



DSK5H MODELS

SIL3 PLe INCREMENTAL ENCODERS

Introduction

When an automation system requires a high degree of risk mitigation of failure modes, often times Functional Safety equipment can be a part of the solution. Sensata | BEI Sensors offers a wide range of Functional Safety encoders to fit most any application or electrical interface requirement. Rated at SIL3 (PLe), these encoders allow safe operation in set-up, production and maintenance modes, significantly reducing operational risks. All encoders have the option of a Digital HTL or TTL operation as an alternative to the Sine/Cosine outputs found on most Functional Safety encoders. This makes them a compatible replacement for existing encoders when migrating to a higher safety level of operation. This series, the DSK5H has a blind, hollow shaft mounting that accepts shafts up to 14mm in diameter with a length not to exceed 24mm. Several flexible tethering options are available for this 58mm diameter encoder.



Features

- Usable up to SIL3 and Cat.4 / PLe according to IEC 61508 / EN ISO 13849
- Suitable for safe motor feedback according to IEC 61800-5-2
- Robust and excellent resistance to shock and vibration
- High protection level: IP65
- High temperature performance -20°C to $+85^{\circ}\text{C}$
- 58mm standard size encoder
- Multiple shaft configurations:
Blind hollow shaft: 9.52mm to 14mm
Other shaft configurations available (solid, through, tapered)
- Wide choice of connection configurations
- Power supply 5Vdc or 11 - 30Vdc
- Digital TTL/RS422, HTL or sine/cosine 1Vpp output
- Resolutions up to 2500ppr

Applications

- Industrial automation
- Automated guided vehicles
- Mills for lumber, steel and other metals
- Printing and packaging equipment
- Food processing equipment
- Forming and die presses

SPECIFICATIONS

Mechanical

	DSK5H (9.52 to 14mm)
Material	Cover: coated zinc alloy Body: aluminum Shaft: AISI 303 stainless steel
Bearings	6803 series - sealed
Maximum Loads	Axial: 20 N Radial: 40 N
Shaft Inertia	< 6,700 g.mm ²
Static/Dynamic torque	10 / 85 mN.m
Permissible max. speed	9,000 RPM

Continuous max. speed	6,000 RPM
Theoretical mechanical lifetime L_{10h} ^(A)	> 24 X 10 ⁹ turns / 100,000 hours
Encoder weight (approx.)	0.30 kg

^(A) **Continuous max. speed – ½ max. load – according to ISO 281:** 1990, L₁₀

Electrical Characteristics / Functional Safety Parameters ^(B)

Electronic Version	Output signals	Operating Voltage +V	Supply current	Current per channel pair	Short circuit protected	Reverse polarity protected	PFD	PFH	MTTFd	DC
2G2	Digital TTL RS422	5V +/-5% ^(C) --- 250mA	100mA with no load	40mA	Yes	Yes	7.51E-05	8.58E-10	1331	HIGH
5G2		11-30V ^(C) --- 250mA			Not to +V		9.52E-05	1.09E-09	1050	
5G5	Digital HTL		Yes	9.52E-05	1.09E-09		1050			
2WT	Sine Cosine 1Vpp	5V +/-5% ^(C) --- 250mA	70mA with no load	10mA	Yes		4.29E-05	4.90E-10	2328	
5WT		11-30V ^(C) --- 250mA			Not to +V		6.60E-05	7.53E-10	1515	

^(B) Safety mission time: 20 years

^(C) Device must be supplied by a Class 2 LPS or SELV/PELV limited energy source ≤60V.

Environmental & Standards Conformity

	DSK5H
Protection (EN 60529)	IP65
Salt Spray (EN 60068-2-11 part 2)	96h
Humidity (EN 60068-2-38)	93% @ 65°C
Shock (EN 60068-2-27)	≤ 100m.s ⁻² (6 ms, half sine)
Vibration (EN 60068-2-6)	≤ 100m.s ⁻² (10 ... 2 000 Hz)
Operating temperature	-20 to 85°C (encoder T°)
Storage temperature	-20 to 85°C
EMC Immunity Test	EN 61000-6-2, increased levels
EMC Emission Test	EN 61000-6-4, increased levels
Isolation	1000 Veff
Functional safety	IEC 61508
	IEC 62061
	ISO 13849-1
	IEC 61800-5-2
Encoders usable up to SIL3 / PLe with specific requirements, see safety user manual for details.	
Z and Z/ are not safety signals.	



STANDARD CONNECTIONS

DSK5H connections

		0V	+V	A or S	B or C	Z	A/ or S/	B/ or C/	Z/	Ground
G6	M23 - 12 pins CW	1	2	3	4	5	6	7	8	Connector body
G8	M23 - 12 pins CCW	10 + 11	2 + 12	8	5	3	1	6	4	Connector body
G3	PVC cable 8 wires 8230/020	WH white	BN brown	GN green	YE yellow	GY grey	PK pink	BU blue	RD red	General shielding
GP	PUR cable 12 wires 8230/050	WH white + WH/GN white /green	BU blue + BN/GN brown / green	GY grey	BN brown	RD red	PK pink	GN green	BK black	General shielding
U3	PVC cable 8 wires	WH	BN	GN	YE	GY	PK	BU	RD	General shield
GC	PUR cable	BK	RD	GN	BN	VT	YE	OG	BU	General shield
GM	M12 8 pins	1	2	3	4	5	6	7	8	Connector body

Note: All connections are UL certified, except G3 and GP



RESOLUTIONS

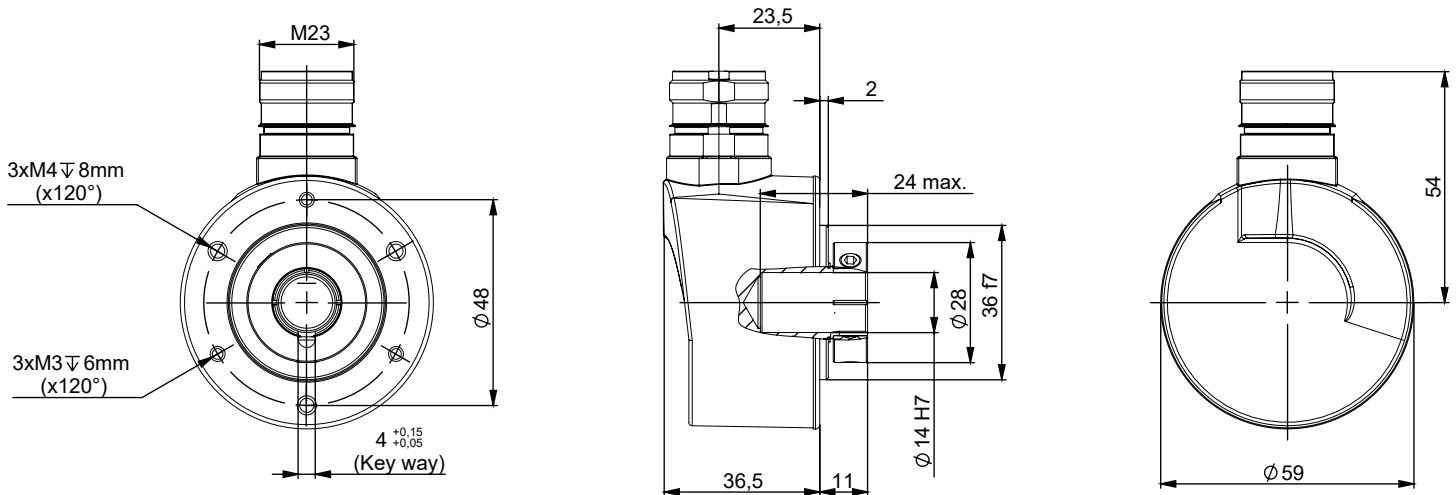
250 256 360 500 512 1000 1024 1500 2000 2048 2500



DIMENSIONS

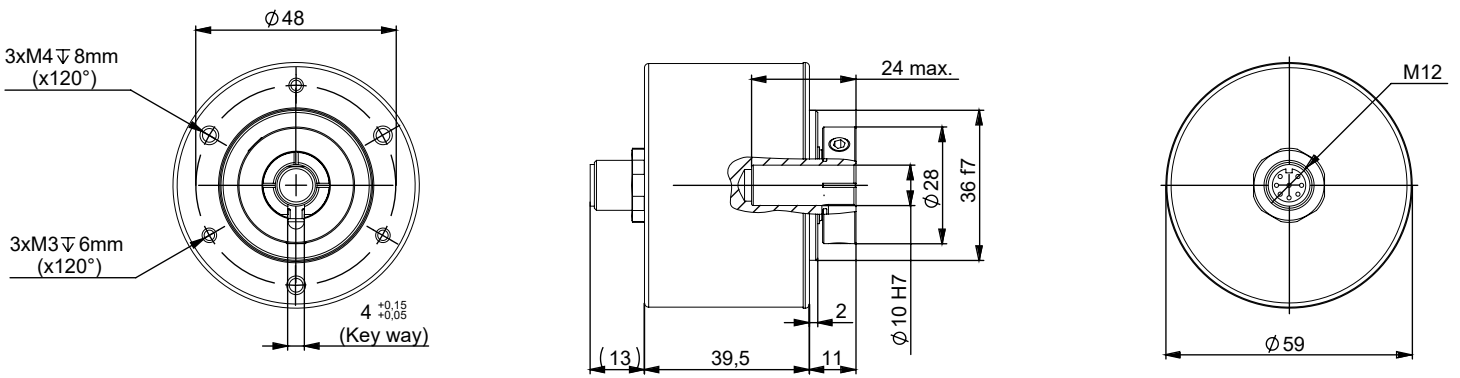
All dimensions are in mm

DSK5H14 - Blind hollow shaft 14mm - M23 Connector output - Radial



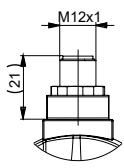
Note: A key (4x4x8) ensuring the positive locks function between driving shaft and encoder is provided in the encoder box.

DSK5H10 - Blind hollow shaft 10mm - M12 Connector output - Axial

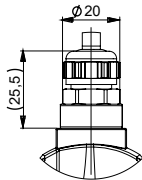


Note: A key (4x4x8) ensuring the positive locks function between driving shaft and encoder is provided in the encoder box.

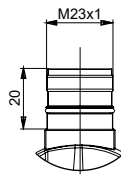
**M12
GMR**



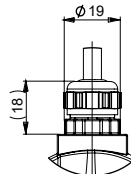
**Cable
U3R, GCR**



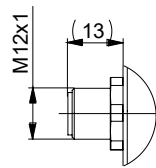
**M23
G6R, G8R**



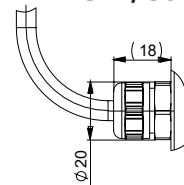
**Cable
G3R, GPR**



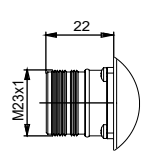
**M12
GMA**



**Cable
G3A, U3A,
GPA, GCA**

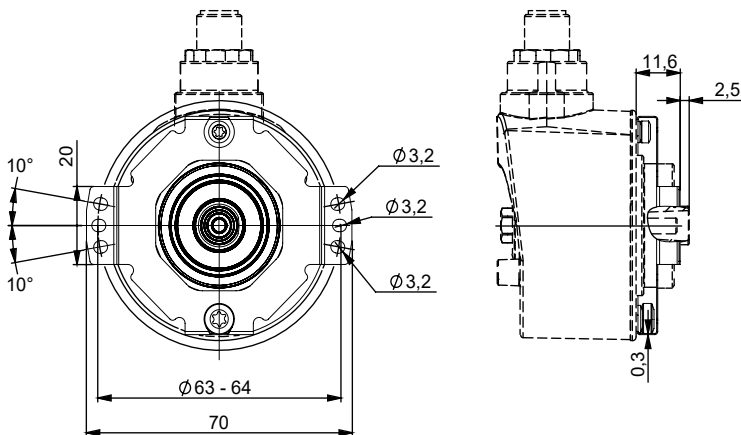


**M23
G6A G8A**

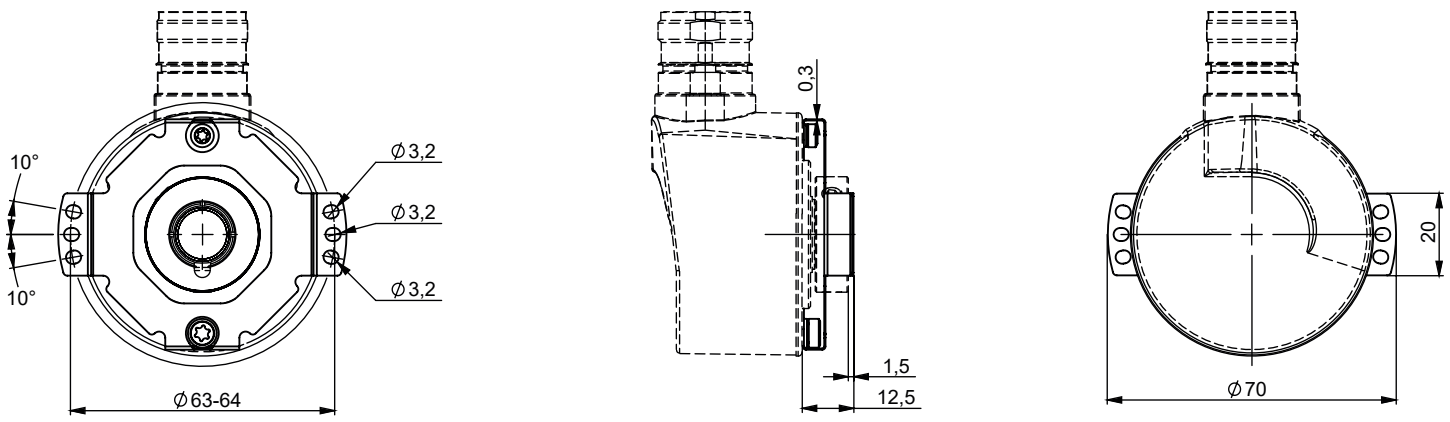


COUPLING INTERFACE

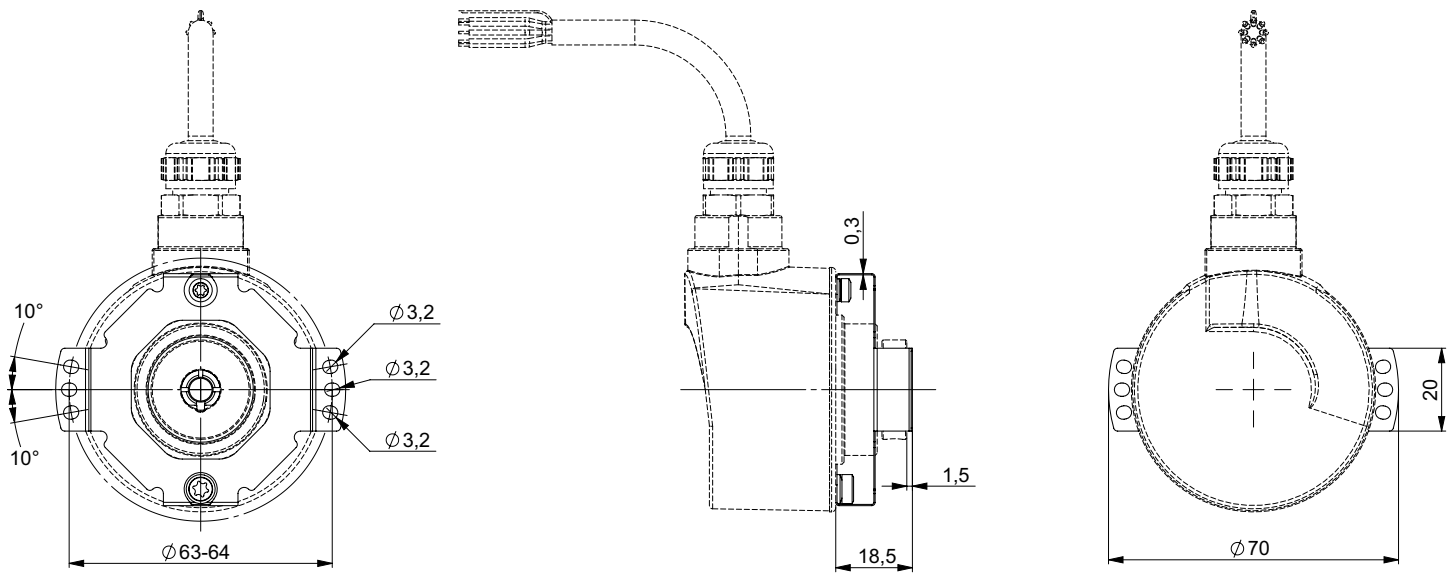
Stator coupling kit M9445/044



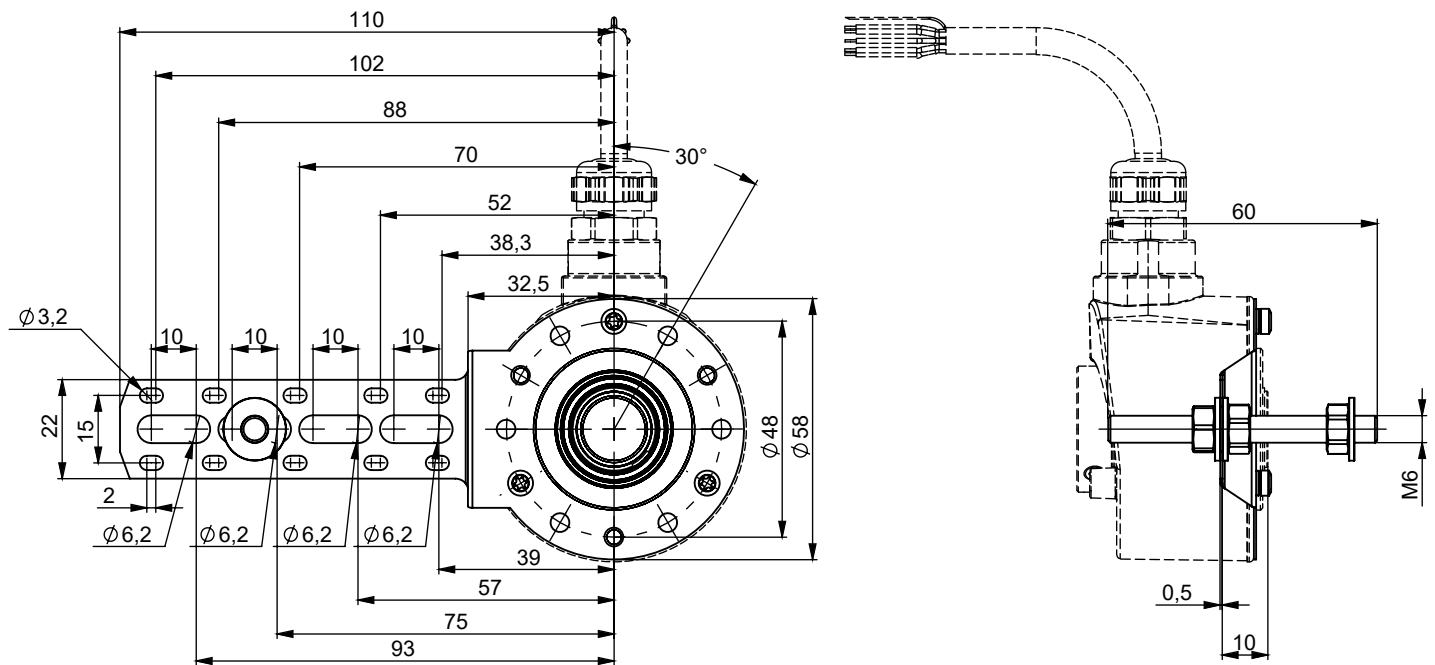
Stator coupling kit M9445/063 for DSK5H 9.52 to 14mm shaft



Stator coupling kit M9445/064



Tether arm kit M9445/047 suitable for all configurations



		9445/063	9445/047	9445/044	9445/064
Permissible misalignments	Axial	+/- 1mm	+/- 1mm	+/- 1mm	+/- 1mm
	Radial	+/- 0.2mm	+/- 0.2mm	+/- 0.2mm	+/- 0.2mm
	Perpend.	+/- 2°	+/- 5°	+/- 2°	+/- 2°
	Runout	0.1mm	0.1mm	0.1mm	0.1mm
Angular rigidity		>600 N.m/rad	>100 N.m/rad	>600 N.m/rad	>600 N.m/rad



GENERAL NOTES

For a safe installation according to the required safety level needed in the application, refer to the user safety User Manual. The safety User Manual provides the technical information (drawings, electrical data, etc...) for a safe integration. A quick installation guide is provided with each encoder for use by the technician who installs the device on the equipment.



ORDERING OPTIONS

Example : DSK5H14 // 5G5 // 9 // 01024 // GP // R // 050 // CSS3**

Contact the factory for special versions, ex: resolution, connection, flange...

	DSK5H	14	//	5G5	9	//	01024	//	GP	R	050	//	CSS3**
Family	[Line connecting DSK5H to DSK5H]												
DSK5H	[Line connecting DSK5H to DSK5H]												
Shaft	[Line connecting 14 to Shaft]												
E3 = 9.52 mm E4 = 12.7 mm 10 = 10 mm 12 = 12 mm 14 = 14 mm	[Line connecting 14 to Shaft]												
Voltage Output	[Line connecting 5G5 to Voltage Output]												
2G2: 5Vdc, TTL RS422 5G2: 11- 30Vdc, TTL RS422 5G5: 11- 30Vdc, HTL 2WT: 5Vdc, Sine 1 Vpp (analog) 5WT: 11- 30Vdc, Sine 1 Vpp (analog)	[Line connecting 5G5 to Voltage Output]												
Channels	[Line connecting 9 to Channels]												
9: Digital electronics AA/ BB/ ZZ/ B before A, CW viewed from flange side Z gated A&B N: Analog electronics SS/ CC/ ZZ/ C before S, CW viewed from flange side Z ungated Contact factory for other configurations	[Line connecting 9 to Channels]												
Resolution	[Line connecting 01024 to Resolution]												
250, 256, 360, 500, 512, 1000, 1024, 1500, 2000, 2048, 2500	[Line connecting 01024 to Resolution]												
Output Termination	[Line connecting GP to Output Termination]												
G6: M23 12 pins CW G8: M23 12 pins CCW GM: M12 8 pins GP: PUR cable 12 wires G3: PVC cable 8 wires U3: PVC Cable 8 wires GC: PUR cable 8 wires	[Line connecting GP to Output Termination]												
Output Orientation	[Line connecting R to Output Orientation]												
R: Radial A: Axial	[Line connecting R to Output Orientation]												
Cable Length	[Line connecting 050 to Cable Length]												
xxx: Cable Length (ex.: 020 = 2 Meters) Blank: No Cable	[Line connecting 050 to Cable Length]												
Accessories*	[Line connecting CSS3** to Accessories*]												
CS****: Key for positive lock CSS3**: Key + 9445/063 stator coupling (for DSK5H 9.52 to 14mm) CSBA**: Key + 9445/047 Tether arm **DX**: Key + 9445/044 stator coupling ??????: Key + 9445/064 stator coupling	[Line connecting CSS3** to Accessories*]												

* Parts mounted on encoder and fasteners included in the encoder box.



AGENCY APPROVALS & CERTIFICATIONS

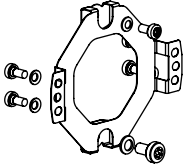
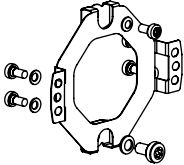
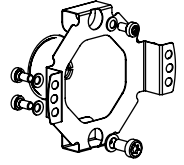
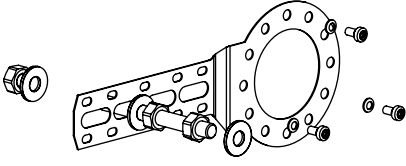
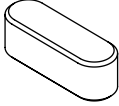
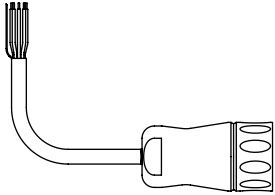


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Description	Part Number
<p>Safety Rated Flexmount Kit Hardware included</p> 	M9445/063
<p>Safety Rated Flexmount Kit Hardware included</p> 	M9445/044
<p>Safety Rated Flexmount Kit Hardware included</p> 	M 9445/064
<p>Safety Encoder Tether Arm Kit Hardware included</p> 	M9445/047
<p>Square shaft keys</p> 	9435/009 = 4mm x 8mm (for DSK5H 9.52 to 14mm)
<p>Standard Mating Connector 2m, 5m, 10m Mating Cable Assembly Other lengths from 0.5m to 25m available upon request, consult factory.</p> 	<p>Extension cords compatible with G6 connection option: RAL-020-001 = M23, PVC cable, 2m RAL-050-001 = M23, PVC cable, 5m RAL-100-001 = M23, PVC cable, 10m</p> <p>Extension cords compatible with G8 connection option: RAL-020-012 = M23, PUR cable, 2m RAL-050-020 = M23, PUR cable, 5m RAL-100-028 = M23, PUR cable, 10m</p> <p>Extension cords compatible with GM connection option: RAL-020-039 = M12 overmolded, PUR cable, 2m RAL-050-052 = M12 overmolded, PUR cable, 5m RAL-100-050 = M12 overmolded, PUR cable, 10m</p>

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