

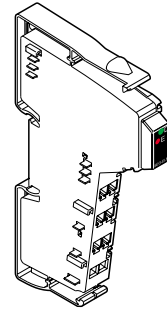
IB IL 24 SEG-ELF

INTERBUS Inline Segment Terminal With Electronic Fuse

Data Sheet 5657A

01/2000

56570001



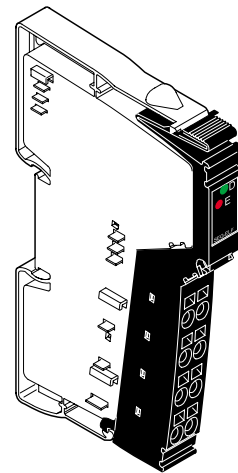
This data sheet is intended to be used in conjunction with the INTERBUS Inline System Manual IB IL SYS PRO UM E.

Function

This terminal is a component of an INTERBUS Inline station. The segment terminal is used to create a partial circuit (segment circuit) within the main circuit. It is not used to supply power and has no elements for the protection against polarity reversal and surge voltage. This terminal has an LED for bus diagnostics and occupies two input data bits, which are used to indicate the status of the electronic fuse.

Features

- Automatic creation of a segment circuit in the main circuit
- Protection of the segment circuit using an electronic fuse with short circuit current limitation
- Diagnostic indicators
- Mapping the status of the electronic fuse in the INTERBUS input data
- Resetting the fuse via INTERBUS or manually using an optional external button

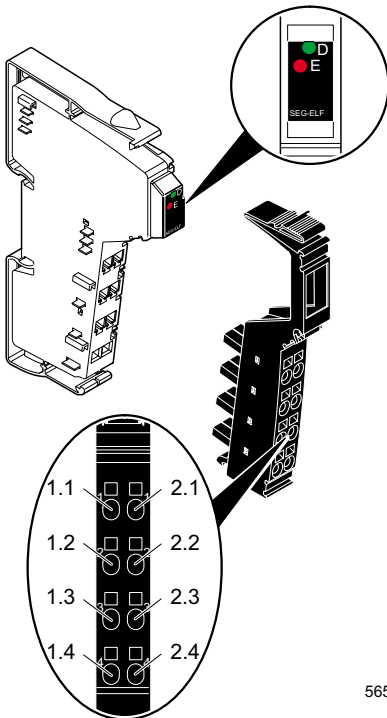


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Figure 1 Terminal IB IL 24 SEG-ELF with connectors fitted



Please note that the connector is not supplied with the terminal. Refer to the Ordering Data on page 13 to order the appropriate connector for your application.



56570003

Figure 2 IB IL 24 SEG-ELF with the appropriate connector

Local Diagnostic Indicator

Des.	Color	Meaning
D	Green	Bus diagnostics
	ON:	INTERBUS is active
	Flashing:	
	0.5 Hz:	Logic supply is present, INTERBUS not active
	2 Hz:	Communication power is present, I/O error
	4 Hz:	Logic supply present, local bus error
OFF:	Logic supply not present, INTERBUS not active	
E	Red	Fuse in segment circuit (U_S)
	OFF:	Fuse OK
	ON:	Fuse has blown



A blown fuse is indicated on both diagnostic indicators. The red LED E lights up and the green LED D flashes at 2 Hz.

Function Identification

Black

Terminal Assignment



The terminal points are **only** provided for measurement purposes and for connecting a manual reset button for the electronic fuse!

Terminal Point	Assignment
1.1	Connection of a manual reset button for the fuse (control input)
2.1	Connection of a manual reset button for the fuse (24 V)
1.2, 2.2	Measuring points for the main voltage U_M
1.3, 2.3	Measuring points for GND of supply voltages
1.4, 2.4	Measuring points for the functional earth (FE)

Behavior of the Electronic Fuse

Function of the Fuse

The fuse monitors the maximum nominal current in the segment circuit, which must not exceed 2.5 A. The terminal indicates the status of the fuse via LED E and via the two input data bits.

If the fuse blows, it remains in this state. The blown fuse is indicated by:

LED E	ON
LED D	Flashing at 2 Hz (I/O error)
Input bit	IN0 = 0 and IN1 = 0
Error message	Error messages to the higher-level control or computer system: Peripheral fault (PF)

Resetting the Fuse

There are three ways of resetting the fuse in an operational state:

- 1 Failure/deactivation and reactivation of the logic supply at the bus terminal module
- 2 24 V pulse at the control input
- 3 Control signal from the application program via INTERBUS

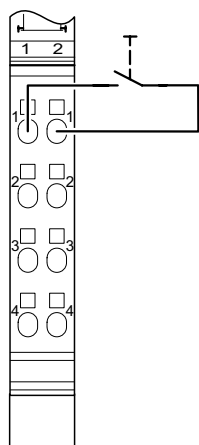
Resetting the Fuse Via the Control Input

To reset the fuse via the control input, connect an optional external button as shown in Figure 3.



The control input should only be supplied with 24 V to reset the fuse!

Set the control input in the idle state with 0 V or leave it open.



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Figure 3 Connection of a button for resetting the fuse

Resetting the Fuse Via a Control Signal From the Application Program

In order to reset the fuse from the application program, send the service "Control_Device_Function" of the firmware.

This service can be used to send control commands to one or more INTERBUS devices. For example, the service may be used to acknowledge an I/O error triggered by the electronic fuse and to reset it.



More detailed information on firmware services can be found in the "Firmware Services and Error Messages" User Manual IBS SYS FW G4 UM E (Order No. 27 45 18 5).

Internal Circuit Diagram

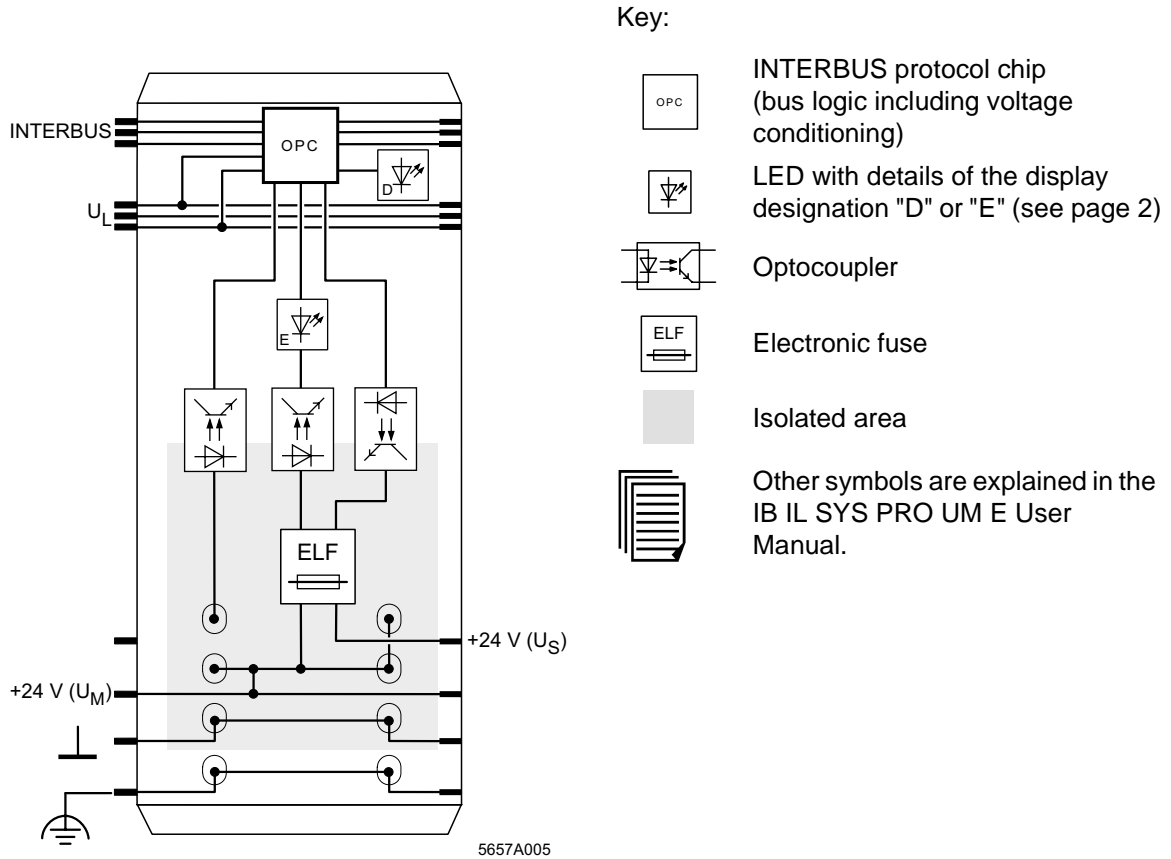


Figure 4 Internal wiring of the terminal points

Programming Data

ID code	BE _{hex} (190 _{dec})
Length code	C2 _{hex}
Input address area	2 bits
Output address area	0 bits
Parameter channel (PCP)	0 bits
Register length (bus)	2 bits

INTERBUS Process Data

Assignment of IN Process Data



The IN process data only maps the status of the electronic fuse.

Bit view	Bit	1	0
Assignment	Fuse OK	1	1
	Fuse has blown	0	0





The two bits can be at any position within a byte due to automatic addressing.



OUT process data is not used.

Technical Data

General Data	
Housing dimensions (width x height x depth)	12.2 mm x 120 mm x 71.5 mm (0.480 in. x 4.724 in. x 2.815 in.)
Weight	Approximately 44 g (without connector)
Operating mode	Process data operation with 2 bits
Permissible temperature (operation)	-25°C to +55°C (-13°F to 131°F)
Permissible temperature (storage/transport)	-25°C to +85°C (-13°F to 185°F)
Permissible humidity (operation)	75% on average, 85% occasionally
 In the range from -25°C to +55°C (-13°F to +131°F) appropriate measures against increased humidity (> 85%) must be taken.	
Permissible humidity (storage/transport)	75% on average, 85% occasionally
 For a short period, slight condensation may appear on the housing if, for example, the terminal is brought into a closed room from a vehicle.	
Permissible air pressure (operation)	80 kPa to 106 kPa (up to 2000 m [6561.68 ft.] above sea level)
Permissible air pressure (storage/transport)	70 kPa to 106 kPa (up to 3.000 m [9842.52 ft.] above sea level)
Degree of protection	IP 20 according to IEC 60529
Class of protection	Class 3 according to VDE 0106, IEC 60536

Interface	
INTERBUS interface	Through data routing

Power Consumption	
Logic supply	7.5 V
Current consumption from the local bus	30 mA, maximum
Power consumption from the local bus	0.23 W, maximum
Main voltage U_M	24 V DC (nominal value)
Nominal current consumption at U_M	2.5 A (nominal value)

Supply of the Module Electronics and I/O Through Bus Terminal/Power Terminal (U_L , U_M)	
Connection method	Through potential routing


24 V I/O Device Supply (U_M , U_S)

The main voltage U_M is supplied by the bus terminal module or by a power terminal. The segment voltage U_S is provided automatically at this terminal and protected by the internal electronic fuse.

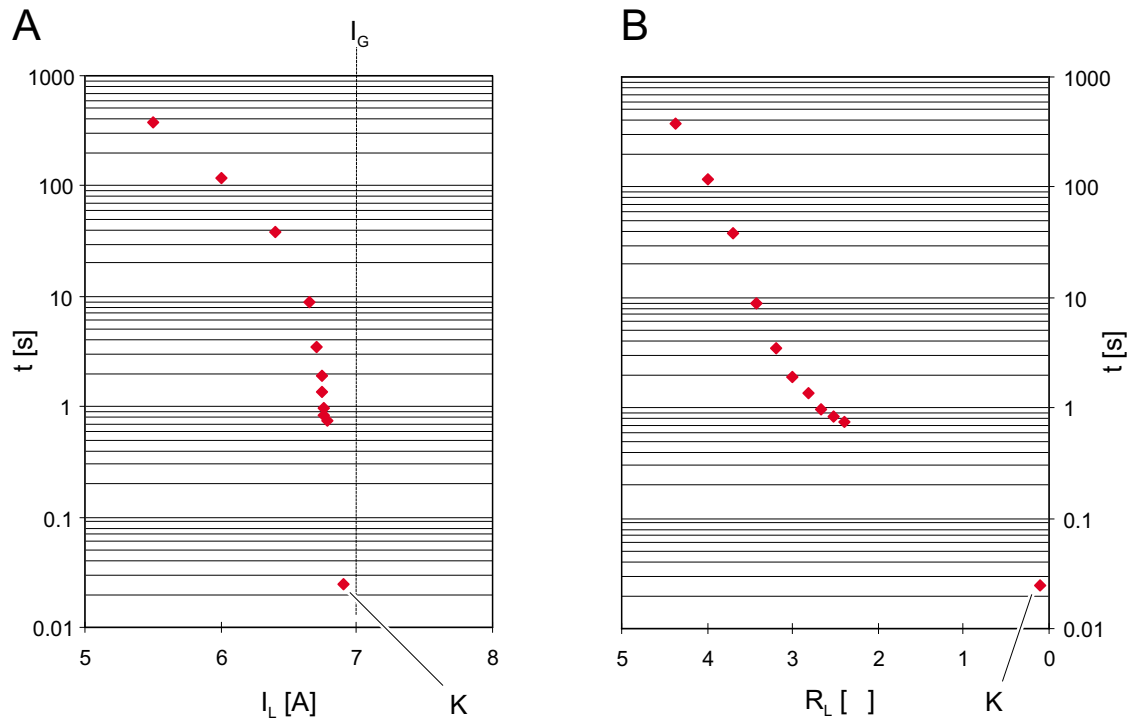
No connections for a supply voltage exist on the segment terminal. The terminal points are **only** provided for measurement purposes and for connecting a button for resetting the blown fuse!

Digital Control Input

Number	1
Nominal voltage U_{IN}	24 V DC
Nominal current at U_{IN}	5 mA
Definition of operating points/switching thresholds	
Low level	< 5 V
High level	> 15 V
Permissible line length to the external button	30 m (98.43 ft.) (to ensure conformance with EMC directive 89/336/EEC)

Segment Circuit Protection	
Nominal voltage	24 V DC
Permissible range	19.2 V DC to 30 V DC
Nominal current	2.5 A
Voltage drop at nominal current	0.5 V
Short circuit current limiting	
Minimum	2.8 A
Maximum	8 A
Behavior after error	Latch function, i.e. remains switched off
Closing resistor	60 mΩ
Tripping time in the event of a short circuit	100 ms
 The fuse is tripped by a thermal overload protection. The tripping time depends on the ambient temperature and the level of the short circuit current. The data entered here applies for an ambient temperature of 25°C (77°F). The power supply unit must be able to provide a short circuit current of at least 8 A.	
Behavior when ground connection is interrupted	
Leakage current when switched on (ON: logic supply present)	2 mA, maximum
Output current when switched off (OFF: logic supply not present)	200 μA
Output voltage when switched off	1 V

Time/Current Characteristic (A) and Time/Resistance Characteristic (B) on Ohmic Overload (Ambient Temperature $T_U = 25^\circ\text{C}$ [77°F])



Where

- t [s] Typical tripping time
- I_L [A] Load current in the segment circuit
- R_L [Ω] Load resistance in the segment circuit
- I_G Current limit (typical)
- Value K Measured value on a hard short circuit

Power Dissipation



To keep the power dissipation to a minimum, the control input **must** be in the idle state (0 V). A constant supply to the control input of 24 V is **not** permitted! This technical connection measure is the basis for the calculations below.

Formula to calculate the power dissipation of the electronics

$$P_{EL} = 0.23 \text{ W} + I_L^2 \times 0.06 \ \Omega$$

Where

P_{tot} Maximum power dissipation of the terminal
 I_L Load current in the segment circuit

Maximum power dissipation of the housing

P_{HOU}

0.6 W

(within the permissible operating temperature)

Derating on 30 V I/O Device Supply (U_M/U_S)


Maximum permissible load current in the segment circuit:


$$I_{Lmax} = 2.5 \text{ A} \quad \text{at } -25^\circ\text{C } (-13^\circ\text{F}) \leq T_U \leq +50^\circ\text{C } (122^\circ\text{F})$$

$$I_{Lmax} = 2.0 \text{ A} \quad \text{at } +50^\circ\text{C } (122^\circ\text{F}) < T_U \leq +55^\circ\text{C } (131^\circ\text{F})$$


Safety Devices

Overload/short circuit in segment circuit	Yes (see page 10)
Surge voltage	Components in the power terminal or the bus terminal module
Polarity reversal	Components in the power terminal or the bus terminal module


Electrical Isolation	
	To provide electrical isolation between the logic level and the I/O area, it is necessary to supply these areas from the bus terminal or from the bus terminal and a power terminal with separate power supplies. Interconnection of the 24 V power supplies is not allowed!
Common potentials	
24 V main power, 24 V segment voltage, and GND have the same potential. FE (functional earth ground) is a separate potential area.	
Separate system potentials consisting of bus terminal/power terminal and I/O terminal	
- Test distance	- Test voltage
5 V supply incoming remote bus / 7.5 V supply (bus logic)	500 V AC, 50 Hz, 1 min.
5 V supply outgoing remote bus / 7.5 V supply (bus logic)	500 V AC, 50 Hz, 1 min.
7.5 V supply (bus logic) / 24 V supply (I/O)	500 V AC, 50 Hz, 1 min.
24 V supply (I/O) / functional earth ground	500 V AC, 50 Hz, 1 min.


Error Messages to the Higher-Level Control or Computer System	
Overload/short circuit in segment circuit	Yes
 If a short circuit occurs in the segment circuit, an error message is generated. LEDs D and E on the terminal also indicate the fault (see "Local Diagnostic Indicator" on page 2).	
Operating voltage out of range	No


Ordering Data

Description	Order Designation	Order No.
Segment terminal with electronic fuse	IB IL 24 SEG-ELF	27 27 78 9
 You need a connector for the terminal.		
Connector (black, w/o color print), pack of 10	IB IL SCN-PWR IN	27 27 46 2
Connector (black, with color print), pack of 10	IB IL SCN-PWR IN-CP	27 27 63 7
INTERBUS Inline System Manual	IB IL SYS PRO UM E	27 43 04 8

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