

# Application note

## SmartAbs® feedback with battery backup

AN00217

Rev C (EN)

BSM R series motors are available with both single and multi turn SmartAbs® feedback options. To retain multi turn position a battery must be fitted to retain position while the drive is off.



### Introduction

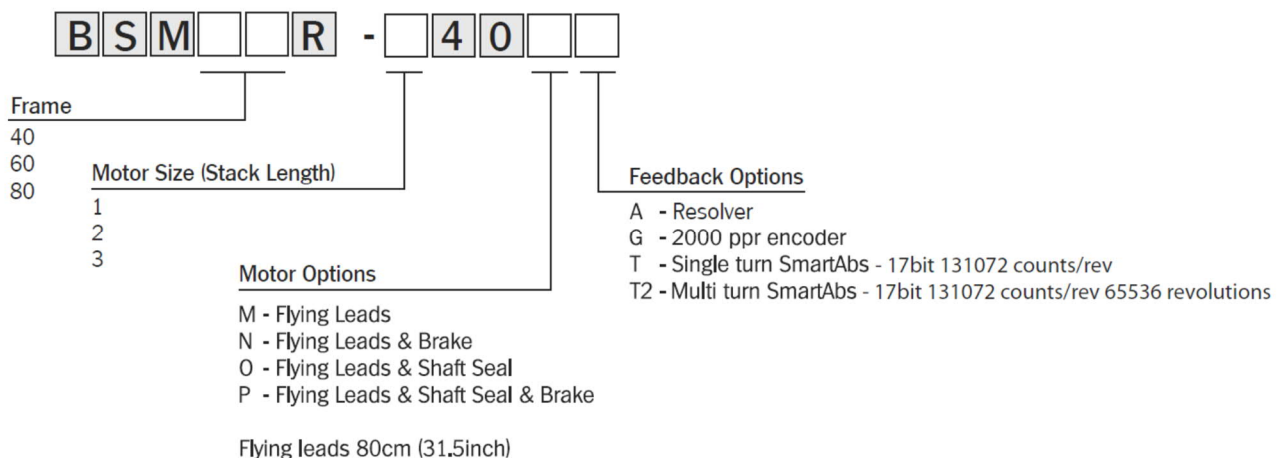
The BSM R series is perfect for highly dynamic and precision motion applications with its high torque density and low inertia. A range of feedback options are available including absolute high-resolution SmartAbs encoders for high performance applications. Flying leads provide easy connection of both motor power and feedback.

When using a multi turn SmartAbs encoder, multi turn position will only be retained after power is removed from the encoder if a battery is fitted.

This application note details the battery specification required and how to connect it to your BSM R series motor.

### Part numbering

BSM R series motors use the following part numbering scheme:



Motors with a T2 feedback option code will need a battery fitted for multi turn absolute positioning. If a battery is not fitted then only the absolute position within one revolution will be restored on power up of the encoder.

**Battery specification**

A battery of the following specification is recommended:

Item	Specification					
	Min	Typical	Max	Unit		
Battery voltage	--	3.6	4.75	V		
Current consumption encoder power on	--	3.6	--	µA		
Current consumption encoder power off	for min. 5 seconds after power off		--	265	1000	µA
	continuous power off		--	100	110	µA

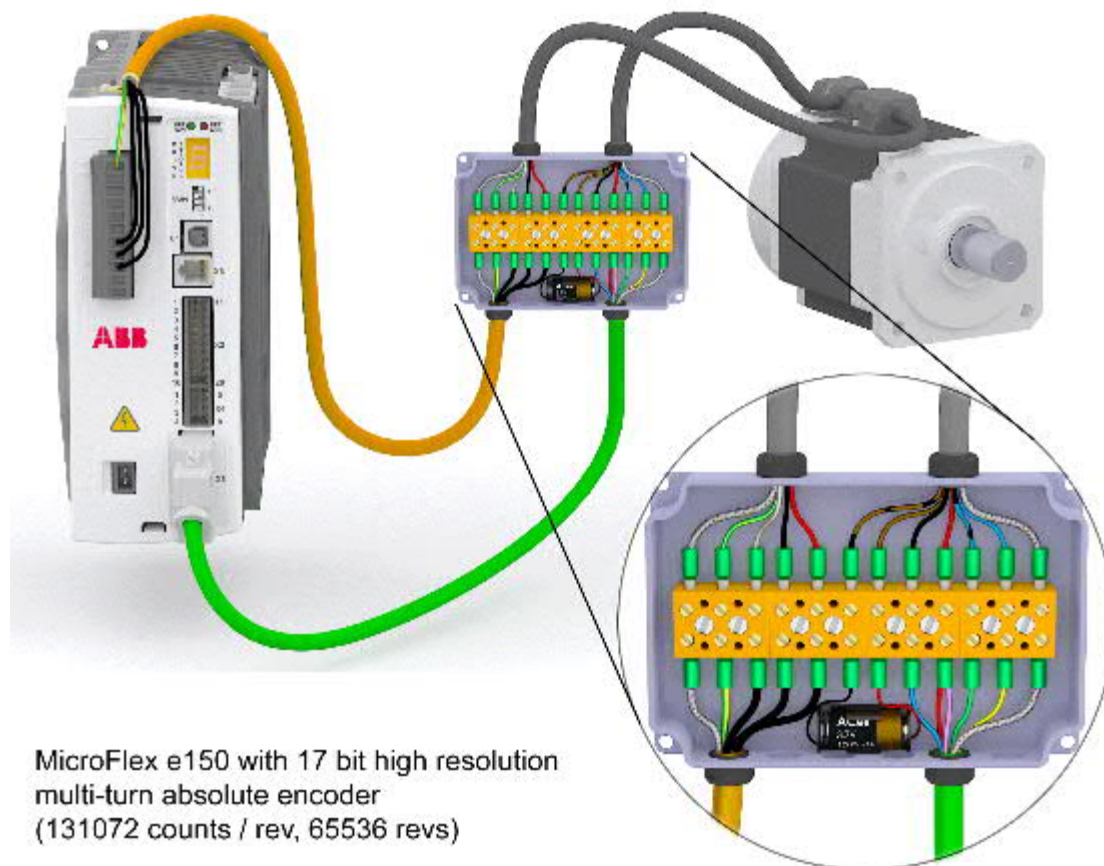
**Note:** If the integrated capacitor for back-up is completely discharged, max instantaneous current of 120mA flows just after the battery power supply is connected.

Max instantaneous current of 5mA flows when the encoder power supply is turned on or off.

**Battery connection**

The battery connection wires are located in the feedback cable of the motor. Brown for battery voltage, brown/black for battery ground.

The image below shows the recommended method for connecting the battery.



In this image a terminal box has been used to extend both the power and feedback cables all the way back to the drive. This same terminal box has then been used to house the battery holder. This terminal box should be selected to ensure the battery environment is as stated in the battery specification. Separate terminal boxes can be used for power and feedback cables, this will reduce the chance of noise from the power cables being coupled into the feedback cable.

The cables used to extend the motor cables back to the drive can be ordered using the following part numbers:

6Amp motor power cable CBL056-501      Raw power cable  
 SmartAbs feedback cable CBL044-501      Raw feedback cable

Cables can be ordered by the metre, i.e. a quantity of 15 would be 15.0m of cable (not 15 off 1m cables).

The table below details the motor feedback cable connections:

Function	BSM R series motor cable colour	Recommended CBL044-501 cable colour	e100/e150/e180 terminal X8
Data	Blue	Green	1
!Data	Blue/Black	Yellow	9
+5VDC	Red	Red	12
0V	Black	Blue	13
Battery+	Brown	-	-
Battery-	Brown/Black	-	-
Shield	Shield	Shield	D-Shell

### Battery error and warning

A battery error will be raised if the battery is missing or the voltage is below the specified levels below. If this error has occurred absolute multi turn position will be lost. Battery checks can be turned off if a battery is not being fitted to stop errors and warnings being generated.

A battery warning will occur to indicate the battery voltage level is getting too low. This gives an advanced warning that the battery will need replacing soon but absolute multi turn position has not yet been lost.

Item	Specification				Error code		DS402 Error code
	Min	Typical	Max	Unit	Mint constant	Value	
Battery error generating voltage	2.5	2.75	3.0	V	_ecENCODER_BATTERY_DEAD	10038	0xFF0B
Battery warning generating voltage	3.0	3.1	3.2	V	_ecENCODER_BATTERY_LOW	20004	0xFF0C

### Battery recommendations

We can recommend the use of the following batteries but there are many other options available:

Toshiba ER6V  
 Saft LS14500

### Contact Us

For more information please contact your local ABB representative or one of the following:

[new.abb.com/motion](http://new.abb.com/motion)  
[new.abb.com/drives](http://new.abb.com/drives)  
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