M0008915C

SANMOTION

MOTION CONTROLLER

C

DO276/A, D0276/B

Digital Output Module

Project Engineering Manual

SANYO DENKI

History

Version	Date	Changes to chapter	Description	Author
V1.0	Feb. 2009		New	S.Satou
V1.0/B	Apr.2010	10	Add pin number on the figure	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

Contents

1 Introduction 4

1.1 Purpose of the document 4
1.2 Intended use 4
1.3 Notes on this document 4
1.3.1 Contents of document 4

2 Safety notes 5

2.1 Representation 5
2.2 General safety instructions 6
2.3 Requirement for UL-certification 6

3 Description of the module 7

3.1 Front view 7
3.2 Accessories 8
3.2.1 Front panel connectors 8

4 Connection and wiring 9

4.1 Digital outputs 9
4.1.1 Example of connecting 9
4.1.2 Status display 10
4.1.3 Connection diagram 11
4.2 EMC and wiring guidelines 11

5 Configuration 12

5.1 General information 12
5.1.1 Configuration via cfg-files 12
5.2 Set up the K-Bus address 13

6 Operating behavior 14

6.1 Short circuit 14
6.2 Switching inductive loads 14

7 Disposal 15

7.1 Disposal of the module 15

8 Technical data 16

9 EC-directives and standards 17

9.1 EC Directives 17
9.2 Standards 17
9.2.1 General procedures and safety principals 17
9.2.2 EMC guidelines 17
9.2.3 Electrical safety and fire protection 17
9.2.4 Requirements on environment and ambience conditions 17

1 Introduction

1.1 Purpose of the document

This document describes the digital output module DO 276/A DO 276/B.

1.2 Intended use

The DO 276/A DO 276/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 DO 276/A DO 276/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 DO 276/A DO 276/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.

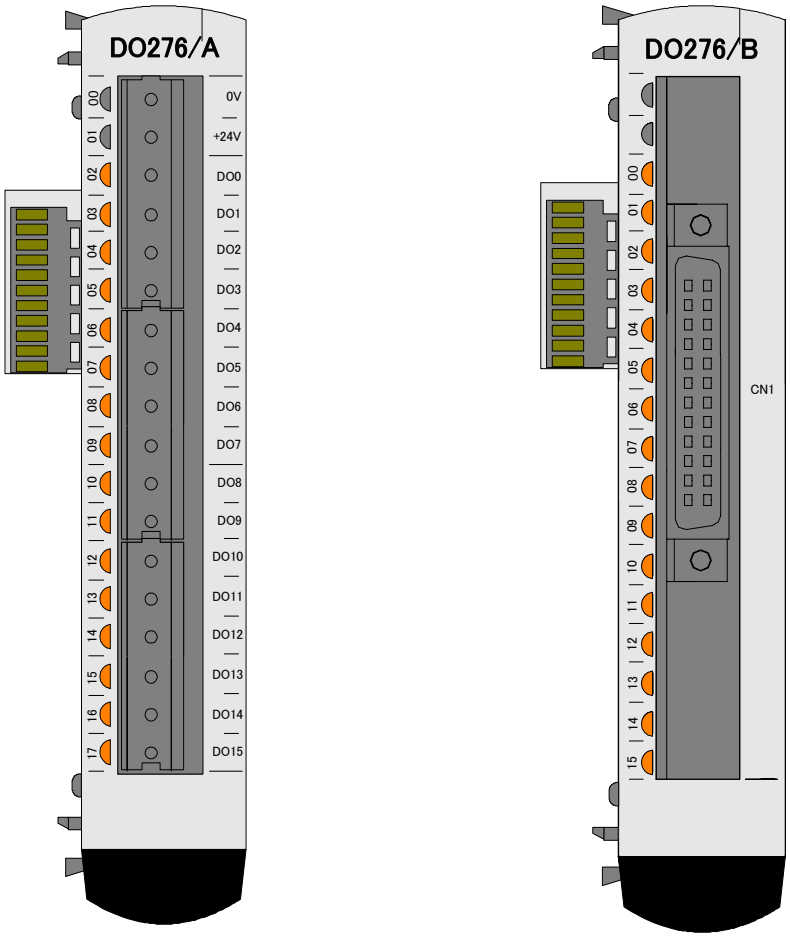
- RATINGS (Electrical):

Model	Power Input	I/O power interface / digital outputs (Number of Output / Output Type)
DO276/A	5V DC, 0.07A	DC General; 24V DC, Class2, 0.5A per point (16 points – 1 common / FET)
DO276/B	5V DC, 0.07A	

3 Description of the module

The DO276 constitutes a digital Output module for use in the SANMOTION C automation system.

3.1 Front view



DO 276 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.

■ DO276/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

■ DO276/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 outputs

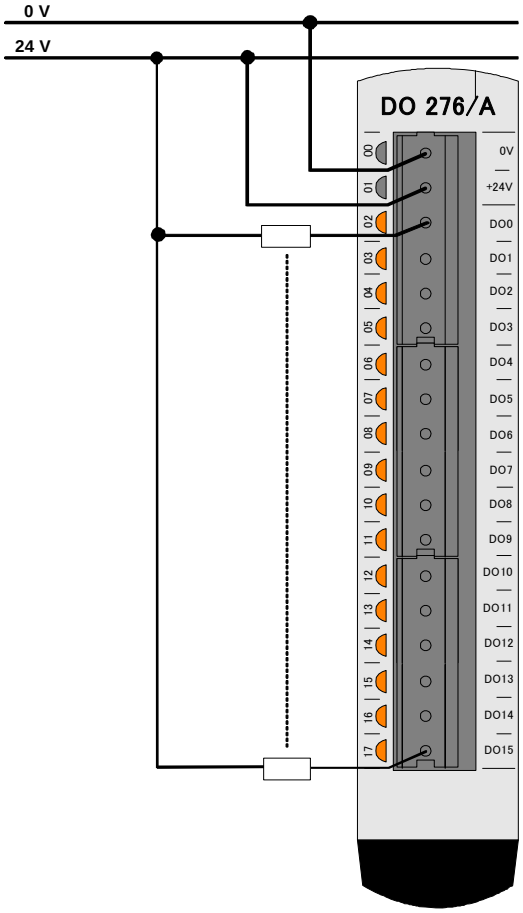
There are 16 digital outputs available to activate the digital actors. They are current sinking digital outputs and are isolated for the evaluation logic.

DO 276/A DO 276/B: 0.5 A nominal current

The nominal voltage supplying the group is 24 V DC.
The switching status is indicated by orange LEDs on the left side of the connector strip.

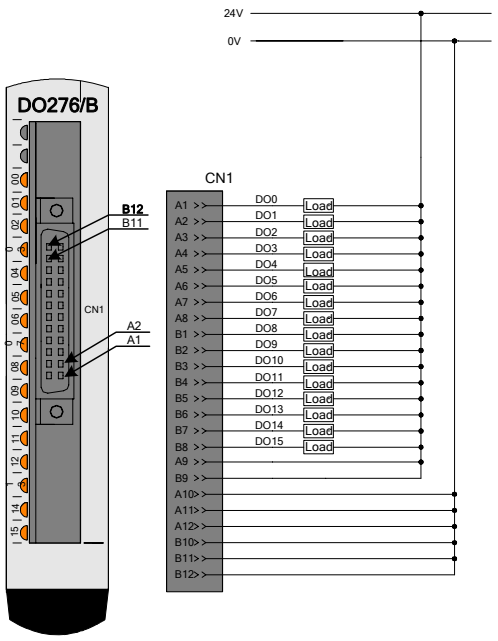
4.1.1 Example of connecting

DO276/A



Connection example for digital outputs

DO276/B



The Current raiting of connector is 3A. Insulation displacement connection (IDC) type is 1A.

Please consider the number of the common line that the common current doesn't beyond the bounds of permissibility.

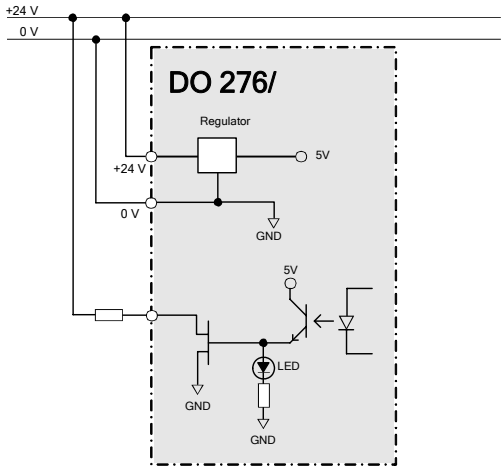
Connection example for digital outputs

4.1.2 Status display

16 orange LEDs for indication of the signal status:

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

4.1.3 Connection diagram



Connection diagram

4.2 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 DO 276/A:

```
[IO.ONBOARD.KBUS:0.DO276A:0]
name="DO276A"
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 outputs:

```
 [IO.ONBOARD.KBUS:0.DO276A:0.DO:0]
name="system.DO0"
...
...
...
[IO.ONBOARD.KBUS:0.DO276A:0.DO:15]
name="system.DO15"
```

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

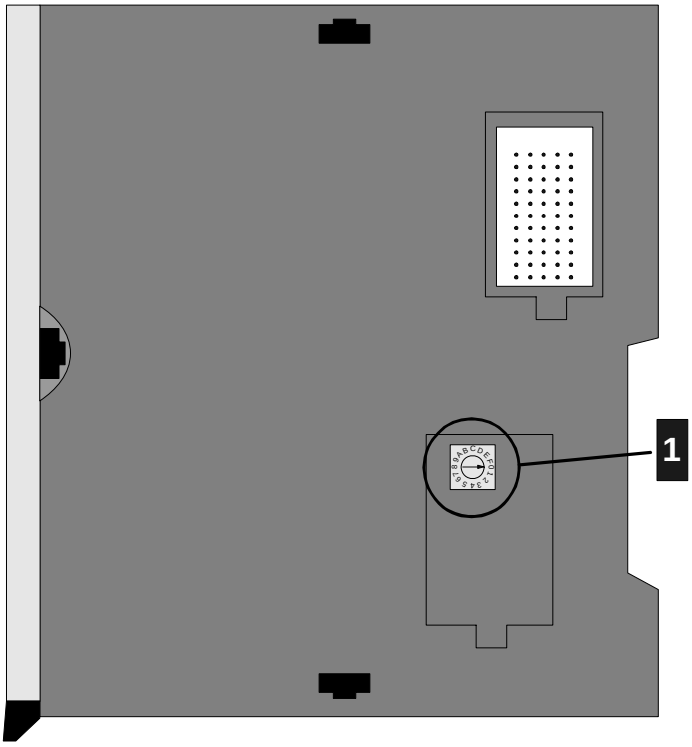
- `system.DO0  [BOOL]  // Digital output value`
- `system.DO0_stat  [BOOL]  // TRUE … Error`

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.
DO276/A and DO276/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 Short circuit

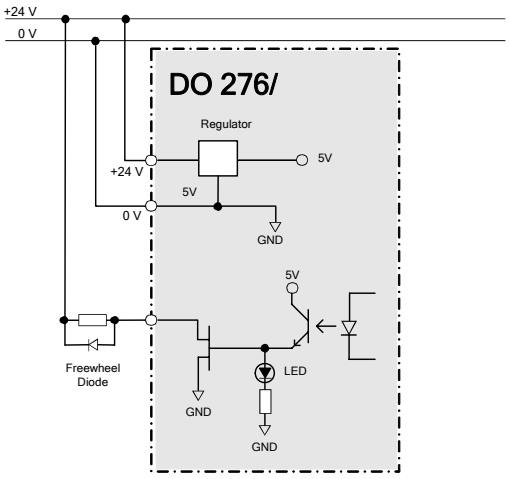
The current limitation function of the output circuit properly acts when an excessive current flows in the output circuit. This means the detection circuit to heating and overcurrent is built into the output circuit. During this function acts, amount of the current is regularly checked. If the cause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

6.2 Switching inductive loads

The module contains no internal freewheeling diode to take up the inductive energy when switching off the inductive loads.

The load capacity of the outputs for inductive loads can be raised by adding an external freewheeling diode, which will, however, significantly increase the switch-off time.

In the case of high load currents, higher values of inductance or greater switching frequency, a freewheeling diode must always be used.



Schematic diagram for the use of a freewheeling diode

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:	DO276/A: Open terminals, grid dimensions 5.08 mm DO276/B: Rectangular connector FCN360 series (FUJITSU)
Power consumption K-Bus 5 V:	0.34 W (0.07A)

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:	16
Nominal voltage:	24 V DC
Processing time:	1 ms
Nominal current:	0.5A
Protection facility:	Short circuit protection (minimum 0.7A)
Status display:	Orange LED
Galvanic isolation:	Yes
Circuit type:	Current sinking

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:	130 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 output characteristics were developed according to EN 61131.
A fundamental difference to the EN 61131 is the fact, that the polarity of the outputs is inverted. (Current sinking)
(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	Apr. 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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