



Operating Manual

Tradesmig 186T/191/251/253 & 313



**Please ensure that this
Instruction Manual and Parts List
is made available to the user of
the equipment**



DECLARATION OF CONFORMITY

Murex Welding Products Ltd.

Declare hereby that:

Murex Tradesmig 186T, 191, 251, 253 & 313 power sources

Part No: 1416117, 1415520, 1415522, 1415524 & 1416123

- are manufactured in accordance with the Council Directive 73/23/EEC (1973-02-19) and 89/336/EEC (1989-05-03) amended by Council Directive 93/68/EEC relating to electrical equipment designed for use within certain voltage limits.
- conform with the protection requirements of Council Directive 89/336/EEC, amended by Council Directives 91/263/EEC, 92/31/EEC and 93/68/EEC relating to electromagnetic compatibility.
- are manufactured in accordance with EN60974-1 Safety Requirements for Arc Welding Equipment
- are manufactured in accordance with EN50199 Electromagnetic Compatibility for Arc Welding Equipment.

On behalf of ESAB Group (UK) Ltd
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Waltham Cross
Herts. EN8 7RP
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A handwritten signature in black ink, appearing to read "P.G. Dodd".

P.G. Dodd
Managing Director
ESAB Group (UK) Ltd
September 2002



Contents

	Page
• Declarations of Conformity	2
• Warnings	4
• Safety	5
• Introduction	6
• Installation	7
• Welding Notes	9
• Welding Faults	10
• Technical Notes Specification	11
• Routine Maintenance	12
• Wiring Diagrams	13
• Parts Lists	17



WARNING



This welding equipment has been designed, manufactured and tested to the highest standards to ensure long and trouble free life. However, regular maintenance is an essential part of keeping the machine operating in a reliable and safe manner and your attention is drawn to any maintenance instructions that are contained in this manual.

In general, all welding equipment should be thoroughly inspected, tested and serviced at least annually. More frequent checking will be required when the equipment is heavily used.

Wear and tear, particularly in electro-mechanical and moving components, are gradual processes. Caught in time, repair costs are small and the benefits in performance, reliability and safety are significant. Left alone, they can put the equipment, and you, at risk.

Have this equipment regularly inspected and maintained by an approved service centre.



WARNING



ARC WELDING AND CUTTING CAN BE INJURIOUS TO YOURSELF AND OTHERS. TAKE PRECAUTIONS WHEN WELDING. ASK FOR YOUR EMPLOYER'S SAFETY PRACTICES WHICH SHOULD BE BASED ON MANUFACTURERS' HAZARD DATA.

ELECTRIC SHOCK – Can Kill

- Install and earth the welding unit in accordance with applicable standards.
- Do not touch live electrical parts or electrodes with bare skin, wet gloves, or wet clothing.
- Insulate yourself from earth and work.
- Ensure your working position is secure.

FUMES AND GASES – Can be Dangerous to Health

- Keep your head out of the fumes.
- Use ventilation, extraction at the arc, or both, to keep fumes and gases from your breathing zone and the general area.

ARC RAYS – Can Injure Eyes and Burn Skin

- Protect your eyes and body. Use the correct welding screen and filter lens and wear protective clothing.
- Protect bystanders with suitable screens or curtains.

NOISE– Excessive noise can damage hearing

- Protect your ears. Use ear defenders or other hearing protection.
- Warn bystanders of the risks.

**READ AND UNDERSTAND THE INSTRUCTION MANUAL
BEFORE INSTALLING OR OPERATING AND SEE WMA PUBLICATION 237
'The arc welder at work' AVAILABLE FROM THE MANUFACTURER.**

PROTECT YOURSELF AND OTHERS

SAFETY

In any arc welding or gouging operation, it is the responsibility of the user to observe certain safety rules to ensure his personal safety and to protect those working near him.









Read all safety articles relevant to arc welding published by the WMA. Pay particular attention to any CAUTION or WARNING Notes included in this manual. CAUTION indicates possible equipment damage. WARNING indicates possible hazard to life.

WARNING




*The ON/OFF switch on this equipment does not isolate the unit from the mains electrical supply. **AC POWER IS PRESENT ON THE ON/OFF SWITCH TERMINALS.***

*The On/Off lamp is an indication that the supply is switched on and does not imply that the unit is isolated from the supply. **BEFORE REMOVING THE COVERS FOR MAINTENANCE, ISOLATE THE UNIT FROM THE MAINS ELECTRICAL SUPPLY.***




1 Electrical

-  Treat electricity with respect. Even the open circuit voltage of this equipment can be dangerous. Adjustments to the torch or replacement of torch parts should be undertaken with the mains supply isolated from the unit.
- If damaged torch cables or torch components are found, the unit must be disconnected from the mains and defective parts must be replaced using only Murex spare parts.
-  Do not work on live circuits or cables. Disconnect the main power supply before checking the machine or performing any maintenance operation.
-  Be sure the case of the welding machine is properly connected to a good electrical earth.
-  Have the wiring for the welding machine installed by a qualified electrician. All connections must be made according to specifications in force and to general safety standards.
-  Do not stand in water or on damp floors while using an arc welder or cutter. Do not use in the rain.
-  Do not operate with worn or poorly connected cables. Inspect all cables frequently for insulation failure, exposed wires and loose connections.
-  Do not overload cables or continue to operate with overheating cables. Cables which are too small for the current carried will overheat, causing rapid deterioration of the insulation.
-  Pay attention that live parts of the torch do not touch any metal which is connected to the earth cable. Fix an insulated hook to hang the torch on when it is not in use.





2 Ventilation

-  Do not weld or cut on containers which have held combustible or flammable materials, or materials which give off flammable or toxic vapours when heated, without proper cleaning.
-  Locate the welding/cutting operation far enough from any vapour-type degreaser using trichlorethylene or other chlorinated hydrocarbons as solvents. The ultraviolet light from the arc can decompose these vapours into toxic gases at a considerable distance from the arc, even though the concentration of the gases is low enough to be undetectable by smell.
-  Be sure to provide adequate ventilation for removal and dilution of fume and gases. Fume exhaust facilities near the arc, or a ventilated helmet should be used when cutting in confined spaces or on toxic material.



3 Glare

-  Never look at the arc without wearing eye protection. Always use the proper protective clothing, filter glasses, and gloves. Be careful to avoid exposed skin areas. Do not use cracked or defective helmets or shields.
-  Never strike an arc when there is someone near who is not protected from the strong light of the arc.
-  Warn bystanders who are not aware of the dangers of ultra-violet light.



4 General

-  Take care when lifting the unit.
-  Ensure that cylinders are secured by chains.
-  Locate the unit so that there is adequate air flow to the ventilation louvres.
-  Always dress correctly to protect against glare, radiation and spatter.

5 Fire

-  Ensure that the correct type of fire extinguisher is available in the welding area.
-  Do not weld near flammable materials or liquids, in or near explosive atmospheres, or on pipes carrying explosive gases.

6 Vehicle Electrics

-  When working on motor vehicles, remove the battery and any circuitry which may be damaged by the arc.
-  Whilst welding be aware of the possibility of 'hidden wires' behind panels or bulkheads.

7 Warning



Switch off before accessing areas which contain moving parts. Particular care should be taken when accessing the wire feed mechanism.

INTRODUCTION

The Tradesmigs 186T, 191, 251, 253 and 313 are Transformer/Rectifier MIG/MAG welding power sources fitted with integral wire feed system. Excluding the 186T Challenger model they are capable of continuous spot and stitch welding using CO2 or Argon rich gases. The 186T provides continuous welding mode only.

A 42 volt a.c. output is available to power a CO2 heater on the 191, 251, 253 & 313 - see Fig 1.

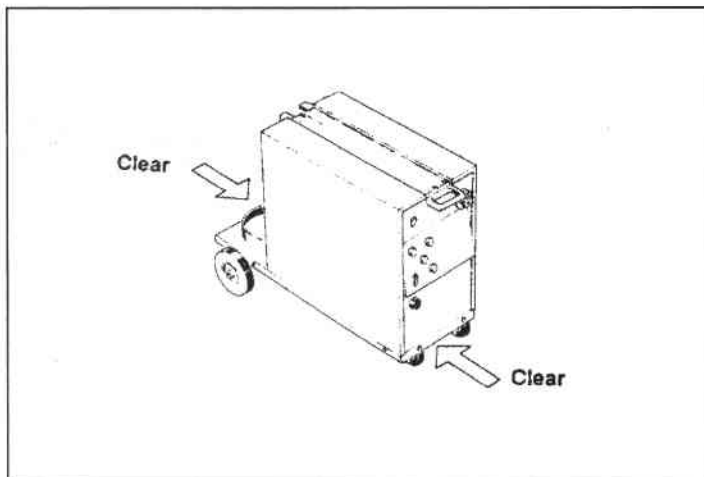
Protection against the effects of overheating is provided by thermal protection devices mounted on the transformer assembly and rectifier bridge. In the event of overheating, power to the unit is interrupted and the fault lamp is illuminated. The protective devices automatically reset when cools.

NOTE
If the fault light comes on whilst welding, do not switch off but leave the unit switched on with the fan running until the protection devices reset. If the fault persists call for technical assistance.

WARNING!
If the fault lamp lights more than once or the fault lamp lights repeatedly after resetting, isolate the unit from the mains supply (remove the supply fuses) and call for technical assistance (from your Murex Service Centre Network).

INSTALLATION

Installation must only be undertaken by qualified electrician or suitably trained person.



Place the unit so that the vents are clear of any obstruction to ventilating air.

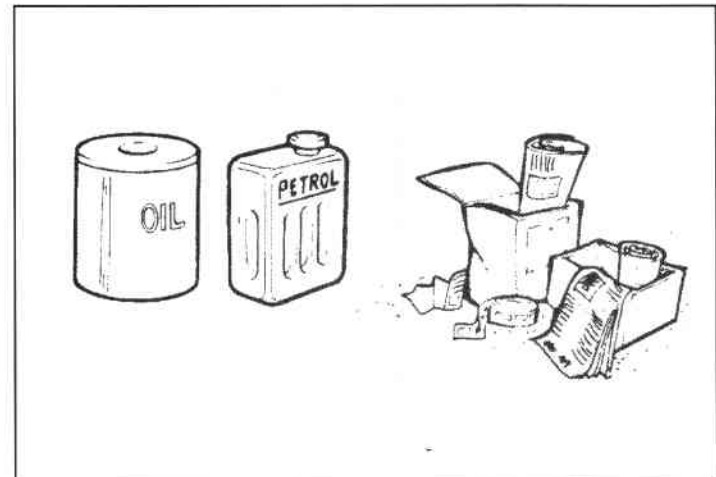
42Vac Heater Connection TM 191, 252, 253, 313.

Feed the cable through the grommet in the back panel and connect the wires to the terminal block marked 1 & 42V on the auxiliary transformer (see Fig 1).

Clamp the cable firmly in the panel mounted clamp provided.

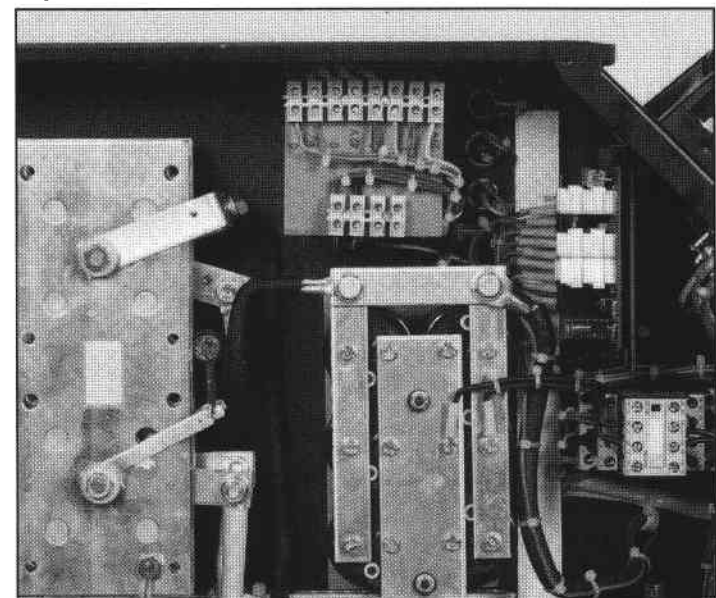
WARNING!
Installation work must be performed by a trained, competent electrician. Do not permit untrained persons to repair this equipment.

WARNING!
Be sure that all primary power to the machine has been externally disconnected. Open wall disconnect switch or circuit breaker before attempting inspection or work inside the power source.



Remove all flammable materials from the area.

Fig 1.



INSTALLATION

Initial Setting up

1. Check the ON/OFF switch is 'OFF'.

WARNING!

This switch does not isolate the unit from the mains electrical supply.

2. **Feed Roll**

Before connecting the gas supplies, ensure that the equipment is set up for the type of size of wire to be used.

3. **Work Return Lead**

Connect the work return lead between the work return socket and a clean area on the work piece.

WELDING WIRE

Fit the reel of welding wire:

1. Remove the hand nut from the hub.
2. Place the reel of wire on the hub so that the wire will be drawn off from the bottom. Ensure that the pin on the hub locates in the hole in the side of the reel. Replace hub hand nut.
3. Release the end of the wire from the side of the reel but do not allow the coils to loosen. Cut off the kinked portion and remove any sharp edges from the end of the wire. This should be done every time the wire is threaded through the equipment.
4. Release the pressure roll arm.
5. Thread the wire through the inlet guide under the feed roll and into the outlet guide, for approximately 150mm until the wire protrudes from the torch connector by approximately 50mm.

Lock down the pressure roll arm so that the welding wire is clamped into position in the groove.
6. Check that the torch lead is laid out straight and connect the torch to the adaptor, ensuring that the wire enters the liner correctly.
7. Remove the nozzle and contact tip from the torch. Using the torch switch, feed the wire through the torch. Thread a contact tip over the wire and screw it into the torch. Tighten the contact tip with the key provided.
8. Fit the nozzle.

WARNING!

The wire, contact tip and wire feed mechanism are 'live' when the torch switch is pressed.

9. Press the torch switch and check that the wire feeds smoothly from the torch.

Do not over tighten the adjusting screw.

10. Cut off the wire to protrude 10mm from the torch connector.

REPLACEMENTS AND ADJUSTMENTS

1. **Guide Tube Removal**

(a) Release the pressure roll.

(b) If the guide tube will move freely, push it forward out of the torch adaptor using a pencil or soft wooden dowel rod, then withdraw it from the torch adaptor using a pair of long nose pliers.

If the guide tube does not move freely, it may be necessary to drive it out using a hard wooden dowel or old guide tube.

NOTE

Do not use a screwdriver or metal tool to push out the tube. Use of such a tool may damage the end of the guide and impair wire feeding.

2. **Feed Roll Changing**

Remove the feed roll retaining screw. It may be necessary to give the screwdriver a sharp twist to avoid turning the motor.

Drop the pressure arm and pull off the feed roll. When replacing the feed roll, note the wire size which is stamped on the face of the roll. The required size must face outwards when the roll is refitted. Ensure that the Woodruff Key is not lost.

Fit the feed roll and lock the pressure arm. Refit the retaining screw giving it a sharp twist with the screwdriver to tighten.

3. **Feed Roll Pressure**

Correct feed roll pressure will provide smooth, uninterrupted feeding of the wire. Inspection of the wire should reveal only slight marks from the feed rolls and no deformation of the wire. Use of the correct pressure is especially important when feeding aluminium wires.

The press should be just enough to provide positive wire drive without slipping.

4. **Overrun adjustment**

Tighten or unscrew the hub tension nut in the centre of the wire reel hub until sufficient hub friction is achieved to prevent overrun.

NOTE

Do not over tighten or the wire will slip in the feed rolls.

ON/OFF SWITCH

With this switch in the ON position power is applied to the fan and control circuits

OVER TEMPERATURE INDICATOR

(see Note 1)

t₂ - 'ON' TIME CONTROL

For spot welding and 'stitch on' time (not on 186T).

t₂ - 'OFF' TIME CONTROL

For 'stitch off' time (not on 186T).

VOLTAGE SELECTOR SWITCH

WORK RETURN LEAD SOCKET



MODE SELECTOR SWITCH

Continuous/Spot/Stitch (not on 186T)

OPTIONAL DIGITAL METER KIT

(not on 186T)

WIRE FEED SPEED (CURRENT) CONTROL

Note 1

The indicator will illuminate and the power source will be inhibited if the temperature of internal components becomes excessive. Should this occur, leave the power source to idle for a few minutes to cool down, do not switch the power source off as this will remove power from the cooling fan.

CAUTION

If this indicator lamp persistently operates do not use until the power source has been checked by an approved Service Engineer.

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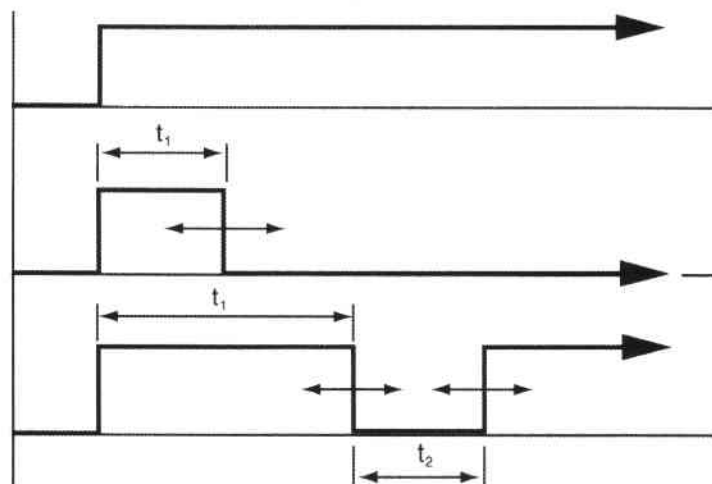
Welding Modes

(Note Spot and Stitch not available on 186T)

Continuous

Spot - t₁

Stitch - t₁ and t₂



WELDING NOTES

Continuous (Bead) Welding

Produces a continuous weld whilst the torch switch is pressed.

1. Switch the process switch to the 'Continuous' welding position (left).
2. Set the voltage and wire feed controls to the appropriate positions for the material to be welded.
3. Trim the electrode wire so that approximately 3-5mm protrudes from the contact tip.

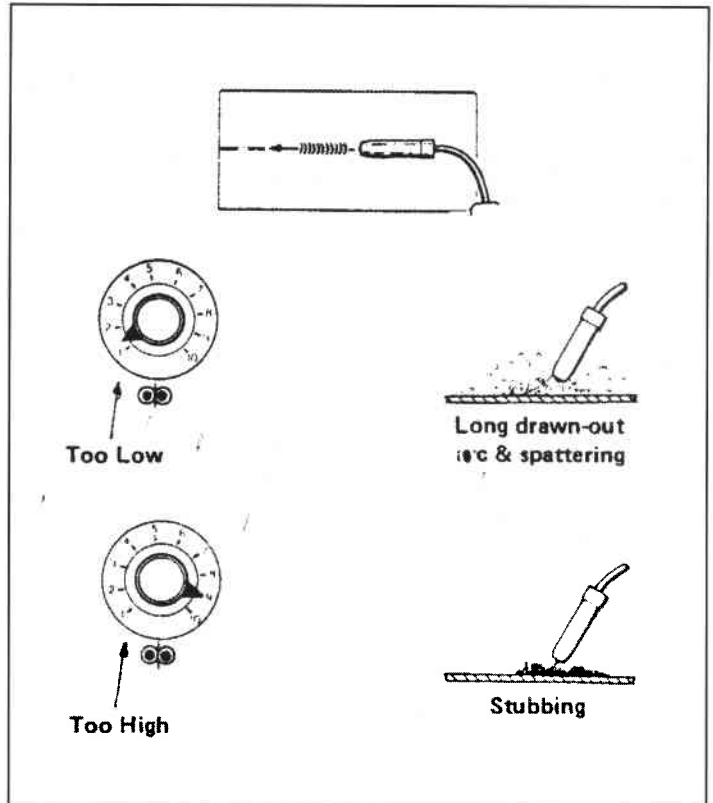
WARNING!

The wire, contact tip and wire feed mechanism are 'live' when the torch switch is pressed.

4. Position the torch over the seam to be welded as follows:
 - (a) Hold the contact tip approximately 10mm from the work surface.
 - (b) Hold the torch so that it makes an angle of approximately 70 degrees to the work surface.
 - (c) Position the torch so that the nozzle is parallel to the seam to be welded.
5. **WARN BYSTANDERS TO SHIELD THEIR EYES**
Lower your helmet.
6. Press the torch switch to strike an arc and, as the weld is deposited, push the torch slowly along the seam at a constant speed.
7. Using the wire feed speed control, adjust for a 'crisp' sounding arc.

NOTE

Low settings of wire speed feed will cause a long drawn out arc and spattering, high settings wire feed will cause stubbing.



Stitch Welding (191, 251, 253 & 313 only)

The wire feed output is switched on and off repeatedly. This produces a lower heat input which is particularly advantageous when welding thin or poor quality materials as well as bridging gaps.

1. Select 'Stitch Welding' by turning the process switch to the right-hand position.
2. Set the 't₁' and 't₂' controls to the half way setting:
Vary the time to obtain best results.
Lower on time = Lower duration of wire feed = Lower heat input.
3. Because of increased burn-back towards the contact tip during interval welding the wire 'stick out' should be held to 6mm (not 3mm).

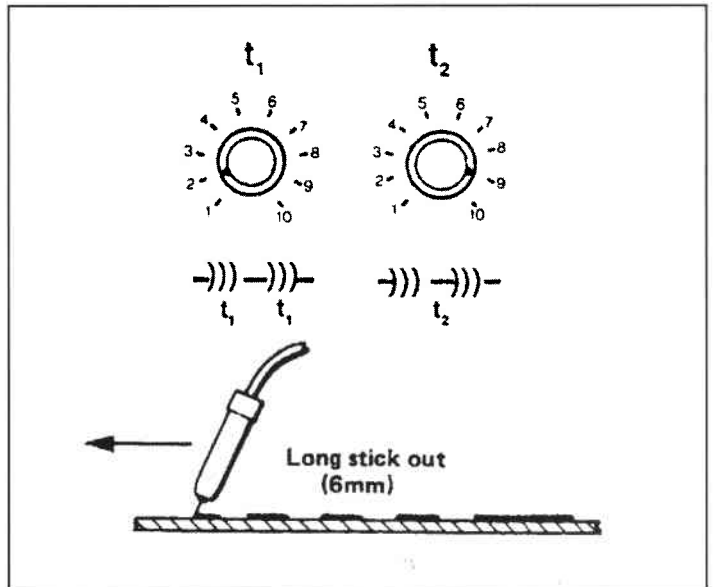
WARNING!

The wire, contact tip and wire feed mechanism are 'live' when the torch switch is pressed.

4. Press the torch switch and the welding process commences. When the 't₁' weld time has elapsed the wire feed stops, causing the welding process to cease. After the pause time (t₂), the wire feed restarts. This procedure is repeated for as long as the torch trigger remains pressed.

NOTE

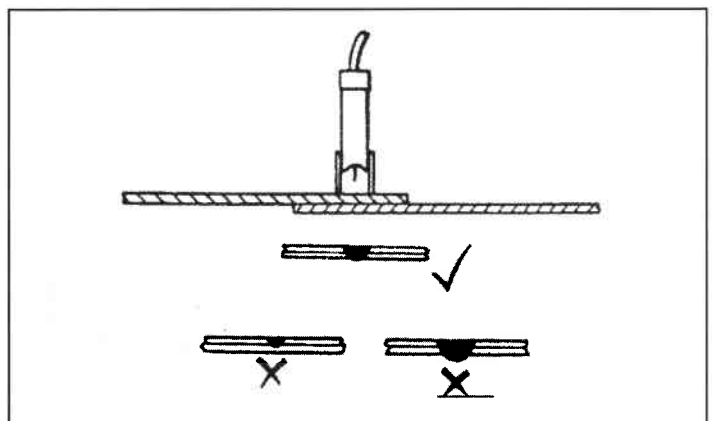
Lower settings of wire speed feed will cause a long drawn out arc and spattering, high settings of wire feed will cause stubbing.



Spot Welding (191, 251, 253 & 313 only)

A circular spot is produced each time the torch switch is pressed. The spot weld time (t₁) can be varied.

1. Select 'spot' welding by turning the process switch to the centre position.
2. Fit a spot weld nozzles to the torch.
3. Set the voltage and wire feed speed controls to near the maximum setting and carry out test welds on scrap materials as follows:
4. Position the support legs of the torch nozzle over the weld area.
5. Press the torch switch and hold the torch over the weld for a few seconds after the weld is complete. Adjust the spot weld time for best results.
6. Check for good weld penetration (small dimple showing on underside of the material).



CONTINUOUS WELDING FAULTS	
FAULT	POSSIBLE CAUSE AND REMEDY
1. Weld deposit 'stringy' and incomplete	1a Torch moved over workpiece too quickly 1b Gas mixture incorrect
2. Weld deposit too thick	2a Torch moved over workpiece too slowly 2b Welding voltage too low
3. Arc unstable, excessive spatter and weld porosity	3a Torch held too far from the workpiece 3b Rust, grease or point on workpiece 3c Insufficient shielding gas, check gas contents gauge, regulator setting and operation of gas valve
4. Wire repeatedly burns back	4a Torch held too close to the workpiece 4b Intermittent break in the welding circuit caused by: (1) Contact tip loose - tighten (2) Contact tip damaged - replace (3) Welding wire or liner corroded - replace wire or liner 4c Wire feed slipping caused by: (1) Restriction in Liner (such as kinks) or contact tip - check and replace if necessary (2) Worn feed rolls - replace (3) Outlet guide or pressure roll adjustment incorrect
5. Burning holes in the workpiece	5a Torch moved too slowly or erratically 5b Welding volts too high 5c Wire feed speed too high
6. Lack of penetration	6a Torch moved too fast 6b Welding volts too low 6c Wire feed too low

SPOT WELDING FAULTS (191, 251, 253 & 313 models only)	
FAULTS	POSSIBLE CAUSE AND REMEDY
1. Insufficient penetration	1a Spot weld time too short 1b Gap between metals to be joined too wide 1c Wrong switch position 1d Welding settings too low
2. Holes burnt through workpiece	2a Spot weld time too long 2b Gap between metals to be joined too wide 2c Weld is too close to the edge of the material 2d Weld settings too low
3. Wire sticks to contact tip or workpiece at the end of the weld	3a Burn-off time incorrect - expert assistance required since burn-back must be accurately timed
4. Wire burns back	4a Poor gas coverage 4b Burn-back time incorrect (see 3 above)

Technical Notes

SPECIFICATION

	TM186T	TM191	TM251	TM253	TM313
Input					
Nominal Voltage	240V	240V	230V	400V	400V
Phase	1	1	1	3	3
Frequency	50/60Hz	50/60Hz	50/60Hz	50/60Hz	50/60Hz
Fuse rating at supply voltage	16A	16A	30A	20A	25A
Output					
Open circuit voltage	18 - 33V	18.5 - 33.5V	19 - 37V	18.5 - 32.5V	19 - 36V
Welding range	30 - 185A	30 - 190A	40 - 250A	50 - 250A	45 - 300A
Rated output					
100% duty cycle	80A/17.5V	80A/17.5V	110A/20.5V	120A/20.0V	180A/22.7V
60% duty cycle	100A/19V	100A/19.0V	150A/21.0V	155A/22.0V	235A/25.6V
45% duty cycle	-	-	-	-	270A/27.5V
35% duty cycle	-	-	200A/24.0V	200A/24.0V	-
30% duty cycle	160A/22V	160A/22V	-	-	-
Control	8 position switched	8 position switched	12 position switched	6 position switched	12 position switched
Rating specification	EN60-974-1	EN60-974	EN60-974	EN60-974	EN60-974
Max. ambient temp.	40 deg. C	40 deg. C	40 deg. C	40 deg. C	40 deg. C
Insulation class	F and H	F and H	F and H	F and H	F
Spot weld timer	N.A.	0.5 to 2 Sec	0.5 to 2 Sec	0.5 to 2 Sec	0.5 to 2 Sec
Stitch weld timer	N.A.	0.5 to 2 Sec	0.5 to 2 Sec	0.5 to 2 Sec	0.5 to 2 Sec
Dimensions					
Height (with wheels)	686mm	686mm	686mm	686mm	686mm
Width (with wheels)	505mm	505mm	505mm	505mm	505mm
Depth (overall)	850mm	850mm	850mm	850mm	850mm
Weight (net)	75kg	75kg	105kg	100kg	130kg

ROUTINE MAINTENANCE

WARNING!

Troubleshooting work must be performed by a trained, competent electrician. Do not permit untrained persons to repair this equipment.

WARNING!

BE SURE THAT ALL PRIMARY POWER TO THE MACHINE HAS BEEN EXTERNALLY DISCONNECTED. OPEN WALL DISCONNECT SWITCH OR CIRCUIT BREAKER BEFORE ATTEMPTING INSPECTION OR WORK INSIDE THE POWER SOURCE.

The following maintenance procedure should be carried out **at least twice a year**.

1. Isolate unit from the mains supply. Remove side panels. Carefully brush away any dust which is found on the electrical parts. (If an air line is used to blow the dust off, be careful that the air jet does not force the dust into the electrical parts. Also be careful not to cause dust clouds which might harm personnel.)

WARNING!

When using an air line to remove dust, use only DRY AIR at a pressure not exceeding 2 bar, and wear a mask and goggles.

2. Check all the electrical and mechanical connections to ensure that they are tight.
3. Check connections between metal parts and earth stud.
Re-connect mains supply (be careful not to touch exposed 'live' parts).
4. Check that the contactor operates properly.
5. Check the operation of all controls. Replace the covers.
6. Check the torch at least once a day to ensure that the contact tip, nozzle and insulator are clean and in proper working order.
7. Whenever a new coil of wire has to be used, blow out the torch wire feed liner with an air line. See 'Warning'.
8. **Check each day** to see that the drive roll pressure is correct.
9. **Once each week** clean dirt and metal dust from around the drive rolls, and check that the drive roll is not excessively worn.

CAUTION

When cleaning inside the wire feed unit, be careful not to force metal dust into the electrical components as this may cause a short circuit fault to occur.

10. **At least once a month** check all connections to see that they are tight, check insulators and grommets for wear.

INSULATION AND CONTINUITY TESTS

These tests should be carried out before installation and after periods of non use.

Before carrying out these tests, ensure that the unit is isolated from the electrical mains supply.

Preparation

1. Join together the live and neutral wires which are connected to TB1.
2. Connect together the welding output SK1 and work return socket SK2.
3. Close the ON/OFF switch S1.
4. Remove the pcb assembly.
5. Disconnect the earth lead from the fan F.
6. Close the main contactor MCI/4.

Continuity

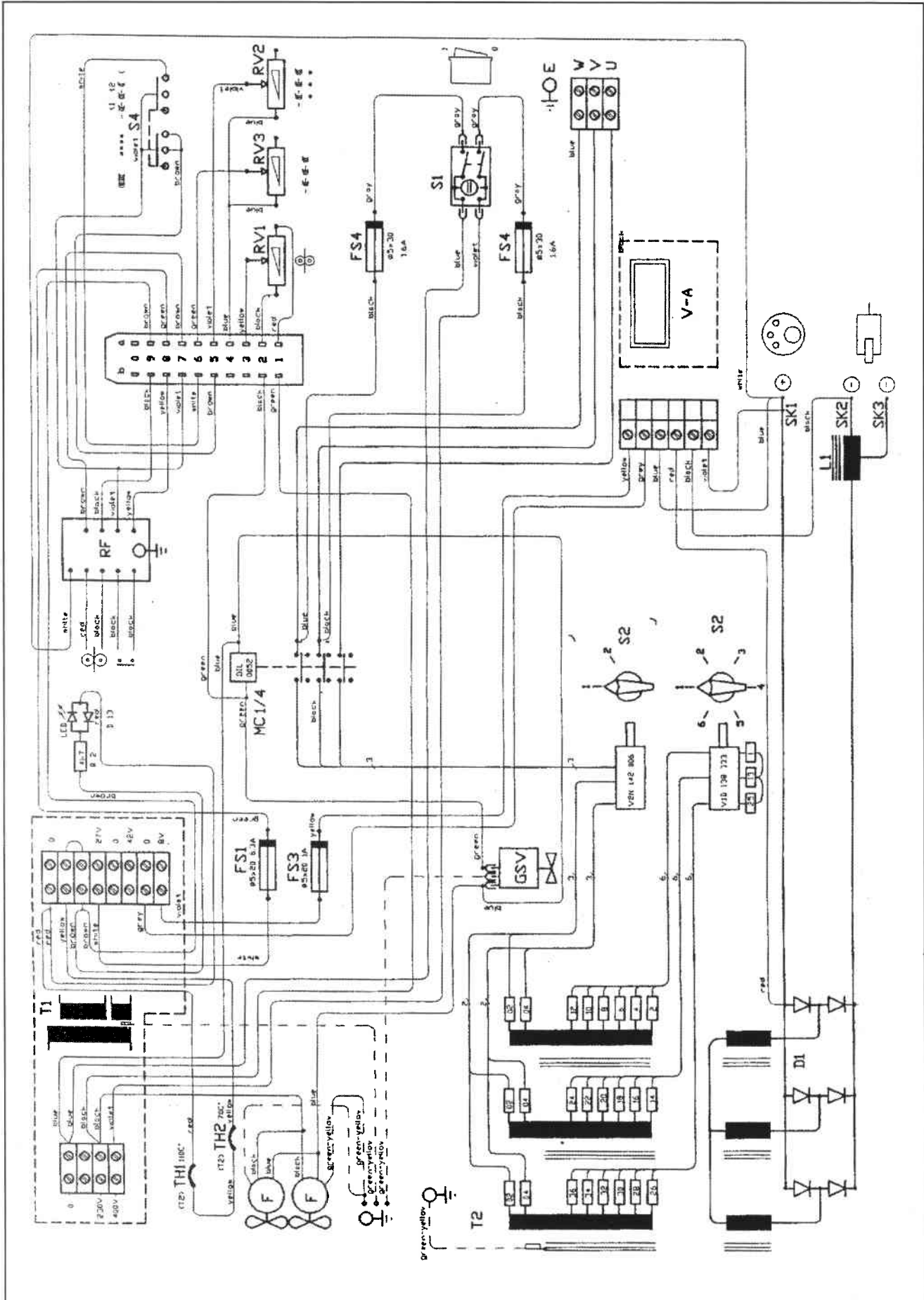
Using an ohm meter of 10,000 ohms per volt or better (eg AVO) check for continuity between the mains input cable earth wire and chassis earth points - see wiring diagrams.

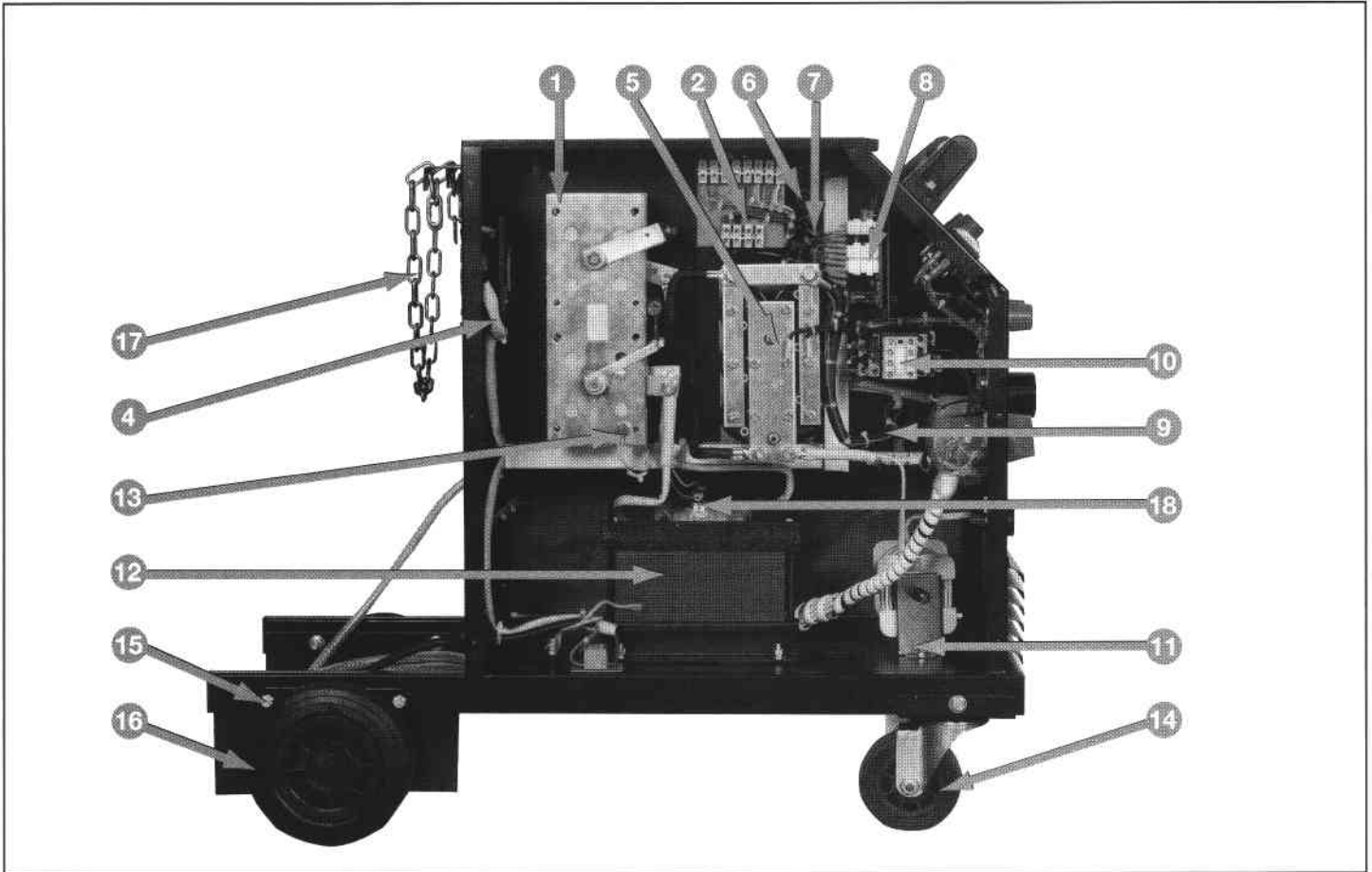
Insulation Tests

With an insulation tester (eg Megger), check for readings greater than 500K ohms between:

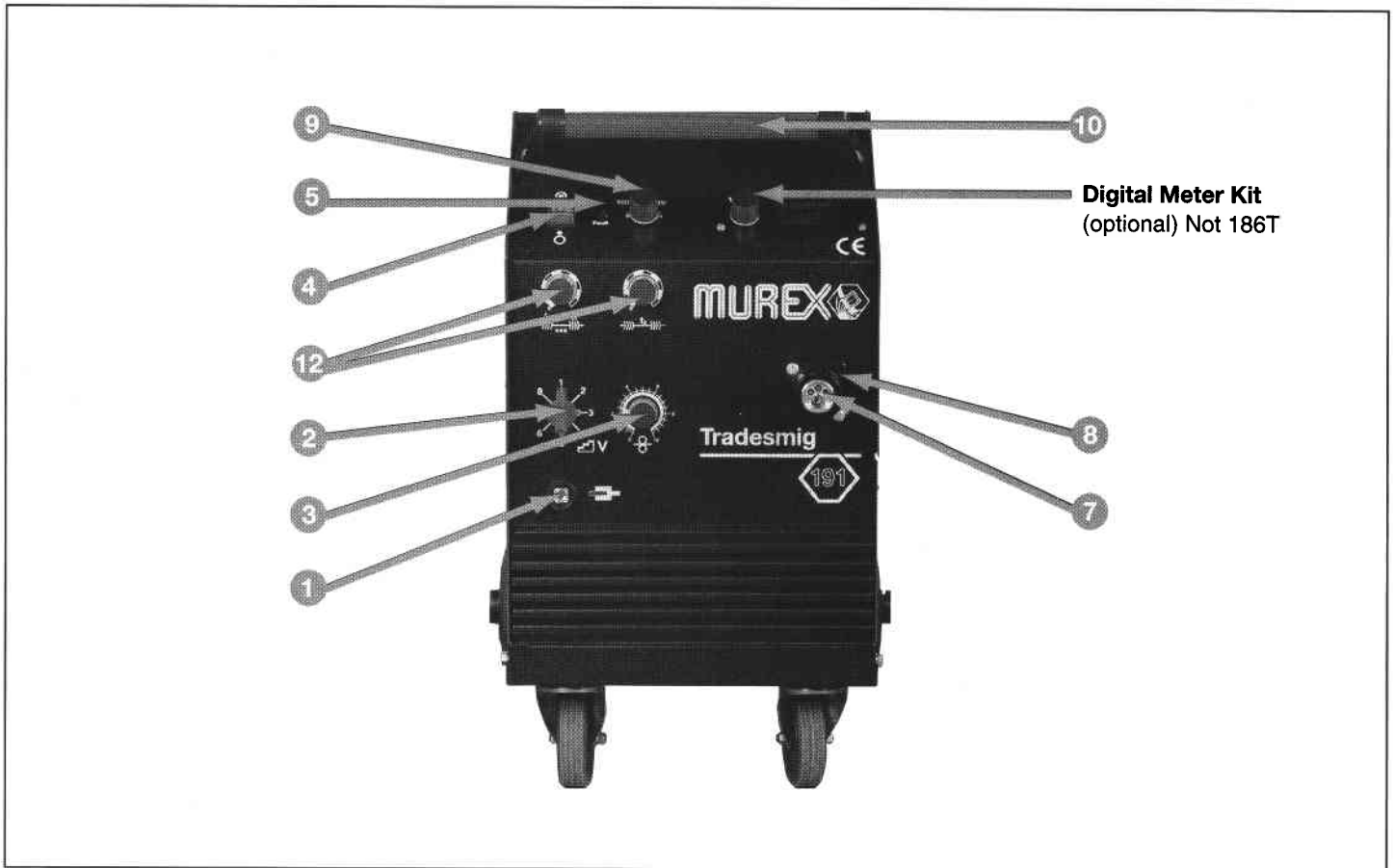
- (a) The mains input wires and output terminals
- (b) The mains input wires and A3 (fuse 2) on the pcb socket
- (c) The mains input wires and the earth wire

WIRING TRADESMIG 313

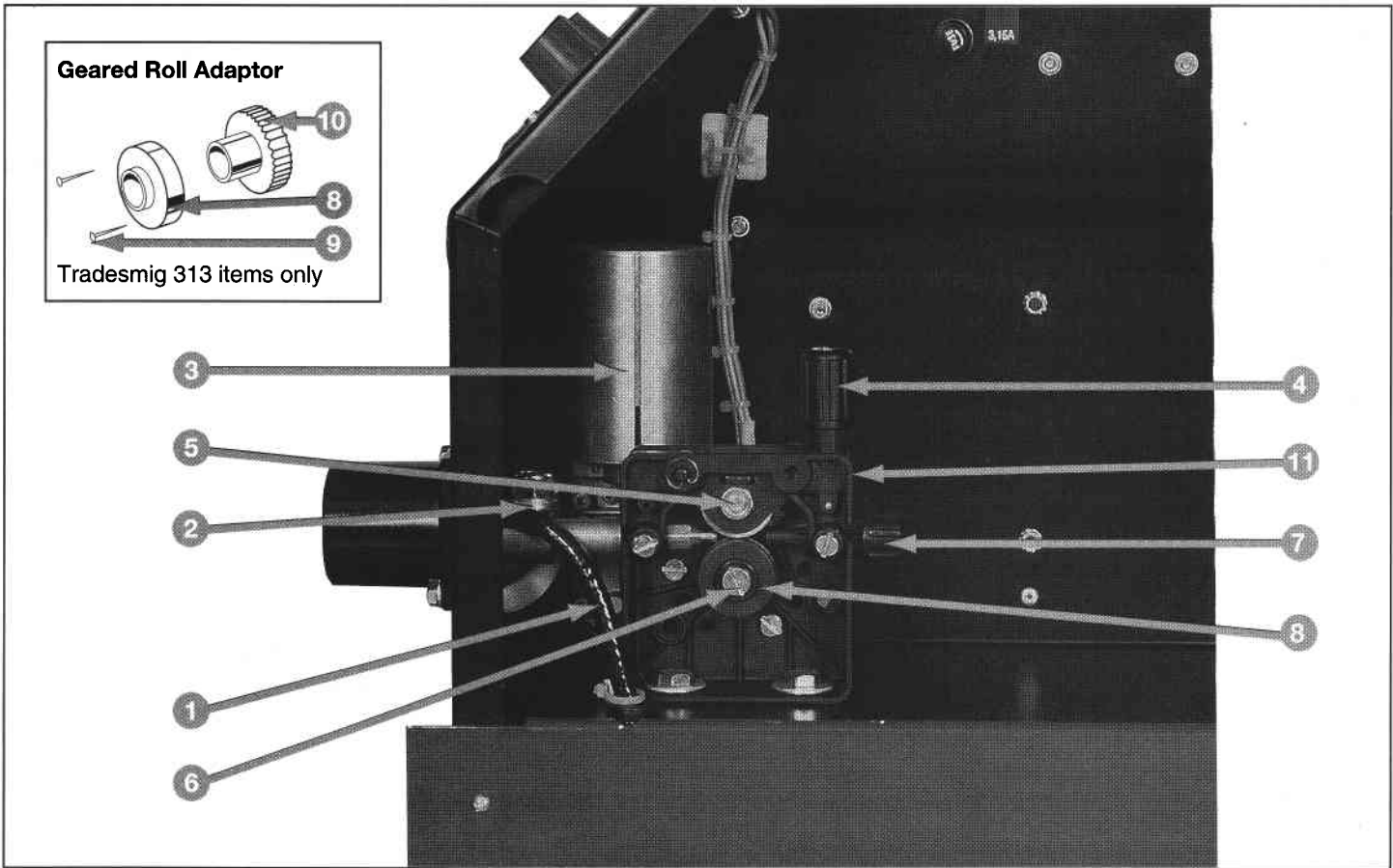




DESCRIPTION	186T	191	251	253	313
1 Diode bridge	1415531	1415531	1415532	1415533	1415534
2 Auxiliary transformer	1416132	1415528	1415528	1415557	1415557
3 Gas valve	1411464	1411464	1411464	1411464	1411464
4 Fan	1411477	1411477	1411477	1411477	1411477
5 Capacitor	1411461	1411461	1411461	-	Item 11 positioned here
6 Fuse holder 20mm	1411514	1411514	1411514	1411514	1411514
7 Fuse holder 30mm	1415559	1415559	1415559	1415559	1415559
- Fuse 1.6A 30mm	1415019	1415019	1415019	1415019	1415019
- Fuse 1A 20mm	1411490	1411490	1411490	1411490	1411490
- Fuse 3.15A 20mm	1411486	1411486	1411486	-	-
- Fuse 6.3A 20mm	-	-	-	1413466	1413466
8 Printed circuit board	1416133	1413467	1413467	1413467	1413467
9 Resistor	1413422	1413422	1413422	1413422	1413422
10 Main contactor	1415529	1415539	1415529	1415539	1415529
11 Inductor	1415541	1415540	1415541	1514442	1415543
12 Main transformer	1415536	1415535	1415536	1415537	1415538
13 Thermostat	1415558	1415558	1415558	1415558	1415558
14 Front castor tray (complete)	1415547	1415547	1415547	1415547	1415547
15 Axle assembly	1415548	1415548	1415548	1415548	1415548
16 Wheel	1413488	1413488	1413488	1413488	1413488
17 Chain	1412481	1412481	1412481	1412481	1412481
18 Thermal switch	1413463	1413463	1413463	1413463	1413463



DESCRIPTION	186T	191	251	253	313
1 DINSE Socket	17242	1404314	17242	17242	17242
- Plug for item 1	1380441	1380444	1380441	1380441	1380441
2 Switch 6 position	-	-	1411459	1411460	1415562
Switch 8 position	1413440	1413440	-	-	-
Switch 2 position	-	-	1415561	-	1413441
- Knob for item 2	1413442	1413442	1413442	1413442	1413442
3 Potentiometer	1411472	1411472	1411472	1411472	1411472
- Knob for item 3	1415545	1415545	1415545	1415545	1415545
4 Switch ON/OFF	1415556	1415556	1415556	1415556	1415556
5 Fault lamp	1413447	1413447	1413447	1413447	1413447
6 Digital Meter Kit (optional)	N/A	1415544	1415544	1415560	1415560
7 Central adaptor	1413108	1409035	1409035	1409035	1409035
8 Central adaptor shroud	N/A	1411523	1411523	1411523	1411523
9 Switch process select	N/A	1413448	1413448	1413448	1413448
10 Handle	1415546	1415546	1415546	1415546	1415546
12 Potentiometer	N/A	1413443	1413443	1413443	1413443
- Knob for item 12	N/A	1415545	1415545	1415545	1415545



DESCRIPTION	186T	191	251	253	313
1 Guide tube	1413108	1413455	1413455	1413455	1413455
2 Clamp	1413108	1413453	1413453	1413453	1413453
- Guide tube liner	1413456	1413456	1413456	1413456	1413881
3 Motor	1415007	1415530	1415530	1415530	1415530
4 Pressure device	1413897	1413897	1413897	1413897	1413897
5 Pressure arm complete	1415001	1413101	1413101	1413101	1413451
6 Feed roll retaining screw	1413104	1413104	1413104	1413104	-
- Woodruff key	1411549	1411549	1411549	1411549	1411549
7 Inlet guide	1413103	1413103	1413103	1413103	1413103
8 Feed roll 0.6 - 0.8	1411470	1411470	1411470	1411470	1409001
Feed roll 0.8 - 1.0	1411471	1411471	1411471	1411471	1413459
Feed roll 1.0 - 1.2S	1411489	1411489	1411489	1411489	1413460
9 Screws (293 only)	-	-	-	-	1414800
10 Geared adaptor (293 only)	-	-	-	-	1413452
- Reel hub assembly	1411467	1411467	1411467	1411467	1411467
- Feed roll block (complete)	-	-	-	-	1413450
11 Feed block casing	1413106	1413106	1413106	1413106	1413106



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