

• 16B0231B1 •
DCREG

DCREG INTERFACE VIA DEVICENET

Update 27/09/06 R.00
Version D4.02

English

- This manual is an integral and essential part of the product. Carefully read the instructions contained herein as they provide important hints for use and maintenance safety.
- This product shall be used only for the purposes it is aimed at. Any other use is to be considered as improper and dangerous. The manufacturer is not responsible for any possible damage caused by improper, erroneous and irrational applications.
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1 COMMUNICATION FEATURES

This manual describes how to interface a DCREG (slave) converter with an intelligent outside control unit (master) via Devicenet.

In order to create this interface, an optional module must be installed on the DCREG (see Module description).

The converter thus becomes a slave node from which a Devicenet master can read and on which it can write. The DCREG will never start a communication towards other nodes, but will only answer incoming commands.

Via Devicenet you can:

- read the parameters mentioned in the following From Master to DCREG
- write the parameters mentioned in the following From DCREG to Master

1.1 EDS File

Each device in a Devicenet network is associated with an Electronic Data Sheet (EDS), containing all the information needed about the device. This file is used by the network configuration program during configuration of the network.

Contact Elettronica Santerno directly to get the most recent version of the EDS file.

2 DEVICENET FIELDBUS COMMUNICATIONS BOARD

The Devicenet communications board allows to interface a DCREG with an external control unit through a communications interface using a CAN protocol of the Devicenet 2.0 type. The baud rate and the MAC ID can be set through the on-board dip-switches.

Max. 512 bytes for input/output data are available; some of them are used for the interfacing with the DCREG.

2.1 Main Features

- Baud Rate: 125, 250, 500 kbits/s
- DIP switch for baud rate and MAC ID selection
- Optically isolated Devicenet interface
- Max. 512 bytes for input & output data
- Max. 2048 bytes for input & output data through mailbox
- Devicenet Specification version: Vol 1: 2.0, Vol 2: 2.0
- Configuration test version: A-12

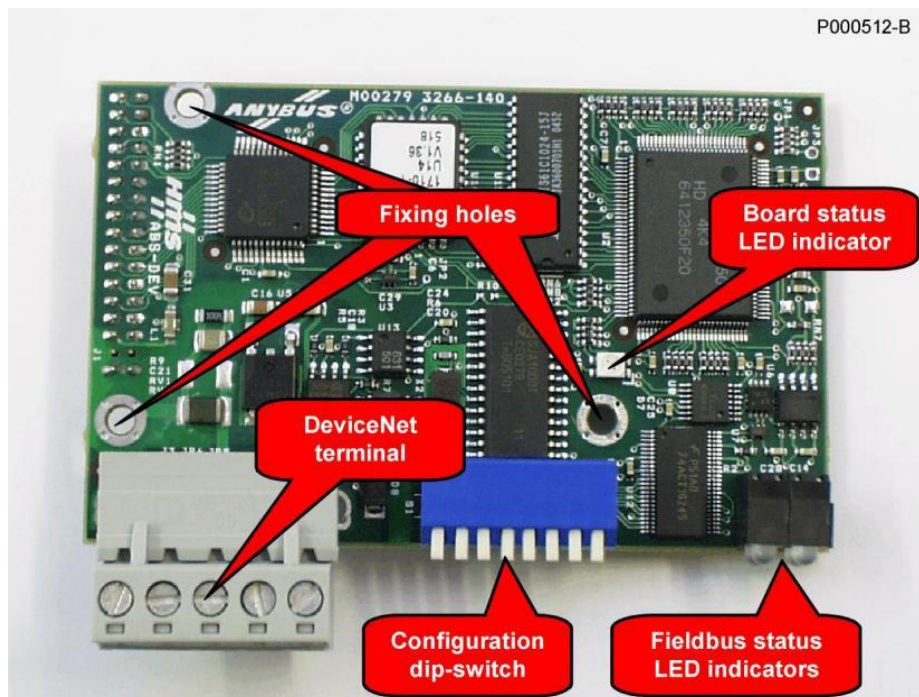


Figure 1: Devicenet Fieldbus communications board

2.2 Devicenet Fieldbus Terminals

The Devicenet Fieldbus communications board is provided with a removable, screwable terminal board (pitch 5.08). The bus interface circuitry has an external supply of 24VDC $\pm 10\%$, as prescribed from the CAN Devicenet specifications.

Terminal arrangement as stated in the table:

N.	Name	Description
1	V-	Negative voltage for bus supply
2	CAN_L	CAN_L bus line
3	SHIELD	Cable shielding
4	CAN_H	CAN_H bus line
5	V+	Positive voltage for bus supply

2.3 Board Configuration

The on-board dip-switches allow to set the baud rate and the MAC ID identifying the device in the Devicenet network.

Dip-switches 1 and 2 allow to set the baud rate, that must be the same for all the related devices. The Devicenet standard allows three baud rates: 125, 250 and 500 kbits/s. Possible settings are the following:

Baudrate	Setting of sw.1 & sw.2	
125 kbits/s	sw.1=OFF	sw.2=OFF
250 kbits/s	sw.1=OFF	sw.2=ON
500 kbits/s	sw.1=ON	sw.2=OFF

The MAC ID can be set between 0 and 63 by entering the configuration of the binary number for six dip-switches, from sw.3 to sw.8. The most significant bit (MSB) is set through sw.3, while the least significant bit (LSB) is set through sw.8.

Some possible settings are shown in the table below:

MAC ID	sw.3 (MSB)	sw.4	sw.5	sw.6	sw.7	sw.8 (LSB)
0	OFF	OFF	OFF	OFF	OFF	OFF
1	OFF	OFF	OFF	OFF	OFF	ON
2	OFF	OFF	OFF	OFF	ON	OFF
3	OFF	OFF	OFF	OFF	ON	ON
.....
62	ON	ON	ON	ON	ON	OFF
63	ON	ON	ON	ON	ON	ON

If multiple devices are connected to the same bus, different MAC IDs are to be set.

2.4 Connection to the Fieldbus

The wiring quality is fundamental for the best reliability of the bus operation. The higher the baud rates, the shortest the bus lengths allowed.

Reliability is strongly affected by the type of wiring and the wire topology. The Devicenet standard allows four types of wires based on the type of related devices. It also allows to connect signal dispatching nodes, line terminators and supply couplers. Two types of lines are defined: the trunk line and the drop lines. Figure xx illustrates the topology of a typical Devicenet trunk line.

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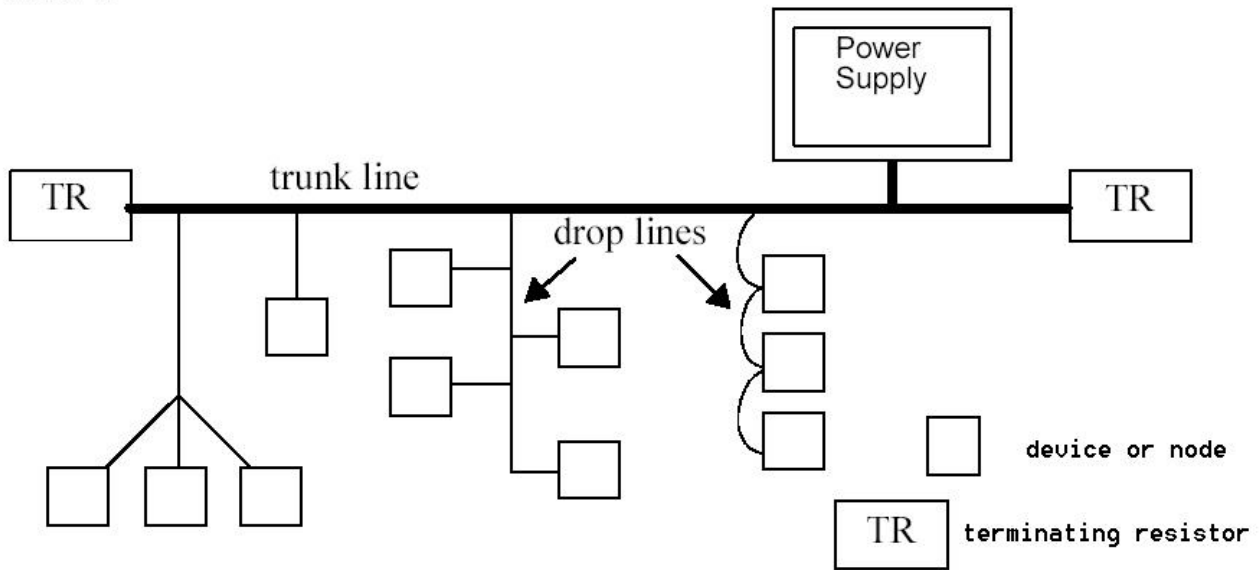


Figure 2: Outline of the topology of a Devicenet trunk line

The DCREG equipped with a Devicenet interface board is typically connected through a drop line consisting of a 5-conductor shielded cable. The Devicenet standard defines three shielded cables based on their diameter: THICK, MID, and THIN cables. The maximum electric length between two Devicenet devices depends on the baud rate and the type of cable being used.

The table below shows the maximum lengths that are recommended based on these variables. The FLAT cable can be used for the main trunk line if drop lines are connected through a system that does not require welding.

Baud Rate	Max. length with FLAT cable	Max. length with THICK cable	Max. length with MID cable	Max. length with THIN cable
125 kbits/s	420m	500m	300m	100m
250 kbits/s	200m	250m	250m	100m
500 kbits/s	75m	100m	100m	100m

**NOTE**

Each Devicenet trunk line must meet some geometric requirements and must provide two terminator nodes and at least one supply node, because devices can be totally or partially powered via the bus. The type of the cable being used also determines the max. supply current available for the bus devices.

For a more comprehensive overview of the Devicenet standard, go to ODVA's home page (<http://www.odva.org>).

**NOTE**

In particular, you can refer to the "Planning and Installation Manual - Devicenet™ Cable System" document at

http://www.odva.org/10_2/Cable_Manual/Cable_Guide/Cable_Guide_Print.pdf

**NOTE**

In case of failures or disturbance in the Devicenet communications, please fill in the "Devicenet Baseline & Test Report" form in the Appendix C of the "Planning and Installation Manual" before contacting the After-sales service.

2.5 Indications

The module is provided with four LEDs installed on its front part and with one LED assembled on the control board which is used for debugging operations.

2.5.1 FRONT LEDs

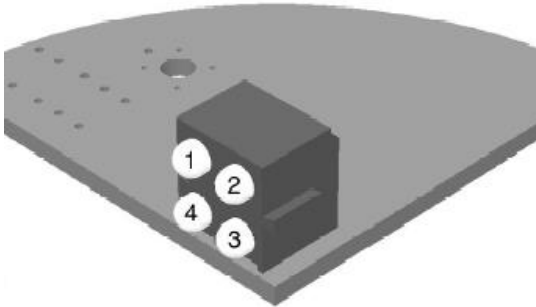


Figure 3: Indications LEDs

The LED functions are described in the table below:

LED	State	Description
1. Reserved		Reserved for future use
2. Network Status	Off Green, steady Green, flashing Red, steady Red, flashing	Off Not powered / Not online Link OK, On line, Connected On line, Not connected Critical link failure Connection timeout
3. Module Status	Off Green, steady Green, flashing Red, steady Red, flashing	No power to device Device operational Data size bigger than configured Unrecoverable fault Minor fault
4. Reserved		Reserved for future use

2.5.2 LED ON THE CONTROL BOARD

The LED located on the control board is a Watchdog LED indicating the state of the module according to the table below:

Colour	Frequency	Description
Red	–	Unspecified internal error, or module operating in bootloader mode.
	1 Hz	RAM fault
	2 Hz	ASIC or FLASH fault
	4 Hz	DPRAM fault
Green	2 Hz	Module not initialized
	1 Hz	Module initialized and operating

3 PARAMETER EXCHANGE

The following table shows the parameters of the DCREG exchanged via Devicenet.

In each of the following are listed:

- 1) the number and the name of the parameter,
- 2) its meaning,
- 3) its range,
- 4) its unit of measure (shown on the display),
- 5) the ratio between the value inside the DCREG (exchanged via Devicenet) and the physical value represented (as shown on the display).

NOTE: unless otherwise specified, each parameter is exchanged as integer with sign at 16 bit (between -32768 and +32767).

For further information on parameter configuration, refer to the "OPERATION MANUAL 15P0059B3 DCREG2 DCREG4" R.05 Software Vers. D4.01...

3.1 From Master to DCREG

1) Name	2) Meaning	3) Range	4) Unit of measure	5) Ratio
M016 FBRref	Speed / voltage reference from Devicenet	-100 ÷ +100	%	100 / 3FFFh
M019 AnOut1	Analog output 1 on terminal 8	-10 ÷ +10	V	10 / FFFh
M020 AnOut2	Analog output 2 on terminal 10	-10 ÷ +10	V	10 / FFFh
M022 MDO	Digital output state	00000xxx _b ÷ 11111xxx _b	Note A)	-
P050 Ilim1A	First current limit bridge A	0 ÷ 300	%	1
P051 Ilim1B	First current limit bridge B	0 ÷ 300	%	1
not used	-	-	-	-
M031 FBDigIn	Digital input state from Devicenet	00000000 _b ÷ 11111111 _b	Note B)	-

3.2 From DCREG to Master

1) Name	2) Meaning	3) Range	4) Unit of measure	5) Ratio
temp	-	-	Note C)	
M001 nFdbk	Speed / voltage feedback	-100 ÷ +100	%	-100 / 3FFFh
M004 Iarm	Armature current	-1.5DriveSize ÷ +1.5DriveSize	A	DriveSize / 2400
M006 Varm	Armature voltage	-1000 ÷ +1000	V	1
M010 AnIn1	Auxiliary analog input 1 at terminals 11 and 13	-100 ÷ +100	%	100 / 3FFFh
M011 AnIn2	Auxiliary analog input 2 at terminal 17	-100 ÷ +100	%	100 / 3FFFh
M012 AnIn3	Auxiliary analog input 3 at terminal 19	-100 ÷ +100	%	100 / 3FFFh
M026 EFreq	Encoder frequency	-102.4 ÷ +102.4	kHz	10 / 3FFFh

Note A)

Bit 3 → MDO5
Bit 4 → MDO1
Bit 5 → MDO2
Bit 6 → MDO3
Bit 7 → MDO4

Note B)

Bit 0 → ENABLE
Bit 1 → START
Bit 2 → MDI1
Bit 3 → MDI2
Bit 4 → MDI3
Bit 5 → MDI4
Bit 6 → MDI5
Bit 7 → MDI6

Note C)

The two 8-bit variables **AlarmNumber** and **Led** are mapped inside the variable **temp**. Its meaning is the following:

high part	low part
Led	AlarmNumber

AlarmNumber has the following meaning:

Drive OK if **AlarmNumber** = 0;
Alarm = **AlarmNumber** if **AlarmNumber** ≤ 33;
Warning = **AlarmNumber**-33 if **AlarmNumber** > 33.

Led indicates the state of the LEDs on the remotable keyboard with the following map:

Bit 0 → RUN
Bit 1 → FORWARD
Bit 2 → LOC SEQ
Bit 3 → BRAKE
Bit 4 → REF
Bit 5 → REVERSE
Bit 6 → LOC REM
Bit 7 → LIMIT

Note D)

DriveSize identifies the size of the armature circuit of DCREG within the range 10 ÷ 3500 A, as can be seen on the starting page of the remotable keyboard.

3.3 Alarm A028 Communication Interrupted

This alarm will trip if the DCREG does not receive any valid message via Devicenet within the timeout which can be set using parameter **C143 A028Delay**. This alarm can be inhibited using parameter **C159 A028Inhibit**.