geo FENNEL

2018/19

Surveying instruments and accessories

Contents

AT OUR CORE:

PRECISION AND INNOVATION.

Decades of experience – an important factor in the quality of our instruments. You can depend on geo-FENNEL surveying instruments to provide precise, reliable results under all working conditions. Whether electronic or optical – our construction and engineering instruments are characterised by their intuitive ease of use, innovation and high accuracy.

Dear Customers,

Each day at geo-FENNEL we seek to become even better for you. It is not for nothing that our surveying instruments enjoy an excellent reputation worldwide. Many years of experience, direct interaction with our customers and our innovations have all resulted in us producing premium-quality surveying products: automatic levels, laser plummets, theodolites, total stations and GPS systems.
At geo-FENNEL you get the surveying instruments you deserve – namely only the best.

This special catalogue is devoted to surveying. The needs of our customers spurn us on each day, and all the time we focus on trust, honesty and fairness. In short, we're your partner! Providing a good service is the driving force behind our daily work. Although we have grown from a small family business into an internationally-active company, we continue to act flexibly to meet the needs of our customers.

It is not for nothing that geo-FENNEL products are considered to be particularly innovative, robust and reliable. And thanks to our wide range of products, we have the right instruments for all needs. In the future, tradesmen will be able to continue to rely on the precision and proven quality of geo-FENNEL. No matter what the challenge waiting for you, with geo-FENNEL products you are optimally equipped for every task. Our broad product portfolio is as diverse as the areas in which they are used. With us you will always find the right measuring instrument – or rather, the optimum solution for any difficult task.

geo-FENNEL products are the instruments of choice when measurements need to be as precise as possible – and not only in building construction and civil engineering.

And now have fun discovering our products!

Would you like to know more about geo-FENNEL?

It all started with rod levels and measuring wheels. Because it was with these two products that Richard Führer decided to go it alone and found the company Führer & Co. in Germany. In 1964, as a sales representative travelling around in his VW Beetle, he laid the foundation for what has been a unique success story in the surveying industry and today's geo-FENNEL GmbH.

We now have over 40 employees working in sales, quality control and production, and the company is based in Baunatal, North Hesse. Since 2001, geo-FENNEL GmbH has been owned by Bernd Vogel, who started out as an employee of Richard Führer in 1986. In 2009, he appointed Martin Haslbauer to the management board. We enjoy an excellent reputation in the industry, and today supply more than 90 countries with high-quality laser measuring and surveying technology. Road construction, building construction and civil engineering companies around the world appreciate our quality, flexibility, service and precision. New markets and, above all, new products are constantly being added. We are particularly proud of our German innovativeness, which, in cooperation with our partners in the Asian region, constantly leads to new, high-quality surveying instruments. As a result of a high export ratio geo-FENNEL products are in use worldwide.

Our relatively small size and the down-to-earth approach with which we conduct our business guarantee our success. What counts for us is to have an honest and cooperative relationship with our customers. Another important part of our company philosophy is the high level of employee responsibility and our associated view of the future of the market. Remaining autonomous, driving innovation and maintaining our independence are all values of crucial importance to us. And our customers appreciate that. It is not only our excellent products that win them over, but above all our unique after-sales service and, should the need arise, our reliable repair service – in fact, everything geo-FENNEL stands for.

FGS 1
geo-FENNEL GNSS-System

» **The geo-FENNEL GNSS Receiver FGS 1 is produced especially for working in challenging terrain.**

» It covers all available GNSS-Sources, such as GPS, GLONASS, GALILEO and BEIDOU or can be limited to specific sources by the user. The integrated anti-jamming capability makes it possible to work under difficult conditions.

The receiver is standardly equipped with Bluetooth, an integrated radio modem (Rx, Tx) and a 4G modem.

The system can be connected with other receivers easily and is supported by application software like Carlson SurvCE or MicroSurvey FieldGenius.

The intelligent design makes the FGS 1 a compact and lightweight device.

1 Small and compact

2 Clear keypad

3 Hot-swap battery design

TECHNICAL DATA	FGS 1
ART. NO.	**751000**
Signal tracking	
256 channels with simultaneously tracked satellite signals	
GPS	L1, L2, L2C, L5
GLONASS	L1/L2
BEIDOU	E1, E5a, E5b
GALILEO	Yes, but not activated
SBAS	WAAS, EGNOS, MSAS, GAGAN
Performance specifications	
Cold start	< 50 s
Warm start	< 30 s
Initialisation time typically	< 10 s
Initialisation reliability typically	> 99.9 %
Signal reacquisition	< 1.5 s
Positioning specifications	
Post processing static	
Horizontal	2.5 mm + 0.5 ppm RMS
Vertical	5.0 mm + 0.5 ppm RMS
Real time kinematic	
Horizontal	8 mm + 1 ppm RMS
Vertical	15 mm + 1 ppm RMS
E-RTK (< 100 km)	
Horizontal	0.20 m + 1 ppm RMS
Vertical	0.40 m + 1 ppm RMS
Code differential GNSS positioning	
Horizontal	0.25 m + 1 ppm RMS
Vertical	0.50 m + 1 ppm RMS
SBAS typically	< 1 m 3D RMS
Stand-alone	< 1.5 m RMS
Communication	
1 serial port (7-pin LEMO), baud rates up to 921,600 bps	
Radio modem (optional)	Tx/Rx with full frequency range from 410 to 4702 MHz
Transmit power	0.5 – 2 W adjustable
Integrated GSM	4G modem
Positioning update rate	1 Hz, 2 Hz, 5 Hz, 10 Hz, 20 Hz
5 LED indicating lights	Power, satellite tracking, differential data
	and data recording
Bluetooth®; V 4.0 protocol, work compatible with Windows 7®, Windows mobile® and Android®	
Data format	
Data inputs/outputs	
Correction data I/O	RTCM 2.x, 3.x, CMR & CMR+ (GPS only)
Position data outputs	
ASCII	NMEA-0183 GSV, RMC, HDT, VHD, GGA, GSA, ZDA, VTG, GST, PJK, PTNL, AVR, GGK

TECHNICAL DATA	FGS 1
geo-FENNEL Binary update to 20 Hz	
Physical	
Size (W x H)	15.8 x 7.5 cm
Weight	0.95 kg (including battery)
Environmental	
Operating temperature	-40 °C – +65 °C (40 °F – 149 °F)
Storage temperature	-40 °C – +85 °C (40 °F – 185 °F)
Humidity resistance	100 % condensation
Dust and water protection	IP67 (withstands 1 m submersion)
Shock and vibration proofing	Yes (survives a 2 m pole drop)
Electrical	
Input voltage	5 – 27 VDC
Power consumption	3.1 W (3 constellations)
Power supply	Li-Ion 2 x 2,000 mAh
Operating time	9 hours
Memory	8 GB (up to 32 GB)

FEATURES

· High-speed processing
· Support for both
  post-processing and kinematic
· Processing ability separate or
  to be combined with GPS,
  GLONASS, GALILEO and
  BEIDOU
· Support for downloads & use
  of precise ephemeris
· Generation of various reports
· User friendly

Field Controller DC 6
Light and Compact Data Collector

> » **The data collector DC 6 is a well-equipped and powerful field controller with a large internal memory.**

> » The robust and feature-rich device is a simple and powerful solution for the daily challenges in the field.

TECHNICAL DATA	DC 6		DC 6	
ART. NO.	**750060**			
Hardware			**GPS Specifications**	
Operating system	Windows Mobile 6.5		Channels	72
Processor	TI Sitara TM AM335x 1 GHz		Tracked satellites	GPS/QZSS: L1 C/A
ROM	8 GB			SBAS: L1 C/A
SD expansion	32 GB			WAAS, EGNOS, MSAS
				GLONASS: L10F
Interface and Input				Galileo: E1 B/C
Integrated speakers	Yes			BEIDOU: B1
Microphone	Yes		Accuracy	Velocity accuracy: 0.05 m/s
Telephone handset	Yes			Position accuracy: 2.5 m
Support for recording and playback	Yes			Post-processed: 1.2 m
Soft key	Digital soft keyboard, character input,		Max navigation update rate	4 Hz
	supports handwriting and spelling input		Cold start	29 s
External power supply	Yes			
SD card slot	Yes, up to 32 GB		**Supported Protocols**	
USB port, serial port	Yes		Protocols	RTCM 2.3, NMEA 0183, UBX binary,
			u-blox proprietary	
Display				
Model	Blanview TFT, LED backlit		**Data Communication**	
Resolution	480 x 640 VGA		Communication module	Built-in universal quad-band commu-
Size	3.7"			nication module (WCDMA)
			Multimedia	Multimedia message
Data Communication			Voice calls	Yes
Bluetooth device	2.1+DER		SIM card	Yes
Wi-Fi	802.11 b/g wireless LAN			
			Physical Specifications	
Power Supply			Size	193 x 91 x 42 mm
Battery capacity	7.2 V, removable li-ion 24.4 Wh		Weight	925 g with battery
Working hours	Up to 10 hours		Relative humidity	5% ~ 95% non-condensing
			Operating temperature	-30 °C – +60 °C
Camera			Storage temperature	-30 °C – +70 °C
Static mode	AutoFocus 5 MP		Waterproof/dustproof	IP67
Image format	JPG (2048 x 1536)		Drop	Withstands 1.5 m free drop onto hard
Video mode	Up to VGA resolution			surface

SUPPLIED WITH

· Adapter
· USB cable
· Battery
· Charger
· Hand strip
· Stylus
· CD and manual
· Screen protector

FEATURES

· Small, handy and powerful controller
· Dust and water protection up to IP67
· Integrated GNSS receiver, incl. GALILEO
· Supports software applications like Carlson SurvCE and MicroSurvey FieldGenius

Juniper Mesa²
A Powerful Tablet

» **Mesa² – combines the advantages of a tablet PC and a robust data collector.**

» In a slim case with the highest protection against water and dust IP68, the Mesa² tablet is the ideal companion even in the toughest environments. With the Windows 10 interface, it brings a powerful functionality for mobile data collection.

With its 7" large and extra-clear display for images, maps and application programmes and its powerful battery of up to 20 hours, the Mesa² is up to all requirements in the field.

TECHNICAL DATA	JUNIPER MESA²	TECHNICAL DATA	JUNIPER MESA²
ART. NO.	**750080**		
Operating System	Microsoft® Windows 10 Pro	Wireless connectivity	Bluetooth® wireless technology 4.0,
Processor	Quad-core Intel® Atom™ Z3745		extra-long range
Memory	4 GB RAM (LPDDR3)		Wi-Fi 802.11 a/b/g/n 2.4 GHz and 5 GHz
Primary data storage	64 or 128 GB flash storage		Micro-SIMSlot 4G LTE, GSM, Verizon
Micro SD/SDXC card slot	SD/SDXC slot, user accessible		
		Environmental ratings and standards	IP68 rating (1.4 meters for 2 hours),
Physical features			waterproof and dustproof
Dimensions, standard	137 mm x 215 mm x 35 mm		
Weight	0,68 - 0,9 kg		
		SUPPLIED WITH	
Display			
Active viewing area	7" (178 mm)	· Removable li-ion battery	
Resolution	WXGA 800 x 1280 pixel resolution	· AC wall charger with international plug kit	
Touchscreen	Capacitive multi-touch interface for	· Input: 100–240 VAC, 50/60 Hz, 0.5 A	
	use with gloves or fine-tip stylus,	· Output: 12 VDC, 1.67 A	
	and in wet conditions	· Capacitive fine-tip stylus with tether	
	Chemically strengthened Dragon-		
	trail™ high ion exchange (HIE™)		
	cover glass for impact and scratch		
	resistance		
Keyboard	Programmable keys		
	Backlit keys		
Batteries	Rechargeable li-ion battery pack,		
	3.65 VDC 10,600 mAh, 38.7 Whr		
	Run time of up to 20 hours		
	User-replaceable		
Connector ports	USB 3.0 host (full-size A connector)		

FGS 1
Set

SUPPLIED WITH
GNSS-SYSTEM FGS 1 COMPLETE SET

| incl. SurvCE: | ART. NO. 751060 |
| incl. FieldGenius: | ART. NO. 751050 |

· 2 x GNSS antenna FGS 1
· 1 x MircroSurvey Fieldgenius-Software or Carlson
  SurvCE-Software
· 1 x field controller DC 6
· 2 x USB cable for FGS 1
· 2 x RS-232 cable for FGS 1
· 1 x measuring tape 3 m
· 1 x tribrach AJ 10 black
· 1 x tribrach adaptor AL 11-D black with
  optical plummet
· 1 x container
· 1 x user manual

SUPPLIED WITH
GNSS-SYSTEM FGS 1 COMPLETE SET

| incl. SurvCE: | ART. NO. 751095 |
| incl. FieldGenius: | ART. NO. 751090 |

· 2 x GNSS antenna FGS 1
· 1 x MircroSurvey Fieldgenius-Software or Carlson
  SurvCE-Software
· 1 x field controller Mesa²
· 2 x USB cable for FGS 1
· 2 x RS-232 cable for FGS 1
· 1 x measuring tape 3 m
· 1 x tribrach AJ 10 black
· 1 x tribrach adaptor AL 11-D black with
  optical plummet
· 1 x container
· 1 x user manual

FGS 1
Set

SUPPLIED WITH
GNSS-SYSTEM FGS 1 NETWORK SET

| incl. SurvCE: | ART. NO. 750160 |
| incl. FieldGenius: | ART. NO. 750100 |

· 1 x GNSS antenna FGS 1
· 1 x MircroSurvey Fieldgenius-Software or Carlson
  SurvCE-Software
· 1 x field controller DC 6
· 1 x USB cable for FGS 1
· 1 x RS-232 cable for FGS 1
· 1 x measuring tape 3 m
· 1 x container
· 1 x user manual

SUPPLIED WITH
GNSS-SYSTEM FGS 1 NETWORK SET

| incl. SurvCE: | ART. NO. 750195 |
| incl. FieldGenius: | ART. NO. 750090 |

· 1 x GNSS antenna FGS 1
· 1 x MircroSurvey Fieldgenius-Software or Carlson
  SurvCE-Software
· 1 x field controller Mesa²
· 1 x USB cable for FGS 1
· 1 x RS-232 cable for FGS 1
· 1 x measuring tape 3 m
· 1 x container
· 1 x user manual

FGS 100
geo-FENNEL GNSS-System

» **The new geo-FENNEL GNS receiver FGS 100 is, due to its unique-in-its-class compact design, a reliable partner in the field, given its suitability for working under rough conditions and in difficult terrain.**

» **It is equipped with an internal TILT-sensor and compensates slopes of the antenna pole up to 30°. This function makes the survey job much easier than before.**

Equipped with a powerful UHF modem (Rx & Tx), Wi-Fi and a 4G modem, it offers a variety of connectivity options.

The receiver with its 572 channels supports all available GNSS sources, such as GPS, GLO-NASS, GALILEO and BEIDOU without the need for further activation.

The system is open to third-party software and supports the Carlson SurvCE and MicroSurvey® FieldGenius software solutions.

TECHNICAL DATA	FGS 100		TECHNICAL DATA	FGS 100	FEATURES
ART. NO.	760010				
Signal Tracking			**Data Format**		· Working distance of internal UHF varies in different environments; the maximum distance is 5 km in ideal situations
Channels, which are simultaneously tracked	572		Correction data I/O	RTCM 2.X, 3.X, CMR, CMR+	
GPS	L1, L2, L2C, L5			(GPS only)	
GLONASS	L1, L2		Position data output		· Works with all kinds of CORS-systems worldwide
GALILEO	E1, E5a, E5b		ASCII	NMEA-0183 GSV, RMC, HDT, VHD,	
BEIDOU	B1, B2, B3			GGA, GSA, ZDA, VTG, GST; PTNL,	· Integrated TILT-sensor with an accuracy up to 3 cm
QZSS	Yes (reserved)			PJK; PTNL, AVR; PTNL, GGK	· Small and handy design
SBAS	WAAS, EGNOS, MSAS, GAGAN		geo-FENNEL Binary update to 20 Hz		· Supports MicroSurvey Field-Genius and Carlson SurvCE
Performance Specifications			**Physical**		
Cold start	< 50 s		Size	Ø 15.8 cm × 7.5 cm	
Warm start	< 30 s		Weight	0.95 kg with two batteries	
Hot start	< 15 s				
Initialisation time	< 10 s		**Environmental**		
Signal reacquisition	< 2 s		Operating temperature	-40 °C to + 65 °C	
Initialisation reliability	> 99.9 %		Storage temperature	-40 °C to + 85 °C	
Tilt sensor	Up to 30°		Humidity	100% condensation	
			Waterproof and dustproof	IP67	Depends on the constellation of additional field controller and usage as base/rover or network system.
Positioning Specifications			Shockproof	Designed to survive a 2 m drop onto	
Static				concrete	
Horizontal	2.5 mm + 0.5 ppm RMS				
Vertical	5.0 mm + 0.5 ppm RMS		**Electrical and Memory**		
Real-time kinematic(RTK)			Input voltage	5–27 VDC	
Horizontal	8.0 mm + 1 ppm RMS		Power consumption	3.1 W	
Vertical	15.0 mm + 1 ppm RMS		Power supply	2 × 2,000 mAh, up to 9 hours typically	
E-RTK (< 100 km)			Internal memory	8 GB	
Horizontal	0.20 m + 1 ppm RMS				
Vertical	0.40 m + 1 ppm RMS				
DGPS	< 0.4 m RMS				
SBAS	1 m 3D RMS				
Stand-alone	1.5 m 3D RMS				
Data Communication					
1 serial port (7-pin LEMO) baud rates up to 921,600 bps					
UHF modem	Tx/Rx with a frequency range from 410–470 MHz				
Transmitting power	0.5 – 2 W				
Range	1 – 5 km				
Wi-Fi/4G modem					
4G bands	800 / 900 / 1,800 / 2,100 / 2,600 MHz				
3G bands	900 / 2,100 MHz				
2G bands	900 / 1,800 MHz				
Support GSM, point to point/points and NTRIP					
Position data output rates	1 Hz, 2 Hz, 5 Hz, 10 Hz, 20 Hz				
5 LEDs	Indicating power, satellite tracking, GPRS status and differential data				
Bluetooth®	V 4.0 protocol, compatible with Windows OS and Android OS				

FGS 100
Set

**SUPPLIED WITH
GNSS-SYSTEM FGS 100 COMPLETE SET**

incl. SurvCE:	ART. NO. 761060
incl. FieldGenius:	ART. NO. 761050

· 2 x GNSS antenna FGS 100
· 1 x MircroSurvey Fieldgenius-Software or Carlson
  SurvCE-Software
· 1 x field controller DC 6
· 2 x USB cable for FGS 100
· 2 x RS-232 cable for FGS 100
· 1 x measuring tape 3 m
· 1 x tribrach AJ 10 black
· 1 x tribrach adaptor AL 11-D black with
  optical plummet
· 1 x Container
· 1 x user manual

**SUPPLIED WITH
GNSS-SYSTEM FGS 100 COMPLETE SET**

incl. SurvCE:	ART. NO. 761095
incl. FieldGenius:	ART. NO. 761090

· 2 x GNSS antenna FGS 100
· 1 x MircroSurvey Fieldgenius-Software or Carlson
  SurvCE-Software
· 1 x field controller Mesa²
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· 2 x RS-232 cable for FGS 100
· 1 x measuring tape 3 m
· 1 x tribrach AJ 10 black
· 1 x tribrach adaptor AL 11-D black with
  optical plummet
· 1 x container
· 1 x user manual

FGS 100
Set

**SUPPLIED WITH
GNSS-SYSTEM FGS 100 NETWORK SET**

incl. SurvCE:	ART. NO. 760160
incl. FieldGenius:	ART. NO. 760150

· 1 x GNSS antenna FGS 100
· 1 x MircroSurvey Fieldgenius-Software or Carlson
  SurvCE-Software
· 1 x field controller DC 6
· 1 x USB cable for FGS 100
· 1 x RS-232 cable for FGS 100
· 1 x measuring tape 3 m
· 1 x container
· 1 x user manual

**SUPPLIED WITH
GNSS-SYSTEM FGS 100 NETWORK SET**

incl. SurvCE:	ART. NO. 760195
incl. FieldGenius:	ART. NO. 760190

· 1 x GNSS antenna FGS 100
· 1 x MircroSurvey Fieldgenius-Software or Carlson
  SurvCE-Software
· 1 x field controller Mesa²
· 1 x USB cable for FGS 100
· 1 x RS-232 cable for FGS 100
· 1 x measuring tape 3 m
· 1 x container
· 1 x user manual

CORS FRS 300 Pro
Reference Station

» **The geo-FENNEL Reference Station FRS 300 Pro is an easy-to-use system for creating your own reference network. Use in conjunction with other reference stations in a CORS network and stand-alone use are both possible.**

» With the geo-FENNEL Reference Station FRS 300 Pro, all available GNSS systems, such as GPS, GLONASS, GALILEO and BEIDOU can be used without effort. The integrated lithium-ion battery prevents data loss and continues to operate reliably until power is restored.

The built-in web server makes it easy to modify receiver, status and firmware settings. User management can be created and monitored easily with the supplied software. The geo-FENNEL Reference Station FRS 300 Pro is the ideal partner for agriculture, deformation monitoring and surveying.

TECHNICAL DATA	CORS FRS 300 PRO
ART. NO.	**752000**
Signal Tracking	
Channels, which are simultaneously tracked: 496	
GPS	L1 C/A, L1P, L2C, L2P, L5
GLONASS	L1 C/A, L1P, L2 C/A, L2P
GALILEO	E1, E5a, E5b
BEIDOU	B1, B2, B3
QZSS	Yes (reserved)
SBAS	WAAS, EGNOS, MSAS, GAGAN
Time precision	GPS+GLONASS+BEIDOU 20 ns
Positioning Specifications	
Static	
Horizontal	3.0 mm + 0.1 ppm RMS
Vertical	3.5 mm + 0.4 ppm RMS
Single-baseline RTK	
Horizontal	8.0 mm + 1 ppm RMS
Vertical	15.0 mm + 1 ppm RMS
Network RTK	
Horizontal	8,0 mm + 0.5 ppm RMS
Vertical	15.0 mm + 0.5 ppm RMS
E-RTK (< 100 km)	
Horizontal	0.20 m + 1 ppm RMS
Vertical	0.40 m + 1 ppm RMS
DGPS	< 0.4 m RMS
SBAS	1 m 3D RMS
Stand-alone	1.5 m 3D RMS
Data Communication	
3 LEMO ports	
One 2-pin LEMO port for power supply and battery charging	
One 7-pin LEMO port (USB UART port) for system debugging and static data downloading	
One 7-pin LEMO port (RS485 Protocol) for meteorological sensor/barograph/inclinometer connection	
1 DB9 male port: Standard RS232 protocol	
1 standard USB port: Connect with external storage card	
1 RJ45 LAN Ethernet port (10/100 Mbit/s) supports protocols HTTP, TCP/IP, FTP, NTRIP	
3 SMA male connectors	
- 1 PPS output	
- Event output	
- Reserve for Bluetooth® and W-LAN	
2 TNC connectors	
- GNSS-antenna connector	
- Frequency-marker oscillator input connector	

Data Format		
Correction data I/O	RTCM 2.X, 3.X, CMR & CMR+ (GPS only)	
Position data output		
ASCII	NMEA-0183 GSV, RMC, HDT, VHD, GGA, GSA, ZDA, VTG, GST; PTNL, PJK; PTNL, AVR; PTNL, GGK	
Extended NMEA-0183	BDGGA, GPNTR, GPCDT, GPHPR	
geo-FENNEL Binary BINEX, RTCM3.X, compatible with major CORS software (VRS, FKP and iMax)		
Data Logging		
Loop recording function supporting long-term recording		
Supports simultaneous data recording		
Maximum 50 Hz data-logging rate		
Storage capacity	8 GB internal memory	
	Maximum 1 TB external memory	
File format	RINEX 3.X, 2.X or geo-FENNEL Binary format	
File log session	5 / 10 / 15 / 20 / 30 min or 1 / 2 / 4 / 24 hour	
Data retrieval and transfer	FTP and USB	
Physical		
Size	202 mm x 163 mm x 75 mm	
Weight	2.4 kg	
Housing	Sturdy aluminium housing	
Environmental		
Operating temperature	-40 °C to + 80 °C	
Storage temperature	-45 °C to + 85 °C	
Humidity	100% condensation	
Waterproof and dustproof	IP67	
Vibration	MIL-STD-810G	
Shockproof	Designed to survive a 1 m drop onto concrete	
Electrical and Memory		
Power consumption	3.5 W	
Power supply	9.5-28 VDC, with over-voltage protection	
Internal battery	7.4 V, 8,800mAh, li-ion; 16-hour continuously working	
User Interface		
Front panel display	4 arrow keys and data-entry power button, reset button and ESC button	
	LCD display showing receiver's status	

OPTIONAL ACCESSORIES
GAT 300 GNSS geodetic antenna
ART. NO. 752010
GAT 500 GNSS choke-ring antenna
ART. NO. 752020
10 m cable
ART. NO. 752001
30 m cable
ART. NO. 752003
50 m cable
ART. NO. 752005

SUPPLIED WITH
· geo-FENNEL GRU software
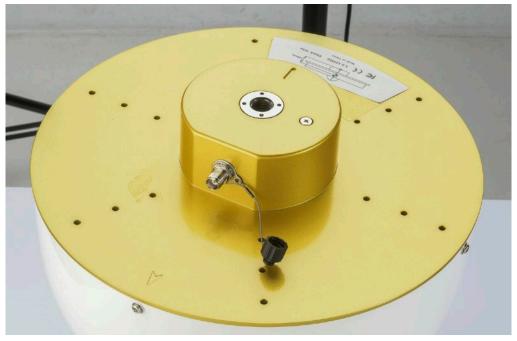
GAT 300/500
GNSS-Antennas

GAT 500

GAT 300

TECHNICAL DATA	GAT 300	GAT 500
ART. NO.	752010	752020
Antenna type	Geodetic	Choke ring
GPS	L1, L2, L5	L1, L2, L5
GLONASS	L1, L2	L1, L2, L3
GALILEO	E1, E2, E5	E1, E5a, E5b
BEIDOU	B1, B2, B3	B1, B2, B3
SBAS	No	Yes
Impedance	50 Ohm	50 Ohm
Polarisation	RHCP	RHCP
Axial ratio	≤ 3 dB	≤ 3 dB
Azimuth coverage	360°	360°
Noise figure	≤2.0	≤ 2.0
Gain at zenith	5.5 dBi	7 dBi
Phase at centre accuracy	± 2 mm	± 1 mm
LNA		
LNA gain	40 dB	50 dB ± 2 dB
Noise figure	≤ 2 dB	≤ 2 dB
VSWR output	≤ 2.0	≤ 2.0
Operation voltage	3 – 18 VDC	3.3 – 12 VDC
Operation current	≤ 45 W	≤ 55 W
Ripple	± 1 dB	± 2 dB
Group delay	< 5 ns	< 5 ns
Physical		
Size	Ø 152 x 62.2 mm	Ø 379 x 311 mm
Connector	TNC female	2.4 kg
Weight	374 g	6.9 kg
Environmental		
Operating temperature	-40 °C to + 85 °C	-40 °C to + 85 °C
Storage temperature	-55 °C to + 85 °C	-45 °C to + 85 °C
Humidity	95% non-condensing	95% non-condensing

Total Stations FTS 101/102

The geo-FENNEL Total Station FTS 101/102 is smart in its design and really easy to handle. It comes with the Windows CE–based application software Micro-Survey FieldGenius or Carlson SurvCE optionally.

TECHNICAL DATA	FTS 101			
Objective Telescope		Circular vial	8' / 2 mm	
Image	Erect			
Objective aperture	45 mm	**Laser Plummet**		
Magnification	30x	Accuracy	± 0.5 mm / 1.5 m	
Field of view	1° 30'	Laser class	2	
Resolving power	3"			
Shortest focus distance	1.0 m	**Power Supply**		
		Li-ion battery	4,400 mAh	
Operation		Operating time	8 h	
Reflectorless	1 – 500 m			
Reflective tape target	1 – 800 m	**Display**		
Mini prism	1 – 1200 m	Dual TFT	3.5" colour display	
Single standard prism	1 – 3500 m	Backlight	Yes	
Accuracy	± 2 mm + 2 ppm	Keyboard	26 keys	
Angle Measurement		**Data Process**		
Minimum reading resolution	1" / 5"	CPU/clock frequency	2 GB / 528 MHz	
Angle accuracy FTS 101	1"	OS	Windows CE 7	
Angle accuracy FTS 102	2"	Application software	SurvCE / FieldGenius	
Angle units	100% / 360° / 400 gon	I/F	RS-232C, Bluetooth®, USB	
Compensator		**Other**		
Axis	2	IP class	IP55	
Range	± 3°	Operating temperature	- 20 °C – 50 °C	
		Dimensions	183 x 342 x 167 mm	
Vial Sensitivity		Weight	5.4 kg	
Plate level vial	30" / 2 mm			

FEATURES	SUPPLIED WITH	FTS 101 + FIELD GENIUS	FTS 101 + SURVCE
		ART. NO. 711000	ART. NO. 711100
· Easy-to-use on-board software	· Desktop charger		
· Easy-to-read display, even in direct sunlight	· 2 x li-ion battery	**FTS 102 + FIELD GENIUS**	**FTS 102 + SURVCE**
· Fast import and export of different data formats without additional software	· Data cable		
	· Container	ART. NO. 710000	ART. NO. 710100
· Fast and accurate measurements	· Stake-out aid RS 96		
· Intensity of the laser plummet can be changed gradually		**ZENITH EYEPIECE 710500 (OPTIONAL)**	
· Compact and smart design			

1	Easy handling	4	What's in the kit
2	Touch pen quickly accessible	5	Clear display
3	Protected connection ports	6	Simple system set-up

» Its touchscreen display greatly improves the workflow of accessing menus and software modes quickly and reliably. The FTS 101 / 102 features a full alphanumeric keypad as well as a "pop-up" keyboard, which both ensure fast and accurate entering of data.

In addition to the ready-supplied applications, the FTS 101/102's software package supports road planing, volume calculation and simple CAD options to make work in the field much easier. Measurements can be easily transferred into different formats to or from existing software like AutoCAD and similar. Due to its usability, it is easily possible to measure and check points, stake-out lines and single points as well as to set up the instrument quickly and accurately.

All features are smartly integrated in a compact and well-designed instrument: Fast and long-range EDM allows for measurements up to 3,500 m with standard prism, and reflec- torless up to 500 m. An integrated laser plummet allows quick and accurate set-up over measuring points, including also under difficult conditions. All total stations are equipped with the RS 96 stake-out aid for fast and secure stake-outs.

The FTS 101/102 measurements can be transferred by standard RS-232 cable but also by Bluetooth® or USB stick. Its two rechargeable li-ion batteries allow the use of the FTS 101/102 for even longer than one working day. All its connectors are well protected against dust and water, which results in IP55.

Total Station FTS 202

» **The geo-FENNEL Total Station FTS 202 is an innovative solution with a reflectorless distance-measuring module with a range of more than 500 m (with reflector, up to more than 3,000 m). Equipped with an electronic level, the geo-FENNEL Total Station FTS 202 provides an exceptionally powerful, cost-effective solution for a wide range of general and specialised construction and engineering applications.**

TECHNICAL DATA	FTS 202			FEATURES
ART. NO.	**710200**			
Telescope		**Laser Plummet**		· Easy-to-use on-board software
Image	Erect	Accuracy	± 0.5 mm / 1.5 m	· Easy-to-read display, including in
Objective aperture	45 mm	Laser class	2	direct sunlight
Magnification	30 x			· Fast import and export of
Field of view	1°30'	**Power Supply**		different data formats
Resolving power	3"	Li-ion battery	4,400 mAh	without additional software
Shortest focus distance	1.0 m	Operating time	20 h	· Fast and accurate measure-
				ments
Operation		**Display**		· Intensity of the laser plummet
Reflectorless	1 – 300 m	Dual 240 x 96 pixel	20 characters x 8 lines	can be changed gradually
Reflective tape target	1.5 – 600 m	Backlight	Yes	· Compact and smart design
Mini prism	1.5 – 1,500 m	Keyboard	22 keys	
Single standard prism	1.5 – 4,000 m			
Accuracy	± 2 mm + 2 ppm	**Data Process**		
		Data recording	2 GB / 528 MHz	**SUPPLIED WITH**
Angle Measurement		Internal memory	20,000 coordinates	
Minimum reading resolution	1" / 5"	Special function	PowerTopoLite	
Angle accuracy	2"	I/F	RS-232C, Bluetooth, USB,	· Desktop charger
Angle units	100% / 360° / 400 gon		SD-Card	· 2 x li-ion battery
				· Data cable
Compensator		**Other**		· Container
Axis	2 axis	IP class	IP56	· Stake-out aid RS 96
Range	± 3°	Operating temperature	- 20 °C – +50 °C	
		Dimensions	190 x 343 x 177 mm	
Vial Sensitivity		Weight	5.7 kg	
Plate level vial	30" / 2 mm			
Circular vial	8' / 2 mm			**ZENITH EYEPIECE 710250 (OPTIONAL)**

» Integrated and comprehensive software package

Selection of applications that support the software in your daily work:
• Construction & engineering surveying
• Stake-out
• Point-to-line, bends
• Graphic display
• Free stationing and resection
• Height determination
• 2D/3D interface
• Indirect distance measurement
• Right-angle coordinates, polar coordinates
• Roads
• Volume determination
• Geodetic tasks and cadastral surveys

Simple, intuitive user interface with large graphic LC display and illuminated, high-contrast displays.

» Reliable and safe:
The exchange of data takes place via standard interfaces or Bluetooth®. The software supports uploads and downloads between the geo-FENNEL Total Station FTS 202 and computers. The software geo-FENNEL DL-01 allows direct exchange of data with any software.

1	Protected connections
2	Clear display
3	Simple system structure
4	Suitcase included

FTS 202 + ZENITH EYEPIECE (OPTIONAL)

ART. NO. 710250
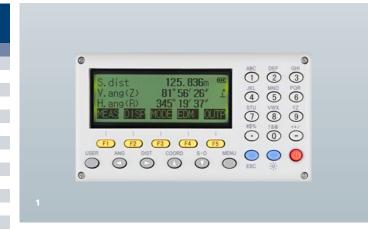
TheoDist® FTD 05
Reflectorless Total Stations
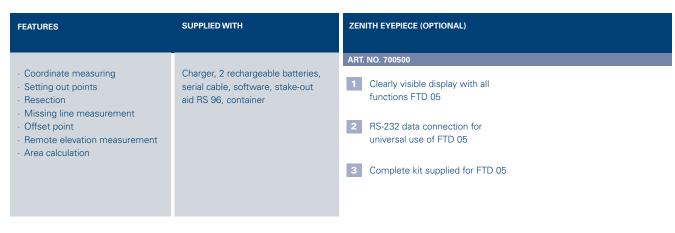
» **The geo-FENNEL TheoDist® is designed to be user friendly and quick to set up on any construction site. Easy to handle, robust, exact and reliable.**

» The main features of the geo-FENNEL TheoDist® are:

· Measuring programmes that provide efficient and easy solutions for setting out
· Three-dimensional measurement of coordinates
· Menu-driven software with intuitive structure to maximise productivity
· A visible laser pointer to improve targeting accuracy, allowing measurements to be taken without looking through the telescope
· Data upload and download to PC via the RS-232 connection or SD card (FTD 02)
· Measuring range of up to 300 m (FTD 05: 200 m) without reflector
· Quick and easy set-up with the integrated laser plummet

» The geo-FENNEL TheoDist® series is equipped with a variety of programmes, from simple distance and angle measurement to precise three-dimensional setting out.

· Missing line
· Offset
· Remote elevation measurement
· Resection
· Integrated application programmes for setting out office-generated designs
· Area

» The communication software supplied with the geo-FENNEL TheoDist® allows the user to save the data in various formats. The data files can be converted into DXF format, making them suitable for upload into CAD software such as AutoCAD®.

TECHNICAL DATA	FTD 05		
ART. NO. 700000			
Telescope		**Laser Pointer**	
Image	Erect	Laser classification	3R
Objective aperture	45 mm	**Laser Plummet**	
Magnification	30x	Accuracy	± 1 mm / 1.5 m
Field of view	1° 30'	Laser classification	2
Resolving power	4"	**Display**	
Shortest focus distance	1.5 m	Dual LCD	4 lines, 24 characters
Distance Measurement		**Power**	
Reflectorless	200 m	Rechargeable battery type	7.2 VDC NiMH
Reflective tape target	600 m	Operating time	5 h
Single standard prism	600 m	Charger	100 / 240 V
Accuracy	3 mm + 2 ppm	**Vial Sensitivity**	
Offset	"0"	Plate level vial	30" / 2 mm
Measuring Time		Circular vial	8' / 2 mm
Fine/rapid/tracking	1.5 s / 0.9 s / 0.3 s	**General Specs**	
Minimum reading	1 mm	Internal memory	50,000 points
Distance units	m / ft	External memory	-/-
Angle Measurement		Weight	6.0 kg
Minimum reading resolution	1" / 5" / 10"	Operating temperature	-20 °C – +50 °C
Angle accuracy	5"	IP class	IPX4
Angle units	100% / 360° / 400 gon	I/O port	RS-232
Compensator			
Type	Electronic		
Range	± 3°		

FEATURES	SUPPLIED WITH	ZENITH EYEPIECE (OPTIONAL)
		ART. NO. 700500
· Coordinate measuring	Charger, 2 rechargeable batteries, serial cable, software, stake-out aid RS 96, container	**1** Clearly visible display with all functions FTD 05
· Setting out points		
· Resection		**2** RS-232 data connection for universal use of FTD 05
· Missing line measurement		
· Offset point		
· Remote elevation measurement		**3** Complete kit supplied for FTD 05
· Area calculation		

1

2

3

FET 402K-L
With Dual-Axis Compensator and Laser Pointer

» Coaxial, focusable laser beam integrated into the telescope

FET 405K/FET 420K
With Dual-Axis Compensator

» FET 402K-L

» FET 405K and FET 420K

TECHNICAL DATA	FET 402K-L	FET 405K	FET 420K	FEATURES
ART. NO.	**316000**	**315000**	**314000**	
Magnification	30x	30x	30x	· 2 large, easy-to-read LCDs
Clear objective aperture	45 mm	45 mm	45 mm	· Simultaneous reading of
Shortest focussing distance	1.4 m	1.4 m	1.4 m	horizontal and vertical circles
Angle measurement	Incremental	Incremental	Incremental	· Illumination of display and
Accuracy	0.6 mgon (2")	1 mgon (5")	4 mgon (20")	field of view
Minimum reading	0.2 mgon (1")	1 mgon (5")	2 mgon (10")	· Clockwise/anti-clockwise
Compensator	Dual axis	Dual axis	Dual axis	horizontal angle reading
Measuring units	400 gon / 360° / mil	400 gon / 360° / mil	400 gon / 360° / mil	· "0" set or hold of horizontal
Target	Focusable	–	–	circle at any desired position
Laser class	3R	–	–	· "V" circle reading in gon/degrees
Beam diameter	5 mm / 100 m	–	–	or % of slope
Maximum visibility	180 m	–	–	
Deviation	5"	–	–	
Laser plummet	Yes	–	–	
Optical plummet	–	3 x	3 x	
Focussing range	–	0.5 – ∞	0.5 – ∞	**OPTIONAL**
Plate level	30" / 2 mm	30" / 2 mm	30" / 2 mm	**90° EYEPIECE**
Circular level	8' / 2 mm	8' / 2 mm	8' / 2 mm	
Operating time/power supply	35 h NiMH / 40 h alkaline	35 h NiMH / 40 h alkaline	35 h NiMH / 40 h alkaline	**ART. NO. 314500**
Theodolite and laser	24 h NiMH / 30 h alkaline	–	–	
Temperature range	-20 °C – +45 °C	-20 °C – +50 °C	-20 °C – +50 °C	
Dust/water protection	IP54	IP54	IP54	
Tribrach	Detachable	Detachable	Detachable	
Weight	4.5 kg	4 kg	4 kg	

FET 220
Electronic theodolite – easy to use

» For use in engineering, civil engineering and general construction.

Particular attention has been paid to making the FET 220 user-friendly with a large easy-to-read display and a laser plummet for precise positioning over a ground point.

SUPPLIED WITH FET 220

· Tribrach
· Rechargeable battery
· Charger
· Battery compartment for alkaline batteries
· Container

TECHNICAL DATA	FET 220
ART.-NO.	313000
Magnification	30x
Clear objective diameter	45 mm
Shortest focussing distance	1,5 m
Angle measurement	absolute encoder
Accuracy	20" (6 mgon)
Minimum reading	10" (3 mgon)
Measuring units	400 gon / 360°
Laser plummet: spot size	Ø 2 mm at 1,5 m
Laser plummet: laser class	2
Operating time / power supply	18 h / NiMH
Temperature range	-20°C to +50°C
Dust / water protection	IP 54
Weight (instrument only)	4,2 kg

FEATURES

· Large easy-to-read LCD
· Laser plummet for easy set up over the ground point
· Illumination of LCD and field of view
· Horizontal circle: Hold-Function, 0-set at any desired position, clockwise/anti-clockwise reading
· Vertical circle: reading in gon / degrees / percent

FET 500
Construction Theodolite

» **The versatile starter model for many applications.**

TECHNICAL DATA	FET 500, 400 GON FET 500, 360°
ART. NO. 400 GON	350000
ART. NO. 360°	350360
Magnification	20 x
Objective aperture	30 mm
Shortest focussing distance	1.2 m
Direct reading	0.1 gon
Estimation	10 mgon
Temperature range	-40 °C – +50 °C
Weight	2.0 kg

GFE 32
Engineers' Automatic Level

» **A high-quality engineers' automatic level with the most robust compensator available on the market. Brilliant optical system for clear view in all conditions.**

By mirroring an index mark into the eyepiece (swing position of the compensator), measurements can be carried out with high accuracy **1**

Extremely robust compensator **2**

» Engineers' Automatic Level GFE 32, 360°

» Engineers' Automatic Level GFE 32-L, 360°

TECHNICAL DATA	ENGINEERS' AUTOMATIC LEVEL GFE 32, 360°	ENGINEERS' AUTOMATIC LEVEL GFE 32-L, 360°
ART. NO.	210332	210333
Magnification	32 x	32 x
Clear objective aperture	45 mm	45 mm
Field of view	1°	1°
Shortest focussing distance	2 m	2 m
Mean error per 1 km double run levelling	±2 mm	±2 mm
using index reference mark	< 1 mm	< 1 mm
Multiplication constant	100	100
Working range of compensator	±15'	±15'
Levelling accuracy compensator	2"	2"
Circular bubble	8' / 2 mm	8' / 2mm
Horizontal circle	360°	360°
Dust/water protection	IP54	IP54
Weight	2.5 kg	2.7 kg
Dimensions	280 x 160 x 140mm	280 x 160 x 140 mm
Temperature range	-25 °C – +50 °C	-25 °C – +50 °C
Laser beam switchable/class	—	635 – 670 nm / 2
Beam diameter	—	2 mm
Laser working range	—	120 m (during day)
	—	300 m (twilight)
Deviation	—	5"
Operating time/power supply	—	8 h / 2 x AAA
Laser filter for eyepiece	—	Yes

SUPPLIED WITH

· Container
· Adjustment pin
· Screwdriver
· Dust brush
· Plumb bob

FEATURES

· Robust and temperature insensitive
· Highly accurate and free-moving vertical axis
· Separate horizontal clamp
· Accurate tangent screw movement and focussing drive without backlash
· Optical sighting device
· Excellent image quality
· Service friendly due to simple construction

1

2

FLP 100
Laser Zenith Plummet

» **A precise laser plummet incorporating a coaxial telescope for both laser and optical observations.**
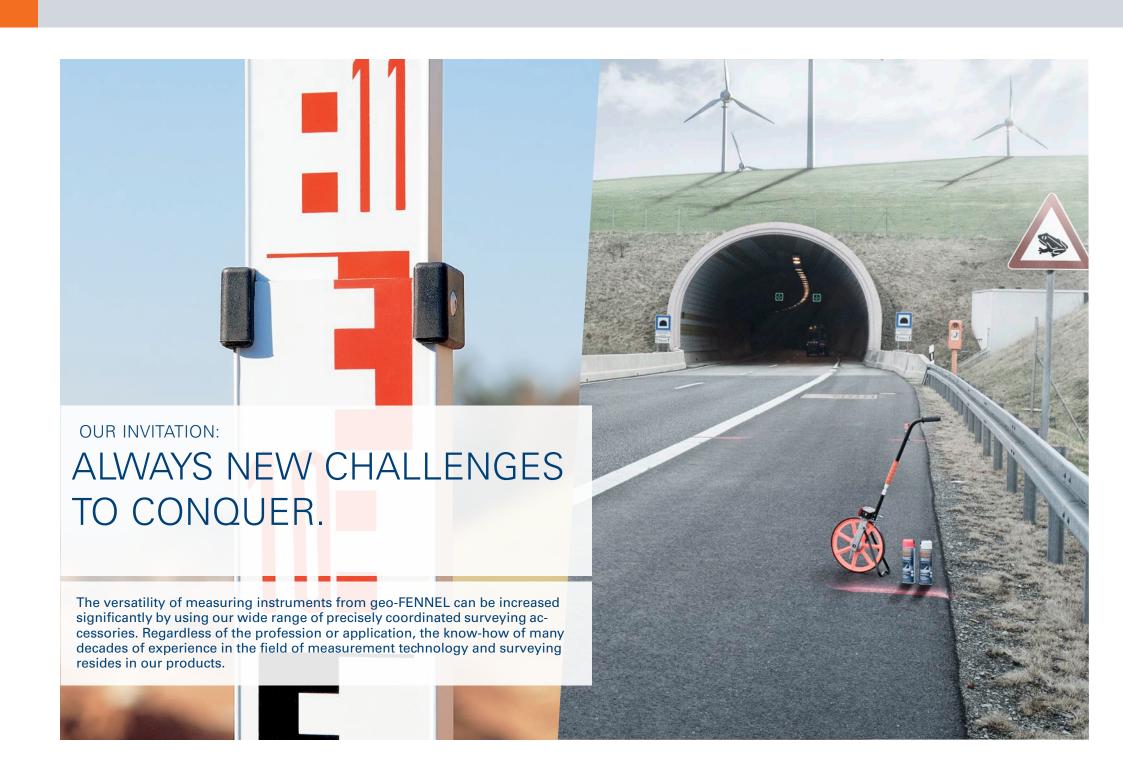
TECHNICAL DATA	FLP 100
Magnification	26x
Clear objective aperture	36 mm
Shortest focussing distance	0.4 m
Laser Pointer	
Laser class/wave length	2M / 635 nm
Spot size Ø	3 mm / 80 m
Max. visible distance (day)	≥ 120 m
Max. visible distance (night)	≥ 250 m
Deviation to optical axis	≤ 3"
Accuracy	± 2.5 mm / 100 m
Optical Plummet	
Laser class/wave length	1 / 650 nm
Accuracy	± 1 mm / 1.5 m
Plate level	20" / 2 mm
Power supply	2 x AA alkalines
Temperature range	-10 °C – +50 °C
Dust/water protection	IP54
Weight	2.8 kg

FEATURES	SUPPLIED WITH
	ART. NO. 310000
· Easy to use with two laser plummets (up and down)	· Set of alkaline batteries
· Laser dot visible up to ≥ 120 m	· Target plate
· High accuracy for precision work	· Container

OUR INVITATION:

ALWAYS NEW CHALLENGES TO CONQUER.

The versatility of measuring instruments from geo-FENNEL can be increased significantly by using our wide range of precisely coordinated surveying accessories. Regardless of the profession or application, the know-how of many decades of experience in the field of measurement technology and surveying resides in our products.

FS 23
FS 23 W/S
Aluminium Tripod

TECHNICAL DATA	FS 23
	ART. NO. 152 **ART. NO. 152 W/S**
· Flat head · 105 – 170 cm · 5.1 kg	**Aluminium Tripod FS 23** · Ideal for all measuring instruments · Quick clamp system · Flat head · Shoulder carrying strap · Diameter of tripod head: 143 mm **Aluminium Tripod FS 23 W/S** · Same as FS 23 tripod, but with screw clamp system

FS 24
FS 24 W/S
Wooden Tripod

TECHNICAL DATA	FS 24
	ART. NO. 154 **ART. NO. 154 W/S**
· Flat head · 105 – 170 cm · 6.5 kg	· Robust wooden tripod for theodolites and total stations · Quick clamp system · Flat head · Shoulder carrying strap · Diameter of tripod head: 140 mm · Same as FS 24 W/S tripod, but with screw clamp system

TN 15
TN 15-0
Telescopic Levelling Staff

TN 15		
ART. NO. TN 15		**485**
ART. NO. TN 15-0		**486**
High-quality levelling staff similar to TN 15, except: · Rear face graduated in mm with "0" at the bottom		

L 23, L 25, L 50
Prism Poles

B 18
Bipod

» For GPS rods and prism poles

Combination options

AL11-D

A4

L 25
L 50

Hdmini

L 23

A3

ALL 103

TECHNICAL DATA	L 23	L 25	L 50
ART.-NO.	223-S01, 223-S02, 223-S03	225	228
Length	122 – 208 cm	134 – 250 cm	160 – 500 cm
Adapters		5/8"	5/8"
223-S01	Optical square (Ø 10 mm)		
223-S02	5/8"		
223-S03	Leica pin		
Adapter height adjustable	No	Yes	No
Clamp type	Quick-release clamp	Quick clamp	Quick clamp
Circular bubble	Yes	Yes	Yes
Case	Yes	Yes	Yes
Weight	0.9 kg	1.5 kg	2.35 kg

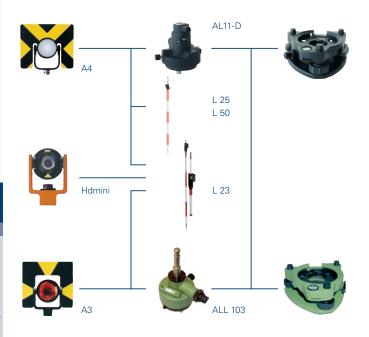| B 18 |
|---|
| ART. NO. 640 |

· Made of aluminium
· Working range of legs: 1.10 m – 1.80 m
· Quick-release clamping mechanism for legs
· Possible rod diameters: 19 – 38 mm
· Staffs and poles secured with thumb screw
· Weight: 2 kg
· Supplied with leg clip and nylon case

G 20, G 25
GPS Antenna Poles

TECHNICAL DATA	G 20	G 25
ART. NO.	630	635
Length	200 cm	136 – 248 cm
Adapter	5/8"	5/8"
Material lower tube	Carbon fibre	Carbon fibre
Material upper tube	Carbon fibre	Aluminium
Connection	Fixed	Telescopic
Clamp type	–	Screw clamp
Circular bubble	Yes	Yes
Case	Yes	Yes
Weight	0.6 kg	1.1 kg
Remark	Lightweight	Steel locking pin can be inserted at 1.80, 2.00, 2.20 m to guarantee no slipping

Prism Set A3
(Leica Style)

ART. NO. 401700

· Tilting prism holder made of plastic, yellow/black target made of metal
· Bag included
· Single prism: Ø 62.5 mm
· Accuracy: ± 2"
· Offset: -34 mm
· Axis height: 84 mm

Mini Prism Pin Pole Set ADS 103

ART. NO. 403100

· The pin pole has 3 sections that screw together to form a height of 0.6, 1.2 or 1.8 m.
· The adjustable 25 mm prism can be locked anywhere along its length.
· Offset: 0 mm
· Many accessories

FP 50
Flat Prism

ART. NO. 403400

· Tilting flat prism with one-sided reflective film, with padded bag
· Diameter: 48 mm
· Offset: 0 mm
· Axis height: 88 / 112 mm (depending on adapter)
· Supplied with Leica, 5/8" and M 17 x 1.25 adapters
· Weight: 130 g

AJ 10 and AJ 10-D
Tribrachs

ART. NO. BLACK	400103
ART. NO. GREEN	400101

AJ 10
· Without optical plummet
· Available in black and green

ART. NO. BLACK	400003
ART. NO. GREEN	400001

AJ 10-D
· With optical plummet
· Available in black and green

Prism Set A4

ART. NO. 401800

· Tilting prism holder made of metal, yellow/black target made of metal
· Bag included
· Single prism: Ø 62.5 mm
· Accuracy: ± 2"
· Offset: 0 / -30 mm
· Axis height: 97 mm

AL11-D
Tribrach Adapter

ART. NO. 400203

AL11-D
· Optical plummet
· Height adjustable
· Tubular vial
· Available in black

ALL 103
Tribrach Adapter

ART. NO. 400205

ALL 103
· Leica adapter
· Optical plummet
· Tubular vial
· Available in green

Mini Prism Set
Hdmini

ART. NO. 403000

· With circular levelling vial, padded bag, 5/8" female base, hook for plumb bob
· Single prism: Ø 25 mm
· Accuracy: ± 2"
· Offset: 0 / -30 mm
· Axis height: 70 mm

F6
Two-way Radio

» **Robust and powerful PMR 446 Two-way radio for professional use**

1	F6-EM earphone/clip microphone
2	F6-HM hand microphone
3	Charger

1   2   3

TECHNICAL DATA	F6
RF output power	0.5 W
Frequency range	446.000 – 446.100 MHz
Channels	16
Audio output	1 W
Accu./operating time	12 V Li-Po 1,300 mAh / 12 h – 30 h
Temperature range	-25 °C – +55 °C
Dust/water protection	IP54
Shock/vibration	MIL STD 810 C/D/E & TIA/EIA 603
Working ranges	
Outside, open terrain	5 km
Outside, area between buildings	3 km

OPTIONAL	OPTIONAL
ART. NO. 870100	**ART. NO. 870150**
· F6-HM hand microphone with jacket clip	· F6-EM earphone/clip microphone

FEATURES

· Clear audio quality
· Automatic squelch
· TOT time-out timer to stop transmitting automatically
· Monitoring function
· DCS/CTCSS encoder and decoder to prevent interference at the same frequency
· Housing made of die-cast and high-resistant plastic
· Powerful lithium polymer rechargeable battery
· Battery-saving mode
· Channel annunciation in English language
· LED showing receipt, transmission and battery status
· Europe-wide licence and toll-free use
· PC programmable (optional):
· Frequency, functions and settings can be set by the optional programming software

SUPPLIED WITH

ART. NO. 870000

· Two-way radio
· Rechargeable battery
· Charger
· Belt clip
· Hand strip

FMD 60
Metal Detector

» Easy-to-use metal detector.
Detection and localisation of manhole covers, site marks, pipes, etc. under earth, mud, water, snow, paths, ...

**FEATURES
HEADPHONE FH 1 (OPTIONAL)**

ART. NO. 800810

· For the use of FMD 60 in loud surroundings
· Padded earcups and headband

TECHNICAL DATA	FMD 60
Measuring depth	60 cm
Operating time	30 h
Measuring disc	Ø 24 cm
Dust/water protection measuring disc	IP67
Weight	2.0 kg
Weight	3.3 kg with case and box

FEATURES

· Detection of all kinds of metals
· Handle adjustable, length 114 – 139 cm
· Headphone jack

SUPPLIED WITH

ART. NO. 800800

· 8 x AA alkaline batteries
· Carrying bag

M10
Precision Measuring Wheel

M 10
ART. NO. 110

· Wheel circumference 1 m
· Clamp for wheel
· Robust support allows M 10
  to stand upright
· Dirt remover
· Precision counter with "0" reset
· Sturdy spokes offer low resistance
  to wind, ensuring ease of use
· The highly visible colour of the
  wheel increases operator safety
  during use on roads
· Weight: 2.7 kg

M10S
Precision Measuring Wheel

M 10S
ART. NO. 141

Same as M 10, except:
· Heavy model with double-disk
  wheel made of metal
· Weight: 3.4 kg

High-Speed Tape

» **4x speed rewind.**

» Nylon-coated steel tape. Abrasion resistant and
  virtually unbreakable. Ergonomically designed to be
  comfortable and easy to use.

HIGH-SPEED TAPE	
ART. NO. 30 m	**M313030**
ART. NO. 50 m	**M313050**

· Tape width: 12.5 mm
· Graduation in mm
· Easy to grip
· Accuracy: CE class II

M 10K
Case

M 10K CASE
ART. NO. 011

Sturdy case for M 10 and M 10S
made from high-quality materials

M 10T
Bag

M 10T BAG
ART. NO. 010

Bag for M 10 and M 10S made from
high-quality materials

EasyWheel M20
Measuring Wheel

» · Compact and durable multi-purpose measuring wheel
· Easy-to-read display
· Foldable for easy storage and transportation
· Brake and zero-reset button incorporated into handle

The counter counts forward and backward **1**

Robust hinge mechanism **2**

Large folding stand for stability **3**

Ergonomic handle with non-slip pistol grip **4**

TECHNICAL DATA	
ART. NO. 120	
Accuracy	± 0.1%
Measuring distance	0 – 9.9999 m
Wheel circumference	1 m
Extended size	1,000 (L) x 140 mm (B)
Folded size	510 (L) x 140 mm (B)
Weight	1.8 kg

SUPPLIED WITH M20

· Measuring wheel
· Carrying case with shoulder strap

FEATURES

· Ergonomic handle with non-slip pistol grip
· Brake and zero-reset integrated into the handle for ease of use
· Smallest unit of measurement 10 cm
· Counter adds when moving forward and subtracts in reverse
· Movable pointer to ensure accuracy of starting point and finishing position
· Large folding stand for stability
· Coated wheel for excellent traction over a variety of surfaces

Marking Spray

» For permanent wall/floor marking.

» Professional marking for building and road construction, civil engineering, construction sites, surveying jobs.

1 Patented one-hand safety cap with easy-touch release

Marking Wheel

» Marking wheel for comfortable marking with GEO-MARKER Marking Spray.

» No need to remove safety cap for use with marking wheel.

MARKING SPRAY
· For fast, clean and precise marking of asphalt, concrete, masonry, plaster, wood, earth and many other substrates
· Markings remain strongly visible up to 9 months
· Marks and sticks to any surface, even if it is wet
· Reliable even at sub-zero temperatures (down to -20 °C)
· Patented one-hand safety cap with easy-touch release
· Guaranteed marking without painted fingers
· Colour-coordinated cap
· Also easy to apply while wearing gloves
· Self-cleaning system, can be 100% emptied by spraying
· Environmentally friendly and non-hazardous to health

COLOURS	
ART. NO. fluo orange	901
ART. NO. fluo red	902
ART. NO. fluo blue	903
ART. NO. fluo yellow	904
ART. NO. fluo green	905
ART. NO. fluo pink	906
ART. NO. red	911
ART. NO. yellow	913
ART. NO. white	915

· Contents 500 ml
· Sales packing 12 cans per carton
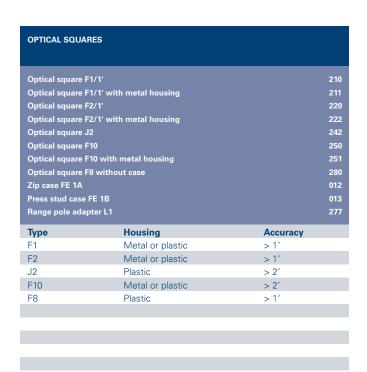
MARKING WHEEL
ART. NO. 940
· Length 83 cm
· Weight 0.6 kg

F1, F2, J2, F10, F8
Optical squares

» For staking out right angles or alignments in a straight line

» F1/F10   » J2   » F8

OPTICAL SQUARES	
Optical square F1/1'	210
Optical square F1/1' with metal housing	211
Optical square F2/1'	220
Optical square F2/1' with metal housing	222
Optical square J2	242
Optical square F10	250
Optical square F10 with metal housing	251
Optical square F8 without case	280
Zip case FE 1A	012
Press stud case FE 1B	013
Range pole adapter L1	277

Type	Housing	Accuracy
F1	Metal or plastic	> 1'
F2	Metal or plastic	> 1'
J2	Plastic	> 2'
F10	Metal or plastic	> 2'
F8	Plastic	> 1'

Rod Levels

» For holding, fixing or suspending to ranging poles and levelling rods

» LR 1   » LR 34   » LR 39   » LR 5

ROD LEVELS	
ART. NO. LR 39, plastic	390
ART. NO. LR 39, metal	391
ART. NO. LR 1, metal, adjustable	310
ART. NO. LR 34, metal, adjustable	330
ART. NO. LR 5, wood	350
LR 39 plastic	Not adjustable
LR 39 metal	Not adjustable
LR 34 + LR1 metal	Adjustable
LR 5 wood	Adjustable

Surveyors' Folding Rules

SURVEYORS' FOLDING RULES	
Surveyors' folding rule, 3 m, erect	410
Surveyors' folding rule, 2 m, erect	412
T1 surveyors' field bag	601

· Made from the finest-quality wood with strong joint springs
· Front side: Levelling graduations (E reading) 1 m black, 1 m red
· Reverse side: mm graduation in black
· Available in 2 m and 3 m lengths

Surveyors' Folding Frames

» Carrying strap included

SURVEYORS' FOLDING FRAMES	
DIN A4, wood	541
DIN A4, plastic (red)	542
DIN A4, Plexiglas (transparent)	543
DIN A3, wood	531

Tailor-made information

» You know best which special requirements you have for our surveying equipment. For further details, data concerning our products, catalogue downloads and all the latest news and information, please visit our website.

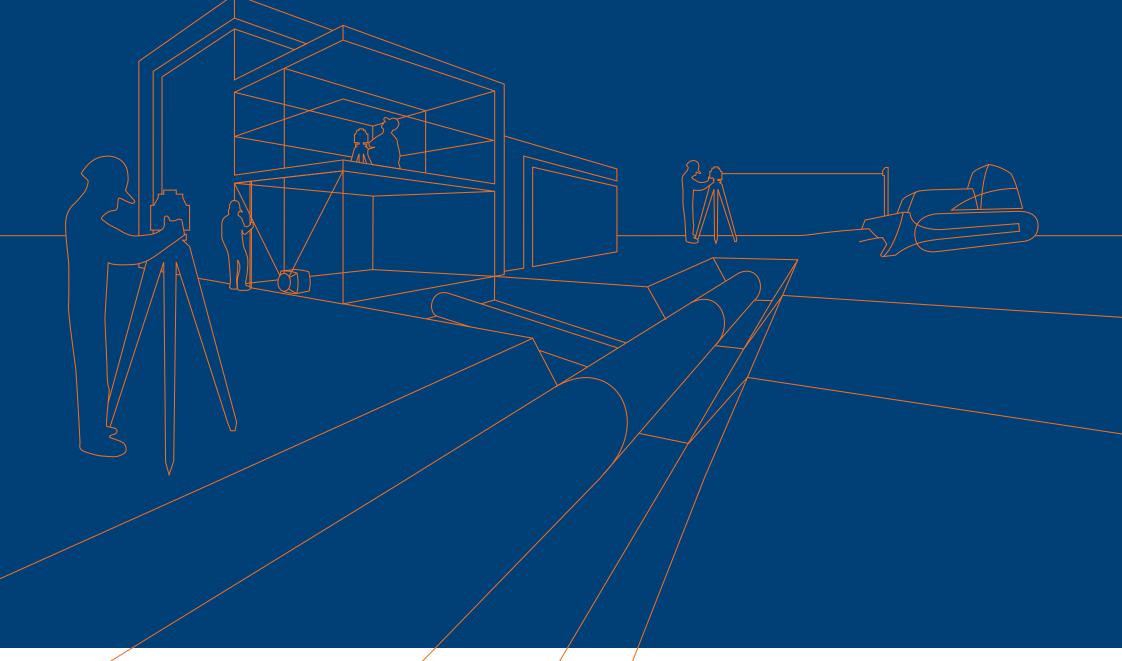**Further information is available @**

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Laser Measuring Tools & Environmental Measuring Instruments

» Here you can view all the other products in our current 2018 catalogue.
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Multi-Line Laser

LINE LASER

Horizontal Dual Grade Laser

Point and Line Laser

Selection PRO

LINE LASER

ROTATING LASER

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