FY-TECH

# Owner's Manual

CE

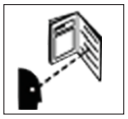
**FY-4220/2E**

The equipment is approved by a number of car manufacturers(China)

# CONTENTS

# Safety Precautions Symbols

Protect yourself and others from injury, read and follow these precautions before installation and operation.



Read instructions.
1、Read owner's Manual before using or servicing unit。
2、Use only manufacturer's supplied replacement。

Exploding parts can injure. Always wear a face shield and long sleeves。

Static can damage PC boards
1、Put on grounded wrist strap before handing boards or parts。
2、Use proper static-proof bags and boxes to store, move or ship PC boards。

1、Wear approved face shield or safety goggles with side shields。
2、Wear proper body protection to protect skin。

Flying metal can injure eyes。
1)Wear safety glasses with side shields or face shield。

1、Magnetic fields can affect pacemakers. Pacemaker wearers keep away.
2、Wearers should consult their doctor before going near plasma arc cutting operations。

Overuse can cause overheating
Allow cooling period , follow rated duty cycle before starting to weld again.

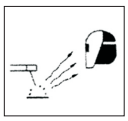
Cylinders can explode if damaged. Gas cylinders contain gas under high pressure. If damaged, a cylinder can explode . Be sure to treat them carefully.

Do not weld in the height!

Fire or explosion hazard.
Do not locate unit on, over, or near combustibe surfaces. Do not install unit near flammables.

Electric shock can kill:
1、Do not touch live electrical parts。
2、Wear dry, hole-free insulating gloves and body protection.
3、Do not wrap electrical cable around your body.
4、Ground the workpiece with a good electrical ground。

Fumes and gases can be hazardous.
welding produces fumes and gases. Breathing these fumes and gases can be hazardous to your health.
If inside, ventilate the area.
Do not weld in a confined space only if it is well ventilated.



Eye protection for welding:

| Current level in amperage | Minimum shade Number |
|---|---|
| 30-150A | #8 |
| 150-300A | #10 |
| 300-500A | #12 |

Moving parts can cause injury.

Keep away from moving parts such as fans.

The heat from the workpiece can cause serious burns。

Keep away from the torch tip.

Remove all flammables of the welding area.

Falling unit can cause injury.

Never cut on pressurized cylinder.

Protect yourself

Warn others

OK

OK

Factory safety!

Maintenance regularly!

# Symbols And Descriptions

## Symbols And Definitions

| | | | |
|---|---|---|---|
| A Amperes | Gas Metal Arc Welding(GMAW) Gun | I On | % Percent |
| V Volts | Wire Feed | O Off | Increase |
| $I_2$ Rated Welding Current | IP Degree Of Protection | Protective Earth (Ground) | Line Connection |
| $S_1$ Power Rating,Products Of Voltage And Current | 1~ Single Phase | No--Do Not DO This | Loose Shield Cup |
| HZ Hertz | X Duty cycle | Gas Input | Adjust Air/Gas Pressure |
| $U_1$ Primary voltage | Direct Current | Gas Output | Do Not switch While welding |
| $U_0$ Rated No Load Voltage(Average) | Constant Current | Input | Wire Feed Spool Gun |
| $U_2$ Conventional Load Voltage | Temperature | V Voltage Input | |

## Description:

Our semi-automatic welder is an all-in-one MIG shielding gases welder (GMAW) with high efficiency that is an ideal substitute for manual arc welding.

Most advanced circuit design and technology are adopted.Excellent performances,supreme reliability, quality welding requirements can be satisfied.Spot weld,groove weld,and fillet weld are available.Most commonly used shielding gases are applicable such as Co2,AR,CO2+AR,CO2+O,etc.

Suitable for welding of variou metallic materials such as mild steel,low carbon steel,low alloy steel, stainless steel, steel,iron,copper, aluminum,nicket,etc.

Extensively used in the welding and field operation of oil pipeline,chemical,car fabrication,shipyard, etc.

# Accessories And Spare Parts

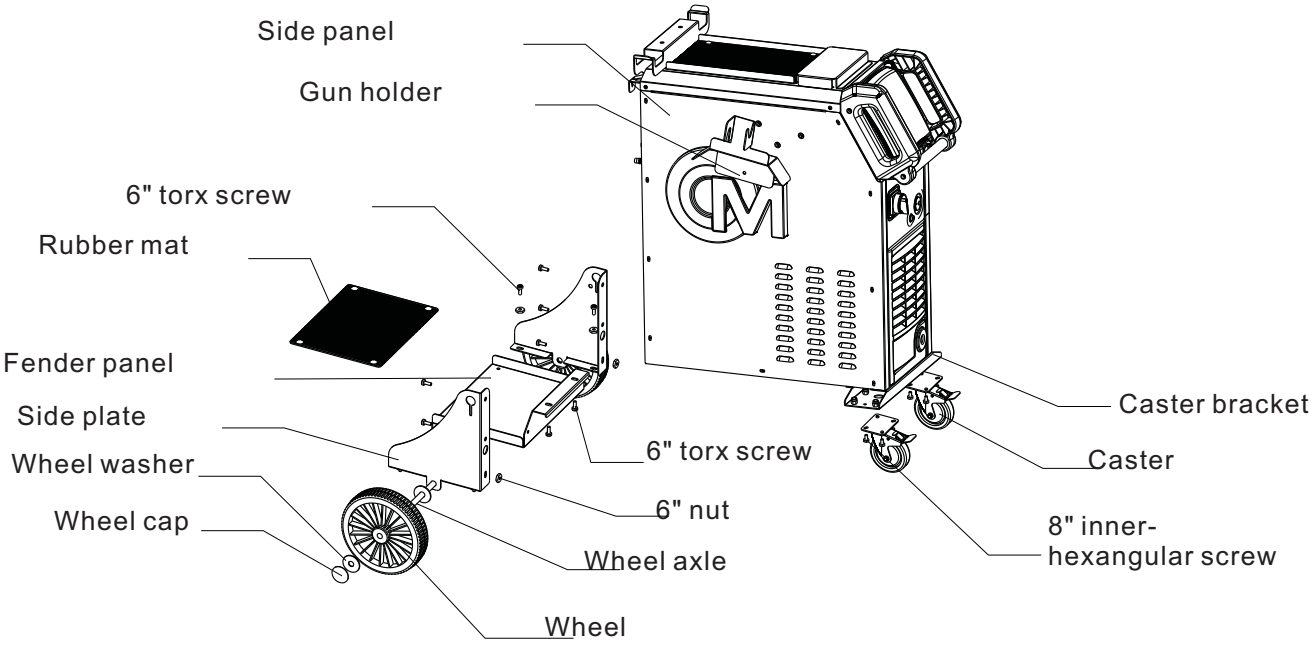
## Accessories And Spare Parts List

| | | |
|---|---|---|
|  Pressure Regulator NO.C001 |  Adjustment Switch NO.C002 |  European Connector NO.C003 |
|  Contact Tip NO.C004 |  Ouput Cable NO.C005 |  Spool Spindle NO.C006 |
|  Welding Gun NO.C007 |  Collect Body NO.C008 |  Fan NO.C009 |
|  Front Adaptor NO.C010 |  Wire Guide NO.C011 |  Shield Cup NO.C012 |
|  Trigger Potentiometer NO.C013 |  Fuse Socket NO.C014 |  Chain NO.C015 |
|  Capacitor NO.C016 |  Electromagnetism NO.C017 |  24AK Gooseneck NO.C018 |
|  Feeder Potentiometer NO.C019 |  15AK Gooseneck NO.C020 |  Feeder Motor NO.C021 |
|  Anti-Clogging Ointment NO.C022 |  Control Transformer NO.C023 |  European Connector Shield NO.C024 |
|  Panel Socket NO.C025 |  Digital Display NO.C026 |  Front Wheel NO.C027 |
|  Back Wheel NO.C028 |  Hose NO.C029 |  Circuit Board NO.C030 |

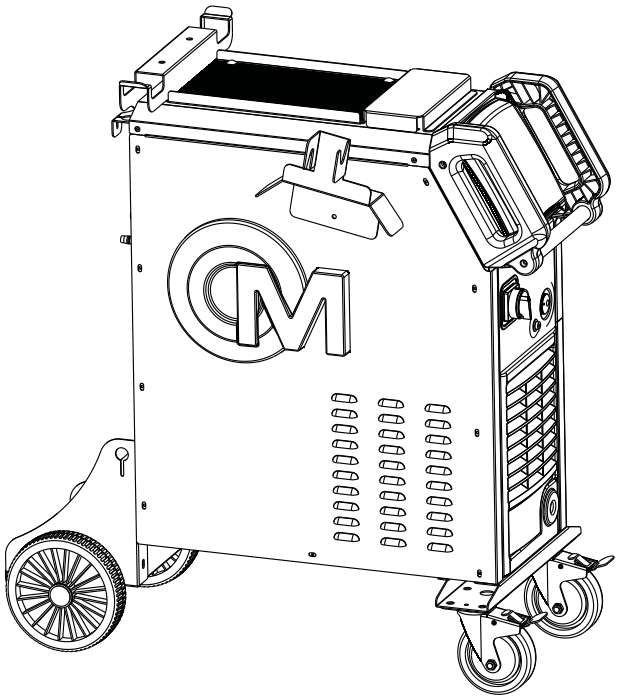
Remarks:

1. Optional orders for above accessories and components are available.
2. Model and part number required when ordering parts from your local distributor.

# Installation Instruction




Install the gun holer to the side panel; install the side plates to the fender panel; install the wheel axle and wheels to the fender panel; install the fender panel to the back panel (using 6" torx screws and nuts); install casters to the caster bracket (using 8" inner-hexagonal screws); put the rubber mat on the fender panel.

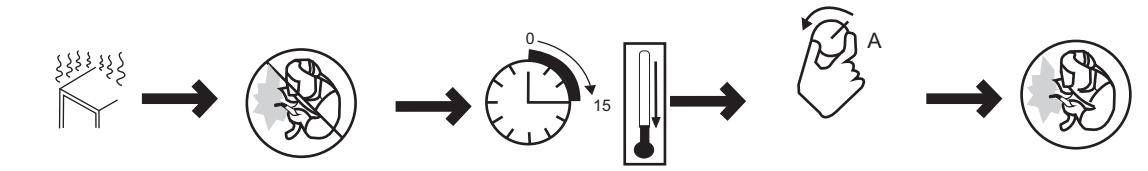


## 1. Specifications

| Parameter \ Model | FY-4220/2E |
|---|---|
| Voltage (V) | AC 380V/3ph |
| Frequency (Hz) | 50 / 60 |
| Rated Max Input Current (A) | 13.6 |
| Max Effective Input Current (A) | 10.3 |
| No-load Voltage (V) | 20-32 |
| Welding Current (A) | 35-250A |
| Duty Cycle | 35% |
| Output Current/Voltage | 35A/17V-<br>250A/26. 5V |
| Insulation Grade | F |
| Wire Diameter | Mild Steel<br>Solid Wire<br>0.8/1.0mm |
| Type | One-piece |
| Dimensions (mm) | 850×380×890 |
| Voltage Adjustment | 10 stages |
| Weight (kg) | 96 |

## 2.Duty Cycle And Overheating

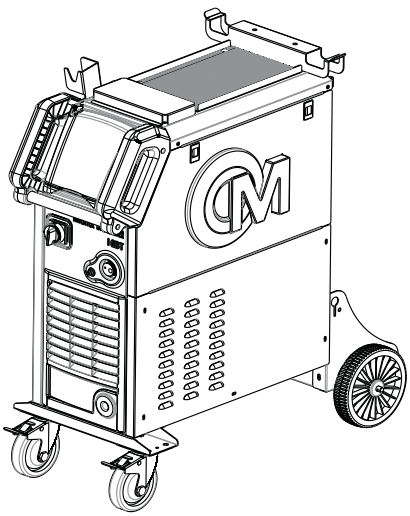
1.Overheat protection is installed on the aluminium board of main transformer and rectifier.The unit products heat while welding.
2.If unit overheats ,output stops, and cooling fan runs.
3.Wait fifteen minutes for unit to cool.Reduce amperage or voltage, or duty cycle before welding.




Overheating | Stop working | Wait 15 minutes for unit to cool | Reduce amperage or reduce duty cycle | Weld again

## 3.Machine Installation

1.Open the package and find out the Owner's Manual.
2.Check the details of accessories according to packing list
that attached to this manual.
3.Properly install this equipment as following diagram.Inspect the unit for any damage. If so,contact your local distributor or service agency.
4)The unit should not be located under sunshine.The worksite should be in low humidity and without dust.
5)Operating Temperature range:-10℃-+40℃.
6)Storage Temperature range:-25℃-+56℃.
7)At least 20cm of space for airflow,30cm of space for two units located side by side.
8)Use tent to protect the machine from stormy weather when operate outdoor.
9)Welding produces fumes and gases,Breathing these fumes and gases can be hazardous to your health.If inside,less than 300m,Venti-
late the area.
10)Properly ground this equipment.
11 ) The input power cord gradient should not more than 15° .



4、Selecting a Location

1)Select a correct location to place the unit。

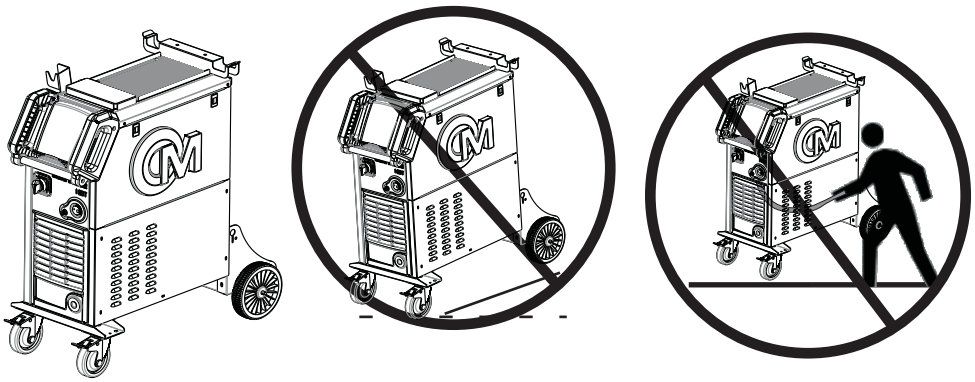
2)Determine input power cord length according to its actual operation requirement.Input power cord must have a minimum inside diameter of 6mm。$^2$

3)Do not move or operate unit where it could tip。

4)Use cart or unit handle to move unit .Do not pull the cords to move unit.

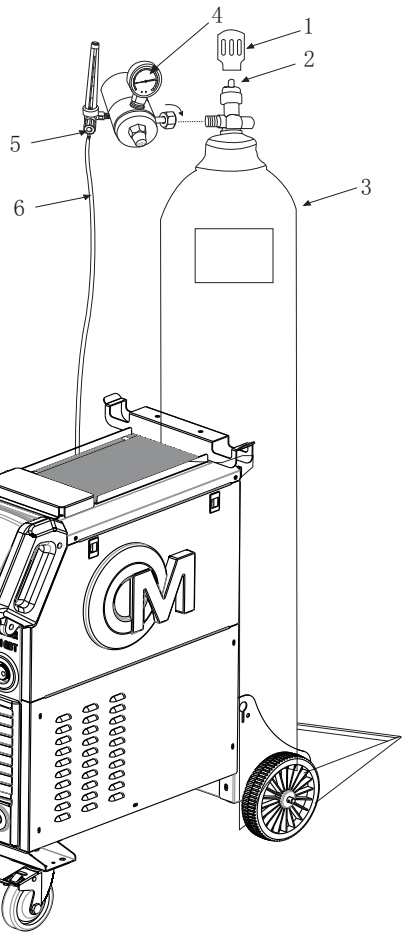
5)Moving gas cylinder and main unit to hight sparaely.Use lifting eye to lift unit only ,not running gear,gas cylinders,or any other accessories.

6)Optional order for individual wire feeder is available.The wire feeder and welding gun divide from the main unit.It is more convenient to operate.

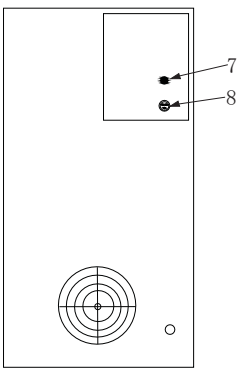


## 5、Installing Gas Supply

1)、Cap
2)、Cylinder valve
(Remove cap,stand to side of valve,and open valve slightly.Gas flow blows dust and dirt from vavle.Close vavle)
3)、Cylinder
4)、Regulator/Flowmeter
(Install so face is vertical)
5)、Flow Adjust
(Typical pressure is 0.05-0.15MPa)
6)、Hose
7)、Hose Connection
(Connect gas hose between regulator/flowmeter and the unit)
8)、Regulator/Flowmeter heating socket
(For low temperature worksite,please plug the regulator/flowmeter to the socket for heating.)



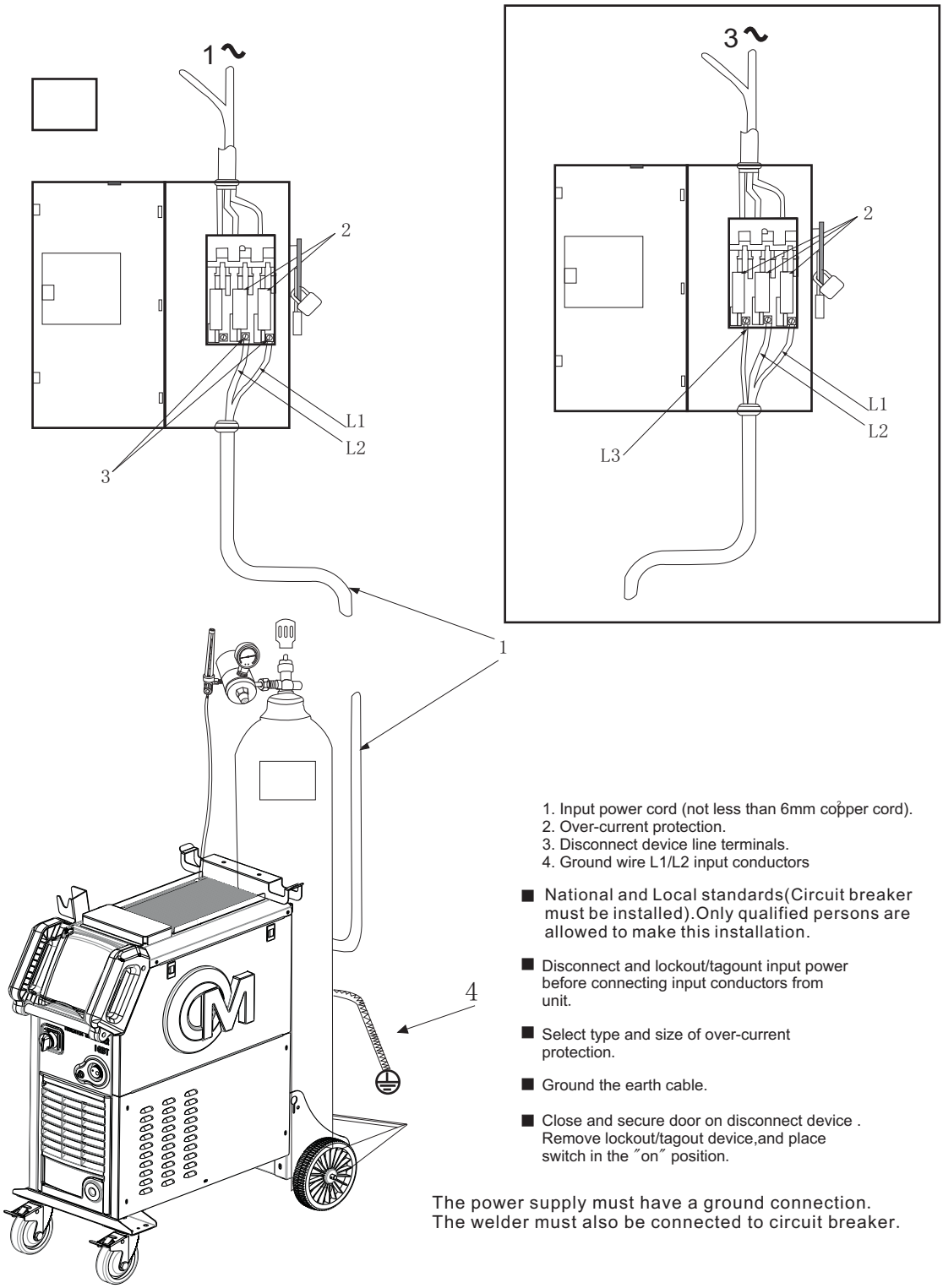

DO NOT use other gases regulator/flowmeter with $Co_2$ shielding gas.




Rear Panel

## 6、Connecting Input Power

The power supply must have a ground connection.
The welder must also be connected to circuit breaker.



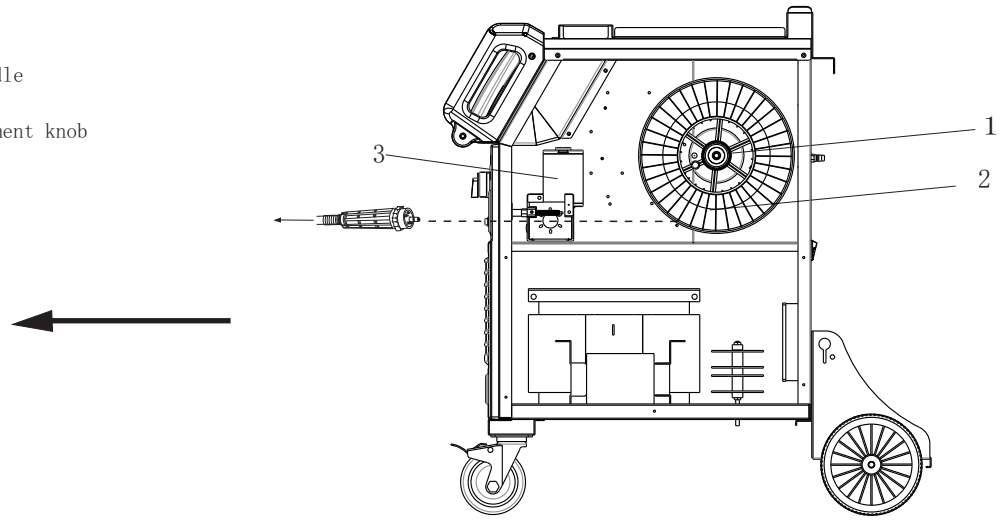

1. Input power cord (not less than 6mm copper cord).
2. Over-current protection.
3. Disconnect device line terminals.
4. Ground wire L1/L2 input conductors

- National and Local standards(Circuit breaker must be installed).Only qualified persons are allowed to make this installation.
- Disconnect and lockout/tagount input power before connecting input conductors from unit.
- Select type and size of over-current protection.
- Ground the earth cable.
- Close and secure door on disconnect device . Remove lockout/tagout device,and place switch in the ″on″ position.

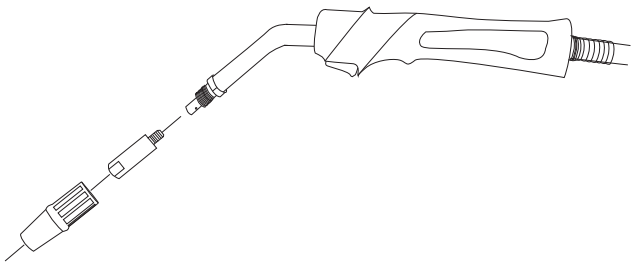
The power supply must have a ground connection.
The welder must also be connected to circuit breaker.

## 7、Threading Welding Wire

1 、Wire spool spindle
2 、Welding Wire
3 、Pressure adjustment knob

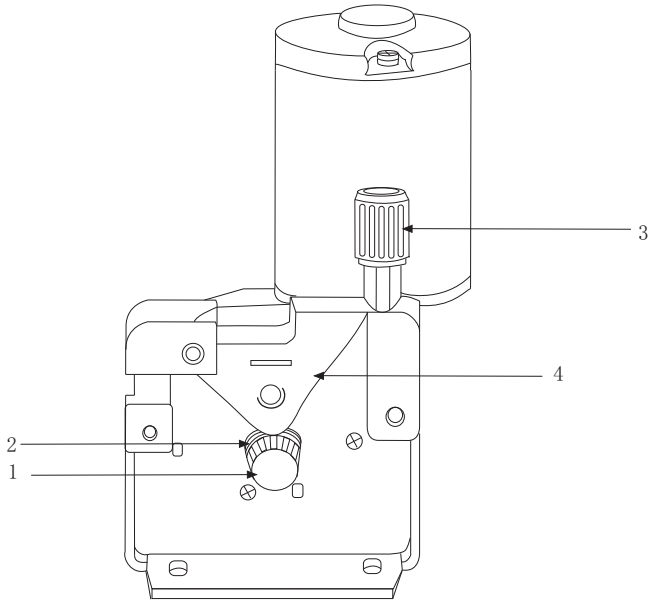



1.Open wire spool spindle;install wire spool;release pressure adjustment knob;pull and hold wire. Push wire thru guides into drive roll.Close wire spool spindle tightly to prevent slipping (Feed wire to check wire spool installation).
2.Set a desired drive roll pressure, close and tighten pressure adjustment knob.
3.Press gun trigger and let go of wire.



4. Remove gun nozzle and contact tip.
5. Press gun trigger until wire comes out of gun. Reinstall contact tip and nozzle.
6. Feed wire to check drive roll pressure ,tighten knob enough to prevent slipping.
7. Cut off wire if welding wire extends too far beyond nozzle.

## 8、Changing Drive Roll

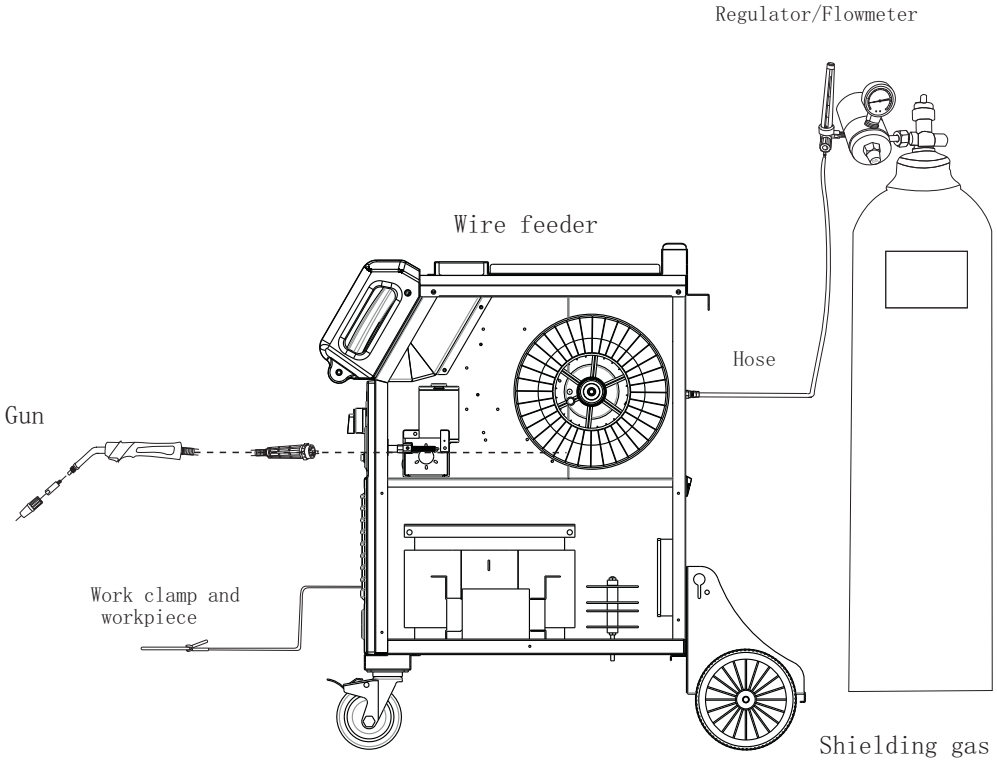



1、Drive roll securing nut
2、Drive roll
3、Pressure adjustment knob
4、Press device

Changing Drive roll:

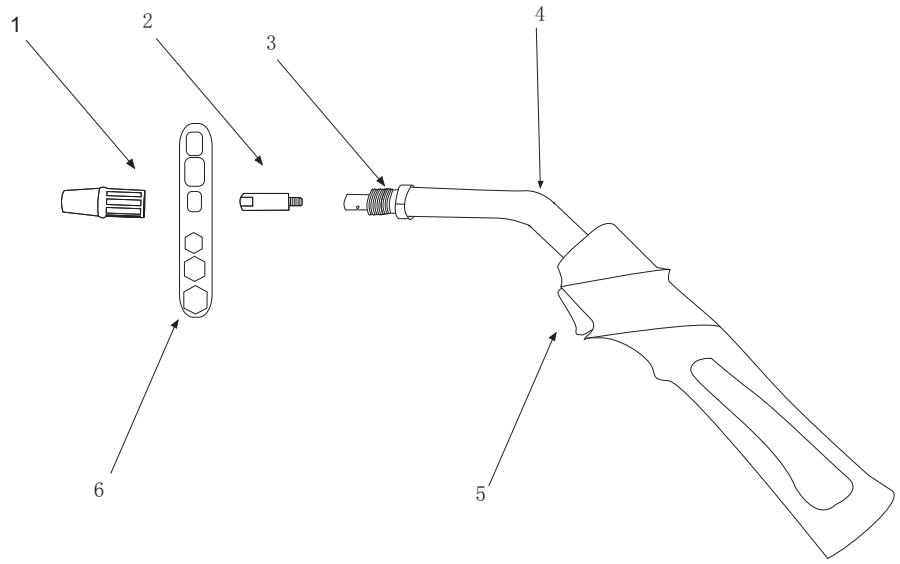
1、Release pressure adjustment knob .Press wire device springs open.
2、Loosen securing nut ,Remove drive roll.
3、The drive roll consists of two different sized grooves.Reinstall the desired wire sized groove close to the motor shaft.
4、Tighten securing nut.
5、Replace press wire device,and set a desired pressure.
6、Make sure drive roll groove lines up with wire guide.

## 9、Typical MIG Process Connection



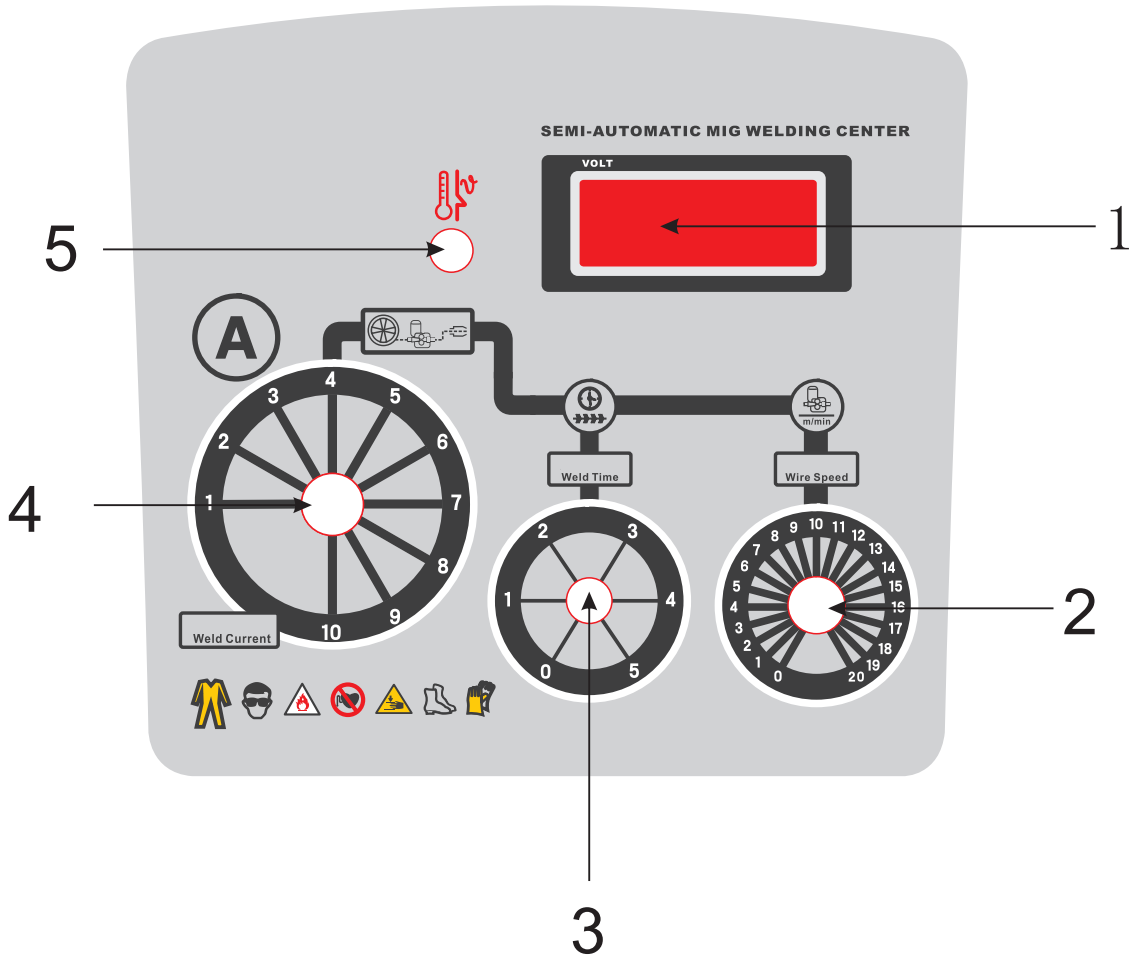

Weld current can damage electronic parts in vehicles. Disconnect both battery cables before welding on a vehicle .Place work clamp as close to the weld as possible.

## 10、Welding Gun



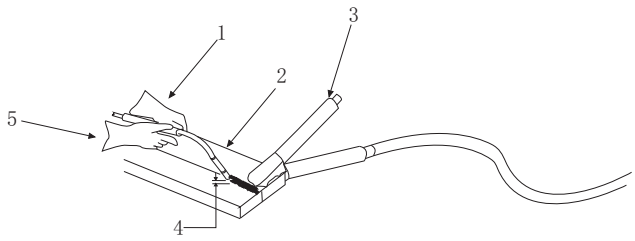

| | |
|---|---|
| 1、Shield cup | C012 |
| 2、Contact tip | C004 |
| 3、Front adaptor | C010 |
| 4、Gooseneck(15/24AK) | C020/018 |
| 5、Trigger | |
| 6、Spanner | |

1、Controls

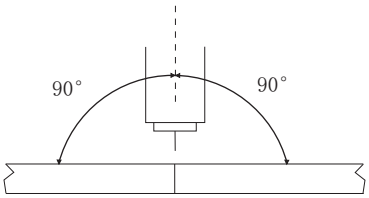



1. Display
2. Wire speed adjustment
3. Weld time extension
4. Weld current adjustment
5. Indicator light

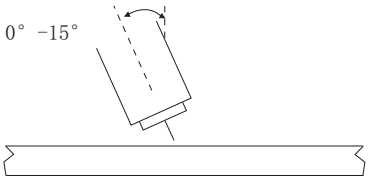
## 2、Holding And Positioning Welding Gun




1、Hold Gun and Control Gun Trigger
2、Workpiece
3、Work Clamp
4、Electrode Extension (Stickout)
5、Cradle Gun and R est Hand on Workpiece

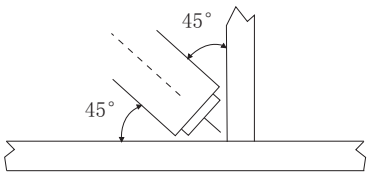



End View Of Work Angle

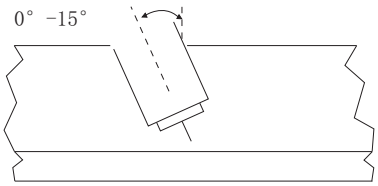



Side View Of Gun Angle

GROOVE WELDS




End View Of Work Angle

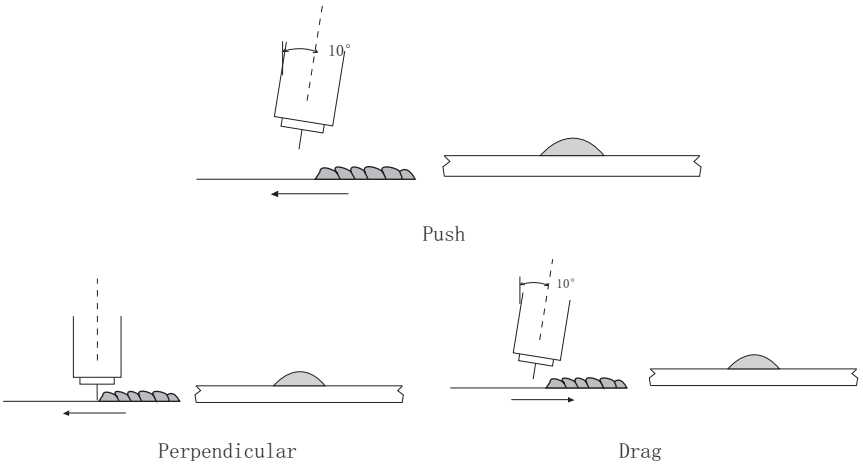



Side View Of Gun Angle

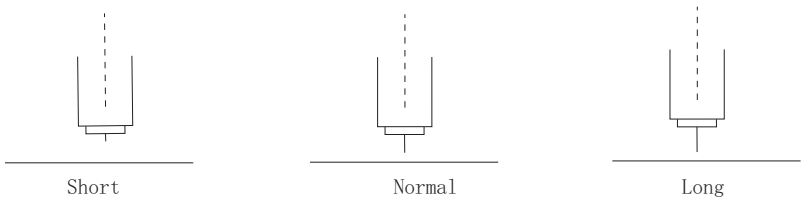
FILLET WELDS

Welding wire is energized when gun trigger is pressed.Before lowering helmet and pressing trigger,be sure wire size is correct to past end of contact tip, and tip of wire is positioned correctly on seam.

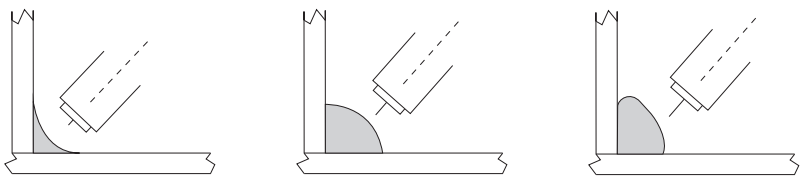
## 3、Conditions That Affect Weld Bead Shape



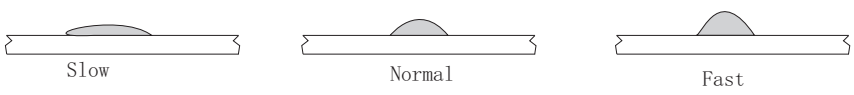

GUN ANGLES AND WELD BEAD PROFILES




ELECTRODE EXTENSIONS(STICKOUT)



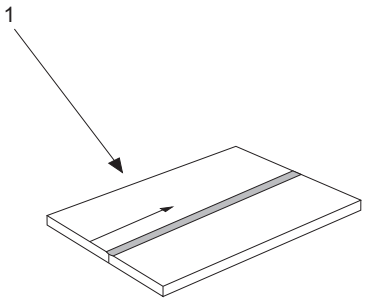

FILLET WELD ELECTRODE EXTENSIONS(STICKOUT)



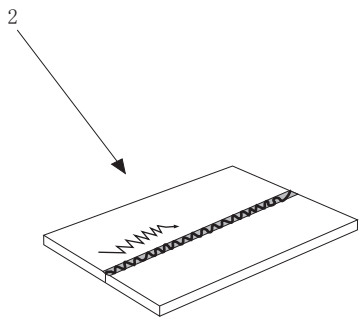

GUN TRAVEL SPEED

Weld bead shape depends on gun angle ,direction of travel,electrode extension(stickout),travel speed, thickness of base metal,wire feed speed(weld current),and voltage.

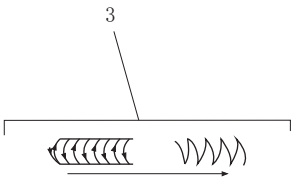
## 4、Gun Movement During Welding




1、Stringer Bead
Steady Movement Along Seam

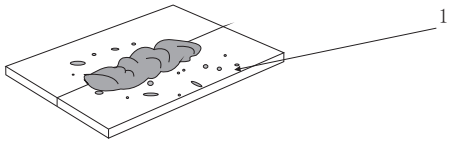



2、Weave Bead
Side To Side Movement Along Seam

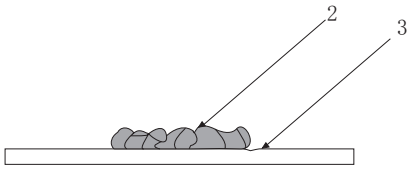



3、Weave Patterns
Use weave patterns to cover a wide area in one pass of the electrode.

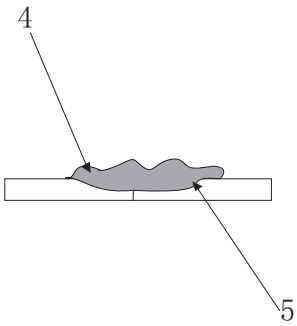
## 5、Poor Weld Bead Characteristics




1、Large Spatter Deposits

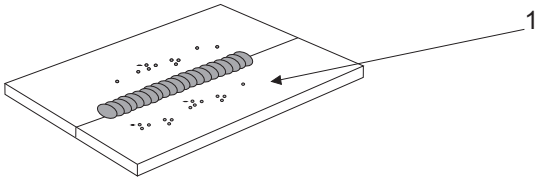



2、Rough ,Uneven Bead
3、Slight Crater During Welding

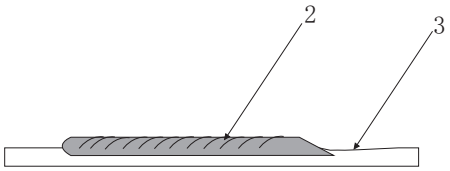



4、Bad Overlap
5、Poor Penetration

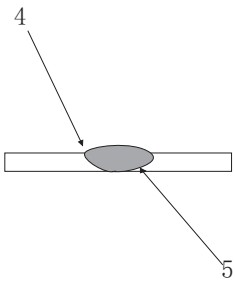
## 6、 Good Weld Bead Characteristics




1、Fine Spatter



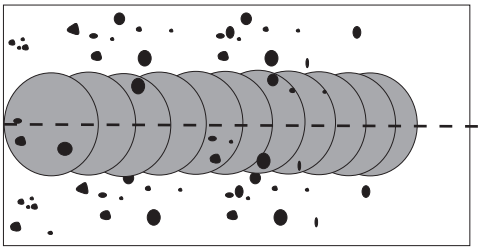

2、Uniform Bead
3、Moderate Crater During Welding




4、No Overlap
5、Good Penetration into Base Metal

# Troubleshooting

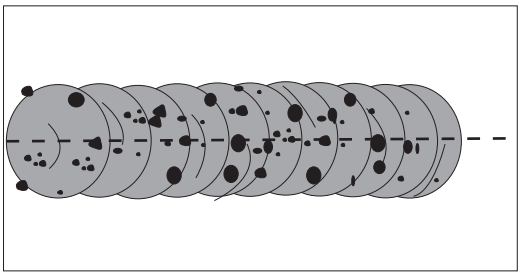
## 1、Excessive Spatter



Excessive Spatter:
Scattering of molten metal particles that cool to solid form near weld bead.

| Possible Causes | Corrective Actions |
|---|---|
| Wire feed too high | Select lower wire feed speed |
| Voltage too high | Select lower voltage range |
| Electrode extension (stickout)too long | Use shorter electrode extension (stickout) |
| Workpiece dirty | Remove all grease,oil,moisture, rust paint undercoating,and dirt from surface before welding. |
| Insufficient shielding gas at welding arc. | Increase flow of shielding gas at regulator/ flowmeter and/or prevent drafts near welding arc |
| Dirty Welding wire | Use clean,dry welding wire. |
| | Eliminate pickup of oil or lubricant on welding wire from feeder or liner. |

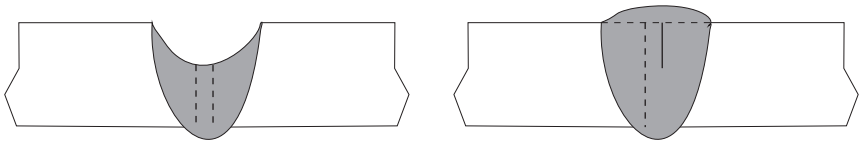
## 2、Porosity



Porosity:
Small cavities or holes resulting from gas pockets in weld metal.

| Possible Causes | Corrective Actions |
|---|---|
| Insufficient shielding gas at welding arc. | Increase flow of shielding gas at regulator / flowmeter and/or prevent drafts near welding arc. |
| | Remove spatter from gun nozzle. |
| | Check gas hoses for leaks. |
| | Adjust nozzle distance from workpiece. |
| | Hold gun near bead at end of weld until molten metal solidifies. |
| Wrong gas | Use welding grade shielding gas ;change to different gas. |
| Dirty welding wire | Use clean,dry welding wire. |
| | Eliminate pick up of oil or lubricant on welding wire from feeder or liner. |
| Workpiece dirty | Remove all grease, oil,moisture,rust,paint, coatings,and dirt from work surface before welding. |
| | Use a more highly deoxidizing welding wire (contact supplier) |
| Welding wire extends too far out of nozzle | Do not extend wire too far beyond nozzle. |

## 3、Excessive Penetration

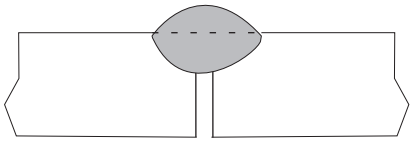


Excessive Penetration　　Good Penetration

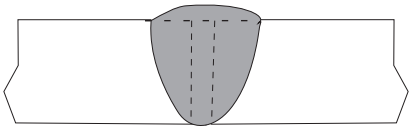
Excessive Penetration：
Weld metal melting through base metal and hanging underneath weld.

| Possible Causes | Corrective Actions |
|---|---|
| Excessive heat input | Select lower voltage range and reduce wire feed speed. |
| | Increase travel speed. |

## 4、Lack Of Penetration



Lack of Penetration

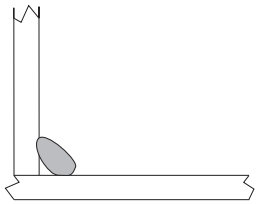


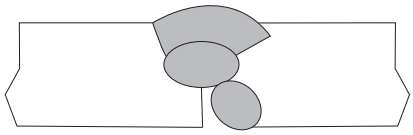
Good Penetration

Lack Of Penetration:
Shall fusion between weld metal and base metal.

| Possible Causes | Corrective Actions |
|---|---|
| Improper joint preparation. | Material too thick.Joint preparation and design must provide access to bottom of groove while maintaining proper welding wire extension and arc characteristics. |
| Improper weld technique. | Maintain normal gun angle of 0 to 15 degrees to achieve maximum penetration. |
| | Keep arc on leading edge of weld puddle. |
| | Do not extend wire too far from nozzle. |
| Insufficient heatinput. | Select higher wire feed speed and/or select higher voltage range. |
| | Reduce travel speed. |

## 5、Incomplete Fusion

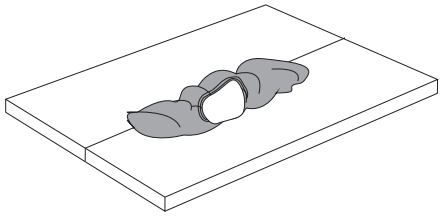




Incomplete Fusion:
Failure of weld metal to fuse completely with base metal or a preceeding weld bead.

| Possible Causes | Corrective Actions |
|---|---|
| Workpiece dirty | Remove all grease, oil,moisture,rust,paint,underco-ating,and dirt from work surface before welding. |
| Insufficient heat input. | Select higher voltage range and/or adjust wire feed speed. |
| Improper welding technique | Place stringer bead in proper location(s)at joint du-ring welding. |
| | Adjust work angle or widen groove to access bottom du-ring welding. |
| | Momentarily hold arc on groove side walls when using weaving technique. |
| | Keep arc on leading edge of weld puddle. |
| | Use correct gun angle of 0 to 15 degrees. |

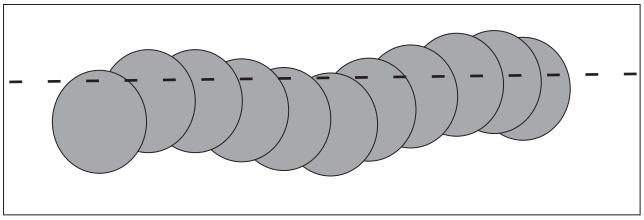
## 6、Burn-Through



Bum-Through:
Weld metal melting completely through base metal resulting in holes where no metal remains.

| Possible Causes | Corrective Actions |
|---|---|
| Excessive heat input. | Select lower voltage range and reduce wire feed speed. |
| | Increase and/or maintain steady travel speed. |

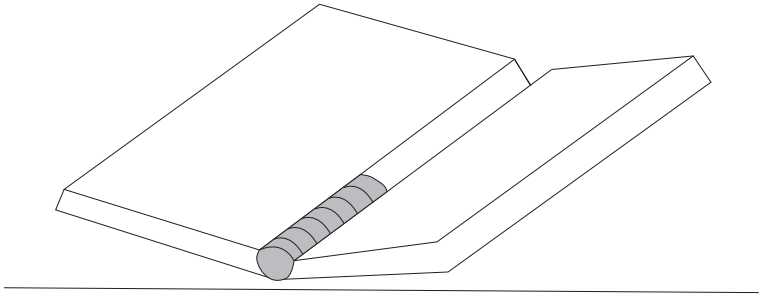
## 7、Waviness Of Bead



Waviness Of Bead:
Weld metal that is not parallel and does not cover joint formed by base metal.

| Possible Causes | Corrective Actions |
|---|---|
| Welding wire extends too far out of nozzle. | Do not extend wire too far from nozzle. |
| Unsteady hand | Support hand on solid surface or use two hands. |

## 8、Distortion



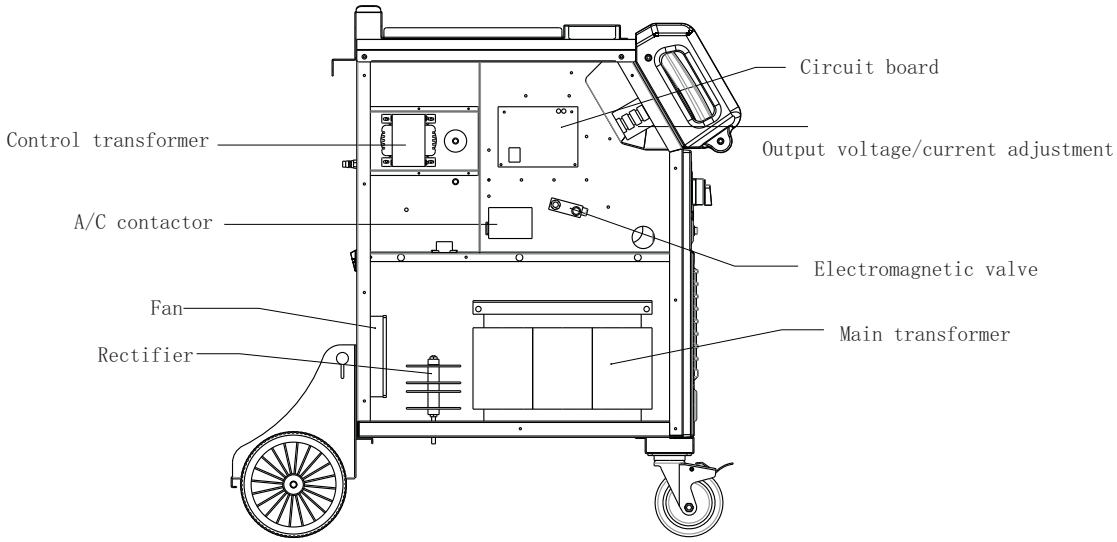
Distortion:
Contraction of weld metal during welding that forces base metal to move.

| Possible Causes | Corrective Actions |
|---|---|
| Excessive heat input. | Use restraint(clamp)to hold base metal in position. |
| | Make tack welds along joint before starting welding operation. |
| | Select lower voltage range and/or reduce wire feed speed. |
| | Increase travel speed. |
| | Weld in small segments and allow cooling between welds. |

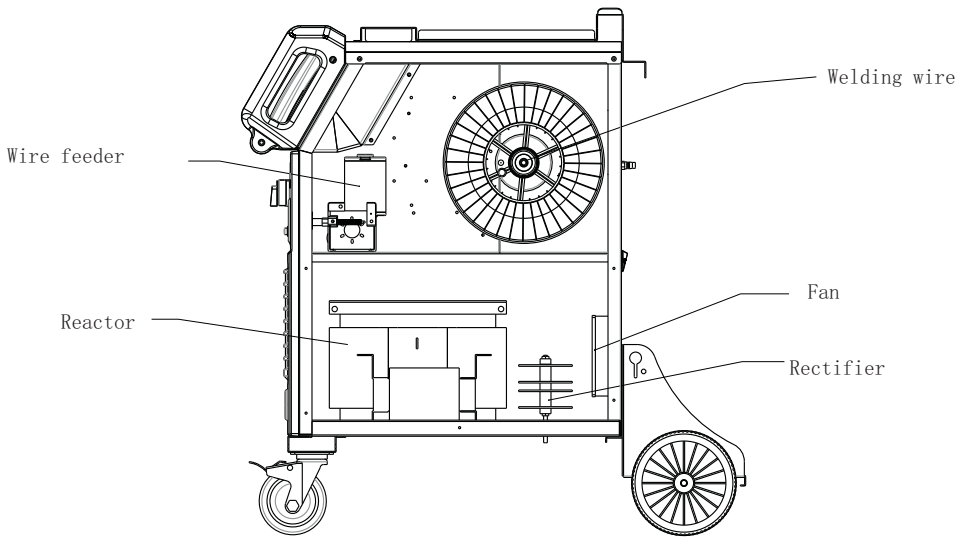
## 9、Troubleshooting Guide For Semiautomatic Welding Equipment

| Problem | Probab le Cau se | Remedy |
|---|---|---|
| Arc can not weld, incomple te fusio n | 1)N ot enoug h power phase.<br>2)T oo low weld ing vol tage. | 1)Ch eck power sourc e.<br>2)Se lect higher voltag e range. |
| No wire feed | 1)Drive roll groove dose not line up with wire guide.<br>2)Obstruction in wire guide.<br>3)Drive roll pressure too high.<br>4)Incorrect wire size.<br>5)Obstruction in wire inlet guide or contact tip.<br>6)Dirty or bad quantity welding wire.<br>7)Press wire device pressure too low. | 1)Aligning drive roll and wire guide.<br>2)C lear obstruc tion in wire guide or replace it if nece ssary.<br>3)Readjust dri ve roll pressur e.<br>4)Repl ace wire or wire guide.<br>5)C lear obstruction in gun contact tip or liner.<br>6)Use good quanti ty welding wire.<br>7)Readjust screws. |
| Excessive spat ter | 1)Wi re feed speed too high.<br>2)C onta ct tip damaged. | 1) Select low er wire feed sp eed.<br>2)Rep lace contact tip. |
| Small cavities or holes resul ting from gas pockets in weld metal | 1)Insufficient shieldinggas at welding arc.<br>2)Regulator\flowmeter damaged.<br>3)Contact tip damaged.<br>4)Leakage, outside gas mix with shielding gas. | 1)Increase flow of shielding gas at regulator /flowmeter.<br>2)Replace regulator/flowmeter.<br>3)Replace contact tip.<br>4)Check gas hoses for leaks. |
| Welding arc not sta ble | 1)Wel ding wire dirt y.<br>2)B ad contact of work clamp.<br>3)Wr ong size gun liner or contact tip, or contact tip worn. | 1)Use clean,dry wel ding wire .<br>2)Connect work clamp to get good metal to metal as cont act.<br>3)R epla ce contact tip. |
| Low or unstable wire speed | 1)D istor ted welding wire.<br>2)Obs truction in gun contact tip or liner. | 1)E liminate pickup of distort ed welding wire from feede r or lin er, or readjust drive roll pressure.<br>2)R epl ace cont act tip or liner. |
| No weld outpu t | 1)Mai n tran sformer overh eats ,overhea t protec tion working.<br>2) Fuse broken.<br>3)Gun trigger damag ed or plug wor n. | 1)Wai t 15-30 mins for unit to cool.<br>2)Replace fuse.<br>3)R eplace gun trigger or plug |

# Exploded View

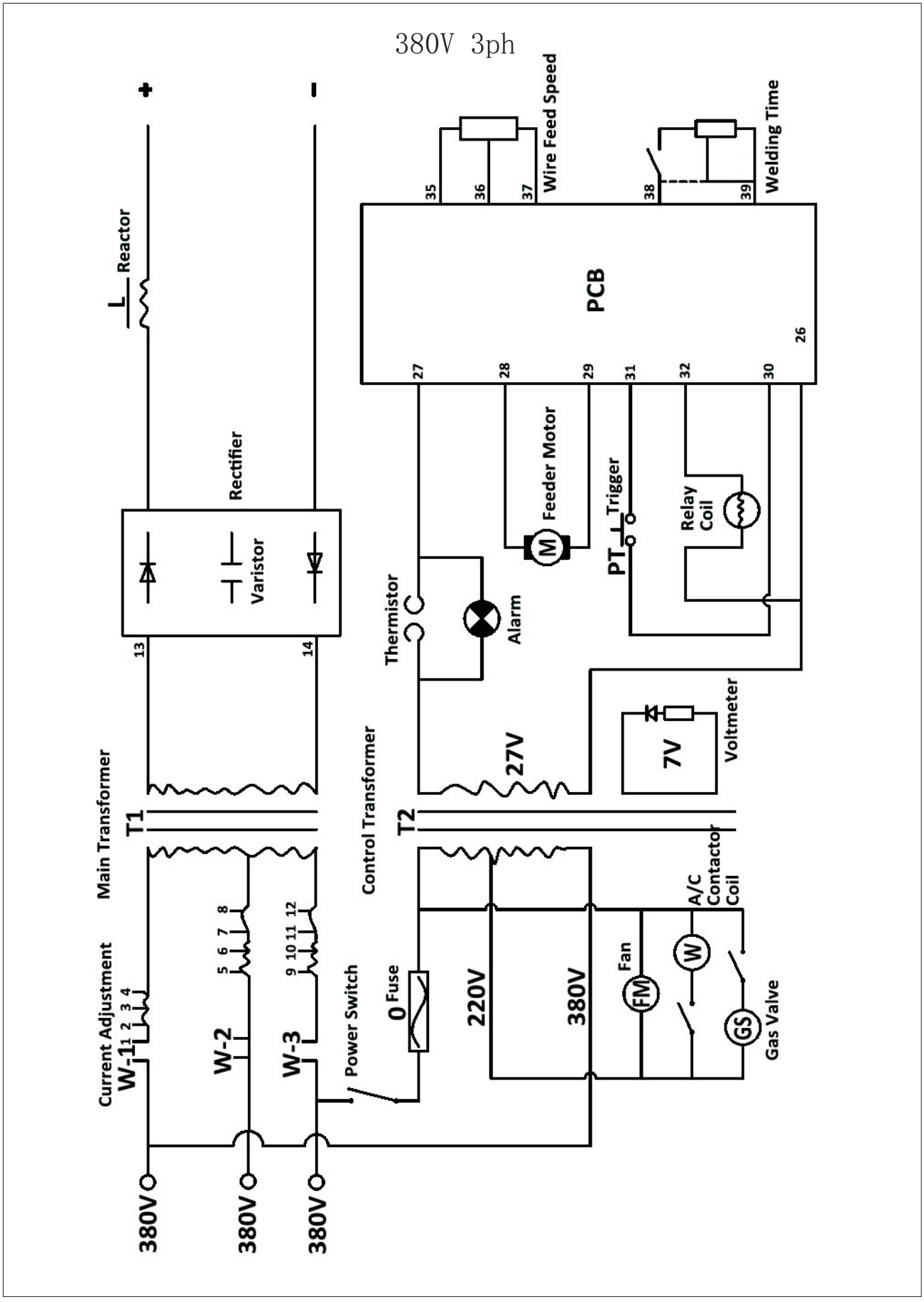



Left-side view



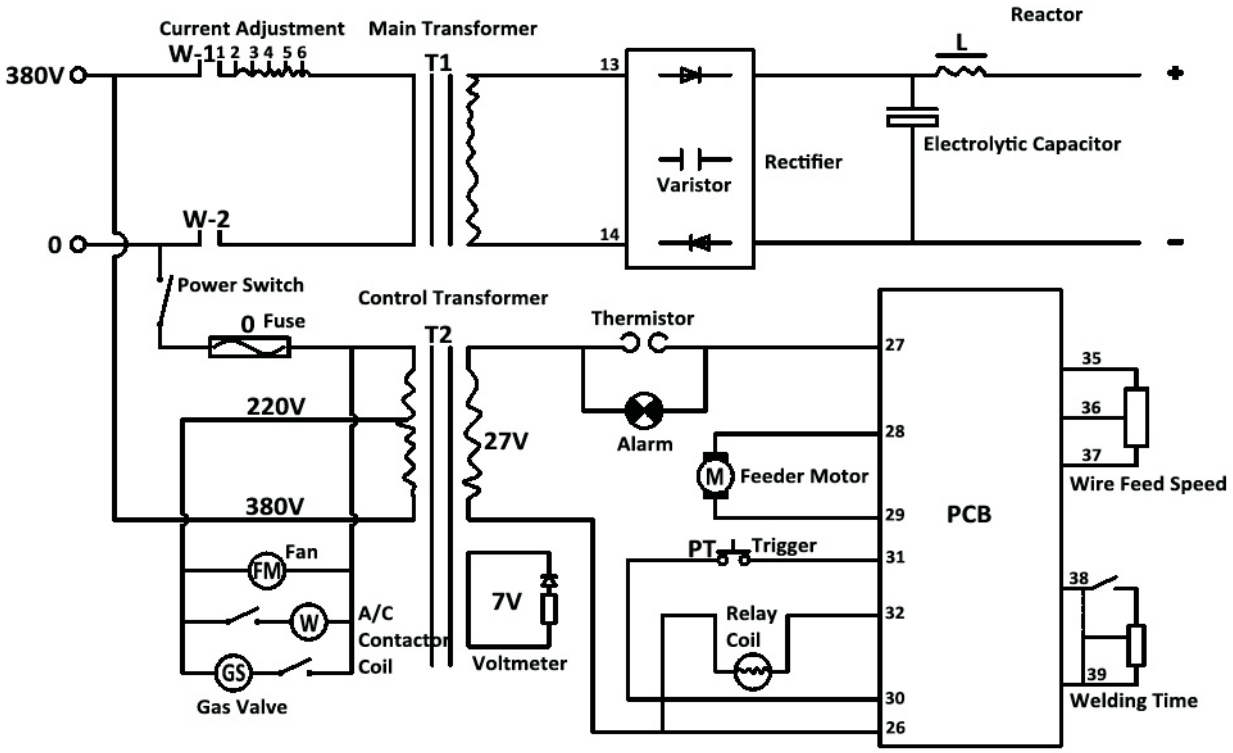

Right-side view

# Circuit Diagram



# Circuit Diagram

## 380V 1ph




## 220V 1ph