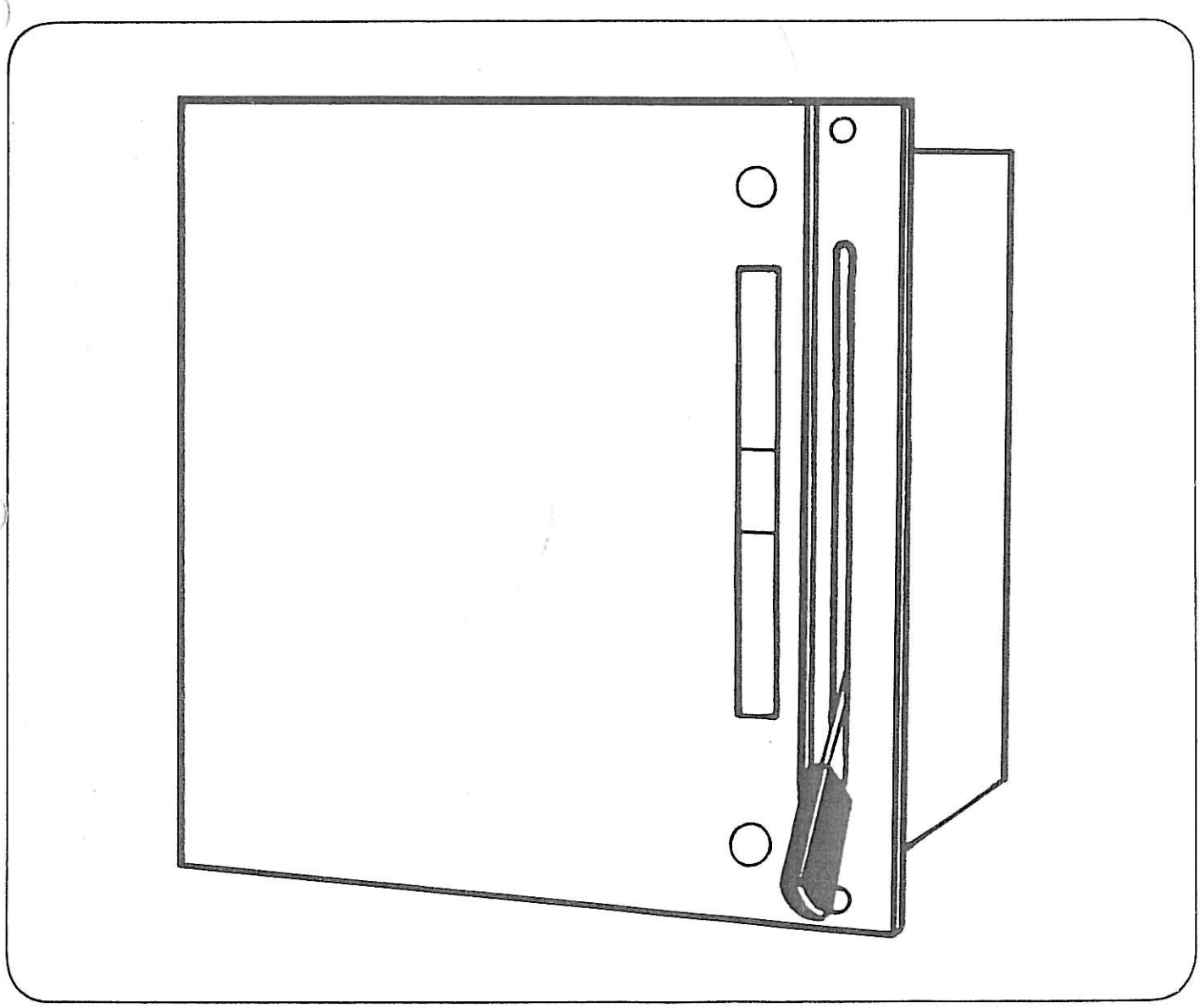
HDC 007/83

HDC & HDS FUSE SWITCH

Maintenance Manual



Ottermill Switchgear Limited Ottery St Mary Devon EX11 1AG

Ottermill

Member of Westinghouse Electric Group

MAINTENANCE & SERVICE MANUAL
TYPE 'HDC' SWITCHES AND FUSE SWITCHES

SUBJECT INDEX

MAINTENANCE & SERVICE MANUAL
TYPE 'HDC' & 'HDS' SWITCHES AND FUSE SWITCHES

1. DESCRIPTION OF EQUIPMENT

These instructions cover the range of 'HD' fuse switches and air break switches of the following framesizes.

HD 06 Framesize
63 amp. fuse switch; 100 amp. air break switch; 40 h.p. motor switch.

HD 1 Framesize
100 amp. fuse switch; 150 amp. air break switch; 60 h.p. motor switch.

HD 2 Framesize
200 amp. fuse switch; 315 amp. air break switch; 100 h.p. motor switch.

HD 3 Framesize
315 amp. fuse switch; 400 amp. air break switch; 150 h.p. motor switch.

HD 4 Framesize
400 amp. fuse switch; 500 amp. air break switch; 200 h.p. motor switch.

HD 6 Framesize
630 amp. fuse switch; 800 amp. air break switch; 300 h.p. motor switch.

HD 8 Framesize
800 amp. fuse switch; 1000 amp. air break switch; 400 h.p. motor switch.

Fuse switches are suitable for use with Ottermill 'T' type fuse links or similar links to B.S.88.

All contact faces have silver inserts for the HD 06 framesize, and are silver plated for the larger sizes to ensure reliable service operation with the minimum of maintenance.

Note all screws are ISO metric coarse thread.

Any correspondence referring to the switches or spares should quote the type and rating details given on the rating plate.

2. COMMISSIONING

2.1 Cabling

Where cables are bolted directly to the switch terminals care is necessary to avoid breaking the mouldings in the vicinity of the terminals. Cables must be fitted carefully to the terminals before bolting up.

2.2 Preliminary Inspection.

BEFORE ENERGISING THE SYSTEM, the equipment should be inspected and its operation checked. The following inspection procedure should be followed:–

Remove the carriage (see Section 3.3.2), terminal screens and removable arc shields (see Section 3.3.3), and check for any visible sign of damage. Remove any dust, wood wool, etc. due to packing or storage. Ensure that there are no loose conducting objects near the terminals or live parts e.g. loose screws, wire, etc.

2.3 Insulation

If there is any sign of dust or damp, wipe all insulation with a dry, clean, lint-free cloth. If the equipment is damp for example due to poor storage, allow to dry out thoroughly before energising the system. If in doubt, check the insulation resistance with a megger, and values in excess of 100 megohms should be obtained.

2.4 Contacts

The contacts should be clean and lightly greased. If they are dusty or dirty, clean and re-grease as described in Section 3.3.4

2.5 Mechanism

Re-assemble the switch and check the opening and closing operation. The contact carriage movement should be fast and positive even when the handle is slowly operated. To operate the switch with the door open, the interlock must be defeated (see Section 3.6).

3. MAINTENANCE

3.1 Fuse link and link replacement

In the event of fuse links blowing, the fault should be traced and rectified, and the fuse link replaced with the correct size and type of ASTA certified fuse links to B.S.88. These are obtainable from Ottermill Switchgear Limited. Fuse links having a higher normal current rating than that stated on the fuse switch name plate must not be used unless approved by Ottermill Switchgear Limited. Fuse links should not be removed or replaced until it is ascertained that the switch is properly in the open position and safe to work on. When replacing fuse links, ensure that the fixing screws are fully tightened, and that no nuts, washers, etc. are left in the switch. It may be convenient on the smaller fuse switches to remove the contact carriage (see Section 3.3.2) before changing fuses. For HDS 4 and HD 8 framesizes, ensure that the cooling fins are replaced after the fuse link. Under no circumstances must the cooling fins be fitted between the moving contact and the fuse link.

Solid links, fitted in place of fuse links to switches and isolators do not normally require replacement. If however these are removed for any reason ensure upon replacement that fixing screws are fully tightened. Switches of framesizes HD 3, HD 4, HD 6 and HD 8 are fitted with double links on earlier models which are separable. Ensure both links are replaced.

3.2 Safety

Before carrying out any maintenance work, ensure that the equipment is isolated from the supply, and safe to work on. If live working is necessary for emergency reasons, ensure that insulated tools, gloves, boots, mats, etc. are used.

It must be emphasised that the consequences of causing a short circuit on high capacity medium voltage systems can be very serious as the current flowing into any arc can release a very large amount of energy resulting in severe flame and damage.

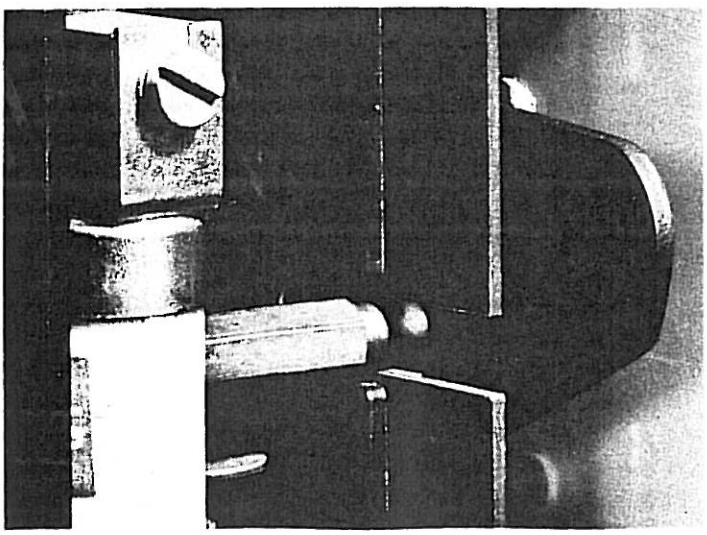
3.3 Normal Service

3.3.1 General

Lightly loaded or infrequently operated equipment should be inspected and the operation checked about every 12 months. Heavily loaded or frequently operated equipment should be inspected about every 6 months (see Section 3.5). Check for loose screws on the switch and mechanism parts, and also on the switch contacts and connections to the switch. The moving mechanism parts should be oiled with a few drops of heavy machine oil if this appears necessary.

If there is evidence of dust or contamination on the insulation surfaces, they should be wiped clean, and any carbon deposits on the inside of the contact housing and arc shields should be wiped off.

The contacts, fuse terminals, and main terminal connections should be checked for any signs of discolouration due to over-heating, and any suspected joint faces cleaned with emery cloth and properly tightened after wiping clean. This does not apply to the silver plated switch main contacts (see Section 3.3.4).

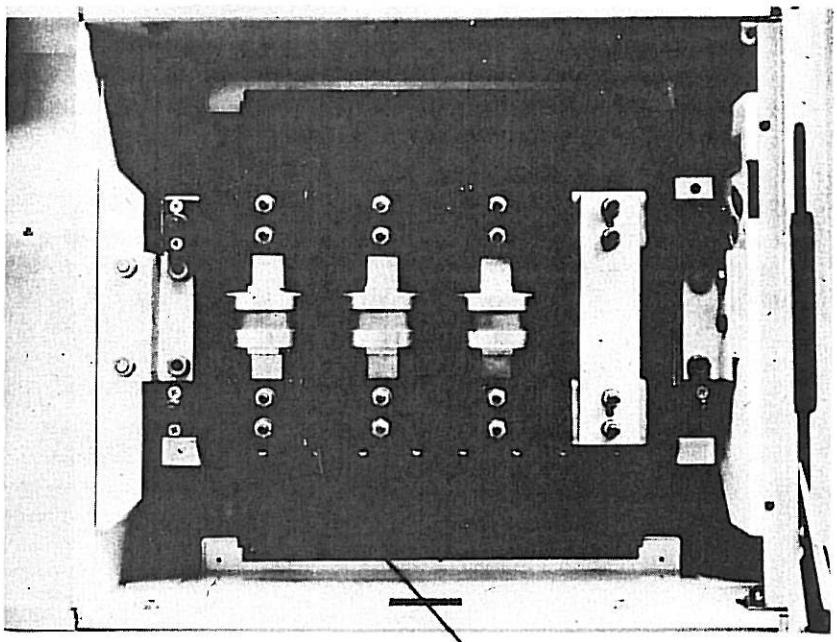


3.3.2 Contact Carriage Removal

For fuse switches of framesizes HD 06, HD 1, HD 2, HD 3 and HD 4 the contact carriage can be removed by lifting the links at each side and withdrawing the carriage from the front. The links should automatically re-engage with the carriage when it is replaced, and this should be checked before closing the door.

The carriage for the HD 3 and HD 4 framesizes should be handled with care to avoid bending the switch blades, resulting in mal-alignment with the fixed contact fingers.

On the HD 6 and HD 8 framesizes, the contact carriage is fastened by four nuts painted red, and can be removed when the nuts are undone.



3.3.3 Arc Shield Removal

HD 06 Framesize

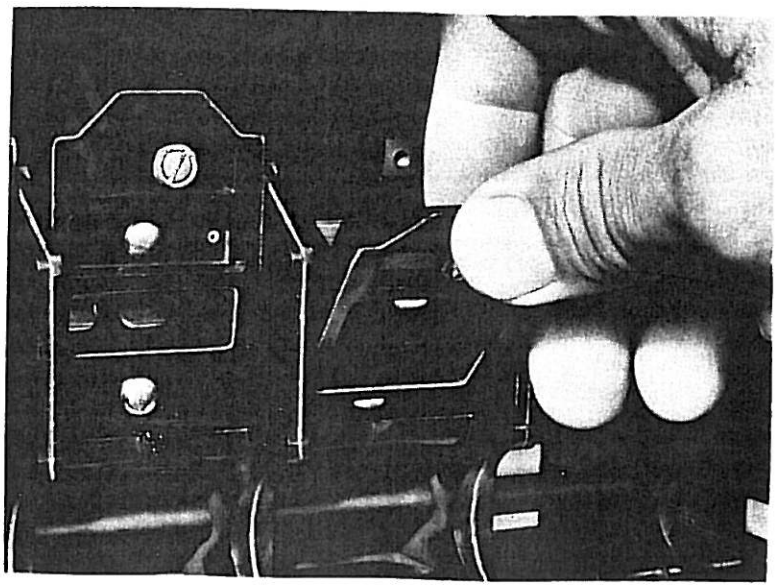
The arc shield is integral with the switch mouldings and is thus not removable. The contacts can be inspected through the aperture when the carriage is removed.

HD 1 Framesize

Swing the shield forward and out after unscrewing the small fixing screw. On some earlier models the shield also serves to hold the contact finger assembly in position, in which case the switch should not be operated without the shield in place.

HD 2 Framesize

The arc shield is removed in a similar way to the HD 1 Framesize.



HD 3 and HD 4 Framesizes

The arc shield is a three pole unit and is removed by unscrewing the two fixing screws at the front. When replacing the arc shield, the fixing screws should be properly tightened with a correct size screw-driver.

HD 6 and HD 8 Framesizes

The arc shields are separate mouldings for each pole, and are held by two insulating screws. When replacing the arc shields, the screws should be tightened with an appropriate size screw-driver and not over tightened.

3.3.4 Contact Maintenance

HD 06 Framesize

Because of the contact design and the thick silver faces, maintenance should be unnecessary on these contacts, and some roughness of the surface is not detrimental to performance. With normal switch operation, the most that is necessary is to remove the worst of the roughness on the moving contacts with a smooth file, and possibly carefully clean the fixed contact surface with a suitable tool or sharp screw-driver blade. Any metal dust should be removed and the surface of the moving contact should be lightly coated with petroleum jelly.

HD 1, HD 2, HD 3, HD 4, HD 6 and HD 8 Framesizes

These contact faces are silver plated, and the main contact surface should not be touched. If the silver is badly tarnished due to some unusual cause i.e. local overheating or corrosive atmosphere, the surface should be cleaned with a suitable metal polish. If there is any evidence of overheating, the cause should be investigated i.e. loose joints, change of contact pressure, (see Section 3.3.1). The leading edges of the blade and fixed contact fingers can be cleaned up with a smooth file if necessary. Any metal dust should be removed and the surfaces lightly coated with petroleum jelly.

3.4 Operation on Fault or Overload

3.4.1 General

If the switch is operated under heavy fault or frequent overload conditions, the contacts may require re-conditioning, and the adjacent insulation may require special attention to remove carbon deposits. The arc shield, and splitters where fitted, should not require attention.

3.4.2 Contact Maintenance & Replacement

HD 06 Framesize

Remarks under Section 3.3.4 apply and replacement should be unnecessary unless there has been accidental damage. If fixed contacts are damaged a new switch or a rebuilt switch will be necessary. If a moving contact requires replacing it can be unscrewed and the new one must be screwed up tight.

HD 1 and HD 2 Framesizes

Instructions regarding fixed contacts are as HD 06 except for some earlier models where the fixed contact assembly can be removed complete, from HD 1 by removing the arc shield, and from HD 2 by unscrewing the fixings after removing arc shield. If, due to accidental damage a moving contact is replaced ensure fixings are screwed tight.

HD 3 and HD 4 Framesizes

Remarks under Section 3.3.4 apply. The contact finger assembly can be removed by unscrewing the fixings, but unless there is burning or damage to the main contact area this will not be necessary. If due to accidental damage a moving contact blade is to be replaced ensure that both fixing screws are evenly tightened and that alignment of the contact blades is correct.

Fixed Contact Setting

On earlier models of HD 1, HD 2, HD 3 and HD 4 framesizes the spring setting is controlled by a bolt which should not be disturbed. If the setting is disturbed and the special nut removed it should be replaced with a new one of the correct type and the nut set to give a compressed spring length of 10mm when the moving contacts are replaced by a 5mm thick gauge piece.

HD 6 and HD 8 Framesizes
Any maintenance required will be similar to that described under Section 3.3.4. The removal or replacement of the fixed contacts requires the removal of the complete panel assembly, and this work is outside the scope of normal maintenance. If necessary contact blades can be replaced, but their correct alignment must be checked.

3.5 Frequent Operation

If the switch is very frequently operated say more than 1000 operations per annum, or is subject to heavy vibration, all nuts, bolts and fixings should be checked for tightness at frequent intervals depending on the conditions. Possibly every 6 months or 1000 operations. This check should include the main terminal connections after ensuring that the circuit is dead and is safe to work on.

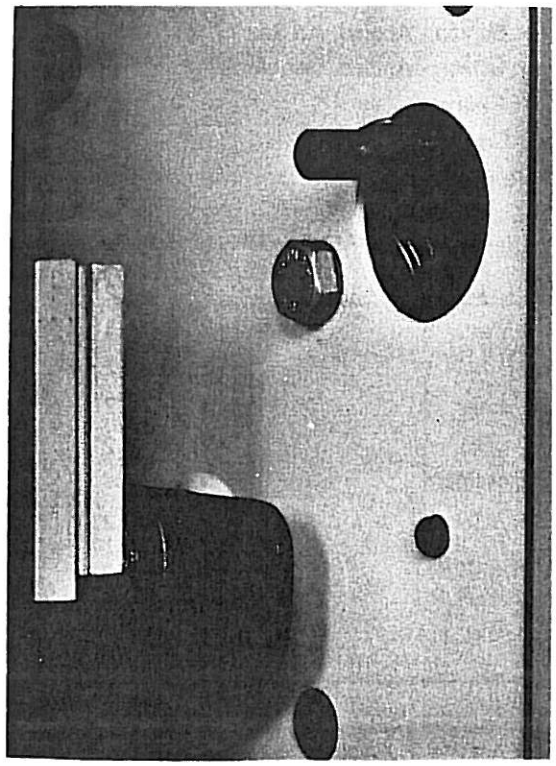
The lubrication of bearings and moving parts is important for frequent operation, and a few drops of heavy machine oil should be applied every 1000 to 5000 operations depending on conditions. Although there may be some wear of mechanism parts at 5000 or 10000 operations, depending on the switch size, no replacements should normally be necessary before operations in excess of this.

3.6 Interlocks & Padlocks

3.6.1 Interlocks

The switch front cover is interlocked to prevent access unless the switch is 'OFF'. This interlock may be defeated when checking the switch operation with the door open by lifting the projecting pin on the righthand side of the switch. This interlock is not adjustable, and its correct function should be checked when servicing the switch.

Figure type interlocks may be fitted as an integral part of the larger framesize HDC switches, and as separate external assemblies on HDS switches. When checking the switch operation with the door open, it must be remembered to insert and turn the figure interlock key before operating the switch.



3.6.2 Padlocks

Operating handle padlock facility in the 'OFF' position is standard provision.

HD 06, HD 1, HD 2, HD 3 and HD 4 Framesizes
Pass hasp through fixed bracket hole and around operating handle and close padlock.

HD 6 and HD 8 Framesizes
Pass hasp through both fixed bracket holes, ensuring handle is in extreme 'OFF' position, and close padlock.

3.7 Auxiliary Switch

Auxiliary switches, if fitted, are small moulded case switches operated by the moving carriage. The switch or contacts should require no maintenance, and it is only necessary to check that the screws are tight, and that the switch lever arm operates the switch satisfactorily. Should the switch be damaged, it must be replaced by a new switch.

3.8 Gaskets

Where dust protecting gaskets are used on the switch escutcheon, they may require replacement after a few thousand operations to maintain their efficiency. Correct replacement material obtained from Ottermill Switchgear Limited may be fitted after releasing the escutcheon by undoing the two Pozidriv screws and removing the old gasket. The thick gasket is stuck to the side face of the escutcheon and the thin gasket is stuck to the inside face of the switch case.

4. MAJOR OVERHAUL

If a major overhaul or repair of a switch is necessary, it should be returned to Ottermill Switchgear Limited, unless a competent staff and suitable facilities are available at the place of installation.

5. SPARES

For completeness, a range of spare parts is listed below, but these spares are not likely to be required unless there has been accidental damage to the switch.
Note that TPS and SPS refer respectively to Triple Pole and Single Pole switches with switched neutral. The neutral cannot be fuse-linked.

FRAME SIZE	DESCRIPTION	NO. PER SWITCH TPS	TPN	TP	SPS	SPN	REF.
All	Padlock	1	1	1	1	1	9326
	Auxiliary Switch		As required				9235
	Auxiliary Switch Screen - Angled, Single Sw		As required				58525
	Auxiliary Switch Screen - Angled, All Sws		As required				58290
	Auxiliary Switch Screen - Angled, Double Sw		As required				58527
	Auxiliary Switch Fixings						
	Screw (Single Sw.)	2	2	2	2	2	5112
	Screw (Double Sw.)	2	2	2	2	2	5120
	Lockwasher	2	2	2	2	2	004E44
	Washer	2	2	2	2	2	004E43
	Door Fastening Screw (HDC)	2	2	2	2	2	57315
	Spring (HDC)	2	2	2	2	2	79946
	Fibre Washer Outer (HDC)	2	2	2	2	2	6656
	Fibre Washer Inner (HDC)	2	2	2	2	2	6654
	Door Fastener (HDS)	2	2	2	2	2	183W86
	Door Fastener Retainer (HDS)	2	2	2	2	2	184W86
	Escutcheon Fixing Screw	2	2	2	2	2	083E20
	Lockwasher	2	2	2	2	2	005E44
	Escutcheon Gasket (R.H.)	1	1	1	1	1	051P07
	Escutcheon Gasket (L.H.)	1	1	1	1	1	053P07

FRAME SIZE	DESCRIPTION	NO. PER SWITCH TPS	TPN	TP	SPS	SPN	REF.
HD 06	Moving Contact (Phase)	6	6	6	2	2	56919
	Moving Contact (Switched Neutral)	2	–	–	2	–	56922
	Fuse Link Fixing Screw	6	6	6	2	2	012E24
	Neutral Link Assembly	–	1	–	–	1	57417

FRAME SIZE	DESCRIPTION	NO. PER SWITCH TPS	TPN	TP	SPS	SPN	REF.
HD 1	Moving Contact (Phase)	6	6	6	2	2	57663
	Moving Contact (Switched Neutral)	2	–	–	2	–	57664
	Fuse Link Fixing Screw	6	6	6	2	2	126E13
	Washer	6	6	6	2	2	008E43
	Lockwasher	6	6	6	2	2	008E44
	Arc Shield	8	6	6	4	2	57740
	Neutral Link	–	1	–	–	1	56994

FRAME SIZE	DESCRIPTION	NO. PER SWITCH TPS	TPN	TP	SPS	SPN	REF.
HD 2	Moving Contact (Phase)	6	6	6	2	2	56996
	Moving Contact (Switched Neutral)	2	–	–	2	–	56997
	Fuse Link Fixing Screw	6	6	6	2	2	126E13
	Washer	6	6	6	2	2	008E43
	Lockwasher	6	6	6	2	2	008E44
	Arc Shield	8	6	6	4	2	55548–1
	Terminal Screen Top	1	1	1	–	–	57188
	Terminal Screen Top	–	–	–	1	1	57187
	Terminal Screen Bottom	1	1	1	–	–	57190
	Terminal Screen Bottom	–	–	–	1	1	57189
	Fixing Screws	4	4	4	4	4	012E24
	Neutral Link	–	1	–	–	1	56994

FRAME SIZE	DESCRIPTION	NO. PER SWITCH TPS	TPN	TP	REF.
HD 3	Moving Contact (Phase)	6	6	6	57049
	Moving Contact (Switched Neutral)	2	–	–	57051
	Fuse Link Fixing Nut	6	6	6	008E27
	Washer	6	6	6	008E43
	Lockwasher	6	6	6	008E44
	Fixed Contact Fixing Screw	24	24	24	104E17
	Fixed Contact Lockwasher	24	24	24	006E44
	Fixed Contact Assembly (Phase)	6	6	6	55471–3
	Fixed Contact Assembly (Neutral)	2	–	–	55489–2
	Arc Shroud	2	2	2	57709
	Neutral Link	–	1	–	57527

FRAME SIZE	DESCRIPTION	NO. PER SWITCH TPS	TPN	TP	REF.
HD 4	Moving Contact (Phase)	6	6	6	57050
	Moving Contact (Switched Neutral)	2	–	–	57051
	Fuse Link Fixing Nut	6	6	6	008E27
	Washer	6	6	6	008E43
	Lockwasher	6	6	6	008E44
	Fixed Contact Fixing Screw	24	24	24	104E17
	Fixed Contact Lockwasher	24	24	24	006E44
	Fixed Contact Assembly (Phase)	6	6	6	55471–3
	Fixed Contact Assembly (Neutral)	2	–	–	55489-2
	Arc Shroud	2	2	2	57709
	Neutral Link	–	1	–	57527

FRAME SIZE	DESCRIPTION	NO. PER SWITCH TPS	TPN	TP	REF.
HD 6	Moving Contact (Phase)	6	6	6	57290
	Moving Contact (Switched Neutral)	2	–	–	57418
	Fuse Link Fixing Nut	12	12	12	008E27
	Washer	12	12	12	008E43
	Lockwasher	12	12	12	008E44
	Fixed Contact Assembly (Phase)	6	6	6	58352
	Fixed Contact Assembly (Neutral)	2	–	–	58354
	Arc Shield	8	6	6	57410
	Neutral Link Assembly	–	1	–	57518

FRAME SIZE	DESCRIPTION	NO. PER SWITCH TPS	TPN	TP	REF.
HD 8	Moving Contact (Phase)	6	6	6	57291
	Moving Contact (Switched Neutral)	2	–	–	57419
	Fuse Link Fixing Nut	12	12	12	008E27
	Washer	12	12	12	008E43
	Lockwasher	12	12	12	008E44
	Fixed Contact Assembly (Phase)	6	6	6	58353
	Fixed Contact Assembly (Neutral)	2	–	–	58355
	Arc Shield	8	6	6	57410
	Neutral Link Assembly	–	1	–	57518