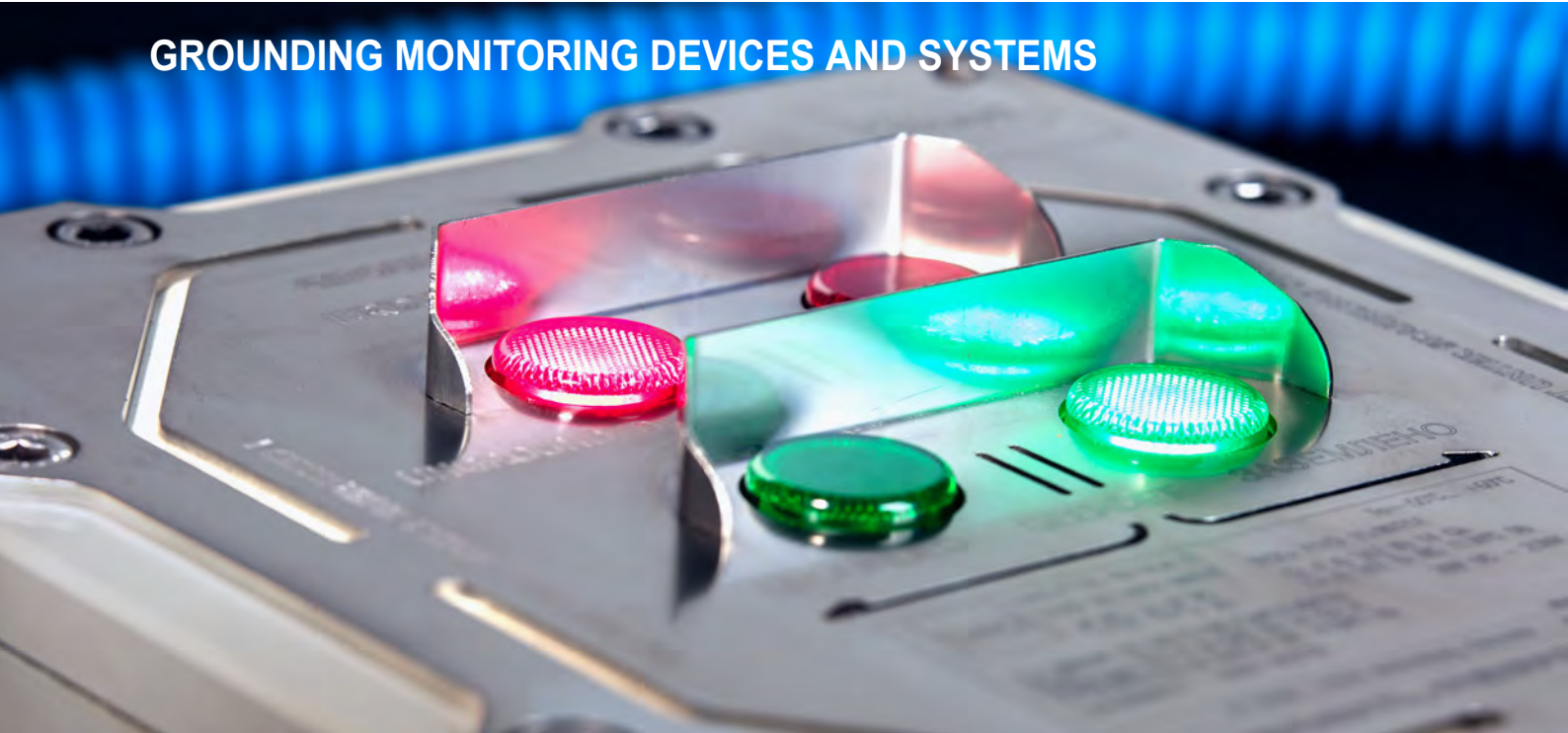


# GROUNDING MONITORING DEVICES AND SYSTEMS



| Product  | Installation in Zone |   |   |    |    |    | Series | Page | WebCode |
|--|----------------------|---|---|----|----|----|--------|------|---------|
|  | 0                    | 1 | 2 | 20 | 21 | 22 |        |      |         |
| <b>General</b>                                       |                      |   |   |    |    |    |        |      |         |
| Applications   |                      |   |   |    |    |    |        | 197  |         |
| <b>Grounding Monitoring Devices and Systems</b>      |                      |   |   |    |    |    |        |      |         |
| Ground Monitoring Device made of Aluminium           |                      | • | • |    | •  | •  | 8485   | 203  | 8485A   |
| Ground Monitoring Device made of Polyester Resin     |                      | • | • |    | •  | •  | 8146   | 198  | 8146H   |
| Ground Monitoring Device made of Stainless Steel     |                      | • | • |    | •  | •  | 8150   | 200  | 8150G   |
| <b>Switching Repeater</b>                            |                      |   |   |    |    |    |        |      |         |
| Switching Repeater                                   |                      |   | • |    |    |    | 9170   | 208  | 9170B   |
| <b>Accessories and Spare Parts</b>                   |                      |   |   |    |    |    |        |      |         |
| Accessories and Spare Parts Series 8146, 8150        |                      |   |   |    |    |    |        | 202  |         |
| Accessories and Spare Parts Series 8485              |                      |   |   |    |    |    |        | 205  |         |
| <b>Dimensional Drawings</b>                          |                      |   |   |    |    |    |        |      |         |
| Grounding Monitoring Devices Series 8146, 8150, 8485 |                      |   |   |    |    |    |        | 206  |         |

For additional products and information please refer to [r-stahl.com](http://r-stahl.com)

## Applications of Grounding Systems and Grounding Monitoring Devices

| Applications  |                         |             |             |       |      |                |         |                    |
|---|-------------------------|-------------|-------------|-------|------|----------------|---------|--------------------|
|   | Product type            | Tank wagons | Road tanker | Drums | IBCs | Tank container | Big Bag | Ambient conditions |
|  | 8485/111-42             | ✓           | ✓           |       |      |                | ✓       | -55 ... +60 °C     |
|  | 8146/5075<br>8146/5-V73 | ✓           | ✓*          | ✓     | ✓    | ✓              |         | -20 ... +55 °C     |
|  | 8150/5-V75              | ✓           | ✓*          | ✓     | ✓    | ✓              |         | -20 ... +55 °C     |

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\* Tanker grounding without object recognition this.



- Continuous monitoring of correct grounding
- Robust design
- Plastic enclosure (IP66)
- Potential-free change-over contact for signalling to the process control system and external control devices
- Insulated point of suspension
- For use up to SIL 2 (IEC 61508)

WebCode **8146H**



The ground monitoring device ensures that tank containers, drums, road tankers, rail cars and IBCs are correctly electrostatically grounded during the loading of flammable liquids and powder.

The device provides a conductive connection to the ground and monitors in parallel the quality of the electrostatic grounding.

This guarantees that the electrostatic charge remains at a safe level and that no explosion hazard is generated by uncontrolled energy discharge.

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|                 | ATEX / IECEx |   |   |    |    |    |
|-----------------|--------------|---|---|----|----|----|
| Zone            | 0            | 1 | 2 | 20 | 21 | 22 |
| Ex interface    |              | • | • |    | •  | •  |
| Installation in |              | • | • |    | •  | •  |

### Selection Table

| Product Description      |                          | Grounding monitoring device |     |  | Product Type | Art. No. | PS | Weight kg |
|--------------------------|--------------------------|-----------------------------|-----|--|--------------|----------|----|-----------|
| Nominal voltage range AC | Nominal voltage range DC | Limit contact               | SIL |  |              |          |    |           |
| 96 – 253 V               | –                        | changeover contact          | 2   |  | 8146/5075    | 136216 ▲ | 54 | 5.800     |
| –                        | 18 – 31.2 V              | changeover contact          | –   |  | 8146/5-V73   | 273441   | 54 | 5.800     |

### Technical Data

| Variant                         | 8146/5075  | 8146/5-V73                                |
|---------------------------------|--|---|
| Explosion Protection            |  |   |
| IECEx gas explosion protection  | Ex db eb [ia Ga] IIC T4 Gb   | Ex db eb [ia Ga] IIC T4 Gb                |
| IECEx dust explosion protection | Ex tb [ia Da] IIIC T80 °C Db   | Ex tb [ia Da] IIIC T80 °C Db              |
| ATEX gas explosion protection   | Ⓔ II 2(1) G Ex db eb [ia Ga] IIC T4 Gb   | Ⓔ II 2 (1) G Ex db eb [ia Ga] IIC T4 Gb   |
| ATEX dust explosion protection  | Ⓔ II 2 (1) D Ex tb [ia Da] IIIC T80 °C Db  | Ⓔ II 2 (1) D Ex tb [ia Da] IIIC T80 °C Db |
| EAC gas explosion protection    | Ⓔ 1Ex d e [ia Ga] IIC T4 Gb X  | Ⓔ 1Ex d e [ia Ga] IIC T4 Gb X             |
| EAC dust explosion protection   | Ⓔ Ex tb IIIC T80 °C Db X   | Ⓔ Ex tb IIIC T80 °C Db X                  |
| Certificates                    | ATEX (PTB), Brazil (ULB), EAC (LPE), IECEx (PTB), SIL (exida) ATEX (PTB), Brazil (ULB), EAC (LPE), IECEx (PTB) |   |
| Safety Data                     |  |   |
| Safety-related maximum voltage  | 253 V  | 253 V                                     |
| Electrical Data                 |  |   |
| Frequency range                 | 48 – 62 Hz   |   |

| Technical Data                           |  |  |
|--|--|--|
| Variant                                  | 8146/5075                              | 8146/5-V73                             |
| Auxiliary Power                          |  |  |
| Nominal current                          | 27 mA                                  | 100 mA                                 |
| Power consumption                        | 3 W                                    | 3 W                                    |
| Output                                   |  |  |
| Output min. load                         | 12 V / 100 $\mu$ A                     | 1 V / 100 $\mu$ A                      |
| Output max. load DC                      | 250 V / 2 A                            | 125 V / 1 A                            |
| Output max. load AC                      | 250 V / 4 A                            | 125 V / 1 A                            |
| Ambient Conditions                       |  |  |
| Ambient temperature                      | -20 °C ... +55 °C                      | -20 °C ... +55 °C                      |
| Storage temperature                      | -40 °C ... +80 °C                      | -40 °C ... +80 °C                      |
| Mechanical Data                          |  |  |
| Degree of protection (IP)                | IP66                                   | IP66                                   |
| Enclosure material                       | Glass fibre reinforced polyester resin | Glass fibre reinforced polyester resin |
| Accessories and spare parts see page 202 |  |  |
| Dimensional Drawings see page 206        |  |  |



- Continuous monitoring of correct grounding
- Robust design
- Weather-protected stainless steel enclosure (IP66)
- Potential-free change-over contact for signalling to the process control system and external control devices
- Insulated point of suspension
- For use up to SIL 2 (IEC 61508)

WebCode **8150G**



The ground monitoring device ensures that tank containers, drums, road tankers, rail cars and IBCs are correctly electrostatically grounded during the loading of flammable liquids.

The device provides a conductive connection to the ground and monitors in parallel the quality of the electrostatic grounding.

This guarantees that the electrostatic charge remains at a safe level and that no explosion hazard is generated by uncontrolled energy discharge.

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|                 | ATEX / IECEx |   |   |    |    |    |
|-----------------|--------------|---|---|----|----|----|
| Zone            | 0            | 1 | 2 | 20 | 21 | 22 |
| Ex interface    |              | • | • |    | •  | •  |
| Installation in |              | • | • |    | •  | •  |

### Selection Table

| Product Description    | Grounding monitoring device | Art. No. | PS | Weight kg |
|------------------------|-----------------------------|----------|----|-----------|
| Enclosure material     | Product Type                |          |    |           |
| 1.4404 stainless steel | 8150/5-V75                  | 256498 ▲ | 54 | 6.580     |






### Technical Data

|                                 |  |
|---------------------------------|--|
| Explosion Protection            |  |
| IECEX gas explosion protection  | Ex db eb [ia Ga] IIC T4 Gb   |
| IECEX dust explosion protection | Ex tb [ia Da] IIIC T80 °C Db   |
| ATEX gas explosion protection   | ⊕ II 2(1) G Ex db eb [ia Ga] IIC T4 Gb   |
| ATEX dust explosion protection  | ⊕ II 2 (1) D Ex tb [ia Da] IIIC T80 °C Db  |
| EAC gas explosion protection    | ⊕ 1Ex d e [ia Ga] IIC T4 Gb X  |
| EAC dust explosion protection   | ⊕ Ex tb IIIC T80 °C Db X   |
| Certificates                    | ATEX (PTB), Brazil (ULB), EAC (LPE), IECEx (PTB), India (PESO), SIL (exida), Taiwan (ITRI) |
| Safety Data                     |  |
| Safety-related maximum voltage  | 253 V  |
| Functional Safety               |  |
| SIL                             | 2  |
| Electrical Data                 |  |
| Frequency range                 | 48 – 62 Hz   |


| Technical Data                           |                    |
|--|--------------------|
| Auxiliary Power                          |                    |
| Nominal voltage range AC                 | 96 – 253 V         |
| Nominal current                          | 27 mA              |
| Power consumption                        | 3 W                |
| Output                                   |                    |
| Limit contact                            | changeover contact |
| Output min. load                         | 12 V / 100 µA      |
| Output max. load AC                      | 250 V / 4 A        |
| Output max. load DC                      | 250 V / 2 A        |
| Ambient Conditions                       |                    |
| Ambient temperature                      | -20 °C ... +55 °C  |
| Storage temperature                      | -40 °C ... +80 °C  |
| Mechanical Data                          |                    |
| Degree of protection (IP)                | IP66               |
| Accessories and spare parts see page 202 |                    |
| Dimensional Drawings see page 206        |                    |

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## Accessories

| Figure   | Description   | Art. No. | PS | Weight kg |
|--|---|----------|----|-----------|
| <b>Grounding clamp with cable</b>  |   |          |    |           |
|   | 10 m oil and petrol resistant cable with robust ergonomic grounding clamp of stainless steel and fast-action plug   | 247673   | Z2 | 2.900     |
| <b>Grounding clamp with spiral cable</b>   |   |          |    |           |
|   | 10 m oil and petrol resistant spiral cable with robust ergonomic grounding clamp of stainless steel and fast-action plug  | 247674   | Z2 | 4.000     |
|  | 5 m oil and petrol resistant spiral cable with robust ergonomic grounding clamp of stainless steel and fast-action plug   | 247672   | Z2 | 1.500     |
| <b>Earth clamp with automatic cable winder</b>                                     |   |          |    |           |
|   | Automatic winder with 20 m of oil and petrol resistant cable with robust ergonomic grounding clamp of stainless steel, and fast-action plug, aluminium enclosure, protected cable duct with stopper | 247671   | Z2 | 14.500    |
|   | Automatic winder with 12 m of oil and petrol resistant cable with robust ergonomic grounding clamp of stainless steel, and fast-action plug, aluminium enclosure, protected cable duct with stopper | 269915   | Z2 | 6.200     |
|  | Automatic winder with 9 m of oil and petrol resistant cable with robust ergonomic grounding clamp of stainless steel, and fast-action plug, plastic enclosure                                       | 247660   | Z2 | 4.500     |

## Spare Parts

| Figure  | Description  | Art. No. | PS | Weight kg |
|---|--|----------|----|-----------|
| <b>Earth clamp with fast-action plug</b>  |  |          |    |           |
|  | Robust ergonomic grounding clamp with 150 mm of cable and fast-action plug<br>Spare part for automatic retractors (247660, 269915 and 247671), regular cables (247673) and spiral cables (247674 and 247672) | 247675   | E2 | 0.600     |

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- Continuous monitoring of correct earthing
- Potential operator errors are prevented thanks to object detection (on truck)
- Water-jet-proof IP65 aluminium enclosure
- Up to four potential-free change-over contacts for signalling
- Ambient temperature -55 °C to +60 °C
- Auxiliary power: 24 V DC – 230 V AC
- Parameterisation when enclosure is closed

WebCode **8485A**



The ground monitoring device ensures the electrostatic grounding of road tankers, rail cars and Big Bag (Rev. C) while loading flammable liquids and powder.

The device provides a conductive connection to the ground and monitors in parallel the quality of the electrostatic grounding. This guarantees that the electrostatic charge remains at a safe level and that no explosion hazard is generated by uncontrolled energy discharge.

The following recommendation requires grounding during loading and recommends interrupting loading in case of incorrect grounding:

- CLC/TR 60079-32-1 recommendation for avoiding ignition hazards due to electrostatic charges.
- TRBS 727 rules for avoiding ignition hazards as a result of electrostatic charges.

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|                 | ATEX / IECEx |   |   |    |    |    |
|-----------------|--------------|---|---|----|----|----|
| Zone            | 0            | 1 | 2 | 20 | 21 | 22 |
| Ex interface    |              | • | • |    | •  | •  |
| Installation in |              | • | • |    | •  | •  |

| Selection Table     |                    |                             |  |  |          |    |           |
|---------------------|--------------------|-----------------------------|--|--|----------|----|-----------|
| Product Description |                    | Grounding monitoring device |  |  |          |    |           |
| Figure              | Enclosure material | Product Type                |  |  | Art. No. | PS | Weight kg |
|                     | Aluminium          | 8485/111-42                 |  |  | 263091 ▲ | 54 | 12.100    |

| Technical Data                  |  |
|---------------------------------|--|
| Explosion Protection            |  |
| IECEx gas explosion protection  | Ex db ib [ib] IIB T4 Gb                            |
| IECEx dust explosion protection | Ex ib [ib] tb IIIC T130 °C Db                      |
| ATEX gas explosion protection   | Ⓔ II 2 G Ex db ib [ib] IIB T4 Gb                   |
| ATEX dust explosion protection  | Ⓔ II 2 D Ex ib [ib] tb IIIC T130 °C Db             |
| EAC gas explosion protection    | Ⓔ 1 Ex d ib [ib] IIB T4 Gb X                       |
| EAC dust explosion protection   | Ⓔ Ex ib [ib] tb IIC T130 °C Db                     |
| Certificates                    | ATEX (FTZU), EAC (STV), IECEx (FTZU), India (PESO) |



## Technical Data

### Safety Data

|                                     |         |
|-------------------------------------|---------|
| Max. voltage U, signalling contacts | 50 V DC |
| Max. current I, signalling contact  | 200 mA  |

### Electrical Data

|                          |   |
|--------------------------|---|
| Connections              | Maximum diameter, single-wire<br>- rigid 2.5 mm <sup>2</sup><br>- flexible 2.5 mm <sup>2</sup><br>- flexible, cable end sleeves with plastic cover 1.5 mm <sup>2</sup><br>- flexible, cable end sleeves without plastic cover 2.5 mm <sup>2</sup> |
| Operating mode selection | Road tanker, rail car and Big Bag recognition<br>Selection via DIP switch   |
| Frequency range          | 47 – 63 Hz  |

### Auxiliary Power

|                          |            |
|--------------------------|------------|
| Nominal voltage range AC | 20 – 230 V |
| Nominal voltage range DC | 20 – 300 V |
| Nominal current          | 50 mA      |
| Power consumption        | 10 VA      |

### Output

|                     |                                |
|---------------------|--------------------------------|
| Limit contact       | up to 4 changeover contact     |
| Output min. load    | 10 V DC / 100 mA               |
| Output max. load AC | 230 V AC / 3 A                 |
| Output max. load DC | 230 V DC / 0.25 A, 40 V DC/3 A |








### Ambient Conditions

|                     |                   |
|---------------------|-------------------|
| Ambient temperature | -55 °C ... +60 °C |
| Storage temperature | -55 °C ... +60 °C |


### Mechanical Data

|                                      |                             |
|--------------------------------------|-----------------------------|
| Degree of protection (IP)            | IP65                        |
| Enclosure version                    | Flameproof enclosure (Ex d) |
| Cable diameter range of cable glands | 6.1 – 11.7 mm               |

Dimensional Drawings see page 206

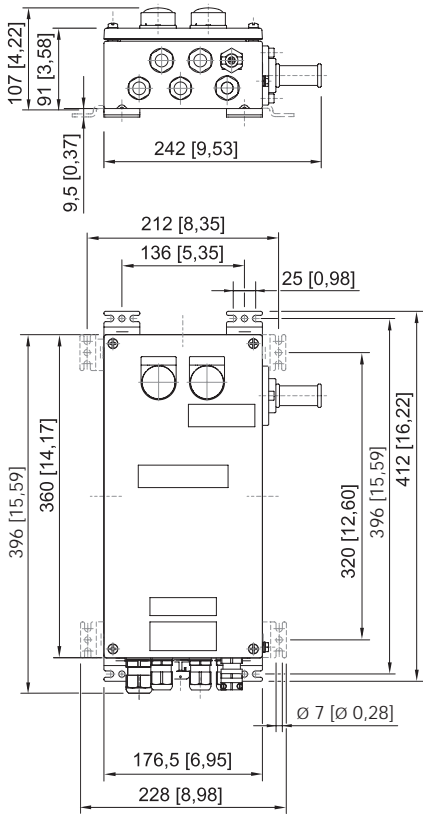
| Accessories   |   |          |    |           |
|---|---|----------|----|-----------|
| Figure  | Description   | Art. No. | PS | Weight kg |
| <b>Earth clamp with spiral cable</b>  |   |          |    |           |
|    | 10 m ÖLFLEX with cable gland for 8485/111-42 Rev. C<br>Clamp made of stainless steel 1.4301<br>Ambient temperature: -30 ... +60 °C  | 263025   | Z2 | 4.000     |
| <b>Earth clamp with cable</b>   |   |          |    |           |
|    | 10 m ÖLFLEX with cable gland for 8485/111-42 Rev. C<br>Clamp made of stainless steel 1.4301<br>Ambient temperature: -40 ... +60 °C  | 263023   | Z2 | 2.900     |
|    | 10 m SIHF-J with cable gland for 8485/111-42 Rev. C<br>Clamp made of stainless steel 1.4301<br>Ambient temperature: -55 ... +60 °C  | 263024   | Z2 | 2.900     |
| <b>Earth clamp with automatic cable winder</b>                                      |   |          |    |           |
|    | Automatic winder with 20 m of oil and petrol resistant cable with robust ergonomic grounding clamp of stainless steel, and fast-action plug, aluminium enclosure, protected cable duct with stopper | 247671   | Z2 | 14.500    |
|   | Automatic winder with 12 m of oil and petrol resistant cable with robust ergonomic grounding clamp of stainless steel, and fast-action plug, aluminium enclosure, protected cable duct with stopper | 269915   | Z2 | 6.200     |
|  | Automatic winder with 9 m of oil and petrol resistant cable with robust ergonomic grounding clamp of stainless steel, and fast-action plug, plastic enclosure                                       | 247660   | Z2 | 4.500     |
| <b>Configuration set</b>  |   |          |    |           |
|  | Configuration set for Rev. C devices consisting of infrared adapter with USB port and USB stick with configuration software   | 263097   | Z2 | 1.000     |

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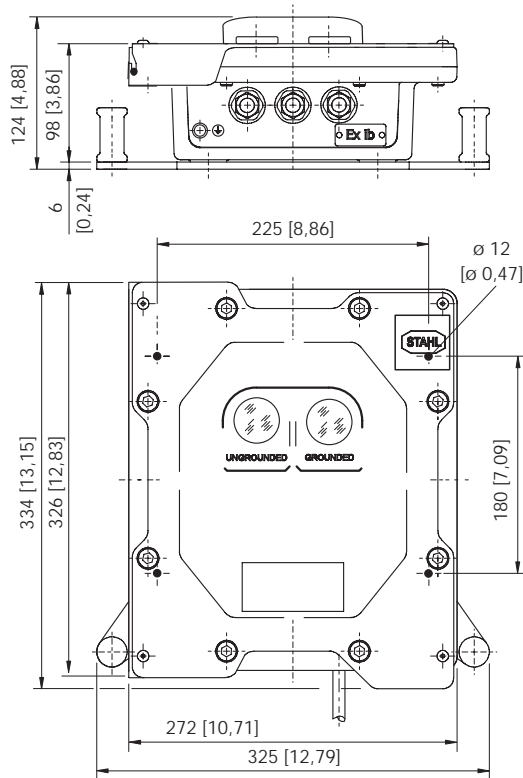
| Spare Parts   |  |          |    |           |
|---|--|----------|----|-----------|
| Figure  | Description  | Art. No. | PS | Weight kg |
| <b>Earth clamp with fast-action plug</b>  |  |          |    |           |
|  | Robust ergonomic grounding clamp with 150 mm of cable and fast-action plug<br>Spare part for automatic retractors (247660, 269915 and 247671), regular cables (247673) and spiral cables (247674 and 247672) | 247675   | E2 | 0.600     |

Dimensional Drawings (All Dimensions in mm [inches]) – Subject to Alterations

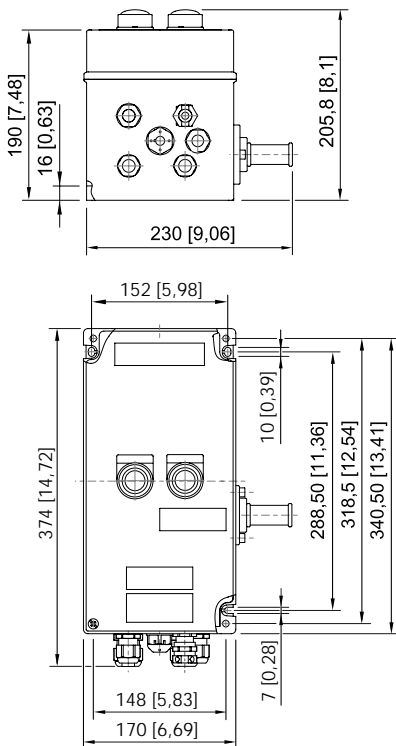
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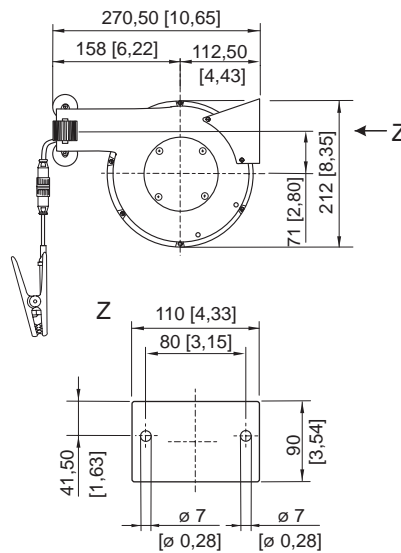
Type 8150/5-V75



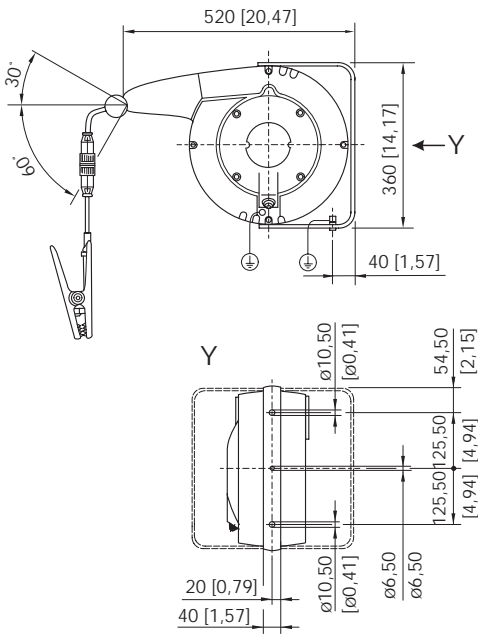
Type 8485/111-42



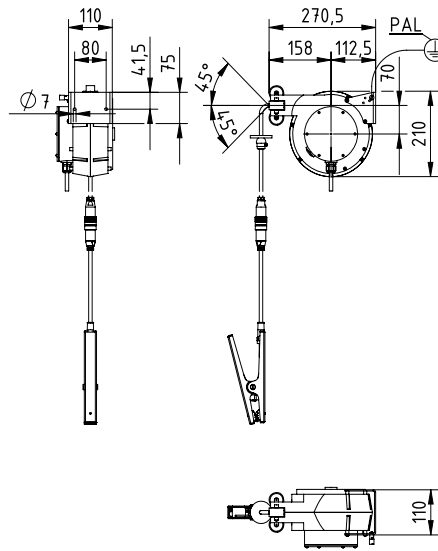
Type 8146/5075, 8146/5-V73



Grounding clamp with automatic cable winder  
Art. no. 247660



Grounding clamp with automatic cable winder  
Art. no. 247671



Grounding clamp with automatic cable winder  
Art. no. 269915



- Controlled electrostatic grounding of extremely versatile objects
- One potential-free change-over contact per channel for signalling to the distributed control system or external signalling devices
- Compact dual-channel device
- 24 V DC supply
- LED status indicator

WebCode **9170B**



The device ensures electrostatic grounding of objects and automatically detects defective or interrupted earth connections in the system and disconnects the process. This guarantees that an electrostatic charge remains at a safe level and that there is no risk of explosion caused by the uncontrolled discharge of this energy.

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|                 | ATEX / IECEx |   |   |    |    |    |
|-----------------|--------------|---|---|----|----|----|
| Zone            | 0            | 1 | 2 | 20 | 21 | 22 |
| Ex interface    | •            | • | • | •  | •  | •  |
| Installation in |              |   | • |    |    | •  |

|                 | NEC 505<br>Class I |   |   | NEC 506 |    |    |
|-----------------|--------------------|---|---|---------|----|----|
| Zone            | 0                  | 1 | 2 | 20      | 21 | 22 |
| Ex interface    | •                  |   |   |         |    |    |
| Installation in |                    |   | • |         |    |    |

|                 | NEC 500 |   |          |   |           |   |
|-----------------|---------|---|----------|---|-----------|---|
|                 | Class I |   | Class II |   | Class III |   |
| Division        | 1       | 2 | 1        | 2 | 1         | 2 |
| Ex interface    | •       |   | •        |   | •         |   |
| Installation in |         | • |          |   |           |   |

| Selection Table    |                              |                |          |    |           |  |
|--------------------|------------------------------|----------------|----------|----|-----------|--|
| Number of channels | 2                            |                |          |    |           |  |
| Auxiliary power    | Output per channel           | Product Type   | Art. No. | PS | Weight kg |  |
| 24 V DC            | 1 change over - signal relay | 9170/21-30-10s | 169318   | 54 | 0.175     |  |

| Technical Data                  |  |
|---------------------------------|--|
| Explosion Protection            |  |
| IECEx gas explosion protection  | Ex nA nC [ia Ga] IIC T4 Gc   |
| IECEx dust explosion protection | [Ex ia Da] IIIC  |
| ATEX gas explosion protection   | ⊕ II 3 (1) G Ex nA nC [ia Ga] IIC T4 Gc  |
| ATEX dust explosion protection  | ⊕ II (1) D [Ex ia Da] IIIC   |
| EAC gas explosion protection    | ⊕ 2Ex nA nC [ia Ga] IIC T4 Gc X  |
| EAC dust explosion protection   | ⊕ [Ex ia Da] IIIC  |
| Certificates                    | ATEX (BVS), Brazil (ULB), Canada (FM), EAC (STV), IECEx (BVS), India (PESO), Korea (KGS), USA (FM) |
| Ship approval                   | CCS, DNVGL   |
| Installation                    | Zone 2, Zone 22  |
| Further information             | see respective certificate and operating instructions  |
| Safety Data                     |  |
| Maximum voltage $U_o$           | 9.6 V  |
| Maximum current $I_o$           | 10 mA  |
| Maximum power $P_o$             | 24 mW  |
| Safety-related maximum voltage  | 253 V  |
| Electrical Data                 |  |
| Signal types                    | Digital input  |

| Technical Data                          |   |
|---|---|
| Electrical Data                         |   |
| LFD relay                               | No  |
| Input                                   |   |
| Resistor for ON                         | $\leq 20 \text{ k}\Omega$   |
| Resistor for OFF                        | $\geq 50 \text{ k}\Omega$   |
| Ambient Conditions                      |   |
| Ambient temperature                     | -20 °C ... +70 °C (Single device)<br>-20 °C ... +60 °C (Group assembly) |
| Storage temperature                     | -40 °C ... +80 °C   |
| Mounting / Installation                 |   |
| Mounting type                           | NS35/15, NS35/7.5 DIN rail  |
| Accessories and spare parts see page 74 |   |
| Dimensional drawings see page 75        |   |