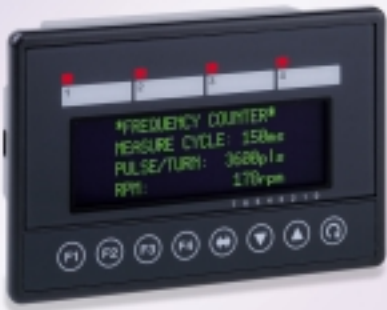# Built-in Display Programmable Logic Controllers

# Visual KV Series

## Features
- The world's smallest PLC with AC power supply built-in
- Easy-to-use Access Window
- Compact operator interface panel available
- Fast processing with 10-µs interrupt and 30-kHz high-speed counters
- User-friendly Windows® ladder software

## Description

### User-friendly design
Designed with the user in mind, the Visual KV is a high-speed compact unit. It features the industry's first built-in Access Window and includes an AC power supply model and operator interface panel.
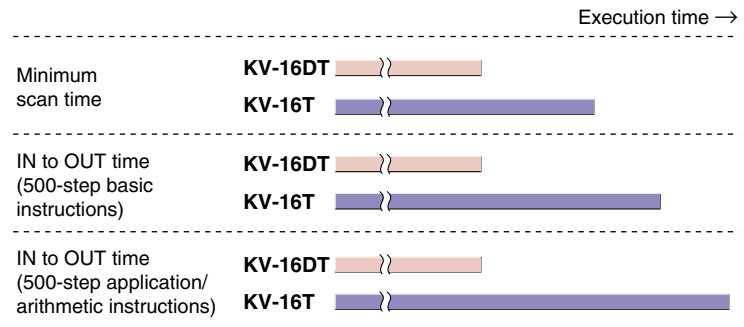
### World's smallest design*

**2/3rd the size of conventional AC type PLCs**
The new AC version 40 I/O KV is 2/3rd the size of conventional PLCs. The slender design not only saves mounting space, but allows the entire system including the distribution panel and the control box to be downsized. (*For AC types that use screw-type terminal blocks)

110
4.33"
70
2.76"
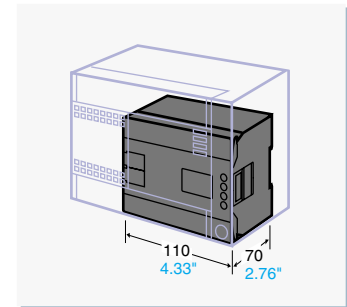
### World's fastest in its class
The fastest processing among products of this class. The minimum scan time is 140 µs and the minimum instruction execution time is 0.7 µs. The processing speed is increased by 50% compared to that of our conventional product.

Execution time →

| | |
|---|---|
| Minimum scan time | KV-16DT |
| | KV-16T |
| IN to OUT time (500-step basic instructions) | KV-16DT |
| | KV-16T |
| IN to OUT time (500-step application/ arithmetic instructions) | KV-16DT |
| | KV-16T |

Note: Refer to P.256 for instructions list.

CE

Refer to P.551 for a list of products complying with EMC directive.

Built-in Display Programmable Logic Controllers **Visual KV**

## Access Window Functions

### No PC or handheld programmer required to monitor operation or make minor changes

The Visual KV CPU features a built-in display (Access Window) that allows the PLC's data to be checked upon start-up, and during modification or changeover.

### Access Window allows information to be conveniently available

**Timer/Counter value**

**Data memory value**
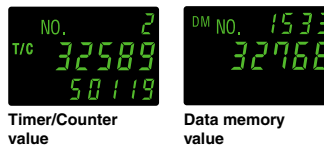
When checking or changing some device values the PLC does not need to be connected to either a PC or handheld programmer.

**Changing & Digital trimmer value**

When making precise on-line adjustments to internal devices, such as a timer, while the PLC is operating.

**Mode indications**

When you need to stop the PLC and check the program without connecting to a PC or handheld programmer.

### Other Functions

**Key lock function**
The Visual KV features a key lock function to prevent accidental changes to the settings.

**Error message function**
Error codes are immediately displayed on the LCD. With a conventional PLC, the PLC had to be connected to a handheld programmer in order to determine the error code.

**User message function**
With a simple ladder program, a flashing LED display message (No.0 to 255) can appear, indicating a user error code.

## Built-in Operator Interface Convenience Functions

### Ladder comment display allows you to easily check, change or detect abnormalities.

In addition to having the same functions as the Visual KV PLC's Access Window, the operator panel KV-D20 displays comments generated by a ladder program. This easy to use display features a variety of functions.

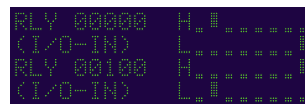Displays operational instruction messages.

### The operator interface panel provides features of a full scale display

The on-screen feedback digital trimmer allows workers to make adjustments without stopping the production line.
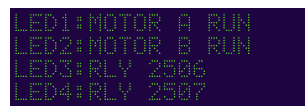
At a glance, the status of registered customized switches F1 to F4 and lamps 1 to 4 can be confirmed.

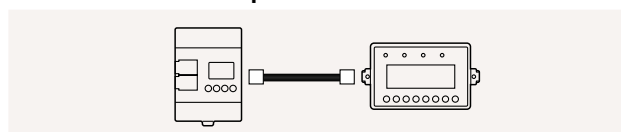Input and output status of the I/O terminals can be monitored.

### Other Functions

**Beep function**
The KV-D20 features a beep function to provide audio cues to workers.

**Display customization**
Workers can choose from various display options to create a customized, easy-to see display.

**A modular cable completes the connection.**

# Visual KV Built-in Display Programmable Logic Controllers

## Functions

### 2-channel high-speed counters

**Incorporates a 30kHz, 2 phase, 24-bit counter and eliminates the need for an additional high-speed counter.**

The Visual KV base unit incorporates 2-channel, 2 phase high-speed counters and 4 high-speed counter comparators. This allows direct connection with a rotary encoder and counting input from the encoder. The Visual KV can be used for various applications, such as speed measurement and high speed interval counting; by utilizing the input capture functions, that automatically saves input values to the 4 interrupt inputs during high-speed counting.



The Visual KV is unmatched in cost and performance.
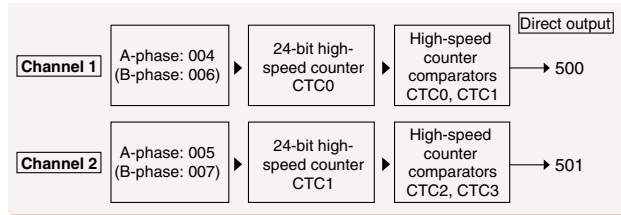
### 4 high-speed interrupt inputs

**Incorporates 4 high-speed interrupt inputs with a maximum speed of 10 µs.**

When an interrupt input occurs, the routine scanning is suspended and the interrupt inputs are immediately processed with a response time of only 10 µs. The Visual KV is optimal for fast sensor input on high-speed lines.
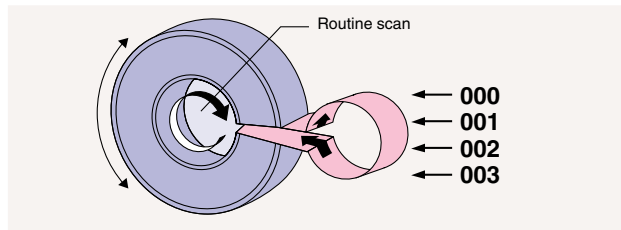


The Visual KV is unmatched in cost and performance.

### Simple ramp-up/down control function

**Incorporates a single-axis stopper motor control independent of the high-speed counter function that allows a motor up to 50kHz to be controlled.**

The Visual KV incorporates a positioning control function similar to expensive units for application practicality and cost reduction.



The Visual KV unit can control stepper motors. (See note.)
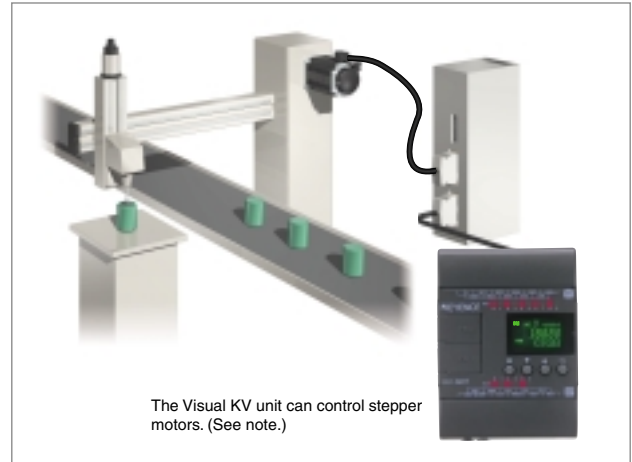
**The simple positioning control stepper function can be activated by just inputting the setting values into the specific data memories.**
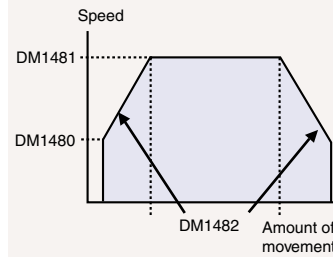


**Setting items for the positioning control function (x-axis)**

Start-up frequency (Hz) : DM1480
Run frequency (Hz)      : DM1481
Acceleration/deceleration
period (ms)             : DM1482
Number of output pulses
            (high order): DM1485
            (low order): DM1484
Operation start relay      : 2310
Forced slowdown stop relay : 2308
Emergency stop relay       : 2309

**Only 1-line of ladder logic is needed to create the positioning control function.**
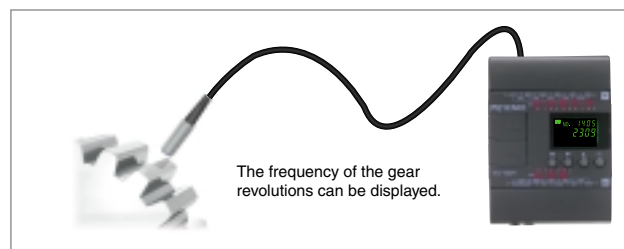
Built-in Display Programmable Logic Controllers **Visual KV**

## Frequency counter function

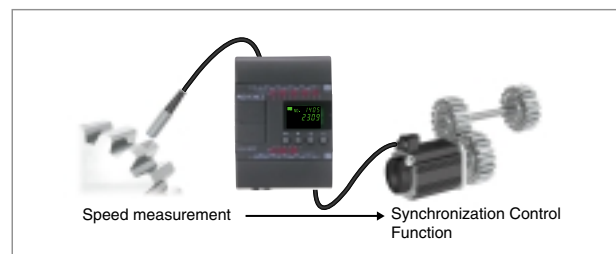**Measures the rotational frequency of a gear or rotary encoder without complicated programming.**

To achieve this measurement, simply input the frequency counting period into the specified data memory using a real number in "ms". The measured result is automatically input into the specified data memory. The measured result can be displayed on the Access Window.

The frequency of the gear revolutions can be displayed.

## Specified frequency pulse output function

**Easily controls motor speed.**

Without complicated programming, pulses with a specified frequency (16 to 50000Hz) can be output. Just input the frequency (Hz) into the specified data memory using a real number. The pulses with the specified frequency are then output from the output (501). The function allows multi-step speed control, as shown below. The preset speed of a motor can be manually changed by simply using the Access Window. This feature is ideal for systems that require frequent setting changes or fine adjustments.

Complicated multi-step ramp up-and-down control is possible.

50kHz
30kHz
20kHz
5kHz
0Hz
0Hz

The Visual KV can be used as a simple stepper motor controller by setting the output frequency on the Access Window (see note.)

## Synchronization control

**A single Visual KV unit enables synchronization control.**

Pulses with a measured frequency can be output (See note.) by combining the frequency counter function with the specified frequency pulse output.
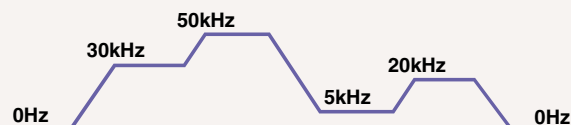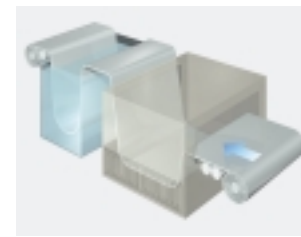
Speed measurement → Synchronization Control Function

**Applications**

Tension adjustment of hoop material

Time adjustment of sheet immersion in a treatment bath

## Cam switch function

**Serves as a simple cam switch.**

An operation similar to that of a cam can be achieved by combining an inexpensive rotary encoder with the Visual KV. Connect the rotary encoder to the Visual KV and input the desired angles into the specified data memories. The relays can then be turned on or off at the specified angles (up to 32 points, in increments of 1 degree.) This Function of the Visual KV can be utilized as an alternative to an expensive cam switch in order to reduce overall costs.
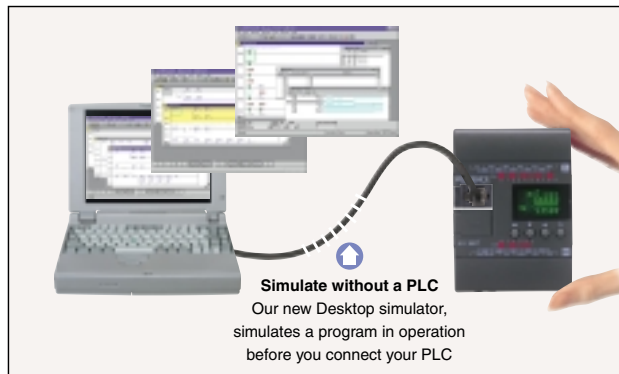
A, B, and Z phases

Rotary encoder (Incremental type)

120°  240°  360°
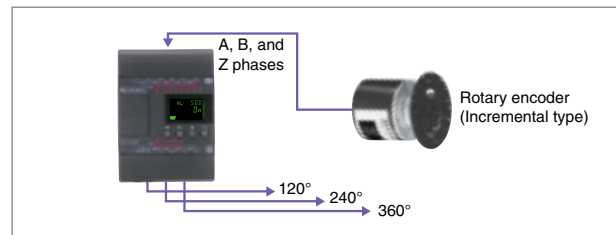
[Note]
A motor driver is required separately.

# Visual KV Built-in Display Programmable Logic Controllers

## Software

"Ladder Builder for KV" ensures fast, easy programming and efficient desktop debugging.

**Simulate without a PLC**
Our new Desktop simulator, simulates a program in operation before you connect your PLC

### Simulator

**Quick debugging without a PLC**

KV Ladder Builder can simulate program execution even without a PLC connected. Providing a single step execution (forward and reverse) in addition to a regular scan execution function increases debugging efficiency.

1 3 4 2
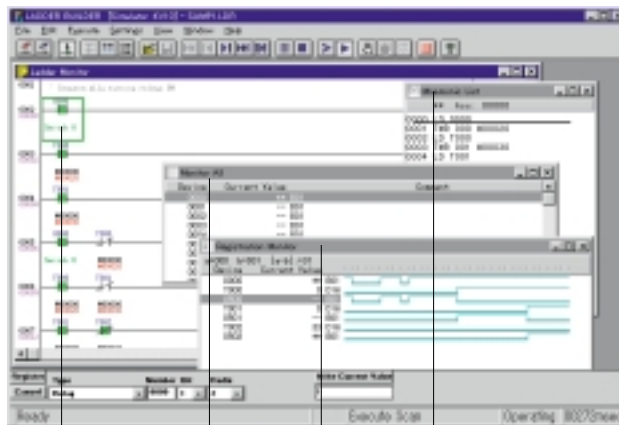
**1 Forward / Reverse Single Step Execution**
Checking the operation process one step at a time can easily identify complex operation problems.

**2 Monitor All Function**
Timers, counters and data memories can be checked simultaneously in multiple windows. For effective debugging, you can check all devices at once, even those that don't appear in the ladder diagram.

**3 Registration Monitor**
The Ladder Builder simultaneously displays multiple timing charts of any devices, conveniently allowing all on/off timing elements to be checked.

**4 Ladder Simulator Allows Verification of Diagram Execution**
By clicking an element in the ladder diagram, the simulator quick screen appears allowing the elements to set or reset.
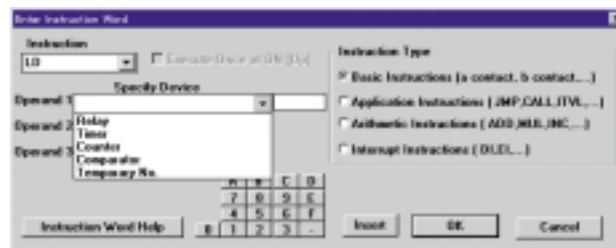
### Editor

#### Easy editing using Windows® functions

**Instruction selection window**

The user-friendly design allows data to be entered from a keyboard or mouse. You can specify a device or command from a drop down menu, eliminating errors.
For programming purposes you can also enter the symbol directly by typing the command.
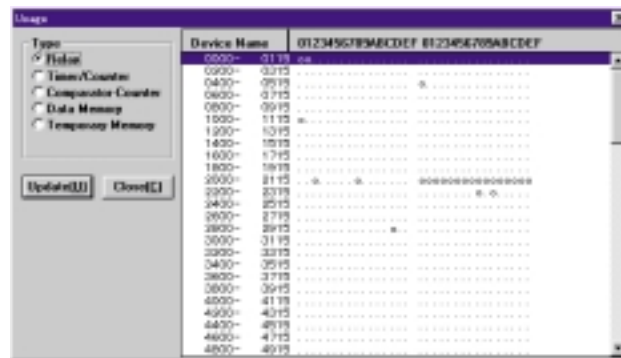
**Auto-save function**

Ladder Builder automatically backs-up the program at predetermined intervals. This protects the data from being lost due to a power loss or system crash.

**Usage list**

When creating Ladder diagrams the usage list automatically tracks and displays addresses that have been used.

**UNDO function**

Ladder Builder for KV enables efficient editing. If you accidentally delete an instruction, you can undo the action simply by clicking the "undo" button.

### Monitor

**Real time monitoring without machine stoppage**

Ladder diagram and element on/off status can be monitored in real time. In addition, timing charts can also be monitored simultaneously.

*"MS-windows" and "Windows" are registered trademarks of Microsoft. Any other company name is a registered trademark of that company.

Built-in Display Programmable Logic Controllers **Visual KV**

## System Variations

**Base Units** Fully equipped with Access Windows, 12 types of base units with various special functions, such as positioning control and high-speed counters, are available.

| I/O **16** 10 inputs 6 outputs | I/O **24** 16 inputs 8 outputs | I/O **40** 24 inputs 16 outputs |
|---|---|---|
| **AC** Relay | | |
| KV-16AR | KV-24AR | KV-40AR |
| **AC** Transistor | | |
| KV-16AT(P) | KV-24AT(P) | KV-40AT(P) |
| **DC** Relay | | |
| KV-16DR | KV-24DR | KV-40DR |
| **DC** Transistor | | |
| KV-16DT(P) | KV-24DT(P) | KV-40DT(P) |

**Expansion Units** An expansion unit can be mounted up to 300mm 11.81" away from the adjacent unit. 8 types of I/O expansion units permit a flexible layout.

**Input**
8 Inputs KV-E8X
16 Inputs KV-E16X

**Output**
8 transistor outputs KV-E8T(P)
16 transistor outputs KV-E16T(P)
8 relay outputs KV-E8R
16 relay outputs KV-E16R

**Input/Output**
4 inputs/ 4 outputs (Relay) KV-E4XR
4 inputs/ 4 outputs (Transistor) KV-E4XT(P)

### The "Special Mini Display" provides basic display functions at a low cost.

**KV-D20 operator panel**
4 function switches and 4 indicators can be customized and preset as desired. Comments on the ladder diagram can be displayed. The KV-D20, with practical functions, is a cost saving system component.

### Ladder builder software

**KV-H6WE2 (Windows)**
Ladder programming created for the conventional KV Series can be utilized with the Visual KV.

### Handheld programmer with a memory card slot

**KV-P3E**
The handheld programmer can be used to easily transfer and save ladder diagrams. (The M-2 and M-3 memory cards are available separately.)

### Visual KV Series model list

| Type | Name | Model | Description |
|---|---|---|---|
| **Base unit** | 16-point AC type | KV-16AT(P) | 10-point input/6-point transistor output |
| | | KV-16AR | 10-point input/6-point relay output |
| | 16-point DC type | KV-16DT(P) | 10-point input/6-point transistor output |
| | | KV-16DR | 10-point input/6-point relay output |
| | 24-point AC type | KV-24AT(P) | 16-point input/8-point transistor output |
| | | KV-24AR | 16-point input/8-point relay output |
| | 24-point DC type | KV-24DT(P) | 16-point input/8-point transistor output |
| | | KV-24DR | 16-point input/8-point relay output |
| | 40-point AC type | KV-40AT(P) | 24-point input/16-point transistor output |
| | | KV-40AR | 24-point input/16-point relay output |
| | 40-point DC type | KV-40DT(P) | 24-point input/16-point transistor output |
| | | KV-40DR | 24-point input/16-point relay output |
| **Expansion unit** | 8-point type | KV-E8X | 8-point input |
| | | KV-E8T(P) | 8-point transistor output |
| | | KV-E8R | 8-point relay output |
| | | KV-E4XT(P) | 4-point input/4-point transistor output |
| | | KV-E4XR | 4-point input/4-point relay output |
| | 16-point type | KV-E16X | 16-point input |
| | | KV-E16T(P) | 16-point transistor output |
| | | KV-E16R | 16-point relay output |
| **Easy-to-set display** | Operator panel | KV-D20 | 20 digits x 4 lines with customized switches/lamps (cable included) |
| **Extension cable for expansion unit** | For all expansion units and adapters | OP-35361 | For 300-mm 11.81" extension |
| **Expansion unit spacer** | Spacer for 8-point expansion unit | OP-35343 | Used to make an expansion unit flush with an AC power type base unit. |
| | Spacer for 16-point expansion unit | OP-35344 | |
| **Metal fixture for screw tightening** | For 16-point base unit | OP-35346 | Used to directly mount the KV Series with screws instead of a DIN rail. |
| | For 24-point base unit | OP-35347 | |
| | For 40-point base unit | OP-35348 | |
| | For 8- to 16-point expansion unit | OP-35349 | |
| **Programming** | Handheld programmer | KV-P3E(01) | Memory card slot, cable (OP-26487) included |
| | Programming support software | KV-H6WE2 | Windows version / With simulator function, delivered on two 3.5-inch floppy disks (cable included) |
| | Cable/connector for PC/AT or compatibles | OP-26487 | For D-sub 9-pin, Base unit-to-PC connection |
| | | OP-26486 | |
| | Memory card | M-2 | Saves/reads ladder programs via KV-P3E(01)' s slot or Z-1 card reader/writer. |
| | | M-3 | M-2: 24 programs max.,M-3: 48 programs max. |

# Visual KV Built-in Display Programmable Logic Controllers

## Specifications

### General specifications

| Item | | Specifications | |
|---|---|---|---|
| | | AC type | DC type |
| Power supply | | KV-16AR/AT(P) KV-24AR/AT(P) KV-40AR/AT(P) | KV-16DR/DT(P) KV-24DR/DT(P) KV-40DR/DT(P) |
| Input supply voltage | | 100 to 240 VAC (±10%) | 24 VDC (±10%, -20%) |
| Allowable instanta-neous time | | Less than 40 ms | Less than 2 ms |
| Internal current consumption (converted into 24 VDC value) | Base unit | KV-16AR/DR :120 mA or less  KV-24AR/DR :140 mA or less  KV-40AR/DR :180 mA or less  KV-16AT/DT :90 mA or less  KV-24AT/DT :100 mA or less  KV-40AT/DT :120 mA or less  KV-16ATP/DTP :100 mA or less  KV-24ATP/DTP :105 mA or less  KV-40ATP/DTP :130 mA or less | |
| | Expansion units | KV-E8X :25 mA or less  KV-E16T :60 mA or less  KV-E16R :110 mA or less  KV-E16X :35 mA or less  KV-E16TP :70 mA or less  KV-E4XT(P) :30 mA or less  KV-E8T(P) :40 mA or less  KV-E8R :70 mA or less  KV-E4XR :45 mA or less | |
| | Others | KV-D20 Operator interface panel: 60 mA or less  KV-P3E(01) Handheld programmer: 65 mA or less | |
| Ambient temperature | | 0 to +50°C , 0 to +45°C [KV-P3E(01)] | |
| Relative humidity | | 35 to 85% | |
| Ambient storage temperature | | -20 to +70°C | |
| Withstand voltage | | 1,500 VAC for 1 minute (Between power terminal and I/O terminals as well as between entire external terminals and case) | |
| Noise immunity | | 1,500 Vp-p or more, pulse width: 1 µs, 50 ns (by noise simulator) In conformance with EN standard (EN61000-4-2/-3/-4/-6) | |
| Shock | | 150 m/s² (150 G), working time: 11 ms, twice in each of X, Y and Z axis directions | |
| Vibration | | 10 to 55 Hz, double amplitude: 1.5 mm 0.06" or less, 2 hours  in each of X, Y and  Z axis directions (1 G or less when attached to DIN rail) | |
| Insulation resistance | | 50 MΩ or more (Between power terminal and I/O terminals as well as between entire external terminals and case by 500 VDC megohmmeter) | |
| Operating atmosphere | | No excessive dust or corrosive gases allowed. | |
| Weight (Approx.) | Base unit | KV-16AR: 300 g  KV-24AR: 350 g  KV-40AR: 450 g  KV-16DR: 190 g  KV-24DR: 240 g  KV-40DR: 330 g  KV-16AT(P): 280 g  KV-24AT(P): 330 g  KV-40AT(P): 410 g  KV-16DT(P): 180 g  KV-24DT(P): 210 g  KV-40DT(P): 280 g | |
| | Expansion units | KV-E8X: 100 g  KV-E16T(P): 130 g  KV-E4XT(P): 100 g  KV-E16X: 130 g  KV-E8R: 130 g  KV-E4XR: 120 g  KV-E8T(P): 100 g  KV-E16R: 130 g | |
| | Others | KV-P3E(01): 230 g    KV-D20: 160 g | |

### Performance specifications

| Item | | Specifications |
|---|---|---|
| Arithmetic operation control method | | Stored program method |
| I/O control method | | Refresh method |
| Programming language | | Ladder chart method + Expanded ladder method |
| Instruction types | | Basic instruction: 28,  Application instruction: 22, Arithmetic instruction: 26,  Interrupt instruction: 4 |
| Minimum scan time | | 140 µs min. |
| Instruction pro-cessing speed | | Basic instruction: 0.7 µs Application instruction: 6.4 µs |
| Program capacity | | 2,000 steps (KV-16xx) |
| | | 4,000 steps (KV-24xx, KV-40xx) |
| Maximum number of expansion units | | 8 (7 for KV-40xx) |
| Number of I/O points (including 10 to 40 I/O points of basic unit) | | 10 to 152 (when maximum number of expansion units are connected) |
| Internal utility relay | | 2,304: 1000 to 1915 and 3000 to 17915 |
| Special utility relay | | 160 points: 2000 to 2915 |
| Data memory (16 bits) | | 2,000 words: DM 0000 to DM1999 |
| Temporary data memory (16 bits) | | 32 words: TM00 to TM31 |
| Timer/counter | | 250 in all: 0.1-sec timer: TMR (0 to 6553.5 secs) 0.01-sec timer: TMH (0 to 655.35 secs) 0.001-sec timer: TMS (0 to 65.535 secs) UP counter: C  Up/down counter: UDC |
| Digital trimmer | | 2 (set in Access Window) |
| High-speed counter | | 2 counters of 30 kHz, 2-phase high-speed counter (0 to 65535 count) *1 |
| High-speed counter comparator | | 4 (2 for each high-speed counter) Direct output is enabled. |
| Positioning control function | | Independent 1 axis, 50 kHz maximum |
| Memory switch | | 16 |
| Data Backup function | Program memory | EEPROM which can be overwritten 100,000 times or more |
| | Data memory, counter, internal utility relay, and contact comment (Held devices are set by the MEMSW instruction.) | Can be backed up with electrical double-layer capacitor for 2 months or more at 25°C. Can be backed up with EEPROM |
| Self-diagnosis | | CPU and RAM errors |
| Number of contact comments stroable | | 1,000 max. |

1. When high-speed counters are set using the MEMSW instruction, 24-bit data can be counted.
2. Comments cannot be handled in the handheld programmer KV-P3E(01).

### I/O configurations (Base units)

| Model | KV-16xR/T(P) | KV-24xR/T(P) | KV-40xR/T(P) |
|---|---|---|---|
| No. of inputs | 10 | 16 | 24 |
| Max. inputs expanded | 74 | 64 | 72 |
| No. of outputs | 6 | 8 | 16 |
| Max. outputs expanded | 70 | 72 | 80 |

### I/O configurations (Expansion units)

| Model (KV-) | E4XR/T(P) | E8X | E8R/T(P) | E16X | E16R/T(P) |
|---|---|---|---|---|---|
| No. of inputs | 4 | 8 | – | 16 | – |
| No. of outputs | 4 | – | 8 | – | 16 |

Built-in Display Programmable Logic Controllers **Visual KV**

## AC power supply

| Item | Specifications |
|---|---|
| Method | Switching method |
| Ripple noise | 240 mVp-p or less |
| AC power current consumption | KV-16Ax: 0.5 A    KV-24Ax: 0.6 A    KV-40Ax: 0.7 A |
| AC power input voltage | 100 to 240 VAC (±10%) |
| AC power factor | 60% |
| Output voltage [1.] | 24 VDC ±10% |
| Output capacity | KV-16Ax: 0.6 A    KV-24Ax: 0.6 A    KV-40Ax: 0.7 A |
| Power consumption | KV-16Ax: 21 W    KV-24Ax: 21W    KV-40Ax: 24 W |
| Fuse | Rated voltage: 240 VAC, rated current: 3.15 A, Characteristics: Fast-melting type |

## Common I/O specifications of base units

| Item | Base units | | Expansion units |
|---|---|---|---|
| | 24 V mode | 5 V mode (Inputs 000 to 007 can be changed to 5 V input.) | – |
| Maximum input rating | 26.4 VDC | | |
| Input voltage | 24 VDC, 5.3 mA | 5 VDC, 1.0 mA | 24 VDC, 5.3 mA |
| Minimum ON voltage | 19V | 4.5V | 19V |
| Minimum OFF current (voltage) | 2mA | 2.5V | 2mA |
| Common method | COM is shared inside. | | 4 points/common |
| Input time constant | 10 ms typical 10 μs when HSP instruction is used Variable in 7 steps from 10 μs to 10 ms while special utility relay 2813 is ON (Set by DM1940) | | Input time constant (Changed in two steps by special utility relays 2609 to 2612) For both rising (OFF → ON) and falling (ON → OFF) operations, 10 ms: 10 ms ±20% 10 μs: 10 μs ±20% |
| Interrupt input response | 10 μs (representative) | | – |
| High-speed counter input response | 30 kHz (24 V ±10%) (duty: 50%) | | – |

## Output specifications (transistor output):
### KV-16AT(P)/DT(P),  KV-24AT(P)/DT(P), and KV-40AT(P)/DT(P)

| Item | Base units | Expansion units |
|---|---|---|
| Rated load | 30 VDC, 0.1 A (500 to 502), 0.3 A (others) | – |
| Peak load current | 0.2 A (500 to 502), 1 A (others) | – |
| Rated load voltage | 30 VDC | – |
| Rated output current | 0.5A/point (NPN), 0.3A/point (PNP) | – |
| Maximum voltage at OFF | 30 VDC | – |
| Leak current in OFF status | 100 μA or less | |
| Residual voltage in ON status | 0.8 V or less | |
| Rising operation time (OFF → ON) | 10 μs or less(500 to 502) (at 5 to 100 mA) 20 μs or less (others) (at 10 to 300 mA) | 50 μs or less |
| Falling operation time (ON → OFF) | 10 μs or less (500 to 502) (at 5 to 100 mA) 100 μs or less (others) (at 10 to 300 mA) | 250 μs or less |
| Common method | 1 common | Shared inside |
| Output frequency | 50 kHz (500 to 502) | – |
| Built-in serial resistance | 1.6 KΩ 1/2W (R500 to R502) | – |

## Output specifications (relay output):
### KV-16AR/DR, KV-24AR/DR, and KV-40AR/DR

| Item | Base units | Expansion units |
|---|---|---|
| Rated load | 250 VAC/30 VDC, 2 A (inductive load), 4 A (resistive load) | |
| Peak load current | 5A | – |
| Rising operating time (OFF → ON) | 10 ms or less | |
| Falling operating time (ON → OFF) | 10 ms or less | |
| Common method | Each common terminal is independent. | 4 points/common |
| Relay service life | Electrical  service life: 100,000 times or more (20 times/min) Mechanical service life: 20,000,000 times or more | |
| Relay replacement | Not allowed | |

## KV-D20 general specifications

| Item | Specifications |
|---|---|
| Supply voltage | Supplied from the communication port of the KV (5 VDC) |
| Current consumption | 5 VDC, 180 mA max. (60 mA max. when converted for 24 V) |
| Ambient temperature | 0 to +50°C |
| Relative humidity | 35 to 85% |
| Ambient storage temperature | -20 to +70°C |
| Withstand voltage | 1,500 VAC for 1 minute (Between power terminal and I/O terminal as well as between entire external terminals and case) |
| Noise immunity | 1,500 Vp-p or more, pulse width: 1 μs, 50 ns (by noise simulator) Conforms to EN standard (EN61000-4-2/-3/-4/-6) |
| Vibration | 10 to 55 Hz, double amplitude: 1.5 mm 0.06", 2 hours in each of X, Y and Z axis directions |
| Insulation resistance | 50 MΩ or more (Between power terminal and I/O terminal as well as between entire external terminals and case by 500 VDC megohmmeter) |
| Operating atmosphere | No excessive dust or corrosive gases. |
| Weight | Main unit: Approx. 160 g, Communication cable: Approx. 60 g Mounting fixture: 30 g (2 pieces) |
| Enclosure rating | Built-in panel, IP-65F only for the front operation panel |

## KV-D20 functional specifications

| Item | Specifications |
|---|---|
| Number of connectable units | 1 per base unit |
| Display screen | Blue-negative type backlighted LCD, 20 digits x 4 lines |
| Character size | 2.95 x 4.75 mm 0.12" x 0.19" (5 x 7 dots) |
| Customized switches | 4 switches assigned to special utility relays F1: 2500    F2: 2501    F3: 2502    F4: 2503 |
| Setting operation switch | ↔  ▼  ▲  ↺ |
| Customized indicator lamps | Four red LEDs assigned to special utility relays Lamp1: 2504  Lamp2: 2505  Lamp3: 2506  Lamp4: 2507 |

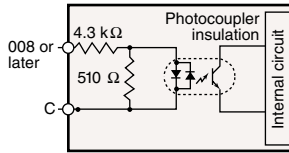# Visual KV Built-in Display Programmable Logic Controllers
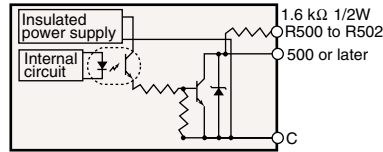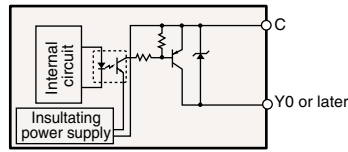
## Input/Output Circuit
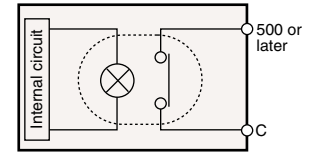
### Base unit

**Input 000 to 007**
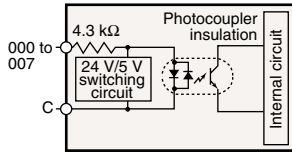


**Input 008 or later**



**KV- xxDT/AT(NPN)**
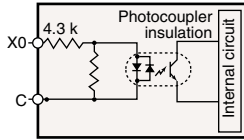


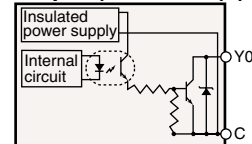**KV- xxDT/AT(PNP)**



**KV- xxDR/AR**
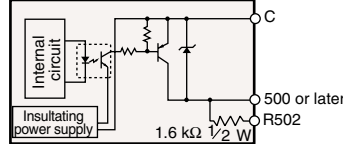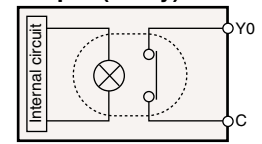


### Expansion unit

**Input**



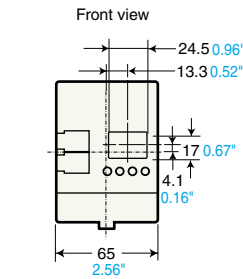**Output (Transistor) (NPN)**
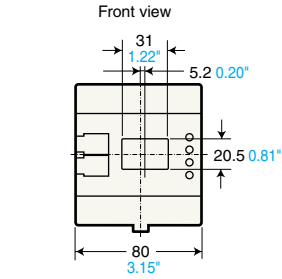


**Output (Transistor) (PNP)**
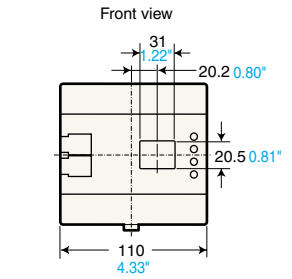


**Output (Relay)**



## Dimensions

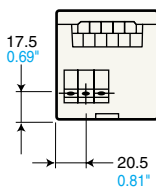Unit: mm   Inch

**KV-16AR/AT(P)/DR/DT(P)**
**(16-I/O base unit)**

Front view



Bottom view of AC type



Side view KV-*A



Side view KV-*D



**KV-24AR/AT(P)/DR/DT(P)**
**(24-I/O base unit)**

Front view



Bottom view (KV-24AR/AT(P))
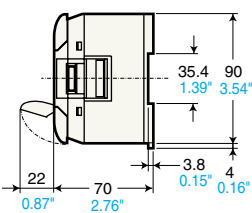


**KV-40AR/AT(P)/DR/DT(P)**
**(40-I/O base unit)**

Front view



Bottom view (KV-40AR/AT(P))
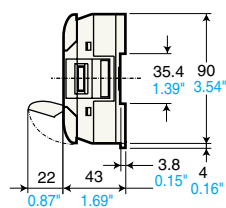
**Built-in Display Programmable Logic Controllers** **Visual KV**

### KV-E4XR/E4XT(P)/E8X/E16X (Expansion input unit)

Unit: mm   Inch

Front view
(KV-E4XR/T(P))

Front view
(KV-E8X)

Front view
(KV-E16X)

Side view

45
1.77"

45
1.77"

65
2.56"

35.4
1.39"

90
3.54"

43.5
1.71"

4
0.16"

4
0.16"
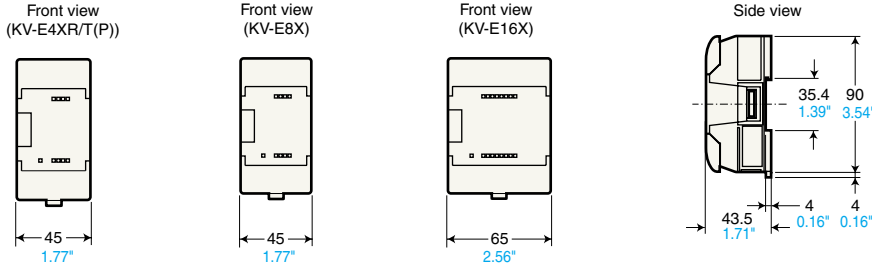
### KV-16AR/AT(P)/DR/DT(P)
### (16-I/O base unit) OP-35346

6-ø5.0 ø0.20"
(Mounting hole)

Main unit
mounting hole*
(2 positions)

99   111
3.90" 4.37"

31
1.22"

50
1.97"

64
2.52"

t=2
t=0.08"
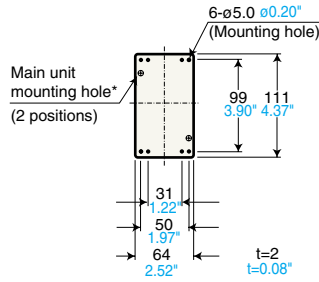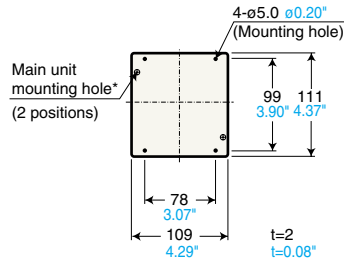
* Two M3.5 countersunk-head screws are
included for mounting the main unit.

### KV-24AR/AT(P)/DR/DT(P)
### (24-I/O base unit) OP-35347

6-ø5.0 ø0.20"
(Mounting hole)

Main unit
mounting hole*
(2 positions)

99   111
3.90" 4.37"

48
1.89"

66
2.60"

79
3.11"

t=2
t=0.08"
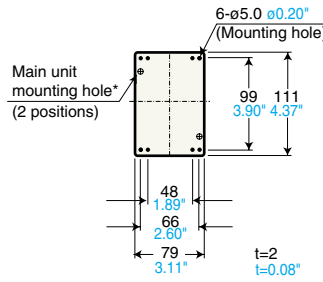
* Two M3.5 countersunk-head screws are
included for mounting the main unit.

### KV-40AR/AT(P)/DR/DT(P)
### (40-I/O base unit) OP-35348

4-ø5.0 ø0.20"
(Mounting hole)

Main unit
mounting hole*
(2 positions)

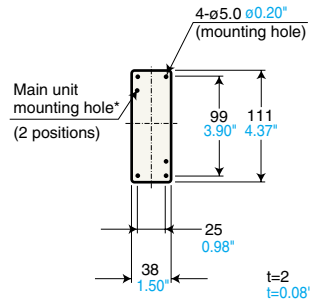99   111
3.90" 4.37"

78
3.07"

109
4.29"

t=2
t=0.08"

* Two M3.5 countersunk-head screws are
included for mounting the main unit.

### KV-E8R/E8T(P)/E16R/E16T(P)
### (Expansion output unit)
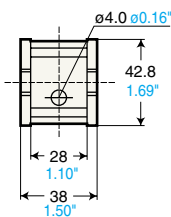### KV-E8X/R16X (Expansion I/O unit)
### KV-E4XR/E4XT(P) (Expansion I/O unit)

4-ø5.0 ø0.20"
(mounting hole)

Main unit
mounting hole*
(2 positions)

99   111
3.90" 4.37"

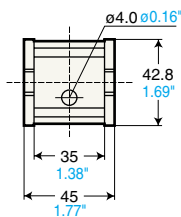25
0.98"

38
1.50"

t=2
t=0.08"

* Two M3.5 countersunk-head screws are
included for mounting the main unit.

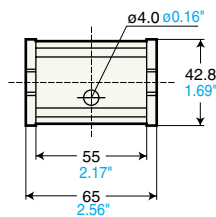### Expansion unit spacer

**OP-35342**
**Spacer for 4-point**
**expansion unit**

**OP-35343**
**Spacer for 8-point**
**expansion unit**

**OP-35344**
**Spacer for 16-point**
**expansion unit**

Side view

ø4.0 ø0.16"

42.8
1.69"

28
1.10"

38
1.50"

ø4.0 ø0.16"

42.8
1.69"

35
1.38"

45
1.77"

ø4.0 ø0.16"

42.8
1.69"

55
2.17"

65
2.56"

25.3
1.00"

66
2.60"

4
0.16"