

***invatec***

**Product Catalogue**



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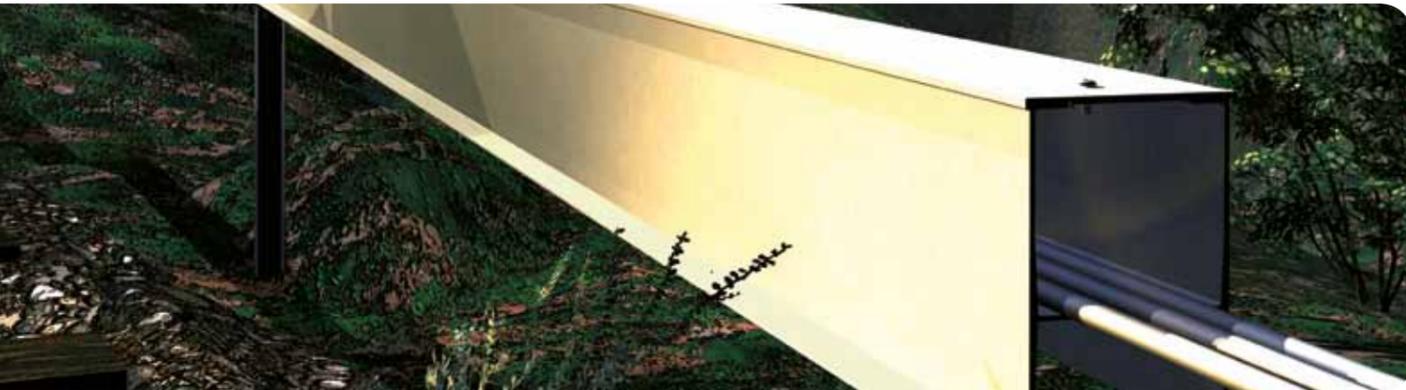


### VARIO TEC<sup>+</sup>

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### VARIO TOP

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To move something with cables, be it energy or data streams – what is essential is a smooth communication to ensure unlimited mobility and quality of life. As a renowned enterprise in the field of synthetic materials technology, we develop and manufacture cable ducts made of synthetic material. Being just one of many, however, is not enough for us in this respect: We strive for solutions, which offer an extra bit of innovation, quality, safety and economy. We spare no efforts to realise this.



## Specifications

	Size 1	Size 2
Length	approx. 1,000 mm	approx. 1,000 mm
Width – outside	approx. 184 mm	approx. 334 mm
Width – inside	approx. 100 mm	approx. 250 mm
Height	approx. 190 mm	approx. 190 mm
Weight (1 element)	approx. 4.5 kg	approx. 6.0 kg

### Mechanical values / Load bearing capacity

The complete cable duct is capable of withstanding a load of approx. 760 kN/m<sup>2</sup> without breaking.  
The lid is designed to handle the following loads:

At a temp. of -35° and +80° approx.  
1.2 kN/100 cm<sup>2</sup>

### Thermal expansion coefficient

1.2 x 10<sup>-4</sup> cm per °C.  
The lid is equipped with expansion joints in longitudinal and transverse direction in order to reliably prevent any expansion caused by heat.

### Material

UV stabilised  
Polypropylene co-polymerisate

### Behaviour in case of fire

Fire protection category K1 in accordance with  
DIN standard 53438 part 2

### Thermal properties

Permanent dimensional stability between -30°C and +85°C.



Installation of the ducts in the cable pits prepared beforehand.



Securing of the cable duct by means of specific ground anchors in accordance with the requirements on site.



Installation of the lid.



Filling of the cable pits.

## 1

Dig out the trench for the cable duct, the width required is approx. 40 cm. The material dug out may partially be reused for filling the space that remains between the cable ducts after installation. No draining layer is required, since any water will reliably be routed around the duct. The control of the water flow prevents any erosion of the formation.

Insert some fine-grained material into the bottom of the trench and use a rake or a ballast fork for levelling. Placing a cord in the direction of installation will make the proper installation of the ducts (height and alignment) easier.

The ducts are installed in the direction of travel. Pay attention to the position of the hinges: facing away from the formation.

## 2

After the first duct has been placed and aligned in the trench and secured by means of a ground anchor, push the second duct from the top onto the dovetail connection of the duct already installed – make sure to hold the duct in a horizontal position. If required\*, secure the duct with a ground anchor. Make sure to place a piece of wood on the head of the ground anchor when driving it into the ground in order to prevent any damaging of the duct floor. One ground anchor per duct is fully sufficient to secure the ducts. Always make sure to drive in the ground anchor on the side of the duct that faces towards the duct already installed. The conical design of the dovetail connection together with an overlapping section at the bottom will reliably retain the duct already installed on the ground. The tolerance provided on the dovetail connections allows for installation of the ducts with a radius of > 100 m.

If an obstacle is to be detoured, cutting lines on the ducts facilitate their cutting at an angle of 45°. The ducts that are mitred will have to be secured with one each ground anchor at the cut, the lid is secured to the lower part of the duct at the cut with two self-tapping screws (ready-to-use angle elements are available at an extra charge).

## 3

Make sure not to compact the material (soil, grit) filled into the remaining space. We recommend mounting the lid prior to the filling in of the material, however, without bolting it in place. This will prevent any soil and gravel from entering the still open duct.

Position the lid vertically onto the hinge bolts on the lower part of the duct with the hinges facing downward and latch in place by exerting slight pressure.

## 4

After the cables have been installed, the lid will be locked in place using the triangular screws supplied. Thread the screws into the tapped hole and tighten with the special spanner. The screws will securely latch on the lid where they are captivated.

# Vario Tec<sup>+</sup> size 1

## VARIO TEC<sup>+</sup> cable trough



Description	Article no.	Dimensions inside (mm) length x width x height	Dimensions outside (mm) length x width x height	Weight	Material
<b>VARIO TEC<sup>+</sup> cable trough</b>	A000101	1,000 x 100 x 150	1,000 x 184 x 190	3.3 kg/m	PP

## VARIO TEC<sup>+</sup> ground-mounted cable duct



Description	Article no.	Dimensions inside (mm) length x width x height	Dimensions outside (mm) length x width x height	Weight	Material
<b>VARIO TEC<sup>+</sup> cable duct</b>	A000100	1,000 x 100 x 150	1,000 x 184 x 190	4.2 kg/m	PP

## VARIO TEC<sup>+</sup> cable lid



Description	Article no.	Dimensions inside (mm) length x width x height	Weight	Material
<b>VARIO TEC<sup>+</sup> cable lid</b>	A000102	1,000 x 140 x 20	0.8 kg/m	PP

# Vario Tec<sup>+</sup> size 2

## VARIO TEC<sup>+</sup> cable trough



Description	Article no.	Dimensions inside (mm) length x width x height	Dimensions outside (mm) length x width x height	Weight	Material
<b>VARIO TEC<sup>+</sup> cable trough</b>	A000201	1,000 x 250 x 150	1,000 x 334 x 190	3.8 kg/m	PP

## VARIO TEC<sup>+</sup> ground-mounted cable duct



Description	Article no.	Dimensions inside (mm) length x width x height	Dimension outside (mm) length x width x height	Weight	Material
<b>VARIO TEC<sup>+</sup> cable duct</b>	A000200	1,000 x 250 x 150	1,000 x 334 x 190	5.6 kg/m	PP

## VARIO TEC<sup>+</sup> cable lid



Description	Article no.	Dimensions inside (mm) length x width x height	Weight	Material
<b>VARIO TEC<sup>+</sup> cable lid</b>	A000202	1,000 x 290 x 20	1.7 kg/m	PP

## Available accessories for Vario Tec<sup>+</sup>

### Triangular screw plug



Description	Article no.	Material
<b>Triangular screw plug</b>	B000101	PA

### Special triangular spanner



Description	Article no.	Dimensions inside (mm) length x width x height	Weight	Material
<b>Special triangular spanner</b>	B000103	600	0.3 kg per piece	Steel

### Peg, galvanised



Description	Article no.	Dimensions inside (mm) length x width x height	Weight	Material
<b>Peg, galvanised</b>	B000102	10 x 300	0.20 kg per piece	Steel
<b>Anchor, galvanised</b>	B001004	10 x 400	0.35 kg per piece	Steel

### Separating strip



Description	Article no.	Dimensions inside (mm) length x width x height	Weight	Material
<b>Separating strip</b>	B000201	1,000 x 250 x 130	1.1 kg/m	Polypropylene

## Available accessories

### Angle piece 45° / 90° left-hand



Description	Article no.	Dimensions inside (mm) length x width x height	Weight	Material
<b>Angle piece 45°/90° left-hand</b>	B000105	Size 1	3.4 kg per article	PP
<b>Angle piece 45°/90° left-hand</b>	B000202	Size 2	4.5 kg per article	PP

### Angle piece 45° / 90° right-hand



Description	Article no.	Dimensions inside (mm) length x width x height	Weight	Material
<b>Angle piece 45° / 90° right-hand</b>	B000106	Size 1	3.4 kg per piece	PP
<b>Angle piece 45° / 90° right-hand</b>	B000203	Size 2	4.5 kg per piece	PP

### Branch, left-hand 45°



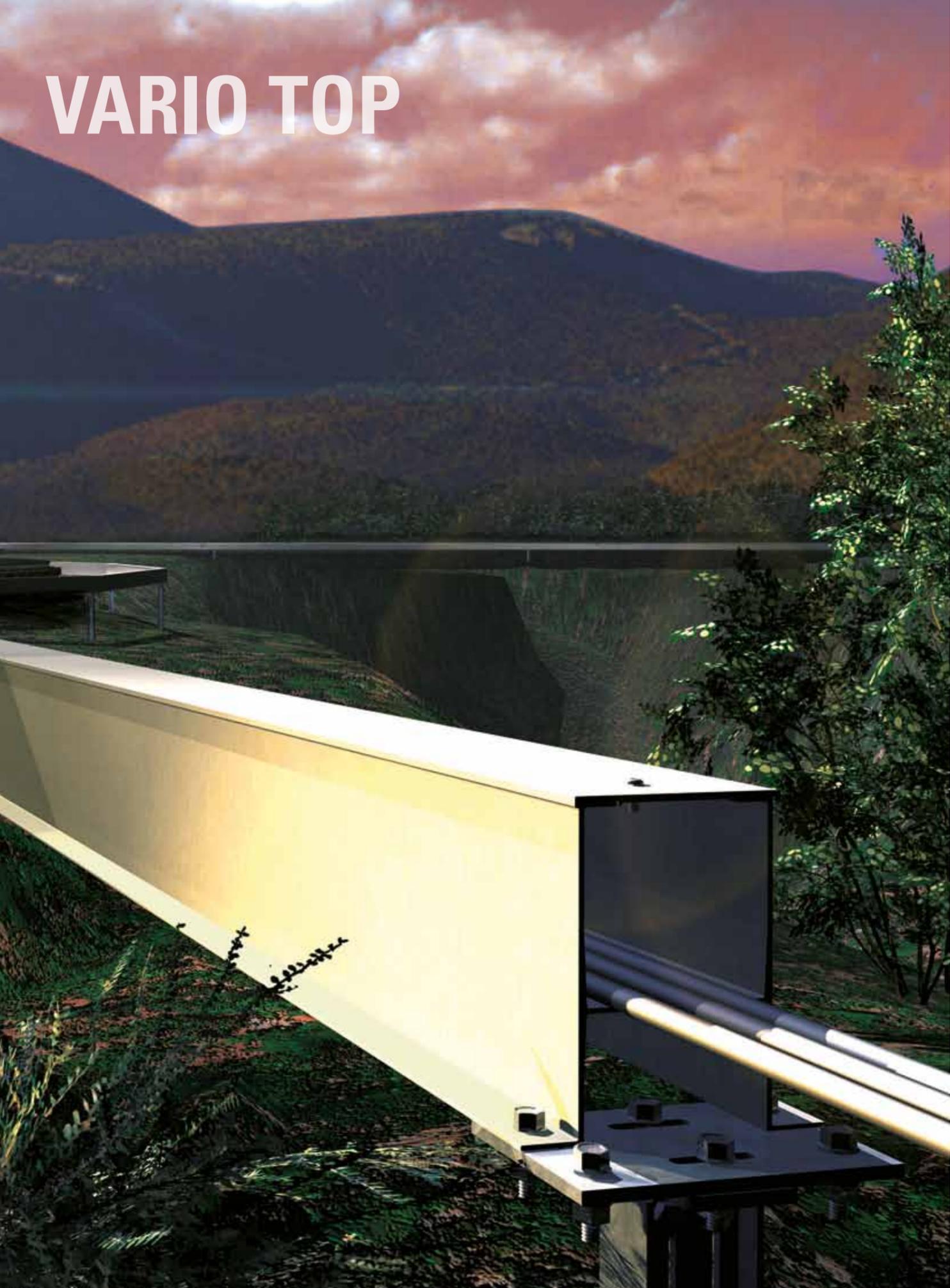
Description	Article no.	Dimensions inside (mm) length x width x height	Weight	Material
<b>Branch, 45° left-hand</b>	B000207	Size 1	5.9 kg per piece	PP
<b>Branch, 45° left-hand</b>	B000209	Size 2	7.4 kg per piece	PP

### Branch, right-hand 45°



Description	Article no.	Dimensions inside (mm) length x width x height	Weight	Material
<b>Branch right-hand 45°</b>	B000208	Size 1	5.9 kg per piece	PP
<b>Branch right-hand 45°</b>	B000210	Size 2	7.4 kg per piece	PP

# VARIO TOP



## Specifications

	Size 1	Size 1a	Size 2
Length	6,000 mm	6,000 mm	6,000 mm
Width	100 mm	150 mm	250 mm
Height	150 mm	150 mm	150 mm
Weight (1 element)	32 kg	44 kg	50 kg

	Longitudinal	Transverse
Tensile strength	300 Mpa	100 Mpa
Flexural strength	250 Mpa	140 Mpa
E-modulus tension	20,000 Mpa	10,000 Mpa
E-modulus flexion	25,000 Mpa	11,000 Mpa
Elongation at rupture	1.0 - 1.8 %	
Compression strength	450 Mpa	65 Mpa
Pressure modulus	10,000 Mpa	4,000 Mpa

Density	1.8 kg/dm <sup>3</sup>
Impact resistance IZOD	1,600 J/m
Barcol hardness	45
Fire protection category	K1 in acc. with DIN standard 53438 part 2
Material	MR-mats and roving reinforced fibreglass section.

# Installation instructions for the invatec pillar-mounted Vario Top® system



The pillars are rammed in after measuring.



The mounting plates are installed, adjusted and bolted onto the pillars.



The cable ducts are positioned and bolted onto the mounting plates.



After the insertion of the cables, the lid will be closed with the quick-action fasteners.

## 1

Peg out the line in accordance with the directives of Deutsche Bahn. Ram in resp. dig in the steel props (centre section of the H-beam transverse to the direction of installation) with appropriate equipment in intervals of 6 m. Make sure to install the props at the same height and aligned properly. The mounting depth of the props depends on the static requirements in accordance with EBA approval resp. is based on individual requirements in case of unfavourable conditions of the foundation. Should this result in a situation where the desired mounting height of the cable ducts may not be achieved, longer props will have to be used.

## 2

The next step is to attach the mounting bracket to the props, using the bolts supplied (M 12\*50). The slots in the mounting brackets allow for accurate adjustment in longitudinal and transverse direction as well as of the height (height compensation +/- 40 mm, longitudinal direction approx. +/- 25 mm, transverse direction approx. +/- 25 mm), cf. enclosed drawing.

Caution! The max. permissible difference in height between the individual props is 2 mm.

## 3

After the mounting bracket has been adjusted properly and bolted to the prop, the GRP elements are placed flat on the mounting bracket and mounted on the supporting plates stress-free using the bolts supplied (M 12\*45). In case of vertical deviations, it is indispensable to use lowering angles in order to ensure a stress-free mounting of the ducts.

## 4

Once all cables have been inserted into the GRP elements, position the lid of 6 m in place and secure as follows: Insert the pan-head Torx bolts (M 8x16, item 6) from the top through the bore in the lid and screw into the closing tongue (held from below) by about 2 turns of the thread (cf. enclosed drawing). Turn the closing tongue in longitudinal direction of the lid. Position the first lid in place to where the middle of the lid rests on the joint of the lower parts (one lid connects two lower parts). Then tighten the pan-head Torx bolt. Turning the pan-head Torx bolt will also turn the closing tongue to where it will engage in the lower section of the trough. Repeat the above steps for the remaining lids (make sure to provide an expansion joint of 4 mm between the lids). The last lid will have to be cut in two using a saw.

The two lid halves (of 3 m each) are then used to close the remaining open lower parts at the beginning and end of the duct distance. If obstacles (overhead line masts or signal masts) are to be detoured horizontally, use an angle grinder with diamond cutting disk to cut the GRP elements and the lids at the joint at the required angle. The direction of the cut is from top to bottom with the profile positioned upright. The mounting hole (13 mm dia.) in the GRP element thus cut away will have to be drilled again. Caution! The full stability of the profiles under load will not be achieved before the lid has been installed. Do not drop the profiles. Unload either on the pallet supplied or by hand.

The following tools are required for the installation:  
Ramming equipment with ramming head required for IPE 100 steel girders. Open-end or box-end spanners (2 each, spanner size 19 mm), screwdrivers with TX 40 drive (in case of detours: drill, angle grinder or saw, metal drill bit dia. 13 mm, make sure to utilise personal protective equipment).

# Vario Top size 1

## VARIO Top cable trough



Description	Article no.	Dimensions inside (mm) length x width x height	Dimensions outside (mm) length x width x height	Weight	Material
<b>VARIO Top cable trough</b>	C000301	6,000 x 100 x 150	6,000 x 100 x 170	4.3 kg/m	GRP

## VARIO Top lid



Description	Article no.	Dimensions inside (mm) length x width x height	Weight	Material
<b>VARIO Top lid</b>	C000302	6,000 x 118 x 4	1.0 kg/m	FRB

## VARIO Top fastener



Description	Article no.	Dimensions inside (mm) length x width x height	Weight	Material
<b>VARIO Top fastener</b>	D000307	105 x 30 x 3	0.1 kg/m	Steel / galvanised

## VARIO Top mounting and adjustment plate



Description	Article no.	Dimensions inside (mm) length x width x height	Weight	Material
<b>VARIO Top mounting and adjustment plate</b>	D000113	166 x 200 x 5	4.0 kg per piece	Steel / galvanised

## VARIO Top lowering kit



Description	Article no.	Dimensions inside (mm) length x width x height	Weight	Material
<b>VARIO Top lowering kit</b>	D000116	166 x 200 x 5	4.0 kg per piece	Steel / galvanised

## Vario Top size 1a

### VARIO Top cable trough



Description	Article no.	Dimensions inside (mm) length x width x height	Weight	Material
<b>VARIO Top cable trough</b>	C000402	6,000 x 150 x 150	6.0 kg/m	GRP

### VARIO Top lid



Description	Article no.	Dimensions inside (mm) length x width x height	Weight	Material
<b>VARIO Top lid</b>	C000403	6,000 x 168 x 4	1.3 kg/m	GRP

### VARIO Top 1a fastener



Description	Article no.	Dimensions inside (mm) length x width x height	Weight	Material
<b>VARIO Top fastener</b>	D000305	165 x 30 x 3	0.1 kg per piece	Steel / galvanised

### VARIO Top mounting and adjustment plate



Description	Article no.	Dimensions inside (mm) length x width x height	Weight	Material
<b>VARIO Top mounting and adjustment plate</b>	D000104	250 x 160 x 8	4.5 kg per piece	Steel / galvanised

### VARIO Top lowering kit



Description	Article no.	Dimensions inside (mm) length x width x height	Weight	Material
<b>VARIO Top lowering kit</b>	D000106	250 x 160 x 8	4.5 kg per piece	Steel / galvanised

## Vario Top size 2

### VARIO Top cable trough



Description	Article no.	Dimensions inside (mm) length x width x height	Dimensions outside (mm) length x width x height	Weight	Material
<b>VARIO Top cable trough</b>	C000412	6,000 x 250 x 150	6,000 x 250 x 178	6.2 kg/m	GRP

### VARIO Top lid



Description	Article no.	Dimensions inside (mm) length x width x height	Weight	Material
<b>VARIO Top lid</b>	C000413	6,000 x 258 x 4	2.1 kg/m	GRP

### VARIO Top fastener



Description	Article no.	Dimensions inside (mm) length x width x height	Weight	Material
<b>VARIO Top fastener</b>	D000405	255 x 30 x 5	0.3 kg per piece	Steel / galvanised

### VARIO Top mounting and adjustment plate



Description	Article no.	Dimensions inside (mm) length x width x height	Weight	Material
<b>VARIO Top mounting and adjustment plate</b>	D000104	264 x 200 x 5	4.5 kg per piece	Steel / galvanised

### VARIO Top lowering kit



Description	Article no.	Dimensions inside (mm) length x width x height	Weight	Material
<b>VARIO Top lowering kit</b>	D000106	264 x 200 x 5	4.5 kg per piece	Steel / galvanised

## VARIO TOP accessories

### 1.5 m steel pillar



Description	Article no.	Dimensions inside (mm) length x width x height	Weight	Material
<b>1.5 m steel pillar</b>	D000101	IPE 100	12.7 kg per piece	Steel / galvanised

### 2.0 m steel pillar



Description	Article no.	Dimensions inside (mm) length x width x height	Weight	Material
<b>2.0 m steel pillar</b>	D000102	IPE 100	17.0 kg per piece	Steel / galvanised

### 2.5 m steel pillar



Description	Article no.	Dimensions inside (mm) length x width x height	Weight	Material
<b>2.5 m steel pillar</b>	D000103	IPE 100	21.2 kg per piece	Steel / galvanised

### Spanner TX 40



Description	Article no.
<b>Spanner TX 40</b>	D000108

## VARIO TOP accessories

### Special bracket for bridge attachment



Description	Article no.	Dimensions inside	Material
<b>Bridge attachment</b>	D000105	Dimensions according to requirements	Steel/galvanised

### Cable outlet flange – size 2 and 1a



Description	Article no.	Dimensions inside	Weight	Material
<b>Cable outlet flange</b>	D000101	From DN 50 - DN 110	0.6 kg per piece	PPs

### Cable outlet flange – size 1



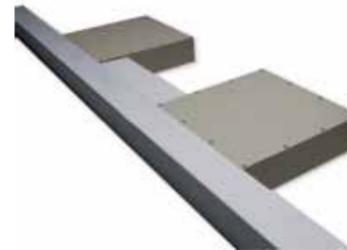
Description	Article no.	Dimensions inside	Weight	Material
<b>Cable outlet flange</b>	D000100	From DN 50 - DN 110	0.7 kg per piece	PPs

### Spacing gauge



Description	Article no.	Dimensions inside	Material
<b>Spacing gauge</b>	D000111	6 m	Aluminium

### Coupling kit and excess cable kit



Description	Article no.	Dimensions inside	Material
<b>Coupling box</b>	D000303	According to requirements	PPs

### RAM



Description	Article no.	Weight
<b>RAM</b>	G000103	26 kg / 40 kg

## VARIO TOP equipment

Flexible tube made of stainless steel

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Description	Article no.	Dimensions inside	Material
<b>Flexible tube</b>	D000310	Ø = 113 mm	Stainless steel V2A

Heat-shrink cap

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Description	Article no.	Dimensions inside
<b>Heat-shrink cap</b>	F000101	Various sizes

# References

## Switzerland



Vario Tec+ with concrete lid.

## England - Doncaster



Custom solution: Vario Top size 2.

## Netherlands



Vario Top size 2: Custom solution mounted on a noise protection wall.



Vario Top size 2 mounted on special mounting brackets along a noise protection wall.

## Freilassing



Custom solution: Coupling kit and excess cable kit, pillar-mounted and attached to Vario Top size 1a.

## Geisingen



Custom solution: Vario Top size 1a mounted directly on natural stone wall with the help of special mounting brackets.

## ESTW Saarbrücken



Custom solution using the VARIO TOP pillar-mounted cable duct system consisting of one duct size 1 and two ducts size 2.



Specific solution used for this particular application: The three parallel cable ducts are mounted on one single pillar only! Custom solution: Cable troughs mounted on C-rails.

# References

## ESTW Leipzig-Stötteritz



Vario Top size 2 installed along the Leipzig - Stötteritz railway line.



Vario Top size 2:  
Coupling kit for shrink sockets.



Custom solution:  
Excess cable kit with sand covered lids.



Reinforcement to cater for possible snow loads.

## Ireland



Custom solution:  
Vario Top size 1a is directly attached to a bridge with the help of special mounting brackets.



New construction of a cable route:  
Installation of a cable route of 40,000 m to accommodate various signal and telephone cables.

## Trier



Municipal utilities Trier:  
Wiring of a transformer station with Vario Tec+ size 2.



Municipal utilities Trier:  
Wiring of a transformer station with Vario Tec+ size 2.

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# *invatec*