

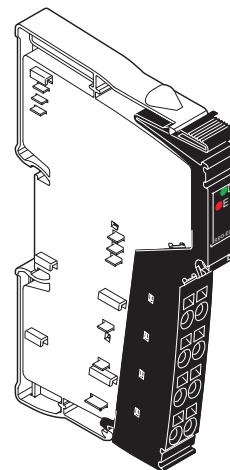
## IB IL 24 SEG-ELF ...

### Inline Segment Terminal With Electronic Fuse

#### AUTOMATIONWORX

Data Sheet

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#### Description

The terminal is designed for use within an 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 therefore has no elements for 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 input data
- Resetting the fuse via the bus system or manually using an optional external button



This data sheet is only valid in association with the IB IL SYS PRO UM E user manual or the Inline system manual for your bus system.



The product versions differ in the scope of supply and the transmission speed (see "Ordering Data" on page 2). The function is identical. Differing technical data is indicated.

For greater clarity, the order designation IB IL 24 SEG-ELF is used throughout this document.



Make sure you always use the latest documentation. It can be downloaded at [www.download.phoenixcontact.com](http://www.download.phoenixcontact.com).

A conversion table is available on the Internet at [www.download.phoenixcontact.com/general/7000\\_en\\_00.pdf](http://www.download.phoenixcontact.com/general/7000_en_00.pdf).



This data sheet is valid for all products listed under "Ordering Data" on page 2.

## Ordering Data

### Terminals

Description	Type	Order No.	Pcs./Pkt.
Segment terminal with electronic fuse with connector and labeling field Transmission speed 500 kbaud	IB IL 24 SEG-ELF-PAC	2861409	1
Segment terminal with electronic fuse Transmission speed 500 kbaud	IB IL 24 SEG-ELF	2727789	1
Segment terminal with electronic fuse with connector and labeling field Transmission speed 2 Mbaud	IB IL 24 SEG-ELF-2MBD-PAC	2863847	1
Segment terminal with electronic fuse Transmission speed 2 Mbaud	IB IL 24 SEG-ELF-2MBD	2861182	1



One of the connectors listed below is needed for the complete fitting of the IB IL 24 SEG-ELF and IB IL 24 SEG-ELF-2MBD terminals.

### Accessories

Description	Type	Order No.	Pcs./Pkt.
Connector (black, w/o color print)	IB IL SCN-PWR IN	2727462	10
Connector (black, with color print)	IB IL SCN-PWR IN-CP	2727637	10

### Documentation

Description	Type	Order No.	Pcs./Pkt.
"Configuring and Installing the INTERBUS Inline Product Range" user manual	IB IL SYS PRO UM E	2743048	1
"Automation Terminals of the Inline Product Range" user manual	IL SYS INST UM E	2698737	1

## Technical Data

### General Data

Housing dimensions (width x height x depth)	12.2 mm x 120 mm x 71.5 mm
Weight (without connectors)	44 g, approximately (without connectors)
Weight (with connectors)	59 g, approximately (with connectors)
Operating mode	Process data mode with 2 bits
Permissible temperature (operation)	-25°C to +55°C
Permissible temperature (storage/transport)	-25°C to +85°C
Permissible humidity (operation)	75% on average, 85% occasionally



In the range from -25°C to +55°C appropriate measures against increased humidity (> 85%) must be taken.

Permissible humidity (storage/transport)	75% on average, 85% occasionally
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For a short period, slight condensation may appear on the outside of 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 above sea level)
Permissible air pressure (storage/transport)	70 kPa to 106 kPa (up to 3000 m above sea level)
Degree of protection	IP20 according to IEC 60529
Protection class	Class 3 according to VDE 0106, IEC 60536

### Transmission Speed

IB IL 24 SEG-ELF	500 kbaud
IB IL 24 SEG-ELF-PAC	500 kbaud
IB IL 24 SEG-ELF-2MBD	2 Mbaud
IB IL 24 SEG-ELF-2MBD-PAC	2 Mbaud

### Interface

Local bus	Through data routing
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### Power Consumption (500 kbaud)

Communications power	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)

### Power Consumption (2 Mbaud)

Communications power	7.5 V
Current consumption from the local bus	60 mA, maximum
Power consumption from the local bus	0.45 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 the I/O Through the Bus Terminal/Power Terminal ( $U_L$ , $U_M$ )

Connection method	Through potential routing
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### 24 V I/O Supply ( $U_M$ , $U_S$ )

The main voltage  $U_M$  is supplied by the bus terminal or by a power terminal. The segment voltage  $U_S$  is provided automatically at the IB IL 24 SEG-ELF terminal and protected by the internal electronic fuse.

Connections for a supply voltage are not provided 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 switching thresholds	
Low level	< 5 V
High level	> 15 V
Permissible cable length to the external button	30 m (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 m $\Omega$
Tripping time in the event of a short circuit	100 ms

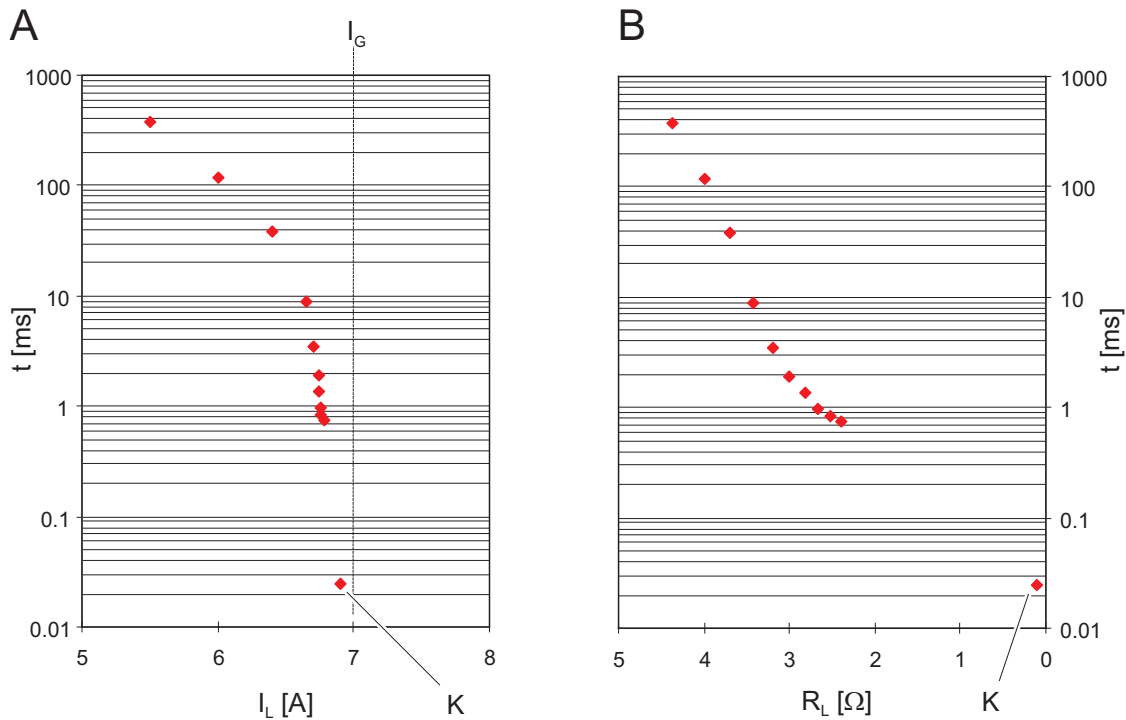


The fuse is tripped by a thermal overload protection. The tripping time depends on the ambient temperature and the level of the short-circuit current. The data entered here applies for an ambient temperature of 25°C. The power supply unit must be able to provide a short-circuit current of at least 8 A.

**Behavior When Ground Connection Interrupted**

Leakage current when switched on (ON: communications power present)	2 mA, maximum
Output current when switched off (OFF: communications power not present)	200 $\mu$ A
Output voltage when switched off	1 V

**Time/Current Characteristic (A) and Time/Resistance Characteristic (B) on Ohmic Overload (Ambient Operating Temperature  $T_A = 25^\circ\text{C}$ )**



Where  
 $t$  Typical tripping time in ms  
 $I_L$  Load current in the segment circuit in A  
 $R_L$  Load impedance in the segment circuit in  $\Omega$   
 $I_G$  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 (500 kbaud)**

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

Where  
 $P_{TOT}$  Total power dissipation of the module  
 $I_L$  Load current in the segment circuit

**Formula to Calculate the Power Dissipation of the Electronics (2 Mbaud)**

$$P_{TOT} = 0.43 \text{ W} + I_L^2 \times 0.05 \Omega$$

Where  
 $P_{TOT}$  Total power dissipation of the module  
 $I_L$  Load current in the segment circuit

**Power dissipation of the housing  $P_{HOU}$**

0.6 W (within the permissible operating temperature)

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

Maximum permissible load current in the segment circuit:

$I_{Lmax}$	= 2.5 A	at $-25^{\circ}\text{C} \leq T_A \leq +50^{\circ}\text{C}$
$I_{Lmax}$	= 2.0 A	at $+50^{\circ}\text{C} < T_A \leq +55^{\circ}\text{C}$

**Safety Equipment**

Overload/short circuit in the segment circuit	Yes (see page 4)
Surge voltage	Protective elements in the power terminal or the bus terminal
Polarity reversal	Protective elements in the power terminal or the bus terminal

**Electrical Isolation/Isolation of the Voltage Areas**



To provide electrical isolation between the logic level and the I/O area, it is necessary to supply these areas via the bus terminal or via the bus terminal and a power terminal from separate power supply units. Interconnection of the power supply units in the 24 V area is not permitted. (See also user manual.)

**Common Potentials**

The 24 V main voltage, 24 V segment voltage, and GND have the same potential. FE is a separate potential area.

**Separate Potentials in the System Consisting of Bus Terminal/Power Terminal and I/O Terminal**

**- Test Distance**

5 V supply incoming remote bus/7.5 V supply (bus logic)
5 V supply outgoing remote bus/7.5 V supply (bus logic)
7.5 V supply (bus logic)/24 V supply (I/O)
24 V supply (I/O)/functional earth ground

**- Test Voltage**

500 V AC, 50 Hz, 1 min.
500 V AC, 50 Hz, 1 min.
500 V AC, 50 Hz, 1 min.
500 V AC, 50 Hz, 1 min.

**Error Messages to the Higher-Level Control or Computer System**

Short circuit/overload in the segment circuit	Yes
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If a short circuit occurs in the segment circuit, an error message is generated. LEDs D and E on the terminal also flash to indicate the fault (see "Local Diagnostic Indicators" on page 7).

Falling below or exceeding the operating voltage	No
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**Approvals**

CE	Yes
UL/CUL	Yes

## Local Diagnostic Indicators and Terminal Point Assignment

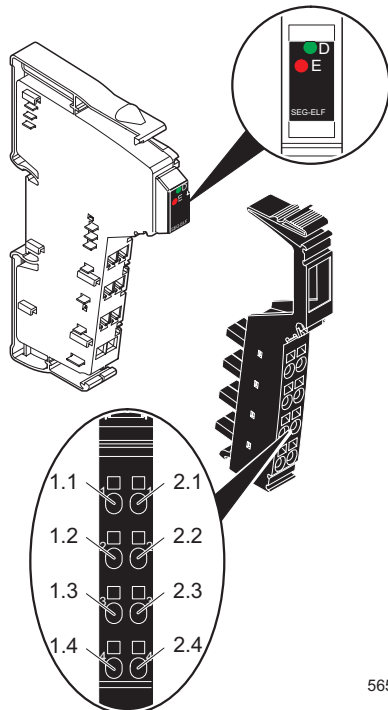


Figure 1 IB IL 24 SEG-ELF with the appropriate connector

5657A003

### Local Diagnostic Indicators

Des.	Color	Meaning
<b>D</b>	<b>Green</b>	<b>Diagnostics</b>
	ON:	Bus active
	Flashing:	
	0.5 Hz:	Communications power present, bus not active
	2 Hz:	Communications power present, peripheral fault
	4 Hz:	Communications power present, local bus error
OFF:	Communications power not present, bus not active	
<b>E</b>	<b>Red</b>	<b>Fuse in segment circuit (<math>U_S</math>)</b>
	OFF:	Fuse OK
	ON:	Fuse has blown



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

### Function Identification

Black

2 Mbaud: white stripe in the vicinity of the D LED

### Terminal Point Assignment



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

Terminal Point	Assignment
<b>1.1</b>	Connection of a manual reset button for the fuse (control input)
<b>2.1</b>	Connection of a manual reset button for the fuse (24 V)
<b>1.2, 2.2</b>	Measuring points for the main voltage $U_M$
<b>1.3, 2.3</b>	Measuring points for GND of supply voltages
<b>1.4, 2.4</b>	Measuring points for functional earth ground (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 the E LED and via the two input data bits.

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

E LED	ON
D LED	Flashing at 2 Hz (peripheral fault)
Input bit	IN0 = 0 and IN1 = 0
Error message	Message 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 communications power at the bus terminal
- 2 24 V pulse at the control input
- 3 Control signal from the application program via the bus system

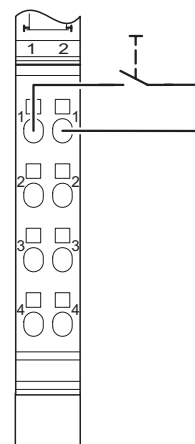
### Resetting the Fuse Via the Control Input

To reset the fuse via the control input, connect an optional external button as shown in Figure 2.



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

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



5657A004

Figure 2 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 "Control\_Device\_Function" service in 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 a peripheral fault triggered by the electronic fuse and to reset it.



For more detailed information on firmware services, please refer to the "Firmware Services and Error Messages" user manual IBS SYS FW G4 UM E (Order No. 2745185).



### Internal Circuit Diagram

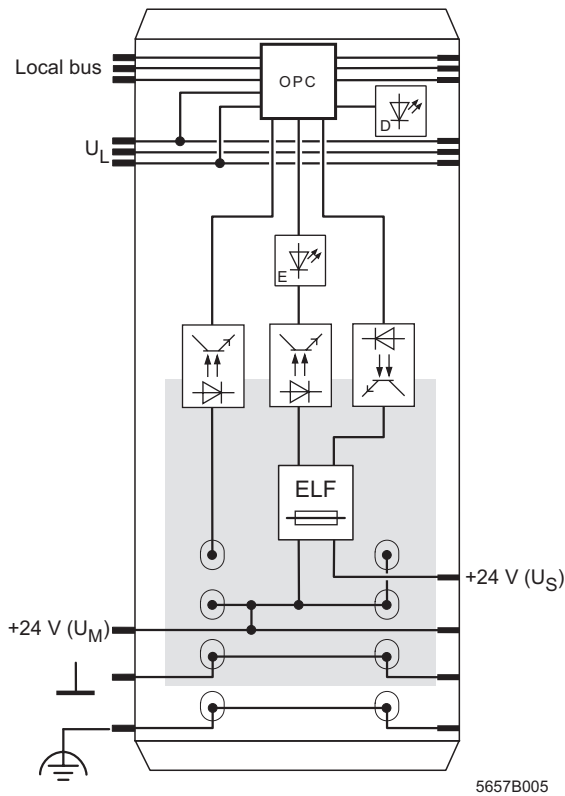







Figure 3 Internal wiring of the terminal points

Key:

-  Protocol chip (bus logic including voltage conditioning)
-  LED with details of the display designation "D" or "E" (see page 7)
-  Optocoupler
-  Electronic fuse
-  Electrically isolated area



Other symbols used are explained in the IB IL SYS PRO UM E user manual or in the Inline system manual for your bus system.

### Programming Data/Configuration Data

#### INTERBUS

ID code	BE <sub>hex</sub> (190 <sub>dec</sub> )
Length code	C2 <sub>hex</sub>
Input address area	2 bits
Output address area	0 bits
Parameter channel (PCP)	0 bits
Register length (bus)	2 bits

#### Other Bus Systems



For the programming data/configuration data of other bus systems, please refer to the corresponding electronic device data sheet (GSD, EDS).

#### Process Data

##### Assignment of IN Process Data



For the assignment of the illustrated (byte.bit) view to your **INTERBUS** control or computer system, please refer to the DB GB IBS SYS ADDRESS data sheet, Order No. 9000990.



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

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