

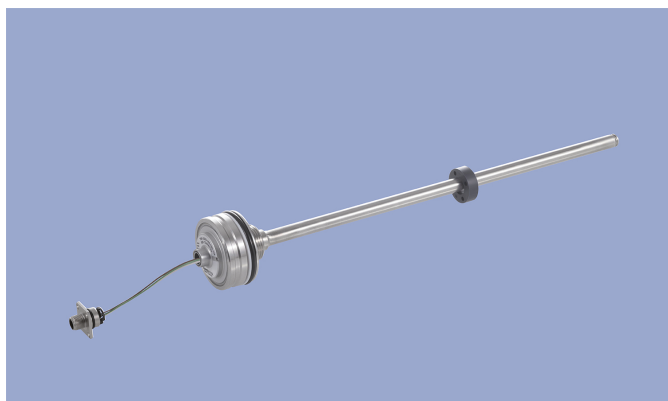
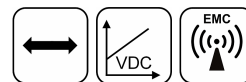
**NOVOSTRICTIVE
Transducer
Touchless**

TM1

Plug-in Flange

Voltage

Mobile Applications



Special Features

- For integration in pneumatic and hydraulic cylinders
- Touchless magnetostrictive measurement technology
- Operating pressure up to 350 bar, peaks up to 450 bar
- Ring-shaped position marker does not contact sensor
- Unlimited mechanical life
- No velocity limit for position marker
- Absolute output
- Outstanding accuracy performance up to 0.04 %
- Wide range of supply voltage
- Optimized for use in mobile applications with highest EMC requirements such as ISO pulses and high interferences to ISO 11452, exceeds E1 requirements
- Other configurations see separate data sheets

Applications

Hydraulic or pneumatic cylinders in

- Agricultural and forestry machinery
- Construction machines
- Vehicles with loading and unloading devices
- Vehicles with extension arms

The absolute position transducer can be used directly in-cylinder and thus enables a compact and cost-effective position measurement. The sensor consists of a stainless steel flange welded to a pressure tight rod and can therefore be used in harsh environments.

The magnetostrictive measuring technology offers excellent accuracy for measuring lengths up to 2000 mm.

The passive ring-shaped position marker allows a mechanically decoupled measurement.

Description

Material	Flange: stainless steel 1.4307 / AISI 304L Flange cover: AlSiMgBi Rod: stainless steel 1.4571 / AISI 316Ti Sealing: O-ring FKM 80, Supporting ring: PTFE
Mounting	Plugged into cylinders, secured in position with set screw M5 ISO 4026
Electrical connection	Connector M12x1, A-coded / Connector system M12x1, A-coded with lead wires / Cable 3x 0.5 mm ² (AWG 20), PUR, unshielded

Mechanical Data

Dimensions	See dimension drawing
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Ordering Specifications

Ordering Specifications

Preferred types printed in bold

Supply voltage U_b
8: $U_b = 12/24$ VDC, 24VDC

Output signal

1: 0.1 ... 10 VDC

4: 0.5 ... 4.5 VDC

5: 0.25 ... 4.75 VDC

Output characteristic

1: Rising output characteristic, seen from flange

2: Falling output characteristic, seen from flange

Electrical connection

104: Connector M12x1, 4-pin

251: Cable, 3-pole, unshielded, A = 1 m

253: Cable, 3-pole, unshielded, A = 3 m

255: Cable, 3-pole, unshielded, A = 5 m

438: Plug system M12x1, 4-pin, with lead wires 80 mm

442: Plug system M12x1, 4-pin, with lead wires 120 mm

446: Plug system M12x1, 4-pin, with lead wires 160 mm

450: Plug system M12x1, 4-pin, with lead wires 200 mm

454: Plug system M12x1, 4-pin, with lead wires 240 mm

T M 1 - 0 5 0 0 - 3 0 5 - 8 5 1 - 4 4 2

Series

Mechanical version

305: Plug-in flange Ø 48 mm

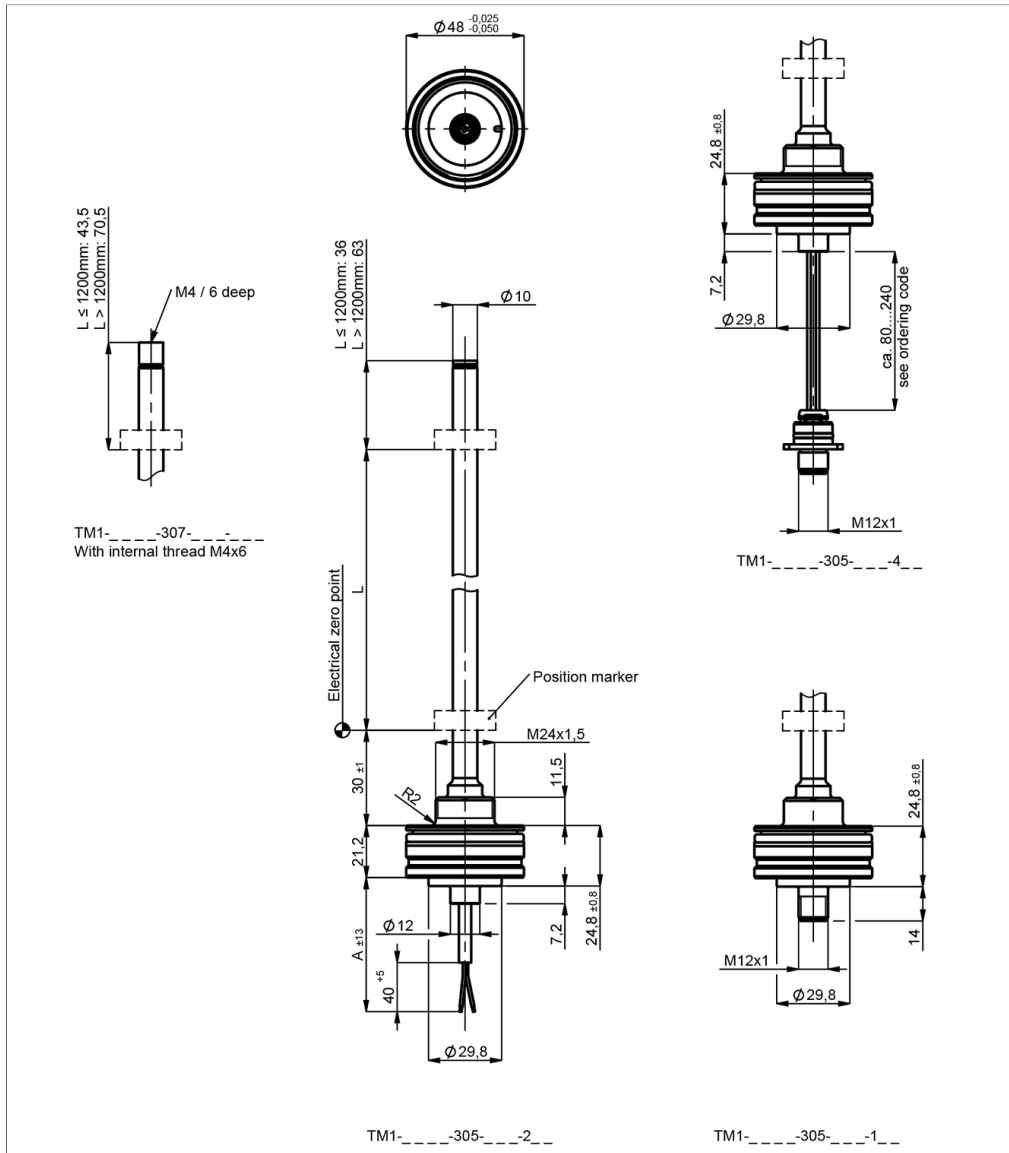
307: Plug-in flange Ø 48 mm with internal thread M4x6 at rod end, additional length 7.5 mm

Electrical measuring range

Standard lengths 0050 up to 2000 mm in 25 mm-steps

Other lengths on request

Drawing



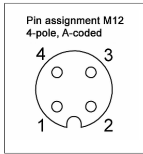
CAD data see
www.novotechnik.de/en/download/cad-data/

Technical Data

Type	TM1-____-305-84 _-_- TM1-____-305-85 _-_-	TM1-____-305-81 _-_-
Output signal	0.25 ... 4.75 V 0.5 ... 4.5 V	0.1 ... 10 V
Load	≥ 10 kΩ	
Sampling rate / Update rate	0.5 kHz	
Electrical measuring range (dim. L)	0 ... 50 mm up to 0 ... 2000 mm	
Absolute linearity	≤ ±0.04 %FS (min. 300 μm)	
Tolerance of electr. zero point	±1 mm	
Resolution	≤ 0.1 mm	
Repeatability	≤ ±0.1 mm	
Hysteresis	≤ ±0.1 mm	
Temperature error	typ. 50 ppm/K (min. 0.01 mm/K)	
Supply voltage Ub	12/24 VDC (8 ... 32 VDC)	24 VDC (16 ... 34 VDC)
Supply voltage ripple	≤ 10% Ub	
Power drain w/o load	< 1 W	
Overvoltage protection	36 VDC (permanent)	
Polarity protection	yes (-36 VDC)	
Short circuit protection	yes (output vs GND and supply voltage up to 36 VDC)	
Insulation resistance (500 VDC)	≥ 10 MΩ	
Environmental Data		
Max. operational speed	Mechanically unlimited	
Vibration IEC 60068-2-6	20 g, 10 ... 2000 Hz, Amax = 0.75 mm	
Shock IEC 60068-2-27	100 g, 11 ms (single hit)	
Protection class DIN EN 60529	IP67 (Connector system M12, fastened, when correctly fitted in cylinder: IP69)	
Operating temperature	-40 ... +105°C (connector M12 / cable), -40 ... +85°C (connector system M12)	
Operating humidity	0 ... 95 % R.H. (no condensation)	
Working pressure	≤ 350 bar	
Pressure peaks	≤ 450 bar	
Burst pressure	> 700 bar	
Life	Mechanically unlimited	
Functional safety	If you need assistance in using our products in safety-related systems, please contact us	
MTTF (IEC 60050)	346 years	346 years
EMC Compatibility		
ISO 10605 ESD (Handling/Component)	8 kV / 15 kV	
ISO 11452-2 Radiated HF-fields	100 V/m	
ISO 11452-4 BCI (Bulk current injection)	200 mA	
CISPR 25 Radiated emission	Level 4	
ISO 7637-2 Transient Emissions	Level 1/2	
ISO 7637-2 Pulses on supply lines	(1, 2a, 2b, 3a, 3b) Level 4	
ISO 7637-3 Pulses on output lines	(3a, 3b) Fast Level 2	
ISO 16750 Pulses on supply lines	Starting profile Level 4 @12 V / Level 3 @24 V, Load dump A +200 V	
EN 13309 Construction machinery		
ISO 14982 Agricult./forestry machines		
Emission/Immunity	Exceeds E1 requirements	
	The EMC measurements are conducted in a reference cylinder. The EMC properties can deviate when using different cylinders.	

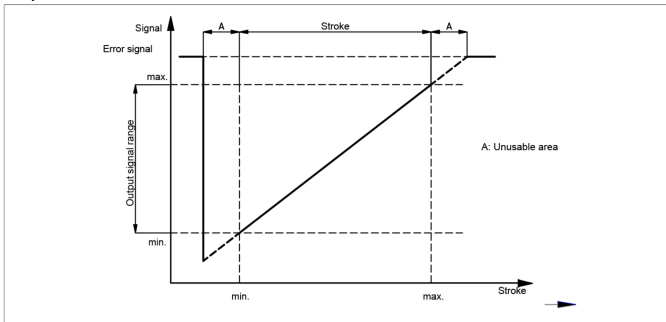
Connection Assignment

Signal	Connector code 1__	Plug system code 4__	Cable code 2__
Supply voltage Ub	Pin 1	Pin 1	BN
GND	Pin 3	Pin 3	WH
Signal output	Pin 2	Pin 2	GN
Do not connect	Pin 4	Pin 4	-

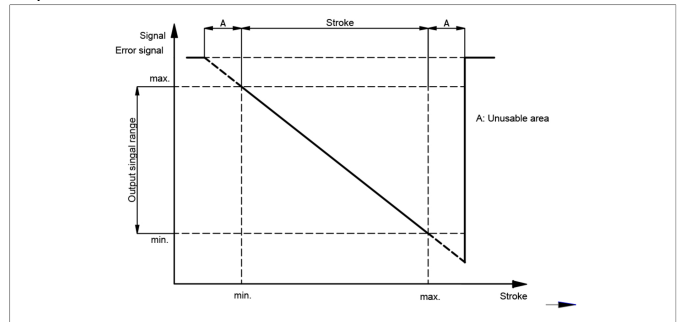


Technical Data
Output
Characteristics

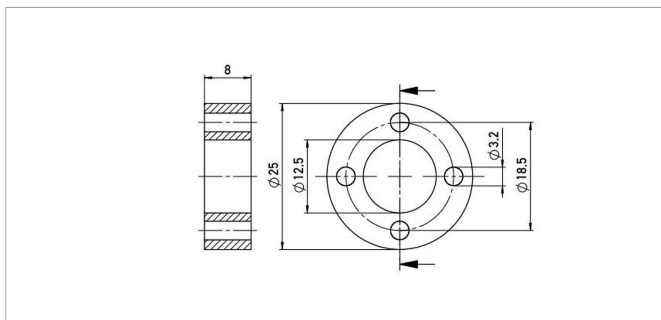
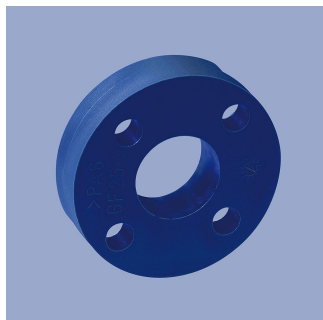
Output characteristic



Output characteristic



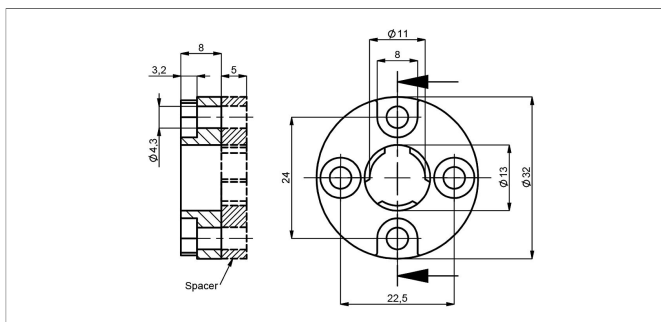
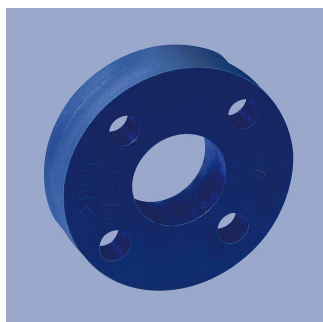
Position Markers



Z-TH1-P18

Ring position marker for fixation with screws M3
 Material PA6-GF
 Weight approx. 12 g
 Operating temp. -40 ... +100°C
 Surface pressure max. 40 N/mm²
 Fastening torque max. 100 Ncm
 of mounting

P/N	Pack. unit [pcs]
400005697	1

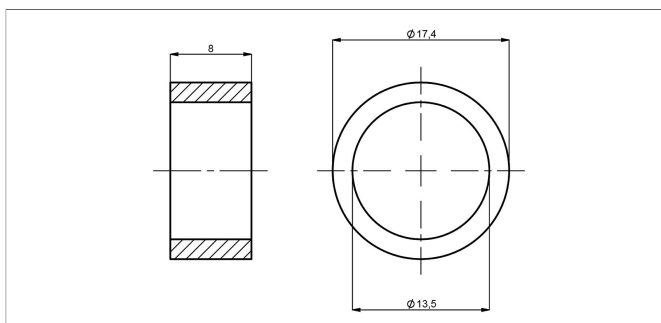
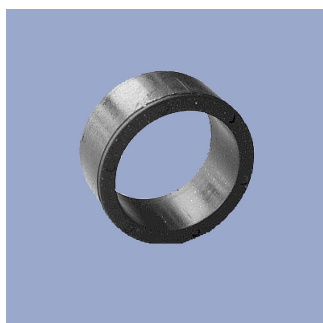


Z-TH1-P19

Z-TH1-PD19 With spacer

Ring position marker for fixation with screws M4, optionally with or without spacer
 Material PA6-GF, Spacer: POM-GF
 Weight approx. 14 g
 Operating temp. -40 ... +100°C
 Surface pressure max. 40 N/mm²
 Fastening torque max. 100 Ncm

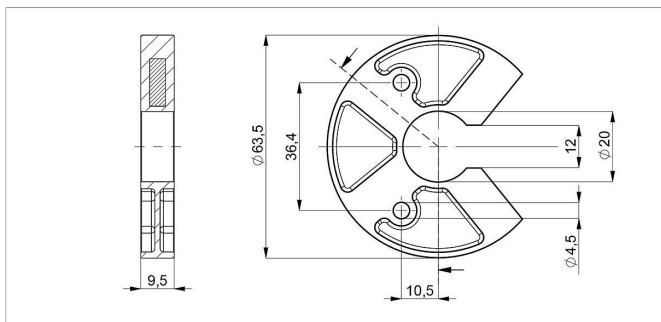
P/N	Spacer	Pack. unit [pcs]
400005698	-	1
400107117	incl.	1



Z-TH1-P30

Ring position marker for mounting via lock washer and retaining ring
 Material NdFeB bonded (EP)
 Weight approx. 5 g
 Operating temp. -40 ... +100°C
 Surface pressure max. 10 N/mm²

P/N	Pack. unit [pcs]
400106139	1



Z-TH1-P25

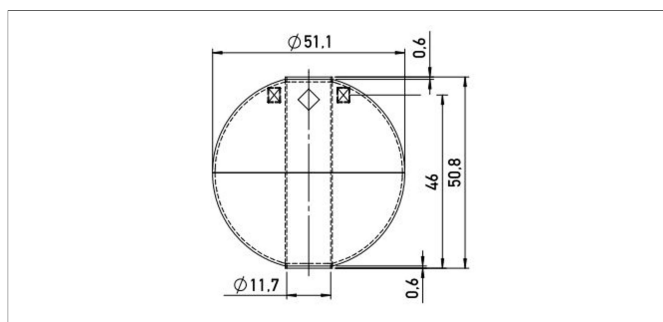
U-shaped position marker for fixation with M4 screws

Caution: for dimension of electrical zero point please follow the user manual!

Material PA6-GF
 Operating temp. -40 ... +105°C
 Surface pressure max. 40 N/mm²
 Fastening torque max. 100 Ncm
 of mounting

P/N	Pack. unit [pcs]
400105076	1

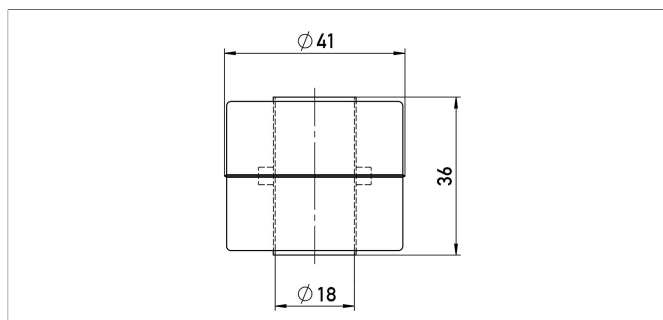
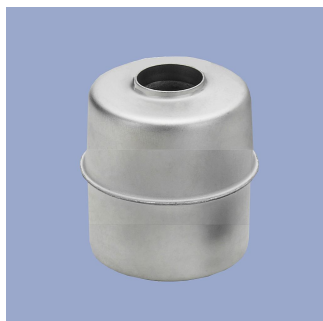
Position Markers



Z-TH1-P22

Ball-type floating position marker
 Material Stainless steel 1.4571
 Weight approx. 42 g
 Operating temp. -40 ... +100°C
 Compression strength ≤ 60 bar
 Density 720 kg/m³
 Immersion depth in water 36.7 mm

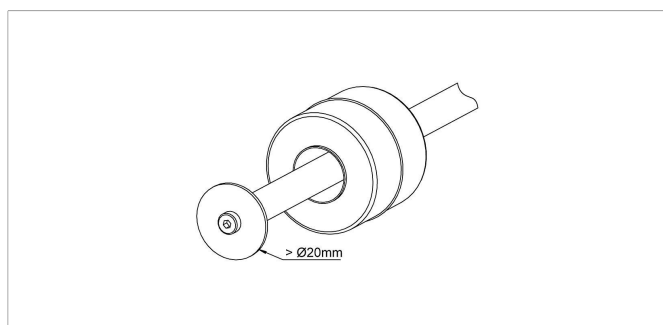
P/N	Pack. unit [pcs]
400056045	1



Z-TH1-P21

Cylinder floating position marker
 Material Stainless steel 1.4404
 Weight approx. 20 g
 Operating temp. -40 ... +100°C
 Compression strength ≤ 8 bar
 Density 740 kg/m³
 Immersion depth in water approx. 26.6 mm

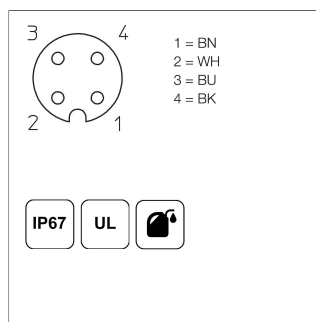
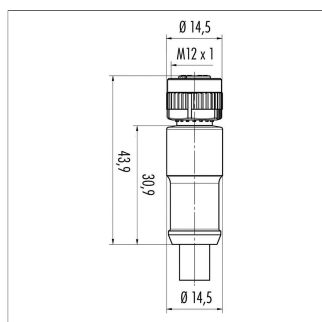
P/N	Pack. unit [pcs]
400056044	1



When using floating position markers, we recommend to secure the marker against loss with a washer at the rod end.

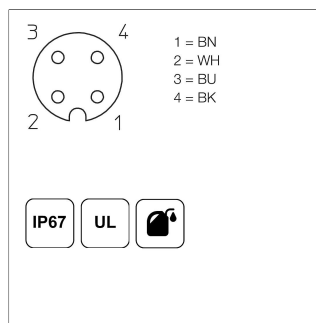
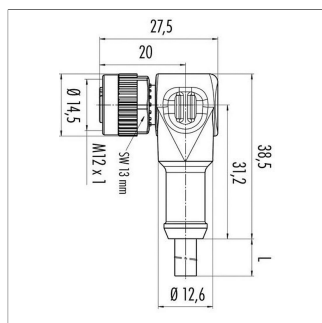
For this purpose, a sensor version with inner thread at the rod end is required (s. ordering code).

Connector System M12



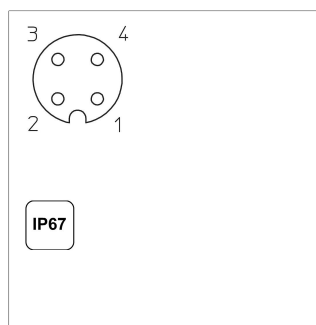
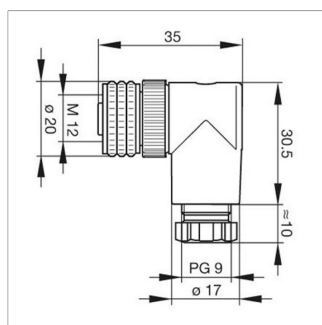
EEM-33-35/36/37
M12x1 Mating female connector, 4-pin, straight, A-coded, with molded cable, not shielded, IP67, open ended
Plug housing PA
Cable sheath PUR, Ø = max. 6 mm, -40 ... +85°C (fixed)
Lead wires PP, 0.34 mm²

P/N	Type	Length
400056135	EEM-33-35	2 m
400056136	EEM-33-36	5 m
400056137	EEM-33-37	10 m



EEM-33-38/39/40
M12x1 Mating female connector, 4-pin, angled, A-coded, with molded cable, not shielded, IP67, open ended
Plug housing PA
Cable sheath PUR, Ø = max. 6 mm, -40 ... +85°C (fixed)
Lead wires PP, 0.34 mm²

P/N	Type	Length
400056138	EEM-33-38	2 m
400056139	EEM-33-39	5 m
400056140	EEM-33-40	10 m



EEM-33-89
M12x1 Mating female connector, 4-pin, angled, A-coded, with coupling nut, screw termination, IP67, not shieldable
Operating temp. -25 ... +90°C
Plug housing PBT
For wire gauge 6 ... 8 mm, max. 0.75 mm²

P/N	Type
400005634	EEM-33-89

IP67 Protection class IP67 DIN EN 60529

IP68 Protection class IP68 DIN EN 60529

Very good Electromagnetic Compatibility (EMC) and shield systems

Very good resistance to oils, coolants and lubricants

C Suited for applications in dragchains

UL UL - approved

CAN-Bus

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