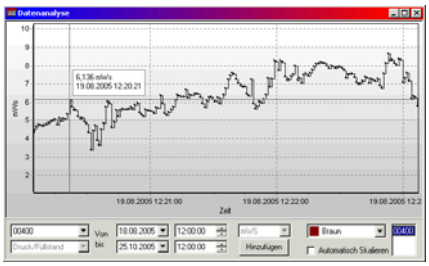
Technical manual BA 1109

Water level



Hydrolog 3000

Water level sensor with data memory

for autonomous measuring and storing
of water levels and temperatures in liquids

High accuracy and long term stable water level measurement

Ceramic highly overload resp. pressure blow resistive membrane

Food- and drinking water suitable materials

Integrated temperature measurement

Integrated battery for minimum 2 million measurements resp.
10 years operation at a measuring interval of 3 minutes

Measuring rates from 1x per second up to 1x per 100 days

Data memory for up to 216 000 measurement values

Interface head up to 3m water column flood protected

Installation in water level tubes of 1 ¼“, at wider level tubes, e.g. 2“, a control plumbing by cable light plumbline is possible without deinstallation

Data retrieval directly per PC resp. handheld-PC or
wireless remote data transmission per GSM/GPRS

ACS-CONTROL-SYSTEM
know how mit system

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Application description

The water level senor with data memory **Hydrolog 3000** is a battery powered system for autonomous measurement of water levels from 1 up to 100m water column and temperatures in liquids, at environmental temperatures from – 25°C to +70°C.

The preferential application fields are water supply and distribution e.g. for measurement tubes, control levels, wells, containers and outstanding waters like lakes and rivers.

The excellent characteristics like highest strength against pressure and pressure blows, high resistance against chemicals and corrosion, very good insensitiveness against temperature shocks and EM interference, highest accuracy and long term stability as well as low influence of temperature makes it possible to use the sensor in various fields with liquids like water, waste water, solvents, oil, sludge, grease, cleaning agents, etc., where levels and temperatures combined with date and time should be surveillanced without having any auxiliary power at the place of installation.

For applications, where food or drink water suitability is necessary, a corresponding variant can be ordered where only suitable materials are used.

Because of many possibilities of adjustment a highest flexibility in the application for control level and especially for pumping test or long term surveillance is given.

Function

The liquid contacts directly the ceramic membrane and causes there a deflection of the membrane because of the hydrostatic pressure of the liquid.
At the maximum deflection the membrane contacts a robust ceramic carrier and because of this, the membrane come through over pressure of e.g. 40-times of nominal load at a sensor with a pressure range of 0...1 m water column without damage.

The water level proportional hydrostatic pressure signal of the ceramic membrane and also the temperature proportional signal of an optional integrated temperature sensor is measured by the integrated high-resolution digital electronic according to the adjusted measurement rate and is stored loss protected.

Because of an intelligent store management the internal data memory with a size of 64kB resp. 128kB allows a recording of minimum 21 600 up to maximum 216 000 measurement data sets at exclusive storage of the measurement signal water level.
If water level as well as temperature are recorded, minimum 16 200 up to maximum 162 000 measurement data sets could be stored.

A highly efficient lithium battery that is integrated in the probe ensures the power supply of the device.
The battery life time is conceived for minimum 2.000.000 measurements.
This equals a run time of minimum 10 years at a measurement rate of 1x per 3 minutes.

Integrated over voltage protection modules prevents the destruction of the water level sensor caused by atmospheric influences like e.g. thunder strike.

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Operation and data retrieval

The setting of the operation parameter, e.g. measurement place name, measuring unit, measuring rate or control value and the data retrieval from the water level sensor is operated in combination with the operation and evaluation software Gerätemanager GM–600 for PC resp. GM–620 for handheld-PC, alternatively directly per cable or wireless per GSM/GPRS remote data transmission (RDT) (only data retrieval) to a PC resp. FTP server.
The software allows a comfortable and flexible adaption to the various requirements of the respective measurement place.

The software version GM–600 is conceived for a PC with operating system MS WINDOWS® 2000 and higher and allows the configuration of the sensor, reading out the measurement values from the sensor, archival, conversion to an excel-, resp. ASCII-, resp. Hydras3-, resp. Wiski-file, as well as the graphical illustration of the measurement values.

The software version GM–620 is conceived for a handheld-PC with operating system MS WINDOWS® and .NET® Framework, like e.g. MS WINDOWS® Mobile.

For the direct cable bound connection to the RS-232 interface (COM port) of the PC resp. handheld-PC, the interface converter STK–RSC–232 is used. For the connection to the USB interface of the PC resp. handheld-PC the interface converter STK–RSC–USB is used.
The water level sensor is equipped with a RS485 interface.
The signal conversion to a RS232 resp. USB interface is made by the interface converter.
At a directly per cable connected PC resp. handheld-PC a real time view of the measuring values of the water level sensor with a measuring rate of 1x per second is possible.

For the more comfortable wireless remote data transmission the battery powered GSM/GPRS RDT module GSM-3000 can be used to configure the water level sensor resp. to read out the measuring values without the need to go to the place of installation
By this the configuration resp. measuring values can be transmitted directly per GSM network between the module and the PC.
Alternatively the measuring values can be transmitted by GPRS to an FTP server, to make the data's worldwide available per internet.
When using the RDT module the active use of an alarm function is possible that informs immediately and continuously by SMS messages about the actual measuring values if the measuring value exceeds a freely adjustable limit measuring value.

The settings of the water level sensor are protected against unauthorized changing's and can only be changed after the input of the valid password.

Detailed informations to the operation parameter and the operation can be found in the technical manual of the Gerätemanager GM–600 resp. GM–620.

Safety notes

Each person that is engaged with inauguration and operation of this device, must have read and understood this technical manual and especially the safety notes.

Installation, electrical connection, inauguration and operation of the device must be made by a qualified employee according to the informations in this technical manual and the relevant standards and rules.

The device may only be used within the permitted operation limits that are listed in this technical manual. Every use besides these limits as agreed can lead to serious dangers.

The materials of the device must be chosen resp. checked for suitability to the respective application requirements (contacting substances, process temperature). An unsuitable material can lead to damage, abnormal behavior or destruction of the device and to the resulting dangers.

The sensors may not used as sole device for prevention of dangerous conditions in machines and plants.

The device meets the legal requirements of all relevant EC directives. CE

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Installation

The water level sensor with data memory **Hydrolog 3000** can be mounted into water level tubes wider than 1 ¼“. The installation in wider water level tubes than 2” is made by using adapter rings.
In water level tubes wider than 2“ a control plumbing with a cable light plumbline without deinstalling the sensor is possible.

The stabile carrying cable with steel axis for strain relief that is necessary to ensure the length stability of the cable, with shield for EMC protection and pressure balancing capillary for compensation the environmental air pressure guarantees an interference-free operation of the water level sensor.
The probe of the water level sensor is put into the medium by the carrying cable.
The carrying cable may not be folded and the cable sheath may not be damaged.
The cut of the carrying cable may only be made by the manufacturer.

A holding ring at the interface head fixes the water level sensor in the filler cap.
At the upper end of the interface head an electrical socket is implemented that functions as interface for operation and data transmission.

The construction of the interface head allows those damage protected flooding up to 3m water column.

Avoid faulting the pressure compensation openings resp. the pressure compensation membrane inside it at the bottom side of the interface head.
The hindrance of the air pressure compensation can lead to faulty measurement results. At a damaging of the pressure compensation membrane the flood protection of the interface head is no more longer ensured.

The correct function of the device within the specific technical data can only be guaranteed, if the permitted temperature in the area of the sensor from – 25°C to +70°C will not be exceeded.

Maintenance

The device is free of maintenance.

Special substances can lead to solid coatings on the membrane.
Such depositions can lead to faulty measurement results of the sensor.
In the case of coat forming liquids the membrane must be regularly cleaned e.g. with clear water. Don’t use sharp tools or aggressive chemicals for cleaning.

Battery change

The integrated highly efficient lithium battery guarantees a run time of the water level sensor of 10 years at a measuring rate of 1x per 3 minutes.
At higher measuring rates, e.g. 1x per second at real time evaluation the battery is loaded stronger and thus discharged faster.

A battery change can only be made by the manufacturer.
The attempt of the user to change the battery resp. to open the probe housing by himself the device can be damaged resp. destroyed. This leads to an expire of all rights to claim under guarantee.

For applications with higher measuring rates the water level sensor **Hydrolog 1000** is available, where the battery can be changed by the user.

Repair

A repair may only be carried out by the manufacturer.

If the device must be sent back for repair, the following informations must be enclosed:
- An exact description of the application.
- The chemical and physical characteristics of the product.
- A short description of the occurred error.

Before returning the device for repair, the following measures must be proceeded:
- All stick product residues must be removed. This is especially important, if the product is unhealthily, e.g. caustic, toxic, carcinogenic, radioactive etc.
- A returning must be refrained, if it is not possible by 100% to remove the unhealthily product completely, because e.g. it is penetrate into cracks or is diffused through plastic.

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Technical data

Auxiliary supply

Power supply:	Integrated lithium battery, changeable by manufacturer
Battery run time:	≥ 2.000.000 measurements resp. ≥ 10 years at a measuring rate of 1x per 3 minutes

Signal water level

Measuring range:	1m water column up to 100m water column	
Measuring units:	mWs / cmWs / bar / mbar / mNN / mAbsenkung	
Measurement resolution:	≤ 0,01% FS [2]	at limit value
Characteristic deviation [3) 5) 12)]:	≤ 0,1% resp. 0,25% FS [2]	
Temperature deviation:	T_k [4] zero	≤ ±0,15% FS [2] / 10 K, max. 0,75K
	T_k [4] span	≤ ±0,15% FS [2] / 10 K, max. 0,5K
Long term drift [12]:	≤ ±0,15% FS [2] / year	not cumulative

Signal temperature

Measuring range:	-25°C ... +70°C
Accuracy:	≤ ± 0,3 Kelvin
Measurement resolution:	≤ 0,1 Kelvin
Long term drift:	≤ ± 0,2 Kelvin / 1000 hours

Clock

Type:	Real time clock
Cycle accuracy:	≤ ±1 minute / month

Data memory

Memory capacity:	64kB	➔	10 700 ... 107 000	data records	water level
		➔	8 000 ... 80 000	data records	water level / temperature
	128kB	➔	21 600 ... 216 000	data records	water level
		➔	16 200 ... 162 000	data records	water level / temperature

Storage method:	Intelligent memory management. Measuring values are only stored at a exceeding of a minimum deviation, but always at a minimum of every 10th measuring cycle
Memory organization:	Circle memory active ➔ at overflow overwriting of the oldest data records Circle memory inactive ➔ memory is written only once
Measuring rate:	one measuring per 1 second up to one measuring per 100 days
Operation / data retrieval:	Operation and evaluation software GM-600 per PC resp. GM–620 per handheld PC, or per RDT module
Data processing:	Graphic data evaluation resp. data export as excel-, ASCII-, Hydras3- or Wiski-file resp. real time evaluation with measuring rate 1x per second and graphic evaluation by GM–600 resp. GM–620
Alarm management:	Surveillance of the measurement signals on exceeding the preset limit values with alarm message per SMS message by RDT module and separately adjustable alarm measuring rate

Interface

Type:	RS485 - full-duplex
Transmission rate:	9600 Baud

2) Referring to nominal measuring span resp. full scale (FS)
3) Nonlinearity + Hysteresis + Reproducibility
4) Tk = Temperature coefficient
5) Limit value adjustment
12) Higher values for special measuring range

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Technical data

Materials

Membrane: (medium contact)	Ceramic AL_2O_3 96%
Probe: (medium contact)	Steel 1.4404 (AISI 316L) / 1.4571 (AISI 316Ti)
Interface head:	CrNi-steel
Holding ring:	Aluminum
Interface socket:	Socket brass nickel plated / chrome plated, insert PBT/PUR, contacts gold plated
Carrying cable: (medium contact)	PE polyethylene
Pressure compens. element:	Filter membrane PES
Gaskets:	medium contact ➔ FPM – fluorelastomere (Viton®) EPDM – etylene-propylene-dienmonomere
	others ➔ FPM – fluorelastomere (Viton®)

Environmental conditions

Environmental temperature: – 25°C...+70°C, ice-free

Liquid temperature: – 25°C...+70°C, ice-free

Measuring range: 0...1mWs up to 0...100 mWs

Overload resistance:

Measuring range	overload / burst pressure
0...1 mwc	+4 bar_{rel}
0...2 mwc	+4 bar_{rel}
0…4 mwc	+4 bar_{rel}
0…5 mwc	+10 bar_{rel}
0...6 mwc	+10 bar_{rel}
0…10 mwc	+10 bar_{rel}
0…20 mwc	+15 bar_{rel}
0…40 mwc	+25 bar_{rel}
0…50 mwc	+40 bar_{rel}
0…100 mwc	+40 bar_{rel}

Vacuum resistance: 0 $mbar_{abs}$

Weight: 0,55 kg + (sensor length L in meter x 0,035 kg)

Protection classification:	Probe	IP68	DIN EN 60529
	Interface head	IP68 up to 3 mwc	DIN EN 60529
Climatic classification:	4K4H	DIN EN 60721-3-4	
Shock classification:	50 g	DIN EN 60068-2-27	(11 ms)
Vibration classification:	20 g	DIN EN 60068-2-6	(10 - 2000 Hz)
EM – Compatibility:	Emission	DIN EN 61326-1	operation device class B
	Immunity	DIN EN 61326-1	industrial range

Reference conditions: DIN EN 60770-1 resp. DIN EN 61003-1
T = 25 °C, relative humidity 45...75 %,
environmental air pressure 860...1060 kPa

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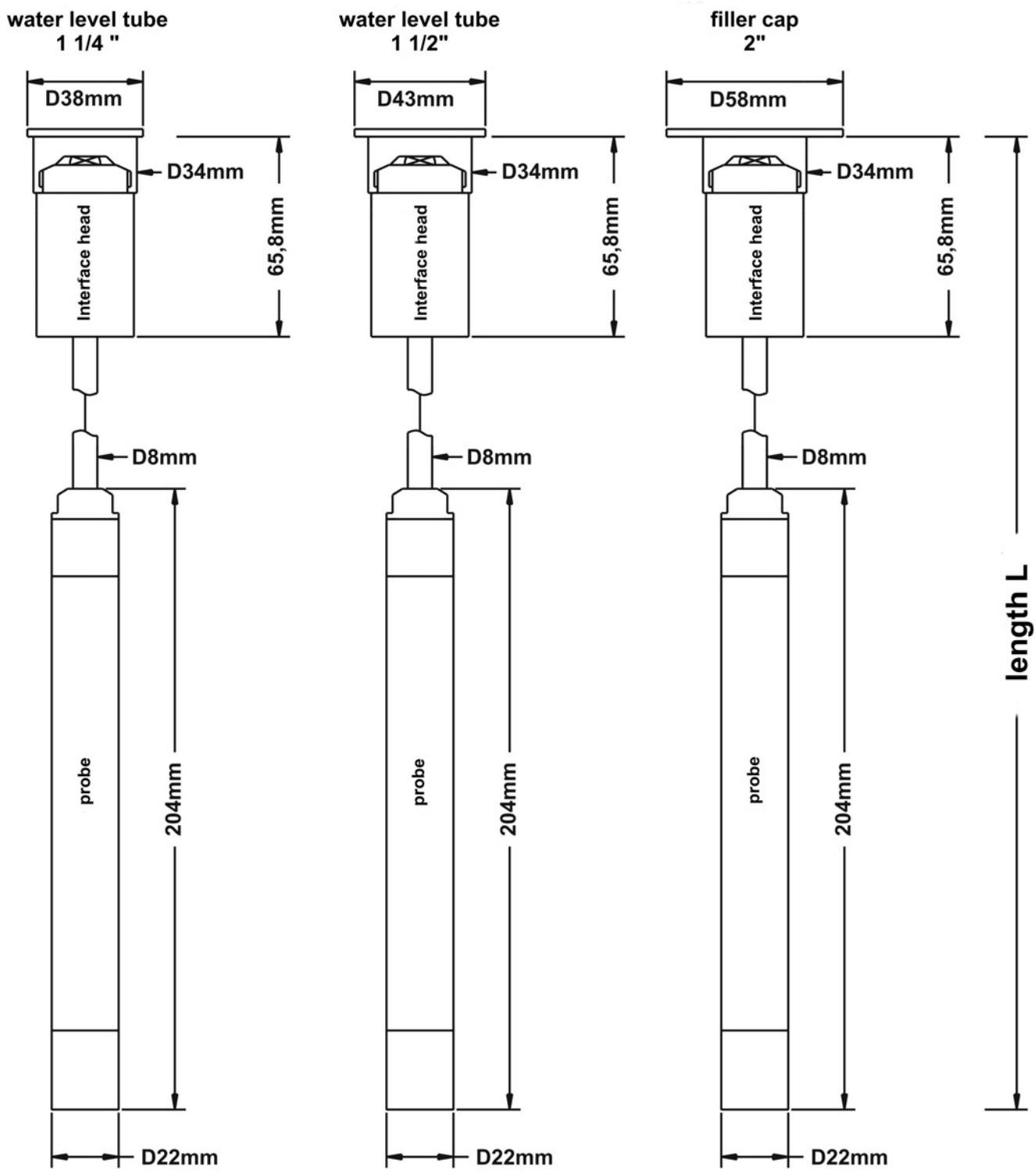
Dimension drawings



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Order code overview

Digital battery powered water level sensor with integrated temperature sensor
with data memory 64kB/128kB, alarm management, operation interval and control value protocol

Type:
- Standard
T Certificate for food and drink water suitability of all liquid contacting materials

Process connection:
20 for installation into 2“ water level tube — control measurement without removal possible
14 for installation into 1 ¼“ water level tube — control measurement without removal not possible
12 for installation into 1 ½“ water level tube — control measurement without removal not possible

Measurement signals:
S Water level
T Water level and temperature

Accuracy measuring system *) – material measuring membrane (medium contact):

0	0,25%		ceramic AL_2O_3	96%
K	0,1%	Linearization protocol	ceramic AL_2O_3	96%

Measuring range:
A 0...1 m water column (mwc)
B 0...2 m water column (mwc)
C 0...4 m water column (mwc)
M 0...5 m water column (mwc)
D 0...6 m water column (mwc)
E 0...10 m water column (mwc)
F 0...20 m water column (mwc)
G 0...40 m water column (mwc)
J 0...50 m water column (mwc)
H 0...100 m water column (mwc)
Y special measuring range — separate specification necessary

Memory capacity:

0	64 kB	max. 107 000 data records	water level
		max. 80 000 data records	water level and temperature
1	128 kB	max. 216 000 data records	water level
		max. 162 000 data records	water level and temperature

1

Material probe (medium contact):
1 Steel 1.4404 (AISI 316L) / 1.4571 (AISI 316 Ti)

Material gaskets (medium contact):
1 FPM fluorelastomere (Viton®)
3 EPDM etylene-propylene-dienmonomere — for food applications

Material carrying cable (medium contact):
A PE polyethylene

Sensor length L (see dimension drawings):
measure in mm

Hydrolog 3000 _ _ _ _ _ _ 1 1 _ A _

Installation material and connection cable are not enclosed in the delivery contents.

*) Higher values for special measuring range

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Accessories, not implemented in standard extend of supply

GM–600	Operation and evaluation software for operating system MS WINDOWS® 2000 and higher
GM–620	Operation and evaluation software for operation system with .NET® Framework, e.g. MS WINDOWS® Mobile
STK–RSC–232	Interface converter RS485/RS232 for PC interface RS 232, cable 1,75m for connection of a Hydrolog 3000 / GSM–3000 with the COM port of a PC
STK–RSC–USB	Interface converter RS485/USB for PC interface USB, cable 1,75m for connection of a Hydrolog 3000 / GSM–3000 with the USB port of a PC
GSM–3000	GSM/GPRS RDT module for connection of Hydrolog 3000 for remote data transmission for configuration, data transmission and alarm management
TDS RECON	Handheld PC for outdoor-use with operation system MS WINDOWS® Mobile with preinstalled operation and evaluation software GM–620 for connection to water level sensors series Hydrolog 3000 resp. GSM–3000 for configuration and data retrieval

Filler cap in foundry aluminum, plastic coated, with 6-edge-seal

VK-A 200	G 2“	acc. to DIN EN ISO228-1
VK-A 300	G 3“	acc. to DIN EN ISO228-1
VK-A 400	G 4“	acc. to DIN EN ISO228-1
VK-A 412	G 4 ½“	acc. to DIN EN ISO228-1
VK-A 500	G 5“	acc. to DIN EN ISO228-1
VK-A 600	G 6“	acc. to DIN EN ISO228-1
SCHVK-6	Key for 6-edge-seal	

Filler cap in foundry aluminum, plastic coated, with 5-edge-security-seal

VK-A 200 S	G 2“	acc. to DIN EN ISO228-1
VK-A 300 S	G 3“	acc. to DIN EN ISO228-1
VK-A 400 S	G 4“	acc. to DIN EN ISO228-1
VK-A 412 S	G 4 ½“	acc. to DIN EN ISO228-1
VK-A 500 S	G 5“	acc. to DIN EN ISO228-1
VK-A 600 S	G 6“	acc. to DIN EN ISO228-1
SCHVK-5	Key for 5-edge-secure seal	

Adapter rings for mounting the water level sensor into wider filler caps

ZR-2-3	2“ to 3“
ZR-2-4	2“ to 4“
ZR-2-412	2“ to 4 ½“
ZR-2-5	2“ to 5“
ZR-2-6	2“ to 6“

Cable clamp fixing	CrNi-steel, for cable diameter 8mm

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