Your Global Automation Partner

TURCK

BL67-GW-DN
DeviceNet Gateway

Instruction for Use

Table of Contents

1 About These Instructions

These operating instructions describe the structure, functions and the use of the product and will help you to operate the product as intended. Read these instructions carefully before using the product. This is to avoid possible damage to persons, property or the device. Retain the instructions for future use during the service life of the product. If the product is passed on, pass on these instructions as well.

1.1 Target groups

These instructions are aimed a qualified personal and must be carefully read by anyone mounting, commissioning, operating, maintaining, dismantling or disposing of the device.

1.2 Documentation concept

This manual contains all information about the DeviceNet gateway of the product line BL67 (BL67-GW-DN).

The following chapter contain a short BL67-description, a description of the used field bus system, exact information about function and structure of the field bus specific DeviceNet gateway as well as all bus specific information concerning the connection to automation devices, the maximum system extension etc.

The bus-independent I/O-modules of the BL67 system as well as all bus independent information as mounting, labeling etc. are described in a separate manual.

- BL67 I/O-modules (Turck documentation no.: German D300572; English D300529)

In addition to that, the mentioned manual contains a short description of the DTM, the project planning and configuration software tool for Turck I/O-systems.

1.3 Explanation of symbols used

The following symbols are used in these instructions:

DANGER

DANGER indicates a dangerous situation with high risk of death or severe injury if not avoided.

WARNING

WARNING indicates a dangerous situation with medium risk of death or severe injury if not avoided.

CAUTION

CAUTION indicates a dangerous situation of medium risk which may result in minor or moderate injury if not avoided.

NOTICE

NOTICE indicates a situation which may lead to property damage if not avoided.

NOTE

NOTE indicates tips, recommendations and useful information on specific actions and facts. The notes simplify your work and help you to avoid additional work.

➤ CALL TO ACTION

This symbol identifies steps that the user has to perform.

↪ RESULTS OF ACTION

This symbol identifies relevant results of steps

1.3.1 Additional documents

The following additional documents are available online at www.turck.com

- Data sheet
- Declaration of Conformity

1.4 Feedback about these instructions

We make every effort to ensure that these instructions are as informative and as clear as possible. If you have any suggestions for improving the design or if some information is missing in the document, please send your suggestions to techdoc@turck.com.

2 Notes on the Product

2.1 Product identification

These instructions apply to the BL67 gateway BL67-GW-DN.

2.2 Scope of delivery

- BL67-GW-DN
- 2 end brackets
- 1 end plate

2.3 Legal requirements

The device falls under the following EU directives:

- 2014/30/EU (electromagnetic compatibility)
- 2011/65/EU (RoHS Directive)

2.4 Manufacturer and service

Hans Turck GmbH & Co. KG
Witzlebenstraße 7
45472 Muelheim an der Ruhr
Germany

Turck supports you with your projects, from initial analysis to the commissioning of your application. The Turck product database contains software tools for programming, configuration or commissioning, data sheets and CAD files in numerous export formats. You can access the product database at the following address:www.turck.de/produkte

Should you have any further questions, please contact the sales and service team in Germany under the following telephone numbers:

Sales: +49 208 4952-380

Technology: +49 208 4952-390

Internet: www.turck.de

Outside Germany, please contact your local Turck representative.

3 For Your Safety

The product is designed according to state-of-the-art technology. However, residual risks still exist. Observe the following warnings and safety notices to prevent damage to persons and property. Turck accepts no liability for damage caused by failure to observe these warning and safety notices.

3.1 Intended use

The devices are only intended for use in industrial applications.

The BL67 gateway BL67-GW-DN is part of the BL67 system. It forms the interface to a DeviceNet network and forwards the data collected from the field by the BL67 I/O modules within the BL67 station to the higher-level DeviceNet master.

The devices may only be used as described in these instructions. Any other usage shall be considered improper and Turck shall not be held liable for any resulting damage.

3.2 General safety instructions

- The device may only be assembled, installed, operated and maintained by professionally trained personnel.
- The device may only be used in accordance with applicable national and international regulations, standards and laws.
- The device only meets the EMC requirements for industrial areas and is not suitable for use in residential areas.

4 DeviceNet – Fieldbus description

4.1 DeviceNet – system overview

DeviceNet is a low-cost communication link to connect industrial devices such as limit switches, photoelectric sensors, valve manifolds, motor starters, process sensors, bar code readers, variable frequency drives, panel displays and operator interfaces to a network and eliminate hard-wiring. The direct connectivity provides improved communication between devices as well as important device-level diagnostics not easily accessible or available through hard-wired I/O interfaces.

DeviceNet is based on a broadcast-oriented communications architecture - the Controller Area Network (CAN). CAN uses the CSMA/BA bus arbitration method. CSMA/BA assures that the highest priority message always gets transmitted. The DeviceNet protocol further defines message priorities such that I/O messages are given top priority and configuration messages have lower priority.

DeviceNet allows Peer-to-Peer data exchange (in which any DeviceNet product can produce and consume messages) and Master/Slave operation (called the Predefined Master/Slave Connection Set.)

4.1.1 Maximum system extension

A DeviceNet network supports up to 64 nodes and an unlimited amount of I/O. The bus uses a trunkline-dropline topology.

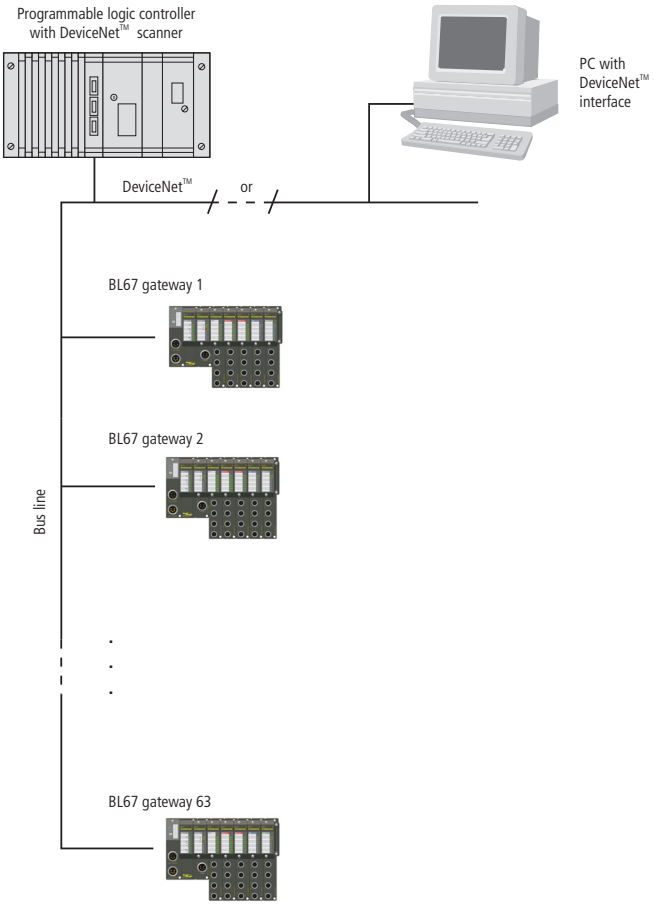


Fig. 1: Maximum system extension

4.1.2 Addressing

The valid range of DeviceNet node addresses is 0 to 63. The station default node address is 63. Each node's address must be set initially. The address is using the decimal rotary coding switches on the gateway; it can also be set with a DeviceNet configuration tool but it is not possible to allocate address directly via the bus.

4.1.3 Power distribution

Bus power and communication are supplied on a single cable. Bus power is 24 VDC and supplies current to operate the node as well as current to power input devices.

4.1.4 EDS files

Electronic data sheets, or EDS files, are specifically formatted ASCII files that contain detailed information about the device, including I/O data size and the device's configurable parameters. The information in an EDS guides a user through the steps necessary to configure a device. EDS files are available on disk or from the
Turck webside (www.turck.com).

4.1.5 Communication rate and cycle time

The DeviceNet specification defines three transmission speeds: 125, 250 and 500 kbps.

All nodes on a network must communicate at the same rate. The complete cycle time of a DeviceNet system is affected by several factors:

- the number of nodes being scanned
- he amount of data produced and consumed by the nodes
- type of I/O messaging (change of state, strobe, poll)
- network communication rate
- device time-out and explicit messaging traffic
- the cycle time of the control program

All of these factors must be considered when calculating the cycle time of a particular network.

4.1.6 Maximum ratings

The DeviceNet. bus uses a trunk and drop topology. The trunk is the main communication cable and requires a 121Ω resistor at both ends of the cable.

The length of the cable depends on the communication rate and the cable type.

Drops are branches off the trunk and may be from 0 to 6 m (20 ft). The cumulative drop lengths are dependent on the communication rate. The table below shows the maximum ratings for a trunk using a thick, mid or thin trunk cable in a DeviceNet network with the maximum number of 64 nodes:

Baud rate (max.)	Thick cable length (max.)	Mid cable length (max.)	Thin cable length (max.)	Drop length (cumulative)	Drop length (max.)
125 kbps	500 m (1640 ft)	300 m (984 ft)	100 m (328 ft)	6 m (20 ft)	156 m (512 ft)
250 kbps	250 m (820 ft)		100 m (328 ft)	6 m (20 ft)	78 m (256 ft)
500 kbps	100 m (328 ft)		100 m (328 ft)	6 m (20 ft)	39 m (128 ft)

4.2 Object model

All DeviceNet devices are described based on an unambiguous object model. Each device is exactly defined with the aid of objects.

The following graphic shows the most important objects of a DeviceNet device.

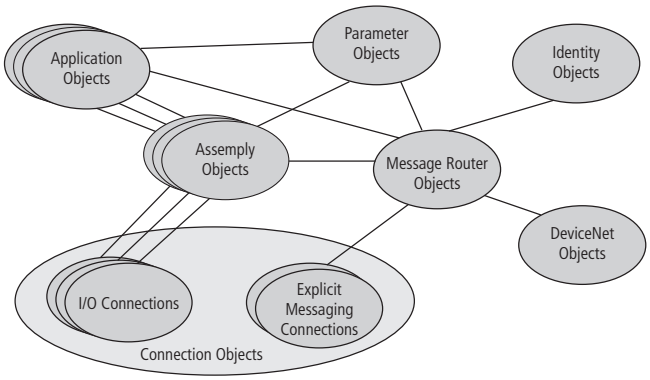


Fig. 2: DeviceNet network

The objects depicted in the graphic can be divided in to 3 groups.

4.2.1 Management objects

Define DeviceNet specific data and functions; these must be supported by all DeviceNet devices:

Identity Object

The Identity Object (Class Code 01Hex) contains all data necessary to clearly identify a node within a network, such as, Vendor ID, Device Type and Product Code. In addition, it contains the current status of a device, the serial number and the product name.

Message Router Object

The Message Router Object (Class Code 02Hex) makes it possible to access all classes and instances in the device via Explicit Messages.

4.2.2 Connection objects

- Define the messages exchanged via DeviceNet:

DeviceNet object

The DeviceNet object (Class Code 03Hex) must be supported by every device. It defines the physical connection of a device and the DeviceNet network. That means, it contains, amongst other things, the device address (MAC ID) and the currently set baud rate.

- Connection object

The Connection object (Class Code 05Hex) is supported by all DeviceNet devices in at least one instance. It defines the connection to the data via I/O Messages or Explicit Messages, the path and the length of the produced/consumed data, the CAN-Identifier used for the connection, time monitoring as well as the behavior in the case of error.

4.2.3 Application specific objects

Define device-specific data and functions (Application Objects, Parameter Object, Assembly Object).

- Application Objects

Application Objects describe simple applications in automation technology. These are either predefined in the DeviceNet object library or they are defined by the user.

- Parameter Object

The Parameter Object (Class Code 0FHex) is an interface to the configuration data and the parameters of a device. It contains an instance for each parameter, which is linked to the parameter to be set.

- Assembly Objects

The Assembly Object (Class Code 04Hex) offers the user a mapping option, meaning, data from attributes of differing instances in different classes can be summarized in a single attribute of an instance from an Assembly Object.

4.3 The DeviceNet communications profile

DeviceNet is based on a connection-oriented communications model. That means that it is only possible to exchange data via specified connections assigned to the devices.

The communication between the slaves in the DeviceNet network can be carried out either via I/O Messages or via Explicit Messages.

4.3.1 I/O Messages

I/O Messages serve to exchange high priority process and application data over the network. The communication between the slaves in the DeviceNet network is carried out according to the Server/Client Model, which means, a producing application transmits data to another or a number of consuming applications. It is quite possible that information is passed to a number of Application Objects in a single device.

The communication between the devices via I/O Messages requires that a IO Messaging Connection Object is set up. This can be achieved either by activating a static I/O Connection Object, which already exists in the device, via the predefined Master/Slave Connection Set, or via a dynamically set up I/O Connection Object. The latter can be set up via an Explicit Messaging Connection Object, which already exists in the device.

4.3.2 Explicit Messages

Explicit Message are used to transmit low-priority configuration data, general management data or diagnostic data between two specific devices. This is a point-to-point connection in a Server/Client System that requires that a request from a client always has to be confirmed by a response from the server.

As is the case with the I/O Messages, the communication between devices using Explicit Massages requires that a Connection Object, the Explicit Messaging Connection Object, is set up. This can be achieved either by activating a static Connection Object, which already exists in the device, via the Predefined Master/Slave Connection Set, or dynamically via the so-called UCMM port (Unconnected Message Manager Port) of a device.

4.3.3 Predefined Master/Slave Connection Set

The Group 2 Only Unconnected Explicit Message Port of the Predefined Master/Slave Connection Set provides an interface with which it is possible to assign up to 4 predefined connections. This model is based on the Master/Slave principle.

The predefined Connection Objects occupy the instances 1 to 4 in the Connection Object (Class ID 5):

Explicit Messages

Group 2 Explicit Request/Response Message (Class ID 5, Instance ID 1)

I/O Messaging Connection

- Polled I/O Connection (Class ID 5, Instance ID 2)
- Bit-Strobe I/O Connection (Class ID 5, Instance ID 3)
- Change of State (COS)/ Cyclic I/O Connection (Class ID 5, Instance ID 4)

4.3.4 Communications profile of the BL67 DeviceNet gateway

The DeviceNet gateway behaves as a DeviceNet Server in the network; the scanner of the higher-level controller operates as a DeviceNet Client.

The following DeviceNet communications types are supported:

- Polled I/O Connection
- COS Connection
- Cyclic I/O Connection
- Bit-Strobe I/O Connection
- UCMM
- Offline Connection Set
- Device Heartbeat Message
- Device Shut Down Message

Polled I/O Connection

A Polled I/O Connection establishes a conventional Master/Slave relationship between a controller and a DeviceNet device. A Polled I/O Connection is a point-to-point connection between two slaves on the fieldbus. The master (Client) transmits a Poll-Request to the slave (Server) who then answers with a Poll-Response.

COS I/O Connection

COS (Change Of State) I/O Connections establish event-controlled connections. That means that the DeviceNet devices generate messages as soon as a change of status occurs.

Cyclic I/O Connection

Messages are triggered time-controlled in Cyclic I/O connections by means of a time generator.

Bit-Strobe I/O Connection

A Bit-Strobe I/O Connection is a connection between a DeviceNet Client and an undefined number of Servers, the Servers being queried by transmitted commands via a Client. The length of the commands is limited to 8 bytes, with each possible node address in the system being assigned a bit within these 8 bytes. The servers answer a request with 8 bytes as well.

UCMM

The DeviceNet gateway offers the option of setting up dynamic Connection Objects via the UCMM port (Unconnected Message Manager Port).

Offline Connection Set

The offline connection set makes it possible to communicate with a node, which is in Communication-Fault but not in the Bus-OFF. It is not normally possible to communicate with such a node via the network; it either has to be switched off manually or re-initialized by turning it off and on. It is possible to communicate with just such a node over the network with the help of the Offline Connection Set.

Device Heartbeat Message

Device Heartbeat Messages enable DeviceNet devices to disclose their own statuses in configured intervals. These messages are configured in the Identity Object.

Device Shut Down Message

If a device has to shut itself down due to internal errors or statuses, it can sign off from the controller with a defined Device Shut Down Message.

Consistency Value

The non-volatile Required Configuration Memory can be tested with the assistance of the Consistency Value.

5 The DeviceNet Gateway for BL67

5.1 Introduction

This chapter contains a description of the BL67 gateway for the standardized fieldbus DeviceNet. The chapter is divided in to the following: a description of the functions, general and specific technical data, a description of address setting and the status indicators, the device profile, and the communications profile. In addition, it contains general explanatory notes about the DeviceNet fieldbus.

5.1.1 Function

The BL67 gateway makes it possible to operate a BL67 station on DeviceNet. The communication between the BL67 gateway and the higher-level controller complies with ODVA specification Rel. V2.0 and corresponds to the communications model described therein. It regulates the entire data traffic between the I/O level and the fieldbus. Information for the DTM is made available via the service interface.

NOTE

BL67 gateways for DeviceNet can only be used as DeviceNet servers.

The gateway supports the three DeviceNet baud rates 125 kbit/s, 250 kbit/s and 500 kbit/s.

Fig. 3: DeviceNet gateway

5.2 Connection and setting options

The gateway has the following connection and setting options:

- **PS/2 female connector**: This is the service interface for connecting the gateway with the DTM. This software allows BL67 station users to parameterize, configure and carry out diagnostics of their stations. The interface is a 6-pole mini DIN plug-in connection (female). Special connection cables or commercially available keyboard and adapter cables can be uses for connecting to a PC serial interface.
- **Sealed Mini-Style Connector:** Two Sealed Mini-Style Connectors (1 male connector + 1 female connector) are available for connecting the gateway to the fieldbus DeviceNet.
- **Two decimal rotary coding switches:** Used to set the DeviceNet address of the gateway.
- **One decimal rotary coding switch:** Used to set the baud rate.
- **SET button:** when the SET button is pressed, it saves the actual configuration of the station to the non-volatile memory of the gateway.

5.3 Dimensions/drilling plan

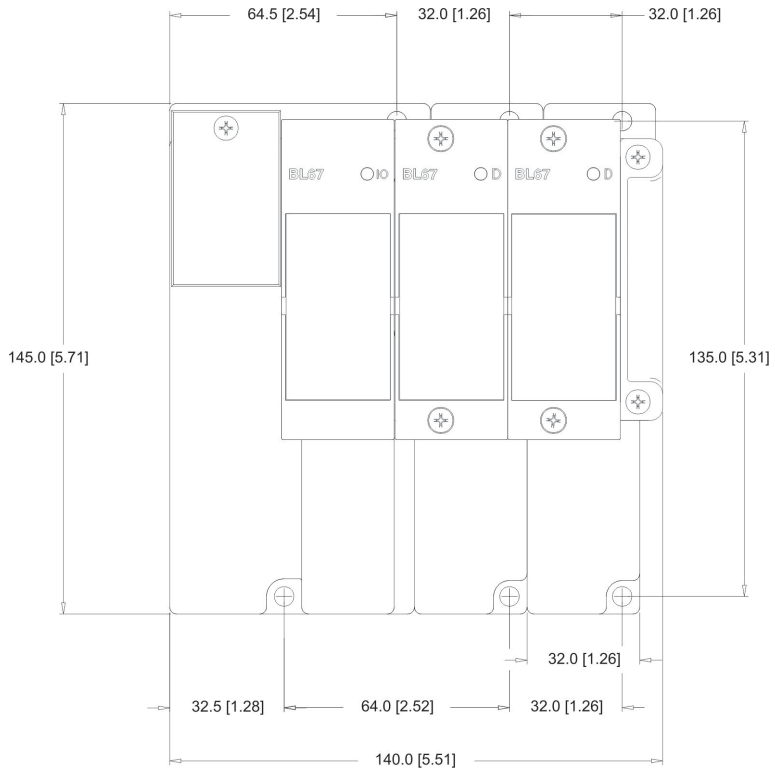


Fig. 4: Dimensions/drilling plan

5.4 Technical information

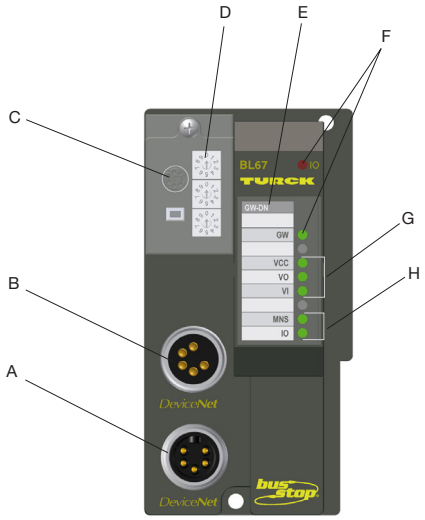


Fig. 5: BL67 Gateway for DeviceNet
A DeviceNet-IN
B DeviceNet-OUT
C Service-interface
D rotary coding switches
E Designation
F Module bus LEDs
G LEDs for voltage supply
H DeviceNet-LEDs

5.4.1 Structure diagram

The BL67 DeviceNet gateway has the following structure:

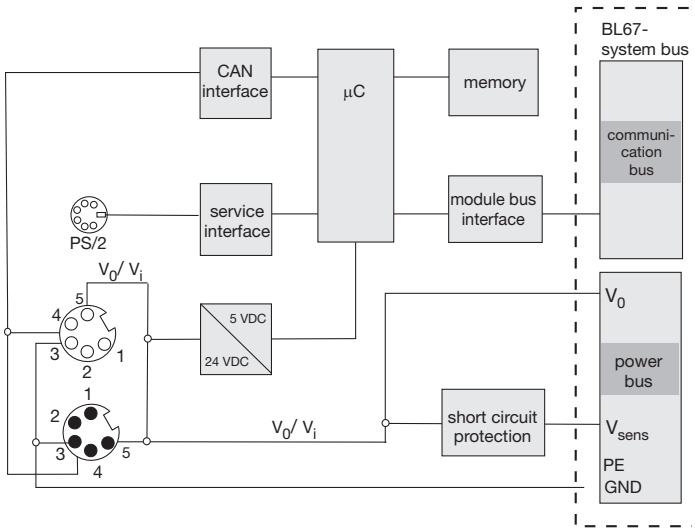


Fig. 6: Gateway structure

5.4.2 Technical data

WARNING

Defective power supply unit

Danger to life due to dangerous voltages on touchable parts

➤ Only use SELV or PELV power supplies in accordance with EN ISO 13849-2, which allow a maximum of max. 60 VDC or 25 VAC in the event of a fault.

CAUTION

Short-circuit in BL67 station

Fire hazard due to overcurrent

➤ Use a non-delay fuse (15 A) for overcurrent protection.

Technical data		
Supply voltage		
Demands on the voltage supply acc. to EN 61131-2		
System supply V_I (U_B)	24 V DC	Used to generate the galvanically isolated module bus supply
Permissible range	11…26 V DC	
Field supply V_O (U_L)	24 V DC	
I_{sys}	0.5 A	Current consumption CPU + module bus at maximum system extension
I_{MB}	Max. 1.5 A	Maximum output current of module bus supply
I_{Vi}	Max. 4 A	Short-circuit and overload protection of the sensor supply from gateway or power feeding module
I_{VO}	Max. 8 A	
Isolation voltage		
U_{DNET}	0 V DC	DeviceNet/module bus
U_{RS}	0 V DC	DeviceNet/service interface
Ambient conditions		
Ambient temperature		
– $t_{Ambient}$	-40…+70 °C /-40…158 °F	
– t_{Store}	- 40…+85 °C / -13…185 °F	
Relative humidity	100 % According to IEC 61131-2	
Climatic tests	According to IEC 61131-2	
Noxious gas	According to IEC 68068-42/43	
Resistance to vibration	According to IEC 61131-2	
Protection class	According to IEC 60529	IP67 (not evaluated by UL)

Technical data		
Use in wet location	Yes	USA/Canada: indoor use
Shock resistant	According to IEC 61131-2	
Topple and fall/free fall	According to IEC 61131-2	
Emitted interference		
High-frequency, radiated	According to EN 55011, Class A	
Immunity to interference		
Static electricity	According to IEC 61131-2	
Electromagnetic HF fields	According to IEC 61131-2	
Fast transients (Burst)	According to IEC 61131-2	
Conducted interferences induced by HF fields	According to IEC 61000-4-6 10 V Criteria A	
High energy transients (Surge), voltage supply	According to IEC 61000-4-5 0,5 kV CM, 12 Ω/ 9 µF 0,5 kV DM, 2 Ω/ 18 µF Criteria B	I/O-line-length ≤ 30 m
Reliability		
Electronic modules pull/plug cycles	20	
Dimensions		
Width x length x height (mm/ inch)	64.5 x 145.0 x 77.5 / 2.54 x 5.71 x 3.05	
Weight	359 g	
Diagnostic interface	PS/2-female connector	
Mounting	DIN rail mounting	
	Direct mounting on mounting plate	With M6 screws, see dimensions/drilling plan s. S. 20

Approvals

Designation	
Approvals	CE cULus

5.4.3

NOTE

This device can cause radio disturbances in residential areas and in small industrial areas (residential, business and trading). In this case, the operator can be required to take appropriate measures to suppress the disturbance at his own cost.

5.4.4 Fieldbus connection and power supply

NOTE

The minimum temperature rating of the cable to be connected to the field wiring terminals must be min. 75°C.

5.4.5 Fieldbus connection via sealed mini-style connector

Two sealed mini-style connectors (1 male connector + 1 female connector) are available for connecting the gateway to the fieldbus DeviceNet.

- Male connector for the incoming bus cable

Fig. 7: DeviceNet male connector

- Female connector for the outgoing bus cable

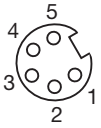


Fig. 8: DeviceNet female connector

5.4.6 Power supply via DeviceNet cable

The system is supplied with 24 V DC via the DeviceNet cable. An additional power supply at the gateways is not necessary.

Pin-No.	Function	Color
1	Drain	Shielding braid, not insulated
2	V+	Red
3	V-	Black
4	CAN_H	White
5	CAN_L	Blue

5.4.7 Service interface connection

Two types of cables can be used to connect the service interface (female PS/2 connector) to a PC for the purpose of using a DTM (project planning and diagnostics software).

- Special connection cable from Turck (IOASSISTANT-ADAPTERKABEL-BL20/BL67; Ident-No.: 6827133)
- Commercially available PS/2 cable with adapter cable SUB-D/ PS/2

Connection with connection cable

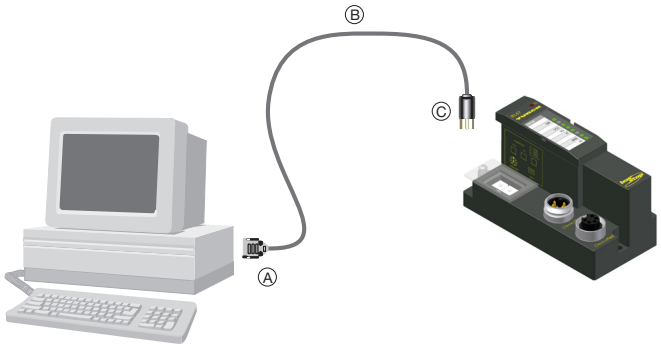


Fig. 9: BL67-gateway connected to PC via special cable

The cables have a PS/2 male connector (connection for female connector on gateway) and a SUB-D female connector (connection for male connector on PC).

Fig. 10: PS/2 male connector on the connection cable to the gateway (top view)

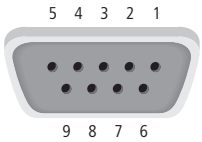


Fig. 11: 9-pole SUB-D female connector on the cable for connecting to PC (top view)

Connection using commercially available cables

A further possibility to connect PC and BL67 gateway is to use a commercially available connection and adapter cable.

The connection shown in the following figure (PS2-male/ PS2-male) is a 6-wire 1:1 connection.

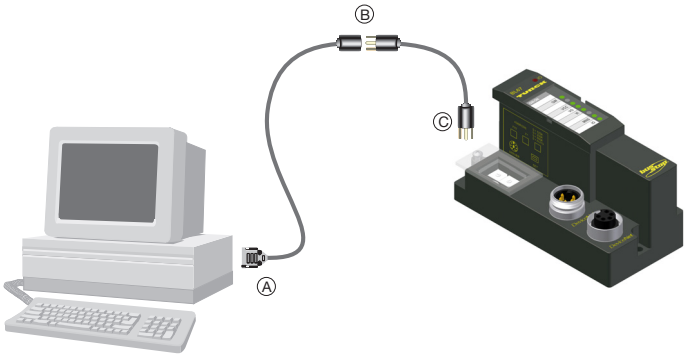


Fig. 12: Connection using commercially available cables
A SUB-D- female
B PS/2-female <–> PS/2-male
C PS/2-male

The following two cables are necessary:

- 1 x PS/2 cable (PS/2 male connector/PS/2 male connector) (commercially available keyboard extension cable)
- 1 x adapter cable (PS/2 female connector/SUB-D female connector) (commercially available extension cable for a PC mouse)

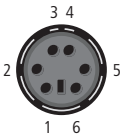


Fig. 13: PS/2 female connector on the gateway (top view)

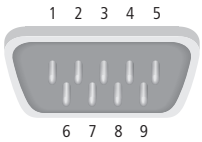


Fig. 14: 9-pole SUB-D male connector on PC (top view)

Pin assignment

The table below shows the pin assignments when using a PS/2 cable and adapter cable:

PS/2			9-pole serial interface on PC	
Pin-No.	Standard PS/2 male connector	BL67 Gateway: PS/2 female connector	Pin-No.	Male connector
1	CLK	+5V (from gateway)	4, 6 (not supported by all adapter cables.)	DTR, DSR
2	GND	GND	5	GND
3	DATA	Not connected	–	–
4	n.c. (DATA2)	TxD	2	RxD
5	+5V	/CtrlMode	7	RTS
6	n.c. (CLK2)	RxD	3	TxD

5.5 Setting up communications

5.5.1 Address setting

The address setting of the DeviceNet gateway on DeviceNet is performed via two decimal rotary coding switches on the gateway. These switches are positioned under a cover just below the service interface.

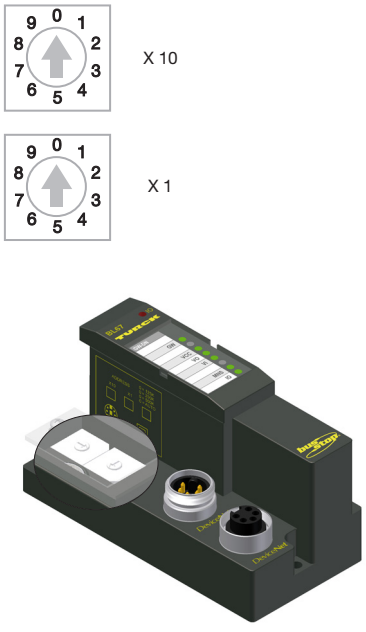


Fig. 15: Rotary coding switches for address setting

NOTICE

DeviceNet allows a maximum of 64 addresses (MAC IDs) to be assigned (00 to 63). Each address may be allocated only once in the entire bus structure.

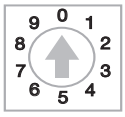
NOTE

It is not necessary to address the internal module bus.

The maximum bus structure for DeviceNet as well as the detailed data for connecting gateways to DeviceNet are described in **Kapitel 5 The DeviceNet Gateway for BL67**.

5.5.2 Setting the baud rate

The baud rate is set via the third decimal rotary coding switch. One of three possible baud rates will be supported depending on the setting.



0: 125 K
1: 250 K
2: 500 K
3: Auto

Fig. 16: Setting the baud rate

NOTICE

The cover at the decimal rotary coding-switches must be closed by tightening the screw after use.

The seal in the cover must not be damaged or slipped.

The protection class IP67 can only be guaranteed if the cover is closed correctly.

5.5.3 Field bus termination

The field bus has to be terminated via a special DeviceNet connector with an internal bus terminating resistor (RSM57-TR2, Ident- No.6602011).

5.5.4 Accepting a BL67 configuration

The DeviceNet gateway has three different memory areas available for saving the station configuration (number and type of the I/O modules that follow the gateway, and module parameter settings).

- Actual configuration memory
  Saves data of modules that follow the gateway and their parameter settings.
- Temp-required configuration memory
  Temporary memory for the station configuration, should this, for example, be altered by a configuration tool.
- Required configuration memory
  Non volatile memory of the complete station configuration. The list of modules contained in the Required Memory serves as a reference list for the exchange of process data.

5.5.5 SET button

The Current Configuration of the station is saved as the Actual Configuration when the SET button on the gateway is pressed for approximately 10 seconds; it is also saved to the both the Temp-Required Configuration Memory and the Required Configuration Memory. The LED "GW" flashes.

5.5.6 Configuring the BL67 station using a configuration tool

The configuration of a BL67 station is temporarily saved to the Temp-Required Configuration Memory when it is being configured with the aid of a configuration tool. To save this configuration as the reference configuration for the process data traffic in the Required Memory of the gateway, the following command must be carried out: SET_CFG _REQUEST (VSC100, Object Instance 2, Attribute No. 112).

NOTE

If the station configuration in the temporary memory no longer corresponds to the actual station configuration, then this is indicated by the "IOs" LED flashing (for further information see: Section "Status Indicators").

The command LOAD_CURRENT_CFG (VSC100, Object Instance 2, Attribute No. 112) loads the Current Configuration of the station from the Actual Configuration Memory into the Temp-Required and Required Configuration Memories.

The command RESTORE_OLD_GFG (VSC100, Object Instance 2, Attribute No. 112) loads the Required Configuration into the temporary memory.

NOTE

All temporarily saved configuration changes instigated by the configuration software are overwritten by the commands LOAD_CURRENT_CFG and RESTORE_OLD_GFG.

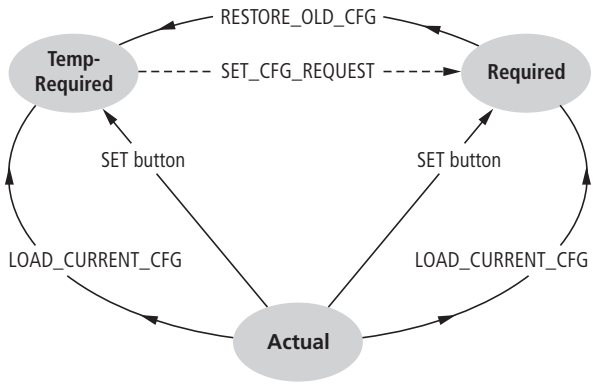


Fig. 17: Accepting the station configuration

The coupling of the DeviceNet gateway to programmable logic controllers (PLC) and the integration in to a DeviceNet network is described in Kapitel 5.

5.5.7 Diagnostic messages via LEDs

Every BL67 gateway displays the following statuses via LEDs:

- 2 LEDs for module bus communication (module bus LEDs): **GW** and **IOs**
- 2 LEDs for DeviceNet communication (fieldbus LEDs): **MNS** and **IO**
- 3 LEDs for monitoring the voltage supply (system, V_{CC}/ inputs, V_I/ outputs, V_O).

LED	Status	Meaning	Remedy
GW	Off	No voltage	Check the voltage supply. If the mains voltage is correctly connected, contact your Turck representative.
	Green	5 V DC operating voltage available; firmware active; gateway is ready to operate and transmit	-
	Green flashing, slowly, 1 Hz and LED IOs red	Firmware not active, software download necessary	Re-install the firmware or contact your Turck representative.
	Green flashing fast, 4 Hz	Firmware active, gateway hardware defect.	Replace the gateway.
IOs	Off and LED GW off	No voltage	Check the voltage supply.
	Green	Module bus active; configured list of modules corresponds to current list at the gateway; communication active.	-
	Green flashing	Station is in force mode of the DTM	Deactivate the force mode of the DTM.
	Red and LED GW off	Controller is not ready or V_{cc} level is not within the required range.	Check the power supply and its wiring. If the mains voltage is correctly connected, contact your Turck representative.
	Red	Module-bus error	Check the individual BL67 modules for correct mounting.

LED	Status	Meaning	Remedy
IOs	Red flashing, 1 Hz	Non-adaptable modification of the physical list of modules.	Compare the engineering of your BL67 station with the physical list of modules. Check the construction of your BL67 station for defect or incorrectly fitted electronic modules.
	Green flashing fast, 4 Hz	No module bus communication	Ensure that the guidelines for the use of power distribution modules have been observed.
	Red/green flashing	The engineered and current list of modules do not correspond; data exchange is still active.	Check your BL67 station for: – pulled modules – incorrectly fitted modules – subsequently fitted modules
V_{CC}	-	CPU not supplied	Check the system supply at the gateway.
	Green	Module bus and CPU running	-
V_O	OFF	Duplicate MAC ID-Check active	OFF
	Green	Supply of outputs ok.	Check the wiring at the gateway and the voltage supply.
	Green flashing, 1 Hz	Undervoltage V_O, System running	Check the system supply at the gateway-
	Green flashing, 4 Hz	Overvoltage V_O, System running	
	Off	No voltage supply.	
V_I	OFF	Duplicate MAC ID-Check active	-
	Green	Sensor supply ok.	-
	Green, flashing, 1Hz	Undervoltage V_I, system running	Check the wiring of the voltage supply at the gateway
	Green, flashing, 4Hz	Overvoltage V_I, system running	
	Red	Short circuit or overload at sensor supply → sensor supply switched off	Automatic restart when debugging.
	Off	No voltage supply.	Check the wiring of the voltage supply at the gateway

The function, meaning and color as well as the frequency of flashing of the LEDs "MNS" and "IO" are precisely defined in the ODVA.

LED	Status	Meaning	Remedy
MNS	OFF	Duplicate MAC ID-Check active	-
	Green	Connection(s) established, device status OK	-
	Green flashing, slowly	No connection established, device status OK	-
	Red	Network error	Check your devices for possible double MAC IDs. Check if the CAN controller is set to BUS OFF.
	Red flashing	Connection(s) are in Time Out	Check if the fieldbus cable is interrupted. Check if a field bus connector has been pulled. Check the 24 V fieldbus voltage.
IO	Green	Outputs are controlled and data exchange is active.	-
	Green flashing, slowly	At least one input/output is in the status "Idle State".	-
	Red	At least one input/output has an error.	
	Red flashing	At least one input/output is in Faulted State.	-

5.6 Device profile of the BL67 DeviceNet gateway

The BL67 DeviceNet gateway is based on the communications adapter profile according to ODVA specifications Rel. V2.0 (ODVA: Open DeviceNet Vendor Association).

It supports the following classes:

Classes	Class Code	
	dec.	hex.
Standard DeviceNet Classes		
Identity Class	1	01
Message Router Class	2	02
DeviceNet Class	3	03
Connection Class	5	05
Assembly Class	4	04
Off-link Connection Manager Class	6	06
Acknowledge Handler Class	43	2B

Classes	Class Code
Vendor Specific Classes (VSC) and Objects	

5.6.1 VSC – Vendor Specific Classes

As well as supporting the above standard DeviceNet classes, the DeviceNet gateway supports the following Vendor Specific Classes:

Class Code		Name	Description
dec.	hex.		
100	64	Gateway Class	Contains data and settings concerning the gateway and the BL67 system as a whole.
101	65	Terminal Slot Class	Contains data concerning the base modules
102	66	Process Data Class	Contains the entire process data
103	67	Power Supply Module Class	Describes the power distribution modules
104	68	Digital Input Module Class	Describes the modules of the type BL67-*DI-*
105	69	Digital Output Module Class	Describes the modules of the type BL67-*DO-*
106	6A	Analog Input Voltage Module Class	Describes the modules of the type BL67-*AI-U*
107	6B	Analog Output Voltage Module Class	Describes the modules of the type BL67-*AO-U*
108	6C	Analog Input Current Module Class	Describes the modules of the type BL67-*AI-I*
109	6D	Analog Output Current Module Class	Describes the modules of the type BL67-*AO-I*
110	6E	Analog Input RTD Module Class	Describes the modules of the type BL67-*AI- PT/NI
111	6F	Analog Input THERMO Module Class	Describes the modules of the type BL67-*AI-THERMO-PI
112 and 113	70 and 71	reserved	
114	72	RS232 Module Class	Describes the modules of the type BL67-*RS232
115	73	RS485/422 Module Class	Describes the modules of the type BL67-*RS485/422
116	74	SSI Module Class	Describes the modules of the type BL67-*SSI

A detailed description of the classes and instances with all attributes can be found in the Appendix.

5.7 Behavior by module replacement

BL67 modules can be replaced for maintenance purposes when the station is either online or offline.

The module bus communication continues without problem if the new module is of the same type as the old module; reference criterion is the identical catalogue number. All previously carried out parameter settings are saved in the non-volatile memory of the gateway; thus allowing them to be entered in to the new module from the gateway.

Any deviation between the new and the old station configuration will be indicated by flashing LED "IOs" (please refer to Section "Status Indicators").

NOTE

If the current configuration of the station and the altered station configuration do not match, meaning, if the new module differs from the pulled module, the LED IOs flashes red. The new module does not take part in exchanging process data; the process data are set to "0".

5.7.1 Replacing a gateway

It should be observed that those parameter settings of the gateway being replaced that differ from the gateway default parameters are not accepted.

The stations can be put in to operation again without the need for configuration tools. Once a gateway has been replaced, the station's configuration is saved in the new gateway by pressing the SET button.

NOTE

The module parameters are saved in the non-volatile memory of the modules, and can be read out by the gateway, by pressing the SET button.

5.8 Mixed operation with other station types

In addition to the BL67 gateway, it is possible to integrate other Turck devices or third-party devices that comply with the DeviceNet communications profile, in to the fieldbus system; thus enabling mixed operation. This makes the DeviceNet system extremely flexible and suitable for use in the most difficult of industrial environments.

6 Connection to Automation Devices

6.1 Introduction

This chapter contains detailed information about connecting a BL67 station to other automation devices, for example, programmable logic controllers (PLC) that comply with the DeviceNet profile.

DeviceNet is based on the DeviceNet specification of the Open DeviceNet Vendors Association (ODVA) Rel. V2.0, Vol. 1 and 2.

BL67 is compatible with all automation devices that comply with the communications profile according to the ODVA specification.

More detailed information concerning the individual controller systems and DeviceNet modules can be found in the respective manuals provided by the manufacturers.

The modules with which BL67 is to communicate must comply with the ODVA specification and the communication profile described therein.

This chapter contains a description of the connection to the SLC 500 controller, and the 1747-SDN Scanner Module manufactured by Allen Bradley.

Designations for hardware and software used in this manual are registered and protected trademarks of the respective manufacturer.

6.2 Address setting

Each BL67 gateway is assigned an address (MAC ID) in the DeviceNet structure. A maximum of 64 addresses (00 to 63) can be assigned. Each MAC ID may be allocated only once in the entire bus structure. The DeviceNet address is set using the decimal rotary coding switches on the gateway.

6.3 Field bus termination

As a DeviceNet slave, the BL67 gateway can be freely placed anywhere within the bus structure.

If the gateway is deployed as the last slave, it is necessary to terminate the DeviceNet with a terminating resistor to ensure continued error-free communication for the entire bus (Turck: RSM57-TR2, Ident no.: 6602011).

6.4 Electronic Data Sheet – EDS File

The BL67 gateway can be integrated in to the DeviceNet structure with the aid of a standardized EDS file.

The classes, instances and accompanying attributes of the BL67 modules are listed in the EDS file.

BL67 offers two different versions of EDS files: 6827183v1.eds and 6827183v1_SP.eds, which can be used according to the application. The EDS file 6827183v1_SP.eds provides the means for processing the selected instance of one module.

The respective current version of the EDS file is available from Turck. It is also possible to make an update by downloading the file from the Turck Homepage: www.Turck.com.

The following table shows the restrictions that result from the use of the respective EDS files.

	6827183v×.eds	6827183v×_SP.eds
Engineering	online / offline	online / -
ADR	✓	-
Supported instances	≤ 32 (incl. Power supply modules)	
Gateway parameterization	✓	✓
Monitoring	Diagnostic/ Parameter	Diagnostic/ Parameter/ Input/ Output
Maximum of each module type, configurable with the EDS-file. (Do not exceed the max. number of supported instances; necessary number of power supply modules has to be planned additional)	16 BL67-xAI-I 16 BL67-xAI-V 16 BL67-xAI-PT 16 BL67-xAI-TC 16 BL67-xAO-I 16 BL67-xAO-V 32 BL67-xDI-x 32 BL67-xDO-x	32 BL67-xAI-I 32 BL67-xAI-V 32 BL67-xAI-PT 32 BL67-xAI-TC 32 BL67-xAO-I 32 BL67-xAO-V 32 BL67-xDI-x 32 BL67-xDO-x
Advantage	Simplification of substitution of gateway and module at the same time	faster handling; max. no. of modules is restricted only by BL67 system limits

6.5 Mapping of process data

The process image of the BL67 gateway is depicted in WORD format (16 bit). The process data of successive modules of the same type, with process data of less than 1 word, are grouped together until 16 bits of process data is reached.

The process data is written in a new word when:

- 16-bit input data is reached and further input modules follow
- 16-bit output data is reached and further output modules follow
- An input module, whose process data length cannot be completely incorporated in the preceding word, follows on from another input module
- An output module, whose process data length cannot be completely incorporated in the preceding word, follows on from another output module.

Example station

- Gateway
- Module A: BL67-4DI-P
- Module B: BL67-2AI-U
- Module C: BL67-8DI-P
- Module D: BL67-4DI-P
- Module E: BL67-8DI-P
- Module F: BL67-8DO-0.5A-P
- Module G: BL67-2AO-I
- Module H: BL67-4DO-0.5A-P

- Module J: BL67-8DI- 0.5A-P
- Module K: BL67-8DO-2A-P

6.5.1 Data mapping for gateways with Maj. Rev. < 5.0

Produced Data (Word No.)	**Input Data (WORD Format) (Bit 15...→...0)**
0	Status Word of the Gateway (Mapping can be disabled via VSC100, instance 2., attr. 132 (84h))
1	A3, A2, A1, A0
2	B15, B14, ..., B1, B0
3	D3, D2, D1, D0; C7, C6, ..., C1, C0
4	J7, J6, ..., J1, J0; E3, E2, E1, E0
Consumed Data (Word No.)	**Output Data (WORD Format) (Bit 15...→... 0)**
0	Control Word of the Gateway (Mapping can be disabled via VSC100, instance 2., attr. 133 (85h))
1	F7, F6, ..., F1, F0
2	G15, G14, ..., G1, G0
3	K7, K6, ..., K1, K0; H3, H2, H1, H0

The example station transmits 5 word input data and 4 word output data accordingly.

6.5.2 Data mapping for gateways with Maj. Rev. ≥ 5.0

Produced Data (Word No.)	**Input Data**
0	Status Word of the Gateway (Mapping can be disabled using attr. 138 in VSC 100, Object Instance 2)
1 to n	Input data of modules (without RFID).
n + x	RFID status word of variable length. Values from "0 = disabled" to "2 = full: 6 bytes". See VSC 102, Object Instance 6, RFID status interface instance.
n + y	Summarized diagnostic data (s. p. 39). Can be enabled/disabled using VSC102, Object Instance 3, attr. 104.
n + z	Scheduled diagnostic data (s. p. 39). Can be enabled/disabled using VSC102, Object Instance 3, attr. 105.
Consumed Data (Word No.)	**Output Data**
0	Control Word of the Gateway (Mapping can be disabled using attribute 139 "GW CONTROL REGISTER" in Gateway Class (VSC 100), Object Instance 2)
1- n	Output data of the modules (without RFID).
n + x	RFID control word of variable length. Values from "0 = disabled" to "200". See VSC 102, Object Instance 5, RFID command interface instance.

NOTE

The data mapping can be structured individually. All parts except for the in- and output data of the station (wihtout RFID-data) can be enabled/ disabled independently from each other.

6.6 Diagnostic options

6.6.1 Summarized diagnostic data

NOTE

The Summarized Diagnostics possibility is only implemented in gateways with Maj. Rev. ≥ 5.0.

The summarized diagnostic data mode will send back 1 bit for each slice within the station. This bit will be "0" if there are no diagnostic flags set on the slice. If there are any diagnostic events on the slice the bit will be set to "1".

Values:

0 = ok

1 = module sends diagnostics, wrong module or module pullled (acc. to VSC 100, Gateway Class, Attr. 116).

The diagnostic bits are placed at the end of the input data. The diagnostic data start WORD aligned (see **Data Mapping for Gateways with Maj. Rev. ≥ 5.0**, s. **p. 37**).

6.6.2 Scheduled diagnostic data

NOTE

The Scheduled Diagnostics possibility is only implemented in gateways with Maj. Rev. ≥ 5.0.

The scheduled diagnostic data map is a time sliced module related data block, which holds diagnostic data of all modules with active diagnostics using a round robin mechanism.

This diagnostic "window" visualizes a specific module diagnostic data for approx. 125ms and changes over to the next active diagnostics afterwards. This is done automatically by the gateway.

The data length for the scheduled diagnostics is set according to properties of the modules attached to the gateway.

Word	Byte	Data
0	0	Slot number of the module which sends the diagnostic data.
	1	State of the diagnostic message: bit 5 = 1: diagnostic active bit 6 = 1: wrong module bit 7 = 1: module pulled (acc. to VSC 100, Gateway Class, Attr. 116)
n		Module diagnostics from the module actually referenced by the round robin mechanism.

The scheduled diagnostic data is placed at the end of the input data and after the summarized diagnositic data (see **Data Mapping for Gateways with Maj. Rev. ≥ 5.0**, s. **p. 38**).

6.7 Status register of the gateway

The Status Register of the gateway is assembled as follows:

Status Bit No.	Designation	Meaning
0 to 7	MESSAGE REGISTER	The Message Register of the Status Word is considered as a group of 8 bits (00h to FFh). The list of message and error codes are contained in the tables below.
8	OUTPUTS NOT PROCESSING	The BL67 outputs are no longer controlled by the process data of an I/O connection.
9	MODULE LIST WARNING	The current module list at the gateway has been modified, meaning: a module has been added, a module has been pulled or a module has been placed on a slot, which was pre-configured as empty.
10	LOCAL FORCE MODE	The force mode of the DTM is active, meaning, the outputs are being controlled by the DTM
11	MODULE DIAG	At least one module has a diagnostic message. Which module is transmitting a diagnostic message and what type of message this is indicated in Attribute 116 "MODULE DIAG SUMMARY" of the Gateway Class 100, Gateway Instance 2.
12	UNDERVOLTAGE FIELD SUPPLY V_I; OVERCURRENT/ SHORT-CIRCUIT I_I.	The fieldbus voltage supply at the fieldbus connector is < 18 V. or: The input current I_{IN} > 4 A.
13	MODULE LIST ERROR	The current module list at the gateway has been modified, meaning, at least one module has been replaced by a module with a different catalogue number.
14	MODULEBUS FAULT	Hardware error. The module bus communication is interrupted.
15	CMD CONFIRMATION	This bit reflects the ACTIVATE COMMAND bit of the Control Word. The execution of a command from the Command Register (Control Word) is confirmed by setting this bit.

Message Codes	Designation	Description
00h	MSG OK	No error
01h to 0Fh	Reserved	-
10h	ADD EXPL ESTABLISHED	There is at least one Explicit Message between the gateway and another slave.
11h to 1Fh	Reserved	-
20h	MODULE ID UNKNOWN	At least one module on the BL67 station is unknown, meaning, it is neither represented by an existing Vendor Specific Classes nor is it listed in the EDS file. Nevertheless, the module is taking part in process data exchange.

Error Codes	Designation	Description
80h to CF	Reserved	-
D0h	DUP MAC ID ERROR **A**	The Duplicate MAC ID Check has failed, because there is a module on the network with the same MAC ID.
D1h	MAC ID ERROR	The set MAC ID has exceeded the 63 address limitation.
D2h	BAUDRATE NOT PERMITTED	The baud rate set using the DIP switches on the gateway is not permissible.
D3h to DFh	Reserved	-
E0h	EEPROM ERROR **A**	Internal error. Gateway replacement required.
E1h	ROTARY CODING SWITCH, DIP SWITCH ERROR **A**	
E2h	ROM/FLASH CRC ERROR **A**	
E3h to EF	Reserved	-
F0h	CFG MODIFICATION IN PROGRESS	The station's configuration at the gateway is being modified.
F1h to FE	Reserved	-
FFh	CMD PROCESSING ERROR	An error has occurred as a command was being executed. The command will not be carried out.

A This status can only be read out by the DTM via the service interface on the gateway.

6.8 Control register of the gateway

The Control Register of the gateway is assembled as follows:

Control Bit No.	Designation	Meaning
0 to 7	COMMAND REGISTER	The Message Register of the Status Word is considered as a group of 8 bits (00h to FFh). The list of Command Codes is contained in the following table.
9 to 14	Reserved	-
15	ACTIVATE COMMAND	The execution of a command of the Command Register (Control Bit 0 to 7) is initiated by setting the bit (0 →1).

Command Codes	Designation	Description
00h	ABORT CMD	A pending command is aborted, no other command is given.
01h to 7Fh	Reserved	-

Command Codes	Designation	Description
80h	FORCE OUTPUTS OFF	The output of Consumed Data is stopped. The outputs are no longer operated via I/O Connections; they are switched off. This command can be revoked either by using the command FORCE OUTPUTS PROCESSING or via a Reset.
81h	FORCE OUTPUTS FAULT VALUES	
82h	FORCE OUTPUTS HOLD	
83h	FORCE OUTPUTS PROCESSING	The exchange of process data is taking place again. The outputs are communicating via I/O Connections.
84h to EFh	Reserved	-
F0h	MODULEBUS SHUTDOWN	The transmission of data via the module bus is stopped. The reaction of the individual BL67 modules depends on their respective parameterization.
F1h	RESTART MODULE BUS	The transmission of data via the module bus will be started. The module list at the gateway will be read in. The exchange of data between the gateway and the modules is taking place again.
F2h tot FFh	Reserved	-

6.9 Reading-in without configuration tool

The current BL67 station configuration at the gateway is saved to the non-volatile Required Memory of the gateway when the SET button on the gateway is pressed, thus making it possible for the configuration to be read out by the DeviceNet scanner. This means that the BL67 station can be configured without the need for a configuration tool.

6.10 Connection to SLC 500 from Allen Bradley

6.10.1 Setting up communications with RSLinx

The software tool "RSNetworx" (version 4.12.00) from Rockwell Automation is used to configure the connection of a BL67 gateway with an Allen Bradley SLC 500. Before a connection to this tool can be established, access to the DeviceNet must be created using the software "RSLinx" (version 2.41.00) from Rockwell Automation.

The following explains the creation of a connection via the node 1770-KFD.

The selection of the DeviceNet Driver module is made using the "Communications → Configure Drivers" command.

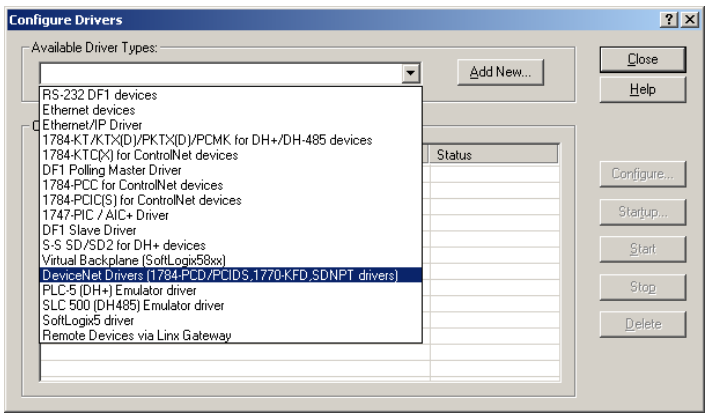


Fig. 18: Selecting the driver type category

Once the type of device has been selected, click the "Add new" button to select the driver module, for example, the 1770-KFD.

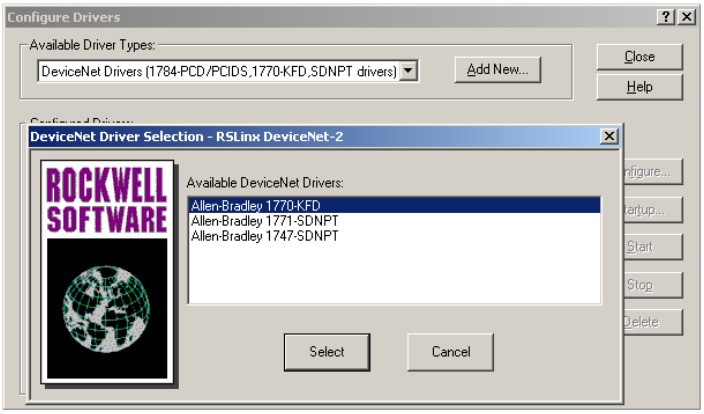


Fig. 19: Selecting the DeviceNet Driver module

The node is configured in the window that opens, which means for example, that the data transmission rate, the serial interface, the node address as well as the baud rate are entered.

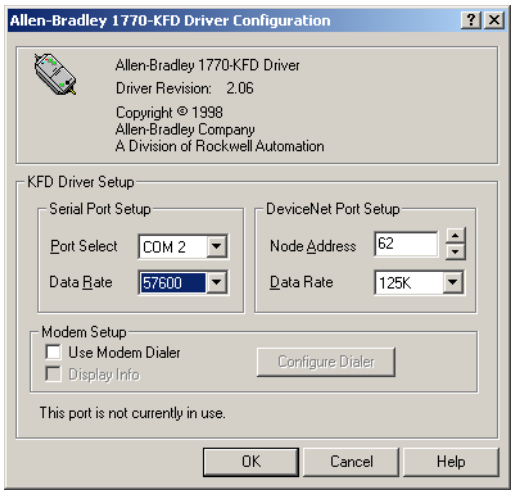


Fig. 20: Configuring the 1770-KFD

The connection to the DeviceNet is established following successful configuration of the KFD tool.

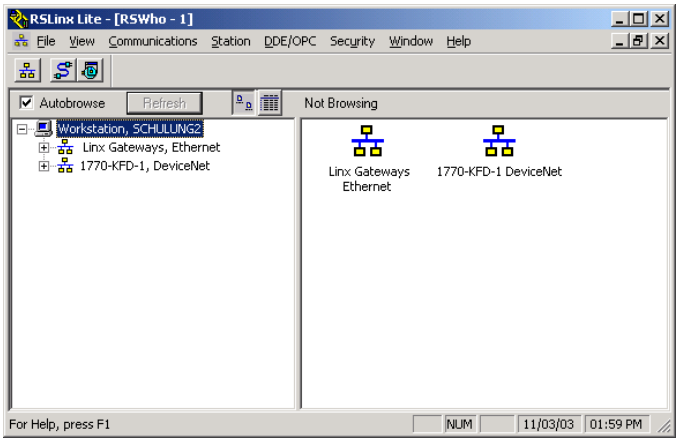


Fig. 21: Depicting the DeviceNet network in RSLinx

6.10.2 Configuring the DeviceNet network with RS Networx

The BL67 gateway is integrated in to the DeviceNet network using the configuration software RSNetworx from Allen Bradley.

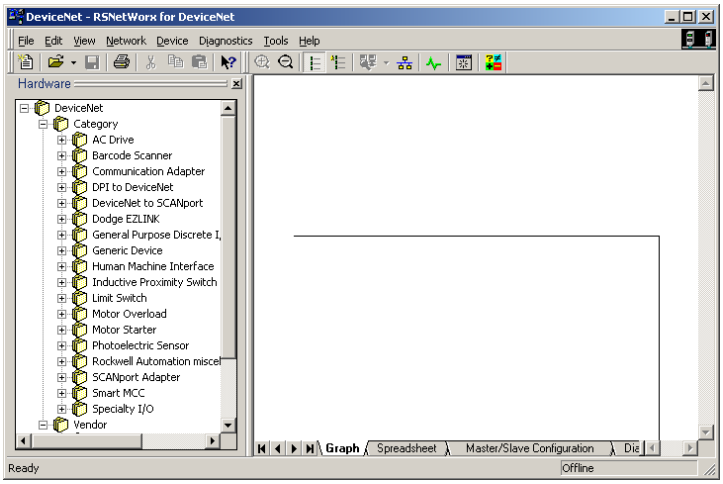


Fig. 22: The Software RSNetworx

Reading in the EDS file

- Create a new or open an existing project.
- Open the EDS Wizard using the "Tools → EDS Wizard" command.

Click the "Register an EDS file(s)" button to add the EDS file to be registered to the program's database, in this case the 6827183V1.eds.

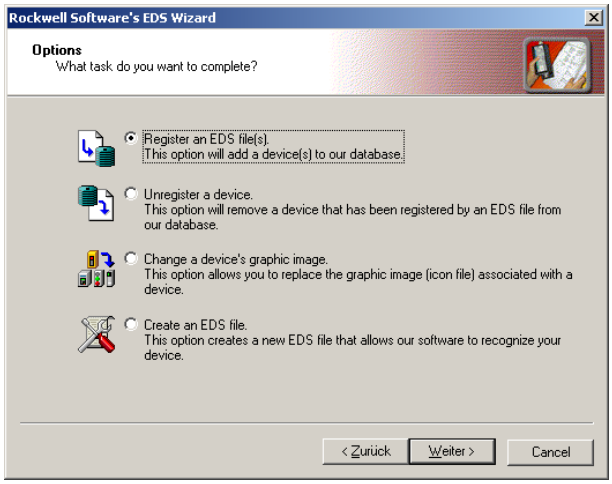


Fig. 23: Registering the EDS File

The BL67 gateway appears in the hardware catalogue of the software following correct registering of the EDS file.

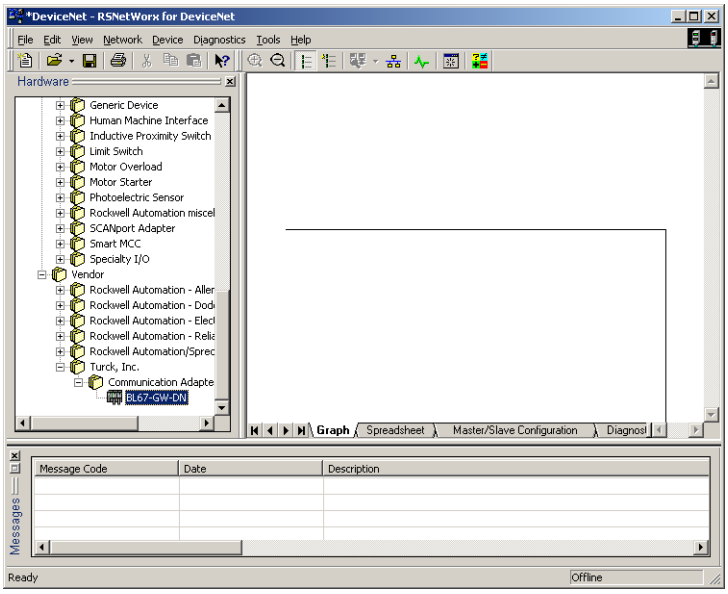


Fig. 24: Hardware catalog with BL67 gateway

Offline configuration of the network

The network nodes are selected from the hardware catalogue using the drag-and-drop operation or by double-clicking on the product name. In this example, the Allen Bradley "1747-SDN Scanner

Module" and the DeviceNet driver module "1770-KFD RS232 Interface" are used as well as the BL67 gateway.

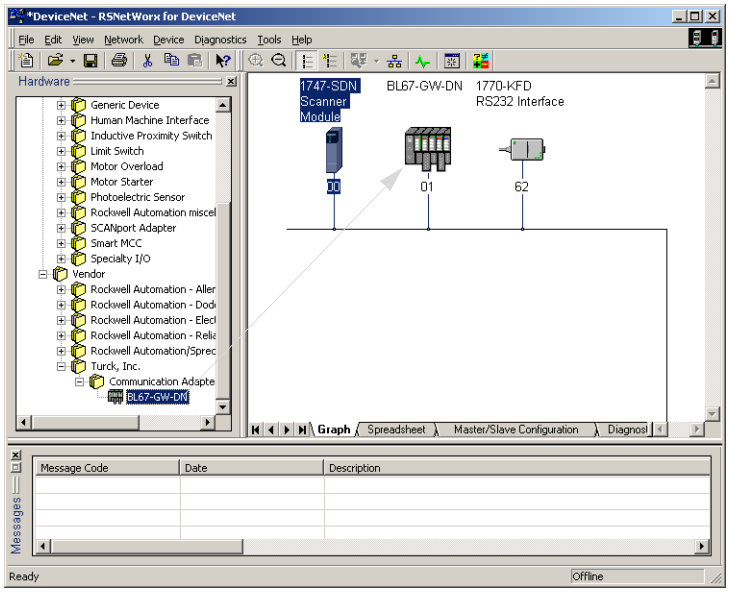


Fig. 25: Selecting the BL67 gateway

NOTE

It should be observed when configuring the network that the node address of the KFD tool matches the address that was allocated when establishing communications in RSLinx.

Configuration of the DeviceNet gateway and the connected BL67 station

The DeviceNet gateway is configured via the "Device → Device properties" command.

The allocation of a station name and the node address is made in the "General" tabbed page.

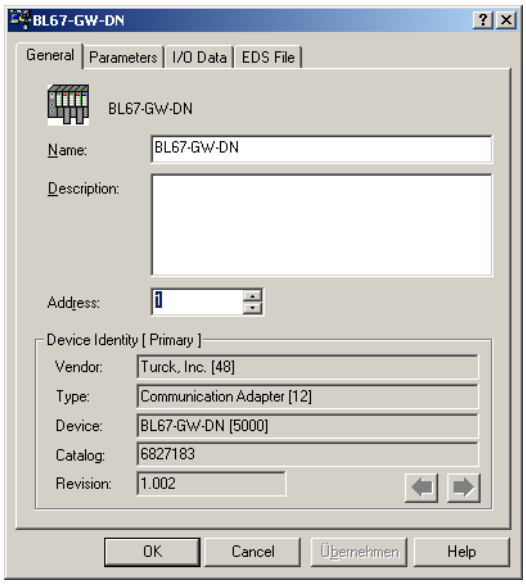


Fig. 26: Setting the node address of the BL67 gateway

Setting the gateway parameters

The gateway parameters are set in the "Device Parameters" tabbed page, where the gateway and the connected modules can be parameterized offline.

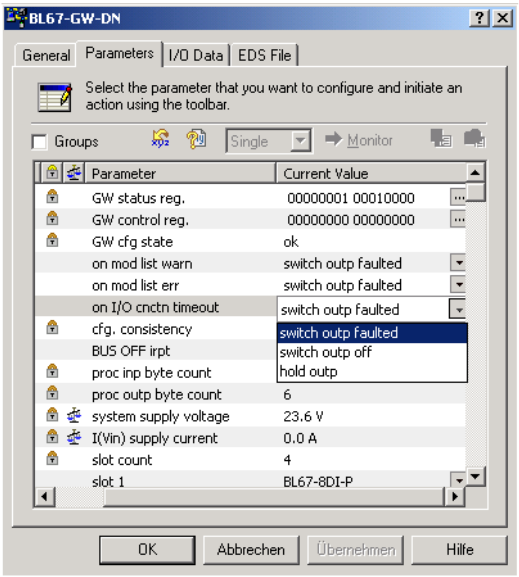


Fig. 27: Setting the gateway parameters

The gateway parameters occupy the lines "cfg. consistency" to "on I/O cnctn timeout". The following Ids are reserved for the BL67 I/O modules.

Offline configuration of the BL67 station

The offline configuration of the BL67 station is also carried out in this tabbed page.

Double-click the text "EMPTY BASE TERMINAL". The respective I/O modules can be selected from the pull-down menu that opens.

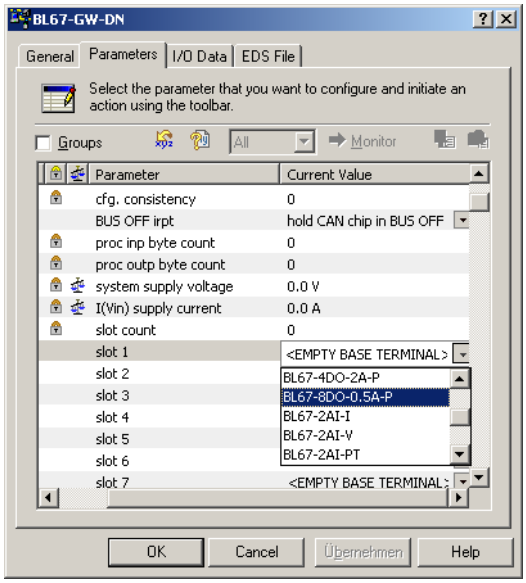


Fig. 28: Selecting the BL67 modules

Online mode

Change to the online mode following the offline configuration of the station using the "Network → Online" command or by clicking the corresponding button on the tool bar.

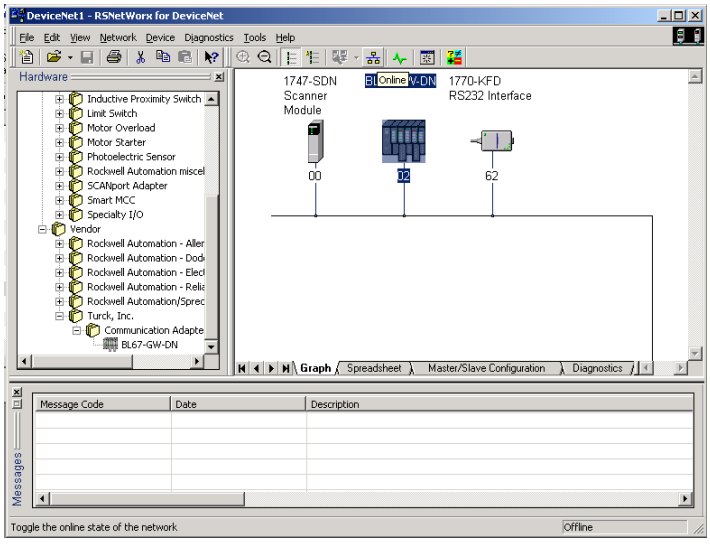


Fig. 29: Changing to the online mode

Incorporating the BL67 station in the scan list of the DeviceNet scanner

In order for the 1747-SDN Scanner Module of the SLC 500 to be able to communicate with the BL67 gateway the BL67 gateway has to be included in the scan list of the 1747-SDN Scanner Module.

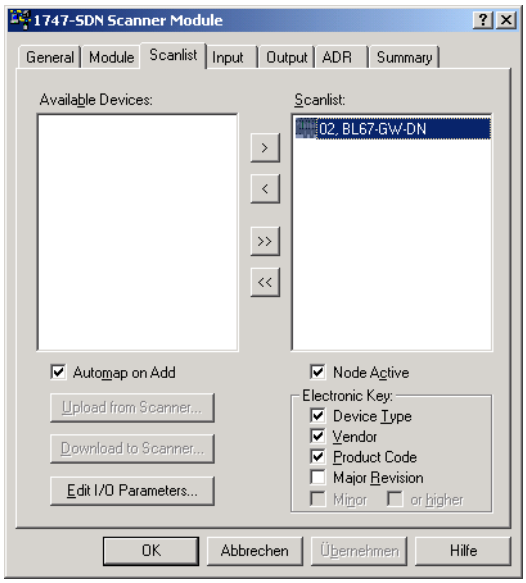


Fig. 30: Incorporating the BL67 Station in the Scan List

Click the "Edit I/O Parameters" button to determine the type of process data exchange (Bit Strobe, COS, Cyclic, Polling) as well as the exact length of input and output data for the respective station.

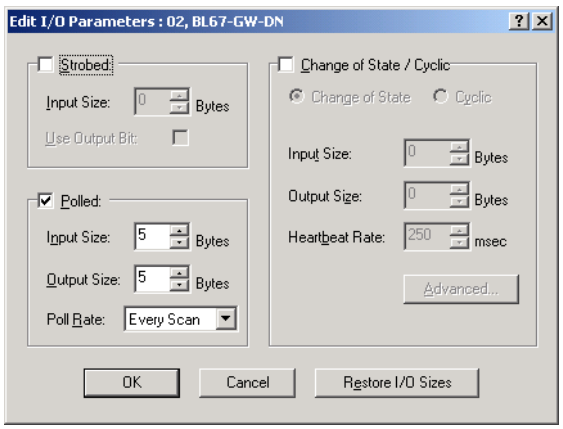


Fig. 31: Setting the type of data transmission

Mapping the input and output data

The tabbed pages "Input" and "Output" display the address of the input and output data in the controller. These can either be automatically mapped by clicking the "AutoMap" button or assigned by setting a start word in the "Start word" box. The addresses set here are accessed in a program in the SLC 500.

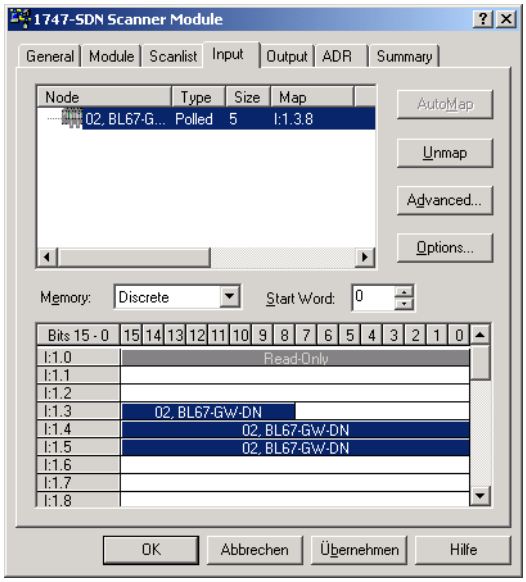


Fig. 32: Mapping the input data

Parameterization and diagnostic of the BL67 station

Double-click the BL67 gateway icon to open the "BL67 -GW-DNET" window. The diagnostics of all the modules on the BL67 station are contained in the tabbed page "Parameters".

The lines "cfg. consistency" to "on I/O cnctn timeout" relate to the gateway, thereafter the BL67 modules follow in the order in which they were plugged in the station.

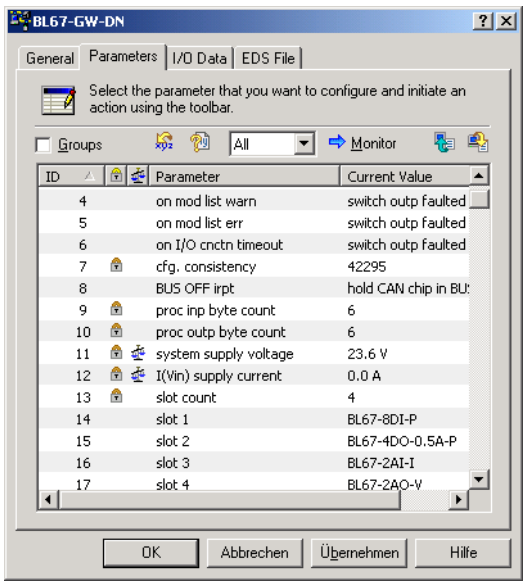


Fig. 33: Station parameters

Status and control word of the cateway

The Status Word and the Control Word of the gateway are displayed in positions two and three of the gateway-specific data.

The following shows the Status Word with the error message "module list warning". This message indicates that the module list saved in the gateway does not correspond to the current one now attached to the gateway.

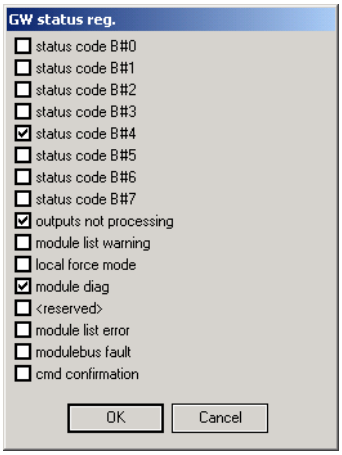


Fig. 34: Status Word with module diagnostics

Please refer to Table 13 to Table 17 for a detailed description of the Status Word and the Control Word as well as their bit assignments.

6.10.3 BL67 station diagnostics

Select the module group from the pull-down menu "Groups" for which the parameters and diagnostics are to be displayed.

As an example, the following indicates an "value range error" at the analog input module.

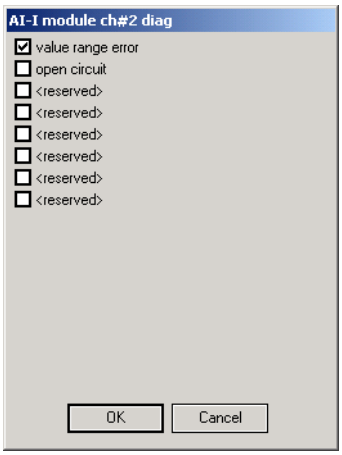


Fig. 35: Diagnostic example

Parameterization of the BL67 station

The BL67 modules are also parameterized in the "BL67 -GW-DN" window.

Double-click the line with the parameters of the respective module to open the window with the parameter settings.

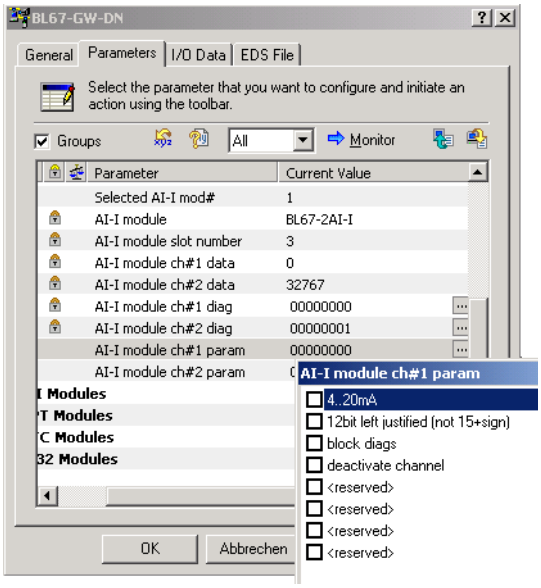


Fig. 36: Setting the parameters of a BL67 module

Altered parameter settings are loaded in to the BL67 gateway by clicking the appropriate button.

Explicit Messaging with the Class Instance Editor

The Class Instance Editor offers the option of Explicit Messaging, meaning, direct reading or writing access to the Classes and Instances of the BL67 modules.

Please refer to the "Appendix" for a list and description of the Classes and Instances.

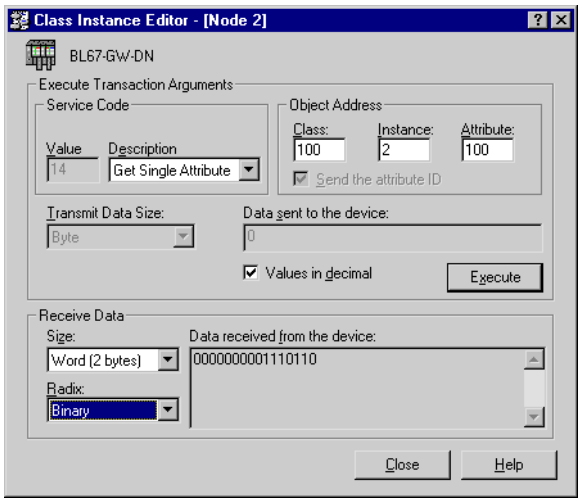


Fig. 37: The Class Instance Editor

Explicit Messaging via transaction blocks

Allen Bradley enables Explicit Messaging for transmitting low priority configuration data, general management data or diagnostic data between two specified devices via transaction blocks of the controller software.

NOTE

Please refer to the respective manuals included in the range of supply for more detailed information about operating the software from Rockwell Automation.

7 Guidelines for Station Planning

7.1 Module arrangement

7.1.1 Random module arrangement

The arrangement of the I/O modules within a BL67 station can basically be chosen at will.

Nevertheless, it can be useful with some applications to group certain modules together.

7.2 Complete planning

The planning of a BL67 station should be thorough to avoid faults and increase operating reliability.

NOTE

If there are more than two empty slots next to one another, the communication is interrupted to all following BL67 modules.

7.3 Maximum system extension

A BL67 station can consist of a gateway and a maximum of 32 modules (equivalent to 1 m station length).

The following overview shows the maximum number of channels possible under these conditions:

- The entire station is made up of the respective channel type only.

Module type	Maximum number		
	Channels	Modules	
BL67-4DI-P	128	32	
BL67-8DI-P	256	32	
BL67-4DO-xA-P	128	32	
BL67-8DO-0.5A-P	256	32	
BL67-2AI-I	64	32	
BL67-2AI-V	64	32	
BL67-2AI-PT	64	32	
BL67-2AI-TC	64	32	
BL67-2AO-I	64	32	
BL67-2AO-V	50	25	Limited due to the high current consumption on the module bus (5 V)
BL67-1RS232	15	15	
BL67-1RS485/422	22	22	
BL67-1SSI	22	22	
BL67-2RFID-C	8	4	

Module type	Maximum number	
BL67-2RFID-A	8	4

Ensure that a sufficient number of Power Feeding modules are used if the system is extended to its maximum.

NOTE

If the system limits are exceeded, the DTM generates an error message when the user activates the command "Station Verify station".

7.3.1 Creating potential groups

Power Feeding modules can be used to create potential groups. The potential isolation of potential groups to the left of the respective power distribution modules is provided by the base modules.

7.4 Plugging and pulling electronic modules

BL67 enables the pulling and plugging of electronic modules without having to disconnect the field wiring. The BL67 station remains in operation if an electronic module is pulled.
The voltage and current supplies as well as the protective earth connections are not interrupted.

NOTICE

Pulling or plugging of modules under load
Interruption of module bus communication, undefined states of I/Os
➤ Disconnect the station from the voltage supply
➤ Pull or plug I/O module

7.5 Extending an existing station

NOTICE

Station expansion under load
Risk of injury due to electric shock!
➤ Switch off the power supply.
➤ Secure the power supply against being switched on again.
➤ Ensure that the unit is de-energized.

7.6 Firmware download

Firmware can be downloaded via the service interface on the gateway using the DTM. More information is available in the program's online help.

NOTICE

Firmware download under load
Damage of the firmware
➤ Disconnect the station from the modules bus before the download.
➤ Disconnect the field side.

8 Guidelines for Electrical Installation

8.1 General notes

8.1.1 General

Cables should be grouped together, for example: signal cables, data cables, heavy current cables, power supply cables.

Heavy current cables and signal or data cables should always be routed in separate cable ducts or bundles. Signal and data cables must always be routed as close as possible to ground potential surfaces (for example support bars, cabinet sides etc.).

8.1.2 Cable routing

Correct cable routing prevents or suppresses the reciprocal influencing of parallel routed cables.

8.1.3 Cable routing inside and outside of cabinets:

To ensure EMC-compatible cable routing, the cables should be grouped as follows:

Various types of cables within the groups can be routed together in bundles or in cable ducts.

Group 1:

- shielded bus and data cables
- shielded analog cables
- unshielded cables for DC voltage ≤ 60 V
- unshielded cables for AC voltage ≤ 25 V

Group 2:

- unshielded cables for DC voltage > 60 V and ≤ 400 V
- unshielded cables for AC voltage > 25 V and ≤ 400 V

Group 3:

- unshielded cables for DC and AC voltages > 400 V

The following group combination can be routed only in separate bundles or separate cable ducts (no minimum distance apart):

Group 1/Group 2

The group combinations:

Group 1/Group 3 and Group 2/Group 3

must be routed in separate cable ducts with a minimum distance of 10 cm apart. This is equally valid for inside buildings as well as for inside and outside of switchgear cabinets.

Cable routing outside buildings

Outside of buildings, cables should be routed in closed (where possible), cage-type cable ducts made of metal. The cable duct joints must be electrically connected and the cable ducts must be earthed.

WARNING

Insufficient lightning protection measures

Risk of death due to lightning strike

➤ When installing cables outside buildings, observe all applicable guidelines for internal and external lightning protection and all earthing regulations.

8.1.4 Lightning protection

The cables must be routed in double-grounded metal piping or in reinforced concrete cable ducts.

Signal cables must be protected against overvoltage by varistors or inert-gas filled overvoltage arrestors. Varistors and overvoltage arrestors must be installed at the point where the cables enter the building.

8.1.5 Transmission cables

The slaves on the bus are connected to one another with fieldbus lines that correspond to the DeviceNet specification (ODVA Spec. Rel. V2.0).

The bus cables must be terminated at the beginning and end with a bus terminating resistor. This can be connected via the number 4 DIP switch on the gateway.

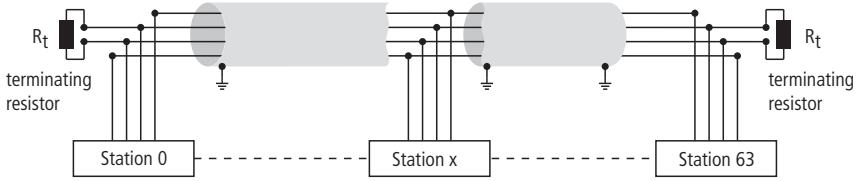


Fig. 38: Representation of a bus cable

8.1.6 Cable types

The following types of cables are used in DeviceNet:

- Thick Cable
  Thick DeviceNet cables are used mostly as rigid trunk cables.
- Thin Cable
  Thin, flexible DeviceNet cables are used for drop lines.
- Flat Cable
- Cable II
- Cable I

Please refer to the DeviceNet specifications (ODVA Spec. Rel. V2.0, Vol. 1) or the ODVA homepage: www.odva.org.

The following diagram shows the schematic construction of a "round" DeviceNet cable:

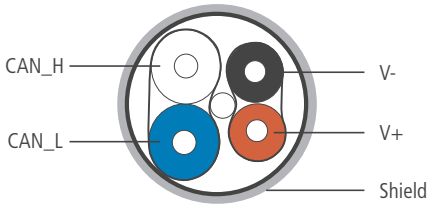


Fig. 39: DeviceNet cable schematic

8.2 Potential relationships

8.2.1 General

The potential relationship of a DeviceNet system realized with BL67 modules is characterized by the following:

- The system supply of gateway and I/O modules as well as the field supply are realized via one power feed at the gateway.
- All BL67 modules (gateway, Power Feeding and I/O modules), are connected capacitively via base modules to the mounting rails.

The block diagram shows the arrangement of a typical BL67 station.

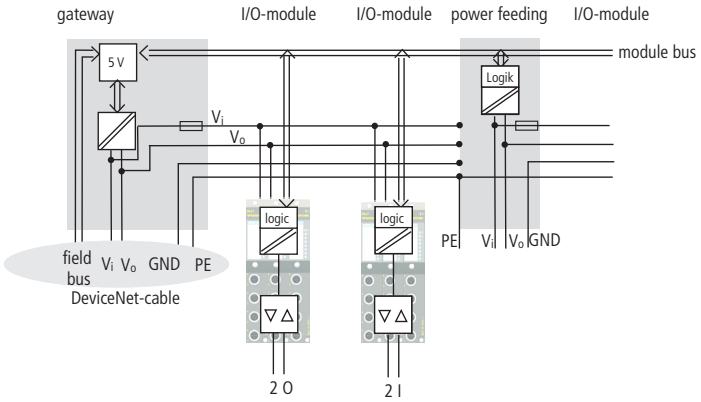


Fig. 40: Block diagram of a BL67 station

8.3 Electromagnetic Compatibility (EMC)

BL67 products comply in full with the requirements pertaining to EMC regulations.

Nevertheless, an EMC plan should be made before installation. Hereby, all potential electromechanical sources of interference should be considered such as galvanic, inductive and capacitive couplings as well as radiation couplings.

8.3.1 Ensuring Electromagnetic Compatibility

The EMC of BL67 modules is guaranteed when the following basic rules are adhered to:

- Correct and large surface grounding of inactive metal components.
- Correct shielding of cables and devices.
- Proper cable routing – correct wiring.
- Creation of a standard reference potential and grounding of all electrically operated devices.
- Special EMC measures for special applications.

8.3.2 Grounding of inactive metal components

All inactive metal components (for example: switchgear cabinets, switchgear cabinet doors, supporting bars, mounting plates, tophat rails, etc.) must be connected to one another over a large surface area and with a low impedance (grounding). This guarantees a standardized reference potential area for all control elements and reduces the influence of coupled disturbances.

- In the areas of screw connections, the painted, anodized or isolated metal components must be freed of the isolating layer. Protect the points of contact against rust.
- Connect all free moving groundable components (cabinet doors, separate mounting plates, etc.) by using short bonding straps to large surface areas.
- Avoid the use of aluminum components, as its quick oxidizing properties make it unsuitable for grounding.

WARNING

Grounding of inactive metal components
Danger to life due to dangerous contact voltage
➤ Connect earth to the protective conductor

8.3.3 PE connection

A central connection must be established between ground and PE connection (protective earth).

8.3.4 Earth-free operation

Observe all relevant safety regulations when operating an earthfree system.

8.3.5 Mounting rails

All mounting rails must be mounted onto the mounting plate with a low impedance, over a large surface area, and must be correctly earthed.

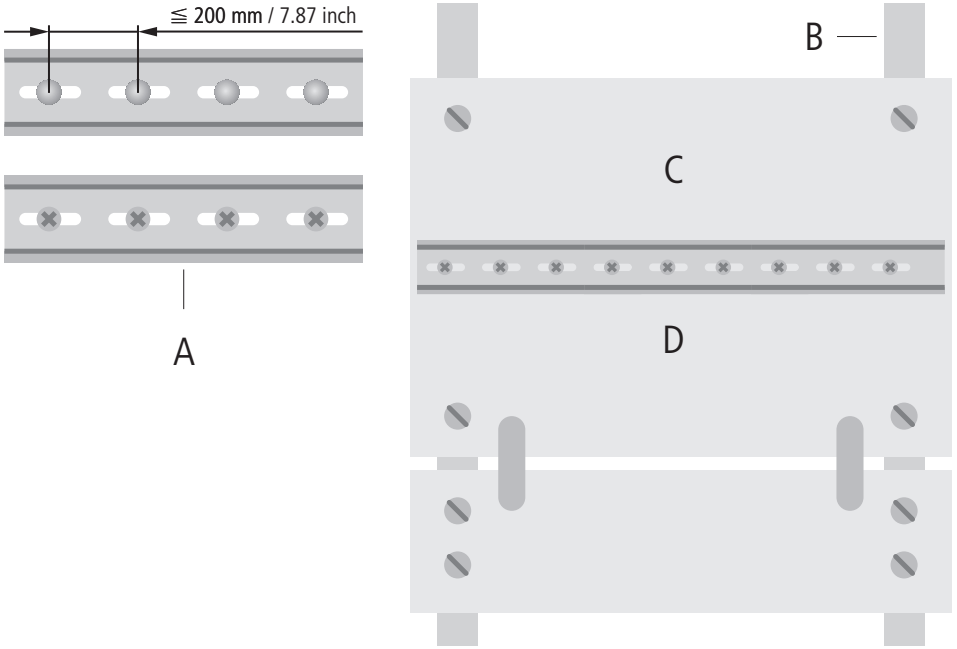


Fig. 41: Mounting options
A *TS 35*
B *mounting rail*
C *mounting plate*
A *TS 35*

Mount the mounting rails over a large surface area and with a low impedance to the support system using screws or rivets.

Remove the isolating layer from all painted, anodized or isolated metal components at the connection point. Protect the connection point against corrosion (for example with grease; caution: use only suitable grease).

8.3.6 Shielding of cables

Shielding is used to prevent interference from voltages and the radiation of interference fields by cables. Therefore, use only shielded cables with shielding braids made from good conducting materials (copper or aluminum) with a minimum degree of coverage of 80 %.

The cable shield should always be connected to both sides of the respective reference potential (if no exception is made, for example, such as high-resistant, symmetrical, analog signal cables). Only then can the cable shield attain the best results possible against electrical and magnetic fields.

A one-sided shield connection merely achieves an isolation against electrical fields.

NOTE

When installing, please pay attention to the following...

- the shield should be connected immediately when entering the system,
- the shield connection to the shield rail should be of low impedance,
- the stripped cable-ends are to be kept as short as possible,
- the cable shield is not to be used as potential compensation.

The insulation of the shielded data-cable should be stripped and connected to the shield rail when the system is not in operation. The connection and securing of the shield should be made using metal shield clamps. The shield clamps must enclose the shielding braid and in so doing create a large surface contact area. The shield rail must have a low impedance (for example, fixing points of 10 to 20 cm apart) and be connected to a reference potential area.

The cable shield should not be severed, but routed further within the system (for example, to the switchgear cabinet), right up to the interface connection.

NOTE

Should it not be possible to ground the shield on both sides due to switching arrangements or device specific reasons, then it is possible to route the second cable shield side to the local reference potential via a capacitor (short connection distances). If necessary, a varistor or resistor can be connected parallel to the capacitor, to prevent disruptive discharges when interference pulses occur.

A further possibility is a double-shielded cable (galvanically separated), whereby the innermost shield is connected on one side and the outermost shield is connected on both sides.

8.4 Potential compensation

Potential differences can occur between installation components that are in separate areas and these

- are fed by different supplies,
- have double-sided conductor shields which are grounded on different installation components.

A potential-compensation cable must be routed to the potential compensation.

Connection 1		Connection 2
V+	0 -------- 0	V+
CAN_H	0 -------- 0	CAN_H
CAN_L	0 -------- 0	CAN_L
V-	0 -------- 0	V-

A potential compensation cable must have the following characteristics:

- Low impedance. In the case of compensation cables that are routed on both sides, the compensation line impedance must be considerably smaller than that of the shield connection (max. 10 % of shield connection impedance).
- Should the length of the compensation cable be less than 200 m, then its cross-section must be at least 16 mm^2 / 0.025 $inch^2$. If the cable length is greater than 200 m, then a cross-section of at least 25 mm^2 / 0.039 $inch^2$ is required.
- The compensation cable must be made of copper or zinc coated steel.
- The compensation cable must be connected to the protective conductor over a large surface area and must be protected against corrosion.
- Compensation cables and data cables should be routed as close together as possible, meaning the enclosed area should be kept as small as possible.

8.4.1 Switching inductive loads

In the case of inductive loads, a protective circuit on the load is recommended.

8.4.2 Protection against electrostatic discharge (ESD)

NOTICE

Exposed metal contacts

Material damage due to electrostatic discharge

➤ Avoid to touch the metallic contacts with bare hands

8.5 Bus connection

Two Sealed Mini-Style Connectors (1 male connector + 1 female connector) are available for connecting the gateway to the fieldbus DeviceNet (in accordance with ODVA Spec. Rel. V2.0)

The shield connection is made via the shielding braid of the DeviceNet cable.

9 Process Image of the Technology Modules

9.1 RSxxx modules

The structure of the process image is represented with symbolic names. These correspond to the attribute names which also correspond to the relevant functions.

The bits and bit groups assigned to the names indicate numerical values.

The meaning of the numerical values is explained in the description of the attributes, **Classes and instances of the DeviceNet gateway**, **chapter 10**.

NOTE

The description of the process input and output data of the modules BL67-1RS232 and BL67-1RS485/422 is identical.

9.1.1 Process input data

- ACTIVE MODE = "1 byte ctrl/status header"

	Bit 7	**Bit 6**	**Bit 5**	**Bit 4**	**Bit 3**	**Bit 2**	**Bit 1**	**Bit 0**
Byte 0 (Status)	STATUS	TX COUNT ACKNOWLEDGE		RX COUNT		RX BYTE COUNT		
Byte 1	Data Byte 0							
...								
Byte 7	Data Byte 6							

- ACTIVE MODE = "2 byte ctrl/status header"

	Bit 7	**Bit 6**	**Bit 5**	**Bit 4**	**Bit 3**	**Bit 2**	**Bit 1**	**Bit 0**
Byte 0 (Control)	STATUS	TX COUNT ACKNOWLEDGE		TX COUNT		TX BYTE COUNT		
Byte 1 (Diag.)	PROCESS DIAGNOSTICS DATA							
Byte 2	Data Byte 0							
...								
Byte 7	Data Byte 5							

9.1.2 Process output data

The individual bits and bit groups provide numerical values.

The meaning of the numerical values is explained in the description of the attributes.

- ACTIVE MODE = "1 byte ctrl/status header"

	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
Byte 0 (Control)	STATUS RESET CONTROL	RX COUNT ACKNOWLEDGE		TX COUNT		TX BYTE COUNT		
Byte 1	Data Byte 0							
...								
Byte 7	Data Byte 6							

- ACTIVE MODE = "2 byte ctrl/status header"

	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
Byte 0 (Control)	STATUS RESET CONTROL	RX COUNT ACKNOWLEDGE		TX COUNT		TX BYTE COUNT		
Byte 1 (Diag.)	reserved						RXBUF FLUSH	TXBUF FLUSH
Byte 2	Data Byte 0							
...								
Byte 7	Data Byte 5							

RXBUF FLUSH:

The RXBUF FLUSH bit is used for clearing the receive buffer. If STATUS RESET CONTROL = 1:
A request with RXBUF FLUSH = 1 will be ignored.

If STATUS RESET CONTROL = 0:
With RXBUF FLUSH = 1 The receive buffer is cleared.

TXBUF FLUSH:

The TXBUF FLUSH bit is used for clearing the transmit buffer.

If STATUS RESET CONTROL = 1:
A request with TXBUF FLUSH = 1 will be ignored.

If STATUS RESET CONTROL = 0:
With TXBUF FLUSH = 1 The receive buffer is cleared.

9.2 SSI-Module

The structure of the process image is represented with symbolic names. These correspond to the attribute names which also correspond to the relevant functions.

The bits and bit groups assigned to the names indicate numerical values.

The meaning of the numerical values is explained in the description of the attributes **Classes and instances of the DeviceNet gateway, chapter 10**.

9.2.1 Process input data

	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
PZDE								
Byte 0 + Byte 1	DIAGNOSTICS AND STATUS							
Byte 2	RESULT WRITE OPERATION		X **B**	X	SSI_ STS3 **A**	SSI_ STS2 **A**	SSI_ STS1 **A**	SSI_ STS0 **A**
Byte 3	RESULT READ OPERATION	X	ADDRESS READ REGISTER					
Byte 4	VALUE READ REGISTER Byte 0							
...								
Byte 7	VALUE READ REGISTER Byte 3							

Bit	Meaning
SSI_STS3	These four bits transfer the status bits of the SSI encoder with the status messages of the SSI module. With some SSI encoders, the status bits are transferred together with the position value.
SSI_STS2	
SSI_STS1	
SSI_STS0	

9.2.2 Process output data

	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
PZDA								
Byte 0 + Byte 1	CONTROL							
Byte 2	X	X **B**	ADDRESS READ REGISTER					
Byte 3	WRITE OPERATION	X	ADDRESS WRITE REGISTER					
Byte 4	VALUE WRITE REGISTER Byte 0							
...								
Byte 7	VALUE WRITE REGISTER Byte 3							

9.3 RFID modules

NOTE

For all information concerning the RFID communication interfaces see the special RFID documentation (Turck document D101642 which can be downloaded from www.turck.com).

10 Appendix

10.1 Classes and instances of the DeviceNet gateway

10.1.1 DeviceNet standard classes

The BL67 gateway supports the following DeviceNet Standard Classes in accordance with ODVA DeviceNet specification Vol. 1 Rel. V2.0.

Class Code dec. (hex.)	Name	Description
01 (1h)	Identity	Enables clear and unambiguous identification of modules. Contains information such as name of manufacturer, product type, serial number (ident number), revision number and so forth.
02 (2h)	Message Router	Provides the means for accessing each class and each instance in the device via Explicit Messages.
03 (3h)	DeviceNetObject	Defines the physical connection of a device and the DeviceNet network. Contains, for example, the MAC ID of the device, the currently set baud rate, and describes switches that may be available for setting of MAC ID and baud rate.
04 (4h)	Assembly	Defines the data transmitted and received via the I/O connections (produced/consumed data) of a device.
05 (5h)	DeviceNet Connection	Defines, amongst other things, the connection to the data via the I/O messages or Explicit Messages as well as the path and length of the transmitted and received data.
06 (6h)	Off-link Connection Manager	Makes it possible to later establish connections between DeviceNet and other networks.
43 (2Bh)	Acknowledge Handler Object	Makes possible the installation of acknowledged COS/Cyclic-I/O connections.

10.1.2 VSC-Vendor Specific Classes

As well as supporting the above named DeviceNet Standard Classes, the DeviceNet gateway supports the following vendor specific classes.

It is possible to gain read (**G**= Get) and/or write (**S**= Set) access to the attributes of classes described in the following:

Class Code dec. (hex.)	Name	Description
100 (64h)	Gateway Class, s. p. 72	Contains data and settings concerning the gateway and the BL67 system as a whole.
101 (65h)	Terminal Slot Class, s. p. 77	Contains data concerning the base modules
102 (66h)	Process Data Class, s. p. 79	Contains process data
103 (67h)	Power Supply Module Class, s. p. 83	Describes the power distribution modules
104 (68h)	Digital Input Module Class, s. p. 85	Describes the modules of the type BL67-*DI-*
105 (69h)	Digital Output Module Class, s. p. 87	Describes the modules of the type BL67-*DO-*
106 (6Ah)	Analog Input Voltage Module Class, s. p. 89	Describes the modules of the type BL67-*AI-V
107 (6Bh)	Analog Output Voltage Module Class, s. p. 91	Describes the modules of the type BL67-*AO-V
108 (6Ch)	Analog Input Current Module Class, s. p. 93	Describes the modules of the type BL67-*AI-I
109 (6Dh)	Analog Output Current Module Class, s. p. 95	Describes the modules of the type BL67-*AO-I
110 (6Eh)	Analog Input RTD Module Class, s. p. 97	Describes the modules of the type BL67-*AI- PT
111 (6Fh)	Analog Input THERMO Module Class, s. p. 100	Describes the modules of the type BL67-*AI-TC
112 (70h)	reserved	-
113 (71h)	reserved	-
114 (72h)	RS232 Module Class, s. p. 103	Describes the modules of the type BL67-1RS232
115 (73h)	RS4xx Module Class, s. p. 109	Describes the modules of the type BL67-1RS422/485
116 (74h)	SSI Module Class, s. p. 115	Describes the modules of the type BL67-1SSI
117 (75h)	Digital Versatile Module Class, s. p. 122	Describes the modules of the type BL67-4DI4DO, BL67-8XSG etc.
118 (76h)	Analog Versatile Module Class, s. p. 126	Describes the modules of the type BL67-xAI/AO-x
119 (77h)	CVI Module Class, s. p. 129	Describes the modules of the type BL67-1CVI
120 (78h)	RFID Module Class s. p. 132	Describes the modules of the type BL67-2RFID-x

Class Instance of the VSC

NOTE

The Class Instance attributes are the same for each Vendor Specific Class.

The class-specific Object Instances and the corresponding attributes are explained in the paragraphs for the different VSC.

The general VSC - Class Instance attributes are defined as follows:.

Attr. No. dec. (hex.)	Attribute name	Get/ Set	Type	Description
100 (64h)	Class revision	G	UINT	States the revision number of the class (Maj. Rel. *1000 + Min. Rel.).
101 (65h)	Max instance	G	USINT	Contains the number of the highest instance of an object created on this level in the class hierarchy.
102 (66h)	# of instances	G	USINT	Contains the number of Object Instances created in this class.
103 (67h)	Max class attribute	G	USINT	Contains the number of the last Class Attribute to be implemented.

Gateway Class (VSC 100)

The Gateway Class contains all the parameters that concern the BL67 system and the gateway.

Class Instance

NOTE

Please refer to paragraph **Class Instance of the VSC**, s. **p. 71**, for the description of the class instance for the VSC.

Object Instance 1

Attr. No. dec. (hex.)	Attribute name	Get/ Set	Type	Description
100 (64h)	Max object attribute	G	USINT	Contains the number of the last object attribute to be implemented
101 (65h)	Hardware revision	G	STRUCT	Contains the hardware revision number of the gateway (USINT Maj./USINT Min.)
102 (66h)	firmware revision	G	STRUCT	Contains the revision number of the Boot Firmware for DeviceNet (Maj./Min.).
103 (67h)	Service tool ident number	G	UDINT	Contains the BOOT ID number that serves as an identification number for the DTM
104 (68h)	Hardware info	G	STRUCT	Contains gateway hardware information (UINT): – count (number of the following entries) – CLOCK FREQUENCY (kHz) – MAIN FLASH (in kB) – MAIN FLASH SPEED (ns) – SECOND FLASH (kB) – RAM (kB), – RAM SPEED (ns), – RAM data WIDTH (bit), – SERIAL EEPRPOM (kbit) – RTC SUPPORT (in #) – AUTO SERVICE BSL SUPPORT (BOOL) – HDW SYSTEM

Object Instance 2

Attr. No. dec. (hex.)	Attribute name	Get/ Set	Type	Description
100 (64h)	Max object attribute	G	USINT	Contains the number of the last object attribute to be implemented
101 (65h)	Hardware revision	G	STRUCT	Contains the hardware revision number of the gateway (USINT Maj./USINT Min.)
102 (66h)	firmware revision	G	STRUCT	Contains the revision number of the Boot Firmware for DeviceNet (Maj./Min.).

Attr. No. dec. (hex.)	Attribute name	Get/ Set	Type	Description
103 (67h)	Service tool ident number	G	UDINT	Contains the BOOT ID number that serves as an identification number for the DTM
104 (68h)	Hardware info	G	STRUCT	Contains gateway hardware information (UINT): – count (number of the following entries) – CLOCK FREQUENCY (kHz) – MAIN FLASH (in kB) – MAIN FLASH SPEED (ns) – SECOND FLASH (kB) – RAM (kB), – RAM SPEED (ns), – RAM data WIDTH (bit), – SERIAL EEPRPOM (kbit) – RTC SUPPORT (in #) – AUTO SERVICE BSL SUPPORT (BOOL) – HDW SYSTEM
105 (69h)	Gateway order	G	UDINT	Contains the ident number of the gateway.
106 (6Ah)	Compiler build	G	SHORT STRING	Contains the creation date of the Firmware, for example, "AUG 12 2003/11:22:01".
107 (6Bh)	System time	G	TIME	Displays the time elapsed (in ms) since the Power up of the gateway.
108 (6Ch)	Status array register	G	ARRAY	Contains all status information of the gateway. This status indicator indicates the status that was integrated in to the I/O data field, which is created at the same time as the I/O connection. Only the most significant status is saved to the Status Register of the transmitted I/O data. The "status array register" makes it possible to read all the momentary status data. ARRAY OF: USINT STAT (status information)
109 (6Dh)	GW status register	G	STRUCT	Status Register of the gateway (see also **Status register of the gateway**, s. **p. 40**). This status indicator belongs to control register2 and makes it possible to read the presently available status data. STRUCT OF: USINT "status register" (status code) BYTE status FLAGS (defined bit-related status information)
110 (6Eh)	GW control register	G/S	STRUCT	Control Register of the gateway. (see also **Control register of the gateway**, s. **p. 41**) Makes it possible for commands to be carried out. STRUCT OF: USINT COMMAND register (command code) BYTE COMMAND FLAGS (defines bit-related commands)

Attr. No. dec. (hex.)	Attribute name	Get/ Set	Type	Description
111 (6Fh)	Gateway CFG state	G	ENUM USINT	Configuration Status Register of the gateway. ENUM USINT: CFG OK(0): The station configuration saved to the non-volatile memory matches the temporary and momentary station configurations. CFG MISMATCH(1): The station configuration saved to the non-volatile memory does not match the temporary configuration. Module SET MODIFIED(2): The momentary station configuration does not match the temporary configuration.
112 (70h)	Gateway CFG command	G/S	ENUM USINT	Configuration Command Register of the gateway. ENUM USINT: IDLE(0):"no action" SET CFG REQUEST(1): The temporarily saved station configuration is saved to the non-volatile memory. This saves the Power up configuration. LOAD CURRENT CFG (2): The momentary station configuration is loaded to both the temporary and the non-volatile memory of the gateway. The non-volatile memory saves the Power up configuration. RESTORE OLD CFG (3): The Required Station Configuration is saved to the temporary memory. All data saved in the temporary memory will be lost; changes will be overwritten.
113 (71h)	On mod. list warning	G/S	ENUM USINT	Reaction to an alteration of a module list modified by the pulling of a module or of module occupying slot configured as empty. SWITCH IO FAULTED (0): The modules are switched to Faulted State. SWITCH IO OFF (1): The gateway switches off the outputs of the modules. SWITCH IO HOLD (2): The gateway makes no further changes to the data of the I/O modules. The outputs are held. SWITCH IO PROCSSING (3): The gateway continues to exchange I/O process data.

Attr. No. dec. (hex.)	Attribute name	Get/ Set	Type	Description
114 (72h)	On mod. list error	G/S	ENUM USINT	Reaction to an alteration of a module list modified by plugging a false module, meaning, a module whose ident number does not match that of the pulled module. SWITCH IO FAULTED (0): The modules are switched to Faulted State. SWITCH IO OFF (1): The gateway switches off the outputs of the modules. SWITCH IO HOLD (2): The gateway makes no further changes to the data of the I/O modules. The outputs are held.
115 (73h)	On IO cnctn timeout	G/S	ENUM USINT	Reaction to the I/O connection exceeding the time limit. SWITCH IO FAULTED (0): The modules are switched to Faulted State. SWITCH IO OFF (1): The gateway switches off the outputs of the modules. SWITCH IO HOLD (2): The gateway makes no further changes to the data of the I/O modules. The outputs are held.
116 (74h)	Module Diag summary	G	ARRAY OF STRUCT	Contains the diagnostic information of all modules ARRAY OF STRUCT: USINT SLOT #: Indicates the slot number (module position) with diagnostic messages. BYTE SLOT FLAGS: Offers slot-related information. Bit 7 = 1 module missing Bit 6 = 1 wrong module plugged DWORD Diag: Contains the module diagnostic information. Module diagnostic bits that are not used are indicated by a ”0”.
117/ 118 (75h/76h)	reserved			
119 (77h)	System supply voltage	G	UINT [mV]	Undervoltage detection for the system supply.
120 - 123 (78h - 7Bh)	reserved			
124 (7Ch)	Gateway (V_{IN}) supply current	G	UINT [mA]	Short circuit and overload protection for V_I.
125 - 131 (7Dh) -(83h)	reserved			

Attr. No. dec. (hex.)	Attribute name	Get/ Set	Type	Description
132 (84h)	GW control word mapping	G/S	USINT	Only for gateways with Maj. rev. < 5.0 2 = Control word mapped into output data (default) 4 = Control word removed from device output data All other values are not allowed. The values are stored to the non-volatile memory of the gateway. The changes become valid after a start-up!
133 (85h)	GW status word mapping	G/S	USINT	Only for gateways with Maj. rev. < 5.0 1 = Status word mapped into input data (default) 3 = Status word removed from device input data All other values are not allowed. The values are stored to the non-volatile memory of the gateway. The changes become valid after a start-up!
134 (86h) - 137 (89h)	reserved			
138 (8Ah)	GW status register	G/S	ENUM USINT	Enables/disables the status register mapping in the process input data. 0 = 0 bytes (status register not mapped in process input data) 1 = 2 bytes (status register mapped in process input data)
139 (8Bh)	GW control register	G/S	ENUM USINT	Enables/disables the control register mapping in the process output data. 0 = 0 bytes (control register not mapped in process output data) 1 = 2 bytes (control register mapped in process output data)

Terminal Slot Class (VSC 101)

This class contains parameters and data for the base modules.

Class Instance

NOTE

Please refer to paragraph Class Instance of the VSC, s. p. 71, for the description of the class instance for the VSC.

Object Instance

Attr. No. dec. (hex.)	Attribute name	Get/ Set	Type	Description
100 (64h)	Max object attribute	G	USINT	Contains the number of the last object attribute to be implemented.
101 (65h)	Module present	G	BOOL	0 = module missing, base module without electronic module. 1 = module is plugged
102 (66h)	Slot state	G	ENUM USINT	NOT USED (0): A non-occupied slot is not taking part in process data traffic. It is not responding to data transmitted or received via I/O Connection Messages. PROCESSING (1): A BL67 module, recognized by the fieldbus is occupying a slot. Data transfer is taking place with the other fieldbus devices via I/O Connection Messages. ALLOCATED (2): The slot is not occupied, but has been reserved for a certain electronic module. The process data are set to 0. WRONG MODULE (3): The wrong module has been plugged in the slot, meaning, it supports process data lengths that were not previously defined or it is a different type of module. This false module will not be made known to the fieldbus and will not take part in process data traffic. The process data for this slot are set to 0.
103 (67h)	Module ID	G	DWORD	Contains the ID of the BL67 module.
104 (68h)	Module diag bit count	G	UINT	States the number of diagnostic bits of the module.
105 (69h)	Module param bit count	G	UINT	States the number of parameter bits of the module.
106 (6Ah)	Module diag bit count	G	UINT	States the number of input bits (produced bits) of the module.

Attr. No. dec. (hex.)	Attribute name	Get/ Set	Type	Description
107 (6Bh)	Module output bit count	G	UINT	States the number of output bits (consumed bits) of the module.
108 (6Ch)	Module sub-mode	G	USINT	Contains the submode ID of the BL67 module.
109 (6Dh	Module group count	G	USINT	States the number of internal groups of the module.
110 (6Eh)	Diag	G	ARRAY OF BYTE	Contains the diagnostic information of the module.
111 (6Fh)	Param	G/S	ARRAY OF BYTE	Contains the parameters of the module.
112 (70h)	input	G	ARRAY OF BYTE	Contains the input data (produced data) of the module.
113 (71h)	output	G/S	ARRAY OF BYTE	Contains the output data (consumed data) of the module.
114 (72h)	Referenced VSC	G	USINT	The VSC that represents this BL67 module. If this module is contained in the internal gateway library, then it is listed in a specific VSC that describes the typical attributes of the module.
115 (73h)	Referenced VSC instance	G	USINT	The VSC Instance that represents this BL67 module. If this module is contained in the internal gateway library, then it is listed in a specific VSC that describes the typical attributes of the module.
116 (74h)	Module registered Index	G/S	ENUM USINT	Contains the index numbers specified in all the module lists.

Process Data Class (VSC102)

This class contains the process-relevant information.

Class Instance

NOTE

Please refer to paragraph Class Instance of the VSC, s. p. 71, for the description of the class instance for the VSC.

Object Instance 1, standard input process data (compressed)

Attr. No. dec. (hex.)	Attribute name	Get/ Set	Type	Description
100 (64h)	Max object attribute	G	USINT	Contains the number of the last object attribute to be implemented.
101 (65h)	Attribute list	G	ARRAY OF USINT	List of all attributes that are supported by this Instance.
102 (66h)	Standard packed process input data	G	ARRAY OF WORD	Input process data, 16-bit aligned, compressed.
103 (67h)	Process data byte count	G	USINT	The number of bytes that are exchanged with this Instance.

NOTE

The following object instances (Object instance 2 to Object instance 8) are only valid for gateways with Maj. Rev. ≥ 5.0.

Object Instance 2, standard output process data (compressed)

Attr. No. dec. (hex.)	Attribute name	Get/ Set	Type	Description
100 (64h)	Max object attribute	G	USINT	Contains the number of the last object attribute to be implemented.
101 (65h)	Attribute list	G	ARRAY OF USINT	List of all attributes that are supported by this Instance.
102 (66h)	Standard packed process output data	G/S	ARRAY OF WORD	Output process data, 16-bit aligned, compressed.

Attr. No. dec. (hex.)	Attribute name	Get/ Set	Type	Description
103 (67h)	Process data byte count	G	USINT	The number of bytes that are exchanged with this Instance.

Object Instance 3, diagnostic instance

Attr. No. dec. (hex.)	Attribute name	Get/ Set	Type	Description
104 (68h)	GW summarized diagnostics	G/S	BOOL	0 = disabled 1 = enabled: 1 bit of diagnosis per slot mapped at the end of the input data image (s. p. 39). The actual data is loaded to the non-volatile memory of the gateway. Changes become valid after a start-up!
105 (69h)	GW scheduled diagnostics	G/S	BOOL	0 = disabled 1 = enabled: time sliced module related data block using a round robin mechanism (s. p. 39). The actual data is loaded to the non-volatile memory of the gateway. Changes become valid after a start-up!
106 (6Ah)	reserved			
107 (6Bh)	I-MAP summarized diags	G	USINT	Contains the number of summarized diagnostic bytes. Changes become valid after a start-up!
108 (6Ch)	I-MAP scheduled diags	G	USINT	Contains the number of scheduled diagnostics bytes. Changes become valid after a start-up!

Object Instance 4, COS/CYCLIC instance

Attr. No. dec. (hex.)	Attribute name	Get/ Set	Type	Description
104 (68h)	COS data mapping	G/S	ENUM USINT	The actual data are loaded to the non-volatile memory of the gateway. Changes become valid after a start-up! 0 = standard (compatible to all gateways Maj. Rev. < 5.0): Data of COS message = Data of polled produced message (input data). 1 = process input data (only the process data input image is transferred to scanner) **2 to 7:** **RFID operation modes** 2 = 16 bytes of RFID- data mapped into a COS message ... 7 = 512 bytes of RFID-data mapped into a COS message (For detailed information, please refer to the special RFID-documentation D101642)

Object Instance 5, RFID command interface instance

Attr. No. dec. (hex.)	Attribute name	Get/ Set	Type	Description
105 (69h)	Q-MAP RFID cmd interface	G	UINT	Contains the number of RFID command interface bytes. (For further information see the special RFID documentation, document number D101642.) The actual data are loaded to the non-volatile memory of the gateway. The changes become valid after a start-up!
104 (68h)	RFID cmd interface length	G/S	USINT	Values 0 to 200 Bytes (only even byte values allowed). 0 = disabled Required min. length depends on RFID commands used. (For further information see the special RFID documentation, document number D101642.)

Object Instance 6, RFID status interface instance

Attr. No. dec. (hex.)	Attribute name	Get/ Set	Type	Description
103 (67h)	I-MAP RFID status interface	G	UINT	Contains the number of RFID status interface bytes. The actual data is loaded to the non-volatile memory of the gateway. The changes become valid after a start-up!
104 (68h)	RFID status interface	G/S	USINT	Defines the length of the RFID status data within the process input data: 0 = disabled: 0 bytes 1 = reduced: 4 bytes 2 = full: 6 bytes

Object Instance 7, RFID last updated channel data instance

Attr. No. dec. (hex.)	Attribute name	Get/ Set	Type	Description
104 (68h)	Oldest updated channel	G	USINT	Contains the number of the channel with the oldest data (FIFO). Only accessible via Explicit Messaging.

Object Instance 8, RFID CIP support

Attr. No. dec. (hex.)	Attribute name	Get/ Set	Type	Description
104 (68h)	RFID CIP support	G	USINT	0 = disabled 1 = enabled: = access via RFID CIP (expl. msg. read/write) to VSC120, attributes 113 and 114, s. p. 133

Power Supply Module Class (VSC103)

This class contains all the relevant information and parameters for the power distribution modules.

Class Instance

NOTE

Please refer to paragraph Class Instance of the VSC, s. p. 71, for the description of the class instance for the VSC.

Object Instance

Attr. No. dec. (hex.)	Attribute name	Get/ Set	Type	Description
100 (64h)	Max object attribute	G	USINT	Contains the number of the last object attribute to be implemented.
101 (65h)	Module present	G	BOOL	0 = module missing, base module without electronic module. 1 = module is plugged
102 (66h)	Terminal slot number	G	USINT	The slot number of the base module belonging to the module (base module to the right of the gateway = No. 1). Corresponds to the respective Instance Number within the TERMINAL SLOT CLASS.
103 (67h)	Module ID	G	DWORD	Contains the module ID.
104 (68h)	Module order number	G	UDINT	Contains the ident number of the module.
105 (69h)	Module order name	G	SHORT STRING	Contains the name of the module, for example, "BL67-PF-24VDC"
106 (6Ah)	Module revision	G	USINT	Contains the revision number of the module firmware.
107 (6Bh)	Module type ID	G	ENUM USINT	Describes the module type: – 0×00: type of module unknown (default) – 0×01: digital module – 0×11: analog voltage mod. – 0×12: analog current mod. – 0×13: analog RTD mod. – 0×14: analog THERMO mod. – 0×1F: analog volt./curr. mod. – 0×22: counter/incr. encoder 32bit – 0×28: SSI interface – 0×31: starter, mechanical – 0×32: starter, electronical – 0×41: RS232 mod. – 0×42: RS485/RS422 mod. – 0×46: RFID module – 0×51: CVI mod.
108 (6Ch)	Module command interface	G/S	ARRAY	The control interface of the BL67 module. ARRAY OF: BYTE: Control byte sequence

Attr. No. dec. (hex.)	Attribute name	Get/ Set	Type	Description
109 (6Dh	Module response interface	G	ARRAY	Response interface of the BL67 module. ARRAY OF: BYTE: Response byte sequence
110 (6Eh)	Diag size	G	UINT	Indicates the number of diagnostic bits of the module.
111 (6Fh)	Diag	G	WORD	Contains the diagnostic information of the module. WORD: Bit for bit assignment according to module specification.
112 (70h)	Module registered index	G	ENUM USINT	Contains the index numbers specified in all the module lists.

Digital Input Module Class (VSC104)

This Class contains all information and parameters for digital input modules.

Class Instance

NOTE

Please refer to paragraph Class Instance of the VSC, s. p. 71, for the description of the class instance for the VSC.

Object Instance

Attr. No. dec. (hex.)	Attribute name	Get/ Set	Type	Description
100 (64h)	Max object attribute	G	USINT	Contains the number of the last object attribute to be implemented
101 (65h)	Module present	G	BOOL	0 = module missing, base module without electronic module. 1 = module is plugged
102 (66h)	Terminal slot number	G	USINT	The slot number of the base module belonging to the module (base module to the right of the gateway = No. 1). Corresponds to the respective Instance Number within the TERMINAL SLOT CLASS.
103 (67h)	Module ID	G	DWORD	Contains the module ID.
104 (68h)	Module order number	G	UDINT	Contains the ident number of the module.
105 (69h)	Module order name	G	SHORT STRING	Contains the name of the module, for example, "BL67-4DI-P".
106 (6Ah)	Module revision	G	USINT	Contains the revision number of the module firmware.
107 (6Bh)	Module type ID	G	ENUM USINT	Describes the module type: – see attribute 107 (6Bh) on s. p. 83
108 (6Ch)	Module command interface	G/S	ARRAY	The control interface of the BL67 module. ARRAY OF: BYTE: Control byte sequence
109 (6Dh	Module response interface	G	ARRAY	Response interface of the BL67 module. ARRAY OF: BYTE: Response byte sequence
110 (6Eh)	Produced data size	G	UINT	Contains information concerning the range of data produced by the module.
Attr. No. dec. (hex.)	**Attribute name**	**Get/ Set**	**Type**	**Description**
111 (6Fh)	Produced data	G	DWORD	Contains the input data of the module. DWORD: Bit for bit assignment according to module specification.

Attr. No. dec. (hex.)	Attribute name	Get/ Set	Type	Description
112 (70h)	Diag size	G	UINT	Contains information concerning the range of the diagnostic data of the module.
113 (71h)	Diag	G	DWORD	Contains the diagnostic information of the module. DWORD: Bit for bit assignment according to module specification.
114 (72h)	Param size	G	UINT	Contains information concerning the range of parameters of the module.
115 (73h)	Params	G/S	DWORD	Contains the parameters of the module. DWORD: Bit for bit assignment according to module specification.
116 (74h)	Module registered Index	G	ENUM USINT	Contains the index numbers specified in all the module lists.

Digital Output Module Class (VSC105)

This Class contains all information and parameters for digital output modules.

Class Instance

NOTE

Please refer to paragraph **Class Instance of the VSC**, s. **p. 71**, for the description of the class instance for the VSC.

Object Instance

Attr. No. dec. (hex.)	Attribute name	Get/ Set	Type	Description
100 (64h)	Max object attribute	G	USINT	Contains the number of the last object attribute to be implemented.
101 (65h)	Module present	G	BOOL	0 = module missing, base module without electronic module. 1 = module is plugged
102 (66h)	Terminal slot number	G	USINT	The slot number of the base module belonging to the module (base module to the right of the gateway = No. 1). Corresponds to the respective Instance Number within the TERMINAL SLOT CLASS.
103 (67h)	Module ID	G	DWORD	Contains the module ID.
104 (68h)	Module order number	G	UDINT	Contains the ident number of the module.
105 (69h)	Module order name	G	SHORT STRING	Contains the name of the module, for example, "BL67-4DO-0.5A-P".
106 (6Ah)	Module revision	G	USINT	Contains the revision number of the module firmware.
107 (6Bh)	Module type ID	G	ENUM USINT	Describes the module type: – see attribute 107 (6Bh) on s. **p. 83**
108 (6Ch)	Module command interface	G/S	ARRAY	The control interface of the BL67 module. ARRAY OF: BYTE: Control byte sequence
109 (6Dh	Module response interface	G	ARRAY	Response interface of the BL67 module. ARRAY OF: BYTE: Response byte sequence
110 (6Eh)	Consumed data size	G	UINT	Contains information concerning the range of data consumed by the module.
111 (6Fh)	Consumed data	G	DWORD	Contains the output data of the module. DWORD: Bit for bit assignment according to module specification.
112 (70h)	Diag size	G	UINT	Contains information concerning the range of the diagnostic data of the module.

Attr. No. dec. (hex.)	Attribute name	Get/ Set	Type	Description
113 (71h)	Diag	G	DWORD	Contains the diagnostic information of the module. DWORD: Bit for bit assignment according to module specification.
114 (72h)	Param size	G	UINT	Contains information concerning the range of parameters of the module.
115 (73h)	Params	G/S	DWORD	Contains the parameters of the module. DWORD: Bit for bit assignment according to module specification.
116 (74h)	Module registered Index	G	ENUM USINT	Contains the index numbers specified in all the module lists.

Analog Input Voltage Module Class (VSC106)

This Class contains all information and parameters for analog input modules (voltage).

Class Instance

NOTE

Please refer to paragraph **Class Instance of the VSC**, s. **p. 71**, for the description of the class instance for the VSC.

Object Instance

Attr. No. dec. (hex.)	Attribute name	Get/ Set	Type	Description
100 (64h)	Max object attribute	G	USINT	Contains the number of the last object attribute to be implemented.
101 (65h)	Module present	G	BOOL	0 = module missing, base module without electronic module. 1 = module is plugged
102 (66h)	Terminal slot number	G	USINT	The slot number of the base module belonging to the module (base module to the right of the gateway = No. 1). Corresponds to the respective Instance Number within the TERMINAL SLOT CLASS.
103 (67h)	Module ID	G	DWORD	Contains the module ID.
104 (68h)	Module order number	G	UDINT	Contains the ident number of the module.
105 (69h)	Module order name	G	SHORT STRING	Contains the name of the module, for example, "BL67-2AI-V".
106 (6Ah)	Module revision	G	USINT	Contains the revision number of the module firmware.
107 (6Bh)	Module type ID	G	ENUM USINT	Describes the module type: – see attribute 107 (6Bh) on s. **p. 83**
108 (6Ch)	Module command interface	G/S	ARRAY	The control interface of the BL67 module. ARRAY OF: BYTE: Control byte sequence
109 (6Dh	Module response interface	G	ARRAY	Response interface of the BL67 module. ARRAY OF: BYTE: Response byte sequence
110 (6Eh)	Module registered index	G	ENUM USINT	Contains the index numbers specified in all the module lists.
111 (6Fh)	Number of supported channels	G	USINT	States the number of analog input channels supported by this module Instance.

Attr. No. dec. (hex.)	Attribute name	Get/ Set	Type	Description
112 - 119 (70h - 77h)	Produced data	G	INT	Contains the data transmitted by the analog input module of channels No. 1 to No. 8. Only those channels are supported that are contained in attribute 111, "Number of supported channels". Attribute 112 contains the data for channel 1, attribute 119 for channel 8.
120 - 127 (78h - 7Fh)	Diag data	G	BYTE	Contains the diagnostic data of the channels 1 to 8 of the analog input module. Only those channels are supported that are defined in attribute 111, Number of supported channels. Attribute 120 contains the data for channel 1, attribute 127 for channel 8. BYTE diag: Bit0: 0 = ok 1 = measurement value range error Bit1 to 7: reserved
128 - 135 (80h - 87h)	Mode parameter data	G/S	BYTE	Contains the diagnostic data of the channels 1 to 8 of the analog input module. Only those channels are supported that are defined in attribute 111, "Number of supported channels". Attribute 128 contains the data for channel 1, attribute 135 for channel 8. BYTE mode: Bit0: Voltage mode: 0 =0....10V 1 =-10V....+10V Bit 1: Value representation 0 =Integer (15Bit + sign) 1 =12Bit (left-justified) Bit 2: Diagnostic: 0 = enable 1 = disable Bit 3 to 7: reserved

Analog Output Voltage Module Class (VSC107)

This Class contains all information and parameters for analog output modules (voltage).

Class Instance

NOTE

Please refer to paragraph Class Instance of the VSC, s. p. 71, for the description of the class instance for the VSC.

Object Instance

Attr. No. dec. (hex.)	Attribute name	Get/ Set	Type	Description
100 (64h)	Max object attribute	G	USINT	Contains the number of the last object attribute to be implemented.
101 (65h)	Module present	G	BOOL	0 = module missing, base module without electronic module. 1 = module is plugged
102 (66h)	Terminal slot number	G	USINT	The slot number of the base module belonging to the module (base module to the right of the gateway = No. 1). Corresponds to the respective Instance Number within the TERMINAL SLOT CLASS.
103 (67h)	Module ID	G	DWORD	Contains the module ID.
104 (68h)	Module order number	G	UDINT	Contains the ident number of the module.
105 (69h)	Module order name	G	SHORT STRING	Contains the name of the module, for example, "BL67-2AO-V".
106 (6Ah)	Module revision	G	USINT	Contains the revision number of the module firmware.
107 (6Bh)	Module type ID	G	ENUM USINT	Describes the module type: – see attribute 107 (6Bh) on s. p. 83
108 (6Ch)	Module command interface	G/S	ARRAY	The control interface of the BL67 module. ARRAY OF: BYTE: Control byte sequence
109 (6Dh	Module response interface	G	ARRAY	Response interface of the BL67 module. ARRAY OF: BYTE: Response byte sequence
110 (6Eh)	Module registered Index	G	ENUM USINT	Contains the index numbers specified in all the module lists.
111 (6Fh)	Number of supported channels	G	USINT	States the number of analog input channels supported by this module Instance.

Attr. No. dec. (hex.)	Attribute name	Get/ Set	Type	Description
112 - 119 (70h - 77h)	Consumed data	G	INT	Contains the data received by the analog output module of channels No. 1 to No. 8. Only those channels are supported that are contained in attribute 111,"Number of supported channels". Attribute 112 contains the data for channel 1, attribute 119 for channel 8.
120 - 127 (78h - 7Fh)	Diag data	G	BYTE	Contains the diagnostic data of the channels 1 to 8 of the analog output module. Only those channels are supported that are defined in attribute 111, "Number of supported channels". Attribute 120 contains the data for channel 1, attribute 127 for channel 8. BYTE diag: Bit 0 to 7: reserved
128 - 135 (80h - 87h)	Mode parameter data	G/S	BYTE	Contains the diagnostic data of the channels 1 to 8 of the analog output module. Only those channels are supported that are defined in attribute 111, "Number of supported channels". Attribute 128 contains the data for channel 1, attribute 135 for channel 8. BYTE mode: Bit0: Voltage mode: 0 = 0....10V 1 = -10V....+10V Bit1: Value representation 0 = Integer (15Bit + sign) 1 = 12Bit (left-justified) Bit2 to 7: reserved
136 - 143 (88h - 8Fh)	Fault value parameter data	G/S	INT	Contains the Fault Value-Definition of the channels 1 to 8 of the analog output modules. Only those channels are supported that are defined in attribute 111, "Number of supported channels". Attribute 136 contains the data for channel 1, attribute 143 for channel 8.

Analog Input Current Module Class (VSC108)

This Class contains all information and parameters for analog input modules (current).

Class Instance

NOTE

Please refer to paragraph **Class Instance of the VSC**, s. **p. 71**, for the description of the class instance for the VSC.

Object Instance

The Object Instances/ attributes of the analog input modules (current) correspond to those of the analog input modules (voltage). Differences are only to be found in the attributes no. 112 to 135 that concern the measurement ranges of the modules (current or voltage measurements).

Attr. No. dec. (hex.)	Attribute name	Get/ Set	Type	Description
112 - 119 (70h - 77h)	Produced data	G	INT	Contains the data transmitted by the analog input module of channels No. 1 to No. 8. Only those channels are supported that are contained in attribute 111, "Number of supported channels". Attribute 112 contains the data for channel 1, attribute 119 for channel 8.
120 - 127 (78h - 7Fh)	Diag data	G	BYTE	Contains the diagnostic data of the channels 1 to 8 of the analog input module. Only those channels are supported that are defined in attribute 111, "Number of supported channels". Attribute 120 contains the data for channel 1, attribute 127 for channel 8. BYTE diag: Bit 0: 0 = ok 1 = measurement value range error Bit 1: 0 =ok 1 =open circuit; only in measurement range: 4 to 20mA Bit 2 to 7: reserved

Attr. No. dec. (hex.)	Attribute name	Get/ Set	Type	Description
128 - 135 (80h - 87h)	Mode parameter data	G/S	BYTE	Contains the diagnostic data of the channels 1 to 8 of the analog input module. Only those channels are supported that are defined in attribute 111, "Number of supported channels". Attribute 128 contains the data for channel 1, attribute 135 for channel 8. BYTE mode: Bit 0: Current mode: 0 = 0 to 20mA 1 = 4 to 20mA Bit 1: Value representation: 0 =Integer (15Bit + sign) 1 =12Bit (left-justified) Bit 2: Diagnostic: 0 = enable 1 = disable Bit 3 to 7:reserved

Analog Output Current Module Class (VSC109)

This Class contains all information and parameters for analog output modules (current).

Class Instance

NOTE

Please refer to paragraph **Class Instance of the VSC**, s. **p. 71**, for the description of the class instance for the VSC.

Object Instance

The Object Instances/attributes of the analog output modules (current) correspond to those of the analog output modules (voltage). Differences are only to be found in the attributes no. 112 to 143 that concern the measurement ranges of the modules (current or voltage measurements).

Attr. No. dec. (hex.)	Attribute name	Get/ Set	Type	Description
112 - 119 (70h - 77h)	Consumed data	G	INT	Contains the data received by the analog output module of channels No. 1 to No. 8. Only those channels are supported that are contained in attribute 111, "Number of supported channels". Attribute 112 contains the data for channel 1, attribute 119 for channel 8.
120 - 127 (78h - 7Fh)	Diag data	G	BYTE	Contains the diagnostic data of the channels 1 to 8 of the analog output module. Only those channels are supported that are defined in attribute 111, "Number of supported channels". Attribute 120 contains the data for channel 1, attribute 127 for channel 8. BYTE diag: Bit 0 to 7: reserved
128 - 135 (80h - 87h)	Mode parameter data	G/S	BYTE	Contains the diagnostic data of the channels 1 to 8 of the analog output module. Only those channels are supported that are defined in attribute 111, "Number of supported channels". Attribute 128 contains the data for channel 1, attribute 135 for channel 8. BYTE mode: Bit 0: Current mode: 0 = 0 to 20mA 1 = 4 to 20mA Bit 1: Value representation: 0 =Integer (15Bit + sign) 1 =12Bit (left-justified) Bit 2 to 7:reserved
Attr. No. dec. (hex.)	**Attribute name**	**Get/ Set**	**Type**	**Description**

Attr. No. dec. (hex.)	Attribute name	Get/ Set	Type	Description
136 - 143 (88h - 8Fh)	Fault value parameter data	G/S	INT	Contains the Fault Value-Definition of the channels 1 to 8 of the analog output modules. Only those channels are supported that are defined in attribute 111, "Number of supported channels". Attribute 136 contains the data for channel 1, attribute 143 for channel 8.

Analog Input RTD Module Class (VSC110)

This Class contains all information and parameters for analog input modules for PT100/NI sensors (current).

Class Instance

NOTE

Please refer to paragraph Class Instance of the VSC, s. p. 71, for the description of the class instance for the VSC.

Object Instance

Attr. No. dec. (hex.)	Attribute name	Get/ Set	Type	Description
100 (64h)	Max object attribute	G	USINT	Contains the number of the last object attribute to be implemented.
101 (65h)	Module present	G	BOOL	0 = module missing, base module without electronic module. 1 = module is plugged
102 (66h)	Terminal slot number	G	USINT	The slot number of the base module belonging to the module (base module to the right of the gateway = No. 1). Corresponds to the respective Instance Number within the TERMINAL SLOT CLASS.
103 (67h)	Module ID	G	DWORD	Contains the module ID.
104 (68h)	Module order number	G	UDINT	Contains the ident number of the module.
105 (69h)	Module order name	G	SHORT STRING	Contains the name of the module, for example, "BL67-2AI-PT".
106 (6Ah)	Module revision	G	USINT	Contains the revision number of the module firmware.
107 (6Bh)	Module type ID	G	ENUM USINT	Describes the module type: – see attribute 107 (6Bh) on s. p. 83
108 (6Ch)	Module command interface	G/S	ARRAY	The control interface of the BL67 module. ARRAY OF: BYTE: Control byte sequence
109 (6Dh	Module response interface	G	ARRAY	Response interface of the BL67 module. ARRAY OF: BYTE: Response byte sequence
110 (6Eh)	Module registered Index	G	ENUM USINT	Contains the index numbers specified in all the module lists.
111 (6Fh)	Number of supported channels	G	USINT	States the number of analog input channels supported by this module Instance.

Attr. No. dec. (hex.)	Attribute name	Get/ Set	Type	Description
112 - 119 (70h - 77h)	Produced data	G	INT	Contains the data received by the analog input module of channels No. 1 to No. 8. Only those channels are supported that are contained in attribute 111, Number of supported channels. Attribute 112 contains the data for channel 1, attribute 119 for channel 8.
120 - 127 (78h - 7Fh)	Diag data	G	BYTE	Contains the diagnostic data of the channels 1 to 8 of the analog input module. Only those channels are supported that are defined in attribute 111, "Number of supported channels". Attribute 120 contains the data for channel 1, attribute 127 for channel 8. BYTE diag: Bit 0: 0 = ok 1 = measurement value range error Bit 1: 0 = ok 1 = open circuit Bit 2: 0 = ok 1 = short-circuit
128 -135 (80h -87h)	Mode parameter data	G/S	BYTE	Contains the parameter data of the channels 1 to 8 of the analog input module. Only those channels are supported that are defined in attribute 111, "Number of supported channels". Attribute 128 contains the data for channel 1, attribute 135 for channel 8. BYTE mode: Bit 0: Mains suppression 0 = 50Hz mains suppression 1 = 60Hz mains suppression Bit 1: value representation: 0 = Integer (15Bit + sign) 1 = 12Bit (left-justified) Bit 2: Diagnose: 0 = release 1 = block Bit 3:Channel: 0 = activate channel 1 = deactivate channel Bit 4: Measurement mode: 0 = 2-wire 1 = 3-wire Bit 5 to 7: reserved

Attr. No. dec. (hex.)	Attribute name	Get/ Set	Type	Description
136 -143 (88h - 8Fh)	Sensor parameter data	G/S	ENUM USINT	Contains the sensor-specific parameter data of the channels 1 to 8 of the analog input module. Only those channels are supported that are defined in attribute 111, "Number of supported channels". Attribute 136 contains the data for channel 1, attribute 143 for channel 8. ENUM USINT: Element: 0: PT100, -200...850°C 1: PT100, -200...150°C 2: NI100, -60...250°C 3: NI100, -60...150°C 4: PT200, -200...850°C 5: PT200, -200...150°C 6: PT500, -200...850°C 7: PT500, -200...150°C 8: PT1000, -200...850°C 9: PT1000, -200...150°C 10: NI1000, -60...250°C 11: NI1000, -60...150°C 12: resistance: 0...100Ω 13: resistance: 0...200Ω 14: resistance: 0...400Ω 15: resistance: 0...1000Ω 16 to 255: reserved

Analog Input THERMO Module Class (VSC111)

This Class contains all information and parameters for analog input modules for thermocouples.

Class Instance

NOTE

Please refer to paragraph Class Instance of the VSC, s. p. 71, for the description of the class instance for the VSC.

Object Instance

Attr. No. dec. (hex.)	Attribute name	Get/ Set	Type	Description
100 (64h)	Max object attribute	G	USINT	Contains the number of the last object attribute to be implemented.
101 (65h)	Module present	G	BOOL	0 = module missing, base module without electronic module. 1 = module is plugged
102 (66h)	Terminal slot number	G	USINT	The slot number of the base module belonging to the module (base module to the right of the gateway = No. 1). Corresponds to the respective Instance Number within the TERMINAL SLOT CLASS.
103 (67h)	Module ID	G	DWORD	Contains the module ID.
104 (68h)	Module order number	G	UDINT	Contains the ident number of the module.
105 (69h)	Module order name	G	SHORT STRING	Contains the name of the module, for example, "BL67-2AI-TC".
106 (6Ah)	Module revision	G	USINT	Contains the revision number of the module firmware.
107 (6Bh)	Module type ID	G	ENUM USINT	Describes the module type: – see attribute 107 (6Bh) on s. p. 83
108 (6Ch)	Module command interface	G/S	ARRAY	The control interface of the BL67 module. ARRAY OF: BYTE: Control byte sequence
109 (6Dh	Module response interface	G	ARRAY	Response interface of the BL67 module. ARRAY OF: BYTE: Response byte sequence
110 (6Eh)	Module registered Index	G	ENUM USINT	Contains the index numbers specified in all the module lists.
111 (6Fh)	Number of supported channels	G	USINT	States the number of analog input channels supported by this module Instance.

Attr. No. dec. (hex.)	Attribute name	Get/ Set	Type	Description
112 - 119 (70h - 77h)	Produced data	G	INT	Contains the data received by the analog input module of channels No. 1 to No. 8. Only those channels are supported that are contained in attribute 111, "Number of supported channels". Attribute 112 contains the data for channel 1, attribute 119 for channel 8.
120 - 127 (78h - 7Fh)	Diag data	G	BYTE	Contains the diagnostic data of the channels 1 to 8 of the analog input module. Only those channels are supported that are defined in attribute 111, "Number of supported channels". Attribute 120 contains the data for channel 1, attribute 127 for channel 8. BYTE diag: Bit 0: 0 = ok 1 = measurement value range error Bit 1: 0 =ok 1 =open circuit Bit 2 to 7:reserved
128 - 135 (80h - 87h)	Mode parameter data	G/S	BYTE	Contains the diagnostic data of the channels 1 to 8 of the analog input module. Only those channels are supported that are defined in attribute 111, "Number of supported channels". Attribute 128 contains the data for channel 1, attribute 135 for channel 8. BYTE mode: Bit 0: Mains suppression 0 = 50Hz mains suppression 1 = 60Hz mains suppression Bit 1: value representation: 0 =Integer (15Bit + sign) 1 =12Bit (left-justified) Bit 2: Diagnose: 0 = release 1 = block Bit 3:Channel: 0 = activate channel 1 = deactivate channel Bit 4 to 7: reserved

Attr. No. dec. (hex.)	Attribute name	Get/ Set	Type	Description
136 - 143 (88h - 8Fh)	Sensor parameter data	G/S	ENUM USINT	Contains the sensor-specific parameter data of the channels 1 to 8 of the analog input module. Only those channels are supported that are defined in attribute 111, "Number of supported channels". Attribute 136 contains the data for channel 1, attribute 143 for channel 8. ENUM USINT: Element: 0: Type K -270....1370 °C 1: Type B 100....1820 °C 2: Type E -270....1000 °C 3: Type J -210....1200 °C 4: Type N -270....1300 °C 5: Type R -50....1760 °C 6: Type S -50....1540 °C 7: Type T -270....400 °C 8: ±50mV 9: ±100mV 10: ±500mV 11: ±1000mV 12 to 255: reserved

RS232 Module Class (VSC114)

This Class contains all information and parameters for RS232 modules.

Class Instance

NOTE

Please refer to paragraph Class Instance of the VSC, s. p. 71, for the description of the class instance for the VSC.

Object Instance

Attr. No. dec. (hex.)	Attribute name	Get/ Set	Type	Description
100 (64h)	Max object attribute	G	USINT	Contains the number of the last object attribute to be implemented.
101 (65h)	Module present	G	BOOL	0 = module missing, base module without electronic module. 1 = module is plugged
102 (66h)	Terminal slot number	G	USINT	The slot number of the base module belonging to the module (base module to the right of the gateway = No. 1). Corresponds to the respective Instance Number within the TERMINAL SLOT CLASS.
103 (67h)	Module ID	G	DWORD	Contains the module ID.
104 (68h)	Module order number	G	UDINT	Contains the ident number of the module.
105 (69h)	Module order name	G	SHORT STRING	Contains the name of the module, for example, "BL67-1RS232".
106 (6Ah)	Module revision number	G	USINT	Contains the revision number of the module firmware.
107 (6Bh)	Module type ID	G	ENUM USINT	Describes the module type: – see attribute 107 (6Bh) on s. p. 83
108 (6Ch)	Module command interface	G/S	ARRAY	The control interface of the BL67 module. ARRAY OF: BYTE: Control byte sequence
109 (6Dh	Module response interface	G	ARRAY	Response interface of the BL67 module. ARRAY OF: BYTE: Response-byte sequence
110 (6Eh)	Module registered Index	G	ENUM USINT	Contains the index numbers specified in all the module lists.
111 (6Fh)	Number of supported channels	G	USINT	States the number of analog input channels supported by this module Instance.
112 (70h)	RX byte count	G	USINT	Number of the valid bytes (0 to 7) in this data segment.

Attr. No. dec. (hex.)	Attribute name	Get/ Set	Type	Description
113 (71h)	RX count	G	USINT	This value is transferred together with every data segment of the process input data. The RX count values are sequential: 00->01->10->11->00.... (decimal: 0->1->2->3->0....) Errors in this sequence show the loss of data segments.
114 (72h)	TX count acknowledge	G	USINT	This value is a copy of the value TX count. TX count has been transmitted together with the last data segment of the process output data. TX count acknowledge is an acknowledge for the successful transmission of the data segment with TRANSMIT count.
115 (73h)	Status	G	BOOL	0 = The communication with the data terminal equipment (DTE) is disturbed. A diagnostic message is generated if the parameter "Diagnostics" is set to "0/ release". The diagnostic data show the cause of the communication disturbance. The user has to set back this bit in the process output data by using STATRES. 1 = The communication with the data terminal equipment (DTE) is error free,
116 (74h)	Process diagnostics data	G	BYTE	Contains the diagnostic information: The diagnostic data are part of the process input data, if ACTIVE MODE = 1 or 2bytes "ctrl/ status header" is set. Diagnostics messages: – Bit 0 to Bit 2: reserved – Bit 3: 0 = ok 1 = parameter error: The set parameter values are not supported. – Bit 4: 0 = ok 1 = hardware failure: The module has to be replaced, e.g. EEPROM or UART may be defect.

Attr. No. dec. (hex.)	Attribute name	Get/ Set	Type	Description
	Process diag-nostics data	G	BYTE	– Bit 5: 0 = ok 1 = handshake error: The DTE connected to the module does not answer a XOFF or RTS handshake. This may cause a overflow in the internal receive-buffer. – Bit 6: 0 = ok 1 = frame error: The module has to be parameterized to be adapted to the data structure of the con-nected DTE. A frame error occurs if the param-eterization (number of data bits, stop bits, par-ity) is not correct. – Bit 7: 0 = ok 1 = buffer overflow: Overflow in the RX-buffer. – Bit 8 to Bit 15: reserved
117 (75h)	RX data	G	ARRAY OF BYTE	Defines the receive-data (0...7).
118 (76h)	RX data and release	G	ARRAY OF BYTE	Defines the data received via RS232 (0...7) + acknowledge for reception
119 (77h)	TX byte count	G/S	USINT	Number of the valid user data bytes in this data segment. l
120 (78h)	TX count	G/S	USINT	This value is transferred together with every data segment. The TX count values are sequential: 00->01->10->11->00.... (decimal: 0->1->2->3->0....) Errors in this sequence show the loss of data segments.
121 (79h)	RX count acknowledge	G/S	USINT	This value is a copy of RX count. RX count has been transmitted together with the last data segment of the process input data. RX count acknowledge is an acknowledge for the successful transmission of the data seg-ment with RX count.

Attr. No. dec. (hex.)	Attribute name	Get/ Set	Type	Description
122 (7Ah)	Status reset control	G/S	BOOL	STATRES: This bit is set to reset the STAT bit in the process input data. With the change from 1 to 0 the status bit is reset (from 0 to 1). If this bit is 0, all changes in TRANSMIT BYTE count, TRANSMIT count and RECEIVE count acknowledge are ignored. Flushing the transmit-/ receive-buffer with process control data (Attr. 123) is possible. If this bit is 1 or with the change from 0 to 1, the flushing of the transmit-/ receive-buffer with process control data (Attr. 123) is not possible.
123 (7Bh)	Process control data	G/S	BYTE	Bit 0 = transmit-buffer flush, Bit 1 = receive-buffer flush
124 (7Ch)	TX data	G/S	ARRAY OF BYTE	Defines the transmit-data (0...7)
125 (7Dh)	TX data and release	S	ARRAY OF BYTE	Defines the data to be transmitted via RS232 (0...7) + transmission is released/ charged immediately
126 (7Eh)	reserved			
127 (7Fh)	Diagnostics	G	WORD	Contains the diagnostic messages (low byte): Diagnostics messages: – Bit 0 to Bit 2: reserved – Bit 3: 0 = ok 1 = parameter error: The set parameter values are not supported. – Bit 4: 0 = ok 1 = hardware failure: The module has to be replaced, e.g. EEPROM or UART may be defect. – Bit 5: 0 = ok 1 = handshake error: The DTE connected to the module does not answer a XOFF or RTS handshake. This may cause a overflow in the internal receive-buffer.

Attr. No. dec. (hex.)	Attribute name	Get/ Set	Type	Description
127 (7Fh)	Diagnostics	G	WORD	– Bit 6: 0 = ok 1 = frame error: The module has to be para-meterized to be adapted to the data structure of the connected DTE. A frame error occurs if the parameteriza-tion (number of data bits, stop bits, parity) is not correct. – Bit 7: 0 = ok 1 = buffer overflow: Overflow in the RX-buffer. – High byte: reserved
128 (80h)	Active mode	G/S	BOOL	0 = 1byte ctrl/status header: The diagnostic data are not part of the process input data, 7 bytes of user data are available. 1 = 2byte ctrl/status header: The diagnostic data are part of the process input data, 6 bytes of user data are available.
129 (81h)	Bit rate	G/S	ENUM USINT	Used to set the baudrate for the gateway: 0 = reserved, 1 = 300 bps 2 = 600 bps 3 = 1200 bps 4 = 2400 bps 5 = 4800 bps 6 = 9600 bps 7 = 14400 bps 8 = 19200 bps 9 = 28800 bps 10 = 38400 bps 11 = 57600 bps 12 = 115200 bps ... 15 = reserved)
130 (82h)	Disable diagnos-tics	G/S	BOOL	0 = released: The diagnostic function is activated. 1 = blocked: The diagnostic function is deactivated.
131 (83h)	Flow control	G/S	ENUM USINT	0 = off: data flow control is deactivated 1 = XON/XOFF Software-handshake is activated 2 = RTS/CTS Hardware-handshake is activated 3 = reserved
132 (84h)	Data width	G/S	ENUM USINT	0 = 7 bits 1 = 8 bits

Attr. No. dec. (hex.)	Attribute name	Get/ Set	Type	Description
133 (85h)	Parity	G/S	ENUM USINT	0 = none 1 = odd The number of the bits set to 1 is odd (incl. data and parity bit). 2 = even The number of the bits set to 1 is even (incl. data and parity bit).
134 (86h)	Stop bits	G/S	ENUM USINT	Number of the stop bits. 0 = 1 bit 1 = 2 bits
135 (87h)	XON character	G/S	USINT	XON character This sign is used to start the data transfer to the data terminal equipment (DTE) with the activation of the software handshake. 0 - 255 default: 17/ 11h
136 (88h)	XOFF character	G/S	USINT	XOFF character This sign is used to stop the data transfer to the data terminal equipment (DTE) with the activation of the software handshake. (0 - 255) default: 19/ 13h

RS4xx Module Class (VSC115)

This Class contains all information and parameters for RS485/422 modules.

Class Instance

NOTE

Please refer to paragraph **Class Instance of the VSC**, s. **p. 71**, for the description of the class instance for the VSC.

Object Instance

Attr. No. dec. (hex.)	Attribute name	Get/ Set	Type	Description
100 (64h)	Max object attribute	G	USINT	Contains the number of the last object attribute to be implemented.
101 (65h)	Module present	G	BOOL	0 = module missing, base module without electronic module. 1 = module is plugged
102 (66h)	Terminal slot number	G	USINT	The slot number of the base module belonging to the module (base module to the right of the gateway = No. 1). Corresponds to the respective Instance Number within the TERMINAL SLOT CLASS.
103 (67h)	Module ID	G	DWORD	Contains the module ID.
104 (68h)	Module order number	G	UDINT	Contains the ident number of the module.
105 (69h)	Module order name	G	SHORT STRING	Contains the name of the module, for example, "BL67-1RS485/422".
106 (6Ah)	Module revision number	G	USINT	Contains the revision number of the module firmware.
107 (6Bh)	Module type ID	G	ENUM USINT	Describes the module type: – see attribute 107 (6Bh) on s. **p. 83**
108 (6Ch)	Module command interface	G/S	ARRAY	The control interface of the BL67 module. ARRAY OF: BYTE: Control byte sequence
109 (6Dh	Module response interface	G	ARRAY	Response interface of the BL67 module. ARRAY OF: BYTE: Response-byte sequence
110 (6Eh)	Module registered Index	G	ENUM USINT	Contains the index numbers specified in all the module lists.
111 (6Fh)	Number of supported channels	G	USINT	States the number of analog input channels supported by this module Instance.

Attr. No. dec. (hex.)	Attribute name	Get/ Set	Type	Description
112 (70h)	RX byte count	G	USINT	Number of the valid bytes (0 to 7) in this data segment.
113 (71h)	RX count	G	USINT	This value is transferred together with every data segment of the process input data. The RX count values are sequential: 00->01->10->11->00.... (decimal: 0->1->2->3->0....) Errors in this sequence show the loss of data segments.
114 (72h)	TX count acknowledge	G	USINT	This value is a copy of the value TX count. TX count has been transmitted together with the last data segment of the process output data. TX count acknowledge is an acknowledge for the successful transmission of the data segment with TRANSMIT count.
115 (73h)	Status	G	BOOL	0 = The communication with the data terminal equipment (DTE) is disturbed. A diagnostic message is generated if the parameter "Diagnostics" is set to "0/ release". The diagnostic data show the cause of the communication disturbance. The user has to set back this bit in the process output data by using STATRES. 1 = The communication with the data terminal equipment (DTE) is error free.

Attr. No. dec. (hex.)	Attribute name	Get/ Set	Type	Description
116 (74h)	Process diagnostics data	G	BYTE	Contains the diagnostic information: The diagnostic data are part of the process input data, if ACTIVE MODE = 1 or 2bytes ctrl/ status header is set. Diagnostics messages: – Bit 0 to Bit 2: reserved – Bit 3: 0 = ok 1 = parameter error: The set parameter values are not supported. – Bit 4: 0 = ok 1 = hardware failure: The module has to be replaced, e.g. EEPROM or UART may be defect. – Bit 5: 0 = ok 1 = handshake error: The DTE connected to the module does not answer a XOFF or RTS handshake. This may cause a overflow in the internal receive-buffer.
	Process diagnostics data	G	BYTE	– Bit 6: 0 = ok 1 = frame error: The module has to be parameterized to be adapted to the data structure of the connected DTE. A frame error occurs if the parameterization (number of data bits, stop bits, parity) is not correct. – Bit 7: 0 = ok 1 = buffer overflow: Overflow in the RX-buffer. – Bit 8 to Bit 15: reserved
117 (75h)	RX data	G	ARRAY OF BYTE	Defines the receive-data (0...7).
118 (76h)	RX data and release	G	ARRAY OF BYTE	Defines the data received via RS485/422 (0...7) + acknowledge for reception
119 (77h)	TX byte count	G/S	USINT	Number of the valid user data bytes in this data segment. I
120 (78h)	TX count	G/S	USINT	This value is transferred together with every data segment. The TX count values are sequential: 00->01->10->11->00.... (decimal: 0->1->2->3->0....) Errors in this sequence show the loss of data segments.

Attr. No. dec. (hex.)	Attribute name	Get/ Set	Type	Description
121 (79h)	RX count acknowledge	G/S	USINT	This value is a copy of RX count. RX count has been transmitted together with the last data segment of the process input data. RX count acknowledge is an acknowledge for the successful transmission of the data segment with RX count.
122 (7Ah)	Status reset control	G/S	BOOL	STATRES: This bit is set to reset the STAT bit in the process input data. With the change from 1 to 0 the status bit is reset (from 0 to 1). If this bit is 0, all changes in TRANSMIT BYTE count, TRANSMIT count and RECEIVE count acknowledge are ignored. Flushing the transmit-/ receive-buffer with process control data (Attr. 123) is possible. If this bit is 1 or with the change from 0 to 1, the flushing of the transmit-/ receive-buffer with ROCESS control data (Attr. 123) is not possible.
123 (7Bh)	Process control data	G/S	BYTE	Bit 0 = transmit-buffer flush, Bit 1 = receive-buffer flush
124 (7Ch)	TX data	G/S	ARRAY OF BYTE	Defines the transmit-data (0...7)
125 (7Dh)	TX data and release	S	ARRAY OF BYTE	Defines the data to be transmitted via RS485/ 422 (0...7) + transmission is released/ charged immediately
126 (7Eh)	reserved			

Attr. No. dec. (hex.)	Attribute name	Get/ Set	Type	Description
127 (7Fh) h)	Diagnostics	G	WORD	Contains the diagnostic messages (low byte): Diagnostics messages: – Bit 0 to Bit 2: reserved – Bit 3: 0 = ok 1 = parameter error: The set parameter values are not supported. – Bit 4: 0 = ok 1 = hardware failure: The module has to be replaced, e.g. EEPROM or UART may be defect. – Bit 5: 0 = ok 1 = handshake error: The DTE connected to the module does not answer a XOFF or RTS handshake. This may cause a overflow in the internal receive-buffer.
	Diagnostics	G	WORD	– Bit 6: 0 = ok 1 = frame error: The module has to be parameterized to be adapted to the data structure of the connected DTE. A frame error occurs if the parameterization (number of data bits, stop bits, parity) is not correct. – Bit 7: 0 = ok 1 = buffer overflow: Overflow in the RX-buffer. – High byte: reserved
128 (80h)	Active mode	G/S	BOOL	0 = 1byte ctrl/status header: The diagnostic data are not part of the process input data, 7 bytes of user data are available. 1 = 2byte ctrl/status header: The diagnostic data are part of the process input data, 6 bytes of user data are available.
129 (81h)	Bit rate	G/S	ENUM USINT	Used to set the baudrate for the gateway: 0 = reserved, 1 = 300 bps 2 = 600 bps 3 = 1200 bps 4 = 2400 bps 5 = 4800 bps 6 = 9600 bps 7 = 14400 bps 8 = 19200 bps 9 = 28800 bps 10 = 38400 bps 11 = 57600 bps 12 = 115200 bps ... 15 = reserved)

Attr. No. dec. (hex.)	Attribute name	Get/ Set	Type	Description
130 (82h)	Disable diagnostics	G/S	BOOL	0 = released: The diagnostic function is activated. 1 = blocked: The diagnostic function is deactivated.
131 (83h)	Flow control	G/S	ENUM USINT	0 = off: data flow control is deactivated 1 = XON/XOFF Software-handshake is activated 2 = RTS/CTS Hardware-handshake is activated 3 = reserved
132 (84h)	Data width	G/S	ENUM USINT	0 = 7 bits 1 = 8 bits
133 (85h)	Parity	G/S	ENUM USINT	0 = none 1 = odd The number of the bits set to 1 is odd (incl. data and parity bit). 2 = even The number of the bits set to 1 is even (incl. data and parity bit).
134 (86h)	Stop bits	G/S	ENUM USINT	Number of the stop bits. 0 = 1 bit 1 = 2 bits
135 (87h)	XON character	G/S	USINT	XON character This sign is used to start the data transfer to the data terminal equipment (DTE) with the activation of the software handshake. 0 - 255 default: 17/ 11h
136 (88h)	XOFF character	G/S	USINT	XOFF character This sign is used to stop the data transfer to the data terminal equipment (DTE) with the activation of the software handshake. (0 - 255) default: 19/ 13h
137 (89h)	RSXX Modus	G/S	ENUM USINT	0 = RS422: Parameterization as 422 1 = RS485: Parameterization as 485

SSI Module Class (VSC116)

This Class contains all information and parameters for SSI- modules.

Class Instance

NOTE

Please refer to paragraph Class Instance of the VSC, s. p. 71, for the description of the class instance for the VSC.

Object Instance

Attr. No. dec. (hex.)	Attribute name	Get/ Set	Type	Description
100 (64h)	Max object attribute	G	USINT	Contains the number of the last object attribute to be implemented.
101 (65h)	Module present	G	BOOL	0 = module missing, base module without electronic module. 1 = module is plugged
102 (66h)	Terminal slot number	G	USINT	The slot number of the base module belonging to the module (base module to the right of the gateway = No. 1). Corresponds to the respective Instance Number within the TERMINAL SLOT CLASS.
103 (67h)	Module ID	G	DWORD	Contains the module ID.
104 (68h)	Module order number	G	UDINT	Contains the ident number of the module.
105 (69h)	Module order name	G	SHORT STRING	Contains the name of the module, for example, "BL67-1SSI".
106 (6Ah)	Module revision number	G	USINT	Contains the revision number of the module firmware.
107 (6Bh)	Module type ID	G	ENUM USINT	Describes the module type: – see attribute 107 (6Bh) on s. p. 83
108 (6Ch)	Module command interface	G/S	ARRAY	The control interface of the BL67 module. ARRAY OF: BYTE: Control byte sequence
109 (6Dh	Module response interface	G	ARRAY	Response interface of the BL67 module. ARRAY OF: BYTE: Response-byte sequence
110 (6Eh)	Module registered Index	G	ENUM USINT	Contains the index numbers specified in all the module lists.
111 (6Fh)	Number of supported channels	G	USINT	States the number of analog input channels supported by this module Instance.

Attr. No. dec. (hex.)	Attribute name	Get/ Set	Type	Description
112 (70h)	Diagnostics and status	G	WORD	Bit 0: 0 = No enabled status signal is active (SSI_STSx = 0). 1 = group diagnostics At least one enabled status signal is active (SSI_STSx = 1).
				Bit 1: 0 = SSI encoder signal present. 1 = SSI error/open circuit SSI encoder signal faulty. (e.g. due to a cable break).
				Bit 2: 0 = A comparison of the register contents has produced the following result: (REG_SSI_POS) ≤ (REG_UPPER_LIMIT) 1 = error POS > UPPER LIMIT A comparison of the register contents has produced the following result: (REG_SSI_POS) > (REG_UPPER_LIMIT)
112	Diagnostics and status	G	WORD	Bit 3: 0 = A comparison of the register contents has produced the following result: (REG_SSI_POS) ≥ (REG_LOWER_LIMIT) 1 = error POS < LOWER LIMIT A comparison of the register contents has produced the following result: (REG_SSI_POS) < (REG_LOWER_LIMIT)
				Bit 4 0 = The parameter set of the module has been accepted. 1 = parameterization error Operation of the module is not possible with the present parameter set.
				Bit 5 to 6 <reserved>
				Bit 7 0 = The SSI encoder is read cyclically. 1 = SSI communication suspended Communication with the SSI encoder is stopped as STOP = 1 (process output) or ERR_PARA = 1.

Attr. No. dec. (hex.)	Attribute name	Get/ Set	Type	Description
112	Diagnostics and status	G	WORD	Bit 8 0 = A comparison of the register contents has produced the following result: (REG_SSI_POS) ≠ (REG_CMP1) 1 = CMP1 register value matches POS A comparison of the register contents has produced the following result: (REG_ SSI_POS) = (REG_CMP1)
				Bit 9 0 = Default status, i.e. the register contents have not yet matched (REG_SSI_POS) = (REG_CMP1) since the last reset. 1= CMP1 flag set The contents of the registers match: (REG_SSI_POS) = (REG_CMP1). This marker must be reset with bit 9 of the control attribute.
112	Diagnostics and status	G	WORD	Bit 10 0 = A comparison of the register contents has produced the following result: (REG_SSI_POS) < (REG_CMP1) 1 = POS ≥ CMP1 register value A comparison of the register contents has produced the following result: (REG_ SSI_POS) ≥ (REG_CMP1)
				Bit 11 0 = A comparison of the register contents has produced the following result: (REG_SSI_POS) ≠ (REG_CMP2) 1 = CMP2 register value matches POS A comparison of the register contents has produced the following result: (REG_ SSI_POS) = (REG_CMP29
112	Diagnostics and status	G	WORD	Bit 12 0 = Default status, i.e. the register contents have not yet matched (REG_SSI_POS) = (REG_CMP2) since the last reset. 1 = CMP2 flag set The contents of the registers match: (REG_SSI_POS) = (REG_CMP2). This marker must be reset with bit 12 of the control attribute.
				Bit 13 0 = A comparison of the register contents has produced the following result: (REG_SSI_POS) < (REG_CMP2) 1 = POS ≥ CMP2 register value. A comparison of the register contents has produced the following result: (REG_SSI_POS) ≥ (REG_CMP2)

Attr. No. dec. (hex.)	Attribute name	Get/ Set	Type	Description
				Bit 14 0 = The SSI encoder values are incremented or the values are constant. 1 = counting downwards The SSI encoder values are decremented.
112	Diagnostics and status	G	WORD	Bit 15 0 = The SSI encoder values are decremented or the values are constant. 1 = counting upwards The SSI encoder values are incremented.
113 (71h)	Result write operation	G	WORD	Bit 0 to 5 <reserved>
				Bit 6: 0 = No modification of the data in the register bank by process output, i.e. ”Write operation” = 0. A write job would be accepted with the next telegram of process output data. (handshake for data transmission to the register.) 1 = control register write acknowledged A modification of the register contents by a process output was initiated, i.e. ”Write operation” = 1. A write job would not be accepted with the next telegram of process output data.
113 (71h)	Result write operation	G	BYTE	Bit 7: 0 = The writing of user data for process output to the register addressed with ”Address write register” in the process output data could not be executed. 1 = control register write accepted The writing of user data for process output to the register addressed with ”Address write register” in the process output data could be executed successfully.
114 (72h)	Result in read operation	G	BYTE	Bit 0 to 6: <reserved>
				Bit 7: 0 = The reading of the register stated in ”Address read register” was accepted and executed. The content of the register is located in ”Value read register”. 1 = register read operation aborted The reading of the register stated in ”Address read register” was not accepted. ”Value read register” is zero.
115 (73x)	Address read register	G	UINT	Address of the input register with contents stated in ”Value read register” when ”Result read operation“ = 0.

Attr. No. dec. (hex.)	Attribute name	Get/ Set	Type	Description
116 (74h)	Value read register	G	DWORD	Content of the register to be read if "Result read operation"= 0. If "Result read operation" = 1, "Value read register" = 0.
117 (75h)	Control	G/S	WORD	Bit 0 to 6: <reserved>
				Bit 7: 0 = Request to read the SSI encoder cyclically 1 = suspend communication requested Request to interrupt communication with the encoder
				Bit 8: 0 = Default status, i.e. the data bits 8 to 10 of the "Diagnostics and status" attribute always have the value 0, irrespective of the actual SSI encoder value. 1 = compare/flag CMP1 active Comparison active, i.e. the data bits 8 to 10 of the "Diagnostics and status" attribute always have a value based on the result of the comparison with the actual SSI encoder value.
117 (75h)	Control	G/S	WORD	Bit 9: 0 = Default status, i.e. reset of Bit 9 of the "Diagnostics and status" attribute not active. 1 = clear CMP1 flag Reset of bit 9 of the "Diagnostics and status" attribute active.
				Bit 10: <reserved>
				Bit 11: 0 = Default status, i.e. the data bits 11 to 13 of the "Diagnostics and status" attribute always have the value 0, irrespective of the actual SSI encoder value. 1 = compare/flag CMP2 active Comparison active, i.e. the data bits 11 to 13 of the "Diagnostics and status" attribute always have a value based on the result of the comparison with the actual SSI encoder value.
				Bit 12: 0 = Default status, i.e. no reset of Bit 12 of the "Diagnostics and status" attribute active. 1 = clear CMP2 flag Reset of bit 12 of the "Diagnostics and status" attribute active.
				Bit 13 to 15: <reserved>
118 (76h)	Address read register	G/S	UINT	Address of the register with contents stated in "Value read register" when "Result read operation" 7 = 0.
119 (77h)	Address write register	G/S	UINT	Address of the register to be written with "Value write register".

Attr. No. dec. (hex.)	Attribute name	Get/ Set	Type	Description
120 (78h)	Value write register	G/S	DWORD	Value to be written to the register with the address stated at "Address write register".
121 (79h)	Write operation	G/S	BOOL	0 = Default status, i.e. there is no request to overwrite the content of the register address stated at "Address write register" with "Value write register". Bit 6 of the "Result write operation"" attribute is reset (=0) if necessary. 1 = Request to overwrite the content of the register at the address "Address write register" with "Value write register".
122 (7Ah)	Write register and execute	S	STRUCTOF UINT DWORD	The structure contains both parts: – Address of the register to be written. – Value to be written. The write operation is executed without checking whether a write job is already present.
123 (7Bh)	Diagnostics	G	WORD	Bit 0: 0 = No enabled status signal is active (SSI_STSx = 0). 1 = group diagnostics At least one enabled status signal is active (SSI_STSx = 1).
				Bit 1: 0 = SSI encoder signal present. 1 = SSI error/open circuit SSI encoder signal faulty. (e.g. due to a cable break).
				Bit 2: 0 = A comparison of the register contents has produced the following result: (REG_SSI_POS) ≤ (REG_UPPER_LIMIT) 1 = error POS > UPPER LIMIT A comparison of the register contents has produced the following result: (REG_SSI_POS) > (REG_UPPER_LIMIT)
123 (7Bh)	Diagnostics	G	WORD	Bit 3: 0 = A comparison of the register contents has produced the following result: (REG_SSI_POS) ≥ (REG_LOWER_LIMIT) 1 = error POS < LOWER LIMIT A comparison of the register contents has produced the following result: (REG_SSI_POS) < (REG_LOWER_LIMIT)
				Bit 4: 0 = The parameter set of the module has been accepted. 1 = parameterization error Operation of the module is not possible with the present parameter set.
				Bit 5 to 15 <reserved>

Attr. No. dec. (hex.)	Attribute name	Get/ Set	Type	Description
124 (7Ch)	Check mode	G/S	WORD	Bit 0 to 4 <reserved>
				Bit 5: 0 = ZERO test of data cable. 1 = disable SSI error detection After the last valid bit, a ZERO test of the data cable is not carried out.
				Bit 6 to 15 <reserved>
125 (7Dh)	Invalid bits LSB	G/S	USINT	Number of invalid bits on the LSB side of the position value supplied by the SSI encoder. The meaningful word width of the position value transferred to the module bus master is as follows: FRAME LENGTH - INVALID BITS MSB - INVALID BITS LSB. The invalid bits on the LSB side are removed by shifting the position value to the right, starting with the LSB. (Default 0 Bit = 0_{hex}). INVALID BITS MSB + INVALID BITS LSB must always be less than FRAME LENGTH.
126 (7Eh)	Bit rate		ENUM USINT	0 = 1 Mbps 1 = 500 kbps 2 = 250 kbps 3 = 100 kbps 4 = 125 kbps 5 = 83 kbps 6 = 71 kbps 7 = 62.5 kbps 8 to 15 <reserved>
128 (80h)	Frame length	G/S	USINT	Number of bits of the SSI data frame. FRAME LENGTH must always be greater than INVALID_BITS. **A** Default: 25 = 19_{hex}
129 (81h)	Kind of coding SSI	G/S	BOOL	0 = Binary code 1 = GRAY code
130 (82h)	Invalid bits MSB	G/S	USINT	Number of invalid bits on the MSB side of the position value supplied by the SSI encoder. The meaningful word width of the position value transferred to the module bus master is as follows: FRAME LENGTH - INVALID BITS MSB - INVALID BITS LSB. The invalid bits on the MSB side are zeroed by masking the position value. I NVALID BITS MSB + INVALID BITS LSB must always be less than FRAME LENGTH. Default: 0 = 0_{hex}

Digital Versatile Module Class (VSC117)

This class contains all information and parameters for digital versatile modules.

NOTICE

In this class, chosen parameter options can only be deactivated by activating another option of this parameter.

Class Instance

NOTE

Please refer to paragraph Class Instance of the VSC, s. p. 71, for the description of the class instance for the VSC.

Object Instance

Attr. No. dec. (hex.)	Attribute name	Get/ Set	Type	Description
100 (64h)	Max object attribute	G	USINT	Contains the number of the last object attribute to be implemented.
101 (65h)	Module present	G	BOOL	0 = module missing, base module without electronic module. 1 = module is plugged
102 (66h)	Terminal slot number	G	USINT	The slot number of the base module belonging to the module (base module to the right of the gateway = No. 1). Corresponds to the respective Instance Number within the TERMINAL SLOT CLASS.
103 (67h)	Module ID	G	DWORD	Contains the module ID.
104 (68h)	Module order number	G	UDINT	Contains the ident number of the module.
105 (69h)	Module order name	G	SHORT STRING	Contains the name of the module, for example, "BL67-4DO-0.5A-P".
106 (6Ah)	Module revision	G	USINT	Contains the revision number of the module firmware.
107 (6Bh)	Module type ID	G	ENUM USINT	Describes the module type: – see attribute 107 (6Bh) on s. p. 83
108 (6Ch)	Module command interface	G/S	ARRAY	The control interface of the BL67 module. ARRAY OF: BYTE: Control byte sequence
109 (6Dh)	Module response interface	G	ARRAY	Response interface of the BL67 module. ARRAY OF: BYTE: Response byte sequence
110 (6Eh)	Module registered Index	G	ENUM USINT	Contains the index numbers specified in all the module lists.

Attr. No. dec. (hex.)	Attribute name	Get/ Set	Type	Description
111 (6Fh)	Module input channel count	G	USINT	Contains the number of input channels supported by the module.
112 (70h)	Module output Channel count	G	USINT	Contains the number of output channels supported by the module.
Input data				
113 (71h)	Module input_1	G	DWORD	Input data of the module (according to channels).
114 (72h)	Module input_2	G	DWORD	Input data of the module (according to channels).
Output data				
115 (73h)	Module output_1	G	DWORD	Output data of the module (according to channels).
116 (74h)	Module output _2	G	DWORD	Output data of the module (according to channels).
Diagnosis data				
117 (75h)	Open circuit error_1	G	DWORD	This attribute contains diagnosis information about open circuit errors (according to channels).
118 (76h)	Open circuit error_2	G	DWORD	This attribute contains diagnosis information about open circuit errors (according to channels).
119 (77h)	Short circuit output error_1	G	DWORD	This attribute contains diagnosis information about output short-circuits (according to channels).
120 (78h)	Short circuit output error_2	G	DWORD	This attribute contains diagnosis information about output short-circuits (according to channels).
Attr. No. dec. (hex.)	**Attribute name**	**Get/ Set**	**Type**	**Description**
121 (79h)	Short circuit sensor error_1	G	DWORD	This attribute contains diagnosis information about sensor short-circuits (according to channels).
122 (7Ah)	Short circuit sensor error_2	G	DWORD	This attribute contains diagnosis information about sensor short-circuits (according to channels).
123 (7Bh)	Cable error_1	G	DWORD	This attribute contains open-circuit diagnosis information (channel 1 to 32).
124 (7Ch)	Cable error_2	G	DWORD	This attribute contains open-circuit diagnosis (channel 33 to 64).

Attr. No. dec. (hex.)	Attribute name	Get/ Set	Type	Description
Parameter data				
125 (7Dh)	Open circuit monitoring mode_1	G/S	DWORD	Enables the open-circuit monitoring (channel 1 to 32).
126 (7Eh)	Open circuit monitoring mode_2	G/S	DWORD	Enables the open-circuit monitoring (channel 33 to 64).
127 (7Fh)	Invert input data_1	G/S	DWORD	The input signal is inverted (channel 1 to 32).
128 (80h)	Invert input data_2	G/S	DWORD	The input signal is inverted (channel 33 to 64).
129 (81h)	Invert output data_1	G/S	DWORD	The output signal is inverted (channel 1 to 32).
130 (82h)	Invert output data_2	G/S	DWORD	The output signal is inverted (channel 33 to 64).
131 (83h)	reserved	-	-	-
132 (84h)	reserved	-	-	-
133 (85h)	Auto recovery output_1	G/S	DWORD	The outputs switch on automatically after an overload.
134 (86h)	Auto recovery output_1	G/S	DWORD	The outputs switch on automatically after an overload.
135 (87h)	reserved	-	-	-
136 (88h)	reserved	-	-	-
137 (89h)	Retriggered recovery output_1	G/S	DWORD	The outputs (channel 1 to 32) have to be retriggered in case of an overload.
138 (8Ah)	Retriggered recovery output_2	G/S	DWORD	The outputs (channel 33 to 64) have to be retriggered in case of an overload.
139 (8Bh)	Enable high side output driver_1	G/S	DWORD	Enables the high side output driver of channels (channel 1 to 32).
140 (8Ch)	Enable high side output driver_2	G/S	DWORD	Enables the high side output driver of channels (channel 33 to 64).
141 (8Dh)	Enable low side output driver_1	G/S	DWORD	Enables the low side output driver of channels (channel 1 to 32).
142 (8Eh)	Enable low side output driver_2	G/S	DWORD	Enables the low side output driver of channels (channel 33 to 64).

Attr. No. dec. (hex.)	Attribute name	Get/ Set	Type	Description
143 (8Fh)	Filter 2500µs Channel 1	G/S	DWORD	Enables the input filter of the channel (channel 1 to 32).
144 (90h)	Filter 2500µs Channel 2	G/S	DWORD	Enables the input filter of the channel (channel 33 to 64).
145 (91h)	Fault value	G/S	DWORD	Activates the fault value for the channel (channel 1 to 32).
146 (92h)	Fault value	G/S	DWORD	Activates the fault value for the channel (channel 33 to 64).
147 (93h)	Block diagnostics	G/S	DWORD	Channel specific diagnostic information is blocked (channel 1 to 32).
148 (94h)	Block diagnostics	G/S	DWORD	Channel specific diagnostic information is blocked (channel 33 to 64).

Analog Versatile Module Class (VSC118)

This class contains all information and parameters for analog versatile modules.

NOTICE

In this class, chosen parameter options can only be deactivated by activating another option of this parameter.

Class Instance

NOTE

Please refer to paragraph **Class Instance of the VSC**, s. **p. 71**, for the description of the class instance for the VSC.

Object Instance

Attr. No. dec. (hex.)	Attribute name	Get/ Set	Type	Description
100 (64h)	Max object attribute	G	USINT	Contains the number of the last object attribute to be implemented.
101 (65h)	Module present	G	BOOL	0 = module missing, base module without electronic module. 1 = module is plugged
102 (66h)	Terminal slot number	G	USINT	The slot number of the base module belonging to the module (base module to the right of the gateway = No. 1). Corresponds to the respective Instance Number within the TERMINAL SLOT CLASS.
103 (67h)	Module ID	G	DWORD	Contains the module ID.
104 (68h)	Module order number	G	UDINT	Contains the ident number of the module.
105 (69h)	Module order name	G	SHORT STRING	Contains the name of the module, for example, "BL67-4DO-0.5A-P".
106 (6Ah)	Module revision	G	USINT	Contains the revision number of the module firmware.
107 (6Bh)	Module type ID	G	ENUM USINT	Describes the module type: – see attribute 107 (6Bh) on s. **p. 83**
108 (6Ch)	Module command interface	G/S	ARRAY	The control interface of the BL67 module. ARRAY OF: BYTE: Control byte sequence
109 (6Dh)	Module response interface	G	ARRAY	Response interface of the BL67 module. ARRAY OF: BYTE: Response byte sequence
110 (6Eh)	Module registered index	G	ENUM USINT	Contains the index numbers specified in all the module lists.

Attr. No. dec. (hex.)	Attribute name	Get/ Set	Type	Description
111 (6Fh)	Module input channel count	G	USINT	Contains the number of input channels supported by the module.
112 (70h)	Module output Channel count	G	USINT	Contains the number of output channels supported by the module.
Input data				
113 (71h)	Channel_1	G	UINT	Input data of the module, channel 1.
...				
128 (80h)	Channel_16	G	UINT	Input data of the module, channel 16.
129 (81h) to 144 (90h)	reserved	G	UINT	Output data of the module.
Diagnosis data				
145 (91h)	Range error	G	WORD	This attribute contains diagnosis information errors in the measurement value range (according to channels).
146 (92h)	Open circuit error	G	WORD	This attribute contains diagnosis information about open circuit errors (according to channels).
147 (93h)	Short circuit output error	G	DWORD	This attribute contains diagnosis information about output short-circuits (according to channels).
148 (94h)	reserved			
149 (95h) to 164 (A4h)	reserved			
Parameter data				
165 (A5h)	Operating mode_ channel 1	G/S	ENUM USINT	Parameter for setting the operating mode of the respective channel: 0 = deactivate channel 1 = -10 V...+10 V 2 = 0 V...+10 V 3 = 0 mA...20 mA 4 = 4 mA...20 mA
...				
180 (B4h)	Operating mode_ channel 16	G/S	ENUM USINT	
181 (B5h)	Representation mode _channel_1	G/S	ENUM USINT	Parameter for setting the type of value representation for the respective channel: 0 = default 1 = 16bit integer 2 = 12bit left justified + diagnostics
...				
196 (C4h)	Representation mode _channel_16			

Attr. No. dec. (hex.)	Attribute name	Get/ Set	Type	Description
197 (C5h)	Block diagnostics	G/S	WORD	Channel specific diagnostic information is blocked.

CVI Module Class (VSC119)

This class contains all information and parameters for the modules BL67-1CVI.

NOTICE

In this class, chosen parameter options can only be deactivated by activating another option of this parameter.

Class Instance

NOTE

Please refer to paragraph **Class Instance of the VSC**, s. **p. 71**, for the description of the class instance for the VSC.

Object Instance

Attr. No. dec. (hex.)	Attribute name	Get/ Set	Type	Description
100 (64h)	Max object attribute	G	USINT	Contains the number of the last object attribute to be implemented.
101 (65h)	Module present	G	BOOL	0 = module missing, base module without electronic module. 1 = module is plugged
102 (66h)	Terminal slot number	G	USINT	The slot number of the base module belonging to the module (base module to the right of the gateway = No. 1). Corresponds to the respective Instance Number within the TERMINAL SLOT CLASS.
103 (67h)	Module ID	G	DWORD	Contains the module ID.
104 (68h)	Module order number	G	UDINT	Contains the ident number of the module.
105 (69h)	Module order name	G	SHORT STRING	Contains the name of the module, for example, "BL67-4DO-0.5A-P".
106 (6Ah)	Module revision	G	USINT	Contains the revision number of the module firmware.
107 (6Bh)	Module type ID	G	ENUM USINT	Describes the module type: – see attribute 107 (6Bh) on s. **p. 83**
108 (6Ch)	Module command interface	G/S	ARRAY	The control interface of the BL67 module. ARRAY OF: BYTE: Control byte sequence
109 (6Dh)	Module response interface	G	ARRAY	Response interface of the BL67 module. ARRAY OF: BYTE: Response byte sequence

Attr. No. dec. (hex.)	Attribute name	Get/ Set	Type	Description
110 (6Eh)	Module registered Index	G	ENUM USINT	Contains the index numbers specified in all the module lists.
111 (6Fh)	Module input channel count	G	USINT	Contains the number of input channels supported by the module.
112 (70h)	Module output Channel count	G	USINT	Contains the number of output channels supported by the module.
Input data				
113 (71h)	Module input_1	G	DWORD	Input data of the module (according to channels).
114 (72h)	Module input_2	G	DWORD	Input data of the module (according to channels).
Output data				
115 (73h)	Module output_1	G	DWORD	Output data of the module (according to channels).
116 (74h)	Module output _2	G	DWORD	Output data of the module (according to channels).
Diagnosis data				
117 (75h)	Common error	G	BYTE	This attribute contains diagnosis information about common errors of the module.
118 (76h)	Valve node_1 error	G	BYTE	This attribute contains diagnosis information about errors of the connected node no. 1.
...				
125 (7Dh)	Valve node_8 error			This attribute contains diagnosis information about errors of the connected node no. 8.
Parameter data				
126 (7Eh)	Guard time	G/S	USINT	Setting the Guard-Time in steps of 100 ms (value 0 to 255); default 3 = 300 ms
127 (7Fh)	Life time factor	G/S	USINT	Factor which defines how often a node is allowed not to answer a request or to exceed the Guard-Time (values 0 to 255); default = 3
128 (80h)	CANopen baudrate	G/S	ENUM USINT	Setting the baudrate for CANopen: 0 = 1000k 1 = reserved 2 = 500k 3 = 250k 4 = 125k **A** 5 = 50k 6 = 20k 7 = 10k
129 (81h)	reserved	-	-	-

Attr. No. dec. (hex.)	Attribute name	Get/ Set	Type	Description
130 (81h)	Common config	G/S	DWORD	Activation of the bus terminating resistor: 0 = no terminating resistor **A** 1 = terminating resistor active
131 (82h)	Node_1 output length	G/S	USINT	Defines the length of the output data of the respective node: 0 = 0 bit 1 = 4 bit 2 = 8 bit 3 = 12 bit 4 = 16 bit 5 = 24 bit 6 = 32 bit
...				
138 (8Ah)	Node_8 output length	G/S	USINT	
139 (8Bh)	Node_1 input length	G/S	USINT	Defines the length of the input data of the respective node: 0 = 0 bit 1 = 4 bit 2 = 8 bit 3 = 12 bit 4 = 16 bit 5 = 24 bit 6 = 32 bit
...				
146 (92h)	Node_8 input length	G/S	USINT	
147 (93h)	Guarding	G/S	BYTE	Activates the node guarding (according to channels).
148 (94h)	Activation	G/S	BYTE	Node activation (according to channels).

RFID Module Class (VSC120)

This class contains all information and parameters for the modules BL67-2RFID-A.

NOTE

The RFID module class (VSC120) is only implemented in gateways with Maj. Rev. ≥ 5.0.

NOTICE

In this class, chosen parameter options can only be deactivated by activating another option of this parameter.

Class Instance

NOTE

Please refer to paragraph Class Instance of the VSC, s. p. 71, for the description of the class instance for the VSC.

Object Instance

NOTE

The object instances of VSC120 represent the individual RFID channels, not the complete modules!

Attr. No. dec. (hex.)	Attribute name	Get/ Set	Type	Description
100 (64h)	Max object attribute	G	USINT	Contains the number of the last object attribute to be implemented.
101 (65h)	Module present	G	BOOL	0 = module missing, base module without electronic module. 1 = module is plugged
102 (66h)	Terminal slot number	G	USINT	The slot number of the base module belonging to the module (base module to the right of the gateway = No. 1). Corresponds to the respective Instance Number within the TERMINAL SLOT CLASS.
103 (67h)	Module ID	G	DWORD	Contains the module ID.
104 (68h)	Module order number	G	UDINT	Contains the ident number of the module.
105 (69h)	Module order name	G	SHORT STRING	Contains the name of the module, for example, "BL67-2RFID-A".
106 (6Ah)	Module revision	G	USINT	Contains the revision number of the module firmware.
107 (6Bh)	Module type ID	G	ENUM USINT	Describes the module type: see attribute 107 (6Bh) on s. p. 83

Attr. No. dec. (hex.)	Attribute name	Get/ Set	Type	Description
108 (6Ch)	Module command interface	G/S	ARRAY	The control interface of the BL67 module. ARRAY OF: BYTE: Control byte sequence
109 (6Dh)	Module response interface	G	ARRAY	Response interface of the BL67 module. ARRAY OF: BYTE: Response byte sequence
110 (6Eh)	Module registered Index	G	ENUM USINT	Contains the index numbers specified in all the module lists.
111 (6Fh)	Module input channel count	G	USINT	Contains the number of input channels supported by the module.
112 (70h)	Module output Channel count	G	USINT	Contains the number of output channels supported by the module.
RFID data				
113 (71h)	TAG data producing	G	ARRY OF BYTE	Provides access to the RFID response data.
114 (72h)	TAG data consuming	G/S	ARRY OF BYTE	Consumes the RFID command data.
RFID info				
115 (73h)	Command interface version	G	USINT	Contains the version of the command interface.
116 (74h)	CMD interface enabled	G	BOOL	Shows if the command interface attribute of the RFID is enabled (see VSC102, object instance 5, attr.104 (68h).
117 (75h)	Status interface version	G	USINT	Contains the version of the status interface.
118 (76h)	Status interface enabled	G	BOOL	Shows if the status interface attribute of the RFID is enabled (see VSC102, object instance 6, attr.104 (68h).
119 (77h)	COS mode enabled	G	BOOL	Shows if the explicit use of COS messages for RFID data is enabled.
120 (78h)	RFID CIP support	G	BOOL	Shows if the CIP access for the RFID handling is enabled.
121 (79h)	RFID available channels	G	BYTE	Contains the list of the available RFID channels. Bit 0 = RFID channel 1 ... Bit 7 = RFID channel 8.
122 (7Ah)	RFID faulty channels	G	BYTE	Contains the list of the faulty RFID channels. Bit 0 = RFID channel 1 ... Bit 7 = RFID channel 8.

Attr. No. dec. (hex.)	Attribute name	Get/ Set	Type	Description
123 (7Bh)	RFID executing channels	G	BYTE	Contains the list of the executing RFID channels. Bit 0 = RFID channel 1 ... Bit 7 = RFID channel 8.
124 (7Ch)	RFID data holding channels	G	BYTE	Contains the list of the data holding RFID channels. Bit 0 = RFID channel 1 ... Bit 7 = RFID channel 8.
125 (7Dh)	RFID TAG present channels	G	BYTE	Contains the list of the present RFID TAG channels. Bit 0 = RFID channel 1 ... Bit 7 = RFID channel 8.
126 (7Eh)	RFID oldest data channel	G	USINT	Contains the number of the channel holding the oldest RFID data.
127 (7Fh)	RFID latest data channel	G	USINT	Contains the number of the channel holding the latest RFID data.

NOTE

For all information concerning the RFID communication interfaces see the special RFID documentation (Turck document D101642 which can be downloaded from www.turck.com).

10.2 Nominal current consumptions of the modules for DeviceNet

Module	Nominal current consumption on 24 V DC
Power supply modules	
BL67-PF-24VDC	≤ 7,8 mA
Digital input modules	
BL67-4DI-P	≤ 7,8 mA
BL67-8DI-P	≤ 7,8 mA
BL67-4DI-PD	≤ 30 mA
BL67-8DI-PD	≤ 30 mA
BL67-4DI-N	≤ 7 mA
BL67-8DI-N	≤ 7 mA
Analog input modules	
BL67-2AI-I	≤ 9,1 mA
BL67-2AI-V	≤ 9,1 mA
BL67-2AI-PT	≤ 11,7 mA
BL67-2AI-TC	≤ 9,1mA
BL67-4AI-V/I	≤ 10 mA
Digital output modules	
BL67-4DO-0.5A-P	≤ 7,8 mA
BL67-4DO-2A-P	≤ 7,8 mA
BL67-8DO-0.5A-P	≤ 7,8 mA
BL67-16DO-0.1A-P	≤ 10 mA
BL67-4DO-2A-N	≤ 22 mA
BL67-8DO-0.5A-N	≤ 22 mA
Analog output modules	
BL67-2AO-I	≤ 10,4 mA
BL67-2AO-V	≤ 15,6 mA
Digital combi modules	
BL67-4DI/4DO-PD	≤ 30 mA
BL867-8XSG-PD	≤ 30 mA
Technology modules	
BL67-1RS232	≤ 26 mA
BL67-1RS485/422	≤ 16 mA
BL67-1SSI	≤ 30 mA

Module	Nominal current consumption on 24 V DC
BL67-1CVI	≤ 50 mA
BL67-2RFID-A	≤ 50 mA

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