

DEH-41455

INSTALLATION INSTRUCTION OF CABLE INTERLOCKS - DRAWOUT BREAKER

Mechanical Interlocking of Multiple Breakers

Mechanically Interlocked Breakers

Many Low Voltage Installations have multiple power sources that are used in many different configurations. The power sources are required to supply the installation simultaneously, alternatively or in a certain logical combinations of both.

The EntelliGuard G™ Power Circuit Breaker can be used to protect these Power supplies and be electrically and mechanically interlocked to provide the necessary logic. The mechanical interlocks are available for fixed and draw out circuit breakers, enabling the direct interlocking of the breakers, mounted side by side or stacked.

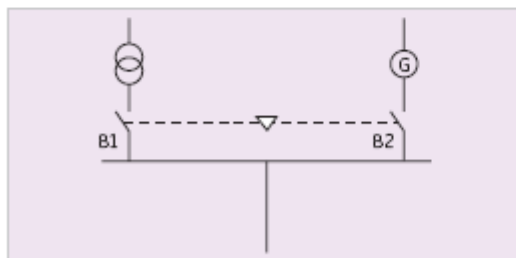
The device has two parts; the first a factory mounted component fitted to the breaker when in Fixed Pattern or the cassette when used in draw out mode. Two or more specially designed field mountable cables available in lengths of 1,0, 1,6, 2,0, 2,5, 3,0, 3,5 and 4,0 metres being the second.



Any combination mode (fixed or draw out), current rating, number of poles or envelope size can be interlocked. The interlocking systems are available in one configuration for 2 breakers and in three others for 3 breakers.

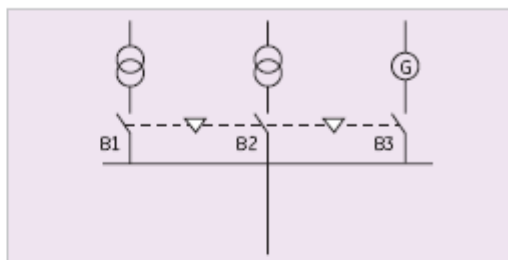
Two Breaker Interlock

Interlock type A in which one of the two breakers (B1 or B2) can be switched ON. Each breaker must be equipped with a factory mounted interlock type A. Two cables are needed.



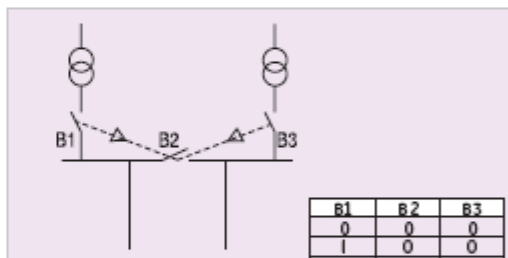
Three Breaker Interlock type B

Interlock type B in which one of the three breakers (B1, B2 or B3) can be switched ON. Each breaker must be equipped with a factory mounted interlock type B. Six cables are needed.



Three Breaker Interlock type C

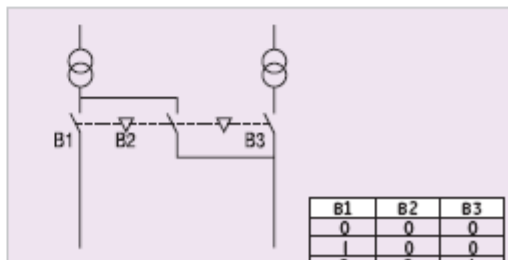
Interlock type C in which one or two of the three breakers can be switched ON in accordance with the inserted diagram. Each breaker must be equipped with a factory mounted interlock type C. Six cables are needed.















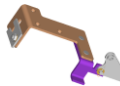
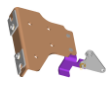




B1	B2	B3
0	0	0
1	0	0
0	0	1
0	1	0
1	1	0
0	1	1
1	0	1

Three Breaker Interlock type D

Interlock type D in which one or two of the three breakers can be switched ON in accordance with the inserted diagram. Breakers B1 & B3 must be equipped with a factory mounted interlock type A and B2 with a interlock type D. Four cables are needed.



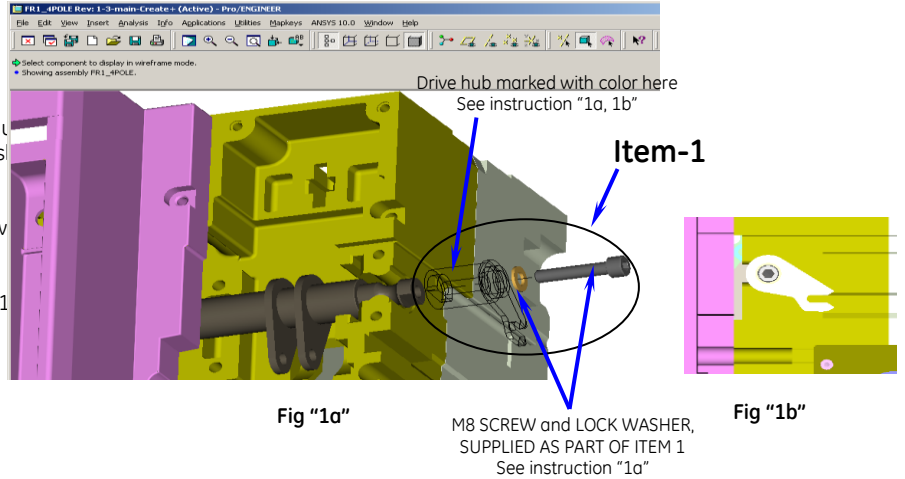
B1	B2	B3
0	0	0
1	0	0
0	0	1
1	0	1
0	1	0

ITEM NO	PART NO	DESCRIPTION	QUANTITY PER KIT				
			G12WAD (TYPE-A)	G13WB (TYPE-B)	G13WC (TYPE-C)	G13WDT (TYPE-D)	
1	10102192G1	CASSTTE DRIVE LEVER	1	1	1	1	
2	10101747G1	INTERLOCK MTG PLTE ASM (TYPE A)	1	-	-	-	
3	10101744G1	INTERLOCK MOUNTING PLATE ASSY	-	1	1	1	
4	10101692P1	SLOTTED FLAT HEAD SCREW-M6x16	4	9	11	9	
5	10100380P1	CERRATED BELLEVILLE WASHER M6	5	10	12	10	
6	10100948P1	HEX NUT M6	5	10	12	10	
7	10100364P1	SLOTTED FLAT HEAD SCREW M6X12	2	2	2	2	
8	10101809G1	BOT BKT ASSY-CI 1/2 A, GACB	1	-	-	-	
9	10101743G2	CABLE BRACKET ASSY (TYPE B,C)	-	1	1	1	
10	10102252G1	SUPPORT PLATE ASM (TYPE B)	-	1	-	1	
11	10101745G1	SUPPORT PLATE ASM (TYPE C)	-	-	1	-	
12	10101726P1	HALF NUT M6	-	3	3	3	
13	10101748G1	CABLE BRACKET LH ASSY (TYPE B)	-	1	-	1	
14	10101746G1	CABLE BKT ASM LH (TYPE C)	-	-	1	-	
15	10102023G1	RH DRIVE ROD ASSY	1	-	-	-	
16	10102251G1	LH DRIVE ROD ASSY	-	1	1	1	
17	70002965	M5 PUSH ON FIXING - RS172-341	2	2	2	2	
18	10102176P1	CASSETTE DIVEROD GUIDE GACB	1	1	1	1	
19	10102642P1	WIRE CIRCLIP	1	1	1	1	

INSTRUCTIONS FOR MOUNTING INTERLOCK MECHANISM - DONE AT FACTORY

STEP 1 – DRIVE HUB ASSEMBLY COMMON FOR ALL TYPES

- 1a. Assemble Drive Hub to the end of breaker layshaft using M8 screw and lock washer supplied with ITEM 1 as shown in Fig.1a. Tighten to 24-28Nm.
- 1b. Use drive hub with red markings for Envelope -1, yellow for Envelope -2 and green for Envelope-3.
- 1c. Ensure the orientation after assembly as shown in Fig. 1b



STEP 2 – INTERLOCK MOUNTING PLATE ASSEMBLY FOR TYPE A

2a. Assemble ITEM 2 to cassette side sheet using M6 screws, washer and nuts at two locations as shown in Fig.2a. Tighten to 3-5Nm.

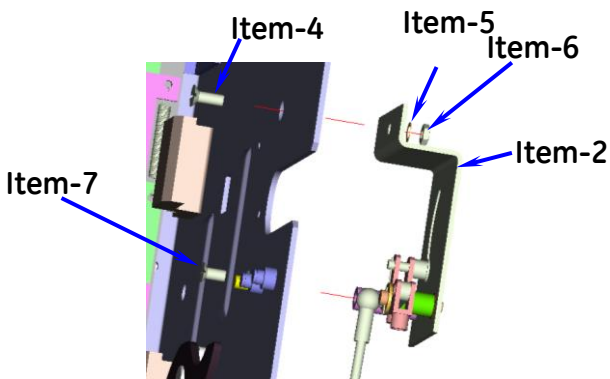


Fig "2a"

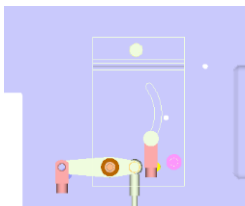


Fig "2b"

FOR TYPE B, C and D

2b. Assemble ITEM 3 to cassette side sheet using M6 screws, washer and nuts at two locations as shown in Fig.2c. Tighten to 3-5Nm.

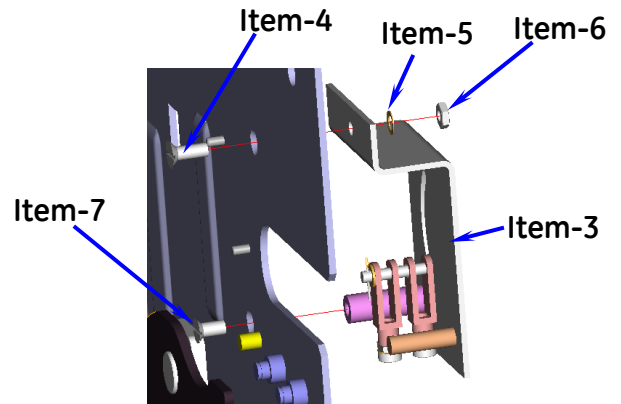


Fig "2c"

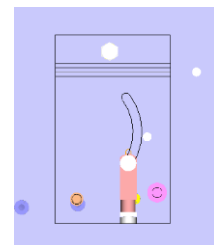
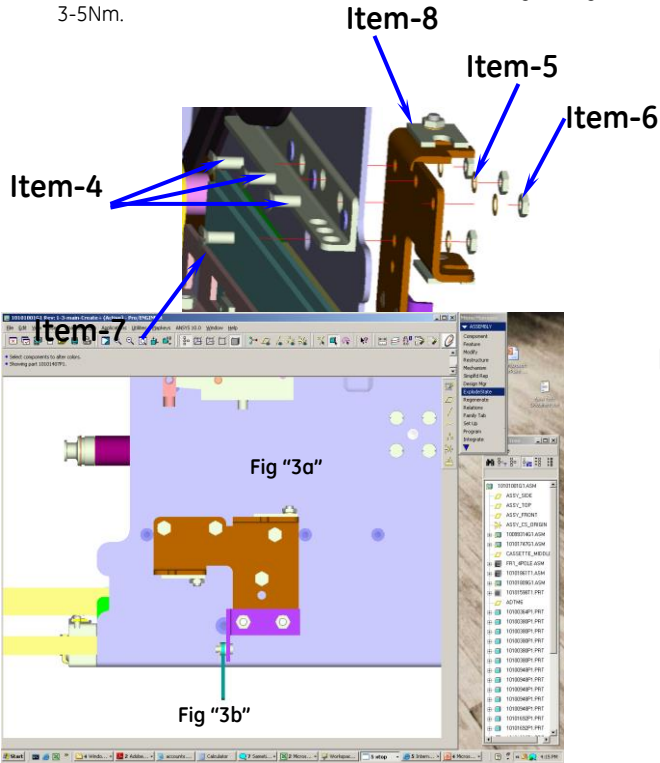


Fig "2d"

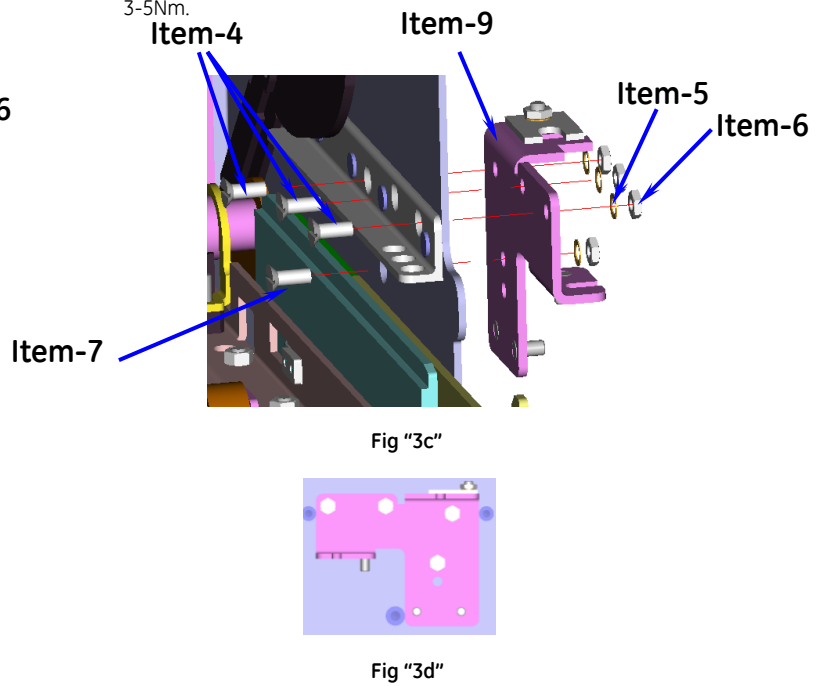
**STEP 3 – RH BRACKET ASSEMBLY
FOR TYPE A**

3a. Assemble ITEM 8 to cassette side sheet using M6 screws, washer and nuts at four locations as shown in Fig.3a. Tighten to 3-5Nm.



FOR TYPE B, C and D

3b. Assemble ITEM 9 to cassette side sheet using M6 screws, washer and nuts at four locations as shown in Fig.3c. Tighten to 3-5Nm.

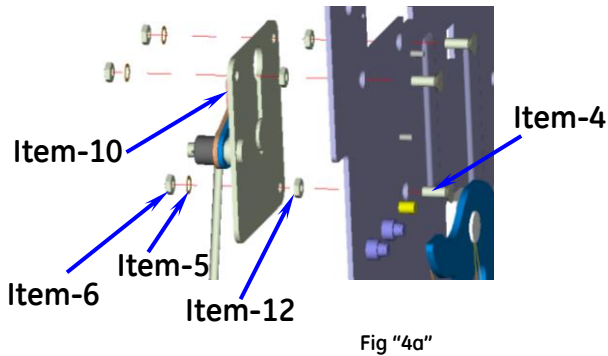


**STEP 4 – LH SUPPORT PLATE ASSEMBLY
FOR TYPE B and D**

4a. Assemble ITEM 10 to cassette LH side sheet using M6 screws, washer and nuts at three locations as shown in Fig.4a. Tighten to 3-5Nm.

4b. Ensure M6 Half Nut ITEM 12 is assembled first to flat head screws and placed between support plate and side sheet.

4c. Ensure smooth movement of lever after assembly



FOR TYPE C

4d. Assemble ITEM 11 to cassette LH side sheet using M6 screws, washer and nuts at three locations as shown in Fig.4c. Tighten to 3-5Nm.

4e. Ensure M6 Half Nut ITEM 12 is assembled first to flat head screws and placed between support plate and side sheet.

4f. Ensure smooth movement of lever after assembly

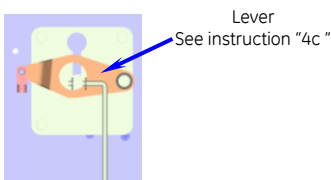
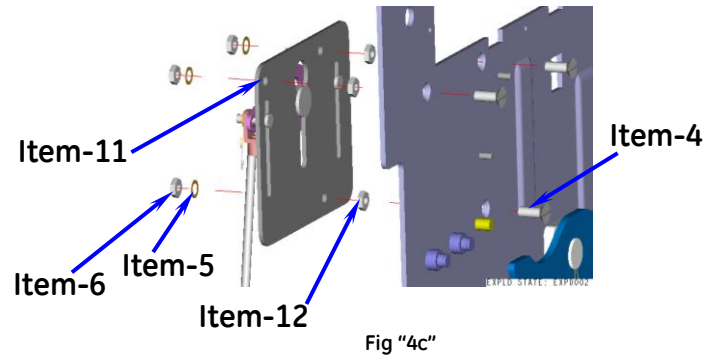


Fig "4b"

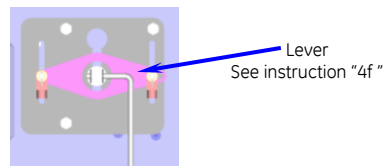
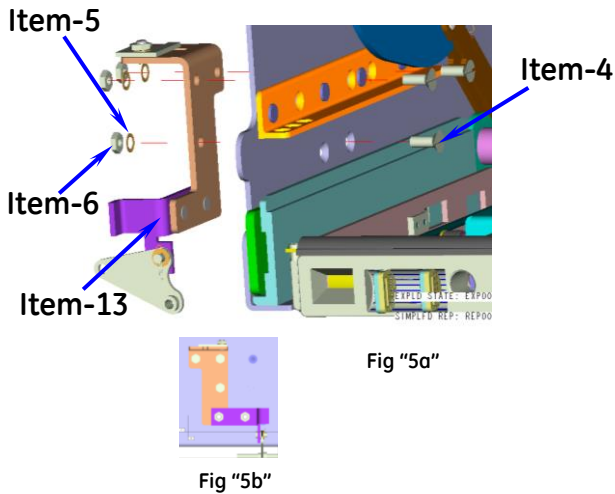


Fig "4d"

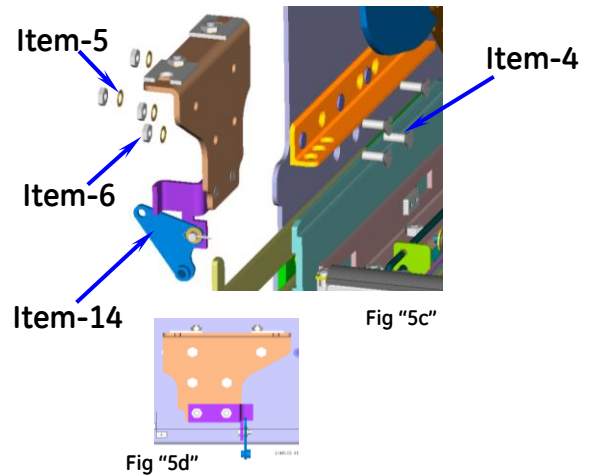
**STEP 5 – LH CABLE BRACKET ASSEMBLY
FOR TYPE B and D**

5a. Assemble ITEM 13 to cassette LH side sheet using M6 screws, washer and nuts at three locations as shown in Fig.5a. Tighten to 3-5Nm.



FOR TYPE C

4d. Assemble ITEM 14 to cassette LH side sheet using M6 screws, washer and nuts at four locations as shown in Fig.5c. Tighten to 3-5Nm.



**STEP 6 – Drive Rod ASSEMBLY
FOR TYPE A**

6a. Prepare the rod assembly with dimensions for various frame sizes as given in the Table

6b. Assemble Square sleeve (part 2) & Special screw (part 3) on rod (part 1) at location per Table T1 and lock with nut (part 4) supplied in ITEM 15 as Shown in detail Z

6c. Cut the length of the rod to dimension "A"
(Refer table T1 for various dimension)

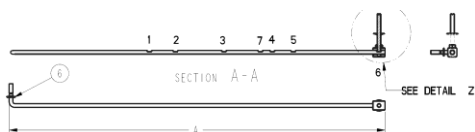
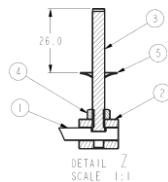
6d. Fit drive rod assembly to the cranks using push on (Item 17) as shown in fig.6a

6e Fix bottom end of the ball joint to the crank as shown in fig. 6a. Lock it using lock washer and nut. Tighten to 5-7Nm

6f. Adjust the length of the ball joint if needed

Table – T1

BREAKER CONFIGURATION	LOCATION	DIM "A"
FRAME 1 3 POLE	1	196
FRAME 1 4 POLE	3	296
FRAME 2 3 POLE	2	231
FRAME 2 4 POLE	4	361
FRAME 2.5 3 POLE	7	344.75
FRAME 3 3 POLE	5	389
FRAME 3 4 POLE	6	504



FOR TYPE B, C and D

6g. Prepare the rod assembly with dimensions for various frame sizes as given in the Table

6h. Assemble Square sleeve (part 2) & Special screw (part 3) on rod (part 1) at location per Table T2 and lock with nut (part 4) supplied in ITEM 16 as Shown in detail Z

6j. Cut the length of the rod to dimension "A"
(Refer table T2 for various dimension)

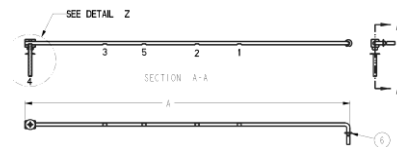
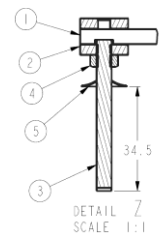
6k. Fit drive rod assembly to the cranks using push on (item 17) both ends as shown in fig.6d

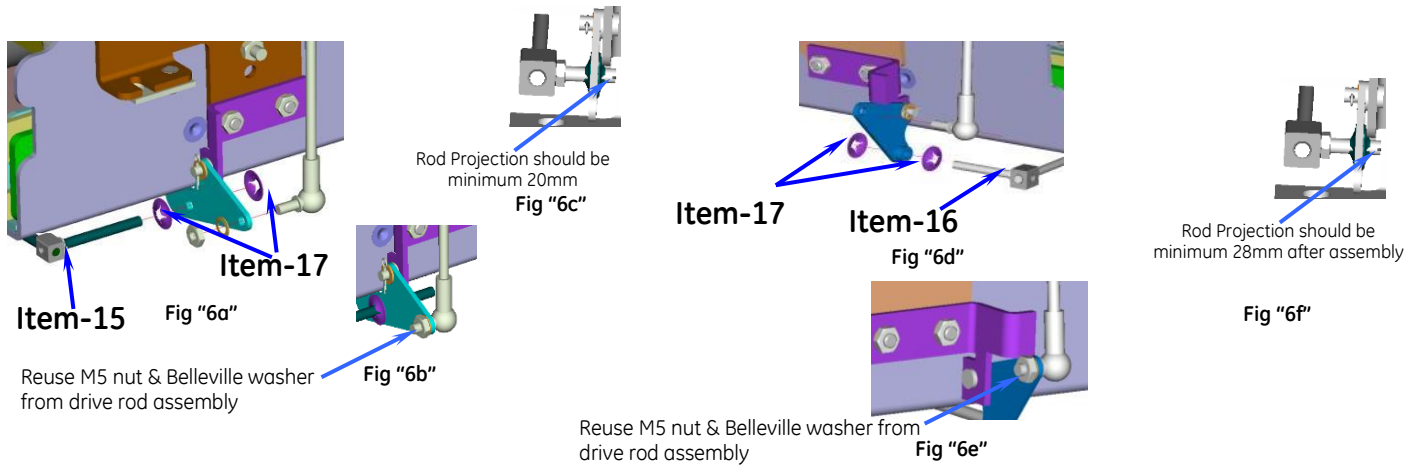
6l Fix bottom end of the ball joint to the crank as shown in fig. 6e. Lock it using lock washer and nut. Tighten to 5-7Nm

6m. Adjust the length of the ball joint if needed

Table – T2

BREAKER CONFIGURATION	LOCATION	DIM "A"
FRAME 1 3/4 POLE	1	178.5
FRAME 2 3/4 POLE	2	243.5
FRAME 2.5 3 POLE	5	325.25
FRAME 3 3 POLE	3	385.5
FRAME 3 4 POLE	4	500.5





Step 7 - Assembly of Drive rod guide on cassette

7a. Remove guide pins (1 Qty for Envelope1 & 2 Qty for Envelope 2&3) from cassette as shown in fig.7a. Remove M8 nut for envelop 2 & 3 if needed.

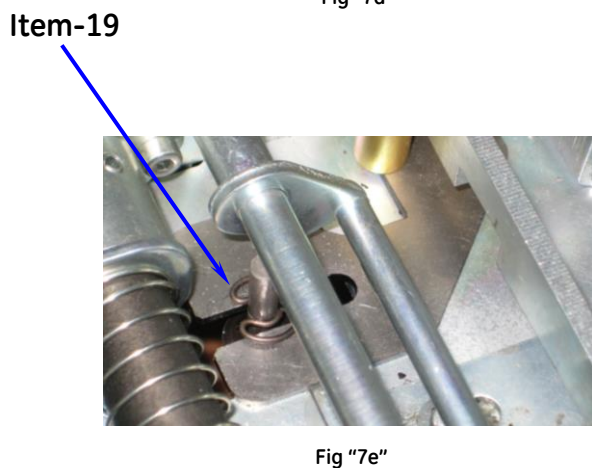
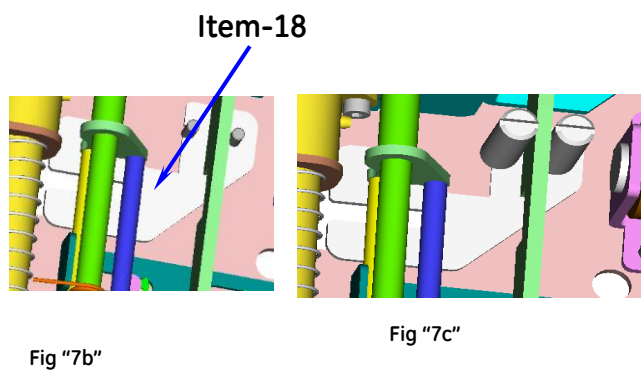
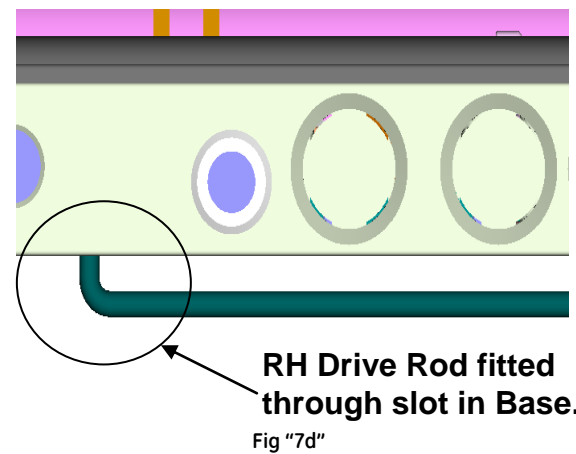
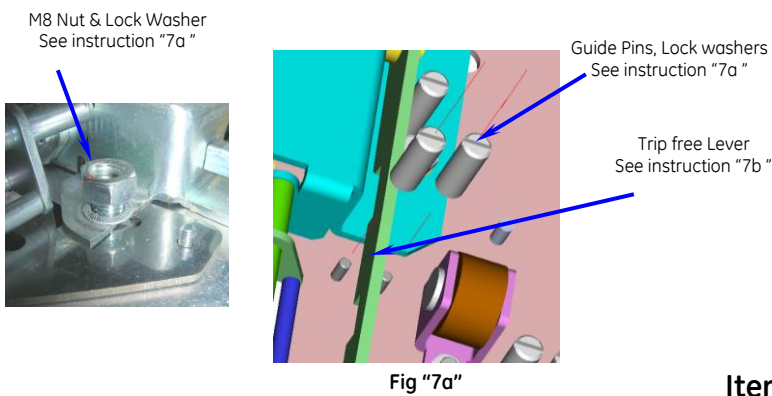
7b. Lift the trip free lever Up and Install Item 18 as shown in Fig 7b

7c. Assemble back the Guide pins along with lock washers. Tighten to 2.5-3.5Nm

7d. Ensure that the Trip free lever is brought back to its original position

7e. Insert the end of Drive rod from Base plate as shown in Fig 7d

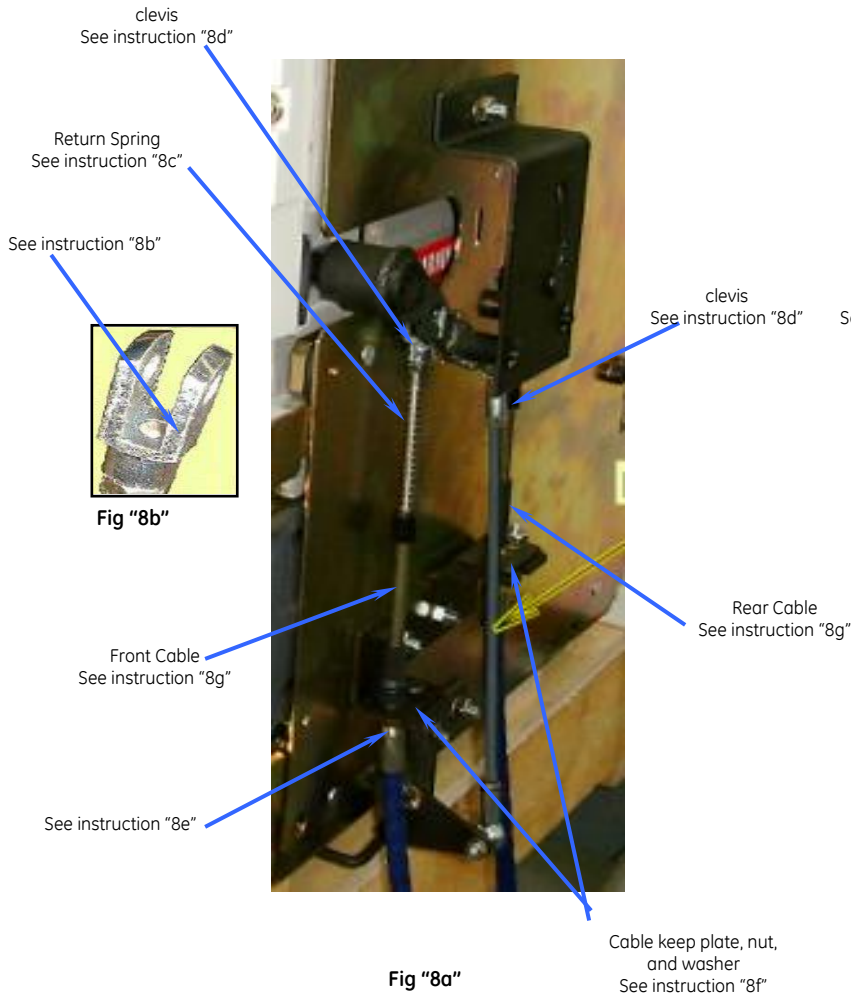
7f. Assemble Wire clip item 19 to the groove in the rod end as shown in fig 7e



INSTRUCTIONS FOR MOUNTING INTERLOCK CABLES & ADJUSTMENTS - DONE AT FIELD

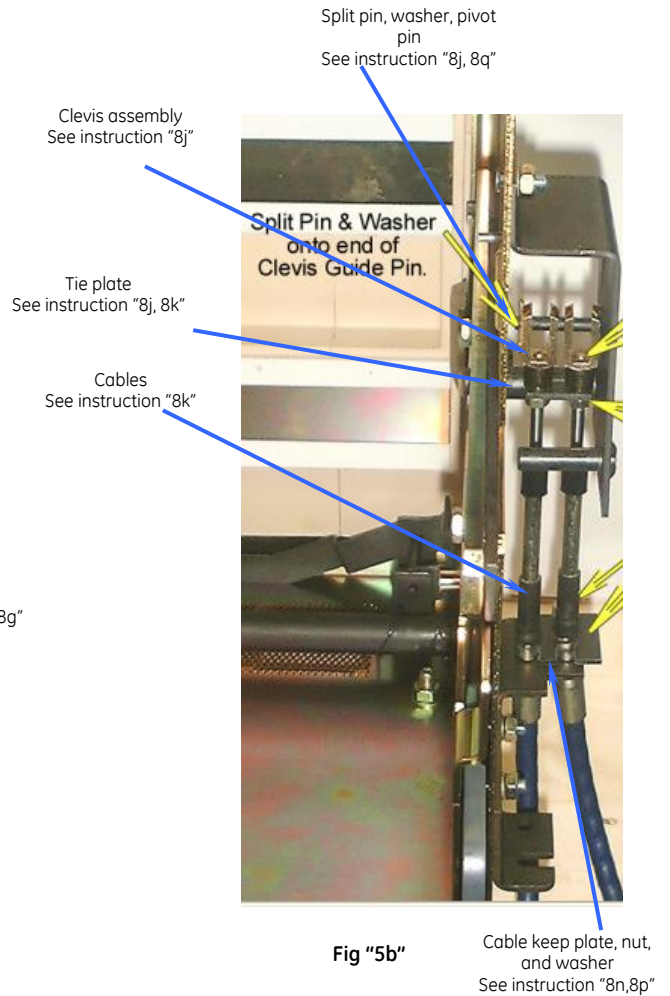
STEP 8 – FITTING THE CABLES RH FOR TYPE A

- 8a. Remove the clevis and attach the cable as shown in Fig. 8a.
- 8b. Screw clevis onto cable until flush with bottom of slot as shown in Fig.8b and lock up with provided nut
- 8c. Place Return spring supplied with cable as shown in Fig.8a.
- 8d. Ensure clevis is used at front and back are assembled
- 8e. Retain and secure cable outers with keep plate using M6 Nut and belleville washer
- 8f. Loosen cable keep plate nuts a little and adjust to secure the cable properly. Tighten back the nuts to 7-9Nm after adjustment
- 8g. Connect front cable of breaker 1 to the rear cable of breaker 2. Connect front cable of breaker 2 to rear cable of breaker 1
- 8h. Do not induce bend radius of less than 125mm when fitting cables



FOR TYPE B,C & D

- 8j. Remove the clevis assembly along with clevis tie plate by removing the split pin, washer and pivot pin. Retain for reuse
- 8k. Screw Clevis(s) onto cable(s) flush with bottom of slot after passing through clevis tie plate and lock nuts. Do NOT lock up nuts until opposite end of cables has been fitted to ensure free movement. Note-temporary M5 screws used to retain tie plates to be removed before assembly of clevis into cables
- 8n. Retain and secure cable outers with keep plate using M6 Nut and belleville washer. Ensure wide fork end to outside and use of middle stud.
- 8p. Loosen cable keep plate nuts a little and adjust to secure the cable properly. Tighten back the nuts to 8Nm after adjustment
- 8q. Assemble back clevis (s) along with tie plate into hub using pivot pin. Secure with split pin and washer
- 8r. Do not induce bend radius of less than 125mm when fitting cables



STEP 9 – FITTING THE CABLES
LH FOR TYPE B AND D

9a. Secure cables to Bracket & Keep Plate. Lock in place with M6 nut & Belleville Washer.

9b. Fit the Return spring (supplied with Cable) onto each cable followed by lock nut

9c. Refer fig.9a to for setting dimension: Screw Clevis on to rear Cable, then slide onto Link Lever and secure using Clevis Clip provided. Repeat for second Link Lever. Ensure to fit a tie plate between two cable and lock it using lock nuts after installation.

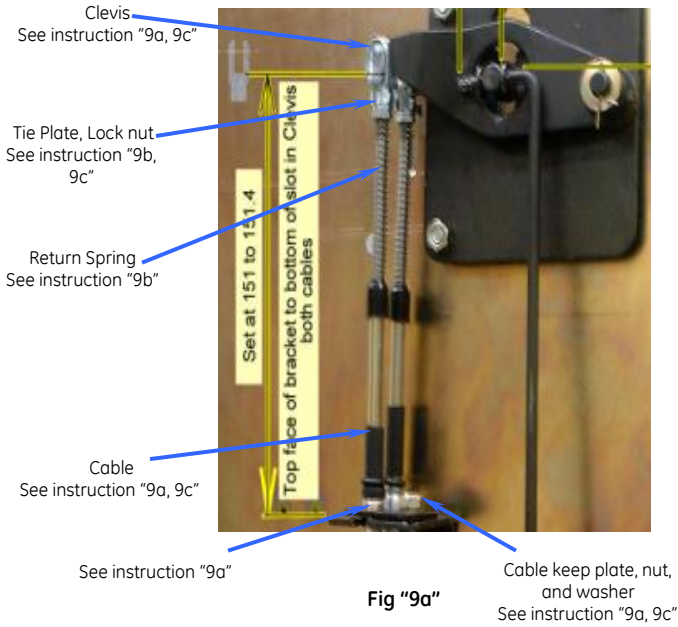


Fig "9a"

FOR TYPE C

9e. Secure cables to Bracket & Keep Plate. Lock in place with M6 nut & Belleville Washer.

9f. Fit the Return spring (supplied with Cable) onto each cable followed by lock nut

9g. Refer fig.9b to for setting dimension: Screw Clevis on to rear Cable, then slide onto Link Lever and secure using Clevis Clip provided. Repeat for RH Link Lever. Secure the Clevis to cable connection using lock nuts after adjustment

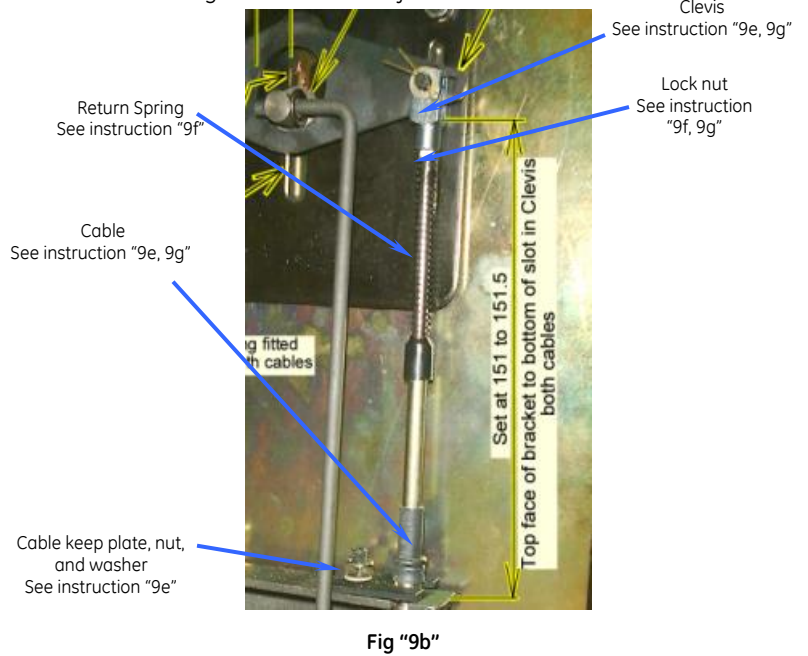
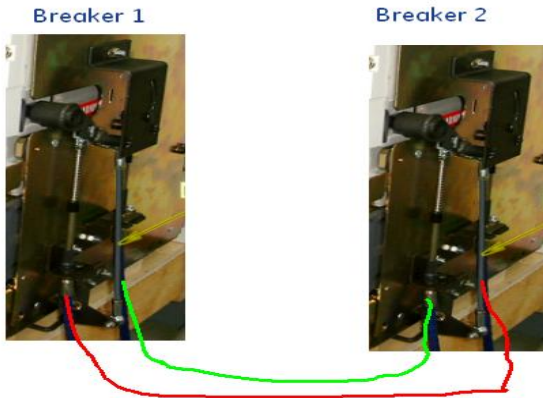


Fig "9b"

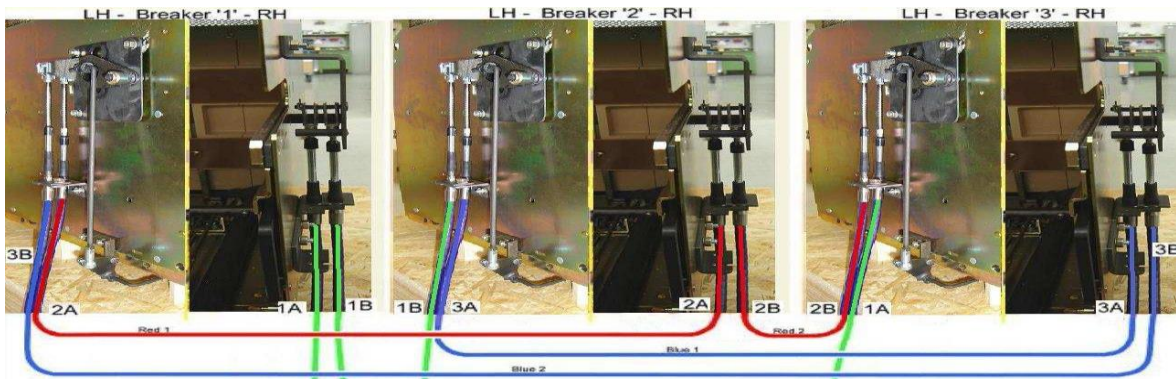
**Cable Connection Diagram:
 Type A**



Truth Table

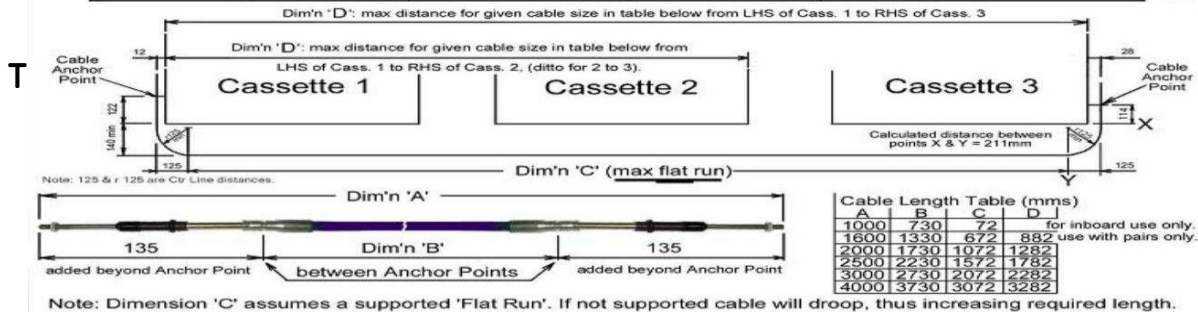
B1	B2
0	0
1	0
0	1

Type B

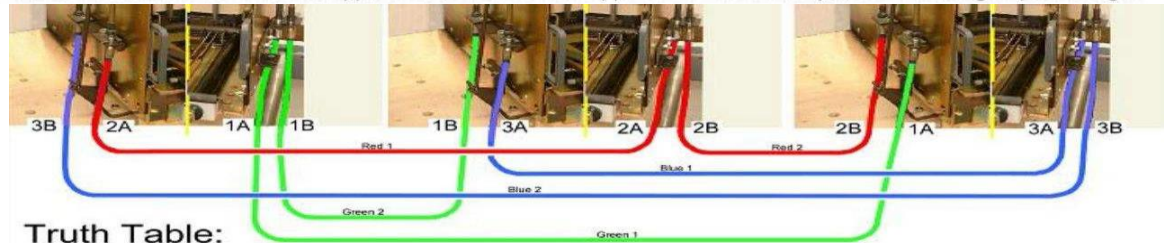


Truth Table:

0	0	0
1	0	0
0	1	0
0	0	1
0	1	1



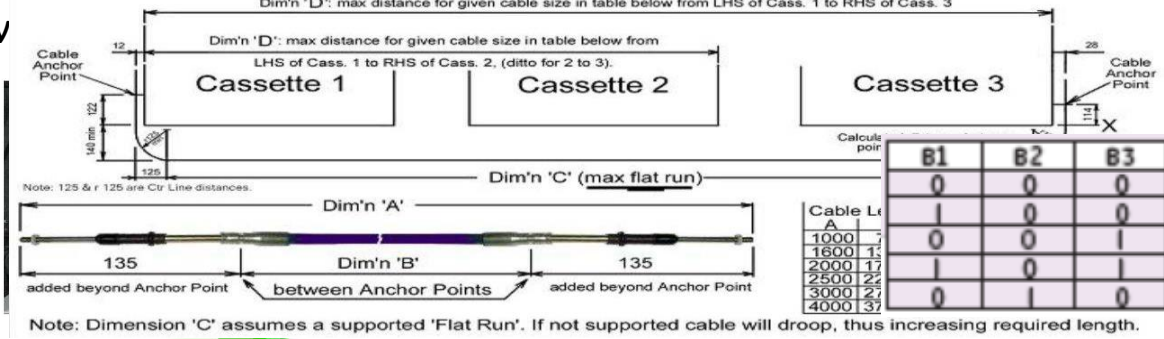
Note: Dimension 'C' assumes a supported 'Flat Run'. If not supported cable will droop, thus increasing required length.



Truth Table:

0	0	0
1	0	0
0	1	0
0	0	1
0	1	1
1	1	0
1	0	1

Ty



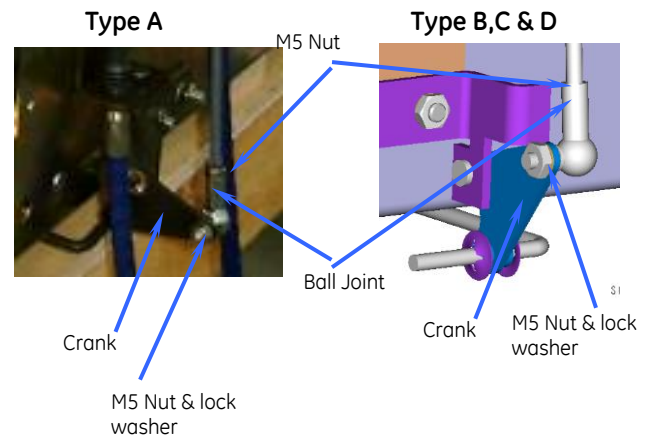
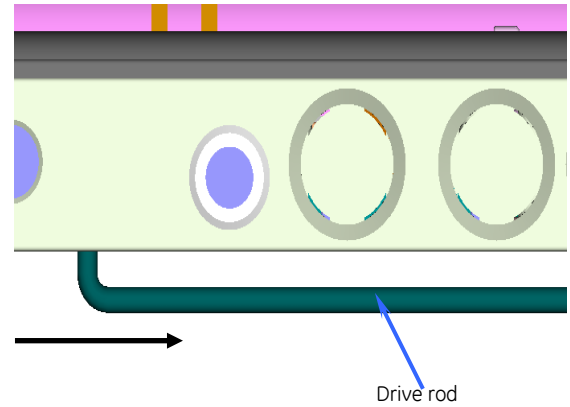
Note: Dimension 'C' assumes a supported 'Flat Run'. If not supported cable will droop, thus increasing required length.

IMPORTANT CHECK

- With all 3 breakers installed in Cassettes and all parts/cables connected:
1. Close one of the breaker (for type A and B) 2 of the breakers (for type C).
 2. Then ensure there is at least 1.5 to 2.0 mm further movement available on Drive Rod horizontally in the direction show in right picture before it becomes solid in other Breakers, which are kept trip free.
 3. Adjust the link rod as described below
 4. This ensures that there is no strain on linkages.
 5. Repeat procedure for the other 2 Breakers.

LINK ROD ADJUSTMENT NOTES

- Adjustment should be required during Operational Test Procedure to obtain correct Interlocking setting On the ON Button:
1. Slacken locking M5 nut at the top of Ball Joint.
 2. Remove M5 nut securing Ball Joint to Crank – retain with washer for reuse.
 3. For Type A unscrew Ball Joint one turn at a time on its Link Rod to increase interlocking clearance (Screw in to decrease clearance).
 4. For Type B,C & D Screw in Ball Joint one turn at a time on its Link Rod to increase interlocking clearance (Unscrew to decrease clearance).
 5. Re secure Ball Joint to Crank and re lock vertical Link Rod onto Ball Joint via nut.



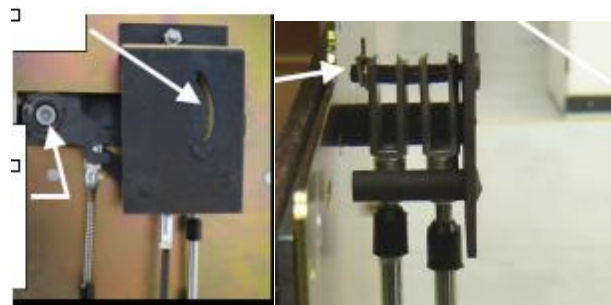
CAUTION: FOR TYPE A

- When Racking breaker into cassette Observe**
1. Drive lever on the breaker clears the front clevis on the cassette transfer lever (left image)
 2. Drive lever engages rear clevis (Right image)
 3. Spherical rod end (arrowed) is in up position & clears when breaker is racked in. adjust by unscrewing clevis

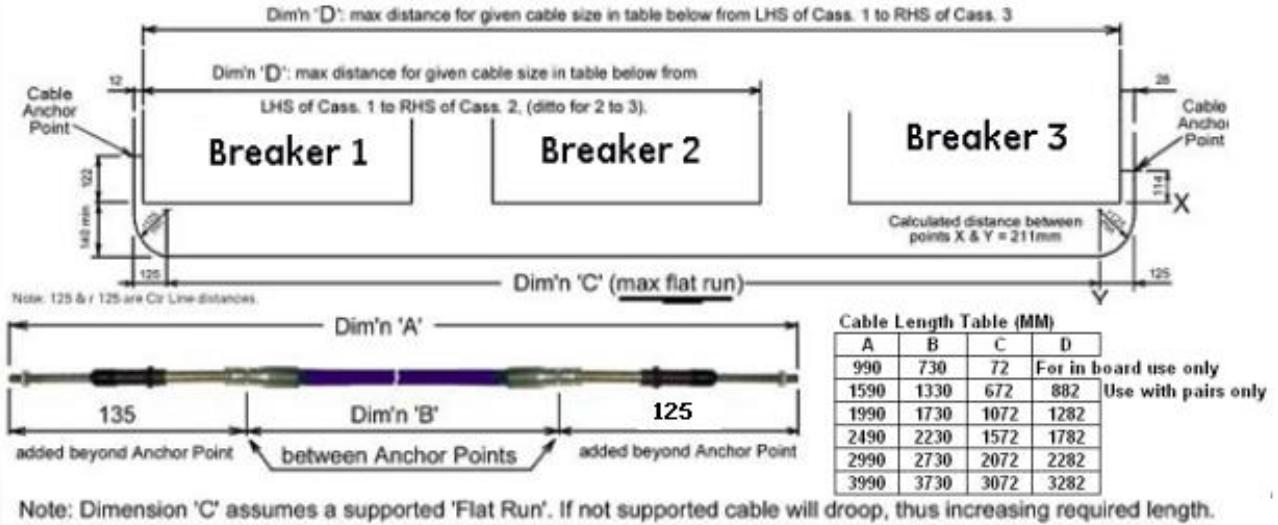


CAUTION: FOR TYPE B & C

- When racking breaker in to cassette observe**
1. Drive lever on the breaker clears the front clevis on the cassette transfer lever (left image)
 2. Drive lever engages in the gap between w clevis (Right image)



Cable Dimensions:



These instructions do not cover all details or variations in equipment nor do they provide for every possible contingency that may be met in connection with installation, operation, or maintenance. Should further information be desired or should particular problems arise that are not covered sufficiently for the purchaser's purposes, the matter should be referred to the ABB Inc.

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