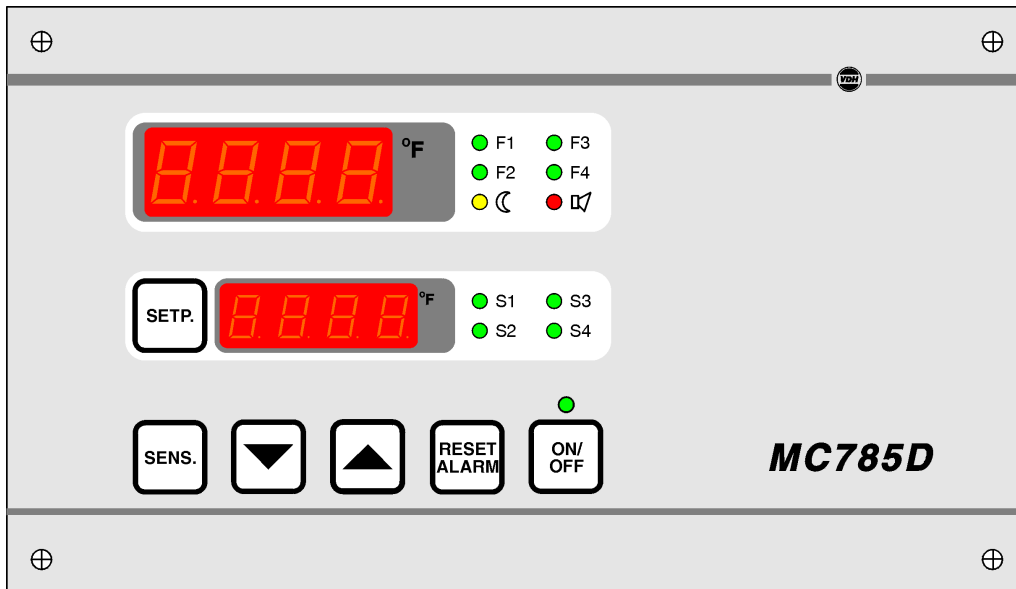


MC 785D °F

Operating Manual wall mounting



Description:	MC 785D 120V °F Thermostat	Doc.nr.:	060172		
Type:	MANUAL	Number of pages:	15	Version:	V1.0
File:	Do060172 MC785D 120V °F v10 EN.wp8	By:	BJB	Date:	26-01-2006
Software:	MC785D F Version: V1.00				
VDH Products BV - Roden - Holland		Signed:		File:	Doc'06

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1 Technical specifications.

General

Type	: MC 785D
Wall mounting:	
Housing	: Grey plastic
Material	: Polystyrol 454h KG 2 natur BASF
Dimensions	: 213 x 180 x 85mm (whd)
Front	: Polycarbonate (IP-44)
Range	: -40/+120°F per 0,1°F
Supply	: 120 Vac; 50/60 Hz (-10/+5%).
Used power	: 9 VA
Store temperature	: -20/+60°C
Operation temperature	: -20/+50°C
Operating rel. humidity	: 10/+90 % RH not condensing
Accuracy	: ± 0,5 % of the range

Front

Display	: 4-number digital display for temperature read-out 4-number digital display for temperature setpoint
LED	: F1 = LED Thermostat 1 active F2 = LED Thermostat 2 active F3 = LED Thermostat 3 active F4 = LED Thermostat 4 active ☾ = LED Night mode active ☒ = LED Alarm active S1 = LED Setpoint 1 in display S2 = LED Setpoint 2 in display S3 = LED Setpoint 3 in display S4 = LED Setpoint 4 in display
Keys	: ON/OFF = On/Off key controller SETP = Setpoint push button ▲ = Up key ▼ = Down key PRG = Program key SENS = Sensor read-out key

In- and outputs

Sensors	: Temperature sensor 1 (Pt-100, 3-wire to DIN/IEC 751) Temperature sensor 2 (Pt-100, 3-wire to DIN/IEC 751) Temperature sensor 3 (Pt-100, 3-wire to DIN/IEC 751) Temperature sensor 4 (Pt-100, 3-wire to DIN/IEC 751)
Digital inputs	: Night offset input (potential free input contact) External alarm input (potential free input contact)
Analog output	: 2x 0/+10Vdc, Rbmin 10Kohm, programmable.
Relay outputs	: RY1 Alarm (C/NO/NC, 250Vac/10A not inductive) Normally C-NO is closed, at alarm C-NC is closed. The next relays have a central common; RY2 Relay 2 programmable (NO, 250Vac/10A not inductive) RY3 Relay 3 programmable (NO, 250Vac/10A not inductive) RY4 Relay 4 programmable (NO, 250Vac/10A not inductive) RY5 Relay 5 programmable (NO, 250Vac/10A not inductive)

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2 Functional specifications.

To the MC 785D thermostat a maximum of four temperature sensors can be connected. As more than one sensor is set active the MC785D controls on the average temperature of these sensors.

A maximum for four different setpoints can be programmed.

The MC785D thermostat has standard functions from 1 thermostat with 1 setpoint and 1 relay output until 4 thermostats with 4 setpoints and 4 relay outputs. Also two-, three- or four-steps thermostat with one setpoint available.

The MC 785D has the control functions cooling or heating. Also has the controller an alarm relay, which becomes active as soon as the alarm levels are exceeded, a sensor is broken or the external alarm input is closed.

The MC 785D has two analog outputs with a range of 0/+10Vdc. The function of these outputs can be programmed as measuring signal, setpoint signal or a P(I) control for the cooling or heating.

The controller has two digital input contacts. The first contact is used as night offset input, the second contact as external alarm.

The above mentioned settings are made via the Internal Parameters.

To allow also other combinations between setpoints, sensor and relays, there is the Advanced Programming. This mode is only advisable for advanced users.

3 Control of the thermostat.

Normally the displays show the measured temperature and the selected setpoint.

Switching the thermostat on and off.

With the **ON/OFF** key the MC 785D can be switched on and off. Is the thermostat switched off, all displays are off. No control function is active.

Select and change temperature setpoint.

With the **UP** and **DOWN** keys the desired setpoint can be selected. The LED's next to the setpoint display indicate which setpoint is shown.

By pushing the **SETPOINT** key, the setpoint starts flashing. With the **UP** and **DOWN** keys the setpoint can be changed. By pressing the **SETPOINT** key again, the new setpoint is accepted.

Read-out and switching sensors on and off.

By pressing the **SENS** key the temperature of the first sensor is shown in the upper display.

The lower display shows the number of the sensor and of the sensor is switched on or off. 'S1on' means that the temperature of sensor 1 is shown and that the sensor is switched on.

Sensors that are switched on are used for the control, switched off sensors not. If more sensors for a thermostat are switched on, the control is based on the average of those sensors.

If during the read-out of a sensor is pressed on the **SETP** key, a sensor can be switched on or switched off.

By pressing the **SENS** key once again, the next sensor is shown. After all sensors are shown, the average measured temperature and the setpoint are shown in the display.

Reset the alarm.

As soon as an alarm situation occurs and an error message appears on the display can, by pressing the **RESET ALARM** key, the alarm be reset.

The error message remains in the display, until the cause of the error is solved.

Day/night input.

If the **NIGHT** input is closed, the MC 785D turns to the night mode. The **NIGHT** LED will light. The setpoints are increased with the night offset.

External alarm input.

If the external alarm input is closed, an alarm message "FE" appears in the display. The alarm relay is activated. By pressing the **RESET ALARM** key, the alarm be reset. The error message remains in the display, until the cause of the error is solved.

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4 Programming internal settings.

By pressing the **RESET ALARM** and **SENS** key simultaneously for more than 5 seconds, the Internal Parameter menu is entered. The temperature display shows a P with a number. With the **UP** and **DOWN** key the desired parameter can be selected.

The setpoint display shows the value of the parameter. By pressing the **SETPOINT** key simultaneously with the **UP** or **DOWN** key, the value can be adjusted.

The parameter table shows the normal programming functions of the thermostat. It is possible to make other combinations between sensors, setpoints and relays. For these advanced programming function please see chapter 8 'Advanced Programming'.

If during 30 seconds no key is touched, the display returns to the normal operating mode.

Parameter table.

Number	Description	Range	Value	Default
Function of the thermostat				
P 01	Function thermostat 0 = 1 setp, 1 relay (D) 1 = 1 setp, 2 relay (D21) 2 = 2 setp, 2 relay (D22) 3 = 1 setp, 3 relay (D31) 4 = 3 setp, 3 relay (D33) 5 = 1 setp, 4 relay (D41) 6 = 4 setp, 4 relay (D44)	0..6	-	0
Settings of the sensors				
P 11	Sensor 1 0 = absent 1 = present	0..1	-	0
P 12	Sensor 2	0..1	-	0
P 13	Sensor 3	0..1	-	0
P 14	Sensor 4	0..1	-	0
P 15	Offset temp. sensor 1	-20..+20	°F	0.0
P 16	Offset temp. sensor 2	-20..+20	°F	0.0
P 17	Offset temp. sensor 3	-20..+20	°F	0.0
P 18	Offset temp. sensor 4	-20..+20	°F	0.0
Setting of the relays				
P 21	Function relay 2 0 = cooling 1 = heating	0..1	-	0
P 22	Differential relay 2	0.1..30.0	°F	1.0
P 23	Offset relay 2	-30..+30	°F	0.0
P 24	Function relay 3	0..1	-	0
P 25	Differential relay 3	0.1..30.0	°F	1.0
P 26	Offset relay 3	-30..+30	°F	0.0
P 27	Function relay 4	0..1	-	0
P 28	Differential relay 4	0.1..30.0	°F	1.0
P 29	Offset relay 4	-30..+30	°F	0.0
P 30	Function relay 5	0..1	-	0
P 31	Differential relay 5	0.1..30.0	°F	1.0
P 32	Offset relay 5	-30..+30	°F	0.0

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Number	Description	Range	Value	Default
Setting of the alarm				
P 41	Type temperature alarm 0 = No alarm 1 = Absolute alarm 2 = Relative to setpoint	0..2	-	1
P 42	Minimum alarm temperature	-	°F	-40.0
P 43	Maximum alarm temperature	40.0..+120.0	°F	+120.0
P 44	Minimum alarm delay	-	minutes	0
P 45	Maximum alarm delay	40.0..+120.0	minutes	0
P 46	Temperature control off during minimum alarm	0..99	-	0
P 47	Temperature control off during minimum alarm	0 = no 1 = yes	-	0
P 48	Temperature control off if all sensors at fault	0 = no 1 = yes	-	0
P 49	Control off during external alarm	0 = no 1 = yes 0 = no 1 = yes	-	0
Display and setpoint				
P 51	Minimum setpoint value	-	°F	-40.0
P 52	Maximum setpoint value	40.0..+120.0	°F	+120.0
P 53	Read-out above -10°F per 1°F	-	-	0
P 54	Read-out below -10°F per 1°F	40.0..+120.0 0 = no 1 = yes	-	1
P 55	Offset night shift	0 = no 1 = yes -30..+30	°F	0.0
Setting analog outputs				
P 61	Function analog output 1 0 = Average control temp. 1 = Setpoint 2 = P(I) cooling 3 = P(I) heating	0..3	-	0
P 62	0 V out at	-100..+200	-	-40.0
P 63	10 V out at	-100..+200	-	+120.0
P 64	Proportional band	0.1..30	-	2.0
P 65	Offset prop. band	-30..+30	-	0.0
P 66	Intergral value (999 gives only P)	1..999	minutes	999
P 71	Function analog output 2 0 = Average control temp. 1 = Setpoint 2 = P(I) cooling 3 = P(I) heating	0..3	-	0
P 72	0 V out at	-100..+200	-	-40.0
P 73	10 V out at	-100..+200	-	+120.0
P 74	Proportional band	0.1..30	-	2.0
P 75	Offset prop. band	-30..+30	-	0.0
P 76	Intergral value (999 gives only P)	1..999	minutes	999
Production details				
P 91	Software version number	-	-	-
P 92	Serial number	-	-	-
P 93	Production date	-	year/wk	-

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5 Operation relay outputs.

Function selection of the thermostat.

With parameter P 01 the function of the thermostat is selected.

- 0 (D) = 1-stage thermostat with one setpoint and one relay output.
- 1 (D21) = 2-stage thermostat with one setpoint and two relay outputs.
- 2 (D22) = 2 thermostats each with his own setpoint and relay output.
- 3 (D31) = 3-stage thermostat with one setpoint and two relay outputs.
- 4 (D33) = 3 thermostats each with his own setpoint and relay output.
- 5 (D41) = 4-stage thermostat with one setpoint and two relay outputs.
- 6 (D44) = 4 thermostats each with his own setpoint and relay output.

All these thermostats control on the average temperature off the active sensors.

Operation of the cooling and heating.

For each relay the function cooling or heating can be programmed.

The cooling switches on if the temperature is higher than the **setpoint + offset cooling + differential cooling** and switches off if the temperature is below **setpoint + offset cooling**.

The heating switches on if the temperature is lower than the **setpoint + offset heating - differential heating** and switches off if the temperature is above **setpoint + offset heating**.

Operation of the alarm.

A selection can be made between no alarm, absolute alarm and relative alarm (P 41).

At an absolute alarm an alarm message will follow as soon as one of the active sensor exceeds the alarm levels. The time delay prevents that an alarm will follow if e.h. the door of the cold room is opened shortly.

The relative alarm are linked to the setpoint. A relative maximum alarm follows if one of the active sensors has a temperature which is higher than **setpoint + maximum alarm temperature**, taking the time delay into account. A relative minimum alarm follows if one of the active sensors has a temperature which is lower than **setpoint - minimum alarm temperature**, taking the time delay into account.

Display and setpoint.

The range over which the setpoint can be set, can be limited with parameter P 51 and P52.

Also a read-out per 0,1°F or per 1°F can be selected.

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6 Sensor calibration.

With the parameters P15 to P18 the temperature sensors can be calibrated. Indicates temperature sensor 1 e.g. 0,2°F too much, the offset (P 15) should be lowered with 0,2°F.

7 Alarms.

In normal position the alarm relay is on and drops during alarm. This to give an alarm if there is a power failure. During alarm the alarm LED on the front flashes. Depending on the settings of the Internal Parameters the control will stop or continue.

An alarm can be caused by:

Temperature alarm : tLO = Minimum alarm temperature
tHI = Maximum alarm temperature

External alarm : FE = External alarm

Sensor failure : F1 = No Temperature sensor on Thermostat-1
F2 = No Temperature sensor on Thermostat-2
F3 = No Temperature sensor on Thermostat-3
F4 = No Temperature sensor on Thermostat-4

E1 = Temperature sensor 1 broken

E2 = Temperature sensor 2 broken

E3 = Temperature sensor 3 broken

E4 = Temperature sensor 4 broken

EA = All control sensors at fault

By pressing the **RESET ALARM** key, the alarm relay is reset. The error message will remain in the display until the alarm is solved. Also the alarm LED will remain flashing.

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8 Advanced Programming.

By pressing the **SETP.** and **SENS** key simultaneously for more than 5 seconds, the Advanced Parameter menu is entered. The temperature display shows an A with a number. With the **UP** and **DOWN** key the desired parameter can be selected. At first A001 must be set to 1 to make the Advanced Programming active.

Now all A... parameters can be set. All P... parameters are not active, they can't be looked at or changed (Only as A001 =0 the P.. Parameters can be set or shown again).

The setpoint display shows the value of the parameter. By pressing the **SETPOINT** key simultaneously with the **UP** and **DOWN** key, the value can be adjusted.

If during 30 seconds no key is touched, the display returns to the normal operating mode.

Unless stated else, 0 = NO and 1 = YES.

Parameter table.

Number	Description	Range	Value	Default
General				
A 001	Advanced programming active	0..1	-	0
A 002	Software version number	-	-	-
A 003	Serial number	-	-	-
A 004	Production date	-	year/wk	-
Number of thermostats				
A 010	Number of thermostats	1..4	-	1
A 011	Thermostat 1 is used as differential thermostat	0..1	-	0
A 012	Thermostat 2 is used as differential thermostat	0..1	-	0
<p>When Thermostat 1 is used as differential thermostat, it controls on the differential temperature of sensor 1 minus sensor 2. When Thermostat 2 is used as differential thermostat, it controls on the differential temperature of sensor 3 minus sensor 4. The sensor has to be assigned accordantly.</p>				
Sensor assignment				
A 110	Sensor 1 0 = not present 1 = thermostat 1 2 = thermostat 2 3 = thermostat 3 4 = thermostat 4 5 = thermostat 1 & 2 6 = thermostat 1 & 3 7 = thermostat 1 & 4 8 = thermostat 2 & 3 9 = thermostat 2 & 4 10 = thermostat 3 & 4 11 = thermostat 1, 2 & 3 12 = thermostat 1, 2 & 4 13 = thermostat 1, 3 & 4 14 = thermostat 2, 3 & 4 15 = thermostat 1, 2, 3 & 4	0..15	-	1
A 120	Sensor 2	0..15	-	1
A 130	Sensor 3	0..15	-	1
A 140	Sensor 4	0..15	-	1

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Number	Description	Range	Value	Default
Sensor offset				
A 210	Offset temperature sensor 1	-20..+20	°F	0.0
A 220	Offset temperature sensor 2	-20..+20	°F	0.0
A 230	Offset temperature sensor 3	-20..+20	°F	0.0
A 240	Offset temperature sensor 4	-20..+20	°F	0.0
Relay assignment				
A 310	Relay 2 0 = not assigned 1 = thermostat 1 2 = thermostat 2 3 = thermostat 3 4 = thermostat 4 5 = thermostat 1 & 2 6 = thermostat 1 & 3 7 = thermostat 1 & 4 8 = thermostat 2 & 3 9 = thermostat 2 & 4 10 = thermostat 3 & 4 11 = thermostat 1, 2 & 3 12 = thermostat 1, 2 & 4 13 = thermostat 1, 3 & 4 14 = thermostat 2, 3 & 4 15 = thermostat 1, 2, 3 & 4	0..15	-	1
A 320	Relay 3	0..15	-	1
A 330	Relay 4	0..15	-	1
A 340	Relay 5	0..15	-	1
Function of thermostats				
A 410	Function thermostat 1 0 = cooling 1 = heating	0..1	-	0
A 420	Function thermostat 2	0..1	-	0
A 430	Function thermostat 3	0..1	-	0
A 440	Function thermostat 4	0..1	-	0
A 510	Differential thermostat 1	0.1..30.0	°F	1.0
A 511	Offset thermostat 1	-30..+30	°F	0.0
A 520	Differential thermostat 2	0.1..30.0	°F	1.0
A 521	Offset thermostat 2	-30..+30	°F	0.0
A 530	Differential thermostat 3	0.1..30.0	°F	1.0
A 531	Offset thermostat 3	-30..+30	°F	0.0
A 540	Differential thermostat 4	0.1..30.0	°F	1.0
A 541	Offset thermostat 4	-30..+30	°F	0.0

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Number	Description	Range	Value	Default
Setting of the alarms				
A 610	Alarm setting thermostat 1 0 = No alarm 1 = Absolute alarm 2 = Relative alarm	0..2	-	0
A 611	Minimum alarm temperature	-40..+120	°F	-40.0
A 612	Maximum alarm temperature	-40..+120	°F	+120.0
A 613	Minimum alarm delay	0..99	minutes	0
A 614	Maximum alarm delay	0..99	minutes	0
A 615	Control off at minimum alarm	0..1	-	0
A 616	Control off at maximum alarm	0..1	-	0
A 620	Alarm setting thermostat 2	0..2	-	0
A 621	Minimum alarm temperature	-40..+120	°F	-40.0
A 622	Maximum alarm temperature	-40..+120	°F	+120.0
A 623	Minimum alarm delay	0..99	minutes	0
A 624	Maximum alarm delay	0..99	minutes	0
A 625	Control off at minimum alarm	0..1	-	0
A 626	Control off at maximum alarm	0..1	-	0
A 630	Alarm setting thermostat 3	0..2	-	0
A 631	Minimum alarm temperature	-40..+120	°F	-40.0
A 632	Maximum alarm temperature	-40..+120	°F	+120.0
A 633	Minimum alarm delay	0..99	minutes	0
A 634	Maximum alarm delay	0..99	minutes	0
A 635	Control off at minimum alarm	0..1	-	0
A 636	Control off at maximum alarm	0..1	-	0
A 640	Alarm setting thermostat 4	0..2	-	0
A 641	Minimum alarm temperature	-40..+120	°F	-40.0
A 642	Maximum alarm temperature	-40..+120	°F	+120.0
A 643	Minimum alarm delay	0..99	minutes	0
A 644	Maximum alarm delay	0..99	minutes	0
A 645	Control off at minimum alarm	0..1	-	0
A 646	Control off at maximum alarm	0..1	-	0
A 650	Temperature control off if all control sensors at fault	0..1	-	0
A 651	Temperature control off at external alarm	0..1	-	0
Display and setpoint				
A 710	Minimum setpoint thermostat 1	-40..+120	°F	-40.0
A 711	Maximum setpoint thermostat 1	-40..+120	°F	+120.0
A 712	Read-out above -10°F per 1°F	0..1	-	0
A 713	Read-out below -10°F per 1°F	0..1	-	0
A 714	Offset night mode thermostat 1	-30..+30	°F	0.0
A 720	Minimum setpoint thermostat 2	-40..+120	°F	-40.0
A 721	Maximum setpoint thermostat 2	-40..+120	°F	+120.0
A 722	Read-out above -10°F per 1°F	0..1	-	0
A 723	Read-out below -10°F per 1°F	0..1	-	0
A 724	Offset night mode thermostat 2	-30..+30	°F	0.0
A 730	Minimum setpoint thermostat 3	-40..+120	°F	-40.0
A 731	Maximum setpoint thermostat 3	-40..+120	°F	+120.0
A 732	Read-out above -10°F per 1°F	0..1	-	0
A 733	Read-out below -10°F per 1°F	0..1	-	0
A 734	Offset night mode thermostat 3	-30..+30	°F	0.0
A 740	Minimum setpoint thermostat 4	-40..+120	°F	-40.0
A 741	Maximum setpoint thermostat 4	-40..+120	°F	+120.0
A 742	Read-out above -10°F per 1°F	0..1	-	0
A 743	Read-out below -10°F per 1°F	0..1	-	0
A 744	Offset night mode thermostat 4	-30..+30	°F	0.0

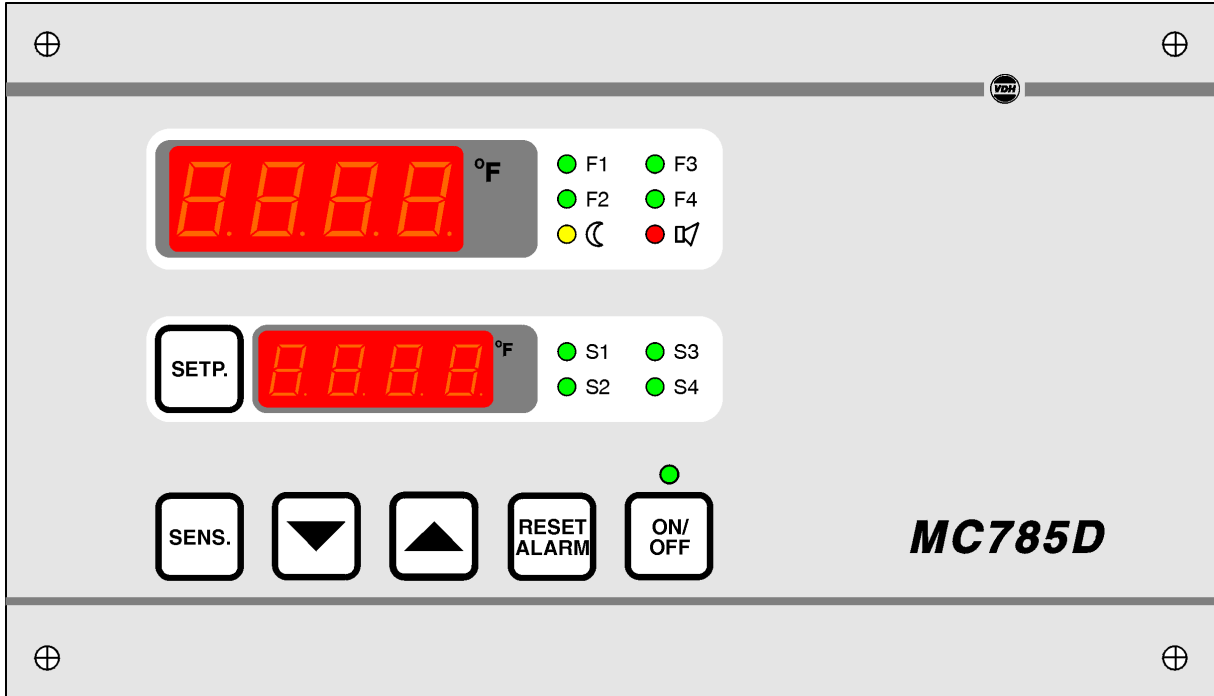
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Number	Description	Range	Value	Default
Analog output 1				
A 810	Function analog output 1 0 = Control temp. thermostat 1 1 = Control temp. thermostat 2 2 = Control temp. thermostat 3 3 = Control temp. thermostat 4 4 = Setpoint thermostat 1 5 = Setpoint thermostat 2 6 = Setpoint thermostat 3 7 = Setpoint thermostat 4 8 = Temperature sensor 1 9 = Temperature sensor 2 10 = Temperature sensor 3 11 = Temperature sensor 4 12 = P(ID) cooling thermost. 1 13 = P(ID) cooling thermost. 2 14 = P(ID) cooling thermost. 3 15 = P(ID) cooling thermost. 4 16 = P(ID) heating thermost. 1 17 = P(ID) heating thermost. 2 18 = P(ID) heating thermost. 3 19 = P(ID) heating thermost. 4	0..19	-	0
A 811	0 V out at	-100..+200	-	-40.0
A 812	10 V out at	-100..+200	-	+120.0
A 813	Proportional band	0.1..30	-	2.0
A 814	Offset proportional band	-30..+30	-	0.0
A 815	Integral value (999 = P)	1..999	minutes	999
A 816	Differential value	0..999	minutes	0
Analog output 2				
A 820	Function analog output 2 0 = Control temp. thermostat 1 1 = Control temp. thermostat 2 2 = Control temp. thermostat 3 3 = Control temp. thermostat 4 4 = Setpoint thermostat 1 5 = Setpoint thermostat 2 6 = Setpoint thermostat 3 7 = Setpoint thermostat 4 8 = Temperature sensor 1 9 = Temperature sensor 2 10 = Temperature sensor 3 11 = Temperature sensor 4 12 = P(ID) cooling thermost. 1 13 = P(ID) cooling thermost. 2 14 = P(ID) cooling thermost. 3 15 = P(ID) cooling thermost. 4 16 = P(ID) heating thermost. 1 17 = P(ID) heating thermost. 2 18 = P(ID) heating thermost. 3 19 = P(ID) heating thermost. 4	0..19	-	0
A 821	0 V out at	-100..+200	-	-40.0
A 822	10 V out at	-100..+200	-	+120.0
A 823	Proportional band	0.1..30	-	2.0
A 824	Offset proportional band	-30..+30	-	0.0
A 825	Integral value (999 = P)	1..999	minutes	999
A 826	Differential value	0..999	minutes	0

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9 Front views.

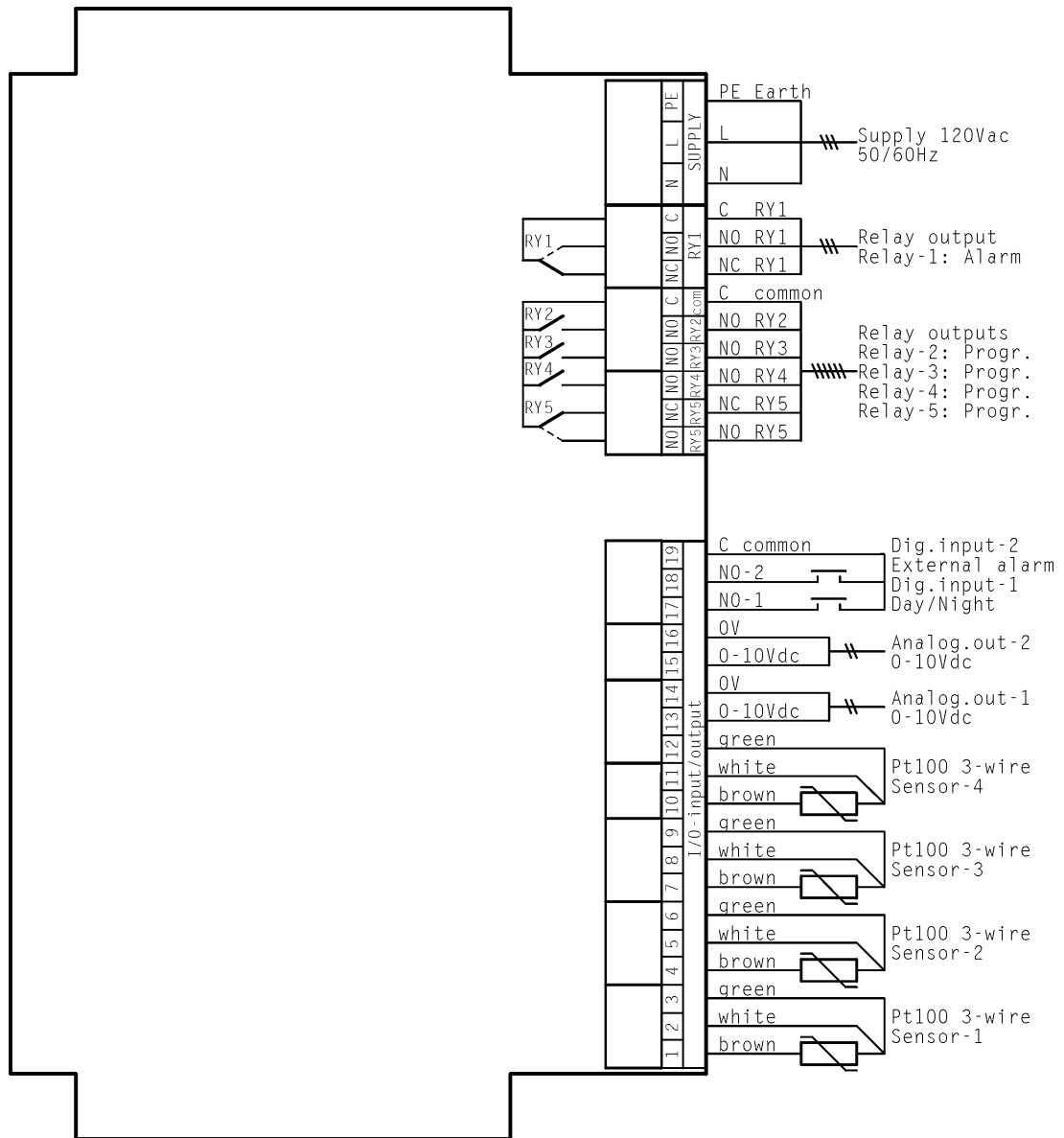
Front view MC 785-D wall mount drawing 060170



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10 Connection diagrams.

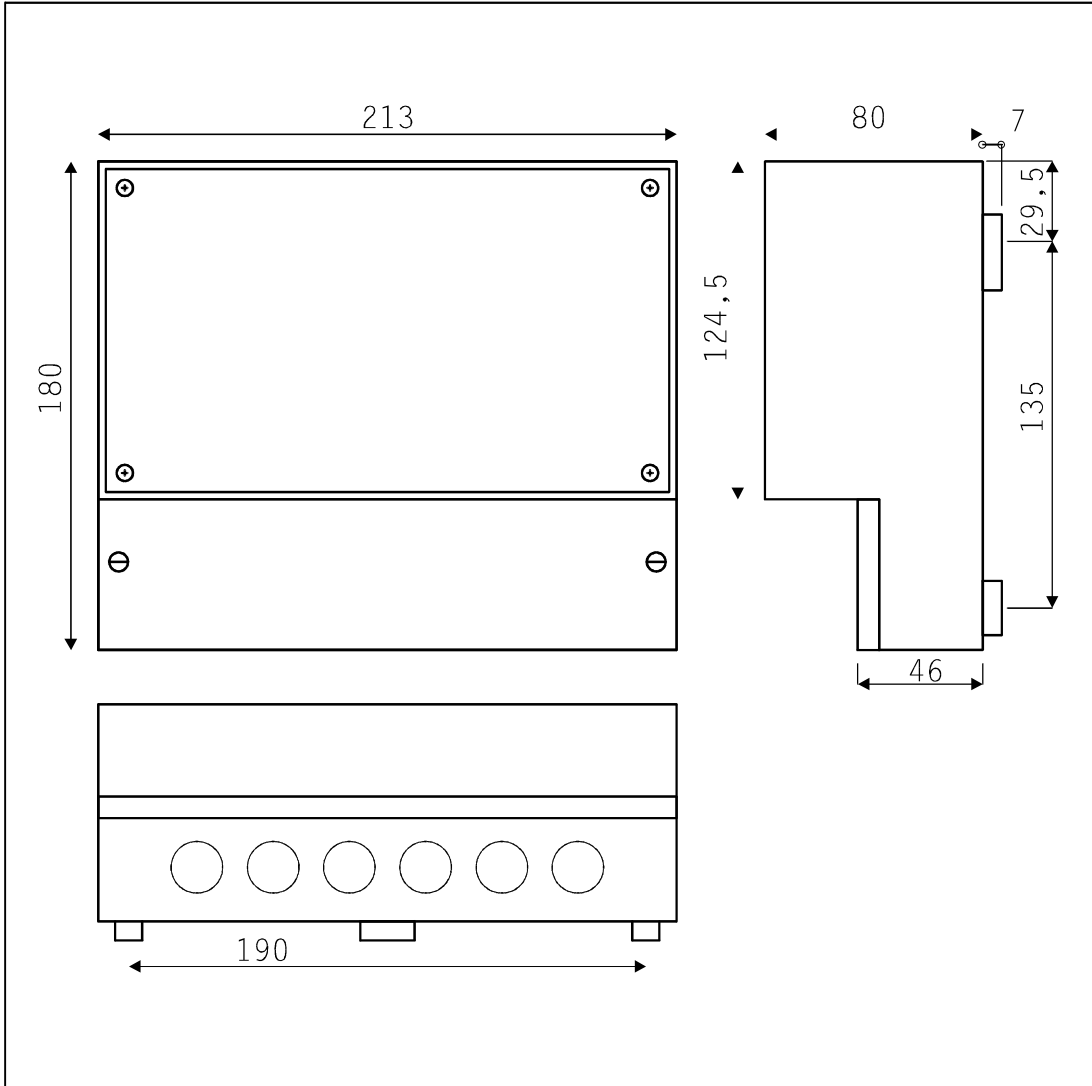
Connection diagram MC785-D wall mount drawing 060169



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11 Dimensions.

Dimensions Wall mount drawing 940024



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