

LG Programmable Logic Controller

# MASTER-K10S1



## Installation Environment

1. Please avoid installing the PLC at following locations where;
  - temperature may experience ambient drops or rising.  
(It should stay within 0 to 55 (32 ~ 131 ))
  - condensation may occur due to abrupt temperature changes.
  - vibration and shock are directly transmitted to the PLC.
  - the PLC is exposed to the direct rays of the sun.
  - the PLC is exposed to corrosive or inflammable gas.
  - the PLC is exposed to conductive powder.
2. Please install the PLC at least 50mm away from a duct or other devices.
3. Be sure to install the PLC in the cabinet which comply with IP54 or higher.
4. Be sure to place the PLC in the manufacturer's original packing while shipping or storing.

## Warranty

- LGIS provides an 18 months warranty from the date of production.
- For troubles within the warranty period, LGIS will replace the entire PLC or repair the troubled parts free of charge except the following cases;
  - the troubles caused by improper treatment or operation.
  - the troubles caused by external devices.
  - the troubles caused by remodeling or repairing based on user's own discretion.
  - the troubles caused by natural disaster.
- This warranty is limited to the PLC itself only. It is not valid for the whole system which the PLC is attached.

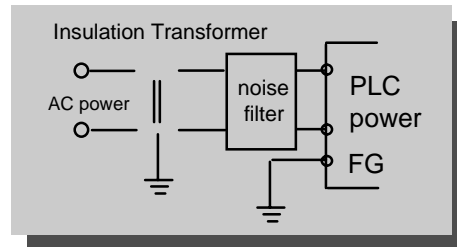


## Characteristics

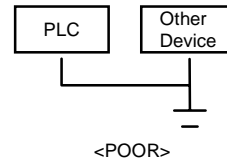
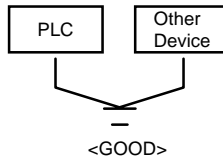
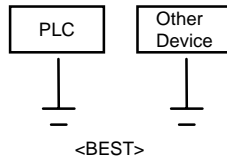
- The user program is stored in a EEPROM, and no battery back-up is required.
- Data communication through RS232C and RS485 is available.
- K10S1 includes a high speed counter being applicable for a simple positioning system.
- K10S1 series are suitable for the control of small machinery having I/O points less than 14 .

## Power Supplying to the PLC

- To prevent the PLC from an improper operation caused by the external noise, place a insulation transformer and/or a noise filter as shown in the right figure.
- Always install AC power cable and signal or data lines in separate ducts or bunches.



- The fuse in the DC power supply may be blown when the DC power is supplied in reverse polarity.
- Be careful to connect power source cable to the correct terminal. Internal device of PLC may be damaged by the improper lead connections.
- Supplying power beyond rated voltage/frequency may damage internal devices.
- Grounding



### Caution

When you supply power to external DC24V devices from the power unit of K10S1, be careful not to exceed the maximum capacity of power unit.

( of inputs simultaneously ON X 7mA)  
 + ( of outputs simultaneously ON X 8mA)  
 + ( current consumption of external DC24V devices)



The maximum  
capacity of power  
supply

Note) The maximum capacity  
of power supply  
K10S1 : 100mA

## Specifications

### • General Specifications

|  |                                       |
|--|---------------------------------------|
| Power Supplies (47 ~ 63Hz) & Consumption | K10S1 : 100~240VAC(Free Voltage) 7.4W |
| Dropout Tolerance                        | 1/2 Cycle                             |
| DC Supply Output                         | 0.1A                                  |
| Withstanding Voltage                     | DC 500V 10M                           |
| Grounding                                | Grounding resistance 100              |
| Noise Immunity                           | 2000V, 1 $\mu$ s (Noise Simulator)    |
| Vibration                                | KSC0903                               |
| Shock                                    | KSC0905                               |
| Operation Temperature                    | 0 ~ 55 ( 32 ~ 131 )                   |
| Storage Temperature                      | -25 ~ 75 ( -13 ~ 158 )                |
| Humidity                                 | 5 ~ 95% RH (Non-condensing), RH-2     |
| Atmosphere                               | Free from corrosive gas               |
| ESD Severity Level                       | Level ESD-3                           |
| Altitude                                 | under 2000m                           |

### • Functional Specifications

|                        |   |
|------------------------|---|
| Program control method | Cyclic execution of stored program  |
| I/O Processing Method  | Updated after each scan   |
| No. of instructions    | 30 Basic instructions & 154 application instructions  |
| Execution time         | 3.2~7.6 $\mu$ s / step  |
| Program capacity       | 800 steps   |
| Memory device type     | EEPROM (8kbyte)   |
| Memory device range    | P : I/O relay / P000 ~ P007 (8points for input)<br>P010 ~ P015 (6points for output)<br>M : Auxiliary relay / M000 ~ M15F (256points)<br>K : Keep relay / K000 ~ K07F (128points)<br>L : Link relay / L000 ~ L07F (128points)<br>F : Special relay / F000 ~ F15F (256points)<br>T : 100ms timer / T000 ~ T031 (32points)<br>10ms timer / T032 ~ T047 (16points)<br>C : Counter / C000 ~ C015 (16points)<br>D : Word(16bit) data register<br>D000 ~ D063 (64word)<br>S : Step controller / S00.00~S15.99(16X100steps) |
| Counter                | Up-counter, Down-counter, Up/down-counter<br>Ring Counter (preset range : 0 ~65535)   |
| Timer                  | On delay-timer, Off delay-timer, Integrating timer,<br>Monostable timer, Retriggerable timer<br>(preset range : 0 ~ 65535)  |
| High speed counter     | 1point, 8kpps, DC24V, Duty : 20 ~ 80%   |
| Other functions        | RS232C, RS485 communication   |

## • I/O Specification

### K10S1

| Item                      | I/O  | Input                             | Output               |
|---------------------------|------|-----------------------------------|----------------------|
|                           | Type | DC                                | Relay                |
| Rated Voltage             |      | DC24V                             | DC24V / AC110 ~ 220V |
| On : Operating Voltage    |      | DC19V                             | -                    |
| Off : Operating Voltage   |      | DC6V                              | -                    |
| Input Current             |      | 7± 2mA / point                    | -                    |
| Max. Output Current       |      | -                                 | 1A / point, 3A / COM |
| On State Voltage Drop     |      | -                                 | 3V                   |
| Off State Leakage Current |      | -                                 | 0.1mA                |
| Off On Response Time      |      | 5ms                               | 10ms                 |
| On Off Response Time      |      | 7ms                               | 10ms                 |
| I/O Status Indicator      |      | LED (Input : Green, Output : Red) |                      |
| Withstand Voltage         |      | AC1500V, 1 minute                 |                      |
| Noise Immunity            |      | 2000Vpp, 1μs (Noise Simulator)    |                      |
| Insulation Device         |      | Photo Coupler                     |                      |

### Note)

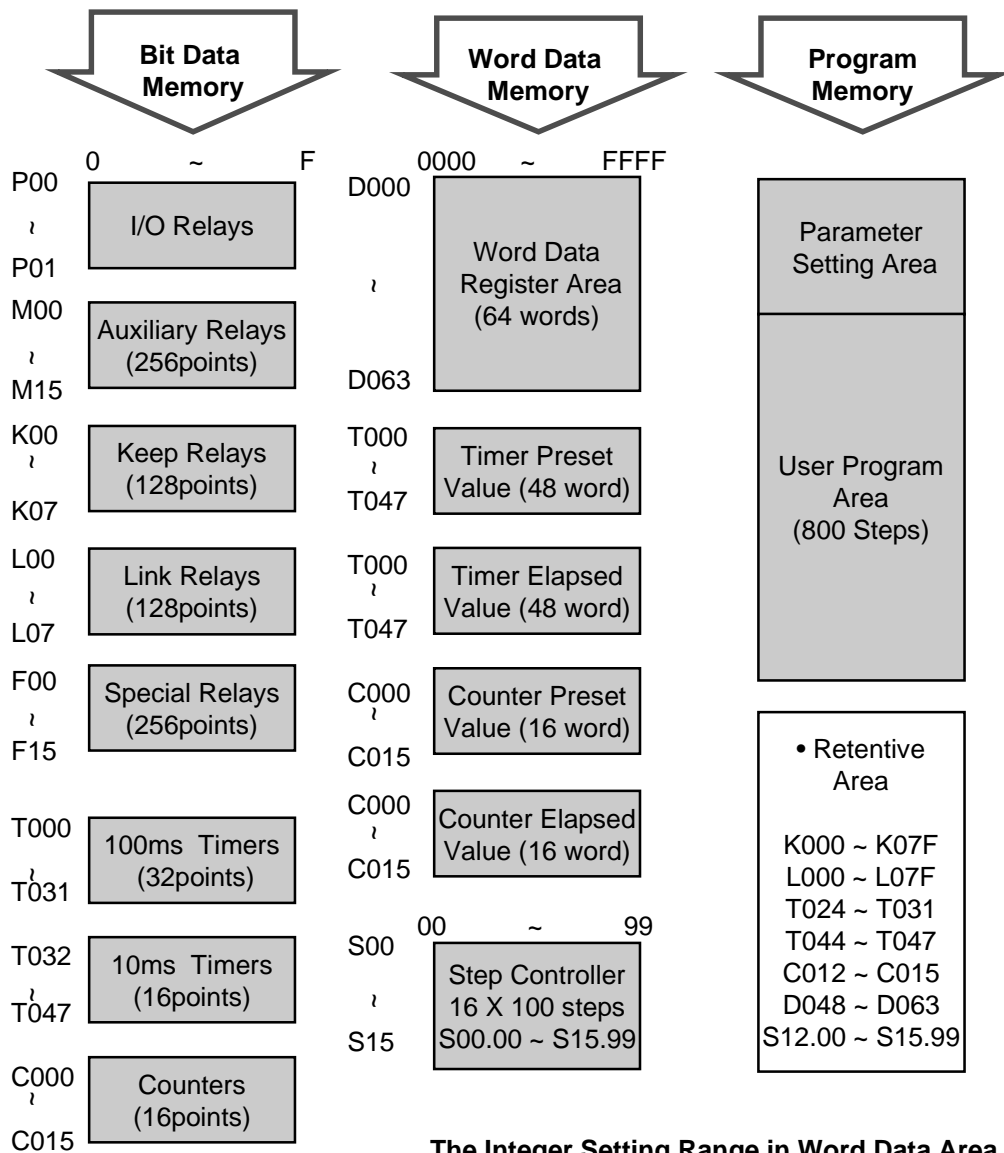
- The expected life span of relay

The relay used in MASTER-K10S1 is FUJI's RB1-E, and those manufacturer guarantee 10million times (mechanical) and 0.1 ~ 3million times (electrical) operation for their relays..

The durability of relay depends on the type of external load. Therefore, we highly recommend customers to connect an external relay or SSR between PLC and large inductive load for improved reliability and maintenance of PLC. The capacity of external relay or SSR should be at least twice larger than the capacity of the load.

- All outputs will be turned off when interruptions of CPU control, voltage drops / interruptions, and/or power up/down occur.
- Improper terminal connection or overloads on I/O may cause a damage on the internal devices.

## Memory Map



### The Integer Setting Range in Word Data Area

0 ~ 65535 (Decimal) or 0 ~ hFFFF(Hex)

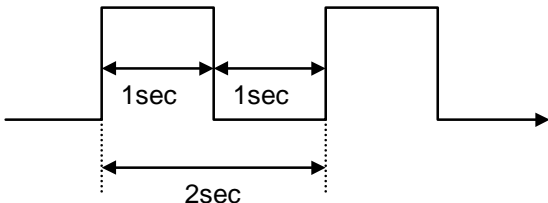
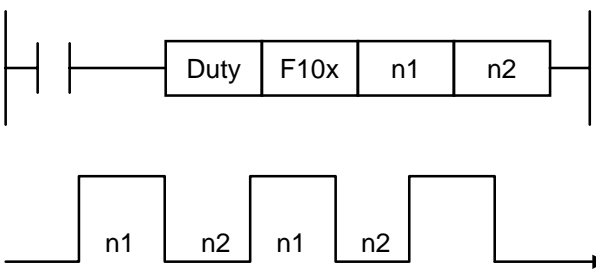
For Double Word Instruction,

0 ~ 4294967295 or 0 ~ hFFFFFFFF

## Special Function Relay : F area

F relay is used as only input operand.

| Relay          | Name                            | Description  |
|----------------|---------------------------------|--|
| F000           | RUN flag                        | Set when the PLC is on RUN mode.   |
| F001           | PGM flag                        | Set when the PLC is on PGM(program) mode.  |
| F002           | PAU flag                        | Set when the PLC is on PAU (pause) mode.   |
| F010           | Always on                       | Use as a dummy relay or initialization in user programs  |
| F011           | Always off                      |  |
| F012           | 1 scan on                       | On during the first scan after PGM → RUN mode  |
| F013           | 1 scan off                      | Off during the first scan after PGM → RUN mode   |
| F014           | Turnover per each scan          | Repeat set / reset according to each scan during PLC is RUN mode.  |
| F020<br>~ F02F | Communication error information | <ul style="list-style-type: none"> <li>•Related to SEND, RECV instructions only</li> <li>•Upper byte : The station No. where error occurred</li> <li>•Lower byte : error code</li> <li>•The error code of time out error : h20</li> <li>•No error : h0000</li> </ul> |
| F030           | Serious error                   | Set in case of internal ROM error, 24V fail error.   |
| F031           | Light error                     | Set in case of WDT error, program error, I/O combination error, missing END/RET error.   |
| F050<br>~ F05F | Error code                      | <ul style="list-style-type: none"> <li>• h0000 : No error</li> <li>• h0014 : I/O error</li> <li>• h0021 : Parameter error</li> <li>• h0025 : Missing RET error</li> <li>• h0023 : Code error</li> <li>• h0024 : Missing END error</li> </ul>                         |

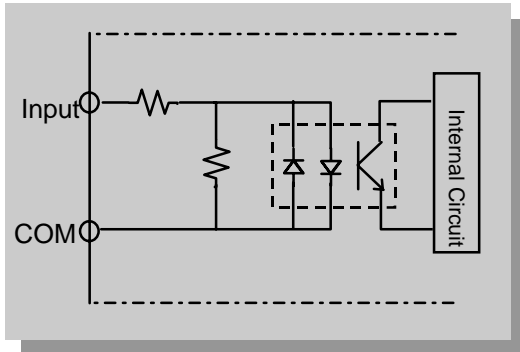
| Relay          | Name  | Description   |
|----------------|---|---|
| F060<br>~ F06F | The step No. where error occurred                           | <ul style="list-style-type: none"> <li>The step No. where program error occurred in stored.</li> <li>In case of branch instruction error, the destination step No. is stored.</li> </ul>  |
| F070<br>~ F077 | High speed counter output register                          | <ul style="list-style-type: none"> <li>HSCNT instruction : F070 ~ F077</li> <li>HSC instruction : use only F070 bit</li> </ul>  |
| F080<br>~ F08F | PLC model   | <ul style="list-style-type: none"> <li>K10S &amp; K10S1 : h0031      • K60S : h0036</li> <li>K30S : h0033                • K100S : h0035</li> </ul>   |
| F090           | 20ms clock  | <p>There relays repeat On/Off with fixed time interval, and are operated only when the PLC is in RUN mode.</p> <p>Example) F094 : 2sec clock</p>  |
| F091           | 100ms clock   |   |
| F092           | 200ms clock   |   |
| F093           | 1sec clock  |   |
| F094           | 2sec clock  |   |
| F095           | 10sec clock   |   |
| F096           | 20sec clock   |   |
| F097           | 1 minute clock  |   |
| F100<br>~ F103 | User defined clock<br>F100 : Clock 0<br>~<br>F103 : Clock 3 | <p>These relays repeat On/Off based on a scan time. (Initial state = Off)</p>   |

| Relay          | Name                                | Description  |
|----------------|-------------------------------------|--|
| F110           | Arithmetic error flag               | Set when an arithmetic error occurred during operation   |
| F111           | Zero flag                           | Set when the result value is zero  |
| F112           | Carry flag                          | Set when carry / borrow occurs as a result of operation  |
| F11A           | On sending flag                     | These flags indicate the communication status when DIN / DOUT instructions are used.   |
| F11C           | On receiving flag                   |  |
| F11E           | Receive completion flag             |  |
| F11F           | Communication error flag            | <ul style="list-style-type: none"> <li>• DIN, DOUT: Set when time-out error occurred.</li> <li>• SEND, RECV : Set when time-out error occurs or NAK message is detected.</li> </ul>            |
| F120           | <                                   | These relays are set according to the result of compare instructions. (CMP, CMPP, DCMP, DCMPP)   |
| F121           |                                     |  |
| F122           | =                                   |  |
| F123           | >                                   |  |
| F124           |                                     |  |
| F125           |                                     |  |
| F130<br>~ F135 | AC power fail                       | The numbers of AC power fail occurred during RUN mode  |
| F140<br>~ F14F | Elapsed value of High speed counter | <ul style="list-style-type: none"> <li>• HSCNT : The elapsed value of high speed counter is stored.</li> <li>• HSC : The low word of elapsed value of high speed counter is stored.</li> </ul> |
| F150<br>~ F15F | Preset value of High speed counter  | <ul style="list-style-type: none"> <li>• HSCNT : The preset value of high speed counter is stored.</li> <li>• HSC : The high word of elapsed value of high speed counter is stored.</li> </ul> |

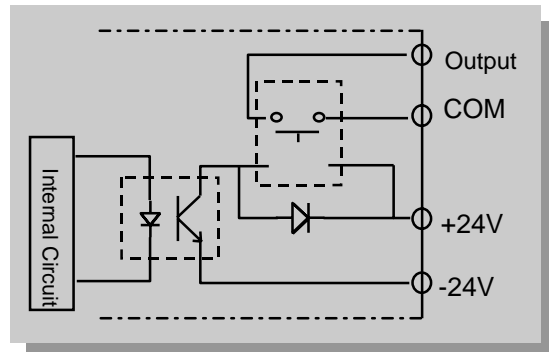


## I/O Circuit

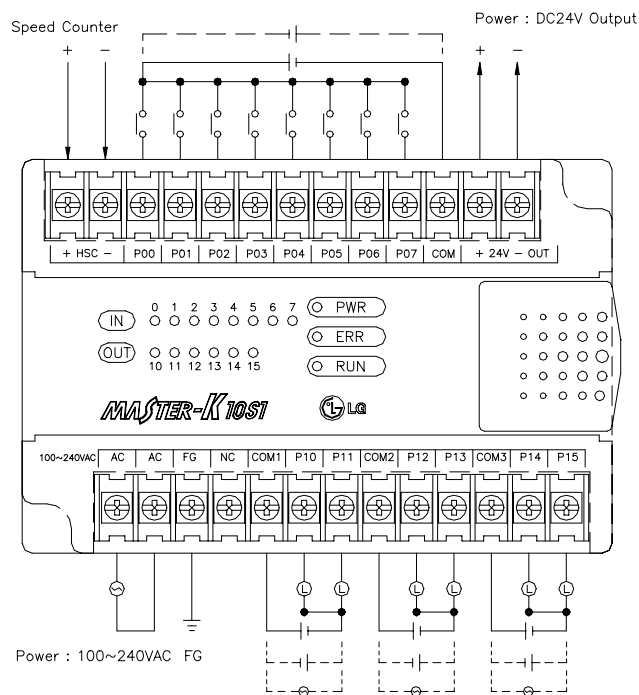
### DC 24V Input



### Relay Output



## External Connection

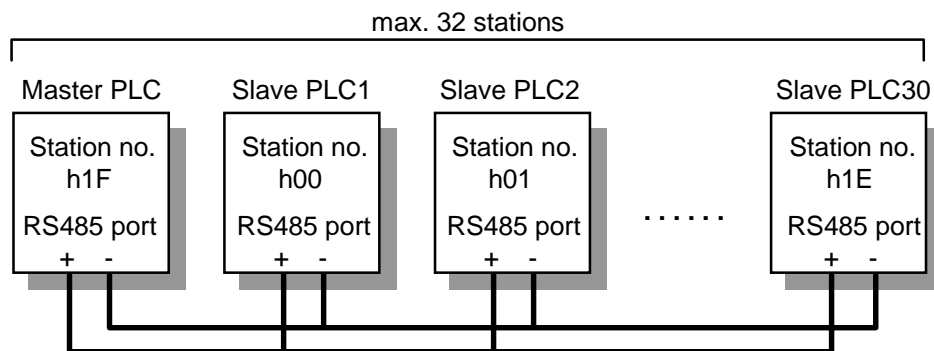


## RS485 COMMUNICATION

### • General Specification

|   |  |
|---|--|
| Instruction for RS485                     | SEND / RECV<br>Above instruction is used in sequence program of only master PLC being designated as station no. h1F.   |
| Communication Method                      | Asynchronous half duplex   |
| Max. Linkable station number              | 32 stations(including self station)  |
| Transmission speed                        | 300 ~ 19200bps(selectable)   |
| Transmission distance                     | Max. 1km(no repeater)  |
| Preset of waiting time for Time Out Error | Preset address = D060<br>Preset value(x 10ms) = 0 ~ 255 (0ms ~ 2550ms)<br>(Default preset value = 0(500ms),<br>if preset value is equal or more than 255, waiting time is 2550ms.) |

### • Network System



- **Instruction**

**SEND [FUN(159)]** : Transmission data from master to slave

**RCV [FUN(158)]** : Receiving data from slave to master

**Instruction Form** :

|  |                     |
|--|---------------------|
|  | [ SEND St S1 D1 n ] |
|  | [ RECV St D2 S2 n ] |

St : Station number of slave PLC to communicate.(This of master PLC is always h1F.)

S1 : Beginning address of word memory device of master PLC in which data to be transmitted to slave is stored.

D1 : Beginning address of word memory device of slave PLC in which data to be received from master will be stored.

S2 : Beginning address of word memory device of slave PLC in which data to be transmitted to master is stored.

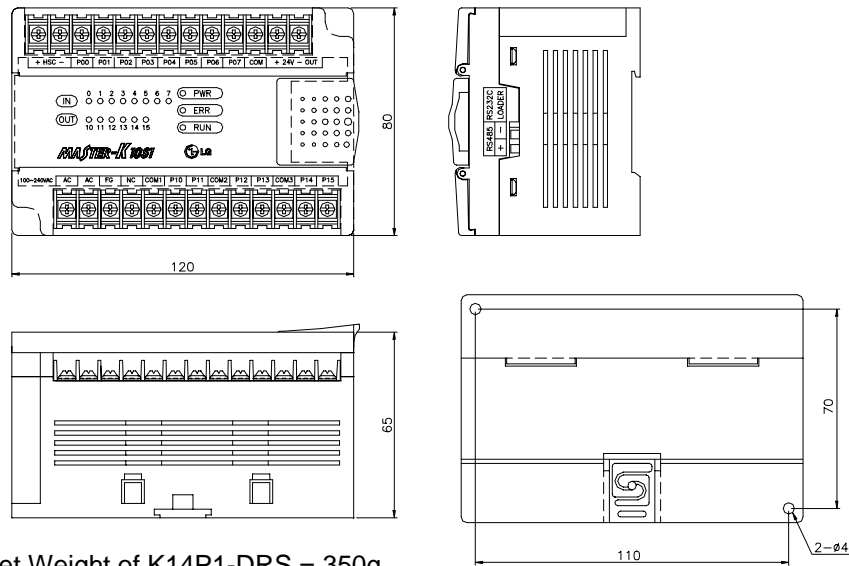
D2 : Beginning address of word memory device of master PLC in which data to be received from slave will be stored.

n : The number of word data to be transmitted or received.(Hex. or Decimal)

### Note

When the transmitted data from master PLC is stored to P area of slave directly, the output data of P area of slave PLC may clear during operation mode of slave PLC changing (PROGRAM mode → RUN mode) according to PLC operation system. The range of address (D1, S2) of word memory device for slave PLC in the SEND/RCV can not be exceed that of master PLC.

## Dimension and Weight



- Net Weight of K14P1-DRS = 350g

## Other Technical Materials

- MASTER-K Programming Manual
- Graphic Loader (GSIKGL) User's Manual
- Handy Loader (KLD-150S) User's Manual
- MASTER-K / PMU Communication Technical Materials

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