

# 14 SAFETY FOR USING AC

IF AC output module or AC input module is used, Section 14.1 is recommended for safety. When using it for a machine directed to the European market, carefully observe the descriptions in Section 14.1 [as per EN50178].

## 14.1 ENVIRONMENT FOR INSTALLATION

### 14.1.1 Installation Category (Overvoltage Category)

Install the unit in the environment of Installation Category II (Overvoltage Category II) or better. [EN50178]

The available impulse surge level to the ground that appears in the power source is 2.5kV maximum. (100VAC system power source is needed in AC input module According to the standard, the available impulse surge level to the ground is 1.5kV for this power source (voltage of which is 150VAC or less). However, for this module, the available impulse surge level to the ground that appears in the power source is 2.5 kV.)

Generally, an isolation transformer used for the main power source is regarded as an effective surge filter.

The class of the 16-point relay output module (AOR16G) is set to installation category (overvoltage category) I.

(Keep any impulse voltage to ground that may appear on the AC power to within 1.5 kV.)

The class for the 8-point relay output module (AOR08G), AC output module, and AC input module is set to installation category (overvoltage category) II.

#### **WARNING**

Connect the same phase of a power source to the commons of the AC input and AC output modules. Otherwise, burnout or fire may occur.

#### **NOTE**

- 1 The AC output module incorporates a 3.2 A fuse per common. It is assumed that, if the load is short-circuited, the fuse blows to protect the triac. However, be sufficiently careful not to cause a short circuit because no little damage occurs to the triac when the fuse blows.
- 2 If external AC input lines run through a long omnibus cable, inter-wire mutual capacitances may cause induced current to flow from live lines to open lines, leading to an ON state. If this is the case, a typical measure might be to lower the input impedance by attaching a bleeder resistance between the input pins.
- 3 If a reed switch is used as the input contact of the AC input module, the reed switch must be one having a permissible current capacity of 1 A or higher. Otherwise rush current may cause the contact to be welded.

### 14.1.2 Pollution Degree

Install the unit in the environment of pollution degree 2 or better. [EN50178]

In cabinet of IP-54 or better (described in Section 3.1), it can be considered as pollution degree 2 or better usually. The IP degree required is depended on the circumstances of machine tool, so select the adequate degree in accordance with such environment.

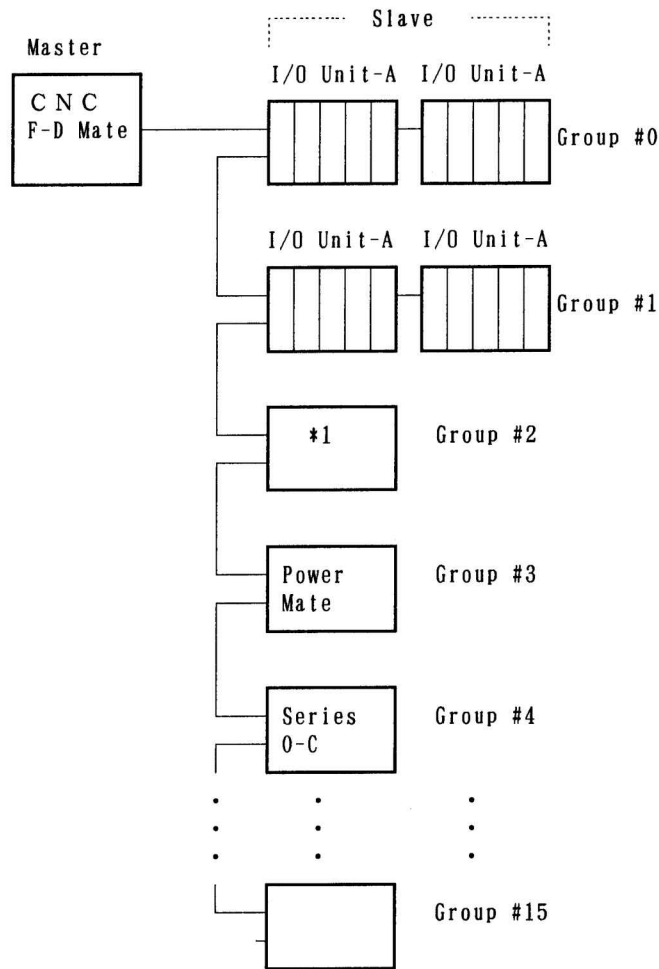
## **II. MAINTENANCE**



# 1 OVERVIEW

## 1.1 SYSTEM CONFIGURATION

I/O Unit-A is connected to a CNC and cell controller through a high-speed serial interface, I/O Link *i* or I/O Link.



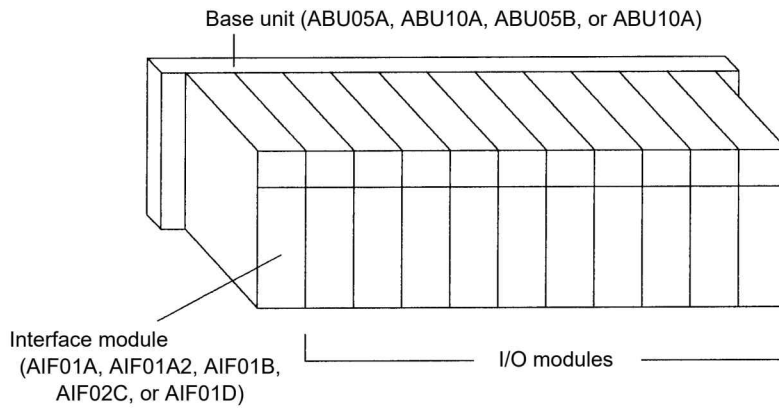
(\*1) Operator's panel connection unit

- (1) The I/O Link *i* or I/O Link consists of a master and slaves.  
 Master: Series0-C, Series15/16/18/20/21, Series15*i*/16*i*/18*i*/20*i*/21*i*/30*i*/31*i*/32*i*/35*i*/0*i*, Power Mate-D/H, Power Mate *i*-D/H, F-D Mate  
 Slave: I/O Unit-A, I/O Unit-B, Power Mate, operator's panel connection unit, and Series 0-C, and so on
- (2) One I/O Link can connect to up to 16 groups of slaves. If the master is not a CNC, one slave group can contain up to 2 of I/O Unit A (2 base units). If the master is the F-D Mate, however, one group can contain up to 4 I/O Units.
- (3) One I/O Link *i* can connect to up to 24 slave groups.  
 Only one I/O Unit-A (one base) can connect to one group.
- (4) I/O Link *i* allows no base expansion.

# 1.2 I/O Unit-A CONFIGURATION

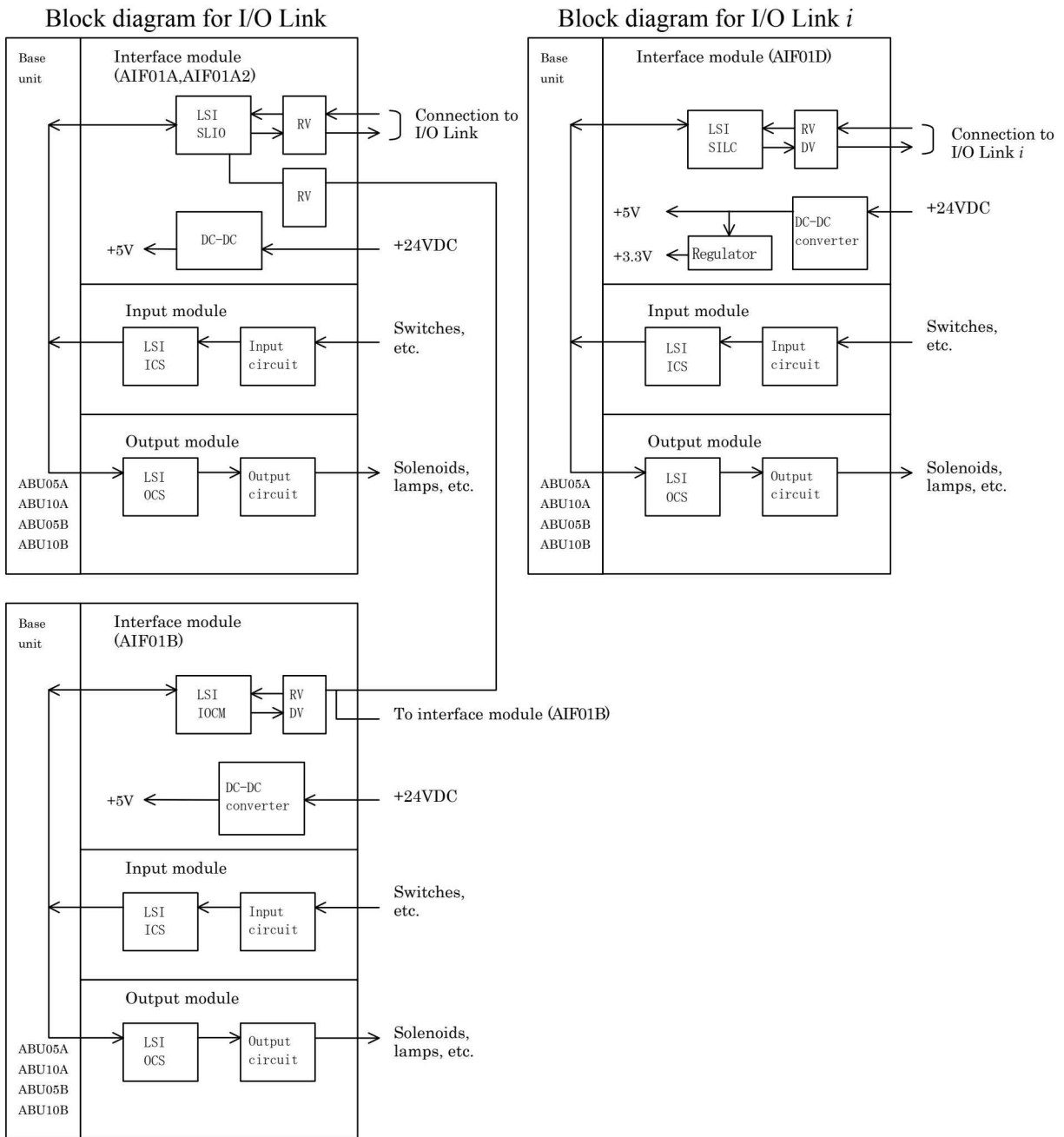
---

An I/O Unit-A consists of a base unit, interface module, and I/O modules.



Interface module  
(AIF01A, AIF01B, or AIF02C)

# 1.3 BLOCK DIAGRAM



## 1.4 I/O Unit-MODEL A CONFORMING TO UL/C-UL

The units conforming to the UL/C-UL standard have different drawing numbers.

The following table lists the units conforming to the UL/C-UL standard and those not.

	I/O Unit-MODEL A conforming to the UL/C-UL standard	I/O Unit-MODEL A not conforming to the UL/C-UL standard
<b>Unit drawing number</b>	A03B-0819-Jxxx	A03B-0807-Jxxx
<b>Unit specification (interface, dimensions, and weight)</b>	Same specification	
<b>Plastic case</b>	Fire retardancy: 94V-0 (material less likely to burn)	Fire retardancy: 94HB
<b>Unit nameplate</b>	The nameplates for the base unit and interface module bear a UL mark.	The nameplates have no UL mark.

- Refer to Section 1.5, "LIST OF UNITS", in Part II for individual unit drawings.
- It is possible to use units conforming to the UL/C-UL standard and those not conforming together.

UL File No. E193565

## 1.5 LIST OF UNITS

### 1.5.1 Units Conforming to UL/C-UL Standard: Ordering Information A03B-0819-Jxxx

Name				Unit conforming to UL/C-UL standard		
				Ordering information	Unit drawing number	Drawing number for printed circuit board in unit
Base unit	10 slots	Horizontal type	ABU10A	A03B-0819-J001	A03B-0819-C001	A20B-9001-0040
		Vertical type	ABU10B	A03B-0819-J004	A03B-0819-C004	A20B-2003-0100
	5 slots	Horizontal type	ABU05A	A03B-0819-J002	A03B-0819-C002	A20B-9001-0020
		Vertical type	ABU05B	A03B-0819-J003	A03B-0819-C003	A20B-2000-0510
Interface module	Power supply connector: SORIAU JAPAN 3-pin (former Burndy)		AIF01A	A03B-0819-J011	A03B-0819-C011	A20B-8000-0410
	Power supply connector: Tyco Electronics 3-pin		AIF01A2	A03B-0819-J014	A03B-0819-C014	A20B-8000-0411
	Power supply connector: SORIAU JAPAN 3-pin (former Burndy)		AIF01B	A03B-0819-J012	A03B-0819-C012	A20B-8000-0420
	Power supply connector: SORIAU JAPAN 3-pin (former Burndy)		AIF02C	A03B-0819-J013	A03B-0819-C013	A20B-8000-0710
	Power supply connector: Tyco Electronics 4 (2+2)-pin, gold-coated		AIF01D	A03B-0819-J015	A03B-0819-C015	A20B-8002-0780

Name				Unit conforming to UL/C-UL standard		
				Ordering information	Unit drawing number	Drawing number for printed circuit board in unit
DC input module	Non-insulations	32 points, 20ms, HONDA 50-pin	AID32A1	A03B-0819-J101	A03B-0819-C101	A20B-8002-0450 or -9000-0970
		32 points, 2ms, HONDA 50-pin	AID32B1	A03B-0819-J102	A03B-0819-C102	A20B-8002-0451 or -9000-0971
		32 points, 20 ms and 2 ms intermixed, HONDA 50-pin	AID32H1	A03B-0819-J111	A03B-0819-C111	A20B-8002-0452 or -9000-0972
	Insulations	16 points, NEG, 20ms, terminal block	AID16C CE:X	A03B-0819-J103	A03B-0819-C103	A20B-8002-0380 or -9000-0931
		16 points, NEG, 2ms, terminal block	AID16K CE:X	A03B-0819-J113	A03B-0819-C113	A20B-8002-0381 or -9000-0932
		16 points, POS, 20ms, terminal block	AID16D	A03B-0819-J104	A03B-0819-C104	A20B-8002-0370 or -9000-0901
		16 points, POS, 2ms, terminal block	AID16 L	A03B-0819-J114	A03B-0819-C114	A20B-8002-0371 or -9000-0902
		16 points, POS, 20ms, terminal block with diagnosis functions	AID16DM	A03B-0819-J116	A03B-0819-C116	A20B-8002-0790
		16 points, POS, 2ms, terminal block with diagnosis functions	AID16LM	A03B-0819-J117	A03B-0819-C117	A20B-8002-0791
		32 points, 20ms, HONDA 50-pin	AID32E1	A03B-0819-J105	A03B-0819-C105	A20B-8002-0150
		32 points, 20ms, HIROSE 50-pin	AID32E2	A03B-0819-J110	A03B-0819-C110	A20B-8002-0160
		32 points, 2ms, HONDA 50-pin	AID32F1	A03B-0819-J106	A03B-0819-C106	A20B-8002-0151
		32 points, 2ms, HIROSE 50-pin	AID32F2	A03B-0819-J109	A03B-0819-C109	A20B-8002-0161
		AC input module	16 points, 100 to 115VAC terminal block	AIA16G	A03B-0819-J107	A03B-0819-C107
DC output module	Non-insulations	32 points, NEG, 0.3A HONDA 50-pin	AOD32A1 CE:X	A03B-0819-J162	A03B-0819-C162	A20B-8002-0460 or -9001-0110
	Insulations	8 points, NEG, 2A, terminal block	AOD08C CE:X	A03B-0819-J151	A03B-0819-C151	A20B-8002-0420 or -9001-0210
		8 points, POS, 2A, terminal block	AOD08D	A03B-0819-J152	A03B-0819-C152	A20B-8002-0410 or -9001-0220
		8 points, POS, 2A, output protection, terminal block	AOD08DP	A03B-0819-J183	A03B-0819-C183	A20B-8002-0060
		16 points, NEG, 0.5A, terminal block	AOD16C CE:X	A03B-0819-J153	A03B-0819-C153	A20B-8002-0400 or -9000-0941
		16 points, POS, 0.5A, terminal block	AOD16D	A03B-0819-J154	A03B-0819-C154	A20B-8002-0390 or -9000-0921
		16 points, POS, 0.5A, terminal block with diagnosis functions	AOD16DM	A03B-0819-J186	A03B-0819-C186	A20B-8002-0800
		16 points, POS, 2A HONDA 40-pin	AOD16D2	A03B-0819-J171	A03B-0819-C171	A20B-8002-0570
		16 points, POS, 2A Weidmüller 24-pin connector	AOD16D3	A03B-0819-J185	A03B-0819-C185	A20B-8002-0520

CE:X.....CE marking is not supported.



Name				Unit conforming to UL/C-UL standard		
				Ordering information	Unit drawing number	Drawing number for printed circuit board in unit
DC output module	Insulations	16 points, POS, 0.3A, output protection, terminal block	AOD16DP	A03B-0819-J182	A03B-0819-C182	A20B-8002-0070
		32 points, NEG, 0.3A HONDA 50-pin connector	AOD32C1 CE:X	A03B-0819-J155	A03B-0819-C155	A20B-8002-0430 or -9001-0070
		32 points, NEG, 0.3A HIROSE 50-pin connector	AOD32C2 CE:X	A03B-0819-J172	A03B-0819-C172	A20B-8002-0440 or -9001-0530
		32 points, POS, 0.3A HONDA 50-pin connector	AOD32D1	A03B-0819-J156	A03B-0819-C156	A20B-8000-0440
		32 points, POS, 0.3A HIROSE 50-pin connector	AOD32D2	A03B-0819-J167	A03B-0819-C167	A20B-8000-0510
AC output module		5 points, 2A, 100 to 230VAC terminal block	AOA05E	A03B-0819-J157	A03B-0819-C157	A20B-8000-0470
		8 points, 1A, 100 to 230VAC terminal block	AOA08E	A03B-0819-J158	A03B-0819-C158	A20B-8000-0480
		12 points, 0.5A, 100 to 115VAC, terminal block	AOA12F	A03B-0819-J159	A03B-0819-C159	A20B-8000-0321
Relay output module		8 points, 4A, terminal block	AOR08G	A03B-0819-J160	A03B-0819-C160	A20B-8002-0470 or -9001-0200
		16 points, 2A, terminal block	AOR16G	A03B-0819-J161	A03B-0819-C161	A20B-8000-0101
		16 points, 2A, HIROSE 50-pin	AOR16H2	A03B-0819-J165	A03B-0819-C165	A20B-8000-0500
DC input/output hybrid module		DI: 24 points DO: 16 points, NEG HONDA 50-pin	AIO40A CE:X	A03B-0819-J200	A03B-0819-C200	A20B-9001-0240 or -8002-0540
Analog input module		12bit, terminal block	AAD04A	A03B-0819-J051	A03B-0819-C051	A20B-8000-0450
		16bit, terminal block	AAD04B	A03B-0819-J063	A03B-0819-C063	A20B-8002-0590
Analog output module		12bit, terminal block	ADA02A	A03B-0819-J052	A03B-0819-C052	A20B-8000-0460
		14bit, terminal block	ADA02B	A03B-0819-J060	A03B-0819-C060	A20B-8001-0980
High-speed counter module (Note)			ACT01A	A03B-0819-J053	A03B-0819-C053	A20B-8000-0540 or -8000-0541
Temperature input module		Pt/JPt	ATI04A	A03B-0819-J056	A03B-0819-C056	A74L-0001-0083#PT
		J/K	ATI04B	A03B-0819-J057	A03B-0819-C057	A74L-0001-0083#JK
		Terminal unit for ATI04A	ATB01A	A03B-0819-J350	A03B-0819-C350	A20B-1005-0920
		Terminal unit for ATI04B	ATB01B	A03B-0819-J351	A03B-0819-C351	A20B-1005-0930

**NOTE**

The high-speed counter module whose ordering information and unit drawing number are, respectively, A03B-0819-J053 and A03B-0819-C053 is dedicated to I/O Link. (See Chapter 8 of Part I, "CONNECTION".)

CE:X ..... CE marking is not supported.

## 1.5.2 Other Units

Name		Ordering information	Drawing number for printed circuit board in unit
Optical adapter for I/O Link	Standard type	A13B-0154-B001	A20B-1004-0240
	High-speed type	A13B-0154-B004	A20B-1004-0242
Optical adapter for I/O Link <i>i</i>		A13B-0154-B101	A20B-2004-0600
Optical fiber junction adapter		A02B-0094-K841	-

Name	Ordering information	Drawing number for printed circuit board in unit
I/O Link dummy unit	A13B-0167-B001	A20B-8000-0940
2-channel I/O Link connector adapter	A20B-1007-0680	A20B-1007-0680
3-channel I/O Link connector adapter	A20B-1008-0360	A20B-1008-0360

### 1.5.3 Early Units (Units not Conforming to UL/C-UL: Ordering Information A03B-0807-Jxxx)

The modules listed below are those produced before the factory was UL-approved.

The module's basic performance does not differ between A03B-0807-Jxxx and A03B-0819-Jxxx.

The units with the new ordering information A03B-0819-Jxxx are housed in cases made of material less likely to burn.

Name				Early unit		
				Early ordering information	Early-unit drawing number	Drawing number for printed circuit board in early unit
Base unit	10 slots	Horizontal type	ABU10A	A03B-0807-J001	A03B-0807-C001	A20B-9001-0040
		Vertical type	ABU10B	A03B-0807-J004	A03B-0807-C004	A20B-2003-0100 or -2000-0550
	5 slots	Horizontal type	ABU05A	A03B-0807-J002	A03B-0807-C002	A20B-9001-0020
		Vertical type	ABU05B	A03B-0807-J003	A03B-0807-C003	A20B-2000-0510
Interface module			AIF01A	A03B-0807-J011	A03B-0807-C011	A20B-8000-0410
			AIF01B	A03B-0807-J012	A03B-0807-C012	A20B-8000-0420
			AIF02C	A03B-0807-J013	A03B-0807-C013	A20B-8000-0710
DC input module	Non-insulations	32 points, 20ms, HONDA 50-pin	AID32A1	A03B-0807-J101	A03B-0807-C101	A20B-9000-0970
		32 points, 2ms, HONDA 50-pin	AID32B1	A03B-0807-J102	A03B-0807-C102	A20B-9000-0971
		32 points, 20 ms and 2 ms intermixed, HONDA 50-pin	AID32H1	A03B-0807-J111	A03B-0807-C111	A20B-9000-0972
	Insulations	16 points, NEG, 20ms, terminal block	AID16C	A03B-0807-J103	A03B-0807-C103	A20B-9000-0931
		16 points, NEG, 2ms, terminal block	AID16K	A03B-0807-J113	A03B-0807-C113	A20B-9000-0932
		16 points, POS, 20ms, terminal block	AID16D	A03B-0807-J104	A03B-0807-C104	A20B-9000-0901
		16 points, POS, 2ms, terminal block	AID16 L	A03B-0807-J114	A03B-0807-C114	A20B-9000-0902
		32 points, 20ms, HONDA 50-pin	AID32E1	A03B-0807-J105	A03B-0807-C105	A20B-8002-0150 or -9001-0010
		32 points, 20ms, HIROSE 50-pin	AID32E2	A03B-0807-J110	A03B-0807-C110	A20B-8002-0160 or -9001-0280
		32 points, 2ms, HONDA 50-pin	AID32F1	A03B-0807-J106	A03B-0807-C106	A20B-8002-0151 or -9001-0011
32 points, 2ms, HIROSE 50-pin	AID32F2	A03B-0807-J109	A03B-0807-C109	A20B-8002-0161 or -9001-0281		
AC input module		16 points, 100 to 115VAC terminal block	AIA16G	A03B-0807-J107	A03B-0807-C107	A20B-8000-0341

Name				Early unit		
				Early ordering information	Early-unit drawing number	Drawing number for printed circuit board in early unit
DC output module	Non-insulations	32 points, NEG, 0.3A, HONDA 50-pin	AOD32A1	A03B-0807-J162	A03B-0807-C162	A20B-9001-0110
	Insulations	8 points, NEG, 2A, terminal block	AOD08C	A03B-0807-J151	A03B-0807-C151	A20B-9001-0210 or -9000-0951
		8 points, POS, 2A, terminal block	AOD08D	A03B-0807-J152	A03B-0807-C152	A20B-9001-0220 or -9000-0911
		16 points, NEG, 0.5A, terminal block	AOD16C	A03B-0807-J153	A03B-0807-C153	A20B-9000-0941
		16 points, POS, 0.5A, terminal block	AOD16D	A03B-0807-J154	A03B-0807-C154	A20B-9000-0921
		16 points, POS, 2A, HIROSE 40-pin	AOD16D2	A03B-0807-J171	A03B-0807-C171	A20B-8002-0570 or -9001-0490
		16 points, POS, 0.3A, output protection, terminal block	AOD16DP	A03B-0807-J182	A03B-0807-C182	A20B-8002-0070
		32 points, NEG, 0.3A, HONDA 50-pin	AOD32C1	A03B-0807-J155	A03B-0807-C155	A20B-9001-0070
		32 points, NEG, 0.3A, HIROSE 50-pin	AOD32C2	A03B-0807-J172	A03B-0807-C172	A20B-9001-0530
		32 points, POS, 0.3A, HONDA 50-pin	AOD32D1	A03B-0807-J156	A03B-0807-C156	A20B-8000-0440
		32 points, POS, 0.3A, HIROSE 50-pin	AOD32D2	A03B-0807-J167	A03B-0807-C167	A20B-8000-0510
	AC output module	5 points, 2 A, 100 to 230VAC terminal block	AOA05E	A03B-0807-J157	A03B-0807-C157	A20B-8000-0470 or -8000-0251
8 points, 1 A, 100 to 230VAC terminal block		AOA08E	A03B-0807-J158	A03B-0807-C158	A20B-8000-0480 or -8000-0381	
12 points, 0.5 A, 100 to 115VAC terminal block		AOA12F	A03B-0807-J159	A03B-0807-C159	A20B-8000-0321	
Relay output module	8 points, 4 A, terminal block	AOR08G	A03B-0807-J160	A03B-0807-C160	A20B-9001-0200 or -9000-0961	
	16 points, 2 A, terminal block	AOR16G	A03B-0807-J161	A03B-0807-C161	A20B-8000-0101	
	16 points, 2 A, HIROSE 50-pin	AOR16H2	A03B-0807-J165	A03B-0807-C165	A20B-8000-0500	
Analog input module	12bit, terminal block	AAD04A	A03B-0807-J051	A03B-0807-C051	A20B-8000-0450	
Analog output module	12bit, terminal block	ADA02A	A03B-0807-J052	A03B-0807-C052	A20B-8000-0460	
	14bit, terminal block	ADA02B	A03B-0807-J060	A03B-0807-C060	A20B-8001-0980	
High-speed counter module (Note)		ACT01A	A03B-0807-J053	A03B-0807-C053	A20B-8000-0540	
Temperature input module	Pt/JPt	ATI04A	A03B-0807-J056	A03B-0807-C056	A74L-0001-0083#PT	
	J/K	ATI04B	A03B-0807-J057	A03B-0807-C057	A74L-0001-0083#JK	
	Terminal unit for ATI04A	ATB01A	A03B-0807-J350	A03B-0807-C350	A20B-1005-0920	
	Terminal unit for ATI04B	ATB01B	A03B-0807-J351	A03B-0807-C351	A20B-1005-0930	

**NOTE**

The high-speed counter module whose ordering information and unit drawing number are, respectively, A03B-0819-J053 and A03B-0819-C053 is dedicated to I/O Link. (See Chapter 8 of Part I, "CONNECTION".)