

# NOMARK 65/99



**THOMAS**  
Welding systems

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## **FOREWORD**

Your new THOMAS stud welder is carefully constructed of the finest components and material available. Used properly, this equipment will give you years of efficient profitable service.

This manual has been specifically prepared for use in familiarizing personnel with the design, installation, operation, maintenance and trouble-shooting of this equipment. Careful consideration should be given to all the information presented to assure the proper performance of this equipment.

A careful study of this manual will enable you to understand how the welders operate to insure proper performance under all conditions.

## **GUARANTEE**

The electrical and mechanical components of your THOMAS stud welder are thoroughly performance inspected prior to assembly in the welder. The assembled welder is completely performance checked. The welder is delivered to you in functional electro-mechanical condition. All parts used in the assembly of the welder and its accessories are fully warranted for a period of one (1) year from the date of delivery.

Under this warranty, the manufacturer reserves the right to repair or replace in its plant in JUMET (BELGIUM), at its option, defective parts which fail during the warrantee period. Notice of any claim for warranty repair or replacement must be furnished to the manufacturer by the purchaser within five (5) days after the defect is first discovered. The manufacturer does not assume any liability for paying shipping costs or for any labor or material furnished where such costs are not expressly authorized in writing.

We do not warrant THOMAS stud welders, parts, or accessories against failures resulting from misuse, abuse, improper installation, maladjustment or use not in accordance to the operating instructions furnished by the manufacturer. The warranty is valid only when studs are purchased from sources approved by the manufacturer.

**Installation servicing or troubleshooting must only be done by qualified personnel trained to work on this type of equipment.**

**The equipment must always be accompanied by the instructions of operation, instructions, safety, inspection and maintenance, applicable information relating to the devices and security instructions required at the place of uses of the machine. The security instructions concerning welding in general must also be well known and applied.**

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# 1 Introduction

- 1.1 General information
- 1.2 Components of the stud welding system
- 1.3 Functional principle of the stud welding system
- 1.4 Stud welding gun C0
- 1.6 Meaning and description of symbols
- 1.7 Other descriptions
- 1.8 Welding elements (studs)
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## 1.1 General information

These operating instructions apply to the power unit type NOMARK 65/99 with welding gun C0 and/or CHP and are intended for the operating, repair and service personnel.

Familiarise yourself with the contents of these operating instructions before starting the power unit. You will then achieve better welding results and work safely.

In the event of difficulties or confusion please consult the after sales service of TWS Tech, who will be pleased to help you.

The figures, specifications and data given in these operating instructions correspond to the state of development as on 13 March 2001.

TWS reserves the right to make technical changes serving to improve the power unit.

### 1.1.1 For your safety

Knowledge of the contents of these operating instructions is essential to ensure safe and trouble free operation of the stud welding system. See chapter 2 for information on proper and safe handling of welding guns.

Circumstances and requirements change from case to case.

Therefore also always comply with your national and EN (European) standards regarding safety.

#### Set-up personnel

Set-up personnel need knowledge and experience in welding to

- assess the workplace,
- set up the equipment
- select the right welding element.

Knowledge in the handling of stud welding systems is also required.

This knowledge is taught either by TWS or trained set-up personnel.

#### Operator

Welding work may only be performed by persons over 18 years of age. Knowledge of welding is presupposed (see also section 1.1.3).

#### Employer

The personnel must be instructed according to the regulations of BG § 1 regularly, at least once a year.

Untrained or unauthorised personnel may not use the power unit.

### 1.1.2 Field of application of the stud welding system

The power unit is designed for welding of welding elements (e.g. welding studs) by the arc pressure welding method. The device only works in combination with a suitable welding gun.

The power unit can be used to weld, for example, welding studs according to EN 13918 – Studs for arc welding – on to weldable workpiece surfaces. Many other forms of welding element can also be welded. Contact THOMAS in this regard if necessary.

### 1.1.3 Features of the stud welding system

- Easy operation  
The power unit is easy to use and – except in the case of work subject to official supervision – no special welding qualification is necessary. The partial mechanisation of the welding process means high-quality welding results can be achieved after a short familiarisation period.
- Safety  
We have designed the device according to EU and national Belgian regulations so that you can work as safely as possible. Work under increased electrical hazard is permitted. The device fulfils the requirements of Protection Class I, IP 21 and comes with the "CE" symbol.
- Long life  
The transformers, rectifiers and electronics are especially robust and together with the modern sheet steel housing guarantee long life of the power unit.

### 1.2 Components of the stud welding system

The stud welding system consists of the **power unit** (type NOMARK 65/ 99), **welding gun** ,(C0), **Ground cable** and chuck



NOMARK 65 / 99



C0 welding gun



Double ground clamp

*Fig. 1 - 1 Power unit and stud welding gun*

1) Power unit NOMARK 65 + C0 ( welding gun for contact welding)

2) Power unit NOMARK 99 + C0 ( welding gun for contact welding)

Both welding units can weld normal welding studs. They are equipped with studs manually.

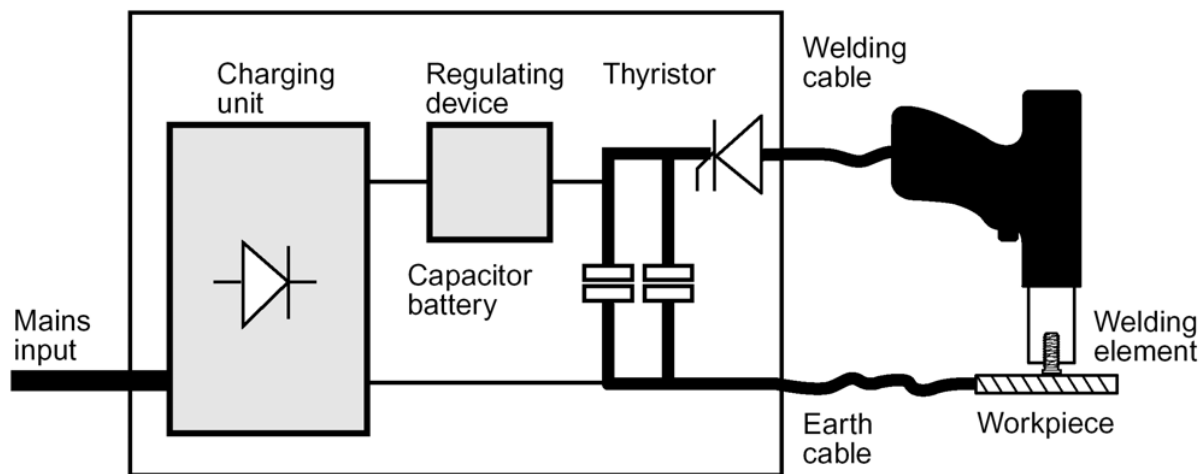
### 1.3 Functional principle of the stud welding system

Stud welding systems are used to weld metal welding studs (e.g. threaded studs) on to weldable metal workpiece surfaces. The power unit NOMARK 65/99 is a mobile welding unit developed by THOMAS that sets new standards in stud welding technology with its compact construction.

It works by the principle of capacitor discharge.

Together with a manually equipped welding gun of the type C0 (contact welding gun), it can weld normal welding studs with ignition tips.

The welding energy required is delivered by the power unit, which charges a capacitor battery via a regulator circuit. The welding current is then activated by a power SCR. The electric circuit is closed by the welding gun, stud, workpiece and earth cable.



*Fig. 1 - 2 Functional principle of the electric control system*

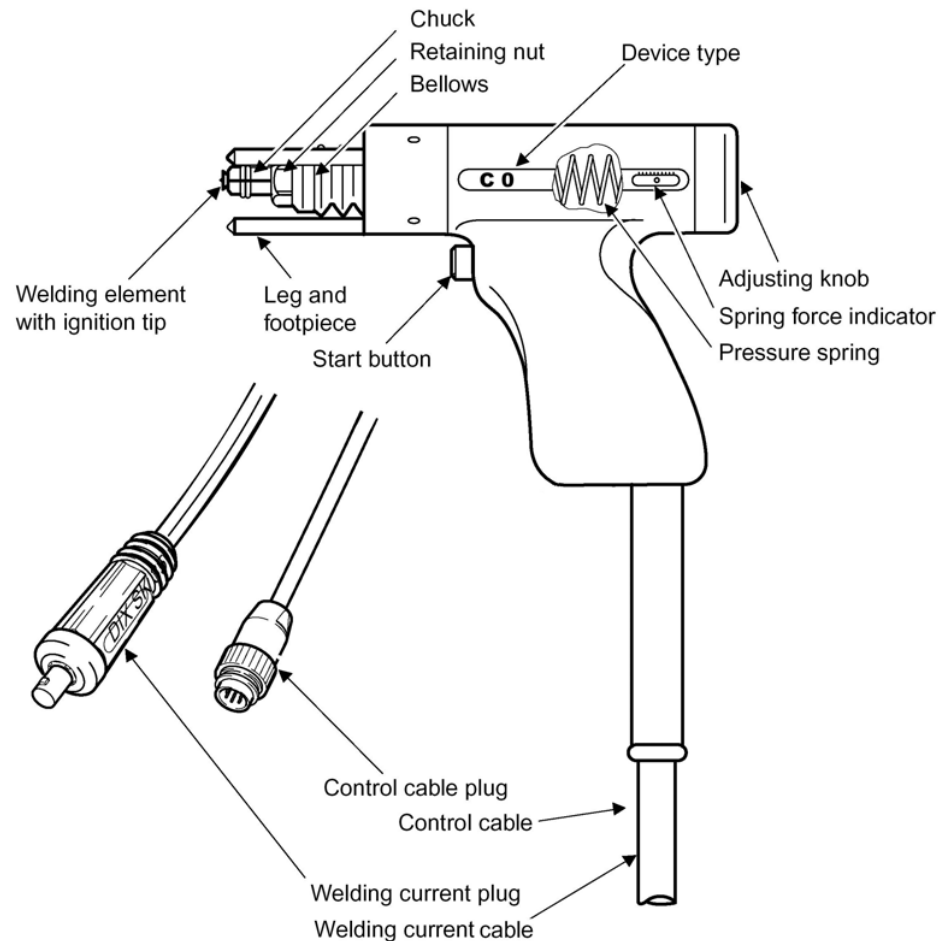


## 1.4 Stud welding gun C0

### Field of application

The C0 is a contact welding gun for welding studs with ignition tips. The welding elements should preferably be of **steel** and **stainless steel**. Brass or Aluminium studs can also be processed with limitations.

Owing to the somewhat longer welding time (compared to gap welding) and deeper penetration, the C0 is especially suitable for lightly galvanised steel



*Fig. 1 - 3 Contact welding gun C0*

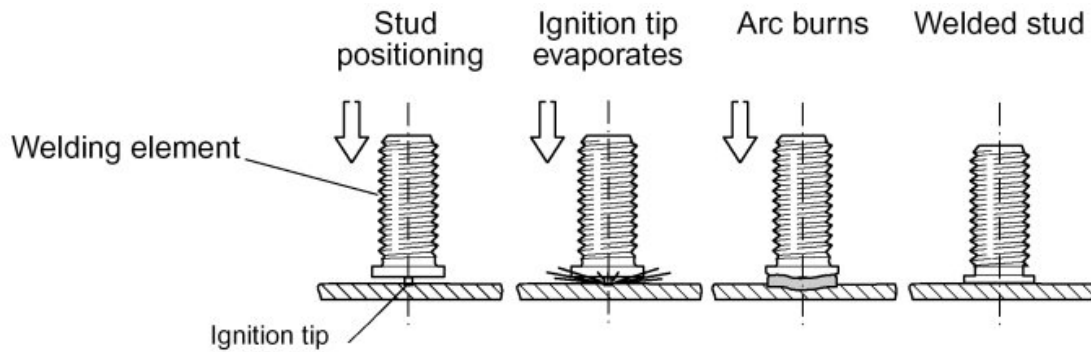
See chapter 5.6 for technical specifications and chapter 5.8 for individual part drawings and replacement part numbers.

### Method

A welding element is first pushed into the Chuck of the welding gun. The ignition tip of the element is then placed down vertically at the required point on the workpiece and the gun pressed down until all positioning feet touch the workpiece (this pushes the plunger against the pressure spring).

The welding current is then switched on and the welding process started by pressing the start button. The ignition tip evaporates and generates an arc, which melts the face of the stud and the workpiece.

The pre-stressed pressure spring then forces the welding element into the weld pool and the arc is extinguished. The capacitors are discharged completely. The weld pool solidifies. This welding process lasts about 1.5 to 3.0 ms. The welding gun can be pulled off the welding element vertically directly afterwards and fitted with a new one.



*Fig. 1 - 4 Contact stud welding sequence*

**Note:**

A threaded stud was chosen as welding element in the figure above.  
Other welding studs equipped with ignition tip are shown in chapter 1.8

## 1.5 Stud welding gun C1

### Field of application

The C1 is a contact welding gun for welding studs with ignition tips. The welding elements should preferably be of **steel** and **stainless steel**. Brass or Aluminium studs can also be processed with limitations.

Owing to the somewhat longer welding time (compared to gap welding) and deeper penetration, the C1 is especially suitable for lightly galvanised steel

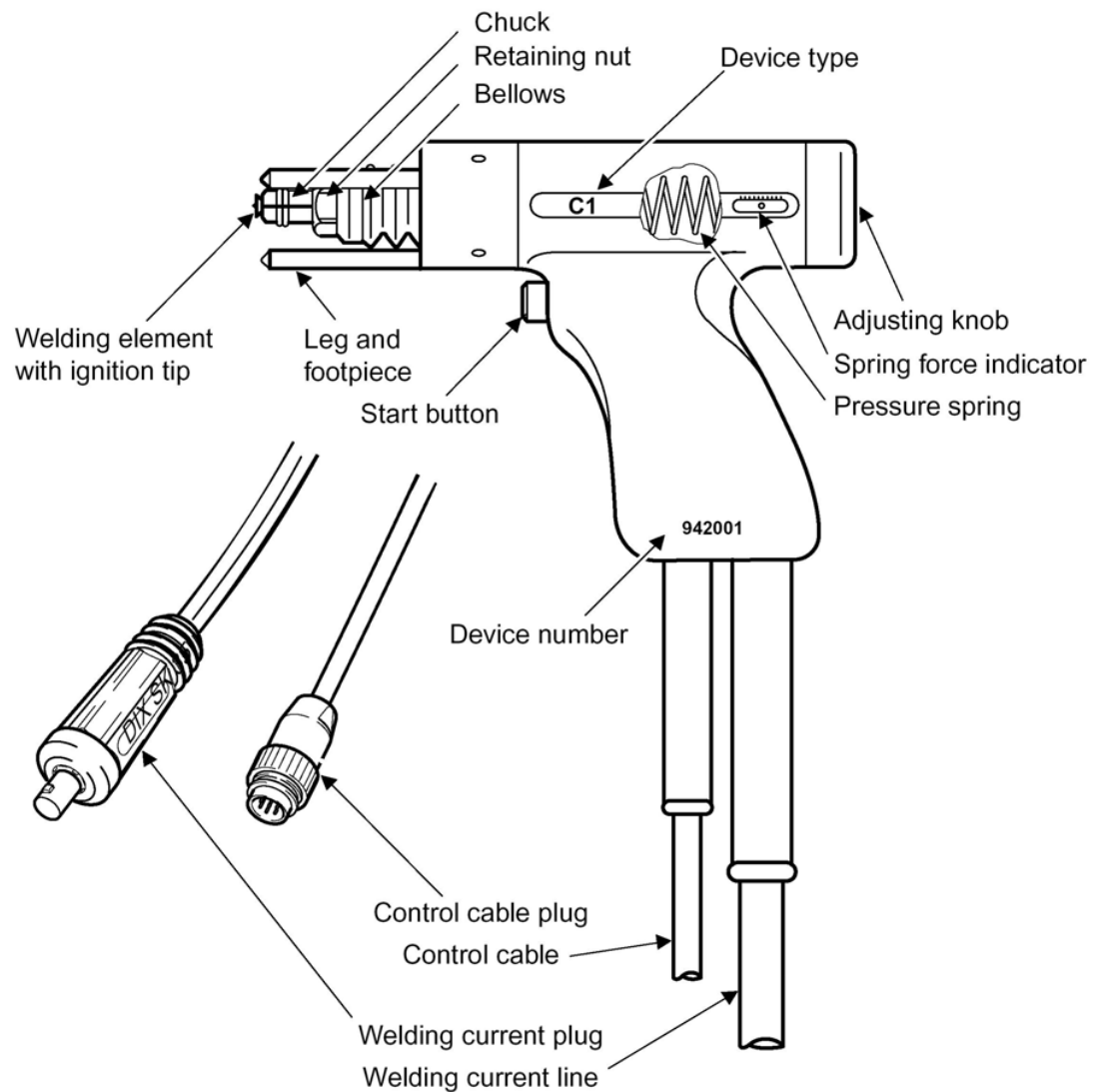


Fig. 1 - 5 Contact welding gun C1

See chapter 5.6 for technical specifications and chapter 5.8 for individual part drawings and replacement part numbers.

### Method

A welding element is first pushed into the Chuck of the welding gun. The ignition tip of the element is then placed down vertically at the required point on the workpiece and the gun pressed down

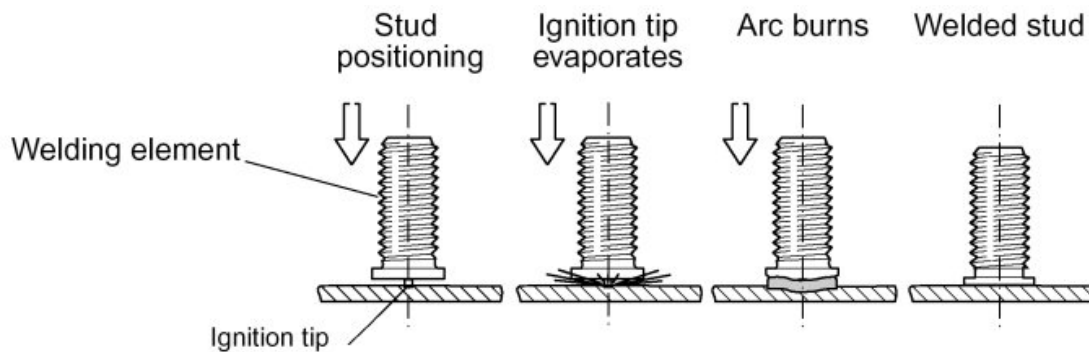
until all positioning feet touch the workpiece (this pushes the plunger against the pressure spring).

The welding current is then switched on and the welding process started by pressing the start button. The ignition tip evaporates and generates an arc, which melts the face of the stud and the workpiece.

The pre-stressed pressure spring then forces the welding element into the weld pool and the arc is extinguished. The capacitors are discharged completely. The weld pool solidifies.

This welding process lasts about 1.5 to 3.0 ms.

The welding gun can be pulled off the welding element vertically directly afterwards and fitted with a new one.



*Fig. 1 - 6 Contact stud welding sequence*

**Note:**

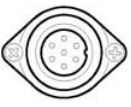


A threaded stud was chosen as welding element in the figure above.

Other welding studs equipped with ignition tip are shown in chapter 1.8

## 1.6 Meaning and description of symbols

### Connections





The connection symbols on the power unit have the following meaning:

Connection	Description	Function
	Control cable socket	Connection socket for control cable; to transmit the control signals to the gun
	Welding cable socket	Connection socket for the welding cable of the gun
	Earth cable socket	Connection socket for the earth cable





Tab: 1 - 7 Connection sockets of the power unit

### Indicators and operating elements

The LED indicators (lamps and display) help the user to follow the welding process visually.

Symbol	Description	Function
	LED display	Shows the current setting for charging voltage
	Main switch I/O	To switch the power unit on / off (Switch positions: I = ON, switch lights up green; O = OFF)
	Charging voltage regulator	Rotary button to set the energy
	Capacitor charge status (ready indica- tor)	LED lights up <b>green</b> : Capacitor fully charged and device ready for weld- ing LED <b>off</b> : Capacitor being discharged, Capacitor being charged

Tab: 1 - 8 Indicators and operating elements

Symbol	Description	Function
	Temperature	LED lights up yellow Temperature in the power Charging cycles longer due to the temperature.
	Blocked	LED lights up red: 1) The residual charge was greater than 70 V (therefore the alarm).
	Contact	LED lights up orange: Contact between the welding element and the workpiece
	Start	LED lights up green: Start button of the gun is being pressed

Tab: 1 - 8 Indicators and operating elements

**Start check:**

- The following must light up when the power unit has been switched on:  
the **main switch**, the **display** (shows the setting for charging voltage)

**Note:**

- The LED for connection of a gun with hoisting magnet has no function when the gun C0 is being used.
- Hold the gun with stud against the workpiece: the contact LED must light up (when earth cable – on both sides – and welding cable connected).
- Hold the gun in the air and press the start button: the start LED must light up.
- Otherwise no further LEDs should light up.

**Troubleshooting**

See Troubleshooting chapter 5.1 Troubleshooting.

## 1.7 Other descriptions

**Ignition tip** The power unit NOMARK 65/99 and connected stud welding gun work by the tip ignition welding method.

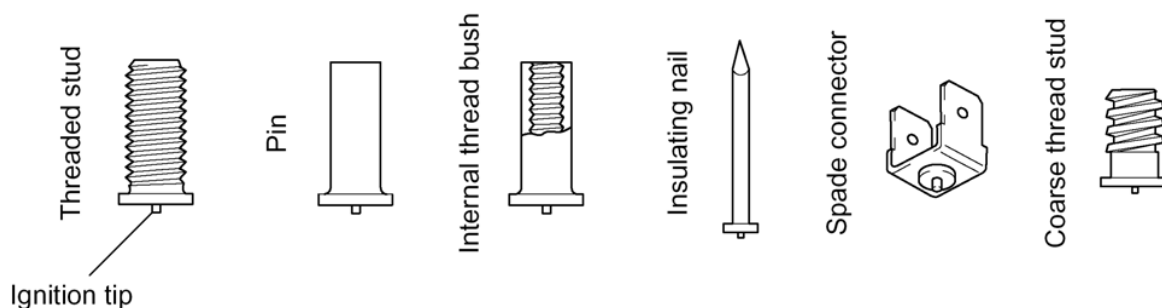
In order to ignite an arc and therefore to generate a weld pool, every stud must have an ignition tip.

**Fan** To avoid unnecessary soiling, the fan is only switched on when a high temperature is reached.

**Inert gas** Inert gas is seldom used in tip ignition welding because the short welding time gives little time for oxidation.

## 1.8 Welding elements (studs)

Depending on how the welding gun is equipped, threaded studs, internal thread bushes and pins (in accordance with DIN 32 501) of various sizes and materials can be welded if they have an ignition tip.



*Fig. 1 - 9 Examples of different types of welding elements*

The following conditions must be observed:

- The diameter of the welding element must be  $\leq 10$ .
- Length of welding studs : from 6 to 40 mm with standard components.  
For studs longer than 40 mm, an intermediate ring must be used.
- Length of welding pins : from 6 to 100 mm with standard components.
- A suitable chuck must be selected for every welding element.

**Note:**

Please contact THOMAS regarding different Chuck shapes and sizes.  
See chapter 5.10 for standard chucks

## 1.9 Material combinations

The weldability of workpiece and welding element materials is defined as follows:

1 = weldable 2 = limited weldability 0 = not weldable/ not tested

\* = limited weldability with contact welding gun

### Contact and gap welding

Material combination	Welding element				
Workpiece	St 37-3 or similar	CrNi steel 1.4301;1.4303	CuZn 37 (Ms 63)	AlMg 3 or similar	Al 99.5
Unalloyed structural steel up to C30	1	1	1	0	0
25 µm galvanised	2	2	1	0	0
CrNi steel 1.4301; 1.4303	1	1	2	0	0
CuZn 37 (Ms 63)	1	2	1	0	0
AlMg 3 or similar	0	0	0	1*	2*
Al 99.5	0	0	0	2*	1*

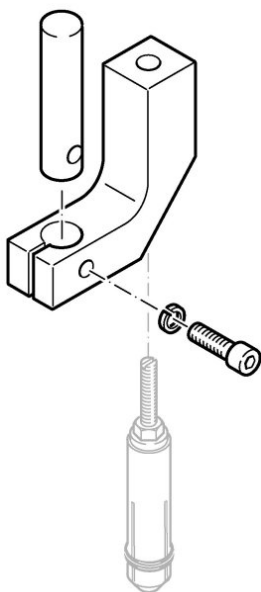
*Tab: 1 - 10 Suitability of material combinations for tip ignition welding*

**Note:**

Your THOMAS specialist advisor will be glad to advise you in the case of material combinations not listed in this table.

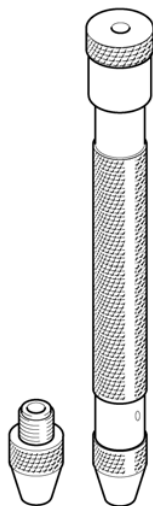


### 1.14 Angle bracket



With the angle bracket you can approach a right-angled surface to up to 8 mm with the gun and weld studs (order no. see chapter 5.10).

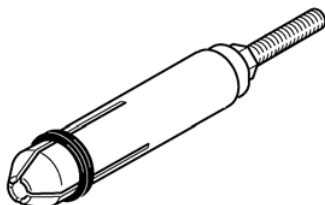
### 1.15 Bending device



The bending device is used in impact bending tests (see chapter 4.7).

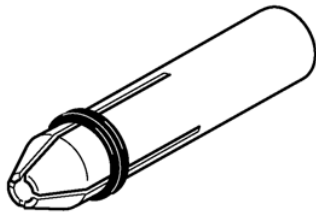
It is manufactured according to DIN 0905 Part 2. The five inserts must be ordered individually (order nos. see chapter 5.10).

### 1.16 Chucks (standard)



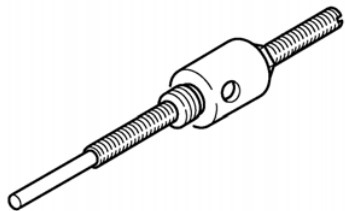
These chucks are used for **threaded studs** and **un-threaded studs** (order nos. see chapter 5.10).

### 1.17 Chucks (for insulation pins)



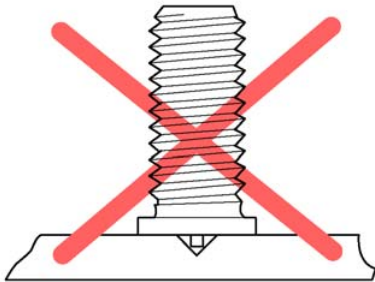
These chucks are used for **insulating nails** and **pins** (order nos. see chapter 5.10).

### 1.18 Chuck extension



The Chuck extension is only used when using a centring device (see chapter 1.10; order nos. see chapter 5.10).

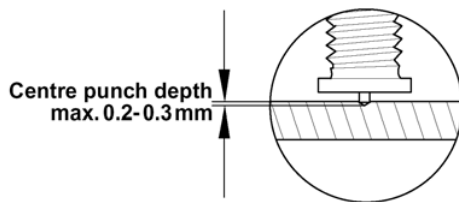
### 1.20 Welding on centre punches



Welding elements with ignition tip can be positioned for pattern welding exactly on centre punches or scribed lines. Since the welding process is started by the ignition tip, marking must be performed carefully.

The arc cannot ignite on a centre punch struck too deeply. Should it nevertheless ignite, then the strength of the weld is questionable.

Therefore make sure that the depth of the centre punch does not exceed 0.3 mm.



**Note:** You can rule out this uncertainty by using a so-called automatic punch (order no. see chapter 5.10).

## **2 Work safety and rights**

2.1 Safety symbols

2.2 Safety information

2.3 Proper use

2.4 Guarantee and liability

2.5 Copyright

2.6 EC Declaration of conformity

## 2.1 Safety symbols

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The warnings and information on safety serve your personal safety, the safety of others and the safety of the product. They are highlighted in these operating instructions by the following safety symbol.

The safety symbol has the following meaning:



This **warning sign** draws attention to dangerous or potentially dangerous situations. It is always used in combination with one of the following terms:

**Danger:** *This additional term means that death, serious physical injury or considerable damage to property will occur if suitable precautionary measures are not taken.*

**Warning:** *This additional term means that death, serious physical injury or considerable damage to property may occur if suitable precautionary measures are not taken.*

**Caution:** *This additional term means that slight physical injury or damage to property may occur if suitable precautionary measures are not taken.*

**Note:** *This additional term introduces important information on proper handling of the product or special information to which attention must be drawn.*



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**Warning:** The operator of the welding system is obligated to allow only those persons to work with the system who are fully acquainted with applicable work safety and accident prevention regulations.

All persons working with the system must read the safety information in these operating instructions before commencing work and then observe it!

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## 2.2 Safety information

One of the prerequisites for safe handling and fault-free operation of the power unit NOMARK 65/99 is knowledge and application of the following information on safety.

### General safety measures

- The operating instructions must be kept readily at hand at the place of use of the power unit NOMARK 65/99 at all times.
- The safety symbols and rating plate on the power unit NOMARK 65/99 must be kept in a legible condition.

### Personnel training

- The operating personnel of the power unit must
  - be instructed in the handling and use of welding equipment.
  - know the contents of these operating instructions and be able to apply them.
- The start-up personnel and electricians must
  - have undergone training qualifying them to carry out repair work.
  - be qualified to start up electric circuits and equipment in accordance with the standards of safety engineering.
- Apprentices and trainees may
  - only work on the welding system under the supervision of an experienced person.

### Personal protective equipment:

- Welding generates arcs, a noise level of 107 dB(A) and welding spatter. The following protective equipment must therefore be worn:



fireproof protective clothing covering the whole body



protective welder goggles with safety glass of protective category 2



protective gloves



helmet (for overhead welding)



ear protection (ear plugs, capsules)

### **Protective measures at the workplace**

- Only weld in rooms that comply with national legal requirements and the requirements of EN.
- Ensure the ambient temperature lies above +5°C so that a perfect and strong weld joint can be guaranteed.
- Set up the stud welding system such that it is protected against shocks, vibrations and accidental falling over.
- Set up the workplace so that personnel in the vicinity are protected against the harmful effects of optical radiation.
- Room barriers and protective screens must be set up such that reflections and permeability of radiation are largely avoided.
- Ensure adequate ventilation and lighting of the workplace. Welding of galvanised, leaded or cadmium-plated parts or parts coated with lead paint can give rise to harmful vapours and gases. An extractor must be used in such cases.
- Do not weld in the vicinity of inflammable vapours. The weld or weld spatter could inadvertently cause an explosion.
- Remove combustible or inflammable substances from a wide area around the welding area. Welding spatter could inadvertently cause a fire.  
If this is not possible, you must nevertheless ensure a fire cannot be caused by flying sparks (e.g. by covering).
- Ensure there is a powder fire extinguisher available at the workplace.
- There is a potential danger of burns at all welded workpieces even if they look "cold" and the welding point is further away. Protect all workpieces against touch if they have a temperature higher than 50°C even only in places.  
Heated workpieces can also cause fires – through heat conduction also at faraway points.
- There is an increased danger in hazardous areas as well as in or at containers containing hazardous substances or residues thereof. Welding may only be carried out in these areas with the written authorisation of the works manager. The works manager must ensure compliance with all safety regulations.



Only weld in rooms / areas in which no dangers from fire, explosions, smoke, vapours or water can arise.

In cases of doubt you must consult an authorised welding safety officer or fire protection officer.

Welding generates strong electromagnetic fields. You must therefore ensure that all people who can come into the vicinity of the stud welding system are informed of the following points and they like you observe them. These electromagnetic fields can:



– threaten the lives of persons with cardiac pacemakers.



– disrupt or damage electrical and electronic equipment (e.g. in cars).

– delete irretrievably the contents of magnetic and electronic data media.

– magnetise and therefore damage clocks and watches.

The welding current cables also irradiate strong electromagnetic fields.

It must be ensured the cables are laid without loops as far as possible and sufficiently far away from other electrical equipment.

This applies especially to welding at building sites and special machines. Consult the respective manufacturer of the electrical equipment in cases of doubt.

The system operator must take suitable remedial measures.



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**Warning:** The power unit NOMARK 65/99 is suitable for use in an industrial environment according to EN 55011 (Rating Class A).

Devices in Rating Class A can cause radio interference in residential and business areas.

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### Safety measures before commencing work

- Before commencing any work (e.g. shift change) check:
  - all components of the equipment (e.g. cables) for external signs of damage.
  - all connecting lines for loose contact or scorching.
  - that all protective devices are positioned and connected correctly.





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**Warning:** Keep body parts (e.g. hand, face) away from the immediate welding area! Heat, welding spatter, radiation, etc. can cause irreparable health damage during the welding process.

As soon as the start button is pressed – e.g. for welding – the welding element and collet carry current and may not be touched!

The welding process can also be started inadvertently, for example when inserting a stud. Therefore never touch the workpiece or earth *and* stud *at the same time* (although the power unit is equipped with a danger reducing device, it can nevertheless happen that you press the start button, which it is impossible to protect against).

Do not wear electroconductive jewellery such as wristwatches, rings or chains!

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- If the power unit has not been switched on for more than two weeks, you should place the power regulator on position 1 and switch on the power unit for about 10 minutes. You can then turn the regulator gradually to the highest setting and then switch off again.

Only then is the power unit fully functional.

### **Safety measures during operation**

- Only use the welding system when it is in perfect technical order.
- All working methods that impair safety are strictly forbidden.

### **Safety measures after finishing work**

- Switch the **main switch** of the power unit on to "0" (OFF) and turn the **power regulator** to position 1. This is important especially before longer work breaks (longer than two weeks) because the capacitors could depolarise and explosive gases could arise. The mains plug should also be pulled out before longer work breaks.
- Secure the power unit against unauthorised use.
- Put down the stud welding system such that it is protected against shocks, vibrations and accidental falling over.
- Should workpieces be hotter than 50°C in places, take precautions to ensure people cannot burn themselves.
- Note and adhere to the stipulated maintenance intervals.



## Safety measures in the event of malfunctions

- Switch off the power unit immediately and pull out the mains plug.
- Secure the welding unit so that it cannot be switched on again and label it as defective.
- Protect hot workpieces against touch.
- After repair work the welding system must be checked to ensure it is fully functional. Check the cables for damage and all safety devices for working order (**chapter 5.1**).



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**Warning:** Only authorised electricians may open the power unit and work inside the housing.

The protective conductor must be connected to the housing again before closing.

---

## Increased electrical danger when working

- in narrow rooms with electroconductive walls.
- in wet, damp, extremely dry and hot rooms.
- on electroconductive parts (metal ladders, scaffolds, mounting rails, base plates, etc.) in rooms with restricted freedom of movement.
- under confined conditions between or on electroconductive parts.

---

**Warning:** Only devices marked with an "S" are permitted in these work conditions – devices for tip ignition are not permitted!

---

## Safety features of the power unit NOMARK 65/99

The power unit is equipped with the following safety features to protect against direct or indirect contact:

- Protective System IP 21:  
Protection against penetration of foreign bodies ( $\varnothing \leq 12.5$  mm).
- Protection against splash water, inclined up to  $60^\circ$  to perpendicular.
- Protection Class I: Device with basic insulation and connection of all touchable, conductive parts with the protective conductor.

The power unit is also equipped with a safety device (danger reducing device) that measures the voltage between the welding poles.

If a voltage of 70V is exceeded at the welding cable sockets outside the brief welding process time, the capacitors are automatically discharged for safety reasons and the device is switched over to "blocked". This prevents any danger.

## 2.3 Proper use

The applicable EN standards and accident prevention regulations were taken into consideration in the development of the power unit NOMARK 65/99. The power unit was built in accordance with the latest level of technology and is safe in operation.

Nevertheless the NOMARK 65/99 may pose a danger when it is operated by untrained personnel or is used improperly.

### Proper use involves adherence to the following points:

- The power unit NOMARK 65/99 is designed to weld welding studs by the tip ignition welding method (contact welding).
- The stud welding gun (C0) may only be equipped with welding studs for which the collet has been designed.
- The stud welding gun (C0) is a handheld device and may not be used in stationary applications.
- The specifications in these operating instructions with respect to combinations of materials ([chapter 1.9](#)) and the characteristics of welding elements and base metals must be observed.
- The range of applications for the power unit NOMARK 65/99 is restricted to closed industrial and commercial areas.  
The NOMARK 65/99 is only conditionally suitable for use in residential and business areas because it is likely to cause electromagnetic interference to electrical and electronic equipment.  
In this case the system operator must take suitable precautions.
- The power unit may only be operated with the replacement parts ([chapter 5.7](#), [chapter 5.8](#) and [chapter 5.9](#)) and accessories ([chapter 5.4](#)) specified in these operating instructions.
- Configurations of the power unit with welding guns from other manufacturers are prohibited.
- Unauthorised constructional changes to the power unit and/or welding gun are not permitted.
- The specified maintenance and inspection routines and replacement of wearing parts must be carried out as stipulated.

Proper use of the welding system also includes adherence to the general and special safety instructions in these operating instructions as well as the applicable **UVV** accident prevention regulations (**BGV A2**, **BGV D1**)<sup>1), 2)</sup>.

Violations of proper use or any applications not contained in these instructions are not permitted and could be dangerous. The manufacturer accepts no liability for resultant damage; the risk is borne solely by the user.

<sup>1)</sup> BGV A2: UVV "Electrical systems and operating materials" (01.04.1979)

<sup>2)</sup> BGV D1: UVV "Welding, cutting and related processes" (01.01.1993)

## 2.4 Guarantee and liability

Guarantee and liability claims for personal injury or damage to property are excluded if they can be attributed to one or more of the following causes:

- improper use of the power unit NOMARK 65/99.
- improper use of the stud welding gun (C0).
- non-adherence to the work and safety instructions and information in these operating instructions.
- non-adherence to the operating instructions for the power unit NOMARK 66/88 and stud welding gun.
- incorrect start-up, operation and maintenance of the welding system.
- use of the welding system in residential or business environments.
- use in damp, inflammable or explosive environments.
- start-up without properly fitted protective devices.
- improperly conducted repairs.
- repairs by unqualified personnel.
- unauthorised constructional changes to the system.
- non-adherence to the stipulated maintenance intervals.

The power unit NOMARK 65/99 with C0 is only designed for the range of applications specified in **chapter 2.3** "Proper use".

Before employing the power unit outside its range of application, consult your TWS specialist advisor, otherwise the guarantee will become void.

- For damage and the like arising from operation of the power unit with the welding guns of other manufacturers, no claims of whatever type can be made against TWS unless it can be proven by an expert that the damage was clearly caused by negligent design or manufacture by TWS and this was foreseeable at the time of design.

## 2.5 Copyright

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The copyright to these operating instructions belongs to TWS.

These instructions contain drawings of a technical nature that may not, in whole or in part, be duplicated, used without authorisation for competitive purposes or given to others.



15th October 2012

## **DECLARATION OF CONFORMITY**

We, THOMAS WELDING SYSTEMS SA, Zone Industrielle, 3<sup>ème</sup> RUE, B. 6040 JUMET (BELGIUM) declare, solely that the product

**NOMARK 65 / NOMARK 99**

mentioned in this declaration, complies with the following standards and / or normative documents :

Low Voltage EN 60974-1

EMC EN 50199

and thus declare that the mentioned product comply to the essentials requirements of the LVD directive 2006/95/EEC.

Pascal THOMAS

### **3 Delivery ... Installation**

- 3.1 Extent of delivery
- 3.2 Receiving inspection
- 3.3 Storage
- 3.4 Transport
- 3.5 Place of use
- 3.6 Erection
- 3.7 Power connection



### 3.1 Extent of delivery

The extent of delivery for the power unit NOMARK 65/99 contains the following components and accessories:

- 1 power unit NOMARK 65/99
- 1 welding gun C0 or C1
- 1 earth cable with two earth clamps.
- Accessories set including :
  - 1 socket spanner (width across flats 17 mm)
  - 1 welding gun Chuck M3
  - 1 welding gun Chuck M4
  - 1 welding gun Chuck M5
  - 1 welding gun Chuck M6
  - 1 welding gun Chuck M8
- 1 set of operating instructions for NOMARK 65/99 with C0/C1 gun

**Note:**

The article numbers for orders are to be found from chapter 5.4 on.

The accessories are only free of charge when ordering a complete set.

### 3.2 Receiving inspection

The power unit was checked for working order before dispatch.

It must be checked on delivery for damage and completeness of the parts contained in the extent of delivery.

The manufacturer or responsible haulage company must be notified immediately of any transport damage and/or missing parts.

### 3.3 Storage

If the power unit NOMARK 65/99 is not put into operation directly after delivery, it must be stored in a secure place.

The complete power unit must be protected adequately against dust and moisture.

To preserve the lifetime of the capacitors, the power unit must be switched on for about an hour every six weeks, with the charging voltage being raised gradually from 1 to 10. Then turn the charging voltage regulator back to position 1.

### 3.4 Transport

To avoid damaging the power unit, the NOMARK 65/99 should only be transported using the carrying handle provided.

### 3.5 Place of use

Use of the power unit NOMARK 65/99 is restricted to closed industrial and commercial rooms.

When using the system in residential and business environments the operator must take special measures to ensure that the electromagnetic fields arising during welding do not represent a danger to people and property.



#### **Danger:**

- Caution! Danger to life! Wearers of cardiac pacemakers must keep clear of the vicinity of stud welding systems.
- The electromagnetic fields arising during welding can disrupt or damage other electrical or electronic equipment. For this reason a minimum distance of 10 m must be kept between the welding system and other electrical and electronic equipment.
- Do not operate the power unit in the vicinity of data storage media. Their contents may be deleted.
- Use of the power unit in rooms where there is a danger of fire or explosions or in damp rooms is strictly forbidden.
- Solvents containing chlorine must be removed from the welding area. They may not be exposed to the arcs of the welding system.

### 3.6 Erection

Place the power unit on a horizontal, vibration-free and non-slip surface. The bearing strength of the surface must be at least twice the weight of the power unit.

Due to the design and power of the NOMARK 65/99, thermal stresses occur in the housing. These temperatures are reduced by a fan.

Make sure the air inlet is always kept free.

To keep the temperature level low, the fan is switched on at a device temperature of 60°C.

To ensure unhindered heat exchange with the surroundings, the power unit must be kept at least 1 m away from other sources of heat.

### 3.7 Power connection

The power cable with plug is located at the back of the unit.

The following mains ratings must be observed:

- Mains voltage: 230V (factory setting)
- Mains frequency: 50Hz (factory setting)
- Mains fuse: min. 10A (slow-blow)

The control voltage for all welding gun functions is supplied by the power unit.

**Note:** If the standard factory setting of 230 V/ 50 Hz is to be changed to 115 V/60 Hz, you must contact TWS.



**Warning:** Switch off the power unit and pull out the mains plug before opening.

The following safety precautions must be taken before the power unit is connected to the mains power supply:

- Only use mains power sockets with tested protective conductor function. This test must be performed by an electrician.
- Compare the values of the mains power supply with the specifications on the rating plate. If they do not correspond, consult an electrician to take appropriate steps (see above).

When the above precautions have been taken, the power unit can be connected to the mains power supply.

## **4 Operation**

- 4.1 Connections of the power unit
- 4.2 Chuck preparation
- 4.3 Adjusting the C0
- 4.5 Tips for good welding results
- 4.6 Work procedure during welding
- 4.7 Testing the weld

All connection sockets and operating elements are arranged freely accessible on the front panel of the power unit NOMARK 65/99.

The mains power switch is located at the back of the unit



## 4.1 Connections of the power unit

The power unit is designed for connection of the welding gun C0 or C1.



**Caution:** If welding guns from other manufacturers are connected to the power unit, no guarantee regarding safety and functionality of the welding system can be given. TWS accepts no liability for damage caused by the use of guns from other manufacturers.



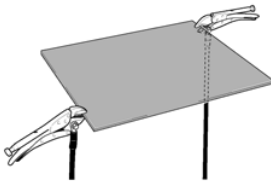
**Warning:** The power unit NOMARK 65/99 must be switched off before carrying out connection work. The main switch must be in the position "0".

Lay the cable such that it does not represent a tripping danger.

### 4.1.1 Connecting the earth cable

Connect the earth cable directly to the workpiece or to the workpiece holder (welding bench, welding grate, etc.) provided.

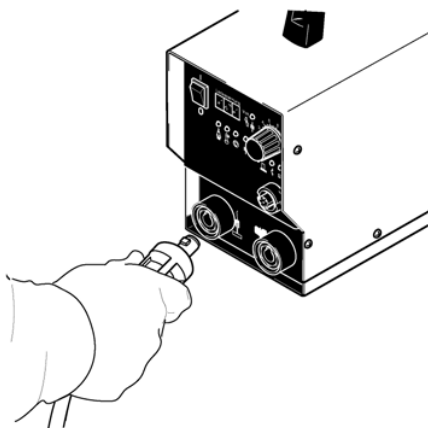
**Note:** Steel structures, pipes, etc. may not be used as current conductor if they are not themselves the workpiece that is to be welded.



**Warning:** Observe all applicable safety regulations and take suitable safety precautions.

**Note:** The welding current circuit may not be earthed.

Exception:  
the workpiece itself is earthed by necessity (steel structure, shipbuilding, pipes, etc.).



- The welding site must lie between the two earth clips: do not place the two earth clips too close to the welding site and – if possible – position them symmetrically and equidistant to the welding site. In this way you avoid a magnetic arc blowing action (sideways deflection of the arc).
- Plug the earth cable plug into the connection socket marked .
- Fasten the earth cable plug firmly in place by turning it strongly clockwise.

#### 4.1.2 Connecting the welding gun

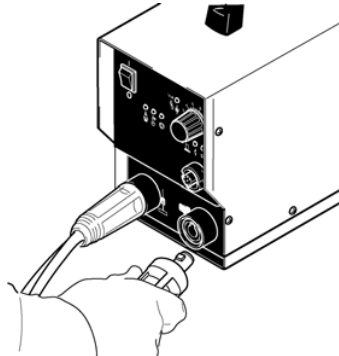


**Caution:**

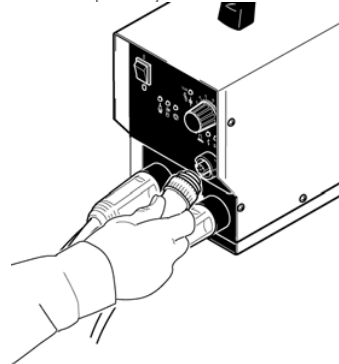
Make sure the power unit is switched off.

- Plug the welding cable plug into the connection socket marked .

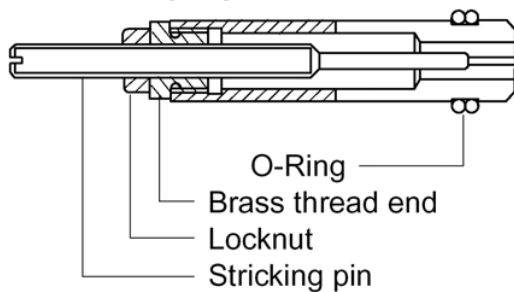
- Fasten the welding cable plug firmly in place by turning it strongly clockwise.



- Plug the control cable plug into the corresponding connection socket and lock it in place.



## 4.2 Chuck preparation



The Chuck is selected in dependence on the welding element (welding stud). The extent of delivery of the stud welding system contains chucks from M3 to M8.

The suitable Chuck must then be adjusted to the length of the welding element

**Note:** Chucks are wearing parts and should therefore always be kept in stock and ordered in time (see chapter 5.10).

### Procedure

1. Select a **Chuck** fitting the diameter and form of the welding element.

2. Depending on the length of the welding element, fit the **striking pin** in the Chuck as follows:

a) Welding elements up to **20 mm** in length:

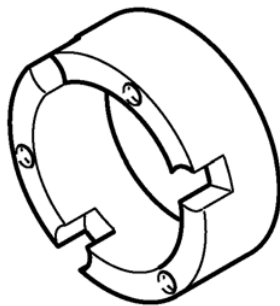
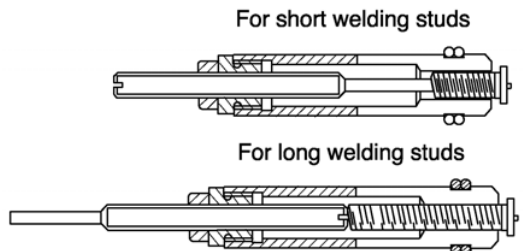
The unthreaded part of the striking pin is located *inside* the chuck.

b) Welding elements from **20 to 40 mm** in length:

The unthreaded part of the striking pin is located *outside* the chuck.

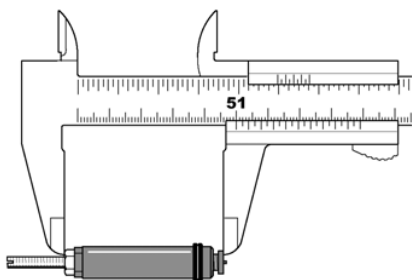
c) Welding elements **over 40 mm** in length:

An intermediate ring (accessory part) is additionally required (see chapter 1.19 and chapter 5.4).



3. Equip the Chuck with the welding element.

4. Turn the striking pin until the distance between locknut and stud face is:  
when using the C0: **51 mm** (to max. **53 mm**)



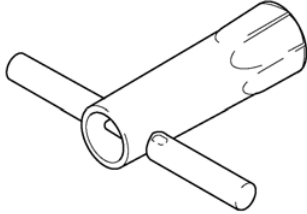
**Note:** Add 12.5 mm when using a Chuck extension!

5. **Warning:** Switch off the power unit before inserting the Chuck (to rule out any eventualities).



**Caution:** The retaining nut may not be tightened when there is no Chuck in the welding gun.

6. Loosen the retaining nut (if it is tight) by turning 90° with the socket spanner.



7. Insert the Chuck to the stop in the plunger of the welding gun.

8. Then tighten the retaining nut firmly.



**Caution:** Make sure that the bellows is positioned correctly on the retaining nut.



### 4.3 Adjusting the C0 and C1 gun



The electrical and mechanical welding parameters are set at the power unit and on the welding gun.

#### Welding time

- The welding time depends on the **stud speed**. It is adjusted indirectly via the **spring force**. The greater the spring force is, the higher the speed of the welding element and therefore the shorter the welding time.

The spring force is set with the adjusting knob (

#### Turning clockwise:

The spring force is increased, thereby **reducing** the welding time.

#### Turning anticlockwise:

The spring force is reduced, thereby **increasing** the welding time.



**Note:** To prevent damage to the adjusting mechanism, never use force to turn the adjusting knob into its end positions.

#### Procedure

- Find your material combination and the diameter of the welding element in table 4 - 1.
- Turn the adjusting knob until the spring force indicator on the welding gun shows the value from the table.

Material combination	Welding element														
	St 37-3 or similar					CrNi steel 1.4301; 1.4303					AlMg 3 or similar				
	ø3	ø4	ø5	ø6	ø8	ø3	ø4	ø5	ø6	ø8	ø3	ø4	ø5	ø6	ø8
Unalloyed structural steel up to C30	1-2	1-2	1-2	1-2	1-2	1-2	1-2	1-2	1-2	1-2	-	-	-	-	-
Steel sheet/plate < 25 µm galvanised	1-2	1-2	1-2	1-2	-	1-2	1-2	1-2	1-2	1-2	-	-	-	-	-
CrNi steel 1.4301; 1.4303	1-3	1-3	1-3	1-3	1-3	1-3	1-3	1-3	1-3	1-3	-	-	-	-	-
AlMg 3 or similar	-	-	-	-	-	-	-	-	-	-	4-6*	4-6*	4-6*	4-6*	-

Tab: 4 - 1 Recommended **spring force** [mm] for contact stud welding gun **C0/ C1**

\* Aluminium joints can only be welded with the contact welding gun with limitations

## Charge voltage

The welding current strength is regulated via the **charge voltage** of the power unit (see table 4 - 2).

To set the charge voltage, turn the power regulator (see chapter 1.6) until the digital display shows the voltage value required.

Material combination	Welding element														
Workpiece	St 37-3 or similar					CCrNi steel 1.4301; 1.4303					AlMg 3 or similar				
	ø3	ø4	ø5	ø6	ø8	ø3	ø4	ø5	ø6	ø8	ø3	ø4	ø5	ø6	ø8
Unalloyed structural steel up to C30	65V	75	95	130	160	65	75	95	115	160	-	-	-	-	-
Steel sheet/plate < 25 µm galvanised	75	95	115	145	190	75	95	115	145	190	-	-	-	-	-
CrNi steel 1.4301; 1.4303	60	65	75	95	145	60	65	75	115	145	-	-	-	-	-
AlMg 3 or similar	-	-	-	-	-	-	-	-	-	-	65*	75*	95*	115*	-

Tab: 4 - 2 Recommended **charge voltage** [V] in the power unit **NOMARK 65/99**

\*

\* Aluminium joints can only be welded with the contact welding gun with limitations

**Note:** The settings in the tables are approximate values only, attained

under optimised welding conditions.

The settings of the power unit and welding gun must be adjusted exactly to the respective welding job (e.g. to the base metal) in dependence on the welding result (see also chapter 4.7 Testing the weld).

## 4.5 Tips for good welding results

The following tips contain important information on how to achieve good weld joints.

1. The welding elements and workpieces must be weldable. Only use material combinations specified in these operating instructions (otherwise suitable tests must be carried out beforehand to confirm the necessary quality features).
2. Make sure that the maximum roughness of the welding zone does not exceed 80  $\mu\text{m}$ .
3. The welding zone should be metallically bright:  
Workpieces of aluminium or with aluminium coating may only be cleaned with a *rust-free* wire brush.  
Carefully remove all soiling like rust, scale, paint, moisture, grease and oil.  
Strip anodised workpiece surfaces with a caustic soda lye or grind them clean.
4. The welding site must be designed so that there is always a surface of at least  $\varnothing$  40 mm available to receive the positioning feet.  
When using centring tubes or similar, at least  $\varnothing$  20 mm.
5. Make sure the workpiece is supported such that it is free of vibrations. This is especially important in the case of large and thin walled workpieces.
6. Always lay the welding and earth cables free of loops. In this way electromagnetic influences can largely be avoided.
7. Fasten the earth clips symmetrically to the welding site and not too close to it. In this way flaws in the weld quality caused by arc blowing can be avoided.
8. Make sure there is a good transfer of current (low resistance) at all contact points in the welding circuit (welding cable connections, chuck, earth cable connection, earth clips).
9. Observe the necessary settings on the welding gun and power unit for your welding job.
10. The welding gun and workpiece may not be moved during the welding process.
11. Always pull the gun off the welding element vertically. This prevents overstretching of the Chuck blades.
12. Avoid welding on one workpiece with more than one welding system at the same time (possible influence on the arcs).
13. In order to check that the settings are correct, a number of trial welds should always be performed before commencing work. The

quality of the welding results must be checked.

**14.** Check the clamping force of the Chuck blades from time to time and bend them together a little if necessary. This increases the lifetime of the chuck.

## 4.6 Work procedure during welding

Before commencing welding work make sure that the welding gun and power unit are connected correctly (chapter 4.1) and the set values correspond to the welding job. Observe the following safety information.



**Warning:** All persons working with the welding system must observe the safety information in chapter 2 before commencing work. When the start button is pressed, the Chuck and the welding element carry current for approx. 10 ms. These parts may not be touched during welding!

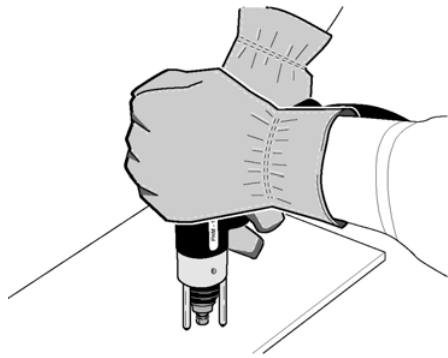
### Preparing the welding gun C0 / C1:

- Equip the gun with a suitable chuck.
- Set the "spring force" (for C0) according to the instructions (chapter 4.3 and chapter 4.4).
- Insert a welding element in the chuck.

### Preparing the power unit NOMARK 65/99:

- Switch on the power unit. Carry out the start check (see page 13).
- Set the charge voltage according to the approximate values specified in chapter 4.3 and chapter 4.4. The setting can be read on the digital display.
- A number of trial welds must be carried out (with the specified values) to find the optimum setting.

### Work procedure:

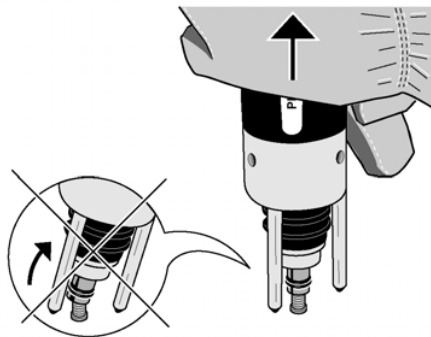


1. If not already done, insert a welding element in the chuck. Position the welding gun on the welding spot vertically. The contact LED lights up.

2. Press the welding gun vertically (90°) against the workpiece surface with both hands.

3. Hold the welding gun steady and press the start button. The welding process is started. At the same time the start LED lights up

A trigger block prevents the welded welding element from being welded again. The power unit remains discharged.



4. After welding remove the welding gun vertically from the welded welding element.

The LED "contact" go out and the power unit charges the capacitors for the next welding operation.

5. Check the welding result in accordance with chapter 4.7. If the welding result is not satisfactory, the settings must be optimised.



**Warning:** After completing welding work or in the case of longer breaks in welding work disconnect the machine from the mains power supply and secure it against unauthorised use.

## 4.7 Testing the weld

Testing of the weld in continuous production monitoring is restricted to a visual inspection of the welded stud. Further testing is possible, but complex. Consult your TWS specialist advisor or study DVS Guideline\*) 0905 Part 2 in this regard. If a weld is thought to be defective, an impact bending test must be carried out on the welding studs concerned according to section 4.7.2.

\*) DVS Guideline 0905 Part 2: Ensuring the quality of stud welds "Stud welding with tip ignition"

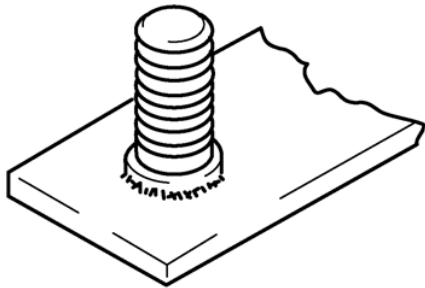
\*\*) DIN 8563 Part 10: Ensuring the quality of stud welds (edition: December 1984)

### 4.7.1 Visual inspection

Every welded welding element must be checked visually.

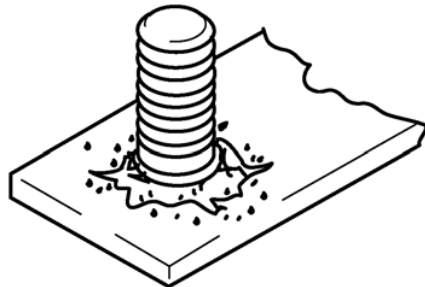
Besides

assessing the **weld bead** for form, size and appearance, you should also check the **nominal length** of the welded stud.



#### 1. Good welding:

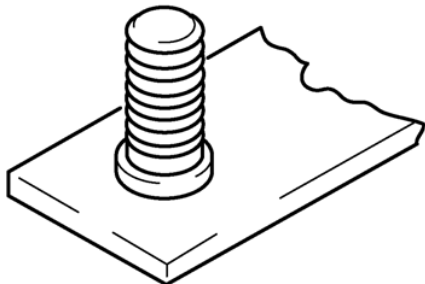
The bead is closed and has a shiny surface. There is no visible undercutting at the bottom of the welding element. Small notches between weld bead and stud shaft are unavoidable and can be ignored.



#### 2. Welding too hot:

Deep notches can be seen between weld bead and stud shaft. Due to the strong melting, the melt zone at the stud middle is recessed.

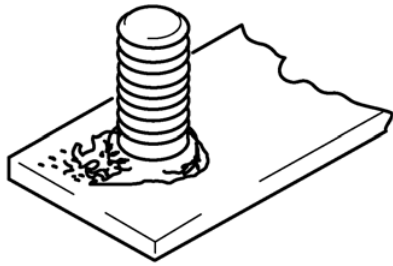
The excess weld metal was flung out of the welding zone. (Spring force or lift too low.)



#### 3. Welding too cold:

The form and height of the weld bead are irregular. Distinct undercutting can be seen at the stud edge. Due to the low energy, the melt zone under the complete stud cross-section is very flat.

(Spring force or lift too high.)



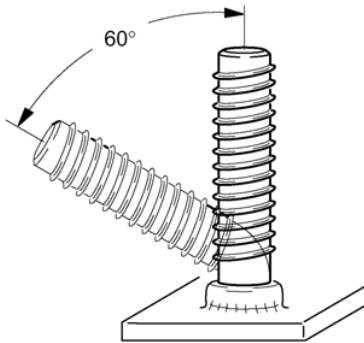
#### 4. Welding too irregular:

The weld bead is asymmetrical (as a result of magnetic arc blowing action) and the stud edge is undercut on one side. (Possibly change earth clip positions.)

#### 4.7.2 Impact bending test

The impact bending test is one of the most common test methods to check welding parameters and to identify defective welds.

If a weld joint is thought to be defective or the fusion length of the stud is too short, the impact bending test must be carried out as follows:



Bend the welding element by 60° with a hammer or bending device. This stresses the weld joint in tension, pressure and bending by an undefined amount.

- The impact bending test is deemed as passed if there are no cracks to be seen in the welding zone.
- If the welding element is torn out of the base metal (a recess is formed in the workpiece), the weldability of the materials is deemed proven.
- If the welding element breaks off in the welding zone, you must check whether:
  - both materials are weldable,
  - the material combinations are weldable,
  - the ignition tip is in order,
  - the settings on the welding gun and power unit are correct and the welding gun or power unit is defective.

If these requirements are not met, an impact bending test must also be carried out on the three previous and three next welds.



**Warning:** Welding work may only be continued when satisfactory test results are obtained.

## 5 Maintenance

- 5.1 Troubleshooting
- 5.2 Care and cleaning
- 5.3 Maintenance intervals
- 5.4 Conversion and wearing parts
- 5.5 Fuse elements
- 5.6 Technical specifications
- 5.7 Replacement parts NOMARK 65/99
- 5.8 Replacement parts C0
- 5.9 Block circuit diagram
- 5.10 Spare parts and welding accessories
- 5.11 Blank page for notes



## 5.1 Troubleshooting

In the event of a malfunction proceed as follows:

1. Switch off the power unit.
2. Unscrew the control, earth and welding cables from the power unit.
3. Switch on the power unit.
4. If in addition to the *main switch*, the *mains power LED*, the *capacitors charge status LED* and the *display* **any other LED** then also lights up, switch off the power unit again and contact TWS.



**Warning:** In the event of a system malfunction the power unit must be switched off, disconnected from the mains and secured to that it cannot be switched on again.

If no other LED lights up, you can take the following remedial measures:



**Warning:** Faults in the power unit NOMARK 65/99 requiring the housing to be opened may only be repaired by authorised electricians!

Faults in the welding gun requiring only replacement of mechanical replacement parts can be repaired by skilled personnel with the aid of the exploded view (chapter 5.8 and chapter 5.9).

After repair a function test of the protective circuits must be carried out by an electrician.

Only replacement parts specified in the corresponding part lists may be used to replace parts!

Malfunctions that cannot be repaired by the remedial measures listed below may only be repaired by TWS or authorised repair technicians.

1. First carry out the **start check** (page 13).  
If the test results is negative, continue with the relevant point in table 5 - 1.

Indicators	Situation	Cause	Remedy
	2. Main switch does not light up although it is switched on	<ul style="list-style-type: none"> <li>• NOMARK not connected</li> </ul> Fault in: <ul style="list-style-type: none"> <li>• Main switch or lamp</li> <li>• Power cable</li> <li>• Mains power plug</li> <li>• Mains fuse</li> </ul>	<ul style="list-style-type: none"> <li>• Connect NOMARK and switch on!</li> </ul> Check*) and replace if necessary*): <ul style="list-style-type: none"> <li>• Main switch or lamp</li> <li>• Power cable with plug</li> <li>• Mains fuse (in switch box)</li> </ul> Replace fuse in NOMARK 65/99*) (see chapter 5.5) Replace fuse*) (see chapter 5.5)
	3. Main switch lights up, Display does not light up	Fuse defective	Replace fuse*) (see chapter 5.5)
	4. Main switch lights up, Display does not light up	Fuse defective	Replace fuse*) (see chapter 5.5)
	5. G1 is connected, but LED "magnet" does not light up	Control cable damaged (e.g. loose contact); hoisting magnet in gun defective	Connect another gun and check whether the LED then lights up; replace cable or hoisting magnet if necessary*)
	6. No G1 connected, but LED "magnet" still lights up	Fault in power unit	Shut down NOMARK and mark as defective so that it is not switched on again; notify TWS after sales service
	7. LED "blocked" lights up	<ul style="list-style-type: none"> <li>• Malfunction</li> <li>• Fault in power unit</li> </ul>	<ul style="list-style-type: none"> <li>• Switch NOMARK off and then on again. If LED does not light up again, continue working.</li> <li>• Shut down NOMARK and mark as defective so that it is not switched on again; notify TWS after sales service</li> </ul> Replace fuse*) (see chapter 5.5)
	9. Ready LED does not light up	Fuse defective	Replace fuse*) (see chapter 5.5)
	10. Contact LED does not light up on contact with the workpiece	<ul style="list-style-type: none"> <li>• No earth or welding cable connected</li> <li>• One of the cables is defective</li> <li>• NOMARK 65/99 defective</li> </ul>	<ul style="list-style-type: none"> <li>• Connect earth, control and welding cables to NOMARK</li> <li>• Replace cable if necessary</li> <li>• Notify TWS aftersales service</li> </ul>
	11. Start LED does not light up although the start button is being pressed	<ul style="list-style-type: none"> <li>• Control cable not connected to NOMARK 65/99</li> <li>• Control cable defective</li> <li>• gun defective</li> <li>• NOMARK 65/99 defective</li> </ul>	<ul style="list-style-type: none"> <li>• Connect and fix cable</li> <li>• Replace cable if necessary</li> <li>• Connect another gun and test LED again</li> <li>• Notify TWS after sales service</li> </ul>
	12. Start LED lights up although the start button is not being pressed	<ul style="list-style-type: none"> <li>• Short circuit in control cable</li> <li>• Start button defective</li> </ul>	<ul style="list-style-type: none"> <li>• Replace control cable or start button if necessary (see chapter 5.8 or chapter 5.9)</li> </ul>



\*) **Check only by electricians!**

Tab: 5 - 1 Troubleshooting using LED indicators

Indicators	Error number	Cause	Remedy
Voltmeter Display	E 1	Gun trigger pressed at machine switch ON	Check gun trigger
	E71	Weld SCR defect	
	E72	Capacitors are not charging	Check fuse or overheat of the machine
	E73	Capacitors are still charged when unit is switched ON	
	E74	Main relay defect	
	E75	Defect charging SCR	
	E76	Capacitors are not charging during the test when unit is switched ON	Check fuse or overheat of the machine
	E77	Capacitors are discharging too fast.	Check Main relay and the discharge resistances.
	E78	No weld (no discharge)	- Weld SCR defect. - Control Board defect - Bad electrical contact in the welding circuit (gun/plate)
	E79	Capacitors voltage is too high (> 210 v)	

Tab: 5 – 1b Troubleshooting using Voltmeter LED display

Malfunction or change	Situation	Cause	Remedy
	Charging cycle takes longer	Temperature NOMARK is high	Clear air slots of NOMARK 65/99 if appropriate; keep adequate distance between NOMARK and other objects; remove heat sources from environs; shield against heat radiation
	<b>Welding is not Started</b>	No welding element in chuck (LED "contact" off)	Insert welding element in chuck and repeat welding
	<b>Welding is not Started</b>	Welding element does not have an ignition tip	Insert welding element with ignition top in Chuck and repeat welding
	<b>Welding is not Started</b>	Control cable defective	Check control cable and replace if necessary
	<b>Welding is not Started</b>	Gun micro switch defective	Check micro switch and replace if necessary
	<b>Welding is not started</b>	Control board defective	Replace control board*) or notify TWS Tech after sales service



\*) Check only by electricians!

Tab: 5 - 2 Defective welds or malfunctions

**Note:** Never weld with an overlarge or expanded Chuck because the Chuck will be damaged.

- Never weld without stud because the Chuck will then also be damaged.

## Welding result defective

1. The start check (see page 13) has been carried out (indicators are okay).
2. Defective welding results were achieved:

### Situation

- Defective weld

- "Cold weld"

- "Very hot weld"

- "Bond weld, stud does not hold"

- Stud shaft or stud thread scorched

- Constantly changing welding results

- Irregular welds

- Arc drop during welding (no-load welding))

- Welding stud crooked

- Welds with distinct beading on one side (blowing action)

### Cause and remedy

- Set correct charging voltage (see table 4 - 2 and table 4 - 4)
- Set welding gun (see table 4 - 1 and table 4 - 3 and chapter 4.7)
- General: study and apply chapter 4.3 to chapter 4.7 inclusive
- Chuck : clean or replace
- Welding time too short (spring force or lift too high)
- Welding time too long (spring force or lift too low)
- Very strong melting loss, stud does not lift off
  - ♦ Increase spring force or lift significantly, clean or replace gun plunger
- Chuck does not match the welding element dimensions -> use a suitable chuck
- Chuck has been expanded □□ retighten or replace (in future pull off the gun vertically from the welded studs)
- Place gun on workpiece at right angle; replace positioning feet if necessary
- Gun plunger is stiff -> clean or replace
- Gun plunger is stiff -> clean or replace
- Clean welding site of oil, grease and other contamination
- Check workpiece for spring
- Check spring force or lift
- Clean supporting feet or supporting tube
- Optimise earth clip position
- Place gun on workpiece at right angle
- Replace worn or bent positioning feet
- Replace positioning tube
- Eliminate magnetic arc blowing action by
  - changing the position of the welding cable
  - changing the position of the earth clips (see fig. 1 - 12)
  - bringing in additional plates on iron parts



\*) **Check only by electricians!**

## 5.2 Care and cleaning

The stud welding system does not require any special care. The following cleaning work is nevertheless recommended.

The cleaning intervals depend on the degree of soiling, but should not exceed max. six months.



**Warning:** The power unit must be switched off and disconnected from the mains power supply *before* cleaning.

### Welding gun

- It must be ensured that the handle of the welding gun is always dry, clean and free of greases and oils.



**Caution:** No aggressive agents, agents containing alcohol or in- flammable liquids may be used to clean the welding system.

- Positioning feet and chucks soiled with weld spatter must be cleaned with a brass wire brush.

### Power unit

- The housing must be wiped with a damp cloth. The rating plate and safety information must be kept in a legible condition.



**Caution:** No aggressive agents, agents containing alcohol or in- flammable liquids may be used to clean the welding system.

- The front panel of the power unit must be cleaned with a grease dissolving cleaning agent. The LED indicators must be clearly readable in operation.
- All connecting cables must be cleaned with a dry cloth. Scorched sites or mechanical defects can then be detected more easily. The cables must be replaced if necessary.
- It might also be necessary to clean the inside of the device if it is very dirty.

### Connecting cables

### Inside the device



**Warning:** Only authorised electricians may open the power unit and work inside the housing.

The power unit must be switched off, disconnected from the mains power supply and secured so that it cannot be switched on again before opening.

- Dirt and contamination inside the power unit like metallic dust or conductive chips must be sucked off. They may not be blown out with compressed air!




**Warning:** After the cleaning work the device must be restored to and handed over in orderly condition so that – when used properly in accordance with these instructions – it does not pose a danger to the user or the environment.

## 5.3 Maintenance intervals

You can avoid malfunctions caused by inadequate maintenance by adhering to the following maintenance intervals. The maintenance intervals and instructions specified in the table below presuppose proper use under normal conditions.



**Warning:** Maintenance work requiring the power unit NOMARK 65/99 to be opened may only be carried out by authorised electricians

Maintenance intervals	Maintenance instructions
Every 8 hours or daily	<ul style="list-style-type: none"> <li>• Check the <b>welding cable, earth cable, control cable</b> and <b>power cable</b> for external damage – replace defective cables immediately.</li> <li>• Check the <b>Chuck</b> (wearing part) for adequate clamping force and wear; replace if necessary.</li> <li>• Check the <b>welding cable plugs</b> for firm connection; tighten if necessary – replace scorched plugs.</li> <li>• Check the <b>retaining nut</b> of the gun for firm seating; tighten if necessary.</li> <li>• Check the <b>bellows</b> for correct seating and adjust if necessary – replace if damaged.</li> <li>• Check the <b>positioning feet</b> for firm seating; tighten if necessary – replace bent feet.</li> <li>• Check the <b>gun plunger</b> for ease of movement – clean with a brass brush.</li> </ul>
Every 35 hours or weekly	<ul style="list-style-type: none"> <li>• Check <b>connections</b> and <b>operating elements</b>.</li> <li>• Make sure the LEDs work.</li> </ul>
Every 800 hours or half-yearly	Power unit NOMARK 65/99: Check for dirt and contamination*) inside the housing and clean*) if necessary according to chapter 5.2. Check all screw connections.
Every two years	<ul style="list-style-type: none"> <li>• General inspection of the power unit by repair technician and electrician.</li> </ul>
	 <b>*) Check only by electricians!</b>

Tab: 5 - 4 Periodic maintenance intervals



**Warning:** After the cleaning work the device must be restored to and handed over in orderly condition so that – when used properly in accordance with these instructions – it does not pose a danger to the user, other people or the environment.

## 5.4 Fuse elements

To protect against impermissibly high currents, the back of the power unit is equipped with one fuse to protect the circuits:

- Fuse 10 A / 250 V – Time Long

The mains power socket to which the power unit is connected should be protected with a fuse of at least 10 A.

*Tab: 5 - 14 Fuses in NOMARK 65/99*

*Fig. 5 - 15 NOMARK 65/99: Back view with fuses*



**Warning:** Always replace defective fuses with like fuses of identical ratings.

## 5.5 Technical specifications

### **Power unit : NOMARK 65 / 99**

Welding method	tip ignition in contact welding
Input voltage / Frequency	NOMARK 65 / 99 (230 V) 230V(±10%) / 50Hz-60Hz (see chapter 3.7) NOMARK 65 / 115 V 115V(±10%) / 50Hz-60Hz (see chapter 3.7)
Mains fuse external	NOMARK 65 (230 V) : T 6.3 A NOMARK 99 (230 V) : T 10 A NOMARK 65 (115 V) : T 10 A
Charge capacity max	NOMARK 65 : 66.000 µF NOMARK 99 : 99.000 µF
Charge voltage	40 to 200 V, continuously adjustable
Fuses:	
Mains voltage	10A / 250V
Cooling	fan (AF)
Protective system	IP 21
Protection class	I (one)
Dimension	(l x w x h) 400 mm x 195 mm x 270 (315) mm
Weight	NOMARK 66 : 12,5 Kg NOMARK 99 : 14 kg
Power cable	length: 3 m line cross section: 3 x 2,5 mm <sup>2</sup>

### **Earth cable (standard)**

Earth cable including	
1 plug and 2 clamps	length 2.5 m.  cross section: 2 x 25 mm <sup>2</sup> ; highly flexible



## 5.6 Explosion view of NOMARK 65 / 99

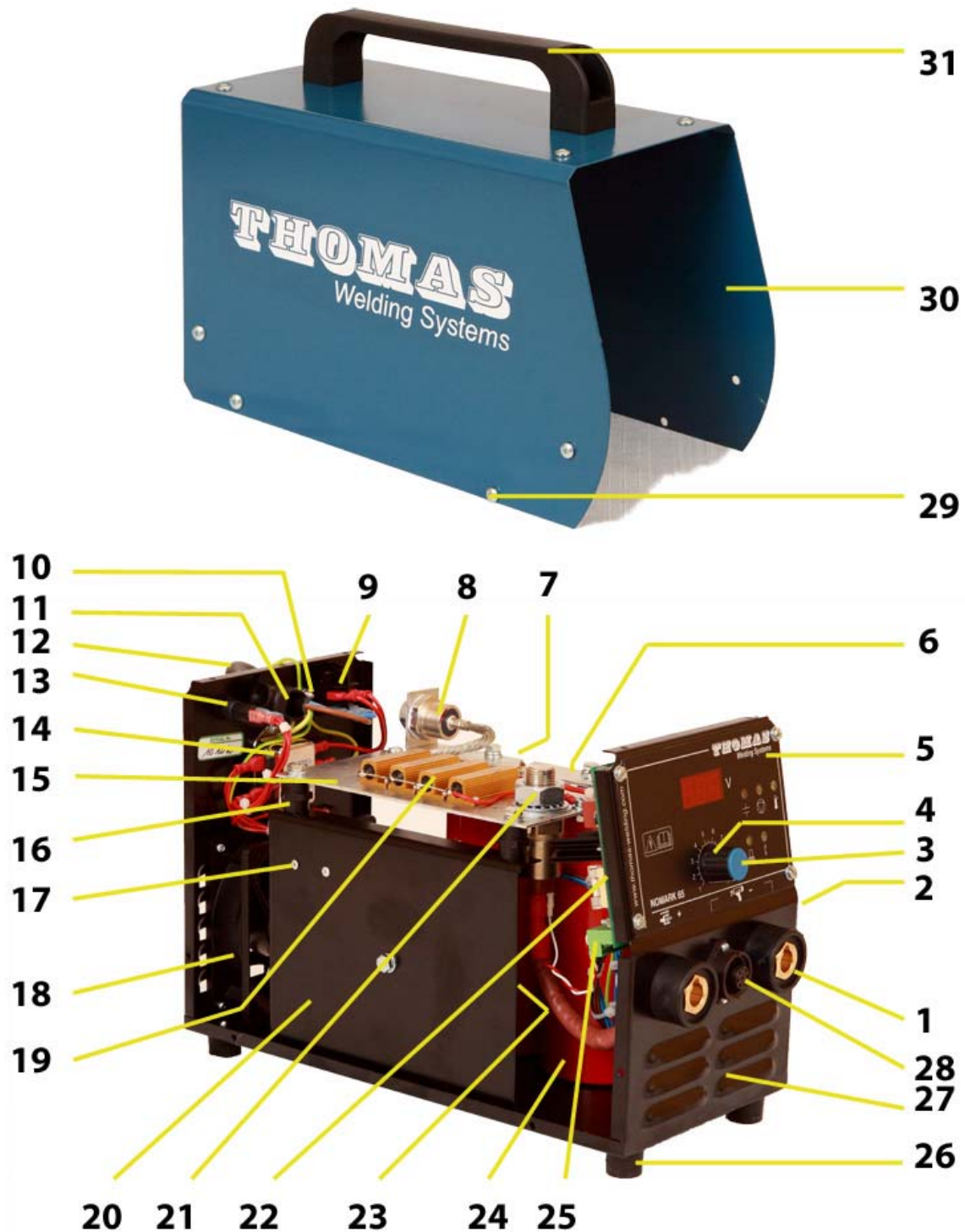


Fig. 5 - 18 Explosion view NOMARK 65 / 99.

Item	Article no.	Part /description	Qty
1.	650.668	Panel mounting weld socket	2
2.	101.002	Panel plug link "U" bar	1
3.	101.003	Knob cap	1
4.	101.004	Knob	1
5.	101.005	Control Panel overlay (NOMARK 65)	1
or	101.040	Control Panel overlay (NOMARK 99)	1
6.	101.006	Negative bus bar	1
7.	101.007	Mounting Pillar	2
8.	101.008	Free wheel diode	1
9.	101.009	Mains On/Off switch	1
10.	101.010	Earth screw	1
11.	101.011	Strain Relief	1
12.	101.012	Cord set (230V)	1
13.	101.013	Fuse holder	1
	122.987	T 6.3 A Fuse (Not shown) NOMARK 65 / 230 V	1
or	100.014	T 10 A Fuse (Not shown) NOMARK 65 / 115 V	1
or	100.014	T 10 A Fuse (Not shown) NOMARK 99 / 230 V	1
14.	101.014	Main filter	1
15.	101.015	Positive bus bar	1
16.	101.016	Insulator Nut	4
17.	101.017	Thermal switch for fan control (NOMARK 65)	1
or	-	No Thermal switch (NOMARK 99)	0
18.	101.018	Fan	1
19.	101.019	Resistor (NOMARK 65)	4
or	101.019	Resistor (NOMARK 99)	5
20.	101.020	Mounting plate	1
or	101.061	Mounting plate NOMARK 65 / 115 V	1
	101.062	Terminal Block NOMARK 65 / 115 V	1
21.	101.021	Welding SCR (NOMARK 65)	1
or	101.050	Welding SCR (NOMARK 99)	1
	101.051	SCR Box clamp (NOMARK 99)	1
	101.052	SCR Mounting plate (NOMARK 99)	2
	101.053	Positive connection cable	1
22.	101.022	Control & Display PCB (NOMARK 65) Fuse F2 : T 6.3 A	1
or	101.022	Control & Display PCB (NOMARK 99) Fuse F2 : T 10 A	1
23.	101.023	Main transformer (NOMARK 65)	1
or	101.060	Main transformer (NOMARK 65 / 115V)	1
or	101.054	Main transformer (NOMARK 99)	1
24.	101.024	33.000 µF capacitors (NOMARK 65)	2
or	101.024	33.000 µF capacitors (NOMARK 99)	3
25.	101.025	PCB Connector	1
26.	101.026	Casing foot	4
27.	101.027	Housing base plate	1
28.	101.028	Panel mounting control socket	1
29.	101.029	Housing cover screw	12
30.	101.030	Housing cover	1
31.	101.031	Carrying handle	1

*Tab: 5 - 19 Replacement parts list NOMARK 65 / 99*

*Fig. 5 - 20 Block circuit diagram*



## 5.8 Technical specifications

### C0 Gun

Type	contact stud welding gun C0
Welding range	M3 – M8 (M 10)
Weight	0,6 kg (without cable)
Noise level	max. 107 dB(A)
Welding & control cable	length: 4 m Weld cable cross section: 25 mm <sup>2</sup>

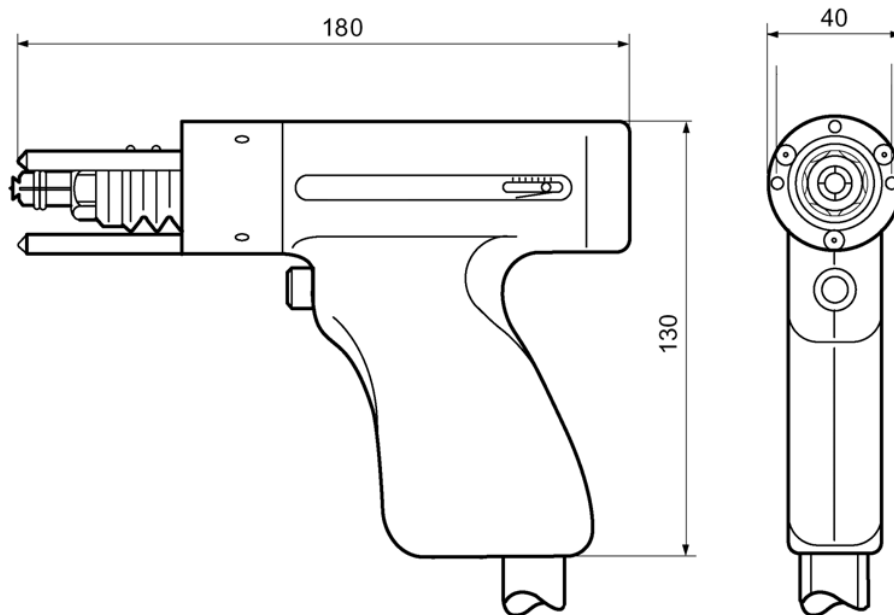


Fig. 5 - 21 Dimensions C0

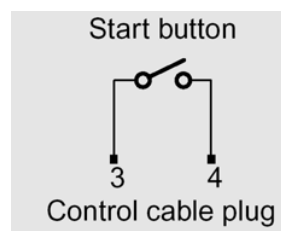


Fig. 5 – 22 Control cable plug connection

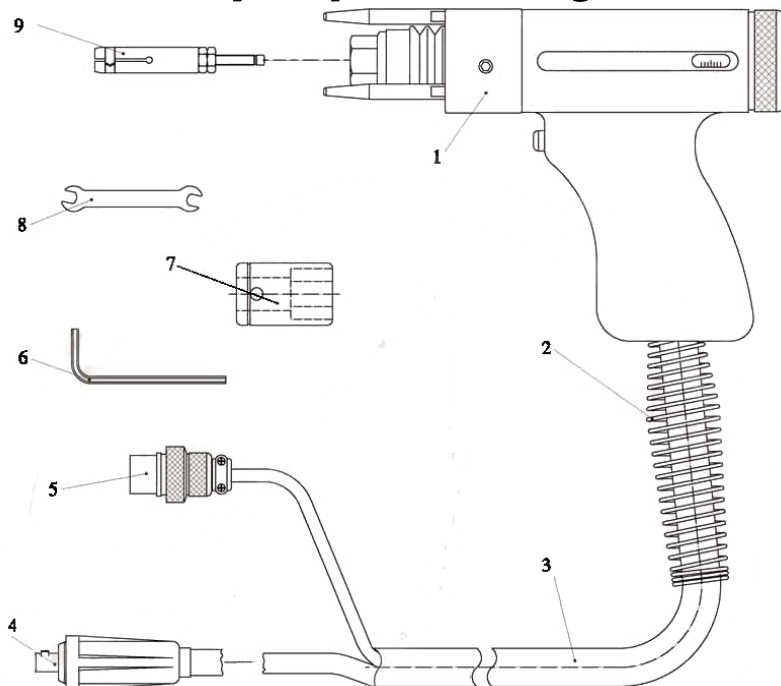
For procurement of replacement parts for the power unit and gun, see the exploded views.






**Warning:** Repair work on the power unit may only be carried out by electricians.  
It is expressly pointed out that the parts may only be stripped to the degree of dismantling shown in the exploded views!

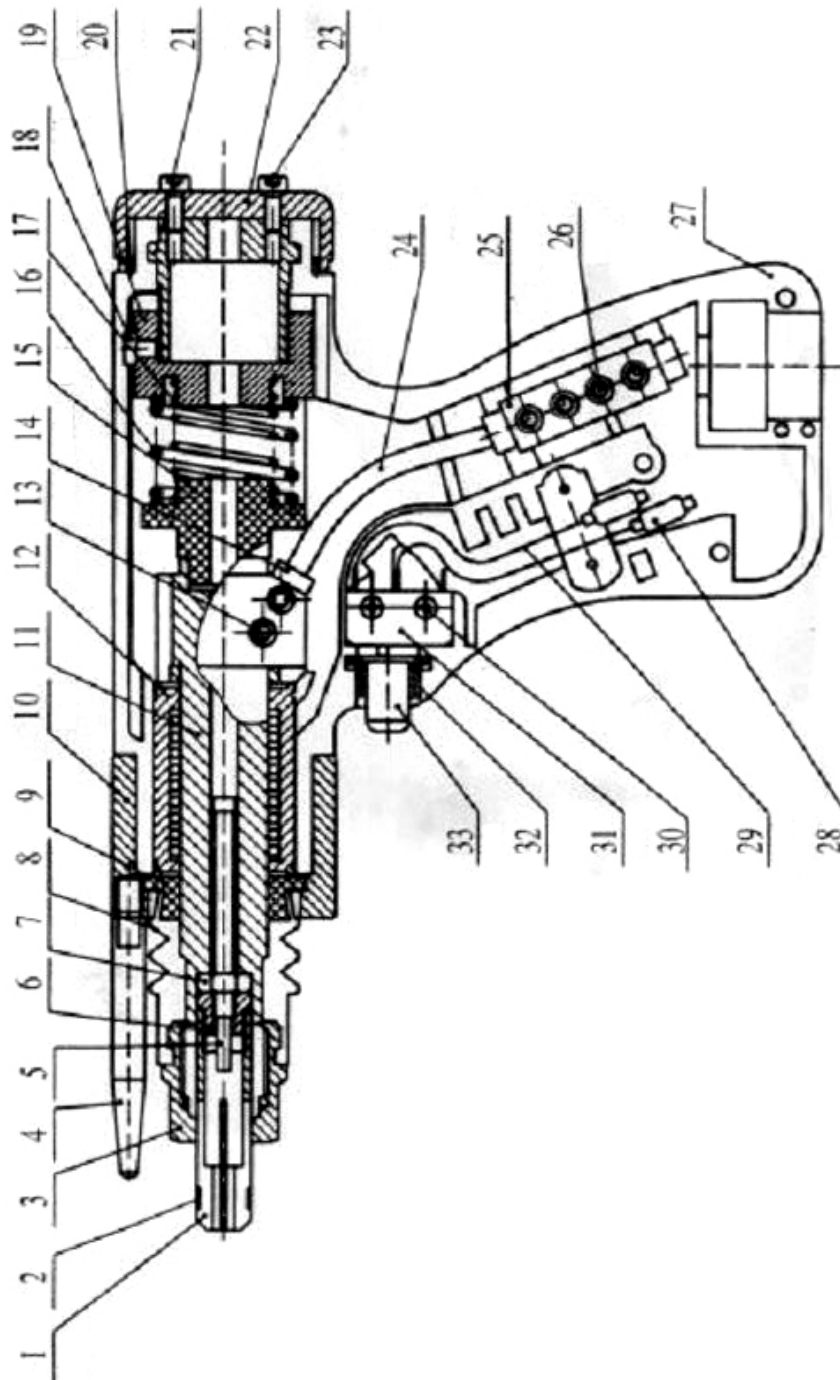
## 5.9 Explosion view of C0 Gun and ground clamps

### ***Spare parts for C0 gun***



1.		Part Number	102.150 C0 Gun complete with cable
		102.151	C0 Gun complete without cable
2.		102.152	Spring (Cable protection)
3.		102.153	Cable (4 meters), with connectors
4.		110.020	Weld male plug
5.		110.304	4 poles connector, cable end
6+7+8		102.154	Key set
9.			Chuck (see welding accessories)
		102.165	Complete double ground with cable
		102.160	Ground Clamp (Sold individually. If you need a pair, be sure to order two)

## ***Spare parts for C0 gun***



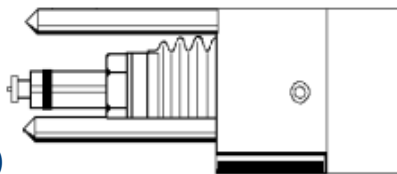
### ***Spare parts for C0 gun***

<b><i>Item</i></b>	<b><i>Part number</i></b>	<b><i>Description</i></b>	<b><i>Quantity</i></b>
1.	Depends on chuck Ø	Chuck	-
2.	190.053	"O" ring	-
3.	102.103	Chuck nut	1
4.	190.002	Tripod Leg. (Ø 6 x 50 mm) Can be replaced by C1/G1 legs	3
5+6+7	190.042	backstop locking nut	-
8.	102.108	Dust protection Bellow	1
9.	102.109	bellow retaining ring	1
10.	102.110	Front end cap / Legs holder (Supplied without leg)	1
11.	102.111	Spindle	1
12.	102.112	Bearing bush	1
13.	102.113	Screw	2
14.	102.114	Ferrule	1
15.	102.115	Fixed spring seat	1
16.	102.116	Spring	1
17.	102.117	Spring	1
18.	102.118	Supplied with part nr 19	1
19.	102.119	Adjustable spring seat	1
20.	102.120	Back cap ring	1
21.	102.121	Spring preload adjuster	1
22.	102.122	Back cap	1
23.	102.123	Back cap screw	2
24.	102.124	Flexible braid assembly	1
25.	102.115	Cable splicing block	1
26.	102.126	Screw	4
27.	102.127	Gun body moulding (2 parts)	1
28.	102.128	Sleeve	2
29.	102.129	Trigger wires	1
30.	102.130	Screw (trigger switch)	2
31.	102.131	Trigger micro switch	1
32.	102.132	Trigger bezel (supplied with nr 33)	1
33.	102.133	Trigger push button	1
,			

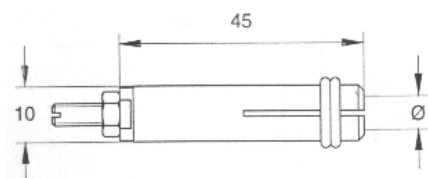
***Fig. 5 - 23 Explosion view standard contact pistol C0***

## 5.10 Welding accessories

### CD Accessories for C0



#### 1. CHUCK



- 190.104 Chuck CD Ø 3 mm
- 190.108 Chuck CD Ø 4 mm
- 190.112 Chuck CD Ø 5 mm
- 190.116 Chuck CD Ø 6 mm
- 190.120 Chuck CD Ø 7,1 mm
- 190.124 Chuck CD Ø 8 mm
- 190.128 Chuck CD Ø 10 mm  
(Depending on the stud length,  
Additional parts could be requested)
- 190.101 Chuck CD Ø 2.5 mm

#### 2. CHUCK for Insulation pins



- 190.102 Chuck CFN Ø 2 mm
- 190.103 Chuck CFN Ø 3 mm
- 190.134 Chuck BIMETAL Ø 3 mm  
( Ø int. = 6 mm x 13 mm)

#### 3. CHUCK for Earth Tag CDL / CDLD



- 190.581 Chuck CDL 6,3 x 0,8 mm

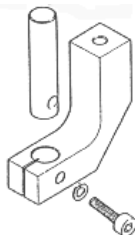
#### Leg for tripod



- 190.002 Leg (Ø 6 x 50 mm)  
*Set of 3 is requested for the  
standard tripod*



## Offset chuck attachment



190.012

Offset chuck attachment  
*The Angled Extension Arm  
allows the welding of studs  
into corners and against  
upstands.*



190.205

CD tester bending bar



190.210

Bending bar nozzle Ø 3 mm

190.216

Bending bar nozzle Ø 4 mm

190.222

Bending bar nozzle Ø 5 mm

190.228

Bending bar nozzle Ø 6 mm

190.234

Bending bar nozzle Ø 8 mm

## 5.11 Technical specifications

### C1 Gun

Type	contact stud welding gun C1
Welding range	M3 – M8 (M 10)
Weight	0,6 kg (without cable)
Noise level	max. 107 dB(A)
Welding cable	length: 5 m line cross section: 25 mm <sup>2</sup>
Control cable	length: 5 m

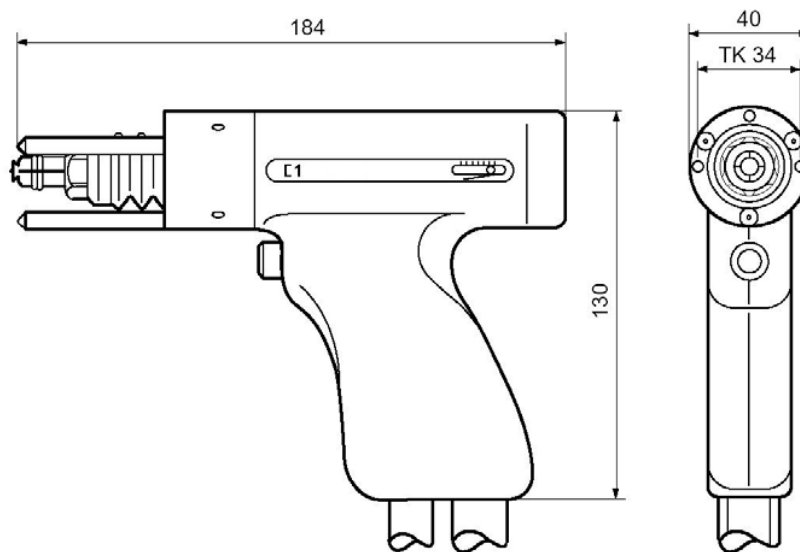


Fig. 5 – 24 Dimensions C1

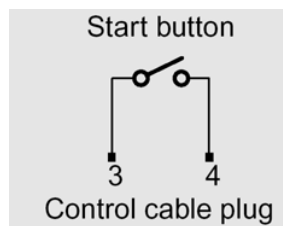


Fig. 5 – 25 Control cable plug connection

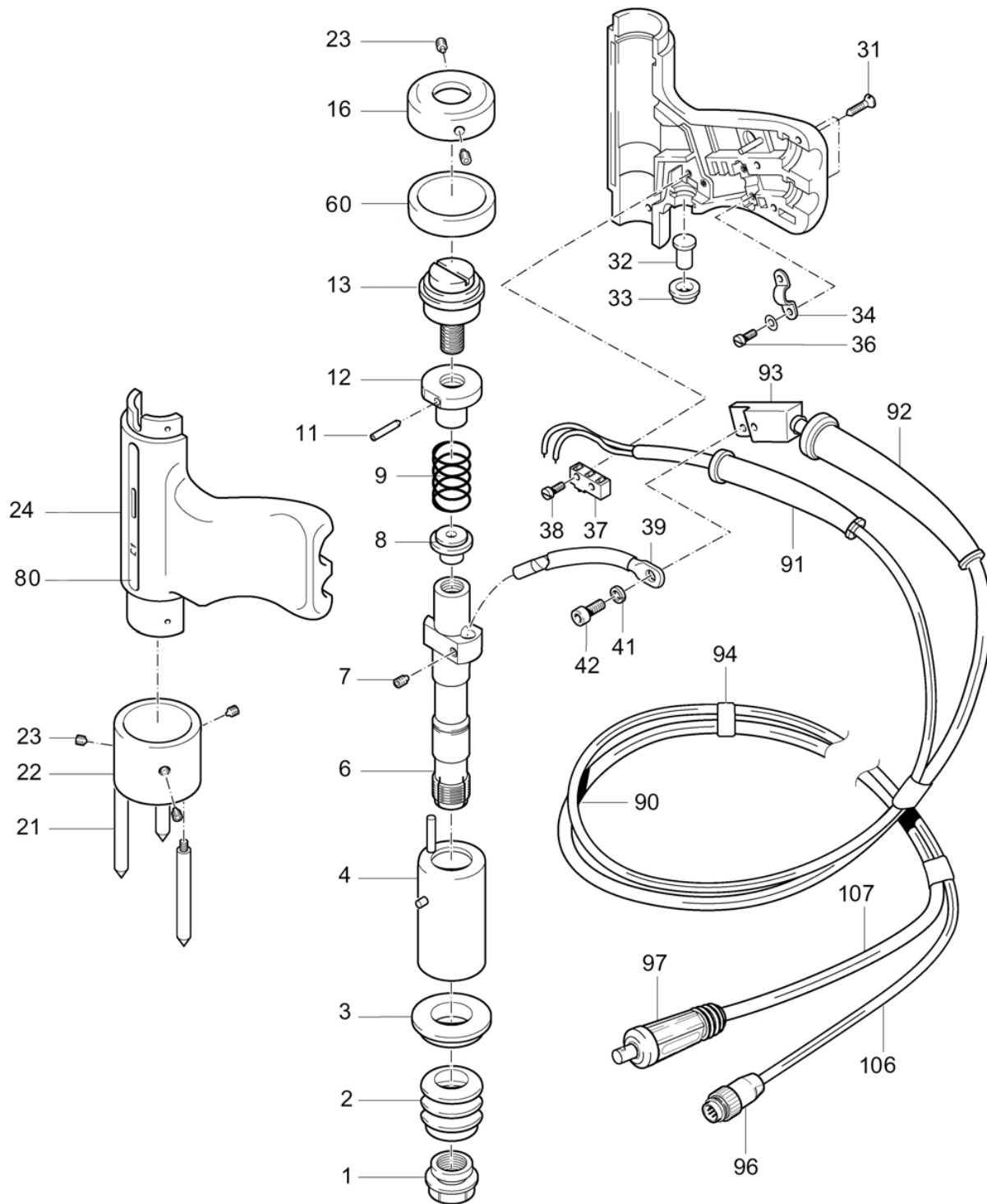
For procurement of replacement parts for the power unit and gun, see the exploded views.



**Warning:** Repair work on the power unit may only be carried out by electricians.  
It is expressly pointed out that the parts may only be stripped to the degree of dismantling shown in the exploded views!

## 5.12 Explosion view of C1 Gun

### *Spare parts for C1 gun*



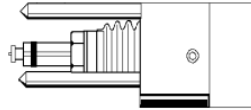
### ***Spare parts for C1 gun***

<b><i>Item</i></b>	<b><i>Part number</i></b>	<b><i>Description</i></b>	<b><i>Quantity</i></b>
1.	102.301	Chuck Nut	1
2.	102.302	Bellow	1
3.	102.303	Bellow retainer	1
4.	102.304	Bearing bush	1
6.	102.306	Spindle	1
7.	102.307	Screw	1
8.	102.308	Fixed spring seat	1
9.	102.309	Main spring	1
11.	102.311	Screw	1
12.	102.312	Adjustable spring seat	1
13.	102.313	Shaft Key	1
16.	102.316	Rear back cap	1
21.	190.002	Tripod Leg	3
22.	102.322	Front end cap / Legs holder (Supplied without leg)	1
23.	102.323	Back cap & front end cap Screws	3+2
24.	102.324	Gun body moulding (2 parts)	1
31.	102.331	Screw	3
32.	102.332	Trigger button	1
33.	102.333	Trigger bezel	1
34.	102.334	Cable securing clip	1
36.	102.336	Screw	2
37.	102.337	Trigger switch	1
38.	102.338	Screw	2
39.	102.339	Flexible braid assembly	1
41.	102.341	Split washer	1
42.	102.342	Screw	1
60.	102.360	Ring	1
80.	102.380	Label "C1"	1
	102.381	Label "THOMAS Welding Systems"	1
90.	102.390	Complete Cable assy' ( 5 meters)	1
91.	102.391	Control cable sleeve	1
92.	102.392	Weld cable sleeve	1
93.	102.393	Cable splicing block	1
94.	102.394	Cable tie clip	10
96.	110.314	Cable end control plug	1
97.	110.020	Cable end weld plug	1
106.	110.232	Control cable (m)	5,3
107.	110.213	Weld cable (m)	5

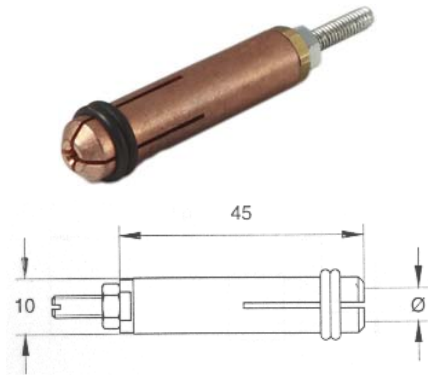
*Fig. 5 - 26 Explosion view contact pistol C1*

## 5.13 Welding accessories

### CD Accessories for C1 / G1



#### 1. CHUCK



- 190.104 Chuck CD Ø 3 mm
- 190.108 Chuck CD Ø 4 mm
- 190.112 Chuck CD Ø 5 mm
- 190.116 Chuck CD Ø 6 mm
- 190.120 Chuck CD Ø 7,1 mm
- 190.124 Chuck CD Ø 8 mm
- 190.128 Chuck CD Ø 10 mm  
(Depending on the stud length,  
Additional parts could be requested)
- 190.101 Chuck CD Ø 2.5 mm
- 190.156 Chuck CD Ø 1/4

#### 2. CHUCK for Insulation pins



- 190.102 Chuck CFN Ø 2 mm
- Chuck CFN Ø 2.6 mm
- 190.103 Chuck CFN Ø 3 mm
- 190.134 Chuck BIMETAL Ø 3 mm  
(Ø int. = 6 mm x 13 mm)

#### 3. CHUCK for Earth Tag CDL / CDLD



- 190.581 Chuck CDL 6,3 x 0,8 mm

### Tool Ø 30 mm for template



190.008 Support Tube 30mm diameter.  
*The support tube allows stud welding with templates and positioning on curved surfaces*

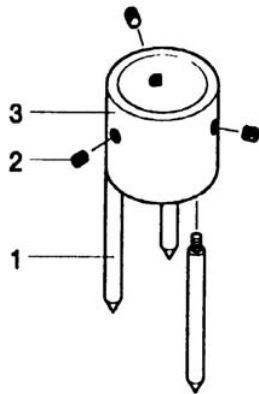
190.009 Longer version (+ 11 mm)  
=> total length : 90 mm

### Tool for reducing noise ( Ø 35 mm)



190.006 Reducing noise/spatter tool

### Standard tripod leg assembly



**190.014** Complete kit consisting of :

1. 190.002 Tripod leg (Ø 6 x 50 mm)
2. 102.323 M5 x 4
3. 102.322 Front end cap / Legs holder  
(Supplied without leg, but with 3 screws M5 x 4)

### Leg for tripod



190.002 Leg (Ø 6 x 50 mm)  
*Set of 3 is requested for the standard tripod*

190.003 Leg (Ø 6 x 116 mm)  
*Set of 3 is requested for the standard tripod*  
Other lengths : on request

### Extension kit (for studs L > 40 mm)



190.016 Extension kit  
(h = 16 mm)

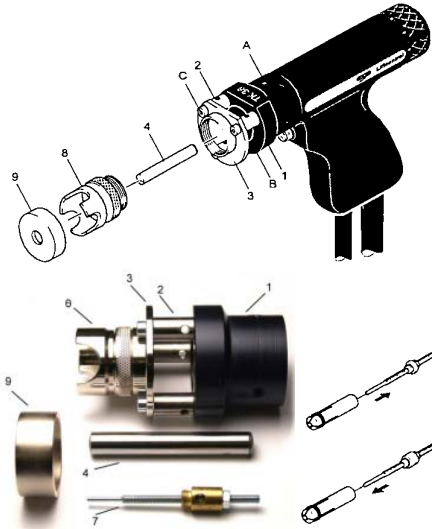
## Socket spanner



190.295 Socket spanner SW 17

## Tube for Template Ø 20, 26 et 30 mm

(allow welding of studs through templates with different diameter holes.)

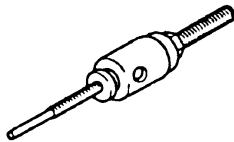


190.30x Complete Assembly:

- 190.310 1. Face plate
- 190.315 2. Spacer ( x 3 )
- 190.320 3. Screw-in ring
- 190.325 4. Centring rod
- 190.33x 8. Nose cone
- 190.34x 9. Centring cup
- 190.045 Longer Chuck Screw

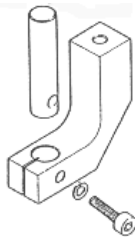
x = 1 for Ø 20 mm.  
x = 5 for Ø 26 mm.  
x = 7 for Ø 30 mm.

## Longer Chuck Back stop Screw



190.045 Chuck Back stop

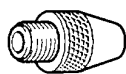
## Offset chuck attachment



190.012 Offset chuck attachment  
*The Angled Extension Arm allows the welding of studs into corners and against upstands.*



CD tester bending bar



Bending bar nozzle Ø 3 mm  
Bending bar nozzle Ø 4 mm  
Bending bar nozzle Ø 5 mm  
Bending bar nozzle Ø 6 mm  
Bending bar nozzle Ø 8 mm

# ISO Kit Accessories for C1 / G1

(for welding longs CD pins > 100 mm)



## 1. CHUCK



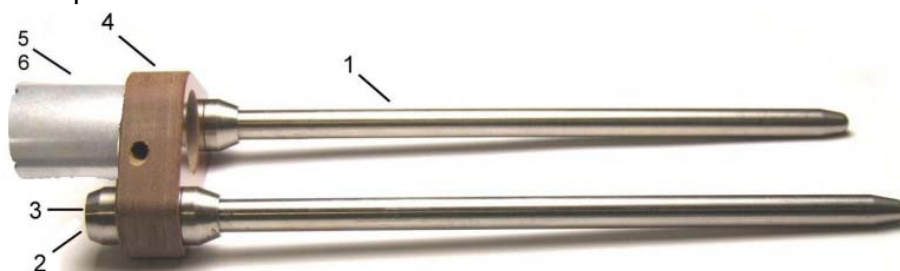
- 190.104 Chuck CD Ø 3 mm
- 190.108 Chuck CD Ø 4 mm
- 190.101 Chuck CD Ø 2.5 mm

## 2. Gun face plate



- 104.127 Face Plate

## 3. Foot plate + Nozzle



- |            |         |            |
|------------|---------|------------|
| 1. Leg (*) | 190.201 | 8 x 170 mm |
|            | 190.202 | 8 x 220 mm |
|            | 190.203 | 8 x 300 mm |
|            | 190.204 | 8 x 400 mm |
|            | 190.205 | 8 x 500 mm |



- |                |         |
|----------------|---------|
| 2. Foot washer | 190.210 |
|----------------|---------|



- |                                      |         |
|--------------------------------------|---------|
| 3. Foot screw<br>M 5 x 25 (or 30 mm) | 190.215 |
|--------------------------------------|---------|



- |                                  |         |
|----------------------------------|---------|
| 4. Foot plate for Ø 35 mm nozzle | 190.240 |
|----------------------------------|---------|



- |                |         |
|----------------|---------|
| 5 Ø35mm Nozzle | 190.241 |
|----------------|---------|



- |                |         |
|----------------|---------|
| 6. Teflon ring | 190.242 |
|----------------|---------|

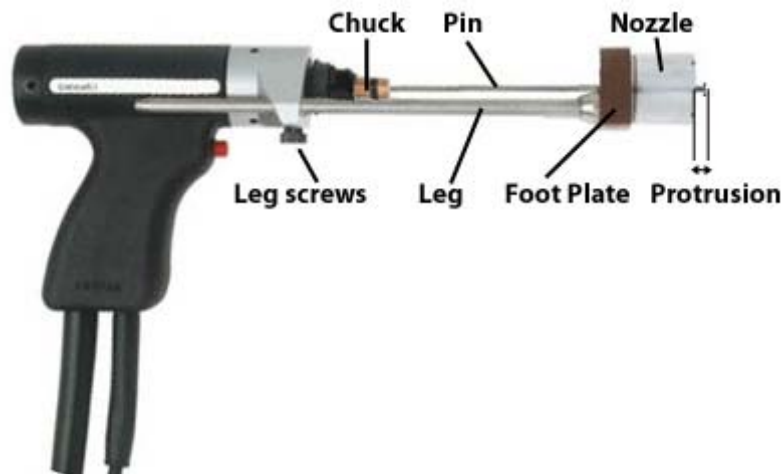
(\*) Leg length >= CD pins length. Sold individually. If you need a pair, be sure to order two

**THOMAS**

Welding systems



## ISO Kit Weld Gun specific setup



1. Adjust Chuck back stop screw.  
There is a depth stop inside of the chuck (Chuck back stop screw)  
The depth stop should be adjusted so that you are retaining a good portion of the stud you are setting up to weld. Typically, this is 10 – 15 mm of the pins you are welding.
2. Seat weld pin firmly against chuck back stop Screw.
3. Loosen the legs adjustment screws.
4. To adjust the protrusion (plunge), loosen the leg set screws in the gun body. Move the foot towards the gun or away from the gun to increase or decrease plunge. The plunge measurements are from the end of the stud and do not include the welding tip.  
Slide the Leg / Foot assembly until weld pin flange extends 2 to 5 mm beyond foot nozzle (spark shield).
5. Retighten adjustment screw.

## 5.11 Blank page for notes

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(We have checked the contents of this publication for correspondence with the hardware it describes. Nevertheless discrepancies cannot be ruled out, for which reason we cannot guarantee complete correspondence.

However, the contents of this publication are checked regularly and any corrections needed incorporated in following editions.

Please send us your recommendations for improvement.

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