 1.

Functional specifications

Resolution of analogue inputs	Temperature probes: range -40/80°C, 0.1 °C
Temperature measurement error	Range -20/20 °C, ±0.5 °C (excluding probe) Range -40/80 °C, ±1.5 °C (excluding probe)
Pressure measurement error	The voltage % error in the input range of 0.5 to 4.5 Vdc is ± 2% (excluding probe). The error in the converted value may vary according to the setting of the parameters /9,/10,/11,/12 (see user manual)