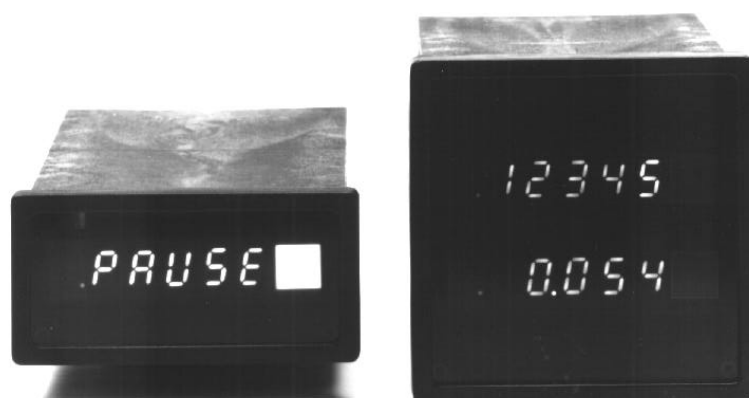


DIS10, 11, 12

Display Module

User Manual



JVL Industri Elektronik A/S - Denmark

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1.1

Introduction

DIS10, DIS11 and DIS12 comprise a series of intelligent display modules that can be connected to JVL Industri Elektronik Controllers which are equipped with registers and a module interface (SMC23-26, SMC30, AMC12, AMC20-22).

Together with a Controller, the Display Module enables numeric values in the range 0 to 65535 to be displayed.

The Display Module is available in the following three models:

DIS10

Module without rack cabinet and glass front panel.

DIS11

1 Module built into cabinet (72 x 36mm) with anti reflex front panel.

DIS12

2 Modules built into common cabinet (72 x 72mm) with anti reflex front panel.

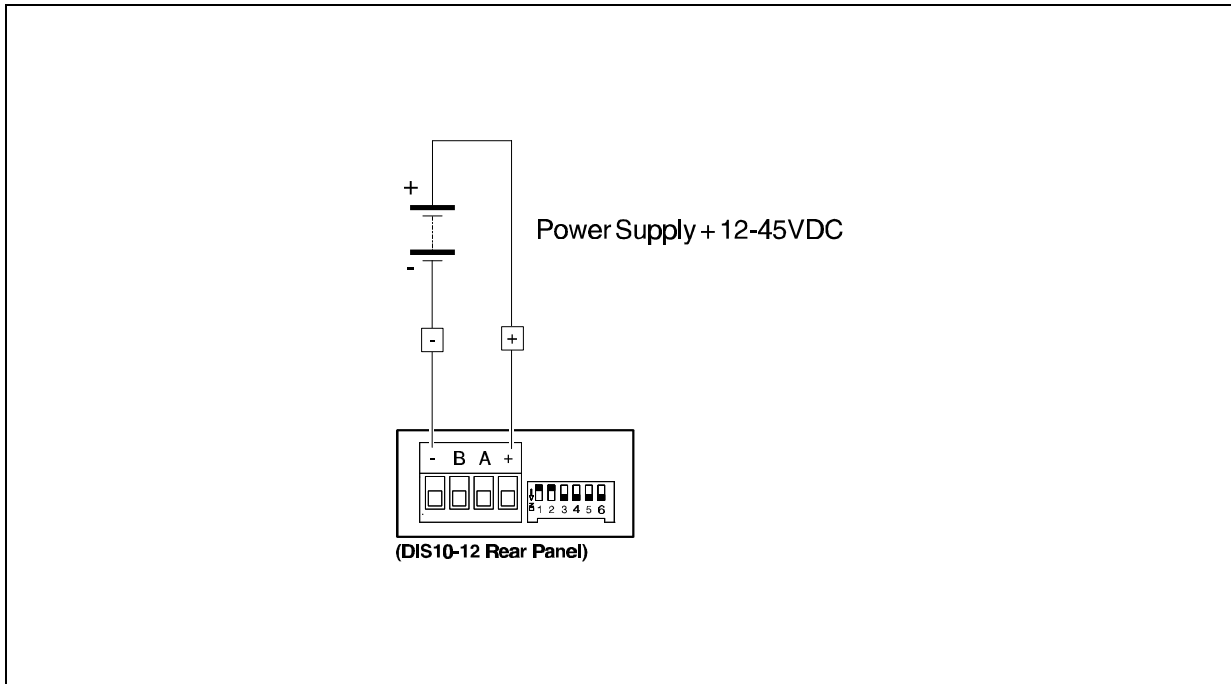
The Module is controlled by the Controller. The program stored in the Controller is used to display numeric values on the Display Module.

Features:

- High-intensity LED display.
- Flexible supply (12-45V).
- Can be located up to 100m from the Controller.
- Galvanically isolated communication interface.
- Protected against voltage overload and incorrect polarity connection.
- Facility for connecting several Controllers to the same Display Module — i.e. 1 Display Module can display data from several Controllers.
- Facility for connecting other types of Modules to the Display Module's interface, including Counter Module type CMO10, Keyboard/Display Module type KDM10D/T.

1.2

Power Supply



Power Supply:

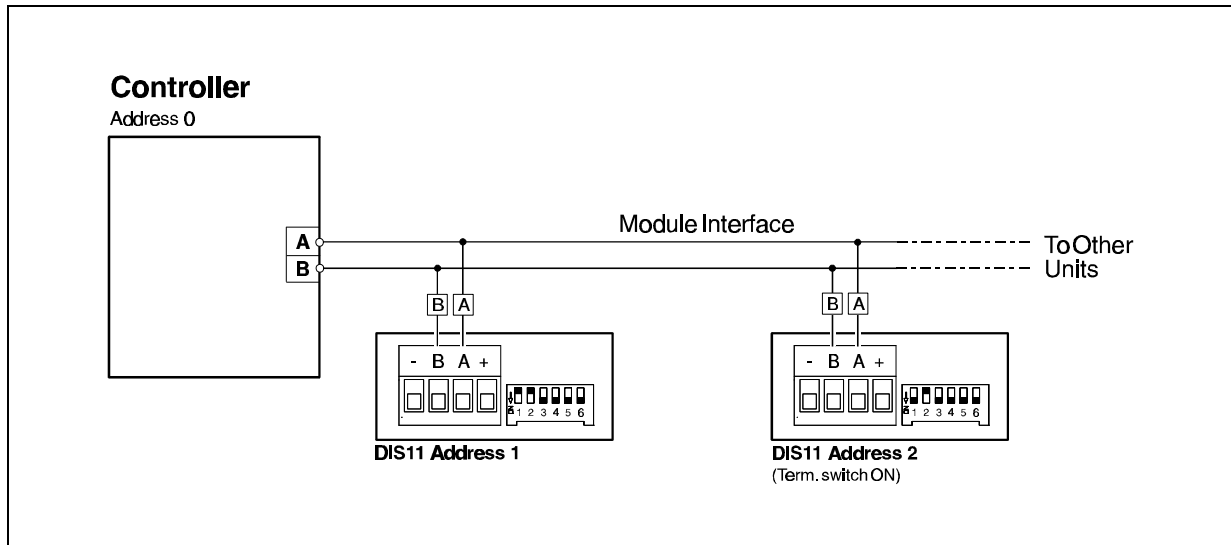
The Display Module is powered by a supply connected to the + and - terminal (see above illustration). The supply voltage connected to the Module must be in the range 12 to 45 VDC. In order to achieve the greatest possible degree of noise immunity, the + and - terminals are galvanically isolated from the interface terminals A and B.

The supply voltage for powering the Module and interface circuitry is generated by a switched-mode power supply, which ensures high efficiency and makes the external supply non-critical. If a voltage greater than 47 VDC is applied to the Module, the voltage overload circuitry will cause the internal fuse to blow.

A 1.5 kW transient-protection diode provides protection against supply line transients. The fuse will also provide protection if the supply voltage is connected with incorrect polarity.

1.3

Module Interface



RS485 Interface "A" and "B":

Terminals "A" and "B" are used to connect the Module to the Controller. All of the Module's functions are controlled via these 2 terminals. Up to 31 modules and at least 1 Controller can be connected to the same interface bus. The interface is protected against any transients that may arise in the interface cables between the Controller and Module. The RS485 Interface offers several advantages in that it provides a balanced, low-impedance communications interface.

These two factors enable communication over large distances despite the presence of electrical noise.

The Modules 2 interface terminals are denoted *A* and *B*. These 2 terminals should be connected to the Controller's terminals (similarly denoted *A* and *B*).

It is recommended that cabling between the Module and the other units connected to the interface bus is made using twisted pair cables.

In systems in which the communication distance between any two units exceeds 25 metres, the DIP-switch marked *TERM* must be set to the *ON* position on those units which are located more than 25 metres away.

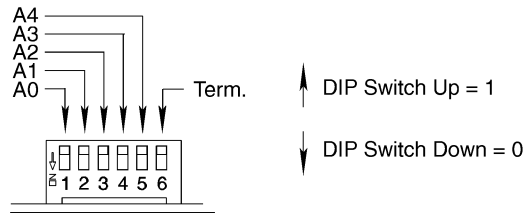
See the following page for the location of the DIP-switch.

1.3

Module Interface

A0	A1	A2	A3	A4	Address
0	0	0	0	0	0
1	0	0	0	0	1
0	1	0	0	0	2
1	1	0	0	0	3
0	0	1	0	0	4
1	0	1	0	0	5
0	1	1	0	0	6
1	1	1	0	0	7
0	0	0	1	0	8
1	0	0	1	0	9
0	1	0	1	0	10
1	1	0	1	0	11
0	0	1	1	0	12
1	0	1	1	0	13
0	1	1	1	0	14
1	1	1	1	0	15

A0	A1	A2	A3	A4	Address
0	0	0	0	1	16
1	0	0	0	1	17
0	1	0	0	1	18
1	1	0	0	1	19
0	0	1	0	1	20
1	0	1	0	1	21
0	1	1	0	1	22
1	1	1	0	1	23
0	0	0	1	1	24
1	0	0	1	1	25
0	1	0	1	1	26
1	1	0	1	1	27
0	0	1	1	1	28
1	0	1	1	1	29
0	1	1	1	1	30
1	1	1	1	1	31



Addressing the Module:

In communication systems where several modules are connected together, each module must be assigned its own unique address.

This address can be selected in the range 1-31.

The table above illustrates how the DIP-switches on the rear panel of the Module must be set.

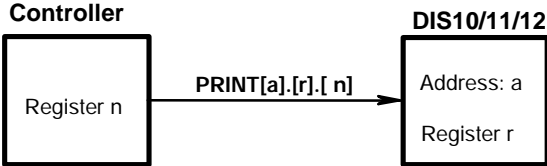
The addresses assigned to modules on the same interface must be unique. If two or more modules use the same address, the Controller will stop program execution and report an error. In certain instances, the modules may operate incorrectly.

2.1 Command Overview

Print Command :

PRINT[a].[r].[n] (Print) Module with address *a*, reads into its register *r*, a value or a register from the Controller.

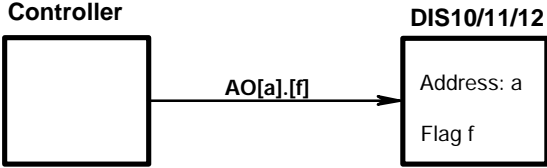
Example : PRINT10.8.4



Activate Command :

AO[a].[f] (Activate) Flag *f* is activated in the Module with address *a*.

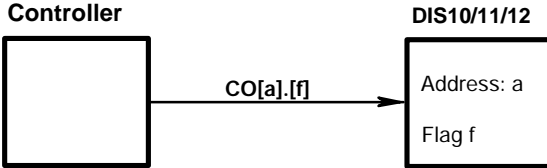
Example : AO10.2



Deactivate Command :

CO[a].[f] (Clear) Flag *f* is deactivated in the Module with address *a*.

Example : CO10.2



2.2 Register and Flag Overview

Overview of Registers in DIS10, DIS11 and DIS12				Command	
Register	Function	Interval	Default	PRINT	INPUT
0	Print to display	0 - 65535	0	Yes	No
1	Comma Register	0 - 5	0	Yes	No
10-25	Mail Box 1-16	0 - 65535	0	Yes	Yes

Overview of Flags in DIS 10, DIS 11 and DIS 12				Command	
Flag	Function	Interval	Default	AO	CO
1	Reset All	0/1	0 (Off)	Yes	Yes
2	" + " character	0/1	0 (Off)	Yes	Yes
3	" - " character	0/1	0 (Off)	Yes	Yes
4	" 1 " character	0/1	0 (Off)	Yes	Yes
5	Bar character	0/1	0 (Off)	Yes	Yes
6	+/- function	0/1	0 (Off)	Yes	Yes
7	Power comma on/off	0/1	1 (On)	Yes	Yes
21	Text-string "Error"	0/1	0 (Off)	Yes	Yes
22	Text-string "run"	0/1	0 (Off)	Yes	Yes
23	Text-string "PAUSE"	0/1	0 (Off)	Yes	Yes
24	Text-string "HALT"	0/1	0 (Off)	Yes	Yes
25	Text-string "SEt"	0/1	0 (Off)	Yes	Yes
26	Text-string "InPut"	0/1	0 (Off)	Yes	Yes
27	Text-string "rESEt"	0/1	0 (Off)	Yes	Yes
28	Text-string "StArt"	0/1	0 (Off)	Yes	Yes
29	Text-string "StoP"	0/1	0 (Off)	Yes	Yes
30	Display test	0/1	0 (Off)	Yes	Yes

2.3 Printout to Display

The Display in the DIS10, DIS11 and DIS12 is a high-intensity, 5-digit LED display.

The *PRINT* command can be used to write numerical values from the Controller to the Module display.

Example :

```
PRINT3.0.1234
```

The above command will result in the numeric value "1234" being printed to the display.

In this example the Module's DIP-switch is set to assign address 3 to the Module.

The contents of a specific Controller register can also be printed to the display.

Example :

```
PRINT9.0.R22
```

The above command will result in the contents of the Controller's register 22 being printed to the Module display (register 0).

In this example the Module address DIP-switch is set to 9.

The following example illustrates the use of the PRINT command in the context of a controller program in which the motor position is continuously displayed on the Module display.

Example :

```
:START      R1=0           ;Reset register 1 (must be used as position register).
:RUN        C1           ;Deactivate output 1 (report "busy" to PLC).
            R1=R1+10     ;Calculate new position.
            G+(R1)       ;Run motor to the position specified by R1.
            A1           ;Activate output 1 (report "ready" to PLC)
            PRINT3.0.R1  ;Print position to DIS11 (module address 3).
            IF R1<100    ;If position greater than 100, jump to END.
            J:RUN        ;Jump to RUN.

:END        C2           ;Deactivate output 2.
            .
            .
```

2.4

Register Description

Register 1

This register controls the decimal point on the Module display. At start-up, the register value is 0, which means that no decimal point is used. The register can be set to a value in the range from 0 to 5. If, for example, 2 decimal places are required, the "PRINT3.1.2" command should be sent to the Module.

Registers 10-25

Postboxes. These registers have no direct function in the DIS 10/11/12 Modules, but can typically be used in systems that include more than 1 Controller. Since 2 Controllers cannot communicate directly with each other, these registers provide a method for exchanging data. For example, Controller 1 can write data to a postbox that subsequently can be read by Controller 2. Each postbox can store a numeric value from 0 to 65535.

2.5

Error Messages

If the Module receives a command it cannot interpret or for other reasons a command cannot be executed, the Module will transmit an error message to the Controller. This error message will stop the Controller program execution.

When Controller program execution has stopped, an error query can be sent using the controller command "F" (feedback). The Module will then return one of the following error messages.

Error Message Format

EE[e].[a].[n] EE means that an error has occurred during communication with one of the external modules. e refers to the type of error that has occurred. a refers to the address of the module in which the error occurred. n refers to the line number of the Controller program at which the error occurred.

Error (**e**):

- 1 A checksum error has occurred during communication.
- 2 Communication Error. Errors have repeatedly occurred during communication (start/stop bit). This can be due to high-level noise transients on the interface cable conductors (A and B). Use 2-core screened cable or a twisted-pair cable. If screened cable is used, the screen must be connected to ground and A and B must each have their own conductor in the cable.
- 3 A command has been used that the Module either does not recognise or cannot comply with. For example this may occur if an attempt is made to write to a register that doesn't exist.

3.1

Specifications

	Min.	Typ.	Max.	Units
Power Supply :				
Supply Voltage	12		45	VDC
Power Consumption		1.3	2.5	W
Module interface (RS485) :				
Communication Rate		50		kbit/sec.
Communication Distance			100	Metres
Diverse :				
Operating Temperature	0		50	°C
Physical Dimensions - DIS10		(-)		mm
Physical Dimensions - DIS11		(112 x 72 x 36)		mm
Physical Dimensions - DIS12		(112 x 72 x 72)		mm

(-) = Data not defined at time of publication.