Example 10. Speed control using encoder feedback via the pulse input

Purpose

This configuration controls an induction motor at its rated speed. Pulse input terminal X4 is used as the setpoint source.[1]

Wiring

This example shows two wiring arrangements.
- Using the built-in power supply (Figure 1).
- Using an external power supply (Figure 2).

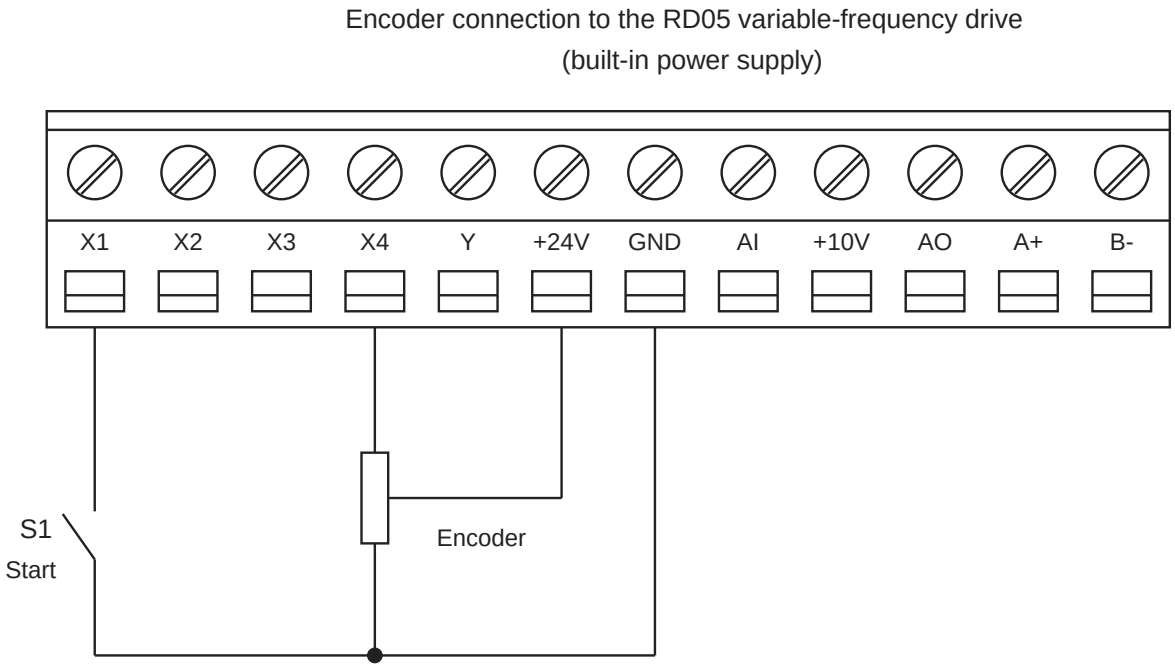


Figure 1. Encoder connection to the variable-frequency drive (RD) using the built-in power supply.[1]

Encoder connection to the RD05 variable-frequency drive
(external power supply)

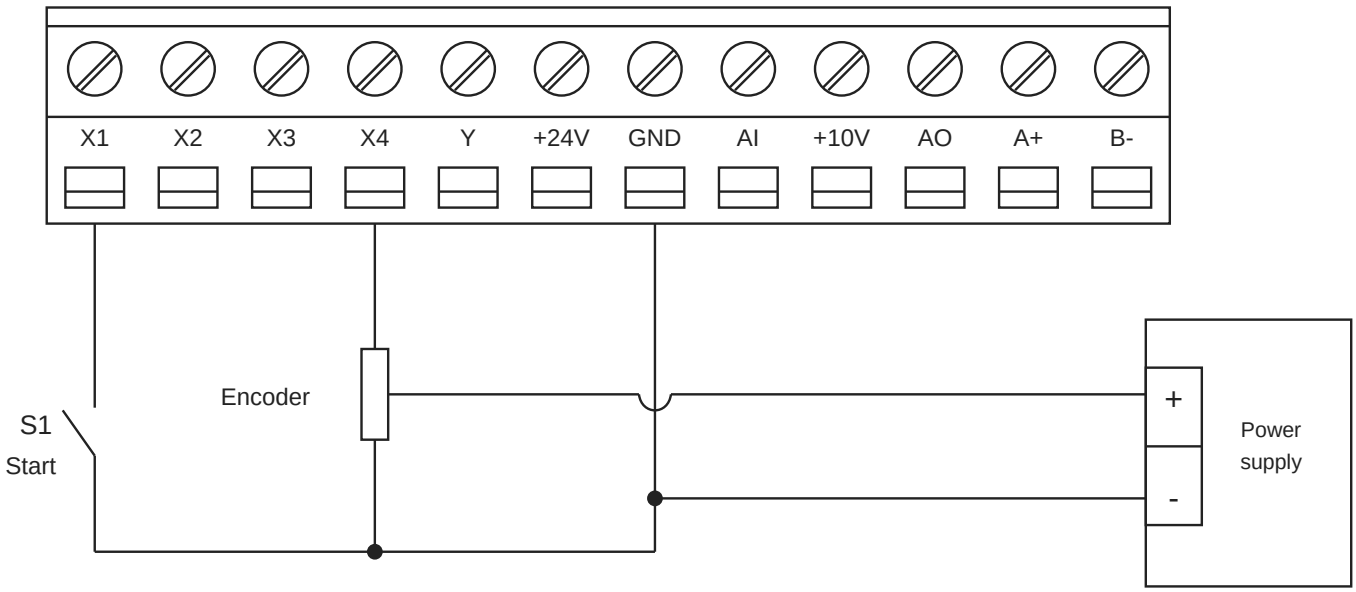


Figure 2. Encoder connection to the RD using an external power supply.[1]

Control sequence

1. Close the contact between terminals X1 and GND to start the induction motor.

2. In automatic mode, closed-loop process control maintains the specified pressure.[1]

3. Open the contact between terminals X1 and GND to stop the motor.

Translation note

[1] The source contains inconsistent descriptions. The figure captions refer to a pressure sensor, although both diagrams show an encoder. The heading inside Figure 2 says “internal power supply,” although an external supply is shown. These labels have been aligned with the diagrams in this translation. The source wording about pressure in step 2 and about pumps and water hammer in the parameter table is retained. The purpose section identifies X4 as the setpoint source, whereas the table selects pulse-input feedback and a setpoint entered in F13.01. The repeated parameter code F05.35 in rows 22 and 23 is also retained. Parameter codes, settings and wiring have not been corrected.

Parameter list

Table 1. Parameter settings.

No.	Code	Description	Value	Notes
1	F01.01	Run command source	1	Start/stop control via digital input
2	F01.02	Frequency reference source	8	Closed-loop process control using the PID controller and feedback
3	F01.10	Maximum output frequency	50	Rated nameplate frequency, Hz
4	F01.13	Lower frequency limit	20	Recommended minimum operating frequency for pumps, Hz
5	F01.22	Acceleration time	5	Protection against water hammer
6	F01.23	Deceleration time	5	Protection against water hammer
7	F02.00	Motor type		Set to match the motor
8	F02.01	Number of motor poles		Set to match the motor
9	F02.02	Rated motor power		Set to match the motor
10	F02.03	Rated motor frequency		Set to match the motor
11	F02.04	Rated motor speed		Set to match the motor
12	F02.05	Rated motor voltage		Set to match the motor
13	F02.06	Rated motor current		Set to match the motor
14	F05.00	X1 terminal function	1	Forward run
15	F05.03	X4 terminal function	39	Frequency measurement at terminal X4
16	F05.20	Control mode selection	0	Two-wire control, mode 1

Parameter list

Table 1. Parameter settings (continued).

No.	Code	Description	Value	Notes
17	F05.22	Active state of terminals X1-X4	0000	Active when the contact is closed
18	F05.31	Minimum pulse-input frequency		Set to match the encoder
19	F05.32	Minimum pulse-input frequency as a percentage of the configured value	0	Percentage of the configured value
20	F05.33	Maximum pulse-input frequency		Set to match the encoder
21	F05.34	Maximum pulse-input frequency as a percentage of the configured value	100	Percentage of the configured value
22	F05.35	Time filter	0	Minimum input pulse duration
23	F05.35	Frequency threshold	0	Minimum frequency detection threshold
24	F7.00	Starting mode	2	Flying start (speed search)
25	F13.00	PID setpoint source	0	Setpoint entered in parameter F13.01
26	F13.01	Control-panel setpoint or feedback value	50%	PID setpoint
27	F13.03	PID feedback source	5	Pulse-input feedback
28	F13.07	PID controller configuration	0000	PID controller logic configuration
29	F13.11	Proportional term	1	Tune to reduce overshoot
30	F13.12	Integral time	8	Tune to reduce overshoot
31	F13.13	Derivative term D1	0.5	Tune to reduce overshoot