



# **Giotto FullControl**

*Advanced  
tube-tube-sheet  
TIG orbital welding system*



MADE IN ITALY



# All you need is ...



**MAUS**  
ITALIA

**Giotto**  
mausitalia.it

**Giotto Equipower 20**

**Giotto FC 250**

**Giotto PG 300**

**Giotto Slide Deck**

**Giotto Equipower 20**

**Giotto Service Trolley**

**GF-2**

This product comprises:

TIG orbital  
welding head

Generator-  
programmer

Trolley-mounted  
deck

Equipotential  
power supply

Service  
trolley

**Giotto FC 250**

GF-7

**Giotto PG 300**

GF-20

**Giotto Slide Deck**

GF-22

**Giotto Equipower 20**

GF-24

**Giotto Service Trolley**

GF-26



# FullControl





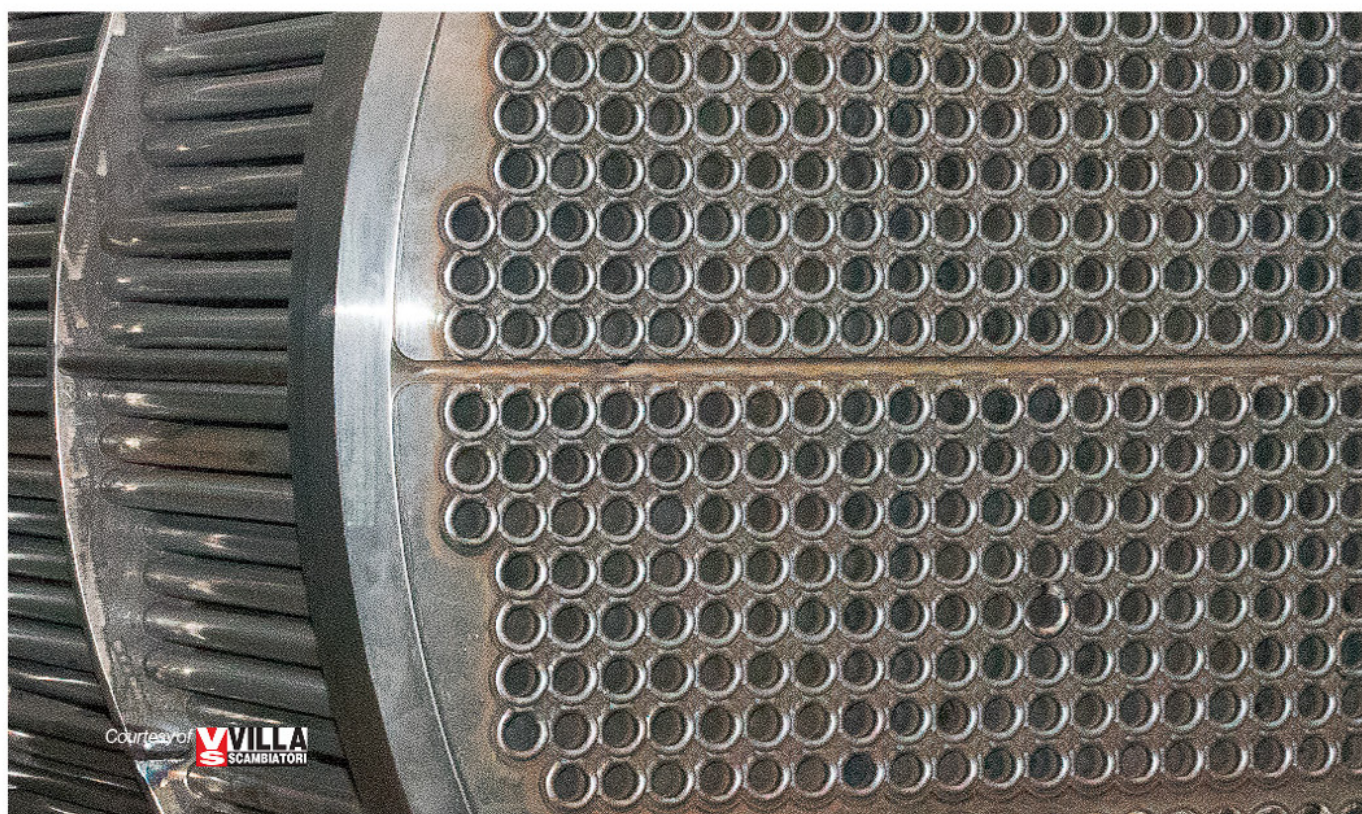
## **Giotto FullControl**

*for a total control of tube-tube-sheet  
TIG orbital welding*

MAUS ITALIA presents the **Giotto FullControl** system, top-of-the-range trolley-mounted semi-automatic systems for heat exchanger tube-tube-sheet orbital welding.

**In-house design and construction** has allowed this product to be optimised, providing a high quality system, composed by:

- **Giotto FC250** orbital head for tube-tube-sheet TIG welding;
- **Giotto PG300** programmer/generator with microprocessor inverter complete with cooling unit and touchscreen interface.
- Accessories, options and spare parts to meet every need for welding tubes to the tube-sheet.



Courtesy of **VILLA**  
SCAMBIATORI



# Focus features

## STANDARD



Fixed angle

### Electrode angle setup

The electrode holder system with preset angles adapts to any welding geometry and makes setup easy and repeatable



Single key

### Adjustments with a single key

All available adjustments for different welding geometries require a single supplied key.



Report

### Continuous recording of the weld

All work parameters can be stored on a USB pen drive and printed on board the machine



Remote control

### Remote control with display

Simple and intuitive interface for control of welding parameters. Comes complete with all manual controls for the welding head.



Sector

### Sectors

The division into up to 9 sectors of the welding cycle allows compensation for the negative effects of gravity on the welding puddle.



Cooling

### 24/7 Usage

The enhanced cooling system inside the head allows intensive use of the system.



Test Gas

### Test gas

The operator has the option to check and adjust the flow of the gas to the flowmeter before the start of the welding cycle.



2nd gas line

### Protective gas line

There is an additional dedicated gas line, inside the body of **Giotto FC250**, for the external protection of welding.

## OPTIONALS



Filler wire

### IWFG

Rotating supply unit for the filler wire



Thrust devices

### Thrust devices

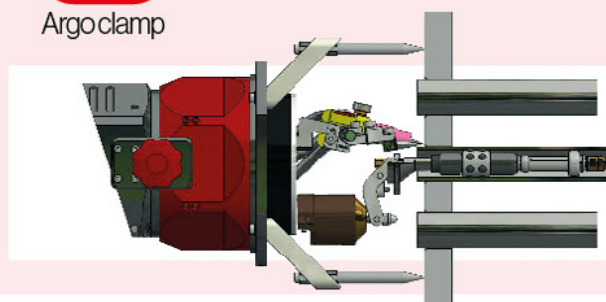
Mounted on the welding head, these allow welding of flush or protruding tubes and, when necessary, for welding in a protected atmosphere.



Argo clamp

### Argo clamp

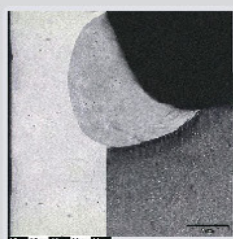
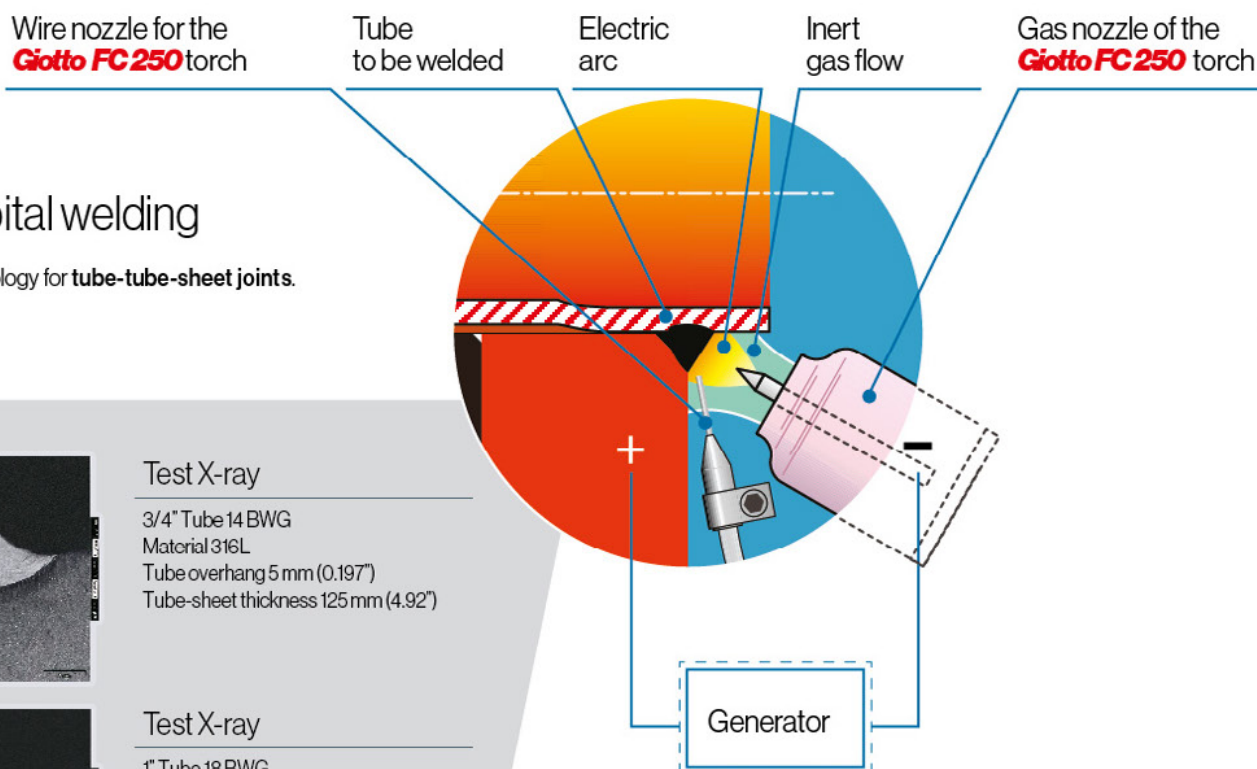
TIG orbital welding head centring and locking system





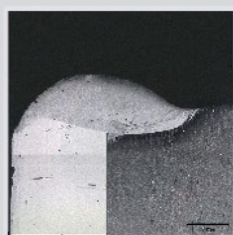
## TIG orbital welding

Unique technology for **tube-tube-sheet** joints.



Test X-ray

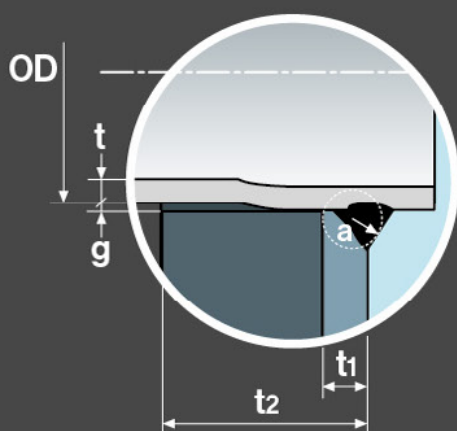
3/4" Tube 14 BWG  
Material 316L  
Tube overhang 5 mm (0.197")  
Tube-sheet thickness 125 mm (4.92")



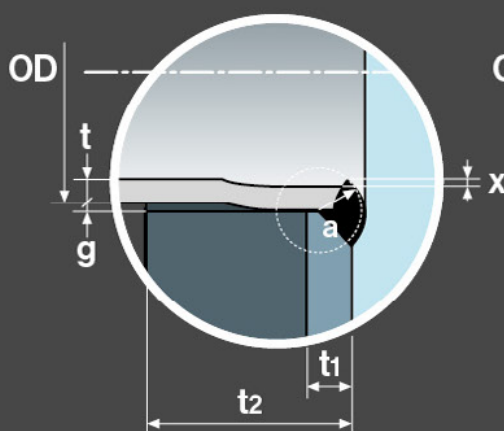
Test X-ray

1" Tube 18 BWG  
Material 304L  
Flush tube  
Tube-sheet thickness 72 mm (2.83")

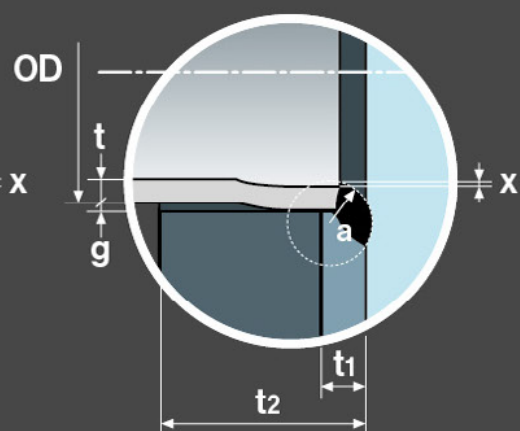
### Protruding tube



### Flush tube



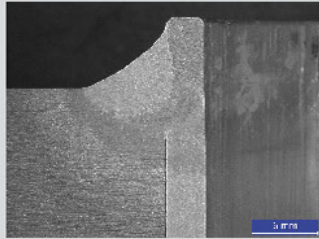
### Recessed tube



**a** welding thickness  
**OD** external diameter of the pipe  
**g** gap between external tube diameter and tube sheet hole  
**t** tube thickness

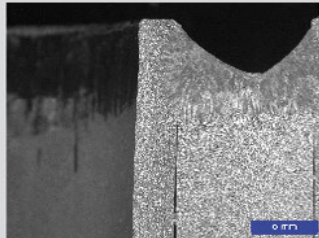
**t1** thickness of plating  
**t2** thickness of the tube-sheet  
**x** weld overflow





### Test X-ray

Tube Ø 26,7 mm x 2,87 mm (1.051" x 0.113")  
ASTMA210 Material  
Tube overhang 5 mm (0.197")  
Tube-sheet thickness 30 mm (1.181")



### Test X-ray

1 3/4" Tube - 10 BWG  
Material TP 316 L  
Tube overhang 5 mm (0.197")  
Tube sheet thickness 30 mm (1.181")

# **Giotto FullControl**

## Advanced tube-tube-sheet TIG orbital welding system

Advanced portable product, suitable for complex applications.  
Stands out for its reliability, precision, ease of use and robustness.

Reliable

Precise

Ergonomic

## Standard supply

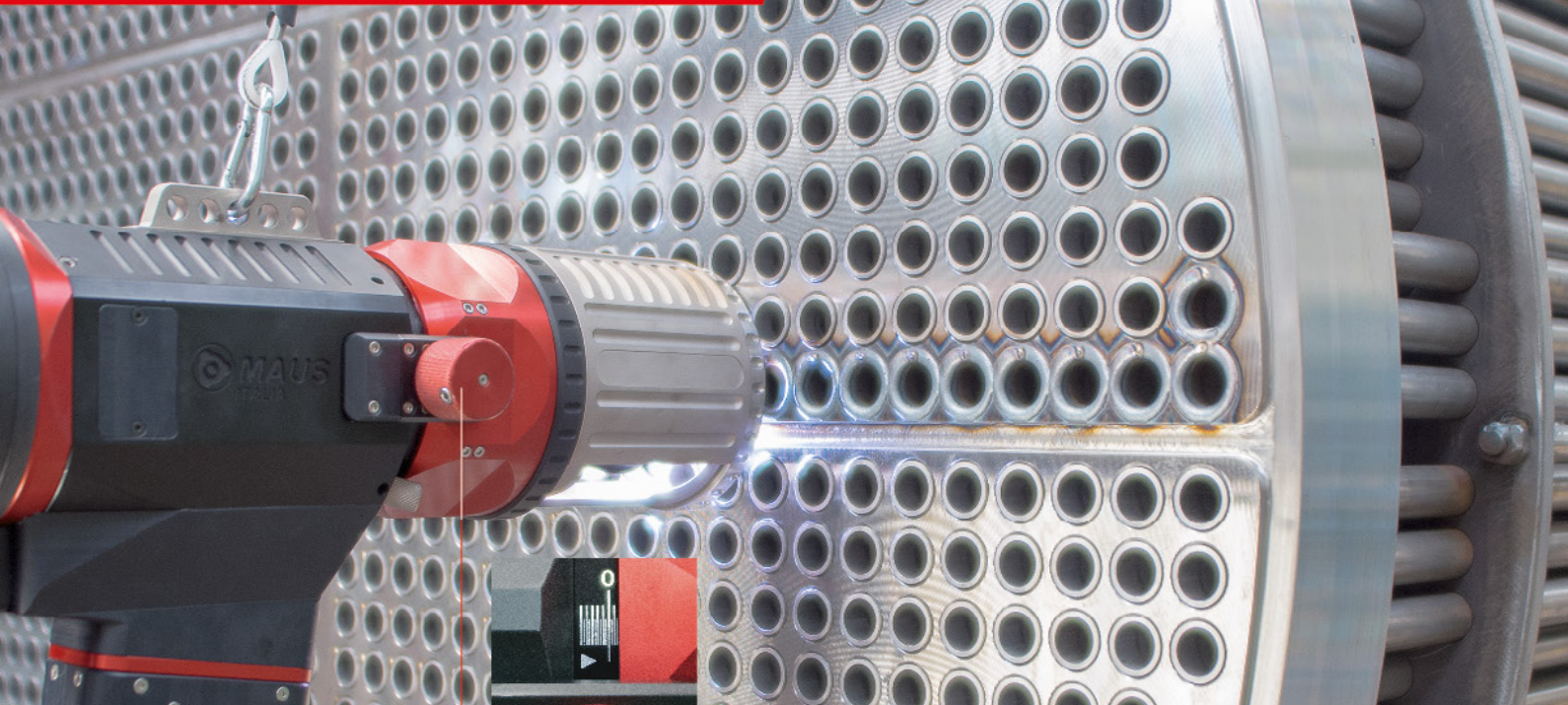
- Giotto FC250** ■ Orbital head with cables (torch power/ cooling)
- Giotto PG300** ■ Trolley-mounted digital programmer generator with inverter
  - Remote control with display
  - Ground wire
  - Digital gauge
  - Electrode holder bracket kit with various angles of incidence
  - Welding head adjustment and maintenance kit
  - Instruction manual
  - Carrying case

## Optionals

- Argo clamp** + TIG orbital welding head centring and locking system
- IWFG** + Rotating filler wire supply unit
- WTC-FT** + Thrust device for welding flush tubes with **BlockOut** anti-glare screen
- WTC-PT** + Four-point thrust device for welding protruding (or recessed) tubes
- WTC-GAS2** + Thrust device for welding tubes in a protected atmosphere

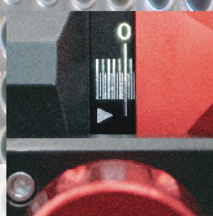






### Micrometric adjustment

Device for adjusting the distance of the electrode from the tube-sheet.



Complete range of devices for centring in the tube consisting of **HS** cartridge spindles and **HC** self-centring cartridges.

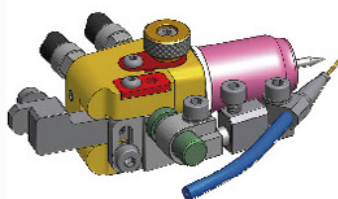
**GF-15**

Different **WTC** thrust devices to be selected on the basis of tube geometry and material, with MAUS ITALIA **BlockOut** screens for anti-dazzle protection.

**GF-18**

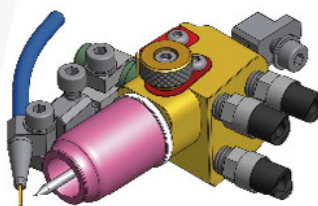


Single key



### Adjustable filler wire feed unit

All adjustments are made with a single supplied key.



### New electrode tightening system

The tangential screw does not require service keys and speeds up replacement of the worn electrode without touching other parts that could change the geometric setting

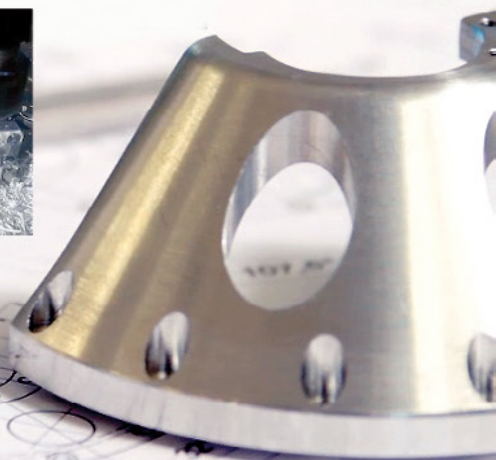
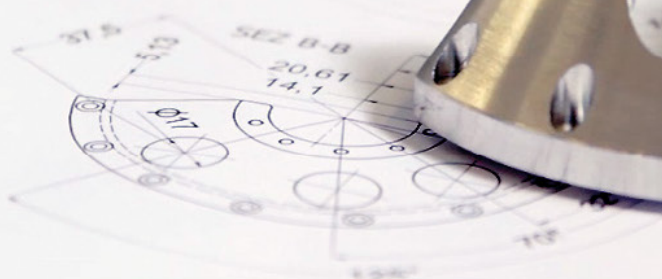
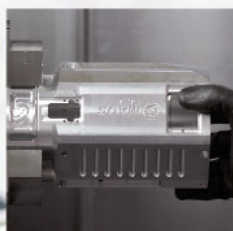


# **Giotto FC 250**

Tube-tube-sheet **TIG orbital  
welding head**

The **Giotto FC 250** head is the result of extensive development and prototyping. Each component is designed and manufactured by MAUS ITALIA.

**"in-house"**



**"Protruding tube"  
geometry**

**"Flush tube"  
geometry**

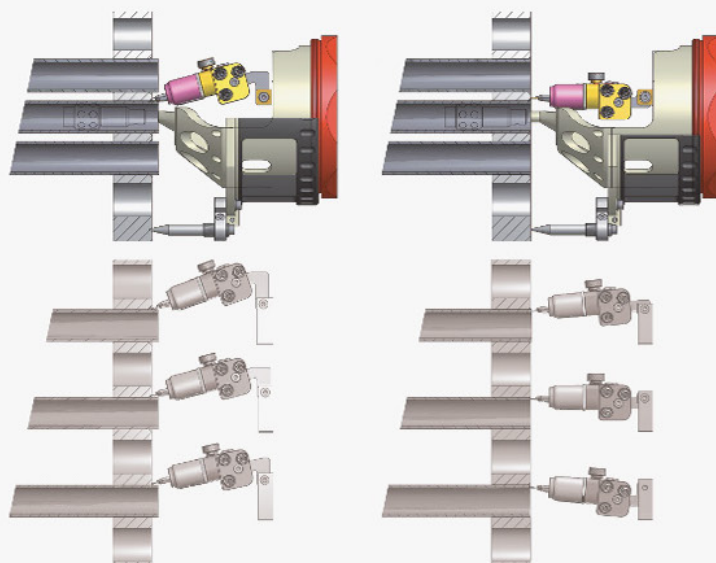


Fixed angle

Electrode angle  
setup guaranteed

Thanks to components with predetermined angles, the proposed system for each welding geometry is absolute and repeatable.

It facilitates geometric setup operations as well as being extremely stable and robust.





Micrometric adjustment

Tangential electrode tightening

**WTC-PT** - thrust device

**HS** - cartridge spindle



# Giotto FC250



Real speed

## Speed adjustment

Programming of the peripheral speed of head rotation.



Encoding

## Precise position

Absolute optical control of the angular position using an encoder.



2nd gas line

## Protective gas line

There is an additional gas line, inside the body of the **Giotto FC250**, dedicated to the external protection of the weld for combination with the **WTC-Gas2** thrust device.

**HC** - self-centring cartridge

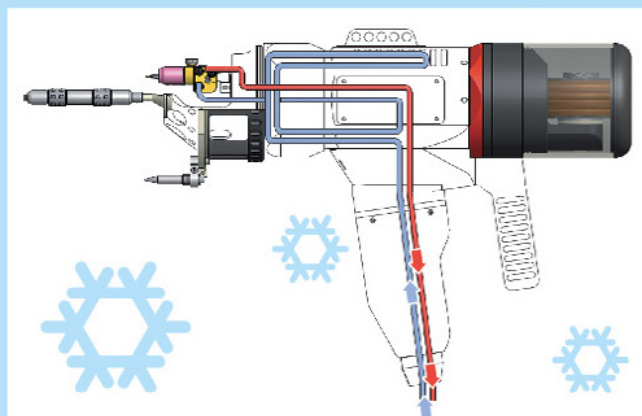


Cooling

## Welding with the ideal temperature

The effective internal cooling system of the **Giotto FC250** orbital welding head guarantees:

- control of the internal temperature of the rotating joint even at high welding amperages;
- continuous use in 24/7 shifts;
- high quality of the welding puddle with a lower average temperature of the electrode and the protective gas passing through it;
- significant improvement in welding performance.







### Test Gas

#### Pre-weld gas control

The operator, using the remote control, has the possibility of checking and adjusting the flow of the gas to the flowmeter before the start of the welding cycle.



### User-friendly.

#### Operator panel on color monitors

This is the interface where the working parameters (and setting) of the orbital head are programmed and displayed.

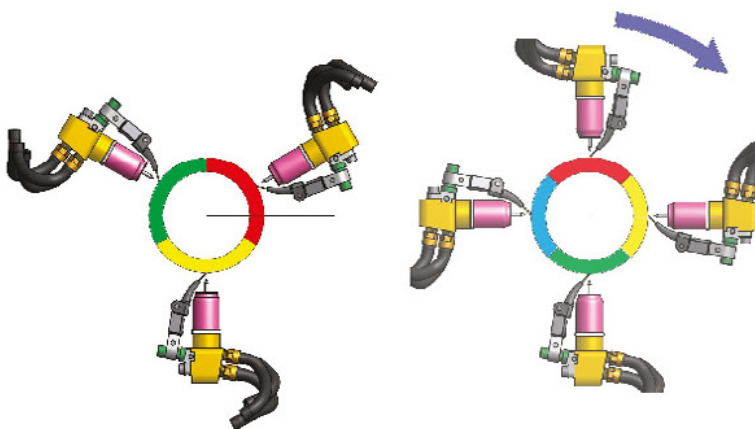
Thanks to the integrated 12.1" monitor, backlit in colors (capacitive touch-screen), parameter programming is extremely fast and simple.



### 9 sectors

#### Welding sectors

There is the option to program, using the integrated software, subdivisions of **up to 9 sectors** of the welding cycle to compensate for the negative effects of gravity on the welding puddle.



## Available parameters

- Date and time
- Serial number of the generator
- Serial number of the connected gun
- Operator
- Name of welding program in use
- Angular position of the torch
- Time in seconds from the beginning of the cycle.
- Average current value.
- Average voltage value.
- Peripheral speed of the orbital head.
- Speed of the filler wire.
- Applied energy.
- Pre-gas
- Starting current
- Slope times
- Welding puddle formation time
- Welding current
- Base current
- Pulse frequency
- Pulse balancing
- Final current



# **Giotto PG 300**

**Digital programmer/generator with inverter** with integrated-control microprocessor and digital interface on monitor

Powerful and compact, MAUS ITALIA's offers the **Giotto PG 300** programmer/generator for controlling the TIG **Giotto FC250** orbital welding head to guarantee 100% repeatability.

Mounted on "carriage pickUp" with gas bottle holder.

Powerful

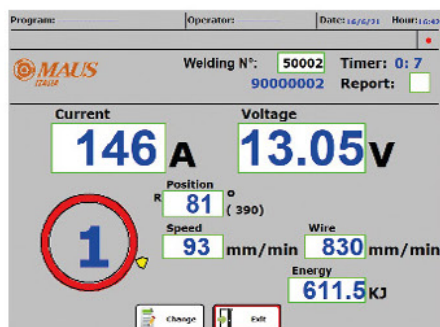
Compact

Ergonomic



- Post gas time
- Welding speed
- Amount of filler wire
- Programmable sectors: 1 to 9 plus slopes
- Programmable up- and downslopes
- Program diagnosis simulation cycle
- Continuous recording of heat input (applied energy in kJ)





### Parameter monitor

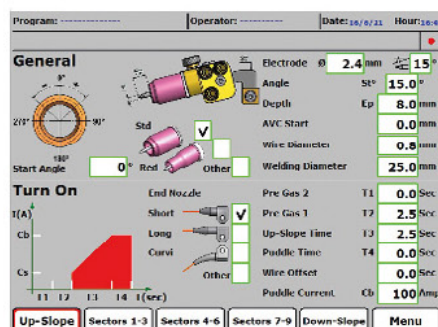
- Clear real-time display of the main welding parameters to allow the operator immediate feedback.



## Welding sectors

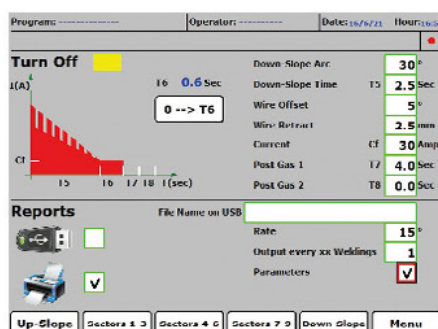
- Definition of the number of sectors (1 to 9) and programming of parameters for each sector

### Control of the arc when shutting down



### Welding head setup - Ignition

- Fundamental variables to guarantee total repeatability. Facilitate the exchange of correct information between operators.
- Definition of the welding start phase



## Shut-down - Reports

- Definition of the final welding phase
- Enabling of welding report production modes



## Report

## Continuous welding recording

All work parameters can be stored on a USB pen drive and printed on board the machine:

- in "time lapse"  
(for rotation angle/weld no.)



## Remote control

### Remote control with display

Simple and intuitive interface for controlling the welding parameters. Complete with all manual welding head controls as well as:

- start-up
- stop
- test gas
- on/off filler wire selector.

Supplied with 8 m (26 ft) connection cable



# Giotto PG300

## Dedicated TIG orbital welding programming and diagnostics software

The **GiottoFullControl** is supplied with dedicated MAUS ITALIA software for intuitive programming of all welding parameters and prompt intervention of complete diagnostics for any malfunctions.

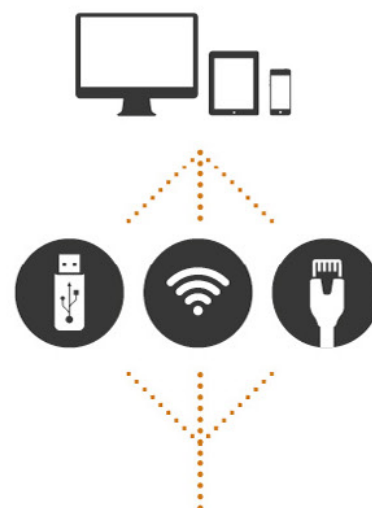
The simulation cycle allows you to try programs stored by the operators in advance (with space available for over 200 programs).

+ Optional



Maus Italia machines transform you into a Smart Factory!

Compliance of the **GiottoFullControl** system with the requirements of the "INDUSTRY 4.0" system, has been examined by an accredited Third party and considered suitable to allow interconnection between the machine and company systems.

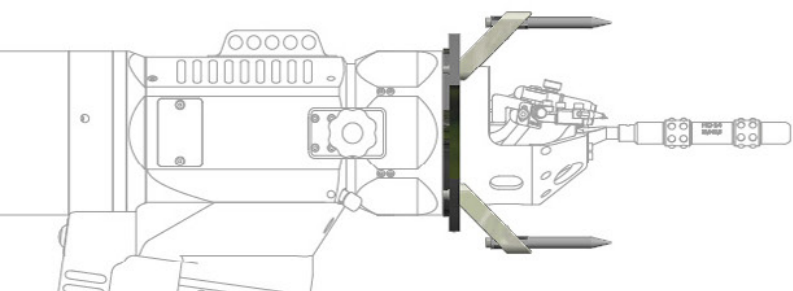






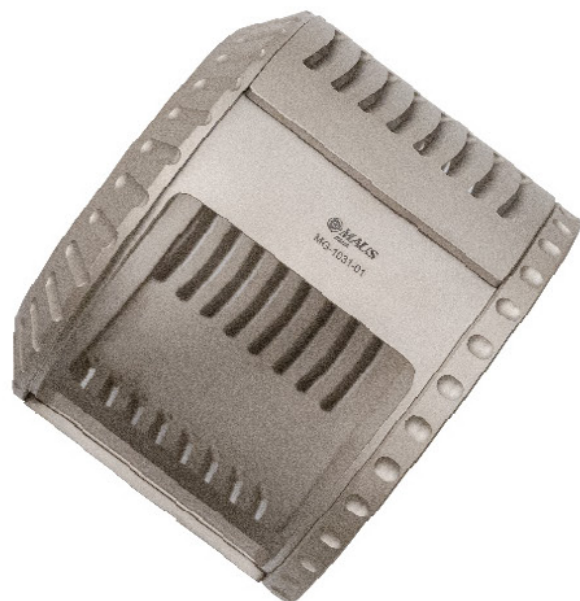
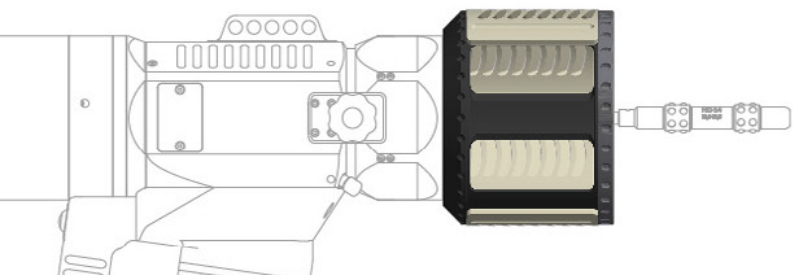
## WTC-PT

4-point of contact thrust  
device for welding  
**protruding tubes**



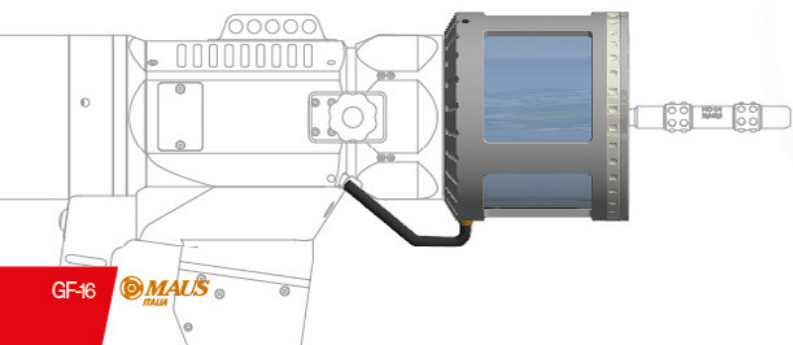
## WTC-FT

Thrust device for  
welding **flush** or **recessed tubes** with  
rotating **BlockOut** anti-dazzle screen



## WTC-Gas2

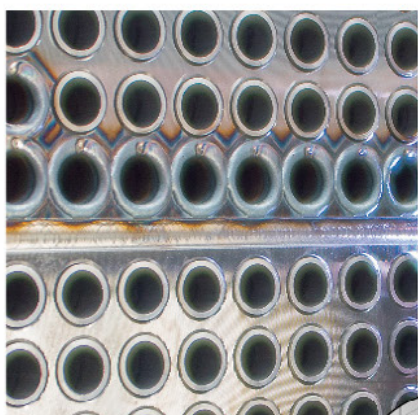
Thrust device for welding **tubes**  
**in a protected atmosphere**



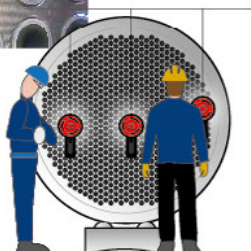




*With manual manoeuvring levers for quick adaptation to the tube pitch*



*Multiple welders can operate simultaneously on the same tube-sheet to increase productivity.*



*The protective atmosphere is created by injection of inert gas into the thrust device with the aim of eliminating any contamination*

## **Giotto FC250**

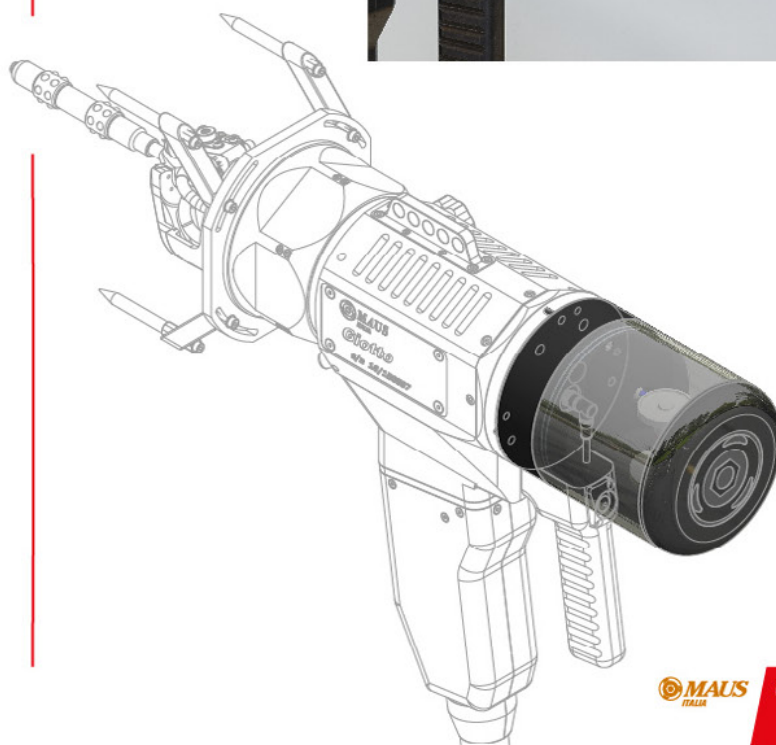
### Optional components

**IWFG** filler wire feed unit and **WTC** thrust devices for the **Giotto FC250** tube-tube-sheet TIG orbital welding head

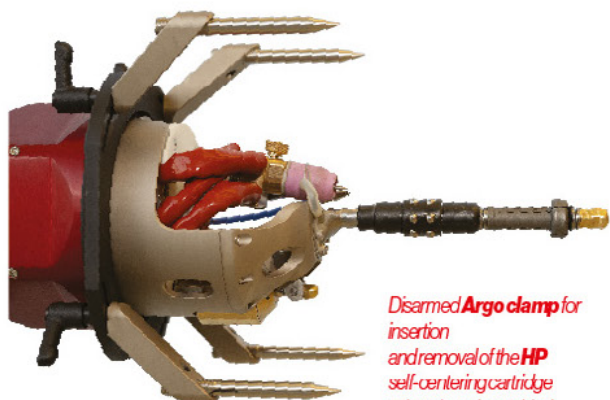


Rotating **filler wire supply unit** for wire from Ø 0.8 to 1 mm (0.0315" to 0.0394") in 1 kg coils (2.2 lb)

*Guarantees regular supply of the wire to the welding puddle. Wire consumption is always in full view of the operator thanks to the transparent protective cloche.*

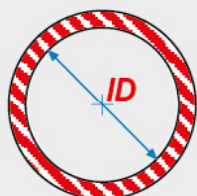






## HP centring

Special centring to support the **Argo clamp** system

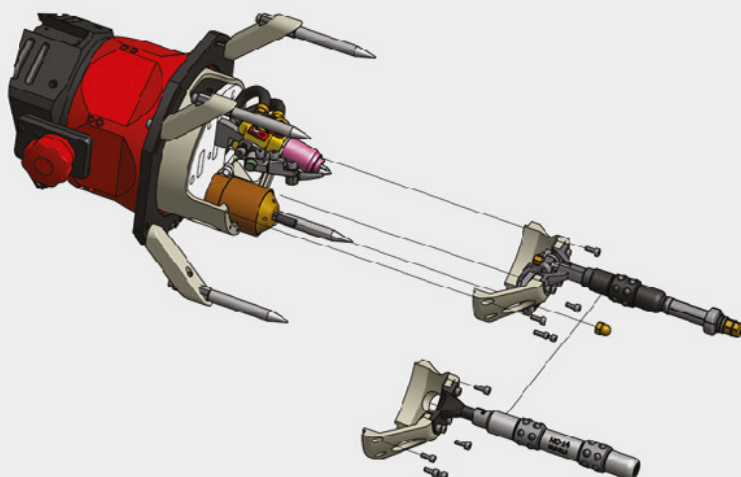


| Tube size                          |             | Cartridge     |        |
|------------------------------------|-------------|---------------|--------|
| ID                                 |             | HP            |        |
| mm                                 | inches      | Cod.          |        |
| STANDARD<br>for immediate delivery | 12,0 ÷ 12,5 | 0.472 ÷ 0.492 | HP-5   |
|                                    | 12,5 ÷ 13,0 | 0.492 ÷ 0.512 | HP-6   |
|                                    | 12,8 ÷ 14,0 | 0.504 ÷ 0.551 | HP-7   |
|                                    | 13,3 ÷ 14,5 | 0.524 ÷ 0.571 | HP-7A  |
|                                    | 13,8 ÷ 15,0 | 0.543 ÷ 0.590 | HP-8   |
|                                    | 14,3 ÷ 15,5 | 0.563 ÷ 0.610 | HP-8A  |
|                                    | 14,8 ÷ 16,0 | 0.583 ÷ 0.630 | HP-9   |
|                                    | 15,8 ÷ 17,0 | 0.622 ÷ 0.669 | HP-10  |
|                                    | 16,8 ÷ 18,0 | 0.661 ÷ 0.709 | HP-11  |
|                                    | 17,8 ÷ 19,0 | 0.701 ÷ 0.748 | HP-12  |
|                                    | 18,8 ÷ 20,5 | 0.740 ÷ 0.807 | HP-13  |
|                                    | 19,3 ÷ 21,5 | 0.760 ÷ 0.846 | HP-13A |
|                                    | 19,8 ÷ 22,5 | 0.779 ÷ 0.886 | HP-14  |
|                                    | 20,9 ÷ 23,8 | 0.823 ÷ 0.937 | HP-14A |
|                                    | 22,3 ÷ 25,0 | 0.878 ÷ 0.984 | HP-15  |
|                                    | 24,5 ÷ 27,0 | 0.965 ÷ 1.060 | HP-16  |
|                                    | 26,5 ÷ 29,0 | 1.043 ÷ 1.141 | HP-17  |
|                                    | 28,5 ÷ 31,2 | 1.122 ÷ 1.220 | HP-18  |

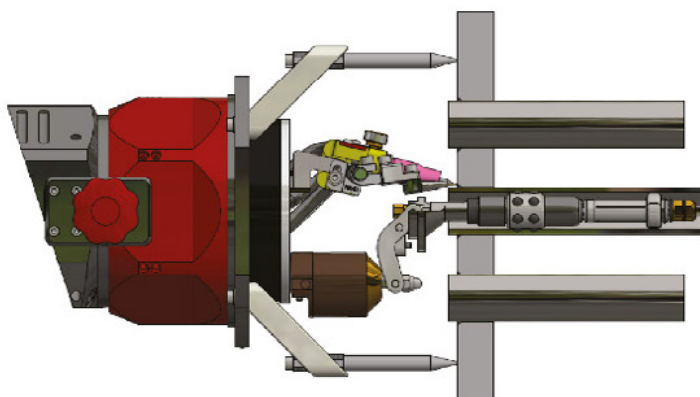


Quick change

Special **HP** centring is interchangeable with the standard centering system consisting of **HC** cartridges and **HS** spindles







# Giotto FC250

## Argo clamp

TIG orbital welding head **centring**  
**and locking system**

PATENT PENDING



The management system of  
**Argo clamp** pneumatic drive  
take place from the welding  
gas already present on board



**Argo clamp** activation is  
ergonomically positioned  
on the welding head

**Argo clamp** ensures centring and precise support of the head to the  
tube to be welded.

MAUS ITALIA, thanks to experience of its already patented  
products using radial caliper expanding tools, fits this technology  
directly on the **Giotto FC250** welding head.

**Argo clamp** instantly expands inside the tube to be welded, locking  
the orbital head.

The **Argo clamp** is powered by the  
protective gas dedicated to the torch  
electrode.



## head locking







Trolley-mounted  
deck

Equipotential  
power supply

Service trolley

**Giotto SlideDeck**

GF-22

**Giotto Equipower 20**

GF-24

**Giotto Service Trolley**

GF-26





## Accessories

Maus Italia, in order to meet the needs of a market that increasingly seeks quality, efficiency and design, has created a series of accessories to accompany its **Giotto** welding systems that offer the opportunity to create a modern, flexible and functional working environment.







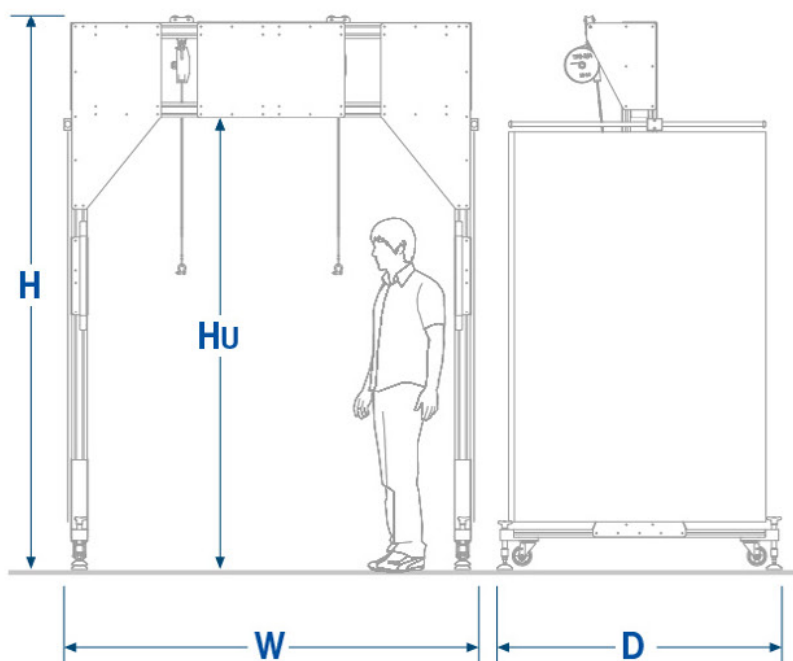
Improved stability

Less operator fatigue

## Giotto Slide Deck

| Dimensions    |           |           |  | 1800 |       | 2800 |       |
|---------------|-----------|-----------|--|------|-------|------|-------|
| Width         | <b>W</b>  | mm inches |  | 2060 | 81.1  | 2860 | 112.6 |
| Depth         | <b>D</b>  | mm inches |  | 1390 | 54.7  | 1450 | 57.1  |
| Height        | <b>H</b>  | mm inches |  | 2800 | 110.2 | 2900 | 114.2 |
| Useful height | <b>Hu</b> | mm inches |  | 2400 | 94.5  | 2500 | 98.4  |
| Capacity      |           | kg lb     |  | 50   | 110   | 45   | 99    |
| Weight        |           | kg lb     |  | 150  | 330   | 170  | 374   |

| Shipping     |  |       |  |     |     |     |     |
|--------------|--|-------|--|-----|-----|-----|-----|
| Width        |  | cm ft |  | 160 | 5.3 | 160 | 5.3 |
| Depth        |  | cm ft |  | 60  | 2.0 | 60  | 2.0 |
| Height       |  | cm    |  | 50  | 1.7 | 50  | 1.7 |
| Crate weight |  | kg lb |  | 35  | 78  | 35  | 78  |
| Total weight |  | kg lb |  | 185 | 408 | 185 | 408 |





## **Giotto Slide Deck**

**Sliding horizontal trolley-mounted deck** for welding head support using balancer

With the aim of providing customers with every accessory necessary for tube-tube-sheet TIG orbital welding, MAUS ITALIA has designed the **Slide Deck** sliding trolley-mounted deck, available in two sizes:

- **Giotto Slide Deck 1800**
- **Giotto Slide Deck 2800**

Supplied in **assembly kit**, the **Slide Deck** allows the operator to connect the **TPB-3A** series balancer (supplied separately).



## **Slider**

The sliding system is designed to give stability and manoeuvrability to the **horizontal movement** of the welding head in front of the tube-sheet.

Each **Giotto Slide Deck** includes a **Slider** for connecting a **TPB-3A** balancer (supplied separately) for **vertical movement** of the welding head.

There is the option, on request, to install up to 3 **Slider** (2 optional) for the manoeuvring of 3 **Giotto FC250** welding heads

## **TPB-3A** Optional

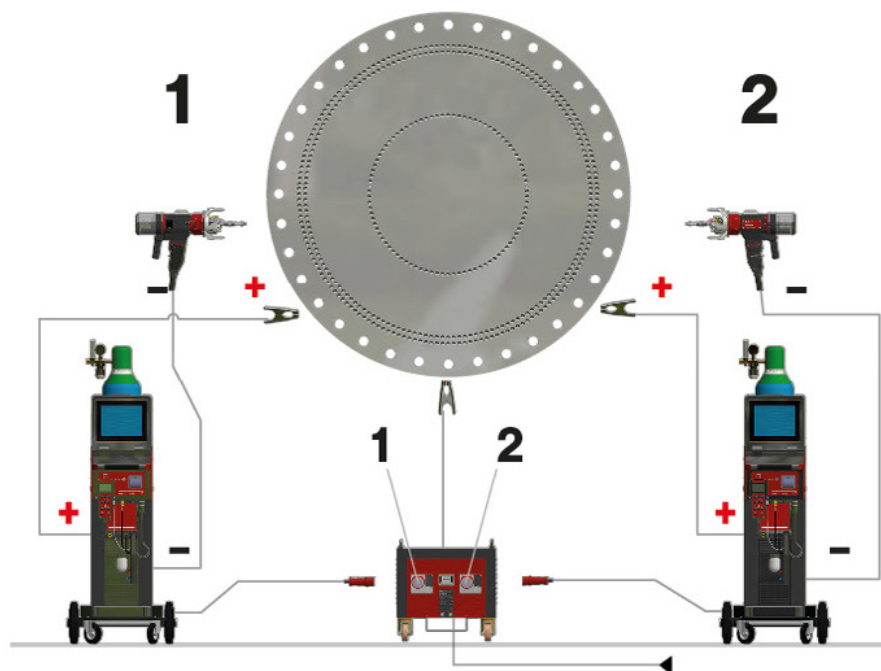
Spring balancer for the **support and vertical movement of the welding head** with a capacity of 10 to 14 kg (22.0 to 30.8 lb)







Avoid mains power supply disturbances

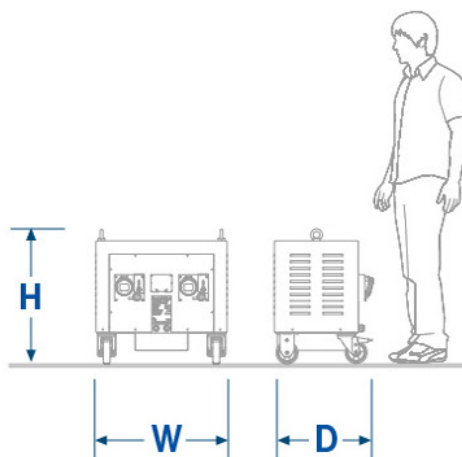


## **Giotto Equipower 20**

| Power supply      |           |                 |   |
|-------------------|-----------|-----------------|---|
| Supply voltage IN | Volt - Ph | 400/440/480 - 3 | ★ |
| OUT Voltage       | Volt - Ph | 2x400 - 3       |   |

| Dimensions |       |           |          |
|------------|-------|-----------|----------|
| Width      | W     | mm inches | 600 23.6 |
| Depth      | D     | mm inches | 450 17.7 |
| Height     | H     | mm inches | 615 24.2 |
| Weight     | kg lb |           | 150 330  |

Different INPUT voltage ★  
available on request







## **Giotto Equipower 20**

**Balanced potential power supply**  
for the simultaneous use of two  
welding systems

To promote increased productivity, MAUS ITALIA suggests the simultaneous use of two or more **Giotto FullControl** systems with the relevant TIG **Giotto FC250** orbital heads on the same tube-sheet.

**Giotto Equipower 20** is equipped with a three-phase transformer and connection point to balance the power supply to the two connected welding systems.

**Giotto Equipower 20** prevents welding systems from interfering each other during production with changes in the electrical network ensuring the right protection to the programmers' electronics.

Protection for electronics on board the machine





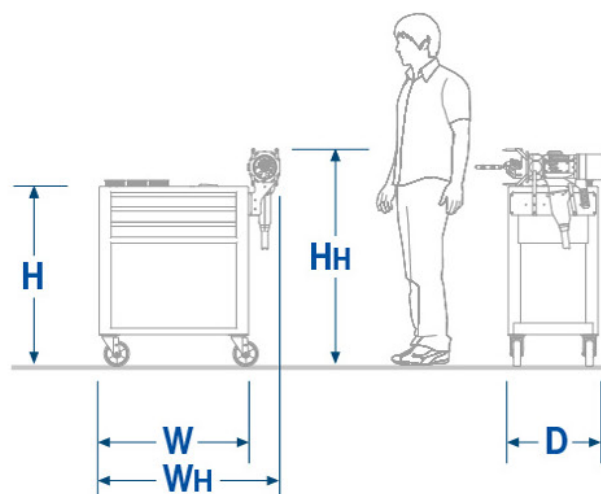


Rapid maintenance

Everything always in order and protected

## **Giotto Service Trolley**

| Dimensions    |           |           |      |      |
|---------------|-----------|-----------|------|------|
| Width         | <b>W</b>  | mm inches | 740  | 29.1 |
| Width + head  | <b>WH</b> | mm inches | 900  | 35.4 |
| Depth         | <b>D</b>  | mm inches | 450  | 17.7 |
| Height        | <b>H</b>  | mm inches | 895  | 35.2 |
| Height + head | <b>HH</b> | mm inches | 1160 | 45.7 |
| Capacity      |           | kg lb     | 400  | 881  |
| Weight        |           | kg lb     | 41   | 90   |





## **Giotto Service Trolley**

**Service trolley** and storage  
for spare parts

A tidy and well-organised workspace is synonymous with efficiency and good practice.

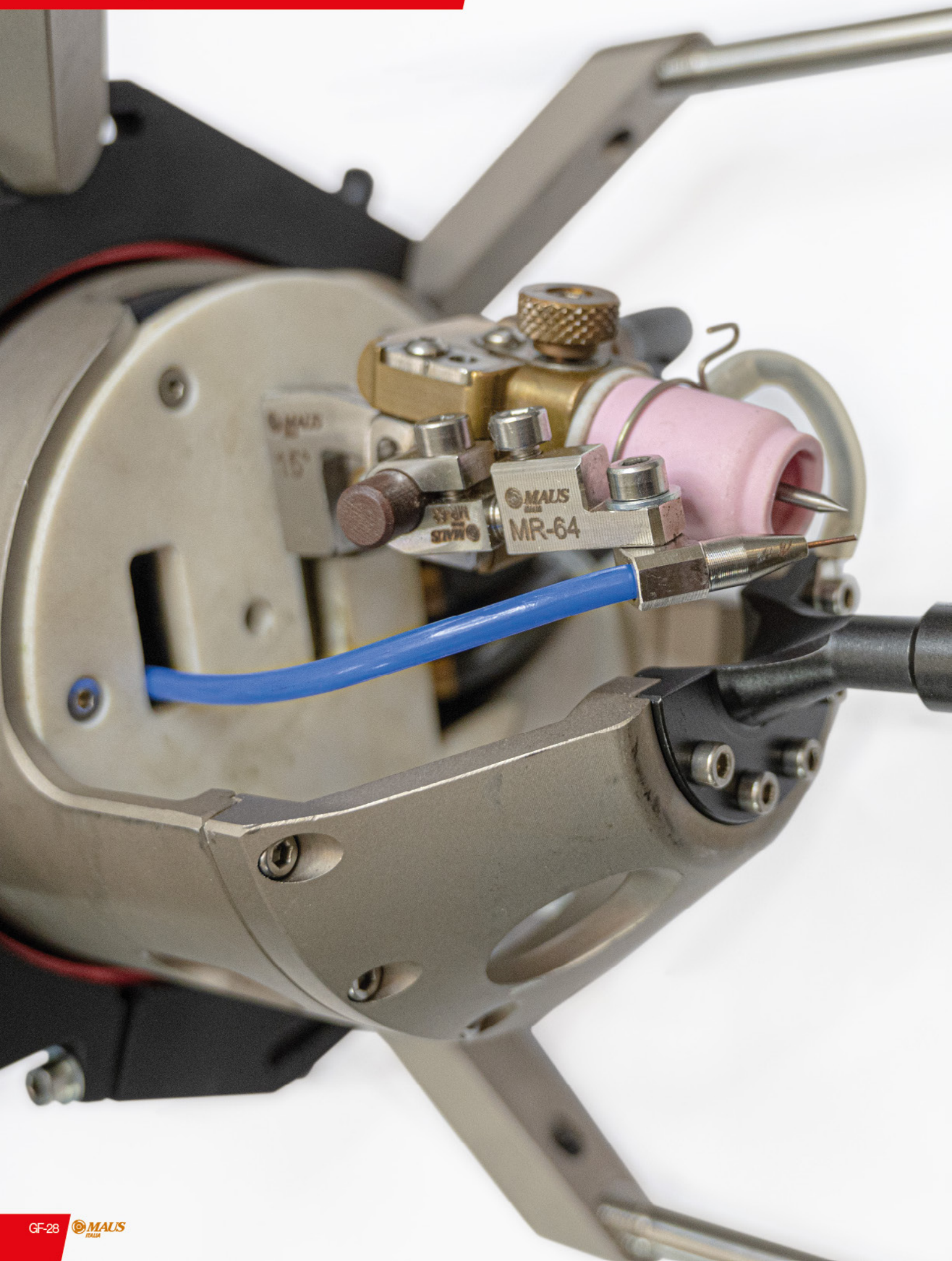
The **Giotto Service Trolley** allows you to organise the consumable spare parts for **Giotto** orbital heads and to store all the keys and service accessories.



- Three drawers mounted on telescopic ball rails with centralised front security lock.
- Large thermoplastic work top
- Orbital head support ensuring stability and functionality
- Lower shelf with rubber mat
- Equipped with 4 wheels of Ø 125 mm







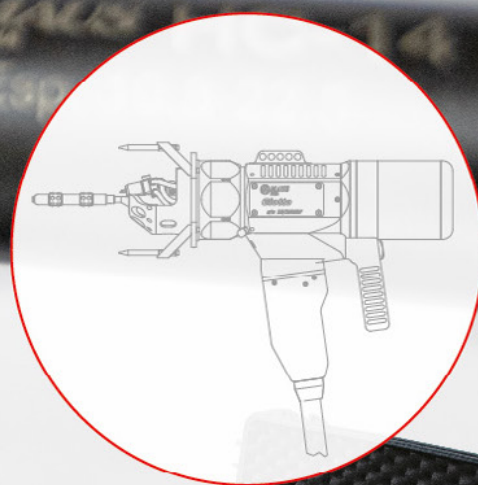
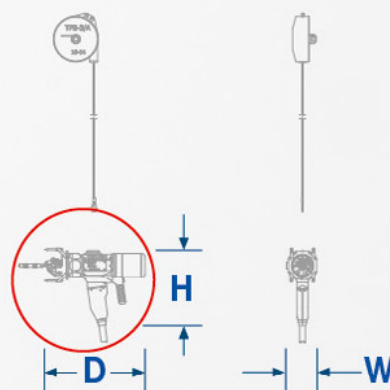


# Giotto FullControl

**Technical features** of the advanced tube-tube-sheet TIG orbital welding system

## Giotto FC250

| General features                |                           |                                         |  |
|---------------------------------|---------------------------|-----------------------------------------|--|
| Duty Cycle                      | A (60%)                   | 250                                     |  |
| Orbital welding speed (max)     | rpm                       | 10                                      |  |
| ID Tube (min.)                  | mm <i>inches</i>          | 8 <i>0.315</i>                          |  |
| OD Tube standard (max.)         | mm <i>inches</i>          | 51 <i>2.008</i>                         |  |
| Welding head cooling            |                           | closed liquid circuit                   |  |
| Welding geometry                |                           |                                         |  |
| Flush                           |                           | ✓                                       |  |
| Recessed (max.)                 | mm <i>inches</i>          | 3,0 <i>0.118</i>                        |  |
| Protruding (max.)               | mm <i>inches</i>          | 12,0 <i>0.472</i>                       |  |
| Tungsten                        |                           |                                         |  |
| Ø 1.6                           |                           | optional                                |  |
| Ø 2.4                           |                           | standard                                |  |
| Ø 3.2                           |                           | optional                                |  |
| Electrode distance adjustment   | mm <i>inches</i>          | manual<br>12 (±6) <i>0.472 (±0.236)</i> |  |
| Filler wire                     |                           |                                         |  |
| Wire coil (weight/Ø)            | kg/mm <i>lbs/inches</i>   | 1/100 <i>2.21/3.937</i>                 |  |
| Recommended wire diameter       | mm <i>inches</i>          | 0,8 <i>0.0315</i>                       |  |
| • Wire diameter (optional)      | mm <i>inches</i>          | 0,6 <i>0.0236</i>                       |  |
| • Wire diameter (optional)      | mm <i>inches</i>          | 1,0 <i>0.0394</i>                       |  |
| • Wire diameter (optional)      | mm <i>inches</i>          | 1,2 <i>0.0472</i>                       |  |
| Wire speed (max.)               | mm/min <i>inches/min</i>  | 2000 <i>78.5</i>                        |  |
| Dimensions                      |                           |                                         |  |
| Width                           | <b>W</b> mm <i>inches</i> | 150 <i>6</i>                            |  |
| Depth (without centring)        | <b>D</b> mm <i>inches</i> | 530 <i>21</i>                           |  |
| Height                          | <b>H</b> mm <i>inches</i> | 475 <i>19</i>                           |  |
| Weight excluding cables and oil | kg <i>lb</i>              | 12 <i>26.5</i>                          |  |
| Cable length                    | m <i>ft</i>               | 6 <i>19.7</i>                           |  |
| Packaging                       |                           |                                         |  |
| Width                           | cm <i>ft</i>              | 70 <i>2.3</i>                           |  |
| Depth                           | cm <i>ft</i>              | 52 <i>1.7</i>                           |  |
| Height                          | cm <i>ft</i>              | 30 <i>1.0</i>                           |  |
| Packaging weight                | kg <i>lb</i>              | 3 <i>7.0</i>                            |  |
| Total weight                    | kg <i>lb</i>              | 18 <i>39.7</i>                          |  |

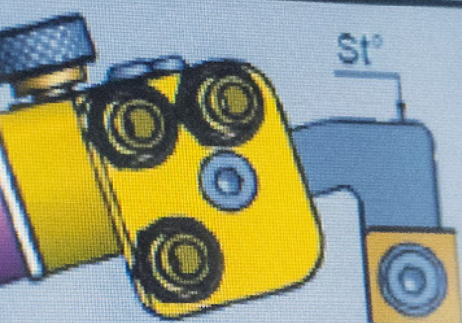




Date: 17-8-21

Hour: 11:20

Messages ...>



Electrode Ø 2.4 mm

15°

Angle

St° 15.0°

Depth

Ep 7.0 mm

AVC Start

0.0 mm

Wire Diameter

0.8 mm

Welding Diameter

2.0 mm

Other

Nozzle

Pre Gas 2

T1 0.0 Sec

Pre Gas 1

T2 1.6 Sec

Up-Slope Time

T3 2.5 Sec

Puddle Time

T4 0.5 Sec

Wire Offset

0.0 Sec

Puddle Current

Cb 135 Amp

Other

Sectors 4-6

Sectors 7-9

Down-Slope

Menu





Pressure reducer for 50-litre argon cylinders

## **Giotto FullControl**

**Technical features** of the advanced tube-tube-sheet TIG orbital welding system



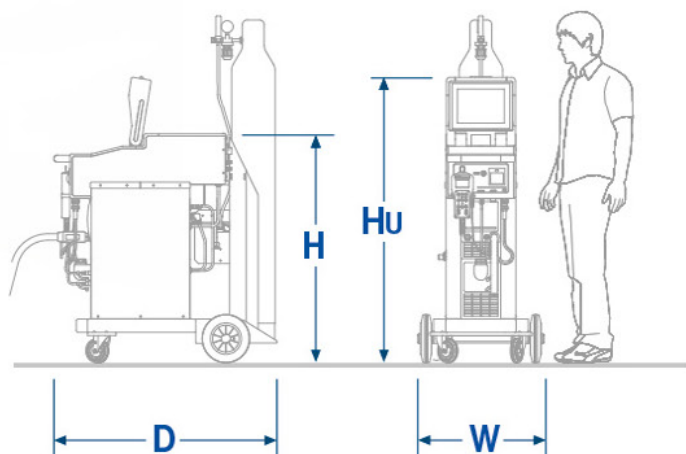
## **Giotto PG 300**

| Power supply                                 |             |           |            |      |
|----------------------------------------------|-------------|-----------|------------|------|
| Supply voltage (±10%)                        | Volt - Ph   |           | 400 - 3    |      |
| Absorbed power                               | kW          |           | 10         |      |
| Network fuses                                | A           |           | 16         |      |
| Cos fi / efficiency                          |             |           | 0,99 / 84% |      |
| Open circuit voltage                         | Vdc         |           | 63         |      |
| Utilisation factor (40°C/104°F. - X=60%)     | A           |           | 250        |      |
| (40°C/104°F. - X=100%)                       | A           |           | 210        |      |
| Capacity                                     |             |           |            |      |
| Cooling power (25°C./77°F.)                  | W           |           | 650        |      |
| Liquid coolant tank                          | l USgal     |           | 2,0        | 0.53 |
| Coolant flow (max.)                          | l/min USgpm |           | 3,3        | 0.87 |
| Dimensions                                   |             |           |            |      |
| Width                                        | <b>W</b>    | mm inches | 670        | 26.4 |
| Depth                                        | <b>D</b>    | mm inches | 1180       | 46.5 |
| Height (transport)                           | <b>H</b>    | mm inches | 1210       | 47.7 |
| Height (usage)                               | <b>HU</b>   | mm inches | 1510       | 59.5 |
| Weight (without cylinder)                    |             | kg lb     | 125        | 276  |
| Degree of protection                         | IP          |           | 23         |      |
| Shipping (with <b>GiottoFC250</b> head case) |             |           |            |      |
| Width                                        |             | cm inches | 80         | 2.7  |
| Depth                                        |             | cm inches | 130        | 4.3  |
| Height                                       |             | cm inches | 145        | 4.8  |
| Crate weight                                 |             | kg lb     | 8          | 18   |
| Total weight                                 |             | kg lb     | 152        | 334  |

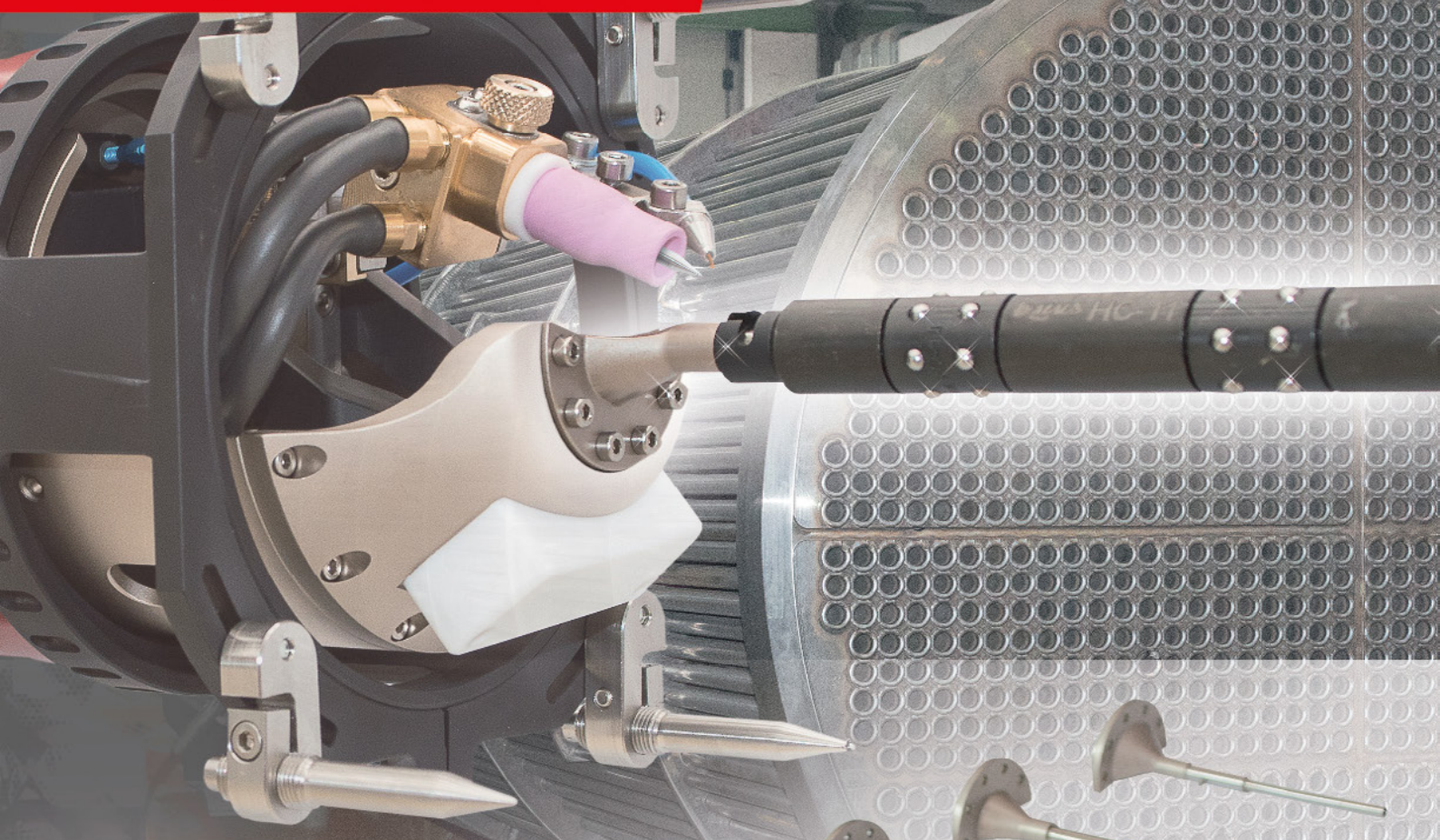
### Work cycle

250 A (40°C./104°F.)  
60%

210 A (40°C./104°F.)  
100%







## Expandable sector cartridge mod. **HSE**

Self-centring system particularly suitable in tube-tube-sheet welding of boilers for internal diameters greater than 57 mm (2 1/4") and in vertical negative head applications (sugar refinery exchangers) where the support of the orbital welding head is guaranteed by the expansion of the sectors.







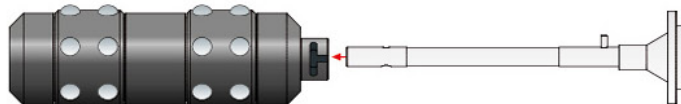
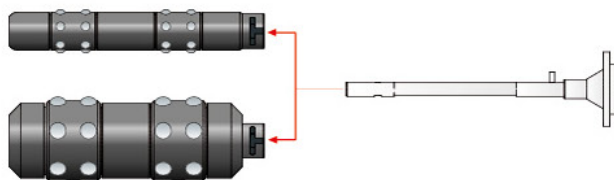
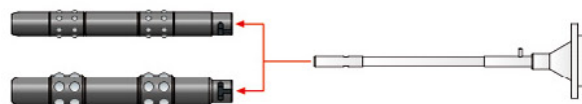
The centring of the torch is guaranteed by the spindle + cartridge system.

Use the table to select the correct combination of the **HS** series spindle and the **HC** series cartridge according to the internal diameter of the tube.

# Giotto FC 250

## Centring

**HS** cartridge spindles and **HC** self-centering cartridges for **Giotto250B** tube-tube-sheet TIG orbital welding head



STANDARD - for immediate delivery

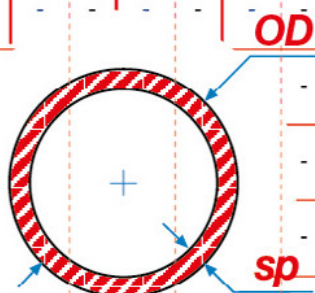
| Tube size   |               | Cartridge | Spindle |
|-------------|---------------|-----------|---------|
| ID          |               | HC        | HS      |
| mm          | inches        | Cod.      | Cod.    |
| 7,4 ÷ 7,8   | 0.291 ÷ 0.307 | HC-76     | HS-MINI |
| 7,7 ÷ 8,3   | 0.303 ÷ 0.327 | HC-80     |         |
| 8,2 ÷ 8,9   | 0.323 ÷ 0.350 | HC-87     |         |
| 8,5 ÷ 9,3   | 0.335 ÷ 0.366 | HC-90     |         |
| 8,8 ÷ 9,7   | 0.346 ÷ 0.381 | HC-95     |         |
| 9,8 ÷ 10,3  | 0.386 ÷ 0.466 | HC-0      | HS-A    |
| 10,0 ÷ 10,5 | 0.394 ÷ 0.413 | HC-1      |         |
| 10,5 ÷ 11,0 | 0.413 ÷ 0.433 | HC-2      |         |
| 11,0 ÷ 11,5 | 0.433 ÷ 0.453 | HC-3      |         |
| 11,5 ÷ 12,0 | 0.453 ÷ 0.472 | HC-4      |         |
| 12,0 ÷ 12,5 | 0.472 ÷ 0.492 | HC-5      |         |
| 12,5 ÷ 13,0 | 0.492 ÷ 0.512 | HC-6      |         |
| 12,8 ÷ 14,0 | 0.504 ÷ 0.551 | HC-7      |         |
| 13,3 ÷ 14,5 | 0.524 ÷ 0.571 | HC-7A     | HS-B    |
| 13,8 ÷ 15,0 | 0.543 ÷ 0.590 | HC-8      |         |
| 14,3 ÷ 15,5 | 0.563 ÷ 0.610 | HC-8A     |         |
| 14,8 ÷ 16,0 | 0.583 ÷ 0.630 | HC-9      |         |
| 15,8 ÷ 17,0 | 0.622 ÷ 0.669 | HC-10     |         |
| 16,8 ÷ 18,0 | 0.661 ÷ 0.709 | HC-11     |         |
| 17,8 ÷ 19,0 | 0.701 ÷ 0.748 | HC-12     |         |
| 18,8 ÷ 20,5 | 0.740 ÷ 0.807 | HC-13     |         |
| 19,3 ÷ 21,5 | 0.760 ÷ 0.846 | HC-13A    |         |
| 19,8 ÷ 22,5 | 0.779 ÷ 0.886 | HC-14     |         |
| 20,9 ÷ 23,8 | 0.823 ÷ 0.937 | HA-14A    |         |
| 22,3 ÷ 25,0 | 0.878 ÷ 0.984 | HC-15     | HS-C    |
| 24,5 ÷ 27,0 | 0.965 ÷ 1.06  | HC-16     |         |
| 26,5 ÷ 29,0 | 1.043 ÷ 1.141 | HC-17     |         |
| 28,5 ÷ 31,  | 1.122 ÷ 1.220 | HC-18     |         |
| 30,5 ÷ 33,0 | 1.201 ÷ 1.299 | HC-19     |         |
| 32,5 ÷ 36,0 | 1.279 ÷ 1.417 | HC-20     |         |
| 35,5 ÷ 39,0 | 1.398 ÷ 1.535 | HC-21     |         |
| 38,5 ÷ 42,0 | 1.516 ÷ 1.653 | HC-22     |         |
| 41,5 ÷ 45,0 | 1.634 ÷ 1.772 | HC-23     |         |
| 44,5 ÷ 48,0 | 1.752 ÷ 1.890 | HC-24     |         |
| 47,5 ÷ 51,0 | 1.870 ÷ 2.008 | HC-25     |         |
| 50,5 ÷ 54,0 | 1.988 ÷ 2.126 | HC-26     | HS-D    |
| 53,5 ÷ 58,0 | 2.106 ÷ 2.283 | HC-27     |         |
| 57,5 ÷ 62,0 | 2.264 ÷ 2.441 | HC-28     |         |
| 61,5 ÷ 68,0 | 2.421 ÷ 2.677 | HC-29     |         |
| 65,5 ÷ 70,0 | 2.579 ÷ 2.756 | HC-30     |         |



# BWG Table

| OD                | 00 BWG |      | 0 BWG |      | 1 BWG |      | 2 BWG |      | 3 BWG |       | 4 BWG |       | 5 BWG |       | 6 BWG |       | 7 BWG |       | 8 BWG |       | 9 BWG |       | 10 BWG |       | 11 BWG |       |
|-------------------|--------|------|-------|------|-------|------|-------|------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|--------|-------|--------|-------|
| “ mm              | “ mm   | “ mm | “ mm  | “ mm | “ mm  | “ mm | “ mm  | “ mm | “ mm  | “ mm  | “ mm  | “ mm  | “ mm  | “ mm  | “ mm  | “ mm  | “ mm  | “ mm  | “ mm  | “ mm  | “ mm  | “ mm  | “ mm   | “ mm  | “ mm   | “ mm  |
| sp →              | 0.380  | 9,65 | 0.340 | 8,64 | 0.300 | 7,62 | 0.284 | 7,21 | 0.259 | 6,58  | 0.238 | 6,05  | 0.220 | 5,59  | 0.203 | 5,16  | 0.180 | 4,57  | 0.165 | 4,19  | 0.148 | 3,76  | 0.134  | 3,40  | 0.120  | 3,05  |
| 1/4”<br>(6,3)     | -      | -    | -     | -    | -     | -    | -     | -    | -     | -     | -     | -     | -     | -     | -     | -     | -     | -     | -     | -     | -     | -     | -      | -     | -      | -     |
| 3/8”<br>(9,5)     | -      | -    | -     | -    | -     | -    | -     | -    | -     | -     | -     | -     | -     | -     | -     | -     | -     | -     | -     | -     | -     | -     | -      | -     | -      | -     |
| 1/2”<br>(12,7)    | -      | -    | -     | -    | -     | -    | -     | -    | -     | -     | -     | -     | -     | -     | -     | -     | -     | -     | -     | -     | -     | -     | -      | -     | -      | -     |
| 5/8”<br>(15,9)    | -      | -    | -     | -    | -     | -    | -     | -    | -     | -     | -     | -     | -     | -     | -     | -     | -     | -     | -     | -     | -     | -     | -      | -     | -      | -     |
| 3/4”<br>(19,0)    | -      | -    | -     | -    | -     | -    | -     | -    | -     | -     | -     | -     | -     | -     | -     | -     | -     | -     | -     | -     | -     | -     | 0.482  | 12,2  | 0.510  | 12,9  |
| 7/8”<br>(22,2)    | -      | -    | -     | -    | -     | -    | -     | -    | -     | -     | -     | -     | -     | -     | -     | -     | -     | -     | -     | -     | -     | -     | 0.607  | 15,4  | 0.635  | 16,1  |
| 1”<br>(25,4)      | -      | -    | -     | -    | -     | -    | -     | -    | -     | -     | -     | -     | -     | -     | -     | -     | -     | 0.670 | 17,0  | 0.704 | 17,9  | 0.732 | 18,6   | 0.760 | 19,3   |       |
| 1.1/4”<br>(31,8)  | -      | -    | -     | -    | -     | -    | -     | -    | -     | -     | -     | -     | -     | -     | -     | -     | 0.890 | 22,6  | 0.920 | 23,4  | 0.954 | 24,3  | 0.982  | 25,0  | 1.010  | 25,7  |
| 1.1/2”<br>(38,1)  | -      | -    | -     | -    | -     | -    | -     | -    | -     | -     | -     | -     | -     | -     | -     | -     | 1.140 | 28,9  | 1.170 | 29,7  | 1.204 | 30,6  | 1.232  | 31,3  | 1.260  | 32,0  |
| 1.3/4”<br>(44,4)  | -      | -    | -     | -    | -     | -    | -     | -    | -     | -     | -     | 1.310 | 33,2  | 1.344 | 34,1  | 1.390 | 35,2  | 1.420 | 36,0  | 1.454 | 36,9  | 1.482 | 37,6   | 1.510 | 38,3   |       |
| 2”<br>(50,8)      | -      | -    | -     | -    | -     | -    | -     | -    | -     | -     | 1.524 | 38,7  | 1.560 | 39,6  | 1.594 | 40,5  | 1.640 | 41,6  | 1.670 | 42,4  | 1.704 | 43,3  | 1.732  | 44,0  | 1.760  | 44,7  |
| 2.1/4”<br>(57,1)  | 1.490  | 37,8 | 1.570 | 39,8 | 1.650 | 41,8 | 1.682 | 42,7 | 1.732 | 43,9  | 1.774 | 45,0  | 1.810 | 45,9  | 1.844 | 46,8  | 1.890 | 47,9  | 1.920 | 48,7  | 1.954 | 49,6  | 1.982  | 50,3  | 2.010  | 51,0  |
| 2.1/2”<br>(63,5)  | 1.740  | 44,2 | 1.820 | 46,2 | 1.900 | 48,2 | 1.932 | 49,1 | 1.982 | 50,3  | 2.024 | 51,4  | 2.060 | 52,3  | 2.094 | 53,2  | 2.140 | 54,3  | 2.170 | 55,1  | 2.204 | 56,0  | 2.232  | 56,7  | 2.260  | 57,4  |
| 2.3/4”<br>(69,8)  | 1.990  | 50,5 | 2.070 | 52,5 | 2.150 | 54,5 | 2.182 | 55,3 | 2.232 | 56,6  | 2.274 | 57,7  | 2.310 | 58,6  | 2.344 | 59,5  | 2.390 | 60,6  | 2.420 | 61,4  | 2.454 | 62,3  | 2.482  | 63,0  | 2.510  | 63,7  |
| 3”<br>(76,2)      | 2.240  | 56,9 | 2.320 | 58,9 | 2.400 | 60,9 | 2.432 | 61,8 | 2.482 | 63,0  | 2.524 | 64,1  | 2.560 | 65,0  | 2.594 | 65,9  | 2.640 | 67,0  | 2.670 | 67,8  | 2.704 | 68,7  | 2.732  | 69,4  | 2.760  | 70,1  |
| 3.1/4”<br>(82,6)  | 2.490  | 63,3 | 2.570 | 65,3 | 2.650 | 67,3 | 2.682 | 68,2 | 2.732 | 69,4  | 2.774 | 70,5  | 2.810 | 71,4  | 2.844 | 72,3  | 2.890 | 73,4  | 2.920 | 74,2  | 2.954 | 75,1  | 2.982  | 75,8  | 3.010  | 76,5  |
| 3.1/2”<br>(88,9)  | 2.740  | 69,6 | 2.820 | 71,6 | 2.900 | 73,6 | 2.932 | 74,5 | 2.982 | 75,7  | 3.024 | 76,8  | 3.060 | 77,7  | 3.094 | 78,6  | 3.140 | 79,7  | 3.170 | 80,5  | 3.204 | 81,4  | 3.232  | 82,1  | 3.260  | 82,8  |
| 3.3/4”<br>(95,2)  | 2.990  | 75,9 | 3.070 | 77,9 | 3.150 | 79,9 | 3.182 | 80,8 | 3.232 | 82,0  | 3.274 | 83,1  | 3.310 | 84,0  | 3.344 | 84,9  | 3.390 | 86,0  | 3.420 | 86,8  | 3.454 | 87,7  | 3.482  | 88,4  | 3.510  | 89,1  |
| 4”<br>(101,6)     | 3.240  | 82,3 | 3.320 | 84,3 | 3.400 | 86,3 | 3.432 | 87,2 | 3.482 | 88,4  | 3.524 | 89,5  | 3.560 | 90,4  | 3.594 | 91,3  | 3.640 | 92,4  | 3.670 | 93,2  | 3.704 | 94,1  | 3.732  | 94,8  | 3.760  | 95,5  |
| 4.1/4”<br>(108,0) | 3.490  | 88,7 | 3.570 | 90,7 | 3.650 | 92,7 | 3.682 | 93,6 | 3.732 | 94,8  | 3.774 | 95,9  | 3.810 | 96,8  | 3.844 | 97,7  | 3.890 | 98,8  | 3.920 | 99,6  | 3.954 | 100,5 | 3.982  | 101,2 | 4.010  | 101,9 |
| 4.1/2”<br>(114,3) | 3.740  | 95,0 | 3.820 | 97,0 | 3.900 | 99,0 | 3.932 | 99,9 | 3.982 | 101,1 | 4.024 | 102,2 | 4.060 | 103,1 | 4.094 | 104,0 | 4.140 | 105,1 | 4.170 | 105,9 | 4.204 | 106,8 | 4.232  | 107,5 | 4.260  | 108,2 |

The diagram illustrates a circular pipe cross-section. A blue arrow labeled 'OD' points to the outer edge of the pipe. Another blue arrow labeled 'sp' points to the thickness of the pipe wall. The pipe is shown with a red and white striped pattern on its outer surface and a blue crosshair in the center.





| 12<br>BWG   | 13<br>BWG   | 14<br>BWG   | 15<br>BWG   | 16<br>BWG   | 17<br>BWG   | 18<br>BWG   | 19<br>BWG  | 20<br>BWG  | 21<br>BWG  | 22<br>BWG  | 23<br>BWG  | 24<br>BWG  | OD<br>mm          |
|-------------|-------------|-------------|-------------|-------------|-------------|-------------|------------|------------|------------|------------|------------|------------|-------------------|
| “ mm        | “ mm        | “ mm        | “ mm        | “ mm        | “ mm        | “ mm        | “ mm       | “ mm       | “ mm       | “ mm       | “ mm       | “ mm       | “ mm              |
| 0.109 2,77  | 0.095 2,41  | 0.083 2,11  | 0.072 1,83  | 0.065 1,65  | 0.058 1,47  | 0.049 1,24  | 0.042 1,07 | 0.035 0,89 | 0.032 0,81 | 0.028 0,71 | 0.025 0,64 | 0.022 0,56 | ← <b>sp</b>       |
| -           | -           | -           | -           | -           | -           | 0.152 3,8   | 0.166 4,1  | 0.180 4,5  | 0.186 4,7  | 0.194 4,9  | 0.200 5,0  | 0.206 5,2  | 1/4"<br>(6,3)     |
| -           | -           | 0.209 5,3   | 0.231 5,8   | 0.245 6,2   | 0.259 6,5   | 0.277 7,0   | 0.291 7,3  | 0.305 7,7  | 0.311 7,9  | 0.319 8,1  | 0.325 8,2  | 0.331 8,4  | 3/8"<br>(9,5)     |
| -           | 0.310 7,9   | 0.334 8,5   | 0.356 9,0   | 0.370 9,4   | 0.384 9,7   | 0.402 10,2  | 0.416 10,5 | 0.430 10,9 | 0.436 11,1 | 0.444 11,3 | 0.450 11,4 | 0.456 11,6 | 1/2"<br>(12,7)    |
| 0.407 10,3  | 0.435 11,1  | 0.459 11,7  | 0.481 12,2  | 0.495 12,6  | 0.509 12,9  | 0.527 13,4  | 0.541 13,7 | 0.555 14,1 | 0.561 14,3 | 0.569 14,5 | 0.575 14,6 | 0.581 14,8 | 5/8"<br>(15,9)    |
| 0.532 13,4  | 0.560 14,2  | 0.584 14,8  | 0.606 15,3  | 0.620 15,7  | 0.634 16,0  | 0.652 16,5  | 0.666 16,8 | 0.680 17,2 | 0.686 17,4 | 0.694 17,6 | 0.700 17,7 | 0.706 17,9 | 3/4"<br>(19,0)    |
| 0.657 16,6  | 0.685 17,4  | 0.709 18,0  | 0.731 18,5  | 0.745 18,9  | 0.759 19,2  | 0.777 19,7  | 0.791 20,0 | 0.805 20,4 | 0.811 20,6 | 0.819 20,8 | 0.825 20,9 | 0.831 21,1 | 7/8"<br>(22,2)    |
| 0.782 19,8  | 0.810 20,6  | 0.834 21,2  | 0.856 21,7  | 0.870 22,1  | 0.884 22,4  | 0.902 22,9  | 0.916 23,2 | 0.930 23,6 | 0.936 23,8 | 0.944 24,0 | 0.950 24,1 | 0.956 24,3 | 1"<br>(25,4)      |
| 1.032 26,2  | 1.060 27,0  | 1.084 27,6  | 1.106 28,1  | 1.120 28,5  | 1.134 28,8  | 1.152 29,3  | 1.166 29,6 | 1.180 30,0 | 1.186 30,2 | 1.194 30,4 | 1.200 30,5 | 1.206 30,7 | 1 1/4"<br>(31,8)  |
| 1.282 32,5  | 1.310 33,3  | 1.334 33,9  | 1.356 34,4  | 1.370 34,8  | 1.384 35,1  | 1.402 35,6  | 1.416 35,9 | 1.430 36,3 | 1.436 36,5 | 1.444 36,7 | 1.450 36,8 | 1.456 37,0 | 1 1/2"<br>(38,1)  |
| 1.532 38,8  | 1.560 39,6  | 1.584 40,2  | 1.606 40,7  | 1.620 41,1  | 1.634 41,4  | 1.652 41,9  | 1.666 42,2 | 1.680 42,6 | 1.686 42,8 | 1.694 43,0 | 1.700 43,1 | 1.706 43,3 | 1 3/4"<br>(44,4)  |
| 1.782 45,2  | 1.810 46,0  | 1.834 46,6  | 1.856 47,1  | 1.870 47,5  | 1.884 47,8  | 1.902 48,3  | 1.916 48,6 | 1.930 49,0 | 1.936 49,2 | 1.944 49,4 | 1.950 49,5 | 1.956 49,7 | 2"<br>(50,8)      |
| 2.032 51,5  | 2.060 52,3  | 2.084 52,9  | 2.106 53,4  | 2.120 53,8  | 2.134 54,1  | 2.152 54,6  | -          | -          | -          | -          | -          | -          | 2 1/4"<br>(57,1)  |
| 2.282 57,9  | 2.310 58,7  | 2.334 59,3  | 2.356 59,8  | 2.370 60,2  | 2.384 60,5  | 2.402 61,0  | -          | -          | -          | -          | -          | -          | 2 1/2"<br>(63,5)  |
| 2.532 64,2  | 2.560 65,0  | 2.584 65,6  | 2.606 66,1  | 2.620 66,5  | 2.634 66,8  | 2.652 67,3  | -          | -          | -          | -          | -          | -          | 2 3/4"<br>(69,8)  |
| 2.782 70,6  | 2.810 71,4  | 2.834 72,0  | 2.856 72,5  | 2.870 72,9  | 2.884 73,2  | 2.902 73,7  | -          | -          | -          | -          | -          | -          | 3"<br>(76,2)      |
| 3.032 77,0  | 3.060 77,8  | 3.084 78,4  | 3.106 78,9  | 3.120 79,3  | 3.134 79,6  | 3.152 80,1  | -          | -          | -          | -          | -          | -          | 3 1/4"<br>(82,6)  |
| 3.282 83,3  | 3.310 84,1  | 3.334 84,7  | 3.356 85,2  | 3.370 85,6  | 3.384 85,9  | 3.402 86,4  | -          | -          | -          | -          | -          | -          | 3 1/2"<br>(88,9)  |
| 3.532 89,6  | 3.560 90,4  | 3.584 91,0  | 3.606 91,5  | 3.620 91,9  | 3.634 92,2  | 3.652 92,7  | -          | -          | -          | -          | -          | -          | 3 3/4"<br>(95,2)  |
| 3.782 96,0  | 3.810 96,8  | 3.834 97,4  | 3.856 97,9  | 3.870 98,3  | 3.884 98,6  | 3.902 99,1  | -          | -          | -          | -          | -          | -          | 4"<br>(101,6)     |
| 4.032 102,4 | 4.060 103,2 | 4.084 103,8 | 4.106 104,3 | 4.120 104,7 | 4.134 105,0 | 4.152 105,5 | -          | -          | -          | -          | -          | -          | 4 1/4"<br>(108,0) |
| 4.282 108,7 | 4.310 109,5 | 4.334 110,1 | 4.356 110,6 | 4.370 111,0 | 4.384 111,3 | 4.402 111,8 | -          | -          | -          | -          | -          | -          | 4 1/2"<br>(114,3) |





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