Castolin Eutectic®
Eutectic Castolin

**Primary transistor-switched AC/DC**
**TIG- and MMA-welding rectifier**

# CastoTIG® 2002 AC/DC


# OPERATING INSTRUCTIONS

Printed on paper bleached without chlorine for the protection of our environment.

## Contents

## General Details

Designed as a primary transistor-switched welding machine, the CastoTIG 2002 AC/DC, represents a further development of the transistor controlled welding machine. It is especially suitable for TIG-manual-, automaton- and MANUAL ELECTRODE WELDING in the AC and DC area. The machine's compact dimensions, low weight and modest power requirements are important advantages, both in the production and repair fields.

### Particular technical advantages

*(applies to both welding processes)*

- Low current consumption - big energy savings.
- High degree of efficiency due to frequency transformation and transistor technology.
- Optimum welding quality through constant current characteristics.
- Current stabilisation: The set welding current value is kept constant by means of the electronic controls regardless of the length of mains or welding cables, or of fluctuations in the mains voltage.
- Temperature of primary and secondary heat dissipators is monitored by thermostatic cut-outs, with an LED display *(Error)*.
- Thermostatically controlled fan.
- Primary over/undervoltage monitoring device with LED display ensures optimum safety *(Error)*.
- Digital voltmeter with actual value indication.
- Continuous welding current adjustment from 5 - 200A AC / 3 - 200A DC / 3 - 180 EL.
- A digital ammeter with COMMAND & ACTUAL VALUE INDICATION is fitted as standard, so that it is also possible to read off the desired welding current *(command value)* when the machine is in open circuit.
- Continuous remote-control regulation of welding current.
- Automatic remote-control unit recognition in the case of hand and pedal-operated units and of pulsed-arc and spot-welding units *(no need for internal/external switchover)*.
- Digital voltmeter with actual value indication.
- Protection class IP 23.

### TIG Welding

- Contact-free ignition with electronic ignition device *(HF)*.
- The 2-step or 4-step function sequence preselected on the machine is called up via the torch trigger and comprises: gas pre-flow, start arc, welding current rise to main current via upslope, current drop via downslope, crater-fill current and gas post-flow.
- ignition monitoring *(see p. 16)*.
- welding torches with dual button function make it possible to alter the current while welding, between the main current and the crater-fill current, without interrupting the welding operation.
- Up-Down control *(option)*.
  = steplessly welding current regulation from the torch.
- Also has contact ignition as standard.

### Manual Electrode Welding

- The HOT-START device enables the ignition process to be adjusted *(externally, via RCT DC remote control unit; internally, via program menu)*.
- Adjustment of welding characteristics possible via steplessly adjustable arc force control on the RCT DC remote control unit.

### Construction

The dimensions of the CastoTig 2002 AC/DC may be small, but the machine is sturdy enough to function reliably even under the toughest working conditions. With its powder-coated steel casing, protected control elements and bayonet locking connecting sockets, this TIG-units are designed to meet the most exacting requirements. The insulated carrying handle makes the unit easy to move around, both within the factory and e.g. out on building sites.

### Cooling

The cooling air passes through ventilating slits in the casing into the interior of the machine, where it cools inactive components in the ventilator channel before flowing out through the ventilation outlet. The ventilator channel has an important protective function, since it contains no electronic components, but serves solely to provide an optimum level of cooling. The power electronics and control components are located in the dustproof section of the machine. The following cooling cycle is automatically controlled by an electronic thermostatic cut-out system *(Fig. **1**)*.

### Functional Sequence

The voltage from the 200 - 240 V mains power supply is rectified. A rapid transistor switching device inverts this DC voltage using a frequency of 100 kHz. The welding transformer produces the required working voltage, which is rectified and fed to the output sockets. An electronic controller *(transistor inverter)* adjusts the power-source characteristic to suit the pre-selected welding process.

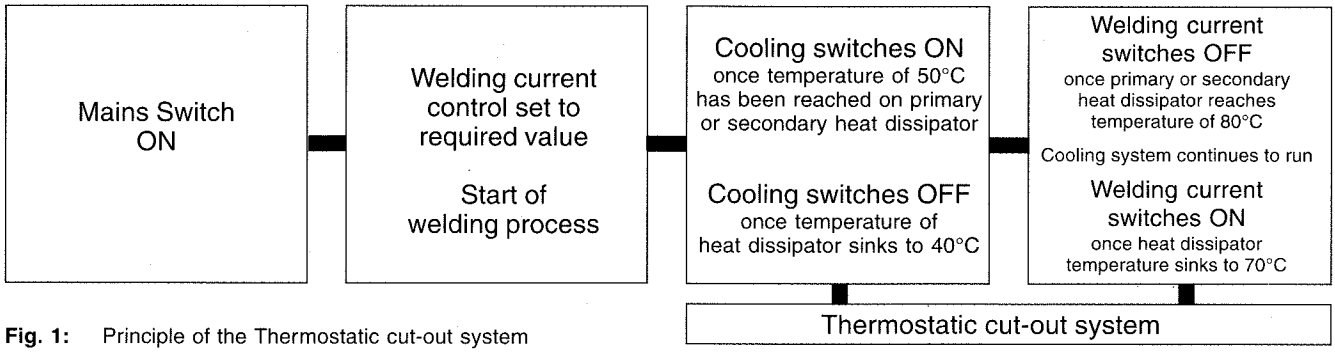



**Fig. 1:** Principle of the Thermostatic cut-out system

## General Safety Regulations

- **Before opening up any machine, always pull out the mains plug first, or otherwise ensure that the machine is "dead".**

- **Components, assemblies or other units may only be started up once they have been installed inside a shockproof housing. They must be "dead" *(i. e. without current)* while being installed.**

- **Tools may only be used on units, components or assemblies once it has been ensured that the units are disconnected from the voltage supply and that any electrical charges stored in components inside the machine have been discharged.**

- **Live cables or leads connected to units, components or assemblies must be checked regularly for signs of insulation faults or breaks.**

  **If any defect is found in the power supply lead, the unit must be withdrawn from service immediately, until the defective power lead has been replaced.**

- **Where new components and assemblies are fitted, attention must constantly be drawn to the importance of adhering strictly to the charac-teristic data for electrical quantities given in the accompanying descriptions.**

  **If the descriptions provided for the non-industrial final user do not make clear what electrical characteristic values apply to a component, advice must be sought from a qualified expert.**

### Electrical Safety Measures when Arc-welding

**Hazards from electric current**

Both mains and welding current can be hazardous. It is forbidden by law for anyone but a qualified electrician to do anything with any parts which are in contact with mains voltage. The only exception to this applies, of course, to the power plug and the mains switch. When repair or maintenance work is being carried out on the power source, the machine must first be completely disconnected from the mains. For all but the most minor jobs on the machine in the course of which the operator may have to leave the room, even if only briefly, the plug socket(s) should be clearly blocked.

**Important note for the TIG welder:**

Inside the power source is the HF ignition unit, which operates at extremely high voltages of several thousand volts. The metal housing containing the ignition device has a warning label on it which reads
**"WARNING! HIGH VOLTAGE CAN KILL!".**

This housing may only be opened by a qualified electrician - and only after the machine has been unplugged from the mains! When welding is being carried out with assisted ignition, the welding bench must be earthed.

**Protective earth conductor**

Every 3-phase power supply system will have a PE conductor. This is a non-live, earthed conductor and connected with the housing of the machine. If an earth fault occurs on the machine there is an immediate short circuit between the PE conductor and phase, causing the fuse on the corresponding phase conductor to blow, and/or tripping the fault-current breaker *(FI)*.

Both the mains and the machine supply leads should be regularly checked by a qualified electrician to ensure that the PE conductor is functioning correctly.

**Open circuit voltage**

The highest - and thus the most dangerous - voltage in the welding current circuit is the open-circuit voltage. The maximum permissible open-circuit voltages are stipulated in national and international regulations according to the type of welding current, the design of the current source and the extent of the specifically electrical danger posed to the workplace.

**Rectifier power sources**

A DC welding power source should be constructed in such a way that if there is a fault in a rectifier *(e.g. open circuit, short circuit or phase fault)*, the permissible AC values cannot be exceeded. Below, the open-circuit voltage ratings to IEC 974 *(1.1.90)* for working under normal conditions and for working under conditions of increased electrical danger:

**Working under normal conditions**

For welding jobs done under normal conditions and using simple equipment, the following open-circuit voltage ratings apply:

- for DC - peak value 113 V
- for AC - peak value 113 V, effective value 80 V

These max. voltages may be exceeded on appliances equipped with an RC circuit, so long as - with the arc unlit - the higher voltage does not occur for longer than 0.2 seconds.

Exceptions may apply in the case of fully mechanised, automatic or other special procedures. For welding current sources capable of delivering either DC or AC, the re-spective regulations apply to whichever operational mode the machine is switched to.

**Working under conditions of increased electrical danger**

Welding work in confined spaces, in cramped surroundings, on or between electrically conductive parts, in damp or hot spaces:

For welding jobs done under conditions of increased electrical danger, the following open-circuit voltage ratings apply:

- for DC - peak value 113 V,
- for AC - peak value 68 V, effective value 48 V.

An AC voltage occurring in the welding circuit may not exceed 48V. This also applies to welding rectifiers being used forwelding purposes when the equipment is used e.g. inside a boiler or tank etc. Welding rectifiers for use inside boilers, tanks and the like must always be clearly marked with the letter S *(safety)*.

### Workpiece clamp

If the electric flex of the workpiece clamp is shorter than the torch hose pack or the manual electrode cable - meaning that the clamp cannot be fixed anywhere immediately near the welding zone - then the welding current will find its own way back. It may do this via machine parts *(e.g. during repair work)*, ball-bearings, electric switches etc. This may then cause certain parts to become red-hot, make chains and steel cables snap, and even cause the PE conductor to melt through.

All this can also happen if the workpiece clamp has simply not been fastened properly, or only laid on the surface of the workpiece, in which case the course taken by the current will depend on the presence of "bridges" or angle bars and the like *(Fig. 2)*.

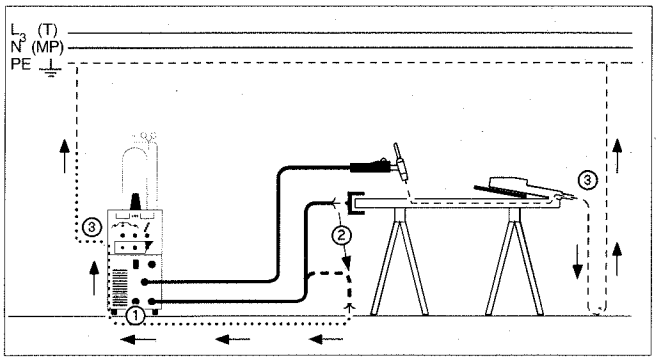



**Fig. 2:** ① Power source may never stand on electrically conductive ground!
② Connection to workpiece: NEVER like this! Use a firmly connected clamp.
③ PE conductors will be destroyed if the welding current ever has to find its own way back.

### Personal protection

- ☐ As a basic safeguard, insulating gloves should be worn on both hands when welding. These protect against electric shocks *(from the opencircuit voltage of the welding current circuit)*, harmful rays *(heat and ultraviolet rays)*, and against splashes of red-hot metal or slag.
- ☐ Solid, insulating footwear should be worn, which should also insulate the wearer in wet conditions. Ordinary shoes are not suitable as falling globules of molten metal can cause burns.
- ☐ Suitable clothing must be worn - NO synthetics!
- ☐ Do not look at the arc with unprotected eyes. Use only protective welding shields with the prescribed type of safety glass. As well as heat and light rays, which may cause dazzling or burns, the arc also gives off ultra-violet rays. These are invisible, and if the welder is insufficiently protected against them they can cause conjunctivitis, which only makes itself felt several hours later and is extremely painful. Quite apart from this, ultra-violet rays have the same effect as sun-burn on unprotected parts of the body.
- ☐ Welder´s mates or persons in the immediate vicinity of the arc must also be made aware of the danger and provided with the necessary protective apparatus; if necessary, protective screens must be erected.
- ☐ Care must always be taken to provide sufficient fresh air, especially when welding in enclosed spaces, since smoke and harmful gases are produced during the welding process.
- ☐ Containers which have been used to store gas, fuel, mineral oils or other such substances must not be welded, even if they have been standing empty for a long time, since there is a high risk of explosion from any residue.
- ☐ Special regulations apply to enclosed spaces where there is a danger of explosion.
- ☐ Welds which are exposed to heavy stresses and which have to fulfil strict safety requirements must only be performed by particularly well-trained and experienced welders. Examples include things such as pressurised containers, track rails, trailer couplings, and so on.

## Technical Data

Machine suitable for welding in confined spaces under conditions of increased electrical danger: S

| | |
|---|---|
| Mains voltage +/-10%: | 1 x 200 / 220 / 230 / 240 V, 50 - 60 Hz |
| Mains fusing 230 V: | 16 A, slow blow |
| Apparent power | |
| at 100 % duty cycle: | 2,4 kVA |
| 60 % duty cycle: | 3,3 kVA |
| 35 % duty cycle: | 5,0 kVA |
| Power factor cos φ (150 A): | 1 |
| (200 A): | 1 |
| Efficiency rate: | 82 % |
| Welding current range TIG: | 3 - 200 A DC<br>5 - 200 A AC |
| Welding current range Electr.: | 3 - 180 A |
| Welding current | |
| at 35 % duty cycle: | 200 A |
| 60 % duty cycle: | 150 A |
| 100 % duty cycle: | 120 A |
| Operating voltage Electr./TIG: | 0 - 35 V |
| Open-circuit voltage: | 45 V |
| Insulation category: | F |
| Protection class: | IP 23 |
| Type of cooling: | AF |
| Dimensions L x W x H (mm): | 570 x 270 x 380 |
| Weight: | 26 kg |

## Commisioning - General Details

**Warning: External interference caused by TIG welding when using high Frequency (HF)**

The high frequency used for contact-free ignition with AC/DC TIG welding, can interfere with the operation of insufficiently shielded computer equipment, EDP centres, industrial robots, computer-controlled processing equipment and measuring stations, even causing complete system breakdown. Also, TIG welding in residential areas may interfere with electronic telephone notworks and with radio and TV reception.

**Supply PC board, or fitting / changing the power plug, may only be carried out by a qualified technician!**

CastoTig 2002 AC/DC may be operated as standard on a mains voltage of 1 x 200 / 220 / 230 V or 240 V (+/- 10% tolerance range).Thanks to its electronic precontrol, the machine automatically adapts itself to the mains voltage supplied to it. This voltage must be in the 175 V - 265 V range (Fig. **3**).

**On machines designed for use with a special voltage, the technical Data on the machine rating plate will apply.**

**The mains plug used must correspond exactly to the mains voltage and current rating of the welding machine in question, as given in the technical Data.**

**The fuse protection for the mains lead should be suitable for the current consumption of the welding machine!**

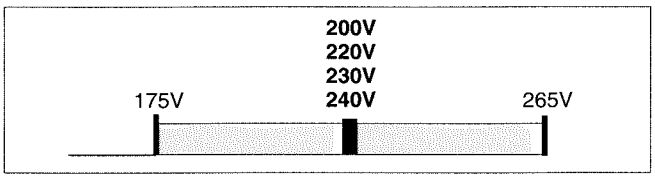



**Fig. 3:** Tolerance ranges of the mains voltages
1 x 200 V / 220 V / 230V oder 240V

## Setting-up Instructions

### Open-air operation

As indicated by its protection category, the machine may be set up and operated in the open air. However, the built-in electrical parts must be protected from direct wetting caused by e.g. external wet cleaning etc.

### Cooling air

Position the machine so that the cooling air can be drawn in freely through the louvers at the rear, and then be expelled through the front and the floor of the machine unhindered.

### Dust

Make sure that any metal dust caused by e.g. grinding work is not sucked into the machine by the cooling fan.

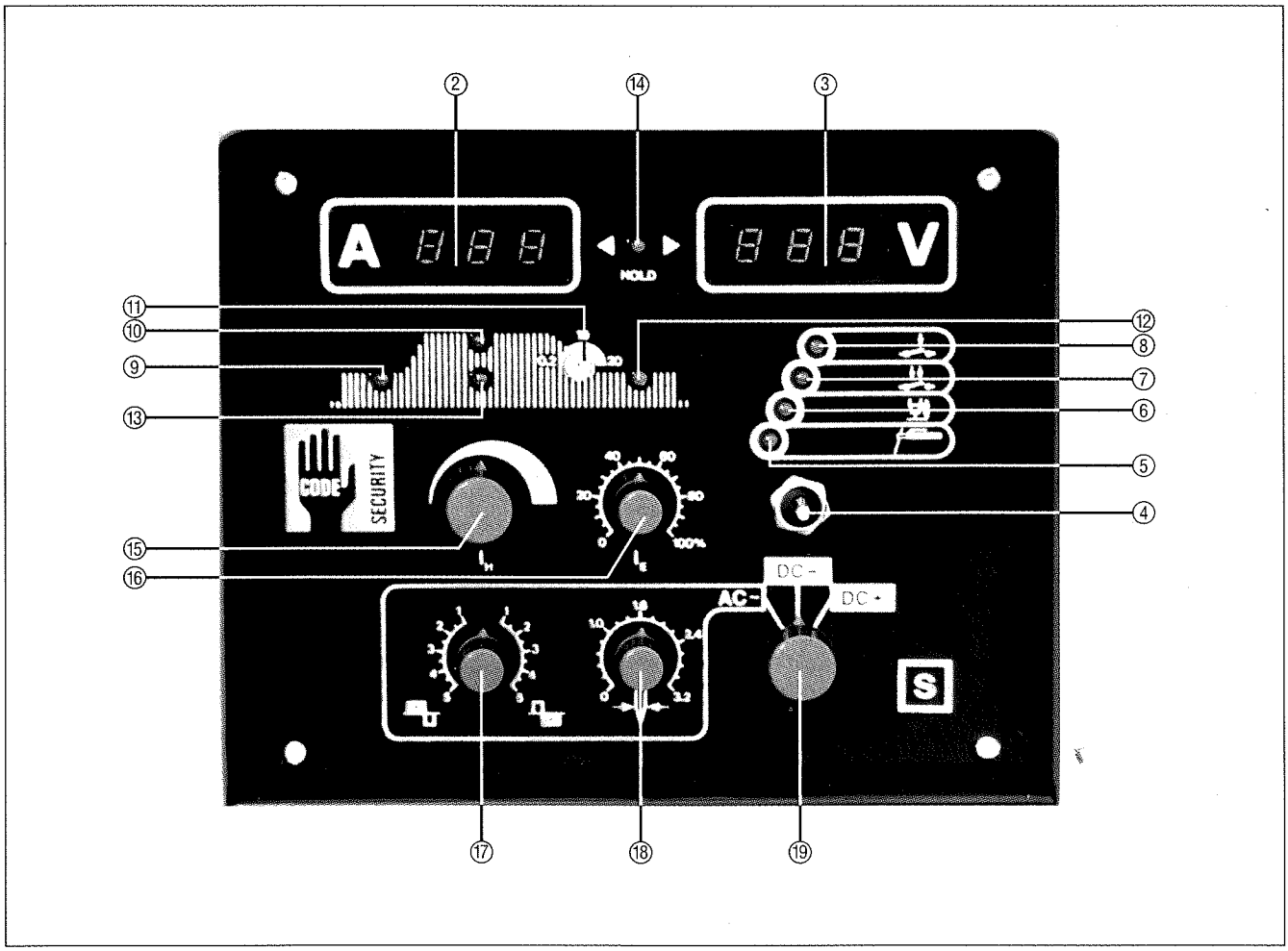



**Fig. 4:** Front view CastoTIG 2002 AC/DC

## Description of Controls

**① Mains ON/OFF switch**
At the back of the device (see Fig. **11**). After switching on, the machine needs approx. 3 sec. before it is ready for operation.

**② Digital Ammeter A**
This indicator permits precision fine adjustment of the main current.
Command value = desired welding current.
Actual value = actual welding current.
The command and actual values are compared internally by the electronic controller.

**③ Digital Voltmeter V**
The welding voltage can be read off from this indicator during welding.

**④ Function selector switch** for
a) 2-step-operation } TIG welding with
b) 4-step-operation } HF-ignition.
c) 2-step-operation } TIG welding with
d) 4-step-operation } contact ignition.
By flipping switches up or down changes from one operating mode to the next can be made.
If either of these two switch positions is selected, the machine automatically switches over to the constant-current characteristic necessary for TIG welding *(= soft arc)*. This puts the arc force control and hot-start devices out of action *(they may also no longer be influenced via the RCT DC remote control unit)*.
When the RCT P and RCT F remote-control units are used, the system switches over to the operating mode in question automatically - the respective LED indicator ⑦ or ⑧ lights up.

e) Manual electrode welding :
When this switch position is selected, the welding characteristics are governed by the values for ARC FORCE and HOT-START which are fixed in the machine itself. It is possible to influence these parameters from outside via the RCT DC remote control unit and the inert menu at function selector switch position
*(See description of RCT DC remote control unit on p. 14)*. After this operating mode has been selected, LED indicator ⑤ lights up and the digital voltmeter indicates the open-circuit voltage.

**⑤ LED-indicator for manual electrode welding:**

- Symbol is selected with the function selector switch ④.
- LED indicator ⑩ does not light up *(for main current $I_H$) (only at welding)*.
- Welding current is present in the current sockets B C.
- Welding current is either adjusted internally with the main current regulator ⑮, or via the dial ㉞ on the RCT AC remote control unit *(RCT DC is also suitable for manual electrode welding)*.

**⑥ LED-indicator for contact ignition:**

- Lights up together with either LED ⑦ or LED ⑧.
- Select via function selector switch ④.
- To ignite the arc, touch workpiece with tungsten electrode after pressing the torch trigger.
- The short-circuit current flowing when contact is made between the electrode and the workpiece corresponds to the minimum current.
- *Where to use contact ignition:*
  Whenever the HF used in contact-free ignition would cause external interference
  *(See "External Interference" on p. 6).*

**⑦ LED-indicator for 4-step-operation, variant 1**
called up via TIG torch trigger.

*Application field:*
manual or automatic welding operations in which settable parameters such as gas pre-flow, start arc, current rise time, main current, current drop time, crater fill current and gas post-flow time are the precondition for a fault-free welded join.

**Functional sequence:**

1. *Push forward the torch trigger and hold it down.*
   - Gas pre-flow time elapses.
   - Arc is ignited *(by HF or contact ignition)* with theamperage set for the start-arc current $I_S$. *(HF switches off automatically after ignition)*.
   - LED ⑨ lights up.
2. *Release the torch trigger.*
   - Over the internally pre-set time *(upslope)*, the amperage climbs until it reaches the value that has been set for the main current $I_H$ *(dial ⑮)*.
   - LED ⑩ lights up.
3. *Push forward the torch trigger and hold it down again*
   - Over the pre-set time *(downslope, dial ⑪)*, the welding amperage drops until it reaches the value that has been set for the crater-fill current $I_E$ *(dial ⑯)* = END-CRATER IS FILLED!
   - LED ⑫ lights up.
4. *Release the torch trigger.*
   - The arc goes out.
   - The gas post-flow time elapses *(this is set internally)*.

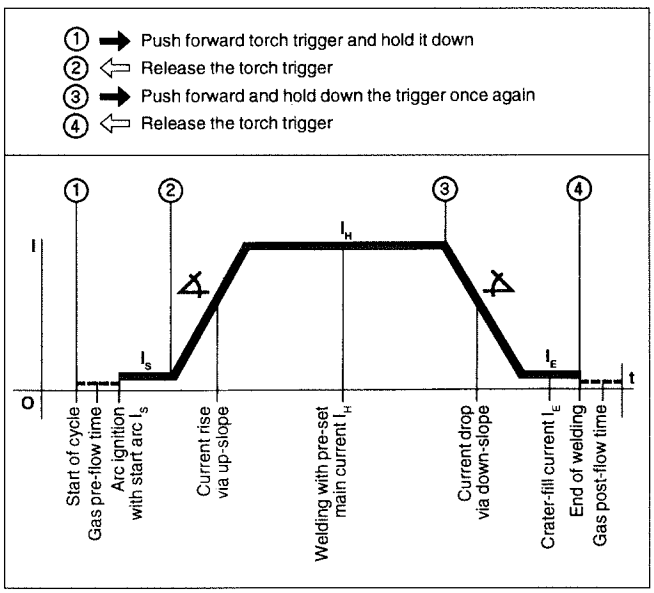



**Fig. 5:** Functional sequence in 4-step operating mode

**Description of 4-step operation, variant 2**

This variant allows the welding current to be lowered from the main current to the crater-fill current and back again, with no break in welding.

***Practical tips:***

- The functional sequence (described in Fig. **6**) is only possible in the 4-step operating mode.
- The functional sequence (described in Fig. **6**) is only possible in the 4-step operating mode.
- If the trigger is accidentally pulled back when the machine is in open circuit, no ignition is possible.

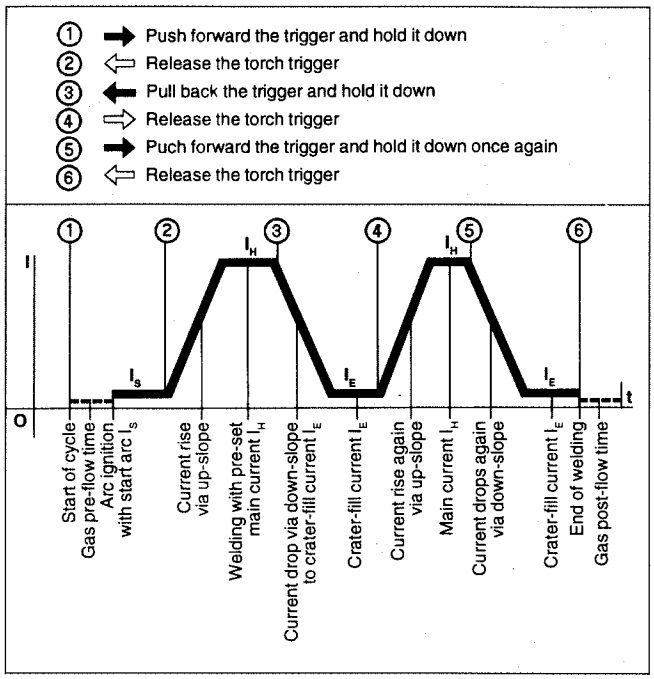



**Fig. 6:** Functional sequence in 4-step operating mode, with facility for lowering the welding current without any break in welding.

**⑧ LED indicator for 2-step operation**

called up via TIG torch trigger.

*Field of use of 2-step operation:* used mainly for tack welding.

**Functional sequence:**

1. *Push forward the torch trigger and hold it down.*
   - Gas pre-flow time elapses.
   - Arc ignites with the start arc current. *(After ignition, the HF device switches itself off automatically).*
   - After ignition, the welding current climbs via the internally pre-set upslope until it reaches the welding-current value $I_H$ selected on dial ⑮.
   - LED ⑩ lights up.
2. *Release torch trigger.*
   - Arc goes out *(with or without current drop).*
   - Gas post-flow time elapses *(this is set internally).*

   When the RCT F remote control pedal unit is used, the machine will automatically switch over to 2-step operation. *(See description of RCT F on p. 14)*

**⑪ Down-Slope** or current drop time:

For continuous adjustment of the current drop speed from the main current down to the crater-fill current $I_E$. Range: 0,2 to 20 seconds.

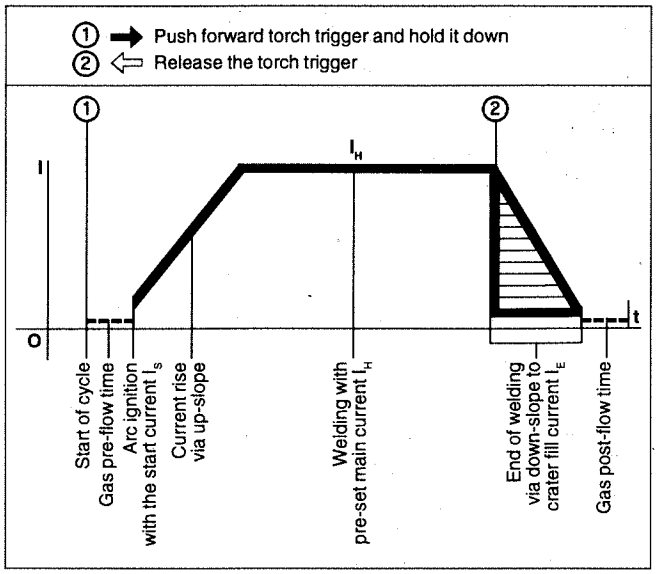



**Fig. 7:** Functional sequence in 2-step operating mode.

**⑭ LED-indicator <HOLD>**

- The HOLD function *(for storing actual values)* works in every operating mode *(except for r.c. pedal unit, pulsed-arc welding using r.c. pedal unit, and pulsed-arc welding up to 20 Hz).*
- Display lights up after actual values have been stored - i.e. the mean of the welding current and voltage values measured before the end of a welding operation is indicated by the digital displays ② and ③, and stored. *(This permits subsequent checking of the welding parameters).*

***Ways of deleting the HOLD function:***

- Switch the mains master switch ① off and back on again.
- adjust the welding current dial ⑮ during the breaks between welding.
- By shifting the function selector switch ④.
- By shifting selector switch ⑲ *(for choosing between DC+, DC- and AC~ currents).*
- Every time you start welding.
- By actuating the torch trigger between welds.

**⑮ Main current dial $I_H$ = welding current**

- For continuous adjustment of the welding current over the 3 *(or 5)* to 200 A range *(TIG)* and over the 3 - 180 A range *(electrode).*
- LED indicator ⑩ lights up.
  The digital ammeter indicates the command value for current as soon as the machine is in open circuit, and then switches over to an indication of the actual value.
  Command value = desired welding current.
  Actual value = actual welding current.

**⑯ Crater fill current: $I_E$**

- Only possible in 4-step operation.
- Is set as a %-age of the main current.
- The welding current is lowered to the crater-fill current when the torch trigger is pressed. LED control light ⑫ indicates that this is taking place, and stays lit up until the end of the pre-set crater-fill time.

⑰ **Balance dial** +□ / □−

- For influencing the positive and negative half-wave. This enables the welder to adapt to the welding problem in hand by optimizing the cleaning and penetration relationships.
- For influencing the loading of the tungsten electrode = optimization of the shape of the cap formed on the electrode tip *(Fig. **8**-c)*.
- Only functions in the AC~ range, in the ⎓ / ⎓ and ▬ positions *(dial ⑰ is automatically made in-operative when the machine is switched over to the DC range)*.

***Examples of settings:***

(Welding current is set to a given value)

a) Balance dial is in position "0" on scale;
Neutral setting.

b) Balance dial is in position "+5" on scale +□
i.e. the positive half-waves are longer than the negative ones = long cleaning phase but reduced penetration depth; increased load on tungsten electrode - cap formed on electrode tip is too large *(Fig. **8**-b)* - risk of tungsten inclusions in the welding pool due to drops being shed by the overheated electrode.

c) Balance dial is in position "-5" on scale □−
i.e. the negative half-waves are longer than the pos. ones = long penetration phase but reduced cleaning effect; tungsten electrode is underloaded *(Fig. **8**-a)* - no cap formed on electrode tip - arc not central - generally unstable.

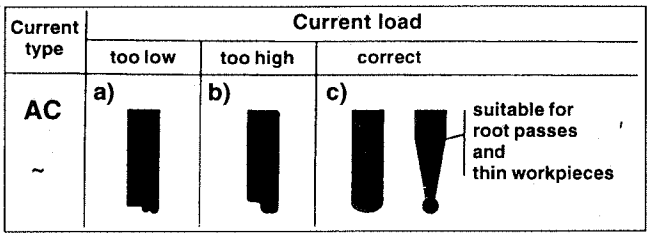



**Fig. 8:** Shapes of caps formed on tungsten electrodes subjected to different loads in the AC range.

⑱ **Adjustment dial for diameter of tungsten electrode (0 - 3,2 mm)**

a) *AC operation:*
- For automatic formation of a spherical tip to the tungsten electrode. Before starting to weld, briefly push the torch trigger forward and then initiate the welding operation. A spherical tip is then formed on the - pointed or blunt - tungsten electrode, through a programmed current/time sequence, as determined by the electrode-diameter value setbeforehand on dial ⑱.
- If the torch trigger is not pushed forward, dial ⑱ can be used to set the ignition current for the diameter of tungsten electrode in question.

b) *DC operation:*
- Adjustment dial ⑱ is only active for contact ignition, and is used to set the ignition current for the diameter of tungsten electrode in question.

⑲ **Selector switch for type of current AC~/DC- / DC+**

This is used for selecting the type of current required, and for reversing the polarity with both TIG and rod electrode manual welding.

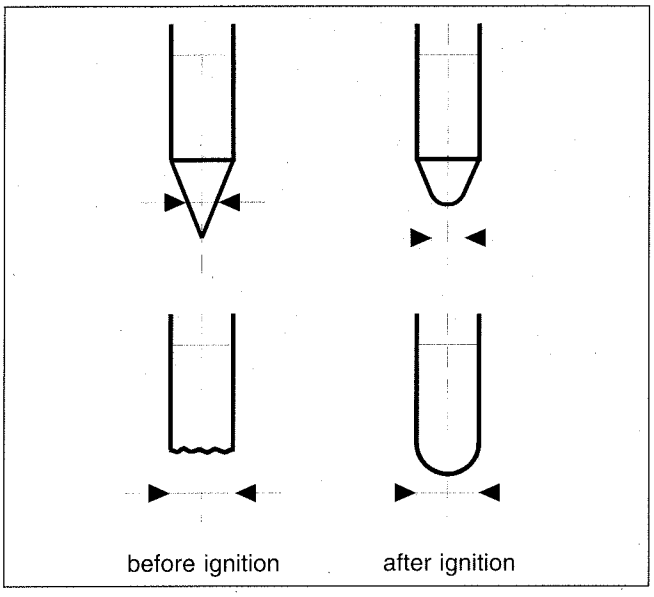



**Fig. 9:** Diagram showing formation of spherical tip

***Functional description:***

1. **DC-** : *(=> TIG welding of unalloyed, low and high alloy steels, Sn or Cu bronzes, copper etc.)*
   a) *TIG mode*
   --> LED ⑦ or ⑧ lights up.
   Minus pole is on the tungsten electrode.
   b) *Manual electode mode*
   --> LED ⑤ lights up.
   Minus pole is on the rod electrode.
2. **DC+** : *(= direct current => special TIG welding)*
   a) *TIG mode*
   --> LED ⑦ or ⑧ lights up.
   The minus pole is on the tungsten electrode.
   ***Warning:*** An electronic interlocking, fitted as standard, prevents the plus-pole from being switched to the tungsten electrode in the TIG mode, as this would overload and damage the electrode.
   b) *Manual electrode mode*
   --> LED ⑤ lights up.
   The plus pole is on the rod electrode
   *(interlocking is automatically made inoperative)*.
3. AC~ : *(= alternating current => TIG welding of aluminium and its alloys, aluminium-bronze etc.)*
   a) *TIG mode*
   --> LED ⑦ or ⑧ lights up.
   Alternating current is on the tungsten electrode.
   b) *Manual electrode mode*
   --> LED ⑤ lights up.
   Alternating current is on the rod electrode.

*The following parameters are set internally:*

- Gas pre-flow time: 0,4 sec.
- Start arc: in DC mode: 36% of $I_H$
  in AC mode: 50% of $I_H$
- Up-Slope: 1,0 sec.
- Gas post-flow time: dep. on amperage 5 - 15 sec.
- Frequency: 60 Hz

All parameters can be changed individually, (see Programming, p. 10).

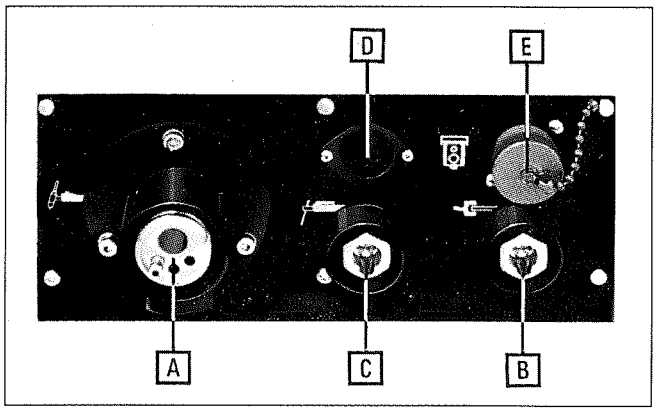



**Fig. 10:** Torch/welding-cable connection points on front of the machine

**A** **TIG torch connection (gas cooled):**
for connecting the central GAS + CURRENT supply for the welding torch.

**B** **Socket with bayonet coupling, serves:**
a) As the connection for the manual electrode cable
b) or the earth cable with manual electrode mode.

**C** **Socket with bayonet coupling, serves:**
as the connection for the manual electrode cable.

**D** **Torch control socket**
Plug in the control plug for the welding torch, and latch in place.

**E** **Connecting socket (10-pole) for remote control unit**
- Plug the remote control cable plug into the socket, the right way round, and tighten the swivel nut.
- The machine automatically recognizes that the remote control unit has been plugged in - there is no need for any internal/external switchover.
- The short-circuit-proof supply voltage to the remote control units protects the electronics against any damage to the remote control cable.
- The desired welding current is set on the remote control unit.

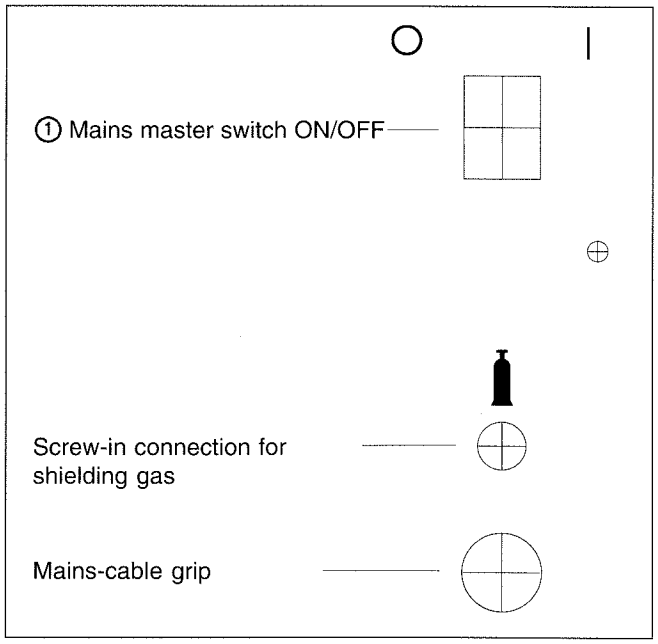



**Fig. 11:** Rear view

# Programming

## Accessing the various program levels

A concise manual for programming is available under item code 39699.

***Pre-setting level - Parameters TIG and Electrode mode:***
Press function selector switch ④, switching the machine on at the same time. As soon as 3 lines appear in the dis-play, stop pressing the selector switch ④.

***Level 1 - Service menu:***
Press function selector switch ④, switching the machine on at the same time. As soon as 3 lines appear in the displays, press the torch trigger once, keeping the selector switch ④ pressed. "P1" will appear on the ammeter ②.
--> Stop pressing the selector switch ④.

***Level 2 - Code lock:***
Proceed as for Level 1, but press the torch trigger twice. Display shows "P2". Stop pressing selector switch ④.

***Level 3 - AC-Parameters:***
Proceed as for Level 1, but press the torch trigger 3 times. Display shows "P3". Stop pressing the selector switch ④.

***Caution:*** Before you access the pre-setting level, check whether the machine is in the "TIG" or "Electrode" mode. The parameters shown will be those for the operating mode in which the machine happens to be.

## Parameters

***TIG pre-setting level:***
All parameters can be selected with function selector switch ④, and then changed with the torch trigger.

- GAS Gas pre-flow 0,2 - 20s (from program version 1.31).
- G-L Gas post-flow at $I_{min}$ 2,0 - 26s.
- G-H Gas post-flow at $I_{max}$ 2,0 - 26s.
- UPS upslope 0,2 - 7s.
- SCU Starter current *(Strart arc 10 - 100% in DC, 30 - 100% in AC).*
- PRO (Program): For storing the parameters, once these have been set, by pressing the torch trigger forward.
- FAC (Factory): For activating the preset parameters by pressing the torch trigger forward.

***Electrode pre-setting level:***
All parameters can be selected with function selector switch ④, and then changed with the torch trigger.

- Hti Hotstart time 0,2 - 2s
- HCU Hotstart current 0 - 100 %
- dYn Arcforce dynamic 0 - 100 A
- PRO (*Program*): For storing the parameters, once these have been set, by pressing the torch trigger backwards.
- FAC (*Factory*): To activate the preset parameters, press the torch trigger backwards.
- In the "Electrode AC" mode, the applicable frequency is the one set in Level 3. The waveform in "Electrode AC" is generally a square-wave one.

***Level 1:*** Service menu with various test programs.

***Level 2:*** The CastoTIG 2002 AC/DC comes with an electronic codelock.

***General:***

a) The codelock is not activated when the machines leave the factory.
b) Whenever you change the numerical combination, keep a written note of it!
c) If the wrong combination is entered 3 times in a row, the machine switches off automatically and can only be re-started by turning the mains master switch ① OFF and then ON.

***Altering the codelock and switching it on/off:***

- ☐ Access program level 2, as described above
- ☐ Enter the existing 3-digit code number: *(on new machines, this is set to "321").* Use the main current ($I_H$) dial ⑮ to enter digits from 0 - 9. Confirm each digit with selector switch ④ until your 3-digit combination is complete.
- ☐ To change the code number: Use selector switch ④ to move to each digit of the combination in turn, entering a new digit from 0 - 9 by pushing the torch trigger forward. After you have entered the new combination, use selector switch ④ to move to the "Cod ON/OFF" point. The codelock can now be switched on or off with the torch trigger. Either ON or OFF will appear on the display. Move on to "PRO" by pressing selector switch ④. When switching over to "OFF", the CODE-number is set back to 321 (as on new machines).
- ☐ PRO *(program)*: For programming the code parameters *(numerical combination plus code ON or OFF).* Push the torch trigger backwards. Now enter the new combination - this code will now be stored in the memory. Using the main current ($I_H$) dial ⑮, enter digits from 0 - 9. Confirm each digit with the selector switch ④. If a wrong combination is entered 3 times in a row, the machine switches off automatically, as described in c) above.
- ☐ CYC - No. of "on/off" cycles, after which the CODE is requested by the machine again.

***Machine start-up when codelock is activated:***

- ☐ Switch on the machine at the mains master switch ①. The display immediately shows "Cod", requesting you to enter the code-number.
- ☐ Using the $I_H$ dial ⑮, enter the combination, confirming each digit with selector switch ④.
- ☐ Once you have entered the 3-digit combination in this way, the machine is ready for use.

***Level 3:*** *(only on AC machines!)*:
All parameters can be selected with the function selector switch ④, and altered with the torch trigger.

- ☐ ACF AC frequency 40 - 100 Hz *(in "Electrode" and TIG modes).*
- ☐ POS Positive half-wave *(tri, SIN, rEC) (only in TIG mode).*
- ☐ nEG Negative half-wave *(tri, SIN, rEC) (only in TIG mode).*
- ☐ PRO *(Program)*: For storing the parameters that have been set, by pushing the torch trigger forward [tri *(=triangle)*, SIN *(=sinus)*, rEC *(=square-wave)*].

**Parameters of the pre-set Castolin program:**

| | | | |
|---|---|---|---|
| GAS | 0,4sec | Hti | 0,5s |
| G-L | 5,0sec | HCU | 50% |
| G-H | 15,0sec | dyn | 30 A |
| UPS | 1,0sec | ACF | 60Hz |
| SCU | DC 36% | POS | sin |
| | AC 50% | nEG | rEC |

## Remote Control Operation

Remote control units are intended for use in situations where the welding parameters must be set directly from the welding workplace. The remote control unit is con-nected electrically to the power source by means of special cables 5 or 10 m in length *(see also description of controls on p. 10, point* E *).*

**The following remote control units are available:**

1. ***RCT AC:*** TIG and manual electrode remote control unit *(AC).*
2. ***RCT DC:*** Manual electrode and TIG remote control unit *(DC).*
3. ***RCT P:*** TIG pulsed-arc remote control unit *(AC/DC).*
4. ***RCT F:*** TIG Remote-control pedal unit. ***N.B.:*** *The only remote control units that can be used are ones designated "RCT". Any other remote control units will not work.*

**Connecting of remote control units**

- ☐ Link the connecting socket E of the power source and the remote-control socket electrically with the remote control cable.
- ☐ Plug in the plug-in connections the right way round and screw the coupling ring on as far as possible.
- ☐ Set the function selector switch ④ in the position for the desired mode (detailed description on page 7, position ④).

## AC-Remote control unit RCT AC

Special workplace remote control unit for TIG AC welding, with an external setting facility for welding current $I_H$, AC~ balance and AC~ frequency. The down-slope still have to be set at the power source as does the preselection of 2-step or 4-step operation.

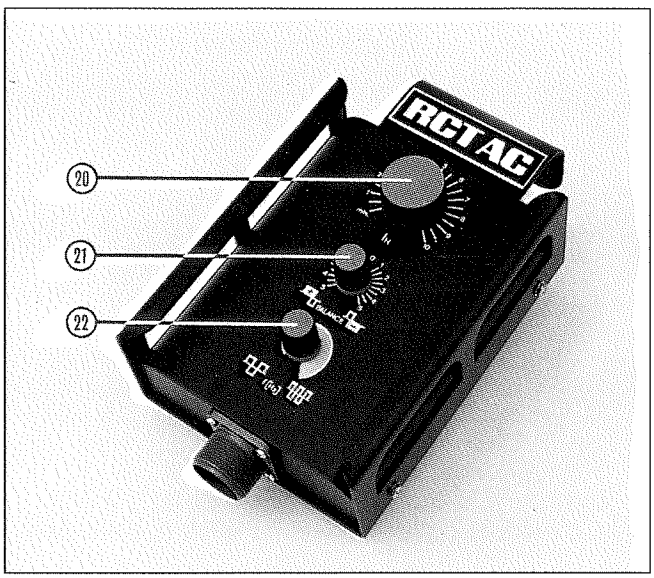



**Fig. 12**

⑳ **Main current dial $I_H$ = welding current**

- Continuous adjustment of welding current in the 5 - 200 A *(TIG)* or the 3-180 A range *(Electrode)*.
- LED indicator ⑩ lights up after actuation of torch trigger.
- The digital ammeter shows the command value for current in the AC~ or DC range even when the machine is still in open circuit.

㉑ **Balance dial**
For influencing the positive and negative half-waves in the manual-electrode and TIG AC~ ranges *(See p. 9, Pt. ⑰ for a detailed description)*.

㉒ **Adjustment dial for AC~ arc frequency** (Hz) makes possible to change the arc-concentration,

***Important:*** If the RCT AC remote control unit is used for manual electrode welding in the AC~ or DC ranges *(function selector switch ④ must be in pos. ⊣⊢)* the HOTSTART CURRENT, HOTSTART TIME and ARCFORCE DYNAMIC will be governed by the values set on the main machine.

## TIG-Remote control pulsing unit RCT P

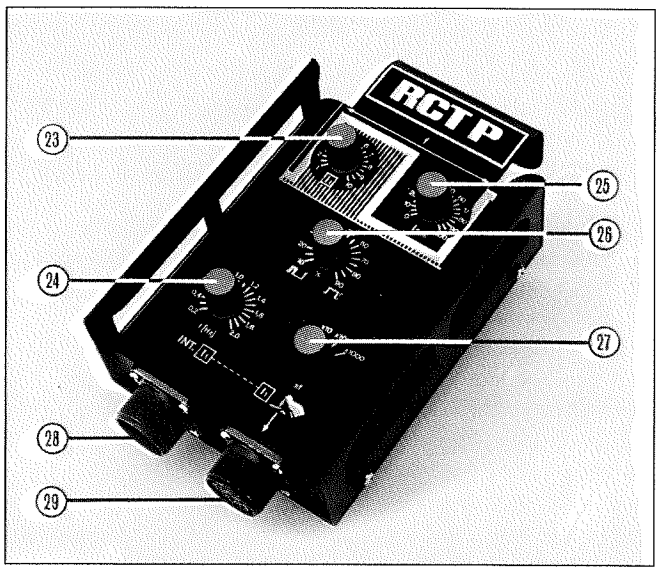



Fig. 13

***Function:*** A relatively low welding current *(background current $I_2$)* rises via a steep up-slope to a considerably higher value *(pulse current $I_1$)* and drops again after a pre-set period *(Duty-Cycle)* to the basic setting *(background current $I_2$)*, a process which repeats itself over and over again. This is only possible when a specially designed current source is used.

During the welding process, small sections of the weld zone melt and solidify quickly. Welding a seam using this method is thus considerably easier to control than if a large welding pool were to from. This technique is also used when welding thin sheet metal. Each fusion point overlaps the next, thus forming a neat and regular seam. When the TIG pulsing technique is used when welding by hand, the welding rod is applied at each current peak. *(Only possible in the lowest frequency range, i.e. 0,25 - 5 Hz)*.

Higher pulse frequencies are generally used in automatic welding applications and serve mainly to stabilize the welding arc.

With the standard RCT P remote control pulsing unit two operational modes are possible:

1. *Regulation of impulse current $I_1$*
   by MANUAL operation of the RCT P remote control unit (INT.)
2. *Adjustment of impulse current $I_1$*
   by means of the RCT F remote control pedal unit.

㉓ **Pulsing current dial $I_1$ (main current)**
For continuous adjustment of the pulsing / main current in the 3 to 200 A range.

㉔ **Puls frequency dial f (Hz)**
For continuous adjustment of the pulse frequency, depending on which frequency range has been preselected by switch ㉗.

㉕ **Background current dial $I_2$**
The setting for the background current is made as a percentage of the value set for the pulsing current $I_1$.

㉖ **Duty Cycle dial %**
(Setting dial for pulse / interval relationship).
This dial is for setting the relationship, in percentage terms, between the pulsing current phase and the background current phase.

***1. Setting-example:***

Duty cycle dial ㉖ is in scale position 10, ⊓⊔
i.e. short pulsing current phase of 10 %, and long background current phase of 90 % - means low degree of heat impact *(Assuming that certain welding parameters are set)*.

***2. Setting-example:*** *(Fig. **14**)*

i.e. pulsing current phase and background current phase are equally long *(each 50 %)* - means medium degree of heat impact *(Assuming no change in the welding parameters that are set)*.

***3. Setting-example:***

Duty cycle dial ㉖ is in scale position 90, ⊓⊔
i.e. long pulsing current phase of 90 %, and short background current phase of 10 % - means high degree of heat impact *(assuming no change in the welding parameters that are set)*.

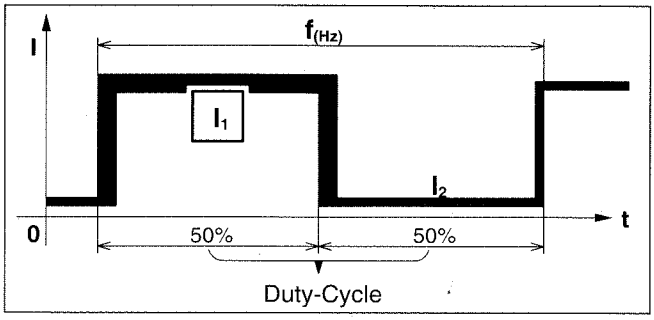



Fig. 14

**㉗ Frequency range switch**
Setting of frequency range:
0,2 - 2 Hz, 2 - 20 Hz, 20 - 200 Hz, 200 - 2000 Hz.

***Functional description:***

- Functional sequence possible in 2-step and 4-step operating mode.
- LED indicator ⑬ blinks up on the power source.
- Set desired operating mode with function selector switch ④.
- The appropriate LED-indicator ⑤, ⑥, ⑦ or ⑧ lights up.
- Pre-select the frequency range *(0.2 - 2 Hz, 2 - 20 Hz, 20 - 200 Hz, 200 - 2000 Hz)* with the range switch ㉗.
- The pulsing current $I_1$ is set continuously *(between "Min." and "Max.")* with setting dial ㉓.
- The setting for the background current $I_2$ is made as a percentage of the pulsing current $I_1$, with setting dial ㉕.
- To select the duty cycle *(= the relationship of pulsing current $I_1$ to background current $I_2$ in %, the frequency remaining constant)*, use dial ㉖.
- Set pulse frequency dial ㉔ to the desired value.
- The mean welding-current amperage is indicated on display A.
- The down slope parameter is set directly on the power source. In the 4-step operating mode, the pulse phase begins as soon as the operator re leases the torch trigger in the up slope. As can be seen in Fig. **15**, pulsing also takes place in the down slope.

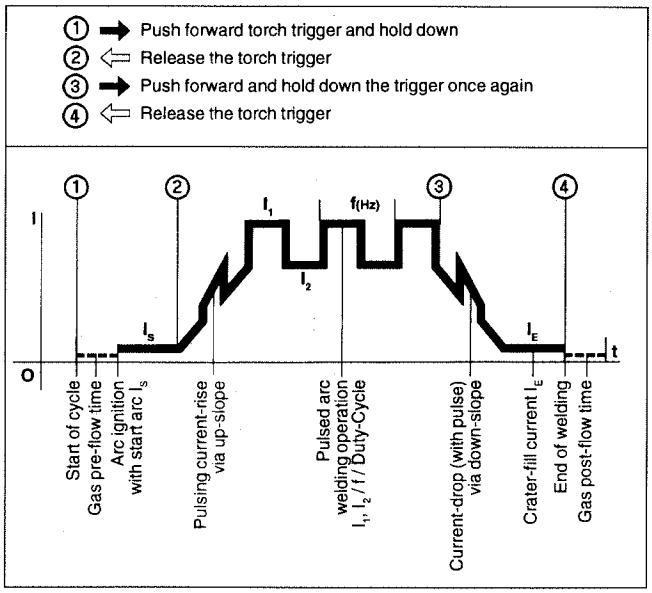



**Fig. 15:** Functional sequence in pulsed-arc welding operation using RCT P (4-step)

**Practical hint**
Castolin double function welding torches have the facility for lowering the current from main to crater-fill current and back without interrupting the welding sequence in pulsed-arc operating mode as well.
For details of the functional sequence, see "Description of 4-step operation / variant 2" *(page 8, Fig. **6**)*.

**Description of operating mode -**
**Regulation of pulse current $I_1$ using RCT Remote-control pedal unit**
A combination of the REMOTE CONTROL PULSING UNIT and the REMOTE CONTROL PEDAL UNIT is particularly advantageous with manual TIG welding in cases where it is necessary to alter the welding pulse current during the welding operation. *(i.e. where the welder is dealing with materials of different strengths).*

**Connecting the remote control unit:**

- Link the connecting socket [E] on the power source and the socket ㉘ on the remote-control pulsing unit electrically with the remote control cable.
- A remote control cable of the same type may be used for linking the remote-control pulsing unit *(socket ㉙)* to the remote control pedal unit *(socket ㉚)*.
- Plug in the plug-in connections the right way round, and screw the coupling ring on as far as possible.

***Functional description:***

- When the RCT F remote-control pedal unit is connected, the machine automatically switches over to 2-step operation.
- LED indicator ⑬ blinks up on the power source.
- Set desired operating mode with function selector switch ④.
- The appropriate LED indicator ⑤, ⑥ or ⑧ lights up - operating mode electrode *(LED indicator ⑤)* is possible.
- The mean welding-current amperage is indicated on display A - No "Hold" function.
- To initiate the ignition process, gently step on the pedal.
- The level of the start arc current, the pulse current $I_1$ and the final crater current can also be controlled from the pedal.
- The base current $I_2$ that is set using the dial on the TR 50mc is a constant percentage of the value of the pulse current $I_1$.
- When the welder takes his foot right off the pedal, the welding current is switched off, thus interrupting the welding operation.
- Gas post-flow time elapses.

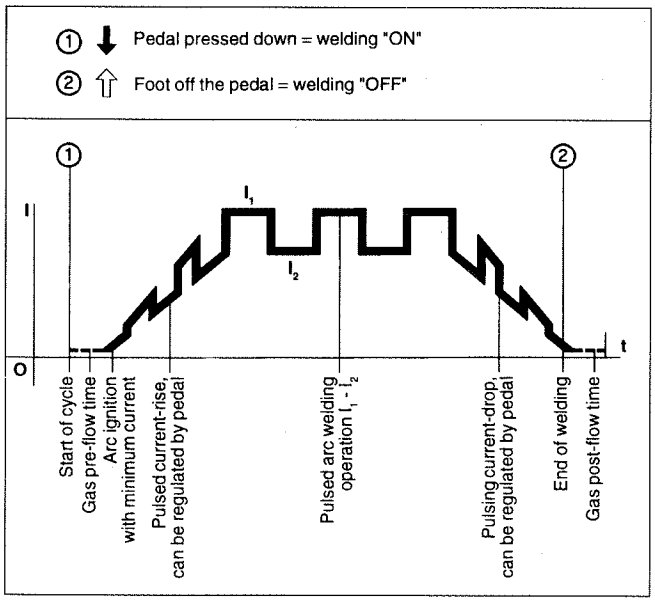



**Fig. 16:** Functional sequence in pulsed-arc operation, in conjunction with the RCT F remote control unit (2-step)

## Remote control pedal unit RCT F

Because workpieces are often awkwardly shaped, it is often necessary to alter the amperage while welding. In such cases, the use of a remote control pedal unit is indispensable.

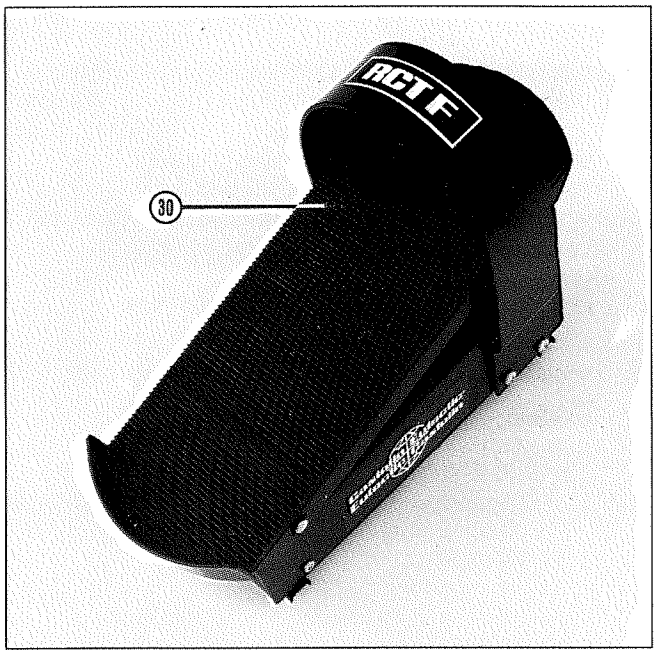



Fig. 17

### *Functional description*

- When the RCT F remote-control pedal unit is connected, the machine automatically switches over to 2-step operation.
- Set desired operating mode with function selector switch ④.
- The appropriate LED indicator ⑤, ⑥ or ⑧ lights up - operating mode electrode *(LED indicator ⑤)* is possible.
- The mean welding-current amperage is indicated on display A - No "Hold" function.
- Gas pre-flow time and gas post-flow time are set directly at the power source.
- To initiate the ignition process, gently step on the pedal.
- The level of the start arc current, the main current $I_H$ and the final crater current can also be controlled from the pedal. When the welder takes his foot right off the pedal, the welding current is switched off, thus interrupting the welding operation.
- Gas post-flow time elapses.

### *Limitation of main current:*

If the maximum welding current value is set internally on the main current $I_H$ dial ⑮, the remote control pedal may be depressed to its full extent without the main welding current exceeding the pre-set value. This has two advantages: Firstly, that the selected current range is covered by one complete depression of the foot pedal. Secondly, the danger that a thin tungsten electrode could be overloaded and thus burn through, due to accidentally depressing the pedal to its full extent, is eliminated.

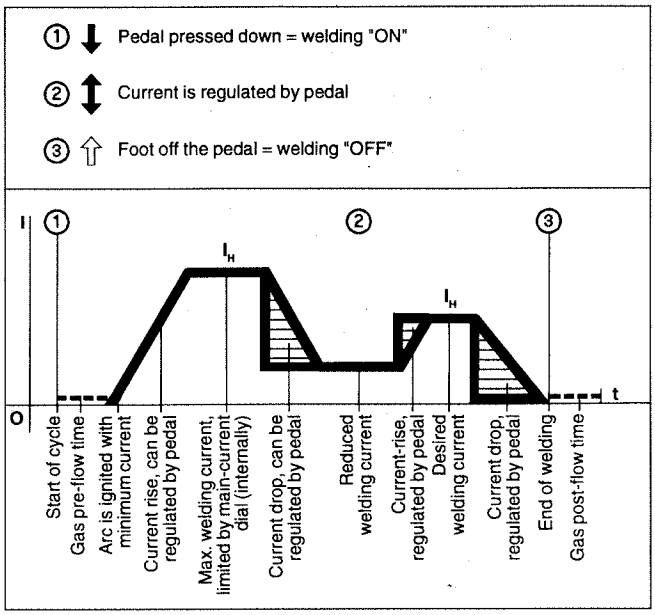



**Fig. 18:** Functional sequence in standard welding operation with the RCT F remote control pedal unit (2-step)

## DC remote control unit RCT DC

This workplace remote control unit is intended for use in particular with manual electrode and TIG welding *(Magnet, for attaching the remote control unit to the workpiece).*

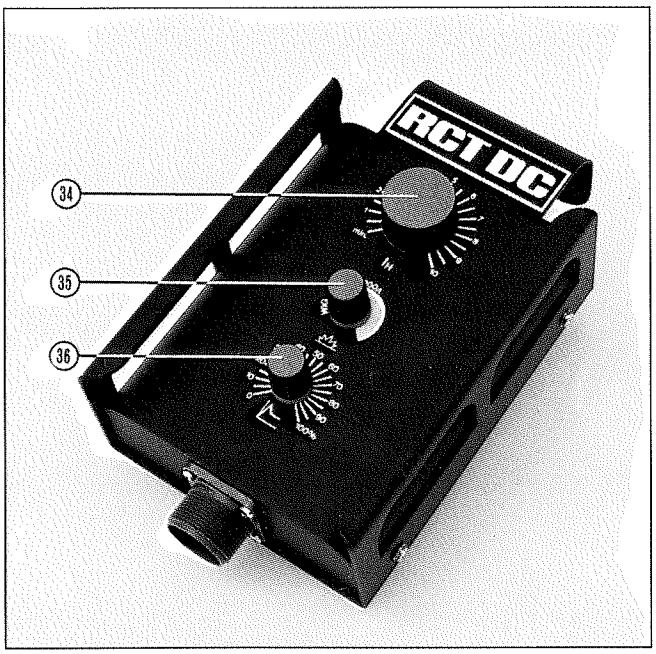



Fig. 19

**㉞ Welding current dial = Main current $I_H$**
For continuous adjustment of the welding current from 3 / 5 to 200A *(TIG)* resp. 3 to 180A *(Electrode) (see also the description on p. 8, Pt. ⑮).*

**㉟ Arc force control dial**
Influences the short circuit amperage at the moment of drop transfer *(from electrode to workpiece).*

***At scale setting min. TIG*** there is no increase at all in the short circuit amperage at the moment of drop transfer *(soft arc).*

***Range of application:***

- TIG-DC welding.
- Welding using rutile electrodes *(fine globules).*
- Basic sheathed electrodes in the medium and upper amperage ranges.
- Caution! When welded at low load, basic-sheathed electrodes tend to "GET STUCK" on the workpiece.

***At scale setting max.*** there is a very considerable increase in amperage at the moment of drop transfer *(hard arc).*

***Range of application:***
Basic sheathed electrodes *(coarse-globule)*, when these are to be welded in the lower amperage range *(vertical-up seams, edge hardfacing welds, root welding etc.).*

***Practical tips!***
When the setting on the arc force control dial is adjusted upwards, the following may be observed when rutile, basic-sheathed or special electrodes are being used:

- Easy ignition.
- Reduction in welding misfires.
- Less electrode burn-on.
- Good root penetration.
- Occasionally an increase in spattering.
- When welding thin sheet metal the danger of "burning through" increases.
- With filling-welds, there will be a tendency for the arc to become somewhat harder.
- With fine-globule electrodes *(titanium)* the above will not be observed, as metal transfer occurs without a short circuit being produced.

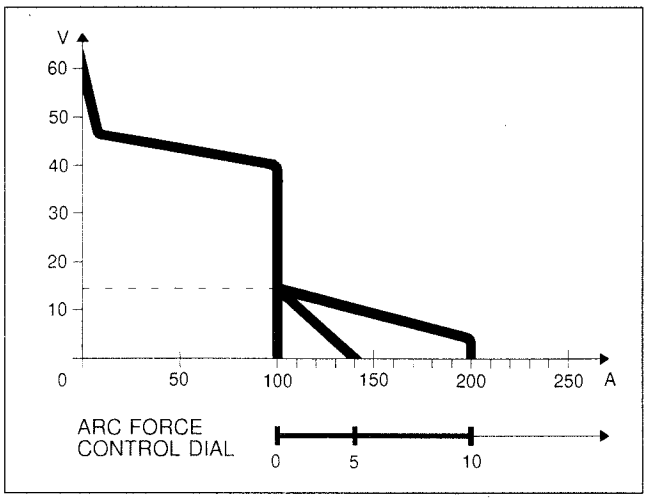



**Fig. 20:** Effect of arc force control dial ㉟ on constant-current characteristic at the moment of short-circuiting. Welding current setting 100 A

**㊱ HOT-START control dial**
only effective in the electrode ignition phase.

***Advantages:***

- Improved ignition even with electrodes where ignition is normally more difficult.
- Improved melting of the base material in the ignition phase, meaning far fewer cold laps.
- Considerable reduction of slag inclusions.
- Is added to the set welding current value on a percentage basis.

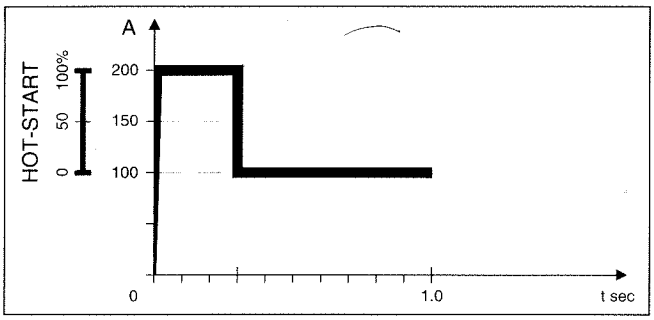



**Fig. 21:** Ignition phase using HOT-START control. Welding current setting 100 A

**Important!**
The maximum setting for the HOT-START current is automatically limited by the maximum circuit of the machine.

**Welding witout remote control unit:**
The parameters for Hot-Start and arc force are pre-set within the machine to average *(mean)* values *(see p. 10, "Electrode" pre-setting level).*

## TIG Welding with high-frequency ignition (HF)

**WARNING!**
**When the CastoTIG 2002 AC/DC is being used for TIG welding, the manual electrode cable will always be live when:**

- **the mains master switch ① is ON,**
- **the operating mode is in the ⌐ or ⌐⌐ position and**
- **when the "start welding" signal has been given from the torch trigger.**

**Make sure, when the manual electrode cable is not in use, that it is either disconnected from the machine or else fastened to the machine in such a way *(insulated)* that the electrode holder and the coated electrode cannot touch any electrically conductive or earthed parts such as the housing, gas cylinder, workpiece etc.**

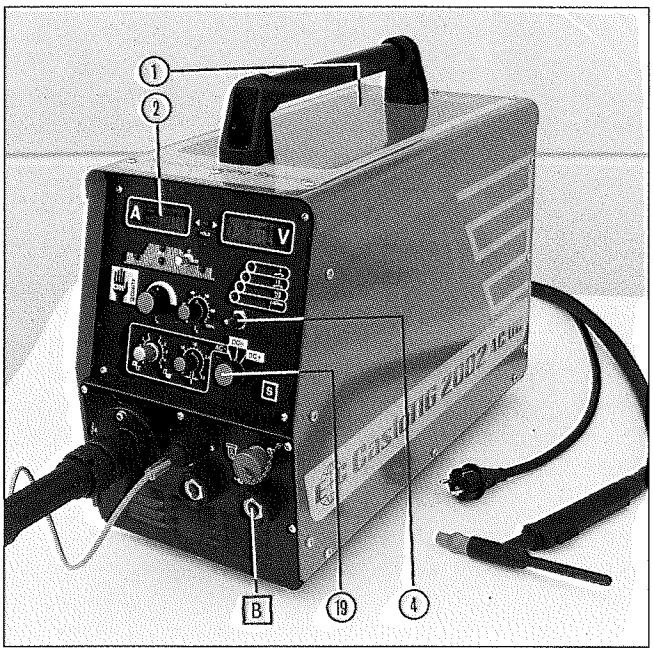



**Fig. 22:** CastoTig 2002 AC/DC welding machine consisting of: Power source and manual torch.

### Start up

- ☐ Fit the torch with a tungsten electrode and a gas nozzle *(see the instruction manual for the torch concerned).*
- ☐ Plug the earth cable into the current socket [B] and latch in place firmly.
- ☐ Connect the gas hose to the machine and the gas pressure regulator.
- ☐ Plug in the mains plug.
- ☐ Switch on the mains master switch ①.
- ☐ Shift selector switch ④ into the ⌐ or ⌐⌐ positions. LED ⑧ or ⑦ lights up.
- ☐ Select the type of current required with selector switch ⑲.
- ☐ In the AC~ mode, set the balance and AC frequency.
- ☐ If necessary, connect a remote control unit *(see description of remote control operation on p. 11).*
- ☐ Select welding parameters *(command value for main current $I_H$ is displayed on ammeter ②).*
- ☐ Open the gas cylinder valve by turning it anti-clockwise.
- ☐ Pull back the torch trigger and release it *(4-step operation).*
  **Warning!**
  High-frequency ignition is now switched on!
- ☐ Turn the setscrew on the underside of the gas pressure regulator in a clockwise direction until the working manometer shows the required flow-rate in litres/min.
- ☐ Pull back and release the torch trigger once again *(= welding OFF).*

### Igniting the arc:

- ☐ Make sure the welding current is switched off. Place the electrode on the weld at the point where the arc is to be ignited, tilt the torch backwards until the edge of the gas nozzle is resting on the workpiece, leaving a gap of between 2 and 3 mm between the tip of the electrode and the workpiece *(Fig. **23**-a).*
- ☐ Close your visor *(Fig. **23**-b).*
- ☐ Switch on the welding current with the torch trigger.
- ☐ Arc ignites without touching the workpiece.
- ☐ Move the torch into the normal position *(Fig. **23**-c).*
  ***Advantage:*** no contamination of either the electrode or the workpiece.

**IMPORTANT:** After ignition in AC~ and DC, the high frequency switches off automatically.

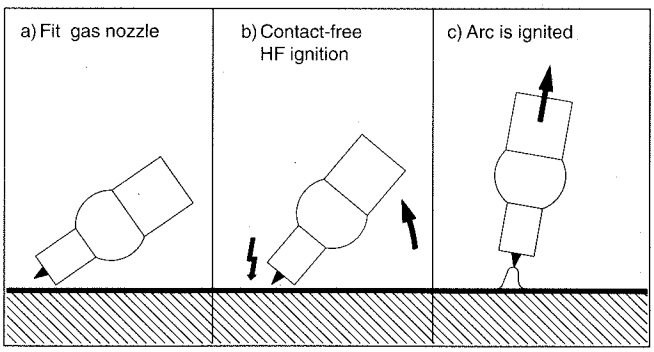



**Fig. 23:** Ignition with aid of ignition device.

### Ignition monitoring:

If, after fruitless attempts to ignite an arc or after an arc-interrupt, the welder forgets to stop the control sequence *(2-step or 4-step)* by means of the torch trigger, the shielding gas will continue to flow, leading to considerable wastage of gas. To prevent this, a monitoring function automatically interrupts the control sequence after approx. 5 seconds in such a case. When another attempt is made to ignite an arc, this must once again be initiated via the torch trigger.

## TIG Welding with contact ignition (without HF)

### Start up

- ☐ Fit the torch with a tungsten electrode and a gas nozzle *(see the instruction manual for the torch concerned).*
- ☐ Plug the earth cable into the current socket and latch in place firmly.
- ☐ Connect the gas hose to the machine and the gas pressure regulator.
- ☐ Plug in the mains plug.
- ☐ Switch on the mains master switch ①.
- ☐ Shift selector switch ④ into the and or and positions. LED ⑧ and ⑥ resp. ⑦ and ⑥ lights up.
- ☐ Using the selector switch ⑲, select the type of current required.
- ☐ If necessary, connect a remote control unit *(see description of remote control operation on p. 11).*
- ☐ Select welding parameters *(command value for main current $I_H$ is displayed on ammeter ②).*
- ☐ Open the gas cylinder valve by turning it anti-clockwise.
- ☐ Push forward the torch trigger and release it *(4-step operation).*
- ☐ Turn the setscrew on the underside of the gas pressure regulator in a clockwise direction until the working manometer shows the required flow-rate in litres/min.
- ☐ Push forward and release the torch trigger once again *(= welding OFF).*

### Igniting the arc:

- ☐ Make sure the welding current is switched off. Place the electrode on the weld at the point where the arc is to be ignited, tilt the torch backwards until the edge of the gas nozzle is resting on the workpiece, leaving a gap of between 2 and 3 mm between the tip of the electrode and the workpiece *(Fig. **24**-a).*
- ☐ Close your visor.
- ☐ Switch on the welding current with the torch trigger - shielding gas starts flowing.
- ☐ Resting the torch on the edge of the nozzle, gradually tilt it upwards until the tip of the electrode touches the workpiece *(Fig. **24**-b).*
- ☐ The arc ignites when the torch is raised and moved into the normal position *(Fig. **24**-c).*
- ☐ Start welding.

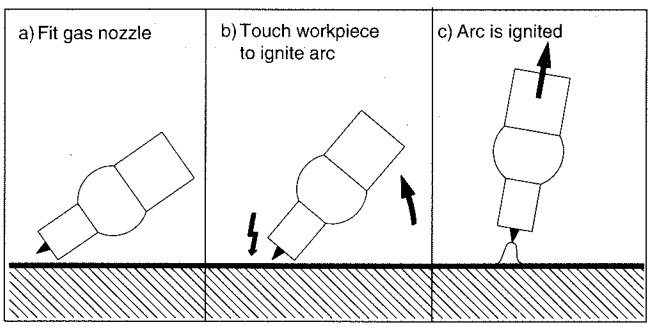



**Fig. 24:** Ignition through touching the workpiece

## Manual welding

### Start up

- ☐ Plug the welding cable into the appropriate current socket *(see symbols)* and secure it by turning it clockwise *(Cable cross-sectional area 35 - 50 mm²).*
- ☐ Select the correct polarity for the type of electrode to be used.
- ☐ Shift the current selector switch ⑲ to the correct position for the type of electrode to be used *(follow directions given by the electrode manufacturer).* The polarity is not changed by plugging the welding cables into different sockets, but by selecting the appropriate setting *(AC~ / DC+ / DC-)* with the aid of the selector switch ⑲.
- ☐ Shift the mains master switch ① to "1".
- ☐ Shift the function selector switch ④ into the position.
  The LED indicator ⑤ and welding current indicator ⑩ lights up.
- ☐ **WARNING! When the CastoTIG 2002 AC/DC is being used for manual electrode welding, the tungsten electrode on the mounted welding torch will always be live when the mains master switch ① is ON and the operating mode is in the position. Make sure, when the torch is not in use, that it is either disconnected from the machine or else fastened to the machine in such a way *(insulated)* that the tungsten electrode cannot touch any electrically conductive or earthed parts such as the housing, gas cylinder, workpiece etc. *(If necessary, fix the tungsten electrode approx. 10 mm back from the edge of the gas nozzle!).***
- ☐ If required, connect remote control unit RCT DC *(see description of remote control operation, p. 14).*
- ☐ Pre-select welding current *(command value for main current $I_H$ is displayed on ammeter ②).*
- ☐ If using remote control unit, set arc force and Hot-Start *(see "RCT DC remote control unit" on p. 14).*
- ☐ Initiate the welding operation.

## Troubleshooting guide

**WARNING! Machine may only be opened up by suitably qualified and skilled personnel!**

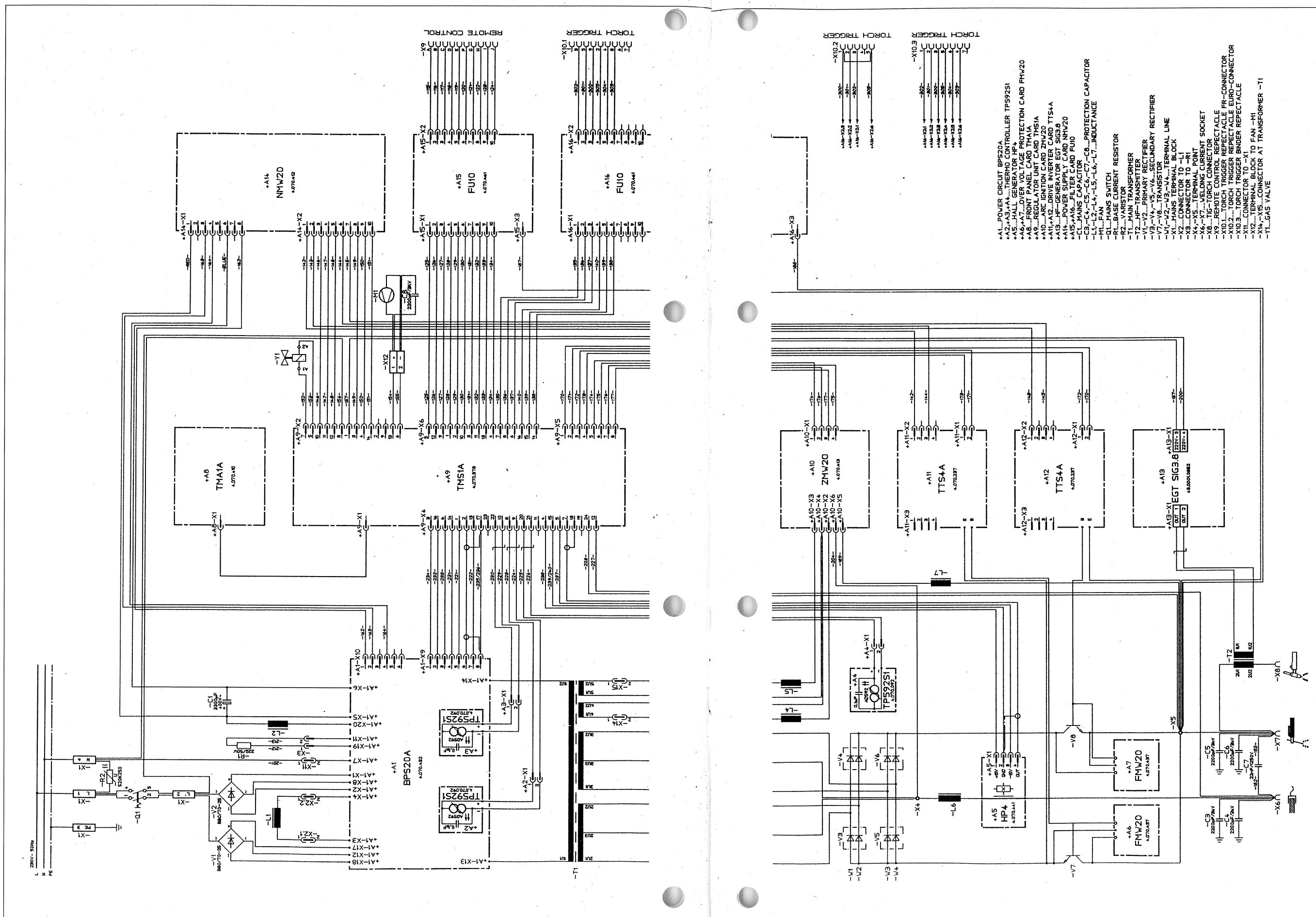
| FAULT | CAUSE | REMEDY |
|---|---|---|
| **1. MACHINE DOES NOT WORK**<br>Mains switch ① is ON, but relevant operating status LED ⑤ - ⑧ and digital displays ② and ③ are not lit up | Break in mains lead, Mains plug is not plugged in | Check mains lead, and mains voltage if necessary, change the fuse |
| | Mains fuse is faulty | Replace fuse |
| | Mains power socket or plug on machine is faulty | Replace any faulty parts |
| **2. NO REACTION WHEN TORCH TRIGGER IS ACTUATED**<br>Mains switch ① is ON, relevant operating status LED ⑤ - ⑧ and digital displays ② and ③ are lit up, but LED displays ⑨, ⑩, ⑫ do not light up when trigger is pushed forward | Torch control plug is not plugged in, or the plug-in connection is faulty | Plug in the control plug and secure it, check connection, replace if necessary |
| | Torch switch (micro-switch) or torch control line is faulty | Repair or replace torch |
| | The "Power ON" reset time after switch-on (10 sec) has not yet elapsed | After switching on at the mains switch, wait for about 10 sec before starting to weld |
| **3. NO WELDING CURRENT**<br>Mains switch ① is ON, relevant operating status LED ⑤ - ⑧ and digital displays ② and ③ are lit up, LED displays ⑨, ⑩, ⑫ light up when the trigger is pushed forward. HF and shielding gas are present | Earth cable is not connected | Clamp the earth cable to the workpiece |
| | Earth cable is plugged into wrong current socket | Plug the earth cable into the ⊣ socket and secure it |
| | Torch is faulty | Change the torch |
| | TC 1 MC control unit AC (DC) is faulty | Change the TC 1 MC AC (DC) |
| | Short circuit in welding-current circuit in electrode welding mode (longer than 1 sec) | Eliminate the short circuit in the welding-current circuit |
| **4. NO WELDING CURRENT**<br>Mains switch ① is ON, relevant operating status LED ⑤ - ⑧ is lit up, digital displays ② and ③ are showing t - P e.g. 82.2 (overtemp. primary) or t - S e.g. 81.2 (overtemp. secondary) | Max. duty cycle has been exceeded or fan is faulty (alternate display of primary and secondary temperature, i.e. t - P / t - S) | Allow the machine to cool<br>⇨ do not switch off, check working of fan |
| | Cooling air-stream is insufficient | Ensure adequate supply of cooling air |
| | Primary module is very dirty | Open up the machine and blast clean with dry compressed air<br>(see "Care and maintenance" on p. 21) |
| **5. NO WELDING CURRENT**<br>Mains switch ① is ON, relevant operating status LED ⑤ - ⑧ is lit up, digital displays ② and ③ are showing: Err 09 (secondary overvoltage fault) | Overvoltage at the welding sockets | Switch machine off and then on again. If the fault happens again, call after-sales service |
| **6. ARC SOMETIMES BREAKS**<br>*(in AC-TIG)*<br>Mains switch ① is ON, relevant operating status LED ⑤ - ⑧ and digital displays ② and ③ are lit up | Tungsten electrode is underloaded | Use a suitable diameter of electrode for the amperage in question |
| **7. ARC SOMETIMES BREAKS**<br>*(in manual electrode)*<br>Mains switch ① is ON, relevant operating status LED ⑤ - ⑧ and digital displays ② and ③ are lit up | Arc-drop voltage of electrode is too high | Use an alternative electrode if possible |
| **8. NO SHIELDING GAS**<br>all other functions are OK | Gas cylinder is empty | Change the gas cylinder |
| | Pressure regulator is defective | Change the regulator |
| | Gas hose is either not connected, or is faulty | Connect the gas hose, replace faulty hose |
| | Welding torch is faulty | Replace the torch |
| | TC 1 MC AC (DC) control unit is defective | Change the TC 1 MC AC (DC) control unit |
| | Gas solenoid valve is defective | Call after-sales service |

| FAULT | CAUSE | REMEDY |
|---|---|---|
| **9. NO GAS POST-FLOW** Tungsten electrode discolours after end of welding | Gas post-flow time is set too short | Using internal program parameters, increase the gas post-flow time (depends on welding amperage - see p.10) |
| **10. POOR ARC IGNITION** | Gas pre-flow time is set too short | Increase gas pre-flow time, esp. with longer hose packs |
| | HF is too weak | See Pt. 11 below |
| | **DC:** Tungsten electrode is alloyed up, or pointed tip is damaged | Sharpen tip of tungsten electrode |
| | **AC:** Tungsten electrode is alloyed up, or domed tip is damaged<br>Incorrect needle diameter ⑱ has been set | Shorten the tungsten electrode and form a new dome at the tip<br>(see p. 8, Pt. ⑱) |
| | Tungsten electrode is underloaded (with especially negative consequences in AC) | Use a suitable electrode for the amperage (also start-arc amperage) in question |
| | Gas nozzle is dirty;<br>HF jumps over the gas nozzle onto the workpiece | Use a new ceramic nozzle |
| | Gas nozzle is too small for the diameter of tungsten electrode used | Use a bigger gas nozzle |
| | Torch is damaged:<br>insulated torch components such as torch body, protective hose etc. are faulty | Replace the damaged parts or change the torch |
| | Ignition device (ZMW 20) is faulty | Call after-sales service |
| **11. HF IS TOO WEAK** | No shielding gas, or not enough<br>[TC 1 MC AC (DC) module] | See Pt. 8 above |
| **12. NO HF** | Fuse F1 on TMS 1A is defective | Change the fuse |
| | HF ignition generator is defective | Call after-sales service |
| **13. WELDING CURRENT CANNOT BE REGULATED** (without remote control unit) | The TC 1 MC AC (DC) control unit is defective | Change the TC 1 MC AC (DC) control unit |
| **14. REMOTE CONTROL UNIT DOES NOT WORK** (all other functions are OK) | Remote control cable is not properly connected | Plug in the remote control cable the right way round; screw it on as far as possible |
| | Remote control cable is faulty | Change the remote control cable |
| | Remote control unit is faulty | Change the remote control unit |
| | 10-pole remote control socket is faulty | Change the remote control socket |

**WARNING!**
**WHERE FUSES NEED TO BE CHANGED, THEY MUST BE REPLACED BY FUSES OF THE SAME RATING. NO WARRANTY CLAIMS WILL BE ACCEPTED IN RESPECT OF DAMAGE CAUSED BY THE USE OF TOO HIGH A RATING OF FUSE!**

| Error no: | Fault diagnosis: |
|---|---|
| Err 01 | Overtemperature indicator: t - P / t - S ⇨ see Pt. 4 |
| Err 02 | Thermosensor short circuit |
| Err 03 | Thermosensor break |
| Err 04 | Not activated at present |
| Err 05 | Hall compensating error |
| Err 06 | Current command value compensating error |
| Err 07 | RAM accessing error |
| Err 08 | Eprom accessing error |
| Err 09 | secondary overvoltage fault ⇨ see Pt. 5 |
| Err 10 | Not activated at present |
| U-P | Primary over- or undervoltage |

# Circuit Diagram CastoTig 2002 AC/CD



## Care and Maintenance

Under normal operating conditions the CastoTIG 2002 AC/DC requires a minimum of care and maintenance. However, to ensure continued trouble-fee operation of your machine for years to come, a certain amount of basic maintenance must be carried out.

- Check the mains plug and mains cable, and the welding torch and earth connection, for signs of damage from time to time.
- Once or twice a year, unscrew the welding machine casing.

  **Caution: Switch off the machine and pull out the plug first!**
- Clean out the inside of the unit using dry compressed air (be careful - blowing compressed air directly onto electronic components from too close a distance may damage them!).

## Repairs

Repairs to the appliance may only be undertaken by our service department or personnel that has been authorized by us.

## Guarantee

The guarantee lasts for 12 months and is valid providing the apparatus is used only for appropriate applications and by a maximum of one shift a day.

The guarantee covers the cost of replacing defective parts and sub-assemblies and any assembly time.

The guarantee does not cover wear parts or consumables and is invalid if the apparatus has been clearly abused or misused.

Any claim made under guarantee must include the **serial number** of the apparatus.

Any return of an apparatus requires E+C's prior agreement. Transportation and related costs will be at the expense of the purchaser.

(Please refer to the General Sales Conditions.)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