KEYENCE

NEW

NEW UNITS RELEASED

Introducing a New High-Speed Processor

PROGRAMMABLE CONTROLLER

KV-5000/3000

REALTIME
Logic Controller

Bluetooth unit

Input/output hybrid unit

A/D, D/A conversion hybrid unit

Temperature/ analogue multi-input unit

CE c UL us LISTED

Programmable Controller
KV Series General Catalogue

[A NEW line-up that includes 11 types of expansion units]

The ultra high-speed KV-5000/3000 PLC delivers real-time control

CPU Unit

KV-5000

Ver. UP

REALTIME Logic Controller

Network capability is a standard function,
thus making it superior to the conventional models.

KV VELOCE II	260k-step large capacity	Inbuilt Ethernet port
USB port	Inbuilt I/O	Structural programming
KV Script	Easy PLC link	FTP client

Network

KV-5000

PLC networking performance is highly enhanced by the built-in Ethernet/ FL-net function.

Ultra-High Speed

KV-5000 KV-3000

The new KV VELOCE (II) ladder execution engine is used and a 60k-step ladder can be executed in 1ms.

High capacity memory

KV-5000 KV-3000

Large capacity SDRAM is used to handle large programmes, so you don't have to spend extra money to increase the memory.

KV Script

KV-5000 KV-3000

KV Script can programme formulas or character strings directly. It reduces programming efforts considerably.

CPU Unit

KV-3000

Ver. UP

REALTIME Logic Controller

The ultra high-speed PLC
has a wide range of applications

KV VELOCE (II)	160k-step large capacity	USB port
Inbuilt I/O	Structural programming	KV Script

CPU Unit

KV-1000

Ultra high-speed and multi-range PLC

KV VELOCE	160k-step large capacity
USB port	Inbuilt I/O
Structural programming	KV Script

CPU Unit

KV-700

Standard speed, multi-range PLC

USB port	Inbuilt I/O

High-performance KV Series Lineup:

○: Available

The model represents:		KV-5000	KV-3000	KV-1000	KV-700
Basic instruction execution speed		10 ns	10 ns	25 ns	100 ns
Floating number operation	Addition & subtraction operation	0.11 µs	0.11 µs	0.28 µs	8.7 µs
	Multiplication operation	0.13 µs	0.13 µs	0.33 µs	8.3 µs
Programme size		260 k	160 k	160 k	16 k*1
Max number of I/O points		3096 points	3096 points	3096 points	3086 points
CPU inbuilt I/O points		16 points/8 points	16 points/8 points	16 points/8 points	10 points/4 points
Communication port	Serial	—	○	○	○
	USB	○	○	○	○
	Ethernet	○	—	—	—
	Bluetooth	○*2	—	—	—
Memory card slot		SD	SD	SD	MMC
Structural programming		○	○	○	—
Fixed-cycle module		○	○	—	—
Local device		○	○	○	—
Local tag		○	○	—	—
KV Script		○	○	○	—
Macro function		○	○	○	– —

*1. Can be scaled up to 32k steps. *2. KV-BT1 Bluetooth unit required.

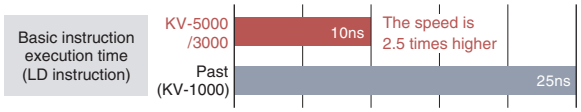
High-speed processor

The new KV VELOCE (II) ladder execution engine is used

The highly-acclaimed 32 bit ladder execution engine “KV VELOCE” is further optimised. And a 60k-step ladder can now be executed only in 1ms, therefore ensuring high speed control and reliability for any application.

Instruction execution speed is increased by 2.5 times

"KV VELOCE(II)" is much faster than previous products.

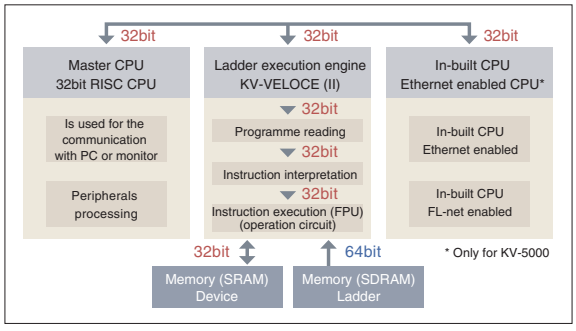


32bit processing

32-bit processing is enabled for CPU/data transfer/internal operations. As a result, extensive 32-bit operation instructions (2-word and floating number operation) can be used without affecting the speed.

FPU (Floating Point Unit)

Integrated FPU allows a best in its class, real time operating capacity.



260k-step large capacity*

Integrated 64bit SDRAM. Best in its class, high capacity memory delivers ultra high-speed access to KV VELOCE II. Ultra high-speed and high capacity indeed.

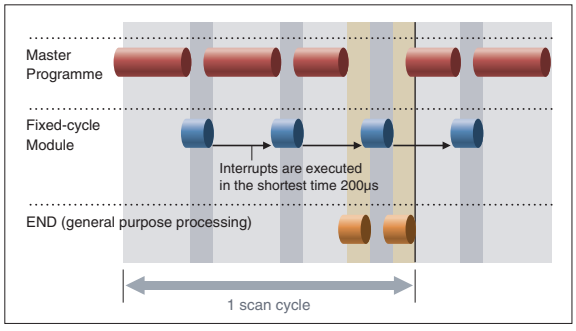
* Only for KV-5000. KV-3000/KV-1000 is 160k step

Scan time fluctuation suppression

The ultra fine task control of the CPU Master allows a less than 10 µs scan time fluctuation.

Fixed-cycle Module

Unmatched 0.2 ms execution cycle is provided by the Fixed-cycle Module. Whenever a fixed scan time is required, this allows the fixed time to be free from influences caused by master programme load changes.



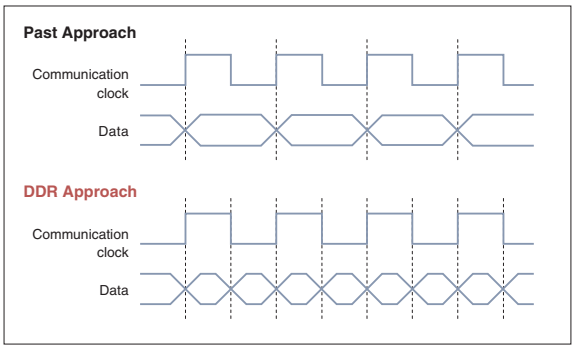
Twice as fast

DDR-based bus communication "V-BUS RT"

While the interchangeability is the same as past models, communication speed has been greatly increased between the CPU and various extension units. The combination of real-time PLC and extended unit delivers the highest performance in the industry.

DDR (Double Data Rate)

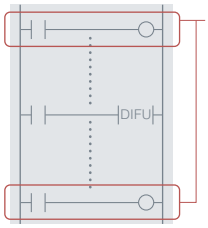
"V-Bus RT" has backwards compatibility with previous units, however for the communication with an extension unit, the "V-BUS RT" uses DDR technology.



Real-time programme transfer

High-speed programme transfer is possible.

- Online programme transfer is achieved in less than 3 seconds (when USB is used)
- The delay of scan time is less than 2 ms in programme transfer.
- Only the programme block is transferred during RUN write.



Changed

(Past) In the case where two points are changed, the in-between circuit block is rewritten and differential instructions are initialised.

(Real-time PLC) Only the changed part is transferred. Other parts are not changed.

* For more information, please refer to the user manual.

Real-time expanded unit

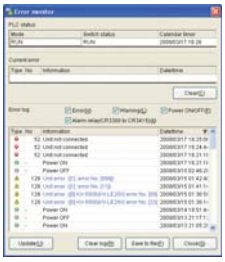
17 new expanded unit models that support DDR are added. The refreshing speed is reduced by half.

Direct refreshing

Direct I/O status refreshing can be enabled during programme execution by the expansion unit. Ultra high-speed processing is done in less than one scan cycle.

Enhanced Error Monitoring

Among others, the PLC's error monitoring performance is further enhanced. Logs for errors, alerts, precautions, and power ON/OFF are kept and displayed. Depending on the project, actions of the CPU Unit can also be specified. In addition, a window displays error confirmations and clearings.



High-performance CPU that is unmatched in the industry.

Ver.UP Network-enabled CPU

CPU-internal Ethernet/FL-net function/CPU-internal I/O function

As part of its standard configuration, the KV-5000 CPU unit is equipped with an Ethernet port which can be used in an extremely wide range of applications, such as communicating with a PC, PLC linking, and debugging over a network. The applications possible are extremely wide and varied. Standard CPU Unit is equipped with 16 inputs/8 outputs used for variable applications. Interrupt, positioning or high speed counters are possible for small-scale control or back up for emergency handling.

Ethernet functions

Easy PLC link function NEW

Programme-free PLC linking has been achieved with Ethernet, in which, socket communication programmes are required in the past. Connections such as those with a touch panel or a PC can be used in combination with other Ethernet communications to perform PLC linking.

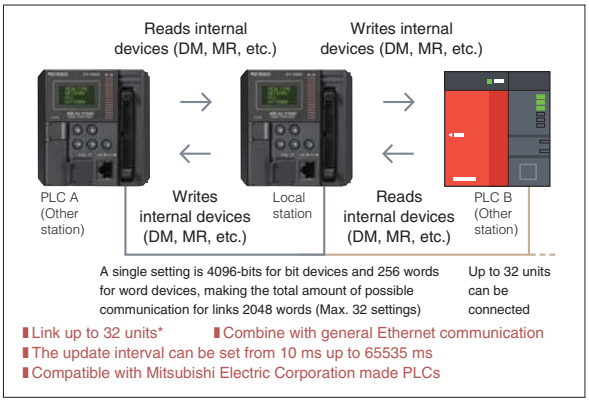
Local station (Master side that sends and receives communication)

	Target PLC/Ethernet unit
KEYENCE Corporation	KV-5000 Ver.2 (Built-in Ethernet port) KV-LE21V*

Other station (Slave side that sends and receives from the local station)

	Target PLC/Ethernet unit
KEYENCE Corporation	KV-5000/KV-5000 Ver.2 (CPU built-in Ethernet port) KV-LE21V, KV-LE20V*
Mitsubishi Electric Corporation	QnUDE (H) (CPU built-in Ethernet port) QJ71E71-100 (Q-Series Ethernet unit), A1SJ71EN3-T (A-Series Ethernet unit)

*Compatible with KV-5000/3000 CPUs

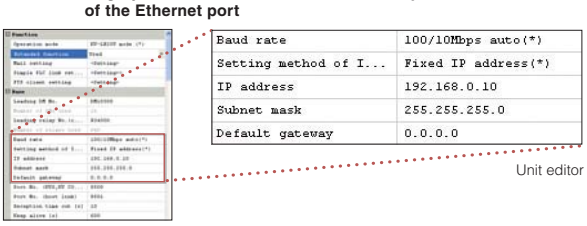


- Link up to 32 units*
- Combine with general Ethernet communication
- The update interval can be set from 10 ms up to 65535 ms
- Compatible with Mitsubishi Electric Corporation made PLCs

*Can individually specify continuous bit devices and word devices in the settings. In settings, it's possible to specify "read", "write", and "transfer" for up to 32 settings.

Communication programmes are not required and it's possible to perform easy PLC linking in just two steps

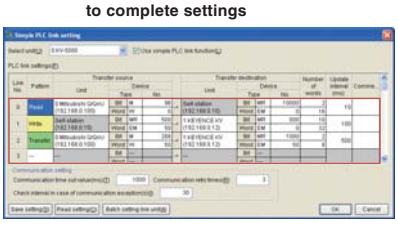
STEP 1: Align your unit with the communication specifications of the Ethernet port



Baud rate	100/10Mbps auto(*)
Setting method of I...	Fixed IP address(*)
IP address	192.168.0.10
Subnet mask	255.255.255.0
Default gateway	0.0.0.0

Unit editor

STEP 2: Then decide on the communication device and update cycle to complete settings

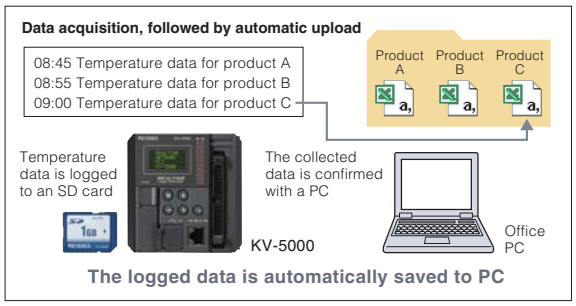


Easy PLC link settings window

Ethernet functions

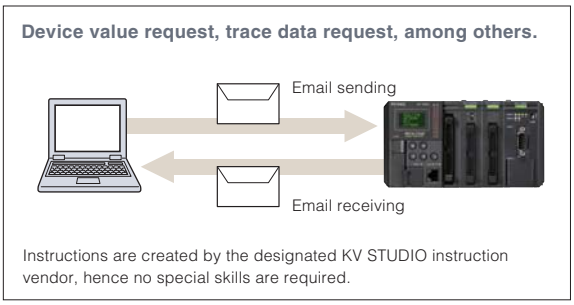
FTP Client functions NEW

Can transfer PLC device values and logging data files at any given timing, to a device such as a PC. For example, it can automatically upload data that has been collected with the KV-5000/30000 CPU built-in logging/trace functions, to a device such as a PC, in CSV format.



Emailing

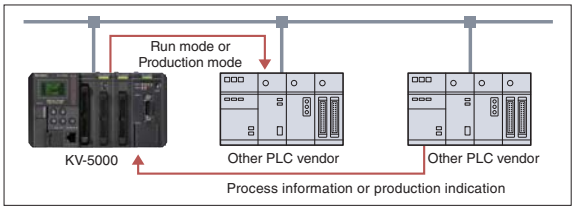
This is used to monitor CPU alarms or device value changes and sends email to PC's. No programming is required. An instruction can be sent by email and a response can be returned by email.



FL-net enabled

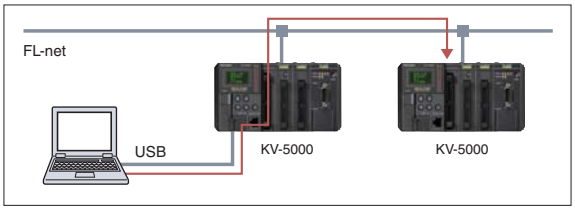
PLC linking

Up to 8192 points of data memory + 8192 points of relay are supported by the CPU Unit. The open FL-net network makes it possible to communicate with other FL-net supported equipment.



FL-net based programme transfer

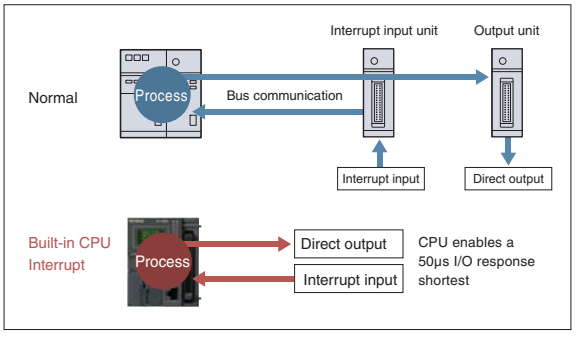
To improve programming efficiency in system building or field maintenance, programmes can be transferred and monitored using the CPU unit over the FL-net network.



Built-in I/O

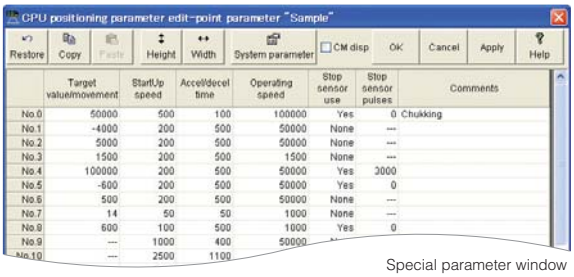
10-point interrupt input

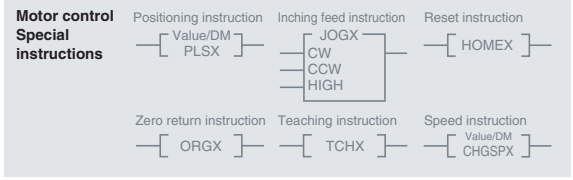
Allows ultra high-speed interrupt processing with a response speed less than 15µs. The built-in CPU interrupt input is linked directly with “KV VELOCE II”, allowing ultra-high speed processing without being affected by the bus transfer rate.



Motor control

Less than 30µs ultra-speed startup. Built-in 2 axes. The Point Parameter window or special instruction allows easy positioning.





High-speed counter

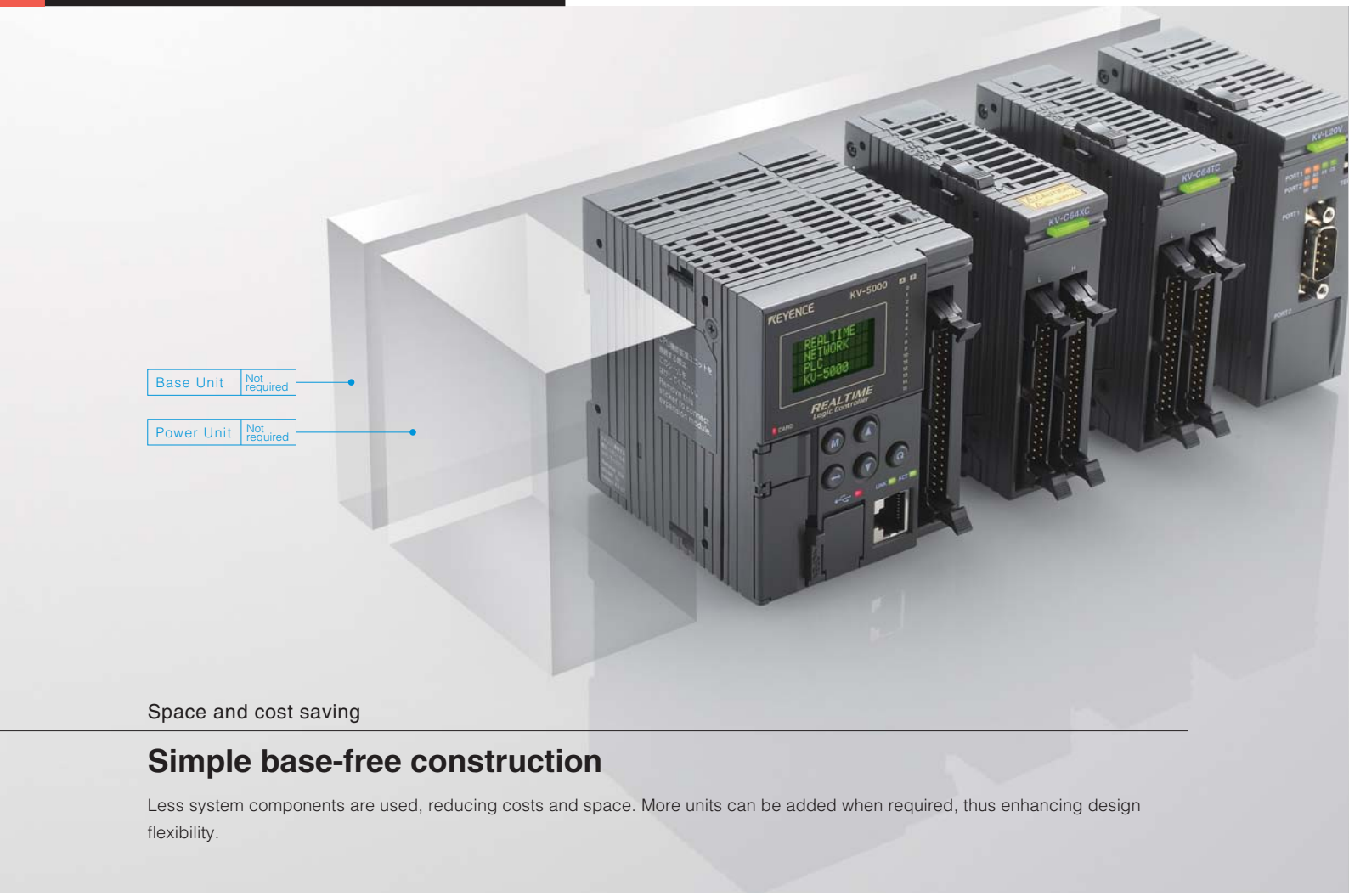
Max 100kHz (phase difference 50kHz). Double channel allows differential line drive input.

Cam switch

Only ABS/INC is required. Up to 32 outputs can be provided, with the unit being 0.1 degree. Zero degree tuning is supported, which can easily be done with special instruction.

Tachometer

Automatic operation and frequency (Hz)/rotation speed (rpm) storage when loading pulse input. Setup is only required for first time use. Forward/reverse rotation can be identified. Double- channel can also be used.



Space and cost saving

Simple base-free construction

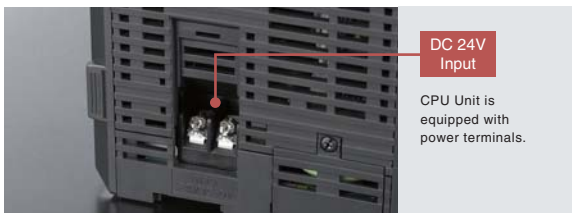
Less system components are used, reducing costs and space. More units can be added when required, thus enhancing design flexibility.

Base-free construction

The connector on one side of the CPU Unit can be used to connect expansion units. DIN rail mounting is possible, making it easy to be mounted in a control cabinet. Adding additional units is easy.

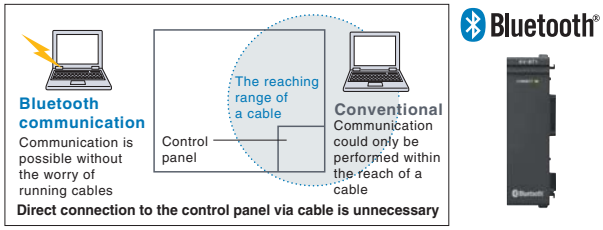
No Power Unit is required

DC24V is provided by the Power Unit in the CPU. You can also use the DC24V power supply in the control cabinet to save costs.



The industry's first Bluetooth unit KV-BT1 NEW

Using the wireless communication unit eliminates the restriction of transfer cables and makes it possible to perform debugging while viewing the operational parts of the equipment or transfer programmes to multiple PLCs without connecting and changing cables.



*Compatible with KV-5000 CPU Ver.2 or later
(Confirm the version by checking the sticker on the side of the main unit.)

USB port is equipped for all the standard models.

A standard USB cable can be used to enable high-speed data transfer to the PLC during startup and for maintenance.

Memory card slots are provided for all the standard models

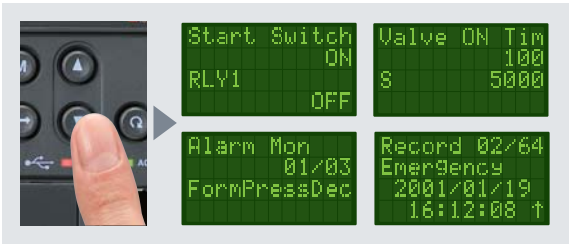
All the standard models are equipped with an SD slots (MMC card for KV-700). These can be used for saving, reading, or a data log.

Super Access Window and Direct Access Switch

CPU or device information can be monitored and changed from the Super Access Window without using a PC. In addition, Expansion Unit status or errors can be identified by pressing the Direct Access Switch.

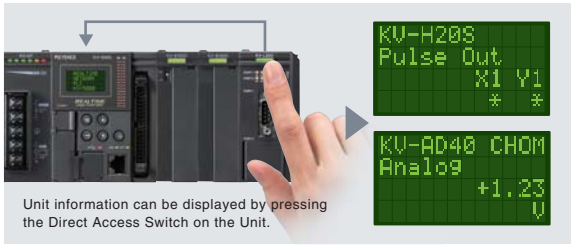
CPU monitoring

Buttons on the CPU Unit can be used to monitor and change devices as well as to display device comments or alert messages.



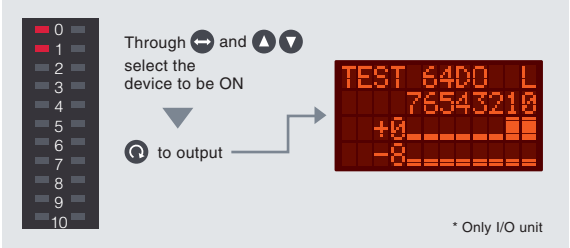
Unit monitoring

Unit settings or status can be checked by pressing the Direct Access Switch of Expansion Unit. Unit status can be checked without using the PLC programme.



I/O calibration

Input Confirmation and Force Output can be enabled through Direct Access Switch and CPU button. I/O calibration can be done even without using a program transfer.

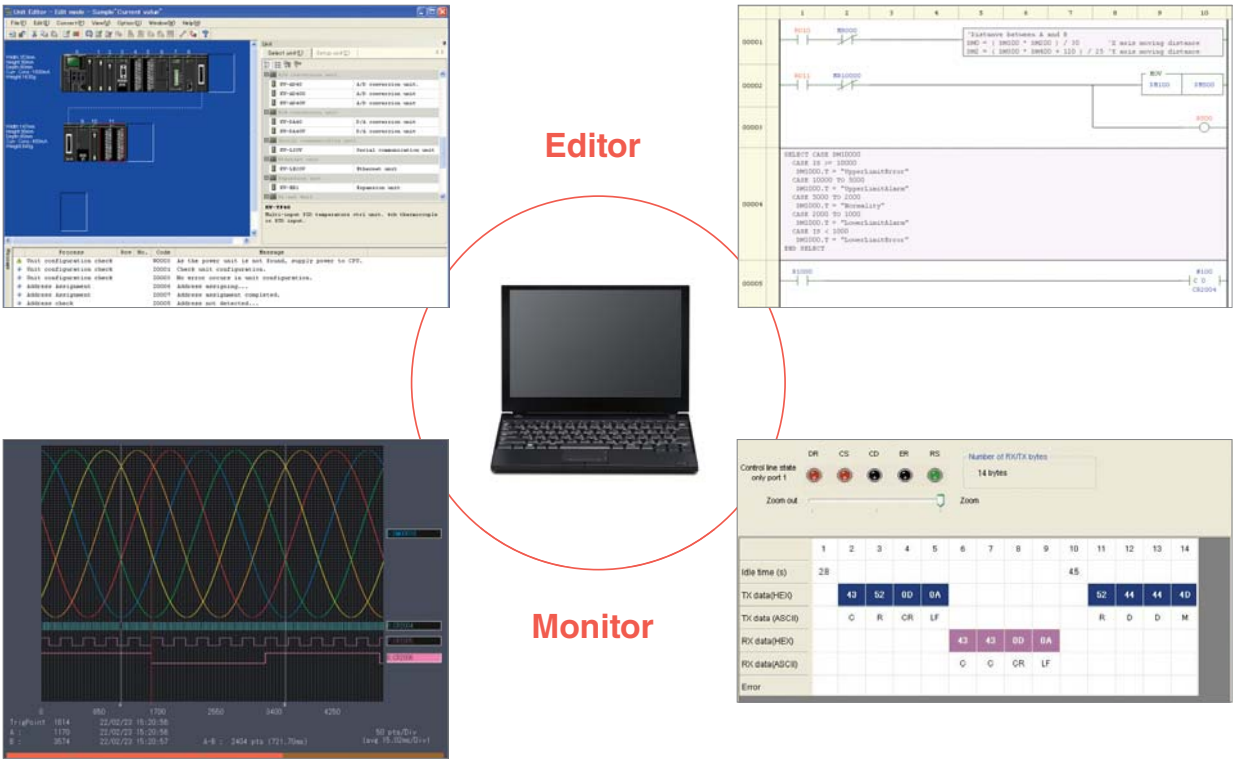


Error message display

In addition to error code, error details are displayed,allowing any error to be known immediately without referring to the manual.

Ladder support software that can be operated intuitively

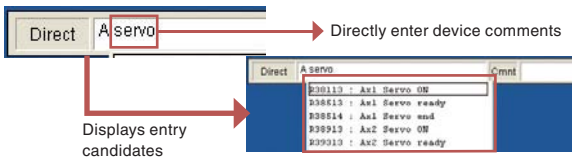
KV STUDIO Ver.6 NEW



New functions that further improves the efficiency of programming and debugging

RT Edit INDUSTRY FIRST

During key entry, instead of device numbers, entry candidates are displayed by directly entering instructions and device comments. This allows you to achieve intuitive programming.



Differential monitor NEW

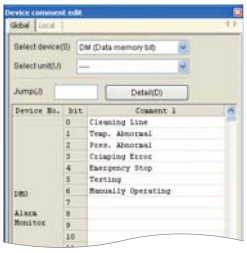
Confirming the detection of rising and falling signals, which was difficult to do visually with conventional monitors, can now be confirmed with count display and sound. Because there is no need to add extra detection confirmation programmes, debugging efficiency is improved.

PID instructions with auto-tuning NEW

Instructions that posses PID control and auto-tuning functions have been prepared. This allows you to easily use PID control, which typically possesses an extremely high level of difficulty and takes time and effort to adjust.

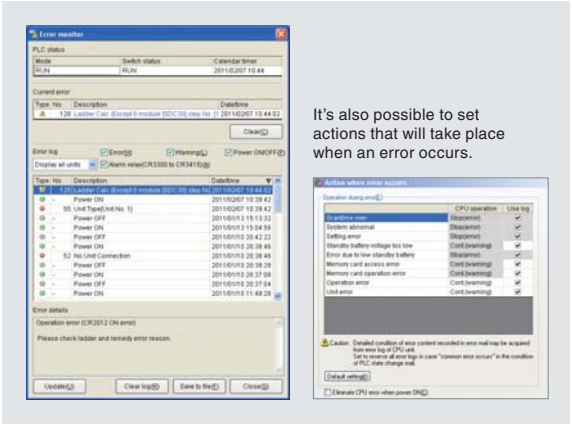
Supports device comments in word bit units NEW

Possible to enter device comments by each bit unit of the word device. Even when you do not want to use a multiple bit devices, word devices have been made easy-to-use, just like using bits. Also, not only is it possible to enter device comments for each bit unit, comments can be entered as words as well.



Error monitor

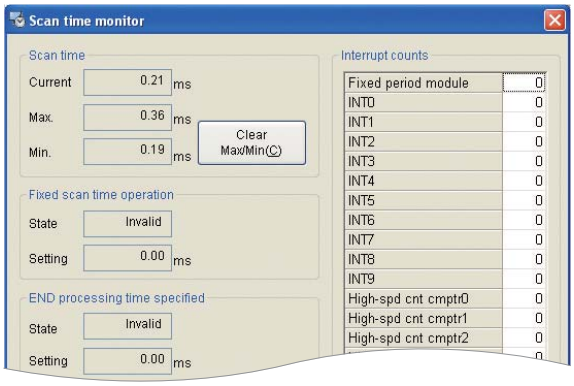
The error monitor function has been enhanced to improve reliability, availability, and serviceability. This function can keep logs for errors, alerts, precautions, and power ON/OFF.



It's also possible to set actions that will take place when an error occurs.

Scan time monitor

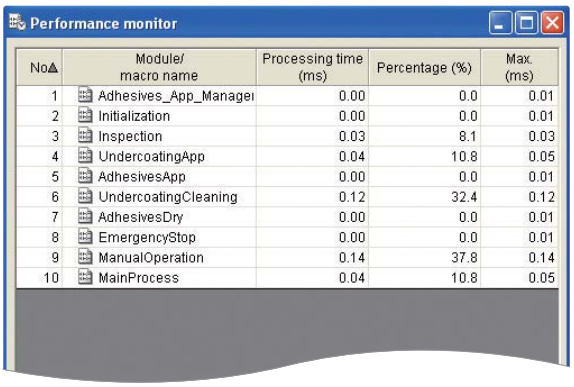
Can precisely understand conditions in which there are variations or interruptions in scan time, and thus demonstrates its power during control debugging that requires high-speed processing.



Performance monitor

NEW

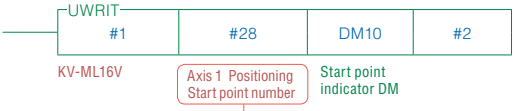
Can monitor the individual execution times in module/micro units and interrupt programme units, making it easy to adjust start-up timing.



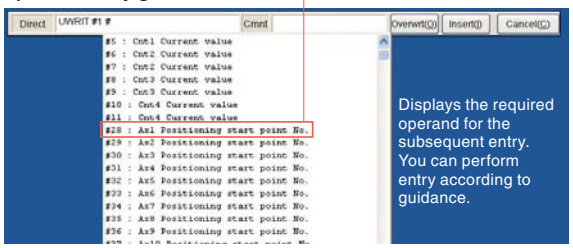
Buffer memory comment display

NEW

It's now possible to display comments that have been assigned to the buffer memory of the expansion unit.



Further convenience with operand entry guidance



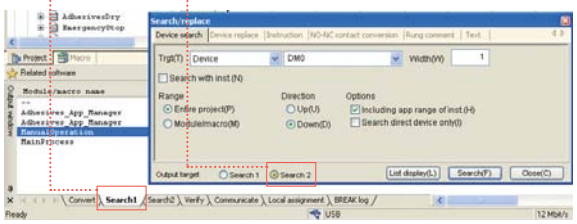
Search function

Ver. UP

Search history can be stored to memory, thus making it possible to continue directly with linked devices and perform searches.

"**Search 1**", "**Search 2**"

SHORTCUT ENTRY: **Ctr + F**

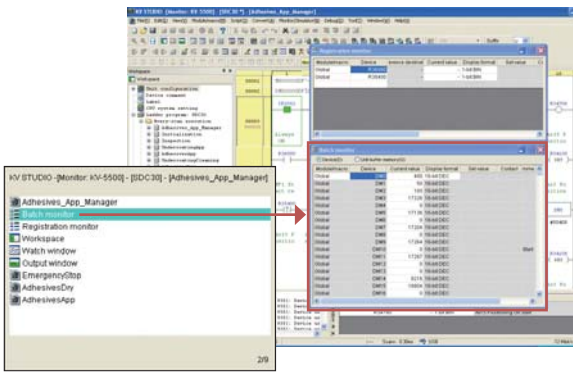


Window switch function

Ver. UP

Displays a navigation window when switching windows, making it possible to smoothly move to a given location.

SHORTCUT ENTRY: **Alt + F6**



Real-Time PLC

Hardware processing performance of the CPU unit is maximised by the KV Script.

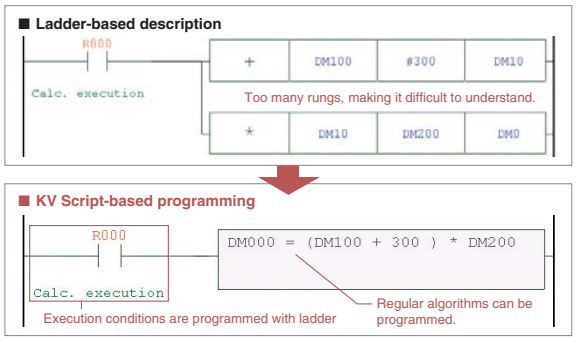
Ver. UP Programming time is significantly reduced by the direct programming algorithm.

"KV Script" can co-exist with the ladder.

Complicated programmes may make the CPU processing speed ineffective. To maximise the CPU processing performance, easy-to-use programming patterns are used by the KV Series.

Directly programmable algorithms

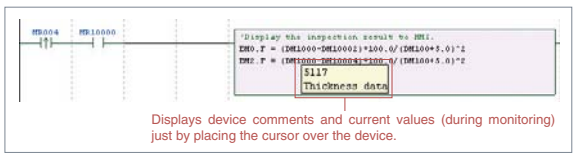
Easy-to-programme algorithms allow a significant reduction of rungs.



The "tool tip monitor"- useful for device monitoring

NEW

Device comments and current values (during monitoring) are displayed just by placing the cursor over the device. Using this in combination with the "watch window", which can monitor all devices currently in-use, makes it even easier to debug KV Script monitoring.

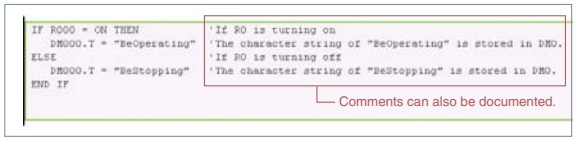


Character strings can be directly programmed

Character strings that are difficult to handle in a ladder can be directly declared. As a result, processing control for product name or batch number-based character strings becomes easier.

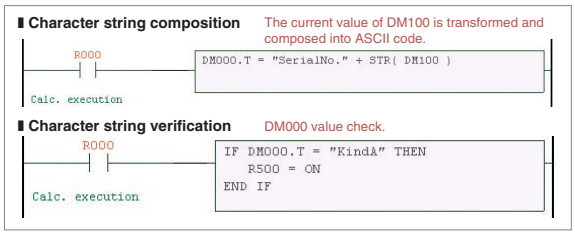
Control statements can be programmed

Various advanced processing statements and functions are provided. Even programmes that are hard for a ladder to handle now become easier.



Simple character string composition/verification

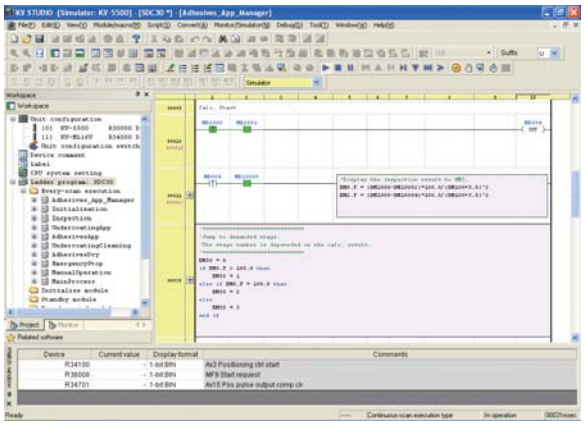
Like algorithms, character strings can also be easily composed or verified. This makes it easy to understand without considering the number of devices being used or ASCII codes.



Ver. UP Legibility has been further improved

True script programming with the PLC

KV Script has been upgraded, making it even easier to view and use. Also, KV Script supports programming with local and array variables. It can support true script programming as well.



Displays comments and labels in an easy to recognise manner NEW

Devices, constants: Black	Functions and syntax: Blue
Comments: Green	Global labels: Light blue
Local labels: Brown	Character strings: Red

Contents which conventionally, were not colour-coded unless selected, are now always colour-coded and displayed. This reduces miss-entry and creates programmes that are even easier to view.

Local variables (label) are supported

Local variables (label) which do not affect other modules can be used. Meaningful terms can be defined without considering specific PLC device codes, thereby allowing more familiar programming.

Sample local variable program

```
'***Natural logarithm setting
e = 2.718281828

'***Power-supply voltage setting
Vcc = 5

'***Setting of bleeder resistance of power supply side
Rg = 4700

'***Setting of thermally sensitive resistor B
Br = 3860

'***Resistance of thermally sensitive resistor at 25 degree C
Rg1 = 5000

'***Temperature setting
TT1 = 25

'***Kelbin setting
KK0 = 273.15
KK1 = KK0 + TT1

'***A/D value acquisition
AD = DM10100.S

'***Measurement voltage calculation
Vv = (Vcc / 4000 )
Vv = Vv *AD

'***Calculation of thermally sensitive
Rg2 = ( Vv * Rg )/( Vcc - Vv )

'***Temperature calculation from ther
KK2 = ( Br * KK1 * LOG(e) )/( Vcc -Vv
TT2 = KK2 - KK0

'***Processing according to temperature of thermally
'* 0-10
IF (TT2 > 0) AND (TT2 <= 10) THEN
 R500 = 1
'* 10-20
ELSE IF (TT2 > 10) AND (TT2 <= 20) THEN
 R501 = 1
'* 20-30
ELSE IF (TT2 > 20) AND (TT2 <= 30) THEN
 R502 = 1
'* 30-40
ELSE IF (TT2 > 30) AND (TT2 <= 40) THEN
 R503 = 1
'* 40-50
ELSE IF (TT2 > 40) AND (TT2 <= 50) THEN
 R504 = 1
'* 50-60
ELSE IF (TT2 > 50) AND (TT2 <= 60) THEN
 R505 = 1
'* 60-70
ELSE IF (TT2 > 60) AND (TT2 <= 70) THEN
 R506 = 1
'* 70-80
ELSE IF (TT2 > 70) AND (TT2 <= 80) THEN
 R507 = 1
'* 80-90
ELSE IF (TT2 > 80) AND (TT2 <= 90) THEN
 R508 = 1
'* 90-100
ELSE IF (TT2 > 90) AND (TT2 <= 100) THEN
 R509 = 1
'* 100 over
ELSE
 R510 = 1
```

Displays entire programmes in an easy to view manner with smooth scrolling NEW

[Conventional]

Scrolling for every block

When a lengthy KV Script programme has been programmed, scrollable units are determined.

[Ver.UP]

Smoothly scroll through entire programmes

With the smooth scrolling function, you can scroll through a programme one line at a time. Because it's possible to display the entire programme, creation and confirmation can be performed with ease, even for lengthy KV Script programmes that cannot be viewed all at once with the monitor.

```
'Initialization(Degree)
DM0.F = 0
DM2.F = 90
DM4.F = 120
DM6.F = 180
DM8.F = 240
DM10.F = 270
'Initialization(Time)
DM1000.L = 1

'Input speed of each axis
DM20.L = 1000000
DM22.L = 20000 'Target speed of AX1
DM24.L = 20000 'Target speed of AX2

if DM20.L = 0 then
    DM0.F = 0
    DM20.F = abs(DM10.F)
else if DM20.L = 10 then
    DM0.F = 15
    DM20.F = abs(DM8.F)
else
    'Calc the degree
    DM14.F = acos(DM20.L/DM12.L)
end if

'Alarm display
if EM0 > 1000 then
    E10.T = "Error"
else
    E10.T = "Normal"
end if
```

Array variables

Array variables allow a simplified processing of large volume of project data such as XY coordinates. Up to 8 dimensional arrays can be defined.

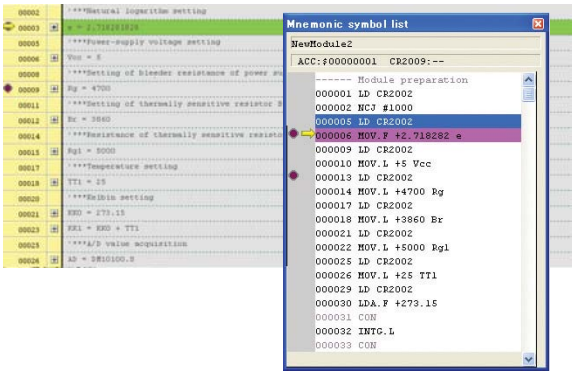
Sample array variable programme

```
'X and Y coordinates setting
 Coordinates[0,0] = 0
 Coordinates[0,1] = 0
 FOR i = 1 TO DM0
  Coordinates[i,0] = Coordinates[(i-1),0] + XPitch
  Coordinates[i,0] = Coordinates[(i-1),0] + YPitch
 NEXT

'Start Operation
NextPoint = 1
IF PositioningCompletion THEN
 InstructionCoord1 = Coordinates[NextPoint,0]
 InstructionCoord2 = Coordinates[NextPoint,1]
 MDSTRT("StartOperation")
 NextPoint = NextPoint + 1
END IF
```

Rung-specific debugging

Rung-specific interrupt settings is possible for KV Scripts. It is just like using a programming language.

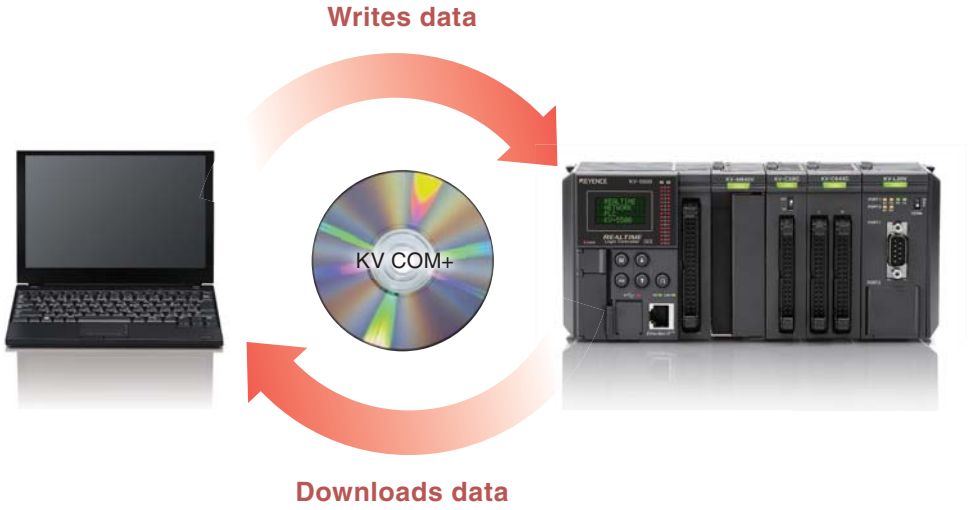


Programme-Free Connection

Supports PLC data collection/transmission and monitoring

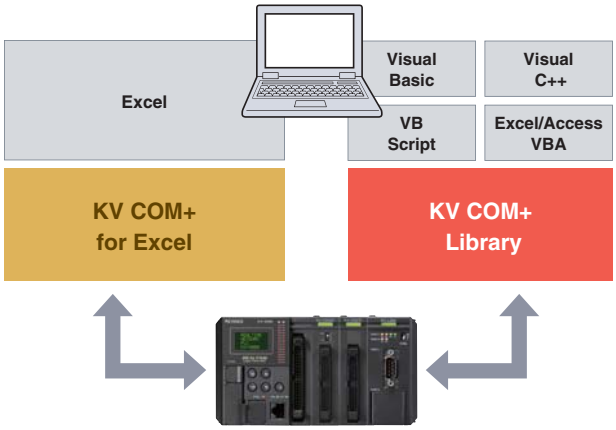
Software to connect PC and PLC

KV COM+ for Excel UNDER DEVELOPMENT
KV COM+ Library UNDER DEVELOPMENT



"KV COM" two applications

When you would like to perform an exchange of data between PC and PLC, this software allows you to perform programme-free connection without having to worry about cumbersome protocol for such forms of communication as serial and Ethernet communication. This line-up of software includes "KV COM+ for Excel", which without programmes can download PLC-internal devices to Excel, and "KV COM+ Library", which can construct advanced system configurations in combination with your applications.



Three basic functions*

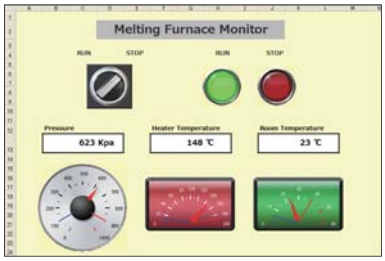
* Functions for KV COM+ for Excel

Data logging

Freely downloads and stores PLC-internal devices to Excel without programmes.

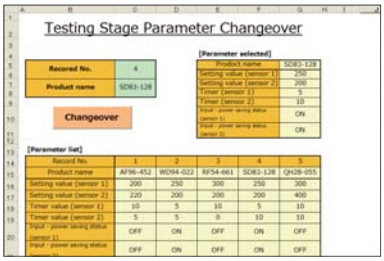
PLC monitor

Can display the condition of PLC devices in real-time on the monitor of an off-site PC.



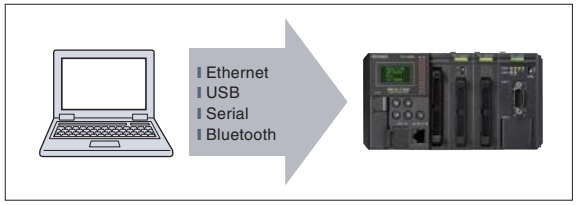
Data folder

Can perform batch rewriting of PLC-internal data (settings, current values, etc.) from an Excel list.



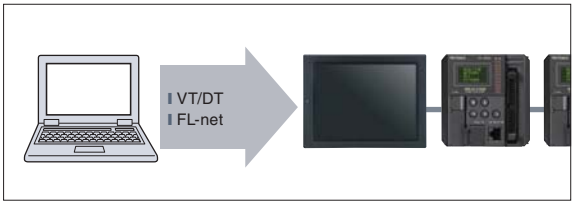
Various communication paths

“KV COM+” supports various paths of communication between a PC and the PLC. Wireless connection via Bluetooth is also possible, allowing you to achieve the best system configuration that matches your operating applications and environment.



System-specific connection configurations

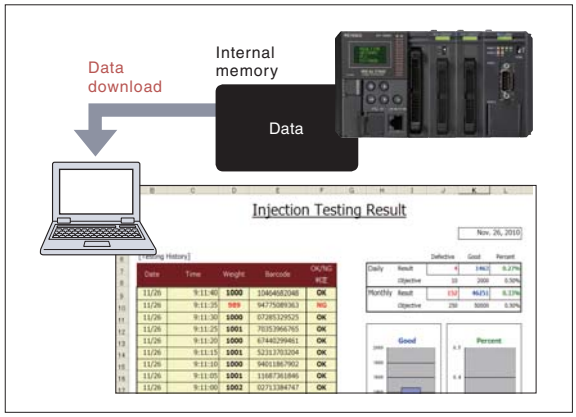
Not only can a 1:1 direct connection with the PLC be performed, communication is possible via “VT/DT” and “FL-net” connections as well. Communication with any given PLC is possible without removing and inserting cables.



Equipped with a real-time logging/trace functions

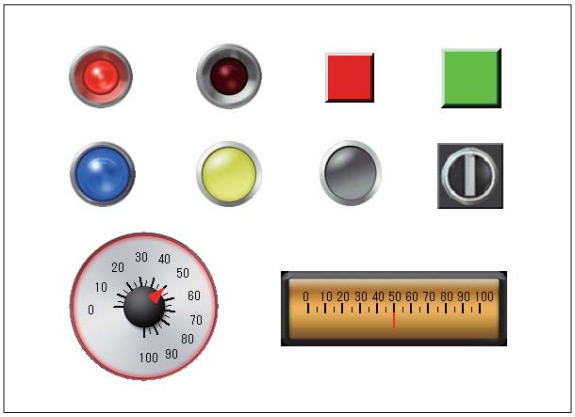
INDUSTRY FIRST

This function achieves high-speed logging starting from 10 ms with new technology that downloads to PC while constantly buffering data within the PLC. With trace, it’s possible to perform sampling from a single scan.



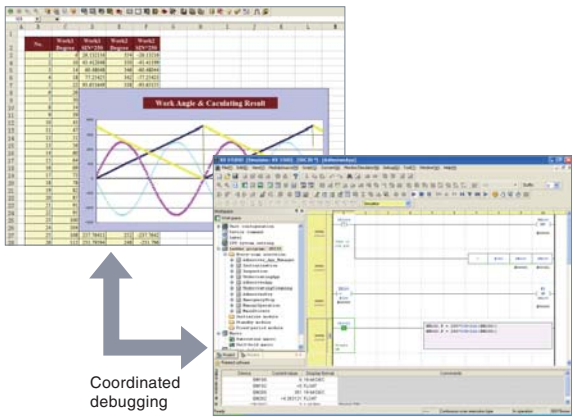
GUI parts prepared as standard

Switches, lamps, and metres have been prepared as standard parts in order to increase the operational-feel and visibility on a PC. Development time is shortened and visibility can be attained.



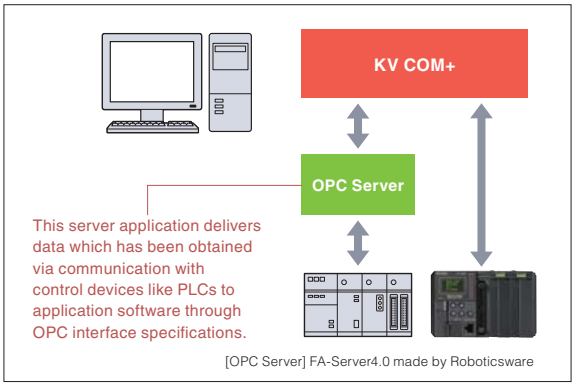
Linked simulation with KV STUDIO

Linked communication can be performed with PC applications that have been created using “KV COM+” and the simulation function in “KV STUDIO”. Even without the actual PLC, it’s possible to perform complete debugging on a PC.



Ability to communicate with other company PLCs using an OPC server connection

Ability to set an OPC server to an access point. This can also setup system configurations using “KV COM+” even with a mixed system that includes other company PLCs.

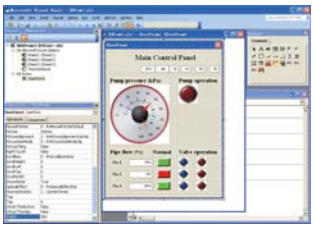


[OPC Server] FA-Server4.0 made by Roboticsware

KV COM+ Library Active X library for communication with the KV Series

Supports a variety of development languages, making it possible to construct a wide range of applications

“KV COM+” can exchange data with the PLC without worrying about communication protocol, reducing development time in relation to system configuration and achieving early start-up. Also, “KV COM+” can exchange data with the KV Series via binary communication, allowing for high-speed communication in comparison to upper link communication. For development languages, VisualBasic, VisualC++, Access VBA/Excel VBA, and VBScript are supported.



KV Series

Complete product line for all control applications.

CPU Unit

→ P.24

Ver. UP
CPU Unit
(24-Point I/O)
KV-5000

Ver. UP
CPU Unit
(24-Point I/O)
KV-3000

CPU Unit
(24-Point I/O)
KV-1000

CPU Unit
(14-Point I/O)
KV-700

Power supply/ peripheral

→ P.24

Power Unit
KV-U7

Error Output Unit
KV-DR1

Bluetooth®

NEW
Bluetooth Unit
KV-BT1

Extended Unit
KV-EB1

I/O unit

→ P.28

Input Unit

16-Point Screw Terminal Block

Input Unit
KV-B16XC

32 Point Connector

Input Unit
KV-C32XC

64 Point Connector

Input Unit
KV-C64XC

Output Unit

16-Point Screw Terminal Block

Relay Output Unit
KV-B16RC

NEW
8 Point Relay Output (Independent Common Point) Unit
KV-B8RC

16-Point Screw Terminal Block

NEW
Transistor NPN Output Unit with Overcurrent Protection
KV-B16TD

PNP Transistor Output Unit
KV-B16TCP

32 Point Connector

NEW
Transistor NPN Output Unit with Overcurrent Protection
KV-C32TD

PNP Transistor Output Unit
KV-C32TCP

64 Point Connector

NEW
Transistor NPN Output Unit with Overcurrent Protection
KV-C64TD

PNP Transistor Output Unit
KV-C64TCP

Input/ output hybrid unit

16-Point Screw Terminal Block

NEW
8 Point Input + 8 Point Transistor NPN Output Unit
KV-B8XTD

32 Point Connector

NEW
16 Point Input + 16 Point Transistor NPN Output Unit
KV-C16XTD

64 Point Connector

NEW
32 Point Input + 32 Point Transistor NPN Output Unit
KV-C32XTD

* KV-××××A, KV-×××TC, KV-C64XB can also be used.

Analogue/ Thermostat Unit

→ P.32

4ch A/D Conversion Unit
KV-AD40V

4ch A/D Conversion Unit
KV-AD40G

4ch A/D Conversion Unit
KV-AD40

NEW
2ch A/D Conversion + 2ch D/A Conversion Unit
KV-AM40V

4ch D/A Conversion Unit
KV-DA40V

4ch D/A Conversion Unit
KV-DA40

4ch Thermostat Unit
KV-TF40

NEW
4ch Temperature and Analogue Multi-Input Unit
KV-TP40

Positioning/ High-Speed Counter Unit

→ P.38

MECHATROLINK

NEW
16-Axis Wire-Saving Positioning/Motion Unit
KV-ML16V

NEW
2-Axis Pulse Train Positioning/Motion Unit
KV-MC20V

NEW
4-Axis Pulse Train Positioning/Motion Unit
KV-MC40V

NEW
KV-M Series function expansion unit
KV-MX1

2-Axis Pulse Train Positioning Unit
KV-H20S

4-Axis Pulse Train Positioning Unit
KV-H40S

2-Axis Pulse Train Sync/Cam Movement Unit
KV-H20G

2ch High-Speed Counter Unit
KV-SC20V

Communi-cation/ Network Unit

→ P.44

NEW
Ethernet Unit
KV-LE21V

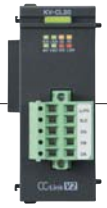
FL-net Unit
KV-FL20V

Serial Communication Unit
KV-L20V

High-Speed Multi-Link Unit
KV-LM20V

Network/ Remote Control

→ P.48



CC-Link

CC-Link Master Station/ Slave Station Unit
KV-CL20

DeviceNet

DeviceNet Unit
KV-DN20

KL-LINK

KL Master Unit
KL-N20V

CC-Link

Screw Terminal Block I/O Unit

Screw Terminal Block Analogue Variable Unit

KL-LINK

Screw Terminal Block (Type B) I/O Unit

Screw Terminal Block (Type BL) I/O Unit

Connector (Type C) I/O Unit

Thermostat Unit

Screw Terminal Block Analogue Variable Unit

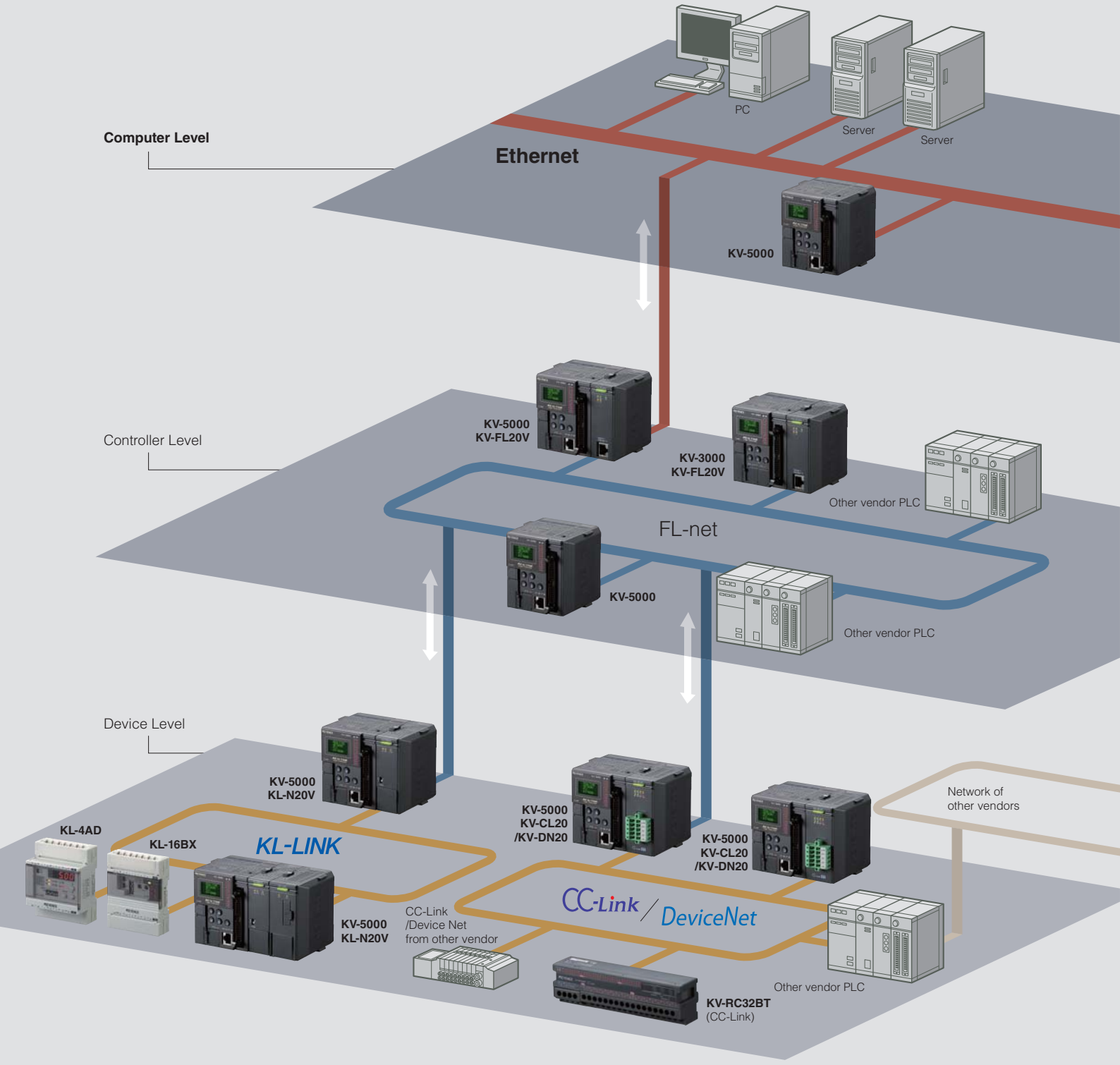
High-Performance Input Unit

* When KV-5000/KV-3000 is being used, KV-××××C, KV-××××V can be refreshed directly.

KV Seamless Network

Network environment is optimised for the network-enabled CPU

Open network support of the KV Series allows a more flexible network design. The real-time PLC can be used in both existing or new systems.



Computer Level Information Network

Ver.UP
Network-enabled CPU Unit
KV-5000

Ethernet Unit
KV-LE20V

Ethernet 100 Mbps

It is a standard LAN network. Both 100BASE-TX and 10BASE-T are supported. Can be used in the existing network.

Ethernet communication specifications

Item	LAN specifications	
	100BASE-TX	10BASE-T
Data rate	100Mbit/s	10Mbit/s
Max cable length	100m	
Media	UTP above five categories	UTP above three categories

Controller Level Network

Network-enabled CPU Unit
KV-5000

FL-net Unit
KV-FL20V

FL-net 100 Mbps

Up to 8192 points of data memory + 8192 points of relay can be looped between FL-net supported devices.

FL-net communication specifications

Item	Specifications
Data rate	100Mbit/s or 10Mbit/s
Max cable length	100m
Max number of nodes	254 units
Looped data volume	Max (8192 bits + 8192 words)/node
Information data volume	Max 1024 bytes
Token period	30ms/32 nodes (2k bits + 2k words/entire node)

Device Level Field Network

Based on your network, choose the applicable device. CC-Link, Devicenet, and KL-LINK.

CC-Link
Master Station/Slave Station Unit
KV-CL20

DeviceNet
Master Station/Slave Station Unit
KV-DN20

KL-LINK
KL-LINK Unit
KL-N20V

CC-Link communication specifications

Item	Specifications				
Data rate	10Mbit/s	5Mbit/s	2.5Mbit/s	625kbit/s	156kbit/s
Max cable length	100m	160m	400m	900m	1200m
Media	Special cable (3-core shielded cable)				
Max number of units connected	64 units				
Communication data volume*	Remote I/O: 8192 points + Remote Register: 4096 points				

* The max number of points linked for each system

DeviceNet communication specifications

Item	Specifications		
Data rate	0.5Mbit/s	0.25Mbit/s	125kbit/s
Max cable length	100m	250m	500m
Media	Special cable (4-core shielded cable)		
Max number of nodes	64		
Communication data volume*	Max 800 words		

* I/O data volume

KL-LINK communication specifications

Item	Specifications			
Data rate	5Mbit/s	2.5Mbit/s	625kbit/s	156kbit/s
Max cable length	50m	120m	500m	1200m
Media	Special cable (2-core shielded cable)			
Sub-station max number of units connected	97 units	129 units	129 units	129 units
Communication data volume	Max 2048 points (128 words)			
Communication period	2.88ms/2048 points			

* Data rate 5Mbit/s

Terminal Level Motion Network

MECHATROLINK
Compatible with MECHATROLINK-II

NEW
Positioning/motion unit
KV-ML16V

MECHATROLINK-II

Compatible with the MECHATROLINK -II AC servomotor wire-saving system. Can connect with supported machines, including servomotors, stepping motors, and inverters from other companies.

* CC-Link is the trade mark of Mitsubishi. * DeviceNet is the trade mark of ODVA(Open DeviceNet Vendor Association)

Unit settings and status can be seen at a glance.

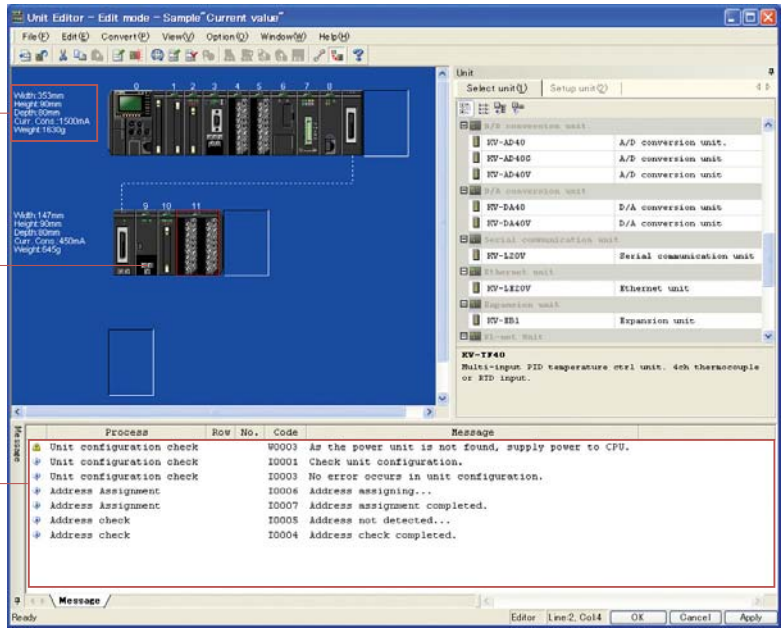
New Unit Editor

System configuration, settings, and monitoring. Ladder-based initial setup is simplified, making system configuration easy to understand even without using the manual.

Automatic calculation
Among others, current consumption, overall width, and weight can be automatically calculated.

Unit monitoring
Unit RUN mode can be monitored by right-clicking the unit.

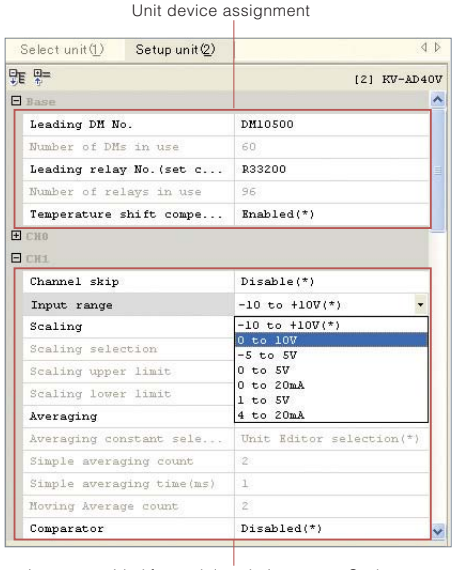
Data log
Any error log or messages can be displayed while monitoring, allowing the user to know the system status at a glance.



Unit settings

Executable expansion unit settings. Since all items are listed and they are easy to understand, the user manual is not needed.

Example: Analogue Unit setting



Help topics are provided for each item being set up. So the user manual isn't needed.

Unit configuration

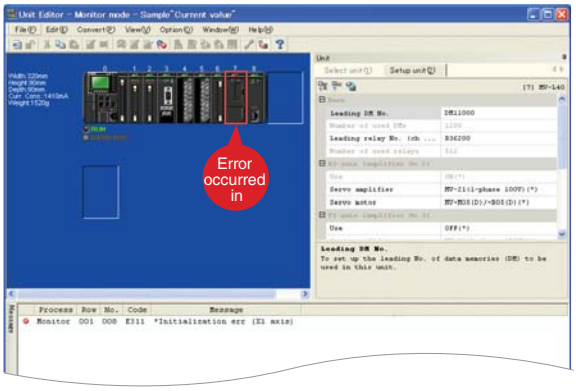
You can do this simply by connecting a PC to the PLC.

Data sheet making

Any unit configurations, relay assignments, and settings can be printed in the form of a figure and checklist, which can be used as the data sheet. This also applies to ladder data change to reduce workload.

Unit monitoring

The Monitoring function is provided with the Unit Editor. System status and error messages are in a concise fashion. In addition, monitoring details for any unit can be displayed.



Structured programming

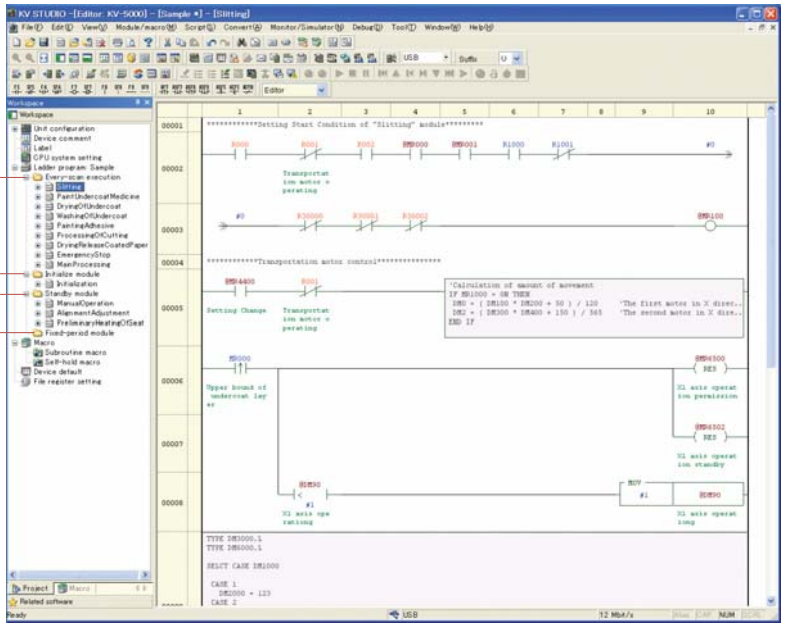
Modular design is supported by dividing the programme. Any module can be directly copied and used for programming,

Every scan execution
Executed every scan.

Initialise module
This is executed only once during programme execution.

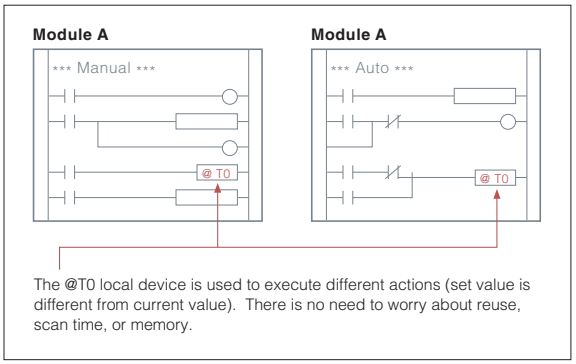
Standby module
This is executed only when required.

NEW
Fixed period Module
Executed in a fixed cycle irrespective of the scan time.



“Local Device” that improves module reuse.

Different from common devices, Local Device is a virtual device that can only be used in the module. A local device can be reused simply by placing “@” in front of the device number.



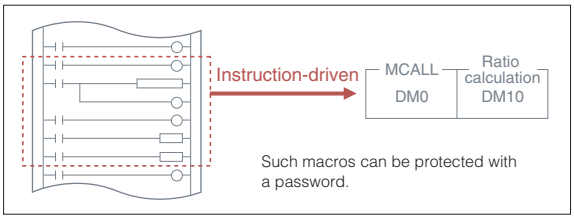
The @T0 local device is used to execute different actions (set value is different from current value). There is no need to worry about reuse, scan time, or memory.

What is Local Device?

Marked with “@”, Local device is actually a virtual device that is assigned to the CPU in executing programme transfer by the “KV STUDIO”. As a result, assignment is automatically done by the reuse destination programme, hence eliminating possible device conflicts. In addition, physical device assignment allows processing speed not be reduced as before. This is a special feature of the standard large-capacity KV Series.

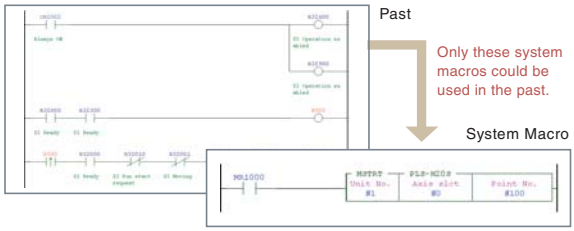
“Macro Function” that allows any ladder circuit block to be treated as a macro

Any ladder circuit block can be programmed as a macro. which can be handled just like an instruction. No device conflict when using a local device which is only affected in the macro.



“System Macros” are provided in the standard models

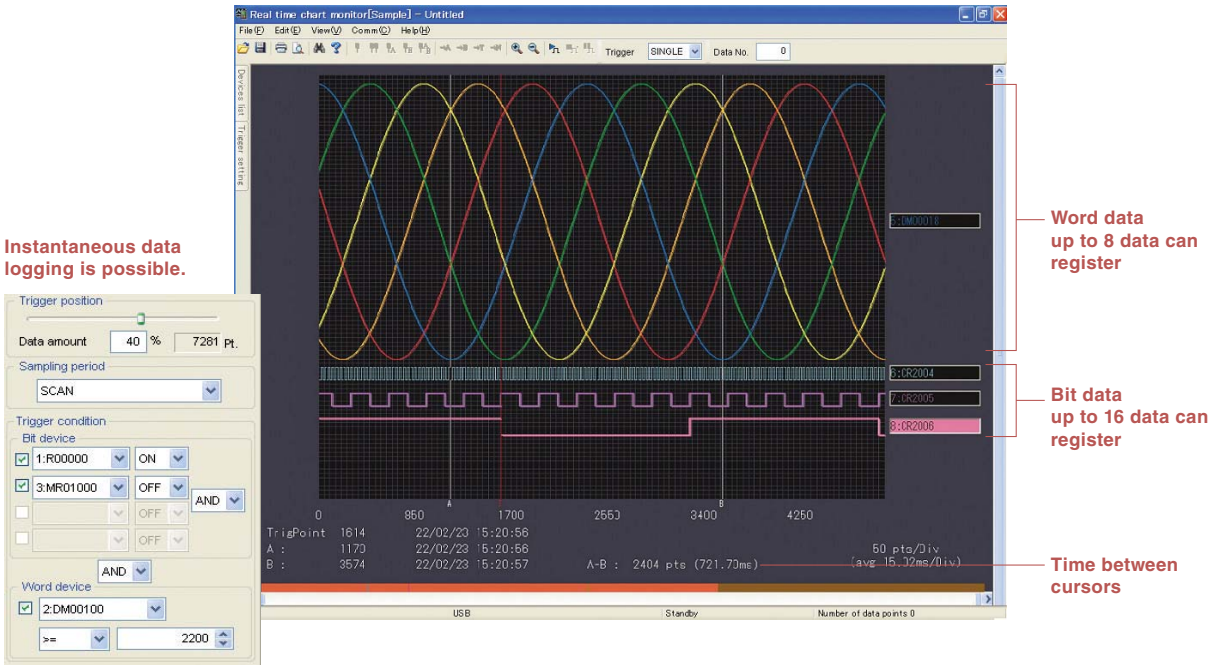
Regularly used programmes for Positioning Unit are provided as “System Macros”. They make it easy to operate an expansion unit by using easy programming.



More than PLC detection

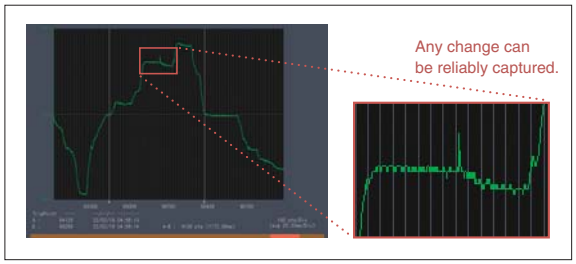
Timing Diagram monitoring

Ultra High-Speed Timing Diagram is provided for real-time PLC monitoring. Any small changes can be identified. An oscilloscope is not required.



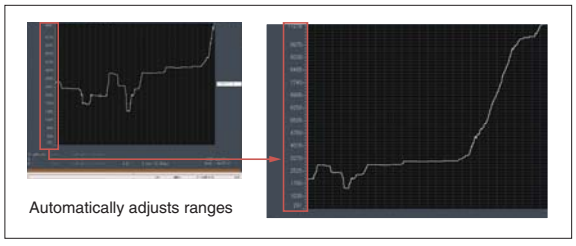
Any instantaneous change can be captured

Data capturing is performed by the CPU Unit, ensuring there is reliable capturing and no data loss. Changes that can only be observed with oscilloscope can also be reliably captured.



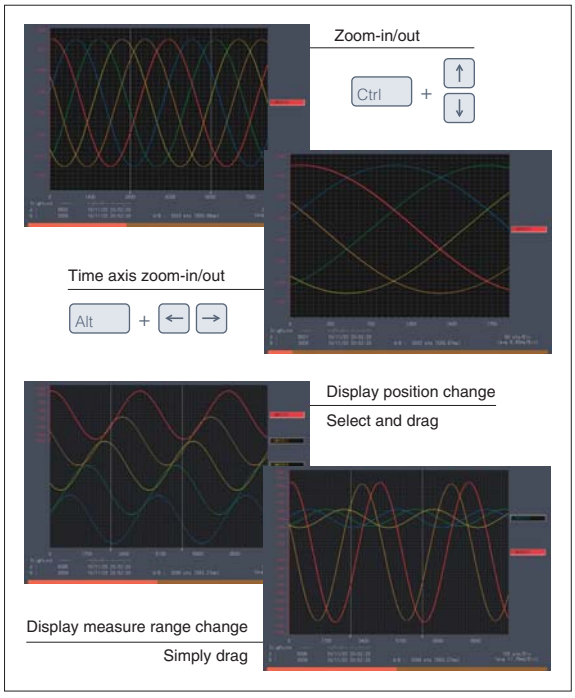
Real-time scaling Ver. UP

This registers devices that you would like to observe and can monitor without adjusting ranges. On the monitor, the ranges for the values inside the device are adjusted in real-time, thus allowing for easy use.



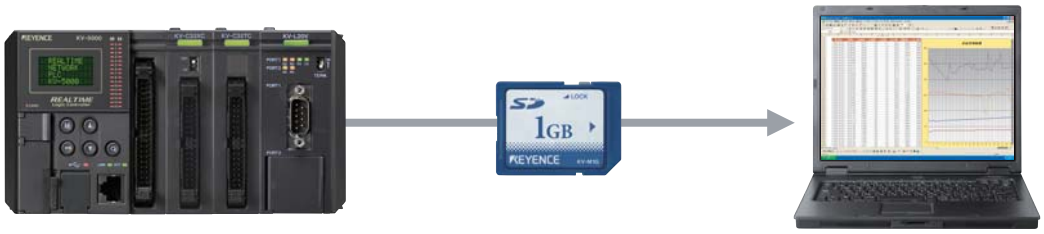
Context-sensitive helps

These help by instantly providing information the user may need, so the user doesn't have to look it up in the user manual. Intuitive operation makes data acquisition/query easier.



Logging/Tracing

Ultra high-speed, high capacity KV-5000/3000 provides optimal data acquisition. Can be used in a wide range of applications.
PC data can be acquired when networked.

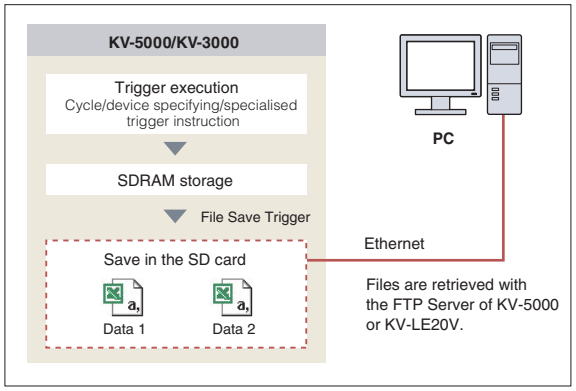


Ultra high speed, high capacity

The SDRAM of CPU Unit is used for ultra high-speed data saving. Up to 128 points (bit/word device) ×10 can be specified.

Accurate data acquisition is possible

Specialised trigger instructions can be provided for data acquisition. A specialised trigger instruction makes it possible to acquire data even while scanning. Accurate fixed interval date is possible if the Fixed-cycle Module is used.

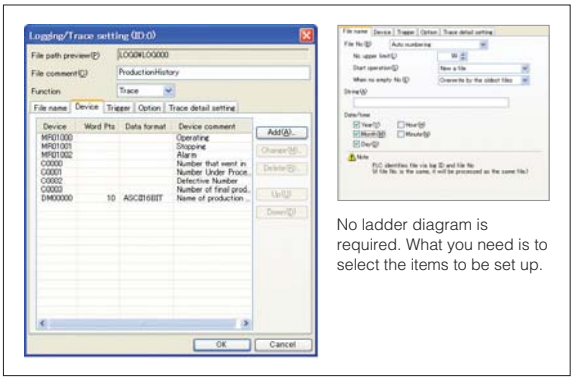


Emailing

Data acquired can be emailed without using any programme. Onsite data analysis is possible by opening the attached data with the Timing Diagram Monitor.

Easy import/export

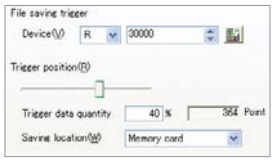
Specialised windows are provided for file name, log device, and trigger condition settings that make it easy to configure.



No ladder diagram is required. What you need is to select the items to be set up.

File Save Trigger

Ratio of data acquired before and after trigger can be set up. This can be used for, data saving before and after the trigger.



KV-1000 is forward compatible in logging.

Any log settings for KV-1000 can be used directly.

CPU Unit

KV-5000 Ver. UP

REALTIME Logic Controller

Network capable, high-capacity CPU

Basic performance	Max number of I/O 3096 points	Programme capacity 260k step	LD/OUT instruction 10ns
Communication port	Ethernet/ FL-net	USB	Bluetooth*1
Inbuilt I/O	24-point		
System	Structural programming	KV Script	Direct refreshing

KV-3000 Ver. UP

REALTIME Logic Controller

Real-time, standard CPU

Basic performance	Max number of I/O 3096 points	Programme capacity 160k step	LD/OUT instruction 10ns
Communication port	USB	Serial	Bluetooth*1
Inbuilt I/O	24-point		
System	Structural programming	KV Script	Direct refreshing

KV-1000

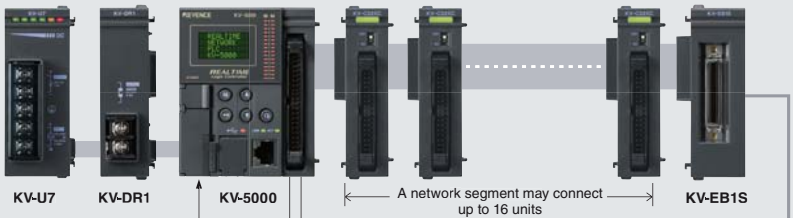
Basic performance	Max number of I/O 3096 points	Programme capacity 160k step	LD/OUT instruction 25ns
Communication port	USB	Serial	
Inbuilt I/O	24-point		
System	Structural programming	KV Script	

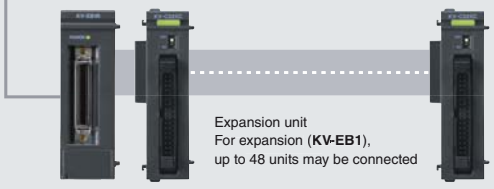
KV-700

Basic performance	Max number of I/O 3086 points	Programme capacity 16k step*2	LD/OUT instruction 100ns
Communication port	USB	Serial	
Inbuilt I/O	14-point		

*1. KV-BT1 Bluetooth unit required *2. 32k step for expanding memory

System Configuration





■ Memory card

SD card
[Only KV-5000/KV-3000/KV-1000]
KV-M1G (1GB)

MMC card
[Only KV-700] **KV-M128C** (128MB)

■ Stand by battery (attached to the body)

DM value/relay state for storing CPU
[Only KV-5000/KV-3000/KV-1000]
OP-51604
[Only KV-700]
OP-42139

■ PC connected equipment

Serial communication port
[Only KV-3000/KV-1000/KV-700]
OP-26486 (D-sub 9-pin connector)
OP-26487 (Modular cable 2.5 m)

All models are provided with USB ports
OP-35331 (3 m)

Bluetooth communication
[For the KV-BT1]
Bluetooth adapter

First in the industry to support the KV-BT1 Bluetooth unit

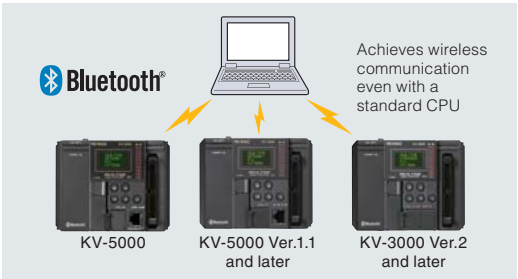
Ver.UP

CPU units that can support the industry's first Bluetooth unit have been expanded. Not only can programming and debugging be performed in a wireless environment with the network compatible KV-5500/5000 CPU Ver.1.1, it can even be performed with the standard KV-3000 CPU Ver.2 as well.

Supported CPUs expanded

Supported CPUs have been expanded to achieve wireless communication without relying on CPU type.

[Supported CPUs] KV-5500, KV-5000 Ver.1.1 and later, KV-3000 Ver.2 and later

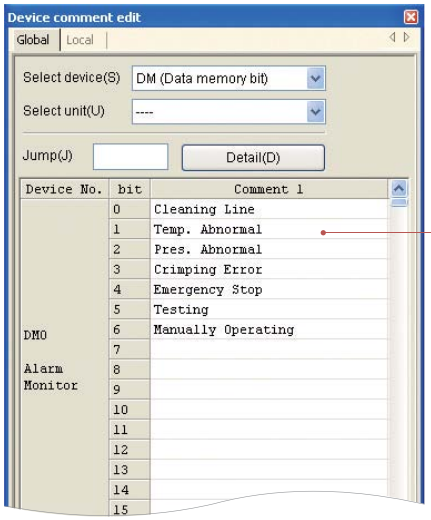


*Refer to P.27 for information on supported international radio laws

Supports device comments in word bit units

NEW

Can separately set device comments for each bit of a word device. Device comments are managed separately from comments in word units. As an example, with DM0 and DM0.0, this makes it possible to set a separate device comment.



Comment entry is handled just as bits are

Enhanced instructions that match complex control details

NEW

Instructions have been greatly expanded to be able to support complex control such as calculation and data processing. This allows for a reduction in programme work hours and can greatly reduce development work hours.

Enhanced arithmetic instructions

Added arithmetic instructions

Exponentials

Arithmetic shift

Common logarithm

Absolute value

Supports double-precision floating point real numbers

Achieves the highest level execution time in the industry with comparison point in 1.4 µs and arithmetic operations in 2.1 to 3.4 µs. This can support controls that require arithmetic accuracy, such as alignment.

Comparison point

Transfer command

KV script operation

```
DM0.DF=DM10.DF*10/DM20
```

Enhanced processing for high-difficulty PID

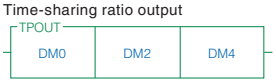
Added PID instructions with auto-tuning

Instructions that posses PID control and auto-tuning functions have been prepared. PID control, which takes time and effort to adjust, can be used with ease. Also, even concerning output processing, instructions have been prepared to simplify programmes that had a tendency to be cumbersome.

PID with auto-tuning

Gradient signal

Time-sharing ratio output



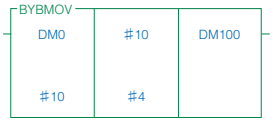
Lag filter

Enhanced data processing

Instructions have been prepared that can easily programme character string processing, which was cumbersome to programme with a ladder programme, and processing in relation to logging that used an ever increasing amount SD-cards.

Added byte-processing instructions

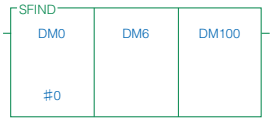
Byte string transfer



Block swap

Added character string processing instructions

Character string search



Added data processing instructions

Sort

Added file operation instructions

Change file name

Obtain free space

Enhanced high-speed processing

Timer instructions that utilise the high-speed performance of the KV have been added. Incredibly precise control is possible.

10 µs timer

Performance specification - CPU unit

Model				KV-5000	KV-3000	KV-1000	KV-700
Operation control mode				Storage programme mode			
I/O control mode				Refresh mode			
Programme language				Expanded ladder diagram, KV script, mnemonic symbol			Expanded ladder diagram, mnemonic
Number of commands	Basic Instructions			79 classes, 162 instructions		68 classes, 151 instructions	67 classes, 122 instructions
	Applied Instructions			39 classes, 56 instructions		35 classes, 36 instructions	19 classes, 19 instructions
	Arithmetic Operation Instructions			104 classes, 243 instructions		83 classes, 185 instructions	64 classes, 294 instructions
	Extended Instructions			85 classes, 120 instructions		74 classes, 106 instructions	31 classes, 48 instructions
	Total			307 classes, 581 instructions		260 classes, 478 instructions	181 classes, 483 instructions
Command execution speed	Basic Instructions			Min. 10ns		Min. 25ns	Min. 100ns
	Applied Instructions			Min. 20ns		Min. 25ns	Min. 100ns
Programme capacity				Approx. 260k steps	Approx. 160k steps		Approx. 16k steps (Approx. 32k step for expansion of memory)
Maximum installation number of the unit				16 units (48 units when expansion unit is connected)			
Max number of I/O points				Maximum 3096 points during expansion (KV-EB1S/KV-EB1R:when 2 units are expanded, 64-point I/O unit is used)			Maximum 3086 points during expansion (KV-EB1S/KV-EB1R: when 2 units are expanded, 64-point I/O unit is used)
Bit device	Input relay		R	Totally 16000 points 1 bit		Totally 9536 points 1 bit	Totally 9530 points 1 bit
	Output relay						
	Internal auxiliary relay						
	Link relay		B	16384 points 1 bit		—	
	Internal auxiliary relay		MR	16000 points 1 bit			—
	Latch relay		LR	16000 points 1 bit			—
	Control relays		CR	640 points 1 bit			
Word Devices	Timer		T	4000 points 32 bit		Totally 4000 points 32 bit	Totally 512 points 32 bit
	Counter		C	4000 points 32 bit			
	Data memory		DM	65535 points 16 bit			20000 points 16 bit (during expansion of memory, 40000 points 16 bit)
	Expansion data memory		EM	65535 points 16 bit			—
			FM	—		32767 points 16 bit	—
	File register	(Memory bank switching mode)	FM	32768 points ×4 memory banks 16 bit		—	
		(Dial mode)	ZF	131072 points 16 bit			
	Link register		W	16384 points 16 bit		—	
	Temporary data memory		TM	512 points 16 bit			
	High-speed counter		CTH	2 points 32 bit			
	High-speed count comparator		CTC	4 points 32-bit (each high speed counter adopts 2 points)			
	Index register		Z	12 points 32 bit		12 points 16 bit	—
	Control memory		CM	6000 points 16 bit		11999 points 16 bit	4000 points 16 bit
Positioning pulse output				2 points (maximum output frequency 100 kHz)			
CPU unit I/O				Input: 16 points, output: 8 points			Input: 10 points, output: 4 points
Power failure hold function	Programme memory			Flash memory be written for 100,000 times			
	Device*			Based on battery 5 years (operating ambient temperature 25°C, in power failure hold mode)			
Self-diagnosis function				CPU abnormal, RAM abnormal, other			

* Target device R/LR/CR/T/C/DM/EM/FM/CTH/CTC/CM

General specification

Item		Size				
Supply voltage		DC24V(±10%)				
Internal current consumption (except the drive current for input loop)	CPU unit	KV-5000: 320mA or less KV-3000: 320mA or less KV-1000: 320mA or less KV-700: 160mA or less				
	Expansion unit	KV-EB1S: 15mA or less KV-EB1R: 25mA or less				
Operating temperature		0 to +50°C (no icing)*1 *2				
Storage temperature		–20 to +70 °C*1				
Operating humidity		10 to 95% RH (no condensing)*1				
Storage humidity		10 to 95% RH (no condensing)*1				
Withstand voltage		AC 1500V For 1 min Between power terminals and I/O terminals or external terminals and housing				
Noise immunity		1500 or more Vp-p pulse width 1μs, 50ns(based on noise simulator) IEC standard compliancy (IEC61000, 4-2/3/4/6)				
Shock resistance		Follow JIS B 3502 IEC61131-2	Intermittent vibration			Scan times
			Frequency	Acceleration	Half amplitude	10 times for X/Y/Z direction (For 100 min)
			5 to 9Hz	—	3.5 mm	
			9t to 150Hz	9.8m/s^2	—	
			Continuous vibration			
			Frequency	Acceleration	Half amplitude	
			5 to 9Hz	—	1.75 mm	
			9 to 150Hz	4.9m/s^2	—	
Insulation resistor		20MΩ above (measured between power terminals and I/O terminals or external terminals and housing with 500V DC megohmmeter)				
Working environment		Without dust and corrosive gas				
Operating altitude		2000m or less				
Overvoltage category		Ⅱ (when using KV-U7)				
Pollution degree		2				
Weight	CPU unit	KV-5000:Approx. 320g KV-3000:Approx. 300g KV-1000:Approx. 290g KV-700:Approx. 240g Expansion memory for KV-700 (OP-42138): Approx.10g				
	End unit	Approx. 30g				
	Start unit	Start unit for KV-5000/3000: Approx. 20g Start unit for KV-1000/700: Approx. 30g				
	Expansion unit	KV-EB1S: Approx. 90g KV-EB1R:Approx. 115g				

*1 The range in which the system is used. *2 According to temperature on lower side of the unit in control panel.

Performance specification - AC power unit

Model	KV-U7
Input power voltage	AC100 to 240V±10%(50/60Hz)
Output voltage	DC24V±10%
Output capacity	1.8A (total value of power supply and repair power supply for various units)
Power consumption	135VA or less
Dwell time	10ms or less
Starting time	2 s or less
Weight	Approx. 190g

Performance specification - Error output unit

Model		KV-DR1
Output form		Relay
Rated load		DC24V 0.5A
Connect resistance		50mΩ or less
Response time	OFF→ON	10ms or less
	ON→OFF	5ms or less
Relay life		Electrical life : above 100,000 times (20 times/min)
		Mechanical life: over 20 million cycles
Relay exchange		Impossible
Internal current consumption		Below DC5V 30ma (powered by CPU unit)
Weight		Approx. 90g

Input specification - CPU unit KV-5000/3000/1000/700

Model	KV-5000/3000/1000								KV-700	
Relay No.	R00000 to R00009 (Common input 10 point)		R00010 to R00013 (high speed A-phase/ B-phase input 2ch counted as 4 points)			R00014 to R00015 (high speed Z-phase input 2ch counted as 2 points)			R00000 to R00009 (10 point)	
Item	DC24V Input mode*1	DC5V Input mode*1	Line driver input	DC5V input (open)	DC24V input (open)	Line driver input	DC5V input (open)	DC24V input (open)	DC24V Input mode*1	DC5V Input mode*1
Max. input voltage	DC26.4V		DC5.5V		DC26.4V	DC5.5V		DC26.4V	DC26.4V	
Rated input voltage	DC24V (5.3 mA*2)	DC5V (1 mA*2)	—	DC5V (20 mA*2)	DC24V (6.5 mA*2)	—	DC5V (8.3 mA*2)	DC24V (3.5 mA*2)	DC24V (5.3 mA*2)	DC5V (1 mA*2)
Min. ON voltage	DC19V	DC4.5V	DC2.0V		DC19V	DC2.0V		DC19V	DC19V	DC4.5V
Max. OFF current	1.5 mA	—	—		1.5 mA	—		1.5 mA	1.5mA	—
Max. OFF voltage	—	DC1.5V	DC1.0V		—	DC1.0V		—	—	DC1.5V
Way for common point	10 point/2 common point		Independent common point			Independent common point			10 point/1 common point	
Input time constant	Typ. 10 ms 10 µs, for HSP instruction When control relay CR2305 is ON 10 µs to 10 ms, 8-grade (Set via CM1620)		Typ. 10 ms 10 µs, for HSP instruction When control relay CR2305 is ON 10 µs to 10 ms, 8-grade (Set via CM1620)			Typ. 10 ms 10 µs, for HSP instruction When control relay CR2305 is ON 10 µs to 10 ms, 8-grade (Set via CM1620)			Typ. 10 ms 10 µs, for HSP instruction When control relay CR2305 is ON 10 µs to 10 ms, 8-grade (Set via CM1620)	
Response frequency	—		100 kHz Input signal : line driver AM26LS31 equivalent Duty ratio 50%	60kHz 5V±10% Duty50%	60kHz 24V±10% Duty50%	—			—	

*1 Switched by input voltage change-over switch. *2 Refers to reference value of input current.

Output specification - CPU unit KV-5000/3000/1000/700

Model	KV-5000/3000/1000		KV-700
Relay No.	R00500 to R00503 (High speed output 4 points)	R00504 to R00507 (universal output 4 points)	R00500 to R00503 (4 point)
Output form	Transistor NPN output	Transistor NPN output	Transistor NPN output
Rated load	DC30V 0.1A	DC30V 0.1A	DC30V 0.1A
Peak value load current	0.2A	0.2A	0.2A
Max. voltage at OFF	DC30V	DC30V	DC30V
Leak current at OFF	100 µA or less	100 µA or less	100 µA or less
Residual voltage in case of on	DC0.6V or less	DC0.6V or less	DC0.3V or less
Way for common point	8 point/1 common point	8 point/1 common point	4 point/1 common point
ON/OFF response time*1	OFF→ON: 1 µs or less ON→OFF: 5 µs or less	OFF→ON: 5 µs or less ON→OFF: 30 µs or less	OFF→ON: 10 µs or less ON→OFF: 10 µs or less
Output frequency	100 kHz (At 5 to 100 mA)	10 kHz (At 5 to 100 mA)	100 kHz (At 5 to 50 mA)

*1 Delay time is response time + internal processing time (scanning time).

Compatibility of KV-5000/3000 Series and KV-1000/700 Series

Compatibility of extension unit

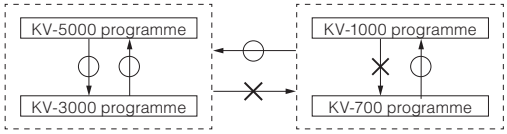
I/O unit may be used in all CPU units. Except a part, special unit may also be used for all CPU units.
○: Possible △: Sometimes impossible ×: Impossible

Sorting	Model	KV-5000 Ver. 2	KV-5000	KV-3000	KV-1000	KV-700
Power	KV-U7	○	○	○	○	○
Error output	KV-DR1	○	○	○	×	×
Bluetooth	KV-BT1	○	×	×	×	×
I/O	D type	○	○	○	○*1	○*1
	C type	○	○	○	△*1	△*1
	A/B type	△*1	△*1	○	○	○
Analogue	KV-AD40V/DA40V/AM40V	○	○	○	○*1	○*1
	KV-AD40/AD40G/DA40	△*1	△*1	○	○	○
Multi-input	KV-TP40	○	○	○	○	○
Temperature Adjustment	KV-TF40	○	○	○	○	○
Positioning/motion	KV-ML16V KV-MC20V/MC40V	○	○	○	×	×
Positioning	KV-H20S/H40S/H20G	○	○	○	○	○
High-speed counter	KV-SC20V	○	○	○	○*1	○*1
Serial communication	KV-L20V	○	○	○	○	○
	KV-L20R	×	×	×	○	○
Ethernet/FL-net	KV-LE21V/LE20V/FL20V	△*2	△*2	○*2	○*3	○*3
	KV-LE20A/FL20	×	×	○	○	○
DeviceNet	KV-DN20	○	○	○	○	○
CC-Link	KV-CL20	○	○	○	○	○
KL master	KL-N20V	○	○	○	○	○
High-speed multi-link	KV-LM20V	○	○	○	○	○
Decentralised system configuration	KV-EB1	○	○	○	○	○

*1 Do not use direct refresh. *2 KV-1000/KV-700 programme may be used through compatibility.
*3 KV-LE20V mode cannot be used (The easy PLC link and FTP client functions also cannot be used.)

Programme compatibility

Programme is forward compatible. However, compatibility exists between KV-5000/3000 programmes.



Support KV STUDIO

KV STUDIO Ver.6 and above support all CPU units (KV-5000/3000/1000/700).

Compatibility of CPU unit

Except some functions in the table below, compatibility exists.
○: Possible ×: Impossible

	KV-5000	KV-3000	KV-1000	KV-700
CPU inbuilt Ethernet port	○	×	×	×
CPU inbuilt USB port	○	○	○	○
CPU inbuilt series port	×	○	○	○
Inbuilt I/O points (I/O) Connector terminal	16 point/8 point 40 pin*1			10 point/ 4 point 20 pin
Memory card	SD			MMC

*1 compatibility exists in KV-5000/3000/1000 built-in I/O connectors.

Performance specification - Bluetooth unit

Model		KV-BT1
Bluetooth version		Bluetooth Ver. 2.0 + EDR
Frequency band		2402 MHz to 2480 MHz
Output class		Class-2 compatible
Transmission system		Frequency hopping spread spectrum (FHSS)
Usage profile		SPP
Communication distance		10 m * Differs depending on environment.
Product definition by radio laws in each country *1	Japan	The KV-BT1 contains the design-certified built-in wireless module
	USA	KV-BT1 incorporates a RF device granted by FCC. (FCC ID: RYYEYXFDC)
	Canada	KV-BT1 incorporates a RF device granted by IC. (IC ID: 4389A-EYXFDC)
	EU Member States	R&TTE Directive
	China	SRRC Certification
	Taiwan	NCC Certification
	Singapore	iDA Certification
	Thailand	NTC Regulation
Supported CPU units		KV-5000 Ver.1.1 and later, KV-3000 Ver.2 and later

*1. Use only in countries with radio laws that are compatible with the KV-BT1. When in countries whose radio laws are not compatible, the user may be punished under the laws of those countries.

I/O unit

Input unit

REALTIME Support

16-Point Screw Terminal Block
KV-B16XC

32 points Connector
KV-C32XC

64 points Connector
KV-C64XC

Direct*1 I/O
Input*2 24V/5V
Input time Constant switching

Output unit

REALTIME Support

16-Point Screw Terminal Block Relay
KV-B16RC

Screw Terminal Block 8 point relay (independent common point)
KV-B8RC
NEW

16-Point Screw Terminal Block NPN Transistor
KV-B16TD
NEW

16-Point Screw Terminal Block PNP Transistor
KV-B16TCP

Direct*1 I/O
Removable terminal block

32 points Connector NPN Transistor
KV-C32TD
NEW

32 points Connector PNP Transistor
KV-C32TCP

64 points Connector NPN Transistor
KV-C64TD
NEW

64 points Connector PNP Transistor
KV-C64TCP

Direct*1 I/O

Input/output hybrid unit

REALTIME Support

Screw Terminal Block 8 point input + 8 point transistor NPN output unit
KV-B8XTD
NEW

Connector 16 point input + 16 point transistor NPN output unit
KV-C16XTD
NEW

Connector 32 point input + 32 point transistor NPN output unit
KV-C32XTD
NEW

Direct*1 I/O
Input*2 24V/5V
Input time Constant switching

* KV-xxxxA, KV-C64XB can also be used.

*1 For CPU unit KV-5000/KV-3000, direct I/O may be used
*2 The KV-C64XC/C32XTD use DC 24 V input mode only

Periphery equipment

KV-5000

16-point screw-type terminal block

32-point connector

64-point connector

■ MIL connector (34-pin) kit

OP-42224
• With standard contact
• Slender type/inclined type

OP-23139
• Accessary standard contact/longitudinal type

One for **KV-C32xx**, two for **KV-C64xx**

■ 16 point terminal block unit

Minitype Y terminal **OP-42221**
• Include 100 pieces

■ Connector unit is universal

Contact
OP-22186
• Used for AWG22-24
• Include 200 pieces

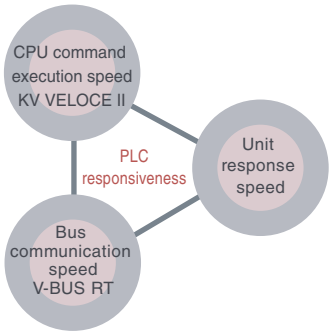
Fine line contact
OP-30594
• Used for AWG26-28
• Include 200 pieces

Special crimping tool for MIL connector
OP-21734

High Specifications

High specification real time I/O

Real time PLC KV-5000/3000 is high speed.



Input response time (OFF→ON)

25μs(typical)

* when input time constant is 25 μs

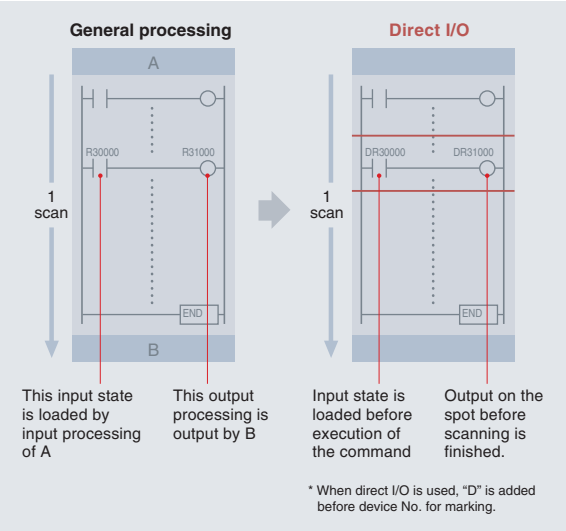
Output response time

< 10μs

* transistor type (50 μs for 64 points)

Support direct I/O NEW

The I/O unit generally refreshes the I/O state after scanning, if direct I/O indication may be sent out, it refreshes on the spot if possible. This is very effective for controls that require a high speed response.

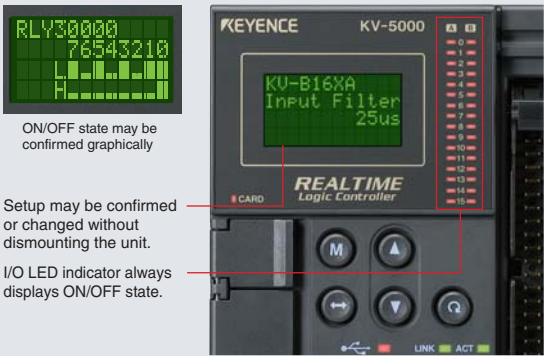


I/O test mode NEW

Through combination of direct switch and operating switch of CPU unit, I/O check may be performed. Since operation may be done while observing the menu display, so anybody can easily execute the I/O check.

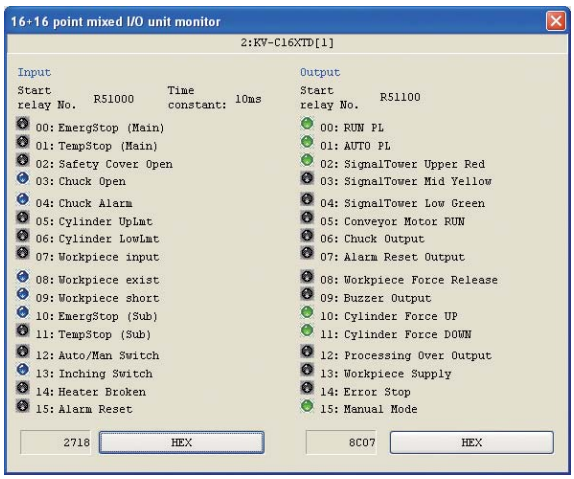
I/O Monitoring

Just press direct access switch of the I/O unit to be monitored to monitor/set up ON/OFF state or input time constant etc unit setup information. In addition, ON/OFF state may always be displayed on special I/O LED indicator.



Unit monitor

Monitor windows specialised for each I/O unit have been built in to the KV STUDIO ladder support software. ON/OFF status can be checked in a list.



Forced set/reset registration function

With the KV STUDIO ladder support software, it's possible to force set/reset the input/output status of an I/O unit. You can carry forward with programme debugging even while the equipment is starting up.

Unit line-up additions

Achieves JUST I/O with small-scale equipment

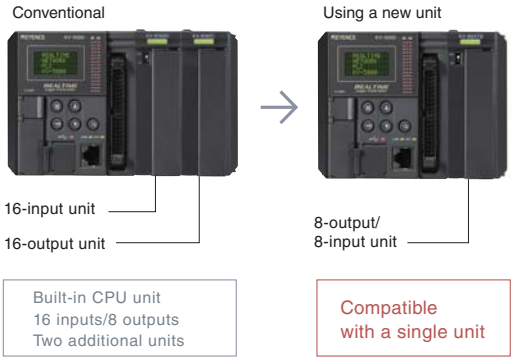
It possible to configure a system with a number of connections that match your equipment using a new unit variation that can optimise the number of inputs/outputs and the number of units. In addition to small-scale equipment with a limited number of connections, it's also possible to reduce the number of units with large-scale equipment, thus allowing for reductions in cost.

Input/output hybrid unit features
KV-xxxXTD Series NEW

New line-up of input/output units
Achieves small-scale control and JUST I/O

I/O units that are best for small-scale equipment with a limited number of inputs/outputs have been added. Combining the input/outputs built into the CPU unit with a series of 3 product models that starting with the “KV-B8XTD", consolidate 8 inputs and 8 outputs into each individual unit makes it possible to create a "JUST I/O" configuration without waste.

When there is a configuration with 24 inputs/16 outputs



Input/output hybrid unit variations

Target device	KV-B8XTD	KV-C16XTD	KV-C32XTD
Number of inputs	8	16	32
Number of outputs	8	16	32

Independent common relay output unit
KV-B8RC features NEW

Achieves control of differing voltages with a single unit
Independent common point 8ch relay output

By separating commons, it's possible to directly connect external devices of differing voltages to a single relay output unit. It can connect an individual rated load of up to 2 A to each output terminal, creating relative flexibility with output contact capacity.

Transistor output unit with overcurrent protection function
Features of the KV-xxxTD Series and KV-xxxXTD Series NEW

Protects against damage to the unit caused by a short-circuited load
Output that includes overcurrent protection

An output unit type that includes overcurrent protection has been added to prevent damage to the output even when the load has short-circuited. This unit achieves large-capacity rated loads, with 0.3 A for terminal block types and 0.2 A for connector types. The I/O unit also utilises the overcurrent protection function. This prevents the occurrence of possible trouble.

Associated equipment - remote I/O unit

CC-Link

KV-RC Series

For details, please refer to Page 50

KL-LINK

B type

BL type

C type

For details, please refer to Page 51

Specification - Input Unit

Model	KV-B16XC		KV-C32XC		KV-C64XC
External connection mode	Removable terminal block		Connector (MIL specification)*1		
Number of inputs	16		32		64
Input mode	DC 24V mode	DC 5V mode	DC 24V mode	DC 5V mode	DC 24V mode*4
Max. input voltage	DC 26.4V				
Rated input voltage	DC 24V 5.3mA	DC 5V 1mA	DC 24V 5.3mA	DC 5V 1mA	DC 24V 4.1mA
Min. ON voltage	19V	3.5V	19V	3.5V	19V
Max. OFF current	1.5mA	–	1.5mA	–	1.5mA
Max. OFF voltage	–	1.5V	–	1.5V	–
Way for common point	16 point/1 common point (2 terminal) *2		32 point/1 common point (2 terminal) *2		32 point/1 common point (4 terminal) *3
Input time constant (4-stage switching)	Input time	OFF→ON TYP	OFF→ON MAX	ON→OFF TYP	ON→OFF MAX
	25 µs	25 µs	65 µs	75 µs	120 µs
	300 µs*5	275 µs	365 µs	275 µs	420 µs
	1 ms	1 ms	1.2 ms	1 ms	1.2 ms
	10 ms	10 ms	12 ms	10 ms	12 ms
Input impedance	4.3kΩ				5.6kΩ
Internal current consumption	15mA or less				25mA or less
Weight	Approx.120g		Approx.110g		Approx.140g

*1 Connector for connector type I/O unit is not attached. MIL34-pin slender connector kit OP-42224, single contact wiring fitting OP-42140 are provided.
*2 2 Common ports of KV-B16XC, KV-C32XC short circuit internally.
*3 4 Common ports of KV-C64XC short circuit internally be H side (2 points), L side (2 points) respectively.
*4 All terminals support two-wire system (however, do not support two-wire system EV series proximity sensor)
*5 Setup is possible when only KV-5000/3000 is connected. When KV-1000/700 is connected, selection is not possible.

Specification - Output Unit

Model		KV-B16RC	KV-B8RC	KV-B16TD	KV-B16TCP	KV-C32TD	KV-B32TCP	KV-C64TD	KV-C64TCP
External connection mode		Removable terminal block				Connector (MIL specification)*1			
Number of outputs		16	8	16		32		64	
Way for common point		8 point/ 2 common point	Independent	16 point/1 common point (2 terminal) *2		32 point/1 common point (2 terminal) *2		64 point/1 common point (4 terminal) *3	
Output form		Relay		MOS FET (N-ch) with overcurrent protection function	Transistor (PNP)	MOS FET (N-ch) with overcurrent protection function	Transistor (PNP)	MOS FET (N-ch) with overcurrent protection function	Transistor (PNP)
Rated load		AC 250V / DC 30V 2A (8A/1 common point)	AC 250V / DC 30V 2A	DC 30V 0.3A	DC 30V 0.2A	DC 30V 0.2A			
Leak current at OFF		–		100µA or less					
Residual voltage in case of on				0.5V or less					
Connect resistance		50mΩ or less		–					
Action time	OFF→ON	10ms or less		100µs or less	10µs or less	100µs or less	10µs or less	150µs or less	50µs or less
	ON→OFF			300µs or less	200µs or less	300µs or less	200µs or less	300µs or less	200µs or less
Internal current consumption		120mA or less	65mA or less	45mA or less	35mA or less	65mA or less	55mA or less	120mA or less	100mA or less
Weight		Approx.190g	Approx.160g	Approx.130g		Approx.100g		Approx.140g	

*1 Connector for connector type I/O unit is not attached. MIL34-pin slender connector kit OP-42224, single contact wiring fitting OP-42140 are provided.
*2 2 Common ports of KV-B16TD, KV-C32TD, KV-B16TCP, KV-C32TCP short circuit internally.
*3 4 Common ports of KV-C64TD, KV-C64TCP short circuit internally be H side (2 points), L side (2 points) respectively.

Specification -I/O Unit

Model			KV-B8XTD (8 + 8)		KV-C16XTD (16 + 16)		KV-C32XTD (32 + 32)
External connection mode			Removable terminal block		Connector (MIL specification)*1		
Input	Number of inputs		8		16		32
	Input mode		DC 24V mode	DC 5V mode	DC 24V mode	DC 5V mode	DC 24V mode*4
	Max. input voltage		DC 26.4V				
	Rated input voltage		DC 24V 5.3mA	DC 5V 1mA	DC 24V 5.3mA	DC 5V 1mA	DC 24V 4.1mA
	Min. ON voltage		19V	3.5V	19V	3.5V	19V
	Max. OFF current		1.5mA	–	1.5mA	–	1.5mA
	Max. OFF voltage		–	1.5V	–	1.5V	–
	Way for common point*3		8 point/1 common point (1 terminal)		16 point/1 common point (1 terminal)		32 point/1 common point (2 terminal)*2
	Input time constant (4-stage switching)	Input time	OFF→ON TYP	OFF→ON MAX	ON→OFF TYP	ON→OFF MAX	
		25 µs	25 µs	65 µs	75 µs	120 µs	
		300 µs*5	275 µs	365 µs	275 µs	420 µs	
		1 ms	1 ms	1.2 ms	1 ms	1.2 ms	
		10 ms	10 ms	12 ms	10 ms	12 ms	
	Input impedance		4.3kΩ				5.6kΩ
Output	Number of outputs		8		16		32
	Output form		MOS FET (N-ch) with overcurrent protection function				
	Rated load		DC 30V 0.3A		DC 30V 0.2A		
	Leak current at OFF		100µA or less				
	Residual voltage in case of on		0.5V or less				
	Way for common point*3		8 point/1 common point (1 terminal)		16 point/1 common point (1 terminal)		32 point/1 common point (2 terminal)*2
	Action time	OFF→ON	100µs or less				150µs or less
		ON→OFF	300µs or less				
Internal current consumption			30mA or less		40mA or less		65mA or less
Weight			Approx.130g		Approx.110g		Approx.130g

*1 Connector for connector type I/O unit is not attached. MIL34-pin slender connector kit OP-42224, single contact wiring fitting OP-42140 are provided.
*2 2 Common port of KV-C32XTD short circuit internally.
*3 COM for input and output are independent of each other.
*4 All terminals support two-wire system (however, do not support two-wire system EV Series proximity sensor)
*5 Setup is possible when only KV-5000/3000 is connected. When KV-1000/700 is connected, selection is not possible.

Analogue/Temperature

Analogue unit

REALTIME Support

Input 4ch
KV-AD40V

Output 4ch
KV-DA40V

Basic performance	Super-high-speed conversion 25μs	High resolution 1/20000	Conversion*1 precision ±0.1%	
Hardware	4ch	Voltage/Current	Differential input*2	
Function	Direct refresh	Scaling	Moving average*2	Zero drift
Software	Unit specific instruction	Unit monitor		

*1 @25°C±5°C, current output of analogue quantity ±0.2% *2 KV-AD40V

Analogue unit

REALTIME Support

Input 2ch + Output 2ch
KV-AM40V
NEW

Basic performance	High-speed conversion 80μs	Resolution 1/8000	Conversion*1 precision ±0.2%	
Hardware	Input 2ch Output 2ch	Voltage/current	Differential input	
Function	Direct refresh	Scaling	Moving average	Zero drift
Software	Unit specific instruction	Unit monitor		

*1 @25°C±5°C

Analogue unit

Input 4ch
KV-AD40G

Basic performance	High speed conversion 80μs	High resolution 1/30000	Conversion*1 precision ±0.05%	
Hardware	4ch	Voltage/current	Differential input	Insulation is provided between CH_A/Bs
Function	Data buffer	Scaling	Moving average primary delay filter	Zero drift
Software	System macro	Unit monitor		

*1 @25°C ±5°C

Analogue unit

Input 4ch
KV-AD40

Output 4ch
KV-DA40

Basic performance	High-speed conversion 80μs	Resolution 1/4000	Conversion*1 precision ±0.2%	
Hardware	4ch	Voltage/current	Differential input*2	
Function	Scaling	Averaging times*2	Time averaging*2	
Software	Unit monitor			

*1 @25°C ±5°C *2 KV-AD40

Temperature/ analogue input Multi-input unit

Input 4ch
KV-TP40
NEW

Basic performance	High-speed conversion 50ms/4ch	High resolution 1/20000	Conversion*1 precision ±0.2%	
Hardware	4ch	Thermocouples/ Platinum temperature measurement resistance/ Voltage/Current	Differential input	Insulated between channels
Function	Scaling	Moving average primary delay filter	Zero drift	Alarm function
Software	Unit monitor			

Multi-input PID temperature adjustment unit

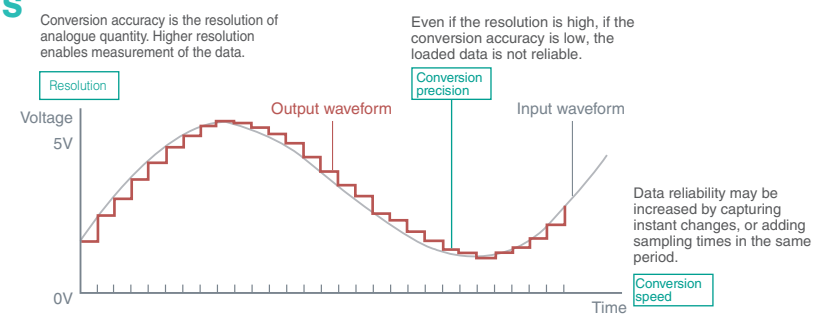
4ch
KV-TF40

Basic performance	High-speed conversion 125ms	Indication accuracy ±0.3%		
Hardware	4ch	Thermocouples	Platinum temperature measurement resistance	Insulated between channels
Function	Auto tune	3 mode voltage stabiliser	Heating-cooling control	Heater break detection
Software	Unit monitor			

High Specifications

Three factors required for analogue control

KEYENCE A/D conversion unit analogue control.



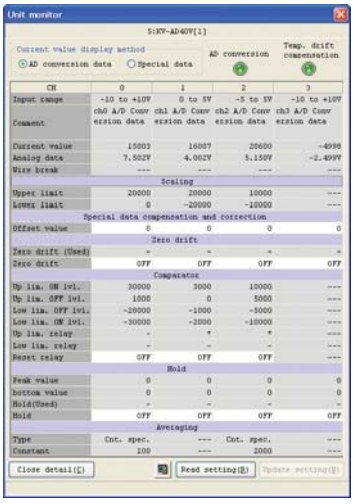
Universal features

Three substantial monitoring functions

Substantial monitoring function for monitoring analogue data is provided. Optimum monitoring may be achieved based on the situation or conditions.

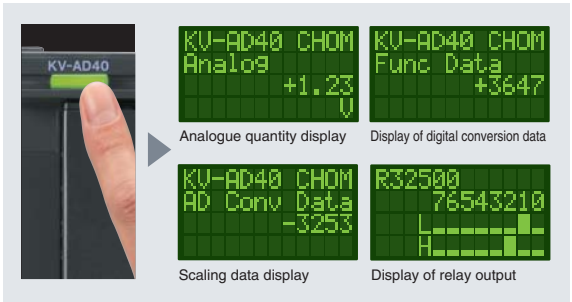
Special unit monitor is provided

Special unit monitor through which the user can see unit status at a glance is provided. Channel data or output state may be confirmed through the list mode, convenience of commissioning is entirely different from previous conditions. To execute the set read or change, it may also be used effectively during maintenance.



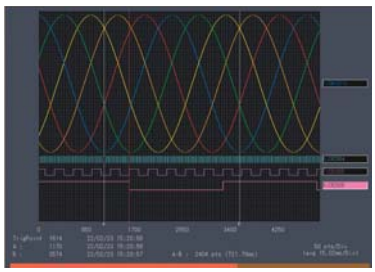
On-site simple monitoring Access window

After direct switch is pressed, the access window of CPU unit may be used to monitor analogue unit information.



Monitor time chart

High speed monitoring of analogue data may be achieved using waveform. Input data may be confirmed without an oscilloscope.



Relevant equipments - remote analogue quantity/temperature adjustment unit

CC-Link

KV-RC4AD/KV-RC4DA NEW

→ For details, please refer to Page 50

KL-LINK

KL-4AD/KL-2DA/KL-DC1V/KL-DC1A/KL-2TF

→ For details, please refer to Page 51 and 52

Unit line-up additions

Further expanded processing applications

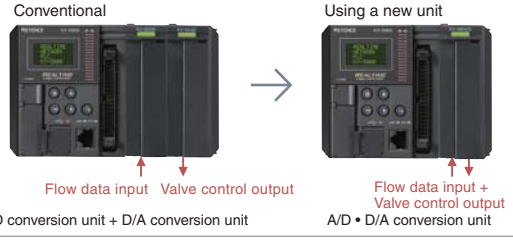
Analogue I/O hybrid with 2ch analogue input + 2ch analogue output, and temperature/analogue multi-input units have been added to the line-up. When added, analogue control with a limited number of connections, temperature/analogue measurement applications and measuring devices can provide support for keeping costs increases to a minimum.

A/D, D/A conversion unit KV-AM40V features NEW

Achieves analogue feedback control with a single unit Powerful for analogue control with a limited number of connections

Feedback control, such as using valves to vary flow in response to pressure can be performed with a single unit. Using the high-speed performance of the CPU unit and expansion unit, high-response control becomes possible. You can reduce the number of units, thus making it possible to introduce cost reduction for analogue control with a limited number of connections.

When using feedback to control valves in response to flow

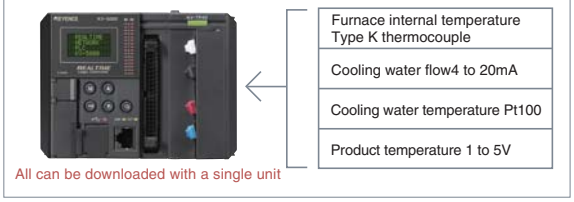


Temperature/analogue multi-input unit KV-TP40 features NEW

Temperature sensor and analogue input with a single unit Powerful temperature and analogue data collection

It is possible to download thermocouples, platinum temperature measurement resistance, voltage, and current all together with a single unit.
Included as standard with the CPU unit, the combined use of the "KV Script function", which can perform operations and the "logging function" which can collect data in CSV format, demonstrates its power with inspection equipment and data collection applications.

Examples of temperature and analogue data input



KV-AD40V/DA40V features

Super-high-speed conversion 25µs FASTEST

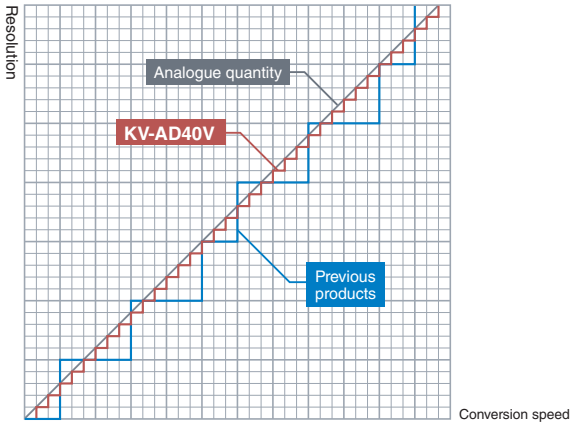
With high speed of CPU unit, conversion speed is also increased by 3.2 times of the previous speed. Since overall responsiveness of the system is increased, by production efficiency is also enhanced.

High resolution 1/20,000

Comparing with previous conditions, 5 times * the precision is achieved with an increase in conversion speed and analogue processing. * compared to KV-AD40

Ultra high precision ±0.1%

Conversion precision is ±0.1% of F.S. ultra high accuracy. Including conversion speed and resolution, three major factors required for analogue control are increased evenly, so as to achieve high reliability control.



KV-AD40V/DA40V Features

Support direct refresh

Through combination with KV-5000/3000, direct refreshing of data exchanged with the unit may be controlled in the programme process. Attention is not required for buffer memory address during direct refresh, refresh may be performed simply via special command of the unit.

Special commands of analogue unit

KV-AD40V refresh command

* Unit No. # 1 KV-AD40V
CH1 analogue input data are transmitted to DM0.

Moving average function

Data loaded at ultra high-speed are averaged inside the unit. Since sampling is carried out according to internal A/D conversion period 25µs respectively, so it will not be influenced by scanning time as occurred during averaging in ladder diagram programme. In addition to simple averaging of times designation, time designation, moving average is also added, selection may be made according to different purposes and environments.

Zero Drift function and Zero Point Amplitude Limit function

Zero Drift function is used to offset current analogue quantity to zero, Zero Point Amplitude Limit function is used to set the lower limit to zero when conversion data is a negative value. Changes may also be made via the programme later (fine adjustment).

KV-AD40G Features

With high resolution 16-bit AD converter

KV-A40G, with 16-bit A/D converter. Top level resolution in this industry is achieved. Not only super-high-speed, but also fine control may be achieved.

AD convertion performance specification

Analogue input range	Resolution
-10 to +10V	1/60000 (0.33mV)
0 to 10V	1/30000 (0.33mV)
0 to 5V	1/30000 (0.17mV)
1 to 5V	1/24000 (0.17mV)
0 to 20mA	1/30000 (0.67μA)
4 to 20mA	1/24000 (0.67μA)

Data buffer function

Buffer storage of up to 10000 points/ch data may be achieved in the AD conversion unit. Analogue data may be acquired without being influenced by the scanning time.

Data buffer conditions

Buffer period	50μs to 3s*
Trigger condition	Select from external trigger terminal input, analogue input level, CPU unit relay
Number of buffers	1 to 10000 (data before trigger may also be buffered)

* For 2ch mode.100μs - 3s for 4ch mode.

Ultra high precision ±0.05% of F.S.

THE HIGHEST IN THIS INDUSTRY

Not only resolution of AD convertion unit is increased, but also accuracy is increased thoroughly. If resolution is very high, but accuracy is low, the loaded data lacks reliability. Ultra high precision of this product may increase manufacture quality, increase reliability of inspection result.

Insulation between channels increases reliability

KV-AD40G insulates every 2ch in analogue input 4ch respectively. Prevents interference of analogue signal between devices.

Moving Average, Primary Delay Filtering function

Used for averaging AD convertion data in the unit. Sampling is carried out according to internal AD convertion period 80μs respectively, so it will not be influenced by scanning time as the averaging in ladder diagram programme. In addition, due to high speed of KV-AD40G, more data can be obtained, so as to increase reliability. Besides simple average of KV-AD40G times designation, time designation, moving average, primary delay filtering functions are also added, more wide wave processing may be supported.

KV-AD40/KV-DA40 Features

High speed conversion 80μs/ch*

Used for capturing delicate analogue quantity change. Test of peak value/valley value is based on unit hardware processing, so test will not be influenced by scanning time.

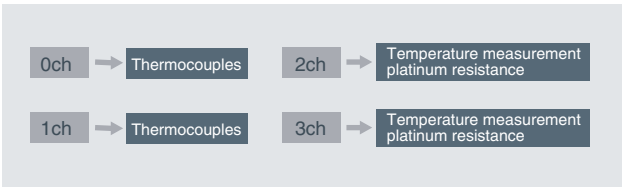
* For 1ch.320μs for 4ch

With Scaling function

The Scaling function may convert the value loaded from displacement sensor/external equipment to arbitrary value. Data may be loaded into the designated device without the previously required ladder diagram programme for value conversion. In additional, the conversion value may be easily changed during adjustment.

KV-TF40 Features

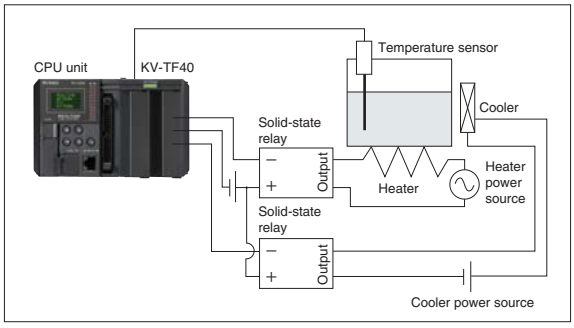
Insulated multi-input system



Such input may also support one unit, so it is unnecessary to differentiate the units used according to different input categories as done previously. Input channel will not be surplus, advantages also exist in aspects of cost and space. Since input category may be set according to the channels freely and respectively, so after setup, additional construction is also very simple. In addition, insulation is provided between the channels and between the power lines completely, so grounded thermocouple may also be used to achieve more correct measurement and withstand higher external interference.

4ch heating and cooling in a single unit with the "Heating and cooling PID control function"

Heating and cooling control are simultaneously controlled, making it possible to use applications that require temperature control with higher precision and responsiveness such as injection machines and food processing machines.



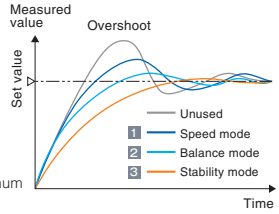
PID settings that can be used easily with the "selectable stabiliser function"

Stability control characteristics that can be selected to match control details without complicated PID control have been presets as three patterns. This is a practical function that can easily setup and reproduce the best settings.

1 **Speed mode**
Prioritises speed accessing settings

2 **Balance mode**
A mode that traces the midpoint between 1 and 3

3 **Stability mode**
Prioritises limiting overshoot to a minimum



The all-in-one, low-cost "heater disconnection alarm function"

By monitoring the current value of the heater, it's possible to output an alarm when the heater disconnects.

Specification - High precision A/D conversion unit

Model	KV-AM40V
Analogue I/O points	Input 2 point (differential input) Output 2 point
Analogue I/O range (resolution)	Voltage: -10 to +10V (1.25 mV 1/16000) -5 to +5V*2 (0.625mV 1/16000) 0 to 10V (1.25mV 1/8000) 0 to 5V (0.625 mV 1/8000) 1 to 5V (0.625mV 1/6400) Current: 0 to 20 mA (2.5µA 1/8000) 4 to 20 mA (2.5µA 1/6400)
Conversion speed	80µs/ch*1*3
Insulation mode	Between unit and CPU: optical couplers are insulated, channels are not insulated
Input resistance	Voltage: 5MΩ, Current: 250Ω
Conversion precision	±0.2% of F.S. (@25°C±5°C), ±0.4% of F.S. (@0 to 50°C)*4
Minimum load resistance voltage	Voltage: 1kΩ
Maximum load resistance current	Current: 600Ω
Max. input	Voltage: ±15V, Current: 300mA
Internal current consumption	140mA or less
Weight	Approx. 150g

*1 When temperature drift correction is used, irrelevant with the number of channels used, temperature drift correction time will be added.
*2 Analogue output is not available within the range of -5 to +5 V.
*3 A/D conversion and D/A conversion are processed independently.
*4 ±0.2% of F.S. (at 0 to 50°C) when using thermal drift correction with A/D conversion.

Specification - High precision A/D conversion unit

Model	KV-AD40G	
Analogue input points	4 point (differential input)	
Analogue input range (resolution)	Voltage: -10 to 10V (0.33 mV 1/60000) 0 to 10V (0.33 mV 1/30000) 0 to 5V (0.17 mV 1/30000) 1 to 5V (0.17 mV 1/24000)	Current: 0 to 20 mA (0.67 µA 1/30000) 4 to 20 mA (0.67 µA 1/24000)
Input resistance	Voltage: 5MΩ, Current: 250Ω	
Insulation mode	Between the unit and CPU : optical coupler insulation CH_A (0 and 1) and between CH_Bs (0 and 1) : optical coupler insulation*	
Conversion speed	80µs/2ch, 160µs/4ch (the quickest 50µs/2ch, 100µs/4ch when data buffer function is used)	
Conversion precision	Voltage:±0.05% of F.S. (@25°C) ±0.1% of F.S. (@0 to 50°C)	Current:±0.05% of F.S. (@25°C) ±0.1% of F.S. (@0 to 50°C)
Max. input	Voltage:±15V, Current:30mA	
Outside trigger input	Number of input points: 1 point input signal: NPN open circuit, no voltage contact signal minimum on voltage: 1V maximum OFF current : 0.1mA	
Data buffer function	Data buffer period: 50µs - 3s buffer data quanitity: maximum 10000 characters/ch Synchronism: CH_A0 - CH_B0 and CH_A1 - CH_B1 have data synchronism	
Special functions	Scaling, average processing (times designation, time designation, moving average, primary delay filtering), data offset, zero drift, zero point amplitude limit, peak/valley value locking, comparator, breaking detection, data buffer, external trigger	
Current consumption	220mA or less	
Weight	Approx. 190g	

* Uninsulated between CH_A0 and CH_A1, between CH_B0 and CH_B1.

Specification - super-high-speed A/D, D/A conversion unit

Model		A/D conversion unit		D/A conversion unit	
		KV-AD40V	KV-AD40	KV-DA40V	KV-DA40
Analogue I/O points		Input 4 point (differential input)		Output 4 point	
Analogue I/O range (resolution)		Input voltage: -10 to +10V (0.5 mV 1/40000) -5 to +5V (0.25 mV 1/40000) 0 to 10V (0.5 mV 1/20000) 0 to 5V (0.25 mV 1/20000) 1 to 5V (0.25 mV 1/16000) Input current: 0 to 20 mA (1 µA 1/20000) 4 to 20 mA (1 µA 1/16000)	Input voltage: -10 to +10V (2.5 mV 1/8000) 0 to 10V (2.5 mV 1/4000) 0 to 5V (1.25 mV 1/4000) 1 to 5V (1.25 mV 1/3200) Input current: 0 to 20 mA (5 µA 1/4000) 4 to 20 mA (5µA 1/3200)	Input voltage: -10 to +10V (0.5 mV 1/40000) 0 to 10V (0.5 mV 1/20000) 0 to 5V (0.25 mV 1/20000) 1 to 5V (0.25 mV 1/16000) Input current: 0 to 20mA (1 µA 1/20000) 4 to 20mA (1 µA 1/16000)	Input voltage: -10 to +10V (2.5 mV 1/8000) 0 to 10V (2.5 mV 1/4000) 0 to 5V (1.25 mV 1/4000) 1 to 5V (1.25 mV 1/3200) Input current: 0 to 20 mA (5 µA 1/4000) 4 to 20 mA (5 µA 1/3200)
Input impedance		Voltage: 5MΩ, Current: 250Ω	Voltage: 1MΩ, Current: 250Ω	–	
Conversion speed		25µs/ch*1	80µs/ch	25µs/ch	80µs/ch
Conversion precision	25°C±5°C	Voltage: ±0.1% of F.S.*2 Current: ±0.1% of F.S.	Voltage: ±0.2% of F.S. Current: ±0.2% of F.S.	Voltage: ±0.1% of F.S. Current: ±0.2% of F.S.	Voltage: ±0.2% of F.S. Current: ±0.2% of F.S.
	0°C±50°C	Voltage: ±0.2% of F.S.*3 Current: ±0.2% of F.S.	Voltage: ±0.2% of F.S. Current: ±0.2% of F.S.	Voltage: ±0.3% of F.S. Current: ±0.3% of F.S.	Voltage: ±0.4% of F.S. Current: ±0.4% of F.S.
Insulation mode		Between unit and CPU: optical couplers are insulated, channels are not insulated		Between unit and CPU: optical couplers are insulated, channels are not insulated	
Others		Absolute maximum input voltage: ±15V, current: 30mA		Maximum load resistance current: 500Ω Minimum load resistance voltage: 1kΩ	Maximum load resistance current: 400Ω Minimum load resistance voltage: 1kΩ
Current consumption		140mA or less	110mA or less	170mA or less	230mA or less
Weight		Approx. 150g		Approx. 150g	

*1 When temperature drift correction is used, irrelevant with the number of channels used, temperature drift correction time 25µs will be added.
*2 The specification when temperature drift correction is used. Conversion accuracy when temperature drift correction is not used : voltage : ±0.5% of F.S., current : ±0.6% of F.S..
*3 The specification when temperature drift correction is used. Conversion accuracy when temperature drift correction is not used: voltage : ±0.7% of F.S., current : ±0.7% of F.S..

Specifications - Temperature/analogue multi-input unit

Model	KV-TP40		
Temperature number of input points	4ch		
Input	Thermocouples	Platinum temperature measurement resistance	Voltage/current
Input range	K: -270.0 to 1372.0°C J: -210.0 to 1200.0°C T: -270.0 to 400.0°C E: -270.0 to 1000.0°C N: -270.0 to 1300.0°C R: -50.0 to 1768.0°C S: -50.0 to 1768.0°C B: 0.0 to 1820.0°C WRe5-26: 0.0 to 2315.0°C	Pt100 : -200.0 to 850.0°C JPt100 : -200.0 to 600.0°C	Voltage: -10V to +10V (0.5 mV 1/40000) 0V to 10V (0.5 mV 1/20000) -5V to +5V (0.5 mV 1/20000) 0V to 5V (0.5 mV 1/10000) 1V to 5V (0.5 mV 1/8000) -100 mV to +100 mV (5 µV 1/40000) 0 mV to 100 mV (5 µV 1/20000) Current: 0 mA to 20 mA (2 µV 1/10000) 4 mA to 20 mA (2 µV 1/8000)
Indication accuracy	±0.2% of F.S. (@25°C±5°C), ±0.4% of F.S. (@0 to 50°C)*4		
Cold contact temperature compensation accuracy	±1°C(During thermocouple input)		
Conversion speed	50ms/4ch		
Insulation mode	Between input terminal and CPU unit: Photocoupler and transformer link, Between ch: Photocoupler and transformer link		
Other functions	External cold-junction compensation, disconnection detection function, scaling function, averaging function (time average, frequency average, moving average, first order lag filter), special data offset function, alarm function, and change rate calculation/change rate alarm functions		
Internal current consumption	90mA or less		
Weight	Approx. 190g		

Specification - Multi-input PID temperature control unit

Model	KV-TF40	
Temperature number of input points	4ch	
Input*1	Thermocouples	Temperature measurement platinum resistance
Temperature sensor category	K, J, T, E, R, B, N, S, W5Re/W26Re	JPt100, Pt100
Indication accuracy	±0.3% of F.S. ±1digit (+25°C) ±0.7% of F.S. ±1digit (0 to +50°C)	
Cold contact temperature compensation accuracy	±1°C	
Sampling cycle	125ms/ch(500ms/4ch)	
Control period	1 to 100s	
Operation mode	PID control (with automatic tuning and 3 mode voltage stabiliser function), heating cooling PID control (with automatic tuning and 3 mode voltage stabiliser function), ON/OFF control	
Tune mode	PID automatic tuning mode	
Control output	Transistor (NPN open) output	
Alarm Output*2	Transistor (NPN open) output	
Alarm mode*3	Absolute value upper limit, absolute value lower limit, deviation upper limit, deviation lower limit, deviation upper limit unexcited, deviation lower limit unexcited, deviation upper and lower limit, within upper and lower limit deviation, absolute value upper limit unexcited, absolute value lower limit unexcited	
Output rated load	Max. DC30V 100mA	
Leak current at OFF output	100µA or less	
Residual voltage when output is on	1.5V or less	
Current sensor (CT) Input*4	4ch	
Current measurement accuracy	±5% or ±2A of input value, whichever is larger	
Insulation mode	Between I/Os: optical coupler and transformer are insulated, between input channels : optical coupler and transformer are insulated	
Memory element	EEPROM 1 million times rewritable	
Other functions	Output control for heater break alarm, control loop break alarm, measured value offset, output limit, slope setup, manual reset, output control when an error occurs	
Current consumption	210mA or less	
Weight	Approx. 270g	

*1 Set up according to channels respectively.
*2 As the alarm output is used as cooling control output when heat/cool control is used, the alarm output cannot be used as the alarm output function.
*3 Standby operation ON/OFF can be selected for each alarm mode.
*4 Use the current sensor (OP-6694, sold separately) made by KEYENCE Corporation.

Positioning/Motion Unit

KV MOTION

Compatible with MECHATRONLINK-II Positioning/ motion unit

KV-ML16V
NEW
MECHATROLINK

Hardware	16-axis	800 points/axis	10 Mbps transmission rate			
Operation mode	Positioning	Speed	Torque	Synchroni-sation	Fine	Manual pulser*1
Function	Interpolation	Arc	Helical			
Software	Virtual axis	Bezier acceleration and deceleration	Cache start	Motion flow	Teaching unit	Unit conversion

* KV-MX1 required

Pulse string positioning/ motion unit

2 axis
KV-MC20V
NEW

4 axis
KV-MC40V
NEW

Hardware	2-axis/ 4-axis	800 points/axis	4 MHz max. frequency			
Operation mode	Positioning	Synchroni-sation	Fine	Manual pulser*1		
Function	Interpolation	Arc	Helical*2			
Software	Virtual axis*2	Bezier acceleration and deceleration	Cache start	Motion flow	Teaching unit	Unit conversion

*1 KV-MX1 required
*2 KV-MC40V only

KV-M Series function expansion unit

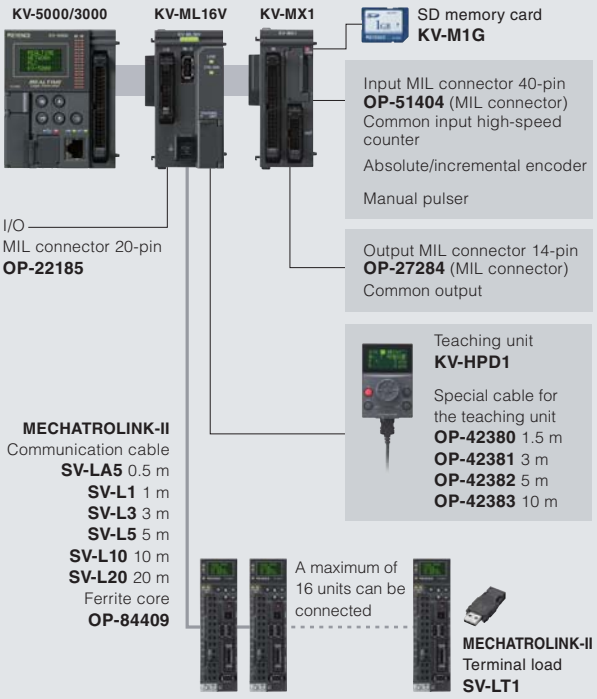
KV-MX1
NEW

High-speed counter | Direct I/O | SD memory card

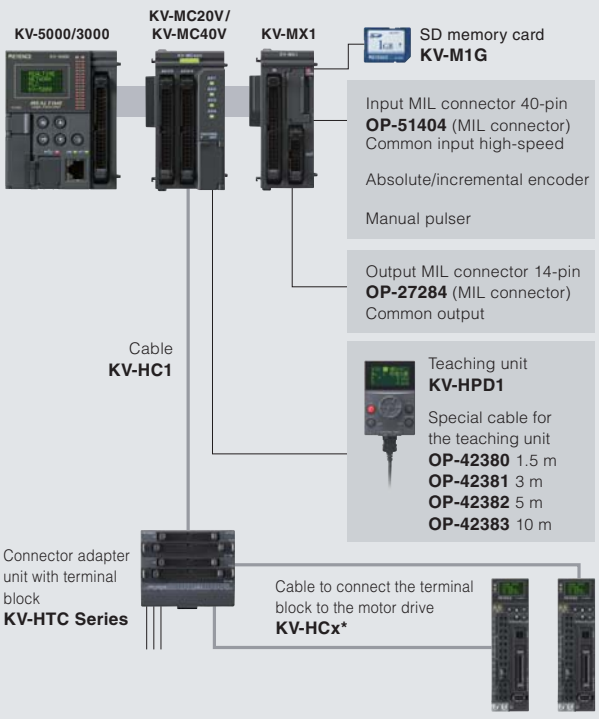
Incremental type: 4 points, 6.4 MHz response frequency
Absolute type: 2 points, 20 KHz response frequency
Common input/output: 12 points/12 points

External device

MECHATROLINK-II type KV-ML16V



Pulse string type KV-MC20V/KV-MC40V

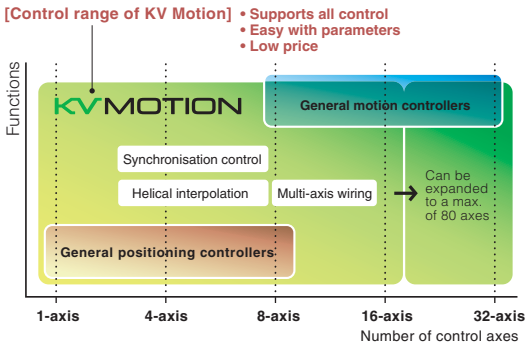


High Spec

Platform standardised to required motor control for factory automation

The KV-M Series can offer support for a wide range of motor control that is required for factory automation, from positioning control to synchronisation control. It brings a variety of merits, including the standardisation of development and inventory in identical environments.

Positioning | Speed control | Torque control | Interpolation (straight line, arc, helical) | Fine control | Synchronisation control | Electronic cam



Common features

A substantial position function

4 MHz max. pulse output (KV-MC20V/MC40V)

Possible to produce a max. pulse output of 4 MHz, which can meet the demands of high-speed and high-precision positioning. Can support the control of motors that demand high-resolution and speed, such as linear and DD motors.

0.6 ms*1 start-up time (KV-MC20V/MC40V)

By speeding-up positioning pattern calculations, the speed of pulse output after receiving an operation start command has been shortened to 0.6 ms, 2.5 times the conventional speed. Can drive motors with an even higher-speed response.

*1 When operated independently

Helical interpolation*2 (3-axis screw control)

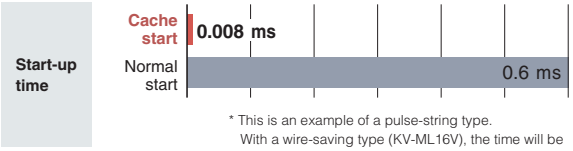
While performing arc interpolation with 2-axes, it's possible to synchronise a third axis and draw a screw-shaped trajectory. Screw-shape control such as metal processing and winding can be achieved just by setting up simple parameters.

*2 Not including the 2-axis type KV-MC20V

Cache start

FASTEST IN ITS CLASS

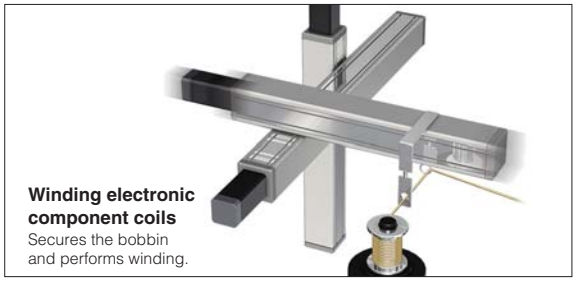
By registering a point that you would like to output at high-speed to cache in advance, it's possible to greatly reduce start-up time without the influence of CPU unit scan-time or calculation time for positioning patterns.



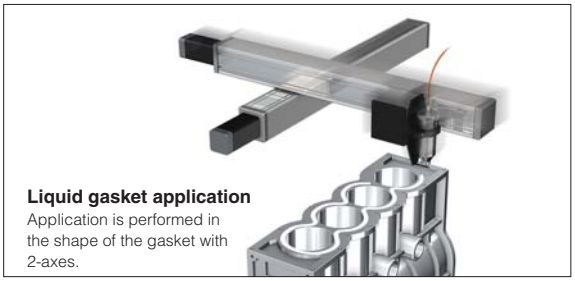
* This is an example of a pulse-string type. With a wire-saving type (KV-ML16V), the time will be the result of adding 1 to 2 control cycles to the above.

Fine control

This function creates control points (command coordinates) that change at each minimum 0.5 ms cycle as fine control data, and following split control cycles, then forms specific coordinates in order, just by specifying data number. With fine control data it's possible to specify the action of multiple axes, from 1 axis up to a maximum of 16 axes (KV-ML16V).



Winding electronic component coils
Secures the bobbin and performs winding.

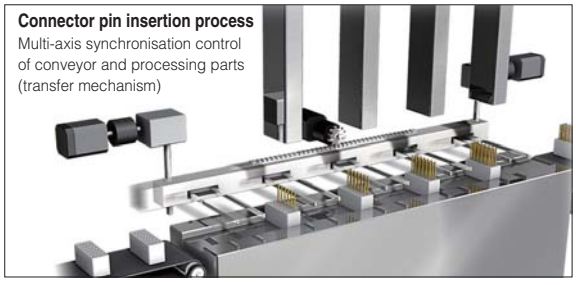


Liquid gasket application
Application is performed in the shape of the gasket with 2-axes.

It has become easier to introduce synchronisation control from 2-axis to multi-axis.

16-axis max. synchronisation control is possible

Synchronisation control is possible for all KV-M Series units. With the KV-ML16V, you can achieve 16-axis max. synchronisation control with a single unit. Also, with the KV-MC40V and KV-ML16V, control with the virtual axis as the main axis is possible.



Connector pin insertion process
Multi-axis synchronisation control of conveyor and processing parts (transfer mechanism)

Introduces synchronisation control with the sense of a positioning unit

Despite its price range being among the class of positioning units, the KV-M Series is able to perform synchronisation control as standard. Because there is no need to select a high-priced motion-specialised unit, synchronisation control can be introduced just like a positioning unit.

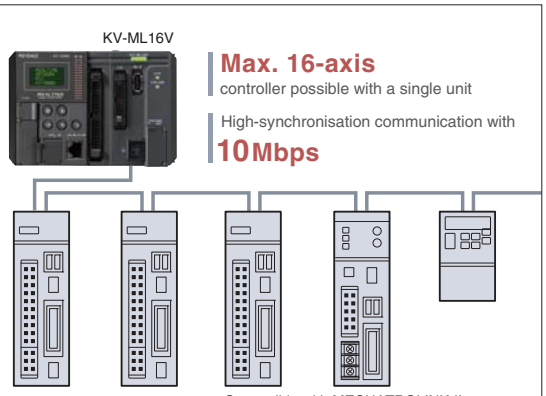
Lens polishing process
Synchronisation control of horizontal movement and polishing parts

Positioning/Motion Unit

KV-ML16V features

Max. 16-axis controller possible with a single unit

The KV-ML16V, which allows for 16-axis max. control with a single unit, is compatible with the MECHATROLINK-II high-synchronisation open network at a high transmission rate of 10 Mbps. Because a multi-range from a limited number of axes to a maximum of 16 axes can be used with a single unit, it's possible to reduce work hours for wiring with its wire-saving functionality and it's possible to configure a system with a high degree of freedom.

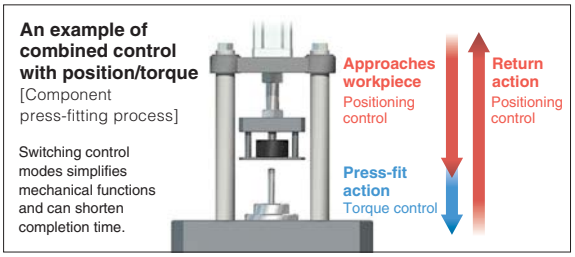


High-speed field network
MECHATROLINK-II

Transmission rate	10Mbps
Max. transmission distance	50 m altogether (100 m when using a repeater unit) 30 m with 16-axis
Number of connection nodes	16

Can perform control with the combination of position, speed, and torque control.

Not only can the KV-ML16V perform positioning control, it can perform control via speed and torque commands as well. Because it's possible to switch control modes from ladder programmes and motion flows, it's easy to configure a system that mixes positioning, speed, and torque control.



"KV MOTION +" software features

Included as standard with KV STUDIO

"KV MOTION+" parameter setting software is included as standard with "KV STUDIO Ver.5.5" ladder support software.
There is no need to purchase special development tools. This software can be used to manage design and maintenance in shared environments.

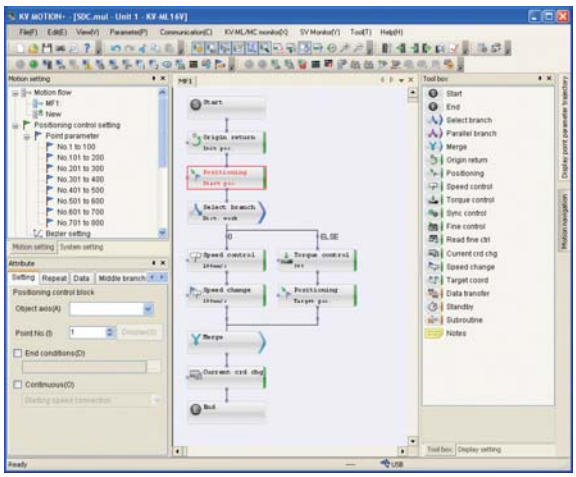
"Motion flow" that eliminates ladder programmes

Conventionally created with ladder programmes, sequential operations such as continuous operations and conditional branching, can be set with flow types. Because the KV-M Series performs motion flow execution, it's possible to process at high speed without influence from CPU unit scan time.

Programming can be done in a mere 3 steps
How to create motion flows

1. Arrange the necessary motion blocks using drag and drop
2. In properties, set the point No. and branch conditions
3. Connect continuous motion blocks using drag and drop

* Tagged comments can be listed as necessary.



General specifications

Power voltage	Main unit: DC 24 V±10% (supplied through the CPU unit)			
	External I/O side: DC 24 V±10%			
Internal current consumption	KV-ML16V: Main unit: 200 mA or less, When connected to KV-HPD1: 290 mA or less External I/O: 120 mA or less KV-MC40V: Main unit: 180 mA or less, When connected to KV-HPD1: 270 mA or less External I/O: 130 mA or less KV-MC20V: Main unit: 120 mA or less, When connected to KV-HPD1: 210 mA or less External I/O: 80 mA or less KV-MX1: Main unit: 30 mA or less, External I/O: 100 mA or less			
Operating surrounding air temperature	0 to +50°C (No freezing)*1*2			
Ambient storage temperature	-20 to +70°C*1			
Operating ambient humidity	10 to 95%RH (No condensation)			
Ambient storage humidity	10 to 95%RH (No condensation)			
Withstand voltage	AC 1500 V for 1 minute Between power terminals and I/O terminals or external terminals and housing AC 500 V for 1 minute Between power terminals and MECHATROLINK-II communications port or FG (KV-ML16V)			
Noise immunity	1500Vp-p Pulse width 1μs, 50ns (based on noise simulator) IEC standard compliant (IEC61000-4-2/3/4/6)			
Shock resistance	Follow IEC61131-2	Intermittent vibration		Scan times
		Frequency	Acceleration	Half amplitude
		5 to 9 Hz	—	3.5 mm
		9 to 150 Hz	9.8 m/s²	—
		Continuous vibration		10 times for X/Y/Z direction (For 100 min)
		Frequency	Acceleration	Half amplitude
		5 to 9 Hz	—	1.75 mm
		9 to 150 Hz	4.9 m/s²	—
Insulation resistance	50 MΩ and above (measured between PLC power terminals and I/O terminals or external terminals and housing with a 500 V DC megohmmetre)			
Hold-up time	10 ms (Conforms to CPU unit)			
Operating atmosphere	Without dust and corrosive gas			
Operating altitude	2000 m or less			
Overvoltage category	II (When using the KV-U7)			
Pollution degree	2			
Weight	KV-ML16V: Approx. 220 g, KV-MC40V: Approx. 225 g, KV-MC20V: Approx. 170 g, KV-MX1: Approx. 160 g			

*1 This is the range of warranty for the system.
*2 According to the temperature on the lower side of the unit in control panel.

Performance specifications

Type		KV-ML16V	KV-MC40V	KV-MC20V
Number of control axes		16 axes (total including virtual axis)	4 axes+1 axes (virtual axis)	2 axes
Connectible CPU units		KV-5000/3000		
Max. number of connected units		5 units	12 units	17 units
Appropriated devices		**16 axes in use** Relay: 2688 points (168 ch) Data memory: 222 words (high speed) 1242 words (simple) **8 axes in use** Relay: 1644 points (104 ch) Data memory: 222 words (high speed) 762 words (simple) **4 axes in use** Relay: 1152 points (72 ch) Data memory: 222 words (high speed) 522 words (simple)	Relay: 1280 points (80 ch) Data memory: 90 words (high speed) 582 words (simple)	Relay: 896 points (56 ch) Data memory: 54 words (high speed) 402 words (simple)
Output format		MECHATROLINK-II	Differential line driver output (Can switch between 1-pulse method, 2-pulse method, and A/B phase method)	
Max. output pulse		—	4MHz	
Control mode		Position control	Position control	
		Torque control		
		Speed control		
		ML-II command		
		I/O control		
Control cycle		0.5 ms (up to 2 axes)	1.0 ms	
		1.0 ms (up to 4 axes)		
		1.5 ms (up to 6 axes)		
		2.0 ms (up to 8 axes)		
		2.5 ms (up to 12 axes)		
		3.0 ms (up to 16 axes)		
External interface		Input: Photocoupler input, Output: Open-collector output (DC 30V 50mA)		
		MECHATROLINK-II port	—	—
Input time constant		Sets each input to 11-grade for every block		
Axis control function execution method		Ladder programme, motion flow		
Motion flow	Block type	Positioning control block, synchronisation control block, fine control block, speed control block, torque control block, zero return block, data transfer block, sub-routine block, standby block, change current coordinate block, change speed block, change target coordinate block, display fine control block, start block, end block, selection branch block, parallel branch block, merge block		
	Programme capacity	768KB		
	Max. amount of blocks	A total of 256 blocks with all flows		
	Max. amount of flows	32		
	Amount of coactivity	Amount of coactivity x2		

Type		KV-ML16V	KV-MC40V	KV-MC20V
Position units		mm, deg (angle), PLS (pulse number), decimal place from 0 to 9 digits, unit conversion function available		
Cumulative address		-2147483648 to +2147483647 Command units		
Positioning control	Positioning mode	Absolute value/incremental value		
	Position setting range	-2147483648 to +2147483647 Command units		
	Interpolation	Straight-line interpolation (max. 16 axes), arc interpolation, helical interpolation		
	Single operation address	-2147483648 to +2147483647 Command units		
	Acceleration/ deceleration curve	Straight-line, S-shaped, Bezier		
	Acceleration/ deceleration period	0 to 65535 ms		
	Start-up time	Independent/ interpolation: 2 to 3 control cycles (When 1st axis is activated)	Independent: 500 to 600 μsec Interpolation (straight-line, 2-axis): 600 to 700 μsec Interpolation (arc, 2-axis): 700 to 800 μsec Interpolation (helical, 3-axis): 800 to 900 μsec (KV-MC40V only) (When 1st axis is activated)	
		Cache start: 1 to 2 control cycles	Zero start: Input time constant +2 μsec Direct cache start: Max. 8 μsec	
	M-code	1 to 65000, WITH/AFTER mode		
	Sensor positioning	Speed based on external input to position switching control		
	Amount of points	800 points/axis		
Synchronisation control	Input	Counter (KV-MX1 required), command coordinates, current coordinates (KV-ML16V only)		
	Clutch	Select from direct, slide, and follow-up		
	Cam	Resolution: 2048 to 32768, Number of data: 4 to 64 (Changes depending on resolutions)		
	Contact output	16 points (out of 16 points, 8 external output points) x2		
	Working adjustment	Adjustment via auxiliary input, phase adjustment, and angle adjustment		
Fine control	Fine data workpiece area	8MB		
	Built-in ROM capacity	512 kB		
	Amount of settings	Built-in ROM: 100, SD memory card: 1000		
	Data capacity of 1 setting	Built-in ROM:512 KB, SD memory card: 8 MB (KV-MX1 required)		
Zero return	Zero return method	Point of origin sensor edge/mid-point, push zero return, DOG type (can specify presence/absence of Z-phase), data set type		
Speed control	Speed command range	-100000 to 100000 (x0.01 min⁻¹)	—	—
Torque control	Torque command range	-80000 to 80000 (x0.01%)	—	—
JOG/inching		Inching (can specify pulse number), JOG (high speed/low speed)		
Teaching		Supports current coordinate teaching and teaching from counter current value		
Memory data		Point parameters 800 points (each axis), synchronisation parameters (each axis), fine settings (built-in ROM- 512 kB, expandable with SD card) Settings such as cam data motion flow settings can be read and written during RUN (with some restrictions)		
High-speed counter		When KV-MX1 is connected INC 4ch/ABS grey 2ch (switches based on settings) Max. 6.4 MHz (2-phase, 4 times)		
5 V power output		—	5 V±5%, Max. 100 mA (total value)	
Output display		Error status/ MECHATROLINK-II communication status	Error status/Pulse output status	
Self-diagnosis function		Can give diagnosis through hardware error, various parameter errors, error number, and messages		
Parameter settings		KV-HPD1, <KV STUDIO> Can perform settings from a ladder programme		
Data backup		Coordinates, error/warning history backup, parameter settings backup via flash ROM, 100,000 times switching		

KV-ML16V MECHATROLINK-II communication specifications

Communication standard	MECHATROLINK-II
Transmission rate	10 Mbps
Number of ports	Supports 1 port end connection only
Max. transmission distance	15 slave units or less: 50 m, 16 slave units: 30 m, can be extended with repeater
Minimum distance between stations	0.5 m
Transmission media/ cable	Specialised 2-core shield twisted-pair cable
Amount of connected stations	Max. 16 slave units 32-byte mode 0.5 ms (up to 2 axes), 1.0 ms (up to 4 axes), 1.5 ms (up to 6 axes), 2.0 ms (up to 8 axes), 2.5 ms (up to 12 axes), 3.0 ms (up to 16 axes) 17-byte mode Unsupported
Transmission byte number	32-byte mode

KV-MX1 Performance specifications

Type	KV-MX1
Supported units	KV-ML16V/KV-MC40V/KV-MC20V
Max. number of connected units	1 unit per positioning/motion unit, right-side only
Number of input cycles	Max. 6.4 MHz (when 2-phase, 4 times)
Number of counter points	INC 4 points, ABS 2 points (Set in <KV STUDIO>)

Simple positioning unit

2 axis
KV-H20S

4 axis
KV-H40S

Hardware	Pulse train mode	1Mpps	Differential line driver	JOG Teaching
Operation mode	Positioning	Speed		
Function	Straight line compensation	ZERO start	Sensor interruption stop	Debug
Software	MOTION BUILDER	System Macro	Unit monitor	

Synchro / Cam motion unit

2 axis
KV-H20G

Hardware	Pulse train mode	1Mpps	Differential line driver	JOG Teaching
Operation mode	Positioning	Speed	Synchro	High-speed counter
Function	Straight line compensation Arc compensation	ZERO start	Sensor interruption stop	Debug
Software	MOTION BUILDER	System Macro	Unit monitor	

High-speed counter unit

REALTIME Support

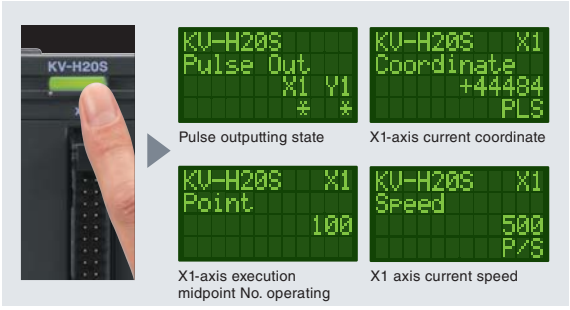
2ch
KV-SC20V

Hardware	1MHz			
Operation mode	Presettable Up/ Down	enable	Frequency count	Tachometer
Function	Direct refresh	Input capture	Input filter	Preset
Software	Unit specific instruction	Unit monitor		

Universal features

On-site simple monitoring access window

Pressing direct switch, information monitoring may be carried out for positioning unit through the access window of CPU unit.



On-site simple adjustment of KV-HPD1

JOG knob demonstration unit that may execute demonstration or commissioning simply is provided.

External device

KV-5000

KV-H20S

■ MIL connector (40-pin) kit

OP-51404
• Standard contact/slender type, inclined type is attached

OP-22184
• Standard contact /longitudinal type is attached

One for **KV-H20S**, two for **KV-H40S/KV-H20G**

■ Connector adaptor unit with terminal block

Connecting cable **KV-HC1**

Connecting cable
KV-HC2
KV-HC3
KV-HC4

2-axis origin sensor, CW/CCW limit sensor, stop sensor, emergency stop input etc

Connector adaptor unit with terminal block
KV-HTCx

Servo motor amplifier *
Stepping motor driven

* Please inquire for details of corresponding motor drive.

■ JOG knob teaching unit

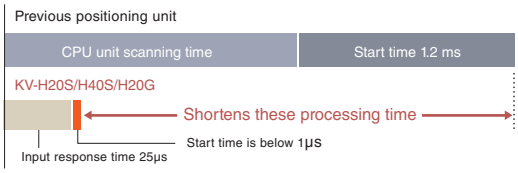
KV-HPD1
• JOG knob
• May display Japanese characters

Connecting cable
OP-42380 1.5 m
OP-42381 3 m
OP-42382 5 m
OP-42383 10 m

* **KV-SC20 (V)** adopts MIL34-pin connector

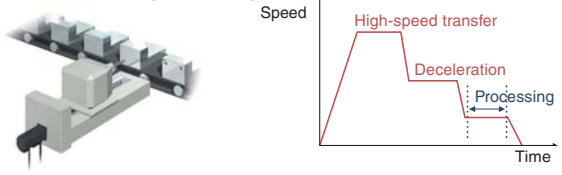
Startup speed only 1µs or less ZERO start function

If start signal input terminal “ZERO_ST” of the unit is used, start 1µs. Since the unit uses direct signal input, scanning time is not completely influenced. It is compatible with the previous ultra high-speed communication.



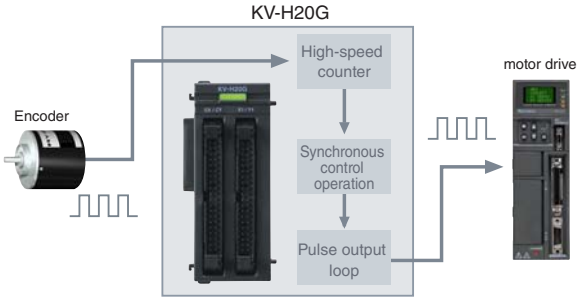
Operating speed may be changed to multisection trapezoid control

The user may execute speed control at any time even during positioning operation. It may be used for positioning control of a cutting machine in which high speed transmission is required before the tip reaches the workpiece, low speed transmission is required during machining.



Achieve 2-axis synchronous control economically KV-H20G

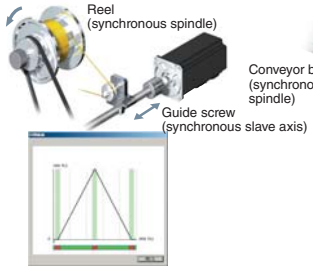
Functions required for high-speed counter/pulse output/cam switch function etc synchronous controls are packaged in one unit, other extension units are not required.



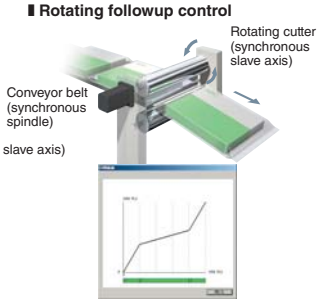
Electronic cam (synchronous control) setup allows mutiple mechanical movements KV-H20G

Only through simple parameters setup, transverse followup control, or rotating followup operation controls required for synchronous operation may be executed.

Transverse followup control



Rotating followup control



Specification – positioning unit /simplify setting

Model	KV-H20S	KV-H40S
Control mode	Positioning (PTP: point to point) control (independent, straight line compensation) speed control (independent), speed control → positioning control (independent)	
No. of axis controlled	2-axis/unit independent 2-axis/Compensation 2-axis (straight line)	4-axis/unit independent 4-axis/Compensation 4-axis (straight line)
Number of positioned points	400 points/axis	200 points/axis
Position Instruction	±99,999,999 (pulse, mm, degree) increment, absolute value coordinate management scope (- 2,147,483,648 - 2,147,483,647)	
Speed Instruction	1 to 1,000,000p/s	
Acceleration/Deceleration (p/s/ms, mm/s/ms, deg/s/ms)	1 to 65,000 (however, 65,000 is set as instant acceleration/deceleration) control period 2ms	
Acceleration/deceleration mode	Straight line, S shape sine curve	
Starting time	Independent operation: 1.5ms straight line compensation operating: 1.8ms	
Pulse output state	Differential line driver output (1 pulse, 2 pulse switching)	
Memory backup	Flash memory	
External device	Demonstration unit KZ-HP1, KV-HPD1 is provided with terminal block connector conversion unit KV-HTC (suitable for servo drive of different manufacturers) parameters setup monitoring software KV-H1HW	
Others	Test run function, sensor interruption stop function, continuous action, approach rotation control	
Current consumption	KV-H20S: 120mA or less For KZ-HP1/KV-HPD1 connection: 200mA or less I/O side: 90mA or less KV-H40S: 130mA or less For KZ-HP1/KV-HPD1 connection: 220mA or less I/O side: 180mA or less	
Weight	Approx. 150g	Approx. 200g

Specification – synchro/cam motion unit

Model	KV-H20G
Control mode	Positioning (PTP: point to point) control (independent, straight line compensation) speed control (independent), speed control → positioning control (independent), synchronous control
No. of axis controlled	2-axis/unit, independent 2-axis, compensation 2-axis (straight line, arc)
Number of positioned points	400 points/axis
Position Instruction	±99,999,999 (pulse, mm, degree) Increment, absolute value Coordinate management scope (- 2,147,483,648 - 2,147,483,647)
Speed Instruction	1 to 1,000,000p/s
Acceleration/Deceleration (p/s/ms, mm/s/ms, deg/s/ms)	1 to 65,000 (however 65,000 is set as instant acceleration/deceleration) control period 2 ms
Acceleration/deceleration mode	Straight line, S shape sine curve
Starting time	Independent operation : 1.5 ms Straight line compensation operating : 1.8 ms Arc compensation operating : 2.1 ms
High-speed Counter dep	With symbol 24-bit 2-phase 2ch (INC)/maximum 12-bit (ABS) Gray code, residual Gray code, binary conversion Compare 2 points/cam switch output 8 points maximum 500kp/s
Pulse output state	Differential line driver output (1 pulse, 2 pulse switching)
Memory backup	Flash memory
External device	Demonstration units KZ-HP1, KV-HPD1 are provided with terminal block connector conversion unit KV-HTC, KV-HTE1 (suitable for servo drive of different manufacturers) parameters setup monitoring software KV-H1HW
Others	Test run function, sensor interruption stop function, continuous action, approach rotation control
Current consumption	KV-H20G: below 130mA, when connected with KZ-HP1/KV-HPD1: below 200mA I/O side: below 150mA
Weight	Approx. 200g

Specification - Multi-function high-speed counter unit

Model		KV-SC20V
Input frequency		1MHz
Count range		32 bit
Number of CH		2ch
Mode	Count mode	Liner, Ring
	Input mode	• 2-phase 1 times/2 times/4 times, 2 pulse (addition and subtraction operation) • internal clock source • 1 pulse direction with/without • other ch consistent output
	Operation mode	• Up down count mode • Count mode within setting time • Preset count mode • Frequency count mode • Enable accumulative count mode • Enable count mode • Tachometer A mode • Tachometer B mode
Input	Count input	A phase/B phase/Z phase (preset) 6, three for each channel 5V/12V/24V DC allow input, line driver allow input, optical coupler insulation
	Control input	Enable (for input & capture) input channels. 1 point counted as 2 points 12 - 24V DC allow input, optical coupler insulation
		Input capture input channels. 1 point counted as 2 points 12 - 24V DC allow input, optical coupler insulation
Output	Comparator matching output	Channels. 2 points counted as 4 points optical coupler insulation Rated load : below DC30V 0.1A
Input capture function		Based on external input (maximum 4 points)
Input screening function		Input time constant switching (count 4 categories/control 7 categories)
Preset function		Preset (Z-phase) input/internal relay
Current consumption		95mA or less
Weight		Approx. 120g

Communication/Network Unit

Ethernet unit

REALTIME Support

KV-LE21V

NEW

- Hardware: 100BASE-TX 10BASE-T; Follow IEEE802.3
- Function: FTP service; Higher-level link; KV socket communication; MC Protocol; Mail receiving/sending
- Software: KV COM+; Unit monitor; Unit specific instruction; Mail communication instruction maker

FL-net unit

REALTIME Support

KV-FL20V

- Hardware: 100BASE-TX 10BASE-T; Follow IEEE802.3; Follow FL-net Ver.2.00
- Function: Cyclic transmission; Message transmission
- Software: KV-FL setup tool; Unit monitor

Serial communication unit

REALTIME Support

KV-L20V

- Hardware: 230kbps; Independent 2 port; RS-232C; RS-422A; RS-485
- Function: Higher-level link; Send/receive text data; PROTOCOL STUDIO; Free transmission; Modem communications
- Software: KV COM+; DATA BUILDER; Unit monitor

High speed multiple link unit

REALTIME Support

KV-LM20V

- Hardware: 2Mbit/s; Wiring length 1km
- Function: Multi-drop 15 units; Dual-port Function

High Specifications

Substantial communication tools

Special software reduces preparation time.

KV-FL setup tool
[KV STUDIO standard configuration]

The setup required for FL-net connection is done using the guide mode. At the same time, the address diagram may also be generated automatically, so programming is very easy.

KV COM+ UNDER DEVELOPMENT
[KV-DH1E (L)]

Software for the purpose of downloading data from the PLC to a PC. Data can be imported to Excel* just with its easy settings. We have also prepared an Active X* and DLL library edition.

Mail communication instruction maker
[KV STUDIO standard configuration]

Content of the Mail to Send command to the PLC may be set simply in guide mode, it may be used without special knowledge.

PROTOCOL STUDIO Ver.2
[Standard KV STUDIO Ver.6 configuration]

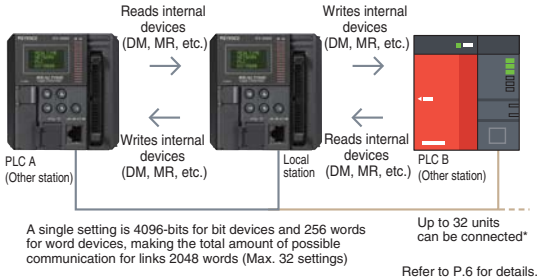
Just register on the command/response required for communication, this reduces ladder diagram programme greatly. Preset macros for various communication equipments are also provided.

* Excel and ActiveX are registered trademarks of Microsoft Corporation, U.S.A.

Features of the KV-LE21V NEW

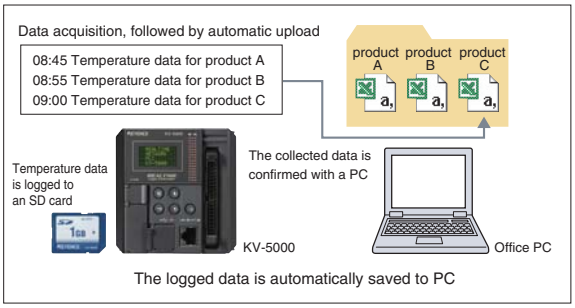
Easy PLC link machine NEW

Achieves PLC linking using Ethernet without programmes. Connections such as those with a touch panel or with a PC can be used in combination with other Ethernet communications to perform PLC linking.



FTP Client functions NEW

Can transfer PLC device values and logging data files at any given timing, to a device such as a PC. For example, it can automatically upload data that has been collected with the KV-5000/3000 CPU built-in logging/trace functions, to a device such as a PC, in CSV format.



Highest processing capacity in this industry

Ultra high-speed data communication of up to 216k characters/s (@2ms scanning time) (8 times of previous speed). Most suitable for joint control with a PC.

Alarm mail delivery function

When an alarm occurs on the CPU unit, mail will be sent to pre-registered email addresses. The mail may contain not only alarm content, but also the value of the designated device.

Support MC protocol

Support MC protocol. Application software prepared for the PLC made by MITSUBISHI Electric (Co., Ltd.) may run directly.

* MC protocol is MELSEC communication protocol for short.
* MELSEC is the trade mark of Mitsubishi.
* Support communication based on with 3E frame/4E frame ASCII which are compatible for QnA code, communication of binary code.

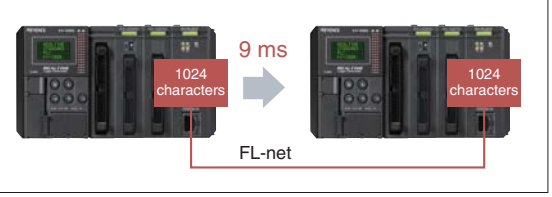
Command mail receiving function

When commands are received via mail, the KV-LE20V will return the response via mail. It is easy to make the PC email with the mail communication instruction maker through which is KV STUDIO standard configration.

Features of the KV-FL20V

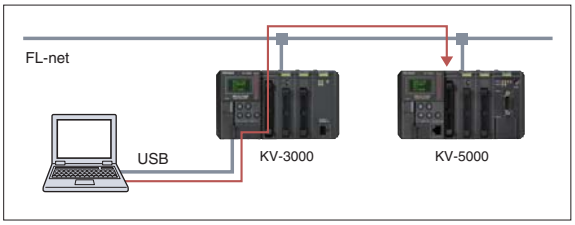
Transfer time 9 ms FASTEST [1024 characters/node, when number of nodes is 2]

Flexible usage of FL-net high speed/high capacity link can do ultra high-speed data transmission. Data link between two PLCs allows transmission of 1024 characters within 9ms.



FL-net enabled

For FL-net connected CPU unit, programme transmission/monitoring may be carried out through network. So as to increase programming efficiency of several persons during system construction or increase on-site maintainability.



Features of the KV-L20V

Support communication speed 230kbps

THE FASTEST IN THIS INDUSTRY

Communication speed of both ports supports the quickest 230kbps speed in this industry. Communication response is noticeably increased.

With completely independent double serial port

Communication port is provided with a switchable D-sub 9 -pin/RS232 port and a RS-232C/RS-422A/RS-485 port. Since they are independent communication ports, they may communicate with two external equipments of different protocols simultaneously.

Mutiple protocol mode

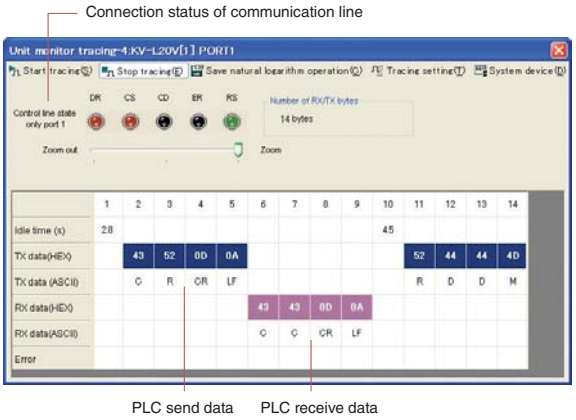
Supports communication protocols of different companies. Connection with other company's corresponding serial communication equipment is possible.

Upper link supports communication protocol

Operation mode	Supported equipments
KV mode	VT3/CV Series from KEYENCE
Link mode	Serial communication device from OMRON
Protocol mode	Serial communication device from MITSUBISHI ELECTRIC

Follow-up function is provided as standard configuration

KV STUDIO is provided with the follow-up function favorably commented in PROTOCOL STUDIO as standard configuration. Since communication content may be "seen", so time is greatly reduced.



Communication programme is reduced greatly

Communication Macro Support Software
"PROTOCOL STUDIO Ver.2"
[Standard KV STUDIO Ver.6 configuration]

These pre-defined macros cover the following products:

Type	Vendor name	model	
Image processing	KEYENCE	CV-5000/CV-3000/CV-2000/CV-700/CV-500/CV-1000	
Instrumentation		AT-V500/LK-G5000/LK-G3000/LJ-G5000/LT-9500/LS-7600/TM-3000/SI-F1000	
Barcode reader		BL-1300/BL-700/BL-600/BL-210/TL-800/BL-N90/SR-600/SR-500	
Transducer		DV-90/N-410/N-400/BL-V35/RF-500/DL-RS1(A)	
Labelling equipment		MD-F3000/MD-S9900/MD-V9900/ML-Z9500/ML-G9300/ MD-V9600/MD-Y9700/MD-H9800/MK-9000/MK-7500	
Discharger		SJ-H/SJ-G/SJ-W100	
Others		TR-V/UV-400	
Converter	Mitsubishi Electric	FLEQROL Series	FR-E500/FR-S500/ FR-A700/FR-F700
	Yaskawa	VS mini Series	VS-mini V7/VS-mini J7
Thermostat	Omron	Cermak NEO Series	E5AN/E5EN/E5CN/E5GN
	RKC	REX-F Series	REX-F400/REX-F700/REX-F900
ROBO CYLINDER	IAI	ROBO CYLINDER Series	PCON/ACON/SCON
		X-SEL Series	X-SEL
Common protocol	—	Modbus (RTU)	
Mixer	Yamaha Corporation	Installation series	IMX644

Above company names and product designations used in these manuals are trademarks or registered trademarks of their respective owners.

Powerful communication macro production function covers serial communication comprehensively
No ladder diagram programme for character string processing is not required

Trivial character string processing in ladder diagram programme or variable conversion processing in communication data is executed in mutiple communication units automatically. Only receive/send timing is managed by the ladder, hence cutting off program substantially. Serial communication with almost all equipments are possible.

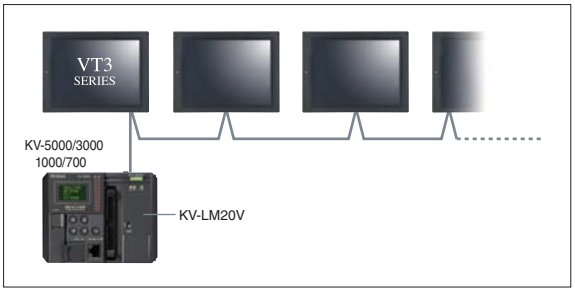
Protocol files of various communication equipments are provided as standard configuration

In addition to KEYENCE products, serial communication equipment protocols of other companies are also included as standard.

Features of the KV-LM20V

High speed multiway connections between one unit and 15 equipments is possible

High speed multiway connection with VT3 Series touch panel, data acquisition system DT-100A may be achieved. With the newly developed "block differential transport protocol", only changed information is transmitted, so the reduction of communication speed may be controlled within the minimum limitation in case of multiple connections.



2Mbit/s super-high-speed communication

Communication with VT3 Series touch panel can communicate at 2Mbit/s ultra high-speed communication. Wiring length may be extended up to 1km.

Universal cable is used to connect the touch panel

Connection of the KV-LM20V and the VT3 Series touch panel adopts universal cable [KPEV-SB (1P)]. Since connection is made using terminal block, it is unnecessary to fabricate a connector or purchase a cable with connector, lowering the costs for constructing a new system.

Specification - Ethernet unit

Model	KV-LE21V		
Function description	Number of sockets		Port No.
	TCP	UDP	
PC applications (KVS/KVB, DB)*1	8	0	8500 (set within the range of 1 to 65535)
Host link communication*2*3	Total 15	1	8501 (set within the range of 1 to 65535)
MC protocol communication*2*3		1	5000 (set within the range of 1 to 65535)*4
VT3 link	0	1	8502 (set within the range of 1 to 65535)
KV socket communication*5	Total 8		any (set within the range of 1 to 65535)
FTP service	4	–	20, 21
Clock data auto-adjustment	–	1	123
Receive/send mail (SMTP, POP3)	2	–	25, 110
DNS	–	1	53
FTP Client	2	–	20, 21 (set within the range of 1 to 65535)
Easy PLC link	–	1	5001 (set within the range of 1 to 65535)
Internal current consumption	80 mA or less		
Weight	Approx. 120 g		

*1 KVS = KV STUDIO, KVB = KV BUILDER, DB = DATA BUILDER
*2 Host link communication, MC Protocol mode TCP and UDP sockets can be used simultaneously in host link communication.
*3 Upper link communication and MC protocol communication may use up to 15 TCP sockets together.
*4 For the MC protocol communication, a port number can be set for the TCP and UDP sockets respectively.
*5 TCP socket and UDP socket under KV socket communication may use up to 8 pieces simultaneously together.

Specification - FL-net Unit

Model	KV-FL20V
Transmission speed	10Mbit/s, 100Mbit/s automatic switching
Interface	Follow IEEE802.3 (follow CSMA/CD)
Max. cable length*	100m
Transmission protocol	UDP/IP FA link protocol
Max. number of nodes	254 units
Volume of cyclic data	Max. (8k bits+8k words)/node
Volume of message data	Max. 1024 bytes
Current consumption	80mA or less
Weight	Approx. 120 g

* Maximum cable length refers to the distance between KV-FL20V and Ethernet exchange (hub).

Specification - Serial communication unit

Model	KV-L20V	KV-L20R
Interface	Port 1: RS-232C Port 2: RS-232C, RS-422A, RS-485 (4-wire type), RS-485 (2-wire type)	
Transmission mode	RS-232C, RS-422A, RS-485 (4-wire type): Full-duplex RS-485 (2-wire type): Half-duplex	
Baud rate	1200, 2400, 4800, 9600, 19200, 38400, 57600, 115200, 230400bit/s	1200, 2400, 4800, 9600, 19200, 38400, 57600, 115200 bit/s
Transmission distance	RS-232C: within 15m RS-422A, RS-485 (4-wire type),RS-485 (2-wire type):Total length of cable within 1200m*	RS-232C: within 15m RS-422A, RS-485 (4-wire type), RS-485 (2-wire type):Total length of cable within 500m*
Current consumption	120 mA or less	
Weight	Approx.160 g	

* When transmission rate is 230400bit/s, total length is within 500m.
* Transmission rate and transmission distance will change according to the connected equipment. Please refer to actual equipment for confirmation.

Specification - High-speed Multi-link Unit

Model		KV-LM20V
Interface	Connect	Terminal block
Transmission parameter	Communication speed (Baudrate)	19200, 115200, 0.5M, 1.0M, 2.0M bit/s
	Transmission distance	19200bit/s: within 1000m 115200bit/s: within 1000m 0.5Mbit/s: within 500m 1.0Mbit/s: within 200m 2.0Mbit/s: within 100m
	Number of transmission units	15 units
	Terminal load	Set by switch on the front panel
	Connection type	multi-drop (branch impermissible)
Current consumption		120mA or less
Weight		Approx.110 g

Network/Remote Unit

CC-Link master· slave unit

KV-CL20

CC-Link V2

Hardware	Baud rate 10Mbit/s	Trunk length 1200m	Input 896 points* Output 896 point	Input 128 words Output 128 words
Operation mode	Remote I/O	PLC Link		
Function	Master	Local station		
Software	KV-CL20 Setup Tool	Auto configuration	Unit monitor	

*Max. number of link points per local station

DeviceNet unit

KV-DN20

DeviceNet

Hardware	Baud rate 500kbit/s	Trunk length 500m	Input 128 words* Output 128 words
Operation mode	Remote I/O	PLC Link	
Function	Master mode	Slave mode	Master&slave mode
Software	KV-DN20 Setup Tool	Auto configuration	Unit monitor

*Max. number of link points per slave

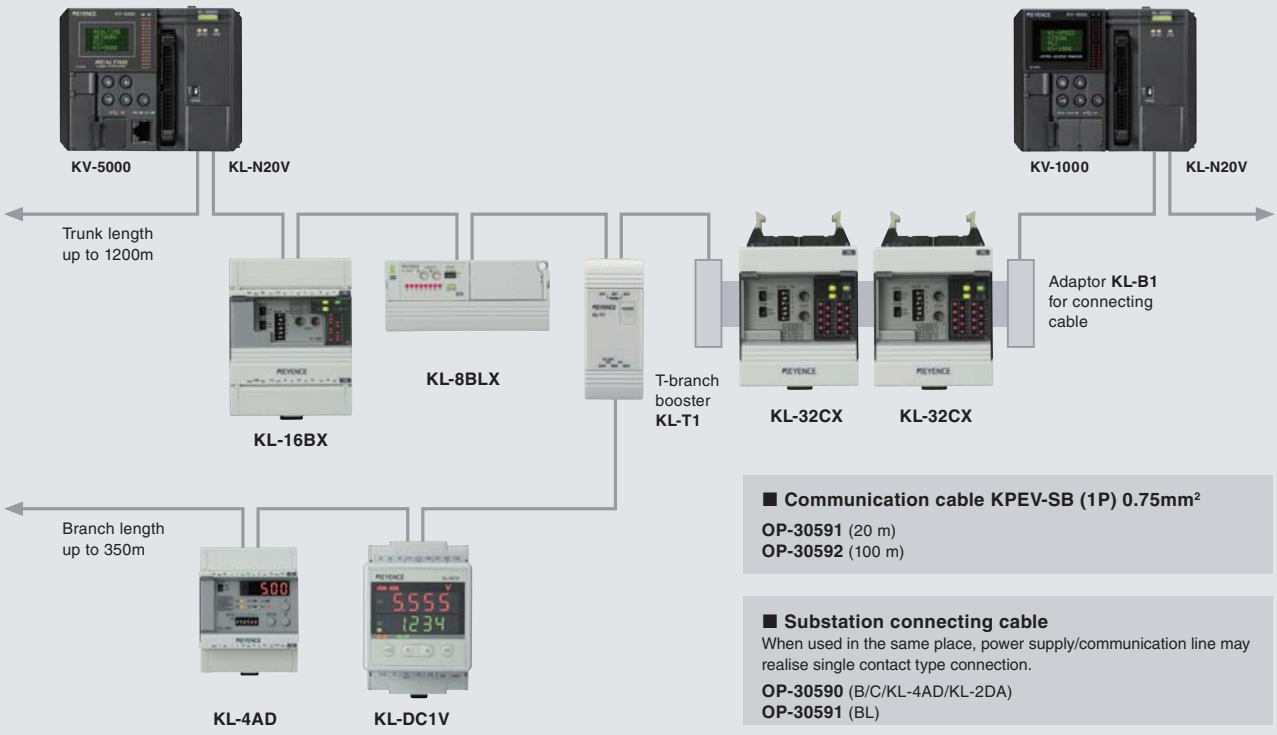
KL-LINK unit

KL-N20V

KL-LINK

Hardware	Baud rate 5Mbit/s	Trunk length 1200m	Input/Output 128 words
Operation mode	Remote I/O	PLC Link	
Function	Remote I/O mode	PLC link mode	
Software	KL link setup tool	Unit monitor	

External device [KL Series connection sample]



■ Communication cable KPEV-SB (1P) 0.75mm²

OP-30591 (20 m)
OP-30592 (100 m)

■ Substation connecting cable

When used in the same place, power supply/communication line may realise single contact type connection.

OP-30590 (B/C/KL-4AD/KL-2DA)
OP-30591 (BL)

High Specifications

Simple

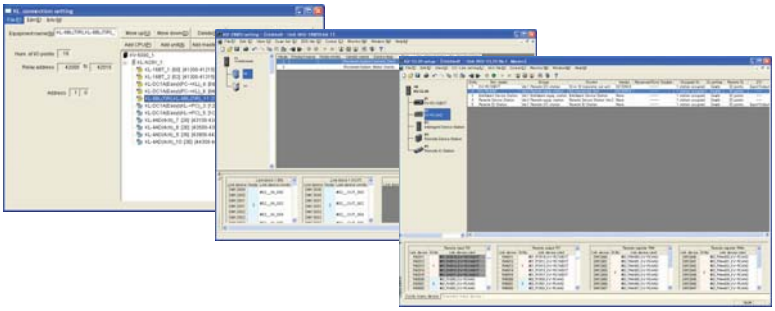
KV STUDIO is provided with connecting setup tools as standard configuration

Compared with the setup based on ladder diagram programme, the start time of the system may be reduced greatly.

KV-CL20/KV-DN20
Setup tool

Main Functions

- Auto configuration
- Production of scanning list
- Production of CSP/EDS file
- Master unit monitor
- Link device monitor
- Error monitor



At ease

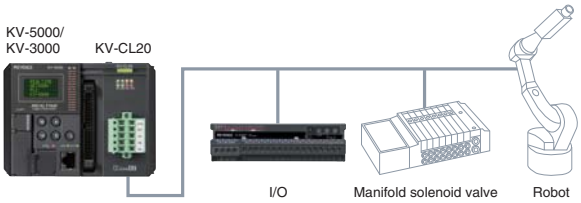
Passed consistency test

Both the KV-CL20 and the KV-DN20 have passed consistency test conducted by CC-Link Association and ODVA (Open devicenet Vendor Association).

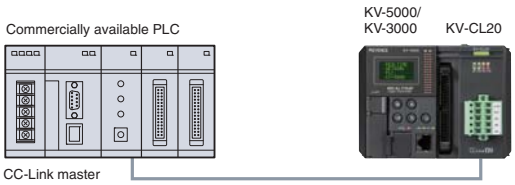
Mutiple action mode

KV-CL20 Master station, master station (duplex), backup master station, local station

[Master station]
KV-CL20 becomes master station, controls slave station equipment.

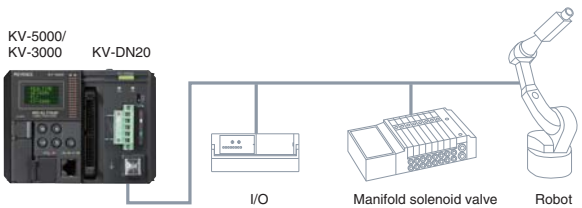


[Local station]
KV-CL20 acts as local station of other CC-Link master stations. It is used for data link with PLCs of the companies.

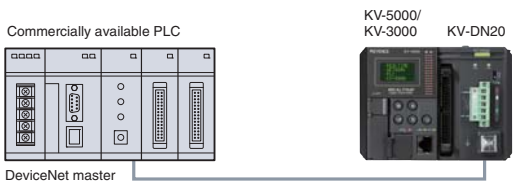


KV-DN20 Master mode, slave mode, master/slave mode

[Master station mode]
KV-DN20 becomes master station, controls slave station equipment.



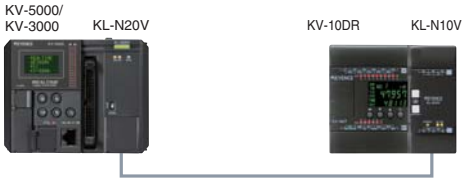
[Slave station mode]
KV-DN20 acts as slave station of other DeviceNet master stations. It is used for data link with PLCs of the companies.



KL-N20V Remote I/O mode, PLC link mode

[Remote I/O mode]
Controls various remote I/O, may act through simple I/O distribution.

[PLC link mode]
Communication with other KL-LINK master. Super-high-speed 2.88ms may be used for communication * when communication speed is 5Mbit/s



CC-Link

Screw terminal block I/O unit

Input 16 points **KV-RC16BX**
Input 32 points **KV-RC32BX**
8-point transistor I/O **KV-RC8BXT**
Transistor output 16 points **KV-RC16BT**
Transistor output 32 points **KV-RC32BT**
8-point relay I/O **KV-RC8BXR**
Relay output 16 points **KV-RC16BR**
16-point transistor I/O **KV-RC16BXT**

	Model	Number of inputs	Number of outputs	Self-up screw terminal block	Relay terminal block function	Input time constant switching	Input voltage switching	Setting rotary switch	Same day shipping
Input	KV-RC16BX	16-point	-	○	○	○	○	○	◎
	KV-RC32BX	32-point	-	○	-	○	○	○	◎
Output	KV-RC16BR	-	16-point relay	○	○	-	-	○	◎
	KV-RC16BT	-	16-point transistor	○	○	-	-	○	◎
	KV-RC32BT	-	32-point transistor	○	-	-	-	○	◎
Input/output co-existence	KV-RC8BXT	8-point	8-point transistor	○	○	○	○	○	◎
	KV-RC8BXR	8-point	8-point relay	○	○	○	○	○	◎
	KV-RC16BXT	16-point	16-point transistor	○	-	○	○	○	◎

Adopts Self-Up screw type terminal block

Self-up screw terminal block is used, so terminal screw may not be dismounted when round crimp terminal is used. Wiring time may be reduced.

With change-over switch for input time constant/input voltage

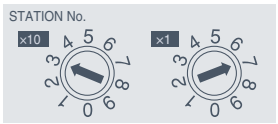
Unit body has built-in input time constant change-over switch (0.2ms/1.5ms/10ms). Input time constant may be set according to input equipment on site. Built-in input voltage change-over switch (24V/5V or 24V/12V) is also provided for switching according to the equipment used.

With relay terminal block function that do not need cross wiring

Universal terminals of power supply/common point etc are added, cross-over wiring is not needed. Additional terminal block for power supply is not needed.

Simple setup operation based on rotating switch could prevent setup error

Station number setup adopts rotating switch. Everybody can easily perform setup operations. Station number setup error that typically occurs due to saving wiring system may be prevented.



Screw terminal block analogue unit

Analogue input 4ch **KV-RC4AD**
[Input range] 0 to 5V, 1 to 5V, ±5V, 0 to 10V, ±10V, 0 to 20mA, 4 to 20mA

Analogue output 4ch **KV-RC4DA**
[output range] 0 to 5V, 1 to 5V, 0 to 10V, ±10V, 0 to 20mA, 4 to 20mA

5-bit digital display function

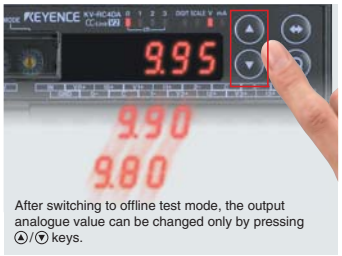
Built-in 5-bit LED display that allows data reading directly on site is provided in minitype body to display scaling value. It may be used in a place away from PLC, current value may be read directly.

May be set only through body

Setup or change may be performed only through key operation on the body even without programme of PLC or special tools.

Offline test mode KV-RC4DA

Offline test mode that outputs any analogue quantity through switch operation is provided. For adjustment on site, action of external equipment may be confirmed even without programming, so as to shorten the startup time.



After switching to offline test mode, the output analogue value can be changed only by pressing ▲/▼ keys.

Compared with previous model, up to three times higher resolution is achieved

Analogue quantity I/O resolution reaches 3 times of previous model, namely 1/12000. Fine control is attained.

KL-LINK

Screw terminal block (B type)

Input 16 points
KL-16BX

Transistor output 16 points
KL-16BT

Relay output 16 points
KL-16BR

Input 8 points
Transistor output 8 points
KL-8BXT

Input 8 points
Relay output 8 points
KL-8BXR

- Removable terminal block is adopted, maintenance is simple for slender installation.
- Power supply supports DC12 - 24V.
- 24V/5V input voltage switching.
- Input time constant switching. (10μs/2.5ms/5ms/10ms)

Screw terminal block (BL type)

Input 8 points
KL-8BLX

Transistor output 8 points
KL-8BLT

Relay output 8 points
KL-8BLR

- Since power supply/common point etc universal terminals are added, cross-over wiring is not required.
- SW etc are completely configured on the top. Setup may be changed easily after setting.
- Power supply adopts DC12 - 24V.
- 24V/5V input voltage switching.
- Input time constant switching. (10μs/2.5ms/5ms/10ms)

Connector type (Type C)

Input 16 points
KL-16CX

Transistor output 16 points
KL-16CT

Input 32 points
KL-32CX

Transistor output 32 points
KL-32CT

- Slender type hardware parts make it possible to protrude from the top or front of the connector.
- MIL connector is adopted. Flat cable may also be connected.
- Power supply supports DC12 - 24V.
- 24V/5V input voltage switching
- Input time constant switching. (10μs/2.5ms/5ms/10ms)

Single contact flat connecting cable

Body power supply and communication line may be connected via special flat cable. Setup may be performed only through the connection of single contact type connectors.

Freely set 3WAY installation mode is achieved

Three direction installation of minitype features.

With relay terminal block function BL type

Since power supply and common port and soon universal terminals are added, cross-over wiring is not required. It is unnecessary to prepare additional terminal blocks for power supply.

Relay may be replaced KL-8BLR

Special drawing apparatus may be used to replace optional (OP-33010) relay conveniently.

Screw terminal block type analogue unit

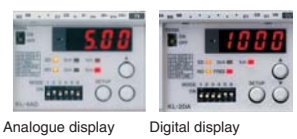
Analogue input 4ch **KL-4AD**
[Input range] 0 to 5V, 1 to 5V, 0 to 10V, ±10V, 0 to 20mA, 4 to 20mA

Analogue output 2ch **KL-2DA**
[Output range] 0 to 5V, 1 to 5V, 0 to 10V, ±10V, 0 to 20mA, 4 to 20mA

- 200μs/ch super-high-speed conversion.
- Achieved high precision 0.2% F.S..
- Adopts removable terminal block that allows easy wiring and maintenance.

4-digit digital display function

Built-in 4-digit LED display that allows direct data reading on site is provided in the mini-type body. Current value may be confirmed on the spot.



Analogue display Digital display

Offline test mode KL-2DA

Offline test mode that outputs any analogue quantity through switch operation, action of external equipment may be confirmed even without programming during adjustment on site.

KL-LINK

High-performance Remote Data Input Unit

DC current input unit **KL-DC1A**
"Input range" 0 to 20mA, ±10mA, ±100mA, ±1A, ±10A

DC voltage input unit **KL-DC1V**
"Input range" 0 to 10V, ±10V, ±100V

Achieves up to 1/200,000 resolution

INITIATIVE IN THIS INDUSTRY

24-bit AD converter is adopted to achieve up to 1/200,000 resolution in high precision mode, tiny signal level difference that cannot be judged previously may also be captured on the spot.

Regular mode	Max.	1/20,000 resolution "2.5 times higher than previous model *"
High-resolution mode	Max.	1/200,000 resolution "25 times higher than previous model *"

* KL-4AD resolution up to 1/8000

DIN guide rail, panel installation may be selected


DIN rail mounting


Panel installation (72 *)


Back is also configured with terminal block
Initiative in this industry

The mounting accessory OP-51667 is required for panel mounting

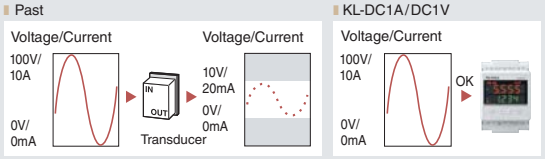
Filtering function that fits site environment

After the body is set, for noise generated due to different site environment or fluctuation generated in the measurement itself, average (simple, moving), low-pass filtering (LPF), high-pass filtering (HPF) may be selected for use at ease.

Wide range, converter is not required

Wide range is applicable to any equipment, previous signal converter is not required.

KL-DC1A "DC current input unit" ±100mA, ±1A, ±10A input range
KL-DC1V "DC voltage input unit" ±100V input range



Accuracy reduce, response speed reduce, cost increase

Weighing sensor gauging unit
KL-LC1

Two correction methods are provided, namely actual correction/theoretical correction: actual correction based on actual weight, or theoretical correction that uses specification of weighing sensor for correction may be used.

Filter setup provides time average, high-pass filtering, low-pass filtering setup. Problems occurred after setup may also be solved.

1ms sampling and lock function are used to measure instant load, 1ms high speed sampling is used to capture instant load change. For peak value/valley value may also be captured correctly using lock function.

Zero adjustment, zero adjustment command under reference load may be selected from panel, control input terminal, PLC (KL relay) according to different service conditions.

Electricity gauging unit
KL-WH1

"Input voltage/measurement frequency"
AC100~250V (sine wave)/50/60Hz

Original unit-based electricity measurement* 2-point control input
Aggregated electricity and original units are loaded into PLC, thereby allowing one unit to be used for original unit-based electricity measurement.
* Electricity required for each production category

Support pulse output for accumulated power amount
May output accumulated pulse of electricity value after gauging, may be added to power metre existing equipment of successfully for use.

Request value may be achieved without ladder diagram programme*
Request value gauged via the KL link may be transmitted to the PLC without ladder diagram programme. Most suitable for request management considering on-site PLC environment, cost, construction of gauging system.

*30 minutes (request time limit) average electricity used

Application


Electricity gauging of filling equipment

Remote Temperature Control Unit

Dual channel multi-input
PID remote unit **KL-2TF**

- Monitoring/operation may be performed on control panel/site.
- Heating/cooling control 2ch.
- Suitable for two inputs simultaneously, namely temperature measurement platinum resistance/thermocouple.

Specifications - CC-Link master station/local station unit

Model	KV-CL20
CC-Link Version	When acts as master station : Ver.2.00 when acts as local station : Ver.2.00/Ver.1.10
Max. number of connected units	As master station, 64 units
Number of occupied stations	As local station, 1 station - 4 stations
Max. number of link points per system	Remote I/O (RLY): 9440 points remote register (DM): read 2048 words/write 2048 words
Communication Specification	Follow CC-Link Ver.1.10
Connection type	Multi-connection
Communication speed	156kbps, 625kbps, 2.5Mbps, 5Mbps, 10Mbps
Connecting cable	CC-Link special cable suitable for Ver.1.10 (shielded 3-core twisted pair wire: OP-79426, OP-79427)
Maximum total length of the cable (maximum communication distance)	Depends on communication rate 156kbps…1200m, 625kbps…900m, 2.5Mbps…400m, 5Mbps…160m, 10Mbps…100m
Operation station	Master station, master station (dual), backup master station, local station
Operation mode	online mode, offline mode, LineTest 1 mode, LineTest 2 mode
Transmission mode	Cyclic transmission, transient transmission
Current consumption	170mA or less (supplied from CPU Unit)
Weight	Approx. 170g

Specification - CC-Link remote I/O unit

CC-Link Version	Ver.2.00/Ver.1.10 remote I/O station
Number of occupied stations	1 station
Supply voltage	DC11.4~26.4V
Current consumption	KV-RC16BX: During 11.4V: below 140mA during 26.4V: 70mA below KV-RC32BX: During 11.4V: below 160mA during 26.4V: 80mA below KV-RC16BT: During 11.4V: below 120mA during 26.4V: 60mA below KV-RC32BT: During 11.4V: below 150mA during 26.4V: 70mA below KV-RC8BXT: During 11.4V: below 120mA during 26.4V: 60mA below KV-RC16BXT: During 11.4V: below 150mA during 26.4V: 80mA below KV-RC16BR: During 11.4V: below 390mA during 26.4V: 150mA below KV-RC8BXR: During 11.4V: below 230mA during 26.4V: 110mA below
Weight	KV-RC16BX:Approx. 250g, KV-RC32BX:Approx. 250g, KV-RC16BT:Approx. 250g, KV-RC32BT:Approx. 250g, KV-RC8BXT:Approx. 250g, KV-RC16BXT:Approx. 250g, KV-RC16BR:Approx. 290g, KV-RC8BXR:Approx. 260g

Specifications - CC-Link remote I/O unit output (transistor output)

Output form	Transistor output (lead type)
Rated load voltage	DC12/24V
Applied load voltage range	DC10.2 to 26.4V
Power supply for output part	DC10.2 to 26.4V
Output load current	0.5A/point 5A/unit entirety *
Lead current in case of OFF	0.1mA or less
Maximum voltage drop in case of on	0.3V(TYP) or less 0.6V(MAX) or less
Output response time (OFF→ON)	0.1ms or less
Output response time (ON→OFF)	1.0ms or less
Insulation	Opto-isolation

* Only KV-RC8BXT, 4A/unit entirety.

Specification - CC-Link remote I/O unit input

Item	24V mode	12V mode*2	5V mode*2
Maximal rated input	DC26.4V	DC26.4V	
Input voltage	DC24V about 5.3mA	DC12V about 2.5mA	DC5V about 0.9mA
Max. ON voltage	19V	3.0V	2.5V
Max. ON current	–	–	
Max. OFF voltage	–	1.0V	0.8V
Max. OFF current	2.0mA	–	
Input impedance	4.3KΩ	4.3KΩ	
Insulation mode	Opto-isolation	Opto-isolation	
Input time constant*3(switch mode)	0.2ms, 1.5ms, 10ms		

*1 In 12V mode, only KV-RC8BXT and KV-RC16BXT may be selected.
*2 In 25V mode, only KV-RC16BX, KV-RC32BX and KV-RC8BXR may be selected.
*3 To enter contact signal, please set to 10ms.

Specifications - CC-Link remote I/O unit output (relay output)

Rated voltage	AC240V/DC24V
Rated output current	AC240V/DC24V 2A/ point 4A/1 common point
ON resistance	50mΩ or less
ON delay time	10ms or less
OFF delay time	10ms or less
Insulation	Relay insulation

Specifications - CC-Link remote analogue unit

Model		KV-RC4AD	KV-RC4DA
CC-Link Version		Ver.2.00/Ver.1.10 remote equipment station	
Number of occupied stations		1-station, duplicate for Ver.2.00, 2-station for Ver.1.10	
Analogue I/O points		Input 4 points	Output 4 points
Analogue I/O range (resolution)		Input voltage: -10 to +10V (0.83mV 1/24000) 0 to 10V (0.83mV 1/12000) -5 to +5V (0.42mV 1/24000) 0 to 5V (0.42mV 1/12000) 1 to 5V (0.42mV 1/9600) Input current: 0 to 20mA (1.67μA 1/12000) 4 to 20mA (1.67μA 1/9600)	Output voltage: -10 to +10V (0.83mV 1/24000) 0 to 10V (0.83mV 1/12000) 0 to 5V (0.42mV 1/12000) 1 to 5V (0.42mV 1/9600) Output current: 0 to 20mA (1.67μA 1/12000) 4 to 20m A(1.67μA 1/9600)
Input resistance		Voltage : 1MΩ*, Current :250Ω	–
Conversion speed		200μs/ch	
Conversion precision	25°C±5°C	Voltage :±0.2% of F.S. Current :±0.2% of F.S.	Voltage :±0.2% of F.S. Current :±0.2% of F.S.
	0°C to 60°C	Voltage :±0.2% of F.S. Current :±0.2% of F.S.	Voltage :±0.3% of F.S. Current :±0.3% of F.S.
Insulation mode		Uninsulated between optical coupler channels	
Others		Maximum absolute input voltage : ±15V, current : 30mA Common (trigger) input Input signal: NPN open, no-voltage contact signal Maximum on voltage: 0.8V, maximum OFF current: 0.1mA Insulation mode: Opto-isolation Common output Output form: Transistor (NPN) Rated load: DC24V 0.5A Leak current at OFF: 100μA or less Residual voltage in case of ON: 0.8V or less Response time: OFF→ON 20μs or less, ON→OFF 200μs or less Insulation mode: opto-isolation	Maximum load resistance current:400Ω, Minimum load resistance voltage
Current consumption		210mA or less	240mA or less
Weight		Approx. 200g	

* 500KΩ when common point is used

Specification - DeviceNet unit

Model	KV-DN20	
Communication protocol	Follow DeviceNet	
Connection type	Multipoint linking	
Baud rate	500kbit/s, 250kbit/s, 125kbit/s	
Transmission media	5 wired special cables (2 signal systems, 2 power systems, 1 shielded cable)	
Max. trunk cable length	Thick cable	500m (when baud rate is 125kbit/s), 250m (when baud rate is 250kbit/s), 100m (when baud rate is 500kbit/s)
	Thin cable	100m (at every baud rate)
Max. number of connected nodes	64 units (including master station, slave station, fitting)	
Current consumption	Internal loop: DC24V or less 45mA (powered by CPU unit) communication loop: DC24V or less 25mA (powered by communication connector)	
Weight	Approx. 150g	

Specification - DeviceNet unit function

Master mode	Number of connected slaves in 1 network	Max.64 units
	Communication type	I/O communication (polling/bit gating Bit-Strobe/COS/Cyclic) Explicit message communication
	Type and size of the assigned device	Relay or data memory (designated as per each block respectively) maximum specification (each block) {for relay : input 64ch, output 64ch, for data memory : input 200 words, output 200 words}×2 blocks
	Device assigning method	Automatic configuration (fixed or assigned from the front) and manual assignment
	Number of slaves connected to each unit	Max.63 units
	Max. I/Os of each slave	Input : 2048 points (128 words) Output :2048 points (128 words)
	Information communication data length	Send: 106 bytes Receive: 110 bytes
Slave mode	Number of connected slaves in 1 network	Max.64 units
	Communication type	I/O communication (polling) Explicit message communication
	Type and size of the assigned device	Relay or data memory maximum specification relay: input 64ch, output 64ch data memory: input 128 words, output 128 words

Specification - KL-LINK unit

Model	KL-N20V			
Communication speed	5Mbit/s	2.5Mbit/s	625kbit/s	156kbit/s
Max. cable length	50m	120m	500m	1200m
Communication medium	Special cable (2 core shielded pair)			
Max. number of connected units of a slave	97 units	129 units	129 units	129 units
Volume of communication data	Max. 2048 points (128 words)			
Communication period*	2.88ms/2048 points			

* Data rate 5Mbit/s.

Specfication - KL-LINK remote I/O unit

Supply voltage	DC10.8~26.4V
Current consumption	KL-8BLX: 80mA or less, KL-16BX:75mA or less, KL-16CX: 75mA or less KL-32CX: 120mA or less, KL-8BLT:80mA or less, KL-8BLR: 170mA or less KL-16BT: 90mA or less, KL-16BR:310mA or less, KL-16CT: 90mA or less KL-32CT: 140mA or less, KL-8BXT:130mA or less, KL-8BXR: 250mA or less
Weight	KL-8BLX: approx. 130g, KL-16BX: approx. 140g, KL-16CX: approx. 70g KL-32CX: approx. 110g, KL-8BLT: approx. 130g, KL-8BLR: approx. 160g KL-16BT: approx. 140g, KL-16BR: approx. 210g, KL-16CT: approx. 70g KL-32CT: approx. 100g, KL-8BXT: approx. 170g, KL-8BXR: approx. 190g

Specification - KL-LINK remote I/O unit input

Item	24V mode	5V mode
Input max. rated value	DC26.4V	
Input voltage	DC24V 5.3mA	DC5V 0.9mA
Min. ON voltage	19V	2.5V
Max. OFF current	2mA	-
Max. OFF voltage	-	0.8V
Input impedance	4.3kΩ	
Insulation mode	Opto-isolation	
Input time constant*(switch mode)	10μs, 2.5ms, 5ms, 10ms	

* To enter contact signal, please set to 10ms.

Specifications - KL-LINK remote I/O unit output (transistor output)

Output form	Transistor output (NPN open)
Rated load voltage	DC5V - 26.4V (power supply for VC-C)
Rated output current	0.5A/point (when 24V or above is applied between VC-C)
Residual voltage in case of on	0.8V or less
Leak current at OFF	100μA or less
ON delay time	25μs or less
OFF delay time	200μs or less
Insulation mode	Opto-isolation

Specification - KL-LINK remote I/O unit input (relay output)

Rated voltage	AC250V/DC30V
Rated output current	2A/point (induction load), 4A/point (resistance load)
	4A/full common point
ON resistance	50mΩ or less
ON delay time	10ms or less
OFF delay time	10ms or less
Insulation mode	Relay insulation

Specification - KL-LINK remote analogue unit

Model		KL-4AD	KL-2DA
Analogue I/O points		Input 4 points	Output 2 points
Analogue I/O range (resolution)		Input voltage: -10 to -10V(2.5mV 1/8000) 0 to 10V(2.5mV 1/4000) 0 to 5V(1.25mV 1/4000) 1 to 5V(1mV 1/4000) Input current: 0 to 20mA(5μA 1/4000) 4 to 20mA(4μA 1/4000)	Output voltage: -10 to -10V(2.5mV 1/8000) 0 to 10V(2.5mV 1/4000) 0 to 5V(1.25mV 1/4000) 1 to 5V(1mV 1/40000 Output current: 0 to 20mA(5μA 1/4000) 4 to 20mA(4μA 1/4000)
Input resistance		Voltage: 1MΩ, Current: 250Ω	-
Conversion speed		High speed mode: 200μs/ch, Average mode: 1.6ms/ch	250s/ch
Conversion precision	25°C	Average mode: ±0.2% of F.S. High speed mode: ±0.5% of F.S.	±0.2% of F.S.
	0 to 60°C	Average mode: ±0.4% of F.S. High speed mode: ±0.7% of F.S.	±0.4% of F.S.
Insulation mode		Uninsulated between optical coupler channels	
Others		Maximum absolute input voltage: ±15V, current: 30mA	Maximum load resistance current: 400Ω, minimum load resistance voltage:1kΩ
Supply voltage		DC24V±10%	
Current consumption		150mA or less	190mA or less
Weight		180g	

Specification - KL-LINK high performance remote data input unit DC Current Input Unit

Model		KL-DC1A				
Number of CH		1ch				
Sampling cycle		In normal mode, 1ms (1000 times/s)/ in high precision mode, 100ms (10 times/s)				
Input range		0 to 20mA(W1)	±10mA(W2)	±100mA(W3)	±1A(W4)	±10A(W5)
Resolution	Normal	0.01mA(1/2000)	0.001mA(1/20000)	0.01mA(1/20000)	0.1mA(1/20000)	1mA(1/20000)
	High precision	0.0001mA(1/200000)	0.0001mA(1/200000)	0.001mA(1/200000)	0.01mA(1/200000)	0.1mA(1/200000)
Input impedance		10Ω	10Ω	1Ω	0.1Ω	10mΩ
Measure accuracy (25±5°C)		±0.2% of F.S.±1digit	±0.2% of F.S.±1digit	±0.2% of F.S.±1digit	±0.3% of F.S.±1digit	±0.5% of F.S.±1digit*
Measure accuracy (0-50°C)		±0.6% of F.S.±1digit	±0.6% of F.S.±1digit	±0.6% of F.S.±1digit	±0.7% of F.S.±1digit	±0.9% of F.S.±1digit*
Other functions		Hold function (Peak, Valley), Zeroing, comparator output, filtering (LPF, HPF), time averaging (simple, moving), scaling, displayed unit conversion, locking function				
Supply voltage		DC24V±10%				
Current consumption		170mA or less				
Weight		Approx. 350g				

* When - 5A - 5A input

Specification - KL-LINK high performance remote data input unit DC Voltage Input Unit

Model		KL-DC1V		
Number of CH		1ch		
Sampling cycle		In normal mode, 1ms (1000 times/s)/ in high precision mode, 100ms (10 times/s)		
Input range		0 to10V(W1)	±10V(W2)	±100V(W3)
Resolution	Normal	0.001V(1/10000)	0.001V(1/20000)	0.01V(1/20000)
	High precision	0.0001V(1/100000)	0.0001V(1/200000)	0.001V(1/200000)
Input impedance		1MΩ	1MΩ	4MΩ
Measure accuracy (25±5°C)		±0.1% of F.S.±1digit	±0.1% of F.S.±1digit	±0.2% of F.S.±1digit
Measure accuracy (0-50°C)		±0.5% of F.S.±1digit	±0.5% of F.S.±1digit	±0.6% of F.S.±1digit
Other functions		Hold function (Peak, Valley), Zeroing, comparator output, filtering (LPF, HPF), time averaging (simple, moving), scaling, displayed unit conversion, locking function		
Supply voltage		DC24V±10%		
Current consumption		170mA or less		
Weight		Approx. 350g		

Specification - KL-LINK high performance remote data input unit Electricity gauging unit specification

Model	KL-WH1
Phase line	3-phase 3-wire, single-phase 2-wire, single-phase 3-wire
Input voltage/measurement frequency	AC100 to 250V (sine wave)/50/60Hz
Power failure memory	Nonvolatile memory (active power and reactive power)
Clearing accumulated value	Elimination command of front key switch, control based input terminal or KL
Current measurement	External current sensor (CT: three types for 50A, 100A, 250A) as options, current is set up via setup switch
Measuring items	Request value, instant active power, instant reactive power, active power quantity, reactive power quantity, phase-to-phase voltage, phase current, power factor, frequency
Supply voltage	AC100 to 220V±10% 50/60Hz
Power consumption	10VA or less
Weight	Approx. 400g

Specification - KL-LINK high performance remote data input unit Weighing sensor input unit

Model		KL-LC1			
Number of CH		1ch			
Measurement range switching		Setup: setup switch, connection: different connecting terminals for different measurement ranges			
Sensor power supply		5V±5% (within 30ma)/10V±5% (within 30mA): selection setup is performed via setup switch			
Applicable sensor		350Ω			
Sampling cycle		1ms(1000 times/s)			
Input range sensor power supply	Input range	Range 1	Range 2	Range 3	Range 4
	5V	-2.5 to -2.5mV	-5.0 to -5.0mV	-10.0 to -10.0mV	-15.0 to -15.0mV
	10V	-5.0 to -5.0mV	-10.0 to -10.0mV	-20.0 to -20.0mV	-30.0 to -30.0mV
Resolution	5V	0.5μV(1/10000)	1.0μV(1/10000)	2.0μV(1/10000)	3.0μV(1/10000)
	10V	0.5μV(1/20000)	1.0μV(1/20000)	2.0μV(1/20000)	3.0μV(1/20000)
Straight line drift (0 to 50°C)		±0.2% of F.S.±1digit			
Zero drift (0 to 50°C)		±0.4% of F.S.±1digit			
Supply voltage		DC24V±10%			
Current consumption		170mA or less			
Weight		Approx. 350g			

Specification - KL-LINK remote temperature control unit

Model	KL-2TF	
Temperature number of input points	2ch	
Input*	Thermocouples	Temperature measurement platinum resistance
Temperature Sensor type	K, J, T, E, R, B, N, S, W5Re/W26Re	JPt100, Pt100
Indication accuracy	±0.3% of F.S.±1digit (at 25°C±5°C) ±0.7% of F.S.±1digit (at 0 to 60°C)	
Sampling cycle	125ms/ch(250ms/2ch)	
Control period	1 to 100s	
Operation mode	PID control (with automatic tuning and 3 mode voltage stabiliser function)/heating cooling PID control (with automatic tuning and 3 mode voltage stabiliser function)/ON/OFF control	
Supply voltage	DC24V±10%	
Current consumption	160mA or less	
Weight	Approx. 210g	
Enclosure rating	IP66f (for panel installation, only front operating part)	

* Channels may be set up respectively

Basic Instructions

Type	Mnemonics	Description
Contact	LD	Connects the device as a NO contact
	LDB	Connects the device as a NC contact
	AND	Connects a device in series as a NO contact
	ANB	Connects a device in series as a NC contact
	OR	Connects a device in parallel as a NO contact
	ORB	Connects a device in parallel as a NC contact
	LDP	Connects the device to the power rail as a NO contact that turns ON for one scan only when the lookup relay is ON
	LDPB	Connects the device to the power rail as a NC contact that turns OFF for one scan only when the lookup relay is ON
	LDF	Connects the device to the power rail as a NO contact that turns ON for one scan only when the lookup relay is OFF
	LDFB	Connects the device to the power rail as a NC contact that turns OFF for one scan only when the lookup relay is OFF
	ANP	Connects the device in series as a NO contact that turns ON for one scan only when the lookup relay is ON
	ANPB	Connects the device in series as a NC contact that turns OFF for one scan only when the lookup relay is ON
	ANF	Connects the device in series as a NO contact that turns ON for one scan only when the lookup relay is OFF
	ANFB	Connects the device in series as a NC contact that turns OFF for one scan only when the lookup relay is OFF
	ORP	Connects the device in parallel as a NO contact that turns ON for one scan only when the lookup relay is ON
	ORPB	Connects the device in parallel as a NC contact that turns OFF for one scan only when the lookup relay is ON
	ORF	Connects the device in parallel as a NO contact that turns ON for one scan only when the lookup relay is OFF
	ORFB	Connects the device in parallel as a NC contact that turns OFF for one scan only when the lookup relay is OFF
Bit Contact	BLD	Connects the specified bit of a lookup word device to the power rail as a NO contact
	BLDB	Connects the specified bit of a lookup word device to the power rail as a NC contact
	BAND	Connects the specified bit of a lookup word device serially as a NO contact
	BANB	Connects the specified bit of a lookup word device serially as a NC contact
	BOR	Connects the specified bit of a lookup word device in parallel as a NO contact
	BORB	Connects the specified bit of a lookup word device in parallel as an NC contact
Comparison Contact	LD=	Connects the device to the power rail as a NO contact that turns ON in the condition A=B
	LD<	Connects the device to the power rail as a NO contact that turns ON in the condition A<B
	LD>	Connects the device to the power rail as a NO contact that turns ON in the condition A>B
	LD<=	Connects the device to the power rail as a NO contact that turns ON in the condition A<=B
	LD>=	Connects the device to the power rail as a NO contact that turns ON in the condition A>=B
	LD<>	Connects the device to the power rail as a NO contact that turns ON in the condition A<>B
	AND=	Connects the device in series as a NO contact that turns ON in the condition A=B
	AND<	Connects the device in series as a NO contact that turns ON in the condition A<B
	AND>	Connects the device in series as a NO contact that turns ON in the condition A>B
	AND<=	Connects the device in series as a NO contact that turns ON in the condition A<=B
	AND>=	Connects the device in series as a NO contact that turns ON in the condition A>=B
	AND<>	Connects the device in series as a NO contact that turns ON in the condition A<>B
	OR=	Connects the device in parallel as a NO contact that turns ON in the condition A=B
	OR<	Connects the device in parallel as a NO contact that turns ON in the condition A<B
	OR>	Connects the device in parallel as a NO contact that turns ON in the condition A>B
	OR<=	Connects the device in parallel as a NO contact that turns ON in the condition A<=B
	OR>=	Connects the device in parallel as a NO contact that turns ON in the condition A>=B
	OR<>	Connects the device in parallel as a NO contact that turns ON in the condition A<>B
Output	OUT	Outputs the previous state
	OUB	Inverts and outputs the previous state
	SET	Turns the target relay ON, and holds it in this state
	RES	Turns the target relay OFF
	KEEP	Sets (holds ON state) or a resets (turns OFF) the target relay according to input of the condition

Type	Mnemonics	Description
Output	DIFU	Turns a target relay ON for one scan at the up edge of the previous state
	DIFD	Turns a target relay ON for one scan at the down edge of the previous state
	ONDL	Sets ON delay operation of the target relay
	OFDL	Set OFF delay operation of the target relay
	SHOT	The target relay operates as a one-shot timer
	FLIK	Uses the target relay as a flicker circuit
	ALT	Sets the target relay for alternate operation
Bit Output	BOUT	Outputs the previous state to the specified bit of the (word) device
	BOUB	Inverts and outputs the previous state to the specified bit of the (word) device
	BSET	Turns the specified bit of the word device ON, and holds this state
	BRES	Turns the specified bit of the word device OFF
Timer/ counter	TMR	32-bit 100 ms subtraction type ON delay timer
	TMH	32-bit 10 ms subtraction type ON delay timer
	TMS	32-bit 1 ms subtraction type ON delay timer
	TMU	32-bit 10 µs subtraction type ON delay timer
	C	32-bit addition counter
	OUTC	32-bit addition counter
	ITVL	Pulse measurement/DM value measurement
	UDC	32-bit increment/decrement counter
	UDT	32-bit increment/decrement timer
Connection/ end	END	End of main routine programme
	ENDH	End of sequence programme
	CON	Serial connection of an output instruction
	MPS	Stores the previous state
	MRD	Reads the content stored by the MPS instruction
	MPP	Clears the content stored to the MPS instruction
	ANL	Serial connection of contact block
	ORL	Parallel connection of contact block
	INV	To invert the previous ON/OFF state before this instruction
	MEP	Only 1 scan period is ON on the up edge of the previous execution condition
	MEF	Only 1 scan period is ON on the down edge of the previous execution condition
DirectI/O	RFSX	To refresh the states of specified number of input relays
	RFSY	To refresh the states of the specifed number of output relays

Applied Instructions

Type	Mnemonics	Description
Shift	SFT	Shift register operation
Memory switch	MEMSW	Memory switch setting
Step	STP	Step start
	STE	Step end
Stage Processing	STG	Stage start
	JMP	Stage jump
	ENDS	Stage end
	W-ON	Hold the destination relay ON when the previous status is ON and the detection relay is ON
	W-OFF	Hold the destination relay ON when the previous status is ON and the detection relay is OFF
	W-UE	Hold the destination relay ON when the previous status is ON and the detection relay is up-edge
	W-DE	Hold the destination relay ON when the previous status is ON and the detection relay is down-edge
Flow	MC	Indicates the start of the master control range
	MCR	Indicates the end of the master control range
	CALL	Sub-routine call
	ECALL	To execute subroutine of specified module
	SBN	Sub-routine start
	RET	Sub-routine end
	FOR	Repeat start
	NEXT	Repeat block end
	BREAK	Repeat forced end
	CJ	Execution Condition ON, jump to LABEL instruction
	NCJ	Execution Condition OFF, jump to LABEL instruction
	SCJ	Performs a jump to the LABEL instruction (1 scan ON delay)
	GOTO	Unconditional jump to LABEL instruction
	LABEL	Sets the jump destination of the CJ, NCJ, SCJ or GOTO instructions
Macro	MCALL	Execution of sub-routine type macro
	MSTRT	Execution of self-hold type macro
	MEND	Stop of self-hold type macro
Module	MDSTRT	Module execution start
	MDSTOP	Module execution stop

Type	Mnemonics	Description
Index Register	ZPUSH	Save index register uniformly
	ZPOP	Read index register uniformly
Indirect specification	ADRSET	Get the address of an indirect-specified device
	ADRINC	Increment the device address by 1
	ADRDEC	Decrement the device address by 1
	ADRADD	Add the address
	ADRSUB	Subtract the address
Buffer memory	UREAD	Read data of the specified buffer memory into device
	UWRIT	Write device data with specified range into the buffer memory
	UFILL	Write the specified 16/32-bit data in batch to the buffer memory
File register	FRSET	Switch the current group No. of the file register to the specified No
	FRSTM	Save the batched file registers of the specified group to the memory card in binary form
	FRLDM	Read the batch data saved in memory card into the file register of the specified group

Arithmetic Operation Instructions

Type	Mnemonics	Description
Data move	DW	Data move
	LDA	Transfers data to internal registers
	STA	Transfer data from internal register to destination
	PLDA	Transfer data of specified digits from source to internal register
	PSTA	Transfer data of specified digits from internal register to destination
	TMIN	Transfers 32-bit numerical values set by the digital trimmer to an internal register
	MOV	Transfer data from source to destination
	BMOV	Block transfer data from source to destination
	FMOV	United transfer data from source to destination
	PMOV	Store information of any continuous bits of word device into the specified bits of specified word device
	BYLMOV	Swap upper data to lower and perform data transfer
	BYBMOV	Swap lower data to upper and perform data transfer
	RND	Store 16-bit random data into destination
Arithmetic/ Comparison Operation	ADD	Binary Data Addition
	SUB	Binary Data Subtraction
	MUL	Binary Data Multiplication
	DIV	Binary Data Division
	INC	Increment the target device value by 1
	DEC	Decrement the target device value by 1
	ROOT	Square root extraction operation
	POW	Exponential operation
	CMP	Data compare
	ZCMP	Zone compare
Logical operation	ANDA	Logic operation of internal register and logic product data
	ORA	Logic operation of internal register and logic ANDed data
	EORA	Logic operation of internal register and logic EORed data
	ENRA	Logic operation of internal register and logic Exclusive NORed data
	COM	Complement
	NEG	Invert sign
Data Shift	SRA	Shift right bits of internal register
	SLA	Shift left bits of internal register
	ASRA	Shift internal register arithmetic right
	ASLA	Shift internal register arithmetic left
	RRA	Shift right bits of internal register with carry
	RLA	Shift left bits of internal register with carry
	RRNCA	No carry shift right bits of internal register
	RLNCA	No carry shift left bits of internal register
	WSR	Shift word data right
	WSL	Shift word data left
	BSR	Shift the content of the device to the right towards the larger device No.
	BSL	Shift the content of the device to the left towards the smaller device No.
Data Control	LIMIT	Upper and lower limit control
	BANDC	Dead band control
	ZONE	Zone control
	APR	Linear approximation
	RAMP	Output input value variation in a specified gradient
	TPOUT	Perform pulse output at a specific ON cycle and time
	LLFLT	Output input through the lag filter
Data conversion	TBCD	Convert binary to BCD
	TBIN	Convert BCD to binary
	MPX	Encode 4-bit number to 16-bit

Type	Mnemonics	Description
Data conversion	DMX	Encode 16-bit number to 4-bit
	GRY	Convert binary to gray code
	RGRY	Convert gray code to binary
	DISN	Disperse word (16-bit) into nibble units (4-bit)
	UNIN	Unite the nibble (4-bit) to word (16-bit)
	DISB	Disperse word (16-bit) into byte (4-bit)
	UNIB	Unite the byte (8-bit) to word (16-bit)
	SWAP	Swap the upper and lower data
	BSWAP	Switch block units for upper and lower data
	XCH	Exchange
	DECO	Decode the numbers of the lower n bits of the internal register to 2n bit binary data
	ENCO	Encode the "1" (ON) positions of specified continuous n number of bit devices to an 8-bit numerical value
	ABS	Absolute value
	CPMSET	Create CIP message
	CPMGET	Obtain CIP message
Floating Point	FLOAT	Convert binary to floating real number
	INTG	Convert floating real number to binary
	DFLOA	Convert binary to double-precision floating point real numbers
	DINTG	Convert double-precision floating point real numbers to binary
	DFTOF	Convert double-precision floating point real numbers to single-precision floating point real numbers
	FTODF	Convert single-precision floating point real numbers to double-precision floating point real numbers
	DISF	Disperse mantissa/exponent of floating real number
	UNIF	Unite mantissa and exponent to floating real number
	EXP	Exponent operation
	LOG	Natural logarithm operation
	LOG10	Common logarithm operation
	RAD	Converts degree (°) to radians (rad)
	DEG	Converts radians (rad) to degree (°)
	SIN	Calculates the sine (sin) value from the angle (rad)
	COS	Calculates the cosine (cos) value from the angle (rad)
	TAN	Calculates the tangent (tan) value from the angle (rad)
	ASIN	Calculates the angle (rad) from the sine (sin) value
	ACOS	Calculates the angle (rad) from the cosine (cos) value
	ATAN	Calculates the angle (rad) from the tangent (tan) value
Text Processing	ASC	Convert binary to HEX ASCII code
	RASC	Convert HEX ASCII code to binary
	DASC	Convert binary to decimal ASCII code
	RDASC	Convert decimal ASCII code to binary
	HASC	Convert 16/32-bit unsigned binary to Hex ASCII
	RHASC	Convert Hex ASCII to 16/32-bit unsigned binary
	FASC	Convert floating real number to text string
	RFASC	Convert text string to floating real number
	SMOV	Move text string
	SADD	Add text string
	SRGHT	Cut a specified number of characters from the right end of a text string
	SLEFT	Cut a specified number of characters from the left end of a text string
	SMID	Cut part of a text string
	SRPLC	Replace part of a text string with a specified text string
	SINS	Insert a text string to be specified
	SDEL	Delete a text string to be specified
	SFIND	Searche a specified text string from a text string
	SCMP	Compare text string
	DISS	Disperse text string (byte units)into text strings (word units)
	UNIS	Unite text string (word units) into text strings (byte units)
	LEN	Detect text string length
	RCOM	Read text string
	STRIM	Delete end of character string
	SFINDN	Search character strings
	CPSASC	Convert CIP character string data
	RCPSASC	Perform reverse conversion of CIP character string data
Simple operation	CAL+	Operand3 Binary data addition operation
	CAL-	Operand3 Binary data subtraction operation
	CAL*	Operand3 Binary data multiplication operation
	CAL/	Operand3 Binary data division operation
	CAL&	Operand3 Logical AND operation
	CAL|	Operand3 Logical OR operation
	CAL^	Operand3 Exclusive OR operation
	CAL~	Operand2 Bit Inversion
	CAL>>	Operand2 Shift right
	CAL<<	Operand2 Shift left

Extended Instructions

Type	Mnemonics	Description
Data Processing	HKEY	Hex key data input
	SEG	Decode for 7-segment display
	BCNT	Count number of ON bits in internal register
	DCNT	Count number of data of same value as internal register in data block
	SER	Detect device No. of data of same value as internal registers in a data block
	MAX	Search maximum value in data block
	MIN	Search minimum value in data block
	AVG	Calculate average value in data block
	WSUM	Total binary data in specified range
	BSUM	Total of binary data (8 bits) in specified range => internal register
	CRC	Calculate CRC value
	ZRES	Reset zone
	EXT	Extend 16-bit internal register => 32-bit internal register
	BCMP	Compare binary data in two specified ranges
	BCMPI	Compare binary data in specified range with specified binary data
	SORT	Arrange binary data
	SORTN	Split and arrange binary data
	DSER	Search the position of the device for storing data consistent with the specified data
Table Processing	FIFOW	Write FIFO data
	FIFOR	Read FIFO data
	LIFOW	Write LIFO data
	LIFOR	Read LIFO data
	FWRIT	Overwrite data block of data table
	FINS	Insert data in data block
	FDEL	Delete data in data block
Clock Processing	WTIME	Write the time data to the calendar timer
	SEC	Convert date/time format data to second format data
	RSEC	Convert second format data to date/time format data
	AJST	Adjust the calendar timer by ±30 seconds
Week contact	LDWK	Connect ON/OFF of specified week/hour/ minute/second ranges with power rail as NO contacts
	LDWKB	Connect ON/OFF of specified week/hour/ minute/second ranges with power rail as NC contacts
	ANDWK	Connect ON/OFF of specified week/hour/ minute/second ranges as NO contacts in series
	ANDWKB	Connect ON/OFF of specified week/hour/ minute/second ranges as NC contacts in series
	ORWK	Connect ON/OFF of specified week/hour/ minute/second ranges as NO contacts in parallel
	ORWKB	Connect ON/OFF of specified week/hour/ minute/second ranges as NC contacts in parallel
Calendar Contact	LDCAL	Connect ON/OFF of specified year/month/day ranges with power rail as NO contacts
	LDCALB	Connect ON/OFF of specified year/month/day ranges with power rail as NC contacts
	ANDCAL	Connect ON/OFF of specified year/month/day ranges as NO contacts in series
	ANDCALB	Connect ON/OFF of specified year/month/day ranges as NC contacts in series
	ORCAL	Connect ON/OFF of specified year/month/day ranges as NO contacts in parallel
	ORCALB	Connect ON/OFF of specified year/month/day ranges as NC contacts in parallel
Alarm	ARES	Clean alarm relay / alarm history
High-speed processing	HSP	Set input time constant to 10µs
	DI	Disable interrupt
	EI	Enable interrupt
	DIC	Set interrupt disabled range
	INT	Execute interrupt
	RETI	End interrupt
	CTH	32-bit high-speed counter
	CTC	32-bit high-speed counter comparator
	RFSCTH	Update the current value of high-speed counter CTH as the latest value
Positioning	PLSX	X-axis positioning start
	PLSY	Y-axis positioning start
	JOGX	X-axis inching operation
	JOGY	Y-axis inching operation
	ORGX	Zero return on X-axis
	ORGY	Zero return on Y-axis
	TCHX	Teaching X-axis
	TCHY	Teaching Y-axis
	HOMEX	X-axis home movement start
	HOMEY	Y-axis home movement start
	CHGSPX	Change the speed on the X-axis
	CHGSPY	Change the speed on the Y-axis
	RFSPSX	Update current value and current speed of X-axis to the newest value
Positioning	RFSPSY	Update current value and current speed of Y-axis to the newest value
Cam Switch	MCMP	Multi-stage comparator operation
	ABSENC	Cam switch operation by an absolute encoder
	INCENC	Cam switch operation by an incremental encoder
Frequency counter	FCNT	Measurement of pulse input frequency using CTH0
	RCNT	Measurement of the speed of rotation of pulse input using CTH0
	PLSOUT	The pulse of the frequency specified by CTH1 is output
PID	PID	PID Control
	PIDAT	Control PID instructions with auto-tuning
Log	LOGE	Enable the log with the specified log ID
	LOGD	Disable the log with the specified log ID
	TRGD	Capture the data log with the specified log ID
Access Window	MWRIT	Write device data to memory card
	MREAD	Read device data from memory card
	MFREE	Get the free space on the memory card
	MMKDIR	Make a directory on the memory card
	MRMDIR	Delete the specified folder in the memory card
	MDEL	Delete specified files in memory card
	MPRINT	Write character strings to a file on a memory card
	MREADL	Read a single line from a file on a memory card
	MCOPY	Copy a file on a memory card
	MMOV	Move a file on a memory card
	MREN	Change the name of a file on a memory card
	MFREEK	Obtain amount of free space on a memory card in kilobytes
	MSTAT	Obtain status of a file on a memory card
Free operation	AWNUM	Display user message 1 on the access window (value)
	AWMSG	Display user message 2 on the access window (text string)
Counter	RFSFRC	Update the current value of free operation counter as the latest value

Instructions available for KV-5000/3000 functions Ver.2.0 or later.

Only instructions available for KV-5000/3000/1000.

Only instructions available for KV-5000/3000.

Only instructions available for KV-1000/700.

Operator

Type	Operator	Description
Arithmetic	+	Calculate summation of 2 values (addition)
	-	Calculate difference of 2 values (subtraction)
	*	Calculate product of 2 values (multiplication)
	/	Calculate quotient of 2 values (division)
	^	Calculate the power
	MOD	Divide 2 values, return remainder
Compare	<	Less than
	<=	Less than or equal to (as follows)
	>	Larger than
	>=	Greater than or equal to (above)
	=	Equal to (equivalent)
	<>	Unequal to (unequivalent)
Assign	=	Substitute the right into the left
	+=	Right plus Left
	-=	Right minus Left
	*=	Right multiplied by Left
	/=	Left is divided by Right
Character string	+, &	Connect 2 character strings
Logic	AND	Logical multiplication of 2 values (AND)
	OR	Logical addition of 2 values (OR)
	XOR	EOR logic of two values
	NOT	Calculate logical not value

Data Type

Suffix	Description
(Device) .U	Processed as unsigned 16-bit data*1 (0 to 65535)
(Device) .S	Processed as signed 16-bit data (-32768 to 32767)
(Device) .D	Processed as unsigned 32-bit data (0 to 4294967295)
(Device) .L	Processed as signed 32-bit data (-2147483648 to 2147483647)
(Device) .F	Processed as floating real number data -3.4E38 <= n <= -1.4E - 45 n = 0 1.4E - 45 <= n <= 3.4E38 (Significant digits : 7 digits)
(Device) .B	Processed as bit data (ON: TRUE, OFF: FALSE)
(Device) .T	Processed as text string data

*1 □.U can be omitted when programming.
Word device without postfixes
Handled as 16-bit unsigned data.

Control statement

Type	Control statement	Description

Conditional branch	IF statement	IF <Conditional equation 1> THEN
		(If the condition 1 is true, executed)
		ELSE IF <Conditional equation 2> THEN
		(If the condition 2 is true, executed)
		ELSE IF <Conditional equation 3> THEN
		(If the condition 3 is true, executed)
		
		ELSE
		(If all the conditions are not true, executed)
		END IF

	SELECT statement	SELECT CASE <Device comparison> CASE <Condition 1> (When equal to condition 1, executed) CASE <Condition 2>-><Condition 3> (When equal to condition 2 or condition 3, executed) CASE <Condition 4>TO<Condition 5> (When condition 4 and condition 5 are met, executed) CASE IS<Comparison><Condition 6> (When the comparison with 6 is true, executed) CASE ELSE (When equal to none of the conditions, executed) END SELECT
	MC statement	MC <Conditional equation> THEN (If the condition is true, executed) MCR
Loop control	FOR statement	FOR <Loop condition> (When the loop condition is met, loop is executed) NEXT
	WHILE statement	WHILE <Conditional equation> (When the loop condition is met, loop is executed) END WHILE
	DO statement	DO (Until the condition is met, loop is executed) UNTIL <Conditional equation>

Type Declaration	TYPE	Type declaration for executing valid devices in a box/area script Example: TYPE DM1000.D TYPE EM.F

Function

Type	Function	Description
Contact	LDP	Connect the device to the power rail as a NO contact that turns ON for one scan only when the lookup relay is ON
	LDPB	Connect the device to the power rail as a NC contact that turns ON for one scan only when the lookup relay is ON
	LDF	Connect the device to the power rail as a NO contact that turns ON for one scan only when the lookup relay is OFF
	LDFB	Connect the device to the power rail as a NC contact that turns ON for one scan only when the lookup relay is OFF
Bit Contact	BLD	Connect the specified bit of a lookup word device to the power rail as a NO contact
	BLDB	Connect the specified bit of a lookup word device to the power rail as a NC contact
Output	SET	Turns the target relay ON
	RES	Turns the target relay OFF
Bit Output	BOUT	Outputs the previous state to the specified bit of the (word) device
	BOUB	Inverts and outputs the previous state to the specified bit of the (word) device
	BSET	Turns the specified bit of the word device ON, and holds this state
	BRES	Turns the specified bit of the word device OFF
Timer/ counter	TMR	32-bit 100 ms subtraction type ON delay timer
	TMH	32-bit 10 ms subtraction type ON delay timer
	TMS	32-bit 1 ms subtraction type ON delay timer
	CNT	32-bit addition counter
Direct I/O	RFSX	To refresh the states of specified number of input relays
	RFSY	To refresh the states of the specifed number of output relays
Flow	CALLE	Sub-routine call
	CALL	To execute subroutine of specified module
Macro	MCALL	Execution of sub-routine type macrol
	MSTRT	Execution of self-hold type macro
	MEND	Stop of self-hold type macro
Module	MDSTRT	Module execution start
	MDSTOP	Module execution stop
Index Register	ZPUSH	Save index register uniformly
	ZPOP	Read index register uniformly
Indirect Specification	ADRSET	Get the address of an indirect-specified device
	ADRINC	Increment the device address by 1
	ADRDEC	Decrement the device address by 1
	ADRADD	Add the address
	ADRSUB	Subtract the address
Datamove	BMOV	Block transfer data from source to destination
	FMOV	United transfer data from source to destination
	PMOV	Store information of any continuous bits of word device into the specified bits of specified word device
Logic Arithmetic Operation	ANDA	Logic operation of internal register and logic product data
	ORA	Logic operation of internal register and logic ANDed data
	EORA	Logic operation of internal register and logic EORed data
	ENRA	Logic operation of internal register and logic Exclusive NORed data
	COM	Complement
	NEG	Invert sign
Exponent Arithmetic operation	INC	Increment specified device by 1
	DEC	Decrement specified device by 1
	ROOT	Square root extraction
	SQRT	Square root extraction
	ABS	Absolute value
	RND	16-bit random number
Buffer memory	UREAD	Read data of the specified buffer memory into device
	UWRIT	Write device data with specified range into the buffer memory
	UFILL	Write the specified 16/32-bit data in batch to the buffer memory
File register	FRSET	Switch the current group No. of the file register to the specified No
	FRSTM	Store the current value of file register into memory card
	FRLDM	Read data stored in memory card to file register

Type	Function	Description
Data Shift	SRA	Shift right bits of internal register
	SLA	Shift left bits of internal register
	RRA	Shift right bits of internal register with carry
	RLA	Shift left bits of internal register with carry
	RRNCA	No carry shift right bits of internal register
	RLNCA	No carry shift left bits of internal register
	WSR	Shift word data right
	WSL	Shift word data left
	BSR	Shift the content of the device to the right towards the larger device No.
	BSL	Shift the content of the device to the left towards the smaller device No.
Data Control	LIMIT	Upper and lower limit limit control
	BANDC	Dead band control
	ZONE	Zone control
	APR	Linear approximation
Data Conversion	TBCD	Convert binary to BCD
	TBIN	Convert BCD to binary
	MPX	Encode 4-bit number to 16-bit
	DMX	Encode 16-bit number to 4-bit
	GRY	Convert binary to gray code
	RGRY	Convert gray code to binary
	SWAP	High lower byte conversion
	DECO	Decode the numbers of the lower n bits of the internal register to 2n bit binary data
	ENCO	Encode the "1" (ON) positions of specified continuous n number of bit devices to an 8-bit numerical value
	TOU	Convert the type of data to unsigned 16bit
	TOS	Convert the type of data to signed 16bit
	TOD	Convert the type of data to unsigned 32bit
	TOL	Convert the type of data to signed 32bit
	DISN	Disperses word (16-bit) into nibble units (4-bit)
	UNIN	Unite the nibble (4-bit) to word (16-bit)
	DISB	Disperses word (16-bit) into byte (4-bit)
	UNIB	Unite the byte (8-bit) to word (16-bit)
Floating Point	FLOAT	Convert BIN data to floating real number data
	TOF	
	INTG	Convert floating real number data to BIN data
	INT	
	DISF	Disperse mantissa/exponent of floating real number
	UNIF	Unite mantissa and exponent to floating real number
	EXP	Exponent operation
	LOG	Natural logarithm operation
	RAD	Convert degree (°) to radian (rad)
	DEG	Convert radian (rad) to degree (°)
	SIN	Calculates the sine (sin) value from the angle (rad)
	COS	Calculate the cosine (cos) value from the angle (rad)
	TAN	Calculate the tangent (tan) value from the angle (rad)
	ASIN	Calculate the angle (rad) from the sine (sin) value
	ACOS	Calculate the angle (rad) from the cosine (cos) value
	ATAN	Calculate the angle (rad) from the tangent (tan) value

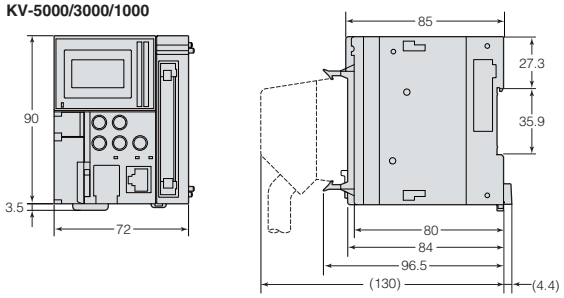
Type	Function	Description
Text Processing	ASC	Convert binary to HEX ASCII code
	RASC	Convert HEX ASCII code to binary
	DASC	Convert binary to decimal ASCII code
	STR	Convert numerical value to decimal ASCII code
	RDASC	Convert decimal ASCII code to binary
	HASC	Convert 16/32-bit unsigned binary to Hex ASCII
	RHASC	Convert Hex ASCII to 16/32-bit unsigned binary
	FASC	Convert floating real number to text string
	RFASC	Text string to floating real number conversion
	VAL	
	SRGHT	Cut a specified number of characters from the right end of a text string
	RIGHT	
	SLEFT	Cut a specified number of characters from the left end of a text string
	LEFT	
	SMID	Cut part of a text string
	MID	
	SRPLC	Replace part of a text string with a specified text string
	REPLACE	
	SINS	Insert a text string to be specified
	INSERT	
	SDEL	Delete a text string to be specified
	DELETE	
	SFIND	Searche a specified text string from a text string
	INSTR	
	DISS	Disperse text string (byte units) into text strings (word units)
	UNIS	Unite text string (word units) into text strings (byte units)
	FIND	Search text string
	LEN	Detect text string length
	CHR	Convert HEX ASCII text code to text string

Type	Function	Description
Data Processing	SEG	Decode for 7-segment display
	BCNT	Count number of ON bits in internal register
	DCNT	Count detected data in specified block
	SER	Detect data in specified block
	DSER	Detect MAX value in a specified block
	MAX	Search maximum value in data block
	MIN	Search minimum value in data block
	AVG	Calculate average value in data block
	WSUM	Total binary data in specified range
	BSUM	Total of binary data (8 bits) in specified range => internal register
	CRC	Calculates the CRC value
	ZRES	Reset specified block
	BCMP	Compare binary datas in two specified ranges
	BCMPI	Compare binary data in specified range with specified binary data
Table processing	FIFOW	Write FIFO data
	FIFOR	Read FIFO data
	LIFOW	Write LIFO data
	LIFOR	Read LIFO data
	FWRIT	Overwrite data block of data table
	FINS	Insert data in data block
	FDEL	Delete data in data block
Clock Processing	WTIME	Write the time data to the calendar timer
	SEC	Convert date/time format data to second format data
	RSEC	Convert second format data to date/time format data
	AJST	Adjust the calendar timer by ±30 seconds
High-speed Processing	DI	Disable interrupt
	EI	Enable interrupt
	DIC	Sets interrupt disabled range
	RFSCTH	Update the current value of high-speed counter CTH as the latest value
Log	LOGE	Enable the log with the specified log ID
	LOGD	Disable the log with the specified log ID
	TRGD	Capture the data log with the specified log ID
Memory Card	MWRIT	Write device data to Memory Card
	MREAD	Read device data from Memory Card
	MFREE	Get the free space on the Memory Card
	MMKDIR	Make a directory on the Memory Card
	MRMDIR	Delete the specified folder in the memory card
	MDEL	Delete specified files in memory card
Access Window	AWNUM	Display user message 1 on the access window (value)
	AWMSG	Display user message 2 on the access window (text string)
Free operation counter	RFSFRC	Update the current value of free operation counter as the latest value

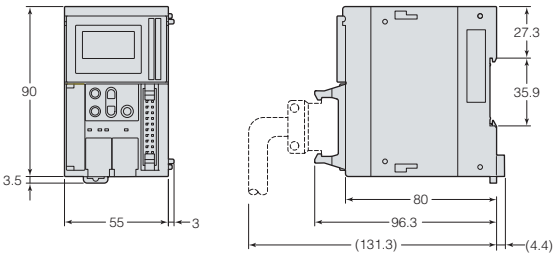
Only functions available for KV-5000/3000.

CPU unit

KV-5000/3000/1000

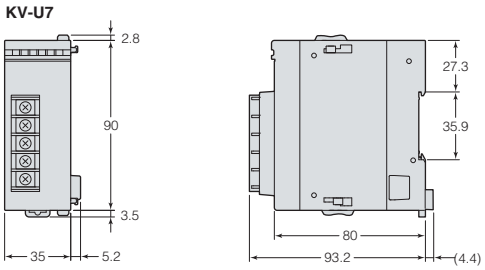


KV-700

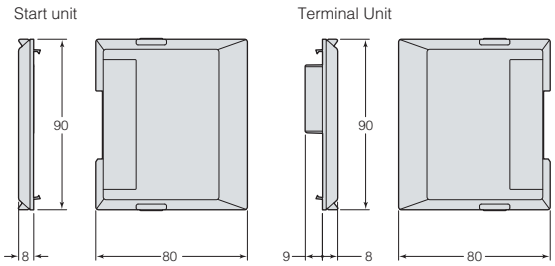


Power unit

KV-U7

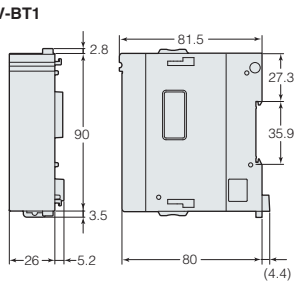


Start Unit/End Unit



Bluetooth unit

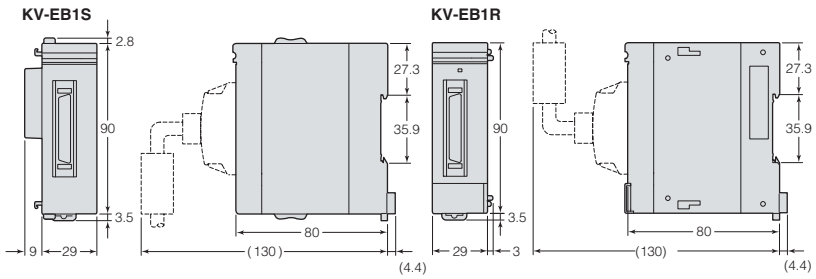
KV-BT1



Expansion unit

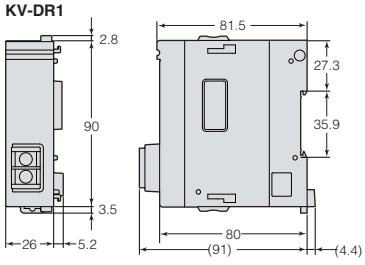
KV-EB1S

KV-EB1R



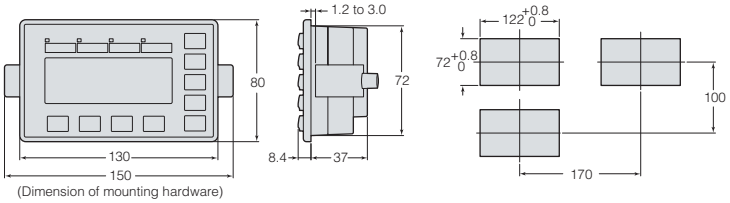
Error output unit

KV-DR1



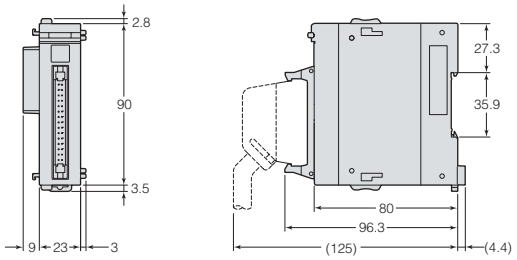
Operating panel

KV-D30

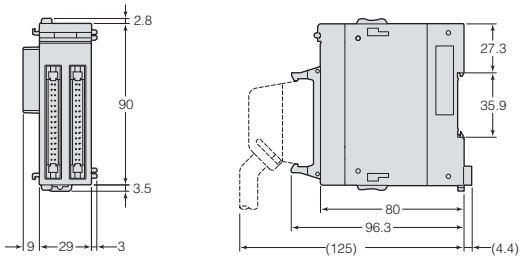


I/O unit

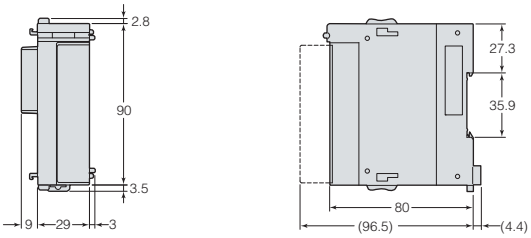
KV-C32 (XA, XC, TA, TC, TD, TCP), KV-C16XTD



KV-C64 (XA, XB, XC, TA, TC, TCD, TCP), KV-C32XTD

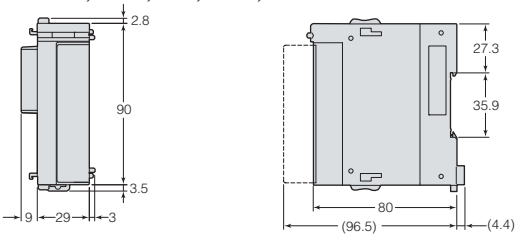


KV-B16 (XA, XC, TA, TC, TD, TCP, RA, RC), KV-B8 (XTD, RC)

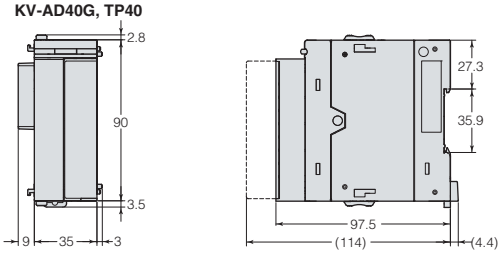


Analogue/Temperature control unit

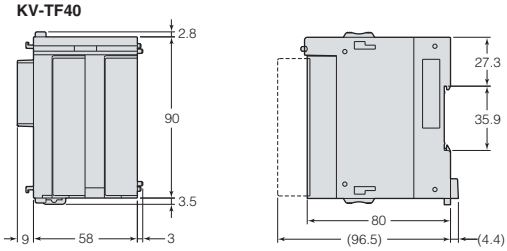
KV-AD40, AD40V, DA40, DA40V, AM40V



KV-AD40G, TP40

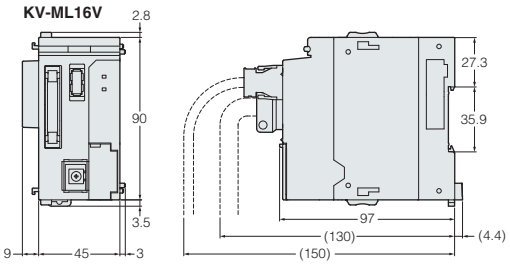


KV-TF40

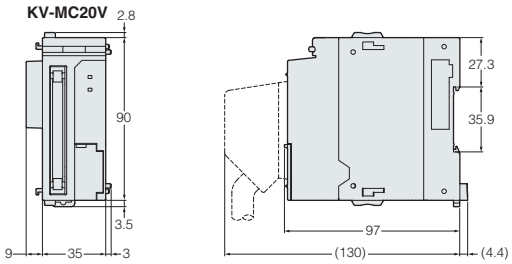


Positioning/Motion unit

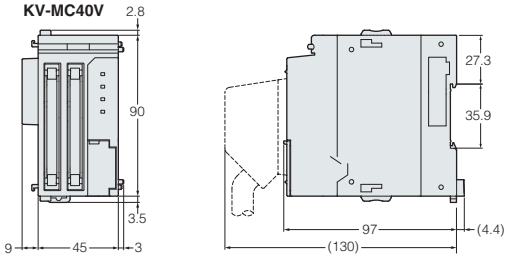
KV-ML16V



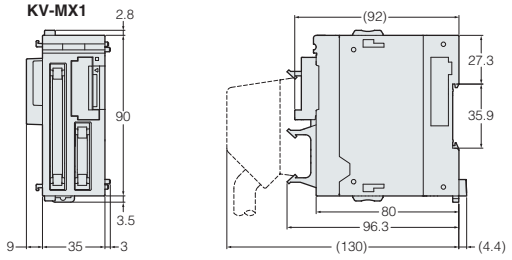
KV-MC20V



KV-MC40V

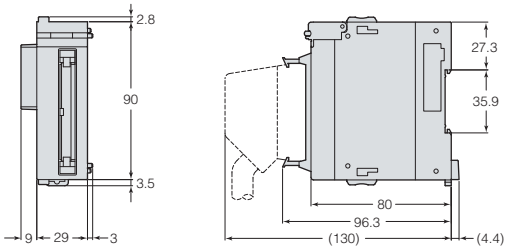


KV-MX1

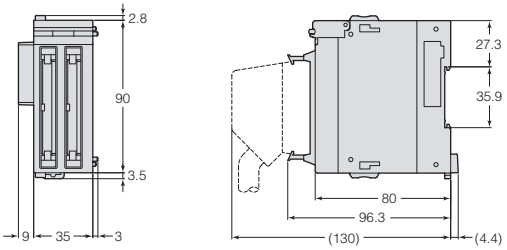


Positioning/High-speed counter unit

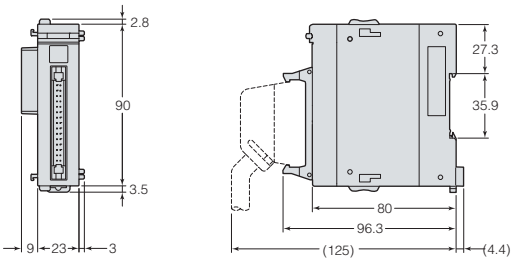
KV-H20S



KV-H40S, H20G

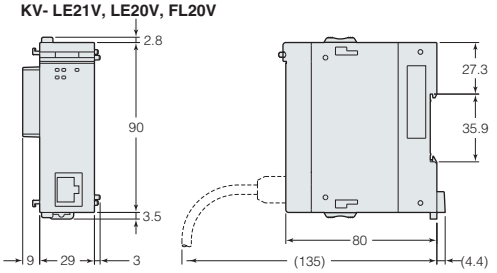


KV-SC20V

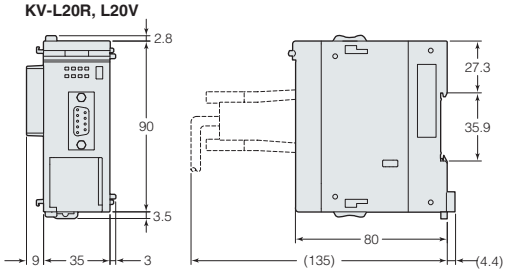


Communication/Network/Remote unit

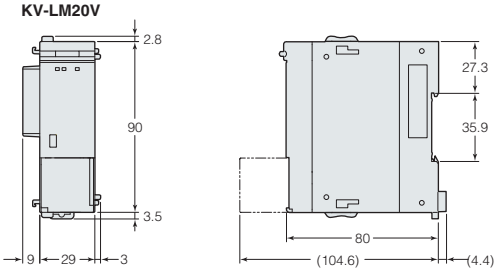
KV- LE21V, LE20V, FL20V



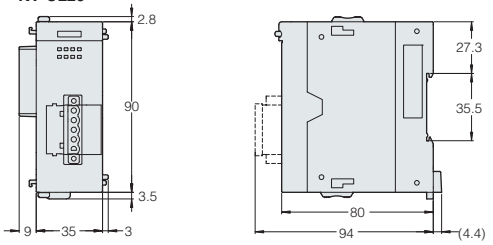
KV-L20R, L20V



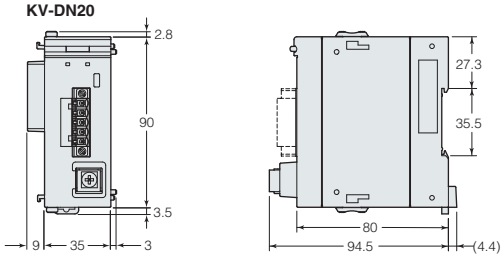
KV-LM20V



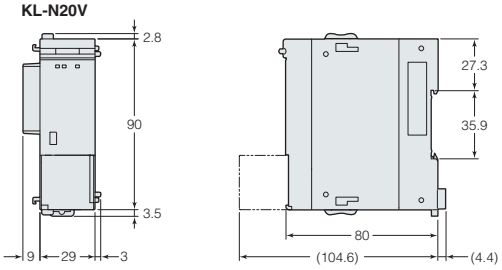
CC-Link
KV-CL20



DeviceNet
KV-DN20

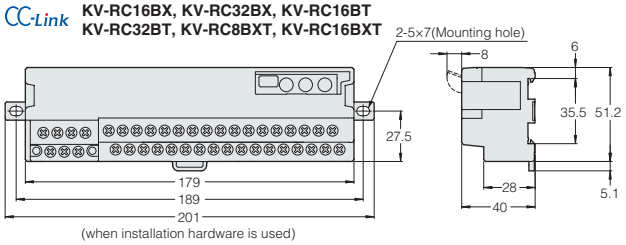


KL-LINK
KL-N20V



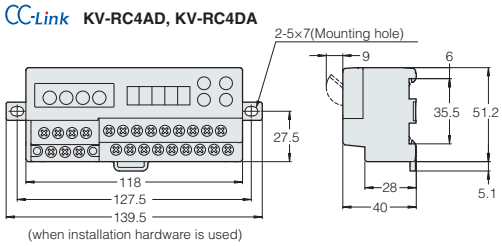
Network/Remote I/O/Remote analogue unit

CC-Link KV-RC16BX, KV-RC32BX, KV-RC16BT KV-RC32BT, KV-RC8BXT, KV-RC16BXT



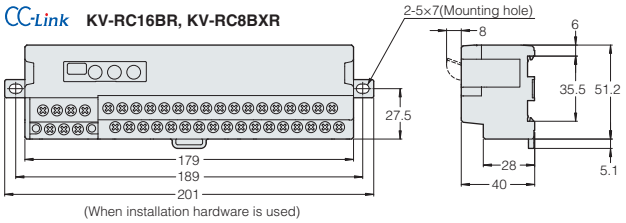
(when installation hardware is used)

CC-Link KV-RC4AD, KV-RC4DA



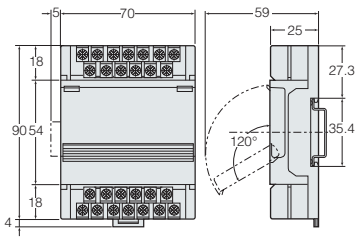
(when installation hardware is used)

CC-Link KV-RC16BR, KV-RC8BXR

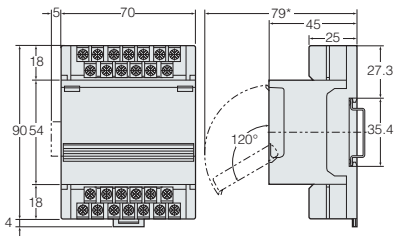


(When installation hardware is used)

KL-LINK KL-16BX, 16BT

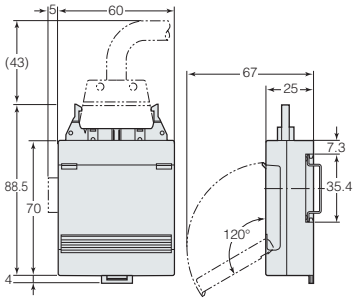


KL-LINK KL-16BR, 8BXT, 8BXR, KL-4AD, 2DA

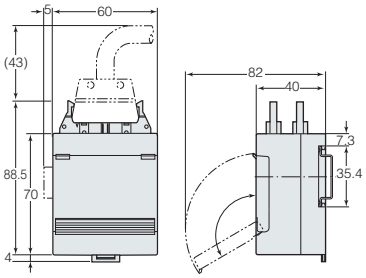


*KL-4AD/2DA, 87.5mm

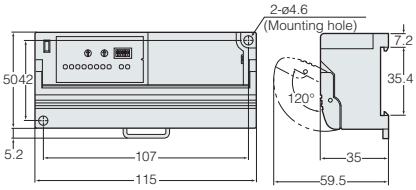
KL-LINK KL-16CX, 16CT



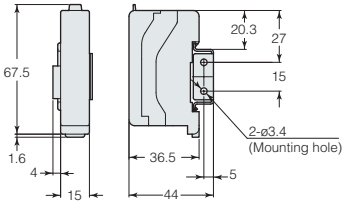
KL-LINK KL-32CX, 32CT



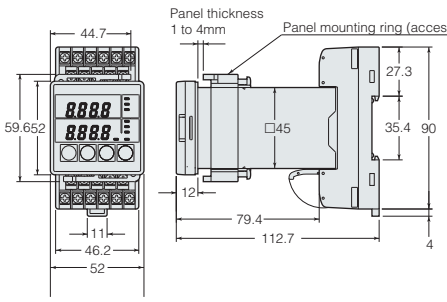
KL-LINK KL-8BLX, 8BLT, 8BLR



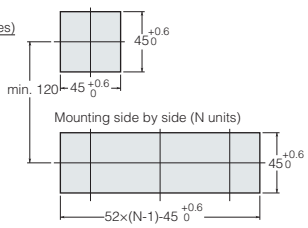
KL-LINK KL-B1



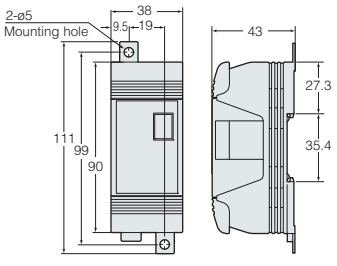
KL-LINK KL-2TF



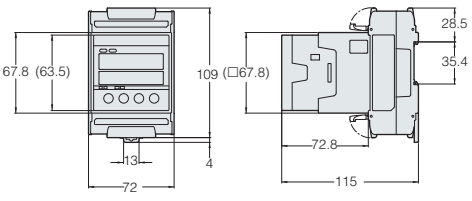
Dimensions of panel cutout



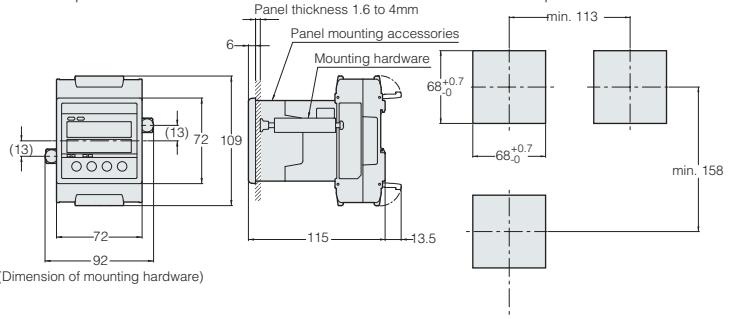
KL-LINK KL-T1



KL-LINK KL-DC1A, KL-DC1V, KL-LC1, KL-WH1



For panel mounted version



(Dimension of mounting hardware)

Name/type		Model	Support direct refresh	Remarks	Refer to (External dimensions)
CPU	CPU unit (Ethernet/FL-net port, inbuilt 24-point I/O)	KV-5000	O	I/Os: 3096 (24 I/Os built in CPU unit) Programme size: 260k steps Executing speed of LD instruction: 0.010μs Data memory capacity: 272k words Built-in Ethernet/FL-net ports Built-in special functions	P2 to 25 (P60)
	CPU unit (Inbuilt 24-point I/O)	KV-3000	O	I/Os: 3096 (24 I/Os built in CPU unit) Programme size: 160k steps Executing speed of LD instruction: 0.010μs data storing time Data memory capacity: 272k words Built-in special functions	
		KV-1000		I/Os: 3096 (24 I/Os built in CPU unit) Programme size: 160k steps Executing speed of LD instruction: 0.025μs Data memory capacity: 160k words Built-in special functions	P5, P22, P24 to 25 (P60)
	CPU unit (Inbuilt 14-point I/O)	KV-700		I/Os: 3086 (14 I/Os built in CPU) Programme size: 16k steps (can be expanded to 32k steps) Executing speed of LD instruction: 0.1μs Data memory capacity: 20k words (40k words when expanding memories) Built-in special functions	
Power	AC power unit	KV-U7		Capacity 1.8A, with load monitoring	P10, P24 (P60)
Error output	Error output unit	KV-DR1		KV-5000/3000 specifice, relay output1a, rated load DC24V 0.5A	P10, P24 (P60)
Wireless communication	Bluetooth unit	KV-BT1		KV-5000 Ver.1.1/KV-3000 Ver.2 and later	P25 (P60)
I/O	Input unit	KV-B16XC	O	16-point, DC5/24V, screw terminal block	P26 to 27, P29 (P61)
		KV-C32XC	O	32-point, DC5/24V, MIL connector 34 pin x 1	
		KV-C64XC	O	64-point, DC24V, MIL connector 34 pin×2 (all terminals support 2-wire sensor)	
		KV-B16XA		16-point, DC5/24V, screw terminal block	— (P61)
		KV-C32XA		32-point, DC5/24V, MIL connector 34 pin x 1	
		KV-C64XA		64 point, DC24V, MIL connector 34 pin x 2	
		KV-C64XB		64-point, DC24V, MIL connector 34 pin x 2 (all terminals support 2-wire sensor)	
	Output unit	KV-B8RC	O	8-point, screw terminal block, relay (independent common point)	P26 to 27, P29 (P61)
		KV-B16RC	O	16-point, screw terminal block, relay	
		KV-B16TC	O	16-point, screw terminal block, transistor (NPN)	
		KV-C32TC	O	32-point, MIL connector 34 pin x 1, transistor (NPN)	
		KV-C64TC	O	64-point, MIL connector 34 pin x 2, transistor (NPN)	
		KV-B16TCP	O	16-point, screw terminal block, transistor (PNP)	
		KV-C32TCP	O	32-point, MIL connector 34 pin x 1, transistor (PNP)	
		KV-C64TCP	O	64-point, MIL connector 34 pin x 2, transistor (PNP)	
		KV-B16TD	O	16-point, screw terminal block, MOSFET (NPN), overcurrent protection available	— (P61)
		KV-C32TD	O	32-point, MIL connector 34-pin x 1, MOSFET (NPN), overcurrent protection available	
		KV-C64TD	O	64-point, MIL connector 34-pin x 2, MOSFET (NPN), overcurrent protection available	
		KV-B16RA		16-point, screw terminal block, relay	
		KV-B16TA		16-point, screw terminal block, transistor (NPN)	
		KV-C32TA		32-point, MIL connector 34 pin x 1, transistor (NPN)	
		KV-C64TA		64-point, MIL connector 34 pin x 2, transistor (NPN)	
	I/O unit	KV-B8XTD	O	Input 8-point, output 8-point, screw terminal block, MOSFET (NPN), overcurrent protection available	P26 to 29 (P61)
		KV-C16XTD	O	Input 16-point, output 16-point, MIL connector 34-pin x 1, MOSFET (NPN), overcurrent protection available	
		KV-C32XTD	O	Input 32-point, output 32-point, MIL connector 34-pin x 2, MOSFET (NPN), overcurrent protection available	
Analogue	A/D conversion unit	KV-AD40G		Voltage/current input 4ch, Conversion speed: 80μs/2ch, 160μs/4ch Resolution: 16bit, Precision ±0.05% of F.S.@25°C	P30 to 35 (P61)
		KV-AD40V	O	KV-5000/3000 support direct refresh Voltage/current input 4ch, Conversion speed:25μs/ch Resolution: 16bit, Precision ±0.1% of F.S.@25°C	
		KV-AD40		Voltage/current input 4ch, Conversion speed:80μs/ch Resolution: 12bit, Precision ±0.2% of F.S.@25°C	
	D/A conversion unit	KV-DA40V	O	KV-5000/3000 support direct refresh Voltage/current output 4ch, Conversion speed:25μs/ch Resolution: 16bit, Precision ±0.1% of F.S.@25°C	
		KV-DA40		Voltage/current output 4ch, Conversion speed:80μs/ch Resolution: 12bit, Precision ±0.2% of F.S.@25°C	
	A/D ·D/A conversion unit	KV-AM40V	O	KV-5000/3000 support direct refresh Voltage/current input 2ch + Voltage/current output 2ch, Conversion speed:80μs/ch, Resolution: 1/8000	
Temperature/ analogue input	Multi-input unit	KV-TP40		Thermocouple, platinum temperature measurement resistance, voltage, and current multi-input 4ch, insulated between channels, conversion speed 50 ms/4ch	
Temperature Adjustment	PID thermoregulation unit	KV-TF40		4ch thermocouple or RTD input, heater wire-break alarm	

Name/type		Model	Support direct refresh	Remarks	Refer to (External dimensions)
KV MOTION Positioning/motion	Positioning/motion unit	KV-ML16V	O	MECHATROLINK-II communication, Max. 16 axes, position control, speed control, torque control, I/O control, MECHATROLINK-II command, straight-line interpolation, arc interpolation, helical interpolation, synchronisation control, fine control, motion flow support	P36 to 39 (P61)
		KV-MC20V	O	2-axis pulse train, position control, straight-line interpolation, arc interpolation, helical interpolation, synchronisation control, fine control, motion flow support	P36 to 37, P39 (P61)
		KV-MC40V	O	4-axis pulse train+1 virtual axis, position control, straight-line interpolation, arc interpolation, helical interpolation, synchronisation control, fine control, motion flow support	
		KV-MX1	O	Incremental encoder input (high-speed counter) 4ch, absolute encoder 2ch, memory card slot, common input: 12 points, common output: 12 points	
Positioning/ high-speed counter	Simple positioning unit	KV-H20S		2-axis pulse train (with linear interpolation)	P40 to 41, P43 (P62)
		KV-H40S		4-axis pulse train (with linear interpolation)	
	Synchro /Cam motion unit	KV-H20G		2-axis pulse train (with linear/arc interpolation, synchronization operation), encoder input, cam switch output	
High-speed counter	Multi-function high-speed counter unit	KV-SC20V	O	KV-5000/3000 support direct refresh 2ch, Max. input frequency: 1MHz	P40 (P62)
Communication/ network	Serial communication unit	KV-L20V	O	KV-5000/3000 support direct refresh 2 ports (RS-232C×1 port, RS-232C/422A/485×1 port)	P44 to 47 (P62)
		KV-L20R		2 ports (RS-232C×1 port, RS-232C/422A/485×1 port)	— (P62)
	Ethernet unit	KV-LE21V	O	KV-5000/3000 support direct refresh 100BASE-TX/10BASE-T, FTP client/server function	P44 to 45, P47 (P62)
		KV-LE20V	O	KV-5000/3000 support direct refresh 100BASE-TX/10BASE-T, FTP server function	
	FL-net unit	KV-FL20V	O	KV-5000/3000 support direct refresh FL-net(OPCN-2)Ver.2.00, 100BASE-TX/10BASE-T	
	Touch panel High-speed Multi-link Unit	KV-LM20V	O	KV-5000/3000 support direct refresh KEYENCE VT3 Series high-speed multi-link unit (Megalink unit)	P44, P46 to 47 (P62)
DeviceNet	DeviceNet unit	KV-DN20		Master mode, slave mode, master/slave mode	P48 to 49, P53 (P62)
CC-Link	CC-Link master/local station unit	KV-CL20		Master station, master station (duplex), backup master station, local station	P48 to 50, P53 (P63)
	Input unit	KV-RC16BX		16-point, DC24/5V, screw terminal block with relay function	P48 to 50, P53 (P62)
		KV-RC32BX		32-point, DC24/5V, screw-type terminal block	
	Output unit	KV-RC16BT		16-point, screw terminal block with relay function, transistor (NPN)	
		KV-RC16BR		16-point, screw terminal block with relay function, relay	
		KV-RC32BT		32 point, screw-type terminal block, transistor (NPN)	
	I/O Unit	KV-RC8BXT		Input 8 point + output 8 point, screw terminal block with relay function, transistor (NPN)	
		KV-RC8BXR		Input 8 point + output 8 point, screw terminal block with relay function, relay	
		KV-RC16BXT		Input 16 point + output 16 point, screw-type terminal block, transistor (NPN)	
	A/D conversion unit	KV-RC4AD		Input 4ch, with 5-digit 7-segment display	
	D/A conversion unit	KV-RC4DA		Output 4ch, with 5-digit 7-segment display	
KL LINK	KL master unit	KL-N20V		Max. 2048-point remote I/O, high-speed PLC link	P48 to 49, P51 to 53 (P62 to 63)
	Input unit	KL-8BLX		8-point, DC24/5V, screw terminal block with relay function	
		KL-16BX		16-point, DC24/5V, screw-type terminal block	
		KL-16CX		16 point, DC24/5V, MIL connector 26 pin×1	
		KL-32CX		32 point, DC24/5V, MIL connector 26 pin×2	
	Output unit	KL-8BLT		8-point, screw terminal block with relay function, transistor (NPN)	
		KL-8BLR		8-point, screw terminal block with relay function, relay	
		KL-16BT		16 point, screw-type terminal block, transistor (NPN)	
		KL-16BR		16 point, screw-type terminal block, relay	
		KL-16CT		16 point, MIL connector 26 pin×1, transistor (NPN)	
		KL-32CT		32 point, MIL connector 26 pin×2, transistor (NPN)	
	I/O unit	KL-8BXT		Input 8 point + output 8 point, screw-type terminal block, transistor (NPN)	
		KL-8BXR		Input 8 point + output 8 point, screw-type terminal block, relay	
	A/D conversion unit	KL-4AD		Input 4ch, with 4-digit 7-segment display	
	D/A conversion unit	KL-2DA		Output 2ch, with 4-digit 7-segment display	
	Remote Temperature Control Unit	KL-2TF		2ch thermocouple or RTD input, heater wire-break alarm	
	DC Current Input Unit	KL-DC1A		Direct current input 1ch	
	DC Voltage Input Unit	KL-DC1V		Direct voltage input 1ch	
	Weighing sensor gauging unit	KL-LC1		Weighing sensor input 1ch	
	Electricity gauging unit	KL-WH1		Electricity gauging unit 1ch	

Software List

Name/type		Model		Remarks
CPU	Ladder Support Software (English)	KV-H4WE		KV STUDIO Ver.6, English, CD-ROM *The English version of KV MOTION+/MOTION BUILDER/MV LINK STUDIO/ PROTOCOL STUDIO are included as standard (including KV BUILDER English Version)
	Ladder Support Software (Chinese)	KV-H4WC		KV STUDIO Ver.6, Simplified Chinese, CD-ROM *The Chinese (simplified) version of KV MOTION+/MOTION BUILDER/ PROTOCOL STUDIO are included as standard (including KV BUILDER English Version)
Positioning/high-speed counter	Positioning Unit Parameter Setting Software	KV-H1HWE		MOTION BUILDER, English, CD-ROM *Included as standard with KV-H4WE (Standard KV STUDIO Ver.6 configuration)
		KV-H1HWC		MOTION BUILDER, Simplified Chinese, CD-ROM *Included as standard with KV-H4WC (Standard KV STUDIO Ver.6 configuration)
Communication/ network	KV-L20V/L20R communication macro support software	KV-H1RWE		PROTOCOL STUDIO Ver.2, English, CD-ROM *Included as standard with KV-H4WE (Standard KV STUDIO Ver.6 configuration)
Application software	Data collection/transfer, monitoring function integrated software	KV-DH1E	UNDER DEVELOPMENT	KV COM+ for Excel CD-ROM, Windows 7/Vista/XP/2000 compatible
		KV-DH1E-5		KV COM+ for Excel 5 licence edition CD-ROM, Windows 7/Vista/XP/2000 compatible
		KV-DH1LE		KV COM+ Library CD-ROM, Windows 7/Vista/XP/2000 compatible
		KV-DH1LE-5		KV COM+ Library 5 licence edition CD-ROM, Windows 7/Vista/XP/2000 compatible

Operation environment

Item	KV STUDIO	
OS	Windows 2000 SP3 or more/XP	Windows 7 / Vista (32-bit edition only)
CPU	Pentium 800MHz or more (1 GHz or more recommended)	As recommended by Microsoft
Memory	256 MB or more	As recommended by Microsoft
CD-ROM drive	2x or more	
Hard disk	950 MB or more	
Display	XGA (1024×768), High Colour16bit or more	

* Microsoft Internet Explorer Ver.6.0 and above has been installed

Item	KV COM+	
OS	Windows 2000 SP3 or more/XP	Windows 7 / Vista (32-bit edition only)
CPU	Pentium 800MHz or more (1 GHz or more recommended)	As recommended by Microsoft
Memory	256 MB or more	As recommended by Microsoft
CD-ROM drive	2x or more	
Hard disk	950 MB or more	

* Microsoft Internet Explorer Ver.6.0 and above has been installed and either Microsoft Office 2010/2007/2003/2002/2000 has been installed

List of External Devices

Name/type		Model	Remarks	Refer to (External dimensions)
Positioning/ motion	Teaching unit for positioning unit	KZ-HP1	All parameters may be changed, displayed in Katakana	—
		KV-HPD1	JOG knob, may display Chinese characters	P32, P36 to 37 (—)
	Connector adaptor unit with terminal block	KV-HTCx	Connection between servo drive <--> positioning unit. For support drive, please inquire the nearest office of this company	P36 (—)
	Encoder uses connector adaptor unit with terminal block	KV-HTE1	Used for external encoder connection or cam switch output	
	Additional basic module for HTC axis	KV-HMx	For support drive, please inquire the nearest office of this company	—
	KV-HTC specific connecting cable	KV-HC1	Special connecting cable between KV-HTC and positioning unit	
		KV-HCx	Special connecting cable between KV-HTC and motor driven	
KL-LINK	Adaptor for connecting cable	KL-B1	Adaptor for KL connecting cable	P44 (P59)
	T-type branch unit	KL-T1	KL T-type branch unit	
Decentralised system configuration	Expansion unit	KV-EB1	3 sections (up to 48 units can be connected when 1m extended cable is used) 2 sections (up to 32 units can be connected when 2m extended cable is used)	P22 (P56)
Simple setup display	Operating panel	KV-D30	Used for KV Series except for KV-1000 (CPU) 2.5m cable with mounting hardware	— (P56)

Option List

Sorting	Related model	Overview	Model	Accessory	Remarks
CPU unit	KV-5000/3000/1000	SD Memory Card	KV-M1G		1GB
	KV-5000/3000 KV-1000/700 Common	PC card adapter	PC card reader/writer		For PCMCIA slots
		Card reader	USB reader/ writer		For USB connection
	KV-5000/3000/1000	Backup battery	OP-51604	O	Connectors in battery chamber connected to the bottom of CPU
		MIL connector 40-pin	OP-22184		Standard contact longitudinal type is attached
		MIL slender connector 40-pin	OP-51404		Standard contact inclined type is attached
	KV-700	Multimedia card (MMC)	KV-M128C		128MB
		Expansion Memory	OP-42138		4M bytes Expansion slots mounted beside CPU unit
		Backup battery	OP-42139	O	Connectors in battery chamber connected to the top of CPU
		MIL connector 20-pin	OP-22185		With standard contact
	KV-5000/3000 KV-1000/700 Common	Contact	OP-22186		Standard AWG22-24 contains 200 pieces
		Fine wire contact	OP-30594		Fine wire AWG26-28 contains 200 pieces
		Special crimping tool for MIL connector	OP-21734		
Software	KV-H3WE KV-H1HWE KV-H1RWE	USB cable	OP-35331		Cable length 3 m
		Modular cable	OP-26487		6-core modular 2.5 m (can be combined with OP-26486 or OP-26485)
		D-Sub 25-pin connector	OP-26485		Combined with OP-26487
		D-Sub 9-pin connector	OP-26486		For DOS/V (combined with OP-26487)
		External USB port adapter	KV-S2		Cable length 1 m
Wireless communication	KV-RT1	USB connection adapter for Bluetooth	Bluetooth adapter		PC-side USB adapter
I/O	KV-C32	MIL connector 34-pin	OP-23139		Standard contact longitudinal type is attached
		Single contact wiring accessories	OP-42140		Coated connecter with single-contact connection and removable without any tool
	KV-C32/C64	MIL slender connector 34-pin	OP-42224		Standard contact inclined type is attached
		Contact	OP-22186		Standard AWG22-24 contains 200 pieces
		Fine wire contact	OP-30594		Fine wire AWG26-28 contains 200 pieces
		Special crimping tool for MIL connector	OP-21734		
	Screw terminal block unit	Miniature Y terminal	OP-42221		Containing 100 pieces
Temperature Adjustment	KV-TF40	Current sensor (CT)	OP-6694		For heater break alarm
Positioning	KV-H20S/ H40S/H20G	MIL connector 40-pin	OP-22184		Standard contact longitudinal type is attached
		MIL slender connector 40-pin	OP-51404		Standard contact inclined type is attached
		MIL connector 20-pin	OP-22185		With standard contact
		MIL connector 14-pin	OP-27284		With standard contact
		Contact	OP-22186		Standard AWG22 – 24 contains 200 pieces
		Fine wire contact	OP-30594		Fine wire AWG26 – 28 contains 200 pieces
		Special crimping tool for MIL connector	OP-21734		
		SD Memory Card	KV-M1G		1GB
	KZ-HP1/ KV-HPD1	Connecting cable	OP-42380		1.5 m
			OP-42381		3 m
			OP-42382		5 m
			OP-42383		10 m
High-speed counter	KV-SC20V	MIL connector 34-pin	OP-23139		Standard contact longitudinal type is attached
		MIL slender connector 34-pin	OP-42224		Standard contact inclined type is attached
CC-Link	CC-Link model	Dedicated communication cables	OP-79426		CC-Link Ver.1.10 cable 20m
			OP-79427		CC-Link Ver.1.10 cable 100m
KL LINK	KL-16C/32C	MIL connector 26-pin	OP-30593	O	With standard contact
		Contact	OP-22186		Standard AWG22-24 contains 200 pieces
		Fine wire contact	OP-30594		Fine wire AWG26-28 contains 200 pieces
		Special crimping tool for MIL connector	OP-21734		
	KL-16C/32C/16B KL-8BXT/R KL-4AD/2DA	Slim mounting hardware	OP-30588		Hardware parts for space-saving longitudinal installation
		Flush mounting hardware	OP-30589		Used for screw installation
		Substation connecting cable	OP-30590		Power/communication cables allow single-contact connection when several units are used in the same place
	KL-8BXR	Relay mainboard (8ch)	OP-33011		Used for KL-8BXR
	KL-16BR	Relay mainboard (16ch)	OP-30595		Used for KL-16BR
	KL-8BL	Connecting cable for I/O unit	OP-32985		Power/communication cables allow single-contact connection when several units are used in the same place
	KL-8BLR	Relay sets	OP-33010		KL-8BLR relay 5 pieces + drawing tool
	KL-2TF	Current sensor (CT)	OP-6694		For heater break alarm
	KL-DC1AKL-DC1V KL-LC1 KL-WH1	Panel mounting accessories	OP-51667		Two hardware parts for installation are attached
	KL-WH1	Current sensor (CT) 50A	OP-51674		KL-WH1 current sensor 50A
		Current sensor (CT) 100A	OP-51675		KL-WH1 current sensor 100A
		Current sensor (CT) 250A	OP-66851		KL-WH1 current sensor 250A
	KL model	Dedicated communication cables	OP-30591		KPEV-SB (1P) 0.75mm^2 20m
			OP-30592		KPEV-SB (1P) 0.75mm^2 100m
Decentralised system configuration	KV-EB1	Extended cable 2m	OP-42141		One system may use 1 piece
		Extended cable 1m	OP-42142		One system may use 2 pieces
Simple setup display	KV-D30	CPU connecting cable(5m)	OP-42143		
		JOG knob	OP-42144		If connected to the special terminal on the back of KV-D30, value may be set via the knob
		High gloss LED indicator	OP-35332		If connected to the special terminal on the back of KV-D30, it may illuminates or go out freelly according to KV-1000 bit ON/OFF

PROGRAMMABLE CONTROLLER

KV-5000/3000

KEYENCE

Please visit: www.keyence.com

SAFETY INFORMATION
Please read the instruction manual carefully in order to safely operate any KEYENCE product.

KEYENCE GLOBAL HEADQUARTERS

1-3-14, Higashi-Nakajima, Higashi-Yodogawa-ku, Osaka, 533-8555, Japan Phone: +81-6-6379-2211

AUSTRIA
Phone: +43 22 36-3782 66-0 Fax: +43 22 36-3782 66-30

BELGIUM
Phone: +32 1 528 1222 Fax: +32 1 520 1623

CANADA
Phone: +1-905-696-9970 Fax: +1-905-696-8340

CHINA
Phone: +86-21-68757500 Fax: +86-21-68757550

CZECH REPUBLIC
Phone: +420 222 191 483 Fax: +420 222 191 505

FRANCE
Phone: +33 1 56 37 78 00 Fax: +33 1 56 37 78 01

GERMANY
Phone: +49 61 02 36 89-0 Fax: +49 61 02 36 89-100

HONG KONG
Phone: +852-3104-1010 Fax: +852-3104-1080

HUNGARY
Phone: +36 1 802 73 60 Fax: +36 1 802 73 61

ITALY
Phone: +39-02-6688220 Fax: +39-02-66825099

JAPAN
Phone: +81-6-6379-2211 Fax: +81-6-6379-2131

KOREA
Phone: +82-31-642-1270 Fax: +82-31-642-1271

MALAYSIA
Phone: +60-3-2092-2211 Fax: +60-3-2092-2131

MEXICO
Phone: +52-81-8220-7900 Fax: +52-81-8220-9097

NETHERLANDS
Phone: +31 40 20 66 100 Fax: +31 40 20 66 112

POLAND
Phone: +48 71 36861 60 Fax: +48 71 36861 62

SINGAPORE
Phone: +65-6392-1011 Fax: +65-6392-5055

SLOVAKIA
Phone: +421 2 5939 6461 Fax: +421 2 5939 6200

SWITZERLAND
Phone: +41 43-45577 30 Fax: +41 43-45577 40

TAIWAN
Phone: +886-2-2718-8700 Fax: +886-2-2718-8711

THAILAND
Phone: +66-2-369-2777 Fax: +66-2-369-2775

UK & IRELAND
Phone: +44-1908-696900 Fax: +44-1908-696777

USA
Phone: +1-201-930-0100 Fax: +1-201-930-0099

WW1-1090

The information in this publication is based on KEYENCE's internal research/evaluation at the time of release and is subject to change without notice.
Copyright (c) 2010 KEYENCE CORPORATION. All rights reserved.

KV5000-WW-C2-E 1011-1 600923 Printed in Japan