ECR

Controller

CONTENTS

Controller

ECR Series

All sizes of EBS, EBR, FLSH, FLCR, and FGRC can be operated with the same controller

How to order

ECR-MNNN3B - NP A 02

(A) (B) (C)

(A) Interface specifications	
NP	Parallel I/O (NPN and PNP common)
LK	IO-Link
CL	CC-Link
EC	EtherCAT

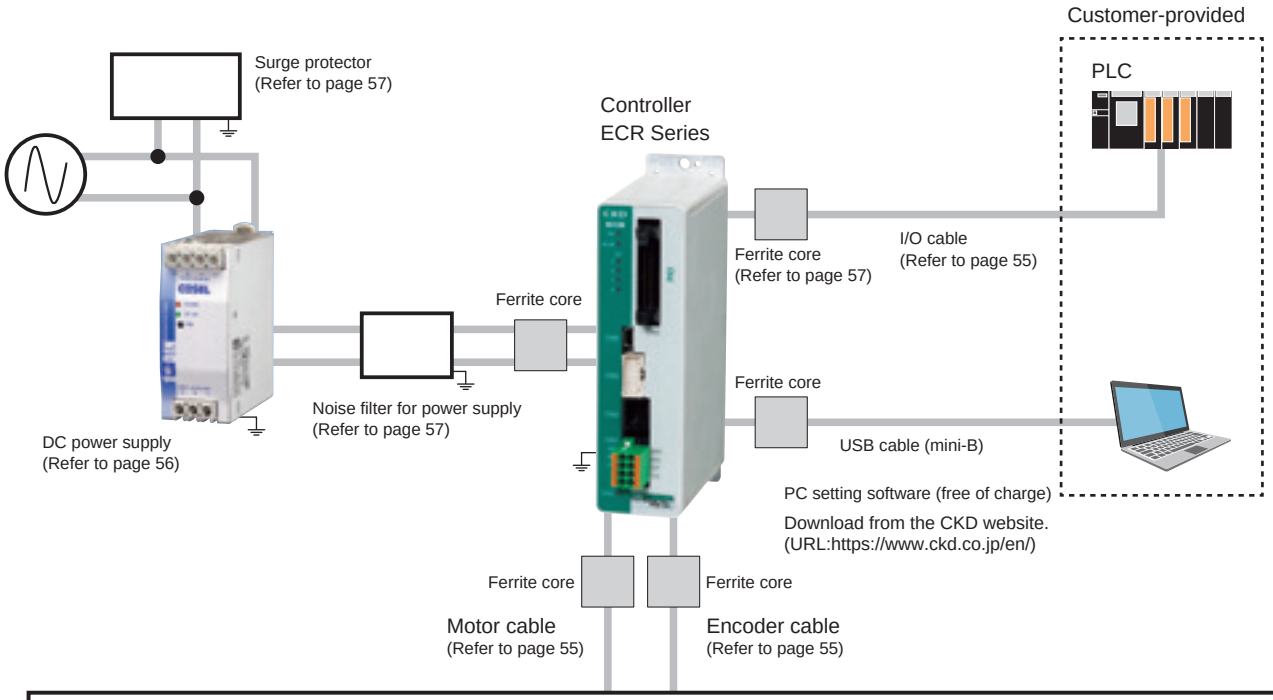
(B) Mounting method	
A	Standard mount
D	DIN rail mount

(C) IO cable length *1	
00	None
02	2m
03	3m
05	5m
10	10m

*1 Select "None" when selecting interface specifications other than "Parallel I/O".

EAR-compliant product (EAR99-embedded product)

System configuration



Connectable actuators

EBS-M Series
(Catalog No. CC-1422A)

EBR-M Series
(Catalog No. CC-1422A)

FLSH Series
(Page 1)

FLCR Series
(Page 13)

FGRC Series
(Page 29)

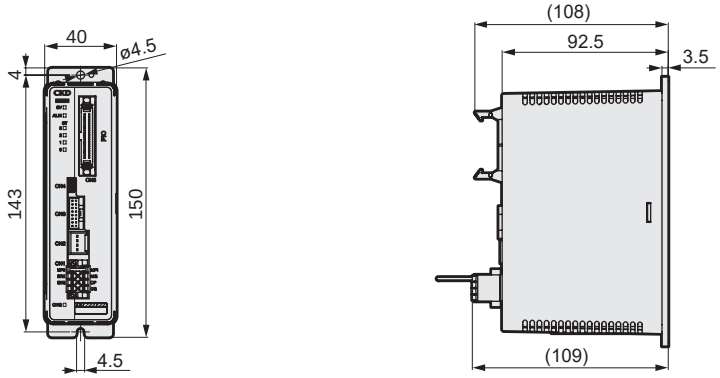
* Refer to the Instruction Manual for details about installing and wiring the noise filter, surge protector, and ferrite core.

General specifications

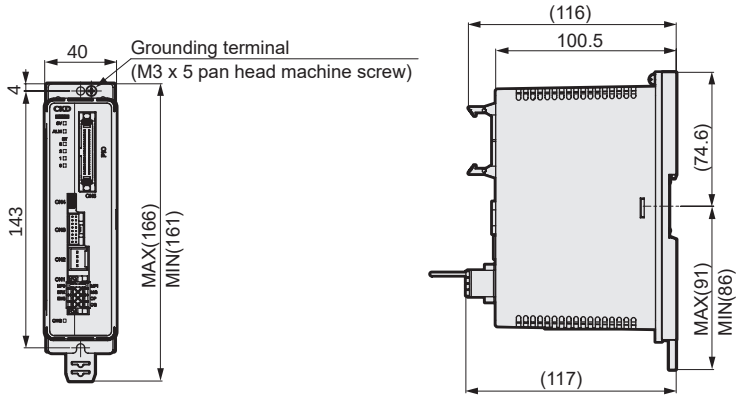
Item		Description						
Applicable actuators		EBS/EBR			FLSH/FLCR/FGRC			
Applicable motor sizes		□35	□42	□56	□20	□25	□25L	□35
Setting tools		PC setting software (S-Tools) Connection cable: USB cable (mini-B)						
External interface	Parallel I/O specification	24 VDC ±10%, input/output max. 16 points, cable length max. 10 m						
	Field network specification	IO-Link, CC-Link, EtherCAT						
Display lamp		Servo ON/OFF LED, alarm status LED Status LED, communication status LED (according to each interface specification)						
Power supply voltage	Control power	24 VDC ±10% or 48 VDC ±10%						
	Power supply	24 VDC ±10% or 48 VDC ±10%						
Current consumption	Control power	0.6 A or less						
	Power supply	2.8 A or less	3.7 A or less	6.1 A or less	1.1 A or less	2.1 A or less	3.2 A or less	3.0 A or less
Motor section maximum instantaneous current		4.0 A or less	5.2 A or less	8.6 A or less	1.5 A or less	3.0 A or less	4.5 A or less	4.2 A or less
Brake current consumption		0.4 A or less						
Insulation resistance		10 MΩ and over at 500 VDC						
Withstand voltage		500 VAC for 1 minute						
Operating ambient temperature		0 to 40°C (no freezing)						
Operating ambient humidity		35 to 80% RH (no condensation)						
Storage ambient temperature		-10 to 50°C (no freezing)						
Storage ambient humidity		35 to 80% RH (no condensation)						
Working atmosphere		No corrosive gas, explosive gas, or dust						
Degree of protection		IP20						
Weight		Approx. 400 g (standard mount) Approx. 430 g (DIN rail mount)						

Dimensions

● Standard mount (ECR-MNNN3B-*A*)



● DIN rail mount (ECR-MNNN3B-*D*)

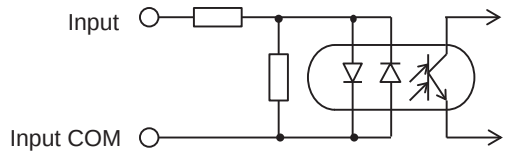


Parallel I/O (PIO) input/output circuit

Input specification

Item	ECR-MNNN3B-NP□□
No. of inputs	16 points
Input voltage	24 VDC ±10%
Input current	3.7 mA/1 point
ON voltage	19 V or higher
OFF current	0.2 mA or less

Input circuit

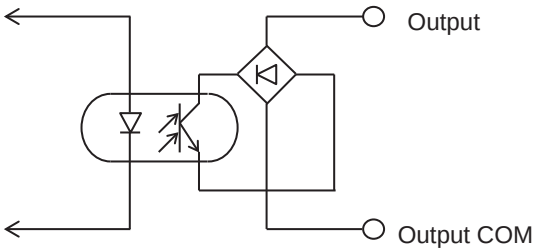


The input is not polarized.
(The input COM can be used with either + or -)

Output specifications

Item	ECR-MNNN3B-NP□□
Output points	16 points
Load voltage	24 VDC ±10%
Load current	20 mA or less/1 point
Internal voltage drop	3 V or less
Leakage current	0.1 mA or less
Output short-circuit protection circuit	Yes
Connecting load	PLC, etc.

Output circuit



The output is not polarized.
(The output COM can be used with either + or -)

Parallel I/O (PIO) Operation mode

Controllers offer nine operation modes.

Use the PC setting software to set the appropriate operation mode. The initial setting is 64-point mode.

Operation mode	Positioning point count	Overview
64-point mode	64 points	· Travel output · Zone output: 2 points · Point zone output: 1 point
128-point mode	128 points	· Travel output · Selectable output: 2 points (point zone, zone 1, zone 2, travel)
256-point mode	256 points	· Selectable output: 2 points (point zone, zone 1, zone 2, travel)
512-point mode	512 points	· Selectable output: 1 point (point zone, zone 1, zone 2, travel)
Teaching 64-point mode	64 points	· JOG (INCH) travel start input · Selectable output: 2 points (point zone, zone 1, zone 2, travel) · Travel output
Simple 7-point mode	7 points	· Travel output · Zone output: 2 points
Solenoid valve mode double 2-position	2 points	· SW output: 2 points · Travel output · Point zone output: 1 point · Zone output: 2 points
Solenoid valve mode double 3-position	2 points	· SW output: 2 points · Travel output · Point zone output: 1 point · Zone output: 2 points
Solenoid valve mode single	2 points	· SW output: 2 points · Travel output · Point zone output: 1 point · Zone output: 2 points

Parallel I/O (PIO) Signal abbreviation list

Input signal

Abbreviation	Name	Abbreviation	Name
PST	Point travel start	JIM	JOG/INCH (-) travel start
PSB*	Point selection bit*	JIP	JOG/INCH (+) travel start
OST	Home position return start	INCH	INCH selection
SVON	Servo ON	P*ST	Point number * travel start
ALMRST	Alarm reset	V1ST	Solenoid valve travel command 1
STOP	Stop	V2ST	Solenoid valve travel command 2
PAUSE	Pause	VST	Solenoid valve travel command
WRST	Write start		
TEACH	Teaching selection		

Output signal

Abbreviation	Name	Abbreviation	Name
PEND	Point travel complete	ALM	Alarm
PCB*	Point number confirmation bit *	WARN	Warning
ACB*	Alarm confirmation bit *	READY	Operation preparation complete
PZONE	Point zone	WREND	Write complete
MOVE	Traveling	TEACHS	Teaching state
ZONE1	Zone 1	P*END	Point number * travel complete
ZONE2	Zone 2	SW1	Switch 1
OEND	Home position return complete	SW2	Switch 2
SONS	Servo ON state		

Parallel I/O (PIO) Operation modes and signal assignment

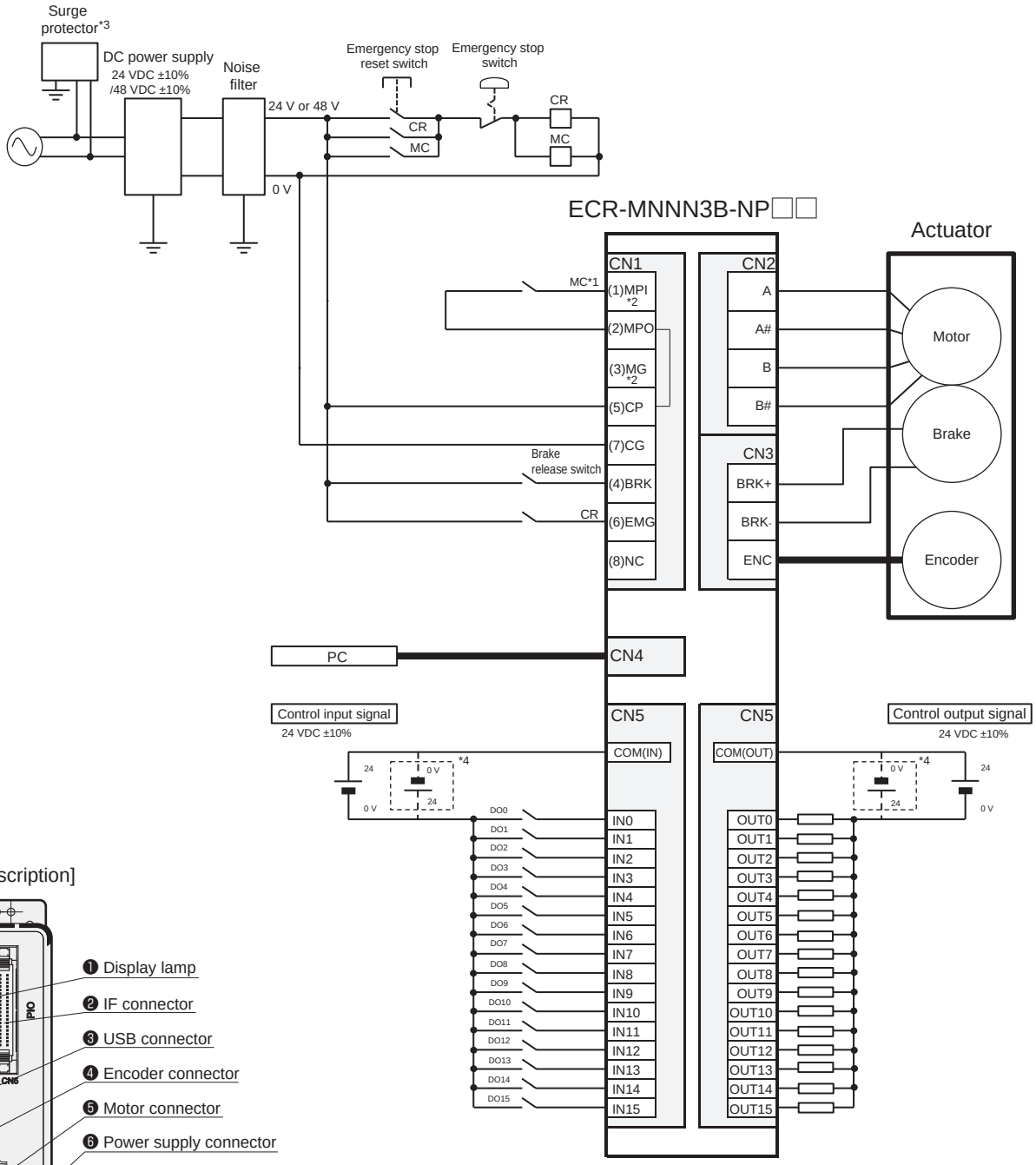
The following figure shows signal assignments in each operation mode.

Operation mode		64-point mode	128-point mode	256-point mode	512-point mode	Teaching 64-point mode	Simple 7-point mode	Solenoid valve mode double 2-position	Solenoid valve mode double 3-position	Solenoid valve mode single
Positioning point count		64	128	256	512	64	7	2	2	2
Input	IN0	PSB0	PSB0	PSB0	PSB0	PSB0	P1ST	V1ST	V1ST	-
	IN1	PSB1	PSB1	PSB1	PSB1	PSB1	P2ST	V2ST	V2ST	VST
	IN2	PSB2	PSB2	PSB2	PSB2	PSB2	P3ST	-	-	-
	IN3	PSB3	PSB3	PSB3	PSB3	PSB3	P4ST	-	-	-
	IN4	PSB4	PSB4	PSB4	PSB4	PSB4	P5ST	-	-	-
	IN5	PSB5	PSB5	PSB5	PSB5	PSB5	P6ST	-	-	-
	IN6	-	PSB6	PSB6	PSB6	TEACH	P7ST	-	-	-
	IN7	-	-	PSB7	PSB7	JIM	-	-	-	-
	IN8	-	-	-	PSB8	JIP	-	-	-	-
	IN9	-	-	-	-	INCH	-	-	-	-
	IN10	PST	PST	PST	PST	PST/ WRST	-	-	-	-
	IN11	OST	OST	OST	OST	OST	OST	OST	OST	OST
	IN12	SVON	SVON	SVON	SVON	SVON	SVON	SVON	SVON	SVON
	IN13	ALMRST	ALMRST	ALMRST	ALMRST	ALMRST	ALMRST	ALMRST	ALMRST	ALMRST
	IN14	STOP#	STOP#	STOP#	STOP#	STOP#	STOP#	-	-	-
	IN15	PAUSE#	PAUSE#	PAUSE#	PAUSE#	PAUSE#	PAUSE#	-	-	-
Output	OUT0	PCB0/ ACB0	PCB0/ ACB0	PCB0/ ACB0	PCB0/ ACB0	PCB0/ ACB0	P1END	P1END	P1END	P1END
	OUT1	PCB1/ ACB1	PCB1/ ACB1	PCB1/ ACB1	PCB1/ ACB1	PCB1/ ACB1	P2END	P2END	P2END	P2END
	OUT2	PCB2/ ACB2	PCB2/ ACB2	PCB2/ ACB2	PCB2/ ACB2	PCB2/ ACB2	P3END	-	-	-
	OUT3	PCB3/ ACB3	PCB3/ ACB3	PCB3/ ACB3	PCB3/ ACB3	PCB3/ ACB3	P4END	-	-	-
	OUT4	PCB4	PCB4	PCB4	PCB4	PCB4	P5END	SW1	SW1	SW1
	OUT5	PCB5	PCB5	PCB5	PCB5	PCB5	P6END	SW2	SW2	SW2
	OUT6	PZONE	PCB6	PCB6	PCB6	TEACHS	P7END	-	-	-
	OUT7	MOVE	MOVE	PCB7	PCB7	MOVE	MOVE	MOVE	MOVE	MOVE
	OUT8	ZONE1	PZONE/ ZONE1/ ZONE2/ MOVE	PZONE/ ZONE1/ ZONE2/ MOVE	PCB8	PZONE/ ZONE1/ ZONE2/ MOVE	ZONE1	ZONE1	ZONE1	ZONE1
	OUT9	ZONE2	PZONE/ ZONE1/ ZONE2/ MOVE	PZONE/ ZONE1/ ZONE2/ MOVE	PZONE/ ZONE1/ ZONE2/ MOVE	PZONE/ ZONE1/ ZONE2/ MOVE	ZONE2	ZONE2	ZONE2	ZONE2
	OUT10	PEND	PEND	PEND	PEND	PEND/ WREND	PZONE	PZONE	PZONE	PZONE
	OUT11	OEND	OEND	OEND	OEND	OEND	OEND	OEND	OEND	OEND
	OUT12	SONS	SONS	SONS	SONS	SONS	SONS	SONS	SONS	SONS
	OUT13	ALM#	ALM#	ALM#	ALM#	ALM#	ALM#	ALM#	ALM#	ALM#
	OUT14	WARN#	WARN#	WARN#	WARN#	WARN#	WARN#	WARN#	WARN#	WARN#
	OUT15	READY	READY	READY	READY	READY	READY	READY	READY	READY

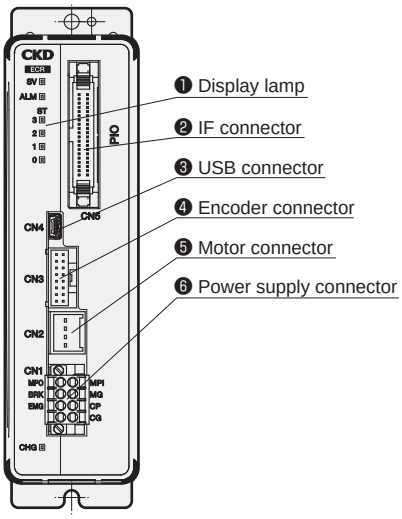
*The pound sign (#) indicates a negative logic signal.

Parallel I/O connection diagram (ECR-MNNN3B-NP**)

[PIO]



[Panel description]



*1 For safety category support, connect the contact of an electromagnetic switch or other device between the MPI and MPO terminals when motor drive power must be shut OFF. (Connected with jumper wires at shipment.)
*2 The MPI and MG terminals can be used to isolate the motor power supply and control power supply.
*3 A surge protector is required to comply with the CE marking.
*4 This can be used even if the polarity is reversed.

● Accessories

Part name	Manufacturer model	Manufacturer
Power supply connector	DFMC1,5/4-STF-3,5	PHOENIX CONTACT

Description of field network operation modes

Mode	Overview
PIO mode (PIO)	The same operation modes as the parallel I/O specification can be selected. Assigned signals are as listed in the parallel I/O signal assignment table. Monitor data cannot be confirmed.
Simple direct value mode (SDP)	An arbitrary target position can be set from the PLC. In this mode, the target position is directly set prior to operation. Operation conditions other than the target position (such as speed and acceleration) will use the values set in the point data during operation. Monitor data can be confirmed.
Full direct value mode (FDP)	All operation conditions (including target position, speed, acceleration, etc.) can be arbitrarily set from the PLC. Monitor data can be confirmed.

Operation mode		PIO	SDP	FDP
Parameter read/write		Not available	Available	Available
Direct value travel selection*1		Selection not possible	1	1
Positioning point count		512	Unlimited	Unlimited
Direct values of motion items *2	Target position	-	○	○
	Positioning width	-	-	○
	Speed	-	-	○
	Acceleration	-	-	○
	Deceleration	-	-	○
	Pressing rate	-	-	○
	Pressing distance	-	-	○
	Pressing speed	-	-	○
	Position specification method	-	-	○
	Operation mode	-	-	○
	Stop method	-	-	○
	Acceleration/deceleration method	-	-	○
Monitor item *3	Position	-	○	○
	Speed	-	△	▲
	Current	-	△	▲
	Alarm	-	△	▲

*1: When the direct value travel selection is 0, it operates with the values set by the point data. This enables up to 512 positioning points.
*2: ○ indicates items operated with the values set by the PLC. - indicates operation with the values set by the point data.
*3: ○ indicates items that can be monitored on all networks at all times. - indicates items that cannot be monitored.
△ indicates items that can be selected from △ for monitoring one at a time with IO-Link and CC-Link or simultaneously monitored with EtherCAT.
▲ indicates items that can be selected from ▲ for monitoring one at a time with IO-Link or simultaneously monitored with CC-Link and EtherCAT.

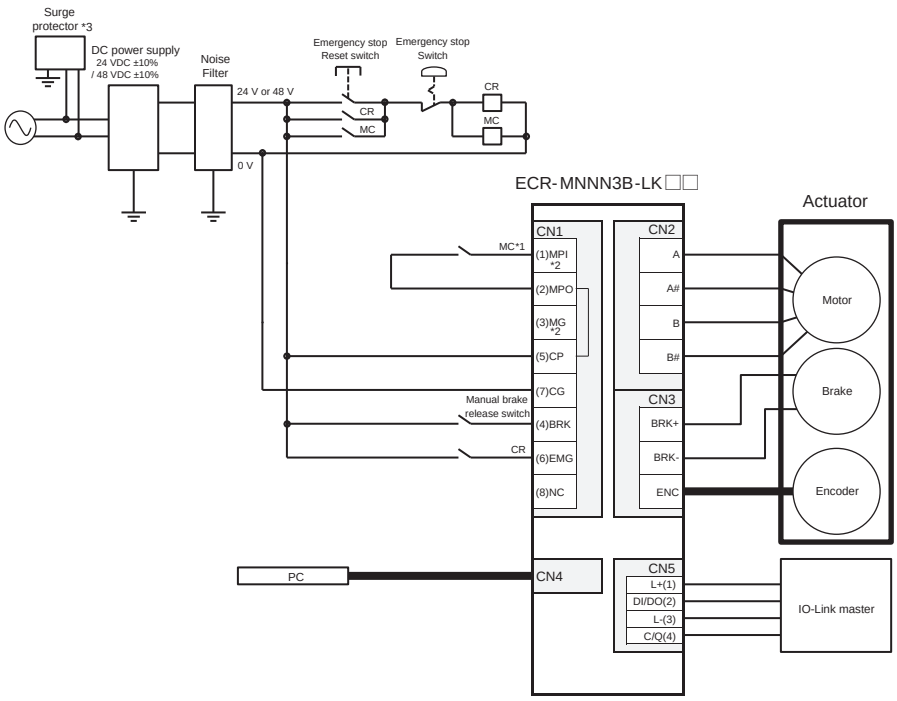
IO-Link specifications and connection diagram (ECR-MNNN3B-LK**)

[Communication specifications]

Item	Specifications
Communication protocol version	V1.1
Transmission bit rate	COM3 (230.4kbps)
Port	Class A
Process data length (input) PD (in) data length	PIO mode: 2 bytes
	Simple direct value mode: 9 bytes
	Full direct value mode: 9 bytes
Process data length (output) PD (out) data length	PIO mode: 2 bytes
	Simple direct value mode: 7 bytes
	Full direct value mode: 22 bytes
Minimum cycle time	PIO mode: 1 ms
	Simple direct value mode: 2 ms
	Full direct value mode: 2.5 ms
Monitor function	Position, speed, current, alarm

* Items that can be monitored change depending on the mode. Refer to page 51 for details.

[IO-Link]



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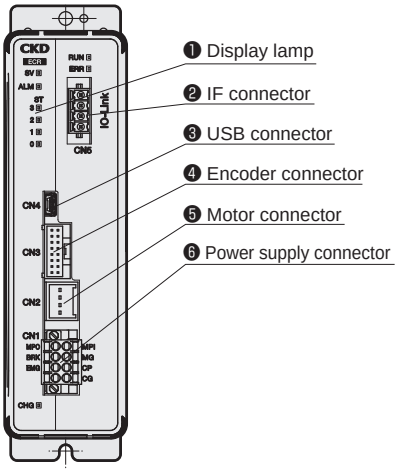
*2 The MPI and MG terminals can be used to isolate the motor power supply and control power supply.
*3 A surge protector is required to comply with the CE marking.

[Panel description]



Cyclic data from master

PD (out)	bit	Full direct value mode Signal name
0	7	Pause#
	6	Stop#
	5	Alarm reset
	4	Servo ON
	3	Home position return start
	2	Point travel start
	1	—
	0	Point number selection bit 8
1	7 to 0	Point number selection bit 7 to 0
2	7	—
	6	—
	5 to 4	Rotation direction
	3 to 1	Monitor number
	0	Direct value travel selection
3 to 6	7 to 0	Position
7 to 8	7 to 0	Positioning width
9 to 10	7 to 0	Speed
11	7 to 0	Acceleration
12	7 to 0	Deceleration
13	7 to 0	Pressing rate
14	7 to 0	Pressing speed
15 to 18	7 to 0	Pressing distance
19 to 20	7 to 0	Gain magnification
21	7	Position specification method
	6 to 5	Operation mode
	4 to 3	Acceleration/deceleration method
	2 to 0	Stop method

Cyclic data from controller

PD (in)	bit	Full direct value mode Signal name
0	7	Operation preparation complete
	6	Warning#
	5	Alarm#
	4	Servo ON state
	3	Home position return complete
	2	Point travel complete
	1	—
	0	Point number confirmation bit 8
1	7 to 0	Point number confirmation bit 7 to 0
2	7 to 5	—
	4	Zone 2
	3	Zone 1
	2	Traveling
	1	Point zone
	0	Direct travel state
3 to 6	7 to 0	Position (monitor value)
7 to 8	7 to 0	Monitor value

*Refer to the Instruction Manual for details of other operation modes.
*The pound sign (#) indicates a negative logic signal.

● Accessories

Part name	Manufacturer model	Manufacturer
Power supply connector	DFMC1,5/4-STF-3,5	PHOENIX CONTACT
IO-Link connector	FMC1,5/4-ST-3,5-RF	PHOENIX CONTACT

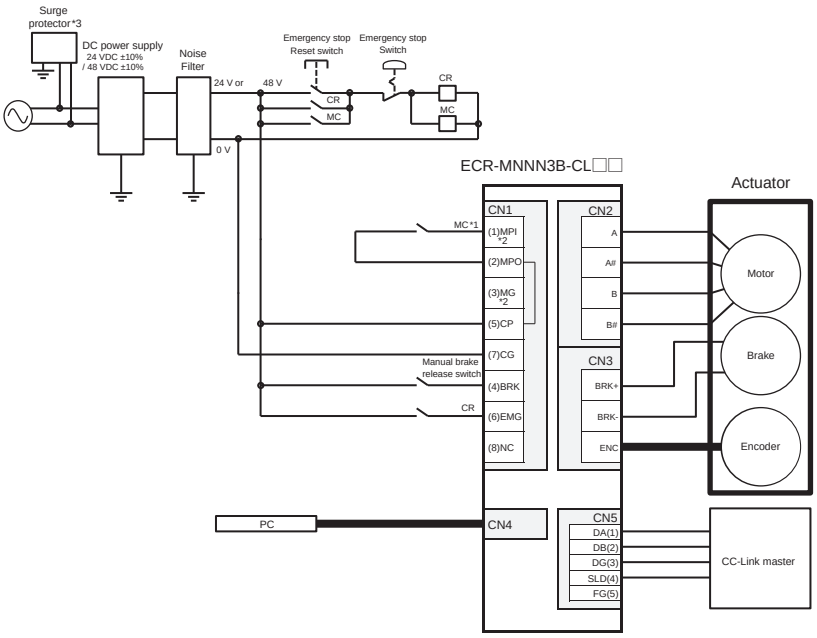
CC-Link specifications and connection diagram (ECR-MNNN3B-CL**)

[Communication specifications]

Item	Specifications
CC-Link version	Ver. 1.10
Station	Remote device station
Remote station No.	1 to 64 (set by parameter setting)
Operation modes and occupied stations	PIO mode (1 station occupied)
	Simple direct value mode (2 stations occupied)
	Full direct value mode (4 stations occupied)
Remote input/output points	PIO mode: 32 points each
	Simple direct value mode: 64 points each
	Full direct value mode: 128 points each
Remote register input/output	PIO mode: 4 words each
	Simple direct value mode: 8 words each
	Full direct value mode: 16 words each
Communication speed	10 M/5 M/2.5 M/625 k/156 kbps (Selected by parameter setting)
Connection cable	CC-Link Ver. 1.10 compliant cable (shielded 3-conductor twisted pair cable)
Number of connected units	42 max. when only remote device stations are connected
Monitor function	Position, speed, current, alarm

* Items that can be monitored change depending on the mode.
Refer to page 51 for details.

[CC-Link]



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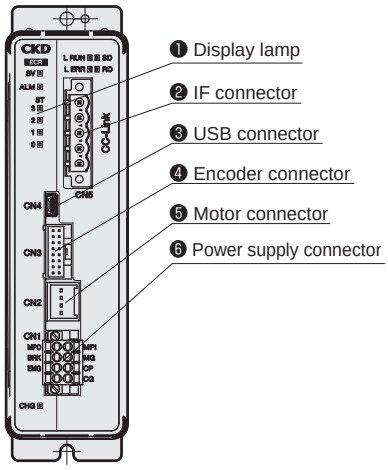
*2 The MPI and MG terminals can be used to isolate the motor power supply and control power supply.
*3 A surge protector is required to comply with the CE marking.

[Panel description]



Cyclic data from master

Device No.	Full direct value mode
	Signal name
RYn0 to RYnF	PIO input signal (conforms to parallel I/O signal assignment)
RY(n+1)0 to RY(n+1)3	–
RY(n+1)4	Data request
RY(n+1)5	Data R/W selection
RY(n+1)6 to RY(n+1)B	–
RY(n+1)C	Monitor request
RY(n+1)D	–
RY(n+1)E	
RY(n+1)F	Direct value travel selection
RY(n+2)0 to RY(n+7)9	–
RY(n+7)A	Error reset request flag
RY(n+7)B to RY(n+7)F	–

* Refer to the Instruction Manual for details of other operation modes.

Cyclic data from controller

Device No.	Full direct value mode
	Signal name
RXn0 to RXnF	PIO output signal (conforms to parallel I/O signal assignment)
RX(n+1)0 to RX(n+1)3	Data response
RX(n+1)4	Data complete
RX(n+1)5	Data write status
RX(n+1)6	–
RX(n+1)7	
RX(n+1)8 to RX(n+1)B	Monitor response
RX(n+1)C	Monitor complete
RX(n+1)D	–
RX(n+1)E	
RX(n+1)F	Direct travel state
RX(n+2)0	Point zone
RX(n+2)1	Traveling
RX(n+2)2	Zone 1
RX(n+2)3	Zone 2
RX(n+2)4 to RX(n+7)9	–
RX(n+7)A	Error status flag
RX(n+7)B	Remote ready flag
RX(n+7)C to RX(n+7)F	–

● Accessories

Part name	Manufacturer model	Manufacturer
Power supply connector	DFMC1,5/4-STF-3,5	PHOENIX CONTACT
CC-Link connector	MSTB2,5/5-STF-5,08ABGYAU	PHOENIX CONTACT

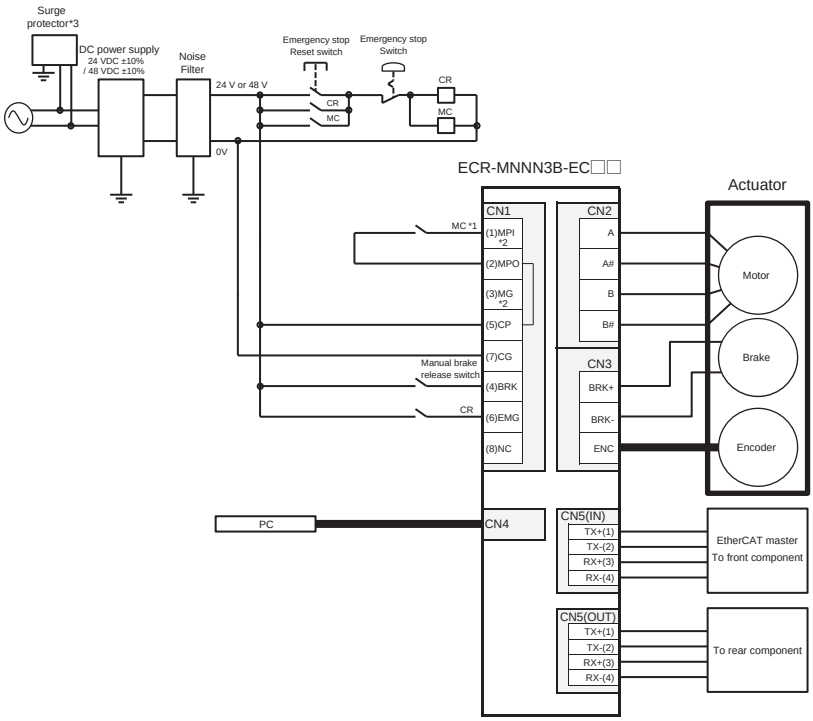
EtherCAT specifications and connection diagram (ECR-MNNN3B-EC**)

[Communication specifications]

Item	Specifications
Communication speed	100 Mbps (fast Ethernet, full duplex)
Process data	Variable PDO mapping
Max. PDO data length	RxPDO: 64 bytes/TxPDO: 64 bytes
Station alias	0 to 65535 (set by parameters)
Connection cable	EtherCAT-compliant cable (CAT5e or higher twisted-pair cable [aluminum tape and braided double-shield] recommended)
Node address	Automatic indexing the master
Monitor function	Position, speed, current, alarm

* Items that can be monitored change depending on the mode. Refer to page 51 for details.

[EtherCAT]



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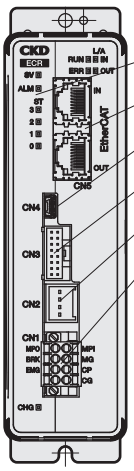
*3 A surge protector is required to comply with the CE marking.

[Panel description]



Process data from master

Index	Sub Index	bit	Full direct value mode
			Signal name
0x2001	0x01	0 to 15	PIO input signal (conforms to parallel I/O signal assignment)
		16 to 31	–
	0x02	0 to 3	–
		4	Data request
		5	Data R/W selection
		6 to 11	–
		12	Monitor request
		13	–
		14	–
		15	Direct value travel selection
		16 to 31	–

*Refer to the Instruction Manual for details of other operation modes.

Process data from controller

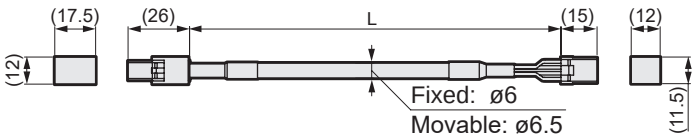
Index	Sub Index	bit	Full direct value mode
			Signal name
0x2005	0x01	0 to 15	PIO output signal (conforms to parallel I/O signal assignment)
		16 to 31	–
	0x02	0 to 3	Data response
		4	Data complete
		5	Data write status
		6	–
		7	–
		8 to 11	Monitor response
		12	Monitor complete
		13	–
		14	–
		15	Direct travel state
		16	Point zone
		17	Traveling
		18	Zone 1
		19	Zone 2
		20 to 31	–

● Accessories

Part name	Manufacturer model	Manufacturer
Power supply connector	DFMC1,5/4-STF-3,5	PHOENIX CONTACT

Relay cable (included with actuator)

● Motor cable (fixed/movable)

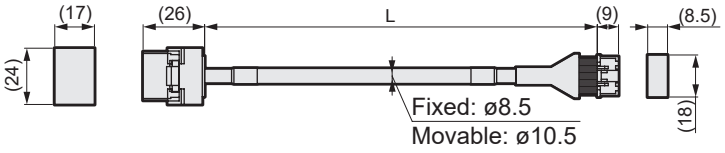


EA-CBLM1 - S 01

Ⓐ Cable type	
S	Fixed cable
R	Movable cable

Ⓑ Cable length	
01	1 m
03	3 m
05	5 m
10	10 m

● Encoder cable (fixed/movable)



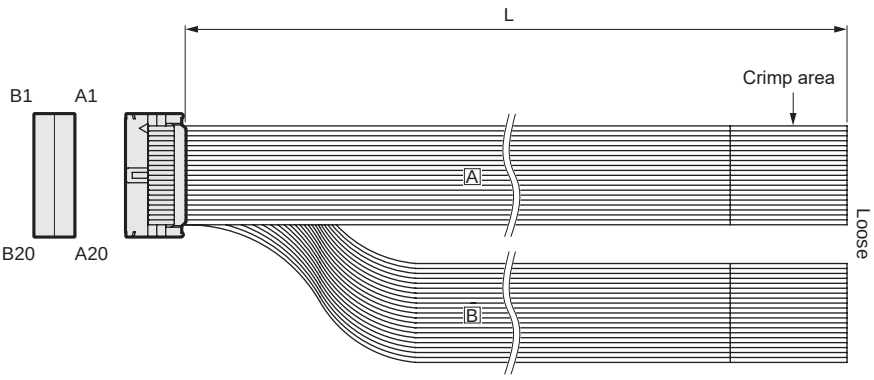
EA-CBLE1 - S 01

Ⓐ Cable type	
S	Fixed cable
R	Movable cable

Ⓑ Cable length	
01	1 m
03	3 m
05	5 m
10	10 m

I/O cable (included with parallel I/O specification controller)

● I/O cable



EA-CBLNP1 - 02

Ⓐ Cable length	
02	2 m
03	3 m
05	5 m
10	10 m

Related parts model No. table

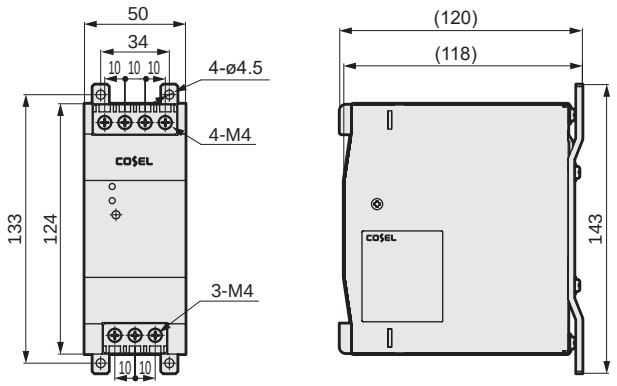
ECR DC power supply

Item \ Model No.		EA-PWR-KHNA240F-24-N2 (Screw mount) EA-PWR-KHNA240F-24 (DIN rail mount)	EA-PWR-KHNA480F-48-N2 (Screw mount) EA-PWR-KHNA480F-48 (DIN rail mount)
Manufacturer		COSEL Co., Ltd.	
Manufacturer model No.	Mounting screw	KHNA240F-24-N2	KHNA480F-48-N2
	DIN rail mount	KHNA240F-24	KHNA480F-48
Input voltage		85 to 264 VAC 1ø or 88 to 370 VDC	85 to 264 VAC 1ø or 88 to 350 VDC
Output	Power	240 W	480 W
	Voltage/current	24 V 10 A	48 V 10 A
	Variable voltage range	22.5 to 28.5 V	45.0 to 55.2 V
Included functions	Overcurrent protection	Operating at 101% min of peak current	
	Overvoltage protection	30.0 to 36.0 V	57.6 to 67.2 V
	Remote control	Available	
	Remote sensing	-	
	Others	DC_OK display, ALARM display	
Operating temperature/humidity		-25 to +70°C, 20 to 90% RH (no condensation), startup possible at -40°C*	
Applicable standards	Safety standards AC input	AC input: Certified UL60950-1, C-UL (CSA60950-1), EN60950-1, UL508, ANSI / ISA12.12.01, and ATEX; Electrical Appliances and Material Safety Act compliant*	
	Safety standards DC input	UL60950-1, C-UL(CSA60950-1), EN60950-1	
	Noise terminal voltage	Compliant with FCC-B, VCCI-B, CISPR22-B, EN55011-B, EN55022-B	
	Harmonic current	Compliant with IEC61000-3-2 (class A)*	
Structure	Dimensions (W x H x D)	50 × 124 × 117 mm	70 × 124 × 117 mm
	Weight	900 g max	1,200 g max
	Cooling method	Natural air cooling	

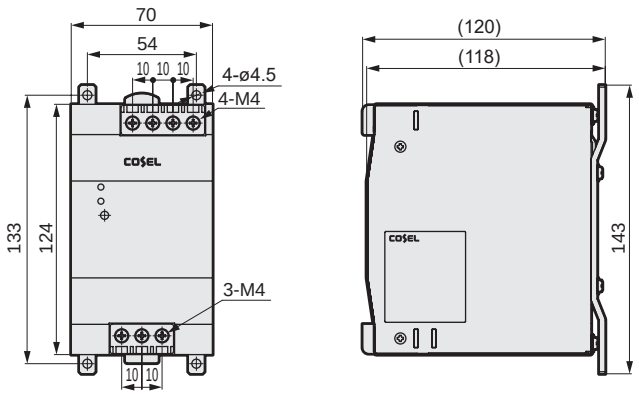
*Refer to the manufacturer's website for details.
*CE and RoHS certification has been obtained under the manufacturer's model number.

Part names and dimensions

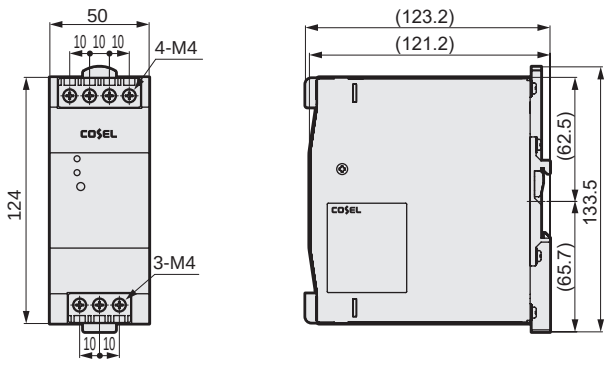
● 24 V screw mounting
EA-PWR-KHNA240F-24-N2



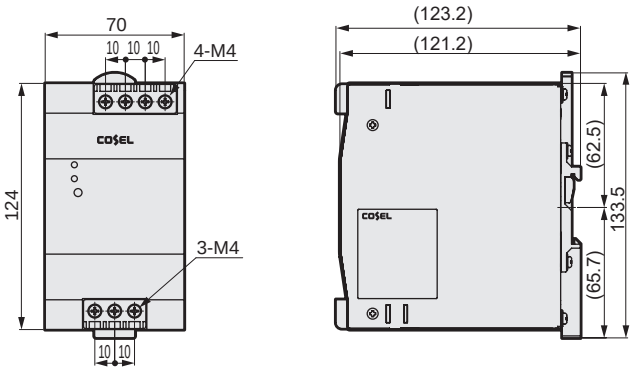
● 48 V screw mounting
EA-PWR-KHNA480F-48-N2



● 24 V DIN rail mounting
EA-PWR-KHNA240F-24



● 48 V DIN rail mounting
EA-PWR-KHNA480F-48



Related parts model No. table

● Other parts

Part name	Model No.
Noise filter for power supply (single phase, 15 A)	AX-NSF-NF2015A-OD
Ferrite core set (7 pieces/set)	EA-NSF-FC01-SET

* Refer to the instruction manual for the ferrite core to be used.