

# Proximity Sensors Capacitive Thermoplastic Polyester Housing Types CA18CAN/CAF.....

CARLO GAVAZZI



- 4<sup>TH</sup> Generation **TRIPLESIELD™**
- Adjustable sensing distance: 2 - 10 mm Flush or 3-15 mm Non-flush
- Protection: short-circuit, transients and reverse polarity
- Dust and humidity compensation
- Dust or Temperature alarm output
- Rated operational voltage: 10-40 VDC
- Output: DC 200 mA, NPN or PNP
- Standard Output: NO and NC
- LED indications for Power-supply, Target and Stability
- IP67, IP68, IP69K, Nema 1, 2, 4, 4X, 5, 6, 6P, 12
- Cable and M12 connector versions available



## Product Description

The CA18CA.. capacitive proximity switches feature an improved 4<sup>TH</sup> Generation **TRIPLESIELD™** technology. Furthermore, these sensors feature increased immunity to electromagnetic interference (EMI), especially to frequency drives. Not only does 4<sup>TH</sup> Generation **TRIPLESIELD™** feature an increased EMI, but it also increases the immunity to humidity and dust. The implementation of stability indication eases the setup procedure as both Stable ON and Stable OFF positions are

indicated by the Green and yellow LEDs. The sensing distance is increased by 25 % allowing room for additional stable detection. The Dust Alarm function gives an early warning that the sensing surroundings have to be cleaned. The Temperature alarm function raises an alarm if the sensing surface goes beyond 60 degree celcius. The sensor housing is featuring IP69K as well as approval by ECOLAB for cleaning and disinfection agents.

## Ordering Key

**CA18CAN12NAM1**

Capacitive proximity switch	CA18CAN12NAM1
Housing diameter (mm)	CA18CAN12NAM1
Housing material	CA18CAN12NAM1
Housing length	CA18CAN12NAM1
Detection principle	CA18CAN12NAM1
Rated operating dist. (mm)	CA18CAN12NAM1
Output type	CA18CAN12NAM1
Output configuration	CA18CAN12NAM1
Connection type	CA18CAN12NAM1

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## Type Selection

Housing diameter	Sensor type	Output type	Output function	Connection	Rated operating distance (S <sub>n</sub> )	Ordering no. Standard	Ordering no. Dust alarm	Ordering no. Temperature alarm
M 18	Flush	NPN	NO+NC	Cable	0 - 8 mm	CA18CAF08NA		
M 18	Flush	NPN	NO+NC	M12 Plug	0 - 8 mm	CA18CAF08NAM1		
M 18	Flush	PNP	NO+NC	Cable	0 - 8 mm	CA18CAF08PA		
M 18	Flush	PNP	NO+NC	M12 Plug	0 - 8 mm	CA18CAF08PAM1		
M 18	Flush	PNP	NO	Cable	0 - 8 mm		CA18CAF08PODU	CA18CAF08POTA
M 18	Flush	PNP	NC	Cable	0 - 8 mm		CA18CAF08PCDU	CA18CAF08PCTA
M 18	Non-Flush	NPN	NO+NC	Cable	0 - 12 mm	CA18CAN12NA		
M 18	Non-Flush	NPN	NO+NC	M12 Plug	0 - 12 mm	CA18CAN12NAM1		
M 18	Non-Flush	PNP	NO+NC	Cable	0 - 12 mm	CA18CAN12PA		
M 18	Non-Flush	PNP	NO+NC	M12 Plug	0 - 12 mm	CA18CAN12PAM1		
M 18	Non-Flush	PNP	NO	Cable	0 - 12 mm		CA18CAN12PODU	CA18CAN12POTA
M 18	Non-Flush	PNP	NC	Cable	0 - 12 mm		CA18CAN12PCDU	CA18CAN12PCTA

## Specifications EN 60947-5-2

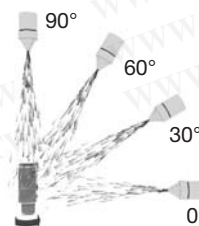
<b>Rated operating distance (S<sub>n</sub>)</b> Non-flush mounted sensor	0 - 12 mm (factory setting 12 mm), (ref. target 36x36 mm ST37, 1 mm thick, grounded)	<b>Sensitivity control</b> Electrical adjustment Mechanical adjustment Adjustable distance	Adjustable by potentiometer 11 turns 16 turns
Flush mounted sensor	0 - 8 mm (factory setting 8 mm - non-flush mounted) (ref. target 24x24 mm ST37, 1 mm thick, grounded)	Flush types Non-flush types	2 to 10 mm 3 to 15 mm
		<b>Effective operating dist. (S<sub>r</sub>)</b>	0.9 x S <sub>n</sub> ≤ S <sub>r</sub> ≤ 1.1 x S <sub>n</sub>

**Specifications (cont.)** EN 60947-5-2

<b>Usable operating dist. (S<sub>u</sub>)*</b>	0.85 x S <sub>r</sub> ≤ S <sub>u</sub> ≤ 1.15 x S <sub>r</sub>	<b>Temperature alarm output</b>	60°C ± 5°C
<b>Repeat accuracy (R)</b>	≤ 5%	Response time examples	
<b>Hysteresis (H)</b>	3 - 20%	T <sub>A</sub> = 25°C	14 sec @ T <sub>EXC</sub> = 800°C 315 sec @ T <sub>EXC</sub> = 80°C
<b>Rated operational volt. (U<sub>B</sub>)</b>	10 to 40 VDC (ripple incl.)	<b>TRIPLESHIELD™</b>	
<b>Ripple</b>	≤ 10%	<b>Exceeding the norms for capacitive sensors</b>	
<b>Output function</b>	NPN or PNP	Electrostatic discharge (EN61000-4-2)	
<b>Output switching function</b>	N.O. and N.C.	Contact discharge	> 40 kV
<b>Rated operational current (I<sub>a</sub>)</b>	≤ 200 mA (continuous)	Air discharge	> 40 kV
<b>Capacitive load</b>	100 nF	Electrical fast transients/burst (EN 61000-4-4)	±4kV
<b>No-load supply current (I<sub>o</sub>)</b>	≤ 12 mA	Surge (EN 61000-4-5)	
<b>Voltage drop (U<sub>d</sub>)</b>	≤ 2.0 VDC @ 200 mA DC	Power-supply	> 2kV (with 500 Ω)
<b>Minimum operational current (I<sub>m</sub>)</b>	≥ 0.5 mA	Sensor output	> 2kV (with 500 Ω)
<b>OFF state current (I<sub>i</sub>)</b>	≤ 100 μA	Wire conducted disturbances (EN 61000-4-6)	> 20 Vrms
<b>Protection</b>	Short-circuit, reverse polarity, transients	Power-frequency magnetic fields (EN 61000-4-8)	
<b>Frequency of operating cycles (f)</b>	50 Hz	Continuous	> 60 A/m, 75.9 μ tesla
<b>Response time OFF-ON (t<sub>on</sub>)</b>	≤ 10 ms	Short-time	> 600 A/m, 759 μ tesla
<b>Response time ON-OFF (t<sub>off</sub>)</b>	≤ 10 ms	Radiated RF electromagnetic fields (EN 61000-4-3)	> 20 V/m
<b>Power ON delay (t<sub>v</sub>)</b>	≤ 200 ms	Shock (IEC 60068-2-27)	30 G / 11ms, 3 pos, 3 neg per axis
<b>Indication</b>		Rough handling shocks (IEC 60068-2-31)	2 times from 1m 100 times from 0,5m
Target detected	LED, yellow	Vibration (IEC 60068-2-6)	10 to 150 Hz, 1 mm / 15 G
Power and detection stability	LED, green	<b>Housing material</b>	
<b>Environment</b>		Body	PBT, grey, 30% glass reinforced
Installation category	III (IEC 60664, 60664A; 60947-1)	Cable gland	PA12, black
Degree of pollution	3 (IEC 60664, 60664A; 60947-1)	Fingernuts	PA12, black
Degree of protection	IP 67, IP 68/60 min., IP69K** (IEC 60529; 60943-1)	Trimmershaft	Nylon
NEMA type	1, 2, 4, 4X, 5, 6, 6P, 12	<b>Weight</b>	
Operating temperature	-30 to +85°C (-22 to +185°F)	Cable version	150 g
Max. temperature on sensing face	120°C (248°F)	Plug version	75 g
Storage temperature	-40 to +85°C (-40 to +185°F)	<b>Approvals</b>	cULus (UL508), ECOLAB
<b>Rated insulation voltage</b>	1 kVAC (rms) IEC protection class III 	<b>CE-marking</b>	Yes
<b>Tightening torque</b>	≤ 2.6 Nm	<b>MTTF<sub>d</sub></b>	825 years @ 40°C (+104°F)
<b>Connection</b>			
Cable	PVC, Ø5.2 x 2 m, 4 x 0.34 mm <sup>2</sup> Oil proof, grey		
Plug (M1)	M12 x 1 - 4 pin		

\* For Flush type sensor flushmounted in conductive material, the usable operating distance (S<sub>u</sub>) is 0.80 x S<sub>r</sub> ≤ S<sub>u</sub> ≤ 1.2 x S<sub>r</sub>, for temperatures exceeding 0 - 60 °C (32 - 140°F).

\*\* The IP69K test according to DIN 40050-9 for high-pressure, high-temperature wash-down applications. The sensor must not only be dust tight (IP6X), but also able to withstand high-pressure and steam cleaning. The sensor is exposed to high pressure water from a spray nozzle that is fed with 80°C water at 8'000–10'000 KPa (80–100bar) and a flow rate of 14–6L/min. The nozzle is held 100–150 mm from the sensor at angles of 0°, 30°, 60° and 90° for 30s each. The test device sits on a turntable that rotates with a speed of 5 times per minute. The sensor must not suffer any damaging effects from the high pressure water in appearance and function.



## Adjustment Guide

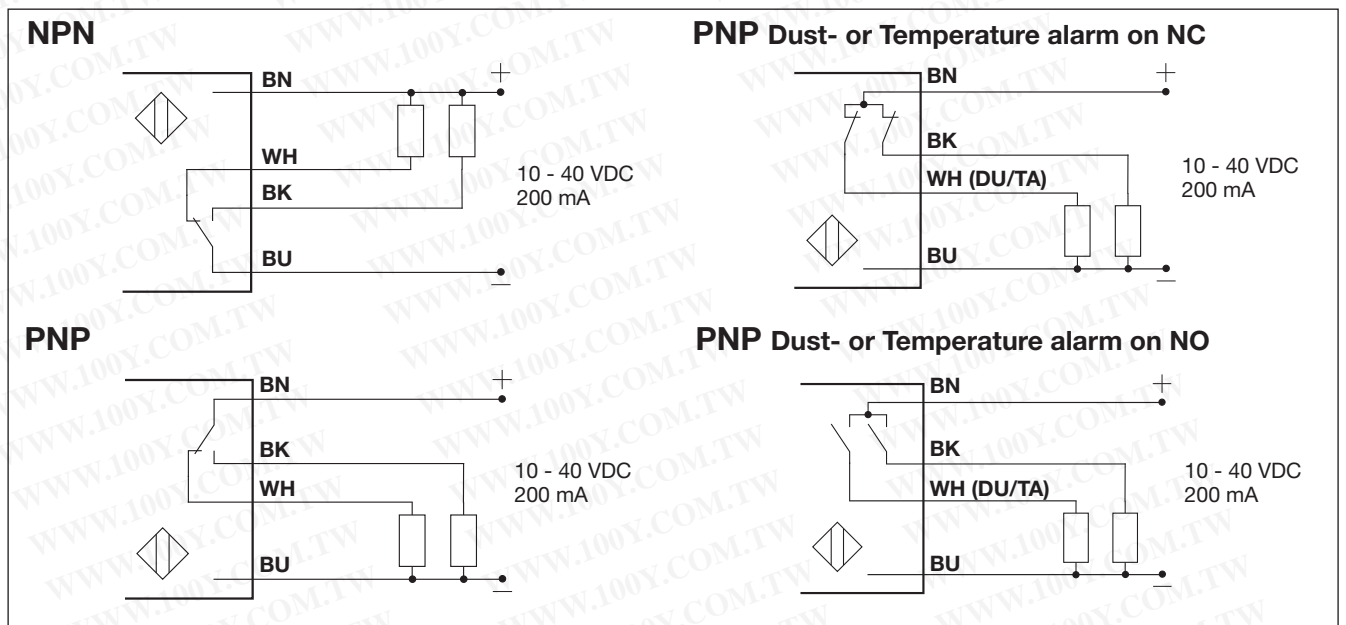
The environments in which capacitive sensors are installed can often be unstable as regards to temperature, humidity, object distance and industrial (noise) interference. Because of this, Carlo Gavazzi offers

as standard features in all **TRIPLESHIELD™** capacitive sensors a user-friendly sensitivity adjustment instead of a fixed sensing range. Likewise, these sensors provide an extended sensing range to accommodate

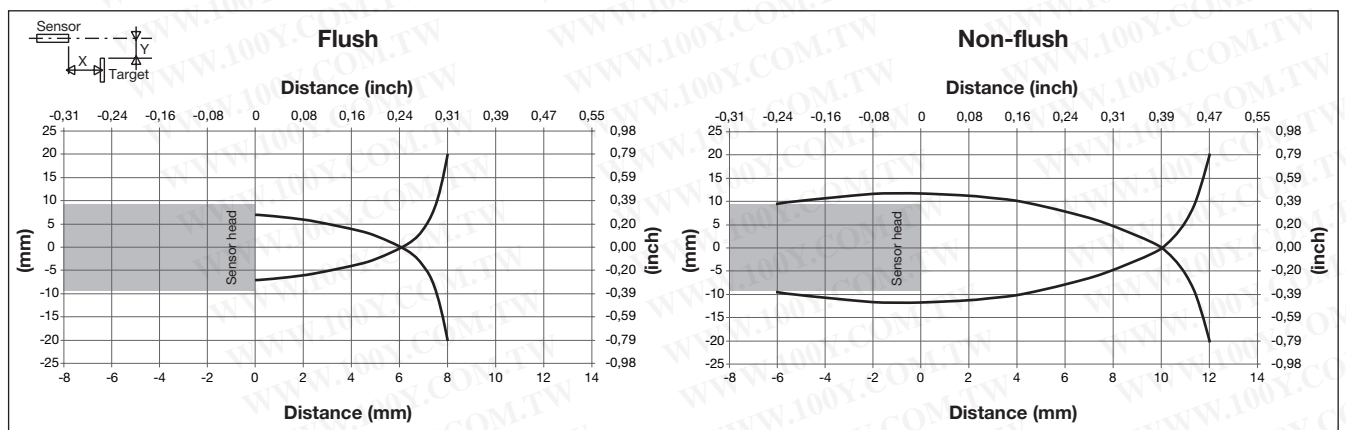
mechanically demanding areas and temperature stability to ensure high immunity to electromagnetic interference (EMI) and a minimum need for adjusting sensitivity if the temperature varies.

**Note:** Sensors are factory set (default) to nominal sensing range  $S_n$ .

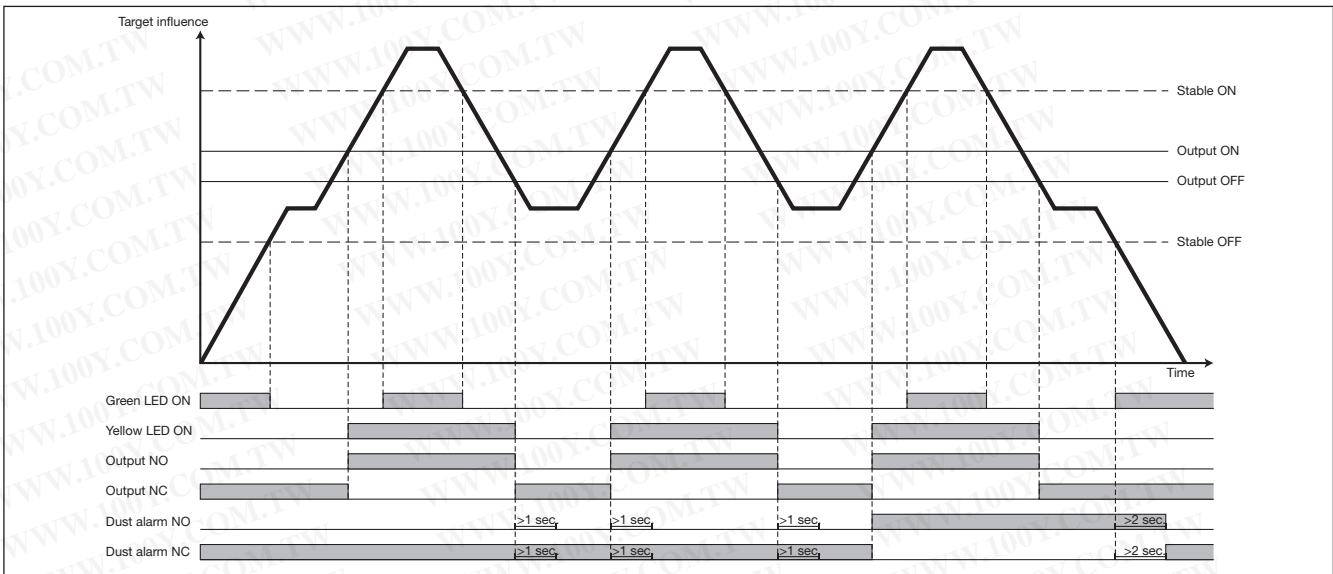
## Wiring Diagram



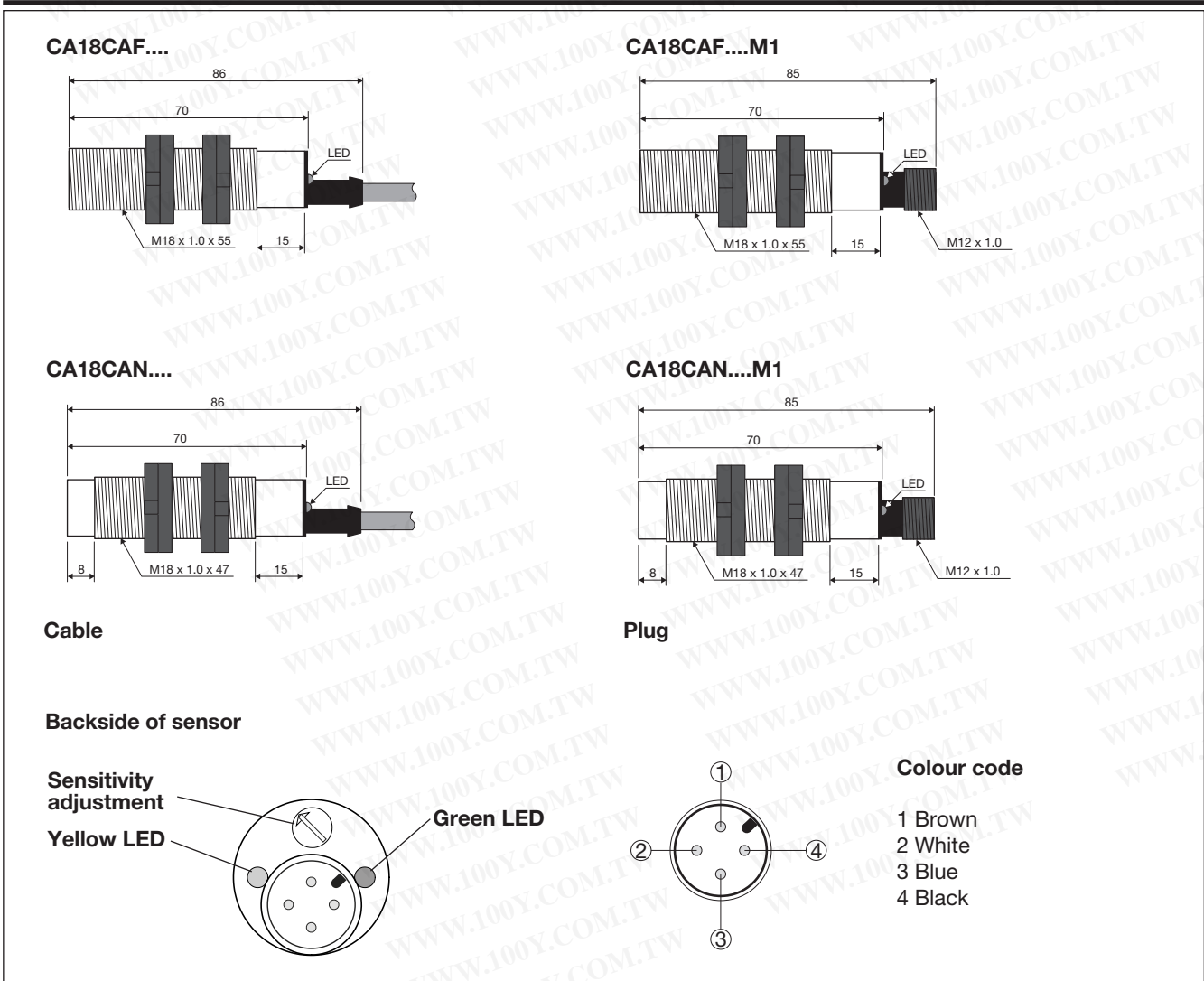
## Detection Diagram



## Detection Stability Indication



## Dimensions



## Installation Hints

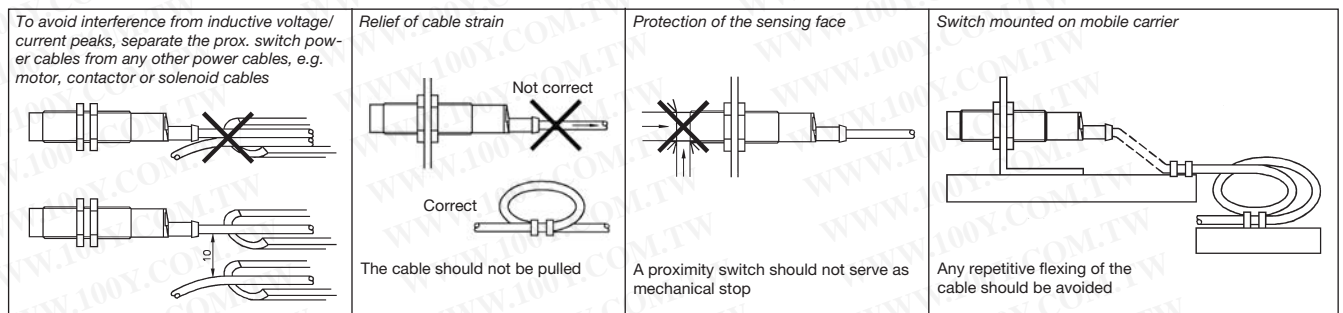
Capacitive sensors have a unique ability to detect almost any material in liquid or solid form. Capacitive sensors are able to detect metallic as well as non-metallic objects. However, their traditional use is for non-metallic materials such as:

- **Plastics Industry**  
Resins, regrinds or moulded products.
- **Chemical Industry**  
Cleansers, fertilizers, liquid soaps, corrosives and petrochemicals.
- **Wood Industry**  
Saw dust, paper products, door and window frames.
- **Ceramics & Glass Industry**  
Raw materials, clay or finished products, bottles.

- **Packaging Industry**  
Package inspection for level or contents, dry goods, fruits and vegetables, dairy products.

Materials are detected due to their dielectric constant. The bigger the size of an object, the higher the density of material, the better or easier it is to detect the object.

The nominal sensing distance for a capacitive sensor is referred to a grounded metal plate (ST37). For additional information regarding dielectric ratings of materials please refer to Technical Information.



## Delivery Contents

- Capacitive switch: CA18CAN/CAF.....
- User manual
- 2 x M18 fingernuts
- Screwdriver
- **Packaging:** Cardboard box

## Accessories

- Connector type CONM14NF.. and CONB14NF-...W-series.
- Mounting Brackets AMB18-S.. (straight), AMB18-A.. (angled)

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