Original manual

Combination Explosion Protection Enclosure with integrated Measuring System and Draw-Wire

II 3G Ex (Gas)

A_W

Stock photo

CE

Date of manufacture: DD.MM.YYYY

_Basic safety instructions
_Intended use
_Product description
_Technical data
_Explosion protection characteristics
_Assembly

User Manual

TR-ECE-BA-GB-0116 v08 03/02/2022

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Text

Cursive or **bold** text represents the title of a document or is used for emphasis.

`Courier`-text shows text which is visible on the display or screen as well as software menu-selections.

″ < > ″ refers to keys on your computer keyboard (e.g. <RETURN>).

Table of contents

Amendment-index

Amendment	Date	Index
First edition	04/10/2015	00
EU directives 2014/30/EU (EMC) and 2014/34/EU (ATEX) added	12/22/2015	01
Correction of the ATEX labeling Ex II 3 G Ex nAc c IIC T5 X	05/30/2016	02
SL3015 ATEX added	08/11/2017	03
Declaration of conformity updated	02/21/2018	04
SL3005 ATEX + ADW75 added	05/30/2018	05
EU declaration of conformities integrated	06/26/2018	06
- New protection class “increased safety”, e - Further encoder series included	08/05/2020	07
- Correction of the ATEX labeling - Updating the declarations of conformity	03/02/2022	08

1 General

This Ex-User manual contains all relevant explosion-safety information and includes the following topics:

- Basic safety instructions
- Intended use
- Product description
- Technical data
- Explosion protection characteristics
- Assembly

Since the documentation has a modular structure, this Ex-User manual represents a supplement to the other documentation such as for example product data sheets, dimensional drawings and leaflets etc.

The Ex-User manual is included, but can also be ordered separately.

1.1 Type designation code, Explosion Protection Enclosure

Absolute-Encoder, 1. Generation

EX	SU	S	ED	D	-	Consecutive number, 5-digit				
*1	*2	*3	*4	*5	-	*6	*6	*6	*6	*6

Absolute-Encoder, 2. Generation

EX	SU	S	ED	G	D	-	Consecutive number, 5-digit				
*1	*2	*3	*4	*5	*6	-	*7	*7	*7	*7	*7

Incremental-Encoder, 1. Generation

EX	SU	S	ED	D	-	Consecutive number, 5-digit				
*1	*2	*3	*4	*5	-	*6	*6	*6	*6	*6

Incremental-Encoder, 2. Generation

EX	SU	S	ED	D	G	-	Consecutive number, 5-digit				
*1	*2	*3	*4	*5	*6	-	*7	*7	*7	*7	*7

*1 to *7: Wild cards and position in the type designation code

Position - Assignment	Code	Description
EX **Identifier EX protection**	A	Explosion protection (ATEX)
SU **Scanning-Unit**	E O M D P	Optical scanning unit, standard resolution Optical scanning unit, high resolution Magnetic scanning unit redundant dual scanning unit Magnet wheel
S **Shaft**	W	Draw-Wire
ED **External-Diameter**		External diameter in mm, see nameplate
G **Generation**	2	Only in case of generation-2 devices
D **Detection**	S M	Single turn Multi turn only in case of absolute encoder
	I	only in case of incremental encoder
Consecutive number	xxxxx	Consecutive number, 5-digit

1.2 Scope

This -User manual applies exclusively for the combination explosion protection enclosure with a built-in measuring system and draw-wire, in connection with the appropriate GAS EX-marking **for the entire assembly**:

- A*W***-, **II 3G Ex _ h IIC T_ Gc X**

‘*’: Placeholder, according to type code
‘_’: Placeholder, according to nameplate

The products are labelled with affixed nameplates and are components of a system.

1.3 Other applicable documents

- the operator's system-specific operation instructions,
- this -User manual
- Pin assignment
- Optional: Safety manual
- interface-specific user manual
- Product data sheet

1.4 Relevant directives and standards

The explosion protection enclosure with integrated measuring system and draw-wire were developed, constructed and finished under compliance with the applicable European- or International standards and directives.

EU-Directive 2014/30/EU	Electromagnetic compatibility
EU-Directive 2014/34/EU	Equipment and protective systems intended for use in potentially explosive atmospheres
EN 61000-6-2	EMC: Interference immunity
EN 61000-6-3	EMC: Interference emission
EN IEC 60079-0	Explosive atmospheres: General requirements
EN IEC 60079-7	Explosive atmospheres: Equipment protection by increased safety "e"
DIN EN 60079-14	Explosive atmospheres: Electrical installations design, selection and erection
EN 60079-15	Explosive atmospheres: Equipment protection by type of protection "n"
DIN EN 60529	Degrees of protection provided by enclosures (IP code)

. . .

. . .

EN 1127-1	Explosive atmospheres: Basic concepts and methodology
EN ISO 80079-36	Non-electrical equipment for use in potentially explosive atmospheres: Basic method and requirements
EN ISO 80079-37	Non-electrical equipment for use in potentially explosive atmospheres: Protection by constructional safety "c"

1.5 Used abbreviations / Terms

A*****-	Explosion protection housing with built-in measuring system, all variants
Assembly	Combination of "individual items of equipment": Explosion protection enclosure with integrated measuring system and draw-wire
EU	***E***uropean ***U***nion
EMC	***E***lectro***m***agnetic ***c***ompatibility
ESD	***E***lectro ***S***tatic ***D***ischarge
IEC	***I***nternational ***E***lectro-technical ***C***ommission
VDE	Association for Electrical, Electronic & Information Technologies

1.6 Product description

The aluminum explosion protection enclosure with built-in systems and integrated evaluation electronics serves the detection of changes in angle for fixed installations. The changes in angle are transmitted to the evaluation electronics via shaft.

The explosion protection enclosure has the ignition protection type

- "n": non-sparking operating equipment (potential gas-explosive atmosphere) or
- "e": increased safety (potential gas-explosive atmosphere)

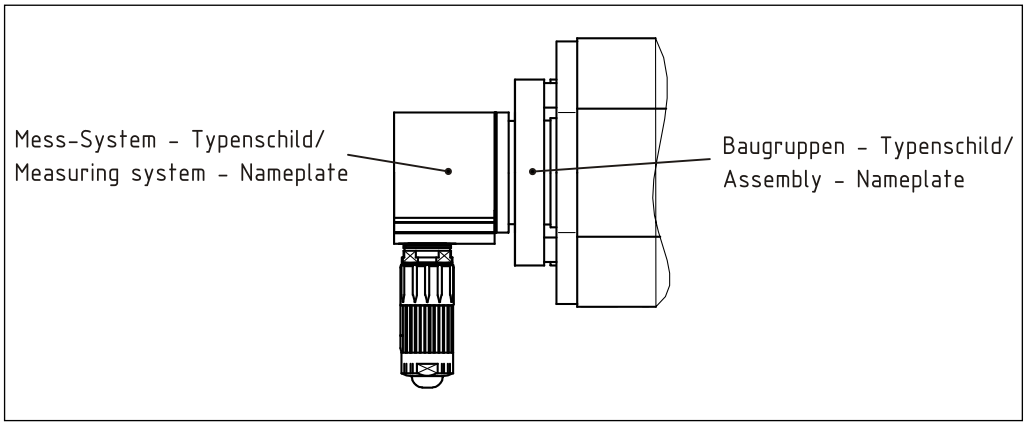
Through its manner of construction, the type of ignition protection and additional measures, the enclosure is suitable for the installation of non-explosion protected rotary measuring system built-in devices.

The draw-wire has the ignition protection type

- "h": constructional safety

and is attached via a coupling to the explosion protection enclosure. With the combination of an angle-measuring-system and a draw-wire, so linear movements can be detected.

The construction, as well as the interaction of the individual components and the housing with regards to their possibilities for use in potentially explosive areas, are tested by the company TR-Electronic GmbH and confirmed by identification with the nameplate **for the entire assembly**.



Figure, similar

2 Basic safety instructions

2.1 Symbol- and note definition

⚠ WARNING	means that death or serious injury can occur if the required precautions are not met.
⚠ CAUTION	means that minor injuries can occur if the required precautions are not met.
NOTICE	means that damage to property can occur if the required precautions are not met.
	indicates important information or features and application tips for the product used.
	signifies that respective ESD-safety measures according to DIN EN 61340-5-1 supplement 1 are to be observed.

2.2 Obligation of the operator prior to commissioning

As an electronic device and for use in potentially explosive areas, the explosion protection enclosure with integrated measuring system and draw-wire is subject to the provisions of the EU-directives EMC and ATEX.

Therefore commissioning of the device is only allowed once it has been established that the system/machine in which the device is to be installed, complies with the provisions of the EU-directives EMC and ATEX, the harmonized standards, European standards or the respective national standards.

2.3 General dangers with the use of this product

The product, hereafter referred to as ***equipment*** is manufactured using the latest technology and according to recognized safety regulations. ***Nevertheless, non-intended use can cause danger to life and limb of the user or third parties or cause damage to the equipment and other property!***

Only use the equipment for its intended use, with safety- and danger awareness and in compliance with the ***Other applicable documents***!

The operator of an electrical system in a potentially explosive environment should keep the equipment in a proper condition, it should be properly operated and monitored and maintenance- as well as repairs are to be performed. This also includes inspection of the equipment for possible transport damage prior to commissioning.
Power connections may not be connected or disconnected with the power engaged. The equipment may not be used in case of defects, as a basic principle it may not be opened.
Use into dust atmospheres is forbidden.

To avoid damages at the wire or wire break at the draw-wire, following points have to be taken into account:

- The maximum measuring length of the wire, maximum acceleration and speed of adjustment must not be exceeded
- The adjustment track of the wire must be free and protected in each operation situation
- Squeezing’s and bends of the wire must be avoided
- Pull the rope only by means of the wire end ring
- Unhindered retraction of the wire must be avoided in any case

2.4 Intended use

The equipment is used for the detection of linear movements as well as the processing of the measurement data for a downstream control through industrial process- and control procedures.

The equipment is a fixed-installation device for use in the Ex-Zone 2 (potentially gas-explosive areas, II 3 G, device protection level Gc).

The assembly takes place through the established attachment possibilities. The electrical data provided on the nameplate of the measuring system, as well as the device category, temperature class etc. for the place of use on the nameplate of the assembly are to be observed. The operating temperature range of the equipment is -20°C to +60°C.

Intended use also includes:

- observation of all instructions contained in the other applicable documents,
- observation of the nameplates and possible prohibition- or instruction labels on the equipment,
- observation of the supplementary documentation,
- operating of the equipment within the limits indicated in the technical data
  - Ex-User manual
  - interface-specific user manual
  - Product data sheet
  - Draw-Wire data sheets

2.5 Non-intended use

Risk of death, bodily injury or damage resulting from non-intended use of the equipment!

⚠ WARNING

- Since the equipment is ***not a safety component*** according to the EU-machine directive, a plausibility test of the measuring-system-values has to be performed through the downstream control.
- It is compulsory for the operator to incorporate the equipment into their own safety system.

NOTICE

- The following uses are especially prohibited:
  - in environments with an explosive atmosphere of the Zones 0, 1, 20, 21, 22
  - for medical aims
  - Commissioning of the equipment if the nameplates are no longer readable or are completely missing.

2.6 Warranty and liability

The "General terms and conditions" (“Allgemeine Geschäftsbedingungen”) of the company TR-Electronic GmbH apply in general. This will be available to the operator with the contract confirmation or –conclusion at the latest. Warranty- or liability claims with regards to personal- and property damage are excluded, if they are the result of one or more of the following causes:

- Non-intended use of the equipment.
- Improper assembly, installation, commissioning, programming, maintenance or dismantling of the equipment.
- Improperly executed work on the equipment by unqualified personnel.
- Operating of the equipment in the presence of technical defects.
- The performance of unauthorized mechanical or electrical modifications of the equipment.
- The performance of unauthorized repairs
- Catastrophic incidents caused by external forces or acts of God.

2.7 Organizational measures

- The other applicable documents must always be kept within reach in the equipment's operating location.
- In addition to the other applicable documents, the generally applicable legal regulations and other mandatory directives for work safety, accident prevention and environmental conservation are to be observed and conveyed.
- The applicable national-, site- and system-specific provisions and requirements are to be observed and conveyed.
- The operator has the obligation to point out any special operational features and requirements to the personnel.
- Before starting work, the personnel responsible for work on or with the equipment must have read and understood the -User manual, in particular the chapter on “Basic safety instructions”.
- The nameplates and possible affixed prohibition- or instruction labels on the equipment must be kept in a readable condition.
- Do not perform any mechanical or electrical modifications to the equipment, except those which are specifically described in the other applicable documents.
- Repairs may only be performed by the manufacturer, or by a person or body who carries the manufacturer's authorization.

2.8 Personnel selection and -qualification; basic obligations

2.8.1 Electrical installations design, device selection and erection

The project development of electrical systems, the selection of the devices and the installation in potentially explosive atmospheres may only be performed by persons whose training includes instruction in various types of ignition and installation techniques, applicable regulations and prescriptions as well as general principles of the Zone-classification. The persons must have the relevant competence for the type of work to be performed.

The personnel must regularly undergo corresponding further training or courses.

For definitions on the knowledge, expertise and competence of the "responsible persons", "manual workers" and "planners", the IEC 60079-14 or DIN EN 60079-14 standards are to be additionally consulted [suppliers e.g. Beuth Verlag GmbH, VDE-Verlag GmbH].

2.8.2 Inspection, maintenance and repair

The inspection, maintenance and repair of electrical systems in potentially explosive environments may only be performed by experienced personnel who have also gained knowledge on the various types of ignition and installation procedures, the requirements of the IEC / DIN EN 60079-17 standard, relevant national provisions and company regulations for the system as well as on the general principles of the Zone-classification during their training.

Personnel are to undergo appropriate further training or instruction regularly. Proof of the relevant experience and completed training must be available.

For definitions on the knowledge, expertise and competence of the "responsible persons", "expert person with leadership functions" and the "performing personnel", the IEC 60079-17 or DIN EN 60079-17 standards are to be additionally consulted [suppliers e.g. Beuth Verlag GmbH, VDE-Verlag GmbH].

2.9 First commissioning / Commissioning

Prior to the first commissioning the equipment is to be checked regarding its suitability in the respective zone according to its assembly labeling. The values indicated on the assembly nameplate are not to be exceeded. Use into dust atmospheres is forbidden.

The operational safety of the equipment and the correct functional arrangement of the equipment inside the plant must be checked before commissioning. It may only be used in a clean and undamaged condition.

2.10 Assembly, installation and dismantling

With installation and operation of the explosion protective equipment, one should consider protection against hazardous environmental influences which limit the intended use of the equipment. This could be protection against aggressive fluids or weather protection for example. During installation, the IEC 60079-14 and DIN EN 60079-14 as well as other national standards and regulations applicable at the installation site are to be adhered to.

The information on the nameplate of the measuring system must be complied with.

The assembly of the equipment takes place according to the enclosure's established mounting possibilities, but impacts such as from hammer blows are to be avoided.

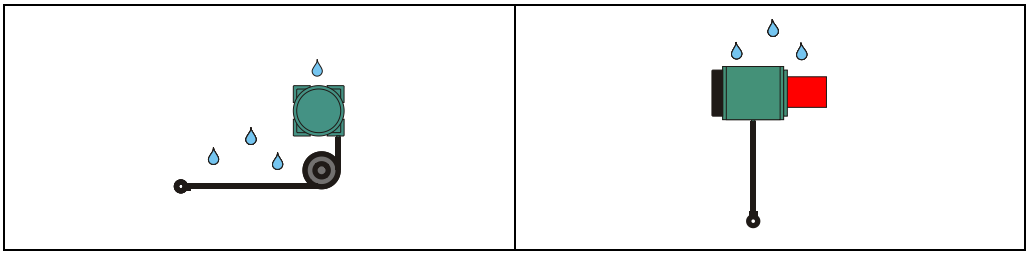
In potentially explosive areas, the equipment's power supply line with mating connector is to be routed in such a way that it is protected from damage and mechanical failure. The maximum connection information on the nameplate of the measuring system must be complied with.

For metal enclosures in potentially explosive areas an equipotential line with at least 4 mm^2 is required.

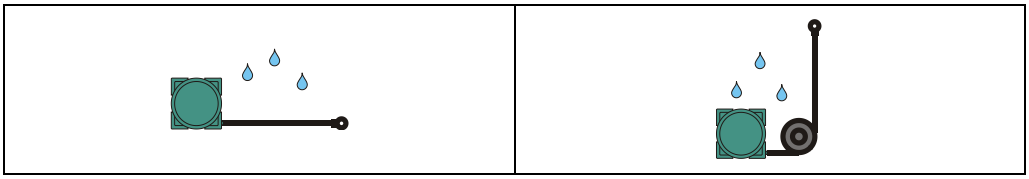
Wiring work, opening and closing of electrical connections may only be performed with the power switched off.
Do not perform any welding work once the equipment has already been wired and switched on.

Touching the equipment-connection contacts with bare hands is to be avoided, or the respective ESD-protective measures are to be implemented.

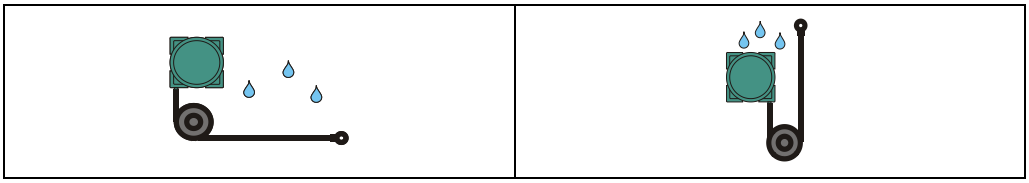
In order to prevent a penetration of water into the cable drum housing, install cable insertion always downward.



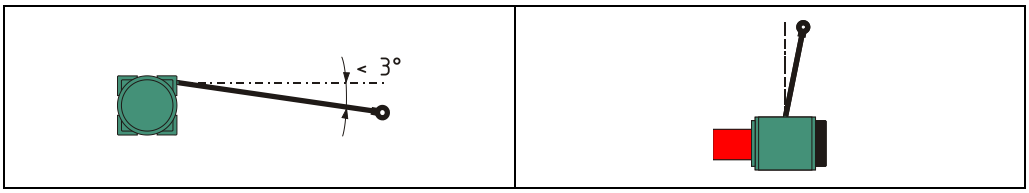
If there isn't a danger of ice formation at the cable, a horizontal arrangement of the cable outlet is possible. If possible the cable outlet should be assembled downward.



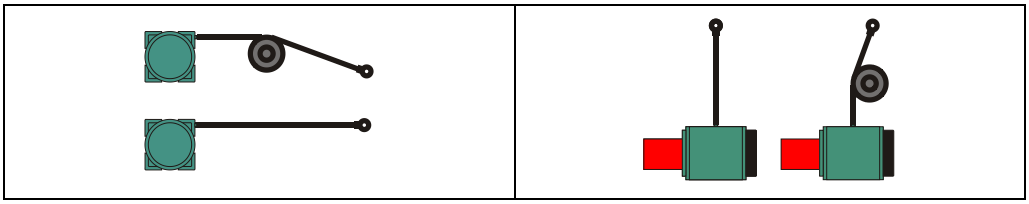
In case of danger of ice formation at the cable the application of a pulley is always to use for breaking the ice. The cable outlet then should always be downward-pointing. This arrangement has always to be preferred where humidity or dust depositions can appear on the cable.



A flat unreeling angle is optimal! An unreeling angle up to 3° is possible, but not recommended. The life time can be reduced.



If a flat unreeling angle is not possible, for example this can be managed with a pulley.



2.11 Inspection, maintenance and repair

The operator of an electrical system in a potentially explosive environment must keep the equipment in an good condition, operate it properly, monitor it and maintenance and repair work must be performed, also see IEC 60079-17 and DIN EN 60079-17 in this respect.

Maintenance work and defect repairs may only be performed by trained professionals. Before the maintenance or repair, the specified safety precautions are to be observed. The warning notes on the equipment and in the other applicable documents are to be adhered to!
The applicable laws and directives are complied with before recommissioning.

- The equipment does not require any maintenance by the operator. Nevertheless, inspections or a replacement must be performed at regular intervals:
  - Visual inspection
    - of the enclosure for damages
    - of the supply line for external damages
    - for dust deposits and removal
  - Checking of the connection plug for a tight fit
  - The pull-back mechanism of the draw wire has to be changed by the manufacturer after 200.000 cycles. The numbers of cycles correspond to the used measuring range, maximum acceleration and speed of adjustment.

- In case of damages, the equipment is to be taken out of service immediately and to be repaired by the manufacturer!

2.12 Special conditions for safe use, marking "X"

The "X" symbol in the labeling of the equipment is used to indicate special application conditions:

The equipment's installation location and -manner are generally to be selected in such a way that it is protected from external mechanical influences and in a way that no function limitations can result.

Misappropriations of the equipment as
- support
- tread plank
- stirrup
- …

are prohibited.

The mating connector must be secured against accidental disconnection through the use of a screw locking device.

3 Transport / Storage

Transport – instructions

Do not drop the device or allow hard impacts!

Only use the original packaging!
Inappropriate packaging material may cause damage to the device during transport.

Storage

Storage temperature: -30 to +80°C

Store in a dry place
Relative humidity: < 65 %, no condensation

4 Technical data

4.1 Power supply

Rated Voltage ..... 24 V DC
Power consumption ..... ≤ 4 W

4.2 Mechanical characteristics, measuring system

see product data sheets www.tr-electronic.com/s/S019293

4.3 Environmental conditions, entire assembly

Vibration, DIN EN 60068-2-6 ..... ≤ 100 m/s^2, sine 50-2000 Hz
Shock, DIN EN 60068-2-27 ..... ≤ 250 m/s^2, half-sine 11ms
EMC
Immunity to disturbance, DIN EN 61000-6-2
Transient emissions, DIN EN 61000-6-3
Working temperature ..... -20 °C…+60 °C
Storage temperature ..... -30 °C…+80 °C, dry
Relative humidity, DIN EN 60068-3-4 ..... < 65 %, non-condensing
[1] **Protection class** ..... **IP64**: Degrees of protection provided by enclosures according to DIN EN 60529

4.4 Enclosure materials, measuring system

Aluminum design
Enclosure material..... Al Mg Si 0.5 F22
Flange material..... EN AW-AlCu6BiPb

Shaft, stainless steel ..... WN 1.4305, corrosion resistant

[1] Observe instructions for plug connections / mating plugs, see chapter 2.12 on page 15

4.5 Draw-Wire

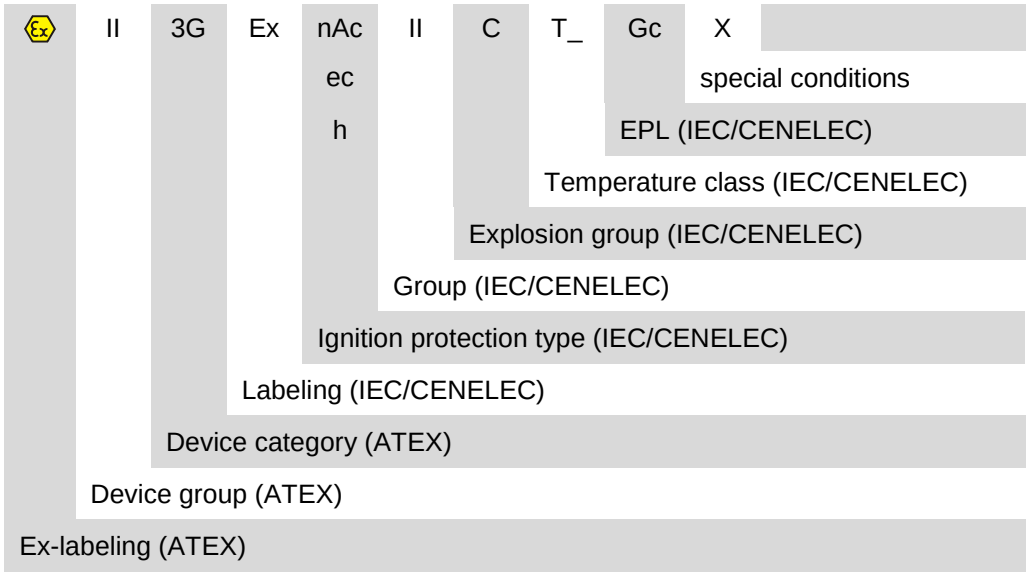
Download:

- Data sheet for Draw-Wire SL3002, 2 m
- Data sheet for Draw-Wire SL3003, 3 m
- Data sheet for Draw-Wire SL3005, 5 m
- Data sheet for Draw-Wire SL3010, 10 m
- Data sheet for Draw-Wire SL3015, 15 m
- Data sheet for Draw-Wire SL3025, 25 m

4.6 Explosion protection characteristics, entire assembly

4.6.1 Ex-labeling, gas

II 3G Ex nAc/ec h IIC T_ Gc X



Device group ..... **II**: potentially gas-explosive areas

Device category ..... **3G**: Zone 2
adequate safety with normal operation

Ignition protection type

- **Measuring system** ..... **nAc**: non-sparking equipment
  Ex-Atmosphere cannot be ignited in case of defined malfunction conditions

  ec: increased safety
  additional measures to prevent ignition of theexplosive atmosphere
- **Draw-Wire** ..... **h**: constructional safety
  no ignition source in case of normal operation

Group ..... **II**: potentially gas-explosive areas

Explosion group ..... **C**: typical gas: Hydrogen, acetylene

Temperature class ..... **T_**: max. enclosure surface-temperature

T3: ≤ 200 °C
T4: ≤ 135 °C
T5: ≤ 100 °C
T6: ≤ 85 °C
see nameplate

EPL (Device protection level) ..... **Gc**: Zone 2
Sufficient safety during normal operation

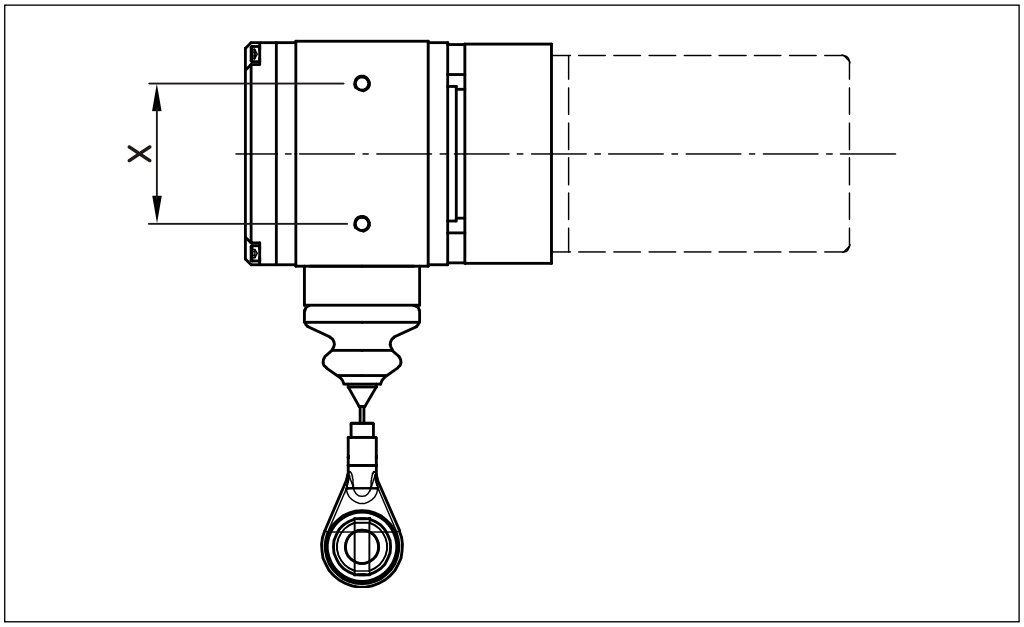
Special conditions ..... **X**: see chapter 2.12 on page 18

5 Assembly

➢ Dimensions of the entire assembly must be taken from the customer-specific drawing

The draw-wire should stand on a ground level and should be mounted via the winding thrills which are situated on both housing sides. While mounting, please pay attention that the wire outlet is aligned to the wire end ring. As soon as the draw-wire is fastened, the wire end ring can be fastened at a moveable object.

Observe references of the “Assembly, installation and dismantling” chapter, see page from 16.



Dimension X:

- Series □ 80 mm: 50 mm, 2x M6x8
- Series □ 130 mm: 80 mm, 2x M8x8

Overall dimensions:

- Data sheet for Draw-Wire SL3002, 2 m
- Data sheet for Draw-Wire SL3003, 3 m
- Data sheet for Draw-Wire SL3005, 5 m
- Data sheet for Draw-Wire SL3010, 10 m
- Data sheet for Draw-Wire SL3015, 15 m
- Data sheet for Draw-Wire SL3025, 25 m

6 Equipotential bonding conductor - Connection

An equipotential is required for systems in potentially explosive areas. This is to be done with a minimum wire diameter of 4 mm^2.

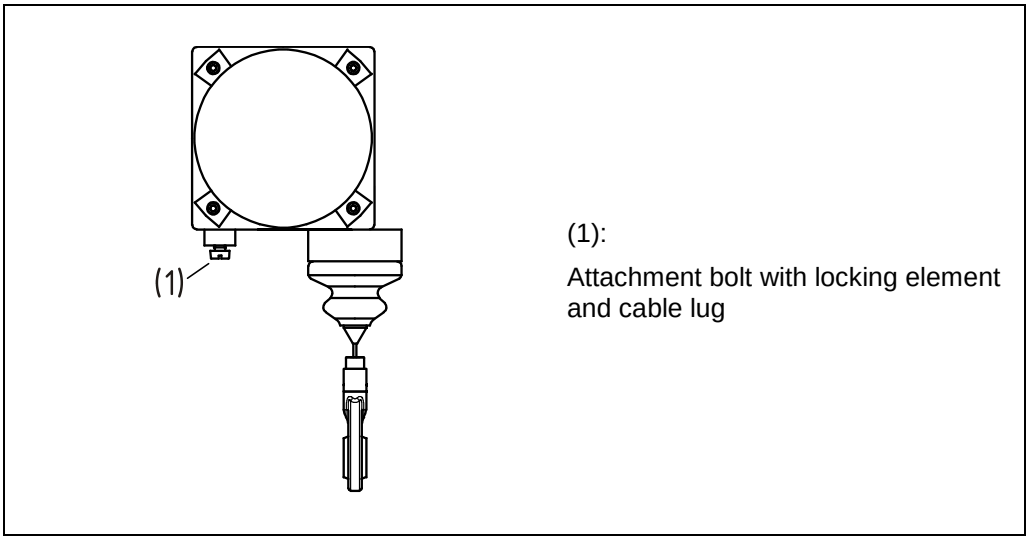


Figure 1: Equipotential bonding conductor - Connection

7 Disposal

Electronic waste is hazardous waste. The applicable country-specific regulations are to be adhered to for disposal.

8 EU declaration of conformity

TR electronic

EU Declaration of Conformity

The Combination Explosion Protection Enclosure with integrated Measuring System and Draw-Wire

Type: A*W***
Order-No.: A*W***-xxxxx

was developed, designed and manufactured to comply with the EU-Directives

Electromagnetic Compatibility (EMC)	**2014/30/EU**	(L 96/79)
Equipment and protective systems intended for use in potentially explosive atmospheres (ATEX)	**2014/34/EU**	(L 96/309)
Restriction of the use of certain hazardous substances in electrical and electronic equipment (RoHS)	**2011/65/EU**	(L 174/88)

under the sole responsibility of

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Germany

The following harmonized standards were applied:

EN 61000-6-2: 2005/AC:2005	Generic standards - Electromagnetic compatibility Immunity (industrial environment)
EN 61000-6-3: 2007/A1:2011	Generic standards - Electromagnetic compatibility Emission (residential environment)
EN IEC 60079-0: 2018	Explosive atmospheres Part 0: Equipment - General requirements
EN IEC 60079-7: 2015/A1:2018	Explosive atmospheres Part 7: Equipment protection by increased safety "e"
EN 60079-15: 2010	Explosive atmospheres Part 15: Equipment protection by type of protection "n"
EN 1127-1: 2019	Explosive atmospheres Part 1: Basic concepts and methodology
EN ISO 80079-36: 2016	Non-electrical equipment for explosive atmospheres Part 36: Basic method and requirements
EN ISO 80079-37: 2016	Non-electrical equipment for explosive atmospheres Part 37: Non-electrical type of protection constructional safety "c"
EN IEC 63000: 2018	Technical documentation for the assessment of electrical and electronic products with respect to the restriction of hazardous substances

Other applied standards:

DIN EN IEC 60079-14:2021	Explosive atmospheres Part 14: Electrical installations design, selection and erection
DIN EN 60529: 2014	Degrees of protection provided by enclosures (IP code)

The products are marked additionally with the following characteristics on the name plate:

 II 3G Ex _ h IIC T_ Gc X

Trossingen, 02/23/2022

Mr. Klaus Tessari, CEO

TR-ECE-KE-DGB-0334-05.docx

9 Accessories

https://www.tr-electronic.com/products/rotary-encoders/accessories.html