WELPING
Welding & Piping

Operator's Manual

Butt fusion welding machine

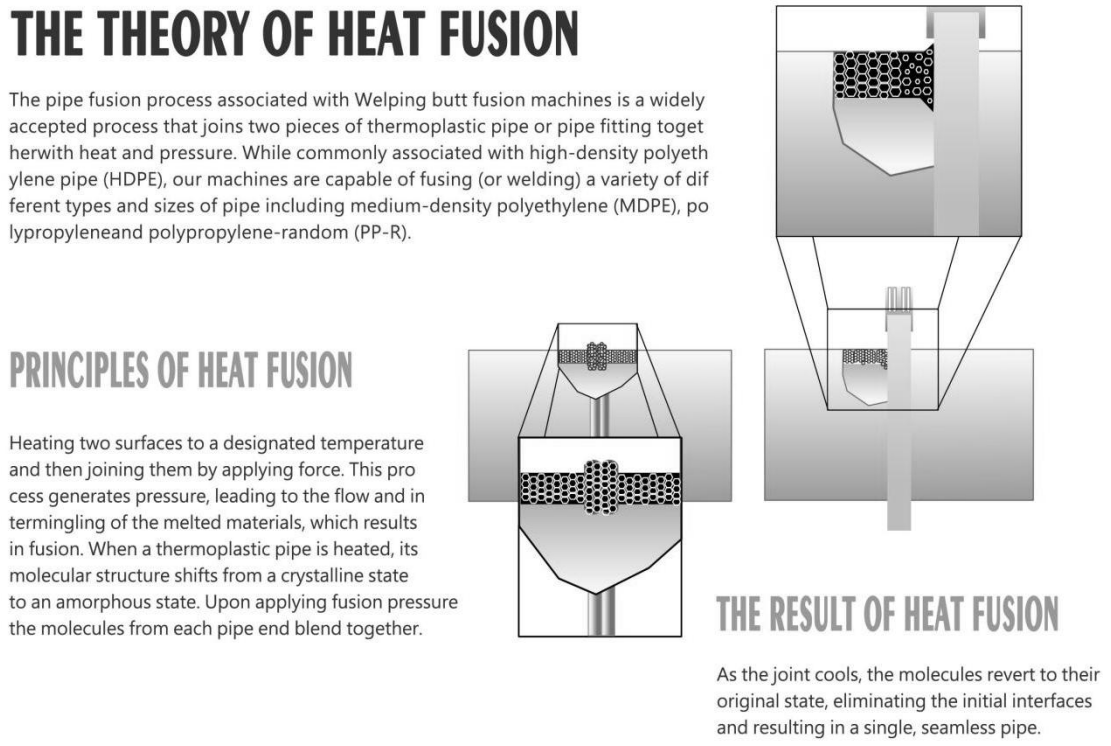
For Model: **1800A**

⚠ WARNING!

Read this Operator's Manual carefully before using the tool. Failure to understand and follow the instructions of this manual may result in electrical shock, fire and/or serious personal injury.

Overview of Fusion operation

The operation of heat fusion is to heat two pipe end surfaces to a specified temperature, then fuse them together by application of certain force. This will develop pressure which causes flow of the melted material, which causes mixing and thus fusion. When the thermoplastic material is heated, the molecular structure is transformed into an amorphous condition. When fusion pressure is applied, the molecules from each thermoplastic part mix together. As the joint cools, the molecules return to the solid form, the original interfaces are gone, and the fitting and pipe have become one complete unit. A strong, fully leak-tight connection is the result.



Major operations include:

Clamping	The pipes are held axially and radially for all subsequent operations to follow
Planing	The pipe ends are planed (trimmed, faced) to establish clean, parallel jointing surfaces perpendicular to the center line of the pipes
Aligning	The pipe ends are aligned with each other to minimize mismatch of the pipe walls.
Heating	A melt pattern that penetrates into the pipe is formed around both pipe ends
Fusing	The melted pipe ends are joined under specified force, which is constant around the pipe interfacial area.
Cooling	The fusion joint is held immobile under specified pressure until adequately cooled.
Inspecting	Visually examine the outlook of the joint for compliance with the standard or fusion procedure used.

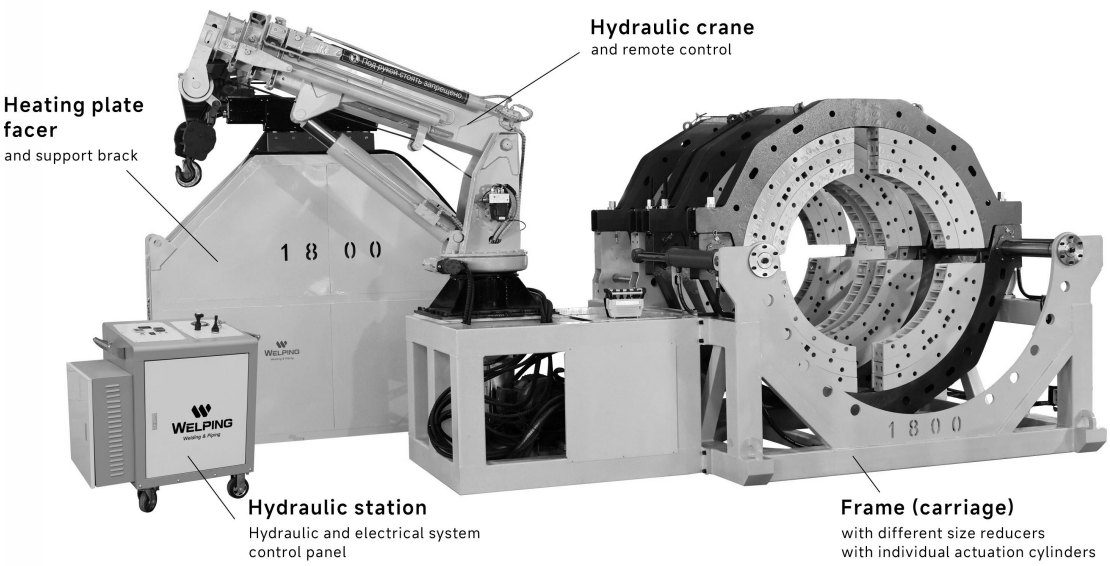
Thank you for choosing WELPING

The WP1800A butt fusion machines allow operators to butt fuse HDPE pipes in the thermoplastic piping jobs, size from 1200mm to 1800mm (reducer sizes depends on the real requirement). With it's heavy-duty design and optimal weight, it is an easy machine to operate when performing fusions in tight spaces as well as on the ground.

The WP1800A machine utilizes the enclosure type hydraulic station to provide hydraulic power to the carriage (frame). The enclosure design can shield splash and dirt in field operation. The Robust carriage (frame) part can withstand heavy duty jobs, free from distortion and breakage. Independent control panels, providing accurate and clear operating interfaces, with stable performance in different environments.

With reasonable care and maintenance, the machine will give years of satisfactory service. Before operating this machine, please read this manual thoroughly, and keep a copy with the machine for future reference.

When fusing thermoplastic pipe materials, refer to the pipe manufacturer's fusion procedures or appropriate joining standard.



Parameters list

Model	WP1800A
Range	Standard 1200-1800mm
Reducers	1200mm, 1400mm, 1600mm
Power supply	380V/50Hz 3PH
Rated power (kw)	78
Heater	65
Facer	7.5
Hydraulic station	5.5
Pressure	0-16Mpa
Working Temp.	170-250℃
Temp. deviation	±10℃

Piston area (cm^2)	100.48
Hydraulic oil	46#
Viscosity	41.4 - 50.6 cSt

Read and Understand

Do not operate this equipment until you have carefully read, and understand all the sections of this manual, and all other equipment manuals that will be used with it.
Your safety and the safety of others depends upon care and judgment in the operation of this equipment.
Follow all applicable local, and industry specific regulations.
WELPING cannot anticipate every possible circumstance that might involve a potential hazard. The warnings in this manual and on the machine are therefore not all inclusive.
You must satisfy yourself that a procedure, tool, work method, or operating technique is safe for you and others. You should also ensure that the machine will not be damaged or made unsafe by the method of operation or maintenance you choose.

General Safety

Safety is important. Pay attention to anything unusual that you notice during set up or operation.
LISTEN for thumps, bumps, rattles, squeals, air leaks, or unusual sounds.
SMELL odors like burning insulation, hot metal, burning rubber etc.
FEEL any changes in the way the equipment operates.
SEE problems with wiring and cables, hydraulic connections, or other equipment.
REPORT anything you see, feel, smell, or hear that is different from what you expect, or that you think may be unsafe.

Work Area Safety

• Keep work area clean and well lit. Cluttered or dark areas invite accidents.
• Do not operate the butt welder in explosive atmospheres, such as in the presence of flammable liquids, gases or dust. The heat may ignite the dust or fumes.
• Keep children and bystanders away while operating the butt welding machine. Distractions can cause you to lose control.

Personal Safety

• Wear a hard hat, safety shoes, safety glasses, and other applicable personal protective equipment.
• Remove hanging jewelry and rings, and do not wear loose-fitting clothing or long hair that could catch on controls or moving machinery.

Electrical Safety

• Always ensure equipment is properly grounded. It is important to remember that if you are working in a wet environment with electrical devices. Proper ground connections help to

minimize the chances of an electric shock.

• Frequently inspect electrical cords and unit for damage. Have damaged components replaced and service performed by a qualified electrician.

• Do not abuse the cord. Keep cord away from heat, oil, sharp edges or moving parts. Damaged or entangled cords increase the risk of electric shock.

NOTICE: Always connect units to the proper power source as listed on the unit, or in the owner's manual. Use GFCI electrical connections when available or required.

Butt Fusion Machine Use and Care

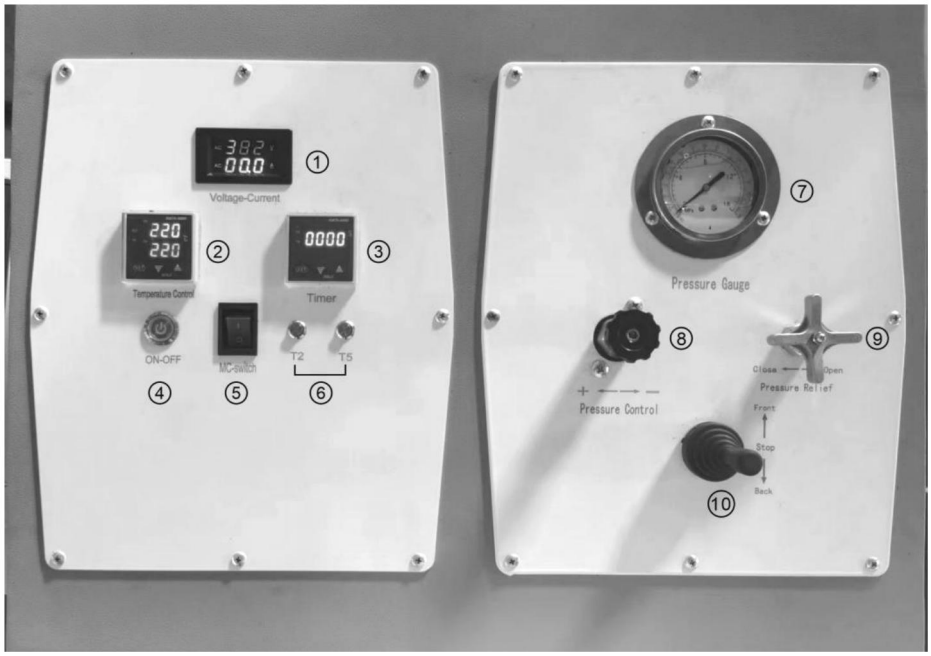
• Facer blades are sharp and can cut. Never attempt to remove blades while the facer (planing tool) is running, or is in the facing position between the clamps. Use care when operating the facer, and when handling the unit.

• The heater is hot and will burn clothing and skin. Keep the heater in its insulated heater stand or blanket when not in use, and use care when heating the pipes.

• Do not use the butt welder if the switch does not turn it ON and OFF. Any welder that cannot be controlled with the switch is dangerous and must be repaired.

• Maintain butt welder and accessories. Check for misalignment or binding of moving parts, breakage of parts and any other condition that may affect the operation. If damaged, have the tool repaired before use. Many accidents are caused by poorly maintained tools.

Operation Panel (Hydraulic station)



① **Voltmeter and ammeter:** shows readings of power current and voltage

② **Temperature controller:** to adjust welding temperature and showing real-time temperature

③ **Timer:** to set T2 (heat soaking) and T5 (cooling) time

④ **Power switch:** On/Off power switch

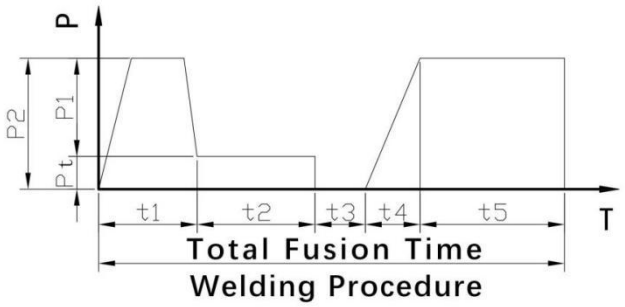
⑤ **MC-switch:** power switch for milling cutter (trimmer)

⑥ **Buttons:** button switches for T2 and T5

⑦ **Pressure gauge:** shows readings of real-time pressure
⑧ **Pressure control valve:** to increase or decrease the desired pressure level
⑨ **Pressure relief valve:** to maintain or relieve pressure level
⑩ **Solenoid valve:** to move forward or backward of the frame moving part

Butt Welding Procedures:

P1: Welding pressure (Mpa)
P2: Total pressure, P2=P1+Pt (Mpa)
Pt: Drag pressure (Mpa)
t1: The time for the welding bead reaching specific height
t2: Heat soaking time (s) = pipe wall thickness (mm)×10
t3: Change-over time (s)
t4: Pressure build up time (s)
t5: Cooling time (min)



t1 Phase: Pressure P2 works on the fusion interface, the purpose is to erase the distance between the pipe ends and heater so that the whole pipe ends can be heated in balance. That' why in this phase, there is no precise time for evaluation, it is checked according to the fusion loop height.

Operation: Move the frame moving clamps forward, at the same time adjust the pressure control valve to increase the pressure up to P2.

t2 Phase: Pressure Pt works on the fusion interface, the purpose is to make the polyethelene pipe ends melt enough, Pt is very important, it will decide the joint quality.

Operation: Rotate " Pressure release valve", when pressure drop to Pt, stop the operation.

t3 Phase: It's the heating plate change-over time, melted pipe ends leave the heating plate surface, the temperature will drop very quickly. For the change-over time, it's the shorter the better.

Operation: Move the frame moving clamps backward, then remove the heating plate quickly.

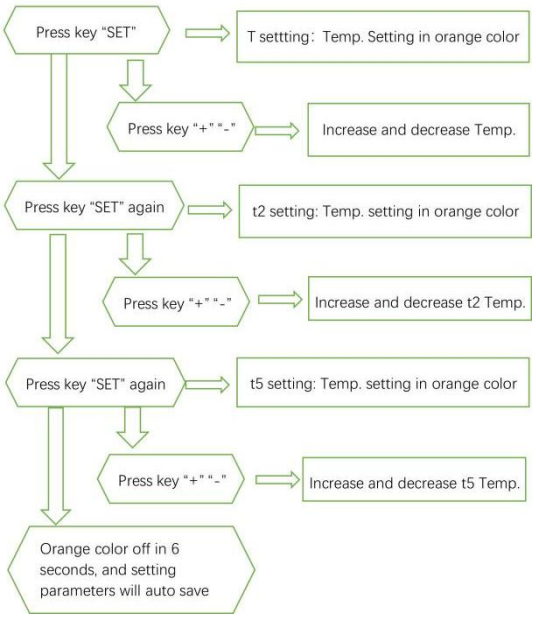
t4 Phase: Pressure P2 gradually establishes in this phase, the cell chain of polyethelene re-established and finally fused together.

Operation: Move the frame moving clamps forward, at the same time adjust the pressure control valve and set the pressure to P2, when two melted ends melted together and become a standard welding joint, then loose the button.

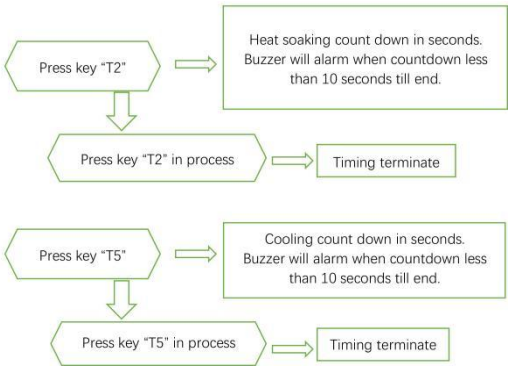
t5 Phase: Cooling phase under certain pressure, the pressure requires to be stable.

Remark: Enter t5 phase, when two pipe ends contact together and forms standard welding bead, turn off the oil pump motor, the accumulator will maintain the pressure for cooling time.

T, t2, t5 setting



t2, t5 timer setting



Pipe inspection

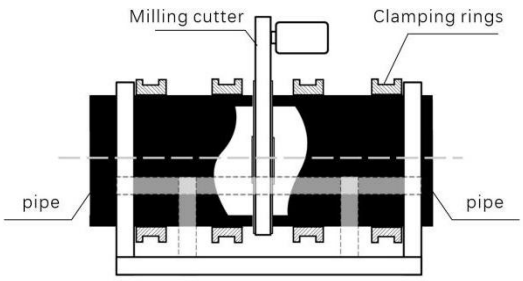
Before welding, first check if the pipe material and pressure setting are correct. Secondly check if there are obvious scratches or fissures on the surface of pipes/fittings. If the depth of scratches or fissures exceeds 10% of the wall thickness, cut the damaged section of pipe. Clear the pipe end surfaces with clean cloth.

Pipe clamping

Place the pipes/fittings into reducers (inserts) of carriage (frame) and leave enough length of pipe to be welded. If the pipe out of the main frame is too long, it should be supported to keep level with the machine. Fasten the screws of clamps to fix the pipes/fittings.

Pipe milling (facing, or planing)

Put the milling cutter (facer) between the pipes/fittings ends and switch on. Assure the pressure selector control is in the facing position. Move the carriage directional control to close the carriage. If the facer stalls, adjust the facing pressure so the facer continues to cut.

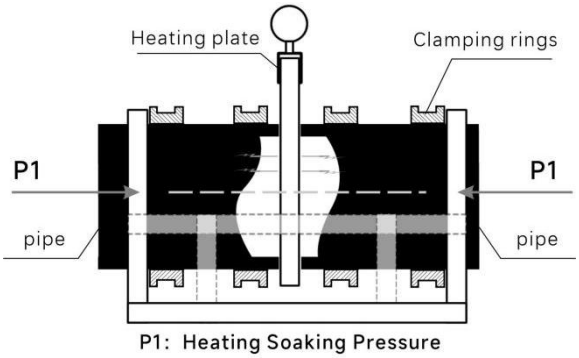


Shift the carriage directional control to the neutral position. Allow the facer to run for several revolutions to ensure that there are no chips hanging on the end of the pipe.Turn facer off.

Close the pipes/fitting ends and checks the alignment of pipes. The max misalignment should not exceed 10% of the wall thickness, and it could be improved by loosening or tightening the screws of clamps. The gap between two pipe ends should not exceed 10% of wall thickness; otherwise the pipes/fittings should be faced again.

Pipe heating

Clear the dust and dirt on the surface of heating plate (Caution: Don't damage PTFE layer), and make sure the temperature has reached the required level.



P1: Heating Soaking Pressure

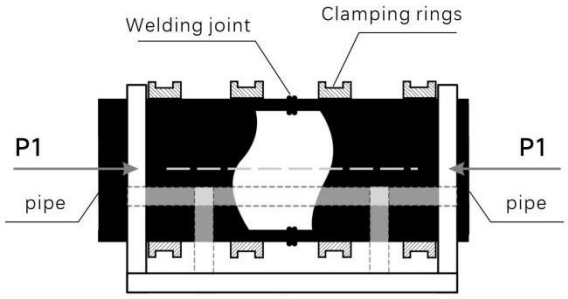
Put the heating plate between the pipe ends after it reaches required temperature. Close the carriage (frame) to bring pipe ends in contact with the heater. Allow for bead-up according to pipe manufacturer's or appropriate joining standard recommendations.

Ensure the heater stays perpendicular to the pipe by supporting the heater during the heating process.

NOTICE: Ensure that the pipe remains in contact with heater throughout the entire process.

Pipe fusing

Shift the carriage directional control to the neutral position. Open the carriage (frame) just enough to remove the heater. Quickly remove the heater. Inspect pipe ends for appropriate melt. Quickly close the carriage, bringing the pipe ends together under the fusion pressure.



P1: Welding and cooling pressure

Allow joint to cool under pressure according to pipe manufacturer's recommendations. When it reaches the required cooling time, loosen the screw of clamps and then takes out the jointed pipes.

Welding Pressure P1 Calculation

P1 (Mpa) = [0.15×π×e×(dn-e)]/S
e: pipe wall thickness, mm;
π: 3.1416;
dn: pipe diameter, mm;
S: hydraulic cylinder surface

For example: (WP1800A=10048mm^2);
0.15Mpa in the pressure coefficient according to Standard DVS 2207

If to fuse SDR17 dnΦ1200mm PE pipe with WP1800A butt fusion machine, execute fusion standard DVS-2207-2005, P1 Standard fusion pressure is :

dn=1200mm e= 70.6mm S=10048mm2
P1=[0.15×3.14×70.6×(1200-70.6)]/10048
=3.7Mpa

Pipe Joints Visual check

Visually check: round bead, good joint	
Narrow and fall bead. Too high pressure while welding	
Too small bead. Pressure is not enough while welding	
A obvious gap between the welding beads. Temperature is not up to required figure or change-over time is too long.	
High & low bead. Different heating time or fusion temperature causes that.	
◎Misalignment. Welding under the condition that the misalignment exceeds 10% of pipe wall thickness while align the two ends.	

Maintenance

1. To ensure optimum performance, the machine must be kept clean and well maintained. With reasonable care, this machine will give years of service. Therefore, it is important that a regular schedule of preventive maintenance be kept.
2. Store machine under shelter, out of the weather, whenever possible.
3. The machine can be cleaned if needed with soap and water. Do not pressure wash. Dry the machine and lubricate some metal parts to keep free of rusting.
4. Pressure gauge should be checked daily. The gauge should read zero when the unit is not running. Damaged gauges should be replaced.
5. To prevent slippage and ensure proper alignment, the clamping parts and inserts (reducers) must be clean. Clean the clamping parts and inserts (reducers) of any dirt or residual material using a stiff-bristled brush.
6. The lock nuts must turn freely. Keep the clamp lock bolt and nuts threads brushed clean. Lubricate the threads if needed.
7. Trimmer (planing tool) blade should be inspected for damage and sharpness. Dull or

chipped blades must be replaced.

NOTICE: Never extend the blade beyond the outer circumference of the facer (planing tool).

8. The heater faces must be kept clean and free of any plastic build up or contamination. Before each fusion joint the heater surfaces must be wiped with a clean dry lint free non-synthetic cloth.

NOTICE: Do not use an abrasive pad or steel wool. Use a non synthetic cloth that won't damage surfaces.

Welding Table for WP1800A

BUTT FUSION WELDING MACHINE PE80/PE100 DVS 2207-1			Bead Build Up		Heating		Change Over	Welding and Cooling		
OD	Wall Thickness	SDR	P2	Bead	Welding pressure	T2	T3	T4	P5	T5
mm	mm		Bar	mm	Bar	Sec.	Sec.	Sec.	Bar	Min.
1200	70.6	17	37.4	4.5	1.5	706	<30	35	P2+Pt	85-109
1200	57.2	21	30.7	4	1.5	572	<25	25-35	P2+Pt	61-85
1200	45.9	26	24.8	3.5	1.5	459	<20	19-25	P2+Pt	45-61
1400	82.4	17	50.9	4.5	1.5	824	<30	35	P2+Pt	85-109
1400	66.7	21	41.7	4	1.5	667	<25	25-35	P2+Pt	61-85
1400	53.5	26	33.8	4	1.5	535	<25	25-35	P2+Pt	61-85
1600	94.1	17	66.5	5	1.5	941	<35	35	P2+Pt	109-133
1600	76.2	21	54.5	4.5	1.5	762	<30	35	P2+Pt	85-109
1600	61.2	26	44.2	4	1.5	612	<25	25-35	P2+Pt	61-85
1800	105.8	17	84.1	5.5	1.5	1058	<40	40	P2+Pt	115-145
1800	85.7	21	68.9	5	1.5	857	<35	35	P2+Pt	85-109
1800	69.2	26	56.2	4.5	1.5	692	<30	25-35	P2+Pt	61-85

Note: The data above is based on the environmental temperature 25℃

Surface temperature of heating plate: PE80=215±10℃； PE100=225±10℃