



MFC

multifunctional electronic fan speed controller

The MFC series automatically control the speed of single phase voltage controllable motors (230 VAC/50 Hz) according the values of multifunctional inputs (Ai1 or Ai2). These inputs can be temperature sensors (PT500) or other sensors with output 0-10 V or 0-20 mA (pressure, CO₂, humidity, light). There is a possibility to connect this device to a BMS (building management system) interface or to use analog voltage (0-10 V) for remote enabling or disabling.

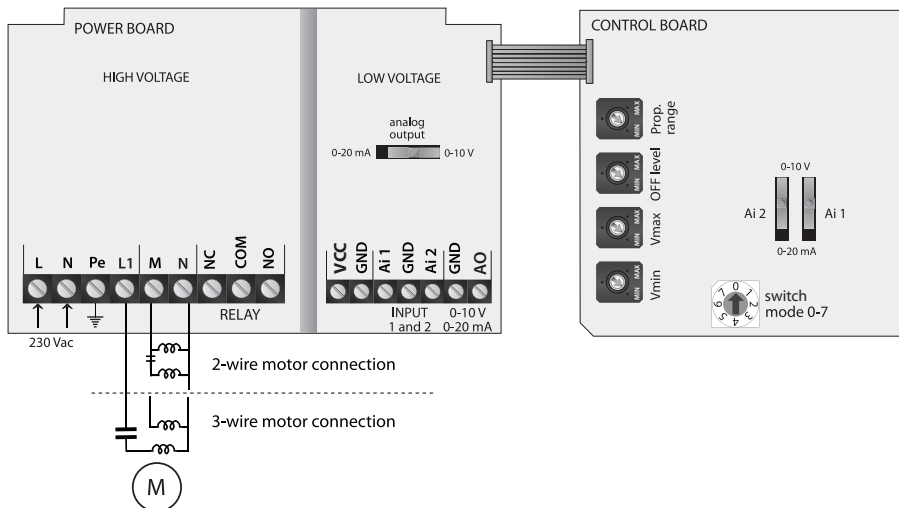
The working principle of this controller is based on the so-called 'zero crossing detection'. An optotriac combined with a microprocessor ensures flawless and accurate control. There is a rotary switch to choose the working mode. When the mode is selected, the controller will program the inputs automatically, such as temperature probe or analog inputs.

FEATURES

- 230 VAC/50 Hz
- Infinitely variable control
- Minimum and maximum speed setting
- Several preset programs (modes) selectable by switch
- Enclosure: plastic (R-ABS, UL94-V0, RAL 7035), IP54
- Ready mounted cable glands
- Maximal ambient temperature: 35 °C
- According to the low voltage directive: 2006/95/EC / the EMC directive: 2004/108/EC
- Sensors not included

	I _{max}	Fuse
MFC-0-15- AT	1.5 A	3.15 A (5*20 mm)
MFC-0-30- AT	3.0 A	5.0 A (5*20 mm)
MFC-0-60- AT	6.0 A	10.0 A (5*20 mm)
MFC-0100- AT	10.0 A	16.0 A (6*32 mm)

WIRING DIAGRAM & GENERAL OVERVIEW



High voltage: power supply 230 VAC - 50 Hz	
L	line
N	neutral
Pe	power earth
Low voltage: input/control signals	
Ai1	multifunctional input 1 (temp. probe PT500 or 0-10 V/0-20 mA)
Ai2	multifunctional input 2 (temp. probe PT500 or 0-10 V/0-20 mA, the device detects the PT500 automatically)
GND	ground
High voltage:	
L1	230 VAC unregulated out (I _{max} 2 A)
M	output for motor
REL	relay output with NO and NC contacts (230 VAC/16 A resistive)
Low voltage:	
VCC	power supply 24 VDC/100 mA
OUT	analog output (0-10 V/100 mA or 0-20 mA - selected by switch)

Mode switch

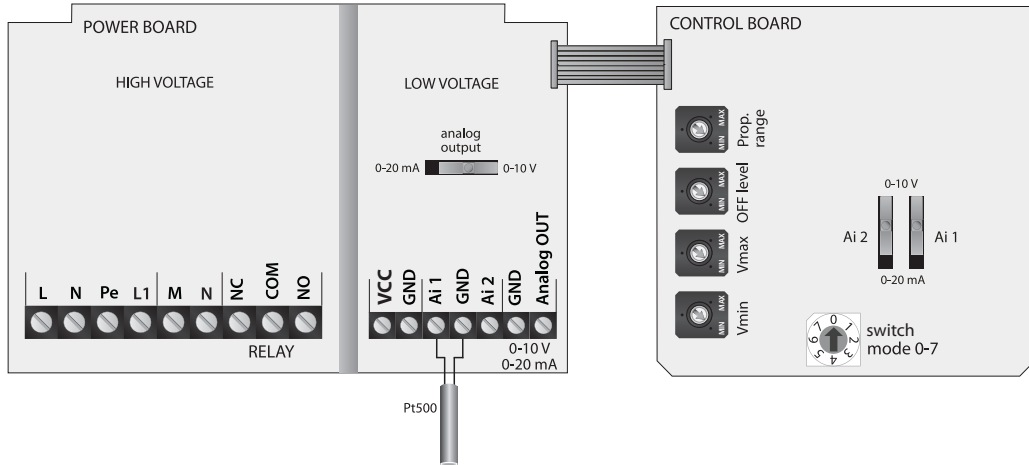
0. HE-heating mode with/without OFF
1. VE-ventilation mode with/without OFF
2. DT mode (differential temperature) without off
3. Analog VE mode (analog signal) with/without OFF
4. HE-heating mode with/without OFF and remote control
5. VE-ventilation mode with/without OFF and remote control
6. Analog VE mode (analog signal) with/without OFF and remote control
7. Analog mode (EVS) without OFF and inverse control



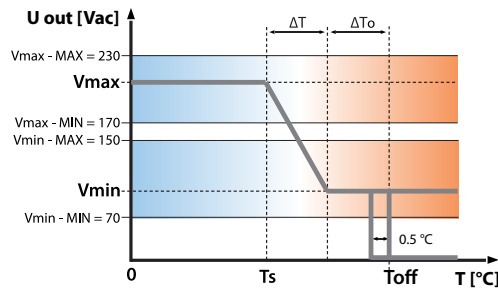
Pos. 0 - HE-heating mode with/without OFF

Ai1 input – temperature probe (PT500)
 Ai2 input – not used

Wiring scheme



Control curve

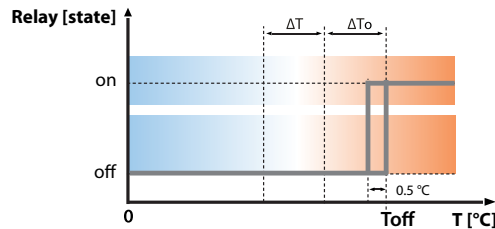


Ts – set temperature by external potentiometer 'SETPOINT'.
 Ts = 5 ÷ 35 °C

ΔT – set proportional range by inner trimmer 'PROP RANGE'
 ΔT = 10 ÷ 25 % from Ts

ΔTo – set off-temperature by inner trimmer 'OFF-LEVEL'
 ΔTo = 10 ÷ 40 % from Ts

Relay position



Toff – off-temperature
 Toff = Ts + ΔT + ΔTo

Vmin – minimum output voltage
 Vmin = 70 ÷ 150 V

Vmax – maximum output voltage
 Vmax = 170 ÷ 230 V

Examples

Ts	15 °C	20 °C	25 °C	30 °C
ΔT	1.5 ÷ 4 °C	2 ÷ 5 °C	2.5 ÷ 6.5 °C	3 ÷ 7.5 °C
ΔTo	1.5 ÷ 6 °C	2 ÷ 8 °C	2.5 ÷ 10 °C	3 ÷ 12 °C
To	18 ÷ 25 °C	24 ÷ 33 °C	30 ÷ 41.5 °C	36 ÷ 49.5 °C

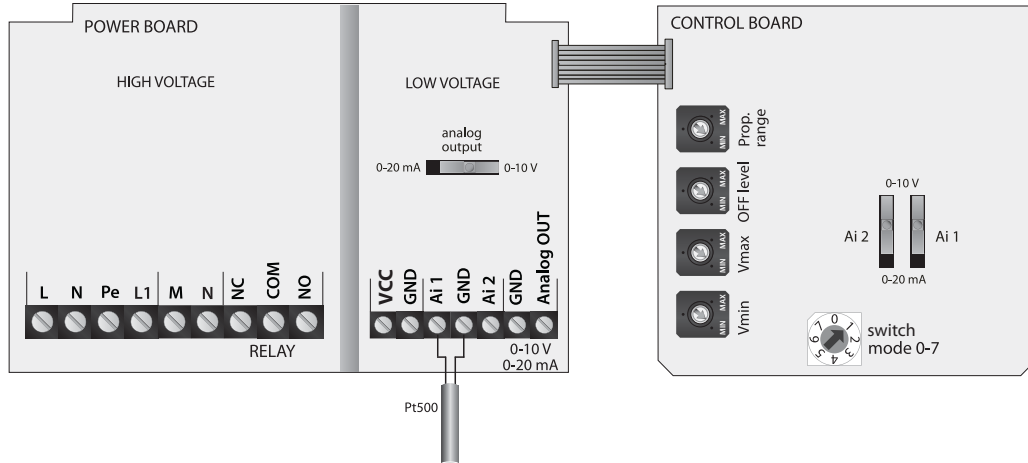


Pos. 1 - VE-ventilation mode with/without OFF

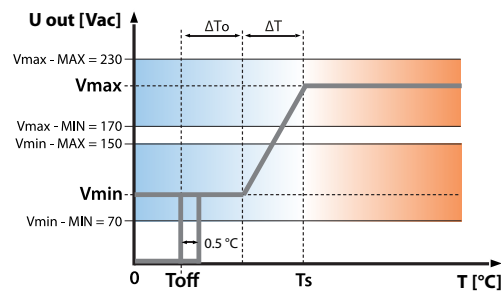
Ai1 input – temperature probe (PT500)

Ai2 input – not used

Wiring scheme



Control curve



T_s – set temperature by external potentiometer 'SETPOINT'.

$T_s = 5 \div 35 \text{ } ^\circ\text{C}$

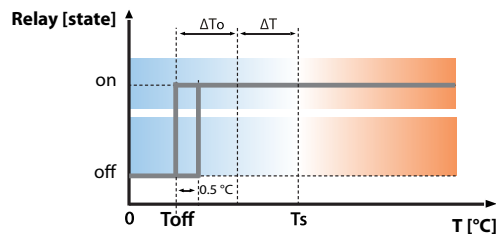
ΔT – set proportional range by inner trimmer 'PROP RANGE'

$\Delta T = 10 \div 25 \text{ \% from } T_s$

ΔT_o – set off-temperature by inner trimmer 'OFF-LEVEL'

$\Delta T_o = 10 \div 40 \text{ \% from } T_s$

Relay position



T_{off} - off-temperature

$T_{off} = T_s - \Delta T - \Delta T_o$

V_{min} – minimum output voltage

$V_{min} = 70 \div 150 \text{ V}$

V_{max} – maximum output voltage

$V_{max} = 170 \div 230 \text{ V}$

Examples

T_s	15 °C	20 °C	25 °C	30 °C
ΔT	1.5 ÷ 4 °C	2 ÷ 5 °C	2.5 ÷ 6.5 °C	3 ÷ 7.5 °C
ΔT_o	1.5 ÷ 6 °C	2 ÷ 8 °C	2.5 ÷ 10 °C	3 ÷ 12 °C
T_o	5 ÷ 12 °C	7 ÷ 16 °C	8.5 ÷ 20 °C	11.5 ÷ 24 °C

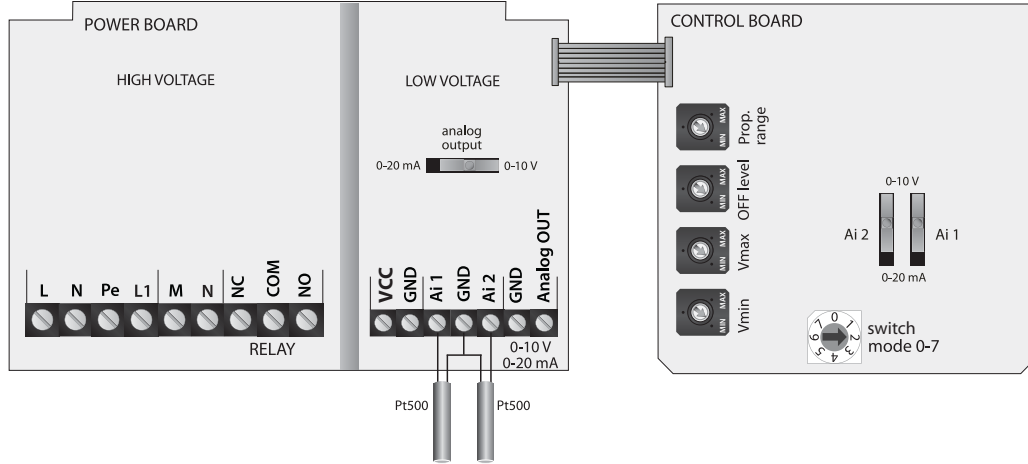


Pos. 2 -DT mode (differential temperature) without off

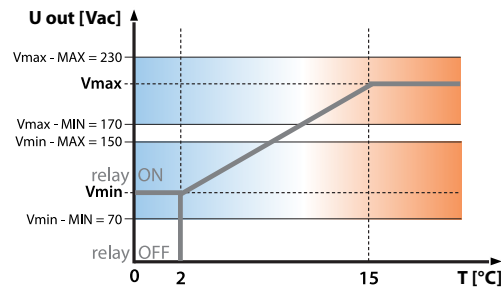
Ai1 input – temperature probe (T1) (PT500)

Ai2 input – temperature probe (T2) (PT500)

Wiring scheme



Control curve



Ts – set differential temperature by external potentiometer 'SETPOINT'.

Ts = 5 ÷ 35 °C

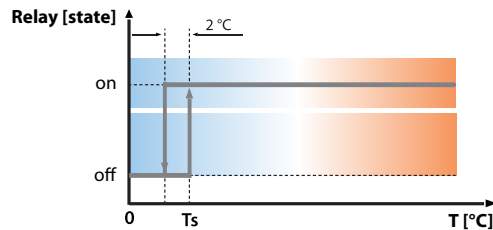
T2 – high temperature (ceiling temperature)

T1 – low temperature (floor temperature)

$\Delta T = T2 - T1$

OFF level $\rightarrow \Delta T < 2$ °C when RELAY switched OFF

Relay position



Vmin – minimum output voltage
Vmin = 70 ÷ 150 V

Vmax – maximum output voltage
Vmax = 170 ÷ 230 V

If: $T1 < Ts$ and $T2 < Ts + 2$ °C \rightarrow RELAY switch ON:

Else: RELAY switch OFF

Examples

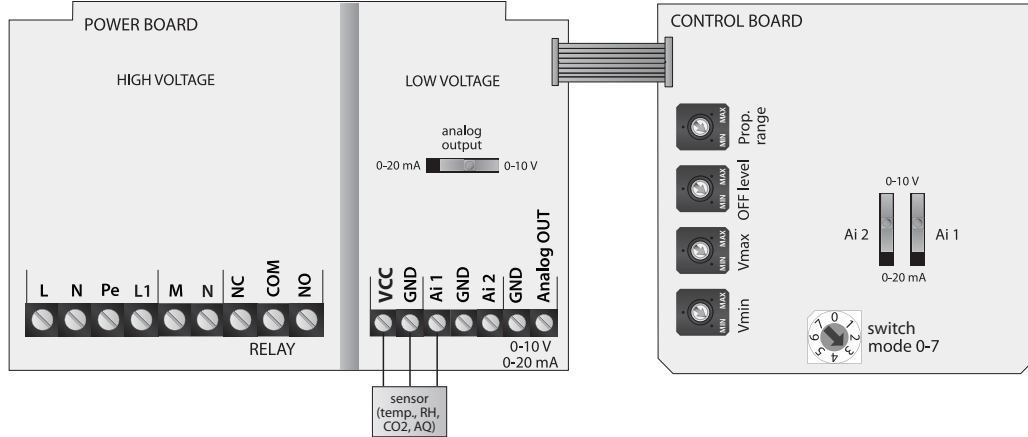
Ts	20 °C	20 °C	20 °C	20 °C	20 °C	24 °C
T1	10 °C	10 °C	15 °C	19 °C	22 °C	22 °C
T2	25 °C	15 °C	16 °C	21 °C	23 °C	26 °C
ΔT	15 °C	5 °C	1 °C	2 °C	1 °C	2 °C
RELAY	OFF	ON	ON	ON	OFF	OFF



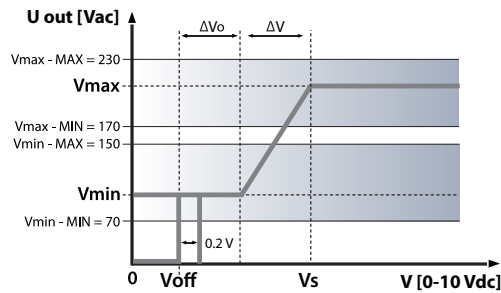
Pos.3 - Analog VE mode (analog signal) with/without OFF

Ai1 input – analog sensor input (0-10 VDC or 0-20 mA, for temp., RH, CO₂, air quality)
 Ai2 input – not used

Wiring scheme



Control curve



Vs – set by external potentiometer 'SETPOINT'

Vs = 0 ÷ 10 V

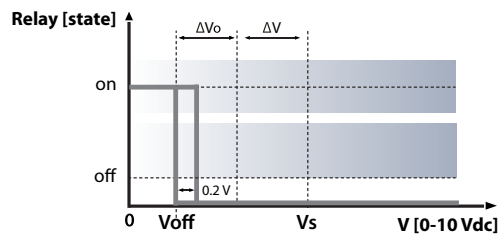
ΔV – set proportional range by inner trimmer 'PROP RANGE'

$\Delta V = 20 \div 80\%$ from (10V - Vs)

ΔV_o – set off-level by inner trimmer 'OFF-LEVEL'

$\Delta V_o = 10 \div 40\%$ from (10V - Vs)

Relay position



Voff – off-point

Voff = Vs - ΔV - ΔV_o

Vmin – minimum output voltage

Vmin = 70 ÷ 150 V

Vmax – maximum output voltage

Vmax = 170 ÷ 230 V

Examples

Vs	5 V	6 V	8 V
ΔV	1.0 ÷ 4.0 V	0.8 ÷ 3.2 V	0.4 ÷ 1.6 V
ΔV_o	0.5 ÷ 2.0 V	0.4 ÷ 1.6 V	0.2 ÷ 0.8 V
Vo	0 ÷ 3.5 V	1.2 ÷ 4.8 V	5.6 ÷ 7.4 V



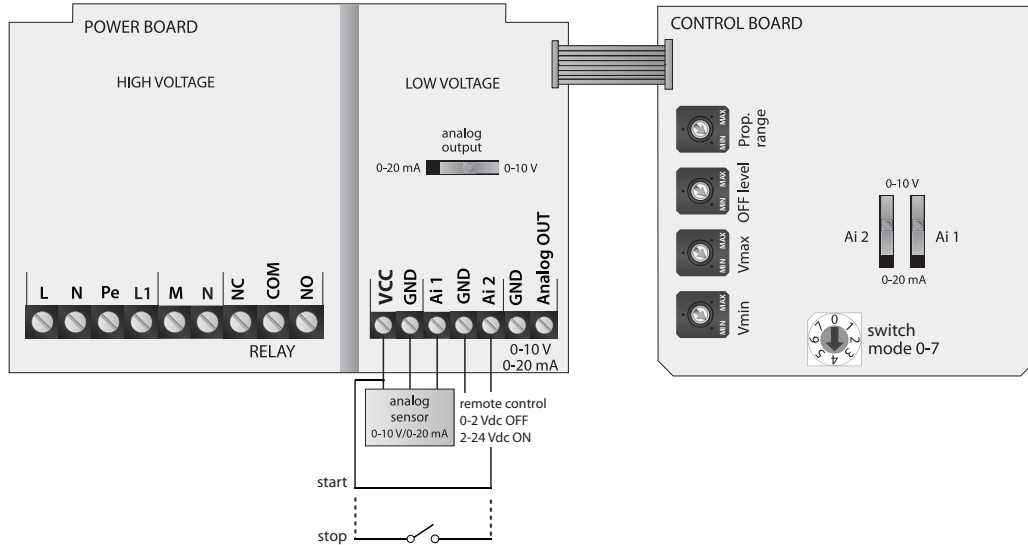
Pos. 4 - HE-heating mode with/without OFF and remote control

Ai1 input – analog sensor input (0-10 VDC/0-20 mA for temperature, pressure)

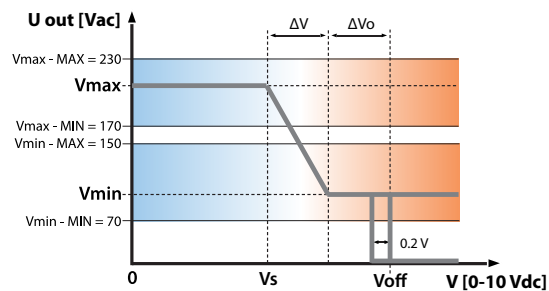
Ai2 input – remote control 0-24 VDC: >2 VDC = enabled < 2 VDC = disabled

0-20 mA: > 4 mA = enabled < 4 mA = disabled

Wiring scheme



Control curve



V_s – set voltage (0-10 VDC) by external potentiometer 'SETPOINT'

$V_s = 0-10\text{ V}$

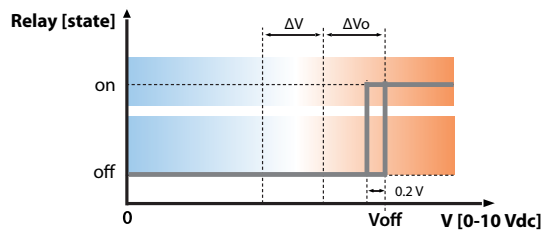
ΔV – set proportional range by inner trimmer 'PROP RANGE'

$\Delta V = 20 \div 80\%$ from V_s

ΔV_o – set off-temperature by inner trimmer 'OFF-LEVEL'

$\Delta V_o = 10 \div 40\%$ from V_s

Relay position



V_{off} - off-temperature

$V_{off} = V_s + \Delta V + \Delta V_o$

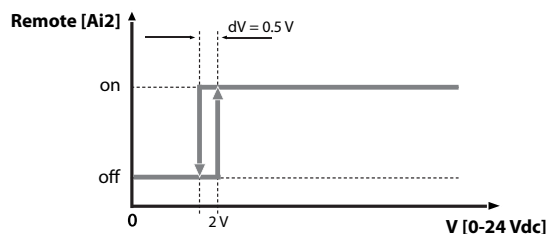
V_{min} – minimum output voltage

$V_{min} = 70 \div 150\text{ V}$

V_{max} – maximum output voltage

$V_{max} = 170 \div 230\text{ V}$

Remote control



Examples

V	2 VDC	4 VDC	5 VDC
ΔV	0.4-1.6 VDC	0.8-3.2 VDC	1.0-4.0 VDC
ΔV_o	0.2-0.8 VDC	0.4-1.6 VDC	0.5-2.0 VDC
V_{off}	2.6-4.4 VDC	5.2-8.8 VDC	6.5-10.0 VDC



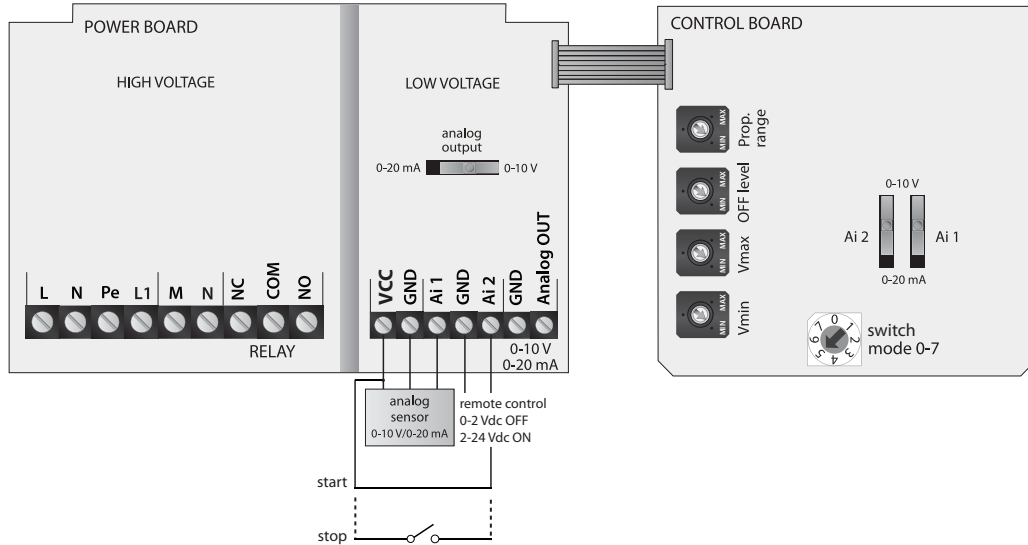
Pos. 5 - VE-ventilation mode with/without OFF and remote control

Ai1 input – analog sensor input (0-10 VDC/0-20 mA for temperature, CO₂, RH, air quality)

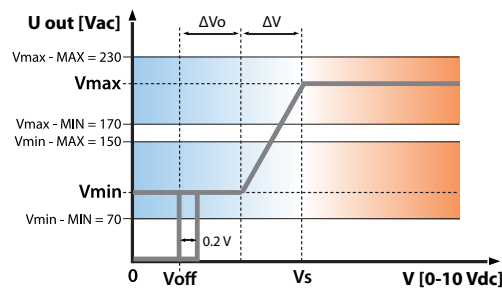
Ai2 input – remote control 0-24 VDC: >2 VDC = enabled < 2 VDC = disabled

0-20 mA: > 4 mA = enabled < 4 mA = disabled

Wiring scheme



Control curve



Vs – set voltage by external potentiometer 'SETPOINT'.
Vs = 0-10 VDC

Vs = 0-10 VDC

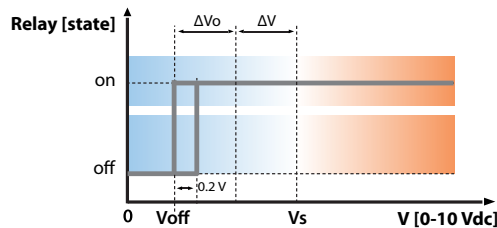
ΔV – set proportional range by inner trimmer 'PROP RANGE'

$\Delta V = 20 \div 80\%$ from Ps

ΔV_o – set off-temperature by inner trimmer 'OFF-LEVEL'

$\Delta V_o = 10 \div 40\%$ from Vs

Relay position



Voff – off-temperature

Voff = Vs - ΔV - ΔV_o

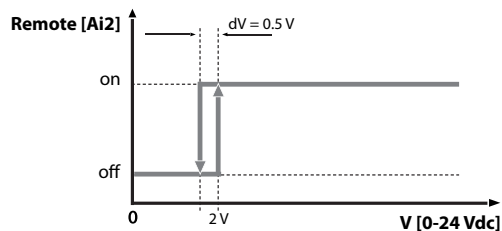
Vmin – minimum output voltage

Vmin = 70 \div 150 V

Vmax – maximum output voltage

Vmax = 170 \div 230 V

Remote control



Examples

Vs	5 V	6 V	8 V
ΔV	1.0 \div 4.0 V	0.8 \div 3.2 V	0.4 \div 1.6 V
ΔV_o	0.5 \div 2.0 V	0.4 \div 1.6 V	0.2 \div 0.8 V
Voff	0 \div 3.5 V	1.2 \div 4.8 V	5.6 \div 7.4 V



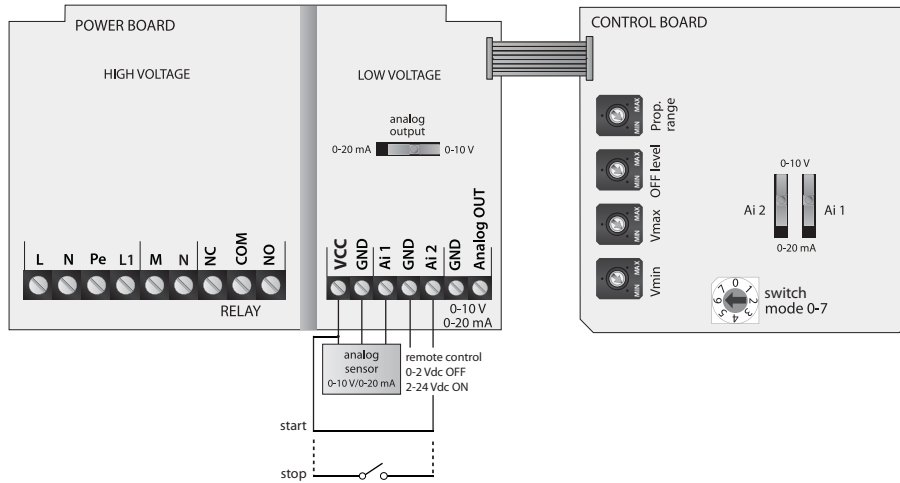
Pos. 6 - Analog VE mode (analog signal) with/without OFF and remote control

Ai1 input – analog sensor input (0-10 VDC/0-20 mA for temperature, CO₂, RH, air quality)

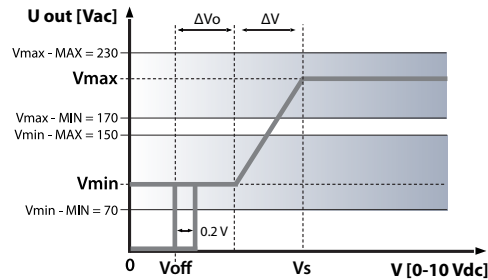
Ai2 input – remote control 0-24 VDC: >2 VDC = enabled < 2 VDC = disabled

0-20 mA: > 4 mA = enabled < 4 mA = disabled

Wiring scheme



Control curve



Vs – Set voltage (0-10 VDC) by external potentiometer 'SETPOINT'

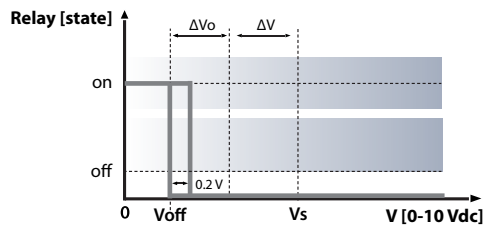
ΔV – Set proportional range by inner trimmer 'PROP RANGE'

ΔV = 20 ÷ 80 % from Ps

ΔVo – set off-level by inner trimmer 'OFF-LEVEL'

ΔVo = 10 ÷ 40 % from Vs

Relay position



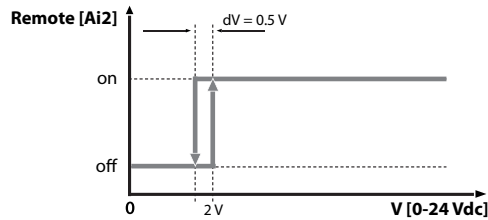
Voff – off-point

Voff = Vs - ΔV - ΔVo

Vmin – minimum output voltage

Vmax – maximum output voltage

Remote control



Examples

Vs	2 V	4 V	5 V
ΔV	0.4 ÷ 1.6 V	0.8 ÷ 3.2 V	0.4 ÷ 1.6 V
ΔVo	0.2 ÷ 0.8 V	0.4 ÷ 1.6 V	0.2 ÷ 0.8 V
Vo	2.6 ÷ 4.4 V	1.2 ÷ 4.8 V	5.6 ÷ 7.4 V



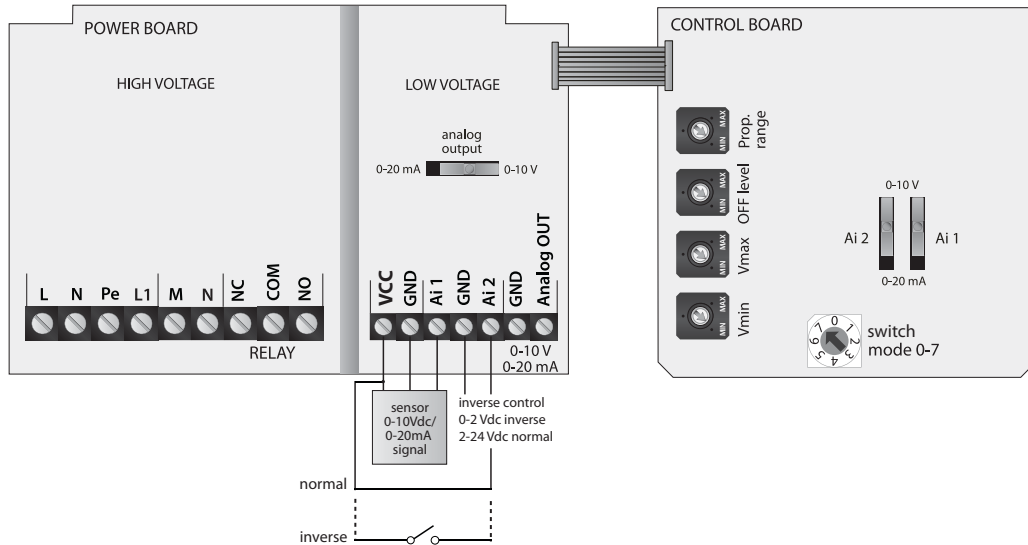
Pos.7: Analog mode (EVS) without OFF and inverse control

Ai1 input – analog input (0-10 VDC/0-20 mA) without OFF (EVS functionality)

Ai2 input – inverse control 0-24 VDC: > 2 VDC = normal < 2 VDC = inverse

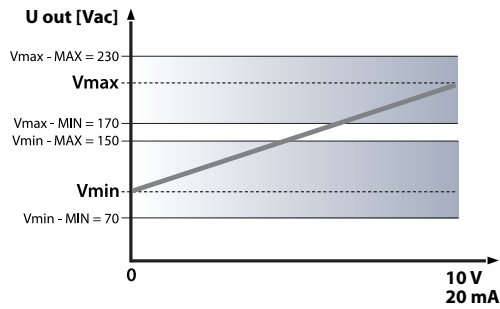
0-20 mA: > 4 mA = normal < 4 mA = inverse

Wiring scheme



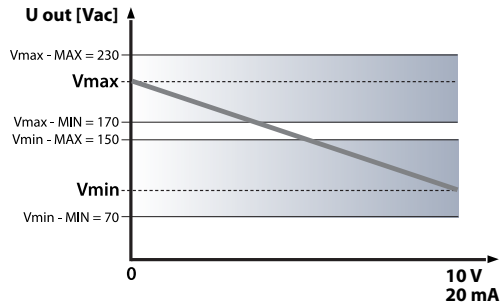
Normal control curve

(if Ai2 = >2VDC)

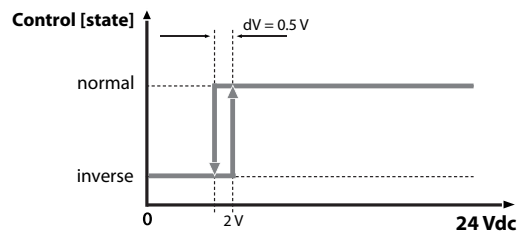


Inverse control curve

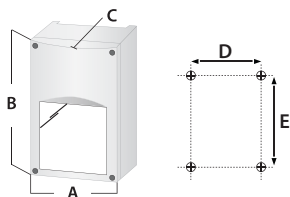
(if Ai2 = <2VDC)



Inverse control



DIMENSIONS & FIXING



	A	B	C	D	E	net weight	gross weight
MFC-0-15- AT	113	178	92	102	140	710 g	800 g
MFC-0-30- AT	113	178	92	102	140	760 g	850 g
MFC-0-60- AT	113	178	92	102	140	920 g	1010 g
MFC-0100- AT	113	178	92	102	140	920 g	1010 g