

# TAYLOR STUDWELDING SYSTEMS LIMITED



## OPERATING GUIDE

FOR

# TYPE CD-i

## CAPACITOR DISCHARGE STUDWELDING EQUIPMENT



A TAYLORMADE CAPACITOR DISCHARGE STUDWELDING SYSTEM

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## **USEFUL INFORMATION**

### **MANUFACTURERS DETAILS**

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SALES DIRECT TEL : +44 (0)1924 487703  
TECHNICAL HELPLINE : +44 (0)1924 487701

You may wish to record the details of your controller below as this information will help with any technical assistance you may require:

<b>CONTROLLER SERIAL No.</b>	
<b>DATE PURCHASED.</b>	

### **PURPOSE AND CONTENT OF THIS GUIDE**

This guide has been written for :

- The personnel of the end-user responsible for the installation and maintenance of the controller.
- The operator of the welding controller.

This guide contains information relating to :

- Installation and connection.
- Operation.
- Technical specifications and parameters.
- Spare parts.

# **USEFUL INFORMATION**

## **FURTHER INFORMATION**

Should you require additional technical information, please contact us directly (details on previous page) or our local agent / distributor (details of agents etc. can be obtained from us).

This guide contains important information which is a pre-requisite for safe Operation of the equipment. The operating personnel must be able to consult this guide when necessary. In the interests of safety, make this guide available to your personnel in good time.

If the equipment is sold / passed on, please hand over this manual to the new owner and if possible please inform us of the name and address of the new owner, in case we need to contact him regarding the safety of the machine.



PLEASE READ THIS GUIDE CAREFULLY BEFORE INSTALLING OR OPERATING THE CONTROLLER.



PLEASE OBSERVE CAREFULLY ALL SAFETY PROCEDURES/INSTRUCTIONS.



THIS EQUIPMENT HAS BEEN EMC TESTED AND APPROVED IN ACCORDANCE WITH BS EN 60974-10 (CATEGORY 2).



THIS MACHINE OPERATES FROM A MAINS SUPPLY OF 100-250V AC @ 50Hz



NEVER REMOVE ANY PORTION OF THE UNIT HOUSING WITHOUT FIRST ISOLATING THE CONTROLLER FROM THE MAINS ELECTRICAL SUPPLY.



NEVER OBSTRUCT THE UNDERSIDE, FRONT OR REAR PANELS AS THIS MAY CAUSE THE UNIT TO OVERHEAT DURING OPERATION.



DO NOT USE THIS WELDING POWER SOURCE FOR PIPE THAWING.

# **IMPORTANT SAFETY INFORMATION !**

## **PROTECT YOURSELF AND OTHERS !**

Read and understand these safety notes.

### **1. ELECTRICAL**

No portion of the outer cover of the welding controller should be removed by anyone other than suitably qualified personnel and never whilst mains power is connected. ALWAYS disconnect the mains plug from the socket.



**BE AWARE !** Capacitors store electrical energy. Check for residual charge before carrying out any internal maintenance.

**DO NOT !** use any fluids to clean electrical components as these may penetrate into the electrical system

Installation must be according to the setting up procedure detailed on page 10 of this manual and must be in line with national, regional and local safety codes.

### **2. FIRE**

During welding small particles of very hot metal are expelled. Ensure that no combustible materials can be ignited by these.

### **3. PERSONNEL SAFETY**

Arc rays can burn your eyes and skin and noise can damage your hearing. Operators and personnel working in close proximity must wear suitable eye, ear and body protection.

Fumes and gases can seriously harm your health. Use the equipment only in a suitably ventilated area. If ventilation is inadequate, then appropriate fume extraction equipment must be used.

Hot metal spatter can cause fire and burns. Appropriate clothing must be worn. Clothing made from, or soiled with, combustible materials must NOT be worn.

Have a fire extinguisher nearby and know how to use it.

Magnetic fields from high currents can affect heart pacemakers or other electronically controlled medical devices. It is imperative that all personnel likely to come into the vicinity of any welding plant are warned of the possible risks before entering the area.

To minimise the risks of exposure to electromagnetic radiation, operators should not drape the welding cables over their shoulders or wrap them around themselves in any way whilst using the equipment. It is also recommended that operators route the welding earth return cables away from themselves and do not stand between the two earth return cables during welding.

# **IMPORTANT SAFETY INFORMATION !**

## **4. MAINTENANCE**

All cables must be inspected regularly to ensure that no danger exists from worn or damaged insulation or from unsound electrical connections. Special note should be made of the cables close to the pistol, where maximum wear occurs. As well as producing inconsistent welds, worn cables can overheat or spark, giving rise to the risk of fire.

## **5. LIMITATIONS OF USE**

The mass of the welding controller is between 11 and 13.3kg dependant on the model purchased and as such is suitable to be manhandled. The controller is not suitable for use in rain or snow or in an environment with increased risk of electric shock.

## **6. TRAINING**

Use of the equipment must be limited to authorised personnel only who must be suitably trained and must have read and understood this manual. This manual must be made available to all operators at all times. Further copies of this manual may be purchased from the manufacturer. Measures must be taken to prevent the use of this equipment by unauthorised personnel.

## **7. INSTALLATION**

Ensure that the site chosen for the equipment is able to support the weight of the equipment and that it will not fall or cause a danger in the course of its normal operation. Do not hang connecting cables over sharp edges and do not install connecting cables near heat sources or via traffic routes where people may trip over them or they may be damaged by the passage of vehicles (forklifts etc.)

## **8. INTERFERENCE**

During welding operations, intense magnetic and electrical fields are unavoidably produced and these may interfere with other sensitive Electronic equipment.

All Taylor Studwelding equipment is designed, manufactured and tested to conform the current appropriate European standards and directives regarding electromagnetic emissions and immunity and as such is safe to use in any normal environment.

## **9. DISPOSAL**

The equipment either wholly or any of its component parts may be disposed of as part of general industrial waste or passed to a scrap merchant. None of the components used in the manufacture are toxic, carcinogenic or harmful to health in their "as supplied" condition.

# **INTRODUCTION TO STUDWELDING**

## **INTRODUCTION**

The complete range of Taylor Studwelding Systems Capacitor Discharge units are compact, portable Stud Welding equipment's. The units are specifically designed to enable a small diameter range of ferrous and non-ferrous weld studs to be welded to light gauge, self-finish or pre-coated materials, in most cases with little or no reverse marking.

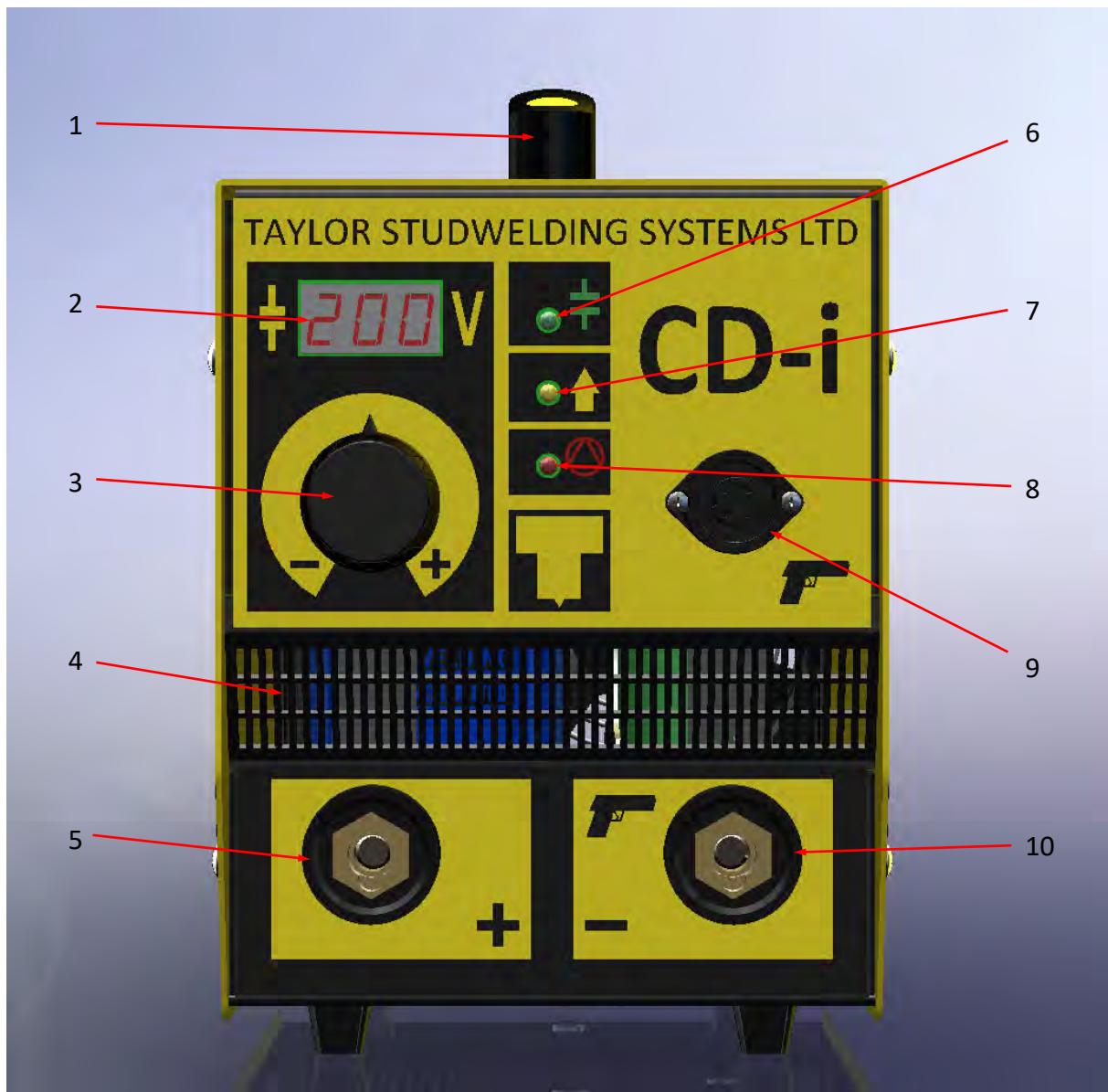
The equipment consists of a control unit, a welding pistol and the necessary interconnecting cables and accessories.

## **THE PROCESS**

Capacitor Discharge stud welding is a form of welding in which the energy required for the welding process is derived from a bank of charged capacitors. This stored energy is discharged across the gap between the two surfaces to be welded as they are propelled towards each other. The arc produced heats the two surfaces, melting a thin film of metal on each surface and the propelling force closes the gap between the two faces, thus forming a weld.

In contact welding the stud to be welded is forced by spring pressure on to the plate. At this point the arc gap between the two components is maintained by a small pip on the welding face of the stud. On initiation of the high current pulse from the capacitors, this pip vaporises and an arc is drawn between the work piece and the stud. The heat from this arc melts the base of the stud and the area of the work piece directly beneath the stud, whilst the spring pressure from the pistol accelerates the stud towards the work piece. Within 3 to 4 milliseconds the stud hits the work piece and the arc is extinguished. The kinetic energy contained in the moving stud and the remaining spring pressure, forge the molten parts together to form a weld.

## GUIDE TO EXTERNAL FEATURES



### FRONT PANEL

1. CARRYING HANDLE
2. WELDING VOLTAGE DISPLAY
3. WELDING VOLTAGE CONTROL KNOB
4. VENTILLATION HOLES **! DO NOT OBSTRUCT !**
5. WELDING EARTH PANEL CONNECTOR
6. GREEN LED - INDICATES READY TO WELD
7. AMBER LED - INDICATES UNIT IS CHARGING
8. RED LED - INDICATES UNIT IS IN RESET MODE. WAIT 10 SECONDS AND RE-START THE CONTROLLER WITH THE ON/OFF SWITCH. IF THE RESET CONDITION PERSISTS A FAULT HAS OCCURED
9. WELDING PISTOL CONTROL CONNECTOR
10. WELDING PISTOL PANEL CONNECTOR







# GUIDE TO EXTERNAL FEATURES



## BACK PANEL

- |   |  |
|---|--|
| <ol style="list-style-type: none"> <li>1. RATING/SERIAL PLATE</li> <li>2. ON/OFF SWITCH</li> <li>3. VENTILLATION FAN/GRILLE - <b>! DO NOT OBSTRUCT !</b></li> </ol> | <ol style="list-style-type: none"> <li>4. MAIN FUSE</li> <li>5. MAINS INLET - IEC SOCKET OR FIXED CABLE (SEE INSET) OPTIONS AVAILABLE</li> </ol> |
|---|--|

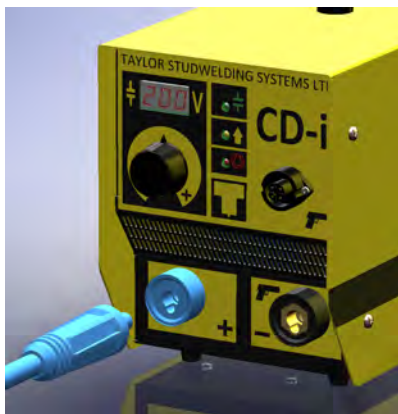
### IMPORTANT NOTES !

-  *Due to the power requirements and Electromagnetic emissions produced during normal use, this machine must only be operated in an industrial environment.*
-  *The unit has inverter technology and is designed to operate from any single phase AC voltage between 100 and 250VAC at 50Hz.*
-  *Never obstruct the front and rear panel ventilation holes or the underside of the unit as this may cause the unit to overheat during operation.*
-  *Never remove any portion of the unit housing without first isolating the unit from the mains electrical supply.*

## SETTING UP AND WELDING

Set up the control unit at the place of work, ensuring that the mains switch is in the OFF position. Ensure that this is done in line with the notes and safety recommendations on pages 5 and 6 of this manual.

Plug the controller into the correct mains AC supply. The controller is rated for any single phase AC voltage between 100 and 250VAC at 50Hz. Ensure the correct plug is fitted for your supply in line with local/national codes.



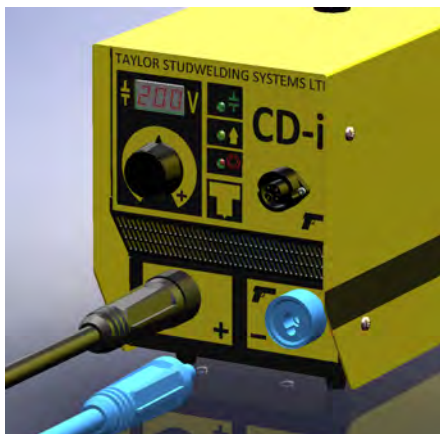
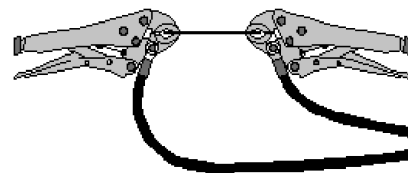
Connect the welding earth cable to the controller panel mounted plug. Note that the cable end plug has a peg which mates with a key slot in the panel mounted socket.

### **IMPORTANT !**

Secure the connector with a clockwise turn until it locks. Failure to do this will result in damage to the connector during welding.



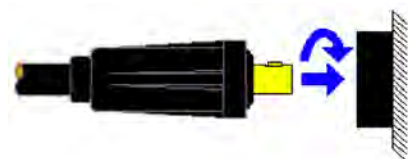
Attach the welding earth clamps to the work piece at approximately 180° to each other. This will help to prevent "Arc blow" when welding takes place. Prior to fitting the clamps, ensure that the contact area of the work piece is free from rust, paint, grease etc. As this will result in a poor welding connection and poor results. Where possible, route the earth cables away from the operator to prevent the operator being positioned between the run of the cables whilst operating the equipment.



Connect the welding pistol cable to the controller panel mounted socket. Note that the cable end plug has a peg which mates with a key slot in the panel mounted socket.

### **IMPORTANT !**

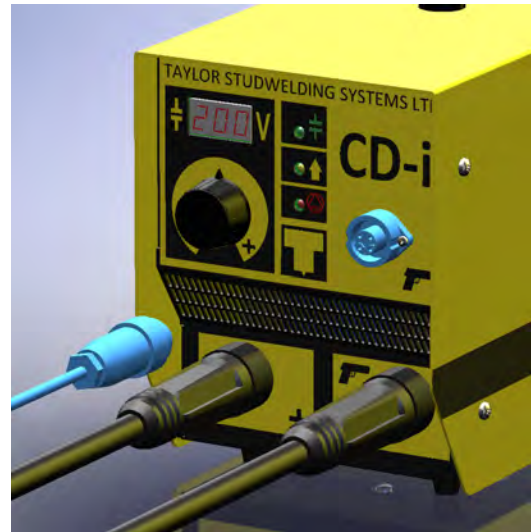
Secure the connector with a clockwise turn until it locks. Failure to do this will result in damage to the connector during



## SETTING UP AND WELDING

Connect the welding pistol control cable to the panel mounted socket on the controller.

Note that the cable end plug and panel mounting socket are keyed to prevent incorrect fitting. Push the plug firmly home and twist the locking ring clockwise to secure the plug in position.



Prepare the pistol for use in accordance with the guidance given in the document “OPERATING GUIDE FOR CD STUDWELDING PISTOLS TYPE C2 & LG2” which accompanies the type C2 pistol supplied with your controller.

The guide contains information on :

- Pistol Setup
- Spare Parts
- Accessories
- Safety

## **WELD SETTINGS**

This page and the following are intended as a guide to setting your machine.

The settings outlined in the table are only intended as a starting point. It is possible that the settings will give satisfactory results without adjustment, but in reality the quality of the welding results is governed by many variable factors. These include, most obviously, the welding power and pistol spring pressure as covered in the table, but can also include factors such as stud and work-piece material type and condition, ambient temperature, relative humidity, quality of supply etc. All of these factors can act on the weld to change the outcome. It is recommended that in all instances, you need to carry out sample welds in your actual conditions and environment. This will enable you to alter the settings, where necessary, to achieve welds that are most acceptable to you.

The setting charts were established with the performance of repetitive weld tests using studs manufactured to the BS EN ISO 13918 standard, in the following materials :

Mild Steel, Grade St37-3  
Stainless Steel, Grade 1.4303  
Aluminium Alloy, Grade AlMg3

and sheet materials of the following types :

1.6 mm Thick, Mild Steel, Grade CR4  
1.6 mm Thick, Stainless Steel, Type S304  
1.6 mm Thick, Aluminium Alloy, Grade HE30, Half Hard

N.R. = NOT RECOMMENDED

## WELD SETTINGS

		i8	i8	i9	i9	i10	i10
STUD Ø	STUD M	VOLTAGE	SPRING	VOLTAGE	SPRING	VOLTAGE	SPRING
<b>M2.5/M3</b>	MS	75	2½	45	2½	35	2½
	SS	75	2½	45	2½	35	2½
	AL	80	2½	50	2½	35	2½
<b>M4</b>	MS	85	2½	60	2½	40	2½
	SS	85	2½	60	2½	40	2½
	AL	90	3½	65	3½	45	3½
<b>M5</b>	MS	105	2½	75	2½	65	2½
	SS	110	2½	85	2½	65	2½
	AL	110	3½	80	3½	70	3½
<b>M6</b>	MS	125	2½	90	2½	80	2½
	SS	135	2½	110	2½	80	2½
	AL	180	4	120	4	120	4
<b>M8</b>	MS	180	3½	130	3½	130	3½
	SS	190	3½	160	3½	130	3½
	AL	NR	4	150	4	160	4
<b>M10</b>	MS	NR	3½	185	3½	155	3½
	SS	NR	3½	NR	3½	170	3½
<b>ETAG</b>	MS	100	2½	75	2½	65	2½

## **WELD TESTING**

Visual examination of weld quality can, even with limited experience, provide a useful quality assessment. In such a check the presence of a small even witness of weld material around the base of the stud flange after welding should be ensured. Poor welds are indicated by excess metal on one side of the welded flange and / or the presence of an undercut or non-fused area between the stud flange and the parent sheet or plate. Incorrect settings, adverse magnetic effects etc. such as those at edge welding positions or with unbalanced earths and studs welded to the work piece at an angle, the controller and pistol should be examined with a view to correcting such defects.

### **MECHANICAL TESTS :**

#### **1. BENDING.**

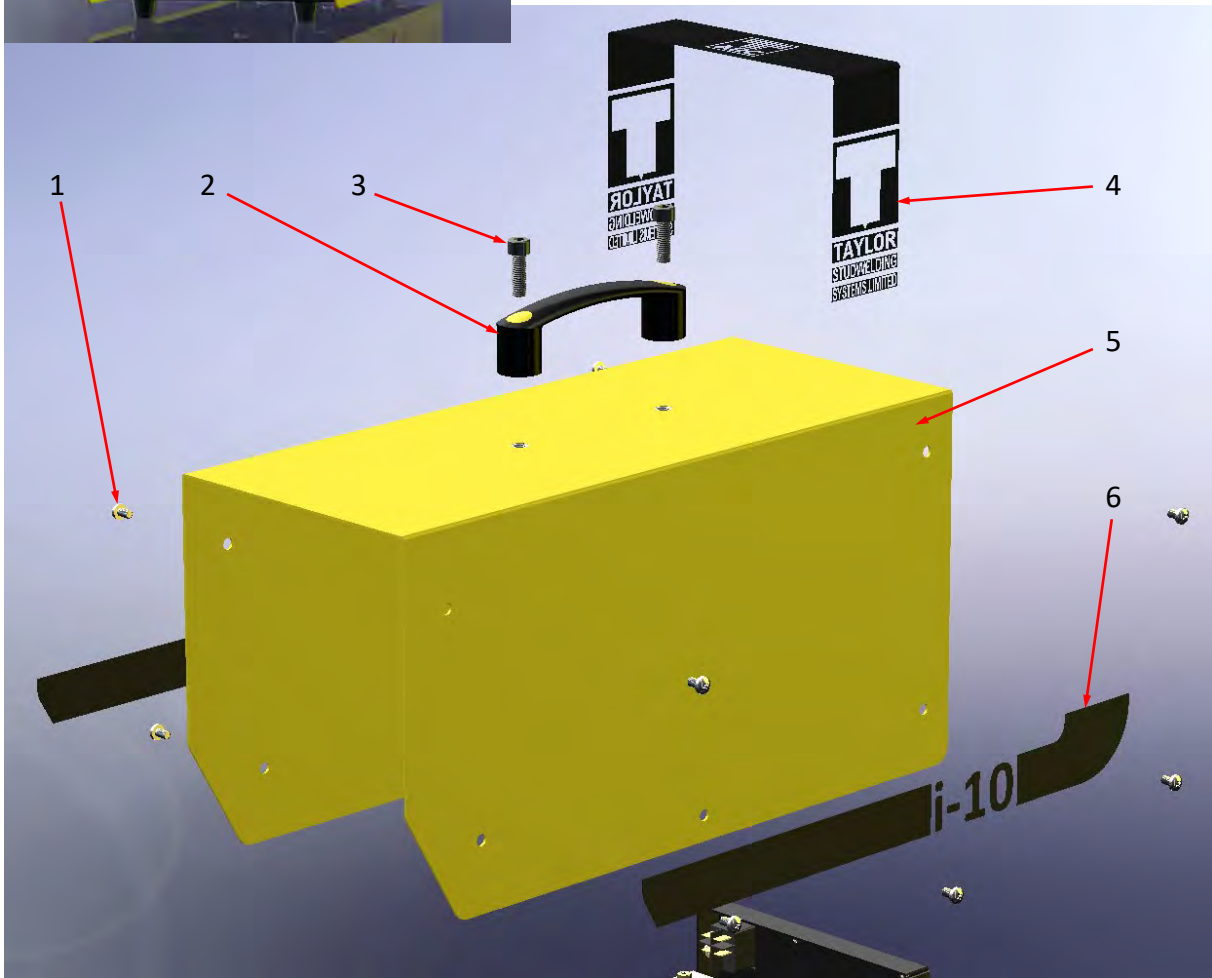
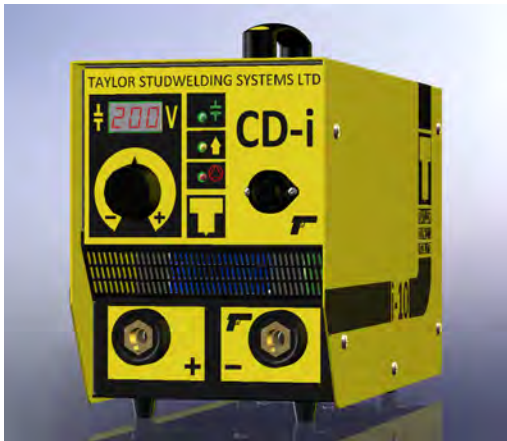
The most easily applied method of testing the quality of welded fasteners considered here, involves the use of a bending bar. This bending bar (available from your supplier, see the accessories section of this manual) fitted with the correct size of nozzle for the stud to be tested is used to bend over the stud in accordance with BS EN ISO 14555:2006 specification.

#### **2. TORSION.**

A torsion test provides useful information for threaded fasteners. This involves tightening a nut on the stud against a spacer, suitably relieved to cater for the flange and weld spatter. For quantitative assessments a suitably calibrated torque wrench may be used, but at its simplest, a spanner will suffice.

In the above tests the performance of the welded joint should be considered in relation to the thickness of the material to which the stud is welded. On thicker materials, a full strength weld is denoted by deformation or failure of the stud shank. On lighter gauge material, severe "dimpling" or "dishing" at the reverse to the weld side normally indicates sufficient strength, whilst in most cases, the tearing of a slug of material from the parent sheet will occur.

# PARTS LIST & EXPLODED DIAGRAMS

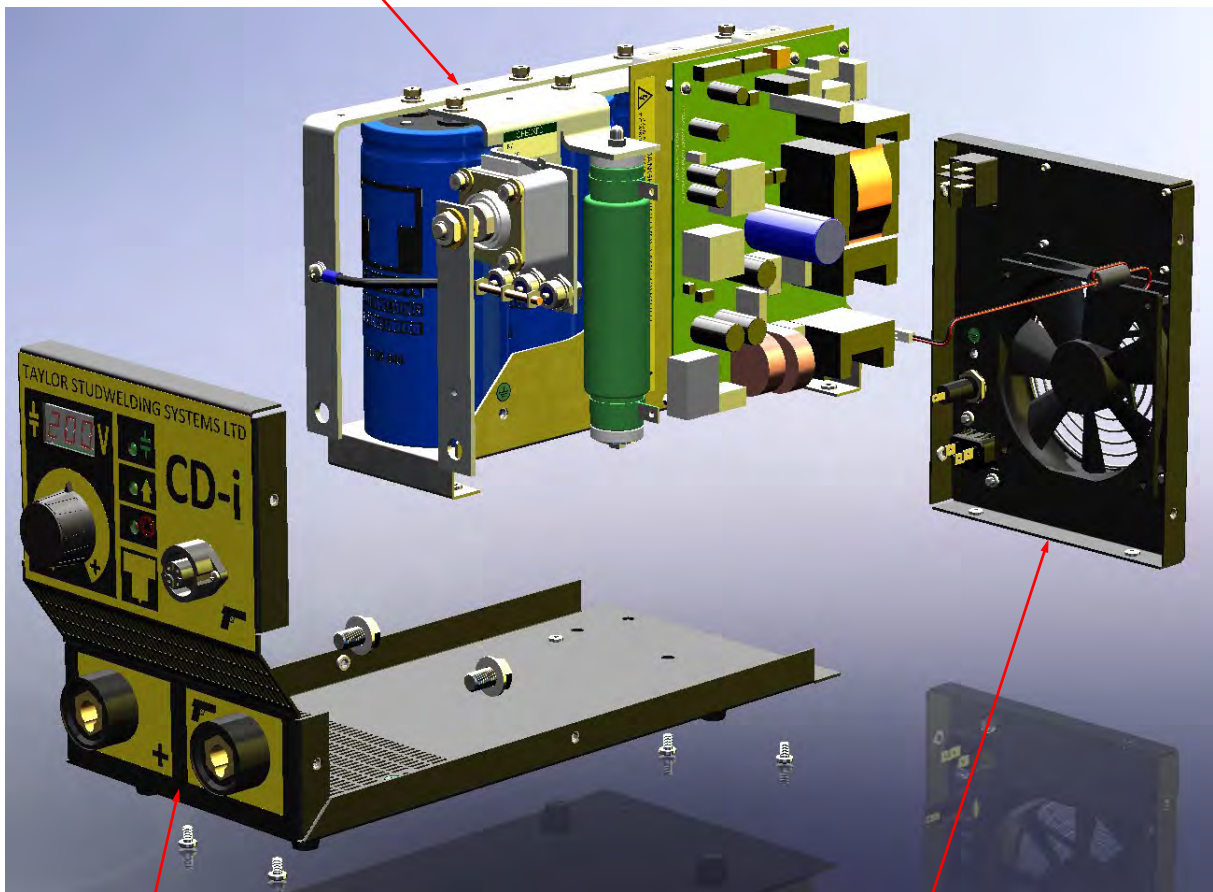


ITEM	No. OFF	PART No.	DESCRIPTION			
1	10	Z200-05-008	SCREW			
2	1	70-105-014	HANDLE			
3	2	Z105-08-025	SCREW	MODEL	LH	RH
4	1	70-105-237	LOGO STICKER	i8	70-105-238	70-105-239
5	1	70-105-230	COVER	i9	70-105-240	70-105-241
6	1	SEE INSET	MODEL IDENT STICKER	i10	70-105-242	70-105-243

# PARTS LIST & EXPLODED DIAGRAMS



SEE PAGES 19 TO 21 FOR A  
BREAKDOWN OF THE CAPACITOR BANK

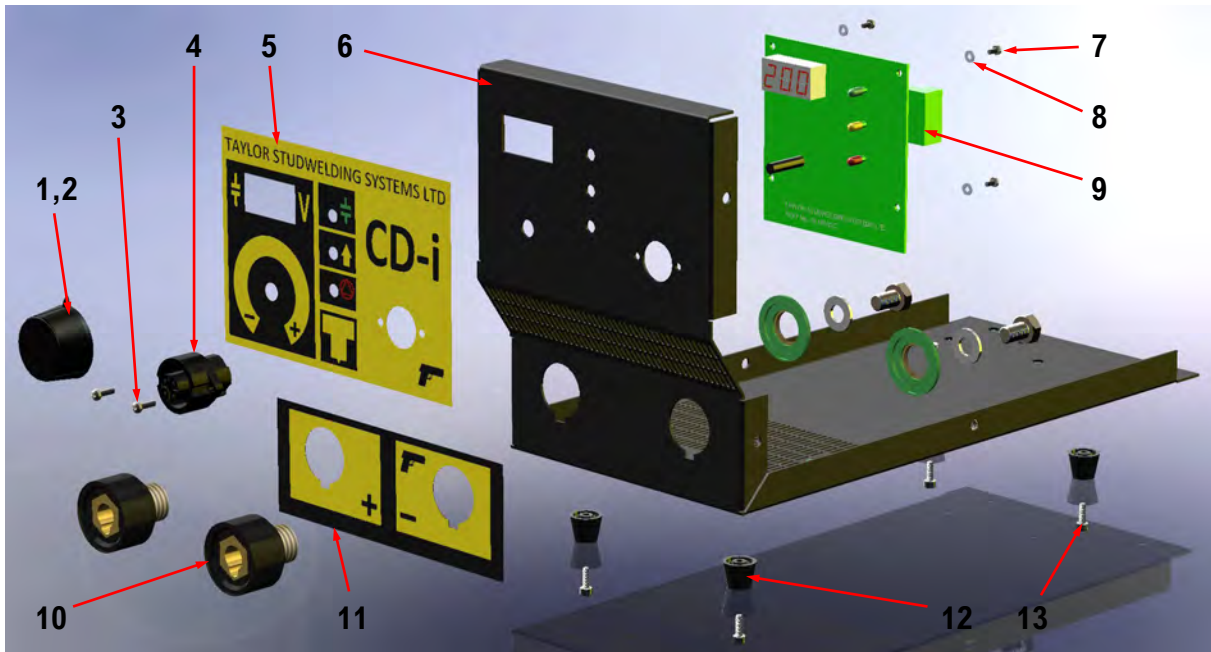


SEE PAGE 17 FOR A BREAKDOWN  
OF THE BASEPLATE

SEE PAGE 18 FOR A BREAKDOWN  
OF THE BACK PANEL

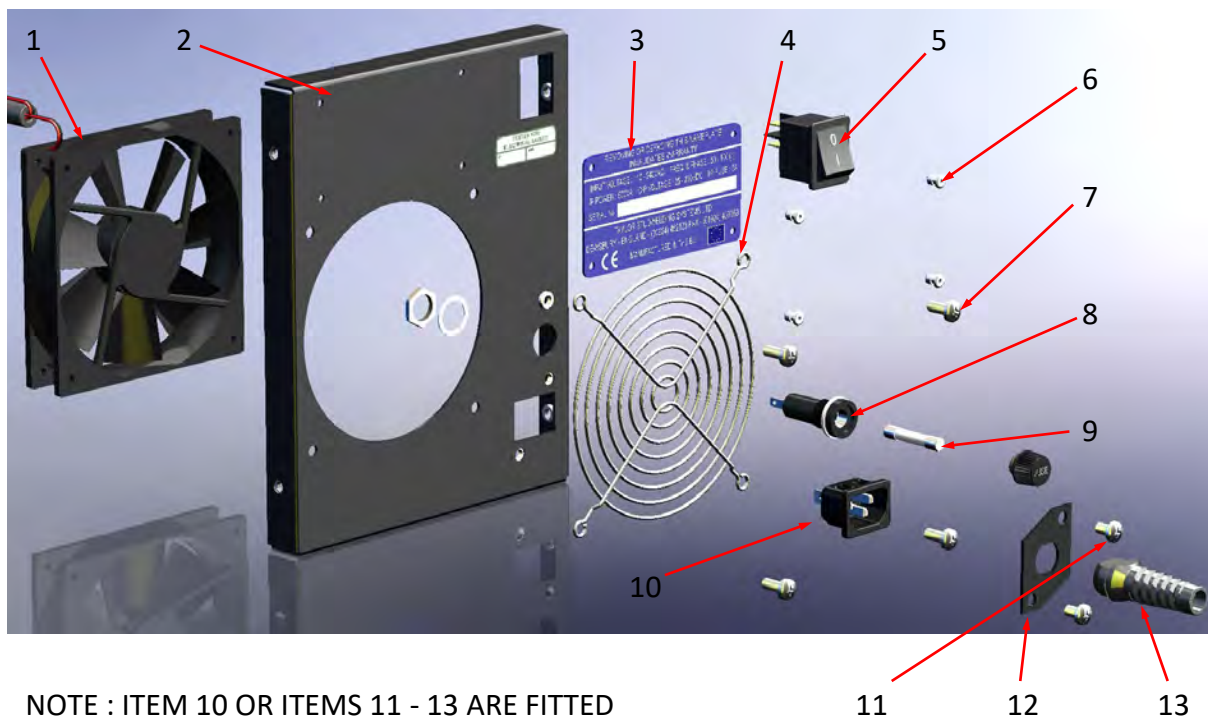


## PARTS LIST & EXPLODED DIAGRAMS



ITEM	No. OFF	PART No.	DESCRIPTION
1	1	81-104-030	KNOB
2	1	81-104-032	KNOB CAP
3	2	Z200-03-010	SCREW
4	1	70-102-025	PANEL CONTROL SOCKET
5	1	70-105-231	CONTROL PANEL OVERLAY
6	1	70-105-227	BASEPLATE
7	4	Z200-03-006	SCREW
8	4	Z610-03-000	WASHER
9	1	70-105-220	DISPLAY PCB
10	2	81-106-031	PANEL WELD SOCKET
11	1	70-105-232	SOCKET PANEL OVERLAY
12	4	70-102-002	FOOT
13	4	Z100-04-016	SCREW

## PARTS LIST & EXPLODED DIAGRAMS



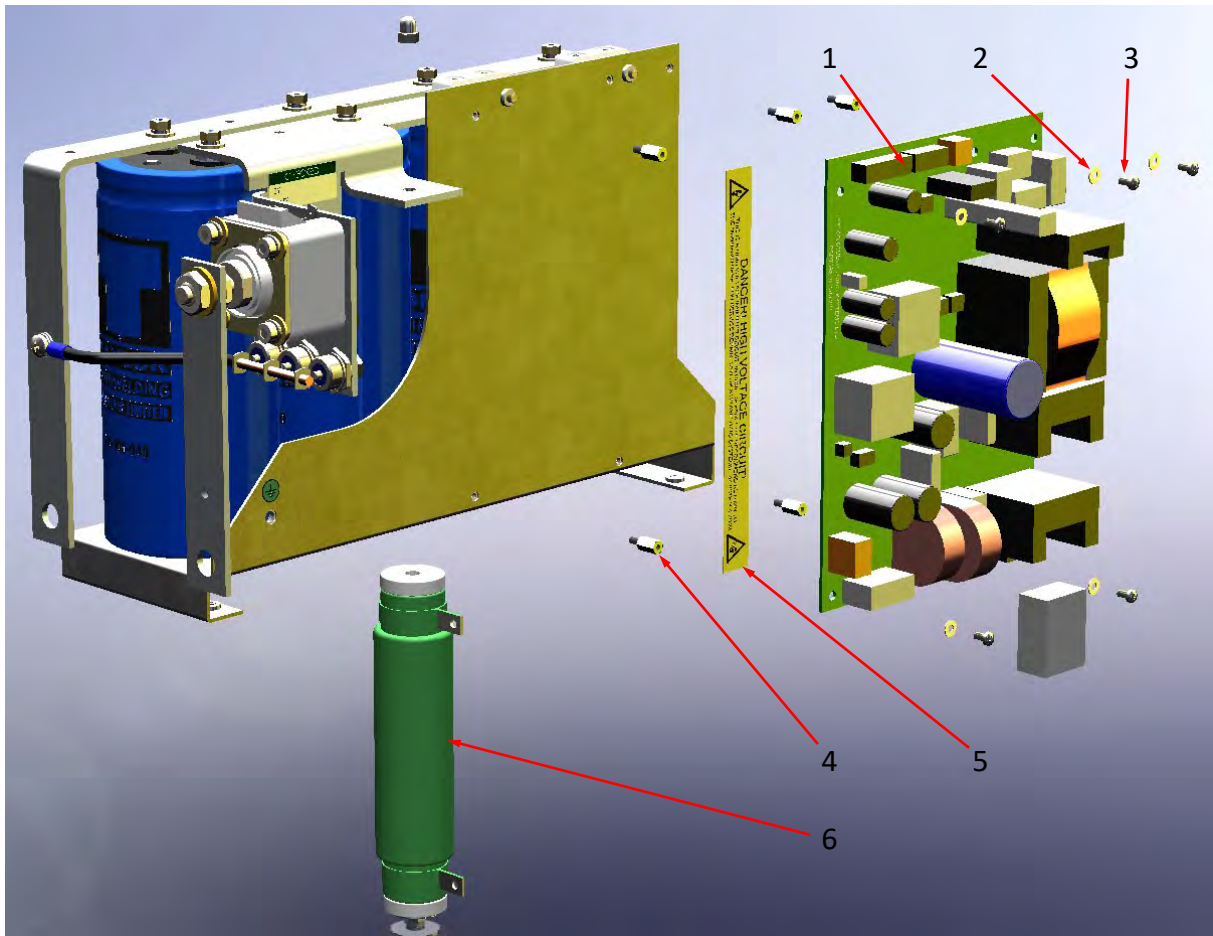
NOTE : ITEM 10 OR ITEMS 11 - 13 ARE FITTED

ITEM	No. OFF	PART No.	DESCRIPTION
1	1	70-105-294	FAN
2	1	70-105-229	BACK PANEL
3	1	70-105-142	SERIAL/RATING PLATE
4	1	70-102-018	FAN GUARD
5	1	70-105-270	ON/OFF SWITCH
6	4	Z650-03-000	RIVET
7	4	Z200-05-012	SCREW
8	1	70-102-085	FUSEHOLDER
9	1	70-105-236	FUSE
10	1	70-105-249	IEC INLET
11	2	Z200-05-008	SCREW
12	1	70-105-248	ADAPTER PLATE (OPTIONAL INSTEAD OF IEC INLET)
13	1	70-102-075	CABLE GLAND (OPTIONAL INSTEAD OF IEC INLET)

MAINS CORDSETS AVAILABLE (NOT SHOWN ABOVE)

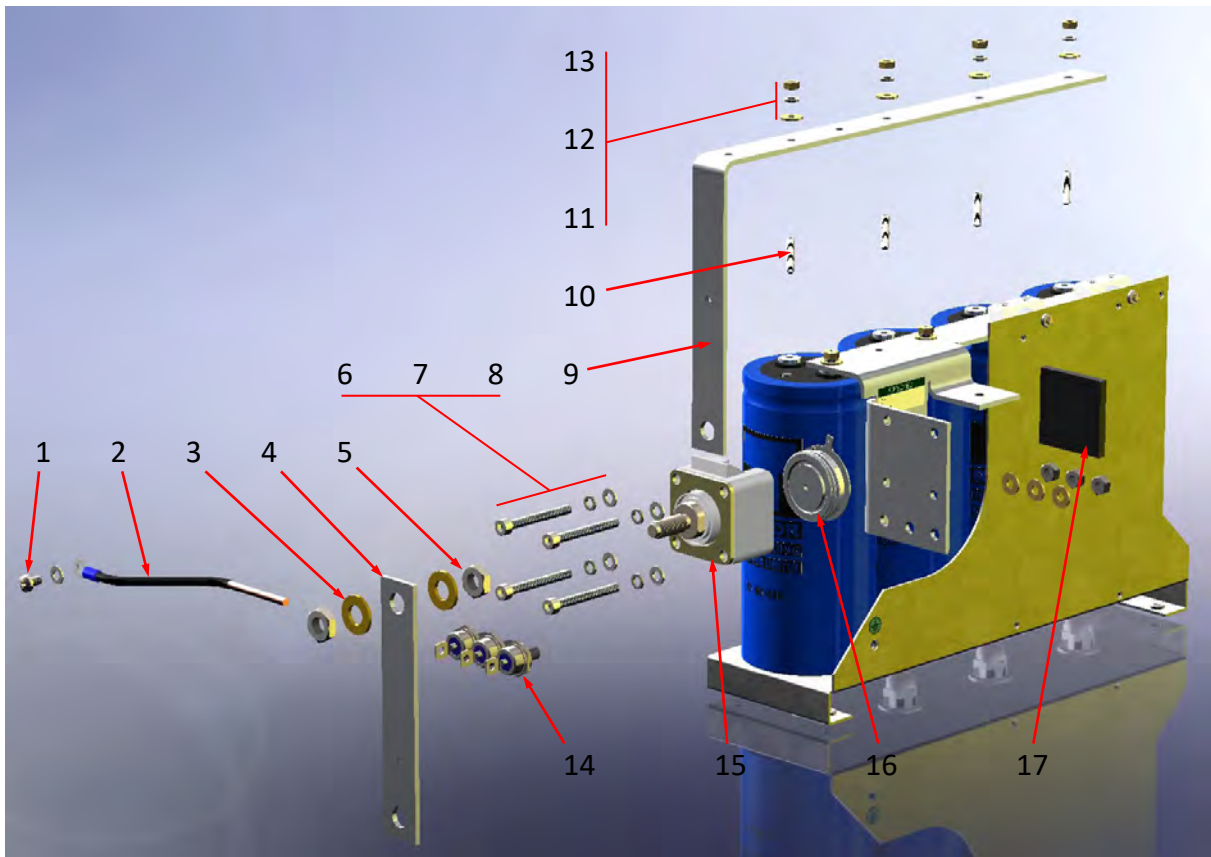
- 70-105-016 UK BS1363 PLUG TO IEC
- 70-102-017 EURO SCHUKO CEE7/7 PLUG TO IEC
- 70-105-028 UK YELLOW BS4343 PLUG TO IEC
- 70-102-044 USA NEMA GROUNDED PLUG TO IEC
- 70-102-015 UK BS1363 PLUG TO STRIPPED ENDS
- 70-102-222 EURO SCHUKO CEE7/7 PLUG TO STRIPPED ENDS

# PARTS LIST & EXPLODED DIAGRAMS



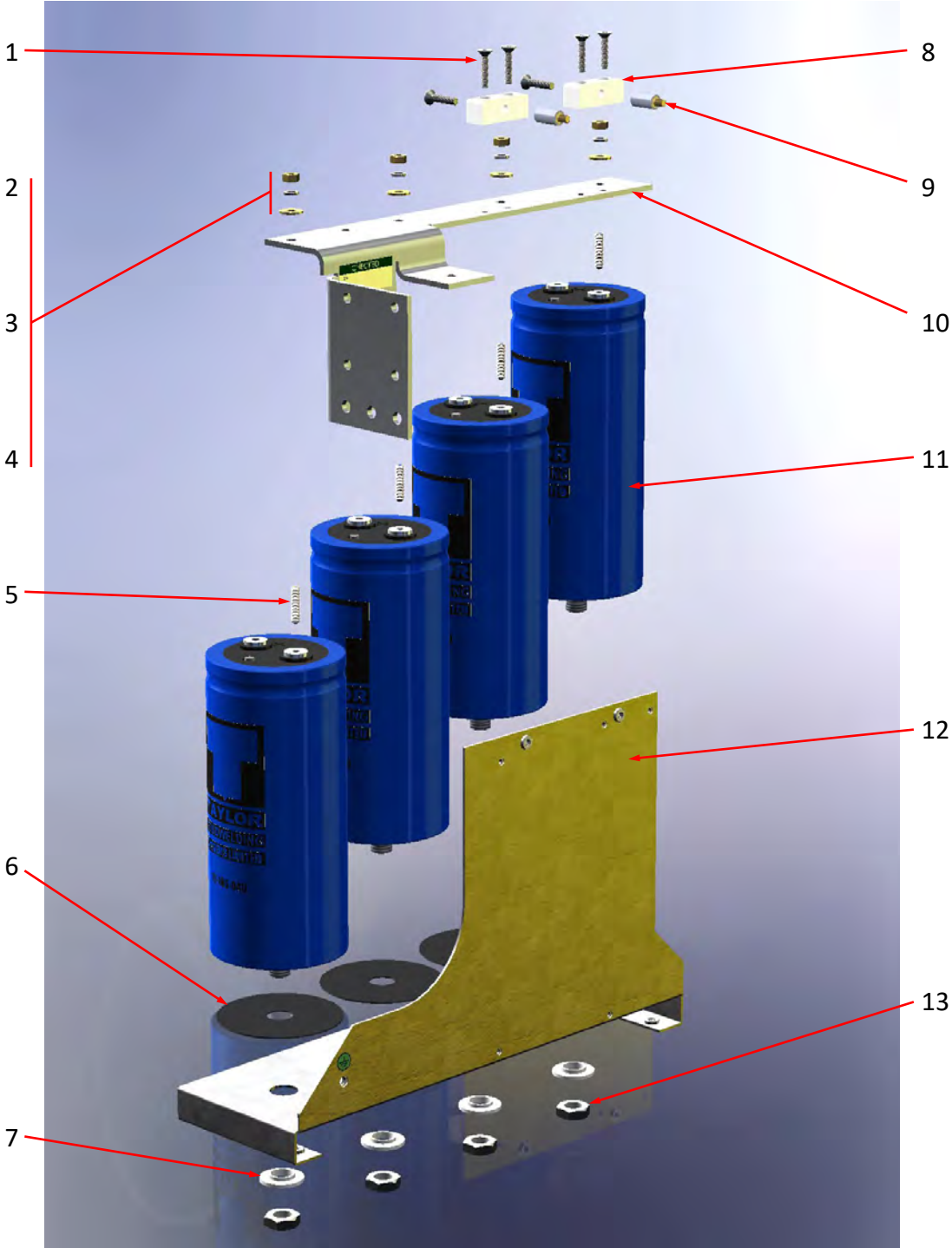
ITEM	No. OFF	PART No.	DESCRIPTION
1	1	70-105-221	MAIN PCB
2	5	Z600-03-000	WASHER
3	5	Z200-03-006	SCREW
4	5	70-105-228	MOUNTING PILLAR
5	1	70-105-226	WARNING STICKER
6	1	70-105-219	RESISTOR
7	1	70-105-245	WIRING HARNESS (NOT SHOWN)

## PARTS LIST & EXPLODED DIAGRAMS



ITEM	No. OFF	PART No.	DESCRIPTION
1	1	Z200-05-008	SCREW
2	1	NA	DIODE LEAD
3	2	Z605-10-000	WASHER
4	1	70-105-225	SOCKET LINK BAR
5	2	Z510-10-000	LOCKNUT
6	4	Z105-05-045	SCREW
7	5	Z615-05-000	SPRING WASHER
8	5	Z600-05-000	WASHER
9	1	70-105-224	POSITIVE BUSBAR
10	4	70-105-139	CAPACITOR SCREW
11	4	Z605-05-999	WASHER
12	4	Z615-05-000	SPRING WASHER
13	4	Z515-05-000	NUT
14	#	70-102-131	DIODE - # NOTE. 2 OFF IN i8, 3 OFF IN i9 & i10 MODELS
15	1	70-102-047	THYRISTOR CLAMP
16	1	70-102-046	THYRISTOR
17	1	70-106-044	CLAMP PLATE

# PARTS LIST & EXPLODED DIAGRAMS

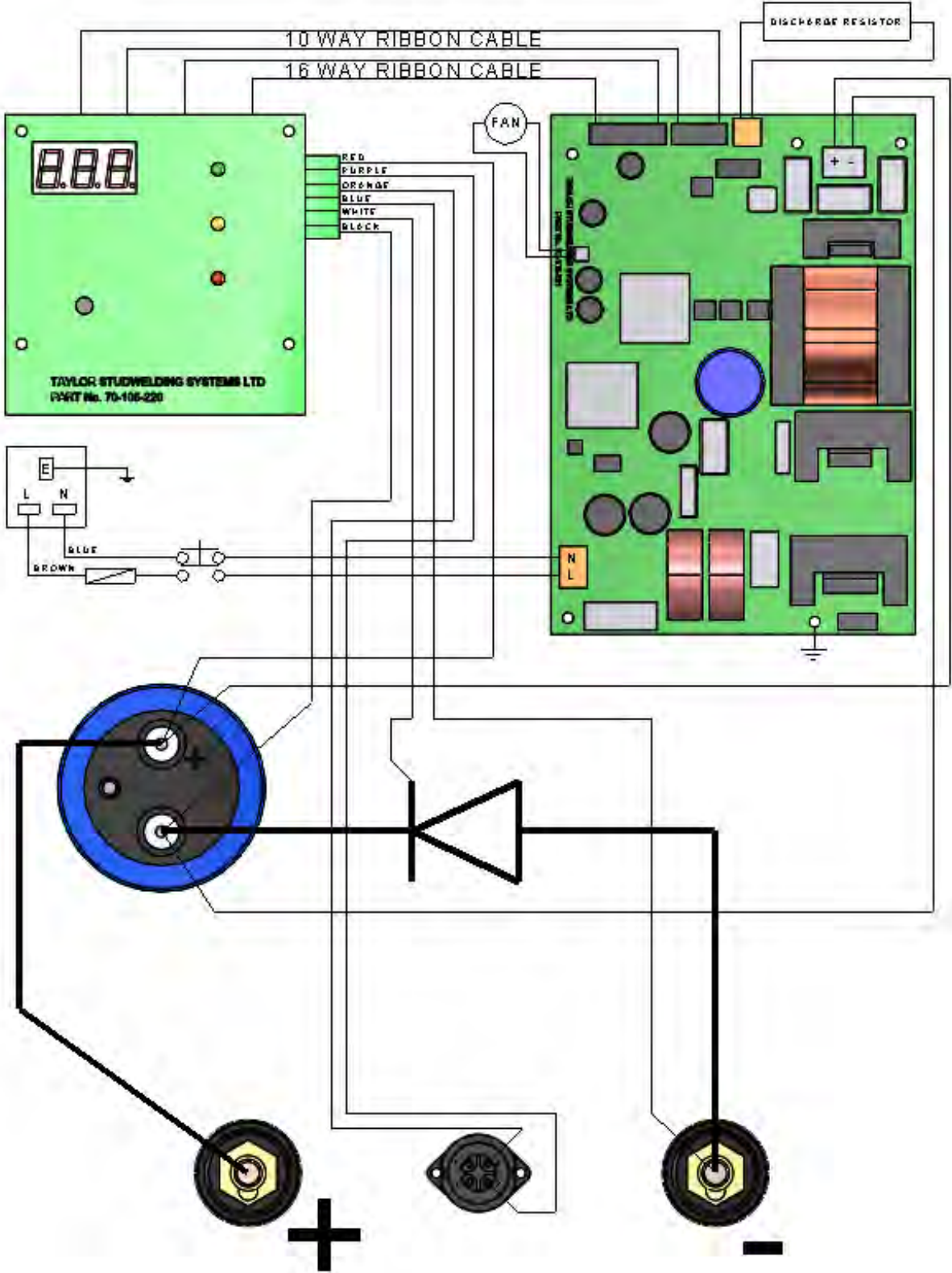


ITEM	No. OFF	PART No.	DESCRIPTION
1	6	Z205-04-016	SCREW
2	4	Z515-05-000	NUT
3	4	Z615-05-000	SPRING WASHER
4	4	Z605-05-999	WASHER
5	4	70-105-139	CAPACITOR SCREW
6	#	70-105-258	INSULATOR
7	#	70-105-259	INSULATOR

ITEM	No. OFF	PART No.	DESCRIPTION
8	2	70-105-234	INSULATED FIXING BLOCK
9	2	70-105-235	MOUNTING PILLAR
10	1	70-105-223	NEGATIVE BUSBAR
11	#	70-105-040	CAPACITOR
12	1	70-105-222	MOUNTING BRACKET
13	#	Z510-12-000	LOCKNUT

# QTY VARIES BY MODEL. i8 = 2, i9 = 3, i10 = 4

# CIRCUIT SCHEMATIC - WIRING



# EU DECLARATION OF CONFORMITY



Responsible Party Name : Taylor Studwelding Systems Ltd  
Address : Commercial Road  
Dewsbury  
West Yorkshire  
WF13 2BD  
UK

Designation of Product : Studwelding equipment CDi series types CDi8, CDi9, CDi10  
Studwelding gun series C1, C2

The above mentioned equipment complies with the requirements of the following directives :

<b>93/68/EEC</b>	<b>The CE Marking Directive</b>
<b>2014/35/EU</b>	<b>The Low Voltage Directive</b>
<b>2014/30/EU</b>	<b>The Electromagnetic Compatibility Directive</b>

The above mentioned products conform to the following European standards :

<b>EN 60974-1:2012</b>	<b>ARC WELDING EQUIPMENT - PART 1 : WELDING POWER SOURCES</b>
<b>EN60974-10:2014</b>	<b>ARC WELDING EQUIPMENT - PART 10 : ELECTROMAGNETIC COMPATIBILITY (EMC) REQUIREMENTS</b>

I hereby declare that the above mentioned equipment has been designed to comply with the relevant sections of the above referenced standards. The equipment complies with all applicable essential requirements of the above mentioned directives.

Signed.

David Taylor  
Managing Director



Authorised European Representative : **J D PEARMAN**  
**GLENN MILLERWEG 36**  
**1311 RT ALMERE**  
**NETHERLANDS**