1. LS187

1.1 General Information

The Logic Scanner LS187 module is a PCI half size module. It is Plug & Play capable and has 1 MByte SRAM onboard, which can be used by B&R Automation Runtime™ for remanent process variables.

The LS187 is an ETHERNET Powerlink Logic scanner module. It can be used as a manager or bus controller module. The connection is made via an RJ45 port.

The module is also equipped with a CAN interface, with its own object buffers in send and receive direction.

1.2 Order Data

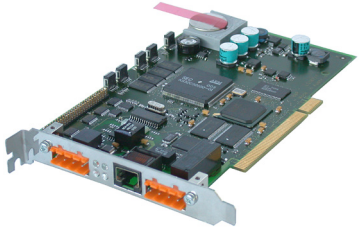
Model Number	Short Description	Image
5LS187.6	Logic Scanner ETHERNET Powerlink, PCI half size module, 1 ETHERNET Powerlink interface, manager or controller function, 1 CAN interface, max. 500 kbps, object buffer in send and receive direction, network capable, electrically isolated, 1 MByte SRAM (Automation Runtime). Order 2 x TB704 terminal blocks separately.	
0TB704.9	Accessory terminal block, 4 pin, screw clamp, 1.5 mm²	
0TB704.91	Accessory terminal block, 4 pin, cage clamp, 2.5 mm²	
Information: **The 4 pin TB704 terminal blocks are not contained in the delivery.**		

Table 1: LS187 order data

1.3 Technical Data

Product ID	LS187
General Information	
C-UL-US Listed	In preparation
Design	Standard PCI half size module, ISA Plug & Play
Installation in B&R PROVIT 2000 Industrial PCs B&R PROVIT 5000 Industrial PCs Desktop PCs	 No Yes Yes
Interfaces	1 x CAN 1 x ETHERNET Powerlink
Power Consumption	TBD

Table 2: LS187 technical data

Product ID	LS187
Ready Relay	
Contact for Ready Relay Design Switching Voltage Continuous Current	 N.O. and N.C. Max. 30 VDC Max. 10 A
Application Interface IF1	
Type	CAN
Controller	Controller SJA 1000
Design	4 pin multipoint connector
Electrical Isolation	Yes
Maximum Distance	1,000 m
Maximum Baud Rate Bus Length ≤60 m Bus Length ≤200 m Bus Length ≤1,000 m	 500 kBit/s 250 kBit/s 50 kBit/s
Network Capable	Yes
Bus Termination Resistor	Optional (externally wired)
Application Interface IF2	
Type	ETHERNET Powerlink Interface
Standard (Compliance)	ANSI/IEEE 802.3
In/Out Buffer	20 KByte [1)]
Data Rate	100 Mbps
Signal	100 Base-T
Port Design	Shielded RJ45 port
Line Length Between Two Stations (Segment Length)	Max. 100 m

Table 2: LS187 technical data (cont.)

1) Beginning with firmware version V 50. Before that 11 KByte.

1.4 Dimensions

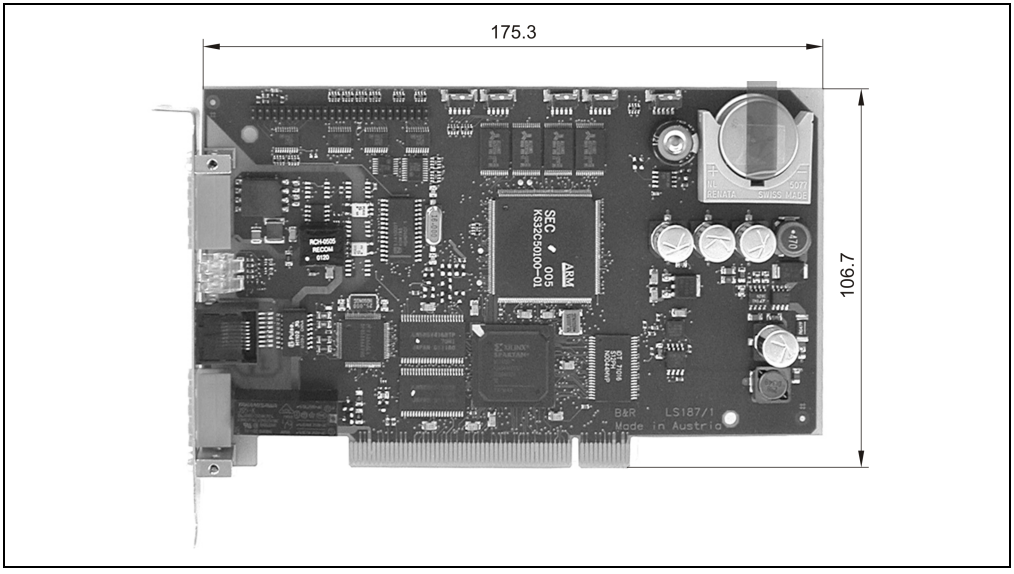


Figure 1: LS187 dimensions

1.5 Operational and Connection Elements

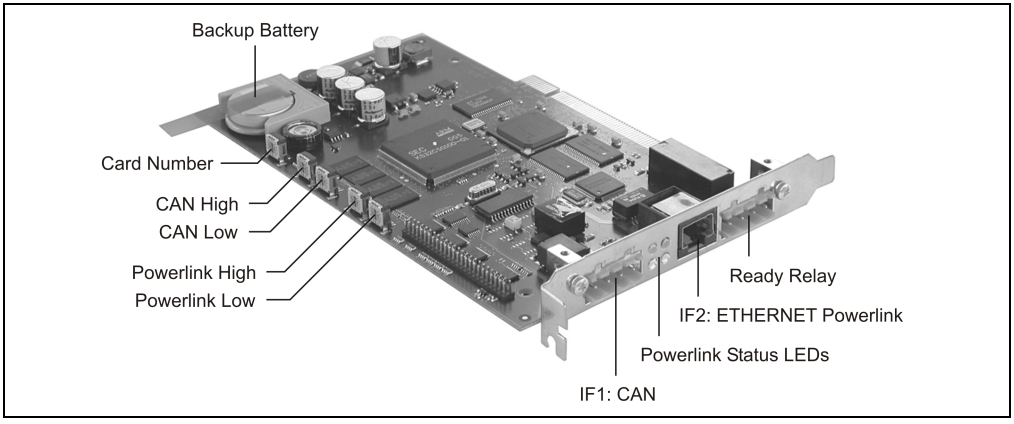


Figure 2: LS187 operational and connection elements

1.6 CAN

1.6.1 CAN Node Number Switch

The node number for the CAN interface (IF1) is set with the two hex switches.

CAN node numbers can also be set using the software.

1.6.2 CAN Interface (IF1)

A 120 Ω bus terminating resistor is included with delivery. The resistor can be inserted where needed between terminal 1 and terminal 3.

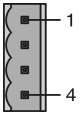
Interface	Description	Pin Assignments		
Application Interface CAN  4 pin multipoint connector	The electrically isolated CAN interface is a 4 pin multipoint connector. Max. baud rate: Bus length ≤60 m: 500 kBit/s Bus length ≤200 m: 250 kBit/s Bus length ≤1,000 m: 50 kBit/s	**Terminal**	**CAN**	
		1	CAN_H	CAN High
		2	CAN⊥	CAN Ground
		3	CAN_L	CAN Low
		4	SHLD	Shield

Table 3: LS187 CAN Interface (IF1)

1.7 ETHERNET Powerlink

1.7.1 ETHERNET Powerlink Station Number

The station number for the Powerlink station is set using both number switches. Station numbers are permitted between $00 and $FD.

Switch Position	Description
$00	Operated as manager station.
$01 - $FD	Station number for Powerlink station. Operated as controller station.
$FE	Reserved, switch position is not permitted.
$FF	Reserved, switch position is not permitted.

Table 4: LS187 ETHERNET Powerlink station number

1.7.2 ETHERNET Powerlink Status LEDs

Image	LED	Color	Description
ETHERNET Powerlink Status LEDs Rx ◯◯ Tx L/C ◯◯ Status	Status	Red/Green	See Section "Status LED" on page 5.
	Tx	Orange	The Powerlink station is sending data.
	Rx	Orange	The Rx LED is always lit when Powerlink activity is present on the bus.
	L/C	Red/Green	Green ... Link Red ..... Collision

Table 5: LS187 ETHERNET Powerlink status LEDs

Status LED

Boot Phase

During booting the red LED is lit. The status LED changes from red to green after the initialization routines are carried out with no errors.

Operation

During operation, the status LED indicate the following states:

Status LED		
Green	Red	Status of the Powerlink Station
On	Off	The Powerlink station is running with no errors.
Off	On	A fatal system error has occurred. The error type can be read using the PLC log book. It concerns an irreparable problem. The system cannot properly carry out its tasks. This status can only be changed by resetting the module.
Blinking Alternately		Powerlink Manager failed. This error code can only occur in bus controller operation. i.e. the set station number lies within the range $01 - $FD.
Off	Blinking	System failure. The red LED signals an error code (see Section "System Failure Error Codes" on page 6).

Table 6: LS187 Status LED

System Failure Error Codes

The error is displayed via the red status LED using four switch-on phases. The switch-on phases are either 150 ms or 600 ms long. Error code outputs are repeated cyclically every 2 seconds.

Legend: • ..... 150 ms
– ..... 600 ms
Pause ... 2 s delay

Error description	Error Code Displayed by Red Status LED									
Stack Overflow	•	•	•	•	Pause	•	•	•	•	Pause
RAM Error	•	•	•	–	Pause	•	•	•	–	Pause
Undefined Address: Access to a Non-Existent Address.	•	•	–	•	Pause	•	•	–	•	Pause
Instruction Fetch Memory Abort: Invalid Memory Access During Instruction Fetch (e. g. UINT access of an uneven address).	•	•	–	–	Pause	•	•	–	–	Pause
Data Access Memory Abort: Invalid Memory Access During Data Access (e. g. UINT access of an uneven address).	•	–	•	•	Pause	•	–	•	•	Pause
Error when Programming the FPGA.	•	–	–	•	Pause	•	–	–	•	Pause
Invalid Station Number (e. g. $FE or $FF)	•	–	–	–	Pause	•	–	–	–	Pause

Table 7: LS187 system failure error codes

1.7.3 ETHERNET Powerlink Interface (IF2)

Figure 3: LS187 ETHERNET Powerlink interface (IF2)

Pin	Assignment	
1	RXD	Receive Data
2	RXD\	Receive Data\
3	TXD	Transmit Data
4	Termination	
5	Termination	
6	TXD\	Transmit Data\
7	Termination	
8	Termination	

Table 8: LS187 pin assignment for ETHERNET Powerlink interface (IF2)

1.8 Ready Relay

The LS187 module is equipped with a ready relay. When activated using software, the PC's driver software must cyclically trigger the watchdog timer.

The relay goes into idle state:

- If the trigger stays off for a defined amount of time.
- When the PC is reset.

The ready relay can be integrated in the control system, in order to recognize an error status on the Soft PLC.

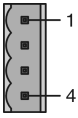
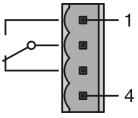
Interface	Terminal	Description	Internal Wiring
Ready Relay  4 pin multipoint connector	1	Normally open contact	
	2	Common connection	
	3	Normally closed contact	
	4	Not connected	

Table 9: LS187 ready relay

1.9 Card Number Switch

The one digit card number ($1 - $F) is configured using the card number switch. This number is used to for module differentiation, in case several LS187 modules are used in one system.

1.10 Backup Battery

The LS187 has 1 KByte SRAM onboard. The module is equipped with a backup battery for data buffering.

1.11 B&R Automation Runtime™

B&R Automation Runtime™ must be installed on the IPC or the desktop PC. The following runtime systems can be installed:

- AR010
- AR105

1.12 SRAM

The LS187 is equipped with 1 MByte SRAM. This memory can be used by B&R Automation Runtime™ for remanent process variables.

1.13 Firmware Update

The firmware is a component of B&R Automation Runtime™. The firmware from the SG4 target is loaded during every start (e. g. IPC).

The latest LS187 firmware is automatically available with an B&R Automation Runtime™ update.