

*Butt fusion machine*



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# AFM -315 CNC Butt Fusion Machine Operation Mannual

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**For right operation, the operator need read this manual in detail.**

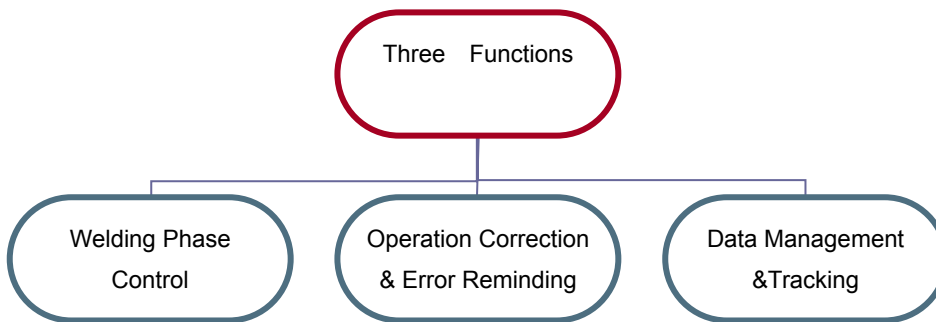
**1. Brief Introduction:**

Automatic butt fusion machine definition: The whole welding process is executed according to procedure which is programmed in the controlling center. The operator inputs specification of pipe and other related parameter, the machine will finish the whole welding according to the order.

Welding parameter includes: Welding Temperature, Pressure in different welding phase.

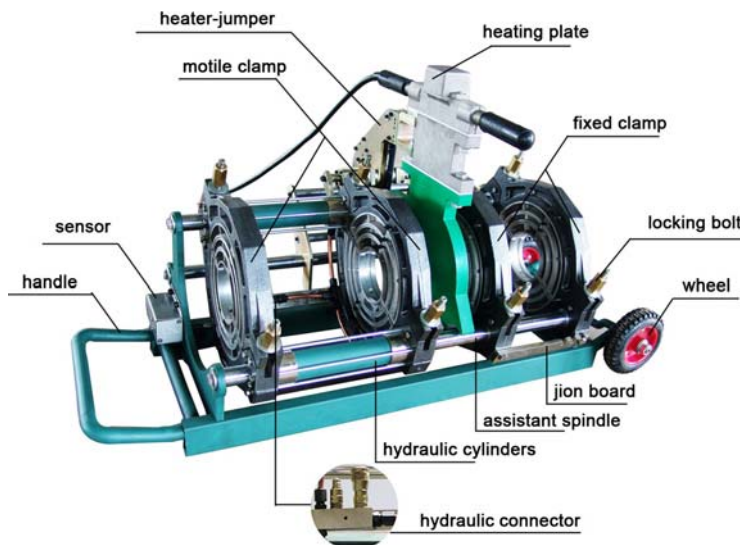
Up to now, there is still no other way to check the quality of welding joint unless the operator destroys the joint. Thus, to guarantee the joint quality, the only way is to implement welding regulation strictly. Automatic butt fusion machine can reduce the influence resulted from the man-made factor to the maximum extent.

There are 3 main functions of Automatic Butt Fusion Machine, Among them, Welding Phase Control is the core function:

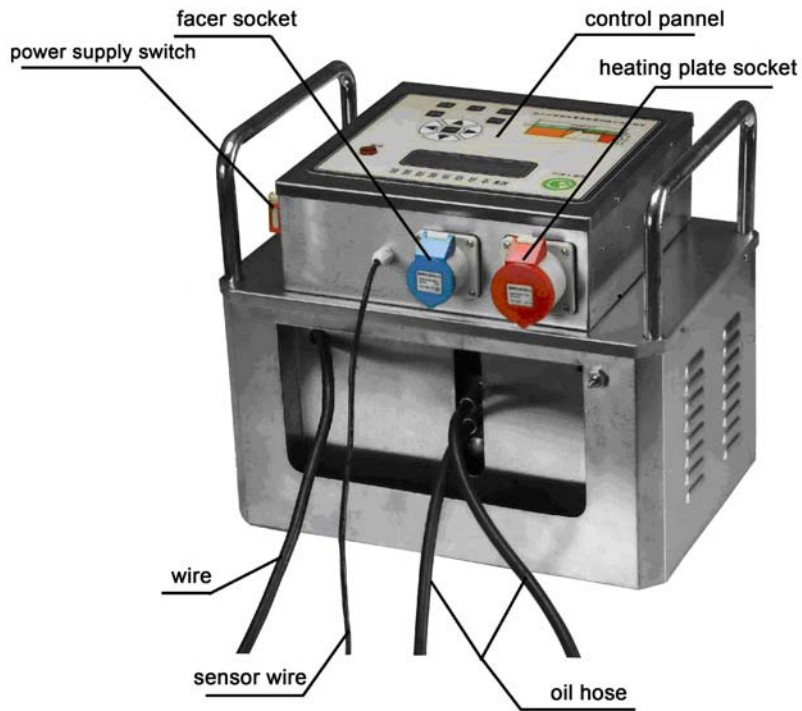


**2. Automatic Butt Fusion Machine Components**

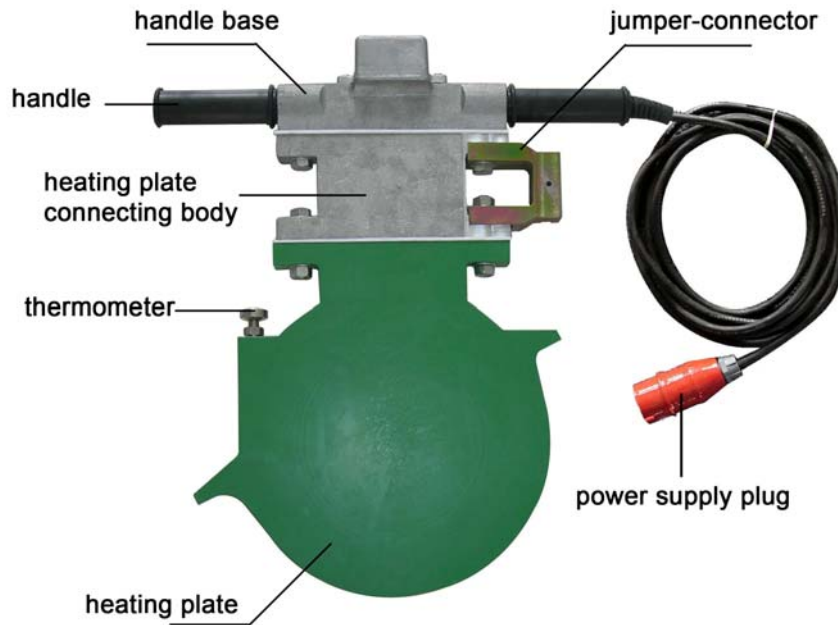
Base machine and heater-jumper:



Controlling Box:



Heater:

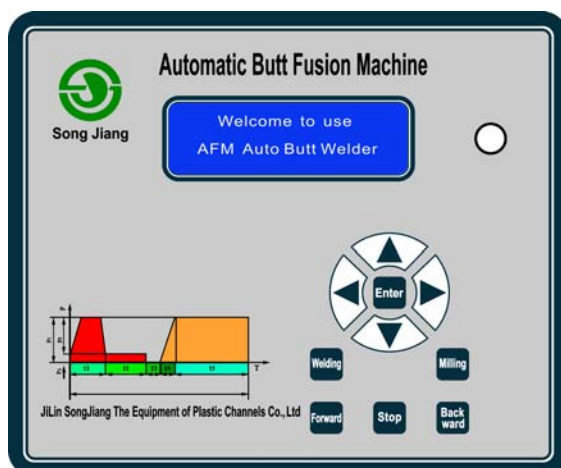


Facer:



### 3. Control Panel

All the control keys are on the controlling panel, user can enter 3 panels:



#### a: Operation Panel :

Authorised operator can enter operation panel to conduct the welding operation and select related welding parameter such as pipe diameter, pipe SDR ,material grade.

#### b: System Management Panel:

Authorised admin can enter system management panel to set the welding standard, language, date, password for operator and so on.

#### c: Data Management Panel:

Authorised admin can enter data management panel to check, download and print the welding data.

## 4. Notice

- a: Only for PE pipe butt welding.
- b: Forbidden to operate under circumstance with inflammable air, as there is possibility of sparkle resulted from facer motor and power switch when they are under work.
- c: Voltage:  $220\pm 15V$ , single phase.
- d: Make sure the power cable is in good condition. The cable should be YZ ( $3\times 4\text{mm}^2$ ) covered with mechanical punch resistant and anti-corrosion rubber. When cable is longer than 100m, the sectional area of cable should be larger than YZ ( $3\times 6\text{mm}^2$ )
- e: Make sure the power plug contacts well with socket.
- f: Put on protective gloves when take heater as the surface temperature of heater reach more than  $200^{\circ}\text{C}$ .
- g: Avoid in-ditch operation as much as possible, in case under in-ditch operation protection measurement must be taken to avoid collapse.

## 5. Operation

### 5.1 Assembly and connecting the machine

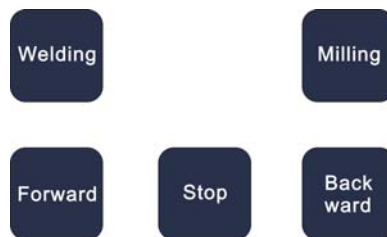
- a: Connect the heater, facer plug with relative socket.
- b: Connect the hydraulic hose with the base machine after the pressure release(Connecting the power source, press" stop" to release pressure)
- c: Connect power source.
- d: Assemble inserts on the base machine.

### 5.2 Operation Keys

Under Operation Panel, the operator can start welding operation. There are two kinds of keys on the controlling pannel---parameter selection key&function key.

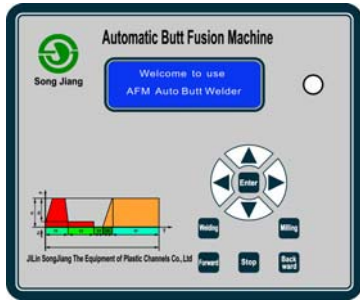


**Parameter Selection Key**



**Function Key**

### 5.3 Enter Operation Panel



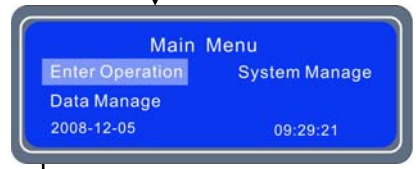
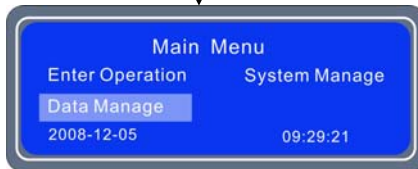
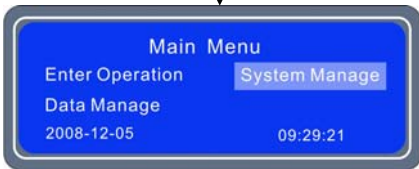
Turn on the power switch →



Wait few mins, the system enter main menu.



Press parameter key ▲ & ▼ to select the submenu.



sbmenu



Manufacturer supply Admin No.



Digit Value from 0 to 9, Press up and down key to increase or decrease the value, after finish the selection for one digit, press "Enter" to input the next digit

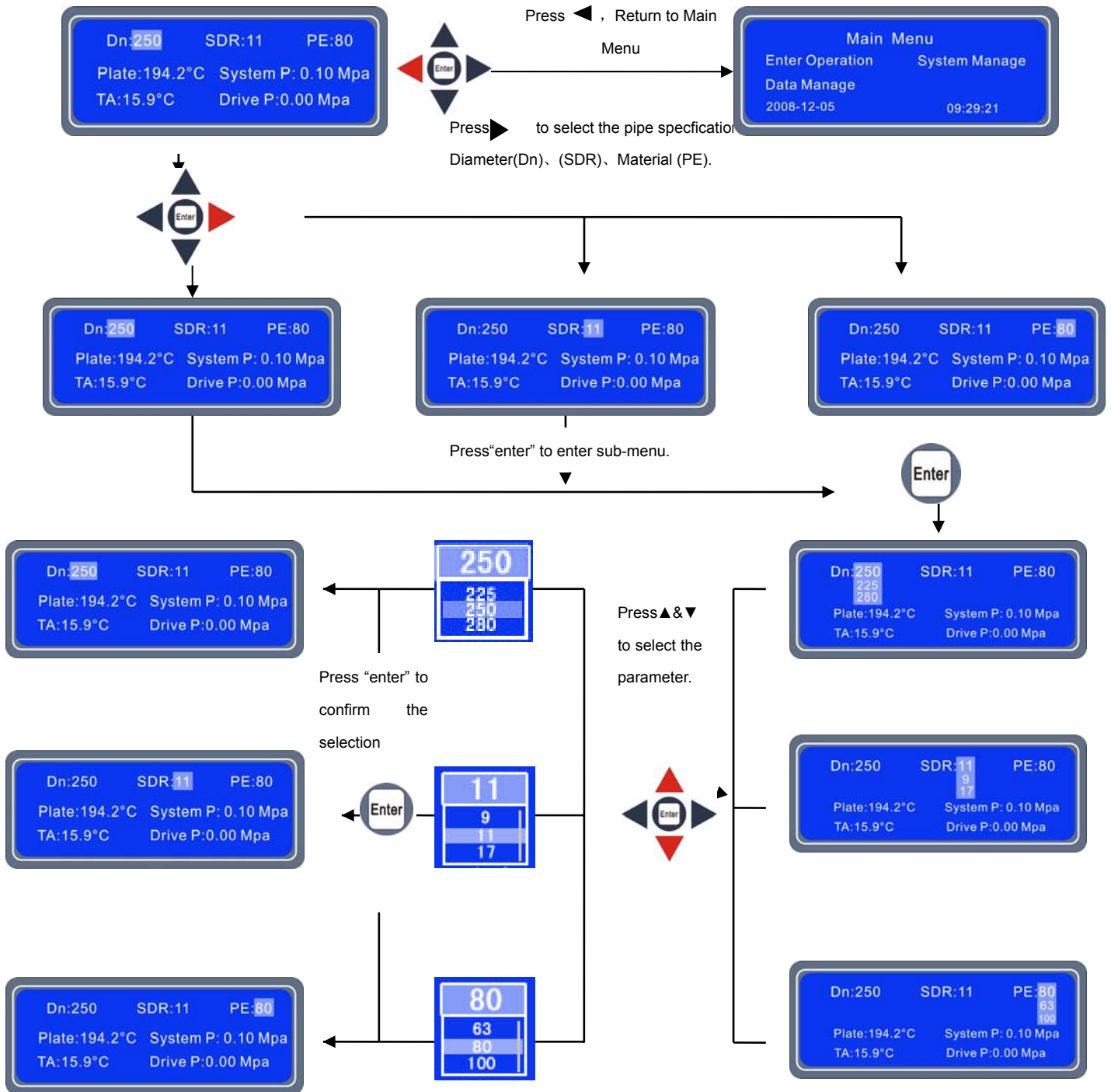


Enter operation pannel, under this pannel" function key" is activated



## 5.4 Operation under Operation Panel

### 5.4.1 Parameter set



### 5.4.2 Pipe loading

After selection of pipe specification, press "backward" to move motile clamps back for pipe loading.





- a . Load the pipe and lock the upper clamp with inserts with locking bolts.
- b . Press“forward” to make the two pipe ends contact with each other( check if they are eccentric).



### 5.4.3 Facing pipe ends

After loading, press” milling”, the motile clamps move forward, the system starts to test the driving pressure.



After driving pressure test, the motile clamps move backward , buzzer buzz, system reminds the operator on the screen” put facer..”



Follow the reminder, put the facer soon and lock the safety pin.

**Remark:** (With 3 times of reminder, if the operator didn't put facer in, the system directly return to initial status)

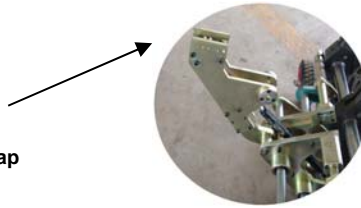
The facer starts to work, after facing ,the facer stops automatically. Take it out, press “forward” to check if the pipe ends are concentric, if it is ok, enter fusion phase.



## 5.5 Fusion

a. Put the heater on the jumper connecting gap.

Jumper Connecting Gap



b. Press "fusion" on the panel

The motile clamps auotmatically move forward;

The machine starts to check the driving pressure and heater temperature auotmatically;

When driving pressure test is over, the temperature of heater reaches the same as set previously, the contacted pipe ends start to separate, the warning lisht turn on and the buzzer starts to ring; the screen shows " put hot plate".

Till now, the machine enter into fully auotmatic fusion status, there is no need for operator's assistance.

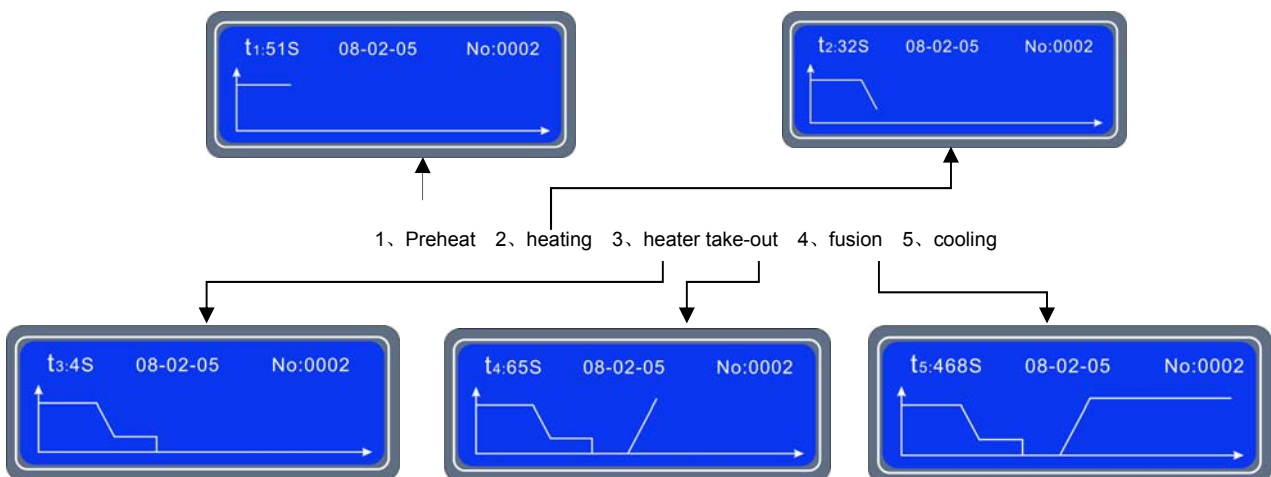


**Remark:** ( With 3 times of reminder, if the operator didn't put heater in, the system directly return to initial status)

c. Press heater down according to the reminder, realse when the motile clamps start to move forward.

During this phase, there is fusion curve showed on the screen as followed.

Fusion seperates into 5 phases:



When the warning light turns on; the buzzer buzz; the motile clamps move backforward, the heater jumps up by itself, the motile clamps move forward, the system enter in to fusion and cooling phase, when cooling finish, the warning light turns on, the buzzer buzz, on the screen it shows:



Press ◀, return to operation panel.

Loose the clamping locking bolt, take off the upper clamps,unload the pipe, press“backforward” move back the motile clamps.

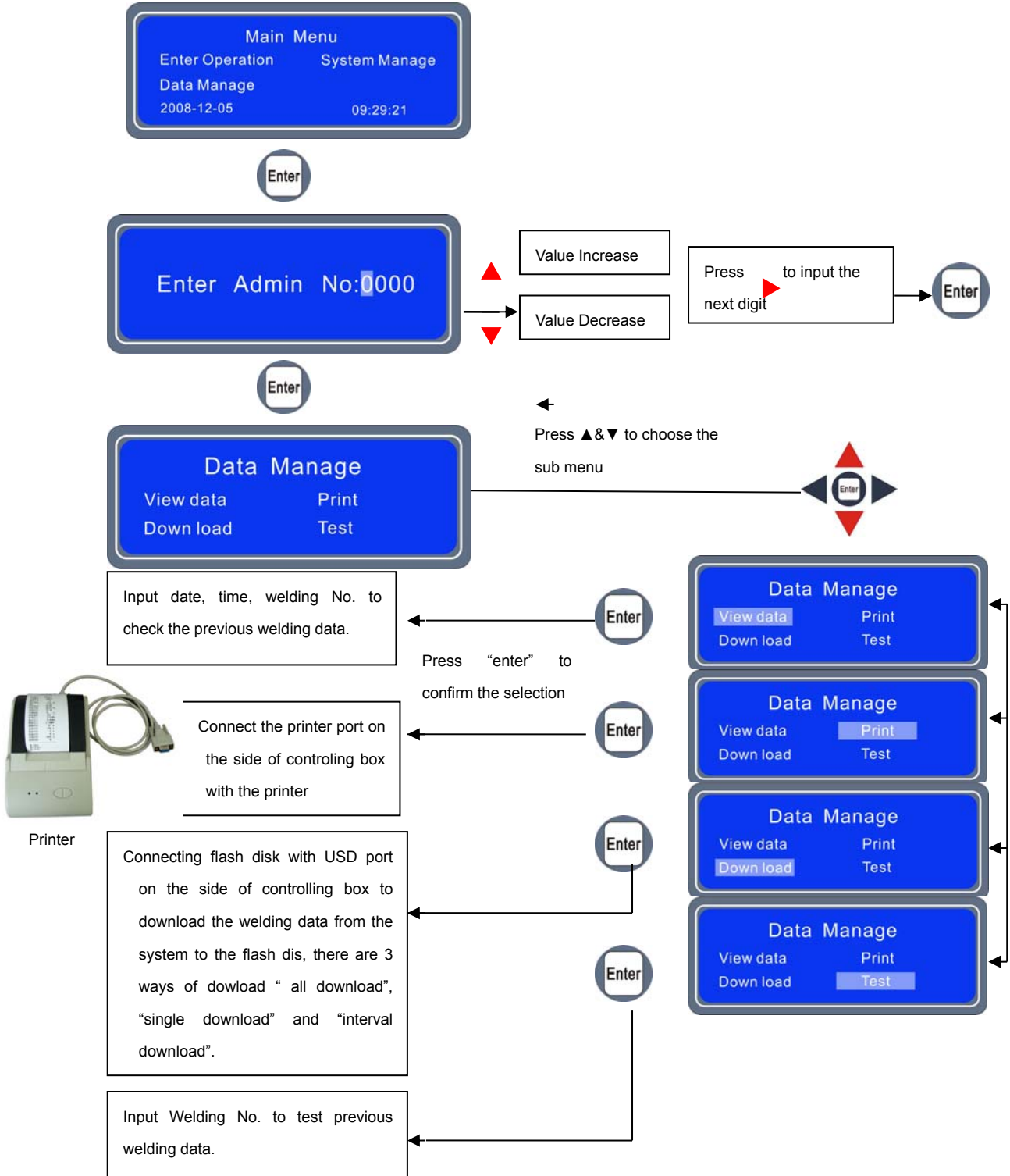
All fusion finish.

**Remark:** if you try to unload the pipe during cooling time, the system will define it as bad joint, the warning light turns on, and the buzzer buzz, on the screen it will show:

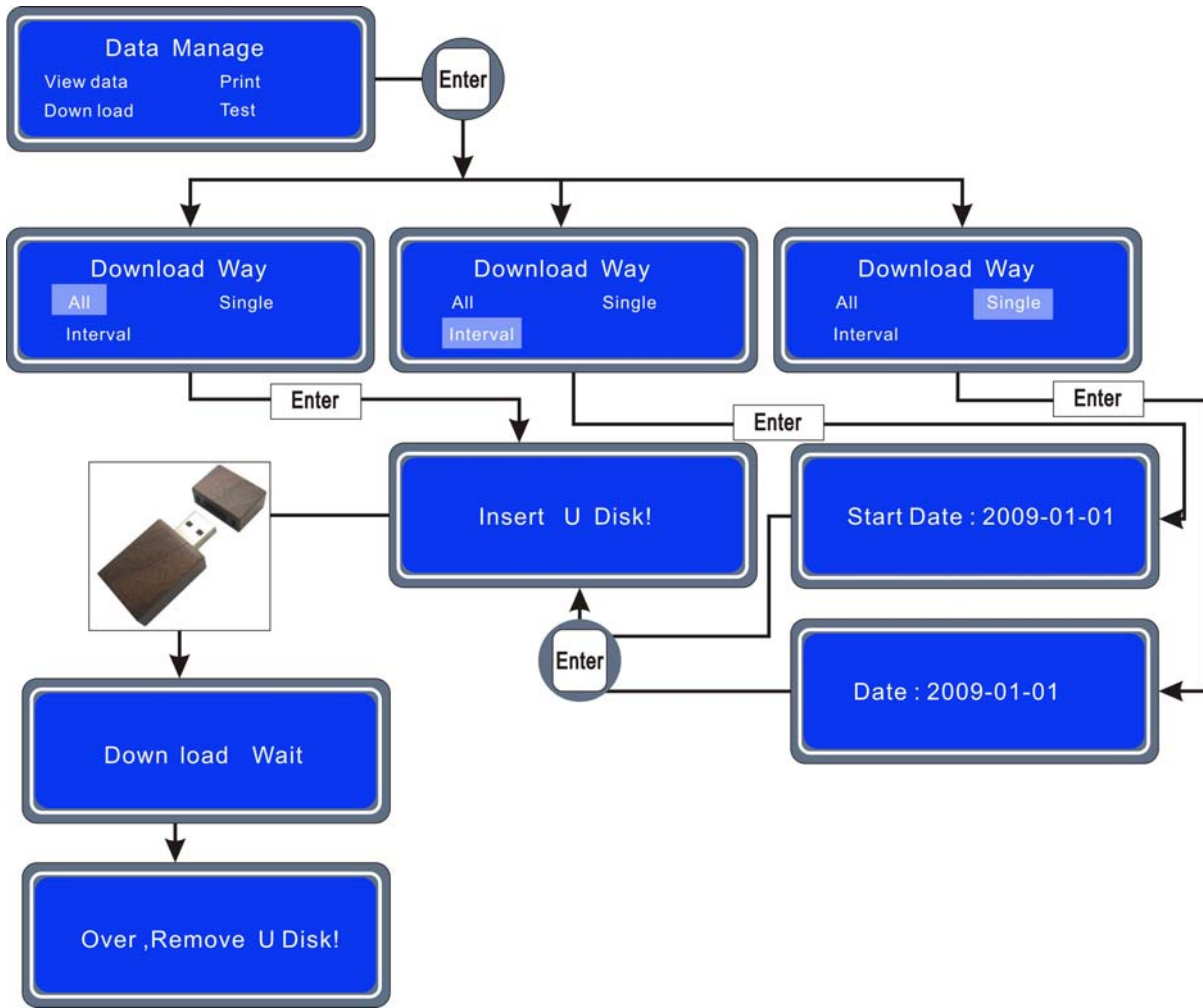


## 6. Data Management

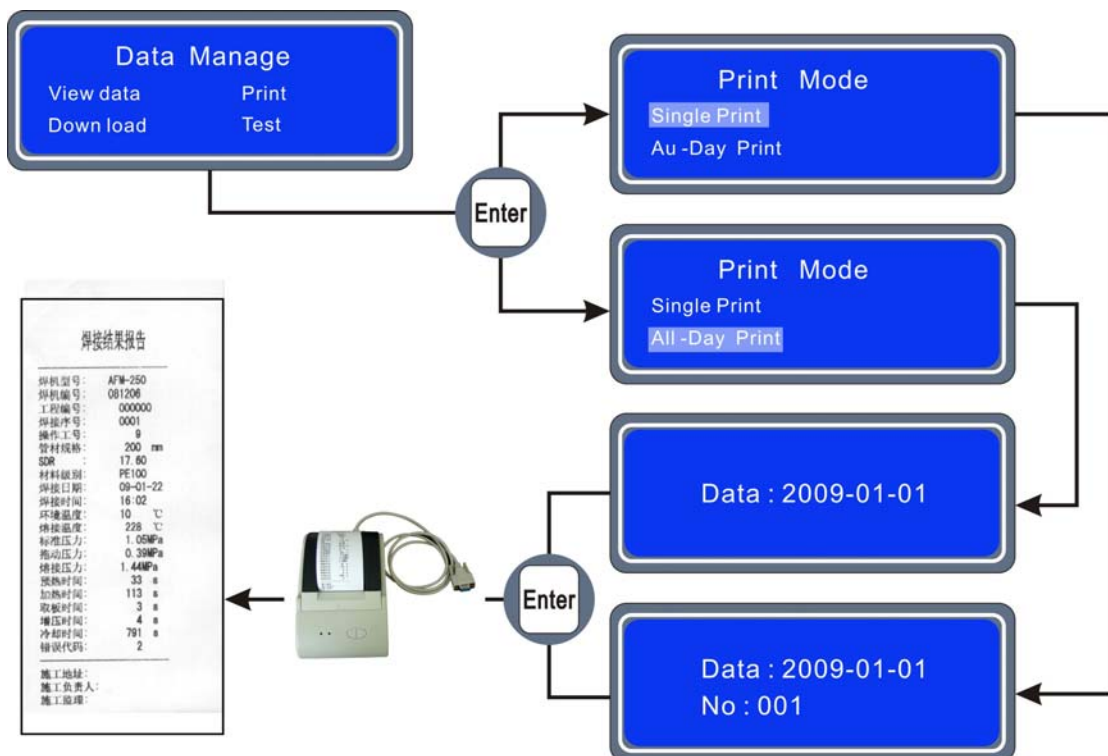
### 4.1 Data Management Pannel



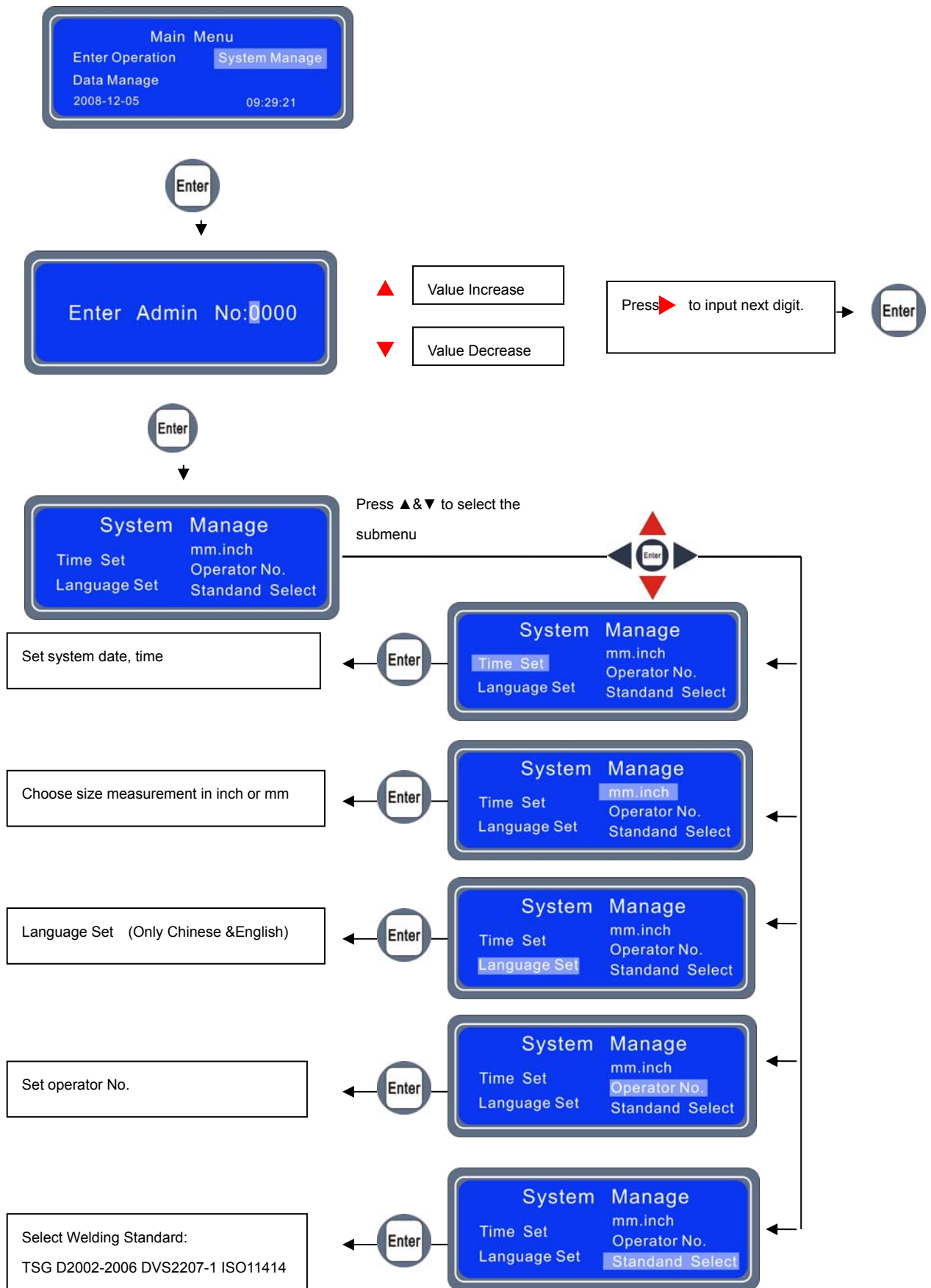
## 7. Data Download



## 8. Data Printing



## 9. System Management



# 10. Welding Table

**Sheet A-1 SDR11 Pipe Welding Table**  
 (Heater Temperature:PE80=210°C±10°C;PE100=225°C±10°C)

Sheet

Diameter DN (mm)	Thickness S (mm)	P2  (MPa)	P=P1 Bead h (mm)	P≈Pt Pre-heat t2 (s)	Heater Take-out t3 (s)	Fusion t4 (s)	p=P1 Cooling t5 (min)
110	10.0	0.5	1.5	100	≤6	<7	≥14
125	11.4	0.7	1.5	114	≤6	<8	≥15
140	12.7	0.8	2.0	127	≤8	<8	≥17
160	14.5	1.0	2.0	145	≤8	<9	≥19
180	16.4	1.3	2.0	164	≤8	<10	≥21
200	18.2	1.6	2.0	182	≤8	<11	≥23
225	20.5	2.0	2.5	205	≤10	<12	≥26
250	22.7	2.5	2.5	227	≤10	<13	≥28
280	25.5	3.2	2.5	255	≤10	<14	≥31
315	28.6	4.1	3.0	286	≤12	<15	≥35

A-2

**SDR17.6 Pipe Welding Table**  
 (Heater Temperature:PE80=210°C±10°C;PE100=225°C±10°C)

Dia DN (mm)	Thickness S (mm)	P2  (MPa)	P=P1 Bead h (mm)	P≈Pt Pre-heat t2 (s)	Heater Take-out t3 (s)	Fusion t4 (s)	P=P1 Cooling t5 (min)
110	6.3	0.3	1.0	63	≤5	<6	9
125	7.1	0.4	1.5	71	≤6	<6	10
140	8.0	0.5	1.5	80	≤6	<6	11
160	9.1	0.7	1.5	91	≤6	<7	13
180	10.2	0.9	1.5	102	≤6	<7	14
200	11.4	1.1	1.5	114	≤6	<8	15
225	12.8	1.3	2.0	128	≤8	<8	17
250	14.2	1.7	2.0	142	≤8	<9	19
280	15.9	2.1	2.0	159	≤8	<10	20
315	17.9	2.6	2.0	179	≤8	<11	23

## 11.AFM Monitoring Control Sheet

No	Error Code	Error	Reason	Judgement	Method	Reminder
1	01	Power Supply is cut off by the end of fusion	During t1、 t2、 t3、 t4 ,When pump is working, power supply is cut off	Unforgivable	Fusion Stop	
2	02	Unload pipe before the regulated cooling time	During t5, test P< P1	Unforgivable	Reminder	Error, Unloading Advanced, Press ← to return back
3	03	Heater Temperature Low	During t1、 t2, test heater temperature is 5 degree lower than targeted value		Reminder	Please wait...
4	04	Heater Temperature High	During t1、 t2, test temperature is 5 degree higher than targeted value	Unforgivable	Reminder	Wrong Welding, Press ◀ to return
5	05	Heater isn't taken out	Position Sensoring Wrong	Unforgivable	Reminder	Wrong Welding, Press ◀ to return
6		Environment Temperature Exceed	Environment Temperature Exceed -10~+40 degree	Unforgivable	Reminder	Environment Temperature Exceed, Press ◀ to return
7		Beyond available driving pressure	Pt>4 Mpa	Unforgivable	Reminder	Exceeding machine's driving pressure , Press ◀ to return
8		Beyond available fusion pressure	P1>5.5Mpa	Unforgivable	Reminder	Exceeding machine's driving pressure, Press ◀ to return
9		Pipe untighten	Wrong Position Sensoring, Wrong Pressure	Amendable	Reminder	Pipe untighten, please reclamping
10		Facer isn't put in	Wrong Position Sensoring	Amendable	Reminder	Please put facer
11		Heater isn't put in	Wrong Position Sensoring	Amendable	Reminder	Please put heater
12		Memory Full		Amendable	Reminder	Memory full, please download.

## 12. Machine Maintenance

No.	Content	Per Day	Per Month	Per Season	Per Year	Remark
1	Power Supply Check	⊙				
2	Pressure Loss Check		⊙			
3	Hydraulic System Leakage		⊙			
4	Hydraulic Cylinder Clean	⊙				
5	Nubrication on Spindle Parts		⊙			
7	Hydrauli Oil Change				⊙	
8	Facer Knife Check		⊙			
9	Heater Surface Clean	⊙				
10	Heater Temperature Check			⊙		
11	Heater Teflon-coating Check		⊙			