Lumberg I/O Network

# LioN-M I/O modules

## Technical Manual

0930 DSL 700 | 0930 DSL 701

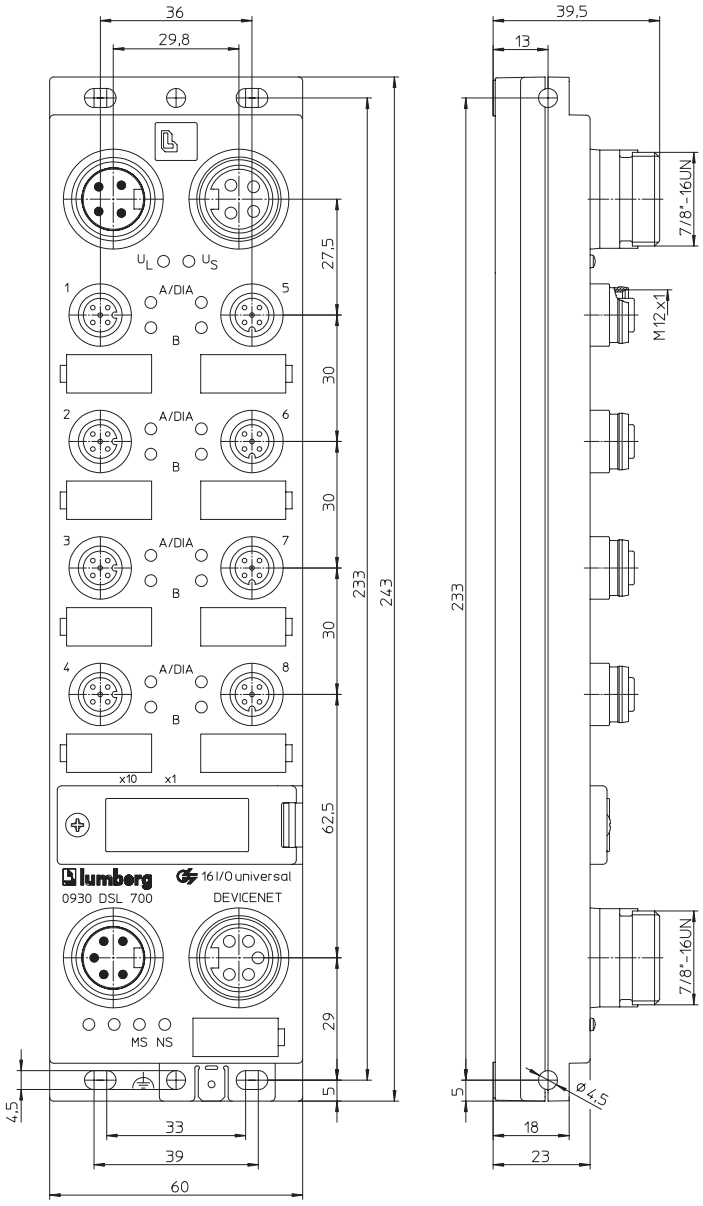
lumberg automation

A Belden Company

# LioN-M I/O modules for DeviceNet

## 0930 DSL 700

16 digital channels (p-switching),
channels can be used universally as inputs or outputs, with rotary address switches



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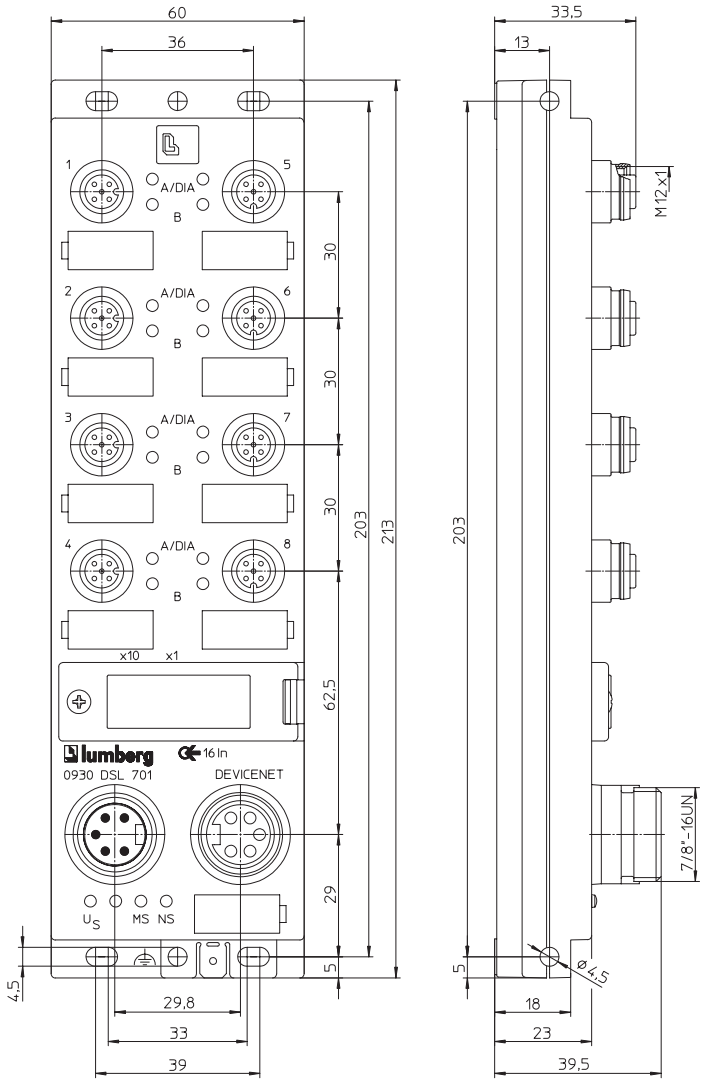

# Content

# 1. About this Manual

Please read the assembly and operating instructions in this Manual carefully before putting the LioN-M type module into operation. The Manual should be stored in a place that is accessible for all users.

The texts, illustrations, diagrams and examples used in this Manual are solely for the purpose of explaining the operation and use of input/output modules of the series type LioN-M.

Please contact us if you have any further questions concerning installation and commissioning of the devices. We will be happy to be of assistance to you at any time.

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Lumberg Automation reserves the right to alter these technical modifications or to modify this Manual at any time without notice.

## 1.1 Explanations of symbols used

### 1.1.1 Use of notes

Notes concerning important information are specially marked. They are displayed as follows:

### 1.1.2 Use of hazard notes

Notes concerning hazards are marked as follows:

⚠ **DANGER:**
Non-compliance with respective precautionary measures will expose the user to life-threatening dangers and health hazards.

⚠ **NOTE:**
Non-compliance with precautionary measures can result in possible damage to equipment and other property.

## 1.2 Safety Guidelines

### 1.2.1 Certified usage

The devices described in this Manual are used as decentralised input/output assemblies in a Device Net network.

Our products have been developed, produced, tested and documented in compliance with safety standards. No hazards to personnel or property are to be anticipated under normal conditions in connection with these products when the handling regulations and safety instructions described here for project planning, assembly and specified operations are complied with.

The modules fulfill the requirements of the

- EMC guideline (89/336/EWG, 93/68/EWG and 93/44/EWG)
- Low-voltage Guideline (73/23/EWG)
- are designed for utilization in the industrial area. The industrial environment is characterised by the fact that users are not directly connected with the public low-voltage mains. Additional measures are to be implemented for utilization in residential quarters and in business and trade areas.

**Warning!**
This installation can cause radio interference in resident areas; the user may be asked to implement appropriate measures.

The error-free, secure operation of the product requires proper transport, storage, set-up and assembly, as well as careful operation. The intended operation of the device can only be guaranteed when the housing is mounted in its entirety. All of the other devices connected with this device must fulfill the requirements contained in EN 61558-2-4 and EN 61558-2-6.

Project planning, installation, commissioning, maintenance and testing of the devices may not be performed by anyone other than an electrician who has successfully completed recognised training courses and who is familiar with the safety standards of automation technology.

The user has to comply with the safety and accident prevention regulations that apply to the specific activity being performed during project planning, installation, commissioning, maintenance and testing of the devices.

No cables or accessories may be installed except for those which fulfill the requirements and regulations governing safety, electromagnetic compatibility and, where appropriate, terminal device equipment for telecommunications and which correspond to the statement of specifications. Information concerning those cables and accessories which are authorized for installation can either be obtained from Lumberg Automation or are already described in this Manual.

### 1.3 Qualified personnel

The personnel requirements are oriented towards the requirements profile outlined by ZVEI and VDMA. Only skilled electricians who are familiar with the contents of this Manual are permitted to install or service the products described.
These are individuals who

- an assess the tasks to be performed on the basis of their professional training, knowledge and experience and on the basis of their knowledge of the pertinent standards, and who can recognise possible dangers.
- have the same knowledge levels as those who have completed a specialised training course, thanks to many years of professional involvement in a comparable area.

No modifications may be carried out on our product hardware or software, insofar as they are not described in the Manual, except by Lumberg Automation personnel.

**Warning!**
Unqualified modifications of hardware or software or non-compliance with the warning notices listed in this Manual could lead to severe injury to persons or damage to property.

## 2. Directions for field installation

The module is to be mounted on a level surface with at least 2 screws.

| Type of mounting | Screw | Tightening torque |
|---|---|---|
| flat | M4 x 25/30 | 1,0 Nm |
| lateral | M4 x 70/80 | 1,0 Nm |

A washer in accordance with DIN 125 is to be provided with all types of mounting fixtures.

**Important note:**
The module is equipped with a grounding sheet for the purpose of discharging parasitic currents and/or for EMC stability.

It is necessary that this grounding sheet is linked with the reference earth by means of a low-impedance connection. If the mounting surface is already grounded, the connection can be made directly via the fastening screw (not with lateral mounting).

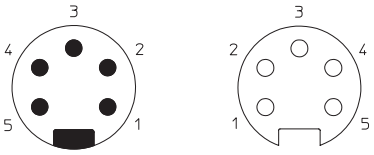
If the mounting surface is not already grounded, or if the lateral mounting holes are used, a grounding strip or a suitable PE wire is to be used!

## 3. Pin assignment

### 3.1 Bus and System supply (0930 DSL 700)
### Bus and System/Sensor supply (0930 DSL 701)

**7/8" male/female connector, 5 poles**

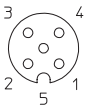
IN OUT




| Pin | Connection 0930 DSL 700 | Function 0930 DSL 700 | Connection 0930 DSL 701 | Function 0930 DSL 701 |
|---|---|---|---|---|
| 1 | Drain | | Drain | |
| 2 | System | +24 V | System / Sensors | +24 V |
| 3 | System | GND (0 V) | System / Sensors | GND (0 V) |
| 4 | Bus | CAN_H | Bus | CAN_H |
| 5 | Bus | CAN_L | Bus | CAN_L |

⚠ **CAUTION, danger of destruction!**
Never place the voltage supply (24 V DC) on the data circuits (Pin 4, Pin 5).

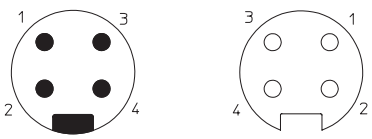
### 3.2 Sensor/Actuator connection, M12 female connector, 5 poles




| Connection | Pin | Function DSL 700 | Function DSL 701 |
|---|---|---|---|
| I/O channels | 1 | +24 V | +24 V |
| | 2 | In/Out B | In B |
| | 3 | 0 V | 0 V |
| | 4 | In/Out A | In A |
| | 5 | earth | earth |

### 3.3 System/Sensor/Actuator supply, 7/8" male/female connector, 4 poles

IN OUT




| Connection | Pin | Function |
|---|---|---|
| Actuators | 1 | +24 V |
| Sensors | 2 | +24 V |
| | 3 | earth |
| Actuators/Sensors | 4 | GND (0 V) |

# 4. Communication with the module

## 4.1 Addressing

### 4.1.1 Rotary address switches

Two rotary switches, located above the 7/8“ bus connections behind a clear cover, are used for direct adjustment of the DeviceNet address (MAC_ID). The switches for setting the tens and the ones of the address are indicated. After selecting the address via the rotary switches the address will be set internally after power is applied to the module. Therefore the power supply must be interrupted briefly if the address is changed during power-on in order to allow the module to adopt the new address.


The valid address range lies between 0 and 63. The address is set to 63 when switched to a value in the range of 64 to 98. The factory setting for the address is 63.

### 4.1.2 Setting of the module address via the network

The module address can also be set via the DeviceNet network when the address allocation is supported by the control unit manufacturer's configuration software that is used.
Precise directions regarding procedural method can be found in the manual for your respective control manufacturer.

The rotary switches must be set to the value "99" to allow software addressing.
The addressing range in such cases lies between 0 and 63.

## 4.2 Data transmission rate

The data transmission rate used is established at the start of communication between the module with the master, and is automatically detected (AutoBaud Detection). The maximal supported Baud rate lies at 500 kbit/s.

## 4.3 Bit assignment

The DeviceNet telegram permits transmission of a maximum of 8 bytes (64 bits) of information data. The information data with these modules consists of two bytes input data and one byte output data. The output byte contains the control values of the individual outputs. Diagnostics are performed as collective diagnostics and deposited in the input byte.

**Bitbelegung / Bit assignment**

| Bit | 7 | 6 | 5 | 4 | 3 | 2 | 1 | 0 |
|---|---|---|---|---|---|---|---|---|
| **M12 Input** | | | | | | | | |
| **Byte 0** | 4B | 4A | 3B | 3A | 2B | 2A | 1B | 1A |
| **Byte 1** | 8B | 8A | 7B | 7A | 6B | 6A | 5B | 5A |
| **Diagnose / Diagnostic** | | | | | | | | |
| **Byte 2** | S8 | S7 | S6 | S5 | S4 | S3 | S2 | S1 |
| S1...8: Status Buchse 1...8 / socket status 1...8 | | | | | | | | |
| **M12 Output** | | | | | | | | |
| **Byte 0** | 4B | 4A | 3B | 3A | 2B | 2A | 1B | 1A |
| **Byte 1** | 8B | 8A | 7B | 7A | 6B | 6A | 5B | 5A |


The undervoltage diagnostics of the actuator system power supply can be switched off with the left DIP switch.

## 4.4 Supported communication modes

- Polled I/O Message Connection
- Change of State / Cyclic Message Connection
- Explicit Message Connection

## 4.5 Diagnostic indication

**Diagnoseanzeige / Diagnostic indication**

| LED | Anzeige<br>Indication | Bedingung<br>Condition |
|---|---|---|
| 1...8 A/B | gelb<br>yellow | Kanalstatus<br>channel status |
| 1...8 A/<br>DIA | rot<br>red | Peripheriefehler<br>periphery fault |
| $U_S$ | grün<br>green | Sensorversorgung<br>sensor power supply |
| $U_L$ | grün<br>green | Aktorversorgung (nur 0930 DSL 700)<br>actuator power supply (only 0930 DSL 700) |
| MS | grün<br>green | Modul betriebsbereit<br>device is ready for operation |
| | grün blinkend<br>green blinking | fehlerhafte Konfiguration<br>wrong configuration |
| | rot<br>red | nicht korrigierbarer Fehler<br>unrecoverable fault |
| | rot blinkend<br>red blinking | korrigierbarer Fehler<br>recoverable fault |
| | rot/grün blinkend<br>red/green blinking | Selbsttest wird durchgeführt<br>self test is running |
| NS | grün<br>green | online, Kommunikation mit Steuerung<br>online, communication with PLC |
| | grün blinkend<br>green blinking | online, keine Kommunikation mit Steuerung<br>online, no communication with PLC |
| | rot blinkend<br>red blinking | Time-Out mindestens einer I/O-Verbindung<br>time-out state of one or more I/O connections |
| | rot<br><br>red | Fehlerhafte Kommunikation, Bus-off Status, redundante Mac-ID<br>Failed communication device, BUS-OFF Status, duplicate MAC-ID |

# 5. Technical data

## 5.1 General data

| | |
|---|---|
| Degree of protection | IP 67<br>(only in locked position) |
| Operating temperature range | -10°C / +60°C |
| Weight | 380 g |
| Housing | PBT |
| Vibration resistance oscillations | 15 g / 5–500 Hz |
| Vibration resistance shocks | 50 g / 11 ms |
| Torques: | |
| Fastening screw M4 | 1,0 Nm |
| Connector M12 | 0,5 Nm |

## 5.2 Technical data – Bus system

| | |
|---|---|
| Protocol | DeviceNet |
| Product code | 36 (DSL 700); 38 (DSL 701) |
| Device Profil | General Purpose Discrect I/O Device Type: 07 hex |
| EDS file | 0930DSL700.eds;<br>0930DSL701.eds |
| Data transmission rates | 125 / 250 / 500 KBit/s |
| Module adjustment | automatic adjustment of the data transmission rate |
| MAC_ID | switch position |
| Adjustment via address switch | 0–63 dec |
| Adjustment via DeviceNet | 99 dec |
| Default address | 63 dec |
| Connection | 7/8" male/female connector, 5 poles; please see pin assignment |

## 5.3 Technical data power supply – Electronics

| | |
|---|---|
| Rated voltage | 24 V DC |
| Voltage range | 11–30 V DC |
| Power consumption | 70 mA |
| Reverse polarity protection | yes |
| Connection | integrated in bus connections |

## 5.4 Technical data power supply – Sensors

| | |
|---|---|
| Rated voltage $U_S$ | min. ( $U_{System}$ - 1,5 V) |
| Max. sensor current/channel | 200 mA (at $T_u$ 30°C) |
| Short-circuit proof | yes |
| Indication ($U_S$) | LED green |
| Indication sensor short-ciricuit | LED red |
| ndication sensor supply $U_S$ | LED green |
| Connection | 0930 DSL 700:<br>7/8" male/female connector, 5 poles; please see pin assignment<br>0930 DSL 701:<br>generated by the electronics power supply |

## 5.5 Technical data power supply – Actuators (only 0930 DSL 700)

| | |
|---|---|
| Rated voltage $U_L$ | 24 V |
| Voltage range | 19–30 V DC |
| Power consumption (without load) | 20 mA max. |
| Galvanic separation | yes |
| Undervoltage threshold | 17 V |
| Delay time<br>Undervoltage detection | < 20 ms |
| Reverse polarity protection | yes, antiparallel diode (please see info) |
| Max. current consumption | 5 A |
| Indication actuator supply $U_S$ | LED green |
| Connection | 7/8"male connector, 3 poles |

The reverse polarity protection only works if the actuator system power supply is protected by a current overload fuse (10 A, mT) and switches off no later than 10–100 ms after a short circuit has occurred.

⚠ **NOTE!**
A power pack with current regulation or an incorrect fuse will result in the destruction of the module in the event of reverse polarity.

## 5.6 Technical data – Inputs

| | |
|---|---|
| Input circuit | Type 3 according to IEC 61131-2 |
| Rated input voltage | 24 V DC |
| Input current at 24 V DC | typ. 5 mA |
| Short-circuit proof | yes |
| Channel type N.O. | p-switching |
| Number of digital channels | 16 |
| Status indication | LED yellow per channel |
| Diagnostic indication | LED red per socket |
| Connection | M12 f emale connector, 5 poles; please see pin assignment |

## 5.7 Technical data – Outputs

| | |
|---|---|
| Output circuit | Type 1.6 A according to IEC 61131-2 |
| Rated output current per channel: | 1.6 A (please see Info 1) |
| Signal state "1" | max. 1.9 A |
| Signal state "0" | max. 1 mA (according to specification) |
| Signal level of the outputs: | |
| Signal state "1" | min. ($U_L$ - 1 V) |
| Signal state "0" | max. 2 V |
| Short-circuit proof | yes |
| Max. output current per module | 9.0 A (please see 2) |
| Overload-proof | yes |
| Number of digital channels | 16 |
| Channel type N.O. | p-switching |
| Status indication | LED yellow per channel |
| Diagnostic indication | LED red per channel/socket |
| Connection | M12 female connector, 5 poles; please see pin assignment |

The outputs are able to switch currents of 1.6 A with a frequency of 3 Hz with inductive loads of the utilization category DC13 (EN60947-5-1).

**Info 1:** Actuator short circuits/overloads are displayed by the channel-related error LED.

**Info 2:** Test proven and approved under the following conditions:
looped through System/Sensor power supply max. 2.5 A
Power supply cable STL 204 (5 x 1 mm²)
Operating temperature range max. 40°C
max. output current 12 A

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