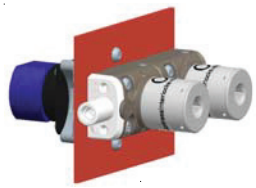
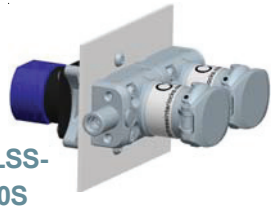
BMR/BMSR Bolt Interlock with Rotary Switch

Installation Instructions

Fortress Interlocks



BMR2-CLIN-B006-02040S



BMSR2-CLSS-B006-02040S

The **BMR** and **BMSR** are robust, modular mechanical bolt interlocks complete with rotary switches, that are used to interface with power breakers, valves, earth switches etc., where hazards need to be indirectly interlocked (often with the use of levers and cams).

The BMR and BMSR can be fitted with 20A, 32A, 63A or 150A switches. The 20A and 32A switches can be fitted behind each module. The 63A and 150A switches must not have any switch fitted behind the immediately adjacent module(s).

IMPORTANT

This product is designed for use according to the installation and operating instructions enclosed. It must be installed by competent and qualified personnel who have read and understood the whole of this document prior to commencing installation. Any modification to, or deviation from these instructions invalidates all warranties. Fortress Interlocks Ltd. accepts no liability whatsoever for any situation arising from misuse or mis-application of this product.

IF YOU HAVE ANY QUESTIONS OR QUERIES OF ANY NATURE WHATSOEVER PLEASE CONTACT THE SUPPLIER WHO WILL BE PLEASED TO ADVISE AND ASSIST.

Tools and Fixings Required For Sealed Panel Mounting

2 M6 screws of length 9 to 14mm for each of the modules with switch(es). 2 M6 screws of length 29 to 34mm for every module.

The screws must project through the panel by 6 to 8mm.
2 brass nuts and seals for each module without a switch (provided).
1 Ø6.5 drill
1 Ø9 drill
Phillips head screwdriver to suit the switch terminals (size depends on switch rating).
Driver to suit the chosen fixing screws above.

Sealed Panel Mounting

Mount this unit well away from sources of vibration or use anti-vibration mountings in order to avoid the effects of vibration, shock and bump.

Mount the unit only in its correctly assembled condition to a flat steel panel of thickness between 3mm and 6mm.

1. Remove the two transportation screws to separate the BMR/BMSR from the rotary switch adaptor. Do not turn the switch or the key while the two halves of the product are apart.
2. Cut the 6mm square shaft on the end of the switch coupler to suit the panel thickness, see figure 4.
3. Drill the panel with the four Ø6.5 holes and one Ø9 hole for the module(s) with the switch(es) as shown in figures 5-8.
4. Drill two Ø6.5 holes for each of the modules without switches, if required.
5. Mount the switch(es) and adaptor(s) behind the panel and fix using 2 M6 screws at 60mm centres, for each switch.
6. Mount the BMR/BMSR onto the front of the panel and fit two screws to each module, at 28.6mm centres.
7. Fit two brass nuts and seals to each module without a switch.
8. Tighten all fixings to a torque of 8 to 10Nm (5.9 to 7.4 lbf ft).
9. All fixings must be permanently prevented from removal, either by vibration or by personnel using standard tools.
10. All fixings must be used.
11. If a bolt extension is used, it should be supported at aproximately 25mm from the end to keep it straight.

Electrical Connection

Check that the unit to be installed is of the same electrical type and voltage rating as the machine control circuits. Note that all units are designed to operate at +/- 10% of the normal supply voltage. The use of an incorrect voltage can seriously damage the unit.

The electrical system must incorporate fuse protection for all circuits, using a Quick-Acting (F) fuse (to suit the switch current rating).
Please refer to figure 3 for the Terminal Numbers for the Rotary Switches. Bond the unit to Earth potential via a fixing screw. The earth wire used must be multi-stranded Yellow and Green PVC sheathed and approved to BS 6231 with conductor cross-sectional area of 2.5mm².

The Earth lead must be fitted such that it will be the last to be broken if the wiring loom is pulled from the product. When all wiring is complete, conduct a Protective Earth Test to BSEN 60204-1: 1998 or IEC 60204-1: 1997. Test the unit for correct operation.

Maximum Permissible Wire Gauge

Wire Type	Units	20A	32A	63A	150A
Single Core or	mm²	2x2.5	2x6	2x16	70
Stranded Wire	AWG	2x12	2x8	2x6	2/0
Flexible Wire	mm²	2x2.5	2x4	2x10	50
	AWG	2x14	2x10	2x6	1/0

The 20A, 32A and 63A switches will accept 2 wires per terminal, one either side of the terminal screw, while the 150A switch will accept only one wire per terminal. Only copper wires are to be used.

Wire Strip Length

The wire strip length is the length of wire left exposed at the end of a cable when the insulation is removed. The recommended lengths are shown below.

Switch	Strip Length (mm)
20A	8
32A	11
63A	15
150A	20

Minimum Voltage and Current

The standard 20A switch has been tested to work down to 5mA at 20V. For lower voltage and current requirements, please contact Fortress.

DC Ratings

The rotary switches are all AC but have the following DC ratings:

DC Voltage	20A Switch	32A Switch	63A Switch	150A Switch
24V	20A	32A	63A	150A
48V	12A	25A	50A	150A
60V	4.5A	10A	16A	-
110V	1A	2A	3A	-
220V	0.4A	0.6A	0.7A	-
440V	0.27A	0.3A	-	-

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Mechanical and Electrical Life

The mechanical life of the lock and bolt mechanism is 1,000,000 operations. The life of the rotary switch is shown below:

Switch Type	Mechanical Life (No of Operations)	AC-21A Electrical Life (No of Operations)
20A	**1,500,000**	**100,000**
32A	**1,500,000**	**100,000**
63A	**1,500,000**	**100,000**
150A	**450,000**	**75,000**

Approvals

The switches are approved to the following:

20A BS, CCC, CSA, GOST, IEC, UL
32A BS, CSA, GOST, IEC, UL
63A BS, CSA, GOST, IEC, UL
150A BS, CSA, GOST, IEC, UL

where
BS = BS EN 60947 (British and EU)
CCC = China Compulsory Certification
CSA = Canadian Standards Association
GOST = Gosudarstvennyj Standard (Russian)
IEC = IEC 60947 – International Electrical Commission (Global)
UL = Underwriters Laboratory (USA)

International Current Variations

BS/IEC/VDE Current Rating	UL Current Rating	CSA Current Rating
20A	20A	16A
32A	30A	30A
63A	65A	65A
150A	150A	150A

Functionality

BMR1 Single Module - With the key free the bolt is usually in the extended position. To retract the bolt the key must be inserted and trapped (reverse sequence is available upon request). The operation of the key extends or withdraws the bolt which in turn changes the contacts on the switch. The bolt may be used to interface with the mechanical linkages e.g. levers or cams on proprietary switchgear applications. Mounting kits must be either fabricated to suit or some are available from switchgear manufacturers.

BMR2-10 Multiple Modules - With the primary key free the bolt is usually in the extended position. To retract the bolt the primary key must be inserted, turned and trapped in the primary lock, and the secondary key turned and removed from the secondary lock (other sequences available on request).The operation of the key extends or withdraws the bolt which in turn changes the contacts on the switch. The bolt may be used to interface with the mechanical linkages e.g. levers or cams on proprietary switchgear applications.

Sequencing

The BMR/BMSR system is extremely flexible in terms of its sequencing possibilities. Two types of operation are possible. These are used individually or mixed to provide complex operation. The two types of operation are:

Sequential Operation

This is when the key in the module interacts only with its neighboring modules.

This dictates the order in which keys are inserted and removed.

Non-Sequential Operation. This is when two or more keys work together in a group. In a non-sequential system, any of the keys in the group can be operated together.

Therefore, the order in which keys are inserted or removed from the group is not dictated. However, all of the keys in the group must be either all inserted and trapped or all removed.

The BMR/BMSR sequence should have been specified at the purchasing stage. If the sequence needs to be changed, contact Fortress Interlocks.

Fitting of Additional Key Exchange Modules

The XMA/XMSA is supplied with its own Installation Instructions.

Commissioning

Mechanical Function Test - Typical example Sequence

1 Start with the primary key inserted and the secondary key(s) removed.
2 Insert the secondary keys.
3 Remove the primary key and check that the bolt moves to the shot or withdrawn position depending upon product ordered.
4 Check that all of the secondary key(s) are trapped.

Electrical Function Test

1 Check that the switch(es) is (are) in the state(s) shown in the wiring diagram - see figure 3.
2 Insert the key and turn 120º clockwise or turn120º anticlock wise and remove the key.
3 Check that the rotary switch(es) change(s) state.

Service and Inspection

Regular weekly inspection of the following is necessary to ensure trouble-free, lasting operation:

1 Secure mounting of components.
2 Debris and wear.
3 If lubricaition/cleaning is required all locks should be lubricated/cleaned with WD40 **Do not use dry lubricant**. The frequency of lubrication/cleaning will depend on the environment. Lubricate/clean at least once a week when used in the concrete industry.

There are no user serviceable parts in a BMR/BMRS module. If damage or wear is found, the whole module must be replaced.
If switch replacement is required, the switch(es) must only be obtained from Fortress Interlocks Ltd. This is because the switch arrangement has been specifically designed for these products and is non-standard. This is a safety critical issue.

Disposal

The BMR/BMSR does not contain any certified hazardous materials so should be disposed of as industrial waste.

Liability coverage is voided under the following conditions:
1.If these instructions are not followed
2.Non-compliance with safety regulations.
3.Installation not performed by authorised personnel

Environmental Specification

Environment Type: Indoor
Ambient Temperature:
Open to the air at 55°C during 24 hours with peaks up to 60°C
Enclosed at 35°C during 24 hours with peaks up to 40°C
Ingress Protection: IP67

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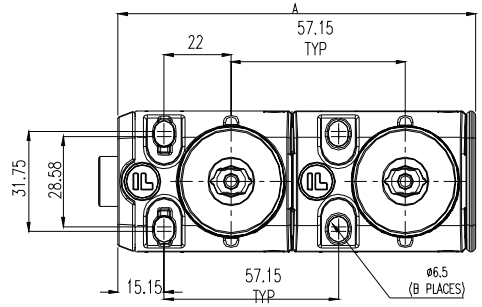
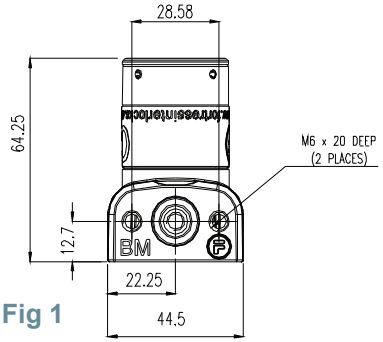
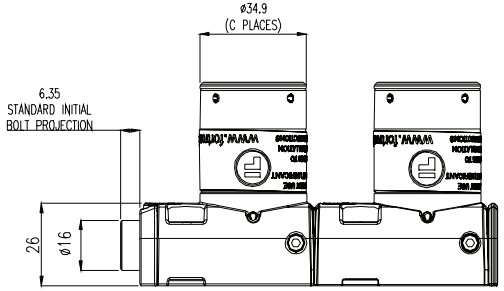
Dimensions Drawings

PRODUCT	DIM A OVERALL LENGTH	DIM B NO OF SLOTTED HOLES	DIM C NO OF CL LOCKS
BM1	60.15	2	1
BM2	117.3	4	2
BM3	174.45	6	3
BM4	231.6	8	4
BM5	288.75	10	5
BM6	345.9	12	6
BM7	403.05	14	7
BM8	460.2	16	8
BM9	517.35	18	9
BM10	574.5	20	10

ALL DIMENSIONS ARE NOMINAL AND ARE SUBJECT TO MANUFACTURING TOLERANCES





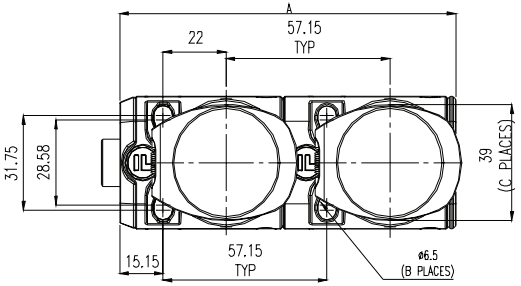


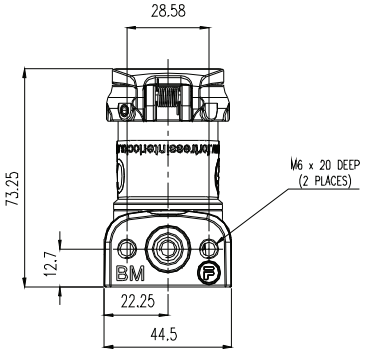
BOLT TRAVEL IS 16mm.

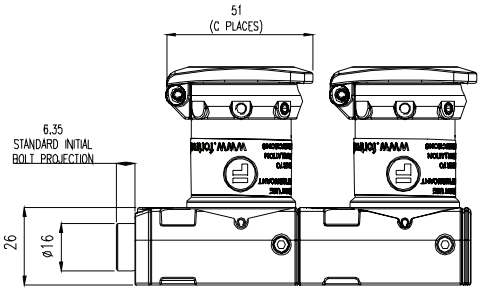
Fig 1

PRODUCT	DIM A OVERALL LENGTH	DIM B NO OF SLOTTED HOLES	DIM C NO OF CLS LOCKS
BMS1	60.15	2	1
BMS2	117.3	4	2
BMS3	174.45	6	3
BMS4	231.6	8	4
BMS5	288.75	10	5

ALL DIMENSIONS ARE NOMINAL AND ARE SUBJECT TO MANUFACTURING TOLERANCES







BOLT TRAVEL IS 16mm.

Fig 2

Wiring Diagram

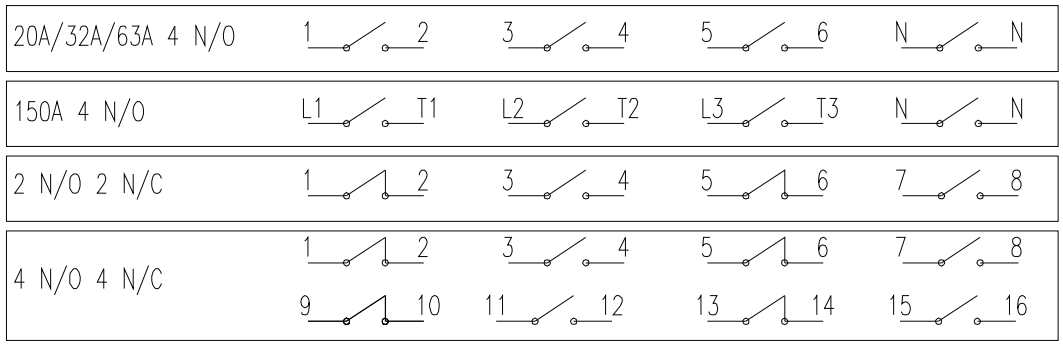
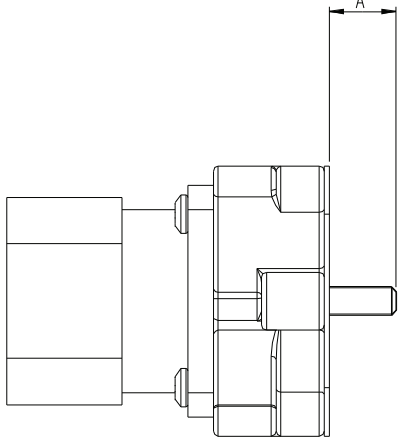


Fig 3

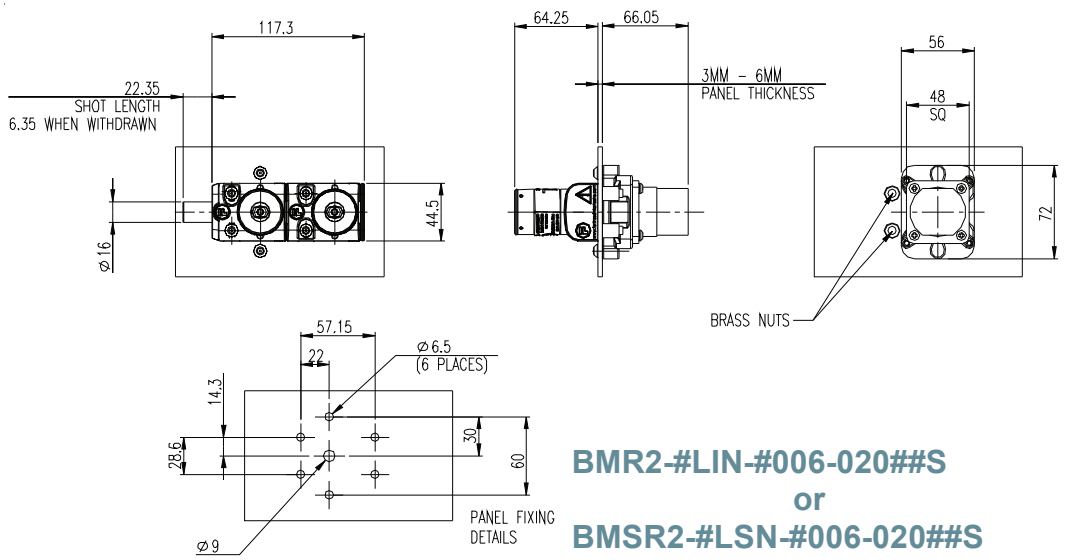
Modification to Suit Panel Thickness



PANEL THICKNESS	DIMENSION A
3	12
4	13
5	14
6	15

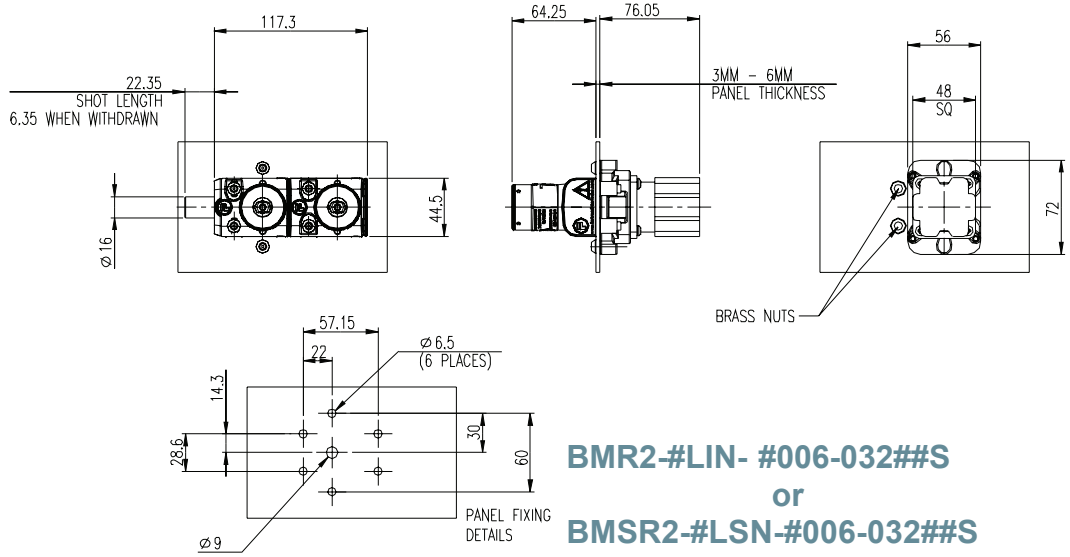
Fig 4

BMR/BMSR Bolt Interlock with Rotary Switch



BMR2-#LIN-#006-020##S
or
BMSR2-#LSN-#006-020##S

Fig 5

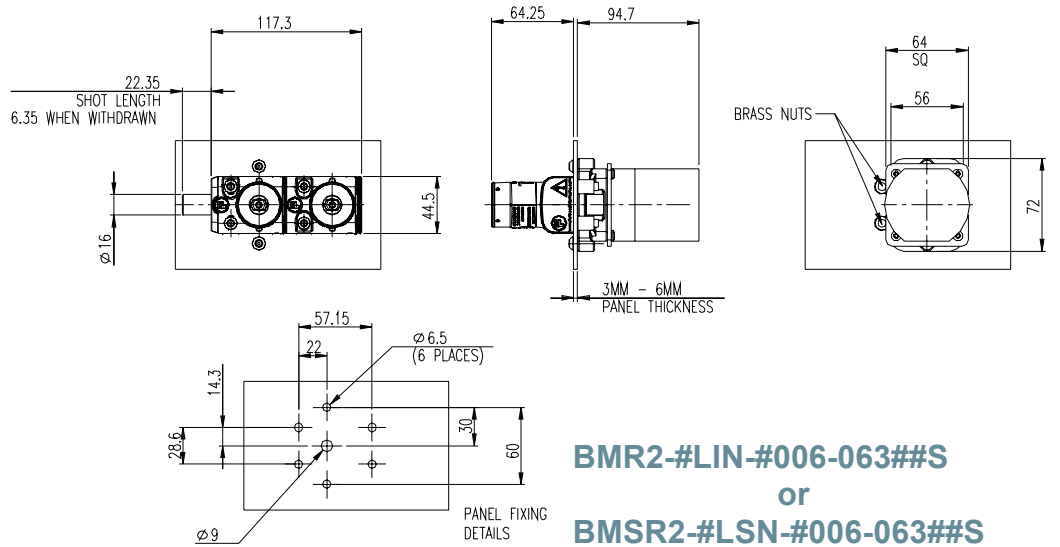


BMR2-#LIN- #006-032##S
or
BMSR2-#LSN-#006-032##S

Fig 6

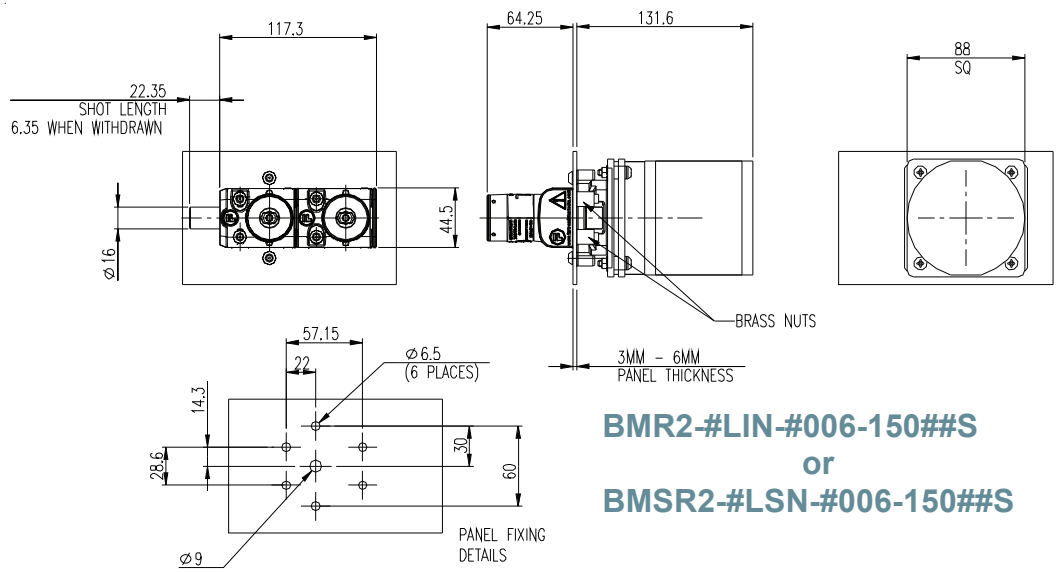
Installation Instructions

Fortress Interlocks



BMR2-#LIN-#006-063##S
or
BMSR2-#LSN-#006-063##S

Fig 7



BMR2-#LIN-#006-150##S
or
BMSR2-#LSN-#006-150##S

Fig 8

 # Variable Character in part number