

POSITAL

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DATASHEET ABSOLUTE MAGNETIC ROTARY ENCODER SSI



Small rotary sensor based on reliable magnetic technology. The compact dimensions mean that they can be used in applications with very limited installation space. Its all around cost efficient design make it a perfect choice for cost sensitive applications. The single turn sensing is based on 360° Hall Effect sensing. POSITAL MCD rotary

encoder series uses the Wiegand effect technology to keep perfect track of the number of rotations even if the rotations are slow and/or there is no system power (this proven technology is known as self powered counter). The system comes without backup batteries making it maintenance free as well as ROHS compliant.

Main Features

- Compact Industrial Design (35,5mm)
- Interface: SSI
(Synchronous-Serial Interface)
- Max. Number of Revolutions up to 32 Bit
- Preset Input and Direction of Rotation
- Code: Gray or Binary
- EMC: EN 61000-6-2, EN 61000-6-4
- Maintenance Free
- No Battery
- 100% Absolute

Mechanical Structure

- Aluminum Flange
- Coated Steel Housing
- Stainless Steel Shaft
- Precision Ball Bearings

Applications

- Production Machines
- Healthcare
- Trucks
- Hoists /Cranes
- Mobile Machines
- Renewable Energy

Electrical Features

- Reverse Voltage Protection
- Over-Voltage Protection
- Preset Function
- Switchable Counting Direction
- (Complement Function)

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Technical Data

Electrical Data

Clock Input	Via Opto-Coupler
Data Output	Line-Driver According to RS 422
Clock Frequency	100 kHz – 2 MHz
Supply Voltage	4.5 – 30 V DC (Absolute Maximum Ratings) ¹
Turn on Time	< 1 s
Power Consumption	Typical 0.7 W
MTBF Time According to	> 3x10 ⁶ h @ T = 40°C
EMC	Emitted Interference: EN 61000-6-4 Noise Immunity: EN 61000-6-2
Connection	Cable Exit or Connector

1) Absolute rotary encoders shall be connected only to subsequent electronics whose power supplies comply with EN 50178

Sensor Data

Single-Turn Technology	Magnetic 2 Axis Hall Sensor
Single-Turn Resolution	Up to 16384 Steps / Revolution (14 Bit)
Single-Turn Accuracy	± 0.35°
Internal Cycle Time	< 600 µs
Multi-Turn Technology	Self Powered Magnetic Pulse Counter (Wiegand Sensor)
Multi-Turn Range	Can Count Up to 200 Billion Revolutions, Limited By Memory
Data Retention Time	≥ 1.25x10 ⁹ h @ T = 35°C

Environmental Conditions

Operating Temperature Sensor ²	-40 to + 85 °C (-22 to +185 °F)
Storage Temperature ²	-40 to + 85 °C (-22 to +185 °F)
Humidity	98 % (Without Condensation)
Protection Class (EN 60529)	IP 54 (Moulded : MCD-...-CAW and MCD-...-CRW)
Casing Side:	IP 65 (Other types : MCD-...-PAM and MCD-...-GAW)
Protection Class (EN 60529)	IP 65 (Clamp Flange MCD-...-C100-..)
Shaft Side:	IP 54 (Other Types : MCD-...-S060-... and MCD-...-B060-...)

2) Please Also Refer to Temperature Range of Cable

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Mechanical Data

Housing	Coated Steel Housing
Flange	Aluminum
Shaft	Stainless Steel
Lifetime	Dependent on Shaft Version and Shaft Load – Refer to Table
Max. Shaft Load	Axial 40 N, Radial 110 N
Inertia of Rotor	$\leq 30 \text{ gcm}^2$ (0.11 oz-in ²)
Friction Torque at + 25°C	$\leq 3 \text{ Ncm}$ (2.8 oz-in)
RPM (Continuous Operation)	Max. 12.000 RPM
Shock	EN 60068-2-27 $\leq 300 \text{ g}$ (Half Sine, 6 ms XYZ)
	MIL-STD-810C $\leq 200 \text{ g}$ (Half Sine, 3 ms XYZ)
Permanent Shock	EN 60028-2-29 $\leq 30 \text{ g}$ (Half Sine, 16 ms XYZ)
	MIL-STD-810C $\leq 30 \text{ g}$ (Half Sine, 11 ms XYZ)
Vibration	EN 60068-2-6 $\leq 30 \text{ g}$ (10 Hz – 1,000 Hz, XYZ)
	MIL-STD-810 $\leq 4.2 \text{ g}$ (5 Hz – 500 Hz XYZ)
Weight (Standard Version)	$\sim 150 \text{ g}$ (0.33 lbs) including cable

Minimum Mechanical Lifetime

Flange	Lifetime in 10 ⁸ revolutions with (F_a/F_r)		
S6 Synchro Flange (MCD-...-S060-...)	224 (20N/20N)	28 (20N/40N)	3 (20N/80N)
C100 Clamp Flange (MCD-...-C100-...)	247 (40N/60N)	104 (40N/80N)	40 (40N/110N)

Cable¹

Operating Temperature Cable	Flexing -5°C to +70°C (+23 to +158 °F)
	Static -30°C to +70°C (-22 to +158 °F)
Minimum Bend Radius	Flexing 10x Cable Diameter
	Static 5x Cable Diameter
Cable	Approx \varnothing 6 mm (~0.236 in)
	Type: LIYCY 4x2x0.14 - (~AWG26)

1) Valid for types: MCD-...-GAW, MCD-...-CAW, MCD-...-CRW

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SSI

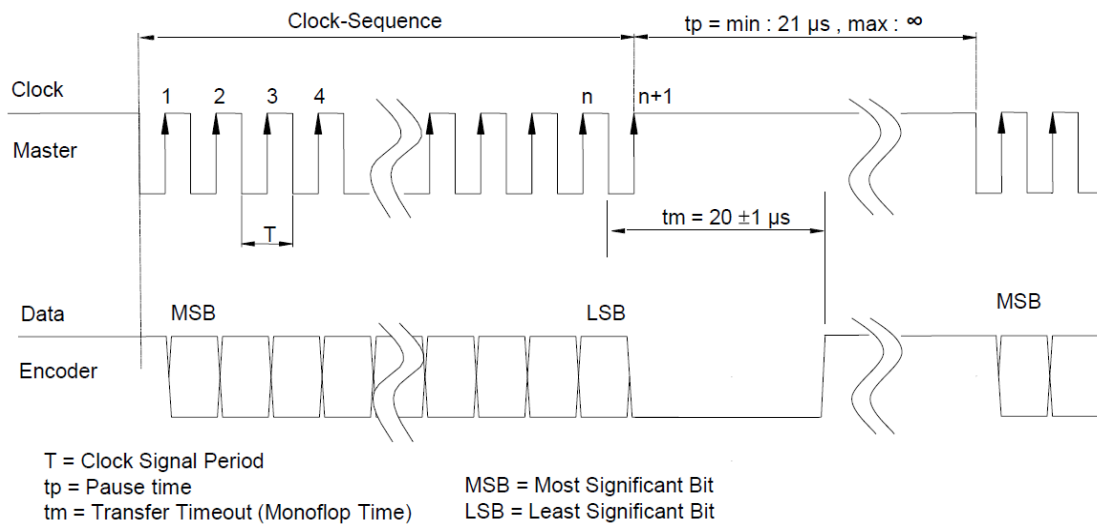
Interface

Synchronous Serial Interface (SSI)

Driver	Driver meets EIA standard RS 422, transmission rates up to 10 Bit/s
Transfer	Transfer distance up to 1200 m
Transmission	Balanced transmission provides high noise immunity, shielded and twisted pair lines are essential to attain extremely

Protocol SSI

Detailed SSI-Interface description and application example under [technical description of SSI interface](#). This product is also available with analog or CANopen interface, please check our [website](#).



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Electrical Connection

Function	Connector Pin-No.	Wire End
GND	1	white
Supply Voltage +U _b	2	brown
SSI Clk+	3	green
SSI Clk-	4	yellow
SSI Data+	5	grey
SSI Data-	6	pink
Preset	7	blue
Complement/DIR	8	red
Shielding	-	Shielding

Connectors (Front View)

M12 Connector

MCD-XXXX-XXXX-XXXX-PAM

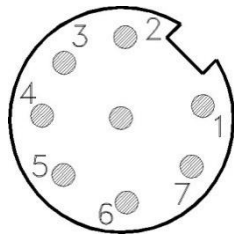
Cable Exit¹

MCD-XXXX-XXXX-XXXX-CAW

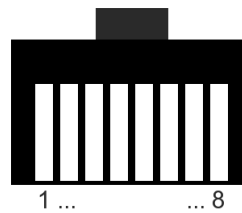
MCD-XXXX-XXXX-XXXX-GAW

MCD-XXXX-XXXX-XXXX-GRW

8 Pin M12 Connector male a-coded



RJ45 Connector



1) A RJ45 Connector (8P8C modular connector) is mounted on the cable end for the CAW / GAW / GRW version. This connector can be used for test purposes also for custom installation. Do not connect to any Ethernet network, devices may be damaged!

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Preset Function

Voltage Level	Function
0 (Input = N.C. or GND)	Inactive
1 (Input \geq 10V / Input \leq UB)	Preset is activated ¹ . The Encoder value will be set to 0 in the moment the Preset Level will change to inactive again (falling edge)
Input Resistance	10 kOhm

1) The Preset needs to be activated for at least 1 second before the falling Edge will be detected.

Direction of Rotation²

Voltage Level	Counting direction for clockwise rotation (view on shaft)
0 (Input = N.C. or GND)	Up
1 (Input \geq 10V / Input \leq UB)	Down
Input Resistance	10 kOhm

2) Formerly Complement function

It takes 1 second before the change takes effect. The counting direction is changed after the DIR is activated.

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Mechanical Models

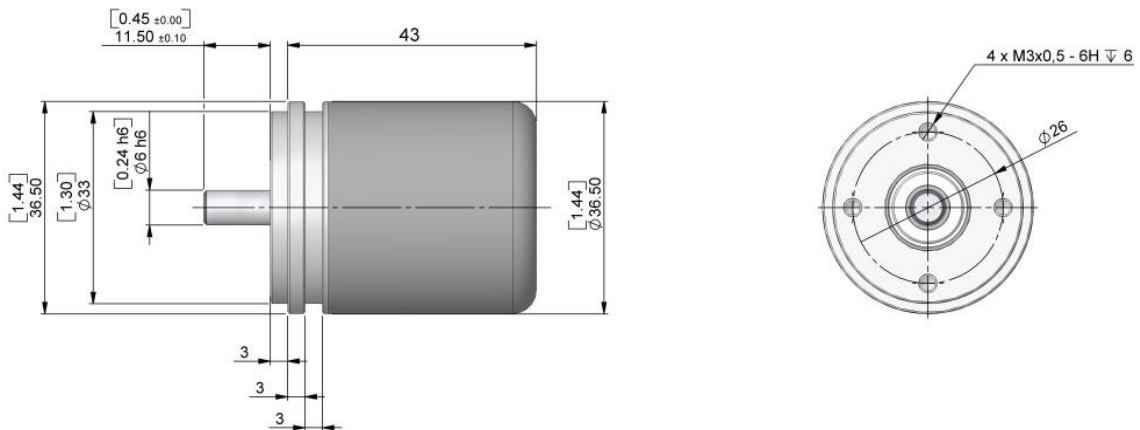
For detailed drawings please refer to our [website](#) or directly contact us. Also available as IGES

Drawing and STEP 3D Model. More versions for Heavy Duty environments available [here](#).

Flange Types

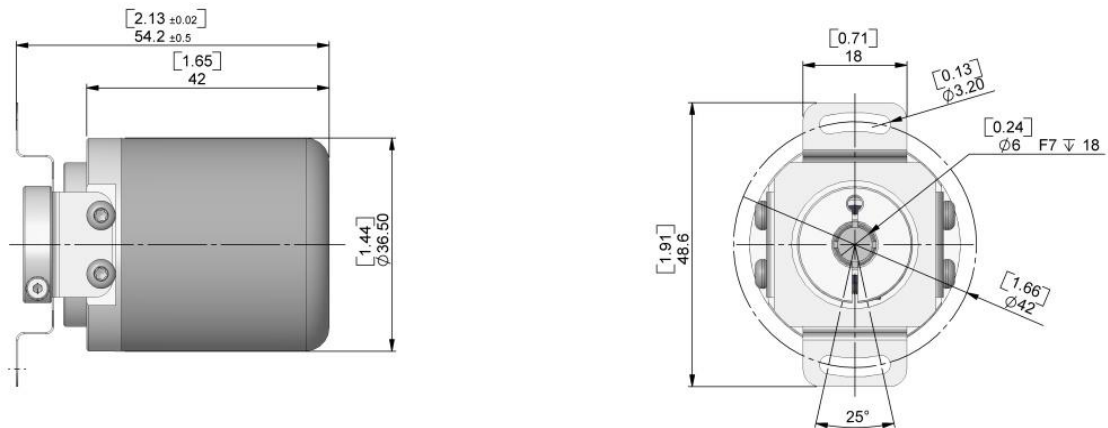
Synchro Flange

MCD-XXXX-XXXX-S060-XXX



Blind Hollow Shaft/Hub Shaft

MCD-XXXX-XXXX-B060-XXX



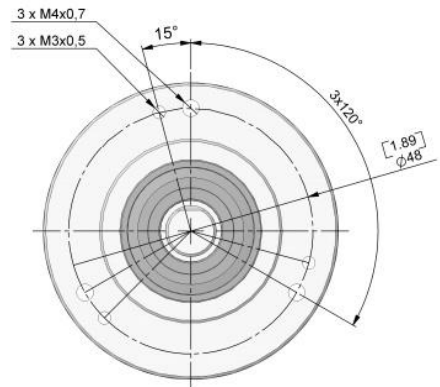
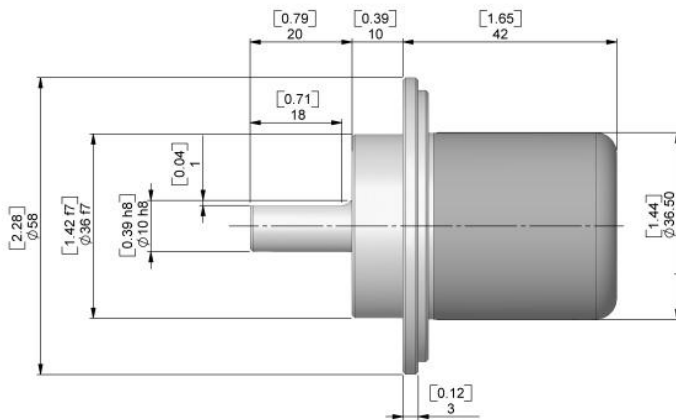
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Clamp Flange

MCD-XXXX-XXXX-C100-XXX

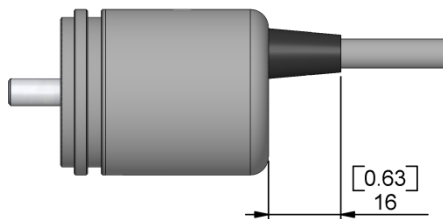


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Housing and Connector Types

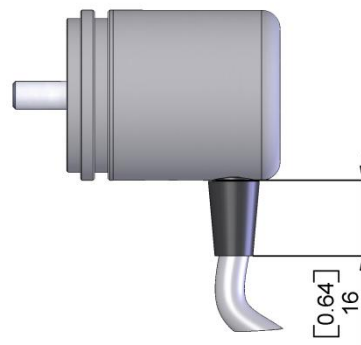
Axial Cable exit

MCD-XXXX-XXXX-XXXX-CAW



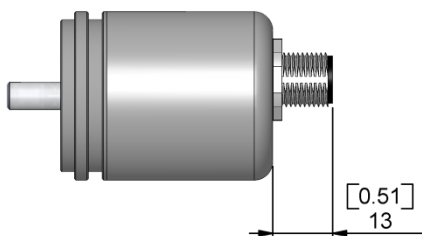
Radial Cable Exit

MCD-XXXX-XXXX-XXXX-CRW



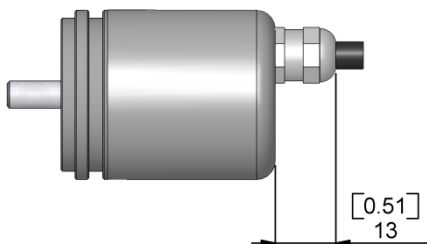
M12 Connector Axial

MCD-XXXX-XXXX-XXXX-PAM



Axial Cable Exit with Gland

MCD-XXXX-XXXX-XXXX-GAW



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Models / Ordering Description

Description	Type key							
Magnetocode	MCD-	---	01	-	---	-	---	0-
Interface / Voltage	SSI – 5-30Vdc	S1						
Version			01					
Code	Gray			G				
	Binary			B				
Bits for Revolutions	Single-Turn							00
	Multi-Turn (4.096 Turns)							12
	Multi-Turn (8.192 Turns)							13
Steps Per Revolution (Bits)	4096 (0.09°)							12
Flange	Synchro Flange Ø 36 mm (Shaft Ø 6 mm)				S			06
	Blind Hollow Shaft Ø 36 mm (Shaft Ø 6 mm)				B			06
	Clamping Flange Ø 58 mm (Shaft Ø 10 mm)				C			10
Shaft Diameter								
Mechanical Options	No Options							0
	Customized							C
Connection	Cable Exit, Axial 1m, Moulded							CAW
	Cable Exit, Radial 1m, Moulded							CRW
	Cable Exit, Axial 1m, with Cable Gland							GAW
	Cable Exit, Axial 5m							CAW-5m
	M12 Connector, 8pin							PAM

Standard = bold, further models on request

Ordering example

MCD-S101G-1312-S060-CAW

Accessories

Article No	Article	Description
34500800	P8F	Counter Connector for MCD-...-PAM
34500801	P8F-STK8.2	Counter Connector for MCD-...-PAM with 2m PUR cable
34500802	P8F-STK8.5	Counter Connector for MCD-...-PAM with 5m PUR cable

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Check Out Some of the Other POSITAL Products



Draw Wire Sensor to Measure Linear Displacements

To measure linear movements or linear displacements, an absolute magnetic rotary encoder can be combined with a draw wire sensor. The contact-free measuring sensor stage of the MCD Sensor doesn't have any abrasion. The sensor can directly be connected to digital control units via SSI- or CANopen or Analog Interface.

[More Information](#)



Heavy Duty Stainless steel Magnetic Encoders for the Toughest Environments

Its stainless steel housing and high protection class of IP69K makes the MCD Heavy Duty rotary encoder resistant against active chemical cleaning and corrosion. Combined with the sturdy ball bearings this sensor is an ideal choice for reliable measurement under extreme environmental conditions and outdoor applications.

[More Information](#)



Tilt Sensors to Measure Inclinations up to 360°

ACS is developed on advanced MEMS technology based capacitance measurement. The sensor is a pre-calibrated device which can be put into immediate operation, upon simple and easy installation with a three point mount and setting of preset. Its compact design, installation "anywhere" and other versatile features makes it an ideal choice for very accurate measurement.

[More Information](#)

Disclaimer

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Typelist

MCD-S101B-0012-S060-CAW	MCD-S101B-1213-B060-GAW	MCD-S101G-0012-S060-CRW	MCD-S101G-1213-B060-PAM
MCD-S101B-0012-S060-CRW	MCD-S101B-1213-B060-PAM	MCD-S101G-0012-S060-CAW-5m	MCD-S101G-1213-C100-CAW
MCD-S101B-0012-S060-CAW-5m	MCD-S101B-1213-C100-CAW	MCD-S101G-0012-S060-GAW	MCD-S101G-1213-C100-CRW
MCD-S101B-0012-S060-GAW	MCD-S101B-1213-C100-CRW	MCD-S101G-0012-S060-PAM	MCD-S101G-1213-C100-CAW-5m
MCD-S101B-0012-S060-PAM	MCD-S101B-1213-C100-CAW-5m	MCD-S101G-0012-B060-CAW	MCD-S101G-1213-C100-GAW
MCD-S101B-0012-B060-CAW	MCD-S101B-1213-C100-CRW	MCD-S101G-0012-B060-CRW	MCD-S101G-1213-C100-PAM
MCD-S101B-0012-B060-CRW	MCD-S101B-1213-C100-PAM	MCD-S101G-0012-B060-CAW-5m	MCD-S101G-1214-S060-CAW
MCD-S101B-0012-B060-CAW-5m	MCD-S101B-1214-S060-CAW	MCD-S101G-0012-B060-GAW	MCD-S101G-1214-S060-CRW
MCD-S101B-0012-B060-GAW	MCD-S101B-1214-S060-CRW	MCD-S101G-0012-B060-PAM	MCD-S101G-1214-S060-CAW-5m
MCD-S101B-0012-B060-PAM	MCD-S101B-1214-S060-CAW-5m	MCD-S101G-0012-C100-CAW	MCD-S101G-1214-S060-GAW
MCD-S101B-0012-C100-CAW	MCD-S101B-1214-S060-GAW	MCD-S101G-0012-C100-CRW	MCD-S101G-1214-S060-PAM
MCD-S101B-0012-C100-CRW	MCD-S101B-1214-S060-PAM	MCD-S101G-0012-C100-CAW-5m	MCD-S101G-1214-B060-CAW
MCD-S101B-0012-C100-CAW-5m	MCD-S101B-1214-B060-CAW	MCD-S101G-0012-C100-GAW	MCD-S101G-1214-B060-CRW
MCD-S101B-0012-C100-GAW	MCD-S101B-1214-B060-CRW	MCD-S101G-0012-C100-PAM	MCD-S101G-1214-B060-CAW-5m
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MCD-S101B-0012-C100-PAM	MCD-S101B-1214-C100-CAW-5m	MCD-S101G-0013-B060-CAW	MCD-S101G-1214-C100-GAW
MCD-S101B-0013-S060-CAW	MCD-S101B-1214-C100-CRW	MCD-S101G-0013-B060-CRW	MCD-S101G-1214-C100-PAM
MCD-S101B-0013-S060-CRW	MCD-S101B-1214-C100-PAM	MCD-S101G-0013-B060-CAW-5m	MCD-S101G-1312-S060-CAW
MCD-S101B-0013-S060-CAW-5m	MCD-S101B-1214-B060-CAW	MCD-S101G-0013-B060-GAW	MCD-S101G-1312-S060-CRW
MCD-S101B-0013-S060-GAW	MCD-S101B-1214-B060-CRW	MCD-S101G-0013-B060-PAM	MCD-S101G-1312-S060-CAW-5m
MCD-S101B-0013-S060-PAM	MCD-S101B-1214-B060-GAW	MCD-S101G-0013-B060-CRW	MCD-S101G-1312-S060-GAW
MCD-S101B-0013-B060-CAW	MCD-S101B-1214-B060-PAM	MCD-S101G-0013-B060-CAW-5m	MCD-S101G-1312-S060-PAM
MCD-S101B-0013-B060-CRW	MCD-S101B-1214-C100-CAW	MCD-S101G-0013-B060-GAW	MCD-S101G-1312-B060-CAW
MCD-S101B-0013-B060-CAW-5m	MCD-S101B-1214-C100-CRW	MCD-S101G-0013-B060-CRW	MCD-S101G-1312-B060-CRW
MCD-S101B-0013-B060-GAW	MCD-S101B-1214-C100-PAM	MCD-S101G-0013-B060-PAM	MCD-S101G-1312-B060-CAW-5m
MCD-S101B-0013-B060-PAM	MCD-S101B-1312-S060-CAW	MCD-S101G-0013-C100-CAW	MCD-S101G-1312-B060-GAW
MCD-S101B-0013-C100-CAW	MCD-S101B-1312-S060-CRW	MCD-S101G-0013-C100-CRW	MCD-S101G-1312-S060-PAM
MCD-S101B-0013-C100-CRW	MCD-S101B-1312-S060-GAW	MCD-S101G-0013-C100-CAW-5m	MCD-S101G-1312-B060-CAW
MCD-S101B-0013-C100-GAW	MCD-S101B-1312-S060-PAM	MCD-S101G-0013-C100-GAW	MCD-S101G-1312-B060-CRW
MCD-S101B-0013-C100-PAM	MCD-S101B-1312-B060-CAW	MCD-S101G-0013-C100-PAM	MCD-S101G-1312-B060-CAW-5m
MCD-S101B-0013-C100-CAW	MCD-S101B-1312-B060-CRW	MCD-S101G-0014-S060-CAW	MCD-S101G-1312-B060-GAW
MCD-S101B-0013-C100-CRW	MCD-S101B-1312-B060-GAW	MCD-S101G-0014-S060-CRW	MCD-S101G-1312-B060-PAM
MCD-S101B-0013-C100-GAW	MCD-S101B-1312-B060-PAM	MCD-S101G-0014-S060-CAW-5m	MCD-S101G-1312-C100-CAW
MCD-S101B-0013-C100-PAM	MCD-S101B-1312-C100-CAW	MCD-S101G-0014-S060-GAW	MCD-S101G-1312-C100-CRW
MCD-S101B-0014-S060-CAW	MCD-S101B-1312-C100-CRW	MCD-S101G-0014-S060-PAM	MCD-S101G-1312-C100-CAW-5m
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MCD-S101B-0014-C100-GAW	MCD-S101B-1313-S060-PAM	MCD-S101G-0014-C100-CRW	MCD-S101G-1313-S060-PAM
MCD-S101B-0014-C100-PAM	MCD-S101B-1313-B060-CAW	MCD-S101G-0014-C100-CAW-5m	MCD-S101G-1313-B060-CAW
MCD-S101B-0014-C100-CAW	MCD-S101B-1313-B060-CRW	MCD-S101G-0014-C100-GAW	MCD-S101G-1313-B060-CRW
MCD-S101B-0014-C100-CRW	MCD-S101B-1313-B060-GAW	MCD-S101G-0014-C100-PAM	MCD-S101G-1313-B060-CAW-5m
MCD-S101B-0014-C100-GAW	MCD-S101B-1313-B060-PAM	MCD-S101G-1212-S060-CAW	MCD-S101G-1313-B060-GAW
MCD-S101B-0014-C100-PAM	MCD-S101B-1313-B060-CRW	MCD-S101G-1212-S060-CRW	MCD-S101G-1313-B060-PAM
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MCD-S101B-1212-S060-CRW	MCD-S101B-1313-B060-PAM	MCD-S101G-1212-S060-GAW	MCD-S101G-1313-C100-CRW
MCD-S101B-1212-S060-CAW-5m	MCD-S101B-1313-C100-CAW	MCD-S101G-1212-S060-CRW	MCD-S101G-1313-C100-CAW-5m
MCD-S101B-1212-S060-GAW	MCD-S101B-1313-C100-CRW	MCD-S101G-1212-S060-PAM	MCD-S101G-1313-C100-GAW
MCD-S101B-1212-S060-PAM	MCD-S101B-1313-C100-CAW-5m	MCD-S101G-1212-B060-CAW	MCD-S101G-1313-C100-PAM
MCD-S101B-1212-B060-CAW	MCD-S101B-1313-C100-GAW	MCD-S101G-1212-B060-CRW	MCD-S101G-1314-S060-CAW
MCD-S101B-1212-B060-CRW	MCD-S101B-1313-C100-PAM	MCD-S101G-1212-B060-CAW-5m	MCD-S101G-1314-S060-CRW
MCD-S101B-1212-B060-CAW-5m	MCD-S101B-1314-S060-CAW	MCD-S101G-1212-B060-GAW	MCD-S101G-1314-S060-PAM
MCD-S101B-1212-B060-GAW	MCD-S101B-1314-S060-CRW	MCD-S101G-1212-B060-PAM	MCD-S101G-1314-S060-CAW-5m
MCD-S101B-1212-B060-PAM	MCD-S101B-1314-S060-CAW-5m	MCD-S101G-1212-C100-CAW	MCD-S101G-1314-S060-GAW
MCD-S101B-1212-C100-CAW	MCD-S101B-1314-S060-GAW	MCD-S101G-1212-C100-CRW	MCD-S101G-1314-S060-PAM
MCD-S101B-1212-C100-CRW	MCD-S101B-1314-S060-PAM	MCD-S101G-1212-C100-CAW-5m	MCD-S101G-1314-B060-CAW
MCD-S101B-1212-C100-GAW	MCD-S101B-1314-B060-CAW	MCD-S101G-1212-C100-GAW	MCD-S101G-1314-B060-CRW
MCD-S101B-1212-C100-PAM	MCD-S101B-1314-B060-CRW	MCD-S101G-1212-C100-PAM	MCD-S101G-1314-B060-CAW-5m
MCD-S101B-1212-C100-CAW	MCD-S101B-1314-B060-GAW	MCD-S101G-1213-S060-CAW	MCD-S101G-1314-B060-GAW
MCD-S101B-1213-S060-CRW	MCD-S101B-1314-B060-PAM	MCD-S101G-1213-S060-CRW	MCD-S101G-1314-B060-PAM
MCD-S101B-1213-S060-CAW-5m	MCD-S101B-1314-C100-CAW	MCD-S101G-1213-S060-GAW	MCD-S101G-1314-C100-CAW
MCD-S101B-1213-S060-GAW	MCD-S101B-1314-C100-CRW	MCD-S101G-1213-S060-PAM	MCD-S101G-1314-C100-CAW-5m
MCD-S101B-1213-S060-PAM	MCD-S101B-1314-C100-GAW	MCD-S101G-1213-B060-CAW	MCD-S101G-1314-C100-GAW
MCD-S101B-1213-B060-CAW	MCD-S101B-1314-C100-PAM	MCD-S101G-1213-B060-CRW	MCD-S101G-1314-C100-PAM
MCD-S101B-1213-B060-CRW	MCD-S101B-1314-C100-CAW-5m	MCD-S101G-1213-B060-GAW	
MCD-S101B-1213-B060-GAW	MCD-S101G-0012-S060-CAW		