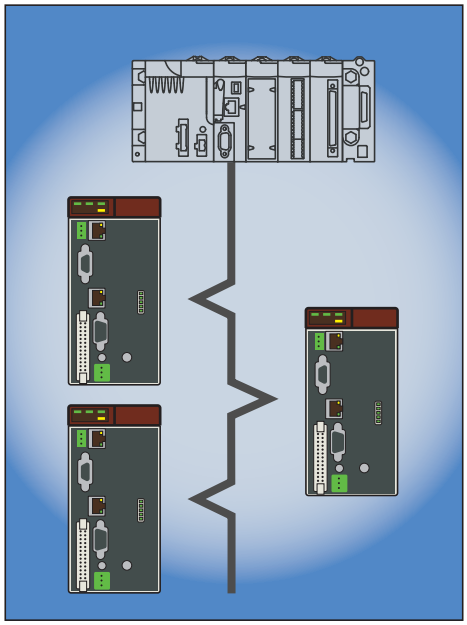
Lexium Controller

User's manual

Retain for future use

DeviceNet

LMC20A 1309



Schneider Electric

Contents

Important Information 4

Documentary structure 5

Introduction 6
- Presentation 6
- Notation 6

Quick start 7

Hardware setup 8
- Receipt 8
- Hardware description 8
- Coding the switches 9

Wiring to the network 10
- Cable routing practices 10
- Wiring the DeviceNet connector 10

Configuring 12
- Configuring 12
- Configuring the communication scanner 12

Configuring by a network tool 14
- Network tool 14
- Going online with RSNetWorx 14
- Creating an EDS file 14
- Configuring the DeviceNet scanner 15
- Editing objects of the Lexium Controller 19

Creating a PLC program 21
- Using I/O messaging 21
- Using explicit messaging 21

Diagnostics by the LMC HMI 22
- Checking the node address and the data rate 22
- Signalling LED 23
- Monitoring the communication scanner 24
- Troubleshooting the communication fault 24

DeviceNet objects 25
- Supported classes 25
- Identity object 26
- Message router object 29
- DeviceNet object 30
- Assembly object 31
- Connection object 33
- Acknowledge handler object 37
- Application objects 38
- DeviceNet interface object 40

NOTE

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The products described in this document may be changed or modified at any time, either from a technical point of view or in the way they are operated. Their description can in no way be considered contractual.

Important Information

NOTICE

Read these instructions carefully, and look at the equipment to become familiar with the device before trying to install, operate, or maintain it. The following special messages may appear throughout this documentation or on the equipment to warn of potential hazards or to call attention to information that clarifies or simplifies a procedure.

The addition of this symbol to a Danger or Warning safety label indicates that an electrical hazard exists, which will result in personnal injury if the instruction are not followed.

This is the safety alert symbol. It is used to alert you to potential personal injury hazards. Obey all safety messages that follow this symbol to avoid possible injury or death.

⚠ DANGER

DANGER indicates an imminently hazardous situation, which, if not avoided, **will result** in death, serious injury, or equipment damage.

⚠ WARNING

Warning indicates a potentially hazardous situation, which, if not avoided, **can result** in death, serious injury, or equipment damage.

⚠ CAUTION

CAUTION indicates a potentially hazardous situation, which, if not avoided, **can result** in injury or equipment damage.

PLEASE NOTE

Electrical equipment should be serviced only by qualified personnel. No responsibility is assumed by Schneider Electric for any consequences arising out of the use of this material. This document is not intended as an instruction manual for untrained persons.

Documentary structure

Installation manual

This manual describes:
- controller installation,
- controller connection.

Optional graphic terminal user manual

This manual describes:
- graphic terminal installation,
- graphic terminal connection,
- controller programming by graphic terminal.

Easy Motion - Programming manual

Delivered pre-installed in Lexium Controller motion controllers, the application model associated with Easy Motion mode is an ergonomic tool enabling:
- fast configuration of axes,
- use of Manual/Automatic mode,
- creation of positioning tasks,
- editing of cam profiles,
- backup and restore of machine parameters,
- diagnostics of the motion controller and its different axes.

This Programming manual also comprises the table of the parameters accessible by the communications protocols.

Motion Pro - Programming manual

The Motion Pro programming manual is included in software online help.
This online help describes:
- software ergonomics,
- IEC 1131 programming,
- function libraries (standard functions, motion control functions, application functions),
- Lexium controller configuration screens.

Modbus, Ethernet, Profibus DP and DeviceNet manuals

These manuals describe:
- connection to bus or network,
- diagnostics,
- software installation,
- protocol communication services

Introduction

Presentation

The DeviceNet communication bus is used to connect a Lexium Controller to a DeviceNet network.

The communication interface has an open-style 5-pin connector for connection to the network.

Data exchanges give access to all Lexium Controller:
- Command,
- Monitoring,
- Diagnostics.

DeviceNet cables and connecting accessories must be ordered separately.

Notation

Formats

Hexadecimal values are written as follows: 16#
Binary values are written as follows: 2#

Vocabulary

Depending on DeviceNet document and tools, equivalent wordings are used. The table below shows vocabulary used in the present document and other corresponding definitions.

In this document	**Other**	Comments
Node address	DeviceNet address, MAC ID	
Data rate	Baud rate	
kbit/s	kBPS, kbps, k	
Setpoint	Reference, target	
Path	Object Address	Class, instance, attribute

The reader should avoid mixing two terms:
- DeviceNet scanner, which is the master device on the DeviceNet network.
- Communication scanner, which is a function inside the Lexium Controller.

Abbreviations

Req. = Required
Opt. = Optional

Quick start

This section is provided to help experienced users quickly start using the DeviceNet interface. If you are unsure how to complete a step, refer to the referenced chapter.

Step		Refer to
1	**Review the safety precautions for the Lexium Controller.**	Installation manual
2	**Verify that the Lexium Controller is properly installed.**	Installation manual
3	**Install the Lexium Controller**	Installation manual
4	**Verify that the Lexium Controller is not powered.**	Hardware setup
5	**Commission the DeviceNet interface.** Set an unique node address and the appropriate data rate using the switches on the interface. If desired, you can disable the switches and use parameter settings instead.	Hardware setup
6	**Connect the Lexium Controller to the DeviceNet network.** Verify that the Lexium Controller is not powered. Then, connect the interface to the network using a DeviceNet cable.	Wiring to the network
7	**Apply power to the Lexium Controller.** The status indicator should be green.If it flashes red, there is a problem (refer to Signaling LED).	Diagnostics by the LMC HMI
8	Check with Motion Pro / CoDeSys by using the Browser the information coming from the DeviceNet module.	
9	**Apply power to the DeviceNet master and other devices on the network.** Verify that the master and network are installed and functioning in accordance with DeviceNet standards, and then apply power to them.	DeviceNet master manuals (DeviceNet cable system planning and Installation manual ...)
10	**Configure the scanner to communicate with the Lexium Controller.** Use a network tool such as RSNetWorx for DeviceNet to configure the scanner on the network. Make sure to: ❑ Set up the scan list, ❑ Map the Lexium Controller data to the scan list, ❑ Save your DeviceNet configuration to the scanner in a file.	Configuring the DeviceNet scanner
11	**Create a PLC program** ❑ Control the Lexium Controller using I/O (assemblies). ❑ Monitor or configure the Lexium Controller using Explicit Messages.	Creating a PLC program DeviceNet master manuals

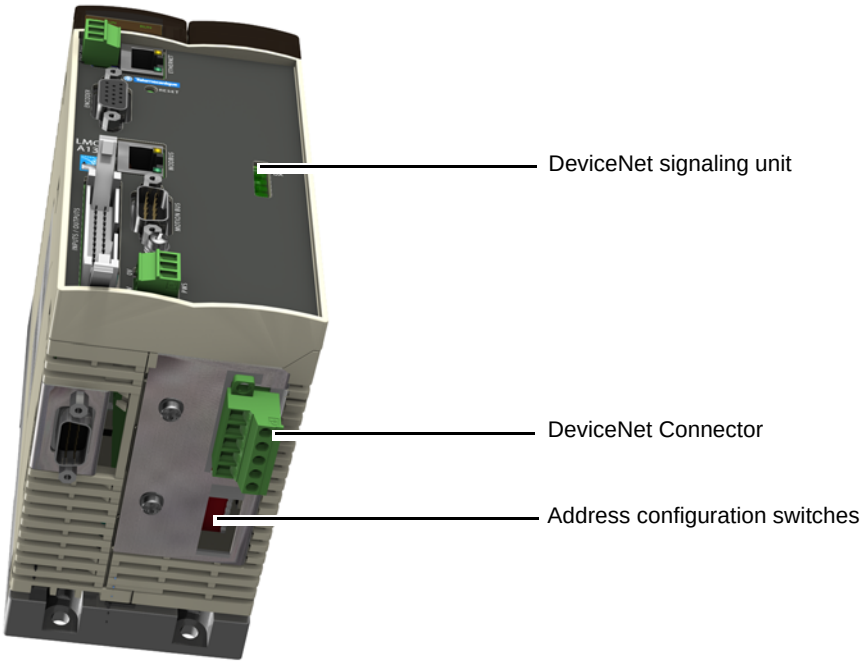
Hardware setup

Receipt

- Check that the Lexium Controller reference printed on the label is the same as that on the delivery note corresponding to the purchase order.
- Remove the Lexium Controller from its packaging and check that it has not been damaged in transit.

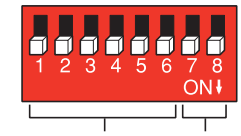
⚠ CAUTION
DAMAGED EQUIPMENT Do not install or operate any Lexium Controller that appears damaged. **Failure to follow this instruction can result in equipment damage.**

Hardware description



Coding the switches

Switches description



high = OFF = 0
low = ON = 1

Overriding the switches

When switches 7 and 8 are set in position low (ON = 1), the data rate and the node address of the Lexium Controller must be set by a network tool (refer to Configuring by a network tool). Default values are 125 kbit/s and node address 63.

Coding the data rate

All devices connected to the DeviceNet network must communicate at the same data rate: 125, 250, or 500 kbit/s. The table below shows the switch settings that configure the DeviceNet data rate on the Lexium Controller.

Switch 7	Switch 8	Data rate
0	0	125 kbit/s
0	1	250 kbit/s
1	0	500 kbit/s
1	1	The DeviceNet data rate and the node address of the Lexium Controller must be set by a network tool.

Any change to the switch setting takes effect at the next power-up.

Coding the node address

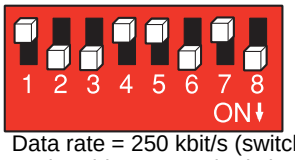
All devices connected to the DeviceNet network must have an unique address, ranging from 0 to 63 (decimal).

If the data rate switches (7 and 8) are both set to 1 (on), the switches 1 to 6 are ignored and the node address must be set by a network tool (default value = 63).

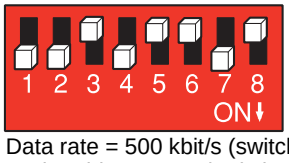
The table below lists the switch setting for each valid node address. Any change to the switch setting takes effect at the next power-up.

Node address	Switches 12 3456	Node address	Switches 12 3456	Node address	Switches 12 3456	Node address	Switches 12 3456
0	00 0000	16	01 0000	32	10 0000	48	11 0000
1	00 0001	17	01 0001	33	10 0001	49	11 0001
2	00 0010	18	01 0010	34	10 0010	50	11 0010
3	00 0011	19	01 0011	35	10 0011	51	11 0011
4	00 0100	20	01 0100	36	10 0100	52	11 0100
5	00 0101	21	01 0101	37	10 0101	53	11 0101
6	00 0110	22	01 0110	38	10 0110	54	11 0110
7	00 0111	23	01 0111	39	10 0111	55	11 0111
8	00 1000	24	01 1000	40	10 1000	56	11 1000
9	00 1001	25	01 1001	41	10 1001	57	11 1001
10	00 1010	26	01 1010	42	10 1010	58	11 1010
11	00 1011	27	01 1011	43	10 1011	59	11 1011
12	00 1100	28	01 1100	44	10 1100	60	11 1100
13	00 1101	29	01 1101	45	10 1101	61	11 1101
14	00 1110	30	01 1110	46	10 1110	62	11 1110
15	00 1111	31	01 1111	47	10 1111	63	11 1111

Examples



Data rate = 250 kbit/s (switches 7 and 8 = 2#01)
Node address = 25 (switches 1 to 6 = 2#01 1001)



Data rate = 500 kbit/s (switches 7 and 8 = 2#10)
Node address = 52 (switches 1 to 6 = 2#11 0100)

Wiring to the network

Cable routing practices

When wiring Lexium Controller to a DeviceNet network, follow all wiring practices required by national and local electrical codes. Also observe the following guidelines:
- Avoid areas of high temperature, moisture, vibration, or other mechanical stress.
- Secure the cable where necessary to prevent its weight and the weight of other cables from pulling or twisting the cable.
- Use cable ducts, raceways, or other structures to protect the cable. Use these structures for signal wiring paths. They must not contain power wiring.
- Avoid sources of electrical interference that can induce noise into the cable. Use the maximum practicable separation from such sources.

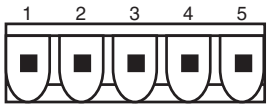
When planning cable routing within a building, follow these guidelines:
- Maintain a minimum separation of 1 m from the following equipment:
  - air conditioners and large blowers,
  - elevators and escalators,
  - radios and televisions,
  - intercom and security systems,
  - fluorescent, incandescent, and neon lighting fixtures.

- Maintain a minimum separation of 3 m from the following equipment:
  - line and motor power wiring,
  - transformers,
  - generators,
  - alternators.

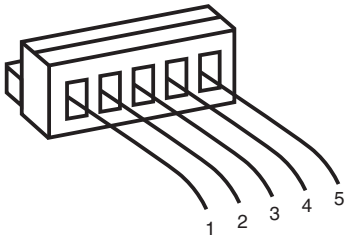
When wiring in electrical equipment rooms or large electrical equipment line-ups, observe the following guidelines for cable segregation and separation of circuits:
- Use metallic conduit for Lexium Controller wiring. Do not run control network and power wiring in the same conduit.
- Separate non-metallic conduits or cable trays used to carry power wiring from metallic conduit carrying low-level control network wiring by at least 300 mm.
- Separate metallic conduits carrying power wiring or low-level control network wiring by at least 80 mm.
- Cross the metallic conduits and non-metallic conduits at right angles whenever power and control network wiring cross.
- Attenuate conducted emissions from the Lexium Controller to the line in some installations to prevent interference with telecommunication, radio, and sensitive electronic equipment. Such instances may require attenuating filters. Consult the Lexium Controller catalog for selection and application of these filters.

Wiring the DeviceNet connector

The figures and the table below show the pin-outs of the Lexium Controller connectors. The removable DeviceNet female connector attaches to the network cable.



DeviceNet male connector



Removable DeviceNet female connector

Pin	Name	Color
1	GND	Black
2	CAN_L	Blue
3	SHIELD	Bare
4	CAN_H	White
5	V+	Red

Line termination: If the Lexium Controller is the first or the last device on the DeviceNet network, a line terminator (121 Ω resistor) must be wired on the removable DeviceNet female connector, between pins 2 and 4 (CAN_L and CAN_H).

Wiring to the network

The ODVA standards (Release 2.0) specify 7 types of cables for use in DeviceNet networks:
- Thick cable
- Thin cable
- Flat cable
- Cable I
- Cable II
- Cable IV
- Cable V

The table below lists main specifications of cables. For more information, refer to the ODVA specifications.

Type of cable	Data conductor pair size	Power conductor pair size	Data impedance
Thick cable	18 AWG	15 AWG	120 Ω +/- 10 % (at 1 MHz)
Thin cable	24 AWG	22 AWG	120 Ω +/- 10 % (at 1 MHz)
Flat cable	16 AWG	16 AWG	120 Ω +/- 10 % (at 500 kHz)
Cable I	24 AWG	22 AWG	120 Ω +/- 10 % (at 1 MHz)
Cable II	18 AWG	15 AWG	120 Ω +/- 10 % (at 1 MHz)
Cable IV	18 AWG	16 AWG	120 Ω +/- 10 % (at 500 kHz)
Cable V	18 AWG	16 AWG	120 Ω +/- 10 % (at 500 kHz)

The maximum permissible length of the network cable depends on the data rate and the type of cable.

Type of cable	Data rate		
	125 kbit/s	250 kbit/s	500 kbit/s
Thick cable	500 m (1640 ft)	250 m (820 ft)	100 m (328 ft)
Thin cable	100 m (328 ft)	100 m (328 ft)	100 m (328 ft)
Flat cable	420 m (1378 ft)	200 m (656 ft)	75 m (246 ft)
Cable I	100 m (328 ft)	100 m (328 ft)	100 m (328 ft)
Cable II	500 m (1640 ft)	250 m (820 ft)	100 m (328 ft)
Cable IV	-	-	-
Cable V	420 m (1378 ft)	200 m (656 ft)	75 m (246 ft)

For maximum length of the drops refer to table, whatever type of cable:

Data rate	Cumulative drop	Maximum drop
125 kbit/s	156 m (516 ft)	6 m (20 ft)
250 kbit/s	78 m (256 ft)	6 m (20 ft)
500 kbit/s	39 m (128 ft)	6 m (20 ft)

Configuring

Principle

Numerous configurations are possible. For more information, refer to the Programming manual.
The following configurations are some of the possibilities available.

DeviceNet communication Network interface is used to connect a LMC20A1309 Controller on a DeviceNet Network. Data can be exchanged to manage all of the Lexium Controller functionality.
The DeviceNet interface is a DeviceNet node slave.

- %MW access
- Monitoring,
- diagnostic

❑ Control with communication scanner

To monitor and control the LMC20A1309 Controller, it is relevant to exchange cyclic data with the default assemblies (100, 101). These assembly's can be used to exchange data between an external DeviceNet Master PLC and the LMC20A1309

Available configurations

❑ The assemblies available are:

- 100: Communication scanner output.
- 101: Communication scanner input.

The examples below are only possible if you use the communication scanner.

Configuring the communication scanner

Please refer to this section if using the assemblies 100 or 101.

The variables exchanged by the output assembly 100 and input assembly 101 are discribed in Motion Pro / CoDeSys software.

The 4 output variables of the assembly 100 are assigned by means of the 4 parameters.

The 4 input variables of the assembly 101 are assigned by means of the 4 parameters

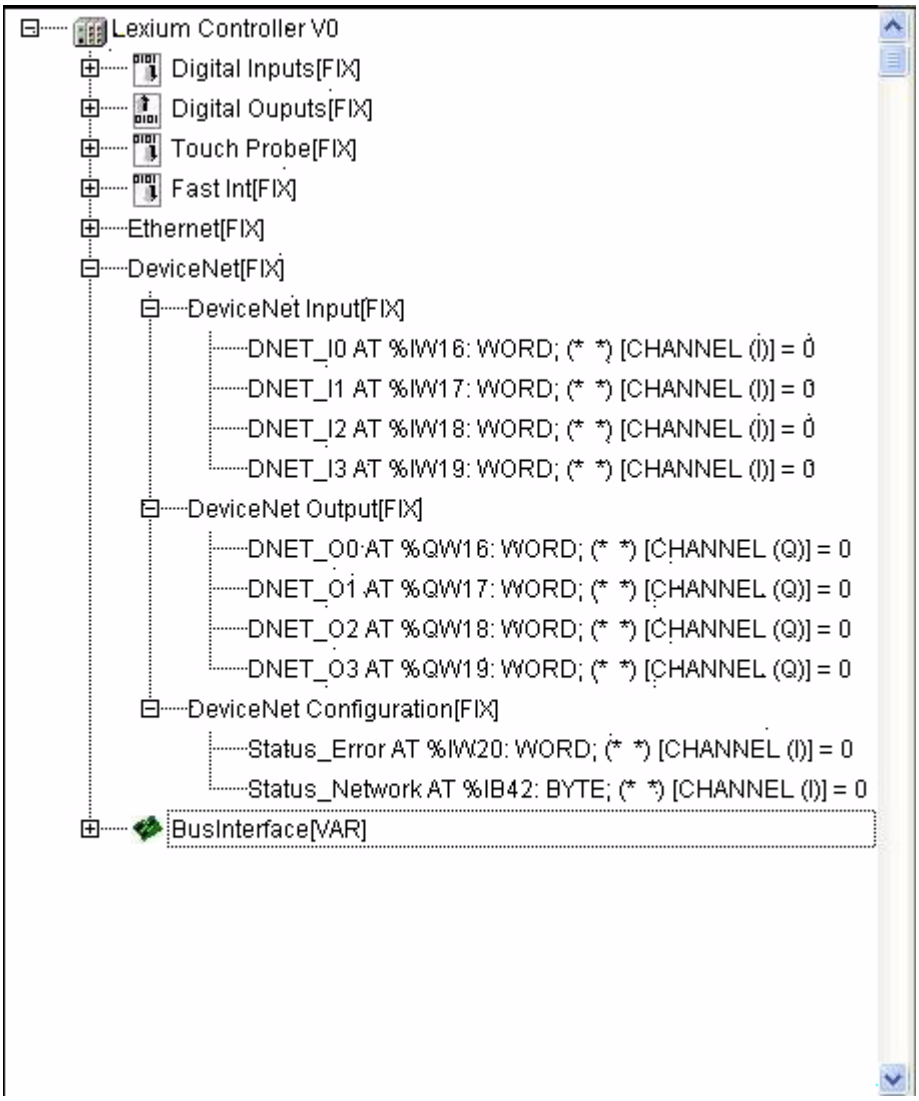
These 8 assignment parameters are described in the tables below:

Parameter name	Output assembly 100	Default assignment
[DNET-I0]	%IW16	Word
[DNET-I1]	%IW17	Word
[DNET-I2]	%IW18	Word
[DNET-I3]	%IW19	Word

Parameter name	Input assembly 101	Default assignment
[DNET-O0]	%QW16	Word
[DNET-O1]	%QW17	Word
[DNET-O2]	%QW18	Word
[DNET-O3]	%QW19	Word

Configuring

It is possible to read the DeviceNet configuration under Motion Pro / CoDeSys. The tree of the parameters are given.



Configuring by a network tool

Network tool

RSNetWorx for DeviceNet is a Rockwell® software application that can be used to set up DeviceNet networks and configure connected devices.

RSNetWorx for DeviceNet (version 2.22.18) is used for examples in this manual. Different versions of software may differ in appearance and procedures.

Proper EDS file (LMC20A_E.eds) and icone (LMC20.ico) for LMC20A1309 controller are distributed on the CD-ROM delivered with each LMC20A1309. They are also available on the Internet : www.schneider-electric.com

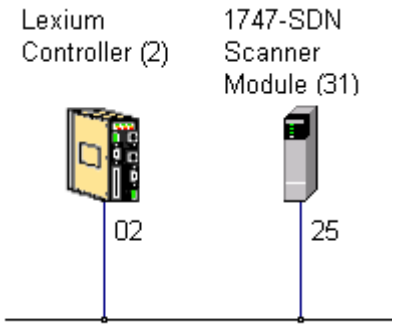
Going online with RSNetWorx

You can view the devices on a DeviceNet network by going online. A device may appear as an unrecognised device if RSNetWorx does not have an EDS file for it.

1 After setting up a Lexium Controller in RSLinx, start RSNetWorx for DeviceNet.

2 Select **Network > Online**. If the Browse for Network dialog box appears, RSLinx has multiple Lexium Controller configured. Select your DeviceNet network, and click **OK**. A prompt appears.

3 Click **OK** to go online. The devices on the network appear in the Configuration View. You can select Graph, Spreadsheet, or Master/Slave views. The figure below shows an example network in a Graph view.



Creating an EDS file

If the adapter and Lexium Controller appear as an unrecognized device, create an EDS file for it.

1 Right-click the "Unrecognized Device" icon, and select **Register Device** in the menu. The EDS Wizard appears.

2 Click **Next** to display the next step.

3 Select **Upload EDS**, and then click **Next**.

4 Type a description (if desired), and then click **Next**.

5 Under Polled, select **Enabled**, type **4** in the Input Size and Output Size boxes, and then click **Next**. RSNetWorx will upload the EDS file from the deviceNet interface.

6 Click **Next** to display the icon options for the node. We recommend that you use the icon for your product. You can change icons by clicking **Change icon**.
Proper EDS file (LMC20A_E.eds) and icone (LMC20.ico) for LMC20A1309 controller are distributed on the CD-ROM delivered with each LMC20A1309. They are also available on the Internet : www.schneider-electric.com

7 Click **Next** to view a summary, and then click **Next** again to accept it.

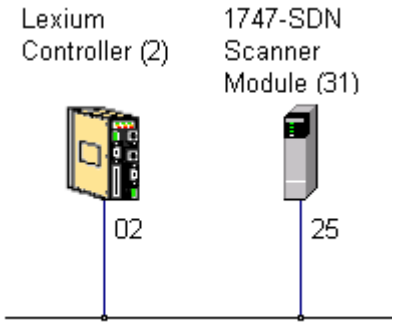
8 Click **Finish** to finish the EDS creation. A new icon represents the Lexium Controller in the Configuration View.

Configuring the DeviceNet scanner

Setting up the scan list

For the scanner to communicate with a Lexium Controller, the scanner must be configured and the Lexium Controllers node number must be added to its scan list.

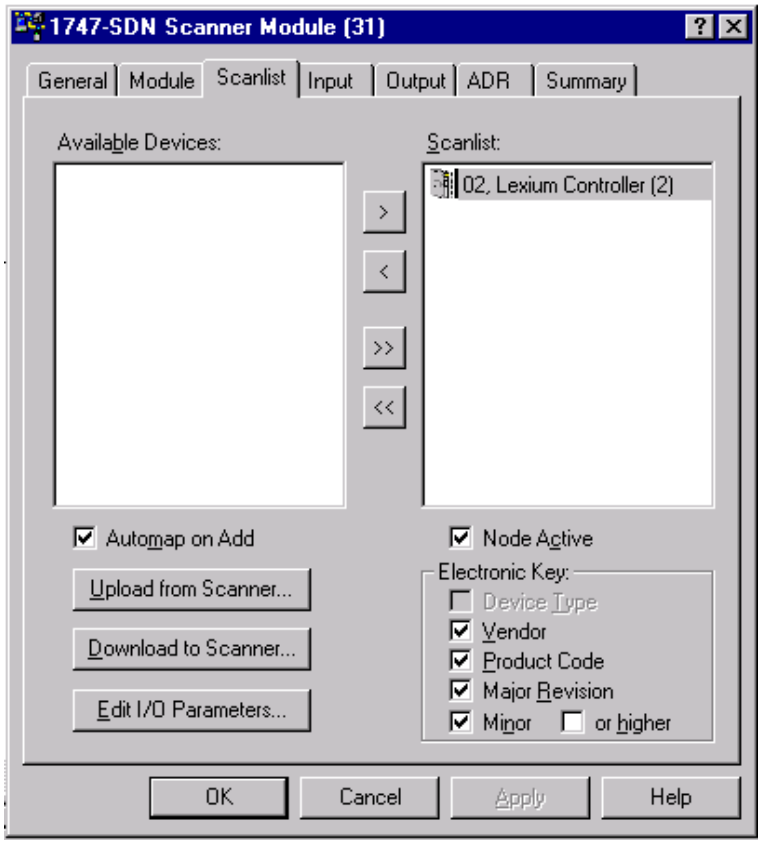
1 Go online with RSNetWorx for DeviceNet. The devices on the network are displayed in the configuration view.



2 Right-click the DeviceNet scanner (node 00) and select **Properties**. The Scanner Module dialog box appears.
Important: If your scanner is an unrecognized device, you must create an EDS file for it and then configure the scanner. Configure the scanner using the General and Module tabs. If you need more information, click **Help** or refer to your scanner documentation.

3 Click the **Scanlist** tab. A message box prompts you to upload.

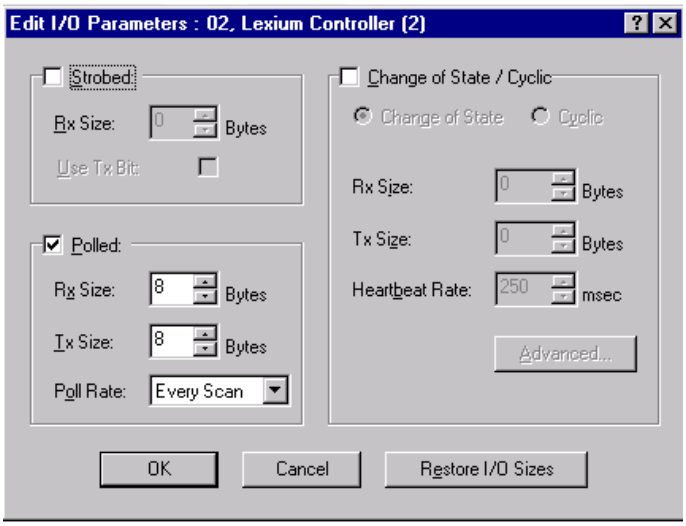
4 Click **Upload**. Data is uploaded from the scanner, and then the Scanlist page appears.



5 Select the **Automap on Add** box (a check mark will appear).

6 Under **Available Devices**, select the Lexium Controller, and then click **>** (Right Arrow) to add it to the scanlist.

7 Under Scanlist, select the Lexium Controller, and then click **Edit I/O Parameters**.
The Edit I/O Parameters dialog box appears.



8 Select the type(s) of data exchange (Polled, Change of State, and /or Cyclic). In our example, we selected Polled.
The type supported by the DeviceNet interface for Lexium Controller are:

	Polled	COS	Cyclic	Strobe
Input (Rx, produced)	●	●	●	No
Output (Tx, consummed)	●	No	No	No

9 Type the number of bytes that are required for your I/O in the Rx Size and Tx Size boxes. The size will depend on the assembly you have selected for your application:

Assembly attribute	**Assembly name**	**Rx size**
101	Communication scanner input	8 bytes

Assembly attribute	**Assembly name**	**Tx size**
100	Communication scanner output	8 bytes

10 Set the scan rate. (Click **Help** for more information.)

Data Exchange	**Rate to set**
Polled	Polled Rate
Change of State	Heartbeat Rate
Cyclic	Send Rate

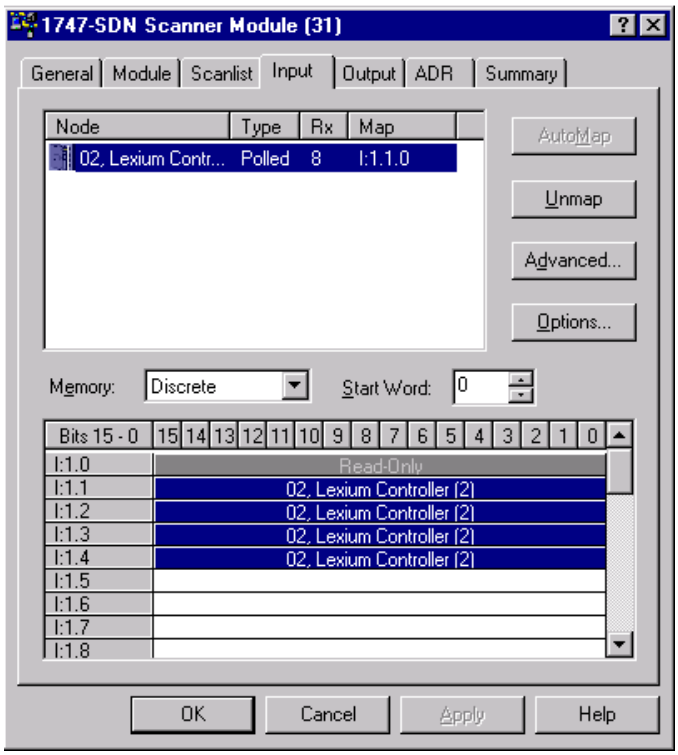
11 Click **OK**.
If you changed any settings, a Scanner Applet asks if it is OK to unmap the I/O. Click **Yes** to continue. The Edit I/O Parameters dialog box closes and then the Scanner Module dialog box reappears.
You will map the I/O in the next section in this chapter.

Mapping the Lexium Controller data in the scanner

Data from I/O messages must be mapped in the scanner. This mapping determines where a PLC program can find data that is passed over the network. You must map both the Input I/O and the Output I/O.

❑ Mapping the inputs

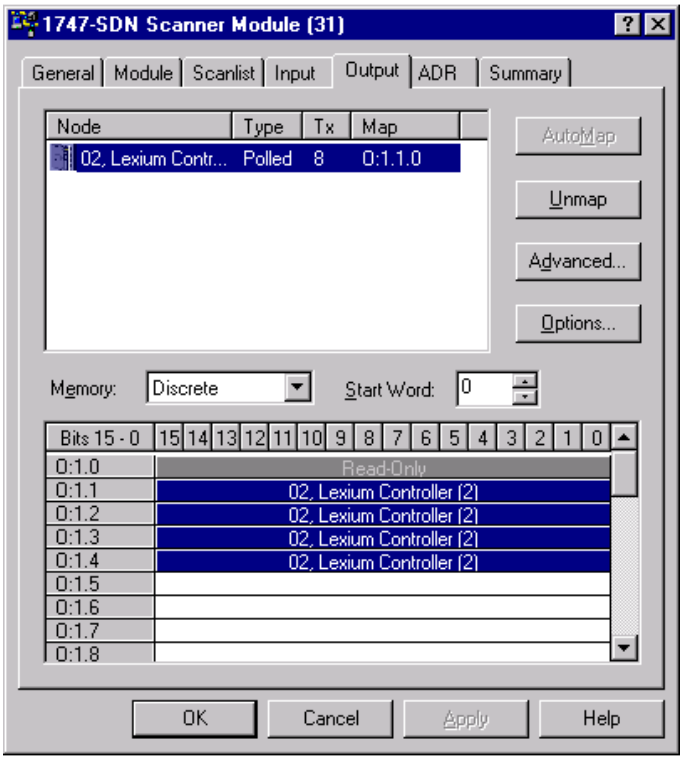
In the Scanner Module dialog box, click the **Input** tab. (If necessary, right-click the scanner in the configuration view to display this dialog box.)



If you selected the **Automap on Add** box in the Scanlist page, RSNetWorx has already mapped the I/O. If it is not mapped, click **Automap** to map it. If you need to change the mapping, click **Advanced** and change the settings. Click **Help** for assistance.

❑ Mapping the outputs

In the Scanner Module dialog box, click the **Output** tab. To display this dialog box, right-click the scanner in the configuration view.



If you selected the **Automap on Add** box in the Scanlist page, RSNetWorx has already mapped the I/O. If it is not mapped, click **Automap** to map it. If you need to change the mapping, click **Advanced** and change the settings. Click **Help** for assistance.

Saving the Configuration

After configuring a scanner, you must download the configuration to the scanner. You should also save it to a file on your computer.

1 In the Scanner Module dialog box, click **Apply** to save the configuration to the scanner. A Scanner Configuration Applet appears and asks if it is OK to download the changes.

2 Click **Yes** to download the changes. The changes are downloaded and then the Scanner Module dialog box reappears.

3 Click **OK** to close the Scanner Module dialog box.

4 Select **File > Save**. If this is the first time that you saved the project, the Save As dialog box appears. Navigate to a folder, type a file name, and click **Save** to save the configuration to a file.

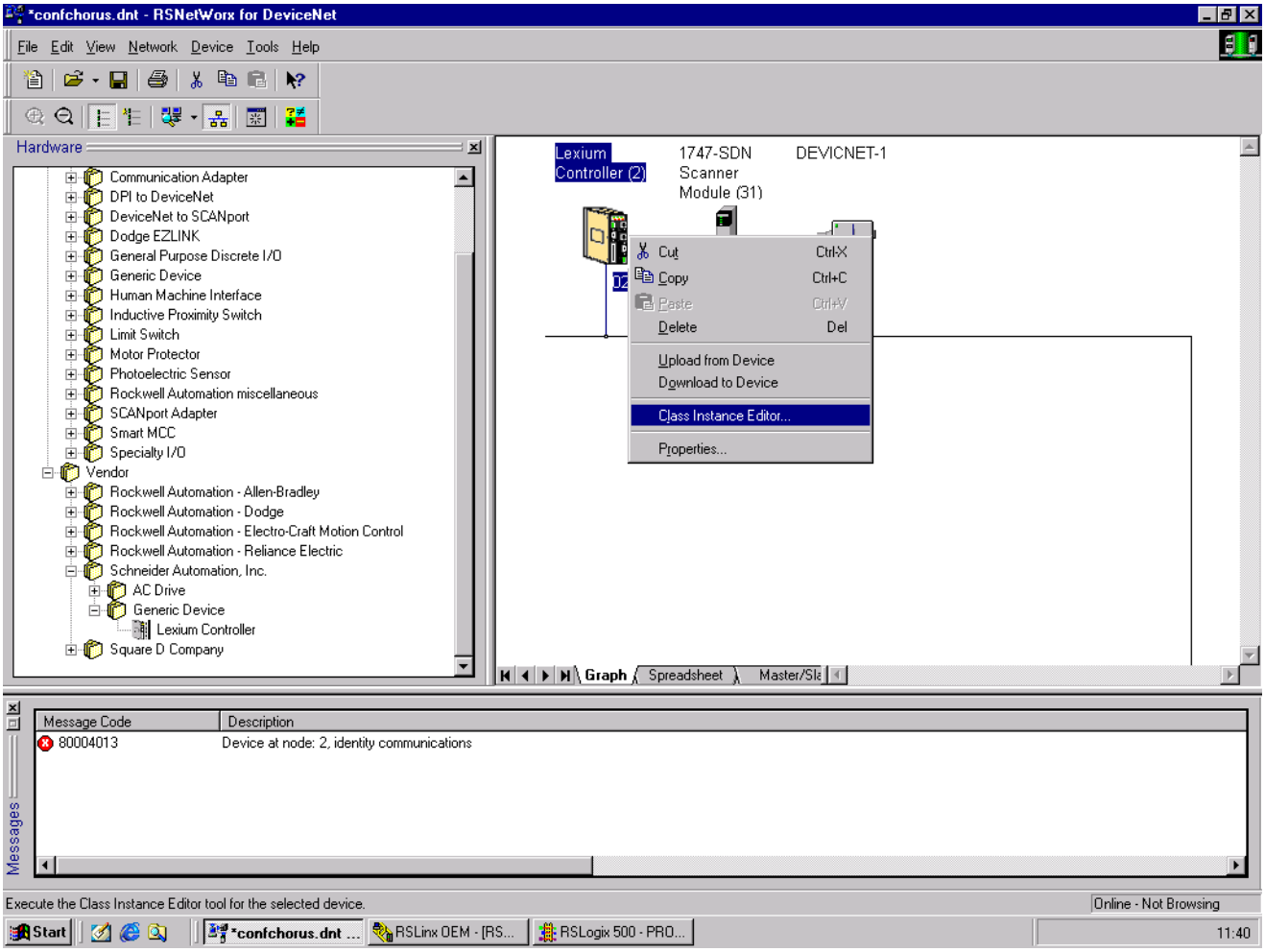
Editing objects of the Lexium Controller

Using the Class Instance Editor

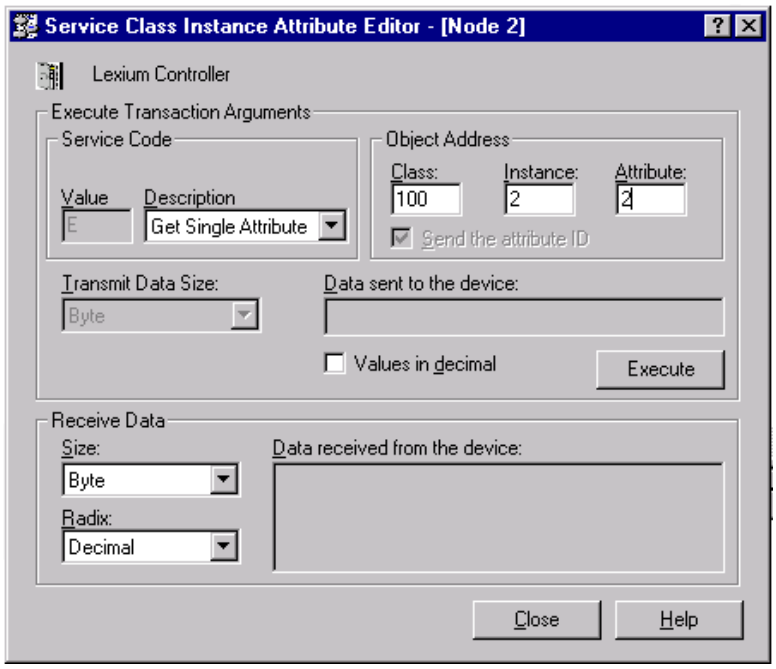
DeviceNet objects of the Lexium Controller can be edited with the Class Instance Editor of RSNetWorx.

This editor provides direct access to the device using native DeviceNet object addressing.
Using this editor requires a detailed understanding of the capabilities and limitations of the device being configured, as well as the possible impacts that these changes may have on the operation of your system. You assume full responsibility for all consequences related to the use of this editor.

1 Go online with RSNetWorx for DeviceNet. The devices on the network are displayed in the configuration view.



2 Right-click on the icon for the Lexium Controller and select **Class Instance Editor.** The Lexium Controller dialog box appears.



3 In the **Object Address** field, type the path of the parameter in the boxes **Class, Instance, Attribute**.

4 In the **Service Code** field, select the action in the **Description** box.

5 In the boxes **Transmit data size**, **Data sent to the device**, **Values in decimal** type the description of the data that you want to send to the Lexium Controller.

6 Click **Execute** to exchange the data with the Lexium Controller. Click **Help** for assistance.

Configuring node address and data rate

If the data rate switches (7 and 8) are set to 1, configure node address and data rate by the Class Instance Editor.

Node address

Base	Class	Instance	Attribute
Hexadecimal	16# 03	16#01	16#01
Decimal	3	1	1

Data rate

Base	Class	Instance	Attribute
Hexadecimal	16# 03	16#01	16#02
Decimal	3	1	2

Using I/O messaging

I/O messaging is used to transfer real time data between the PLC and the Lexium Controller :
- Commands,
- Setpoints,
- Settings,
- States,
- Measurements,
- ...

To obtain the best response time in the application choose the adequate exchange method:
- Change of State (COS),
- Cyclic,
- or Polled.

The exchange method is downloaded in the Lexium Controller by the DeviceNet scanner and must be configured by network tool (refer to Configuring the DeviceNet scanner).

Using explicit messaging

I/O messaging is used to transfer data that does not require continuous updates between the PLC and the Lexium Controller :
- Configuration,
- Settings,
- Fault parameters,
- Log parameters;
- ...

If the PLC program configures the Lexium Controller using explicit messaging.
The new value of the parameters are not stored in EEPROM and they will be lost at next power off.
To store the values of parameters (whole configuration) in EEPROM, it is necessary to set to 1 the bit 1 of Extended control word (CMI), refer to the Communication parameters manual.

Checking the node address and the data rate

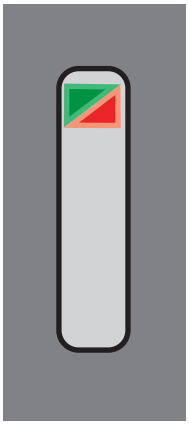
It is possible to read the Baudrate and the node address with Motion Pro / CoDeSys software by using **PLC Browser** command. The command is "Optioncardinf" (for option card information).

The list of informations given by this command is:

Soft Version:	**1.0ie1**
Hard Version:	**1.0**
BaudRate:	**52 ➡ 1250000 Bauds**
	60 ➡ 250000
	68 ➡ 500000
Address:	**1**
	0 to 63

Signaling LED

The DeviceNet features one combined Module/Network Status LED (MNS), which is visible through the Lexium Controller cover:



MNS

LED status indication

LED state	Lexium Controller state	Indication
Off	Device is not on line	• The device is not powered. • The device has not completed the duplicate node address test yet.
Flashing green	Device is operational and on line, but not connected OR Device is on line but needs commissioning	The device is on line and operating in a normal condition, but network connections are not established. • The device has passed the duplicate node address test and is on line, but has not established connections to other nodes. • The device is not allocated to a master. • Configuration is missing, incomplete, or incorrect.
Rapid flashing green	Device is operational, online, and connected	The device is operating in a normal condition. It is allocated to a master.
Flashing red	Major fault and/or connection time-out	• The device has experienced a major recoverable fault. • One or more I/O connections timed out.
Rapid flashing red	Critical fault or critical link failure	• The interface has a major unrecoverable fault and may need replacing. • The device has detected an error that has rendered it incapable of communicating on the network (duplicate node address or bus turned off).
Flashing green / red	Communication fault	The device has detected a Network Access error and is in the Communication Faulted state. The device has subsequently received and accepted an Identify Communication Faulted Request—Long Protocol message.

Note: After power on, the MNS LED quickly glows green then red and finally turns off.

Monitoring the communication scanner

Use Motion Pro / CoDeSys to see the value of the Data value exchanged on DeviceNet.

Troubleshooting the communication fault

DeviceNet faults are indicated by the LED on the Lexium Controller.

The **[Network fault]** parameter can be used to obtain more detailed information about the origin of the last fault. It can be accessed under Motion Pro / CoDeSys by using the Browser and by monitoring the Status Error or Status Network available in the sheet PLC configuration.
Information is available by the command "Optioncardinf" in the **PLC browser**.

Status Error:
0 ➡ No Error
1 ➡ User Default
2 ➡ Duplicate MacId
3 ➡ CAN Fifo RX
4 ➡ CAN Fifo TX
5 ➡ CAN Overrun
6 ➡ Sending
7 ➡ CAN Bus Off
8 ➡ Time out on explicit or periodic connection
9 ➡ Acknowledgment on periodic connection

Status Network:
0 ➡ No Connection
1 ➡ Device self testing
2 ➡ StandBy
3 ➡ Operational
4 ➡ Major Recoverable Fault
5 ➡ Major Unrecoverable Fault

End of DeviceNet Configuration Info

This parameter is available in the DeviceNet Interface object (16#64 = 100), attribute 4.

Value	Description of the values of the [Network fault] parameter	
0	No fault	
1	Fault triggered by the user This type of fault can be triggered by the parameter "ForceFault/trip" of the Control Supervisor object (16#28 = 41), attribute 17.	
2	Duplicate node address (MAC ID)	
3	CAN FIFO RX error	These events may be caused by loose or broken cables or by noise.
4	CAN FIFO TX error	
5	CAN overrun	
6	CAN transmit error	These events may be caused by loose or broken cables or by noise.
7	CAN bus off	
8	Control time out. COS, cyclic, polling or explicit messaging restart the timer. The time out can be configured in the parameter "Expected_packet_rate" of the Connection object (5), attribute 9.	
9	Acknowledge error, for COS or cyclic only. The error can be configured in the parameters "Acknowledge Timer" and "Retry Limit" of the Acknowledge Handler object, attributes 1 and 2.	

Supported classes

Object class	Class ID		Need for ODVA conformance	No. of instances	Effect on behavior	Interface
	Hex.	Dec.				
Identity	16#01	1	Required	1	Supports the reset service	Message router
Message router	16#02	2	Optional	1		Explicit message connection
DeviceNet	16#03	3	Required	1	Configures node attributes	Message router
Assembly	16#04	4	Required	13	Defines I/O data format	Message router, assembly, or parameter object
DeviceNet connection	16#05	5	Required	3	Logical ports into or out of the device	I/O connection or message router
Acknowledge handler	16#2B	43	Optional	1		I/O connection or message router
Application	16#64 - 16#6A	100-106	Optional		Vendor specific object	Message router or parameter object
DeviceNet interface	16#80	128	Optional	1		

Identity object

The Identity object provides identification and status information about the Lexium Controller.

Class code

Hexadecimal	Decimal
16#01	1

Class attributes

Attribute ID	Access	Name	Need	Data type	Value	Details
1	Get	Revision	Opt.	UINT	1	—
2	Get	Max Instances	Opt.	UINT	1	1 defined instance

Instance attributes

Attribute ID	Access	Name	Need	Data type	Value	Details
1	Get	Vendor ID	Req.	UINT	243	Schneider Automation, Inc [243]
2	Get	Device type	Req.	UINT	16#00	Generic Device
3	Get	Product code	Req.	UINT	1 or 5	9: (LMC)
4	Get	Revision	Req.	Struct of: USINT USINT	—	Product revision of the Lexium Controller (1)
5	Get	Status	Req.	WORD	—	See definition in the table below
6	Get	Serial number	Req.	UDINT	—	Serial number of the Lexium Controller
7	Get	Product name	Req.	Struct of: USINT STRING	—	24 (product name length) “Lexium Controller”
8	Get	State (see Figure on page 28)	Opt.	USINT	—	0: Non existent 1: Device self-testing 2: Standby 3: Operational 4: Major recoverable fault 5: Major unrecoverable fault
10	Get/Set	Heartbeat interval (2)	Opt.	USINT	0–255	Interval in seconds between two heartbeat messages. 0: No message.

(1) Mapped in a word: MSB minor revision (second USINT), LSB major revision (first USINT).
Example: Decimal 517 = 16#0205 means revision V5.2.

(2) The heartbeat message broadcasts the current state of the device.

Attribute 5–status

Bit	Definition
0	Owned by master (predefined master/slave connection)
2	Configured (not used)
8	Minor recoverable fault (not used)
9	Minor unrecoverable fault (not used)
10	Major recoverable fault
11	Major unrecoverable fault
Others	Reserved 0 (reset to 0)

Class service

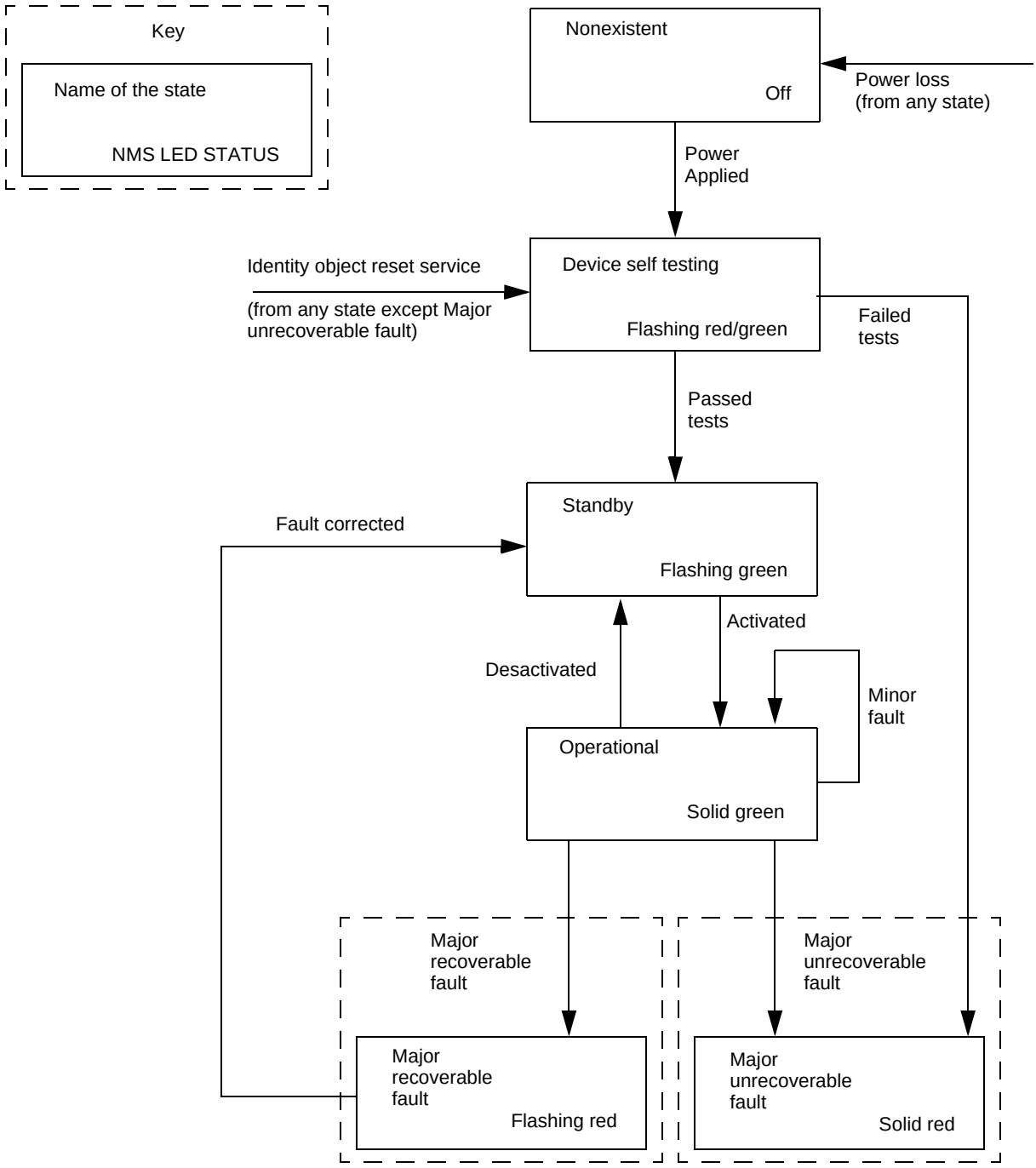
Service code	Service name	Need	Description
16#0E	Get_Attribute_Single	Req.	Read an attribute

Instance service

Service code	Service name	Need	Description
16#0E	Get_Attribute_Single	Req.	Read an attribute
16#10	Set_Attribute_Single	(1)	Write an attribute
16#05	Reset	Req.	Reset DeviceNet module

(1) Required if the heartbeat interval must be defined.

State diagram for the Identity object



Message router object

The Message router object is the element through which all the "Explicit messages" objects pass in order to be directed towards the objects they are truly destined to.

Class code

Hexadecimal	Decimal
16#02	2

Class attributes

Attribute ID	Access	Name	Need	Data type	Value	Details
1	Get	Revision	Opt.	UINT	1	-
2	Get	Max instances	Opt.	UNT	1	1 Defined instance

Instance attributes

Attribute ID	Access	Name	Need	Data type	Value	Details
1	Get	Object list: Number classes	Opt.	Struct of: UINT UINT [ ]	20 (codes)	List of supported objects; the first UINT is the number of supported classes; the remaining UINTs are the codes of these classes.
2	Get	Number available	Opt.	UINT	1	Maximum number of simultaneous connections
3	Get	Number active	Opt.	UINT	1	Number of active connections
4	Get	Active connections	Opt.	UINT [ ]	1	List of active connections (referred to with their respective Connection instance ID)

Class service

Service code	Service name	Need	Description
16#0E	Get_Attribute_Single	Req.	Read an attribute

Instance service

Service code	Service name	Need	Description
16#0E	Get_Attribute_Single	Req.	Read an attribute

DeviceNet objects

DeviceNet object

The DeviceNet object provides the status and configuration of a DeviceNet node.

Class code

Hexadecimal	Decimal
16#03	3

Class attributes

Attribute ID	Access	Name	Need	Data type	Value	Details
1	Get	Revision	Opt.	UINT	2	—
2	Get	Max Instances	Opt.	UINT	1	1 Defined instance

Instance attributes

Attribute ID	Access	Name	Need	Data type	Value	Details
1	Get/Set (1)	Node address	Req.	USINT	0–63	See below
2	Get/Set (1)	Data rate	Opt.	USINT	0–2	0 = 125 kbit/s; 1 = 250 kbit/s; 2 = 500 kbit/s See below
3	Get/Set	BOI (BusOff interrupt)	Opt.	BOOL	—	Upon BusOff event: 0: CAN component remains in BusOff 1: Component is reset and communication resumes
4	Get/Set	BusOff counter	Opt.	USINT	0–255	Number of occurrences of BusOff state. Set access is used to reset this counter.
5	Get	Allocation information	Opt.	BYTE USINT	— 0–63	Allocation choice Master address (255 not allocated)

(1) Use Set access only if data rate switches (7 and 8) are both set to 1 (ON).

Class service

Service code	Service name	Need	Description
16#0E	Get_Attribute_Single	Req.	Read an attribute

Instance service

Service code	Service name	Need	Description
16#0E	Get_Attribute_Single	Opt.	Read an attribute
16#10	Set_Attribute_Single	Opt.	Write an attribute
16#4B	Allocate Master/Slave Connection Set	Opt.	Allocation connection master/slave
16#4C	Release Master/Slave Connection Set	Opt.	Release connection master/slave

DeviceNet objects

Assembly object

Class code

Hexadecimal	Decimal
16#04	4

Class attribute

Attribute ID	Access	Name	Need	Data type	Value	Details
1	Get	Revision	Opt.	UINT	2	—
2	Get	Max instance	Opt.	UINT	101	2 defined instances

Instances supported

Instance	Name	Data size
100	Communication scanner output	8 bytes
101	Communication scanner input	8 bytes

Instance attributes

Attribute ID	Access	Name	Need	Data type	Value	Details
3	Get/Set (1)	Data	Req.			

(1) Set access is restricted to output instance only (instance 100).

Class service

Service code	Service name	Need	Description
16#0E	Get_Attribute_Single	Req.	Read an attribute

Instance service

Service code	Service name	Need	Description
16#0E	Get_Attribute_Single	Req.	Read an attribute
16#10	Set_Attribute_Single	Opt.	Write an attribute

DeviceNet objects

Output assembly 100

Bytes 0 and 1

1st Scanner out parameter [DNET_O0]

Bytes 2 and 3

2nd Scanner out parameter [DNET_O1]

Bytes 4 and 5

3rd Scanner out parameter [DNET_O2]

Bytes 6 and 7

4th Scanner out parameter [DNET_O3]

Input assembly 101

Bytes 0 and 1

1st Scanner in parameter [DNET_I0]

Bytes 2 and 3

2nd Scanner in parameter [DNET_I1]

Bytes 4 and 5

3rd Scanner in parameter [DNET_I2]

Bytes 6 and 7

4th Scanner in parameter [DNET_I3]

Connection object

Class code

Hexadecimal	Decimal
16#05	5

Class attributes

Attribute ID	Access	Name	Need	Data type	Value	Details
1	Get	Revision	Opt.	UINT	1	—
2	Get	Max instances	Opt.	UINT	4	3 defined instances (1)

(1) Only instances 1 (explicit message), 2 (polled I/O message), and 4 (change of state/cyclic message) are supported. Instance 3 (bit strobe) is not supported.

Attributes of instance 1—Explicit message instance

Attribute ID	Access	Name	Need	Data type	Value	Details
1	Get	State	Req.	USINT	—	0 : Non-existent 3 : Established 5 : Deferred Delete
2	Get	Instance_type	Req.	USINT	0	Explicit Message
3	Get	TransportClass_trigger	Req.	BYTE	16#83	Class 3 server
4	Get	Produced_connection_id	Req.	UINT	10xxxxxx011	xxxxxx = Node address
5	Get	Consumed_connection_id	Req.	UINT	10xxxxxx100	xxxxxx = Node address
6	Get	Initial_comm_characteristics	Req.	BYTE	16#21	Explicit messaging via Group 2
7	Get	Produced_connection_size	Req.	UINT	36	Produced data maximum size (in bytes)
8	Get	Consumed_connection_size	Req.	UINT	36	Consumed data maximum size (in bytes)
9	Get/Set	Expected_packet_rate	Req.	UINT	2500	2.5 sec. (TimeOut)
12	Get/Set	Watchdog_timeout_action	Req.	USINT	1 or 3	1 : Auto-Delete 3 : Deferred Delete (Default)
13	Get	Produced connection path length	Req.	UINT	0	Length of attribute 14 data
14	Get	Produced connection path	Req.	Array of UINT	Null	Empty
15	Get	Consumed connection path length	Req.	UINT	0	Length of attribute 16 data
16	Get	Consumed connection path	Req.	Array of UINT	Null	Empty

Refer to DeviceNet specification for more information.

Attributes of instance 2—Polled I/O message instance

Attribute ID	Access	Name	Need	Data type	Value	Details
1	Get	State	Req.	USINT	—	0: Non-existent 1: Configuring 3: Established 4: TimeOut
2	Get	Instance_type	Req.	USINT	1	I/O Message
3	Get	TransportClass_trigger	Req.	BYTE	16# 83	Class 3 server
4	Get	Produced_connection_id	Req.	UINT	01111xxxxxx	xxxxxx = Node address
5	Get	Consumed_connection_id	Req.	UINT	10xxxxxx101	xxxxxx = Node address
6	Get	Initial_comm_characteristics	Req.	BYTE	16# 01	Group 1 / Group 2
7	Get	Produced_connection_size	Req.	UINT	4, 6, or 8	Size of data produced
8	Get	Consumed_connection_size	Req.	UINT	4, 6, or 8	Size of data consumed
9	Get/Set	Expected_packet_rate	Req.	UINT	—	Exchange frequency (ms)
12	Get/Set	Watchdog_timeout_action	Req.	USINT	0, 1, or 2 (2)	0: Transition to TimeOut 1: Auto-Delete 2: Auto-Reset
13	Get	Produced_connection_path length	Req.	UINT	8	Default: 8 bytes
14	Get/Set	Produced_connection_path	Req.	Array of UINT	16# 20 04 24 65 30 03	Input assembly (Default : Instance 101, 16# 20 04 24 65 30 03)
15	Get	Consumed_connection_path length	Req.	UINT	8	Default: 8 bytes
16	Get/Set	Consumed_connection_path	Req.	Array of UINT	16# 20 04 24 64 30 03	Output assembly (Default : Instance 100, 16# 20 04 24 64 30 03)
17	Get/Set	Production_inhibit_time	Cond.	UINT	0	Minimum time between 2 data productions. Undefined

Attributes of instance 4—Change of state/cyclic message instance

Attribute ID	Access	Name	Need	Data type	Value	Details
1	Get	State	Req.	USINT	—	0: Non-existent 1: Configuring 3: Established 4: TimeOut
2	Get	Instance_type	Req.	USINT	1	I/O Message
3	Get	TransportClass_trigger	Req.	BYTE	16# X2	Class 2 Client Cos:16# 12 - Cyclic:16# 02
4	Get	Produced_connection_id	Req.	UINT	01101xxxxxx	xxxxxx = Node address
5	Get	Consumed_connection_id	Req.	UINT	10xxxxxx101	xxxxxx = Node address
6	Get	Initial_comm_characteristics	Req.	BYTE	16# 01	Group 1 / Group 2
7	Get	Produced_connection_size	Req.	UINT	4, 6, or 8	Size of data produced
8	Get	Consumed_connection_size	Req.	UINT	0	Size of data consumed
9	Get/Set	Expected_packet_rate	Req.	UINT	—	Exchange frequency (ms)
12	Get/Set	Watchdog_timeout_action	Req.	USINT	0, 1, or 2 (2)	0: Transition to TimeOut 1: Auto-Delete 2: Auto-Reset
13	Get	Produced_connection_path_length	Req.	UINT	8	Default: 8 bytes
14	Get/Set	Produced_connection_path	Req.	Array of UINT	16# 20 04 24 65 30 03	Input assembly (Default : Instance 101, 16# 20 04 24 65 30 03)
15	Get	Consumed_connection_path_length	Req.	UINT	8	Default: 8 bytes
16	Get/Set	Consumed_connection_path	Req.	Array of UINT	16# 20 2B 24 01 30 03	Output assembly: The first and only one instance of the Acknowledge handler object (Class ID 16#2B)
17	Get/Set	Production_inhibit_time	Cond.	UINT	0	Minimum time between 2 data productions. Undefined

Class service

Service code	Service name	Need	Description
16#08	Create	Opt.	Instantiation of a connection
16#0E	Get_Attribute_Single	Req.	Read an attribute

Instance service

Service code	Service name	Need	Description
16#0E	Get_Attribute_Single	Req.	Read an attribute
16#10	Set_Attribute_Single	Opt.	Write an attribute
16#05	Reset	Opt.	Reset Inactivity/Watchdog timer

Acknowledge handler object

The acknowledge handler object directs the acknowledgment of messages received.

Class code

Hexadecimal	Decimal
16#2B	43

Class attributes

Attribute ID	Access	Name	Need	Data type	Value	Details
1	Get	Revision	Opt.	UINT	1	—
2	Get	Max instance	Opt.	UINT	1	—

Instance attributes

Attribute ID	Access	Name	Need	Data type	Value	Details
1	Get/Set	Acknowledge timer	Req.	UINT	16	Default: 16 ms
2	Get/Set	Retry limit	Req.	USINT	1	—
3	Get/Set	COS producing connection instance	Req.	UINT	4	Assembly

Class service

Service code	Service name	Need	Description
16#0E	Get_Attribute_Single	Req.	Read an attribute

Instance service

Service code	Service name	Need	Description
16#0E	Get_Attribute_Single	Req.	Read an attribute
16#10	Set_Attribute_Single	Req.	Write an attribute

Application objects

Class code

Hexadecimal	Decimal
16#64 to 6A	100 to 106

Lexium Controller parameters path

The Lexium Controller parameters are grouped in classes.
Each application class has 100 instances from 1 to 100.
Each instance groups 100 Motion Pro / CoDeSys object (%MW).
Each attribute in an instance relates to a Motion Pro / CoDeSys object.

The first Motion Pro / CoDeSys object registered in the first application class (class code: 16#64 is %MW0).

Examples:

Address	Path Hexadecimal	Path decimal
3 000	16# 64 / 1F / 01	100 / 31 / 01
10 000	16# 65 / 01 / 01	101 / 1 / 1
10	16# 64 / 01 / 0B	100 / 01 / 11

Class = [Adr / 10 000] + 100
Instance = [(Adr MOD 10000) / 100] + 1
Attribut = [Adr MOD 100] + 1

If an address is Adr = XY AB CD in decimal the value for Class/Instance/Attribut is:

Class = XY + 100
Instance = AB + 1
Attribut = CD + 1

To perform the Motion Pro / CoDeSys Address with the DeviceNet address given by Class/Instance/Attribut is:

Adr = (Class - 100) x 10 000 + (Instance - 1) x 100 + Attribut - 1

When a read access to the class 6A h is done for the address between 65 536 and 69 999 the returned value is 8 000 h.
A write access is not take into account for the same range of Address.

DeviceNet objects

Class attributes

Attribute ID	Access	Name	Need	Data type	Value
1	Get	Revision	Opt.	UINT	1
2	Get	Max instance	Opt.	UINT	100
6	Get	Max ID number of class attribute	Opt.	UINT	7
7	Get	Max ID number of instance attribute	Opt.	UINT	100

Instance attributes

Attribute ID	Access	Name	Data type	Value
1	Get/Set	First parameter of the class	UINT / USINT	Value returned by the Lexium Controller
...	...	...	...	...
X	Get/Set	Last parameter of the class	UINT / USINT	Value returned by the Lexium Controller

Note: Depending on the parameter, write access may be prohibited. Refer to the Communication parameters manual for more information.

Class service

Service code	Service name	Need	Description
16#0E	Get_Attribute_Single	Req.	Read an attribute

Instances service

Service code	Service name	Need	Description
16#0E	Get_Attribute_Single	Req.	Read an attribute
116#0	Set_Attribute_Single	Opt.	Write an attribute

DeviceNet interface object

Class code

Hexadecimal	Decimal
16#80	128

Class attributes

Attribute ID	Access	Name	Need	Data type	Value
1	Get	Revision	Opt.	UINT	1
2	Get	Max instance	Opt.	UINT	1
6	Get	Max ID number of class attribute	Opt.	UINT	7
7	Get	Max ID number of instance attribute	Opt.	UINT	2

Instances attributes

Attribue ID	Access	Name	Data type	Details
1	Get	[Network fault]	USINT	0 : no fault 1 : user forced fault 2 : duplicate Node Address 3 : CAN FIFO RX Error 4 : CAN FIFO TX Error 5 : CAN OverRun 6 : CAN send Error 7 : CAN Bus Off 8 : Control Time Out 9 : Acknowledge Error
2	Get	Software revision of the DeviceNet interface	UINT	Ex : 16# 1109 = V1.1ie09

DeviceNet objects

Class service

Service code	Service name	Need	Description
16#0E	Get_Attribute_Single	Req.	Read an attribute

Instance services

Service code	Service name	Need	Description
16#0E	Get_Attribute_Single	Req.	Read an attribute
16#10	Set_Attribute_Single	Opt.	Write an attribute