MODULAR SOLDERING REWORKING COMPLEX IK-650Pro

SET OF MANUALS FOR USE AND SAFITY

English Edition 1.2E

HELSINKI 2017

The present set of Manuals and Instructions contains:

I. GENERAL INTRODUCTION AND SAFETY RECOMMENDATIONS

II. MANUAL FOR IKV-65 INFRA-RED TOP HEATER

III. "TERMOPRO-CENTER" UNIVERSAL PROGRAM FOR CONTROL AND MANAGEMENT OF SOLDERING PROCESS (USER MANUAL)

IV. NP – SERIES MULTIFUNCTIONAL DIGITAL PREHEATER FOR SOLDERING AND BOTTOM HEATING OF PRINTED CIRCUIT BOARDS (PCB) (MANUAL FOR SAFITY AND USE)

V. AIR COOLER FC-500. MANUAL FOR SAFITY AND USE

VI. VACUUM PICK UP UNIT BM-0.45. MANUAL FOR SAFETY USE

These documents are dedicated to devices which could be used as seporate machine or as integrated part of IK650Pro Reworking Complex, depending on customers need.

Please consult your Supplier for proper device specification to avoid mismatch to your working tasks!

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I. General Introduction and Safety recommendations

1. Introduction

We thank You for Your decision to buy our Reworking Soldering Complex IK-650Pro!
It was fabricated by us especially for You and in accordance with the highest quality standards. Before shipping the equipment to you, it had been tested by our experts on compliance with EU directives presented in the Section "**Documents taken into account in Production and Documentation"**.
Despite the fact that the equipment is rather simple in operating, we strongly recommend to read the Manual before starting work paying a close attention to the **Safety Instructions**.

Infrared Soldering Reworking Modular Complex IK-650Pro had been designed for soldering of electronic components to printed circuit boards (PCB) for a purpose of Assembly and/or Repair. The Complex operates both with lead-free and traditional solder technologies, and imprelents PCB reflow thermo-profiles with top & bottom heaters. Depending on Bottom Heater specification the Complex can be also used for reflowing solder paste or re-balling (recovery BGA components contacts tinning).

2. Documents taken into account in a process of production

For EU Countries only:
OOO NTF "Techno Alliance Electronics" being the responsible Manufacturer declares that Reworking Soldering Coplex IK with Characteristics presented in Section 5.1 is a serial product and meets following EU Directives:

- Directive 2006/95/ECs relating to electrical equipment designed for use within certain voltage limits.

- Directive 89/336/EC related to electro-magnetic compatibility of 3rd May 1989;.

- Machinery Directive 2006/42/EC of the European Parliament and of the Council of 17 May 2006 on machinery and amending Directive 95/16/EC.

Technical documentation for EU Authority Use is kept by European official Representative of the Manufacturer:
K&K Kauppa ja Konsultointy Oy:
Fredrikinkatu 33B,
00120 Helsinki
Finland

3. Briefly about Manufacturer

The NTF "Techno Alliance Electronics" Company was founded in 1993 in Moscow, Russia. Since that time hundreds of enterprises in dozens High-Tech industries appreciated the quality and service of "TERMOPRO" Brand. We have thousands customers among modern Service Centers and Manufacturing Companies which use modern methods of soldering for BGA and other SMD components. For contact information of OOO NTF "Techno Alliance Electronics" Sales Office and Manufacturing Facilities please see page #16 of this Manual.

4. Safety Measures while operating the Machine


WARNING: Read all instructions and safety recommendations. Failure to follow warnings and instructions may cause electric shock, burns, fire and / or serious injury in result.

Keep these instructions with recommendations for future use.

Reworking Soldering Complex IK-650Pro is designed only for installation and remove of electronic components. Other use as the center in whole, and each of its devices or components individually will be considered by the manufacturer as executed by the User at his (User) own personal responsibility and risk.

4.1 Precautions and safety while equipment operating.


Do not touch the heaters and adjacent hot parts. This will result in burns. Any potentially dangerous objects, in particular those which can cause a fire, must be removed from a working area.


WARNING! ***The heater will stay Hot for a long time after power turn off!***


Using a laser pointer a User has to avoid directing it to his eyes, even of reflected radiation. The product incorporates laser module 5 mW. The laser beam pointed to eyes can cause serious injury. Some models are equipped with replaceable filters for reducing the power of the laser beam (mounted under the nut laser pointer). It is necessary to monitor filters condition and replace these in case of burnout or opacity. Two filters should be set when capacity excess. In the models not equipped with filters a User should move a laser with particular care to avoid reflective surfaces contact with the beam. The flat reflecting surface has to be set so that the laser beam is reflected in safe direction.


In case of operation fault do not open device yourself (this can cause even more damage), and contact an experienced service personal.
General safety measures are to be taken working with electrical installations and heating devices. Premises, where the Complex operates, must be equipped with fire extinguishing agents and exhaust ventilation.


All inter-units connections must be made before connecting to the power line. All connectors must be secured with cap nuts (where applicable). Before switching on make sure that grounding outlet or a separate ground terminals are in order.

 **A fuse replacement should be carried out only when the device is switched off (the power cord must be disconnected from Power line socket).**

 **During the working process the temperature of the heater's housing and adjacent metal parts can exceed 100 ° C, therefore a care should be taken in all manipulations of Top heater. Ceramic emitter and adjoining machine elements can be heated to over 600 ° C, therefore very careful operation have to be carried changing a diaphragm - do not touch a diaphragm and retaining spring with bare hands.**

 **NEVER!**

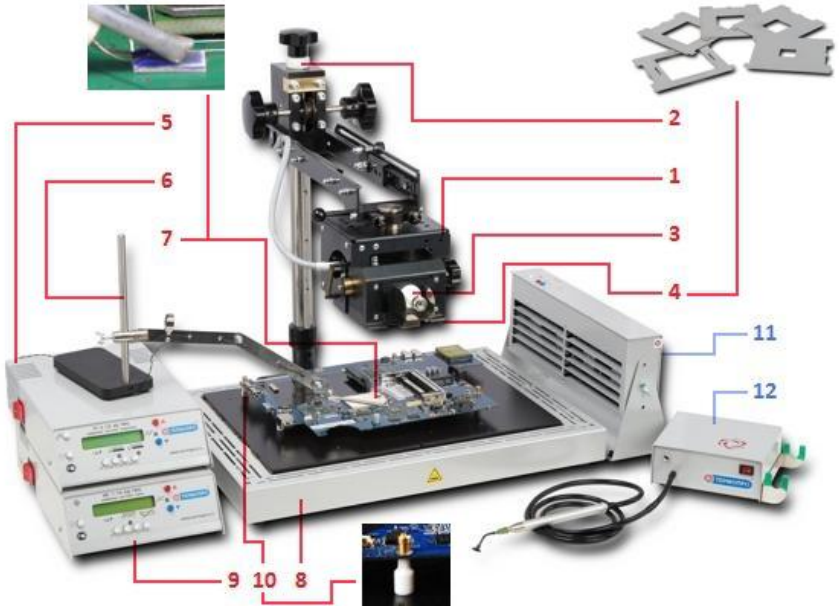
- **use fans or other cooling devices for cooling the upper heater;**
- **touch hot parts of devices with bare hands ;**
- **put arms under the window of Top heater screen at working Mode, as in the case of crumbling ceramic emitter (due to age, improper operation or emitter deffect) ceramic particles heated to a high temperature can cause severe burns;**
- **connect the unit to Power line without the grounding.**
- **leave turned on unit unattended; In the absence of a reliable grounding the proper work of the equipment can not be guaranteed;**
- **turn on a heater near flammable materials and flammable liquids;**
- **carry out maintenance without shutting down the unit and disconnecting it off power supply line.**

 **WARNING: DO NOT let comfort or experience in device operation (gained from repeated use) dominate strict adherence to safety rules for handling this device. Improper use of tools or failure to follow the safety rules stated in this Manual may cause serious personal injury.**

5. Description of Complex Set

5.1 Maximum Set of Reworking Soldering Complex IK-650Pro

Reworking Center IK-650Pro has a modular design and its delivery set can be different depending on Customer request. IK-650Pro is equipped and managed by multifunctional software "TERMOPRO-CENTER" (read refer Manual for Control and Management procedure).

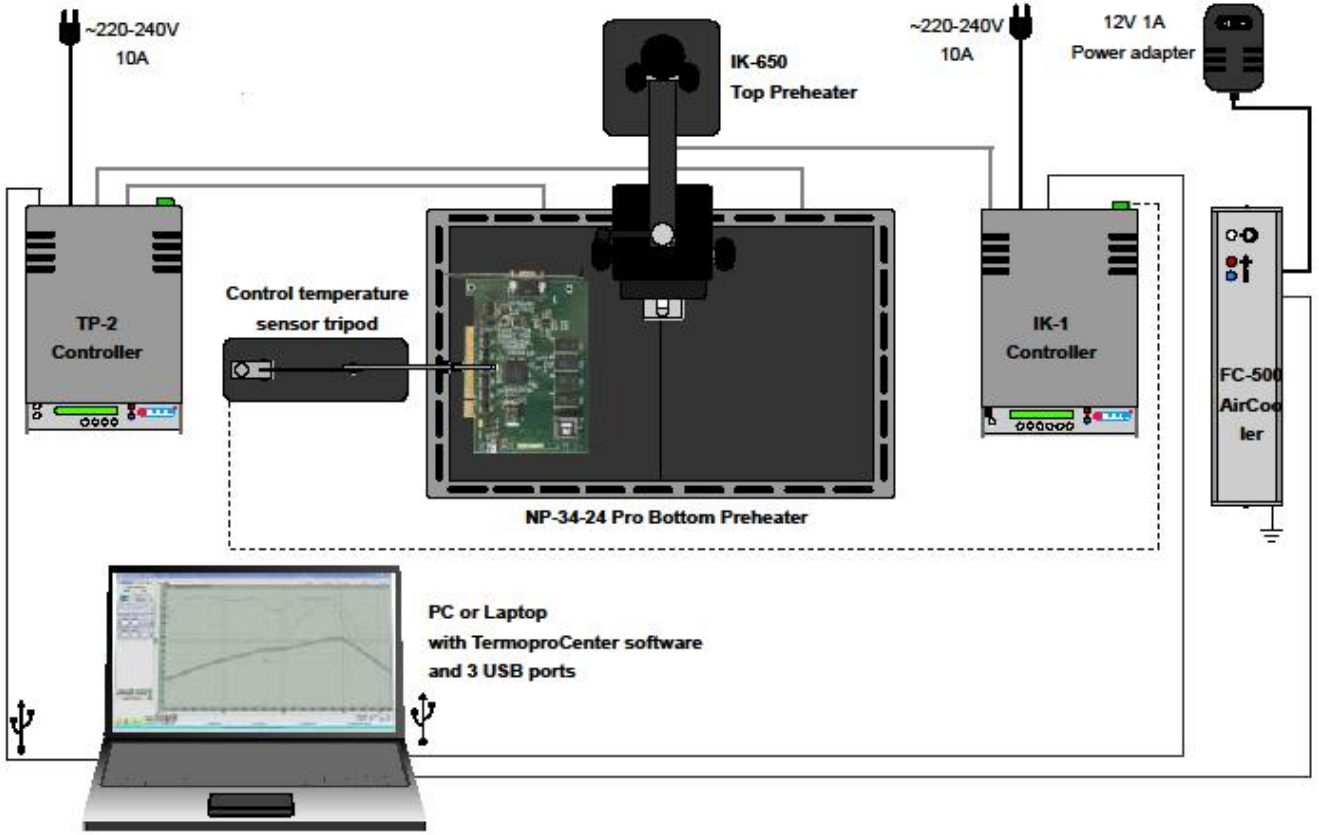


Pic. 1. Reworking Center IK-650 Assembly

Complete Set of Reworking Soldering Center IK-650Pro includes:

1. Upper heater IKV-65
2. Upper heater rack
3. Laser pointer for Upper Heater positioning over component center
4. Replaceable diaphragm for IR focus on PCB
5. IK 1-10 KD thermo-controller for Upper heater and temperature on PCB surface controls
6. PDS-300 3-joints Holder for thermo-sensor positioning on PCB surface
7. TD-1000 (3pcs) thermo-sensor for temperature control on PCB surface
8. NP 34-24 2-zone PCB Bottom pre-heater. (IK-650Pro can be set up with other Bottom Pre-heaters of NP- series by request)
9. TP 2-10 AB 2-channel thermo-controller regulating independently each of 2 pre-heater's zones (thermo-regulator can be replaced with other models by request)
10. FCM-15, FCK-15 (set of 10 pcs) PTFE racks for PCB installation on Pre-heater's surface
11. FC-500 Air-Cooler - used for safe and controlled cooling of component and PCB in accordance with Thermo-profile ramp.
12. BM-0.45 Vacuum PickUp unit for lifting components from PCB (optional)

By Customer request configuration of Complex IK650 Pro can be changed and optimized per his needs. The minimal set of equipment which can not be changed or replaces is Upper Heater IKV-65, its rack and Controller IK1-10KD Pro as a set.



5.3 Diagram of interconnection of Modular Soldering Reworking Complex IK-650Pro

II. Manual for Upper Infra-Red Heater IKV-65 with Rack & TDS-300 Control Sensor Holder

6. START UP

6.1. Before first switch on

Check the delivery set for a lack of visible defects of components:

- Rack and an Upper heater with a laser pointer;
- Thermo- controller of Upper heater with Power Cord;
- Set of interchangeable diaphragm for emitter;
- 3-joints Holder TDS-300 for a temperature sensor mounting and support ;
- Sensor for temperature control on a board (3 pieces);
- 2-zones Bottom pre-heater NP34-24ABPro (IK-650 system can be equipped with other NP Series pre-heaters on request);
- 2-channel temperature controller TP2-10ABPro with a Power cord (can be replaced by other models on request);
- (PTFE) racks for PCB installation at pre-heater's heating surface (10 pcs);
- Software "TERMOPRO Center" on CD;
- Set of Original Safety and Use Manuals for each device.
- *(OPTIONAL)FC500 Cooller with Power adapter and grounding line wire.*
- *(OPTIONAL)BM0.45 Vacuum Pickup unit (see for its set configuration in package of unit)*

If the above items are damaged or missing, please contact your supplier.

6.2. First Switch on

First of all, please read the present Manual for Safe Use. Then, the procedure is as follows:

- Unpack station;
- Place its modules on a flat and hard surface;
- Place the modules in a way to ensure maximum ease of movement for operator and avoid appearance of wire and cables in heater work zone;
- Before proceeding please fix the Upper heater holder on the table with bolts supplied in a kit, or clamp (not included).
- Make vertical adjustment of the Upper IR emitter

6.2.1. Connecting to Power line

(FOLLOW DIAGRAM PRESENTED ABOVE IN CHAPTER 5.3)

- Check whether the voltage specified on controllers housing labels match to available power line parameters.
- Connect the Upper heater and Bottom pre-heater power cords to thermo-controllers on its rare panels.
- Connect the cords from Termosensor on a holder to referred termonal on Upper Heater controllers (*in some Controllers models Sensor terminal is available on bottom heater controller as well. You can use any, and system shall identify it automatically*);
- Connect the additional sensor left free terminal (*if available by your spec*) if needed;
- Connect Cooler Unit to power line with suppleid 12V power adapter;
- When your Complex is supposed to work under PC control, first install drivers to PC (*drivers can be downloaded from our website or installed from the supplied CD*), then connect devices (*2 controllers and Cooler*) to PC using supplied USB cables.

6.2.2. Switching On

Switch on Controllers of Upper IR Heater and Lower Pre-heater. After temperature digits appear on display

the Center is ready for use. Turn the Cooler unit on (if you are going to use it). Red indicators on its top will lit.

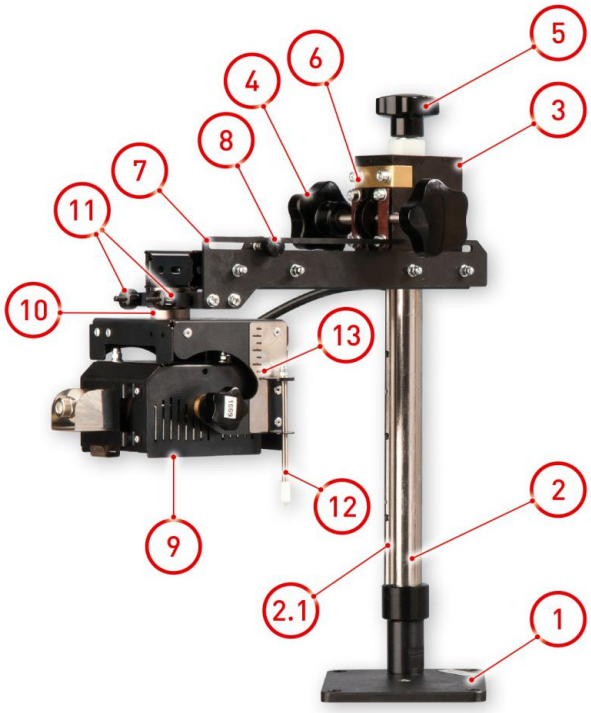
6.3. Software Set Up

Before starting the program "TERMOPRO - CENTER" all units included into system have to be turned on. In this case the program will automatically detect a presence of each particular unit and conduct initialization. Please double-check the fact that all devices are presented on main working interface of the Program (*read manual for "TermoProCenter" software*).

For Further work in "ThermoPro-Center" Program please refer to its Manual

7. Equipment operation

7.1 Top heater Device and controls of a rack



Pic.2.1 Upper heater IKV-65 on tripod

1- basement;
2- pillar,
2.1- guide rod;
3- vertical movement mechanism carriage;
4- Vertical movement wheels;
5- Wheels for carriager fixing;
6- Flat springs;
7- Horizontal movement telescopic guide rails;
8- Nut fixing a horizontal placement of Upper heater;
9- Upper heater;
10- Upper heater axis;
11- Clamps (nuts) tightening a heater rotation;
12- Gap probe rod;
13- Scale, showing a distance from a board to emitter.

Specification of IKV-65 Top heater

Power Supply Voltage /Max. Consumed Power	~220-230V 50Hz / 3000W
Main fuse	10A
IR Emitter power	250 W
IR Emitter working surface	60x60 mm
IR Emitter max. temperature	650 °C
IR ray wave length	2-10 mkm
Recommended distance from PCB to Upper Emitter diaphragm For flat diaphragm For 3D concentrator	 15-25мм 8-12мм
Controller Display type	LCD

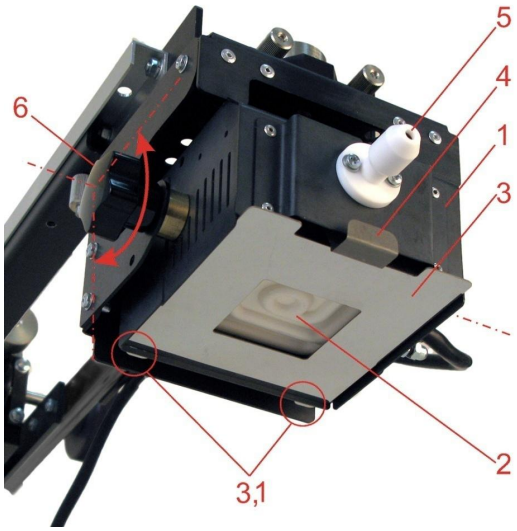
7.2. Upper heater rack adjustment

Upper heater rack is designed to deliver and hold a Top heater head (emitter) over a soldering zone. Also, it provides an ability to move an Upper heater head (Pic 2.2) vertically, horizontally and rotate it around vertical heater axis and around its pilar axis. The combination of these movements can position a heater head over any point of boards at the desired height and with desired gap.

For lifting heaters head up rotate the pair of wheels (4) to derive Upper heater to the desired height (Pic. 2.1).

To rotate the telescopic guide rails (7) around the pillar (2) un-tight (if necessary) the fixing wheels (5) (Pic. 2.1) on a top of pillar. To move the upper heater horizontally loose the fixing nut (8) (Pic. 2.1), bring upper heater to the desired area and tighten the nut (8) without big force application. To rotate the Upper heater around its vertical axis un-tight two locking nuts (11) on a prismatic clamps (Fig. 2.1), rotate Upper heater without much force applied and tighten the nuts to secure the position.
To simplify a working process, as well as extend its life, it is recommended to adjust the tightness of all fixing nuts and hand-wheels to eliminate gaps in movable joints, to leave of a small friction and work then without changing the tightening.

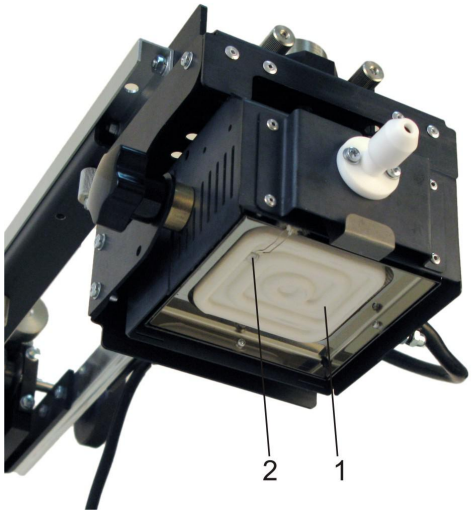
7.3. Top Heater operation



Pic. 2.2. Upper heater: main elements

1- case;
2- ceramic Infra-Red Emitter;
3- diaphragm;
3.1 - slots for diaphragm instalation;
4- diaphragm fixing spring;
5- laser pointer;
6- handle for pointer/work positions turn on (*on some modifications is situated on right side*)

The Upper heater head is shown in Pic 2.2. has an Ceramic emitter (2) placed into metal housing (1), is pivotally suspended. The diaphragm (3) serves for limitation of heating area. Diaphragm is held in slots (3.1) with spring (4). For convenience of Upper heater aiming it is equipped with a laser pointer (5).



Pic. 2.3. Upper heater without diaphragm

1- Ceramic Infra Red Emitter;
2- Temperature sensor

Pic. 2.3. shows the Top heater without a diaphragm. The temperature sensor (2) and IR emitter (1) are located in front of the heater and this fact has to be kept in mind to avoid a sensor demaging during all manipulations with device (for example at a diaphragm replacement).
To use the laser pointer it is necessary to rotate the handle (6) (Pic. 2.2) 90 ° clockwise around horizontal axis. Now the laser pointer (5) will be directed downwards (Pic. 2.4.) what automatically turns it on and the heater off. To continue with the heater turn heater head back to its start up position.

Turn on/off an Upper heater can also be used if you need to stop heating a soldered object quickly without remove the heater from the work area *(**Please keep in mind the gap between board and heater**).*

For a diaphragm replacement use pliers or tweezers (3) (Pic. 2.2.). Pull a diaphragm fixing spring (4) toward from the heater housing holding it by tweeze or other tool, and remove diaphragm from slots 3.1. Then install a new diaphragm into the slots by pulling the spring (4), put it in the slots other diaphragm. Then release the spring to fix the diaphragm.

Puc. 2.4. Upper heater in a pointing position

Puc. 2.5. Upper heater in soldering position

7.4. The basic operating procedure for removing components (manual mode)

Initial state: the power is on; heaters are turned off and not hot; the upper heater is raised on a rack to a top position and is pulled out from a work area; the board prepared for soldering (racks mounted, flux applied, etc.).

Turn Upper heater on for preliminary heating using a switch on a controller side. (*For Preliminary temperature set up see Section #5 of NP-Series Multifunctional Pre-heater Manual)*

- Heat up Bottom pre-heater to required temperature (identified by operator and depends on PCB type and gap between PCB and heater plate. Recommended value 200...300°C).
- Before the process start up, a PCB has to be installed on racks at Bottom pre-heaters plate, Control Sensor istalled at proper place at PCB.
- Using laser pointer move an Upper heater in a position over a center of processed component and turn a head into working position. (Pic.2.4).
- Wait till processing board warm up to desired temperature monitored on controller display section refers to thermo- sensor. Then set up operating temperature of Upper heater (450 ... 650 ° C) and switch on; down a head to a working height (20 ... 40 mm over component surface (Pic. 2.5). A less distance - a bigger power of the infrared radiation per square unit, and a smaller shape of a heating area to a shape of a window in diaphragm).
- Wait for component joints melting, lift Upper heater into top position and remove component from a board using tweeze or vacuum pent (not included into delivery).
- Turn the heater off and remove Top heater from working zone. Start cooling process.

The above component Removing (De-soldering) procedure in manual mode should be considered only as a base for development of most effective and safe parameters for further production and repair particular type boards & components. The user can introduce any changes into process in accordance with his requirements to the process. The process development for a new components installation will be made by User himself based on his knowledge and experience.

"Thermpro-Center" software provides User with ability to manage and control soldering and de-soldering processes in automatic mode and in accordance with selected Thermo-profile. For more detailed introduction with automotive mode we highly recommend to study Manual for "ThermoPro-Center" Software.

7.5 The basic operating procedure for component installation

For more detailed recommendations and advises please refer to a link
http://www.termoprocenter.com/files/IK-650/Complex_IK-650_practical_questions.pdf

7.6 The process of work completion.

- Close the "Thermopro Center" program *(if it has been used)*
- Turn both controllers off.

8. Maintenance

A minimum proper amount of flux is recommended to use in soldering process. This reduces a volume of condensation of bured off soldering materials residues at equipment surfaces. **An exhaust ventilation is highly recommended.** Mechanical moving parts are a subject of normal wear-off resulting eventually in increased backlash and other mechanical mismatchess. Parts displacements can also take place. To prolong equipment working life we highly recommend carrying out a regular preventive maintenance.

Maintenance should be held when it is necessary depending on the intensity of use, but not less than once every six months. First of all dust should be carefully remove with cotton fabric from all accessible surfaces. Wear debris on moving parts should be also removed If necessary with pure petrol or light solvent analogue moisten the cloth.

ATTENTION !!! *In IKV 65 models of the top heater a special clamping device is used for the sensor installation (is not presented at Pic. 2.3). It is prohibited to wipe this device, temperature sensor and its contacts. Any touch to this part can disturb a temperature sensor factory adjustments and lead to loss of a claimed product performance. Such improper maintanence will terminate the guarantee service of the product as well.*

In a process of maintenance the lubrication has to be replaced or renewed in following joints and parts (Pic.2.1.):

- Pillar (2) surface and inner surface of carriage vertical movement mechanism (3) which are in a contact with pillar.
- Guide rod sides (2.1) in a place of contact with vertical carriage movement mechanism (3).
- Horizontal movement rolls and guide rails (7).
- Place of alignment of vertical movement wheels axels (4) with flat springs (6) (conical roll which provides a vertical movement and guide rod (2.1) are not recommended for lubrication).
- Threads of moving fixing nuts and wheels.

For lubrication of above surfaces an automotive lithium greases of light brands are recommended.

When the vertical movement carriage mechanism demonstrate a slip downit is important to make sure that there is no grease on the conical surface of the metal roller and in contact between roller surface of the guide rod (2.1). If necessary, slightly tighten the flat springs (6) fixing roller axis to the carriage. The flat spring (6) is located on the front plane of the carriage (3). The tightening is carried out by four screws (two on each spring). The screws should be uniformly rotated in a clockwise direction, each at the same angle (about 45 degrees at a time). Proper tighten ensures smooth movement of the carriage (3) on the pillar 2 without jamming and slippage.

9. Terms of the warranty limitation

The Manufacturer reserves the right to introduce any changes into design, working scheme, internal program of the Controller and software, supplied with equipment, any time and without preliminary notification. The present Manual also can be changed any time without preliminary notification.

The manufacturer is committed to the toll-free repair or replacement of hardware components **within 12 months**, subject to the user's manual of recommendations set forth herein. Possibility of warranty repair service is determined by an authorized local service company or by the manufacturer after the examination (inspection) equipment.

For repairs contact the organization at the place of purchase of you system. Repair after warranty period is over possible for an extra fee. The cost of repair is determined by an authorized local service company or the manufacturer after an examination of faults.

The Manufacturer does not provide Warranty services either obvious or undermine if these are not presented and listed into the Clause. Any undermine warranties are limited by the present warranty by Law.

Within Warranty period:

The Manufacturer provides free repair or replacement of the defective product (products) with similar product without defects within a limited warranty period. If the product is no longer available it will be replaced with a similar type one. If a defect in material or workmanship is found within the limited warranty period these will be replace with the same but with no defects.

The warranty period starts from the date of first customer purchase. Evidence of the date of purchase is a waybill or transport company consignment note with date delivery to the first customer. Also, the reference period of the guarantee may start from the date specified in the warranty card Manufacturer provides with a product serial number, signature and seal of the trading organization on the card.

If a Buyer can not submit an above mentioned documents the warranty period begins on the date of product acceptance by Manufacturer Quality control department. Date of acceptance is determined by the serial number of the product. This limited warranty is not extend for any product with no serial number. Warranty repairs are carried out on a Manufacturer territory, and any transport costs borne by the Buyer. The warranty period is extended for a period of the product repair. Extending the guarantee does not apply to a time of return shipment of the product to a place of repair.

The Buyer has to cover the costs of materials and repair job if a warranty service work is carried out when warranty period is over.

Manufacturer warranty within the warranty period in applied at:

- Materials used for manufacturing;
- Quality and precision of mechanical parts and its work;
- Assembly correctness and calibration of equipment.
- Stability in time of declared technical characteristics and functions.

Manufacturer Warranty does not cover following:

- Natural wear out and/or loss of materials and its parts.
- Gradual loss of electrical contacts due to high temperatures exposure in combination with corrosive vapors of materials used, and other external factors.
- Destruction of paint & electroplating due to corrosion, high temperatures exposure and corrosive vapors used in Buyer working process as well as other external factors.
- Violations of the present manual recommendations by User during equipment operation.
- Mechanical or other damages to the product due to User's negligence.
- Unauthorized changes of design or electrical schematic carried by User.
- Attempts of unauthorized repair.
- Improper and untimely maintenance.
- Damage to products due to improper transportation.
- Any damage caused by natural disasters, earthquakes, lightning, abnormal voltage or environmental influences.

All costs the Manufacturer carries for non-warranty repair and/or replacement are on a Buyer's side.

The Manufacturer does not hold warranty for the following materials and products:

- Perishable parts
- Lubricants
- Packing materials and manual itself
- Cables, connectors of other Manufacturers supplied in a set with equipment (these are covered by its Manufacturer Warranty).

10. Disposal

Disposal of old and replaced parts, spare parts and/or other equipment components as well as a whole devices should be carried out by the Buyer or an End User in accordance with the laws of a Country where it is supposed to be carried.

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