M0010052B

SANMOTION

MOTION CONTROLLER

C

DI286/A

Digital Input Module

Positive/negative common available

Project Engineering Manual

SANYO DENKI

History

Version	Date	Changes to chapter	Description	Author
V1.0/A	Jul.2011		New	S.Satou
V1.0/B	Apr.2012	2.3	Addition of item derating chart	S.Satou

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1 Introduction

1.1 Purpose of the document

This document describes the structure of the digital input module DI 286/A.

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 DI 286/A 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 DI 286/A 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 persons or a risk of damage to other property or equipment under normal circumstances, provided that the

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 DI 286/A
- Description of the wiring (including 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.**

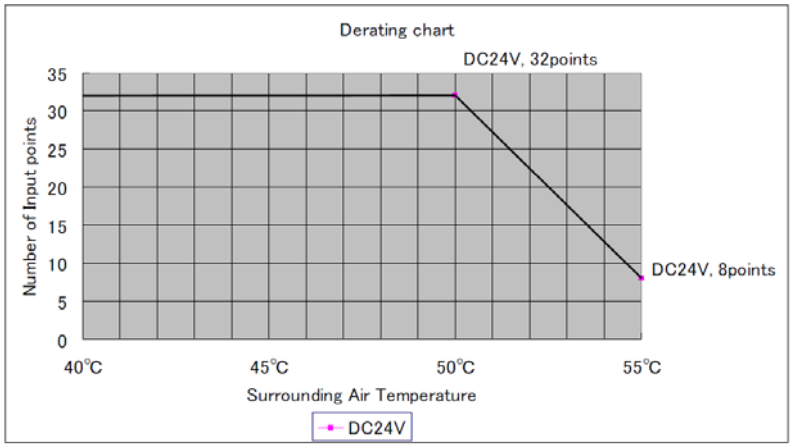
2.3 Requirement for UL-certification

- 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.

- RATINGS (Electrical):

Model	DI286/A
5VDC internal current consumption	5VDC, 0.1A
Rated input voltage	24VDC, Class2
Rated input current	4mA/point (at 24VDC)

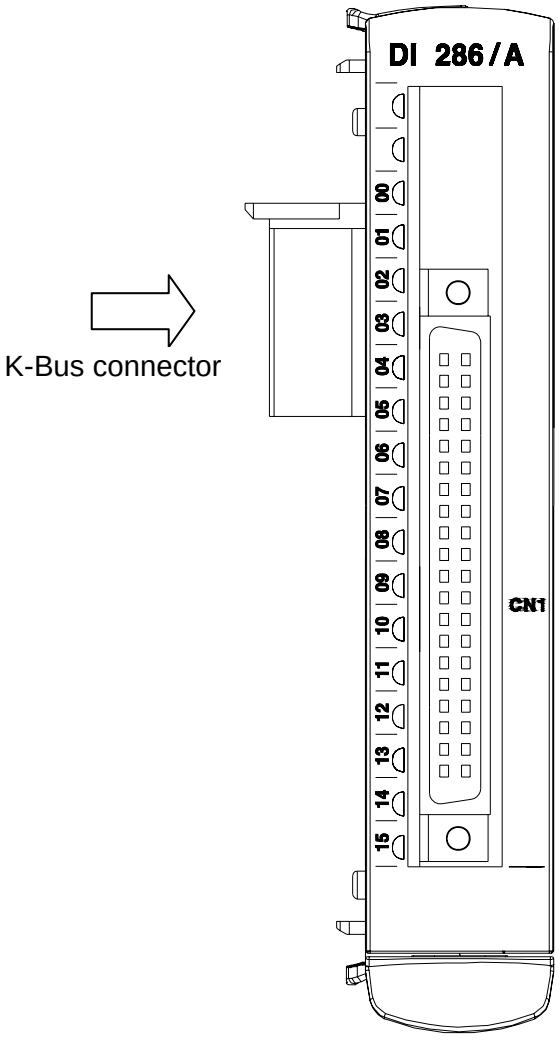
- Derating chart
  When using, please consider the following derating chart.



3 Description of the module

The DI 286/A is a digital Input module.

3.1 Front view



DI 286/A 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 DI286/A.
The appropriate connectors are not included in the delivery of this production.

■ DI286/A

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 Power supply

4.1.1 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 input circuits. The current consumption is 100mA.

4.2 Digital inputs

For the processing of external digital signals, 32 digital inputs of positive or negative common are available. They are capable of using current sourcing digital inputs or current sinking digital input. They are isolated for the evaluation logic.
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).**



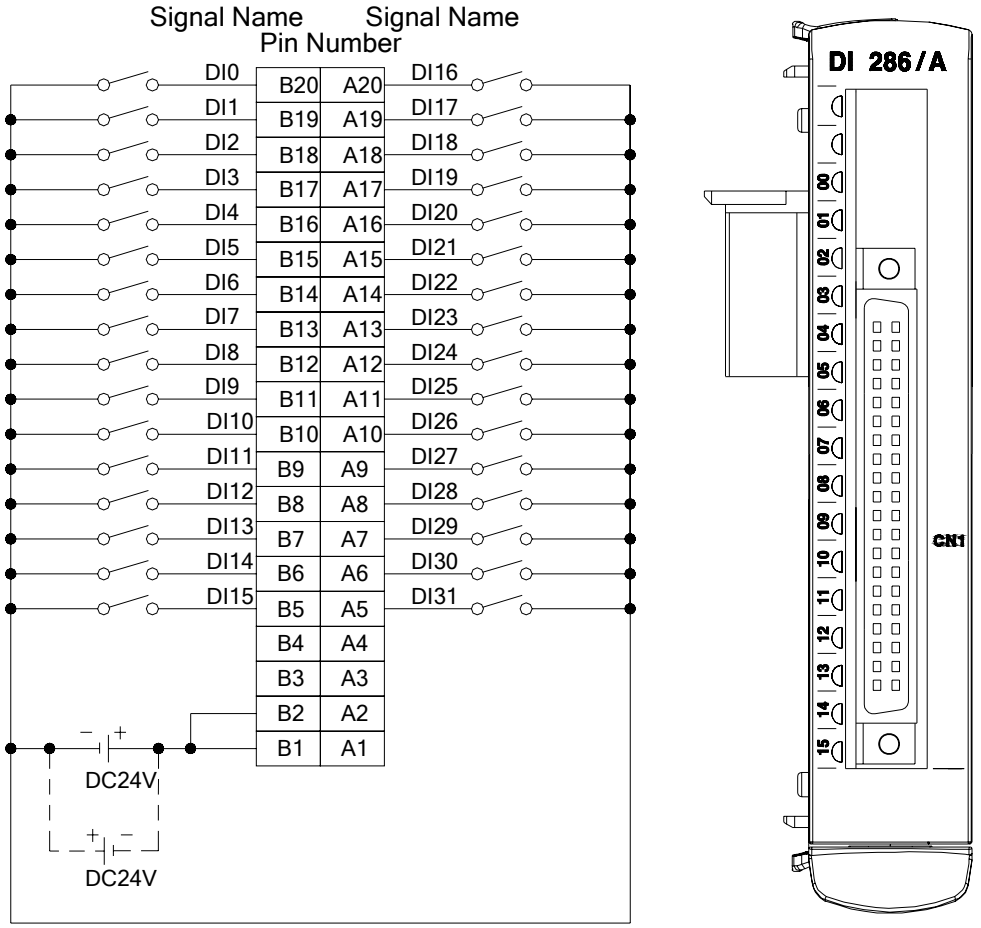
CAUTION!

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.**

4.2.1 Example of connecting

DI286/A



CN1connection example (Viewed from the front of the module)

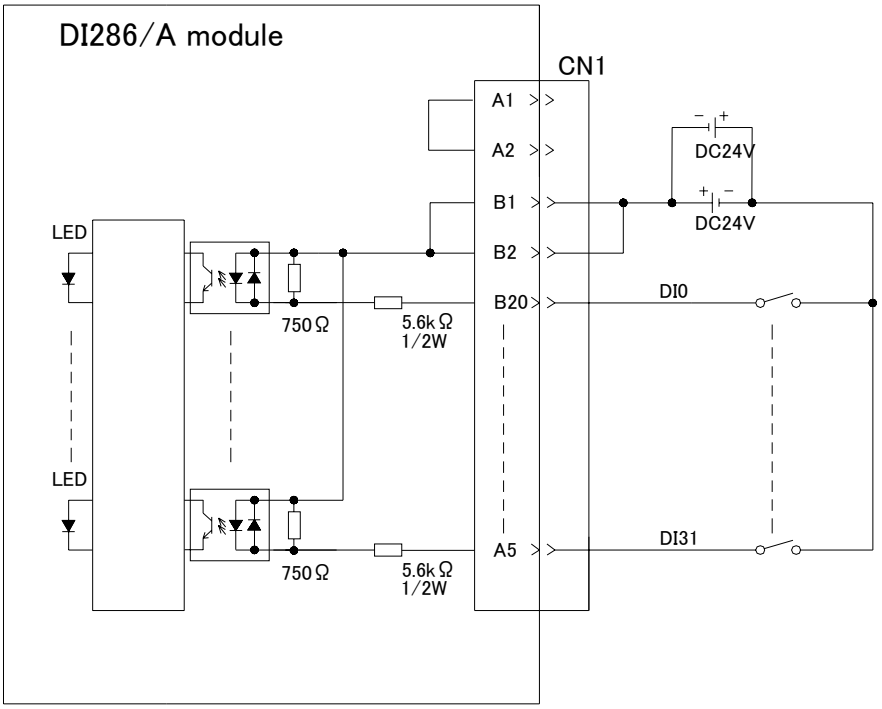
4.2.2 Status display

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

- LED is lit: input on “1”
- LED is dark: input 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	DI0 on “1”	DI16 on “1”	DI0 and DI16 on “1”
01	DI1 on “1”	DI17 on “1”	DI1 and DI17 on “1”
02	DI2 on “1”	DI18 on “1”	DI2 and DI18 on “1”
03	DI3 on “1”	DI19 on “1”	DI3 and DI19 on “1”
04	DI4 on “1”	DI20 on “1”	DI4 and DI20 on “1”
05	DI5 on “1”	DI21 on “1”	DI5 and DI21 on “1”
06	DI6 on “1”	DI22 on “1”	DI6 and DI22 on “1”
07	DI7 on “1”	DI23 on “1”	DI7 and DI23 on “1”
08	DI8 on “1”	DI24 on “1”	DI8 and DI24 on “1”
09	DI9 on “1”	DI25 on “1”	DI9 and DI25 on “1”
10	DI10 on “1”	DI26 on “1”	DI10 and DI26 on “1”
11	DI11 on “1”	DI27 on “1”	DI11 and DI27 on “1”
12	DI12 on “1”	DI28 on “1”	DI12 and DI28 on “1”
13	DI13 on “1”	DI29 on “1”	DI13 and DI29 on “1”
14	DI14 on “1”	DI30 on “1”	DI14 and DI30 on “1”
15	DI15 on “1”	DI31 on “1”	DI15 and DI31 on “1”

4.2.3 Connection diagram



input diagram

4.3 Interrupt inputs

The digital inputs DI0 and DI1 can also be used as interrupt inputs for the speedy processing of external digital signals.

CAUTION

- **Do not install the interrupt inputs cables together with the main circuit lines or power cables. Keep a distance of 100mm or more between them. Failure to do so may result in malfunction due to noise.**
- **Interfering impulses over 10V may trigger an unwanted interrupt event.**

4.4 EMC and wiring guidelines

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

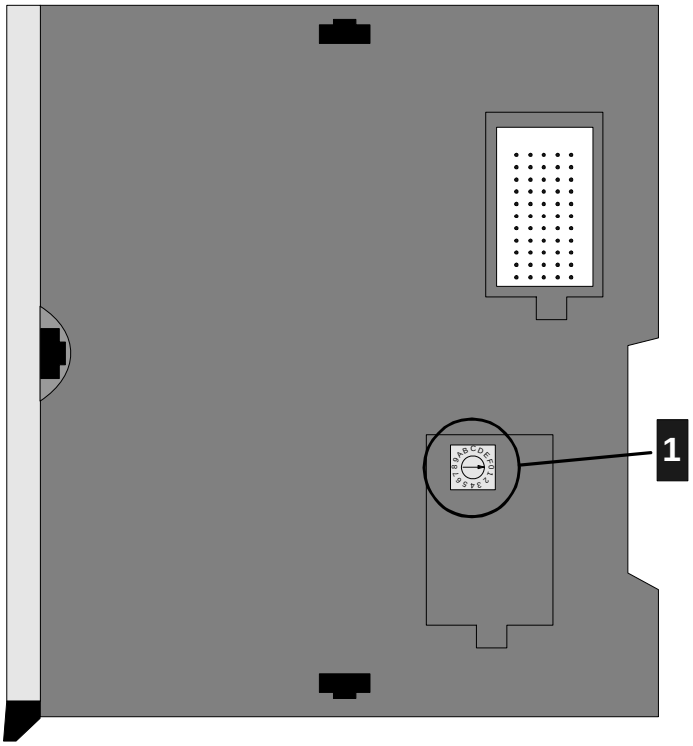
5 Configuration

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.

5.1 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.

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 Debouncing

The inputs are filtered with a default debouncing time of 1 ms.
To suppress interference signals from switches, keys etc, a debouncing time of 100 ms can be set in the configuration. The signal must therefore be applied for at least 100 ms at the input, for it to be recognized and processed by the system.

Information
The debouncing function is possible only when the digital input is not used as interrupt input.
If the input is configured as interrupt input, the debouncing takes automatically place with 34 µs (the configuration parameter is not relevant)

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 according to EN61131-2:2007
Addressing at K-Bus:	Via 16-digit address switch, on the side
Connection terminals:	40pin Rectangular connector FCN360 series (FUJITSU)
5VDC current consumption(K-Bus):	0.5 W (0.1A)

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 inputs

Number of inputs:	32
Rated input voltage	24VDC
Input voltage tolerance range:	19.2VDC to 30VDC
Rated input current:	4mA TYP. (at 24VDC)
Input type:	Positive / negative common available. Capable of using current sourcing digital inputs or current sinking digital input
ON voltage / ON current:	15V or higher / 4mA or higher
OFF voltage / OFF current	5V or lower / 1mA or lower
Filter:	Configurable 1 KHz, 10 Hz
Cycle time:	1 ms
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
Common terminal arrangement:	16 points/1 common (common teruminal:B1,B2)

Interrupt inputs

Number of inputs:	2 (DI0, DI1)
Response time of K-Bus interrupt:	50 µs

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

To check the conformity of the system with the directives, the following nonbinding legal European standards were applied:

9.2.1 General procedures and safety principals

EN 61131-1:2007	Programmable Controllers - Part 1

Information
This product was developed for the use in industrial areas and can cause radio interference when used in residential areas.

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	Apr. 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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