

Special-Survey Equipment for tunnelling and monitoring

TK 8



**GOECKE
SCHWELM**



GOECKE - YOUR PERFECT SUPPLIER FOR SURVEYING



HARALD GOECKE

Managing Director, Technical Manager, Development,
Customer Service, Quality Management

Our product manager for tunnel surveying and contact person
for implementation of custom-made products.

Phone: +49 23 36 - 47 90 - 0

E-mail: info@goecke.de

Dear Sir or Madam,

The current special brochure „Special-Survey Equipment for tunnelling and monitoring“ is a small – but valuable – guide to help you plan and fulfill your day-to-day work. Instead of being spread throughout many chapters in the general catalogue, you will find the most important products together with some innovations in a compact and clearly arranged manner on only a few pages in this brochure.

Increasing requirements regarding precision as well as growing time and pricing pressures are challenging tunnel staff and surveyors more and more. Therefore, the use of practice proven and inexpensive surveying accessories becomes increasingly more important.

Since 2000 we have developed a range of surveying accessories in close cooperation with leading specialists. Even under difficult conditions these accessories have performed excellently on sites at home and abroad and stand up without problems to every comparison.

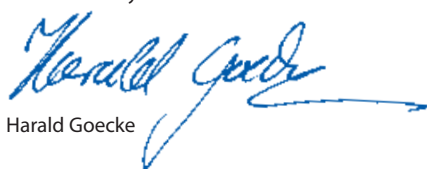
As a competent supplier, it is our aim to contribute to a smooth operation of your tunnel construction project with the help of our products and services. As a GOECKE customer, you benefit from a range of important advantages:

- Competent advice
- Durable, site-orientated design
- High product quality, all products have approved of excellently performance
on many tunnel construction sites and with other large-scale projects
- Short delivery times thanks to large-scale stock-keeping
- High flexibility regarding the implementation of special solutions
- Favourable prices

Please ask for an individual offer for your current projects.

We look forward to a long-lasting and (continuing) successful working relationship with you.

Yours faithfully



Harald Goecke

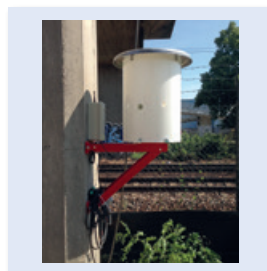
TABLE OF CONTENT



page 4
Forced centering device
for pillars



page 5
Measuring pillars for temporary
monitoring campaigns
and lockable lid



page 6
Weather and vandalism pro-
tection cover for monitoring
projects



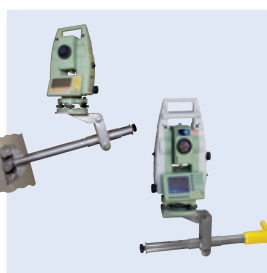
page 7 - 9
Tachylock theft protection



page 10
Wall bracket 14-TK - ...,
heavy duty version



page 11
Brackets for special
applications



page 12
Wall bracket 14-TK2, reliable
joint installation
Wall bracket 14-TK3, the
universal bracket



page 13
Single arm wall bracket
14-TK1, lightweight and
mobile



page 15
Convergence measuring bolts
and equipment



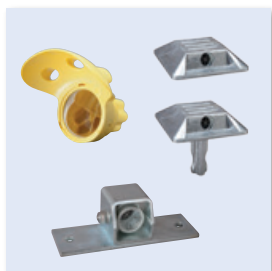
page 16
Adapter with LEICA-stud,
wall bolts



page 17
Reflective target marks and
special prisms for
deformation measurements



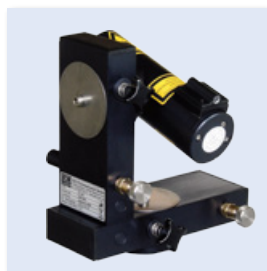
page 18
Monitoring prisms



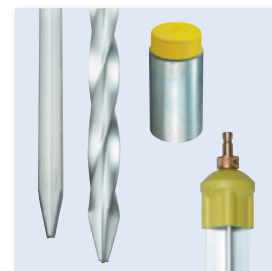
page 19
Monitoring prisms



page 20/21
magnetic ball prisms

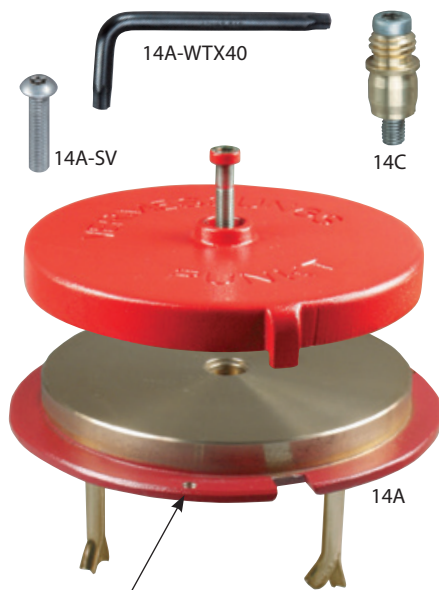


page 22
Tunnel laser TL-80



page 23
Cross profiles made of
aluminium and equipment

1



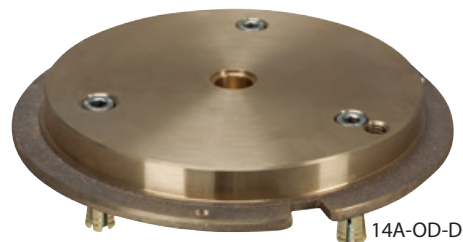
Drill hole for adjusting screw
(makes it easy to adjust horizontal position at installation)

2



M10 thread
for Tachylock

New



3



1 PILLAR PLATE 14A WITH PROTECTION COVER

The best and therefore the most popular solution. The main advantage is the heavy cover, which optimally protects the precision-machined 160mm diameter plate against mechanical influences.

The centering bolt 14C is required for measurement (order separately), which is screwed into the thread of the plate with the supplied M8 Allen screw (scope of delivery).

The special screw with pin-Torx head 14A-SV made of stainless steel, which is optionally

available for the cover, also protects the cover against theft because it cannot be loosened with "normal" tools. The pin-Torx angle wrench 14A-WTX40 is required for this purpose.

Please note: Only tripods without optical plummet should be used.

Scope of delivery: Brass plate with red powder-coated protective cover, inscription "VERMES-SUNGS-PUNKT", Allen screw for protective cover, 3 pcs. M10 x 80 anchor bolts, 3 pcs. M6 grub screws for leveling during installation, installation instructions and drilling template.

Description of items	Order No
Pillar plate with protection cover and installation instruction	14A
Central bolt with M8-fixing screw	14C
Replacement cover for pillar plate 14A, red, with Allen bolt	14A-ED
Pin-Torx special bolt for cover 14A, M8 x 35	14A-SV
Pin-Torx angle wrench, suitable for 14A-SV	14A-WTX40

2 PILLAR PLATE 14A-OD/-D FOR TACHYLOCK

Special model of the pillar head end plate without protective cover. For monitoring applications where the instrument remains permanently on the pillar and is to be secured against theft with a Tachylock system.

This version has an additional M10 hole as standard for mounting our Tachylock Ultra system. (For details see page 7).

The finely machined plate with a diameter of 160 mm otherwise complies to the standard 14A version.

The centering bolt 14C is required for measurement (order separately, see table 14A), which is screwed into the thread of the plate with the supplied M8 Allen screw (scope of delivery).

Please note: Use only tribrachs without optical plummet.

This pillar head end plate is available in two versions:

14A-OD for setting in concrete:

- Consisting of the pillar head end plate, 3 anchor bolts M10 x 80, 3 threaded pins M6 for leveling.
- Advantage: leveling during installation is possible due to the threaded pins supplied.
- Disadvantage: The plate cannot be removed and reused.

14A-OD-D for dowel mounting:

- Consisting of the pillar head end plate, 3 brass dowels M8 x 40, 3 stainless steel screws M8 with Allen key.
- Advantage: For temporary measuring pillars, the plate can be easily removed and reused.
- Disadvantage: If the surface is not level and horizontal, this plate cannot be levelled.

Description of items	Order No
Pillar plate with M10 thread for Tachylock system for setting in concrete , with mounting material, without protective cover	14A-OD
Pillar plate with M10 thread for Tachylock system for dowelling , with mounting material, without protection cover	14A-OD-D

3 PILLAR PLATE WITHOUT PROTECTIVE COVER

14AS for setting in concrete:

Brass, Ø 160 mm x 20 mm, but without protective cover and with fixed 5/8" thread, which can be protected by a cap nut (14ASK). We recommend this plate only for shorter monitoring periods and/or infrequent repeat measurements, as the plate becomes unusable if the 5/8" thread is damaged. Scope of delivery: plate, three galvanized M10 x 80 anchor bolts, installation instructions, drilling template for the anchors.

14ASD for dowel mounting:

It is fastened with three M8 stainless steel Allen screws and 40 mm brass dowels. The advantage of this variant: For temporary measuring pillars, the plate can be easily disassembled and reused. However, if the ground is not level and horizontal, this plate cannot be precisely levelled. Scope of delivery: plate, three stainless steel hexagon socket screws, three brass dowels M8 x 40.

Description of items	Order No
Pillar plate without protection cover to set in concrete	14AS
Pillar plate without protection cover, for dowel mounting	14ASD
Cap nut brass with 5/8"-thread	14ASK

1 MEASURING PILLAR FOR TEMPORARY MONITORING CAMPAIGNS

For relatively short-term monitoring campaigns, the installation - and later removal - of classic concrete measuring pillars with an adequately deep foundation is often uneconomical.

For such applications we manufacture easy to install and remove measuring pillars made from steel according to your specifications.

The actual pillar consists of a 120mm x 120mm rectangular tube with 3mm thick walls. The standard base plate measures 400 x 400 x 10mm. The device support plate 200 x 200 x 10mm is prepared with a 5/8" internal thread, 4 x M6 and 2 x M10 threaded holes for the mounting of weather protection cover and Tachylock (see notes from page 7).

Upon request, we also supply the pillar with a fixed external thread. In this case the mounting

of Tachylock is not possible.

In addition to our standard type in straight design and a total length of 1,500mm, we also supply special models for a wide range of applications. The prices depend on the length of the pillar, type of mounting and number of units. Please allow 2-3 weeks for delivery.

The pillars are fastened with M10 heavy-duty anchors which are included in the scope of delivery.

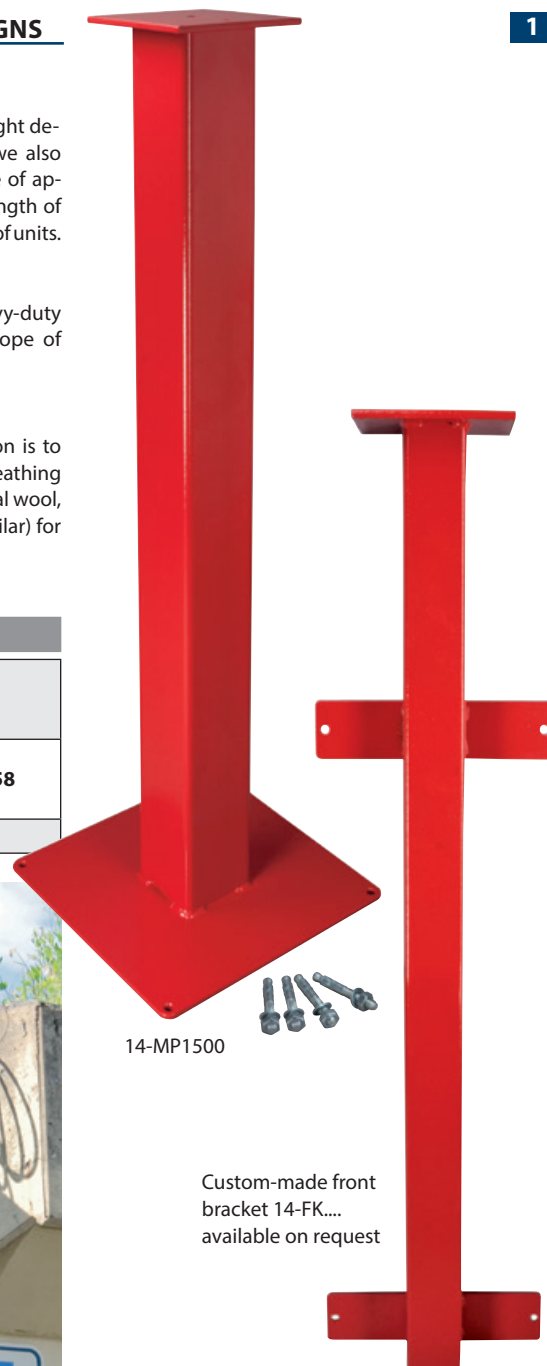
Note:

If a significant amount of solar radiation is to be expected, we recommend on-site sheathing with suitable insulation material (mineral wool, 4cm-Styrodur hard foam boards, or similar) for longer pillars.

Description of items	Order No
Mobile measuring pillar, length: 1,500mm with 5/8" internal thread , prepared for Tachylock and weather protection cover assembly, powder-coated in red, incl. four M10 heavy-duty anchors	14-MP1500
Mobile measuring pillar, length: 1,500mm, although with fixed 5/8" external thread , prepared for weather protection cover assembly, not suitable for Tachylock	14-MP1500-58
Mobile measuring pillar, other lengths and types	14-MP-SL



Illustrations above: Special versions of mobile measuring pillars



14-MP1500

Custom-made front bracket 14-FK... available on request

2

2 LOCKABLE COVER F. MEASURING PILLARS MADE FROM STAINLESS STEEL

For measuring pillars with 400mm outside diameter (concreted KG-pipes), we offer standardized covers made of stainless steel (V2A).

The hinged and lockable cover have a wall thickness of 1.5mm and a cover height of 55mm. They offer optimal weather and anti-vandalism protection for the device support plate and can be installed in 10-15 minutes. The hinge and the closing angle, can be glued into the pillar using standard adhesive resins (e.g. 106-IM345).

The scope of delivery includes the hinged cover, the hinge, a striker plate and a high-quality U-lock.

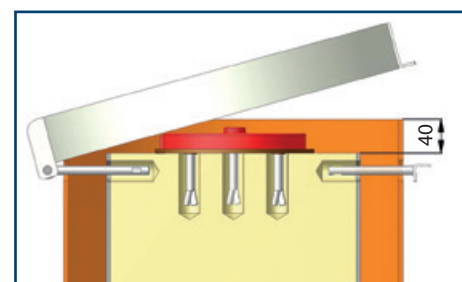
To ensure proper functioning of the cover, it is imperative that the upper edge of the inner pillar is 40 mm lower. (See picture)

Delivery times of 4 to 6 weeks may occur, especially for large orders.

Description of items	Order No
Lockable hinged cover made from stainless steel for Ø 400mm measuring pillars, complete with strike plate and padlock	14KD-400



14KD-400



WEATHER- AND ANTI-VANDALISM PROTECTION COVER FOR MONITORING PROJECTS



The weather and anti-vandalism protection cover 14-WSH-TK with drilled viewing ports and mounting brackets on the wall console 14-TK500-M in use.



Mounting frame from 14-WSH-P on a concrete pillar.



Drill the viewing ports with a sheet metal drill. The exact location of the viewing ports can be easily and precisely indicated using a visible EDM beam and can then be immediately drilled. The total station can remain in the housing for this.

Total stations in monitoring campaigns must usually be protected using a suitable housing against weather influences and vandalism.

The planning for using traditional housings is difficult, since it needs to be known in advance if and where support to hold the protective cover could disturb the view of the targets to be monitored.

The larger the viewing window, the bigger the risk that your instrument could be damaged by vandalism. Glazed viewing windows often cause problems due to light refraction, unwanted reflection and, in many cases, produce a device unfriendly climate within the protective housing.

As condensation is more dangerous than rain water to your station, a heating system must be provided in many cases which significantly increases the energy requirements for the system.

The GOECKE weather and vandalism protection cover made of semi-transparent plastic is – in combination with a reflectorless tachymeter – universally applicable and solves the above-mentioned problems.

NOTES ON FUNCTION AND INSTALLATION

For use with the GOECKE weather and anti-vandalism protection cover, a tachymeter is absolutely necessary, which can generate a visible laser-beam in addition to the infrared distance measurement. This is needed to mark or stake out the viewing ports.

Installation steps:

1. Screw or dowel the mounting frame or bracket onto the bracket or pillar
2. Carryout zero measurement on the targets to be observed
3. Mount the cover, switch the device to reflectorless measuring mode beforehand
4. Illuminate and mark the viewing ports for the targets in the staking mode
5. Drill the cut-outs for the viewing ports with the sheet metal drill (Ø 50mm)

Your advantages at a glance:

- Universal use - helps avoid the use of expensive individual solutions
- Allows relatively steep views
- Unbreakable plastic for best protection against vandalism
- Good privacy for the total station (reduces the risk of theft)
- Optimal ventilation of the device
- Only a very small viewing cut-out required for the prisms
- No problems with erroneous measurements by light reflection within the cover housing
- Can be easily mounted on wall consoles and measurement pillars
- Suitable for all modern total stations
- Inexpensive price

GOECKE's protection cover can be used on measuring pillars and instrument brackets.

For use with brackets, we particularly recommend our model 14-TK500-M (shown on page 8). These brackets can be factory-fitted with all the required mounting holes for the mounting bracket of the protection cover. This reduces the assembly effort to a minimum.

For quick and easy installation, you require the following tools:

- Screwdriver for pin-Torx screws TX-25
- Screwdriver for pin Torx screws TX-30
- Drill, e.g. cordless drill
- Sheet drills

To dowel the mounting frame onto a measuring pillar or when it is required to drill threaded holes into brackets, depending on the individual installation situation, further tools may be required.

Technical data:

Cover height:	530mm
Internal diameter:	392mm
Material:	Absolutely impact resistant, semi-transparent special plastic

Tip:

For theft protection of your total station, our practical and inexpensive Tachylock provides a proven solution.

Description of items	Order No
Weather and anti-vandalism protection cover for wall bracket 14-TK400-M - 1000-M and mobile measuring pillar 14-MP1500 (page 5 + 10) with mounting brackets, aluminium lid, stainless steel screw/bolt kit (V2A), installation instructions	14-WSH-TK
Weather and anti-vandalism protection cover for concrete pillar mounting with mounting frame, aluminium lid, stainless steel screw/bolt kit (V2A) and 4 fixing dowels with screws, installation instructions	14-WSH-P
Screwdriver for pin-Torx security screws, TX-25	14-TX25-SD
Screwdriver for pin-Torx security screws, TX-30	14-TX30-SD
Sheet metal drills (conical drill bits) Ø 14 - 50mm	14-WSH-SB

TACHYLOCK THEFT PROTECTION

We offer two different variants to protect your total stations against theft and unauthorized access during monitoring campaigns.

This is achieved by the shielding of the tribrach or the complete encapsulation of the tribrach. The standard tachylock system (46-TL-SET) was produced from 2010 to mid 2020 and could be universally used on our tunnel brackets, mobile measuring pillars and pillar head end plates.

Increasing numbers of vandalism and theft incidents on major projects, both at home and abroad, made it necessary to further develop the proven Tachylock system. In this context, the sometimes significantly larger instrument dimensions were taken into account.

The result of this development are the systems Tachylock-Plus and Tachylock-Ultra. In the case of Tachylock-Plus, only the housing dimensions and mounting holes of the first Tachylock generation were adapted to the increased instrument dimensions. Tachylock-Ultra is a new development and encapsulates the complete instrument tribrach extremely effectively against unauthorized access from outside.

All systems require a female M10 thread for mounting, which is prefabricated at the factory on our tunnel brackets 14-TK400-M to

-1000-M, mobile measuring pillars 14-MP1500 and pillar head end plates 14A-OD.

Due to its larger housing dimensions, the Tachylock-Plus system can only be mounted on 14-TK400-M to -1000-M brackets and 14-MP1500 mobile measuring pillars produced as of March 2020. Only on these models is the instrument mounting plate equipped with a second M10 threaded hole (84 mm axial dimension to the center of the plate).

Which Tachylock system goes best with which instruments or GOECKE articles? please refer to the matrix below.



Tachylock Ultra on a concrete pillar



Tachylock-Ultra for concrete pillars

Tachylock-Ultra for consoles and mobile measuring pillars



Tachylock-Plus on a wall bracket

New

		Suitable for instrument type:			Suitable for Goecke articles:				
Designation	Order No	LEICA		TRIMBLE	14-TK400-M-1000-M until 04/2020 (1x M10 drilling)	14-TK400-M-1000-M as of 04/2020 (2x M10 drilling)	14-MP1500 until 04/2020	14-MP1500 until 04/2020	14A-OD
		TC1100	TS15	S6					
		TC1200	TS16	S8					
		TS30	TM50/60	VX					
		TM30	MS50/60						
Tachylock-Plus for brackets and mobile measuring pillars, housing dimension 45 x 45 mm, length 54 mm	46-TLP-SET	●	●	●	○	●	○	●	○
Tachylock Ultra for brackets and mobile measuring pillars, suitable for LEICA instruments	46-TLU-TKL	●	●	○	○	●	○	●	○
Tachylock Ultra for brackets and mobile measuring pillars, suitable f. TRIMBLE instruments	46-TLU-TKT	○	○	●	○	●	○	●	○
Tachylock-Ultra for concrete pillars, suitable for LEICA instruments	46-TLU-PL	●	●	○	○	○	○	○	●
Tachylock-Ultra for concrete pillars, suitable f. TRIMBLE instruments	46-TLU-PT	○	○	●	○	○	○	○	●



1



For mounting Tachylock-Plus and Tachylock-Ultra for wall brackets and mobile measuring pillars you need:

2



46-TLU-TKL (with cutouts on underside of housing for mounting bracket of weather protection hood)

1 TACHYLOCK-PLUS F. WALL BRACKETS & MOBILE MEASURING PILLARS

The revised anti-theft device for your total station in combination with our heavy wall brackets 14-TK400-M to 1000-M (see page 10) and our mobile measuring pillar (see page 5).

Scope of delivery: Galvanized steel housing block, hardened shackle lock, M10 screw, mounting instructions.

For mounting, a thin-walled tubular socket wrench SW 24, an Allen wrench with ball

head (SW 8) and a special 5/8"-fastening screw (46-TL-58) are required.

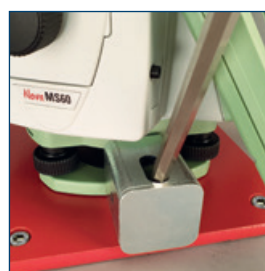
Please note:

Due to the larger instrument dimensions, the Tachylock Plus housing had to be extended by 11 mm. This only fits on the wall brackets and measuring pillars manufactured by us as of 04/2020, which are supplied with two M10 threaded holes (distance to 5/8" thread 70 and 84 mm).

Description of items	Order No
Tachylock-Plus anti-theft device, set, dimensions 45 x 45 mm, Length 54 mm	46-TLP-SET
Pipe socket wrench SW 22/24 mm, galvanized steel	46-RSS
Special 5/8" mounting screw for tribrach	46-TL-58
Allen key with ball head SW 8, long version	46-TL-IS8-KK



M10 threaded hole with 84 mm center distance to the center of the plate required.



Tachylock anti-theft device tighten with Allen key.



Insert the U-lock and lock it.

2 TACHYLOCK-ULTRA F. WALL BRACKETS & MOBILE MEASURING PILLARS

The ultimate anti-theft device for your total station in combination with our wall brackets 14-TK400-M to 1000-M and mobile measuring pillars 14-MP1500.

A thin-walled tubular socket wrench SW 24, the special socket wrench 46-TLU-SS, an Allen wrench with ball head (SW8) and a special 5/8" fixing screw (46-TL-58) are required for mounting.

Advantages:

- Protective ring made of high-strength steel with 8 mm wall thickness

- All components galvanized, lock body and shackle made of hardened special steel
- Double shackle locking for extreme pulling resistance
- Operation in the dark with illuminated key with LED
- Co-locking keys for use on large projects for several systems available at extra cost (delivery time approx. 2 weeks)
- Can be combined with weather and vandalism protection covers
- Suitable for LEICA devices from TPS1100 to MS60 and TRIMBLE S6, S8 and VX

Description of items	Order No
Tachylock-Ultra for wall brackets and mobile measuring pillars, housing Ø 177 x 56 mm, surface galvanized, M10 x 16 mounting screw, suitable for LEICA instruments	46-TLU-TKL
Tachylock-Ultra for wall brackets and mobile measuring pillars, housing Ø 177 x 56 mm, surface galvanized, M10 x 16 mounting screw, suitable for TRIMBLE instruments	46-TLU-TKT
Tachylock-Ultra lock, unequal locking, incl. galvanized cover bracket (Fig. see page 9)	46-TLU-S
Tachylock-Ultra lock, keyed alike, incl. galvanized cover bracket (Fig. see page 9)	46-TLU-S-G
Tachylock-Ultra lock, keyed alike according to sample, incl. galvanized cover bracket (not shown)	46-TLU-S-GM
Special socket wrench for Tachylock-Ultra	46-TLU-SS
Pipe socket wrench SW 22/24 mm, galvanized steel (Fig. see above)	46-RSS
Special 5/8" mounting screw for tribrach (Fig. see above)	46-TL-58
Allen key with ball head SW 8, long version (Fig. see above)	46-TL-IS8-KK

3 TACHYLOCK-ULTRA FOR PILLAR PLATE 14A-OD

The ultimate anti-theft device for your total station in combination with our pillar plate 14A-OD or 14A-OD-D, the variant for dowelling. (see page 4)

For mounting the tribrach, the centering bolt 14C, an Allen screwdriver SW 6 with toggle handle and an Allen wrench with ball end (SW 8) are required.

Advantages:

- Protective ring made of high-strength steel with 8 mm wall thickness

- All components galvanized, lock body and shackle made of hardened special steel
- Double shackle locking for extreme pulling resistance
- Operation in the dark with illuminated key with LED
- Co-locking keys for use on large projects for several systems available at extra cost (delivery time approx. 2 weeks)
- Can be combined with weather and vandalism protection covers
- Suitable for LEICA devices from TPS1100 to MS60 and TRIMBLE S6, S8 and VX

Description of items	Order No
Tachylock-Ultra for concrete pillars, housing-Ø 177 x 70 mm, surface galvanized, M10 x 16 fixing screw, suitable for LEICA instruments	46-TLU-PL
Tachylock-Ultra for concrete pillars, housing-Ø 177 x 70 mm, surface galvanized, M10 x 16 fixing screw, suitable for TRIMBLE instruments	46-TLU-PT
Tachylock-Ultra lock, unequal locking, incl. galvanized cover bracket	46-TLU-S
Tachylock-Ultra lock, keyed alike, incl. galvanized cover bracket	46-TLU-S-G
Tachylock-Ultra lock, keyed alike according to sample, incl. galvanized cover bracket (not shown)	46-TLU-S-GM
Special socket wrench for Tachylock-Ultra	46-TLU-SS
Pillar plate with M10 thread for Tachylock system for setting in concrete , with mounting material, without protective cover, (see page 4)	14A-OD
Pillar plate with M10 thread for Tachylock system for dowelling , with mounting material, without protective cover, (see page 4)	14A-OD-D
Centering bolt with M8 fixing screw	14C
Allen screwdriver with toggle handle, SW 6	46-TL-IS6-QG
Allen key with ball head SW 8, long version	46-TL-IS8-KK



3



46-TLU-S

46-TLU-S-G

New



14A-OD



46-TLU-PL



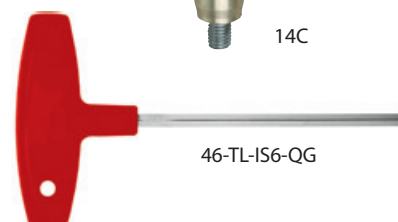
46-TLU-PT



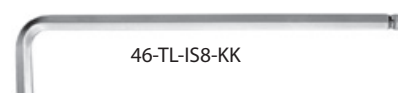
46-TLU-SS



14C



46-TL-IS6-QG



46-TL-IS8-KK



46-TLU-PL (from front)



46-TLU-PL (from behind)



14-TK700 in use:
cost effective, stable, reliable



14-TK500



Wall bracket with adapter
angle set 14-TK-AWS and
weather protection cover



14-GMK
Track measuring bracket for DB lattice masts

BRACKETS FOR MEASUREMENT INSTRUMENTS

On many tunnel construction sites and during monitoring campaigns, brackets for measuring instruments are improvised with the possibilities available at the time. The results are sometimes not very functional and aesthetically pleasing.

We have dealt intensively with the subject of brackets in many discussions with experts and have developed a whole range of different systems, which have meanwhile proved their worth for years on many construction sites.

1 WALL BRACKET 14-TK - ..., HEAVY DUTY VERSION

The proven wall bracket 14-TK-... can normally be delivered at short notice for diverse wall distances and can be installed in the stope and the sole-plate areas.

The solid and very inexpensive construction guarantees reliable operation under all conditions without complicated clamps or filigree parts.

The 200 x 200mm large, 10mm thick mounting plate is delivered with a 25mm long 5/8"-hex bolt for every commercially available measuring instrument.

If you want to use the brackets with our weather protection covers and/or the Tachylock system (see p. 6 - 9), you must order the 14-TK...-M version, where the device mounting plate is fitted equipped with additional threaded holes for mounting the accessories.

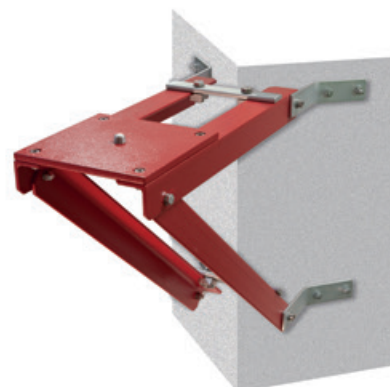
All parts are cleanly deburred and powder-coated in red. The mounting is done with the with the four M10 heavy-duty dowels supplied. Even on rough surfaces, the bracket can be fastened without any problems.

Due to the modular design, the brackets of this series are shipped in disassembled condition.

Description of items	Order No
Wall bracket 400 mm, standard version	14-TK400
Wall bracket 400 mm, for tachylock/weather protection cover	14-TK400-M
Wall bracket 500 mm, standard version	14-TK500
Wall bracket 500 mm, for tachylock/weather protection cover	14-TK500-M
Wall bracket 600 mm, standard version	14-TK600
Wall bracket 600 mm, for tachylock/weather protection cover	14-TK600-M
Wall bracket 700 mm, standard version	14-TK700
Wall bracket 700 mm, for tachylock/weather protection cover	14-TK700-M
Wall bracket 800 mm, standard version	14-TK800
Wall bracket 800 mm, for tachylock/weather protection cover	14-TK800-M
Wall bracket 1.000 mm, standard version	14-TK1000
Wall bracket 1.000 mm, for tachylock/weather protection cover	14-TK1000-M
Adapter bracket set for bracket mounting on building corners, steel, galvanized	14-TK-AWS



14-TK-AWS



2 TRACK MEASURING BRACKET FOR DB LATTICE MASTS

The track measuring bracket for lattice masts was specially developed for mounting on DB lattice masts of type R100-13, R100-7, R100-17 and R101-1. The bracket is attached to the mast

profiles with two solid clamping claws that can be flexibly adjusted in slotted holes. The device plate is factory-prepared for the mounting of Tachylock and the weather protection cover.

Description of items	Order No
Track measuring bracket for DB lattice masts, mounting plate 200 x 200 x 10 mm with 5/8"-female thread, material steel galvanized, weight 14 kg, Dim. 1350 x 200 x 80 mm	14-GMK

3 MAGNETIC BRACKET, DEMOUNTABLE

With the magnetic bracket you can easily mount your instrument on all magnetic surfaces quickly and reliably. The four round magnets, with a diameter of 80 mm, are easily pivoted on the dismountable construction, so that you can also securely mount the bracket on curved surfaces.

Depending on the thickness of the material and the nature of the surface, each magnet has a holding force of up to 20 kg. The 200 x 200 mm mounting plate is made of anodized aluminum. The wall distance to the 5/8" threaded stud is 290 mm.

Description of items	Order No
Magnetic bracket, dismountable, swivel-mounted round magnets, material galvanized steel, 200 x 200 mm aluminum mounting plate, weight 5,67 kg, dim. 390 x 200 x 520 mm	14-MK290



14-MK290
Magnetic bracket, demountable

4 UNIVERSAL CLAMP BRACKET

This new model has been specially developed for use in steel and plant construction. Due to continuous grooves on all 4 sides of the 800mm long console profile, the screw clamps can be quickly and flexibly converted depending on the application. The aluminum mounting plate with 5/8" external thread can also be variably positioned in the grooves.

A maximum clamping width of 135 mm can be achieved with the two screw clamps. The screwed-on hardwood plate on the bracket arm provides additional friction between the bracket and the component. Ideal for mounting on vertical and horizontal double-T beams. Scope of delivery: aluminum profile, mounting plate, 2 x screw clamps.

Description of items	Order No
Universal clamping bracket, clamping width up to 135 mm, mounting plate Ø 145 mm, 5/8" external thread, material anodized aluminum, weight 3.3 kg, dim. 40 x 40 x 800 mm	14-UK800

14-UK800
Universal clamping bracket for mounting on various steel and structural parts



14-UK800

5 SCAFFOLDING BRACKETS, WALL AND CEILING BRACKETS

The brackets shown below are suitable for different applications. In particular, the recently introduced scaffold bracket now makes it possible to mount the instruments vibration-free even on facade scaffolds with a tube diameter of 40 - 48 mm, to be mounted vibration-free.

The universal articulated arm console with its two joints, it is very well suited for measuring from small niches in the tunnel, for example. The ceiling console is factory-prepared for the installation of Tachylock and the weather protection cover.

Description of items	Order No
Scaffolding bracket, clamping range of the fastening clamps Ø 40 - 48 mm, mounting plate Ø 140 mm, projection 300 mm, 5/8" thread, steel galvanized	14-GRK
Short bracket, 300 cm wall distance to 5/8" thread, mounting plate Ø 140 mm, galvanized steel, dim. 370 x 160 x 70 mm	14-TK4-300
Short bracket, 400 cm wall distance to 5/8" thread, mounting plate Ø 140 mm, galvanized steel, dim. 470 x 160 x 70 mm	14-TK4-400
Ceiling bracket for overhead mounting, clear height 600 mm, 5/8" female thread, galvanized steel, dim. 435 x 200 x 670 mm	14-DK600-M
Universal articulated arm bracket for overhead mounting, mounting plate Ø 145 mm, 5/8"-male thread, clear height 450 mm, galvanized steel, dim. variable, on request	14-UGK500

14-GRK
Scaffolding bracket

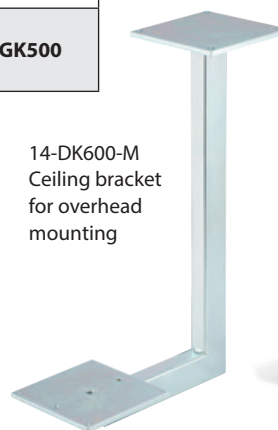


New



14-TK4-400
Short bracket

14-DK600-M
Ceiling bracket for overhead mounting



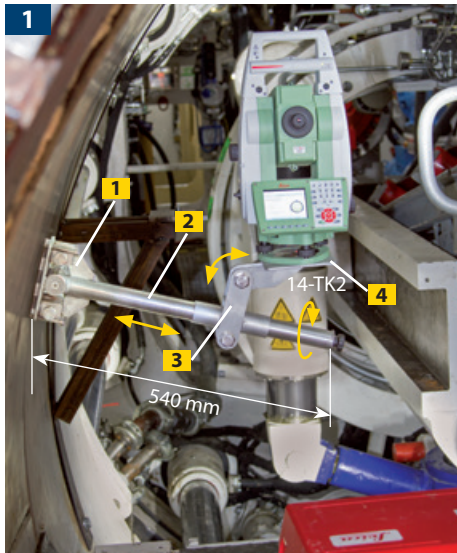
14-UGK500
Universal joint arm bracket for Overhead mounting



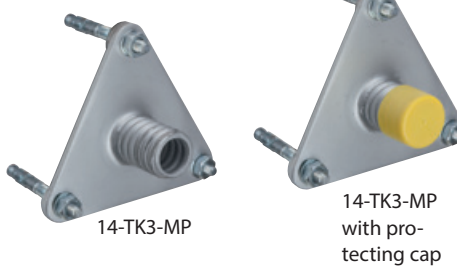
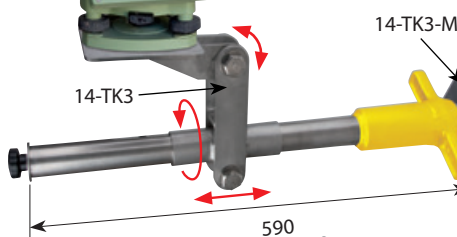
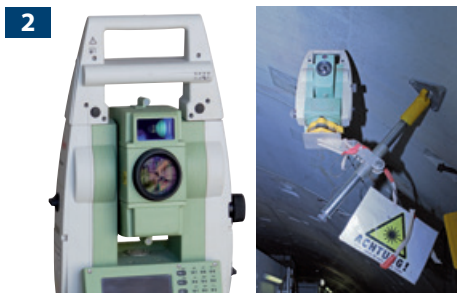
14-GRK



14-UGK500



14-TK2:
Overhead-
mounting at
the top of the
tunnel



1 WALL BRACKET 14-TK2 - RELIABLE JOINT ASSEMBLING

The wall bracket 14-TK2 was specially designed for use in TBM operations with segment construction and has been proven since 2007.

Installation in any segment joint from 5mm minimum width, either axially or radially, can be done in less than a minute. The well thought-out design means it can be used with even the heaviest measuring instruments at any point in the tunnel profile.

Note: Not suitable for Trimble S8 instruments!

The bracket foot (1) is inserted in the segment joint with the fixed mounting arm (2). The reliable locking of the bracket is done using two clamping jaws which are pressed using two M16 bolts onto the edges of the joint.

The swivelling and tilting hinge arm (3) with the equipment mounting plate (4) can be fixed in any position to the extension arm using two

M16 clamping bolts completely reliably.

When used in the ridge area, the hinge arm can be turned on the axis of the extension arm which also allows the instrument to be optimally aligned here too.

The bracket is made completely from stainless steel (V2A), and designed in a solid fashion so that you will have many years of use.

A ratchet and 24mm socket is needed for assembly. Further tools are not required.

The most important advantages at a glance:

- Installation time less than one minute
- No drilling required
- Very high load bearing
- Can be installed in every position in the profile

Description of items	Order No
Universal bracket for concrete segment joints high-grade steel	14-TK2
Ratchet wrench with 1/2"-drive, professional	14-TK2-KN
Socket, width across flats 24mm, for 1/2" ratchet wrench, professional	14-TK2-SN24



14-TK2 Detail clamping mechanism



2 UNIVERSAL WALL BRACKET 14-TK3

These brackets can be used in any point in the tunnel profile efficiently and reliably too.

The reusable, galvanised mounting plate 14-TK3-MP is installed at any desired location in the profile using three M10 impact dowels. The three-point support gives a secure attachment even on uneven surfaces. The mounting plate is hardly visible and is normally left on the wall in most cases after the measurement.

For the measurement, an extension arm with a hinge arm is screwed onto the mounting plate. Reliably tightening is best done using a hammer blow on the arms of the threaded nut.

The connection between the extension arm and the mounting plate is done using a round thread, which can cope with light contamination, by sprayed concrete for example.

The bracket is mainly manufactured from stainless steel (V2A). Only the threaded part is constructed from painted steel for technical construction reasons.

You need the following tools for installation:

- (Cordless) hammer drill with drill Ø 10mm
- Ratchet
- SW 17 and SW 24mm sockets
- Hammer (to tighten the extension arm)

Wall bracket 14-TK3 scope of delivery:

Extension arm with threaded nut, hinge arm with clamp system, 5/8" fixing screw made from stainless steel. (Without mounting plate 14-TK3-MP)

Mounting plate 14-TK3-MP scope of delivery:

Galvanised mounting plate with three-point attachment, round threaded pin, plastic protective cap for thread, 3 galvanised M10 heavy-load anchors to hammer in.

Description of items	Order No
Universal wall bracket with cantilever and hinge, 5/8" screw, without mounting plate	14-TK3
Mounting plate for 14-TK3 galvanized steel with mounting material	14-TK3-MP
Heavy duty anchors M10x80, galvanized w. washer for mounting nut, per piece	14-TK-SLD
Ratchet wrench with 1/2"-drive, professional	14-TK2-KN
Socket, width across flats 24mm, for 1/2" ratchet wrench, professional	14-TK2-SN24
Socket, width across flats 17mm, for 1/2" ratchet wrench, professional	14-TK2-SN17

1 SINGLE ARM-BRACKET 14-TK1 – LIGHT AND MOBILE

1

Very light, easy to transport and precisely manufactured brackets made from aluminium for installation in sole-plate and slope areas. The repeat accuracy achievable for the positioning of the instrument lies in the range of a few tenths of a millimetre.

As even on large construction projects, it is rare that many instrument positions are used simultaneously, this system is extremely economical.

The arm of the bracket consists of a very stiff 40 x 60mm aluminium box section with a screwed on device mounting plate (Ø 120mm). The tripod is fixed to the bracket using a handy 5/8" tightening screw.

The bracket is adapted to the wall with this system using a solid brass bolt with a protective cover which is glued to the wall. During measurement, the cover is unscrewed and replaced with an adapter bolt made of stainless steel, the console is slid onto this and fastened using the clamping lever.

The two guide pins on the adapter bolts 14-TK1-AB increase the centring accuracy as the bracket arm can only be in a position (identical to the initial installation in relation to the wall bolts).

Setting up is thereby done in a matter of seconds as there is no requirement for a lengthy horizontal levelling of the bracket. As the tripod only offers limited levelling possibilities, the wall bolts must be very precisely installed.

For this, we recommend our two-component cement and the installation apparatus 14-TK1-EV with two installed tube guides at right-angles to each other.

The positive contact of the head of the bolt on the tunnel lining is very important here. Therefore the gap between the back of the bolt and the tunnel lining must also be filled with two-component cement, or similar.

If you plan to use a device heavier than 7kg or a motorised instrument, the bracket should be secured using two additional braces to the sides and downwards to achieve even higher stiffness.

For this, there are two standard wall bolts with M8 internal thread installed under the bracket on the 11R-series (see page 16).

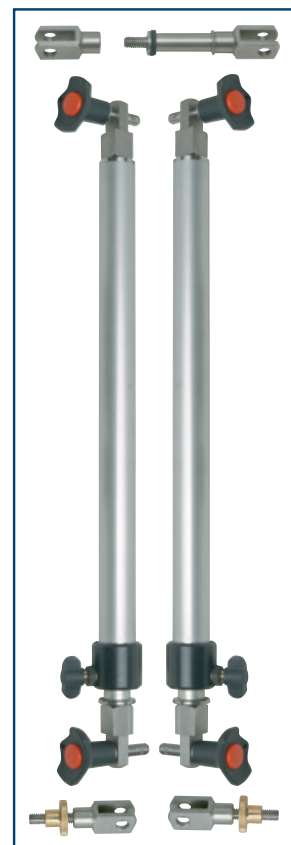
The bracing kit 14-TK1-TSA contains all the required parts and is available as an option.

For the protective transport of bracket, adapter bolts and the optionally available bracing kit, we recommend our transport case with a foam insert cut to suit. In this special case, you can store two complete bracket sets with bracing sets and installation aid.

Distance to wall: 490 or 690mm
Weight (without bracing kit): 2.3kg



14-TK1-WA
with optional supplied telescope
props set 14-TK1-TSA, in this picture
with LEICA-Total station.

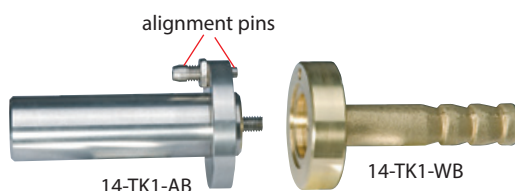


14-TK1-TSA

Description of items	Order No
Single arm-bracket, aluminium, without props set, wall distance 490mm	14-TK1-WA
Single arm-bracket, aluminium, without props set, wall distance 690mm, (customized, not pictured)	14-TK1-WA-L
Telescope props set (2 props with adapters)	14-TK1-TSA
Adapter bolts high-grade steel (connection wall bolt-bracket)	14-TK1-AB
Special – installation device with cross tubular level for 14-TK1-WB/L	14-TK1-EV
Transportation box for two bracket packages, wall distance 490mm (without content)	14-TK1-TK
Brass wall bolts, shank-Ø 20mm, shank length 90mm, incl. protection cap	14-TK1-WB
Brass wall bolts, shank-Ø 20mm, shank length 200mm, incl. protection cap	14-TK1-WB-L



14-TK1-TK
(Contents not included in the delivery)



14-TK1-AB

14-TK1-WB



14-TK1-EV



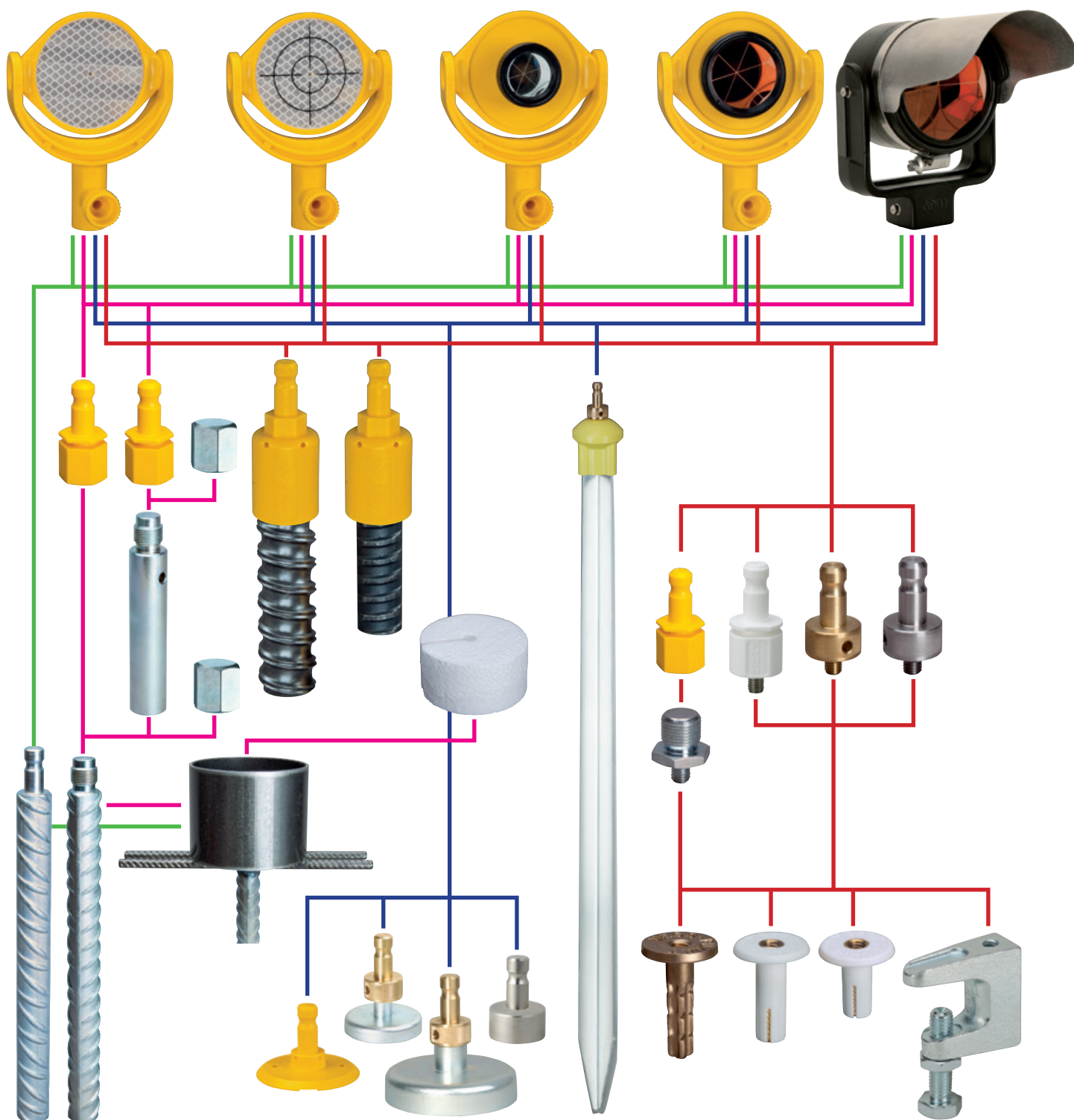
14-TK1-WB



14-TK1-WB-L

ADAPTER EQUIPMENT FOR PRISMS

The matrix will give you an overview of the standard accessories, which will normally be in stock and are described in detail on the following pages.



Assembly for convergence adapter

Details on these products may be found on page 15.

Assembly on steel structures with welding, magnet or adhesive-adapters

Details on these products may be found on page 16.

Assembly on wall adapters with M8 female thread

Details on these products may be found on page 16.

CONVERGENCE-BOLTS AND EQUIPMENT

In tunnels, prisms for monitoring deformations are assembled predominantly on convergence adapters. They can either be directly mounted to the reinforcement of the tunnel lining or even fitted subsequently by drilling and gluing.

Alternatively you have the choice between the standard version 5KB with 3/8 inch male thread or the model 5KBW with fixed 12mm LEICA-adapter.

We recommend the use of bolt 5KB including connection adapter 46-VA made of plastic, which has an integrated predetermined breaking point (sacrificial join).

This combination is particularly reliable because even strong mechanical forces are unable to damage the convergence adapter, which is embedded in concrete. If heavy equipment touches the holder or a blasting backfire, the connection adapter would normally break but the bolt and the holder would remain intact.

On construction sites with blasting activities both bolt types could be mounted with protection rings made of steel. In combination with the optionally supplied blind plug, the bolts can be additionally protected against shotcrete!

1 CONVERGENCE-BOLT WITH 12MM LEICA-ADAPTER

Made of galvanised reinforcing steel with turned 12mm LEICA attachment plugs. Great value for money as no additional adapter is needed, but not quite as secure as order no. 5KB with the 46-VA connection adapter.

Diameter: 22mm
Length: 250mm
Custom made lengths: min. order 100 pieces
Protection ring against damage: optional
Extension: not possible
Protection of mounting: none

Description of items	Order No
Convergence-bolt L 250mm with LEICA-adapter	5KBW
Convergence-bolt, special lengths on request, with LEICA-adapter	5KBW-...

2 CONVERGENCE-BOLT WITH G3/8"-MALE THREAD + ACCESSORIES

Standard bolt made of zinc coated concrete steel. Our prisms can basically be attached with connection adapter 46-VA including predetermined breaking point. Optimal protection at a value for money. Included in the delivery is a soft plastic cap. Alternative caps are made of steel.

Diameter: 22mm
Length: 250mm
Custom made lengths: min. order 100 pieces
Protection ring against blasting: optional
Extension: possible, see table
Protection of mounting: standard cap or cap made of steel

Description of items	Order No
Convergence-bolt L 250mm with G3/8"-thread, plastic cap	5KB
Convergence-bolt, special lengths on request, with G3/8"-thread, plastic cap	5KB-...
Connection adapter with predetermined breaking point, G3/8" on LEICA-adapter	46-VA
Protection cap made of steel for 5KB, tool width 22mm	46-SK
Extension for 5KB, L 100mm, 3/8"- male/female, steel, galvanic-zinc coated	5KB-V100
Extension for 5KB, special lengths on request, steel, galvanic-zinc coated	5KB-V...
Pipe plunge tool width across flats 22/24mm for mounting 46-VA on 5KB	46-RSS

3 PROTECTION RING AGAINST DAMAGE TO CONVERGENCE-BOLT

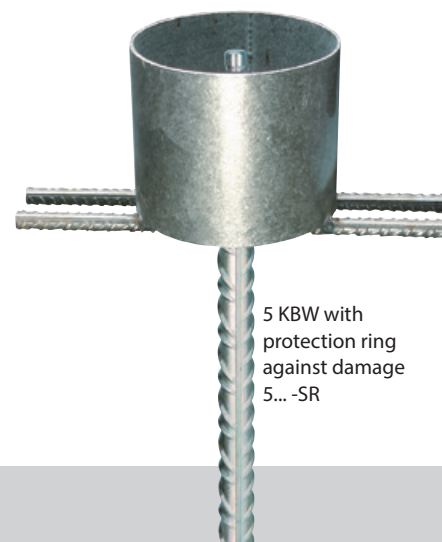
For blasting operations, our convergence measuring bolts can be fitted with a welded on protective ring made of steel. The prism holder is then located deep within the ring and protected from stone impact.

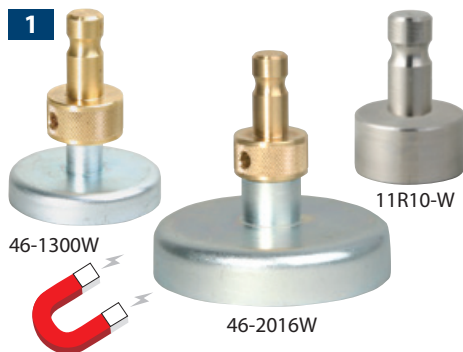
The attached anchors (Ø 8 x 220mm) fitted transversely to the bolt axis, allows simple attachment to the reinforced mat.

Using the optionally available closing plugs made of Styrofoam you can prevent the penetration of sprayed-on concrete into the protective ring. The closing plugs are suitable for use with both the 5KB and 5KBW designs.

The design with the explosive protection ring is only fitted when requested in the order, we require approximately 2 days for their manufacture.

Description of items	Order No
Protection ring against damage, made of steel, Ø 100mm, H= 80mm, fixed on convergence-bolt 5KB or 5KBW welded	5...-SR
Closing plug for protection ring made of Styrofoam, Ø 96 x 50mm	5-SBS





1 WELDING - /MAGNET ADAPTER WITH LEICA-ADAPTER

We also recommend a magnet adapter for short time monitoring or if you want to assemble targets on prefabricated parts. For long term monitoring the high-grade steel welding adapter 11R10-W is more suitable. Magnetic holding force: 46-1300W approx. 22kg, 46-2016W ca. 55kg.

Description of items	Order No
Magnet adapter with 12mm LEICA-adapter, Ø 50mm	46-1300W
Magnet adapter with 12mm LEICA-adapter, Ø 80mm	46-2016W
High-grade steel welding adapter Ø 25mm with LEICA-adapter	11R10-W
High-grade steel electrode Ø 2.5 x 300mm, for welding 11R10-W	11R10-EVA



46-TK-M8 used here with the 11R5W adapter and 46-MP glass prism.

2 BEAM CLAMP WITH M8-FEMALE THREAD

This galvanised cast-iron clamp enables you to fix prisms to various components. It requires a prism adapter with an M8 female thread (see below). Reliable clamping is ensured by an M10 hexagonal bolt. Among others, frequent applications are: lattice booms, T-beams and sheet piling profiles with a maximum thickness of 23mm.

Description of items	Order No
Beam clamp with M8-female thread, max. base width 23mm	46-TK-M8

3 WALL BOLT WITH M8-FEMALE THREAD

Our wall bolts from the 11R series offer a particularly economical way to install prisms in concrete, rocks or walls when used with the respective adapters. We recommend the special spanner 11R2-ST and the step drill 11H-SBO for installation. (Details see www.goecke.de).

Spreading and/or locking bolts made from stainless steel are included in delivery of all bolts.

Description of items	Order No
M8-wall bolt, brass, L 46mm, for glueing „MESS-PUNKT“	11R1
M8-wall bolt, plastic material, L 30mm „MESS-PUNKT“, white	11R2-30W
M8-wall bolt, plastic material, L 40mm „MESS-PUNKT“, white	11R2-40W
M8-wall bolt, plastic material, L 40mm „SURVEY-POINT“, white	11R2-40W-SP
M8-wall bolt, plastic material, L 40mm „ARPENTAGE“, white	11R2-40W-AP
Replacement stud bolts M8x10 (spreading and locking bolts)	M8x10VA
Allen key with locking handle width across flats 4mm for 11R-bolts	11R2-ST
Twist drill, Ø 12mm / Ø 31mm, drill depth 48mm	11H-SBO

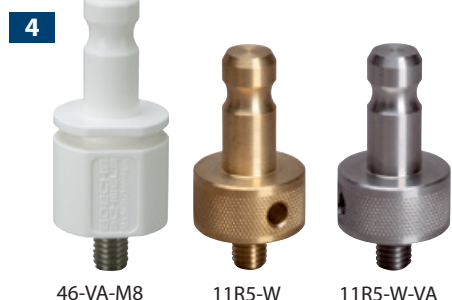


4 ADAPTER M8 - LEICA-ADAPTER FOR WALL BOLT

The model 46-VA-M8 made of plastic material with an integrated predetermined breaking point is provided with a loose high-grade steel headless screw M8x30. If force is applied to the

prism, the adapter will break. Normally the wall bolt is undamaged. All-metal adapters of model range 11R5-W... are significant more stable but don't have a predeter-minated breaking point.

Description of items	Order No
Adapter M8 - LEICA adapter, plastic material, with predetermined breaking point	46-VA-M8
Adapter M8 - LEICA adapter, brass	11R5-W
Adapter M8 - LEICA adapter, stainless steel	11R5-W-VA



5 ADAPTER 5/8" INTERNAL THREAD - LEICA ADAPTER

Adapter 5/8" internal thread - LEICA adapter, plastic with predetermined breaking point.

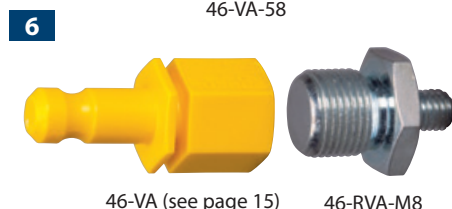
Description of items	Order No
Adapter 5/8" - LEICA adapter, plastic, with predetermined breaking point	46-VA-58



6 ADAPTER G3/8" - M8

This adapter is the connector between wall bolt 11R... and the connection adapter 46-VA (see page 15). The 3/8" thread is not a 3/8"-16 UNC photo thread, but rather a G3/8" thread with 16.6 mm outside diameter.

Description of items	Order No
Adapter G3/8" - M8, steel galvanic-zinc coated, width across flats 22mm	46-RVA-M8



GOECKE BIREFLEX-TARGETS

Since 2000, GOECKE reflex-targets with holder have been proved in value in countless large-scale tunneling and engineering projects in Germany and abroad.

Unlike standard reflex-targets the foil carrier with a central drill hole or crosshairs can be rotated spherically and therefore can be turned ideally in any target direction.

Advantages:

- High centring/positioning accuracy, even with a change of target mark
- Skid-resistant clamping screw for safemounting on any 12mm plug

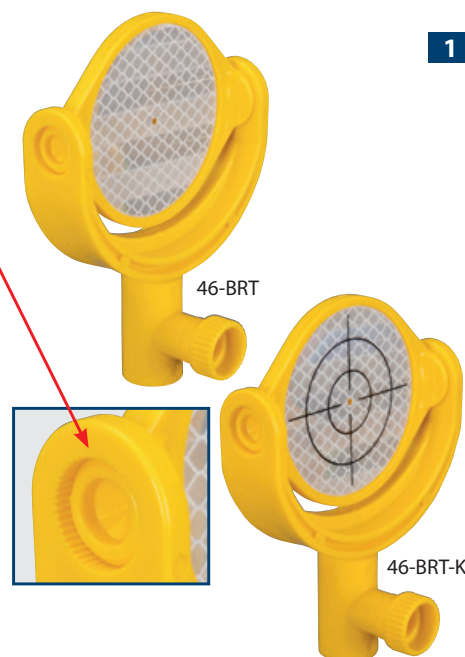
- Precise, deliberately stiff bedding of foil-/prism-carrier for unintentional rotation, locks every 7,5°
- Thanks to its high pre-tensioning, the extremely reliable reflex target mark does not even fall off its swivel bracket during drill-and-blast operations
- Suitable for extremely adverse conditions, marks are easily removed and may be reused even after a contact with shotcrete
- Permanently weather-resistant and UV-resistant special plastics. No "moisture expansion" of the mark on the receptacle plug, the material does not absorb any water.

1 BIREFLEX-TARGETS

Consists of an unbreakable specially created plastic. Double-sided reflex foil with a diameter of 60mm, target drill hole is vertically and horizontally centred for comfortable and precise aiming. Slip-proven locking screw for reliable locking of vertical axis.

Target distance: about 10m to max. 150m
 Mounting: 12mm-adapter (WILD/LEICA-compatible)
 Tilting axis height: 86mm
 Offset: 2mm

Description of item	Order No
Bireflex-target with neutral reflex foil (Ø 60mm, offset 2mm)	46-BRT
Bireflex-target with crosshairs on reflex foil (Ø 60mm, offset 2mm)	46-BRT-K
Mounting flange with WILD/LEICA attachment plug (Details see page 16)	46-MF-L



Mini prism 46-MP with weather protection cover 46-MP-WH on mounting flange 46-MF-L. (see p.18)

MONITORING-PRISMS

When structures are monitored with automated measuring sequences, the preferred type of prism is a glass prism. When buying monitoring prisms you should especially consider the following features:

- The coating of the prism's back wall (copper coating or silver coating)
- The weather resistance of the prism
- A secure fixing and locking of the standing axis and the tilting axis
- Weather protection
- A good price

With our longstanding experience in supporting monitoring projects, we should be pleased to offer competent advice in choosing the prisms which are suitable for your application.

Thanks to our own manufacturing capabilities, we also offer a fast, unbureaucratic and reasonably priced modification of standard prisms. Your contacts for any monitoring issues are Harald Goecke.

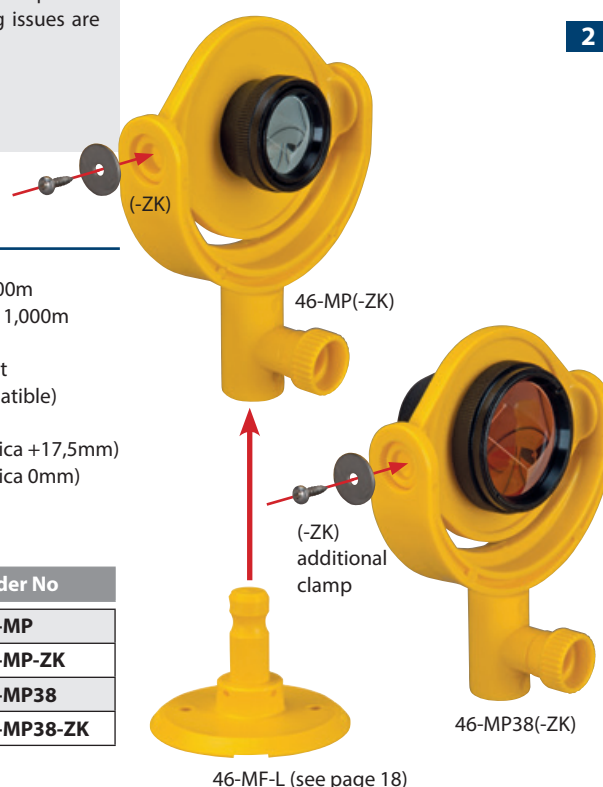
2 HOLDER WITH 25MM OR 38MM MINI PRISM

Tilting holder made of break-proof special plastics, silver-coated 25mm-diameter mini prism or copper-coated prism with a diameter of 38mm. With the optional additional clamp, the prism is locked so securely in its tilting axis that swiveling is only possible by force.

The visible prism centre is only located in the vertical and tilt axis on the 46-MP and 46-MP-ZK version with a 25mm prism.

Target distance 46-MP: approx. 500m
 Target distance 46-MP38: approx. 1,000m
 Grinding accuracy: < 5"
 Recording: 12mm socket (LEICA compatible)
 Tilt-axis height: 86mm
 Offset 46-MP: -16,9mm (Leica +17,5mm)
 Offset 46-MP38: -34,4mm (Leica 0mm)

Description of item	Order No
GOECKE Monitoring-Prism Ø 25 mm	46-MP
GOECKE Monitoring-Prism Ø 25 mm, with additional clamp	46-MP-ZK
GOECKE Monitoring-Prism Ø 38 mm	46-MP38
GOECKE Monitoring-Prism Ø 38 mm, with additional clamp	46-MP38-ZK



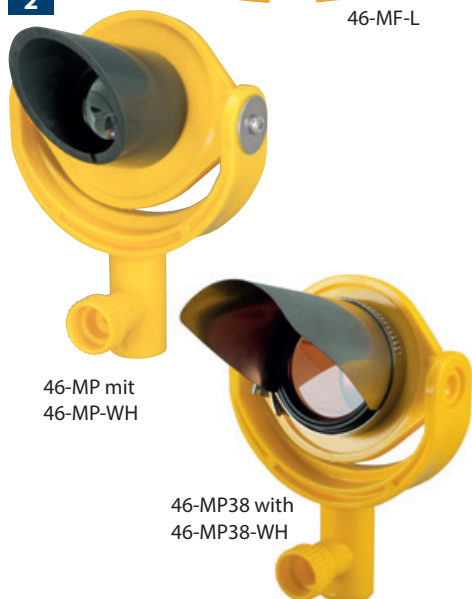
46-MF-L (see page 18)

1



46-MF-L

2



46-MP mit
46-MP-WH

46-MP38 with
46-MP38-WH

3



46-MP-K



25 units of these adapters will fit into 46-MP-K

4



46-GPH1-MP with
46-GPH1-WH

1 MOUNTING FLANGE WITH LEICA MOUNTING PLUG

Flange for fitting to our Bireflex targets and all prisms with a 12mm LEICA mounting plug by either adhesive bonding or dowelling/screwing. For prisms with an 86mm high tilting axis, the resulting smooth distance is 100mm to the bottom face of the flange.

Break-proof special plastics with a diameter of 60mm. For a safe and durable mounting of the flange, we recommend our mounting adhesive 13-MK (see www.goecke.de). The flange is fitted with a lever opening to forcibly loosen the adhesive bond.

Description of items	Order No
Mounting flange for adhesive bonding, dowelling/screwing to Leica plugs	46-MF-L

2 WEATHER PROTECTION COVER F. GOECKE MINI PRISM 46-MP/MP38

The new and inexpensive weather protection cover 46-MP-WH provides your mini prism 46-MP with effective protection against rain and dew.

or upside down. The slot should point down so that any collected water (from storms or heavy rain) can easily drain away.

The plastic pipe is cut obliquely and has a slot at the bottom. It is pushed over the prism's housing highly pre-stressed and can then be turned into the desired position.

We also offer a weather protection cover for the 46-MP38 prism as an optional extra. The weather protection cover is made from stainless high-grade steel. It is fixed to the prism housing by a stainless steel clamp.

The cover's rotation option provides an effective protection in any possible prism installation position whether upright, horizontally, diagonally

Please note that the delivery does not include the mini prism 46-MP.

Description of items	Order No
Weather protection cover for mini prism 46-MP, Ø 40 x 62mm	46-MP-WH
Weather protection cover for mini prism 46-MP38, Ø 47 x 75mm, made from stainless high-grade steel, including clamp	46-MP38-WH

3 SPECIAL CASE FOR MONITORING PRISMS

The large quantities of monitoring prisms used represent considerable value which should be carefully transported and stored.

can safely store or transport a maximum of 25 prisms including their adapters (11R5-W, 11R5-W-VA, 46-VA oder 46VA-M8) in a compact design.

For our popular monitoring prisms (order no. 46-MP, 46MP-38, 46-BRT and 46-BRT-K), we re-commend our special case in which you

External dimensions (L x W x H): 48x41.5x17.5cm
Weight: approx. 2.2 kg

Description of items	Order No
Special case for 25 monitoring prisms (46-MP, 46-MP38, 46-BRT und 46-BRT-K)	46-MP-K

4 LEICA GPH1 COMPATIBLE MONITORING PRISM

For target distances of more than 500m, we recommend the use of this prism. It is based on our prism 46-63-3022 which has been proven for many years.

It is fixed to the prism housing by a stainless steel clamp to ensure its rotation. As a result, the prism may be used in any conceivable mounting position without any loss of weather protection.

For the use in monitoring campaigns, the prism is equipped with a clamp-on standing and tilting axis. As an optional extra, a weather protection cover made of stainless steel is also available.

We recommend - as a minimum - to additionally seal the back of the prism housing (e. g. with silicone or a PU sealant).

Offset: -34,4mm (Leica 0mm)

Description of items	Order No
LEICA GPH1 compatible monitoring prism with clamp-on the standing and tilting axis	46-GPH1-MP
Weather protection cover made of stainless steel with clamp to be fitted to LEICA GPH1 (compatible) prisms	46-GPH1-WH

PRISM ADAPTERS

For adapting your prisms to wall or ground points, we offer various special adapters for all common applications described on pages 13 and 14.

5 MONITORING PRISM LEICA GMP104 / GMP104 COMPATIBLE

Robust and inexpensive prism systems with housings and brackets from anodised aluminium and copper-coated mini prisms. The prisms can be rotated or tilted on the vertical and tilting axes. The L-shaped bracket has a leg length of 76mm.

The original LEICA GMP104 is delivered without mounting accessories. The delivery of the almost identical 46-LMP includes a M8 x 20 stainless steel bolt with which the prism can be fastened to every dowel or wall bolt with a M8 thread (see page 16).

Offset: -25,5mm (Leica +8,9mm)

Description of items	Order No
LEICA GMP104 monitoring prism, without mounting accessories	LEICA GMP104
LEICA GMP104-compatible Prism, with M8x20 screw	46-LMP



6 MONITORING PRISM LEICA GPR112 WITH ACCESSORIES

The GPR112 with 60mm diameter is suitable for target distances up to 2,500m and is protected by a special filter to prevent condensation on the rear of the prism.

from aluminium. Included in the delivery of the prism, is an adapter with a 5/8" internal thread. The prism can be adjusted and fixed in both axes using the tilting mount GHT112 made from aluminium. The holder can be fastened to almost any surface using its M8 internal thread (see page 16), on 5/8" threaded bolts or even with 3.5mm Spax screws.

Using the M8 internal thread on the rear side of the housing, the GPR112 is screwed onto the optionally available holder GHT112 made

Offset: Leica -7,1mm

Optionally available and recommended is the weather protection cover GDZ112.

Description of items	Order No
LEICA GPR112 monitoring prism with M8 -internal thread	LEICA GPR112
LEICA GHT112 tilting mount with M8 and 5/8"-adapters	LEICA GHT112
LEICA GDZ112 weather protection cover for GPR112, plastic	LEICA GDZ112



7 MONITORING PRISM FOR NEAR SURFACE OBSERVATIONS

The prisms of the 46-MP17-AL series are suitable for monitoring busy roads in public areas thanks to their size of 100 x 100 x 23mm (L x W x H). The aluminium housing with integrated glass prisms (Ø 17mm) can also be driven over by heavy trucks.

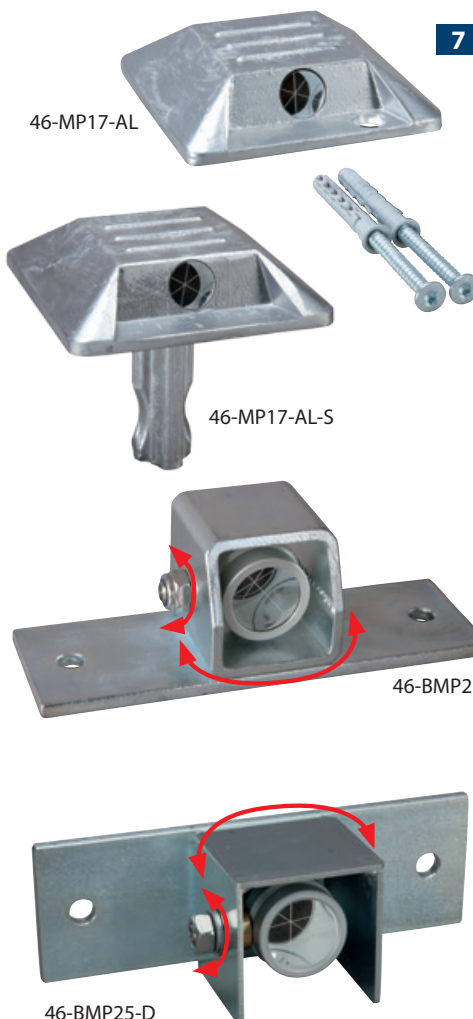
instrument location. Offset: -11,3mm (Leica +23,1mm)

The installation of the 46-MP17-AL is either done using a suitable mounting adhesive, or with the supplied dowels (much more reliable). We recommend our injection cement 106-IM345 to secure the 46-MP17-AL-S. During installation, it is required for constructional reasons, that the prisms are roughly aligned to the intended

The prism 46-BMP25 has an extremely stable housing made from 4mm thick galvanised steel. and is designed for horizontal assembly. Turning and tilting 25mm mini prism made from aluminium. Base plate 155 x 50 x 5mm, total system height 50mm. The diameter of the mounting holes is 8.5mm.

We are able to offer you the new 46-BMP25-D prism for vertical assembly. Offset: -16,9mm (Leica +17,5mm)

Description of items	Order No
Monitoring prism Ø 17mm, in aluminium housing 100 x 100 x 23mm, adhesive or dowel installation, with fastening bolts and dowels	46-MP17-AL
Monitoring prism Ø 17mm, in aluminium housing 100 x 100 x 23mm, with pin 26 x 30 x 70mm, for adhesive mounting	46-MP17-AL-S
Monitoring prism Ø 25mm, for horizontal assembly, metal housing, without mounting material	46-BMP25
Monitoring prism Ø 25mm, for vertical assembly, metal housing, without mounting material	46-BMP25-D





System of ball prisms consisting of a magnetic ball base and the ball prism as used in a track monitoring project.



Ball prism monitoring system with M8 thread connection for mounting in a wall plug.

MONITORING WITH MAGNETIC BALL PRISMS

Precise – universal – inexpensive

Our modular system of ball prisms was especially developed for monitoring applications. The major advantage of this system is its very high centring accuracy of $\pm 0.1\text{mm}$ and an opportunity of targeting the same prism from various viewing angles without any loss in accuracy. These prisms are also very inexpensive.

The prisms consist of a galvanised steel ball manufactured to a tolerance of $\pm 0.05\text{mm}$ and a triple prism inserted exactly in its centre.

The system is completed by a ball base and centring plates, which are adapted to the specific mounting situation and may be reliably fixed on almost any surface by adhesive bonding or screwing/dowelling.

The ball bases have integrated permanent magnets with various holding forces ensuring a reliable connection to the ball prism and the centring plate.

This sophisticated design allows swivelling the prism in all directions over a range of 200 gon.

When the points to be monitored are easily accessible and when measuring intervals are long, the prisms may be mounted shortly before the measurement. As a consequence, they can be used for other projects during the interval.

In such case, only the ball base or the centring plates will remain at the object to be monitored. The base is protected against dirt and adverse weather conditions by a cover plate which is included with the product.

Note:

When using the prism on vibrating components (such as rail tracks, crane rails etc.), a base with a powerful magnet (4 or 20kg holding force) should be used in all cases, and the centring plate should be fixed by adhesive bonding. In addition, we recommend securing the magnet base, ball prism and centering plate with Loctite 243.

1

1 MONITORING BALL PRISMS Ø 30MM AND Ø 1.5" (38.1MM)

Glass mini prisms manufactured with a high level of precision and mounted in a ball housing made of galvanised steel or special stainless steel, which reacts to magnets. Optionally supplied in a Ø 30mm or 1.5" (38.1mm) version. For distances of more than 400m, we recommend the 1.5" ball. The maximum distances indicated

depend on the equipment and the weather.

The prism constant must be set with the correct sign on the tachymeter. It is only then that the measured slope distance will be amended by this amount in the machine. The Leica offsets and the offsets for other tool providers are specified here.

Both versions offer the following advantages:

- Manufacturing precision of the ball: $\pm 0.05\text{mm}$
- Grinding accuracy: 2"
- Silver-coated prism back
- Accuracy prism constant $\leq 0.1\text{mm}$
- Deviation tolerance from prism centre: $\pm 0.2\text{mm}$
- Impact-resistant and waterproof
- Prism height 30.8mm (see sketch p.21)

Technical Data	46-1450	46-1450-S	46-1445	46-1445-S
Ball-Ø	30mm	30mm	1.5" (38.1mm)	1.5" (38.1mm)
Prism-Ø	17.5mm	17.5mm	25mm	25mm
Material	Galvanised steel	Magn. stainless steel	Galvanised steel	Galvanised steel
Ball back	M6 internal thread	M6 internal thread	Ø 2mm hole	Ø 2mm hole
Offset	-11.3mm (Leica +23.1mm)	-11.3mm (Leica +23.1mm)	-16.9mm (Leica +17.5mm)	-16.9mm (Leica +17.5mm)

The ball prisms can also be purchased from us with an inspection certificate issued by the Karlsruhe Institute of Technology, all for the price of €80.00 net on top of the list price. This inspection certificate refers to the ball prism, whose serial number is engraved on the back of the ball. Apart from the location of the centre of the prism to

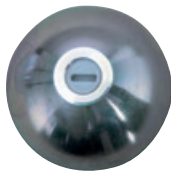
the centre of the ball, the prism constant K is also stated, which was defined using several comparative measurements transformed into an ultra-precise reference reflector. If you place an order, please add the additional "PS" details to the order number (for example, 46-1445-PS).

Description of items	Order No
Ball prism Ø 30mm (17.5mm), galvanised steel, M6 internal thread	46-1450
Ball prism Ø 30mm (17.5mm), galvanised steel, Ø 2 mm hole	46-1450-S
Ball prism Ø 30mm (17.5mm), magn. stainless steel, M6 internal thread	46-1445
Ball prism Ø 38.1 mm (25 mm), galvanised steel, Ø 2 mm hole	46-1445-S

For transport and storage of ball prisms we recommend the cases 46-1468.



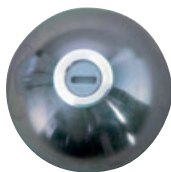
46-1450



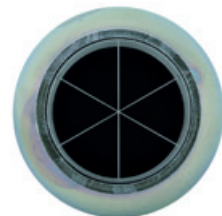
Rückseite M6-internal thread



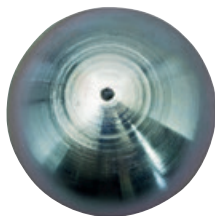
46-1450-S



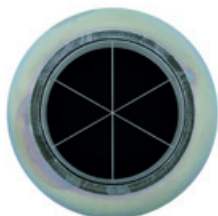
Ball back M6-internal thread



46-1445



Ball back Ø 2mm hole



46-1445-S



Ball back Ø 2mm hole

2 PROTECTIVE CAP FOR BALL PRISMS

A protective cap can be clipped onto the ball prisms (order numbers 46-1450/-1451 and 1450-S). It is made from durable white plastic. It protects the prism from dust, rain, snow, etc.

Due to the tunnel effect, more precise alignment with the tool is required when using the cap. The centre of the prism must be visible.

Description of items	Order No
Protective cap Ø 25mm, white plastic, clip-on design, suitable for 46-1450/-1451/-1450.S	46-1469



3 BALL BASE Ø 33MM WITH PERMANENT MAGNET

This ball base made of hard anodised aluminium features an integrated permanent magnet and is suitable for very fast and reliable mounting on all magnetic surfaces and our centring plates. (on p. 22) Available for balls with Ø 30mm (silver base) or 1.5" / Ø 38.1mm (blue base) and various holding forces for each version. Please refer to the notes in the intro text at the top of

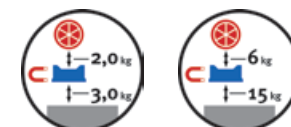
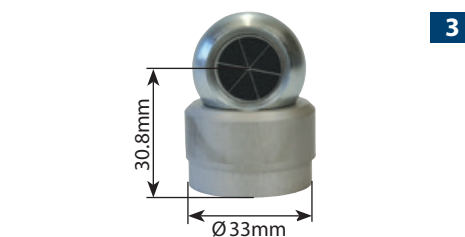
page 20. The distance between the ball centre and the bottom of the base face is always 30.8 mm ± 0.1mm and - with the right combination of components - is irrespective of the selected base and prism.

All ball bases are supplied with a magnetic cover plate to protect against contamination.

Description of items for ball prisms Ø 30mm	Order No
Ball base Ø 33mm, magnetic holding force 1/1.5kg, silver anodised	46-1460
Ball base Ø 33mm, magnetic holding force 6/3.5kg, silver anodised	46-1460-S
Ball base Ø 33mm, magnetic holding force 12/20kg, silver anodised	46-1460-S2
Description of items for ball prisms Ø 1.5" (38.1mm)	Order No
Ball base Ø 33mm, magnetic holding force 2/3kg, blue anodised	46-1457-S
Ball base Ø 33mm, magnetic holding force 6/15kg, blue anodised	46-1457-S2



The included protective plate protects the base.



4 DETACHING TOOL FOR BALL BASES WITH POWER MAGNETS

It is rarely possible to detach ball bases with magnetic forces of 15 and 20kg (46-1460-S2 and 46-1457-S2) from the subsoil without using

a tool. We recommend our plastic detaching tool with carrying strap, which fits all our ball bases.

Description of items	Order No
Plastic detaching tool for all ball bases with carrying strap	46-1460-Z



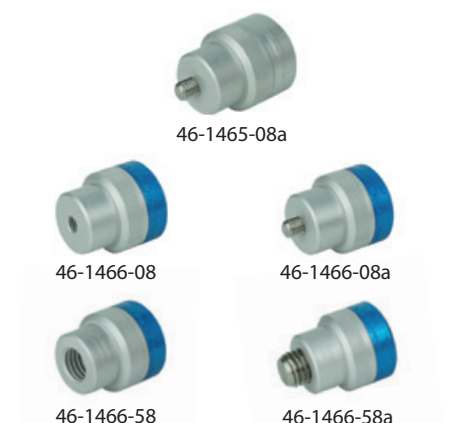
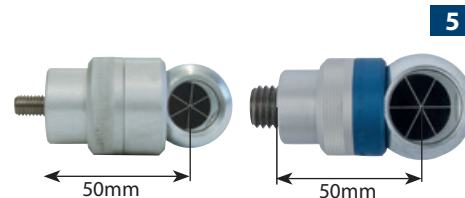
5 BALL BASE W. PERMANENT MAGNET AND THREAD CONNECTION

When you want to use ball prisms with M8 wall plugs, prism rods or similar devices, our ball bases, available for balls with Ø 30mm (silver base) or 1.5" / Ø 38.1mm (blue base), along with thread connection are the right choice. The distance between the ball centre and the bottom face of the base for all bases is 50mm ± 0.1 mm.

In addition to our standard types with external thread, we also supply bases with internal thread and/or 1/4" thread upon request.

All ball bases are supplied with a cover plate to protect against contamination.

Description of items for ball prism Ø 30mm	Holding force	Order No
Ball base with M8 external thread, silver anodised	0.5kg	46-1465-08a
Ball base with M8 external thread, silver anodised	4.5kg	46-1465-208a
Ball base with 5/8" external thread, silver anodised	4.5kg	46-1465-258a
Description of items for ball prism Ø 1.5" (38.1mm)	Holding force	Order No
Ball base with M8 internal thread, blue anodised	3.0kg	46-1466-08
Ball base with M8 external thread, blue anodised	3.0kg	46-1466-08a
Ball base with 5/8" internal thread, blue anodised	3.0kg	46-1466-58
Ball base with 5/8" external thread, blue anodised	3.0kg	46-1466-58a



1



46-1461
with ball base 46-1460
and prism 46-1450



46-1461



46-1463



46-1463
with ball base
46-1460 and
prism 46-1450



46-1464



46-1464-VA

2

46-1468-15D



3



New

114-TL80



59-A452



114-TL80-HA196



Transport case



114-NE-12-2A

1 CENTERING PLATES FOR BALL BASES WITH Ø 33 MM

It is not necessary to fit each point with a permanent prism for a variety of monitoring tasks. If the observation points are easily accessible, it is often sufficient to attach a centring plate prior to the zero measurement. It is only when the measurement itself is taken that the ball prism and magnetic base is inserted into and aligned in the centring plate – with this process ensuring a centred finish in a rapid and ultra-precise manner.

Even in the case of non-magnetic subsoils, we

recommend that you use centring plates made from galvanised steel or a special stainless steel that reacts to magnets.

Centring precision fit:
Ø 33mm ± 0.1mm

We supply centring plates for screwing/dowelling or adhesive applications. All models have central holes of Ø 8mm facilitating the pinpoint centring of the plates above a marking (cross-hair).

Description of items	Order No
Centring plate for adhesive applications for ball bases with Ø 33mm, Ø 40 x 4mm, galvanised steel	46-1461
Centring plate for screwing for ball bases with Ø 33mm, Ø 60 x 4mm with 4 holes of Ø 4.5mm, galvanised steel	46-1463
Centring plate for screwing and/or adhesive applications for ball bases with Ø 33mm, Ø 40 x 7mm for countersunk bolts, galvanised steel	46-1464
Centring plate for screwing and/or adhesive applications for ball bases with Ø 33mm, Ø 40 x 7mm for countersunk bolts, stainless high-grade steel (reacts to magnets)	46-1464-VA

For fastening to load-bearing substrates, we recommend using our MS polymer-based assembly adhesive.

2 TRANSPORT CASE FOR BALL PRISMS AND BASES

In order to transport your ball prisms, we re-recommend our special cases made of shockproof ABS plastic with foam insert. Each "nest" is suitable for storing one prism including the base. Dimensions: 270 x 230 x 82mm, weight approx. 920g.

Description of items	Order No
Special case for ball prisms and accessories with 15 nests for ball bases with a max. holding force of 4 kg	46-1468-15D
Special case for spherical prisms and accessories with 6 nests for spherical bases with a holding force of 15 - 20 kg, (without illustration)	46-1468-6D

3 TUNNEL LASER TL-80

The TL-80 tunnel laser, in a rugged metal housing, emits a laser beam as a reference axis. It has a horizontal and vertical rotary axis system with clamping and fine drive for fast and exact fine alignment.

The tunnel laser can be used autonomously or in conjunction with a tribrach. For this purpose, it is advantageous to adjust the tilt axis height to the surveying equipment to be used.

Technical Data TL-80			
Laser class	3 R, P < 5 mW	Warranty	24 months
Laser	Diode, visible red, 635 nm	Temperature range	-20°C to +50°C
Beam diameter	13 mm at laser	Power supply	10 to 14 V DC/0.1A
Range	up to 500 m	Size (L x W x H)	157 x 185 x 195 mm
HZ-VZ fine drives	yes - clampable	Weight	1.8 kg
Working range	HZ 360° - VZ 300°	Reverse polarity protection	yes
Tilt axis height	145 mm, (with adapter 114-TL80-HA196 and 59-A452: 196 mm)	Waterproof	up to 3,5 m
Equipment mounting	5/8" female thread	Working range power supply	110V - 240V
		Scope of delivery	laser, carrying case

Description of items	Order No
Tunnel laser TL-80 with standard scope of delivery	114-TL80
Height compensation adapter with H=28.5 mm for tilt axle height 196 mm (in combination with 59-A452)	114-TL80-HA196
Tribrach adapter, rigid, H= 22.5 mm	59-A452
Power supply unit with 1.80 m input cable and 2 m output cable, 230 V to 12 V, with CA-COM plug	59-NE-12-2A

ALUMINIUM CROSS PROFILES

Our cross profiles made from a corrosion-resistant special aluminium alloy can be used in a variety of ways in soft to medium hard ground. Typical areas of application include the marking of railway lines, boundary and forest markers and sliding slope monitoring. For soft ground we recommend the spiral version, which offers a significantly better anchorage compared to the standard version.

In order to ensure optimum marking of the point, we recommend you use one of our end caps customised specifically for the cross profile.

To drive it in you should use our special tool and a sledge hammer. Deformation of the shank can therefore be avoided, which would complicate the attaching of the end cap.

The caps are attached after driving in the cross profile and are permanently connected with one or two hammer blows.

We only manufacture cross profiles to order; the typical lead time is approximately two working days.



1 CROSS PROFILE MADE FROM ALUMINIUM

Cross profile made of aluminum, 48 x 48 x 3mm, sharpened on one side. Minimum order quantity 10 pieces.

Description of items	Order No
Cross profile, straight version, length 60cm	KA-60
Cross profile, straight version, length 80cm	KA-80
Cross profile, straight version, length 100cm	KA-100
Cross profile, straight version, length 120cm	KA-120
Cross profile, straight version, length 150cm	KA-150
Cross profile, straight version, length 200cm	KA-200
Cross profile, spiral version, length 60cm	KA-60-G
Cross profile, spiral version, length 80cm	KA-80-G
Cross profile, spiral version, length 100cm	KA-100-G
Cross profile, spiral version, length 120cm	KA-120-G
Cross profile, spiral version, length 150cm	KA-150-G
Cross profile, spiral version, length 200cm	KA-200-G

Beside the dimensions in the table, we are able to deliver any length as custom-made within a short time frame.

2 DRIVING IN TOOL FOR CROSS PROFILE

To hammer in the profile of the anchor gently, we recommend our hammering tool adapted to the cross profile and a sledge hammer.

Description of items	Order No
Driving in tool for cross profile	KA-EW
Sledge hammer with ash shaft, 5.0kg	23D-5

3 END CAP FOR CROSS PROFILE WITH M8-FEMALE THREAD

To attach to our aluminium cross profile. Aluminium, yellow coated. Cap diameter 60mm, height 65mm, with level point and M8-female

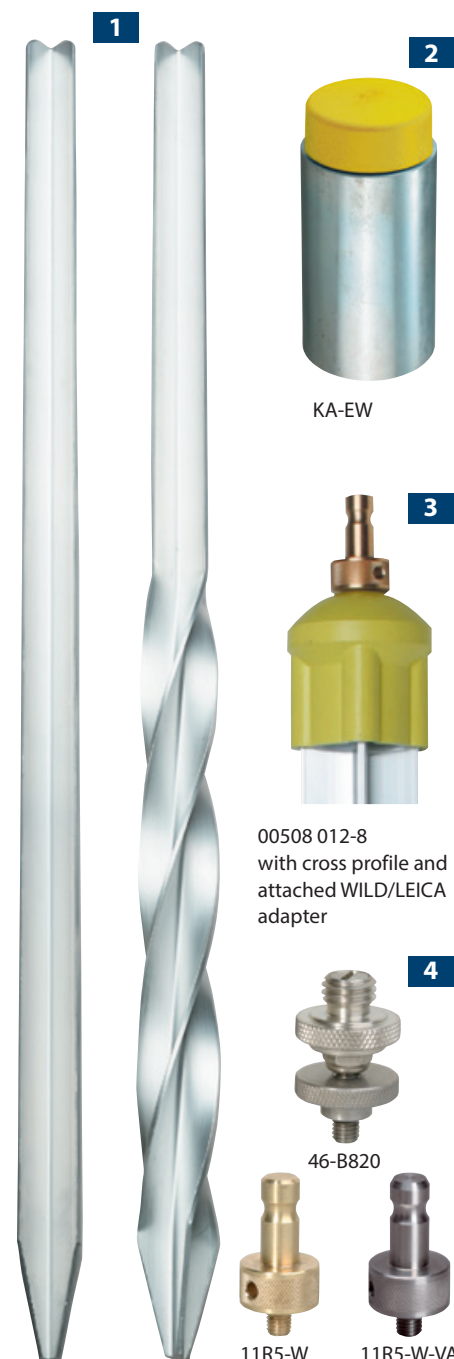
thread. Not included in the shipment is the LEICA-adapter in the picture.

Description of items	Order No
End cap for cross profiles, Ø 60mm, with M8-female thread	00508 012-8

4 PRISM ADAPTER FOR CROSS PROFILES

For prisms with 5/8"-female thread it is possible to use e.g. the rotatable adapter 46-B820. For LEICA-prisms the plug adapter 11R5-W or 11R5-W-VA.

Description of items	Order No
Adapter from M8 male thread to 5/8" male thread for tilting axis 70 mm, stainless steel, rotatable, height 30 mm	46-B820
Adapter from M8 male thread to LEICA plug-in spigot, brass	11R5-W
Adapter from M8 male thread to LEICA male pin, stainless steel	11R5-W-VA





**GOECKE
SCHWELM**



GOECKE GmbH & Co. KG

Ruhrstraße 38 D-58332 Schwelm
Phone: +49 (0) 23 36 - 47 90 - 0
Fax: +49 (0) 23 36 - 47 90 - 10
E-Mail: info@goecke.de
Internet: www.goecke.de

Distribution in Austria by:

**GOECKE
AUSTRIA**



GOECKE AUSTRIA GmbH

Am Hochrain 8 - A-3454 Thallern
Phone: +43 (0) 22 76 - 2 05 56
Fax: +43 (0) 22 76 - 2 05 70
Mobile: +43 (0) 664 - 2 51 71 91
E-Mail: info@goecke-austria.at
Internet: www.goecke-austria.at