Connection and Operation (Pulse Input Package)

Names and Functions of Driver Parts

	R50128-C		1 Signal Monitor Display					
		-1	♦ LED Indicators					
	NAME (2		Indication	Color Function		ction	When Activated	
	ON I		OPERATION	Green	Power Supp	ly Indication	Lights when power is on.	
	ia 🔤	_	ALARM	Red	Alarm Ir	ndication	Blinks when protective functions are activated.	
Motor Connector -		-2						
	Chill Content							
MOTOR		3	Blink Count	Function			When Activated	
Not used.	चित्र 🔅	1 0verheat		/erheat	The temperature of the driver's internal heat sink has reached approximately 85°C (185°F).			
	04		2	Overload The		The motor has	he motor has been operated continuously over 5 seconds under a load exceeding the maximum torque.	
		3 Overvoltage The primary voltage of 4 Speed Error The motor cannot acc		voltage of the driver's inverter has exceeded the a	allowable level.			
	- <u>9</u> , n			ed Error	The motor cannot accurately follow at the indicated pulse speed.			
Power Input Terminals -		-5	5 Overcurrent An excessive current has flowed through the inverter		current has flowed through the inverter power ele	ement inside the driver.		
	6		0v	erspeed	The motor shaft velocity exceeds 5000 r/min. (Except geared type)			
Protective Farth	- 81 =	7 EEPROM Data Error A motor control parameter h		rol parameter has been damaged.				
Terminal			8 Sensor Error The power has been turned on without the motor cable connected to the			cted to the driver.		
I	VEXTA	Lights (No blinking) System Error The driver has fatal error.						

2 Function Switches

Indication	Switch Name	Function
1000/500 ×1/×10	Resolution Select Switch	This function is for selecting the motor resolution. For each geared type, the resolution of gear output shaft is 1/gear ratio. [1000] [\times 1] \rightarrow 1000 P/R (0.36'/step) [1000] [\times 10] \rightarrow 10000 P/R (0.036'/step) [500] [\times 1] \rightarrow 500 P/R (0.72'/step) [500] [\times 10] \rightarrow 5000 P/R (0.072'/step)
1P/2P	Pulse Input Mode Switch	The settings of this switch are compatible with the following two types of pulse input modes: "1P" for the 1-pulse input mode, "2P" for the 2-pulse input mode.

Notes:

Always turn the power off before switching resolution or pulse input, and turn it ON again after you have made the change.
If the resolution select switch is set to [×10], it cannot control the resolution selected by the input signal. It is always [×10].

3 Current Adjustment Switch

Indication	Switch Name	Function
CURRENT	Current Adjustment Switch	The motor running current can be lowered to suppress temperature rise in the motor and driver, or lower operating current in order to allow a margin for motor torque (a maximum of 16 settings).

4 Velocity Filter Adjustment Switch

Indication	Switch Name	Function			
V.FIL	Velocity Filter Adjustment Switch	This switch is used to make adjustments when a smooth start-stop or smooth motion at low speed is required (a maximum of 16 settings).	Set to "0" The difference in characteristics mode by the velocity filter.		

5 Input/Output Signals (36 pins)

Indication	Input/Output	Pin. No	Signal	Signal Name	
	External power input	1	Vcc+5V	Power Supply	
		2	GND		
		3	Vcc+24V		
		9	DIR. (CCW)	Rotation Direction (CCW Pulse)*	
	Input	10	DIR. (CCW)		
		11	PLS (CW)	Pulse	
		12	PLS (CW)	(CW Pulse)*	
		13	BSG1	Quadrature BSG Outpu	
		14	GND	(Open-collector)	
		15	ASG1	Quadrature ASG Output	
	Output	16	GND	(Open-collector)	
	Output	17	BSG2	Quadrature BSG Output	
		18	BSG2	(Line driver)	
		19	ASG2	Quadrature ASG Outp	
CN4		20	ASG2	(Line driver)	
	Input	21	ACL	Alarm Clear Timing (Open-collector)	
		22	ACL		
	Output	23	TIM.1		
		24	GND		
		25	ALARM	Alarm	
		26	ALARM		
		27	TIM.2	Timing	
		28	TIM.2	(Line driver)	
		29	END	Positioning	
		30	END	Completion	
	Input	31	×10	Resolution Select	
		32	×10		
		33	C.OFF	All Windings Off	
		34	C.OFF		
Description of insul/output singula . Desc 0.50					

Description of input/output signals → Page C-52

* Signal name in parentheses represents the setting in 2-pulse input mode.

Introduction



/ithout

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Page C-274 Controller EMP400 Series -Driver cables -> Page C-300

Connecting the Electromagnetic Brake to a Power Supply

Connect the electromagnetic brake to the power supply using a cable of at least AWG24. The power supply input to the electromagnetic brake is 24 VDC \pm 5% 0.3 A minimum (AS46: 0.1 A minimum) and therefore must be independent of the driver's power supply for signal control

Notes

- Applying a voltage that exceeds the specifications will cause the electromagnetic brake to generate a great amount of heat, resulting in motor temperature rises and possible damage to the motor. Conversely, if voltage is too low, the electromagnetic brake may not release.
- To protect the switch contacts and prevent noise, always connect the surge suppressor. (*The surge suppressor is included with electromagnetic brake motors.)
 To prevent noise, use a dedicated power supply for electromagnetic brake.
- Correct polarity (+ and -) must be ensured when connecting the electromagnetic brake leads of AS Series to the DC power supply. If polarity is incorrect, the electromagnetic
- brake will not operate . When using as a CE certified part, use a dedicated DC power supply for electromagnetic brake.
- (1) AS46
- The electromagnetic brake leads are linked to the connector on the motor [600 mm (23.6 in.)]. When connecting with the DC power supply, connect the red spiral lead wire to +24 V, and the black lead wire to the ground (GND). Use the extension cable or the flexible extension cable (both sold separately)



◇Input Signal Connection

Signals can be connected directly when 5 VDC is supplied. If the signals are used at a voltage exceeding 5 VDC, be sure to provide an external resistor to prevent the current exceeding 20 mA from flowing. Internal components will be damaged if a voltage exceeding 5 VDC is supplied directly without using an external resistor. Example: If the voltage is 24 VDC, connect a resistor (R₁) of 1.5 to 2.2 k Ω and 0.5 W

or more

◇Output Signal Connection Use output signals at 30 VDC or less and 15 mA or less.

If these specifications are exceeded, the internal components may be damaged. Check the specification of the connected equipment.

When the current is above 15 mA, connect an external resistor R2.

Notes on Wiring

- Use multi-core, twisted-pair shielded wires of AWG28 or thicker for the control I/O signal lines (CN4), and keep wiring as short as possible [within 2 m (6.6 ft.)].
- Note that as the length of the pulse signal line increases, the maximum transmission frequency decreases. Technical reference -> Page F-54
- When it is necessary to extend the wiring distance between the motor and driver more than 0.4 m (1.31 ft.), the accessory extension cable or flexible extension cable must be used. Electromagnetic brake motor models [except motor frame size 42 mm (1.65 in.)] must use an electromagnetic brake extension cable or flexible extension cable (sold separately). The frame size 42 mm (1.65 in.) models can use a standard extension cable even for electromagnetic brake motor models. Extension cables for electromagnetic brake motor -> Page C-297 Always use the motor cable for industrial connector type (sold separately) for connection between the industrial connector type motor and the driver.
- Use the following cable for the power line:
 - Single-phase 100-115 VAC, Single-phase 200-230 VAC: 3-core cable of AWG18 or thicker
- Three-phase 200-230 VAC: 4-core cable of AWG18 or thicker. Provide a minimum distance of 300 mm (1 ft.) between the control I/O signal lines and power lines (AC lines, motor lines and other large-current circuits) Do not run the control I/O signal lines in the same duct as power lines or bundle them with power lines.
- To ground the driver, lead the ground conductor from the protective earth terminal (M4) and connect the ground conductor to provide a common ground point.

▲ Caution

If the "Timing" signal output or "Quadrature" signal output is used, a 5 VDC or 24 VDC power supply is required. Connect the power supply for "Timing" signal output or "Quadrature" signal output to either 5 VDC or 24 VDC. Do not input 5 VDC and 24 VDC at the same time.

Description of input/output signals → Page C-52

Recommended Crimp Terminals unit = mm (in.)



Crimp terminals are not provided with the products. They must be purchased separately.

(2) AS66, AS69, AS98

The electromagnetic brake leads are linked to the connector on the driver connection side of extension cable for electromagnetic brake motor (sold separately). Be sure to use the accessory (sold separately) extension cable or flexible extension cable. Connect the orange/black spiral lead wire (orange for flexible extension cable)[60 mm (2.36 in.)] to +24 V, and the gray lead wire [60 mm (2.36 in.)] to the ground (GND)



Description of Input/Output Signals



PLS (CW) and DIR. (CCW) Input Signal

◇Input Circuit and Sample Connection



 The colored characters indicate signals under the 1-pulse input mode, while the black characters indicate signals under the 2-pulse input mode.

Note:

 The external resistor is not needed when Vo is 5 VDC. When the voltage exceeds 5 VDC, connect the external resistor R₁ to keep input current at 20 mA or less. When 5 VDC or more is applied without the external resistor, the internal components may get damaged.

◇Pulse Waveform Characteristics



• For pulse signals, use input pulse waveforms like those shown in the figure above.

◇Pulse Input Modes

• 1-Pulse Input Mode

The 1-pulse input mode uses "Pulse" (PLS) and "Rotation Direction" (DIR.) signals. CW is selected by inputting DIR. signal at low level (with the input photocoupler ON), CCW by inputting at high level (with input photocoupler OFF).

Rotation Direction Signals Photocoupler "ON": Clockwise

Photocoupler "OFF": Counterclockwise 1-Pulse Input Mode



2-Pulse Input Mode

The 2-pulse input mode uses "CW" and "CCW" pulses. When "CW" pulses are input, the motor's output shaft rotates clockwise when the motor is viewed facing the shaft; when "CCW" pulses are input, the shaft rotates counterclockwise.



All Windings Off (C.OFF) Input Signal Resolution Select (×10) Input Signal Alarm Clear (ACL) Input Signal

◇Input Circuit and Sample Connection





When Using 24 VDC



◇All Windings Off (C.OFF) Input Signal Pin No. ③3, ④

This controller power supply offers a choice of either 5 VDC or 24 VDC. Inputting the "All Windings Off" (C.OFF) signal puts the motor in a non-excitation (free) state. It is used when turning the motor shaft externally or when positioning manually. This signal clears the deviation counter.



◇Resolution Select (×10) Input Signal Pin No. ③), ③

This controller power supply offers a choice of either 5 VDC or 24 VDC.

Inputting this signal when 1000 P/R or 500 P/R is selected as resolution via the function switch will increase the resolution ten times to 10000 P/R or 5000 P/R.

Note:

 While the resolution select switch is set to 10000 P/R or 5000 P/R, input of this signal will not change the resolution.

◇Alarm Clear (ACL) Input Signal

Pin No. 21, 22

This controller power supply offers a choice of either 5 VDC or 24 VDC. This signal is used for canceling the alarm without turning off power to the driver when a protective function has been activated.

Note:

 The following alarm cannot be cleared. To cancel the alarm, first resolve the cause and check for safety, and then turn power on again.

· Overcurrent · EEPROM data error · System error

2-Phase PK **EMP400**

SG8030J

Controllers Accessories

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Positioning Completion (END) Output Signal Alarm (ALARM) Output Signal

◇Output Circuit and Sample Connection



◇Positioning Completion (END) Output Signal Pin No. 29, 30

Circuits for use with 30 VDC, 15 mA maximum.

This signal is output at the photocoupler ON state when positioning is completed. This signal is output when the rotor position is less than \pm 1.8° from the command position, approximately 2 msec after the

pulse input stops.



Note:

• The "Positioning Completion" signal blinks during operation with a pulse input frequency of 500 Hz or less

◇Alarm (ALARM) Output Signal

Pin No. 25, 26

Circuits for use with 30 VDC, 15 mA maximum. The photocoupler turns OFF when one of the driver's protective functions has been activated. When an abnormality such as an overload or overcurrent is detected, the "Alarm" signal will be output, the driver's LED indicator (ALARM) blinks, and the motor stops (non-excitation state).

To cancel the alarm, first resolve the cause and check for safety, and then input an "Alarm Clear" (ACL) signal or reset power. Once power has been turned off, wait at least 10 seconds before turning it on again.



Notes

• The "Alarm" output uses positive logic (normally closed), all other outputs use negative logic (normally open)

 The ALARM indicator lights (not blinks) when system error protective function has been activated

Timing (TIM.1, TIM.2) Output Signal

Quadrature (ASG1/BSG1, ASG2/BSG2) Output Signal

Output Circuit and Sample Connection

Open-Collector Output



Circuits for use with 30 VDC, 15 mA maximum.

Line Driver Output



◇Timing (TIM.1, TIM.2) Output Signal Pin No. 23, 24, 27, 28

When the "Timing" signal is output, the transistor turns ON (For the line driver output which is TIM.2. the output signal is ON). This signal is used to detect the home position with greater precision. The number of pulses of this signal is 50 pulses per one motor shaft rotation.



Notes:

A precise "Timing" signal output cannot be obtained when the speed of the pulse input frequency is over 500 Hz.

When the "Timing" signal output is used, 5 VDC or 24 VDC power supply is necessary.

Pin No. 13~20

A counter or similar device can be connected to monitor the position of the motor. The pulse resolution is the same as the motor resolution at the time of power-on.

[Example: Resolution select switch (1000 P/R) → Output pulse number for each motor rotation (1000).]

The phase difference between A and B is 90° in electrical angle. Notes

• The pulse output accuracy is, regardless of resolution, within $\pm 0.36^{\circ}$ (repetition accuracy: within $\pm 0.09^{\circ}$).

• When the "Quadrature" signal output is used, 5 VDC or 24 VDC power supply is necessary. This signal is only for position verification when the motor has stopped. There is a 1 msec (maximum) time lag between real rotor motion and the output signals.

◇Pulse Waveform Characteristics



(Clockwise rotation of motor)