JK Fenner

POWERTRAN - PLC S

PROGRAMMABLE LOGIC CONTROLLER

Block Type PLC-S

- CM3-SB16MDT
- CM3-SB16MDTV

www.jkfennerindia.com

Before You Start

This manual contains important information on the use and operation of this device. Please read all the information carefully for optimal performance and to prevent any damage or misuse of the device.

To keep product safely, all activities including product installation, wiring operation, or maintenance required are to be treated by trained personnel.

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Safety symbols are classified into two categories, “WARNING” and “CAUTION”.

 Warning-This symbol describes situations that could cause major or fatal injury to the user.

 Caution-This symbol describes situations that may cause minor injury or damage to the device.

SAFETY SYMBOLS USED IN THIS PRODUCT MEANS:

 This symbol warns the user of potential hazards.

 This symbol warns the user of un-insulated voltage within the unit that can cause dangerous electric shock.

Keep this manual nearby the user operating devices so it can be easily checked.

A-class equipment (Broadcasting communication equipment for business)

This product has passed the testing for electromagnetic waves for business use, and has not been designed or manufactured to be used as a household item; users are advised as such.

Design Precautions (⚠ Warning)

Please install a safety circuit to protect entire control system in case of an unexpected power shutdown and PLC module malfunction. Such anomalies may severely compromise the integrity of the overall system.

External to the PLC, please install circuits and switches to safeguard the system from mechanical damages (ex. Emergency stop, upper/lower limit switches, forward/reverse direction interlocking circuits, etc)

When the PLC detects either of the following failure conditions, it may stop operation and turn off all outputs.

- The overcurrent protection or overvoltage protection of the power supply module is activated.

- The PLC CPU detected a failure, such as the watchdog timer error or module installation failure, with its self-diagnostic function.

In addition, all outputs may be turned on when there is a failure that the PLC CPU cannot detect, such as in the relay or TR terminal. Build an extra monitoring circuit that will monitor any output signal that could cause serious accidents.

A greater than normal current passed through the PLC for an extended period of time, or a short-circuited load flows in the output module may cause a fire.

Build a circuit that turns on the external power supply after the PLC power supply is turned on. If the external power supply is turned on first, it could result in output failure or malfunction.

In order to ensure that the system operates safely, please configure an interlock circuit in the scan program for the following situations.

- When exchanging data with computer or other devices.

- When operated by a computer or other devices.

Not doing so could result in output failure or malfunction.

Precautions for design (⚠ Caution)

Do not bundle the input/output signal or communications cables with the main circuit and power cables. They should be installed at least more than 100 mm (3.94inches) apart. Not doing so could result in output failure or malfunction.

Precautions for mounting (⚠ Caution)

Use the PLC in the environment that meets the general specifications given in this manual.

Using this PLC in any environment outside the range of the general specifications could result in electric shock, fire, malfunction, or damage to or deterioration of the product.

Please ensure that each module is installed correctly in its place. Loosely or incorrectly installed pieces may result in malfunction, failure, or free-fall.

Power supply in PLC should be turned off before mounting the module. Not doing so could cause an electric shock or damage to the device.

Install I/O devices or extension connectors correctly. If they are installed incorrectly, it may result in an input or output failure.

Do not convey direct vibration into PLC. Doing so could cause electric shock, fire or malfunctions.

After wiring work, please make sure to close the terminal cover before turning on the power for the PLC system.

Precautions for wiring (⚠ Warning)

Make sure to check the device's rated voltage and circuit arrangement before wiring. Failure to do so may cause electric shock or damage on the device.

Make sure to close the terminal cover before turning on the power of PLC system after wiring work. Failure to do so may cause electric shock.

Precautions for wiring (⚠ Caution)

Make sure to check device's regular voltage and sequence of terminals. Failure to do so may cause fire, electric shock and malfunctions.

Make sure to tighten the screw with standard torque. Loose connections may cause short-circuit, fire or malfunctions.

In grounding the FG ground terminals, be sure to conduct the product at least D type (Class 3) grounding. Not doing so could result in electric shock or malfunctions.

When wiring, make sure that wiring debris do not enter the module. Failure to do so may cause fire, equipment damage or malfunctions.

Precautions for test run and repair (⚠ Warning)

Please do not touch the terminals when the power is ON. Doing so could cause an electric shock or malfunctions.

When cleaning or tightening the screw, turn off the power of PLC and all other systems. Failure to do so could cause an electric shock or malfunctions.

Do not charge, disassemble, heat up, short, or solder the battery. Doing so could cause the battery to heat up, rupture or ignite thereby harming the user.

Precautions for test run and repair (⚠ Caution)

Do not dissociate the PCB from the module's casing or make any modifications to the device. Doing so may cause fire, electric shock or malfunction.

When mounting or separating the module, make sure to turn off power to PLC and all other devices. Failure to do so could cause an electric shock or malfunctions.

Use radio, walkie-talkie or cellphone devices at least 30cm away from the PLC. Not doing so could result in malfunction.

Precautions for Disposal (⚠ Caution)

When the product is disposed of, it should be done so according to your country's regulations for similar types of industrial waste. Not doing so may cause an occurrence of toxic substances or explosion.

GENERAL SPECIFICATIONS

<table>
<tr><th>Items</th><th colspan="4">Specification</th><th>Standards</th></tr>
<tr><td>Ambient Temp.</td><td colspan="4">-10℃~65℃</td><td>-</td></tr>
<tr><td>Storage Temp.</td><td colspan="4">-25℃~80℃</td><td>-</td></tr>
<tr><td>Ambient Humidity</td><td colspan="4">5~95%RH, Non-condensing</td><td>-</td></tr>
<tr><td>Storage Humidity</td><td colspan="4">5~95%RH, Non-condensing</td><td>-</td></tr>
<tr><td rowspan="8">Vibration</td><td colspan="4">For discontinuous vibration</td><td rowspan="8">IEC 61131-2</td></tr>
<tr><td>Frequency</td><td>Acceleration</td><td>Amplitude</td><td>Times</td></tr>
<tr><td>5≤f<9Hz</td><td>-</td><td>1.75mm</td><td rowspan="2">X,Y,Z Each direction, 10times</td></tr>
<tr><td>9≤f≤150Hz</td><td>9.8m/s^2{1G}</td><td>-</td></tr>
<tr><td colspan="4">Continuous vibration</td></tr>
<tr><td>Frequency</td><td>Acceleration</td><td>Amplitude</td><td>Times</td></tr>
<tr><td>5≤f<9Hz</td><td>-</td><td>3.5mm</td><td rowspan="2">X,Y,Z Each direction, 10times</td></tr>
<tr><td>9≤f≤150Hz</td><td>4.9m/s^2{0.5G}</td><td>-</td></tr>
<tr><td>Shocks</td><td colspan="4">• Max. impact acceleration : 147m/s^2{15G}
• Authorized time : 11ms
• Pulse wave : Sign half-wave pulse (3 times each in X,Y,Z)</td><td>IEC 61131-2</td></tr>
<tr><td rowspan="6">Noise</td><td>Square wave impulse noise</td><td colspan="3">± 2,000V</td><td>POWERTRAN standard</td></tr>
<tr><td>Electrostatic discharge</td><td colspan="3">± 4kV (Contact), ± 8kV (Air)</td><td>IEC 61131-2
IEC61000-4-2</td></tr>
<tr><td>Radiated electro-magnetic field</td><td colspan="3">80~1000 MHz,10V/m</td><td>IEC 61131-2
IEC61000-4-3</td></tr>
<tr><td rowspan="4">Fast Transient Burst noise (Voltage)</td><td colspan="2">CPU, Power</td><td>3kV</td><td rowspan="4">IEC 61131-2
IEC61000-4-4</td></tr>
<tr><td colspan="2">Digital/Analog I/O (AC)</td><td>2kV</td></tr>
<tr><td colspan="2">Digital/Analog I/O (DC)</td><td rowspan="2">1kV</td></tr>
<tr><td colspan="2">Communication</td></tr>
<tr><td>Ambient Conditions</td><td colspan="4">No corrosive gas or dust</td></tr>
<tr><td>Altitude</td><td colspan="4">2,000m or less</td></tr>
<tr><td>Pollution</td><td colspan="4">2 or less</td></tr>
<tr><td>Cooling</td><td colspan="4">Natural air cooling</td></tr>
</table>

GENERAL SPECIFICATIONS

Items		Specification	Remar
Power		DC 12 - 24V	-
Program Control Method		Cyclic execution of stored program, Time Driven Interrupt	-
I/O Control Method		Indirect method, Directed by program instruction	-
Program Language		LD(Ladder Diagram), IL(Instruction List), SFC(Sequential Function Chart)	-
Data Processing Method		32bit	-
Instructions	Sequence	55 Instruction	-
	Application	389 Instruction	-
Processing speed (Sequence)		300 ns/Step	-
Program capacity		10K Step	-
Maximum I/O points		DI 8pts / DO 8pts	-
Operation mode		Remote Run, Remote Stop	-
Back-up method		K address by (Latch) parameter	-
Total program		128	-
Program type	Scan	Scan, Subroutine, Cold/Hot Start initialization, Periodic Interrupts	-
	Periodic Interrupts	Maximum 15 scan program (Minimum period :10ms)	-
	Special	PID , HSC, Positioning, IO Input Filter, Special Card init.)	-
	Communication	User Protocol(Serial) Comm. Program, MODBUS/RTU Master	-
	Etc.	SFC, FBD (Function Block Diagram)	-
Self-diagnosis function		Detect delay of scan time, memory, I/O, Power Supply	-
Re-start		Cold, Hot Restart	-
Maximum Expansion		No Expansion	-

Device memory	**X**	8 pts (X00 – X07)	Bit
	Y	8 pts (Y10 – Y17)	Bit
	M	8192 pts (M0000 - M511F)	Bit
	L	4096 pts (L0000 - L255F)	Bit
	K	4096 pts (K0000 - K255F)	Bit
	F	2048 pts (F0000 - F127F)	Bit
	T	512 pts (T0000 – T0511)	Word
	C	512 pts (C0000 – C0511)	Word
	S	100 states x 100 set (00.00 - 99.99)	-
	D	10000 words (D0000 - D9999)	Word
	Z	1024 words (Call Stack : Z0000 - Z0063, Z1000 - Z1063)	Word
	Q	8192 pts (Q0000 – Q511F)	Bit
	R	16 pts (Index)	-
High Speed Counter		20Kpps (In case of 2Ph. 2Multi. Max 10Kpps)	-
Positioning		X axis: Position/Speed control 100Kpps Y axis: Position control 5Kpps, Speed control 100kpps	-
PID		32 Channels, Auto-Tuning	-
Comm. Channel		Standard : USB Loader, Serial 1(RS232C) Optional(SB16MDTV only) : Serial 1Ch(RS485)	-
Etc.		Real number operation, Online edit	-

GENERAL SPECIFICATIONS

▶ Device

- Input : X
- Output : Y
- Sub Relay : M
- Keep Relay : K
- Timer : T
- Counter : C
- Data Device : D
- Sub Data Device : @D
- Link Relay : L
- Step control Relay : S
- Special Relay : F
- Index register : R

▶ Device Address

- Bit Data : [Device] + [Card No.] + [Bit No.]

Device : X, Y, M, K, L, F, Card No.: 10Dec (Decimal). 3 Characters
Bit No.: 16Hex. 1 Character
Ex) X0100-> 10Dec.(word) + 16Hex(Last Bit) : [10th Address and 0th bit]

- Word Data : [Device] + [Card No.]

Device : D, Z, T, C, Card No.: 10Dec. 4 Characters
Ex) D0100-> 10Dec.(word) : [100th word Address]

- Timer, Counter Output : [Device] + [Bit No.]

Device : T. C, Bit No.: 10Dec 4 Characters
Ex) T0100-> 10Dec.(word) : [T 100th Bit Address]

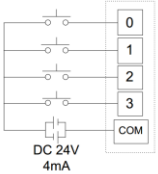
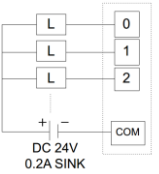
- Step Controller I/O : [Device] + [Card No.] + [.] + [Step No.]

Device : S
Card No.: 10Dec. 2 Charaters, Step No.: 10Dec. 2Characters
Ex) Sxx.xx -> xx is 10Dec. (0~99)

- Assign Bit Device to Word : [Device] + [Card No.] + [0]

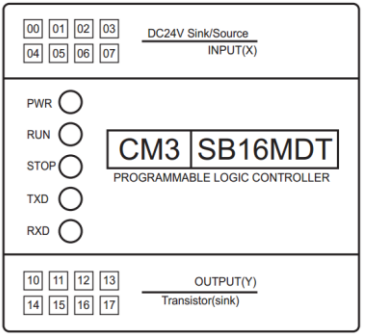
Device : X, Y, M, K, L, F, Card No.: 10Dec. 3 Characters
Ex) X010-> 10Dec. (word), : [X 10th Address]

I/O SPECIFICATION

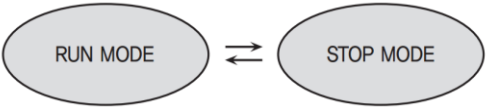
Item	DC Input	TR Output
Rated I/O Voltage	DC 24V DC 12/24V (High Speed Counter)	DC 12/24V
Rated I/O Current	4mA	1point 0.2A, COM 2A
On V/A	DC 9V (Ch : 1~4) / 3mA, DC 14V (Ch : 5~8) / 3mA	-
Off V/A	DC 7V (Ch : 1~4) / 1mA, DC 12V (Ch : 5~8) / 1mA	-
Response time	3ms or less	1ms or less
Operation indicator	Input ON, LED ON	Input ON, LED ON
Insulation method	Photo coupler insulation	Photo coupler insulation
Input method	SINK/SRC	-
Output method	-	SINK
Method		

NAMES OF PART AND MODE CHANGE

▶ **Names of Parts**



▶ **Mode change**



- Operation mode is changed by mode switch.
- The mode can be changed through POWERTRAN but when power reset, RUN/STOP mode is decided through switch position.

CPU MODULE FEATURES

▶ **Built-in Function**

- **PID Control**

  It operates 32 LOOP PID without PID module.

- **I/O reservation**

  It scans module at designated slot.

  It refers to reservation function which writes a program without I/O change in case of expansion, damage or replacement.

- **Online Edit**

  Program can be edited while Run mode.

▶ **Features**

- **20Kpps High Speed Counter (2 Channel) Built-in**

  2PH. 2 / 4 Multi. (2PH. 2Multi – 10Kpps) Input mode possible, Voltage input type (Open collector)

- **100kpps 2axis Pulse Output built-in. (Positioning)**

  Pulse + Direction Output, Position/Speed/Speed-Position, Position-Speed Control.

- **Max. 3communications can be work simultaneously. (USB, RS232, RS485)**

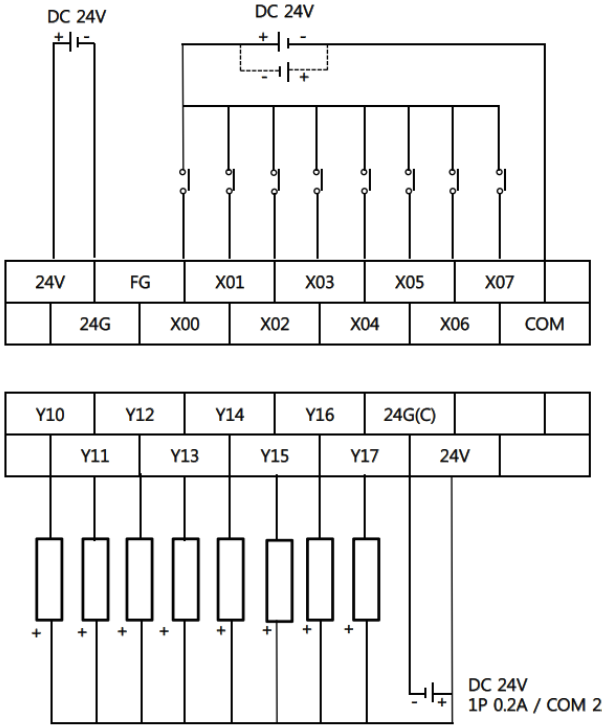
  POWERTRAN HMI, MODBUS RTU/TCP, PLC Link, Protocol program(User protocol), Loader
  protocol, Remote access & up/down load supported.
  (Only SB16MDTV support RS485.)

- **Memory (10K Step)**

- **Data reserved in case of power cut**

  Built-in Flash memory enabling permanent backup of program without any separate battery.

CPU I/O PIN MAP

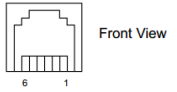


BUILT-IN COMM. SPECIFICATION

Items		RS232C	RS485
Comm. Protocol	POWERTAN HMI Protocol	POWERTRAN HMI Protocol	
	POWERTRAN Protocol	O	O
	User Protocol	O	O
	MODBUS/RTU	Master/Slave	Master/Slave
Types	Data Bit	8 Bit	
	Stop Bit	1 or 2 Bit	
	Parity	Even / Odd / None	
Synchronization		Asynchronous	
Transmission speed		1200 ~ 38400	

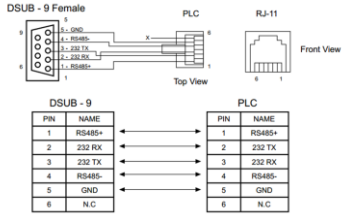
COMMUNICATION INTERFACE

▶ **Serial Port PIN Map**

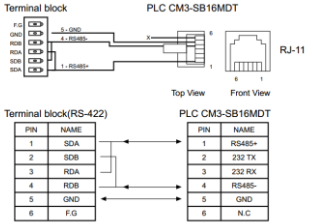


	RS232C		RS485	
	PIN	**NAME**	**PIN**	**NAME**
	1	-	1	RS485 TX
	2	RS232 TX	2	-
	3	RS232 RX	3	-
	4	-	4	RS485 RX
	5	GND	5	GND
	6	-	6	-

▶ **RS-232/RS-485 wiring example**



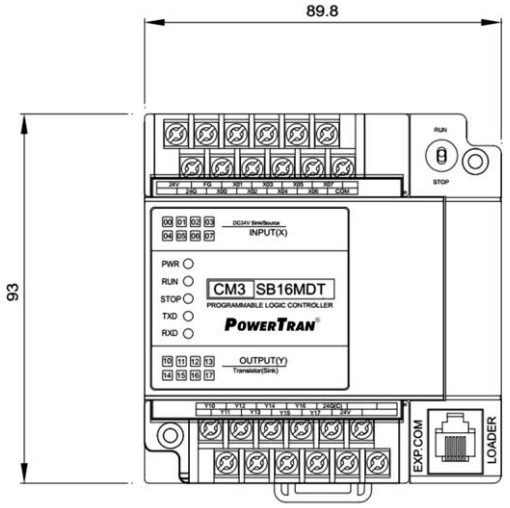
▶ **RS-422 wiring example**

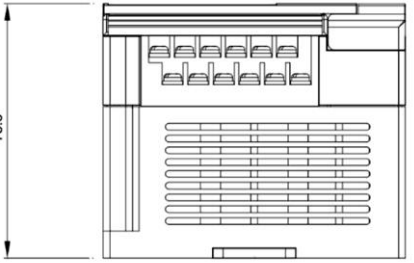


* Only SB16MDTV support RS-485.

DIMENSION

(Unit: mm)





MEMO

MEMO

MEMO

PRODUCT WARRANTY

JKFIL Industrial automation products including hardware, software, and firmware (collectively called "Products") carry a **one-year warranty** against defects in materials and workmanship beginning from the date of product receipt from seller or its appointed distributor. If a product proves defective in materials and workmanship within one year from the date of purchase, we will replace or repair it. JKFIL makes no representation or warranty, express or implied, that the operation of the Products will be uninterrupted or error free, or that the functions contained therein will meet or satisfy buyer's intended use or requirements.

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This warranty will be void if Products date codes or serial numbers are removed or defaced. Warranties do not apply to products that have been subjected to abnormal use, abnormal conditions, improper storage, exposure to moisture or dampness, unauthorized modifications, unauthorized repair, misuse, neglect, accident, alteration, improper installation or other acts which are not the fault of JKFIL, including damage caused in shipping. Our warranty also does not apply to any product that has been damaged by external causes such as fire, flood, sand, dirt, lightning, acts of God, battery leakage, theft, blown fuses, improper use of any electrical source or connection to product not recommended in writing for interconnection by JKFIL.

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PRODUCT WARRANTY

To minimize the risk of potential safety problems, you should follow all applicable local and national codes that regulate the installation and operation of your equipment. These codes vary from area to area and usually change with time. It is your responsibility to determine which codes should be followed, and to verify that the equipment, installation and operation is in compliance with the latest revision of these codes.

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THE COURT AT CHENNAI SHALL HAVE EXCLUSIVE JURISDICTION.

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