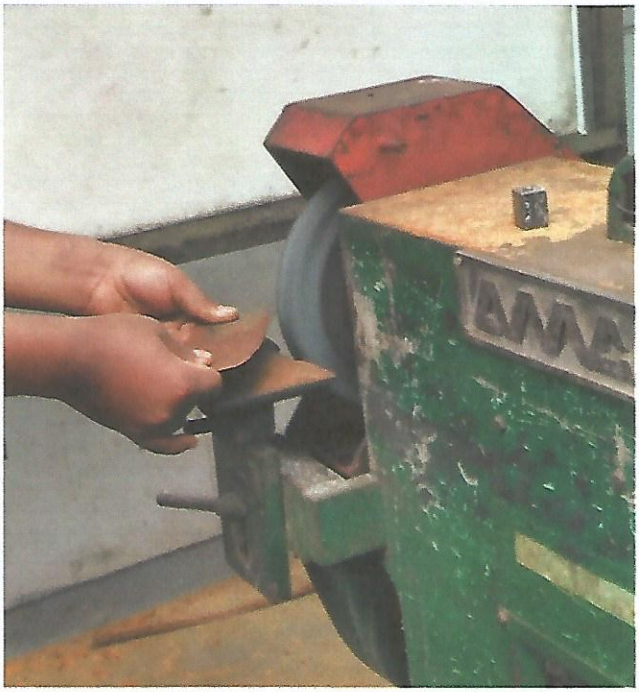
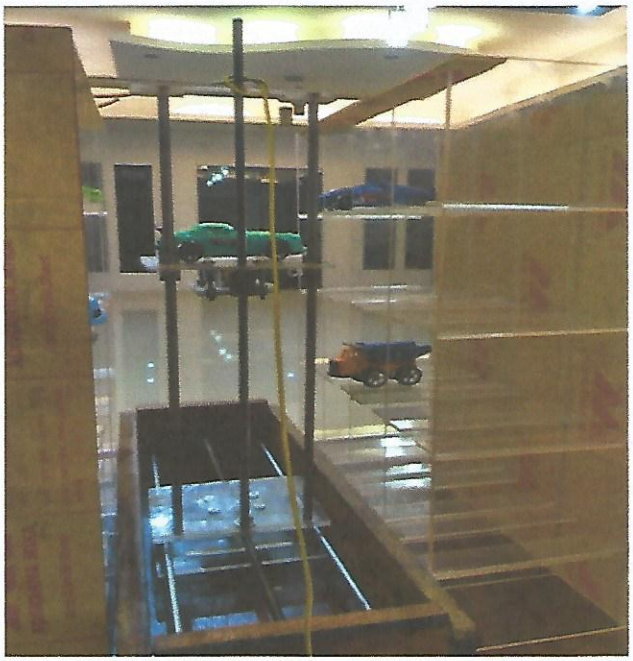
LAMPIRAN

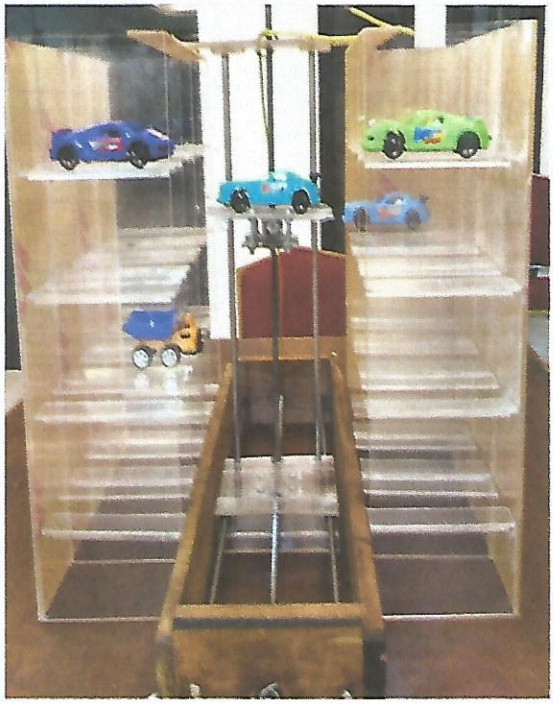
1. Foto-Foto Perancangan Gedung Dan Sistem Mekanik

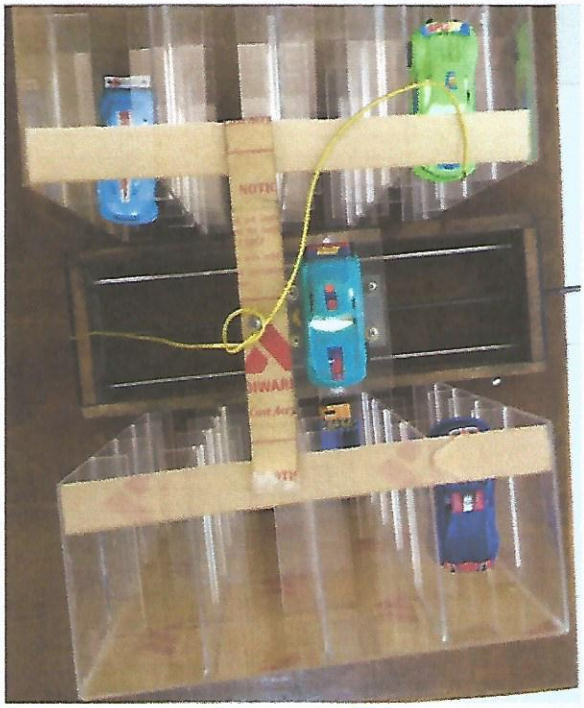
a. Foto pembuatan gedung untuk tempat parkiran

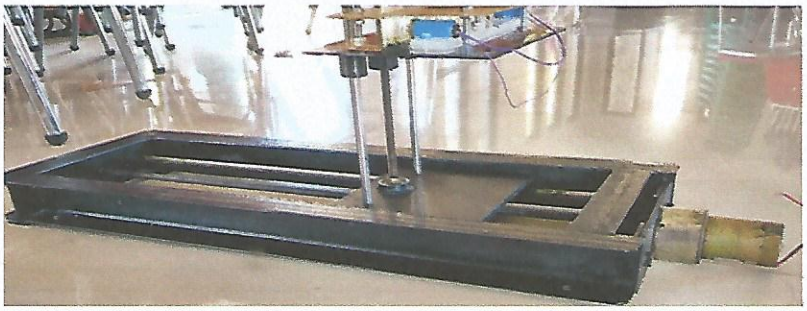

ADHARNA MIKA

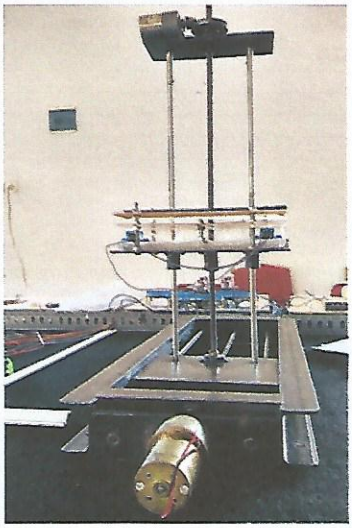


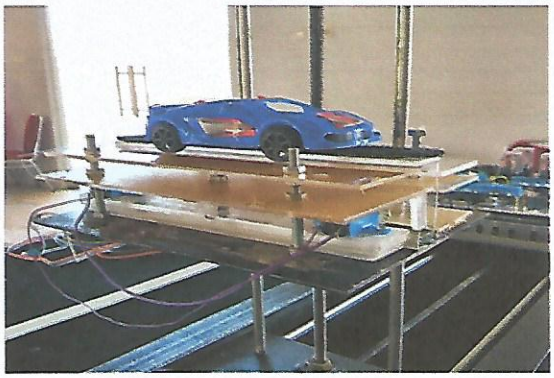




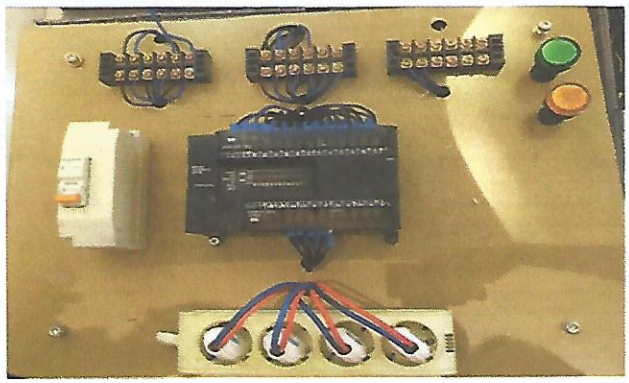


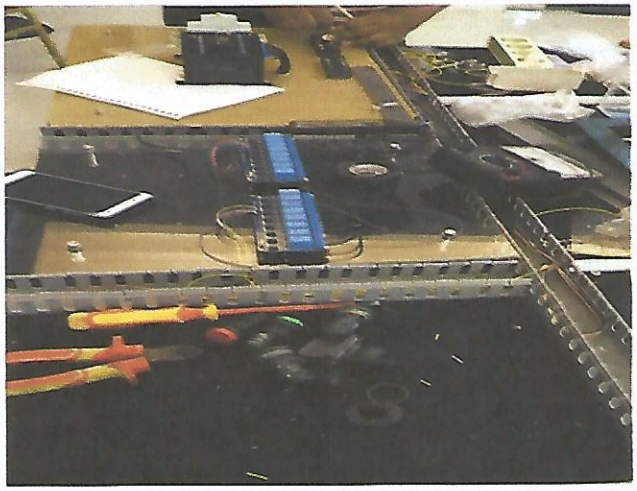


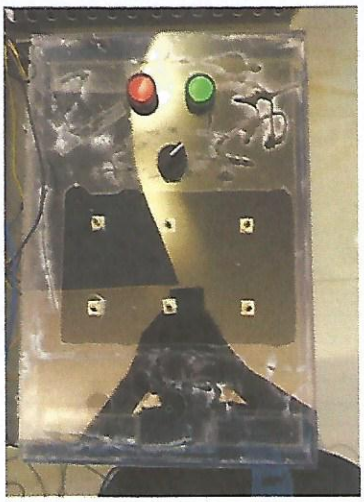


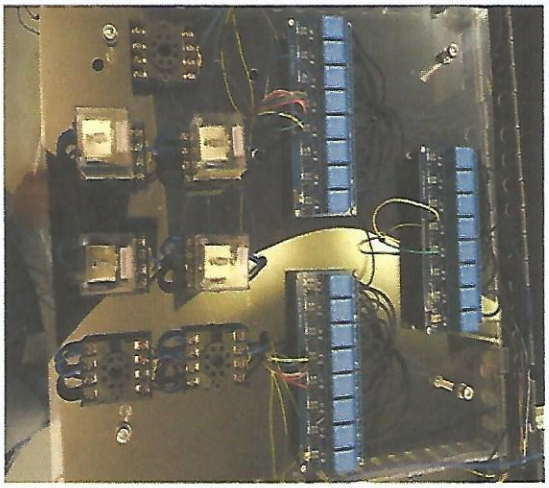


2. Foto Komponen-Komponen Rancang Bangun

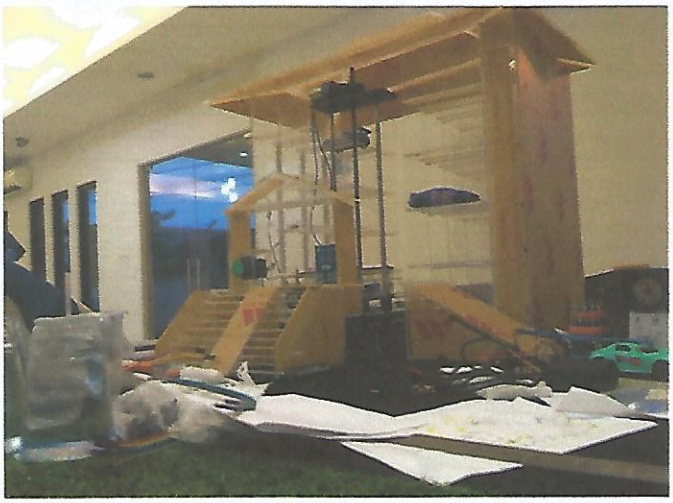


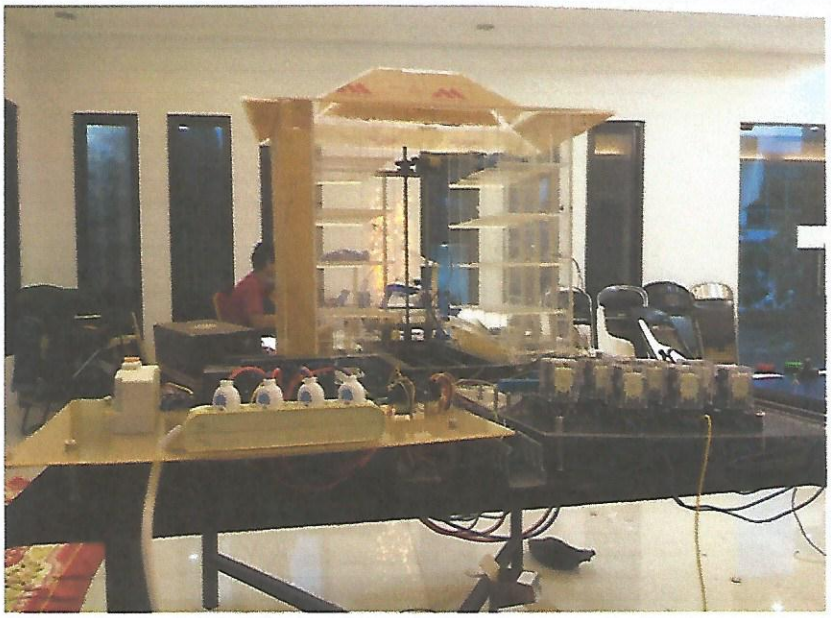


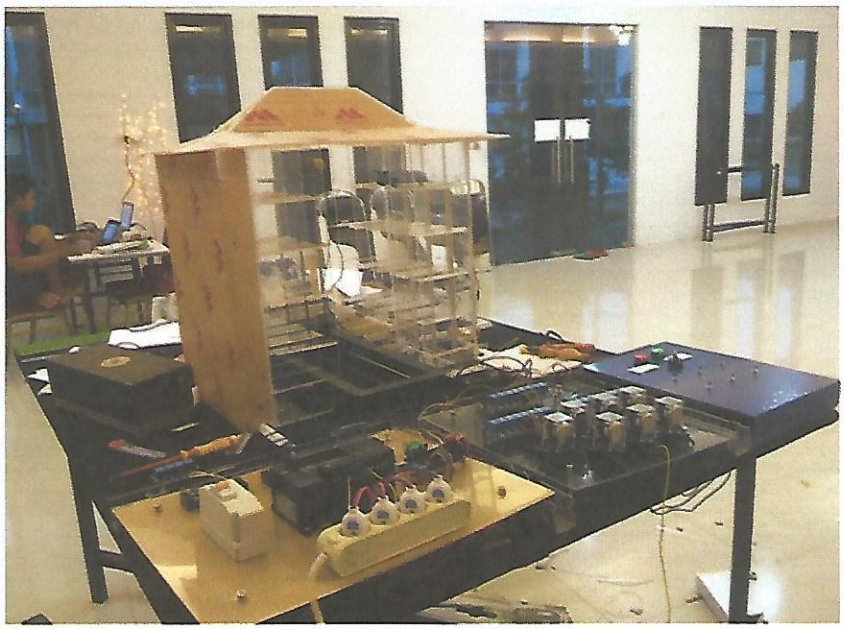




3. Foto keseluruhan Rancang Bangun



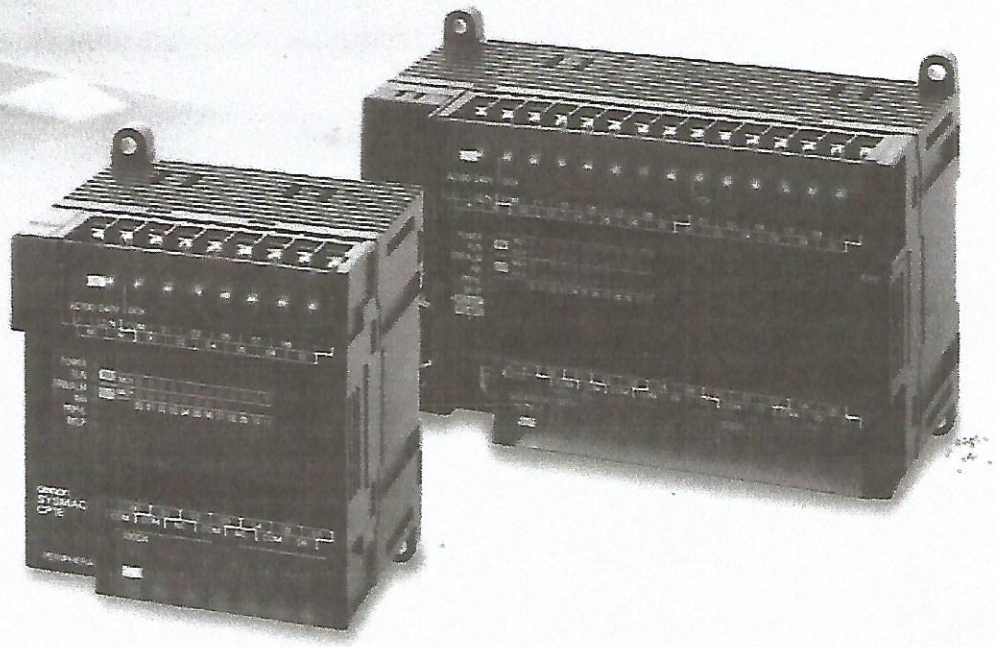




OMRON

CP1E

Cost-effective CP1E with Enhanced Expandability for Analog and Temperature Control

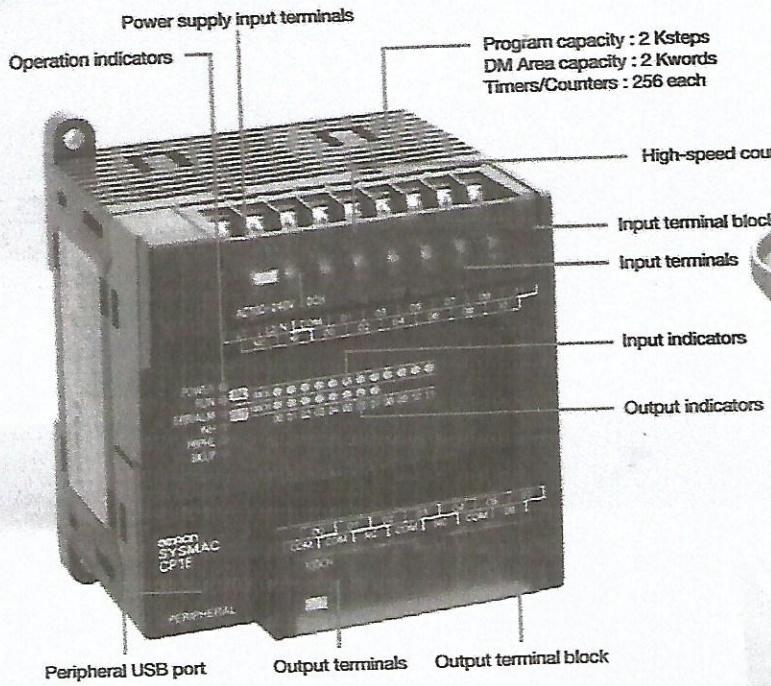


» Easy to use

» Economical

» Efficient

Cost-Effective, Easy Application, Application to Many Systems

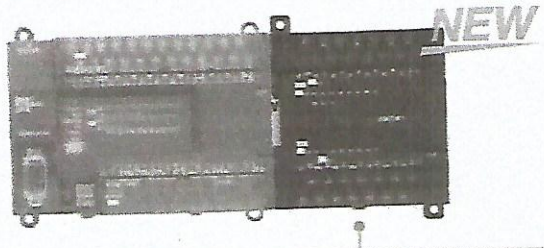


- Support Software with "Smart Input" intuitive operation.
- USB port provides. Support Software can be connected using commercially available USB cables.

E□□S-type

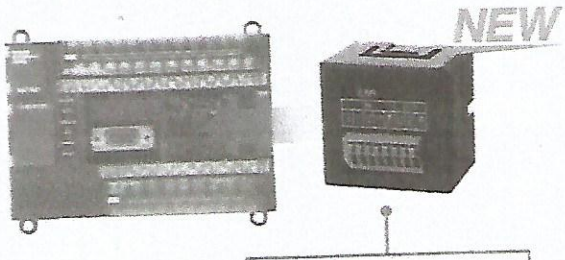
The Basic Models provide cost performance and easy application.

Expanded capabilities to control analog I/O and temperature at minimum cost



Analog I/O Units
Up to 8 analog I/O per Unit, high resolution of 1/12,000

Temperature Sensor Units
Multi-inputs: thermocouple and analog inputs, up to 12 thermocouple inputs per Unit



Analog Option Board

Note: Can be mounted to the CP1E-N□□ only.

Exceptional Cost

Responding to Global Competition with More Device Control Possibilities

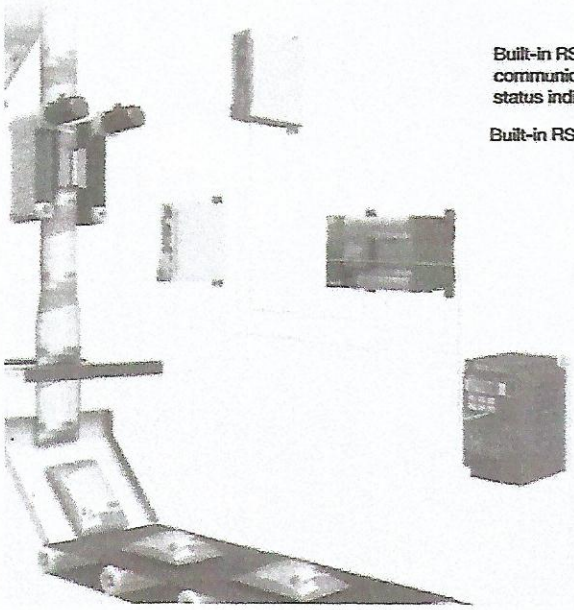
The CP1E provide high cost performance to further reduce costs by allowing you to select the optimal CPU Unit from the E□□S-type Basic Models or N/□□S(1)-type Application Models.

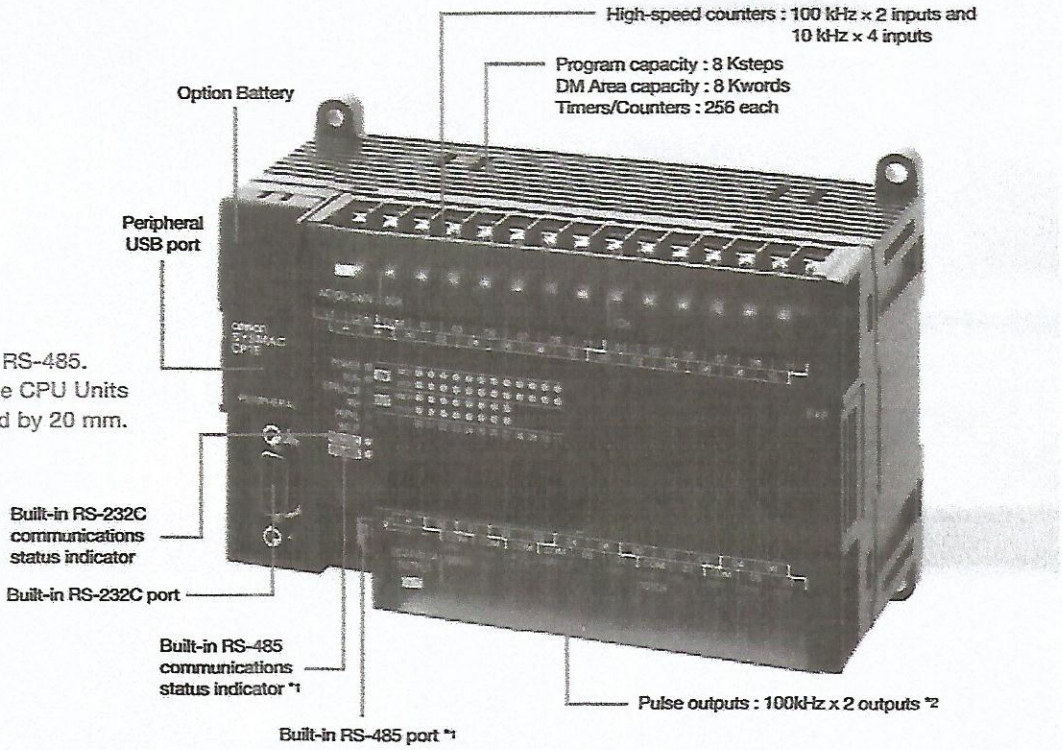
Economical

- Exceptional Cost.
- Optimal cost with a selection of two types of CP1E CPU Units.

Efficient

- Lineup including CPU Units with built-in three ports: USB, RS-232C, RS-485.
- The depth of the CP1E-N□□S(1)-type CPU Units with RS-232C connectors is reduced by 20 mm.





*1. N□□S1-type only.
*2. Models with transistor outputs.

N□□S(1)-type

Compatible with small Programmable Terminals

Simple and User Friendly

Easy to use input editor with smart input function

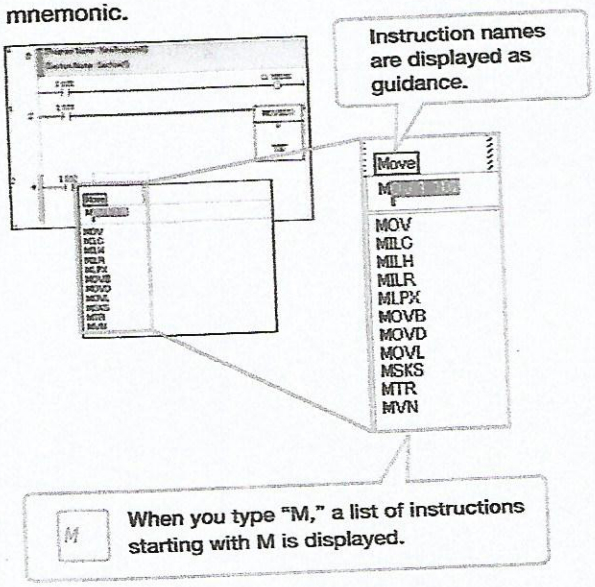
All Models

When you begin typing an instruction from the keyboard in Ladder Editor Mode, suggested instructions are displayed and the addresses are automatically entered. Connecting lines are added automatically based on the cursor position, enabling intuitive ladder programming.

Easy Input Editor

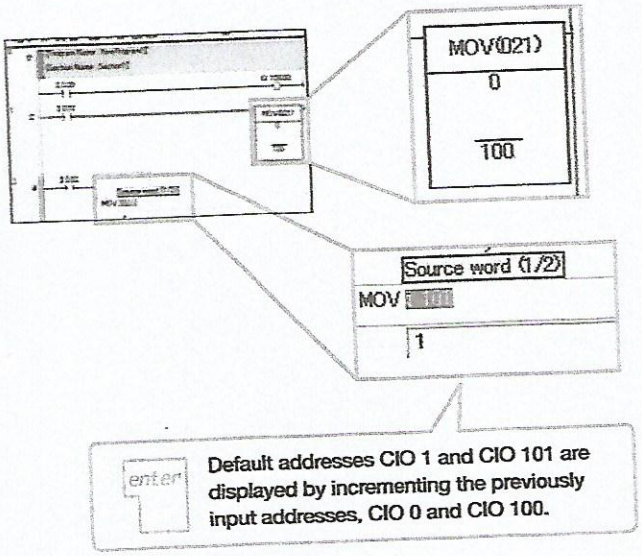
Instruction and Address Input Assist Functions

When you begin typing an instruction from the keyboard while in the Ladder Editor Window, suggested instructions are displayed. All you have to do is select the instruction from the list for easy input even if you do not remember the entire mnemonic.



Address Incrementing

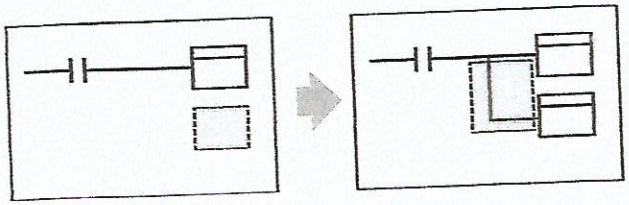
The address of the next operand, including input bits and output bits, is incremented by one and displayed as the default. This enables easily inputting consecutive addresses.



User-friendly Ladder Program Input

Automatic Connecting Line Insertion

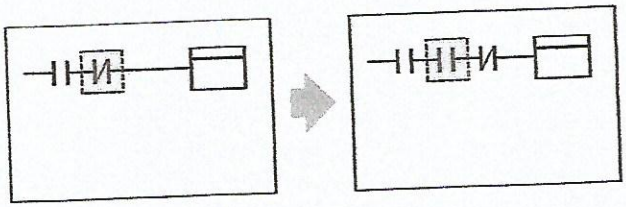
With the automatic connecting line insertion function the necessary connection is added automatically based on the curser position.



When an instruction is input at the curser, a connecting line is automatically inserted.

Automatic Column Insertion When Inserting Instructions

The column is automatically inserted when an instruction is added even if the curser is above another instruction.



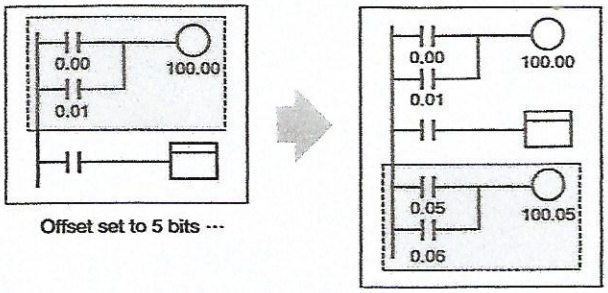
When an instruction is input at the curser, a column is automatically inserted for the instruction.

ntuitive control with "Smart Input."

Easy to reuse ladder programming

Copying with Address Incrementing

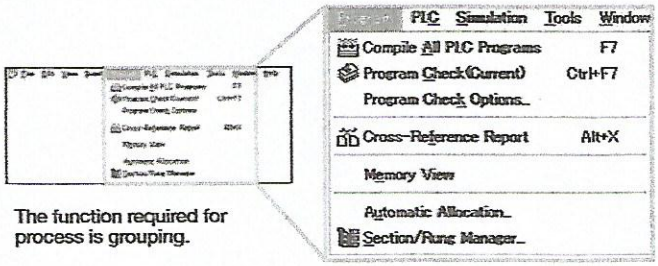
To create the same group of ladder instructions more than once with the address addition copy function, the instructions can be reused simply by inputting an address offset.



Intuitive Menu Structure

Intuitive Menu Display

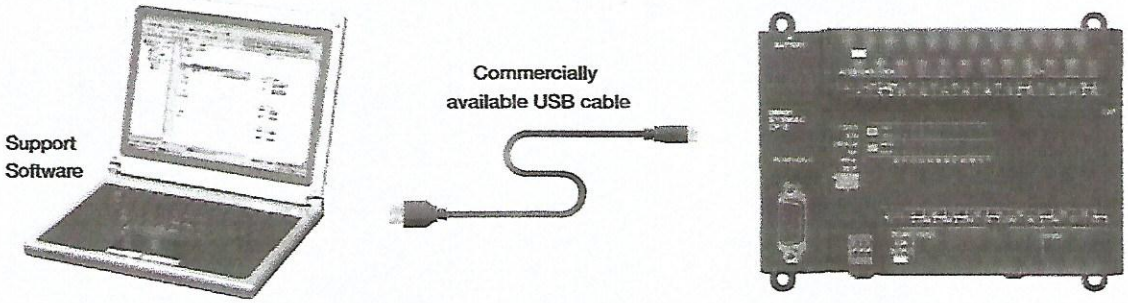
An intuitively designed menu structure makes it easy to see the overall system simply by looking at the menu for smooth operation without referring to a manual.



Only commercially available USB cables required

All Models

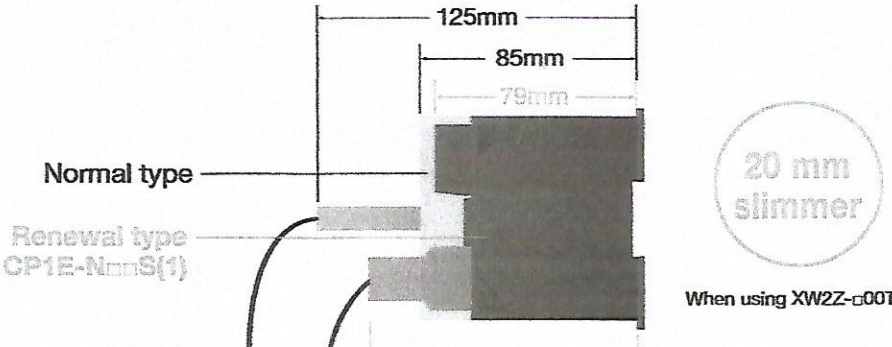
All CP1E CPU Units use high-speed USB for the peripheral port. Support software (computers) can be connected using commercially available USB cables. Without the need for USB conversion cables or special cables, connection is easier and cable cost is low.



The depth of CPU Units with RS-232C connectors is reduced by 20 mm

Renewal type

6 mm slimmer than the normal type.

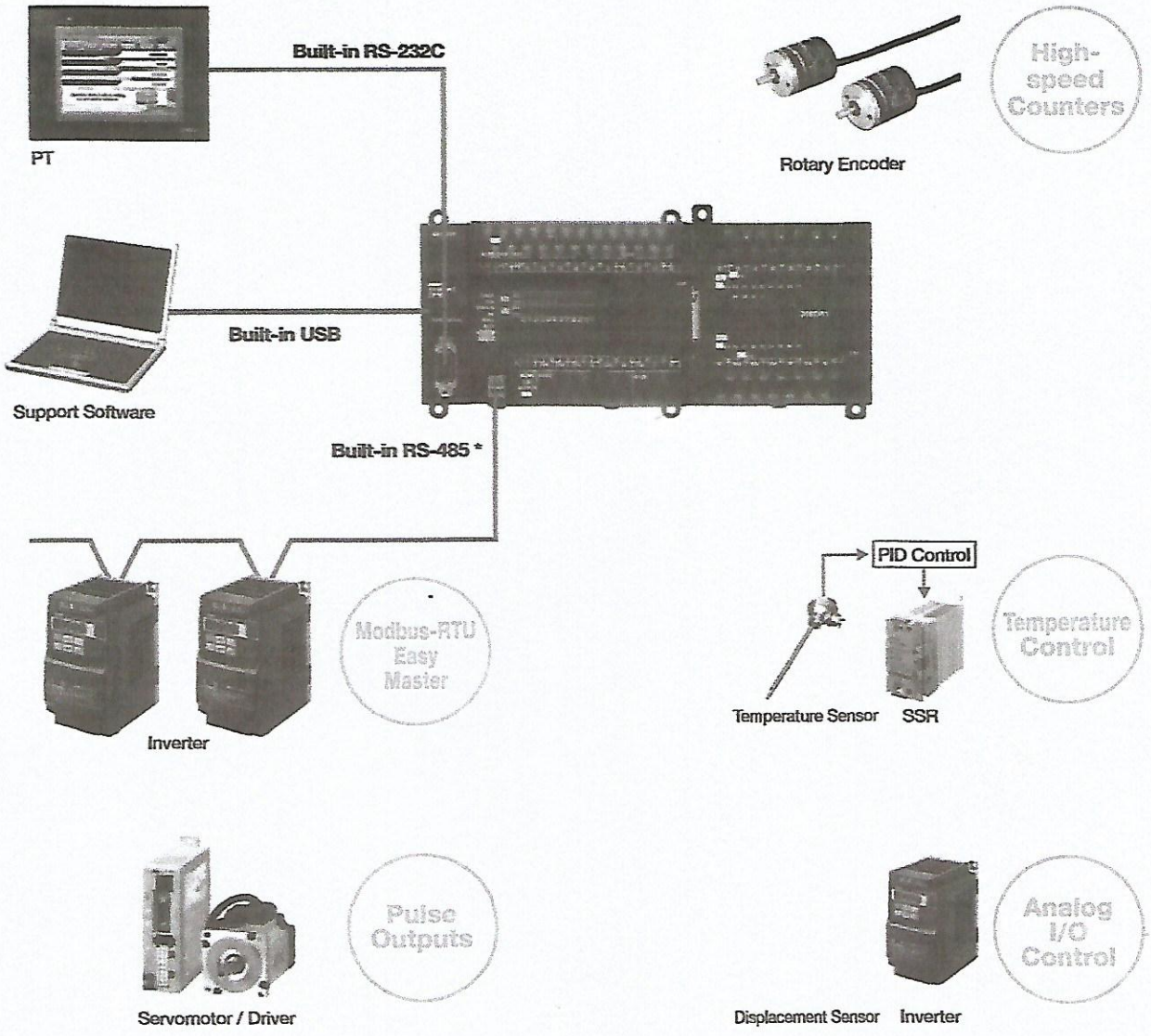


Efficient and Effective

More Applications with Advanced Control Capabilities and Functionality

Application Models

**The Application Models (CP1E-N□□ /N□□S(1)) are equipped with high-speed counters, pulse outputs, and a built-in serial port(s).
In addition, using the Expansion Unit and Option Board, you can control a wide range of devices.**



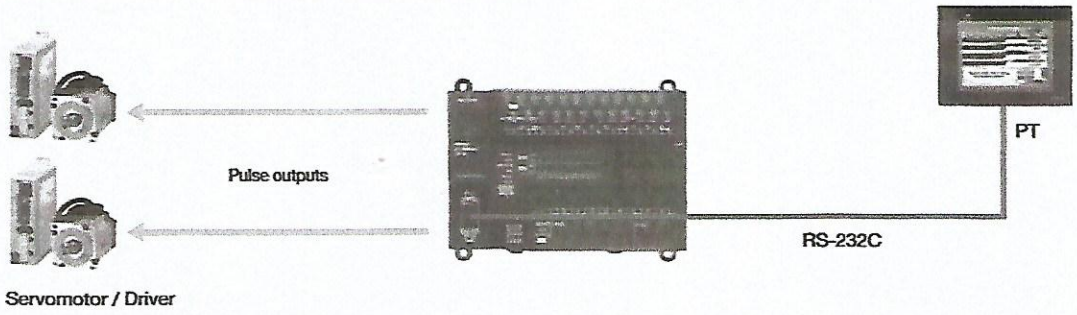
* Use a built-in RS-485 port of the N□□S1-type CPU Unit or mount an RS-422A/485 Option Board to the N□□-type CPU Unit.

Flexibly handle even small-scale systems.
Various Option Units available for increased expandability.

Pulse Outputs

Models with transistor Output

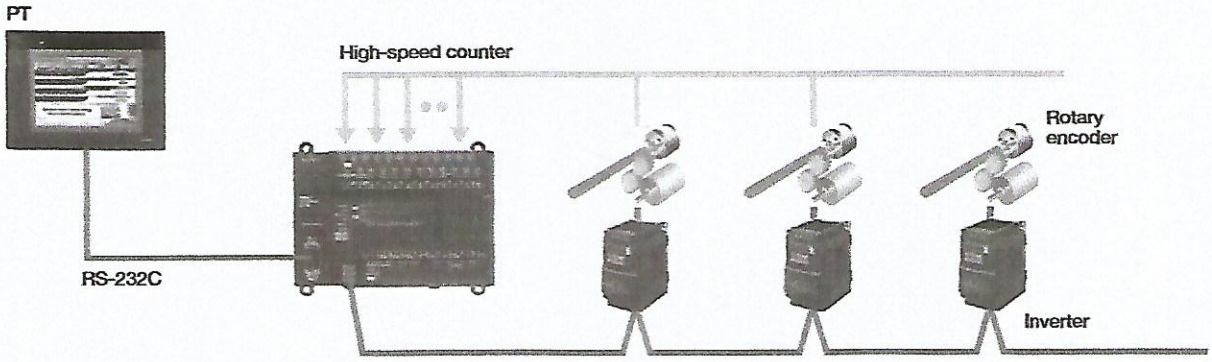
Two 100kHz pulse outputs for high-precision position control.



High-speed Counters*

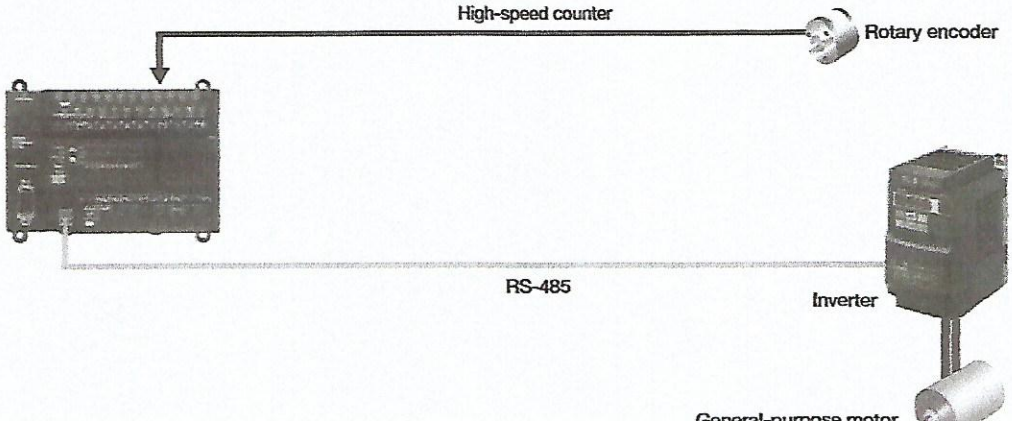
Control multiple axes with one PLC using the two 100kHz and four 10kHz, single-phase high-speed counters.

* The Basic Models are equipped with six 10kHz, single-phase high-speed counters.



Modbus-RTU easy master

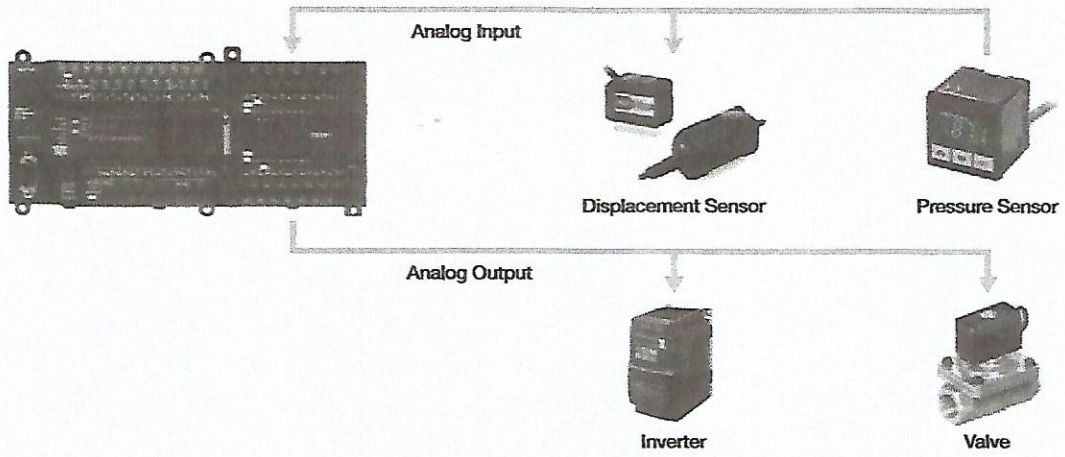
Specify Inverter speeds via RS-485



Efficient and Effective

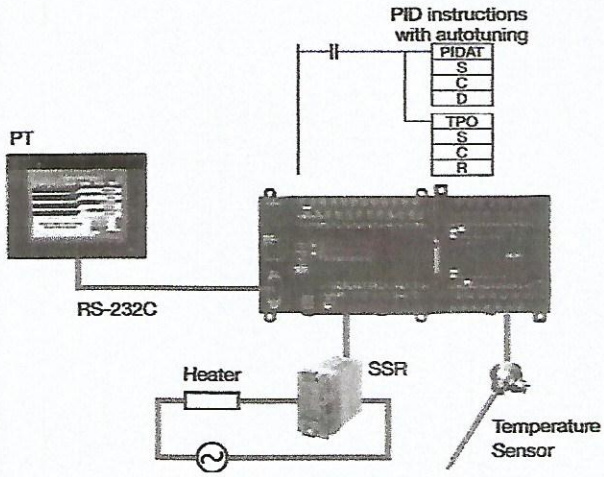
Analog I/O Control

High-accuracy analog I/O control with a resolution 1/12,000.
You can add up to 4 analog I/O by mounting an Analog Option Board and up to 24 analog I/O by connecting Expansion Units.

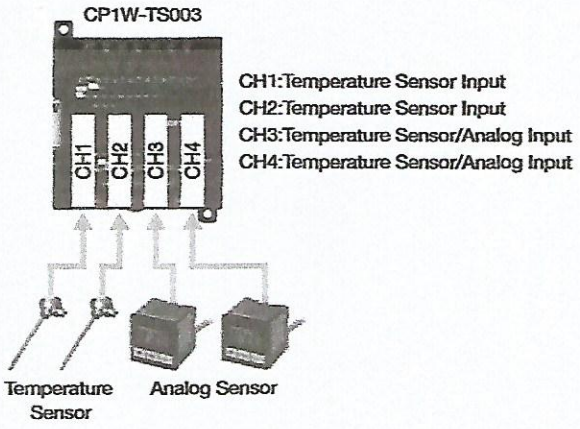


Temperature Control

The combination of the Temperature Input Unit with the PID instructions enables temperature control.
Up to 12 thermocouple inputs per Unit for CP1W-TS004.

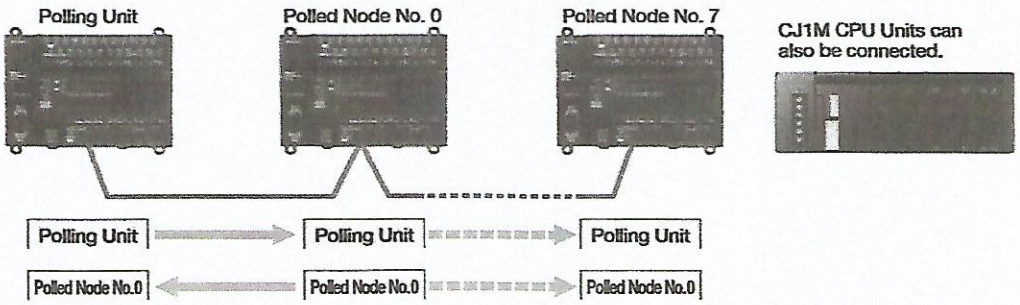


The CP1W-TS003 has two inputs that can be used for temperature sensor or analog inputs.
Both temperature sensor and analog inputs can be achieved with only one Unit.



Serial PLC Links

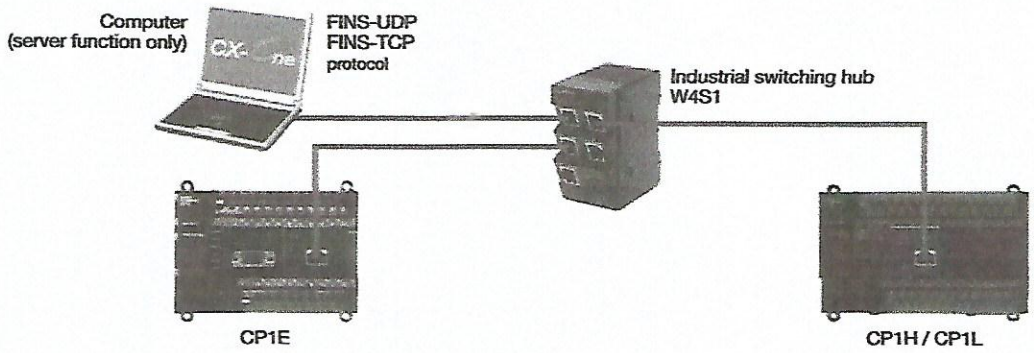
Link data with up to 10 words between up to nine CP1E-N CPU Units when controlling a device with multiple CP1E-N PLCs.



exibly handle even small-scale systems.
arious Option Units available for
creased expandability.

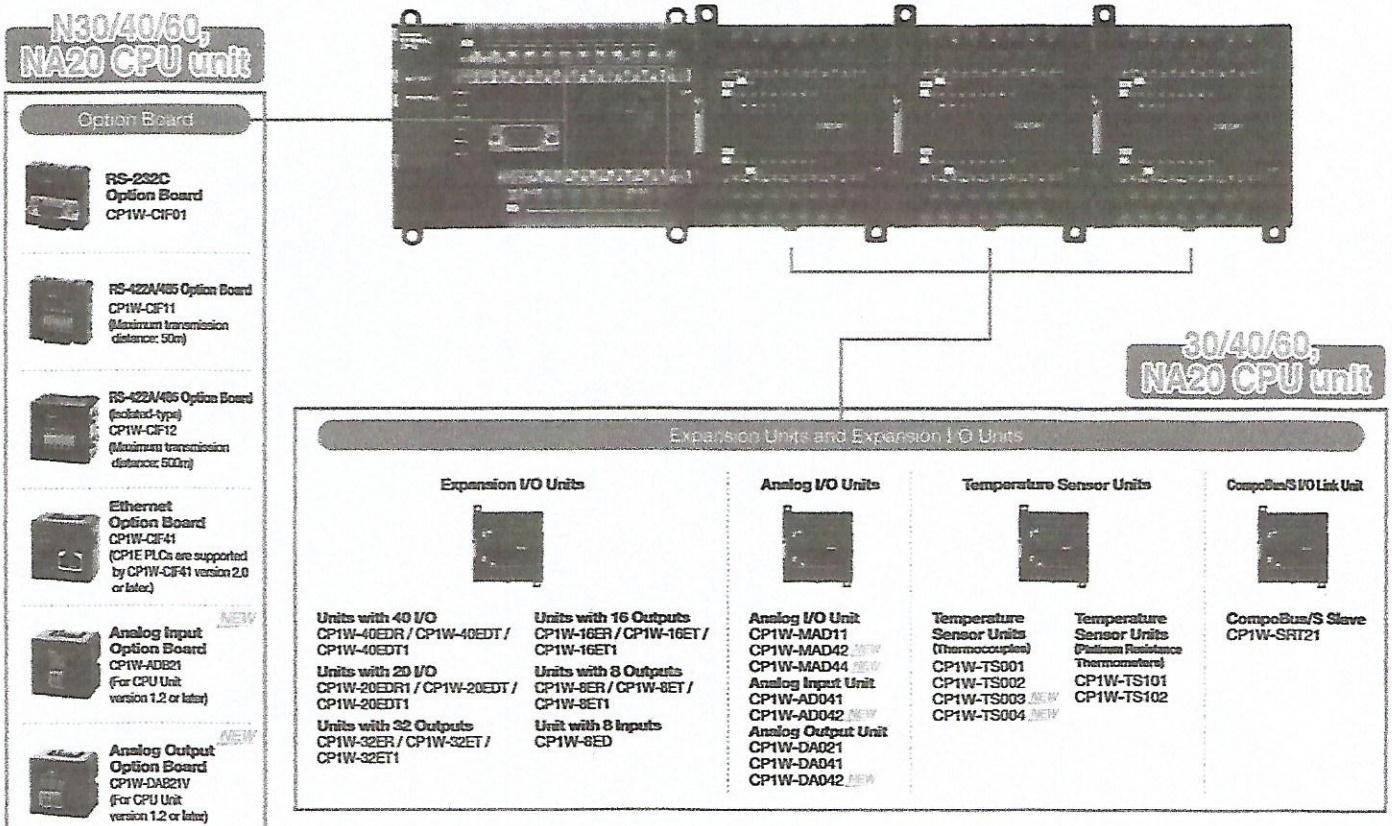
Ethernet Communications

Mount a CP1W-CIF41 Ethernet Option Board to an option board slot on the CP1E-N/NA type CPU Unit.
Perform monitoring and programming with CX-Programmer,or communicate with a host computer via Ethernet.(server function only)



Optional units for more flexibility

An option board for an additional Serial or Ethernet communication port can be added to the N30/40/60 and NA20 CPU Unit. Three expansion units are available. * The Option Board cannot be mounted to the CP1E-N□□S/N□□S1.



Ordering information

International Standards

- The standards are abbreviated as follows: U: UL, U1: UL(Class I Division 2 Products for Hazardous Locations), C: CSA, UC: cULus, UC1: cULus (Class I Division 2 Products for Hazardous Locations), CU: cUL, N: NK, L: Lloyd, and CE: EC Directives.
- Contact your OMRON representative for further details and applicable conditions for these standards.

Application models

■Renewal type (N□□S1-type) CP1E CPU Units: Built-in 3 ports

Product name	Specifications						Model	Standards
	Power Supply	Inputs	Outputs	Output type	Program capacity	Data memory capacity		
N□□S1-type with 30 I/O Points	100 to 240 VAC	18	12	Relay	8K steps	8K words	CP1E-N30S1DR-A	CE
	24VDC			Transistor (sinking)			CP1E-N30S1DT-D	
				Transistor (sourcing)			CP1E-N30S1DT1-D	
N□□S1-type with 40 I/O Points	100 to 240 VAC	24	16	Relay			CP1E-N40S1DR-A	
	24VDC			Transistor (sinking)			CP1E-N40S1DT-D	
				Transistor (sourcing)			CP1E-N40S1DT1-D	
N□□S1-type with 60 I/O Points	100 to 240 VAC	36	24	Relay			CP1E-N60S1DR-A	
	24VDC			Transistor (sinking)			CP1E-N60S1DT-D	
				Transistor (sourcing)			CP1E-N60S1DT1-D	

■Renewal type (N□□S-type) CP1E CPU Units: Built-in 2 ports

Product name	Specifications						Model	Standards
	Power Supply	Inputs	Outputs	Output type	Program capacity	Data memory capacity		
N□□S-type with 30 I/O Points	100 to 240 VAC	18	12	Relay	8K steps	8K words	CP1E-N30SDR-A	CE
	24VDC			Transistor (sinking)			CP1E-N30SDT-D	
				Transistor (sourcing)			CP1E-N30SDT1-D	
N□□S-type with 40 I/O Points	100 to 240 VAC	24	16	Relay			CP1E-N40SDR-A	
	24VDC			Transistor (sinking)			CP1E-N40SDT-D	
				Transistor (sourcing)			CP1E-N40SDT1-D	
N□□S-type with 60 I/O Points	100 to 240 VAC	36	24	Relay			CP1E-N60SDR-A	
	24VDC			Transistor (sinking)			CP1E-N60SDT-D	
				Transistor (sourcing)			CP1E-N60SDT1-D	

■Normal type (N/NA□□-type) CP1E CPU Units

Product name	Specifications						Model	Standards
	Power Supply	Inputs	Outputs	Output type	Program capacity	Data memory capacity		
N□□-type with 14 I/O Points	100 to 240 VAC	8	6	Relay	8K steps	8K words	CP1E-N14DR-A	UC1, N, L, CE
				Transistor (sinking)			CP1E-N14DT-A	
				Transistor (sourcing)			CP1E-N14DT1-A	
	24VDC			Relay			CP1E-N14DR-D	
				Transistor (sinking)			CP1E-N14DT-D	
				Transistor (sourcing)			CP1E-N14DT1-D	
N□□-type with 20 I/O Points	100 to 240 VAC	12	8	Relay			CP1E-N20DR-A	
				Transistor (sinking)			CP1E-N20DT-A	
				Transistor (sourcing)			CP1E-N20DT1-A	
	24VDC			Relay			CP1E-N20DR-D	
				Transistor (sinking)			CP1E-N20DT-D	
				Transistor (sourcing)			CP1E-N20DT1-D	
N□□-type with 30 I/O Points	100 to 240 VAC	18	12	Relay			CP1E-N30DR-A	
				Transistor (sinking)			CP1E-N30DT-A	
				Transistor (sourcing)			CP1E-N30DT1-A	
	24VDC			Relay			CP1E-N30DR-D	
				Transistor (sinking)			CP1E-N30DT-D	
				Transistor (sourcing)			CP1E-N30DT1-D	
N□□-type with 40 I/O Points	100 to 240 VAC	24	16	Relay			CP1E-N40DR-A	
				Transistor (sinking)			CP1E-N40DT-A	
				Transistor (sourcing)			CP1E-N40DT1-A	
	24VDC			Relay			CP1E-N40DR-D	
				Transistor (sinking)			CP1E-N40DT-D	
				Transistor (sourcing)			CP1E-N40DT1-D	
N□□-type with 60 I/O Points	100 to 240 VAC	36	24	Relay			CP1E-N60DR-A	
				Transistor (sinking)			CP1E-N60DT-A	
				Transistor (sourcing)			CP1E-N60DT1-A	
	24VDC			Relay			CP1E-N60DR-D	
				Transistor (sinking)			CP1E-N60DT-D	
				Transistor (sourcing)			CP1E-N60DT1-D	
NA-type with 20 I/O Points (Built-in analog	100 to 240 VAC	12 (Built-in analog	8 (Built-in analog	Relay	8K steps	8K words	CP1E-NA20DR-A	
	24VDC			Transistor (sinking)			CP1E-NA20DT-D	

Basic models

■Renewal type (E□□S-type) CP1E CPU Units

Product name	Specifications						Model	Standards
	Power Supply	Inputs	Outputs	Output type	Program capacity	Data memory capacity		
E□□S-type with 14 I/O Points	100 to 240 VAC	8	6	Relay	2K steps	2K words	CP1E-E14SDR-A	CE
E□□S-type with 20 I/O Points		12	8	Relay			CP1E-E20SDR-A	
E□□S-type with 30 I/O Points		18	12	Relay			CP1E-E30SDR-A	
E□□S-type with 40 I/O Points		24	16	Relay			CP1E-E40SDR-A	
E□□S-type with 60 I/O Points		36	24	Relay			CP1E-E60SDR-A	

■Normal type (E□□-type) CP1E CPU Units

Product name	Specifications						Model	Standards
	Power Supply	Inputs	Outputs	Output type	Program capacity	Data memory capacity		
E□□-type with 10 I/O Points	100 to 240 VAC	6	4	Relay	2K steps	2K words	CP1E-E10DR-A	UC1, N, L, CE
				Transistor (sinking)			CP1E-E10DT-A	
				Transistor (sourcing)			CP1E-E10DT1-A	
	24VDC			Relay			CP1E-E10DR-D	
				Transistor (sinking)			CP1E-E10DT-D	
				Transistor (sourcing)			CP1E-E10DT1-D	
E□□-type with 14 I/O Points	100 to 240 VAC	8	6	Relay			CP1E-E14DR-A	
E□□-type with 20 I/O Points		12	8	Relay			CP1E-E20DR-A	
E□□-type with 30 I/O Points		18	12	Relay			CP1E-E30DR-A	
E□□-type with 40 I/O Points		24	16	Relay			CP1E-E40DR-A	

Optional Products

■Battery Set

Product name	Specifications	Model	Standards
Battery Set	For N□□/NA-type CP1E CPU Units Note: Mount a Battery to an N□□/NA-type CP1E CPU Unit if the data in the following areas must be backed up for power interruptions. DM Area (D) (except backed up words in the DM Area), Holding Area (H), Counter Completion Flags (C), Counter Present Values (C), Auxiliary Area (A) , and Clock Function.(Use batteries within two years of manufacture.)	CP1W-BAT01	–

■Option Boards (for CP1E N30/40/60 or NA20 CPU Units)

Product name	Specifications	Model	Standards
RS-232C Option Board	One RS-232C Option Board can be mounted to the Option Board slot. One RS-232C connector is included.	CP1W-CIF01	UC1, N, L, CE
RS-422A/485 Option Board	One RS-422A/485 Option Board can be mounted to the Option Board slot.	CP1W-CIF11	
RS-422A/485 Isolated-type Option Board	One RS-422A/485 Option Board can be mounted to the Option Board slot.	CP1W-CIF12	
Ethernet Option Board	One Ethernet Option Board can be mounted to the Option Board slot. CP1E CPU Units are supported by CP1W-CIF41 version 2.0 or later. When using CP1W-CIF41, CX-Programmer version 9.12 or higher is required.	CP1W-CIF41	
Analog Input Option Board	Can be mounted in CPU Unit Option Board slot. 2 analog inputs. 0-10V(Resolution:1/4000), 0-20mA (Resolution:1/2000).	CP1W-ADB21*	
Analog Output Option Board	Can be mounted in CPU Unit Option Board slot. 2 analog outputs. 0-10V (Resolution:1/4000).	CP1W-DAB21V*	
Analog I/O Option Board	Can be mounted in CPU Unit Option Board slot. 2 analog inputs. 0-10V(Resolution:1/4000), 0-20mA(Resolution:1/2000). 2 analog outputs. 0-10V (Resolution:1/4000).	CP1W-MAB221*	

Note: It is not possible to use a CP-series Ethernet Option Board version 1.0 (CP1W-CIF41), LCD Option Board (CP1W-DAM01), or Memory Card (CP1W-ME05M) with a CP1E CPU Unit.

Ordering information

Optional Products

■Expansion I/O Units and Expansion Units (for CP1E N30/40/60 or NA20 CPU Units)

Unit type	Product name	Inputs	Outputs	Specifications		Model	Standards
CP1W Expansion I/O Units	Input Unit	8	—	DC24V Input		CP1W-8ED	U, C, N, L, CE
	Output Units	—	8	Relay		CP1W-8ER	
				Transistor(sinking)		CP1W-8ET	
				Transistor(sourcing)		CP1W-8ET1	
		—	16	Relay		CP1W-16ER	N, L, CE
				Transistor(sinking)		CP1W-16ET	
				Transistor(sourcing)		CP1W-16ET1	
		—	32	Relay		CP1W-32ER	
				Transistor(sinking)		CP1W-32ET	
				Transistor(sourcing)		CP1W-32ET1	
	I/O Units	12	8	Relay		CP1W-20EDR1	U, C, N, L, CE
				Transistor(sinking)		CP1W-20EDT	
				Transistor(sourcing)		CP1W-20EDT1	
		24	16	Relay		CP1W-40EDR	N, L, CE
				Transistor(sinking)		CP1W-40EDT	
				Transistor(sourcing)		CP1W-40EDT1	
CP1W Expansion Units	Analog Input Unit	4CH	—	Input range: 0 to 5 V, 1 to 5 V, 0 to 10 V, ±10 V, 0 to 20 mA, or 4 to 20 mA.	Resolution: 1/6000	CP1W-AD041	UC1, N, L, CE
					Resolution: 1/12000	CP1W-AD042	UC1, CE
	Analog Output Unit	—	2CH	Output range: 1 to 5 V, 0 to 10 V, ±10 V, 0 to 20 mA, or 4 to 20 mA.	Resolution: 1/6000	CP1W-DA021	UC1, N, L, CE
		—	4CH		Resolution: 1/6000	CP1W-DA041	
					Resolution: 1/12000	CP1W-DA042	UC1, CE
	Analog I/O Unit	2CH	1CH	Input range: 0 to 5 V, 1 to 5 V, 0 to 10 V, ±10 V, 0 to 20 mA, or 4 to 20 mA. Output range: 1 to 5 V, 0 to 10 V, ±10 V, 0 to 20 mA, or 4 to 20 mA.	Resolution: 1/6000	CP1W-MAD11	UC1, N, L, CE
		4CH	2CH		Resolution: 1/12000	CP1W-MAD42	UC1, CE
		4CH	4CH		Resolution: 1/12000	CP1W-MAD44	CE
	Temperature Sensor Unit	2CH	—	Sensor type: Thermocouple (J or K)		CP1W-TS001	UC1, N, L, CE
		4CH	—	Sensor type: Thermocouple (J or K)		CP1W-TS002	
		2CH	—	Sensor type: Platinum resistance thermometer (Pt100 or JPt100)		CP1W-TS101	
		4CH	—	Sensor type: Platinum resistance thermometer (Pt100 or JPt100)		CP1W-TS102	
		4CH	—	Sensor type: Thermocouple (J or K) 2 analog inputs* Input range: 1 to 5 V, 0 to 10 V, 4 to 20 mA.	Resolution: 1/12000	CP1W-TS003	UC1, CE
		12CH	—	Sensor type: Thermocouple (J or K)		CP1W-TS004	UC1, CE
	CompoBus/S I/O Link Unit	8	8	CompoBus/S slave		CP1W-SRT21	UC1, N, L, CE
I/O Connecting Cable		80 cm (for CP1W Expansion I/O Units and Expansion Units) Only one I/O Connecting Cable can be used in each PLC.				CP1W-CN811	UC1, N, L, CE

Note: An I/O Connecting Cable (approx. 6 cm) for horizontal connection is provided with CP1W Expansion I/O Units and Expansion Units.
* Only last two channels can be used as analog input.

Programming Devices

■Support Software

Product name	Specifications	Number of licenses	Media	Model	Standards
FA Integrated Tool Package CX-One Lite Ver.4.□	CX-One Lite is a subset of the complete CX-One package that provides only the Support Software required for micro PLC applications. CX-One Lite runs on the following OS. OS: Windows XP (Service Pack 3 or higher, 32-bit version) / Windows Vista (32-bit/64-bit version) / Windows 7 (32-bit/64-bit version) / Windows 8 (32-bit/64-bit version) / Windows 8.1 (32-bit/64-bit version). CX-One Lite Ver. 4.□ includes Micro PLC Edition CXProgrammer Ver.9.□.	1 license	CD	CXONE-LT01C-V4	—
FA Integrated Tool Package CX-One Ver.4.□	CX-One is a comprehensive software package that integrates Support Software for OMRON PLCs and components. CX-One runs on the following OS. OS: Windows XP (Service Pack 3 or higher, 32-bit version) / Windows Vista (32-bit/64-bit version) / Windows 7 (32-bit/64-bit version) / Windows 8 (32-bit/64-bit version) / Windows 8.1 (32-bit/64-bit version). CX-One Ver. 4.□ includes CX-Programmer Ver. 9.□.	1 license*1	DVD*2	CXONE-AL01D-V4	—

Note: 1.CP1E-E60SDR-A CPU Units are supported by CX-Programmer version 9.42 or higher. When Micro PLC Edition CX-Programmer is used, you need version 9.42 or higher.
The E20/30/40(S), N20/30/40(S□) CPU Units are supported by CX-Programmer version 8.2 or higher.
The E10/14(S), N14/60(S□), and NA20 CPU Units are supported by CX-Programmer version 9.03 or higher.
When Micro PLC Edition CX-Programmer is used, you need version 9.03 or higher.
2.When using CP1W-CIF41, CX-Programmer version 9.12 or higher is required. N30/40/60, NA20 only.
3. The CX-One and CX-One Lite cannot be simultaneously installed on the same computer.

*1. Multi licenses are available for the CX-One (3, 10, 30 or 50 licenses).
*2. The CX-One is also available on CD (CXONE-AL□□C-V4).

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DATA SHEET

OMRON

OMRON
MK-I / -S
RELAY

Based on OMRON Datasheet

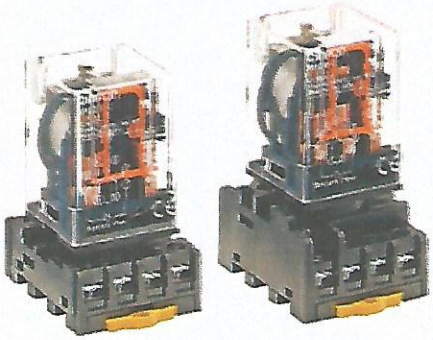
General-purpose Relay

MK-I/-S

10490

Exceptionally Reliable General-purpose Relay Features Mechanical Indicator/Push Button

- Breaks relatively large load currents despite small size.
- Long life (minimum 100,000 electrical operations) assured by silver contacts.
- Built-in operation indicator (Mechanical, LED), push button, diode surge suppression, varistor surge suppression.
- Standard models are UL, CSA, SEV, DEMKO, NEMKO, SEMKO, TÜV (IEC), and VDE.
- Conforming to CENELEC standards.



Model Number Structure

■ Model Number Legend

Standard Models

MK □ □ □ - □ - □ □
1 2 3 4 5 6

1. **Contact Form**
   2: DPDT
   3: 3PDT
2. **Cover**
   P: Dust cover
3. **Internal Connection Construction**
   Blank: Standard
   2 or 5: Non-standard connection
   (Refer to *Terminal Arrangement/ Internal Connections)*
4. **Mechanical Indicator Push Button**
   S: Mechanical indicator and push button
   I: Mechanical indicator
5. **Approved Standards**
   Blank: UL, CSA, DEMKO, NEMKO SEMKO, SEV, TÜV
   VD: VDE
6. **Rated Voltage**
   (Refer to *Coil Ratings*)

Special Accessories

MK □ □ □ □ - □ - □ - □ □
1 2 3 4 5 6 7 8

1. **Contact Form**
   2: DPDT
   3: 3PDT
2. **Cover**
   P: Dust cover
3. **Classification**
   N: LED indicator
   D: Diode
   V: Varistor
   ND: LED indicator and diode
   NV: LED indicator and varistor
4. **Coil Polarity**
   Blank: Standard
   1: Reverse
   (Refer to *Terminal Arrangement/ Internal Connections)*
5. **Internal Connection Construction**
   Blank: Standard
   2 or 5: Non-standard connection
   (Refer to *Terminal Arrangement/ Internal Connections)*
6. **Mechanical Indicator Push Button**
   S: Mechanical indicator and push button
   I: Mechanical indicator
7. **Approved Standards**
   Blank: UL and CSA only
   VD: VDE (N and D models only)
8. **Rated Voltage**
   (Refer to *Coil Ratings*)

MK-I/-S
Ordering Information

■ List of Models

Type	Terminal	Contact form	Internal connection (see note 3)	With mechanical indicator	With mechanical indicator and pushbutton	Coil ratings	Approved standards
Standard	Plug-in	DPDT	Standard	MK2P-I	MK2P-S	AC (∿), DC (⎓)	UL, CSA, SEV, DEMKO, NEMKO, SEMKO, TÜV
			Non-standard	MK2P2-I	MK2P2-S		
		3PDT	Standard	MK3P-I	MK3P-S		
			Non-standard	MK3P2-I MK3P5-I	MK3P2-S MK3P5-S		
LED Indicator (see note 2)		DPDT	Standard	MK2PN□-I	MK2PN□-S	AC (∿), DC (⎓)	UL, CSA
			Non-standard	MK2PN□-2-I	MK2PN□-2-S		
		3PDT	Standard	MK3PN□-I	MK3PN□-S		
			Non-standard	MK3PN□-2-I MK3PN□-5-I	MK3PN□-2-S MK3PN□-5-S		
Diode (see note 2)		DPDT	Standard	MK2PD□-I	MK2PD□-S	DC (⎓)	UL, CSA
			Non-standard	MK2PD□-2-I	MK2PD□-2-S		
		3PDT	Standard	MK3PD□-I	MK3PD□-S		
			Non-standard	MK3PD□-2-I MK3PD□-5-I	MK3PD□-2-S MK3PD□-5-S		
Varistor		DPDT	Standard	MK2PV-I	MK2PV-S	AC (∿)	UL, CSA
			Non-standard	MK2PV-2-I	MK2PV-2-S		
		3PDT	Standard	MK3PV-I	MK3PV-S		
			Non-standard	MK3PV-2-I MK3PV-5-I	MK3PV-2-S MK3PV-5-S		
VDE approved		DPDT	Standard	MK2P-I-VD	MK2P-S-VD	AC (∿), DC (⎓)	UL, CSA, SEV, DEMKO, NEMKO, SEMKO, TÜV, VDE
			Non-standard	MK2P2-I-VD	MK2P2-S-VD		
		3PDT	Standard	MK3P-I-VD	MK3P-S-VD		
			Non-standard	MK3P2-I-VD MK3P5-I-VD	MK3P2-S-VD MK3P5-S-VD		
LED Indicator VDE approved		DPDT	Standard	MK2PN-I-VD	MK2PN-S-VD	AC (∿), DC (...)	UL, CSA, VDE
			Non-standard	MK2PN-2-I-VD	MK2PN-2-S-VD		
		3PDT	Standard	MK3PN-I-VD	MK3PN-S-VD		
			Non-standard	MK3PN-2-I-VD	MK3PN-2-S-VD		
				MK3PN-5-I-VD	MK3PN-5-S-VD		
Diode VDE approved		DPDT	Standard	MK2PD-I-VD	MK2PD-S-VD	DC (...)	UL, CSA, VDE
			Non-standard	MK2PD-2-I-VD	MK2PD-2-S-VD		
		3PDT	Standard	MK3PD-I-VD	MK3PD-S-VD		
			Non-standard	MK3PD-2-I-VD	MK3PD-2-S-VD		
				MK3PD-5-I-VD	MK3PD-5-S-VD		

Note: 1. When ordering, add the rated voltage to the model number. Rated voltages are given in the coil ratings table in *Specifications*.

Example: MK3P5-S 230 VAC
(230 VAC: Rated voltage)

2. This DC coil comes in two types: standard coil polarity and reversed coil polarity. Refer to *Terminal Arrangement/Internal Connections*.

Example: MK2PN1-I 24 VDC
(1: Reverse polarity)

3. Refer to *Terminal Arrangement/Internal Connections* for non-standard internal connection.

4. The gold plating thickness depends on the request.

Example: MK3P-I AP3 24 VAC
(AP3: Gold plating thickness: 3 µm)

■ Accessories (Order Separately)

Item		Model
Track-mounted Socket	8-pin type	PF083A-E
	11-pin type	PF113A-E
Hold-down Clip		PFC-A1

MK-I/-S
Specifications

■ Coil Ratings

UL, CSA, DEMKO, NEMKO, SEMKO, SEV, TÜV

Rated voltage		Rated current		Coil resistance	Must operate voltage	Must release voltage	Max. voltage	Power consumption
		60 Hz	50 Hz					
AC (∿)	6 V	360 mA	404 mA	3.9 Ω	80% max. of rated voltage	30% min. of rated voltage	90% to110% of rated voltage	Approx. 2.3 VA (at 60 Hz) Approx. 2.7 VA (at 50 Hz)
	12 V	180 mA	202 mA	16.9 Ω				
	24 V	88.0 mA	98.0 mA	62.0 Ω				
	50 V	39.0 mA	46.3 mA	330 Ω				
	100 V	24.8 mA	28.4 mA	1,010 Ω				
	110 V	21.0 mA	24.7 mA	1,240 Ω				
	120 V	18.0 mA	20.2 mA	1,520 Ω				
	200 V	12.1 mA	14.2 mA	4,520 Ω				
	220 V	11.0 mA	12.9 mA	5,130 Ω				
	230 V	10.5 mA	12.3 mA	6,170 Ω				
	240 V	9.2 mA	10.3 mA	6,450 Ω				
DC (⎓)	6 V	255 mA		23.5 Ω		15% min. of rated voltage		Approx. 1.5 W
	12 V	126 mA		95 Ω				
	24 V	56 mA		430 Ω				
	48 V	29.5 mA		1,630 Ω				
	100 V	14.7 mA		6,800 Ω				
	110 V	15.1 mA		7,300 Ω				

VDE

Rated voltage		Rated current		Coil resistance	Must operate voltage	Must release voltage	Max. voltage	Power consumption
		50 Hz	60 Hz					
AC (∿)	6 V	380 mA	325 mA	4.4 Ω	80% max. of rated voltage	30% min. of rated voltage	90% to110% of rated voltage	Approx. 2.0 VA (at 60 Hz) Approx. 2.4 VA (at 50 Hz)
	12 V	175 mA	145 mA	19.0 Ω				
	24 V	91.0 mA	76.5 mA	70.7 Ω				
	50 V	42.0 mA	36.0 mA	330 Ω				
	100 V	24.0 mA	20.5 mA	1,150 Ω				
	110 V	21.5 mA	18.0 mA	1,400 Ω				
	120 V	20.0 mA	17.0 mA	1,600 Ω				
	200 V	11.2 mA	9.4 mA	5,110 Ω				
	220 V	10.2 mA	8.7 mA	5,800 Ω				
	230 V	9.6 mA	8.1 mA	6,990 Ω				
	240 V	9.4 mA	7.9 mA	7,400 Ω				
DC (⎓)	6 V	225 mA		26.7 Ω		15% min. of rated voltage		Approx. 1.3 W
	12 V	116 mA		107 Ω				
	24 V	56.0 mA		440 Ω				
	48 V	29.0 mA		1,660 Ω				
	100 V	13.1 mA		7,660 Ω				
	110 V	12.5 mA		8,720 Ω				

Note: 1. The rated current and coil resistance are measured at a coil temperature of 23°C with tolerances of +15%/–20% for AC rated current and ±15% for DC coil resistance.

2. Performance characteristic data are measured at a coil temperature of 23°C.

3. ∿ indicates AC and ⎓ indicates DC (IEC417 publications).

4. For 200 VDC applications, a 100-VDC Relay is supplied with a fixed 6.8 kΩ, 30 W resistor. Be sure to connect the resistor in series with the coil.

5. For models with the LED indicator built in, add an LED current of approximately 0 through 5 mA to the rated current.

MK-I/-S

■ Contact Ratings

Load	Resistive load (cosϕ = 1)	Inductive load (cosϕ = 0.4)
Contact mechanism	Single	
Contact material	Ag	
Rated load	10 A at 250 VAC 10A at 28 VDC	7 A at 250 VAC
Rated carry current	10 A	
Max. switching voltage	250 VAC, 250 VDC	
Max. switching current	10 A	
Max. switching power	2,500 VA, 280 W	1,750 VA

■ Characteristics

Contact resistance	50 mΩ max.
Operate time	AC: 20 ms max. DC: 30 ms max.
Release time	20 ms max.
Max. operating frequency	Mechanical:18,000 operations/hr Electrical:1,800 operations/hr (under rated load)
Insulation resistance	100 MΩ min. (at 500 VDC)
Dielectric strength	2,500 VAC, 50/60 Hz for 1 min between coil and contacts; 1,000 VAC, 50/60 Hz for 1 min between contacts of same polarity, terminals of the same polarity; 2,500 VAC, 50/60 Hz fro 1 min between current-carrying parts, non-current-carrying parts, and terminals of opposite polarity
Vibration resistance	Destruction:10 to 55 to 10 Hz, 0.75-mm single amplitude (1.5-mm double amplitude) Malfunction:10 to 55 to 10 Hz, 0.5-mm single amplitude (1.0-mm double amplitude)
Shock resistance	Destruction:1,000 m/s^2 (approx. 100G) Malfunction:100 m/s^2 (approx. 10G);
Endurance	Mechanical:10,000,000 operations min. (at operating frequency of 18,000 operations/hour) Electrical:Refer to *Engineering Data.*
Error rate (reference value)	10 mA at 1 VDC
Ambient temperature	Operating:–10°C to 40°C (with no icing or condensation)
Ambient humidity	Operating: 5% to 85%
Weight	Approx. 85 g

Note: The data shown are initial values.

MK-I/-S

■ Approved Standards

The following ratings apply to all models.

UL 508 (File No. E41515)/CSA 22.2 No.0/14 (File No. LR35535)

Coil ratings	Contact ratings	Operations
6 to 110 VDC 6 to 240 VAC	10 A, 28 VDC (resistive) 10 A, 250 VAC (resistive) 7 A, 250 VAC (general use)	100,000 cycles

SEV, DEMKO, NEMKO

Coil ratings	Contact ratings	Operations
6 to 110 V⎓ 6 to 240 V∿	10 A, 250 V∿ (NO) ($\cos\phi = 1$) 5 A, 250 V∿ (NC) ($\cos\phi = 1$) 10 A, 28 V⎓ (NO) 5 A, 28 V⎓ (NC) 7 A, 250 V∿ ($\cos\phi = 0.4$)	100,000 cycles

SEMKO

Coil ratings	Contact ratings	Operations
6 to 110 V⎓ 6 to 240 V∿	10 A, 250 V∿ (NO) ($\cos\phi = 1$) 5 A, 250 V∿ (NC) ($\cos\phi = 1$)	100,000 cycles

TÜV (VDE 0435 Teil 201/05'90, IEC 255 Teil 1-00/'75, EN 60950/'88

(TÜV File No.: R9051410)

Coil ratings	Contact ratings	Conditions	Operations
6, 12, 24, 48, 100 110 V⎓ 6, 12, 24, 50, 100, 110 115, 120, 200, 220 230, 240 V∿	10 A, 250 V∿ ($\cos\phi = 1$) 10 A, 28 V⎓ 7 A, 250 V∿ ($\cos\phi = 0.4$)	IEC 255-1-00 Item 3.1.4 Pollution Degree 3, Overvoltage Category II Pick up class - class 2 Temperature class - class b	100,000 cycles

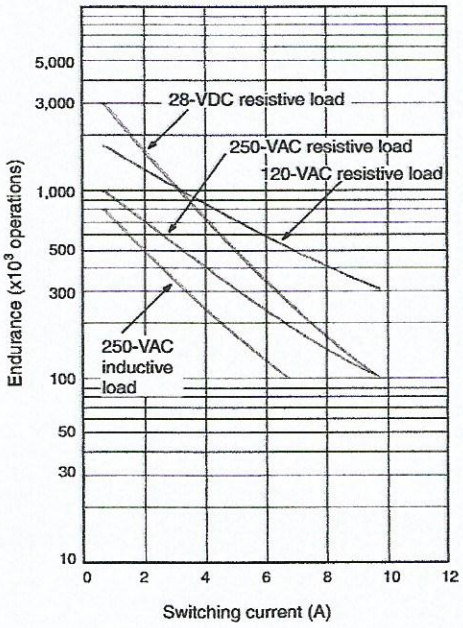
VDE (VDE 0435 Teil 201/05'83, IEC 255 Teil 1-00/'75)

(VDE File No.: NR 5340)

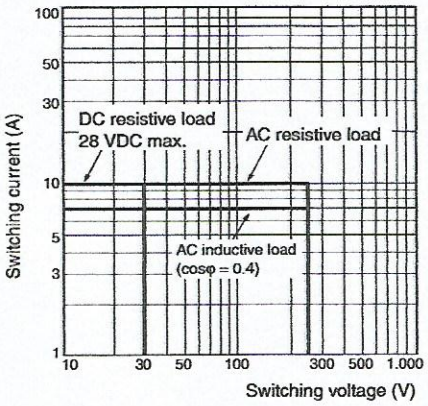
Coil ratings	Contact ratings	Conditions	Operations
6, 12, 24, 48, 100 110 V⎓ 6, 12, 24, 50, 100, 110 115, 120, 200, 220 230, 240 V∿	10 A, 250 V∿ ($\cos\phi = 1$) 10 A, 28 V⎓ 7 A, 250 V∿ ($\cos\phi$ ⎓ 0.4)	C/250 - class 1, class C	100,000 cycles

MK-I/-S
Engineering Data

■ Electrical Endurance



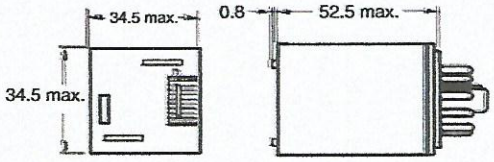
■ Maximum Switching Power



MK-I/-S
Dimensions

Note: All units are in millimeters unless otherwise indicated.

■ Relays



Sockets

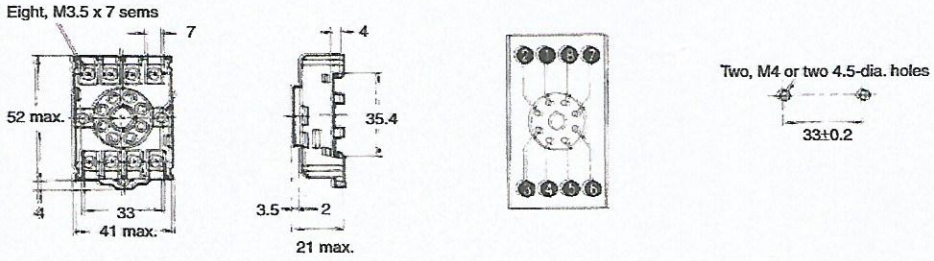
See below for Socket dimensions.

Socket	Surface-mounting Socket (for track or screw mounting)	
	Finger-protection models	—
Maximum carry current	10 A	5 A
2 poles	PF083A-E	PF083A
3 poles	PF113A-E 	PF113A 

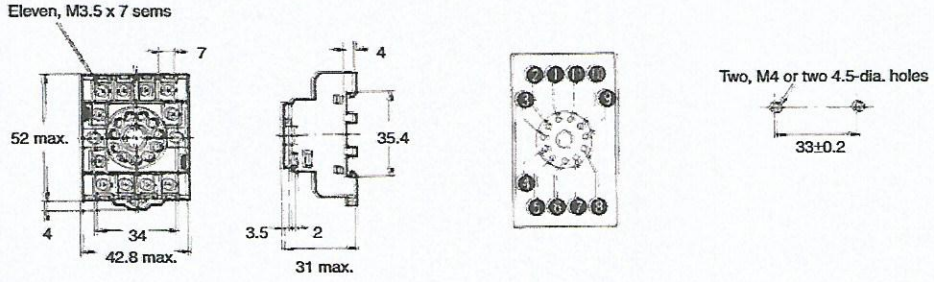
Note: Use the Surface-mounting Sockets (i.e., finger-protection models) with "-E" at the end of the model number. When using the PF083A and PF113A, be sure not to exceed the Socket's maximum carry current of 5 A. Using at a current exceeding 5 A may lead to burning. Round terminals cannot be used for finger-protection models. Use Y-shaped terminals.

PF083A-E (Conforming to EN 50022)

Terminal Arrangement **Mounting Holes**



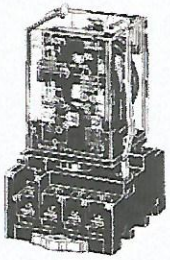
PF113A-E (Conforming to EN 50022)



MK-I/-S

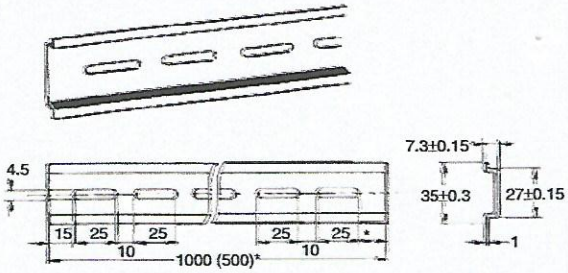
Hold-down Clips

PFC-A1



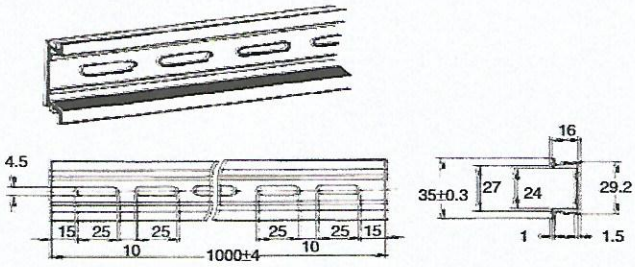
Mounting Tracks

PFP-100N, PFP-50N
(Conforming to EN 50022)



* This dimension applies to the PFP-50N Mounting Track.

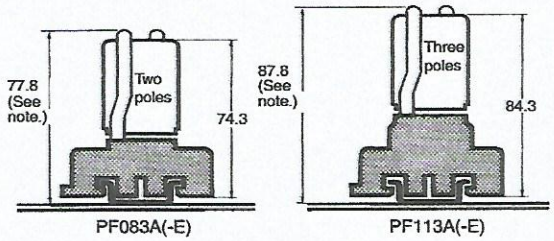
PFP-100N2
(Conforming to EN 50022)



* A total of twelve 25 x 4.5 elliptic holes is provided with six holes cut from each track end at a pitch of 10 mm.

Mounting Height with Sockets

Surface-mounting Sockets



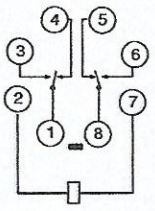
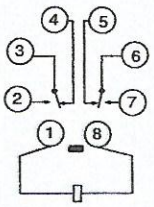
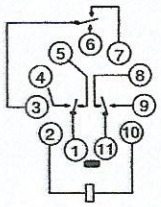
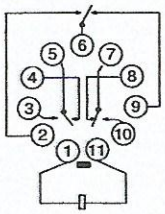
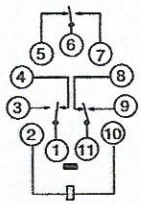
PF083A(-E) PF113A(-E)

Note: PF083A(-E) and PF113A(-E) allow either track or screw mounting.

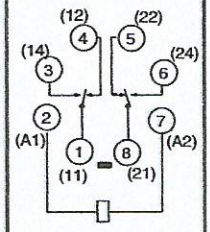
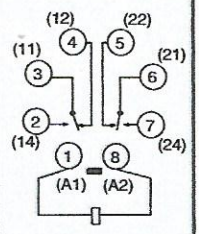
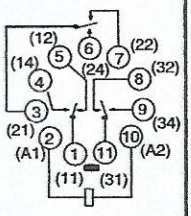
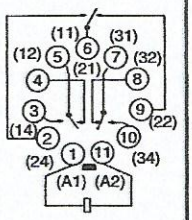
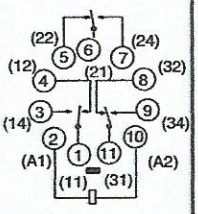
MK-I/-S

Terminal Arrangement/Internal Connection (Bottom View)

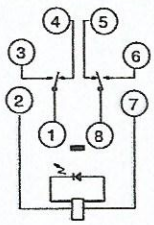
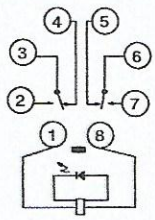
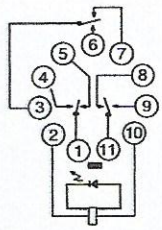
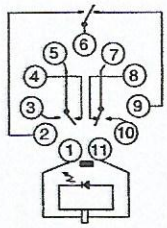
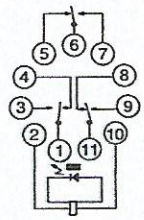
Standard (AC/DC Coil)

MK2P-I, -S	MK2P2-I, -S	MK3P-I, -S	MK3P2-I, -S	MK3P5-I, -S
				

VDE-approved Type (AC/DC Coil) ( ): Dual Numbering

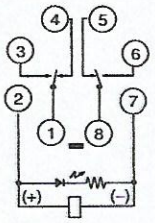
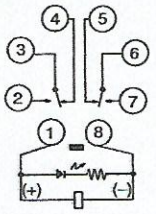
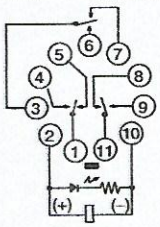
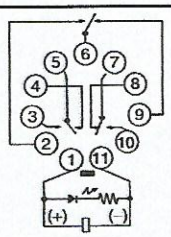
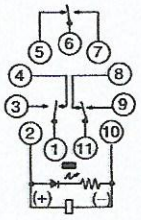
MK2P-I-VD, -S-VD	MK2P2-I-VD, -S-VD	MK3P-I-VD, -S-VD	MK3P2-I-VD, -S-VD	MK3P5-I-VD, -S-VD
				

LED Indicator Type (AC Coil)

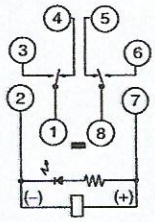
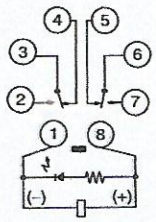
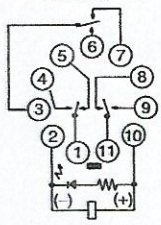
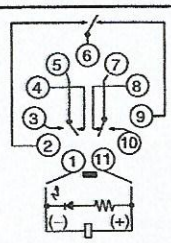
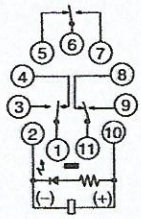
MK2PN-I, -S	MK2PN-2-I, -S	MK3PN-I, -S	MK3PN-2-I, -S	MK3PN-5-I, -S
				

MK-I/-S

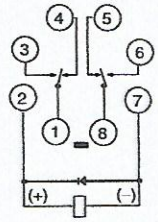
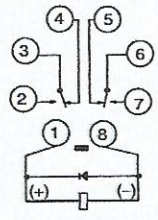
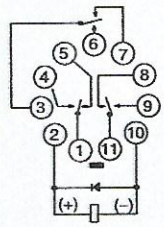
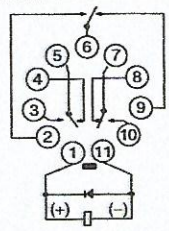
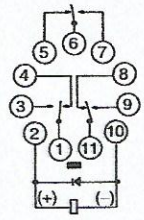
LED Indicator Type (DC Coil: Standard Polarity)

MK2PN-I, -S	MK2PN-2-I, -S	MK3PN-I, -S	MK3PN-2-I, -S	MK3PN-5-I, -S
				

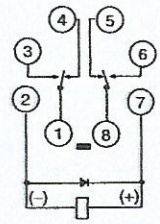
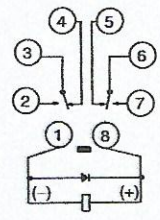
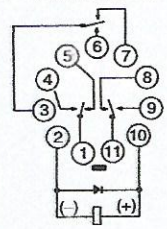
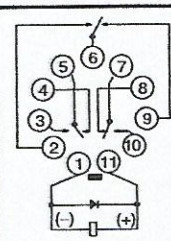
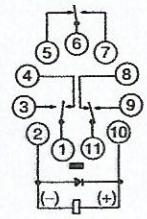
LED Indicator Type (DC Coil: Reverse Polarity)

MK2PN1-I, -S	MK2PN1-2-I, -S	MK3PN1-I, -S	MK3PN1-2-I, -S	MK3PN1-5-I, -S
				

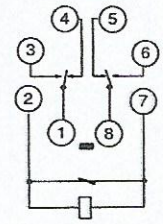
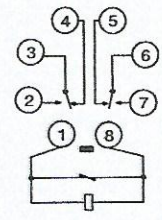
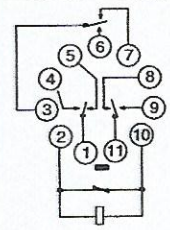
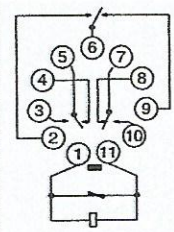
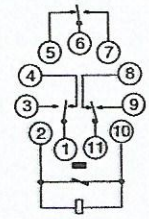
Diode Type (DC Coil: Standard Polarity)

MK2PD-I, -S	MK2PD-2-I, -S	MK3PD-I, -S	MK3PD-2-I, -S	MK3PD-5-I, -S
				

Diode Type (DC Coil: Reverse Polarity)

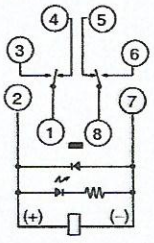
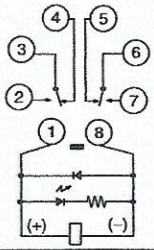
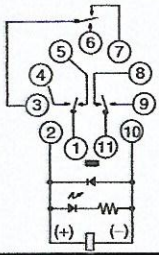
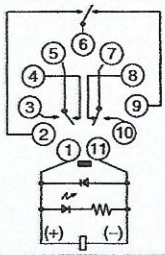
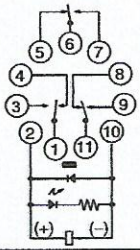
MK2PD1-I, -S	MK2PD1-2-I, -S	MK3PD1-I, -S	MK3PD1-2-I, -S	MK3PD1-5-I, -S
				

Varistor Type (AC Coil)

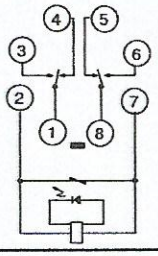
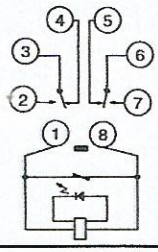
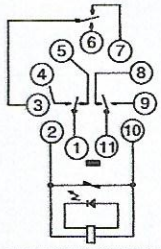
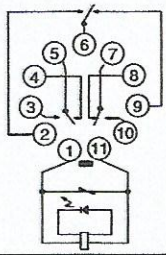
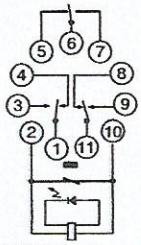
MK2PV-I, -S	MK2PV-2-I, -S	MK3PV-I, -S	MK3PV-2-I, -S	MK3PV-5-I, -S
				

MK-I/-S

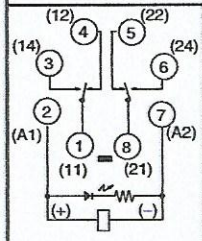
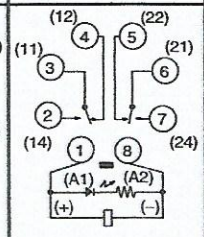
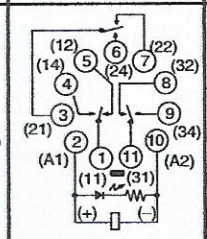
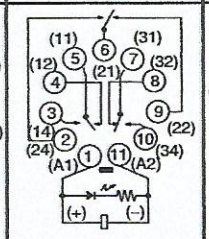
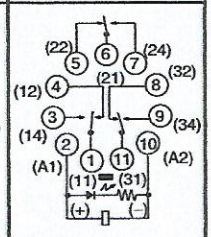
LED Indicator and Diode Type (DC Coil)

MK2PND-I, -S	MK2PND-2-I, -S	MK3PND-I, -S	MK3PND-2-I, -S	MK3PND-5-I, -S
				

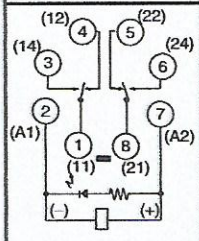
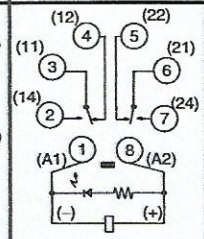
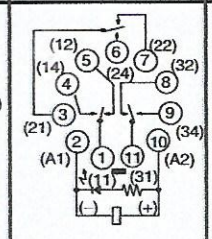
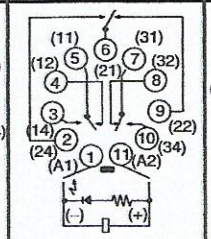
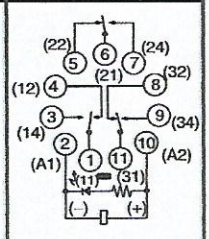
LED Indicator and Varistor Type (AC Coil)

MK2PNV-I, -S	MK2PNV-2-I, -S	MK3PNV-I, -S	MK3PNV-2-I, -S	MK3PNV-5-I, -S
				

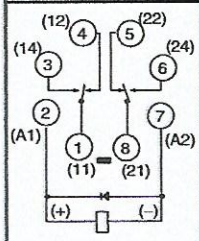
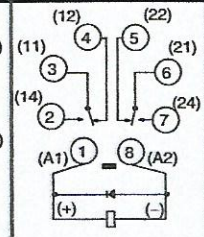
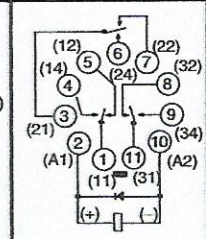
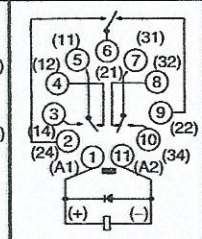
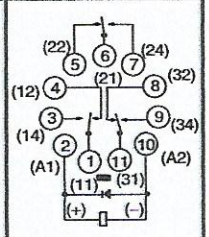
VDE Approved Type LED Indicator Type (DC Coil: Standard Polarity) ( ): Dual Numbering

MK2PN-I-VD, -3-VD	MK2PN-2-I-VD, -3-VD	MK3PN-I-VD, -S-VD	MK3PN-2-I-VD, -S-VD	MK3PN-5-I-VD, -S-VD
				

VDE Approved Type LED Indicator Type (DC Coil: Reverse Polarity)

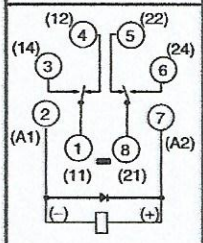
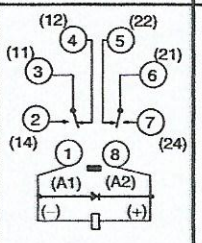
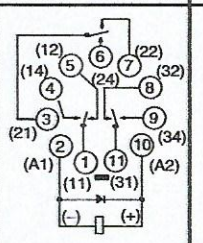
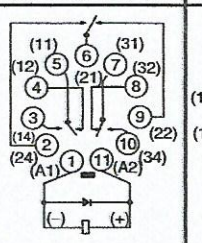
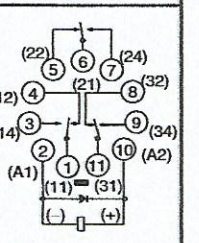
MK2PN1-I-VD, -S-VD	MK2PN1-2-I-VD, -S-VD	MK3PN1-I-VD, -S-VD	MK3PN1-2-I-VD, -S-VD	MK3PN1-5-I-VD, -S-VD
				

VDE Approved Type Diode Type (DC Coil: Standard Polarity)

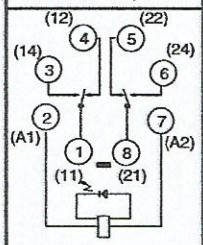
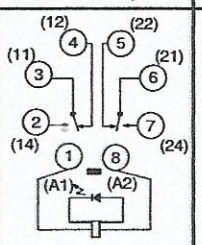
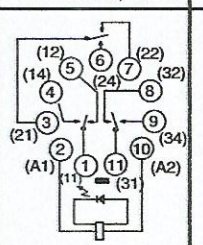
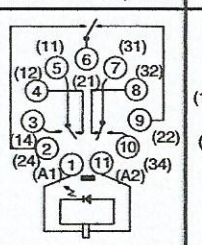
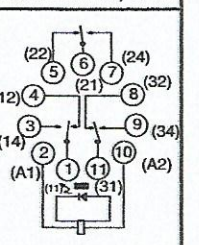
MK2PD-I-VD, -S-VD	MK2PD-2-I-VD, -S-VD	MK3PD-I-VD, -S-VD	MK3PD-2-I-VD, -S-VD	MK3PD-5-I-VD, -S-VDS
				

MK-I/-S

VDE Approved Type
Diode Type
(DC Coil:
Reverse Polarity)

MK2PD1-I-VD, -S-VD	MK2PD1-2-I-VD, -S-VD	MK3PD1-I-VD, -S-VD	MK3PD1-2-I-VD, -S-VD	MK3PD1-5-I-VD, -S-VD
				

VDE Approved Type
LED Indicator Type
(AC Coil)

MK2PN-I-VD, -S-VD	MK2PN-2-I-VD, -S-VD	MK3PN-I-VD, -S-VD	MK3PN-2-I-VD, -S-VD	MK3PN-5-I-VD, -S-VD
				

ALL DIMENSIONS SHOWN ARE IN MILLIMETERS.
To convert millimeters into inches, multiply by 0.03937. To convert grams into ounces, multiply by 0.03527.

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by AMETEK TIP

PITTMAN®

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Series 6000 LO-COG® 22mm Brush Commutated DC Motors

Maximum Continuous Torque oz-in (N-m)	No-Load Speed rpm (rad/s)	Peak Torque (Stall) oz-in (N-m)	Torque Constant oz-in/A (N-m/A)	Back EMF Constant V/krpm (V/rad/s)	Resistance Ω	Inductance mH	Rated Voltage V	Encoder	Outline Drawing Page Number	Part Number
0.81 (0.0057)	8260 (865)	2.70 (0.0191)	1.85 (0.013)	1.37 (0.013)	7.75	4.05	12	None	PE-4	6312S001-R1
0.81 (0.0057)	8260 (865)	2.70 (0.0191)	3.70 (0.026)	2.74 (0.026)	30.38	16.20	24	None	PE-4	6312S002-R1
1.32 (0.0093)	7780 (815)	5.56 (0.0393)	2.02 (0.014)	1.49 (0.014)	4.19	2.76	12	None	PE-4	6313S003-R1
1.32 (0.0093)	7780 (815)	5.56 (0.0393)	4.04 (0.029)	2.99 (0.029)	16.90	11.04	24	None	PE-4	6313S004-R1

PITTMAN®

Series 8000 LO-COG® Brush Commutated DC Motors

Maximum Continuous Torque oz-in (N-m)	No-Load Speed rpm (rad/s)	Peak Torque (Stall) oz-in (N-m)	Torque Constant oz-in/A (N-m/A)	Back EMF Constant V/krpm (V/rad/s)	Resistance Ω	Inductance mH	Rated Voltage V	Encoder	Outline Drawing Page Number	Part Number
1.58 (.011)	7847 (821.7)	7.4 (.052)	1.94 (0.014)	1.43 (0.014)	3.1	1.57	12	500 CPR	PE-5	8322S001
1.58 (.011)	7847 (821.7)	7.4 (.052)	3.88 (0.027)	2.87 (0.027)	12.1	6.27	24	None	PE-5	8322S002
1.58 (.011)	7847 (821.7)	7.4 (.052)	3.88 (0.027)	2.87 (0.027)	12.1	6.27	24	500 CPR	PE-5	8322S003
1.58 (.011)	7847 (821.7)	7.4 (.052)	1.94 (0.014)	1.43 (0.014)	3.1	1.57	12	None	PE-5	8322S008
2.62 (.019)	10158 (1063.7)	16.8 (.118)	1.54 (0.011)	1.14 (0.011)	1.17	0.58	12	None	PE-5	8324S004
2.62 (.019)	10158 (1063.7)	16.8 (.118)	1.54 (0.011)	1.14 (0.011)	1.17	0.58	12	500 CPR	PE-5	8324S005
2.62 (.019)	10158 (1063.7)	16.8 (.118)	3.09 (0.022)	2.29 (0.022)	4.33	2.34	24	None	PE-5	8324S006
2.62 (.019)	10158 (1063.7)	16.8 (.118)	3.09 (0.022)	2.29 (0.022)	4.33	2.34	24	500 CPR	PE-5	8324S007

Series 9000 LO-COG® Brush Commutated DC Motors

Maximum Continuous Torque oz-in (N-m)	No-Load Speed rpm (rad/s)	Peak Torque (Stall) oz-in (N-m)	Torque Constant oz-in/A (N-m/A)	Back EMF Constant V/krpm (V/rad/s)	Resistance Ω	Inductance mH	Rated Voltage V	Encoder	Outline Drawing Page Number	Part Number
2.3 (.016)	7015 (734.6)	13.8 (.097)	2.2 (0.016)	1.63 (0.016)	1.93	1.16	12	500 CPR	PE-6	9232S001
2.3 (.016)	7015 (734.6)	13.8 (.097)	4.4 (0.031)	3.25 (0.031)	7.38	4.64	24	None	PE-6	9232S002
2.3 (.016)	7015 (734.6)	13.8 (.097)	4.4 (0.031)	3.25 (0.031)	7.38	4.64	24	500 CPR	PE-6	9232S003
4.7 (.033)	5993 (627.6)	31.6 (.223)	2.67 (0.019)	1.98 (0.019)	1.08	0.84	12	None	PE-6	9233S012
4.7 (.033)	5993 (627.6)	31.6 (.223)	5.28 (0.037)	3.9 (0.037)	3.94	3.29	24	None	PE-6	9233S013
6.1 (.043)	6151 (644.1)	41.3 (.291)	2.58 (0.018)	1.91 (0.018)	0.83	0.63	12	None	PE-6	9234S004
6.1 (.043)	6151 (644.1)	41.3 (.291)	2.58 (0.018)	1.91 (0.018)	0.83	0.63	12	500 CPR	PE-6	9234S005
6.1 (.043)	6151 (644.1)	41.3 (.291)	5.17 (0.037)	3.82 (0.037)	2.96	2.51	24	None	PE-6	9234S006
6.1 (.043)	6151 (644.1)	41.3 (.291)	5.17 (0.037)	3.82 (0.037)	2.96	2.51	24	500 CPR	PE-6	9234S007
9.5 (.067)	4913 (514.5)	61.8 (.436)	6.49 (0.046)	4.8 (0.046)	2.49	2.63	24	None	PE-6	9236S008
9.5 (.067)	4913 (514.5)	61.8 (.436)	6.49 (0.046)	4.8 (0.046)	2.49	2.63	24	500 CPR	PE-6	9236S009
11.5 (.081)	5331 (558.3)	77 (.543)	6 (0.042)	4.44 (0.042	1.85	1.97	24	None	PE-6	9237S010
11.5 (.081)	5331 (558.3)	77 (.543)	6 (0.042)	4.44 (0.042)	1.85	1.97	24	500 CPR	PE-6	9237S011

Note: All encoders supplied with 20" lead wires.

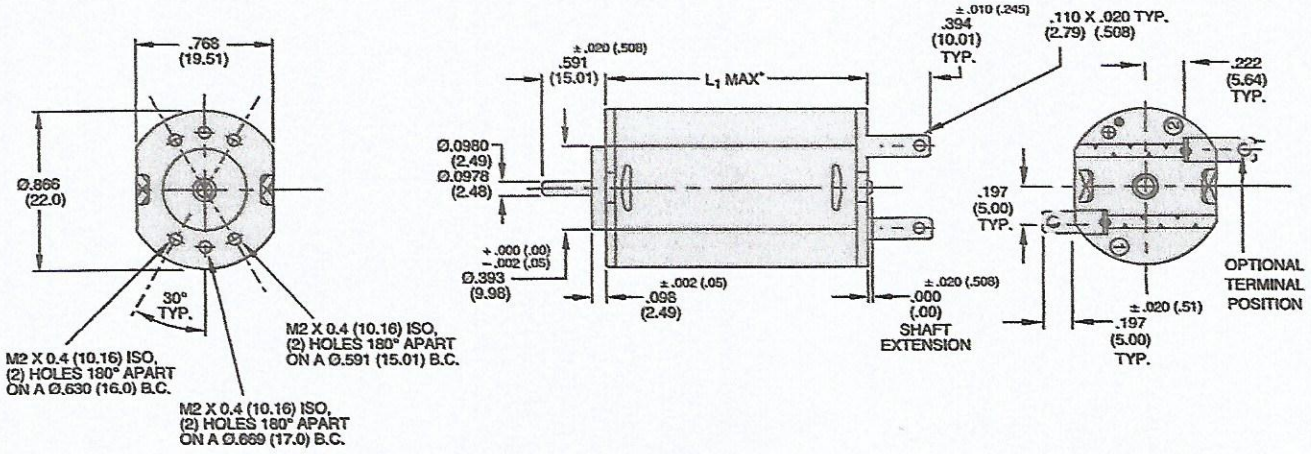
PITTMAN®

Series 14000 LO-COG® Brush Commutated DC Motors

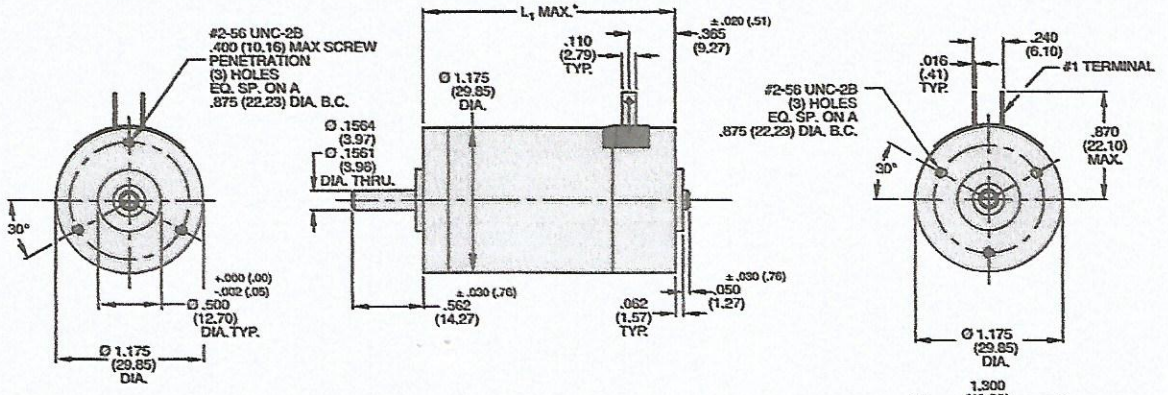
Maximum Continuous Torque oz-in (Nm)	No-Load Speed rpm (rad/s)	Peak Torque (Stall) oz-in (Nm)	Torque Constant oz-in/A (Nm/A)	Back EMF Constant V/krpm (V/rad/s)	Resistance Ω	Inductance mH	Rated Voltage V	Encoder	Outline Drawing Page Number	Part Number
10 (.071)	4230 (443.0)	62.8 (.444)	3.72 (0.026)	2.75 (0.026)	0.72	0.63	12	500 CPR	PE-6	14201S001
10 (.071)	4230 (443.0)	62.8 (.444)	7.44 (0.053)	5.5 (0.053)	2.79	2.54	24	None	PE-6	14201S002
10 (.071)	4230 (443.0)	62.8 (.444)	7.44 (0.053)	5.5 (0.053)	2.79	2.54	24	500 CPR	PE-6	14201S003
21 (.148)	3456 (361.9)	159 (1.12)	9.26 (0.065)	6.85 (0.065)	1.38	2.26	24	None	PE-6	14203S009
21 (.148)	3456 (361.9)	159 (1.12)	4.63 (0.033)	3.42 (0.033)	0.37	0.56	12	None	PE-6	14203S010
26 (.184)	3702 (387.7)	204 (1.44)	4.33 (0.031)	3.21 (0.031)	0.27	0.4	12	500 CPR	PE-6	14204S004
26 (.184)	3702 (387.7)	204 (1.44)	8.67 (0.061)	6.41 (0.061)	1.01	1.6	24	None	PE-6	14204S005
26 (.184)	3702 (387.7)	204 (1.44)	8.67 (0.061)	6.41 (0.061)	1.01	1.6	24	500 CPR	PE-6	14204S006
36.5 (.258)	3216 (336.8)	284 (2.01)	10 (0.071)	7.39 (0.071)	0.84	1.36	24	None	-	14206S011
50 (.35)	3211 (336.3)	410 (2.90)	10 (0.071)	7.39 (0.071)	0.59	0.87	24	None	PE-6	14207S007
50 (.35)	3211 (336.3)	410 (2.90)	10 (0.071)	7.39 (0.071)	0.59	0.87	24	500 CPR	PE-6	14207S008

Note: All encoders supplied with 20" lead wires.

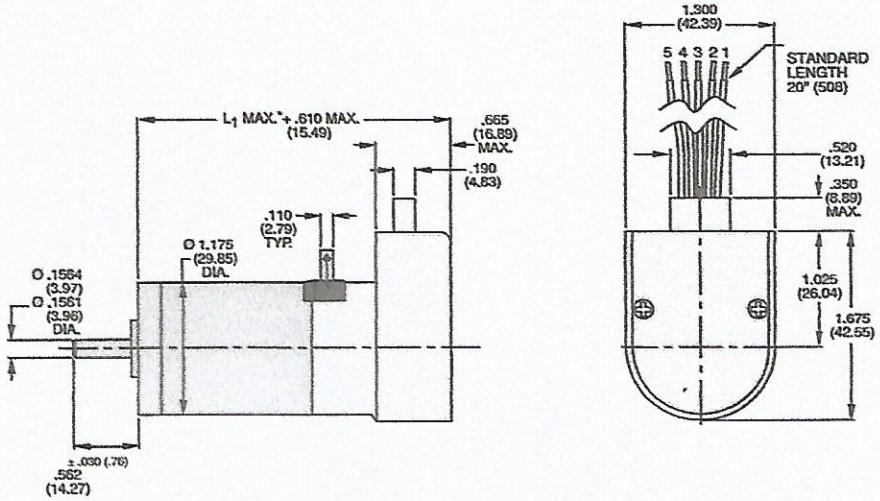
Series 6000 LO-COG® 22mm Brush Commutated DC Motors



Series 8000 LO-COG® Brush Commutated DC Motors



With 91X0 Encoder



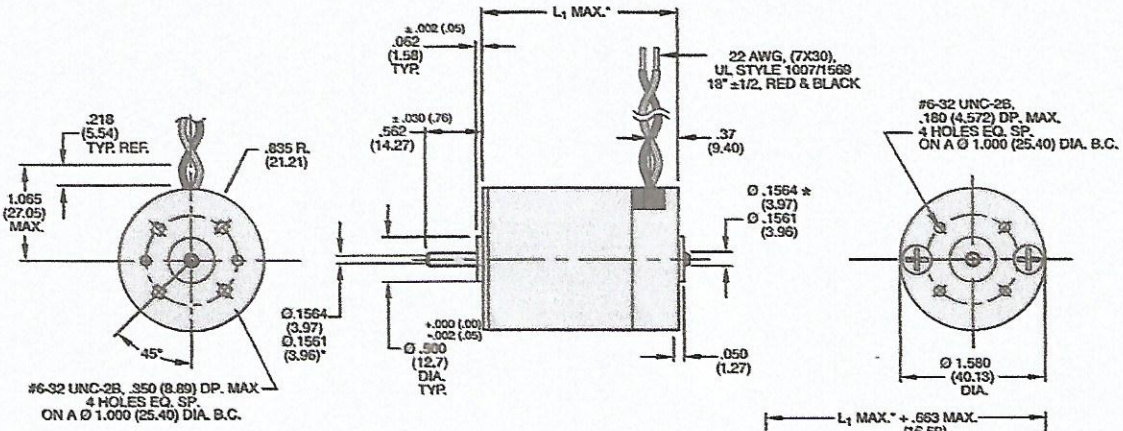
L_1	Model Number
2.003 (50.9)	8322
2.378 (60.4)	8324

Encoder Connection Chart

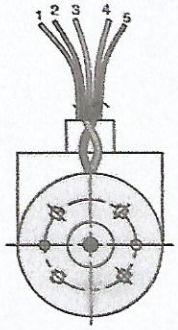
Pin No.	Color	Connection
1	Black	Ground
2	Green	Index
3	Yellow	Channel A
4	Red	Vcc
5	Blue	Channel B

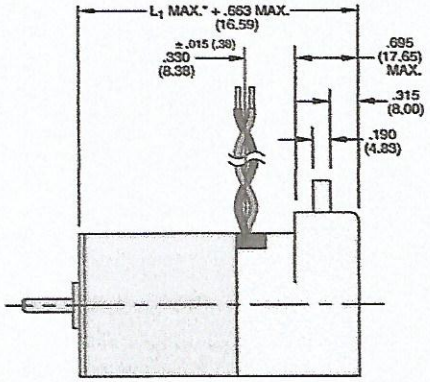
Notes:
- Unless otherwise specified, all tolerances are to be ±.005 (.01)
- All measurements are in inches (mm)

Series 9000 LO-COG® Brush Commutated DC Motors



With 91X0 Encoder

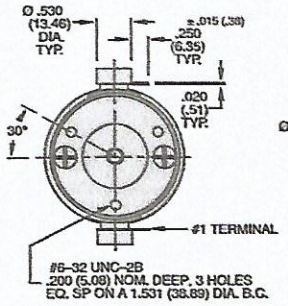


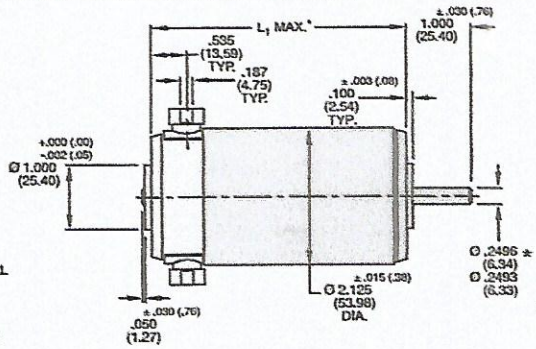


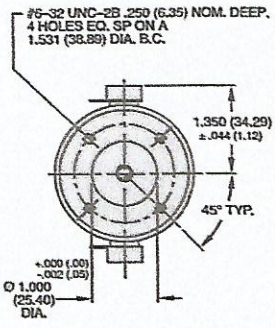
L_1	Model Number
1.828 (46.4)	9232
2.203 (55.9)	9233
2.403 (61.0)	9234
3.053 (77.5)	9236
3.353 (85.2)	9237*

* The 9237 Motor has a 5mm $\left(\begin{matrix}.1966\\.1964\end{matrix}\right)$ Ø Shaft

Series 14000 LO-COG® Brush Commutated DC Motors

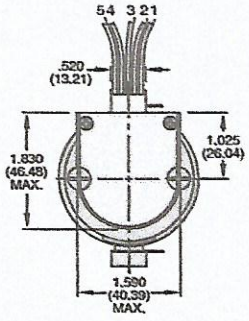


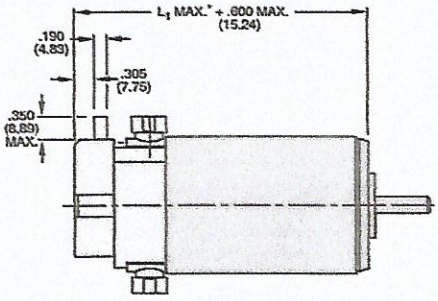




L_1	Model Number
2.953 (75.0)	14201
3.703 (94.1)	14203
4.078 (103.6)	14204
4.953 (125.8)	14206
5.703 (144.9)	14207*

With 91X0 Encoder





Encoder Connection Chart

Pin No.	Color	Connection
1	Black	Ground
2	Green	Index
3	Yellow	Channel A
4	Red	Vcc
5	Blue	Channel B

Notes:
- Unless otherwise specified, all tolerances are to be ±.005 (.01)
- All measurements are in inches (mm)

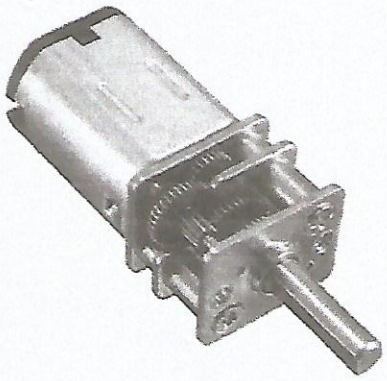
* The 14207 Motor has a 8mm $\left(\begin{matrix}.3147\\.3144\end{matrix}\right)$ Ø Shaft

PITTMAN®

Datasheet

G12-N20 Geared Mini DC Motor

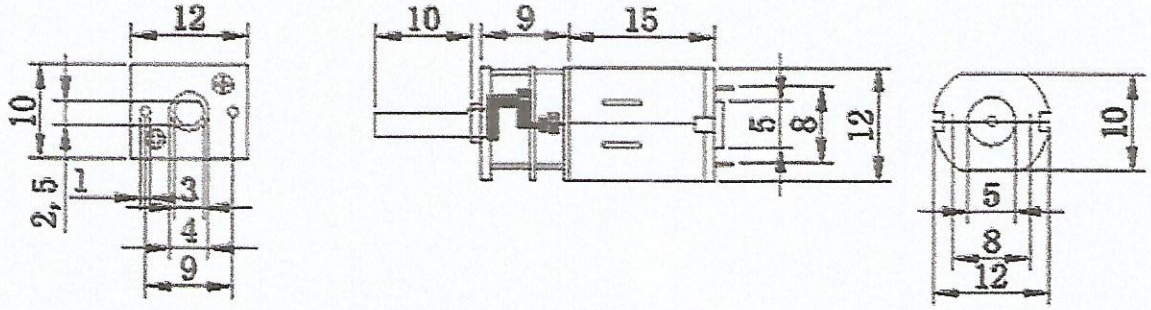
This is a DC Mini Metal Gear Motor, ideal for making robots. Light weight, high torque and low RPM. Fine craftsmanship, durable, not easy to wear. With excellent stall characteristics, can climb hills easily. You can also easily mount a wheel on the motor's output shaft. Widely used on boat, model car, robotic, home appliances, linear motion control.



Brief Data:

- Model :GA12-N20
- Rated Voltage : 6~12V
- Revolving Speed : 100RPM @ 6V
- Load Speed: 80RPM
- Rated Torque: 2 kg.cm
- Stall Torque: 16 kg.cm
- Rated Current: 0.07A
- Stall Current: 1A
- Reduction Ratio: 1:10
- Total Length : 34mm
- Gear Material: Full Metal
- Gearbox Size : 15 x 12 x 10mm (L*W*H)
- Shaft Size : 3 x 10mm(D*L)
- Net Weight : 10g

Unit: mm



Supply Voltage vs RPM:

Supply Voltage	RPM
3V	50
6V	100
12V	200

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Website : www.polisriwijaya.ac.id **E-mail :** info@polsri.ac.id

KESEPAKATAN BIMBINGAN LAPORAN AKHIR (LA)

Kami yang bertanda tangan di bawah ini,

Pihak Pertama

Nama	: Budi Nur Ramadhan
NIM	: 061430310150
Jurusan	: Teknik Elektro
Program Studi	: Teknik Listrik

Pihak Kedua

Nama	: Drs. Indrawasih,M.T.
NIP	: 196004261986031002
Jurusan	: Teknik Elektro
Program Studi	: Teknik Listrik

Pada hari ini ...Senin..... tanggal .....19-05-2017.... telah sepakat untuk melakukan konsultasi bimbingan Laporan Akhir.

Konsultasi bimbingan sekurang-kurangnya 1 (satu) kali dalam satu minggu. Pelaksanaan bimbingan pada setiap hari .....Rabu..... pukul ..10.00...., tempat di Politeknik Negeri Sriwijaya.

Demikianlah kesepakatan ini dibuat dengan penuh kesadaran guna kelancaran penyelesaian Laporan Akhir.

Palembang, 19-05-2017

Pihak Pertama,

(Budi Nur Ramadhan)
NIM 061430310150

Pihak Kedua,

(Drs. Indrawasih,M.T.)
NIP 196004261986031002

Mengetahui,
Ketua Program Studi

(Mohammad Noer, S.S.T., M.T.)
NIP 196505121995021001

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KESEPAKATAN BIMBINGAN LAPORAN AKHIR (LA)

Kami yang bertanda tangan di bawah ini,

Pihak Pertama

Nama	: Budi Nur Ramadhan
NIM	: 061430310150
Jurusan	: Teknik Elektro
Program Studi	: Teknik Listrik

Pihak Kedua

Nama	: Sutan Marsus, S.S.T.,M.T.
NIP	: 196509301993031002
Jurusan	: Teknik Elektro
Program Studi	: Teknik Listrik

Pada hari ini ...Jum'at..... tanggal .....19-05-2017..... telah sepakat untuk melakukan konsultasi bimbingan Laporan Akhir.

Konsultasi bimbingan sekurang-kurangnya 1 (satu) kali dalam satu minggu. Pelaksanaan bimbingan pada setiap hari .....Selasa..... pukul ...10.00....., tempat di Politeknik Negeri Sriwijaya.

Demikianlah kesepakatan ini dibuat dengan penuh kesadaran guna kelancaran penyelesaian Laporan Akhir.

Palembang, ...19-05-2017.....

Pihak Pertama,

(Budi Nur Ramadhan)
NIM 061430310150

Pihak Kedua,

(Sutan Marsus, S.S.T.,M.T.)
NIP 196509301993031002

Mengetahui,
Ketua Program Studi

(Mohammad Noer, S.S.T., M.T.)
NIP 196505121995021001

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LEMBAR BIMBINGAN LAPORAN AKHIR

Nama : Budi Nur Ramadhan
NIM : 061430310150
Jurusan/Program Studi : Teknik Elektro / Teknik Listrik
Judul Laporan Akhir : Rancang Bangun Miniatur Sistem Parkir Otomatis Bertingkat Menggunakan Programmable Logic Controller
Pembimbing (1)/ II *) : Drs. Indrawasih, M.T.

No.	Tanggal	Uraian Bimbingan	Tanda Tangan Pembimbing
1.	19/5-2017	Bab I acc	
2.	23/5 2017	Bab II → Perbaikan lihat pada tata tulisan	
3.	24/5 2017	Bab II → acc Lanjut Bab III	
4.	26/5 2017	Bab III perbaiki Sistem kerja	
5.	31/5 2017	Bab III acc	
6.	7/6 2017	Bab IV Perbaiki lagi pd tulisan	
7.	9/6 2017	Bab IV perbaiki lagi pada tulisan	

No. Dok. : F-PBM-17 Tgl. Berlaku : 13 Desember 2010 No. Rev. : 00

No.	Tanggal	Uraian Bimbingan	Tanda Tangan Pembimbing
8.	20/6/2017	Bab IV acc Lanjut Bab V	
9.	3/7/2017	Bab V → acc, rekomendasi	
10.			
11.			
12.			

Palembang, 27-07-2017

Ketua Program Studi

Teknik Listrik

(Mohammad Noer, S.S.T., M.T.)

NIP 196505121995021001

Catatan:

*) melingkari angka yang sesuai.

Ketua Jurusan/Ketua Program Studi harus memeriksa jumlah pelaksanaan bimbingan sesuai yang dipersyaratkan dalam Pedoman Laporan Akhir sebelum menandatangani lembar bimbingan ini.

Lembar pembimbingan LA ini harus dilampirkan dalam Laporan Akhir.

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LEMBAR BIMBINGAN LAPORAN AKHIR

Nama : Budi Nur Ramadhan
NIM : 061430310150
Jurusan/Program Studi : Teknik Elektro / Teknik Listrik
Judul Laporan Akhir : Rancang Bangun Miniatur Sistem Parkir Otomatis Bertingkat Menggunakan Programmable Logic Controller
Pembimbing I /(II) *) : Sutan Marsus, S.S.T., M.T.

No.	Tanggal	Uraian Bimbingan	Tanda Tangan Pembimbing
1.	19/5-17	Bab I & II → perbaiki semua tulisan Asing di cetak Miring LIHAT PADATULISAN	
2.	22/5-17	Bab I → ACC Bab II → perbaiki Lihat pd tulisan	
3.	26/5-17	Bab II → perbaiki. Copi Lihat pd tulisan	
4.	31/5-17	Bab II → ACC Lanjut ke bab III	
5.	2/6-17	Bab III → perbaiki Lihat pd tulisan	
6.	6/6-17	Bab III → perbaiki. Copi Lihat pd tulisan	
7.	9/6-17	Bab III → ACC Lanjut Bab IV	

No. Dok. : F-PBM-17 | Tgl. Berlaku : 13 Desember 2010 | No. Rev. : 00

No.	Tanggal	Uraian Bimbingan	Tanda Tangan Pembimbing
8.	12/6-17	Bab IV → perbaiki: lihat pd tulisan	
9.	16/6-17	Bab IV → ACC / Bab V → ACC. Lengkapi dengan Daftar2	
10.		pustaka, tabel, gambar dan lampiran	
11.		Siap untuk disidangkan	
12.		pada tgl 17/7-17	

Palembang, ...27-07-2017.....

Ketua Program Studi

Teknik Listrik

(Mohammad Noer, S.S.T., M.T.)
NIP 196505121995021001

Catatan:
*) melingkari angka yang sesuai.
Ketua Jurusan/Ketua Program Studi harus memeriksa jumlah pelaksanaan bimbingan sesuai yang dipersyaratkan dalam Pedoman Laporan Akhir sebelum menandatangani lembar bimbingan ini.
Lembar pembimbingan LA ini harus dilampirkan dalam Laporan Akhir.

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REKOMENDASI UJIAN LAPORAN AKHIR (LA)

Pembimbing Laporan Akhir memberikan rekomendasi kepada,

Nama	:	Budi Nur Ramadhan
NIM	:	0614 3031 0150
Jurusan/Program Studi	:	Teknik Elektro/Teknik Listrik
Judul Laporan Akhir	:	RANCANG BANGUN MINIATUR SISTEM PARKIR MOBIL OTOMATIS MENGGUNAKAN *PROGRAMMABLE LOGIC CONTROLLER*

Mahasiswa tersebut telah memenuhi persyaratan dan dapat mengikuti Ujian Laporan Akhir (LA) pada Tahun Akademik 2016/2017.

Palembang, 3 - 7 - 2017

Pembimbing I,

Drs. Indrawasih, M.T.
NIP. 196004261986031002

Pembimbing II,

(Sutan Marsus, S.S.T., M.T.)
NIP. 196509301993031002

No. Dok. : F-PBM-22 | Tgl. Berlaku : 13 Desember 2010 | No. Rev. : 00

KEMENTERIAN PENDIDIKAN DAN KEBUDAYAAN
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REVISI UJIAN LAPORAN AKHIR (LA)

Ruang : 04
Dosen Penguji : Andri Syafeli
Nama Mahasiswa : Budi Nur R.
NIM : 0614 3031 0450
Jurusan/Program Studi : T. Listrik.
Judul Laporan Akhir : Sistem parkir mobil otomatis.

No	Uraian Revisi	Paraf
01	Rangkaian Kontrol.	
02	Analisa. Kontrol.	25/07/2017

Palembang, ...
Dosen Penguji,

(Andri Syafeli)

KEMENTERIAN RISET, TEKNOLOGI DAN PENDIDIKAN TINGGI
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Website : www.polisriwijaya.ac.id **E-mail :** info@polsri.ac.id

PELAKSANAAN REVISI LAPORAN AKHIR

Mahasiswa berikut,

Nama : BUDI NUR RAMADHAN

NIM : 06.1430310150

Jurusan/Program Studi : T. ELEKTRO / T. LISTRIK

Judul Laporan Akhir : RANCANG BANGUN MINIATUR SISTEM PARKIR MOBIL OTOMATIS BERTINGKAT MENGGUNAKAN PROGRAMMABLE LOGIC CONTROLLER

Telah melaksanakan revisi terhadap Laporan Akhir yang diujikan pada hari Senin tanggal 17 bulan 07 tahun 2017 Pelaksanaan revisi terhadap Laporan Akhir tersebut telah disetujui oleh Dosen Penguji yang memberikan revisi:

No.	Komentar	Nama Dosen Penguji *)	Tanggal	Tanda Tangan
01	Sudah di revisi	Andri Suyadi	20/7 2017	
02	Tdk ada Revisi	Zainuddin I	27/7 17	

Palembang, ...

Ketua Penguji **),

(Ir. Zainuddin Idris, M.T.)

NIP 195711251989031001

Catatan:

*) Dosen penguji yang memberikan revisi saat ujian laporan akhir.

**) Dosen penguji yang ditugaskan sebagai Ketua Penguji saat ujian LA.

Lembaran pelaksanaan revisi ini harus dilampirkan dalam Laporan Akhir.