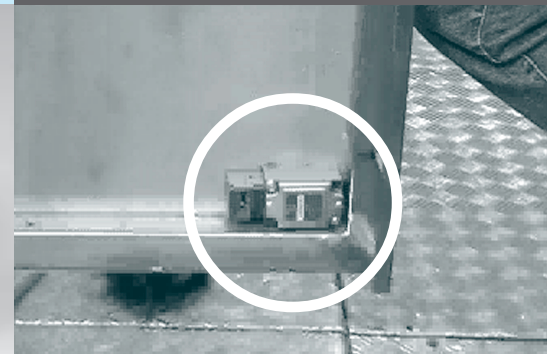
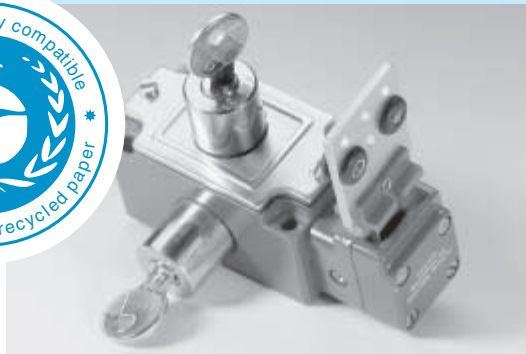
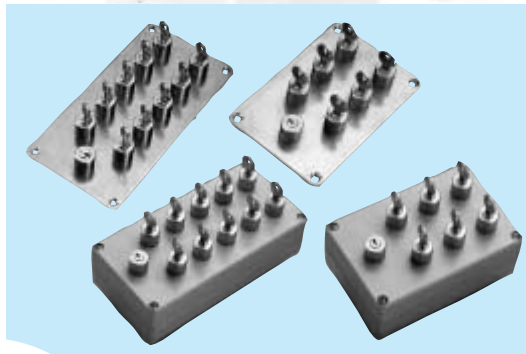
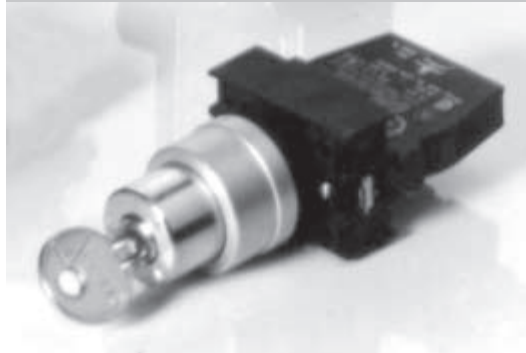


SHGV safety door interlocking system

Catalogue SHGV



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A **SCHMERSAL** company

Protecting safety doors without wiring:

Cost savings

The SHGV safety door interlocking system enables cost economies to be made in the protection of moving guards without affecting the safety level.

Costs economies are achieved by eliminating the wiring between moving guard and switch cabinet.

The function of electrical interlocking is achieved by means of an intelligent key transfer between a locking device with key fitted to the



Example of a safety door interlocking system of the type series SHGV in a textiles production system.

guard and a key-operated selector switch as control element.

In view of the fact that the SHGV safety door interlocking system has a locking function too electromagnets to keep the safety doors locked are not needed if overtravel motions are expected, and, depending on the application, there will be no need for zero motion monitors or safe timer modules.

System classification

* Refer here to EN 1088 – Interlocking devices with and without guard locking – General principles and provisions for design – Informative annex E: Interlocking devices with key transfer system

In the language of standardisation, systems which fall within the scope of the SHGV safety door interlocking system are also referred to as key transfer systems or “trapped key systems”.

Whilst not particularly prevalent in continental Europe, but enjoying widespread popularity in the United

Kingdom and USA, key transfer systems are not a locally tolerated feature. In European machine legislation they are a recognised and fully accepted protective device in terms of the protective objectives aspired to with the use of interlocking devices*.



Furthermore, the SHGV type series has been BG prototype tested by the Berufsgenossenschaftliche Institut für Arbeitssicherheit BIA, St. Augustin (No. 953038 dated 28. 8. 2000).

Application

* The suitability of the system for explosion-protected applications must be checked by the customer in each individual case.

The SGHV type series is particularly suitable in more complex production systems and plants to protect divided maintenance and service doors which are used only rarely.

Other applications include situations in which an electrical shock is possible, applications with higher ambient temperatures, specific uses in tough ambient conditions and in chemical and process engineering in

view of the explosion protection feature*. By contrast, because of the key transfer, the system is less suitable for charging doors or moving guards with more frequent access.

Function

The fundamental functional characteristic of a key transfer system is that, depending on the operating state of the machine control system, the key is trapped and cannot be withdrawn either

- in automatic mode (with the guard locked) in a control element (usually in a key-operated selector switch)

or

- in the guard locking device, namely in a lock, if the guard is open (in an electrically de-energised state).

In other words, a principle feature of the system is that the removable key is trapped either in the guard locking device or in the switch lock.

The locking device of the guard is designed in such a way that the key transfer can only be enabled if the guard is closed and locked (fail-safe). Only in this way can the key be transferred from here to the key-operated selector switch.

When the machine control system is switched on the key is trapped and cannot be removed for as long as the switch is set to ON.

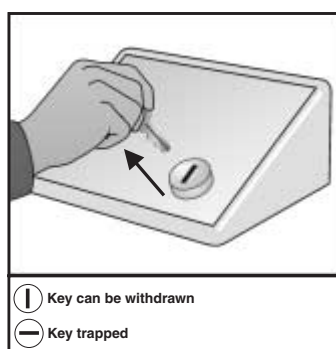
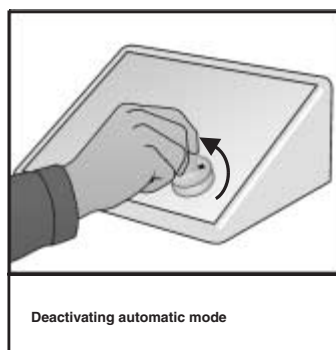
If the transfer time between the opening of the key-operated selector switch and the locking of the guard is not sufficient for a hazardous machine motion to come to a standstill, a key-operated selector switch interlocking device may also be required.

SHGV safety door interlocking system

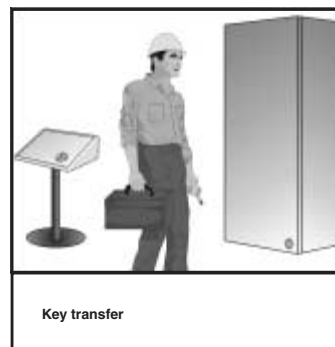
Functional sequence

The automatic mode of the machine control system is enabled when the NC contact(s) of a 2-position selector switch is/are closed. This corresponds to the position of the key-operated selector switch in which the key is trapped.

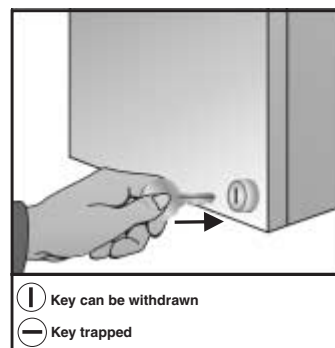
1. For interruption/shutdown of automatic mode, the key in the key-operated selector switch is turned from the trapped position to the removable position. The NC contact(s) are positively opened and the automatic mode of the machine control system is automatically disconnected.



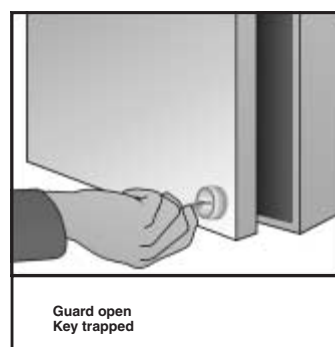
2. This enables the key to be transferred from the key-operated selector switch to the guard.



3. The locking device on the guard is unlocked by turning the lock barrel to trapped position.



4. The guard can be opened.



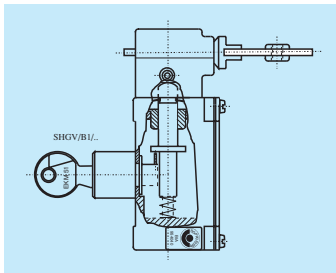
5. A mechanical fail-safe device prevents the key being switched back when the guard is open.
6. If the guard is closed again it is locked once again by turning the key back from trapped position to the position in which it can be withdrawn.
7. The key which is now back in the key-operated selector switch is used to reactivate the machine control system, i.e. by turning it back from the removable position to the trapped position.

Versions supplied

Scope of delivery

The standard SHGV system consists of the following assemblies:

- **Guard locking device (type SHGV, see page 8)**, the design of which is based on that of a position switch with separate actuator, but the function of the position monitoring and locking is based exclusively on a mechanical principle of operation using the integrated lock barrel and the positively connected mechanism as well as the interaction between actuator and the articulating mechanism in the device head.



- **Version with two operating heads (see page 10)**, using which divided gates, for example, can be protected.



- **Version with a second lock barrel (see page 12)**, using which the operation of lock barrel 1 can be blocked if an operator needs to access a room and wishes to protect himself from unintentional start-up of the machine control system by a third party.



- **Key-operated selector switch (type SHGV/ESS, see page 13)**, as control element if the access time to the guard is greater than the stopping time of a hazardous machine motion.

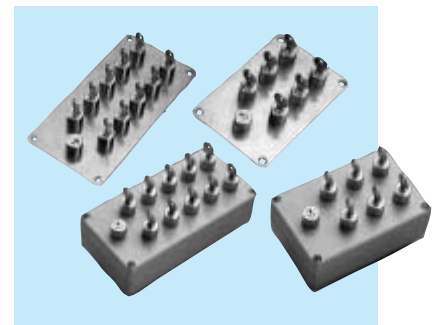


- **Key (with individual cut)** and a matching lock barrel in the guard locking device and in the key-operated selector switch, withdrawal of the key only being possible in the safety relevant position in each individual case.

- **Optionally: key-operated selector switch interlocking device with electromagnetic principle of operation (type SVE, see page 14)** and controllable key release (for 1 to 3 key-operated selector switches).



- **Optionally: key-operated selector switch interlocking device with mechanical principle of operation (type SVM, see page 18)** and controllable key release (for 6 or 10 keys).

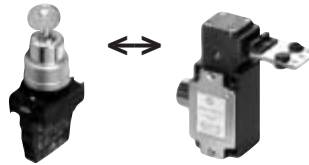


Applications

Applications for plants without overtravel motions

Use in applications without hazardous overtravel motions, i.e. for overtravel time < time for key transfer.

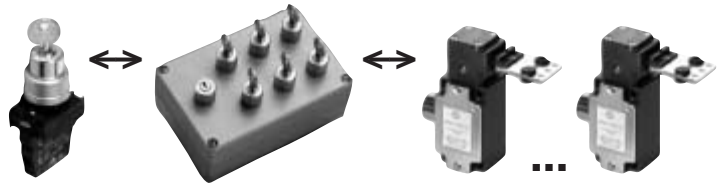
Here: one SHGV/ESS key-operated selector switch locks one moving guard.



Application for plants without overtravel motions

Use in applications without hazardous overtravel motions, i.e. for overtravel time < time for key transfer.

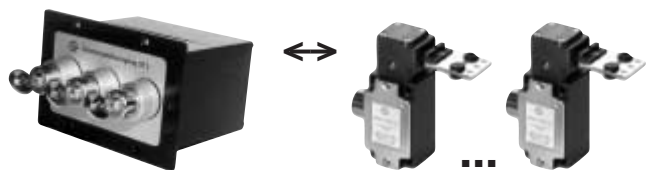
Here: one SHGV/ESS key-operated selector switch locks several moving guards by means of the SVM interlocking device.



Application for plants with overtravel motions

Use in applications with hazardous overtravel motions, i.e. overtravel time > time for key transfer.

Here: one SVE key-operated selector switch interlocking device locks up to 3 moving guards.



Application for plants with overtravel motions

Use in applications with hazardous overtravel motions, i.e. overtravel time > time for key transfer.

Here: one SVE key-operated selector switch interlocking device locks several moving guards by means of SVM interlocking device.



User information

Reliable secondary protective circuit

The scope of supply does not contain a suitable follow-up protective circuit for the processing of signals from the key-operated selector switch (type SHGV/ESS) or from the key-operated selector

switch interlocking device (type SVE), e.g. via a safety relay module of the make ELAN.-SRB.

The signals must be processed in the same way as an electrical interlock-

ing device, i.e. depending on control category, the positively opening NC contact(s) must be open in the OFF position of a machine control system and vice-versa.

Framework conditions

When using the SHGV safety door interlocking system it must be ensured that

- the time between switching off at the control panel and access to the guard is greater than the stopping time of any hazardous motion, or that the key-operated selector switch interlocking device of the type SVE is used;
- only one key is used in the key transfer system and any spare keys available are stored carefully;
- the separate actuators of the SHGV guard locking devices are fitted to the guard in such a way, e.g. with the non-reusable screws supplied with the equipment, that they cannot be released by simple means;

- the entry throat for the separate actuator is fitted in the guard locking device in a concealed position where at all possible. This recommendation applies generally to interlocking devices with separate actuator.

Please note:

- Owing to the key transfer system the systems are less suited to charging doors or moving guards with more frequent access.
- Even if key and lock barrel have 200 individual cuts/tumbler arrangements, a key can be copied in the same way as a separate actuator. Any damage caused as a result of such wilful manipulation

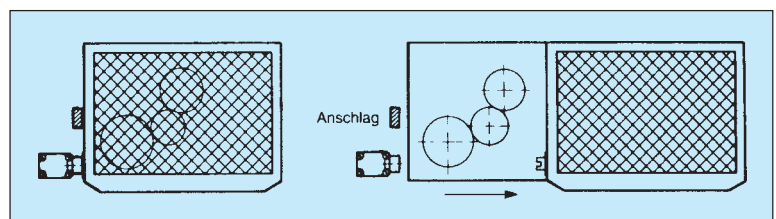
of a guard no longer falls within the protection of statutory accident insurance (otherwise there would also be no BG test certificate for the SHGV system) for example.

- Every SHGV system comes with a spare key should the original one be lost under the strict condition that it is kept carefully and not used in the operational key transfer procedure.

Installation

The separate actuator is mounted on the moving guard and the SHGV locking device on the closing edge of the guard. When the guard is closed the separate actuator is inserted into the entry throat of the operating head.

The funnel shaped entry throat in the operating head automatically centres the actuator when the moving guard is closed. This function is supported by rubber buffers within integrated spacer sleeves in the mounting bores of the actuator. These design features thus permit tolerances between the guides of the moving



guard and the entry throat of the operating head.

The separate actuators of the devices are always to be located in such a way that they do not run out in front

of the closing edge and thus present an additional hazard to the operators.

SHGV devices may not be used as mechanical end stops.

Key-operated selector switches

Design

The key-operated selector switches available for the SHGV system have been taken from the traditional Elan range of control devices and signal lamps for equipment installation with 22.3 mm single hole mounting to DIN 50 007.

The devices consist of the assemblies

- operating head with mounting flange

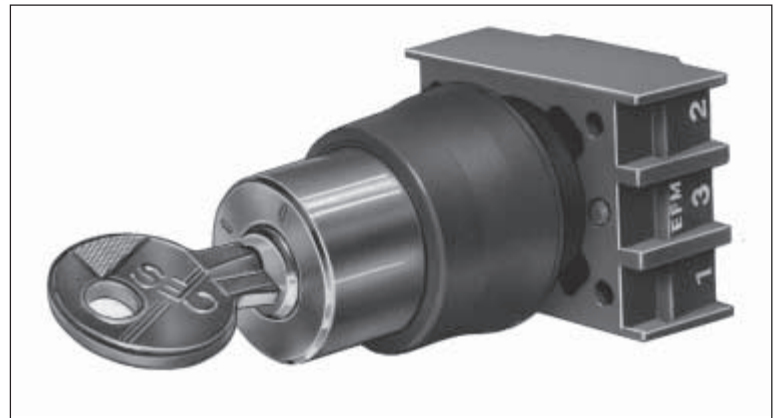
and

- contact element.

The degree of protection of the front side is IP 65.

Only single plunger key-operated selector switch operating heads of the type series SHGV/ESS21S2 with key positions S1 (key trapped) and S2 (key removable) are available for the SHGV system.

The standard scope of supply for each key-operated selector switch further includes a contact element EF 103 with one NC contact 11-12 and one NO contact 23-24, with screw type terminals, or optionally with slip-on terminals.



In key withdrawal position S2, the plunger in the operating head positively acts on the contact element and thus positively opens contact 11-12. Two additional contact elements can also be snap fitted to the mounting flange and any contact configurations can be selected.

There must, however, be at least one NC contact 11-12 incorporated in the safety circuit of the machine control system, such that positive opening of this contact brings about the shutdown of automatic mode in the machine control system.

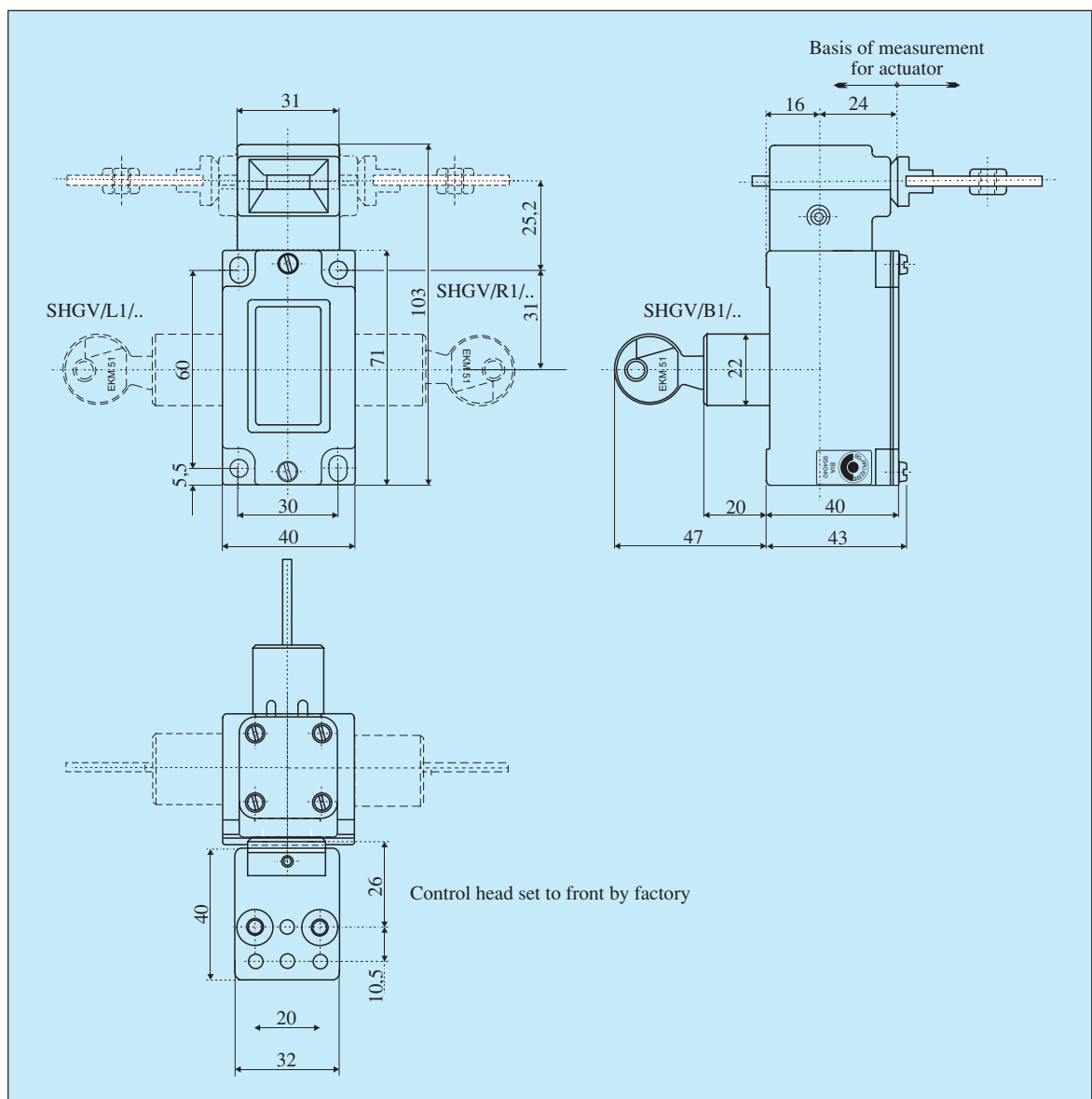


Safety door interlocking system – SHGV type series – version with 1 operating head

Functional and design features

- Key transfer system according to EN 1088
- No wiring to moving guard
- Funnel-shaped entry throat for actuator*
- Functionality of an interlocking device with guard locking
- Operating head offset 4 x 90°

Dimensions



* Standard actuator BO (supplied): see page 22; other versions: see page 22 et seq.

Technical data

Degree of protection	Enclosure: IP 67 (1 m wg/30 m.) Operating head: IP 00
Actuating forces	Insertion of actuator – 15 N Withdrawal of actuator – 5 N
Ambient temperature range	–25° C ... +70° C
Storage temperature range	–40° C ... +80° C
Materials used	Enclosure: AISi 12 painted signal red (RAL 3000) SHG cover: steel, passivated Perbunan seals: oil and petrol resistant
Mechanical life	2 x 10 ⁶ switching cycles
Shock resistance	> 30 g/18 ms
Vibration resistance	> 15 g/10 ... 200 Hz
Climatic resistance	40/91 to DIN 50 015, FW24 to DIN 50 016
Key-operated selector switch	See Elan catalogue D-22.G

Supply table

Brief description, function	Type designation	Part no.
SHGV guard locking device with standard actuator BO, key-operated selector switch ESS21S2 and contact element EF 103.1 (1 NC contact/1 NO contact with screw type terminals):		
– lock barrel left/locking device	SHGV/L1/(*)/ESS21S2/103	134 5400
– lock barrel right/locking device	SHGV/R1/(*)/ESS21S2/103	134 5401
– lock barrel back/locking	SHGV/B1/(*)/ESS21S2/103	134 5402

(*) Entry of the individual tumbler arrangement number at the works or by the customer

Additional text in orders required for: – additional contact elements or contact elements with other terminal types (see Elan catalogue D-22.G), – other actuators (see page 22 et seq.), – supply of key-operated selector switch interlocking devices SVE (see page 14 et seq.)

Individual device	Type designation	Part no.
– Key-operated switch	SHGV/ESS21S2/(*)/103	134 5430
– Locking device	SHGV/(**).1/(*).*+BO	134 5410

(*) Entry of the individual tumbler arrangement number at the works or by the customer

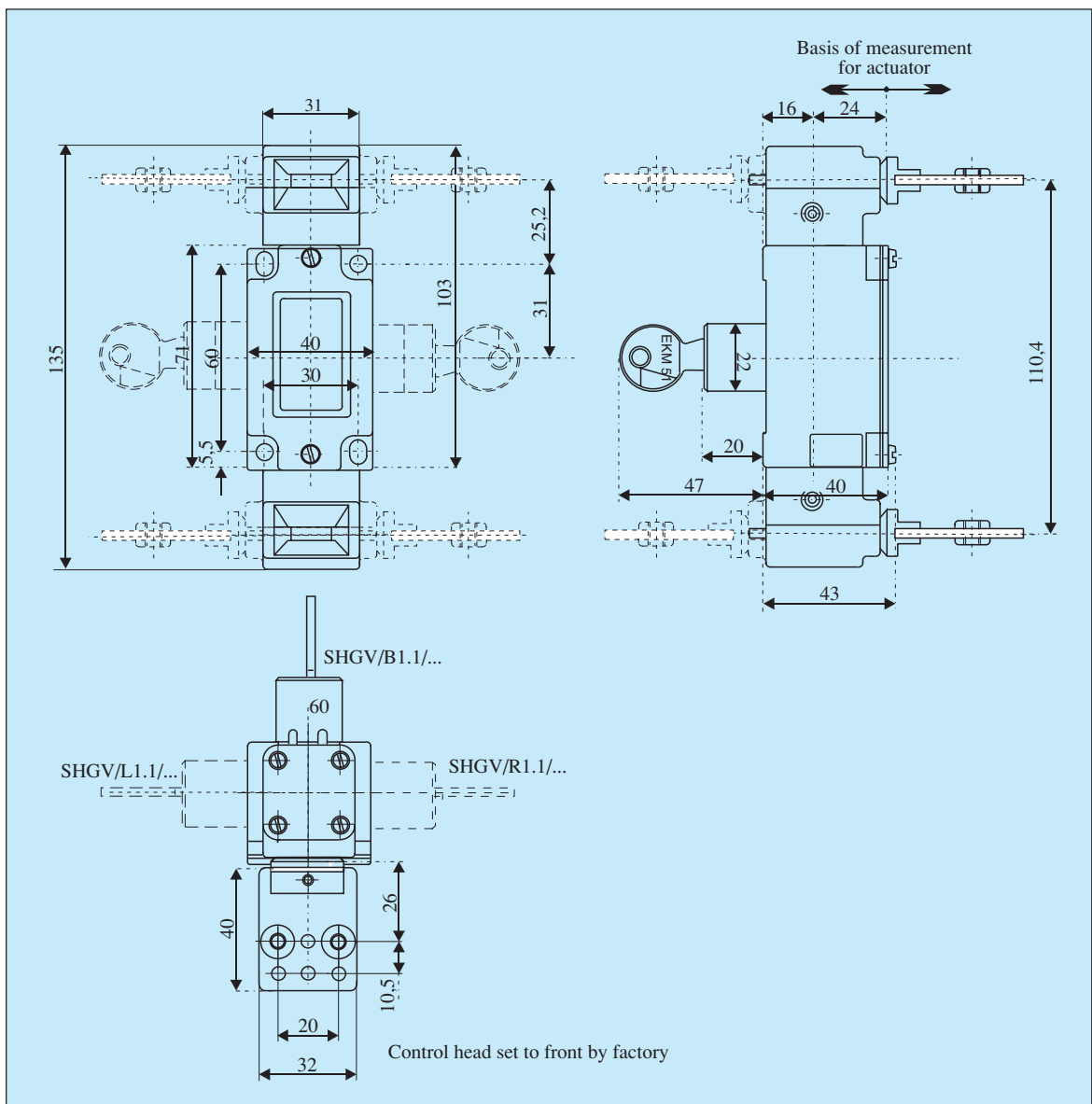
(**) When ordering, please specify the position of the lock barrel (L, R or B).

Safety door interlocking system – SHGV type series – versions with 2 operating heads

Functional and design features

- Key transfer system according to EN 1088
- No wiring to moving guard
- Funnel-shaped entry throat for actuator*
- Functionality of an interlocking device with guard locking
- Operating head offset 4 x 90°
- with 2 operating heads for double doors

Dimensions



* Standard actuator BO (supplied): see page 22; other versions: see page 22 et seq.

Technical data

Degree of protection	Enclosure: IP 67 (1 m wg/30 m.) Operating head: IP 00
Actuating force	Insertion of actuator – 15 N Withdrawal of actuator – 5 N
Ambient temperature range	–25° C ... +70° C
Storage temperature range	–40° C ... +80° C
Materials used	Enclosure: AISi 12 painted signal red (RAL 3000) SHG cover: steel, passivated Perbunan seals: oil and petrol resistant
Mechanical life	2 x 10 ⁶ switching cycles
Shock resistance	> 30 g/18 ms
Vibration resistance	> 15 g/10 ... 200 Hz
Climatic resistance	40/91 to DIN 50 015, FW24 to DIN 50 016
Key-operated selector switch	See Elan catalogue D-22.G

Supply table

Brief description, function	Type designation	Part no.
SHGV guard locking device mit 2 standard actuators BO, key-operated selector switch ESS21S2 and contact element EF 103.1 (1 NC contact/1 NO contact with screw type terminals):		
– lock barrel left/locking device	SHGV/L1.1/.*(*)/ESS21S2/103	134 5377
– lock barrel right/locking device	SHGV/R1.1/.*(*)/ESS21S2/103	134 5378
– lock barrel back/locking device	SHGV/B1.1/.*(*)/ESS21S2/103	134 5379

(*) Entry of the individual tumbler arrangement number at the works or by the customer

Additional text in orders required for: – additional contact elements or contact elements with other terminal types (see Elan catalogue D-22.G), – other actuators (see page 22 et seq.), – supply of key-operated selector switch interlocking devices SVE (see page 14 et seq.)

Individual device	Type designation	Part no.
– Key-operated switch	SHGV/ESS21S2/.*(*)/103	134 5430
– Locking device	SHGV/.*(**).1.1/.*(*)+BO	134 5381

(*) Entry of the individual tumbler arrangement number at the works or by the customer

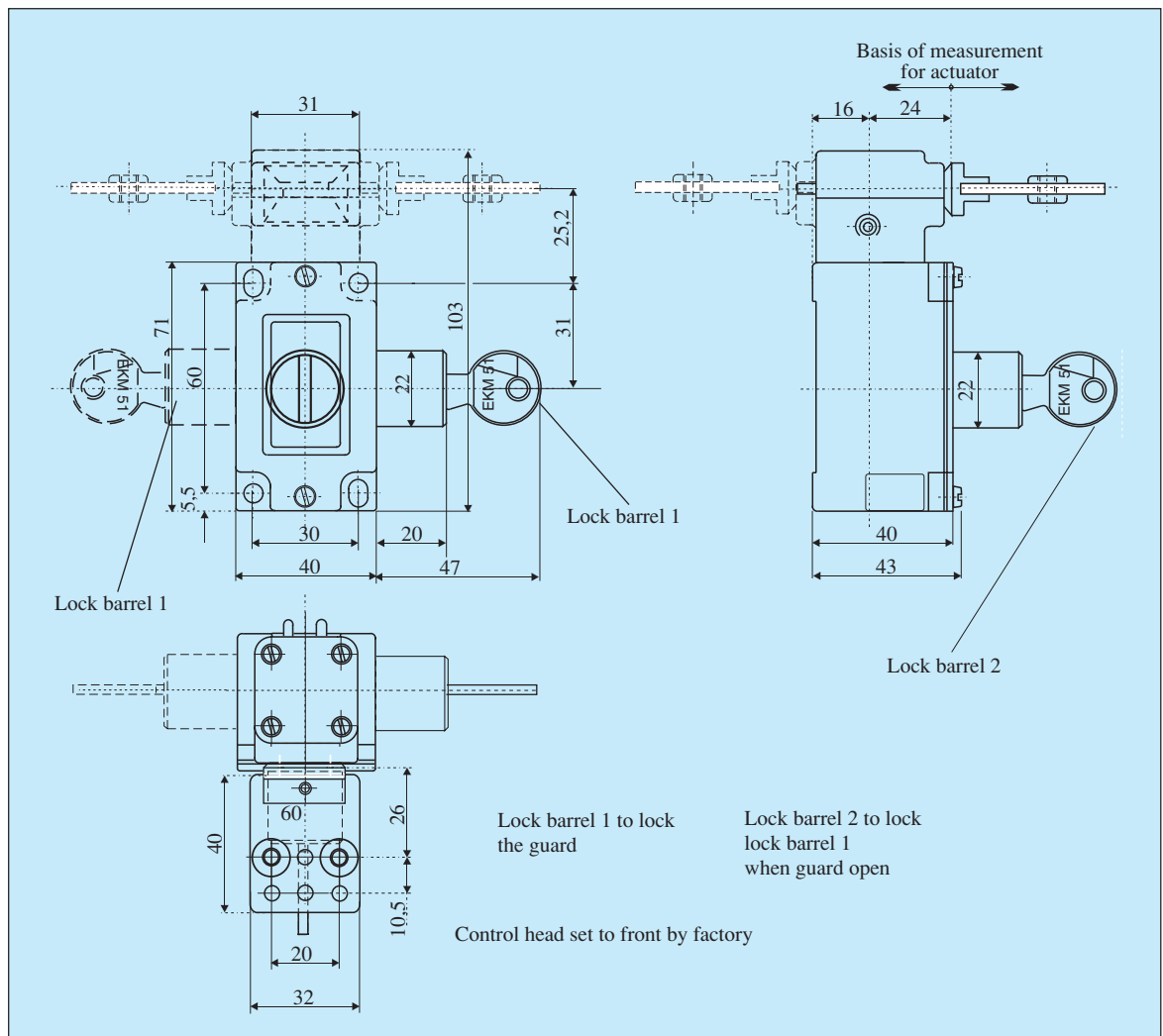
(**) When ordering, please specify the position of the lock barrel (L, R or B).

Safety door interlocking system – SHGV type series – version with additional lock barrel

Functional and design features

- Key transfer system according to EN 1088
- No wiring to moving guard
- Operating head offset 4 x 90°
- Funnel-shaped entry throat for actuator*
- with additional lock barrel to prevent unexpected machine start by third party

Dimensions



* Standard actuator BO (supplied): see page 22; other versions: see page 22 et seq.

Technical data

Degree of protection	Enclosure: IP 67 (1 m wg/30 m.) Operating head: IP 00
Actuating force	Insertion of actuator – 15 N Withdrawal of actuator – 5 N
Ambient temperature range	–25° C ... +70° C
Storage temperature range	–40° C ... +80° C
Materials used	Enclosure: AISi 12 painted signal red (RAL 3000) SHG cover: steel, passivated Perbunan seals: oil and petrol resistant
Mechanical life	2 x 10 ⁶ switching cycles
Shock resistance	> 30 g/18 ms
Vibration resistance	> 15 g/10 ... 200 Hz
Climatic resistance	40/91 to DIN 50 015, FW24 to DIN 50 016
Key-operated selector switch	See Elan catalogue D-22.G

Supply table

Brief description, function	Type designation	Part no.
SHGV guard locking device with 2 lock barrels, standard actuator BO, key-operated selector switch ESS21S2 and contact element EF 103.1 (1 NC contact/1 NO contact with screw type terminals):		
– lock barrel 1 left/lock barrel 2 in cover	SHGV/LD1/(*)/(*)ESS21S2/103	134 5370
– lock barrel 1 right/lock barrel 2 in cover	SHGV/RD1/(*)/(*)ESS21S2/103	134 5371

(*) Entry of the individual tumbler arrangement number at the works or by the customer

Additional text in orders required for: – additional contact elements or contact elements with other terminal types (see Elan catalogue D-22.G), – other actuators (see page 22 et seq.), – supply of key-operated selector switch interlocking devices SVE (see page 14 et seq.)

Individual device	Type designation	Part no.
– Key-operated switch	SHGV/ESS21S2/(*)/103	134 5430
– Locking device	SHGV/(**)D1/(*)/(*)+BO	134 5372

(*) Entry of the individual tumbler arrangement number at the works or by the customer

(**) When ordering, please specify the position of the lock barrel (L, R or B).

Actuators for SHGV safety door interlocking system

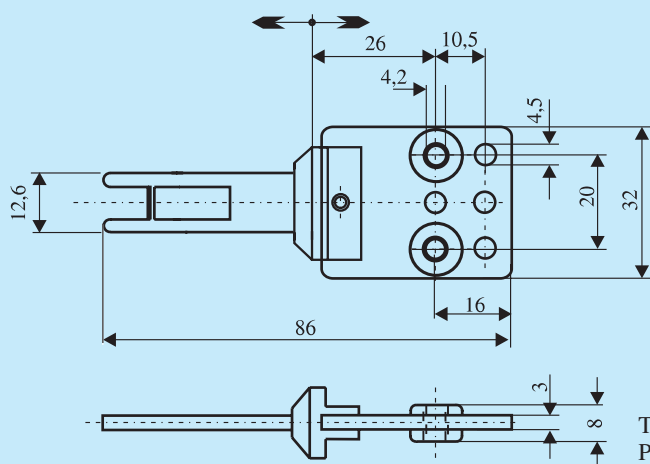
Functional and design features

- Scope of delivery including non-reusable screws
- Balancing of tolerances between the guide of the moving guard and the entry throat of the operating heads by means of rubber buffers and integrated spacing sleeves

Technical data

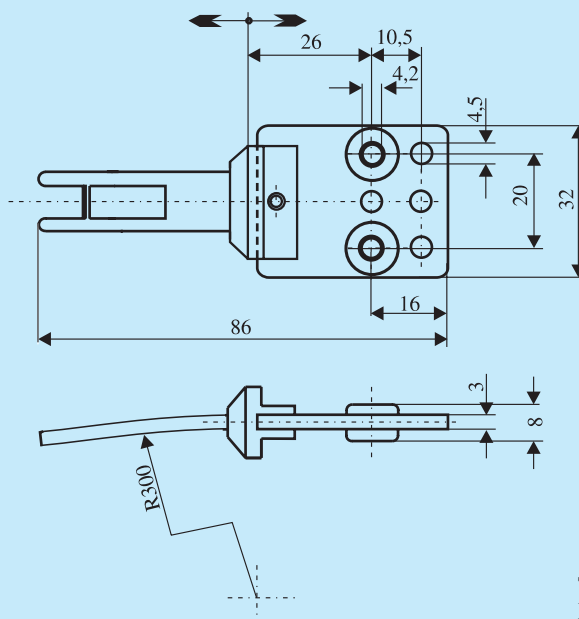
Actuator	steel, galvanised
Auxiliary stop	glass fibre reinforced thermoplastic with self-extinguishing properties to UL 94-V-0, signal red
Rubber buffers	Perbunan, oil and petrol resistant

Actuator for radiuses > 500 mm*



Type designation: BO
Part no.: 134 9000

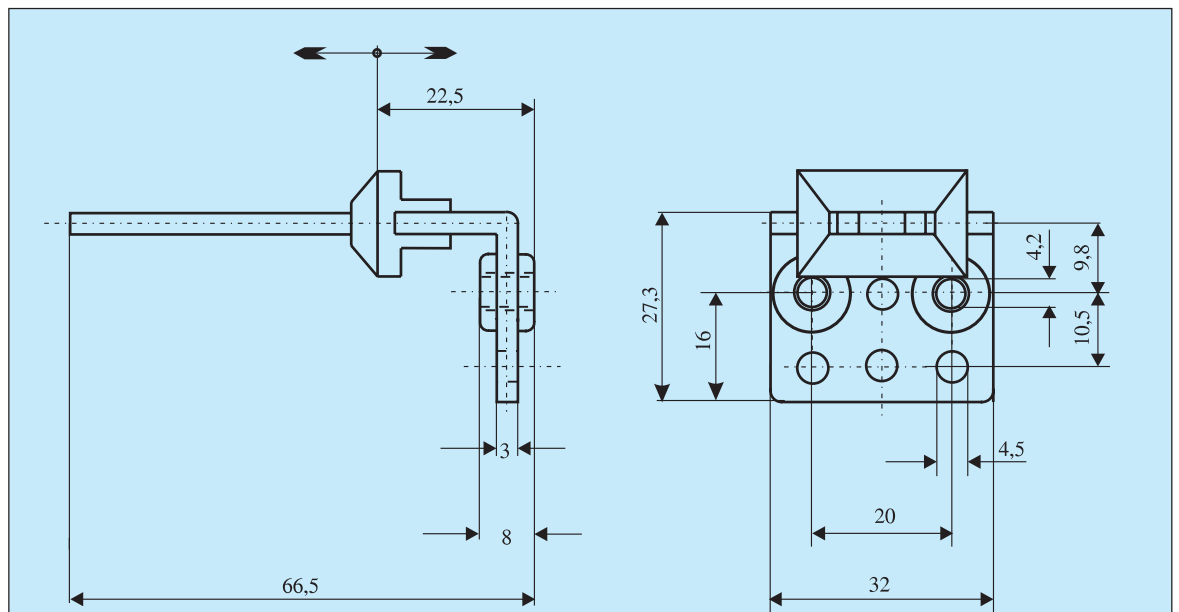
Actuator for radiuses >250 <500 mm



Type designation: BOR
Part no.: 134 9005

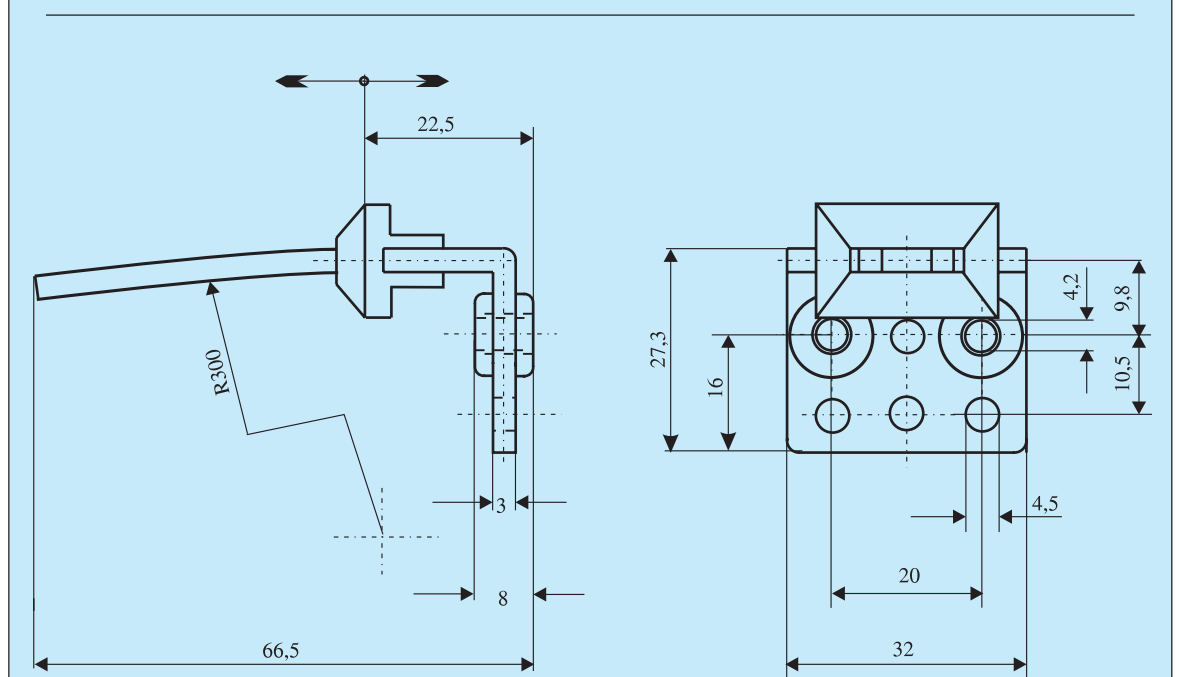
* Belongs to standard SHGV scope of delivery

**Bent actuator
for radiuses
> 500 mm**



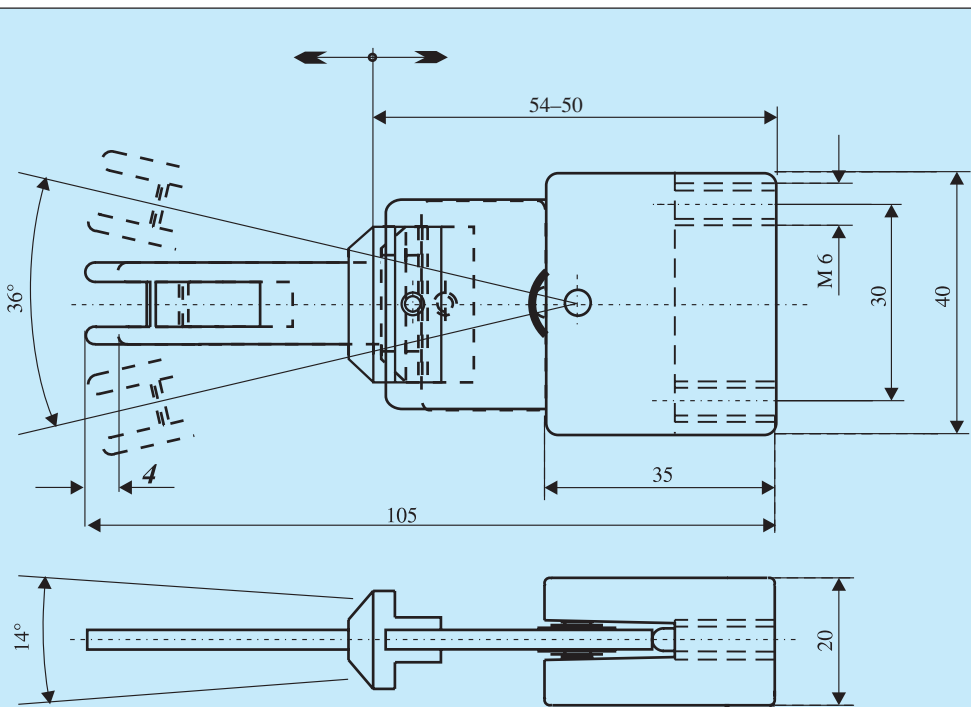
Type designation: BOW
Part no.: 134 9010

**Bent actuator
for radiuses
>250 <500 mm**



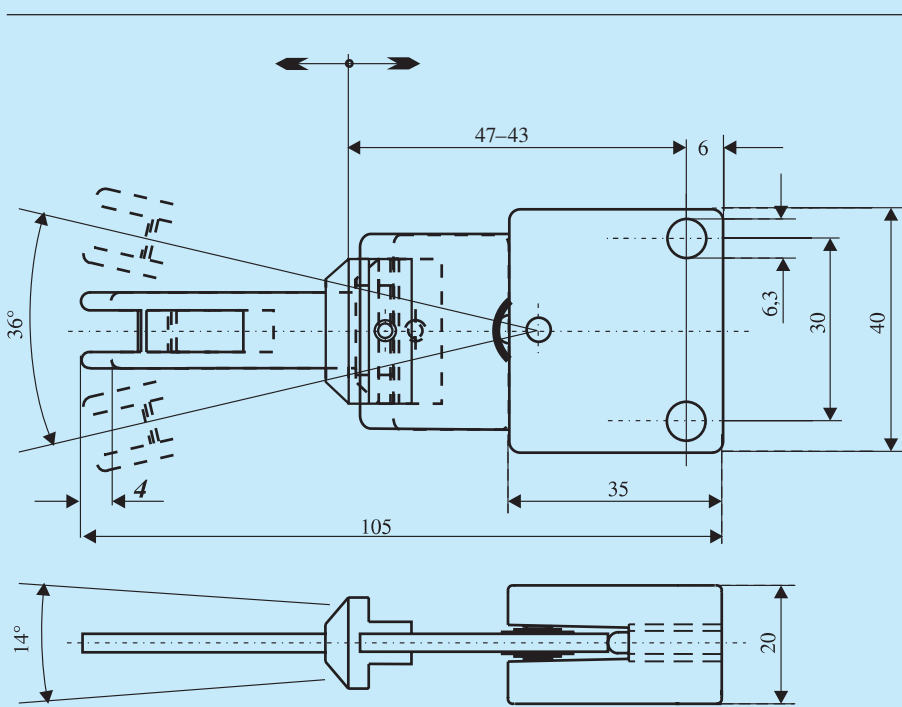
Type designation: BOWR
Part no.: 134 9015

Telescopic actuator, fixed from the rear



Type designation: BOF/HIS.1
Part no.: 134 9020

Telescopic actuator, fixed from the top



Type designation: BOF/HIS.2
Part no.: 134 9025