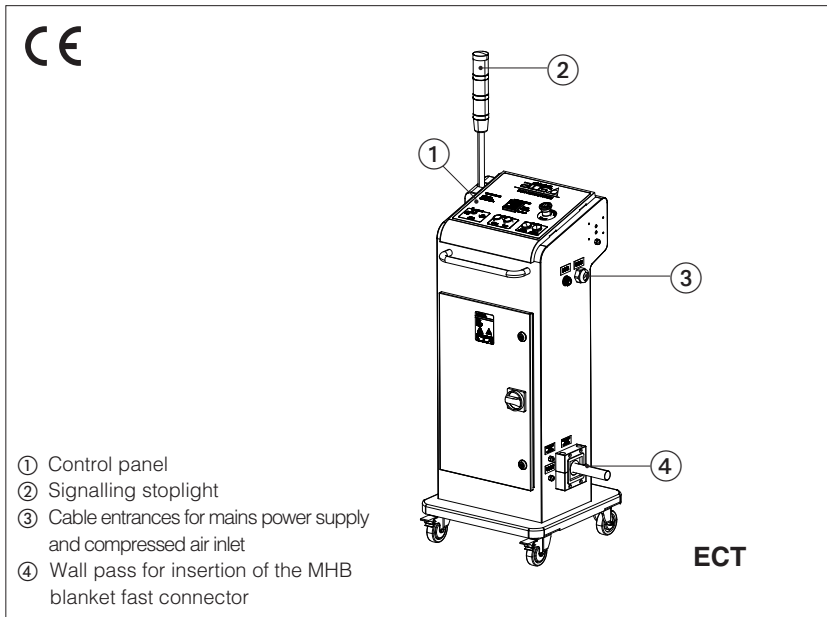


Electronic command trolleys

for controlling the heating of molds using MHB blankets



ECT

Electronic command trolleys, designed to power MHB inductive heating blankets (see tech. tab. AI 300) for metal and rubber molds preheating. They allow to regulate the molds temperature more quickly, precisely and efficiently than conventional open flame burners, significantly reducing heating times and eliminating the risks related to combustible gases in production plants. Each trolley contains an EPG power generator, for blanket power supply, and all necessary control devices.

It is possible to perform heating cycles according to the following integrated control logics:

- Timed control for rapid heating based on a predefined time
- Thermoregulated control for precise closed-loop temperature control

ECT trolleys can be equipped with ECD-TS transceiver for data transmission to a PC (see tech. tab. AI110).

1 MODEL CODE

ECT	-	H	-	TR	-	T400VAC	-	P	*
Electronic command trolley									Series number
Size									
Temperature control logic						Power supply (1)			
TM = Timed TR = Thermoregulated						T400VAC for 380-400VAC - 50/60Hz three-phase T460VAC for 440-460VAC - 50/60Hz three-phase			
						Transceiver option P = Prepared for the installation of the transceiver(2) T = Transceiver installed (3)			

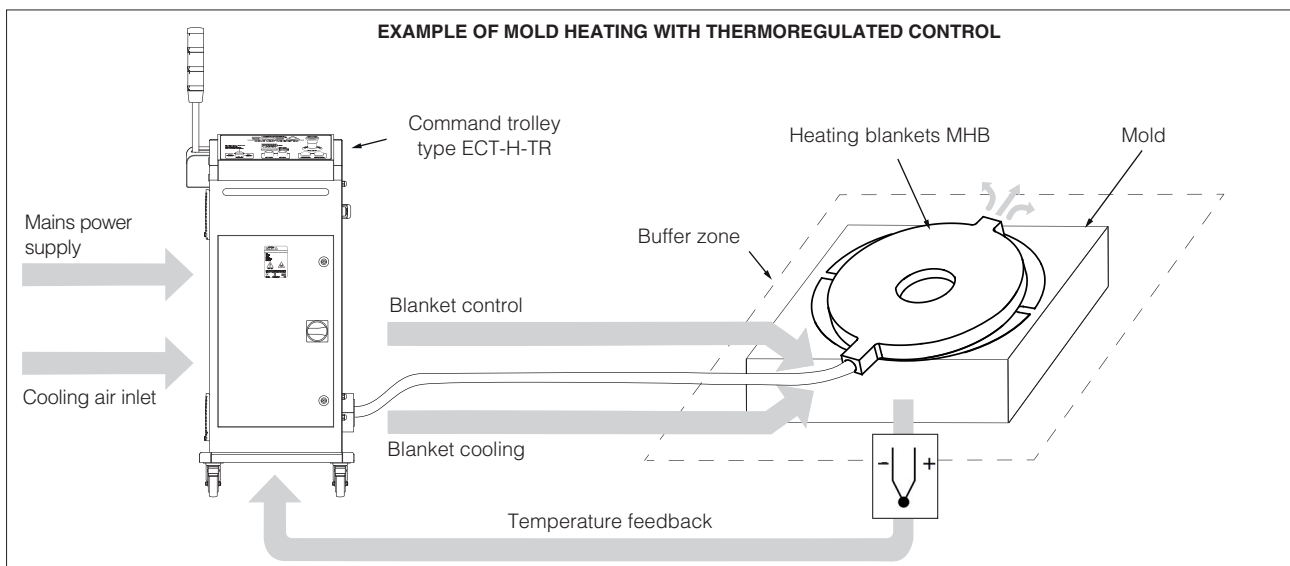
(1) For different supply voltages, please contact Atos Induction's technical department

(2) The trolley is ready for any subsequent installation of the ECD-TS transceiver (not included) by the customer

(3) The ECD-TS transceiver is already installed inside the generator

Note: For data transmission to PC are required the ECD-RV radio/USB converter and the ECD-SW software (not included). See tech. tab. AI110

2 FUNCTIONAL EXAMPLE



3 FUNCTIONAL DESCRIPTION

Thanks to the internal EPG generator, the control trolleys feed the MHB blankets with amplitude and frequency modulated currents, generating magnetic fields able to heating elements composed of ferromagnetic materials. The generator automatically adapts the current modulation to optimize the magnetic coupling between the heating element and the material to be heated. This functionality maximizes the thermal power transmission, as well as improving efficiency and reducing heating cycles times.

ECT trolleys integrate the following temperature control logics:

a) Timed control

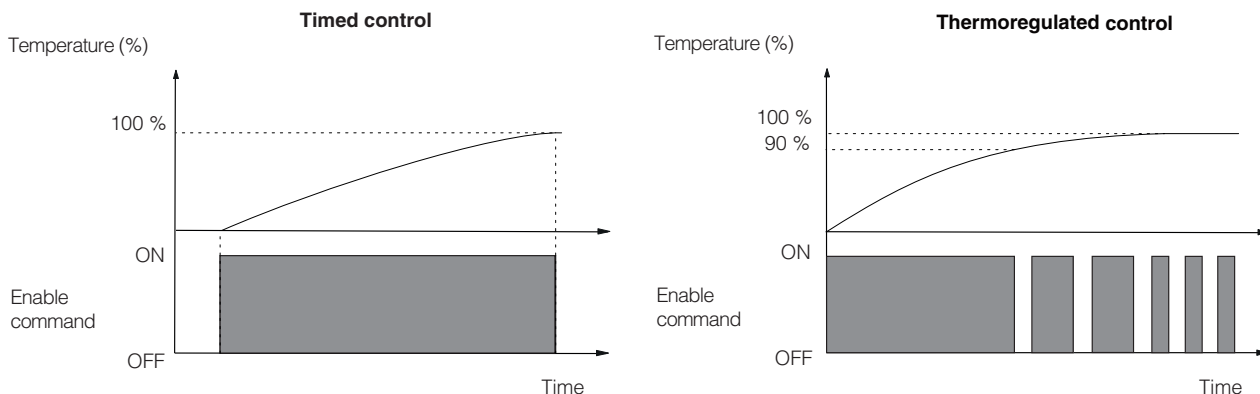
The trolley timer enables the EPG generator for a predefined time to reach the desired temperature. In this condition, the generator provides constant power for the set time interval, after which the heating process is automatically interrupted. The heating interval is defined by the user according to the application requirements.

! In order to safely use time control, it is necessary to verify that, at the end of the set time, the mold does not exceed the maximum temperature (300°C) permissible by the MHB blanket

b) Thermoregulated control

Through ON/OFF modulation of the enable signal, the machine control unit precisely regulates the temperature in closed-loop control. This control logic requires a temperature sensor (K-type thermocouple) to measure the effective temperature of the molds. The sensor feedback signal is sent to the thermoregulator which compares the value with the set reference temperature. At the beginning of the heating cycle, the enable command is switched ON until about 90% of the desired temperature is reached. Subsequently the thermoregulator modulates the enable command to obtain the target temperature. This control logic allows high precision in temperature achievement and maintenance, eliminating possible thermal drifts.

The following graphs show the timed and thermoregulated control logics.



4 MAIN CHARACTERISTICS

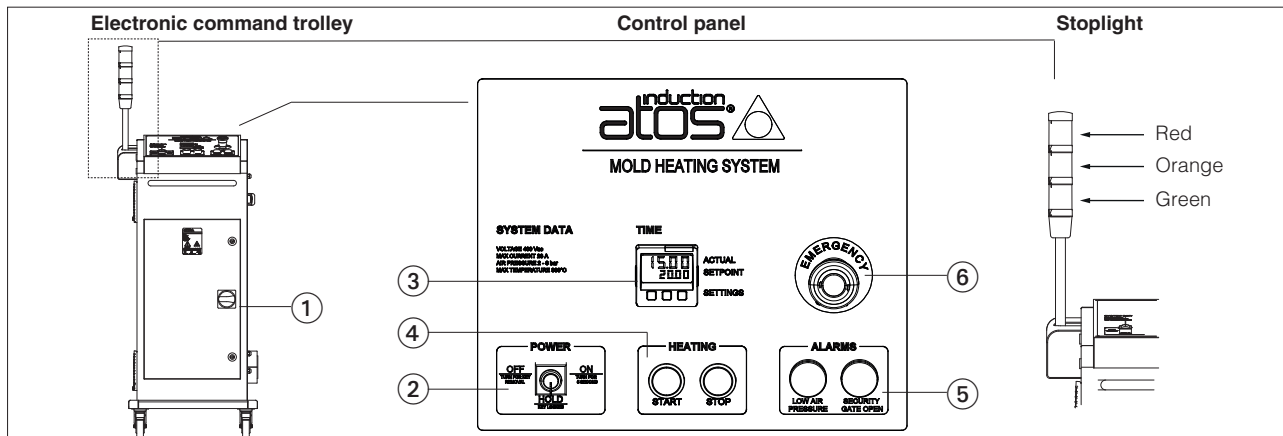
Trolley position	During the heating process the trolley must be placed in a safety zone, outside the buffer zone, at a distance of at least 1600mm from the edge of MBH Mold Heating Blanket. See section 8
Ambient temperature range	0°C ÷ +40°C
Max. mold temperature	300°C
Ambient humidity range	30% ÷ 60%
Inlet air pipe diameter	External diameter 12 mm - not included with the trolley
Inlet air pressure	2 ÷ 6 bar
IP protection degree [CEI EN 605229]	IP 42
Compliance	EC Declaration of Conformity valid in accordance with the directives: EMC 2014/30/UE (EN 61000-6-2; EN 61000-6-4); Low voltage 2014/35/UE (EN 60519-1; EN 60519-3); RoHS 2011/65/UE; REACH (CE n° 1907/2006)

5 ELECTRICAL CHARACTERISTICS

Maximum power	[kW]	15
Power supply		3x400 ±10% VAC o 3x460 ±10% VAC
Maximum power supply (+5%)	T400VAC [A] T460VAC [A]	22,8 19,8
Frequency	[Hz]	50 ÷ 60
Power factor	[cos φ]	0,95
Output	Peak voltage [V]	1200
	Peak current [A]	95
	Frequency [kHz]	4 ÷ 10
Control circuit voltage		24 VDC
ECT power cable		FG16OR16 4X10 mm ² (three-phase + ground) - not included with the system

6 CONTROL PANEL AND SIGNALLING STOPLIGHT

The control panel is equipped with buttons and indicator lights to control the heating process. At the top of the panel is positioned a stoplight to remotely visualise the operating status of the system.



General disconnecter ①

The general disconnecter links the trolley to the power grid.

Turn the switch to ON to connect the control panel to the mains.

Turn the switch to OFF to disconnect the control panel from the mains.

The general disconnecter must be in the OFF position to open the front door of the trolley.

Key switch ②

Switch ON: turn the key to the right to **ON**, hold for five seconds to enable the power supply to the generator and the thermoregulator.

Once released, the key automatically returns to position **HOLD** and cannot be removed. Orange lights up on the stoplight.

If the heating element is not correctly connected or coupled with the mold, the control panel cannot be activated, and the stoplight illuminates red.

Switch OFF: Turn the key to the left to **OFF** to shut down the control panel.

In this position, the key can be removed to prevent the activation of the panel.

Timer (for ECT-TM) ③

The timer allows to set the mold heating time without the use of a dedicated thermocouple.

The time is shown on the digital display. The factory preset value is 25 min.

Press the buttons \uparrow \downarrow to change the heating cycle time.

At the end of the set time, the heating process stops automatically.

In order not to overcome the maximum admissible temperature of 300°C, it is recommended that the first heating cycles be carried out for short intervals, gradually increasing until the desired temperature is reached.

During these phases, it is necessary to monitor the temperature of the metal at the points in direct contact with the MHB blanket.

Thermoregulator (for ECT-TR) ③

The thermoregulator controls the fluid temperature in closed loop according to the thermoregulated control logic described in section 3.

The selected temperature Tset is shown on the digital display. Press the buttons \uparrow \downarrow to change the temperature up to a maximum of 300°C.

The user must place a K-type thermocouple on the mold surface, in direct contact with the MHB blanket, and connect it to the trolley thermoregulator as shown in section 7. In this way the thermocouple measure one of the hottest points on the mold; it should be considered that the system will initially heat the surface in contact with the heating blanket and subsequently it will propagate uniformly over the entire mold volume.

Heating ④

The START/STOP buttons can be used to control the heating process.

START: after setting the timer (ECT-TM) or the thermoregulator (ECT-TR), press the button to power up the inductor and start the heating process. The stoplight turns green.


STOP: Press the button to de-energise the inductor and stop the heating process. The stoplight turns orange.


Alarms ⑤

Two alarm lights, placed on the control panel, indicate non-consent to start or forced interruption of the heating cycle due to the following anomalies:

- **LOW AIR PRESSURE:** inlet air pressure in the cooling circuit less than 2 bar.
- **SECURITY GATE OPEN:** open buffer zone gate.

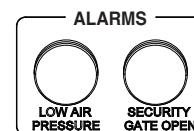
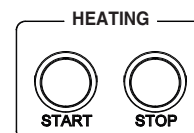
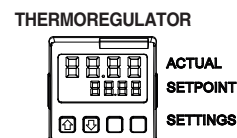
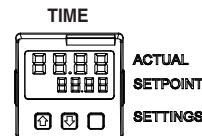
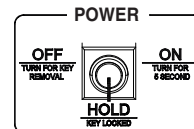
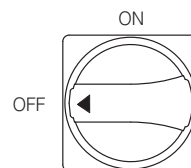
Both alarms are associated with red lighting on the stoplight.

 If the stoplight turns red and simultaneously both warning lights are off, this means that there is an internal failure. Check all the connections and the correct positioning of the blanket on the mold. If the problem persists, contact Atos Induction technical service

 In case of thermocouple breakage (for ECT-TR only), the blanket supply is automatically interrupted. The stoplight turns red, and an error message appears on the display of the thermoregulator. The heating can be restarted once the thermocouple fault has been solved

Emergency stop ⑥

In the case of an emergency, press the button EMERGENCY STOP to switch off the trolley completely.



7 CONNECTION WITH PC

The ECD-TS transceiver permits the transmission of generator diagnostic information (operating status and alarms) to a computer. It is necessary to use the ECD-RV radio/USB converter and the associated ECD-SW software to establish a communication with the PC. The radio/USB converter can communicate with multiple trolleys equipped with transceiver, but not simultaneously. See tech. tab. AI110.

8 INSTALLATION PRESCRIPTIONS

Use the handle on the front of the trolley to move it. Once in position, lock the wheels with the brakes.

Note: in order to prevent damage during shipping, the trolley is delivered with the wheels separated from the chassis. Mount them before starting to use the system, using the screws provided.

The ECT trolley must always be positioned outside the buffer zone, see tech. tab. AI300 sect. 6. The buffer zone must be delimited by a physical barrier with a safety sensor.

The safety sensor ensures that the blanket is segregated during the heating process.



During the heating process, access to the buffer zone is severely prohibited; if the barrier is opened, the process is automatically interrupted

8.1 Electrical connections

To connect the cables to the trolley, open the panel front door, insert each of them through the corresponding cable gland (located on the right side of the trolley) and connect the cable ends to the appropriate terminal blocks. See section 9 for connection specifications.

Connection to the power grid

The trolley must be connected to the mains in accordance with the applicable safety and industrial systems requirements of the country of installation.

Connection of thermocouple (for ECT-H-TR only)

Make sure to place the thermocouple firmly between the MHB blanket and the surface of the mold, so that it can measure the temperature in the area of contact between fabric and metal.



Wrong positioning of the thermocouple would cause errors in the thermoregulation process and possible damage to the MHB blanket

Connection of buffer zone safety sensor

The safety sensor must be installed to detect any accidental opening of the barrier, which delimits the buffer zone, during the heating cycles.

8.2 Compressed air connection

The ECT trolley is provided with an inlet for compressed air, necessary to cool the inductor inside the MHB blanket.

Connect the air pipe to the quick coupler on the right side of the trolley.

Ensure air pressure and supply pipe specifications as indicated in section 9.



At the end of the heating cycle, the air continues to flow towards the heating element to protect the internal inductor. However, always remove the MHB blanket from the hot mold at the end of the heating process

8.3 MHB heating blanket connection

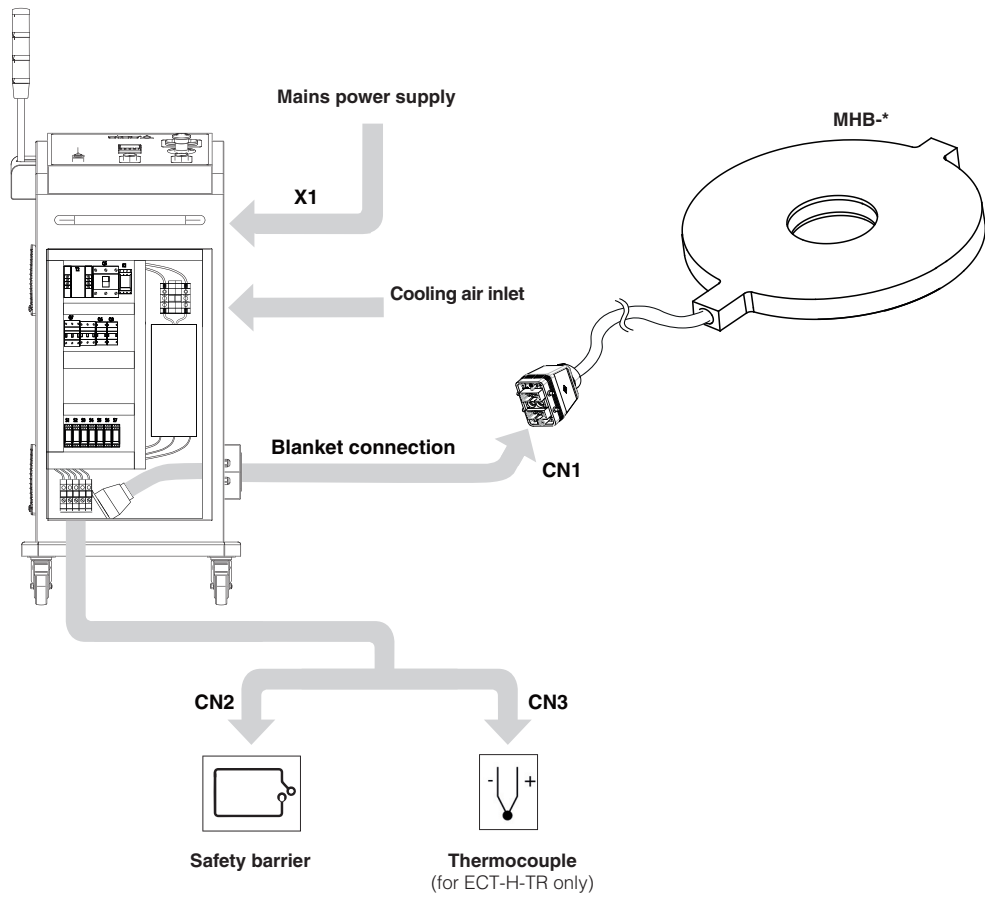
To connect the blanket, open the front door, remove the cover of the wall pass (on the right side of the trolley), insert the blanket cable through the wall pass, connect the quick connector to the corresponding interface located inside the trolley, and finally replace the wall pass cover. The connector contains the electrical connections, and the cooling air pipes.



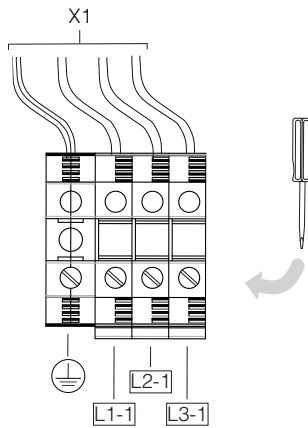
The trolley can supply only one blanket at a time, so it is not possible to connect several inductors to a trolley



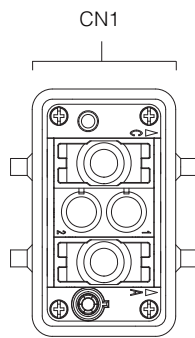
All connections must be performed exclusively by qualified personnel



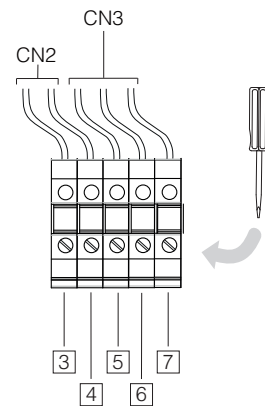
Power supply connection



Blanket connection



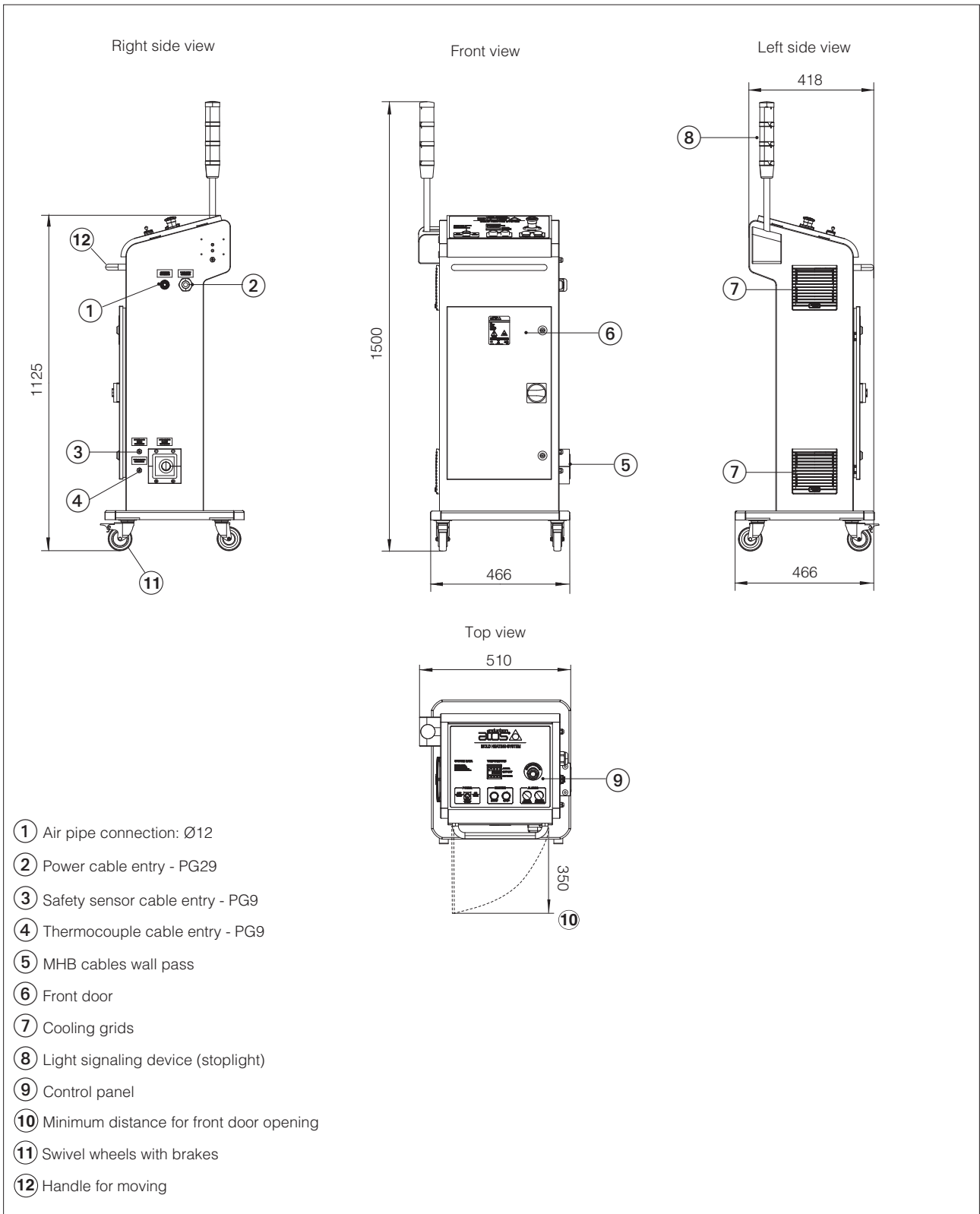
Safety sensor and thermocouple connection



TERMINAL BLOCKS	PIN	TECHNICAL SPECIFICATIONS	NOTES
X1 (4)	L1-1	3x400 VAC or 3x460 VAC	Mains power connection
	L2-1		
	L3-1		
	Yellow / green		
CN1			Blanket connection
CN2 (5)	3	24VDC (5 A max)	Input - Safety sensor contact
	4		
CN3 (5)	5	Terminal Ni-Cr	Input - K type thermocouple (for ECT-H-TR only)
	6	Terminal Ni-Al	
	7	Shielding terminal	

(4) Cable section: min.10 mm²; max.16 mm²; (5) Max. cable section = 2,5 mm²

10 DIMENSIONS [mm]



11 RELATED DOCUMENTATION

AI100	Electronic power generators
AI110	Electronic communication devices
AI300	Mold heating blankets