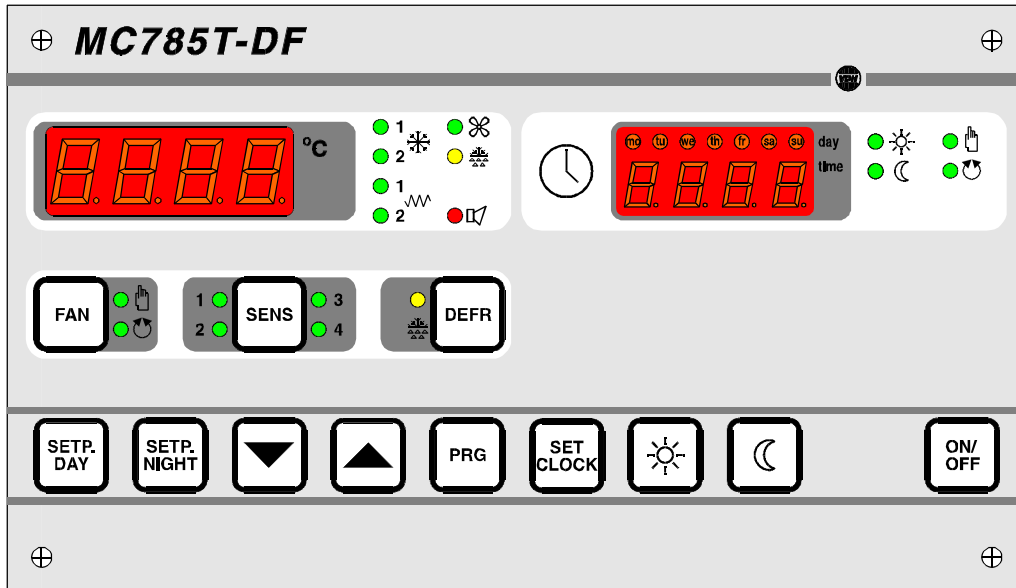


MC 785T-DF ALFANET

-65/+35°C

panel and wall mounting

Operating Manual



Description: MC 785T-DF ALFANET Thermostat		Doc.no.:	080630
Type: MANUAL	Number of pages: 16	Version:	V1.0
File: Do080630 MC785T-DF ALFANET -65_+35C v10 EN.wpd	By: HN	Date:	13-05-2008
Software: MC785T-DF AN: V1.00	Signed:	File:	Doc'08
VDH Products BV - Roden - Holland			

Operating Manual	Document no.: 080630	Version: V1.0
MC 785T-DF ALFANET	Client: General	Page: 2 of 16

Table of contents

1.	Technical specifications	3
2.	Functional specifications	4
3.	Control of the thermostat	5
4.	Programming the internal settings	6
5.	Operation of relay outputs	10
6.	Sensor calibration	12
7.	Alarms	12
8.	Front views	13
9.	Connection diagrams	14
10.	Dimensions	16

The information contained in this document is assumed to be accurate. However, VDH Products BV does not accept any liability for eventual mistakes or errors, and retains the right to adapt or change this document without notice.













Operating Manual	Document no.: 080630	Version: V1.0
MC 785T-DF ALFANET	Client: General	Page: 3 of 16

1. Technical specifications

General

Type	: MC 785T-DF
Wall mounting:	
Housing	: Grey plastic
Material	: Polystyrol 454h KG 2 natur BASF
Dimensions	: 213 x 180 x 85mm (whd)
Front	: Polycarbonate (IP-44)
Panel mounting:	
Housing	: Steel plate panel
Material	: Steel plate in silver grey
Dimensions	: 217 x 155 x 85mm (whd)
Panel cutout	: min. 208 x 146mm (wh)
Front	: Polycarbonate (IP-44)
Range	: -65/+35°C per 0.1°C
Supply	: 230 Vac; 50/60 Hz (-10/+5%).
Used power	: 9 VA
Operating temperature	: -20/+50°C
Store temperature	: -20/+60°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
LED's	:  1 = LED Relay cooling 1 active
	:  2 = LED Relay cooling 2 active
	:  1 = LED Relay heating 1 active
	:  2 = LED Relay heating 2 active
	:  = LED Fan active
	:  = LED Defrost active
	:  = LED Alarm active (blinking)
	:  = LED Fan in auto mode
	:  = LED Fan in manual mode (hand)
	: S1 = Temperature sensor 1 read-out
	: S2 = Temperature sensor 2 read-out
	: S3 = Temperature sensor 3 read-out (defrost sensor)
	: S4 = Temperature sensor 4 read-out (option)
	:  = LED Defrost in manual mode
	:  = LED Day position active
	:  = LED Night position active

Operating Manual	Document no.: 080630	Version: V1.0
MC 785T-DF ALFANET	Client: General	Page: 4 of 16

Keys	: ON/OFF	= On/Off key control
	SET DAY	= Set point day push button
	SET NIGHT	= Set point night push button
	▲	= Up key
	▼	= Down key
	PRG	= Programming key with LED indication
	FAN	= Fan auto/manual key with indication
	SENS	= Sensor read-out key
	DEFR	= Manual defrost key
	SET CLOCK	= Programming key clock
	DAY	= Forced day position
	NIGHT	= Forced night position

In- and outputs

Sensors	: Sensor-1 (default control)	Pt-100, 3-wire to DIN/IEC 751
	Sensor-2 (default control)	Pt-100, 3-wire to DIN/IEC 751
	Sensor-3 (default control)	Pt-100, 3-wire to DIN/IEC 751
	Sensor-4 Defrost sensor	Pt-100, 3-wire to DIN/IEC 751
Digital inputs	: Alarm/door input	(potential free input contact)
Communication	: RS485 Network (Option)(A,B,GND 2x twisted pair shielded, min. 0.75mm ²)	
Relays	: RY1 Alarm or Day/Night	(C/NO/NC, 250Vac/10A not inductive)
	Alarm: Normally C-NO is closed, at alarm C-NC is closed.	
	Day/Night: At night position C-NO is closed	
	The following relays have a central common:	
	RY2 Function-1	(NO, 250Vac/10A not inductive)
	RY3 Function-2	(NO, 250Vac/10A not inductive)
	RY4 Fan	(NO, 250Vac/10A not inductive)
	RY5 Defrost	(NO-NC, 250Vac/10A not inductive)

2. Functional specifications

The MC 785T-DF has three different operating modes. These are:

- Mode 0 - 2x cooling
- Mode 1 - cooling/heating
- Mode 2 - 2x heating

The MC 785DF has an analog P(I)-output with a range of 0/+10 Vdc. The function of this output is programmable as measuring signal, Set point signal or a P(I) output for the cooling or heating.

A selection can be made between three different modes of defrosting: no defrost, natural defrost or electric defrost. Defrosting can take place on a real-time basis.

The function of the sensor(s) can also be programmed. There is a choice between not present, control, control/alarm, or only read-out or alarm. Sensor-4 also has the function of defrost sensor.

The thermostat has a real-time clock. This can be used to programme the day and night switching on times.

The above-mentioned settings can be made via the Internal Parameters.

Operating Manual	Document no.: 080630	Version: V1.0
MC 785T-DF ALFANET	Client: General	Page: 5 of 16

3. Control of the thermostat

Normally the display shows the temperature of the control sensor(s).

Read-out of the sensors.

Press the **SENS** key. The display shows the temperature of sensor 1. The LED 1 next to the **SENS** key will start to flash, to indicate that sensor 1 is being shown. By pressing the **SENS** key again, the other sensors can be displayed.

Viewing and changing the day Set point.

Press the **SET DAY** key. The day Set point appears in the display. To change the Set point press the **SET DAY** key simultaneously with the **UP** or **DOWN** key. When the **SET DAY** key has been released the measured temperature will again appear in the display.

Viewing and changing the night Set point.

Press the **SET NIGHT** key. The night Set point appears in the display. To change the Set point press the **SET NIGHT** key simultaneously with the **UP** or **DOWN** key. When the **SET NIGHT** key has been released the measured temperature will again appear in the display.

Manual start of defrost.

By pressing the **DEFR** key the defrost can be started manually, and therefore independently of the defrost timer. The defrost release temperature is not taken into account, so that defrost will always start.

Changing the defrost mode.

Press the **PRG** and the **DEFR** keys simultaneously. The defrost mode will appear in the display.

- 0 = no defrost
- 1 = natural defrost
- 2 = electric defrost

The mode can be changed by using the **UP** and **DOWN** keys. Press the **DEFR** key and the control temperature will again appear in the display.

Operation of the fan control.

With the **FAN** key a switch can be made between manual and automatic fan mode. In manual mode the fan will run continuously; in auto mode the fan will only run during cooling or heating, including the fan off delay time. During electric defrost the fan will always stop.

Setting the clock.

Press the **PRG** and **SET-CLOCK** keys simultaneously. In the clock display the hours will start to flash. Using the **UP** and **DOWN** keys the hours can be set. Next press the **SET-CLOCK** key. The minutes will start to flash and can be set with the **UP** and **DOWN** keys. When the **SET-CLOCK** key is pressed again the days will start to flash. The day can be set using the **UP** and **DOWN** keys. If the **SET-CLOCK** key is pressed again the clock will show the new day/time.

Operating Manual	Document no.: 080630	Version: V1.0
MC 785T-DF ALFANET	Client: General	Page: 6 of 16

Programming the DAY and NIGHT switching times.

Press the **SET-CLOCK** key. The **MO** LED (monday) will flash, the **DAY** LED will flash and the switch-on time of the DAY stand for Monday will appear in the time display. This time can be varied by using the **UP** and **DOWN** keys. Should --.-- be set, then on Monday it will not switch to the DAY stand. The setting will be confirmed by pressing the **PRG** key.

Now the switch-on time of the NIGHT stand for Monday will appear and the **NIGHT** LED will flash. This time can then be set by using the **UP** and **DOWN** keys. Should --.-- be set as time, then on Monday it will not switch to the NIGHT stand. The setting will be confirmed by pressing the **PRG** key.

Now, the DAY and NIGHT switch-on times for Tuesday thru' Sunday can be set in the same way.

By pressing the **SET-CLOCK** key it is possible to exit the programming of the DAY/NIGHT clock.

Thermostat forced in the DAY stand.

Press the **DAY** (☀) key for several seconds. The **DAY** LED lights up and the **HAND** LED will flash to indicate that the thermostat is manually in the DAY stand. By pressing the **DAY** key again the thermostat can be exited from the manual DAY stand. Depending on the setting of the timer the **DAY** or **NIGHT** LED will light up.

Thermostat forced in the NIGHT stand.

Press the **NIGHT** (☾) key for several seconds. The **NIGHT** LED lights up and the **HAND** LED will flash to indicate that the thermostat is manually in the NIGHT stand. By pressing the **NIGHT** key again the thermostat can be exited from the manual NIGHT stand. Depending on the setting of the timer the **DAY** or **NIGHT** LED will light up.

Resetting the alarm.

As soon as an alarm situation occurs and an error message appears in the display, the alarm can be reset by pressing the **SET DAY** key.

The error message remains in the display until the cause of the error has been resolved.

Digital input.

Via the Internal Parameters an option can be selected to use the digital alarm input as door contact. Should the digital input close then the control will stop.

4. Programming the internal settings

By pressing the **PRG** and **SET DAY** keys simultaneously for longer than 5 seconds the Internal Parameter menu is entered. The display shows a P followed by a number. Use the **UP** or **DOWN** key to select the required parameter.

When the required parameter has been selected press the **SET DAY** key to look at the value of the parameter. By pressing the **SET DAY** and the **UP** or **DOWN** keys simultaneously this value can be changed. When the keys have been released the parameter number appears in the display again.

If no key is touched for 30 seconds or the **PRG** key is pressed, then the display will return to the normal operating mode.

Operating Manual	Document no.: 080630	Version: V1.0
MC 785T-DF ALFANET	Client: General	Page: 7 of 16

Parameter table.

Number	Description	Range	Value	Default
P 01	Function thermostat 0 = 2x cooling 1 = cooling/heating 2 = 2x heating	0..2	-	0
P 02	Change between the two stages (if P01 = 0)	0 = no 1 = yes	-	0
P 03	Start 2nd stage (if P01 = 0 or 2)	0 = temp 1 = time	-	0
P 04	Start delay second stage	0..99	min	15
P 05	Differential function 1	0.1..10	°C	1.0
P 06	Differential function 2	0.1..10	°C	1.0
P 07	Offset function 1	-10..+10	°C	0.0
P 08	Offset function 2	-10..+10	°C	0.0
P 10	Function sensor 1 0 = not present 1 = control 2 = control & alarm 3 = read-out only 4 = alarm	0..4	-	2
P 11	Function sensor 2 0 = not present 1 = control 2 = control & alarm 3 = read-out only 4 = alarm	0..4	-	2
P 12	Function sensor 3 0 = not present 1 = control 2 = control & alarm 3 = read-out only 4 = alarm 5 = defrost	0..5	-	2
P 13	Function sensor 4 0 = not present 1 = defrost	0..1	-	1
P 14	Offset sensor 1	-10/+10	°C	0.0
P 15	Offset sensor 2	-10/+10	°C	0.0
P 16	Offset sensor 3	-10/+10	°C	0.0
P 17	Offset defrost sensor(4)	-10/+10	°C	0.0
P 20	Minimum adjustable Set point	-65..+35	°C	-65.0
P 21	Maximum adjustable Set point	-65..+35	°C	+35.0
P 22	Read-out above -10°C in whole degrees	0 = no 1 = yes	-	0
P 23	Read-out below -10°C in whole degrees	0 = no 1 = yes	-	1
P 30	Start delay cooling	0..99	-	0
P 31	Stop delay cooling	0..99	-	0
P 32	Parameter 30/31 in seconds or minutes	0 = sec 1 = min	-	0
P 33	Minimum on time cooling	0..99	minutes	0
P 34	Minimum off time cooling	0..99	minutes	0
P 40	Switch off delay fan	0..99	minutes	0
P 41	Switch on temperature fan after defrost	-65..+35	°C	2.0
P 42	Switch on delay fan after defrost	0..99	minutes	0
P 43	Drainage time	0..99	minutes	0

Operating Manual	Document no.: 080630	Version: V1.0
MC 785T-DF ALFANET	Client: General	Page: 8 of 16

Number	Description	Range	Value	Default
P 50	Defrost 0 = none 1 = natural 2 = electric/hotgas	0..2	--	0
P 51	Defrost-interval	1..99	hours	12
P 52	Maximum defrost time	1..99	minutes	30
P 53	End of defrost temperature	-20/+30	°C	5.0
P 54	Defrost release temperature If the evaporator temperature is higher than the release temperature then defrost will not start.	-65/+35	°C	2.0
P 55	Defrost relay is on during natural defrost	0 = no 1 = yes	-	0
P 56	Defrost based on compressor run hours	0 = no 1 = yes	-	0
P 57	Display fixed during defrost	0 = no 1 = yes	-	0
P 58	Maximum time display fixed	1..99	minutes	15
P 60	Defrost at real time	0 = no 1 = yes	-	0
P 61	Start defrost 1 (--.-- is skipped)	0.00-23.59	hours/min	0.00
P 62	Start defrost 2 (--.-- is skipped)	0.00-23.59	hours/min	3.00
P 63	Start defrost 3 (--.-- is skipped)	0.00-23.59	hours/min	6.00
P 64	Start defrost 4 (--.-- is skipped)	0.00-23.59	hours/min	9.00
P 65	Start defrost 5 (--.-- is skipped)	0.00-23.59	hours/min	12.00
P 66	Start defrost 6 (--.-- is skipped)	0.00-23.59	hours/min	15.00
P 67	Start defrost 7 (--.-- is skipped)	0.00-23.59	hours/min	18.00
P 68	Start defrost 8 (--.-- is skipped)	0.00-23.59	hours/min	21.00
P 69	Start defrost 9 (--.-- is skipped)	0.00-23.59	hours/min	--.--
P 70	Start defrost 10 (--.-- is skipped)	0.00-23.59	hours/min	--.--
P 71	Alarm type 0 = None 1 = Absolute 2 = Relative to Set point	0..2	-	1
P 72	Alarm only active during control	0 = no 1 = yes	-	1
P 73	Control off at minimum alarm	0 = no 1 = yes	-	0
P 74	Control off at maximum alarm	0 = no 1 = yes	-	0
P 75	Minimum alarm temperature	-65..+35	°C	-65.0
P 76	Maximum alarm temperature	-65..+35	°C	+35.0
P 77	Minimum alarm delay	0..99	minutes	0
P 78	Maximum alarm delay	0..99	minutes	0

Operating Manual	Document no.: 080630	Version: V1.0
MC 785T-DF ALFANET	Client: General	Page: 9 of 16

Number	Description	Range	Value	Default
P 80	Function analog output 0 = Control temperature 1 = Sensor 1 2 = Sensor 2 3 = Defrost-sensor 1 4 = Defrost-sensor 2 5 = Temperature Set point 6 = P(I) cooling 7 = P(I) heating	0..7	-	0
P 81	0V off at temperature	-65..+35	°C	-65.0
P 82	10V off at temperature	-65..+35	°C	+35.0
P 83	Prop. range cooling	0.1..10	°C	1.0
P 84	Integral value cooling (999 gives only P)	1..999	minutes	999
P 85	Prop. range heating	0.1..10	°C	1.0
P 86	Integral value heating (999 gives only P)	1..999	minutes	999
P 90	Control off when all control sensors are defective	0 = no 1 = yes	-	0
P 91	Control off at external alarm	0 = no 1 = yes	-	0
P 92	External alarm as door contact (control off, no alarm)	0 = no 1 = yes	-	0
P 93	Function Relay-1 0 = Alarm 1 = Day/Night	0..1	-	0
P 95	Network number	1..250	-	1
P 96	Log-interval time	1..120	minutes	5
P 97	Software version	-	-	-
P 98	Series number	-	-	-
P 99	Production date	-	year/wk	-

Remarks:

P93: If P93 = 1 then Relay-1 is used as day/night status relay, and then C-NO is closed during night operation.

P95 and P96: Only applicable if control is applied with network (ALFANET).

Operating Manual	Document no.: 080630	Version: V1.0
MC 785T-DF ALFANET	Client: General	Page: 10 of 16

5. Operation of relay outputs

Operation of cooling and heating.

2x cooling: Cooling 1 (RY2) switches on if the temperature is higher than the **Set point + offset₁ + differential₁** and switches off if the temperature is lower than **Set point + offset₁**.

Second stage switches on:

Temperature: Cooling 2 (RY3) switches on if the temperature is higher than the **Set point + offset₂ + differential₂** and switches off if the temperature is lower than **Set point + offset₂**.

Time: Cooling 2 (RY3) switches on if the set delay time for the second stage has passed and cooling 1 is still active. Cooling 2 switches off if cooling 1 switches off.

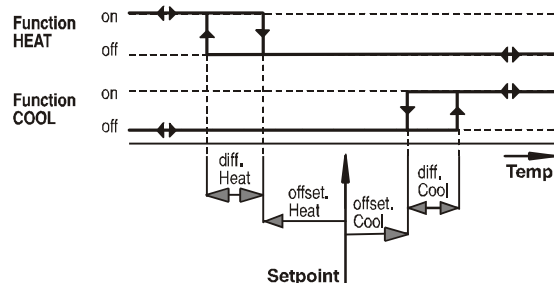
2x heating: Heating 1 (RY2) switches on if the temperature is lower than the **Set point + offset₁ - differential₁** and switches off if the temperature is lower than **Set point + offset₁**.

Second stage switches on:

Temperature: Heating 2 (RY3) switches on if the temperature is lower than the **Set point + offset₂ - differential₂** and switches off if the temperature is lower than **Set point + offset₂**.

Time: Heating 2 (RY3) switches on if the set delay time for the second stage has passed and heating 1 is still active. Heating 2 switches off if heating 1 switches off.

Cooling/heating: Cooling (RY2) switches on if the temperature is higher than the **Set point + offset₁ + differential₁** and switches off if the temperature is lower than **Set point + offset₁**.
Heating (RY3) switches on if the temperature is lower than the **Set point + offset₁ - differential₁** and switches off if the temperature is lower than **Set point + offset₁**.



Function Cooling/Heating

Operating Manual	Document no.: 080630	Version: V1.0
MC 785T-DF ALFANET	Client: General	Page: 11 of 16

Operating the defrost.

There are three different methods for defrost.

1. No defrost.
2. Natural defrost.

Before defrost is started, a check is made to see if the temperature of the defrost-sensor is lower than the defrost-release-temperature (P 54). If this is not the case then defrost will be skipped.

If defrost starts the cooling is switched off and the defrost-relay (RY5) is activated. The fan will run continuously during defrosting. Defrost is stopped when the end-of-defrost-temperature (P53) is reached, with a limit of the maximum-defrost-time (P 52).

3. Electric defrost.

Before defrost is started, a check is made to see if the temperature of the defrost-sensor is lower than the defrost-release-temperature (P 54). If this is not the case then defrost will be skipped.

If defrost starts the cooling is switched off, the fan stops and the defrost-relay (RY5) is activated. Defrost is stopped when the end-of-defrost-temperature (P 53) is reached, with a limit of the maximum-defrost-time (P 52).

After defrost the fan will only start again when the temperature of the defrost-sensor is lower than the fan-release-temperature (P 41).

Remarks about operation with two defrost sensors.

If two defrost-sensors have been activated, before the start of defrost a check will be made to see if the temperature of one of the two defrost-sensors is lower than the defrost-release-temperature (P 54). If this is not the case then defrost will be skipped.

And defrost stops when both sensors have reached the end-of-defrost-temperature (P 53), with a limit of the maximum-defrost-time (P 52).

Operating Manual	Document no.: 080630	Version: V1.0
MC 785T-DF ALFANET	Client: General	Page: 12 of 16

6. Sensor calibration

The sensors can be calibrated with the parameters P14 (Sensor-1), P15 (Sensor-2), P16 (Sensor-3) and P17 (Defrost Sensor-4). Should a sensor indicate 0.2°C too much, for example, then the corresponding offset-parameter must be set at -0.2°C.

7. Alarms

The alarm relay is on in a normal position; it falls during an alarm. In this way it also gives an alarm if there is a power failure. During the alarm the alarm LED on the front flashes. Depending on the Internal Parameters the control will either stop or continue.

An alarm can be caused by:

- Control sensor is not present (F1).
- Sensor defect (E1, E2, E3 or E4).
- The alarm sensor gives a minimum or maximum alarm (LO or HI).
- External alarm (EC).

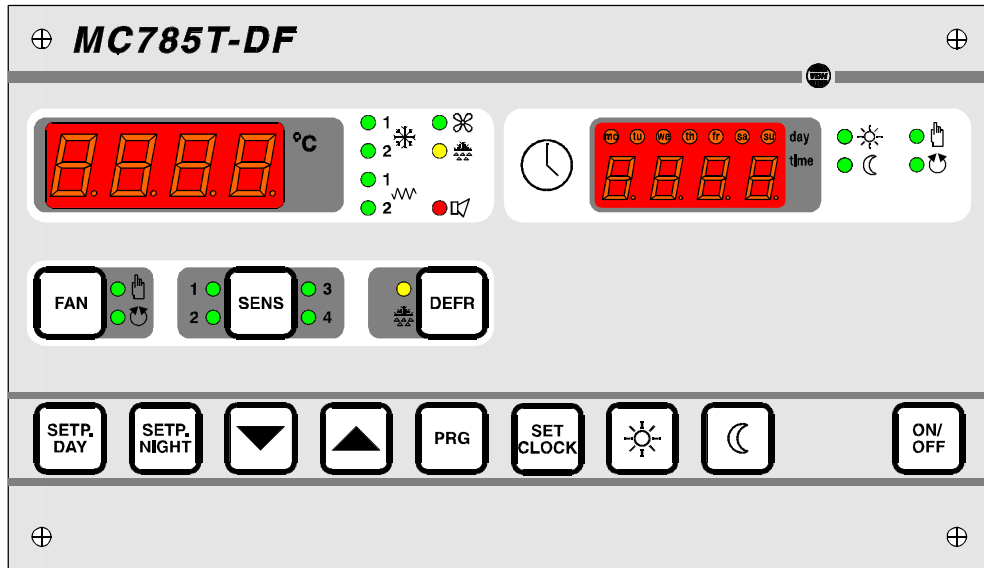
By pressing the **SET DAY** key the alarm relay can be reset. The error message will remain in the display until the error has been resolved. The alarm LED will also continue to flash.

Temperature alarm:	LO = Minimum alarm
	HI = Maximum alarm
No control sensor:	F1 = Control sensor is not present
Sensor failure:	E1 = Sensor 1 defect
	E2 = Sensor 2 defect
	E3 = Sensor 3 defect
	E4 = Sensor 4 defect (defrost sensor)
External alarm:	EC = External alarm contact

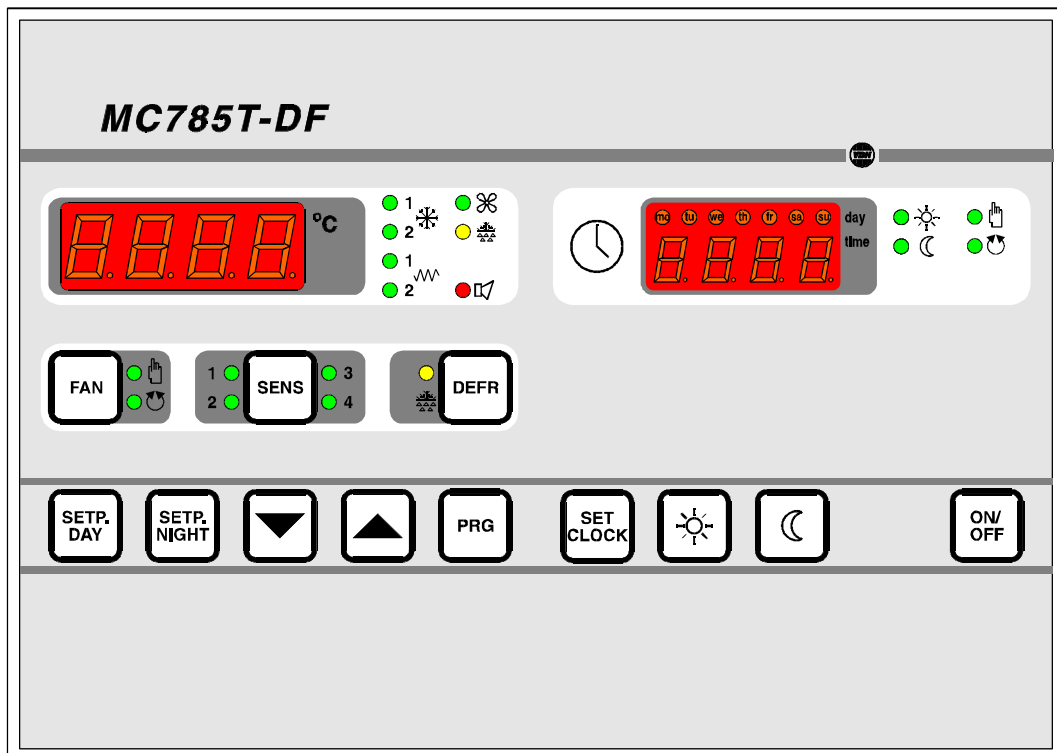
Operating Manual	Document no.: 080630	Version: V1.0
MC 785T-DF ALFANET	Client: General	Page: 13 of 16

8. Front views

Front view of MC 785T - DF drawing 950393



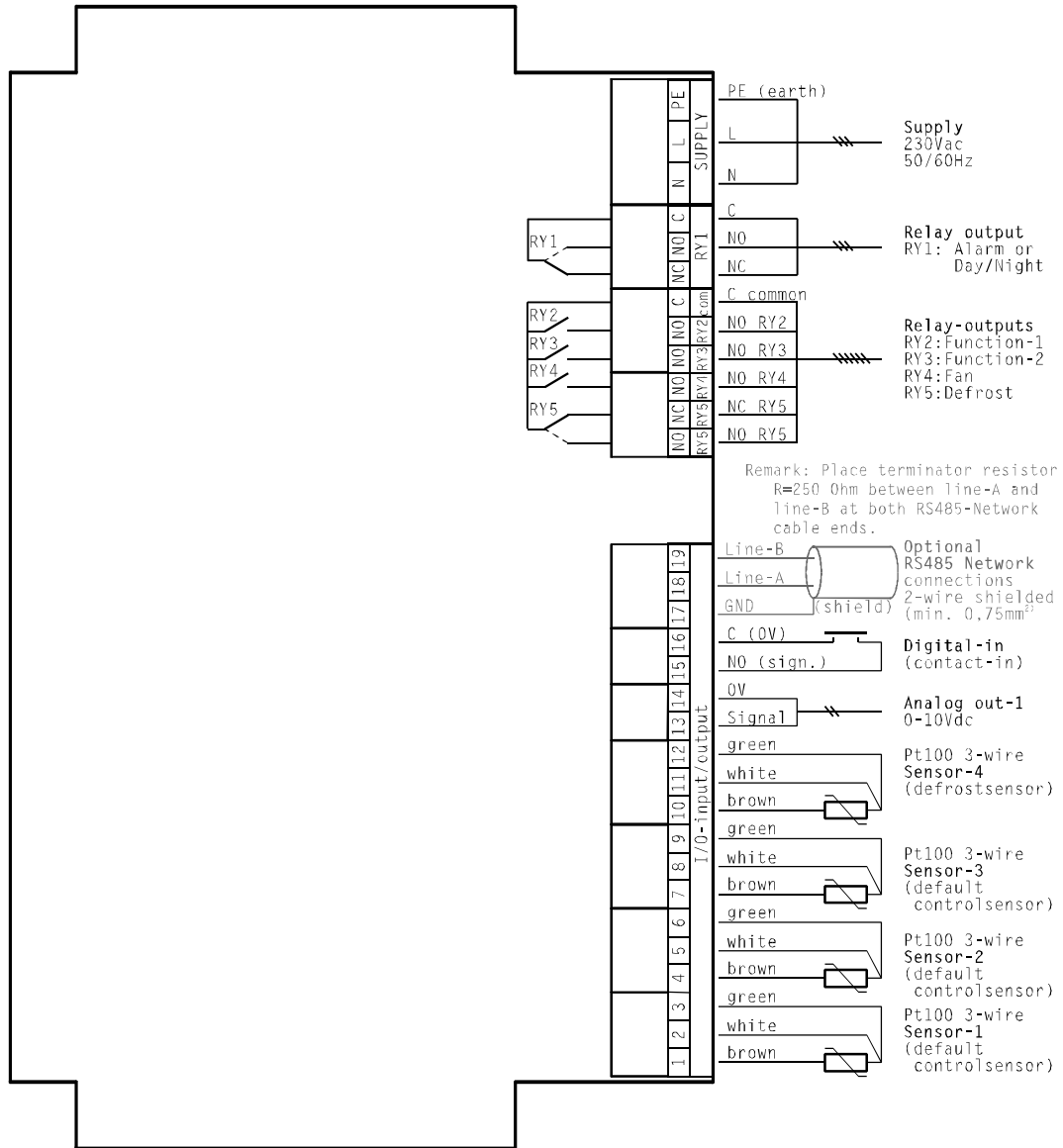
Front view of MC 785T-DF panel mounting. Drawing 970050



Operating Manual	Document no.: 080630	Version: V1.0
MC 785T-DF ALFANET	Client: General	Page: 14 of 16

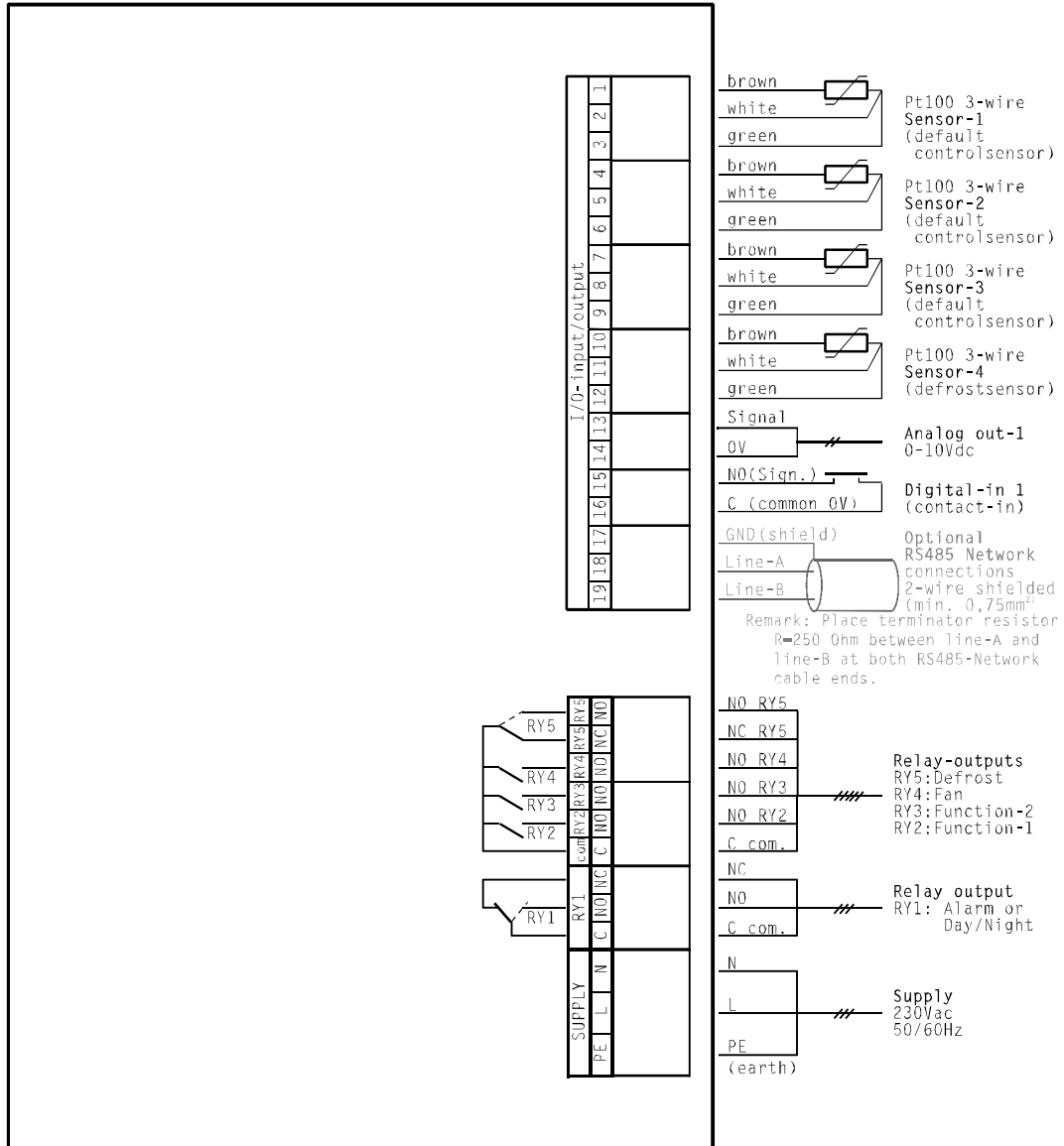
9. Connection diagrams

Connection diagram MC 785T - DF wall mounting. Drawing 960563

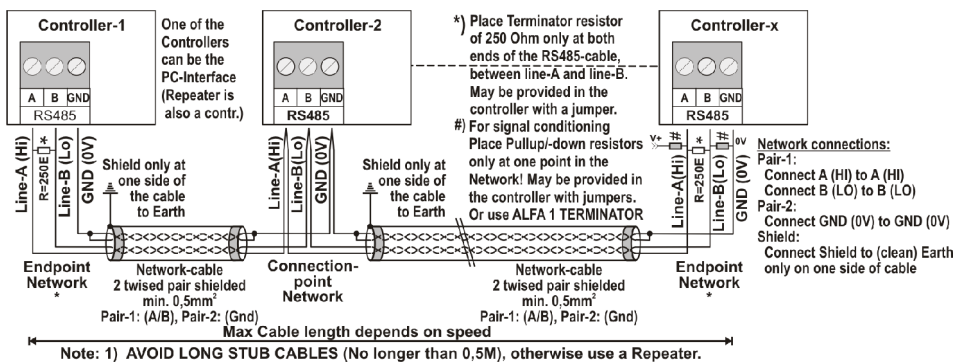


Operating Manual	Document no.: 080630	Version: V1.0
MC 785T-DF ALFANET	Client: General	Page: 15 of 16

Connection diagram MC785T-DF panel mounting. Drawing 991296



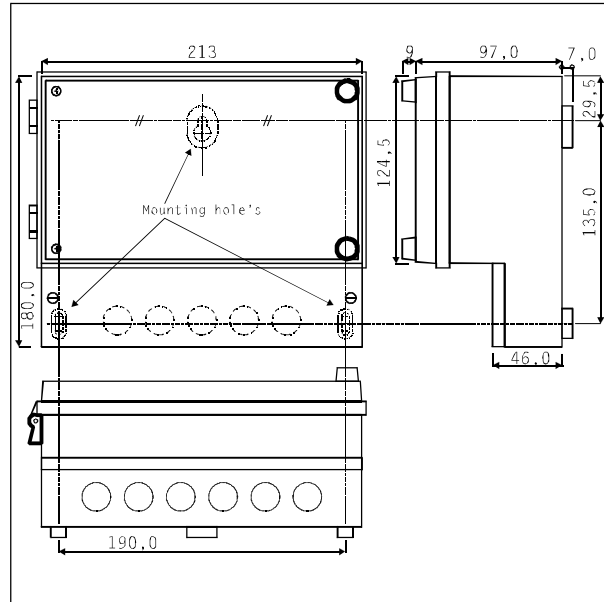
RS 485 NETWORK CONNECTIONS 2-twisted pair shielded cable:



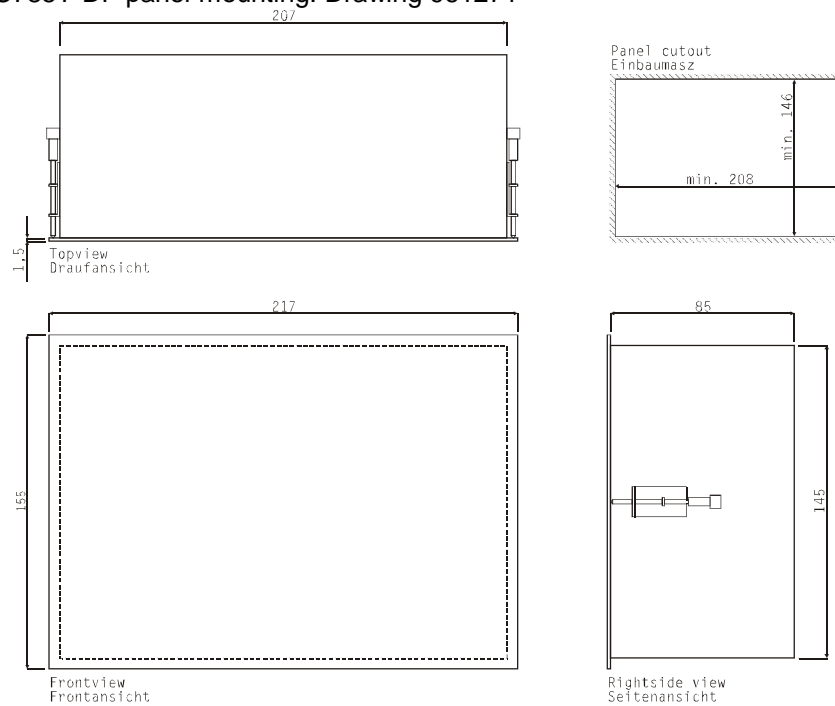
Operating Manual	Document no.: 080630	Version: V1.0
MC 785T-DF ALFANET	Client: General	Page: 16 of 16

10. Dimensions

Dimensions MC 785-DF wall mounting. Drawing 941402



Dimensions MC785T-DF panel mounting. Drawing 961271



@