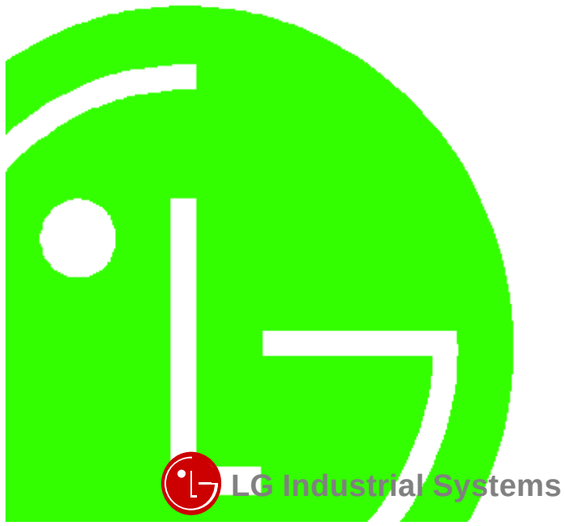
DATA SHEET

LG Programmable Logic Controller
Positioning Module

MASTER-K K3F-POPA K4F-POPB



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Before handling the product

Read this data sheet carefully prior to any operation, mounting, installation or start-up of the product.

Materials for MASTER-K

Name	Code
MASTER-K KGL-WIN (Programming Software)	702005036
MASTER-K (Instructions & programming)	702006539
MASTER-K CPU User' s Manual	702006391
MASTER-K Position Control(pulse type) Manual	

Name	Code
MASTER-K K3F-POPA / K4F-POPB Data Sheet	

❑ Safety Precautions

Be sure to read carefully the safety precautions given in data sheet and user' s manual before operating the module and follow them.

The precautions explained here only apply to the K3F-POPA/K4F-POPB.

For safety precautions on the PLC system, see the MASTER-K CPU User' s manual.

A precaution is given with a hazard alert triangular symbol to call your attention, and precautions are represented as follows according to the degree of hazard.

⚠WARNING If not provided with proper prevention, it can cause death, fatal injury or considerable loss of property.

⚠CAUTION If not properly observed, it can cause a hazard situation to result in severe or slight injury or a loss of property.

However, a precaution followed with **⚠CAUTION** can also result in serious conditions.

Both of two symbols indicate that an important content is mentioned, therefore, be sure to observe it.

Keep this manual handy for your quick reference in necessary.

❑ Design Precautions

⚠WARNING

▶To prevent over run, set stroke upper / lower limits in parameter, and attach . mechanical upper / lower limit switches.

⚠CAUTION

▶Do not run I/O signal lines near to high voltage line or power line. Separate them as 100 mm or more as possible. Otherwise, noise can cause module malfunction.

❑ Installation Precautions

⚠CAUTION

▶Operate the PLC in the environment conditions given in the general specifications.

▶If operated in other environment not specified in the general specifications, it can cause an electric shock, a fire, malfunction or damage or degradation of the module.

▶Make sure the module fixing pro-jections is inserted into the module fixing hole and fixed.

▶Improper installation of the module can cause malfunction, disorder or falling.

❑ Wiring Precautions

⚠CAUTION

▶When grounding a FG terminal, be sure to provide class 3 grounding which is dedicated to the PLC.

▶Before the PLC wiring, be sure to check the rated voltage and terminal arrangement for the module and observe them correctly.

If a different power, not of the rated voltage, is applied or wrong wiring is provided, it can cause a fire or disorder of the nodule.

▶Drive the terminal screws firmly to the defined torque. If loosely driven, it can cause short circuit, a fire or malfunction.

▶Be careful that any foreign matter like wire scraps should not enter into the module. It can cause a fire, disorder or malfunction.

❑ Test RUN and Maintenance Precautions

⚠WARNING

▶Do not contact the terminals while the power is on. It can cause malfunction.

▶When cleaning or driving a terminal screw, perform them after the power has been turned off.

▶Do not perform works while the power is applied, which can cause disorder or malfunction.

⚠CAUTION

▶Do not separate the module from the printed circuit board(PCB), or do not remodel the module.

They can cause disorder, malfunction, damage of the module or a fire.

When mounting or dismounting the module, perform them after the power has been turned off.

▶Do not perform works while the power is applied, which can cause disorder or malfunction.

❑ Waste Disposal Precautions

⚠CAUTION

▶When disposing the module, do it as an industrial waste.

1. Introduction

Positioning module, a special function module, positions a moving object (such as processed goods and tools) exactly at the place indicated by the current position, by moving the object at the setting speed.

K3F-POPA and K4F-POPB modules are linked to various servo controlling driver systems or a stepping motor controlling driver system to provide high accuracy position control with output voltage signal for positioning.

If altered for other applications, they can be widely used for a machine tool, a semi-conductor assembler, small sized machining center and a lifter.

2. General Specifications

Item	Specifications					Standard
Operating temperature	0 ~ 55℃					
Storage temperature	-25 ~ 70℃					
Operating Humidity	5 ~ 95%RH, non-condensing					
Storage humidity	5 ~ 95%RH, non-condensing					
Vibration	Occasional vibration					IEC 1131-2
	Frequency	Acceleration	Amplitude	Sweep count		
	10≤f∠57 Hz	-	0.075 mm	10 times in each direction for X, Y, Z		
	57 ≤f≤150 Hz	9.8㎨ {1G}	-			
	Continuos vibration					
	Frequency	Acceleration	Amplitude			
	10≤f∠57 Hz	-	0.035 mm			
	57≤f≤150 Hz	4.9㎨{0.5G}	-			
Shocks	*Maximum shock acceleration: 147㎨ {15G} *Duration time :11 ms *Pulse wave: half sine wave pulse(3 times in each of X, Y and Z directions)					IEC 1131-2
Noise immunity	Square wave impulse noise	±1,500 V				
	Electrostatic discharge	Voltage :4kV(contact discharge)				IEC 1131-2 IEC 801-2
	Radiated electromagnetic field	27 ~ 500 MHz, 10 V/m				IEC 1131-2 IEC 801-3
	Fast transient burst noise	Severity Level	All power modules	Digital I/Os (Ue ≥ 24 V)	Digital I/Os (Ue < 24 V) Analog I/Os communication I/Os	IEC 1131-2 IEC 801-4
		Voltage	2 kV	1 kV	0.25 kV	
Atmosphere	Free from corrosive gases and excessive dust					
Altitude for use	Up to 2,000m					
Pollution degree	2 or lower					
Cooling method	Self-cooling					

3. Performance Specifications

Item		Specifications	
		K3F-POPA	K4F-POPB
Number of I/O points		64	
Output type		Pulse output (A/B type)	
Number of control axis		Two (simultaneous or independent)	
Interpolation		Linear interpolations	
Positioning data	Capacity	300 points per axis	
	Setting method	Input from S/W package	
Positioning	Method	Absolute/incremental method can be selected for each axis	
	Positioning address	- 16,744,447 to + 16,744,447	
	Speed	10 to 200,000 (pulse/sec), 128 data per x and y axes (Index data), maximum 200Kpps	
	Acceleration /deceleration	Operation pattern : Trapezoidal	
	Backlash compensation	0 to 999 pulses	
	Zero point compensation	±999 pulses	
	Operation method	Single positioning	
		Repetitive positioning	
		Automatic positioning	
		Continuous positioning	
		Constant access positioning	
		Constant access positioning with the determined positions	
Homing		Homing differs by toggles of the zero point L/S. There exist 3 methods by toggles the upper/lower limit or zero point L/S	
M code function		256 data (After/With mode)	
Zone setting function		3 zones can be set.	
Manual Pulse Generator(MPG)		Not allowed	Allowed
Speed/Position Teaching		ROM/RAM Teaching	ROM Teaching
Connection connector		37pin	34pin
M code mode		With, After, None	
Speed Overide		Setting unit : 1 ~ 99(unit:pulse)	
Manual operation function		Jog operation, Manual pulse operation, Inching and Teaching.	
Floating zero point set function		Setting the zero point by S/W at the point that the user wants to set.	
Present value Preset		This function changes the present position to an arbitrary position.	
Weight / Current consumption		137g / 5VDC 0.28A	296g / 5VDC 0.35A

4. External Interface I/O Specifications

Signal Name	Rated input Voltage/Current	Input Voltage Range	On Voltage	Off Voltage	Input Resistance	Response Time
Origin L/S	24VDC/10㎃	20.4 26.4VDC	Min 16VDC	Max DC4V	2.2kΩ	Max 1.8ms
Upper L/S	24VDC/10㎃	20.4 26.4VDC	Min 16VDC	Max DC4V	2.2kΩ	Max 1.8ms
Lower L/S	24VDC/10㎃	20.4 26.4VDC	Min 16VDC	Max DC4V	2.2kΩ	Max 1.8ms
EMG	24VDC/10㎃	20.4 26.4VDC	Min 16VDC	Max DC4V	2.2kΩ	Max 1.8ms
Origin	24VDC/10㎃	20.4 26.4VDC	Min 16VDC	Max DC4V	2.2kΩ	On:Max 0.1ms
MPG	5VDC	4.25 5.5VDC	Min 4VDC	Max 1VDC	430Ω	Pulse width : Min 1ms
	12VDC	10.8 13.2VDC	Min 8VDC	Max 2VDC	430Ω	
VTP	24VDC/10㎃	20.4 26.4VDC	16VDC	Max 4VDC	2.2kΩ	On:Max 1.8ms

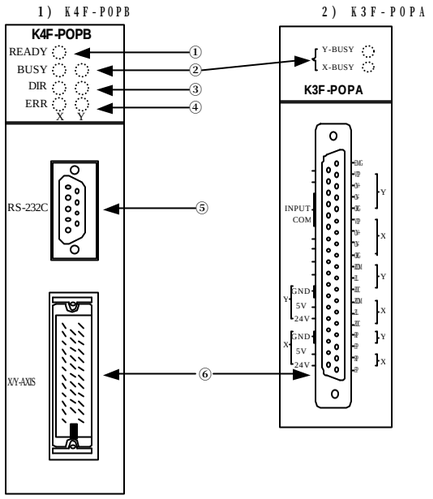
Signal Name	Rated load voltage	Load voltage range	Load current	On Voltage drop
Pulse output	5VDC	4.75 5.25VDC	Max 70㎃	Max 0.3VDC
	24VDC	20.4 26.4VDC	Max 70㎃	Max 0.3VDC

5. External Connection

I/O	Internal Circuit	Pin No. K4F-POPB	Pin No. K3F-POPA	Signal Name	
PULSE OUTPUT	*2 *2	2 (13,14)	20	X_24V	X-axis external incoming power supp - ly of pulse output (DC 24V)
		24 (13,14)	21	X_5V	X-axis external incoming power supp - ly of pulse output (DC 5V)
		26	1	X_FP	X-axis forward direction pulse output
		4	2	X_RP	X-axis reverse direction pulse output
		1 23	22 23	X_GND	X-axis ground of pulse output
	*2 *2	2 (13,14)	24	Y_24V	Y-axis external incoming power supp - ly of pulse output (DC 24V)
		24 (13,14)	25	Y_5V	Y-axis external incoming power supp - ly of pulse output (DC 5V)
		25	3	Y_FP	Y-axis forward direction pulse output
		3	4	Y_RP	Y-axis reverse direction pulse output
		1 23	26 27	Y_GND	Y-axis ground of pulse output
ORIGIN INPUT		18	5	X_ZOC	X-axis Open Collector input of Z phase(DC 24V)
		28	6	X_ZL	X-axis Line Driver input of Z phase (DC 5V)
		6	7	X_ZCOM	X-axis Z phase input ground
		17	8	Y_ZOC	Y-axis Open Collector input of Z phase(DC 24V)
		27	9	Y_ZL	Y-axis Line Driver input of Z phase (DC 5V)
		5	10	Y_ZCOM	Y-axis Z phase input ground
X INPUT		21	12	X_OV-	External lower limit switch input (N.C)
		10	13	X_OV+	External upper limit switch input (N.C)
		22	11	X_ORG	Origin limit switch input(N.O)
		-	14	X_VTP	Speed position conversion input(N.O)
		11 14	32,33 34,35	INPUT COM	Input signal Common
Y INPUT		20	16	Y_OV-	External lower limit switch input (N.C)
		9	17	Y_OV+	External upper limit switch input (N.C)
		31	15	Y_ORG	Origin limit switch input(N.O)
		-	18	Y_VTP	Speed position conversion input(N.O)
		11 33	32,33 34,35	INPUT COM	Input signal Common
EMG		32	19	EMG	Emergency stop signal input : X / Y axis (N.C)
		11 33	32,33 34,35	INPUT COM	Input signal Common
MPG		30	-	MPG_A	MPG A Phase
		8		MPG_AGND	MPG A Phase Common
		29		MPG_B	MPG B Phase
		7		MPG_BGND	MPG B Phase Common

*2 : K4F-POPB 의 외부공급전원 (13,14)는 외부전원 5/24V Common 임.

6. Part Name



No.	Descriptions
①	Ready signal Ready signal of positioning module
②	Busy signal Turn On if each axis Busy signal turn on ▶K3F-POPA : Flicker if error appear 1) 0.5sec interval flicker: Middle warnning of pulse no output 2) 1.0sec interval flicker: Low warnning of pulse output
③	DIR signal ▶Turn On : Forward direction pulse output ▶Turn Off : Reverse dirction pulse output
④	ERR signal ▶K4F-POPB: Turn On if error appear
⑤	RS-232C Connection Connector ▶Connector connect with software package ▶K3F-POPA is connected with communication port of CPU Module (here, CPU Module is to be STOP status)
⑥	External interface connector Connector connect with Drive Device

6. INSTALLATION

The following explains the installation precautions are wiring for system reliability.

6.1 Installation precautions

1) Make sure that the module be firmly connected to the base module.
2) Follow the specifications of the module for operating environment.
3) Be sure to check that the driver is corrected connected to the connector.
4) Do not mount/dismount the module or the connector for driver while the power is being turned on.
5) When installing the module in a closed location use a heat prevention fan as possible.

7 Wiring

7.1 Wiring precautions

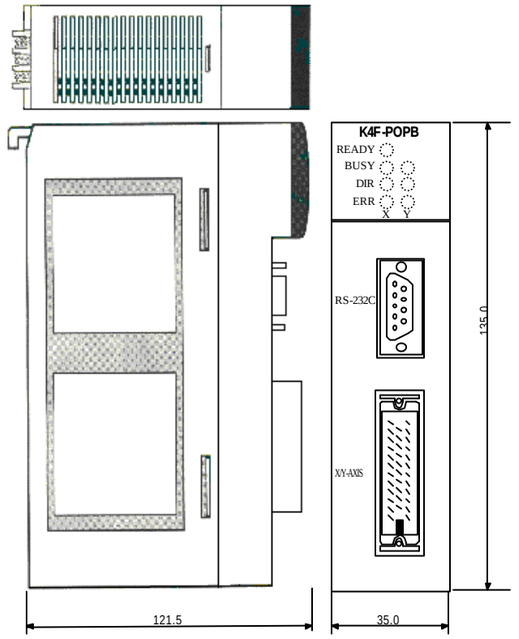
1) The cable length from the positioning module to the connected driver should be as short as possible (1 to 3 M)
2) When wiring I/O signal wires, separate the wires from the power line or circuit lines. (20 cm or more)
3) The connection cable length should be short as possible.

7.2 Wiring I/O signal wires

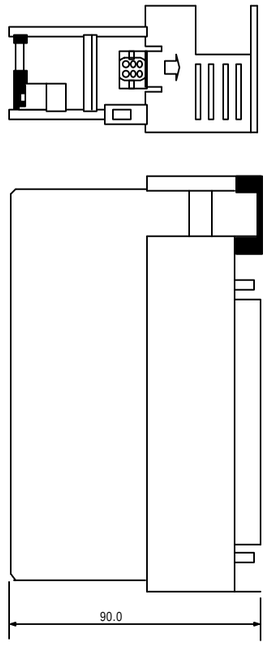
1) If it is thought that there's noise sources when wiring between the positioning module and drivers, use the twisted pair cable and shielded cable for input pulses from the positioning module to drivers.
2) When running I/O signal wires in piping, this should be guarded.
3) Use a stabilized external power supply (5VDC, 24VDC)

9. Dimension

9.1 K4F-POPB

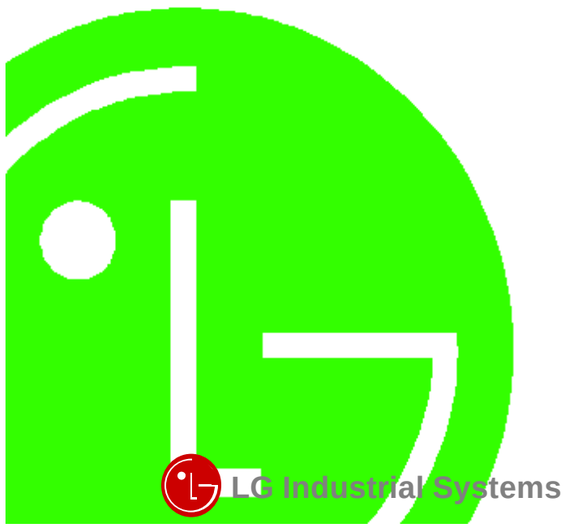


9.2 K3F-POPA



DATA SHEET

LG Programmable Logic Controller
Positioning Module
K4F-POPA
MASTER-K K7F-POPA
K7F-POAA



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702006313

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MASTER-K (Instructions & programming)	702006539
MASTER-K CPU User' s Manual	702006391
MASTER-K K4F-POPA / K7F-POPA / K7F-POAA Manual	702006471

Name	Code
MASTER-K K4F-POPA / K7F-POPA / K7F-POAA Data Sheet	702006313

❑ Safety Precautions

Be sure to read carefully the safety precautions given in data sheet and user' s manual before operating the module and follow them.

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▶If operated in other environment not specified in the general specifications, it can cause an electric shock, a fire, malfunction or damage or degradation of the module.

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CAUTION

▶When grounding a FG terminal, be sure to provide class 3 grounding which is dedicated to the PLC.

▶Before the PLC wiring, be sure to check the rated voltage and terminal arrangement for the module and observe them correctly.

If a different power, not of the rated voltage, is applied or wrong wiring is provided, it can cause a fire or disorder of the nodule.

▶Drive the terminal screws firmly to the defined torque. If loosely driven, it can cause short circuit, a fire or malfunction.

▶Be careful that any foreign matter like wire scraps should not enter into the module. It can cause a fire, disorder or malfunction.

❑ Test RUN and Maintenance Precautions

WARNING

▶Do not contact the terminals while the power is on. It can cause malfunction.

▶When cleaning or driving a terminal screw, perform them after the power has been turned off.

▶Do not perform works while the power is applied, which can cause disorder or malfunction.

CAUTION

▶Do not separate the module from the printed circuit board(PCB), or do not remodel the module.

They can cause disorder, malfunction, damage of the module or a fire.

When mounting or dismounting the module, perform them after the power has been turned off.

▶Do not perform works while the power is applied, which can cause disorder or malfunction.

❑ Waste Disposal Precautions

CAUTION

▶When disposing the module, do it as an industrial waste.

1. Introduction

Positioning module, a special function module, positions a moving object (such as processed goods and tools) exactly at the place indicated by the current position, by moving the object at the setting speed. K7F-POAA are linked to various ' servo controlling driver systems' to provide high accuracy position controlling with output voltage signal for positioning.

K7F-POAA and K4F-POPA modules are linked to various servo controlling driver systems or a stepping motor controlling driver system to provide high accuracy position control with output voltage signal for positioning.

If altered for other applications, they can be widely used for a machine tool, a semi-conductor assembler, small sized machining center and a lifter.

2. General Specifications

Item	Specifications				Standard
Operating temperature	0 ~ 55℃				
Storage temperature	-25 ~ 70℃				
Operating Humidity	5 ~ 95%RH, non-condensing				
Storage humidity	5 ~ 95%RH, non-condensing				
Vibration	Occasional vibration				IEC 1131-2
	Frequency	Acceleration	Amplitude	Sweep count	
	10≤f<57 Hz	-	0.075 mm	10 times in each direction for X, Y, Z	
	57 ≤f≤150 Hz	9.8㎨ {1G}	-		
	Continuos vibration				
	Frequency	Acceleration	Amplitude		
	10≤f<57 Hz	-	0.035 mm		
	57≤f≤150 Hz	4.9㎨{0.5G}	-		
Shocks	*Maximum shock acceleration: 147㎨ {15G} *Duration time :11 ms *Pulse wave: half sine wave pulse(3 times in each of X, Y and Z directions)				IEC 1131-2
Noise immunity	Square wave impulse noise	±1,500 V			
	Electrostatic discharge	Voltage :4kV(contact discharge)			IEC 1131-2 IEC 801-2
	Radiated electromagnetic field	27 ~ 500 MHz, 10 V/m			IEC 1131-2 IEC 801-3
	Fast transient burst noise	Severity Level	All power modules	Digital I/Os (Ue ≥ 24 V)	Digital I/Os (Ue < 24 V) Analog I/Os communication I/Os	IEC 1131-2 IEC 801-4
		Voltage	2 kV	1 kV	0.25 kV	
Atmosphere	Free from corrosive gases and excessive dust				
Altitude for use	Up to 2,000m				
Pollution degree	2 or lower				
Cooling method	Self-cooling				

3. Performance Specifications

[K7F-POAA]

Item		Specifications
Number of I/O points		64
Output type		Voltage output
Number of control axis		Two (simultaneous or independent; 8 simultaneous axes at synchronous operation)
Interpolation		Linear and circular interpolations
Positioning data	Capacity	150 points per axis
	Setting method	Input from S/W package
Positioning	Method	Absolute/incremental method can be selected for each axis
	Positioning command	The following 4 types can be selected by the command unit for each axis. -99,999,999 to +99,999,999 PLS (command unit : 1 PLS) Max. 999 m (command unit : 0.1 to 10 ㎛/PLS) Max. 999,999 inch (command unit : 0.00001 to 0.001 inch/PLS) Max. 999,999 deg (command unit : 0.00001 to 0.001 deg/PLS)
		The following 4 types can be selected by the command unit for each axis. 10 to 250,000 PLS/sec (command unit : 1 PLS) 10 to 150,000 mm/sec (command unit : 0.1 to 10 ㎛/PLS) 1 to 15,000 inch/min (command unit : 0.00001 to 0.001 inch/PLS) 1 to 15,000 deg/min (command unit : 0.00001 to 0.001 deg/PLS)
	Acceleration /deceleration	Trapezoidal , S type or exponential
	Backlash compensation	(10 to 9,900)× positioning command unit
	Zero point compensation	±999 pulse
	Operation mode	Single positioning
		Repetitive positioning
		Automatic positioning
		Continuous positioning
		Random access positioning
		Random access positioning with the determined positions
Homing		Reducing time differs by toggles of the zero point L/S. There exist 3 methods by the time that the upper/lower limit or zero point L/S is reached.
M code function		256 data (After/With mode)
Zone setting function		3 zones can be set.
Manual operation function		Jog operation, Teaching Play Back
Floating zero point set function		This function changes the present position to an arbitrary position.

[K7F-POPA,K4F-POPA]

Item		Specifications	
		K7F-POPA	K4F-POPA
Number of I/O points		64	32
Output type		Pulse output (A/B type)	
Number of control axis		Two (simultaneous or independent)	One
Interpolation		Linear interpolations	None
Positioning data	Capacity	300 points per axis	
	Setting method	Input from S/W package	
Positioning	Method	Absolute/incremental method can be selected for each axis	
	Positioning command	- 16,744,447 to + 16,744,447	
	Speed	10 to 200,000 (pulse/sec), 128 pulses per x and y axes (Index data)	
	Acceleration /deceleration	Trapezoidal	
	Backlash compensation	0 to 999 pulses	
	Zero point compensation	±999 pulses	
	Operation method	Single positioning	
		Repetitive positioning	
		Automatic positioning	
		Continuous positioning	
		Constant access positioning	
		Constant access positioning with the determined positions	
Homing		Reducing time differs by toggles of the zero point L/S. There exist 3 methods by the time that the upper/lower limit or zero point L/S is reached.	
M code function		256 data (After/With mode)	
Zone setting function		3 zones can be set.	
Manual operation function		Jog operation, Manual pulse operation, Inching and Teaching.	
Floating zero point set function		Setting the zero point by S/W at the point that the user wants to set.	
Present value Preset		This function changes the present position to an arbitrary position.	
Weight / Current consumption		530g / 5VDC 0.25A	305g / 5VDC 0.21A

4. External I/O Specifications

The K7F-POAA positioning module uses voltage as its output.

The K7F-POPA positioning module uses pulse as its output.

This section explains the specifications for external input /output.

4.1 External Input

1) Zero point limit (N.O), Upper/ lower limit (N.C), Emergency stop (N.C)

Item	Specifications
Rated input voltage	+ 24 VDC (- 15% to + 20%)
Rated input current	10 mA
On guarantee voltage	Minimum 16 VDC
Off guarantee voltage	Minimum 4 VDC
On delay time	2 ms or less
Off delay time	2 ms or less

2) Encoder feedback input signal (For the K7F-POAA only)

Item	Specifications
Open Collector (Phase A, B and Z)	Frequency : Max. 60 KPPS Pulse rising time : Max. 0.5 μs Pulse falling time : Max. 0.5 μs On guarantee voltage : Min. 2.7 V Off guarantee voltage : Max. 0.8 V
Line Driver (Phase A, B and Z)	Frequency : Max. 60 KPPS Pulse rising time : Max. 0.5 μs Pulse falling time : Max. 0.5 μs

3) Zero point (Phase Z)

(For the K7F-POPA, K7F-POAA and K4F-POPA only)

Item	Specifications	Response time
Open Collector	+ 24 VDC (- 15 % to + 20%) 10 mA	0.1 ms or less
Line Driver	Same as the AM26LS31	

4) Manual Pulse Generator: For the K7F-POPA only

Item	Specifications	
Input voltage	+ 5 VDC (±5%)	+ 12 VDC (±5%)
On guarantee voltage	Min. 4 VDC	Min. 8 VDC
Off guarantee voltage	Max. 1 VDC	Max. 2 VDC
Pulse width	1 ms or more	

* N.O : Normal Open * N.C : Normal Closed

4.2 External Output

1) Servo On (Open Collector output) : For the K7F-POAA only

The Servo On signal is output to the servo driver

Item	Specifications
Load voltage	+ 4.75 VDC to 26.4 VDC
Load current	Maximum 10 mA
Maximum on voltage drop	Maximum 0.6 VDC
Off leakage current	Maximum 0.1 mA

2) Control voltage : For the K7F-POAA only

The control voltage is output to the servo driver : ±3v, ±6V, ±10V

3) NPN open collector output : For the K7F-POPA and K4F-POPA only

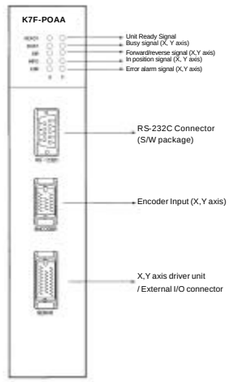
[Pulse string (FP, RP)]

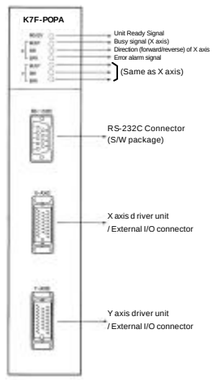
Item	Specifications
Max. On/off current	5 VDC, 150 mA 24 VDC, 150 mA
Min. On/off current	5 VDC, 2 mA 24 VDC, 2 mA
Maximum On voltage drop	0.3 V or less
Off leakage current	0.1 mA or less
External power supply	5 VDC (±5%) 24 VDC(-15%~20%)

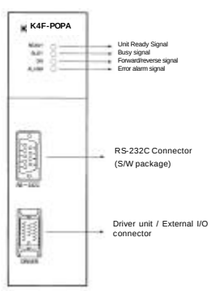
5. Part Name

1) K7F-POAA 2) K7F-POPA

3) K4F-POPA







6. INSTALLATION

The following explains the installation precautions are wiring for system reliability.

6.1 Installation precautions

1) Make sure that the module be firmly connected to the base module.
2) Follow the specifications of the module for operating environment.
3) Be sure to check that the driver is corrected connected to the connector.
4) Do not mount/dismount the module or the connector for driver while the power is being turned on.
5) When installing the module in a closed location use a heat prevention fan as possible.

7 Wiring

7.1 Wiring precautions

1) The cable length from the positioning module to the connected driver should be as short as possible (1 to 3 M)
2) When wiring I/O signal wires, separate the wires from the power line or circuit lines. (20 cm or more)
3) The connection cable length should be short as possible.

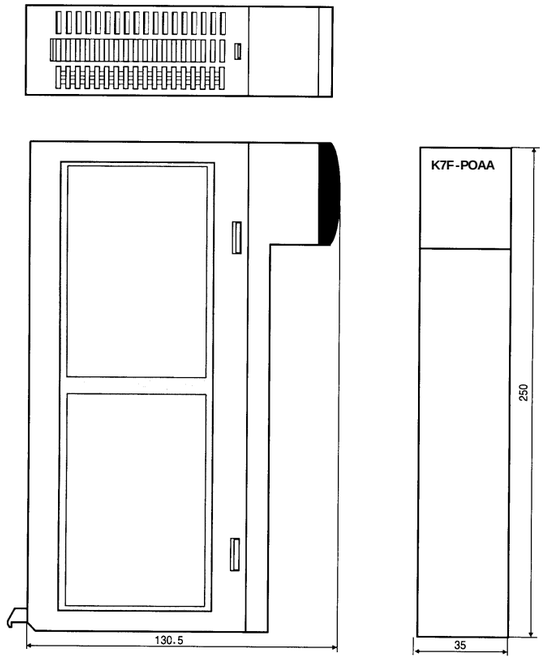
7.2 Wiring I/O signal wires

1) If it is thought that there's noise sources when wiring between the positioning module and drivers, use the twisted pair cable and shielded cable for input pulses from the positioning module to drivers.
2) When running I/O signal wires in piping, this should be guarded.
3) Use a stabilized external power supply (5VDC, 24VDC)

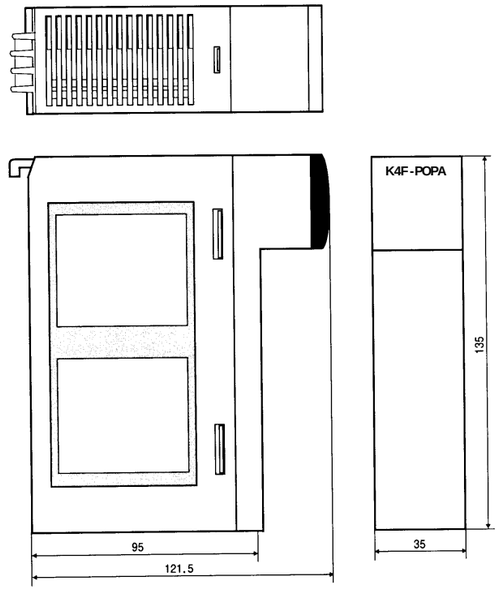
8. Dimension

[K7F-POAA, K7F-POPA]

(These 2 modules have same dimensions) unit : mm

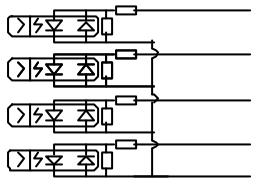
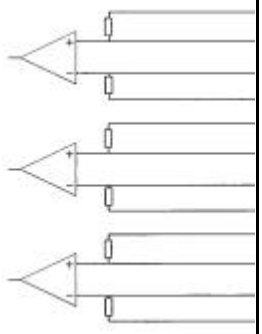
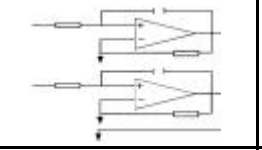
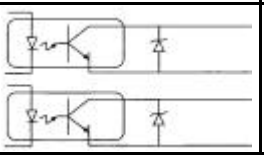


[K4F-POPA] unit : mm



8. External Wiring

[K7F-POAA]

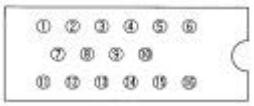
I/O	Internal Circuit	Pin No. X-axis	Pin No. Y-axis	Signal Name
		14	22	Upper Limit
		15	23	Lower Limit
		16	16	Emergency Stop
		24	25	Origin Limit
		10, 17	20	Input Common
		1	1	Encoder DC +5V Vcc
		3	9	Encoder A phase
		4	10	Encoder A* phase
		15, 16	15, 16	Encoder DC +5V GND
		1	1	Encoder DC +5V Vcc
		5	11	Encoder B phase
		6	12	Encoder B* phase
		15, 16	15, 16	Encoder DC +5V GND
		1	1	Encoder +5V Vcc
		7	13	Encoder Z phase
		8	14	Encoder Z* phase
		15, 16	15, 16	Encoder DC +5V GND
		18		X-axis voltage output
			19	Y-axis voltage output
		5, 6, 7	8, 9, 21	Signal GND
		12		X-axis Servo On signal
		4	4	Servo On common
			11	Y-axis Servo On signal
		4	4	Servo On common

■ Pin assignment of connectors

1) SERVO

Pin No	Name	I/O Type	Function
1	Not used	-	-
2	Not used	-	-
3	Not used	-	-
4	Sv On Com	Output	Common of Servo On Signal
5	Output Sig GND	Power	Common of Voltage Output Signal
6			
7			
8			
9			
10	In Com	Power	Common of External Power Supply (+24V)
11	Y-axis Servo On	Output	Y-axis Servo On output signal
12	X-axis Servo On	Output	X-axis Servo On output signal
13	Not used	-	-
14	X-axis + Over Run	Input	Upper Limit S/W Input (N.C)
15	X-axis – Over Run	Input	Lower Limit S/W Input (N.C)
16	Emergency Stop	Input	Emergency Stop Limit S/W Input (N.C)
17	In Com	Power	Common of External Power Supply (+24V)
18	X-axis Speed	Output	Output of X-axis Speed command voltage
19	Y-axis Speed	Output	Output of Y-axis Speed command voltage
20	In Com	Power	Common of External Power Supply (+24V)
21	Output Sig GND	Power	Common of Voltage Output Signal
22	Y-axis + Over Run	Input	Upper Limit S/W Input (N.C)
23	Y-axis – Over Run	Input	Lower Limit S/W Input (N.C)
24	X-axis Origin	Input	Origin Limit S/W Input (N.O)
25	Y-axis Origin	Input	Origin Limit S/W Input (N.O)

2) Encoder



Pin No.	Name	I/O Type	Function
1	Encoder Vcc	Power	DC +5V Vcc
2	Not used	-	-
3	X-Enc-A	Input	Input of X-axis Encoder A phase
4	X-Enc-A*	Input	Input of X-axis Encoder A* phase
5	X-Enc-B	Input	Input of X-axis Encoder B phase
6	X-Enc-B*	Input	Input of X-axis Encoder B* phase
7	X-Enc-Z	Input	Input of X-axis Encoder Z phase
8	X-Enc-Z*	Input	Input of X-axis Encoder Z* phase
9	Y-Enc-A	Input	Input of Y-axis Encoder A phase
10	Y-Enc-A*	Input	Input of Y-axis Encoder A* phase
11	Y-Enc-B	Input	Input of Y-axis Encoder B phase
12	Y-Enc-B*	Input	Input of Y-axis Encoder B* phase
13	Y-Enc-Z	Input	Input of Y-axis Encoder Z phase
14	Y-Enc-Z*	Input	Input of Y-axis Encoder Z* phase
15	Encoder GND	Power	DC +5V Ground
16	Encoder GND	Power	DC +5V Ground

■ **Using the DIP switch**

The DIP switch is located on the side of the K7F – POAA module.

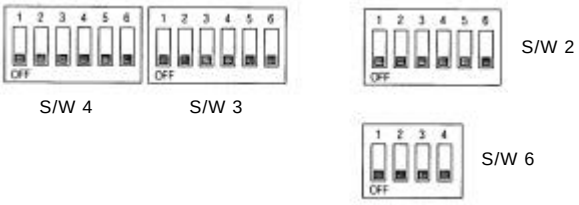
<Uses>

SW2 : Used to select whether inputs will be given to the Line Driver to Open Collector.

SW3,4 : Used to select on output voltage between 0 to 3V, 0 to 6V and 0 to 10V SW3 is used for Y axis output voltage and SW4 for X axis.

SW6 : Used to select an extension rate of the encoder inputs between once, twice and four times extensions.

<Appearance>



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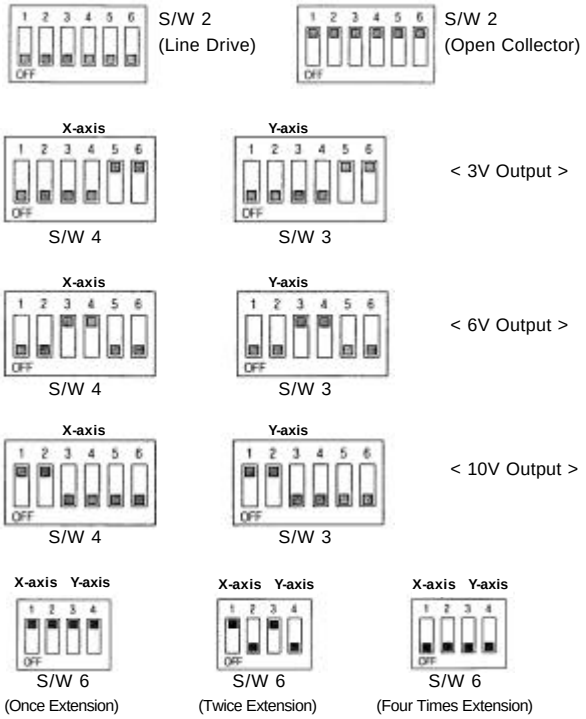
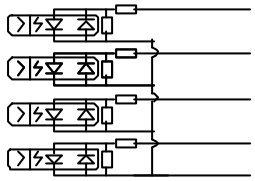
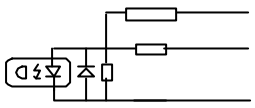
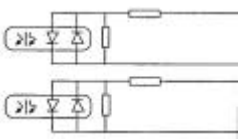
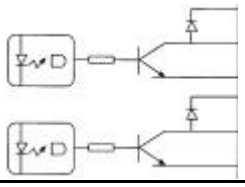
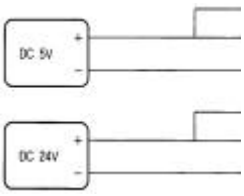
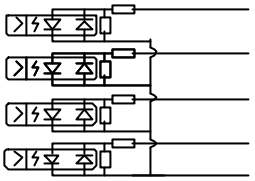
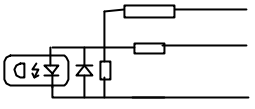
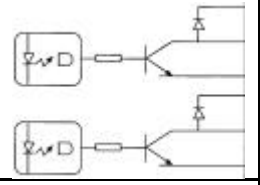
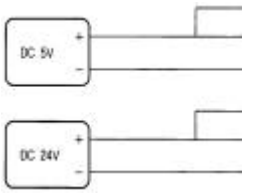


[K7F-POPA]

I/O	Internal Circuit	Pin No. X-axis	Pin No. Y-axis	Signal Name	
N.C I N P U T		3	3	Upper Limit	
		18	18	Lower Limit	
		19	19	Emergency Stop	
		22	22	Origin Limit	
		21	21	Input Common	
Origin Input		24	24	Z phase (O.C 24V)	
		25	25	Z phase (Line Driver 5V)	
		15	15	Z phase Common	
M P G		9	9	MPG A phase	
		8	8	Common of A phase	
		16	16	MPG B phase	
		7	7	Common of B phase	
O U T P U T		4, 5	4, 5	5/24V Common	
		2	2	Forward Pulse	
		10	10	5/24V GND	
		4, 5	4, 5	5/24V Common	
		11	11	Reverse Pulse	
		10	10	5/24V GND	
Input DC Power *1		4, 5	4, 5	5/24V Common + 5V 5/24V GND	When use 5V
		17	17		
		10	10		
		4, 5	4, 5	5/24V Common + 24V 5/24V GND	When use 24V
		1	1		
		10	10		

*1 : External power supplied to K7F-POPA
(Use same power for X,Y axes)

[K4F-POPA]

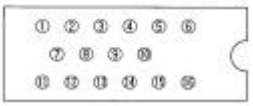
I/O	Internal Circuit	Pin No. X-axis	Pin No. Y-axis	Signal Name	
N.C I N P U T		13	Not Used	Upper Limit	
		14		Lower Limit	
		15		Emergency Stop	
		12		Origin Limit	
		16		Input Common	
Origin Input		9	Not Used	Z phase (O.C 24V)	
		4		Z phase (Line Driver 5V)	
		8		Common of Z phase	
O U T P U T		10	Not Used	5/24V Common	
		2		Forward Pulse	
		1		5/24V Gnd	
		10		5/24V Common	
		3		Reverse Pulse	
		1		5/24V Gnd	
Input DC power *1)		10	Not Used	5/24V Common + 5V 5/24V Gnd	When use 5V
		11			
		1			
		10	Not Used	5/24V Common + 24V 5/24V Gnd	When use 24V
		7			
		1			

*1) : External power supplied to K4F-POPA

■ Pin assignment of connectors

Pin No	Name	Item	Function
1	+ 24V	Power	External incoming power(only when use)
2	FP	Output	Forward direction pulse output
3	+ Over Run	Input	Upper limit switch input (N.C)
4	5/24V Vcc	Input	Common of external input power
5	5/24V Vcc	Input	Common of external input power
6	FG	Power	Frame ground
7	MPG B Common	Input	Common of manual pulse B phase
8	MPG A Common	Input	Common of manual pulse A phase
9	MPG A phase	Input	Input of manual pulse A phase
10	5/24V GND	Power	Ground of external power supply
11	RP	Output	Reverse direction pulse output
12	Not used	-	-
13	Not used	-	-
14	Not used	-	-
15	Z Com	Input	Common of Z phase input
16	MPG B phase	Input	Input of manual pulse B phase
17	+5V	Power	External incoming power(only when use)
18	- Over Run	Input	Lower limit switch input (N.C)
19	Emergency Stop	Input	Emergency limit switch input (N.C)
20	Not used	-	-
21	In Com	Power	Common of external power (+24V)
22	Origin	Input	Origin limit switch input (N.O)
23	Not used	-	-
24	Z Oc	Input	Open Collector input of Z phase (+24V)
25	ZL	Input	Line Drive input of Z phase

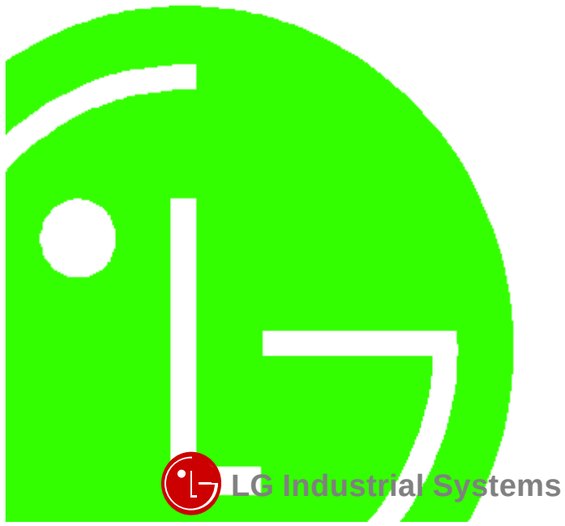
■ Pin assignment of connectors



Pin No.	Name	Item	Function
1	5/24V GND	Power	Ground of external power supply
2	FP	Output	Forward direction pulse output
3	RP	Output	Reverse direction pulse output
4	ZL	Input	Line Drive input of Z phase
5	Not used	-	-
6	FG	Power	Frame Ground
7	+24V	Power	External incoming power supply(only when use)
8	Z Com	Input	Common of Z phase input
9	Z OC	Input	Open Collector input of Z phase (+24V)
10	5/24V Vcc	Input	Common of external power supply
11	+5V	Power	External incoming power supply(only when use)
12	Origin	Input	Origin limit switch input (N.O)
13	- Over Run	Input	Lower limit switch input (N.C)
14	+ Over Run	Input	Upper limit switch input (N.C)
15	Emergency Stop	Input	Emergency stop limit switch input (N.C)
16	In Com	Power	Common of external power supply (+24V)

DATA SHEET

LG Programmable Logic Controller
Positioning Module
MASTER-K K4F-POPB K4F-POPC



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702006380

Before handling the product

Read this data sheet carefully prior to any operation, mounting, installation or start-up of the product.

Materials for MASTER-K

Name	Code
MASTER-K KGL-WIN (Programming Software)	702005036
MASTER-K (Instructions & programming)	702005058
MASTER-K CPU User' s Manual	702004919
MASTER-K K4F-POPB / K4F-POPC Manual	702006313

Name	Code
MASTER-K K4F-POPB / K4F-POPC Data Sheet	702006380

❑ Safety Precautions

Be sure to read carefully the safety precautions given in data sheet and user' s manual before operating the module and follow them.

The precautions explained here only apply to the K4F-POPB/K4F-POPC

For safety precautions on the PLC system, see the MASTER-K CPU User' s Manuals.

A precaution is given with a hazard alert triangular symbol to call your attention, and precautions are represented as follows according to the degree of hazard.

⚠WARNING If not provided with proper prevention, it can cause death, fatal injury or considerable loss of property.

⚠CAUTION If not properly observed, it can cause a hazard situation to result in severe or slight injury or a loss of property.

However, a precaution followed with **⚠CAUTION** can also result in serious conditions.

Both of two symbols indicate that an important content is mentioned, therefore, be sure to observe it.

Keep this manual handy for your quick reference in necessary.

❑ Design Precautions

⚠WARNING

▶To prevent over run, set stroke upper / lower limits in parameter, and attach mechanical upper / lower limit switches.

⚠CAUTION

▶Do not run I/O signal lines near to high voltage line or power line. Separate them as 100 mm or more as possible. Otherwise, noise can cause module malfunction.

❑ Installation Precautions

⚠CAUTION

▶Operate the PLC in the environment conditions given in the general specifications.

▶If operated in other environment not specified in the general specifications, it can cause an electric shock, a fire, malfunction or damage or degradation of the module.

▶Make sure the module fixing pro-jections is inserted into the module fixing hole and fixed.

▶Improper installation of the module can cause malfunction, disorder or falling.

❑ Wiring Precautions

⚠CAUTION

▶When grounding a FG terminal, be sure to provide class 3 grounding which is dedicated to the PLC.

▶Before the PLC wiring, be sure to check the rated voltage and terminal arrangement for the module and observe them correctly.

If a different power, not of the rated voltage, is applied or wrong wiring is provided, it can cause a fire or disorder of the nodule.

▶Drive the terminal screws firmly to the defined torque. If loosely driven, it can cause short circuit, a fire or malfunction.

▶Be careful that any foreign matter like wire scraps should not enter into the module. It can cause a fire, disorder or malfunction.

❑ Test RUN and Maintenance Precautions

⚠WARNING

▶Do not contact the terminals while the power is on. It can cause malfunction.

▶When cleaning or driving a terminal screw, perform them after the power has been turned off.

▶Do not perform works while the power is applied, which can cause disorder or malfunction.

⚠CAUTION

▶Do not separate the module from the printed circuit board(PCB), or do not remodel the module.

They can cause disorder, malfunction, damage of the module or a fire.

When mounting or dismounting the module, perform them after the power has been turned off.

▶Do not perform works while the power is applied, which can cause disorder or malfunction.

❑ Waste Disposal Precautions

⚠CAUTION

▶When disposing the module, do it as an industrial waste.

1. Introduction

Positioning module, a special function module, positions a moving object (such as processed goods and tools) exactly at the place indicated by the current position, by moving the object at the setting speed.

K4F-POPB and K4F-POPC modules are linked to various servo controlling driver systems or a stepping motor controlling driver system to provide high accuracy position control with output voltage signal for positioning.

If altered for other applications, they can be widely used for a machine tool, a semi-conductor assembler, small sized machining center and a lifter.

2. General Specifications

Item	Specifications				Standard
Operating temperature	0 ~ 55℃				
Storage temperature	-25 ~ 70℃				
Operating Humidity	5 ~ 95%RH, non-condensing				
Storage humidity	5 ~ 95%RH, non-condensing				
Vibration	Occasional vibration				IEC 1131-2
	Frequency	Acceleration	Amplitude	Sweep count	
	10≤f∠57 Hz	-	0.075 mm	10 times in each direction for X, Y, Z	
	57 ≤f≤150 Hz	9.8㎨ {1G}	-		
	Continuos vibration				
	Frequency	Acceleration	Amplitude		
	10≤f∠57 Hz	-	0.035 mm		
	57≤f≤150 Hz	4.9㎨{0.5G}	-		
Shocks	*Maximum shock acceleration: 147㎨ {15G} *Duration time :11 ms *Pulse wave: half sine wave pulse(3 times in each of X, Y and Z directions)				IEC 1131-2
Noise immunity	Square wave impulse noise	±1,500 V			
	Electrostatic discharge	Voltage :4kV(contact discharge)			IEC 1131-2 IEC 801-2
	Radiated electromagnetic field	27 ~ 500 MHz, 10 V/m			IEC 1131-2 IEC 801-3
	Fast transient burst noise	Severity Level	All power modules	Digital I/Os (Ue ≥ 24 V)	Digital I/Os (Ue < 24 V) Analog I/Os communication I/Os	IEC 1131-2 IEC 801-4
		Voltage	2 kV	1 kV	0.25 kV	
Atmosphere	Free from corrosive gases and excessive dust				
Altitude for use	Up to 2,000m				
Pollution degree	2 or lower				
Cooling method	Self-cooling				

3. Performance Specifications

[K4F-POPB,K4F-POPC]

Item		Specifications	
Number of I/O points		64	
Output type		Pulse output (A/B type)	
Number of control axis		Two (simultaneous or independent)	
Interpolation		Linear interpolations	
Positioning data	Capacity	300 points per axis	
	Setting method	Input from S/W package	
Positioning	Method	Absolute/incremental method can be selected for each axis	
	Positioning command	- 16,744,447 to + 16,744,447	
	Speed	10 to 200,000 (pulse/sec), 128 pulses per x and y axes (Index data)	
	Acceleration /deceleration	Trapezoidal	
	Backlash compensation	0 to 999 pulses	
	Zero point compensation	+ - 999 pulses	
	Operation method	Single positioning	
		Repetitive positioning	
		Automatic positioning	
		Continuous positioning	
		Constant access positioning	
		Constant access positioning with the determined positions	
Homing		Reducing time differs by toggles of the zero point L/S. There exist 3 methods by the time that the upper/lower limit or zero point L/S is reached.	
M code function		256 data (After/With mode)	
Zone setting function		3 zones can be set.	
Manual operation function *1		Jog operation, Manual pulse operation, Inching and Teaching.	
Floating zero point set function		Setting the zero point by S/W at the point that the user wants to set.	
Present value Preset		This function changes the present position to an arbitrary position.	
Weight / Current consumption		530g / 5VDC 0.25A	305g / 5VDC 0.21A

*1 : Manual operation function is for the only K4F-POPB

4. External I/O Specifications

K4F-POPB and K4F-POPC positioning module uses pulse as its output.
This section explains the specifications for external input /output.

4.1 External Input

1) Zero point limit (N.O), Upper/ lower limit (N.C), Emergency stop (N.C)
External input 1,2 *2

Item	Specifications
Rated input voltage	+ 24 VDC (- 15% to + 20%)
Rated input current	10 mA
On guarantee voltage	Minimum 16 VDC
Off guarantee voltage	Minimum 4 VDC
On delay time	2 ms or less
Off delay time	2 ms or less

*2 : External input 1,2 is for the only K4F-POPC

2) Zero point (Phase Z)

Item	Specifications	Response time
Open Collector	+ 24 VDC (- 15 % to + 20%) 10 mA	0.1 ms or less
Line Driver	Same as the AM26LS31	

3) Manual Pulse Generator: For the K4F-POPB only

Item	Specifications	
Input voltage	+ 5 VDC (±5%)	+ 12 VDC (±5%)
On guarantee voltage	Min. 4 VDC	Min. 8 VDC
Off guarantee voltage	Max. 1 VDC	Max. 2 VDC
Pulse width	1 ms or more	

* N.O : Normal Open * N.C : Normal Closed

4.2 External Output

1) Servo On (Open Collector output) : For the K4F-POPC only
The servo On signal is output to the Servo Driver

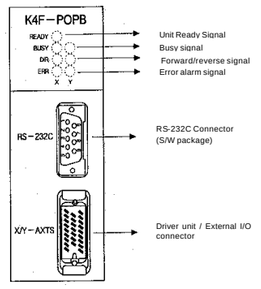
Item	Specifications
Load voltage	+ 4.75 VDC to 26.4 VDC
Load current	Maximum 10 mA
Maximum on voltage drop	Maximum 0.6 VDC
Off leakage current	Maximum 0.1 mA

3) NPN open collector output
[Pulse string (FP, RP)]

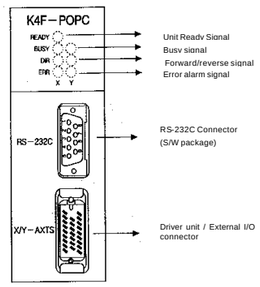
Item	Specifications
Max. On/off current	5 VDC, 150 mA 24 VDC, 150 mA
Min. On/off current	5 VDC, 2 mA 24 VDC, 2 mA
Maximum On voltage drop	0.3 V or less
Off leakage current	0.1 mA or less
External power supply	5 VDC (±5%) 24 VDC(-15%~20%)

5. Part Name

1) K4F-POPB



2) K4F-POPC



6. INSTALLATION

The following explains the installation precautions are wiring for system reliability.

6.1 Installation precautions

1) Make sure that the module be firmly connected to the base module.
2) Follow the specifications of the module for operating environment.
3) Be sure to check that the driver is corrected connected to the connector.
4) Do not mount/dismount the module or the connector for driver while the power is being turned on.
5) When installing the module in a closed location use a heat prevention fan as possible.

7 Wiring

7.1 Wiring precautions

1) The cable length from the positioning module to the connected driver should be as short as possible (1 to 3 M)
2) When wiring I/O signal wires, separate the wires from the power line or circuit lines. (20 cm or more)
3) The connection cable length should be short as possible.

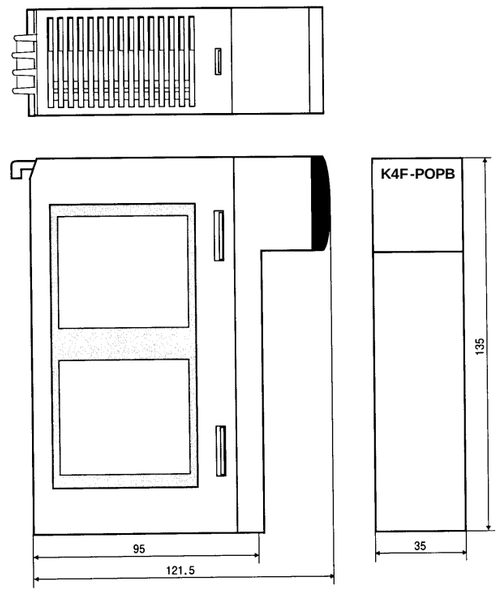
7.2 Wiring I/O signal wires

1) If it is thought that there's noise sources when wiring between the positioning module and drivers, use the twisted pair cable and shielded cable for input pulses from the positioning module to drivers.
2) When running I/O signal wires in piping, this should be guarded.
3) Use a stabilized external power supply (5VDC, 24VDC)

8. Dimension

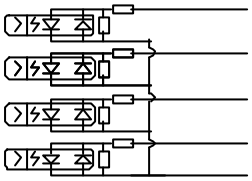
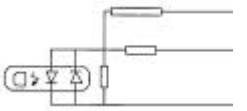
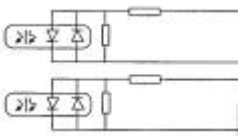
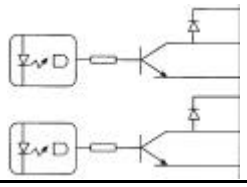
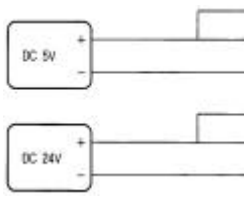
[K4F-POPB, K4F-POPC]

(These 2 modules have same dimensions) unit : mm

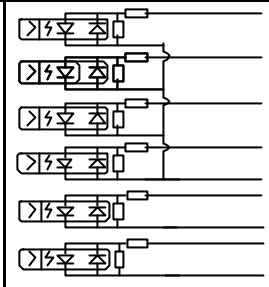
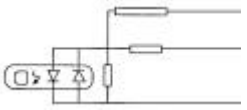
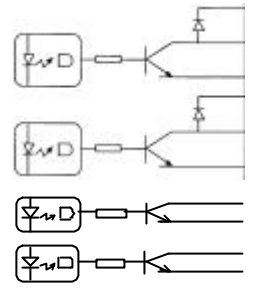
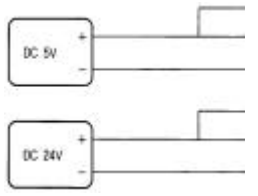


7.3 External Wiring

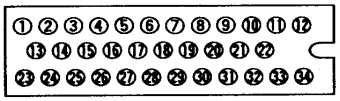
[K4F-POPB]

I/O	Internal Circuit	Pin No. X-axis	Pin No. Y-axis	Signal Name	
INPUT		10	9	Upper Limit(N.C.)	
		21	20	Lower Limit(N.C.)	
		32	31	Emergency Stop(N.C.)	
		22	32	Origin Limit(N.O.)	
		11, 33	11, 33	+24V Input Common	
Origin Input		18	17	Z phase (O.C 24V)	
		28	27	Z phase (Line driver 5V)	
		6	5	Common of Z phase	
MPG		30	30	MPG A phase (+5V/+12V)	
		8	8	Common of A phase	
		29	29	MPG B phase (+5V/+12V)	
		7	7	Common of B phase	
OUTPUT		13, 14	13, 14	5/24V Common	
		26	25	Forward Pulse	
		1, 23	1, 23	5/24V GND	
		13, 14	13, 14	5/24V Common	
		4	3	Reverse Pulse	
		1, 23	1, 23	5/24V GND	
Input DC Power		13, 14	13, 14	5/24V Common	When use 5V
		24	24	+ 5V	
		1, 23	1, 23	5/24V GND	
		13, 14	13, 14	5/24V Common	When use 24V
		2	2	+ 24V	
		1, 23	1, 23	5/24V GND	

[K4F-POPC]

I/O	Internal Circuit	Pin No. X-axis	Pin No. Y-axis	Signal Name	
INPUT		10	9	Upper Limit(N.C.)	
		21	20	Lower Limit(N.C.)	
		32	32	Emergency Stop(N.C.)	
		22	31	Origin Limit(N.O.)	
		15	17	External Input 1	
		29	30	External Input 2	
		33	33	+24V Input Common	
Origin Input		18	17	Z phase (O.C 24V)	
		28	27	Z phase (Line Driver 5V)	
		6	5	Common of Z phase	
OUTPUT		13	13	5/24V Common	
		26	25	Forward Pulse	
		1,23	1,23	5/24V GND	
		13	13	5/24V Common	
		4	3	Reverse Pulse	
		1,23	1,23	5/24V GND	
		12	14	Servo On	
		8	8	Servo On Common	
		16	19	Deviation Counter Clear	
		11	11	Deviation Counter Clear Common	
Input DC power		13	13	5/24V Common	When use 5V
		24	24	+ 5V	
		1,23	1,23	5/24V GND	
		13	13	5/24V Common	When use 24V
		2	2	+ 24V	
		1,23	1,23	5/24V GND	

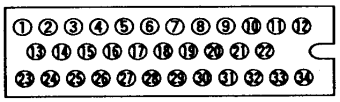
■ Pin assignment of connector



[K4F-POPB]

Pin No	Name	Item	Function
1, 23	PO_GND	Power	Pulse output ground
24	PO_+5V	Power	External incoming power(+5V)
2	PO_+24V	Power	External incoming power(+24V)
13,14	PO_COM	Power	Connection with PO_+5V(or PO_+24V)
26	X_FP	Output	Forward direction pulse output of X axis
4	X_RP	Output	Reverse direction pulse output of X axis
25	Y_FP	Output	Forward direction pulse output of Y axis
3	Y_RP	Output	Reverse direction pulse output of Y axis
10	X_OVERRUN+	Input	Upper limit switch input of X axis(N.C.)
21	X_OVERRUN-	Input	Lower limit switch input of X axis(N.C.)
22	X_ORG	Input	Orgin limit switch input of X axis(N.O.)
9	Y_OVERRUN+	Input	Upper limit switch input of Y axis(N.C.)
20	Y_OVERRUN-	Input	Lower limit switch input of Y axis(N.C.)
31	Y_ORG	Input	Orgin limit switch input of Y axis(N.O.)
32	EMG	Input	Emergency stop limit switch input(N.C.)
11,33	ICOM	Power	Common of +24V input(OVERRUN,ORG,EMG)
18	X_ZOC	Input	Input of X axis Z phase(Open Collector,+24V)
28	X_ZL	Input	Input of X axis Z phase (Line Driver,+5V)
6	X_ZGND	Input	Common of X axis Z phase
17	Y_ZOC	Input	Input of Y axis Z phase(Open Collector,+24V)
27	Y_ZL	Input	Input of Y axis Z phase (Line Driver,+5V)
5	Y_ZGND	Input	Common of Y axis Z phase
30	MPG_A	Input	Input of manual pulse A phase(+5V/+12V)
8	MPG_AGND	Input	Common of MPG A phase input
29	MPG_B	Input	Input of manual pulse B phase(+5V/+12V)
7	MPG_BGND	Input	Common of MPG B phase input
12,34	FG	Input	Frame Ground
15,16,19	-	-	Not Used

■ Pin assignment of connector



[K4F-POPC]

Pin No	Name	Item	Function
1, 23	PO_GND	Power	Pulse output ground
24	PO_+5V	Power	External incoming power(+5V)
2	PO_+24V	Power	External incoming power(+24V)
13	PO_COM	Power	Connection with PO_+5V(or PO_+24V)
26	X_FP	Output	Forward direction pulse output of X axis
4	X_RP	Output	Reverse direction pulse output of X axis
25	Y_FP	Output	Forward direction pulse output of Y axis
3	Y_RP	Output	Reverse direction pulse output of Y axis
10	X_OVERRUN+	Input	Upper limit switch input of X axis(N.C.)
21	X_OVERRUN-	Input	Lower limit switch input of X axis(N.C.)
22	X_ORG	Input	Orgin limit switch input of X axis(N.O.)
9	Y_OVERRUN+	Input	Upper limit switch input of Y axis(N.C.)
20	Y_OVERRUN-	Input	Lower limit switch input of Y axis(N.C.)
31	Y_ORG	Input	Orgin limit switch input of Y axis(N.O.)
32	EMG	Input	Emergency stop limit switch input(N.C.)
33	ICOM	Power	Common of +24V input(OVERRUN,ORG,EMG)
18	X_ZOC	Input	Input of X axis Z phase(Open Collector,+24V)
28	X_ZL	Input	Input of X axis Z phase (Line Driver,+5V)
6	X_ZGND	Input	Common of X axis Z phase
17	Y_ZOC	Input	Input of Y axis Z phase(Open Collector,+24V)
27	Y_ZL	Input	Input of Y axis Z phase (Line Driver,+5V)
5	Y_ZGND	Input	Common of Y axis Z phase
12	X_SERVO_OUT	Output	Servo On output to X axis Servo
14	Y_SERVO_OUT	Output	Servo On output to Y axis Servo
15	X_SVINP1	Input	External input 1 from X axis Servo
29	X_SVINP2	Input	External input 2 from X axis Servo
16	X_DIFF_CLR	Output	Deviation counter clear signal of X axis
19	Y_DIFF_CLR	Output	Deviation counter clear signal of Y axis
7	Y_SVINP1	Input	External input 1 from Y axis Servo
30	Y_SVINP2	Input	External input 2 from Y axis Servo
8	SERVO_COM	Power	Common of X axis and Y axis Servo On output
11	DIFF_COM	Power	Common of X axis and Y axis deviation counter clear
34	FG	Input	Frame ground