M0010053B

SANMOTION

MOTION CONTROLLER

C

DO286/A, DO286/B

Digital Output Module

Source type / Sink type

Project Engineering Manual

SANYO DENKI

History

Version	Date	Changes to chapter	Description	Author
V1.0	Jul. 2011		New	S.Satou
V1.0/B	Jan. 2012	P8, P11, P21 P12, P13	Maximum load current: 0.1A/ point, 6A/module Maximum cable length: 30m	S.Satou

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1 Introduction

1.1 Purpose of the document

This document describes the structure of the DO 286/A and the DO 286/B (digital output module).

1.2 Target groups, pre-requirements

This document is intended for the following persons with adequate skill pre-requirements:

Target group	Knowledge and skills pre-requirement
Project engineer	Basic technical training (University of Applied Science/University level, engineering degree or corresponding professional experience). Knowledge in: • working mode of a PLC, • safety regulations, • the application.
Operator	Basic technical training (Vocational high school, engineering degree or corresponding professional experience). Knowledge in: • safety regulations, • working mode of machine or plant, • principal functions of the application, • system analysis and troubleshooting, • setting options at the operating installations.
Service technician	Basic technical training (Vocational high school, engineering degree or corresponding professional experience). Knowledge in: • working mode of a PLC, • safety regulations, • working mode of machine or plant, • diagnosis possibilities, • systematic error analysis and rectification.

1.3 Intended use

The DO 286/A and the DO 286/B was developed for control applications in industrial machines. The typical applications areas include injection molding machines, robots, presses, machine tool and similar.
The assembly must only be used for the above-mentioned applications and only in connection with recommended or approved third-party equipment.

The DO 286/A and the DO 286/B has been developed, manufactured, tested and documented in accordance with the appropriate safety standards. Therefore, the products do not pose any danger to the health of per-

sons or a risk of damage to instructions and safety precautions relating to the intended use are properly observed.

1.4 Notes on this document

This manual is integral part of the product. It is to be retained over the entire life cycle of the product and should be forwarded to any subsequent owners or users of the product.

1.4.1 Contents of document

- Description of the DO 276/A and the DO 276/B
- Description of the wiring (incl. EMC guidelines)
- Technical data

1.5 Documentation for further reading

- “SANMOTION C” automation system manual (CP23x)
- System manual “SANMOTION C” automation system (CP24x)

2 Safety notes

2.1 Representation

At various points in this manual you will see notes and precautionary warnings regarding possible hazards. The symbols used have the following meaning:



DANGER!

- **indicates an imminently hazardous situation which will result in death or serious bodily injury if the corresponding precautions are not taken.**



WARNING!

- **indicates a potentially hazardous situation which can result in death or serious bodily injury if the corresponding precautions are not taken.**



CAUTION!

- **means that if the corresponding safety measures are not taken, a potentially hazardous situation can occur that may result in property injury or slight bodily injury.**

CAUTION

- **CAUTION used without the safety alert symbol indicates a potentially hazardous situation which, if not avoided, may result in damage to property.**



- **This symbol reminds you of the possible consequences of touching electrostatically sensitive components.**

Information

Useful practical tips and information on use of equipment are identified by the "Information" symbol. They do not contain any information that warns about potentially dangerous or harmful functions.

2.2 General safety instructions



WARNING!

- **It is absolutely essential to observe the safety instructions in the system manual.**

CAUTION

Improper use of the assembly or the control system leads to irreparable damage!

- **Turn off the power supply before installing or removing the module. Otherwise, the module can be destroyed or undefined signal states can lead to damage of the control system.**

2.3 Requirement for UL-certification

- The device is defined as an "open type equipment" (UL 508) or as an "open equipment" (EN 61131-2), so that it must be installed in a control cabinet.

- Please use the 24VDC, Class 2 power supply for external power supply when the UL-certification is necessary.

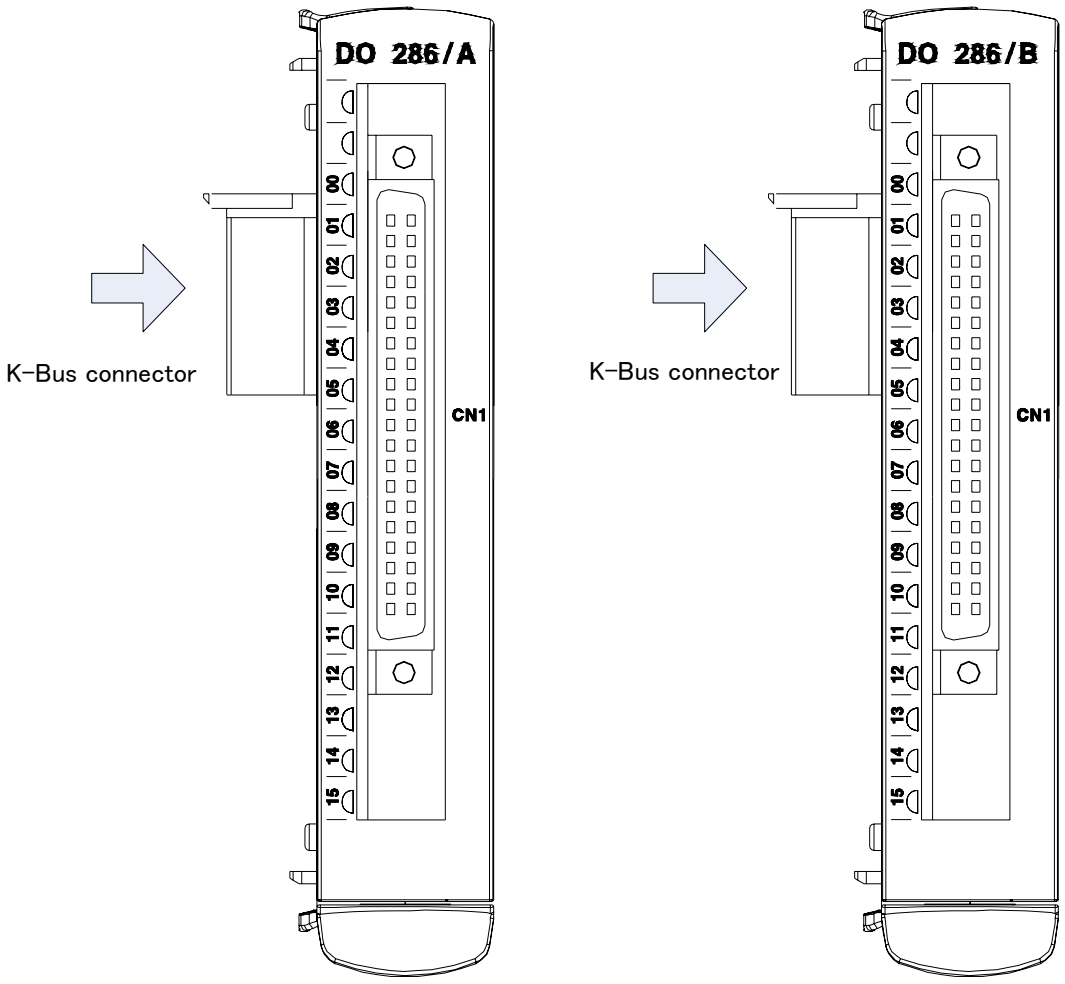
- RATINGS (Electrical):

Model	DO286/A	DO286/B
Output type	Source type	Sink type
5VDC internal current consumption	5V DC, 0.05A	
External power supply	24VDC, Class2 40mA	
Number of Output	32	
Output device	FET	
Maximum load current	0.1A/point, 6A/module	

3 Description of the module

The DO286/A and the DO286/B are digital Output module.

3.1 Front view



DO 286/A DO 286/B Front view

CAUTION

- **Please note handling the K-Bus connector that has gone out left. When handling is bad, might it be not possible to connect, and cause the bad connection.**
- **Please do not touch the metallic portion of the connector. The circuit might be damaged by static electricity.**

3.2 Accessories

3.2.1 Front panel connectors

The following connector can be used for the DO286/A, DO286/B.
The appropriate connectors are not included in the delivery of this production.

■ DO286/A, DO286/B

Type	Parts number (Fujitsu component)
Soldering type	Socket：FCN-361J040-AU Connector cover：FCN-360C040-J2
Crimp type	Socket：FCN-363J040 Connector cover：FCN-360C040-J2 Contact：FCN-363J-AU
Insulation displacement connection	Connector：FCN-367J040-AU

＊The connector cover can use B type and E type besides the J2 type.

4 Connection and wiring

4.1 5VDC Power supply

5VDC power supply is powerd by the K-BUS.
This power supply is a power for internal side of a photo-couplers in digital output circuits. The current consumption is 50mA.

4.2 External power supply

The external power supply is connected between B1,B2 of CN1 and A1,A2 of CN1.
This power supply is a power for external side of photo-couplers in digital output circuits. The current consumption is approximately 40mA (at DC24V, all outputs is ON).

4.3 Digital outputs

There are 32 digital outputs available to activate the digital actors. Them of the DO 286/A are current soucing digital outputs and are isolated for the evaluation logic. Also them of the DO 286/B are current sinking digital outputs and are isolated for the evaluation logic.
The max. load current per point is 0.1 A nominal current.
The rated load voltage is 19.2VDC to 30V DC.
The switching status “high” is indicated by 16 bi-color LEDs on the left side of the connector.



WARNING!

Danger of personal injury due to electric shock!

- **Supply the device exclusively from power sources that have an extra low voltage (e.g. SELV or PELV according to EN 61131-2)**
- **Connect only voltages and power circuits to connections, terminals and interfaces up to 50 V rated voltage that have a secure disconnect for hazardous voltages (e.g. with sufficient isolation).**



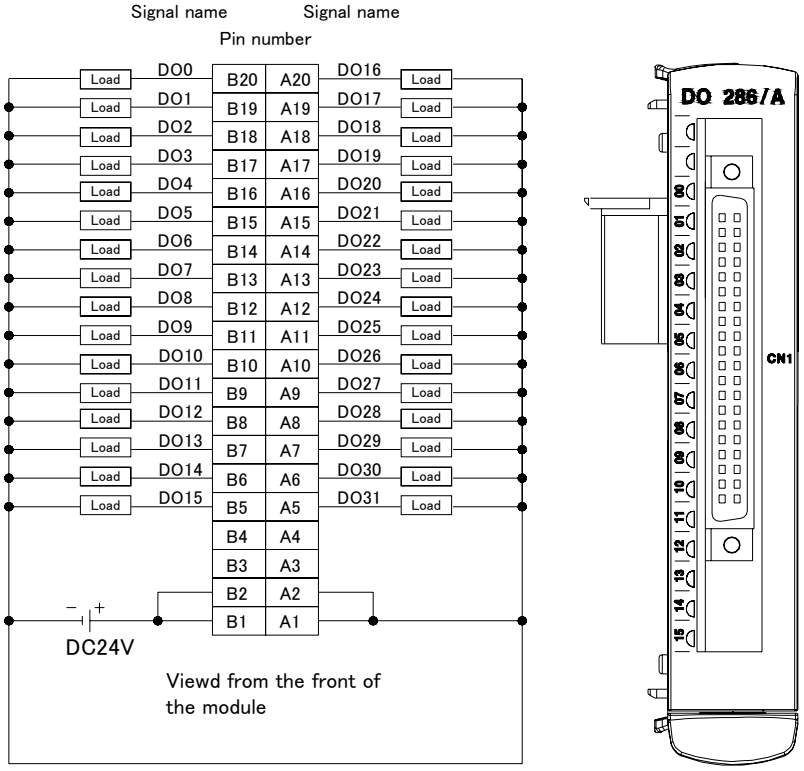
CAUTION!

Fire hazard during module failure!

- **Provide suitable fuses for the 24VDC power supply for the final application. Only fuses with a maximum nominal disconnecting current of 10 A may be used.**

4.3.1 Example of connecting

- DO286/A (Current soucing digital output)



Connection example for DO286/A

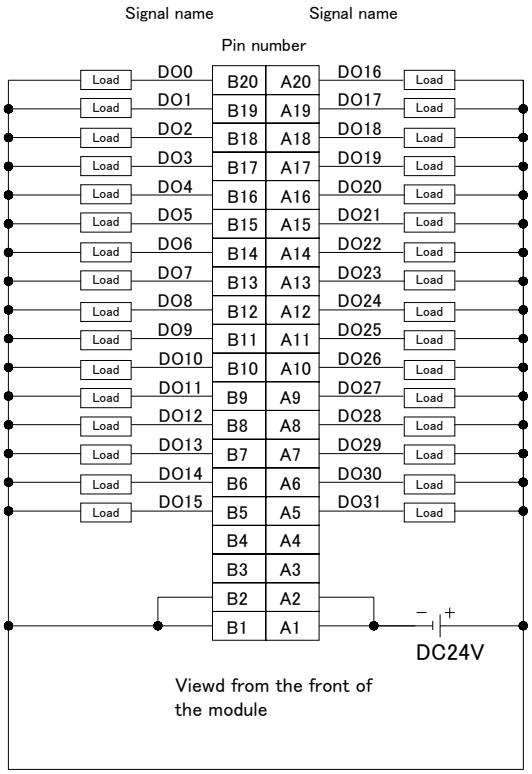
CAUTION!

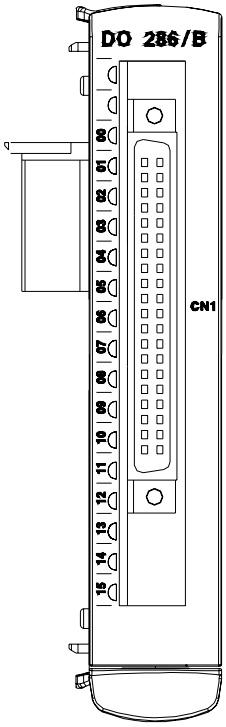
The rated current of connector is 3A per pin. In case of insulation displacement (IDC) type connector is 1A.

CAUTION!

The maximum cable length is 30m.

- DO286/B (Current sinking digital output)





Connection example for DO286/B

CAUTION!

The rated current of connector is 3A per pin. In case of insulation displacement (IDC) type connector is 1A.

CAUTION!

The maximum cable length is 30m.

4.3.2 Status display

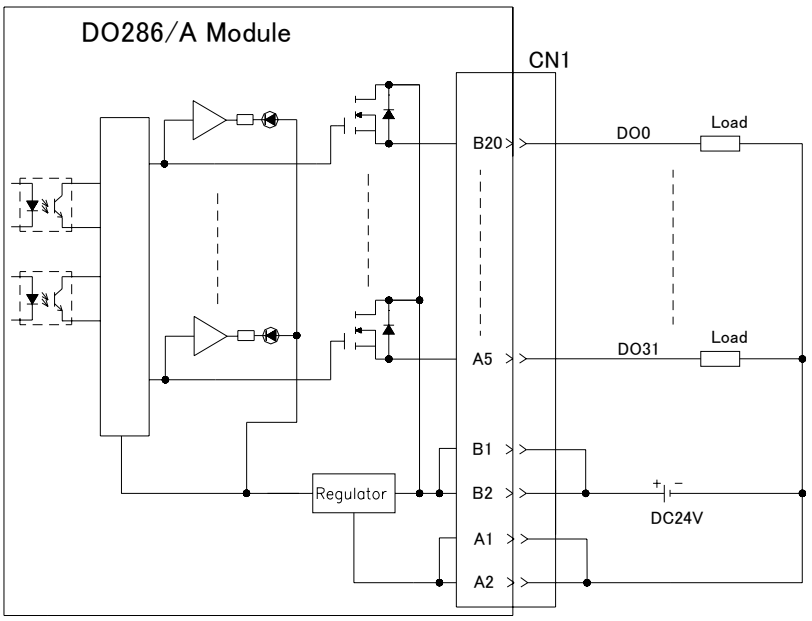
16 BI-color LEDs for indicating the signal status on the left side of the connector.

- LED is lit: output on “1”
- LED is dark: output on “0”
- Each signal status when an LED lights up, is as follows.

LED name on the front plate	Red-LED is lit	Green-LED is lit	Red-LED and Green-LED are concurrently lit. (It will be seen as if Orange-LED is lit)
00	DO0 on “1”	DO16 on “1”	DO0 and DO16 on “1”
01	DO1 on “1”	DO17 on “1”	DO1 and DO17 on “1”
02	DO2 on “1”	DO18 on “1”	DO2 and DO18 on “1”
03	DO3 on “1”	DO19 on “1”	DO3 and DO19 on “1”
04	DO4 on “1”	DO20 on “1”	DO4 and DO20 on “1”
05	DO5 on “1”	DO21 on “1”	DO5 and DO21 on “1”
06	DO6 on “1”	DO22 on “1”	DO6 and DO22 on “1”
07	DO7 on “1”	DO23 on “1”	DO7 and DO23 on “1”
08	DO8 on “1”	DO24 on “1”	DO8 and DO24 on “1”
09	DO9 on “1”	DO25 on “1”	DO9 and DO25 on “1”
10	DO10 on “1”	DO26 on “1”	DO10 and DO26 on “1”
11	DO11 on “1”	DO27 on “1”	DO11 and DO27 on “1”
12	DO12 on “1”	DO28 on “1”	DO12 and DO28 on “1”
13	DO13 on “1”	DO29 on “1”	DO13 and DO29 on “1”
14	DO14 on “1”	DO30 on “1”	DO14 and DO30 on “1”
15	DO15 on “1”	DO31 on “1”	DO15 and DO31 on “1”

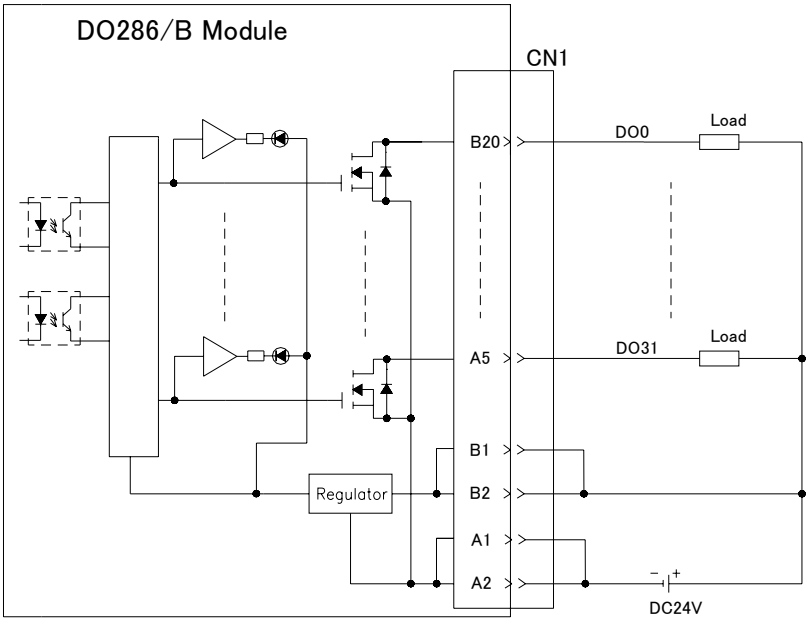
4.3.3 Connection diagram

- DO286/A (Current soucing digital output)



Connection diagram

- DO286/B (Current sinking digital output)



Connection diagram

4.4 EMC and wiring guidelines

Pay attention from the outset to careful wiring and shielding.
Further information: See system manual.

5 Configuration

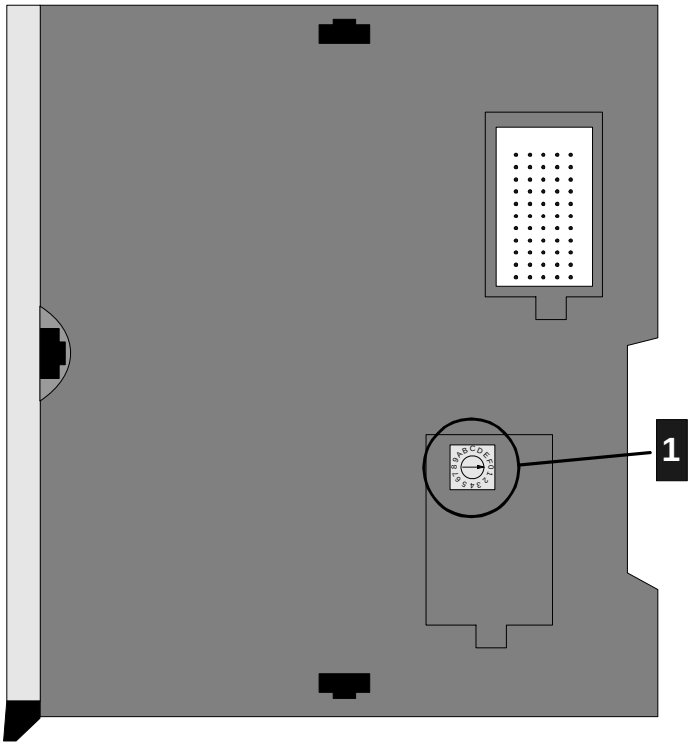
5.1 General information

A SANMOTION C system needs data for the configuration of system performance, its I/O-devices and interfaces. The system reads this data during the start-up operation and allocates them to its components and devices. Configuration data is created by included configuration tools or by editing configuration files.
For further information to the configuration see the documentation of the included configuration tool.

5.2 Setting the K-Bus address

The modules are addressed via the address switch. A maximum of 12 modules of the same type can be distinguished on one line.

The address switch is located on the right side underneath the lower cover. The K-Bus plug is located underneath the upper cover.



1.... Address switch

Position of the address switch

On leaving the factory all modules are set to address 0 and both covers are closed.

***Information**:*
Modules of the same type that are installed within the same line must have different address switch positions. Different modules (e.g. AM 299/B and DM 276/A) may have the same address switch positions.
DO286/A and DO286/B are distinguished as the same module.

The two covers for the K-Bus plug and the address switch must remain locked at the last module in the line (to protect against dirt and damage through electrostatic discharge on contact).

6 Operating behavior

6.1 Short circuit

The current limitation function of the output circuit properly acts when an excessive current flows in the output circuit. This means the detection circuit to heating and overcurrent is built into the output circuit. During this function acts, amount of the current is regularly checked. If the cause of excessive current is removed, the behavior of output circuit returns automatically.

6.2 Switching inductive loads

When an inductive load is connected, connect a diode to the load in parallel. Use a diode that meets the following conditions.

- Reverse breakdown voltage is equal to or more than 10 times as large as the circuit voltage.
- Forward current is equal to or more than 2 times as large as the load current.

7 Disposal

7.1 Disposal of the module

CAUTION

Please observe the regulations regarding disposal of electric appliances and electronic devices!

- **Dispose of ecologically harmful agents - Electrical instruments and Electronic devices (including their accessories) - separate from general household garbage.**
- **Most of the product components can be recycled. In order to recycle them in the best possible way, the products must be disassembled into individual modules. Then it makes important contribution to the protection of our environment! Observe the local regulations in the country of assembly.**

8 Technical data

General information

Supply voltage:	5 V DC from K-Bus (for internal circuit)
Overvoltage category:	II
Equipment class:	III
Addressing at K-Bus:	Via 16-digit address switch, on the side
Connection terminals:	40pin Rectangular connector FCN360 series (FUJITSU)
Power consumption K-Bus 5 V:	0.25 W (0.05A)

Environmental conditions

Operating temperature:	+0 °C to +55 °C
Storage temperature:	-40 °C to +70 °C
Relative humidity of air:	10 % to 95 % (non condensing)
Vibration resistance:	according to EN 61131-2
Shock resistance:	according to EN 61131-2
Pollution degree:	Less than 2

Digital outputs

Number of outputs:	32
External power supply: voltage:	19.2 ～ 30 V DC
: current:	40mA TYP. (at 24V DC)
Max. Load current:	0.1A / point, 3A / common
Max. Voltage drop at ON:	3VDC (max.) 0.1A
Leakage current at OFF:	0.5mA or less
Processing time:	1 ms
Common terminal arrangement:	16 points / 1 common DO286/A: common terminal B1, B2 DO286/B: common terminal A1, A2
Short circuit protection:	DO286/A: min. 1.0A DO286/B: min. 0.7A
Status display:	16 Bi-color LEDs. (red and green) Red-LED and Green-LED are concurrently lit. It will be seen as if Orange-LED is lit .
Galvanic isolation:	Yes
Circuit type:	DO286/A: Current soucing type DO286/B: Current sinking type

Interfaces

System bus interface:	K-Bus Parallel Bus-interfaces, plug-in on side

Casing, dimensions

Dimensions:	
Module height:	120 mm
Mounting Depth:	100 mm
Module width:	22.5 mm
Module width (incl. K-Bus plug):	32.5 mm
Weight:	135 g

9 EC-directives and standards

9.1 EC Directives

Directive 2004/108/EEC	EMC-directive
Directive 2002/95/EC	RoHS-Directive

9.2 Standards

9.2.1 General procedures and safety principals

EN 61131-1:2007	Programmable Controllers - Part 1

9.2.2 EMC guidelines

IEC 61131-2:2007	Programmable controllers – Part2

9.2.3 Electrical safety and fire protection

EN 61131-2:2007	Programmable controllers - Part 2

9.2.4 Requirements on environment and ambience conditions

EN 61131-2:2007	Programmable controllers - Part 2
Vibrations	Frequency range $5 \leqq f < 9$Hz 3.5mm displacement, constant amplitude Frequency range $9 \leqq f \leqq 150$Hz 9.8m/s^2 acceleration, constant amplitude
Shock	147m/s^2, 11ms in each of 3 mutually perpendicular axes

Release	
Revision A	Jul. 2011
Revision B	Jan. 2012

Precautions For Adoption

⚠Cautions

The possibility of moderate or minor injury
and the occurrence of physical damage are assumed
when the precautions at right column are not observed.
Depending on the situation,
this may cause serious consequences.
Be sure to follow all listed precautions.

⚠Cautions

- Be sure to read the instruction manual before using this product.
- Take sufficient safety measures and contact us before applying this product to medical equipment that may involve human lives.
- Contact us before adapting this product for use with equipment that could cause serious social or public effects.
- The use of this product in high motion environments where vibration is present, such as in vehicles or shipping vessels, is prohibited.
- Do not convert or modify any equipment components.

* Please contact our Business Division for questions and consultations regarding the above.

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