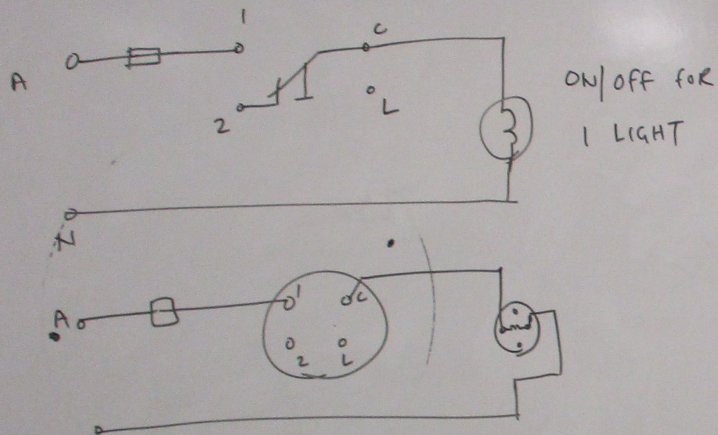


SINGLE POLE DOUBLE THROUGH SWITCH

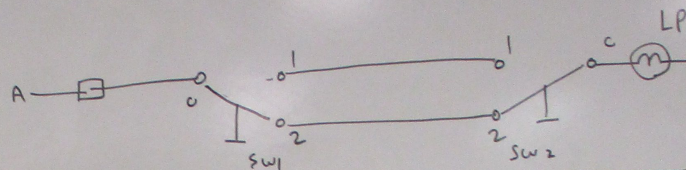
HPM TYPE 770



CONNECTION TABLE

TERMINAL	TOGGLE UP	TOGGLE DOWN
C-1	X	
C-2		X
1-2		
1-L		
2-L		

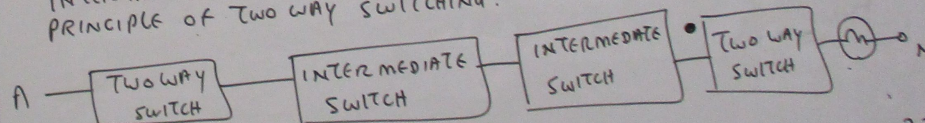
TWO WAYS SWITCH



SWITCH CONFIGURATION	LPI CONDITION	
	ON	OFF
SW1 TOGGLE DOWN + SW2 TOGGLE DOWN	X	
SW1 TOGGLE UP ONLY		X
SW2 TOGGLE UP ONLY	X	
SW1 TOGGLE UP + SW2 TOGGLE UP		X

INTERMEDIATE SWITCHING

INTERMEDIATE SWITCHING IS AN EXTENSION OF THE PRINCIPLE OF TWO WAY SWITCHING.



INTERMEDIATE SWITCH

0-0

0-0

POSITION(1)

TOGGLE ~

0-0

POSITION(2)

CLIPSAL 30m1

1 2 3 4

POSITION(1)

TOGGLE DOWN

POSITION(2)

TOGGLE UP

CLIPSAL 30 m1

TERMINAL	SWITCH POS	
	TOGGLE UP	TOGGLE DOWN
1-2		
1-3		
1-4	X	
2-3	X	
2-4		
3-4		

HPM 770/1

TERMINAL	SWITCH POS	
	TOGGLE UP	TOGGLE DOWN
1-2	X	
1-3		
1-4		
2-3		
2-4		
3-4	X	

HPM 770/1

3 4 1 2

POSITION(1)

TOGGLE UP

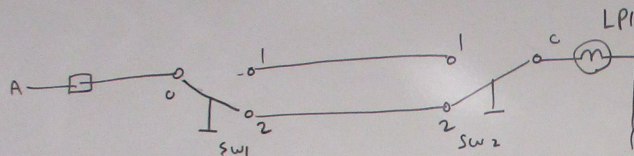
POSITION(2)

TOGGLE DOWN

LIGHT SWITCH

ON/OFF FOR
1 LIGHT

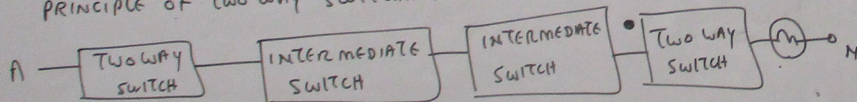
Two ways switch



SWITCH configuration	LPI condition	
	ON	OFF
SW1 TOGGLE DOWN + SW2 TOGGLE DOWN	X	
SW1 TOGGLE UP ONLY		X
SW2 TOGGLE UP ONLY		X
SW1 TOGGLE UP + SW2 TOGGLE UP	X	

INTERMEDIATE SWITCHING

INTERMEDIATE SWITCHING IS AN EXTENSION OF THE PRINCIPLE OF TWO WAY SWITCHING.



INTERMEDIATE SWITCH

0-0-0

0-0-0

POSITION(1)

TOGGLE ~

0-0-0

POSITION(2)

CLIPSAL 30 ml

1 2 3 4

POSITION(1)
TOGGLE DOWN

POSITION(2)
TOGGLE UP

Hpm 770/1

3 4 1 2

POSITION(1)
TOGGLE UP

POSITION(2)
TOGGLE DOWN

CLIPSAL 30 ml

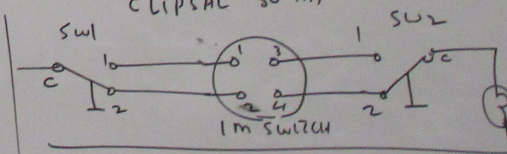
TERMINAL	SWITCH POSITION	
	TOGGLE UP	TOGGLE DOWN
1-2		
1-3		X
1-4	X	
2-3	X	
2-4		X
3-4		

Hpm 770/1

TERMINAL	SWITCH POSITION	
	TOGGLE UP	TOGGLE DOWN
1-2	X	
1-3		
1-4		X
2-3		X
2-4		
3-4	X	

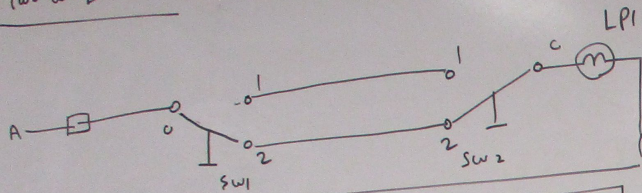
CLASS EXERCISE

CLIPSAL 30 ml



SW1	1m SWITCH	SW2	LIGHT	
			ON	OFF
C-1	TOGGLE DOWN	C-1		
C-2	TOGGLE DOWN	C-2		
C-1	TOGGLE UP	C-1		
C-2	TOGGLE UP	C-2		
C-1	TOGGLE UP	C-2		
C-2	TOGGLE DOWN	C-1		

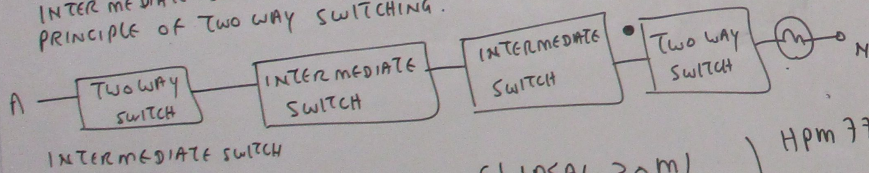
Two ways switch



SWITCH configuration	LPI condition	
	ON	OFF
SW1 TOGGLE DOWN + SW2 TOGGLE DOWN	X	X
SW1 TOGGLE UP ONLY		X
SW2 TOGGLE UP ONLY	X	
SW1 TOGGLE UP + SW2 TOGGLE UP		

INTERMEDIATE SWITCHING

INTERMEDIATE SWITCHING IS AN EXTENSION OF THE PRINCIPLE OF TWO WAY SWITCHING.



0-0-0

0-0

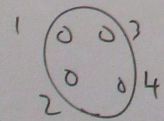
POSITION(1)

TOGGLE

0-0

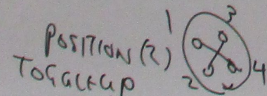
POSITION(2)

CLIPSAL 30m



POSITION(1)

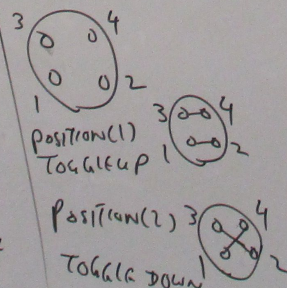
TOGGLE DOWN



POSITION(2)

TOGGLE UP

Hpm 770/1



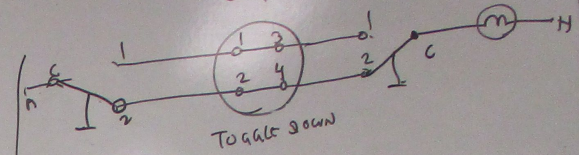
CLIPSAL 30 m

TERMINAL	SWITCH POSITION	
	TOGGLE UP	TOGGLE DOWN
1-2		X
1-3	X	
1-4		X
2-3	X	
2-4		X
3-4		

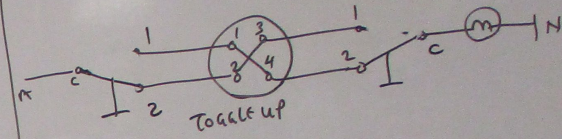
Hpm 770/1

TERMINAL	SWITCH POSITION	
	TOGGLE UP	TOGGLE DOWN
1-2	X	
1-3		X
1-4		X
2-3		X
2-4	X	
3-4		

CLIPSAL 30m



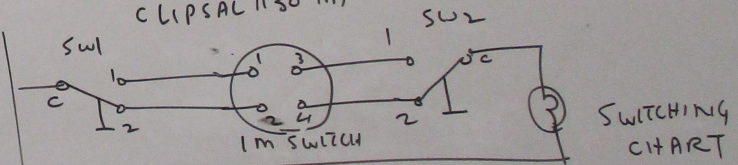
TOGGLE DOWN



TOGGLE UP

CLASS EXERCISE

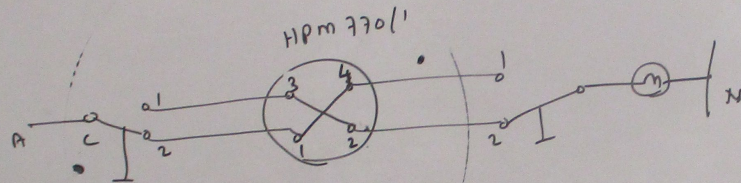
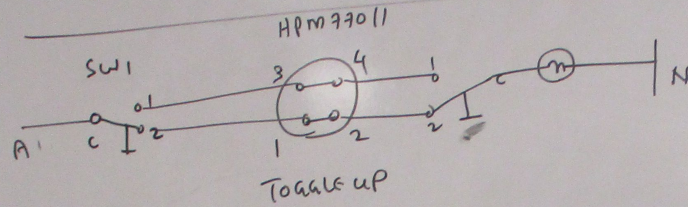
CLIPSAL 30 m



SWITCHING CHART

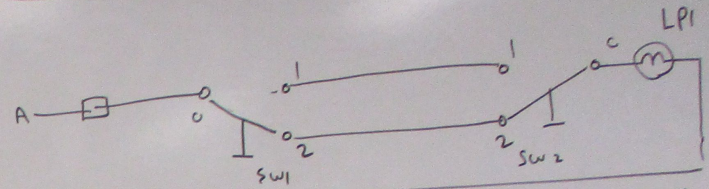
SW1	1m switch	SW2	LIGHT	
			ON	OFF
C-1	TOGGLE DOWN	C-1	X	
C-2	TOGGLE DOWN	C-2	X	
C-1	TOGGLE UP	C-1		X
C-2	TOGGLE UP	C-2		X
C-1	TOGGLE UP	C-2	X	
C-2	TOGGLE DOWN	C-1	X	

REPLACE CLIPSAL 30 ml WITH HPM 770/1
TRACE THE SWITCHING DIAGRAM



SW1	1 m switch	SW2	LIGHT	
			ON	OFF
C-1	TOGGLE DOWN	C-1		
C-2	TOGGLE DOWN	C-2		
C-1	TOGGLE UP	C-1		
C-2	TOGGLE UP	C-2		
C-1	TOGGLE UP	C-2		
C-2	TOGGLE DOWN	C-1		

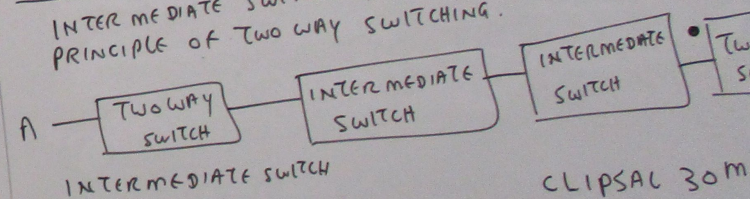
Two ways switch



SWITCH configuration	LPI condition	
	ON	OFF
SW1 TOGGLE DOWN + SW2 TOGGLE DOWN	X	
SW1 TOGGLE UP ONLY		X
SW2 TOGGLE UP ONLY		X
SW1 TOGGLE UP + SW2 TOGGLE UP	X	

INTERMEDIATE SWITCHING

INTERMEDIATE SWITCHING IS AN EXTENSION OF THE PRINCIPLE OF TWO WAY SWITCHING.



0-0

0-0

POSITION(1)

TOGGLE ~

0-0

POSITION(2)

CLIPSAL 30 ml

0-0

POSITION(1)

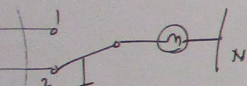
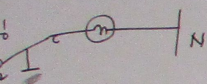
TOGGLE DOWN

POSITION(2)

TOGGLE UP

ml WITH HPM 970/1

GRAM



SW2	LIGHT	
	ON	OFF
C-1		
C-2		
C-1		
C-2		
C-2		
C-1		

TUTORIAL ELECTRICAL DRAWING

- ① CIRCUIT DIAGRAMS ARE INTENDED TO DESCRIBE
- (a) THE OPERATION OF SOME COMPONENTS IN A CIRCUIT
 - (b) THE OPERATION OF SWITCH CONTACTS IN A CIRCUIT.
 - ✓ (c) THE OPERATION OF ALL COMPONENTS IN A CIRCUIT.
 - (d) THE PHYSICAL LAYOUT OF COMPONENTS IN A CIRCUIT

- ② CIRCUIT DIAGRAMS ARE SOME TIMES REFERRED TO AS

- ✓ (a) SCHEMATIC DIAGRAMS
- (b) BLOCK DIAGRAMS
- (c) WIRING DIAGRAMS
- (d) COMPONENT DIAGRAMS.

- ③ CIRCUIT DIAGRAMS ARE ALWAYS DRAWN IN THE ELECTRICALLY

- (a) LOG CONDITION
- (b) SHUT DOWN CONDITION
- (c) RE-SET CONDITION

- ✓ (d) ALL OF THE ABOVE

- ④ SPST IS ABBREVIATION FOR

- (a) SINGLE PLATE / SINGLE THROW
- (b) SWITCH PLATE / SINGLE THROW
- (c) SINGLE POLE / SWITCH TOGGLE
- ✓ (d) SINGLE POLE / SINGLE THROW

- ⑤ AN INSTRUMENT SUITABLE FOR TESTING CIRCUIT CONTINUOUSLY WOULD BE A

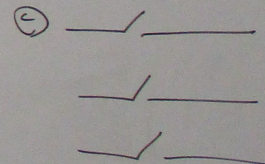
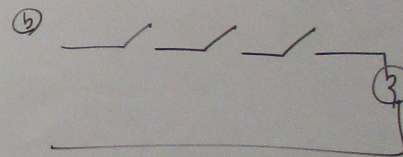
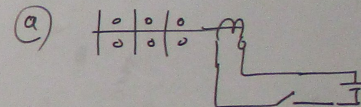
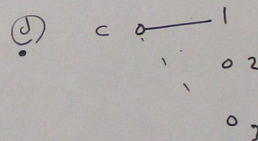
- (a) VOLT METER (b) OHM METER ✓
- (c) WATT METER (d) NONE OF ABOVE

- ⑥ WHAT IS THE MINIMUM NUMBER OF SWITCHES TO BE WIRED FOR AN INTERMEDIATE SWITCH SET UP.

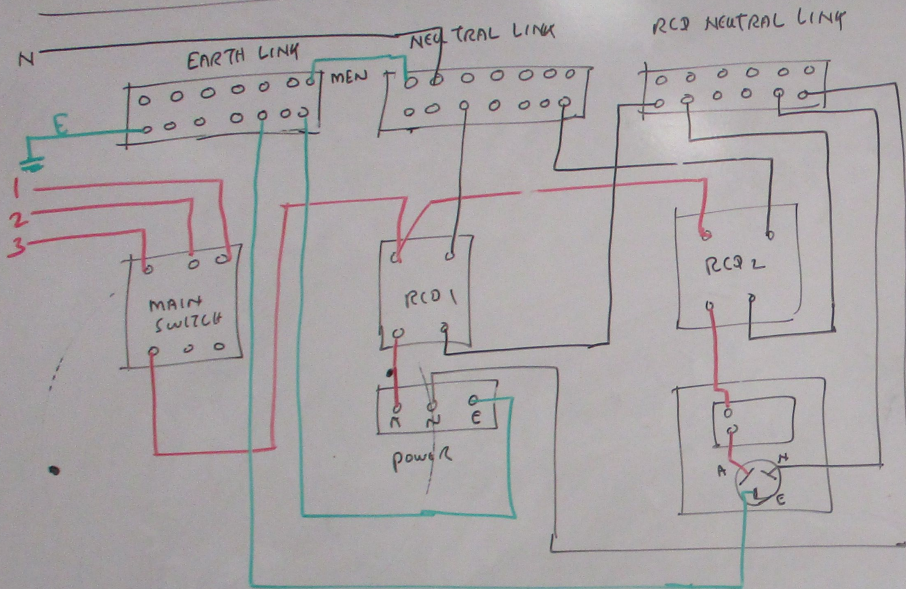
- (a) 1 (b) 2 (c) 3 (d) 4

- ⑦ A TRIPLE POLE SWITCH IS A SWITCH WHICH

- (a) OPENS (OR) CLOSE THREE CONTACTS SIMULTANEOUSLY WITH ONE TOGGLE ACTION
- (b) OPENS (OR) CLOSE ONE SINGLE CONTACT WITH THREE TOGGLE ACTIONS
- (c) HAS THREE SWITCH MECHANISMS MOUNTED ON ONE PLATE
- ✓ (d) OPENS (OR) CLOSE THREE CONTACTS WITH TRIPLE ACTION

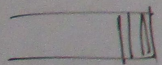


SWITCH BOARD CONNECTION



CONDUIT BENDING

PRECAUTION → CONDUCTORS AND CABLES WILL NOT SUFFER DAMAGE
 → BENDS IN RIGID CONDUIT SHALL BE SUCH THAT INTERNAL DIAMETER IS NOT SIGNIFICANTLY REDUCED AS 3000 / 3.10.3.4

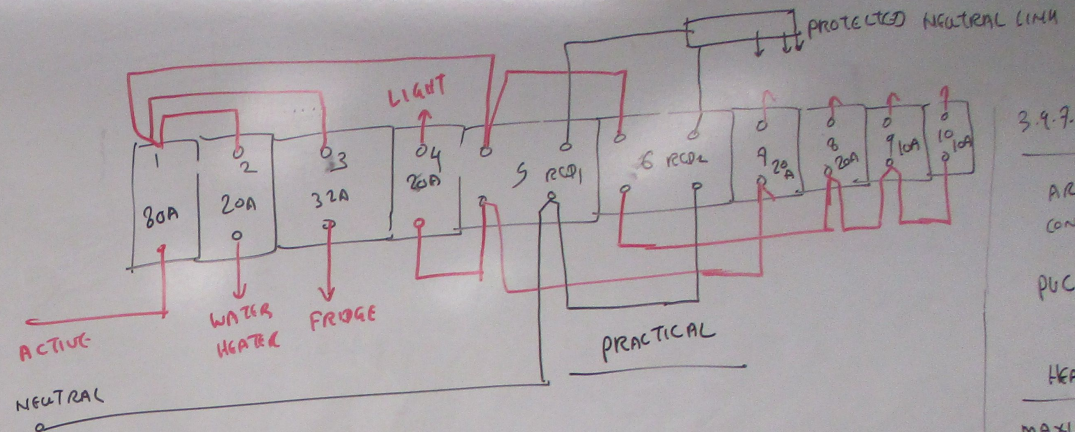


THREAD TO JOIN CONDUIT (EXTERNAL DIE)

REMOVE METAL PIECES

STEEL CONDUIT MUST BE EARTHED

S.3.2.3



TERMINATIONS

EACH ENDS OF FLEXIBLE CONDUIT SHALL BE SECURELY ANCHORED TO FIXED CONDUIT.

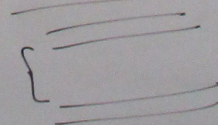
CHANGE WIRING ENCLOSURE, AS 3.10.2.2
 ANY CHANGE FROM ONE TYPE OF WIRING ENCLOSURE TO ANOTHER SHALL BE MADE AT SWITCHBOARD (OR) BY MEANS OF SUITABLE DEVICE THAT PROVIDES COMPLETE PROTECTION.

SINGLE INSULATED CABLE IN STEEL CONDUIT

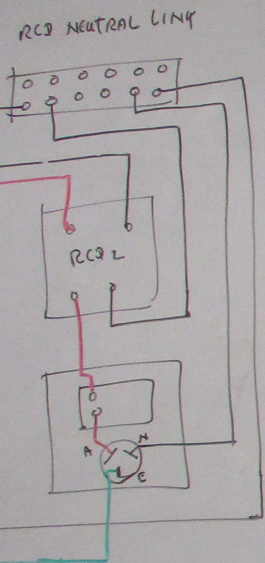
- SHALL NOT BE INSTALLED WITHOUT SHORT CIRCUIT PROTECTION 3.9.7.1-2

3.9.5 WIRING SYSTEM INSTALLED VERTICALLY

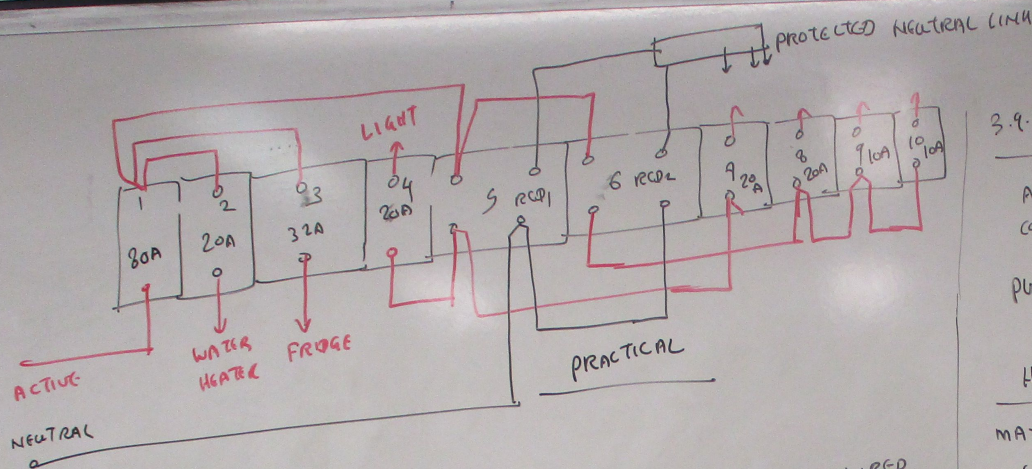
SHALL NOT EXCEED 8m



↑ VERTICAL



WILL NOT SUFFER
T SHALL BE SUCH THAT
IS NOT SIGNIFICANTLY
| 3.10.3.4
(INTERNAL DIE)



TERMINATIONS

EACH ENDS OF FLEXIBLE CONDUIT SHALL BE SECURELY ANCHORED TO FIXED CONDUIT.

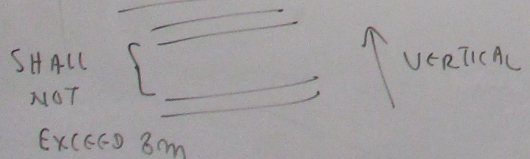
CHANGE WIRING ENCLOSURE, AS 3.10.2.2

ANY CHANGE FROM ONE TYPE OF WIRING ENCLOSURE TO ANOTHER SHALL BE MADE AT SWITCHBOARD (OR) BY MEANS OF SUITABLE DEVICE THAT PROVIDES COMPLETE PROTECTION.

SINGLE INSULATED CABLE IN STEEL CONDUIT

- SHALL NOT BE INSTALLED WITHOUT SHORT CIRCUIT PROTECTION 3.9.7.1-2

3.9.5 WIRING SYSTEM INSTALLED VERTICALLY



3.9.7.2 INSULATED AND SHEATHED CABLE

ARMOUR SHEATHED CABLE INSTALLED IN CONCRETE SHALL BE CONTAINED WITH APPROPRIATE WIRING ENCLOSURE

PVC INSULATION OPERATES WITHIN 75°C (OR) 90°C
V75, V90

HEATING CABLE

MAXIMUM VOLTAGE 600 (OR) 1000V | CONDUCTOR C.S.A 1 → 240 mm²
CURRENT 18 → 450A

MAXIMUM OPERATING TEMPERATURE

CONTINUOUS EXPOSED TO TOUCH 70°C
CONTINUOUS NOT EXPOSED TO TOUCH | PVC SHEATHED 90°C
CONTINUOUS NOT EXPOSED TO TOUCH, NOT PVC SHEATHED 250°C
INTERMITTENT > 1000°C
COPPER MELTING POINT 1083°C

FIRE RATED CABLE

AS / NZS 3013: 1995
CATEGORY WS2W, IEC 60331, BS 6387
OLEX C.S.A 10 → 630 mm²

XLPE → 90°C

PVC POLY VINYL CHLORIDE

THERMAL CONDUCTIVITY 0.16 W / m K
SPECIFIC HEAT 1000 J / kg K

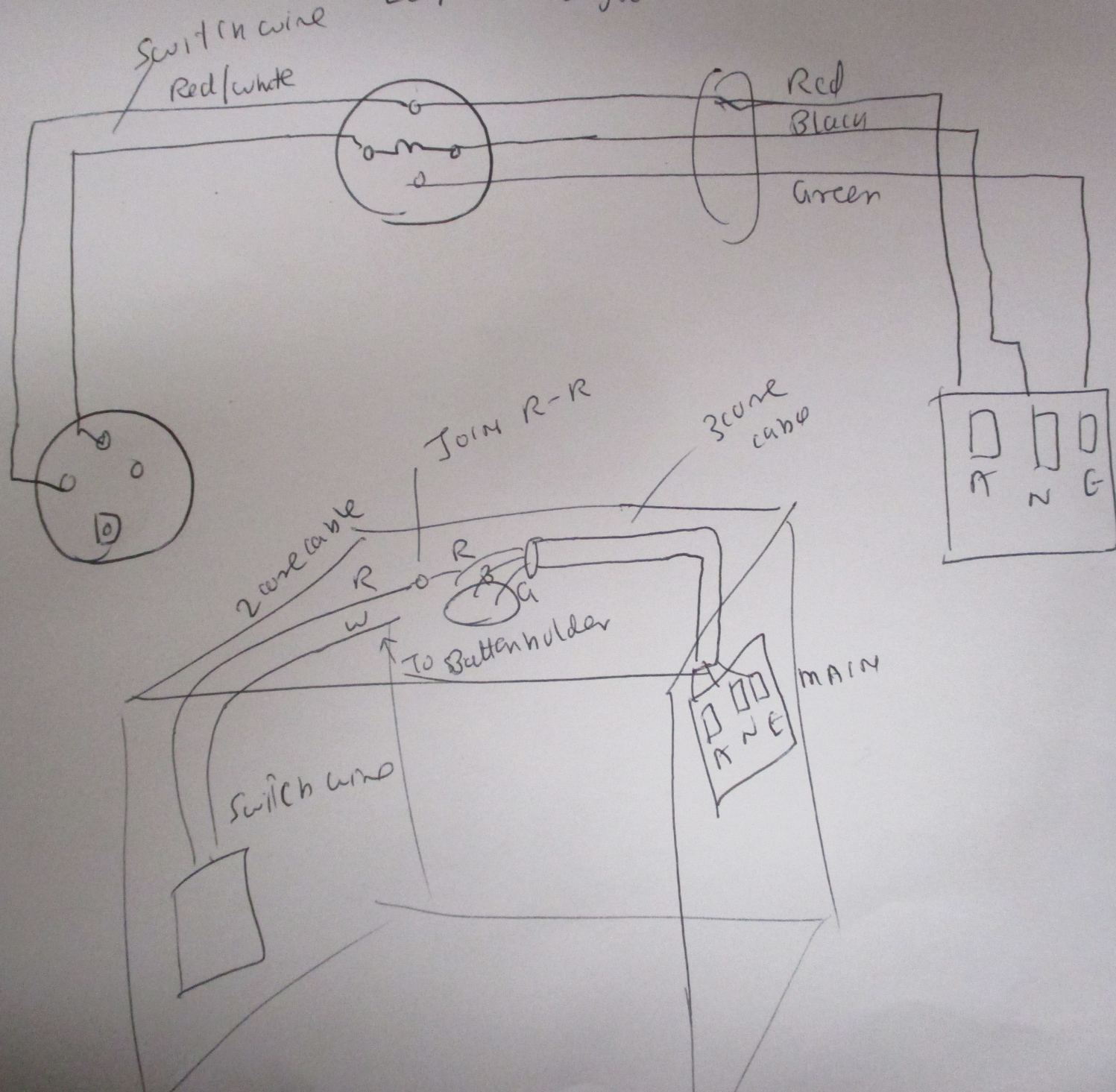
0 → 50°C



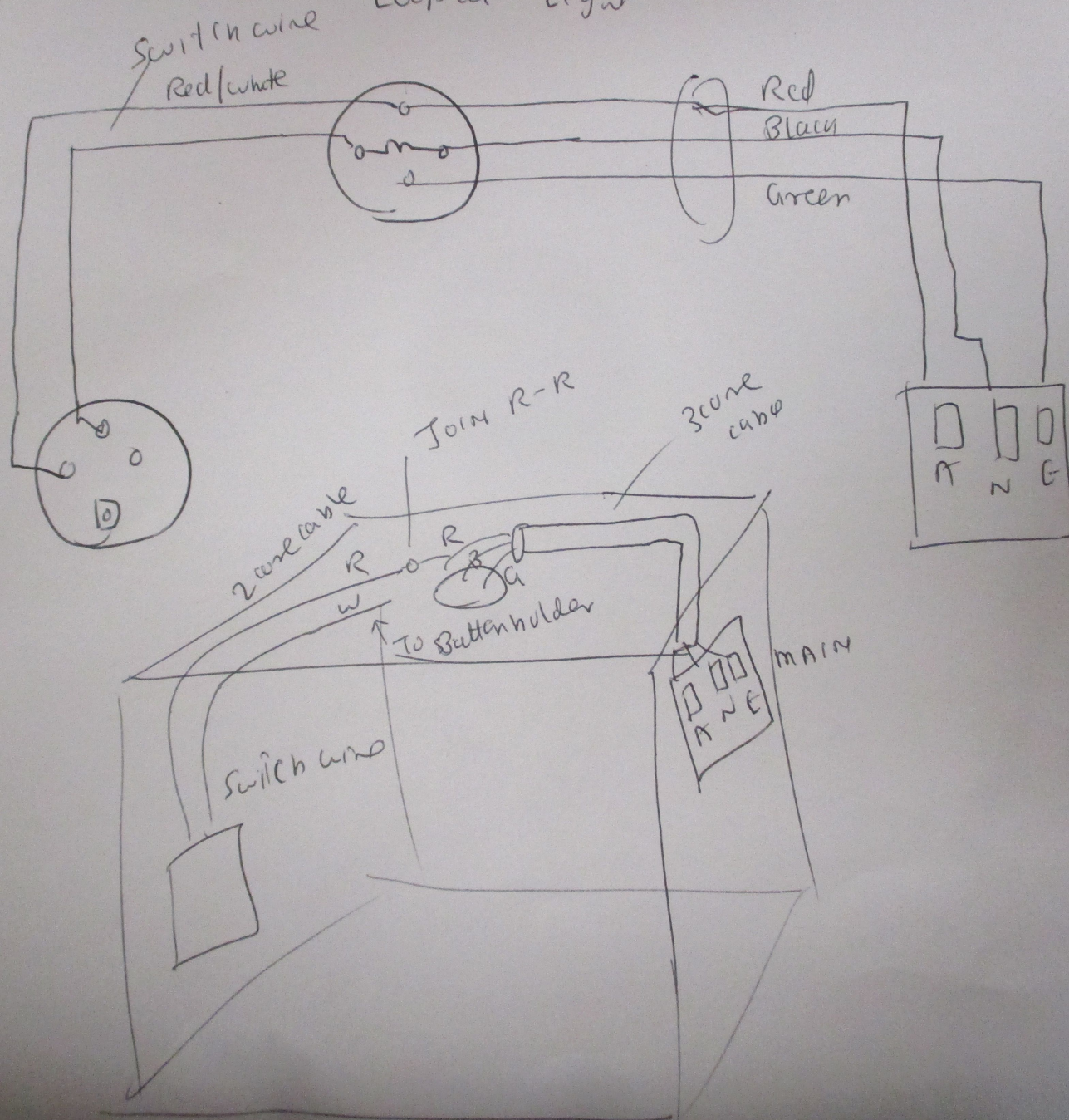


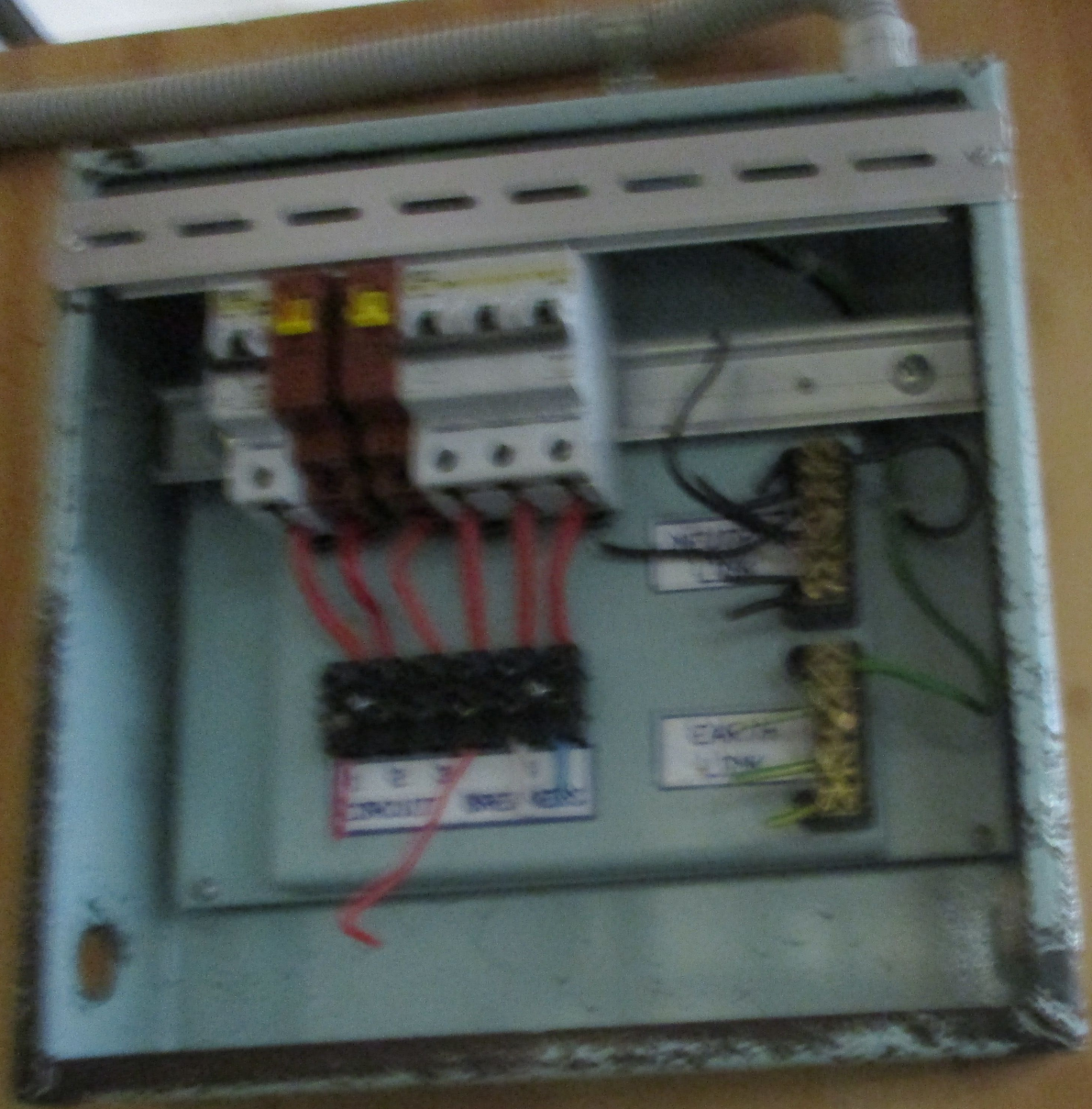


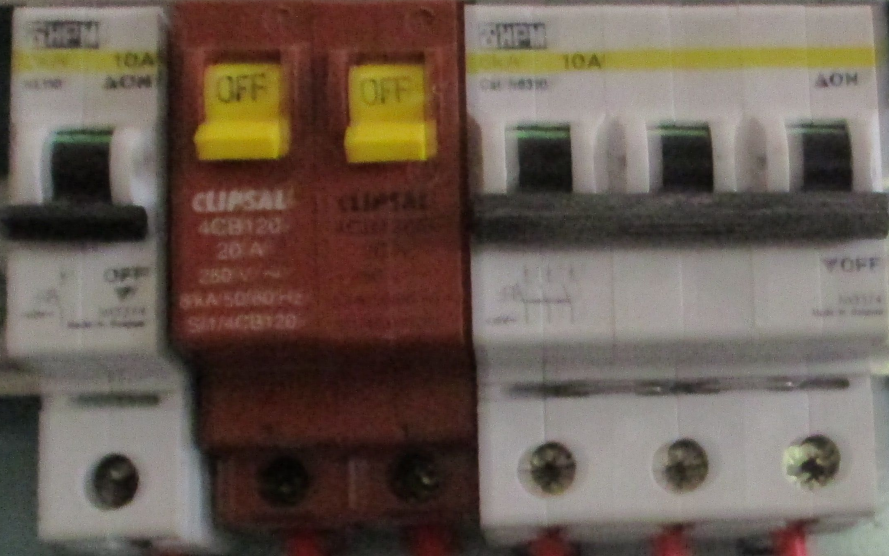
Loop at Light



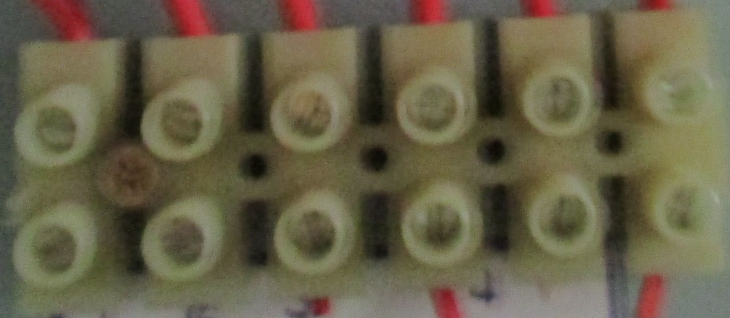
Loop at Light







NEUTRAL
LINK



CIRCUIT BREAKERS

EARTH
LINK





