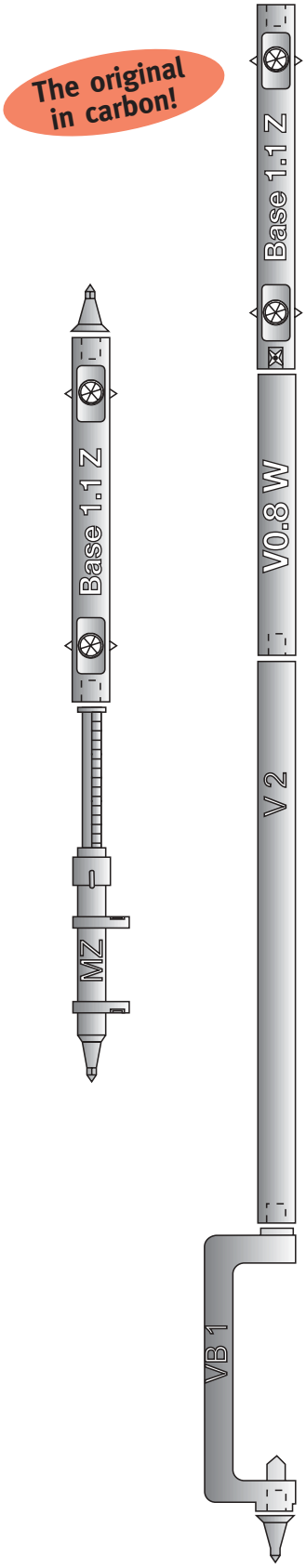
System Vektor

Universal prism pole Vektor (light – stable – accurate)

The prism pole for multiple use with excellent characteristics



Base

The core of the prism pole System Vektor is always the Base 1.1 with 2 prisms, which are synchronically tiltable, in a distance of exactly 1 m.

The Base 1.1 is available in 2 formats:

1. Base 1.1Z and 1.1W
Prisms completely integrated in the carbon tube.
(also available as Base 2.1 with 3 prisms in a distance of 1 m each).

2. Base 1.1 HIP
modularly built with components of the prism series HIP

For both formats, the following **prism constants K** (Leica in brackets) are available:

-11	(+23,1)	mm = Leica 360°-Prism
-16	(+18,4)	mm
-30	(+4,4)	mm
-34/35	(0)	mm

see also catalogue page 4

- use of very strong mini prisms (Ø 18 mm for K = -11 mm, all other Ø 25 mm).
- central symmetric point (visible center) for all prisms is in the tube axis.
  This is a requirement for the maximum achievable accuracy of the angle and distance measurements.
- additional red target point in the center of the prism for exact positioning of the reticule .
- tilting of the prisms:
  Base 1.1Z and 1.1W: synchronic tilting of the prism by linkages in the tube.
  For constants K = -11 (+23,1) mm and K = -16 (+18,4) mm there is a lever at the rear side.
  Base 1.1 HIP: synchronic tilting of the prisms for all prism constants by an exterior linkage made of carbon fibre.

The base 1.1 HIP is available also with reflecting target as inexpensive alternative to glass prisms.
Prism constant K = 0 mm (= -34,4 mm in the Leica system)

Extensions

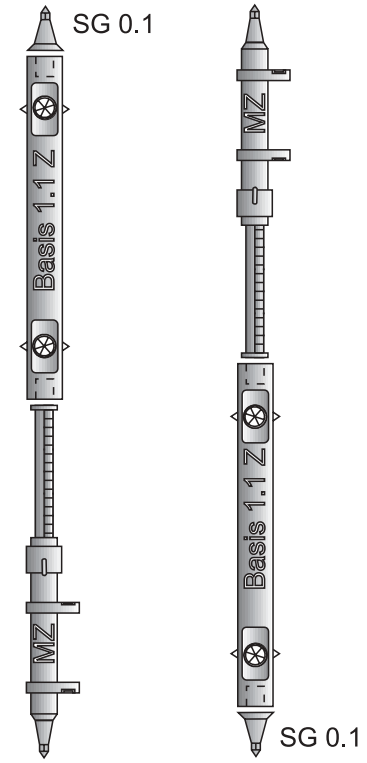
Material and components correspond to the actual standards of technology:
Tube construction (outside Ø 44 mm, inside Ø 40 mm) made of extremely light and strong carbon or of a blend of carbon fibre / glass fibre)

Advantages compared to aluminium:
- carbon fibre is lighter by approx. 40%. Blend 10-20%.
- much higher pliability.
- can not be deformed permanently, 100% re-set to the original shape even after extreme use.
- expansion coefficient (temperature) is 100 times smaller
- no corrosion.
- comfortable handling also in cold temperatures.

Further advantages:
- all extensions are waterproof.
- the coating is made of signal red colour.
- prism case and linkages are made of very solid anodised aluminium
- thread and thread inserts are made of stainless steel.
- standardised connection of the extensions with 5/8" threads.

The prism pole can be used for multiple purposes due to its compact method of construction, e.g. as

- standard prism pole (see catalogue page 27)
- prism pole to measure hidden points (see catalogue page 27)
- as sewer measuring rod **to measure tube diameters** (see catalogue page 28 + 29)



Lage I Lage II

System Vektor

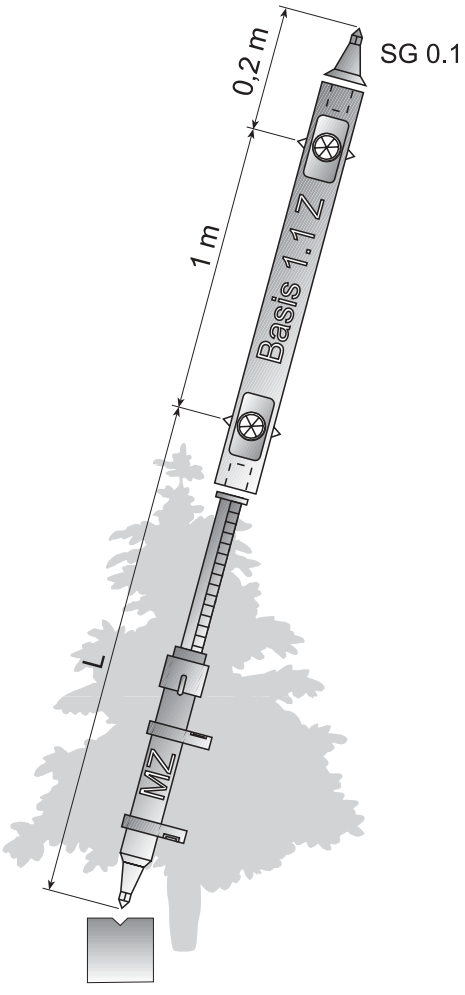
Vektor as standard prism pole

For the standard prism pole with **Base 1.1Z** together with the **point SG 0.1** and the **mini prism pole MZ**, all connections are 5/8" threads.
Instead of the mini prism pole MZ, all other prism poles can be used with 5/8" male thread and a defined graduation for the prism tilting axis height of 100 mm.

For the standard prism pole with **Base 1.1W** (W=WILD=Leica) the connection to the **mini prism pole MW** is done with Leica vertical bolts (Ø 12x40 mm), all other connections are 5/8" threads. Instead of the mini prism pole MW, all other prism poles could be used with Leica vertical bolt (Ø 12x40 mm) and with a graduation according to original Leica prisms.

By combining Base 1.1Z or 1.1W + mini prism pole, it is possible to smoothly measure points in face left (position I) with a prism target height of 0,80 to 1,25 m (prism 1) and of 1,80 to 2,25 m (prism 2). The target height can be read on the defined graduation of the prism pole (2 mm graduation). In face right (position II), the target height is 0,2m for the 1. prism and 1,2m for the 2. prism.
The additional use of the pin SG 0.1 avoids the time consuming screwing of the pin of the mini prism pole when changing from position I to position II.
In both positions, **2 adjustable circular levels** on the mini prism pole MZ or MW with an accuracy of 25' assure a plumbed position.

The mini prism pole is equipped with a very simple quick clamp.
This new clamp prevents the unintentional closing of the telescopic extension.
Because of the light construction of the System Vektor, a simple ranging pole tripod is sufficient.
(clamp opening › 45 mm!)



Vektor as prism pole to measure hidden points.

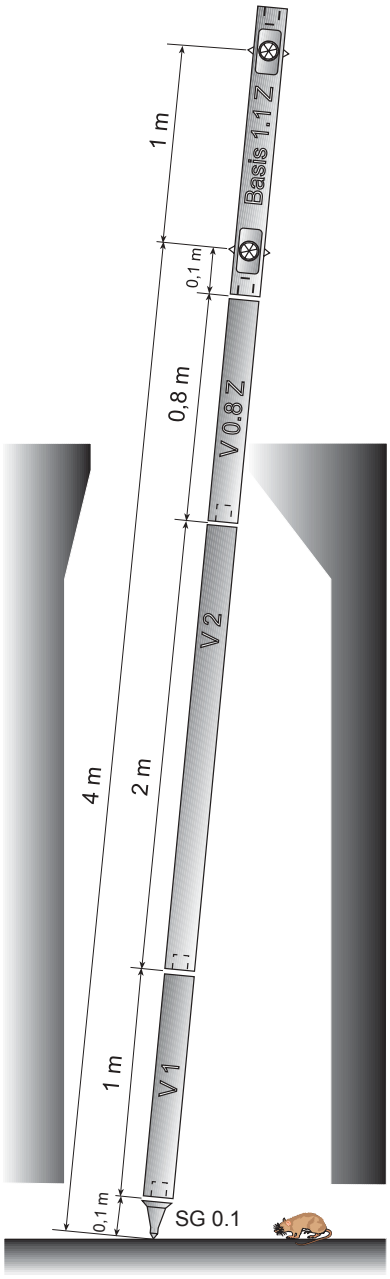
The prism pole Vektor in combination Base 1.1Z or 1.1W + mini prism pole is very suitable also to measure hidden points.
The co-ordinates X, Y, Z of the visible prisms 1 and 2 will be defined by the electronic total station/EDM.
The co-ordinates X, Y, Z of the hidden point P can be calculated with the length L (can be read at the graduation of the mini prism pole).
For that purpose, the prism pole can be held in any inclination. Only the pin has to be on the point P and the two prisms have to be aligned on the total station/EDM. It is understood that the position of the prism pole should not be changed during measuring with prism 1 and 2.
This makes it necessary to use a tripod.
(see page 35 "Universal tripod" and Ranging Pole "Tripod FS 45").

In this way, the prism pole Vektor can replace old tools for surveying hidden points as for example the optical square or the cross staff.

Further possibilities for use are points that are difficult to access or where a prism cannot be put directly, e.g.
- inside corners in rooms
- gable of a roof

In this way, the point can be measured in face left and face right (position I and position II), whereas especially face right (position II) assures a very exact measurement due to the short length of L = 0,2 m.

Measuring of points difficult to access that are far away can be done by extensions which can be screwed onto the opposite side of the prism pole.



System Vektor

Vektor as sewer measuring rod

The structural principle is the same as for the surveying of hidden points. However, as for measuring shaft ground points (channel bottom, etc.) the points are far away, the use of a regular prism pole as extension is not sufficient.

Regular telescopic prism poles with multiple extensions show the following disadvantages:
- heavy weight
- length often insufficient
- unstable
- clamp between the single telescope parts not stable enough
- graduation not exact
- no way to define tube diameters

The extension V of the System Vektor does not show these disadvantages. Because of the outstanding characteristics of the carbon fibre tube, it is possible to extend to more than 6 m without problems.

When using the Base 1.1Z, all connections are 5/8" threads – same as for Vektor as standard prism pole.

When using the Base 1.1W, the connection to the extension Vo.8W is done by a Leica vertical bolt (Ø 12 x 40 mm). This is necessary when using the bow (see page 29); all other sections will also be screwed with 5/8" threads.

The combination of Base 1.1 + extension Vo.8 + pin SG 0.1 has a usable length of 1 m (= distance between bottom prism and pole pin). It can be extended with the extensions V1 and V2 in steps of 1m or 2m.

The System Vektor creates a new dimension in sewer measuring rods with regard to handling and precision.

Examples:

Base 1.1Z + 4 m extension **Carbon** (Vo8Z, V2, V1, SG 0.1):

Weight approx. 2,8 kg

Base 1.1Z + 4 m extension in a blend of Carbon/GFK- (Vo8Z, V2, V1, SG 0.1):

Weight approx. 3,1 kg

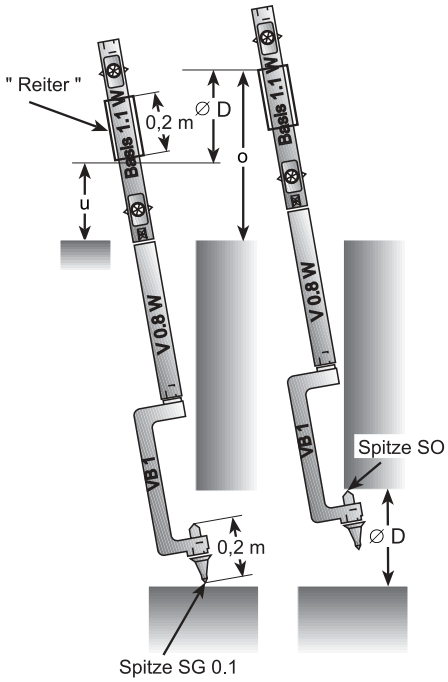
System Vektor

Additional definition of tube diameters by the use of the bow VB1

If the definition of the tube nominal diameter was possible from outside, mostly all channel diameters could be registered without physically going down into the channel.

This problem can be resolved with the **Bow VB1:**
- can be screwed onto extension Vo.8, V1 or V2 with a 5/8" thread
- extremely light and rigid because of carbon fibre construction and aluminium profile
- additional pins So to measure tube vertex.

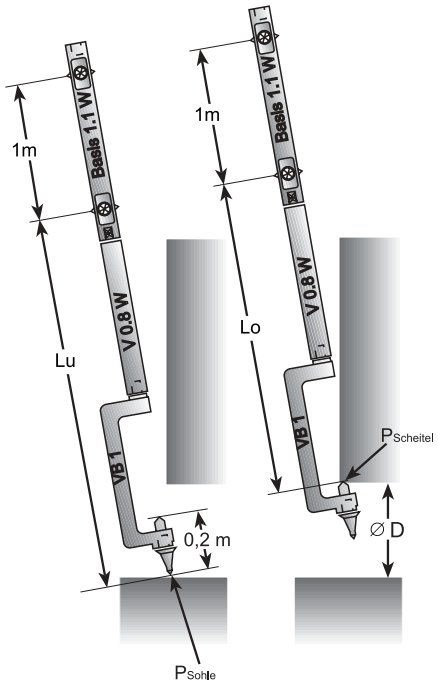
The definition of the inner diameter D for tubes with **D › 0,2** m can be done in 2 ways:



1. local measuring of the tube diameter D:

(The Base 1.1 W will be equipped with a "rider", a 20cm case made of synthetic material, which can be moved between the two prisms).

a.) setting the measuring rod on the tube bottom with the **pin SG 0.1.**
---› reading of the vertical distance **u** from the rider bottom **side up** to reference position (road surface) with a rule or steel band. To calculate easily, the "rider" should be rounded off (e.g. 0,9 m).
b.) Touching of the tube vertex with the **pin So** of the measuring rod.
---› reading of the vertical distance **o** from the rider **upper part** up to the reference position (e.g. 1,3m).
c.) Tube diameter **D = o-u** (e.g. D = 1,3 m – 0,9 m = 0,4 m).

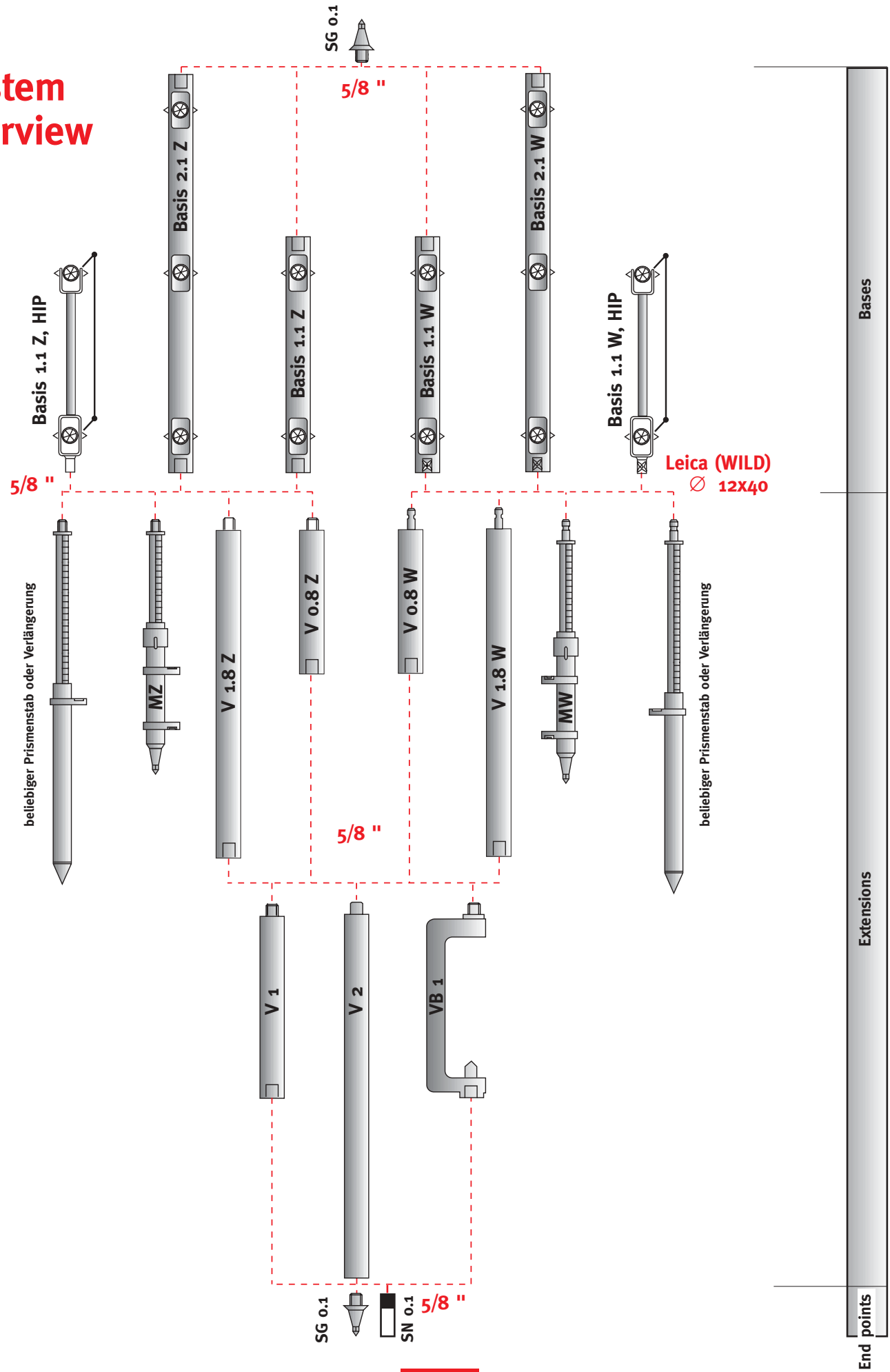


2. Surveying with Total station/EDM:

a.) Setting the **pin SG 0.1** of the measuring rod on the tube bottom.
---› calculation of the co-ordinates X, Y, **Z** of point P_{bottom} by measuring of prism 1 and 2 and entering the extension Lu (e. g. L_u = 2 m).
b.) Touching the tube vertex with the pin So of the measuring rod.
---› calculation of the coordinates X, Y, **Z** of point P_{vertex} same as point P_{bottom} by entering the extension $L_o = L_u$-0,2 m (e. g. L_o = 1,8 m).
c.) Tube diameter **D = $Z_{P\ (vertex)} - Z_{P\ (bottom)}$**

An useful application of the bow is only possible in combination with the Base 1.1W + Vo.8 W (Leica vertical bolt), in order to align the Base with the synchronically tiltable prisms to the total station/EDM independently of the bow VB1.
As many extensions V1 and V2 as needed may be screwed between the extension Vo.8W and the measuring bow VB1 (5/8"- thread).

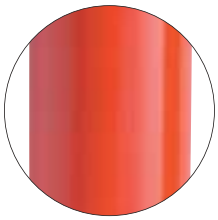
System overview



Material and equipment

Bases and extensions of the system Vektor are made of different materials and available in different formats.

Material:



Tubes made of compound material with 100% carbon fibre (Carbon, CFK):
- outside Ø: 44 mm, inner Ø: 40 mm
- very light
- high pliability.
- be deformed permanently, 100% re-set to the original shape even after extreme use.
- expansion coefficient is 100 times smaller than aluminium
- no corrosion.
- comfortable handling also in cold temperatures.
- all extensions are waterproof.
- the coating is made of signal red colour.
- thread and thread insert are made of stainless steel.
- 100% Carbon is an expensive material

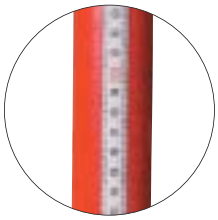
Compound material made of a blend of carbon/glass fibre (CFK/GFK)

Characteristics same as of the tubes made of 100% carbon, however:

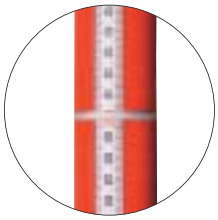
- slightly higher weight (see table data from pages 32 and 33)
- orange-red outside colour instead gel coating
- lower material price

Equipment:

All extensions (Vo.8Z, Vo.8W, V1.8Z, V1.8W, V1 and V2) of the system Vektor are also available with integrated measuring band.



The measuring band is 13 mm wide and attached to the exterior of the carbon fibre or blend fibre tube. The graduation cannot be removed and shows the mm-graduation on both sides. For poles with maximum 5 m extension, the numbers are continuing cm-values in black, the decimetre numbers are in red for a better visibility.



When the single extensions will be screwed together, the graduation build one continuous line (to get a correct measurement, it is understood that the extensions have to be screwed together in the correct order.)

With the integrated measuring band, there are further possibilities, e.g.:

- as stable, precise levelling rod upto 6m length and more
- for direct stake out of channel bottoms