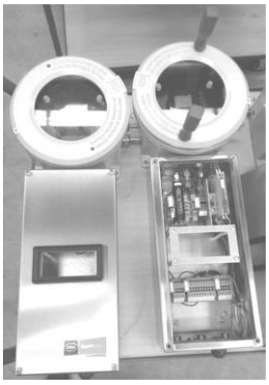
Installation instructions
mini CORI-FLOW meter/controller in ‘Ex de’ combination

Standard version : XM1.-STD-…-.A
Extended version : XM1.-EXT-... -.A



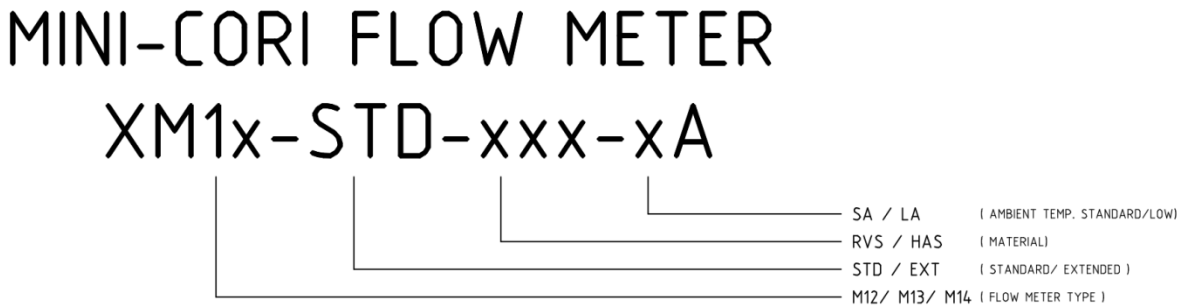
11.02.2015
16.03.2015 Rev01
18.07.2016 Rev02
03.03.2017 Rev03

The unit mini CORI-FLOW XM1x consists of a flameproof enclosure (Exd) type 8265 and an Increased safety enclosure (Exe) type 8150 (make R. Stahl GmbH). The flameproof enclosure contains a mini CORI-FLOW meter/controller (and an optional indicator *for the extended version only)*.
The process tubes are welded to the flow meter/controller and are installed for connection outside of the box. For connection instructions see below.
The terminals for connecting the flow meter/controller are located inside the Increased safety enclosure (as well as an optional anti-freeze thermostat, an optional isolating repeater and an optional display, *for the extended version only)*.
For installation of this unit the attached manual of the 8265 and the 8150 must be followed including the following points. For further information please see the attached Mini CORI-FLOW Instruction manual.

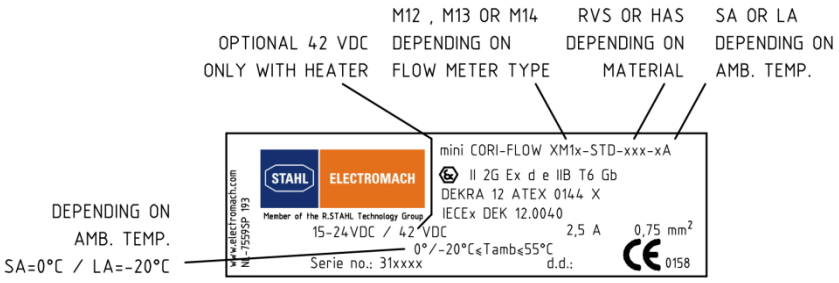
1. General:

- Periodic inspections must be executed according the EN/IEC 60079-17 latest version.
- Nothing in the unit may be altered without consent of the original manufacturer Electromach b.v.

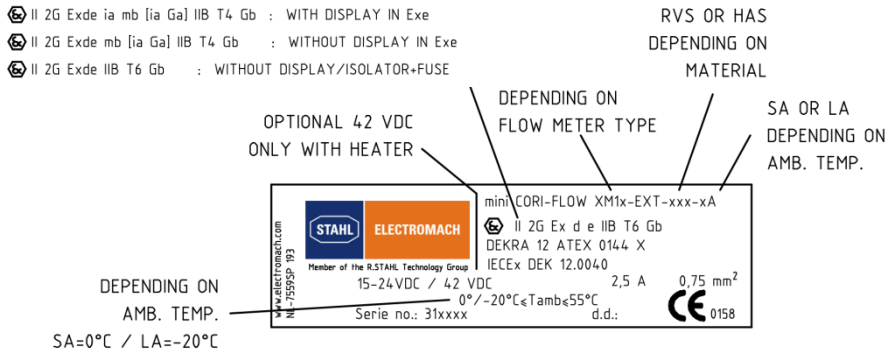
Type key:



Certification label Standard version:



Certification label Extended version:



2. Marking:

Marking:	II 2 G Ex d e IIB T6 Gb
Certificate number:	DEKRA 12ATEX0144 X
Notified body:	Dekra Certification (0158)
Marking:	Ex II 2 G Ex d e IIB T6 Gb (standard version) Ex II 2(1) G Ex d e mb [ia Ga] IIB T4 Gb (extended version without Ex i display) Ex II 2(1) G Ex d e ia mb [ia Ga] IIB T4 Gb (extended version with Ex i display)
Ambient temperature range:	**Standard Version** 0°C…+55°C (standard ambient – without heater) -20°C…+55°C (low ambient – with heater) **Extended version** 0°C…+40°C (standard ambient – without heater) -20°C…+40°C (low ambient – with heater)
Process temperature range:	0°C to 70°C
Process pressure:	max. 13,8 MPa (types XM12 and XM13) max. 10,7 MPa (type XM14)

Standards:

Standard version and Extended version

ATEX	EN 60079-0: 2012 EN 60079-1: 2007 EN 60079-7: 2007 EN 60079-11: 2012 EN 60079-18: 2015
IECEx	EN 60079-0: 2011 EN 60079-1: 2007 EN 60079-7: 2006 EN 60079-11: 2011 EN 60079-18: 2014
IP	EN 60529

3. Electrical connection:

The cables can be inserted in the increased safety (Exe) enclosure through the provided cable entries. The cable glands have the following entry/cable dimensions:

Hummel HSK-M-Exe M20x1,5: 6-12 mm. cable diameter
Hummel HSK-M-Exe M16x1,5: 3-7 mm. cable diameter

The above mentioned cable glands may only be used for fixed installation of Group II apparatus. The user shall ensure adequate clamping of the cable.

In case no cable glands are provided, the following cable glands can be used to insert cables and conductors into the enclosure:

- Plastic or metal cable glands for permanently installed cable conductors
- Plastic or metal cable glands with strain relief for conductors, that are not permanently installed To seal unused openings
- Plastic or metal stopping plugs can be used

Make sure that these components have an “EU Type Examination Certificate”, respectively an “IECEx Certificate of Conformity” with type of protection Exe. The IP degree of protection stated on the rating plate has to be observed.

Electrical connection to be made according the drawings/schematics and the following description.

Electrical data

Power supply: 15-24 VDC, max. 19W (standard version)
15-24 VDC, max. 35W (extended version)
Max. 42 VDC, 80W (For optional heater)

Terminal arrangement for customer connection

Optional Bus IN / Bus OUT (-XIN and -XOUT):
Terminals 1, 2, 3 and 4
Before connecting the BUS wiring to the terminals, check the used BUS Type according to the Model Key of the unit and the corresponding terminals. As shown in de appendix BUS HOOK-UP.

For extended version only: Optional External indicator 4-20mA (-Xi1)
Terminals 1, 2 and 3 (when used, X1-2 and X1-8 are not connected)

Instrument (-X1):
Terminal 1 – TX-RS232
Terminal 2 – Analog Output
Terminal 3 – Analog Inpunt
Terminal 4 – 0V power
Terminal 5 – + Valve out
Terminal 6 – RX-RS232
Terminal 7 – +Us
Terminal 8 – 0V Sense
Terminal 9 – Shield

4. Intrinsically safe parameters (for extended version only):

The intrinsically safe parameters for the isolating repeater 9164/13-20-06 are:

- Ui = 30 V
- Ii = 150 mA
- Pi = 1 W
- Ci = 0 nF
- Li = 0 mH
- U_o = 0 V
- I_o = 0 mA
- P_o = 0 W

Optionally an 9160 transmitter supply unit can be used.

5. Optional Heater connection:

The heater circuit shall be controlled using the three wire PT 100 or REx. The PT100 shall be controlled with a suitable temperature controller/transmitter (e.g. type 9182 make R. Stahl). The controller must be programmed in a way that at max. 70°C. the heaters are switched off. The clixon is installed in case the temperature inside the enclosure is too high due to any type of failure in the heater circuit or temperature controller.

Terminal arrangement for heater connection (max. 42VDC)

Heater/Clixon (-X2):
Terminal 1 and 2
3-wire PT100 (-X2):
Terminal 3, 4 and 5

For extended version only:

Terminal arrangement for heater connection max. 24V with anti-freeze REX 011 thermostat inside Exe enclosure

Heater/Clixon (-X2):
Terminal 1 and 2

6. Instruction for mini CORI-FLOW connection to the process:

- ***Fluid/gas connections***
  Bronkhorst High-Tech B.V. mini CORI-FLOW meters/controllers are equipped with compression or face-seal-fittings. For leak tight installation of compression type fittings make sure that the tube is inserted to the shoulder in the fitting body and that no dirt or dust is present on tube, ferrules or fittings. Tighten the nut finger-tight; while holding the instrument and then tighten the nut 1 turn. If applicable follow the guidelines of the supplier of the fittings. Special types of fittings are available on request.

  * Note: Always check your system for leaks, before applying fluid/gas pressure. Especially if toxic, explosive or other dangerous fluids are used.

- ***Piping***
  BE SURE THAT PIPING IS ABSOLUTELY CLEAN!
  DO NOT mount abrupt angles direct on in- and outlet, especially not with high flow rates. We recommend at least 20 pipe diameters distance between the angle and the instrument.
  Special care should be taken in regard to reducers placed just in front of the mini CORI-FLOW. High pressure drop and flow disturbance can occur which can influence the flow measurement of the mini CORI-FLOW.

- ***Temperature/pressure***

  The underneath mentioned maximum pressures and temperatures must be maintained when installing the product. For Standard Ambient temp. SA: 0°C and Low Ambient temp.: -20°C.

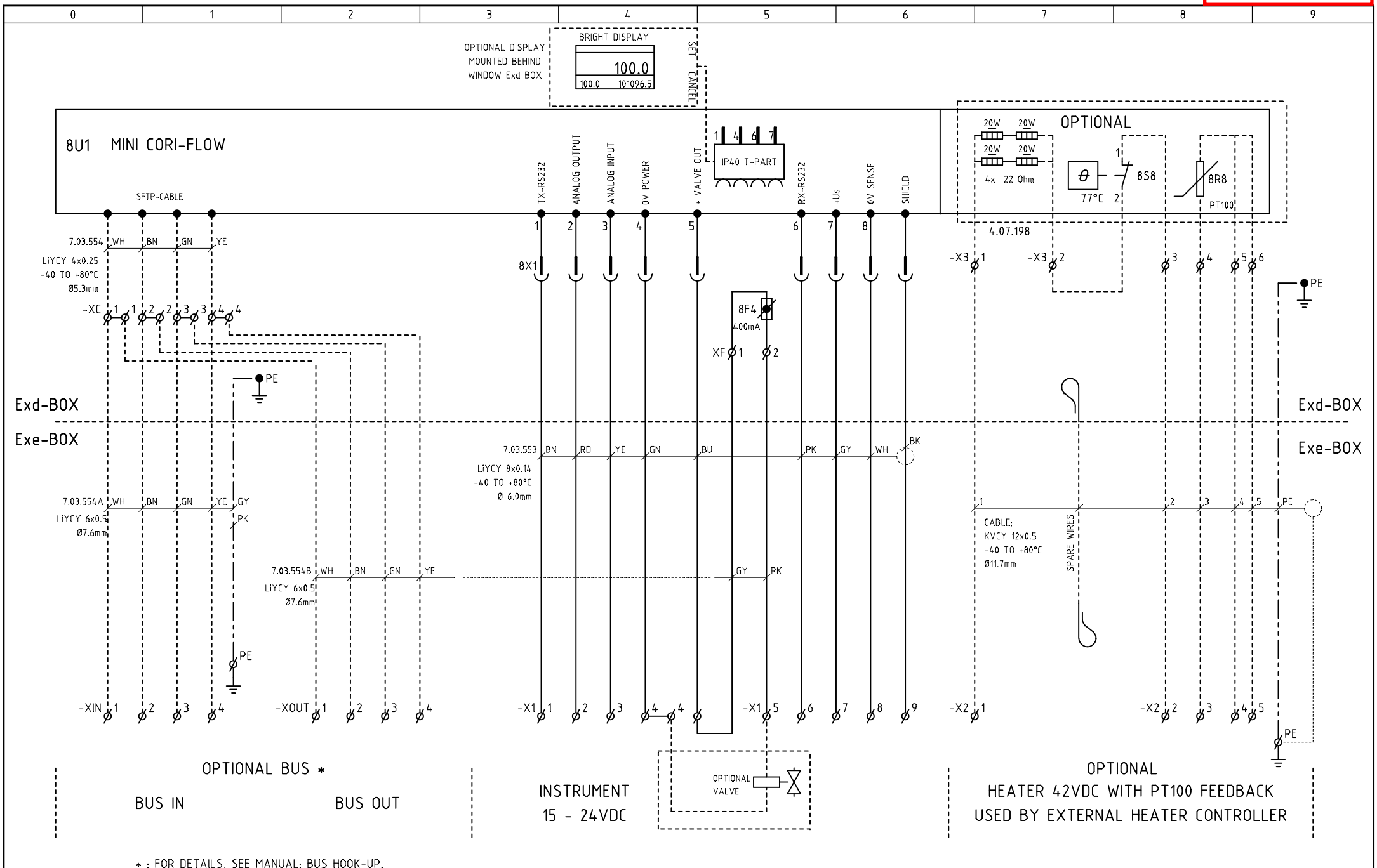
Max. permissible process pressure:	138 Bar (XM12 and XM13 versions) 107 Bar (XM14 version)
Ambient temperature **standard** version	0°/ -20 °C to +55 °C
Ambient temperature **extended** version	0°/ -20 °C to +40 °C
Process medium:	Gas/fluid combustible/non-combustible
Process temperature:	0°C. to +70°C.
PT100 control temperature:	Max. 70°C.

Appendix:

1. Wiring diagram standard version XM1x-STD sheet 8
2. Wiring diagram extended version XM1x-EXT sheet 8
3. Bus type Hook-Up sheet 10

- Manual flameproof enclosure (Ex d) type 8265
- Manual increased safety enclosure (Exe) type 8150

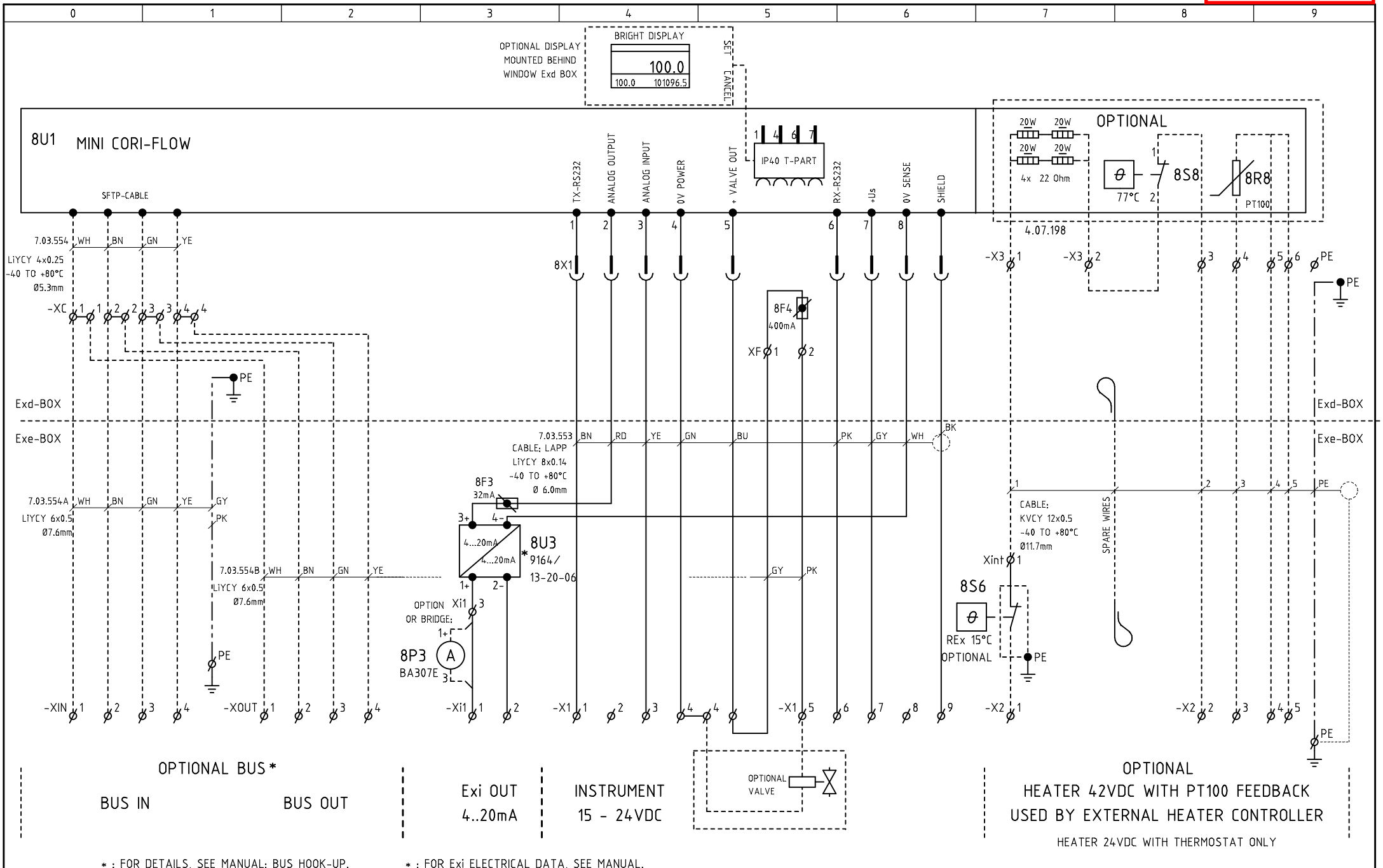
APPENDIX 1



* : FOR DETAILS, SEE MANUAL: BUS HOOK-UP.

TITLE: WIRING DIAGRAM	STAHL ELECTROMACH	REVISION:	DATE:	DRAWN:	CHECKED:	INTERNAL:	DATE:	DRAWN:	CHECKED:
CLIENT: BRONKHORST HIGH-TECH		FIRST ISSUE: 0	04-04-2017	JST	MBE	PROJECT/DRAWING No: XM1x-STD-xxx-xA			SHEET: 8
		ACTUAL: 0							

APPENDIX 2



* : FOR DETAILS, SEE MANUAL: BUS HOOK-UP.

* : FOR Exi ELECTRICAL DATA, SEE MANUAL.

TITLE: LAY-OUT Exd BOX		REVISION:	DATE:	DRAWN:	CHECKED:	INTERNAL:	DATE:	DRAWN:	CHECKED:
CLIENT: BRONKHORST HIGH-TECH	STAHL ELECTROMACH	FIRST ISSUE: 0	04-04-2017	JST	MBE	PROJECT/DRAWING No: XM1x-EXT-xxx-xA			SHEET: 8
		ACTUAL: 0							

0	1	2	3	4	5	6	7	8	9

PROFIBUS-DP

PROFIBUS-DP IN	
-XIN	
Pin 1	NC
Pin 2	Data A
Pin 3	NC
Pin 4	Data B
Housing	Shield

PROFIBUS-DP OUT	
-XOUT	
Pin 1	+5V out*
Pin 2	Data A
Pin 3	data gnd*
Pin 4	Data B
Housing	Shield

DeviceNet tm

DeviceNet IN	
-XIN	
Pin 1	+Us
Pin 2	0Vdc
Pin 3	CAN-H
Pin 4	CAN-L
Housing	Shield

DeviceNet OUT	
-XOUT	
Pin 1	+Us
Pin 2	0Vdc
Pin 3	CAN-H
Pin 4	CAN-L
Housing	Shield

* signals are for termination purpose only

Modbus

Modbus IN	
-XIN	
Pin 1	+Us
Pin 2	0V / Modbus common
Pin 3	D1 Modbus (B/B')
Pin 4	D0 Modbus (A/A')
Housing	Shield

Modbus OUT	
-XOUT	
Pin 1	+Us
Pin 2	0V / Modbus common
Pin 3	D1 Modbus (B/B')
Pin 4	D0 Modbus (A/A')
Housing	Shield

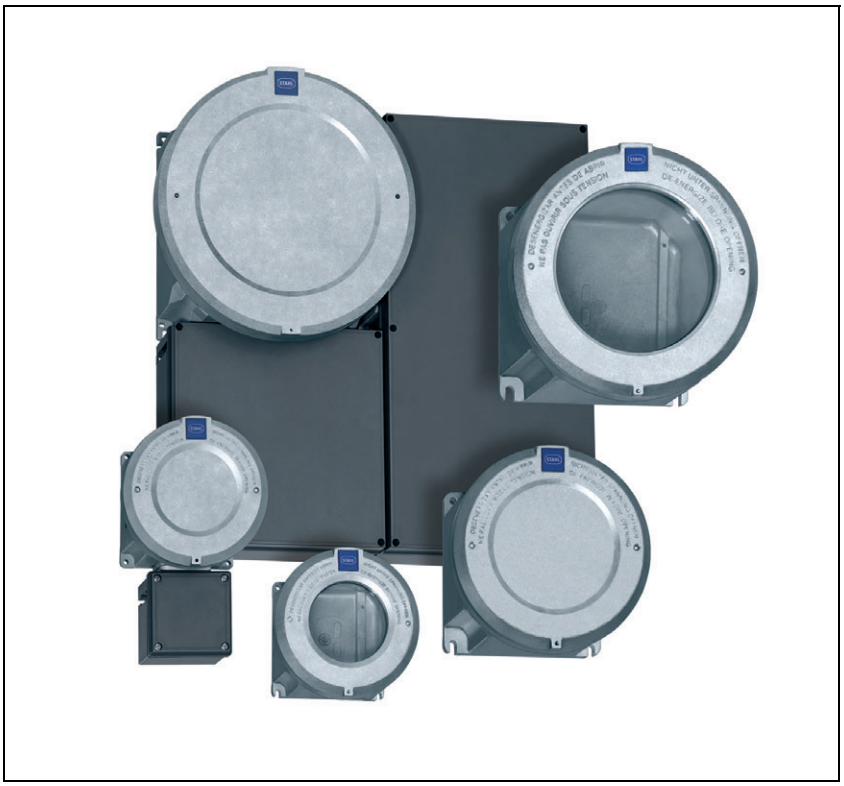
FLOW-BUS

FLOW-BUS IN	
-XIN	
Pin 1	+Us
Pin 2	0Vdc
Pin 3	RS485-A
Pin 4	RS485-B
Housing	Shield

FLOW-BUS OUT	
-XOUT	
Pin 1	+Us
Pin 2	0Vdc
Pin 3	RS485-A
Pin 4	RS485-B
Housing	Shield

Please check the used BUS type in the model key before connecting the wiring on the terminals XIN and Xout.

Bus Hook-Up Rev.0
Bronkhorst High-Tech
feb-17



Operating instructions

Additional languages www.stahl-ex.com

EN

GUBox

Ex d Enclosures made of Light Metal, Flameproof Encapsulation

Series 8265/0 Empty enclosure

Series 8265/4 control panel, integrated in Ex e enclosure

Series 8265/5 control panel

STAHL

EN

Contents

EN

EN

1 General Information

1.1 Manufacturer

R. STAHL Schaltgeräte GmbH
Am Bahnhof 30
74638 Waldenburg
Germany

Phone: +49 7942 943-0
Fax: +49 7942 943-4333
Internet: www.stahl-ex.com
E-Mail: info@stahl.de

1.2 Information regarding the operating instructions

ID-No.: 143457 / 826560300010
Publication Code: 2016-03-10·BA00·III·en·09

1.3 Further documents

Please see the following attached documents for further important information:

- Device list
- Circuit diagram

1.4 Conformity with standards and regulations

Conformity with standards and regulations is specified in the corresponding certificates and the EC Declaration of Conformity. These documents can be downloaded from our homepage www.stahl-ex.com.

2 Symbols Used

	Information sign: describes notes and recommendations.
	Warning symbol: danger due to energised parts!
	Warning symbol: danger due to explosive atmosphere!
	Warning symbol: danger due to hot surfaces!
	Warning symbol: general hazard

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8265/0, 8265/4

Symbol	Meaning
NB 0158 16338E00	ATEX-Notified Body for Quality Assessment.
 02198E00	According to marking, device approved for hazardous areas.

8265/5

Symbol	Meaning
CE 0158 05594E00	CE marking according to the currently applicable directive.
 02198E00	According to marking, device approved for hazardous areas.

3 General Safety Notes

3.1 Operating instructions storage

Read these operating instructions carefully and store them near the installation place. For correct operation, observe all enclosed documents and the operating instructions of the equipment to be connected.

3.2 Safety notes

⚠ WARNING	
	**Use the devices only for their intended purpose!** ▶ We cannot be held liable for damage caused by incorrect or unauthorized use or by non-compliance with these operating instructions. ▶ Use the device only if it is undamaged.

⚠ WARNING	
	**Any unauthorized work on the device is prohibited!** Installation, maintenance, overhaul and repair may only be carried out by appropriately authorised and trained personnel.

Observe the following information during installation and operation:

- Any damage may compromise the explosion protection
- National and local safety regulations
- National and local accident prevention regulations
- National and local assembly and installation regulations
- Generally recognized technical regulations
- Safety notes in these operating instructions
- Characteristic values and rated operating conditions on the rating plates and data plates
- Additional information plates on the device

3.3 Modifications and alterations

⚠ WARNING	
	**Alterations and modifications to the device are not permitted.** We shall not accept any liability or warranty obligations for damage resulting from alterations and modifications.

3.4 Special Versions

In case of additional/different order options, special versions may differ from the description given here.

4 Intended Use

The enclosures are used to build motor starters, control stations and terminal boxes. They are suitable for being mounted in measuring equipment and customer-specific control panels.
This technology allows using sparking and arcing equipment in zones 1 and 2.
The built-in components are standard electrical and switching devices, being designed and wired according to customer specifications.
The enclosure units can be installed as components in Ex e control systems. A typical application is as circuit breakers for motor protection in light and heating circuits.
Flameproof cable glands for directly introducing the cable into the enclosure or threaded holes for conduit connection are possible. For indirect cable entry, however, enclosures with terminal compartments of "Increased safety" of the series 8146, 8125 and 8150 are used.

EN

5 Technical data

Explosion Protection	
Global (IECEx)	
Gas and dust	8265/0: IECEx PTB 07.0027 U 8265/4: IECEx PTB 07.0028 U 8265/5: IECEx PTB 07.0029 8265/0: Ex db eb IIC Gb 8265/4: Ex db eb ia ib [ia Ga] IIC Gb 8265/5: Ex db eb ia ib [ia Ga] IIC T6, T5, T4 Gb 8265/0: Ex tb IIIC Db 8265/5: Ex tb IIIC T 80°C, T 95°C Db
Europe (ATEX)	
Gas and dust	8265/0: PTB 06 ATEX 1023 U 8265/4: PTB 06 ATEX 1076 U 8265/5: PTB 06 ATEX 1077 8265/0: ⟨Ex⟩ II 2 G Ex db eb IIC Gb 8265/4: ⟨Ex⟩ II 2 G Ex db eb ia ib [ia Ga] IIC Gb 8265/5: ⟨Ex⟩ II 2 G Ex db eb ia ib [ia Ga] IIC Gb T6, T5, T4 Gb 8265/0: ⟨Ex⟩ II 2 D Ex tb IIIC Db 8265/5: ⟨Ex⟩ II 2 D Ex tb IIIC T 80°C, T 95°C Db

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Technical Data

Rated cross section

Enclosure	Cross-section
Size 1 Size 2 Size 3 Size 4	max. 95 mm^2
Size 5 Size 6	max. 120 mm^2

Rated operational voltage U_e

Standard:	1000 V
Special:	10 kV – depending on the cable entries or bushings used or depending on the corresponding built-in equipment.

Rated operational current I_e

Enclosure	Current
Size 1 Size 2 Size 3 Size 4	max. 160 A
Size 5 Size 6	max. 250 A

Refer to the rating and data plates of the devices!

Degree of protection

IP54 without O-ring
IP66 with O-ring silicone -60 °C ... +60 °C (Ex tb IIIC Db)

Enclosure

Aluminium, copper-free (seawater-resistant) AL Si7Mg03 according to EN 13195.
Upon direct contact with seawater, a coating is recommended.

EN

Technical Data

Power dissipation and temperature class

Enclosure	Ambient temperature range			
	Temperature class T6		Temperature class T5	
	max. +60 °C	max. +40 °C	max. +60 °C	max. +40 °C
Size 1 not painted	13 W	27 W	22 W	38 W
Size 1 painted	16 W	35 W	28 W	49 W
Size 2 not painted	18 W	40 W	35 W	58 W
Size 2 painted	23 W	52 W	45 W	75 W
Size 3 not painted	23 W	58 W	52 W	85 W
Size 3 painted	26 W	75 W	67 W	110 W
Size 4 not painted	38 W	85 W	72 W	130 W
Size 4 painted	49 W	110 W	93 W	169 W
Size 5 not painted	49 W	117 W	96 W	190 W
Size 5 painted	63 W	152 W	124 W	247 W
Size 6 not painted	58 W	138 W	115 W	205 W
Size 6 painted	75 W	179 W	149 W	266 W

Max. number of holes

Maximum number of metrical bores for each enclosure side

Enclosure	M20 x 1.5	M25 x 1.5	M32 x 1.5	M40 x 1.5	M50 x 1.5	M63 x 1.5	M75 x 1.5	M90 x 1.5	M105 x 1.5
Size 1	3	1	1	1	--	--	--	--	--
Size 2	3	2	2	1	--	--	--	--	--
Size 3	8	4	3	2	1	1	1	--	--
Size 4	16	9	6	4	3	1	1	--	--
Size 5	18	9	8	5	3	2	1	1	--

EN

Technical Data

Max. number of conduit holes

Maximum number of conduit bores for each enclosure side

Enclosure	1/2“	3/4“	1“	1 1/4“	1 1/2“	2 “	2 1/2“	3“
Size 1	2	1	1	1	--	--	--	--
Size 2	2	2	1	1	--	--	--	--
Size 3	5	3	2	2	1	1	--	--
Size 4	10	6	5	4	3	2	--	--
Size 5	12	9	6	5	3	2	1	1
Size 6	18	12	8	6	6	3	2	1

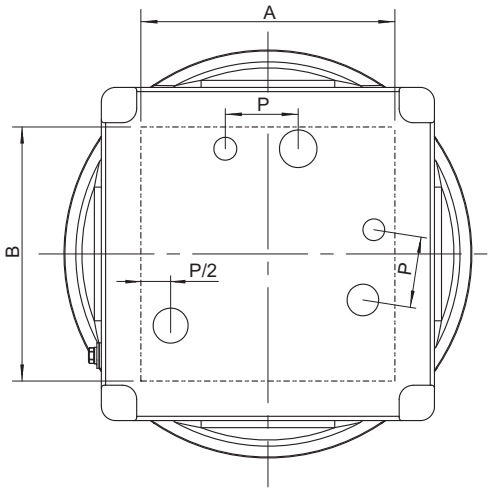
Bores with connection chamber

Maximum permitted threaded holes for bushings and actuating bushings for each enclosure side

Thread size *)	M10 x 1	M15 x 1.5	M16 x 1.5	M20 x 1.5	M24 x 1.5	M33 x 1.5	M42 x 1.5	M48 x 1.5	M56 x 1.5
Size 1	3	2	2	1	1	1	--	--	--
Size 2	3	2	2	1	1	1	--	--	--
Size 3	7	4	4	3	3	2	--	--	--
Size 4	20	12	12	8	7	4	3	2	1
Size 5	28	15	15	10	8	6	3	2	1
Size 6	43	20	20	15	11	8	4	3	2

*) Thread according to ISO 965-1/-3, tolerance class medium or higher. Other types of threads which meet the requirements according to IEC/EN 60079-1, Tables 3 and 4, are possible.
For thread dimensions which are between the values specified in the table, the maximum number depends on the next larger thread size specified in the table.

Base and cover installation



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Surface for base installation		
Enclosure	Length A in mm	Width B in mm
Size 1	60	45
Size 2	84	68
Size 3	112	96
Size 4	120	152
Size 5	180	80
Size 6	200	148

Maximum number of thread entries in the base (NPT/NPSM)											
Size	1/2“ NPT	3/4“ NPT	3/4 ... 1/4“ NPSM	1“ NPT	1“ NPSM	1 1/4“ NPT	1 1/4“ NPSM	1 1/2“ NPT	2“ NPT	2 1/2“ NPT	3“ NPT
Size 1	2	1	1	1	1	1	--	--	--	--	--
Size 2	2	2	2	1	1	1	1	1	--	--	--
Size 3	3	3	3	1	1	1	1	1	1	--	--
Size 4	5	5	5	2	2	2	2	1	1	1	--
Size 5	5	5	5	2	2	2	2	1	1	1	--
Size 6	5	5	5	2	2	2	2	1	1	1	1

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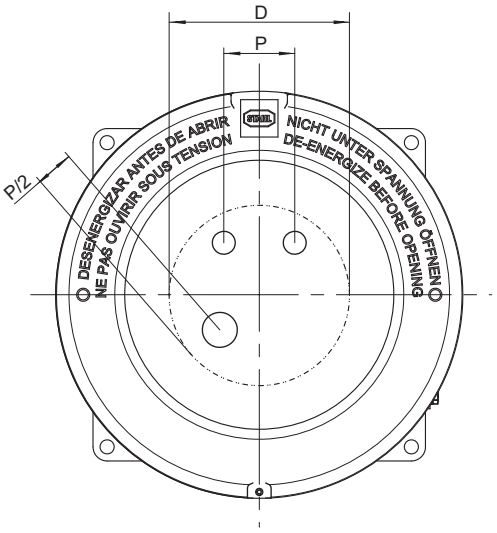
Maximum number of metrical entries in the base					
Size	M10 x 1.5; M14 x 1.5; M15 x 1.5; M16 x 1.5	M20 x 1.5; M24 x 1.5; M25 x 1.5	M32 x 1.5; M33 x 1.5; M36 x 1.5	M40 x 1.5; M42 x 1.5; M48 x 1.5; M50 x 1.5; M56 x 1.5; M63 x 1.5	M75 x 1.5
Size 1	2	1	1	--	--
Size 2	2	1	1	1	--
Size 3	3	2	1	1	--
Size 4	4	2	2	1	--
Size 5	4	2	2	1	--
Size 6	5	3	3	1	1



12806E00

Surface for ceiling installation	
Enclosure	Diameter D in mm
Size 1	75
Size 2	107
Size 3	143
Size 4	191
Size 5	208
Size 6	208

Maximum number of thread entries in the ceiling (NPT/NPSM)			
Size	3/4 ... 1/4“ NPSM	1“ NPSM	1 1/4“ NPSM
Size 1	1	--	--
Size 2	2	--	--
Size 3	3	--	--
Size 4	5	--	--

Size 5	8	3	3
Size 6	8	3	3

Maximum number of metrical entries in the ceiling		
Size	M10 x 1.5; M14 x 1.5; M15 x 1.5; M16 x 1.5; M20 x 1.5	M24 x 1.5; M25 x 1.5
Size 1	2	1
Size 2	3	2
Size 3	5	3
Size 4	7	5
Size 5	8	8
Size 6	8	8

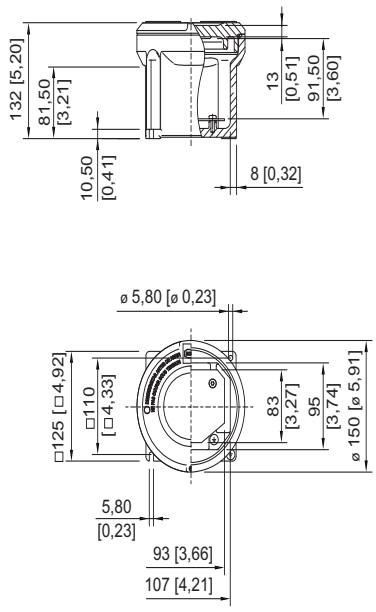
6 Transport and storage

- Transport and storage are only permitted in the original packaging.
- The devices must be stored in a dry place and vibration-free.

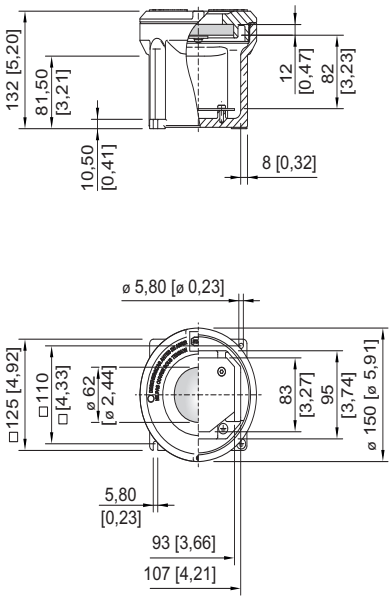
7 Installation

7.1 Dimensions / fastening dimensions

Dimensional drawings (All dimensions in mm/inches) - subject to alterations



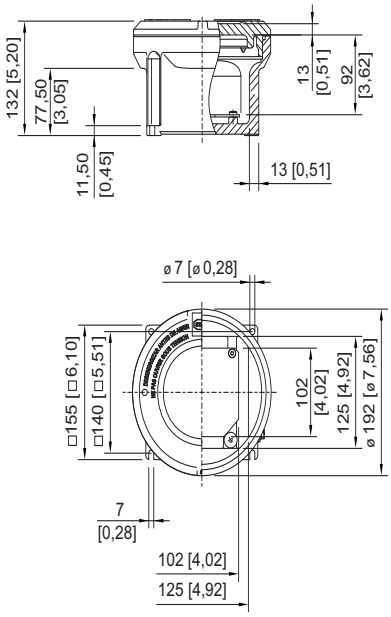
Enclosure size 1
8265/.1-000,
without inspection window



Enclosure size 1
8265/.1-001,
with inspection window

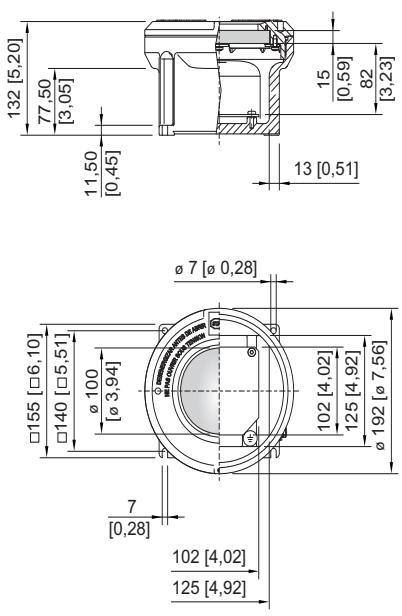
EN

Dimensional drawings (All dimensions in mm/inches) - subject to alterations



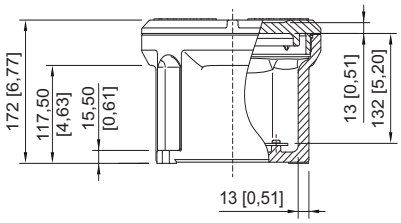
05575E00

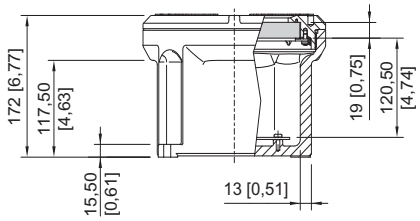
Enclosure size 2
8265/.2-000,
without inspection window

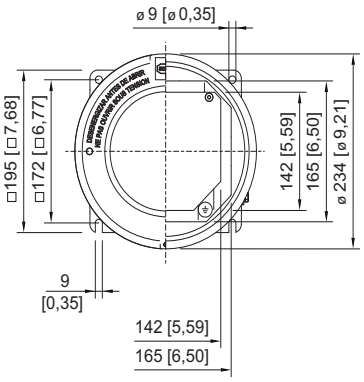


05578E00

Enclosure size 2
8265/.2-001,
with inspection window

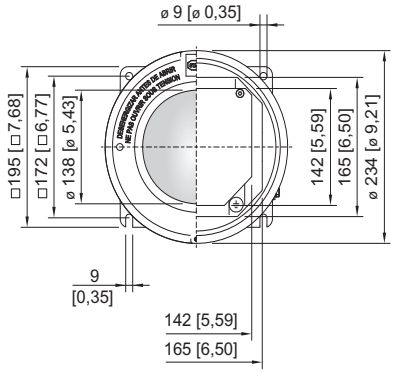






05580E00

Enclosure size 3
8265/.3-000,
without inspection window

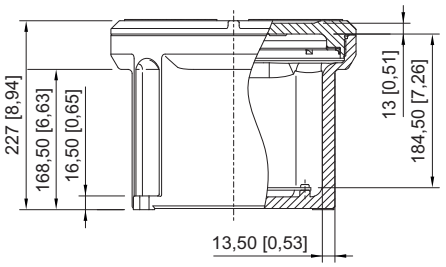


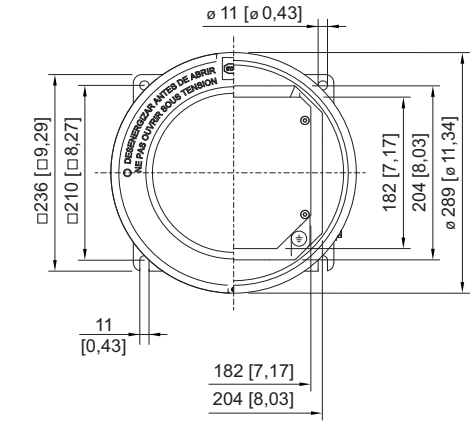
05581E00

Enclosure size 3
8265/.3-001,
with inspection window

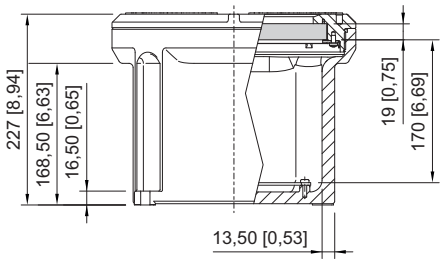
EN

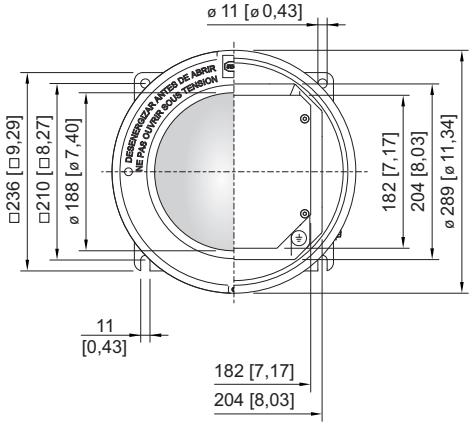
Dimensional drawings (All dimensions in mm/inches) - subject to alterations





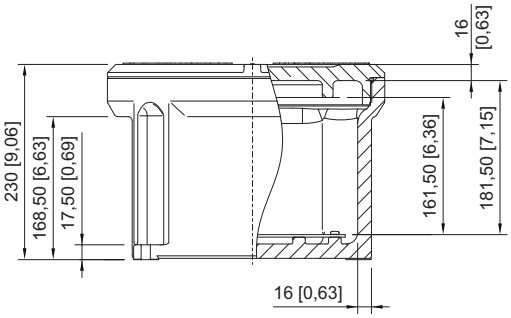
05584E00

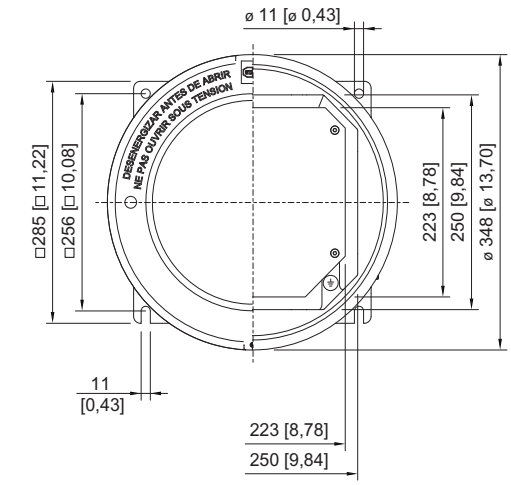




05588E00

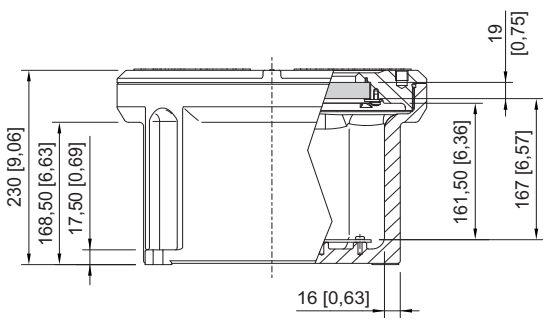
Enclosure size 4
8265/.4-000,
without inspection window

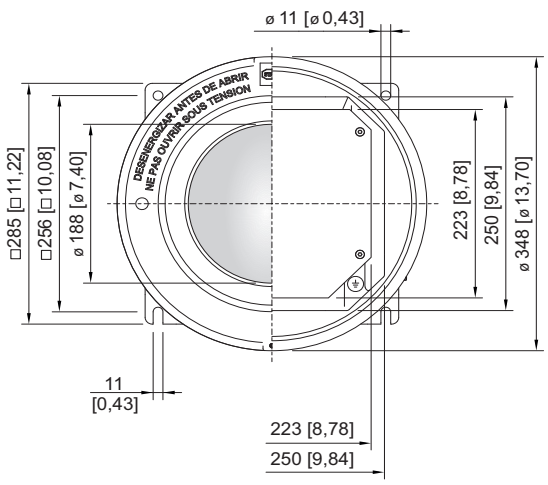




11398E00

Enclosure size 4
8265/.4-001,
with inspection window



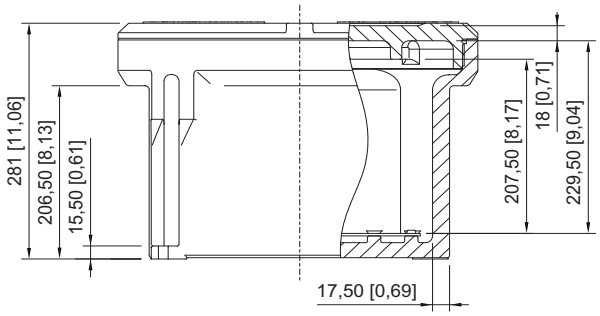


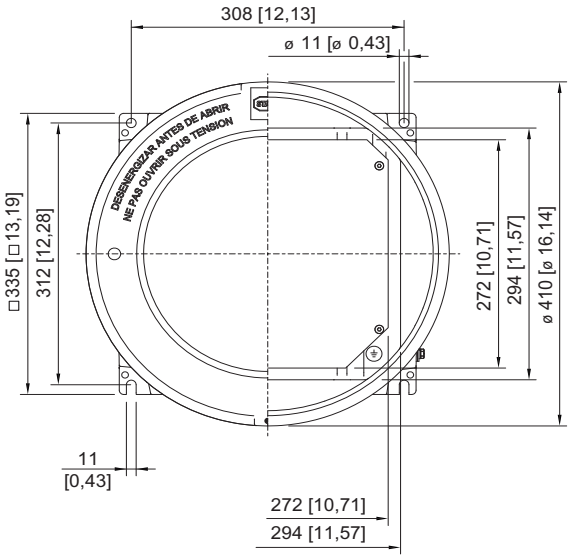
11399E00

EN

Dimensional drawings (All dimensions in mm/inches) - subject to alterations

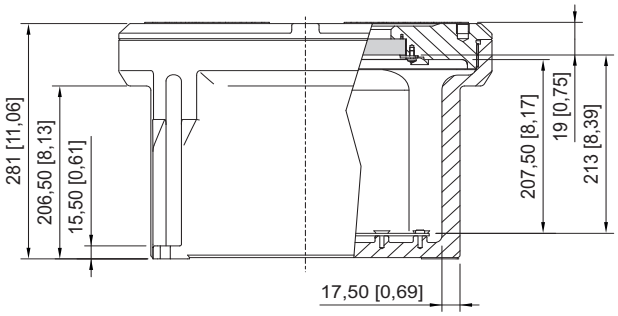
Enclosure size 5
8265/.5-000,
without inspection window

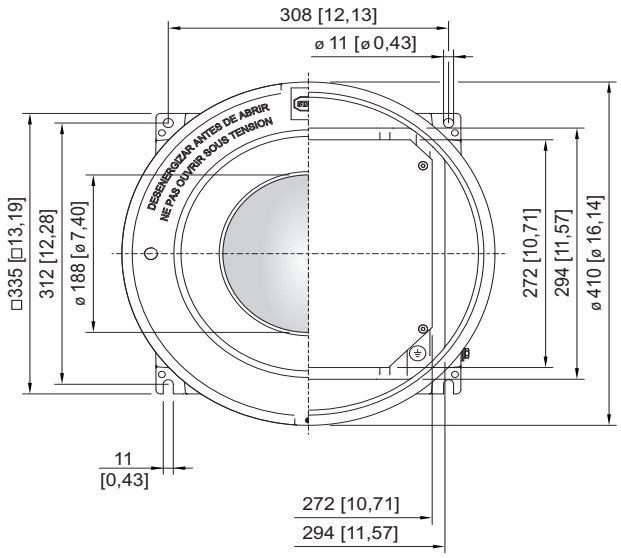




13133E00

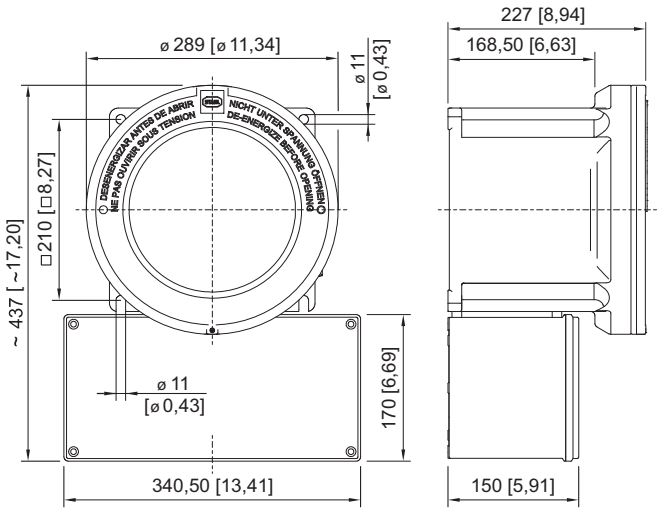
Enclosure size 5
8265/.5-001,
with inspection window





13134E00

Enclosure size 6
8265/.6-000,
without inspection window



05589E00

Enclosure size 6
8265/.6-001,
with inspection window

Enclosure size 4
8265/.4-000,
with connection chamber 8146/.S7.

7.2 Installation Conditions

⚠ WARNING
Inadmissible mechanical load! ▶ Protect the device from mechanical load.

☞	This device is suitable for outdoor and indoor use.
☞	If the explosion protected equipment is exposed to the weather, it is advisable to provide a protective cover or wall.

Internal wiring

☞	Use only wires which can be used for the corresponding temperature.

7.3 Mounting and Operating Position

⚠ WARNING	
	**Incorrectly performed installation!** ▷ Risk of severe injuries. ▶ Observe the thread sizes for the cable entries specified in the equipment documentation. ▶ The connection line must comply with the relevant regulations and must have the required cross-section. The diameter must be identical to the data on the bushing. ▶ Ensure that the maximum permissible conductor temperatures are not exceeded by selecting suitable wires and means of running them. ▶ The permissible ambient temperature at the intrinsically safe built-in devices and components must not be exceeded. ▶ The switchgear combination must only be installed in a dry and clean environment.

⚠ WARNING	
	**Installation in dust Ex areas!** ▶ The control panel 8265/5*-*** must not be used in areas where highly charge-generating processes, machine friction and separation processes, electron spraying (e.g. around electrostatic coating systems) and pneumatically conveyed dust occur.

⚠ WARNING	
	**Increased temperature due to connection cable!** ▶ If the selected connection cable causes a temperature of more than 70 °C at the cable entries, the cable entries must be designed for the corresponding temperature.

☞	Fasten the device to the attachment holes provided for this purpose using suitable screws and accessories (see dimensional drawings).
☞	Observe the weight of the enclosure! If necessary, use suitable auxiliary tools for transport.
☞	When mounting the component, ensure presence of a flat surface.

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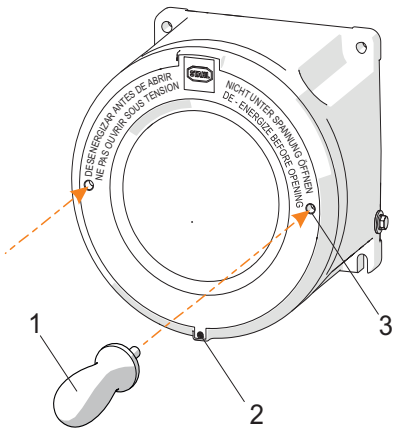
Empty enclosure

☞	The operating position is optional.

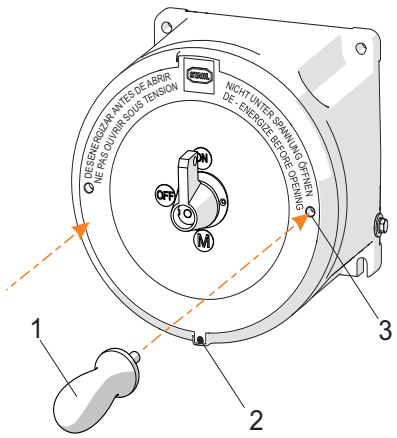
Control panel

☞	For the operating position, please refer to the enclosed documentation.

Opening the enclosure cover

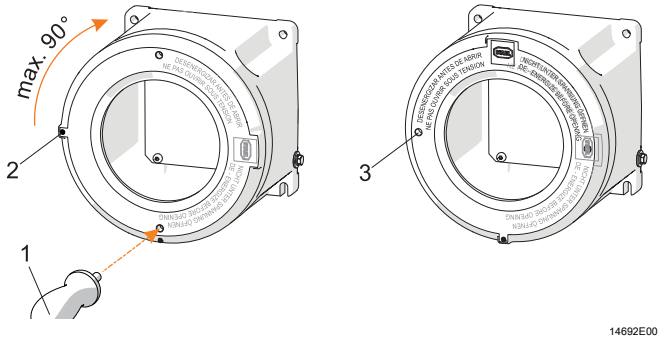


- Loosen the threaded pin (2).
- Insert the key (1) into the hole (3) and unscrew the enclosure cover.
- Place the enclosure cover carefully aside.

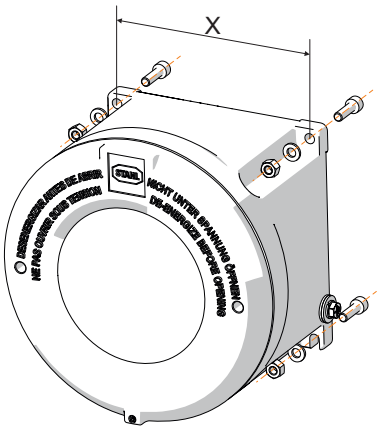


- To open the cover, move the handle to the OFF position.
- Pull the handle upward and move it to the M position.
- Loosen the threaded pin (2).
- Insert the key (1) into the hole (3) and unscrew the enclosure cover.
- Place the enclosure cover carefully aside.

Closing the enclosure cover



- Lubricate the thread with OKS 403 grease.
- Attach the enclosure cover to the enclosure.
- Insert the spanner (1) into the hole (3) and screw down the enclosure cover evenly.
- Unscrew the enclosure cover by max. 90° so that the logo is at the top of the enclosure.
- Tighten the threaded pin (2).



05997E00

- Place the Ex d enclosure on two screws (for distance “x”, see dimensional drawings).
- Fasten the Ex d enclosure by means of two further screws.
- Tighten all screws.

7.4 Electrical Connection

- The information given in chapter "Technical Data" must be observed.
- The conductor must be connected carefully.
- The conductor insulation must reach to the clamping units.
- Do not damage the conductor (nicking) when stripping it.
- Ensure that the maximum permissible conductor temperatures and the maximum permissible surface temperature are not exceeded by selecting suitable electric lines and means of running them.

⚠ WARNING
Incorrectly routed wires in the Ex e connection chamber! ▷ If lines have not been installed correctly, explosion protection is no longer guaranteed. ▶ Strictly adhere to the required creepage distances and clearances. ▶ Mounting rails or elements must be fastened properly.

Intrinsically safe circuits

⚠ WARNING	
	**Danger due to incorrectly dimensioned cables and wires!** ▷ Risk of severe injuries. ▶ Use only insulated cables and wires whose testing voltage is AC 500V and whose minimum quality is H05. ▶ The diameter of one conductor must not be smaller than 0.1 mm. ▶ The diameter of individual wires of finely stranded conductors must not be smaller than 0.1 mm.

EN

Insulation test voltage

With regard to the insulation and separation of terminals and cables, it should be noted that the insulation test voltage is derived from the sum of the rated operating voltages of intrinsically safe circuits.

"Intrinsically safe against earth"

In case of "intrinsically safe against earth" then the insulation voltage value is at least 500 V (or double the value of the intrinsically safe circuit rated operational voltage).

“Intrinsically safe against non intrinsically safe“

In case of "intrinsically safe against non-intrinsically safe", then the insulation voltage value is at least 1500 V (double the sum of the rated operational voltage of intrinsically-safe circuits plus 1000 V).

⚠ WARNING	
	**Danger due to incorrectly routed cables and wires!** ▷ Risk of short circuit. ▶ Wires and cables must be at a minimum distance of 8 mm to wires and cables of other intrinsically safe circuits. **Exception**: The cores of intrinsically safe or non-intrinsically safe circuits are protected by an earthed shield.

☞	A distance of 50 mm around an insulating (≥ 1 mm thick) or earthed metal (≥ 0.45 mm thick) isolating plate must be provided between the connection points of intrinsically safe and non-intrinsically safe circuits. An isolating plate at a distance of ≤ 1.5 mm to the enclosure wall must be provided between the connection points of intrinsically safe and non-intrinsically safe circuits.

EN

Terminal blocks in Ex e terminal compartment

☞	Pay attention to the test certificate of the terminals. Only one conductor may be connected to each terminal. Terminal bridging is only permitted if original I.S. accessories have been used. Equip with the necessary partitions as needed. For additional protection against splaying use crimped wire-end sleeves or cable lugs. The cross section of the splay protection must meet the conductor cross section.

External wiring

Run the connecting cables with intact external insulation jackets through the cable entries into the connection chamber.
Make sure that the cable diameter and the clamping cross-section on the cable entry are identical.
Tighten the hexagon nuts of the cable entry in such a way that the tightness of the connection chamber and the strain relief protection at the connection point are guaranteed. To determine the tightening torques, refer to the operating instructions of the individual components.
Run the connecting wires in the connection chamber such that:

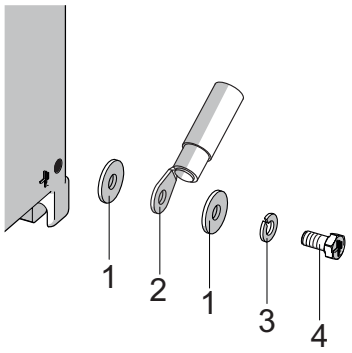
- the bending radii for the respective conductor cross-section do not fall below the minimum permissible values.
- mechanical damage to the conductor insulation due to rubbing against sharp-edged metal parts is avoided.

Terminals

Tighten the screws of the connection terminals in accordance with the specified tightening torques.

Screw dimensions	M3	M4	M5	M6	M8	M10
Tightening torque [Nm]	0.8	2.0	3.5	5.0	10.0	17.0

Protective earth conductor



05592E00

- The protective earth conductor must always be connected to the enclosure using a cable lug (2). Place a washer (1) above and below the cable lug and secure the screw (4) using a locking device (3).
- Regardless of the operating voltage, connect all bare, non-energised metal parts to the protective system.
- The external protective earth conductor is designed to be fitted with a cable lug. The cable must be run and fixed near to the enclosure to prevent movement of the cable.

EN

7.4.1 Making Additional through Holes

If additional through holes are required, for example for fastening cable glands, breathers or other built-in parts in the enclosure, the following has to be observed:

- When determining positions of the through holes, observe the mounting distance to ensure collision-free mounting.
- Space requirements result from the width across corners of the cable gland plus the space required for the tool used to fasten the cable gland.
- Adjust the hole diameters to the dimensions of the built-in parts and/or their seals.
- Measure the dimensions on the plane surfaces of the inner side of the enclosure, not on the outer side of the enclosure.
- Make sure that the through holes are located on the plane surfaces of the enclosure sides with parallel running interior and exterior contours.
- Additional through holes can be bored, laser-cut or punched.
- During punching make sure that the surfaces remain flat.
- Do not damage circumferential sealing lips.

8 Commissioning

⚠ WARNING	
	**Check the device before commissioning!** To ensure correct operation, check the device before commissioning.

Before commissioning, ensure that:

- ✗ no components are damaged
- ✗ the device has been installed according to regulations
- ✗ there are no foreign bodies inside the device
- ✗ all detachable connections have been tightened firmly
- ✗ the prescribed tightening torques have been observed
- ✗ the connection has been performed correctly

⚠ WARNING	
	**Danger due to unauthorized cable entries!** ▷ If unauthorized cable entries are used, explosion protection can no longer be guaranteed. ▶ Use only cable entries approved for the required type of protection.

⚠ WARNING	
	**Danger due to open bores or unused cable entries on the Ex e enclosure!** ▷ The explosion protection can no longer be guaranteed if bores or unused cable entries of the Ex e enclosure are left open. ▶ Close open bores using stopping plugs certified in accordance with Directive 94/9/EC (e.g. type 8290) and unused cable entries using plugs certified in accordance with Directive 94/9/EC (e.g. type 8161).

9 Operation

9.1 Function

The function depends on the built-in components.

10 Maintenance, Overhaul and Repair

10.1 Maintenance

Regular maintenance work:

- Consult the relevant national regulations (e.g. IEC/EN 60079-17) to determine the type and extent of inspections.
- Plan the intervals such that any expected defects are detected promptly.

⚠ WARNING	
	**Danger due to live parts!** ▷ Risk of severe injuries. ▶ All connections and wiring must be disconnected from the power supply. ▶ Secure the connections against unauthorized switching.

⚠ WARNING
Installation work only by the qualified personnel! ▶ Installation work may only be carried out by appropriately authorized and trained personnel. ▶ Observe the relevant national regulations in the country of use.

10.2 Cleaning

✗ Clean with a cloth, brush, vacuum cleaner or similar items.
✗ When cleaning with a damp cloth, use water or mild, non-abrasive, non-scratching cleaning agents.
✗ Never use aggressive cleaning agents or solvents.

10.3 Repair instructions

- Replace the device.

11 Disposal

Observe the national waste disposal regulations.

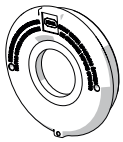
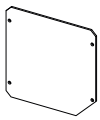
EN

12 Accessories and Spare parts

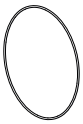
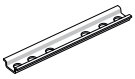
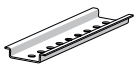
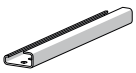
⚠ WARNING
Serious risk of injury! ▶ Use only original accessories as well as original spare parts by R. STAHL Schaltgeräte GmbH. ▶ Use of other spare parts or accessories can invalidate the explosion protection.

Accessories and spare parts can be found on the data sheet on our homepage: www.stahl-ex.com.

Accessories and Spare Parts

Designation	Figure	Description		Art. no.	Weight kg
Cover with inspection window	 11400E00	for enclosure: Visible cutout of the inspection window	Size 1 Ø 62 mm	211037	0.890
		for enclosure: Visible cutout of the inspection window	Size 2 Ø 100 mm	209698	5.495
		for enclosure: Visible cutout of the inspection window	Size 3 Ø 138 mm	143452	2.232
		for enclosure: Visible cutout of the inspection window	Size 4 Ø 188 mm	143453	3.856
		for enclosure: Visible cutout of the inspection window	Size 5 Ø 186 mm	211041	5.303
		for enclosure: Visible cutout of the inspection window	Size 6 Ø 188 mm	201886	9.220
Mounting plate	 11401E00	for enclosure size 1		208862	0.120
		for enclosure size 2		143484	0.189
		for enclosure size 3		143485	0.364
		for enclosure size 4		143486	0.744
		for enclosure size 5		143487	1.070
		for enclosure size 6		143488	1.700

Accessories and Spare Parts

Designation	Figure	Description	Art. no.	Weight kg
O-Ring	 11402E00	Silicone, for enclosure size 1	211270	0.006
		Silicone, for enclosure size 2	221717	0.008
		Silicone, for enclosure size 3	221718	0.010
		Silicone, for enclosure size 4	221719	0.012
		Silicone, for enclosure size 5	211271	0.020
		Silicone, for enclosure size 6	221720	0.026
Drain and breather valve	 15776E00	with thread $^{3}/_{8}$“	107998	0.026
		with thread $^{1}/_{2}$“	107999	0.090
Mounting rail	 14856E00	TS15 L 80 mm for enclosure size 1	212425	0.013
		TS15 L 90 mm, diagonal for enclosure size 1	212338	0.010
		TS15 L 105 mm for enclosure size 2	143497	0.018
		TS15 L 133 mm for enclosure size 3	137902	0.020
		TS15 L 189 mm for enclosure size 4	137908	0.029
		TS15 L 218 mm for enclosure size 5	212427	0.030
		TS15 L 280 mm for enclosure size 6	166448	0.049
	 09671E00	TS35 L 80 mm for enclosure size 1	212424	0.027
		TS35 L 90 mm, diagonal for enclosure size 1	212339	0.025
		TS35 L 105 mm for enclosure size 2	143498	0.037
		TS35 L 133 mm for enclosure size 3	137970	0.040
		TS35 L 189 mm for enclosure size 4	137976	0.060
		TS35 L 218 mm for enclosure size 5	212426	0.033
		TS35 L 280 mm for enclosure size 6	166449	0.100
	 15760E00	G32 L 133 mm for enclosure size 3	137939	0.020
		G32 L 189 mm for enclosure size 4	137945	0.130
		G32 L 218 mm for enclosure size 5	212428	0.135
		G32 L 280 mm for enclosure size 6	166450	0.200

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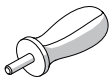
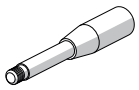
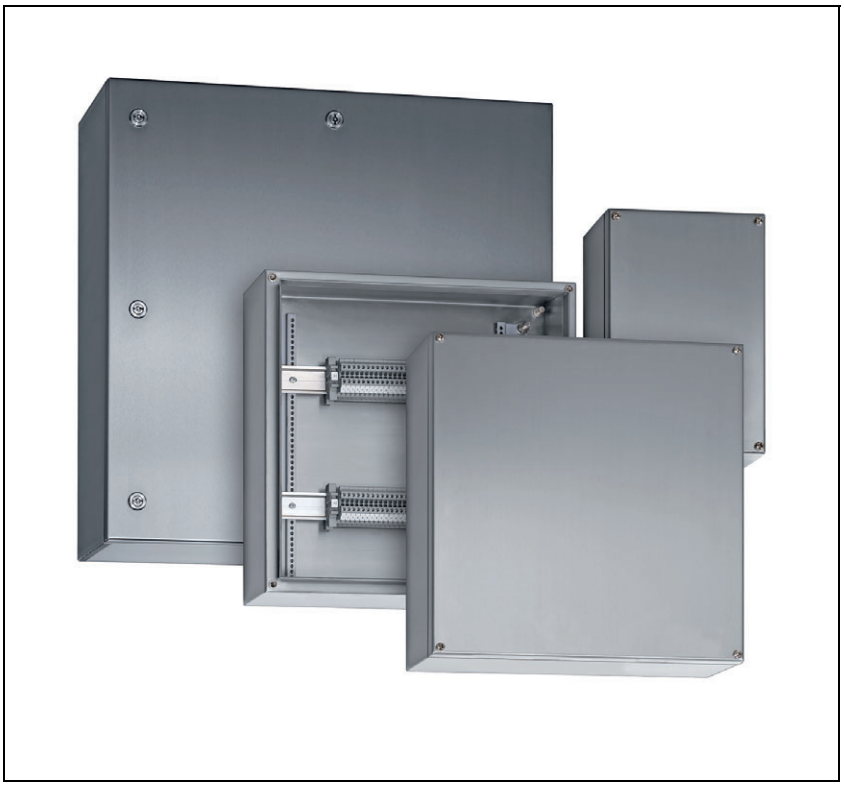
Accessories and Spare Parts

Designation	Figure	Description	Art. no.	Weight kg
Grub screw	 05984E00	M5x16-A2 with hexagon socket and pointed tip	110216	0.001
Key	 05986E00	to open the enclosure cover for size 1, 2, 3, 4 2 wrenches are required.	142059	0.060
Adjustable wrench	 13135E00	to open the enclosure cover for size 5, 6 2 wrenches are required.	221927	0.214

EN



Operating Instructions

Additional Languages Www.stahl-ex.com

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Terminal Box

Series 8150/1,
Series 8150/2

– Save For Future Use! –

EN

Contents

1 General Information

1.1 Manufacturer

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Germany

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Internet: www.stahl-ex.com
E-Mail: info@stahl.de

1.2 About these operating instructions

- Read these operating instructions, especially the safety notes, carefully before use.
- Observe all other applicable documents (see also "Further documents" section).
- Keep the operating instructions throughout the service life of the device.
- Make the operating instructions accessible to operating and maintenance personnel at all times.
- Pass the operating instructions on to each subsequent owner or user of the device.
- Update the operating instructions every time you receive an amendment to them from R. STAHL.

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The original instructions are the German edition.
They are legally binding in all legal affairs.

1.3 Further documents

- Data sheet
- EU Type Examination Certificate

For documents in additional languages, see www.stahl-ex.com.

1.4 Conformity with standards and regulations

- Certificates and EU Declaration of Conformity: www.stahl-ex.com.
- The device has IECEx approval. See IECEx homepage: http://iecex.iec.ch/

EN

2 Explanation of the symbols

2.1 Symbols in these operating instructions

Symbol	Meaning
	Tip for making work easier
 **DANGER!**	Dangerous situation which can result in fatal or severe injuries causing permanent damage if the safety measures are not complied with.
 **WARNING!**	Dangerous situation which can result in severe injuries if the safety measures are not complied with.
 **CAUTION!**	Dangerous situation which can result in minor injuries if the safety measures are not complied with.
NOTICE!	Dangerous situation which can result in material damage if the safety measures are not complied with.

2.2 Symbols on the device

Symbol	Meaning
NB 0158 16338E00	Notified body in accordance with ATEX directive for monitoring the manufacturer's quality control system.
 02198E00	According to marking, device certified for hazardous areas.

EN

3 Safety

The device has been manufactured to the state of the art while observing recognised safety-related rules. When using the device, it is nevertheless possible for hazards to occur to life and limb of the user or third parties or for the device, environment or material assets to be compromised.

- ▸ Use the device only
- if it is not damaged
- as intended, while remaining aware of safety and dangers
- in accordance with these operating instructions.

3.1 Intended Use

The terminal box 8150 is used to distribute electric energy and / or electric signals in hazardous areas. It is explosion-protected equipment approved for use in hazardous areas of Zones 1 and 2 as well as 21 and 22.
The terminal box is manufactured in various sizes and can be combined to create larger distribution units.
Intended use includes observing these operating instructions and the other applicable documents, e.g. the data sheet.
All other use of the terminal box is not intended.

3.2 Personnel qualification

Qualified specialist personnel are required to perform the tasks described in these operating instructions. This primarily applies to work in the following areas:

- Product selection, project engi-

neering and modification
- Mounting/dismounting the device
- Installation
- Commissioning
- Maintenance, repair, cleaning

Specialists who perform these tasks must have a level of knowledge that complies with the relevant national standards and regulations.

Additional knowledge is required for activities in hazardous areas! R. Stahl recommends a level of knowledge described in the following standards:
- **IEC/EN 60079-14 (Electrical installations design, selection and erection)**
- **IEC/EN 60079-17 (Inspection and maintenance of electrical installations)**
- **IEC/EN 60079-19 (Equipment repair, overhaul and reclamation)**

3.3 Residual risks

3.3.1 Explosion hazard

An explosion hazard cannot be entirely ruled out in hazardous areas despite the device having a state-of-the-art design.

▶ Perform all work steps in hazardous areas with the utmost care at all times!

Possible moments of danger (residual risks) can be categorised according to the following causes:

Mechanical damage

The device can be pressed or scratched during transport, mounting or commissioning, causing it to no longer be leak-tight. Such damage can, for example, render the device's explosion protection partially or fully ineffective. This can result in explosions causing fatal or severe injuries to persons.
- ▶ Observe the weight and the maximum load-bearing capacity of the device; see specifications on the packaging.
- ▶ Transport the device only in the original packaging or in equivalent packaging.
- ▶ Use transporting or lifting equipment which is suitable for the size and weight of the device and can reliably carry the weight of the device.
- ▶ Check the packaging and the device for damage. Report any damage to R. STAHL immediately.
- ▶ Store the device in the original packaging in a dry (no condensation) and stable position which is safe from vibrations.
- ▶ Do not damage the enclosure, built-in components or seals during mounting.

Excessive heat-up or electrostatic charge

Subsequently modifying the device, operating it outside of permitted conditions or cleaning it improperly can cause it to heat up severely or to become electrostatically charged, resulting in it producing sparks. This can result in explosions causing fatal or severe injuries to persons.

- Operate the device only within the prescribed operating conditions (see the type plate and the "Technical data" chapter).
- Devices which have a polyester powder coating must not be installed in areas containing severely charge-producing processes.
- Do not paint the device. Consult with R. STAHL before mending flaws such as scratches.
- Comply with the area specification of EN IEC 60079-0 when fitting additional plastic adhesive plates.
- Clean the device only with a damp cloth.

Impairment of IP protection

When installed properly and completely, the device will have the required IP degree of protection. Making structural changes to the device or mounting it improperly can impair its IP protection. This can result in explosions causing fatal or severe injuries to persons.

- Fit plates (on the outside) only without drilling any additional holes.
- Only drill holes for cable glands exactly according to the instructions in the "Product selection, project engineering and modification" and "Mounting" chapters of these operating instructions. Consult with R: STAHL first if there are any discrepancies or uncertainties.
- Mount the device only in the prescribed mounting position. More detailed explanations of this can be found in the "Mounting" chapter.

Improper installation, commissioning, maintenance or cleaning

EN

Basic work such as installation, commissioning, maintenance or cleaning of the device must be performed only in accordance with the valid national regulations of the country of use and only by qualified persons. Otherwise the explosion protection can be rendered ineffective. This can result in explosions causing fatal or severe injuries to persons.

- Have mounting, installation, commissioning and maintenance performed only by qualified and authorised persons (see section 3.2.).
- Perform modifications to the device only in accordance with these operating instructions. Have the modifications inspected and approved by R. STAHL or an inspection authority (3rd party inspection).
- Perform maintenance and repairs on the device only using original spare parts and after consultation with R. STAHL.
- Gently clean the device only with a damp cloth and without scratching, abrasive or aggressive cleaning agents or solutions.
- Never clean the device with a strong water jet, e.g. using a high-pressure washer!

3.3.2 Risk of injury

Falling devices or components
The heavy device or components can fall during transport and mounting, causing severe injury to persons in the form of bruises and contusions.
- Use transporting and lifting equipment suitable for the size and weight of the device when transporting and mounting it.
- Observe the weight and the maximum load-bearing capacity of the device; see specifications on the packaging.
- Use suitable mounting hardware for mounting.

Electric shock
During electric installation, operation and maintenance, there will at times be high voltages present at the device. Persons coming into contact with electric lines carrying excessively high voltage can suffer severe electric shocks and consequently injuries.
- Operate the device only on equipment with the internal voltage specified in the "Technical data" chapter.
- Connect electric circuits only to suitable terminals.

4 Transport and storage

DANGER! Explosion due to damaged seal in devices with enclosure hinges!
Non-compliance results in fatal or severe injuries.
- Devices with enclosure hinges must be transported only with a transport lock.

- Transport and store the device carefully and in accordance with the safety notes (see chapter 3).

EN

5 Product selection, project engineering and modification

DANGER! Explosion due to subsequent, complete painting of the device!
Non-compliance results in fatal or severe injuries.
- Do not paint the device.
- Consult with R. STAHL before mending flaws such as scratches.

DANGER! Explosion due to defective sealing of the device!
Non-compliance results in fatal or severe injuries.
- Fit plates (on the outside) only without drilling any additional holes.
- Only drill additional holes exactly in accordance with the instructions in the "Mounting" chapter. Consult with R. STAHL first if there are any discrepancies or uncertainties.
- Equip the enclosure only with equipment (e.g. cable entries, stopping plugs, drain and breather valves) that is verifiably approved for use in hazardous areas. Examples: EU Type Examination Certificate or IECEx Certificate of Conformity
- Seal unused cable entries with certified plugs (red).
- Seal all open drilled holes by means of suitable equipment.

EN

When complying with the installation conditions and specifications on the type plate:

- Check whether enough cable entries are provided. Drill additional holes if necessary; see sections 5.1 to 5.2.
- Equip terminals and, if necessary, mount built-in components; see section 5.4.

The methods mainly considered for modification are subsequently machining or equipping the terminal box. In this case, the following possibilities are available:

- Additional through holes on the flange plate, either by R. STAHL or by the customer (section 5.1)
- Additional through holes in the enclosure, either by R. STAHL or by the customer (section 5.2)
- External attached components either by R. STAHL or by the customer (section 5.3)
- Internal built-in components either by R. STAHL or by the customer (section 5.4)

Work that has been carried out single-handedly must be inspected and approved in accordance with national regulations. Otherwise it must be inspected and approved by R. STAHL or an inspection authority (3rd party inspection) (section 3.3.1). R. STAHL can do this on request and for appropriate remuneration. No additional inspection and approval is required if the work is carried out by R. STAHL.

5.1 Additional through holes in flange plates

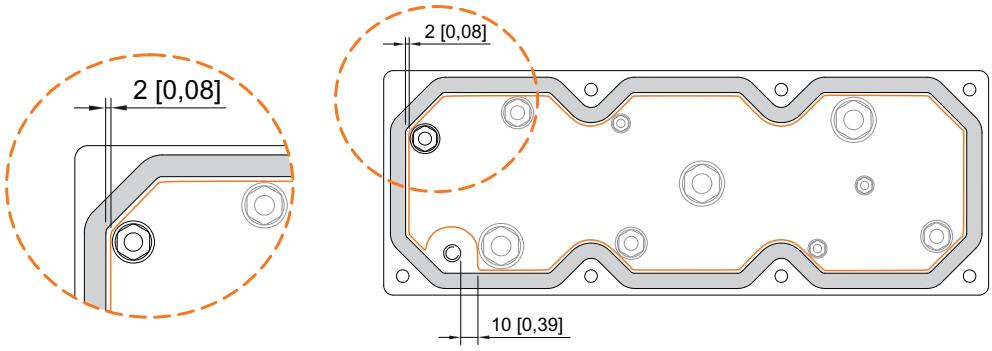
5.1.1 Creation of additional drilled holes and through holes by R. STAHL

- Forward the following information to R. STAHL:
  - Type
  - Data sheet
  - Quantity, manufacturers and approvals of the components that are to be installed.

R. STAHL

- will check whether the components, drilled hole diameters, quantity and position correspond with the approval
- will create the drilled holes and through holes
- will mount the components
- will update the order documentation
- will carry out a routine test
- will, if necessary, fit a new type plate if the technical data has changed, e.g. due to the components that are to be additionally installed.

5.1.2 Ascertaining the usable area for cable entries in flange plates



Collision frame and earth connection of flange plate

- Select a space/area for the cable entry on the flange plate anywhere inside the collision frame (see thin line in figure). Ensure that screw connections made later do not go beyond this collision frame.

Observe the following conditions when doing so:
- Leave enough distance to the circumferential seal (min. 2 mm) (see detail in figure).
- Leave enough distance to the earth connection (min. 10 mm) (see bottom of figure).

5.1.3 Creation of additional drilled holes and through holes by the customer

- Modify the device carefully and only in accordance with the safety notes (see chapter 3).
- Calculate the usable area, see section 5.1.2.
- Create additional through holes by lasing or punching (drilling, hole cutting).
- Ensure that the surfaces remain flat during punching and cutting.
- Determine the core hole diameter for threads. Do not use an NPT thread!
- When determining the through holes, observe the mounting distances.
- Adjust the hole diameters to the dimensions of the built-in parts or their seals.
- The use of built-in components with flat seal (gasket) is preferred.
- Observe section 5.3 "Built-in components" when subsequently equipping components!

5.2 Additional through holes in the enclosure

Terminal boxes which the customer wants delivered without drilled holes are generally marked as empty enclosures (marking in accordance with EN IEC 60079-7 and EN IEC 60079-0, as incomplete equipment "U" inside the enclosure).

5.2.1 Creation of additional drilled holes and through holes by R. STAHL

- Give the following information to R. STAHL:
- Enclosure side
- Type
- Data sheet
- Quantity, manufacturers and approvals of the components that are to be installed.

EN

R. STAHL
- will check whether the components, drilled hole diameters, quantity and position correspond with the approval
- will create the drilled holes and through holes
- will mount the components
- will update the order documentation
- will carry out a routine test
- will, if necessary, fit a new type plate if the technical data has changed, e.g. due to the components that are to be additionally installed.

5.2.2 Calculate the usable area for cable entries in the enclosure

Important for the following calculation:
- Measure the dimensions on the plane surface inside of the enclosure (not on the outside of the enclosure)
- Consider additional space required for blind rivet nuts. The space requirement for the built-in part is determined using the width across corners of the cable entry plus additional space for the tool.

The calculation is performed in three steps:
- Calculate the total usable area
- Calculate the required area for cable entries
- Calculate the remaining usable area.

1.) Calculate the total usable area

The total usable area for installation is calculated as follows:

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(Length of the inner enclosure wall - 2 x 10 mm*) x (Height of the inner enclosure wall - 2 x 10 mm*)

*2 x 10 mm = circumferential rim of the inner enclosure wall

2.) Calculate the required area for cable entries

- Multiply the quantity of desired cable entries by the space requirement values of the appropriate type from the following table.

	Cable entry thread diameter							
	≤ 12 mm	≤ 16 mm	≤ 20 mm	≤ 25 mm	≤ 32 mm	≤ 40 mm	≤ 50 mm	≤ 63 mm
Required space for each piece	315 mm^2	495 mm^2	685 mm^2	990 mm^2	1560 mm^2	2420 mm^2	3425 mm^2	5160 mm^2

Important: The area for the cable entries must be smaller than the total usable area. Otherwise a larger enclosure must be chosen.

3.) Calculate the remaining usable area

- Subtract the required area for cable entries from the total usable area.

Calculation example:

Starting conditions:

- Dimensions of inner enclosure wall: 297 mm (Side D) x 122 mm (Side C)
- Desired cable entries: M20 (15 pc), M32 (7 pc)

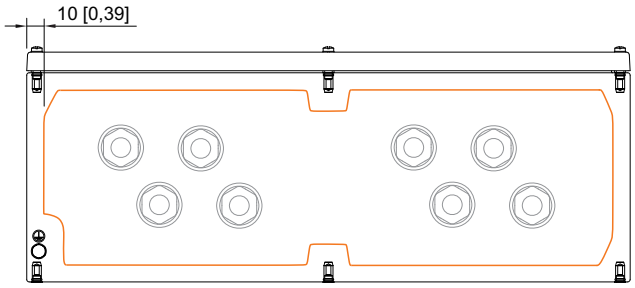
Calculate the total usable area:
(297 mm - 2 x 10 mm*) x (122 mm - 2 x 10 mm*)
= **28254** mm²

Calculate the required area for cable entries and remaining usable area:

Quantity	Type		Area	
15 pieces	M20	15 x 685 mm²	10275 mm²	
7 pieces	M32	7 x 1560 mm²	10920 mm²	
			21195 mm²	required area for cable entries
			28254 mm²	usable area
			7059 mm²	remaining usable area

5.2.3 Creation of additional drilled holes and through holes by the customer

- Modify the device carefully and only in accordance with the safety notes (see chapter 3).
- Calculate the usable area for built-in components, see sections 5.1.2 and 5.2.2.
- Create additional through holes by lasing or punching (drilling, hole cutting). When doing so, maintain a distance of min. 10 mm to the rim of the enclosure (see figure).



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- Ensure that the surfaces remain flat during punching and cutting.
- When determining the through holes, observe the mounting distances.
- Adjust the hole diameters to the dimensions of the built-in parts or their seals.
- The use of built-in components with flat seal (gasket) is preferred.
- Observe section 6.3 "Cable entries, stopping plugs, breathers" when subsequently equipping components!

5.3 External attached components (cable entries, stopping plugs, breathers)

Drilled holes and through holes are generally already equipped with the components intended for the application ex-factory.
If customers intend to carry out equipping themselves, a dust and transport protection is applied to the openings in the enclosure (adhesive tape with a warning note or plastic caps) ex-factory.

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5.3.1 Fitting of attached components by R. STAHL

▶ Give the following information to R. STAHL:
- Type
- Data sheet
- Quantity, manufacturers and approvals of the components that are to be attached.

R. STAHL
- will check whether the components, quantity and position correspond with the approval
- will mount the components
- will update the order documentation
- will carry out a routine test
- will, if necessary, fit a new type plate if the technical data has changed, e.g. due to the components that are to be additionally attached.

5.3.2 Fitting of attached components by the customer

Select material

It is advisable to use the following materials when equipping the terminal box:
Cable entry
- for electric lines which are permanently installed: Plastic or metal cable entries for electric lines which are permanently installed
- for electric lines which are not permanently installed: Plastic or metal cable entries with strain relief.

Closing of unused entries
- Plastic or metal stopping plugs.

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Drainage and pressure equalisation (prevention of the vacuum effect)
- Plastic or metal drain and breather valves.

▶ Equip the device carefully and in accordance with the safety notes (see chapter 3).
▶ Observe the specifications on the type plate of the device for the selection and operating temperature of the components and seals.
▶ Calculate the usable area for attached components; see sections 5.1.2 and 5.2.2.
▶ Adjust the hole diameters of drilled holes to the dimensions of the built-in parts or their seals!
▶ The use of attached components with flat seal (gasket) is preferred.

5.4 Internal built-in components (conductors, terminals, fuses)

Ascertain the maximum number of conductors

Heat develops in every terminal box due to contact resistances at the terminals and the cables installed in the enclosure. In order to ensure that the maximum temperatures of a terminal box are not exceeded, care should be taken that the current load of the circuits installed in the terminal box does not exceed certain values!

5.4.1 Ascertain the number of conductors using the table from the EU Type Examination Certificate

- Refer to the specifications in the EU Type Examination Certificate for the maximum permitted number of conductors – in relation to the current load and conductor cross-section.

Taking enclosure 8150/1-0250-0180-120 as an example: The maximum permitted number of conductors can be ascertained using the following table.

8150/1-0250-0180-120

[A]* \ [mm²]**	1,5	2,5	4	6	10	16	25	35	50	70	95	120	150	185	240	300
6																
10	63															
16	21	42	163													
20	9	24	47													
25		11	26	51												
35			7	20	50											
50				3	16	41										
63					5	19	68									
80						7	21	76								
100							9	20								
125								8	20							
160									7	18						
200										6	15	48				
225										2	9	19				
250											4	11	24			
315												2	7	14		
400														3	9	28
500																5

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*) Current, **) conductor cross-section

Explanations of the table:
Each inserted conductor and each internal connection conductor must be selected.
Jumpers and protective conductors are not considered as conductors.

Noncritical (light area of the table)
The light area is noncritical in terms of heating up the enclosure. Circuits classified as being in this area can be incorporated in the enclosure in any number.

Critical (inscribed area of the table)
The inscribed area of the table shows the maximum permissible number of conductors considering the cross-section of the conductor and the continuous current loading.
When using this table, simultaneous factors and load factors may be accounted for.
Mixed arrangements with circuits of different cross-sections and currents are possible;
in this case the proportion of the loading from the individual circuits should be allowed for.
If a terminal box is fully loaded according to the critical area of the inscribed part of the table, then any number of circuits from the noncritical, light area may be added.

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Dangerous (dark area of the table)
Terminal boxes which are designed according to this area require an additional temperature-rise test.

Example calculation (general):

Cross-section [mm²]	Current [A]	No. of conductors	Proportion
2.5	16	10 (of 30)	= 33 %
16	50	12 (of 48)	= 25 %
25	63	36 (of 90)	= 40 %
			= 98 % < 100 %

▶ Ensure that operating temperatures – in particular low ones – of the terminal box and the selected electric lines match.

5.4.2 Additional terminals

Fitting of additional terminals by R. STAHL

▶ Forward the following information to R. STAHL:
- Type
- Manufacturer
- Data sheet
- Quantity
- Enclosure size

R. STAHL
- will check whether the terminal type, quantity, cross-section and current load correspond with the approval
- will check whether the enclosure size, drilled holes and through holes are sufficient
- will install the terminals
- will, if necessary, create required drilled holes and fit required cable entries
- will update the order documentation
- will carry out a routine test
- will, if necessary, fit a new type plate if the technical data, such as current or conductor cross-section, has changed.

Fitting of additional terminals by the customer

▶ Modify the device carefully and only in accordance with the safety notes (see chapter 3).
▶ Ascertain additional terminal points, terminal type, quantity, cross-section and current load.
▶ Check whether type plate data is changed as a result of subsequently equipping (cross-section, voltage, current, etc.).
▶ Check whether enough space and fastening options are available for equipping.

Subsequently equipping is not permitted if the installation conditions are not complied with!

5.4.3 Fuses

Installing, modifying or retrofitting fuses is only permitted to be performed by R. STAHL!

When fitting fuses, the ambient temperature values for the following temperature classes apply:

Fuse current value	Temperature class
≤ 4 A	T6
> 4 A ... (5 A	T5
> 5 A ... (6.3 A	T4

When fitting fuses, the ambient temperature values for areas with dust explosion hazard for the following max. permissible surface temperatures apply:

Fuse current value	Ambient temperature (Ta)	Max. permissible surface temperature
≤ 4 A	≤ 40 °C	T80°C
≤ 4 A	≤ 56 °C	T95°C
≤ 5 A	≤ 46 °C	T95°C
≤ 6.3 A	≤ 70 °C	T130°C

6 Mounting and installation

6.1 Mounting/dismounting, operating position

- Mount the device carefully and only in accordance with the safety notes (see chapter 3).
- Read through the following installation conditions and assembly instructions carefully and follow them precisely.

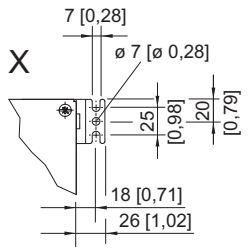
6.1.1 Operating position

DANGER! Explosion due to incorrect mounting position!

Non-compliance results in fatal or severe injuries.

- Mount the device only on the floor or wall, not overhead or in a free-standing position.
- Mount the device torsion-free only on a level surface.

- Mount the device using the mounting straps. Refer to the dimensional drawing for the dimensions of the mounting holes.



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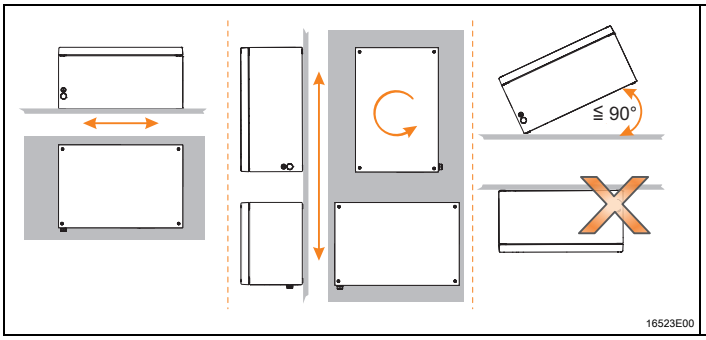

- Alignment of enclosure depending on mounting type:
- For vertical mounting: any alignment
- For horizontal mounting: cover on top
- Hanging position/overhanging cover is not permitted!

6.1.2 Environmental installation conditions

- Provide a protective roof or wall if the explosion-protected device is exposed to weather.
- Equip explosion-protected electric equipment with a breather and drain valve in order to prevent the vacuum effect. Observe the correct mounting orientation (bottom) when doing so. See also section 6.1.1
- Do not create any cold bridges (risk of condensation). If necessary, mount the enclosure with a clearance to reduce condensation in the enclosure to a minimum.

6.2 Installation

Operation under difficult conditions, such as on ships or in strong sunlight, requires additional measures to be taken for correct installation, depending on the place of use. Further information and instructions on this can be obtained from your regional sales contact on request.

DANGER! Explosion due to severe heat-up inside the enclosure!
Non-compliance results in fatal or severe injuries.
- Ensure that distances between Ex e electric circuits and Ex i electric circuits comply with standards (EN IEC 60079-11).
- Select suitable conductors that do not exceed the permitted heating temperature within the enclosure.
- Pay attention to the specified cross-sections.
- Attach the core end sleeves properly.

DANGER! Explosion due to improper installation!
Non-compliance results in fatal or severe injuries.
- Install the device carefully and only in accordance with the safety notes (chapter 3).
- The installation steps stated below must be carried out very precisely.

The necessary technical details/data on electric installation can be found in the following documents:
- "Technical data" chapter in these operating instructions
- Documentation and data sheets provided by the terminal manufacturers
- Documentation and data sheets of the installed devices (e.g. for specifications on equipotential bonding, earthing and intrinsically-safe circuits)

6.2.1 Conductor Connection

- Select suitable conductors that do not exceed the permitted heating temperature within the enclosure.
- Ensure that conductors have the specified cross-sections.
- Guide the conductor insulation so that it reaches the terminals.
- Do not damage the conductor when stripping the insulation (e.g. by denting it).
- Attach the core end sleeves properly.
- If the system is equipped with all possible terminals and live conductors, and the maximum current load has been reached, ensure that the length of a conductor from the screw connection to the terminal point does not exceed the diagonal planes of the enclosure.

6.2.2 Protective Conductor Connection

- Always connect the protective conductor.
- Use cable lugs for external protective conductor connection.
- Permanently install the protective conductor close to the enclosure.
- Connect all uncoated, non-energised metal parts to the protective conductor system.
- Neutral conductors have to be installed as live conductors.

6.2.3 Installation Conditions

Installation conditions for creepage distances and clearances

<table>
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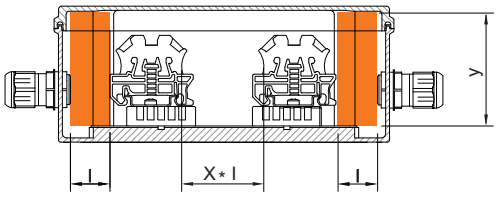
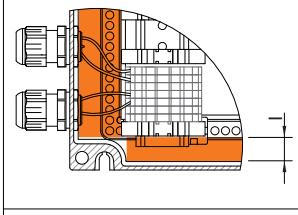
<td rowspan="3"> 
</td>
<td rowspan="3">l = Minimum distance from the enclosure in accordance with EN IEC 60079-7 standard (table)
y = Clearance
X = Factor in accordance with EN IEC 60079-7 depending on conductor cross-section
X * l = Minimum distance</td>
</tr>
<tr>
<td> 
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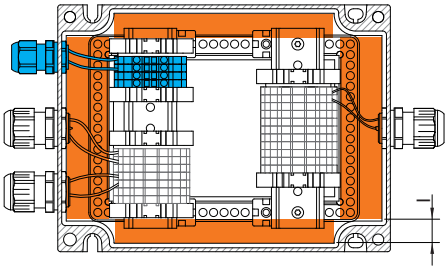
<td> 
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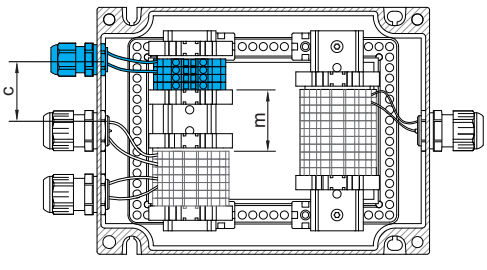
<td> 
</td>
<td>m = 50 mm distance between Ex e and Ex i terminal blocks
c = 8 mm distance between Ex e and Ex i cable lines</td>
</tr>
</table>

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Distances, creepage distances and clearances

- When installing components the creepage distances and clearances between the individual components as well as between the components and the enclosure wall must be sufficiently dimensioned. Observe the values from the EN IEC 66079-7 standard (table) when doing so.
- Check the creepage distances of the components and comply with them in accordance with the specifications in the respective operating instructions.
- The clearance distances, depending on the rated operational voltage of the fitted terminals, must be complied with.
- Observe the distance between the enclosure cover and connection screws of the built-in components (with the conductor connected): at least the value of the required clearances.

Distance between the connecting units for intrinsically safe and non-intrinsically safe circuits

- Mount partitions used to separate connection terminals at least 1.5 mm from the enclosure walls, or alternatively ensure a minimum distance of 50 mm between the uncoated conducting parts of the connection terminals (when measured in any direction around the partition)
- Make sure that metallic partitions
  - are at least 0.45 mm thick
  - are earthed
  - are sufficiently strong and rigid
  - have sufficient current carrying capacity.
- Make sure that non-metallic, insulating partitions
  - are at least 0.9 mm thick
  - have an appropriate comparative tracking index (CTI)
  - are reinforced to prevent deformation.
- When using fuses > 4 A, implement additional design measures to prevent impermissible heat-up at the terminals of the intrinsically safe circuits.

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Covers for combinations of non-intrinsically safe and intrinsically safe circuits

- Equip all live parts which are not acc. to "Ex i" protection with an inner cover which meets at least the degree of protection IP30 when the equipment is open.

Intrinsically safe circuits

- In intrinsically safe circuits, use only insulated cables and conductors with a test voltage of at least 500 V AC and a minimum quality of H05.
- Calculate the insulation test voltage for the insulation and separation of terminals and conductors from the sum of the rated operational voltages of intrinsically safe and non-intrinsically safe circuits.
  - In case of "intrinsically safe to earth", there is a minimum rated insulation voltage value of 500 V (otherwise, double the value of the rated operational voltage of intrinsically safe circuits).
  - In the case of "intrinsically safe to non-intrinsically safe", there is a minimum rated insulation voltage value of 1500 V (otherwise, double the rated operational voltage plus 1000 V).

Clearance and creepage distances of intrinsically safe components

- Make sure that the creepage distances and clearances between the uncoated, conductive parts of connection terminals of separated, intrinsically safe circuits to earthed or potential-free, conductive parts is equal or greater than the values of EN IEC 60079-11, Table 5.
- For separated, intrinsically safe electric circuits, set up a safe distance between the uncoated, conductive parts of external connections, which meets the following requirements:

• minimum 6 mm between the separated, intrinsically safe circuits
• minimum 3 mm to earthed parts if possible connection to earth has not been considered in the safety analysis.

7 Commissioning

Before commissioning, carry out the following checks:

- Check the enclosure for damage.
- Check that mounting and installation have been performed correctly. When doing so, check whether all covers and partitions for live parts have been installed and fastened.
- Make sure that all openings/drilled holes in the enclosure are sealed with permissible components. Dust and transport protection (adhesive tape or plastic caps) fitted at the factory must be replaced with certified components.
- Make sure that seals and sealing systems are clean and undamaged.
- If necessary, remove foreign bodies.
- If necessary, clean the connection chamber.
- Check whether all prescribed tightening torques have been observed.

8 Maintenance, overhaul, repair

- Observe the relevant national regulations in the country of use, e.g. EN IEC 60079-14, EN IEC 60079-17, EN IEC 60079-19.

8.1 Maintenance

Check the following points in addition to the national regulations:

• whether the clamping screws holding the cables are securely seated,
• whether the device enclosure and / or protective enclosure have cracks or other visible signs of damage,
• compliance with the permitted temperatures,
• whether the nut is securely seated.

8.2 Maintenance

- Perform maintenance on the device according to the applicable national regulations and the safety notes in these operating instructions (chapter 3).

8.3 Repair

- Perform repairs to the device only using original spare parts and after consulting with R. STAHL.

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9 Returning the device

- Only return or package the devices after consulting R. STAHL!
  Contact the responsible representative at R. STAHL for this.

R. STAHL's customer service is available to handle returns if repair or service is required.

Only return or package the devices after contacting and consulting R. STAHL!

- Contact customer service personally.

or

- Go to the www.stahl.com website.
- Select "Downloads" > Customer service > "RMA Request".
- Fill out the form.
  Wait for confirmation. R. STAHL's customer service will contact you.
  You will receive an RMA slip after speaking with customer service.
- Send the device along with the RMA slip in the packaging to R. STAHL Schaltgeräte GmbH (refer to Section 1.1 for the address).

10 Cleaning

- Check the device for damage before and after cleaning it. Take damaged devices out of operation immediately.
- To avoid electrostatic charging, the devices located in hazardous areas may only be cleaned using a damp cloth.
- When cleaning with a damp cloth, use water or mild, non-abrasive, non-scratching cleaning agents.
- Do not use aggressive detergents or solvents.
- Never clean the device with a strong water jet, e.g. using a high-pressure washer!

11 Disposal

- Observe national and local regulations and statutory regulations regarding disposal.
- Separate materials when sending them for recycling.
- Ensure environmentally friendly disposal of all components according to the statutory regulations.

12 Accessories and Spare parts

NOTICE! Malfunction or damage to the device due to the use of non-original components.
Non-compliance can result in material damage.

- Use only original accessories and spare parts from R. STAHL Schaltgeräte GmbH (see data sheet).

13 Annex A

13.1 Technical data

Explosion Protection		
Version	8150/1	8150/2
Global (IECEx)		
Gas and dust	IECEx PTB 09.0048 Ex db eb ia/ib mb IIA, IIB, IIC T6 (Ta = -60 ... +40 °C) Ex db eb ia/ib mb IIA, IIB, IIC T5 (Ta = -60 ... +55 °C) Ex db eb ia/ib mb IIA, IIB, IIC T4 (Ta = -60 ... +70 °C) Ex tb IIIC IP66 T130°C (Ta = -60 ... +70 °C) Ex tb IIIC IP66 T95°C (Ta = -60 ... +55 °C) Ex tb IIIC IP66 T80°C (Ta = -60 ... +40 °C)	IECEx PTB 09.0048 Ex ia/ib IIA, IIB, IIC T6 (Ta = -60 ... +75 °C) Ex tb IIIC IP66 T80°C (Ta = -60 ... +75 °C)
Europe (ATEX)		
Gas and dust	PTB 09 ATEX 1108 **Ⓔx II 2 G Ex db eb ia/ib mb IIA, IIB, IIC T6 (Ta = -60 ... +40 °C)** **Ⓔx II 2 G Ex db eb ia/ib mb IIA, IIB, IIC T5 (Ta = -60 ... +55 °C)** **Ⓔx II 2 G Ex db eb ia/ib mb IIA, IIB, IIC T4 (Ta = -60 ... +70 °C)** Ⓔx II 2 D Ex tb IIIC IP66 T130°C (Ta = -60 ... +70 °C) Ⓔx II 2 D Ex tb IIIC IP66 T95°C (Ta = -60 ... +55 °C) Ⓔx II 2 D Ex tb IIIC IP66 T80°C (Ta = -60 ... +40 °C)	PTB 09 ATEX 1108
Certifications and certificates		
Certificates	IECEx, ATEX, Brazil (INMETRO), India (PESO), Russia (TR), Belarus (TR)	
Types of protection	depending on the actual fitted components used and their type of protection	

Technical Data	
Electrical data	
Rated operational voltage	max. 1100 V depending on terminal types and explosion protected components that are used
Rated operational current	max. 630 A depending on terminal types and explosion protected components used
Ambient conditions	
Ambient temperature	see explosion protection data depending on terminal types and explosion protected components used

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Technical Data

Mechanical data

Degree of protection	IP66 acc. to EN IEC 60529
Material	
Enclosure	stainless steel V1.4301 (AISI 304) respectively 1.4404 (AISI 316L) brush finished
Seal	Silicone, foamed
Mounting plate	sheet steel, galvanized
Cover lock	- with captive M6 stainless steel combo head screws or - with hinges / cam locks Double-bit key no. 5 for cam lock included in delivery
Flange	
Standard version	without flange
Special version	with flange
Wall thickness	
Enclosure cover	min. 2 mm
Mounting plate	3 mm
Cover screws tightening torque	4.5 Nm
Protective conductor connection	M8 blind rivet nut (1x): at the outside of the enclosure M8 rivet nut (1x): on mounting plate M6 bolt (1x): additionally on enclosures with cover hinges
Rated cross-section	max. 300 mm^2
	depending on terminal types and explosion protected components used

Note

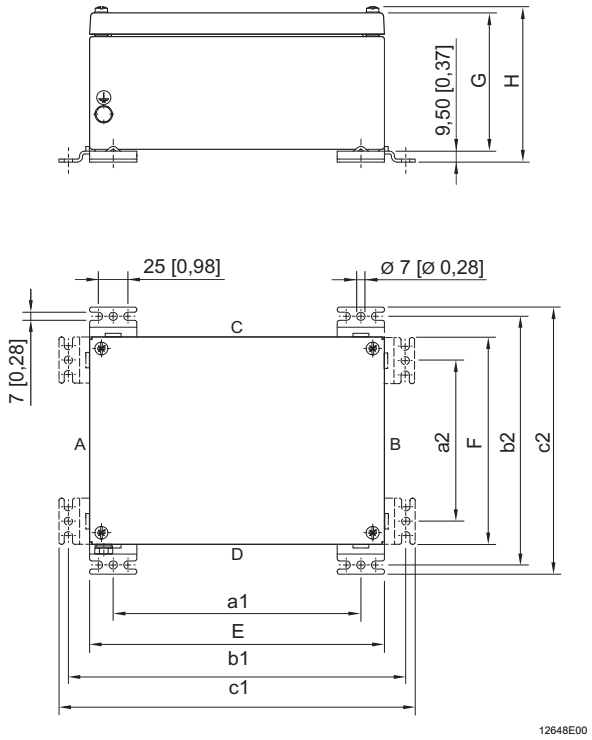
	please refer to the manufacturer's terminal data, e.g. the tightening torque

For further technical data, see www.stahl-ex.com.

14 Annex B

14.1 Dimensions / fastening dimensions

Dimensional Drawings (All dimensions in mm [inches]) - Subject to alterations



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Dimensional Drawings (All dimensions in mm [inches]) - Subject to alterations

	Width [mm]	Height [mm]	Depth [mm]	Total depth [mm]	Fixing dimensions [mm]					
Type	E	F	G	H	a1	a2	b1	b2	c1	c2
8150/.-0176-0116-091-..1.	176.5 [6.95]	116.5 [4.59]	91 [3.58]	106 [4.17]	136 [5.35]	76 [2.99]	212 [8.35]	152 [5.98]	228 [8.98]	168 [6.61]
8150/.-0176-0176-091-..1.	176.5 [6.95]	176.5 [6.95]	91 [3.58]	106 [4.17]	136 [5.35]	136 [5.35]	212 [8.35]	212 [8.35]	228 [8.98]	228 [8.98]
8150/.-0236-0176-091-..1.	236.5 [9.31]	176.5 [6.95]	91 [3.58]	106 [4.17]	196 [7.72]	136 [5.35]	272 [10.71]	212 [8.35]	288 [11.34]	228 [8.98]
8150/.-0300-0200-150-..1.	300 [11.81]	200 [7.87]	150 [5.91]	165 [6.50]	260 [10.24]	160 [6.30]	336 [13.23]	236 [9.29]	352 [13.86]	252 [9.92]
8150/.-0360-0176-091-..1.	360 [14.17]	176.5 [6.95]	91 [3.58]	106 [4.17]	320 [12.60]	136 [5.35]	396 [15.59]	212 [8.35]	412 [16.22]	228 [8.98]
8150/.-0360-0360-091-..1.	360 [14.17]	360 [14.17]	91 [3.58]	106 [4.17]	320 [12.60]	320 [12.60]	396 [15.59]	396 [15.59]	412 [16.22]	412 [16.22]
8150/.-0400-0300-150-..1.	400 [15.75]	300 [11.81]	150 [5.91]	165 [6.50]	360 [14.17]	260 [10.24]	436 [17.17]	336 [13.23]	452 [17.80]	352 [13.86]
8150/.-0400-0400-150-..1.	400 [15.75]	400 [15.75]	150 [5.91]	165 [6.50]	360 [14.17]	360 [14.17]	436 [17.17]	436 [17.17]	452 [17.80]	452 [17.80]
8150/.-0600-0400-150-..1.	600 [23.62]	400 [15.75]	150 [5.91]	165 [6.50]	560 [22.05]	360 [14.17]	636 [25.04]	436 [17.17]	652 [25.67]	452 [17.80]
8150/.-0727-0360-150-..1.	727 [28.62]	360 [14.17]	150 [5.91]	165 [6.50]	687 [27.05]	320 [12.60]	763 [30.04]	398 [15.67]	779 [30.67]	412 [16.22]

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