



VARIO switching light curtain for object detection

Technical Description



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1 General information

1.1 About this technical description

These operating instructions contain information regarding the proper and effective use of the VARIO switching light curtain. They are included in the delivery contents.

1.2 Explanation of symbols

The symbols used in this technical description are explained below.



Attention!

Observe passages marked with this symbol. Failure to heed this information may lead to injuries to personnel or damage to the equipment.



Notice!

This symbol indicates text passages containing important information.

1.3 Declaration of Conformity

The KONTURflex measuring light curtain was developed and manufactured in accordance with applicable European standards and directives.

The manufacturer of the product, Leuze electronic GmbH & Co KG in D-73277 Owen/Teck, possesses a certified quality assurance system in according to ISO 9001.



2 Safety notices

2.1 Safety standards

The VARIO switching light curtain was developed, manufactured and tested in accordance with the applicable safety standards. It corresponds to the state of the art.

2.2 Intended use

**Attention!**

The protection of personnel and the device cannot be guaranteed if the device is operated in a manner not corresponding to its intended use. Leuze electronic GmbH + Co. KG is not liable for damages caused by improper use. Knowledge of this manual is an element of proper use.

Light curtains of type VARIO are designed as switching light curtains.

In particular, unauthorised uses include:

- rooms with explosive atmospheres
- operation for medical purposes

**Attention!**

The light barriers are not certified safety light barrier in accordance with EN 61496. They are not safety components in the spirit of EC machine directive 89/392/EEG with supplement 93/44/EEG, appendix 4.

They must not, therefore, be used to protect persons from danger.

Areas of application

The VARIO light curtains are designed, in particular, for the following areas of application:

- object detection in storage and materials-handling applications
- overhang controls in transport systems
- object detection and process controls in the packaging industry

2.3 Working safely

**Attention!**

Access to or changes on the device, except where expressly described in this operating manual, is not authorised.

Safety regulations

Observe the locally applicable legal normatives and the regulations of the employer's liability insurance association.

Qualified personnel

Mounting, commissioning and maintenance of the device must only be carried out by qualified personnel.

Electrical work must be carried out by a certified electrician.

3 Product description

3.1 General information

The VARIO product line is a compact series of light barrier systems with an excellent price-to-performance ratio. The product line has been optimised for standard object detection applications. It is easy to work with and individual parameter options make it possible to meet a wide range of needs.

3.2 Performance features

Features

- Factory configuration provides plug-and-play system
- Signal output (PNP) short-circuit proof, light or dark switching
- Warning output (PNP), short-circuit proof, for conditions including soiling, malfunction and normal functionality
- Additional evaluation of diagonal beams
- Calibration of all beams and saving of all current brightness values
- Direct connection to 24VDC
- No separate evaluation unit or synchronisation line required
- Aluminium housing, natural anodising

Advantages for you

- Time-saving installation
- Reliable and flexible operation
- Ensures availability of the light barrier
- Increased detection safety in sensing objects
- Individual adjustment of light barrier to different ranges
- Low installation effort
- Low installation effort
- Sturdy, very small dimensions

3.3 Functions:

Function	Monitoring area	Output	Factory settings
Switching behaviour when operating voltage is applied, light switching	Monitoring area free	Switched on (approx. 24 V through black wire)	Light switching *)
	Monitoring area not free	Switched off (approx. 0 V through black wire)	---
Switching behaviour when operating voltage is applied, dark switching	Monitoring area free	Switched off (approx. 0 V through black wire)	---
	Monitoring area not free	Switched on (approx. 24 V through black wire)	---
Warning output	Normal function	Switched off (approx. 0 V through yellow wire)	x
	Fault	Switched on (approx. 24 V through yellow wire)	x

Table 3.1: Switching-behaviour options

Function	Setting	Effect	Factory setting
Beam evaluation in the monitoring area	Parallel	The evaluation is performed in parallel for each transmitter LED and receiver element (1 : 1)	Parallel ^{a)}
	Parallel and diagonal	The evaluation is performed in parallel for each transmitter LED and receiver element and is also offset diagonally by one channel	---
Delay time of the warning signal	Delay in seconds for activation of the warning output (yellow wire)	Interference factor tolerance in seconds	60

Table 3.2: Setting the operating mode

- a) If other factory settings are desired, please specify when ordering. There is no cost for adjusting these parameters! Please observe chapter 6.1.

3.4 Switching behaviour

You have the option of selecting between light and dark switching behaviour for the signal output. Additional data can be found in chapter 3 and 6.1.

Please indicate your preference when ordering. There is no cost for adjusting these parameters!

3.5 Beam evaluation in the monitoring area

You have the option of increasing the resolution and thus detection reliability by selecting diagonal beam evaluation in addition to parallel beam evaluation.

Please indicate your preference when ordering. There is no cost for adjusting these parameters!

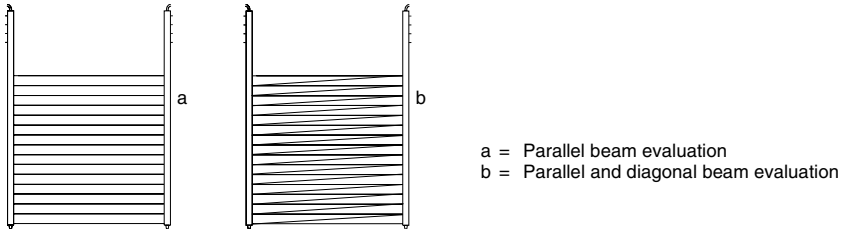


Figure 3.1: Beam evaluation in the monitoring area



Notice!

Please note that response time is doubled for diagonal beam evaluation. The times are listed in chapter 6.

3.6 Programming

The VARIO switching light curtain can be programmed using the VARIOsoft configuration software. The software functions under the Windows® 95/98/2000/NT/XP operating systems. A description of the software can be found in the Help texts.



Notice!

The VARIOsoft configuration software can be downloaded from the Internet from the following address: <http://www.leuze.de/downloads/los/08/variosoft.zip>

To connect the serial PC interface, you will also need the V-Int-232 interface module (Part No. 649 00000).

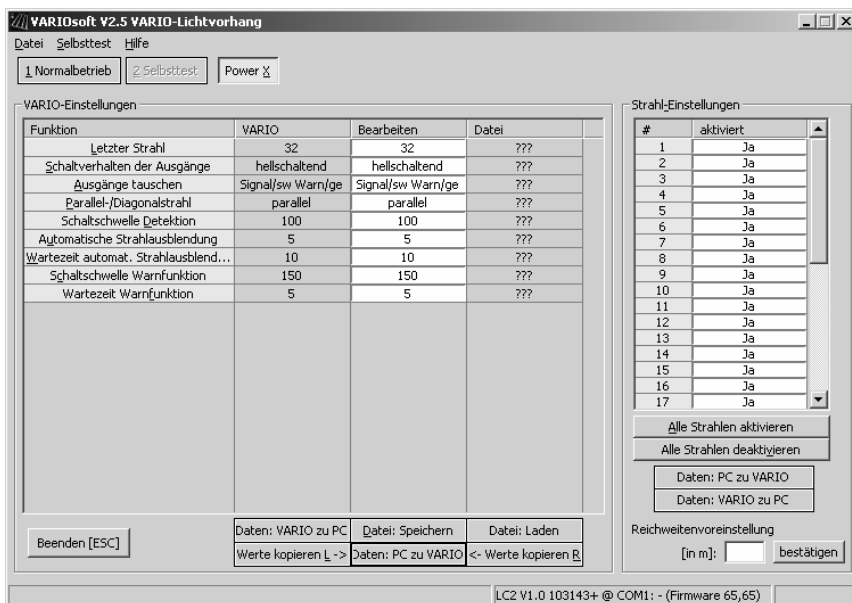


Figure 3.2: VARIOsoft configuration interface

4 Mounting and commissioning

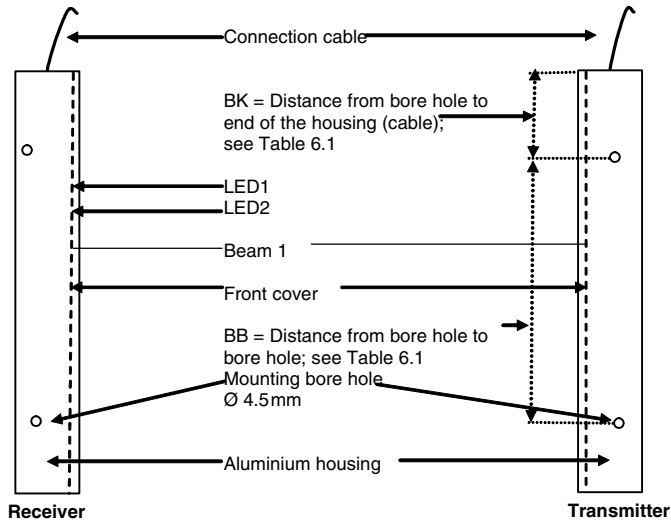


Figure 4.1: Mounting the VARIO light barrier



Notice!

For the locations of the first and last beams to the profile edge, please refer to table 6.1 "Ordering information and dimensions" on page 16

1. The transmitter and receiver devices must be aligned with each other with an accuracy of about 10° .
2. Do not place any mechanical load on the devices or bend them, etc.
3. Be careful during horizontal mounting, as liquids may be detected on the front cover as if they were objects. If they remain there for a long time, they may penetrate the bar and damage the electronics. Increased risk of soiling.
4. Protect the cable from being crushed and from exposure to strong electromagnetic effects.
5. Strong extraneous light effect (caused for example by strobe lights, direct sunshine) on the receiver bar should be avoided.
6. Prevent optical sensors (for example other light barriers, photoelectric sensors) from affecting each other by positioning them appropriately or blocking them from each other, etc.
7. There must be no reflecting surfaces near the light barrier. Otherwise objects may not be detected due to the reflection.

4.1 Electrical connection

4.1.1 M8 plug version

Transmitter:

1. Positive (brown)
2. n.c.
3. Negative (blue)
4. n.c.

Receiver

1. Positive (brown)
2. Warn/cal. (yellow)
3. Negative (blue)
4. Output (black)

4.1.2 Cable version

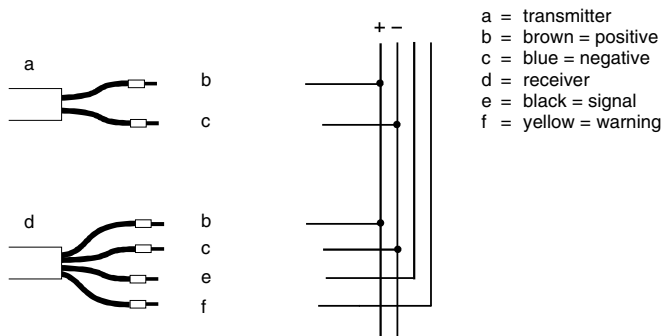


Figure 4.2: Pin assignment of the VARIO light barrier

1. Devices must only be connected while there is no voltage in the system.
2. Avoid ground loops; all devices must have the same grounding potential.
3. A potential difference of 60V between the device housing and the supply voltage must not be exceeded.
4. Insulate unused wires.

4.2 LED displays

Display of the LEDs during the calibration sequence			
LED1	LED2	Operating state	Action
Illuminated	Flashes 1x	Calibration complete	Normal operation
Flashing		Defective beams	System monitoring, repair if needed
	Flashing	Defective beams	System monitoring, repair if needed
Flashing	Flashes at the same rate	Excessive value differences of the individual beams or beams have not yet been calibrated	Check the alignment of the light barrier bars
Flashing	Flashes alternately	Self test detects system error	System monitoring and repair if needed

Table 4.1: Flashing code of the LEDs during the calibration sequence

If the reception of the respective beams is inadequate for a period of approx. 60 seconds, the light barrier indicates this state by activating the warning output. Please also observe chapter 5.

Display of LEDs during normal operation			
LED1	LED2	Operating state	Event
Off	Off	No function	Unknown
On	On	In operation	Monitoring area free
On	Off	In operation	Object detected
Flashing	On	Soiled front cover, defective beam	Monitoring area free
Flashing	Off	Soiled front cover, defective beam	Object detected
Flashing	Flashing together or alternating	Light barrier not working, defective	Unknown

Table 4.2: Display of LEDs during normal operation

4.3 Commissioning and calibrating

Please note the following procedure:

1. Mounting with alignment of the light barrier
2. Connection of the light barrier cable to the terminals provided for that purpose
3. Connect the yellow wire of the cable to the bridge to the +24VDC terminal
4. Keep the monitoring area free, especially beam 1
5. Turn on the 24VDC supply voltage
6. Disconnect the bridge between the yellow wire and +24VDC as long as the light barrier is still connected to the supply voltage
=> The upper LED (LED 1) flashes once indicating that data are being saved
7. Check the functionality of the light barrier in the entire monitoring area using an opaque object.

The calibration (items 3 to 6, yellow wire) is important for adapting the light barrier to the specific application. You should, therefore, perform the calibration for availability following a change to the application.



Notice!

Note that the monitoring area, especially beam 1 (the first beam starting from the side of the connection cable) is free.

5 Maintenance

The VARIO does not require regular maintenance.

If the front cover should become soiled, clean it with a moist cloth.

- Do not use any cleaners which contain solvents to clean.
- Do not use any high-pressure cleaners or steam jet cleaners.
- When cleaning, take care not to scratch the front cover.
- If necessary, realign and recalibrate the light curtain.

6 Specifications

Light barrier housing	Aluminium, natural anodising, front cover made of plastic, dark red. (Do not use any cleaning agents which contain solvents!)
Profile cross section	12x 58mm at beam spacing of 5mm 10x 27mm at other beam spacings
Connection	Permanently attached lines, 4m in length, ready-made with ferruled ends or M8 plug version
Transmitter	2-wire round line, Ø approx. 4.9mm; PVC sheathing for permanent mounting, or M8 plug version. Light wavelength, approx. 880nm
Receiver	4-wire round line, Ø approx. 4.9mm; PVC sheathing for permanent mounting, or M8 plug version.
Permissible angular deviation	± -10° (between the transmitter bar and receiver bar)
Operating voltage	24VDC (+20%; -15%), protected against reverse polarity Use a grounded voltage supply!
Interference rejection – ambient light	Operation with no interference with the effect caused by a halogen light source, 500W, outside the +/- 15° angular range of the beam axis at a distance of ≥ 1m. Operation with no interference with sunshine up to 200,000LUX outside the +/- 25° angular range of the beam axis.
Power consumption	Approx. 8W (total)
Outputs	Short-circuit-proof semiconductor outputs PNP switching current, max. 200mA
Operating temperature	-10°C to 45°C
Humidity	Up to 90 % relative, non-condensing
Range	Approx. 0.7 ... 6m
Response time	Parallel beams: Approx. 100ms Diagonal beams: Approx. 200ms
Maximum number of beams	32
Protection class	IP54 (others available on request)

6.1 Ordering information and dimensions

Part#	Short designation	Function	Beam spacing	Measurement field height	Number of beams	Length of profile	BK	BB	GB	GT	LLK	LEK
64810000	VT5-35	VARIO transmitter	5	35	8	120	6	108	12	58	17.5	67.5
64910000	VR5-35/HP	VARIO receiver	5	35	8	120	6	108	12	58	17.5	67.5
64812000	VT5-75	VARIO transmitter	5	75	16	160	6	148	12	58	17.5	67.5
64912000	VR5-75/HP	VARIO receiver	5	75	16	160	6	148	12	58	17.5	67.5
64814000	VT5-115	VARIO transmitter	5	115	24	200	6	188	12	58	17.5	67.5
64914000	VR5-115/HP	VARIO receiver	5	115	24	200	6	188	12	58	17.5	67.5
64816000	VT5-155	VARIO transmitter	5	155	32	240	6	228	12	58	17.5	67.5
64916000	VR5-155/HP	VARIO receiver	5	155	32	240	6	228	12	58	17.5	67.5
64820000	VT12.5-88	VARIO transmitter	12.5	88	8	260	30	200	10	27	13.5	158.5
64920000	VR12.5-88/HP	VARIO receiver	12.5	88	8	260	30	200	10	27	13.5	158.5
64822000	VT12.5-188	VARIO transmitter	12.5	188	16	360	30	300	10	27	13.5	158.5
64922000	VR12.5-188/HP	VARIO receiver	12.5	188	16	360	30	300	10	27	13.5	158.5
64824000	VT12.5-288	VARIO transmitter	12.5	288	24	460	80	300	10	27	13.5	158.5
64924000	VR12.5-288/HP	VARIO receiver	12.5	288	24	460	80	300	10	27	13.5	158.5
64826000	VT12.5-388	VARIO transmitter	12.5	388	32	560	80	400	10	27	13.5	158.5
64926000	VR12.5-388/HP	VARIO receiver	12.5	388	32	560	80	400	10	27	13.5	158.5
64830000	VT25-175	VARIO transmitter	25	175	8	360	30	300	10	27	20	165
64930000	VR25-175/HP	VARIO receiver	25	175	8	360	30	300	10	27	20	165
64832000	VT25-375	VARIO transmitter	25	375	16	560	80	400	10	27	20	165
64932000	VR25-375/HP	VARIO receiver	25	375	16	560	80	400	10	27	20	165
64834000	VT25-575	VARIO transmitter	25	575	24	760	30	700	10	27	20	165
64934000	VR25-575/HP	VARIO receiver	25	575	24	760	30	700	10	27	20	165
64836000	VT25-775	VARIO transmitter	25	775	32	960	80	400	10	27	20	165
64936000	VR25-775/HP	VARIO receiver	25	775	32	960	80	400	10	27	20	165
64840000	VT50-350	VARIO transmitter	50	350	8	560	80	400	10	27	20	190
64940000	VR50-350/HP	VARIO receiver	50	350	8	560	80	400	10	27	20	190
64842000	VT50-750	VARIO transmitter	50	750	16	960	80	400	10	27	20	190
64942000	VR50-750/HP	VARIO receiver	50	750	16	960	80	400	10	27	20	190
64844000	VT50-1150	VARIO transmitter	50	1150	24	1360	80	600	10	27	20	190
64944000	VR50-1150/HP	VARIO receiver	50	1150	24	1360	80	600	10	27	20	190
64846000	VT50-1550	VARIO transmitter	50	1550	32	1760	130	500	10	27	20	190
64946000	VR50-1550/HP	VARIO receiver	50	1550	32	1760	130	500	10	27	20	190
64850000	VT100-700	VARIO transmitter	100	700	8	970	85	400	10	27	20	250

Model: HP: 6xxxxxx0, HD: 6xxxxx1, DP: 6xxxxx2, DD: 6xxxxx3

All dimensions in mm

BK = bore hole to end of housing (cable) LLK = distance to housing edge - last beam

BB = bore hole to bore hole LEK = distance to housing edge - first beam (for line)

GB = housing width Profile length = LEK + measurement field height + LLK

GT = housing depth Tolerance of the beam positions +/- 2mm

Table 6.1: Ordering information and dimensions

Part#	Short designation	Function	Beam spacing	Measurement field height	Number of beams	Length of profile	BK	BB	GB	GT	LLK	LEK
64950000	VR100-700/HP	VARIO receiver	100	700	8	970	85	400	10	27	20	250
64851000	VT100-1100	VARIO transmitter	100	1100	12	1370	85	600	10	27	20	250
64951000	VR100-1100/HP	VARIO receiver	100	1100	12	1370	85	600	10	27	20	250
64852000	VT100-1500	VARIO transmitter	100	1500	16	1770	135	500	10	27	20	250
64952000	VR100-1500/HP	VARIO receiver	100	1500	16	1770	135	500	10	27	20	250
64853000	VT100-1900	VARIO transmitter	100	1900	20	2170	85	500	10	27	20	250
64953000	VR100-1900/HP	VARIO receiver	100	1900	20	2170	85	500	10	27	20	250
64854000	VT100-2300	VARIO transmitter	100	2300	24	2570	85	600	10	27	20	250
64954000	VR100-2300/HP	VARIO receiver	100	2300	24	2570	85	600	10	27	20	250
64855000	VT100-2700	VARIO transmitter	100	2700	28	2970	85	700	10	27	20	250
64955000	VR100-2700/HP	VARIO receiver	100	2700	28	2970	85	700	10	27	20	250
64856000	VT100-3100	VARIO transmitter	100	3100	32	3370	85	800	10	27	20	250
64956000	VR100-3100/HP	VARIO receiver	100	3100	32	3370	85	800	10	27	20	250
65810000	VT5-35-M8	VARIO transmitter	5	35	8	120	6	108	12	58	17.5	67.5
65910000	VR5-35/HP-M8	VARIO receiver	5	35	8	120	6	108	12	58	17.5	67.5
65812000	VT5-75-M8	VARIO transmitter	5	75	16	160	6	148	12	58	17.5	67.5
65912000	VR5-75/HP-M8	VARIO receiver	5	75	16	160	6	148	12	58	17.5	67.5
65814000	VT5-115-M8	VARIO transmitter	5	115	24	200	6	188	12	58	17.5	67.5
65914000	VR5-115/HP-M8	VARIO receiver	5	115	24	200	6	188	12	58	17.5	67.5
65816000	VT5-155-M8	VARIO transmitter	5	155	32	240	6	228	12	58	17.5	67.5
65916000	VR5-155/HP-M8	VARIO receiver	5	155	32	240	6	228	12	58	17.5	67.5
65820000	VT12.5-88-M8	VARIO transmitter	12.5	88	8	260	30	200	10	27	13.5	158.5
65920000	VR12.5-88/HP-M8	VARIO receiver	12.5	88	8	260	30	200	10	27	13.5	158.5
65822000	VT12.5-188-M8	VARIO transmitter	12.5	188	16	360	30	300	10	27	13.5	158.5
65922000	VR12.5-188/HP-M8	VARIO receiver	12.5	188	16	360	30	300	10	27	13.5	158.5
65824000	VT12.5-288-M8	VARIO transmitter	12.5	288	24	460	80	300	10	27	13.5	158.5
65924000	VR12.5-288/HP-M8	VARIO receiver	12.5	288	24	460	80	300	10	27	13.5	158.5
65826000	VT12.5-388-M8	VARIO transmitter	12.5	388	32	560	80	400	10	27	13.5	158.5
65926000	VR12.5-388/HP-M8	VARIO receiver	12.5	388	32	560	80	400	10	27	13.5	158.5
65830000	VT25-175-M8	VARIO transmitter	25	175	8	360	30	300	10	27	20	165
65930000	VR25-175/HP-M8	VARIO receiver	25	175	8	360	30	300	10	27	20	165
65832000	VT25-375-M8	VARIO transmitter	25	375	16	560	80	400	10	27	20	165
65932000	VR25-375/HP-M8	VARIO receiver	25	375	16	560	80	400	10	27	20	165

Model: HP: 6xxxxx0, HD: 6xxxxx1, DP: 6xxxxx2, DD: 6xxxxx3

All dimensions in mm

BK = bore hole to end of housing (cable)

LLK = distance to housing edge - last beam

BB = bore hole to bore hole

LEK = distance to housing edge - first beam (for line)

GB = housing width

Profile length = LEK + measurement field height + LLK

GT = housing depth

Tolerance of the beam positions +/- 2mm

Table 6.1: Ordering information and dimensions

Part#	Short designation	Function	Beam spacing	Measurement field height	Number of beams	Length of profile	BK	BB	GB	GT	LLK	LEK
65834000	VT25-575-M8	VARIO transmitter	25	575	24	760	30	700	10	27	20	165
65934000	VR25-575/HP-M8	VARIO receiver	25	575	24	760	30	700	10	27	20	165
65836000	VT25-775-M8	VARIO transmitter	25	775	32	960	80	400	10	27	20	165
65936000	VR25-775/HP-M8	VARIO receiver	25	775	32	960	80	400	10	27	20	165
65840000	VT50-350-M8	VARIO transmitter	50	350	8	560	80	400	10	27	20	190
65940000	VR50-350/HP-M8	VARIO receiver	50	350	8	560	80	400	10	27	20	190
65842000	VT50-750-M8	VARIO transmitter	50	750	16	960	80	400	10	27	20	190
65942000	VR50-750/HP-M8	VARIO receiver	50	750	16	960	80	400	10	27	20	190
65844000	VT50-1150-M8	VARIO transmitter	50	1150	24	1360	80	600	10	27	20	190
65944000	VR50-1150/HP-M8	VARIO receiver	50	1150	24	1360	80	600	10	27	20	190
65846000	VT50-1550-M8	VARIO transmitter	50	1550	32	1760	130	500	10	27	20	190
65946000	VR50-1550/HP-M8	VARIO receiver	50	1550	32	1760	130	500	10	27	20	190
65850000	VT100-700-M8	VARIO transmitter	100	700	8	970	85	400	10	27	20	250
65950000	VR100-700/HP-M8	VARIO receiver	100	700	8	970	85	400	10	27	20	250
65851000	VT100-1100-M8	VARIO transmitter	100	1100	12	1370	85	600	10	27	20	250
65951000	VR100-1100/HP-M8	VARIO receiver	100	1100	12	1370	85	600	10	27	20	250
65852000	VT100-1500-M8	VARIO transmitter	100	1500	16	1770	135	500	10	27	20	250
65952000	VR100-1500/HP-M8	VARIO receiver	100	1500	16	1770	135	500	10	27	20	250
65853000	VT100-1900-M8	VARIO transmitter	100	1900	20	2170	85	500	10	27	20	250
65953000	VR100-1900/HP-M8	VARIO receiver	100	1900	20	2170	85	500	10	27	20	250
65854000	VT100-2300-M8	VARIO transmitter	100	2300	24	2570	85	600	10	27	20	250
65954000	VR100-2300/HP-M8	VARIO receiver	100	2300	24	2570	85	600	10	27	20	250
65855000	VT100-2700-M8	VARIO transmitter	100	2700	28	2970	85	700	10	27	20	250
65955000	VR100-2700/HP-M8	VARIO receiver	100	2700	28	2970	85	700	10	27	20	250
65856000	VT100-3100-M8	VARIO transmitter	100	3100	32	3370	85	800	10	27	20	250
65956000	VR100-3100/HP-M8	VARIO receiver	100	3100	32	3370	85	800	10	27	20	250

Model: HP: 6xxxxx0, HD: 6xxxxx1, DP: 6xxxxx2, DD: 6xxxxx3

All dimensions in mm

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BB = bore hole to bore hole LEK = distance to housing edge - first beam (for line)

GB = housing width Profile length = LEK + measurement field height + LLK

GT = housing depth

Tolerance of the beam positions +/- 2mm

Table 6.1: Ordering information and dimensions

6.2 Accessories

The following items are available as accessories:

- M8 cable in various lengths (e.g. K-D M8A 4P-5m-PVC Part No. 501 04526)
- Interface module V-INT-232 (Part No. 649 00000) for PC configuration
- VARIOsoft via Internet: <http://www.leuze.de/downloads/los/08/variosoft.zip>



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Componentes Electronicas Ltda.
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