K7M

Programmable Logic Controller

NEW

IMO

Functions

Performance

ALL in

Network

Programming

Aiming at the Compactness and High Function

°· **High function and performance with Exclusive MPU chip**
  - Execution speed : 0.5μs/step
  - Program capacity : 7ksteps

°· **Various built-in functions for the enlarging application fields**
  - One(1) High speed counter (1~16kHz, 2~8kHz)
  - One(1) Pulse train output (2kHz)
  - Eight(8) PID control with auto tuning
  - Eight(8) Pulse catch inputs
  - Filtered input
  - Eight(8) External interrupt inputs
 - One(1) RS-232C I/F (dedicated, user defined, Modbus protocol)

ONE, All for your needs

Powerful programming Tool (KGLWIN)

°· **Windows-based tool (Windows 95, 98 and NT)**

°· **Applicable to all the K series**

°· **Ladder diagram, Mnemonic language supported**

°· **Possible to Edit a program in RUN mode**

°· **Forced I/O On/Off**

°· **Display the comments in a program**

°· **Available all printers supported by Wndows**

°· **Powerful debuggings**
  - Execution step by step
  - Execution to a given step
  - Execution till the data becomes a given value.
 - Execution the cycles at the No. of given times

Applications

Eight(8) PID loops with auto tuning (built-in)

It can be applied for temperature control, Pressure control, Flow control in the fields such as Chemical and process Industries, Glass and ceramics, Wood and paper industry, Food & Drink industry and Furnace, etc.
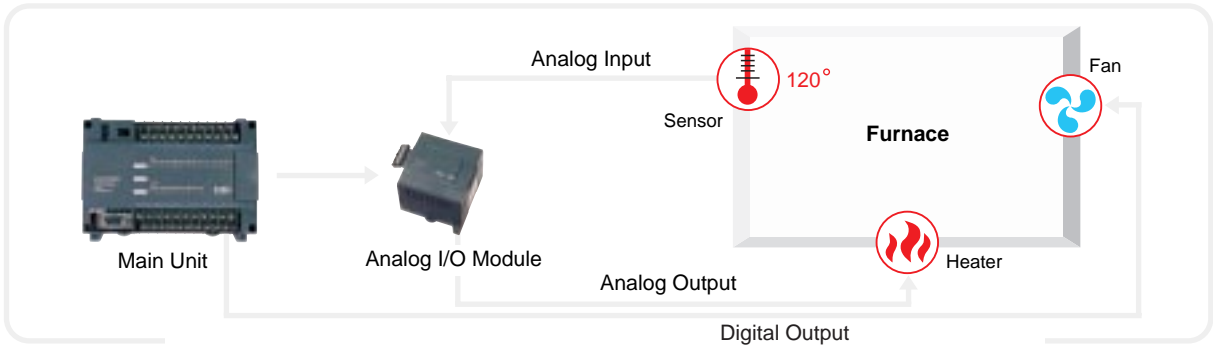

Single High Speed Up / Down Counter (built-in)

Single high speed counter up to 16kHz enables and resets input, as up/down counter for connecting incremental encoders or high speed pulse generator. This counter is independent of the CPU ladder logic execution, so counting is not affected(16kHz for 1phase, 8kHz for 2phases, 24bits) by the scan time.
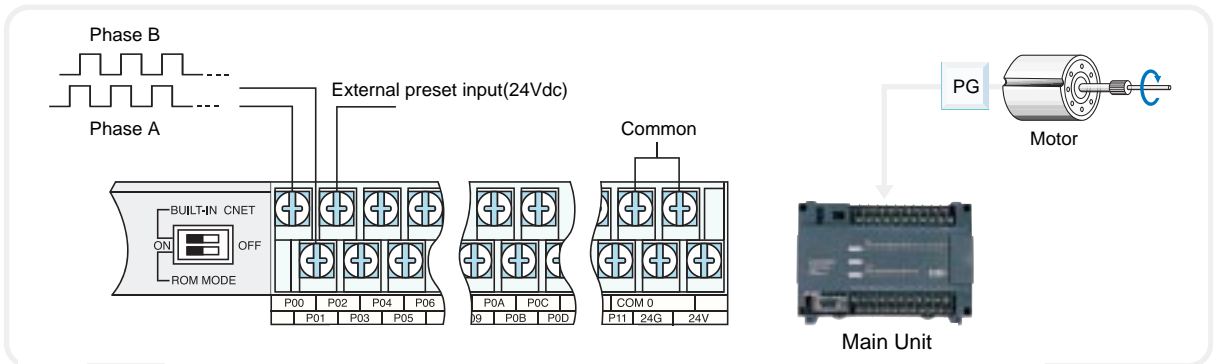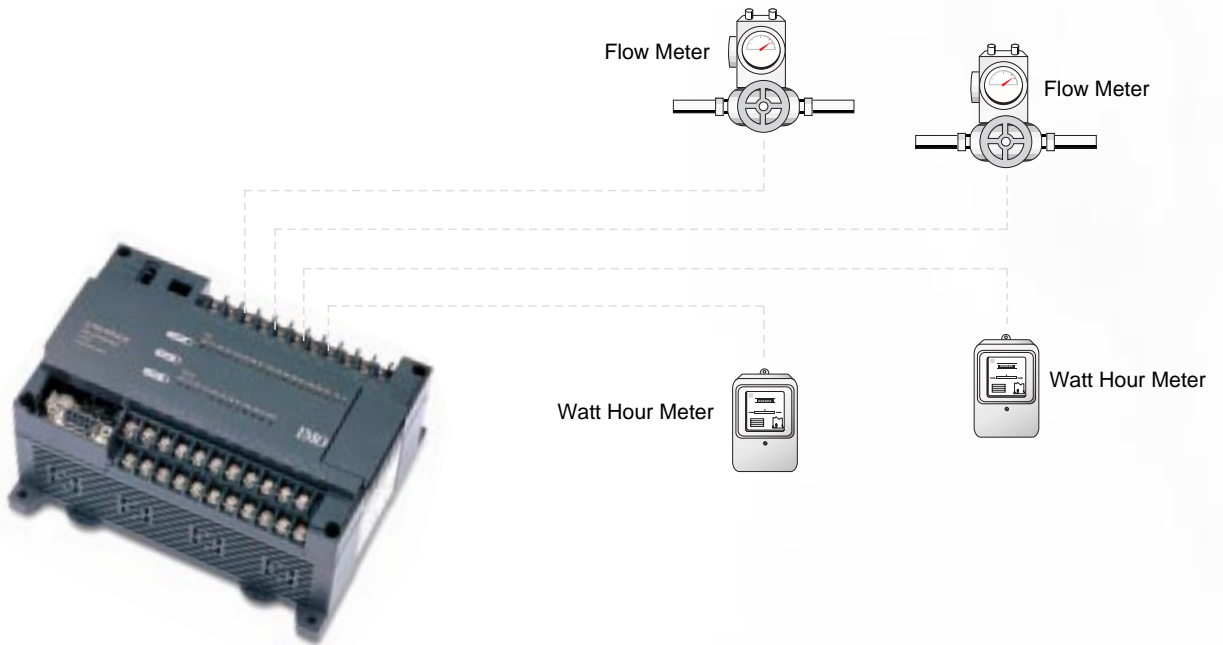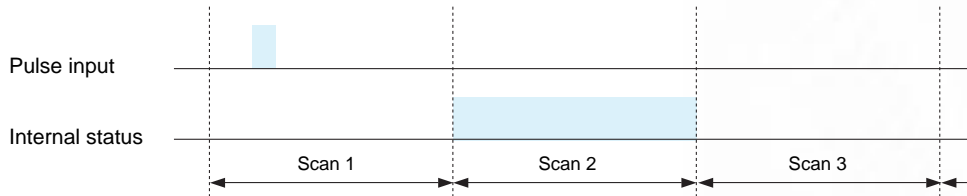

Pulse Output (built-in, TR type)

One high-frequency pulse output(max. 2kpps) enables to build stepping motor and simple positioning control systems.

IMO
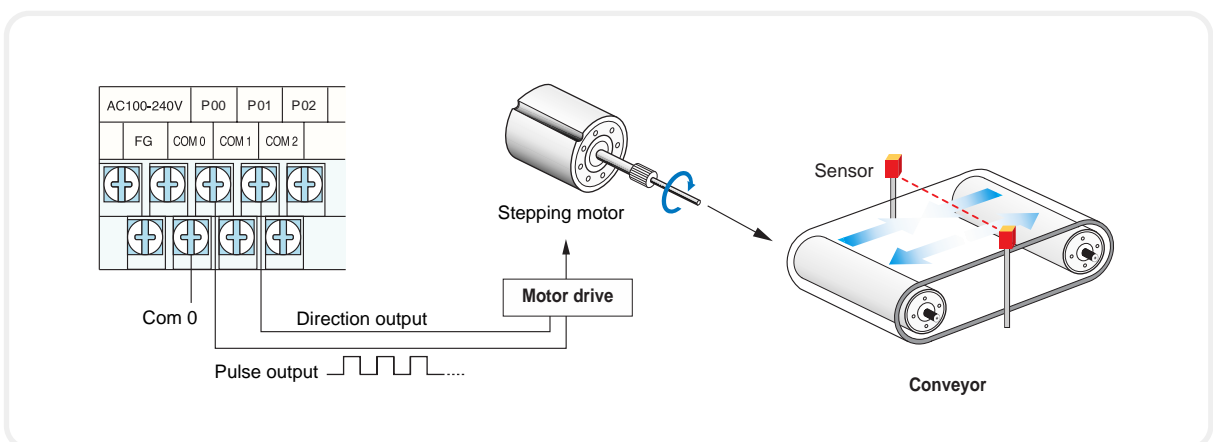
⊙ Eight(8) Pulse catch Inputs (built-in)

Pulse catch inputs can capture fast pulse inputs that cannot normally be detected during the nomal input cycling.
Max. 8 different pulse catch inputs(P000~P007) are available and pulses with width as small as 0.2ms
can be captured. You can configure these inputs in the basic parameter setting of KGLWIN.

Pulse input

Internal status

| Scan 1 | Scan 2 | Scan 3 |

Flow Meter

Flow Meter

Watt Hour Meter

Watt Hour Meter

⊙ Discrete inputs with filters (built-in)

Inputs with filters prevent the CPU from reading abnormal inputs and reduce the possibility of input malfunction.
The fillter time can be programmed from 0 to 15ms in 1ms increments.

Filter time

Filter time

Input signal

Internal status

TIME

Input signal

Internal status

Shorter pulses than filter time are ignored

Communications
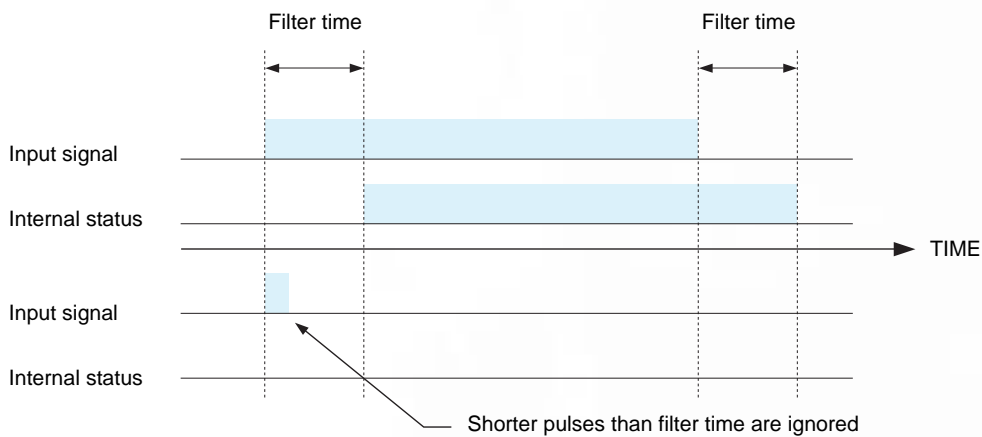
1:1 Direct Link
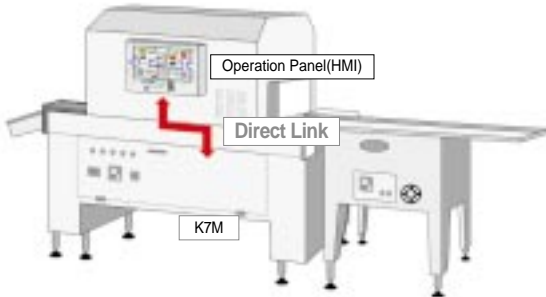
Application Example
Packaging Machine using Operation Panel

- Provides Additional RS232C Ch. via Loader Port.
- Direct Connection with Display Unit or HMI machine,etc.
- Can use Both Loader & Operation Panel
  ⇨ Convenient initial test Operation.
- 1:N Link available using RS232-422 Converter

Operation Panel(HMI)
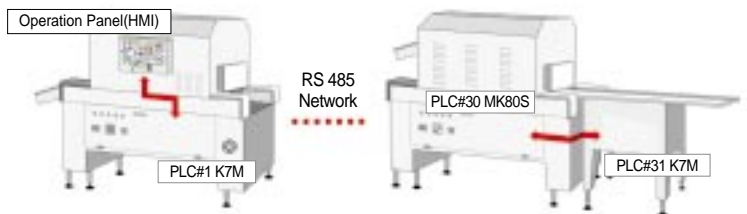
Direct Link

K7M

## 1:N Local Area Monitor & Control

Application Example
Complex Packaging Machine using Operation Panel & PLCs

- Provides 1:N Communications using RS485 Interface.
- Possible to manage a group of machines.

Operation Panel(HMI)

RS 485 Network

PLC#30 MK80S

PLC#1 K7M

PLC#31 K7M

N:N Distributed Control

- Provides N:N Communications using RS485 Interface without any Host.
- Possible to manage several groups machines.

PLC#4

PLC#3

PLC#2

PLC#5

PLC#1 K7M

PLC#6,7°¶
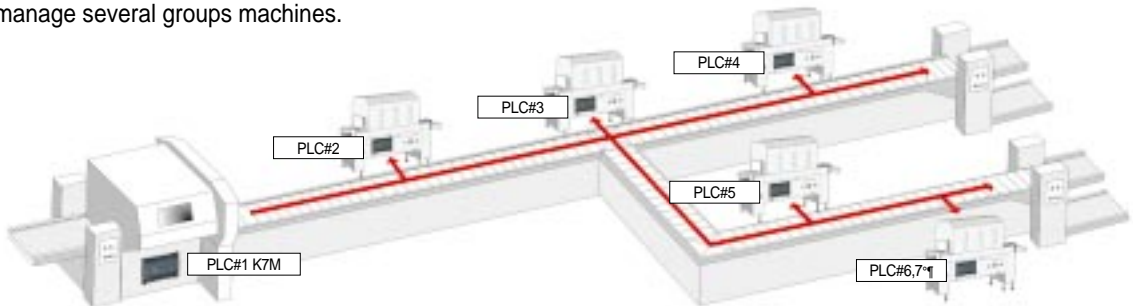
MODBUS Network Interface

- K7M Provides Industrial Standard Protocol like Modbus & User defined Protocol made by User.
- User can edit Link Characteristics & Protocol using User Defined Protocol (Stop Bit, Parity, Data length°¶)
- Frames to be sent or received can be created as required by user.

MODBUS ASCII / RTU Protocol

Converter

Network Master/Slave

PLC K7M

Master/Slave (Built-in port)

Slave

Slave
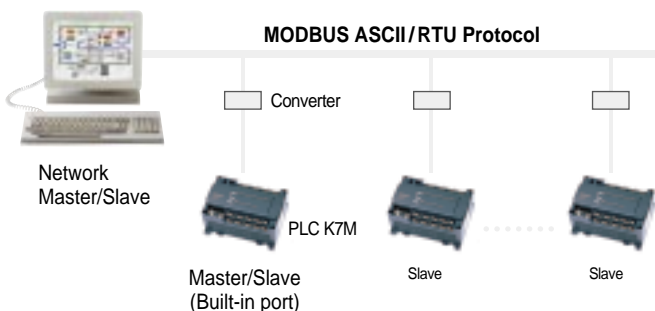
Modem Communication

Application Example
Water Treatment System in wide and long distance Area

- Modem enables Remote programming up to 100km
- Possible to program and monitor the PLCs via 2nd Level Link
- Low Cost TeleMetering & TeleControl System available

Modem

Modem

Wide Area Process

Control Center

Plant

PLC 1st Level

Plant

River

PLC 2nd Level

Booster Plant

Industry / Home

IMO
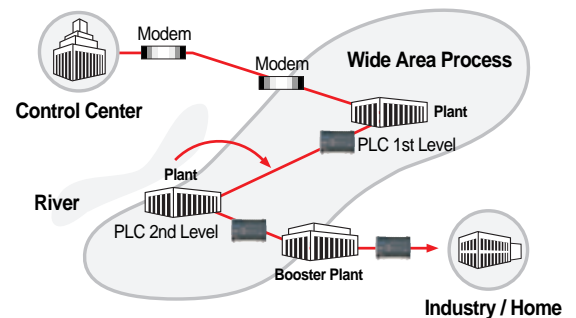
Overview

- Windows-based tool (Windows 95, 98 and NT)
- Applicable to all the MASTER-K series
- Ladder diagram, Mnemonic language supported
- Remote programming via network is available
- Several windows can be displayed in a screen
- Display the comments in a program Available all printers supported by Windows

On-line Editing

- Possible to Edit a program in RUN mode
- Forced I/O On/Off and change the value of data

Powerful debuggings

- Execution step by step
- Execution to a given step
- Execution till the data becomes a given value.
- Execution the cycles at the No. of given times

Multi-Window

On-line Editing

Debugging
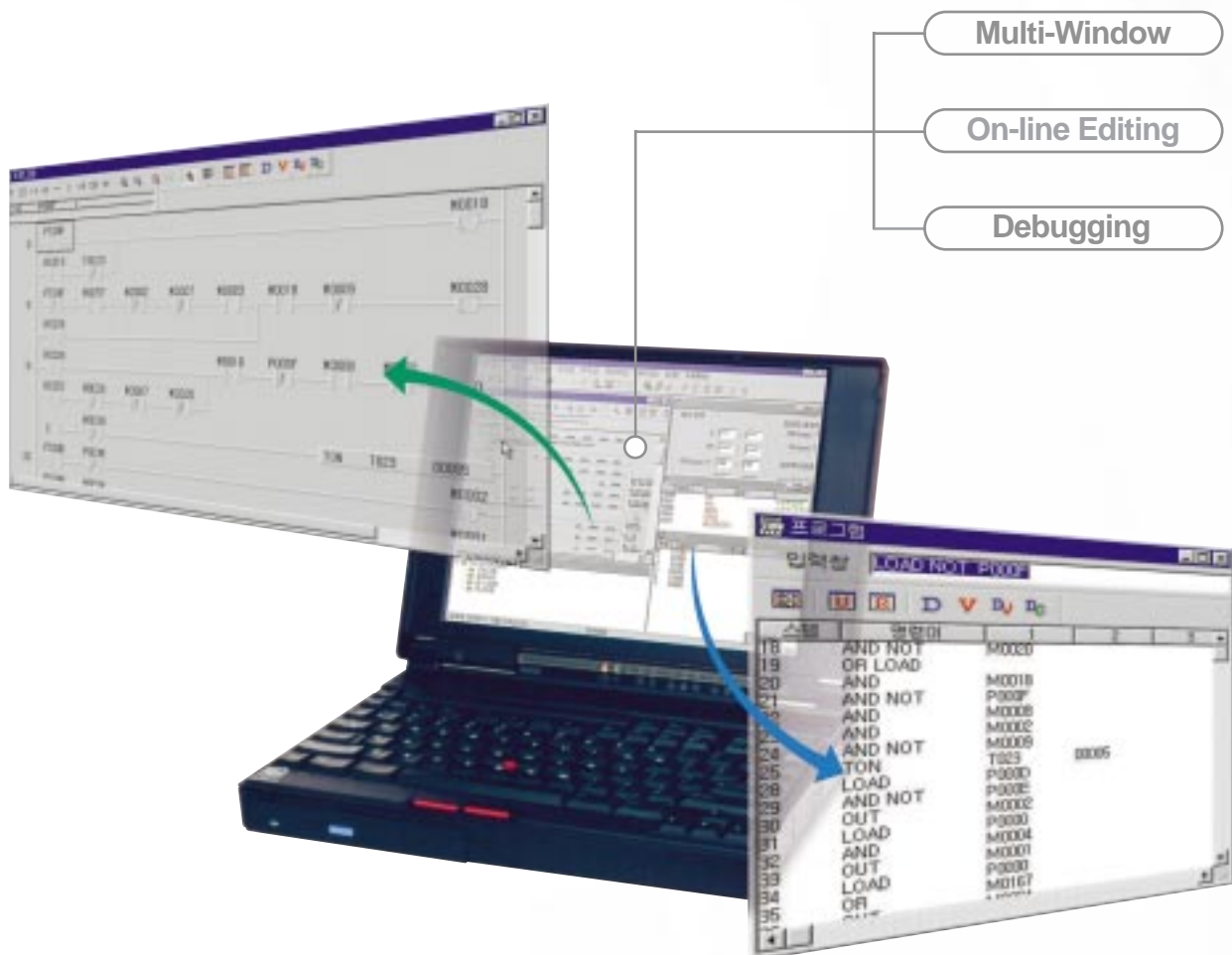
Specification

Perfomance specification of main module

Item		Specifications	Remarks
Program control method		Cyclic operation of stored program, interrupt task operation	
I/O control method		Refresh method, Direct I/O method	
Programming language		Mnemonic program Ladder Diagram	
No. of instructions	Basic	30 kinds	
	Application	218 kinds	
Processing speed		0.5 μs/step	
Program capacity		7ksteps	
I/O points		20 ~ 80 points	
Data memory	I/O area (P)	P0000 ~ P013F	
	Aux. Area (M)	M0000 ~ M191F	
	Keep area (K)	K0000 ~ K031F	Non volatile area
	Link area (L)	L0000 ~ L063F	
	Special area (F)	F0000 ~ F063F	
	Timer (T)	100ms : T000 ~ T191 10ms : T192 ~ T255	Changeable by parameter setting
	Counter (C)	C000 ~ C255	
	Step control area (S)	S00.00 ~ S99.99	
	Data register (D)	D0000 ~ D4999	
Built-in special function	PID control	Controlled by instruction Auto tuning, Forward/reverse action Forced output, Operation scan time setup	
	Cnet I/F Function (RS-232C)	Dedicated protocol MODBUS protocol User-defined protocol	
	High speed counter — Counting speed	1-phase: 16kHz(1 channel) 2-phase: 8kHz(1 channel)	
	High speed counter — Counting modes	3 counting modes - 1 phase, Up/down count with program input - 1 phase, Up/down count with B phase input - 2 phase, Up/down count with phase difference	
	High speed counter — Multiplication	select one of 1, 2, or 4	
	Pulse input	Pulse width: 0.2 ms, 8 points	
	Pulse output	1x 2 kHz (Transistor output only)	
	External interrupt	8 points, 0.4ms	
	Input filter	0 ~ 15ms	

*Remark) K7M-DR10S(/DC), K7M-DT10,:Built in RS232 and RS-485 I/F, not available for Cnet I/F module

IMO

Input

Item \ Type	K7M-DR10S(/DC) K7M-DT10S	K7M-DR20S(/DC) K7M-DT20S	K7M-DR30S(/DC) K7M-DT30S	K7M-DR40S(/DC) K7M-DT40S	K7M-DR60S(/DC) K7M-DT60S	G7E-DR10A -
Input Point	6	12	18	24	36	6
Insulation Device	Photo coupler					
Rated Input Voltage	DC12~24V					
Rated Input Current	DC12V 4.5mA, DC24V 9mA					
Operation Voltage	DC10.2~28.8V (Ripple : 5% or less)					
Max. Simultaneously On	100% Simultaneously on					
On Voltage / Current	More than DC9.5V/3.5mA (P000~P002 : 6.3mA)					
Off Voltage / Current	Less than DC5V/1.8mA (P000~P002 : 6.3mA)					
Input Impedance	About 2.7K Ω (P000~P002 : 1.5K Ω)					
Response Time — Off ⇒On	1~15ms					
Response Time — On ⇒ Off	1~15ms					
Operation Indicator	LED					
External wiring	Terminal block (M3 x 6 screw)					

* Remark K7M-DR10S/DC, DR20S/DC, DR30S/DC, DR40S/DC, DR60S/DC : DC 12~24V powered.

Output(Relay)

Item \ Type	K7M-DR10S(/DC)	K7M-DR20S(/DC)	K7M-DR30S(/DC)	K7M-DR40S(/DC)	K7M-DR60S(/DC)	G7E-DR10A
Output Pointt	4	8	12	16	24	4
Switching Device	Relay					
Insulation Device	Relay					
Rated Load Voltage/ Current	DC24V / 2A (Resistive load), AC220V / 2A (COS¨ ϕ=1) 1 Point 2A/1 Point/com, 4A/2 Points/com, 4A/4 Points/com					
Minimum Input	DC5V/1mA					
Max. Load Voltage	AC250V DC110V					
Max. Switching Frequency	1,200 Times/Hour					
Surge Killer	None					
Lifetime of Relay — Mechanical	Over 0.1 million times					
Lifetime of Relay — Electrical	Over 20 million times					
Response Time — Off ⇒ On	Within 10ms					
Response Time — On ⇒ Off	Within 12ms					
Operation Indicator	LED					
External wiring	Terminal block (M3 x 6 screw)					

Output(Transistor)

Item \ Type	K7M-DT10S	K7M-DT20S	K7M-DT30S	K7M-DT40S	K7M-DT60S	-
Output Pointt	4	8	12	16	24	-
Rated Load Voltage	DC 12/24					
Rated Load Current	0.5A/1 Point, 3A/1com					
Response Time — Off ⇒ On	Less than 2ms					
Response Time — On ⇒ Off	Less than 2ms					
Common Method	8 Points / 1com, Sink type					
Operation Indicator	LED					
Insulation Device	Photo coupler					
Surge Killer	Clamp diode					
Internal Power Consumption	170mA					

Option module

Option Module

Analog I/O module (G7F-ADHA)

Item			Specifications
A/D part	Analog input	Voltage	DC0~10V
		Current	DC0~20mA or 4~20mA
	Digital Output Resolution		12bit (0~4,000)
	Voltage/Current Selection		• Selected by dip switch • Short V and 1 terminal for current Input
	Analog Input Channels		2channels/module
	Absolute Maximum Input	Voltage	DC+12V
		Current	DC+25mA
D/A part	Digital Output Resolution		12bit (0~4,000)
	Analog Output	Voltage	DC0~10V (load impedance 2KΩ-1MΩ)
		Current	DC0~20mA (load impedance 560Ω)
			DC4~20mA (load impedance 560Ω)
	Voltage/Current Selection		Separated terminal
	Analog Input Channels		1channels/module
	Absolute Maximum Input	Voltage	DC+15V
		Current	DC+24mA
Maximum Resolution	DC 0~10V		2.5mV (1/4,000)
	DC 0~20mA		5 μA(1/4,000)
	DC 0~20mA		6.25 μA(1/3,200)
Accuracy			±0.5% or less (Full scale)
Conversion Time			Scan time+1.5ms/channels
Insulation Device			Photo coupler between Input terminal and ground (No insulation between channels)
External Wiring			14Point terminal block
Power supply			DC24V, 80mA
Current consumption			DC5V, 10mA
Weight			240g

Analog Potentiometer Module (G7F-AT2A)

- Four analog potentiometer can be used on the job manually to adjust set Points such as timer values of other variables, without going into PLC program.

- Adjustment can be made from the front part of the module using variable resistors
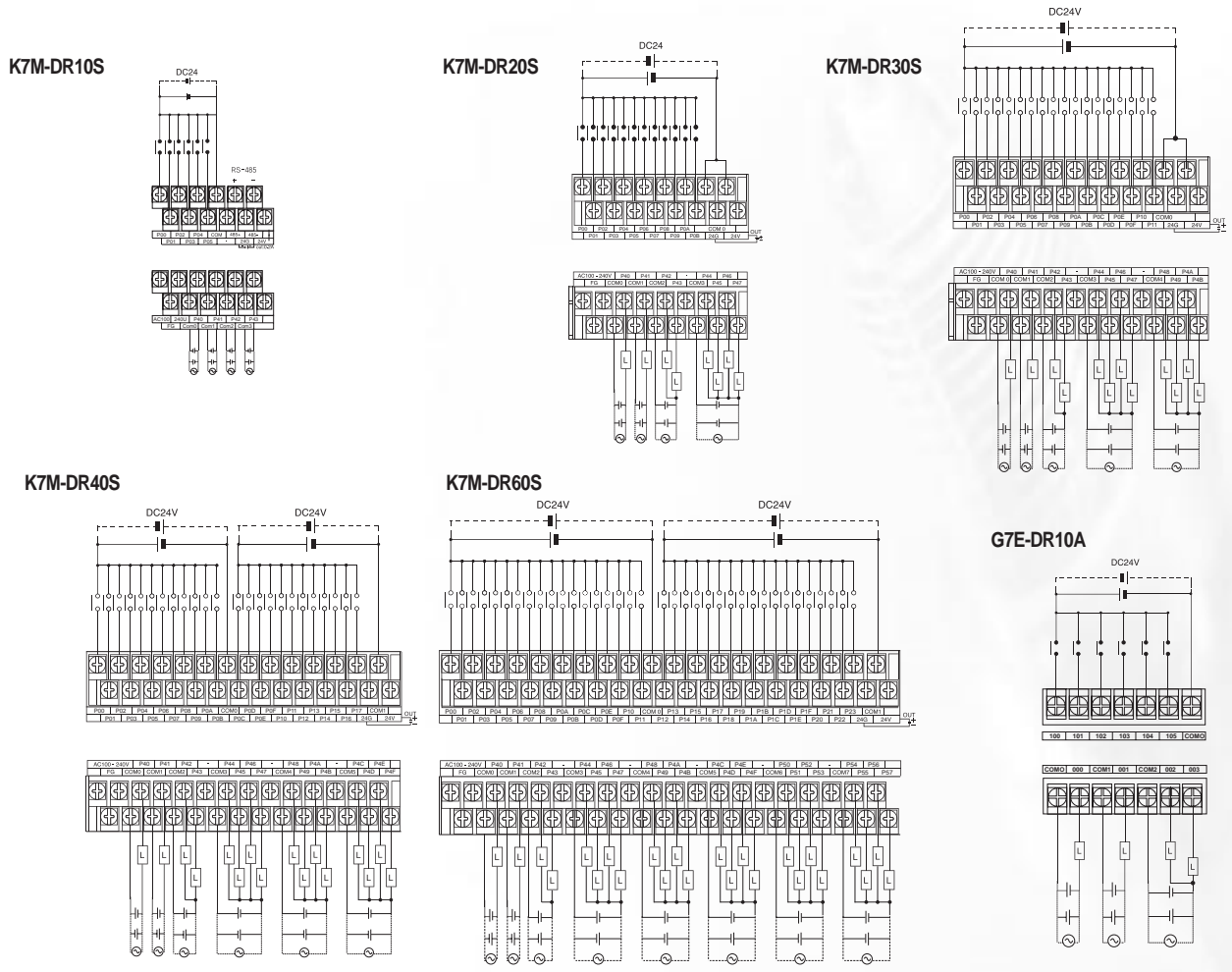
Item	Specifications
No. of Timers	4 Point
Digital Output Range	(8bit) 0~200
Timers Setting	Set by adjustable volume switch
Accuracy of Timer	±2.0% (Full acale)
Current Consumption	50mA
Weight	200g

Cnet I/F Module (G7L-CUEB, G7L-CUEC)

- RS-422/485 interface enables communication between computer and 32 PLCs using the multidrop System(G7L-CUEC)
- MODBUS Master/Slave mode can be used on a MODBUS RTU or ASCII mode
- Long distance communication through RS-232C modem connection(G7L-CUEB)
- Communication parameter setting can be made in Programming Tool(KGLWIN)

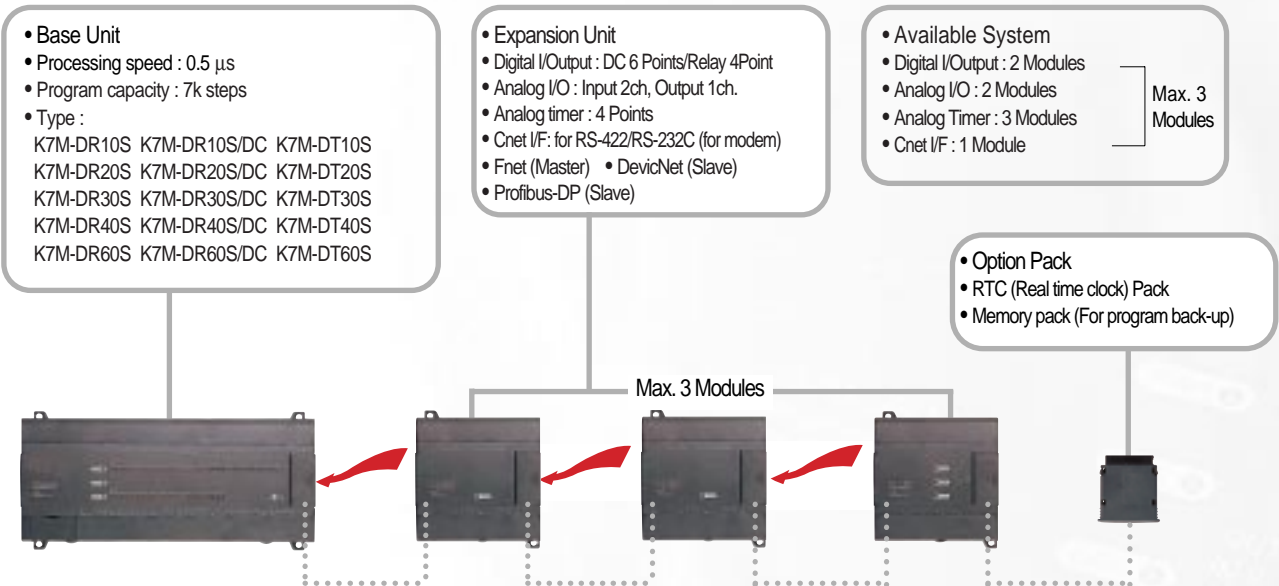| Item		Specifications
Mode		RS-422, Modem (RS-232C)
	Dedicated Mode	Supports multidrop/1:1 communication via LG dedicated protocol Supports high
		speed link service
	KGMWIN Mode	Supports remote control via MASTER-K PLC protocol
	Modbus Mode	Supports master and slave function with MODBUS Protocol (ASCII, RTU)
	User Mode	Operated with user-defined protocol
D/A part	Date Bit	7 or 8
	Stop Bit	1 or 2
	Start Bit	1 or 2
	Parity	Even / Odd / None
	Synchronization	Asynchronous method
	Transmission Speed	9,600/19,200/38,400/56,000/76,800/115,200/128,000 bps
	Setting Method	Parameter setting with KGLWIN software
	Max. Cable Length	500m
	Weight	180g

Power Specification

Item		Specifications	
	Type	AC Powered	DC Powered
	Rated Voltage	AC100~240 (Free voltage)	DC12~24V (Free Valtage)
Input	Input Voltage Range	AC85~264V	DC10.2~28.8V
	Frequency	47~63Hz	-
	Leakage Current	3mA or less (AC264V, 63Hz)	
	Dropout Tolerance	20ms or less	2ms or less
	Output Current	0.2A (Isolated from DC5V)	-
DC24V Output	Output Voltage	24V±10% (21.6~26.4V)	-
	Over-Current Voltage	0.22~1.5A	-

IMO

Wiring Diagrams

K7M-DR10S

K7M-DR20S

K7M-DR30S

K7M-DR40S

K7M-DR60S

G7E-DR10A

System Configuration

- Base Unit
- Processing speed : 0.5 μs
- Program capacity : 7k steps
- Type :
  - K7M-DR10S K7M-DR10S/DC K7M-DT10S
  - K7M-DR20S K7M-DR20S/DC K7M-DT20S
  - K7M-DR30S K7M-DR30S/DC K7M-DT30S
  - K7M-DR40S K7M-DR40S/DC K7M-DT40S
  - K7M-DR60S K7M-DR60S/DC K7M-DT60S

- Expansion Unit
- Digital I/Output : DC 6 Points/Relay 4Point
- Analog I/O : Input 2ch, Output 1ch.
- Analog timer : 4 Points
- Cnet I/F: for RS-422/RS-232C (for modem)
- Fnet (Master)   • DevicNet (Slave)
- Profibus-DP (Slave)

- Available System
- Digital I/Output : 2 Modules
- Analog I/O : 2 Modules
- Analog Timer : 3 Modules
- Cnet I/F : 1 Module

Max. 3 Modules

- Option Pack
- RTC (Real time clock) Pack
- Memory pack (For program back-up)

Max. 3 Modules

Memory pack
*When only basic unit is used : connect to the expansion connector of the basic unit.
*When expansion unit is used : connect to the expansion connector of the last connected expansion unit.

Product list

| Type	Part Number	Specification		Power Supply	Remarks
Base Unit	K7M-DR10S	• 6 DC 12/24V Inputs	• 4 Relay Outputs	AC85~264V (Free voltage)	*1
	K7M-DR20S	• 12 DC 12/24V Inputs	• 8 Relay Outputs		
	K7M-DR30S	• 18 DC 12/24V Inputs	• 12 Relay Outputs		
	K7M-DR40S	• 24 DC 12/24V Inputs	• 16 Relay Outputs		
	K7M-DR60S	• 36 DC 12/24V Inputs	• 24 Relay Outputs		
	K7M-DT10S	• 6 DC 12/24V Inputs	• 4 Transistor Outputs		
	K7M-DT20S	• 12 DC 12/24V Inputs	• 8 Transistor Outputs		
	K7M-DT30S	• 18 DC 12/24V Inputs	• 12 Transistor Outputs		
	K7M-DT40S	• 24 DC 12/24V Inputs	• 16 Transistor Outputs		
	K7M-DT60S	• 36 DC 12/24V Inputs	• 24 Transistor Outputs		
	K7M-DR10S/ DC	• 6 DC 12/24V Inputs	• 4 Relay Outputs	DC12~24V (Free voltage)	
	K7M-DR20S/ DC	• 12 DC 12/24V Inputs	• 8 Relay Outputs		
	K7M-DR30S/ DC	• 18 DC 12/24V Inputs	• 12 Relay Outputs		
	K7M-DR40S/ DC	• 24 DC 12/24V Inputs	• 16 Relay Outputs		
	K7M-DR60S/ DC	• 36 DC 12/24V Inputs	• 24 Relay Outputs		
	Built-In functions	• Programming capacity : 7K steps • 1 High speed counter (16 KHz for 1 Phase, 8 KHz for 2 Phases) • 8 PID Loops with auto Tuning • 8 Pulse catch Inputs (Min. 0.2ms) • Discrete Inputs with filters (0~15ms, each 1ms) • 8 External Interrupt Inputs (0.4ms) • 1 RS-232C and 1 Loader port (Dedicated, userdefined, Modbus protocol available)			*2
Exp. Module	G7E-DR10A	• 6 DC 12/24V Inputs	• 4 Relay Outputs		
	G7F-ADHA	• 2 Analog Inputs	• 1 Analog Outputs		
	G7L-CUEC	• RS-422/485 Communication module			
	G7L-CUEB	• RS-232C Communication module (Modem available)			
	G7L-PBEA	• Profibus-DP slave module			
	G7F-AT2A	• Analog potentio meter, 4 points			
Exp. Pack	G7E-RTCA	• Real time clock pack			
	G7M-M256	• Flash memory pack for program back-up (256Kbytes)			

*1 1 Buit-In High speed counter : 1 phase 16K pps, 2 phases 8K pps
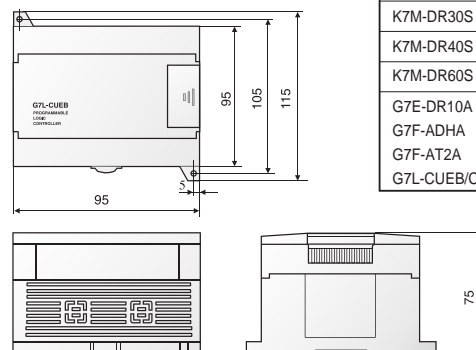*2 K7M-DR10S (/DC), K7M-DT10S : built-In 1 RS-232C port and 1 RS-485 port available

Dimensions

1. Main unit
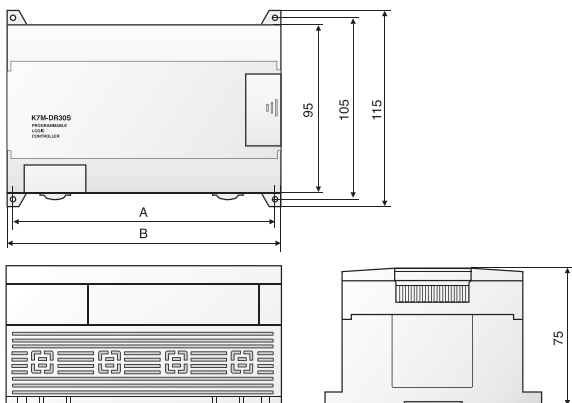
2. Expansion modules

(Unit : mm)

	A	B
K7M-DR10S	85	95
K7M-DR20S	135	145
K7M-DR30S	135	145
K7M-DR40S	165	175
K7M-DR60S	215	225
G7E-DR10A G7F-ADHA G7F-AT2A G7L-CUEB/C	85	95