IOM11/IOM11A
Input/Output Module

User´s Manual
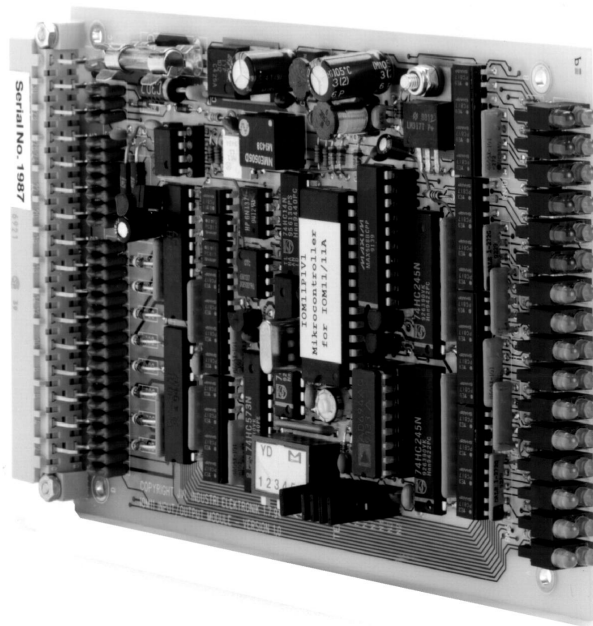
Contents

1.1 Introduction

Input/Output Module IOM 11 is intended for extending the number of inputs and outputs on JVL Motor Controllers equipped with a module interface.

Each Input/Output Module has 16 inputs and 8 outputs, all of which are optically isolated. It is additionally equipped with a counter whose value can be read by the overall Controller. Moreover, extended model IOM11A has an analogue output for control of e.g. frequency converters, DC motors and thermostat controls.

Via the Controller's extended command set, it is possible to activate or deactivate individual outputs or set all outputs up to a certain binary pattern. Control of program flow is also possible by reading individual inputs or reading all 16 input values simultaneously.

In addition, IOM11 can function as a link for exchanging data between motor controllers and a PLC.

Features

€ 16 inputs (5-30VDC). Galvanically isolated

€ 8 outputs (5-30VDC/500mA) Galvanically isolated and short-circuit protected

€ Status output for error indication

€ Connection of overall Controller via built-in RS485 interface using simple 2-core cable enables long communication lines

€ Up to 31 units can be connected to the same interface bus, corresponding to a total of 248 outputs and 496 inputs

€ Non-critical power supply, 12-45 VDC

€ Includes a counter which can count from 0 to 65535 (max. 5kHz). The counter can be read by the overall Controller and thus control program execution.

€ Additional 12 bit analogue output on type IOM11A with following features: 0-10V/ 0-20mA/4-20mA

1.2   Status Indicators

IOM11 Front:

Input 1 ── ◯◯ ── Main Supply
Input 2 ── ◯◯ ── Output Supply
Input 3 ── ◯◯ ── Output 1
Input 4 ── ◯◯ ── Output 2
Input 5 ── ◯◯ ── Output 3
Input 6 ── ◯◯ ── Output 4
Input 7 ── ◯◯ ── Output 5
Input 8 ── ◯◯ ── Output 6
Input 9 ── ◯◯ ── Output 7
Input 10 ── ◯◯ ── Output 8
Input 11 ── ◯◯ ── Error Output
Input 12 ── ◯◯ ── Error Output 1-4
Input 13 ── ◯◯ ── Error Output 5-8
Input 14 ── ◯◯ ── Communication Error
Input 15 ── ◯◯ ── Fuse Error
Input 16 ── ◯◯ ── Analogue Output Error

Input Status

Supply Status

Output Status

Error Status

32 light emitting diodes (LEDs) on the front of the Module indicate status for the inputs and outputs, the power supply and errors.

Input status

The 16 LEDs, Input 1 to Input 16, show the actual level of each of the 16 inputs. If a diode is lit, it indicates that the corresponding input is logic "1".

Note that the light intensity of a given diode will depend on the voltage connected to the corresponding input (high light intensity at high voltage).

Supply status

The LED marked Main Supply is lit if the main supply (terminal P+ and P-) is within the nominal voltage range.

The LED marked Output Supply is lit if an external supply is connected to the output circuit (terminal O+ and O-)

Output status

The 8 LEDs marked Output 1 to Output 8 show the actual level of each of the 8 outputs.

If a diode is lit, it indicates that the corresponding output is activated. Note that the light intensity of the diodes will depend on the supply voltage to the output circuit.

Error status

The LED marked "Error Output" is lit if the error output is active.

The LED marked "Error Output 1-4" is lit if one of the outputs 1 to 4 has been overloaded.

The LED marked "Error Output 5-8" is lit if one of the outputs 5 to 8 has been overloaded.
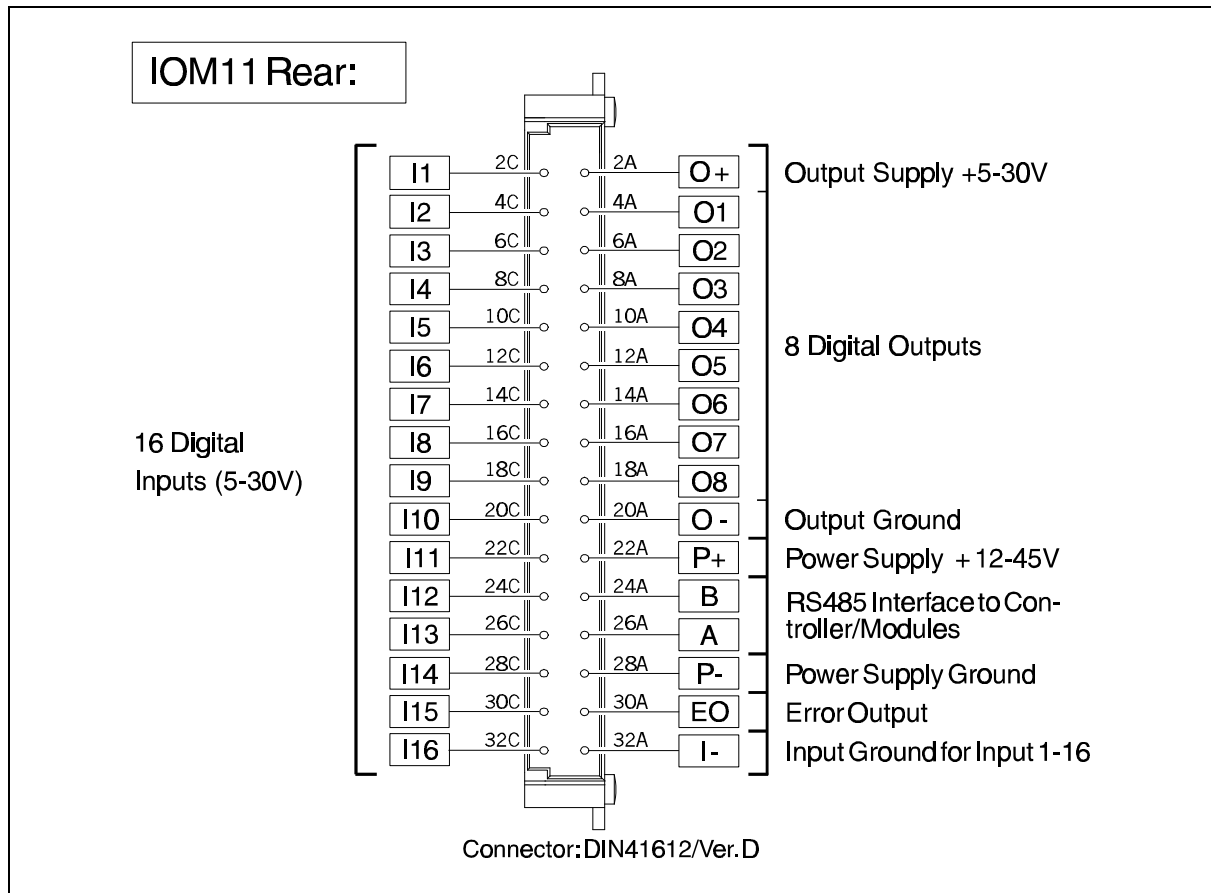
The LED marked "Communication Error" is lit if the IOM11 has received a command it does not recognise or is unable to execute.

The LED marked "Fuse Error" is lit if the fuse is blown. This is typically caused by too high an input voltage on the terminals P+/P-.

The LED marked "Analogue Output Error" is lit if the analogue output has been overloaded. See also section 2.6.

1.3　　　　　　　　　Connections

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┌─────────────────────────────────────────────────────────────────────┐
│                                                                       │
│   │ IOM11 Rear: │                                                     │
│                                                                       │
│                        ┌─────┐                                        │
│              ┌─ I1   2C ─o  o─ 2A   O+ ─┐   Output Supply +5-30V      │
│              │  I2   4C ─o  o─ 4A   O1  │                             │
│              │  I3   6C ─o  o─ 6A   O2  │                             │
│              │  I4   8C ─o  o─ 8A   O3  │                             │
│              │  I5  10C ─o  o─10A   O4  │                             │
│              │  I6  12C ─o  o─12A   O5  │   8 Digital Outputs         │
│              │  I7  14C ─o  o─14A   O6  │                             │
│  16 Digital  │  I8  16C ─o  o─16A   O7  │                             │
│  Inputs      │  I9  18C ─o  o─18A   O8 ─┘                             │
│  (5-30V)     │  I10 20C ─o  o─20A   O-      Output Ground            │
│              │  I11 22C ─o  o─22A   P+      Power Supply +12-45V      │
│              │  I12 24C ─o  o─24A   B       RS485 Interface to Con-   │
│              │  I13 26C ─o  o─26A   A       troller/Modules          │
│              │  I14 28C ─o  o─28A   P-      Power Supply Ground       │
│              │  I15 30C ─o  o─30A   EO      Error Output             │
│              └─ I16 32C ─o  o─32A   I-      Input Ground for Input 1-16│
│                                                                       │
│               Connector: DIN41612/Ver. D                              │
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```

All connections to and from the Module are on the rear of the Module.

Power Supply "P+/P-"
The control part of the Module is supplied with power via the terminals *P+* and *P-*. The Module can be supplied with a voltage between 12 and 45VDC. Note that P+ and P- are galvanically isolated from the input and output circuits as these must be supplied with power separately.

Error Output "EO"
The error output is used as status connector. The output is activated if the output circuit is overloaded or if other failures occur that prevent the Module from functioning correctly.

RS485 Interface "A/B"
The Module´s connection to the controller. Via these 2 terminals all the functions of the Module are controlled. Up to 31 modules and minimum 1 controller can be connected to the module interface.
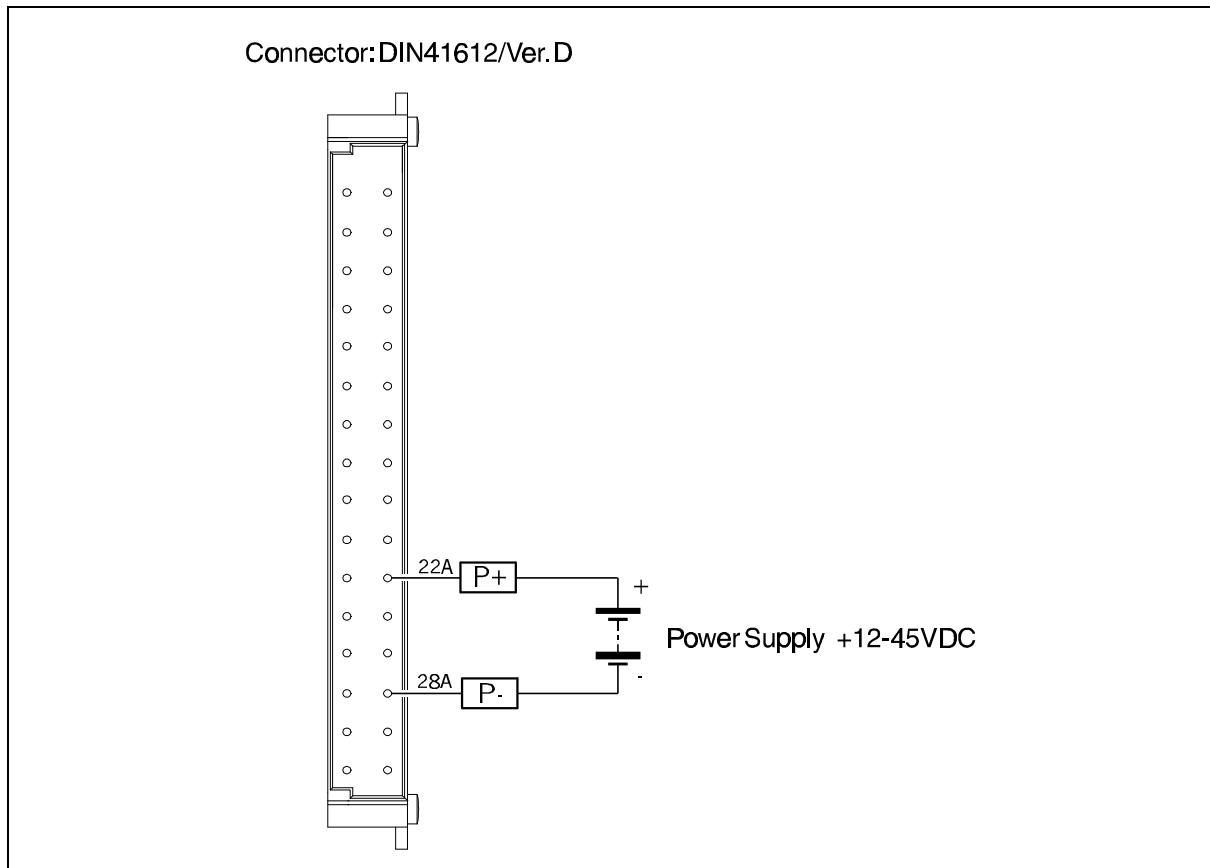
Outputs "O1-O8"
The 8 outputs *O1-O8* are galvanically isolated from the other terminals on the Module. Each output can be loaded continously with a current of max. 500mA.

Inputs "I1-I16"
The 16 inputs are galvanically isolated from the other terminals on the Module. Each input accepts voltages from 5 to 30VDC.

2.1   Power Supply

Connector: DIN41612/Ver. D

Power Supply +12-45VDC

IOM11 contains a switch-mode power supply which ensures a high efficiency and makes the supply voltage uncritical.
IOM11 can therefore be supplied with a DC voltage in the interval from 12 to 45V.

The power supply terminals are marked P+ and P-. IOM11 is protected against voltage transients and a fuse protects against incorrect polarisation of the supply and voltage overload.

The fuse is a 5x20mm, 630 mA slow-blow fuse.

2.2 Module Interface
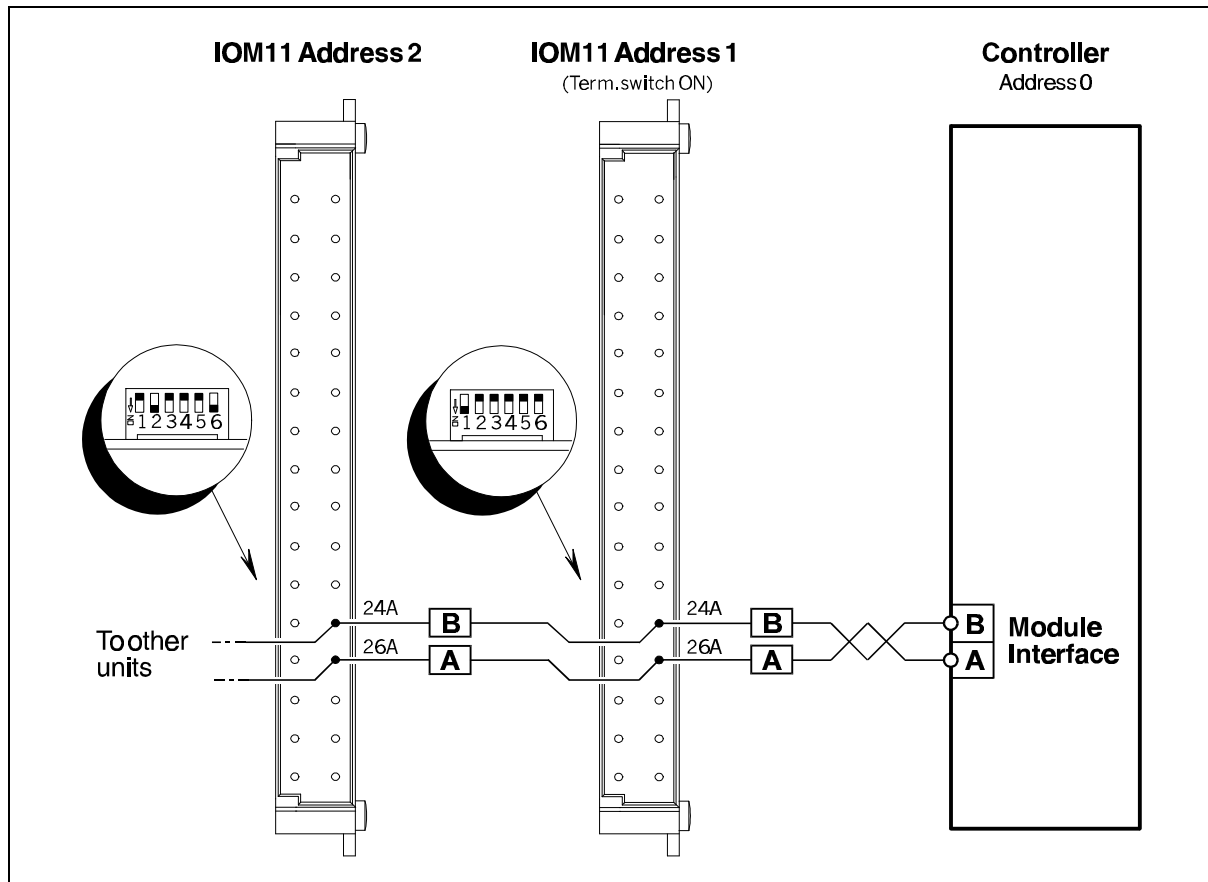
IOM11 is controlled serially via the module interface, (RS485). The module interface allows up to 32 units to be connected in parallel. The module interface offers several advantages: balanced operation and low impedance communication line.

These 2 factors makes it possible to communicate over long distances, regardless of electrical noise.

The interface terminals marked *A* and *B* are connected to the terminals on the controller, also marked *A and B.* It is recommended that twisted pair cabling is used between the IOM11 and the other units on the communication line. See also above drawing.

In a system in which the communication distance is more than 25 metres between 2 units, the DIP switch marked TERM must be set to position ON on those units which are situated more than 25 metres away from the others.

See location of the DIP switch on the following page.

2.2 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

A4
A3
A2
A1
A0 ———————— Term.

1 2 3 4 5 6

Dipswitch up (OFF) = 0

Dipswitch down (ON) = 1

In a communication system in which several units are coupled together, each unit must be assigned its own unique address.

This address can be chosen in the range from 1 to 31.

The tables above show how the DIP switches on the side of the module must be set for each address.

The address of each module in a system must be unique. If two or more modules are assigned the same address, program execution will stop and an error message given.

Note that if several modules are connected on the same module interface, the addresses need not be assigned consecutively.

2.3 Input Circuit

Connector: DIN41612/Ver.D
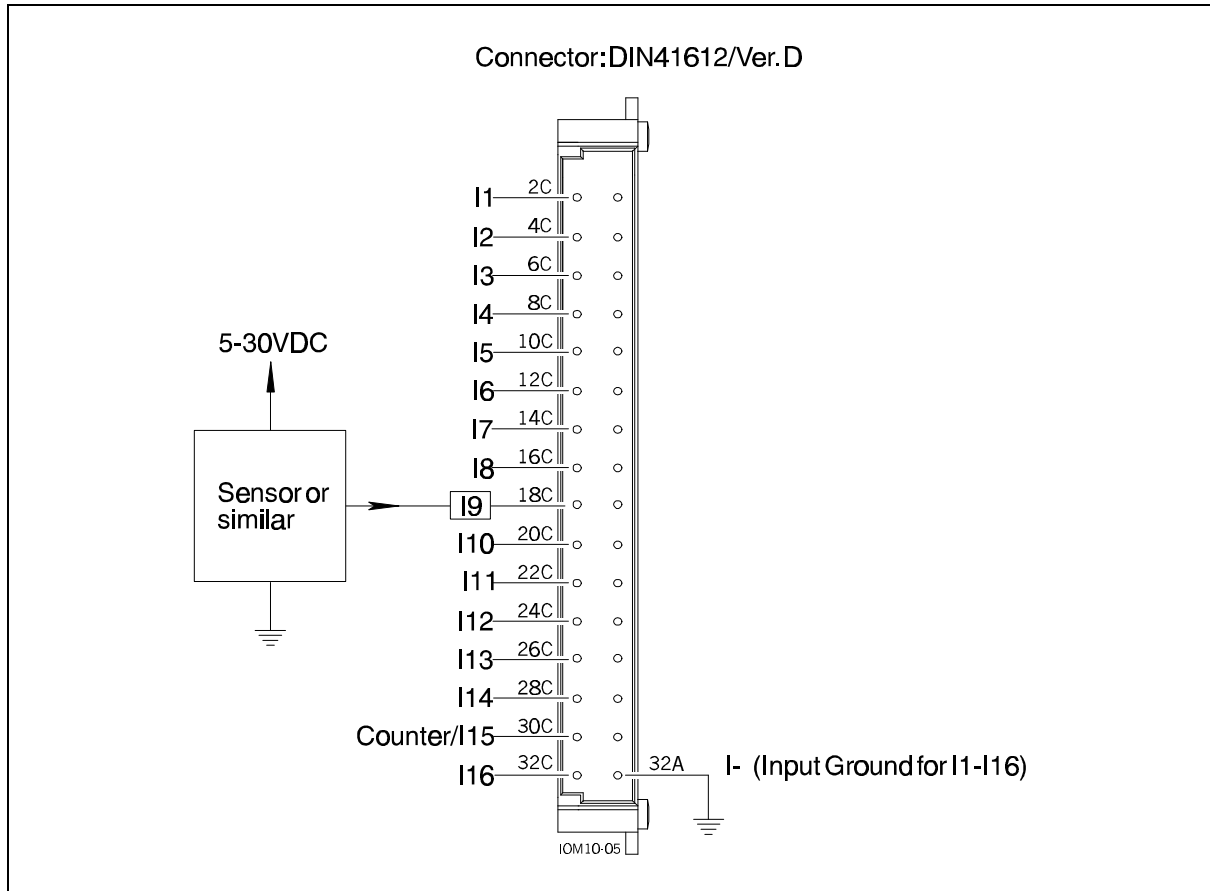
The input circuit contains 16 digital inputs.
Each input can be read via the program in the connected controller. The inputs are galvanically isolated from the other circuitry in the IOM11.

All the inputs have a common ground terminal designated I-.

Each input can operate with voltages in the range 5 to 30VDC.

Counter Input
The Module contains a counter which continously measures the voltage impulses on input 15. Input 15 can however at all times be regarded as a normal input, that is, at any time a logic level can be read from the output without influencing the counter.
When the Module is switched on, the counter will be re-set. Thereafter it will be incremented by 1 each time an impulse is applied to the input. The counter can count from 0 to 65535. If the value of 65535 is exceeded the counter is re-set.

See section 3.3 for counter commands.

2.4   Output Circuit
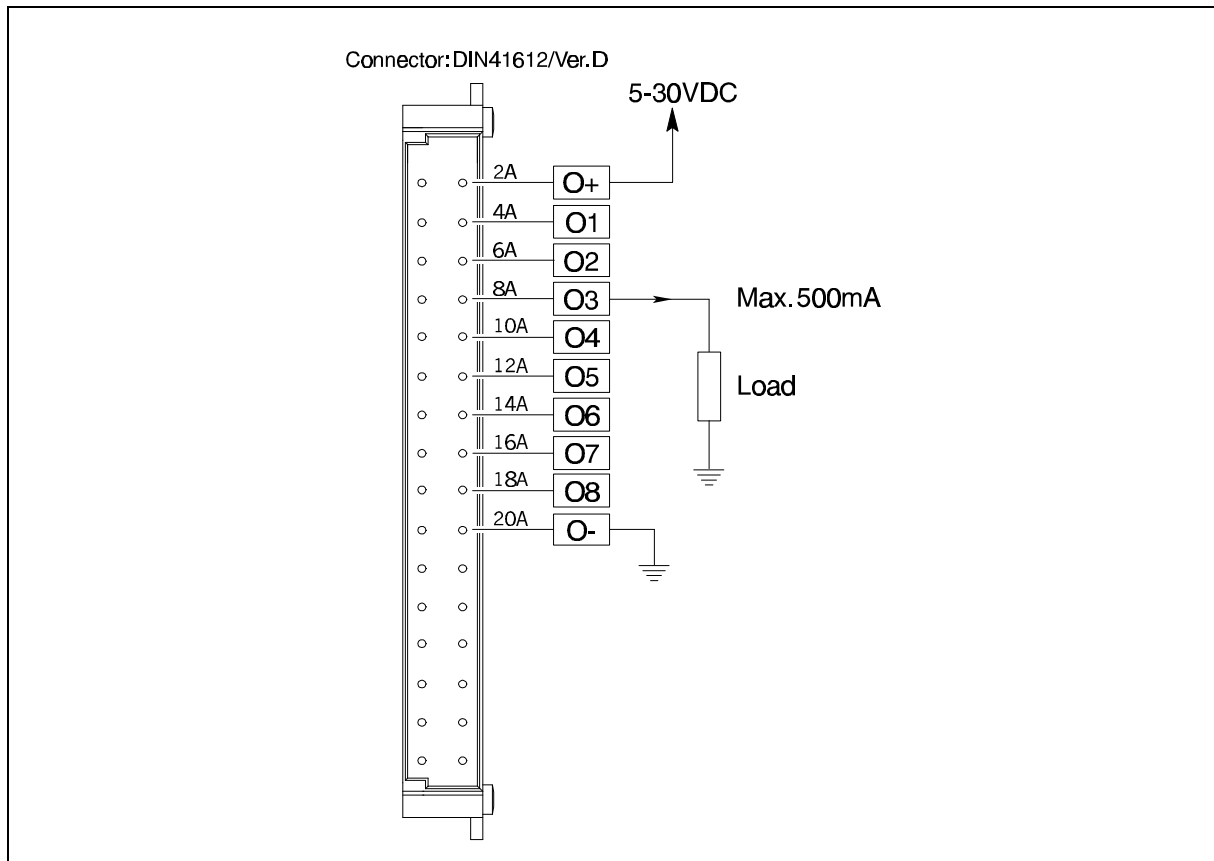
The output circuit contains 8 digital outputs.
Each output can be activated/deactivated via the program in the connected controller. The outputs are galvanically isolated from other circuitry in the IOM11.

The output circuit must be supplied by an external power supply in order to function. This power supply is connected to the terminals designated *O+* and *O-*. The output circuit operates with voltages from 5 to 30VDC.
Each output can supply 500mA continuously.
All outputs are short-circuit protected which means that they will be disconnected if short-circuited. When the short-circuit is removed, the output will again function normally.

If a given output is overloaded, one of the 2 error LEDs on the front of the IOM11 will be lit.
Note that this error situation will also result in an activation of the error output and that the *"Error Output"* LED will be lit- see section 1.2 for the location of the error LEDs.

The outputs are all source drivers, which means that if a given output is activated there will be a contact between the +supply *(O+)* and the output.

2.5   Error Output

Connector: DIN41612/Ver.D
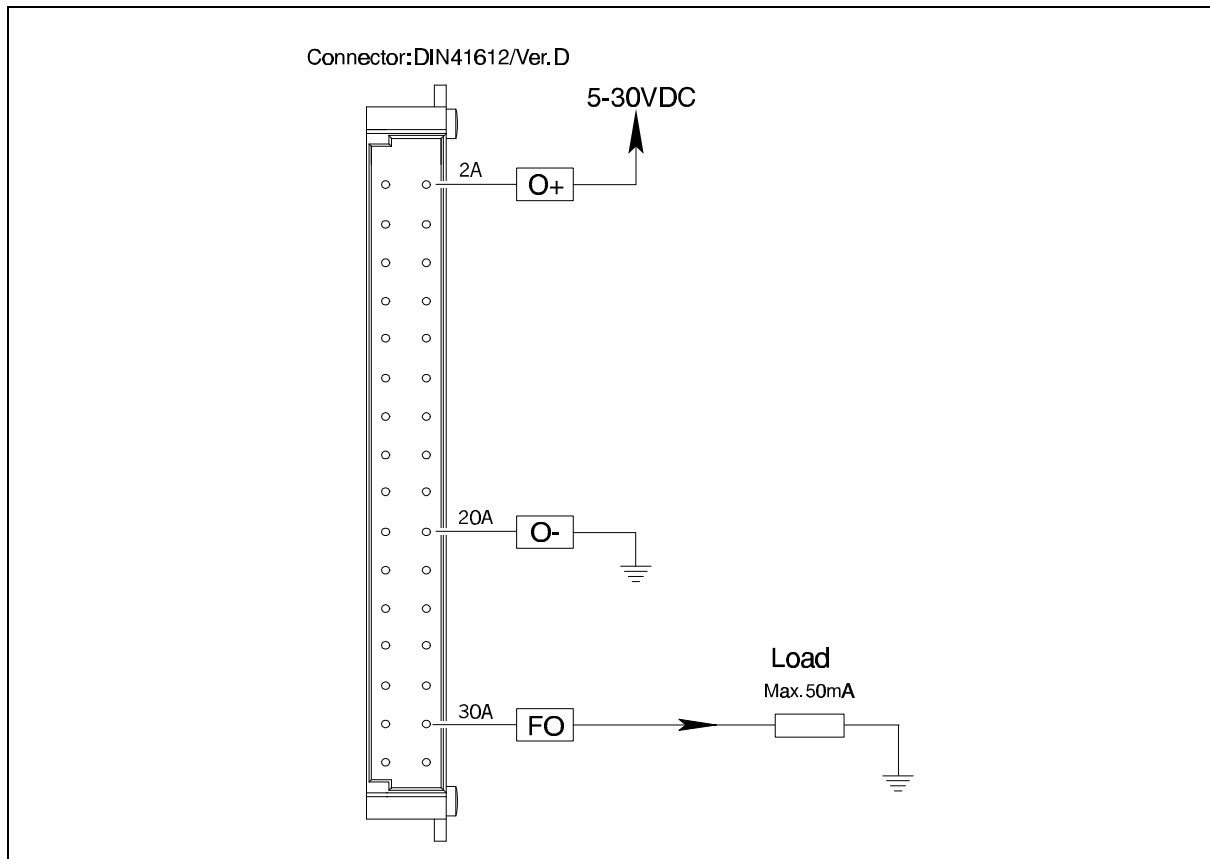
IOM11 is equipped with an error output which is activated by one of the following conditions:

• If one of the 8 user outputs is short-circuited

• If a command is received which the IOM11 does not recognise or is unable to execute.
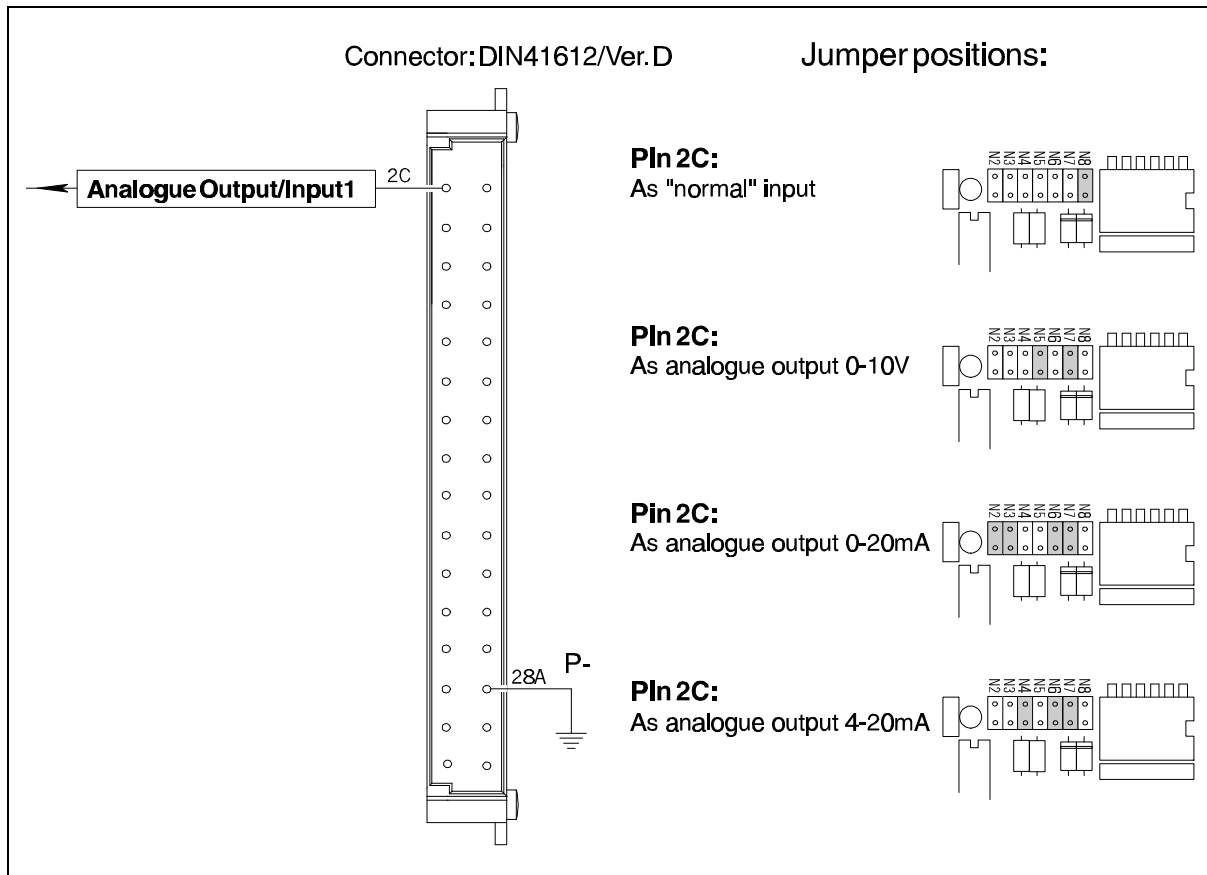
This error output shares its supply with the other 8 outputs and can be loaded with max. 50mA DC.
The error output, is like the other 8 outputs, is of the source driver type.

Note !   The error output is not short-circuit protected.

If a system contains several IOM11 modules, all the error outputs can be connected in parallel to give a common error connection. This common error connection will then be activated if an error occurs in any of the modules in the system.

The LED designated *"Error Output"* on the front of the IOM11 will be lit when the error output is activated.

(IOM11-A only)

Connector: DIN41612/Ver. D   Jumper positions:

Pin 2C:
As "normal" input

Pin 2C:
As analogue output 0-10V

Pin 2C:
As analogue output 0-20mA

Pin 2C:
As analogue output 4-20mA

IOM11A includes an analogue output which can be controlled via the program in the connected controller.

Because of the limited number of connector pins, the analogue output shares pin 2C with Digital Input 1. The choice of using this pin as a digital input or analogue output is made by setting jumpers as shown above.

Note that the analogue output (pin 2C), must be used together with power supply ground (pin 28A). The analogue output is **not** galvanically isolated from the other circuitry in the IOM11A.

The analogue output can give either a current of 4-20mA/0-20mA, or a voltage of 0-10V. These three ranges are selected by placing the jumpers according to the above drawing.

Error Indication

IOM11A includes a feature that makes it possible to monitor if a failure occurs in connection with the analogue output. The monitoring function is only operative if the IOM11 is set to deliver a current (4-20mA or 0-20mA). A failure can be, for instance, if the output is not connected or if the load on the output is so small that the IOM11A is not able to deliver the required current. Note that the error detection circuit is not able to register a short-circuit of the analogue output.

In an error situation the error LED located on the front of the IOM11 designated *"Analogue Output Error"* will be lit - see also section 1.2.

Note !   The error LED will always be lit if the IOM11 is not set to give a current.

3.1   Command Overview

Print Command :

    PRINT[a].[r].[n]   (Print)   Print to register *r* in the Module with address *a*, the Controller value or register contents *n*.
                                                                   Example : PRINT10.3.4

Input Command:

    R[n]=INPUT[a].[r]   (Input)   Read into Controller register *n* the contents of register *r* from the module with address *a*.
                                                                      Example : R4=INPUT10.2

Flow Command:

    IF I[a].[i]=[l]   (If Then)   Execute next line if input *i* on Module *a* is equal to logic level *l*.
                                                                   Example : IFI2.16=1

Activate Command:

    AO[a].[f]   (Activate)   Activate flag *f* in Module with address *a*.
                                                                     Example: AO10.21
                                                                 This command activates output 1 (flag 21) on the module with address 10.

Deactivate Command:

    CO[a].[f]   (Deactivate) In the Module with the address *a*, the flag *f* is deactivated.
                                                                     Example : CO10.21
                                                                 This command deactivates output 1 (flag 21) on the module with the address 10.

3.2   Overview of Registers and Flags

Overview of IOM11 registers				Command	
Register	**Function**	**Interval**	**Default**	**PRINT**	**INPUT**
1	Output register for outputs 1 to 8	0-255	0	Yes	No
2	Input register for inputs 1 to 16	0-65535	-	No	Yes
3	Counter register	0-65535	0	Yes	Yes
4	Register for analogue output (only IOM11A)	0-4095	0	Yes	No
10	Post box 1	0-65535	0	Yes	Yes
11	Post box 2	0-65535	0	Yes	Yes
12	Post box 3	0-65535	0	Yes	Yes
13	Post box 4	0-65535	0	Yes	Yes

Overview of IOM11 flags				Command		
Flag	**Function**	**Interval**	**Default**	**AO**	**CO**	**IF**
1-16	Input flags for inputs 1 to 16	0 / 1	-	No	No	Yes
21-28	Output flags for outputs 1 to 8	0 / 1	0	Yes	Yes	No
100	Reset counter	0 / 1	0	Yes	No	No
101	Trigger flag	0 / 1	1	Yes	Yes	No

3.3   Registers

IOM11 contains a number of registers whose contents can be read via the *INPUT* command and assigned a value via the *PRINT* command. These registers have the following functions.

Register 1   This register contains status for the outputs 1 to 8 on IOM11.
The register can be changed using the *PRINT* command or using the *AO* or *CO* command. The register is divided into 8 flags which can be activated individually.
The register has the default value of 0 at start up.

Register 2   This register contains status for the inputs 1 to 16 on IOM11.
The register and thus the inputs can be read using the *INPUT* command. The register is divided into 16 flags which can be read individually using the *IF* command.
The register has the default value at start up which corresponds to the input levels.

Register 3   The Module´s counter is represented by this register. The counter register can be read using the *INPUT* command and read into using the *PRINT* command.
The commands *AO* and *CO* cannot be used with this register
The counter register can contain numbers from 0 to 65535. At start up the register has the default value of 0.

Register 4   This register represents the analogue output.
(IOM11A only)   The value of the register determines the current or voltage which the analogue output should transfer.
The register can contain a number between 0 and 4095 corresponding to the working range of the analogue outputs (12Bit).
The content of the register can be influenced by the *PRINT* command only.
The register has the default value of 0 at start up.

Register 10-13   Module IOM11 contains 4 user registers which can be used as "Post Boxes" These Post Boxes do not have any direct function in the IOM11, but can typically be used in systems with more than one controller. The Post Boxes can be read via the *INPUT* command and can be assigned a value using the *PRINT* command.
As two controllers can not talk directly with each other, these registers give the possibility of exchanging data between two controllers by letting controller 1 write to a Post Box which later can be read by controller 2.
The registers have the default value of 0 at start up.

3.4 Flags

IOM11 contains flags that can be used to control the individual inputs and outputs as well as, among other things; the functioning of the counter.

The following flags are available:

Flag 1-16   The 16 inputs on IOM11 are each represented by an individual flag.

Flag 1   =   Input 1
Flag 2   =   Input 2
.
.
Flag 16   =   Input 16

These 16 flags can be read individually using the IF command.
Note that the flags cannot be addressed by the commands *AO* and *CO* (Activate/Clear).

Flag 21-28   The 8 outputs on IOM11 are each represented by an individual flag.

Flag 21   =   Output 1
Flag 22   =   Output 2
.
.
Flag 28   =   Output 8

These 8 flags can be addressed individually using the *AO* and *CO* commands.
Note that the flags cannot be read via the *IF* or *INPUT* commands.
The flags are deactivated (logic 0) when the IOM11 is switched on.

Flag 100   Reset flag. If this flag is activated, the counter (register 3) is immediately re-set
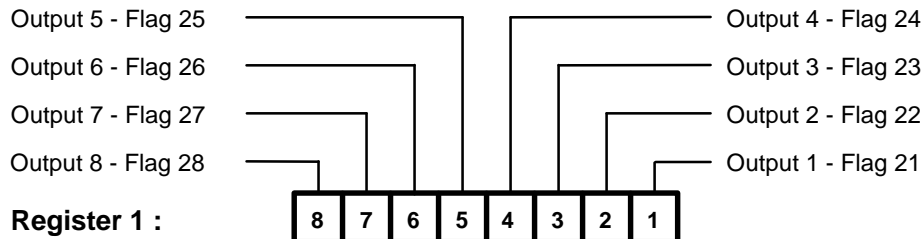The flag is automatically deactivated after it has been activated.

Flag 101   Trigger flag. If this flag is activated, the counter will be incremented 1 each time the counter input receives a level going from logic "0" to logic "1".
If the flag is deactivated, the counter will be incremented by 1 each time the counter input receives a level going from Logic "1" to logic"0".
The flag is activated when the IOM11 is switched on.

3.5   Use of Outputs

IOM11 includes 8 outputs. These 8 outputs are represented by register 1.
The content of the register can be changed using the *PRINT* command or the *AO* or *CO* commands.
The register is divided into 8 flags, corresponding to each of the outputs which can be addressed individually.

Output 5 - Flag 25		Output 4 - Flag 24
Output 6 - Flag 26		Output 3 - Flag 23
Output 7 - Flag 27		Output 2 - Flag 22
Output 8 - Flag 28		Output 1 - Flag 21

Register 1 : | 8 | 7 | 6 | 5 | 4 | 3 | 2 | 1 |

If it is required to address a single output, the commands *AO* and *CO* are used. *AO* is used when a specific output must be activated (logic1), and *CO* is used if a specific output must be deactivated (logic0).

Example 1 :   **AO3.21**   This command will activate output 1 (Flag21) in the module with address 3.

Example 2 :   **CO5.23**   This command will deactivate output 3 (Flag 23) in the module with address 5.

If it is required to address all 8 inputs simultaneously, the *PRINT* command can be used.
When the *PRINT* command is used to write to register 1, the 8 least significant bits are transferred from the value or the register which is specified.

Example 3 :   Register 5 contains the decimal number 14156.
This corresponds to the binary code (16bit) "00110111.01001100".

The command *PRINT4.1.R5* will transfer the lower 8 bits from register 5 to the 8 outputs on the module with address 4.
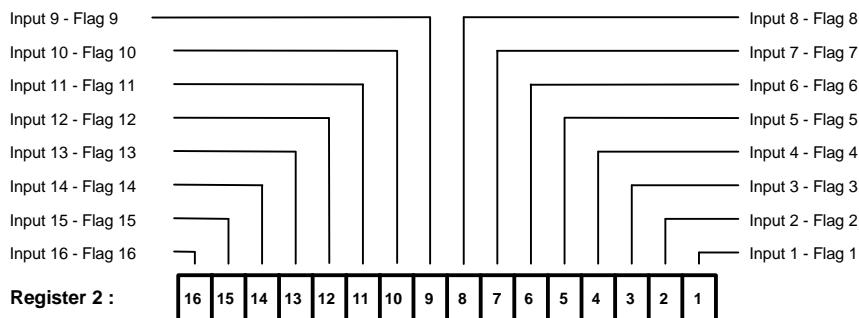Thus, the outputs will be set to the following levels:

Output	1	logic	"0"
-	2	-	"0"
-	3	-	"1"
-	4	-	"1"
-	5	-	"0"
-	6	-	"0"
-	7	-	"1"
-	8	-	"0"

3.6   Use of Inputs

IOM11 includes 16 inputs. These inputs are represented by register 2.
The register, and thus the inputs, can be read using the *INPUT* or *IF* command. The register is divided into 16 flags which can be read individually using the *IF* command, or simultaneously using the *INPUT* command.

Input 9 - Flag 9		Input 8 - Flag 8
Input 10 - Flag 10		Input 7 - Flag 7
Input 11 - Flag 11		Input 6 - Flag 6
Input 12 - Flag 12		Input 5 - Flag 5
Input 13 - Flag 13		Input 4 - Flag 4
Input 14 - Flag 14		Input 3 - Flag 3
Input 15 - Flag 15		Input 2 - Flag 2
Input 16 - Flag 16		Input 1 - Flag 1

Register 2 :

16	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1

Example 1 :   The following conditions are given:
A voltage of 24V (logic "1") is applied to input 14 on the module with address 3.

```
:START      IF I2.1=1      ; If input 1 on module with address 2 is logic
            J:NEXT         ; "1", jump to NEXT.
            J:START        ; Otherwise jump to start.
:NEXT       A1             ; Activate output 1
```

.

Another possibility for read-in from register 2 is the *INPUT* command.
This command makes it possible to read-in the entire content of register 2 as a total value.
Note that the value read-in must be handled as a 16 bit binary number corresponding to the 16 inputs available on the IOM11.

Example 2 :   The following conditions are given:
The following logic levels are applied to the inputs (input 16 to 1) on the module with the address 5: "01110101.00111010".

The command *R7=INPUT5.2* will transfer the logic levels from input 1 to 16 on the module with the address 5, to register 7.

After the command has been executed, the controller´s register 7 will contain the binary value "01110101.00111010" corresponding to the decimal number 30010.

3.7   Use of the Counter

The counter register can be read by using the *INPUT* command and can be assigned a value using the *PRINT* command. The commands *AO* and *CO* cannot be used with this register. Flag 100 and Flag 101 is associated with this register. Activation of Flag 100 will re-set the counter. Flag 101 determines whether the counter will be incremented on a shift from logic 0 to logic 1, or from logic 1 to logic 0 - see also section 3.4.
The counter register can contain numbers from 0 to 65535.

Example 1:   It is desired to read the Module´s counter into user register 7.
                   The address of the Module is 20.

                   Therefore the following command is given in the program.

                   R7=INPUT20.3

Example 2:   It is desired to assign the value 230 to the Module counter and then wait until the counter has reached 360 whereafter the counter is re-set. The address of the Module is 11.
                   This is done as follows.:

```
             PRINT11.3.230   ; Assign the value 230 to the counter register.
:READ        R1=INPUT11.3    ; Get the content of the counter register.
             IF R1<360          ; If the content is smaller than 360,
               J:Read           ; jump back and read counter again.
             AO11.100           ; If the content is greater than 360, re-set the
                              ; counter and continue program.
```

Note it is recommended that greater than or less than(> <) are used for comparisons of reference numbers and counter register, as the counter possibly will count pass the reference value.

See also section 2.3 about the counter function.

3.8   **Use of Analogue Output** (IOM11A only)

The analogue output in the IOM11A is represented by register 4. Register 4 determines which current or voltage the analogue output should transfer.

The register can contain a number between 0 and 4095, which corresponds to the operating range of the analogue output (12Bit). The register has the value 0 at start-up.

The content of the register can only be changed by the PRINT command.

Example 1 :   A value of 4095 must be applied to the analogue output. This corresponds to 10.000 V being transferred on the output.

              PRINT3.4.4095

Note that the value being applied to the register does not correspond directly to the voltage or the current. The value is converted as follows.

If the analogue output is set (see section 2.6) to give a voltage of 0 to 10V, the required voltage can be converted to a register value as follows.

$$n = Uout[V] \times 409.5 \quad \text{or} \quad Uout\,[V] = \frac{n}{409.5}$$

If the analogue output is set (see section 2.6) to give a current of 0 to 20mA, the required current can be converted to a register value as follows.

$$n = Iout\,[mA] \times 204.75 \quad \text{or} \quad Iout\,[mA] = \frac{n}{204.75}$$

If the analogue output is set (see section 2.6) to give a current of 4 to 20mA, the required current can be converted to a register value as follows.

$$n = (Iout\,[mA]-4) \times 255.94 \quad \text{or} \quad Iout\,[mA] = 4 + \frac{n}{255.94}$$

Example 2 :   The following command is used in a controller program.

              PRINT2.4.1000

              This command will cause the analogue output on an IOM11 with address 2 to give a voltage of 2.442V.

              See also section 2.6 for setting up the analogue output.

3.9   Use of Post Boxes

The IOM11 Module contains 4 user registers which can be used as "Post Boxes". These Post Boxes do not have any direct function in the IOM11, but can typically be used in systems using more than one controller. The Post Boxes can be read via the INPUT command. Values can be assigned to the Post Boxes using the *PRINT* command.

As 2 controllers cannot communicate directly with each other, these registers open up the possibility for exchanging data by allowing controller 1 to write to a Post Box which later can be read by controller 2. The Post Boxes are made up of the 4 registers 10 to 13.

Example 1 :   Register R5 contains the number 123.

The command *PRINT4.10.R5* will transfer the number 123 from the controller´s register R5 to register 10 in the Module with address 4.

Thus the Module´s register 10 will contain the number 123. Note that the number which was in register 10 before the *PRINT* command was executed will be over-written and thus erased.

Example 2 :   Register 10 in the Module contains the number 123.

The command *R2=INPUT4.10* will transfer the number 123 from register 10 in the Module with address 4 to register R2 in the controller.

Thus the controller´s register R2 will contain the number 123. Note that the number which was in the controller´s register R2 before the *INPUT* command was executed will be over-written and thus erased.

3.10   Error Messages

If the Module receives a command which it cannot interpret, or if for some other reason it can not execute a command, it will return an error message to the controller. This error message will stop program execution of the controller.
In addition, the *"Communication Error"* LED on the front of the IOM11 will be lit.

When program execution has stopped, the type of error can be queried using the *"F"* command (feedback). One of the following error messages will be returned.

Format of the error message

EE[e].[a].[n] EE means that an error has occurred in communication on one of the external modules. e refers to which type of error. a refers to the address of the Module in which the error occurs. n refers to the program line number in which the error occurred.

Error (e):

1   A check-sum error has occurred during communication.

2   Communication error. Repeated errors have occurred in the communication(start/stop bit). This may be caused by high-level noise transients on the communication line (A and B). It is recommended that a 2 core shielded or twisted pair of cable is used. If a shielded cable is used, the shield must be connected to ground, and A and B must each have their own conductor.

3   A command has been used which the Module does not recognise or has been unable to execute. This may for instance be the case if an attempt to activate output 9 has been made, as only 8 outputs are available.

4   Time-out error. The Module has not sent a response within the allowed time interval.
    This may be due to incorrect specification of a Module address.

4.1 Electrical Specifications

|	Min.	Typ.	Max.	Unit
Power Supply:				
Supply Voltage	12		35	V DC
Power Consumption		1.6	-	W
Interface :				
Communication Rate		50		kbit/s
Communication Distance	-		100	m
User Inputs:				
Input Impedance	3.2		3.6	kOhm
Logic "0"	-		3.8	V DC
Logic "1"	4.5		-	V DC
Logic "0"	-		1.0	mA DC
Logic "1"	2.0		-	mA DC
User Outputs :				
Voltage Supply	6		28	V DC
Current Load per Output			500	mA DC
Analogue Output (*):				
Resolution	-		12	Bit
Output Voltage (1)	0		10	V DC
Output Current (2)	0		20	mA DC
Output Current (3)	4		20	mA DC
Offset Error	-	±½	±½	LSB
Gain Error	-	±¼	-	LSB
Temperature Drift @ 0-50°C	-		100	ppm
Diverse :				
Operating Temperature	0		50	°C

*   Only IOM11A includes an analogue output.
   The data given for the analogue output is only valid if the Module is supplied with minimum 20V at the termi-
   nals P+ and P-.

2   Jumpers placed in position 0-10V
3   Jumpers placed in position 0-20mA
4   Jumpers placed in position 4-20mA

4.2 Physical Dimensions
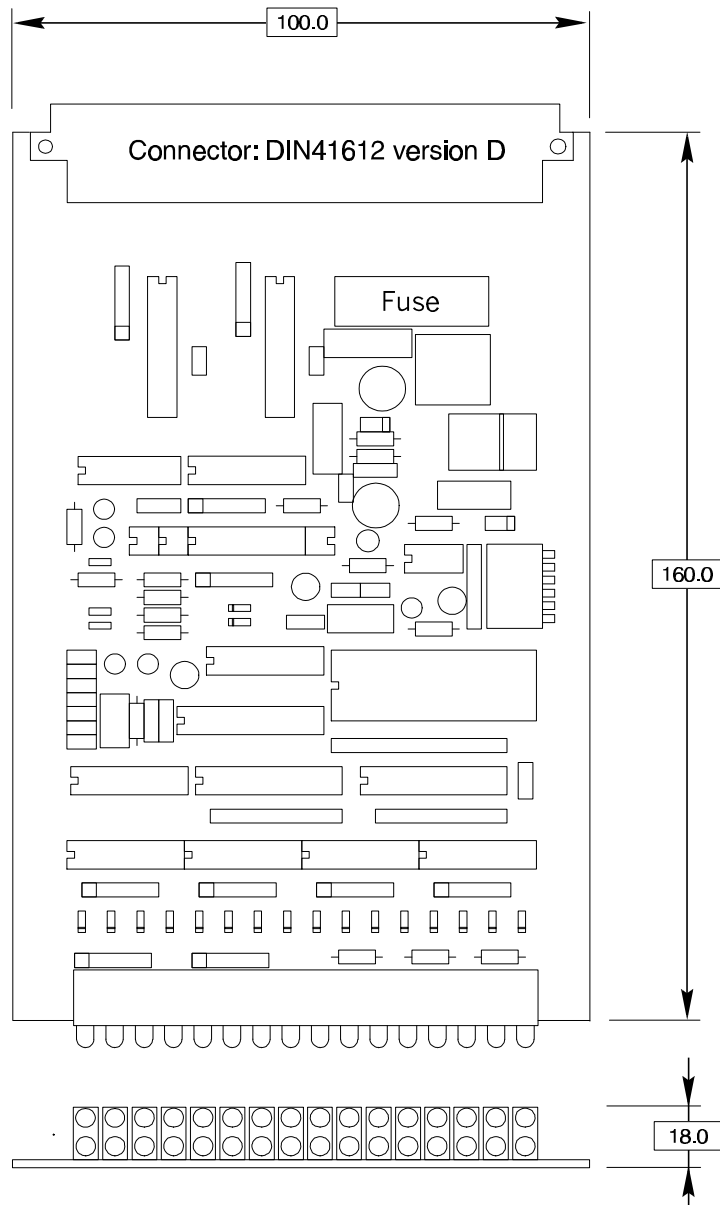
If IOM11 is mounted in a closed cabinet, it must, depending on the load on the outputs, be cooled in some way. IOM11 is however protected against over-heating. A built-in thermal fuse will disconnect the output stages if the temperature exceeds approximately 90°C.