SCHMERSAL

EN Operating instructions. . . . . .pages 1 to 8
Original

Content

1. About this document

1.1 Function

This operating instructions manual provides all the information you need for the mounting, set-up and commissioning to ensure the safe operation and disassembly of the switchgear. The operating instructions must be available in a legible condition and a complete version in the vicinity of the device.

1.2 Target group: authorised qualified personnel

All operations described in this operating instructions manual must be carried out by trained specialist personnel, authorised by the plant operator only.

Please make sure that you have read and understood these operating instructions and that you know all applicable legislations regarding occupational safety and accident prevention prior to installation and putting the component into operation.

The machine builder must carefully select the harmonised standards to be complied with as well as other technical specifications for the selection, mounting and integration of the components.

1.3 Explanation of the symbols used

Information, hint, note:
This symbol indicates useful additional information.

Caution: Failure to comply with this warning notice could lead to failures or malfunctions.
Warning: Failure to comply with this warning notice could lead to physical injury and/or damage to the machine.

1.4 Appropriate use

The Schmersal range of products is not intended for private consumers.

It is the responsibility of the manufacturer of a machine or plant to ensure the correct functionality of the entire machine or plant.

The product must be exclusively used in accordance with the versions listed below or for the applications authorised by the manufacturer. Detailed information regarding the range of applications can be found in the chapter "Product description".

1.5 General safety instructions

The user must observe the safety instructions in this operating instructions manual, the country specific installation standards as well as all prevailing safety regulations and accident prevention rules.

Further technical information can be found in the Schmersal catalogues or in the online catalogue on the Internet: products.schmersal.com.

The information contained in this operating instructions manual is provided without liability and is subject to technical modifications.

There are no residual risks, provided that the safety instructions as well as the instructions regarding mounting, commissioning, operation and maintenance are observed.

1.6 Warning about misuse

In case of inadequate or improper use or manipulations of the component, personal hazards or damage to machinery or plant components cannot be excluded.

x.000 / 08.2023 / v.A. - 103025505-EN / D / 2023-08-02 / AE-Nr. 16575

1.7 Exclusion of liability

We shall accept no liability for damages and malfunctions resulting from defective mounting or failure to comply with this operating instructions manual. The manufacturer shall accept no liability for damages resulting from the use of unauthorised spare parts or accessories.

For safety reasons, invasive work on the device as well as arbitrary repairs, conversions and modifications to the device are strictly forbidden, the manufacturer shall accept no liability for damages resulting from such invasive work, arbitrary repairs, conversions and/or modifications to the device.

2. Product description

2.1 Ordering code

This operating instructions manual applies to the following types:

EX-T. 454-①Z-②-③-④

No.	Option	Description
①	11	1 NO / 1 NC
	02	2 NC
	20	2 NO
	22	2 NO / 2 NC
	13	1 NO / 3 NC
	31	3 NO / 1 NC
	04	4 NC
②		Without staggered contacts, standard for 11, 02, 20
	H	With staggered contacts for 22, 13, 31, 04
③		Included in standard version
	DN	With integrated Dupline® input module (only zone 21 and 22)
④		Smooth shaft (Standard)
	1801	Toothed shaft (10° increments)

The devices are modular and supplied without actuating elements. A range of functions can be mapped through combination with a specific actuating element.

Only if the information described in this operating instructions manual are realised correctly, the compliance with the Explosion Protection Directive is maintained.

2.2 Special versions

For special versions, which are not listed in the ordering code below 2.1, these specifications apply accordingly, provided that they correspond to the standard version.

2.3 Purpose

Position switches are used wherever moving parts on machinery and plants need to be positioned, controlled and monitored.

Belt alignment switches monitor belt alignment in material handling plants and are arranged in pairs on either side of the transported material, close to the drive rollers and pulleys. In the event of deviations on the conveyor belt, a staggered signal is generated as a pre-warning or to shut off the conveyor belt (see switching angle diagram). The device is suitable for harsh environmental conditions.

On the Dupline® version, the switch statuses are queried via the two-channel Dupline® input module and transmitted via the Dupline® 2-wire installation bus to a control unit.

2.4 Determination and use for explosion protection

The components can be used in explosion-endangered areas of Zone 21 and 22 equipment category 2D and 3D. The EX-T. 454 version without Dupline® input module can also be installed in potentially explosive gas atmospheres of zones 1 and 2, category 2G and 3G, when the intrinsic safety Ex ib ignition protection type is used.

The EX-T. 454-... version with integrated Dupline® input module is only suitable for use in potentially explosive dust atmospheres of zones 21 and 22, category 2D and 3D.

The installation and maintenance requirements to the standard series 60079 must be met.

During installation in intrinsically safe current circuits (Ex i), it must be borne in mind that the device may only be connected to a single, approved electrical apparatus (e.g. SRB 200EXi-..., barrier, isolated switch amplifier).
The safety data of both devices must be compared.

Note external sources of heat and/or cold. The switch may only be operated in the temperature range specified in the datasheet. External influences, e.g. solar radiation, external sources of cold, must be borne in mind and precautionary measures taken, if applicable.

2.5 Technical Data

Marking in accordance with the ATEX directives:	
- Version without Dupline® -DN:	⟨Ex⟩ II 2GD
- Version with Dupline® -DN:	⟨Ex⟩ II 2D
Marking in accordance with standards:	
- ATEX, IECEx without Dupline® -DN:	Ex ib IIC T6 Gb Ex tb IIIC T80°C Db Ex ib IIIC T80°C Db
- ATEX, IECEx with Dupline® -DN:	Ex tb IIIC T80°C Db
Applied standards:	EN 60947-5-1
- ATEX:	EN IEC 60079-0, EN 60079-11, EN 60079-31
- IECEx:	IEC 60079-0, IEC 60079-11, IEC 60079-31
Certificate numbers:	
- ATEX:	TÜV 17 ATEX 8004
- IECEx:	TUR 18.0048
Enclosure:	Grey cast iron, galvanized and painted
Max. impact energy:	7 J
Max. surface temperature:	+80 °C
Degree of protection:	IP66 and IP67 to EN 60529
Ambient temperature:	−20 °C … +60 °C
Storage temperature:	−20 °C … +60 °C
Contact material:	Silver
Contact type:	Slow action, positive break NC contact ⊖; double break of 2 separated contact bridges
Connection:	Screw terminals M4
Cable type:	rigid single wire or fine wire
Max. cable section:	0.75 ... 2.5 mm² (incl. conductor ferrules)
Cable entry:	2 x M20 x 1.5
Mechanical life:	1 million operations
Switching frequency:	max. 1,800/h
Tightening torque:	
- Cable gland:	8 Nm
- Blocking screws:	8 Nm
- Cover screws:	1 Nm
- Earth screws:	PE 1 Nm PA 1.2 Nm

Electrical data	
Rated impulse withstand voltage U_{imp}:	6 kV
Rated insulation voltage U_i:	400 V
Thermal test current I_{the}:	10 A
Utilisation category:	AC-15, DC-13
Rated operating current/voltage I_e/U_e:	4 A / 230 VAC 1 A / 24 VDC
Max. fuse rating:	6 A gG D-fuse
Required short-circuit current:	1,000 A

Deviating data of the Dupline® variant -DN (see also operating instructions of the Dupline® input module)	
Supply voltage:	8.2 VDC
Power consumption:	100 µA
Device insulation:	internal short-circuit proof
Rated impulse withstand voltage U_{imp}:	800 V
Rated insulation voltage U_i:	30 VDC
Connection:	screw terminals
Cable type:	rigid single wire or fine wire
Cable section:	
- Rigid single wire:	0.2 … 4 mm²
- Flexible:	0.25 … 2.5 mm² (with conductor ferrule)

2.6 Safety-technical data – Intrinsic safety

For explosion protection with intrinsic safety ignition protection type (Ex i), the switchgear must be wired with suitable associated equipment. Associated electrical equipment is suitable only if the safety-technical data for the device are consistent in accordance with the "verification of intrinsic safety". *

Safety-technical data – Intrinsic safety*		Comparison of safety-technical data*
Voltage U_i:	60 V	$U_i \geq U_o$
Current I_i:	100 mA	$I_i \geq I_o$
Power P_i:	6 W	$P_i \geq P_o$
Capacity C_i:	0	$C_i + C_{cable} \leq C_o$
Inductivity L_i:	0	$L_i + L_{cable} \leq L_o$

U_o, I_o, P_o, C_o, L_o can be found in the documentation for the associated equipment.

3. Mounting

3.1 General mounting instructions

The installation may only be carried out with the system de-energised and by authorised personnel.

Two mounting holes are available. The use of a protective ground wire is imperative.

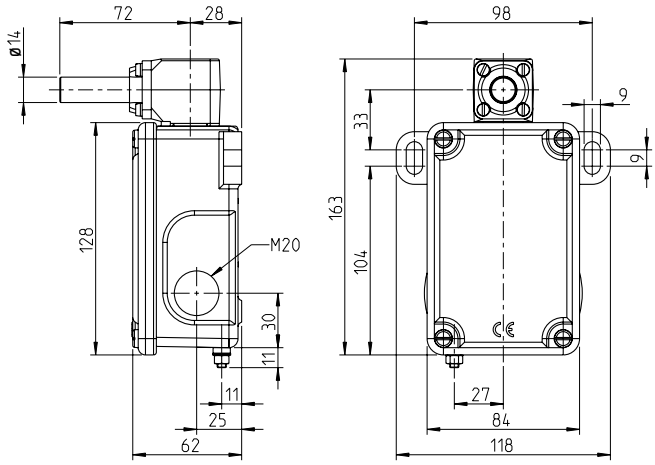
Belt alignment switches are arranged in pairs on either side of the transported material, close to the drive rollers and pulleys. It must be ensured that the belt alignment lever is affixed at a distance of 10 - 20 mm from the transported material.

Please note the information concerning maximum belt speed, switching frequency and tightening torques provided in the technical data.

3.2 Dimensions

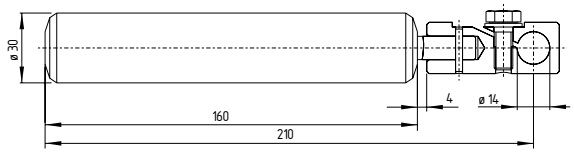
All measurements in mm.

EX-T. 454 (Basic switch)



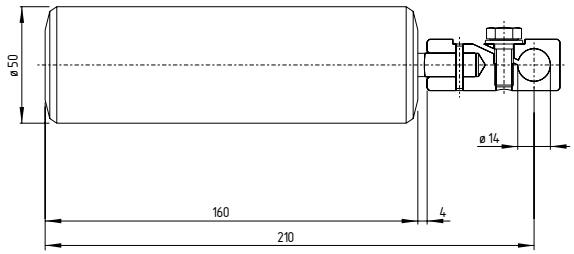
Lever

LEV-U14-B30-150-RVA



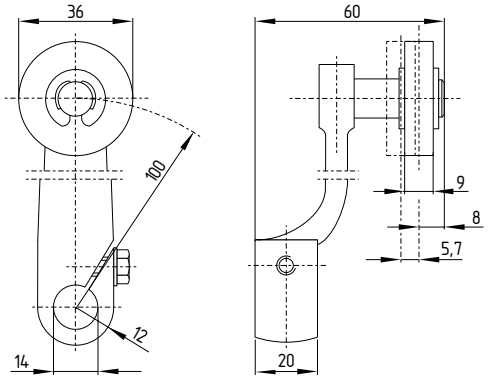
- For belt speeds of up to 3 m/s
- Continuous adjustment of lever position 360°

LEV-U14-B50-150-RVA



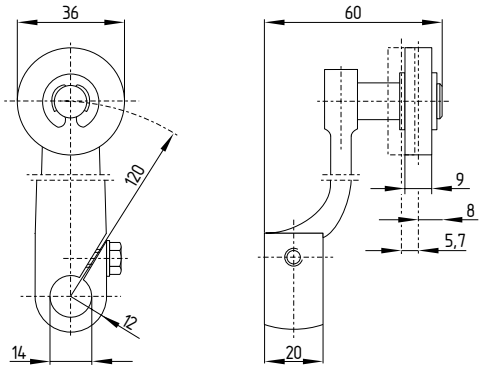
- For belt speeds of up to 6 m/s
- Continuous adjustment of lever position 360°

Roller lever A



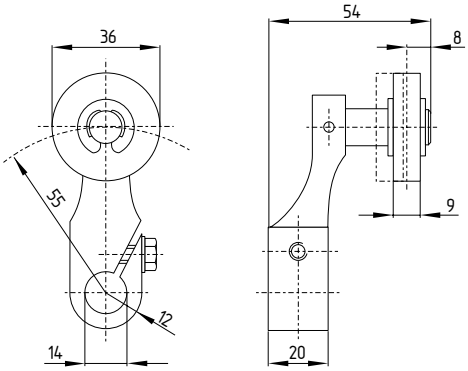
- Actuating speed max. 3 m/s, min. 0.05 m/s with an actuating angle of α and β = 30°
- Continuous adjustment of lever position 360°
- Splined shaft and lever available with 10° toothing

Roller lever 2A



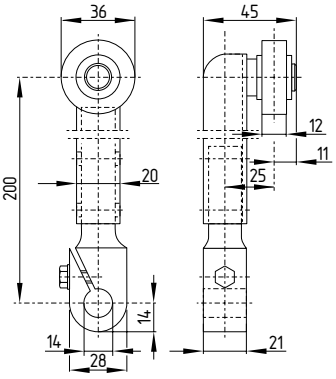
- Actuating speed max. 3 m/s, min. 0.05 m/s with an actuating angle of α and β = 30°
- Continuous adjustment of lever position 360°
- Splined shaft and lever available with 10° toothing

Roller lever L



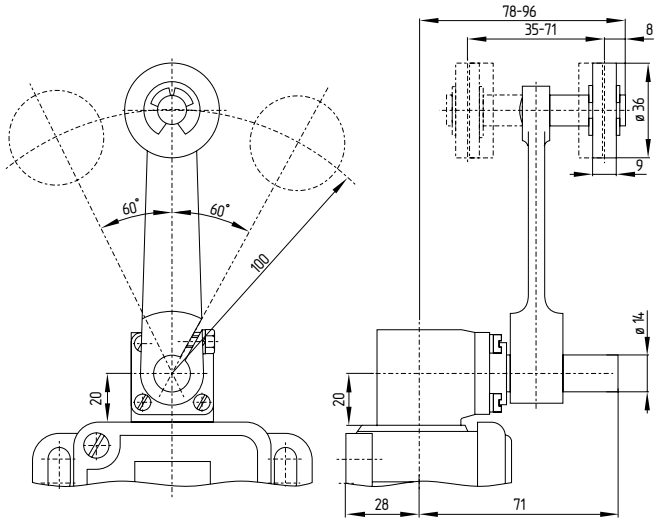
- Actuating speed max. 3 m/s, min. 0.05 m/s with an actuating angle of α and β = 30°
- Continuous adjustment of lever position 360°
- Splined shaft and lever available with 10° toothing

Roller lever V



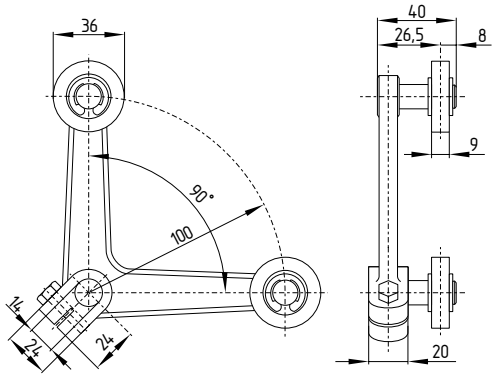
- Actuating speed max. 3 m/s, min. 0.05 m/s with an actuating angle of α and β = 30°
- Continuous adjustment of lever position 360°
- Splined shaft and lever available with 10° toothing

Roller lever D



- Actuating speed max. 3 m/s with an actuating angle of α and β = 30°
- Continuous adjustment of lever position 360°
- 180° repositioning of the actuator head on the shaft
- With metal roller available on request
- Splined shaft and lever available with toothing

Offset roller lever 4D



- Continuous adjustment of lever position 360°
- Splined shaft and lever available with 10° toothing

4. Electrical connection

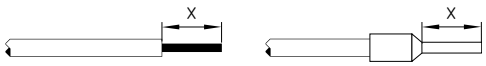
4.1 General information for electrical connection

The electrical connection may only be carried out by authorised personnel in a de-energised condition.

Only use Ex cable glands and Ex blanking plugs with integrated or associated seals which are authorised for the corresponding field of application. The cable glands must be fitted in accordance with the applicable operating instructions manual. Cable glands are only authorised for permanent cables. The constructor must provide for the necessary strain relief. Ununused cable entries must be sealed by means of Ex approved locking screws. Cable glands and locking screws are not included in the delivery.

The contact labelling can be found in the wiring compartment of the switch. Do not install cable loops in the inside space of the enclosure. Bare wires must not protrude beyond the clamping disc. Lead the cable insulation up to the clamping disc. All screws and/or nuts of the terminals, also the unused, must be screwed tight.

Settle length x of the conductor: 6 mm



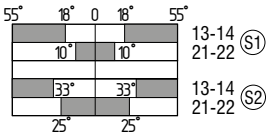
After wiring, the cover screws must be tightened uniformly.
Tightening torque cover screws: 1 Nm

The external equipotential bonding terminal is to be connected in accordance with EN 60079-14 section 6.3. A ring tongue size M5 must be used to connect the conductor.

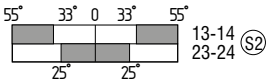
4.2 Switch travel diagrams

All NC contacts have positive break ⊖.

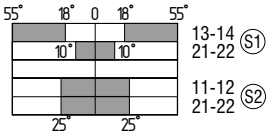
2 NO / 2 NC



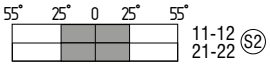
1 NO / 1 NC



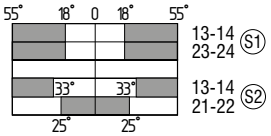
1 NO / 3 NC



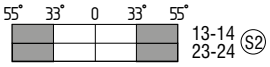
2 NC



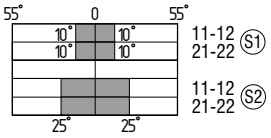
3 NO / 1 NC



2 NO



4 NC



Key:

S1, S2	Switch insert S1, S2
▬	Contact closed
▭	Contact open
P	Positive break angle

4.3 Accessories for cable entry

Accessories for cable entry (not included in delivery)	Ordering code	Tightening torque
Ex cable gland M20 x 1.5 Nickel plated brass	103003455	8 Nm
EX-Locking screw M20 x 1.5 Nickel plated brass	101185059	8 Nm

Always use the cable gland in accordance with the requisite conductor.

4.4 Assembly of the Dupline® input module

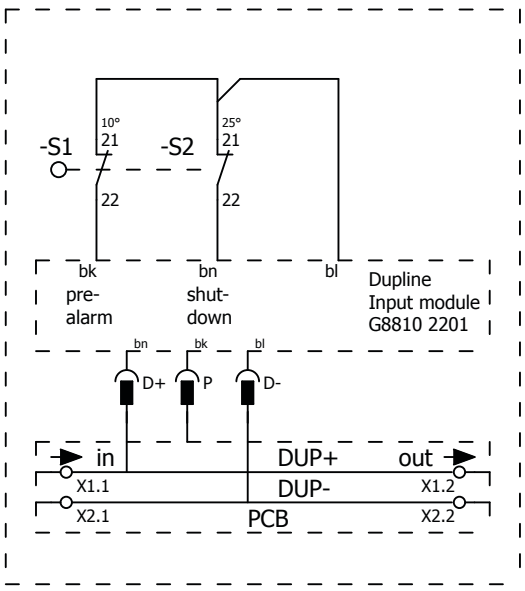
Before electrical installation, the Dupline® input module must be addressed and parametrised in accordance with the specifications of Dupline® (www.dupline.com).

Dupline®

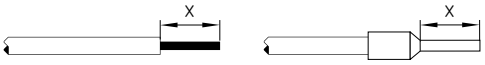
Release the connector on the circuit board with Dupline® input module connection and connect it to the programming device with the aid of the ACC-PRGC-DN programming cable. After successful addressing, the connector must be plugged back into the address bar.

Connect the wires of the Dupline® installation bus to the dedicated terminals marked with DUP+ / DUP-. The terminals marked with DUP+ / DUP- on the side serve as a means of connection to the next Dupline® bus subscribers.

Wiring example Dupline®



Settle length x of the cable at terminals of type s or f: 8 mm



The two normally-closed contacts of the switch elements are already connected to the Dupline® input module.

For correct operation, the installation regulations of the Dupline® input module must be observed. For supply and also addressing of the Dupline® input modules, the following Dupline® system components are required.

4.5 Dupline® system components

Accessories Dupline®	Ordering code
Hand-held programming device GAP1605	103010199
Test unit GTU8	103013800
programming cable ACC-PRGC-DN	103033601
Dupline® master channel generator SD2DUG24	103033128
Cable termination DT01	103010203

5. Set-up and maintenance

5.1 Functional testing

The function of the component must be tested. The following conditions must be previously checked and met:

1. The installation is executed according to the instructions
2. The connection is executed correctly
3. The cable is correctly executed and connected.
4. The component is not damaged
5. Check for free movement of the actuating element
6. Remove particles of dust and soiling
7. Check cable entry and connections in a de-energised condition

5.2 Maintenance

In case of correct installation in accordance with the above-described instructions, the component requires little maintenance. For use in extreme conditions, we recommend routine maintenance including the following steps:

1. Check the free movement of the actuating element
2. Remove particles of dust and soiling
3. Check the correct fixing of the cover screws
4. Check for damages and correct fixing
5. Check cable entry and connections in a de-energised condition
6. Check the castor on the belt alignment lever to verify ease of movement.

Avoid electrostaic charging. Clean with damp cloth.
Do not open the device when live.

For explosion protection reasons, the component must be exchanged after max. 1 million operations.

Damaged or defective components must be replaced.

6. Disassembly and disposal

6.1 Disassembly

The product must be disassembled in a de-energised condition only.

6.2 Disposal

The product must be disposed of in an appropriate manner in accordance with the national prescriptions and legislations.

7. EU Declaration of conformity

EU Declaration of conformity

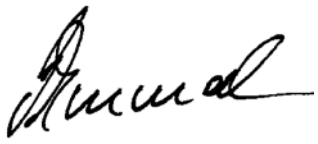
SCHMERSAL

Original

K.A. Schmersal GmbH & Co. KG
Möddinghofe 30
42279 Wuppertal
Germany
Internet: www.schmersal.com

We hereby certify that the hereafter described components both in their basic design and construction conform to the applicable European Directives.

Name of the component:	EX-T. 454	EX-T. 454-...-DN
Type:	see ordering code	
Marking:	Ⓔx II 2G ib IIC T6 Gb Ⓔx II 2D tb IIIC T80°C Db Ⓔx II 2D ib IIIC T80°C Db	Ⓔx II 2D tb IIIC T80°C Db
Description of the component:	Belt alignment switch / Position switch -DN version with integrated Dupline® input module [1]	
Relevant Directives:	2014/34/EU Explosion Protection Directive (ATEX) 2014/30/EU [1] EMV-Directive 2011/65/EU RoHS-Directive	
Applied standards:	EN 60947-5-1:2017 + AC:2020 EN IEC 60079-0:2018 EN 60079-11:2012 EN 60079-31:2014	
Notified body, which approved the full quality assurance system, referred to in Appendix IV, 2014/34/EU:	TÜV Rheinland Industrie Service GmbH Am Grauen Stein 51105 Köln ID n°: 0035	
Notified body:	TÜV Rheinland Industrie Service GmbH Am Grauen Stein 51105 Köln ID n°: 0035	
EU-type examination certificate:	TÜV 17 ATEX 8004	
Person authorised for the compilation of the technical documentation:	Oliver Wacker Möddinghofe 30 42279 Wuppertal	
Place and date of issue:	Wuppertal, August 2, 2023	



Authorised signature
Philip Schmersal
Managing Director

EX-T454-C-EN

The currently valid declaration of conformity can be downloaded from the internet at products.schmersal.com.

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