AOTAI

CATALOGUE

Complete Solutions For
Welding & Cutting

Orbital Welding System

Application /Orbital Welding System

TIG Orbital Welding System

Orbital Welding System

Developed for all position tube - tube sheet automatic welding, Compared with manual welding, more efficient, more reliable, more convenient, and more beautiful.

Brings consistent excellent quality and increases productivity
-Very simple operation program
-Excellent welding performance
-Mature welding process
-Extremely low labor intensity

Recommended Areas of Use

- Boiler
- Chemical industry
- Heat exchanger
- Air-conditioner
- Power
- Plant

Heat Exchanger

Boiler

Condensator

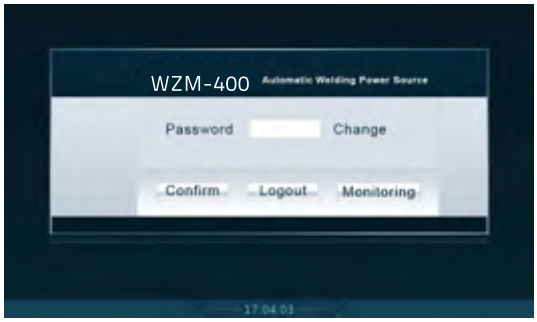
Standard Equipments

- Power Source WZM-400
- Welding Head WTS60II
- Manipulator CZJ1.9*1.2

Features and Benefits

- Portable, beautiful and easy to move
- X /Y /Z triaxial motion, to realize welding head fast pinpoint
- Triaxial motion relay on linear guideway, stable and reliable
- Two locking manner: manual locking, stable and reliable; pneuma-lock, convenient
- Four height adjustable stand bars install on foundation, to ensure holder position level precise
- Four universal trundle install on foundation, easy to move

TIG Orbital Welding System



User management login interface
- User needs to enter password, modify welding standard, safe to use

System setting interface
- Rotate speed increase
- Manual rotate speed
- Wirefeeding speed
- Inch wirefeeding speed
- Current increase
- Voltage increase

Welding monitoring interface
- Real time monitor whole welding process
- Real time check relative welding parameter, running status, current position, welding manner, etc

Adjustable welding parameters interface
- Pre-gas time
- Post gas time
- Peak current
- Base current
- Peak current time
- Wirefeeding speed
- Arc length

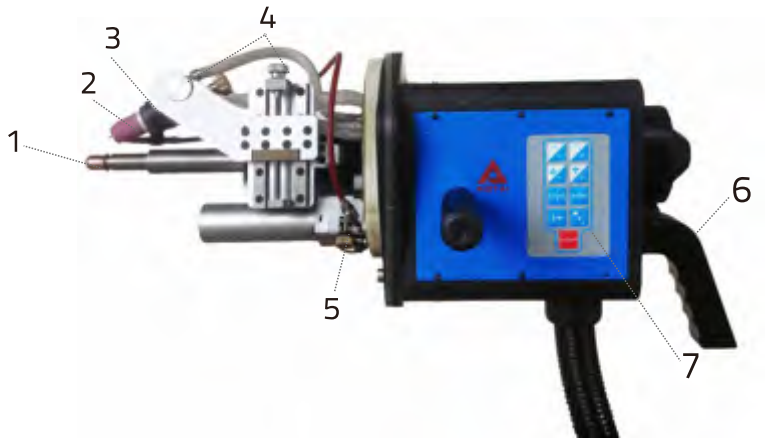
Equipment name	Item	Parameter
WZM-400 Power source	Rated input voltage/frequency	380V±10% 50Hz
	Welding current	5~400A
	Duty cycle (20℃)	400A 60%/315A 100%
	Power	13.5KVA
	Savable programs	60
	Sections	16
	Main function	CC or pulse current output/Rotation control/ Wire feeding control/Protection gas control/ Auto control of arc length/ Horizontal swing control, etc.
	Dimension (mm /inch)	1100*600*1250 /43*23*49

TIG Orbital Welding System

WTS60II tube-sheet head

Features and Benefits

- Easy operation, reduce welder's skill requirements
- Excellent welding performance and appearance
- Infinite rotation device, no intertwine trouble of wire, water, power and gas feeding



1. Center positioning copper head available for all tube diameters (end-user provided, when more than 60mm, the related machinery parts shall be customized)
2. Standard TIG torch, maintenance friendly
3. Longtime continuous working with circulating water cooling
4. Manual adjustment knob, easy adjustment without any tools, save time and energy
5. Integrated wire feeder using 1.0kg wire reel (included)
6. Arc length automatic tracking and manual adjustment
7. One press to start and automatically welds till complete. Efficient and reliable

Item	
Model	WTS60II tube-sheet head
Tube sheet connection form	Tube protrusion or flush tube
Weldable material	Carbon steel, stainless steel, titanium alloy, etc.
Tube diameter (mm /inch)	16-80 /0.6-3.1(For 60-80, it needs to replace related mechanical parts.)
Maximum welding current (A)	300
Wire diameter (mm /inch)	0.8 1.0 /0.031 0.039
Torch rotation speed (rpm)	0.35~6.0
Maximum wire feeding speed (mm/inch/min)	1800 /71
Cooling	Water cooled
Weight (kg /lb)	12.5 /27.5
Duty cycle (A)	300@70%
Dimension (mm/inch)	425*265*210 /17*10*6

TIG Orbital Welding System

Equipment name	Item	Item
Manipulator	X axis stroke (mm /inch)	750 /29
	Y axis stroke (mm/inch)	1900 /75
	Z axis stroke (mm/inch)	1200 /47
	Minimum welding height (mm/inch)	600 /24
	Dimension (mm/inch)	1100*2300*2230 /43*90*88
	Load (kg /lb)	9~ 15 /4~6.7
Balance	Stroke (mm/inch)	1500 /59
	Weight (kg /lb)	4 /8.8

WTS40 Self-melting tube sheet head

Features & Benefits

- Small size, light weight, simple operation, zero requirement for welder skill
- Flexible and accurate positioning, safe and reliable.
- Closed-type welding ensures welding seam quality
- Infinite rotation structure avoids water, power, and gas winding.
- Water cooled, high duty cycle

Summary

- Mainly used for flush tubes, self-melting, tube-tube sheet welding
- Main welding material: stainless steel, titanium alloy, carbon steel, etc.
- Power source WZM-400

Application area

- Power stations, air conditioners, heat exchangers, boilers, nuclear power, chemical and other industries

Item	Technical parameter	
Mode	WTS40	
Weldable material	Carbon steel, stainless steel, titanium alloy etc.	
Main tube sheet connection form	Flush tubes	
Tube diameter (mm)	Φ16~Φ38	
Tungsten electrode diameter	2.4	
Torch rotation speed (rpm)	0.5~10	
Tungsten electrode angle (mm /inch)	7°	Range: Φ16~Φ28
	0°	Range: Φ25~Φ38
Protection gas	Argon	
Cooling	Water cooled	
Cooling water flow (ml/min)	≥600	
Weight (kg/lb)	3 /6.6	
Dimension (mm /inch)	317*86*148 /12*3*6	
Rated welding current	100A, rated duty cycle : 70%	
Power source	WZM-400	

TIG Orbital Welding System

Tube-tube Welding Head -WTC Series

WTC18 WTC40 WTC80 WTC118 WTC158

Summary

- Mainly used for all-position, self- fusion, tube-tube welding
- Mainly suitable for thin-wall tube-tube welding of stainless steel, titanium alloy, etc.
- Can work with power source WZM-400

Application area

Electronic, chemical, food/drinking water, air conditioner, medicine/medical equipment, instrument &meter, aviation/aerospace, engineering installation and nuclear power , etc.

Features & Benefits

- Small size, light weight, simple operation, zero requirement for welder skill
- Flexible automatic centering fixture, accurate positioning, safe and reliable.
- Closed-type welding ensures welding quality.
- Infinite rotation device avoids water, power, and gas winding.
- Water cooled, high duty cycle
- Common function keys on welding head make it convenient for fast welding.

Item	Technical parameters				
Model	WTC18	WTC40	WTC80	WTC118	WTC158
Weldable material	Carbon steel, stainless steel, titanium and titanium alloy etc.				
Tube diameter (mm /inch)	Φ6~Φ12.7	Φ6~Φ38.1	Φ19.05~Φ76.2	Φ38.1~Φ101.6	Φ50.8~Φ152.4
Torch rotation speed (rpm)	0.3~6.0	0.2657~5.3145	0.194~3.877	0.092~1.924	0.073~1.472
Maximum welding current (A)	60	Duty cycle 40%@85	Duty cycle 40%@100	Duty cycle 40%@120	Duty cycle 40%@120
		Duty cycle 60%@65	Duty cycle 60%@75	Duty cycle 60%@100	Duty cycle 60%@90
		Duty cycle 100%@45	Duty cycle 100%@55	Duty cycle 100%@80	Duty cycle 100%@75
Protection gas	Argon				
Cooling	Water cooled				
Cooling water flow (ml/min)	≥450m				
Weight (kg /lb)	2.0 /0.9	3.5 /7.7	5/11.1	6.5 /14.4	10 /22.2
Dimension (mm)	292*96*34	377*70*42	436*156*44.5	540*195*54	577*255*56
Power source					

TIG Orbital Welding System

Orbital Welding System- WTS60

Orbital Welding System- WTS40

Orbital Welding System-Tube

Features and Benefits (HW-15 Balancer)

- Easy to move, adjustable load
- Mainly applicable to welding large-scale tube sheet structure, such as large heat exchangers, etc.

Features and Benefits (Remote control box)

- Fine adjust welding parameter, perfect control whole welding process
- Realize real time welding parameter modification
- LCD on-hand controller can real-timely show welding parameter, faulty information like over-heat or over current, and welding stage like HF arc ignition
- Multi-function buttons save space, make interface simple, beautiful and powerful, improve the cost-efficacy

Features and Benefits (Manipulator)

- Aluminum structure with light weight makes it look good and move stably.
- Convenient pneumatic locking method
- X/Y/Z triaxial movement realizes rapid and accurate positioning of head.
- 4 universal wheels on the base ensures flexible and convenient movement.

Application

Applications

Heze, Shandong, China
Stainless steel, 25mm
2 passes with wire feeding
1 Min per pipe

Zhengzhou, Henan, China
Heat exchanger in chemical industry
Carbon steel, 51mm
1 pass with wire feeding
1.5 Min per pipe

Jinan, Shandong, China
Stainless steel, 19mm
1 pass without wire feeding
40 seconds per pipe

WTS40NK

WTS40NK INNER HOLE WELDING TECHNICAL SOLUTION

Workpiece details

- Tube inner diameter: Φ20~Φ40mm

  Tube wall thickness: 1mm - 2mm

- Tube-sheet material: carbon steel, stainless steel and so on

  Inner hole welding: The maximum depth is less or equal 200 mm. The specific dimensions are customized according to the workpiece.

- Joint type: Tube-tube self fused welding/butt-jointed tubes self fused welding

Workpiece assembling requirements

- Pipe hole processing requirements: Spot welding is needed before welding. And the concentricity should be ensured during spot welding.
- Surface cleaning: Conduct oil removal and rust removal to the workpiece to appear metallic luster.

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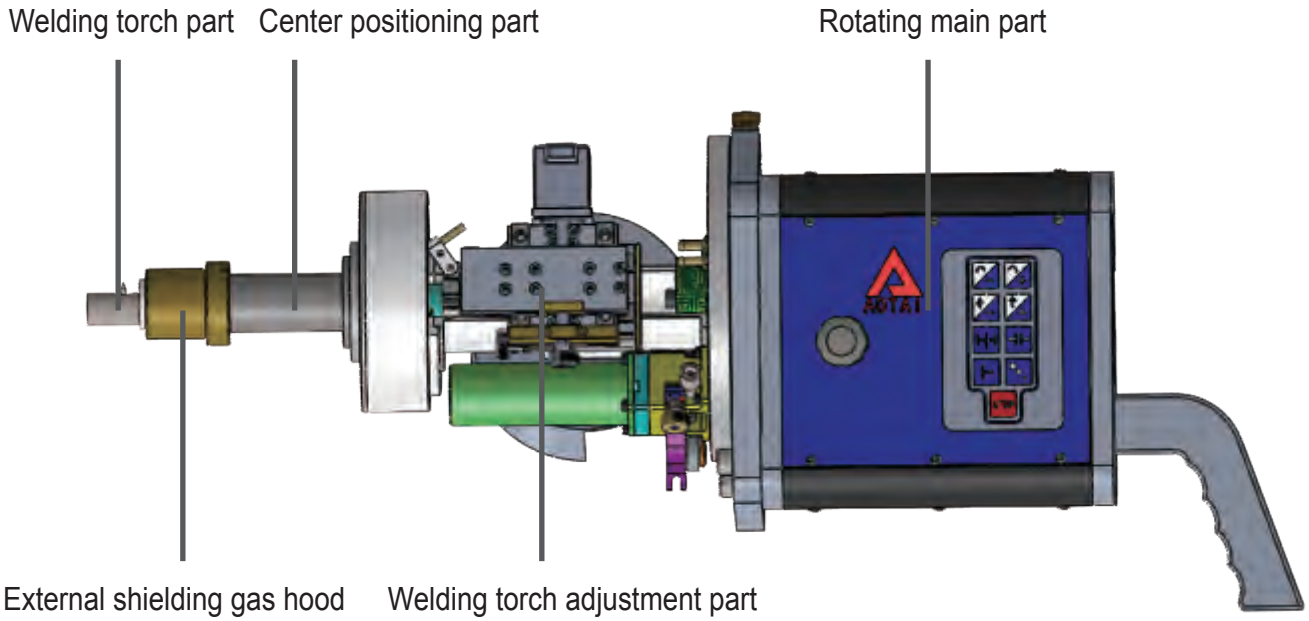
WTS40NK

WTS40NK INNER HOLE WELDING TECHNICAL SOLUTION

Equipment introduction

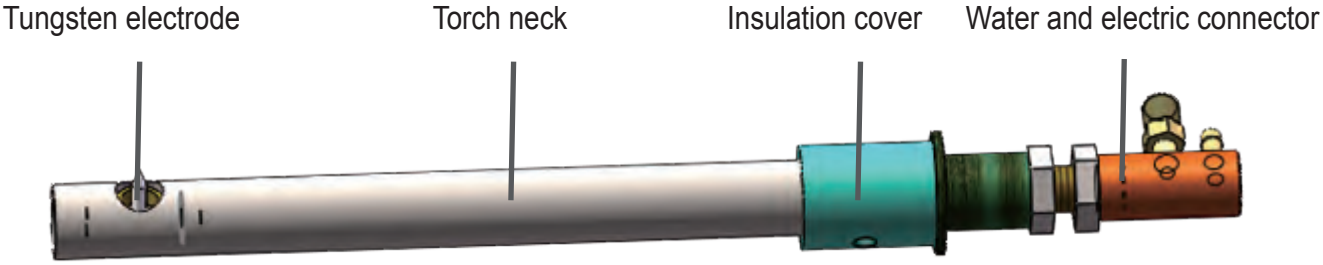
1. Introduction for major body and structure



WTS40NK welding head mainly consists of welding torch part, welding torch adjustment part, center positioning part, wire feeder part, rotating main part and external shielding gas hood.

2. Welding torch part

Welding torch part is a special torch for inner hole welding that enjoys cycled water-cooling inside.



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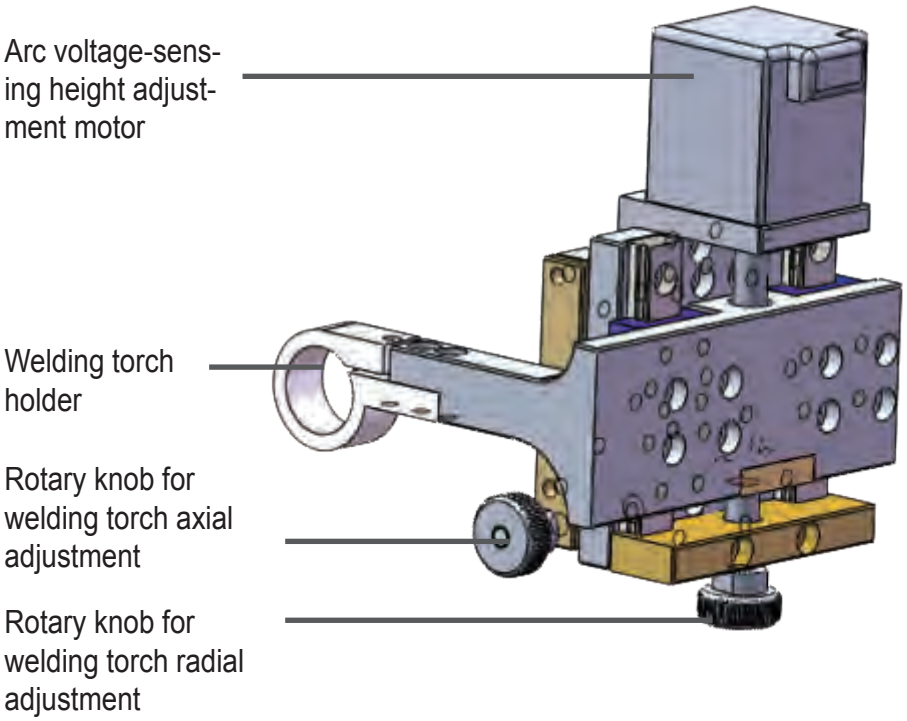
WTS40NK

WTS40NK INNER HOLE WELDING TECHNICAL SOLUTION

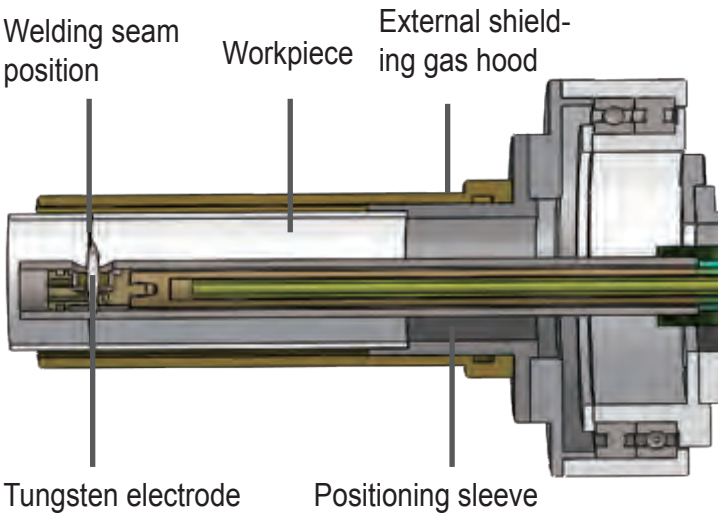
3. Welding torch adjustment part

The welding torch adjustment part is used to fine adjust torch position before welding so as to align tungsten electrode to the welding seam, and adjust the arc height during welding. The height can be adjusted automatically according to the arc voltage during welding.



4. Center positioning part

The center positioning part is used for welding head positioning before welding. The inside positioning sleeve need to be replaced according to different tube outer diameter.



5. External shielding gas hood

External shielding gas hood is used to protect the welding seam outside the tube with argon, in order to prevent workpiece from being oxidized. This needs to be customized according to the diameter of welded tube and the position of welding seam.

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Automatic Open Head TIG Orbital Pipeline Welding

CONTENTS

1 Products Introduction

01. Products brief introduction
02. Products features
03. Composition parts
04. Technical parameters
05. Operating principles

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1. Products introduction:

The automatic open head all-position TIG orbital welding system for small-diameter pipeline, which is mainly applied in girth seam automatic welding of water, petroleum, natural gas and other pipelines. It is one of the advanced equipment to realize all-position automatic welding.

2. Products features:

- Adopting highly precise embeded control system to control the operation procedure of the whole inverter directly. So as to ensure the effective coordination of current control and welding operation time sequence, and then obtain highly qualified welding seam.
- Highly integrated design provides compact structure and convenient movement.
- The professional design of welding head makes it be adapted to several pipe diameter and narrow space operation on site.

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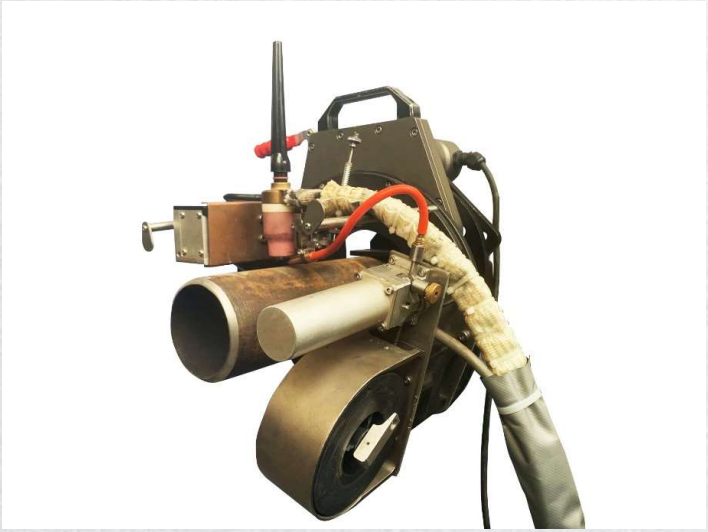
3. Composition parts:

All composition parts of automatic open head TIG orbital pipeline welding system

- Welding machine
- Welding head
- Remote controller



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4. Technical parameters:

The main technical parameters of welding machine	
Item	**Technical parameters**
Welding machine model	WZM-400
Welding machine type	Inverter
Purpose	To realize all-position TIG pipeline welding
Welding current	5 ~ 400A
Duty cycle (40℃)	400A 60% / 315A 100%
OCV	70V
Input voltage / frequency	380V±10% 60Hz
Power	13.5 KVA
Torch cooling method	Built-in recycle water-cooled type
Display	10-inch touch screen digital displayer

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Control function	DC / pulse current Rotating movement Wire feeding movement Shielding gas control Arc length control Horizontal oscillation control
The number of separable intervals	8
The lift of water pump	35 m
Water tank capacity	6L
Protection / insulation class	IP21S/H
Weight (with no coolant)	99 Kg
Dimension	1100×600×1250 mm

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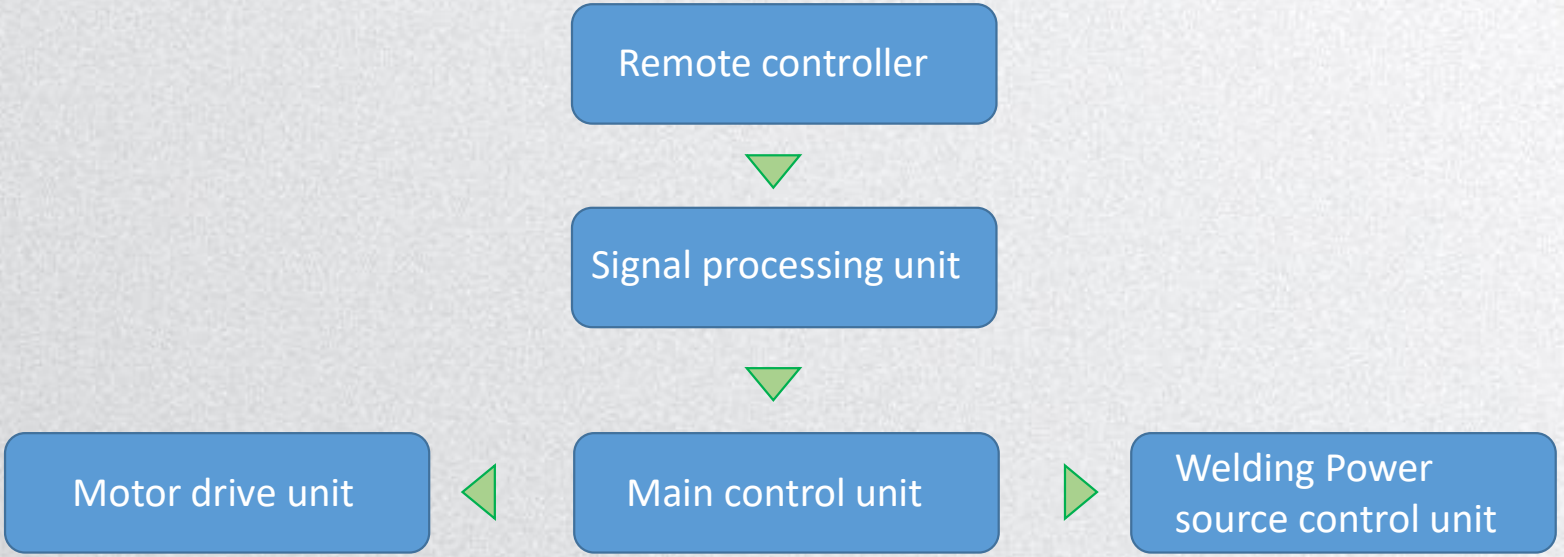
5. Operating principle:

The command control signal is processed by the signal processing unit through the corresponding key operation of the remote controller, and then sent to the main control unit. The main control unit recalls various parameters in the welding expert database according to the preset program, and sends control signals to the rotating motor drive unit and the welding power supply control unit. Furthermore, it controls the head and welding power supply to carry out corresponding actions, and automatic adjustment of welding torch attitude in the welding process.



2 Product Advantages

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1. Advanced all-position welding head

✓ The welding head travelling and wire feeding are drove by comstant torque motor. Meanwhile, in the condition of ensuring wire feeding stability, the encoder is equipped to keep welding stable for both downward welding and upward welding.

✓ The welding head can calculate the travelling position according to the rotation angle, and can provide accurate position signal in the process of all-position welding, which greatly improves the quality of all-position welding.

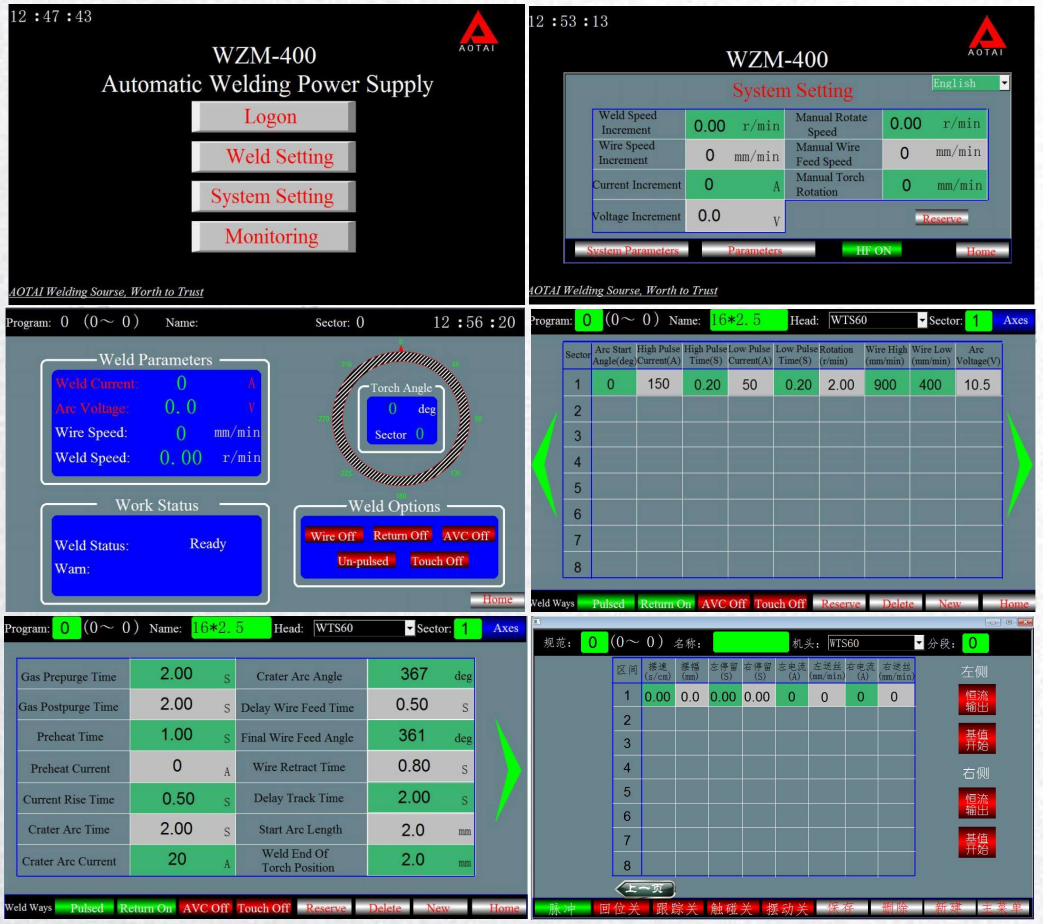
✓Wire feeding angle setting device can be applied to adjust wire feeding tip flexibly in all directions.

✓Welding head can be customized according to pipe diameter, suitable for pipe diameter range: 30mm - 168mm.

2. The human-machine interfaces of multi-process main control box

The adopted 10-inch industrial touch screen enjoys following functions:

- It can be adjusted precisely in section and the parameters of angled welding process can be edited freely.
- The dwell time at left and right, wire feeding quantity at left and right, current and other parameters can be adjusted respectively, even much more finely.
- The pulse time, the peak and base pulse current, wire feeding speed can be adjusted freely in the pulse mode to control welding better.
- The current welding parameters can be monitored at the main interface in real time.
- The parameters of earlier period and later period, arc stopping position and other parameters can be adjusted seperatly.
- The single-time adjustment quantity of manual control box can be set in system setting.



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3. Multifunctional intelligent remote control box

◆ Remote control box provides easy operation and fast mastering because of its humanized layout and big-small keys design.

◆ Every parameter can be adjusted according to groove details during welding.

3. The comparision of new and traditional processes in small-diameter petoleum, natural gas and water pipeline welding

01. The current situation of industrial processes

02. The processes comparision of open head automatic TIG orbital welding

03. Actual on-site welding quality

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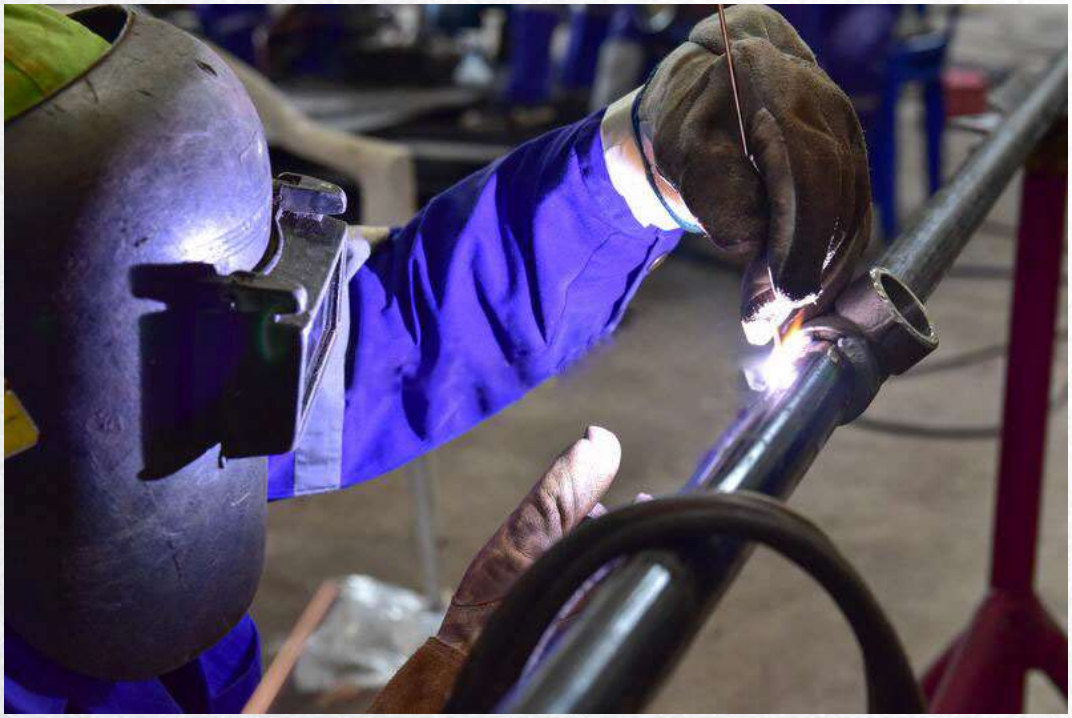
Current situation of industrial process; the exsiting filler and cover welding processes for small-diameter petroleum, natural gas and water pipeline:

- **Manual TIG**



The pain points exsit in the process of small-diameter petroleum, natural gas and water pipeline welding:

- **Manual TIG: high labor intensity, low welding efficiency, difficult to hire high-level welder**

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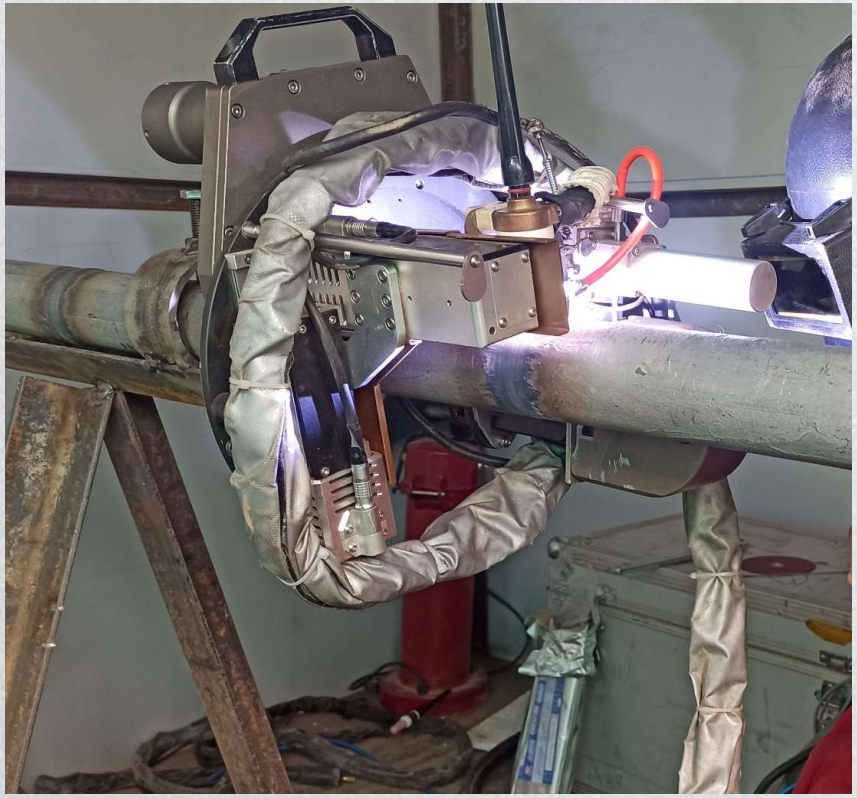
Automatic all-position pipeline welding system

Open head automatic TIG orbital welding



All-position TIG welding process

Pipe diameter: 30mm; Wall thickness: 5mm

The welding of one girth seam with 45° V-type groove only costs **10 minutes**.

Pipe diameter: 60mm; Wall thickness: 5mm

The welding of one girth seam with 45° V-type groove only costs **13 minutes**.

Pipe diameter: 76mm; Wall thickness: 5mm

The welding of one girth seam with 45° V-type groove only costs **17 minutes**.

Applying K114 automatic all-position welding system can greatly reduce manual labor intensity, improve welding efficiency and quality. Welder can start his operation after being simple trained.

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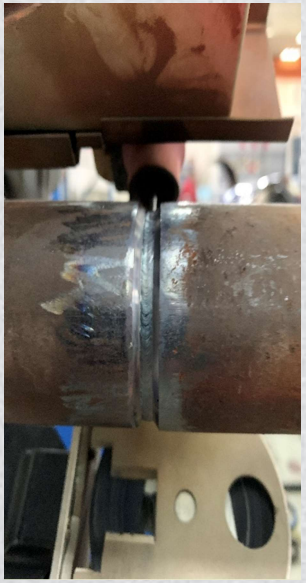
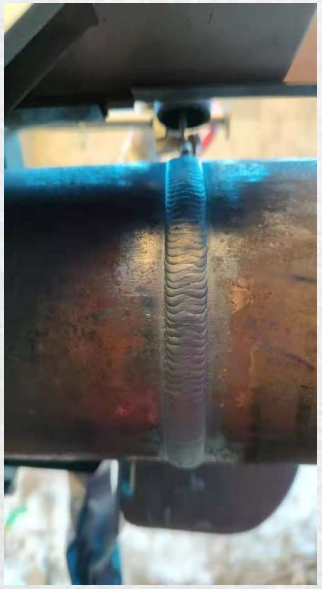
➢ Welding quality:



The formation of root welding

The inner formation of root welding

Filler welding



Cover welding

The one-time qualified rate of the second class flaw detection standards is greater than 95%

The appearance forming effect pictures of automatic welding

4 Application Case

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A project in Tibet

The welding of petroleum feeding pipeline; "one side welding with back formation" should be realized for root welding; beautiful formation of appearance; no flaw should be detected;
Base material: carbon steel
Pipe diameter: 76mm
Wall thickness: 6mm
Shielding gas: Argon
Tungsten electrode diameter: 3.2mm
Wire diameter: 1.0mm
Wire spool weight: 1KG
Groove: 45° V-type groove
After simple training, customer mastered how to weld with K114 automatic welding system. It enjoys 100% qulified rate for more than 100 seams welded by customer. The efficiency has been greatly improved.

5 Target Customers

05 Target Customers

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Chamical plant

Shipyard

Gas pipeline station

SMART STABLE POWERFUL

6 The Ordering Information

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Ordering code:

809350-00004 Open head automatic TIG pipeline orbital welding assemblies | [K114 (WZM-400 <0014> <1128>)]

524401-02001 Inverter pulse TIG integrated type machine [WZM-400 <0014>]

340010-00100 Digital remote controller | [WZM—YK (5-pin —Blue 0 — WZM)]

361023-00270 All-position tube-tube welding head [K114]

370030-00309 Welding cable| [1×5m 50mm² (red coper pipe Φ14×1 DKJ95-1 red quick plug)]

461011-00004 Grounding clamp | [DJ-500A-1]