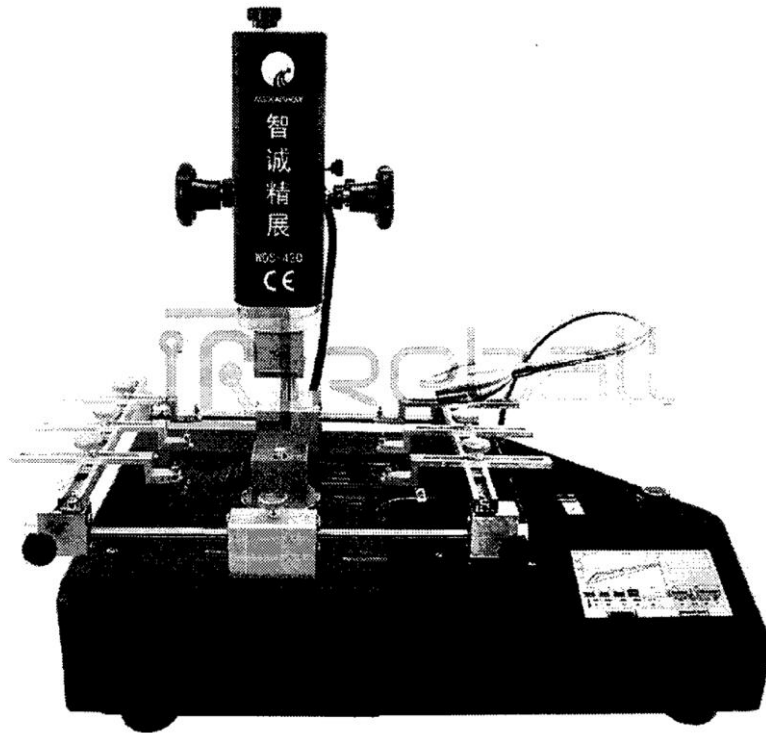


WISDOMSHOW WDS-420 BGA Soldering Station

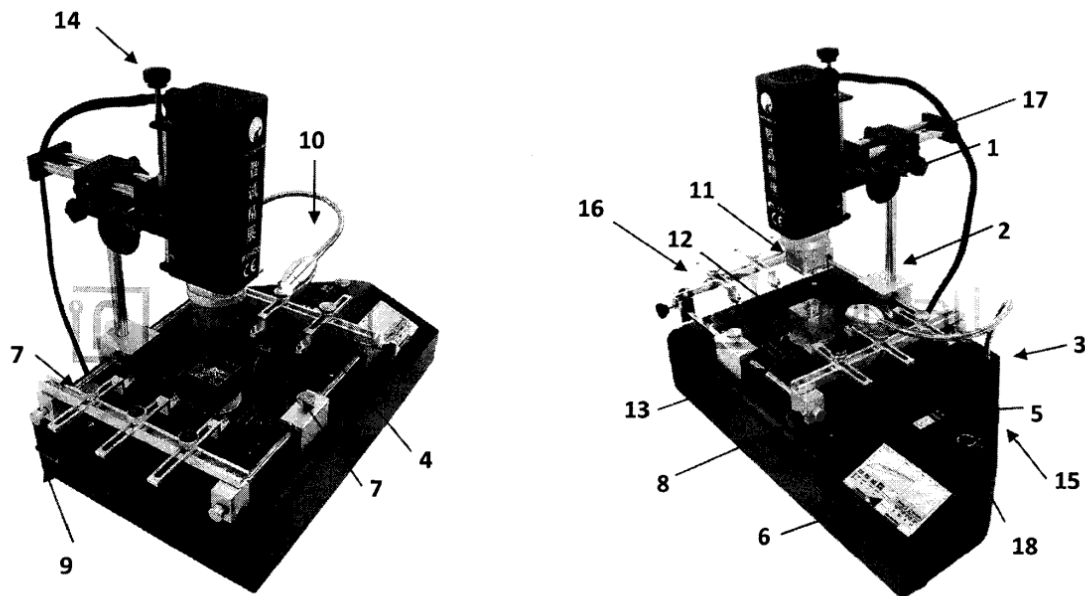
User Manual v3.0



Specifications

- Total power: 4000W
- Upper hot air heating element power: 1200W
- Lower hot air heating element power: 1200W
- Bottom preheater power: 4x400W (1600W)
- Supply voltage: AC 220V/230V 50/60Hz
- Temperature sensor: Type K thermocouple, accuracy +/- 2°C
- PCB/PBA positioning (PCB holder): table with 6 clamps
- Min. PCB/PBA board size: 10x10mm
- Max. PCB/PBA board size: 210x300mm
- Bottom IR preheater size: 205x205mm
- Max. hot air nozzle size: 50x50mm
- Min. BGA chip size: 6x6mm
- Max. BGA chip size: 50x50mm
- Station dimensions: 470(W) x 340(D) x 390mm(H)
- Control: 4.3" HD HMI color touchscreen + PLC controller
- Net weight: 12kg (gross ~18kg)

Technical Data - Component Legend



- 1 - Upper heating element up/down adjustment
- 2 - Upper heating element left/right adjustment
- 3 - Vacuum suction cup
- 4 - Transverse fan controlled from LCD
- 5 - Type K thermocouple connector (place sensor close to the BGA chip)
- 6 - LCD touchscreen display
- 7 - PCB board holder locking knob
- 8 - Left and right PCB board holder locking knob
- 9 - Main power switch
- 10 - LED lighting
- 11 - Upper HR heating element (Zone I)
- 12 - Lower HR heating element (Zone II)
- 13 - Lower IR preheater (Zone III)
- 14 - Minimum height adjustment for upper HR nozzle
- 15 - Fan cooling the interior of the housing
- 16 - PCB board holder and supports
- 17 - Upper heating element front/back adjustment
- 18 - Emergency STOP button

Package Contents

- 1. WISDOMSHOW WDS-420 soldering station
- 2. Type K thermocouple
- 3. Polish and English user manual
- 4. Four nozzles for the upper hot air heater and two for the lower
- 5. Four holders for non-standard PCB/PBA boards + four mounting screws
- 6. Suction tip for the vacuum suction cup
- 7. Flux application brush

General Information

The WISDOMSHOW WDS-420 BGA/microBGA integrated repair system is a professional and modern solution for the disassembly and assembly of BGA, uBGA, BGA, CSP, SMD, micro SMD,

LGA, CCGA, CBGA, CPGA, QFN, MLF, PGA chips, and LED panel repair for consumer electronics, medical, telecommunications, military, and automotive service centers.

The device has been designed with particular attention to small BGA and micro SMD components for repairing motherboards of mobile phones, all kinds of modules and controllers including automotive ones, manufactured using both leaded and lead-free solder technology. Particularly recommended for work with small chips and PCB/PBA boards.

Distinguishing Features of the WDS-420:

- Compact station dimensions relative to the power of the three heating zones
- High heating power of 4000W ensuring operation with every type of BGA chip
- High-quality infrared emitters - temperature rise up to 3°C/sec
- Ability to set 9 temperature steps for each heating profile
- Large PCB/PBA area of 210x300mm relative to the station dimensions
- Large bottom IR preheater area of 205x205mm relative to the station dimensions
- Built-in vacuum suction cup
- 3 heating zones: upper HR, lower HR, lower IR
- All station parameters controlled and visualized from the 4.3" LCD touchscreen
- External temperature sensor input for the BGA chip (included)
- Magnetic quick-change hot air nozzles
- Ability to rotate the hot air nozzle 360° (nozzles made from titanium alloys)
- 6 PCB board holders
- Smooth hot air fan speed adjustment
- Particularly recommended for automotive service centers: PCB/PBA mount is 5cm above IR preheater, allowing PBA boards with ODB connectors without risk of thermal damage
- Programs up to 20,000 heating profiles, monitored and editable in real time; each profile programmable in 9 temperature blocks

All parameters can be set independently using the 4.3" HD LCD HMI touchscreen. The display shows all operating parameters in real time, including graphical visualization of the heating process and temperature graphs.

Temperatures displayed on screen:

- Upper HOTAIR heater temperature
- Lower HOTAIR heater temperature
- Lower IR preheater temperature
- Actual temperature at the BGA chip

The station includes an electric vacuum suction cup. The **Hold** function maintains all achieved temperatures until pressed again, useful when solder is resistant to melting. Automatic cooling of all 3 zones occurs after the process, and zone cooling can also be controlled manually.

Precise Type K thermocouples (+/- 2°C, closed loop) are used. An alarm sounds at the end of each process. A built-in overtemperature protection system will stop the process and cut off the circuit if temperatures become uncontrolled.

An efficient transverse fan automatically cools PCB/PBA boards after desoldering/soldering, preventing board deformation and protecting the BGA reballing effect. Magnetic nozzles mount easily one-handed and can be positioned at any angle.

Standard hot air nozzles: upper heater: 18x18, 24x24, 30x30mm. Lower heater: 35x35mm. Other sizes available separately.

BGA Chip Replacement Procedure

Desoldering the BGA Chip

1. The entire PCB board should be preheated (80-100°C for 12-24 hours) before replacing the BGA chip, to avoid surface stresses and laminate damage. Do the same for chips with uncertain storage conditions. Avoid changing humidity or drafts during the process.
2. Place the board in the PCB holder, select the upper heater type, place the temperature sensor, select the heating profile, then press **Desolder**.

2.1. Ensure the distance between the chip and nozzle edge is no greater than 10mm (usually a few mm) for optimal heating efficiency.

2.2. Up to 20,000 profiles can be defined and changed in real time via **Advanced Menu**. Each profile can be divided into 9 temperature blocks S1-S9 (IPC standards require no more than 5).

Current Curve		LEADFREE									Curve manage	Save	Save As
		S1	S2	S3	S4	S5	S6	S7	S8	S9			
Upper	°C	165	195	215	235	255	0	0	0	0			
Time	s	30	30	30	30	40	0	0	0	0			
Lower	°C	170	200	220	240	260	0	0	0	0			
Time	s	30	30	30	20	100	0	0	0	0			
Others													
Bottom	0-50%	180	Reflow Temp	°C	217	Cool Time	sec	90	Upper (+/-)	°C	0	Lower (+/-)	°C
Upper Air	50-100%	100	Lower Air	50-100%	100	Pre-heat	°C	180	Alarm Time	sec	10	Beep Time	sec

3. When the BGA chip starts to "spring" (move due to ball reflow), stop heating, move the upper heater, and remove the chip using the vacuum suction cup or bent-tip tweezers. Timing is critical - solder that is too cool may solidify during removal, tearing pads. Use **HOLD** to extend the profile if needed.

4. After chip removal, ensure the board and bottom preheater are cooled by the transverse fan.

BGA Ball Replacement

After desoldering, remove remaining solder using a copper braid and a soldering iron with a wide tip (e.g. knife type) with flux. Do not remove solder completely to bare pads - this may prevent BGA balls from adhering. After preparing the pads, apply an even mist of flux, then apply BGA balls using the appropriate stencil. Reflow balls using the BGA preheater. Leaded solder reflow temp: 183°C; lead-free: 217°C.

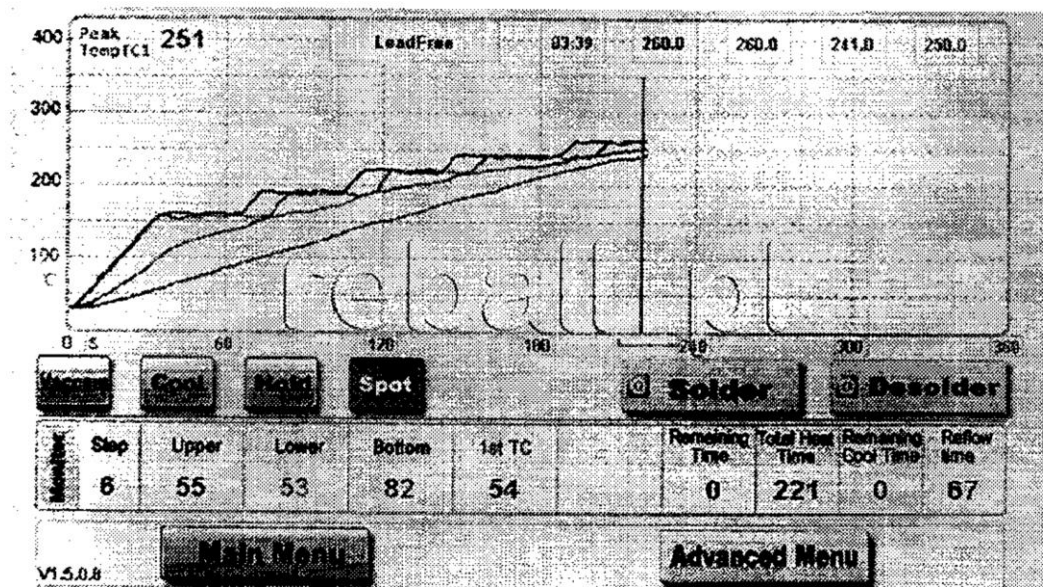
Soldering the BGA Chip

1. Mount the prepared BGA chip with balls onto the PCB board following the appropriate markings.
2. Before starting, check that the lower IR emitter is not contaminated from previous processes, as this shortens heater service life.
3. Start the station and solder in the reverse order of desoldering. Reflow is visible when the chip settles and "springs." Use **HOLD** if unsure about the profile.
4. After soldering, cool the chip by holding the upper nozzle 3-5mm above it for 30-40 seconds. The fan will also cool the chip during this time.

Station Control via Touchscreen

1. Before first use, read the Safety and Notes section at the end of this manual.
2. Start the station using the side switch.

3. When the white screen appears, press anywhere to proceed to the main screen.



Main Screen Controls and Display Reference:

Peak temptc1 - Peak value of the external sensor temperature

LeadFree - Profile name

VACUUM - Electric vacuum suction cup switch

COOL - Switch for all HOTAIR fans and the transverse fan

HOLD - Maintains all temperatures at the current level until pressed again (useful when some balls have not melted)

SPOT - Laser pointer or light switch (depending on model)

SOLDER - Starts the chip soldering process; transverse fan starts automatically when complete

DESOLDER - Starts the chip desoldering process; vacuum cup activates on completion, then transverse fan starts after 10 seconds

STEEP - Current temperature step of the running profile

UPPER - Outlet air temperature of the upper hot air nozzle

LOWER - Outlet air temperature of the lower hot air nozzle

BOTTOM - Temperature under the PCB/PBA laminate

1st TC - Temperature indicated by the external sensor near the BGA chip

REMAINING TIME - Remaining time of the current step until set temperature is reached

TOTAL HEAT TIME - Total duration of the profile

REMAINING COOL TIME - Remaining cooling time (set in Advanced Menu)

REFLOW TIME - Reflow time counted from when Reflow Temp (set in Advanced Menu) is reached

4. Programming Profiles

To program a profile, go to **Advanced Menu** from the main screen. Each profile can be divided into 9 temperature blocks S1-S9 (IPC standards require no more than 5).

Current Curve		LEADFREE									Curve manage	Save	Save As
		S1	S2	S3	S4	S5	S6	S7	S8	S9			
Upper	°C	165	195	215	235	255	0	0	0	0			
Time	s	30	30	30	30	40	0	0	0	0			
Lower	°C	170	200	220	240	260	0	0	0	0			
Time	s	30	30	30	20	100	0	0	0	0			

Others									
Bottom 0-50%	180	Reflow Temp °C	217	Cool Time sec	90	Upper (+/-) °C	0	Lower (+/-) °C	0
Upper Air 50-100%	100	Lower Air 50-100%	100	Pre-heat °C	180	Alarm Time min	10	Beep Time sec	3

Main Menu

Block Parameters:

UPPER - Set temperature of the upper HR heater

LOWER - Set temperature of the lower HR heater

TIME - Time after which the next step is activated

BOTTOM - Set temperature of the IR preheater

REFLOW TEMP - Temp above which Reflow time is counted (leaded = 183°C, lead-free = 217°C per IPC)

PREHEAT TEMP - Preheats laminate and BGA before soldering. If > 0, IR preheater activates at power-on. If = 0, station follows Bottom field value during the profile.

COOL TIME - Operating time of the transverse fan after the soldering process

UPPER/LOWER (+/-)°C - Temperature correction for HR heaters (WARNING: changes may damage PCB and BGA chip)

UPPER AIR - Percentage fan speed of the upper heater (lower = shorter heater life)

LOWER AIR - Percentage fan speed of the lower heater (lower = shorter heater life)

PRE-HEAT - 0 = IR preheater does not auto-start; above 0 = runs at set temp even without profile

ALARM TIME - Time before profile end when station alerts about completion

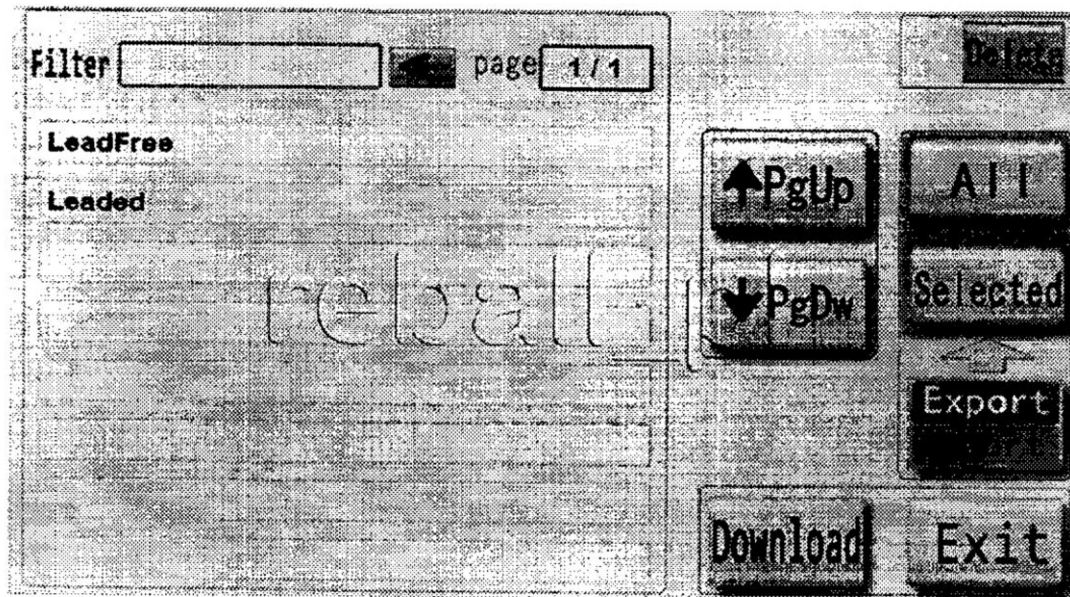
BEEP TIME - Duration of the end-of-profile alarm

How to Read a Heating Profile - Example for Upper HR Heater:

1. Bottom preheater reaches 180°C and maintains it. Temperature under the laminate may differ.
2. Upper HR heater in S1 reaches 165°C and holds for 30 seconds, then S2 proceeds to 195°C (30s hold), continuing until S5 reaches 255°C after 50 seconds.

Save profiles with **Save** (existing name) or **Save As** (new name). Use **Curve Manager** to manage profiles (PgUp/PgDw to navigate, Download to load, Delete to remove, Export/Import available for

stations with USB port).



Safety and Notes

1. After startup, the station performs a self-test of all modules. Fans may activate and will turn off upon successful completion.
2. After soldering, automatic cooling of hot air zones occurs. Fans turn off at 49°C and restart at 60°C.
3. The transverse fan can be controlled manually or automatically via Advanced Menu / Cool Time.
4. If the thermocouple is not connected to the LCD panel, the 1st TC temperature will not display correctly.
5. An average soldering profile lasts from 4 to 6 minutes.

Sample Heating Profiles

1 - Factory Lead-Free Profile

	S1	S2	S3	S4	S5
Upper (°C)	160	190	220	240	260
Time (s)	30	30	30	40	30
Lower (°C)	160	190	220	240	260
Time (s)	30	30	30	40	80

Bottom: 200°C | Reflow Temp: 217°C | Cool Time: 90s | Upper Air: 80% | Lower Air: 80%

2 - Factory Leaded Profile

	S1	S2	S3	S4
Upper (°C)	160	180	210	230
Time (s)	30	30	40	30
Lower (°C)	150	170	200	220
Time (s)	30	30	40	80

Bottom: 180°C | Reflow Temp: 183°C | Cool Time: 90s | Upper Air: 80% | Lower Air: 80%

IMPORTANT NOTE

Please note that each profile will require fine-tuning on a specific station unit and the climatic conditions of the room.

THERE ARE NO universal ready-made profiles for BGA chip replacement!

Profiles available online or from manufacturers can only suggest a direction. When creating or implementing profiles, the following must be taken into account:

- The same station model
- The same heater power in the given station model
- Temperature sensor placement in the identical location
- The same distance between the heater and the BGA chip
- Identical temperature and humidity in the service room
- The same hot air nozzle size
- Time of year (summer/winter) - room temperature

All of the above parameters directly affect the result. A few degrees difference can determine the success or failure of the entire process. Only when all variables are kept identical between workstations can profiles truly be shared between them.

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