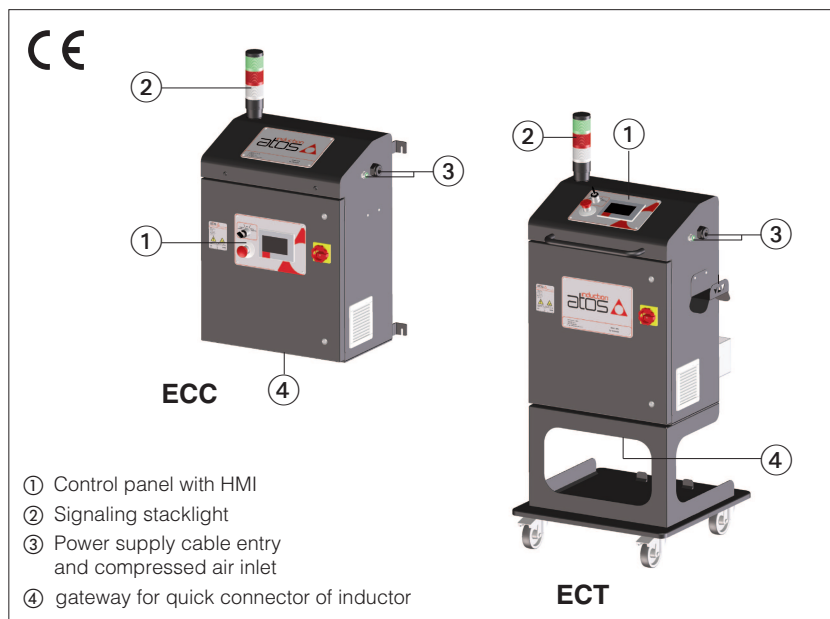


Electrical control systems ECT and ECC

for heating control of molds using planar inductors



ECT, ECC

Electrical control systems designed to power and control **MHP** planar inductors. The control systems are available in two versions: mobile (ECT) and fixed (ECC). These systems are used for preheating or heating of planar metal elements, such as molds for metals and rubber. They allow for faster, more precise, and efficient temperature control of the molds compared to traditional free flame burners, significantly reducing heating times and eliminating risks associated with the use of combustible gases in production facilities. Each system contains an EPG power generator for inductor power supply. Heating cycles can be performed according to the following integrated control logic:

- Timed control for rapid heating based on a predefined time interval
- Temperature-regulated control for precise closed-loop temperature regulation.

1 MODEL CODE

ECT	-	H	-	TC	-	T400VAC	-	T	20
Electrical command: ECC = Cabinet ECT = Trolley								Series number (2)	
Power up to 15 kW								Transmitter T = Transmitter installed in the EPG	
TC = Integrated thermocouple						Power supply (1) T400VAC for 380-400VAC - 50/60Hz 3-phase T460VAC for 440-460VAC - 50/60Hz 3-phase			

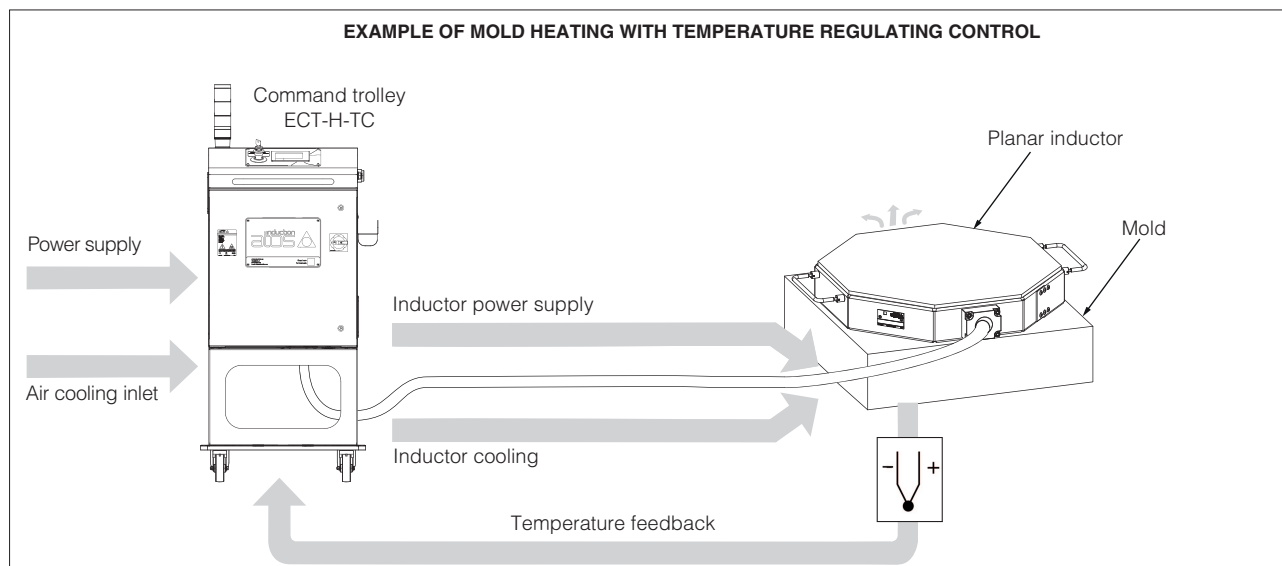
(1) For other voltage code, please contact Atos Induction technical office

(2) The new ECC and ECT 20 series are compatible exclusively with the MHP 20 series

Note: To transmit data from internal digital inverter EPG to a PC, the Radio/USB Converter ECD-RV and ECD-SW software are provided with, which are not included in control system; see AI110 technical table for details.

On the other hand, the software for monitoring and controlling the ECC and ECT with a PC is readily available through ethernet port via LAN.

2 FUNCTIONAL EXAMPLE



3 FUNCTIONAL DESCRIPTION

Through the integrated EPG generator, the electric control systems power the planar inductor with amplitude and frequency-modulated currents, generating magnetic fields capable of heating the ferromagnetic materials of the molds to be heated. The generator automatically adapts the current modulation to optimize the magnetic coupling between the heating element and the material to be heated. This feature maximizes the transmitted thermal power and reduces process times.

The electric control systems integrate the following temperature control logics:

Timed control

The timer enables the EPG generator for a predetermined time required to reach the desired temperature.

In this condition, the generator supply a constant power for the entire set time interval, at the end of which the heating process is automatically interrupted. The heating time is defined by the user according to the application's needs.

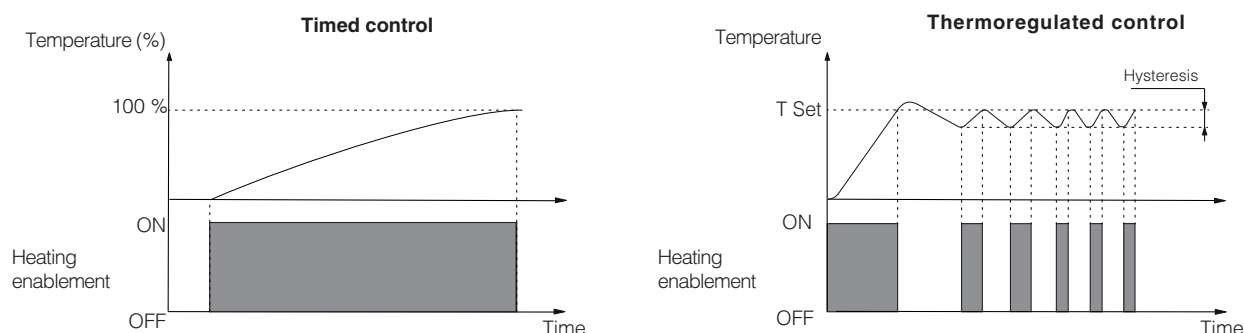
 To use the timed control is necessary to verify that, with the time set, the mold does not exceed the maximum allowable temperature of 350°C.

Thermoregulated control

The temperature is precisely regulated in closed loop by the temperature controller through ON/OFF modulation of the Enable signal sent to the EPG generator integrated in the control system. This control logic requires the installation of a sensor (type K thermocouple) to measure the actual temperature of the mold. The sensor output signal is sent to the temperature controller, which compares the value with the set reference temperature. The controller modulates the enable command to reach and maintain the set temperature according with an ON-OFF with hysteresis feedback logic. This control logic allows for high precision in reaching and maintaining the set temperature, cancelling out possible thermal drifts.

Hysteresis value can be selected by the customer in the 0.5 to 10°C range.

The following diagrams show the timed and temperature-controlled control logics.



Moreover both ECT/ECC allow for local or remote control:

Local Control

The system can work as a stand-alone workstation with its own controls and regulations already implemented inside.

Remote Control

The system can be remotely controlled by a PC connected in the same LAN with a dedicated software, exploiting all the functionalities offered by the machine.

ECC/ECT can also act as slaves in a TCP/IP network.

The two remote communication protocols are mutually exclusive, are selected with the local control panel and travel via the same Ethernet port.

4 GENERAL CHARACTERISTICS

Positioning	During the heating process, the control system must be located in a safe position, outside the buffer zone
Ambient temperature	0°C ÷ +40°C
Max mold temperature	350°C
Relative humidity	30% ÷ 60%
Inlet air pipe diameter	External diameter 12 mm - not supplied
Inlet air pressure	3 ÷ 8 bar
Protection degree [CEI EN 605229]	IP 54
Compliance	CE conformity, according to: EMC 2014/30/UE (EN 61000-6-2; EN 61000-6-4); Low voltage directive 2014/35/UE (EN 60519-1; EN 60519-3); Comply with Directive 2011/65/EU as amended (RoHS 2), including Delegated Directive (EU) 2015/863 and all subsequent delegated directives in force on the date of this statement REACH Regulation (EC) n°1907/2006

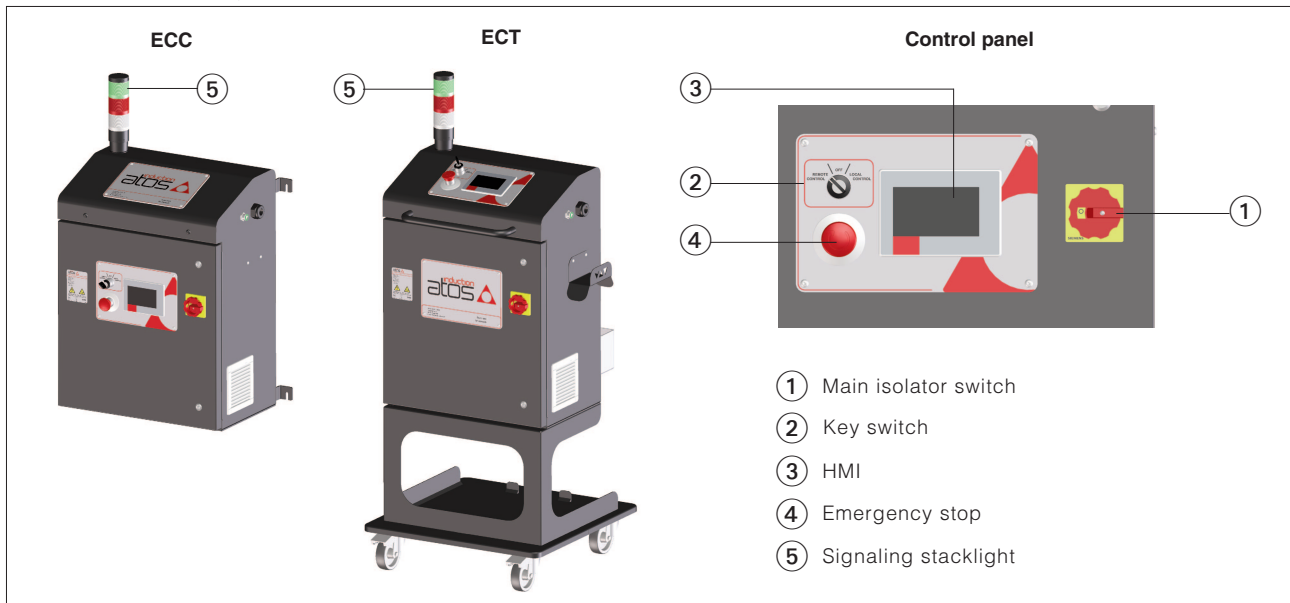
5 ELECTRICAL CHARACTERISTICS

Max power	[kW]	15
Power supply		400/460 VAC ± 10%, 50/60Hz
Max power	T400VAC [A]	22,8
consumption (+5%)	T460VAC [A]	19,8
Power factor (cos φ)	[Hz]	0,95
Output	Peak voltage [V]	1200
	Peak current [A]	100
	Frequency [kHz]	4 ÷ 15
Circuit control voltage		24 VDC
Power cable		FG16OR16 4X10 mm ² (three-phase + PE) - not included

6 CONTROL PANEL AND STOPLIGHT SIGNAL

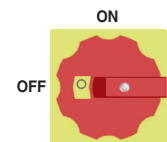
 General indications are provided below; please refer to the operation and maintenance manual for start-up

The control panel is equipped with buttons and indicator lights to control the heating process. The presence of a stoplight signals the operational status of the system.



Main isolator switch ①

The main switch allows the control system to be connected to the power supply.
Turn the switch **ON** to connect the system to the power supply.
Turn the switch **OFF** to disconnect the system from the power supply.
To open the front door of the trolley/cabinet, the main switch must be in the OFF position.



Key switch ②

The control system is equipped with a three-position selector switch that allows the operating mode to be chosen.

OFF: the heating process is disabled and no start command can be executed.

LOCAL CONTROL: all heating functions are managed directly from the control panel installed ECC or ECT.

REMOTE CONTROL: heating functions are enabled through an external control system or remote command interface.

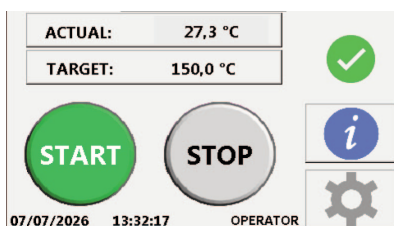


HMI ③

The HMI is the interface used to manage the system, allowing both the setting of operating parameters and the start/stop of the heating process.

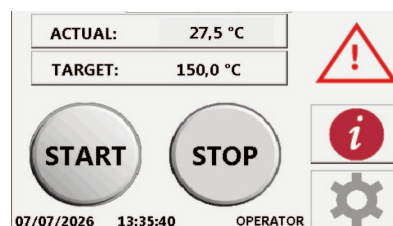
Ready Status:

When the system is properly connected and the generator is ready to start heating the inductor.



Fault Status:

In the event of thermal or inductor coupling anomalies, the system interrupts power and the fault can be viewed by touching the "i"



The same interface is presented onto the control panel display in "Local Control" or onto PC monitor in "Remote Control" operation.

Emergency stop ④

Red EMERGENCY STOP pushbutton, designed for immediate system shutdown, is placed onto the control panel. The system is also equipped with a port for additional EMERGENCY STOP to be remotely placed by the customer, if required. When activated, it disables the generator power circuits and interrupts energy delivery to the induction heating system, bringing the equipment to a safe state. System restart is only possible after manual reset and subsequent re-enablement.



Signaling stacklight ⑤

Green Light: steady: machine engaged in a heating cycle. The system may or may not deliver power depending on the operating conditions.
flashing: machine in scheduled start mode: less than 5 minutes left before heating starts.

Red Light: machine in Error state. It is not possible to start the heating.

White Light: steady: machine in stand-by in local control mode. No error present, ready for cycle start.
flashing: machine in stand-by in remote control mode. No error present, ready for cycle start.

7 INSTALLATION REQUIREMENTS

⚠ General indications are provided below; please refer to the operation and maintenance manual for start-up.

To move the control trolley, use the handle located on the front part of the trolley. Once positioned, lock the wheels using the brakes. The cabinet version should be fixed to the wall using suitable anchoring systems chosen according to the wall material. It must be properly leveled during installation to ensure correct operation of internal components and safe access for maintenance activities. The mass of the ECC is below 55 kg.

Note: to prevent possible damage during shipping, the electric command is delivered with the stoplight disassembled. Mount it before using the system.

7.1 Electrical Connections

To wire the control system, open the front door, insert the cables through the dedicated cable glands (located on the right side of the trolley or on the bottom of the panel) and connect the terminals to the corresponding terminals. See section 8 for connection specifications.

Thermocouple connection

Ensure that the thermocouple is securely positioned between the inductor and the surface of the mold so that it can measure the temperature in the contact zone between the inductor and the mold (just in thermoregulated mode). Use a type K thermocouple, and the use of armored type ensures greater wear resistance.

⚠ The system will give an error also if it is set in time-regulation mode and a thermocouple is sensed.

Connection of safety switch for a safety zone

If a safety zone with barrier is in place, the interlock switch (dry contact) can be directly connected with ECC/ECT port. When the switch is open the heating process is inhibited.

The presence or not of a safety zone control is an option that can be selected by the monitor.

The safety switch must be installed to prevent any accidental openings of the barrier, which delimits the safety zone, during the inductor power supply phases.

7.2 Compressed air connection

The ECT and ECC are equipped with an inlet for compressed air, necessary for the cooling of the planar inductor.

Connect the air hose to the side-mounted quick connector on the ECC or ECT control.

Ensure the air pressure and feeding tube specifications, as indicated in section 4.

⚠ The air flow is triggered by inductor internal temperature and it is independent by the state of the heating cycle.

⚠ After the heating, the MHP must be removed from the mold.

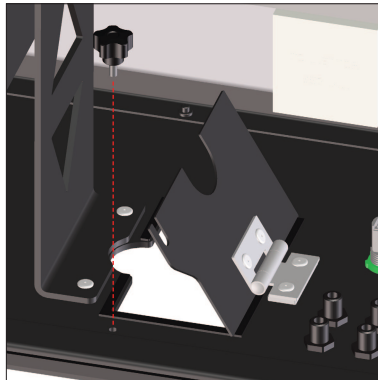
7.3 Connection of the MHP heating plate

To connect the heating plate, turn the general switch to the "OFF" position and open the front door.

Unscrew the locking knob on the MHP cable pass-through door.

Insert the MHP quick connector into the designated slot, ensuring both lateral retaining arms are securely locked.

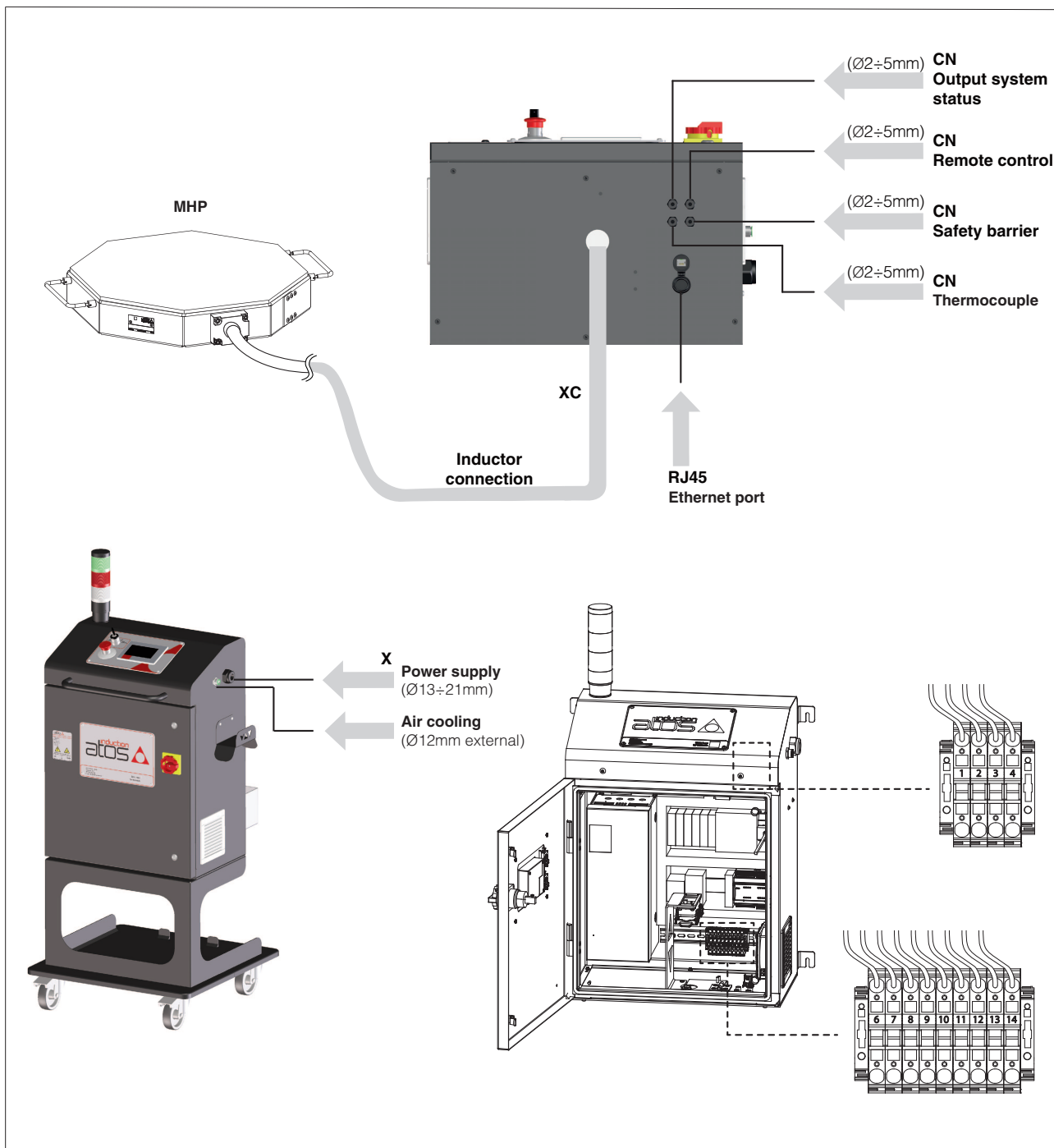
Close the MHP cable pass-through door and tighten the knob to lock it in place, and close the front door



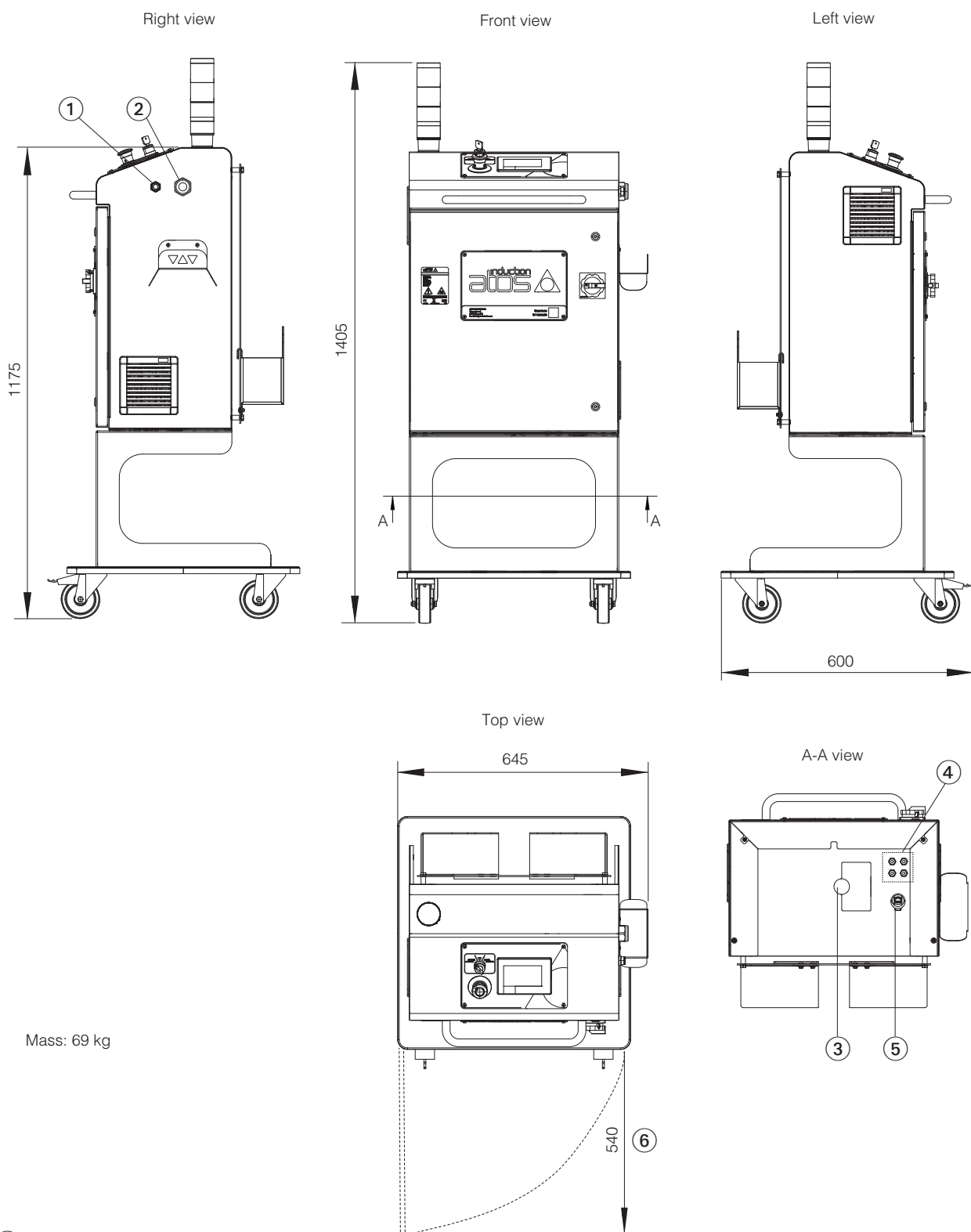
⚠ The control system can only power one heating element at a time, therefore it is not possible to connect multiple heating elements

⚠ All connections must be made exclusively by expert and qualified personnel.

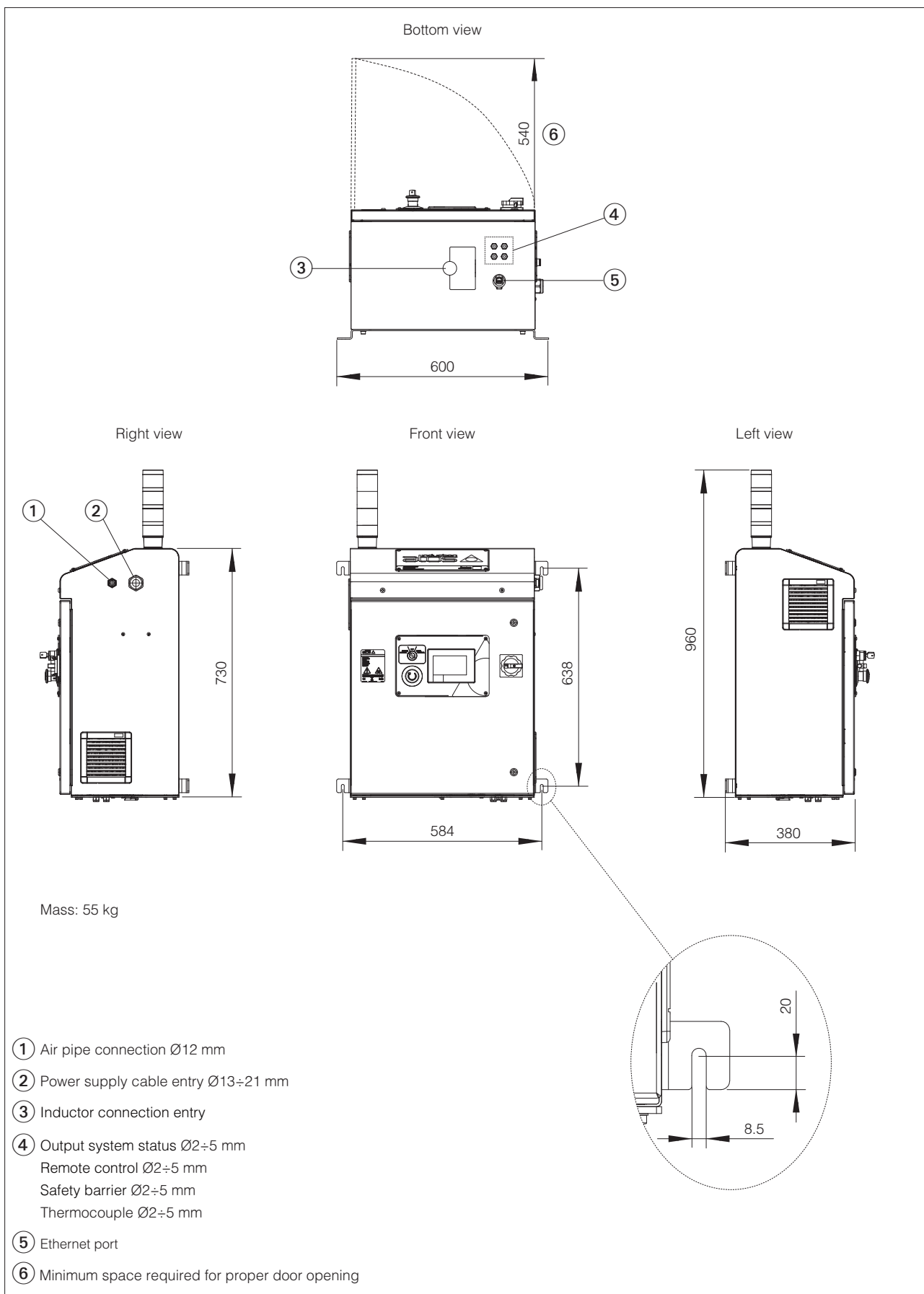
⚠ The new ECC and ECT 20 series are compatible exclusively with the MHP 20



TERMINAL BLOCK	PIN	TECHNICAL SPECIFICATIONS	RECOMMENDED WIRE	NOTES
X	1	L1, L2, L3 + PE 400/460 VAC ±10%, 50/60Hz	FG16OR16 4x10mm²	Power supply
	2			
	3			
	4	PE connection (yellow/green)		
XC	Planar inductor connection			
CN	6	relè - 10 A max	cross section 1 mm²	Output - System status closed: system working; open: System not working
	7			
	8	digital input 24VDC (5 A max)	cross section 1 mm²	Input - Emergency button remote (optional) - Jumper if not used
	9			
	10	digital input 24VDC (5 A max)	cross section 1 mm²	Input - Safety switch (optional)
	11			
	12	Terminal Ni-Cr	cross section 1 mm²	Input - Thermocouple (optional)
	13	Terminal Ni-Al		
	14	GND (optional)		
RJ45	Ethernet port			



10 ECC DIMENSIONS [mm]



11 RELATED DOCUMENTATION

AI100 Electronic power generator
AI110 Electronic communication devices

AI310 Inductive heating plates