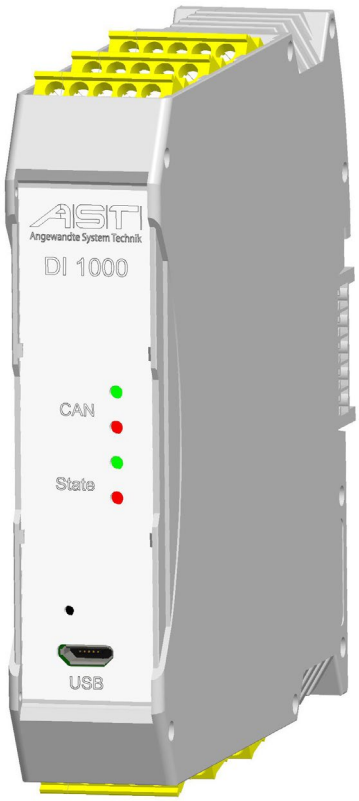
AST Gruppe
Angewandte System Technik

Digital Interface
DI 1000

Original
Manual



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Contents

1. Safety instructions

This operating manual describes the installation, commissioning and operation of the digital interface DI 1000. It is assumed that qualified staff only who have adequate knowledge in the fields of measuring and control engineering take all measures.

Attention!
Any non-compliance with these safety precautions may result in severe damage to property and health.

1.1. Field of application

The digital interface DI 1000 has been designed to the purpose of amplifying the output signals of sensors with metal-foil strain gauges, preferably force transducers and transform them into standard signals. Any other application is regarded contrary to the intended purpose. The manufacturer does not accept any liability for damages resulting from such inappropriate usage. In this case it is the user alone who has to bear the risk.
Type DI 1000 must not be used as the sole means to prevent dangerous conditions of machines and plants. All machines and plants must be constructed in such a way (e.g. by using mechanical stops, limit switches) that a condition of failure does not result in a situation of severe danger.
It must be made sure that any erroneous setting or malfunction of the unit or its breakdown cannot cause damage or be a risk to the operating staff or other persons.

1.2. Installation

The unit must be installed and connected in compliance with the current DIN- and VDE-standards. Supply cables and signal lines shall be installed so that interference signals such as electrical interference do not have any adverse effects on the function of the equipment.

1.3. Maintenance

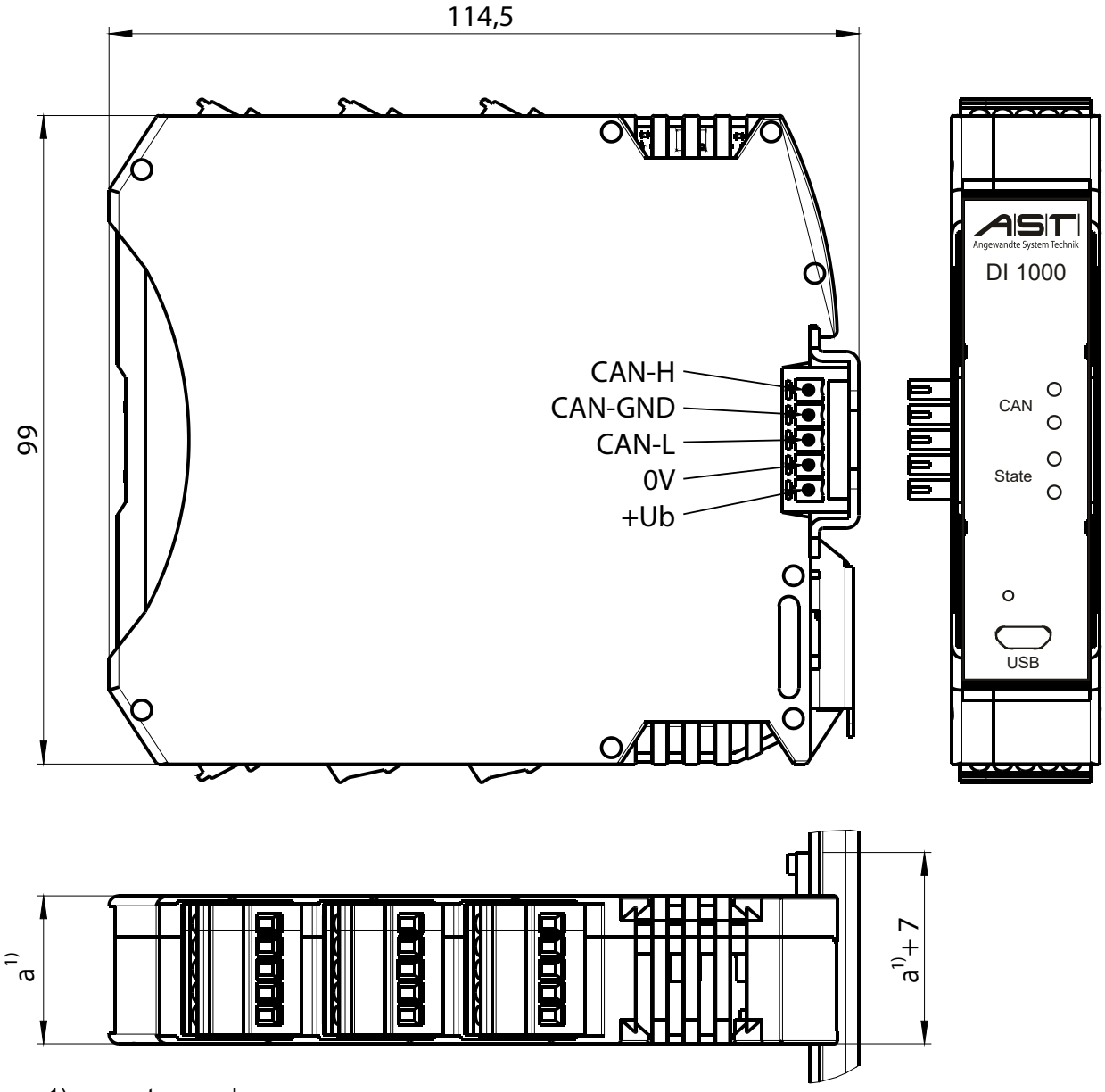
The device does not contain any components that require maintenance. Repairs shall be carried out by the manufacturer only.

2. Device description

- Universal usable digital strain gauge amplifier with up to 8 measuring channels
- Connecting with different kind of strain gauge sensors
- Complete system solutions through networking of devices via CANopen
- 24 bit resolution
- Up to 3200 Sps conversion rate per measuring channel
- Setting by our software ASTAS®2 or via CANopen
- CANopen and power supply 24V via TBUS for simply linking of devices

3. Dimensions

assembly Rail TS35



1) - see type code

Figure 1 - Dimensions DI 1000

4. Type code

Type code	Description
DI1101-A100-2	Digital Interface for DIN rail mounting, 1-channel, 1 x mV/V- Input, 2 digital-inputs, Type A, a= 22,5mm
DI1104-A400-8	Digital Interface für Normschiene, 4- channel, 4 x mV/V- Input, 8 digital- inputs, Type A, a= 90,0mm
DI1102-B200-1	Digital Interface für Normschiene, 2- channel 2 x mV/V- Input, 1 digital- input, Type B, a= 22,5mm
DI1104-B400-2	Digital Interface für Normschiene, 4- channel, 4 x mV/V- Input, 2 digital- inputs, Type B, a= 45,0mm
DI1108-B800-4	Digital Interface für Normschiene, 8- channel, 8 x mV/V- Input, 4 digital- inputs, Type B, a= 90,0mm

Table 1- Type code

5. Specifications

Type		**Type A**	**Type B**
Device profile		CiA 404: Sensors and controllers	
Input strain gauge sensor			
Number of strain gauge input channals		1/ 2/ 4	2/ 4/ 8
Connectin equipment		4- or 6-wire system, configurable	4-wire system
Input signal range (+Si/-Si)	mV/V	0,5/ 1,0/ 2,0[2]/ 4,0	
Internal resistance of strain gauges bridge	Ω	50 ... 1000	100 … 1000
Power supply for strain gauge gridge (+EX/-EX)	VDC	± 2,5 (5,0)	
EMI- Filter cut-off frequency (-3dB))	Hz	approx. 2700	
Resolution ADU	Bit	24	
Conversion rate ADU	Sps	up to 3200	up to 510
Input temperature sensor PT1000			
Number		1 per channel, maximum 4	none
Temperature measuring range	°C	-40 ... 125	-
Input digital switching signal			
Number of switching inputs		2 per channel, maximum 8	1 per channel,maximum 4
Type of switching inputs		potential free, optically isolated	
Input voltage switching inputs	VDC	low: ≤2,0 - high: ≥ 4,5	
Galvanic isolation	VDC	1000	
Output digital CAN			
Data transfer rate (adjustable)	kBits/ s	125[2]/ 250/ 500	
Protocol		CANopen CiA 404	
Number of PDO´s - adjustable		4	
Modul adress - adjustable		1 … 126, 127 reserved	
Status indicator		2 LEDs	
Filter - configurable		Moving average, Repeating average Average over last N values	
Accuracy class digital CAN		regarding strain gauge sensor: 2 mV/V Input signal = 100 % v. E.	
Non-linearity	%v. E.	0,0025	
Noise (depending on conversion rate)	%v. E.	<0,001 at 3200 Sps	<0,015 at 220 Sps
Temperature coefficient amplification	%v.E./10K	<0,01	
Temperature coefficient zero point	%v.E./10K	<0,01	
Power supply			
Supply voltage	VDC	18 ... **24** ...36	
Power consumption	W/channel	4	2
Galvanic isolation	VDC	1000	
Environmental conditions			
Working temperature range	°C	-20 ... +60	
Storage temperature range	°C	-30 ... +70	
interference resistance		DIN EN 61000-6-2	
Interference emissions		DIN EN 55011-B	
Construction			
Dimensions (H x T)	mm	114,5 x 99	
Width	mm	a[1]	

1) - see type code

2) - factory settings

6. CANopen

Our products comply in particular with the following standards of CAN in Automation (CiA) e. V., which can be downloaded after registration at https://www.can-cia.org/groups/specifications/.

- CiA 301: CANopen application layer and communication profile
- CiA 404: CANopen device profile for measuring devices and closed-loop controllers

In addition to these, the standards CiA 302 (additional application layer functions), 305 (LSS) and others are also followed.

6.1. Communication protocols

Both SDO (service data object, normal and expedited) and PDO (process data object, dynamic mapping) are supported.

6.2. Object dictionary and eds file

Data access takes place via the so-called object directory. This directory has a tree structure, the addressing of individual data objects is done via indices and subindices.

The structure of the object dictionary is specified in a product specific eds file (CiA 306), which is provided by A.S.T.. This file is intended for use by supporting software, but is also readable and interpretable directly in a text editor without further conversions. Here is an excerpt of such a file, which is explained in the following:

```
[6130]
ParameterName=AI Float PV
ObjectType=8
SubNumber=9

[6130sub0]
ParameterName=Number of entries
ObjectType=7
DataType=5
AccessType=ro
PDOMapping=0
;;AI Float PV

[6130sub1]
ParameterName=AI Float PV1 (DMS)
ObjectType=7
DataType=8
AccessType=ro
PDOMapping=1
;; Analogeingang, Kanal 1, Klemme 10

[6130sub2]
ParameterName=AI Float PV2 (Temp)
ObjectType=7
DataType=8
AccessType=ro
PDOMapping=1
```

This excerpt is the beginning of the description of the objects with the (hexadecimal) index 0x6130 as well as those with the subindices 0 to 2. This is an array whose length is defined in the object 0x6130:0. The array is described in the device profile 404 and contains the force measurement values (PV, process value) of the analog input (AI, analog input) already converted, for example, into the unit kilonewton in floating point format (float, floating point). The different subindices (here 1 and 2) correspond to the input channels.

Comments, descriptions, notes or similar are marked by the double semicolon.

Similar objects exist for the configuration of the device and also for further inputs and outputs, if available.

7. Electrical connection

7.1. Connection description

Connection	Description
n.u.	Not used
+EX n	Excitation voltage - plus
- EX n	Excitation voltage - minus
+SE n	with 6-wire technology sense signal - plus
- SE n	with 6-wire technology sense signal – minus
+SI n	Signal - plus
- SI n	Signal - minus
SH n	Shield
+Ub	Power voltage - plus
0V	Power voltage - minus
CAN-H	CAN-Bus - plus
CAN-L	CAN-Bus - minus
CAN-GND	CAN-Bus GND, internal ground potential
+PT n	Temperature sensor PT1000 - plus
- PT n	Temperature sensor PT1000 - minus
IN n	Digital switching input
R n	Digital switching input return l

n… running index

Table 2 – Connection description

7.2. Connections

7.2.1. Type A

7.2.1.1. Position of the connections DI 1101-A100-2

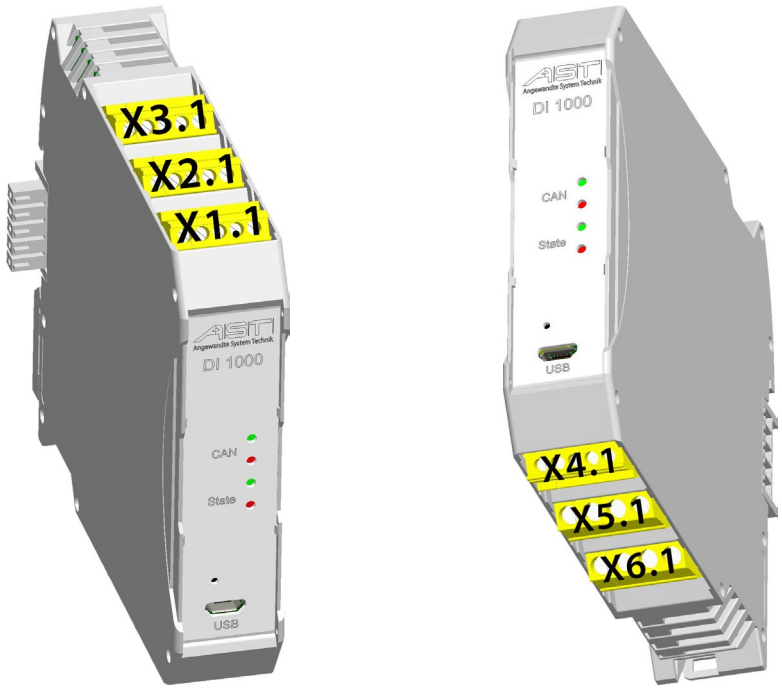


Figure 2 – Position of the connections D 1101-A100-2

7.2.1.2. Position of the connections DI 1104-A400-8

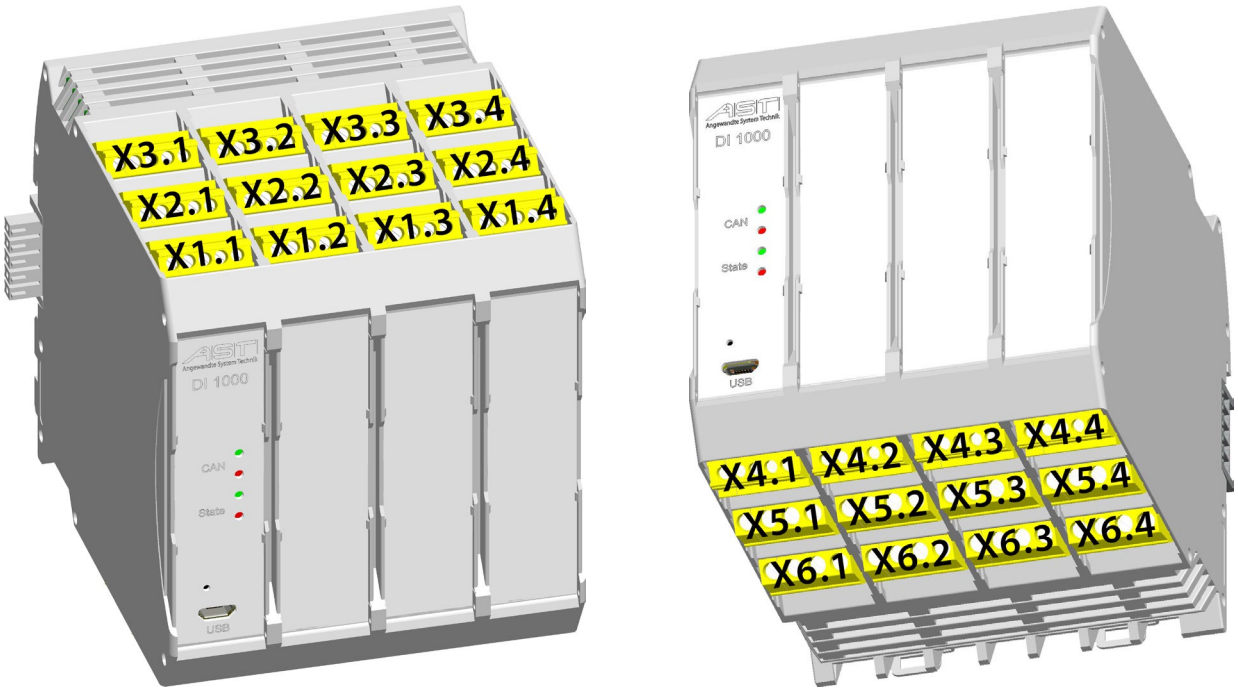


Figure 3 - Position of the connections DI 1104-A400-8

7.2.1.3. Designation of the Type A connections

seen from the front panel

X1.1	IN2	R2	IN1	+SE1	-SE1
X2.1	+EX1	-EX1	+SI1	-SI1	SH1
X3.1	n.u.	n.u.	+PT1	-PT1	SH2
X4.1	R1	n.u.	n.u.	+Ub	0V
X5.1	n.u.	n.u.	n.u.	n.u.	
X6.1	n.u.	n.u.	n.u.	n.u.	

X1.2	IN4	R4	IN3	+SE3	-SE3
X2.2	+EX3	-EX3	+SI3	-SI3	SH3
X3.2	n.u.	n.u.	+PT2	-PT2	SH4
X4.2	R3	n.u.	n.u.	+Ub	0V
X5.2	n.u.	n.u.	n.u.	n.u.	
X6.2	n.u.	n.u.	n.u.	n.u.	

X1.3	IN6	R6	IN5	+SE5	-SE5
X2.3	+EX5	-EX5	+SI5	-SI5	SH5
X3.3	n.u.	n.u.	+PT3	-PT3	SH6
X4.3	R5	n.u.	n.u.	+Ub	0V
X5.3	n.u.	n.u.	n.u.	n.u.	
X6.3	n.u.	n.u.	n.u.	n.u.	

X1.4	IN8	R8	IN7	+SE7	-SE7
X2.4	+EX7	-EX7	+SI7	-SI7	SH7
X3.4	n.u.	n.u.	+PT4	-PT4	SH8
X4.4	R7	n.u.	n.u.	+Ub	0V
X5.4	n.u.	n.u.	n.u.	n.u.	
X6.4	n.u.	n.u.	n.u.	n.u.	

Table 3 – Designation of the Type A connections

7.2.2. Type B

7.2.2.1. Position of the connections DI 1102-B200-1

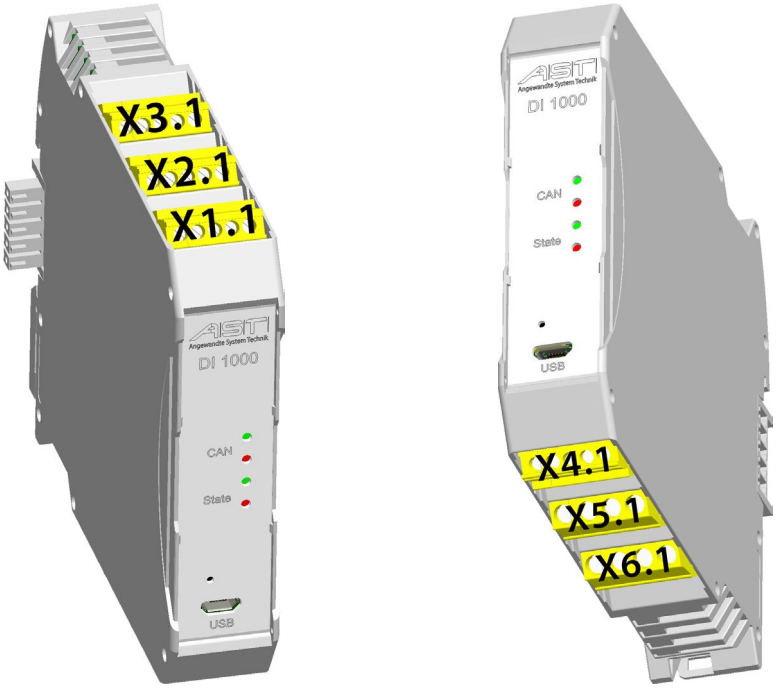


Figure 4 - Position of the connections DI 1102-B200-1

7.2.2.2. Position of the connections DI 1104-B400-2

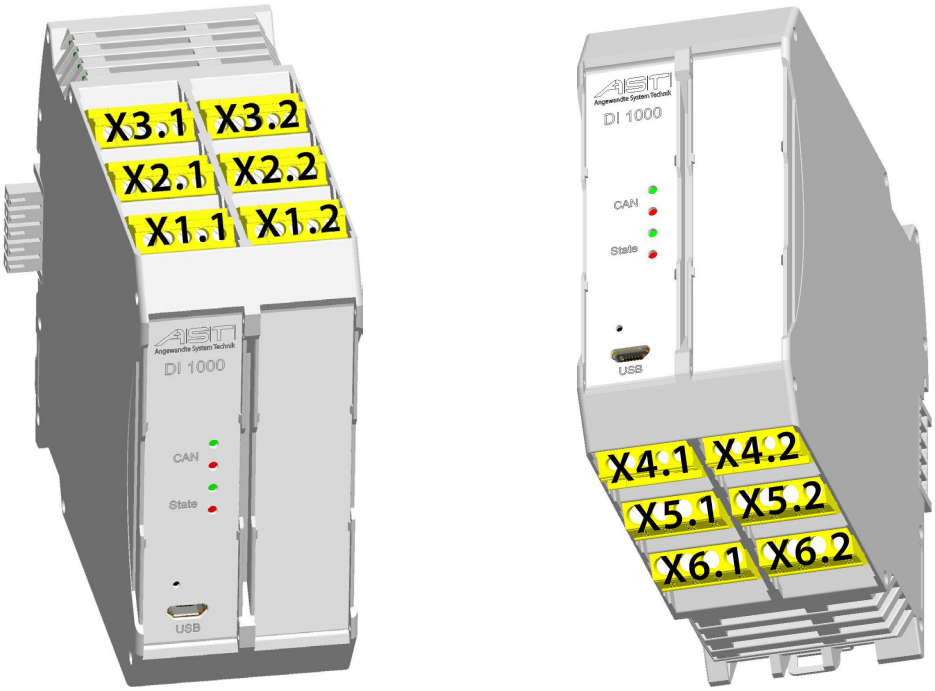


Figure 5 - Position of the connections DI 1104-B400-2

7.2.2.3. Position of the connections DI 1108-B800-4

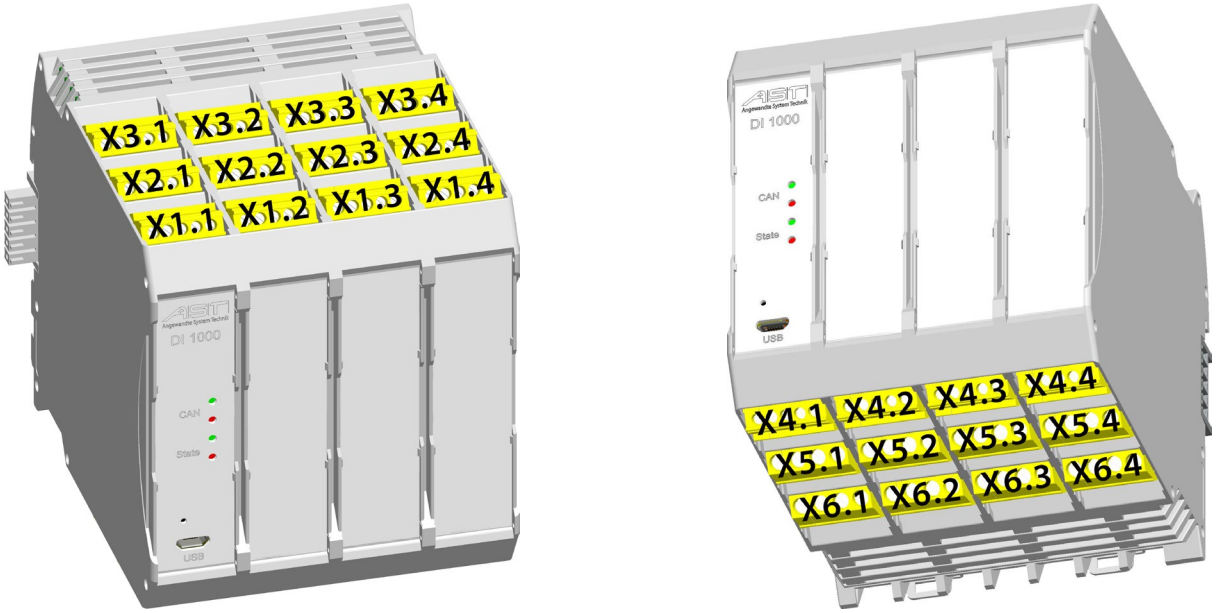


Figure 6 - Position of the connections DI 1108-B800-4

7.2.2.4. Designation of the Type B

seen from the front panel

X1.1	n.u.	n.u.	IN1	n.u.	n.u.
X2.1	+EX1	-EX1	+SI1	-SI1	SH1
X3.1	+EX2	-EX2	+SI2	-SI2	SH2
X4.1	R1	n.u.	n.u.	+Ub	0V
X5.1	n.u.	n.u.	n.u.	n.u.	
X6.1	n.u.	n.u.	n.u.	n.u.	

X1.2	n.u.	n.u.	IN3	n.u.	n.u.
X2.2	+EX3	-EX3	+SI3	-SI3	SH3
X3.2	+EX4	-EX4	+SI4	-SI4	SH4
X4.2	R3	n.u.	n.u.	+Ub	0V
X5.2	n.u.	n.u.	n.u.	n.u.	
X6.2	n.u.	n.u.	n.u.	n.u.	

X1.3	n.u.	n.u.	IN5	n.u.	n.u.
X2.3	+EX5	-EX5	+SI5	-SI5	SH5
X3.3	+EX6	-EX6	+SI6	-SI6	SH6
X4.3	R5	n.u.	n.u.	+Ub	0V
X5.3	n.u.	n.u.	n.u.	n.u.	
X6.3	n.u.	n.u.	n.u.	n.u.	

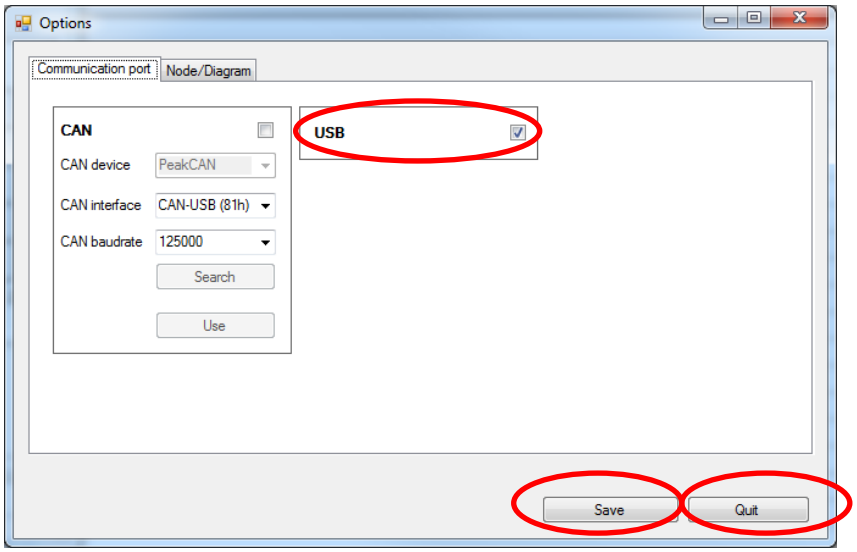
X1.4	n.u.	n.u.	IN7	n.u.	n.u.
X2.4	+EX7	-EX7	+SI7	-SI7	SH7
X3.4	+EX8	-EX8	+SI8	-SI8	SH8
X4.4	R7	n.u.	n.u.	+Ub	0V
X5.4	n.u.	n.u.	n.u.	n.u.	
X6.4	n.u.	n.u.	n.u.	n.u.	

Table 4 – Designation of the Type B connections

8. Setting/Adjustment DI1xxx

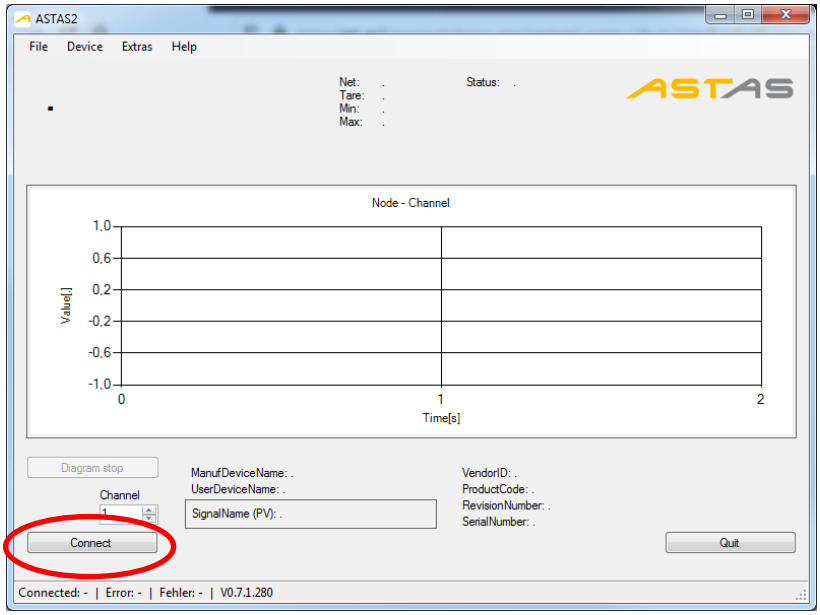
8.1. Connect to USB

Setting communication port:
Menü ⇒ Extras ⇒ Options ⇒ Check „USB“ ⇒ Button “Save“ ⇒ Button „Quit“



8.2. Connect to device

⇒ Button „Connect“.

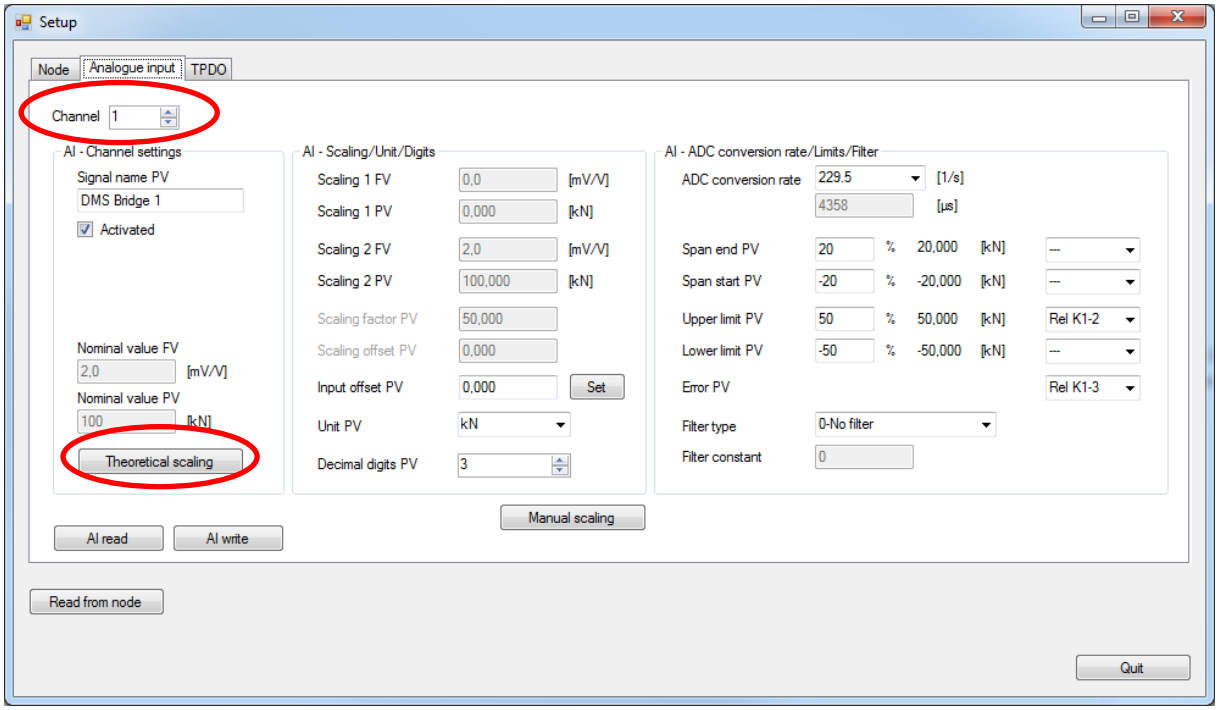


8.3. Settings/setup Device

Menü ⟹ Device ⟹ Setup ⟹ Tab „Analog Input“

8.3.1. Theoretical scaling

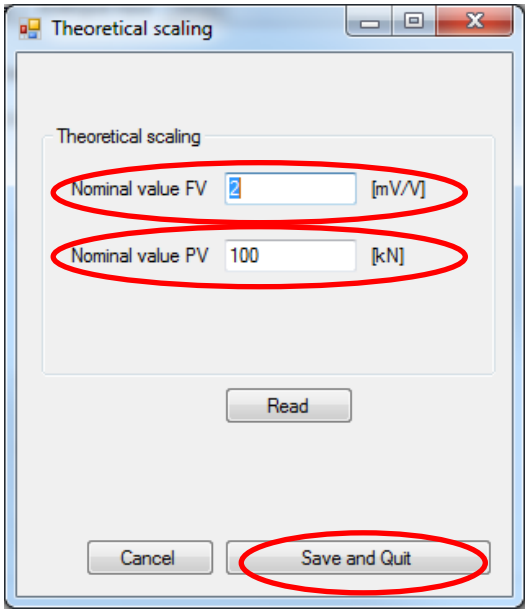
Use correct channel and then button „Theoretical scaling



8.3.2. Enter load cell nominal values

Sensitivity ⟹ Nominal value FV

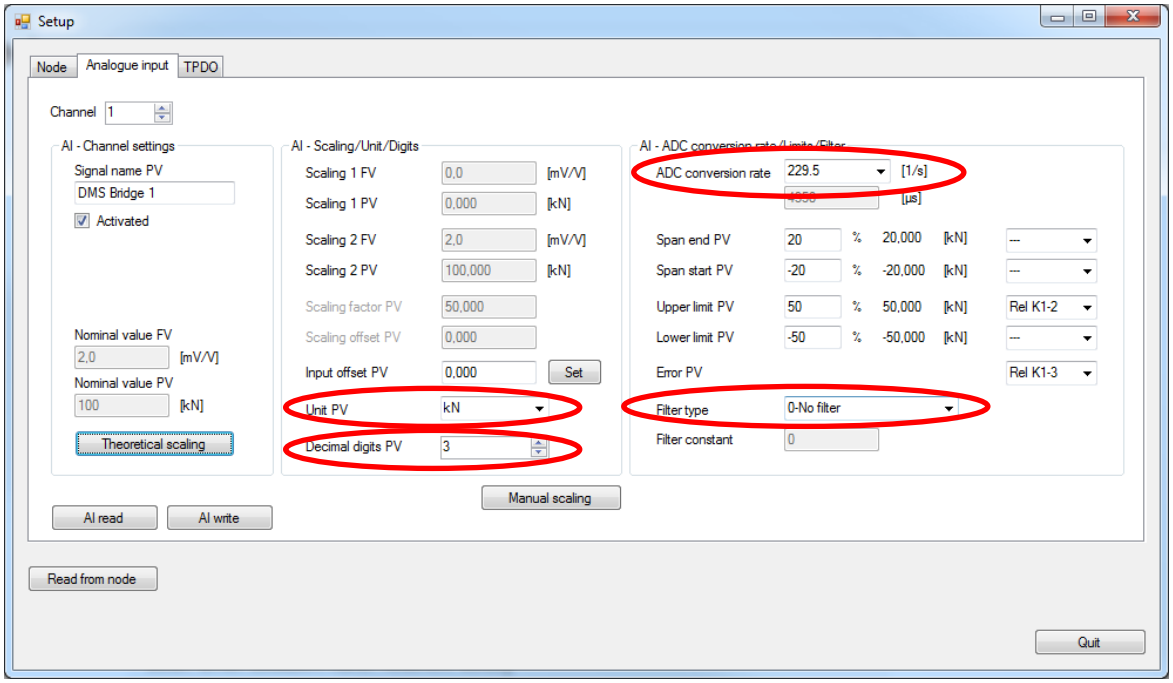
Rated characteristic value ⟹ Nominal value PV



⟹ Button „Save and Quit“

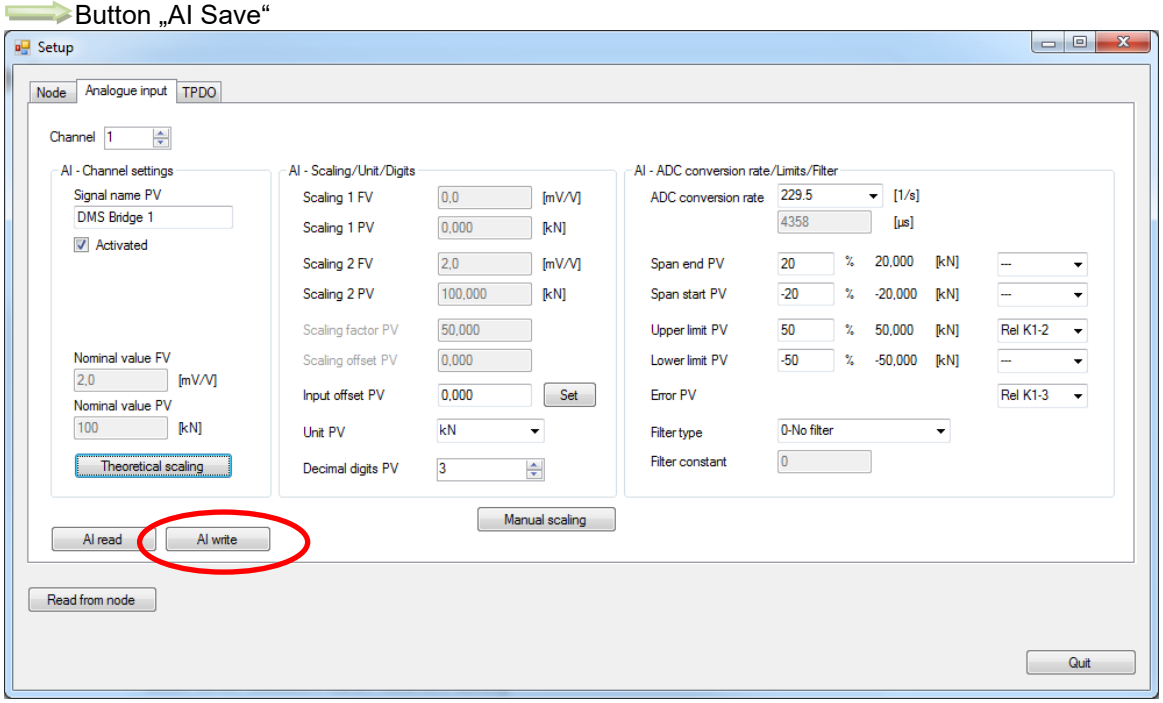
8.3.3. Enter additional settings

Unit ⟹ Unit PV
Decimal digits ⟹ Decimal digits PV (Standard: 3)
ADC conversion rate ⟹ ADC conversation rate (Standard: 229.5 1/s)
Filter ⟹ Filter type (Standard: 0-No Filter)



8.3.4. Save settings

⟹ Button „AI Save“



8.4. Settings additional measurement channels

Go to chapter 8.3.1 – For settings you must choose the right channel.

9. EC Declaration of Conformity

A.S.T. - Angewandte System Technik GmbH
Mess- und Regeltechnik

AST Gruppe
Angewandte System Technik

EU-Konformitätserklärung
EC Declaration of Conformity

No. 01/20

Hersteller: Manufacturer:	A.S.T. - Angewandte System Technik GmbH Mess- und Regeltechnik
Anschrift: Adress:	Marschnerstraße 26, 01307 Dresden Bundesrepublik Deutschland
Produktbezeichnung: Product description:	Digitales Interface DI 1000 Digital interface DI 1000

Das bezeichnete Produkt stimmt in der von uns in Verkehr gebrachten Ausführung mit den Vorschriften folgender Europäischer Richtlinien überein:
The product described above in the form as delivered is in conformity with the provisions of the following European Directives:

2014/30/EU Richtlinie des Rates zur Angleichung der Rechtsvorschriften der Mitgliedsstaaten über die elektromagnetische Verträglichkeit.
Council Directive on the approximation of the laws of the Member States relating to electromagnetic compatibility.

Die Konformität mit der Richtlinie 2014/30/EU wird nachgewiesen durch die Einhaltung folgender harmonisierter Normen:
Conformity to the Directive 2014/30/EU is assured through the application of the following harmonised standards:

Störfestigkeit: Interference resistance:	DIN EN 61000-6-2: 2006-03
Störaussendung: Emitted interference	DIN EN 61000-6-3: 2011-09 DIN EN 55022: 2011-12

Dresden, den 30.01.2020

i. A. Heinrich

gez. Dr.-Ing. Gerd Heinrich
Qualitätsmanagementbeauftragter

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