Capacitive point level sensor/CleverLevel

LBFS-2

LBFS-2.#####.0

Overview

- Reliable in diverse media
- Wide variety of process connections
- For hygienic and industrial applications
- With marine, WHG and cULus approval
- Optionally available with Ex certification
- Process temperatures up to 150 °C

Picture similar

EN 50155

Technical data

Performance characteristics	
Measuring principle	CleverLevel level switches (Frequency Sweep)
Hysteresis	< ± 1 mm
Media characteristics	DC > 1.5
Step response time, T90	0.1 s , typ. 0.2 s , max.
Trigger modes	Single Point Two Point Window trigger
Damping	0 … 60 s , adjustable
Repeatability	< ± 1 mm
Process conditions	
Process temperature	Refer to section "Operating conditions"
Process pressure	Refer to section "Operating conditions"
Process connection	
Connection variants	Refer to section "Dimensional drawings"
Mounting position	Any, top, bottom, side
Wetted parts material	PEEK Natura AISI 316L (1.4404) AISI 304 (1.4301), optional
Surface roughness wetted parts	Ra ≤ 0.8 µm
Ambient conditions	
Operating temperature range	-40 … 85 °C -25 … 70 °C , with cable outlet -5 … 70 °C , when cable is moved
Storage temperature range	-40 … 85 °C -25 … 70 °C , with cable outlet
Degree of protection (EN 60529)	IP67 , with appropriate mating connector IP69K , with appropriate mating connector
Humidity	< 98 % RH , condensing

Ambient conditions	
Cable bending radius	r ≥ 10 mm
Insulation resistance	> 100 MΩ , 500 V DC (for Rail version)
Insulation voltage	600 V AC , EN 50155 (for Rail version)
Vibration	EN 60068-2-64: 38m/s2 (20-100Hz), 15min per axle EN 60068-2-64: 144m/s2 (10-100Hz), 300min per axle EN 60068-2-6: 1,6mm (5-25Hz), 4g (25-100Hz)
Shock	EN 60068-2-27: 100g/6ms, 18 shocks
Output signal	
Output type	PNP NPN PWM
Switching logic	High-Active Low-Active
Voltage drop	PNP: (+Vs -1.4 V) ± 0.5 V, Rload ≥ 10 kΩ NPN: (+0.8 V) ± 0.5 V, Rload = 10 kΩ
Current rating	50 mA , max. *For Ex devices, see Ex sections
Off leak current	< 100 µA , max.
Status indication	Status indication by bright, green and blue LEDs
Short circuit protection	Yes
Housing	
Style	Compact transmitter
Overall size	Refer to section "Dimensional drawings"
Material	Stainless steel
Electrical connection	
Connector	M12-A, 4-pin, polycarbonate M12-A, 4-pin, stainless steel
Cable	5 m, 4-wire, PVC

Technical data

Power supply	
Voltage supply range	8.5 … 35 V DC
Current consumption (no load)	< 8 mA , typ. < 15 mA , max.
Power-up time	≤ 0.2 s @ 24 V
Reverse polarity protection	Yes
Factory settings	
Switching range (dielectric constant DC)	< 75.3 % , DC > 2
Range hysteresis	2.4 %
Damping	0 s
Ex ta IIIC T200X°C Da	
Voltage supply range, Un	30 V DC , max.
Current rating, In	10 mA + max. 20 mA output load
Ingress protection for M12 mating connector min.	IP 67
Temperature class T135 °C	- 40 < Tamb < 85 °C - 25 < Tamb < 70 °C , with cable sensor
Ex ia IIC T4 Ga or Ex ia IIC T3 Ga	
Maximum values for barrier selection, Ui	30 V DC
Maximum values for barrier selection, Ii	100 mA
Maximum values for barrier selection, Pi	660 mW
Internal capacitance, Ci	56 nF , + 0.17nF/m, for LBFS-2.x2xxx.x 56 nF , + 0.20nF/m, for LBFS-2.xx52x.x
Internal inductance, Li	46 µH , + 0.27µH/m, for LBFS-2.x2xxx.x 46 µH , + 1.13µH/m, for LBFS-2.xx52x.x
Ingress protection for M12 mating connector min.	IP 67
Temperature class T1 ... T4	- 40 < Tamb < 85 °C - 25 < Tamb < 70 °C , with cable sensor

Ex ec IIC T4 Gc or Ex ec IIC T3 Gc	
Voltage supply range, Un	30 V DC , max.
Current rating, In	100 mA , max.
Ingress protection for M12 mating connector min.	IP 67
Temperature class, T1 ... T4	- 40 < Tamb < 85 °C - 25 < Tamb < 70 °C , with cable sensor
Compliance and approvals	
EMC Emission	EN 61326-1 EN 50121-3-2
EMC Immunity	EN 61326-1 EN 50121-3-2
Hygiene	FDA 3-A (74-07) EHEDG EL Class I Refer to section "Compliance and approvals"
Railway applications	EN 50155
Safety	cULus listed, E365692 WHG (overfill, leakage) pending
Marine	Lloyd´s Register DNV CCS Refer to section "Compliance and approvals"
Explosion protection	IECEx / ATEX II 1D - Ex ta IIIC T135 °C Da (pending) IECEx / ATEX II 1G - Ex ia IIC T4 Ga (pending) ATEX II 3G - Ex ec IIC T4 Gc (pending) CCC (pending)
Pharma	USP Class VI (PEEK material) Refer to section "Compliance and approvals"

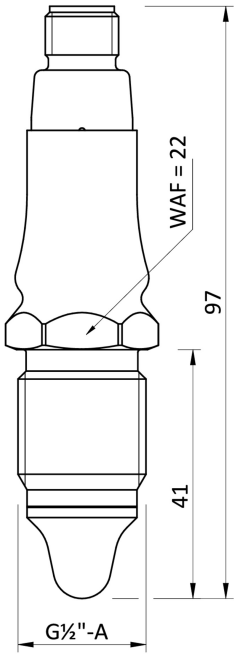
Operating conditions

Ordering key	Process connection	BCID	Continuous		Temporary (t < 1 h)	
			Process temperature @ Tamb < 50 °C	Process pressure	Process temperature max. @ Tamb < 50 °C	Process pressure @ Process temperature max.
			(° C)	(bar)	(° C)	(bar)
LBFS-2.##1##.#	G 1/2 A ISO 228-1 BSC	G07	-40 … 115	-1 … 100	135	-1 … 80
LBFS-2.##2##.#	G 3/4 A ISO 228-1	G10	-40 … 115	-1 … 100	135	-1 … 80
LBFS-2.##3##.#	G 1 A ISO 228-1	G11	-40 … 115	-1 … 100	135	-1 … 80
LBFS-2.##4##.#	G 1/2 A hygienic	A03	-40 … 115	-1 … 10	135	-1 … 5
LBFS-2.##5##.#	G 1/2 A ISO 228-1 for reverse assembly (in-shell thread)	T10	-40 … 85	-1 … 100	N/A	N/A
LBFS-2.##6##.#	3/4-14 NPT	N03	-40 … 115	-1 … 100	135	-1 … 80
LBFS-2.##7##.#	M18 × 1 ISO 261 / ISO 965	M11	-40 … 85	N/A	N/A	N/A
LBFS-2.##A##.#	G 1/2 A DIN EN ISO 1179-2 (3852-E), NBR gasket	G51	0 … 100	-1 … 100	N/A	N/A
LBFS-2.##B##.#	G 1/2 A DIN EN ISO 1179-2 (3852-E), FKM gasket	G51	0 … 115	-1 … 100	135	-1 … 80
LBFS-2.##C##.#	G 1/2 A DIN EN ISO 1179-2 (3852-E), EPDM gasket	G51	-40 … 115	-1 … 100	135	-1 … 80
LBFS-2.##E##.#	G 1/2 A DIN EN ISO 1179-2 (3852-E), FKM gasket, with cooling neck	G51	0 … 150	-1…50 (< 150°C) -1 … 100 (< 115°C)	N/A	N/A
LBFS-2.##F##.#	G 1/2 A DIN EN ISO 1179-2 (3852-E), EPDM gasket, with cooling neck	G51	-40 … 150	-1 … 50 (< 150 °C) -1 … 100 (< 115 °C)	N/A	N/A
LBFS-2.##G##.#	G 1/2 A ISO 228-1 BSC, with cooling neck, not applicable for mounting with ZPW1-7x1	G07	-40 … 150	-1 … 50 (< 150 °C) -1 … 100 (< 115 °C)	N/A	N/A
LBFS-2.##J##.#	G 1/2 A hygienic gasket, with cooling neck	A03	0 … 150	-1 … 10	N/A	N/A
LBFS-2.##K##.#	G 1/2 A hygienic, length 82 mm	A03	-40 … 115	-1 … 100	135	-1 … 80
LBFS-2.##L##.#	G 1/2 A hygienic, sliding connection, length 250 mm	A03	-40 … 150	-1 … 5	N/A	N/A
LBFS-2.##M##.#	1/2-14 NPT, with cooling neck	N02	-40 … 150	-1 … 50 (< 150 °C) -1 … 100 (< 115 °C)	N/A	N/A
LBFS-2.##N##.#	1/2-14 NPT	N02	-40 … 115	-1 … 100	135	-1 … 80

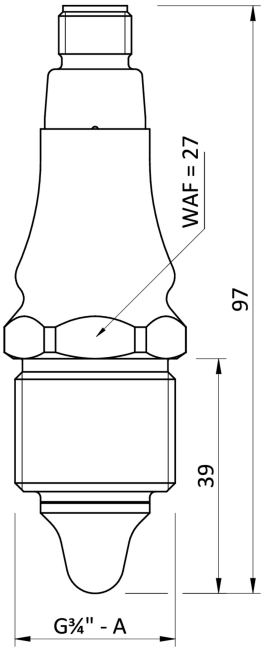
Compliance and approvals

Ordering key	Process connection	BCID	EN 1935/2004 EN 10/2011 EN 2023/2006	FDA	3-A	EHEDG EL-Class I	USP Class VI	DNV	Lloyd' Regist	CCS
LBFS-2.##1##.#	G 1/2 A ISO 228-1 BSC	G07					■	■	■	■
LBFS-2.##2##.#	G 3/4 A ISO 228-1	G10					■	■	■	■
LBFS-2.##3##.#	G 1 A ISO 228-1	G11					■	■	■	■
LBFS-2.##4##.#	G 1/2 A hygienic	A03	■	■	■	■	■	■	■	■
LBFS-2.##5##.#	G 1/2 A ISO 228-1 for reverse assembly (in-shell thread)	T10					■	■	■	■
LBFS-2.##6##.#	3/4-14 NPT	N03					■	■	■	■
LBFS-2.##7##.#	M18 × 1 ISO 261 / ISO 965	M11					■	■	■	■
LBFS-2.##A##.#	G 1/2 A DIN EN ISO 1179-2 (3852-E), NBR gasket	G51					■	■	■	■
LBFS-2.##B##.#	G 1/2 A DIN EN ISO 1179-2 (3852-E), FKM gasket	G51					■	■	■	■
LBFS-2.##C##.#	G 1/2 A DIN EN ISO 1179-2 (3852-E), EPDM gasket	G51					■	■	■	■
LBFS-2.##E##.#	G 1/2 A DIN EN ISO 1179-2 (3852-E), FKM gasket, with cooling neck	G51					■	■	■	■
LBFS-2.##F##.#	G 1/2 A DIN EN ISO 1179-2 (3852-E), EPDM gasket, with cooling neck	G51					■	■	■	■
LBFS-2.##G##.#	G 1/2 A ISO 228-1 BSC, with cooling neck	G07					■	■	■	■
LBFS-2.##J##.#	G 1/2 A hygienic gasket, with cooling neck	A03	■	■	■			■	■	■
LBFS-2.##K##.#	G 1/2 A hygienic, lenght 82 mm	A03	■	■				■	■	■
LBFS-2.##L##.#	G 1/2 A hygienic, sliding connection, length 250 mm	A03	■	■		■				■
LBFS-2.##M##.#	1/2-14 NPT, with cooling neck	N02						■	■	■
LBFS-2.##N##.#	1/2-14 NPT	N02						■	■	■

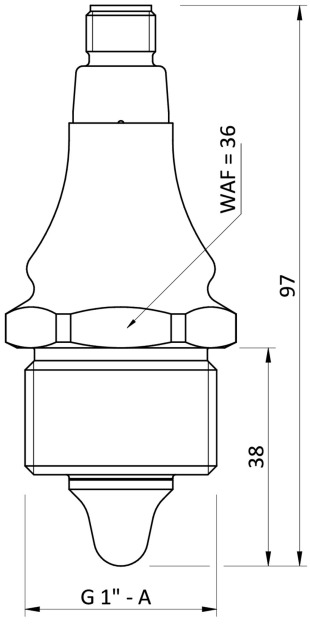
Dimensional drawings (mm)



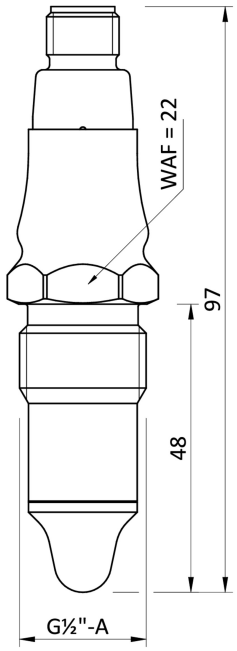
G 1/2 A ISO 228-1 BSC (BCID: G07)



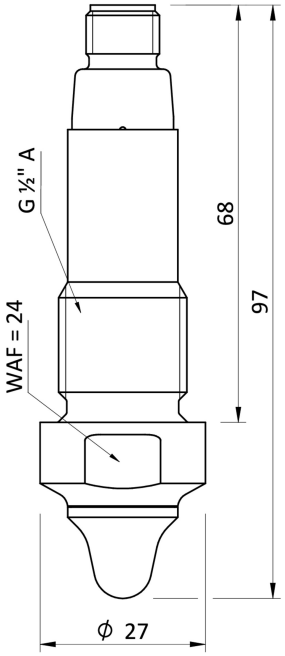
G 3/4 A ISO 228-1 (BCID: G10)



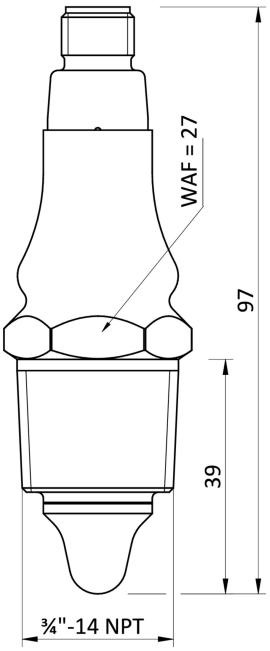
G 1 A ISO 228-1 (BCID: G11)



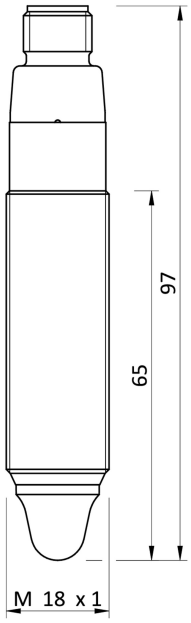
G 1/2 A hygienic (BCID: A03)



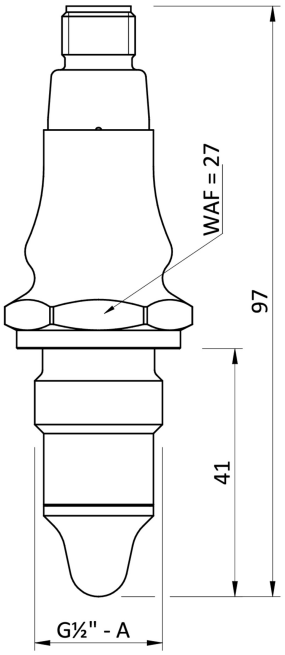
G 1/2 A ISO 228-1 for reverse assembly (in-shell thread) (BCID: T10)



3/4-14 NPT (BCID: N03)

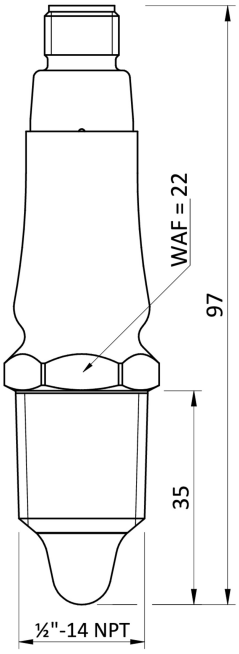


M18 × 1 ISO 261 / ISO 965 (BCID: M11)

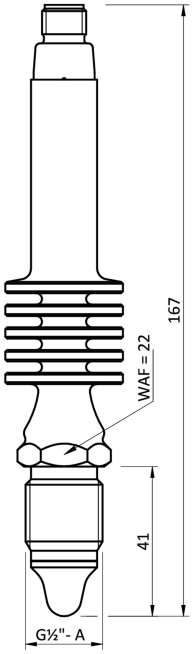


G 1/2 A DIN EN ISO 1179-2 (BCID: G51)

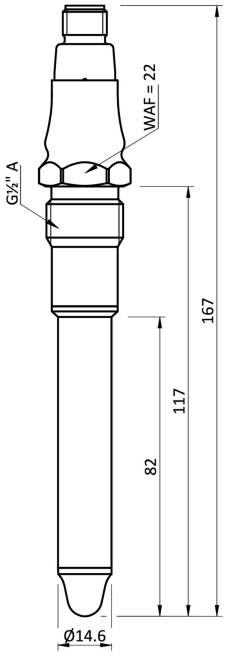
Dimensional drawings (mm)



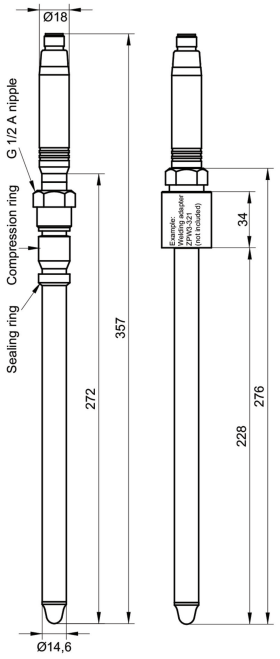
1/2-14 NPT (BCID: N02)



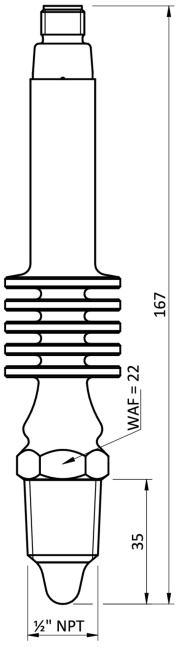
G 1/2 A ISO 228-1 BSC with cooling neck (BCID: G07)



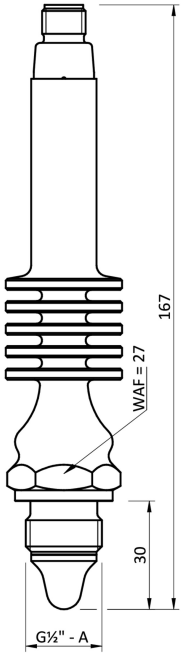
G 1/2 A hygienic, 82 mm length (BCID: A03)



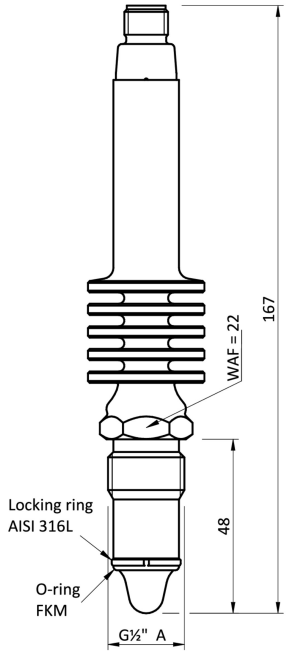
G 1/2 A hygienic, sliding connection, 250 mm length, including compression ring kit ZPX1-006 (BCID: A03)



1/2-14 NPT with cooling neck (BCID: N02)



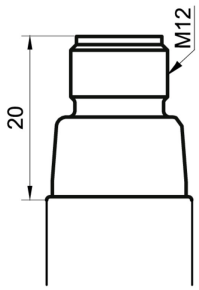
G 1/2 A DIN EN ISO 1179-2 (3852-E) cooling neck (BCID: G51)



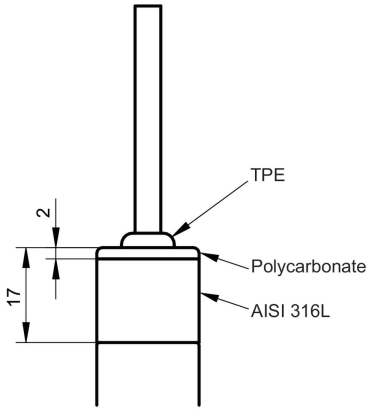
G 1/2 A hygienic, high temperature, with cooling neck (BCID: A03)

Dimensional drawings (mm)

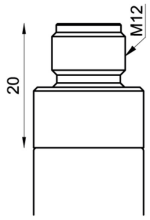
Housing



Connector M12-A, 4-pin, polycarbonate (with LED)

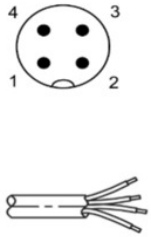
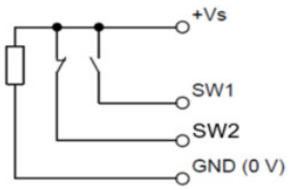
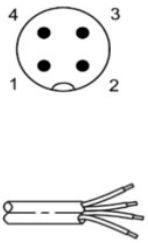
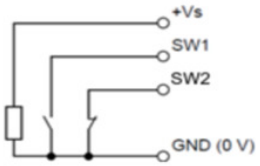


Cable outlet, 4-wire, 5 m length



Connector M12-A, 4-pin, stainless steel (without LED)

Electrical connection

Output type	Electrical connection	Equivalent circuit	Function	Pin assignment
PNP			+Vs	1
			SW1	4
			SW2	2
			GND (0 V)	3
			+Vs	BN
			SW1	BK
			SW2	WH
			GND (0 V)	BU
NPN			+Vs	1
			SW1	4
			SW2	2
			GND (0 V)	3
			+Vs	BN
			SW1	BK
			SW2	WH
			GND (0 V)	BU

Ordering information

Ordering key - Configuration possibilities see website

	LBFS-2	.	#	#	#	#	#	.	#
Product									
Level switches	LBFS-2								
Compliance and approvals									
Standard			0						
IECEx / ATEX II 3G Ex ec IIC T4 Gc			3						
IECEx / ATEX II 1G Ex ia IIC T4 Ga resp. IECEx / ATEX II 1D Ex ta IIC T135 °C Da			4						
Railway (EN50155)			R						

LBFS-2

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Ordering information

Ordering key - Configuration possibilities see website

	LBFS-2	.	#	#	#	#	#	.	#
Electrical Connection									
M12-A, 4-pin, polycarbonate (with LED)			1						
Cable outlet 5 m, 4-wire, PVC			2						
M12-A, 4-pin, stainless steel (without LED)			3						
Process Connection									
G 1/2 A ISO 228-1 (G07)				1					
G 3/4 A ISO 228-1 (G10)				2					
G 1 A ISO 228-1 (G11)				3					
G 1/2 A hygienic (A03)				4					
G 1/2 A ISO 228-1 for reverse assembly (in-shell thread) (T10)				5					
3/4-14 NPT (N03)				6					
M18x1 (M11)				7					
G 1/2 A DIN EN ISO 1179-2 (3852-E) NBR gasket (G51)				A					
G 1/2 A DIN EN ISO 1179-2 (3852-E) FKM gasket (G51)				B					
G 1/2 A DIN EN ISO 1179-2 (3852-E) EPDM gasket				C					
G 1/2 A DIN EN ISO 1179-2 (3852-E) cooling neck and FKM gasket				E					
G 1/2 A DIN EN ISO 1179-2 (3852-E) cooling neck and EPDM gasket				F					
G 1/2 A ISO 228-1 with cooling neck (G07)				G					
G 1/2 A hygienic gasket, FKM, with cooling neck (A03)				J					
G 1/2 A hygienic, length 82 mm (A03)				K					
G 1/2 A hygienic, sliding connection, length 250 mm (A03)				L					
1/2-14 NPT (N02)				N					
1/2-14 NPT with cooling neck (N02)				M					
Process connection material									
Stainless Steel 1.4301 - AISI 304					1				
Stainless Steel 1.4404 - AISI 316L					2				
Output Configuration									
PNP output						1			
NPN output						2			
Configuration									
Factory settings									0
Customer-specific									C

(1) Process connection "5": Including gasket ZPX3-14B0 (glass/aramide fiber with NBR)
(2) Process connection "7": Including the two M18 nut