ARTISAN®
TECHNOLOGY GROUP

Your **definitive** source for quality pre-owned equipment.

Artisan Technology Group
(217) 352-9330 | sales@artisantg.com | artisantg.com

Full-service, independent repair center
with experienced engineers and technicians on staff.

We buy your excess, underutilized, and idle equipment
along with credit for buybacks and trade-ins.

Custom engineering
so your equipment works exactly as you specify.

- Critical and expedited services
- In stock / Ready-to-ship
- Leasing / Rentals / Demos
- ITAR-certified secure asset solutions

Expert team | Trust guarantee | 100% satisfaction

All trademarks, brand names, and brands appearing herein are the property of their respective owners.

Find the *Mitsubishi Melsec K2NCPU* at our website: ***Click HERE***

MITSUBISHI

PROGRAMMABLE CONTROLLER

MELSEC-K

K2N

Instruction Manual

type MELSEC-K2N

66009A

IB (NA) 66009-A

MITSUBISHI ELECTRIC

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

CONTENTS

1. GENERAL DESCRIPTION ..... 3 ~ 4 — 1

2. EQUIPMENT ..... 5 ~ 10 — 2

2.1 List of Equipment 6
2.2 List of Peripheral Equipment 9

3. SYSTEM CONFIGURATION ..... 11 ~ 16 — 3

3.1 System Configuration 12
3.2 Allocation of I/O Numbers 13
3.3 Instruction on System Design 15

4. SPECIFICATIONS ..... 17 ~ 56 — 4

4.1 General Specifications 18
4.2 Performance Specifications 19
4.2.1 CPU performance specifications 19
4.2.2 Memory specifications 26
4.2.3 I/O unit specifications 27
4.2.4 Power supply unit specifications 53
4.2.5 Basic base unit specifications 55
4.2.6 Extension base unit specifications 55
4.2.7 Extension cable specifications 55
4.2.8 Lithium battery specifications 56
4.2.9 Fuse specifications 56
4.2.10 Dummy unit specifications 56

5. HANDLING ..... 57 ~ 80 — 5

5.1 Nomenclature and Explanation 58
5.2 Loading 66
5.2.1 Loading procedure 66
5.2.2 Memory loading and setting 67
5.2.3 Battery loading 68
5.2.4 Extension base unit number setting 68
5.2.5 Connection of extension cable 69
5.2.6 Unit mounting to panel 70
5.2.7 Wiring 71
5.2.8 Troubles and corrective actions for I/O circuits 74
5.3 Operation Procedures 77
5.3.1 Flowchart for trial run 77
5.3.2 Error list 79

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

6. MAINTENANCE AND INSPECTION ..... 81 ~ 92 **6**

6.1 Daily Inspection 82
6.2 Periodic Inspection 83
6.3 Troubleshooting 84
6.3.1 General troubleshooting flowchart 84
6.3.2 Flowchart used when "POWER" LED has turned off 85
6.3.3 Flowchart used when "RUN" LED has turned off 86
6.3.4 Flowchart used when "RUN" LED flickers 87
6.3.5 Flowchart used when output load of output unit does not turn on 88
6.3.6 Flowchart used when program cannot be written 89
6.4 Battery Change 90
6.4.1 Battery life 90
6.4.2 Battery changing procedure 91
6.5 Fuse Change 92

7. EXTERNAL DIMENTIONS ..... 93 ~ 100 **7**

7.1 K2NCPU Unit 94
7.2 I/O Units 95
7.3 Power Supply Unit 96
7.4 Basic Base Units 97
7.5 Extension Base Units 98
7.6 Dummy Unit 100

8. CAUTIONS FOR SPECIFICATIONS ..... 101 ~ 104 **8**

8.1 Watchdog Timer (WDT) 102
8.2 Accuracy of 10ms Timer 103
8.3 Maximum Counting Speed of Counter 104

9. HANDLING INSTRUCTIONS ..... 105 ~ 106 **9**

9.1 Main Unit 106
9.2 Memory 106
9.3 Battery 106

APPENDIX ..... 107 ~ 126 **10**

1. COMPATIBILITY OF K2 SERIES AND K2N SERIES 109
2. COMPARISON OF K2 AND K2N 117
3. PROCESS TIME 123

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

1. GENERAL DESCRIPTION

1. GENERAL DESCRIPTION. . . . . 3 ~ 4

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

1

1. GENERAL DESCRIPTION

Type MELSEC-K2N has been developed as a new model which replaces the conventional Type MELSEC-K1, K2, and K2(S1, S2, S3). The new model has been greatly improved in reliability and ease of operation, such as the increase of application instructions and the run display of all I/O units. The K2N is also equipped with new functions, such as a pause function which allows a temporary stop with an output state retained.

〈**Features**〉

1. The conventional I/O units, peripheral equipment (except some units), and special units (such as positioning unit and analog unit) can be used without modifications.
2. 14 types of application instructions are provided in addition to 18 types of sequence instructions and 8 types of data instructions.
3. For the operation speed of sequence instruction, 3.8 μs/step or 5.6 μs/step can be selected.
4. A pause function is available which permits a stop with an output state retained.
5. Since all I/O units are provided with LED displays, running conditions can be checked.
6. A photocoupler insulation system has been applied to all I/O units to improve reliability against noise.
7. All external connection methods for 16-point and 32-point I/O units use a terminal block connector to improve operability.
8. The addition of AC input and relay output units for 32 points allows a system to be compact and extremely low-priced.

Cautions for Handling

1. 3.8 μs/step or 5.6 μs/step can be selected for sequence instruction execution time. For a system which consists of only I/O units having type names with "N" at the end and K1, K2 series output units, either 3.8 μs/step or 5.6 μs/step can be used. For a system which utilizes other units (K1, K2 series input units and special units), be sure to set the sequence instruction operation time to 5.6 μs/step.
2. When the external failure number device "F" is used, be sure to load only an input unit into the slot 0 of basic unit. Otherwise, the system will malfunction.
3. When a special unit is used for a system which employs the extension base unit K55BN or K58BN, be sure to load the special unit into the extension base unit which requires a basic base unit or a power supply unit.
4. For the compatibility of various type units and base units of K1 and K2 series and those of K2N series, see the "APPENDIX" of this instruction manual.
5. Before proceeding to installation and operation according to this instruction manual, be sure to read Section 9 "HANDLING INSTRUCTIONS" of this manual.

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

2. EQUIPMENT

2. EQUIPMENT ..... 5 ~ 10

2.1 List of Equipment. 6
2.2 List of Peripheral Equipment 9

Artisan Technology Group - Quality Instrumentation. Guaranteed | (888) 88-SOURCE | www.artisantg.com

2. EQUIPMENT

2.1 List of Equipment

2

Name		Type	Remarks				
CPU unit		K2NCPU	4096 steps, I/O: 512 points M: 250 points, T, C: 128 points, D: 96 points				
Base unit	Master Basic base unit	K12BN	2 I/O units can be loaded				
		K15BN	5 I/O units can be loaded				
		K18BN	8 I/O units can be loaded				
	Extension bese unit	K65BN	5 I/O units can be loaded				
		K68BN	8 I/O units can be loaded				
		K55BN	5 I/O units can be loaded, power supply unit is not required				
		K58BN	8 I/O units can be loaded, power supply unit is not required				
Memory	EP-ROM	2KROM	For 2 K steps				Select required memory and load it into socket.
		4KROM	For 4 K steps				
	IC-RAM	KORAM	For 1 K step				
		4KRAM	For 4 K steps				
Power supply unit		K61PN	Input	100V AC	Output	5VDC 4A	Select 1 unit per base unit and load it into power supply unit position.
		K62PN	Input	100V AC	Output	5VDC 4A, 24VDC 2A	
		K63P	Input	24V DC	Output	5VDC 6A	
		K64PN	Input	100V AC	Output	5VDC 15A	
		K65PN	Input	100VAC	Output	5VDC 10A, 24VDC 1A	
Extention cable		K61CBLN	Length 500 mm				Connection between base units 1 cable per extension base unit.
		K67CBLN	Length 900 mm				
		K76CBLN	Length 2000 mm				
		K77CBLN	Length 3000 mm				
Input unit		KX10N	16 points	100VAC input unit			
		KX11N	32 points	100VAC input unit			
		KX20N	16 points	200VAC input unit			
		KX21N	32 points	220VAC input unit			
		KX40N	16 points	12/24VDC input unit			
		KX41N	32 points	12/24VDC input unit			
		KX42N	64 points	12/24VDC input unit			
		KX71N	32 points	input unit for sensor			
		KX80	16 points	12/24VDC input unit			
		KX80E	16 points	12/24VDC input unit			
		KX81L	32 points	12/24VDC input unit			

Assumed 8 SLOT RACK

Table 2.1 List of Equipment

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

Name		Type	Remarks
Output unit		KY10N	16 points relay contact output unit
		KY11N	16 points relay contact output unit with noise suppression
		KY13N	32 points relay contact output unit
		KY13SN	32 points relay contact output unit with noise suppression
		KY22N	16 points triac output unit (for 2A)
		KY23N	32 points triac output unit (for 1A)
		KY40N	16 points 12/24VDC transistor output unit (for 0.1A)
		KY41N	32 points 12/24VDC transistor output unit (for 0.1A)
		KY42N	64 points 12/24VDC transistor output unit (for 0.1A)
		KY51N	32 points 24VDC transistor output unit (for 0.5A)
		KY60N	16 points 12/24/48VDC transistor output unit (for 0.2A)
		KY71N	32 points TTL, COMS (5/12VDC) output unit
		KY60E	16 points 24VDC transistor output unit (for 2A)
		KY80	16 points 24VDC transistor output unit (for 0.5A)
		KY81L	32 points 24VDC transistor output unit (for 0.5A)
Special unit	External failure monitor unit	KN61	External failure number is diaplyed in decimal 2 digits at inside of unit.
		KN62	External failure number is displayed in decimal 3 digits at outside of unit.
	Analog timer unit	KT61	16 points analog timer: 0.3 ~ 3 seconds, 3 ~ 30 seconds
	Positioning unit	KD71N	Pulse train output, 2 axes (independent 2 axes, simultaneous 2 axes — linear interpolation possible)
		KD71NS1	Dedicated to MELDAS-S1, pulse train output, 2 axes (independent 2 axes, simultaneous 2 axes — linear interpolation possible)
	Teaching unit for positioning	KD71TU (KD71TUE)	Read, write, position display, monitor, and test of 400-point position data
	High speed counter unit	KD61	BCD 4 digit reversible counter, 20KHz, with comparator, 1/2 phase input
	A/D converter unit	KA62A	0 ~ ±20mA/0 ~ ±10V analog input, 11 bits, 4 channels are contained
	D/A converter unit	KA63A	4 ~ 20mA/0 ~ ±10V analog output, 11 bits, 2 channels are contained
	Insulation amplifier unit	KA64	Insulation amplifier for KA62A and 63A, 2 channels are coktained
	PID programmer	KD81	0 ~ 5VDC/4 ~ 20mA analog input/output, 4 channels are contained in input and output, respectively; digital output 2 channels; counter, 4 channels are contained.
	PID control unit	KD81HP	Programming unit with liquid crystal display, write read, monitor, and test of KD81 program.
	Intelligent com-mnication unit	KD51 (KD51E)	Memory 64 K bytes, multi-task (8 tasks), with RS-232C (3 channels) and RS-422 (1 channel)

Table 2.1 List of Equipment

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

Name			Type	Remarks
Special unit	Serial data link unit	Master data link unit	KJ71L2	Link unit for master side of serial data link system
		Local data link unit	KJ71L3 KJ71P3*	Link unit used when programmable controller is used as local channel
		Computer link unit	KJ71L7	Link unit for link with computer
		Remove data link unit	KJ72L5 KJ72P5*	Link unit used for I/O unit of remote I/O system
Dummy unit			KG62N	Changeover selection of 16, 32, or 64 points is possible.
Blank cover			KG62	Blank cover for area where I/O unit is not loaded.
Miscellaneous	Battery		K6BAT	For IC-RAM backup and power failure latch
	Fuse	For power supply	MF60NR-5A-05	Encased in glass tube, 5A, loaded into base unit
		For KY22N, 23N, 60N	MP50	Plug type, 5A
		For KY51N	MP20	Plug type, 2A

*KJ71P3 and KJ72P5 are used for optical data link system with optical fiber cables.

Table 2.1 List of Equipment

Note: The latch unit Type KL61 cannot be used.

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

2.2 List of Peripheral Equipment

Unit	Description	Type	Remarks
Programming with CRT	Graphic programming panel GPP	K8GPP (K8GPPE)	Used together with K6GPF and K63CBL.
	GPP interface unit	K6GPF (K6GPFE)	Interface used for connection of main unit CPU and GPP or K6PSB.
	Cable	K63CBL	Cable for connection of K6GPF and GPP, length 3 m
Support base	Peripheral equipment support base	K6PSB	Two peripheral units can be loaded, used together with K6GPF and K63CBL.
Programming unit	Programming unit	K7PU* (K7PUE)	Program I/O unit loaded into main unit CPU or K6PSB
P-ROM writer	P-ROM writer unit	K6WU (K6WUE)	Loaded into main unit CPU, GPP, or K6PSB, for 2KROM
Audio cassette	Audio cassette interface	K6MTF (K6MTFE)	Interface for commercially available audio cassette, with dedicated cable.
Data cassette	Data cassette interface	K7MTF (K7MTFE)	Interface for main unit CPU, GPP, or K6PSB and K7MT
	Data cassette	K7MT (K7MTE)	Data cassette for industrial use. Tape for this unit is CT-300 by TEAC and is commercially available.
	Cable	K63CBL	Cable for connection of K7MT and K7MTF.
Printer	Printer	K6PR (K6PRE)	For circuit diagram of program and hard copy of list, used together with K6PRF and K65CBL.
	Printer interface unit	K6PRF (K7PRFE)	Interface for K6PR and main unit, GPP, or K6PSB.
	Cable	K65CBL	Cable used for connection of K6PR and K6PRF, length 3 m.
	Printer paper	K6PR-Y	9-inch paper, available in units of 2000 sheets.
	Ink ribbon for K6PR	K6PR-R	Replacement ink ribbon
Handy recorder	Handy recorder	K6PRT	Equipped with P-ROM writer, printer interface, and audio cassette interface functions (provided with K70CBL).
	HGP interface unit	K6HGPF (K6HGPFE)	Interface for connection of main unit CPU and K6PRT or K6HGP
	Cable	K70CBL	Cable used for connection of K6HGP or K6PRT and K6GHPF, length 2 m.
Handy graphic programmer	Handy graphic programmer	K6HGP (K6HGPE)	Handy graphic programming unit with LCD (provided with K70CBL).
	Cable	PCX-K11-1 K70CBL	Cable used for connection of K6HGP or K6PRT and K6HGPF, length 2 m.
	HGP interface unit	K6HGPF (K6HGPFE)	Interface for connection of main unit CPU and K6PRT or K6HGP
ER	P-ROM eraser	K6ER	Ultraviolet eraser for 2KROM and 4KROM.
External failure monitor	External failure number display unit	K6FD	Failure numbers 100 ~ 999 can be displayed.
Switch	Switch unit	K6SW	16-point unit for simulation input.

*Use the K7PU (K7PUE) with care referring to the CAUTION described in page 23.

Table 2.2 Peripheral Equipment

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

MEMO

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

3. SYSTEM CONFIGURATION

3. SYSTEM CONFIGURATION . . . . . 11 ~ 16

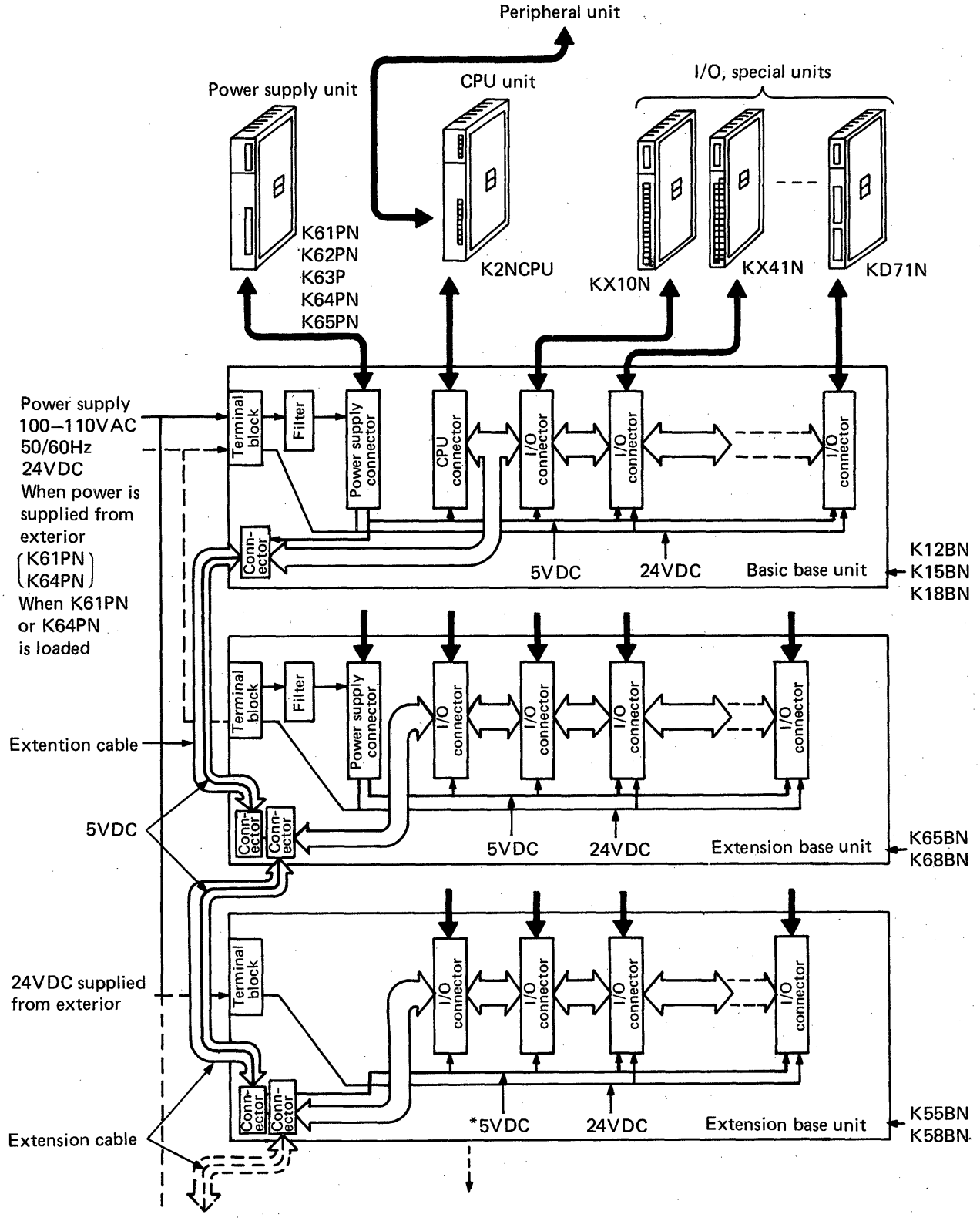
3.1 System Configuration 12
3.2 Allocation of I/O Numbers 13
3.3 Instruction on System Design 15

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

3. SYSTEM CONFIGURATION

3.1 System Configuration

The hardware of K2N consists of the units shown below.



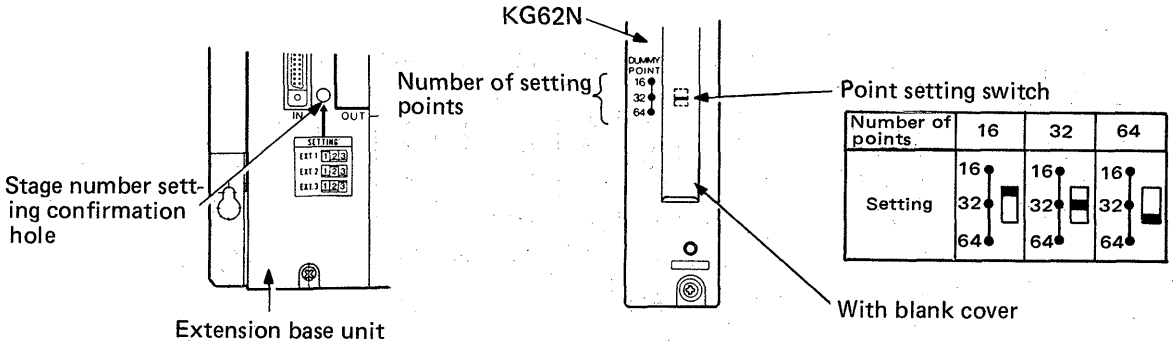
*5VDC of K55BN or K58BN is supplied by the basic base unit.

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

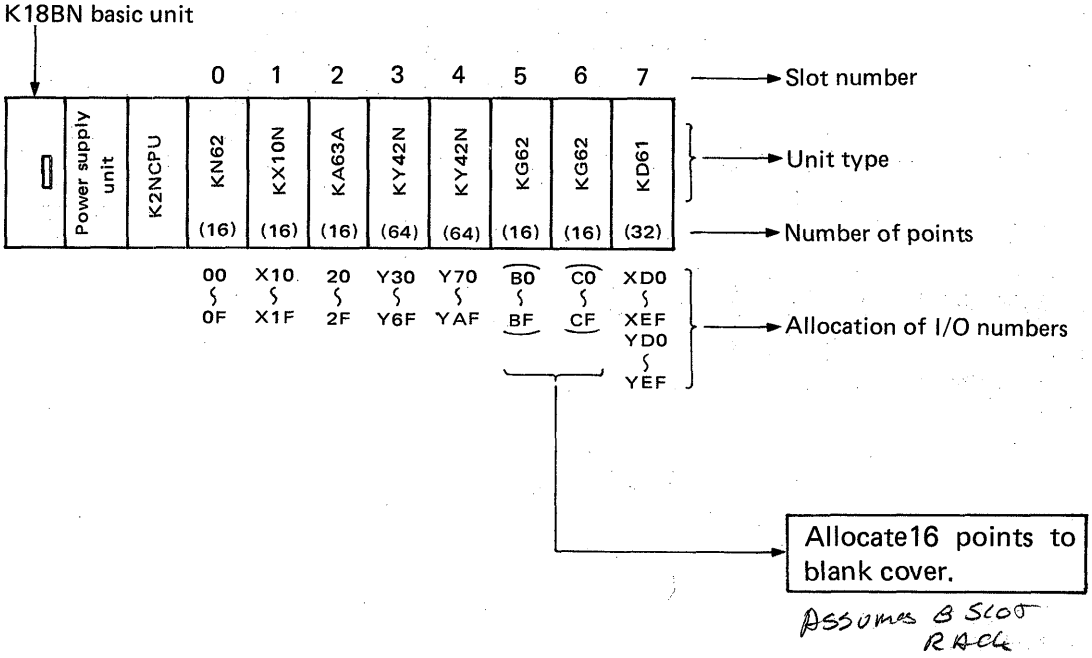
3.2 Allocation of I/O Numbers

(1) Basis of allocation

- All 8 slots of base unit are exclusively used.
- The I/O numbers of extension base unit are allotted in order of stage number setting switch numbers of base unit. (See the figure shown at left below.)
- For an empty slot, 16 points are exclusively used.
- When the blank cover KG62 is used, 16 points are exclusively used automatically.
- When the dummy unit KG62N is used, the number of set points are exclusively used. (See the figure shown at right below.)



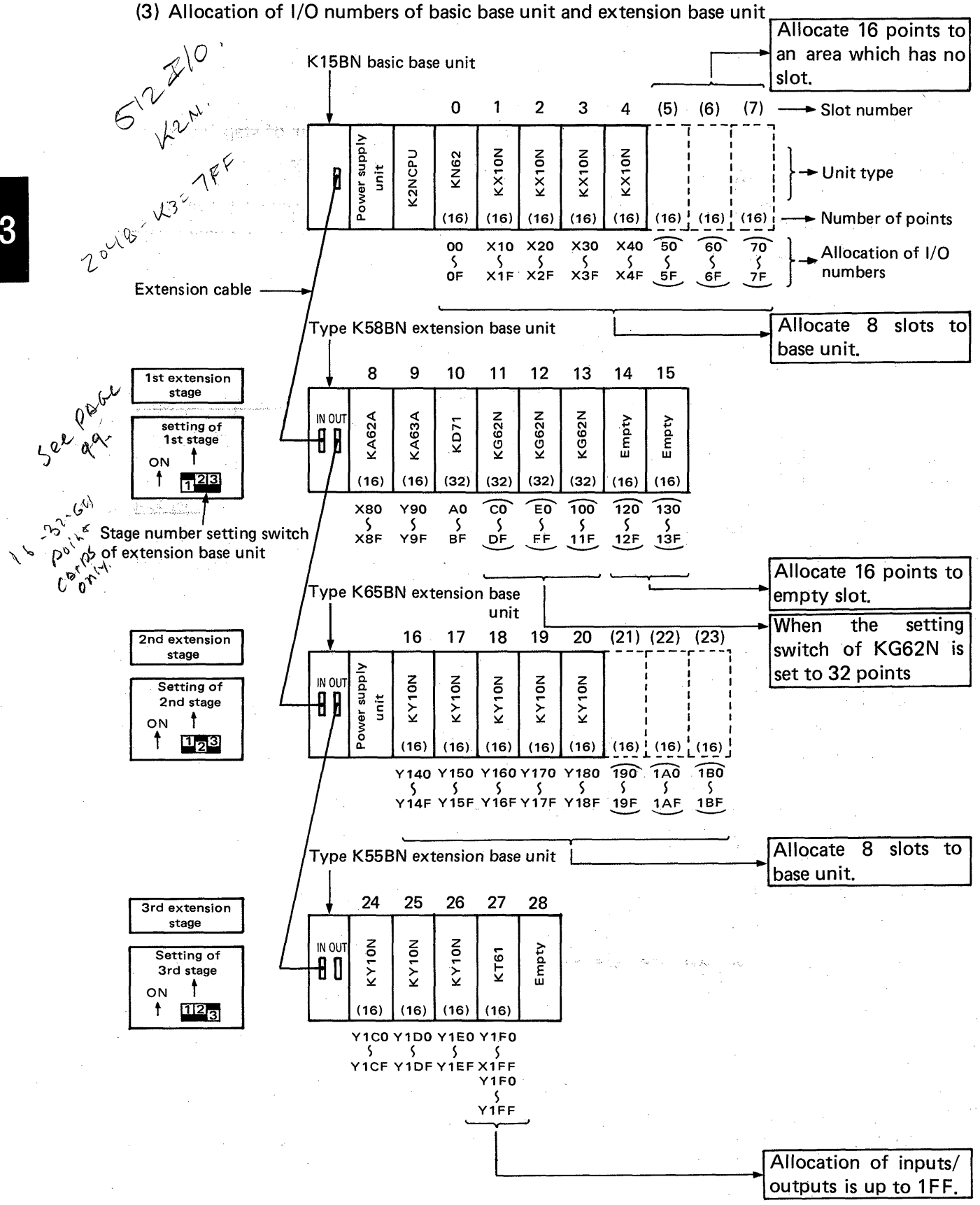
(2) Allocation of I/O numbers of basic base unit



Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

3

(3) Allocation of I/O numbers of basic base unit and extension base unit



Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

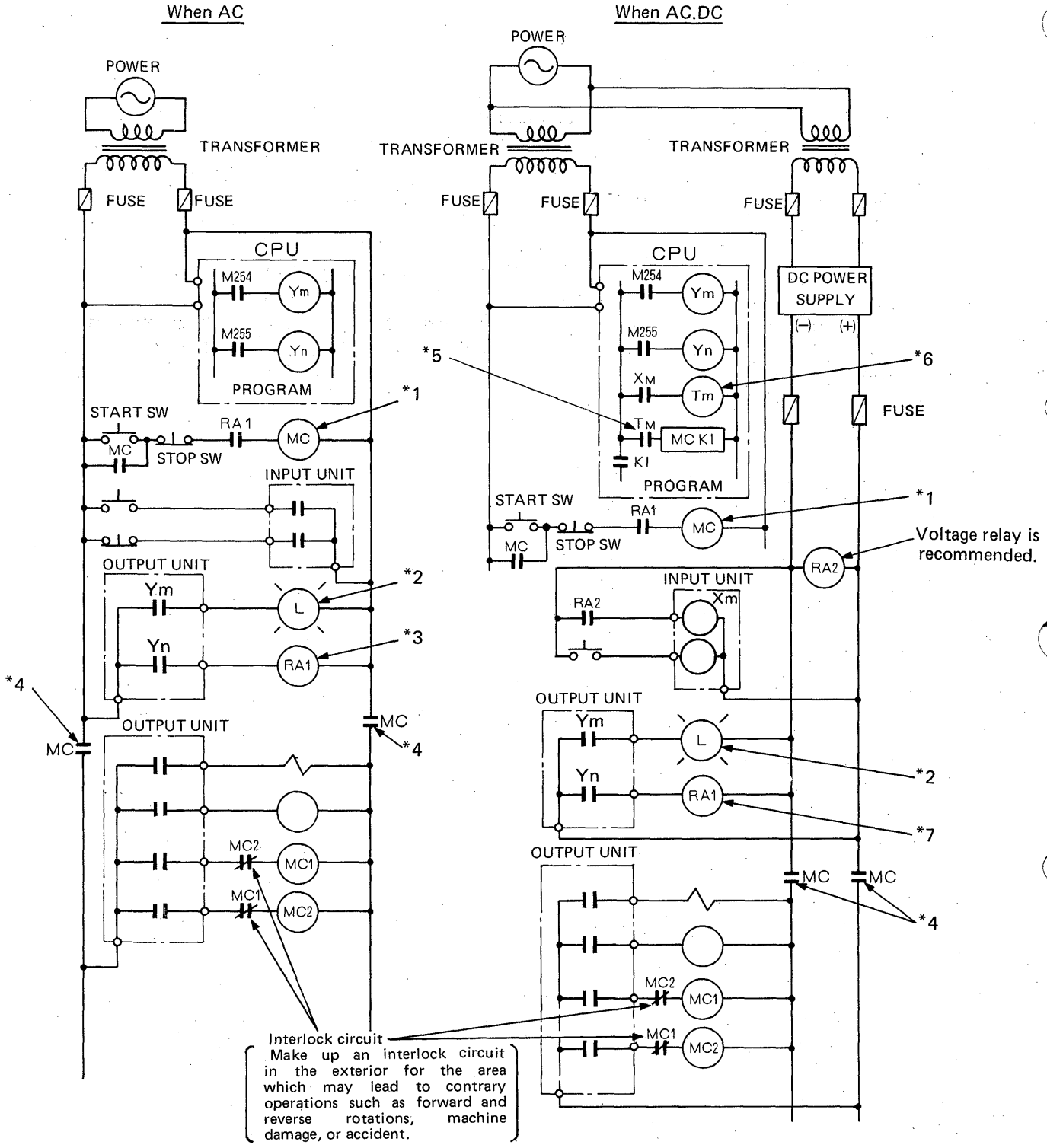
3.3 Instruction on System Design

Use the control system, which utilizes the programmable controller, with special care to the following points:

When the power of system is turned on or off, process output may not temporarily perform normal operation due to the difference between the delay time and rise time of the power supply of programmable controller main unit and the external power supply (especially DC) for process. Also, at the time of error of external power supply or failure of programmable controller main unit, output process may possibly make erroneous operation.

In order to prevent the aforementioned erroneous operations from resulting in the erroneous run of the entire system and also from fail safe aspect, constitute circuits (such as emergency stop circuit, protection circuit, and interlock circuit), which may result in machine damage or accident due to erroneous operation, in the exterior of the programmable controller.

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com



*1: *Run/stop circuit (run can be made when RA1, run output of programmable controller, turns on)*
*2: *Alarm indicator (lamp or buzzer)*
*3: *On when run by M255*
*4: *Power of output equipment is turned off when stopped. (At the time of emergency stop or stop due to operation of limit switch)*
*5: *DC power supply establishment symbol input*
*6: *Set timer at the interval of time to when DC POWER SUPPLY is established. (Set a value to approx. 0.5 seconds.)*
*7: *On when run by M255*

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

4. SPECIFICATIONS

4. SPECIFICATIONS . . . . . 17 ~ 56

4.1 General Specifications 18
4.2 Performance Specifications 19
4.2.1 CPU performance specifications 19
4.2.2 Memory specifications 26
4.2.3 I/O unit specifications 27
4.2.4 Power supply unit specifications 53
4.2.5 Basic base unit specifications 55
4.2.6 Extension base unit specifications 55
4.2.7 Extension cable specifications 55
4.2.8 Lithium battery specifications 56
4.2.9 Fuse specifications 56
4.2.10 Dummy unit specifications 56

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

4. SPECIFICATIONS

4.1 General Specifications

Item	Specifications
Line voltage	100—110VAC, single phase, 50/60Hz ± 2Hz
Line voltage fluctuation range	85 ~ 121VAC
Operating ambient temperature	0 ~ 55°C
Storage ambient temperature	−10 ~ 75°C
Operating ambient humidity	10 ~ 90%RH, no dew condensation
Storage ambient humidity	10 ~ 90%RH, no dew condensation
Vibration resistance	Conforms to Class 3, IIB, JIS C 0911 (16.7 Hz, 3 mm double amplitude, 2 hours)
Shock resistance	Conforms to JIS C 0912 (10 g x 3 times in 3 directions)
Dielectric withstand voltage	1500VAC for 1 minute across batch of AC external terminals and case
Noise resistance	1000 Vpp noise voltage, 1μs noise width and 25 ~ 60Hz noise frequency by noise simulator
Insulation resistance	5 MΩ or larger by 500VDC insulation resistance tester across batch of AC external terminals and case
Grounding	Class 3 grounding; grounding is not required when it is impossible.
Operating ambience	To be free from corrosive gases. Dust should be minimal.
Cooling method	Self-cooling
Mounting screw tightening torque	17 kg·cm (M4 x 0.7 screws)

Table 4.1 General Specifications

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

4.2 Performance Specifications

4.2.1 CPU performance specifications

(1) Performance specifications

Item		Specifications
Control method		Stored program, repeated operation
I/O control method		Direct system (Input and output are made each time during repeated operation.)
Programming language		Dedicated language to sequence control (relay symbol type, used together with logic symbolic language)
Instruction	Sequence instruction	18 types
	Data instruction	8 types
	Application instruction	14 types
	Word length	16 bits (2 bytes)/step (1-, 2-, 3-step instruction)
Sequence instruction execution time		3.8μs/step (FAST), 5.6μs/step (SLOW); SLOW or FAST is selected by setting pin.
Data instruction execution time		Maximum 1180μs/instruction (3 steps); for details, see APPENDIX Section 4 "PROCESS TIME".
Program capacity and memory		IC-RAM / EP-ROM: 1024 steps — K0RAM / —; 2048 steps — — / 2KROM; 4096 steps — 4KRAM / 4KROM. • Select required memory and load it into socket. • RAM is backed up by lithium battery.
Number of I/O points		Total of inputs/output: maximum 512 points
Number of temporary memories		250 points (M0 ~ M249); for application of M250 ~ M255, see page 21.
Timer counter	Number of points	128 points (T,C0 ~ 127 including timers and counters)
	Timer specification	T0 ~ T95: 0.1 ~ 999.9 sec. setup time, 0.1 sec. setup time increments, accuracy ± scan time T96 ~ T127: 0.01 ~ 99.99 sec. setup time, 0.01 sec. setup time increments, accuracy ± scan time
	Counter specifications	1 ~ 9999 setting range, maximum counting speed of 10 ~ 20 pulses/sec. (at 1 K step)
Shift register	Number of usable points	249 bits (M1 ~ M249) excluding those used for temporary memory.
	Specifications	With temporary memory in units of 1 bit combined, up to 253 bits are possible (data shift is also possible).
Data register	Specifications	96 points (D0 ~ 95), 16 bits for 1 data, maximum of 4 digits can be handled in units of 4 bits.
	Data input/output	Four I/O points make up 1 digit. Usable jointly with process input/output. Decimal 1 ~ 4 digits in the range of 0 ~ 9999.

Power failure latch range

Rotary SW No. / LATCH SW	(*1) OFF	0 ON	1 ON	2 ON	3 ON	4 ON	5 ON	6 ON	7 ON	8 ON	9 ON	A ON	B ON	C ON
Temporary memory	None	None	M224 ~M249	M192 ~M249	M160 ~M249	M128 ~M249	M96 ~M249	M64 ~M249	M32 ~M249	M0 ~M249	None	None	None	None
Timer, counter	None	None	T·C84~95 T·C124~127	T·C72~95 T·C120~127	T·C60~95 T·C116~127	T·C48~95 T·C112~127	T·C36~95 T·C108~127	T·C24~95 T·C104~127	T·C12~95 T·C100~127	T·C0~95 T·C96~127	None	None	None	None
Data register	None	None	D84 ~D95	D72 ~D95	D60 ~D95	D48 ~D95	D36 ~D95	D24 ~D96	D12 ~D95	D0 ~D95	D36 ~D95	D24 ~D95	D12 ~D95	D0 ~D95

Allowable instantaneous	20ms. Initial start in case of 20ms or longer period
Power-on, restart after power failure	Automatic restart by turning on "RUN" switch
IC-RAM backup	Lithium battery (guaranteed service life of 5 years), total power failure guarantee period of 300 days
Self-diagnostic function	Watchdog timer error detection (170ms watchdog timer), error machine code, power supply error detection, RUN signal output by program from exterior, with overcurrent and overvoltage protection

Table 4.2 Performance Specifications

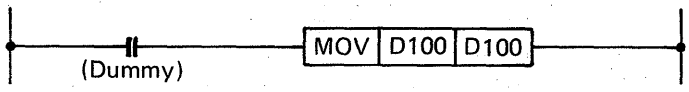
Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

Item		Specifications
Function	Microcomputer mode	Operation is possible by joint use of programmable controller and microcomputer programs, microprocessor is 8085A-2 (clock: 10MHz)
	Serial data link	Remove I/O system and local programmable controller system are possible.
	Computer link	Monitor control by RS-232C is possible.
	Pause	Stop of programmable controller is possible with output state held.
Weight (kg)		0.7

CAUTION

1. *1 located at the contents of power failure latch range indicates that any rotary switch number may be set.

2. The rotary switch number can be monitored by the data register D100. However, since the number is monitored in decimal, note that the rotary switch number "A" is monitored as "10", "B" as "11", and "C" as "12".
   When GPP is used for monitoring, insert the following circuit in the sequence circuit and monitor D100. Then, rotary switch number can be monitored.



3. The sequence instruction execution time can be set to 3.8 μs/step (FAST position) or 5.6 μs/step (SLOW position) by the setting of connector (CON8, CON9) pins.
   For a system which consists of only I/O units having type name with "N" at the end and K1, K2 series output units, either 3.8 μs/step or 5.6 μs/step can be used. For a system which uses other units (K1, K2 series input units and all special units), be sure to set to the 5.6 μs/step position (CON8).

4. Data can processed up to FFFF (hexadecimal) in BIN code.

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

(2) Device list

	Device	Description	Number	Number of Points	Remarks
1	X	Input	X, Y000 ~ 1FF	512 points	Numbers are expressed in hexadecimal notation (0 ~ 9, A ~ F).
2	Y	Output			
3	M	Temporary	M0 ~ 249	250 points	Dummy contacts — Internal only.
		Special temporary memory	M250 ~ 255	6 points	M250, 251: For data link M252, 253: For pause function M254: Turns on when battery voltage reduces. M255: Output of self-diagnostic results. Turns on during run. Turns off at stop and power-off.
4	T	Timer	0 ~ 127 for both T and C	Total 128 points for T and C	• T and C are numbered in series like T0, T1, C2, T3, C4 . . . . • T and C set values can be specified for constant Kn (1 ~ 9999) and data register Dn (0 ~ 95). Both are entered into the next step number of OUT instruction. • T0 ~ 95 (96 points) are 100ms timers. T96 ~ 127 (32 points) are 10ms timers.
5	C	Counter			
6	F	External failure memory	F0 ~ 99	100 points	For external failure display
		Function number	F100 ~ 127	28 points	Application instruction
7	D	Data register	D0 ~ 95	96 points	
		Special register	D100 ~ 127	28 points	Special register, register for data link
8	K	Constant	K0 ~ 9999	–	Numeric constant: 0 ~ 9999 Master control: 0 ~ 63 Digit designation: 1 ~ 4 Jump destination step number: 0 ~ 4095

Table 4.3 Device List

CAUTION

When the number of temporary memories "M" is insufficient, unused "Y" (output) can be employed as a temporary memory (M). The range of usable "Y" is as follows:

- "Y" having a reverse number of loaded input unit is used as a temporary memory.
- "Y" located at an "empty" slot position, where I/O unit is not loaded, is used as a temporary memory (up to 1FF).

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

(3) Instruction list

No.	Instruction Symbol (Name)	Function	Drawing Representation	No.	Instruction Symbol (Name)	Function	Drawing Representation
1	LD Load	Logic operation start (Contact a operation start)	X.Y.M.T.C.F	10	MC Master control	Master control start	MC Kn Kn n=0~63
2	LDI Load inverse	NOT logic operation start (Contact b operation start)	X.Y.M.T.C.F	11	MCR Master control reset	Master control reset	MCR Kn n=0~63
3	AND AND	Logical product Contact a series connection	X.Y.M.T.C.F	12	SET Set	Set of Y, M, F	SET Y.M.F
4	ANI AND inverse	Logic NAND (Contact b series connection)	X.Y.M.T.C.F	13	RST Reset	Reset of Y, M, F Reset of counter temporary value	RST Y.M F.C
5	OR OR	Logical add (Contact a parallel connection)	X.Y.M.T.C.F	14	SFT Shift	1-bit shift of temporary value	SFT M
6	ORI OR inverse	Logic NOR (Contact b parallel connection)	X.Y.M.T.C.F	15	CJ Conditional jump	Conditional jump (Jump to latter step number when input signal is on)	CJ K Jump destination number
7	ANB AND block	Logic block AND (Series connection between blocks)		16	PLS Pulse	Pulse (Pulses for 1 cycle of program is generated at rise of input signal)	PLS M
8	ORB OR block	Logic block OR (Parallel connection between blocks)		17	NOP NOP	No operation	For program delete or space
9	OUT OUT	Coil output (Y, M) Timer output (T) Counter output (C) Function No. output (F)	*1 Y.M.T.C.F	18	END END	Program end	Return to step 0 Be sure to enter END at the end of program.

Table 4.4 Sequence Instruction List

*Note: *1: T and C set values can be specified for constant K and data register D.*
**2: OUT T, C and CJ are 2-word instructions. All others are 1-word instructions.*

No.	Instruction Symbol (Name)	Function	Drawing Representation	No.	Instruction Symbol (Name)	Function	Drawing Representation
1	MOV Move	Data transfer S→D	*5 *1 *2 MOV S D	5	+ Plus	Addition *4 D+S→D	*5 *1 *2 + S D
2	>= Larger	Magnitude comparison S>D	*5 *6 *1 *2 >= S D Y.M.T.C.F	6	− Minus	Subtraction *4 D−S→D	*5 *1 *2 − S D
3	< Smaller	Magnitude comparison S<D	*5 *6 *1 *2 < S D Y.M.T.C.F	7	BCD BCD	BIN→BCD conversion S→BCD conversion →D	*5 *1 *2 BCD S D
4	= Equal	Coincidence S=D	*5 *6 *1 *2 = S D Y.M.T.C.F	8	BIN Binary	BCD→BIN conversion S→BIN conversion →D	*5 *1 *2 BIN S D

Table 4.5 Data Instructions

*Note: *1: S stands for source.*
**2: D stands for destination.*
**3: All data instructions are 3-word instructions.*
**4: Negative numbers are not handled.*
**5: Instruction data operation is initiated when input signal is on.*
**6: These instructions are used for series contact a, while others are for coils.*

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

MOV BCD BIN +, −

S \ D	K	D	T	C	X	Y	M
K		○	○	○		○	○
D		○	○	○		○	○
T		○	○	○		○	○
C		○	○	○		○	○
X		○	○	○		○	○
Y		○	○	○		○	○
M		○	○	○		○	○

>,<,=

S \ D	K	D	T	C	X	Y	M
K	○	○	○	○	○	○	○
D	○	○	○	○	○	○	○
T	○	○	○	○	○	○	○
C	○	○	○	○	○	○	○
X	○	○	○	○	○	○	○
Y	○	○	○	○	○	○	○
M	○	○	○	○	○	○	○

MOV	Km	Dn	Constant set : constant Km (0 ~ 9999) is set to Dn.
MOV	Dm	Dn	Transfer : Content of Dm is transferred to Dn.
MOV	Dm	T,Cn	Change of T, C temporary value : Content of Dm is written into T, C temporary value.
MOV	Dm	KnY,M	Batch output : Dm content is output in blocks in units of 4 points up to 16 points.
MOV	T,Cm	Dn	Read of T, C temporary value : T, C temporary value is transferred to Dn.
MOV	KmX,M	Dn	Batch input : X, M content is inputted to Dn in blocks in units of 4 points up to 16 points.
MOV	Km	KnY	Pattern output to Y : Bit pattern is output to Y in blocks in units of 4 points up to 16 points.
MOV	KmX	KnM	Batch input of X to M : X is inputted to M in blocks in units of 4 points up to 16 points.
MOV	KmY	Dn	Output pattern save of Y : Y is transferred to Dn in units of 4 points up to 16 points.
BCD	Dm	Dn	Binary data of data register is converted into BCD.
BCD	T,Cm	Dn	T, C temporary value is read and converted into BCD.
BIN	Dm	Dn	BCD data of data register is converted into binary.
BIN	KmX	Dn	BCD data of input is converted into binary and inputted in blocks.
BCD	T,Cm	KnY	T, C temporary value (binary) is converted into BCD and output directly to Y.
BCD	Dm	KnY	Binary data of Dm is converted into BCD and output directly to Y.
+	Km	Dn	Constant addition : Km (0 ~ 9999) + Dn content is done and the result is stored into Dn.
+	Dm	Dn	Addition : Dn content + Dm content is done and the result is stored into Dn.
−	Km	Dn	Constant subtraction : Dn content − Km (0 ~ 9999) is done and the result is stored into Dn.
−	Dm	Dn	Subtraction : Dn content − Dm content is done and the result is stored into Dn.
>	Dm	Dn	Magnitude comparison : Dm content > Dn content is judged.
<	Km	Dn	Magnitude comparison : Constant Km (0 ~ 9999) < Dn content is judged.
=	Dm	Dn	Coincidence judgement : Dm content = Dn content is judged.
>,<,=	Km	T,Cn	Direct comparison of T, C temporary value and reference value (Km).
>,<,=	Km	KnY	Comparison of output pattern and reference pattern (Km).

Table 4.6 S, D Instruction List of Data Instructions

CAUTION

Note that when programming is performed by use of K6GPP (K6GPPE), K7GPP (K7GPPE), K6PU (K6PUE) or K7PU (K7PUE) (unit having a legend plate which does not indicate "DATE" as shown below), only the S and D combinations of programmable data instructions shown in the following tables can be used.

[DATE indicating] □□□ K3 □

→ Version No.

→ Manufacturing date

MOV

S \ D	K	D	T	C	X	Y	M
K		○					
D		○	○	○		○	○
T		○					
C		○					
X		○					
Y							
M		○					

>,<,=,+,−

D	K	D	T	C	X	Y	M
K		○					
D		○					
T							
C							
X							
Y							
M							

BCD(○)
BIN(•)

S \ D	K	D	T	C	X	Y	M
K							
D		○, •					
T		○					
C		○					
X		•					
Y							
M							

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

Same result Before Resetting

Instruction	Function	Content of Operation
OUT F108	4 ↔ 16 bit decode/ encode	Decoded/ encoded data: D110 (□) — Decode/ encode setting: D111 (000 *) → Result of decode/ encode: D112 (□). *0 = decode 1 = encode
OUT F109	16 bit check	Data to be checked: D110 (□) → Number of bits of "1": D111 (□). Number of bits of "1" in (D110) is checked and its numeral is stored into (D111).
OUT F110	6-digit BCD addition	Augend: Upper 2 digits D111 (00), Lower 4 digits D110 (□) + Addend: Upper 2 digits D113 (00), Lower 4 digits D112 (□) = Result of addition: Upper 3 digits D115 (0), Lower 4 digits D114 (□)
OUT F111	6-digit BCD subtraction	Minuend: Upper 2 digits D111 (00), Lower 4 digits D110 (□) − Subtrahend: Upper 2 digits D113 (00), Lower 4 digits D112 (□) = Result of subtraction: Upper 2 digits D115 (*), Lower 4 digits D114 (□). *00 = + 10 = −
OUT F112	6-digit BCD multiplication	Multiplicand: Upper 2 digits D111 (00), Lower 4 digits D110 (□) × Multiplier: Upper 2 digits D113 (00), Lower 4 digits D112 (□) = Result of multiplication: Upper 4 digits D116 (□), Middle 4 digits D115 (□), Lower 4 digits D114 (□)
OUT F113	6-digit BCD division	Dividend: Upper 2 digits D111 (00), Lower 4 digits D110 (□) ÷ Divisor: Upper 2 digits D113 (00), Lower 4 digits D112 (□) = Result of division: Upper 2 digits D115 (00), Lower 4 digits D114 (□) (Quotient); Upper 1 digit D117 (000), Lower 4 digits D116 (□) (Remainder)
OUT F114	Batch shift of temporary memory M	Starting number of M: D110 (0) — Number of Ms to be shifted: D111 (0) — Setting of shift direction: D112 (000 *). *0 = leftward shift 1 = rightward shift. Starting number of M is placed in (D110) and Ds in (D111) are shifted once.

Table 4.7 Application Instruction List

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

Instruction	Function	Content of Operation
OUT F115	Batch shift of data register D	Starting number of D: 00 (D110); Number of Ds to be shifted: 00 (D111); Setting of shift direction: 000 * (D112) *0 = leftward shift 1 = rightward shift Starting number of D is placed in (D110) and Ds in (D111) are shifted once.
OUT F116	Batch reset of data register D	Starting number of D: 00 (D110); Number of Ds to be reset: 00 (D111) Starting number of D is placed in (D110) and Ds in (D111) are reset.
OUT F117	Indirect read of T, C, D	T, C, D number 3 digits: * (D110) → Result of read (D111) *0 = T·C 1 = D
OUT F118	Indirect write of T, C, D	T, C, D number 3 digits: * (D110) → Result of write (D111) *0 = T·C 1 = D
OUT F119	Y → D data transfer	Number of digits of Y and starting number Number of digits / Starting number (D110) → Number of D at transfer destination: 1 (D111) Batch transfer from output Y to data register D in units of 4 points up to 16 points
OUT F126	Read from KD71	See "Application Instructions and Usages instruction manual.
OUT F127	Write to KD71	See "Application Instructions and Usages instruction manual.

Table 4.7 Application Instruction List

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

4.2.2 Memory specifications

	RAM		ROM	
Type	K0RAM	4KRAM	2KROM	4KROM
Capacity	1024 steps	4096 steps	2048 steps	4096 steps
Construction	24-pin IC package	28-pin IC package	24-pin IC package	28-pin IC package
Remarks	—	—	ROM writer K6WU K6PRT	ROM writer K6PRT

Table 4.8 Memory Sepcifications

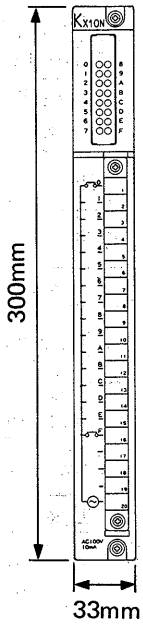
Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

4.2.3 I/O unit specifications

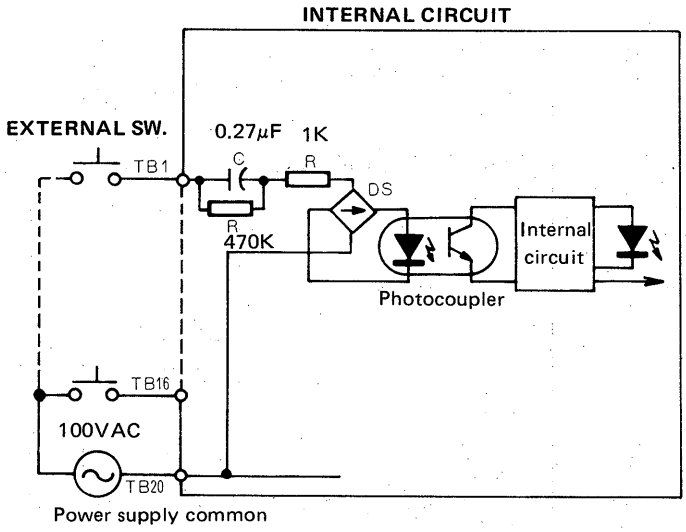
P-27 to 37
Lower most Inputs.

(1) Type KX10N input unit

AC Input Unit

Specifications \ Type		KX10N	Front View
Input points		16 points	
Insulation system		Photocoupler	
Rated input voltage		100–120VAC 50/60Hz	
Rated input current		10mA (100VAC 60Hz)	
Operating voltage range		85 ~ 132VAC (50/60Hz±5%)	
Max. simultaneous ON points		16 points	
Inrush current		Max. 200mA, within 0.3ms (132VAC)	
ON voltage/ON current		80VAC or higher/6mA or higher (TB20, TB1 ~ 16)	
OFF voltage/OFF current		30VAC or lower/3.5mA or lower (TB20, TB1 ~ 16)	
Input impedance		Approx. 10KΩ (60Hz), approx. 12KΩ (50Hz)	
Response time	OFF → ON	15ms or shorter	
	ON → OFF	30ms or shorter	
Internal current consumption (5V)		70mA (TYP. all points ON)	
Common wiring system		16 points/common (common terminal: TB20)	
Operation indicator		ON display (LED)	
External connection system		20-point terminal block connector (M3 x 6 mm screws)	
Applicable wire size		0.75 ~ 2 mm² (applicable tightening torque: 7 kg.cm)	
Applicable solder-less terminal		1.25–3, 1.25–YS3A, 2–S3, 2–YS3A, V1.25–3, V1.25–YS3A, V2–S3, V2–YS3A	Weight: 0.51 kg

Terminal No.	Signal No.
TB1	X00
TB2	X01
TB3	X02
TB4	X03
TB5	X04
TB6	X05
TB7	X06
TB8	X07
TB9	X08
TB10	X09
TB11	X0A
TB12	X0B
TB13	X0C
TB14	X0D
TB15	X0E
TB16	X0F
TB17	Not used
TB18	Not used
TB19	Not used
TB20	Power supply common

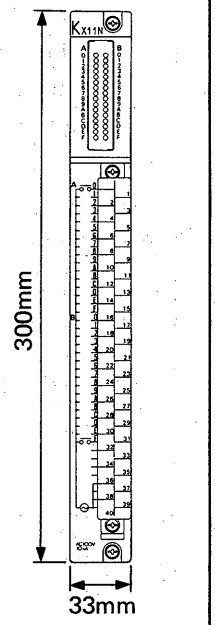


Note: Signal numbers apply also to the case where the unit is loaded into "0" slot position (the next CPU). This also applies to all the input/output units described in the following pages.

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

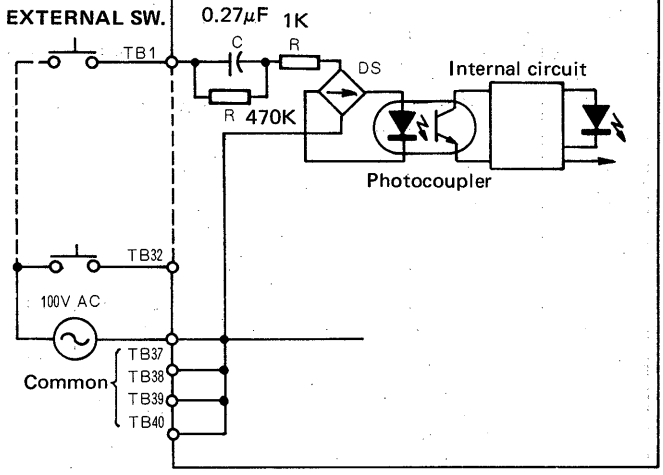
(2) Type KX11N input unit

AC Input Unit

Specifications \ Type		KX11N	Front View
Input points		32 points	
Insulation system		Photocoupler	
Rated input voltage		100–120VAC 50/60Hz	
Rated input current		10mA (100VAC 60Hz)	
Operating voltage range		85 ~ 132VAC (50/60Hz±5%)	
Max. simultaneous ON points		32 points	
Inrush current		Max. 200mA, within 0.3ms (132VAC)	
ON voltage/ON current		80VAC or higher/6mA or higher (TB37 ~ 40, TB1 ~ 32)	
OFF voltage/OFF current		30VAC or lower/3.5mA or lower (TB37 ~ 40, TB1 ~ 32)	
Input impedance		Approx. 10KΩ (60Hz), approx. 12KΩ (50Hz)	
Response time	OFF → ON	15ms or shorter	
	ON → OFF	30ms or shorter	
Internal current consumption (5V)		130mA (TYP. all points ON)	
Common wiring system		32 points/common (common terminal: TB37 ~ 40)	
Operation indicator		ON display (LED)	
External connection system		40-point terminal block connector (M3 x 6 mm screws)	
Applicable wire size		0.75 ~ 2 mm² (applicable tightening torque: 7 kg·cm)	
Applicable solder-less terminal		1.25–3, 1.25–YS3, 2–S3, 2–YS3A, V1.25–3, V1.25–YS3, V2–S3, V2–YS3A	Weight: 0.56 kg

Terminal No.	Signal No.	Terminal No.	Signal No.
TB1	X00	TB21	X14
TB2	X01	TB22	X15
TB3	X02	TB23	X15
TB4	X03	TB24	X15
TB5	X04	TB25	X15
TB6	X05	TB26	X19
TB7	X06	TB27	X1A
TB8	X07	TB28	X1B
TB9	X08	TB29	X1C
TB10	X09	TB30	X1D
TB11	X0A	TB31	X1E
TB12	X0B	TB32	X1F
TB13	X0C	TB33	Not used
TB14	X0D	TB34	Not used
TB15	X0E	TB35	Not used
TB16	X0F	TB36	Not used
TB17	X10	TB37	Power supply common
TB18	X11	TB38	Power supply common
TB19	X12	TB39	Power supply common
TB20	X13	TB40	Power supply common

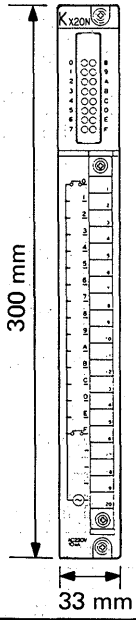
INTERNAL CIRCUIT



Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

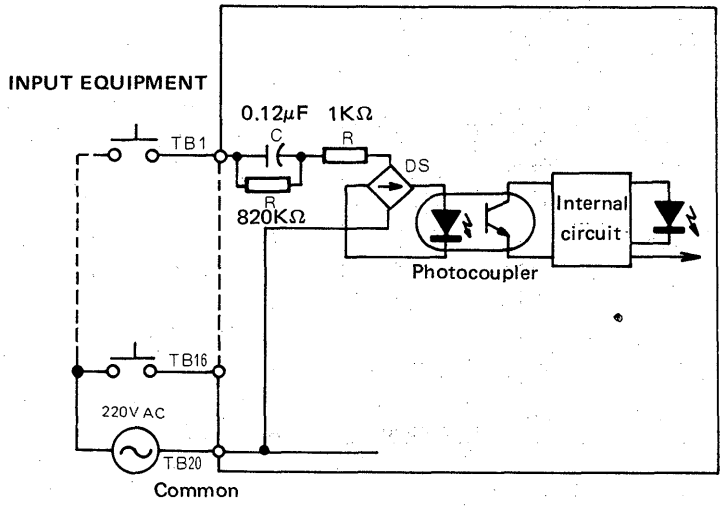
(3) Type KX20N input unit

AC Input Unit

Specifications \ Type		KX20N	Front View
Input points		16 points	
Insulation system		Photocoupler	
Rated input voltage		200 – 240VAC 50/60Hz	
Rated input current		10mA (220VAC 60Hz)	
Operating voltage range		170 ~ 264VAC (50/60Hz ± 5%)	
Max. simultaneous ON points		16 points	
Inrush current		Max. 400 mA, within 0.12 ms (264 V AC)	
ON voltage/ON current		160VAC or higher/5.5mA or higher (TB20, TB1~16)	
OFF voltage/OFF current		70VAC or lower/3.5mA or lower (TB20, TB1~16)	
Input impedance		Approx. 22 kΩ (60 Hz), approx. 24 kΩ (50 Hz)	
Response time	OFF → ON	15 ms or shorter	
	ON → OFF	30 ms or shorter	
Internal current consumption (5V)		70 mA (TYP. all points ON)	
Common wiring system		16 points/common (common terminal: TB20)	
Operation indicator		ON display (LED)	
External connection system		20-point terminal block connector (M3 x 6 mm screws)	
Applicable wire size		0.75 ~ 2 mm^2 (applicable tightening torque: 7 kg·cm)	
Applicable solder-less terminal		1.25–3, 1.25–YS3A, 2–S3, 2–YS3A V1.25–3, V1.25–YS3A, V2–S3, V2–YS3A	Weight 0.51kg

Terminal No.	Signal No.
TB1	X00
TB2	X01
TB3	X02
TB4	X03
TB5	X04
TB6	X05
TB7	X06
TB8	X07
TB9	X08
TB10	X09
TB11	X0A
TB12	X0B
TB13	X0C
TB14	X0D
TB15	X0E
TB16	X0F
TB17	Not used
TB18	Not used
TB19	Not used
TB20	Power supply common

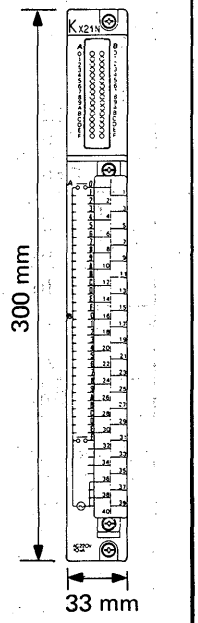
INTERNAL CIRCUIT



Artisan Technology Group - Quality Instrumentation Guaranteed | (888) 88-SOURCE | www.artisantg.com

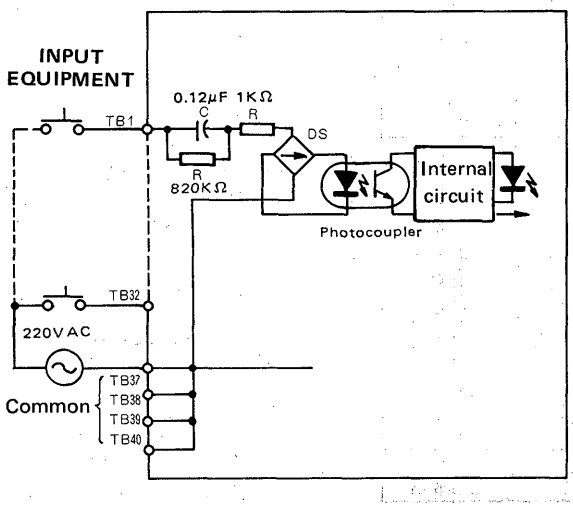
(4) Type KX21N input unit

AC Input Unit

Specifications \ Type		KX21N	Front View
Input points		32 points	
Insulation system		Photocoupler	
Rated input voltage		200 – 240VAC 50/60Hz	
Rated input current		10mA (220VAC 60Hz)	
Operating voltage range		170 ~ 264VAC (50/60Hz ± 5%)	
Max. simultaneous ON points		32 points	
Inrush current		Max. 400 mA, within 0.12 ms (264 V AC)	
ON voltage/ON current		160VAC or higher/5.5mA or higher (TB37 ~ 40, TB1 ~ 32)	
OFF voltage/OFF current		60VAC or lower/3 mA or lower (TB37 ~ 40, TB1 ~ 32)	
Input impedance		Approx. 22 kΩ (60 Hz), approx. 24 kΩ (50 Hz)	
Response time	OFF → ON	15 ms or shorter	
	ON → OFF	30 ms or shorter	
Internal current consumption (DC5V)		130 mA (TYP. all points ON)	
Common wiring system		32 points/common (common terminal: TB37 ~ 40)	
Operation indicator		ON display (LED)	
External connection system		40-point terminal block connector (M3 x 6 mm screws)	
Applicable wire size		0.75 ~ 2 mm² (applicable tightening torque: 7 kg·cm)	
Applicable solder-less terminal		1.25–3, 1.25–YS3A, 2–S3, 2–YS3A V1.25–3, V1.25–YS3A, V2–S3, V2–YS3A	Weight: 0.57kg

Terminal No.	Signal No.	Terminal No.	Signal No.
TB1	X00	TB21	X14
TB2	X01	TB22	X15
TB3	X02	TB23	X16
TB4	X03	TB24	X17
TB5	X04	TB25	X18
TB6	X05	TB26	X19
TB7	X06	TB27	X1A
TB8	X07	TB28	X1B
TB9	X08	TB29	X1C
TB10	X09	TB30	X1D
TB11	X0A	TB31	X1E
TB12	X0B	TB32	X1F
TB13	X0C	TB33	Not used
TB14	X0D	TB34	Not used
TB15	X0E	TB35	Not used
TB16	X0F	TB36	Not used
TB17	X10	TB37	Power supply common
TB18	X11	TB38	Power supply common
TB19	X12	TB39	Power supply common
TB20	X13	TB40	Power supply common

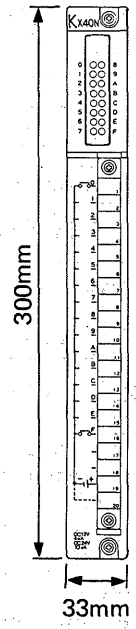
INTERNAL CIRCUIT



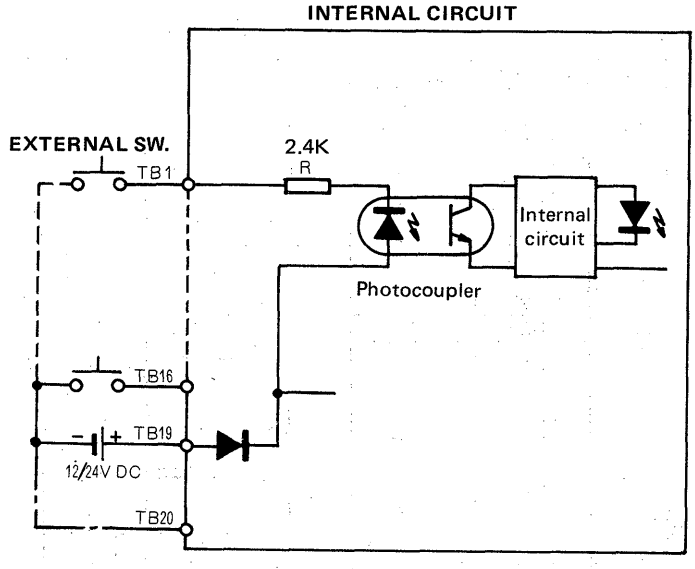
Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

(5) Type KX40N input unit

DC Input Unit

Specifications \ Type		KX40N		Front View
Input points		16 points		
Insulation system		Photocoupler		
Rated input voltage		12VDC	24VDC	
Rated input current		4mA	10mA	
Operating voltage range		10.2 ~ 26.4VDC (ripple ratio: within 5%)		
Max. simultaneous ON points		16 points		
ON voltage/ON current		9VDC or higher/3mA or higher (TB19, TB1 ~ 16)		
OFF voltage/OFF current		6VDC or lower/1.5mA or lower (TB19, TB1 ~ 16)		
Input resistance		Approx. 2.4KΩ		
Response time	OFF → ON	15ms or shorter		
	ON → OFF	20ms or shorter		
Internal current consumption (5V)		70mA (TYP. all points ON)		
Common wiring system		16 points/common (common terminal: TB19)		
Operation indicator		ON display (LED)		
External connection system		20-point terminal block connector (M3 x 6 mm screws)		
Applicable wire size		0.75 ~ 2 mm² (applicable tightening torque: 7 kg·cm)		
Applicable solderless terminal		1.25–3, 1.25–YS3A, 2–S3, 2–YS3A, V1.25–3, V1.25–YS3A, V2–S3, V2–YS3A		Weight: 0.47 kg

Terminal No.	Signal No.
TB1	X00
TB2	X01
TB3	X02
TB4	X03
TB5	X04
TB6	X05
TB7	X06
TB8	X07
TB9	X08
TB10	X09
TB11	X0A
TB12	X0B
TB13	X0C
TB14	X0D
TB15	X0E
TB16	X0F
TB17	Not used
TB18	Not used
TB19	12/24V DC
TB20	0V



● *Usually, it is not required to wire – – – areas.*
(These areas are necessary only when the unit is changed to KX30.)

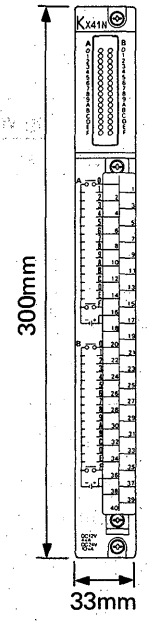
Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

(6) Type KX41N input unit

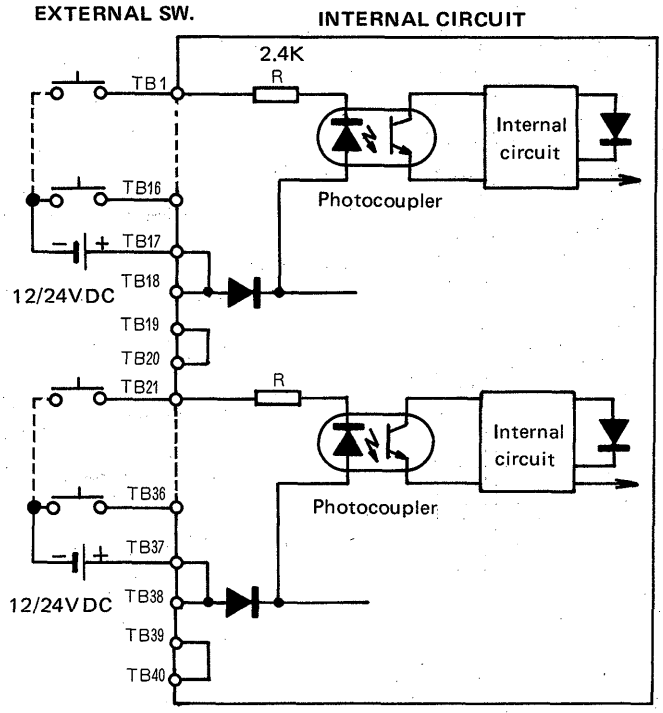
I N

4

DC Input Unit

Specifications \ Type		KX41N		Front View
Input points		32 points		
Insulation system		Photocoupler		
Rated input voltage		12VDC	24VDC	
Rated input current		4mA	10mA	
Operating voltage range		10.2 ~ 26.4VDC (ripple ratio: within 5%)		
Max. simultaneous ON points		32 points		
ON voltage/ON current		9VDC or higher/3mA or higher (TB17, 18, TB1 ~ 16 / TB37, 38, TB21 ~ 26)		
OFF voltage/OFF current		6VDC or lower/1.5mA or lower (TB17, 18, TB1 ~ 16 / TB37, 38, TB21 ~ 36)		
Input resistance		Approx. 2.4KΩ		
Response time	OFF → ON	15ms or shorter		
	ON → OFF	20ms or shorter		
Internal current consumption (5V)		130mA (TYP. all points ON)		
Common wiring system		16 points/common (common terminal: TB17, 18 / TB37, 38)		
Operation indicator		ON display (LED)		
External connection system		40-point terminal block connector (M3 x 6 mm screws)		
Applicable wire size		0.75 ~ 2 mm² (applicable tightening torque: 7 kg·cm)		
Applicable solder-less terminal		1.25–3, 1.25–YS3A, 2–S3, 2–YS3A, V1.25–3, V1.25–YS3A, V2–S3, V2–YS3A		Weight: 0.51 kg

Terminal No.	Signal No.	Terminal No.	Signal No.
TB1	Y00	TB21	Y10
TB2	Y01	TB22	Y11
TB3	Y02	TB23	Y12
TB4	Y03	TB24	Y13
TB5	Y04	TB25	Y14
TB6	Y05	TB26	Y15
TB7	Y06	TB27	Y16
TB8	Y07	TB28	Y17
TB9	Y08	TB29	Y18
TB10	Y09	TB30	Y19
TB11	Y0A	TB31	Y1A
TB12	Y0B	TB32	Y1B
TB13	Y0C	TB33	Y1C
TB14	Y0D	TB34	Y1D
TB15	Y0E	TB35	Y1E
TB16	Y0F	TB36	Y1F
TB17	12/24V DC	TB37	12/24V DC
TB18	12/24V DC	TB38	12/24V DC
TB19	Not used	TB39	Not used
TB20	Not used	TB40	Not used

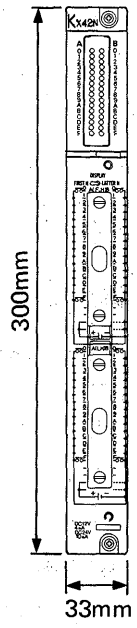


- *Terminals across each input terminal common are independent.*

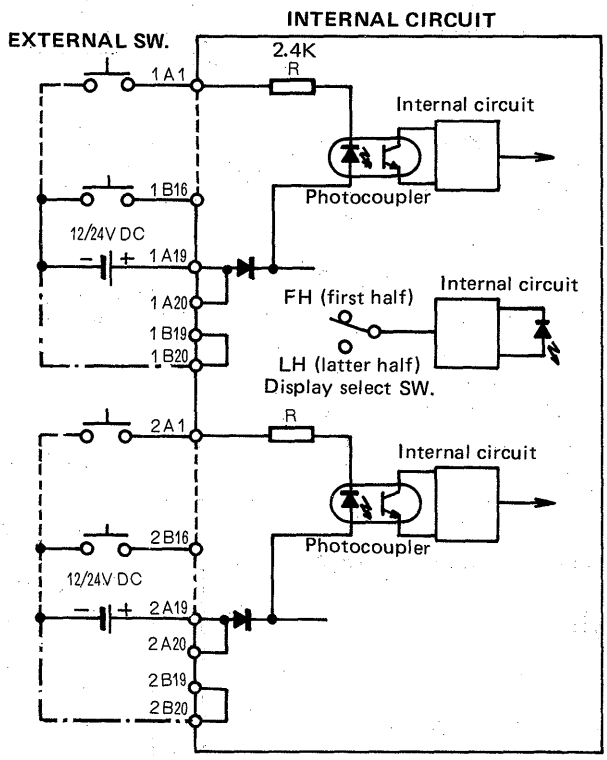
Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

(7) Type KX42 input unit

DC Input Unit

Specifications \ Type		KX42N		Front View
Input points		64 points		
Insulation system		Photocoupler		
Rated input voltage		12VDC	24VDC	
Rated input current		4mA	10mA	
Operating voltage range		10.2 ~ 26.4VDC (ripple ratio: within 5%)		
Max. simultaneous ON points		64 points		
ON voltage/ON current		9VDC or higher/3mA or higher (1A19, 20, 1A1 ~ 16, 1B1 ~ 16 / 2A19, 20, 2A1 ~ 16, 2B1 ~ 16)		
OFF voltage/OFF current		6VDC or lower/1.5mA or lower (1A19, 20, 1A1 ~ 16, 1B1 ~ 16 / 2A19, 20, 2A1 ~ 16, 2B1 ~ 16)		
Input resistance		Approx. 2.4KΩ		
Response time	OFF → ON	15ms or shorter		
	ON → OFF	20ms or shorter		
Internal current consumption (5V)		130mA (TYP. all points ON)		
Common wiring system		32 points/common (common terminal: 1A19, 20 / 2A19, 20)		
Operation indicator		Changeover display of 32 points by ON display (LED) SW		
External connection system		Two 40-pin connectors (with solder)		
Applicable wire size		0.3 mm²		
Accessory		Two external wiring connectors	Weight	0.58 kg

Pin No.	Signal No. (FH)	Pin No.	Signal No. (LH)
1A1	X00	2A1	X20
1A2	X01	2A2	X21
1A3	X02	2A3	X22
1A4	X03	2A4	X23
1A5	X04	2A5	X24
1A6	X05	2A6	X25
1A7	X06	2A7	X26
1A8	X07	2A8	X27
1A9	X08	2A9	X28
1A10	X09	2A10	X29
1A11	X0A	2A11	X2A
1A12	X0B	2A12	X2B
1A13	X0C	2A13	X2C
1A14	X0D	2A14	X2D
1A15	X0E	2A15	X2E
1A16	X0F	2A16	X2F
1A17	Not used	2A17	Not used
1A18	Not used	2A18	Not used
1A19	12/24VDC	2A19	12/24VDC
1A20	12/24VDC	2A20	12/24VDC
1B1	X10	2B1	X30
1B2	X11	2B2	X31
1B3	X12	2B3	X32
1B4	X13	2B4	X33
1B5	X14	2B5	X34
1B6	X15	2B6	X35
1B7	X16	2B7	X36
1B8	X17	2B8	X37
1B9	X18	2B9	X38
1B10	X19	2B10	X39
1B11	X1A	2B11	X3A
1B12	X1B	2B12	X3B
1B13	X1C	2B13	X3C
1B14	X1D	2B14	X3D
1B15	X1E	2B15	X3E
1B16	X1F	2B16	X3F
1B17	Not used	2B17	Not used
1B18	Not used	2B18	Not used
1B19	0V	2B19	0V
1B20	0V	2B20	0V

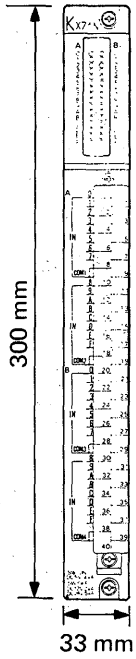


- *Terminals across each input terminal common are independent.*
- *Usually, it is not required to wire--- areas.*
  (These areas are necessary only when the unit is changed to KX32.)

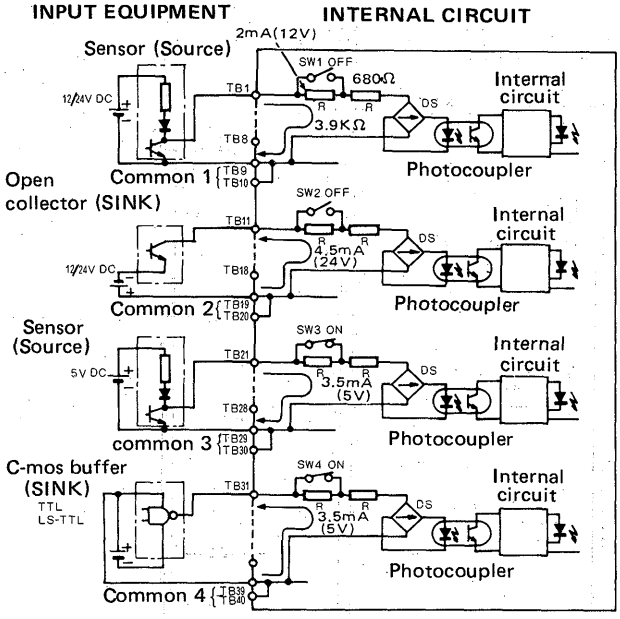
Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

(8) Type KX71N input unit

Input Unit for Sensor

Specifications \ Type		KX71N			Front View	
Input points		32 points				
Insulation system		Photocoupler				
Input voltage		5VDC	12VDC	24VDC		
Input current	TYP.	3.5mA	2mA	4.5mA		
	MAX.	5.5mA	3mA	6mA		
Operating voltage range		4.5 ~ 5.5VDC (SW. ON), 10.2 ~ 26.4VDC (SW. OFF)				
Max. simultaneous ON points		32 points				
ON voltage/ON current		3.5VDC or higher/0.32mA or higher (Switch → ON), 4VDC or higher/0.32mA or higher (Switch → OFF). *1				
OFF voltage/OFF current		1.5VDC or lower/0.1mA or lower (Switch → ON), 2VDC or lower/0.1mA or lower (Switch → OFF). *2				
Input impedance		Approx. 1.4kΩ (Switch → ON), approx. 5.5kΩ (Switch → OFF).				
Response time	OFF → ON	0.5 ms or shorter				
	ON → OFF	3 ms or shorter				
Internal current consumption (DC5V)		130mA (TYP. all points ON)				
Common wiring system		8 points/common (common terminal: TB9,TB10,TB19.TB20 TB29.TB30,TB39.TB40) (SW position selected per common)				
Operation indicator		ON display (LED)				
External connection system		40-point terminal block connector (M3 x 6 mm screws)				
Applicable wire size		0.75 ~ 2 mm² (applicable tightening torque: 7 kg·cm)				
Applicable solder-less terminal		1.25–3, 1.25–YS3A, 2–S3, 2–YS3A V1.25–3, V1.25–YS3A, V2–S3, V2–YS3A			Weight	0.52kg

Terminal No.	Signal No.	Terminal No.	Signal No.
TB1	X00	TB21	X10
TB2	X01	TB22	X11
TB3	X02	TB23	X12
TB4	X03	TB24	X13
TB5	X04	TB25	X14
TB6	X05	TB26	X15
TB7	X06	TB27	X16
TB8	X07	TB28	X17
TB9	Power supply Common 1	TB29	Power supply Common 3
TB10	Power supply Common 1	TB30	Power supply Common 3
TB11	X08	TB31	X18
TB12	X09	TB32	X19
TB13	X0A	TB33	X1A
TB14	X0B	TB34	X1B
TB15	X0C	TB35	X1C
TB16	X0D	TB36	X1D
TB17	X0E	TB37	X1E
TB18	X0F	TB38	X1F
TB19	Power supply Common 2	TB39	Power supply Common 4
TB20	Power supply Common 2	TB40	Power supply Common 4



*1: *Turn on SW1 ~ 4 when 5VDC is used. Turn them off when 12/24VDC is used.*

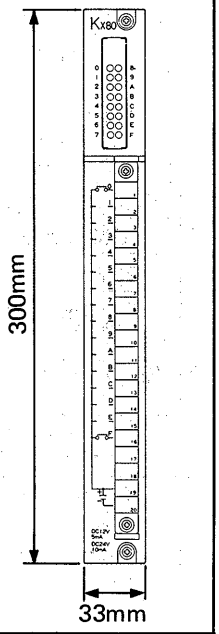
*2: *Terminals are measured across TB9, 10 and TB1 ~ 8, across TB19, 20 and TB11 ~ 18, across TB29, 30 and TB21 ~ 28, and across TB39, 40 and TB31 ~ 38.*

● *Terminals across each output terminal common are independent.*

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

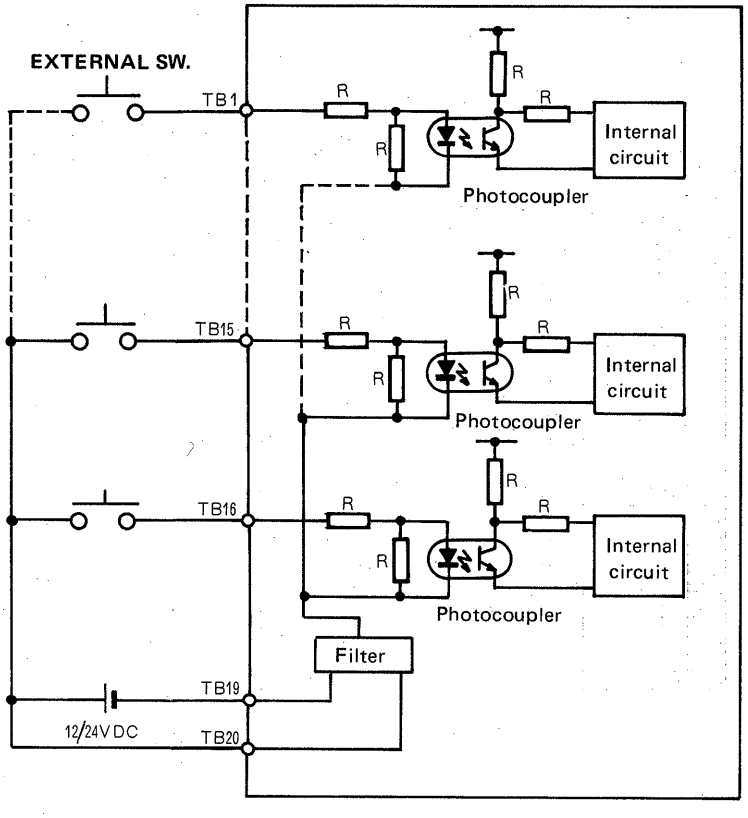
(9) Type KX80 input unit

DC Input Unit

Specifications \ Type		KX80	Front View
Input points		16 points	
Insulation system		Photocoupler	
Rated input voltage		12V/24VDC	
Rated input current		10mA (24VDC)	
Operating voltage range		10.2 ~ 26.4VDC	
Max. simultaneous ON points		16 points	
ON voltage/ON current		9.6VDC or higher/2.2mA or higher (TB19, TB1 ~ 16)	
OFF voltage/OFF current		6VDC or lower/1.1mA or lower (TB19, TB1 ~ 16)	
Input resistance		Approx. 2.4KΩ	
Response time	OFF → ON	5 ~ 20ms	
	ON → OFF	10 ~ 30ms	
Internal current consumption (5V)		20mA (TYP. all points ON)	
Common wiring system		16 points/common (common terminal: TB19)	
Operation indicator		ON display (LED)	
External connection system		20-point terminal block connector (M3 x 6 mm screws)	
Applicable wire size		0.75 ~ 2 mm² (applicable tightening torque: 7 kg·cm)	
Applicable solder-less terminal		1.25–3, 1.25–YS3A, 2–S3, 2–YS3A, V1.25–3, V1.25–YS3A, V2–S3, V2–YS3A	Weight: 0.47 kg

Terminal No.	Signal No.
TB1	X00
TB2	X01
TB3	X02
TB4	X03
TB5	X04
TB6	X05
TB7	X06
TB8	X07
TB9	X08
TB10	X09
TB11	X0A
TB12	X0B
TB13	X0C
TB14	X0D
TB15	X0E
TB16	X0F
TB17	Not used
TB18	Not used
TB19	0V
TB20	12/24V DC

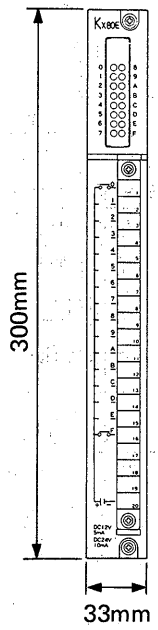
INTERNAL CIRCUIT



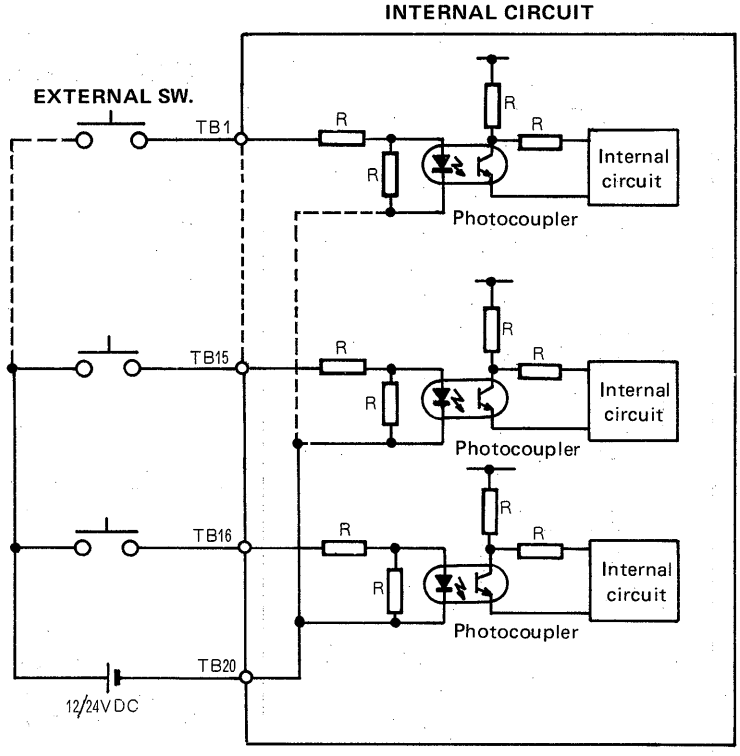
Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

(10) Type KX80E input unit

DC Input Unit

Specifications \ Type		KX80E	Front View
Input points		16 points	
Insulation system		Photocoupler	
Rated input voltage		12V/24VDC	
Rated input current		10mA (24VDC)	
Operating voltage range		10.8 ~ 26.4VDC	
Max. simultaneous ON points		16 points	
ON voltage/ON current		9.6VDC or higher/3mA or higher (TB20, TB1 ~ 16)	
OFF voltage/OFF current		6VDC or lower/1.5mA or lower (TB20, TB1 ~ 16)	
Input resistance		Approx. 2.4KΩ	
Response time	OFF → ON	5.7 ~ 6.6ms	
	ON → OFF	6 ~ 7ms	
Internal current consumption (5V)		20mA (TYP. all points ON)	
Common wiring system		16 points/common (common terminal: TB20)	
Operation indicator		ON display (LED)	
External connection system		20-point terminal block connector (M3 x 6 mm screws)	
Applicable wire size		0.75 ~ 2 mm² (applicable tightening torque: 7 kg·cm)	
Applicable solder-less terminal		1.25–3, 1.25–YS3A, 2–S3, 2–YS3A, V1.25–3, V1.25–YS3A, V2–S3, V2–YS3A	Weight: 0.5 kg

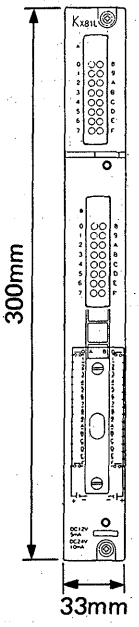
Terminal No.	Signal No.
TB1	X00
TB2	X01
TB3	X02
TB4	X03
TB5	X04
TB6	X05
TB7	X06
TB8	X07
TB9	X08
TB10	X09
TB11	X0A
TB12	X0B
TB13	X0C
TB14	X0D
TB15	X0E
TB16	X0F
TB17	Not used
TB18	Not used
TB19	Not used
TB20	Not used



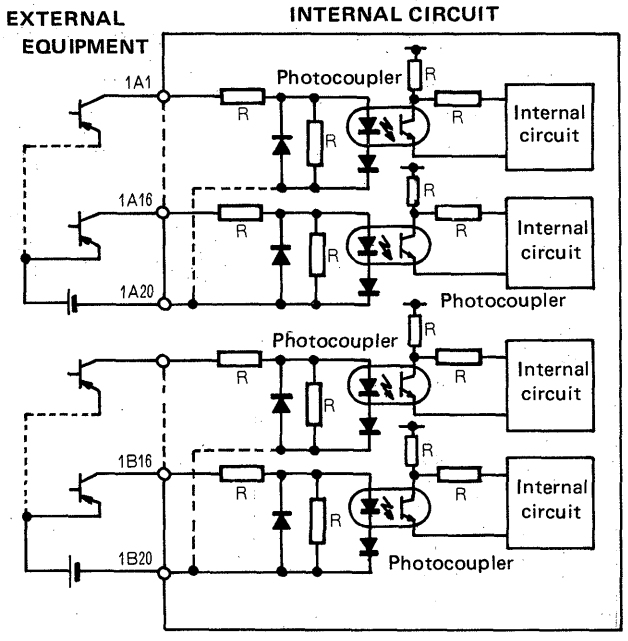
Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

(11) Type KX81L input unit

DC Input Unit

Specifications \ Type		KX81L	Front View
Input points		32 points	
Insulation system		Photocoupler	
Rated input voltage		12V/24VDC	
Rated input current		10mA (24VDC)	
Operating voltage range		10.8 ~ 26.4VDC	
Max. simultaneous ON points		32 points	
ON voltage/ON current		9.6VDC or higher/3mA or higher (1A20, 1A1 ~ 16 / 1B20, 1B1 ~ 16)	
OFF voltage/OFF current		6VDC or lower/1.5mA or lower (1A20, 1A1 ~ 16 / 1B20, 1B1 ~ 16)	
Input resistance		Approx. 2.4KΩ	
Response time	OFF → ON	5.7 ~ 6.6ms/24VDC	
	ON → OFF	6 ~ 7ms/24VDC	
Internal current consumption (5V)		30mA (TYP. all points ON)	
Common wiring system		16 points/common (common terminal: 1A20, 1B20)	
Operation indicator		ON display (LED)	
External connection system		40-pin connector (with solder)	
Applicable wire size		0.3 mm^2	
Accessory		External wiring connector	Weight: 0.45 kg

Terminal No.	Signal No.	Terminal No.	Signal No.
1A1	X00	1B1	X10
1A2	X01	1B2	X11
1A3	X02	1B3	X12
1A4	X03	1B4	X13
1A5	X04	1B5	X14
1A6	X05	1B6	X15
1A7	X06	1B7	X16
1A8	X07	1B8	X17
1A9	X08	1B9	X18
1A10	X09	1B10	X19
1A11	X0A	1B11	X1A
1A12	X0B	1B12	X1B
1A13	X0C	1B13	X1C
1A14	X0D	1B14	X1D
1A15	X0E	1B15	X1E
1A16	X0F	1B16	X1F
1A17	Not used	1B17	Not used
1A18	Not used	1B18	Not used
1A19	Not used	1B19	Not used
1A20	0V	1B20	0V



● *Terminals across each input terminal common are independent.*

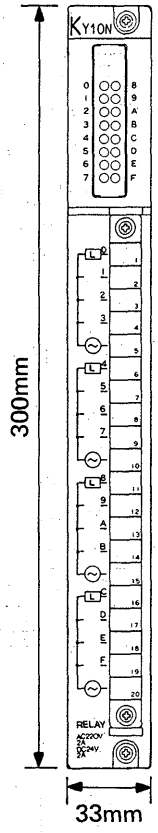
Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

(12) Type KY10N output unit

Contact Output Unit

Specifications \ Type		KY10N
Output points		16 points
Insulation system		Photocoupler
Rated switching voltage, current		24VDC 2A (resistance load)/point 240VAC 2A ($\cos\phi$=1)/point, 8A/common
Min. switching load		5VDC 20mA, 12/24VDC 10mA, 100/200VAC 5mA
Max. switching voltage		264VAC, 125VDC
Leakage current at OFF		No leakage current
Response time	OFF → ON	8 ms or shorter
	ON → OFF	15 ms or shorter
Life	Mechanical	20 million times or more
	Electrical	Rated switching voltage, current load ---- 200 thousand times or more
		200VAC 1.5A, 240VAC 1A ($COS\phi$=0.7) 200 thousand times or more
		200VAC 1A, 240VAC 0.5A ($COS\phi$=0.35) 200 thousand times or more
		200VAC 0.7A, 240VAC 0.1A (L/R=7ms) 200 thousand times or more
Max. switching frequency		3600 times/hour
Surge killer		Not provided
Internal current consumption	5V DC	100 mA (TYP. all points ON)
	24V DC	300 mA (24VDC, TYP. all points ON)
Common wiring system		4 points/common (common terminal: TB5, 10 TB15, TB20)
Operation indicator		ON display (LED)
External connection system		20-point terminal block connector (M3 x 6 mm screws)
Applicable wire size		0.75 ~ 2 mm^2 (applicable tightening torque: 7 kg·cm)
Applicable solder-less terminal		1.25–3, 1.25–YS3A, 2–S3, 2–YS3A V1.25–3, V1.25–YS3A, V2–S3, V2–YS3A

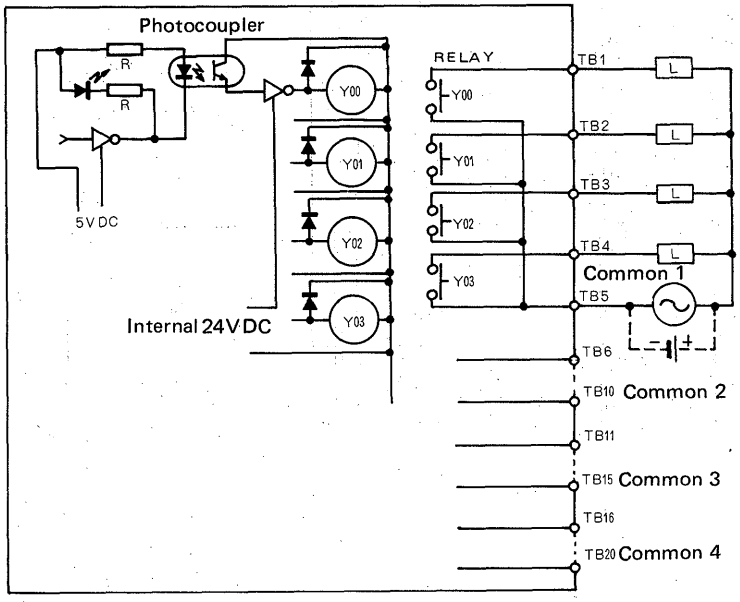
Front View



Weight 0.60kg

Terminal No.	Signal No.
TB1	Y00
TB2	Y01
TB3	Y02
TB4	Y03
TB5	Common 1
TB6	Y04
TB7	Y05
TB8	Y06
TB9	Y07
TB10	Common 2
TB11	Y08
TB12	Y09
TB13	Y0A
TB14	Y0B
TB15	Common 3
TB16	Y0C
TB17	Y0D
TB18	Y0E
TB19	Y0F
TB20	Common 4

INTERNAL CIRCUIT **EXTERNAL EQUIPMENT**



● *Terminals across each output terminal common are independent.*

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

(13) Type KY11N output unit

38 to 52 covers most of outputs

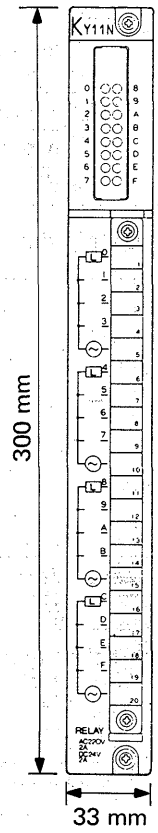
OUT

4

Contact Output Unit (with noise suppression)

Specifications \ Type		KY11N
Output points		16 points
Insulation system		Photocoupler
Rated switching voltage, current		24VDC 2 A (resistance load)/point 240VAC 2 A (cosφ=1)/point, 8 A/common
Min. switching load		5VDC 20mA, 12/24VDC 10mA, 100/200VAC 5mA
Max. switching voltage		264VAC, 125VDC
Leakage current at OFF		2mA (200VAC 60Hz)/1mA (100VAC 60Hz)
Response time	OFF → ON	8 ms or shorter
	ON → OFF	15 ms or shorter
Life	Mechanical	20 million times or more
	Electrical	Rated switching voltage, current load ---- 200 thousand times or more
		200VAC 1.5A, 240VAC 1A (COSφ0.7) 200 thousand times or more
		200VAC 1A, 240VAC 0.5A (COSφ=0.35) 200 thousand times or more
		24VDC 0.7A, 100VDC 0.1A (L/R=7ms) 200 thousand times or more
Max. switching frequency		3600 times/hour
Noise suppression		Varistor (387 ~ 473V), CR absorber (0.022μF + 47Ω)
Internal current consumption	5V DC	100 mA (TYP. all points ON)
	24V DC	300 mA (24VDC, TYP. all points ON)
Common wiring system		4 points/common (common terminal: TB5, TB10 TB15, TB20)
Operation indicator		ON display (LED)
External connection system		20-point terminal block connector (M3 x 6 mm screws)
Applicable wire size		0.75 ~ 2 mm² (applicable tightening torque: 7 kg·cm)
Applicable solder-less terminal		1.25–3, 1.25–YS3A, 2–S3, 2–YS3A V1.25–3, V1.25–YS3A, V2–S3, V2–YS3A

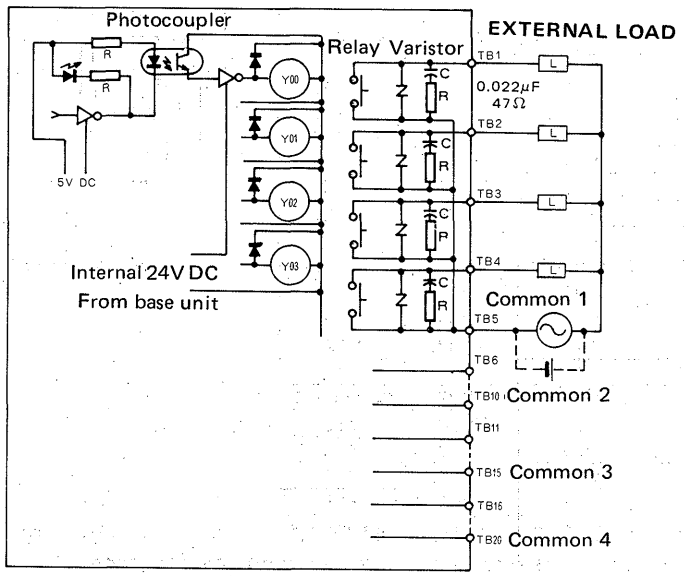
Front View



Weight	0.64kg

Terminal No.	Signal No.
TB1	Y00
TB2	Y01
TB3	Y02
TB4	Y03
TB5	Common 1
TB6	Y04
TB7	Y05
TB8	Y06
TB9	Y07
TB10	Common 2
TB11	Y08
TB12	Y09
TB13	Y0A
TB14	Y0B
TB15	Common 3
TB16	Y0C
TB17	Y0D
TB18	Y0E
TB19	Y0F
TB20	Common 4

INTERNAL CIRCUIT



● *Terminals across each output terminal common are independent.*

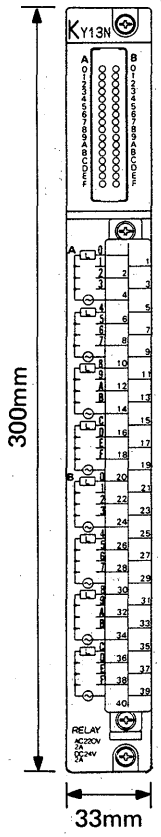
Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

(14) Type KY13N output unit

Contact Output Unit

Specifications \ Type		KY13N
Output points		32 points
Insulation system		Photocoupler
Rated switching voltage, current		24VDC 2A (resistance load)/point 240VAC 2A (cosφ=1)/point, 5A/common
Min. switching load		5VDC 20mA, 12/24VDC 10mA, 100/200VAC 5mA
Max. switching voltage		264VAC, 125VAC
Leakage current at OFF		No leakage current
Response time	OFF → ON	8 ms or shorter
	ON → OFF	15 ms or shorter
Life	Mechanical	20 million times or more
	Electrical	Rated switching voltage, current load ---- 200 thousand times or more
		200VAC 1.5A, 240VAC 1A (COSφ=0.7) 200 thousand times or more
		200VAC 1A, 240VAC 0.5A (COSφ=0.35) 200 thousand times or more
		24VDC 0.7A 100VDC 0.1A (L/R=7ms) 200 thousand times or more
Max. switching frequency		3600 times/hour
Surge killer		Not provided
Internal current consumption	5V DC	200 mA (TYP. all points ON)
	24V DC	600 mA (24VDC, TYP. all points ON)
Common wiring system		4 points/common (common terminal: TB5, TB10, TB15, TB20 TB25, TB30, TB35, TB40)
Operation indicator		ON display (LED)
External connection system		40-point terminal block connector (M3 x 6 mm screws)
Applicable wire size		0.75 ~ 2 mm² (applicable tightening torque: 7 kg·cm)
Applicable solder-less terminal		1.25–3, 1.25–YS3A, 2–S3, 2–YS3A V1.25–3, V1.25–YS3A, V2–S3, V2–YS3A

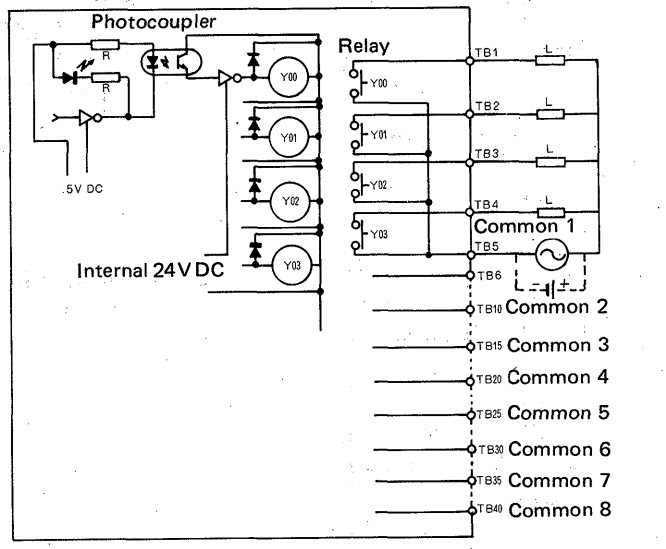
Front View



Weight	0.75kg

Terminal No.	Signal No.	Terminal No.	Signal No.
TB1	Y00	TB21	Y10
TB2	Y01	TB22	Y11
TB3	Y02	TB23	Y12
TB4	Y03	TB24	Y13
TB5	Common 1	TB25	Common 5
TB6	Y04	TB26	Y14
TB7	Y05	TB27	Y15
TB8	Y06	TB28	Y16
TB9	Y07	TB29	Y17
TB10	Common 2	TB30	Common 6
TB11	Y08	TB31	Y18
TB12	Y09	TB32	Y19
TB13	Y0A	TB33	Y1A
TB14	Y0B	TB34	Y1B
TB15	Common 3	TB35	Common 7
TB16	Y0C	TB36	Y1C
TB17	Y0D	TB37	Y1D
TB18	Y0E	TB38	Y1E
TB19	Y0F	TB39	Y1F
TB20	Common 4	TB40	Common 8

INTERNAL CIRCUIT **EXTERNAL LOAD**



● *Terminals across each output terminal common are independent.*

Note: Signal numbers apply also to the case where the unit is loaded into "0" slot position. This also applies to all the input/output units described in the following pages.

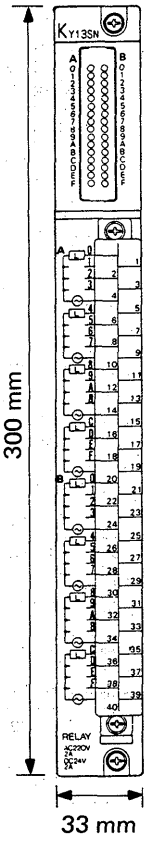
Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

(15) Type KY13SN output unit

Contact Output Unit (with noise suppression)

Specifications \ Type		KY13SN
Output points		32 points
Insulation system		Photocoupler
Rated switching voltage, current		24VDC 2A (resistance load)/point 240VAC 2A ($\cos\phi$=1)/point, 5A/common
Min. switching load		5VDC 20mA, 12/24VDC 10mA, 100/200VAC 5mA
Max. switching voltage		264VAC, 125VDC
Leakage current at OFF		0.1mA (200VAC 60Hz)
Response time	OFF → ON	8 ms or shorter
	ON → OFF	15 ms or shorter
Life	Mechanical	20 million times or more
	Electrical	Rated switching voltage, current load --- 200 thousand times or more
		200VAC 1.5A, 240VAC 1A ($\cos\phi$=0.7) 200 thousand times or more
		200VAC 1A, 240VAC 0.5A ($\cos\phi$=0.35) 200 thousand times or more
		24VDC 0.7A, 100VDC 0.1A (L/R=7ms) 200 thousand times or more
Max. switching frequency		3600 times/hour
Noise suppression		Varistor (387 ~ 473V)
Internal current consumption	5V DC	200 mA (TYP. all points ON)
	24V DC	600mA (24VDC, TYP. all points ON)
Common wiring system		4 points/common (common terminal: TB5, TB10, TB15, TB20 TB25, TB30, TB35, TB40)
Operation indicator		ON display (LED)
External connection system		40-point terminal block connector (M3 x 6 mm screws)
Applicable wire size		0.75 ~ 2 mm^2 (applicable tightening torque: 7 kg·cm)
Applicable solder-less terminal		1.25–3, 1.25–YS3A, 2–S3, 2–YS3A V1.25–3, V1.25–YS3A, V2–S3, V2–YS3A

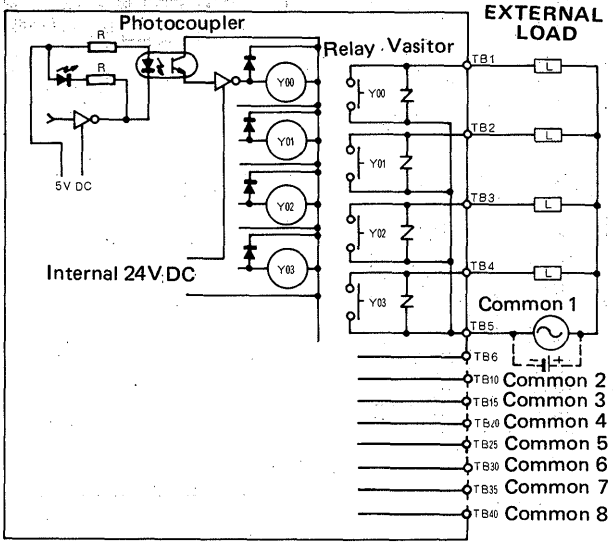
Front View



Weight: 0.79kg

Terminal No.	Signal No.	Terminal No.	Signal No.
TB1	Y00	TB21	Y10
TB2	Y01	TB22	Y11
TB3	Y02	TB23	Y12
TB4	Y03	TB24	Y13
TB5	Common 1	TB25	Common 5
TB6	Y04	TB26	Y14
TB7	Y05	TB27	Y15
TB8	Y06	TB28	Y16
TB9	Y07	TB29	Y17
TB10	Common 2	TB30	Common 6
TB11	Y08	TB31	Y18
TB12	Y09	TB32	Y19
TB13	Y0A	TB33	Y1A
TB14	Y0B	TB34	Y1B
TB15	Common 3	TB35	Common 7
TB16	Y0C	TB36	Y1C
TB17	Y0D	TB37	Y1D
TB18	Y0E	TB38	Y1E
TB19	Y0F	TB39	Y1F
TB20	Common 4	TB40	Common 8

INTERNAL CIRCUIT



●*Terminals across each output terminal common are independent.*

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

OUT

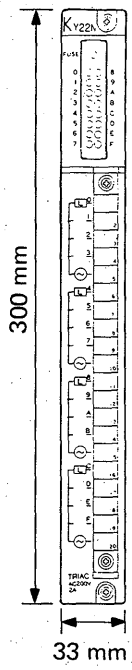
4

(16) Type KY22N output unit

Triac Output Unit

Specifications \ Type		KY22N
Output points		16 points
Insulation system		Photocoupler
Rated load voltage		100 — 240VAC 40 ~ 70 Hz
Max. load voltage		264VAC
Max. load current		2A/point, 5A/common
Min. load voltage, current		24VAC 100mA, 100VAC 10mA, 240VAC 20mA
Max. inrush current		25A — 10ms or shorter, 10A — 100ms or shorter
Leakage current at OFF		1.5mA (120VAC 60Hz), 3mA (240VAC 60Hz)
Max. voltage drop at ON		1.5V or lower (1 ~ 2A), 1.8V or lower (0.2 ~ 1A or lower), 5V or lower (0.2A or lower)
Response time	OFF → ON	1 ms or shorter
	ON → OFF	1.5 cycles + 1 ms or shorter
Internal current consumption (5V)		280mA (TYP. all points ON)
Noise suppression		CR absorber (0.022μF + 47Ω)
Fuse rating		Fast-melting fuse 5A (1 comon/pce)
Fuse blow indicator		Provided (LED turns on when fuse blows)
Common wiring system		4 points/common (common terminal : TB5, TB10 / TB15, TB20)
Operation indicator		ON display (LED)
External connection system		20-point terminal block connector (M3 x 6 mm screws)
Applicable wire size		0.75 ~ 2 mm² (applicable tightening torque: 7 kg·cm)
Applicable solder-less terminal		1.25–3, 1.25–YS3A, 2–S3, 2–YS3A V1.25–3, V1.25–YS3A, V2–S3, V2–YS3A

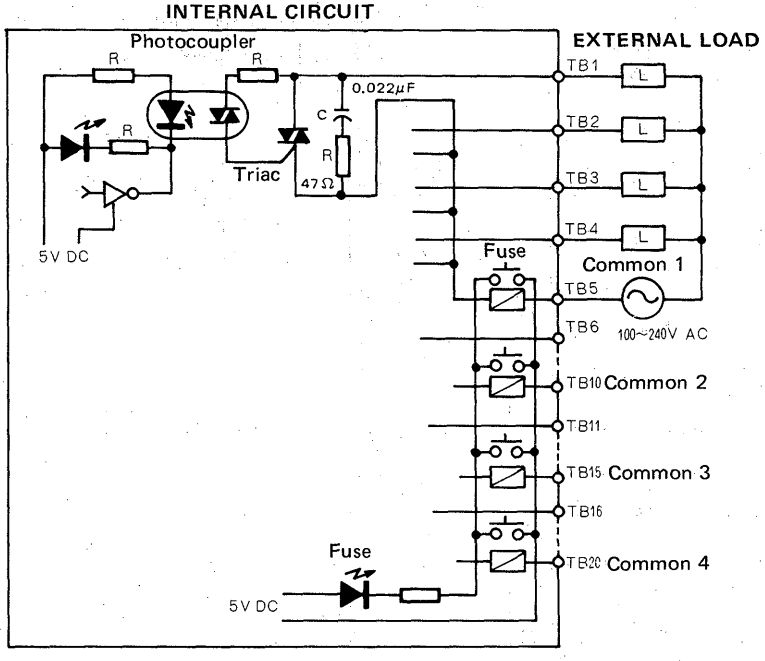
Front View



Weight: 0.85kg

Terminal No.	Signal No.
TB1	Y00
TB2	Y01
TB3	Y02
TB4	Y03
TB5	Common 1
TB6	Y04
TB7	Y05
TB8	Y06
TB9	Y07
TB10	Common 2
TB11	Y08
TB12	Y09
TB13	Y0A
TB14	Y0B
TB15	Common 3
TB16	Y0C
TB17	Y0D
TB18	Y0E
TB19	Y0F
TB20	Common 4

INTERNAL CIRCUIT



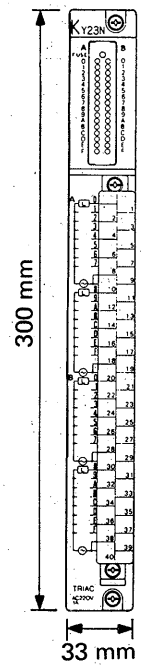
● *Terminals across each output terminal common are independent.*

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

(17) Type KY23N output unit

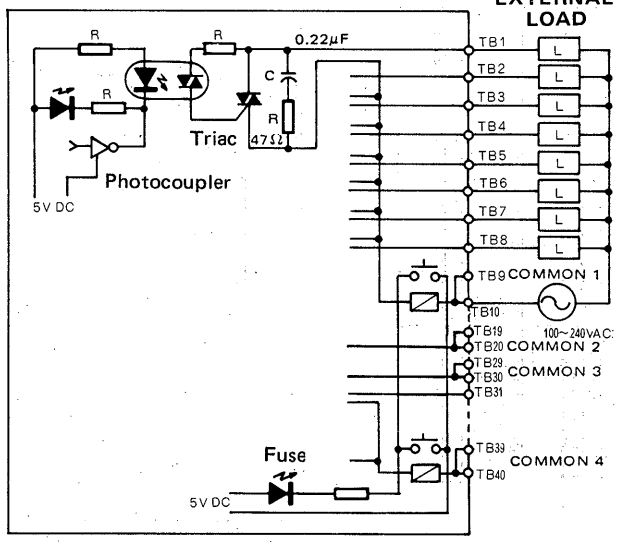
Triac Output Unit

Specifications \ Type		KY23N	Front View
Output points		32 points	
Insulation system		Photocoupler	
Rated load voltage		100 – 240VAC	
Max. load voltage		264VAC	
Max. load current		1A/point, 4A/common	
Min. load voltage, current		24VAC 100mA, 100VAC 10mA, 240VAC 20mA	
Max. inrush current		25A – 10ms or shorter, 10A – 100ms or shorter	
Leakage current at OFF		1.5mA (120VAC 60Hz), 3mA (240VAC 60Hz)	
Max. voltage drop at ON		1.5V or lower (1 ~ 2A), 1.8V or lower (0.2 ~ 1A or lower), 5V or lower (0.2A or lower)	
Response time	OFF → ON	1 ms or shorter	
	ON → OFF	1.5 cycles + 1 ms or shorter	
Internal current consumption (5V)		540mA (TYP. all points ON)	
Noise suppression		CR absorber (0.022μF + 47Ω)	
Fuse rating		Fast-melting fuse 5A (1 comon/pce)	
Fuse blow indicator		provided (LED turns on when fuse blows)	
Common wiring system		8 points/common (common terminal: TB9. TB10, TB19, TB20 TB29, TB30, TB39, TB40)	
Operation indicator		ON display (LED)	
External connection system		40-point terminal block connector (M3 x 6 mm screws)	
Applicable wire size		0.75 ~ 2 mm² (applicable tightening torque: 7 kg·cm)	
Applicable solder-less terminal		1.25–3, 1.25–YS3A, 2–S3, 2–YS3A V1.25–3, V1.25–YS3A, V2–S3, V2–YS3A	Weight: 0.94kg



Terminal No.	Signal No.	Terminal No.	Signal No.
TB1	Y00	TB21	Y10
TB2	Y01	TB22	Y11
TB3	Y02	TB23	Y12
TB4	Y03	TB24	Y13
TB5	Y04	TB25	Y14
TB6	Y05	TB26	Y15
TB7	Y06	TB27	Y16
TB8	Y07	TB28	Y17
TB9	Common 1	TB29	Common 3
TB10		TB30	
TB11	Y08	TB31	Y18
TB12	Y09	TB32	Y19
TB13	Y0A	TB33	Y1A
TB14	Y0B	TB34	Y1B
TB15	Y0C	TB35	Y1C
TB16	Y0D	TB36	Y1D
TB17	Y0E	TB37	Y1E
TB18	Y0F	TB38	Y1F
TB19	Common 2	TB39	Common 4
TB20		TB40	

INTERNAL CIRCUIT



● *Terminals across each output terminal common are independent.*

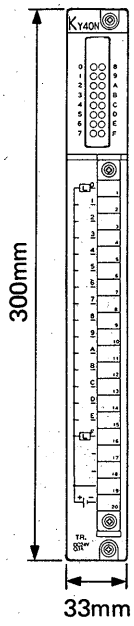
Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

(18) Type KY40N output unit

Transistor Output Unit

Specifications \ Type		KY40N
Input points		16 points
Insulation system		Photocoupler
Rated load voltage		5/12/24VDC
Operating load voltage range		4.75 ~ 40VDC
Max. load current		0.1A/point, 1.6A/common
Max. inrush current		0.4A
Leakage current at OFF		0.1mA or lower
Max. voltage drop at ON		1.5V (100mA), 0.75V (5mA), 0.7V (1mA)
Response time	OFF → ON	1ms or shorter
	ON → OFF	1ms or shorter (resistance load)
Internal current consumption (5V)		110mA (TYP. all points ON)
External supply power current consumption		22mA (24VDC TYP. all points ON)
Noise suppression		Clamp diode
Common wiring system		16 points/common (common terminal: TB20)
Operation indicator		ON display (LED)
External connection system		20-point terminal block connector (M3 x 6 mm screws)
Applicable wire size		0.75 ~ 2 mm^2 (applicable tightening torque: 7 kg·cm)
Applicable solder-less terminal		1.25–3, 1.25–YS3A, 2–S3, 2–YS3A, V1.25–3, V1.25–YS3A, V2–S3, V2–YS3A

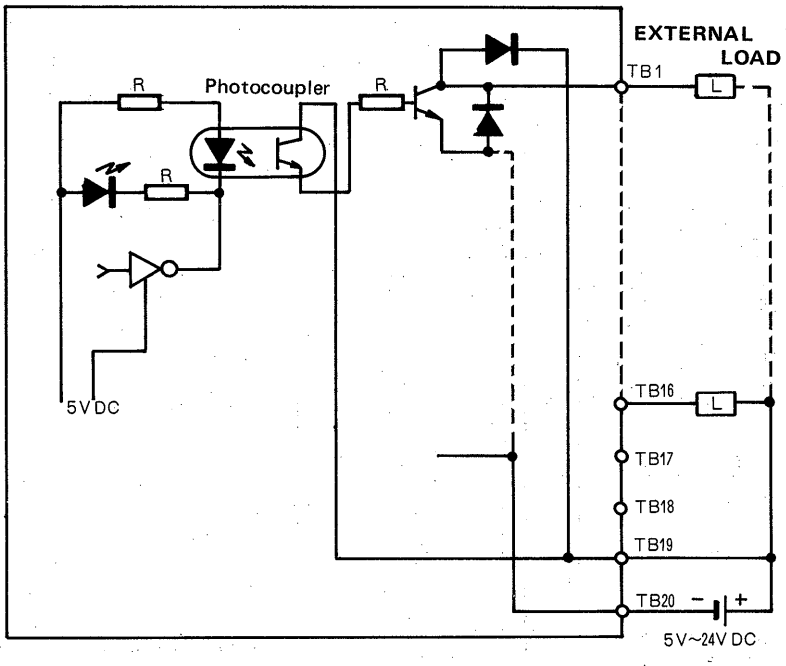
Front View



Weight	0.47 kg

Terminal No.	Signal No.
TB1	Y00
TB2	Y01
TB3	Y02
TB4	Y03
TB5	Y04
TB6	Y05
TB7	Y06
TB8	Y07
TB9	Y08
TB10	Y09
TB11	Y0A
TB12	Y0B
TB13	Y0C
TB14	Y0D
TB15	Y0E
TB16	Y0F
TB17	Not used
TB18	Not used
TB19	5 ~ 24V DC
TB20	0V

EXTERNAL CIRCUIT



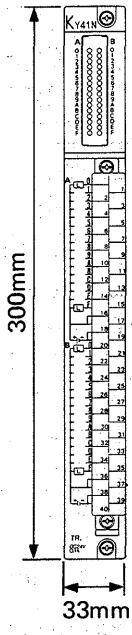
Note 1: Use the same power supply for load power and external supply power. When they are not the same, noise suppression is not activated.
Note 2: At the time of connection, do not reverse the polarity of external supply power.

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

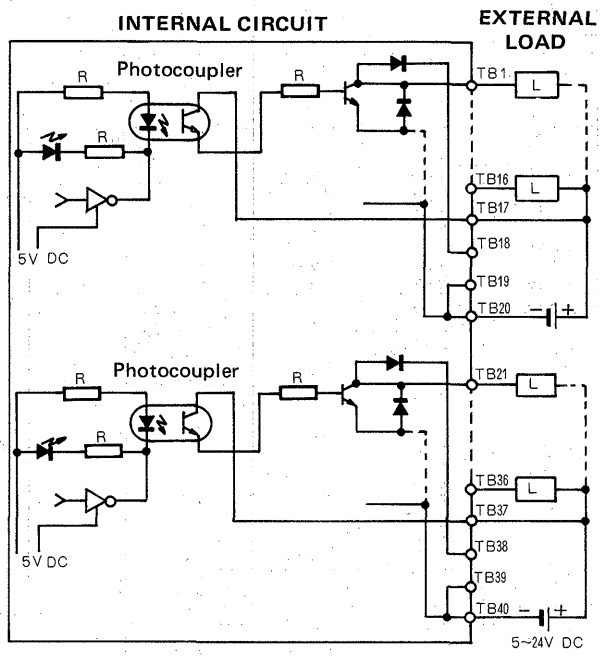
(19) Type KY41N output unit

Transistor Output Unit

Specifications \ Type		KY41N	Front View
Input points		32 points	
Insulation system		Photocoupler	
Rated load voltage		5/12/24VDC	
Operating load voltage range		4.75 ~ 40VDC	
Max. load current		0.1A/point, 1.6A/common	
Max. inrush current		0.4A	
Leakage current at OFF		0.1mA or lower	
Max. voltage drop at ON		1.5V (100mA), 0.75V (5mA), 0.7V (1mA)	
Response time	OFF → ON	1ms or shorter	
	ON → OFF	1ms or shorter (resistance load)	
Internal current consumption (5V)		210mA (TYP. all points ON)	
External supply power current consumption		22mA/common (24VDC TYP. 16 points ON)	
Noise suppression		Clamp diode	
Common wiring system		16 points/common (common terminal: TB19, 20 / TB39, 40)	
Operation indicator		ON display (LED)	
External connection system		40-point terminal block connector (M3 x 6 mm screws)	
Applicable wire size		0.75 ~ 2 mm² (applicable tightening torque: 7 kg·cm)	
Applicable solder-less terminal		1.25–3, 1.25–YS3A, 2–S3, 2–YS3A, V1.25–3, V1.25–YS3A, V2–S3, V2–YS3A	Weight: 0.49 kg



Terminal No.	Signal No.	Terminal No.	Signal No.
TB1	Y00	TB21	Y10
TB2	Y01	TB22	Y11
TB3	Y02	TB23	Y12
TB4	Y03	TB24	Y13
TB5	Y04	TB25	Y14
TB6	Y05	TB26	Y15
TB7	Y06	TB27	Y16
TB8	Y07	TB28	Y17
TB9	Y08	TB29	Y18
TB10	Y09	TB30	Y19
TB11	Y0A	TB31	Y1A
TB12	Y0B	TB32	Y1B
TB13	Y0C	TB33	Y1C
TB14	Y0D	TB34	Y1D
TB15	Y0E	TB35	Y1E
TB16	Y0F	TB36	Y1F
TB17	5 ~ 24V DC	TB37	5 ~ 24V DC
TB18	5 ~ 24V DC	TB38	5 ~ 24V DC
TB19	0V	TB39	0V
TB20	0V	TB40	0V



Note 1: Use the same power supply for load power and external supply power. When they are not the same, noise suppression is not activated.

Note 2: At the time of connection, do not reverse the polarity of external supply power.

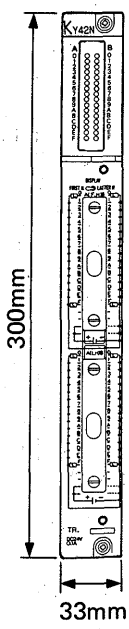
- *Terminals across each output terminal common are independent.*

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

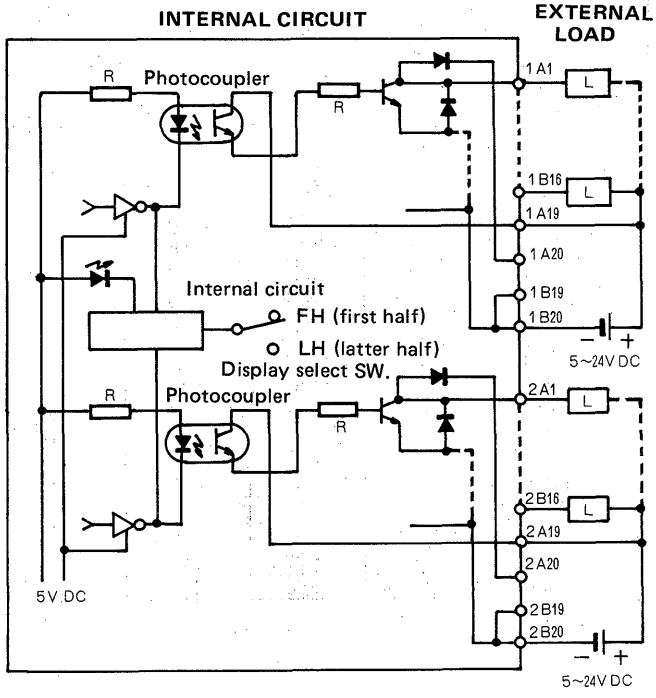
(20) Type KY42N output unit

Transistor Output Unit

Specifications \ Type		KY42N	Front View
Input points		64 points	
Insulation system		Photocoupler	
Rated load voltage		5/12/24VDC	
Operating load voltage range		4.75 ~ 40VDC	
Max. load current		0.1A/point, 3A/common	
Max. inrush current		0.4A	
Leakage current at OFF		0.1mA or lower	
Max. voltage drop at ON		1.5V (100mA), 0.75V (5mA), 0.7V (1mA)	
Response time	OFF → ON	1ms or shorter	
	ON → OFF	1ms or shorter (resistance load)	
Internal current consumption (5V)		320mA (TYP. all points ON)	
External supply power current consumption		44mA/common (24VDC TYP. 32 points ON)	
Noise suppression		Clamp diode	
Common wiring system		32 points/common (common terminal: 1B19, 20 / 2B19, 20)	
Operation indicator		Changeover display of 32 points by ON display (LED) SW	
External connection system		Two 40-pin connectors (with solder)	
Applicable wire size		0.3 mm²	
Accessory		Two external wiring connectors	Weight: 0.56 kg



Pin No.	Signal No. (FH)	Pin No.	Signal No. (LH)
1A1	Y00	2A1	Y20
1A2	Y01	2A2	Y21
1A3	Y02	2A3	Y22
1A4	Y03	2A4	Y23
1A5	Y04	2A5	Y24
1A6	Y05	2A6	Y25
1A7	Y06	2A7	Y26
1A8	Y07	2A8	Y27
1A9	Y08	2A9	Y28
1A10	Y09	2A10	Y29
1A11	Y0A	2A11	Y2A
1A12	Y0B	2A12	Y2B
1A13	Y0C	2A13	Y2C
1A14	Y0D	2A14	Y2D
1A15	Y0E	2A15	Y2E
1A16	Y0F	2A16	Y2F
1A17	Not used	2A17	Not used
1A18	Not used	2A18	Not used
1A19	5 ~ 24V DC	2A19	5 ~ 24V DC
1A20	5 ~ 24V DC	2A20	5 ~ 24V DC
1B1	Y10	2B1	Y30
1B2	Y11	2B2	Y31
1B3	Y12	2B3	Y32
1B4	Y13	2B4	Y33
1B5	Y14	2B5	Y34
1B6	Y15	2B6	Y35
1B7	Y16	2B7	Y36
1B8	Y17	2B8	Y37
1B9	Y18	2B9	Y38
1B10	Y19	2B10	Y39
1B11	Y1A	2B11	Y3A
1B12	Y1B	2B12	Y3B
1B13	Y1C	2B13	Y3C
1B14	Y1D	2B14	Y3D
1B15	Y1E	2B15	Y3E
1B16	Y1F	2B16	Y3F
1B17	Not used	2B17	Not used
1B18	Not used	2B18	Not used
1B19	0V	2B19	0V
1B20	0V	2B20	0V



Note 1: Use the same power supply for load power and external supply power. When they are not the same, noise suppression is not activated.

Note 2: At the time of connection, do not reverse the polarity of external supply power.

- *Terminals across each output terminal common are independent.*

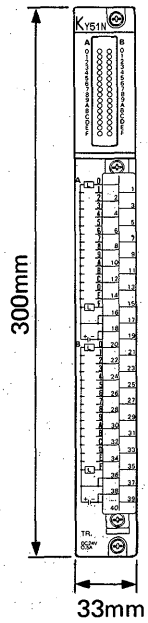
Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

(21) Type KY51N output unit

Transistor Output Unit

Specifications \ Type		KY51N
Input points		32 points
Insulation system		Photocoupler
Rated load voltage		12/24VDC
Operating load voltage range		10.2 ~ 30V DC
Max. load current		0.5A/point, 8A/common
Max. inrush current		7A 10ms or shorter, 3.5A 100 ms or shorter
Leakage current at OFF		0.1mA or lower
Max. voltage drop at ON		0.9V (TYP) 0.5A, 1.5V (MAX.) 0.5A
Response time	OFF → ON	1ms or shorter
	ON → OFF	1ms or shorter (resistance load)
Internal current consumption (5V)		360mA (TYP. all points ON)
External supply power current consumption		120mA/common (24VDC TYP. 16 points ON)
Noise suppression		Varistor (52 ~ 62V)
Fuse rating		Fast-melting fuse 2A (1 common/4 pcs)
Fuse blow indicator		Provided (LED turns on when fuse blows)
Common wiring system		16 points/common (common terminal: TB19, 20 / TB39, 40)
Operation indicator		ON display (LED)
External connection system		40-point terminal block connector (M3 x 6 mm screws)
Applicable wire size		0.75 ~ 2 mm² (applicable tightening torque: 7 kg·cm)
Applicable solder-less terminal		1.25–3, 1.25–YS3A, 2–S3, 2–YS3A, V1.25–3, V1.25–YS3A, V2–S3, V2–YS3A

Front View

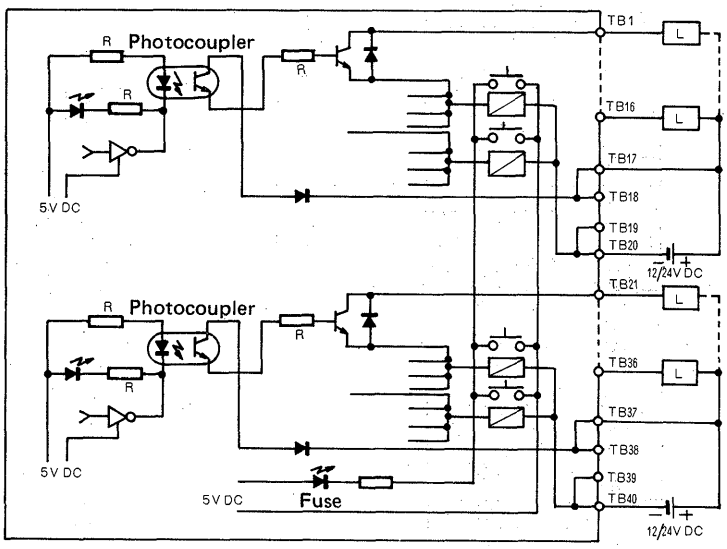


Weight	0.63 kg

Terminal No.	Signal No.	Terminal No.	Signal No.
TB1	Y00	TB21	Y10
TB2	Y01	TB22	Y11
TB3	Y02	TB23	Y12
TB4	Y03	TB24	Y13
TB5	Y04	TB25	Y14
TB6	Y05	TB26	Y15
TB7	Y06	TB27	Y16
TB8	Y07	TB28	Y17
TB9	Y08	TB29	Y18
TB10	Y09	TB30	Y19
TB11	Y0A	TB31	Y1A
TB12	Y0B	TB32	Y1B
TB13	Y0C	TB33	Y1C
TB14	Y0D	TB34	Y1D
TB15	Y0E	TB35	Y1E
TB16	Y0F	TB36	Y1F
TB17	12/24V DC	TB37	12/24V DC
TB18	12/24V DC	TB38	12/24V DC
TB19	0V	TB39	0V
TB20	0V	TB40	0V

INTERNAL CIRCUIT

EXTERNAL LOAD



- *Terminals across each output terminal common are independent.*

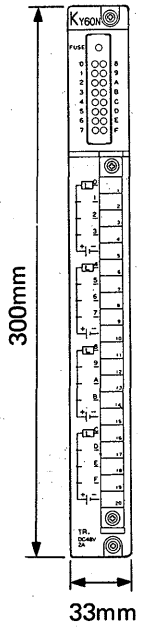
Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

(22) Type KY60N output unit

Transistor Output Unit

Specifications \ Type		KY60N
Input points		16 points
Insulation system		Photocoupler
Rated load voltage		12/24/48VDC
Operating load voltage range		10.2 ~ 60VDC
Max. load current		2A/point, 5A/common
Max. inrush current		8A 100ms or shorter, 12A 10 ms or shorter
Leakage current at OFF		0.1mA or lower
Max. voltage drop at ON		1.5V (2A)
Response time	OFF → ON	1ms or shorter
	ON → OFF	1ms or shorter (resistance load)
Internal current consumption	5V	240mA (TYP. all points ON)
	24V	90mA (TYP. all points ON)
Noise suppression		Varistor (108 ~ 132V)
Fuse rating		Fast-melting fuse 5A (1 common/pce)
Fuse blow indicator		Provided (LED turns on when fuse blows)
Common wiring system		4 points/common (common terminal: TB5, TB10 / TB15, TB20)
Operation indicator		ON display (LED)
External connection system		20-point terminal block connector (M3 x 6 mm screws)
Applicable wire size		0.75 ~ 2 mm² (applicable tightening torque: 7 kg·cm)
Applicable solder-less terminal		1.25–3, 1.25–YS3A, 2–S3, 2–YS3A, V1.25–3, V1.25–YS3A, V2–S3, V2–YS3A

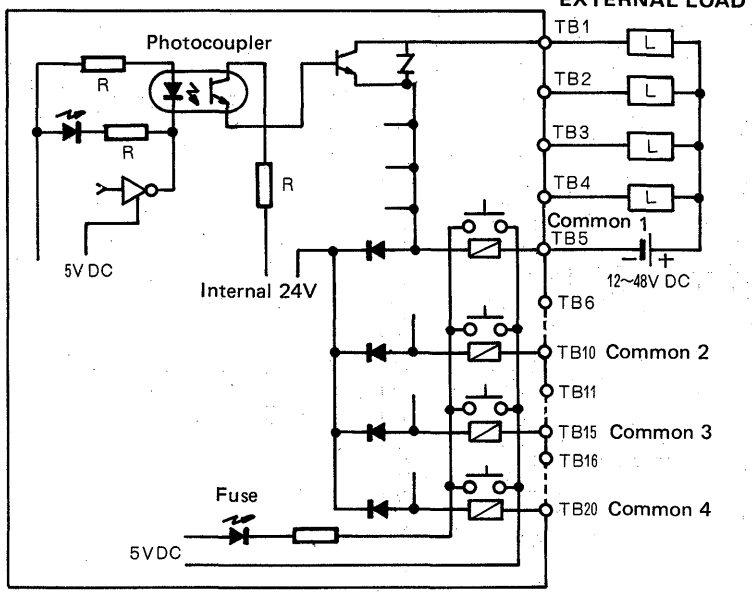
Front View



Weight: 0.72 kg

Terminal No.	Signal No.
TB1	Y00
TB2	Y01
TB3	Y02
TB4	Y03
TB5	Common 1
TB6	Y04
TB7	Y05
TB8	Y06
TB9	Y07
TB10	Common 2
TB11	Y08
TB12	Y09
TB13	Y0A
TB14	Y0B
TB15	Common 3
TB16	Y0C
TB17	Y0D
TB18	Y0E
TB19	Y0F
TB20	Common 4

INTERNAL CIRCUIT



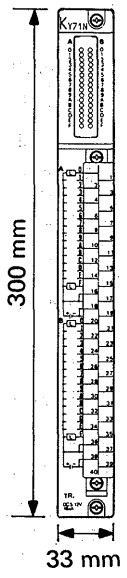
- *Terminals across each output terminal common are independent by diode.*

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

(23) Type KY71N output unit

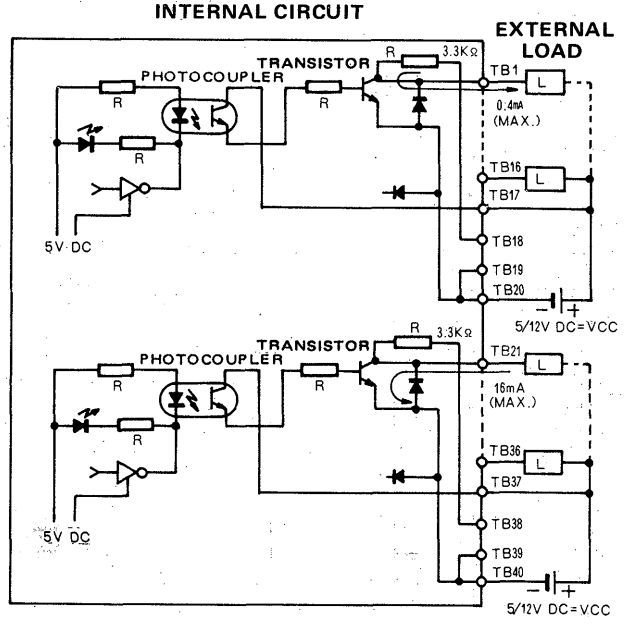
TTL, CMOS Output Unit

Specifications \ Type		KY71N	Front View
Output points		32 points	
Insulation system		Photocoupler	
Rated load voltage		5/12VDC	
Operating load voltage range		4.5 ~ 15VDC	
Max. load current		16 mA/point, 256 mA/common (sink load)	
Output voltage at OFF		VOH: 3.5V (Vcc = 5V, IOH = 0.4mA)*1	
Max. voltage drop at ON		VOL: 0.2V (IOL = 16mA)*1	
Response time	OFF → ON	1 ms or shorter	
	ON → OFF	1 ms or shorter	
Internal current consumption (5 V)		190 mA (TYP. all points ON)	
External supply power current consumption		100mA/common (12VDC, TYP, 16 points ON)	
Common wiring system		16 points/common (common terminal: TB19, TB20 / TB39, TB40)	
Operation indicator		ON display (LED)	
External connection system		40-point terminal block connector (M3 x 6 mm screws)	
Applicable wire size		0.75 ~ 2 mm² (applicable tightening torque: 7 kg·cm)	
Applicable solder-less terminal		1.25–3, 1.25–YS3A, 2–S3, 2–YS3A V1.25–3, V1.25–YS3A, V2–S3, V2–YS3A	Weight: 0.49kg



Terminal No.	Signal No.	Terminal No.	Signal No.
TB1	Y00	TB21	Y10
TB2	Y01	TB22	Y11
TB3	Y02	TB23	Y12
TB4	Y03	TB24	Y13
TB5	Y04	TB25	Y14
TB6	Y05	TB26	Y15
TB7	Y06	TB27	Y16
TB8	Y07	TB28	Y17
TB9	Y08	TB29	Y18
TB10	Y09	TB30	Y19
TB11	Y0A	TB31	Y1A
TB12	Y0B	TB32	Y1B
TB13	Y0C	TB33	Y1C
TB14	Y0D	TB34	Y1D
TB15	Y0E	TB35	Y1E
TB16	Y0F	TB36	Y1F
TB17	5/12V DC	TB37	5/12V DC
TB18	5/12V DC	TB38	5/12V DC
TB19	0V	TB39	0V
TB20	0V	TB40	0V

INTERNAL CIRCUIT



*1: *IOH = 0.4 mA indicates current which flows out of unit to exterior.*
IOL = 16 mA indicates current which flows into unit from exterior.

●*Terminals across each output terminal common are independent.*

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

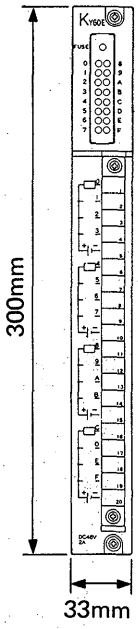
(24) Type KY60E output unit

OUT

4

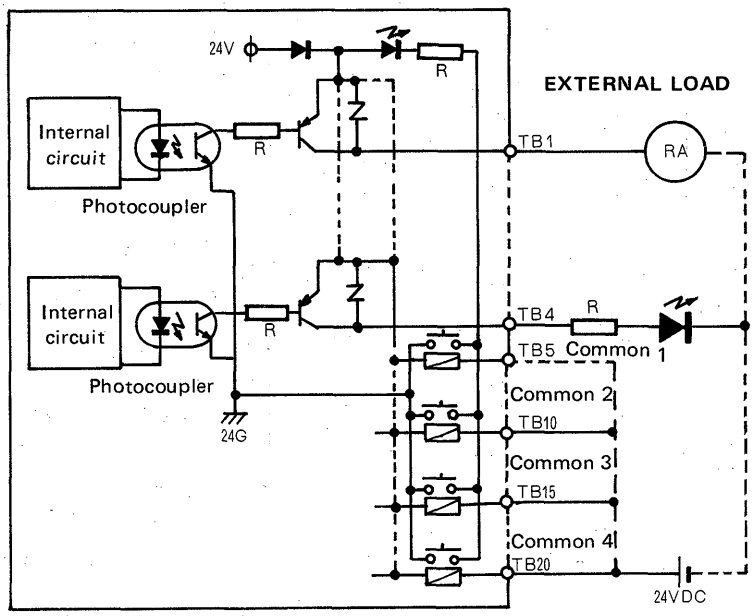
Transistor Output Unit

Specifications \ Type		KY60E	Front View
Input points		16 points	
Insulation system		Photocoupler	
Rated load voltage		12/24VDC	
Operating load voltage range		10.2 ~ 55VDC	
Max. load current		2A/point, 4A/4 points	
Max. inrush current		10A 100 ms or shorter	
Leakage current at OFF		0.1mA or lower	
Max. voltage drop at ON		1.5V (MAX.) 2A	
Response time	OFF → ON	0.1ms	
	ON → OFF	0.5ms	
Internal current consumption	5V	150mA (TYP. all points ON)	
	24V	40mA (TYP. all points ON)	
Noise suppression		Varistor (60 ~ 76V)	
Fuse rating		Fast-melting fuse 5A (1 common/pce)	
Fuse blow indicator		Provided (LED turns on when fuse blows)	
Common wiring system		4 points/common (common terminal: TB5, TB10 / TB15, TB20)	
Operation indicator		ON display (LED)	
External connection system		20-point terminal block connector (M3 x 6 mm screws)	
Applicable wire size		0.75 ~ 2 mm² (applicable tightening torque: 7 kg·cm)	
Applicable solder-less terminal		1.25–3, 1.25–YS3A, 2–S3, 2–YS3A, V1.25–3, V1.25–YS3A, V2–S3, V2–YS3A	Weight: 1.0 kg



Terminal No.	Signal No.
TB1	Y00
TB2	Y01
TB3	Y02
TB4	Y03
TB5	Common 1
TB6	Y04
TB7	Y05
TB8	Y06
TB9	Y07
TB10	Common 2
TB11	Y08
TB12	Y09
TB13	Y0A
TB14	Y0B
TB15	Common 3
TB16	Y0C
TB17	Y0D
TB18	Y0E
TB19	Y0F
TB20	Common 4

INTERNAL CIRCUIT

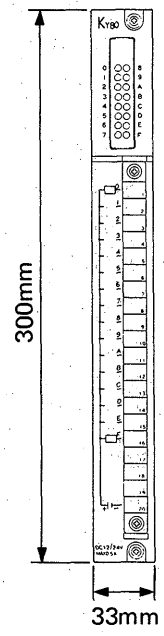


- *Terminals across each output terminal common are independent by diode.*

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

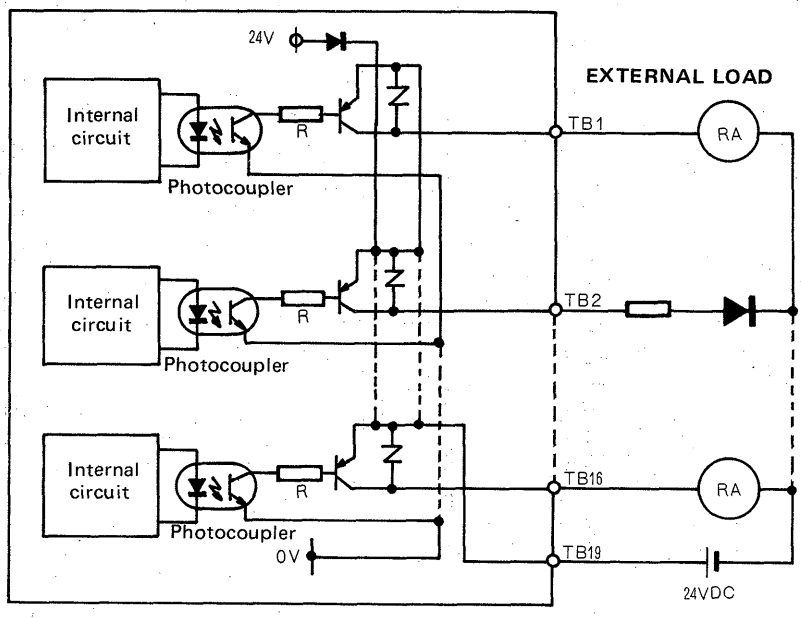
(25) Type KY80 output unit

Transistor Output Unit

Specifications \ Type		KY80	Front View	
Input points		16 points		
Insulation system		Photocoupler		
Rated load voltage		12/24VDC		
Operating load voltage range		10.2 ~ 50VDC		
Max. load current		0.5A/point, 2A/4 points		
Max. inrush current		4A 100 ms or shorter		
Leakage current at OFF		0.1mA or lower		
Max. voltage drop at ON		1.2V (MAX.) 0.5A		
Response time	OFF → ON	0.1ms		
	ON → OFF	0.5ms		
Internal current consumption	5V	130mA (TYP. all points ON)		
	24V	25mA (TYP. all points ON)		
Noise suppression		Varistor (52 ~ 62V)		
Common wiring system		16 points/common (common terminal: TB19)		
Operation indicator		ON display (LED)		
External connection system		20-point terminal block connector (M3 x 6 mm screws)		
Applicable wire size		0.75 ~ 2 mm^2 (applicable tightening torque: 7 kg·cm)		
Applicable solder-less terminal		1.25–3, 1.25–YS3A, 2–S3, 2–YS3A, V1.25–3, V1.25–YS3A, V2–S3, V2–YS3A	Weight	0.55 kg

Terminal No.	Signal No.
TB1	Y00
TB2	Y01
TB3	Y02
TB4	Y03
TB5	Y04
TB6	Y05
TB7	Y06
TB8	Y07
TB9	Y08
TB10	Y09
TB11	Y0A
TB12	Y0B
TB13	Y0C
TB14	Y0D
TB15	Y0E
TB16	Y0F
TB17	Not used
TB18	Not used
TB19	24V DC
TB20	Not used

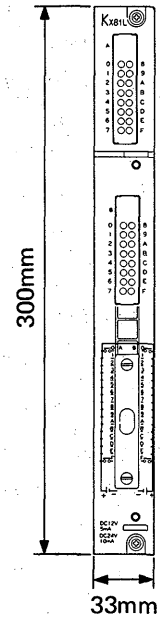
INTERNAL CIRCUIT



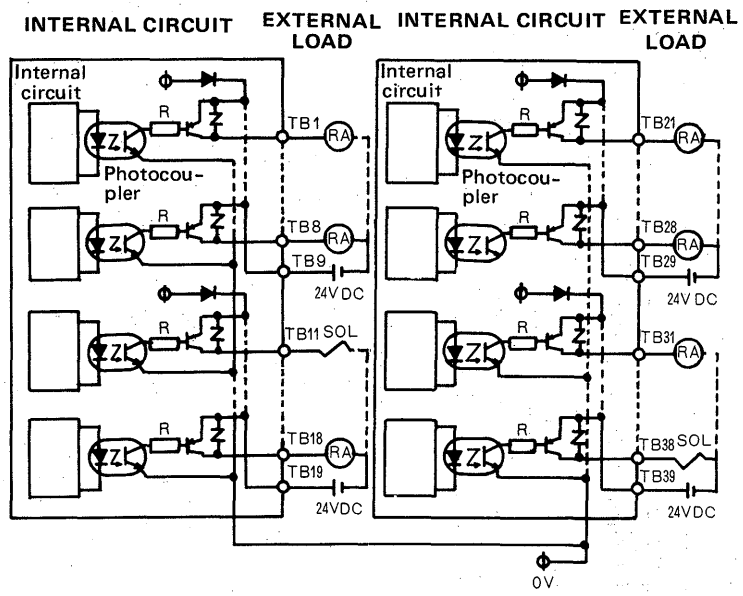
Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

(26) Type KY81L output unit

Transistor Output Unit

Specifications \ Type		KY81L	Front View
Input points		32 points	
Insulation system		Photocoupler	
Rated load voltage		12/24VDC	
Operating load voltage range		10.2 ~ 50VDC	
Max. load current		0.5A/point, 2A/4 points	
Max. inrush current		4A 100 ms or shorter	
Leakage current at OFF		0.1mA or lower	
Max. voltage drop at ON		1.2V (MAX.) 0.5A	
Response time	OFF → ON	0.1ms	
	ON → OFF	0.5ms	
Internal current consumption	5V	260mA (TYP. all points ON)	
	24V	50mA (TYP. all points ON)	
Noise suppression		Varistor (52 ~ 62V)	
Common wiring system		8 points/common (common terminal: 1A9, 1A19, 1B9, 1B19)	
Operation indicator		ON display (LED)	
External connection system		40-pin connector (with solder)	
Applicable wire size		0.3 mm²	
Accessory		External wiring connector	Weight: 0.6 kg

Terminal No.	Signal No.	Terminal No.	Signal No.
TB1	Y00	TB21	Y10
TB2	Y01	TB22	Y11
TB3	Y02	TB23	Y12
TB4	Y03	TB24	Y13
TB5	Y04	TB25	Y14
TB6	Y05	TB26	Y15
TB7	Y06	TB27	Y16
TB8	Y07	TB28	Y17
TB9	24V DC	TB29	24V DC
TB10	Not used	TB30	Not used
TB11	Y08	TB31	Y18
TB12	Y09	TB32	Y19
TB13	Y0A	TB33	Y1A
TB14	Y0B	TB34	Y1B
TB15	Y0C	TB35	Y1C
TB16	Y0D	TB36	Y1D
TB17	Y0E	TB37	Y1E
TB18	Y0F	TB38	Y1F
TB19	24V DC	TB39	24V DC
TB20	Not used	TB40	Not used



- *Terminals across each output terminal common are independent.*

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

4.2.4 Power supply unit specifications

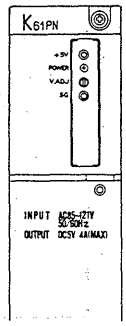
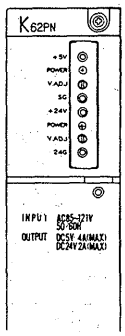
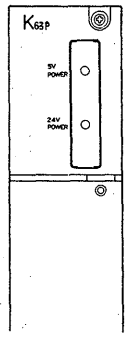
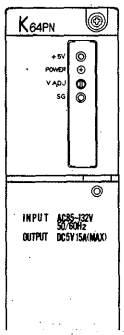
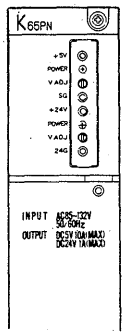
Item		Specifications				
		K61PN	K62PN	K63P	K64PN	K65PN
Input voltage		100–110VAC $^{+10\%}_{-15\%}$ (85~121VAC)	100–120VAC $^{+10\%}_{-15\%}$ (85~121VAC)	24VDC (20~30VDC)	100–120VAC $^{+10\%}_{-15\%}$ (85~132VAC)	100–120VAC $^{+10\%}_{-15\%}$ (85~132VAC)
Input frequency		50/60Hz	50/60Hz	–	50/60Hz	50/60Hz
Max. input apparent power		50VA	160VA	input current 2.8A (MAX)	150VA	160VA
Inrush current		7A, within 8ms	24A, within 8ms	–	30A, within 8ms	30A, within 8ms
Rated output current	5VDC	4A	4A	6A	15A	10A
	24VDC		2A			1A
Over-current protection	5VDC	4.5 ~ 6.5A	4.5 ~ 6.5A	6.6 ~ 7.4A	16.5 ~ 22.5A	11 ~ 18A
	24VDC		2.2 ~ 3.2A			1.5 ~ 2.5A
Over-voltage protection	5VDC	6.0 ~ 6.5V	6.0 ~ 6.5V	6.0 ~ 6.9V	6.0 ~ 6.5V	6.0 ~ 6.5V
	24VDC		27 ~ 28.5V			27 ~ 28.5V
Efficiency		65% or higher	65% or higher	72% or higher	65% or higher	65% or higher
Power indicator		5VDC LED display	5VDC, 24VDC LED displays	5VDC, 24VDC LED displays	5VDC LED displays	5VDC, 24VDC LED displays
Front view						
External dimensions (mm)		300 x 53 x 166				
Weight (kg)		1.2	1.5	1.4	1.5	1.5

Table 4.9 Power Supply Unit Specifications

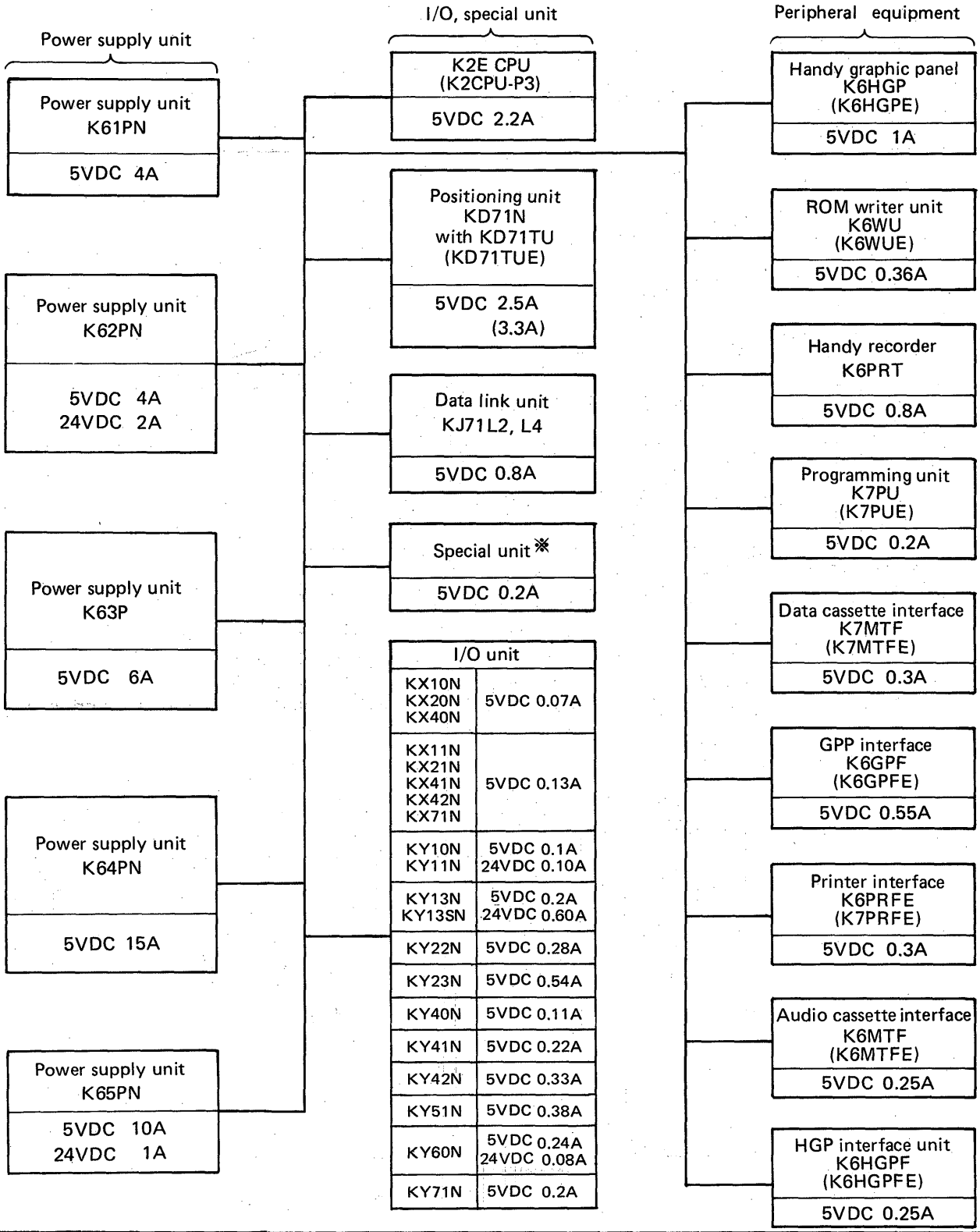
Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

POWER

4

Selection of Power Supply Unit

The power capacity of power supply unit and the load current of K2ECPU and each I/O unit are as shown below. Calculate total current consumption to select a power supply unit.



CAUTION

1. *Special unit marked with ※ indicates each unit described in the Instruction manual of Table 2.1 (P6).*
2. *In the event that the programmable controller is run with insufficient power capacity, it will lead to the failure of power supply unit, the damage of sequence program, or the failure of CPU.*

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

4.2.5 Basic base unit specifications MASTER

	K12BN	K15BN	K18BN
Number of loaded I/O units	2 units can be loaded	5 units can be loaded	8 units can be loaded
Terminal screw size	M4 x 0.7 x 6		
Applicable wire size	0.75 ~ 2 mm^2		
Applicable solder-less terminal	(V)1.25–4, (V)1.25–YS4, (V)2–S4, (V)2–YS4A (Applicable tightening torque: 17 kg·cm)		
External dimensions (mm)	300 x 240 x 4.5	300 x 345 x 45	300 x 450 x 45
Weight (kg)	1	1.5	2

Table 4.10 Basic Base Unit Specifications

4.2.6 Extension base unit specifications

	K65BN	K68BN	K55BN	K58BN
Number of loaded I/O units	5 units can be loaded	8 units can be loaded	5 units can be loaded	8 units can be loaded
Requirement of power supply unit	Power supply unit is required		Power supply unit is not required	
Terminal screw size	M4 x 0.7 x 6			
Applicable wire size	0.75 ~ 2 mm^2			
Applicable solder-less terminal	(V)1.25–4, (V)1.25–YS4, (V)2–S4, (V)2–YS4A (Applicable tightening torque: 17 kg·cm)			
External dimensions (mm)	300 x 310 x 45	300 x 415 x 45	300 x 275 x 45	300 x 380 x 45
Weight (kg)	1.4	1.9	1.2	1.6

Table 4.11 Extention Base Unit Specifications

4.2.7 Extension cable specifications

	K61CBLN	K67CBLN	K76CBLN	K77CBLN
Cable length	500 mm	900 mm	2000 mm	3000 mm
Application	Connection between basic base unit and extension base unit Connection between extension base units			
Weight (kg)	0.2	0.3	0.5	0.7

Table 4.12 Extension Cable Specifications

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

4.2.8 Lithium battery specifications

Lithium Battery Type	K6BAT
Nominal voltage	3.6 V
Guaranteed battery life	5 years
Total power	300 days (7200 hours)
Application	IC-RAM memory backup Latch function backup

Table 4.13 Lithium Battery Specifiactions

4.2.9 Fuse specifications

Type	MF60NR	MP50	MP20
Application	For base unit	For output inputs KY22N, KY23N, KY60N	For output unit KY51N
Shape	Encased in glass tube	Plug type	Plug type
External dimensions (mm)	ϕ6 x 32	17.2 x 5.5 x 19	17.2 x 5.5 x 19
Rated current	5A	5A	2A

Table 4.14 Fuse Specifiactions

4.2.10 Dummy unit specifications

Type	KG62N
Number of exclusively used I/O points	Maximum 64 points
Application	Unit for securing 16, 32, or 64 points in advance when I/O is expected to be added in the future.
External dimensions (mm)	300 x 33 x 166
Weight (kg)	0.4

Table 4.15 Dummy Unit Specifications

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

5. HANDLING

5. HANDLING ..... 57 ~ 80

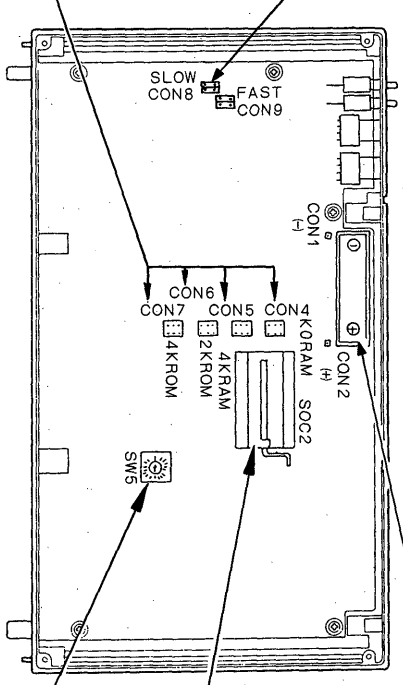
5.1 Nomenclature and Explanation 58
5.2 Loading 66
5.2.1 Loading procedure 66
5.2.2 Memory loading and setting 67
5.2.3 Battery loading 68
5.2.4 Extension base unit number setting 68
5.2.5 Connection of extension cable 69
5.2.6 Unit mounting to panel 70
5.2.7 Wiring 71
5.2.8 Troubles and corrective actions for I/O circuits 74
5.3 Operation Procedures 77
5.3.1 Flowchart for trial run 77
5.3.2 Error list 79

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

5. HANDLING

5.1 Nomenclature and Explanation

(1) K2NCPU unit panel and interior



Memory setting pin (CON4 ~ CON7)

Pin for setting program memory, RAM or ROM, and 1K, 2K or 4K. (This pin is factory-set to CON4.)

Process time setting pin

Pin for setting process time of one step of sequence instruction to FAST position (3.8μs/step) or SLOW position (5.6μs/step). (This pin is factory-set to SLOW position.)

RUN LED

Light emitting diode indicating run of programmable controller. Turns on when RUN key switch is at "RUN" position and turns off when RUN switch is at "STOP" or "PAUSE" position. When error occurs during run, self-diagnostic function detects error and this light emitting diode flickers.

LATCH switch

At "ON" position, power failure latch is activated.
At "OFF" position, power failure latch is disabled.
By combination of this switch and rotary switch, 13 types of power failure latch ranges can be set.

M. PRO (Memory Protect) switch

At "ON" position, contents of memory are protected.
At "OFF" position, protection of memory contents is reset.

Key switches

RUN—
"RUN": Programmable controller is run.
"STOP": Programmable controller is stopped.
"PAUSE": Programmable controller is stopped with output on.

RESET—
Switch used to reset arithmetic operation error and to initialize arithmetic operation.

Rotary switch

Switch for setting power failure latch range.
(This switch is factory-set to "0" position.

Socket for program and memory (SOC2)

Socket with lever for loading IC-RAM or EP-ROM memory.

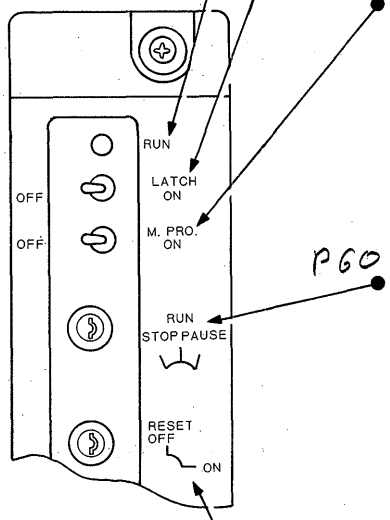
Battery (K6BAT)

Battery for backing up when IC-RAM memory and power failure latch function are used.

Connector for peripheral unit

Connector for connecting peripheral unit.

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com



RUN ----- RUN indicator LED

This LED indicates that the programmable controller is running. When the STOP-RUN-PAUSE select switch is at the "RUN" position and operation is normally executed, the LED is lit. When the select switch is at the "STOP" or "PAUSE" position, the LED is off. When CPU error occurs during run, the self-diagnostic function causes this LED to flicker.

LATCH ON-OFF ----- Power failure latch switch

The retention of contents at the time of power failure is referred to as a power failure latch function. When this switch is at the ON position, contents are retained at the time of power failure. When this switch is at the OFF position, contents cannot be retained at the time of power failure. The contents of temporary memory (M), timer (T), counter (C), and data register (D) to be retained at the time of power failure are determined depending on the position of power failure latch range setting rotary switch.

M. PRO. ON-OFF ----- Memory protect switch

When IC-RAM is used for a memory and this switch is at the "ON" position, write of data into sequence program memory from peripheral equipment is inhibited. Therefore, this switch protects the memory from being rewritten due to misoperation of peripheral equipment. When writing data into sequence program memory, be sure to move this switch to the "OFF" position.

STOP-RUN-PAUSE ----- STOP-RUN-PAUSE select key switch

This is a key switch used to specify the run, stop, or pause of programmable controller.

To run the programmable controller, move this switch to the "RUN" position. When the power is turned on with the switch at the "RUN" position, operation is immediately initiated.

When the switch is moved from the "RUN" to "STOP" position, operation is stopped and all output points are turned off. This is a temporary stop of operation and the control information during run remains as it is. Therefore, when the switch is moved to the "RUN" position without resetting by the RESET key switch, the operation is resumed. For normal start of run, the power may be turned on with this switch at the "RUN" position.

The pause function allows the programmable controller to stop with an output state held. Use this function by the combination of temporary memories M252 and M253.

RESET ON-OFF ----- RESET key switch

This switch is used to reset an arithmetic operation error and initialize arithmetic operation.

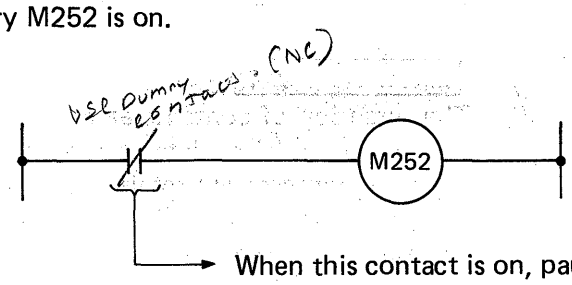
When the RUN indicator LED flickers during run, reset an error by this switch. To resume arithmetic operation after clearing all contents of operation, also use this switch. At this time, the contents of M, T, C, D, and outputs are all cleared. M, T, C, and D, for which power failure latch has been set by the rotary switch, are not cleared.

Artisan Technology Group - Quality Instrumentation. Guaranteed | (888) 88-SOURCE | www.artisantg.com

Pause Function

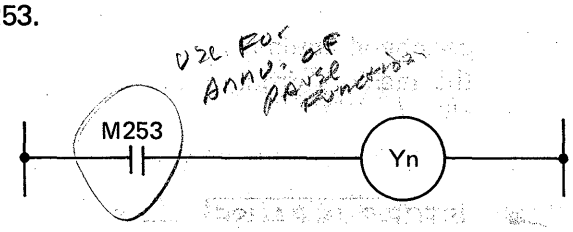
(a) Execution of pause

Even if the "STOP-RUN-PAUSE" key switch on the CPU unit panel is moved to the PAUSE position, the pause function is not executed. The pause function is executed only when the temporary memory M252 is on.



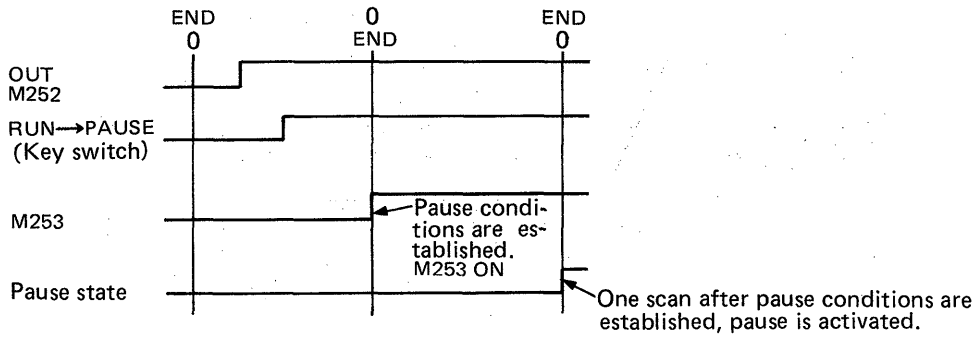
(b) Temporary memory M253

M253 is on during the execution of pause function.
When it is desired to indicate the execution of pause at the exterior, turn on an output Y at the contact of M253.



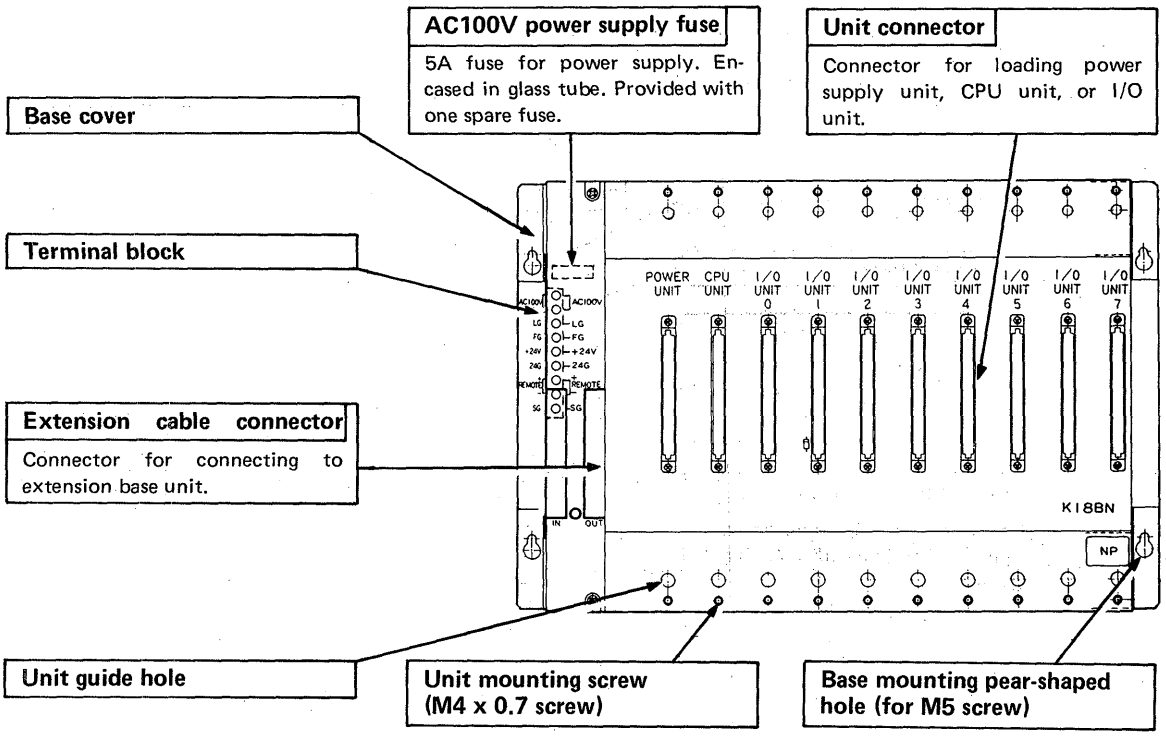
(c) During the execution of pause, the RUN indicator LED is off. However, the temporary memory M255 is on.

(d) The time chart, which indicates time until pause is activated, is shown.

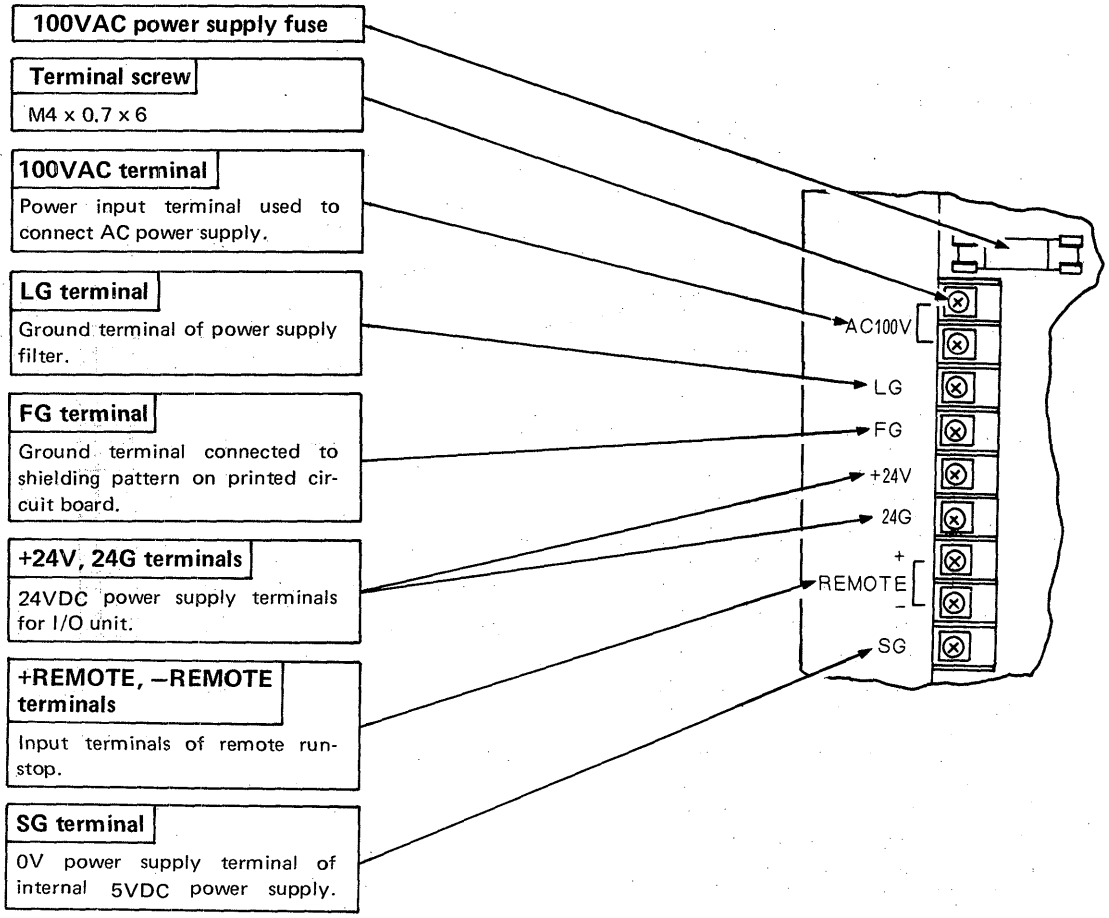


Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

(2) External view of basic base unit



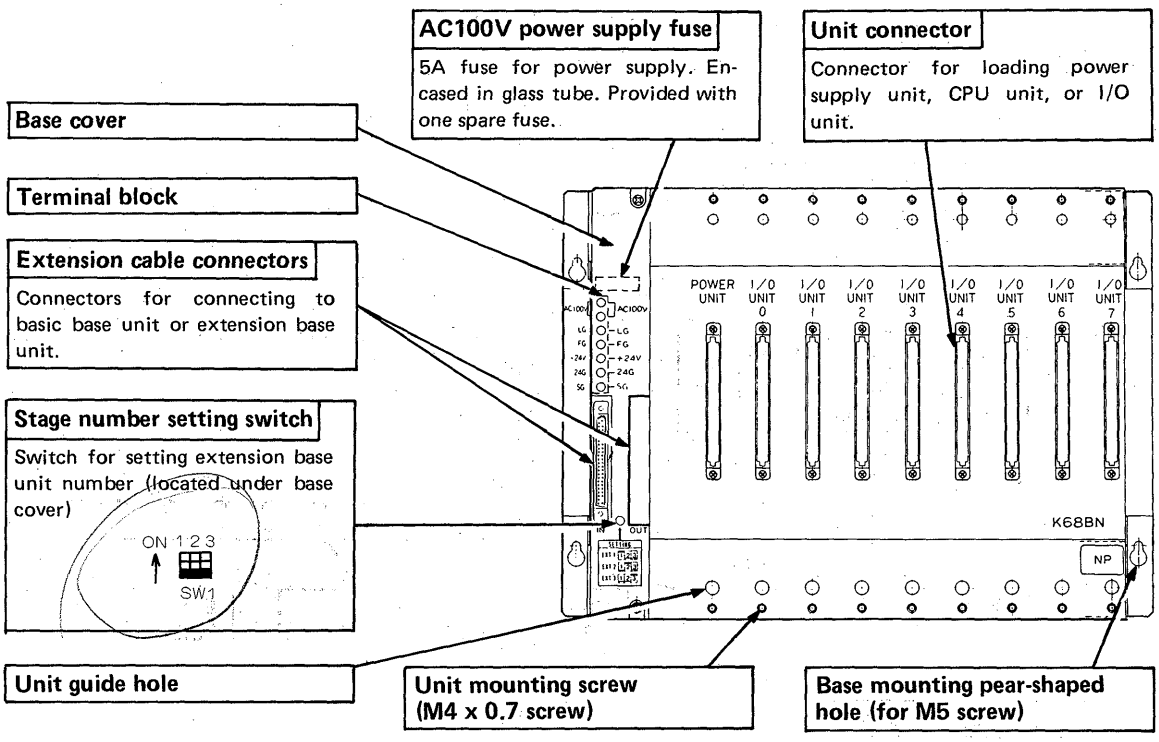
Details of terminal block



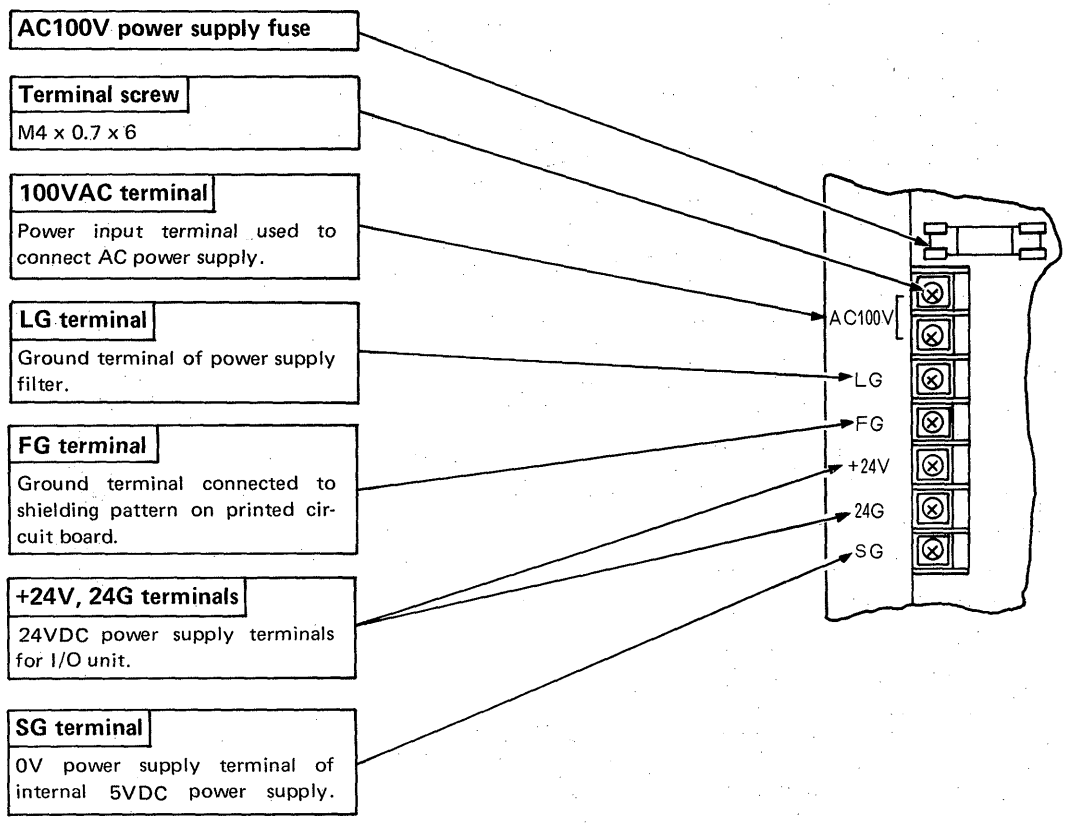
Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

(3) External view of extension base unit

1 Type K68BN, K65BN

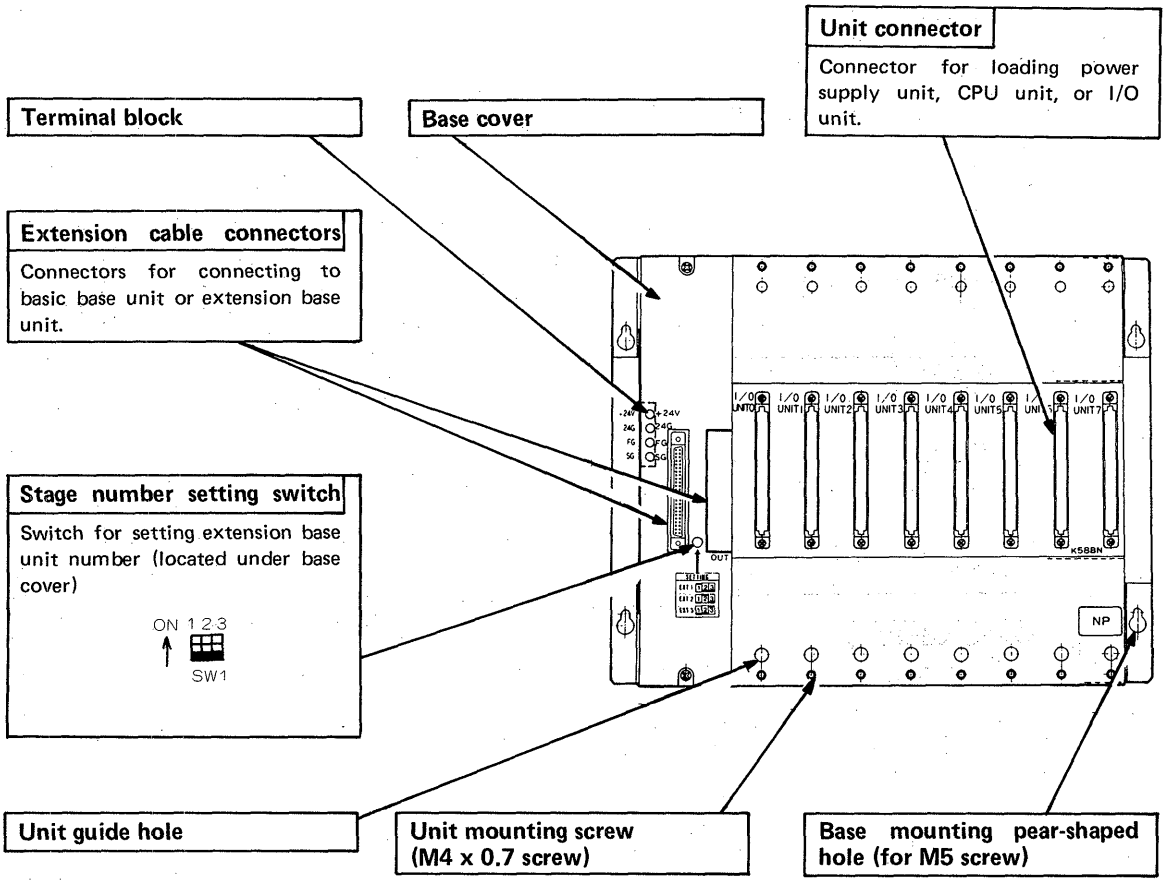


Details of terminal block

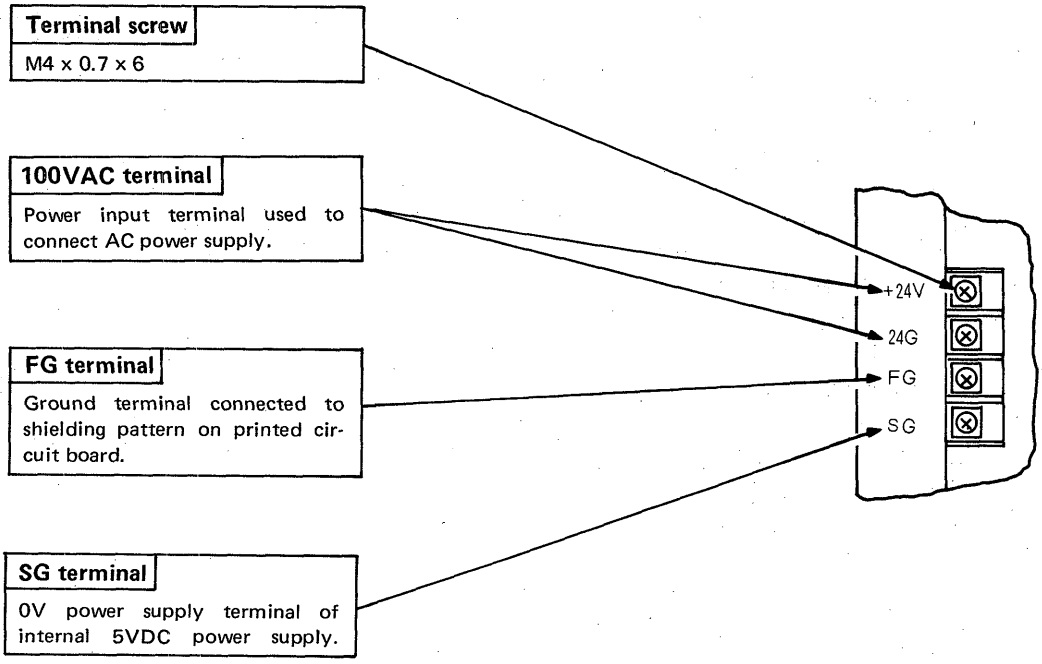


Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

2 Type K58BN, K55BN



Details of terminal block



Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

(4) Front panel of power supply unit

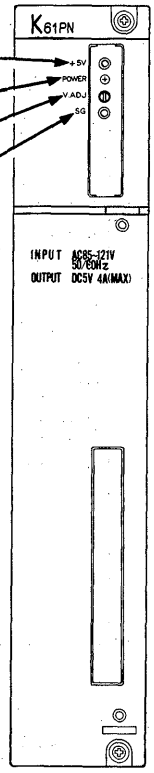
K61PN, K64PN

"+5V" terminal
5VDC check terminal. +5V is developed at this terminal. "SG" terminal is for checking 0V.

"POWER" LED
LED for indicating 5VDC power supply.

"V.ADJ"
Variable resistor for adjusting 5VDC voltage. (4.9 ~ 5.1VDC)

"SG" terminal
Check terminal of 0V side of 5VDC.



K62PN, K65PN

"+5V" terminal
5VDC check terminal. +5V is developed at this terminal. "SG" terminal is for checking 0V.

"POWER" LED
LED for indicating 5VDC power supply.

"V.ADJ"
Variable resistor for adjusting 5VDC voltage. (4.9 ~ 5.1VDC)

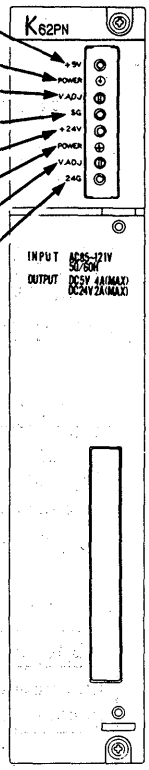
"SG" terminal
Check terminal of 0V side of 5VDC.

"+24V" terminal
24VDC check terminal. +24V is developed at this terminal. "24G" terminal is for checking 0V.

"POWER" LED
LED for indicating 24VDC power supply.

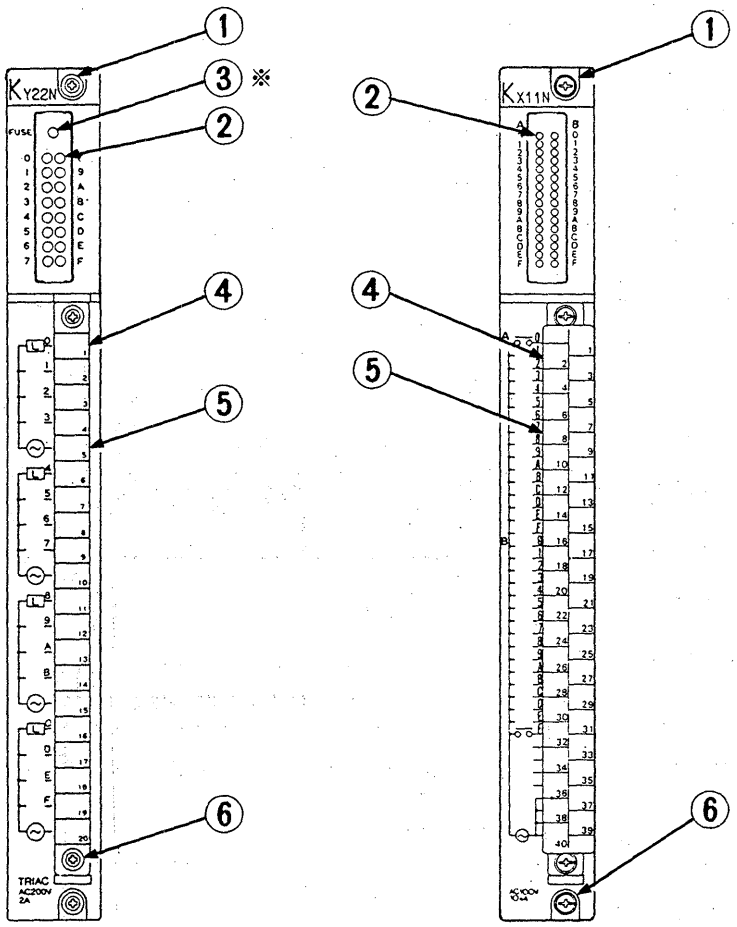
"V.ADJ"
Variable resistor for adjusting 24VDC voltage. (23 ~ 25VDC)

"24G" terminal
Check terminal of 0V side of 24VDC.



Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

(5) Front panel of I/O unit



20-point terminal block connector type	40-point terminal block connector type	40-point pin connector type

① Unit mounting screw ----- Screw for mounting the unit to the base unit (M4 screw)

② I/O indicator LED ----- Light emitting diode indicating the on and off state of I/O unit. This LED is lit at the on state.

③ *Fuse blow indicator LED ----- This light emitting diode is lit when the fuse blows.

④ Terminal block ----- Terminal block which connects the power and I/O signal wires.

⑤ Terminal screw (M3 x 0.5 x 6)

⑥ Terminal block fixing screw (M4 screw)

⑦ Display select switch ----- Select switch for LED display of first 32 points and latter 32 points.

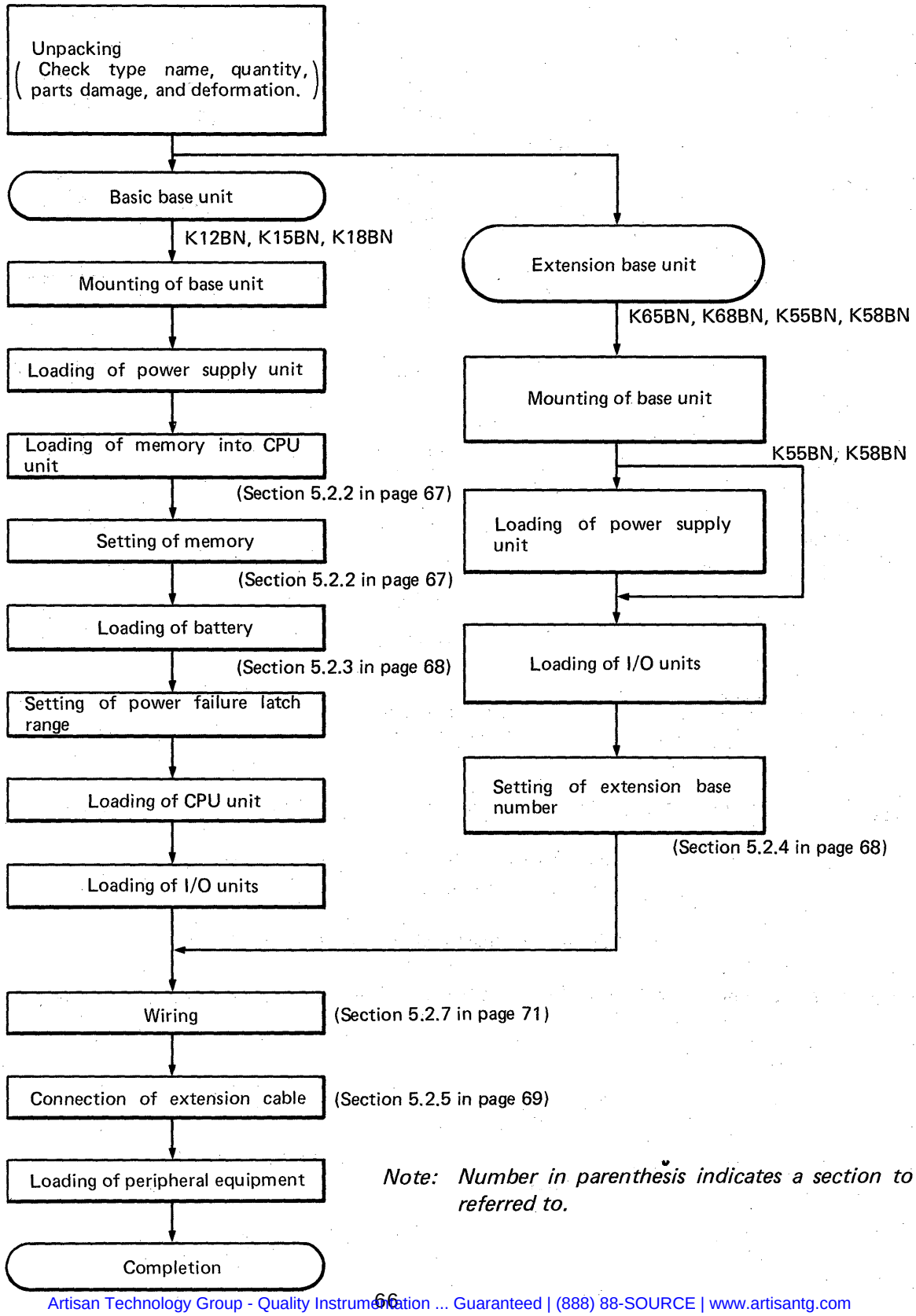
⑧ Pin connector ----- Used to connect the power and I/O signal wires (40-pin connector).

Note: Units provided with the fuse blow indicator are KY22N, KY23N, KY51N, and KY60N.

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

5.2 Loading

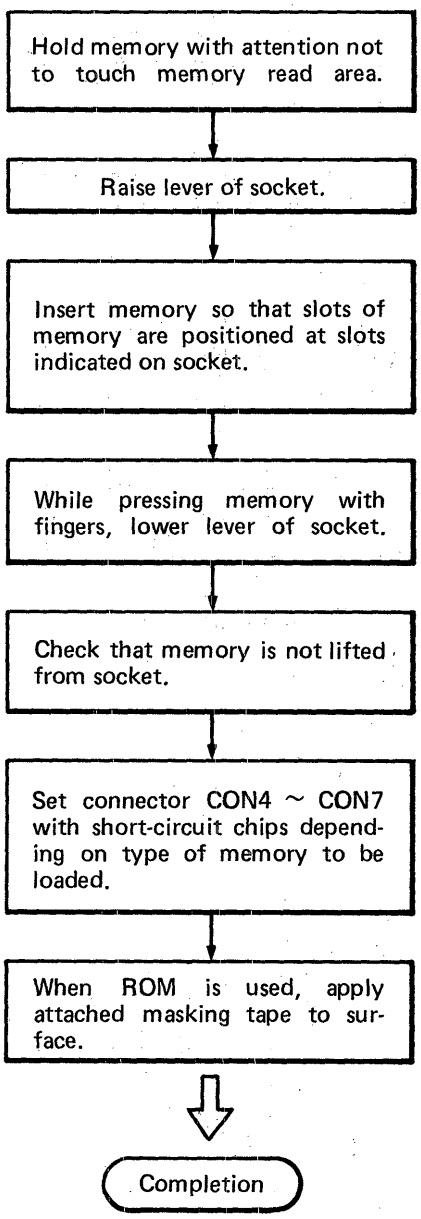
5.2.1 Loading procedure



Note: Number in parenthesis indicates a section to be referred to.

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

5.2.2 Memory loading and setting



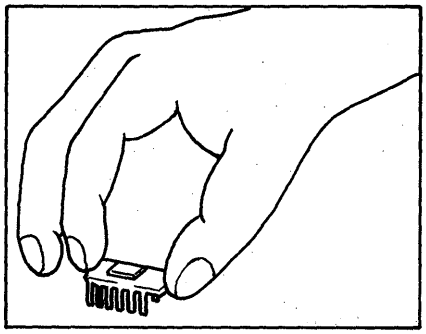


Fig. 5.1 How to Hold Memory

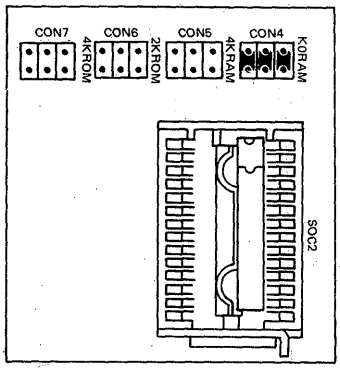


Fig. 5.2 Before Loading Memory

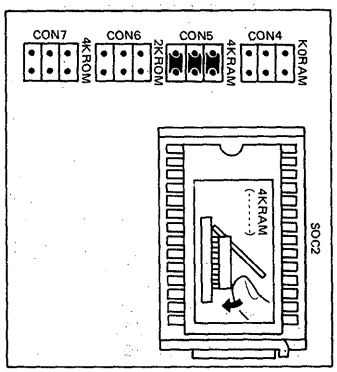


Fig. 5.3 After Loading Memory

	Number of Steps	Memory Loaded into Socket	Connector Type and Setting			
			CON7	CON6	CON5	CON4
RAM	1024	KORAM	○○○ ○○○	○○○ ○○○	○○○ ○○○	●●● ●●●
	4096	4KRAM	○○○ ○○○	○○○ ○○○	●●● ●●●	○○○ ○○○
ROM	2048	2KROM	○○○ ○○○	●●● ●●●	○○○ ○○○	○○○ ○○○
	4096	4KROM	●●● ●●●	○○○ ○○○	○○○ ○○○	○○○ ○○○

See P 58

Table 5.1 Setting of Memory

CAUTION

1. Be sure to load the memory according to the indication on the socket.
   Snugly fit the memory into the socket. Be careful not to loosely fit the memory into the socket.
2. Do not touch the lead area of memory. Also, do not bend the leads.
3. Be sure to store the memory in the case which has been used for the delivery of memory.
4. Never place the memory on a metal, which leaks or may possibly leak, or on an object which is charged with static electricity, such as wood, plastic, vinyl, fiber, cable, and paper.

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

5.2.3 Battery loading

Check that battery is loaded with correct polarity.

↓

Check that negative lead wire provided for battery is connected to correct position ($\overset{CON1}{(-)}$).

↓

Insert positive lead wire provided for battery into connector ($\overset{CON2}{(+)}$) (red lead wire for positive pole).

⇩

Completion

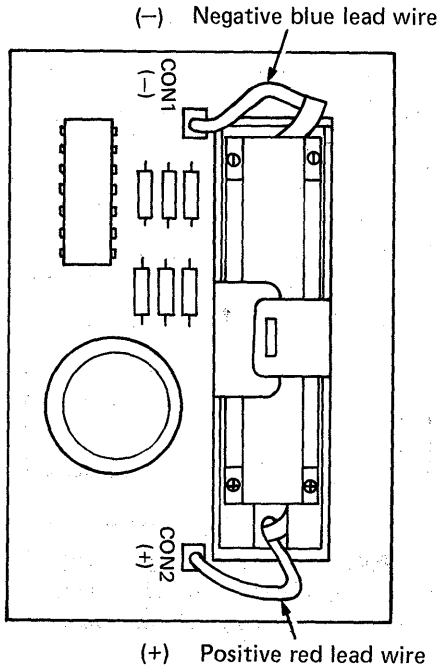


Fig. 5.4 Loading of Battery

CAUTION

When the battery is shipped, the lead wires are disconnected from the battery so that the battery is not consumed. When the RAM is used or the power failure latch function is employed with ROM, connect the lead wires.

5.2.4 Extension base unit number setting

Remove base cover mounting screws (two screws) and remove base cover from extension base unit.

↓

Select setting number from 1 ~ 3 of switch (SW1) located at lower left of base unit and move selected position to ON position.

⇩

Completion

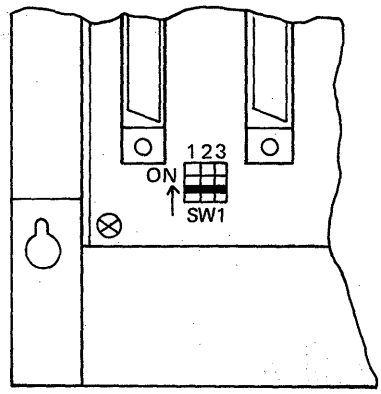


Fig. 5.5 Setting of Extension Base Unit Number

CAUTION

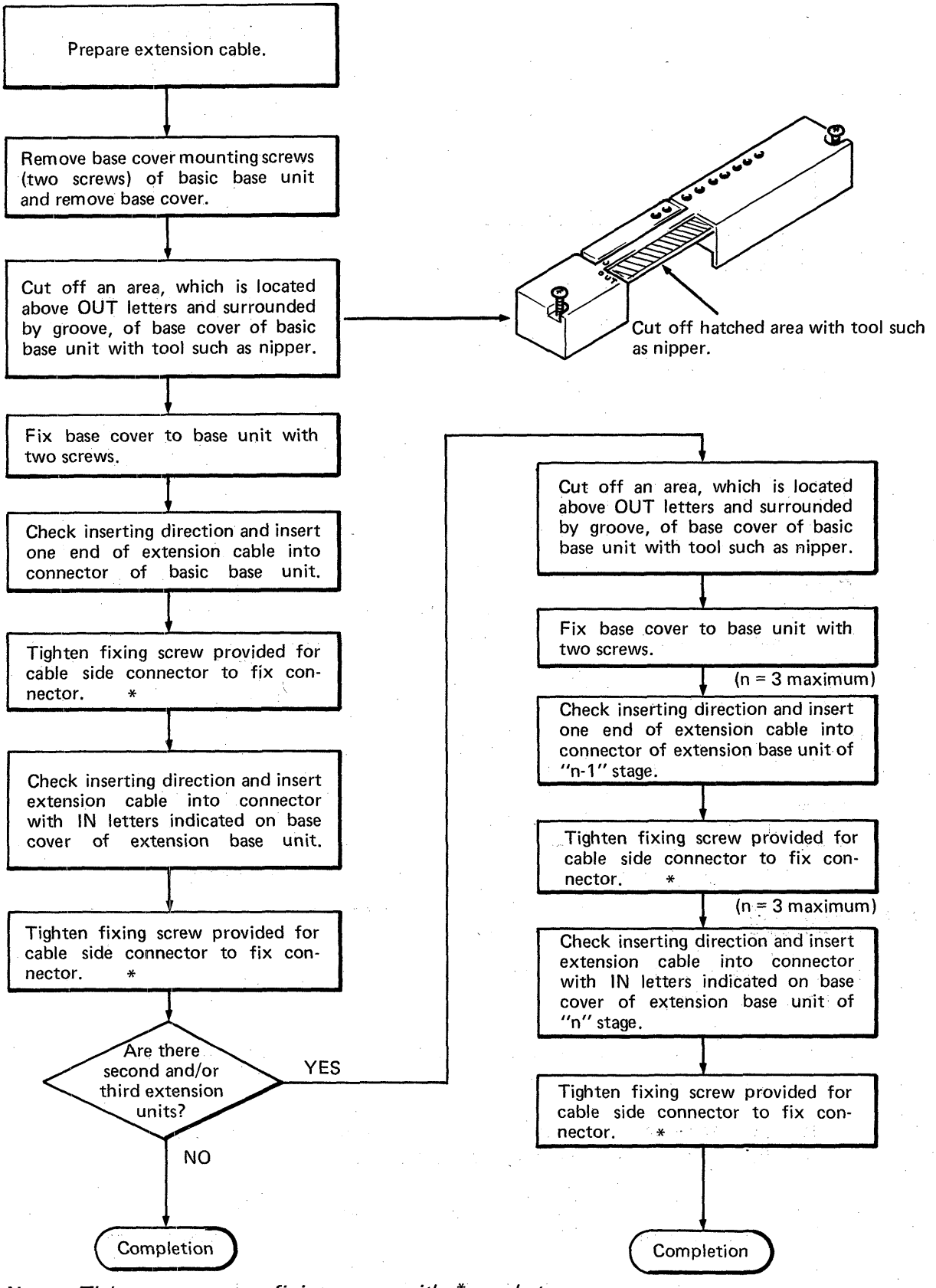
Be sure to set only one of three (1 ~ 3) positions of the switch (SW1) to ON position. When all positions are not set to ON position or two or three positions are set to ON position, note that erroneous input/output will be provided.

Extension Stage Number	Setting of SW1
1	ON ↑ 1 2 3
2	ON ↑ 1 2 3
3	ON ↑ 1 2 3

Setting of SW1

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

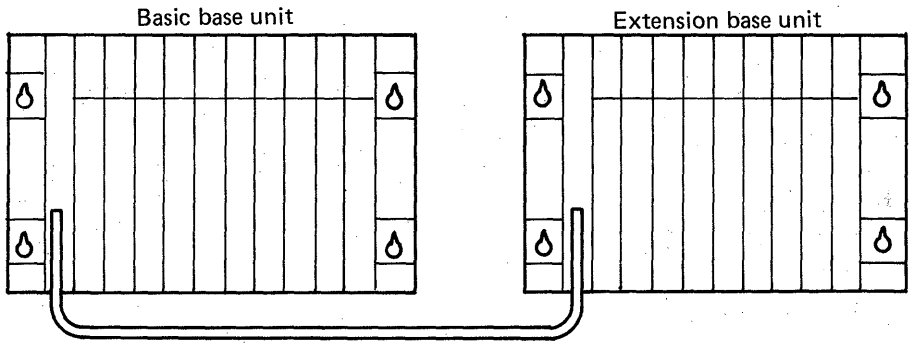
5.2.5 Connection of extension cable



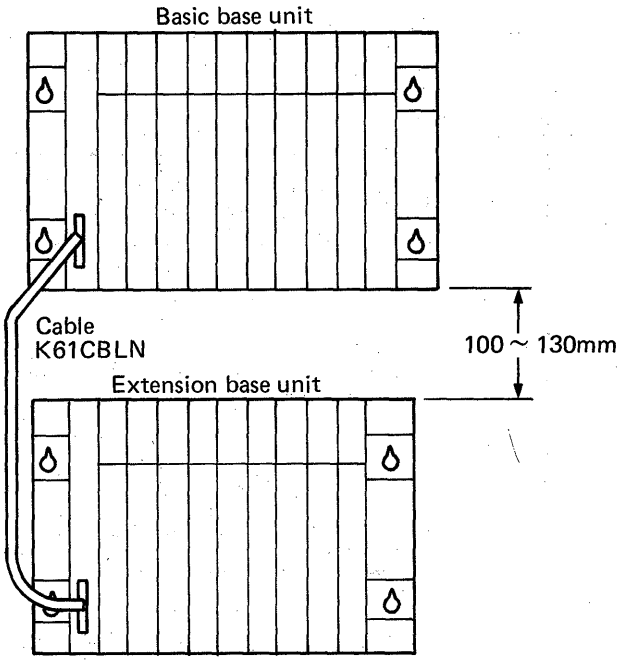
*Note: Tighten connector fixing screw with * mark to 3.7 ~ 4.9 kg·cm torque.*

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

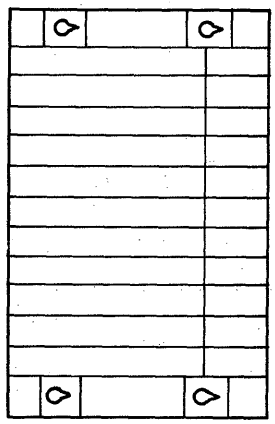
5.2.6 Unit mounting to panel



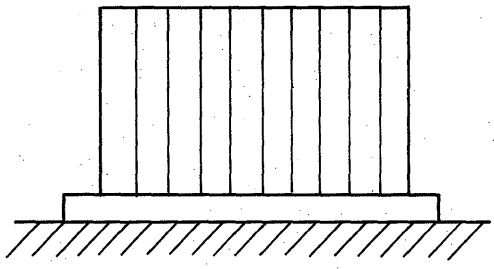
(1) Parallel Mounting



(2) Serial Mounting



(3) Vertical Mounting ----- Not allowed



(4) Horizontal Mounting ----- Not allowed

CAUTION

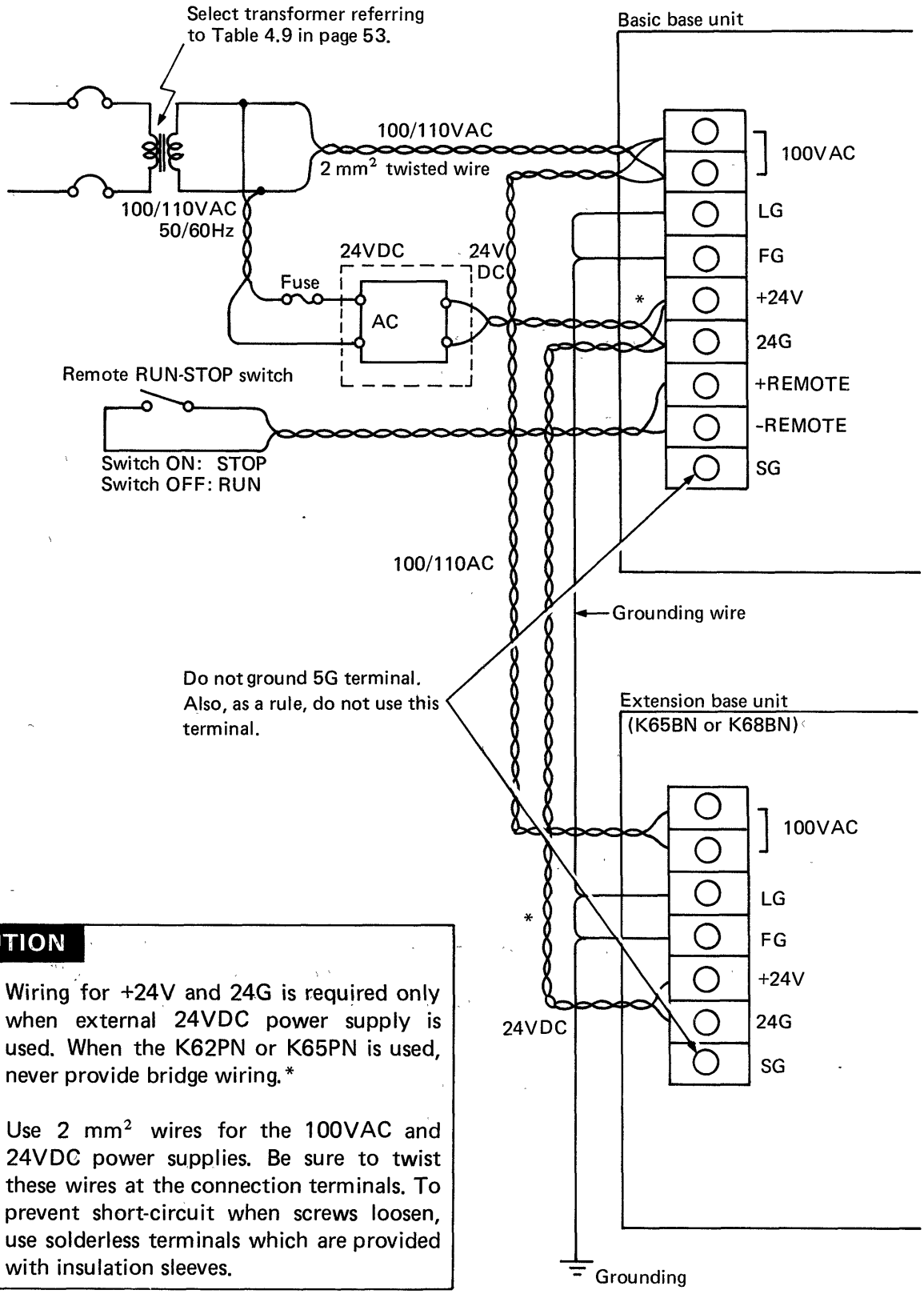
1. (3) vertical mounting and (4) horizontal mounting as shown above are not allowed due to poor ventilation.
2. For sufficient ventilation, provide a 50 mm or longer distance from the top and bottom of programmable controller to other constructions.
3. Mount vibration sources, such as a large-sized magnetic contactor and a no-fuse breaker, on another panel or separate them from the units.
4. If a base unit mounting surface is not uniform, excessive power is applied to the printed circuit boards, resulting in malfunction. Therefore, mount the base unit to a flat surface.
5. Provide a wiring duct as necessary. The height of duct located under the unit should be 50 mm or less for sufficient ventilation.

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

5.2.7 Wiring

(1) Wiring of power supply and grounding

When only the basic base unit is mounted or when the extension unit is added, wire the power supply and grounding as shown in Fig. 5.7.



CAUTION

1. Wiring for +24V and 24G is required only when external 24VDC power supply is used. When the K62PN or K65PN is used, never provide bridge wiring.*

2. Use 2 mm² wires for the 100VAC and 24VDC power supplies. Be sure to twist these wires at the connection terminals. To prevent short-circuit when screws loosen, use solderless terminals which are provided with insulation sleeves.

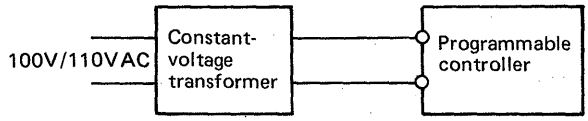
Fig. 5.6 Wiring of Power Supply and Grounding

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

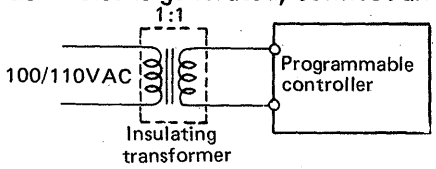
(2) Wiring instructions

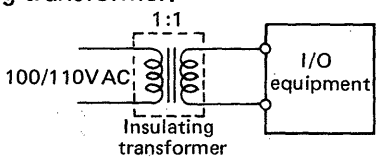
Power Supply

1 When voltage fluctuations are larger than specified, connect a constant-voltage transformer.



2 Use a power supply which generates minimal noise across wires and across wire and ground. When much noise is generated, connect an insulating transformer.



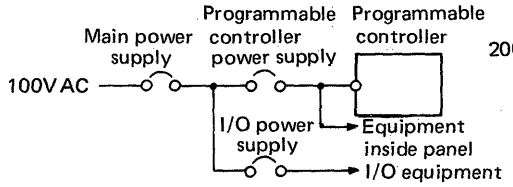


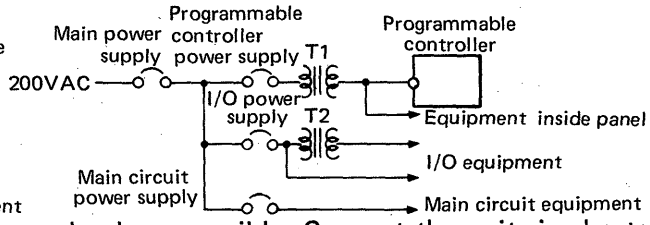
3 Use a transformer which has the following capacity to reduce voltage from 200VAC to 100VAC.

Power Supply Unit	Transformer Capacity
K61PN	50VA x n
K62PN	160VA x n
K64PN	150VA x n
K65PN	160VA x n

"n" stands for the number fo power supply units.

4 Separate the power supply system for programmable controller from the power supply systems for I/O equipment and power equipment as shown below.





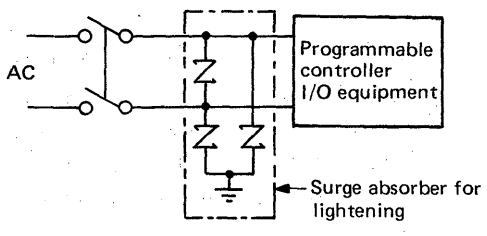
5 Twist the 100VAC and 24VDC wires as closely as possible. Connect the units in shortest distance possible.

6 To minimize voltage drop, use thickest (2 mm^2 from a solderless terminal) wires possible for 100VAC and 24VDC.

7 Do not bundle the 100VAC and 24VDC cables with the main-circuit (high-voltage, large-current) wires and I/O signal wires. Also do not wire the 100VAC and 24VDC cables close to the aforementioned wires. If possible, provide more than 100 mm distance between them.

8 As a measure against surge due to lightening, connect a varistor for lightening as shown at right.

Note: Select a surge absorber for lightening which will not exceed its maximum allowable circuit voltage even when the power voltage rises to the maximum.



Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

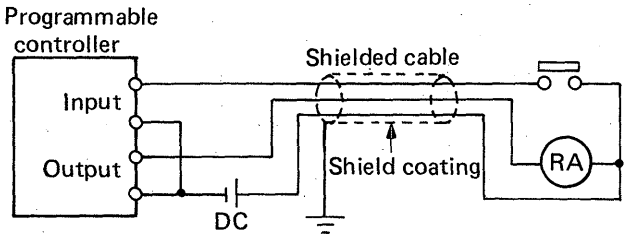
I/O Equipment

1 Although wire size connectable to terminal block connector is 0.75 ~ 2mm^2, it is recommended to use wire size of 0.75mm^2 for the convenience of usage.

2 Separately wire the input wire and output wire.

3 Separate I/O signal wires at least 100 mm away from high-voltage and large-current main circuit wires.

4 When the I/O signal wires cannot be separated from the main circuit wires and power wires, conduct grounding on the programmable controller side by use of batch-shielded cables.



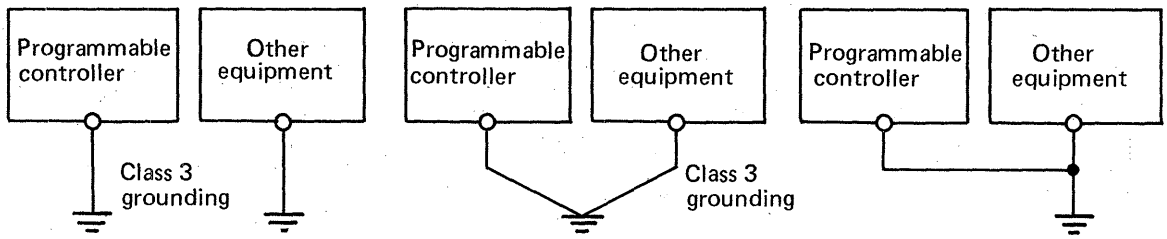
5 When wiring has been done by use of piping, securely ground the piping.

6 Separate the 24VDC I/O wires from the 100VAC and 200VAC wires.

7 When wiring has been conducted in 200 mm or longer distance, malfunction is caused by leakage current due to line capacity. Take a corrective action as described in Section 5.2.8.

Grounding

1 Ground the programmable controller as independently as possible.
Conduct the grounding work by way of Class 3 grounding (with grounding resistance 100Ω or less). When independent grounding is impossible, use the joint grounding method as shown in the figure below (b).



(a) Independent grounding ----- best

(b) Common grounding ----- good

(c) Common grounding ----- not allowed

2 Use 2 mm^2 or thicker grounding wire.

3 Grounding point should be nearest possible to the programmable controller to minimize the distance of grounding cable.

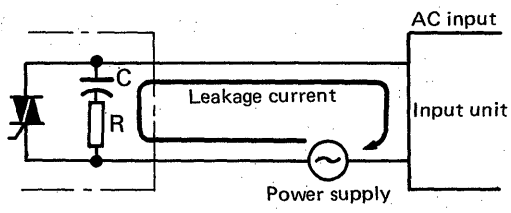
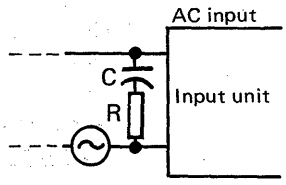
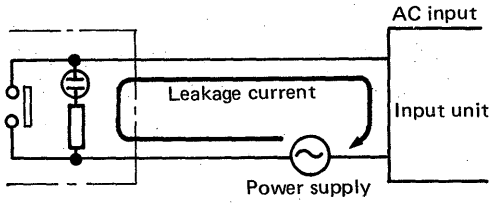
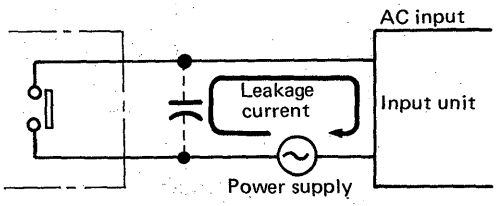
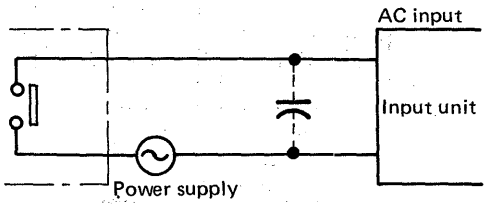
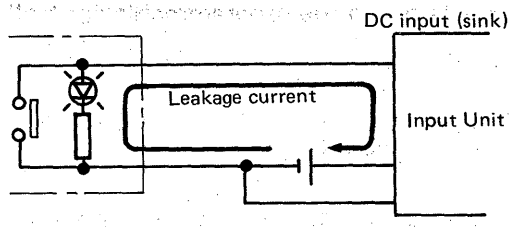
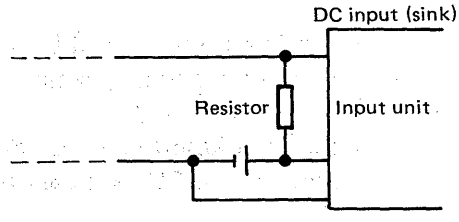
4 Should malfunction occur due to grounding, disconnect either or both of the grounding terminals (LG, FG) of base unit from the grounding.

5 Provided with sufficient measures against noise, the programmable controller can be used without grounding except when there is especially much noise.

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

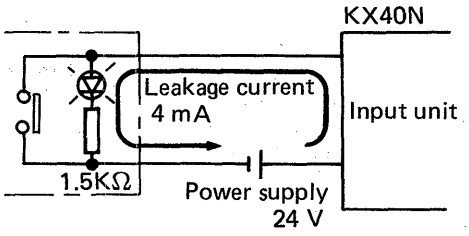
5.2.8 Troubles and corrective actions for I/O circuits

(1) Troubles and corrective actions for input circuit

Condition	Cause	Corrective Action
Example 1 Input signal fails to turn off.	Leakage current of input switch (such as drive by non-contact switch) 	Connect a resistor which will make the voltage across terminals of input unit lower than OFF voltage value.  It is recommended to use 0.1 ~ 0.4μF + 47 ~ 120Ω (1/2W) for constant of CR.
Example 2 Input signal fails to turn off.	Drive by limit switch with neon lamp 	Same as Example 1 Or make up another independent display circuit.
Example 3 Input signal fails to turn off.	Leakage current due to line capacity across wiring cables. Line capacity C across twisted pair wires is approx. 100 PF/m. 	Same as Example 1. However, leakage current is not generated when power supply is located on the input equipment side as shown below. 
Example 4 Input signal fails to turn off.	Drive by switch with LED indicator 	Connect a proper resistor which will make the voltage across input unit terminal and — common higher than OFF voltage.  *: Calculation example of value of connected resistor is shown in the next page.

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

1 Calculation example of Example 1

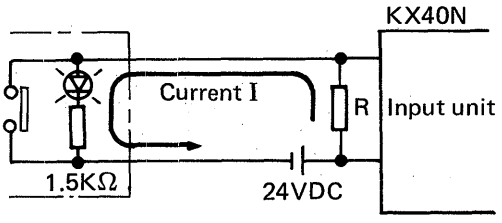


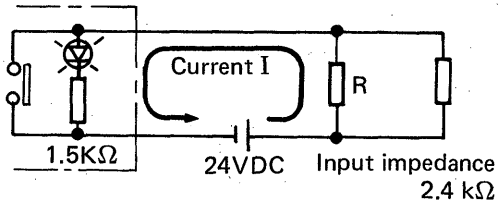
The switch with LED indicator is connected to KX40N and there is a 4 mA leakage current.

The voltage across terminal and common is obtained by the following expression:

V_{TB} = 4 (mA) x 2.4 (KΩ) = 9.6 (V) (Voltage drop of LED is ignored.)

Since the OFF voltage should be 6 (V) or lower, the input signal does not turn off. Therefore, connect a resistor as shown below.





Calculate the value of resistor R as shown below:

Since the terminal voltage should be 6V or lower,

$$\left(\frac{2.4R}{2.4+R}(K\Omega)\right) \times 4\ (mA) \leqq 6\ (V)$$

Therefore, $R \leqq 4\ (K\Omega)$

For this reason, set R to 3 KΩ.

Then, the power capacity W of resistor is obtained by the following expression:

W = (applied voltage)^2/R

(or W = (maximum current)^2 x R)

Therefore, the power capacity W of resistor R is

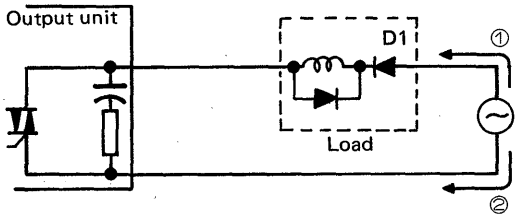
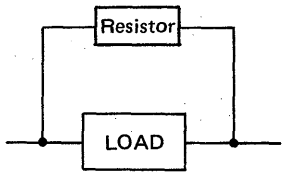
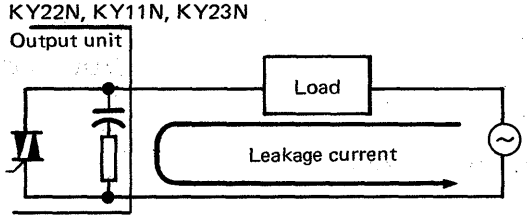
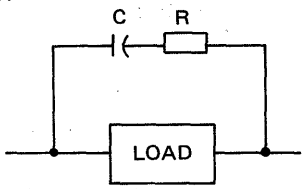
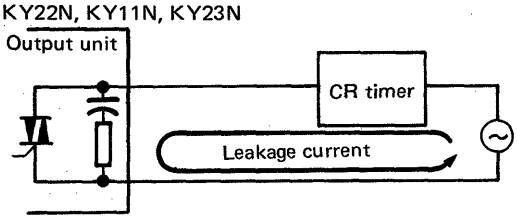
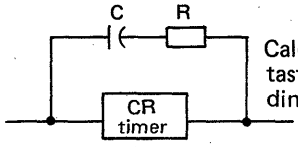
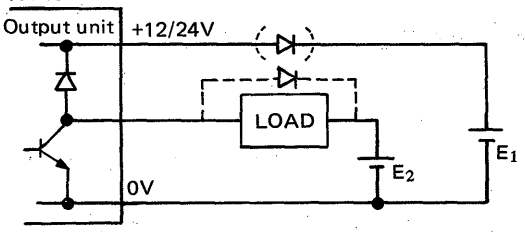
W = 24 (V)^2/3 (KΩ) = 0.192 (W)

To provide 3 ~ 5 times allowance, set the power capacity of resistor to 0.5 ~ 1 (W).

As calculated above, connect a resistor of 3 (KΩ) and 0.5 ~ 1 (W) across the terminal in question and COM.

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

(2) Troubles and corrective actions for output unit

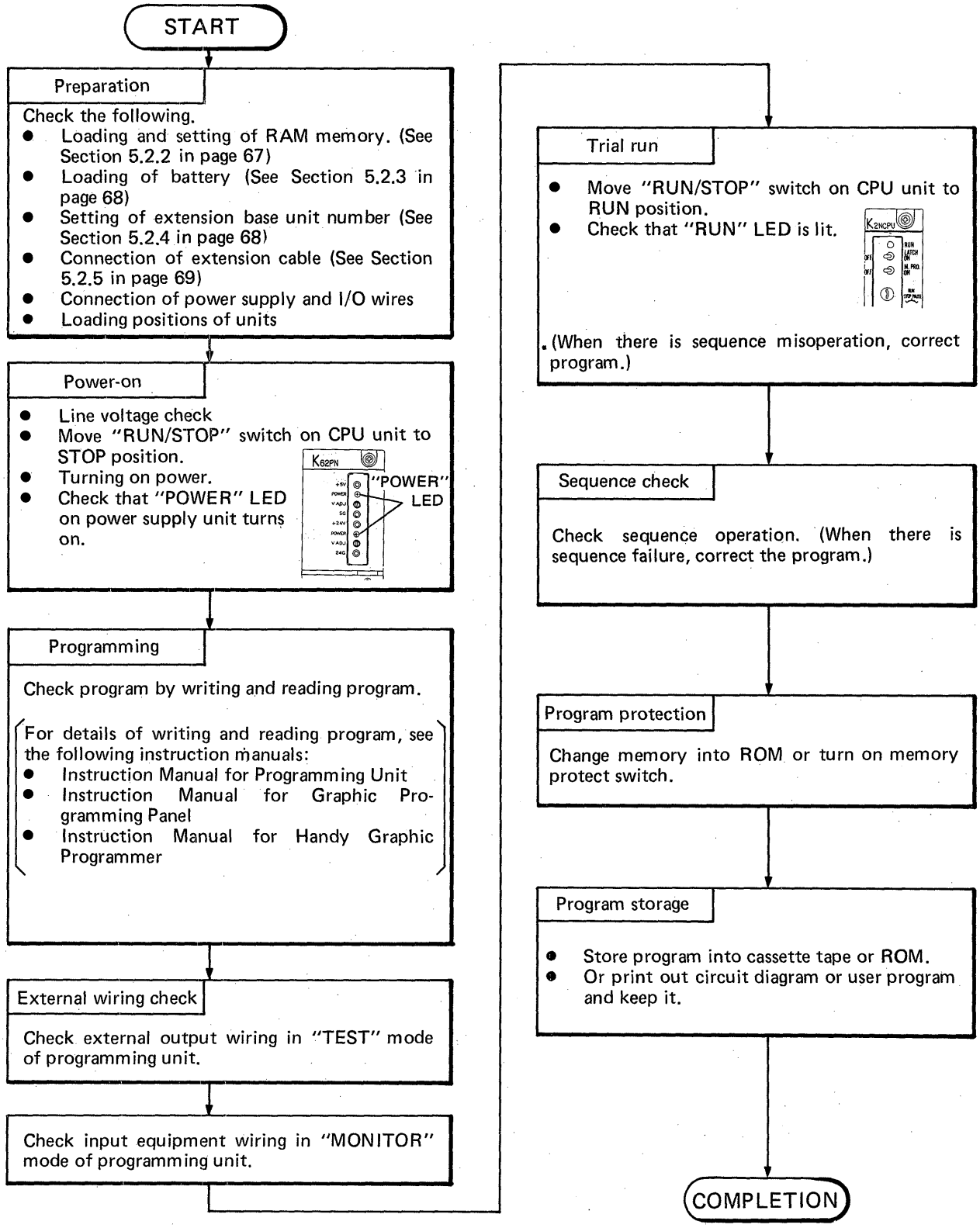
Condition	Cause	Corrective Action
Example 1 When output is off, excessive voltage is applied to load	Load is half-wave rectified internally (seen in some solenoids) KY22N, KY11N, KY23N  When power supply polarity is as shown by ① C is charged. When polarity is as shown by ② voltage charged in C plus line voltage are applied across D1. Max. voltage is approx. $2\sqrt{2}E$.	Connect resistor of several ten KΩ to several hundred KΩ across both ends of load. *Note: When resistor is used in this way, it does not pose problen to output element but may sometimes cause the diode, which is built in the load, to deteriorate or burn.* 
Example 2 Load fails to turn off.	Leakage current due to built-in noise suppression KY22N, KY11N, KY23N 	Connect resistor of several ten KΩ across load. *Note: When wiring distance from output card to load is long, take care because there may exist leakage current due to line capacity.*  It is recommended to use 0.1 ~ 0.47μsF + 47 ~ 120Ω (1/2W) for constant of CR.
Example 3 When load is CR type timer, time limit fluctuates.	KY22N, KY11N, KY23N 	After driving relay, drive the CR type timer at the same contact. Use timer which is not C-R type. *Note: Some timers have half-wave rectified internal circuits. Therefore, the same care as indicated in Note in Example 1 should be taken.*  Calculate the contast of CR depending on loads.
Example 4 Load fails to turn off. (For direct current)	Snake path due to use of two power supplies. KY40N  When E1 < E2, snake path occurs.	Reduce power supplies from two to one. Connect a snake path prevention diode. *Note: When load is relay or similar device, it is necessary to connect reverse voltage absorbing diode (shown in dotted line in the figure at left) with the load.*

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

5.3 Operation Procedures

5.3.1 Flowchart for trial run

This section shows a flowchart beginning after the completion of programmable controller installation until trial run.



Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

(1) Power-off

Because of the following reasons, turn on or off the power as seldom as possible. To stop operation temporarily, move the "STOP-RUN-PAUSE" switch on CPU to "STOP" position.

- Minimize electrical stresses which will be applied to elements due to turn-on and inrush currents.
- Minimize thermal stresses which will be applied to elements due to turn-on and inrush currents.
- Minimize the interval of power-off time to lengthen the service life of backup battery.

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

5.3.2 Error list

When the RUN indicator LED on the CPU flickers, check for an error in the following procedure.

Example

① PU
〈 Operation 〉
TEST | K | STEP ±

〈 Display 〉 Error display
[ ] | K | 5021

② GPP
〈 Operation 〉
KCPU
TEST | K | GO

〈 Display 〉 ----- CRT
Error step
5021
Error display

Table 5.2 shows the error types and corrective actions.

Error Display	Content	Corrective Action
0 〉 4095	Display of error step number (1) The instruction code of program, which is being processed, has a code which the CPU cannot decode. (2) The result of conversion into BCD exceeds "9999". (3) Since the program has jumped to a step behind END by CJ instruction, END has not been executed.	The step indicated by error display has a program error. Correct the program.
4096	The program is not provided with END.	Write END in the program. (When END instruction is not provided, GPP cannot display a circuit mode.)
5000	The power failure latch range setting rotary switch has been set to one of D ~ F.	Check the setting of rotary switch and set it to one of 0 ~ C.
5004	Two or more KJ71L2 or KJ71L3 (P3) are loaded.	Reduce the number of KJ71L2 or KJ71L3 (P3) units to one.
5005	Four or more KJ71** are loaded.	Reduce the number of KJ71** units to three or less.
5006	(1) Hardware error of KJ71** (2) The position of KJ71** setting switch is incorrect.	(1) Check the position of KJ71** setting switch.
5007	The initial program is incorrect.	Correct the initial program. (See Section 5.2.3 (2) of Instruction Manual for Data Link System.)
5021	The process time of program has exceeded 170 ms.	Reduce the process time of program by using a CF instruction, for example.

Table 5.2 Error Types and Corrective Actions

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

MEMO

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

6. MAINTENANCE AND INSPECTION

6. MAINTENANCE AND INSPECTION . . . . . 81 ~ 92

6.1 Daily Inspection 82
6.2 Periodic Inspection 83
6.3 Troubleshooting 84
6.3.1 General troubleshooting flowchart 84
6.3.2 Flowchart used when "POWER" LED has turned off 85
6.3.3 Flowchart used when "RUN" LED has turned off 86
6.3.4 Flowchart used when "RUN" LED flickers. 87
6.3.5 Flowchart used when output load of output unit does nc turn on 88
6.3.6 Flowchart used when program cannot be written 89
6.4 Battery Change 90
6.4.1 Battery life 90
6.4.2 Battery changing procedure. 91
6.5 Fuse Change 92

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

6. MAINTENANCE AND INSPECTION

6.1 Daily Inspection

Check the items in Table 6.1

No.	Check Item		Check Point	Judgement	Corrective Action
1	Main unit mounting conditions		Check for loose mounting screws and cover.	The main unit should be securely mounted.	Retighten screws.
2	Connecting conditions		Check for loose terminal screws.	Screws should not be loose.	Retighten terminal screws.
			Check for closeness of solderless terminals	Proper clearance should be provided between solderless terminals.	Correct.
			Check connectors of extension cable.	Connectors should be securely mounted.	Retighten connector mounting screws.
3	Main unit indicator lamps	"POWER" lamp	Check that the lamp is on.	On. (Off indicates an error.)	See Section 6.3.2
		"RUN" lamp	Check that the lamp is on during run.	On. (Off or flicker indicates an error.)	See Section 6.3.3 and 6.3.4.
		Input lamp	Check that the lamp turns on and off.	On when input is off. Off when input is off. (Display, which is not as mentioned above, indicates an error.)	See Section 6.3.5.
		Output lamp	Check that the lamp turns on and off.	On when output is on. Off when output is off. (Display, which is not as mentioned above, indicates an error.)	See Section 6.3.5.

Table 6.1 Daily Inspection Items

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

6.2 Periodic Inspection

Check the items in Table 6.2 once or twice each six months. Also check the items after the programmable controller is moved or modified and wiring has been changed.

No.	Check Item		Checking Method	Judgement	Corrective Action
1	Line voltage		Measure voltage across 100VAC terminal.	85 ~ 121V AC	Change supply power. Change transformer tap.
2	Connecting conditions	Mounting conditions	Move the unit.	The unit should be mounted securely and positively.	Retighten screws.
		Dust or foreign material sticking	Visual check.	There should be no sticking dust or foreign material.	Remove and clean.
3	Connecting conditions	Loose terminal screws	Retighten screws with screwdriver.	Screws should not be loose.	Retighten.
		Closeness of solderless terminals	Visual check.	Proper clearance should be provided between solderless terminals.	Correct.
		Loose connector	Visual check.	Connectors should be mounted securely.	Retighten connector mounting screws.
4	Battery		Check that M254 turns off with PU in monitor mode.	(Preventive maintenance)	If battery capacity reduction is not indicated, change battery when specified service life is exceeded.
5	Fuse		Check if fuse has blown or not.	(Preventive maintenance)	Change fuse periodically if it does not blow because its element is consumed due to inrush current.
6	Output voltage of power supply unit		Measure voltage at check terminals of	5V (4.9 ~ 5.1V) 24V (23 ~ 25V)	Adjust voltage at the power supply unit.

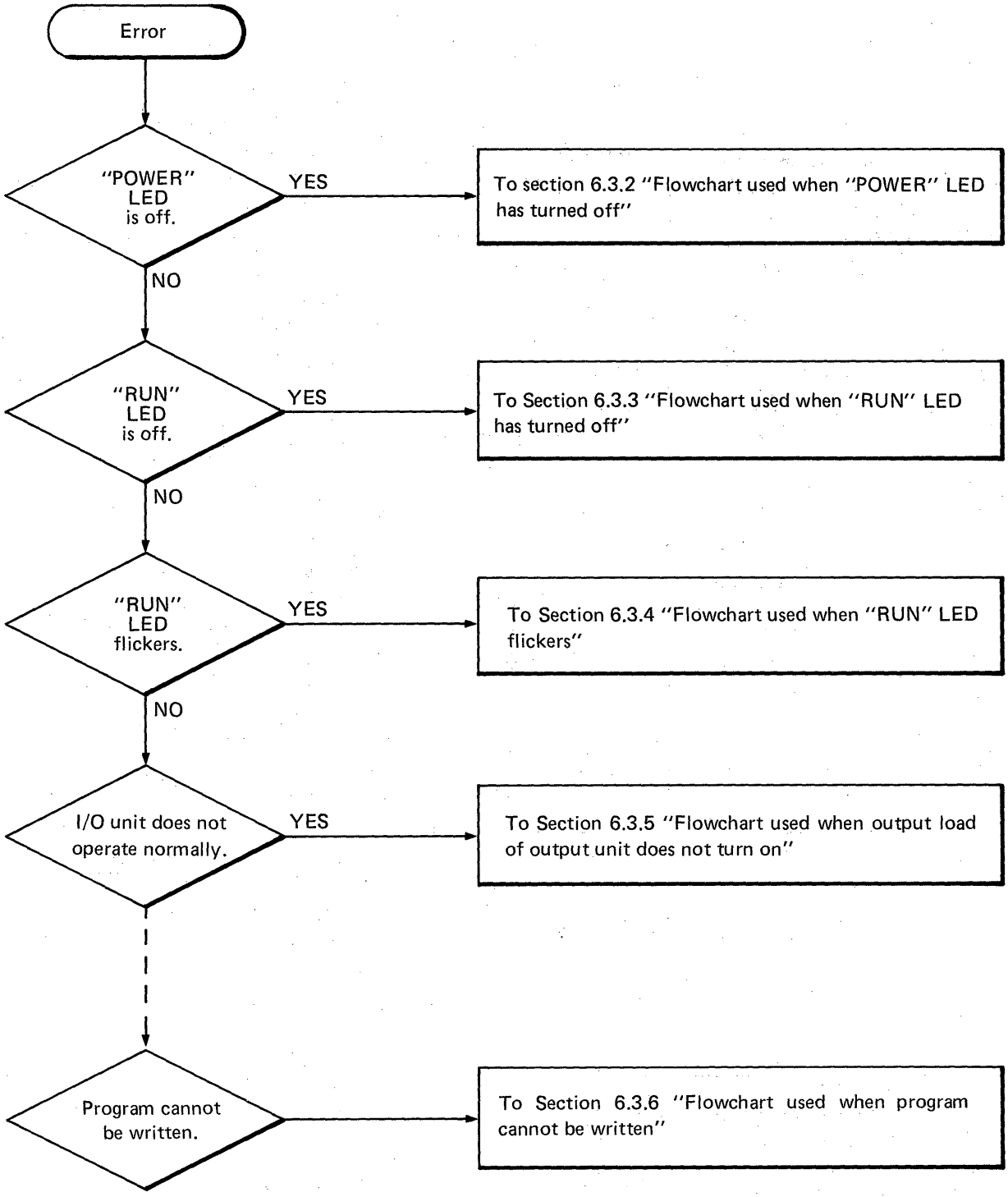
Table 6.2 Periodic Inspection Items

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

6.3 Troubleshooting

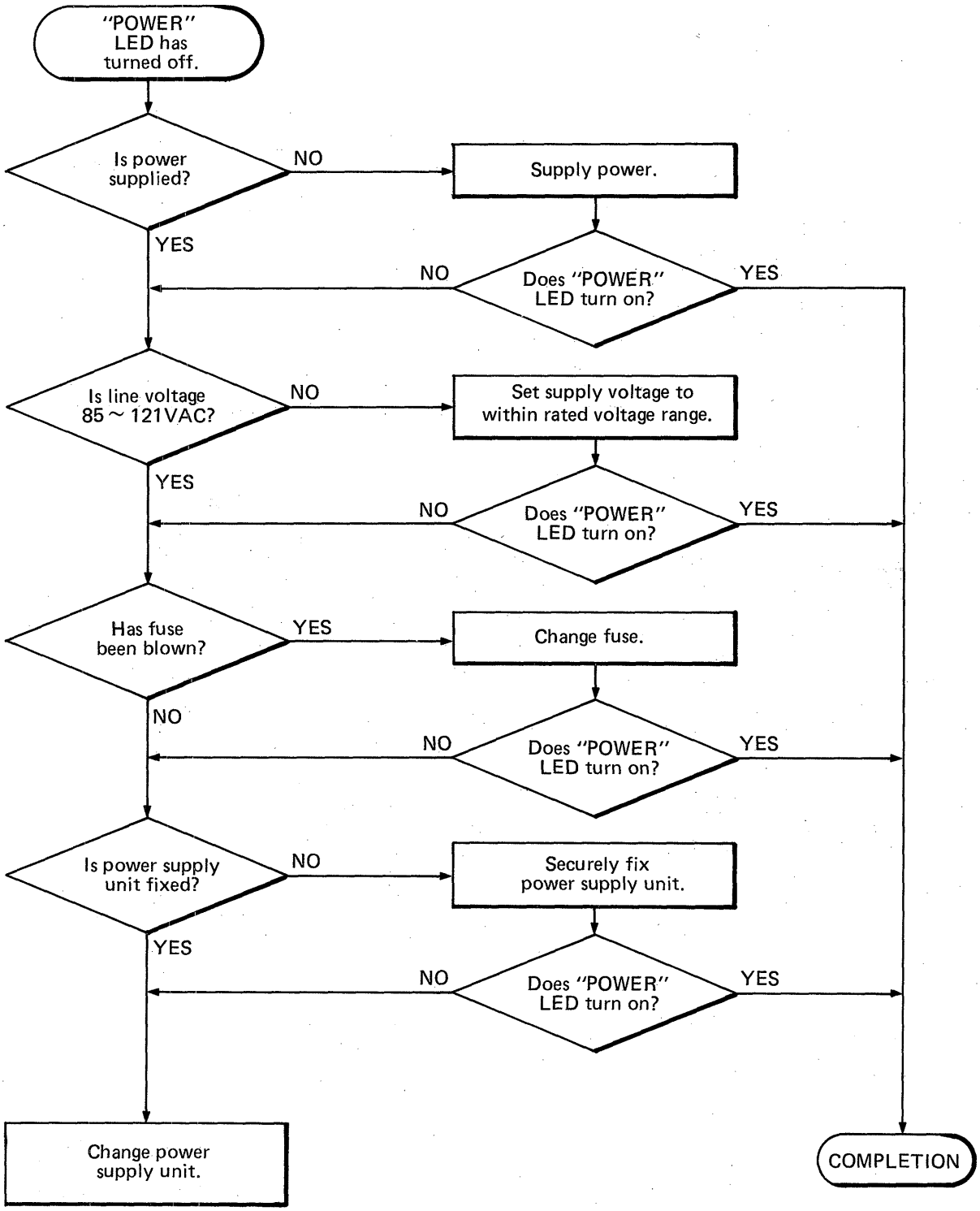
This section explains simple troubleshooting procedures.

6.3.1 General troubleshooting flowchart



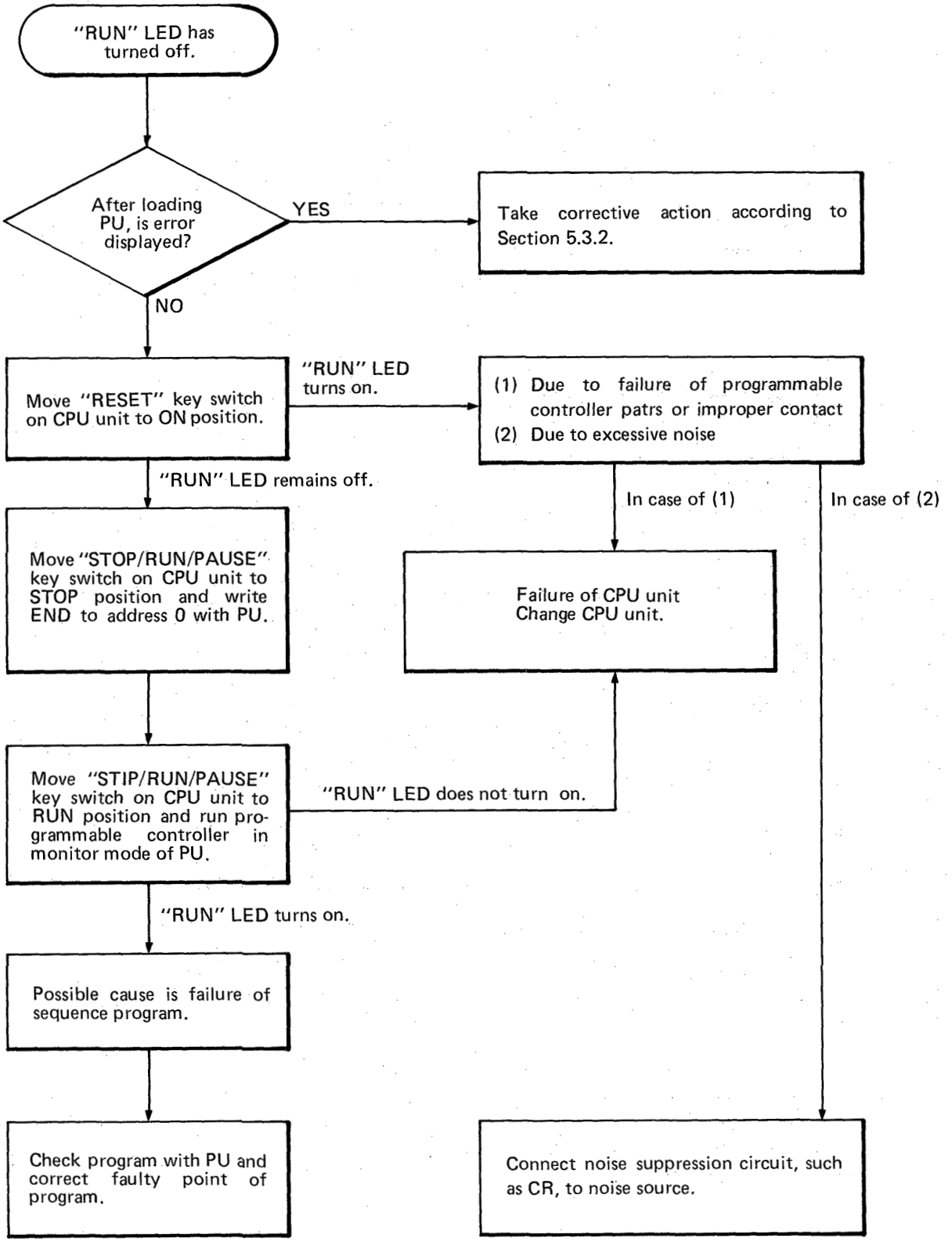
Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

6.3.2 Flowchart used when "POWER" LED has turned off



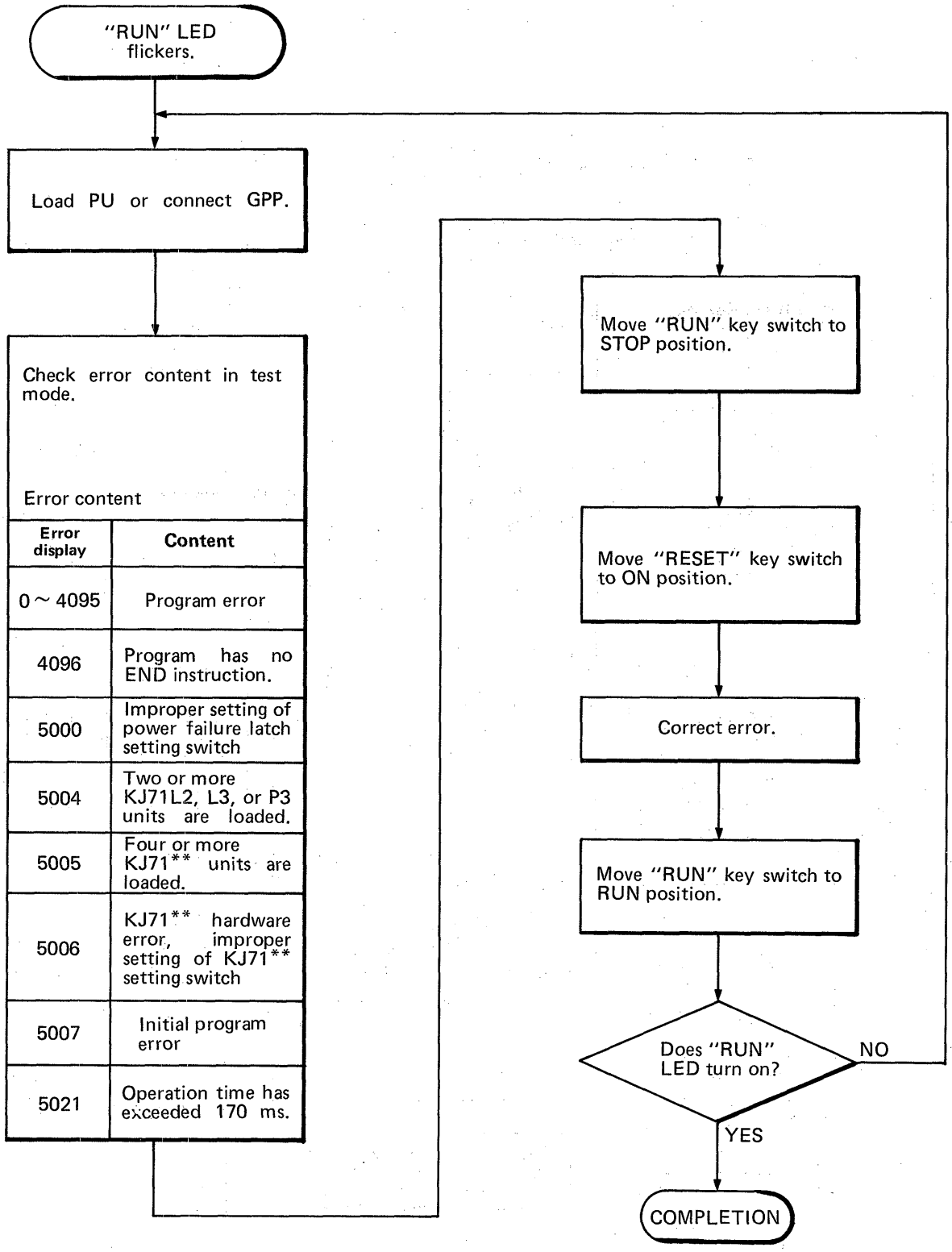
Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

6.3.3 Flowchart used when "RUN" LED has turned off



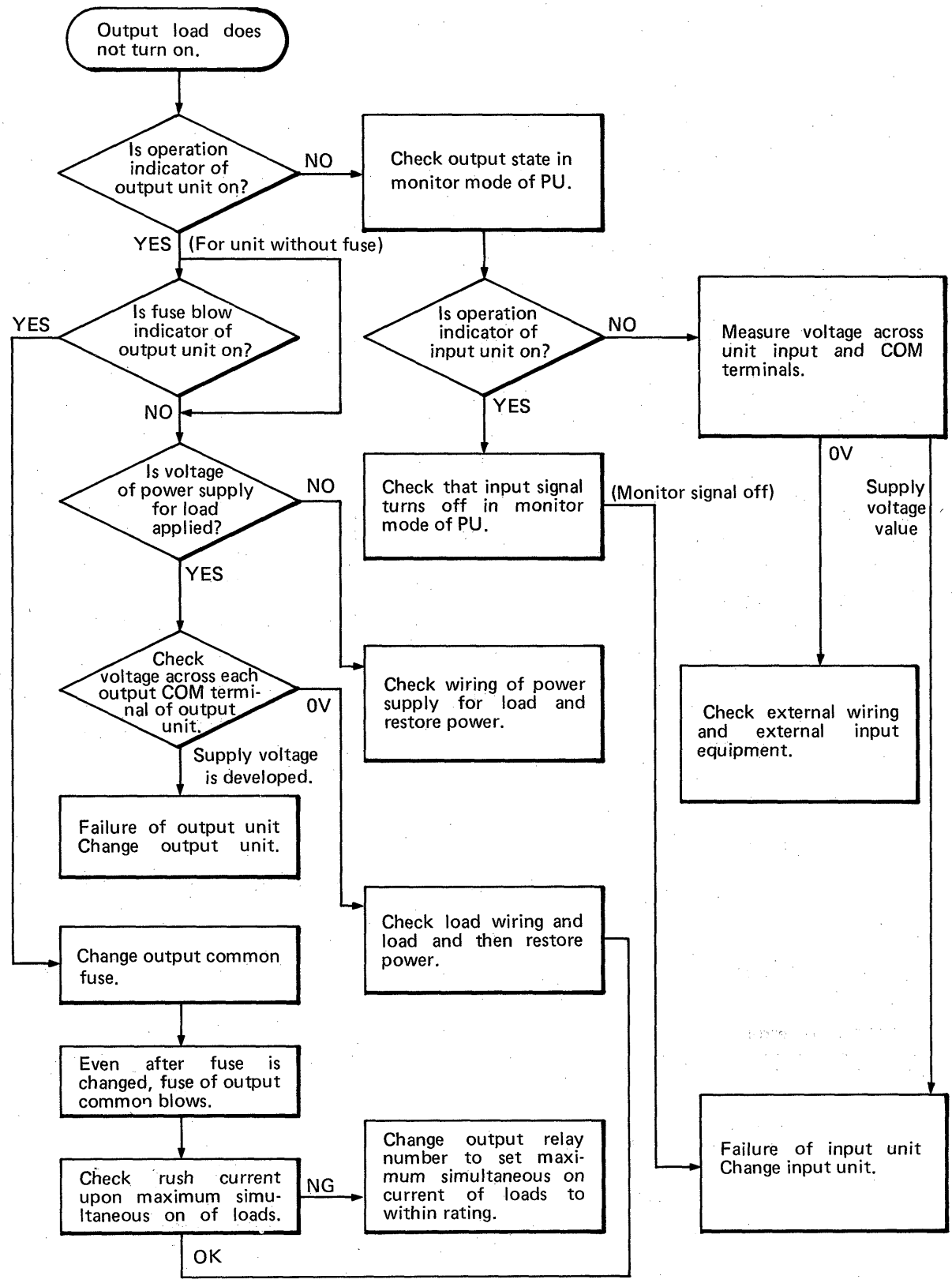
Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

6.3.4 Flowchart used when "RUN" LED flickers



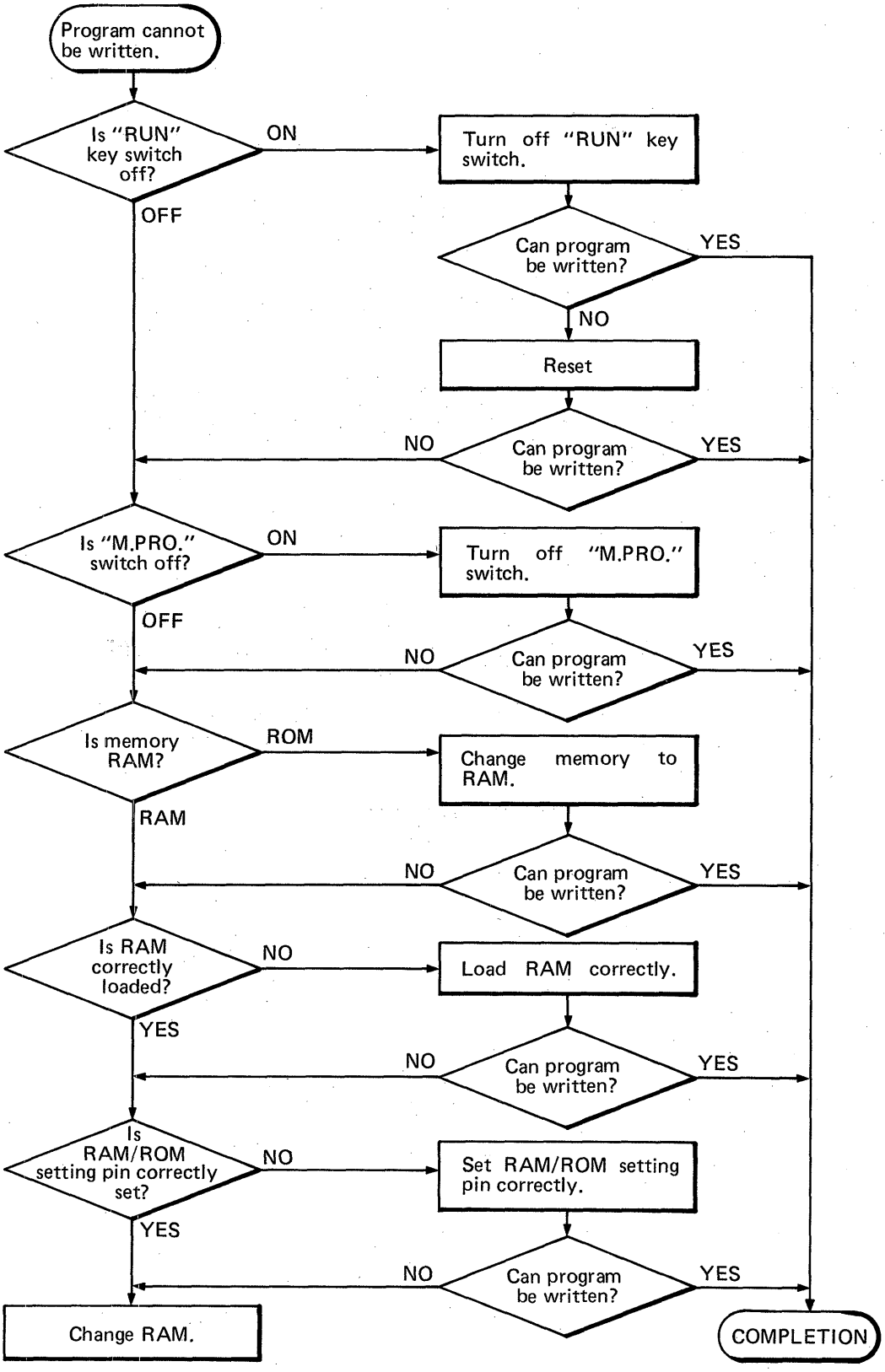
Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

6.3.5 Flowchart used when output load of output unit does not turn on



Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

6.3.6 Flowchart used when program cannot be written



Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

6.4 Battery Change

6.4.1 Battery life

M254 turns on when the voltage of battery for back up of program and power failure latch function reduces. The battery can be used approximately one month after M254 has turned on. However, if this period is exceeded, the contents of program and power failure latch will be erased. Therefore, it is recommended to change the battery soonest possible for preventive maintenance.

The guides of preventive maintenance are as follows:

1 When the battery is guaranteed within five years and a total of power cut time is less than 300 days (7200 hours), change the battery in four or five years.

2 When the battery is guaranteed within five years and a total of power cut time has exceeded 300 days (7200 hours), calculate the day when the total power cut time will exceed 7200 hours, in terms of the operating hours during one day or one week and also the power cut time, thus obtaining the time to change the battery.

Example

Assuming that the operating time is 10 hours a day, the power is stopped for 14 hours a day for five days, and the power is stopped the whole day for two days, the battery changing time is calculated as follows in terms of the power-off period during a week.

14 (hours) x 5 (days) = 70 (hours)
24 (hours) x 2 (days) = 48 (hours)
} Power-off period during a week

7200 (hours)/(70 + 48) (hours) = 61 weeks

61 weeks x 7 (days) = 427 (days)

By calculating a month as 30 days,

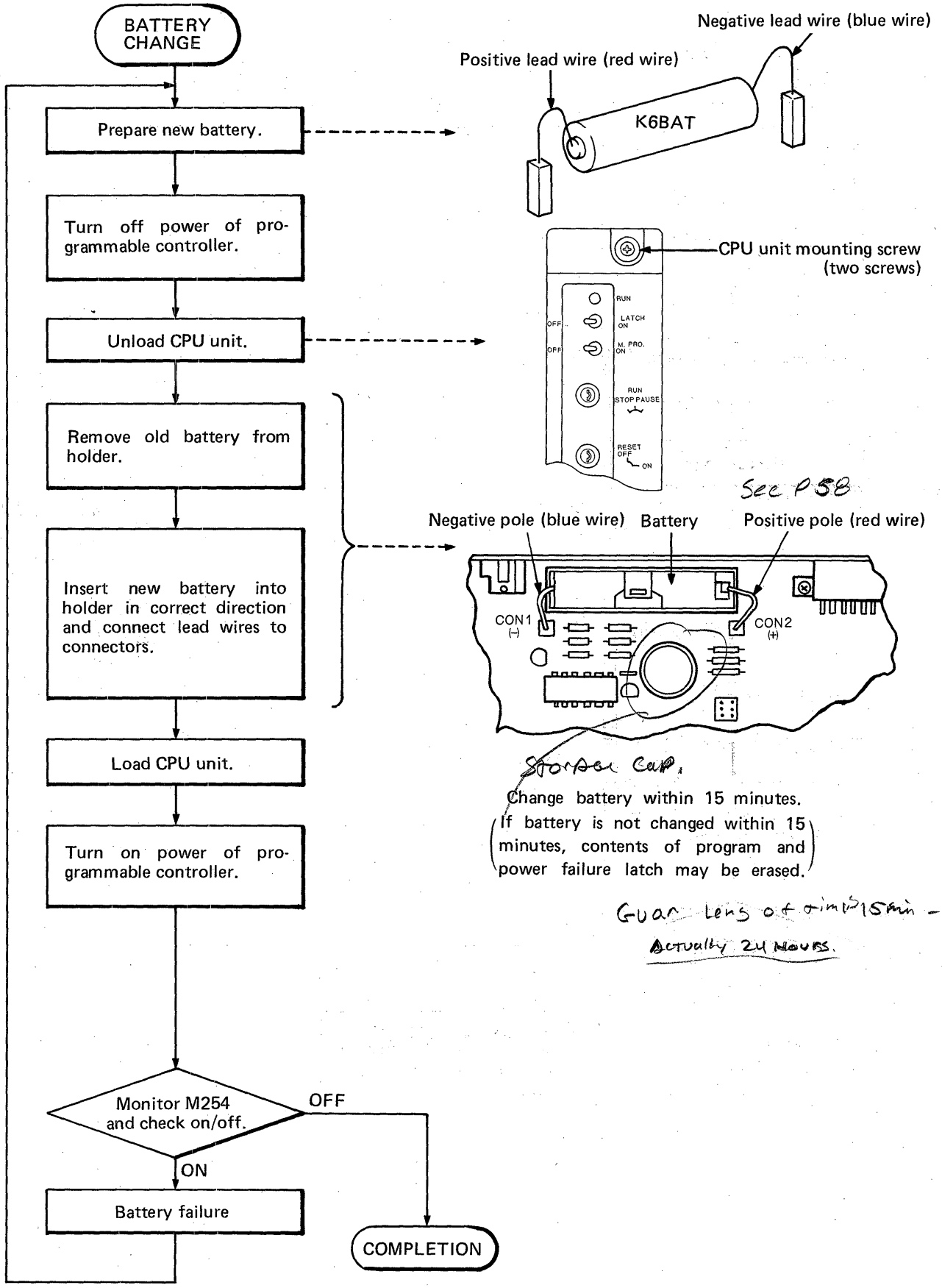
427 (days)/30 (days) = 14.2 months

Therefore,

it is required to change the battery every 14 months.

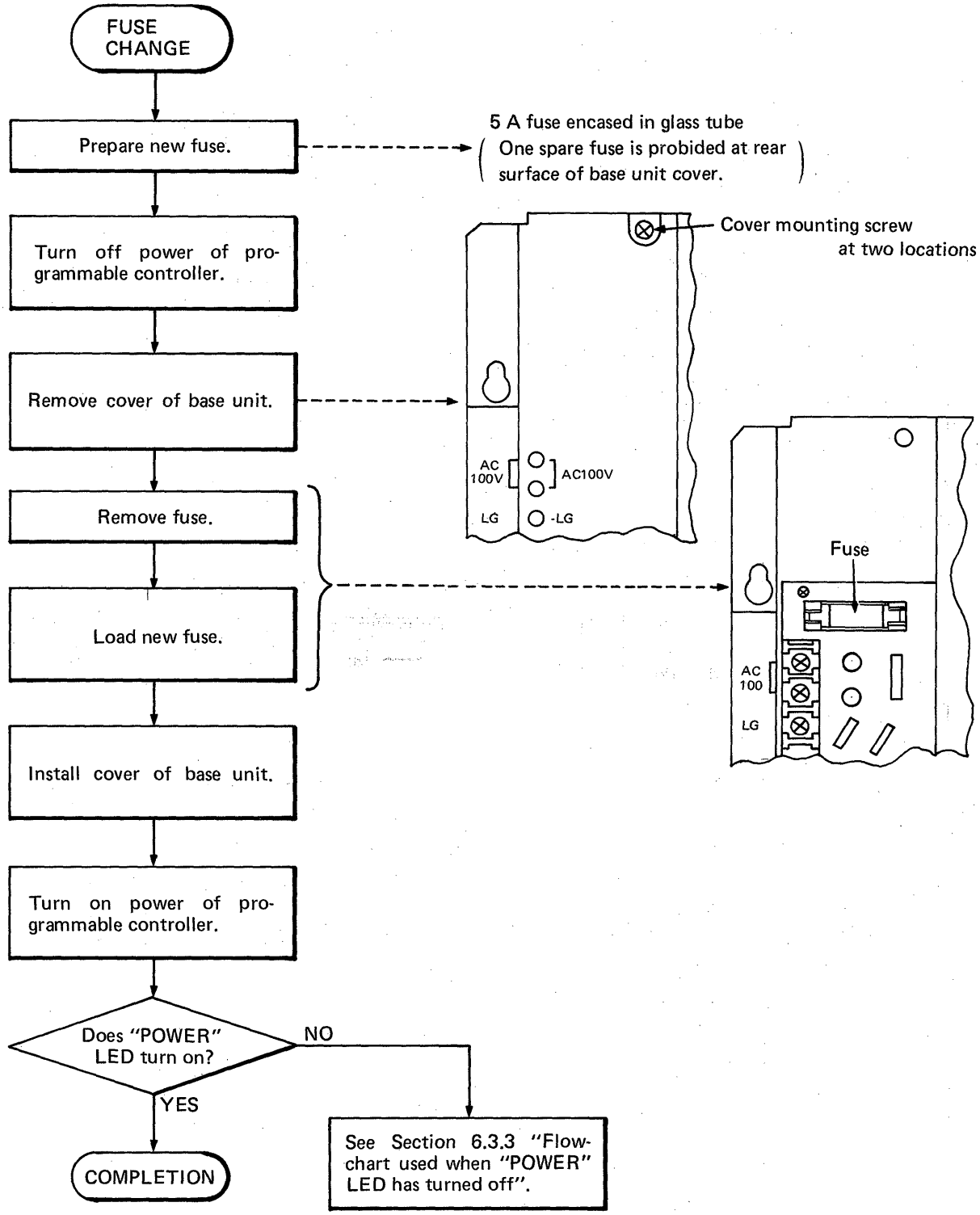
Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

6.4.2 Battery changing procedure



Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

6.5 Fuse Change (Base unit)



Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

7. EXTERNAL DIMENSIONS

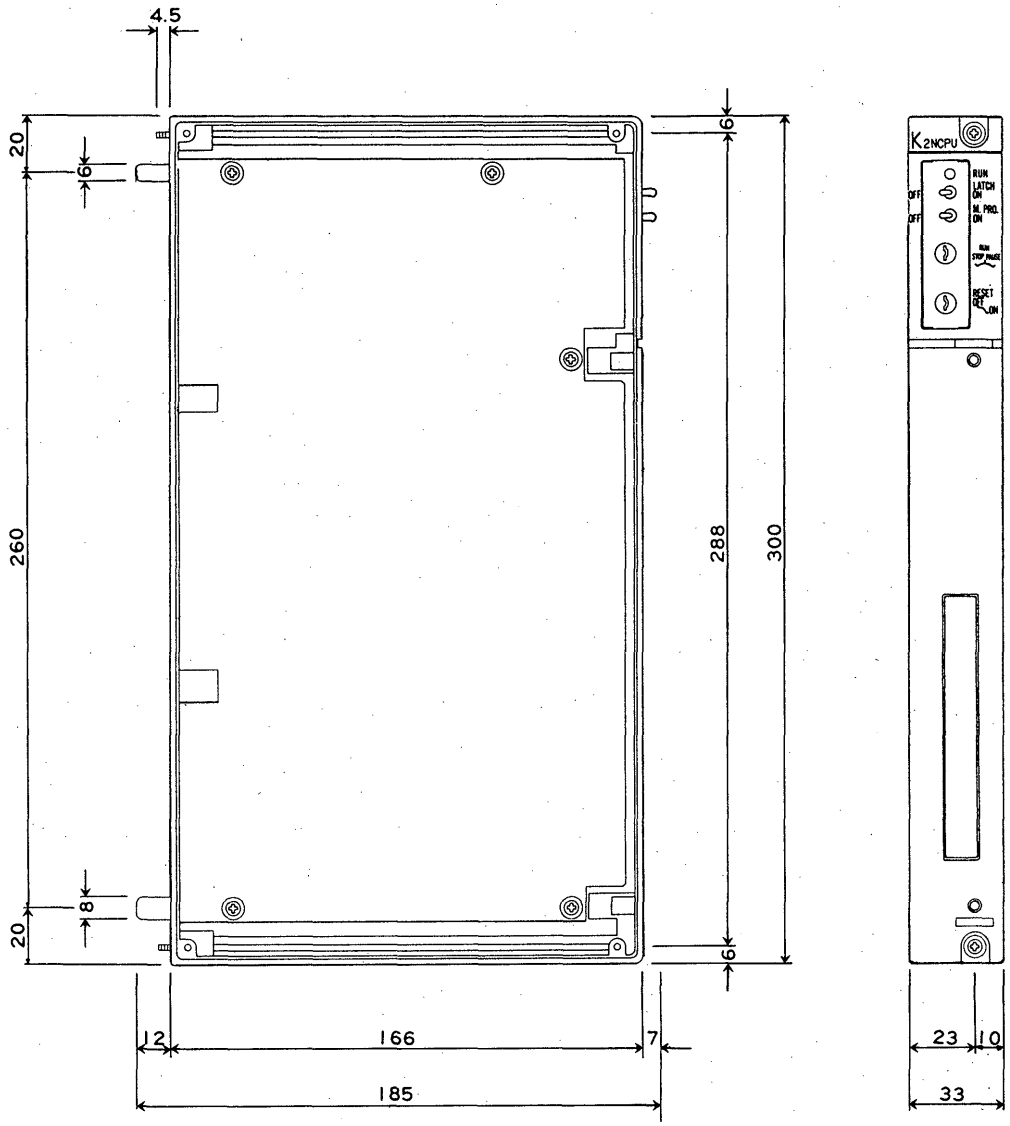
7. EXTERNAL DIMENSIONS . . . . . 93 ~ 100

7.1 K2NCPU Unit 94
7.2 I/O Units 95
7.3 Power Supply Unit 96
7.4 Basic Base Units 97
7.5 Extension Base Units 98
7.6 Dummy Unit 100

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

7. EXTERNAL DIMENTIONS

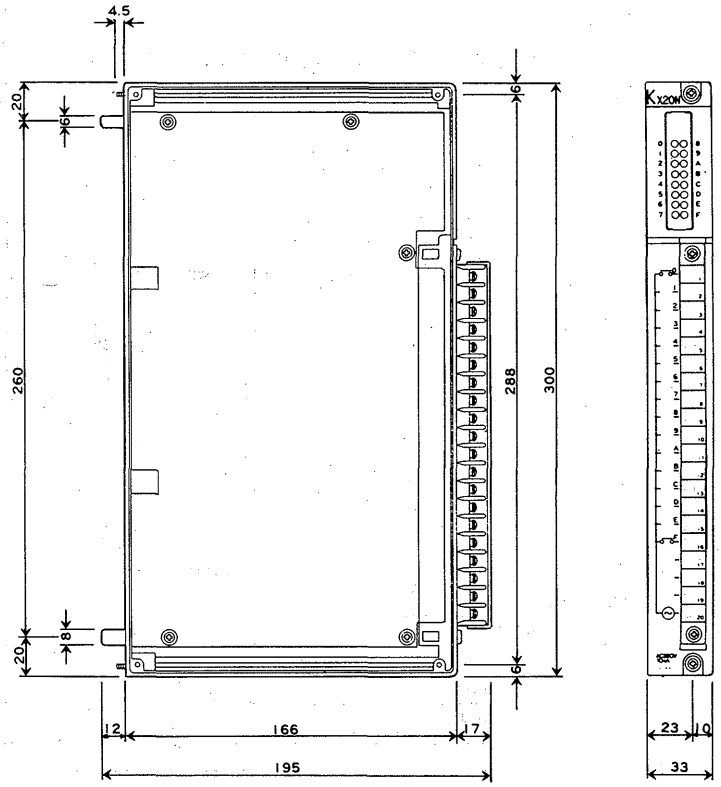
7.1 K2NCPU Unit



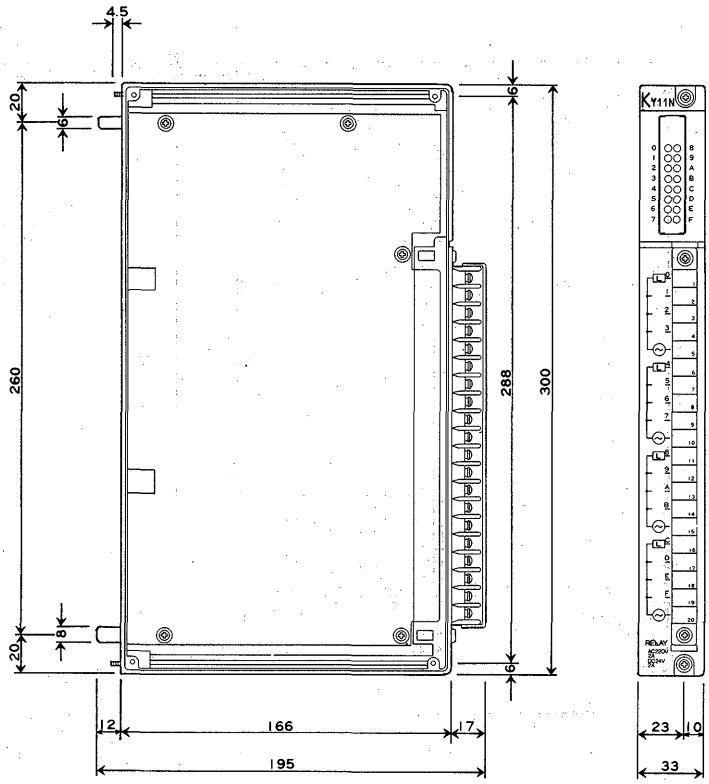
Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

7.2 I/O Units

20-point terminal block connector type

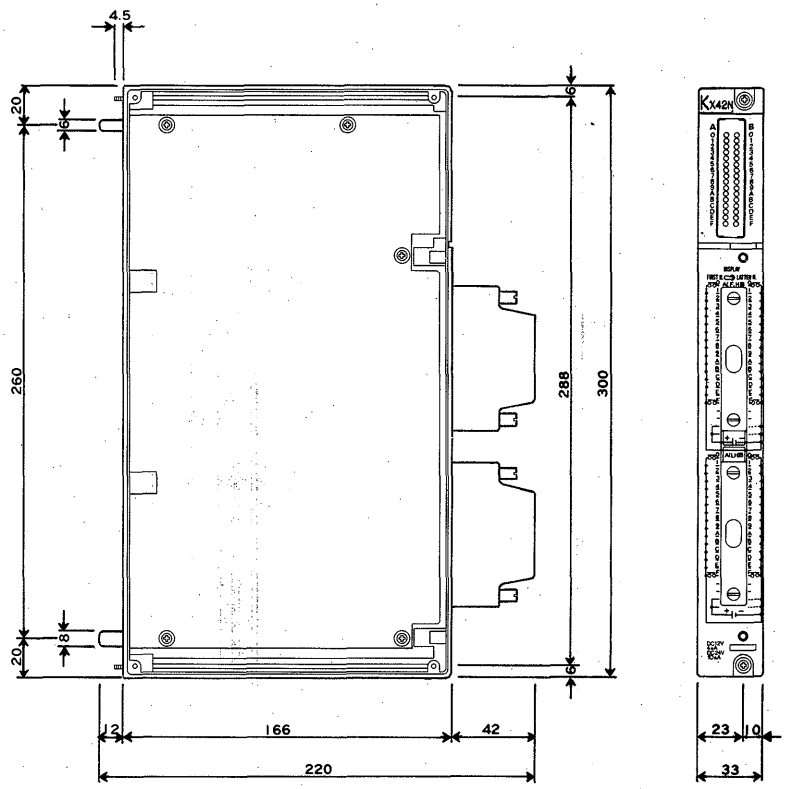


40-point terminal block connector type



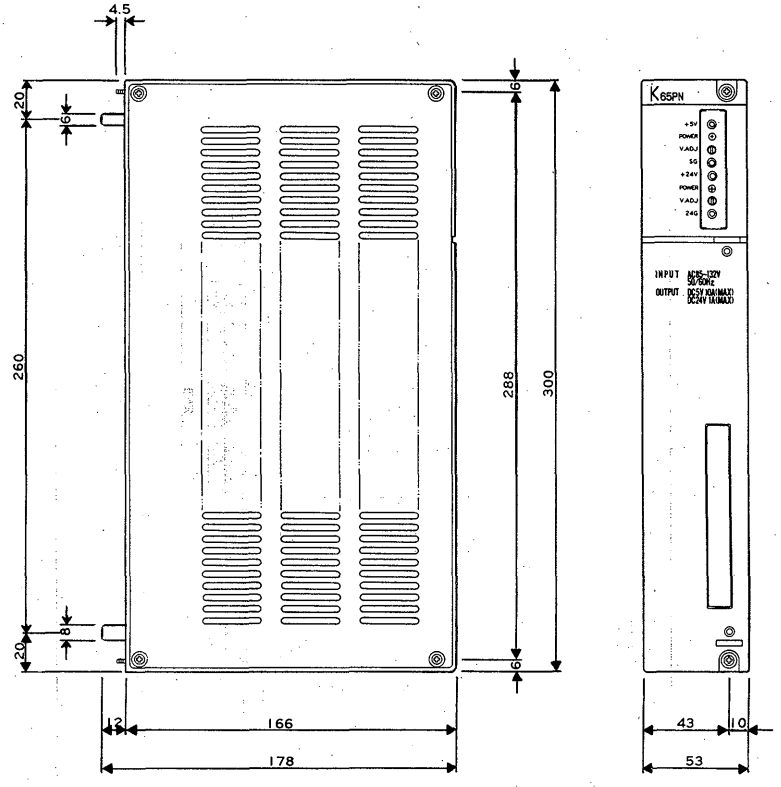
Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

40-pin connector type



7

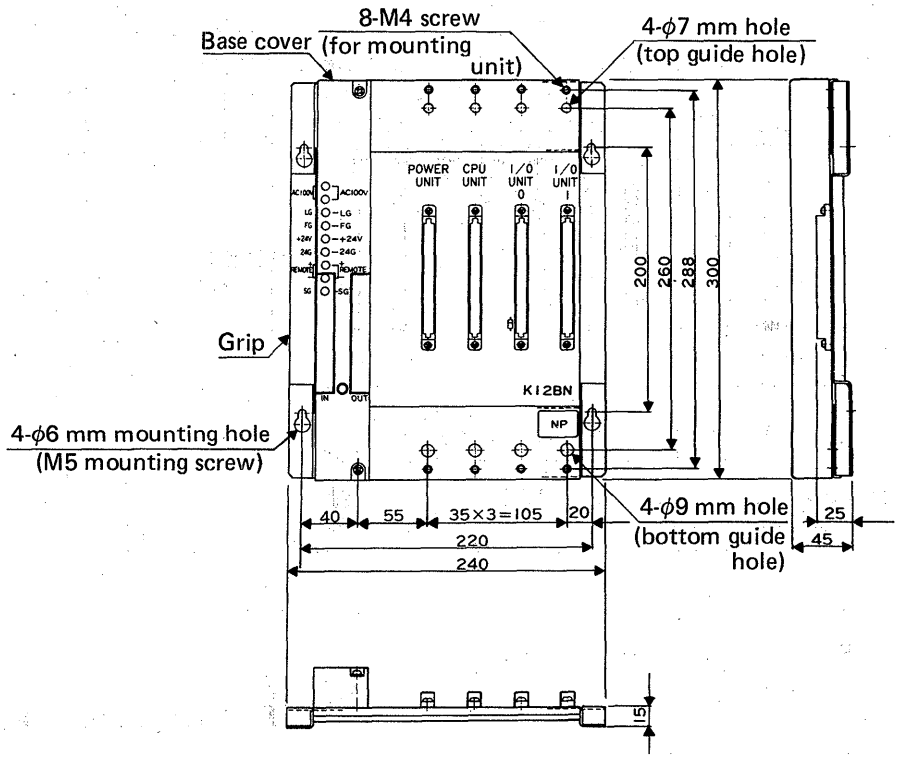
7.3 Power Supply Unit



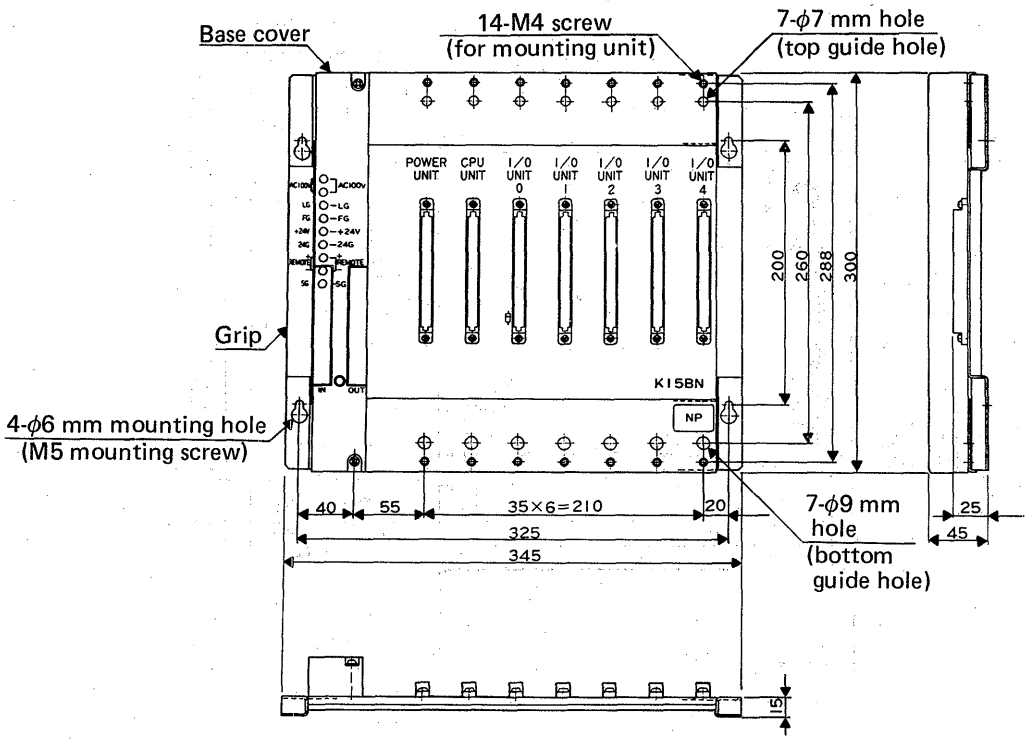
Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

7.4 Basic Base Units

Type K12BN base unit

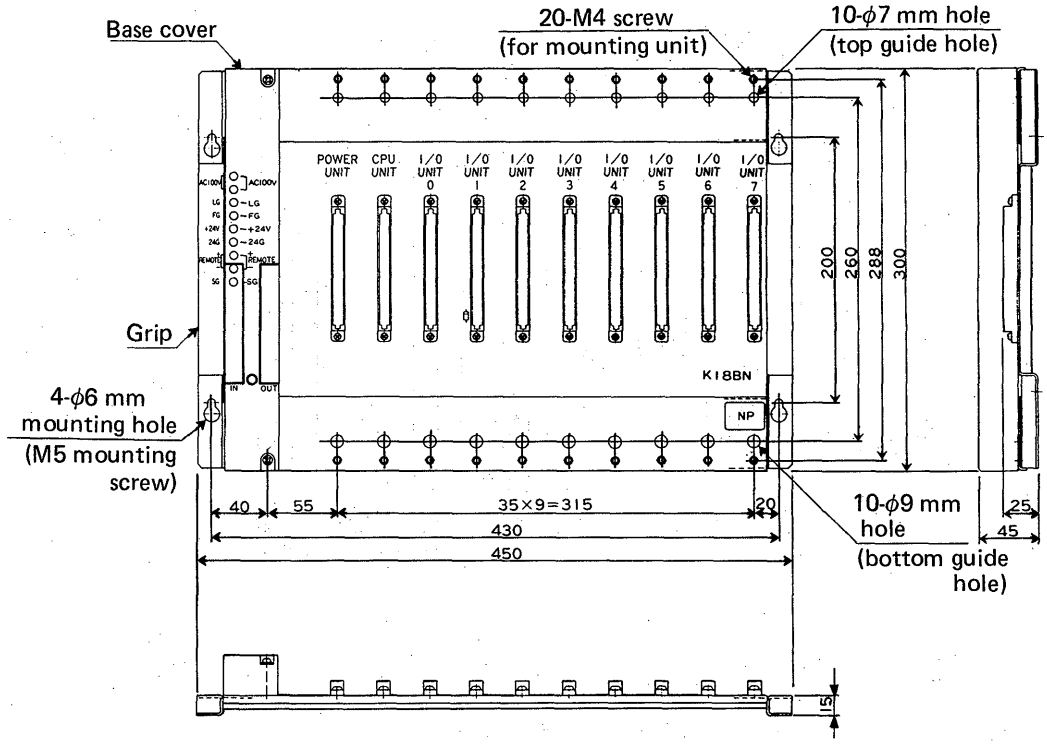


Type K15BN base unit



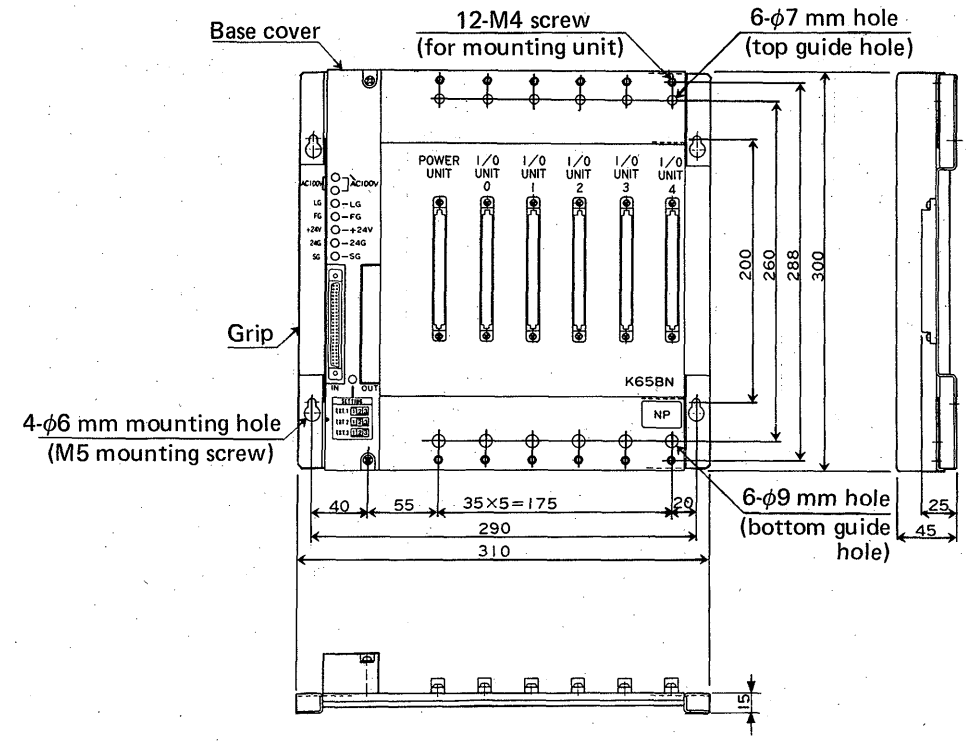
Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

Type K18BN base unit



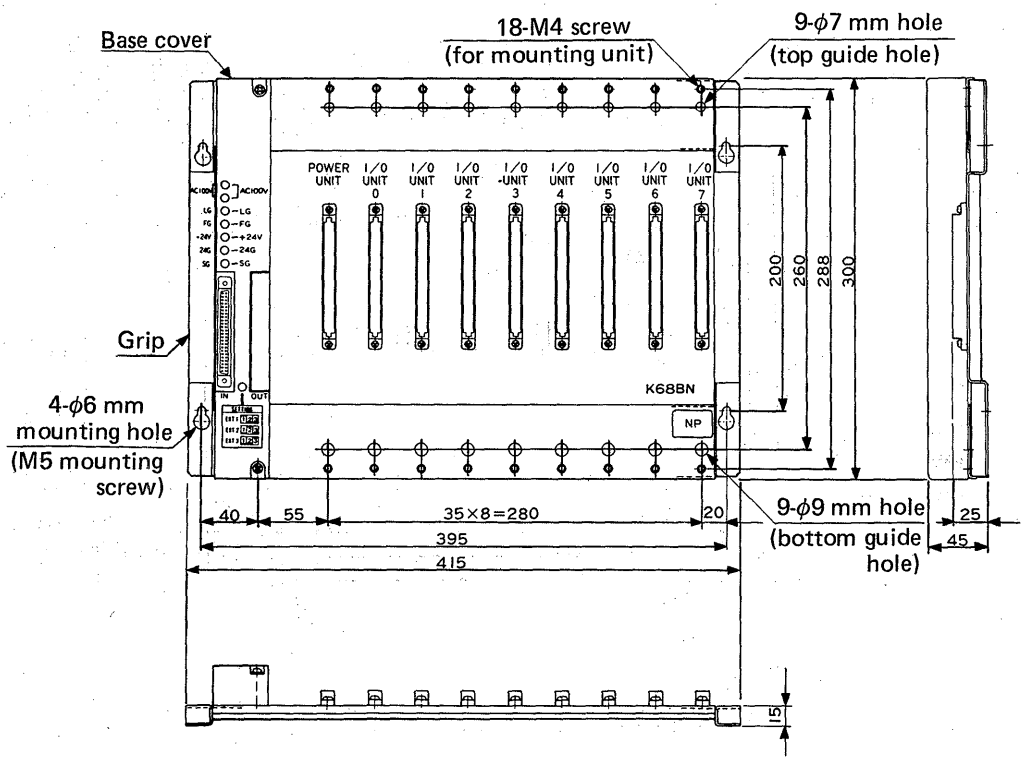
7.5 Extension Base Units

Type K65BN base unit

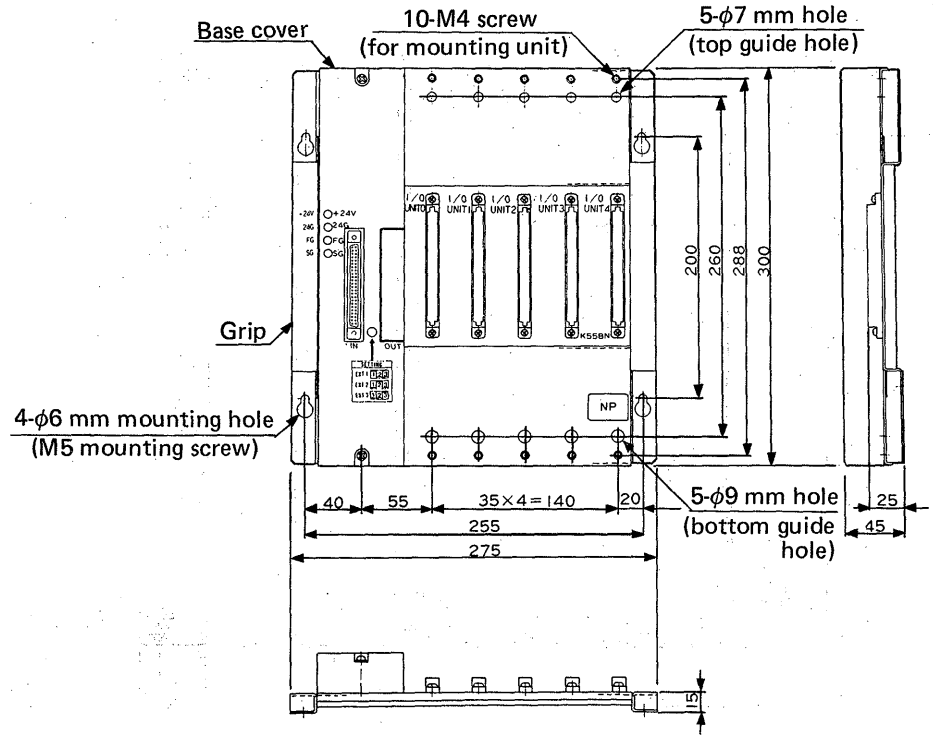


Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

Type K68BN base unit

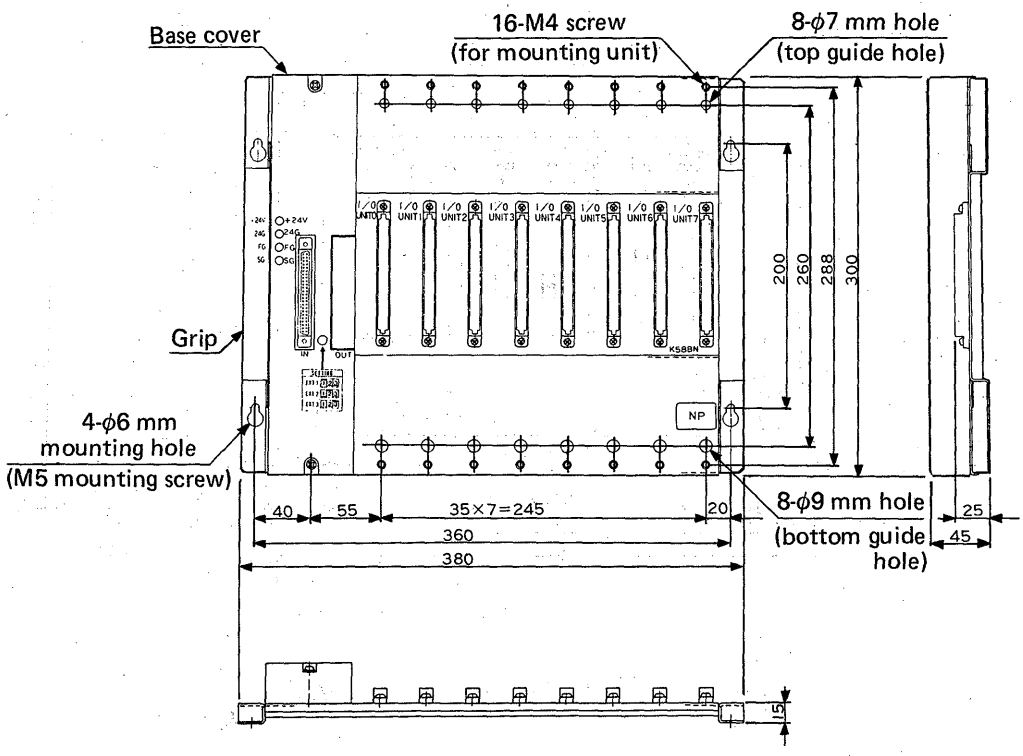


Type K55BN base unit



Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

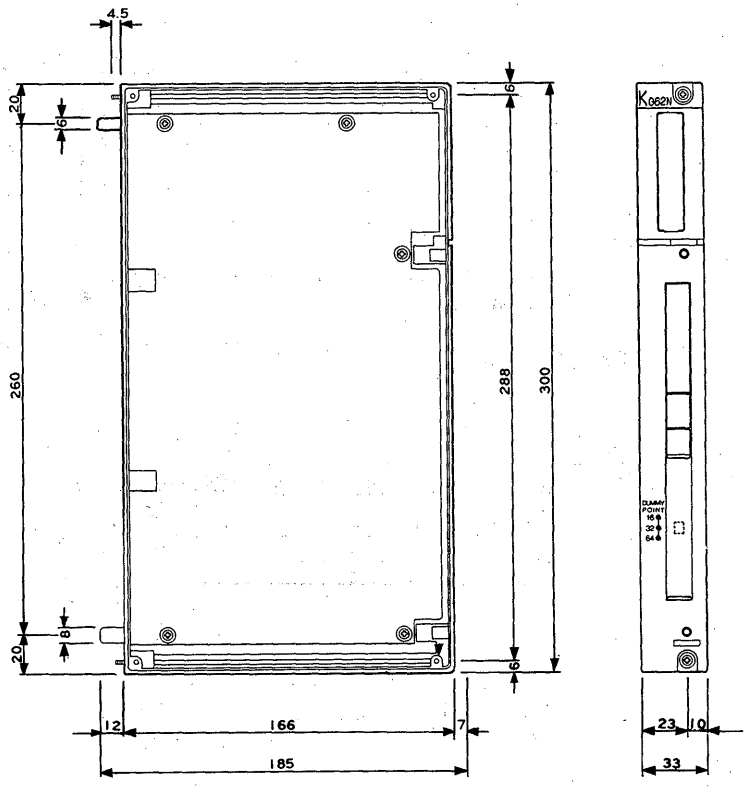
Type K58BN base unit



7

7.6 Dummy Unit

KG62N



Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

8. CAUTIONS FOR SPECIFICATIONS

8. CAUTIONS FOR SPECIFICATIONS ..... 101 ~ 104

8.1 Watchdog Timer (WDT) 102
8.2 Accuracy of 10ms Timer 103
8.3 Maximum Counting Speed of Counter 104

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

8. CAUTIONS FOR SPECIFICATIONS

8.1 Watchdog Timer (WDT)

(1) The watchdog timer is a hardware-assisted self-diagnostic function and detects the following:

- One program cycle (scan time) has exceeded specified time. (Software)
- Failure of parts and memories, operation stop due to noise. (Hardware)

(2) The watchdog timer is factory-set to 170 ms.

(3) When a watchdog timer error is detected, the "RUN" LED display changes as follows:

"RUN" LED Display	Factor
Flicker	Scan time has exceeded 170 ms. *1
OFF *2	• Operation has stopped due to failure of parts (such as transistor and IC) • Operation has stopped due to noise.

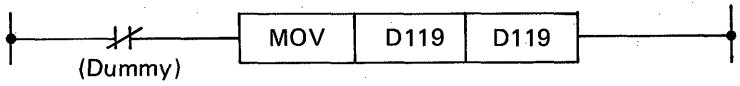
*Note 1: *1: The "RUN" LED flickers due to a program error (as indicated below).*

- *END is not written.*
- *Instruction code is abnormal.*

**2: When the LED has turned off, the error code "5021" is not displayed.*

Note 2: To measure scan time, monitor the data register D119 with PU or GPP because scan time is stored in D119.

When GPP is used for monitoring, insert the following circuit in the sequence circuit and monitor D119. Then, scan time can be monitored.



Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

8.2 Accuracy of 10ms Timer

The accuracy of 10ms timer depends on scan time (timer accuracy ± scan time). Fig. 8.1 shows an example in which the 10ms timer, T127, is used with set value of 6 seconds (K600) for a program with 25 ms scan time.

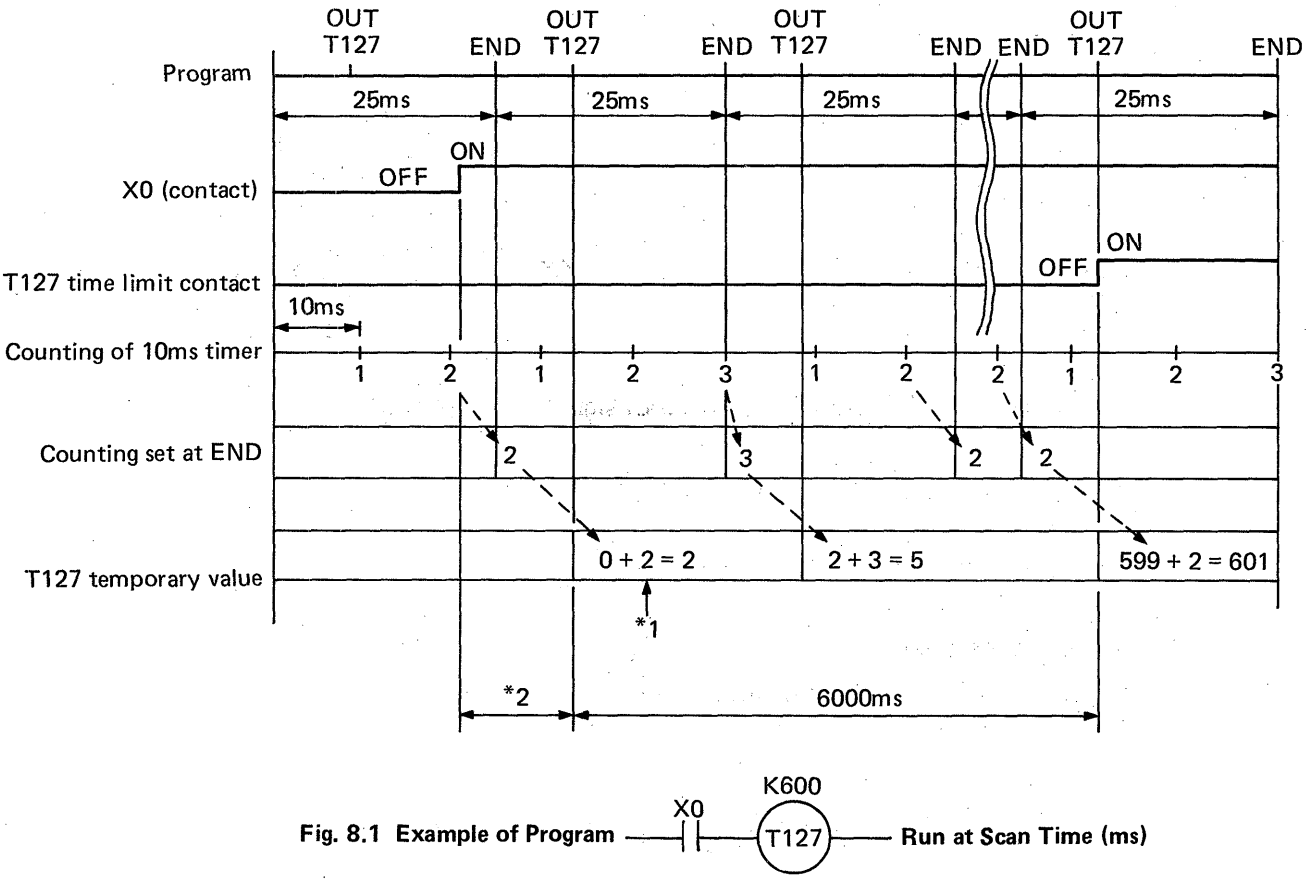


Fig. 8.1 Example of Program

The interval of time until the 10ms timer times up includes the counting errors*1($^{+0}_{-\text{scan time}}$) of 10ms timer and also the errors produced depending on where the timer start condition has been set in the program*2($^{+\text{scan time}}_{-0}$). Therefore, the accuracy of 10ms timer is ± scan time.

Thus, the accuracy of timer in the above example is ±0.025 seconds with respect to the set value 6 seconds.

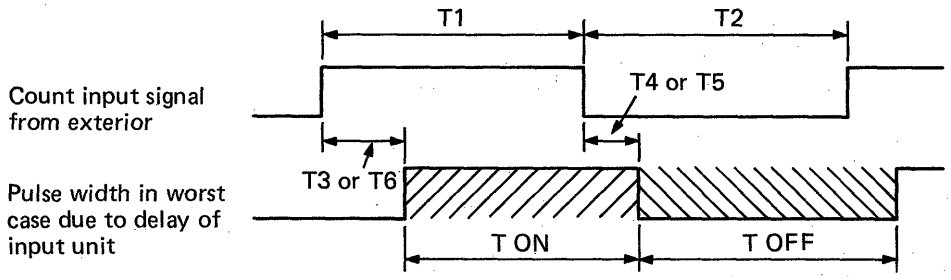
Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

8.3 Maximum Counting Speed of Counter

The maximum counting speed of counter depends on the arithmetic operation time of one program cycle (scan time) and the response time of input unit. Counting is possible only when TON and TOFF in the figure below are longer than the scan time, respectively.

Calculation expression of maximum counting speed of counter

$$\text{Maimum counting speed} \quad Cmax < \frac{1000}{\frac{1}{n} \cdot ts + a} \quad \text{(counts/second)}$$



where, n = ON/OFF ratio of count input signal $\left(n = \frac{T1}{T1 + T2}\right)$

$$\text{When} \frac{T1}{T1 + T2} \leqq 0.5, \; n = \frac{T1}{T1 + T2}$$

$$\text{When} \frac{T1}{T1 + T2} \geqq 0.5, \; n = 1 - \frac{T1}{T1 + T2}$$

ts : scan time (ms)

a : response time constant of input unit

$$a = T3 + T4 - T5 - T6$$

T3 = maximum ON response time of input unit (ms)
T4 = minimum OFF response time of input unit (ms)
T5 = maximum OFF response time of input unit (ms)
T6 = minimum ON response time of input unit (ms)

Example

Calculate the maximum counting speed under the following conditions.

Scan time = 100 ms
ON response time of input unit = max. 20 ms, min. 5 ms
OFF response time of input unit = max. 30 ms, min. 10 ms
ON/OFF ratio = 40%

$a = 20 + 10 - 30 - 5 = -5$ (ms)

$$Cmax < \frac{100}{\frac{100}{40} \times 100 + (-5)}$$

Therefore, the maximum counting speed is 4 (counts/second) or lower.

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

9. HANDLING INSTRUCTIONS

9. HANDLING INSTRUCTIONS ..... 105 ~ 106

9.1 Main Unit 106
9.2 Memory 106
9.3 Battery 106

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

9. HANDLING INSTRUCTIONS

9.1 Main Unit

(1) Since the case, terminal block connector, and pin connector of this programmable controller are made of plastic, do not drop or give strong shock.

(2) Do not remove the printed circuit board of each unit from the case. Removal may cause board failure.

(3) At the time of wiring, take care to prevent the entry of wire chips from the top into the unit. If such chips have entered, remove them.

(4) Tighten screws, such as unit mounting screws and terminal screws, in the range specified below.

Screw	Tightening Torque Range (kg/cm)
I/O unit terminal block terminal screw (M3 screw)	5 ~ 8
I/O unit terminal block mounting screw (M4 screw)	8 ~ 14
Base unit terminal block terminal screw (M4 screw)	10 ~ 14
Unit mounting screw (M4 screw)	8 ~ 12
Extension cable connector mounting screw	3.7 ~ 4.9

(5) Design the system so that the protection and safety circuits, which are furnished to protect the programmable controller from troubles, are located in the exterior of the system.

9.2 Memory

(1) When loading a memory into the socket, securely press the memory against the socket and then lock it with the lever. After loading, check that the memory is not lifted.

(2) When handling the memory, strictly follow Section 5.2.2.

(3) Be careful not to unload the RAM, which stores a program, from the socket. The program will be immediately erased.

9.3 Battery

(1) Do not short-circuit the battery.

(2) Do not disassemble the battery.

(3) Do not throw the battery into a flame.

(4) Do not heat the battery.

(5) Do not solder the poles of battery.

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

APPENDIX

APPENDIX . . . . . 107 ~ 126

1. COMPATIBILITY OF K2 SERIES AND K2N SERIES. 109

2. COMPARISON OF K2 AND K2N. 117

3. PROCESS TIME 123

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

APPENDIX

1. COMPATIBILITY OF K2 SERIES AND K2N SERIES

Although there is a description in this manual that the K2N series is compatible with the K2n series, they are not compatible in regards to some specifications and units. Noncompatibility of the two series is as explained in the following items. When using the K2N series units for the present system, caution should be used for the following items. For details of the following items, see the following pages.

[Items]

1.1 Compatibility of K2 Series (K2CPU, K2CPU-S2, K2CPU-S3) and K2N Series

(1) Setting of sequence instruction execution time

(2) Utilization of K2CPU program for K2NCPU

(3) Utilization of K2CPU memory for K2NCPU

(4) Compatibility of K2CPU and K2NCPU in loading

(5) Use of latch unit KL61

(6) Use of parallel data link unit KJ61

(7) Use of K6GPP, K7GPP and K6PU, K7PU

(8) Use of K6WU

(9) Combinations of extension bases for K2 series and K2N series

(10) Units which can be used for each system

1.2 Compatibility of K2HCPU and K2NCPU

(1) Utilization of K2HCPU program for K2NCPU

(2) Compatibility of K2HCPU and K2NCPU in loading

(3) Use of analog output unit KA63A

(4) Miscellaneous

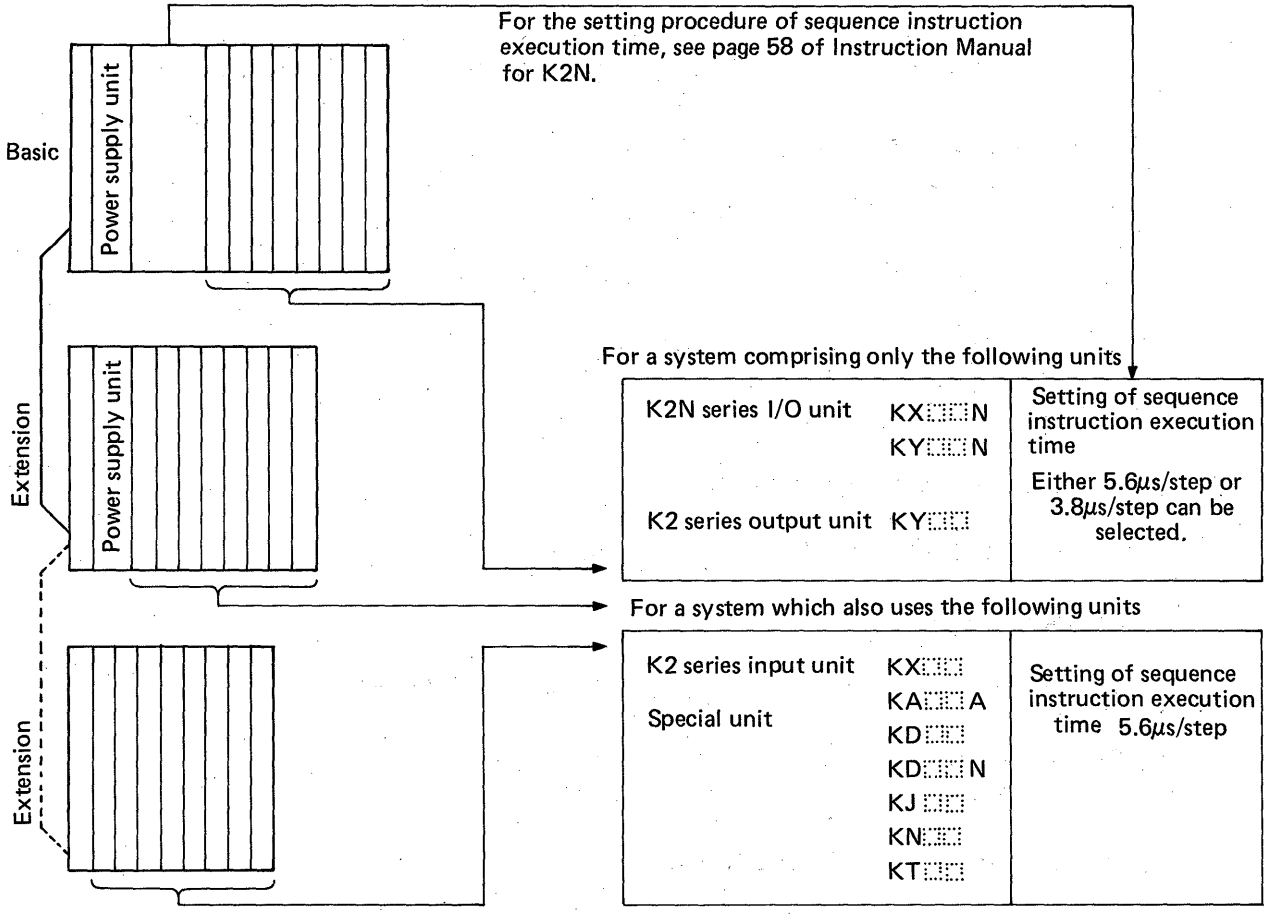
Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

1.1 Compatibility of K2 Series (K2CPU, K2CPU-S2, K2CPU-S3) and K2N Series

(The K2CPU described below indicates K2CPU, K2CPU-S2, or K2CPU-S3.)

(1) Setting of sequence instruction execution time

For a system comprising I/O units, which are provided with "N" at the end of type name, and K1, K2 series output units, either 3.8μs/step or 5.6μs/step execution time can be used. For a system which also uses other units (K1, K2 series input units and special units), be sure to set the execution time to 5.6μs/step.



(2) Utilization of K2CPU program for K2NCPU

(a) In the K2NCPU, temporary memories M250 ~ M253 are used for special applications. Therefore, a program of K2CPU, which uses temporary memories M250 ~ M253, cannot be readily utilized for the K2NCPU. Utilize a K2CPU program for the K2NCPU after correcting the program, i.e. changing the usable range of temporary memories to M0 ~ M249 or using unused Y as temporary memories.

Usable Range of Temporary Memories M	
K2CPU	K2NCPU
M0 ~ M253	M0 ~ M249

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

(b) T96 ~ T127 of K2NCPU are 10ms timers and T96 ~ T127 of K2CPU are 100ms timers. Therefore, when utilizing the program of K2CPU, which uses the 100ms timers, for the K2NCPU, take the set value "K**" up one place, i.e. change "K**" to "K**0". When a set value "K****" is used, change the timer number range to T0 ~ T95.

Timer Specifications	
K2CPU	**K2NCPU**
T0 ~ T127: 100ms timers	T 0 ~ T 95: 100ms timers T96 ~ T127: 10ms timers

(c) K2NCPU and K2CPU are different in power failure latch range. Therefore, utilize a program of K2CPU, which uses power failure latch, for the K2NCPU after correcting the program to the contents of power failure latch which can be set in the range shown in the table below.

Power failure latch range			1	2	3	4	5
	K2CPU	Temporary memory	None	M128~M253	M0~M253	M128~M253	M0~M253
		Timer, counter	None	None	None	T:C64~T:C127	T:C0~T:C127
		Data register	None	None	None	D32~D95	D0~D95

	K2NCPU	Rotary SW No. / LATCH SW	(#1) OFF	0 ON	1 ON	2 ON	3 ON	4 ON	5 ON	6 ON	7 ON	8 ON	9 ON	A ON	B ON	C ON
		Temporary memory	None	None	M224 ~M249	M192 ~M249	M160 ~M249	M128 ~M249	M96 ~M249	M64 ~M249	M32 ~M249	M0 ~M249	None	None	None	None
		Timer, counter	None	None	T:C84~95 T:C124~127	T:C72~95 T:C120~127	T:C60~95 T:C116~127	T:C48~95 T:C112~127	T:C36~95 T:C108~127	T:C24~95 T:C104~127	T:C12~95 T:C100~127	T:C0~95 T:C96~127	None	None	None	None
		Data register	None	None	D84 ~D95	D72 ~D95	D60 ~D95	D48 ~D95	D36 ~D95	D24 ~D96	D12 ~D95	D0 ~D95	D36 ~D95	D24 ~D95	D12 ~D95	D0 ~D95

(3) Utilization of K2CPU memory for K2NCPU

The RAM memory 2KRAM for K2CPU is of substrate type while the RAM memories K0RAM and 4KRAM for K2NCPU are of IC chip type. Therefore, the K2CPU memory cannot be utilized for the K2NCPU. The ROM memory for K2CPU is 1KROM or 2KROM and two ROM loading sockets are provided. The ROM memory for K2NCPU is 2KROM or 4KROM and one ROM loading socket is provided. When 4K step is selected, the ROM memory for K2CPU cannot be utilized for the K2NCPU.

Memory specifications	K2CPU		K2NCPU	
	IC-RAM	EP-ROM	IC-RAM	EP-ROM
1K step	–	1KROM	K0RAM	–
2K step	2KRAM*	2KROM	–	2KROM
4K step	2KRAM x 2*	2KROM x 2	4KRAM	4KROM

*Memories with * mark are of substrate type. Others are of IC ship type.*

10

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

(4) Compatibility of K2CPU and K2NCPU in loading

It is possible to unload the K2CPU and load the K2NCPU instead. However, the CPU case width of K2NCPU is smaller than that of K2CPU. Therefore, since clearance is provided when the K2NCPU is mounted, it is necessary to take measures for dust prevention. (However, the K2CPU cannot be mounted instead of the K2NCPU.)

(5) Use of latch unit KL61

The latch unit KL61 cannot be used for the K2NCPU system. Therefore, when using the K2NCPU for the K2CPU system which uses the KL61, unload the KL61 and change the contents of latch to the power failure latch range shown in the preceding page.

(6) Use of parallel data link unit KL61

The parallel data link unit KJ61 cannot be used for the K2NCPU system. For a new system, therefore, it is recommended to use an independent K3CPU system in consideration of the number of inputs/outputs and memory capacity. For the existing system, use the K2CPU-S3 which is presently used.

(7) Use of K6GPP, K7GPP and K6PU, K7PU

When programming by use of K6GPP, K7GPP, K6PU, or by use of K7PU which does not have "K3", e.g. "406K3F", in the DATE column of rating plate, the combinations of data instructions, which have been added to the K2NCPU, cannot be used. Therefore, when using the combinations of added data instructions, use the K8GPP or the K7PU which has "K3", e.g. "406K3F" in the DATE column of rating plate.

[Data Instruction Combinations of K2CPU]

MOV (●)
>,<,=,+,–, (○)

D \ S	K	D	T	C	X	Y	M
K		○●					
D		○●	●	●		●	●
T		●					
C		●					
X		●					
Y							
M		●					

BCD (○)
BIN (●)

D \ S	K	D	T	C	X	Y	M
K							
D		○●					
T		○					
C		○					
X		●					
Y							
M							

[Data Instruction Combinations of K2NCPU]

MOV,BCD,BIN,+,–

D \ S	K	D	T	C	X	Y	M
K		○	○	○		○	○
D		○	○	○		○	○
T		○	○	○		○	○
C		○	○	○		○	○
X		○	○	○		○	○
Y		○	○	○		○	○
M		○	○	○		○	○

>,<,=

D \ S	K	D	T	C	X	Y	M
K	○	○	○	○	○	○	○
D	○	○	○	○	○	○	○
T	○	○	○	○	○	○	○
C	○	○	○	○	○	○	○
X	○	○	○	○	○	○	○
Y	○	○	○	○	○	○	○
M	○	○	○	○	○	○	○

(8) Use of K6WU

Data can be written into the ROM by K6WU up to the capacity of 2KROM (2K step). Therefore, when writing the contents of 4K step memory of K2NCPU, use the K6PRT. However, the contents of 4K step memory can be written into two 2KROMs by the K6WU for the purpose of storage.

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

(9) Combinations of extension bases for K2 series and K2N series

The following table shows the usable range of K2 series and K2N series extension bases for each CPU system.

CPU / Base Unit Configuration	K3CPU	K1, K2CPU	K0J1, K0J2	K2NCPU
Basic	K37B	K1□B K2□B	K0J1 K0J1H K0J2	K1□BN
Extension 1	K6□B or K6□BN	K6□B or K6□BN	K6□B or K6□BN	K6□BN or K5□BN
Extension 2	K6□B or K6□BN	K6□B or K6□BN		K6□BN or K5□BN
Extension 3	K6□B or K6□BN	K6□B or K6□BN		K6□BN or K5□BN
Extension cable	K61CBL or K67CBL K61CBLN, K67CBLN, K76CBLN, K77CBLN		K0J-62CBL	K61CBL or K67CBL K61CBLN, K67CBLN K76CBLN, K77CBLN
Unusable extension base unit	K55BN, K58BN			K6□B

10

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

(10)Usable units of each system

The following tables show the usable ranges of units for K2 series and units for K2N series in each system. In the table, the ○ mark indicates that the unit can be used and the X mark indicates that the unit cannot be used.

(1) K3 system

	Power Supply Unit		CPU Unit	I/O Unit		Extension Base Unit		
	K6 ⬚ P	K6 ⬚ PN	K3CPU	KX⬚/KY⬚	KX⬚N/KY⬚N	K6 ⬚ B	K6 ⬚ BN	K5 ⬚ BN
Use for basic base unit K37B	○	○	○	○	○	○	○	X *1

(2) K2 system

	Power Supply Unit		CPU Unit		I/O Unit		Extension Base Unit		
	K6 ⬚ P	K6 ⬚ PN	K2CPU	K2NCPU	KX⬚/KY⬚	KX⬚N/KY⬚N	K6 ⬚ B	K6 ⬚ BN	K5 ⬚ BN
Use for basic base unit K2 ⬚ B	○	○	○	○ *2	○	○	○	○	X *1
Use for basic base unit K1 ⬚ BN	○	○	X *3	○	○	○	X *4	○	○
Use for basic base unit K1 ⬚ B	○	○	X *3	○	○	○	○	○	X *1

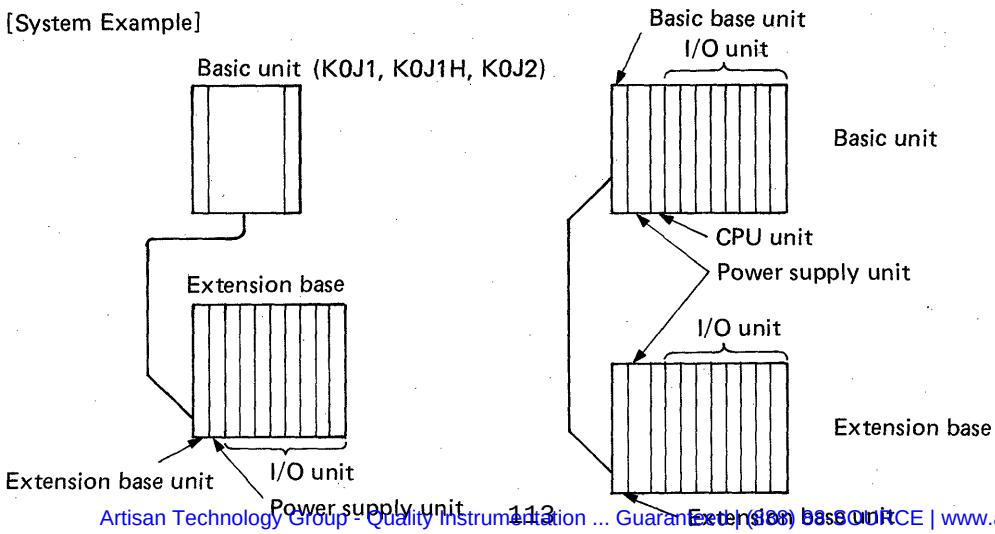
(3) K0J1, K0J2 systems

	Extension Base Unit			Power Supply Unit		I/O Unit	
	K6 ⬚ B	K6 ⬚ BN	K5 ⬚ BN	K6 ⬚ P	K6 ⬚ PN	KX⬚/KY⬚	KX⬚N/KY⬚N
Use for basic base unit K0J1 (2)	○	○	X *1	○	○	○	○

(4) K1 system

	Power Supply Unit		CPU Unit	I/O Unit		Extension Base Unit		
	K6 ⬚ P	K6 ⬚ PN	K1CPU	KX⬚/KY⬚	KX⬚N/KY⬚N	K6 ⬚ B	K6 ⬚ BN	K5 ⬚ BN
Use for basic base unit K1 ⬚ B	○	○	○	○	○	○	○	X *1
Use for basic base unit K1 ⬚ BN	○	○	○	○	○	X *4	○	○

[System Example]



Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

*1: The extension base K5□BN is supplied with DC 5V by the basic base. Since DC 5V is not supplied by the present basic base (basic unit), the K5□BN cannot be used.

*2: When the basic base K2□B is loaded with the K2NCPU, approximately 20 mm clearance is provided. Therefore, it is necessary to take measures for dust prevention.

*3: Since the width of K2CPU is larger (approximately 20 mm) than that of K2NCPU, the K2CPU cannot be loaded instead of the K2NCPU.

*4: When the K2 series extension base K6□B is connected to the K2N series basic base K1□BN, the DC 5V line outgoing from the basic base is short-circuited at the extension base. Therefore, the extension base K6□B cannot be used for the basic base K1□BN.

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

1.2 Compatibility of K2HCPU and K2NCPU

The K2HCPU and K2NCPU are different in I/O control method. (The K2HCPU is of refresh type and the K2NCPU is of direct type.) Therefore, there are differences in program and others between the K2HCPU and K2NCPU. The differences are explained below.

(1) Utilization of K2HCPU program for K2NCPU

(a) The K2NCPU uses function numbers F126 and F127 for the application instruction. The K2HCPU uses function numbers F126 and F127 for special timing pulses. Therefore, the program of K2HCPU, which uses the function numbers F126 and F127, cannot be readily utilized for the K2NCPU. Utilize the program after changing F126 and F127 to temporary memories M or other devices according to the operation. Also, by changing the program format to the direct type by the program, processing may be performed faster.

(b) The K2HCPU and K2NCPU are different in the value of watchdog timer. The K2HCPU uses a 200ms timer and the K2NCPU uses a 170ms timer. Therefore, when the scan time of program is set to 170ms or longer, utilize the K2HCPU program for K2NCPU after changing the scan time to 170ms or shorter by use of CJ and other instructions.

(c) ● The K2HCPU and K2NCPU are different in the usable range of temporary memories M.

● The K2HCPU and K2NCPU are different in the power failure latch range.

For details of the above two points, see Section 1.1 (2)(a) and (c).

(2) Compatibility of K2HCPU and K2NCPU in terms of loading

It is possible to unload the K2HCPU and load the K2NCPU instead. However, the CPU case width of K2NCPU is smaller than that of K2HCPU. Therefore, since clearance is provided when the K2NCPU is mounted, it is necessary to take measures for dust prevention.

(3) Use of analog output unit KA63A

The KA63A is provided with a connector for selecting NORMAL or REFRESH I/O control method on the printed circuit board. When the KA63A is used for the K2HCPU system, select the REFRESH position. Therefore, when the K2HCPU has been changed to the K2NCPU, set the I/O control method selection connector of KA63A to the NORMAL position.

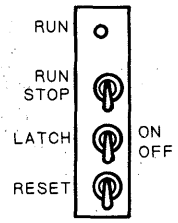
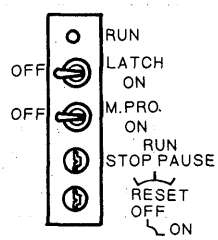
(4) Miscellaneous

For details of other items, see Section 1.1 since the items of K2CPU apply to the K2HCPU.

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

2. COMPARISON BETWEEN K2 AND K2N

(1) Comparison of K2CPU-S3 and K2NCPU

Item		K2CPU-S3	K2NCPU
Instruction	Standard instruction	26 types (18 types of sequence instructions and 8 types of data instructions)	
	Application instruction	12 types	14 types
	Word length	16 bits (2 bytes)/step, 1-, 2-, 3-word instructions	
Program capacity		Maximum 4096 steps	
Sequence instruction		5.6μs/step	3.8μs/step
Data instruction execution time		100 ~ 500μs/instruction	Maximum 950μs/instruction
Program memory	IC-RAM	In units of 2048 steps (printed circuit board)	1024 or 4096 steps selectable
	EP-ROM	1024 or 2048 steps selectable	2048 or 4096 steps selectable
	Number of memory loading sockets	2	1
Number of inputs/outputs		Maximum 512 points	
Number of temporary memories		254 points (M0 ~ 253)	250 points (M0 ~ 249)
Timer		100ms (T0 ~ T127)	100ms (T0 ~ T95) 10ms (T96 ~ T127)
Shift register	Number of usable points	253 bits (M1 ~ 253)	249 bits (M1 ~ 249)
	Specifications	Consists of combined temporary memories in units of 1 bit. SET and application instructions are used.	
Power failure latch		Five divisions of mode①~⑤	13 divisions of mode⓪~Ⓒ
Watchdog timer		100ms	170ms
Scan time measuring function		Not provided	Since scan time is stored in data register D119, scan time be measured by monitoring D119.
Microcomputer mode function		Provided	Provided
Link function	Parallel data link	Provided (KJ61)	Not provided
	Serial data link	Provided for only master channel (KJ71L2) or slave channel (KJ71L3/P3)	Provided for master channel (KJ71L2) and slave channel (KJ71L3/P3)
	Computer link	Provided (KJ71L4/KJ71L7)	Provided (KJ71L4/KJ71L7)
Memory protect function		Not provided	Provided
Controls of unit front panel			
External dimensions		300 x 53 x 166	300 x 33 x 166
Interchangeability		Interchangeable	Interchangeable (provided that base unit has been changed)

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

(2) Specification of Input Units

	Item		Specifications					
K2 Series	Input Unit		KX10	No pertinent unit	KX20	No pertinent unit	KX30	KX40
	Input system		AC/DC input		AC input		DC input	DC input
	Points/unit		16 points		16 points		16 points	16 points
	Insulation system		Photo-coupler		Photo-coupler		Non-insulation	Photo-coupler
	Rated input voltage		100VAC 100VDC		220VAC		12-24VDC	12-24VDC
	Input current		10mA		10mA		7mA (24VDC)	10mA (24VDC)
	Operation voltage	ON voltage	80VAC or higher		160VAC or higher		9VDC or higher	9VDC or higher
		OFF voltage	30VAC or lower		60VAC or lower		2.4VDC or lower	2.4VDC or lower
	Input response time	OFF→ON	5 ~ 20ms		5 ~ 20ms		5 ~ 20ms (24VDC)	5 ~ 20ms (24VDC)
		ON→OFF	20 ~ 40ms		20 ~ 40ms		5 ~ 15ms (24VDC)	10 ~ 30ms (24VDC)
	Input indicator		LED display		LED display		LED display	LED display
	External connection		20-point terminal block connector		20-point terminal block connector		20-point terminal block connector	20-point terminal block connector
	Common wiring		16 points/common		16 points/common		16 points/common	16 points/common
	External dimensions		300x33 x183		300x33 x183		300x33 x183	300x33 x183
	Compatibility with K2N		Compatible (Only when DC input voltage is not used)	–	Compatible	–	Compatible	Compatible

	Input unit		KX10N	KX11N	KX20N	KX21N	KX40N
K2N Series	Input system		AC input	AC input	AC input	AC input	DC input
	Points/unit		16 points	32 points	16 points	32 points	16 points
	Insulation system		Photo-coupler	Photo-coupler	Photo-coupler	Photo-coupler	Photocoupler
	Rated input voltage		100-120VAC	100-120VAC	200-240VAC	200-240VAC	12-24VDC
	Input current		10mA	10mA	10mA	10mA	10mA (24VDC)
	Operation voltage	ON voltage	80VAC or higher	80VAC or higher	160VAC or higher	160VAC or higher	9V or higher
		OFF voltage	30VAC or lower	30VAC or lower	60VAC or lower	60VAC or lower	6V or lower
	Input response time	OFF→ON	15ms or shorter	15ms or shorter	15ms or shorter	15ms shorter	15ms or shorter
		ON→OFF	30ms or shorter	30ms or shorter	30ms or shorter	30ms or shorter	20ms or shorter
	Input indicator		LED display	LED display	LED display	LED display	LED display
	External connection		20-point terminal block connector	40-point terminal block connector	20-point terminal block connector	40-point terminal block connector	20-point terminal block connector
	Common wiring		16 points/common	32 points/common	16 points/common	32 points/common	16 points/common
	External dimensions		300x33 x183	300x33 x195	300x33 x183	300x33 x195	300x33x183
	Compatibility with K2N		Compatible	–	Compatible	–	Compatible

10

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

	Item		Specifications							
K2 Series	Input unit type		KX31	KX41	KX41L	KX32	KX72	KX80	KX80E	KX81L
	Input system		DC input	DC input	DC input	DC input		DC input	DC input	DC input
	Points/unit		32 points	32 points	32 points	64 points	16, 32, 64 points	16 points	16 points	32 points
	Insulation system		Non-insulation	Photo-coupler	Photo-coupler	Non-insulation	Non-insulation	Photo-coupler	Photo-coupler	Photo-coupler
	Rated input voltage		12-24VDC	12-24VDC	12-24VDC	12-24VDC	5-24VDC	12-24VDC	12-24VDC	12-24VDC
	Input current		7mA (24VDC)	10mA (24VDC)	10mA (24VDC)	7mA (24VDC)	7mA (24VDC)	10mA (24VDC)	10mA (24VDC)	10mA (24VDC)
	Operation voltage	ON voltage	9VDC or higher	9VDC or higher	9VDC or higher	9VDC or higher	4VDC or higher	9.6VDC or higher	9.6VDC or higher	9.6VDC or higher
		OFF voltage	2.4VDC or lower	2.4VDC or lower	2.4VDC or lower	2.4VDC or lower	1VDC or lower	6VDC or lower	6VDC or lower	6VDC or lower
	Input response time	OFF→ON	5 ~ 20ms (24VDC)	5 ~ 20ms (24VDC)	5 ~ 20ms (24VDC)	5 ~ 20ms (24VDC)	0.1ms or shorter	5 ~ 20ms	5.7 ~ 6.6ms	5.7 ~ 6.6ms
		ON→OFF	5 ~ 15ms (24VDC)	10 ~ 30ms (24VDC)	10 ~ 30ms (24VDC)	5 ~ 15ms (24VDC)	0.1ms or shorter	10 ~ 30ms	6 ~ 7ms	6 ~ 7ms
	Input indicator		Not provided	Not provided	LED display	Not provided	Not provided	LED display	LED display	LED display
	External connection		40-pin connector	40-pin connector	40-pin connector	40-pin connectorx2	40-pin connectorx2	20-point terminal block connector	20-point terminal block connector	40-pin connector
	Common wiring		32 points/common	32 points/common	32 points/common	32 points/common	32 points/common	16 points/common	16 points/common	16 points/common
	External dimensions		300x33 x166(208)	300x33 x166(208)	300x33 x166(208)	300x33 x166(208)	300x33 x166(208)	300x33 x183	300x33 x183	300x33 x183
	Compatibility with K2N		Compatible (Only when terminal block is used)	Compatible (Only when terminal block is used)	Compatible (Only when terminal block is used)	Compatible	Compatible (Only when terminal block is used)	–	–	–

	Item		Specifications			
K2N Series	Input unit type		KX41N	KX42N	K71N	No pertinent unit
	Input system		DC input	DC input	Sensor input	
	Points/unit		32 points	64 points	32 points	
	Insulation system		Photocoupler	Photo-coupler	Photo-coupler	
	Rated input voltage		12-24VDC	12-24VDC	5-24VDC	
	Input current		10mA (24VDC)	10mA (24VDC)	4.5mA (24VDC)TYP 6mA(24VDC) MAX	
	Operation voltage	ON voltage	9V or higher	9V or higher	3.5V or lower	
		OFF voltage	6V or lower	6V or lower	1.5V or lower	
	Input response time	OFF→ON	15ms or shorter	15ms or shorter	0.5ms or shorter	
		ON→OFF	20ms or shorter	20ms or shorter	3ms or shorter	
	Input indicator		LED display	LED display (Only when 32 poins changeover display by switch)	LED display	
	External connection		40-point terminal block connector	40-pin connectorx2	40-pin connextor	
	Common wiring		16 points/common	32 points/common	8 points/common	
	External dimensions		300x33x195	300x33 x166(208)	300x33 195	
	Compatibility with K2N		Compatible (Only when pin connector is used)	Compatible	Compatible (Only when pin connector is used)	–

	Item		Specifications		
K2N Series	Input unit type		No pertinent unit	No pertinent unit	No pertinent unit
	Input system				
	Points/unit				
	Insulation system				
	Rated input voltage				
	Input current				
	Operation voltage	ON voltage			
		OFF voltage			
	Input response time	OFF→ON			
		ON→OFF			
	Input indicator				
	External connection				
	Common wiring				
	External dimensions				
	Compatibility with K2N		–	–	–

10

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

(3) Comparison of output units

	Item		Specifications							
K2 Series	Output unit type		KY10	KY11			KY22		KY30	KY40
	Output system		Contact output	Contact output			Triac output		Transistor output	Transistor output
	Points/unit		16 points	16 points			16 points		16 points	16 points
	Insulation system		Relay	Relay			Photo-coupler		Non-insulation	Photo-coupler
	Rated load voltage		100-220VAC 24VDC	100-220VAC 24VDC			100-220VAC		24VDC	24VDC
	Max. load current	1 point	2A	2A			2A		0.1A	0.1A
		Simultaneous 4 points	8A	8A			5A		1.6A (Simultaneous 16 points)	1.6A (Simultaneous 16 points)
	Output response time	OFF→ON	5ms	15ms			1ms		0.1ms	0.1ms
		ON→OFF	15ms	15ms			10ms		0.1ms	0.1ms
	Output indicator		LED display	LED display			LED display		LED display	LED display
	External connection		20-point terminal block connectior	20-point terminal block connector			20-point terminal block connector		20-point terminal block connector	20-point terminal block connector
	Common wiring		4 points/ common	4 points/ common			4 points/ common		16 points/ common	16 points/ common
	Surge killer		Not Provided	Provided			Provided		Provided	Provided
	Fuse		Not Provided	Not Provided			Provided		Not Provided	Not Provided
	External dimensions		300x33x183	300x33x183			300x33x183		300x33x183	300x33x183
	Interchangeability with KX(Y) N		Interchangeable	Interchangeable			Interchangeable		Interchangeable	Interchangeable
K2N Series	Output unit type		KY10N	KY11N	KY13N	KY13SN	KY22N	KY23N	KY40N	
	Output system		Contact output	Contact output	Contact output	Contact output	Triac output	Triac output	Transistor output	
	Points/unit		16 points	16 points	32 points	32 points	16 points	32 points	16 points	
	Insulation system		Photo-coupler	Photo-coupler	Photo-coupler	Photo-coupler	Photo-coupler	Photo-coupler	Photo-coupler	
	Rated load voltage		240VAC 24VDC	240VAC 24VDC	240VAC 24VDC	240VAC 24VDC	100-240VAC	100-240VAC	5-24VDC	
	Max. load current	1 point	2A	2A	2A	2A	2A	1A	0.1A	
		Simultaneous 4 points	8A	8A	5A	5A	5A	4A (Simultaneous 8 points)	1.6A (Simultaneous 16 points)	
	Output response time	OFF→ON	8ms or shorter	8ms or shorter	8ms or shorter	8ms or shorter	1ms or shorter	1ms or shorter	1ms or shorter	
		ON→OFF	15ms or shorter	15ms or shorter	15ms or shorter	15ms or shorter	1.5 cycle + 1ms or shorter	1.5 cycle + 1ms or shorter	1ms or shorter	
	Output indicator		LED display	LED display	LED display	LED display	LED display	LED display	LED display	
	External connection		20-point terminal block connector	20-point terminal block connector	40-point terminal block connector	40-point terminal block connector	20-point terminal block connector	40-point terminal block connector	20-point terminal block connector	
	Common wiring		4 points/ common	4 points/ common	4 points/ common	4 points/ common	4 points/ common	8 points/ common	16 points/common	
	Surge killer		Not provided	Provided	Not provided	Provided	Provided	Provided	Provided	
	Fuse		Not provided	Not provided	Not provided	Not provided	Provided	Provided	Not provided	
	External dimensions		300x33x183	300x33x183	300x33x195	300x33x195	300x33x183	300x33x195	300x33x183	
	Interchangebility with KX(Y)		Interchangeable	Interchangeable	—	—	Interchangeable	—	Interchangeable (Should be used at 5VDC and 12VDC.)	

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

	Item		Specifications									
K2 Series	Output unit type		KY31	KY41	KY41L	KY32	KY51	KY60	KY60E	KY80	KY81L	No pertinent unit
	Output system		Transistor output	Transistor output	Transistor output	Transistor output	Transistor output	Transistor output	Transistor output	Transistor output	Transistor output	
	Points/unit		32 points	32 points	32 points	64 points	32 points	16 points	16 points	16 points	32 points	
	Insulation system		Non-insulation	Photo-coupler	Photo-coupler	Non-coupler	Non-coupler	Photo-coupler	Photo-coupler	Photo-coupler	Photo-coupler	
	Rated load voltage		24VDC	24VDC	24VDC	24VDC	48VDC	48VDC	24VDC	24VDC	DC24V	
	Max. load current	1 points	0.1A	0.1A	0.1A	0.1A	0.5A	2A	2A	0.5A	0.5A	
		Simultaneous 4 points	3.2A (Simultaneous 32 points)	3.2A (Simultaneous 32 points)	3.2A (Simultaneous 32 points)	3.2A (Simultaneous 32 points)	2A	4A	4A	2A	2A	
	Output response time	OFF→ON	0.1ms	0.1ms	0.1ms	0.1ms	0.1ms	0.1ms	0.1ms	0.1ms	0.1ms	
		ON→OFF	0.1ms	0.1ms	0.1ms	0.1ms	0.1ms	0.1ms	0.5ms	0.5ms	0.5ms	
	Output indicator		Not provided	Not provided	LED display	Not provided	Not provided	LED display	LED display	LED display	LED display	
	External connection		40-pin connector	40-pin connector	40-pin connector	40-pin connector	40-pin connector	20-point terminal block connector	20-point terminal block connector	20-point terminal block connector	40-pin connector	
	Common wiring		32points/common	32points/common	32points/common	32points/common	4points/common	4points/common	4points/common	16points/common	8points/common	
	Surge killer		Provided	Provided	Provided	Provided	Provided	Provided	Provided	Provided	Provided	
	Fuse		Not provided	Not provided	Provided	Not provided	Provided	Provided	Provided	Not provided	Not provided	
	External dimentions		300x33 x166 (208)	300x33 x166 (208)	300x33 x166 (208)	300x33 x166 (208)	300x33 x166 (208)	300x33 x183	300x33 x183	300x33 x183	300x33 x166 (208)	
	Interchangeability with KX(Y) N		Interchangeable (Only when terminal block is used)	Interchangeable (Only when terminal block is used)	Interchangeable (Only when terminal block is used)	Interchangeable	Not Interchangeable	Interchangeable	—	—	—	—

	Item		Specifications					
K2N Series	Output unit type		KY41N	KY42N	KY51N	KY60N	No pertinent unit	KY71N
	Output system		Transistor output	Transistor output	Transistor output	Transistor output		TTL, COM output
	Points/unit		32points	64points	32points	16points		32points
	Insulation system		Photocoupler	Photo-coupler	Photo-coupler	Photo-coupler		Photo-coupler
	Rated loas voltage		5-24VDC	5-24VDC	12-24V DC	12-48V DC		5-12VDC
	Max. load current	1 points	0.1A	0.1A	0.5A	2A		0.016A
		Simultaneous 4 points	1.6A (Simultaneous 16 points)	3A (Simultaneous 32 points)	8A (Simultaneous 16 points)	5A		0.256A (Simultaneous 16 points)
	Output response time	OFF→ON	1ms or shorter	1ms or shorter	1ms or shorter	1ms or shorter		1ms or shorter
		ON→OFF	1ms or shorter	1ms or shorter	1ms or shorter	1ms or shorter		1ms or shorter
	Output indicator		LED display	LED display (only when change-over display by switch)	LED display	LED display		LED display
	External connextion		40-point terminal block connector	40-pin connector x 2	40-points terminal block connector	20-points terminal block connector		40-points terminal block connector
	Common wiring		16 points/common	32points/common	16points/common	4points/common		16points/common
	Surge killer		Provided	Provided	Provided	Provided		Provided
	Fuse		Not provided	Not provided	Provided	Provided		Not provided
	External dimensions		300x33x195	300x33 x166 (208)	300x33 x195	300x33 x183		300x33 x195
	Interchangeability with KX(Y)		Interchangeable (Should not be used at 5VDC and 12VDC Interchangeable only when pin connector is used.)	Interchangeable	Not interchangeable	Interchangeable	—	—

10

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

(4) Comparison of power supply units

K2 Series	K2N Series	Interchangeability
K61P	K61PN	All units have the same specifications and external dimensions. Units are interchangeable with each other.
K62P	K62PN	
K64P	K64PN	
K65P	K65PN	

(5) Comparison of base units

Item	K12B	K22B	K15B	K25B	K18B	K28B	K65B	K68B		
Type	K12B	K22B	K15B	K25B	K18B	K28B	K65B	K68B		
Number of loaded I/O units	2 units	2 units	5 units	5 units	8 units	8 units	5 units	8 units		
Requirement of extension power supply unit							Required	Required		
External dimensions	300x240 x25	300x345 x25	300x365 x25	300x365 x25	300x450 x25	300x470 x25	300x310 x25	300x415 x25		
Interchangeability with K ⬚ ⬚ BN	Inter-change-able	Not *1 inter-change-able	Inter-change-able	Not *1 inter-change-able	Inter-change-able	Not *1 inter-change-able	Inter-change-able	Inter-change-able		
Type	K12BN		K15BN		K18BN		K65BN	K68BN	K55BN	K58BN
Number of loaded I/O units	2 units		5 units		8 units		5 units	8 units	5 units	8 units
Requirement of extension power supply unit							Required	Required	Not required	Not required
External dimensions	300x240x25		300x345x25		300x450x25		300x310 x25	300x415 x25	300x275 x25	300x380 x25
Interchangeablility with K ⬚ ⬚ BN	Inter-change-able	Inter-change-able	Inter-change-able	Inter-change-able	Inter-change-able	Inter-change-able	Not inter-change-able	Not inter-change-able	Not inter-change-able	Not inter-change-able

*Note: *1: When the CPU unit is also changed to a new type, the unit becomes interchangeable.*

10

(6) Comparison of extension cables

K2 Series	K2N Series	Interchangeability
K61CBL	K61CBL	All cables have the same specifications and external dimensions. Cables are interchangeable with each other.
K67CBL	K67CBLN	

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

3. PROCESS TIME

Since average process time data values are shown in the table, actual time may vary slightly. When calculating scan time, provide allowance so that an error is not detected by the WDT.

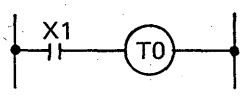
(Unit: μs)

Instruction	Condition					Process Time
LD	X, Y					3.8 (5.6)
	M, T, C, F					3.8 (5.6)
LDI	X, Y					3.8 (5.6)
	M, T, C, F					3.8 (5.6)
AND	X, Y					3.8 (5.6)
	M, T, C, F					3.8 (5.6)
ANI	X, Y					3.8 (5.6)
	M, T, C, F					3.8 (5.6)
OR	X, Y					3.8 (5.6)
	M, T, C, F					3.8 (5.6)
ORI	X, Y					3.8 (5.6)
	M, T, C, F					3.8 (5.6)
ANB	–					3.8 (5.6)
ORB	–					3.8 (5.6)
OUT	Y					3.8 (5.6)
	M					3.8 (5.6)
	T	Non execution *1				83
		Execution	After time-up			73
			Per 0.1 seconds	K		85
				D		85
	C	Non execution				72
		Execution	Non count			72
			After count-up			74
			After count-up	K		134
				D		139
	F	Non execution				89
		Execution				262

Instruction	Condition			Process Time
MC	–			71
MCR	–			65
SET	Y	Non execution		3.8 (5.6)
		Execution		3.8 (5.6)
	M	Non execution		3.8 (5.6)
		Execution		3.8 (5.6)
	F	Non execution		63
		Execution		263
RST	Y	Non execution		63
		Execution		79
	M, F	Non execution		63
		Execution		69
	C	Non execution		63
		Execution		79
SFT	M	Non execution		67
		Execution		77
CJ	K	Non execution		63
		Execution		105
PLS	M	Non execution		69
		Execution	ON	75
			OFF	75
NOP	–			3.8
END	–			230

Sequence Instructions

*Note 1: Non execution *1 means that operation condition is off. (X1 is off.)*



(When X1 is OFF)

Note 2: Value in parenthesis applies when process time setting pin is set to SLOW position (5.6μs/step).

10

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

(Unit: μs)

	S \ D	K	D	T	C	X	Y	M
Process time of MOV instruction	K	–	168	168	168	–	398	355
	D	–	185	185	185	–	418	371
	T	–	185	185	185	–	418	371
	C	–	185	185	185	–	418	371
	X	–	428	428	428	–	655	605
	Y	–	428	428	428	–	655	605
	M	–	378	378	378	–	605	568
Process time of > instruction	K	192	207	207	207	475	475	418
	D	208	223	223	223	492	492	435
	T	208	223	223	223	492	492	435
	C	208	223	223	223	492	492	435
	X	452	468	468	468	732	732	673
	Y	452	468	468	468	732	732	673
	M	402	418	418	418	682	682	623
Process time of = instruction	K	188	205	205	205	472	472	415
	D	205	222	222	222	492	492	432
	T	205	222	222	222	492	492	432
	C	205	222	222	222	492	492	432
	X	448	465	465	465	723	723	665
	Y	448	465	465	465	723	723	665
	M	398	415	415	415	673	673	623
Process time of + instruction	K	–	201	201	201	–	714	609
	D	–	218	218	218	–	729	624
	T	–	218	218	218	–	729	624
	C	–	218	218	218	–	729	624
	X	–	461	461	461	–	964	864
	Y	–	461	461	461	–	964	864
	M	–	415	415	415	–	924	814

Note 1: Time shwon in above table applies to execution. 7.7μs applies to non execution.
Note 2: X, Y, and M in above table apply to four digits. Shorter precess time applies to 1 ~ 3 digits.

10

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

(Unit: μs)

	S \ D	K	D	T	C	X	Y	M
Process time of — instruction	K	—	208	208	208	—	714	609
	D	—	225	225	225	—	729	624
	T	—	225	225	225	—	729	624
	C	—	225	225	225	—	729	624
	X	—	468	468	468	—	964	864
	Y	—	468	468	468	—	964	864
	M	—	418	418	418	—	924	814
Process time of < instruction	K	195	210	210	210	478	478	422
	D	212	228	228	228	495	495	438
	T	212	228	228	228	495	495	438
	C	212	228	228	228	495	495	438
	X	452	468	468	468	732	732	665
	Y	452	468	468	468	732	732	665
	M	405	422	422	422	665	665	607
Process time of BIN instruction	K	—	341	341	341	—	596	555
	D	—	358	358	358	—	613	571
	T	—	358	358	358	—	613	571
	C	—	358	358	358	—	613	571
	X	—	596	596	596	—	855	805
	Y	—	596	596	596	—	855	805
	M	—	555	555	555	—	805	755
Process time of BCD instruction	K	—	646	646	646	—	905	871
	D	—	663	663	663	—	921	880
	T	—	663	663	663	—	921	880
	C	—	663	663	663	—	921	880
	X	—	921	921	921	—	1180	1130
	Y	—	921	921	921	—	1180	1130
	M	—	871	871	871	—	1130	1080

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

(Unit : μs)

Instruction	Condition		Process Time	Instruction	Condition		Process Time
OUT F108	4 ↔ 16	Decode	220	OUT F115	Batch shift of D	5	185
		Encode	285			10	255
						50	840
OUT F109	16 bit check		245	OUT F116	Batch reset of D	5	160
						30	440
						90	1120
OUT F110	6 digits + 6 digits		183	OUT F117			138
OUT F111	6 digits – 6 digits		2130	OUT F118			138
OUT F112	6 digits x 6 digits		5480	OUT F119			400
OUT F113	6 digits ÷ 6 digits		3205	OUT F126	Parameter read 9 data	During stop	28000
						During positioning	41000
OUT F114	Batch shift of M	10 bits	185	OUT F127	Parameter write 9 data		28000
		100 bits	1020				
		200 bits	1980				

Application Instructions

10

IMPORTANT

(1) Design the system so that the protection and safety circuits, which are furnished to protect the programmable controller from troubles, are located in the exterior of the system.

(2) Since the printed circuit boards are mounted with electronic parts, which will be adversely affected by static electricity, handle them as described below when they are directly handled.

1) Ground human body and work bench.

2) Do not directly touch the conductive areas of printed circuit board and its electrical parts with a non-grounded material.

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

MITSUBISHI ELECTRIC CORPORATION
HEAD OFFICE MITSUBISHI DENKI BLDG MARUNOUCHI TOKYO 100 TELEX J24532 CABLE MELCO TOKYO

These products or technologies are subject to Japanese and/or COCOM strategic restrictions and diversion contrary thereto is prohibited.

IB (NA) 66009-A (8412) MEE Printed in Japan

Specifications subject to change without notice.

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

Artisan Technology Group is an independent supplier of quality pre-owned equipment

Gold-standard solutions

Extend the life of your critical industrial, commercial, and military systems with our superior service and support.

We buy equipment

Planning to upgrade your current equipment? Have surplus equipment taking up shelf space? We'll give it a new home.

Learn more!

Visit us at **artisantg.com** for more info on price quotes, drivers, technical specifications, manuals, and documentation.

Artisan Scientific Corporation dba Artisan Technology Group is not an affiliate, representative, or authorized distributor for any manufacturer listed herein.

We're here to make your life easier. How can we help you today?

(217) 352-9330 | sales@artisantg.com | artisantg.com

ARTISAN® TECHNOLOGY GROUP