



Documentation

Control Drawing ELX

Connection diagrams, Ex markings and technical data for explosion protection

Version: 1.0.0
Date: 2019-09-18

BECKHOFF

Table of contents

1 Foreword	5
1.1 Notes on the documentation.....	5
1.2 Safety instructions	6
1.3 Documentation issue status	7
2 Connection diagrams	8
2.1 Terminals with digital inputs	8
2.1.1 ELX1052	8
2.1.2 ELX1054	9
2.2 Terminals with digital outputs	10
2.2.1 ELX2002	10
2.3 Terminals with analog inputs	11
2.3.1 ELX3152	11
2.3.2 ELX3181	13
2.3.3 ELX3202	14
2.3.4 ELX3204	17
2.3.5 ELX3312	18
2.3.6 ELX3314	19
2.3.7 ELX3351	20
2.4 Terminals with analog outputs.....	22
2.4.1 ELX4181	22
2.5 Terminals for position measurement	23
2.5.1 ELX5151	23
3 Ex markings	24
4 Technical data for explosion protection	27
5 Appendix	28
5.1 EtherCAT AL Status Codes	28
5.2 Specific condition of use	28
5.3 Support and Service	29

1 Foreword

1.1 Notes on the documentation

Intended audience

This description is only intended for the use of trained specialists in control and automation engineering who are familiar with the applicable national standards.

It is essential that the documentation and the following notes and explanations are followed when installing and commissioning these components.

It is the duty of the technical personnel to use the documentation published at the respective time of each installation and commissioning.

The responsible staff must ensure that the application or use of the products described satisfy all the requirements for safety, including all the relevant laws, regulations, guidelines and standards.

Disclaimer

The documentation has been prepared with care. The products described are, however, constantly under development.

We reserve the right to revise and change the documentation at any time and without prior announcement.

No claims for the modification of products that have already been supplied may be made on the basis of the data, diagrams and descriptions in this documentation.

Trademarks

Beckhoff®, TwinCAT®, EtherCAT®, EtherCAT G®, EtherCAT G10®, EtherCAT P®, Safety over EtherCAT®, TwinSAFE®, XFC®, XTS® and XPlanar® are registered trademarks of and licensed by Beckhoff Automation GmbH. Other designations used in this publication may be trademarks whose use by third parties for their own purposes could violate the rights of the owners.

Patent Pending

The EtherCAT Technology is covered, including but not limited to the following patent applications and patents: EP1590927, EP1789857, EP1456722, EP2137893, DE102015105702 with corresponding applications or registrations in various other countries.

The logo for EtherCAT, featuring the word "EtherCAT" in a bold, black, sans-serif font. A red arrow points from the top of the "A" towards the right, ending above the "T". A registered trademark symbol (®) is located to the right of the "T".

EtherCAT® is registered trademark and patented technology, licensed by Beckhoff Automation GmbH, Germany.

Copyright

© Beckhoff Automation GmbH & Co. KG, Germany.

The reproduction, distribution and utilization of this document as well as the communication of its contents to others without express authorization are prohibited.

Offenders will be held liable for the payment of damages. All rights reserved in the event of the grant of a patent, utility model or design.

1.2 Safety instructions

Safety regulations

Please note the following safety instructions and explanations!
Product-specific safety instructions can be found on following pages or in the areas mounting, wiring, commissioning etc.

Exclusion of liability

All the components are supplied in particular hardware and software configurations appropriate for the application. Modifications to hardware or software configurations other than those described in the documentation are not permitted, and nullify the liability of Beckhoff Automation GmbH & Co. KG.

Personnel qualification

This description is only intended for trained specialists in control, automation and drive engineering who are familiar with the applicable national standards.

Description of instructions

In this documentation the following instructions are used.
These instructions must be read carefully and followed without fail!

DANGER

Serious risk of injury! / Risque accru de blessures !

Failure to follow this safety instruction directly endangers the life and health of persons.

Si cette consigne de sécurité n'est pas respectée, il existe une situation de danger imminent pouvant porter atteinte à la vie et à la santé des personnes !

WARNING

Risk of injury! / Risque de blessures !

Failure to follow this safety instruction endangers the life and health of persons.

Si cette consigne de sécurité n'est pas respectée, il existe une situation de danger pouvant porter atteinte à la vie et à la santé des personnes !

CAUTION

Personal injuries! / Risque de dommages corporels !

Failure to follow this safety instruction can lead to injuries to persons.

Si cette consigne de sécurité n'est pas respectée, il y a un risque de dommages corporels pour les personnes !

NOTE

Damage to environment/equipment or data loss / Dommages pour l'environnement/les appareils ou perte de données

Failure to follow this instruction can lead to environmental damage, equipment damage or data loss.

Si cette consigne de sécurité n'est pas respectée, il y a un risque de dommages pour l'environnement, de dommages pour les appareils ou de perte de données.

Tip or pointer / Conseil ou indication



This symbol indicates information that contributes to better understanding.

Ce pictogramme attire l'attention sur des informations qui permettent une meilleure compréhension.

1.3 Documentation issue status

Version	Comment
1.0.0	<ul style="list-style-type: none">• First release
0.4	<ul style="list-style-type: none">• Chapter <i>Ex marking</i> added
0.3	<ul style="list-style-type: none">• Chapter <i>Specific condition of use</i> added• Technical data for explosion protection extended
0.2	<ul style="list-style-type: none">• Technical data for explosion protection corrected
0.1	<ul style="list-style-type: none">• First preliminary version

2 Connection diagramms

2.1 Terminals with digital inputs

2.1.1 ELX1052

Two-channel digital input terminals for NAMUR sensors, Ex i

non-hazardous location or classified hazardous location Class I, Div. 2, Group... or Zone 2, Group IIC	non-hazardous location or classified hazardous location Class I, Div. 1, Group... Class II, Div. 1, Group... or Zone 0, 20, 1, 21, 2, 22 Groups I, IIC, IIIC
---	---

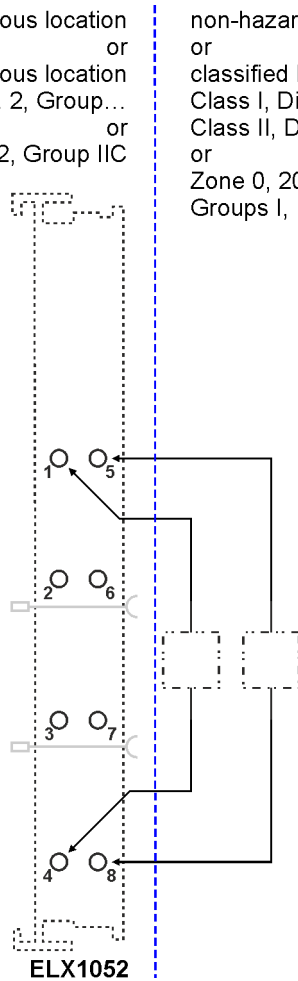


Fig. 1: ELX1052 - Sensor connection

2.1.2 ELX1054

Four-channel digital input terminals for NAMUR sensors, Ex i

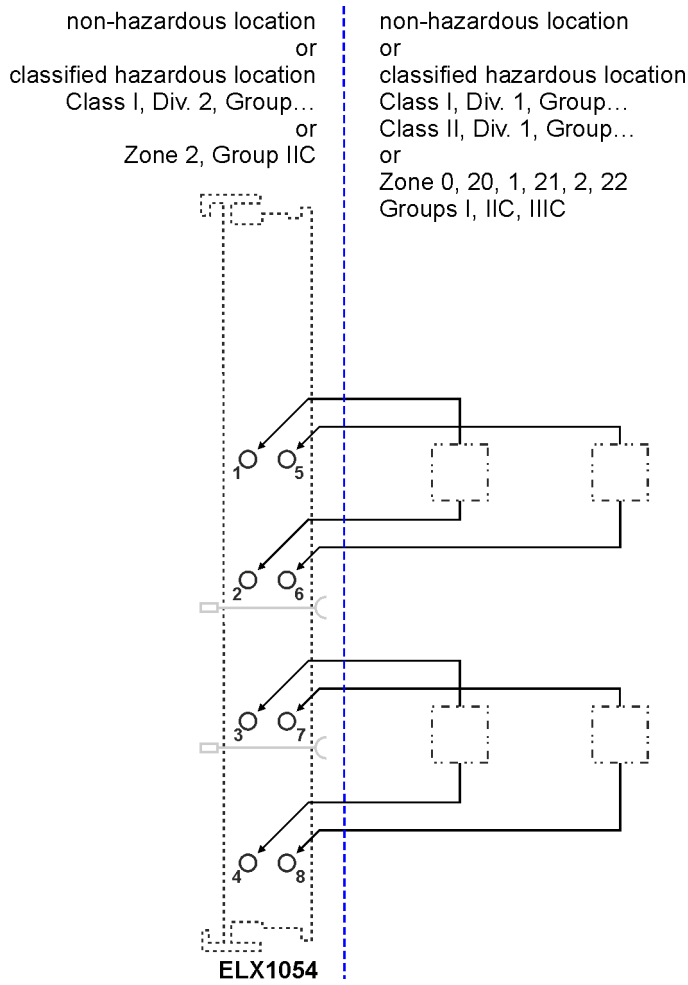


Fig. 2: ELX1054 - Sensor connection

2.2 Terminals with digital outputs

2.2.1 ELX2002

Two channel, digital output terminal, 24 V_{DC}, 40 mA, Ex i

non-hazardous location or classified hazardous location Class I, Div. 2, Group... or Zone 2, Group IIC	non-hazardous location or classified hazardous location Class I, Div. 1, Group... Class II, Div. 1, Group... or Zone 0, 20, 1, 21, 2, 22 Groups I, IIC, IIIC
---	---

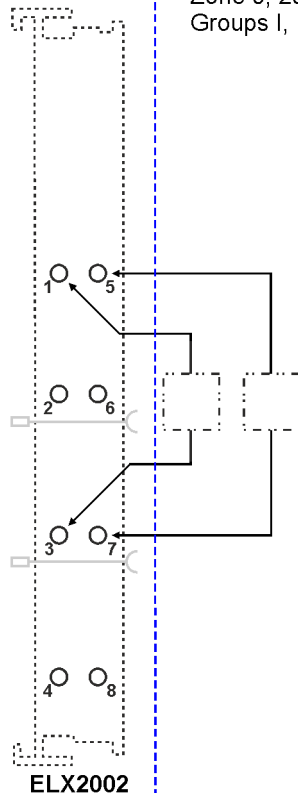


Fig. 3: ELX2002 - Actuator connection

2.3 Terminals with analog inputs

2.3.1 ELX3152

Two channel, analog, output terminal, 0/4...20 mA, single-ended, 16 Bit, Ex i

2-wire

non-hazardous location or classified hazardous location Class I, Div. 2, Group... or Zone 2, Group IIC	non-hazardous location or classified hazardous location Class I, Div. 1, Group... Class II, Div. 1, Group... or Zone 0, 20, 1, 21, 2, 22 Groups I, IIC, IIIC
---	---

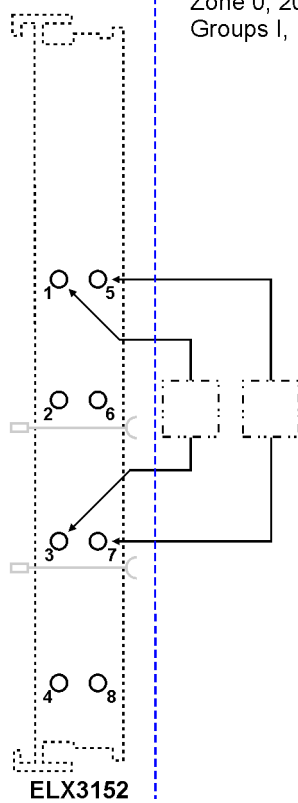


Fig. 4: ELX3152 - Sensor connection (2-wire)

4-wire

non-hazardous location or classified hazardous location Class I, Div. 2, Group... or Zone 2, Group IIC	non-hazardous location or classified hazardous location Class I, Div. 1, Group... Class II, Div. 1, Group... or Zone 0, 20, 1, 21, 2, 22 Groups I, IIC, IIIC
---	---

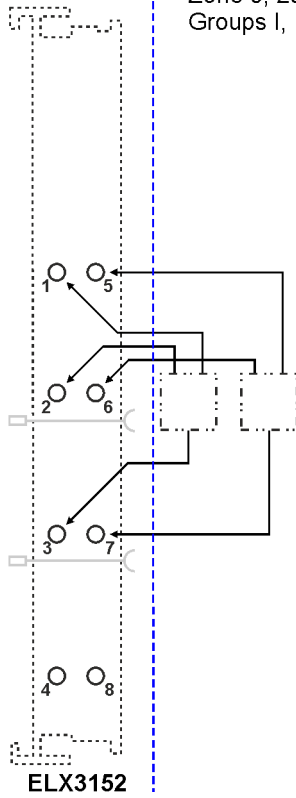


Fig. 5: ELX3152 - Sensor connection (4-wire)

2.3.2 ELX3181

One-channel analog input terminal 4...20 mA, single-ended, 16 bit, HART, Ex i

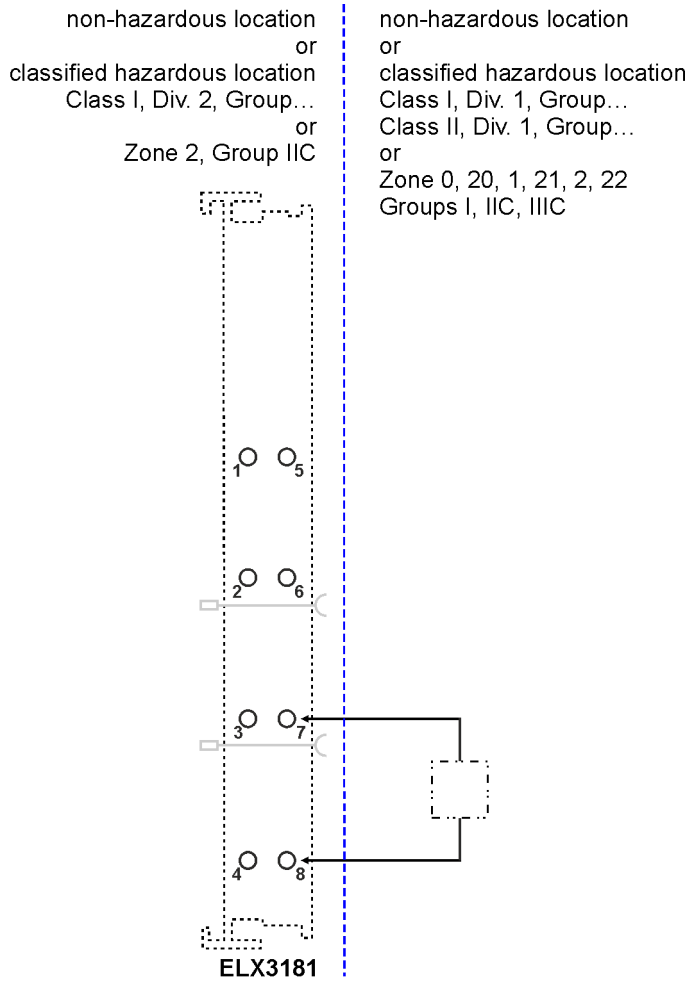


Fig. 6: ELX3181 - Sensor connection

2.3.3 ELX3202

Two-channel analog input terminal, RTD, 16 bit, Ex i

2-wire

non-hazardous location or classified hazardous location Class I, Div. 2, Group... or Zone 2, Group IIC	non-hazardous location or classified hazardous location Class I, Div. 1, Group... Class II, Div. 1, Group... or Zone 0, 20, 1, 21, 2, 22 Groups I, IIC, IIIC
---	---

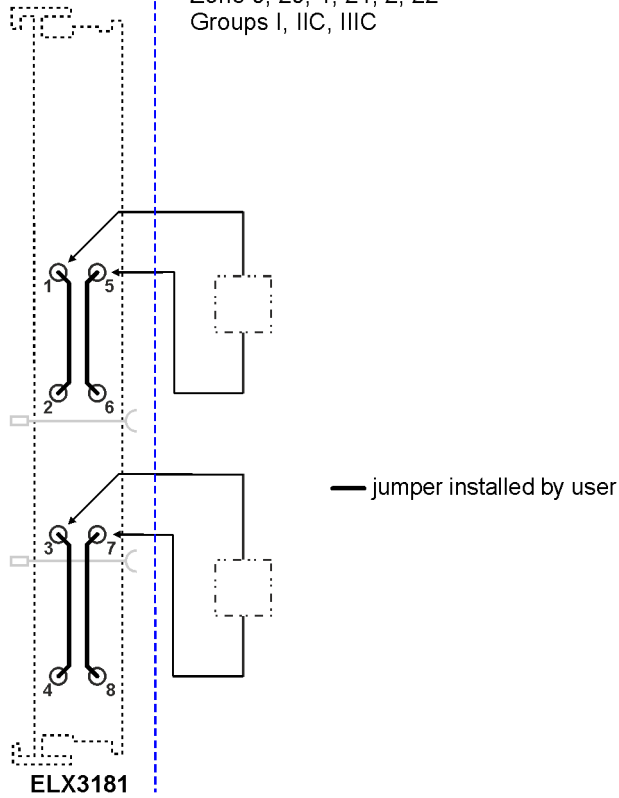


Fig. 7: ELX3202 - Sensor connection (2-wire)

3-wire

non-hazardous location or classified hazardous location Class I, Div. 2, Group... or Zone 2, Group IIC	non-hazardous location or classified hazardous location Class I, Div. 1, Group... Class II, Div. 1, Group... or Zone 0, 20, 1, 21, 2, 22 Groups I, IIC, IIIC
---	---

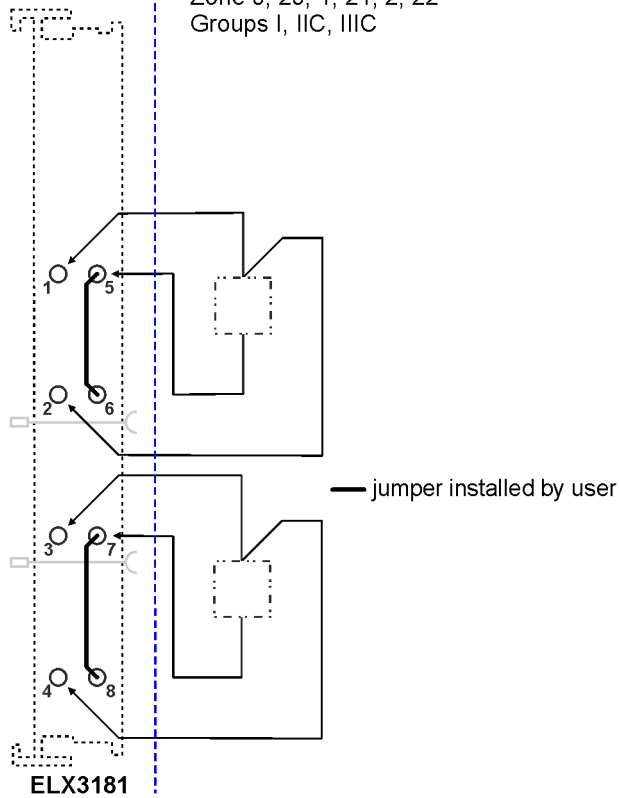


Fig. 8: ELX3202 - Sensor connection (3-wire)

4-wire

non-hazardous location or classified hazardous location Class I, Div. 2, Group... or Zone 2, Group IIC	non-hazardous location or classified hazardous location Class I, Div. 1, Group... Class II, Div. 1, Group... or Zone 0, 20, 1, 21, 2, 22 Groups I, IIC, IIIC
---	---

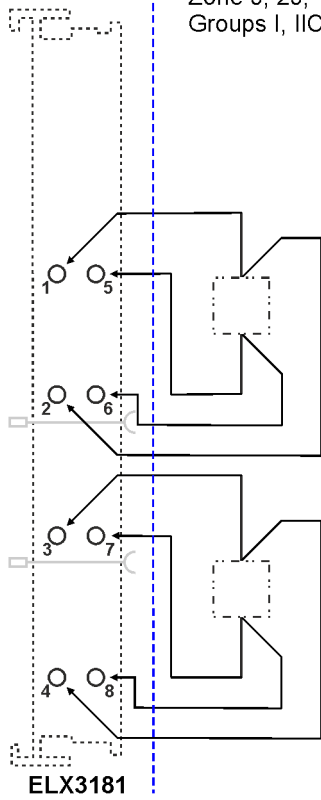


Fig. 9: ELX3202 - Sensor connection (4-wire)

2.3.4 ELX3204

Four-channel analog input terminal, RTD, 16 bit, Ex i

non-hazardous location or classified hazardous location Class I, Div. 2, Group... or Zone 2, Group IIC	non-hazardous location or classified hazardous location Class I, Div. 1, Group... Class II, Div. 1, Group... or Zone 0, 20, 1, 21, 2, 22 Groups I, IIC, IIIC
---	---

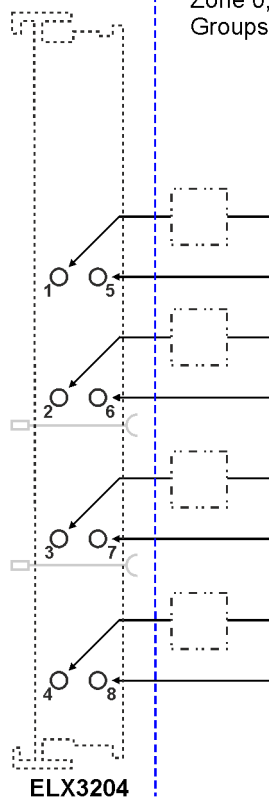


Fig. 10: ELX3204 - Sensor connection

2.3.5 ELX3312

Two-channel analog input terminal for thermocouples, 16 bit, Ex i

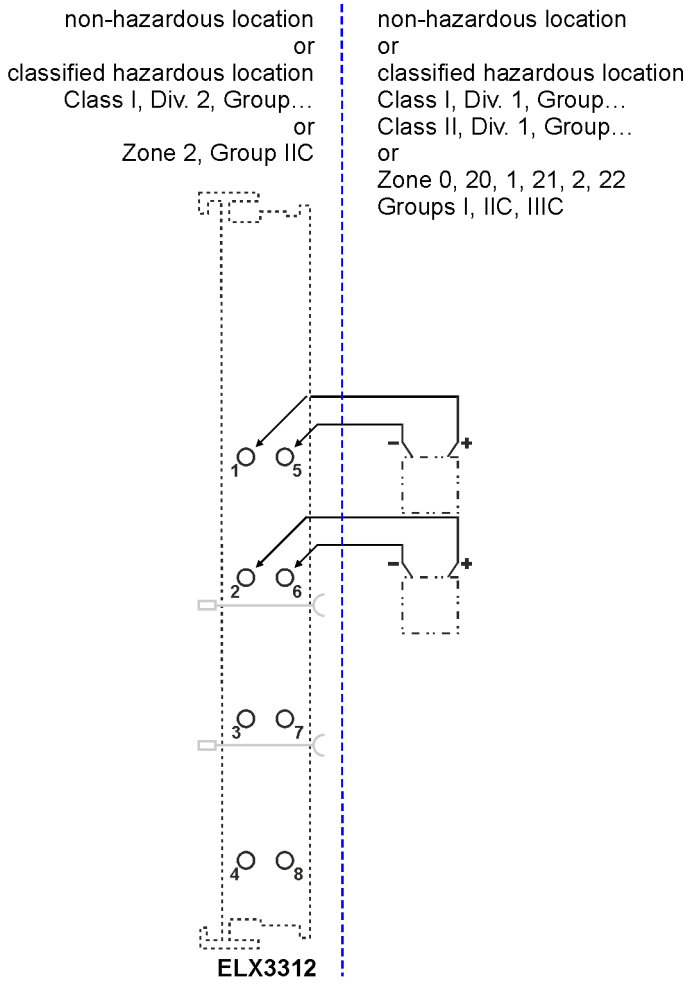


Fig. 11: ELX3312 - Connection of thermocouples

2.3.6 ELX3314

Four-channel analog input terminal for thermocouples, 16 bit, Ex i

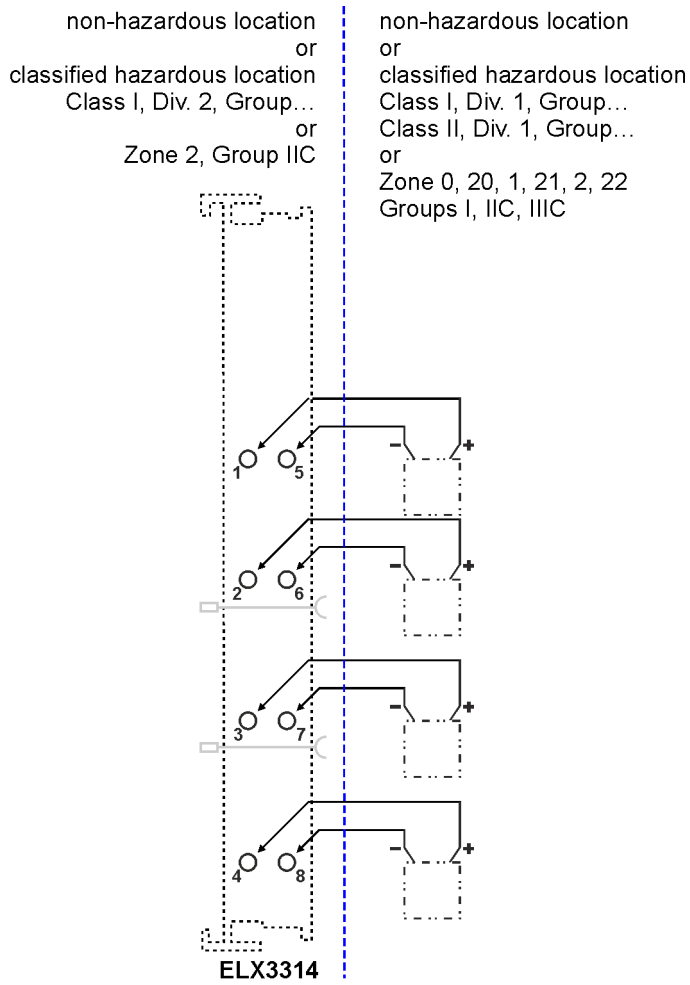


Fig. 12: ELX3314 - Connection of thermocouples

2.3.7 ELX3351

One-channel analog input terminal for strain gauge, 16 bit, Ex i

4-wire

non-hazardous location or classified hazardous location Class I, Div. 2, Group... or Zone 2, Group IIC	non-hazardous location or classified hazardous location Class I, Div. 1, Group... Class II, Div. 1, Group... or Zone 0, 20, 1, 21, 2, 22 Groups I, IIC, IIIC
---	---

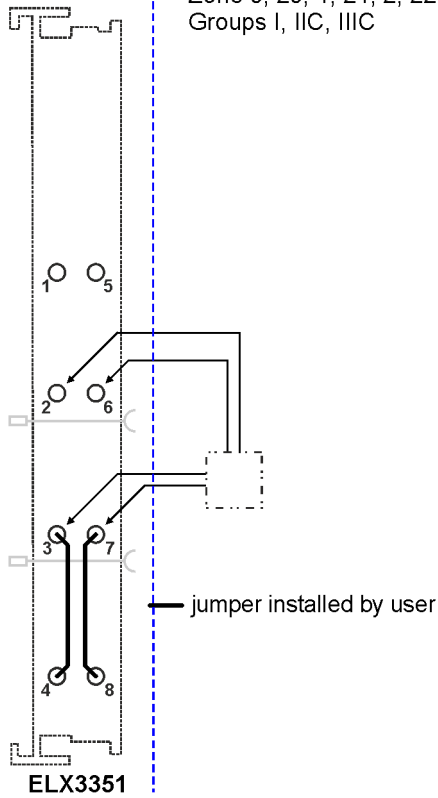


Fig. 13: ELX3351 - Connection of strain gauge (4-wire)

6-wire

non-hazardous location or classified hazardous location Class I, Div. 2, Group... or Zone 2, Group IIC	non-hazardous location or classified hazardous location Class I, Div. 1, Group... Class II, Div. 1, Group... or Zone 0, 20, 1, 21, 2, 22 Groups I, IIC, IIIC
---	---

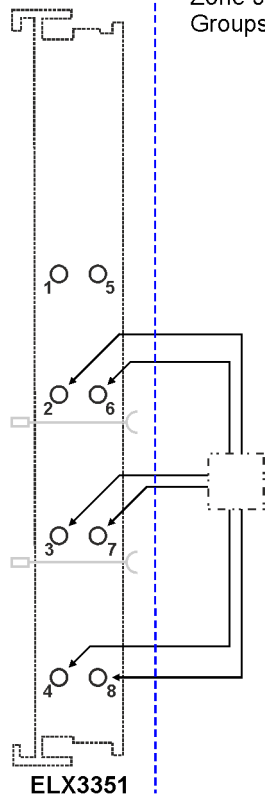


Fig. 14: ELX3351 - Connection of strain gauge (6-wire)

2.4 Terminals with analog outputs

2.4.1 ELX4181

One-channel analog output terminal 0/4...20 mA, single-ended, HART, 16 bit, Ex i

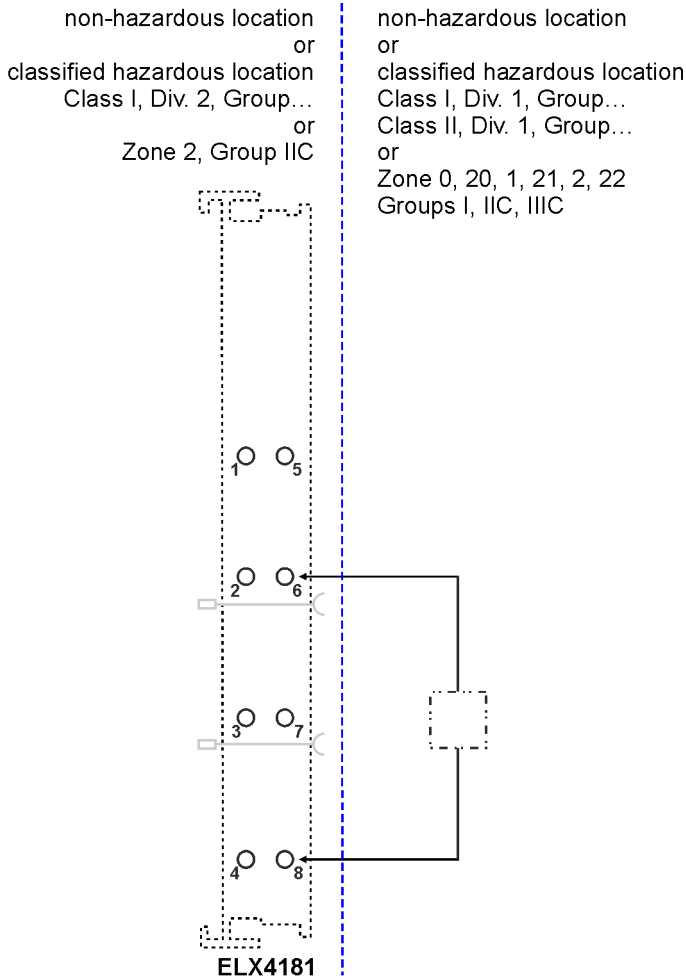


Fig. 15: ELX4181 - Actuator connection

2.5 Terminals for position measurement

2.5.1 ELX5151

One-channel incremental encoder interface, NAMUR, 32 bit, Ex i

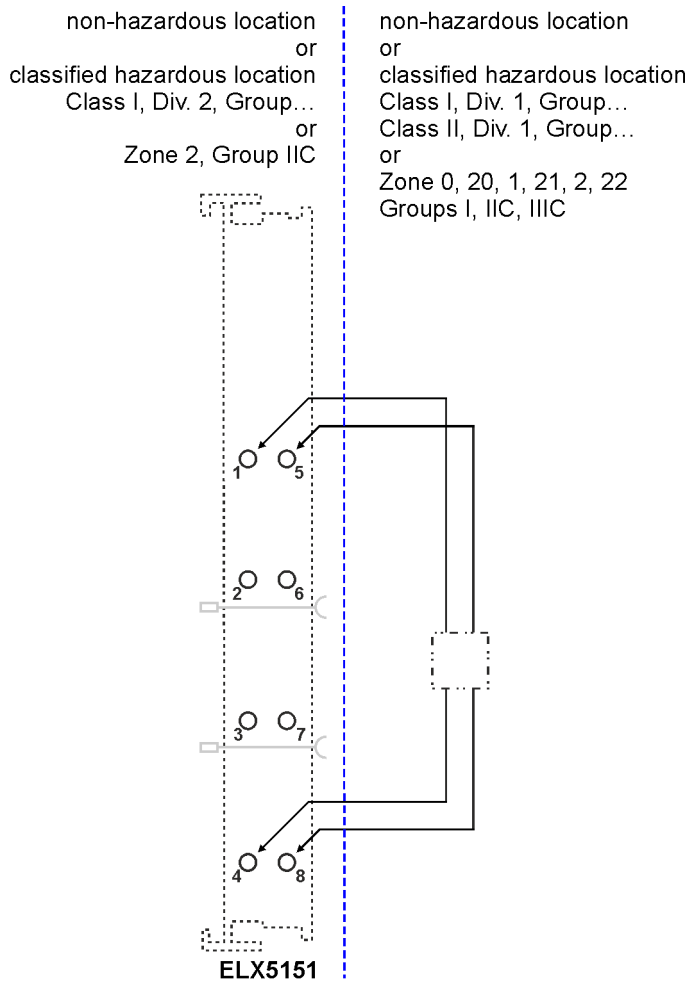


Fig. 16: ELX5151 - Connection of incremental encoder

3 Ex markings

Ex markings on ELX signal terminals

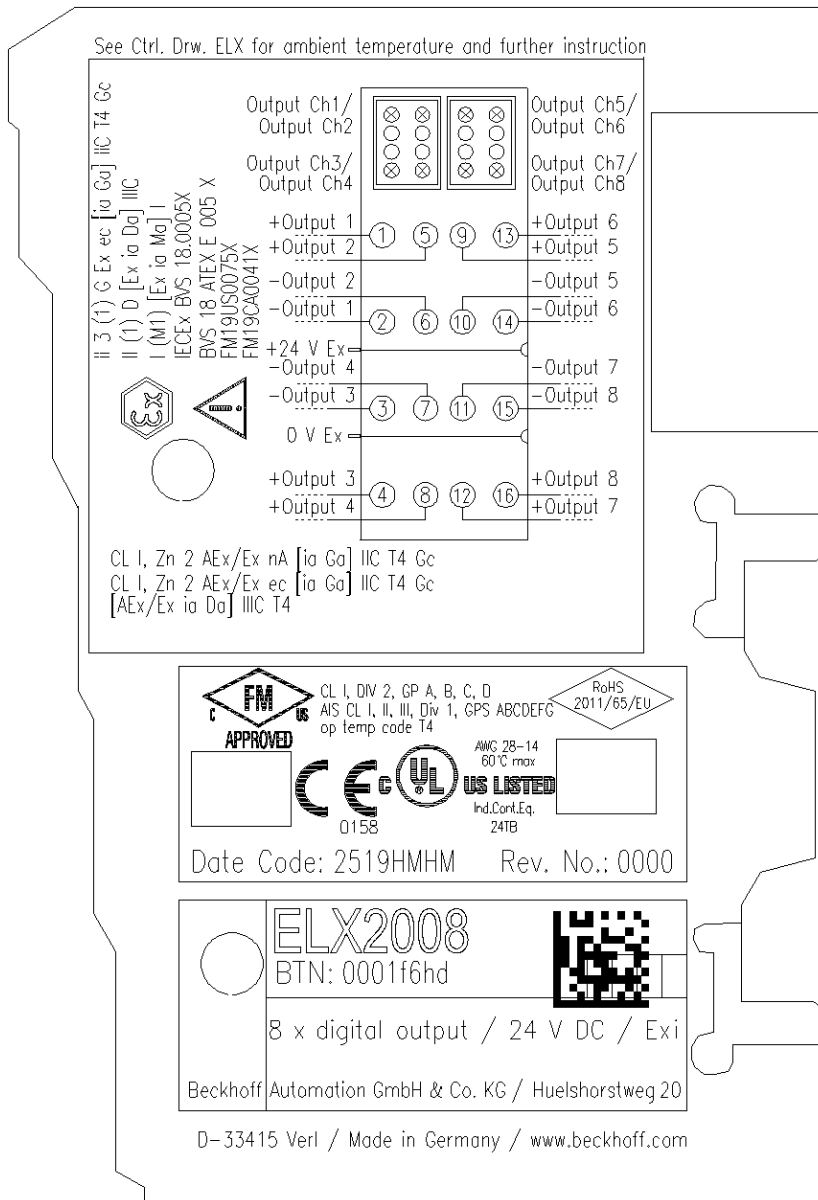


Fig. 17: ELX2008-0000 with date code 2519HMHM, BTN 00001f6hd and Ex marking

The Ex marking in this Figure is identical on all ELX signal terminals, that includes ELX1052, ELX1054, ELX2002, ELX2008, ELX3152, ELX3181, ELX3202, ELX3204, ELX3312, ELX3314, ELX3351, ELX4181 and ELX5151.

Ex markings on ELX power supply terminals

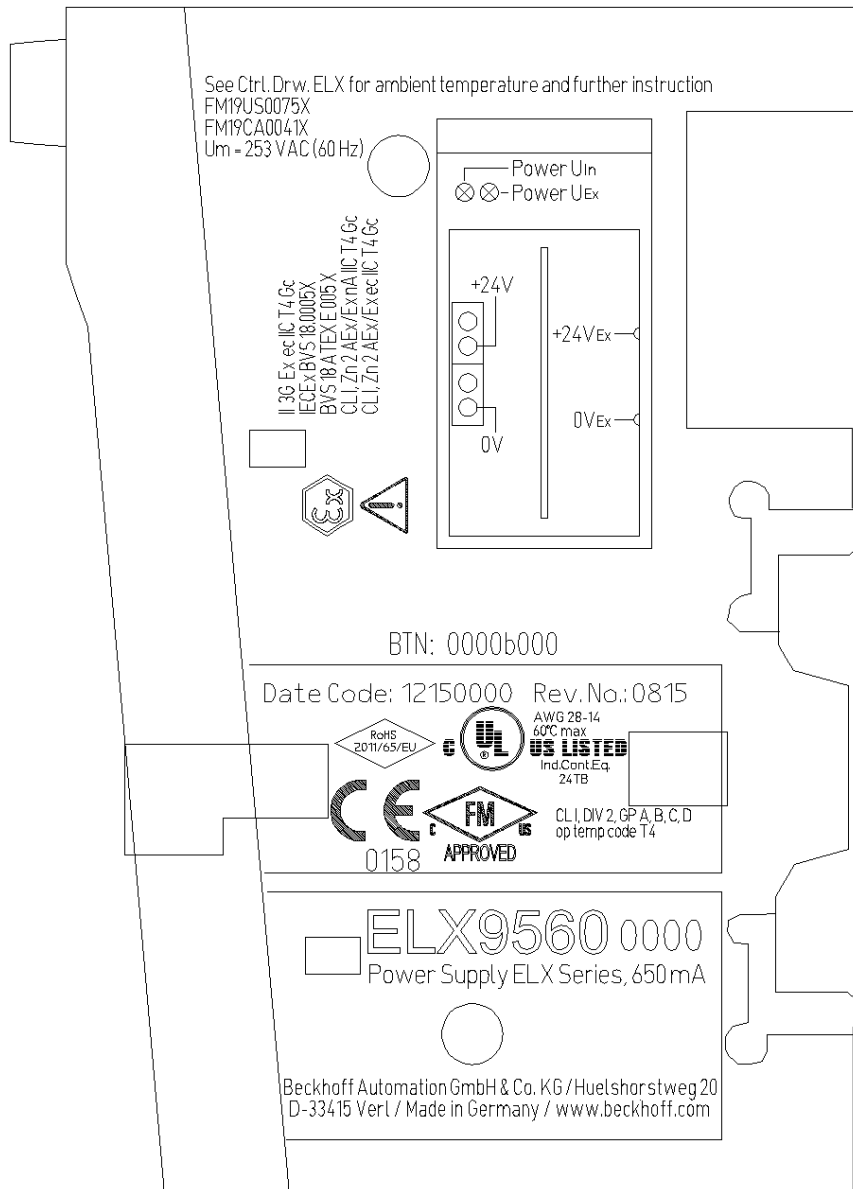


Fig. 18: ELX9560-0000 with date code 12150000, BTN 000b000 and Ex marking

The Ex marking in this figure is identical on ELX9410 and ELX9560.

Ex markings on ELX bus end cover

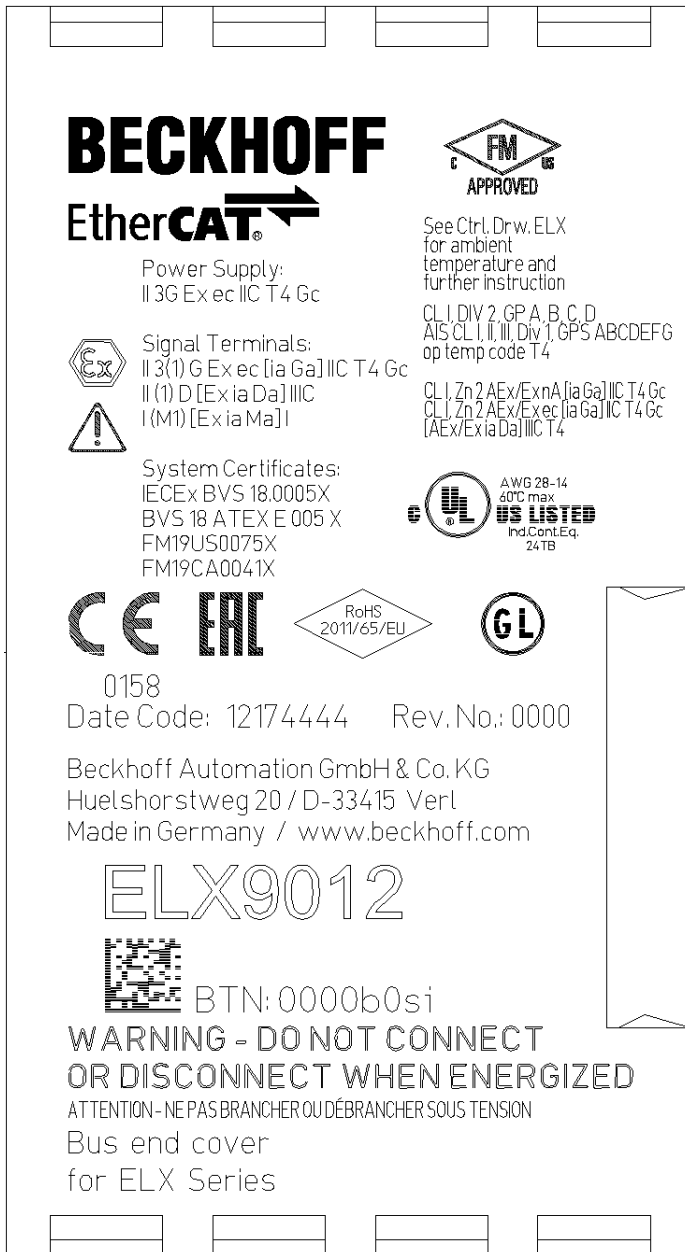


Fig. 19: ELX9012 with date code 12174444, BTN 0000b0si and Ex marking

4 Technical data for explosion protection

ELX Terminal	Connection	P ₀ [mW]	U ₀ [V]	I ₀ [mA]	Group	L ₀ [mH]	C ₀ [µF]
ELX1052-****-****	see page [▶ 8]	33	10.75	12	A, B	100	2.14
					C, E	100	15
					D, F, G	100	66
ELX1054-****-****	see page [▶ 9]	28	10.72	10.4	A, B	100	2.14
					C, E	100	15
					D, F, G	100	66
ELX2002-****-****	see page [▶ 10]	768	27.7	111	A, B	0.094	0.085
					C, E	9.2	0.663
					D, F, G	16	2.2
ELX3152-****-****	see page [▶ 11]	565	27.7	85	A, B	2	0.085
					C, E	18	0.663
					D, F, G	30	2.2
ELX3181-****-****	see page [▶ 13]	565	27.7	85	A, B	2	0.085
					C, E	18	0.663
					D, F, G	30	2.2
ELX3202-****-****	see page [▶ 14]	15	4.94	12	A, B	100	100
					C, E	100	1000
					D, F, G	100	1000
ELX3204-****-****	see page [▶ 17]	15	4.94	12	A, B	100	100
					C, E	100	1000
					D, F, G	100	1000
ELX3312-****-****	see page [▶ 18]	0.5	4.94	0.5	A, B	100	100
					C, E	100	1000
					D, F, G	100	1000
ELX3314-****-****	see page [▶ 19]	0.5	4.94	0.5	A, B	100	100
					C, E	100	1000
					D, F, G	100	1000
ELX3351-****-****	see page [▶ 20]	214	11.76	146	A, B	1.7	1.5
					C, E	6.6	9.9
					D, F, G	13.3	39
ELX4181-****-****	see page [▶ 22]	565	27.7	85	A, B	2	0.085
					C, E	18	0.663
					D, F, G	30	2.2
ELX5151-****-****	see page [▶ 23]	33	10.72	12.4	A, B	100	2.14
					C, E	100	15
					D, F, G	100	66

NOTE



Installation, parameterization, programming etc.

Further information on installation, parameterization, programming etc. can be found in the respective terminal-specific documentation, which is available for download on <https://www.beckhoff.de/english/download/ethercat.htm>.

5 Appendix

5.1 EtherCAT AL Status Codes

For detailed information please refer to the [EtherCAT system description](#).

5.2 Specific condition of use

WARNING

Please note!

- The equipment shall only be used in an area of at least pollution degree 2, as defined in IEC 60664-1!
- The equipment shall be installed in an enclosure that provides a minimum ingress protection of IP54 in accordance with IEC 60079-0!
- Transient protection shall be provided that is set at a level not exceeding 140% of the peak rated voltage value at the supply terminals to the equipment!
- The circuits shall be limited to overvoltage Category II as defined in IEC 60664-1!
- The Terminal system is suitable for use in a temperature range of -25°C to +60°C.
- Do not disconnect energized terminals!
- The last terminal of each segment is to be covered by a bus end cover ELX9012, unless two ELX9410 terminals are installed in direct succession for continuing the same terminal segment with standard Beckhoff EtherCAT terminals (e.g. EL/ES/EK).
- An additional ELX9560 power supply terminal, followed by further ELX signal terminals can be connected to the right side of the ELX9410.

5.3 Support and Service

Beckhoff and their partners around the world offer comprehensive support and service, making available fast and competent assistance with all questions related to Beckhoff products and system solutions.

Beckhoff's branch offices and representatives

Please contact your Beckhoff branch office or representative for local support and service on Beckhoff products!

The addresses of Beckhoff's branch offices and representatives round the world can be found on her internet pages:

<http://www.beckhoff.com>

You will also find further documentation for Beckhoff components there.

Beckhoff Headquarters

Beckhoff Automation GmbH & Co. KG

Huelshorstweg 20
33415 Verl
Germany

Phone: +49 5246 963 0
Fax: +49 5246 963 198
e-mail: info@beckhoff.com

Beckhoff Support

Support offers you comprehensive technical assistance, helping you not only with the application of individual Beckhoff products, but also with other, wide-ranging services:

- support
- design, programming and commissioning of complex automation systems
- and extensive training program for Beckhoff system components

Hotline: +49 5246 963 157
Fax: +49 5246 963 9157
e-mail: support@beckhoff.com

Beckhoff Service

The Beckhoff Service Center supports you in all matters of after-sales service:

- on-site service
- repair service
- spare parts service
- hotline service

Hotline: +49 5246 963 460
Fax: +49 5246 963 479
e-mail: service@beckhoff.com