GB

Transducer transmitter

BILT 4

⟨Ex⟩ II 2(1) G

Technical Manual

BLH NOBEL
A VPG Brand

Contents

Caution, risk of danger. Documentation needs to be consulted.

Article number 110278
Cable diameter 5.0 – 12.0 mm

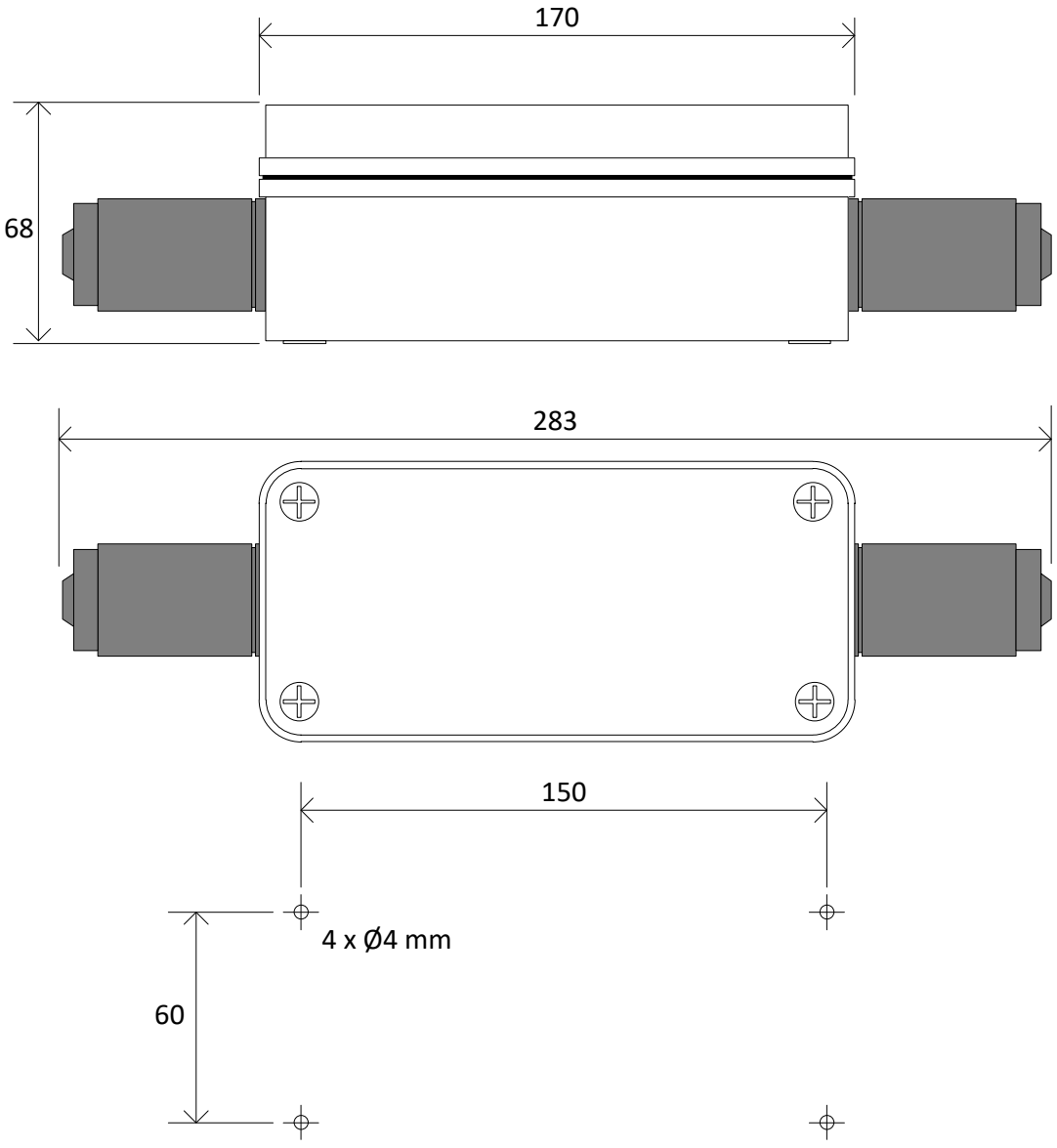


Figure 1. Enclosure dimensions for BILT 4.

Introduction

General

BILT 4 is a two-wire current loop transmitter, designed for industrial measuring by means of a strain gauge transducer. An external DC supply provides power to the transmitter and the transducer, and the current in the loop is proportional to the load on the transducer.

By a gain switch and potentiometers for gain and zero offset, a suitable measuring range for the transducer is easily set.
A switch is also provided for compensation of poor transducer linearity.

The electronic module is well protected in an internally shielded polycarbonate enclosure. Cable glands and a sealed lid give protection from dust and humidity and the enclosure is easily installed on any flat surface.

BILT 4 is approved as an intrinsically safe apparatus for use in explosive atmospheric gas mixture in zone 1 or zone 2, and for connection to a transducer approved for zone 0 to zone 2. The connection cable to safe area shall pass by appropriate barriers or isolators.
Read more in section 'Installation'.

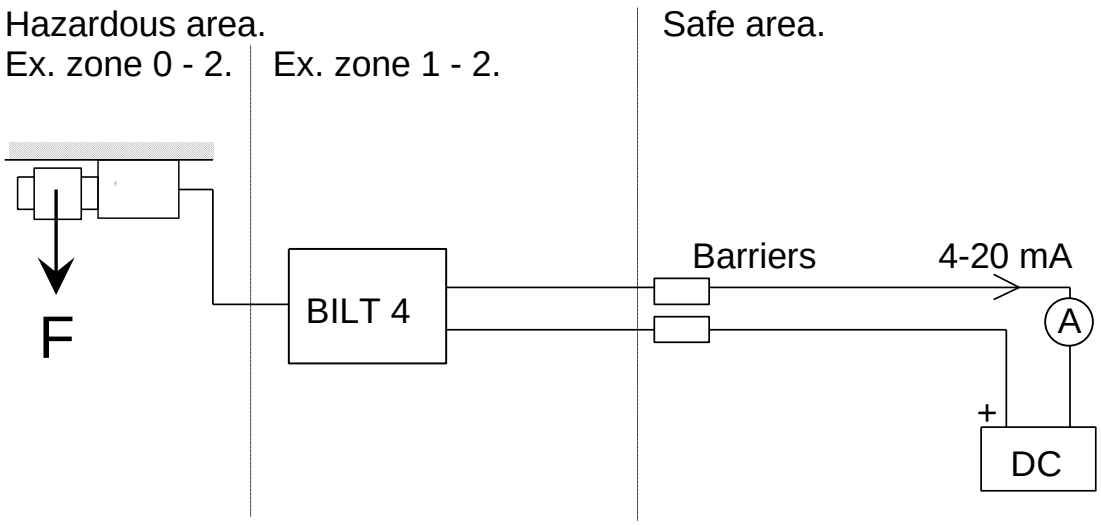


Figure 2. With BILT 4 and the transducer in a hazardous area, the cable to the instrumentation in the safe area must pass through protective barriers.

Ex. safety description

Ex type approval CENELEC

CE 1180 Ex II 2(1) G Ex ia IIC T4

SP 03ATEX3602	ATEX product certification by SP, Sweden. See Appendix 2.
1180	Production certification by Baseefa (2001), UK.
Ex II 2(1) G Ex ia IIC T4	Group II category 2 for use in zone 1 – 2 (connection to zone 0). Intrinsically-safe for explosion group IIA – IIC, temperature class T1 – T4.

The connection terminals J1-J2 (transducer input, power supply and analogue output) make up an intrinsically safe input with the following input data:

Safety parameters:	U_i:	30.0 V
	P_i:	1.2 W
	I_i:	200 mA
	C_i:	30.0 nF
	L_i:	10 µH
	T_{amb}:	-20 to +60 °C
Ambient pressure	0.8 to 1.1 bar	

WARNING for electrostatic charging of the enclosure. Only use a moist cloth, don't charge by rubbing with a dry cloth or by using solvents.

Technical data

Transducer input

Transducer	350 – 1000 ohms
Excitation	0.96 VDC
Signal input	0.4 – 3.8 mV/V
Zero adjustment	±0.58 mV/V with 350 ohm transducer

Power supply

Unregulated power supplies cannot be used.

Supply voltage	8 – 30 VDC
Consumption	4–20 mA

Analogue output

Current	4–20 mA		
Load, maximum	0 ohm	for supply voltage	8 VDC
loop resistance	100 ohms	-"-	10 VDC
	200 ohms	-"-	12 VDC
	500 ohms	-"-	18 VDC
	800 ohms	-"-	24 VDC
	1000 ohms	-"-	28 VDC

Non linearity	<0.1 % of range
Bandwidth	Approx. 500 Hz (-3 dB)

Environmental

Temperature range	-25 to +70 °C
in intrinsic safe circuit	-20 to +60 °C
CE conformity	Industrial process control, ATEX

Mechanical data

Protection	IP 67
Dimensions:	
Art. No. 110 278	280 x 80 x 68 mm incl. protection at cable glands
Cable diameter	5.0 – 12.0 mm

Calibration

Methods	Dead weight calibration, shunt calibration, calibration with transducer simulator

Installation

General

The enclosure for BILT 4 has an internal shield, connected to the compression cable glands, having internal spring contacts for cable shield connection. This gives a continuous shielding, and by external insulators on the cable glands connection to ground is prevented.

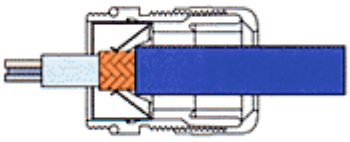
In the shielded enclosure, all electronic components are mounted on a circuit board, protected by a metal shield box. Switches and potentiometers can be reached through openings in the shield box lid.
On the circuit board screw terminals are provided for cable connection.

Installation in hazardous area *shall be performed in accordance with valid regulations and by trained personnel.* The cable gland insulators shall be fitted to prevent grounding of the cable shield and to give conformity with the certificate.
The system designer shall draw up a document, describing the installation.

Applicable standards for installation and maintenance in European countries associated to CENELEC are EN 60079-14 and EN 60079-17.

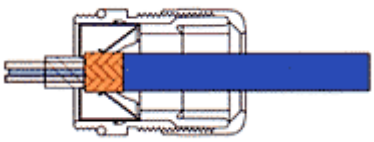
Mechanical installation

Mounting of the enclosure should be made by screws through openings in the lid screw cavities.
Shielded cables should be used and firmly fixed in the compression cable glands.
The cables should be routed so that electromagnetic interference from other cables is avoided.



Cable with inner sheath and braid shield:

1. Remove an adequate length of the outer cable sheath and the shield.
2. Cut through the outer sheath about 10 mm from the edge.
3. Push the cable through the gland.
4. Remove the cut length of cable sheath.
5. Pull the cable back until the springs in the gland connect to the shield.
6. Tighten the compression nut to secure the cable in the gland.



Cable with foil shield:

1. Remove an adequate length of the outer cable sheath.
2. Remove the foil shield, saving about 20 mm at the edge of the cable sheath.
3. Carefully fold back the foil shield over over the cable sheath.
4. Push the cable into the gland until the springs connect to the shield.
5. Tighten the compression nut to secure the cable in the gland.

Figure 4. Connection of the cable shield by contact springs in the cable gland.

Electrical installation

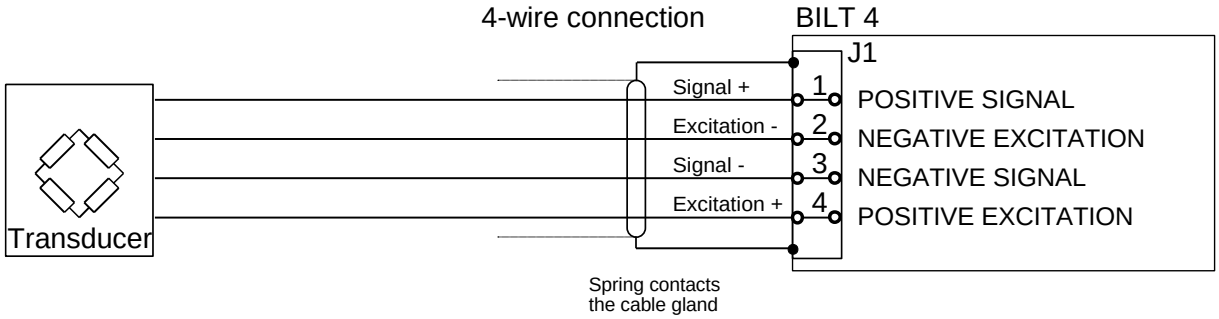
For connection of cable shields, spring contacts are provided in the cable glands. The outer sheath and the shield of the cable should be prepared, and the cable properly positioned to bring the shield in contact with these springs. See Figure 4.

All other electrical connections are made to screw terminals on the circuit board. Refer to markings on the electronic module and to the following diagrams.

Transducer input

Terminals 1 – 4.
Connection of transducers should be handled with great care to achieve good measuring data. 4-wire connection should be used and the cable delivered with the transducer should be connected directly to BILT 4. It is recommended not to shorten this cable.

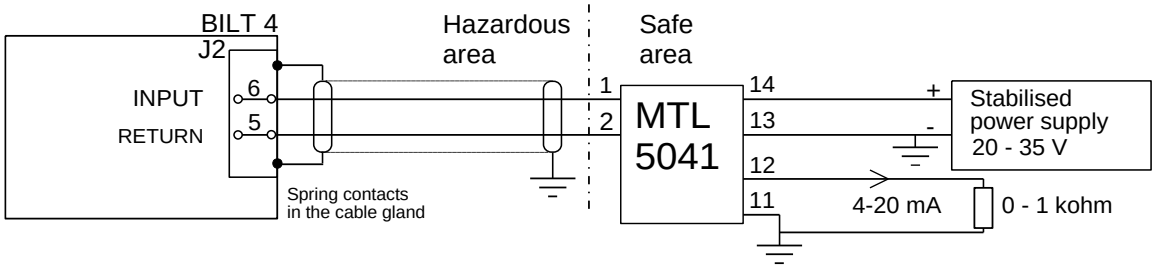
NOTE! Transducer cables must be routed at least 200 mm from power cables.



Power supply / analogue output

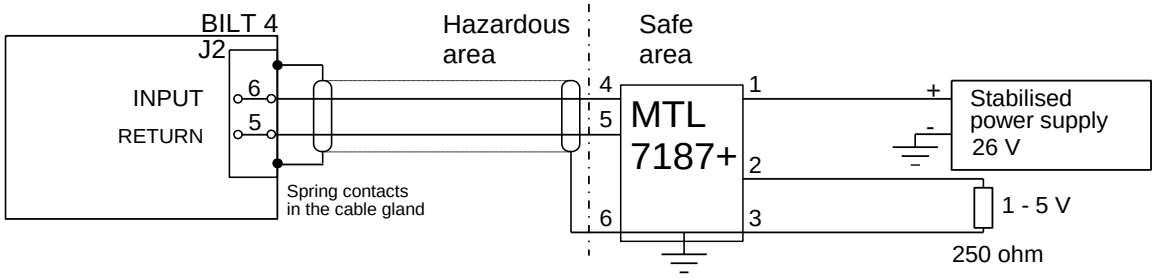
Terminals 5 and 6. (See next page.)
Supply voltage for BILT 4 may be from 8 to 30 VDC, depending on the current loop resistance. See Technical data.

The output signal is the current, 4–20 mA, drawn from the power supply connection to BILT 4. The current is proportional to the force in the measuring direction of the connected transducer.



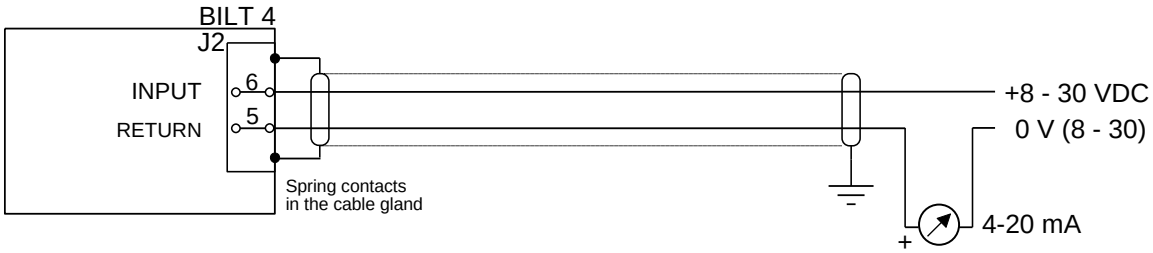
Examples of installation in hazardous area:

BILT 4 used in a hazardous area, connected to power supply and measurement instrument via an isolating IS unit. The cable shield is connected to ground at the IS unit or at another suitable point.



BILT 4 used in a hazardous area, connected to power supply and measurement instrument via a diode safety barrier. The cable shield must be connected to ground only at the diode barrier.

Installation in non-hazardous area:



BILT 4 used in a non-hazardous area, connected to power supply and measurement instrument by current loop in a shielded cable.

Calibration

General

In BILT 4, the transducer signal controls the module's current consumption to a value, corresponding to the force on the transducer. For BILT 4 the output signal range is 4–20 mA. The corresponding forces are defined by the application.
A suitable transducer for the actual force range and the overload that may occur should be chosen. A data sheet for the transducer with sensitivity and shunt calibration data may be necessary for calibration of the application.

Rotary switches and trim potentiometers are used to set gain and zero offset for the output current and compensation for transducer non-linearity. If the transducer non-linearity, according to the data sheet, is over 0.4 % it can be compensated for in BILT 4, following separate instructions.

NOTE! During calibration the switch 'LIN' should be set in its centre position, the arrow pointing at the word LIN.

Three calibration methods can be used for BILT 4:
Dead weight calibration, Shunt calibration and Calibration with transducer simulator.
The two last methods use data sheet values, assuming ideal installation conditions.
Dead weight calibration compensates for effects from intended actions and non-intended errors from the transducer installation.
Knowledge about possible errors by transducer installation, and methods to avoid them, is essential to obtain correct measured values during operation after the calibration.

To simplify the gain setting, it is wise to start by setting the switch 'GAIN' in a position, calculated from the data sheet values.

Example: (Values from this example will also be used in following examples.)

Transducer range:	5000 N
Force at 4 mA:	120 N
Force at 20 mA:	2800 N

The force range is 2680 N for output signals from 4 to 20 mA, i.e. 16 mA. According to the data sheet the output signal for 5000 N is 2.044 mV/V. This gives 2.044 · 2680 / 5000 = 1.096 mV/V for the force range. Select the highest 'GAIN' switch setting that includes the calculated output signal range, see illustration on next page. In this case set 'GAIN' to 1.02 - 1.41, (the arrow pointing at LOW).

DATA AND CALIBRATION SHEET ArtNo:1130480

LOAD CELL KIS-3 S/N 322471

RATED LOAD (R.L)	10	kN	!	EXCITATION VOLTAGE, RECOMMENDED	10 V AC OR DC
			!	EXCITATION VOLTAGE, MAXIMUM	18 V AC OR DC
OVERLOAD, SAFE	100	% R.L.	!		
OVERLOAD, ULTIMATE	200	% R.L.	!	INPUT RESISTANCE 350 +/- 3 OHMS INCL. STANDARD CABLE	
			!	OUTPUT RESISTANCE 350.1 OHMS INCL. STANDARD CABLE	
SIDE LOAD, SAFE	100	% R.L.	!		
SIDE LOAD, ULTIMATE	200	% R.L.	!	TEMPERATURE RANGE -40 TO +80 DEGREES C	
ELECTRICAL CONNECTION SHIELDED 4-CONDUCTOR CABLE			!	TEMPERATURE EFFECT (-10 TO +50 DEGREES C)	
EXCITATION POSITIVE: RED			!		
EXCITATION NEGATIVE: BLACK			!	ON OUTPUT 0.001 % OF OUTPUT PER DEG. C	
SIGNAL POSITIVE: GREEN			!		
SIGNAL NEGATIVE: WHITE			!	ON ZERO BALANCE 0.001 % OF R.O. PER DEG. C	

RATED OUTPUT (R.O.) (TOLERANCE 0.1 %)		2.0394 mV/V
NONLINEARITY (BEST FIT THROUGH ZERO)	+/-	0.010 % R.O.
ZERO BALANCE		+0.0 % R.O.
CREEP 5 MINUTES		+0.001 % R.O.

CALIBRATION VALUES (TOLERANCE 0.1 %)SHUNT RESISTOR CONNECTED BETWEEN 'EXCITATION NEGATIVE 'AND 'SIGNAL NEGATIVE'
40 KOHMS CORRESPOND TO 9.9111 kN
80 KOHMS CORRESPOND TO 4.9683 kN
THE VALUES INDICATED FOR OUTPUT VOLTAGE AND CALIBRATION VALUES ARE APPLICABLE AT OPEN CIRCUIT WITHOUT EXTERNAL BALANCING RESISTORS AND WITH A CONNECTING CABLE OF STANDARD LENGTH.

Vishay Nobel AB
S-691 27 KARLSKOGA

KARLSKOGA 03-04-30

Figure 3. Each transducer from Nobel Weighing Systems is delivered with a detailed data and calibration sheet.

Dead weight calibration

By dead weight calibration known weights are used, together with the gravitation, to generate known forces on the transducer. Normally only one weight is needed for the calibration. This weight ought to correspond to the difference between the high and the low limit of the force range, but it could also have a smaller value.

Zero setting does not affect the gain, so it can be performed after the calibration. For example, removal of equipment for handling of the calibration weight makes a new zero setting necessary.

Before the calibration, the desired output signal for the calibration weight should be calculated.

Example:

A weight of 200 kg is available for the calibration. If the gravitation is 9.82 m/s², the desired current value is $4 + 16 \cdot 200 \cdot 9.82 / 2680 = 15.73$ mA.

Adjustment

With no weight on the transducer, set the output signal to 4 mA by potentiometer ‘ZERO’.

Then load the calibration weight on the transducer and set the output signal to the calculated value by potentiometer ‘GAIN’.
(‘ZERO’ and ‘GAIN’ are 20-turn trim potentiometers without mechanical end stop.)

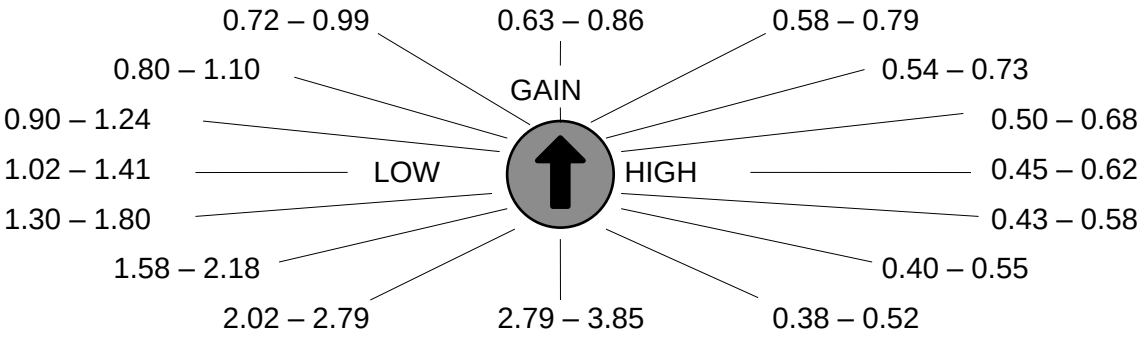
If the calculated value cannot be obtained, change the setting of the switch ‘GAIN’ and repeat the whole adjustment.

After this adjustment, the potentiometer ‘ZERO’ can be used to offset the output range.

Example:

120 N on the transducer should give 4 mA, but after the adjustment above 0 N will give 4 mA, so an output range offset is necessary.
120 N corresponds to $16 \cdot 120 / 2680 = 0.72$ mA, so load the transducer to get the output current just above 4.72 mA. Read the output and then adjust it down by potentiometer ‘ZERO’ to a value that is 0.72 mA lower.
Remove the load from the transducer.

Input signal ranges in mV/V for the GAIN switch



Shunt calibration

Connection of a resistor across the connections for negative excitation and negative transducer signal will result in a transducer signal change. The data sheet for a transducer from Vishay Nobel specifies the forces, expressed in Newton, that will give the same signal changes as connection of certain shunt resistors (40 kohm, 80 kohm, etc.). If one of these given force values is smaller than the desired force range for 4–20 mA, (2680 N in our example) it can be used for the calibration.
In other cases a different resistor value can be used, calculated by a separate instruction.
The accuracy of the shunt resistor affects the accuracy of this calibration method.

Adjustment

Set the output signal to 4 mA by potentiometer ‘ZERO’.

Then connect the shunt resistor across the connections ‘NEGATIVE EXCITATION’ and ‘NEGATIVE SIGNAL’ in BILT 4.

Set the output signal by potentiometer ‘GAIN’ to a value that corresponds to the shunt calibration force, given in the data sheet for the connected resistor.

Remove the resistor from BILT 4.

If the desired value cannot be obtained, repeat the adjustment with a different setting of the switch ‘GAIN’.

Example:

The shunt calibration value for 80 kohm is 2490 N, according to the data sheet.
Desired output signal for the adjustment will be $4 + 16 \cdot 2490 / 2680 = 18.87$ mA.

After this adjustment, potentiometer ‘ZERO’ can be used to offset the output range.

Example:

120 N on the transducer should give 4 mA. After the adjustment above 0 N will give 4 mA, so an output range offset is necessary.
120 N corresponds to $16 \cdot 120 / 2680 = 0.72$ mA. Connect a resistor across the connections ‘NEGATIVE EXCITATION’ and ‘NEGATIVE SIGNAL’ in BILT 4, or load the transducer, to get an output signal just over 4.72 mA.
Read the output signal and then adjust it down by potentiometer ‘ZERO’ to a value that is 0.72 mA lower.
Remove the resistor or the load.

Calibration with transducer simulator

This calibration requires the transducer data sheet and a transducer simulator, having the same impedance as the transducer, that can be set to at least two known values (or two simulators with fixed known values). The simulator values should be converted to Newton and one of the values ought to be 0.
The simulator(s) should replace the transducer during the calibration.

Adjustment

With the simulator output signal set to 0, set the output signal from BILT 4 to 4 mA by potentiometer ‘ZERO’.
Then change the simulator output (or connect another simulator) and set the output signal from BILT 4 to the desired value by potentiometer ‘GAIN’.
If the desired value cannot be obtained, change the setting of switch ‘GAIN’ and repeat the adjustment.

Example:

The transducer simulator signals 0 and 1 mV/V can be obtained.
1 mV/V corresponds to 5000 · 1 / 2.044 = 2446 N, which is less than the force range, 2680 N.
Desired output signal value for 1 mV/V will be: 4 + 16 · 2446 / 2680 = 18.60 mA.

After this adjustment, potentiometer ‘ZERO’ can be used to offset the force range. This must be done with the transducer connected to BILT 4 so that transducer unbalance is compensated.
See the examples after dead weight calibration and shunt calibration.

Operation

Power supply

The transducer amplifier is powered by DC voltage from an external supply and should not be turned off during weekends and over-night. Continuous power supply to electronics and transducer prevents moisture condensation in the units.

As DC power is connected to BILT 4 the current consumption will correspond to the actual load on the measuring equipment.

Output signal

The output signal can reach values between 3 – 3.5 mA and 25 – 30 mA. For values between 3.8 mA and 21 mA a the relationship between force and output signal is normal, but for values outside this range no conclusions can be drawn about the size of overload or underload.

Service

The transducer transmitter contains no user replaceable parts and, to comply with the certification, all repairs must be done by the manufacturer or an approved repairer.

Manufacturer: Vishay Nobel AB
Skrantahöjdsvägen 40
Karlskoga
SWEDEN

Declaration of Conformity

We Vishay Nobel AB
Box 423, S-691 27 KARLSKOGA
SWEDEN

declare under our sole responsibility that the products

Transducer Transmitter BILT 4
from serial nr. 2014-0001

to which this declaration relates is in conformity with the following standards or other normative documents

The essential requirements in the EMC Directive 2004/108/EC.

EN 61326-1:2013

The essential requirements in the ATEX Directive 94/9/EC with later amendments

EN 60079-0: 2012
EN 60079-11: 2012
Group II Category 2(1) G, Ex ia IIC T4

EC – Type examination Certificate: SP 03ATEX3602
Latest supplement: SP 03ATEX3602/2
Notified body for EC type Examination: SP 0402 Borås Sweden
Notified Body for production: Baseefa 1180 Buxton UK

The product is supplied by Ui = 30 V and is therefore not covered by the requirements in the Low Voltage Directive 2006/95/EC.

On behalf of the above named company, I declare that, on the date the equipment accompanied by this declaration is placed on the market, the equipment conforms with all technical and regulatory requirements of the above listed directives.

KARLSKOGA, 30th of January 2014

Lars Nilsson, Managing Director

Publication 200466R0
Vishay Nobel AB

Spec.:200439R1

CERTIFIKAT

Supplement No. 2

to

EC-TYPE EXAMINATION CERTIFICATE

Equipment or Protective systems or Components intended for use in Potentially Explosive Atmospheres
Directive 94/9/EC

Certificate Number:

SP03ATEX3602

Certificate SP03ATEX3602 of 3.6.2003 including Supplement No. 1 has been updated to cover the following standards:

– EN 60079-0:2009 (SS-EN 60079-0 ed 3)
– EN 60079-11:2007 (SS-EN 60079-11 ed 1)

– EN 60079-0:2012 (SS-EN 60079-0 ed 4)
– EN 60079-11:2012 (SS-EN 60079-11 ed 2)

Code: **II 2 (1) G Ex ia IIC T4**

Category "2 (1)" in the code indicates that the amplifier (transmitter) is category 2 (for location in zone 1) and the intrinsically safe input (two cable connections) are category 1 (for connection to zone 0 circuits).

Applicant (manufacturer): Vishay Nobel AB

Report No.

PX01986:C

Drawings and documents

Description	Number	Issue	Date	Pages
Specification (PG 13,5)	110278	Rev. 3	120229	3 pages
Specification kretskort	110153	Rev. 0	010615	19 pages
BILT 4 assembly (PG 13,5)	400560	Rev. 2	030729	1 page
PC-board	500458	Rev. 0	000616	1 page
Circuit diagram	500610	Rev. 2	010806	1 page
PC assembly	500662	Rev. 0	000616	1 page
Beröringsskydd för PG13,5...	500664	Rev. 1	070206	1 page
Låda, PG 13,5	500666	Rev. 1	110406	1 page
Jordplåt… PG 13,5	500740	Rev. 0	001128	1 page
Skylt	500743	Rev. 2	120229	1 page
Montageskena	600418	Rev. 0	000619	1 page
Etikett… PG 13,5	600680	Rev. 1	030729	1 page
Technical Manual	600679	Rev. 3	120924	26 pages

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Appendix 2.

CERTIFIKAT

Borås 21th March 2013

SP Technical Research Institute of Sweden
Certification

Lennart Månsson
Certification Manager

Robert Carlsson
Certification Officer

SP ref.: 247404

SP Technical Research Institute of Sweden

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Appendix 2.

CERTIFIKAT

Supplement No. 1

to

EC-TYPE EXAMINATION CERTIFICATE

Equipment or Protective systems or Components intended for use in Potentially Explosive Atmospheres
Directive 94/9/EC

Certificate Number:

SP03ATEX3602

Certificate SP03ATEX3602 of 3.6.2003 has been extended to apply also to a variant of the Transducer Amplifier type BILT 4 as specified below.

The specifications below apply for the equipment and replaces corresponding specifications according to the certificate. In other respects the specifications stated in the certificate apply.

The differences concern minor modifications of the enclosure, circuit diagram, marking and technical manual. Location shoulders on the cover have been removed to allow mounting of the cover in two possible directions on the enclosure.

Applicant (manufacturer): Vishay Nobel AB

Report No.

PX01986:B

Drawings and documents

Description	Number	Issue	Date	Pages
Specification (PG 21)	110277	Rev. 0	030430	2 pages
Specification (PG 13,5)	110278	Rev. 1	100302	3 pages
Specification kretskort	110153	Rev. 0	010615	19 pages
BILT 4 assembly (PG 21)	400559	Rev. 2	030729	1 page
BILT 4 assembly (PG 13,5)	400560	Rev. 2	030729	1 page
PC-board	500458	Rev. 0	000616	1 page
Circuit diagram	500610	Rev. 2	010806	1 page
PC assembly	500662	Rev. 0	000616	1 page
Beröringsskydd för PG21...	500663	Rev. 0	000620	1 page
Beröringsskydd för PG13,5...	500664	Rev. 1	070206	1 page
Låda, PG 21	500665	Rev. 0	000620	1 page
Låda, PG 13,5	500666	Rev. 1	110406	1 page
Jordplåt… PG 13,5	500740	Rev. 0	001128	1 page
Jordplåt… PG 21	500741	Rev. 0	001128	1 page
Skylt	500743	Rev. 1	110321	1 page
Montageskena	600418	Rev. 0	000619	1 page

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Appendix 2.

Etikett… PG 13,5	600680	Rev. 1	030729	1 page
Etikett… PG 21	600681	Rev. 1	030729	1 page
Technical Manual	600679	Rev. 2	110822	22 pages

Note: One set of the drawings and documents above, submitted to the holder of this certificate, may contain or may be accompanied with comments by SP which shall be considered by the holder.

Borås 11th October 2011

SP Technical Research Institute of Sweden
Certification

Lennart Månsson
Certification Manager

Robert Carlsson
Certification Officer

SP ref.: 247404

SP Technical Research Institute of Sweden

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Appendix 2.

CERTIFICATE

Certificate issued by a Notified Body

SP 03ATEX3602
(24 74 04)

[1] EC-TYPE EXAMINATION CERTIFICATE

[2] **Equipment or Protective System intended for use in Potentially Explosive Atmospheres Directive 94/9/EC**

[3] EC-Type Examination Certificate Number: **SP 03ATEX3602**

[4] Equipment or Protective System: Transducer Amplifier type BILT 4

[5] Applicant (manufacturer): Vishay Nobel AB, Karlskoga, Sweden

[6] Address: Skrantahöjdsvägen 40, Karlskoga, Sverige

[7] This equipment or protective system and any acceptable variation thereto is specified in the schedule to this certificate and the documents therein referred to.

[8] SP, Notified Body No. 0402 in accordance with Article 9 of the Council Directive 94/9/EC of 23 March 1994, certifies that this equipment or protective system has been found to comply with the Essential Health and Safety Requirements relating to the design and construction of equipment and protective systems intended for use in potentially explosive atmospheres, given in Annex II to the Directive.

The examination and test results are recorded in a confidential report No. P301826:A.

[9] Compliance with the Essential Health and Safety Requirements has been assured by compliance with:

- EN 50014:1997 + A1…A2 (SS-EN 50014 ed. 4 + A1…A2)
- EN 50020:2002 (SS-EN 50020 ed. 5)

[10] If the sign "X" is placed after the certificate number, it indicates that the equipment or protective system is subject to special conditions for safe use specified in the schedule to this certificate.

[11] This EC Type examination certificate relates only to the design, examination and tests of the specified equipment or protective system in accordance to the Directive 94/9/EC. Further requirements of the Directive apply to the manufacturing process and supply of this equipment or protective system. These are not covered by this certificate.

[12] The marking of the equipment or protective system shall include the following

Ex II 2(1) G EEx ia IIC T4

Borås 3 June 2003

SP Swedish National Testing and Research Institute
Certification

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Appendix 2.

CERTIFICATE
SP 03ATEX3602, dated 03.06.2003

Signed on behalf of SP, 03.06.2003:

[13] **Schedule**

[14] **EC-TYPE EXAMINATION CERTIFICATE No. SP 03ATEX3602**

[15] **Description of equipment**

The transducer amplifier has two cable entries for permanent connection to a transducer and an associated apparatus. The corresponding cable terminals forms an intrinsically-safe input with input data as specified below.

The amplifier is cased in a plastic enclosure for permanent mount. The amplifier is available in two versions with different diameter for the cable entries (art.no. 110277 for PG21 and 110278 for PG13,5). The enclosure has a conductive coating inside for screening. The screens of the connected cables are connected to the conductive coating via the cable entries. An internal sheet metal rail provides an infallible connection between the cable entries for the connected cable screens. The intrinsically safe circuit of the amplifier is electrically insulated from the enclosure.

Data for the two terminals (J1 and J2) forming an intrinsically-safe input:

Maximum input voltage (U_i):	30,0 V
Maximum input current (I_i):	200 mA
Maximum input power (P_i):	1,2 W
Internal capacitance (C_i):	30,0 nF
Internal inductance (L_i):	10 µH

Ambient temperature (T_{amb}): -20 °C to +60 C°

[16] **Report No.**

P301826:A

[17] **Special conditions for safe use**

None

[18] **Essential health and safety requirements**

Additional requirements not applicable.

[19] **Drawings and documents**

According to the specification P301826:B.

SP 611

Appendix 2.

Document no. 35174
Article no. 600 679 R3