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D1-30 Operating Manual

1 Installation

1.1 Checking the box

Before installation, verify that the package contents is in compliance with orders.

Inside the package are:

- 1 D1-30 module
- 1 instruction manual

Make sure that the model number corresponds to the ordered code and the manual edition

The D1 series modules are covered by a 2 years warranty except for damages caused by bad handling or incorrect wiring.

For the date of purchase see the authentic label on the back of the modules.

1.2 Dimensions

The size of the D1-30 modules are shown in figure 1.1.

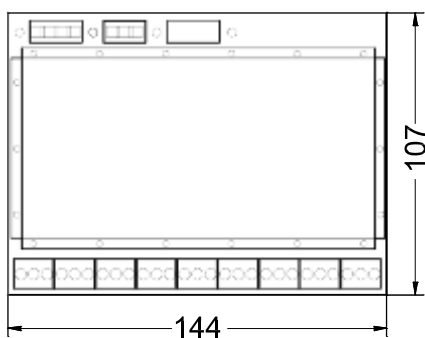


Figure 1.1 - Dimensions of the D1-30 module

1.3 General

All products of the D1 series are equipped with a plastic environment for a robust and easy mounting on standard DIN EN rail and by a shielding screen-printed.

On the cover there are mounting indications in schematic:

In the gray areas are shown the interface circuits inside the module,

in the yellow areas are shown the sensors and actuators to be connected externally.

The cover serigraph provides only a general wiring diagram and cannot show all the possible connection cases: It is therefore necessary, before activating the module, read this manual carefully.

Do not exert excessive pressure on the cover fixing and and remove the module from the rail. Remember to do these operations with power off.

1.4 Description of the physical form

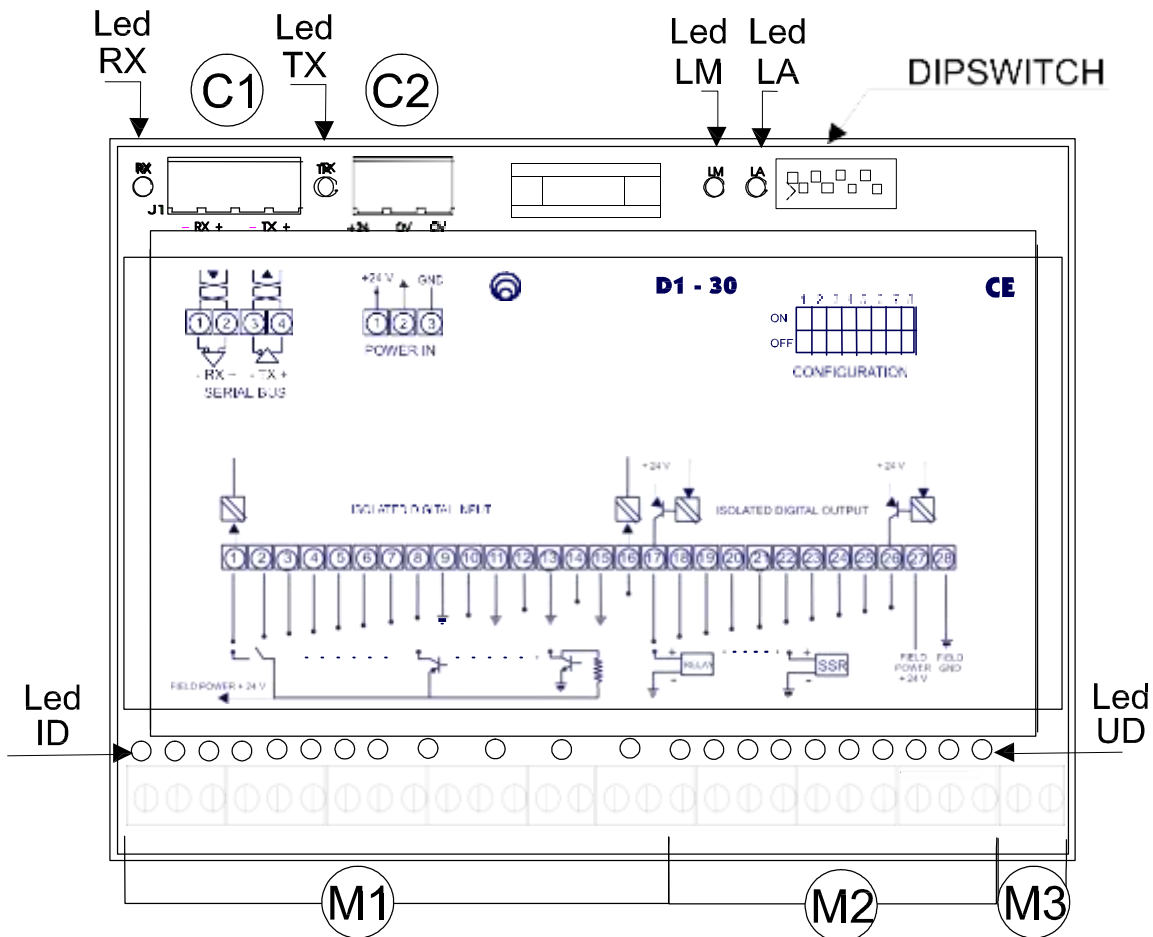


Figure 1.2 – D1-30 Schematic

Description

[C1] Connector for RS422/485
 [C2] +24 VDC power supply connector
 [M1] digital input terminal
 [M2] terminal power outputs
 DIPSW dipswitch address for selection of the device and the communication protocol (MODBUS ASCHI or RTU)

Led LA : led poweron
 Led LM LED diagnostics
 Led TX TX Transmitted data
 Led LRX RX Received data
 LED ID LED physical inputs
 Led UD LED physical outputs

[M1] [M2] [M3] - Input and output screws

DIGITAL INPUT		
1	Digital input	1
2	Digital input	2
3	Digital input	3
4	Digital input	4
5	Digital input	5
6	Digital input	6
7	Digital input	7
8	Digital input	8
10	Digital input	9
12	Digital input	10
14	Digital input	11
16	Digital input	12

DIGITAL OUTPUT	
17	Digital output 1
18	Digital output 2
19	Digital output 3
20	Digital output 4
21	Digital output 5
22	Digital output 6
23	Digital output 7
24	Digital output 8
25	Digital output 9
26	Digital output 10

FIELD POWER	
27	+24 VDC Power
28	Field ground

WARNING!

Terminals 9, 11, 13, 15 are grounded - do not connect an input signal!

[C1] – Serial connection

	RS422		RS485
1	RX-	1	N.C.
2	RX+	2	N.C.
3	TX-	3	TX-/RX-
4	TX+	4	TX+/RX+

[C2] - Power

	ALIM
1	+24 Vcc
2	FIELD GND
3	MECH. GND

1.5 Supply

The module must be powered with a DC power supply 24 VDC ($18V < V_{cc} < 36V$) through the connector [C2] and absorb a maximum current $I_{cc} = 75 \text{ mA}$ at 24 VDC.

The negative power supply must be connected to pin 2 of [C2].
After supplying the power, verify that the LED is turned on LA.

1.6 Digital Inputs

There are 12 optically isolated digital inputs (24 VDC).

Connect the wires "positive" from the sensors to the terminals of the terminal [M1] according to the scheme described in section 1.4. Connect the wires "negative" from the sensors to terminal No. 28 (FIELD GND) terminal of [M3].

Thresholds.

The state is OFF for input voltages between 0 and 4 Vdc,

The state is ON for voltages between 15 and 30 Vdc.

To filter repeated disturbances of less than 100 ms, the changement of state of an input filter is supported by a digital filter up and down counter. The minimum duration of the signal for the detection of the state is 100 ms (in the absence of disturbances). The processing time of all inputs is about 100 ms.

1.7 Digital Outputs

There are 10 optically isolated digital outputs, +24 V PNP transistor "open collector", with diode suppression and maximum output current of 100 mA per channel (I_{max}). They can be used to activate relays, SSR, actuators relays.

Connect the wires "positive" from the actuators to terminals [M2] according to the scheme described in section 1.4. Connect the wires "negative" from the actuators to terminal No. 28 (FIELD GND) terminal [M3]. Connect to terminal No. 27 to a +24 VDC voltage to power the outputs.

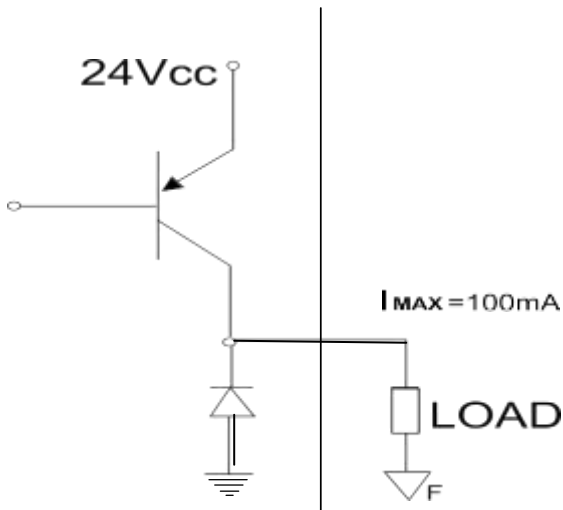


Figure 1.3 - Digital Outputs

1.8 Serial communication

1.8.1 Serial Connection

To connect to modules D1 is necessary to use the serial interface RS422/485 that usually are not standard equipment in personal computers. An alternative to using internal serial cards you can use external serial interface converters. (Ex.) C1-25. See manual of C1-25 converter for simplicity

C1-25			D1-30	
N°	RS-422		RS-422	N°
1	GND	↔	GND	2 C2
2	RX-	↔	TX-	3 C1
3	RX+	↔	TX+	4 C1
4	TX-	↔	RX-	1 C1
5	TX+	↔	RX+	2 C1
6	0 V			
7	+24 V			

C1-25			D1-30	
N°	RS-485		RS-485	N°
1	GND	↔	GND	2 C2
2	n.c.		n.c.	1 C1
3	n.c.		n.c.	2 C1
4	TX-/RX-	↔	TX-/RX-	3 C1
5	TX+/RX+	↔	TX+/RX+	4 C1
6	0 V			
7	+24 V			

Table 1.1.
Table 1.1 - Connection C1-25 - D1-30 (RS 422/485)

The D1-30 modules are supplied with configurable RS422/485 serial interface, typically configured as RS485. To change the configuration, simply remove the protective cover and move the jumper at the top left

1.8.2 Communication Protocol

The communication protocol software is realized according to the standard Modbus ASCII or RTU: protocol Selection is via the selectors # 4 of dipswitch (RTU = ON, ASCII = OFF).

The baud rate is set at 19200 and can not be changed after purchase. To get a configuration with baud rate to 9600, you must specify that when ordering.

ASCII protocol

Baud rate 19200 (Option 9600)

7 data bits

Even parity bit

1 stop bit

RTU protocol features

Baud rate 19200 (Option 9600)

8 data bits

NO parity bit

1 stop bit

NOTES

At power on, the device waits 4 seconds before you communicate.

1.8.3 Identification

The device can be assigned an identification address between 1 and 15, specified according to the binary notation, using selector from 5 to 8 of dipswitch (table 1.2).

				Address				
	1	2	3	4	5	6	7	8
				PROT.	2^3	2^2	2^1	2^0
ON				RTU				
OFF	X	X	X	ASCII				

Table 1.2 - configuration using dipswitch

NOTES

The address 0 is reserved.

Selectors No. 1, 2, 3 must be kept in the OFF position.

1.8.4 Cable Connection

Use a shielded cable (RS-485) or two (RS-422) twisted pairs of conductors in compliance with EIA RS-485, EIA RS-422, using the shield for the mass.

Type recommended cable for long distances (over 500 m.) Belden 9841 (RS-485), 9842 (RS-422)

Maximum line attenuation: 6 dB

Maximum line: 100 nf

Maximum length: 1200 m
 Line Impedance: 100 to 120 ohms

1.9 Earth wiring and shielding

For best performance it is advisable to observe the following rules:

- Mechanical ground (pin No. 3 connector [C2]) must be connected directly to earth;
- The negative power supply (connector pin # 2 [C2]) is connected to a local earth.

2 Operation

2.1 Application

The D1-30 provides 12 digital input channels and 10 digital output channels, each channel has an associated LED status indicator ON / OFF.

The particular filtering technique used here will recognize the state of each input signal in the presence of numerous electrical disturbances, the state of each input is made available through the 12-port digital read-only : DI1 DI12.

The state of ON / OFF of the 10 output channels is controlled by the 10-port digital .. DO1 DO10. At power-on the outputs assume the security configuration corresponding to the state "0" of the 10 output-ports. This configuration is maintained until the status of the digital ports is not updated.

The door "Restart number" is only for diagnostic use and provides an indication of the presence of electrical noise.

A : List of Ports (TAGS)

.1 (Holding Registers)

adress	Description	ID	Byte	Limits	R/W
00	Restart Number	Rs	1	0: 255	R/W
01	Reserved	-	-	-	-
02	Reserved	-	-	-	-
03	Output state	DO	2	0: 65535	R/W

.2 (Coils)

adress	Description	ID	R/W
00	Digital Output 1	DO1	R/W
01	Digital Output 2	DO2	R/W
02	Digital Output 3	DO3	R/W
03	Digital Output 4	DO4	R/W
04	Digital Output 5	DO5	R/W
05	Digital Output 6	DO6	R/W
06	Digital Output 7	DO7	R/W
07	Digital Output 8	DO8	R/W
08	Digital Output 9	DO9	R/W

09	Digital Output 10	DO10	R/W
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.3 (Input Status)

Indirizzo	description	ID	R/W
00	Digital input 1	DI1	R
01	Digital input 2	DI2	R
02	Digital input 3	DI3	R
03	Digital input 4	DI4	R
04	Digital input 5	DI5	R
05	Digital input 6	DI6	R
06	Digital input 7	DI7	R
07	Digital input 8	DI8	R
08	Digital input 9	DI9	R
09	Digital input 10	DI10	R
10	Digital input 11	DI11	R
11	Digital input 12	DI12	R

Modbus functions supported:

- 1) **Function 1:** read coils. Simple query (see table). Multiple query : from address 0 to address 9 (max. depth 10 inputs)
- 2) **Function 2:** read discrete inputs. Simple query (see table). Multiple query : from address 0 to address 12, max depth: 12 inputs.
- 3) **Function 5:** write single coil (see table)
- 4) **Function 15:** write multiple coils. Simple query , depth 1 (see table). Multiple query : max depth 8 (ie addresses 0 to 7) . All 10 outputs cannot be written in a single multiple command.
- 5) **Function 3:** read holding registers . At address 3 reads in 16 bits (2 bytes) the state of the digital outputs. The function is equivalent to the function 1 when used in multiple mode.

Query response time: 70: 85 msec. for each function in simple and multiple mode.