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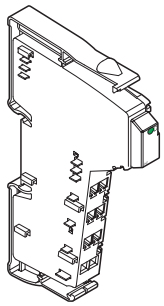
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IB IL AI 2/SF-ME



Inline Terminal
With Two Analog Input Channels

Data Sheet 703700 04/2004 5564B001

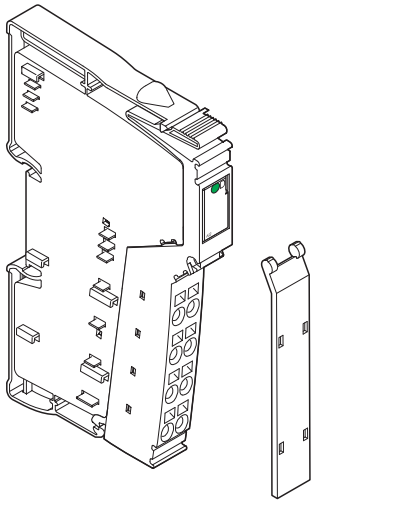
This data sheet is only valid in association with the IB IL SYS PRO UM E user manual or the Inline system manual for your bus system.

Function

The terminal is designed for use within an Inline station. It is used to acquire analog voltage or current signals.

Features

- Two analog single-ended signal inputs for the connection of either voltage or current signals
- Sensors are connected using 2-wire technology
- Three current measuring ranges: 0 mA to 20 mA, ±20 mA, 4 mA to 20 mA
- Two voltage measuring ranges: 0 V to 10 V, ±10 V
- Channels are configured independently of one another using the bus
- Measured values can be represented in four different formats
- 12-bit resolution
- Process data update of both channels in 1.5 ms, maximum
- Diagnostic indicator



5564C010

Figure 1 IB IL AI 2/SF-ME terminal

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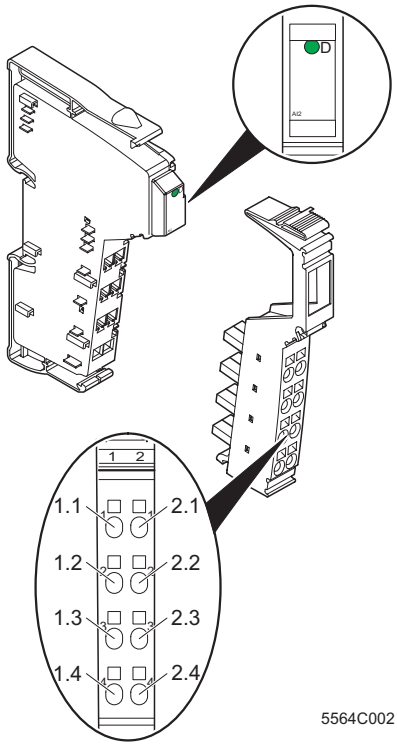


Figure 2 IB IL AI 2/SF-ME terminal

Local Diagnostic and Status Indicators

Des.	Color	Meaning
D	Green	Diagnostics

Terminal Assignment

Terminal Points	Signal	Assignment
1.1	**+U1**	Voltage input channel 1
2.1	**+U2**	Voltage input channel 2
1.2	**+I1**	Current input channel 1
2.2	**+I2**	Current input channel 2
1.3	**-1**	Minus input for channel 1 (common for current and voltage)
2.3	**-2**	Minus input for channel 2 (common for current and voltage)
1.4, 2.4	**Shield**	Shield connection

Installation Instructions

High current flowing through the potential jumpers U_M and U_S leads to a temperature rise of the potential jumpers and the inside of the terminal. Observe the following instructions to keep the current flowing through the potential jumpers of the analog terminals as low as possible:

Create a separate main circuit for the analog terminals.

If this is not possible in your application and you are using analog terminals in a main circuit together with other terminals, place the analog terminals behind all the other terminals at the end of the main circuit.

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Internal Circuit Diagram

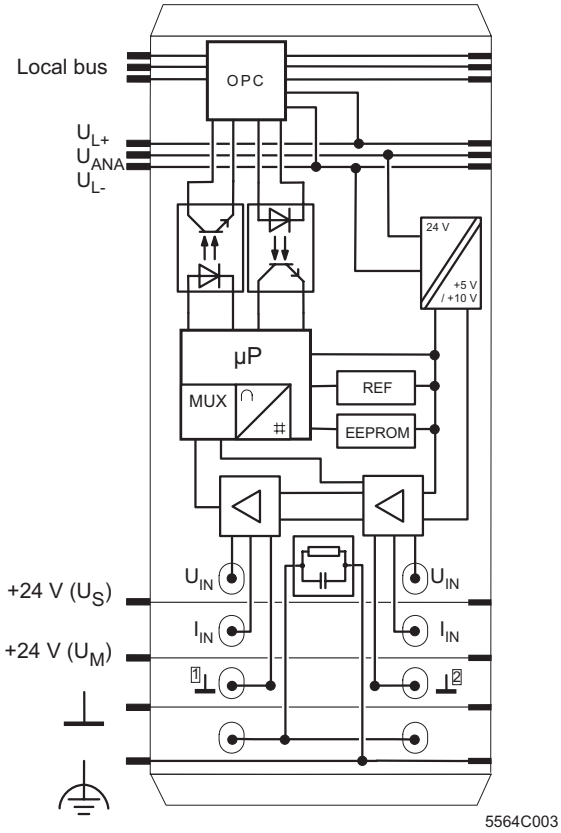


Figure 3 Internal wiring of the terminal points

Key:

OPC	Protocol chip
	Optocoupler
	Power supply unit with electrical isolation
µP MUX	Microprocessor with multiplexer and analog-to-digital converter
REF	Reference voltage
EEPROM	Electrically erasable programmable read-only memory
	Amplifier
	Coupling network

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.

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Electrical Isolation

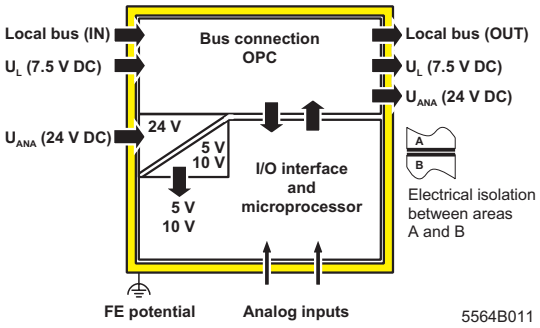


Figure 4 Electrical isolation of the individual function areas

Connection Notes

Do not connect voltages exceeding ±5 V to a current input. This damages the module electronics as the maximum permissible current of ±100 mA is exceeded.

Always connect the analog sensors using shielded, twisted pair cables.

Connect the shielding of the sensor with PE potential.

When using cables > 1 m (3.28 ft.) fold the outer cable sheath back and connect the shield to the terminal via the contacts 1.4 or 2.4. These contacts connect the shield directly to FE (functional earth ground) on the terminal side.

Additional wiring is not necessary.

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Within the terminal, ground is connected to FE via an RC-element.

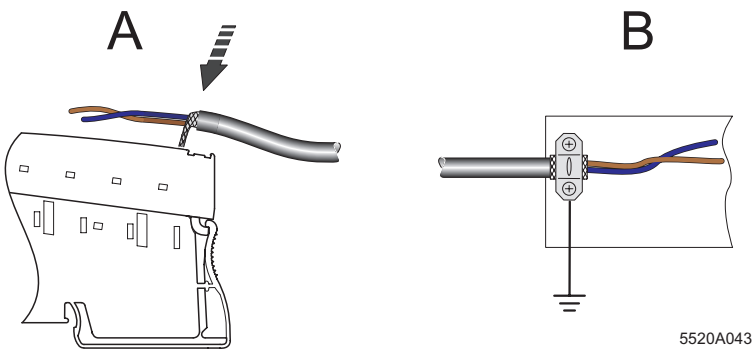


Figure 5 Connection of analog sensors, signal cables

If you want to use **both** channels of the IB IL AI 2/SF-ME terminal, you can connect the shield in various ways depending on the cable feed.

1 If **one** multi-wire cable is used to connect both sensors, connect the shielding as described above (see Figure 5).

2 If **two individual** cables are used to connect the sensors, proceed as follows to prevent ground loops (see Figure 6):

- Install a busbar with a connection to the ground potential in front of the Inline terminal (detail B in Figure 6). Fold back the outer sheath of the two cables at the appropriate position and connect the shields of both cables, e.g., using an SK shield clamp (see "CLIPLINE" catalog). The busbar must be the **only** point at which the shield of every cable is connected to ground potential.
- Lead the cables to the Inline terminal and connect the shield, as described above, to the terminal points 1.4 and 2.4. (Detail A in Figure 5).
- Lead the sensor cable into the sensor making sure to maintain the integrity of the cable **insulation** (detail C in Figure 6).

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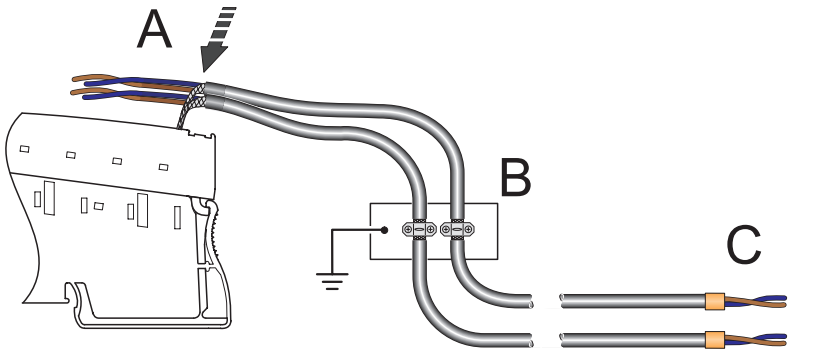


Figure 6 Connection of two analog sensors with individual cables

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Connection Examples

Figure 7 and Figure 8 show the connection schematically (without shield connector). One side of the shielding must be connected at the sensor or at an appropriate point to the functional earth ground potential.

Connection of Active Sensors

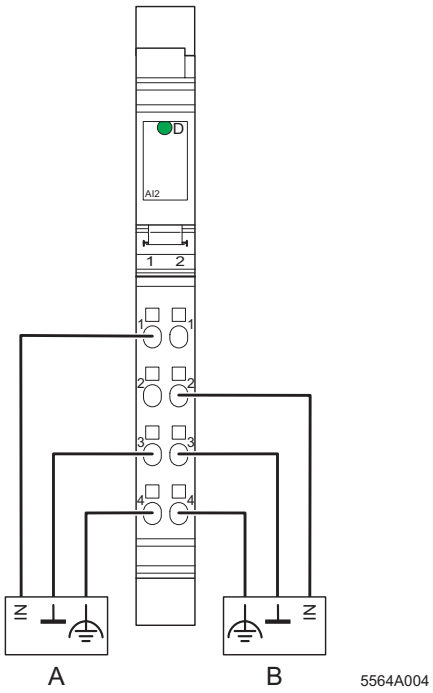


Figure 7 Connection of active sensors in 2-wire technology

A Active sensor with voltage output (channel 1)

B Active sensor with current output (channel 2)

Connection of Passive Sensors

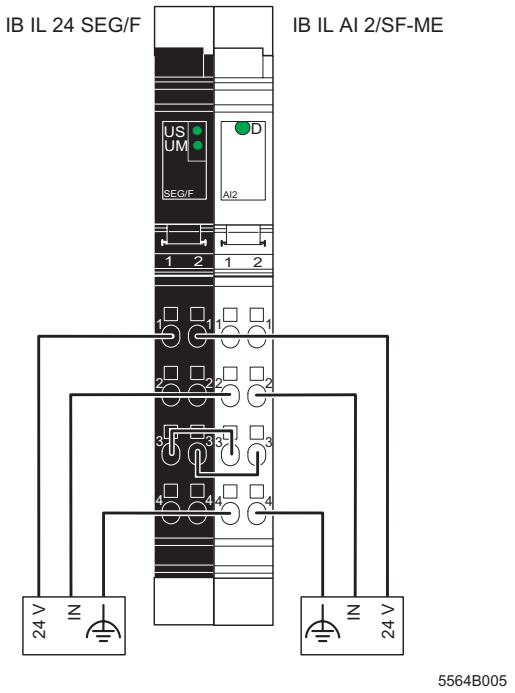


Figure 8 Connection of two passive sensors in 2-wire technology

Figure 8 shows the passive sensor supply. The sensors are supplied through a pre-connected segment terminal with a fuse. The sensors can also be supplied from an external power supply unit.

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Connection for Battery Monitoring

Both reference inputs (minus inputs) of each IB IL AI 2/SF-ME terminal are connected to each other. If signal sources are connected in series, wrong connections can lead to a short circuit of individual signal sources.

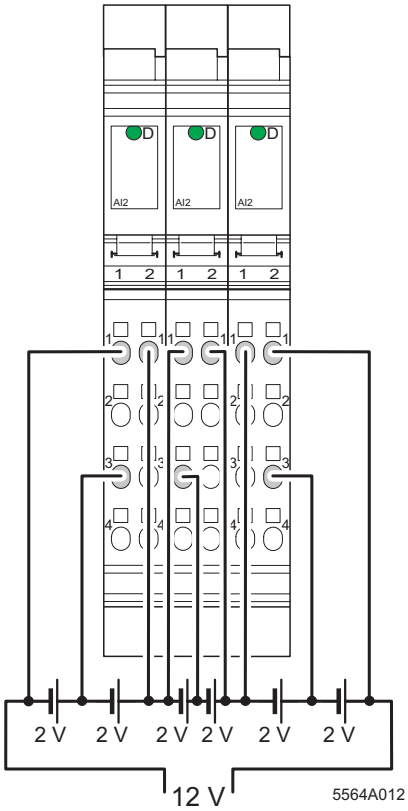


Figure 9 Connection for battery monitoring

Because of the single-ended inputs, the following connections are necessary:

Connect the reference input of a terminal between two voltage sources.

Channel 1 measures the first voltage source with opposite polarity. The measured value must be adapted in the control system to the polarity.

Channel 2 measures the second voltage source with correct polarity.

Configure the terminal to bipolar (±10 V).

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Programming Data/ Configuration Data

INTERBUS

ID code	$7F_{hex}$ (127_{dec})
Length code	02_{hex}
Input address area	4 bytes
Output address area	4 bytes
Parameter channel (PCP)	0 bytes
Register length (bus)	4 bytes

Other Bus Systems



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

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Process Data



For the assignment of the illustrated (byte.bit) view to your INTERBUS control or computer system, please refer to the data sheet DB GB IBS SYS ADDRESS Order No. 90 00 99 0.

OUT Process Data Words for the Configuration of the Terminal (see page 13)

(Word.bit) view	Byte	Word 0															
	Bit	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
(Byte.bit) view	Byte	Byte 0								Byte 1							
	Bit	7	6	5	4	3	2	1	0	7	6	5	4	3	2	1	0
Channel 1	Assignment	1	0	0	0	0	0	Filter		0	0	Format		Measuring range			
Channel 2	Assignment	1	0	0	0	0	0	Filter		0	0	Format		Measuring range			

Assignment of the Terminal Points to the IN Process Data Words (see page 14)

(Word.bit) view	Byte	Word 0															
	Bit	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
(Byte.bit) view	Byte	Byte 0								Byte 1							
	Bit	7	6	5	4	3	2	1	0	7	6	5	4	3	2	1	0
Channel 1	Signal	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
		Terminal point 1.1: voltage input Terminal point 1.2: current input															
	Signal reference	Terminal point 1.3															
	Shielding (FE)	Terminal point 1.4															
Channel 2	Signal	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
		Terminal point 2.1: voltage input Terminal point 2.2: current input															
	Signal reference	Terminal point 2.3															
	Shielding	Terminal point 2.4															

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OUT Process Data Words

With the two OUT process data words you can configure each channel of the terminal independently. The following configurations are possible:

– Selecting a measuring range according to the input signal
– Switching off average value generation
– Changing the formats of the measured value representation

The configuration settings are not saved. It must be transmitted in each bus cycle.

After applying voltage (power up) to the Inline station, the "Measured value invalid" message (error code 8004_{hex}) appears in the IN process data words. After 1 second, maximum, the preset configuration is accepted and the first measured value is available. If you change the configuration the corresponding channel is re-initialized. The "Measured value invalid" message (error code 8004_{hex}) appears in the OUT process data words for 100 ms, maximum.

Default:

Measuring range:	0 V to 10 V
Average value generation:	Switched on
Output format:	IL format

You cannot change the signal input type through the OUT process data words. Current or voltage measurement is selected by applying the measured signal to the current or voltage input.

In addition, select the corresponding measuring range through the OUT process data words.

Do not simultaneously apply current and voltage signals to an input channel as you will not obtain valid measured values.

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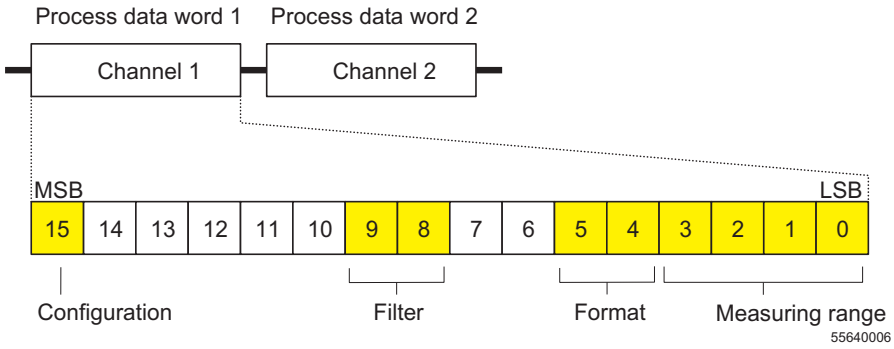


Figure 10 OUT process data words

MSB Most significant bit

LSB Least significant bit

One OUT process data word is available for the configuration of each channel.

Set bit 15 of the corresponding output word to 1 to configure the terminal. If bit 15 = 0 the preset configuration is active.

Bit 15:

Code	Configuration
0	**Default**
1	Configuration data

Bit 9 and bit 8:

Code	Filter
00	**16-sample average value (default)**
01	No filter
10, 11	Reserved

Bit 5 and bit 4:

Code	Format
00	**IB IL (12 bits) (default)**
01	IB ST (12 bits)
10	IB RT (12 bits)
11	Standardized display

Bit 3 to bit 0:

Code	Measuring Range (Voltage)
0000	**0 V through 10 V (default)**
0001	±10 V
0010 through 0111	Reserved

Code	Measuring Range (Current)
1000	0 mA through 20 mA
1001	±20 mA
1010	4 mA through 20 mA
1011 through 1111	Reserved

Set all reserved bits to 0.

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IN Process Data Words

The measured values are transmitted, per channel, to the controller board or the computer by means of the IN process data words.

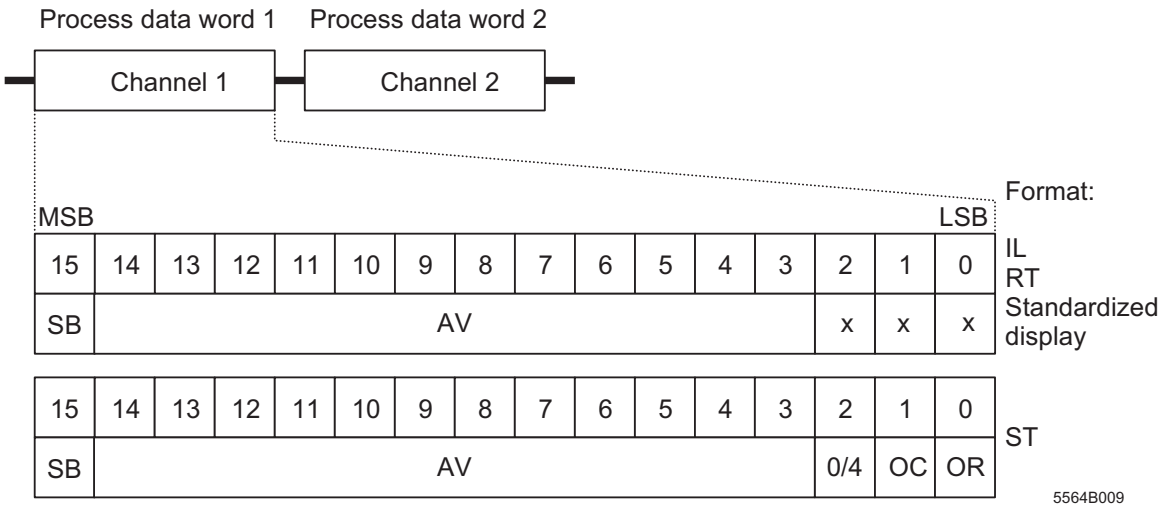


Figure 11 Sequence of the IN process data words and display of the bits of the first process data word in the different formats

SB	Sign bit	OC	Open circuit
AV	Analog value	OR	Overrange
0/4	Measuring range 4 through 20 mA	x	Without meaning (may be 0 or 1)
MSB	Most significant bit	LSB	Least significant bit

The "IB IL" and "standardized display" process data formats support extended diagnostics. The following error codes are possible:

Code (hex)	Error
8001	Overrange
8002	Open circuit
8004	Measured value invalid/no valid measured value available
8010	Configuration invalid
8040	Module faulty
8080	Underrange

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Formats for Representing the Measured Values

"IB IL" Format

The measured value is represented in bits 14 through 3. An additional bit (bit 15) is available as a sign bit.

This format supports extended diagnostics. Values >8000_{hex} indicate an error. The error codes are listed on page 14.

15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
SB	AV												x	x	x

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Figure 12 Measured value representation in "IB IL" format (12 bits)

SB	Sign bit	AV	Analog value
x	Without meaning (may be 0 or 1)		

This format is preset (default). To ensure that the terminal can be operated in previously used data formats, the measured value representation can be switched to different formats.

Significant Measured Values

Some codes are used for diagnostic functions. In this case, take the complete 16-bit value into account.

Measuring range 0 mA through 20 mA / 0 V through 10 V

Input Data Word (Two's Complement)		0 mA to 20 mA I_{Input}	0 V to 10 V U_{Input}
hex	dec	mA	V
8001	Overrange	> +21.675	> +10.837
7F00	32512	+21.675	+10.837
7530	30000	+20.0	+10.0
0008	8	+5.33 µA	+2.667 mV
0000	0	0	0
0000	0	< 0	< 0

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Measuring range -20 mA through +20 mA / -10 V through +10 V

Input Data Word (Two's Complement)		-20 mA to +20 mA I_{Input}	-10 V to +10 V U_{Input}
hex	dec	mA	V
8001	Overrange	> +21.675	> +10.837
7F00	32512	+21.675	+10.837
7530	30000	+20.0	+10.0
0008	8	+5.33 µA	+2.667 mV
0000	0	0	0
FFF8	-8	-5.33 µA	-2.667 mV
8AD0	-30000	-20.0	-10.0
8100	-32000	-21.675	-10.837
8080	Underrange	< -21.675	< -10.837

Measuring range 4 mA through 20 mA

Input Data Word (Two's Complement)		4 mA to 20 mA I_{Input}
hex	dec	mA
8001	Overrange	> +21.3397
7F00	32512	+21.3397
7530	30000	+20.0
0008	8	+4.004267
0000	0	+4.0 to 3.2
8002	Open circuit	< +3.2

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"IB ST" Format

The measured value is represented in bits 14 through 3. The remaining 4 bits are available as sign, measuring range and error bits.

This format corresponds to the data format used on INTERBUS ST modules.

15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
SB	AV												0/4	OC	OR

55640007

Figure 13 Measured value representation in "IB ST" format (12 bits)

SB	Sign bit	OC	Open circuit
AV	Analog value	OR	Overrange
0/4	Measuring range 4 through 20 mA		

Significant Measured Values

Measuring range 0 mA through 20 mA / 0 V through 10 V

Input Data Word (Two's Complement)	0 mA to 20 mA I_{Input}	0 V to 10 V U_{Input}
hex	mA	V
7FF9	> 21.5	> 10.75
7FF8	20.0 to 21.5	10.00 to 10.75
7FF8	19.9951	9.9975
4000	10.0	5.0
0008	0.0048828	0.002441
0000	0	0

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Measuring range -20 mA through +20 mA / -10 V through +10 V

Input Data Word (Two's Complement)	-20 mA to +20 mA I_{Input}	-10 V to +10 V U_{Input}
hex	mA	V
7FF9	> 21.5	> 10.75
7FF8	20.0 to 21.5	10.00 to 10.75
7FF8	19.9951	9.9975
0008	0.0048828	0.002441
0000	0	0
FFF8	-0.0048828	-0.002441
8000	-20.0 to -21.5	-10.00 to -10.75
8001	< -21.5	< -10.75

Measuring range 4 mA through 20 mA

Input Data Word (Two's Complement)	4 mA to 20 mA I_{Input}
hex	mA
7FFD	> 21.5
7FFC	20.0 to 21.5
7FFC	19.9961
000C	4.003906
0004	3.2 to 4.0
0006	< 3.2

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"IB RT" Format

The measured value is represented in bits 14 through 0. An additional bit (bit 15) is available as a sign bit.

This format corresponds to the data format used on INTERBUS RT modules.

In this data format error codes or error bits are not defined. An open circuit is indicated by the positive final value $7FFF_{hex}$.

15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
SB	AV												x	x	x

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Figure 14 Measured value representation in "IB RT" format (15 bits)

SB	Sign bit	AV	Analog value
x	Without meaning (may be 0 or 1)		

Significant Measured Values

Measuring range 0 mA through 20 mA / 0 V through 10 V

Input Data Word (Two's Complement)	0 mA to 20 mA I_{Input}	0 V to 10 V U_{Input}
hex	mA	V
7FF8	≥ 19.9951	≥ 9.9976
4000	10.0	5.0
0008	4.88 µA	2.447 mV
0000	≤ 0	≤ 0

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Measuring range -20 mA through +20 mA / -10 V through +10 V

Input Data Word (Two's Complement)	-20 mA to +20 mA I_{Input}	-10 V to +10 V U_{Input}
hex	mA	V
7FF8	+19.9951	+9.9976
4000	+10.0	+5.0
0008	+4.883 µA	+2.442 mV
0000	0	0
FFF8	-4.883 µA	-2.442 mV
8008	-19.999389	-9.99939
8000	≤ -20.0	≤ -10.0

Measuring range 4 mA through 20 mA

Input Data Word (Two's Complement)	4 mA to 20 mA I_{Input}
hex	mA
7FF8	19.9961
4000	12.0
0008	4.0039
0000	4.0
0000	3.2 to 4.0
7FF8	< 3.2

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"Standardized Display" Format

The data is represented in bits 14 through 3. An additional bit (bit 15) is available as a sign bit.

In this format, data is standardized to the measuring range and represented in such a way that it indicates the corresponding value without conversion. In this format one bit has the value of 1 mV or 1 µA. Quantization from bit 3 is 8 mV or 8 µA.

This format supports extended diagnostics. Values >8000_{hex} indicate an error. The error codes are listed on page 14.

15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
SB	AV												x	x	x

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Figure 15 Measured value representation in "standardized display" format (15 bits)

SB	Sign bit	AV	Analog value
x	Without meaning (may be 0 or 1)		

Significant Measured Values

Because of the display standardization not all of the possible codes are used. Some codes are additionally used for diagnostic functions. Therefore, the resolution is not 15 bits but exactly 13.287713 bits.

Measuring range 0 V through 10 V

Input Data Word (Two's Complement)		0 V to 10 V U_{Input}
hex	dec	V
8001	Overrange	> +10.837
2710	10000	+10.0
0008	8	+0.008
0000	0	≤ 0

Measuring range 0 mA through 20 mA

Input Data Word (Two's Complement)		0 mA to 20 mA I_{Input}
hex	dec	mA
8001	Overrange	> +21.674
4E20	20000	+20.0
0008	8	+0.008
0000	0	≤ 0

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Measuring range -10 V through +10 V

Input Data Word (Two's Complement)		-10 V to +10 V U_{Input}
hex	dec	V
8001	Overrange	> +10.837
2710	10000	+10.0
0008	8	+0.008
0000	0	0
FFF8	-8	-0.008
D8F0	-10000	-10.0
8080	Underrange	< -10.837

Measuring range -20 mA through +20 mA

Input Data Word (Two's Complement)		-20 mA to +20 mA I_{Input}
hex	dec	mA
8001	Overrange	> +21.674
4E20	20000	+20.0
0008	8	+0.008
0000	0	0
FFF8	-8	-0.008
B1E0	-20000	-20.0
8080	Underrange	< -21.674

Measuring range 4 mA through 20 mA

Input Data Word (Two's Complement)		4 mA to 20 mA I_{Input}
hex	dec	mA
8001	Overrange	> 21.339
3E80	16000	20.0
0008	8	4.008
0000	0	4.0 to 3.2
8002	Open circuit	< 3.2

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Example

Measured value representation in different data formats.

Measuring range: 0 mA to 20 mA

Measured value: 10 mA

Input data word:

Format	hex Value	dec Value	Measured Value
IB IL	3A98	15 000	10 mA
IB ST	4000	16 384	10 mA
IB RT	4000	16 384	10 mA
Standardized display	2710	10 000	10 mA

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Technical Data

General Data	
Order Designation	IB IL AI 2/SF-ME
Order No.	28 63 94 4
Housing dimensions (width x height x depth)	12.2 mm x 120 mm x 71.5 mm (0.480 x 4.724 x 2.815 in.)
Weight	47 g (without connectors)
Operating mode	Process data mode with 2 words
Transmission speed	500 kbaud
Type of sensor connection	2 and 3-wire technology
Power supply for the sensors	With an external power supply unit or with an additional segment terminal with a fuse (IB IL 24 SEG/F)
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, to 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, to 85% occasionally
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 [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	IP20 according to IEC 60529
Class of protection	Class 3 according to VDE 0106, IEC 60536

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Deviations From Common Technical Data That Are Indicated in the IB IL SYS PRO UM E User Manual	
Noise Immunity Test According to EN 50082-2	
Electrostatic discharge (ESD) according to EN 61000-4-2; IEC 61000-4-2	Criterion B 6 kV contact discharge 6 kV air discharge
Mechanical Requirements	
Shock test according to EN 60068-2-27; IEC 60068-2-27	15g load for 11 ms, half sinusoidal wave, three shocks in each space direction and orientation 25g load for 11 ms, half sinusoidal wave, three shocks in each space direction and orientation

Interface	
Local bus	Data routing

Power Consumption	
Communications power U_L	7.5 V
Current consumption from U_L	45 mA (typical) / 60 mA (maximum)
I/O supply voltage U_{ANA}	24 V DC
Current consumption at U_{ANA}	13.5 mA (typical) / 18.0 mA (maximum)
Total power consumption	622 mW (typical)

Supply of the Module Electronics and I/O Through the Bus Terminal/Power Terminal	
Connection method	Potential routing

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Analog Inputs	
Number	2 analog single-ended inputs
Measured value representation	In the formats IB IL (12 bits with sign bit) IB ST (12 bits with sign bit) IB RT (12 bits with sign bit) Standardized display (12 bits with sign bit)
 Please read the notes on page 15 and page 21 on measured value representation in "IB IL" and "standardized display" format.	
Average value generation	Over 16 measured values (can be switched off)
Conversion time of the A/D converter	120 µs, approximately

Analog Input Stages	
Voltage Inputs	
Input resistance	>220 kΩ
Limit frequency (-3 dB) of the input filter	40 Hz
Process data update of both channels	<1.5 ms
Behavior upon sensor failure	Goes to 0 V
Maximum permissible voltage between analog voltage inputs and analog reference potential	±32 V
Common mode rejection (CMR) Reference: voltage input signal, valid for permissible DC common mode voltage range	90 dB, minimum 110 dB, typical
Permissible DC common mode voltage for CMR	40 V between voltage input and FE

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Analog Input Stages (Continued)	
Current Inputs	
Input resistance	50 Ω (shunt)
Limit frequency (-3 dB) of the input filter	40 Hz
Process data update of both channels	<1.5 ms
Behavior upon sensor failure	Goes to 0 mA/4 mA
Maximum permissible voltage between analog current inputs and analog reference potential	±5 V (corresponding with 100 mA across the sensor resistances)
Common mode rejection (CMR) Reference: current input signal, valid for permissible DC common mode voltage range	90 dB, minimum 110 dB, typical
Permissible DC common mode voltage for CMR	40 V between current input and FE
Maximum permissible current	±100 mA

Tolerance Behavior and Temperature Response of the Voltage Inputs (The error indications refer to the measuring range final value of 10 V.)		
	Typical	**Maximum**
Total error of the voltage inputs at 23°C (73.4°F) offset error + gain error + linearity error	±0.25%	±0.50%
Total error of the voltage inputs (-25°C to +55°C [-13°F to +131°F]) offset error + gain error + linearity error + drift error	±0.40%	±0.75%

Tolerance Behavior and Temperature Response of the Current Inputs (The error indications refer to the measuring range final value of 20 mA.)		
	Typical	**Maximum**
Total error of the current inputs at 23°C (73.4°F) offset error + gain error + linearity error	±0.30%	±0.55%
Total error of the current inputs (-25°C to +55°C [-13°F to +131°F]) offset error + gain error + linearity error + drift error	±0.45%	±0.80%

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Additional Tolerances Influenced by Electromagnetic Fields				
Type of Electromagnetic Interference	**Typical Deviation from the Measuring Range Final Value (Voltage Input)**		**Typical Deviation from the Measuring Range Final Value (Current Input)**	
	Relative	**Absolute**	**Relative**	**Absolute**
Electromagnetic fields; field strength 10 V/m, according to EN 61000-4-3/IEC 61000-4-3	< ±2%	< ±200 mV	< ±2%	< ±400 µA
Conducted interference Class 3 (test voltage 10 V), according to EN 61000-4-6/IEC 61000-4-6	< ±1%	< ±100 mV	< ±1%	< ±100 µA
Fast transients (burst) 4 kV supply, 2 kV input, according to EN 61000-4-4/IEC 61000-4-4	< ±1%	< ±100 mV	< ±1%	< ±100 µA

Safety Equipment	
Surge voltage	Suppressor diodes in the analog inputs

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 the station bus terminal and the sensors connected to the analog input 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	- 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 U_{ANA} / I/O	500 V AC, 50 Hz, 1 min
7.5 V supply (bus logic), 24 V supply U_{ANA}/functional earth ground	500 V AC, 50 Hz, 1 min
I/O / functional earth ground	500 V AC, 50 Hz, 1 min

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Error Messages to the Higher-Level Control or Computer System	
Failure of the internal voltage supply	Yes
Peripheral fault/user error	Yes, error message via the IN process data (see page 14)

Ordering Data

Description	Order Designation	Order No.
Terminal with two analog input channels; including connectors and labeling fields	IB IL AI 2/SF-ME	28 63 94 4
As an option, you can connect the shield using the shield connector which is available as an accessory.		
Connector with six spring-cage connections and shield connection (green, w/o color print); pack of 5	IB IL SCN-6-SHIELD-TWIN	27 40 24 5
"Configuring and Installing the INTERBUS Inline Product Range" user manual	IB IL SYS PRO UM E	27 43 04 8

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