EN

INDUCTION HEATER SERIES

DHI-120-HD

Operating and Maintenance Manual, v. 3

DAWELL CZ
INDUSTRIAL HEATING TOOLS

CONTENT

INTRODUCTION

Dear customer, thank you for purchasing a product of DAWELL CZ s.r.o. We believe that you will be fully satisfied with our product and will choose us again in future. If you have any questions or comments, feel free to contact us via out web site or turn to your business representative.
Pursuant to this Manual, the first use of the equipment is the legal step whereby the use confirms with their free will that they have read this Manual properly, understood its meaning fully and are informed about all the risks.

CAUTION! Do not attempt to start (use) the equipment before you have read the whole Operating Manual. Keep the Manual for future use.

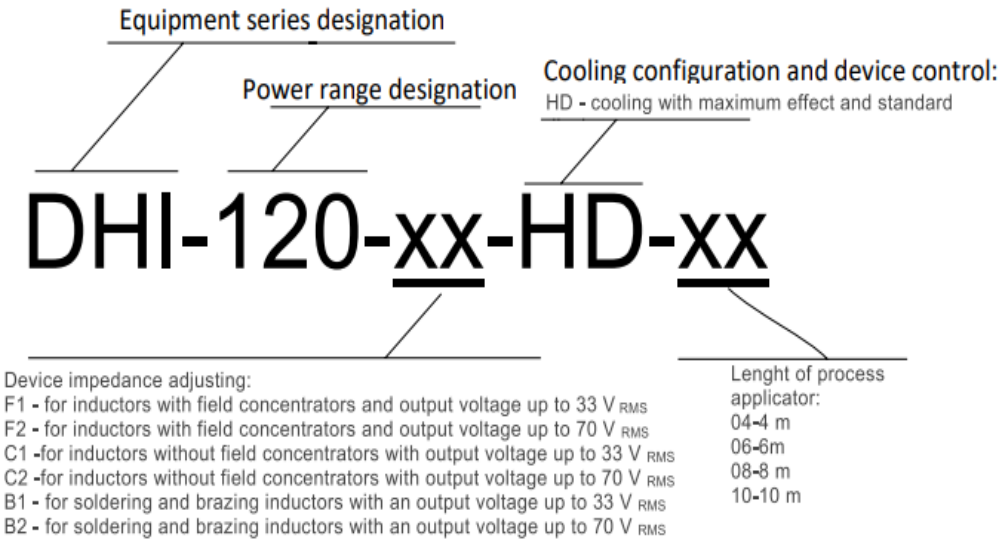
EQUIPMENT SPECIFICATION

Equipment with type designation **DHI-120-xx-HD-xx** is specified as:

- Portable electric equipment
- Protection class I electric equipment
- For class II dusty environments
- Equipment designated for industrial environments only

Equipment with type designation **DHI-120-x2-HD-xx** is specified as:

- Catefory of selected electrical equipment



SAFETY INSTRUCTIONS

3.1 GENERAL RULES FOR USING EQUIPMENT SERIES DHI-120-HD

Symbols shown in this Manual warn and identify potential hazards when handling the device.

- Do not leave series DHI-120-HD unattended while turned on. Always deactivate DHI-120-HD with the master switch when not using it for heating!
- Make sure that the power supply unit has sufficient air supply for cooling.
- Make sure that the ventilation openings are free of dust and dirt, to not preclude flow of cooling air.
- Do not attempt repairs of series DHI-120-HD on your own. The device contains no parts that the user could repair.
- The user is responsible for the system installation and use in accordance with instructions shown in this Manual. The supplier is not liable for any damage due to inexpert use and operation.
- **Equipment with type designation DHI-120-F1-HD, DHI-120-C1-HD, DHI-120-C2-HD may only be operated by persons over 15 years of age, properly trained and familiar with the Operating Manual.**
- **Devices with the type designation DHI-120-C2-HD may work only persons knowledgeable about the legislation Decree §6 of 50/1978 of the collection with a valid electrotechnical qualification, properly trained and familiar with the instructions for use and manual.**
- **The equipment must not be operated by persons with reduced decision-making ability and persons under the influence of drugs, alcohol or medication.**
- Keep persons standing around and animals at a safe distance while working with the device, including while the heated material is cooling down.
- Avoid working in rain, water and humid environments. Keep the working area well ventilated and dry, clean and well lit.

SYMBOL	EXPLANATIONS
	**DANGER!** Denotes a dangerous situation that will result in a serious injury or death. The potential risks are shown under the following symbols, or explained in the text.
	Before plugging in your DHI-120-HD, make sure the socket voltage matches that on the product plate. If the socket voltage does not match that shown on the type plate, it can result in a serious hazard and damage to your device.
	**Important!** Read this Manual carefully to gain information about the device features. Inappropriate handling may cause injuries to persons and damage to the device.
	**Please note: This equipment is not intended for use in residential environments and does not need to provide adequate protection of radio reception in such environments.**

3.2 INFORMATION SYMBOLS

The symbols shown below will guide you through this Manual and warn you of potential risks.
If you see a warning symbol, pay attention and follow the instructions shown below to avoid the dangers.
Read all the safety notifications and follow the instruction shown below.
You will find more safety instructions below.

SYMBOL	EXPLANATIONS
	Risk of death by electrocution.
	CAUTION! Hot surface! Danger of burns!
	CAUTION! Risk of electric shock!
	Risk of fire.
	Electromagnetic field risk.
	Do not operate with cardiac pacemakers, implanted devices and while wearing watches or other metal object.
	Always use! Safety goggles, surgical mask, face mask and protective gloves.

3.3 SYMBOLS INDICATING HEALTH RISKS

3.3.1	ELECTRIC SHOCK
	**CAUTION!** In equipment with type designation **DHI-120-C2-HD**, the connecting terminals and contact with accessible live parts of the heating inductor may produce life-threatening voltage. These types may only be operated by persons with valid electrical engineering qualifications or the operator has to ensure prevention of the risk of contact with these parts using an appropriate method (coverings, partitions, access restrictions) pursuant to ISO 14119 or ISO 14120. **Caution!** Never remove casing and do any activity with the induction heater unless you have first disconnected the plug from the socket. **Then wait at least 1-2 minutes after unplugging it.** **DO NOT WORK WITH THE DEVICE IN RAIN AND IN MOIST ENVIRONMENTS AND UNDER CONDITIONS WHERE COOLING OF THE HEATING INDUCTOR MAY CAUSE CONDENSATION OF EXPLOSIVE VAPOURS ON THE INDUCTOR INSULATION OR TERMINALS.** **Caution! Any interventions in the electric section may only be made by persons with adequate electrical engineering qualifications. There is a risk of electric shock during any unauthorised servicing.**

3.3.2 CAUTION!	HOT SURFACE
 	**CAUTION! Do not touch any objects located near the heating inductor unless you have checked that it has cooled down.** Do not touch the heating inductor if the heater is activated and a powerful dynamic magnetic field is active. **ALWAYS wear protective gloves or other protections when handling the device as there is a risk of burns. The protective equipment is specified below.**

3.3.3	RISK OF FIRE
 	**DO NOT OPERATE THE EQUIPMENT IN ENVIRONMENTS WITH AN EXPLOSION HAZARD!** Do not overheat parts. Do not heat materials above their melting temperature, as there is a risk of burns. Do not use the equipment near naked flame and inflammable substances. Keep inflammable substances outside the working area. Do not place the device on inflammable surfaces or near them. Do not use the device i fit is near pressuree cylinders or objects that may contain inflammable particles of dust, gas, vapour or liquids. After completion of work with the device, check the area to make sure there is no risk of sparks, flames or other ways of starting fire.

3.4 WARNING SYMBOLS FOR OPERATING THE EQUIPMENT

3.4.1	SAFETY EQUIPMENT WHEN WORKING WITH THE DEVICE
	Always wear safety goggles or face mask when using series DHI-120-HD.
	Use of series DHI-120-HD may produce dangerous waste gases from burning of old paints, lubricants, sealants, glues etc. These exhausts may be toxic. Always use adequate protective masks or respirators.
	Always use protective gloves with adequate resistance when working with the device. The high temperatures produced by using series DHI-120-HD may cause serious burns on contact with the heated part.

3.4.2	ELECTROMAGNETIC EFFECTS
	The electromagnetic field (EMF) may affect implanted medical devices. The device is not intended to be used by users of cardiac pacemakers or other implanted devices. When working with the device, observe a safety distance from the heating inductor, which is specified in its Instruction Manual. Short-term exposure of tissue to temporally variable magnetic fields of high intensity may lead to tissue heating due to induced currents. Long-term exposure to temporally variable magnetic fields of high intensity may lead to: - undesirable effects on nerve function, - fatigue, - headache, - blood formation disorders.
  	Persons with other metallic or electronic surgical implants are not allowed to work with series DHI-120-HD and have to keep a safe distance of at least 5 m from the device. When working with the DHI-120-HD, do not wear any metal objects such as jewels, rings, watches, necklaces, identification plates, belt buckles, piercing or clothes with metal components such as metal rivets, buttons, zip fasteners, etc. The device can heat these metal objects very fast and thus cause serious burns or even ignition of clothes. **! Persons with these devices should immediately consult their doctor to avoid potential troubles connected with them while handling series DHI-120-HD.**

3.4.3	Mechanical hazards
	**Tripping hazard** – while working with series DHI-120-HD, take care not to trip over the freely laid extender hose of the process applicator.
	**Risk of unintended movement on an incline –** Equipment series DHI-120-HD has a travel mechanism with a brake. When operating the device on an incline, always make sure that the travel wheel brakes are engaged.
	**Equipment falling risk –** Do not operate the device on inclines steeper than 15°. Unstable device position may lead to injuries or damage to the equipment or other property damage as a consequence of the device falling.

PERIODIC INSPECTION AND MAINTENANCE

Scheduling device maintenance has to consider the degree and circumstances of device use. Considerate use and preventive maintenance help prevent needless defects and malfunctions. Perform checks as per standards and law in force. **Only workers with adequate electrical engineering qualifications** may carry out any jobs on the device.

Warning! Any handling of the power supply, including maintenance, requires device disconnection from the power grid. To prevent injuries, always disconnect the power cable from the grid and wait at least 2 minutes before removing the casing. Discharge the capacitor circuits before any further work.

Periodic maintenance includes cleaning the device every half a year:

1. Disconnect the device plug from the power grid and wait at least 2 minutes (the capacitors inside the device will discharge). Then remove the upper device casing.
2. Clean all dirty electric connections and tighten any loose ones with an adequate tool.
3. Clean the internal device parts (coolers in particular) to remove dust and dirt – for example using a soft brush and vacuum cleaner.
4. All coverings have to be grounded. Before attaching any covering, remember to connect the green-and-yellow grounding wires using respective connectors.
5. After maintenance, carry out safety measurements as per standards in force.

Note: Never use solvents or thinners (e.g., acetone), because they may damage insulation, plastic parts or lettering on the front panel!!

STORAGE

Equipment series DHI-120-HD has to be stored in a clean and dry room. Protect the device from rain, direct sunshine and frost. After heating completion, leave the device switched on for 10 more minutes - it will be cooled down by fans until it is cold, then it deactivates the fans. After that, turn it off using the master switch and disconnect it from the power line.
If you disconnect the device immediately, leave it and all the working coils to cool down for at least 15 minutes.

WARRANTY PROVISION

1. Unless otherwise specified, the warranty period for devices is set by the manufacturer at 12 months from the date of sale to the buyer. A warranty period of 6 months applies to the induction burner. A warranty period of 3 months applies to consumable parts such as attachments, coils etc.
2. When making a claim for warranty repair, the warranty certificate has to be shown; it is only valid if it bears the date of sale, serial number, stamp of the shop and the seller's signature, confirming proper demonstration and explanation of the device features.
3. The warranty period will be extended by the time for which the device is in warranty repair. If the repair finds no defects falling under the warranty, the device owner shall pay the costs of the servicing technician's work.
4. The warranty servicing covers defects occurring during the warranty period demonstrably due to flawed design, flawed workmanship or inappropriate material. Such defects will be repaired by the manufacturer free of charge. Complaints shall be made by the user with the device manufacturer; the place of performance is the manufacturer's registered office.
5. The warranty does not cover defects caused by inexpert handling, overloading, use of wrong accessories, or interventions by unauthorised persons, natural wear and tear, or damage during transport. Recognised defects exclude damage occurring due to inadequate care of neglected maintenance, non-adherence to rules specified in the Manual, using the device for purposes for which it is not intended, and overloading the device, albeit temporarily.
6. The warranty expires if the user makes any unpermitted modifications or changes to the device, connects the device wrongly, or has used the device in contravention of technical requirements.
7. The manufacturer is under no circumstances liable for subsequent damage caused by using the device. This warranty does not under any circumstances constitute the manufacturer's liability in excess of the price of the device.
8. Device maintenance and repairs have to use exclusively original parts supplied by the manufacturer in accordance with their Instructions for Use.

COMMISSIONING

7.1 UNPACKING AND FIRST START

1. Unpack the device and any accessories supplied and check that they are in good order and the device and the accessories are not damaged. If you find any defects, do not continue!
2. Let the device acclimatise for 15 minutes.
3. Check that the heating inductor is fastened to the handle sufficient with all the screws.
4. Connect the device to a 3x 400 V socket and turn it on using the switch at the front of the device.
5. The cooling circuit venting is activated automatically, and the letters "FIL" flash on the display during this. The coolant level may decrease noticeably during the filling.
6. When the venting is completed, check the coolant level. If the coolant level decreases below the minimum limit during the venting, do not continue working. In that case, have the coolant refilled by an authorised servicing technician trained by the manufacturer and with valid electrical engineering qualifications. If the coolant level is within the limits after the cooling circuit venting, the device series DHI-120-HD is ready for use.

7.2 COOLANT REFILLING

Check the coolant level before each device start.
The device has integrated coolant flow rate inspection. In case the coolant runs out, the device stops heating and displays an error message. In that case, have the coolant refilled by an authorised servicing technician trained by the manufacturer and with valid electrical engineering qualifications.

REPLACEABLE HEATING INDUCTOR ATTACHMENTS

The induction heater equipment series DHI-120-HD comes with a basic heating focus inductor. The other accessories are listed in the chapter *Spare parts and consumables*.

Correct and safe device functioning requires exclusive use of original heating inductors, attachments, reducers and other accessories in accordance with their Instructions for Use.

The lifetime of different types of heating inductors and accessories is specified in their Instruction Manuals along with inspection and maintenance intervals.

8.1 REPLACING A HEATING INDUCTOR ATTACHMENT

1. Deactivate the device using the switch on the front side of the device.
2. Grip the handle so that it is vertical with the attachment upwards, at least 20 cm above the top edge of the power supply unit. Maintain that position throughout the replacement procedure.
3. Unscrew the heating inductor attachment using a suitable tool.
4. Make sure the threads and contact surfaces of the handle and the attachment are clean and without signs of corrosion.
5. Screw on the new completely attachment using respective original fasteners to produce a permanent connection of the attachment contact surfaces.
6. Switch on the device, first vent the cooling circuit and check the coolant level.
7. Make a visual check of the tightness of the attachment-handle connection and any other connections of the new attachment. If coolant is leaking, it is no longer possible to use the device safely.
8. Check the connection conductivity by briefly activating the device without the heating inductor load.

- If the device display shows an output power, everything is in order.
- If it shows the message “A.Fr”, the contact of the contact surfaces is not correct. In that case, it is no longer possible to use the device safely.

ABOUT THE DEVICE AND HEATING

9.1 SUPPORTED TECHNOLOGIES

DHCS3 – DAWELL Heating Control System 3
Technology developed by DAWELL CZ enabling controlled heating with multiple-pass real-time control of various parameters, which is the heart of the device features. The heating can thus be controlled in various modes, increasing its applicability and versatility. It can be used in grids with poorer switchgear, where it does not cause power failures etc.

BIPT – Boost Induction Power Technology
Enables increasing output power for better and faster material heating. This technology finds application primarily in open coils and heating various types of material.

DIPA – Dynamic Induction Power Adjust
Automatic optimum setting of required power for achieving max. efficiency, speed and long-term heating in dependence on other heating parameters.

QCT – Quiet Cooling Technology
An adaptive mode optimising cooling for quiet operation or maximum power output.

URC – Universal Remote Control
Support to universal remote device control, both analog and digital, or using a data bus, enabling easy integration into production processes.

ACMS – Automatic Check And Monitor System
Combines features that check and verify device functionality and condition after activation, and a feature that constantly supervises and monitors the heating running and parameters for maximum device safety and reliability.

DFU – Device Firmware Update
Enables updating the firmware.

HEATING MODES AND THEIR APPLICATION

The heater has two heating modes available:

1. Power control mode based on heating inductor magnetic field intensity (CF)

In this mode, the induction heater maintains the same intensity of the magnetic field regardless of the coil surrounding conditions. The heater behaves similarly to a gas burner, where the set field intensity matches the flame power. The amount of induced heat is then easily controlled by moving the heating inductor nearer or further from the material, similarly to flame heating. The advantage is easy control over the induced heat as needed and, most importantly, gentle and sensitive heating, e.g., in car repair.
Another advantage is that moving the heating inductor away does not increase the power output and resulting needless device overheating, and increases the maximum continuous heating time.
Advantages:

- Power control by moving nearer or further.
- Gentle heating.
- Lower loss in heating, particularly for open coils or when moving focus coil away from material.

2. Controlled power mode (CP)

In this mode, the device tries to deliver and maintain the set amount of transmitted energy to the material. The advantage is thus the controlled amount of heat introduced to the material, which combined with timing enables relatively accurate heating to a set temperature, e.g., for repeated pre-heating in production etc.
The disadvantage of this mode that when moved further from the material, the device significantly increases the power output to maintain the energy delivery level to the material, thus increasing the loss and resulting in increasing lost power, which may in turn lead to faster device overheating. The device efficiency is reduced as well.

Advantages:

- The device automatically maintains the set amount of energy transmitted to the material, thus heating the material accurately.

Drawbacks:

- The disadvantage is the great increase in the reactive induction power when moved away from the material or with inappropriately chosen coil, resulting in high heating power circuit load and quick temperature increase, reducing in turn the load factor and possibly overheating the device.
- The device efficiency is reduced.

3. Program mode (PRG)

This mode enables power setting depending on time as per the material process requirements. It finds application notably in controlled heating and cooling of materials, soldering, repeated heating to a target temperature etc.

CONTROLLED HEATING

Using the heating timer

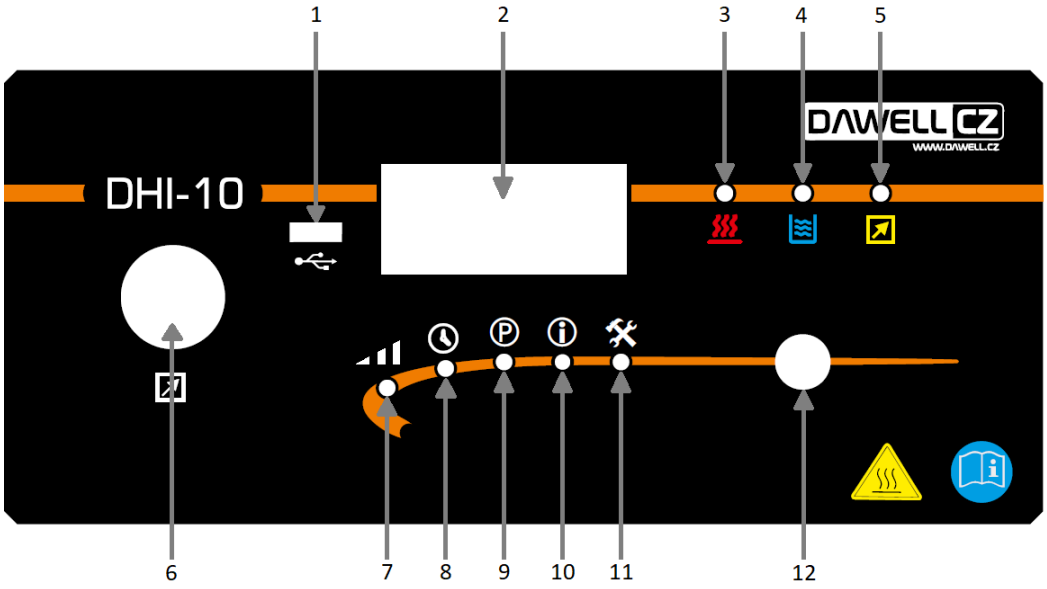
The device has an integrated heating timer for easy setting of desired heating time, which combined with the controlled power mode enables relatively accurate and repeatable heating with controlled generated thermal energy, i.e., heating to a set temperature.

DESCRIPTION OF DEVICE COMPONENTS

Pos.	Description	Pos.	Description
1	Handle	**10**	Cooling holes
2	Induction burner cable	**11**	Coolant level gauge
3	Connector for remote control	**12**	Mains switch
4	Display	**13**	Front wheel brake
5	Encoder	**14**	Grid power cable
6	Storage area	**15**	LED light
7	Control cable	**16**	Induction burner bracket
8	Induction burner control button	**17**	Nameplate
9	Induction focus attachment	**18**	Plug 3x 400 V_{AC}

DEVICE CONTROLS IN "STANDARD" VERSION

13.1 DESCRIPTION OF DEVICE CONTROLS



Pos.	Description	Pos.	Description	Pos.	Description
1	USB connector	**5**	REMOTE indicator lamp	**9**	PROGRAM - Power setting indicator lamp
2	Display	**6**	Connector for remote control	**10**	INFO indicator lamp
3	Heating indicator lamp	**7**	Power control indicator lamp	**11**	SETTING indicator lamp
4	Cooling and overheating indicator lamp	**8**	TIMER indicator lamp / PROGRAM-Timer	**12**	Encoder

Heating indicator lamp

- Indicates heating status.

	Indicator lamp	Status
	Green	Heating in progress
	Yellow	Warning – limited heating output
	Red	Heating error – overloading
	Red, flashing	Heating error – wrong coil

Cooling and overheating indicator lamp

	Indicator lamp	Status
	Green	Cooling in progress
	Green, flashing	Only water circuit active, venting
	Yellow	Warning – near overheating
	Red	Cooling error – no coolant or hose squeezed

REMOTE indicator lamp

	Indicator lamp	Status
●	Green	Remote control activated

13.2 ACTIVATING THE DEVICE

- Check the coolant level.
- Connect the device to a socket and turn it on using the switch on the front side of the device.
- The device auto diagnostic test (self-test) is initiated automatically and the cooling circuit is vented; the letters “FIL” flash on the display during this.
- If the device detects lack of coolant, it displays the error message E12. In that case, coolant needs refilling.
- If everything is in order, the device switches to standby.

13.3 STANDBY MODE

This is the initial device status, which allows turning the encoder to set the desired heating power, depending on the mode selected:

- Controlled power mode (CP), indicator lamp glows red ● – the user sets the desired heating power in % of maximum heating power and the device automatically adjusts the required parameters to maintain the set power.
- Controlled magnetic field mode (CF), indicator lamp glows green ● – the user sets the desired field intensity in % of maximum magnetic field intensity and the device maintains automatically.

The indicator lamp starts flashing during the heating and the display shows the current readings of power output in kW.
The desired heating mode can be set in the settings or switched by pressing and holding down the encoder – the display shows the corresponding mode name CP/CF and the indicator lamp changes colour. Press the encoder to move to further device parameter settings, such as the heating timer etc.
Note: If the power is controlled remotely, the letters “rc” are displayed for 3 sec when turning the encoder.

	Indicator lamp	Status
●	Red	Heating power setting in %, mode CP
✳	Red, flashing	Power reading in kW during the heating
●	Green	Magnetic field intensity setting in %, mode CF
✳	Green, flashing	Power reading in kW during the heating

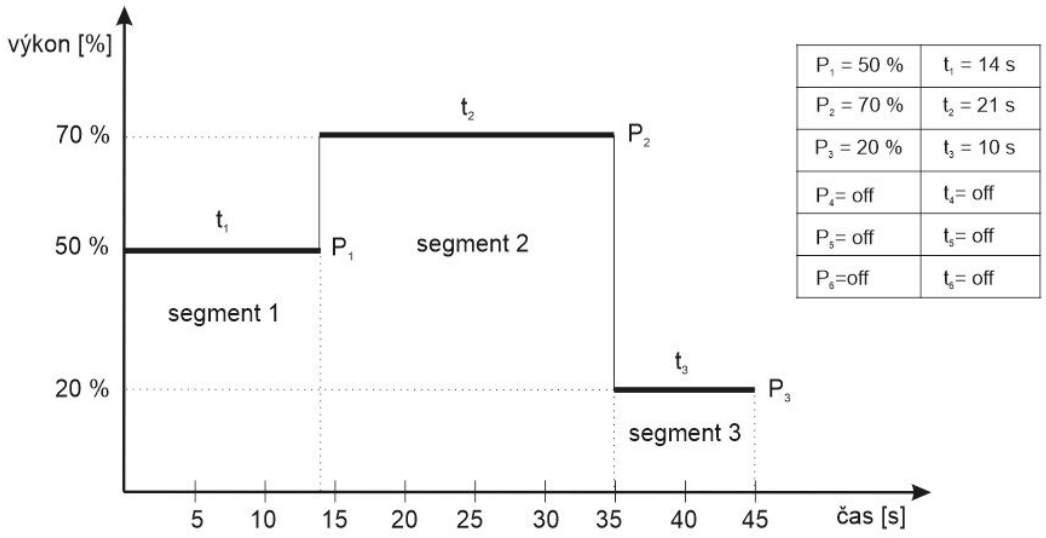
13.4 HEATING TIMER

The timer makes it possible to automatically stop heating after a set amount of time, enabling accurate dosing of energy (heat) transmitted to the material, e.g., for spot or repeated heating to a set temperature.
Press the encoder repeatedly until the TIMER indicator lamp glows red ●. Turn to set the desired heating time in seconds or deactivate the timer by selecting “OFF”.
If the timer is set, then the indicator lamp glows green ● when the heating starts, and if the heating is stopped by the timer, the indicator lamp starts flashing green ✳ and the display shows the letters “OFF” once the button is pressed. Pressing the button stops the heating immediately. Note: If heating is started in the timer settings, the display will show the remaining heating time (remaining heating time countdown).
Note: Press the encoder to enter pre-heating/program settings (see following chapter). To exit to power settings immediately, press and hold down the encoder.

	Indicator lamp	Status
●	Red	Heating time settings
●	Green	Timer active – heating in progress
✳	Green, flashing	Timer has ended the heating

13.5 PROGRAM

Programs enable power setting depending on time as per the material process requirements. It finds application notably in controlled heating and cooling of materials, soldering, repeated heating to a target temperature etc. One program consists of max. 6 adjustable segments, each segment enabling setting of required heating power and time.



P_1 = 50 %	t_1 = 14 s
P_2 = 70 %	t_2 = 21 s
P_3 = 20 %	t_3 = 10 s
P_4= off	t_4= off
P_5= off	t_5= off
P_6=off	t_6= off

Up to 9 programs can be set in the mode (Pr. 1 – Pr. 9).

To switch the device to the Program mode, press the encoder with repeated long pushes and selected the PRG mode. Another way to switch the device to the Program mode is in the Settings (with the setting indicator lamp on), where turn the encoder to select the item “reG” and confirm the selection by pressing the encoder. Turn the encoder to select “PRG”. Confirm selection of PRG mode by pressing the encoder.

1. Power control – program selection
   The power control indicator lamp is on. Turn the encoder to the right or left to choose program 1-9. Press the encoder to go to settings for the first segment of the selected program and then go to step 2.

2. Time – the time value is 1-600 seconds.
   The timer indicator lamp is on. Turn the encoder to the right or left to set the required time value. Press the encoder to confirm the selected time and go to step 3.

3. Power Ⓟ - the power value is shown in percent, min. 100%.
   The program indicator lamp is on. Turn the encoder to the right or left to set the required power value. Press the encoder to confirm the selected power and go to step no. 4.

4. Info ⓘ - choose to set another segment or leave the program settings.
   The INFO indicator lamp is on if the screen displays “SE. 2” and the second segment has been active and there are values that can be changed. If the screen displays “end”, the second segment has not been set before.
   Turn the encoder to “SE.2” to continue settings of the second segment and press to confirm, then repeat the whole procedure from step 2 to set the second segment.
   Press the encoder to select “end” to finish the settings. The other segments are inactive now.

The program settings are complete and the screen displays “- - -”; press the encoder to confirm and go back to step 1.

If the lock (“LCK”) is active, you cannot change program settings, only select a program.
To exit to program selection immediately, press and hold down the encoder.

13.6 INFO

Info enables display of basic information about the heating process and the device. It thus facilitates selection or optimisation of induction coils for the material to be heated, removal of any problems etc.

If you wish to display Info, press the encoder repeatedly until the indicator lamp ⓘ glows red 🔴. Turn the encoder to select the parameter to display and press to confirm. The display shows the latest reading (indicator lamp glows green 🟢), or shows the current reading during the heating (indicator lamp flashes green 🟢).

Press again to return to parameter selection, and you can select another one. If you wish to exit the Info display and continue to further settings, select “---” in the parameters and press to confirm. To exit to power settings immediately, press and hold down the encoder.

Indicator lamp		Status
🔴	Red	parameter selection
🟢	Green	latest reading
🟢	Green, flashing	current reading during the heating

The following parameters are available on this screen:

Description	Displayed	Unit
Return / exit	---	---
Power transmitted	P	kW
Output power	Po	kVA
Power factor	PF	1 %
Frequency	FrE	kHz
Input current	IC	A
Output current	OC	A
Inverter voltage	VOL	Vdc
Cooling temperature	tEP	°C
Pressure	PSr	kPa
Limitation	OL	--- = no limitation po = max. power transmitted ic = max. input current oc = max. output current dut = max. inverter duty tE = temperature
Errors	Err	Device error history

P – Input power

Specifies the current device input power in Watt, which approximately (deducting the loss power output) defines the output or energy transmitted to the material being heated. It is thus a parameter directly related to heating speed and temperature. The transmitted power increases with growing bond (decreasing gap) between the heating coil and the material.

Po – Output power

It is related to inverter output power and is specified in VA (volt-amperes). This is the apparent power. It is directly related with the intensity of the magnetic field generated by the heating inductor. When the bond between the induction coil and material decreases, or when heating less magnetic or non-ferrous metal materials, this output power has to increase in order to maintain the same amount of energy introduced to the material, increasing the loss in turn.

PF – Power Factor

This indicates the power factor of the heating induction output circuit and is directly related to the bond between the heating inductor and the material being heated, making this parameter very useful for selecting the optimal coil. The closer the number to 100 %, the higher the efficiency of energy transmission to the material, and vice versa.

Frequency „FrE“

The current heating frequency, which should be within 20-40 kHz with a correctly selected coil, depending on the load and the material being heated. If it deviates significantly, the device displays a warning, meaning that the user should use a more appropriate coil. If the frequency exceeds the limit values, the device turns itself off and reports an error.

Output current

Indicates the current delivered by the inverter to the resonance circuit in Amperes.

Input current

Specifies the phase current in Amperes currently consumed from the three-phase grid without the neutral conductor.

Inverter input voltage

The current voltage on the capacitor of the inverter input filter in Volts; it equals the grid voltage amplitude when used without a load.

Cooling temperature

Indicates the maximum temperature of device coolant in degrees Celsius.

Limitation

Indicates power or parameter limitation, if any, during the heating. For example, if the user sets the desired power to 10 kW using an inappropriate coil, the device will not only display a low power factor (PF), it will also indicate a duty-type limitation at the output, meaning that the inverter cannot deliver any more energy. Alternatively, if the user sets a current limit at the input to, say 10 A, the device reports that the power is limited by the input current. If heating proceeds correctly and in the optimum band, the device will always display “---”, meaning that the device is not limited by anything.

The heating is limited:

- “---” = no limitation, heating proceeds optimally
- “po” = by maximum device power
- “ic” = by maximum input current
- “oc” = by maximum inverter output current
- “dut” = by maximum inverter output voltage
- “tE” = by max. temperature

Errors

Shows a history of the latest errors that have occurred in the device. Turning the encoder clockwise shows the full error history progressively.

13.7 SETTINGS

Allows setting the heating parameters

Press the encoder repeatedly until the 🛠 indicator lamp glows red 🔴 (parameter selection). Then turn the encoder to select the parameter to display or set and press to confirm. The indicator lamp glows green 🟢 (value setting). Now you can turn the encoder to set the desired parameter value. Press the encoder to confirm the setting; this will return you to selection of another parameter, or select “---” to go to the next setting. To exit to power settings immediately, press and hold down the encoder.

The following parameters can be set:

Name	Displayed	Value
Return / exit	---	---
Lock	LCK	No Yes = screen is locked
Heating mode	REG	CF = constant magnetic field / current CP = constant heating power PRG = power based on program set
Remote control	rc	OFF PEd = on/off control, power set on device PEA = analog, current coil (0-5 V/10 V)
Limitation on input current	ic.L	4–16 A = limitation on maximum input current
Limitation on output apparent power	Po.L	Sets the maximum apparent power 2–12 kVA depending on the device model
Cooling setting	COL	Lo – silent cooling mode Std – standard cooling mode Hi– maximum cooling power mode
Water fill	FIL	No Yes = activates filling and venting
Factory settings	FAC	No Yes = Loads factory settings
Firmware	Fir	Displays firmware version

"LCK" – Locking

Enables locking in the modes:

- CP and CF = Heating timer setting, Info
- PRG = Program settings

"REG" Heating mode

Enables selection of desired heating mode – see Heating modes. The following options are available:

- CF = control based on desired magnetic field intensity
- CP = control to desired heating input power
- PRG = power control based on program set

"Po.L" Maximum output power

Allows you to select the maximum apparent inverter output power, which is convenient for small coils, limited by maximum power or current. This enables use of specialised, small or wire coils, which would otherwise overheat. The other advantage is the possibility of limiting the max. power to the minimum required, which in combination with the CP power control mode significantly reduces device overheating and increases the heating efficiency.

"COL" Cooling mode

By pressing of encoder controller it will be switched to the mode of setting the operating mode of the cooling circuit. By turning of the encoder you can select an option. Press the encoder to save the selected option and return to "Settings".

"ic.L" Inverter Input Current Limit

Enables limitation on current consumed from the grid, which enables trouble-free use of the device even in grids with weaker circuit breakers, e.g., in repairs, construction industry, workshops etc. The current value set corresponds to the circuit breaker in a three-phase system without a neutral conductor.

“FIL” Coolant filling and venting
Used for manual activation of venting and coolant filling.

“RC” Remote control
Remote device control settings. The following options are available:

- PEd - pedal = heating is activated by stepping on a pedal, with power set on the device.
- PEA - analog pedal = heating is activated and power adjusted by a pedal, or heating activation and deactivation is controlled by analog signal 0-5V, or 0-10V or a current coil 20 mA.

FAC “Factory setting”
Reverts to factory settings.

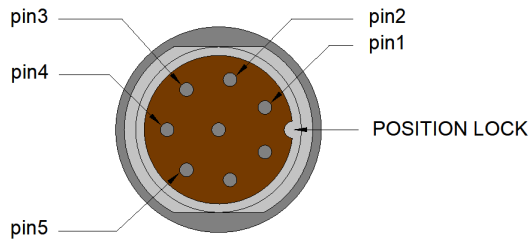
Firmware
Displays the current device firmware version.

13.8 CONNECTOR FOR ACCESSORIES

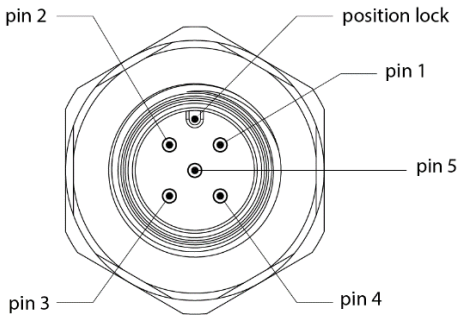
The connector serves exclusively connection of original accessories.
Caution – The circuits are not galvanic ally separated from the secondary circuits of the DHI-120-HD, meaning connection of a master system requires original galvanic ally insulated transducers pursuant to IEC 60071-1 or IEC 60664-1! The device supplier may terminate the warranty if the device is damaged due to connection of non-original accessories or inexpert or incorrect connection.

Connector DWBUS 1.0:

Typ: MIC338



Typ: 12-05PMMS

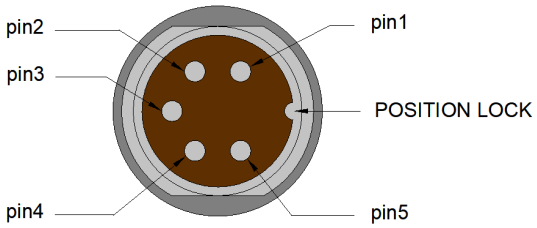


Wiring connector DWBUS 1.0:

Pin	Identification	Function
1	GND	GND
2	ON/Analog	Input
3	OK/RS485B	Input / output
4	HEAT/485A	Input / output
5	VOUT	Power supply

Connector DWBUS 2.0:

Typ: MIC335



Wiring connector DWBUS 2.0:

Pin	Identificaton	Function
1	GND	POWER
2	DWBUS_H	Input / output
3	DWBUS_L	Input / output
4	12 V	POWER
5	-	RESERVE

LIST OF ERROR MESSAGES

Error code	Error description	Possible causes
E1[3]	Grid undervoltage	An error as a consequence of connection to a grid with a lower nominal voltage or connection via a parametrically inadmissible extension cable or failure of a phase.
E2[3]	Grid overvoltage	An error as a consequence of connection to a grid with a higher nominal voltage.
E3[1]	Input overcurrent	An error as a consequence of short-term overload.
E4[1], E5[1]	Output overcurrent	An error as a consequence of connection of a non-original heating inductor, short circuit on the inductor as a consequence of damaged insulation or unexpected change in the nature of work.
E6[1]	Overload	An error as a consequence of unexpected change in the nature of work.
E7[1], E8[1]	Frequency – min/max	An error as a consequence of connection of a non-original heating inductor with an inductance outside the device operating range or failure of internal metering circuits.
E9[1], E10[1], E11[1]	Resonance circuit and frequency control error	An error as a consequence of connection of a non-original heating inductor or short circuit on the inductor as a consequence of damaged insulation.
E12[1]	Out of coolant	An error as a consequence of leakage or long-term neglect of checking coolant level.
E13[1]	Hose squeezed or clogged	An error as a consequence of excessive bending strain of the process applicator extension hose, use of non-original coolant or neglected maintenance.
E14[2] – E18[2]	Device overheating	An error as a consequence of non-compliance with environmental requirements, restriction to air flow rate by incorrect location or clogging of cooling exchangers with dust or due to long-term device overloading.
E20-E256	Device servicing errors	Device hardware errors.

[1] - error resettable by the user by pressing:

a) induction burner control button
b) encoder (STANDARD version)
c) buttons + or – (EASY DISPLAY version)

[2] – error reset automatically once device cools down

[3] – error reset automatically once the grid parameters enter the required limits for correct device functioning

TECHNICAL PARAMETERS

Model	DHI-120-F1-HD-04	DHI-120-F1-HD-06	DHI-120-F1-HD-08	DHI-120-F1-HD-10
Power supply requirements	3 x 415 V + 15/-20 %	3 x 415 V + 15/-20 %	3 x 415 V + 15/-20 %	3 x 415 V + 15/-20 %
Frequency	50/60 Hz	50/60 Hz	50/60 Hz	50/60 Hz
Consumption	3 x 16 A	3 x 16 A	3 x 16 A	3 x 16 A
Protective system	IP21	IP21	IP21	IP21
Operating frequency	18-35 kHz	18-35 kHz	18-35 kHz	18-35 kHz
Applicator length	4 m	6 m	8 m	10 m
Input power	10 kW	10 kW	10 kW	10 kW
Apparent output power	14 kVA	14 kVA	14 kVA	14 kVA
Heating inductor voltage	< 33 V_{RMS}	< 33 V_{RMS}	< 33 V_{RMS}	< 33 V_{RMS}
Dimensions (w x h x d)	400x760x700 mm	400x760x700 mm	400x760x700 mm	400x760x700 mm
Weight	63.2 kg	64.3 kg	65.4 kg	66.5 kg
Coolant capacity	10 l	10 l	10 l	10 l

Model	DHI-120-C1-HD-04	DHI-120-C1-HD-06	DHI-120-C1-HD-08	DHI-120-C1-HD-10
Power supply requirements	3 x 415 V + 15/-20 %	3 x 415 V + 15/-20 %	3 x 415 V + 15/-20 %	3 x 415 V + 15/-20 %
Frequency	50/60 Hz	50/60 Hz	50/60 Hz	50/60 Hz
Consumption	3 x 16 A	3 x 16 A	3 x 16 A	3 x 16 A
Protective system	IP21	IP21	IP21	IP21
Operating frequency	18-35 kHz	18-35 kHz	18-35 kHz	18-35 kHz
Applicator length	4 m	6 m	8 m	10 m
Input power	10 kW	10 kW	10 kW	10 kW
Apparent output power	14 kVA	14 kVA	14 kVA	14 kVA
Heating inductor voltage	< 33 V_{RMS}	< 33 V_{RMS}	< 33 V_{RMS}	< 33 V_{RMS}
Dimensions (w x h x d)	400x760x700 mm	400x760x700 mm	400x760x700 mm	400x760x700 mm
Weight	63.5 kg	64.6 kg	65.7 kg	66.8 kg
Coolant capacity	10 l	10 l	10 l	10 l

Model	DHI-120-B1-HD-04	DHI-120-B1-HD-06	DHI-120-B1-HD-08	DHI-120-B1-HD-10
Power supply requirements	3 x 415 V + 15/-20 %	3 x 415 V + 15/-20 %	3 x 415 V + 15/-20 %	3 x 415 V + 15/-20 %
Frequency	50/60 Hz	50/60 Hz	50/60 Hz	50/60 Hz
Consumption	3 x 16 A	3 x 16 A	3 x 16 A	3 x 16 A
Protective system	IP21	IP21	IP21	IP21
Operating frequency	18-35 kHz	18-35 kHz	18-35 kHz	18-35 kHz
Applicator length	4 m	6 m	8 m	10 m
Input power	10 kW	10 kW	10 kW	10 kW
Apparent output power	14 kVA	14 kVA	14 kVA	14 kVA
Heating inductor voltage	< 33 V_{RMS}	< 33 V_{RMS}	< 33 V_{RMS}	< 33 V_{RMS}
Dimensions (w x h x d)	400x760x700 mm	400x760x700 mm	400x760x700 mm	400x760x700 mm
Weight	63.2 kg	64.3 kg	65.4 kg	66.5 kg
Coolant capacity	10 l	10 l	10 l	10 l

Model	DHI-120-F2-HD-04	DHI-120-F2-HD-06	DHI-120-F2-HD-08	DHI-120-F2-HD-10
Power supply requirements	3 x 415 V + 15/-20 %	3 x 415 V + 15/-20 %	3 x 415 V + 15/-20 %	3 x 415 V + 15/-20 %
Frequency	50/60 Hz	50/60 Hz	50/60 Hz	50/60 Hz
Consumption	3 x 16 A	3 x 16 A	3 x 16 A	3 x 16 A
Protective system	IP21	IP21	IP21	IP21
Operating frequency	18-35 kHz	18-35 kHz	18-35 kHz	18-35 kHz
Applicator length	4 m	6 m	8 m	10 m
Input power	10 kW	10 kW	10 kW	10 kW
Apparent output power	14 kVA	14 kVA	14 kVA	14 kVA
Heating inductor voltage	≤ 70 V_{RMS}	≤ 70 V_{RMS}	≤ 70 V_{RMS}	≤ 70 V_{RMS}
Dimensions (w x h x d)	400x760x700 mm	400x760x700 mm	400x760x700 mm	400x760x700 mm
Weight	63.2 kg	64.3 kg	65.4 kg	66.5 kg
Coolant capacity	10 l	10 l	10 l	10 l

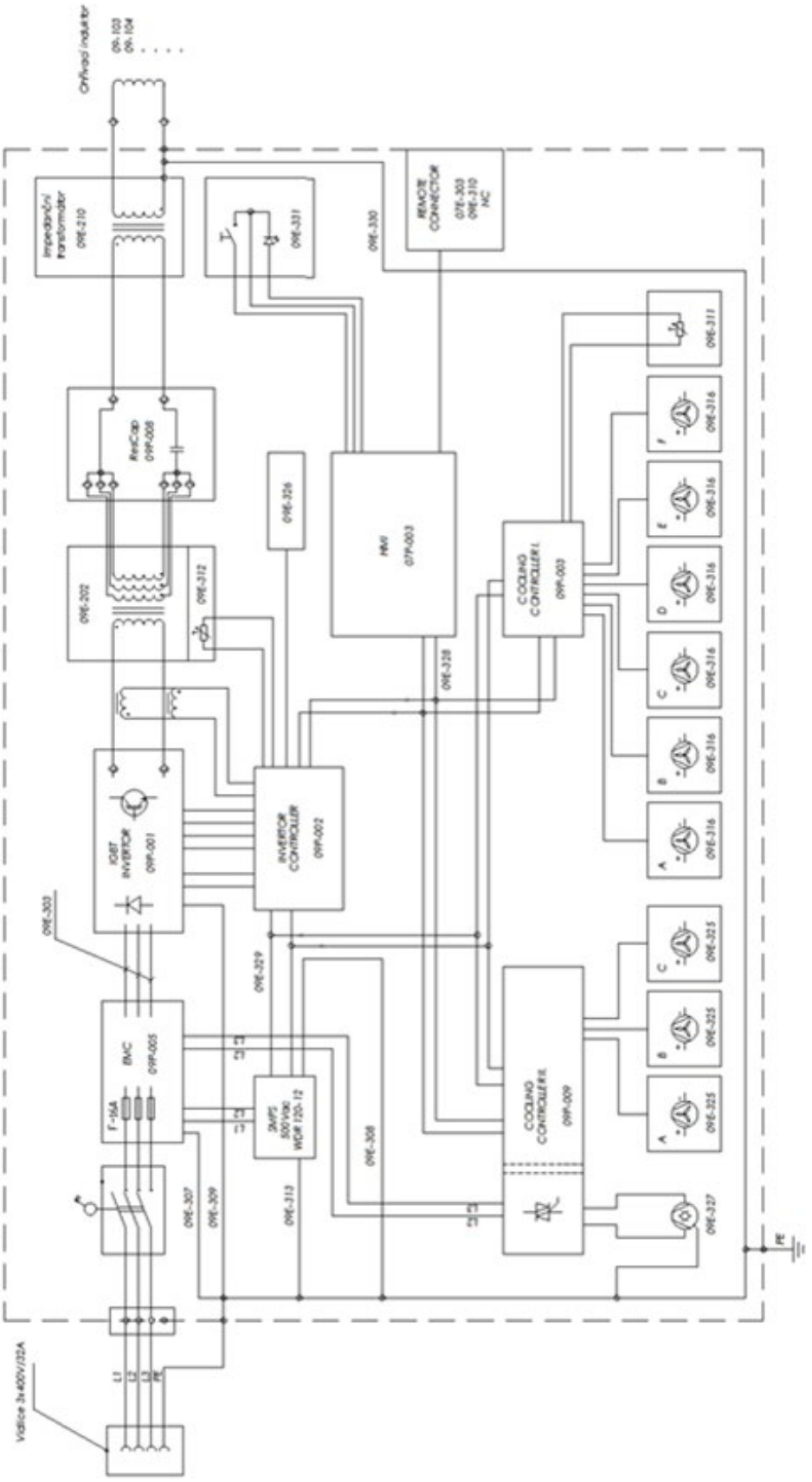
Model	DHI-120-C2-HD-04	DHI-120-C2-HD-06	DHI-120-C2-HD-08	DHI-120-C2-HD-10
Power supply requirements	3 x 415 V + 15/-20 %	3 x 415 V + 15/-20 %	3 x 415 V + 15/-20 %	3 x 415 V + 15/-20 %
Frequency	50/60 Hz	50/60 Hz	50/60 Hz	50/60 Hz
Consumption	3 x 16 A	3 x 16 A	3 x 16 A	3 x 16 A
Protective system	IP21	IP21	IP21	IP21
Operating frequency	18-35 kHz	18-35 kHz	18-35 kHz	18-35 kHz
Applicator length	4 m	6 m	8 m	10 m
Input power	10 kW	10 kW	10 kW	10 kW
Apparent output power	14 kVA	14 kVA	14 kVA	14 kVA
Heating inductor voltage	≤ 70 V_{RMS}	≤ 70 V_{RMS}	≤ 70 V_{RMS}	≤ 70 V_{RMS}
Dimensions (w x h x d)	400x760x700 mm	400x760x700 mm	400x760x700 mm	400x760x700 mm
Weight	63.2 kg	64.3 kg	65.4 kg	66.5 kg
Coolant capacity	10 l	10 l	10 l	10 l

Model	DHI-120-B2-HD-04	DHI-120-B2-HD-06	DHI-120-B2-HD-08	DHI-120-B2-HD-10
Power supply requirements	3 x 415 V + 15/-20 %	3 x 415 V + 15/-20 %	3 x 415 V + 15/-20 %	3 x 415 V + 15/-20 %
Frequency	50/60 Hz	50/60 Hz	50/60 Hz	50/60 Hz
Consumption	3 x 16 A	3 x 16 A	3 x 16 A	3 x 16 A
Protective system	IP21	IP21	IP21	IP21
Operating frequency	18-35 kHz	18-35 kHz	18-35 kHz	18-35 kHz
Applicator length	4 m	6 m	8 m	10 m
Input power	10 kW	10 kW	10 kW	10 kW
Apparent output power	14 kVA	14 kVA	14 kVA	14 kVA
Heating inductor voltage	≤ 70 V_{RMS}	≤ 70 V_{RMS}	≤ 70 V_{RMS}	≤ 70 V_{RMS}
Dimensions (w x h x d)	400x760x700 mm	400x760x700 mm	400x760x700 mm	400x760x700 mm
Weight	63.2 kg	64.3 kg	65.4 kg	66.5 kg
Coolant capacity	10 l	10 l	10 l	10 l

In terms of electromagnetic compatibility, the device is classified according to the ČSN EN 55011 standard as:

- "Class A equipment is equipment suitable for use in all locations except those belonging to residential environments and except those directly connected to the low-voltage electricity distribution network that supplies buildings used for residential purposes only."
- "Group 2 devices are devices in where high-frequency energy in the frequency range 9 kHz to 400 GHz is intentionally created and used."

DEVICE BLOCK DIAGRAM



USED DEVICE DISPOSAL

These devices are built using materials that contain no toxic substances or poisonous to the user. Dispose of the discarded device using a collection point intended for collection of used electric equipment. Do not dispose of the used device as ordinary waste.

The company is registered in the ASEKOL joint recollection system (under manufacturer reference number 04499/16-ECZ) and finances electrical waste management itself. This symbol on products and/or in product documentation means that used electric and electronic products must not be added to ordinary municipal waste.

SPARE PARTS AND CONSUMABLES

Code	Description
09-100-01	Round focus coils DHI-100 basic type
09-101-01	Profile U-shaped coil 15 mm diameter
09-102-01	Round focus coils
09-103-01	Round one-spiral coil 22 mm diameter
09-104-01	Round one-spiral coil 28 mm diameter
09-105-01	Round one-spiral coil 34 mm diameter
09-106-01	Round one-spiral coil 40 mm diameter
09-107-01	Round one-spiral coil 47 mm diameter
09-108-01	Round one-spiral coil 57 mm diameter
09-109-01	Round one-spiral coil 67 mm diameter
09-110-01	Round one-spiral coil 82 mm diameter
09-111-01	Round two-spiral coil 22 mm diameter
09-112-01	Round two-spiral coil 28 mm diameter
09-113-01	Round two-spiral coil 34 mm diameter
09-114-01	Round two-spiral coil 40 mm diameter
09-115-01	Profile U-shaped coil 14 mm diameter
09-116-01	Profile U-shaped coil 17 mm diameter
09-117-01	Focus coil 90° front
09-118-01	Profile U-shaped coil 12 mm diameter AKE
09-119-01	Focus coil 45°
09-120-01	Round focus coils 20 mm

The manufacturer reserves the right to specify additional accessories through a separate instruction manual supplied with the accessory.

Standards used

The following standards were used in the development and conformity assessment:

- ČSN EN 60519-1 ed. 4:2015
- ČSN EN 60519-3 ed. 2:2006
- ČSN EN 55011 ed. 4:2017
- ČSN EN 61000-6-4 ed. 2:2007
- ČSN EN IEC 61000-6-2 ed. 4:2019