Example 8. Maintaining a Set Temperature in Ventilation and Air-Conditioning Systems Using Closed-Loop Control of the Cooled-Medium Temperature.

Purpose:

This configuration is intended to control a fan based on signals from a temperature sensor with a measuring range of 0 °C to 100 °C and a standardized 4-20 mA output. The control setpoint is specified by the preset digital setpoint in parameter F13.01, as a percentage of the signal applied to AI.

Wiring Diagram:

Two wiring arrangements are considered in this example:

- Using the internal power supply (Fig. 1).
- Using an external power supply (Fig. 2).

Temperature sensor wiring diagram to RD05
(internal power supply used)

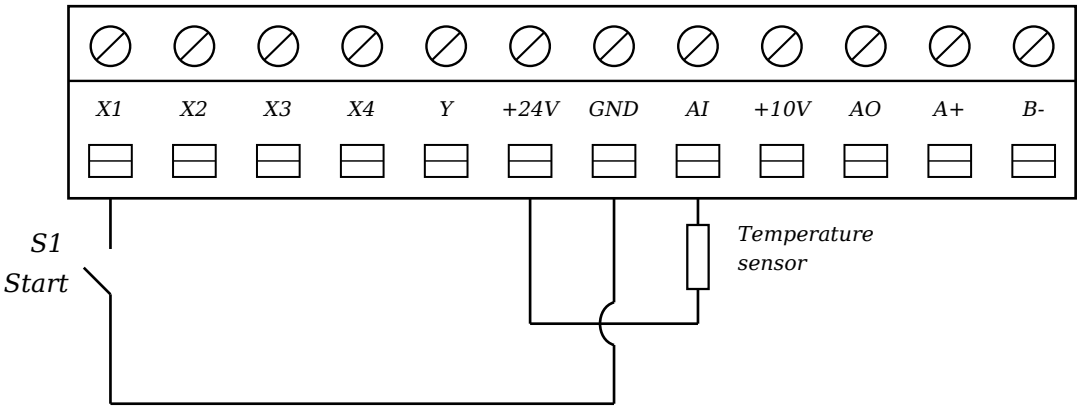


Figure 1. Temperature sensor wiring diagram to the RD (internal power supply used)

Temperature sensor wiring diagram to RD05
(external power supply used)

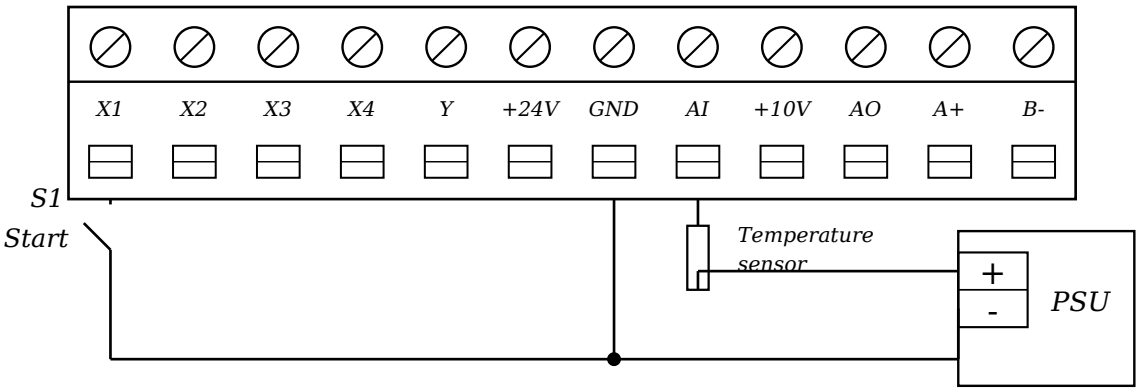


Figure 2. Temperature sensor wiring diagram to the RD (external power supply used)

Note: When connecting a temperature sensor with a current output signal, the DIP switch (AI in this example) must be set to the **"I"** position.
GND is the common terminal for power ratings of 0.75-5.5 kW; COM is the common terminal for power ratings of 7.5-22 kW.

Control Algorithm:

1) The induction motor is started by closing terminals X1 and COM.
2) In automatic mode, the set temperature is maintained using closed-loop process control.
3) The motor is stopped by opening terminals X1 and COM.

Parameter List.

Table 1. Parameter List.

No.	Code	Parameter	Value	Notes
1	F01.01	Start signal source	1	Start/stop via digital input
2	F01.02	Frequency reference source	8	Closed-loop PID process control with feedback
3	F01.10	Maximum output frequency	50	Rated nameplate frequency, Hz

4	F01.13	Lower frequency limit setpoint	20	Recommended minimum speed for pumps, Hz
5	F01.22	Acceleration time	5	Water-hammer protection
6	F01.23	Deceleration time	5	Water-hammer protection
7	F02.00	Motor type		According to motor
8	F02.01	Number of poles		According to motor
9	F02.02	Rated motor power		According to motor
10	F02.03	Rated motor frequency		According to motor
11	F02.04	Rated motor speed		According to motor
12	F02.05	Rated motor voltage		According to motor
13	F02.06	Rated motor current		According to motor
14	F05.00	X1 terminal function selection	1	Forward run
15	F05.20	Control mode selection	0	Two-wire control system 1
16	F05.22	X1-X4 terminal active-signal selection	0000	Active when contact closes
17	F5.41	AI input signal type	1	Current signal 0...20 mA
18	F5.50	AI analog input lower limit	20	Limits the current signal to the 4...20 mA range
19	F05.51	Ratio of analog signal value to AI lower-limit value	100	Temperature-sensor analog signal inversion
20	F05.53	Ratio of analog signal value to AI upper-limit value	0	
21	F7.00	Start mode	2	Flying start (speed search)
22	F13.00	PID setpoint source selection	0	Setpoint from control panel (parameter F13.01)
23	F13.01	PID setpoint	50	Setpoint as % of analog input signal value
24	F13.03	PID feedback source	2	Feedback from temperature sensor
25	F13.07	PID controller setup	0000	PID controller logic setup
26	F13.11	Proportional term	1	Overshoot adjustment

27	F13.12	Integration time	8	Overshoot adjustment
28	F13.12	Differential term	0.5	Overshoot adjustment