

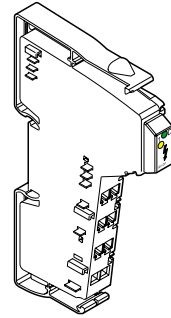
# IB IL 120 DI 1

## INTERBUS Inline Terminal With One Digital Input in the 120 V AC Voltage Area

Data Sheet 5764B

09/2000

57641001



This data sheet is only valid in association with the INTERBUS Inline System Manual IB IL SYS PRO UM E.

### Function

The terminal is designed for use within an INTERBUS Inline station. This terminal is used to detect digital input signals in the 120 V AC voltage area.



#### Dangerous Voltage

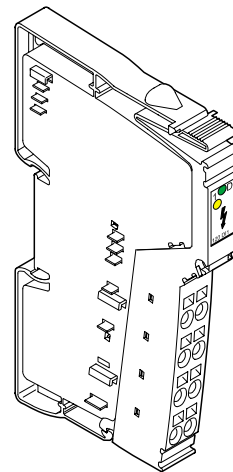
Connecting and disconnecting the terminal is only allowed if the **power supply is disconnected**.

When working on the terminal and wiring, always switch off the supply voltage and ensure it cannot be switched on again.

**If these instructions are not followed, there is a danger of damage to health, or even of a life-threatening injury.**

### Features

- Connections for one digital sensor
- Maximum permissible load current 500 mA
- Diagnostic and status indicators



57641007

Figure 1 IB IL 120 DI 1 terminal with connector



Please note that the connector is not supplied with the terminal. Please refer to Ordering Data on page 12 to order the appropriate connectors for your application.



## **Safety Instructions for Inline Terminals for Installation in Areas Outside the SELV (Low Voltage Area)**

Only qualified personnel may work on low voltage area Inline terminals.

Qualified personnel are people who, because of their education, experience and instruction, and their knowledge of relevant standards, regulations, accident prevention and service conditions, have been authorized by those responsible for the safety of the plant to carry out any required operations, and who are able to recognize and avoid any possible dangers.

(Definitions for skilled workers according to EN 50110-1:1996.)

**The instructions given in this data sheet must be followed during installation and startup.**

Technical modifications reserved.

## **Correct Usage**

The terminal is only to be used within an Inline station as specified in this data sheet and the INTERBUS Inline System Manual. Phoenix Contact accepts no liability if the device is used for anything other than its designated use.



This data sheet describes the module-specific features of the IB IL 120 DI 1 terminal.



For general information on the INTERBUS Inline product family, please refer to the IB IL SYS PRO UM E INTERBUS Inline System Manual.

## General Description

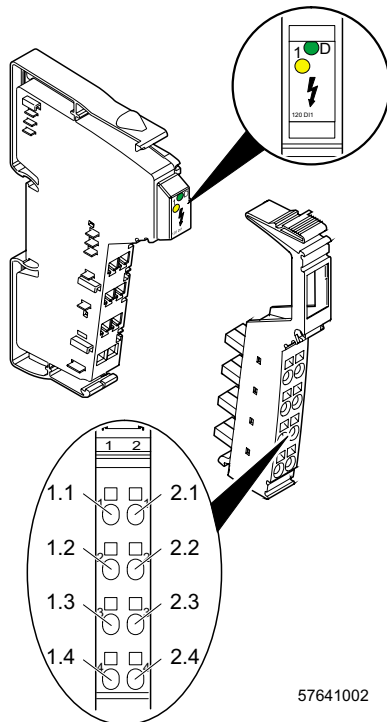


Figure 2 IB IL 120 DI 1  
with the appropriate connector

### Function Identification

Cobalt blue with lightning bolt

### Housing/Connector Color

Gray housing

Gray connector, color-coded according to function

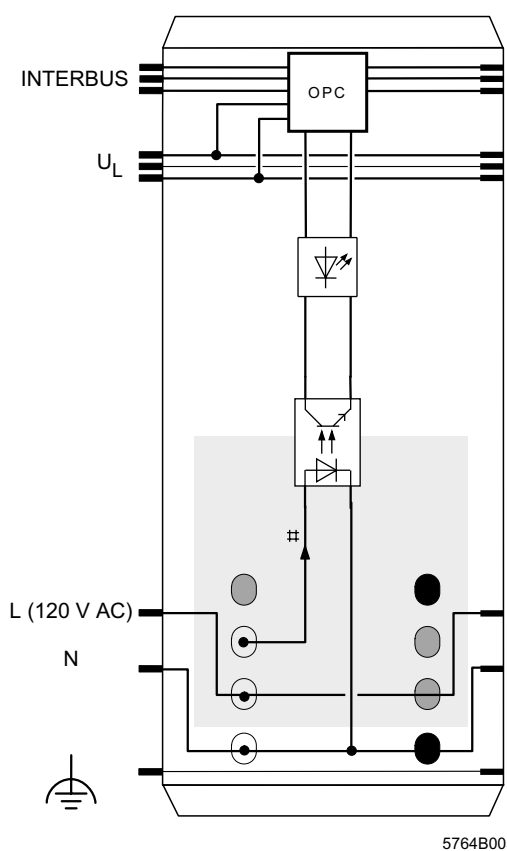
### Local Diagnostic and Status Indicators

Des.	Color	Meaning
D	Green	Bus diagnostics
1	Yellow	Input status indication

### Terminal Assignment

Terminal Point	Assignment
1.1	Not used
1.2	Digital input
1.3	Connection of phase L
1.4	Neutral conductor connection (N)
2.1, 2.2, 2.3, 2.4	Not used

## Internal Circuit Diagram



Key:









-  INTERBUS protocol chip (bus logic including voltage conditioning)
-  LED
-  Optocoupler
-  Digital input
-  Isolated area
-  Terminal point, without metal contact
-  Terminal point, without metal contact, with filler plugs
-  Other symbols are explained in the IB IL SYS PRO UM E User Manual.

Figure 3 Internal wiring of the terminal points

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## General Installation Instructions

### Installing the System



Install the system according to the requirements of EN 50178.

### Starting Up an Inline Station

An Inline station can only be started up if it has been properly installed. This means:

- all terminals must be installed with their connectors
- the station must be terminated with the end plate and the two end clamps



#### **Avoiding malfunctions**

The AC terminal must **only** be connected to the Inline station through an appropriate power terminal. The voltage should only be switched on when the AC area has been terminated with the end terminal and all the connectors are connected.



**The special features of the AC and SELV terminals and connectors are listed in the user manual and in the data sheets for the power terminals for AC areas.**

## Installation Instructions and Notes for an AC Area



### Dangerous Voltage

Please note that these are dangerous voltages when working on circuits that do not meet SELV requirements.

Connecting and disconnecting terminals for the AC voltage area is only allowed if the power supply is disconnected.

When working on terminals and wiring, always switch off the supply voltage and ensure it cannot be switched on again.



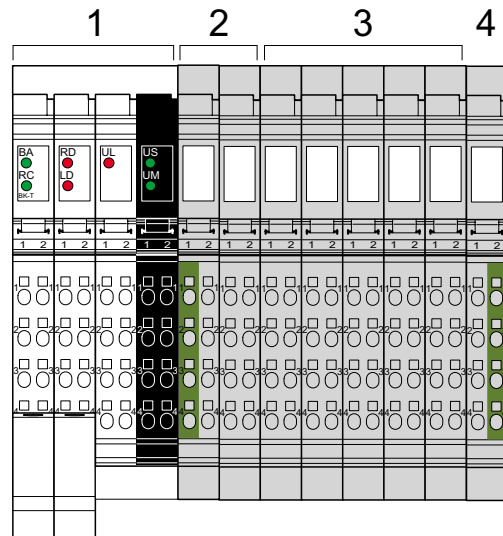
### Please Use Grounded AC Networks

Inline terminals for the AC voltage area should only be operated in grounded AC networks.

### Structure of an AC Area

An AC area **must** have an AC power terminal at one end and an AC end terminal at the other.

I/O terminals that are suitable for this area can be used between these terminals. The number is limited by the system restrictions of the INTERBUS Inline station and the entire INTERBUS system (see IB IL SYS PRO UM E User Manual).



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Figure 4 Example of an Inline AC area

- 1 Bus terminal
- 2 AC power terminal
- 3 Various AC input/output terminals
- 4 AC end terminal

### Fusing an AC Area

Protect each AC area using an intrinsically safe fuse.



Please note that the fuse required depends on the specific application.

### Connecting the Supply and the I/O in the AC Area



#### Multiple supplies are not permitted

The supply voltage must **only** be supplied to the power terminal for which it is meant.

The connecting cables of all actuators and sensors should only be connected to the Inline AC terminals. The use of external bus bars for group voltages is **not permitted**.

### Interrupting PE Jumpering in the AC Area

The PE jumper begins at the power terminal of the AC area and, in a complete AC area, ends at the end terminal.

If a terminal is removed from this area, the PE jumper is interrupted.

As long as the installation instructions are followed, all subsequent terminals will be disconnected.

## Connection Example

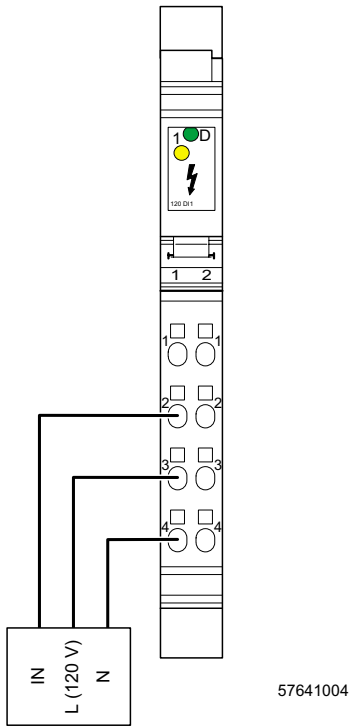


Figure 5 Typical sensor connections



### Observe the current carrying capacity

The maximum total current flowing through the potential jumpers is 8 A.

## Programming Data

ID code	BE <sub>hex</sub> (190 <sub>dec</sub> )
Length code	C2 <sub>hex</sub>
Process data channel	2 bits
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 the Terminal Points for the IN Process Data



Bit View	Bit	1	0
Terminal	Terminal point (signal)	–	1.2
	Terminal point (L)	–	1.3
	Terminal point (N)	–	1.4
Status indication	LED		1




For the assignment of the bit view shown to your control or computer system, please refer to data sheet [DB GB IBS SYS ADDRESS](#), Part No. 90 00 99 0.



## Technical Data

General Data	
Housing dimensions (width x height x depth)	12.2 mm x 120 mm x 66.6 mm (0.480 in. x 4.724 in. x 2.622 in.)
Weight	39 g (without connector)
Operating mode	Process data operation with 2 bits
Sensor connection type	3-wire
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 [6562 ft.] above sea level)
Permissible air pressure (storage/transport)	70 kPa to 106 kPa (up to 3000 m [9843 ft.] above sea level)
Degree of protection	IP 20 according to IEC 60529
Interface	
INTERBUS local bus	Through data routing
Power Consumption	
Communications power	7.5 V
Current consumption from the local bus	30 mA, maximum
Power consumption from the local bus	0.23 W, maximum
I/O supply voltage	120 V AC (nominal value)
Nominal current consumption on the I/O supply voltage	Depends on the sensor
Supply of the Module Electronics Through the Bus Terminal and of the I/O Through the Power Terminal	
Connection method	Through potential routing

Digital Input	
Number	1
Input features	According to EN 61131-2 Type 1
Definition of switching thresholds	
Signal 0	$0 \text{ V AC} \leq U_{IN} \leq 40 \text{ V AC}$
Signal 1	$77 \text{ V AC} \leq U_{IN} \leq 135 \text{ V AC}$
Nominal input voltage $U_{IN}$	120 V AC
Permissible range	$108 \text{ V AC} \leq U_{IN} \leq 135 \text{ V AC}$
Nominal input current for $U_{IN}$	8.1 mA at 120 V AC, 60 Hz
Total current	Depends on the sensor
Characteristic curve of the current	Linear in the area $1 \text{ V} < U_{IN} < 135 \text{ V}$
Delay time	$T_{ON}$ 40 ms, typical $T_{OFF}$ 10 ms, typical
Permissible cable length to the sensor	30 m (98.425 ft.)
Protection	No integrated protection against short circuit and overload
Behavior in the event of an error (short circuit)	Protective element in the power terminal is damaged
 Short circuit protection can be achieved by means of a pre-connected fuse with an appropriate fusible element.	
Switching frequency	Maximum network frequency, depending on bus length, data rate, and ambient conditions

Input Characteristic Curve			
Frequency (Hz)	Input Voltage (V)	Typical Input Current (mA)	Active Power Loss (mW)
60	30	2.55	213
60	60	4.54	254
60	90	6.46	321
60	120	8.10	416
60	150	9.46	537

Power Dissipation	
Formula to calculate the power dissipation of the electronics	
$P_{EL} = 0.23 \text{ W} + \left(\frac{U_{IN}}{Z}\right)^2 \times 100 \Omega + \frac{U_{IN}^2}{68000 \Omega}$	
Where	
$P_{EL}$	Total power dissipation of the terminal
$Z$	Reactance ( $Z = 18813 \Omega$ [60 Hz])
$U_{IN}$	Input voltage of the input
<b>Power Dissipation of the Housing <math>P_{HOU}</math></b>	0.7 W (within the permissible operating temperature)

Concurrent Channel Derating	
None	

Safety Devices	
Overload/short circuit in phase L	Using external fuse
Surge voltage	Protective circuits of the power terminal


Electrical Isolation/Isolation of the Voltage Areas	
<b>Common Isolated Groups</b>	
Phase and neutral conductor have the same potential. PE is a separate potential area.	
<b>Separate system potentials consisting of bus terminal/power terminal in the 24 V DC area and supply terminals/I/O terminals in the AC area</b>	
<b>- Test Distance</b>	<b>- Test Voltage</b>
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)/I/O area	2500 V AC, 50 Hz, 1 min
Routine test	1200 V AC, 50 Hz, 1 min
I/O area/PE	500 V AC, 50 Hz, 1 min
Input/phase	500 V AC, 50 Hz, 1 min


Error Messages to the Higher-Level Control or Computer System	
None	


## Ordering Data

Description	Order Designation	Order No.
Terminal with one digital input in the 120 V AC voltage area	IB IL 120 DI 1	28 36 70 6
A connector is needed to complete the terminal.		
I/O connector with 8 connections using the spring-clamp method (gray, with color print) pack of 10	IB IL SCN-8-AC-ICP	27 40 26 1
INTERBUS Inline System Manual	IB IL SYS PRO UM E	27 43 04 8

Phoenix Contact GmbH & Co  
 Flachsmarktstr. 8  
 32825 Blomberg  
 Germany

 + 49 - 52 35 - 30 0

 + 49 - 52 35 - 34 12 00

 [www.phoenixcontact.com](http://www.phoenixcontact.com)