M0008913C

SANMOTION

MOTION CONTROLLER

C

DI266/A, DI266/B

Digital Input Module

Project Engineering Manual

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History

Version	Date	Changes to chapter	Description	Author
V1.0	Feb. 2009		New	S.Satou
V1.0/B	May.2010		Revise power consumption K-Bus 5 V (C.8)	S.Satou
V1.0/C	Dec.2010	Chapter 2.3 Chapter 3.2.1 Chapter 8	Add chapter 2.3 Specify no attachment to the connector for wiring Specify pollution degree and consumption current	S.Satou

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1 Introduction

1.1 Purpose of the document

This document describes the digital input module DI 266/A DI 266/B.

1.2 Intended use

The DI 266/A DI 266/B was developed for control tasks on industrial machines. Typical fields of operation are, among others, injection molding machines, robots, presses, tool machines and the likes.
The module may only be used in above listed individual instances and only in conjunction with recommended/approved third-party equipment/installations.
The DI 266/A DI 266/B has been developed, manufactured, tested and documented in accordance with the appropriate safety standards. Provided, therefore, that the instructions and safety precautions relating to the intended use are properly observed, under normal circumstances the products do not represent any danger to the health of personnel or a risk of damage to other property or equipment.

1.3 Notes on this document

This manual is part of the product. It must be retained over the whole lifetime and if necessary referred to subsequent owners or users of the product.

1.3.1 Contents of document

- Description of the DI 266/A DI 266/B
- Description of the wiring (incl. EMC guidelines)
- Description of the configuration
- Technical data

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, if not avoided, will result in death or serious injury.**



WARNING!

- **indicates a potentially hazardous situation which, if not avoided, could result in death or serious injury.**



CAUTION!

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

NOTICE

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



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

Information
Informations on use of equipment and useful practical tips are identified by the symbol "Information". "Information" do not contain any information that draws attention to potentially dangerous or harmful functions.

2.2 General safety instructions

WARNING!

- **Attention must be paid to the safety instructions of the system manual "SANMOTION C Automation system"**

- The safety instructions in the project engineering manual "SANMOTION C automation system" are to be complied with.

NOTICE

- **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 I/O power interface when the UL-certification is necessary.

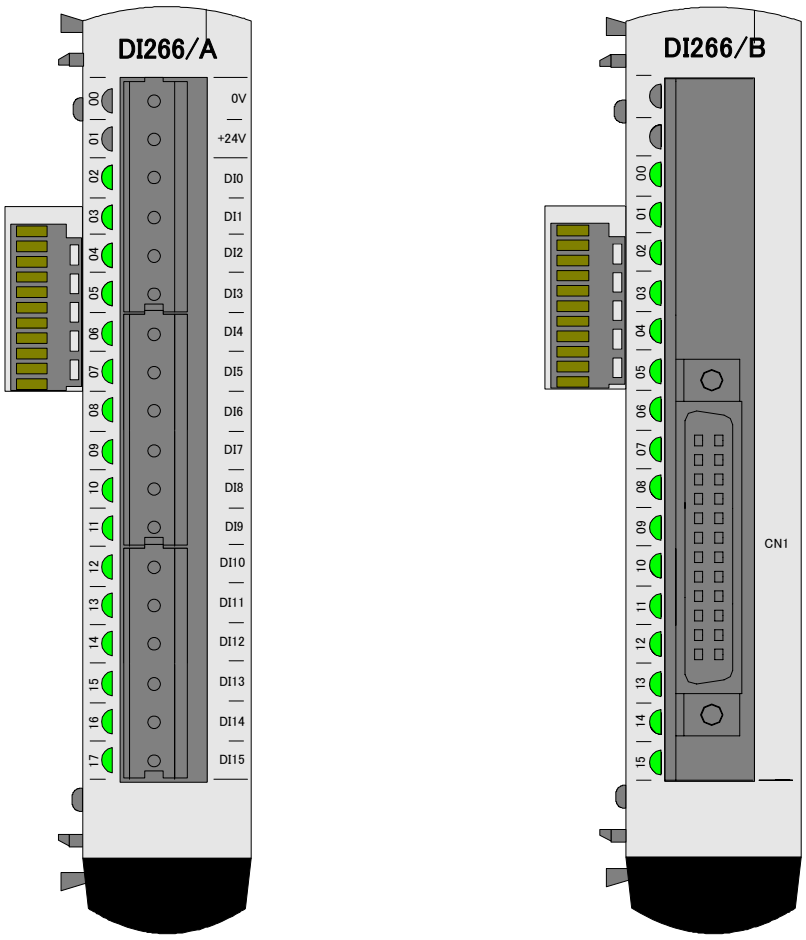
- RATINGS (Electrical):

Model	Power Input	I/O power interface/point (Number of Input)
DI266/A	5V DC, 0.05A	24V DC, Class2, 4.3mA per point (16 points – 1 common)
DI266/B	5V DC, 0.05A	

3 Description of the module

The DI 266 constitutes a digital Input module for use in the SANMOTION C automation system.

3.1 Front view



DI 266 Front view

NOTICE

- **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 is required for the Front panel connectors.
The appropriate female connectors are not included in the delivery of this production.

■ DI266/A

COMBICON Plugs made by Phoenix Contact
MSTB 2,5/2-ST-5,08 （Power supply 1 block）
MSTB 2,5/8-ST-5,08 （Digital input 2 block）

or Omnimate Raster made by Weidmuller
Please give the following serial number goods to me in the business mind.
BLZ5.08/2 （Power supply 1 block）
BLZ5.08/8 （For digital input 2 block）

The following optional peripheral equipment is available for SANMOTION C.
Please specify the following model number when you order to our company.

Model number	Contents
AL-00591171-02	MSTB 2,5/2-ST-5,08 x 1 MSTB 2,5/8-ST-5,08 x 2

■ DI266/B

FCN-360 connector made by Fujitsu component
- ・Soldering type Socket：FCN-361J024-AU
  Connector cover：FCN-360C024-J2
- ・Crimp type Socket：FCN-363J024
  Connector cover：FCN-360C024-J2
  Connector ：FCN-363J-AU
- ・Insulation displacement connection ：FCN-367J024-AU/F

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

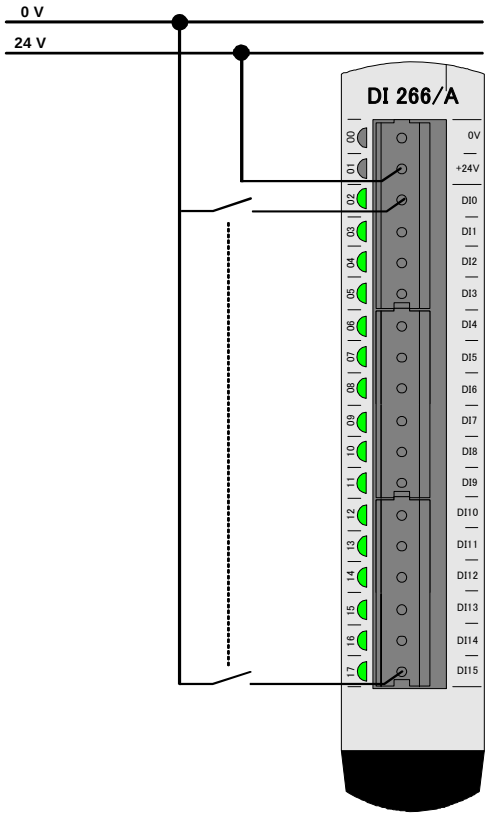
4 Connection and wiring

4.1 Digital inputs

For the processing of external digital signals, 16 digital inputs of type 1 (according to EN 61131-2: 2003) are available. They are current sourcing digital inputs and are isolated for the evaluation logic.
The switching status is indicated by green LEDs on the left side of the connector strip.

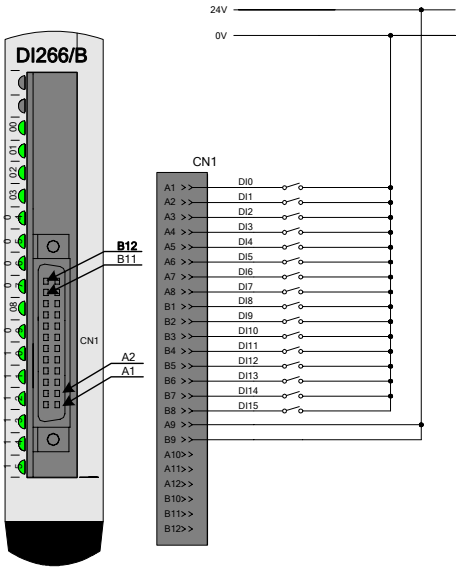
4.1.1 Example of connecting

DI266/A



Connection example for digital inputs

DI266/B



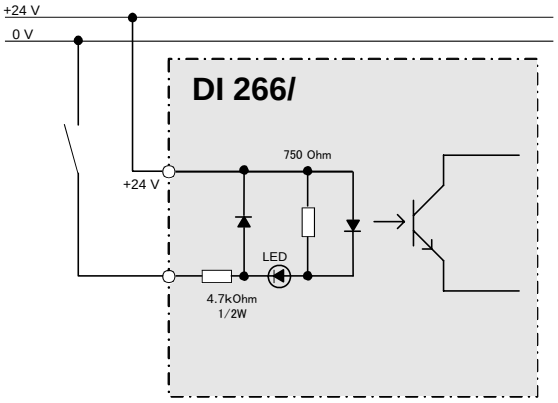
Connection example for digital inputs

4.1.2 Status display

16 green LEDs for indication of the signal status:

- LED on: input status ON
- LED off: input status OFF

4.1.3 Connection diagram



Connection diagram

4.2 Interrupt inputs

The digital inputs DI0 and DI1 can also be used as interrupt inputs for the speedy processing of external digital signals. They are current sourcing digital inputs and are isolated for the evaluation logic.
The switching status is indicated by green LEDs on the left side of the connector strip.

4.3 EMC and wiring guidelines

Further information: See system manual "SANMOTION C automation system"

5 Configuration

5.1 General information

For configuration, the SANMOTION C system requires data that are read out from the configuration data (*.cfg) during the start-up of a master module.

5.1.1 Configuration via cfg-files

All .cfg-files must be located in the directory “\\application\control\config" and are read-in during the start-up of the control-CPU.

Example:

Configuration of the K-Bus:

```
[IO.ONBOARD.KBUS:0]
name="KBUS"
cycleTime=0.001
```

Configuration of the DI 266/A:

```
[IO.ONBOARD.KBUS:0.DI266A:0]
name="DI266A"
cycleTime=0.001
optional=0                  // optional configuration:
                            // 0 ... when the module is not
                            //        available an "Error" occurs
                            // 1 ... when the module is not
                            //        available a "Warning" occurs
```

Configuration of the digital inputs DI0 and DI1 (interruptible):

```
[IO.ONBOARD.KBUS:0.DI266A:0.DI:0]
name="system.DI0"
despikeTime=0               // Debouncing time:
                            // 0 ... without debouncing(1 ms)
                            // 1 ... with debouncing(100 ms)
interruptEnable=0           // Interrupt enabling:
                            // 0 ... Off
                            // 1 ... On
interruptEdge=0             // Interrupt edge:
                            // 0 ... no edge
                            // 1 ... falling edge
                            // 2 ... rising edge
                            // 3 ... rising and falling edge
```

Information
Debouncing is only possible, if die inputs are configured as a digital input, not as an interrupt input.
If the input is configured as an interrupt input, the despike time is automatically set to 34 µs (the parameter `despikeTime` is irrelevant)

```
[IO.ONBOARD.KBUS:0.DI266A:0.DI:1]
name="system.DI1"
despikeTime=0
interruptEnable=0
interruptEdge=0
```

Configuration of the digital inputs DI2 to DI15:

```
[IO.ONBOARD.KBUS:0.DI266A:0.DI:2]
name="system.DI2"
despikeTime=0
...
...
...
[IO.ONBOARD.KBUS:0.DI266A:0.DI:15]
name="system.DI15"
despikeTime=0
```

Hardware end points created through the configuration of the digital inputs:

- `system.DI0 [BOOL] // Digital input value`
- `system.DI0_stat [BOOL] // TRUE … Error`

Hardware end points created through the configuration of the interrupt inputs:

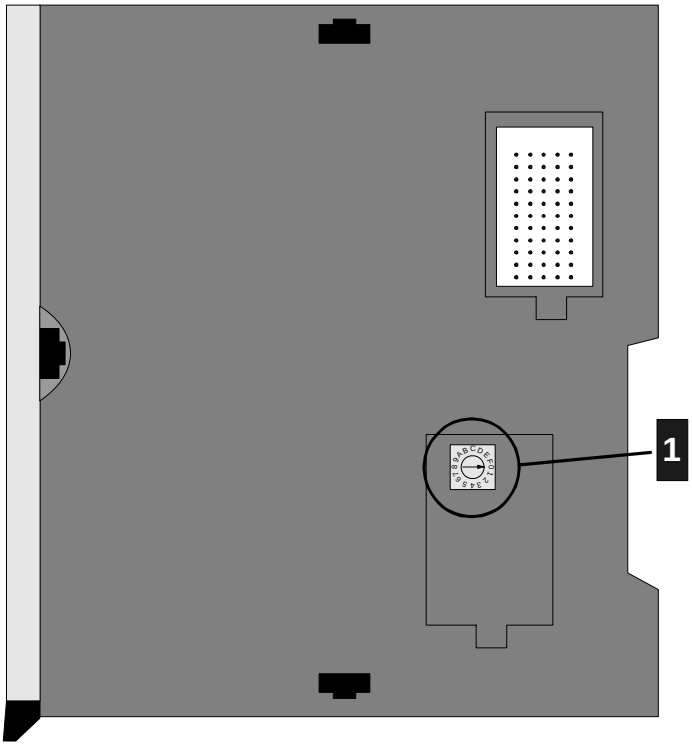
- `system.DI0 [BOOL] // Digital input value`
- `system.DI0_stat [BOOL] // TRUE … Error`
- `system.Dio_parInt [KHW_Int_Param] // Interrupt parameter`

These hardware end points can be accessed from the IEC and teachcontrol.

5.2 Set up 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.
DI266/A and DI266/B are distinguished as the same module.

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

6 Operating behavior

6.1 Debouncing

The default despike time is 1 ms (configuration parameter `despikeTime = 0`).
To suppress interference signals from switches, buttons etc. a Debounce function can be activated in the configuration (configuration parameter `despikeTime = 1`).
To be recognized and for the system to process it further, the signal must be pending at the input for at least 100ms.

Information
The debounce function is only possible, when the digital input is not used as an interrupt input.
If the input is configured as an interrupt input, the despike time is automatically set to 34 µs (the parameter `despikeTime` is irrelevant)

7 Disposal

7.1 Disposal of the module

- **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:	24 V DC from front (19,2 V to 30 V, acc. to EN 61131-2) 5 V DC from K-Bus
Addressing at K-Bus:	Via 16-digit address switch, on the side
Connection terminals:	DI266/A: Open terminals, grid dimensions 5.08 mm DI266/B: Rectangular connector FCN360 series (FUJITSU)
Power consumption K-Bus 5 V:	0.24 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 inputs

Number of inputs:	16
Input type:	Type 1 (according to EN 61131-2)
Voltage range for "0":	15 V ≤ UH ≤ 30 V
Voltage range for "1":	-3 V ≤ UL ≤ 5 V
Filter:	Configurable 1 KHz, 10 Hz
Cycle time:	1 ms
Status display:	Green LED
Galvanic isolation:	Yes
Circuit type:	Current sourcing

Interrupt inputs

Number of inputs:	2 (DI0, DI1) of the 16 digital inputs
Input type:	Type 1 (according to EN 61131-2)
Voltage range for "0":	15 V ≤ UH ≤ 30 V
Voltage range for "1":	-3 V ≤ UL ≤ 5 V
Filter:	12 kHz
Response time of K-Bus interrupt:	50 µs
Status display:	Green LED
Galvanic isolation:	Yes
Circuit type:	Current sourcing

Interfaces

System bus interface:	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:	125 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

The following, legally non-binding European standards, were applied in order to check that the SANMOTION C System conforms with the Directives.

Information
The input characteristics were developed according to EN 61131.
A fundamental difference to the EN 61131 is the fact, that the polarity of the inputs is inverted. (Current sourcing)
(see EN 61131-2 Chapter "Digital In-/Outputs").

9.2.1 General procedures and safety principals

EN 61131-1:2003	Stored Program Controls - Part 1

9.2.2 EMC guidelines

IEC 61131-2:2007	Programmable controllers – Part2: Equipment requirements and tests
EMI	Radiated disturbance
EMS	Electrostatic discharge: IEC61000-4-2:1995+A1:1998+A2:2001 Radio-frequency electromagnetic field: IEC61000-4-3:2006 Electrical fast transient/burst: IEC61000-4-4:2004 Surge: IEC61000-4-5:1995+A1:2001 Radio-frequency conducted disturbances: IEC61000-4-6:1996 Power frequency magnetic field: IEC61000-4-8:1993+A1:2001

9.2.3 Electrical safety and fire protection

EN 61131-2:2003	Stored Program Controls - Part 2

9.2.4 Requirements on environment and ambience conditions

EN 61131-2:2003	Stored Program Controls - 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	Feb. 2009
Revision B	May 2010
Revision C	Dec. 2010

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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