



Level measurement

Universal technology for liquids, bulk materials and sediments



Measurably superior in processes

**You decide when production processes need to be faster and more reliable.
You are responsible for a cost-efficient solution of your measuring task and
you select the best technology for your company.**

**However, you rely not only on technical factors and commercial arguments.
But you also evaluate product and technological competence?**

We attach great importance
to providing qualified advice and optimum product
solutions – even for difficult measuring tasks.
We show you efficient options and interesting
perspectives so that you can safely decide what
is expedient and economically suitable for your
application. So that you are fully satisfied.

A complex range of various measuring principles
is not decisive – it shows instead a variety of appli-
cation options. The reliability of the level measuring
devices in use, the precision of the measuring
results and solid, simple handling are what counts.
Precision for many years – is this also an important
criterion for you? We provide it.

What's in it for you?

You benefit from measurable performance for your
level measurement.



Liquid measurement

... continuous and up-to-date just like liquid levels.

For stocking, tank content, storage capacities or automated disposal. You know yourself: Realtime inventory reports provide reliability for all production and fiscal necessities. We offer modern technology for this purpose, with good application advice.

- TDR – LFT guided microwave
- UM30 ultrasonic
- LFV200 vibration fork
- CQ28 capacitive
- CM30 capacitive
- LL fibre-optic cable with WLL190

Bulk material measurement

... simply fascinating, fascinatingly simple.

Varying fill levels, very different product characteristics, changing pyramid peaks in bulk materials, high dust generation or ignitable ambient conditions. You know best: Bulk materials make complex demands on level measurement. And not just in silos or bunkers. The bulk material transport on conveyor belts also needs to be monitored. We provide this too.

- MBA200
- Bulkscan
- DMT

Reliable, in small and large containers



Modern technology for small and large measuring tasks. Laser, guided microwave (TDR), ultrasound, capacitive measurement up to the electromechanical option: Measure liquid levels reliably with our measuring devices.

- **Modern sensor technology** for almost all liquids, e.g. water, oils, coolants, cooling lubricants, foodstuffs, cleaning agents, paint, varnish. Also for foaming liquids and emulsions
- **Non-contact measurements**
- All parts that come into contact with products are made of **stainless steel or Teflon**
- Measurement **independent** of the **container form**

Typical applications

- Machine tools
- Food industry
- Automotive industry
- Print industry
- Water, waste water
- Paper production and processing
- Wood processing, preparation
- Automation in buildings
- Agriculture



Machine tools



Food industry



Automotive industry



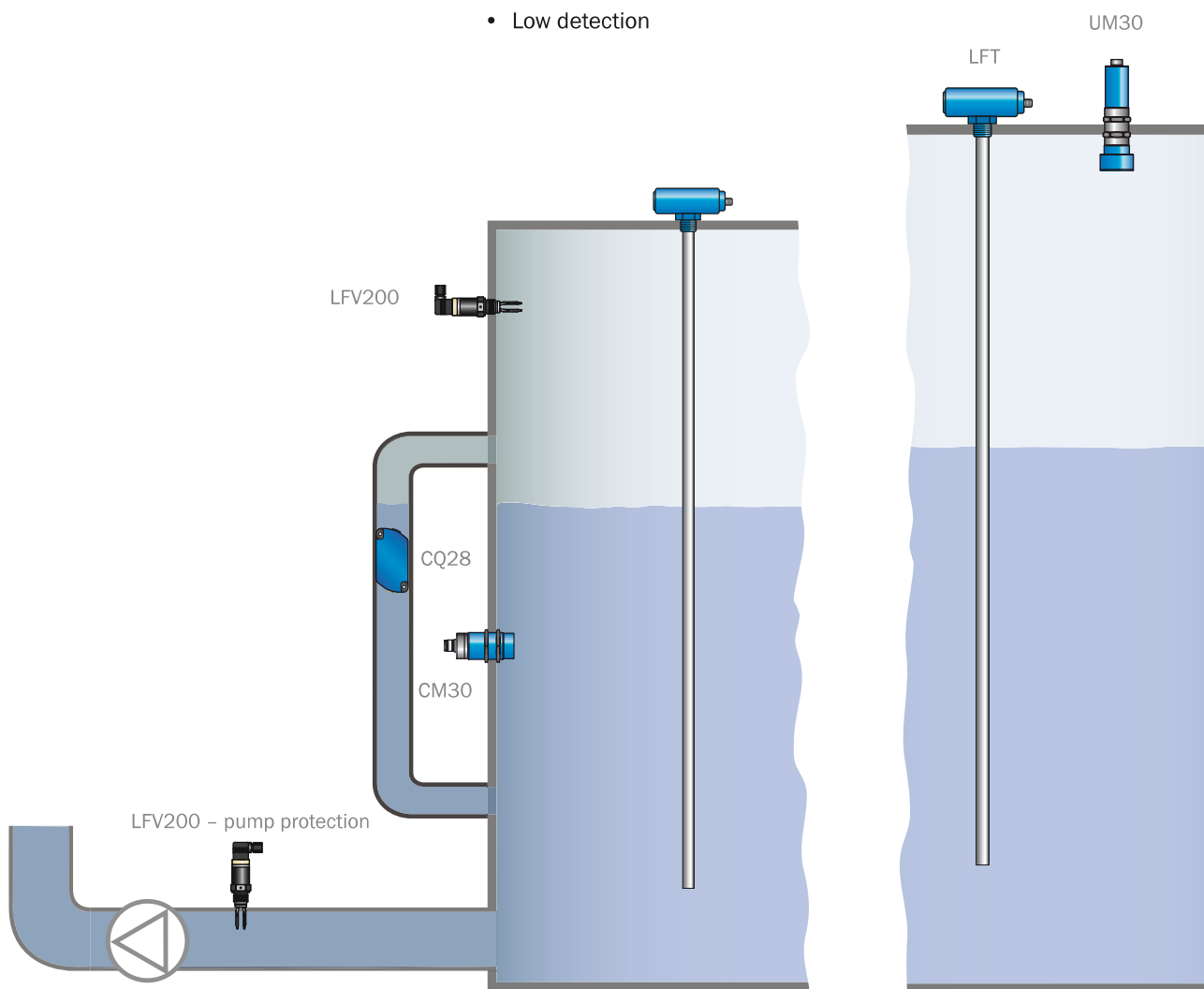
Paper production and processing



Limit level measurement

- High level detection
- Demand level detection
- Low detection

Continuous measurement



LFT level sensor with TDR



Technology for limit levels and continuous measurement.

- TDR technology makes it independent of mounting conditions and tank environments
- Measures in almost all liquids regardless of subsequent changes in the medium – no re-calibration necessary
- Precise and flexible measurement, particularly in small tanks and containers
- Reasonably priced, reliable, continuous level measurement and limit level detection with just a single device
- Simple single-button operation and setting of switching point via teach-in

Extremely short microwave pulses are emitted from the antennae system onto the product to be measured, reflected from the liquid surface, and received by sensitive electronics. The time between transmission and reception of the signal is proportional to the level in the container. A special time dilation process allows reliable and precise measurement of the extremely short times.



LFT	
Measuring principle	Guided microwave, TDR
Application	Liquids
Measuring method also suitable for	Foam
Maximum measuring range	2 m
Maximum measuring accuracy	3 mm
Signal output	4 ... 20 mA, Binary
Typical installation position	Vertical
Maximum temperature in container	80 °C
Maximum pressure in container	1 bar rel.
Protection class (IP)	IP 67
Type of connection	M12x1, 5-pin, 8-pin
Power supply	18 ... 30 V DC
Ambient temperature	-10 ... +60 °C
Process connection	G 3/4" A, 3/4" NPT



UM30 level sensor



Ultrasonic sensor for limit levels and continuous measurement.

- High measurement accuracy due to time-of-flight measurement
- Independent of type of material (also foils, glass, bottles, liquids)
- Teach-in
- Immune to dirt, dust and vapours
- Scanning distance up to 6000 mm
- Binary outputs or analogue output

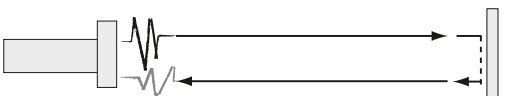


Ultrasonic sensors are based on the time-of-flight principle in which an ultrasonic signal (sound wave) is generated by exciting a membrane and emitted towards an object of any shape. The sound wave is reflected and the echo received again. Given a known medium density, the distance between the object and the sensor is calculated from the speed of sound and the time difference between transmission and reception of the signal. Whereby the ultrasonic sensor is both transmitter and receiver.

UM 30	
Measuring principle	Ultrassound, time-of-flight process
Application	Bulk materials, liquids
Measuring method also suitable for	Dust, vapours
Maximum measuring range	6 m
Maximum measuring accuracy	1 mm, 2 % GTW
Signal output	4 .. 20 mA or 0 ... 10 V DC, binary
Typical installation position	Vertical
Protection class (IP)	IP 65
Type of connection	M12x1, 5-pin
Power supply	12 ... 30 V DC
Ambient temperature	-20 ... +70 °C
Process connection	Metric M30 thread

Functional principle

1. Sound wave emitted
2. Reflection



3. Reception of echo



LFV200 level sensor



Vibration limit switch for limit level measurement.

The LFV200 vibration fork is a universal vibration limit switch for measuring the levels of almost all liquids.

- Can be used in containers and pipes regardless of the installation station
- Commissioning without calibration
- Production-independent switching point
- Friction- and maintenance-free
- Small, compact housing
- Aseptic version for food & pharmaceutical industries
- High reproducibility



The sturdy stainless steel tuning fork is piezoelectrically energized and vibrates at its resonant frequency. If the tuning fork is covered with liquid, the vibration frequency changes. This change is reliably detected by the integrated electronic circuitry and converted into a switch signal. The switching status is visible on the outside by a two-coloured LED. No adjustments are required to put the LFV200 into operation.

LFV200	
Measuring principle	Vibrating fork
Application	Liquids
Measuring method also suitable for	Foam, vapours
Maximum measuring temperature	Up to 150 °C
Maximum measuring accuracy	±2 mm
Signal output	Digital
Typical installation position	Universal
Protection class (IP)	IP 67, IP 65
Type of connection	M12x1, DIN 43650 plug
Power supply	10 ... 55 V DC or 20 ... 253 V UC
Ambient temperature	-40 ... +70 °C
Process connection	G 3/4", G 1", Triclamp 1, Triclamp 2, tube thread DIN11851 DN 25, 40, 50



CQ28 capacitive sensor



Limit level measurements through walls too.

- Adjustable switching distance 1 ... 10 mm
- 4-wire, 10 ... 30 V DC
- Programmable output function
- High EMC resistance to interference
- IP 68 enclosure rating
- Teach-in at the press of a button or remote adjustment via control wire
- Ultra-flat housing: 28 x 46 x 5.5 mm³ (W x H x D)



Brilliant functional principle: the active element of the capacitive proximity sensor works like a condenser within whose electrical field increased capacity is triggered as soon as an object approaches it. This increase is detected and transmitted by a signal evaluator.

Solid or liquid, compact or crumbly, metallic or non-metallic – a capacitive sensor detects all materials equally well, regardless of their properties. Because just its presence in the sensor's electrostatic field is enough to detect any non-gaseous material. And watery solutions are particularly well detected. Liquids and bulk materials are also reliably detected by the CQ28 even through non-metallic walls and without contact with the medium.

C Q 2 8	
Measuring principle	Capacitive
Application	Liquids, bulk materials
Measuring method also suitable for	Dust, foam
Maximum measuring range	Switching distance up to 10 m
Signal output	Digital
Typical installation position	Vertical/horizontal
Protection class (IP)	IP 68
Measurement through container wall	Yes
Type of connection	PVC cable, 2 m
Power supply	10 ... 30 V DC
Ambient temperature	-20 ... +85 °C



CM30 capacitive sensor



Capacitive limit level measurement.

- Adjustable switching distance 2 ... 16 mm (flush) or 4 ... 25 mm (non-flush)
- 4-wire 10 ... 40 V DC or 2-wire 250 V AC
- Antivalent or configurable output function
- High EMC resistance to interference
- IP 67 enclosure rating
- Sensitivity adjustment via potentiometer
- Metric housing



Brilliant functional principle: the active element of the capacitive proximity sensor works like a condenser within whose electrical field increased capacity is triggered as soon as an object approaches it. This increase is detected and transmitted by a signal evaluator.

The CM30's advantage: as a capacitive sensor it detects all non-gaseous materials – regardless of their properties. In addition to solid, compact, crumbly, metallic and non-metallic materials, the CM30 also detects the presence of watery solutions particularly well in its electrostatic field.

Another plus: object detection takes place reliably even through non-metallic walls without contact with the medium.

CM 30	
Measuring principle	Capacitive
Application	Liquids, bulk materials
Application	Dust, foam
Signal output	Digital
Typical installation position	Vertical/horizontal
Protection class (IP)	IP 67
Measurement through container wall	Yes
Type of connection	PVC cable, 2 m, M12 plug connection 4-pin
Power supply	10 ... 40 V DC, 250 V AC
Ambient temperature	-25 °C ... 80 °C

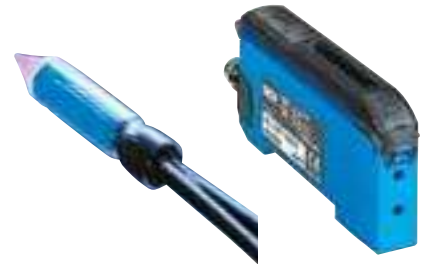


LL3-DF02 level sensor with WLL190T-2



Fibre-optic cable for detection of a liquid level.

- Measures almost all liquids
- Precise and flexible measurement, particularly in small containers such as beverages bottles
- Teach-in via adjustment button or external input
- Binary outputs



The fibre-optic cable for measuring liquid levels detects the level of almost any liquid. Whereby it is irrelevant whether the liquid is clear or opaque. The detection principle is based on the differing refractive indices of air and liquids. There is a large difference between the refractive index of the plastic and the air when the tip of the sensor is in the air. The light beam is completely reflected and returned to the receiver. The difference in the refractive index of plastic and liquid is, however, considerably smaller when the tip of the sensor is in the liquid. The majority of the light beam is then absorbed by the liquid and only a very small amount of light returns to the receiver. The level of the liquid is thus determined.

LL3-DF02 with WLL190T-2

Measuring principle	Visible red light
Application	Liquids
Application	Low foam formation
Maximum measuring accuracy	+/-0.5 mm
Signal output	Binary
Typical installation position	Vertical
Protection class (IP)	IP 67 ¹ /IP 66 ²
Type of connection ²	M12, 4-pin
Power supply ²	12 ... 24 V DC
Ambient temperature	-40 ... +105 °C ¹ , -25 ... +55 °C ²

¹Fibre-optic cable, ² WLL190T-2 evaluation unit



Master material goods with ease – with SICK sensors

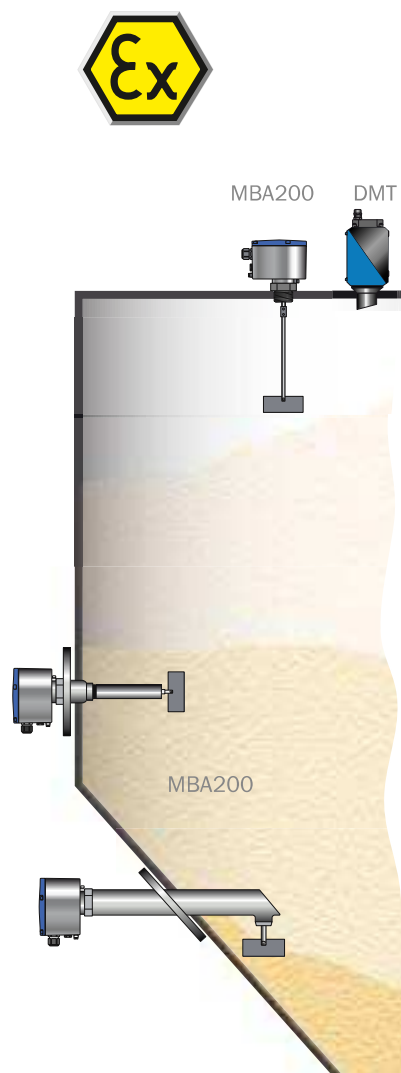


Level measurement tasks made easy. SICK offers simple selection of the right solution, even for very complex level measurement tasks.

- **Modern sensor technology:**
Radar, laser, ultra sound, electromechanical
- Universal for **all bulk materials**, e.g. stones, sand, wood chips, flue ashes, cement, flour, grain
- Explosion protection according to:
ATEX (zone 20/21)
- Silo level for limit level measurement: **unlimited**
- Silo level for continuous measurement: **to 70 m**
- **Non-contact** measurements
- Application also in **strong vibrations**
- All parts that come into contact with products are made of **stainless steel**
- Product temperatures **up to 800 °C**
- Process pressure **up to 10 bar**

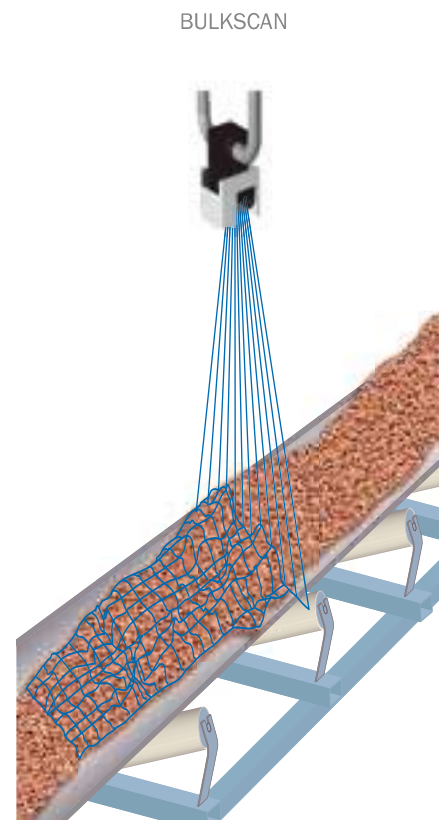
Typical applications

- Waste treatment
- Rubber, plastics processing
- Glass, ceramics, china
- Building materials, stones, earth
- Cement works
- Power plants
- Metal and steel processing
- Foodstuffs, animal feed
- Paper manufacture, printing industry
- Wood processing
- Bottling plants
- Mining industry
- Conveyor systems



Limit level measurement

- High level detection
- Demand level detection
- Low detection



Continuous measurement

MBA200 level sensor



The reliable level indicator.

Over many years, SICK's rotating paddle level indicators have proven themselves to be rugged, safe and reliable limit level signallers for all bulk materials. Now SICK has developed a new rotating paddle signaller with many functional advantages:

- Plug-in device head for simple mounting, checking of function and replacement
- Improved bearings made of stainless steel and seals made of a combination of Viton/Teflon
- Safety-oriented switching as full or empty signaller



The container with its material content and a measurement probe form an electrical condenser. The filling height is determined by measuring the condenser capacity.

A synchronous motor slowly moves the rotating paddle. When the level of bulk material reaches the paddle, the rotating motion is blocked. The counter torque is used to turn the motor mechanics against a switch which shuts off the motor. This condition is electronically transmitted with a relay switch contact.

Using a spring mechanism, the motor mechanics are returned to their operational position as soon as the rotating paddle is freed from the bulk material. The switch is released and the paddle begins to rotate again.

MBA200	
Measuring principle	Rotor shaft, electromechanical
Application	Bulk materials, sediments
Measuring method also suitable for	Dust
Signal output	Relay (changeover contact)
Typical installation position	Vertical, horizontal
Approvals	ATEX
Dust explosion zones	20/21
Maximum temperature in container	800 °C
Maximum pressure in container	10 bar
Protection class (IP)	IP 65
Type of connection	Terminal compartment
Power supply	230 V, 115 V, 24 V DC
Ambient temperature	-15 ... +60 °C, With heater: -30 ... +60 °C
Process connection	1 1/2" thread, flange



DMT laser scanner



Non-contact detection of large distances.

- Measurement range up to 155 m
- High measurement accuracy due to time-of-flight measurement
- Simple adjustment via pilot light
- Easy handling by means of programmable parameters
- 2 switching outputs
- Serial RS-422 or RS-232 interface and analogue output
- PROFIBUS



The pulse travel time measures with tiny laser light flashes of only four nano-seconds each. This sensor has very large scanning widths. The measured values are simply transmitted by means of different interfaces – analog/RS-422 and RS-232 or PROFIBUS.

DMT	
Measuring principle	Laser, Laser class 1
Application	Bulk materials, liquids
Measuring method also suitable for	Dust
Maximum measuring range	155 m
Maximum measuring accuracy	10 mm
Signal output	4 ... 20 mA, RS-422
Typical installation position	Variable
Max. object temperature	1200 °C
Protection class (IP)	IP 65
Measurement through container wall	Optical window
Type of connection	Terminal compartment, 9-pin plug connector
Power supply	18 ... 30 V DC (limit values)
Ambient temperature	Operation: -10 ... +55 °C, Storage -25 ... +70 °C



BULKSCAN laser scanner



The measurement system for conveyor belts.

The BULKSCAN system measures the volume throughput of any bulk materials on conveyor belts. It determines volumes in bulk material stores. The measurement values can be used directly for control or regulatory purposes.

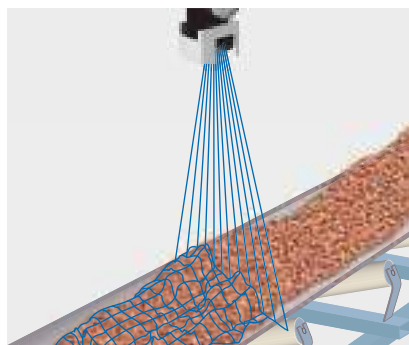
- Accurate volume measurement and determination of the centre of gravity
- Continuous measurement
- The laser scanner is easy to mount above the conveyor belt; no parts touch the product
- Possible to convert volumes to mass or density



Scan and measure volumes with the rugged BULKSCAN laser scanner – wherever the bulk material is transported via conveyor belt. Belt utilisation is monitored and optimised – also saving energy and cutting loading time.

A pulsed laser beam is emitted as a “measuring sensor”. When it hits an object (bulk material), it is reflected and registered in the receiver of the scanner. The time between emission and receipt of the pulse is proportional to the distance between the scanner and the object (time-of-flight). A rotating mirror moves the pulsed laser beam resulting in fan-shaped scanning of the surroundings (laser radar). The two-dimensional contour data are sent to the LMI evaluation unit via an RS-422 interface.

BULKSCAN	
Measuring principle	Laser time-of-flight measurement
Application	Bulk materials
Measuring method also suitable for	Dust
Maximum measuring range	15 m
Maximum measuring accuracy	3 ... 5 %
Signal output	4 ... 20 mA, RS-422
Typical installation position	Vertical
Maximum temperature in container	50 °C
Maximum pressure in container	Atmosphere
Protection class (IP)	IP 65
Measurement through container wall	Optical window
Type of connection	Terminal compartment
Power supply	24 DC, approx. 3 W
Ambient temperature	0 ... 50 °C



FACTORY AUTOMATION

With its intelligent sensors, safety systems, and auto ident applications, SICK realises comprehensive solutions for factory automation.

- Non-contact detecting, counting, classifying, and positioning of any types of object
- Accident protection and personal safety using sensors, as well as safety software and services



LOGISTICS AUTOMATION

Sensors made by SICK form the basis for automating material flows and the optimisation of sorting and warehousing processes.

- Automated identification with bar code and RFID reading devices for the purpose of sorting and target control in industrial material flow
- Detecting volume, position, and contours of objects and surroundings with laser measurement systems



PROCESS AUTOMATION

Analyzers and Process Instrumentation by SICK MAIHAK provides for the best possible acquisition of environmental and process data.

- Complete systems solutions for gas analysis, dust measurement, flow rate measurement, water analysis or, respectively, liquid analysis, and level measurement as well as other tasks



Worldwide presence with subsidiaries in the following countries:

Australia
Belgium/Luxembourg
Brasil
Česká Republika
China
Danmark
Deutschland
España
France
Great Britain
India
Israel
Italia
Japan

Nederlands
Norge
Österreich
Polska
Republic of Korea
Republika Slovenija
România
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Schweiz
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