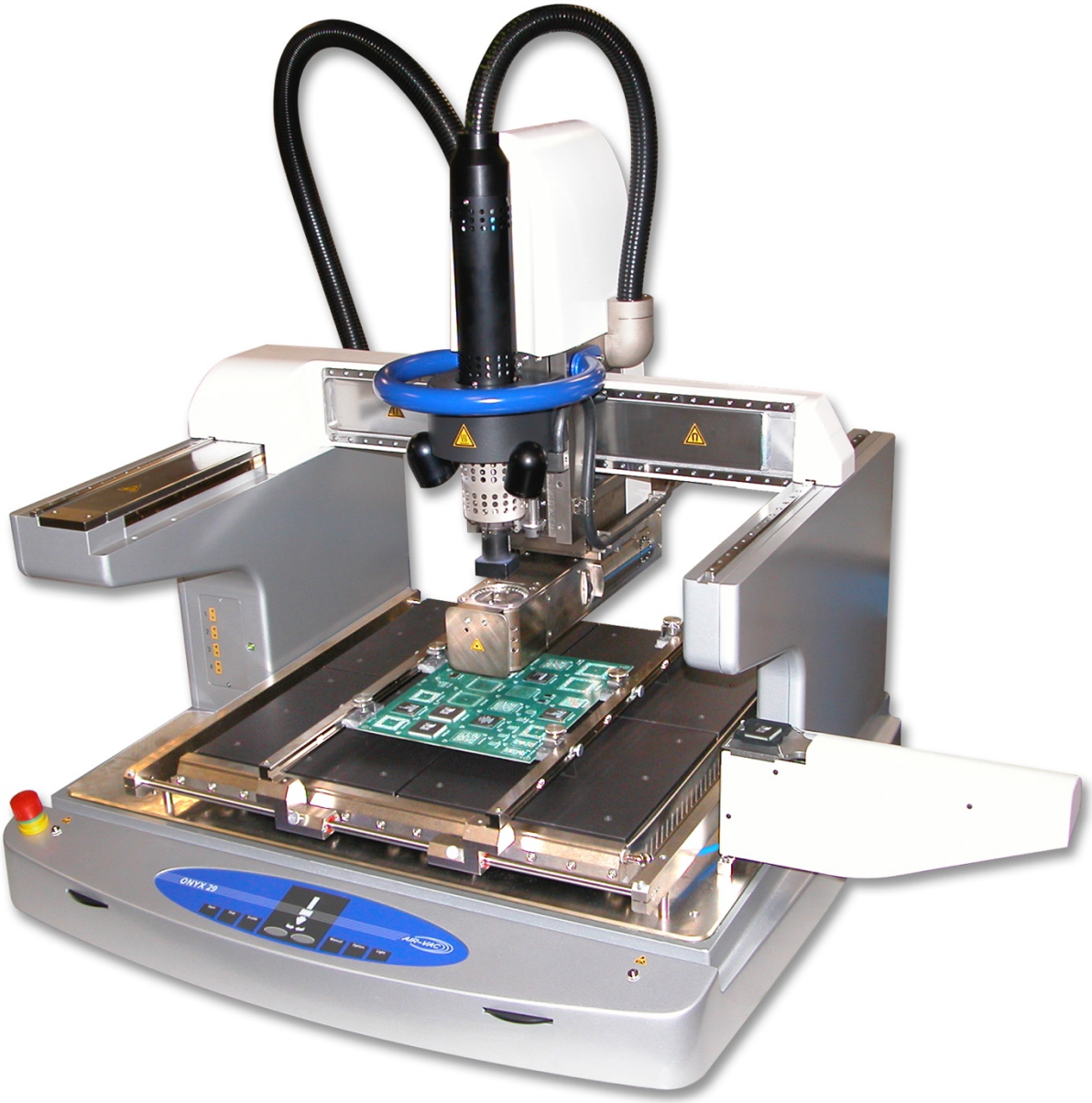
ONYX29

User Manual #0029.00.900
Series 7, Revision 4.0



High Performance Automation Rework

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1 Copyright

Operating Instructions

The information contained in this Operating Instructions is the property of Infotech AG/Air-Vac Engineering and shall not be reproduced or published to a third party or in part without prior written approval of Infotech AG/Air-Vac Engineering.

Please read this Operating Instructions carefully before the initial set-up, to insure the optimal start-up and maintenance of the equipment and to help avoid the possible creation of danger points within the systems.

Every effort has been made to ensure that the information herein is complete and accurate.

However, the information in this document is subject to change without notice. Infotech AG/Air-Vac Engineering assumes no responsibility for any error or damages resulting from faulty operation or in observance of this manual.

Critical evaluations and comments about this manual by the user are welcomed. Your comments assist us in preparation of future documentations.

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Publisher:
Infotech AG
Vogelherdstrasse 4
CH . 4500 Solothurn/Switzerland

Tel: +41 / 32 626 86 00
Fax:+41 / 32 626 86 09

E-mail: info@infotech.swiss
Web: www.infotech.swiss

2 Warranty

2.1 Warranty - General

Air-Vac Engineering Company warrants its equipment for a period of one (1) year from date of shipment on all parts, materials and labor costs required to repair the system except for component parts that are considered "wear and tear" items that are warranted for ninety (90) days. These include, but are not limited to, heaters, belts, lights, vacuum cups and tubing.

Air-Vac agrees to repair or replace any or all such equipment that may prove to be defective within the warranty period, without expense, excluding shipping to the owner. This warranty shall not apply to any products that have been repaired or altered except by Air-Vac Engineering. Services under warranty shall not affect an extension of the warranty period, nor will a new warranty period be granted for the parts, which were replaced/repaired. The title of the replaced parts will automatically pass to Air-Vac.

Air-Vac reserves the right to reject replacement under this warranty where, in the sole opinion of Air-Vac, the defect is due to obvious misuse and/or improper maintenance of the module or any part thereof. The express and/or implied warranty of Air-Vac is limited to the replacement and/or repair of any item defective in material and/or workmanship. Other damages, if any, direct or consequential are expressly excluded from this warranty.

Air-Vac shall be liable under this warranty only if 1) Air-Vac receives notice during the appropriate warranty period (90 days or 1 year as applicable); 2) The products are operated in accordance with the supplied documentation; and 3) Such products are, to Air-Vac's satisfaction, determined to be defective.

When contacting Air-Vac for warranty inquiries, please provide the *Order Number that the parts were shipped, Model and Serial Number of the product and the Reason for Warranty.* Products cannot be returned to Air-Vac without authorization – please call for an RMA #.

2.2 Heating Element Limited Life Warranty

Air-Vac Engineering Company warrants the heating elements for a period of ninety (90) days from date of shipment. Air-Vac agrees to repair or replace any or all such equipment that may prove to be defective within the warranty period, without expense, excluding shipping to the owner. This warranty shall not apply to any products that have been repaired or altered except by Air-Vac Engineering. Services under warranty shall not affect an extension of the warranty period, nor will a new warranty period be granted for the parts, which were replaced/repaired. The title of the replaced parts will automatically pass to Air-Vac.

Air-Vac reserves the right to reject replacement under this warranty where, in the sole opinion of Air-Vac, the defect is due to obvious misuse and/or improper maintenance of the module or any part thereof.

> *Heating element life is affected by several factors, temperature, airflow, condition of incoming air (water and oil contamination) and overall process cycle. These products are considered a "consumable" item. The length of useful service will vary based on the conditions under which they are run. Higher temperatures and/or lower flows will cause shortened life.*

The express and/or implied warranty of Air-Vac is limited to the replacement and/or repair of any item defective in material and/or workmanship. Other damages, if any, direct or consequential are expressly excluded from this warranty.

Air-Vac shall be liable under this warranty only if 1) Air-Vac receives notice during the warranty period; 2) The products are operated in accordance with the supplied documentation; and 3) Such products are, to Air-Vac's satisfaction, determined to be defective.

When contacting Air-Vac for warranty inquiries, please provide the *Order Number that the parts were shipped, Model and Serial Number of the product and the Reason for Warranty.* Products cannot be returned to Air-Vac without authorization – please call for an RMA #.

3 Declaration of Conformity

L2 VL 013 EG KONFORMITÄTSERKLÄRUNG	L2	HW-Entwicklung		INFOTECH automation
	08.10.18	V1.1	UB	

Declaration of Conformity

We declare under our sole responsibility that the product described under „Technical data" is in conformity with the following listed "EC-Guidelines", "Used EN-Standards" or standardization documents. Conformity assessment procedure is according to the machine guide line 2006/42/EG annex VIII.

Technical data:	ONYX 29 – Selective Soldering System Series 7
Serial number:	003.07.XXX – Year of manufacture 2020
Manufacturer:	Infotech AG, Vogelherdstrasse 4, CH-4500 Solothurn
Equipment and Product Safety Act:	ProdSG (Product and safety law, according 2001/95/EC)
EC-Guidelines:	Machinery 2006/42/EC, Low voltage 2014/35/EU, Electromagnetic compatibility 2014/30/EU, Pressure devices 2014/68/EU, RoHS 2011/65/EC, Noise 2003/10/EC, Vibration 2002/44/EC.

EN-Standards:

EN 349	EN 11553-1	EN 60204-1
EN 547-1	EN 12100	EN 60825-1
EN 614	EN 13849-1	EN 61000-4-2
EN 692	EN 13850	EN 61000-4-4
EN 894-1, -2	EN 13855	EN 62471
EN 1037	EN 13857	EN 81346-2
EN 4414	EN 14119	
EN 10218-1	EN 55022	

When part of the system is being changed without our agreed permission, this declaration of conformity will become invalid.

Authorised representative for the compilation of the technical relevant documents:
Ernest Fischer CEO Infotech AG, Vogelherdstrasse 4, CH-4500 Solothurn.

Solothurn, 13.02.2020

Infotech AG

Dr. Urs Bürgi
CTO

Ernest Fischer
CEO

4 Introduction

Notes and Warnings

This manual contains safety instructions wherever these are required or prescribed. These instructions are divided into two categories as follows:

Note
A note describe special actions, procedures, instructions and information that are relevant to the subsequent section or step. Inobservance of the instructions can result in damage to the machine or to the process material.

Warning
A warning indicates that inobservance of the instructions can result in personal injury.

4.1 Welcome

This user guide must be studied carefully before the setup process and the initial operation of the machine can take place. Thus, in order to guarantee a trouble-free operation of the machine "ONYX 29 Series 7".

This user guide has been compiled in accordance with ISO 9000 and the EC machine guidelines. It contains all important information and instructions to operate the machine "ONYX 29 Series 7" safe and trouble-free.

Warning
Considering the complexity of this system, trained and qualified personnel must be present at the installation.

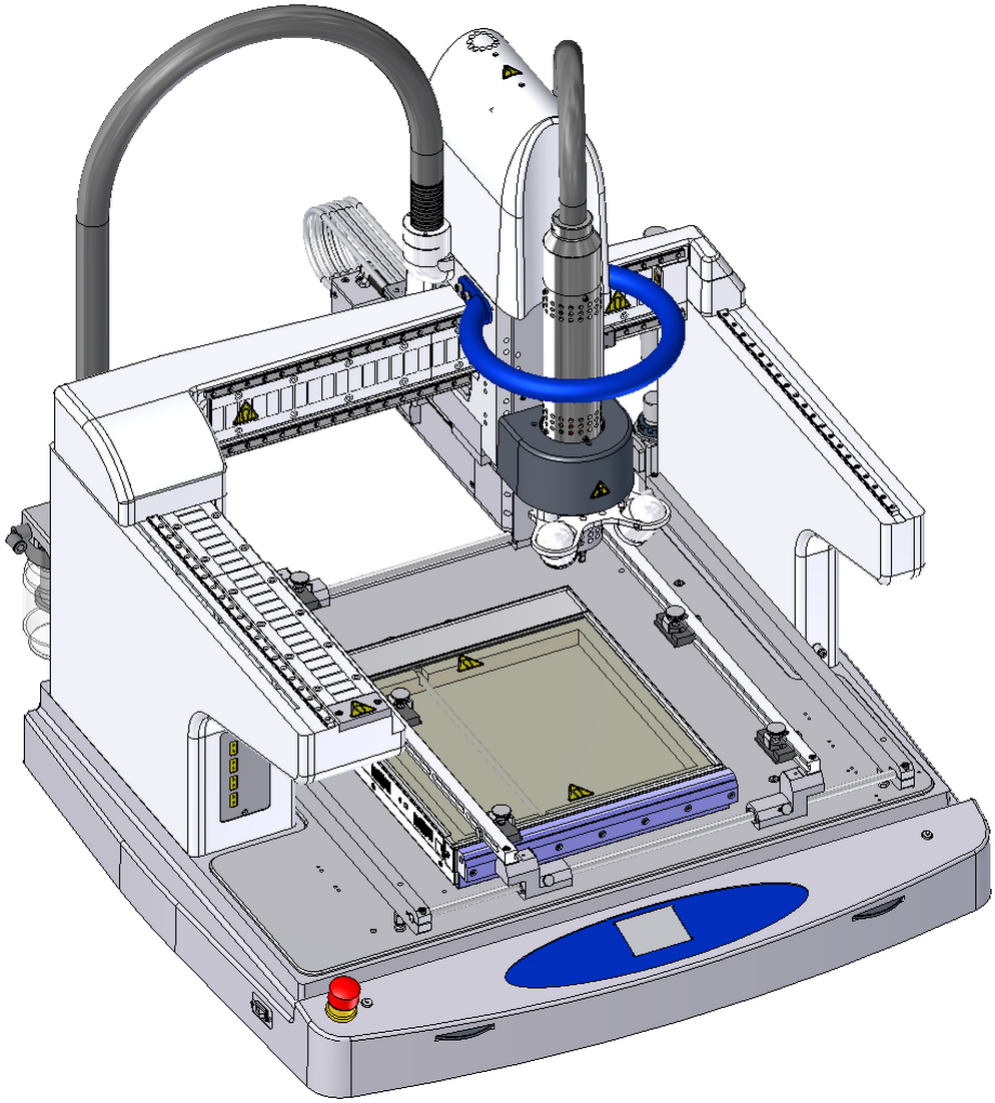
This user guide must always be kept in reach next to the machine. It is an essential part of the machine. The safety precautions were tested in accordance with the machine guidelines 2006/42/EC.

4.2 Designated use of the Machine

The ONYX 29 Series 7 machine provides the capability to semi-automated removal, site cleaning and soldering advanced technology components such as BGA's, CSP's, Flip Chip, Micro-Discretes, surface mount connectors and fine pitch QFP's as well as traditional leaded devices such as PLCC's, SOIC's and sockets.

The ONYX 29 Series 7 machine is especially configured to support all lead-free soldering processes. All peripherals are matched to fulfill the higher temperature and tighter tolerance requirements.

It is possible to use the machine in a semi-automated mode. If a process has to be executed multiple times, the process executes fully automated, except of the vision alignment processes.



5 General Safety Instructions

5.1 Basic Safety Instructions

In addition to the safety instructions in this document, the following guidelines must be observed to prevent personal injuries in general:

Warning
Because strong magnetic fields are associated with the system motor coils and magnet assembly, persons having active implants (pacemakers, etc) or having any other ferromagnetic products are not qualified and are not allowed either to operate the equipment or enter within a 0,5m perimeter around the system.

Warning
The hot gas tool and the pre-heater are required to reach temperatures well above 60 °C. Hot Surface Warning Labels are found on the covers of each heated surface. It is not allowed to touch the system and especially these surfaces by not authorized personnel. Skin contact with these surfaces would result in a shock reaction and therefore presents an inherent potential thermal danger to the operators.

Warning
If flux is used during the soldering processes and flux is evaporating, be careful not breathing the evaporating gases.

In case of strong evaporating gases, be sure to install a fume extraction unit. Evaporating flux gases can be dangerous for the operator.

Warning
Only qualified personnel is allowed to work on the peripherals with high voltages. The governing laws and regulations must be observed.

Warning
The ONYX 29 Series 7 semi-automated soldering systems use an open platform design to allow the operator having optimum access to the working area. During the CE-certification procedure, the possible risks for injuries on the open platform design have been reviewed and danger analyzes processes have been performed

The safety installations in combination with the reduced speed of the X-/Y-axes of the platform of maximum 0,15 m/s and the reduced force on the these axis are acceptable and are reducing the risk of injuries of upper body parts.

Further safety shields such as safety light curtains or safety covers have been reviewed. These additional possible safety guards would obstruct the easy operation of the system.

Each operator of the system must be instructed about the danger points of the open system.

Note
Read this manual carefully before you operate, service or repair the machine. The machine may only be operated by qualified personnel who have received an appropriate training.

When cleaning parts and peripherals of the machine, use only the sub-stances recommended. When maintaining and servicing the machine, use only the tools admitted therefore.

Before you re-start the system after maintenance or repair, make sure that other personnel, tools and foreign materials are removed from the motion area of the subsystems of the machine.

When working with high voltages, always ensure that another person is near you who is familiar with all emergency power off controls and can give you medical assistance.

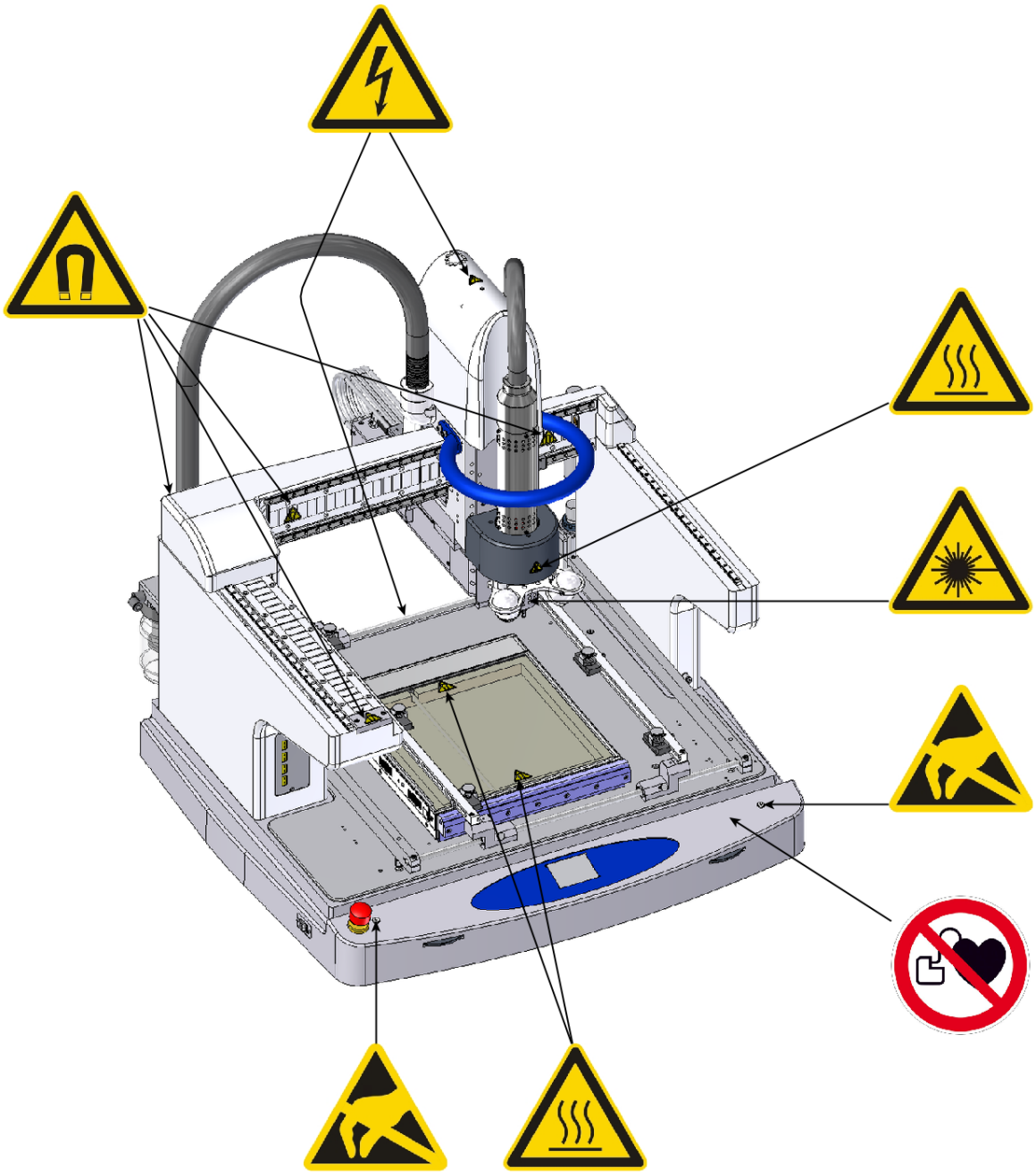
When removing the board carrier, pre-heater and the application base plate, the main switch in the back of the machine must be switched off and locked.

Note
When processing electronic boards with active devices, the operator must be grounded with the machine, to avoid damaging the active components on the board.

5.2 Machine Warning Labels

The following warning labels were used on the machine "ONYX 29 Series 7":

Warning
Each removed or defective warning label on the machine "ONYX 29 Series 7" must be replaced immediately.



Warning of magnetic field	
	**Warning labels on the machine:** • IP-500 Y-Axis left side in the back • IP-500 Y-Axis left side in the front • IP-500 X-Axis left side • IP-500 X-Axis right side
This warning label indicates areas with strong magnetic fields. In the close area of the linear motor of the X and Y axis strong magnetic fields occur. Due to the strong forces in the immediate area of the permanent magnet rails (distance of less than 100 mm) particular prudence is required. Persons with magnetically influenced implants (e.g. pace makers) or with other ferromagnetic prostheses are not allowed neither to operate the machine nor to perform any maintenance work on the machine. For those persons a safety distance of 0.5 m to the linear drives and the magnet rails of the linear drives must be observed! There are no special measures of precaution to be taken when people operate outside the machine.	

Warning of dangerous voltage	
	**Warning labels on the machine:** • Head cover X-Slider • On cable channel at power inlet
This label indicates the presence of electrical equipment. Labels are found beside all removable covers where electrical equipment is mounted. They are used to indicate a possible shock hazard. Only qualified personnel are allowed to work on the peripherals with high voltages. The governing laws and regulations must be observed.	

Warning of hot surfaces	
	**Warning labels on the machine:** • In the front of the hot gas system • On each pre-heater • In the front of the fume extraction unit (optional)
This label indicates hot surfaces well above 60 °C. It is not allowed to touch these surfaces without safety gloves. Skin contact with these surfaces would result in a shock reaction and therefore presents an inherent potential thermal danger to the operators.	

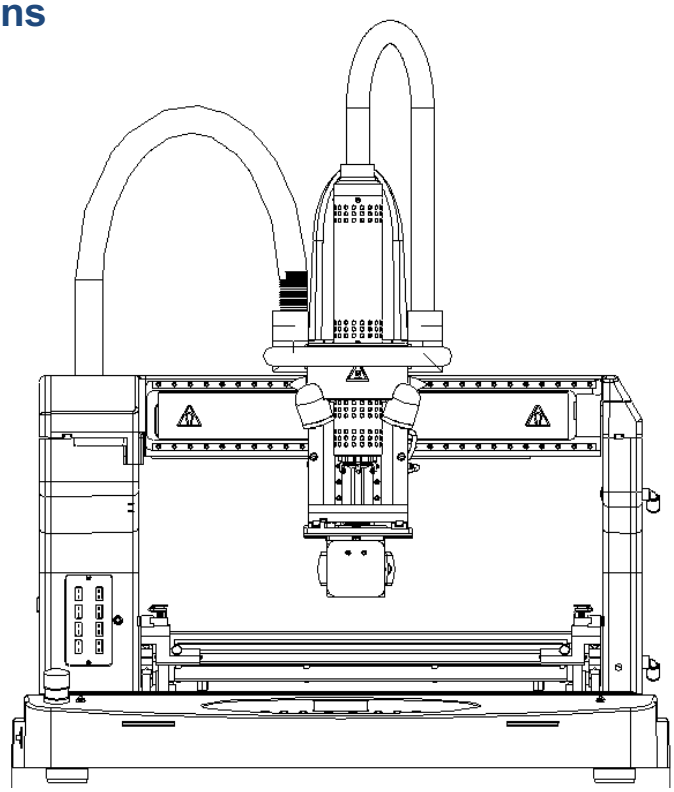
Warning of laser	
	**Warning labels on the machine:** • In the front of the vision system
This label indicates the danger of laser beams. Lasers generate a very intensive, strong bundled beam. The intensive light beam can especially harm the eyes and the skin.	

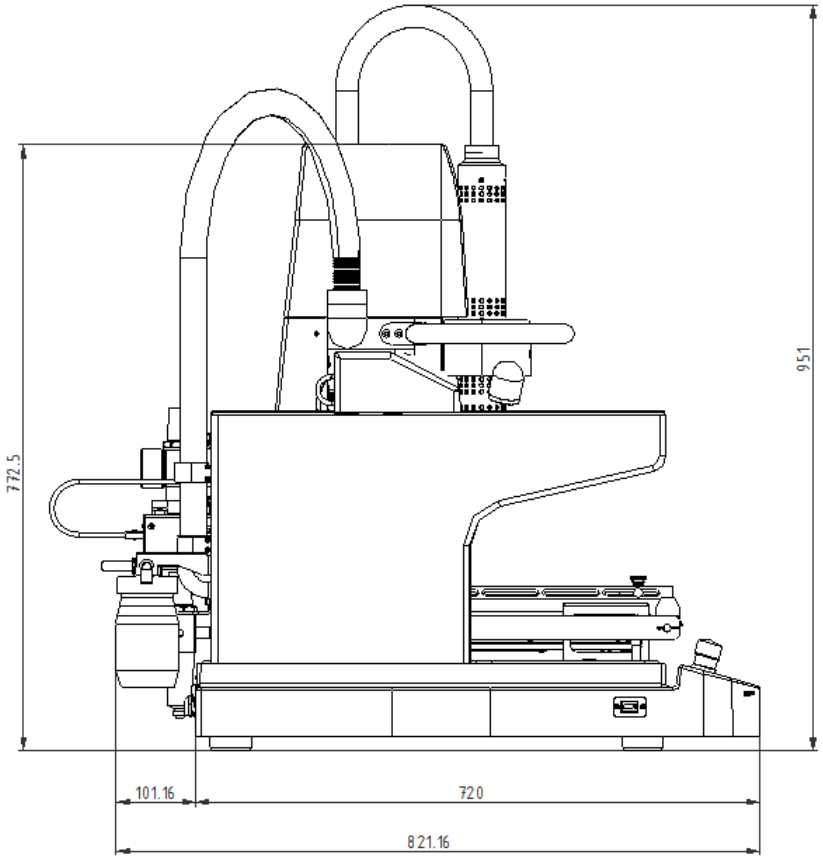
No access with cardiac pacemaker or implanted defibrillators	
	**Warning labels on the machine:** • On the front of the Machine, right side
Anyone having active implants (pacemakers) or having any other ferromagnetic prosthesis is not qualified to work with these kinds of devices, or to approach them. For those persons a safety distance of 0.5 m to the linear drives and the magnet rails of the linear drives must be observed!	

5.3 Airborne Noise Emitted

The emission sound pressure level of the machine is less 75 dB(A).

6 Specifications





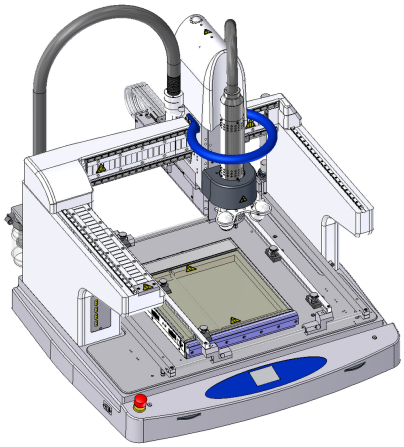
6.1 General Specifications

Dimensions and Weight	Width	823 mm	
	Depth	821 mm	
	Height	951 mm	773 mm without hose
	Weight	140 kg	308 lbs.
	Weight with Packaging	200 kg	441 lbs.
Electrical 3-phase power	U (Voltage)	3 x 400/ 230 VAC	3 x 208 VAC
	I (Current)	16 A	20 A
	P (Power)	10.0 kW	7.2 kW
	F (Frequency)	50 Hz	60 Hz
Air source	Air pressure	0.6 MPa / 100 l/min	6 bar / 100 l/min
Axes acceleration	X / Y	1.5 ms-2	limited to guarantee
	Z	0.60 ms-2	operator safety
Axes speed	X / Y	0.15 ms-1	limited to guarantee
	Z	0.06 ms-1	operator safety
Working area	X / Y	400 mm	
	Z	150 mm (OBC 30 mm)	optional OBC 70 mm
	Theta	+/- 12 degree	
	Vision-X	60 mm	
	Vision-Y	220 mm	
	Vision-Zoom	ca. 20 mm	FOV (Field Of View)
Axes resolution	X / Y	0.001 mm	
	Z at OBC 30 mm	0.0005 mm	
	Z at OBC 70 mm	0.0005 mm	
* Process accuracy	X / Y at OBC 30 mm	+/– 0.009 mm	
+/– 3 Sigma	X / Y at OBC 70 mm	+/– 0.015 mm	
	Z	+/– 0.015 mm	
	Theta	+/– 0.02°	
Board dimensions	Maximum size	508 x 508 mm	larger on demand
	Maximum thickness	6 mm	
	Clearness above	30 mm	optional 70 mm
	Clearness below	20 mm	optional 30 mm
	Pre-heater area	490 x 490 mm	optional 300 x 300 mm
Vision system	Object size OBC 30	0.2 x 0.2 - 70 x 70 mm (larger on demand)	
	Object size OBC 70	0.4 x 0.4 - 70 x 70 mm (larger on demand)	
	FOV with OBC 30	2.7 x 2.1 - 24 x 18 mm (pixel size 0.009 - 0.045 mm)	
	FOV with OBC 70	3.8 x 2.9- 30 x 22 mm (pixel size 0.012 - 0.052 mm)	
	Illumination	Component illumination with adjustable light intensity	
		Board illumination with adjustable light intensity	
	Vision X/Y/Zoom	Closed loop motorized	Vision X/Y/Zoom

ONYX 29 Series 7: Technical data are subject to change without notice!

* Values based on glass flip chip placements on glass substrate, further variation of accuracies available upon machine configuration.

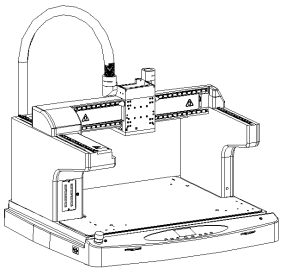
7 Semi-Automated Soldering System



High end platform
Precision force sensor table
ManualMotion
Interface for up to 4-pre-heater ports
4 Thermo couple ports (max. up to 8)
Field illumination
Z-axis 150 mm (OBC 30 up to OBC 70)
Advanced solder head
Nitrogen gas flow
Site clean pneumatics
Pressure controller blow off (optional)
Vision system with MFOV
Teach laser pointer
Board carrier 508 mm (optional) board carrier 508 mm (optional)
Pre-heater (optional)
Board cooling (optional)
Component shuttle (optional)
Fume extraction unit (optional)
Camera support (optional)
Direct view camera (optional)

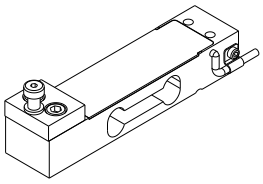
7.1 High End Platform

- Wear free Cartesian X and Y axes mechanism
- X/Y linear optical scale encoders
- X/Y linear motors
- Closed loop motion control system for X and Y axes
- ManualMotion wheels for manual X/Y motion
- Includes distributed fiber optic based control system
- Up to 8 thermo couple ports (4 standard)
- Includes all the pneumatics and electronics for all options (except of the head specific controls) which are located in the head



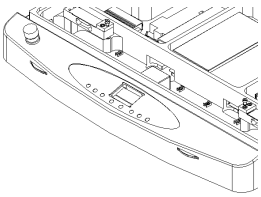
7.2 Precision force Sensor Table

- Micro precision force sensor table which is included in the base of the system. The entire application base plate is attached to the force sells
- Mechanical over load protection
- Force sensor input directly on the master CPU with real time connection to the Z-axis motion board
- Force moves as low as 0.2 N possible in 0.1 N steps, for pick and place processes



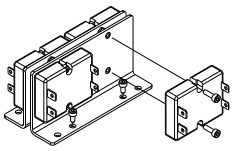
7.3 ManualMotion

- Manual axis motion via integrated hand wheels
- X/Y-axes, Z-axis
- Theta axis via operator buttons on operator panel
- Allows teaching and performing manual processes efficiently



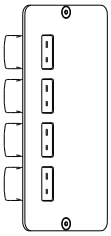
7.4 Interface for Preheater Ports

- Includes 4 SSR relays and connector ports to connect 4 pre-heaters.



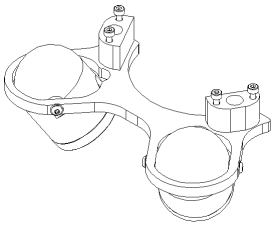
7.5 Thermo Couple Modules

- ManualModule with 4 thermocouple ports (standard)
- Per default:
  TC # 1 is used for the overboard temperature
  TC # 2 is used for the joint temperature
  TC # 3 is used for the case (package) temperature
  TC # 4 is not allocated



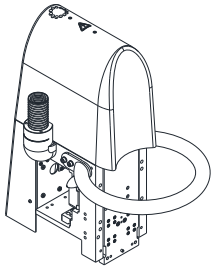
7.6 Field Illumination

- LED bright light stationary on the left and on the right side of the solder head used to illuminate the process area on the board. The illuminated area is always focused to the front side of the nozzle
- The illumination can be used with the advanced- and with the economic solder head
- The illumination can be switched on by the light switch on the operator panel, or by the software

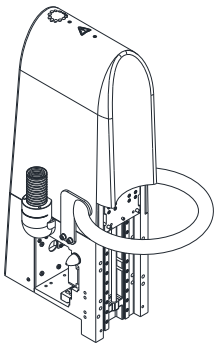


7.7 Z-Axis

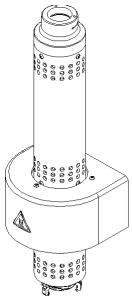
- The standard system Z-axis has a travel range of 150 mm with an Over Board Clearance (OBC) of 30 mm
- Z-axis closed loop motorized with a 0.5 µm resolution.
- Possible force move processes and force servoing (in combination with the micro precision force table)
- The Z-axis can be operated automatically or using the manual motion wheels
- At E-stop, the Z-axis break is active



- Optional long stroke Z-axis which has a travel range of 230 mm with an Over Board Clearance (OBC) of 70 mm
- Z-axis closed loop motorized with a 0.5 µm resolution.
- Possible force move processes and force servoing (in combination with the micro precision force table).
- The Z-axis can be operated automatically or using the manual motion wheels.
- As an example, it is possible to work with UBC = 40 mm and OBC = 50 mm.
- Using this longer Z-axis and therefore a longer distance to the board, enlarges the field of view of the vision unit, and therefore reduces the possible adjustment accuracy
- At E-stop, the Z-axis break is active



7.8 Advanced Solder Head

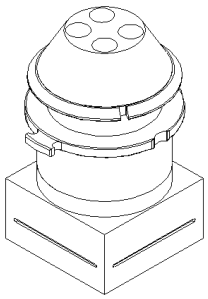


- Includes the advanced head pneumatics which is located in the platform and all the controls and pneumatics in the head interface
- Hot gas system with 2 KW at 230 VAC heating source, temperatures up to 450 °C (internal 750 °C)
- Gas (air or nitrogen) flow closed loop control from 8 to 80 l/min
- Heater element bypass to allow rapid cooling
- Motorized Theta axis +/- 15° (usable +/-12°)
- Various temperature profiles can be programmed as part of the process setup and process execution.
- The Site clean tool can be mounted. The vacuum hose for this tool is guided externally

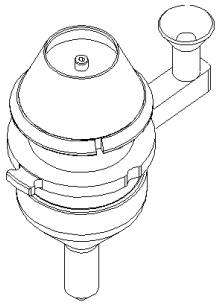
The head is optimized especially for lead free soldering processes qualified for higher temperatures and tighter temperature tolerances.

The nozzles used with the hot gas system can be used on previous equipments from ONYX. The heated gas is guided into the hot air nozzle, where pick, place, removal, site cleaning and soldering processes can be performed.

The nozzle interface is designed to allow manual changing of the nozzles, any hot gas nozzles and site clean nozzles can be installed which full fill the length tolerance of the standard ONYX nozzles.



Typical hot gas nozzle



Typical site clean nozzle

- The correct nozzle design is essential to guarantee professional and repeatable soldering processes.
- Many different types of nozzles are available, please ask for the nozzle specific documentation

Note
An interchangeable module (usually the module which is touching the object) is called a Nozzle. The module the nozzle is mounted to is called the Tool.

Warning
The Hot Gas system is configured to reach temperatures well above 60 °C. Hot Surface Warning Labels are found on the cover.

The Hot Gas nozzles can be very hot as well. To replace a nozzle, use the correspondence manual nozzle change tool and, if necessary, use protection gloves.

Never drop a nozzle, specifically the site clean nozzle onto the pre-heater. The pre-heater glass surface may be damaged.

7.9 Nitrogen Gas Flow

Nitrogen gas flow with an additional pneumatic maintenance unit is installed which allows connecting a second gas source, in most cases this second gas is nitrogen. It is being used when lead free soldering processes are being performed.

The software supports switching between pneumatic valves to switch between air and nitrogen within each heating stage of the interactive solder process.

7.10 Site Clean Pneumatics

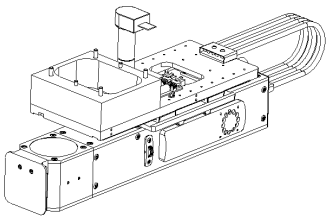
Site clean pneumatic valves, vacuum bottle and vacuum ejector are installed to allow using the site clean process nozzles. Site cleaning is being used when rest solder has to be removed from a PCB after removing a defective component.

VisualMachines™ software supports fully automated touch less site clean processes.

7.11 Vision System (with MFOV)

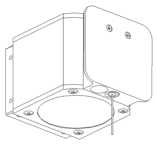
The ONYX 29 Series 7 comes with a one camera beam splitter vision system for matching components manually to the board. Both images the board image and the component image are visible at the same time.

- Motorized zoom, adjustable Field of View (FOV) between 2.7 x 2.1 to 24 x 18 mm (pixel size 0.009 to 0.045 mm), OBC70 = 3.8 x 2.9 to 30 x 22 mm (pixel size 0.012 to 0.052 mm). The position of the Zoom-axis is stored within the program and is always automatically reused
- Manual adjustable focus
- White or green component, white board ring light illumination
- Programmable light intensity
- Closed loop, motorized Vision Y-axis to move the prism between the component and the board and additionally to move the cube for the multiple field of view process
- Closed loop, motorized Vision X-axis to move the cube for the multiple field of view process
- Multiple field of view (MFOV) process
- Closed vision cube in the front, which protects the unit from the evaporation flux gases



7.12 Teach Laser Pointer

- Laser pointer (class 2 laser product) installed in the front section of the vision system. The laser pointer generates a red dot on the board surface
- Po <1 mW, λ = 400-700 nm.
- Can be used to teach positions on the board
- Only in combination with the vision system



Warning
Do not stare into the beam – Laser radiation class 2 laser product 400-700 nm < 1 mW.

7.13 Preheater

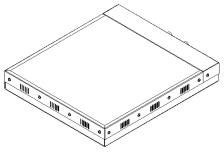
Different pre-heaters with one- or multiples zones (up to4) can be used with the ONYX 29 Series 7. The temperature of each zone is program controlled, using a temperature sensor inside each pre-heater zone and a Solid State Relays (SSR) mounted inside the base of the system.

All pre-heaters are supported within the interactive soldering process which allows having different set points per soldering stage and a controlled maximum board temperature.

Note
All available pre-heaters are designed and qualified for lead free soldering processes where higher temperatures and tighter temperature tolerances are needed.

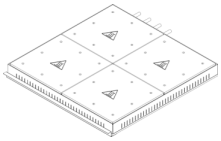
Pre-heater 310 x 350 mm (heating area)

- Maximum surface temperature of up to 300 °C, optional up to 400°
- Various temperature profiles can be programmed as part of the process setup and process execution



Pre-heater 490 x 490 mm

- Laser edged 4 zone pre-heater
- 1500 Watt per zone, 6000 Watt total heating power
- Maximum surface temperature of up to 400 °C
- Various temperature profiles can be programmed as part of the process setup and process execution
- Mainly used for large board applications where the uniformity of the heat distribution is essential



Warning
The pre-heater is configured to reach temperatures well above 60 °C. Hot Surface Warning Labels are found in the front and in the back of the pre-heater system. On the pre-heater itself, it is not visible if the heaters are hot. Never touch any parts of the pre-heater or the parts close by.

Zones	Heater dimension [mm]	P @ 230 VAC at 20 °C [Watt]	Type	Continuous Temp. [°C]	Peak Temp. [°C]
1	Heater = 310 x 350	3260	Aluminum plate	200	*300 (400)
4	Heater = 490 x 490 Zone = 245 x 245	6000 1500	Aluminum plate	200	**300 (400)
2	Heater = 245 x 490 Zone = 245 x 245	3000 1500	Aluminum plate	200	**300 (400)

* It is possible to use the 310 x 350 mm pre-heater with peak temperatures up to 400 °C during the pre-heat stage. Using the pre-heater at temperatures over 300 °C must be limited to very short time slots, otherwise the machine can get serious damage.

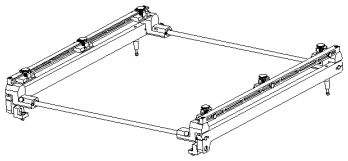
** It is possible to use the 490 x 490 mm pre-heater with peak temperatures up to 400 °C during the pre-heat stage. Using the pre-heater at temperatures over 300 °C must be limited to very short time slots, otherwise the machine can get serious damage.

The pre-heaters are being defined to be operated at the given peak temperature. However, the ONYX 29 Series 7 is not designed to have the heaters running continuously at the peak temperature. Having the pre-heaters running at the given peak temperature limit should be used only when needed during the actual reflow or soldering process. As a general formula, the following rule can be used:

Warning
The same amount of time a preheater is being operated above the continues temperature limit, it has to be operated below the continues temperature limit. Using the pre-heaters over the given peak temperatures has to be limited to short pre-heat stages only. It is the operators responsibility to limit the high temperatures. Otherwise the machine can get serious damage. ONYX will take no responsibility for any damages resulting from faulting this rule.

7.14 Board Carrier

- On the board carrier various sizes boards can be mounted
- Left and right side rails are adjustable
- Supports 508 mm wide boards (20"), length of board is not limited
- Board carrier can be lifted manually for adjustments of the bridges with the under board clamp



Note
The board carrier cannot be locked at the raised position due to the risk of serious damage, if the program would be started that way.

7.15 Head Temperature Sensor

The Head Temperature Sensor measures the temperature of a massive piece at the robot head assembly.

It's recommendable to preheat the robot head before starting a thermo profile in order to get a continuous stability of the process. This sensor allows an automatic intergraded preheat process in the program.

7.16 PC Module

To run VisualMachines™ with the ONYX 29 Series 7, the following minimum PC hard- and software requirements must be met:

Hardware requirements:

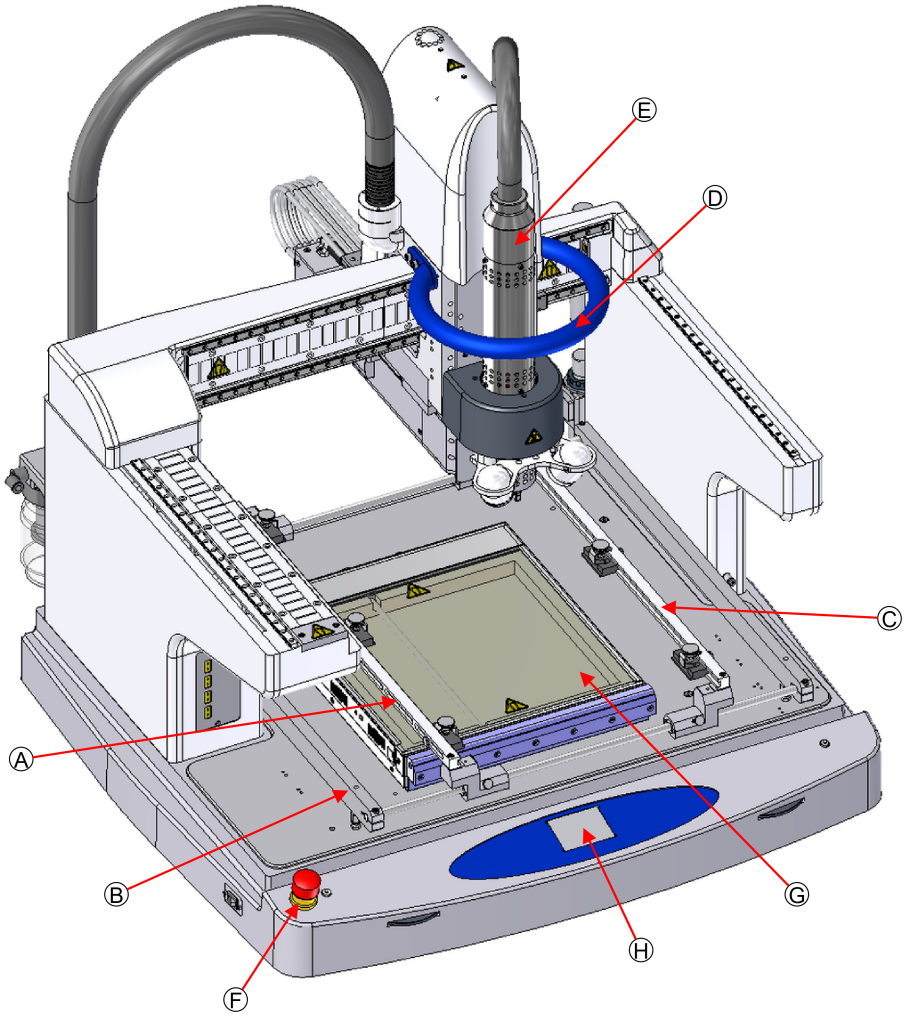
- Processor: Intel Core i5 Duo, or better
- Hard drive space: 2 GB of free space
- Memory (RAM): Minimum 8 GB
- Graphics adapter 1 GB with DirectX 12
- Display: Minimum Resolution: 1280 x 1024 pixels
- PCIe Slots: 1 slot available for Network interface card GigE dual, PCIe x2
- Ethernet port: 1 Gbps
- Network interface card GigE dual (2 interfaces RJ-45), PCIe x2 with Jumbo frames support.

Optional: Additional Network interface card GigE (1 interface RJ-45), PCIe or PCI for connection to the Customer in-house network.

Software requirement:
Operating system: Windows 10 Pro / Pro for Workstations / Enterprise 64 Bit

Note
In order to preserve the computing power of the PC for its main task, this is to control the ONYX 29 Series 7, never:
- Install office software or similar packages
- Install games, navigation software or similar packages
- Install any antivirus software, contact the Air-Vac Service Department at 1-203-888-9900.
- Connect the PC with internet access for surfing purposes
- Install add-on hardware

8 Machine Overview and Options



Note
The machine layout may be custom specific any may appear different. The here displayed machine layout describes the Standard Hot Gas system.

Item A, B and C: Identifies the board carrier and support features

The board carrier has two fixed (A) support arms and two adjustable rails (B) to hold the board. Both movable arms are spring loaded to allow for board growth during heating cycles.

Front and rear knobs lock the movable arms in place.

Each movable arm has three (3) sectional supports (C) to hold the edge of the board. These supports should be positioned to provide maximum support under the targeted component. Move the sectional supports to the correct position(s) if edge components/clearance is an issue. If using very large boards, boards with widths larger than 450 mm, then the screws of these supports must be replaced. The maximum width then is 508 mm or 20".

Each sectional support has a swinging board lock to secure the board to the carrier.
Bottom supports provide necessary rigidity to prevent board downward warping during the heating and component placement steps.

The board carrier pivots upward to allow access to the underside of board. This feature simplifies board support positioning. It is important to position board supports clear of any bottom side components. Supports should be directly in contact with the board.

Note
The board carrier cannot be locked in the raised position. It would be too dangerous, if the board carrier would be raised, locked and an operator hits the start button…

Item D: Identifies a handle used to manually position the robot head.

This handle is normally used during various robot training. The assembly head can easy be moved.

Note
When moving the robot head manually, make sure the nozzle is at a safe height, otherwise the nozzle and machine peripherals may be damaged.

Item E: Identifies the hot gas heater.

The hot gas heater generates hot gas (air or nitrogen). The hot gas then is guided into the hot gas nozzles.

Note
This cover shields the Hot Gas heating element from the operator. The hot gas tool can get very hot.

Item F: Identifies the emergency stop button.

Engage this button if any unplanned motion or process activity occurs.

Do not use it to control pause a running program, it shall be used only in emergency situations.

Item G: Identifies the board pre-heater panels.

There are 4 independently programmable heater zones.

Item H: Identifies the machine operator panel.

The buttons located on this panel provide optional operator interaction during normal program execution.

8.1 Peripherals Overview of the Standard Hot Gas System

Waffle Feeders

- This position defines component à nozzle feeding device.
- Waffle Feeder 2" by 2" or 4" by 4" (multiple components – rows x columns).
- Universal component insertion tray for single component.

Flux Station

- This peripheral is defined when a controlled flux dipping process is required. The same station may be used to stamp conductive adhesive onto the substrate.

Nozzles

- The correct nozzle is critical to proper component/board processing.
- The nozzle is attached to the heater assembly by inserting the nozzle within the heater clamping fingers.
- Tilt the nozzle with the top at a 45° angle from your hand. Nozzle can be hot, be sure to use the correct sized nozzle-handling pliers.
- Insert the nozzle into the rear-clamping finger and rotate to a vertical position. All 3 clamping fingers must be fully seated to the nozzle.

Warning
The Hot Gas system is configured to reach temperatures well above 60 °C. Hot Surface Warning Labels are found on the cover.

The Hot Gas nozzles can be very hot as well. To replace a nozzle, use the correspondence manual nozzle change tool and, if necessary, use protection gloves.

Never drop a nozzle, specifically the site clean nozzle onto the pre-heater. The pre-heater glass surface may be damaged.

8.2 Options Overview

8.2.1 70mm (2.75") Top Side Clearance

Objective:

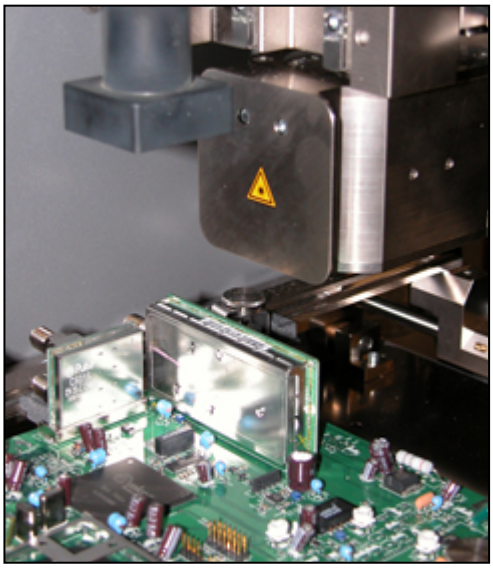
- Provide increased top side clearance for assemblies with vertical daughter cards or tall devices that exceed the standard 30mm (1.2") top side clearance.

Includes:

- Machine frame modifications for additional clearance.
- Longer z-axis stroke to access the board.

Photo:

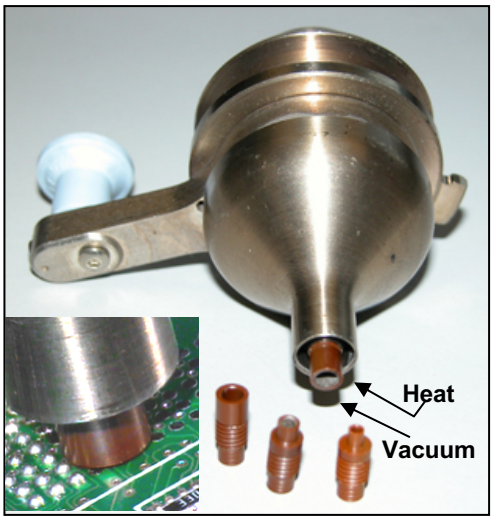
- 1.9" tall through hole device fits easily under the Vision System.
- Extended z-axis stroke enables nozzle to reach the board to rework the BGA.



8.2.2 Site Cleaning System

Objective:

- Fully automated removal of residual site solder without damaging the pads or solder mask. Eliminates the need for traditional solder iron/solder wick process and associated issues (ie. manual intervention, mechanical contact of pads).



How It Works:

- The site cleaning tool pattern is automatically generated based on the part dimension.
- Hot gas reflows the residual solder on the pads.
- A vacuum sensor continuously adjusts the height of the composite vacuum tip to provide non-contact site cleaning.

Notes Of Interest:

- Non-contact site cleaning will become critical for lead-free rework due to the significantly higher temperature required to reflow the residual site solder.
- Small, medium and large composite vacuum tips provided.
- Micro tips and collectors also available.

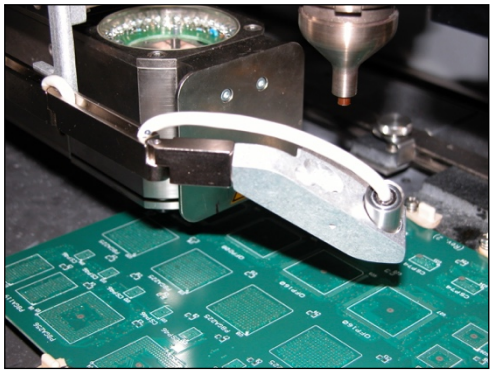
Photos:

- Various size composite tips. (Inset) Site cleaning system in process.

8.2.3 IR Sensor

Objective:

- Provides process repeatability by insuring that the board is at the exact same target temperatures each time before localized reflow begins.



How It Works:

- Operator is instructed to position the sensor head at the beginning of the process.
- The non-contact temperature sensor monitors topside board temperature and automatically triggers the localized reflow process once the target temperature is reached.

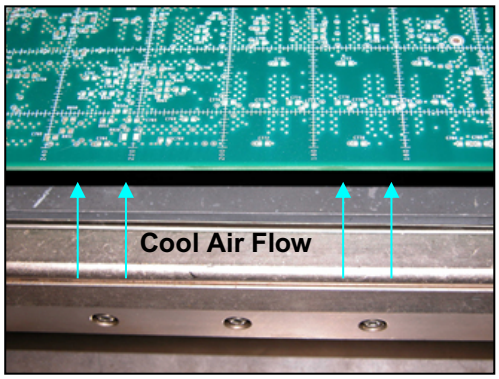
Photo:

- Non-contact IR Sensor with pivoting head and laser pointer.

8.2.4 Board Cooling System

Objective:

- Provides controlled cool down of both the device and assembly to effectively manage time-over-reflow and to facilitate handling of the assembly after rework.



How It Works:

- High laminar flow of cool air is directed between the bottom heater and the assembly, providing rapid cooling.
- Programmable control allows the cooling air to be turned on/off whenever desired.

Notes Of Interest:

- The cooling rate of the solder joint after reflow is critical. The faster the cooling rate, the smaller the solder grain size and the higher the fatigue resistance.

Photos:

- Illustration of laminar flow of cool air passing between the bottom of the board and top of preheater.
- Software controlled cool down.

8.2.5 Universal Insertion Tool

How It Works:

- Mechanically self-centers any square device for accurate pick up. Used in conjunction with component shuttle.

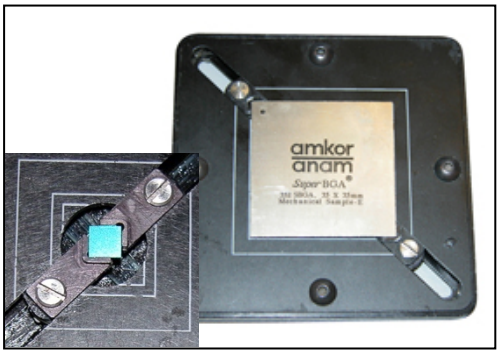


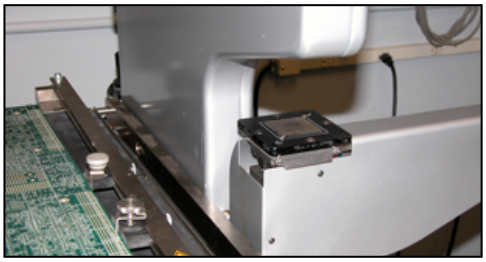
Photo:

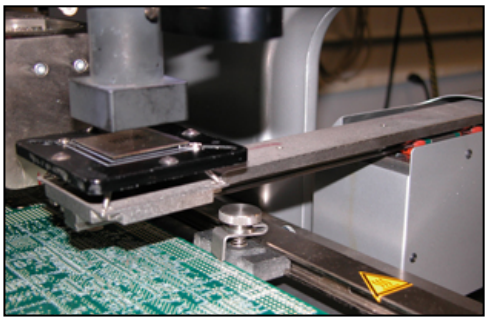
- Mechanically centered 35mm SBGA.
- (Inset) 6mm Flip Chip.

8.2.6 Automatic Component Shuttle

Objectives:

- Provides a safe, repeatable location for component pick up, flux dipping and drop off away from the heated work area.
- Eliminates manual component loading and removal in the heated work area.





How It Works:

- Software-controlled pneumatic shuttle enters the work area for pick up, flux dipping or drop off then exits the work area.
- Shuttle-based component pick up and flux dipping is force controlled.

Notes Of Interest:

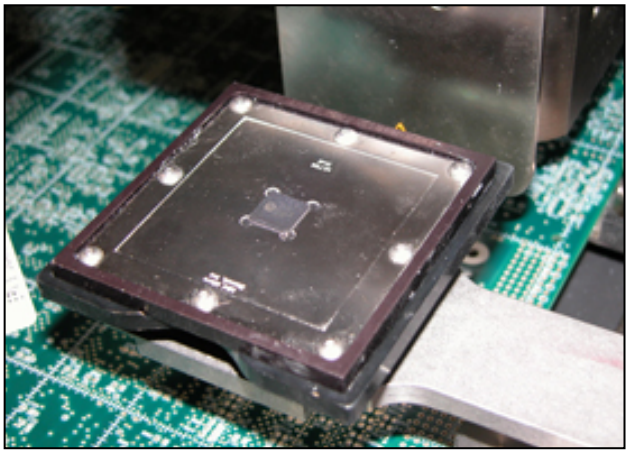
- Multi-location pick and flux dipping capability for multi-processing of small devices (custom tooling required).

Photos:

- Home position away from work area.
- Work position for force-controlled component pick-up.

8.2.7 Paste-On-Device Micro Stencil Adapter

- Component-specific micro stencil applies solder paste directly to the component spheres.
- Pasted device in stencil is placed in micro stencil adapter, which is used in conjunction with the component shuttle to pick the pasted device.



Notes Of Interest:

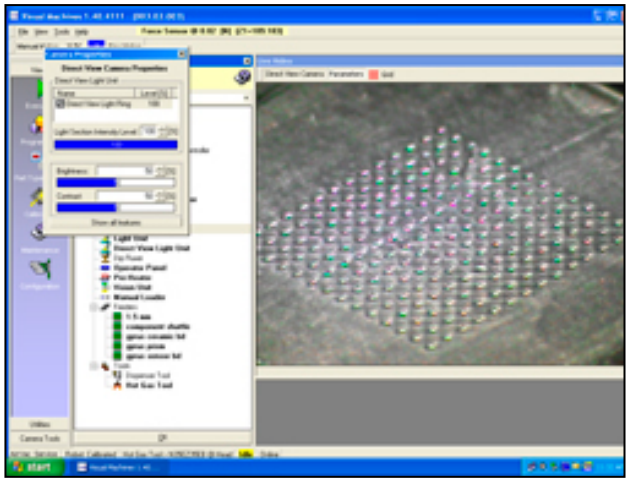
- Air-Vac does not supply the component-specific micro stencils. Recommended supplier is Mini Micro Stencil (760-591-3804).

Photo:

- MLF68 with center ground pad in micro stencil (solder paste applied to device).
- Micro stencil installed into adapter for direct pick from shuttle.

8.2.8 Flux Dip Pedestals

- Stainless steel fluxing pedestals with precision-machined depth provides controlled application of tacky flux directly to the solder spheres on the device.
- Used in conjunction with the component shuttle.



Notes Of Interest:

- Various sizes and depths available. Recommended depth is 50% of ball height.

Photo:

- PBGA196 imprint on flux pedestal in component shuttle.

8.2.9 Direct View Camera & Mount Assembly

Objective:

- Provides high magnification site viewing including the ability to verify component reflow has occurred.

How It Works:

- Operator is instructed to position the DV camera on the site. Focus, zoom and lighting adjustments are made to optimize clarity.
- The site image is integrated with the software and displayed on the PC monitor.

Notes Of Interest:

- The DV camera is a valuable process development aid especially for difficult to see tiny devices.
- The DV camera is also recommended for use in conjunction with the dispensing option to provide dispense inspection capability.

Photos:

- Camera/mount assembly.
- Close-up view of BGA spheres.

8.2.10 Four (4) Additional Thermocouple Ports

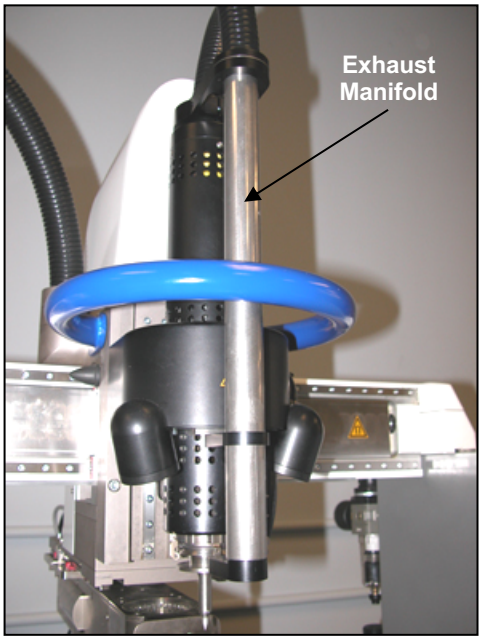
Objective:

- Four (4) additional TC channels (total of 8) provides additional monitoring capability for advanced process development applications. The ONYX29 includes four (4) TC channels.

8.2.11 Fume Extraction Manifold

Objective:
- Removes flux vapors from the work environment for operator health and safety.
- Includes:
- Fume extraction manifold and hose assembly.

Notes Of Interest:
- Requires connection to a central exhaust or self-contained filtering system.



8.2.12 Ergonomic Workstation

Objective:
- Provides a self-contained work cell environment for the machine and operator.

Features:
- 60"W x 36"D ultra-sturdy construction with anti-static laminate surface and CPU holder.
- Available accessories include lockable storage drawer, nozzle rack, monitor stand and keyboard tray. All are designed for ergonomic operation.

Notes:
- See **"Installation"** Chapter for info.

9 VisualMachines™

The VisualMachines™ Software is used to support the ONYX 29 Series 7 processes, removal, site cleaning and soldering.

The base software VisualMachines™ is designed to put the focus on the application, not the programming. It is an object oriented, modular software environment that enables rapid implementations of complex motion, vision and process control modules. The software uses drag and drop Visual wires to allow easy application specific changes. The top-level software architecture can be used, modified for the application needs, or can be replaced completely with an application specific user interface.

VisualMachines™ is an open system that can be extended by users with the standard tools from Microsoft's Visual Studio. VisualMachines™ provides Views, which represent possible actions the user may select for various operations.

The principal views are:

Operating the machine, start and stop of production programs
(Access level **Operator** and higher)

Creating new or modifying existing production programs
(Access level **Process** and higher)

Defining the part type specific parameter and processes
(Access level **Process** and higher)

Defining the part specific parameter and processes
(Access level **Process** and higher)

Machine and peripheral calibrations
(Access level **Maintenance** and higher)

Displaying actual states of the machine and the peripherals
(Access level **Maintenance** and higher)

Displaying preventive maintenance states of the machine
(Access level **Maintenance** and higher)

Machine and peripheral configuration
(Access level **Administrator** and higher)

The implementation on the ONYX 29 Series 7 allows operating the system within the Execution view, using the access level **Operator and Technical Operator** only.

The online help, the description to each page can be called directly within the page. Available help screens can be opened by clicking the question mark icon.

10 Installation

10.1 Transport

The machine must be transported in a temperature and humidity-controlled environment. The temperature range shall be within -20 °C to 50 °C. The relative humidity must be less than 60% (these data don't correspond to the operation conditions).

The machine has to be transported in the specially developed packaging and with the specially designated transport locks. This prevents the machine from damage due to vibrations and shocks.

Machine crate, exists as wooden pallet with cardboard box, or as fully wooden crate:
ONYX 29: Length = 130 cm, Width = 90 cm, Height = 102 cm

Warning
Never move the system without using the special provided package material. Even when moving the system only within the building, the system must be transported on top of an adequate damping material, otherwise the linear bearings may get damaged.

10.2 Unpacking

Before unpacking the machine, the packaging has to be examined to eliminate possible transport damage. The boxes should be opened carefully. Compare the content with the packing list. The serial number of the machine has to correspond with the number on the packing list.

Check the type label on the machine "ONYX 29 Series 7".

ONYX 29					**CE**
Serial Number:	003.07.XXX				
Documentation:	300.16.410				
Manufactured:	XXX				
U 3 x 208 VAC		**I**	20 A	**f**	60 Hz
P 7.2 kW			20 A	**p**	6 bar
m XXX Kg					
Made in Switzerland by Infotech AG, Vogelherdstrasse 4, 4500 Solothurn					

The packaging and the transport locks have to be stored in a safe place, so that the machine can be professionally packed at a later date.

For the installation please consider the following chapter.

The space for the system has to be ready before the system can be moved. Make sure the table or lab bench where the system will be installed provides a stable flat surface.

Warning
A Minimum of 4 persons is needed to manually move or carry the machine from the crate to its final location. The machine weight is 140 kg (308 lbs.). The weight is unbalanced, the left side (when standing in front).

10.3 Re-Packing

If the machine has to be shipped again, the original transport locks and the original packaging have to be used.

Contact the supplier, if the transport locks or the packaging is not available.

Insufficiently protected and packed machines can be damaged during the transport. In this case the warranty will be limited.

Please consider the packing pictures in the chapter "**Appendix: Packaging**".

10.4 Requirements (also see Facility Requirements)

The machine has to be installed in a room with a plane floor and under the following environmental conditions:

Environmental requirements	
Temperature	18 °C ... 30ºC
Humidity	10 % ... 60%, rel. humidity, non-condensing
Process parameters guaranteed	
Temperature	18 °C ... 22ºC
Humidity	45 % ... 60%, rel. humidity, non-condensing
Floor conditions	
Minimal floor loading	500 kg/m2 (sealed concrete or similar)
Ambient light	
If possible, the machine should not be exposed to direct daylight or other strong fluctuations of the ambient light. **(Could have an influence to the reliability of vision processes)**	

Note
Floor quality corresponds to made of concrete material (no raised floor!) that stability and damping is guaranteed.

10.5 Facility Requirements

Electrical:

- Machine Power: 208 VAC, 50/60 Hz, 3-phase, 25 A (max).
  6' of 12/4 power cord supplied. **No plug supplied with system.**
  - Monitor Power: (208V) - Provided by convenience plug on machine.
  - Computer Power: (208V) - Provided by convenience plug on machine.

Optional equipment:

- Time/Pressure dispense: 110/208 VAC, 50/60 Hz, 1A/.5 A, single phase.

Air/Nitrogen:

- Head Air/Nitrogen Supply: 90-130 psi, 3 scfm, clean, dry air (non-condensing) source. 1/8"-18NPT with 1/4" lines (supplied). Direct plumb (no quick disconnect).
- Accessory Air Supply: 90-170 psi = 25 scfm, clean, dry air (non-condensing) source.
- With top heater and board cooling system operating, system consumes up to 25 scfm @80 psi. With all systems activated, 70 psi. must be maintained. Requires both gas lines be direct plumbed (no quick disconnect).

Electrical: IMPORTANT

- This system is designed to operate on 208VAC, 3 phase.
- Under full load conditions, power must not drop below 205VAC. Verify all 3 phases.
- If the PC and monitor are connected to a separate power source, or connected through a voltage regulator, the machine minimum voltage is 195V.
- Under no load conditions, power must not exceed 215VAC.

General:

These requirements must be addressed prior to the installation and training visit. This will assure you receive a productive training program within the scheduled installation time.

Physical:

- ONYX29 Dimensions:

  Base:
  32W" x 32D" x 36H"
  Operating with workstation:
  78W" x 50"D x 55"H

- ONYX29 Weight:

  ONYX29 (265 lbs.)
  with workstation (365 lbs.)

10.6 Workstation (optional): Assembly

ATTENTION NOTES:

IAC Industries takes great care in the packaging of its products, however damage can occur during shipment. Check all packages and parts for any signs of damage. If damage is evident STOP and contact the carrier that delivered your order. Request a freight claim inspector to document the damage and begin the freight claim process.

Tools required to assemble your WM BENCH products are:

7/16" and 1/2" wrench or socket with ratchet.
Phillips screwdriver 8" long.
Utility knife.
Safety glasses and light duty protective gloves.

NOTE: Power tools are NOT recommended unless they are equipped with a torque limiting device which can limit the torque to 10 foot lbs maximum at aluminum attachment points, and 15 foot lbs maximum for all other attachment points.

Unpack your order and separate like parts into separate areas. Be careful not to damage parts as they are being moved around and put into position. Also be sure all parts are removed from the packing materials before these materials are thrown away.

Locate the Hardware Kits and keep them in a central area. If the assembly is going to take more than one day, all individual hardware pieces should be returned to a central location.

Check all parts and Hardware Kits against the itemized packing list found with the assembly instructions. If you believe there are parts missing from your order please contact IAC Industries customer service HOTLINE at 800-989-1422.

If your order has ESD worksurfaces or accessories please review this section for helpful instructions and cautions before you begin assembling the workstations.

PRE ASSEMBLY CHECK LIST

Your bench has been carefully packed at the factory to prevent damage during shipment. Unpack all parts and examine them for damage. Contact your freight carrier for freight claims information if your order was shipped "freight collect" or "pre-pay and add". Contact IAC Industries at **800 989-1422** if parts are missing.

1/4-20x.75 Hex Head Bolt

1/4 Flat Washer

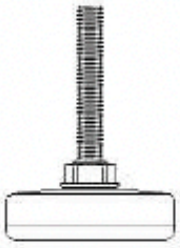
5/16-18x.75 Hex Head Bolt

Beam Connector Plate

Description	Qty
Worksurface	1
Pedestal Leg	2
Support Beam	2
Support Beam	2
Leg Extender	4

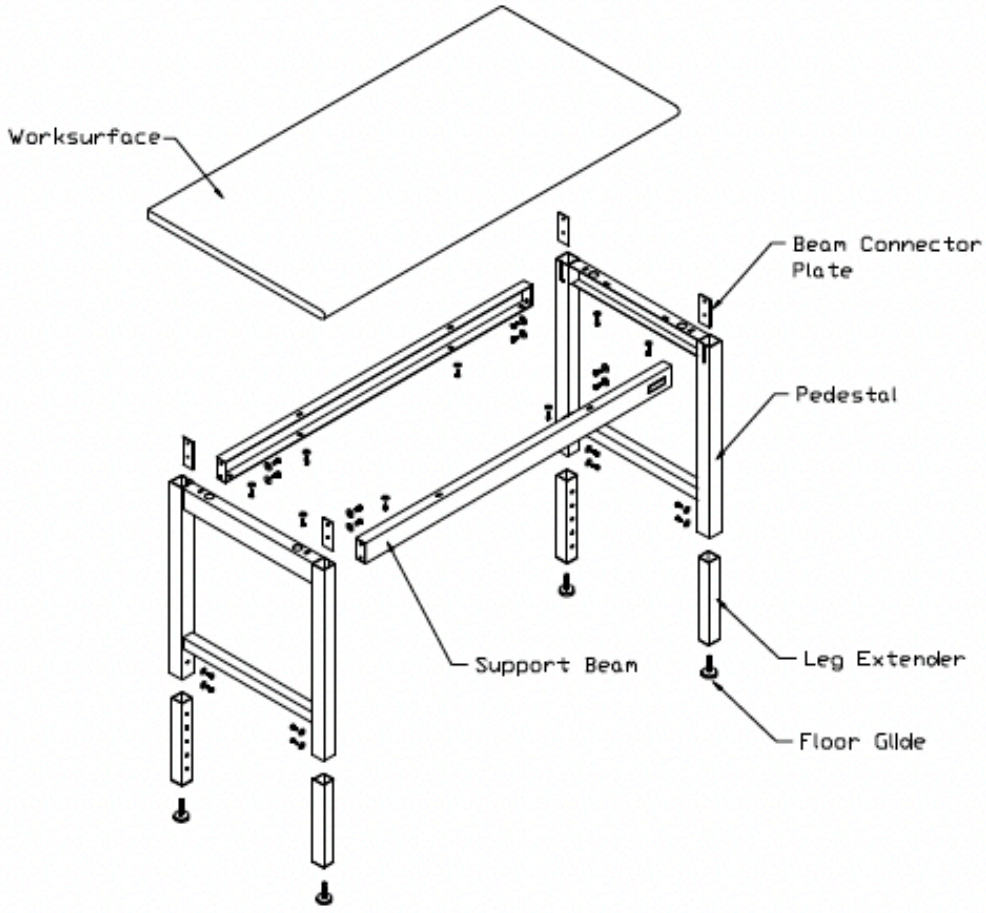
HARDWARE KIT #HWR001

Description	Qty
1/4-20 x .75" Hex Head Bolt	16
1/4 Flat Washer	24
5/16-18 x .75" Hex Head Bolt	8
Beam Connector Plate	4
Floor Glide	4



Floor Glide 5/16-18

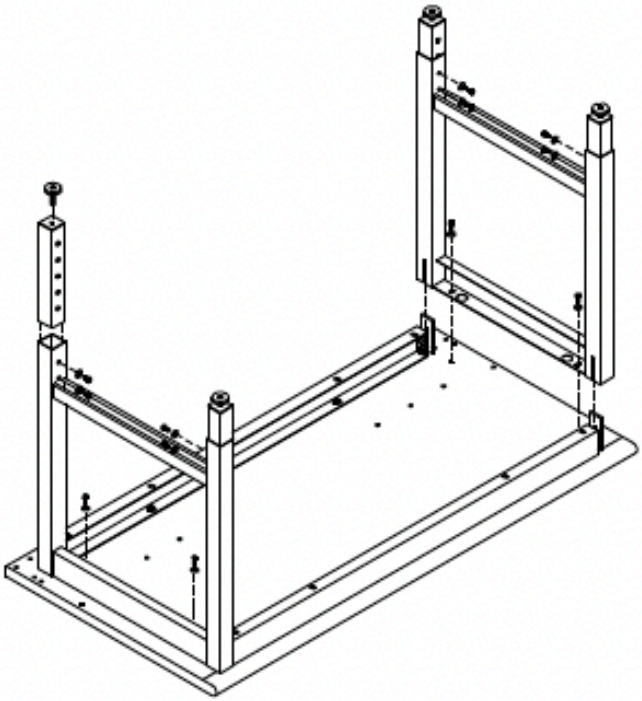
Workmaster E Series Bench Exploded View:



Workmaster E Series Bench Assembly:

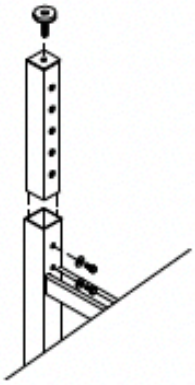
Step 3:

Align the workbench pedestals over the ends of the support beams and lower them down over the beam connector plates so that the plates are on the inside of the pedestal tubing. Align the slots in the pedestal support beam over the inserts in the worksurface and thread the 1/4-20 x .75 hex head bolts with the 1/4 flat washers into the inserts. Tighten the beam connector hardware. The frame should now be aligned on the worksurface to even the overhangs on the right and left sides tighten the beam attachment and the pedestal support hardware. NOTE: Do not over tighten the hardware that goes into the threaded inserts in the worksurface as this could cause the inserts to pull out of the worksurface.



Step 4:

Slide the workbench leg extender into the pedestal tube making sure the plastic insert in the end of the leg extender is exposed. Align the threads of the leg extender with the holes in the pedestal tube and select the desired height of the bench. Thread the 1/4-20 x .75 hex head bolts with the 1/4 flat washers into the threaded holes in the leg extender and tighten. Thread the floor glide into the plastic insert of the leg extender. The floor glides are used to level the bench when assembly is complete and it is put into position.

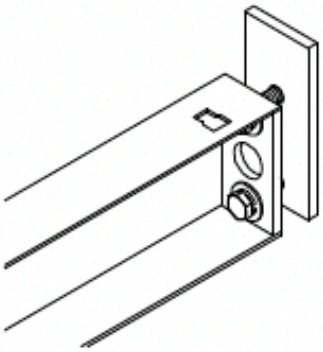


If you have ordered footrests, drawers, lower shelves or suspended cabinets for this bench please see pages15 thru 26 for assembly instructions. If not the workbench can be turned over for assembly of above the worksurface accessories or it can be put into place.

Workmaster E Series Bench Assembly:

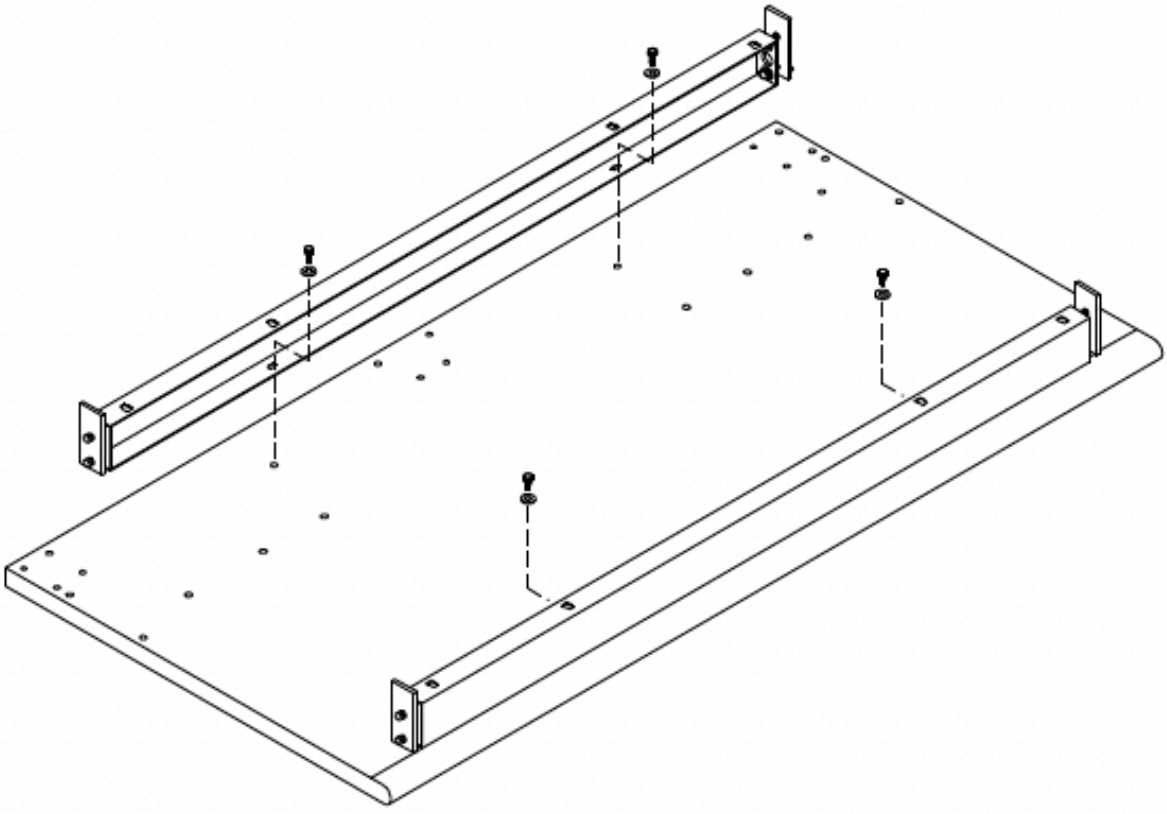
Step 1:

Attach beam connector plates to the ends of the bench support beams using the 5/16-18 x .75 hex head bolts and 1/4 flat washers supplied as shown. DO NOT TIGHTEN THE HARDWARE. If you have ordered a TE1 Electrical Channel it installs in the same way as the standard support beam and can be installed in the front or rear beam location.



Step 2:

Place worksurface topside down on smooth flat surface being sure to protect it from damage by foreign objects. IAC recommends the use of packing type blankets or clean cardboard. Place the support beams on the worksurface with the open side toward the center of the worksurface and align the slots of the support beams over the threaded inserts in the worksurface as shown. Thread 1/4-20 x .75 hex head bolts and 1/4 flat washers into the threaded inserts to attach the beams to the worksurface. DO NOT TIGHTEN THE HARDWARE.



Workmaster Modesty Panel

Item	Description	Qty
1	Modesty Panel	1

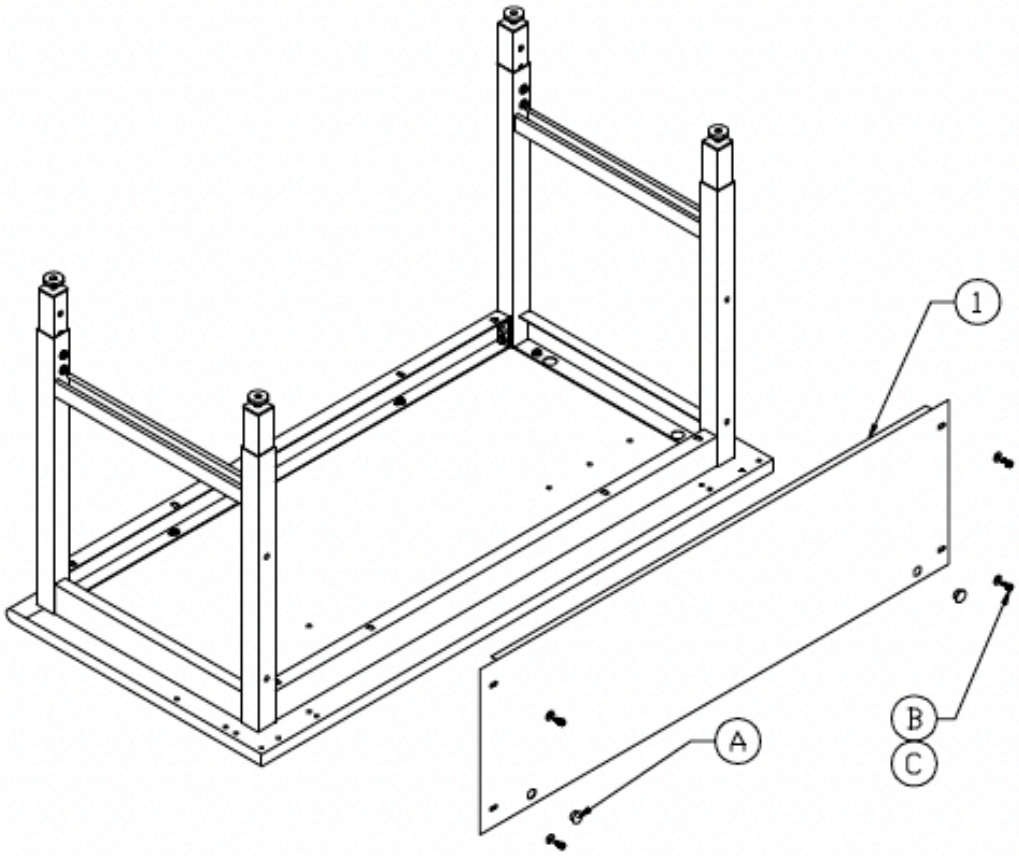
HARDWARE KIT HWR030

A	Cap, Plug .875 DIA Black Heyco #2703	2
B	Washer, 1/4 Flat Black	4
C	Bolt, 1/4-20 X .75 HHW Black	4
D	Screw, #14 X 1.00 PPH SMS Black	4

Note: This instruction can also be used for mounting modesty panels to benches with one and two cabinets.

Step 1:

Install the modesty panel to the back of the pedestal legs of the bench by using four 1/4-20 x .75 hex head bolts item C and four 1/4 flat washers item B. Install plastic caps as needed.



Please Note: To retrofit a modesty panel to an existing workbench place the modesty panel against the rear of the pedestal legs and using the slots in the modesty panel as a template drill four 7/32" diameter holes in the pedestal legs. Attach the modesty panel using four # 14 x 1.00 screws item D and four 1/4 flat washers item B.

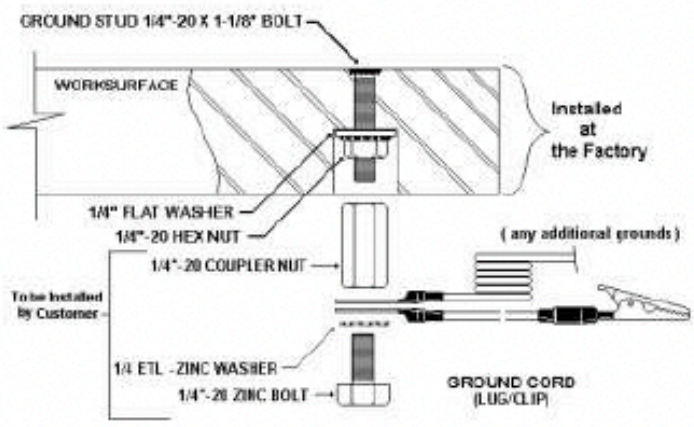
ESD Grounding

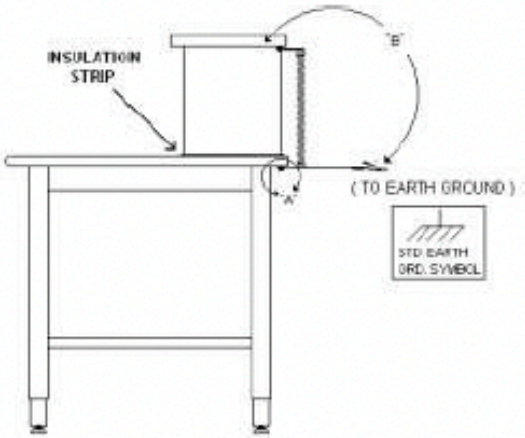
HARDWARE KIT HWR014 and HWR016

Note: do not use power tools for installation of ground cords.

Step 1:

For ESD worksurfaces and instrument shelves to dissipate static electricity they require the connection of a ground cord to an earth ground. IAC install grounding studs on each rear corner of all ESD worksurfaces and instrument shelves as well as insulation strips between work surface and riser boxes. Thread the 1/4-20 coupler nut onto one of these ground studs and tighten it being careful not to over tighten. Over tightening this coupler nut can cause damage to the connection between the ground stud and the laminate. Place the eyelet of the ground cord (or cords if you are also grounding an instrument shelf to the same ground stud) over the 1/4-20 x 1/2" bolt and thread the bolt into the coupler nut. The alligator clip must attach to an earth ground.





ESD Laminate Testing:

Although IAC conducts connectivity and surface resistance tests at the factory on all ESD worksurfaces and instrument shelves, IAC recommends that customers conduct their own tests on all ESD worksurfaces and instrument shelves to ensure that the ground cord installation has been completed correctly and that the ESD material is working properly.

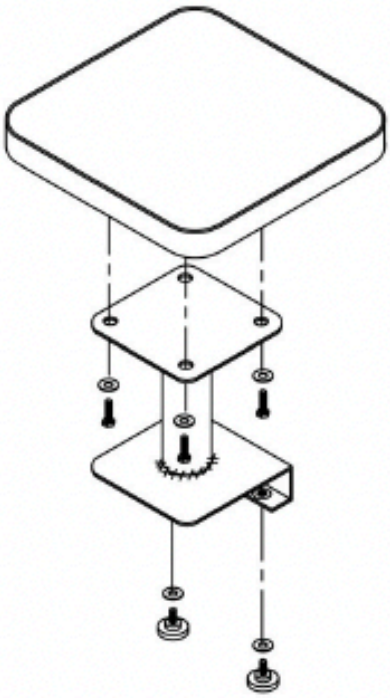
Cleaning ESD Materials:

ESD laminates are designed to resist abrasion, scuffing, scorching, and most solvents. Intense exposure to any of these conditions can damage the ESD properties of the laminate and will require the replacement of the worksurface or instrument shelf. ESD laminate worksurfaces and instrument shelves are cleaned much the same as non-ESD laminated surfaces with a damp cloth and light soapy cleanser. A mild chemical cleaner can also be used as long as the laminate is not exposed to the chemical for long periods of time. Stains can be removed with a two-minute exposure to a 5% hypo chloride bleach solution immediately followed by a light soapy cleanser.

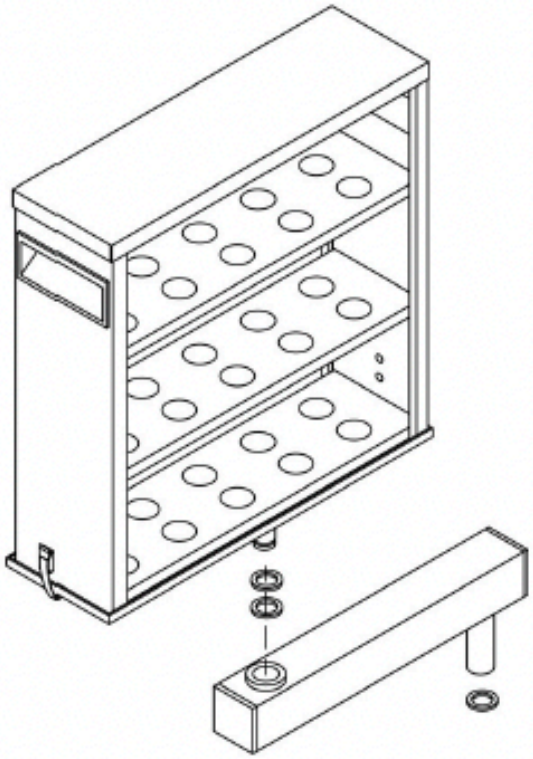
ESD Ground Precautions:

1) Connect each workbench worksurface individually to the earth ground.
2) The green wire in a standard wall duplex can be used if it has been absolutely determined that it is attached to an earth ground.
3) Do not use power tools to install grounding hardware and components.
4) If benches are relocated IAC recommends the ground cords connections be re-tested.
5) Never use abrasive pads or cleansers to clean ESD surfaces.
6) Never wax ESD surfaces and avoid cleaners with wax-based properties.
7) Test ESD worksurfaces and instrument shelves frequently to ensure it is working properly.

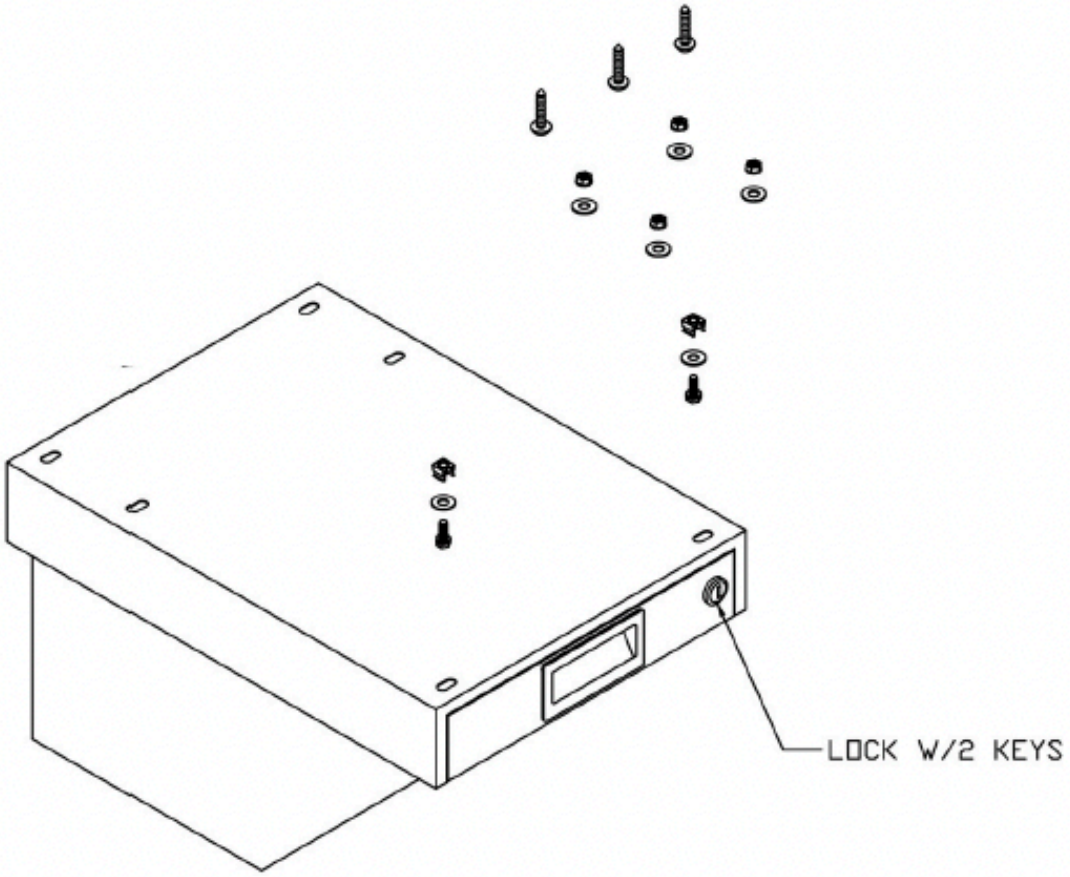
Monitor Stand



Nozzle Holder



Triple Locking Drawer



10.7 Installation of the ONYX Machine

Note
Floor loading capacity of 500 kg/m2 (installation specifications, common for industrial applications, concrete material, no raised floor).

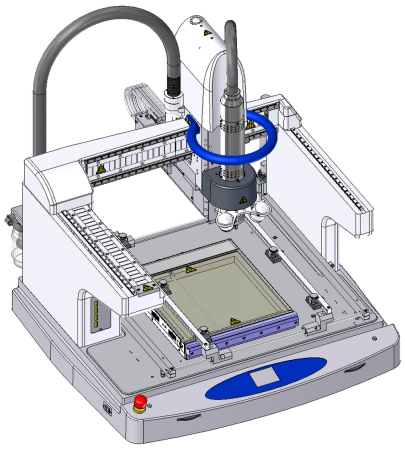
Before the machine "ONYX 29 Series 7" can be installed on its place, the machine table or a strong lab bench with a flat and horizontal surface must be installed. This table must be very stable to support the system.

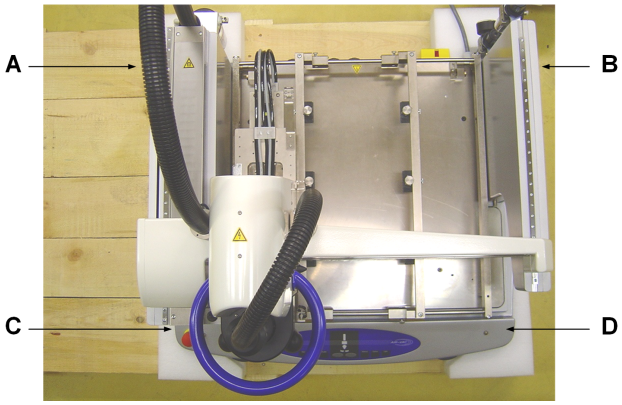
Move the machine onto top of the machine support.

Note
The machine layout may be custom specific any may appear different. The here displayed machine layout describes the high end selective soldering system.

Warning
A Minimum of 4 persons is needed to manually move or carry the machine from the crate to its final location. The machine weight is 140 kg (308 lbs.).

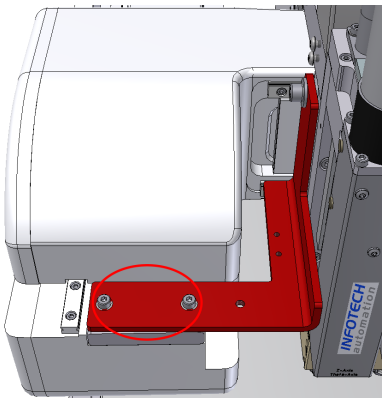
The weight is unbalanced, the left side (when standing in front). Use the corner spots on the base for lifting the machine, as marked A, B, C and D on the following drawing.





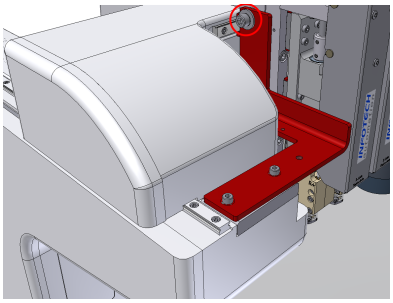
After the system has been moved to the proper location, the transport safety locks can be removed, the cables can be connected, and the system can be made ready for operation.

10.8 Removing the Transport Locks

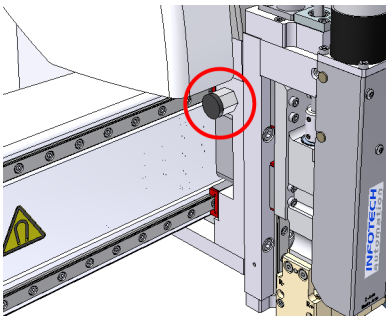


Remove two screws.

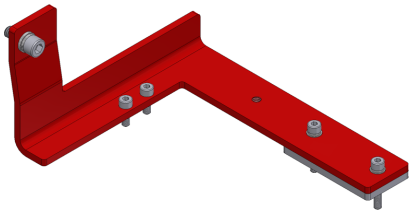
After these two screws are removed, the X-axis can be moved carefully to the right side. Make sure not to move the Y-axis during this moment because the linear scale of the Y-axis can be damaged.



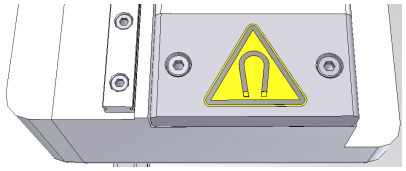
The screw of the transport lock can be removed and after that the transport lock can be removed.



Loosen the rubber buffer on the transport lock, screw it into the X-slide and tighten it by hand.



Replace the two remaining screws in the transport lock by the ones removed in the picture above (longer ones).

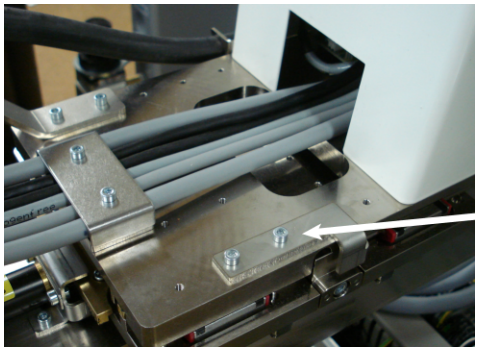


The screws of the transport locks are to be used for the attachment of the Y-Axis. The screws have different lengths. When transporting the machine, the longer screws are used with the transport lock.

Warning
Use always the longer screws to mount the transport lock. The shorter ones have no screw lock and therefore can be loosed during the transport.

Note
Put the safety bracket with the longer screws and the buffer replacement screw into a safe location. It will be used each time the system is being moved.

Move the X-axis and the Y-axis from one end to the other end, then move both axis to about the center location. These two main axis can be moved easy, when there is no power to the system, as linear motors and linear encoders are used.



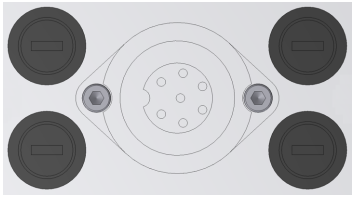
Remove the Vision Y-axis transport safety lock by removing two screws. Re-attach them in the same location but facing up. This way the locks are always present when needed.

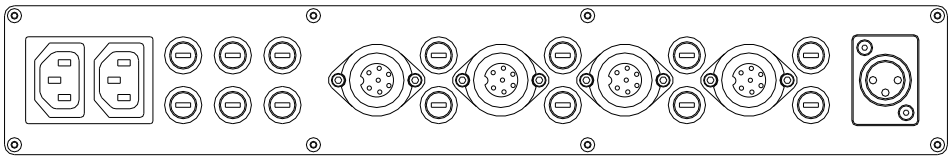
Warning
The Vision X-axis cannot be moved manually. Do not try to move the Vision X-axis manually. The motor transmission may get damaged.

Note
The Vision Y-axis cannot be moved easy. Carefully move the Vision Y-axis slightly to the front.

10.9 Install the Preheater when available

Normally the preheater is transported inside its separate packaging. Unpack the preheater and remove the isolation material. Make sure that there is no isolation material left at the pre-heater and at the application base plate. The pre-heaters feed have to be located in the appropriate holes of the base plate (if available). The connections seen from the back side:





The cables of the preheaters can be installed in the back of the system. It is possible that the system is equipped with 1 pre-heater zone, 2- or 4 pre-heater zones. Install as many cables into the pre-heater port as available. The ONYX 29 Series 7 has a maximum of 4 ports.

Warning
The two cables of the Pre-heater 300 x 300 mm have to be connected into Pre-Heater port 1 and Pre-Heater port 2, respective into Pre-heater port 3 and Pre-heater port 4. This type pre-heater can be used on machines with 3 phases and neutral wiring (Europe) providing 400 Volt AC between the phases and 230 between phase and neutral (3 x 230/400 VAC). Make sure to set the internal pre-heater specific bridge cable.

10.10 Electrical Installation

Warning
Only qualified personnel may work on the peripherals with low voltage devices. Country specific prescriptions must be considered.

While working in the low voltage area, make sure to have another person present who knows the machine and can apply first aid.

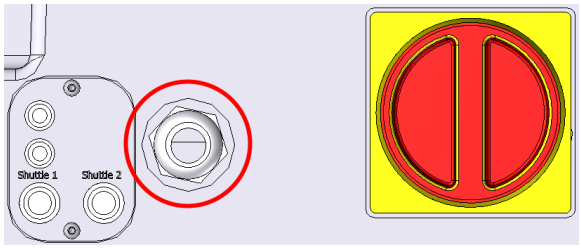
The power supply has to be disconnected to assure that no one can start the machine.

Note
Before doing the startup procedure of the machine, the electric schematic has to be studied.

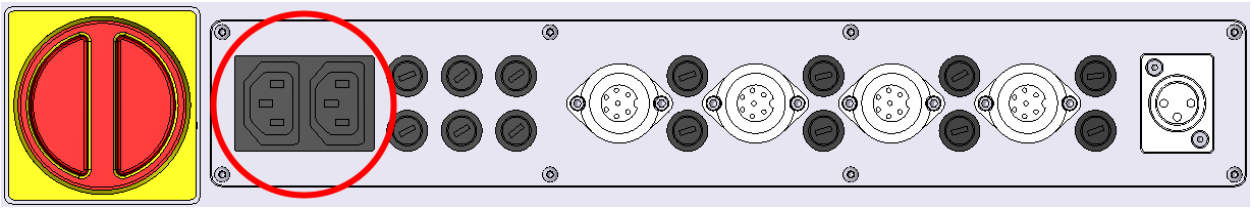
10.10.1 Main Power Supply

The main 3-phase power cable is already connected inside the base chassis.

Use this cord to connect to a facility power outlet. Please note that the wire labeled 1 must be connected to phase 1, the wire labeled 2 must be connected to phase 2 and the wire labeled 3 must be connected to phase 3. This is important because of the phase shift.



Install the PC and monitor. The power of the PC and the monitor can be taken from the system, connect the PC and the Monitor to the ports labeled accordingly:

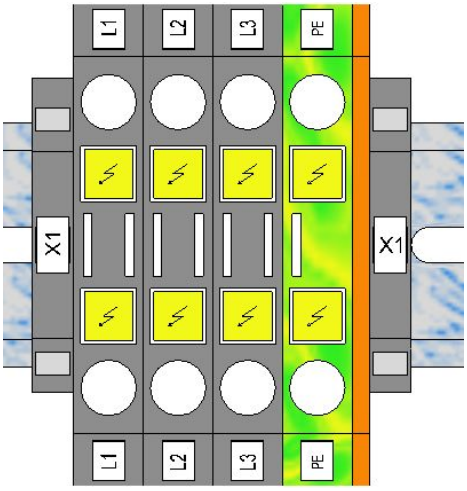


Warning
The power supplied on these PC- and monitor power ports provide a voltage of 208 or 230 VAC, make sure the PC and the monitor are configured for this voltage supply. Otherwise the PC and monitor can be damaged. When the system is connected 3 x 208 VAC 3PE, then the system operates okay with the voltage tolerance of +/-10%.

However the voltage for the PC may be too low. Please check the specifications of the PC.

Electrical Supply	3 x 208 V /120 VAC (3PNE)	60 Hz	3 Phasen 16 A

The external 3 phase main power cable has to be conducted through the large terminal. Depending on the cable cross-section some rubber distance rings have to be removed inside the terminal.

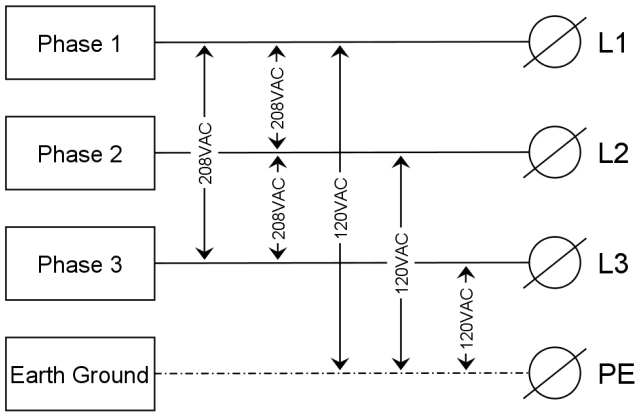


Feed-in: 3 x 208 V /120 VAC 3PE
Phase 1 = Clamp X1/L1
Phase 2 = Clamp X1/L2
Phase 3 = Clamp X1/L3
Earth Ground = Clamp X1/PE

Use a screwdriver size 3 to fix the cables in the clamps. Make sure that all three phases supply the appropriate voltage.

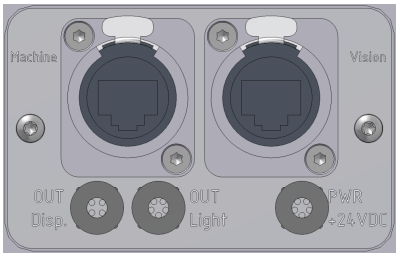
Potential Difference

208VAC 3PE



Note
If all measured voltages are in the defined range, the main power switch on the machine " ONYX 29 Series 7" can be switched on.

On the side of the communication interface, the network cable (Ethernet) is plugged into the RJ45 socket (Machine), the other end is connected to the computer.



On the side of the communication interface the camera cable is plugged into the RJ45 socket (Vision), the other end is connected to the computer.

If an optional vision unit is to be used, the illumination is to connected on the plug (OUT Light). This signal supplies a 24 VDC signal.

If an optional dispense system is to be used, the trigger signal of the dispense unit is to connected on the plug (OUT Light). This signal supplies a 24 VDC impulse.

If one ore two optional and external component shuttle has been supplied with the system, then the electrical connector and the pneumatic hose can be connected to the on the other side, below the pneumatic maintenance units. Connect the electrical connector in the upper port and the pneumatic hose into the lower port.

10.10.2 Heater Phase Detection

The phase sequence and orientation is not known the first time the machine is connected to the power. An automatic Input power phase detection is integrated in the VisualMachines™ Software which has to be executed after installation or changing the power port. Otherwise the heaters perform with overshoots and do not follow the set points. See chapter phaser detection how to use the heater phase detection in the Software.

10.11 Pneumatic Installation

10.11.1 Main Air Connection

The machine has to be supplied with clean, dry and non-condensing air.

Connect the air hose to the Pneumatic maintenance unit located at the back left side of the machine. If two maintenance units are installed, the lower unit is the main air source unit. The upper one is used for the soldering processes, for example nitrogen can be connected.

It is better to use a straight connection to the main pneumatic maintenance unit and not a 90 degree connection as displayed on the picture. Use at minimum a hose with a diameter of 8 mm (1/3 Inch tube).

If a second maintenance unit is installed, this unit must be connected as well. Normally this unit is being supplied with nitrogen. However, if nitrogen is not available, then it must be connected to an air source. Otherwise it will not be possible to use the hot gas tool.

Note
The system may be equipped with one or with two pneumatic maintenance units. The lower unit is for the general purpose pressure supply, the optional upper unit may be used to provide a second source gas, mostly nitrogen, for the hot gas soldering processes.

Both units must be adjusted to 0.55 MPa or 5.5 bar (80 PSI) with a tolerance of +/- 0.05 MPa or +/-0.5 bar.

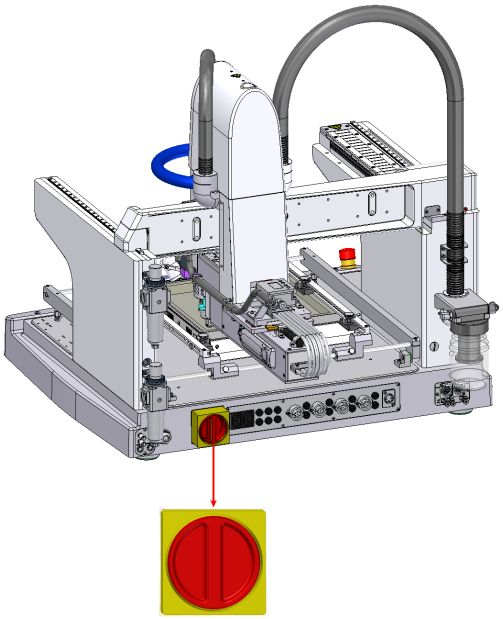
11 Power On and Off

The several steps are listed below and described in detail in the following sections:

- Turn on the main power switch
- Turn on the control power switch
- Turn on the computer (PC)
- Start the VisualMachines™ software
- Log in using the username and password
- Release E-stop and press the Enable button on the operator panel
- Start calibration program
- The system is ready

11.1 Power On

Turn on the main power switch



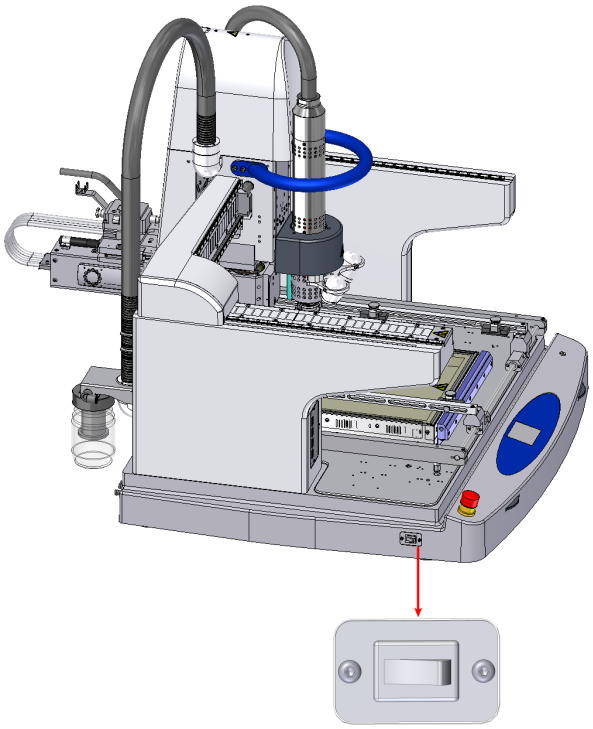
The main power switch is located on the front left side of the machine "ONYX 29 Series 7".

The pictured main power switch is figured in off state. The switch must be turned 45° clockwise to switch the machine on.

Normally this switch is not switched off. It is being switched off only if maintenance personnel need to have access to the power control modules in the base of the system.

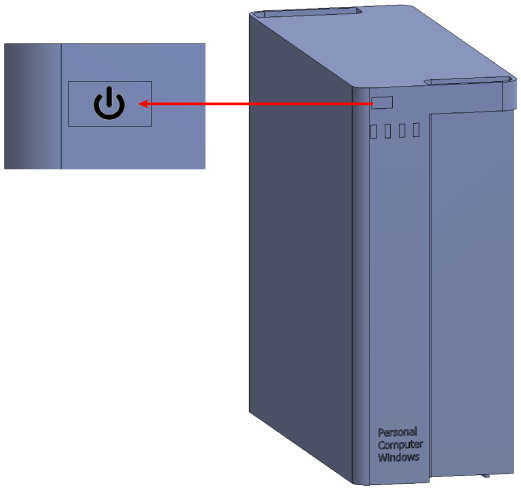
Note
Please be aware that switching off this main 3-phase power switch will switch off the PC and monitor as well. Shut down the PC first before manipulating this switch to OFF (0).

Turn on the control power switch



The control power switch is located on the front right side.

Turn on the computer (PC)



Switch on the monitor, the PC and load the operating system Windows.

VisualMachines™ Software

Note
Wait until the PC has loaded the windows operating system. This may take some minutes.

As soon as the Windows operating system has been loaded, double click the Icon VisualMachines™ and the software will be started.

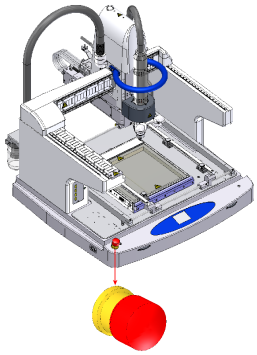
The system can be configured, that VisualMachines™ starts automatically. Refer to the Windows operator system manual.

Log in using the username and password

Input the username and password. Different access levels with different rights, depending on the user, can be configured. Typically these are:

Level 1	Operator (Technical Operator)
Level 2	Maintenance
Level 3	Process
Level 4	Administrator

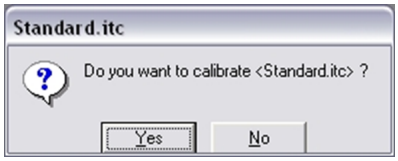
Release E-stop and press Enable button



To release E-stop button (big, red button on the left side of the operator panel), it must be turned for around 20°. The axes are not enabled when the E-stop button is released. To enable the axes the Enable button must be pressed. When the start button will be pressed, the axes will be calibrated if necessary.

Start the system state

The VisualMachines™ Software will prompt the operator to execute the calibration program.



The minimum of the calibration that must be executed at start-up is the calibration of the axes. The X-, Y-, Z- and Theta axes, the Vision X- and Vision X axes will move to find its zero position. At the end of the calibration program, per default, the system moves the axes to the park position (this may be configured different from system to system).

Note
The system is physically moving the axes during calibration. make sure there are no tools or any other parts in the working area.

The system is now ready for operation.

11.2 Power Off

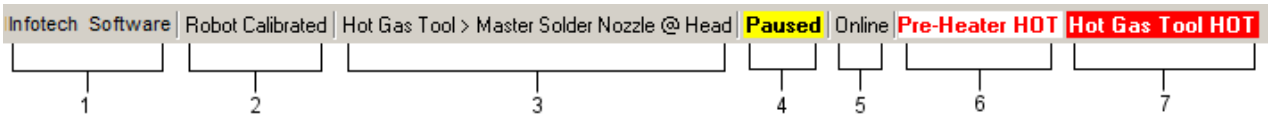
To turn off the machine, follow the turn on sequence in reverse order:

- Ending of the production
- Press E-stop
- Close the VisualMachines™ application
- Turn off the computer (PC)
- Turn off the control power switch

Note
The VisualMachines™ software cannot be closed, unless all the heating devices show temperatures below 60 °C. The actual temperature, as long as the temperature is above 60 °C, is being displayed in the status Line. The red blinking text indicates temperature above 60 °C.

11.3 Status bar and safety protection warnings

Independent of the VisualMachines™ view, the status line at the bottom of the monitor is always displayed:



1. Operator name & access level
2. Shows the robot status: calibrated/ not calibrated
3. Shows on which tool which nozzle to which head is
4. Runtime/ Idle/ Paused Running/ E-Stop
5. Online/ Offline
6. Pre-heater HOT Warning of hot surfaces! If more than 60 °C, flashes a warning text.
7. Hot Gas Tool HOT Warning of hot surfaces! If more than 60 °C, flashes a warning text.

The status bar is machine configuration specific and may appear different on your system.

Warning
For the Pre-heaters and for the Hot Gas systems, hot temperature warning labels are being displayed within the status line, as soon as the temperature of one of these devices is showing temperatures above 60 °C.

The actual temperature is being displayed in a red, blinking box.

The VisualMachines™ software cannot be closed, unless all the heating devices show temperatures below 60 °C and the warning messages have disappeared.

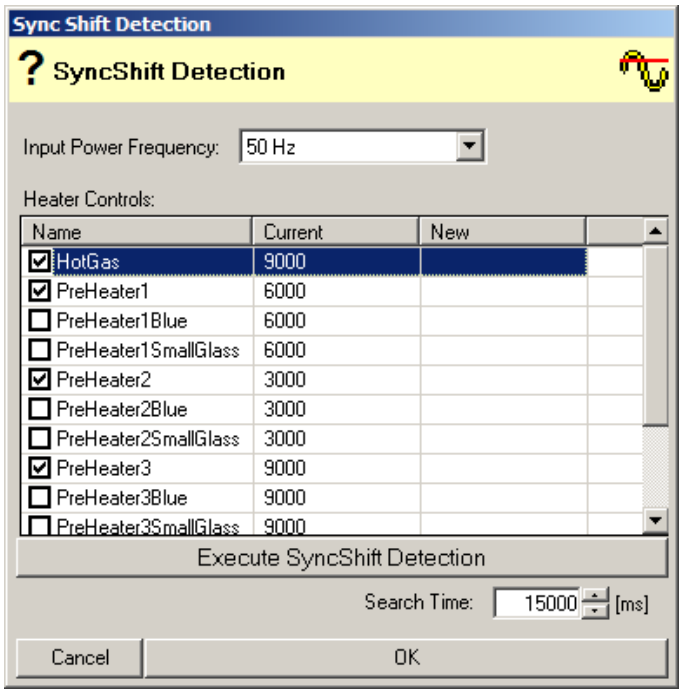
Note
For accurate software descriptions and software help use the online help within the software VisualMachines™.

11.4 Phase Detection

Each time a machine is being connected to a new power source, the phase detection program must be executed. This is important, as all the heaters are calibrated exactly based on a given phase shift. If the phase shift is not as configured, then the controlling of the heaters will not work properly.

Before starting with the phase detection process, make sure the machine and the heaters are "cold".

1. Start VisualMachines™ (version 1.60.34 or higher)
2. Log in at least as Service group
3. Open the **Utilities** view and select the **Heater Phase Det**
4. The Heater Phase Detection utility is shown:



- **Name**: The list shows all available Heater Controls that have to be redetected.
- **Current**: Shows the current phase shift value for the corresponding heater control
- **New**: Displays the new found phase shift value. By clicking the **OK** button, this value does get applied and stored in the configuration database

5. Do not change the Search Time value. Default value is: 15'000 [ms]
6. Make sure **EStop** is released and start the detection operation by clicking the **Execute SyncShift Detection** button

Note
The detection is a slow process and can take up to 10 minutes!

7. In the case of an error displayed in the New column, increase the Search Time by 5'000 [ms] and execute the **SyncShift Detection** again on the "bad" marked heaters only
8. Click the **OK** Button to store the new phase shifts

11.5 Operator Panel

Start Starting a program for execution. This button has the same function as the Start button in the Execution View and of the foot switch (optional). A program can be executed only when it is loaded and selected. The program name must appear in the header of the Execution View, when it is properly selected. For program execution the Emergency-stop button must be released and the power to the axes must be enabled.

If a program is paused it is possible to re-start the program by selecting the Start Button.

Stop Stops, pauses the program at the next program step. This button has the same function as the Pause button in the Execution View.
If the program is already paused, activating the Stop button again, stops the program from execution, the program cannot be continued it needs to be restarted.

Enable The Enable button is used to enable the axes power after the E-stop has been released. When the axes power is enabled, the axes cannot be moved manually. Once the power is enabled, the power can be disabled using this button again.

Manual Once the power is enabled, the Manual button switches the control of an axis to the Manual Motion Mode (ManualMotion)…. Turning the ManualMotion wheels on the operator panel moves the selected axis. This can be used especially to teach points on an axis. The selected axis can be moved manually this way.

ManualMotion start level	→	All axes are enabled
ManualMotion first level	→	Left wheel = X-axis (coarse or fine)
	→	Right wheel = Y-axis (coarse or fine)
ManualMotion second level	→	Left wheel = Z-axis (coarse or fine)
	→	Right wheel = VY-axis (coarse or fine)
ManualMotion third level	→	Left wheel = X-axis (coarse or fine)
	→	Right wheel = Y-axis (coarse or fine)
ManualMotion fourth level	→	Left wheel = Z-axis (coarse or fine)
	→	Right wheel = VY-axis (coarse or fine)
ManualMotion fifth level	→	Starts again at first level…

To disable the ManualMotion mode, select the Enable button which enables all axes and deactivates the manual motion mode.

During the vision alignment process, these wheels are used to match the component to the board.

Option The option button has no factory defined function. It can be used for any function within the process sequences.

Light The light button is used to switch on and off the Field Illumination.

Theta Using these buttons allows rotating the Theta axis for alignment of the part on the nozzle.

12 Program Execution

Note
For accurate software descriptions and software help use the online help within the software VisualMachines™.

12.1 Execution View & Main Execution

After starting VisualMachines™, the Execution View is opened automatically.

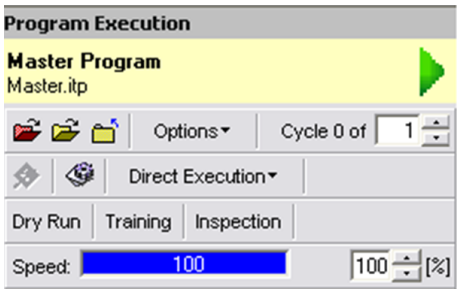
Otherwise the Execution View is opened by clicking the Execution button on the Views tab.

The Execution View allows opening and executing existing programs. All access levels allow the access to the Execution View and its functions.

A program must be loaded and selected for execution. There can only 1 program be selected for execution. The exception is when executing calibration sequences, then the selected program is temporarily removed. At the end of the calibration it is automatically selected again.

The Main Execution provides the functionalities to load, to start and to stop programs. When there are program errors during the program execution an error message is displayed in the Program Error Control section, so that the user can interact with the program execution.

12.1.1 Program Header



The header shows the name and the description of the selected program. If no program is selected, it will display "No Program…"

Quick Select button will open a submenu with all loaded programs. Selecting a program from the pull-down list will directly assign it to the execution so that it can be started.

Select or open program button will open the "Select and Open Program" window. It is possible to browse for finding the correct programs in various directories and then to select programs.

Close the current program for Execution button will unload the current selected program

Copy the current selected program button will copy the selected program. It will let the user give a new internal name and description. The program does get directly selected in the execution

Options — **Options** button opens a pull-down menu where you can enable/disable some display options like the Monitor or the Program Status window (see below).

Cycle — **Cycle** field defines the number of repetitions of the program before the program execution is finished. The left field shows the current execution status.

> **Note**
> Setting the cycle number to ZERO will loop the program indefinitely till the user is stopping it.

Calibration button opens a pull-down menu containing all peripherals that can be calibrated from the Execution View.

Maintenance button opens a pull-down menu containing all peripherals that support maintenance operation from the Execution View.

Direct Execution — **Direct Execution** button allows starting single process blocks that are supporting this feature (execution single processes instead of entire programs).

Dry Run — **Dry Run** Enable/Disable mode allows operating the system without using any media. The heaters are not being activated, no dispense- or flux media is being applied.

Training — **Training** Enable/Disable mode allows training pre-defined process parameters.

> **Note**
> Training mode allows setting process parameters in real environment during the program execution, for example teaching positions, setting dimensions or setting light parameters. Training mode functionality depends on each process and may appear different depending on the system configuration.
>
> Only qualified personnel with the label "Technical Operator" or higher has access to the Training mode through the "Direct Access Feature".

Inspection — **Inspection** Enable/Disable mode allows executing View processes in the program. If this option is disabled, the View processes are not executed. When using interactive soldering processes, the executed profile will be shown at the end of the process sequence when enabled.

Speed — **Speed** sets the velocity in percent for the robot axes.

Start — **Start** button to run the currently selected program

Pause — **Pause** button to pause the currently running program

12.1.2 Program Error Control

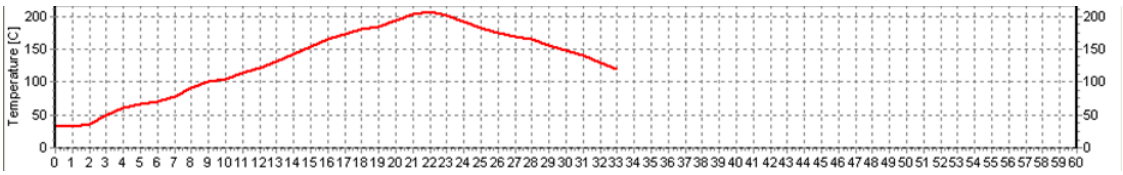
The Program Error Control gets always enabled when there is an error occurring during the program execution. The user can make decisions how to continue by clicking the following buttons:

Resume button will go on with the next process in the loaded program
Retry button will retry a procedure within the process
Skip button will skip a procedure within the process or even the whole process by continuing with the next one
Stop button immediately aborts the current running prograM
Process Properties button is active when process properties are available

Note
The meaning of the Error Control buttons is different from error to error. The text besides each button will describe its effect on the program/Process execution

12.2 Execution Monitor

The **Monitor** window can be enabled under the pull down **Options**, see section above. Temperature curves of peripherals are being displayed during program execution:



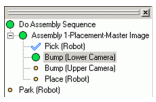
Using the **Menu** button opens a new submenu:

- **Clear Monitor** will clear all curves on the monitor
- **Hide Monitor** will hide the monitor. Click on the **Monitor** button in Program Control strip to show it again
- **Display Legend** will show a legend below the graph
- **Display Last Values** will show the last values of the monitor lines below the graph
- **Zoom all** option allows zooming the whole history of the captured values
- **Export…** will open an export dialog that allows saving the graph to a file or to clipboard in different image formats
- **Export to File…** open a dialog to save the graph by values to a *.csv file that can be imported in Microsoft Excel

Below the standard entries you can see a list of all peripherals that are supporting the monitoring function. By clicking on a peripheral name, you can select an entry to add its curve to the graph.

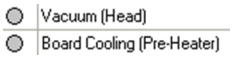
12.3 Program Status

The **Program Status** window is open automatically as soon as the execution of a program is started. It shows the position of the execution in the currently running program.



Icons in the tree have the following meaning:
Process has still to be done
Currently running process
✓ Process has done successfully
✕ Process was having an error

12.4 Direct Signal Manipulation



Below the "Program Error Control" menu, depending on the system configuration, digital output signals are listed which may be selectable during a paused execution.

13 Master Program Execution

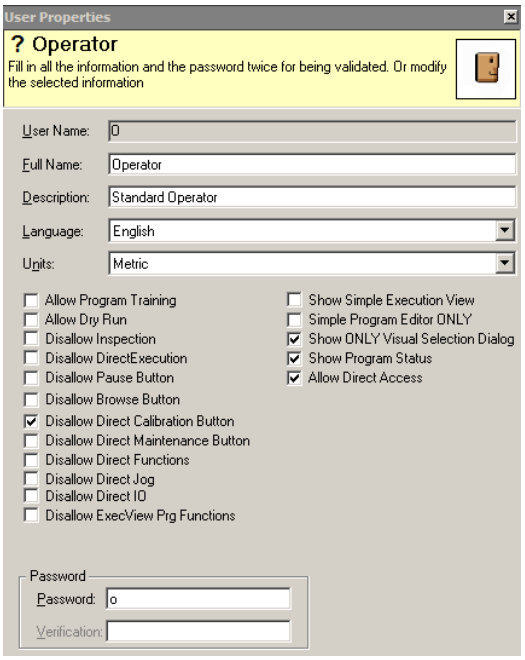
Note
For accurate software descriptions and software help use the online help within the software VisualMachines™.

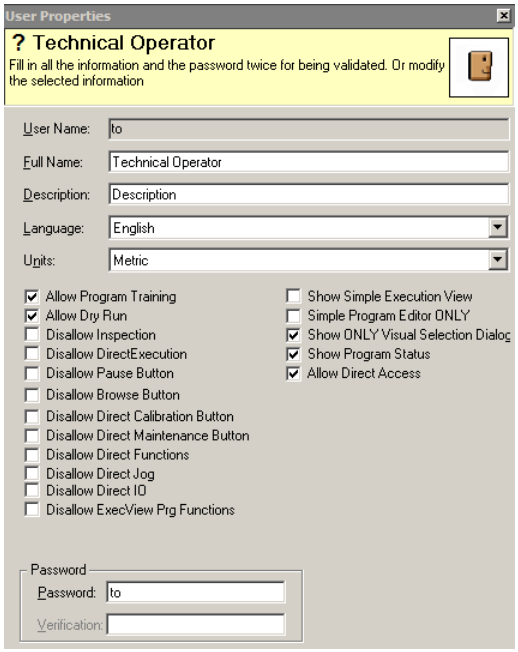
13.1 Operator Access Level

To process removal, site cleaning and soldering on the ONYX 29 Series 7 the user access level is divided into the Operator and the Technical Operator. Both have access to the Execution View only. The Operator is able to operate removal, site cleaning and soldering processes with existing programs and existing part type specific soldering profiles.

The Technical Operator is allowed to change process parameters via the Direct Access feature of VisualMachines™.

The following menu pages show the different configuration parameters which then differentiates between the Operator and the Technical Operator:





Note
The operator access level allows all the processing within the Execution View.

Within the Master Program, the process lists Removal, Site Cleaning and Soldering are available for various Part types. For Passwords and further access levels, contact your local dealer. These process lists in detail are explained in the following sections.

13.2 Master Program

Note
The Master Program (Template Program) is being modified continuously and enhanced in order to cover as many soldering applications as possible using practical experience. The process sequence varies, depending on different machine configurations. For these reasons the following pictures and descriptions may appear different to the installed programs.

The master program can be loaded by selecting the Icon **Select or open** program.

The name of the program must be visible within the program header before it can be executed.

The Technical Operator has access to the **Training** button. If the Training button is selected, it will be possible to change process parameters during the program execution through the Direct Access pages.

Select the **Start** button to start the master program.

13.2.1 Data Library Structure

VisualMachines™ stores the application specific data in databases with several different database tables. All the process specific data is stored in the Part Type database. The process data of these part types can be used in several different programs. The master program provides always the start parameters. Once the master program has been changed, it can be saved under a new name and can be re-executed at any time.

Assembly Within a program, the assembly contains the location coordinates and the link to which part is being used. The assemblies are program specific and stored within the program, not in a global database. If a program contains 1 assembly, then only one part and therefore also only 1 part type can be processed. Multiple assemblies could be setup, which use the same part and part type.

Part Each assembly within a program links to a part. Parts must be created program record contains the pick location specific and are stored within the programs. The parts link to a feeder and to a part type.

Feeder The feeders are stored within the machine specific configuration database. The feeder record contains the pick location.

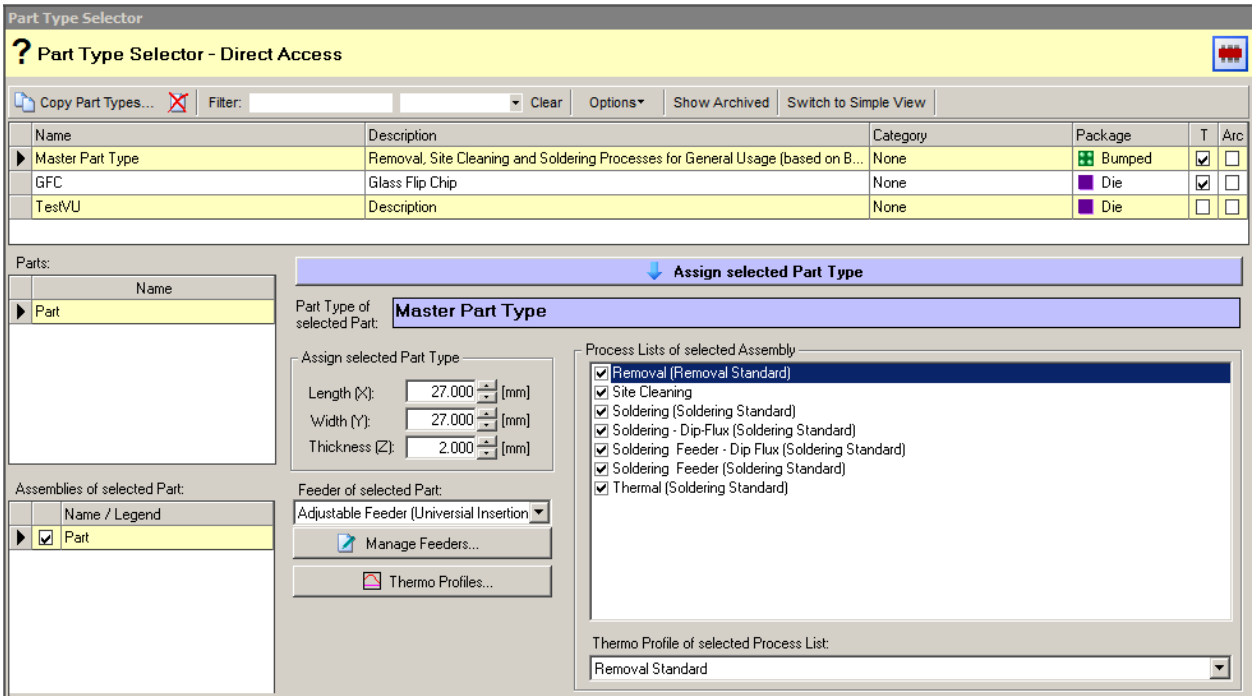
Part type The part types are stored in a global database and contain all the part- and process specific data. The part type can contain several process lists. For example, the Master part type contains 3 process lists, removal, site cleaning and soldering. Additionally, different profiles can be selected.

The ONYX 29 Series 7 in general is being used to perform one part process sequence after each other. Each time the process sequence can be re-defined. If a larger sequence has to be setup using multiple parts on one board which are being executed automatically, then multiple parts with multiple process lists can be programmed. If this is the case, please ask your local dealer how to setup multiple parts programming. The Master program described in this section is based on one part to be processed.

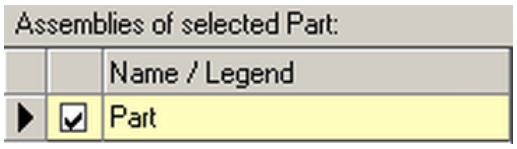
13.2.2 Select or Copy Part Types (Direct Access)

Operator may skip this section. Once the start button has been selected, then the Technical operator is allowed to select or change the Part Type to be processed and change the thermo profile parameters associated with it.

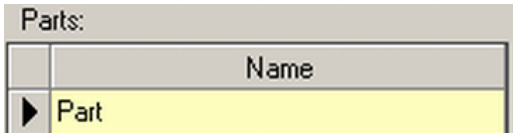
If the **Training mode** is selected, then the following dialog is showing up:



Note
The Part Type selection dialog is accessible through the Technical Operator only and is being displayed when the Training mode is selected.

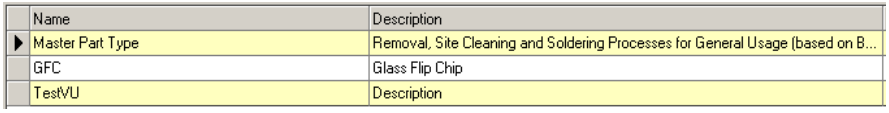


The Master Program contains 1 Assembly record, which inks to 1 Part record.

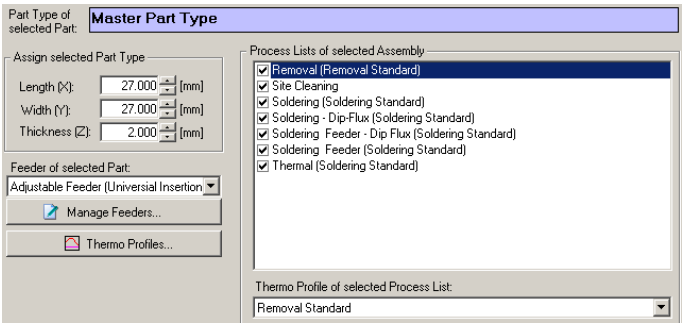


The Master Program contains 1 Part record, which links to the Master Part Type record.

The global part type database will grow with the time.



Assign selected Part Type
The Technical Operator can select change the part type to be processed within this screen. Selecting the correct part type within the **Available Part Types** menu and selecting the **Arrow** button, activates the new part type record.



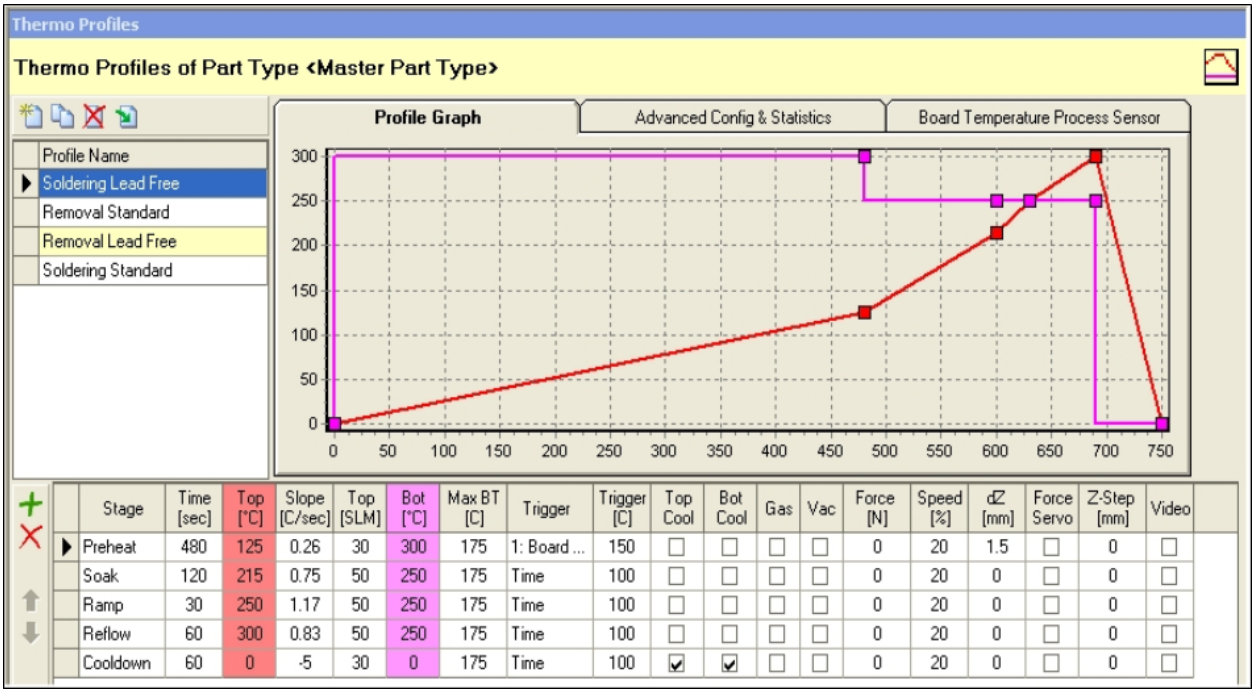
The Part Type Dimensions are being displayed and can be changed for the current production run. If a part type other than the Master Part Type is being selected, the dimensions should not be changed. In this case a copy of the part type record should be done instead, it can then be renamed and the dimensions can be changed. It is important to use the correct dimensions of the part to be processed, as several process parameters will be influenced when the dimensions are wrong.

Below the dimensions, the **Thermo Profiles…** button allows accessing the associated profiles which are being executed during the interactive soldering process. See the section just below.

Each part type record can have different process lists. The Master Part type contains process lists for Removal, Site Cleaning and for Soldering. Once the part type record has been changed, the available process lists will be selected. The Technical Operator must re-assign which process lists shall be used.

Thermo Profiles

The part type specific thermo profiles can be seen by selecting the **Thermo Profiles…** button:



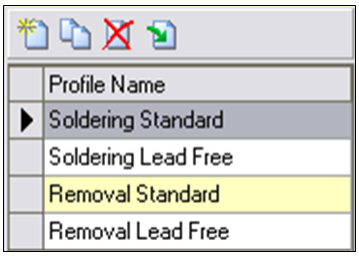
Profiles can be added, copied, imported from other part type records, removed and edited.


Is adding a new profile record


Copies the selected profile record

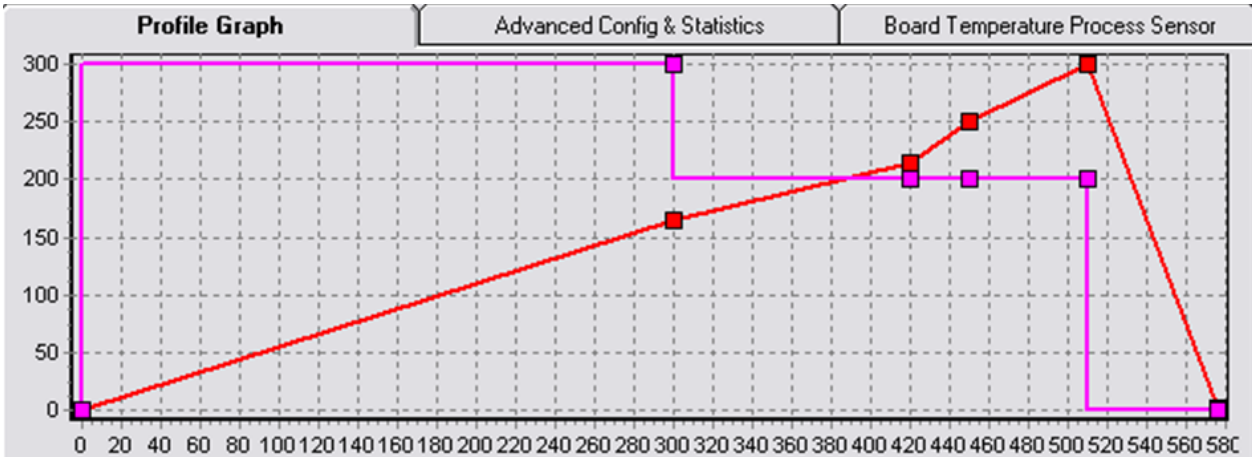

Deletes the selected profile


Opens a dialog box which allows selecting profiles from other part type records and import these



Profile Graph

The **Profile Graph** shows the set Temperature/Time diagram of the selected profile over the defined stages. The pink line defines the bottom heater temperatures over time (pre-heater), the red line defines the top heater temperatures over time (hot gas heater). Bottom heaters show always a rectangle profile. It is a slow acting heating device and does not exactly follow the selected profile. If multiple sections of the pre-heater are available, the profile display is averaged.



Advanced Config & Statistics

The **Advanced Config & Statistics** menu allows selecting timeouts and statistical values.

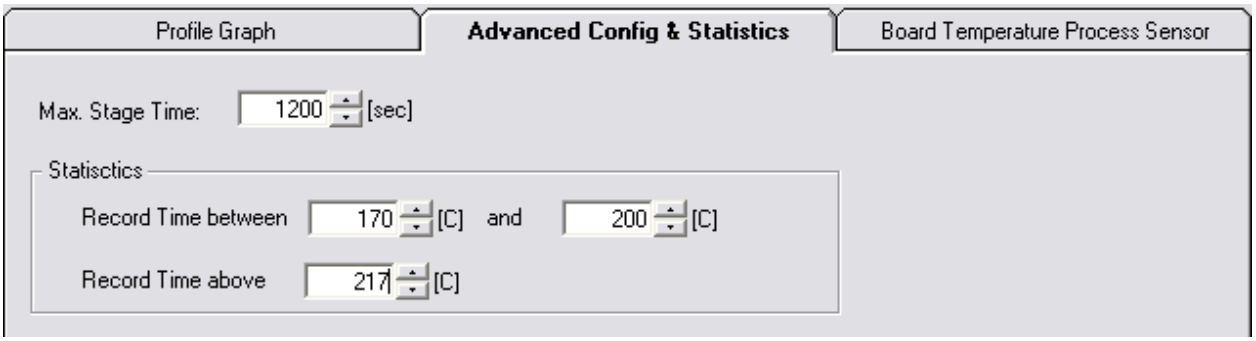
Max. Stage Time defines the maximum time a stage can be active. This value can be practical, if a profile error has been programmed, and a temperature trigger is not being reached. Using this parameter allows selecting a timeout value. After the time has been reached and a defined temperature trigger is not being reached, a program error is being prompted. The program run can then be terminated.

Record Time… between and… allows defining the soak temperature values for the statistical printout. Typically the soak time is being measured that way. All the connected thermocouples can be used and are recorded separately. Usually the thermocouple connected to the Joint will be used (per default thermocouple 2). The time the thermocouple will report temperatures in the defined temperature range will be recorded.

Record Time above allows defining the reflow temperature value for the statistical printout. Typically the reflow time is being measured that way. Any thermo couple can be used as above, but usually the joint thermocouple 2 is used.

Typical temperatures are:

Prozesstemperatur	Standard [°C]	Bleifrei [°C]
Verbindungstemp. (Joint soak)	140 - 170	170 - 200
Verbindungstemp. (Joint reflow)	> 183	> 217

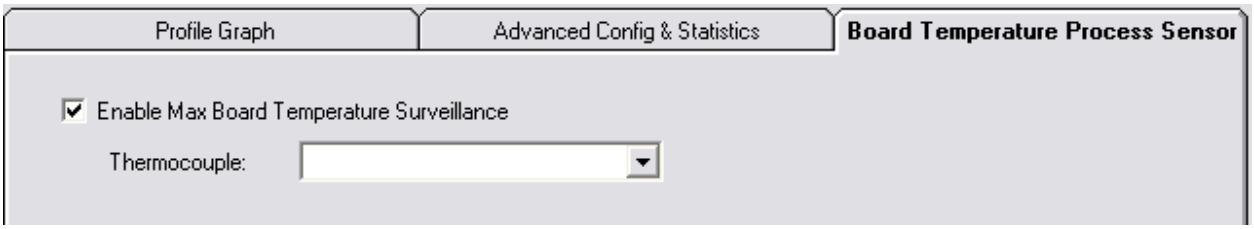


Board Temperature Process Sensor

The **Board Temperature Process Sensor** menu allows selecting max board temperatures surveillance process.

If the checkbox **Enable Max. Board Temperature Surveillance** is set active, then a thermo couple can be selected which will protect the board overheating. If the bottom heater temperature is set too high, then the board may get too hot. Independent of the set bottom heater temperature, if the sensor reports a too hot board temperature, the pre-heater is switched off. The actual max. board temperature can be selected within the profile table.

Thermocouple allows selecting the thermocouple sensor which should be used to survey the board temperature.



Profile Table

Within the profile table, the different stages can be programmed. Normally 5 stages are being defined, Pre-heat, Soak, Ramp, Reflow and Cooldown. It is possible to add additional sub-stages of the main stages. When adding a new stage, it is added at the bottom of the table. Using the arrows on the left site of the table the added stage can be moved to the location desired. The main stages cannot be moved and cannot be deleted.

- Is adding a new stage at the bottom of the table
- Deletes the selected sub-stage (main stages cannot be deleted)
- Moves the selected sub-stage one row up
- Moves the selected sub-stage one row down

Stage	Time [sec]	Top [°C]	Slope [C/sec]	Top [SLM]	Bot [°C]	Max BT [C]	Trigger	Trigger [C]	Top Cool	Bot Cool	Gas	Vac	Force [N]	Speed [%]	dZ [mm]	Force Servo	Z-Step [mm]
Preheat	300	164	0.55	30	300	125	1: Board TC	100	☐	☐	☐	☑	0	20	0	☐	0
Soak	120	215	0.42	50	200	125	Time	100	☐	☐	☐	☑	0.05	20	0	☑	0
Ramp	30	250	1.17	50	200	125	Time	100	☐	☐	☐	☑	0.05	20	0	☑	0
Reflow	60	300	0.83	50	200	125	Time	100	☐	☐	☐	☑	0.05	20	0	☑	0
Cooldown	100	20	-2.8	30	20	125	Time	100	☑	☑	☐	☐	0	20	0.1	☐	0

Note
The Interactive solder table may look different depending on the system configuration. The table above is shown with active force servoing but no direct view camera installed. The table blow is shown with disable force servoing but with a direct view camera installed.

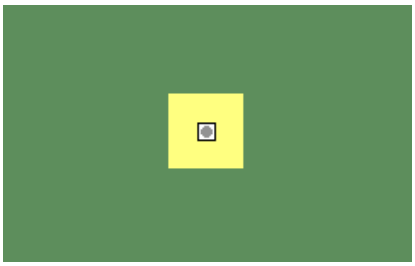
Stage	Time [sec]	Top [°C]	Slope [C/sec]	Top [SLM]	Bot [°C]	Max BT [C]	Trigger	Trigger [C]	Top Cool	Bot Cool	Gas	Vac	Force [N]	Speed [%]	dZ [mm]	Video
Preheat	480	125	0.26	30	300	175	1: Therm...	150	☐	☐	☐	☐	0	20	1.5	☐
Soak	120	215	0.75	50	250	175	Time	150	☐	☐	☐	☐	0	20	0	☐
Ramp	30	250	1.17	50	250	175	Time	150	☐	☐	☐	☐	0	20	0	☐
Reflow	60	300	0.83	50	250	175	Time	150	☐	☐	☐	☐	0	20	0	☐
Cooldown	100	20	-2.8	30	20	175	Time	150	☑	☑	☐	☑	1	20	0	☐

Stage	Defines the profile stage, normally Pre-heat, Soak, Ramp, Reflow and Cooldown.
Time [sec]	The time of the stage in seconds. If the trigger is set to a temperature, then the time has a secondary function. If the temperature is reached before the time, then the stage time is shortened, or if the temperature is not yet reached, then the stage time is being enlarged automatically.
Top [°C]	The temperature in °C of the hot gas heater. The top heater is displayed always in red color.
Slope [°C/sec]	The slope time in degrees per second. This factor is being calculated automatically if the Time or Top (Temperature) is being modified. If the slope is being changed, then the Time factor is calculated automatically. If a negative value is shown, then this reflects a cool down profile stage.
Top [SLM]	The gas flow in standard liters per minute of the hot gas heater. Within the range of 20 - 80 liters per minute a value can be defined.
Bot [°C]	The temperature in °C of the bottom heater, or pre-heater. The temperature is always used for all the selected pre-heater zones if multiples are available. The bottom heater is displayed always in pink color.
Max BT [°C]	The maximum board temperature in °C. This is the maximum temperature the board is allowed to reach, independent of the set Bottom heater temperature. The thermocouple selected in the menu page Board Temperature Process Sensor (see above) is being used as measuring device.
Trigger	It is possible to finish a stage based on a reached time or a reached temperature. Usually the pre-heat stage is triggered by the board temperature. All other stages normally are triggered by time. Clicking inside the trigger field opens a pull down with the possible temperature trigger sensors. Depending on the system configuration this pull down menu appears different. Normally the board thermocouple 1 is being used. Or if available the optional process temperature sensor mounted in the vision cube (not listed here).

Note
The following fields are always set at the beginning of the stage, where the parameters are being defined.

Trigger [°C]	If the trigger is set to a temperature, then this value defines the trigger temperature in °C. If the trigger is set to time, this value has no effect.
Top Cool	If selected, then the gas (air or nitrogen) is by-passing the top heater element for rapid package cool down processes.
Bot Cool	If selected, then the optional board cooling air of the pre-heater is switched on for rapid board cool down processes.
Gas	If selected the second optional gas source, mostly nitrogen, is being used.
Vac	If selected the solder head vacuum is switched on.
Force [N]	Force level in Newton in combination with dZ moves and Force Servo processes.
Speed [%]	Z-axis speed in percentage of the maximum Z-axis speed in combination with the dZ moves, see below.
dZ [mm]	It is possible to move the Z-axis at the beginning of a new stage. The speed previously selected is used. If a force is being defined, then the Z-axis moves either to the defined distance or to the defined force.
Force Servo	If selected the force on the component is always monitored and the Z-axis is always moved according to the force reading. Therefore, it is possible to keep the defined force level even if a board is being warped during the solder process.
Z-Step [mm]	If the Force Servo process is selected, then the Z-axis movement steps in mm can be defined within this field.
Video	If the Video process is selected, then the live video of the direct view camera is being shown during that particular stage during execution.

13.2.3 Select Process List



Once the start button has been selected, then the Operator is allowed to select the process list of the selected Part. The board is displayed as a green image. The Master program shows a large board, the maximum possible 508 x 508 mm board. Depending on where the last process took place the component will be shown.

Click with the right mouse button onto the component to receive the following pull down menu with the available process lists. In the top row, the corresponding Part record is listed with the possible process lists. The Master program includes the process lists, Removal, Site Cleaning and Soldering. The process lists with a red dot will not be executed the ones with a green dot will be executed. The selection can be changed by clicking with the left mouse button on the corresponding line.

Note
Once these selections are done, then the actual program execution starts.

13.2.4 Status Window: Removal, Site Cleaning, Soldering

During the execution of the process list, the status window is being displayed on the right side, which shows the current step within the program sequence or process list as information.

Removal

- Park (Robot)
- Board Load (Board Carrier)
- Operator Message (General Processes)
- Heating (Pre-Heater)
- Do Assembly Sequence
  - Part-Removal-Board
    - Place Position Teach (Vision Unit)
    - Control Heating (Hot Gas Tool)
    - Match (Vision Unit)
    - Control Heating (Hot Gas Tool)
    - Control (Force Table)
    - Pick (Robot)
    - Interactive Soldering (Interactive Soldering)
    - Pick (Robot)
    - Control Heating (Hot Gas Tool)
    - Reject (Reject Bin)
- Stop Heating (Pre-Heater)
- Park (Robot)
- Wait (Thermocouples)
- Stop Heating (Pre-Heater)
- Heating (Pre-Heater)
- Board Unload (Board Carrier)

Site-Cleaning

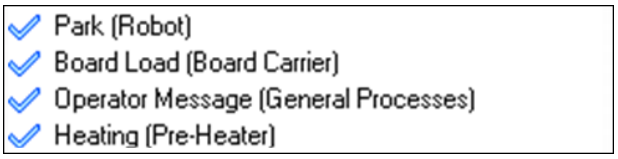
- Park (Robot)
- Board Load (Board Carrier)
- Operator Message (General Processes)
- Heating (Pre-Heater)
- Do Assembly Sequence
  - Part-Site Cleaning-Board
    - Heating (Pre-Heater)
    - Maintain (Pre-Heater)
    - Place Position Teach (Vision Unit)
    - Control Heating (Hot Gas Tool)
    - Wait (Thermocouples)
    - Operator Message (General Processes)
    - Site Cleaning (Hot Gas Tool)
    - Control Heating (Hot Gas Tool)
    - Maintain (Pre-Heater)
- Stop Heating (Pre-Heater)
- Park (Robot)
- Wait (Thermocouples)
- Stop Heating (Pre-Heater)
- Heating (Pre-Heater)
- Board Unload (Board Carrier)

Soldering

- Park (Robot)
- Board Load (Board Carrier)
- Operator Message (General Processes)
- Heating (Pre-Heater)
- Do Assembly Sequence
  - Part-Soldering-Board
    - Place Position Teach (Vision Unit)
    - Move (Robot)
    - Operator Message (General Processes)
    - Pick (Robot)
    - Match (Vision Unit)
    - Operator Message (General Processes)
    - Place (Robot)
    - Interactive Soldering (Interactive Soldering)
    - Place (Robot)
    - Control Heating (Hot Gas Tool)
- Stop Heating (Pre-Heater)
- Park (Robot)
- Wait (Thermocouples)
- Stop Heating (Pre-Heater)
- Heating (Pre-Heater)
- Board Unload (Board Carrier)

The images above prove that all the process steps are identical, except of the actual Do Assembly Sequence process: Part-Removal-Board, Part-Site Cleaning-Board and Part-Soldering-Board. The processes before the actual Part… process are being called the initialization process steps. The processes after the actual Part… process are being called the completion process steps.

13.2.5 Initialization Process Steps



Park (Robot)

All axes of the robot are automatically moving to the defined park positions. This allows having access to the board carrier. This step is executed automatically and does not need any operator attention.

Board Load (Board Carrier)

The operator is prompted to manually load the board. The board shall be placed carefully inside the board carrier. The board clamps and board supports must be set properly.

After the board is properly in place, select the **Resume** button.

Warning
Just below the board carrier, the pre-heater is located which can reach temperatures well above 60 °C. Use heat protection gloves or be very careful not to touch the pre-heater. Also the side rails of the board carrier may be hot.

When lifting up the board carrier to adjust the board supports, make sure the board carrier rails with the board clamps are not being moved into the vision cube. The lower led protection glass may get damaged otherwise.

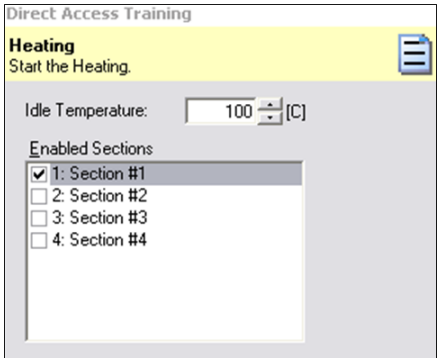
The board carrier cannot be locked in any raised position, as it would be too dangerous to have the robot moving and the board carrier locked at an upper position.

Operator Message (General Process)

The operator is prompted to manually install the Thermocouple #1 onto the board. This step may be ignored if an optional process temperature sensor is installed inside the vision cube, or an optional external pyrometer is being used.

After the thermocouple is properly in place, select the **Resume** button.

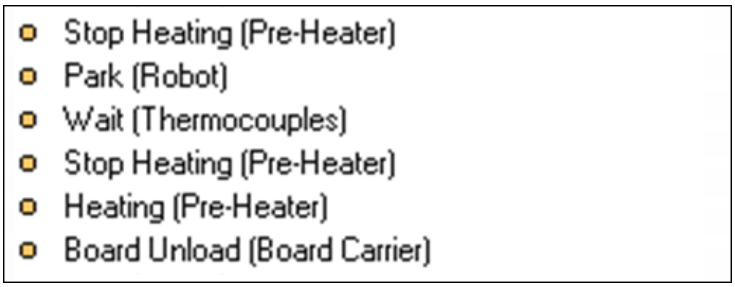
Heating (Pre-Heater)



The selected zones of the pre-heaters are being activated and brought to the defined idle temperature.

The Technical Operator using the Training mode can select the zones to be used and the temperature. Once the zones are defined then this step is executed automatically and does not need any operator attention.

13.2.6 Completion Process Steps



Stop Heating (Pre-Heater)

The pre-heaters are being switched off, if the optional board cooling is installed, it is being activated automatically. This step is executed automatically and does not need any operator attention.

Park (Robot)

All axes of the robot are automatically moving to the defined park positions. This allows having access to the board carrier. This step is executed automatically and does not need any operator attention.

Wait (Thermocouple)

If a board thermocouple is being defined and installed, normally thermocouple 1, then the system is waiting until the board temperature of 60 degrees has been reached, which allows a safe removing of the board. This step is executed automatically and does not need any operator attention, except the operator needs to wait.

Stop Heating (Pre-Heater)

If the optional board cooling is installed, it is being switched off. This step is executed automatically and does not need any operator attention.

Heating (Pre-Heater)

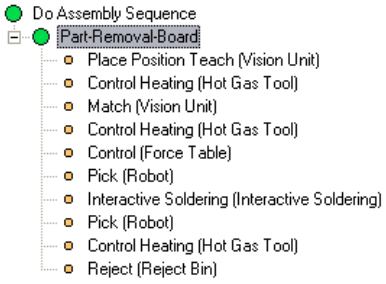
The selected zones of the pre-heaters are being activated and brought to the defined idle temperature, this way the idle time between the production runs can be minimized. This step is executed automatically and does not need any operator attention.

Board Unload (Board Carrier)

The operator is prompted to manually unload the board.

Warning
Just below the board carrier, the pre-heater is located which can reach temperatures well above 60 °C. Use heat protection gloves or be very careful not touching the pre-heater. Also the side rails of the board carrier and the board itself may be hot.

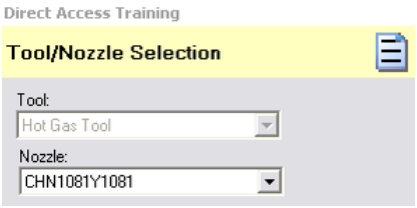
13.2.7 Part Removal Process Steps



A soldered part must be removed from a board. For that process, the Part-Removal process is being setup as a template within the Master program.

During the Part-Removal process, the nozzle is being visually aligned over the part to be removed. The nozzle is positioned just over the part and during the interactive soldering process the part is removed. Finally it is being rejected.

Tool/Nozzle



The Tool is the interface between the head and the nozzle. The tool is mounted fix. The nozzle is interfacing the parts or the board (site clean nozzle) and can be changed.

The Technical Operator using the Training mode can change the Nozzle to be used in the software using the direct access menu page. This does not physically change the nozzle. It is important that the nozzle is always physically changed when selecting another nozzle in the software.

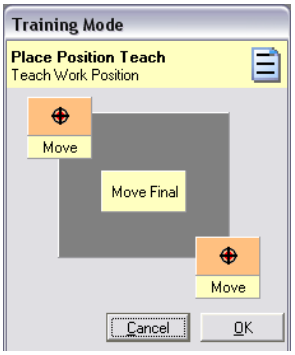
Note
If the nozzle which is setup in the software and the nozzle which is used in the program is different, the operator is being asked to change the nozzle. After a nozzle change the nozzle must be manually aligned.

Place Position Teach (Vision Unit)

The Position on the board where the process shall be executed must be defined. If the position is already set from the previous program execution, then the teach process can be skipped as the ONYX 29 Series 7 uses closed loop axis and stores the process positions in databases.

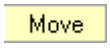
A laser pointer is located in the front section of the vision cube. This laser pointer is automatically activated and provides a red spot on the board. This red dot must be moved onto the process site of the board.

Disable the robot using the **Enable** button on the Operator Panel and move the laser dot onto the location where the process should take place.



For a more accurate position teach process, select the button **Process Properties** which opens the **Place Position** Teach menu page.

Within the Place position teach menu it is possible to teach 2 positions. Move the laser dot onto the first corner and select the **Laser Dot Set Point** button, then move to the second, opposite corner and select the other button.



Selecting **Move**, respectively the **Move Final** button, the laser pointer is moved to the taught positions.

If the teach process must be performed with only one position, then position the laser dot onto the correct location and select both **Laser Dot Set Point** buttons.

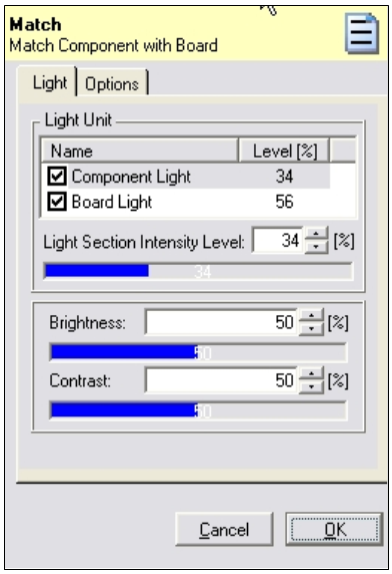
Note
The Position for the Part-Removal process must be taught in a coarse mode. The final alignment is being done using the vision to align the nozzle to the part to be removed.

Control Heating (Hot Gas Tool)

Because the vision unit will be used in the next step, this control heating process makes sure the top heater is switched off. This step is executed automatically and does not need any operator attention.

Match (Vision Unit)

Through the vision system the nozzle outline can be matched over the part which needs to be removed. This way the exact position can be fine tuned. Use the manual motion wheels to move X and Y, use the operator panel buttons to move the Theta axis.



To adjust the image parameters, select the button **Process Properties** which opens the **Match** menu page. This page is opened directly when the Training mode is selected.

The **Component Light** is the light looking upwards and makes the nozzle outline visible.

The **Board Light** is the light looking downwards and makes the component on the board visible.

The **Brightness** and the **Contrast** are camera specific parameters and influence the board and the component (part) image.

To adjust the light, switch off the Board light first, switch on the Component light and adjust the **Light section Intensity Level** until the nozzle outline appears okay in the live video. Switch off the Component light and switch on the Board light. Adjust the **Light section Intensity Level** until the part on the board appears okay in the live video. Switch on both lights and check the image.

Control Heating (Hot Gas Tool)

The top heater is activated with the idle temperature and the idle flow level using air. This step is executed automatically and does not need any operator attention.

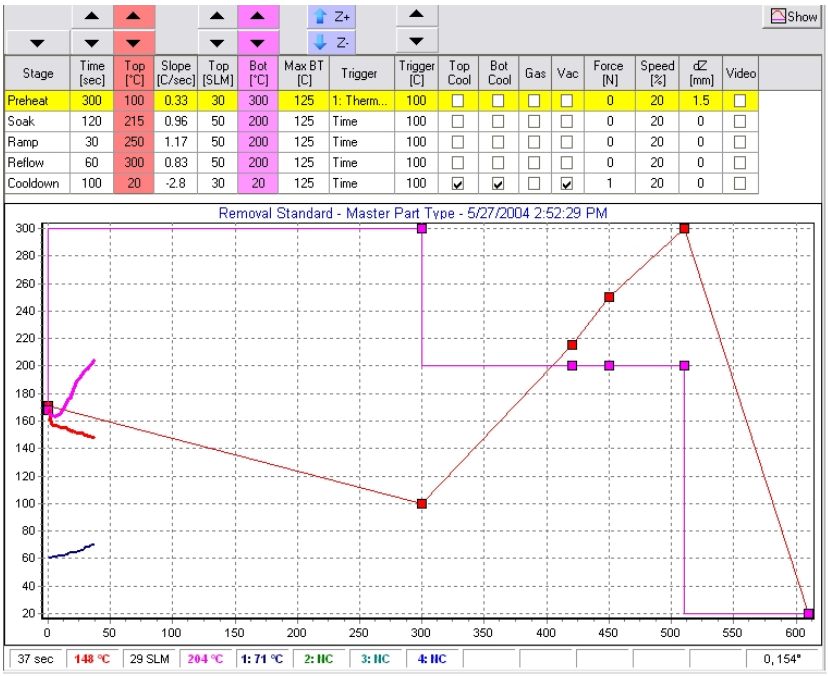
Control Force (Force Table)

The force sensor table is being reset to be ready for very delicate force moves. This step is executed automatically and does not need any operator attention.

Pick (Robot)

The Z-axis moves onto the part to be removed. The technical Operator in Training mode may select how the Z-axis shall move to the pick position, either to be moved manually, move to the theoretic position or using the force table. The actual step is executed automatically and does not need any operator attention.

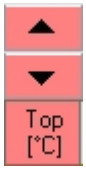
Interactive Soldering



The interactive soldering page is shown in Training mode. In this mode the arrows on top of the table are active. For the Operator access level these buttons are inactive and cannot be used. When a profile is being modified during the Training mode it can be saved at the end of the program or can be saved under a different program name.

Selecting this button allows skipping to the next stage. This button is available in the Training mode. It shall be used only during debug or setup phases. In normal operation it should be avoided to interrupt active soldering stages.

Using these up- and down buttons allows changing the time of the active stage. It is not possible to move behind the already passed time. This button is available in the Training mode only. It shall be used only during debug or setup phases. In normal operation it should be avoided to change the time of the active soldering stages.

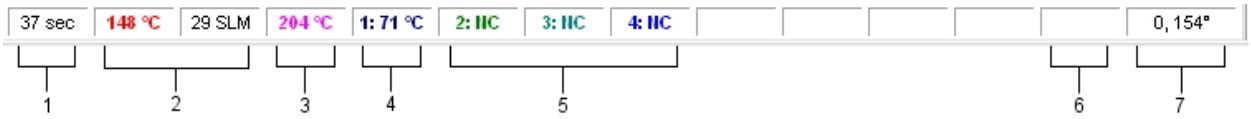


Using these up- and down buttons allows changing the set temperature of the top heater (Hot gas System) of the active stage. This button is available in the Training mode only. It shall be used only during debug or setup phases. In normal operation it should be avoided to change the hot gas temperature of the active soldering stages.

Using these up- and down buttons allows changing the set gas flow of the top heater (Hot gas System) of the active stage. This button is available in the Training mode only. It shall be used only during debug or setup phases. In normal operation it should be avoided to change the hot gas flow of the active soldering stages.

Using these up- and down buttons allows moving the Z-axis in small steps. This button is available in the Training mode only. It shall be used only during debug or setup phases.

Using these up- and down buttons allows changing the set trigger temperature of the active stage. This button is available in the Training mode only. It shall be used only during debug or setup phases. In normal operation it should be avoided to change the trigger temperature of the active soldering stages.



1. Shows the remaining time of the actual profile stage
2. Top heater (Hot gas system) temperature and gas flow
3. Preheater temperature
4. Thermocouple 1 (Board)
5. Thermocouple 2, 3 and 4... Optional up to 8 (NC = not connected)
6. Optional process temperature sensor
7. Shows the time and temperature on the actual mouse pointer position in the diagram

Note
It is possible to change the Removal Profile during the part is actually processed. If the profile has interactively been changed, the changed profile will be shown at the end of the sequence, where it will be possible to save the changes, or to save the changed profile under a different profile name.

Pick (Robot)

The Z-axis moves to the depart position with reduced speed and then to the safe position, with the part on the nozzle. During this process, the presence of the part at the nozzle is being checked using the vacuum sensor. This step is executed automatically and does not need any operator attention.

Control Heating (Hot Gas Heater)

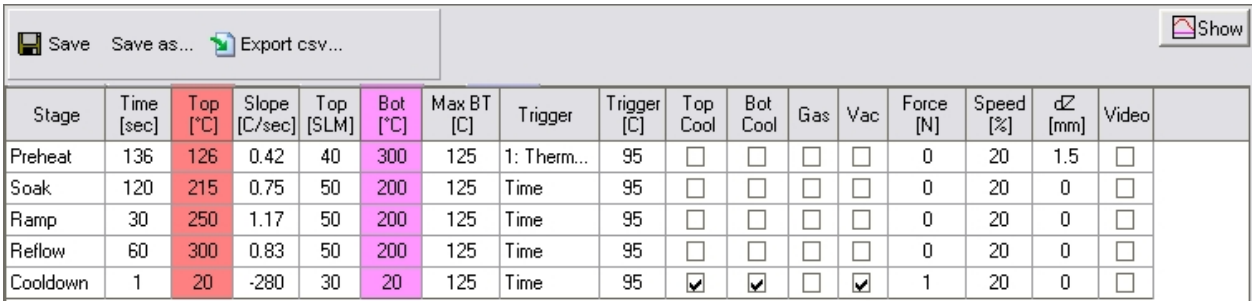
This control heating process makes sure the top heater is switched off. This step is executed automatically and does not need any operator attention.

Reject (Reject Bin)

The removed part is being rejected. This step is executed automatically and does not need any operator attention.

Inspection (Interactive Soldering)

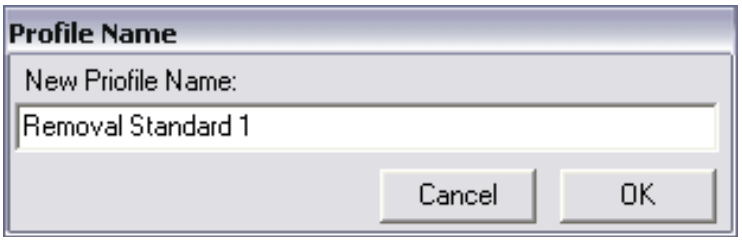
The executed profile during the interactive soldering process is being re-called and displayed. This inspection step is being processed when the Technical Operator has modified the interactive soldering profile during the execution, or when the Inspection mode is activated.



Stage	Time [sec]	Top [°C]	Slope [C/sec]	Top [SLM]	Bot [°C]	Max BT [C]	Trigger	Trigger [C]	Top Cool	Bot Cool	Gas	Vac	Force [N]	Speed [%]	dZ [mm]	Video
Preheat	136	126	0.42	40	300	125	1: Therm...	95	☐	☐	☐	☐	0	20	1.5	☐
Soak	120	215	0.75	50	200	125	Time	95	☐	☐	☐	☐	0	20	0	☐
Ramp	30	250	1.17	50	200	125	Time	95	☐	☐	☐	☐	0	20	0	☐
Reflow	60	300	0.83	50	200	125	Time	95	☐	☐	☐	☐	0	20	0	☐
Cooldown	1	20	-280	30	20	125	Time	95	☑	☑	☐	☑	1	20	0	☐

Select the **Save** button to store the changes in the original profile. Be careful overwriting standard data in the profile.

Select the **Save as…** button to open a new **Profile Name** window. It is possible to enter a new name. Click the **OK** button to store the profile under a new profile record in the database.

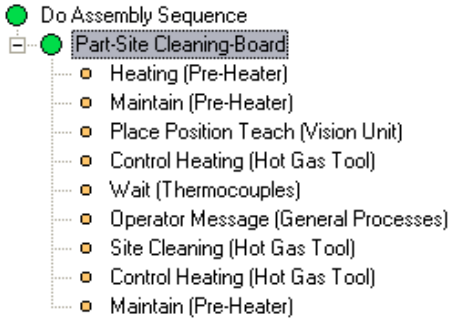


Select the **Export csv…** button to export the data of the profile together with the collected statistical data. This exported data can be edited using Microsoft Excel.

Select the **Show** button to open the menu with the thermo couple statistic values. **NA** indicates there was no data collected, or there was no thermocouple connected.

TC	Min	Max	Slope+	Slope-	< >
1 Thermocouple ...	45	116	0.4	0	0
2 Thermocouple ...	NA	NA	NA	NA	0
3 Thermocouple ...	NA	NA	NA	NA	0
4 Thermocouple ...	NA	NA	NA	NA	0

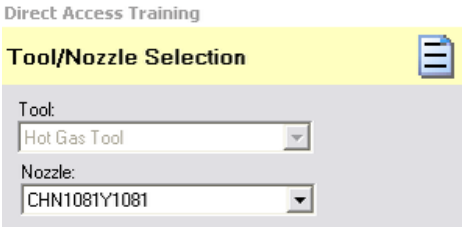
13.2.8 Part Site Cleaning Process Steps



After a part has been removed from a board, the site must be cleaned from the rest solder. For that process, the Part-Site cleaning process is being setup as a template within the Master program.

Often this is made off line. With the Part-Site Cleaning process, it can be done professionally, repeatable and fully automated within the system.

Tool/Nozzle

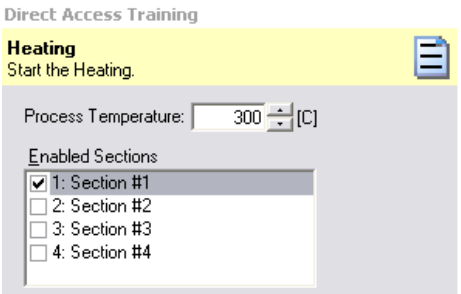


The Tool is the interface between the head and the nozzle. The tool is fixed mounted. The nozzle is interfacing the parts or the board (site clean nozzle) and can be changed.

The Technical Operator using the Training mode can change the Nozzle to be used in the software using the direct access menu page. This does not physically change the nozzle. It is important that the nozzle is always physically changed when selecting another nozzle in the software.

Note
If the nozzle which is setup in the software and the nozzle which is used in the program is different, the operator is being asked to change the nozzle. After a nozzle change the nozzle must be manually aligned.

Heating (Pre-Heater)



The selected zones of the pre-heaters are being activated and brought to the defined process temperature.

The Technical Operator using the Training mode can select the zones to be used and the temperature. Once the zones are defined then this step is executed automatically and does not need any operator attention.

Maintain (Pre-Heater)

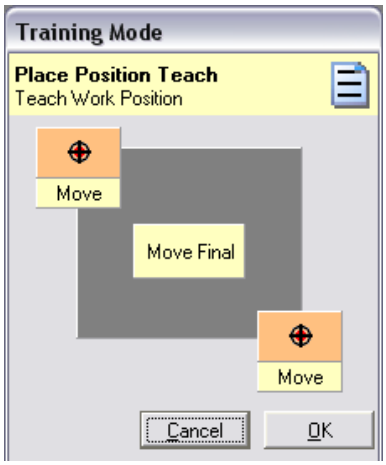
The board thermocouple 1, when installed, is checking the board temperature. If the board temperature reaches the maintain temperature, then the pre-heater zones are switched off. Once the temperature is getting below the maintain temperature the pre-heaters are activated again. With this process, it is possible to keep the board temperature around the target temperature during all the next process steps.

Place Position Teach (Vision Unit)

The Position on the board where the process shall be executed must be defined. If the position is already set from the previous program execution, then the teach process can be skipped as the ONYX 29 Series 7 uses closed loop axis and stores the process positions in databases.

A laser pointer is located in the front section of the vision cube. This laser pointer is automatically activated and provides a red spot on the board. This red dot must be moved onto the process site of the board.

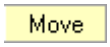
Disable the robot using the **Enable** button on the Operator Panel and move the laser dot onto the location where the process should take place.



For a more accurate position teach process, select the button **Process Properties** which opens the **Place Position Teach** menu page.

This page is opened directly when the Training mode is selected.

Within the Place position teach menu it is possible to teach 2 positions. Move the laser dot onto the first corner and select the **Laser Dot Set Point** button, then move to the second, opposite corner and select the other button.



Selecting the **Move**, respectively the **Move Final** button, the laser pointer is moved to the taught positions.

If the teach process must be performed with only one position, then position the laser dot onto the correct location and select both **Laser Dot Set Point** buttons.

Note
The Position for the Part-Removal process must be taught in a coarse mode. The final alignment is being done using the vision to align the nozzle to the part to be removed.

Control Heating (Hot Gas Tool)

The top heater is activated with the idle temperature and the idle flow level using air. This control heating process makes sure the top heater is switched off. This step is executed automatically and does not need any operator attention.

Wait (Thermocouple)

If a board thermocouple is being defined and installed, normally thermocouple 1, then the system is waiting until the set board temperature, has been reached. This step is executed automatically and does not need any operator attention, except the operator needs to wait.

Operator Message (General Processes)

The operator is prompted to manually put flux onto the place location. After the site is properly fluxed, select the **Resume** button.

Site Cleaning (Hot Gas Tool)

The Site Cleaning process is executed automatically.

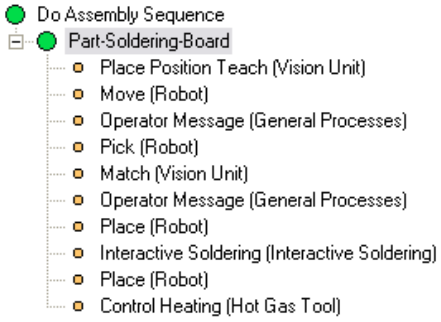
Control Heating (Hot Gas Tool)

This control heating process makes sure the top heater is switched off. This step is executed automatically and does not need any operator attention.

Maintain (Pre-Heater)

The pre-heater / board temperature maintain process is switched off. This step is executed automatically and does not need any operator attention.

13.2.9 Part Soldering Process Steps

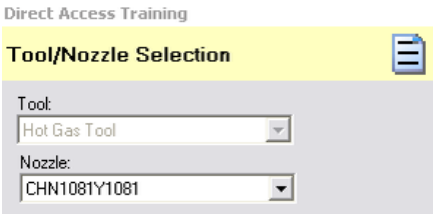


A part must be soldered to a board. For that process, the Part-Soldering process is being setup as a template within the Master program.

During the Part-Soldering process the part is being acquired and visually overlaid over the placement site. The alignment is being done manually using the manual option wheels. The manual motion wheels are moving the motorized X/Y-axes during that process.

After the alignment process the part is placed and soldered during the interactive soldering process.

Tool/Nozzle



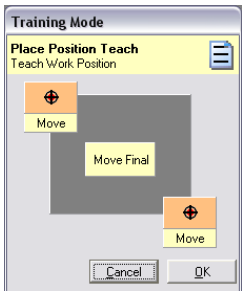
The Tool is the interface between the head and the nozzle. The tool is fixed mounted. The nozzle is interfacing the parts or the board (site clean nozzle) and can be changed.

The Technical Operator using the Training mode can change the Nozzle to be used in the software using the direct access menu page. This does not physically change the nozzle. It is important that the nozzle is always physically changed when selecting another nozzle in the software.

Note
If the nozzle which is setup in the software and the nozzle which is used in the program is different, the operator is being asked to change the nozzle. After a nozzle change the nozzle must be manually aligned.

Place Position Teach (Vision Unit)

The Position on the board where the process shall be executed must be defined. If the position is already set from the previous program execution, then the teach process can be skipped as the ONYX 29 Series 7 uses closed loop axis and stores the process positions in databases.

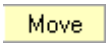


A laser pointer is located in the front section of the vision cube. This laser pointer is automatically activated and provides a red spot on the board. This red dot must be moved onto the process site of the board. Disable the robot using the **Enable** button on the Operator Panel and move the laser dot onto the location where the process should take place.

For a more accurate position teach process, select the button **Process Properties** which opens the **Place Position Teach** menu page.

This page is opened directly when the Training mode is selected.

Within the Place position teach menu it is possible to teach 2 positions. Move the laser dot onto the first corner and select the **Laser Dot Set Point** button, then move to the second, opposite corner and select the other button.



Selecting the **Move**, respectively the **Move Final** button, the laser pointer is moved to the taught positions.

If the teach process must be performed with only one position, then position the laser dot onto the correct location and select both Laser Dot Set Point buttons.

Note
The Position for the Part-Removal process must be taught in a coarse mode. The final alignment is being done using the vision to align the nozzle to the part to be removed.

Move (Robot)

The Master Program is being setup, that the part is manually loaded to the nozzle. For that reason, the nozzle is being moved to the front right position for easier access. If a feeder is setup, then this Move process can be ignored.

Operator Message (General Processes)

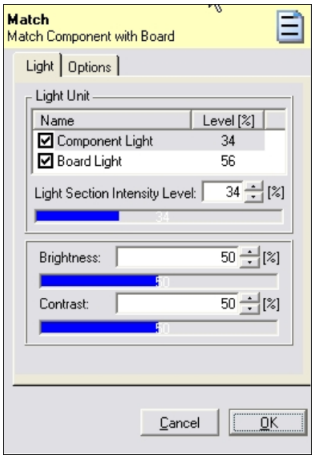
The operator is prompted to manually put a component to the nozzle. After the part is properly in place, select the Resume button. If a feeder is setup, then this manual process can be ignored.

Pick (Robot)

The vacuum of the robot is switched on, the component will resist on the nozzle.
If a feeder is setup, then this Pick process is executed automatically, the nozzle is being moved over the part which then is being acquired and brought up over the safe height position.

Match (Vision Unit)

Through the vision system the nozzle outline can be matched over the part which needs to be removed. This way the exact position can be fine tuned. Use the manual motion wheels to move X and Y, use the operator panel buttons to move the Theta axis.

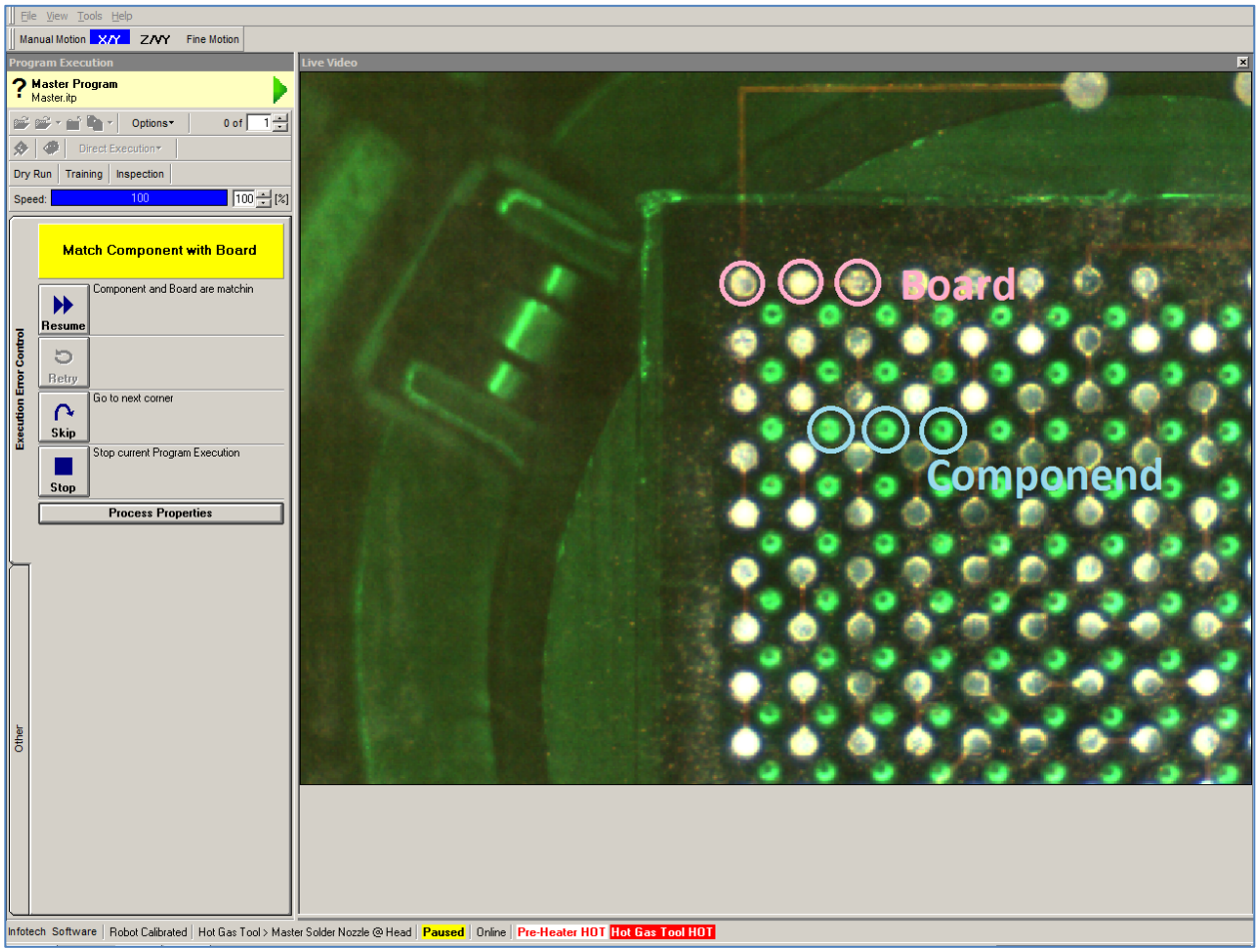


To adjust the image parameters, select the button **Process Properties** which opens the **Match** menu page. This page is opened directly when the Training mode is selected.

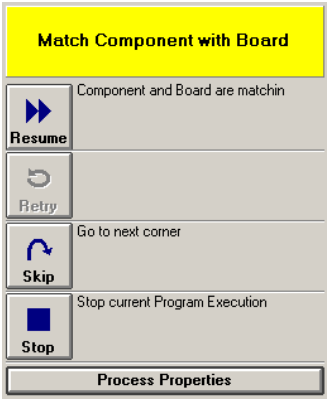
The **Component Light** is the light looking upwards and makes the nozzle outline visible.

The **Board Light** is the light looking downwards and makes the component on the board visible. The **Brightness** and the **Contrast** are camera specific parameters and influence the board and the component (part) image.

To adjust the light, switch off the Board light first, switch on the Component light and adjust the **Light section Intensity Level** until the nozzle outline appears okay in the live video. Switch off the Component light and switch on the Board light. Adjust the **Light section Intensity Level** until the part on the board appears okay in the live video. Switch on both lights and check the image.



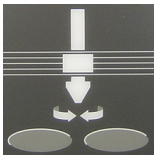
Select the **Resume** button after the alignment process is completed and the next process will be executed.

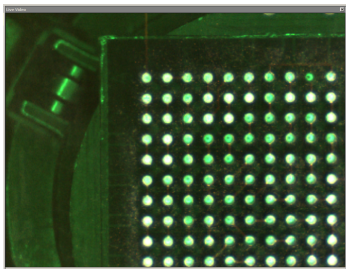


Select the **Skip** button to move the vision system to the next corner. If the part is smaller than the selected field of view (FOV), then the entire component is shown and the Skip button has no effect. If the part is larger than the FOV, then each corner can be aligned. Using the Skip button will move the vision system to all four corners and at the end to the center of the part. Selecting Skip again will move it to the corners again.

Select the button **Process Properties** which opens the **Match** menu page (see previous page).

The first step in the alignment process should be to align the rotation of the part. Use the center buttons on the operator panel to rotate the Theta axis with the part on the nozzle. During rotating the part, check the live video until the images appear parallel. It is important to have the two images parallel before starting to align the X/Y axes.

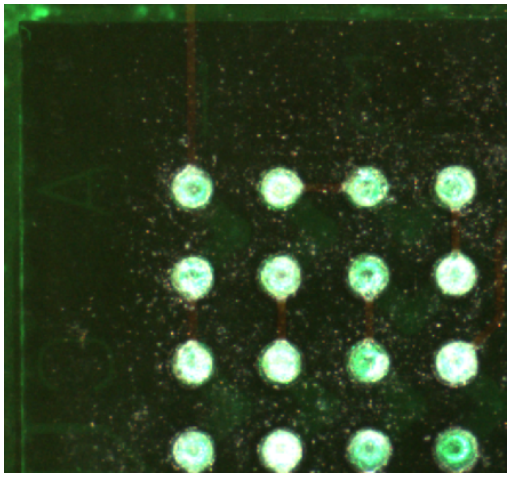




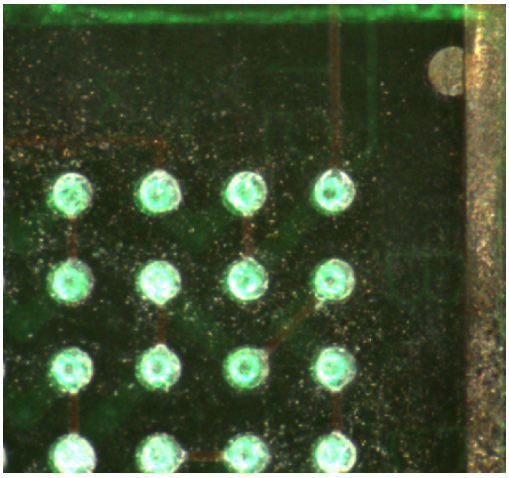
The second step is to align the X/Y axes. Use the manual motion wheel in the front of the machine to move the X/Y system with the part on the nozzle. Move until the images appear aligned.

Use the **Skip** button to move to the opposite corner (Top/Left ➔ Bottom/Right ➔ Top/Right ➔ Bottom/Left ➔ Center).

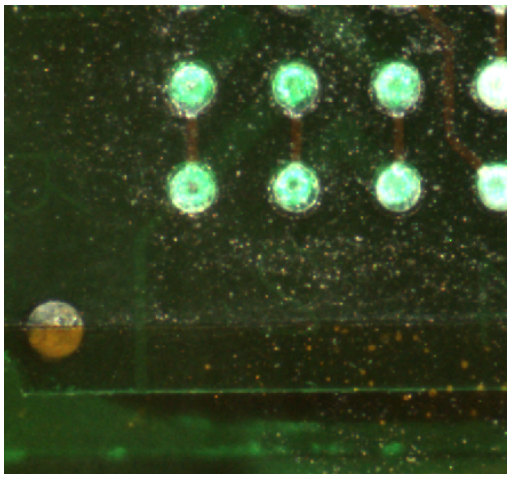
Top left



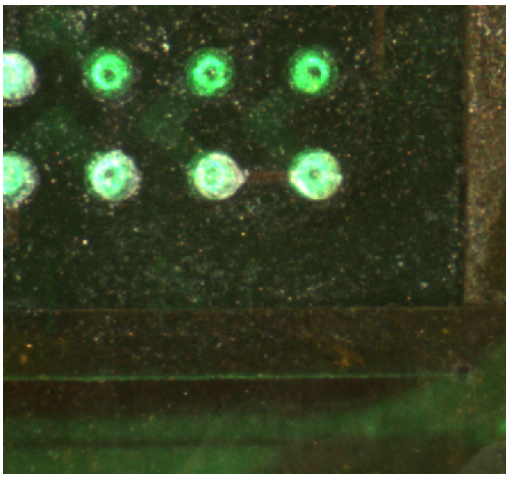
Top right



Bottom left



Bottom right



Operator Message (General Processes)

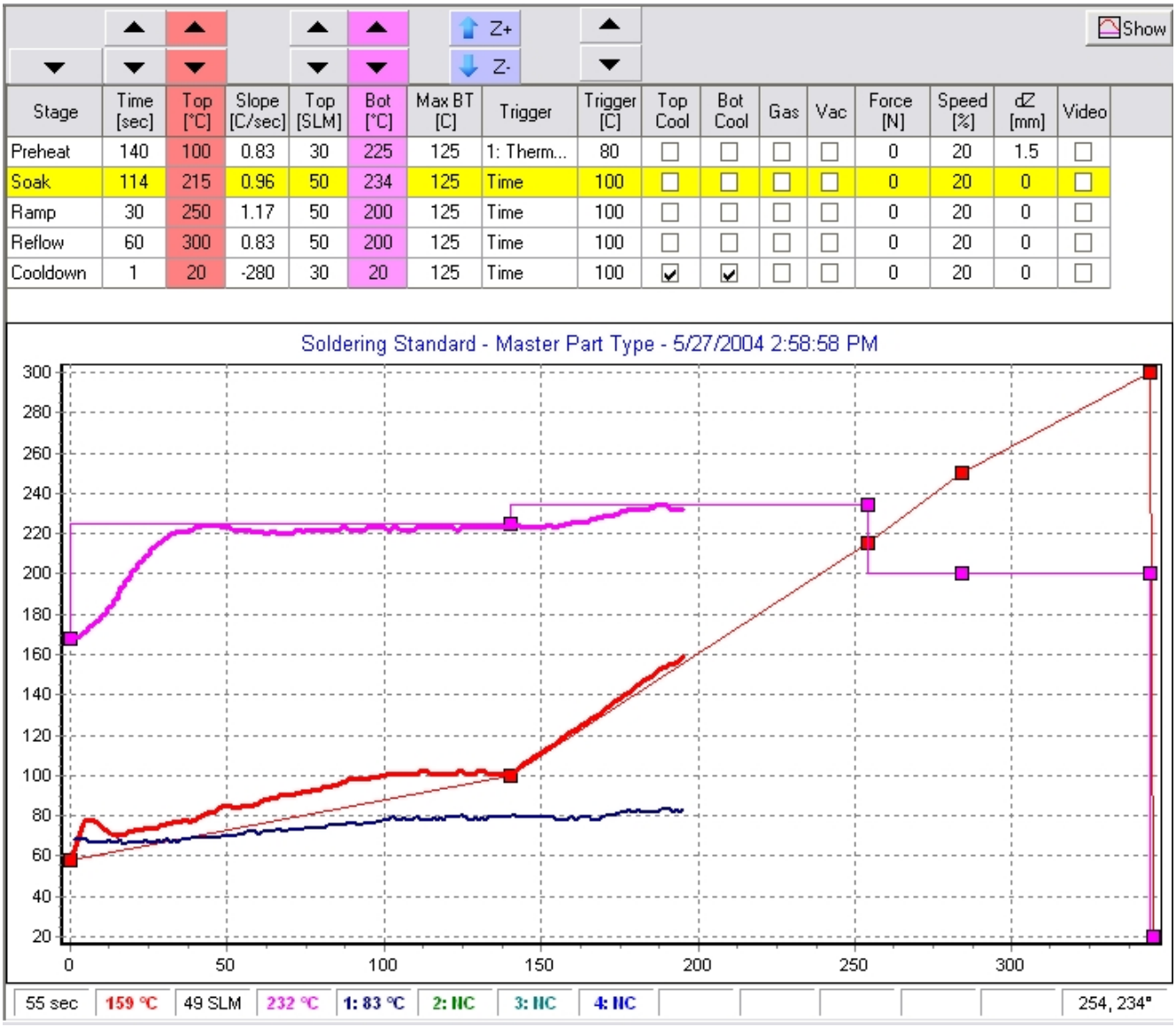
The operator is prompted to manually put flux onto the place location. After the site is properly fluxed, select the Resume button.

Place (Robot)

The Z-axis moves automatically with the part on the nozzle above the location on the board. This step is executed automatically and does not need any operator attention.

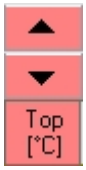
Interactive Soldering

The interactive soldering page is shown in Training mode. That way the arrows on top of the table are active. For the Operator access level these buttons are inactive and cannot be used. When a profile is being modified during the Training mode it can be saved at the end of the program or can be saved under a different program name.



Selecting this button allows skipping to the next stage. This button is available in the Training mode. It shall be used only during debug or setup phases. In normal operation it should be avoided to interrupt active soldering stages.

Using these up- and down buttons allows changing the time of the active stage. It is not possible to move behind the already passed time. This button is available in the Training mode only. It shall be used only during debug or setup phases. In normal operation it should be avoided to change the time of the active soldering stages.

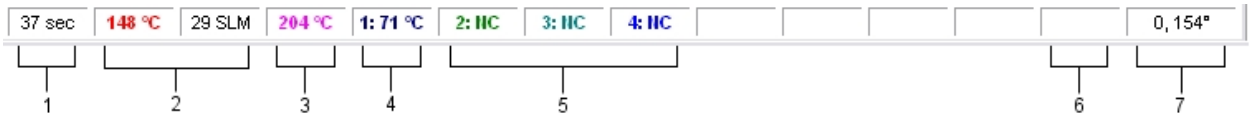


Using these up- and down buttons allows changing the set temperature of the top heater (Hot gas System) of the active stage. This button is available in the Training mode only. It shall be used only during debug or setup phases. In normal operation it should be avoided to change the hot gas temperature of the active soldering stages.

Using these up- and down buttons allows changing the set gas flow of the top heater (Hot gas System) of the active stage. This button is available in the Training mode only. It shall be used only during debug or setup phases. In normal operation it should be avoided to change the hot gas flow of the active soldering stages.

Using these up- and down buttons allows moving the Z-axis in small steps. This button is available in the Training mode only. It shall be used only during debug or setup phases.

Using these up- and down buttons allows changing the set trigger temperature of the active stage. This button is available in the Training mode only. It shall be used only during debug or setup phases. In normal operation it should be avoided to change the trigger temperature of the active soldering stages.



1. Shows the remaining time of the actual profile stage
2. Top heater (Hot gas system) temperature and gas flow
3. Preheater temperature
4. Thermocouple 1 (Board)
5. Thermocouple 2, 3 and 4... Optional up to 8 (NC = not connected)
6. Optional process temperature sensor
7. Shows the time and temperature on the actual mouse pointer position in the diagram

Note
It is possible to change the Removal Profile during the part is actually processed. If the profile has interactively been changed, the changed profile will be shown at the end of the sequence, where it will be possible to save the changes, or to save the changed profile under a different profile name.

Inspection (Interactive Soldering)

The executed profile during the interactive soldering process is being re-called and displayed. This inspection step is being processed when the Technical Operator has modified the interactive soldering profile during the execution, or when the Inspection mode is activated.

Save Save as... Export csv... Show

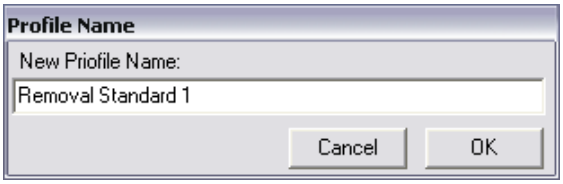
Stage	Time [sec]	Top [°C]	Slope [C/sec]	Top [SLM]	Bot [°C]	Max BT [C]	Trigger	Trigger [C]	Top Cool	Bot Cool	Gas	Vac	Force [N]	Speed [%]	dZ [mm]	Video
Preheat	136	126	0.42	40	300	125	1: Therm...	95	☐	☐	☐	☐	0	20	1.5	☐
Soak	120	215	0.75	50	200	125	Time	95	☐	☐	☐	☐	0	20	0	☐
Ramp	30	250	1.17	50	200	125	Time	95	☐	☐	☐	☐	0	20	0	☐
Reflow	60	300	0.83	50	200	125	Time	95	☐	☐	☐	☐	0	20	0	☐
Cooldown	1	20	-280	30	20	125	Time	95	☑	☑	☐	☑	1	20	0	☐

Select the **Save** button to store the changes in the original profile. Be careful overwriting standard data in the profile.

Save Save as... Export csv... Show

Stage	Time [sec]	Top [°C]	Slope [C/sec]	Top [SLM]	Bot [°C]	Max BT [C]	Trigger	Trigger [C]	Top Cool	Bot Cool	Gas	Vac	Force [N]	Speed [%]	dZ [mm]	Video
Preheat	136	126	0.42	40	300	125	1: Therm...	95	☐	☐	☐	☐	0	20	1.5	☐
Soak	120	215	0.75	50	200	125	Time	95	☐	☐	☐	☐	0	20	0	☐
Ramp	30	250	1.17	50	200	125	Time	95	☐	☐	☐	☐	0	20	0	☐
Reflow	60	300	0.83	50	200	125	Time	95	☐	☐	☐	☐	0	20	0	☐
Cooldown	1	20	-280	30	20	125	Time	95	☑	☑	☐	☑	1	20	0	☐

Select the **Save as…** button to open a new **Profile Name** window. It is possible to enter a new name. Click the **OK** button to store the profile under a new profile record in the database.



Select the **Export csv…** button to export the data of the profile together with the collected statistical data. This exported data can be edited using Microsoft Excel.

Select the **Show** button to open the menu with the thermo couple statistic values. **NA** indicates there was no data collected, or there was no thermocouple connected.

TC	Min	Max	Slope+	Slope-	< >
1 Thermocouple ...	45	116	0.4	0	0
2 Thermocouple ...	NA	NA	NA	NA	0
3 Thermocouple ...	NA	NA	NA	NA	0
4 Thermocouple ...	NA	NA	NA	NA	0

14 System Calibration

The whole system is calibrated and functioning. This chapter contains some explanations for a better understanding of the machine. Periodical maintenance tasks can be found in chapter "Preventive Maintenance".

Note
For detailed software descriptions please use the "Online Help" of the VisualMachines™ software.

14.1 Directions

Direction Terms

The directional terms of the machine are defined as follows:

Front	The front side of the system is the side where the screen is located. Usually the system is operated from this side.

Axes Directions

The machine "ONYX 29 Series 7" is a four axes robot. Movements in four directions (X, Y, Z and Theta) are possible.

X-axis	A movement along the X axis is horizontal and parallel to the shortest line that runs between the left and right side of the system. In the coordinate system, forward (positive) X motion means from the left to right.
Y-axis	A movement along the Y axis is horizontal, perpendicular to the X axis, and parallel to the shortest line that runs between the front and rear of the system. In the coordinate system, forward (positive) Y motion means from the front to the rear.
Z-axis	A movement along the Z axis is vertical and parallel to a line extending above, and perpendicular to the X and Y axes. In the coordinate system, positive Z motion means upward.
Theta-axis	A movement of the Theta axis is a rotational movement around the Z axis. In the coordinate system, positive Theta motion means counter clockwise (when observed from above).

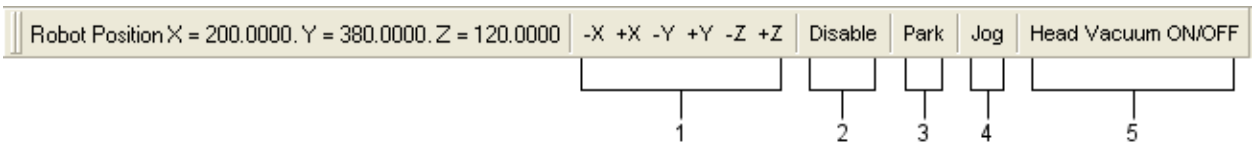
14.1.1 Coordinate System

All the functions of the ONYX 29 Series 7 are always based on the same coordinate system. After power- up, the axes must be calibrated. During the calibration of each axis, the encoder index must be found. The X- and the Y-axes encoders are glass type linear encoders with the index in the center of the working envelope. The zero point of the coordinate system is defined in the front/left section of the working envelope, so all the X/Y coordinates used within the system are positive.

The Z- and the Vision-Y-axes have rotary encoder. The Z-axis calibrates its index at the closest position to the top. The Vision Y-axis zero is at the back end.

14.1.2 Robot Coordinate Band

It is possible to open the **Robot Coordinate Band** through the Tools pull down menu. The band displays the current robot position of the TCP (Tool Center Point) of the head (including any tool/nozzle offsets):



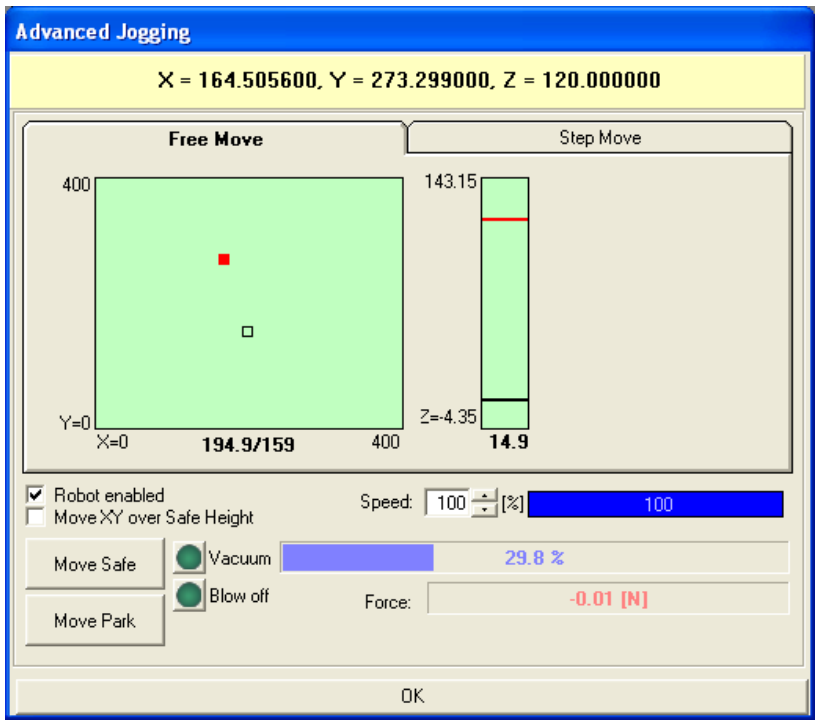
1. Jog buttons
2. Enable or disable robot axes
3. Move robot to park position
4. Open the Robot Jog dialog
5. Enable or disable the head vacuum

Jog buttons (-X, +X, -Y, +Y, -Z, +Z)	Each axis can be moved individually in small increments. The moving steps can be defined in the robot configuration property page. The increments can be temporarily modified by using the Robot Jog dialog and adjusting the Linear and the Theta Increment (see the section behind).
Disable/Enable	The Disable/Enable buttons act the same way as the Release button on the operator panel. It does release (disable) the power to the axis to allow manual motion. Enable gives power to the axis so that VisualMachines™ has control over the axes.
Park	The Park button is available when the robot is enabled. This function will move the assembly head to the defined park position.
Jog	The Jog button opens the Robot Jog dialog to move the robot axis individually.
Head Vacuum ON/OFF	Switch the head vacuum on and off.

Note
If the ONYX 29 Series 7 is equipped with an Advanced or an Economic solder head, then the Theta axis is not part of this robot coordinate band.

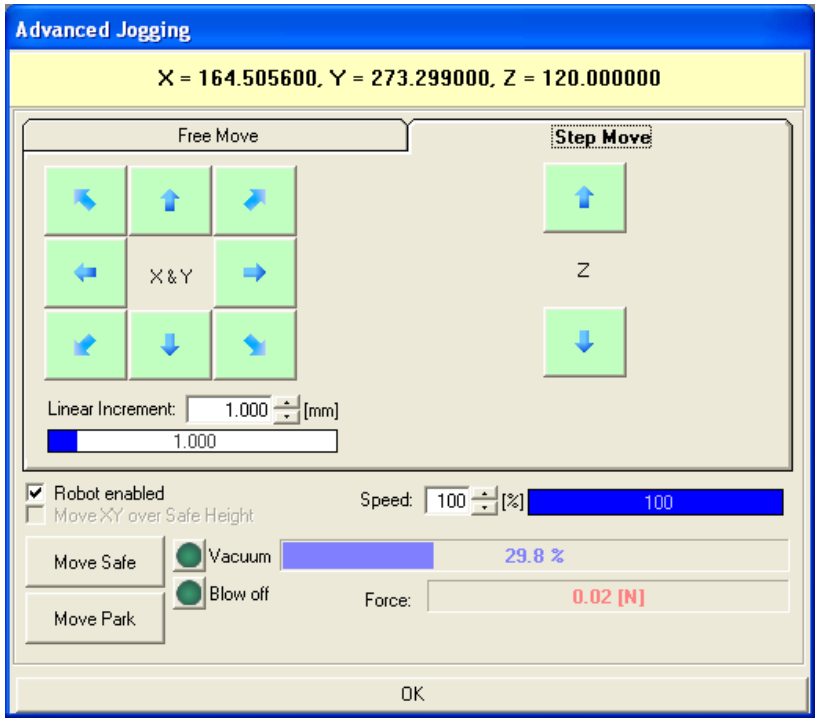
14.1.3 Advanced Jogging

Use this to move the robot axes using two different jogging methods. One method is to move the axes step by step and the other method is to move the axes freely by pointing to the target position using the mouse cursor.



Free Move

The red mark in the green field shows the actual robot position. Use the mouse cursor to point to the new position and hold the left mouse button down till the position is reached. The robot motion stops immediately when the mouse button is released.



Step Move

Use the step move buttons to move the corresponding axis step by step in the desired direction. The **Linear Increment** defines the linear distance for the step moves. This value affects directly the step distance for the jogging buttons in the Robot Coordinate Band (see the section before).

Robot enabled	Defines whether the robot axes are enabled or disabled
Move XY over Safe Height	When enabled, the robot moves over the safe height to another XY position.
Move Safe	Moves the Z-axis to the safe height.
Move Park	Moves all axes to the park position.
Speed	Adjust the speed from 1% to 100% of the nominal speed.
Vacuum	Enable/Disable the nozzle vacuum. The vacuum level will be displayed right to the text
Blow off	Enable the nozzle blow off.
Force	Displays the force level of the force table.

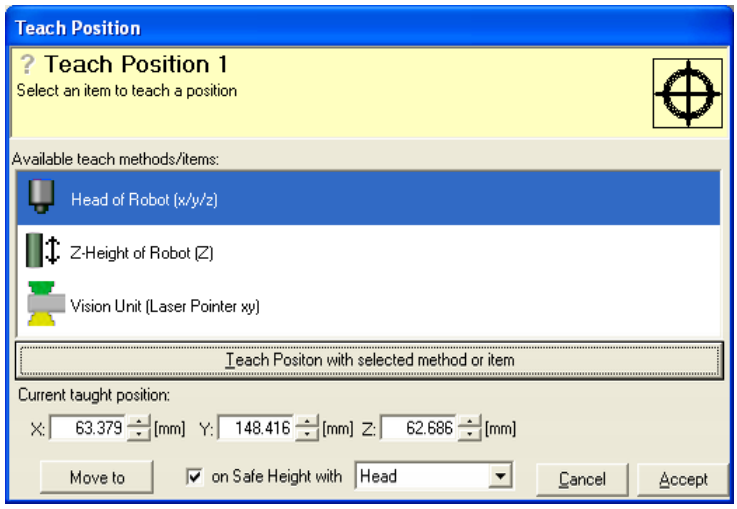
14.1.4 Teaching Positions

It is possible to teach any X/ Y/ Z positions.

This can be done manually by moving the X/Y system or using the Vision Unit. When teaching using the vision unit, the Z-coordinate cannot be taught directly, but it is possible to continue with a single Z-height teach in the same teaching task:

It is possible to choose a teaching device to teach a particular position in the working area of the robot. It is also possible to edit the current taught coordinates directly. After a position has been taught with a selected item, this dialog will be returned again that additional teaching tasks can be performed. Select **Accept** to return and take the new position or **Cancel** to dismiss without updating the position.

Vision Unit	Is selected when a position (X / Y) is to be programmed with the vision unit.
Cancel	The modified coordinates are discarded, not saved. Then the window closes.
Accept	The new learned coordinates are accepted and then the window closes.



14.2 Calibration View

This section can be skipped for all Operators and Technical Operators. It is necessary to have the access level of Maintenance or higher to have access to the Calibration View and its functions.

The Calibration View is opened by clicking the **Calibration** button on the Views tab. The Calibration View shows the machine configuration in a hierarchical tree structure. Bold marked items are providing calibration functionality.

It is also possible to create special calibration programs that are combining sequenced calibrations of different peripherals.

Note
To get access to customer specific applications or functions and for more detailed information on how to use the VisualMachines™ calibration programs, please see the Software Reference Guide.

14.2.1 Main Calibration

The Calibration Programs panel manages the calibration programs. Some peripherals have calibrations functions, which can be used in a calibration program defined in the Program Editor. Calibration programs are stored in the Calibration folder of the VisualMachines™ directory with the extension "itc".


Create a new calibration program


Open an existing calibration program


Edit the currently selected program


Close the currently selected program


Directly execute the currently selected calibration program


Perform a validation of the currently selected program

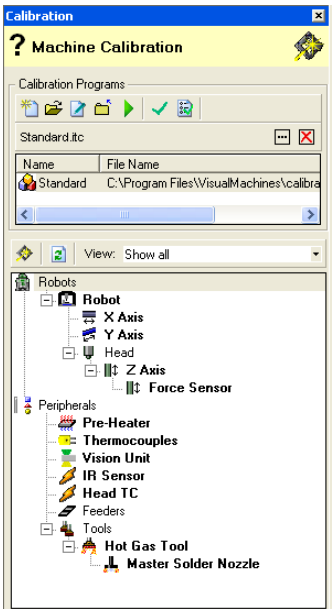

Show results of the program validation


Set the currently selected program as Startup Calibration Program


Clear the Standard Calibration Program


Clicking on this button will execute or open the selected calibration function


Clicking on this button will refresh the tree view



The **OK** button does close the main calibration page.

Note
The standard calibration program can be executed directly during start-up of VisualMachines™. Normally it contains the robot calibration only.

The Calibration Tree can appear differently depending on the system configuration.

Warning
Calibrations can be executed from trained personnel only. Some of the calibration procedures require movements of the axes.

14.2.2 Axes Calibration

Note
Each time the system is powered up, all axes need to be calibrated

See the section before, how the calibration tree program can be executed after power up. If the robot is not calibrated, no program execution can be started.

Axes calibrations can be executed manually with the Calibration view menu.

Machine	Executes the calibration of all axes within the system, starting with Z, continuing with Theta, X, Y, VisionX, VisionY and VisionZoom.
X-Axis	Calibrates only the X-Axis
Y-Axis	Calibrates only the Y-Axis
Z-Axis	Calibrates only the Z-Axis
Theta-Axis	Calibrates only the Theta-Axis, if present

14.2.3 Temperature Sensor and Thermo Couple Calibrations

The ONYX29 Series 7 comes with several temperature sensors, depending on its configuration. Possible sensors:
- Up to 8 thermocouples type K (standard 4)
- Up to 4 temperature sensors PT100 of the Pre-heaters
- The Hot gas system thermo couple type K

Except of the 8 thermocouples, all the temperature sensors are part of a PID loop controlled circuit. The PID parameters can be calibrated on the Control module, the same way as calibrating motor parameters. This requires intensive training and can be performed by special educated personnel only.

All temperature and thermocouple sensors can be calibrated with an offset. Within the calibration menu, the actual reading of the temperature sensor is being displayed at real time. An additional added offset has immediate effect.

Note
The gas flow controller is calibrated and do not need additional calibrations. For more detailed information on how to use the VisualMachines™ calibration programs, please see the online help system.

14.2.4 Precision Force Sensor Table

The ONYX 29 Series 7 is configured with the Precision Force Sensor table.

Note
The force sensors are factory calibrated and do not need additional calibrations. For more detailed information on how to use the VisualMachines™ calibration programs, please see the online help system.

14.2.5 Flow Controller

The ONYX 29 Series 7 with the advanced solder head uses a closed loop gas flow sensor.

Note
The gas flow sensor is factory calibrated and does not need additional calibrations. For more detailed information on how to use the VisualMachines™ calibration programs, please see the online help system.

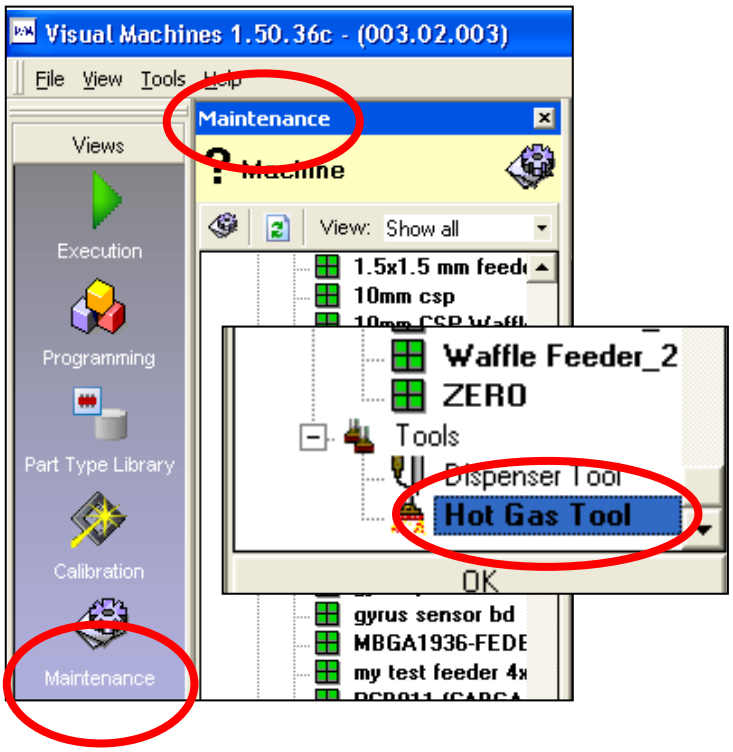
14.3 Flow Rate Verification

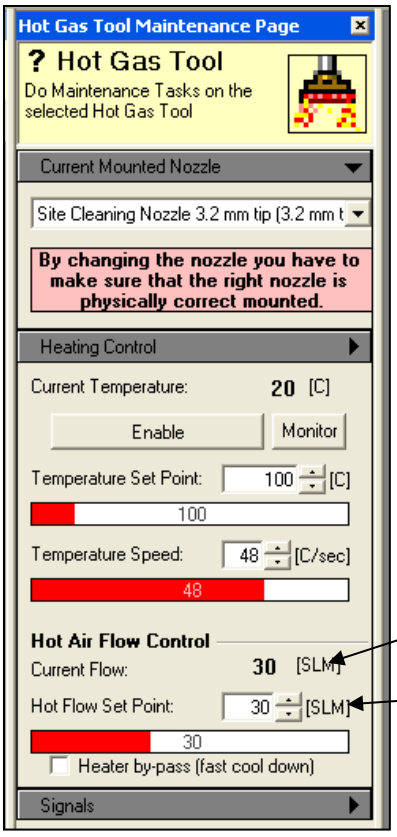
Note

The ONYX29 Incorporates a precision mass flow controller to regulate the hot air flow. The flow of this device is verified prior to shipment on ONYX units by the manufacturer and does not need adjustment.

However, if verification/calibration of the mass flow valve is a requirement before releasing the machine to production, (1) the valve can be removed from the machine and sent back to the manufacturer for certification, (2) customers can purchase a Calibration Kit #1016.02.010 from Air-Vac to perform the calibration. Once purchased, customer would then maintain the calibration of this kit for future use.

1. Go into the Maintenance view (operator/password restricted) and double click "Hot Gas Tool".





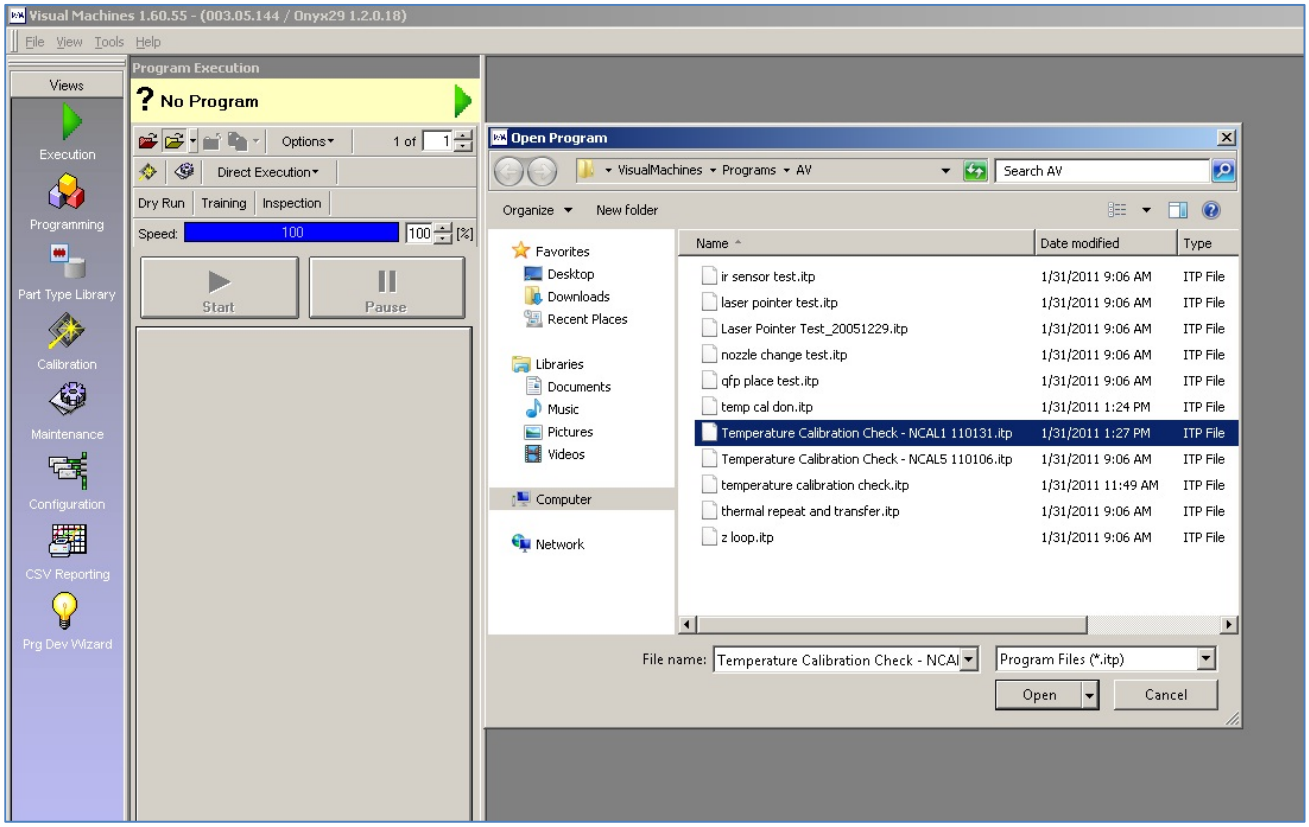
2. Increase the flow rate and check the actual flow output **(A)** versus the set point **(B)** at 10 SLM intervals between 20 and 80 SLM.

The actual rate should be +/- 3 SLM. If the flow rate exceeds this tolerance, contact Air-Vac.

14.4 Hot Gas Tool Temperature Verification

Tools required: NCAL1 Temperature Nozzle

1. Open the temperature verification profile in the Air-Vac directory.
- Go to Execution; Open Program folder; Open AV folder;
- Select "Temperature Calibration Check – NCAL1 <date code>.itp"



2. Select basic view

3. Load NCAL1 nozzle into the Solder Head and plug the T/C of the nozzle into T/C #1.

4. Execute this program following the step-by-step prompts.

5. The actual temperature output through T/C #1 (NCAL1 nozzle) at 300 seconds should be manually recorded. **(Select basic view to read board thermocouple temperature).** Note that there is a CSV file created as a part of this program so the temperature at 300 seconds can be determined from that after the run is complete.

6. If the actual temperature is within 300c +/-3 degrees (ie. 297˚C to 303˚C), re-calibration of the top heater is not required.

7. If recalibration is required, using the value just recorded proceed to Hot Gas Tool Calibration step #5.

14.5 Hot Gas Tool Calibration

Tools required: NCAL1 Temperature Nozzle

1. Open the temperature verification profile in the Air-Vac directory.
- Go to Execution; Open Program folder; Open AV folder;
- Select "Temperature Calibration Check – NCAL1 <date code>.itp"

2. Load NCAL1 nozzle into the Solder Head and plug the T/C of the nozzle into T/C #1.

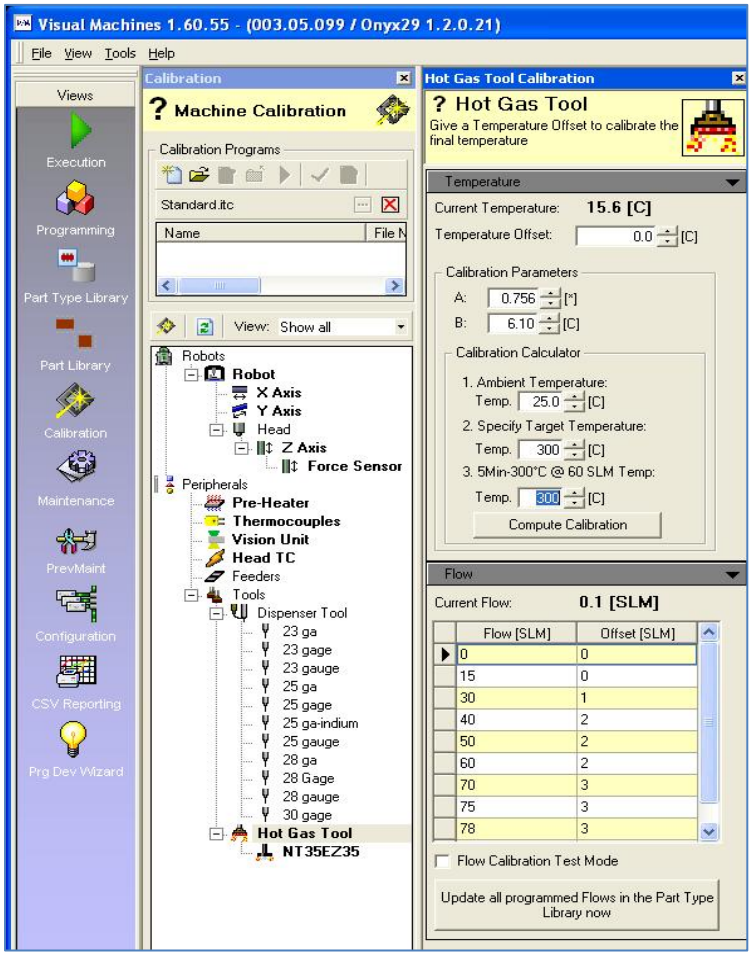
3. Execute the program following the step-by-step prompts. Record the Ncal1 temperature at 300 seconds. A CSV file is created and can be reviewed to get the temperature after the program has been run.

4. Verify that the target temperature is 300˚C +/- 3˚C. If the temperature is not within the tolerance continue.

Go to Calibration View; Hot Gas Tool Calibration; Calibration Calculator

5. At step #3, of the calibration calculator (5 min-300@60slm temp) enter the value from the previous run. Example: If recorded temp is 315˚C then enter 315. Then Click on Compute Calibration, Apply, Okay.

6. Repeat steps #3 – #5 as required to obtain 300˚C +/- 3˚C.



15 Preventive Maintenance

The preventive maintenance on the machine "ONYX 29 Series 7" must be done periodically. The warranty can only be granted if the preventive maintenance has always been performed according to instructions and plan.

Machine Component	***Maintenance Activity***	***Notes***	***Frequency***		
			Daily	*Weekly*	*Monthly*
Data Backup	Profiles and part types must be written to an off-machine storage media (network server, memory stick, cd, etc.)	Off-machine data back-up is the most critical maintenance task. Air-Vac is not responsible for lost data.		X	
Nozzles	Clean nozzles of flux and inspect o-rings and vacuum cups			X	
Site Clean Tool (option)	Install the SC nozzle and activate the SC vacuum to verify that a strong vacuum exists. Inspect tip collector and blue vacuum cup for wear.	Vacuum cup should be replaced after 8 hrs. of use	X	X	
Machine Frame	Clean the machine frame and the machine covers Make sure there are no flux- or dispense media spoiled on the machine	Dry lint-free cloth, in case of flux, use flux remover			X
Vision Unit	Clean the protective cover glass on the lower and on the upper side of the vision unit	Kimwipes® Denatured Alcohol			X
Pneumatic Unit	Drain the air regulator filters of any water or oil (verify the air pressure is 0.55 mba)				X
Vacuum Filter	Replace vacuum filter if vacuum is insufficient to hold component.	See instructions in Maintenance Section			X
X-Y Axes Encoder	Clean the linear glass or steel scale encoder carefully	See instructions in Maintenance Section		X	
X-Y-Z Axis Bearings	Clean all the linear bearing rails carefully. Lubricate the bearing rails afterwards slightly with oil	Benzine, dry lint-free cloth 3 in 1 oil			X
Z-axis Lead Screw	Clean the lead screw Lubricate the lead screw afterwards slightly with oil	Benzine, soft brush 3 in 1 oil			X
Computer/Machine	Hard Boot		8-10 hrs per shift		
Nozzle	Temperature Calibration	See instructions in Maintenance Section			X
Site Clean Jar	Filter Change	Changing filter is dependent on usage	As required		

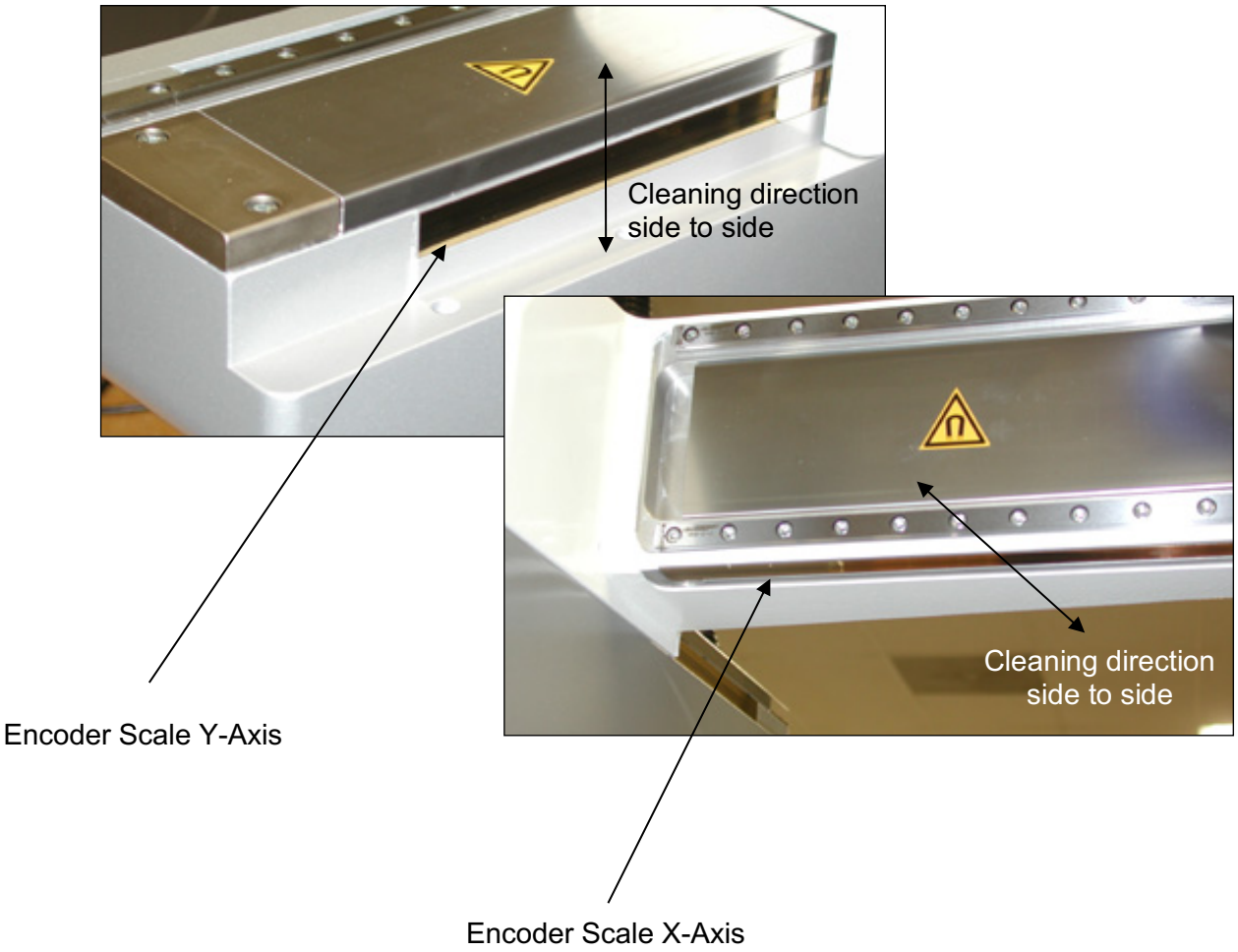
15.1.1 X-Y Axes Encoder Scale Cleaning Instructions

Supplies required: Denatured Alcohol and Kimwipes® cleaning wipes.

- When cleaning the encoder scale, wet the surface with the Denatured Alcohol and allow the alcohol to loosen the dirt (or evaporated flux solutions) before wiping.
- Using the Kimwipes®, wipe carefully side to side, **not** end to end. Never try to remove the dust or dirt by rubbing very hard or using any abrasive material, this will damage the encoder scale!

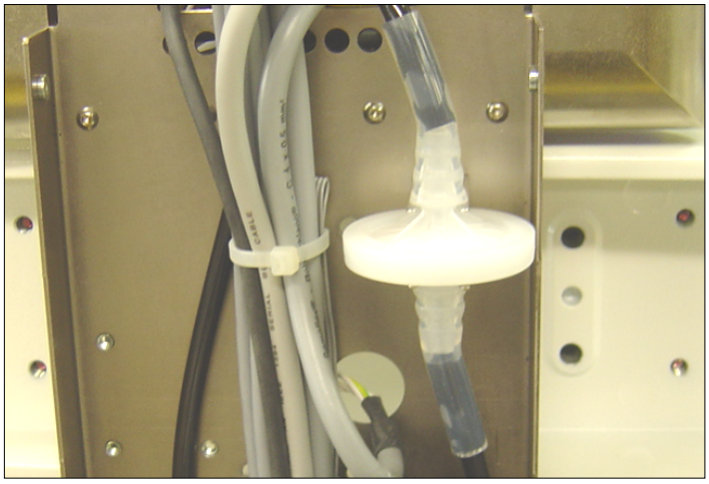
WARNING

USE DENATURED ALCOHOL AND KIMWIPES® TO CAREFULLY CLEAN THE ENCODER SCALE.
USE OF ANY OTHER TYPE OF CLOTH OR CLEANING SOLUTION WILL DAMAGE SCALE.



15.1.2 VACUUM FILTER

The ONYX 29 assembly head vacuum uses an inline filter. The filter is located under the back cover of the head. If the process includes heavy evaporating flux, then the filter must be replaced on a regular base.



15.2 Maintenance View

This section can be skipped for all Operators and Technical Operators. It is necessary to have the access level of Maintenance or higher to have access to the Maintenance View and its functions. The Maintenance View is opened by clicking the **Maintenance** button on the Views tab.

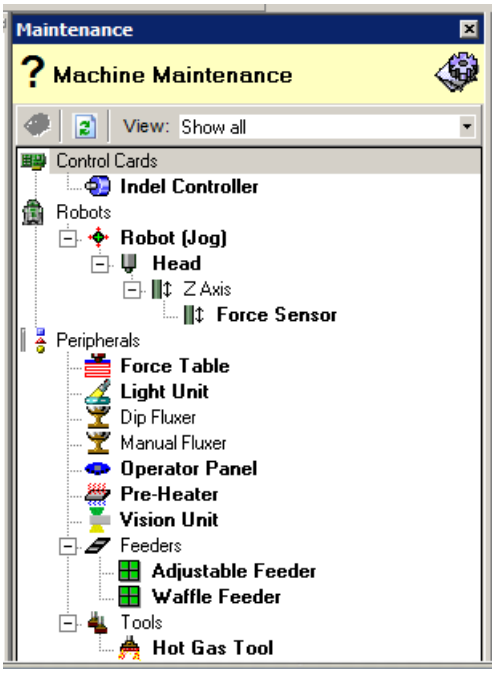
The Maintenance View displays a partial machine configuration in a hierarchical tree structure. Bold marked items are having an active maintain function that can be opened or executed. Omitted items are not having any maintenance functionality. Maintenance allows viewing and modifying the current state of the corresponding item.

Each peripheral may provide maintenance functions.

Note
To get access to customer specific applications or functions and for more detailed information on how to use the VisualMachines™ Maintenance menus, please see the Software Reference Guide.

15.2.1 Machine Maintenance

Select a bold marked item of the hierarchical Machine Maintenance tree:



 Clicking on this button will open the selected maintenance function

 Clicking on this button will refresh the tree view

Note
The Maintenance Tree can appear differently depending on the system configuration. The following sections show the most important Maintenance peripherals and functions.

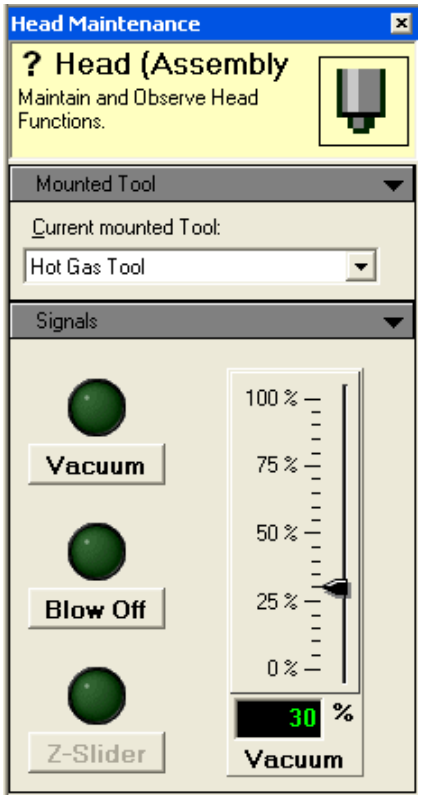
15.2.2 Head Maintenance

The head maintenance page displays information of the current attached tool.

Selecting another tool entry in the **Current mounted Tool** list and clicking **OK** does change the tool in VisualMachines™.

Warning
Changing the current mounted tool does not change it physically. Please make sure that the linked tool does correspond to the mounted one.

The status bar is showing the current mounted tool/nozzle combination on the head.



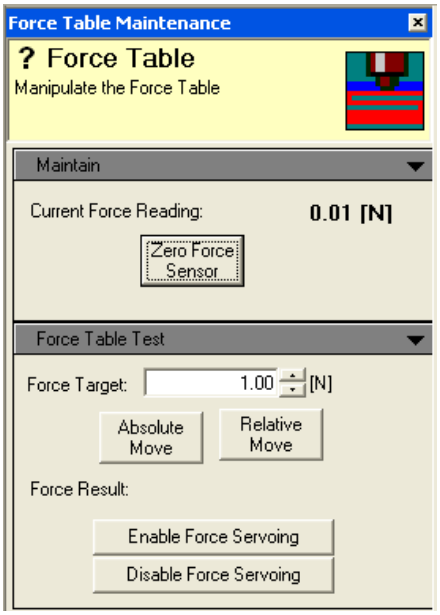
Signals:

The actual state of the head signals are displayed in a graphical format. The digital signal to switch the **Vacuum** and **Blow off** air is available. Clicking on the button below the digital signal displays does toggle the current state.

Also, the Vacuum sensor can be monitored.

15.2.3 Force Sensor Maintenance

The force sensor maintenance page displays the current load on the force sensor table.

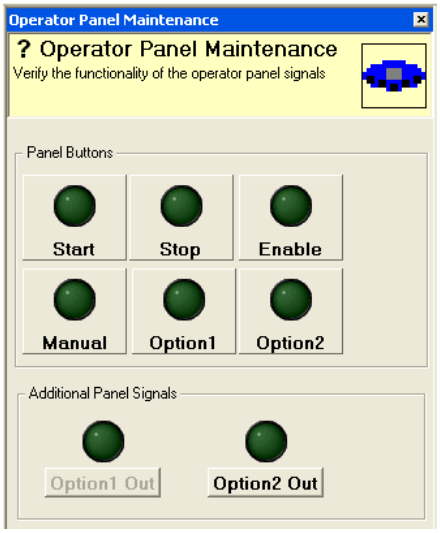


Zero Force Sensor button does reset the force sensor to 0 N.

The **Force Threshold** field can be used to check the functionality of the system. Values set in this page have no effect during program execution. As soon as the force table has reached the set Threshold force, then the **Trigger** signal is activated.

15.2.4 Machine Operator Panel Maintenance View

Through the Maintenance View, the Operator Panel buttons can be diagnosed:



Panel Buttons:

Start	Start indicates the state of the Start-Button
Stop	Stop indicates the state of the Stop-Button
Enable	Enable indicates the state of the Enable-Button
Manual	Manual indicates the state of the Release-Button
Option1	Option1 indicates the state of the Option-Button
Option2	Option2 indicates the state of the Light-Button

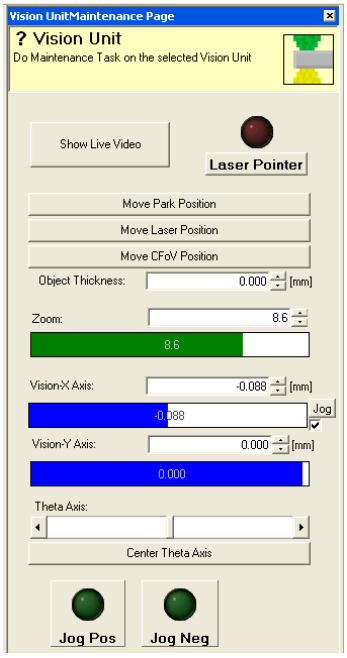
Additional Panel Signals:

Option1	Option1 lets enabling/disabling the option
Option2	Option2 lets enabling/disabling the field illumination

Note
The Option2 button is fix assigned to operate the field illumination mounted at the solder head. On the operator panel it is labeled "Light"

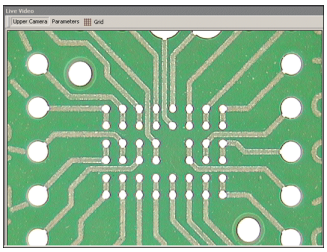
15.2.5 Vision Unit

The Maintenance view of the Vision unit peripheral can display live streaming video. It allows changing light unit parameters and also camera features. All signals and motion axis can be operated in this menu page. Values set in this page have no effect during program execution.



- **Show Live Video** activates the live video page
- **Laser Pointer** sets the Laser Pointer output. If activated it displays a small red dot on a mounted board. It is located in the front section of the vision cube.
- **Move Park Position** button moves the vision cube to its defined park position. If the Multiple Field of View option is installed it may move the Vision-X and the Vision-Y axes.
- **Move Laser Position** button moves the vision cube to its position, where the laser pointer is exactly in the center location of the nozzle. This position is used for teach processes with laser pointer guidance.
- **Move CFoV Position** button moves the vision cube to its position, where the vision center image is exactly in the center location of the nozzle. At the same time the Z-axis moves the nozzle into the correct focus level. This level can temporary be influenced by entering an **Object Thickness** value.
- The **Zoom** slider moves the motorized Vision-Zoom axis of the vision unit.
- The **Vision-X Axis** slider moves the motorized Vision-X axis of the vision unit.
- The **Theta Axis slider** moves the Theta axis.
- The **Center Theta Axis** moves the Theta-axis to its center position.

Live Video



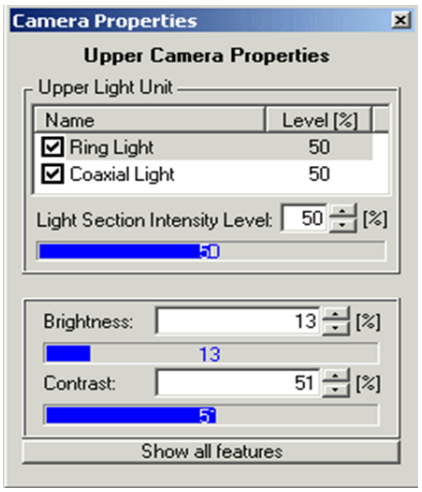
Live video is being displayed. Clicking the **Grid** button shows a grid in front of the live video. The number of grid lines in x- and y-direction can be changed by editing the corresponding text fields.

Clicking on the **Parameters** button opens the camera parameter adjustment page. It allows modifying camera features, such as contrast and brightness.

The **Light Intensities** of the linked Light Unit peripheral can be adjusted. The brightness and the contrast of the image can be directly changed. The new values are immediately transmitted to the camera so that the effect can be checked on the screen.

The **Show all features** button is only available for users with Administrator access level or higher.

Clicking on the **Show all features** button expands the page and shows additional parameters that can be adjusted. The parameters are depending on the camera type and driver; only the supported features are shown.



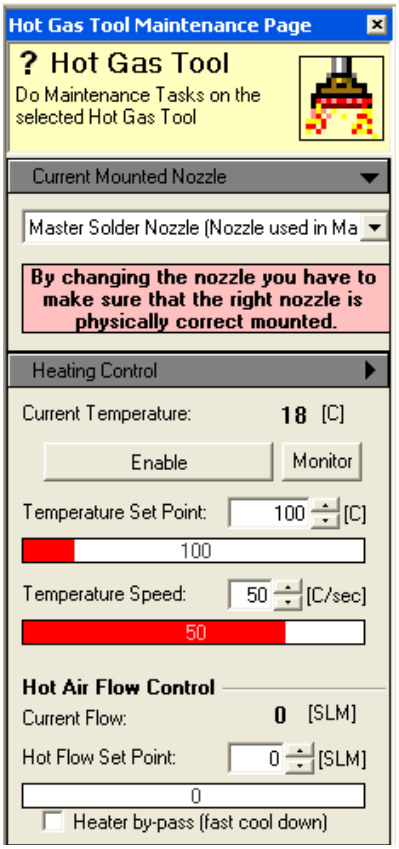
Selecting a feature allows changing its value by dragging the slider below the list. Enabling the check box of a one-push feature allows changing its state. The white balance one-push feature for example, does allow executing directly a white balance operation of the camera. The white balancing effect can be seen on the live video.

- The **Apply Camera Default** button sets all features back to the last saved state.
- Clicking on the Save Camera Default button does save the current feature setting as the default setting. These values will be used to initialize the camera at each start of VisualMachines™.
- The **Video Parameters** button opens the driver dialog to modify directly video parameters. This page is depending on the installed camera driver and is not part of this documentation.

Note
Show All Features does only show camera supported features. The available values and one-push features are depending on the installed camera type and driver.

15.2.6 Hot Gas Tool

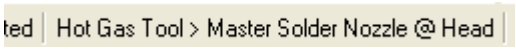
The Maintenance of the Hot Gas Tool displays the actual state of the current mounted nozzle.



- Choose a nozzle from the drop-down list that is mounted on the tool.
- Click the **OK** button to save the current setting.

Note
By changing the nozzle you have to make sure that the right nozzle is physically correctly mounted

The status bar is showing the current mounted tool / nozzle combination on the heads.

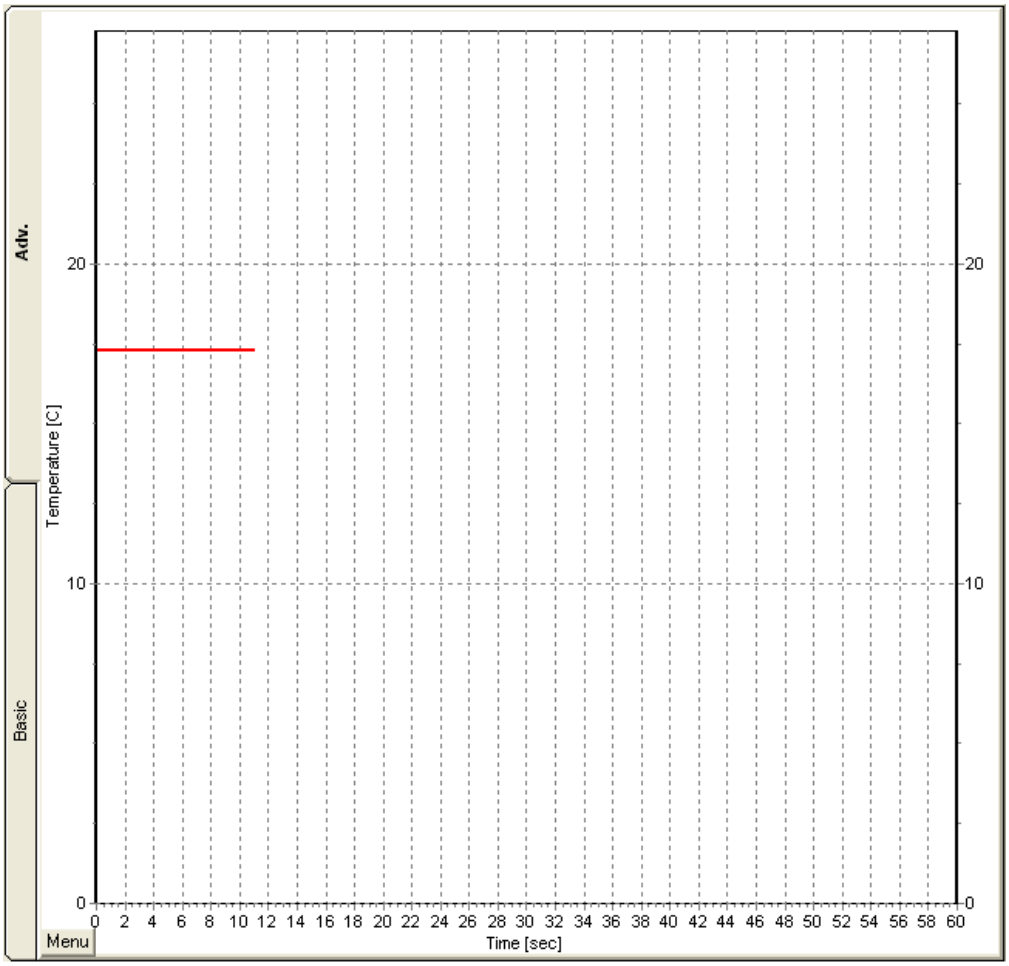


Heating Control

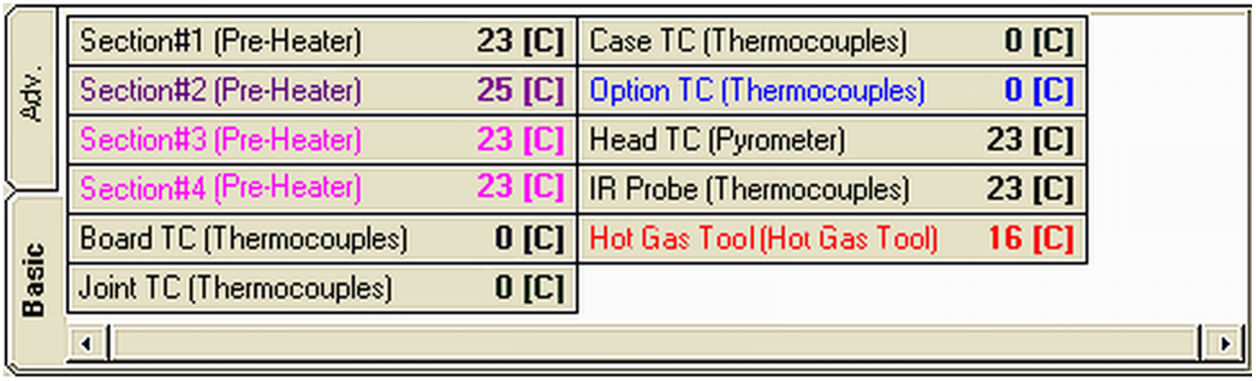
- **Current Temperature** shows the actual temperature of the Hot Gas Tool. If this is bigger than the max temperature in the configuration page, the hot gas tool is not connected.
- **Monitor** Opens a new window where the heating curve is being displayed.
- **Enable** button enables/disables the heater.
- **Temperature Set Point:** Sets the target temperature for the heater.
- **Temperature Speed:** Sets the speed for the heater to reach the defined set point.

Hot Air Flow Control

- **Current Flow** shows the current hot air flow
- **Hot Flow Set Point** for the tool
- **Heater by-pass** (fast cool down) switches the valve that the heater element is by passed for rapid cool down processes.

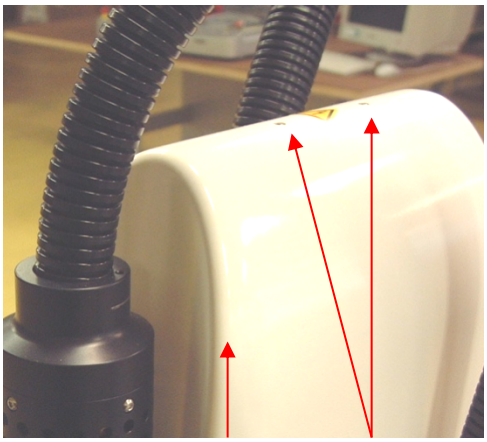


- **Advance**: Display the actual heating graph
- **Basic**: Display the actual heating table

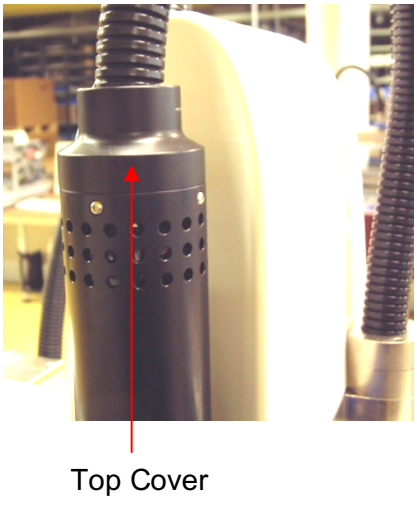


15.3 Upper Heating Element Replacement

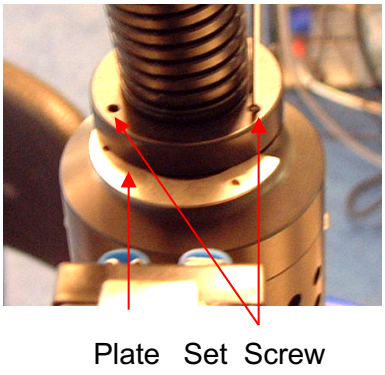
1. Take off the white Cover.



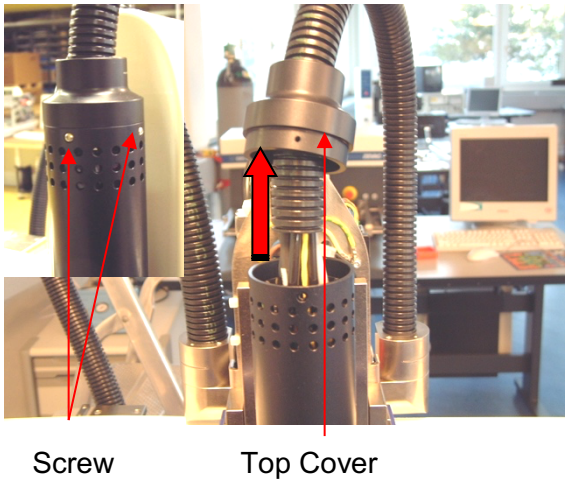
2. Take off the Top Cover by…



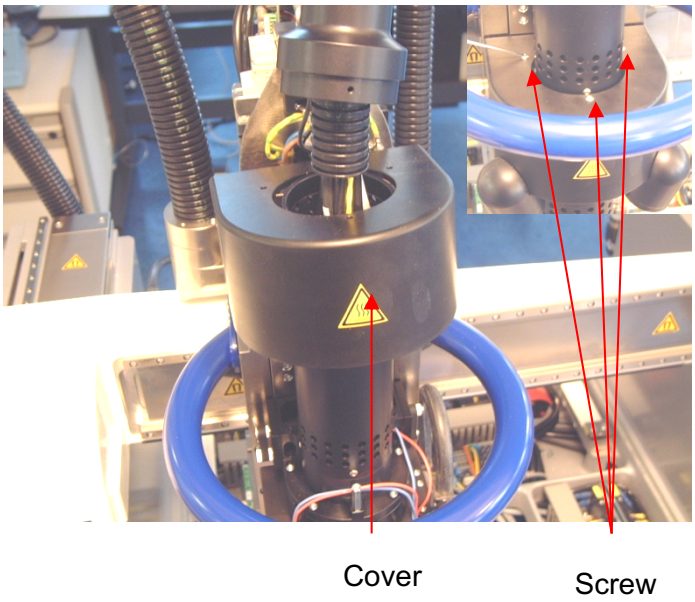
3. Loosening the two set Screws and take off the Plate.



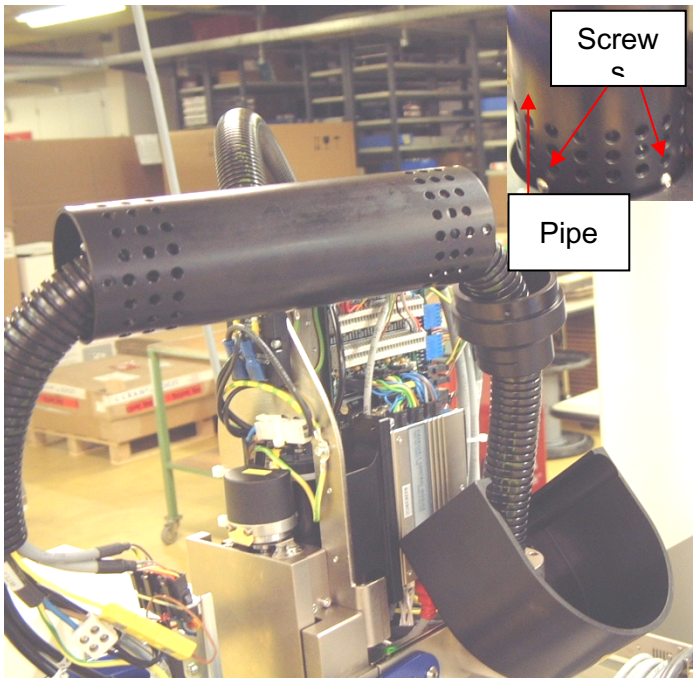
4. Loosen the three Screws and slide the top Cover through the Tube.



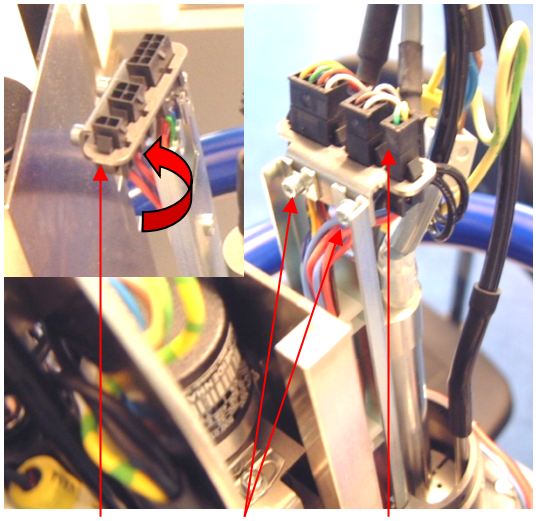
5. Take off the three Screws and lift up the Cover.



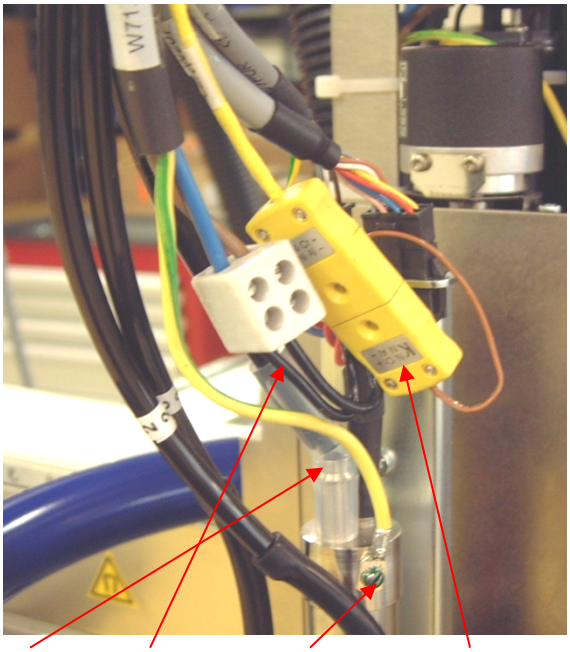
6. Take off the three Screws and slide the Pipe through the Tube.



7. Loosen the two screws, take off the Connector and slide the Connector Bracket to the rear side.

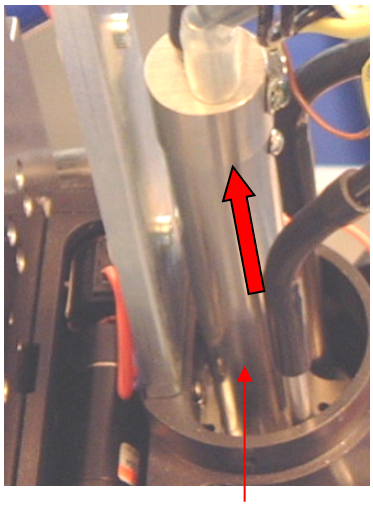


8. Take off the black Wiring (two), remove the Tube, unscrew the GND Screw, disconnect the Connector.



Tube Black Wiring GND Screw Connector

9. Remove the old Heating Element, mount the new Heating Element back until you get to the mechanical end Limit.



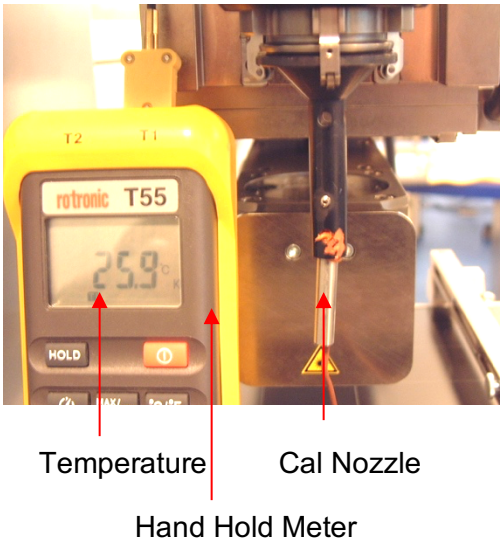
Heating Element

Note

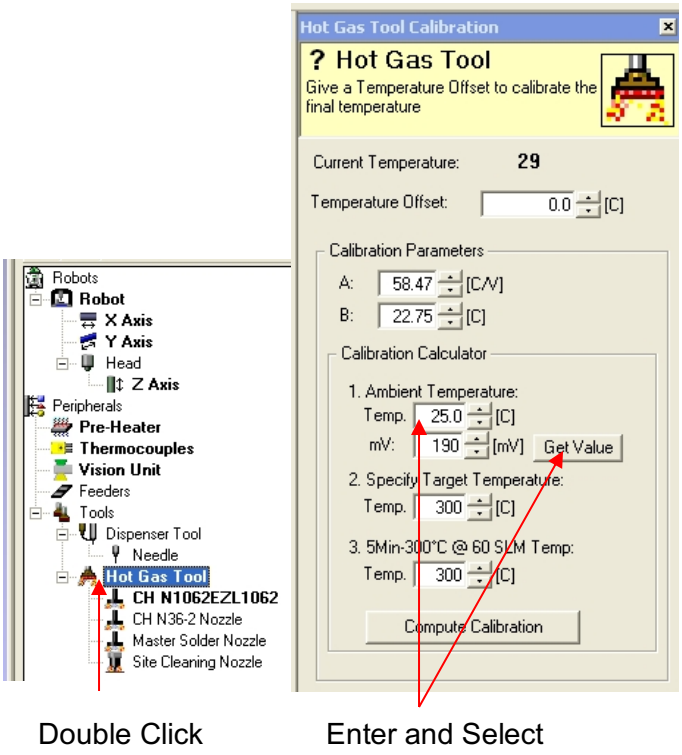
To remount all removed parts, follow the same procedure in reverse.

15.4 Temperature Calibration:

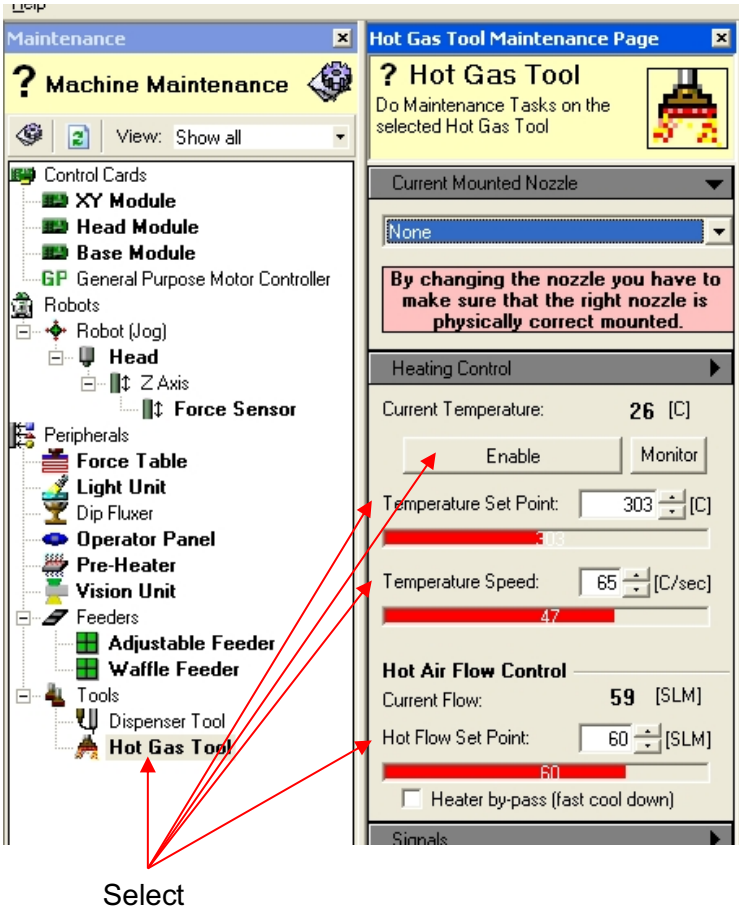
1. Mount the Cal Nozzle, connect the Hand Held Meter, note the Temperature.



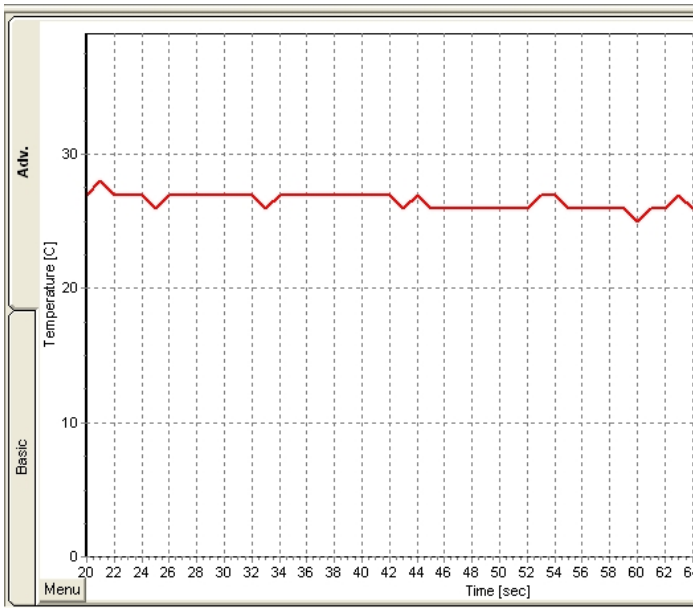
2. Go to **Calibration**, double click **Hot Gas Tool** enter the readout Value in **1. Ambient Temperature Temp.,** then select **Get Value,** the Software will calculate the Value in **mV,** verify that the Value in **2. Specify Target Temperature Temp.** is 300˚C.



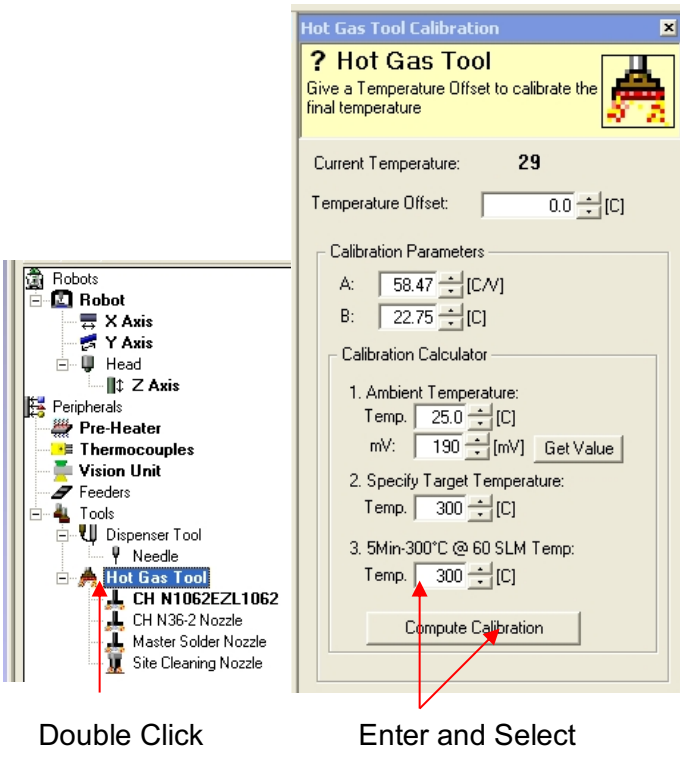
3. Go to **Maintenance**, Double click **Hot Gas Tool,** enter **Temperature set Point** 300, **Temperature speed** 65, **Hot Flow Set Point** 60, **SLM** click on Enable.



4. Activate Temperature Adv. The Monitor start after 300 sec. Check the read out on the Hand Held Meter, note the Value sample 280 °C.



5. Go back to **Calibration,** double click **Hot Gas Tool,** enter the difference Value you get from the **Hand Held Meter Sample 280°C,** enter the Value in calibration Calculator **3. 5Min.300°C@60SLM Temp**. Then select **Computer Calibration.**



Note

The Calibration is done exit the screen and start the Visual Machine Software

16 Software Backup

It is important to make safety copies of all the software parameters of the system and of all the programs. VisualMachines™ provides a backup utility, which allows backing up configuration- and program files automatically at launch of VisualMachines™. These files are stored within a Zip-File. If the PC is connected to a network, then it is essential that the back-up directory is re-defined to a network location which is part of a regular system back-up. Otherwise the backup directory must be backed up regularly.

Warning
It is important to have always up to date software backups. The Configuration database, the Library- and User database and the Programs must be saved to backup devices on a regular base. Use other backup locations than the machines PC hard disk.

ONYX will not be responsible for any lost data.

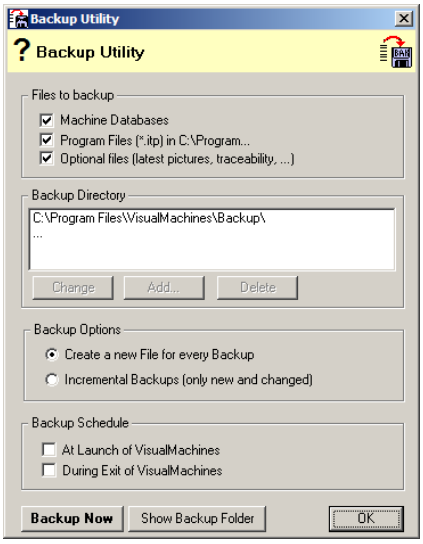
The Backup utility is setup per default, that at every launch of VisualMachines™ all relevant database files are saved into a ZIP file into the default backup directory:

C:\Programme\VisualMachines\Backup

VM Backup 27.05.2004 15-27-40.zip This backup has been made on May. 27. 2004 at 15:27

Note
If a system must be re-installed, it is possible to reuse such an automatic created backup during the installation of VisualMachines™. That way it will be guaranteed no data is being lost. Consult your local dealer on how to re-install the software and the backup.

The Backup utility can be found on the Utilities bar with the appropriate access level.



Backup Now startet sofort einen Backup Prozess.
Klicken auf **Show Backup Folder** öffnet ein Explorer Fenster, das den Inhalt des aktuellen Backup Ordners anzeigt.

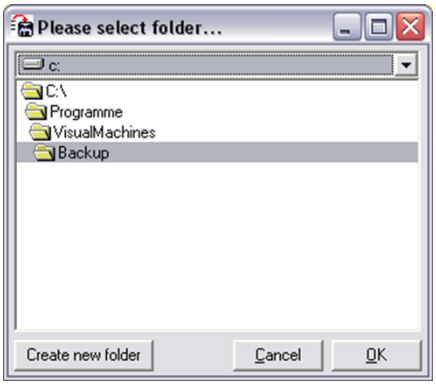
Mit **OK** wird das Fenster geschlossen.

Files to Backup:

- **Machine Databases** does backup all databases like machine configuration, part types user and passwords and machine usage data.
- **Program Files** does backup all process programs
- **Optional Files** does backup all traceability related data.

Backup Directory:

This field shows the actual path, where the ZIP-compressed files are stored.
Click on … to browse the folder using the **Please select folder** dialog



Create new folder prompts to type in a name for the new folder that will be created in the actual folder.

Backup Options:

With **Create a new File for every Backup** the backup will be created as a new file, while **Create a new File for every Backup** overwrites the existing backup file.

Backup Schedule:

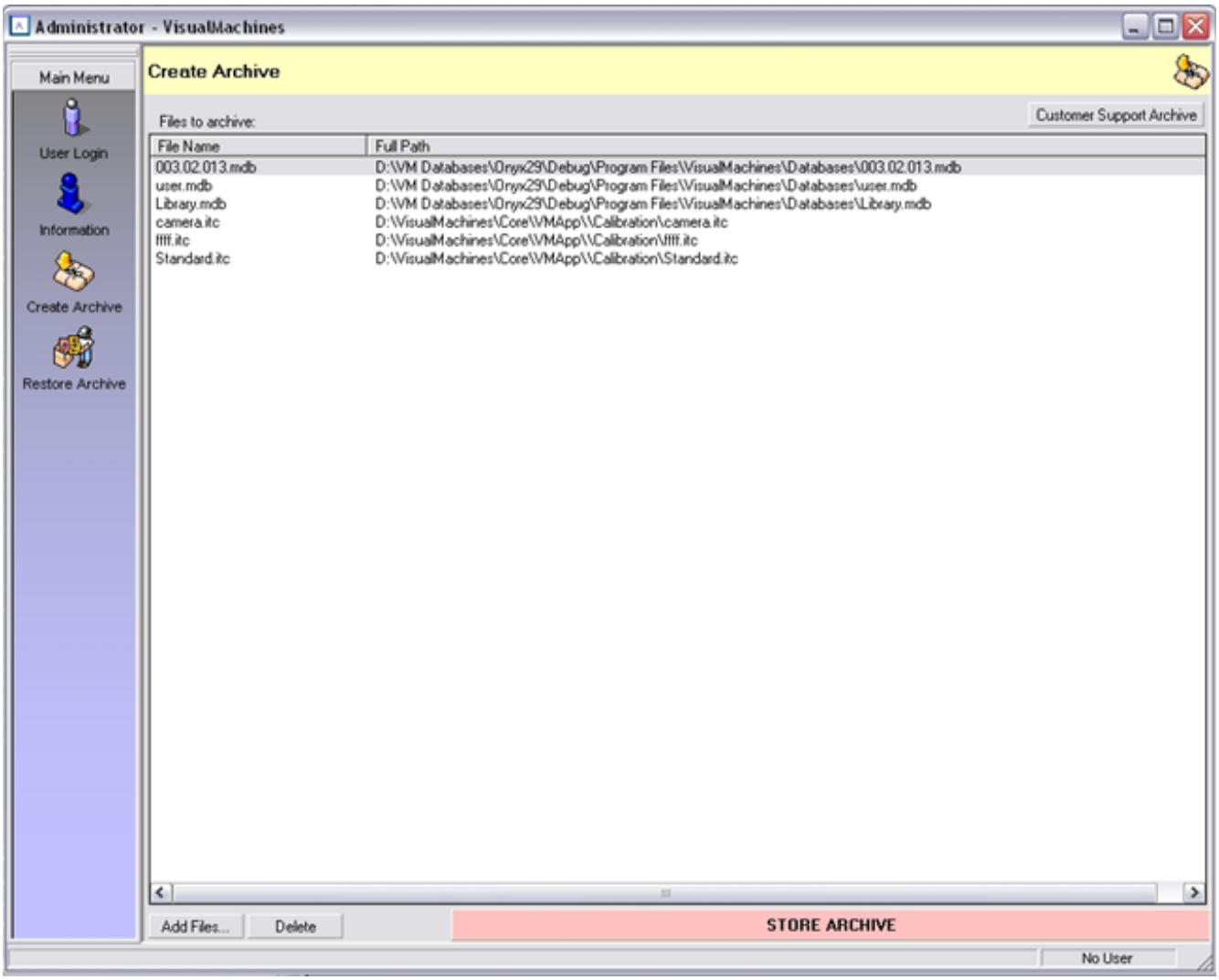
At Launch of VisualMachines™ does create a backup at every startup of VisualMachines™.

16.1 Create Software Archive

Note
Each time a question regarding the software, or reporting a software- or process problem, have the appropriate software archive ready. The software archive can be created very easy, it merges multiple back-up files into a Zip file.

The Administrator application can be opened if the VisualMachines™ is closed. Double clicking onto the icon on the desktop or by **CTL-ALT-A**.

The Create Archive function is useful to create a special compressed archive file.



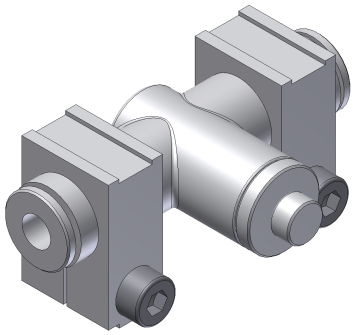
Note
The compressed files are Zip compatible and can be re-used as the Restore option during VisualMachines™ installation (see installation). For further information please see the online help within the Administrator application.

17 Pneumatic

17.1 Adjusting the Blow-Off Air

The mounting head of the machine "ONYX 29 Series 7" is equipped with vacuum and blow-off air to pick and place parts. After disabling the vacuum on the placement process, the blow-off air can be activated for a short time to release the residual vacuum. The blow-off air has to be adjusted as low as possible to make sure that the parts will not be blown away after the placement.

The adjustment screw of the blow-off air is located under the head cover of the machine. The cover can be removed after loosening two screws.

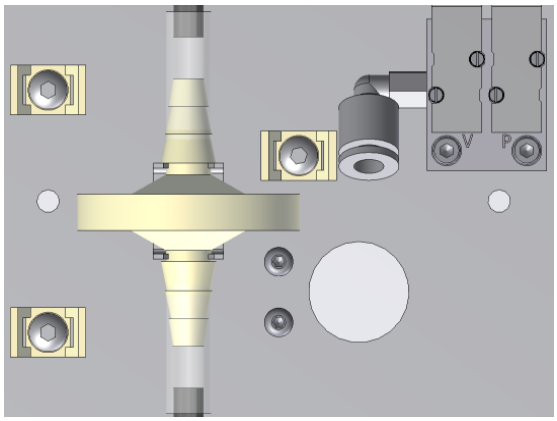


Switch off the assembly head vacuum using the Head peripheral in the Maintenance view. Switch on the blow-off air. Adjust the manual blow-off air adjustment valve, until the blow-off air can be felt at the nozzle.

Use a small nozzle and wet your finger, this way it is easier to feel the blow-off air.

After the proper adjustments, lock the throttle valve, switch off the blow off air and install the head cover again. If the option pressure controller blow-off is installed, the adjustment of the throttle valve has to be done with the pressure controller set to 20%.

17.2 Vacuum Filter

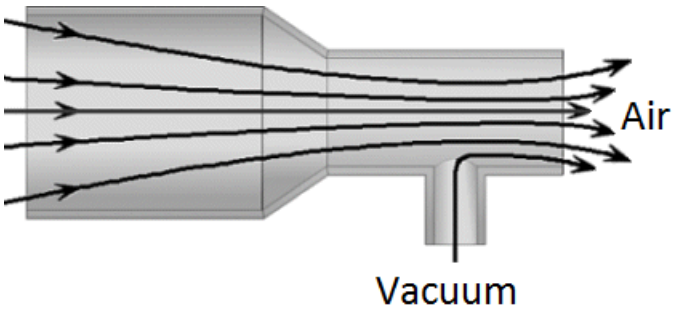


The ONYX 29 Series 7 assembly head vacuum uses an inline filter. The filter is located under the back cover of the head. If the process includes heavy evaporating flux, then the filter must be replaced on a regular base.

17.3 Venturi Valve

Note
The compressed air is also used to generate some vacuum by means of a Venturi.

An abnormally low air-pressure at the machine's input will immediately influence the resulting vacuum level.



18 Electric Module

Note
The Electrical Schema **300.16.410ES** and **300.16.411ES**, and the I/O Lists are a part of the User's Guide and the machine documentation.

Warning
Only qualified personnel may work on the peripherals with low voltage devices. Country specific prescriptions must be considered.

While working in the low voltage area, make sure to have another person present, who knows the machine and can apply first aid.

The power supply has to be disconnected to assure that no one can start the machine.

Note
Before doing the startup procedure of the machine, the electric schematic has to be studied.

The general control voltage is +24 VDC. All digital input and output signals are usually with +24 VDC. The analog input and output signals operate with a voltage of 0 ... 10 VDC. The rotary motors are usually operated at +48 VDC. The linear axes are controlled by a servo amplifier.

18.1 Wire Color

Wire color for main power 120/208VAC and 230/400VAC:

Chassis ground wire	Yellow/Green
Neutral wire	IEC: Light Blue, UL: White
Phase L1	Black / Black 1
Phase L2	Black / Black 2
Phase L3	Black / Black 3

Wire color (VDC):

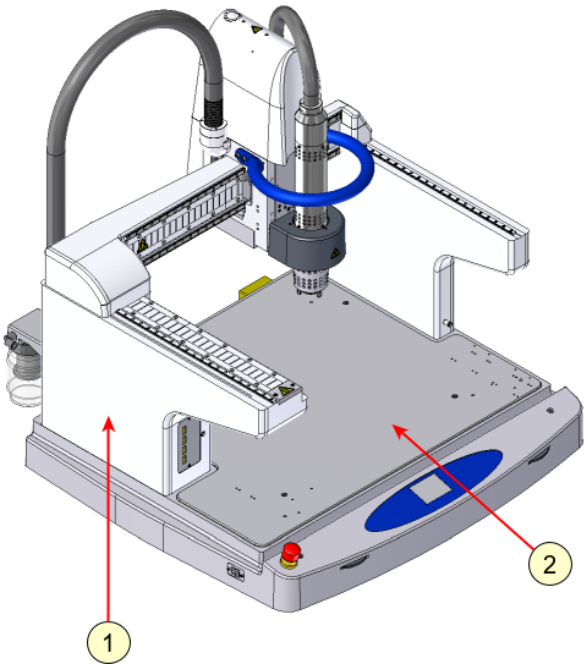
Control voltage	**Color**	**Remarks**
GND	Blue/White	24VRET / COMMON / 0V
+24VDC	Blue	
+48VDC	Violet	
+XXVDC	Pink	VDC (Special Voltage)

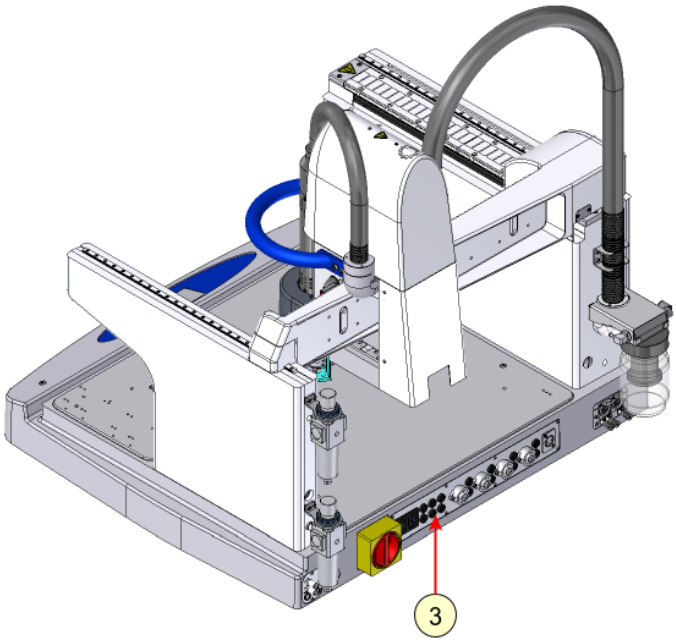
External voltage (VAC / VDC):

+XXVAC / VDC	Orange	External voltage
GND	Orange/White	External voltage

18.2 Main Module

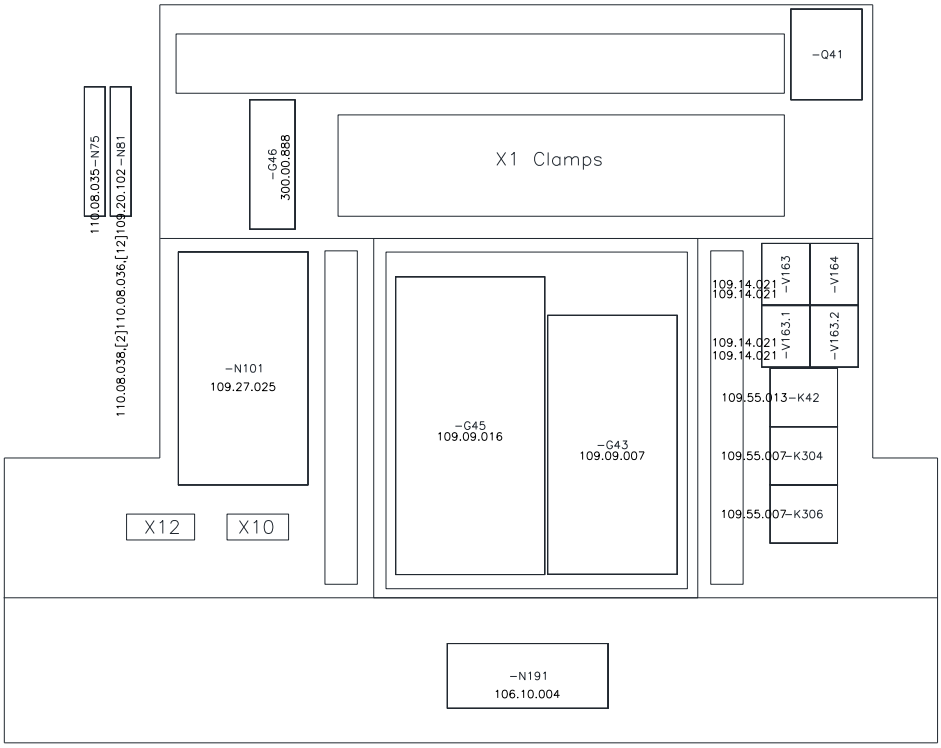
The main module is located under the tabletop of the machine "ONYX29 Series 7" and is accessible from the top side.





1 Electric Module Machine Left Side
2 Electric Module (under base plate)
3 Power Strip rear view

18.2.1 Electric Module Machine Base



Machine Base

BMK	Element	Page	Path	Description
N75	Master Controller (COP-MAS2)	7	5	Communication between PC and Controller
N81	COP-IT	8	1	Thermocouple, Force sensor, Z-Probe and PWM-Signals

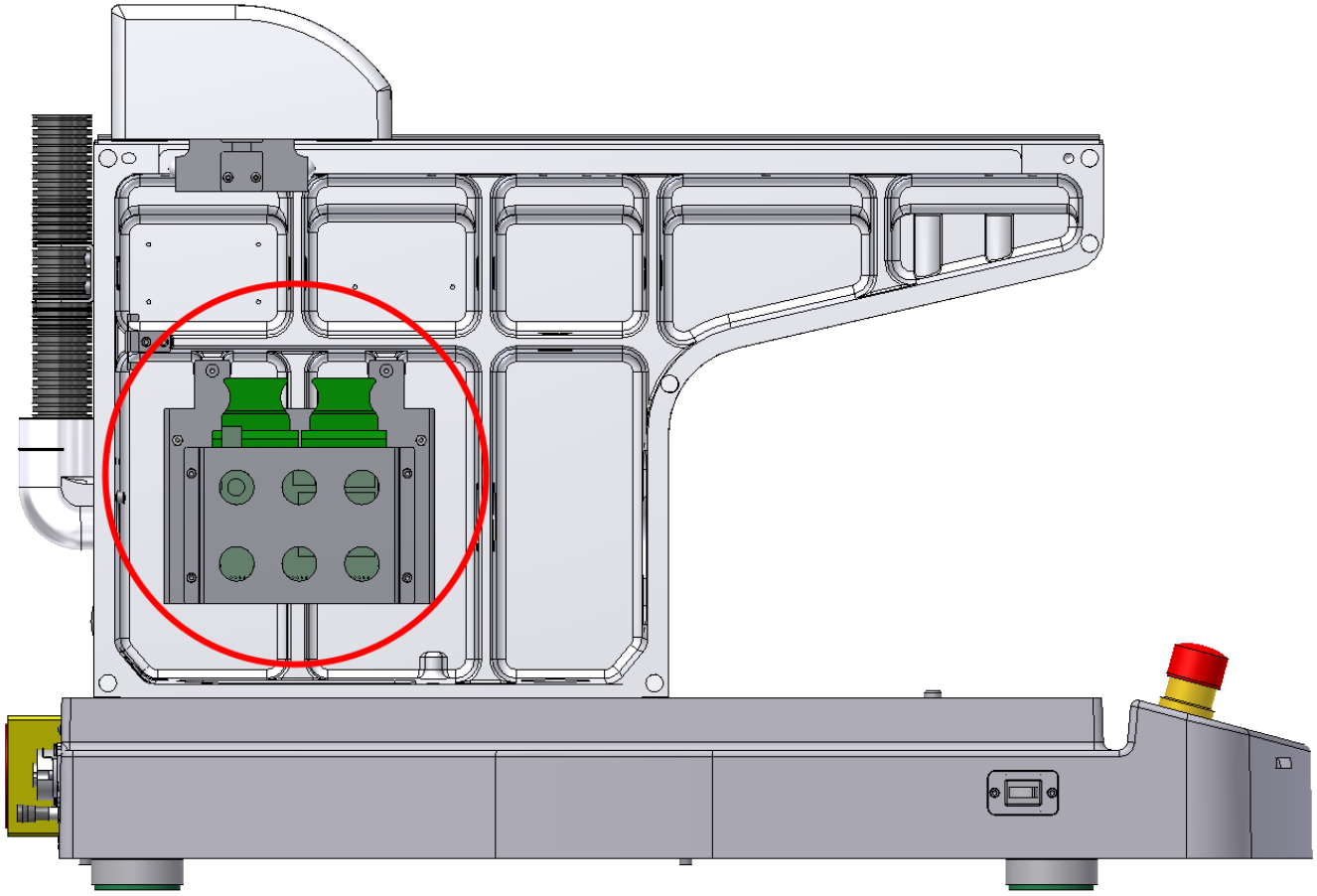
BMK	Element	Page	Path	Description
G43	Power Supply 24 VDC	4	3	24 VDC Digital Signals and Logic Power
G45	Power Supply 48 VDC	4	5	48 VDC Motor Power
G46	AC Power Supply 12 VDC	4	6	AC-Power Synchronize

BMK	Element	Page	Path	Description
Q41	Motor Circuit Breaker	4	1	Main Power Switch
N101	Application Module 1 (MAX4x4)	10	1	Motor, PWM- and I/O-Signals
N191	Pressure Controller 5 bar	19	1	Blow Off

BMK	Element	Page	Path	Description
V163	SSR	16	3	Pre-Heater 1
V163.1	SSR	16	3	Pre-Heater 2
V163.2	SSR	16	3	Pre-Heater 3
V164	SSR	16	4	Pre-Heater 4

BMK	Element	Page	Path	Description
K42	Contactor	4	2	System Control ON/OFF
K304	Contactor	30	4	Power Motor +48 VDC ON/OFF
K306	Contactor	30	6	Power Heater ON/OFF

18.2.2 Electric Module Machine Left Side



BMK	Element	Page	Path	Description
N75	Master Controller (COP-MAS2)	7	5	Communication between PC and Controller
N81	COP-IT	8	1	Thermocouple, Force sensor, Z-Probe and PWM-Signals

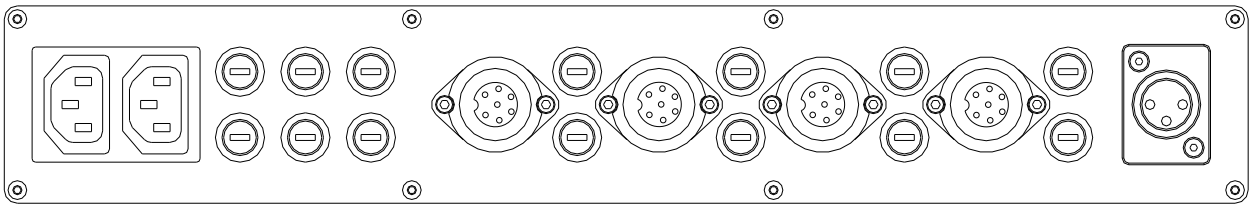
18.2.3 Electric Module Machine Head

Inside the Advanced- or Economy solder head, there is another MAX4 controller module with the corresponding distribution card located. All head motors and all head I/O signals are supported up in the head:

BMK	Element	Page	Path	Description
N201	Head Module 1 (MAX4x4)	20	1	Motor, PWM- and I/O-Signals

18.3 Fuses

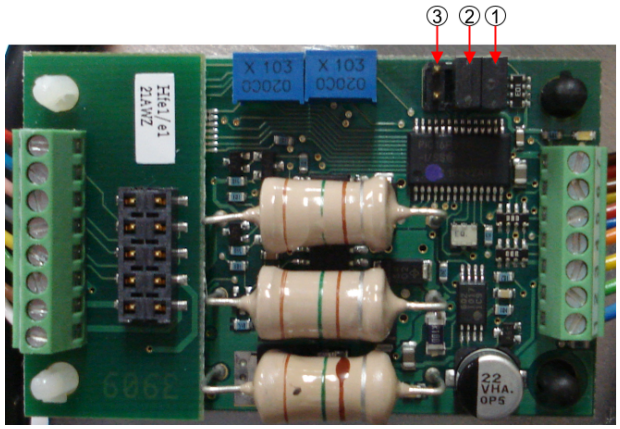
The 3-phase main power switch has included a 16A internal fuse per phase. If the fuse is activated, the main switch is automatically switched off. After the problem has been fixed the switch can be switched on again. No fuses need to be replaced. The fuses on the back panel are shown in the image below, every installed pre-heater channel includes a fuse per phase.



BMK	Element	Page	Path	Description
F43	Glass Fuse 24 VDC Control	4	3	4 A Fast Blow (5 mm x 20 mm)
F45	Glass Fuse 48 VDC Motor	4	5	6.3 A Fast Blow (5 mm x 20 mm)
F51	Glass Fuse Air Fan	5	1	6.3 A Fast Blow (5 mm x 20 mm)
F52	Glass Fuse Wafer Heater	5	2	6.3 A Fast Blow (5 mm x 20 mm)
F62	Glass Fuse Pre-Heater 1	6	2	8 A Slow Blow (5 mm x 20 mm)
F62.1	Glass Fuse Pre-Heater 1	6	2	8 A Slow Blow (5 mm x 20 mm)
F64	Glass Fuse Pre-Heater 2	6	4	8 A Slow Blow (5 mm x 20 mm)
F64.1	Glass Fuse Pre-Heater 2	6	4	8 A Slow Blow (5 mm x 20 mm)
F65	Glass Fuse Pre-Heater 3	6	5	8 A Slow Blow (5 mm x 20 mm)
F65.1	Glass Fuse Pre-Heater 3	6	5	8 A Slow Blow (5 mm x 20 mm)
F67	Glass Fuse Pre-Heater 4	6	7	8 A Slow Blow (5 mm x 20 mm)
F67.1	Glass Fuse Pre-Heater 4	6	7	8 A Slow Blow (5 mm x 20 mm)
F71	Glass Fuse Hotgas	7	1	8 A Slow Blow (5 mm x 20 mm)
F72	Glass Fuse Hotgas	7	2	8 A Slow Blow (5 mm x 20 mm)

Note
Please note that the Fuse identification matches the location of the electrical schematics. For example: Fuse F42 is listed on page 4 in column 2 in the electrical schematics.

18.3.1 General Purpose Controllers



The general purpose controller is used for the Vision-Zoom axis. The Vision Zoom axes are located under the head cover:

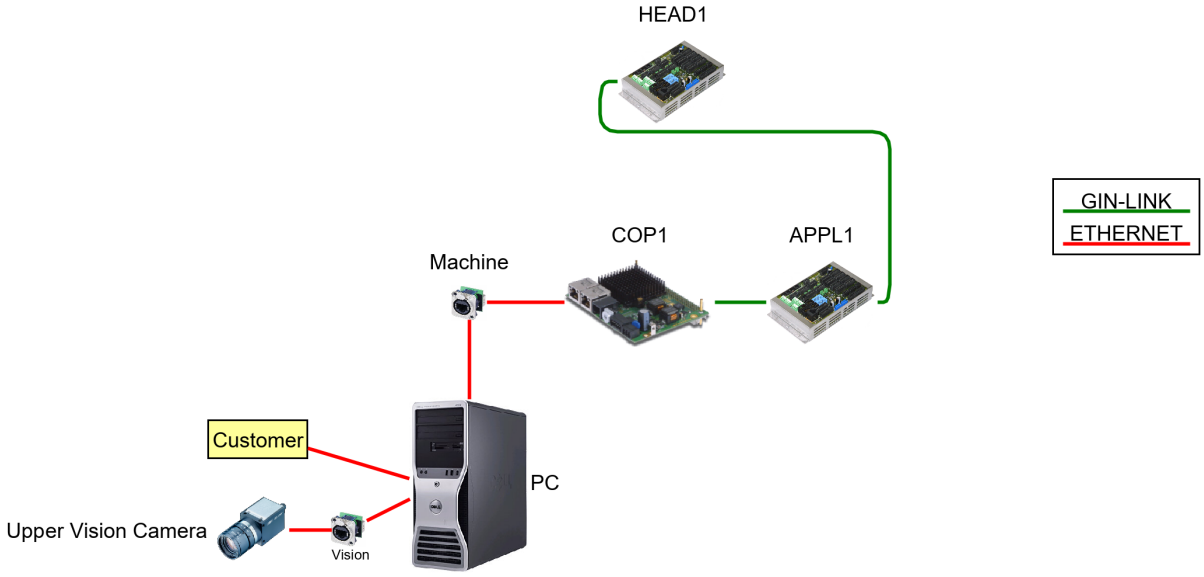
On the controller, the potentiometer has to be adjusted fully open (completely to the clockwise side).

Jumper 1 - 2 set
Jumper 3 open

18.4 Control System

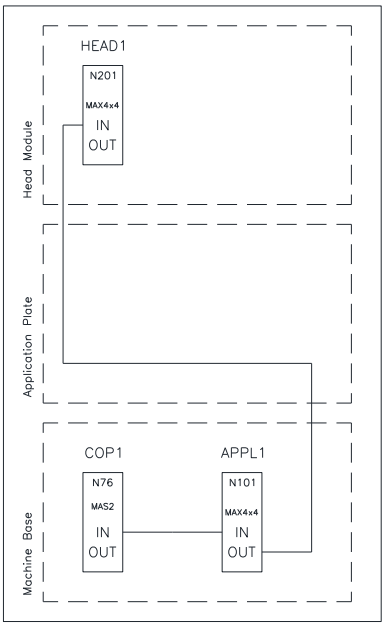
System	Module	IP-Address
003.07.XXX ONYX ONYX 29 Series 7	PC	192.168.1.100
	Master Controller	192.168.1.251
	Upper Vision Camera	192.168.2.200

The different controllers are communicating over an ethernet cable (Gin-Link). The SAM controller builds the interface between the Gin-Link network of the machine and the Ethernet network of the PC.



BMK	Element	Page	Path	Address Switch
N76	Master Controller (COP-MAS2)	7	6	S1=1
N101	Application Module 1 (MAX4x4)	10	1	S1=0
N201	Head Module 1 (MAX4x4)	20	1	S1=0

GinLink Wiring:

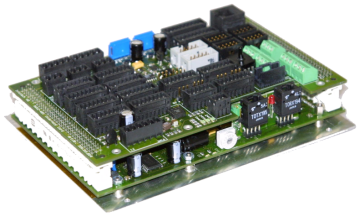


Detailed information about the wiring can be found in the Electric documentation.

300.16.410ES ONYX 29 Series 7 (208 VAC)
300.16.411ES ONYX 29 Series 7 (400 VAC)

18.4.1 Hardware

18.4.1.1 MAX4x4 Controller



The MAX4x4 controller will be used to control small motors of the machine as well as the digital and analogue signals.

If a MAX4x4 controller is replaced, the address switch on the new controller has to be adjusted to the same value as the address switch on the old controller. Also all jumpers have to be configured the same way as they are configured on the old controller. The address switches are located on the side of the MAX4x4 controller. Further the software configuration has to be loaded onto the controller.

- 3 PWM signals (2 A)
- 4 Encoder input signals
- 16 Digital output signals (24V, 2A)
- 24 Digital input signals (24V)
- 4 Analog output signals (16 Bit)
- 14 Analog input signals (16 Bit)
- 4 DC- or 3-phase motors (5 A)

18.4.1.2 COP-MAS2 Controller

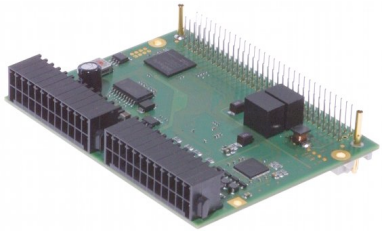
The COP-MAS2 is the ideal CPU-Board for simple to mid-level complex applications.

The high versatility of the new COP-MAS2 is based in its compact size in combination with a powerful ARM-CPU but as well through its design to connect until six more COP-Modules. Hence, it's possible to create a compact controller with only one COP-Hub.

Furthermore, a COP-MAS2 can be used as well as a GinLinc Master (or Slave). If the Cop-Master is being used as fieldbus-slave it will work as an active bus-coupler with its own CPU. The local computing power can be used for preprocessing signals and executing of custom specific applications.

The communication between COP-Master and a PC-based HMI will be done by Ethernet link.

18.4.1.3 COP-IT Card



The COP-IT module has two high-speed PWM outputs an RGB-PWM, two force- and probe inputs and four thermocouples (Type K). With the aid of an analog input, an external PT100 measurement can be performed.

19 Trouble Shooting

19.1 No Power Available

- Check, if the main power switch on the machine "ONYX 29 Series 7" is switched on.
- Check, if the control power switch on the machine is switched on.
- Check all fuses, see the chapter "**Electric module - Fuses"**.

19.2 E-Stop Cannot Get Released

- Check if the green power LED on the left side of the machine is shining. If the LED doesn't shine, take a look at the previous chapter.
- Check if the E-stop button is released.

19.3 No Air Pressure

- Check the in-house air supply and the input pressure on the machine.
- Check the air pressure on the maintenance unit.

19.4 Not Enough Vacuum On Nozzles

- Check the air input pressure on the pneumatics maintenance unit. The air input pressure has to be adjusted to 0.55 MPa (5.5 bar / 80 PSI).
- The pneumatic diagram **300.11.915PS** is a part of the User Guide and the machine documentation.

19.5 Hot Gas Heater Cannot Be Enabled & No Heat Is Being Generated

- Check that the E-stop is released and enough air pressure into the system is provided. The safety system status should be at the state Safety system: READY.
- Check the hot gas system fuses of the ONYX 29 Series 7 (see section "Fuses of the ONYX 29 Series 7")
- Check that a nozzle with the type Hot Gas Nozzle is mounted. This can be seen in the maintenance screen of the Hot gas system.
- Make sure that the temperature reading makes sense otherwise the analog sensor is not properly connected.

19.6 Height During Site Clean Process Is Not Constant

If the site clean tool is raising its position during the site clean process, and it is moving way above the board, then clean the site clean tool. It might be that the vacuum channel inside the tool is full of solder.

20 Disposal of the Machine

Packaging Material

The packaging material should be preserved. When moving the machine later, use the original packaging.

If the packaging material is not used any longer, it should be disposed considering the local terms.

The packaging material consists of a wooden palette, cardboard and polyethylene. These materials have to be disposed separately considering the local terms.

Machine "ONYX 29 Series 7"

Before the disposing the machine has to be disconnected from the local power connector and the pneumatic supply. The machine and all peripherals have to be disposed separately considering the local terms.

21 Appendix: Packaging

The packaging of the machine "ONYX 29 Series 7" was specially developed and made for it. If the machine has to be transported again, the original transport lock and packaging has to be used.

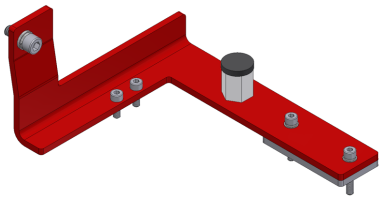
Contact the supplier, if the transport lock or the packaging is no longer available.

Warning
The machine may not be transported without the standard packaging. Even if the machine has to be transported over a short distance, the machine has to be damped sufficiently. Otherwise the linear guiding rails can be damaged. Do never transport the machine on a pallet truck.

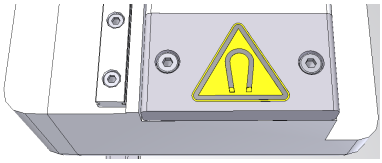
Before the machine will be moved, the transport locks have to be mounted to secure the movable axes.

Prevent the machine from strong vibrations during the transport because the linear guiding rails can be damaged.

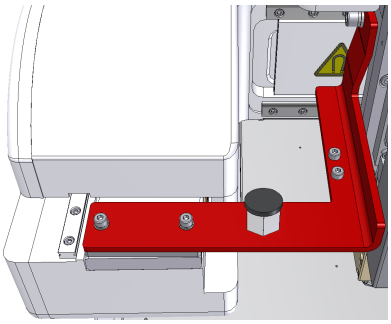
21.1 Transport Lock on Movable Axes



Always use the "longer" screws, which are normally screwed into the transport lock.



The screws of the Y-block are too short for a correct use of the transport lock.



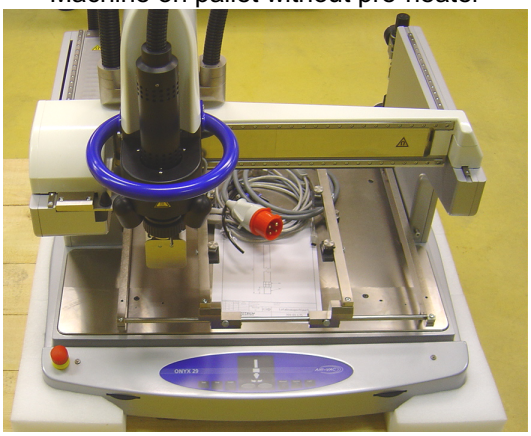
The shorter screws as well as the X-axis stop are screwed into the transport lock during transport.

Warning
When moving the X-axis make sure to not damage the linear scale of the Y-axis.

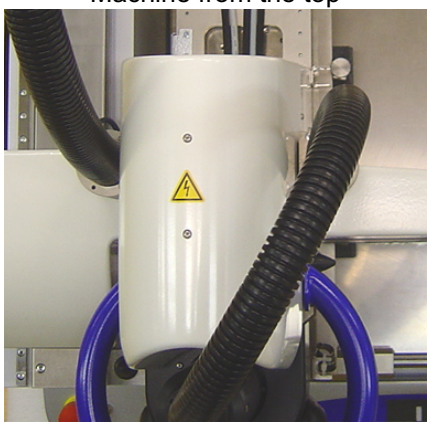
21.2 Image Sequence Packaging

Note
The machine on the pictures can be different from your machine configuration.

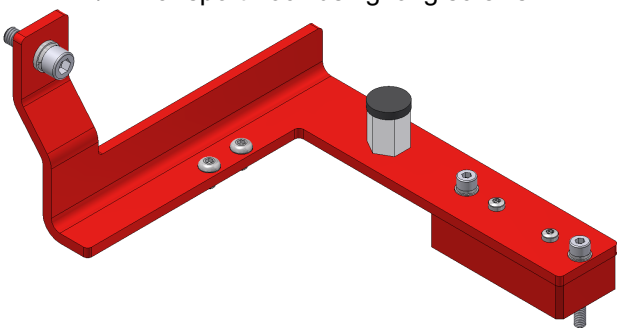
5
Machine on pallet without pre-heater



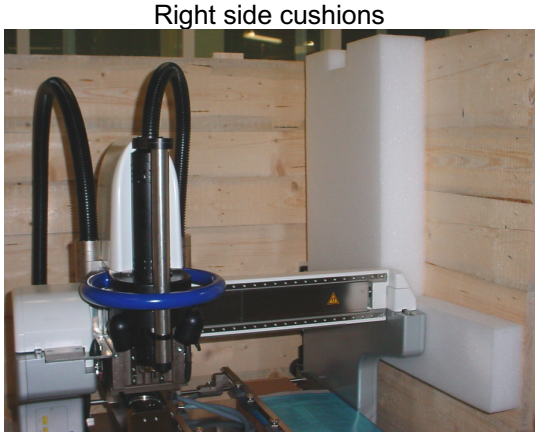
6
Machine from the top



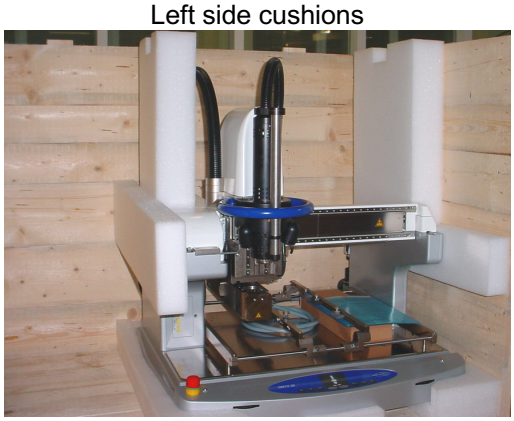
7
X/Y-Transport Lock using long screws



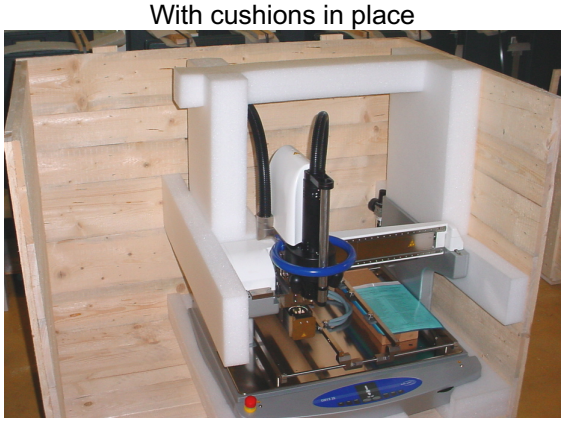
8
Right side cushions



9
Left side cushions

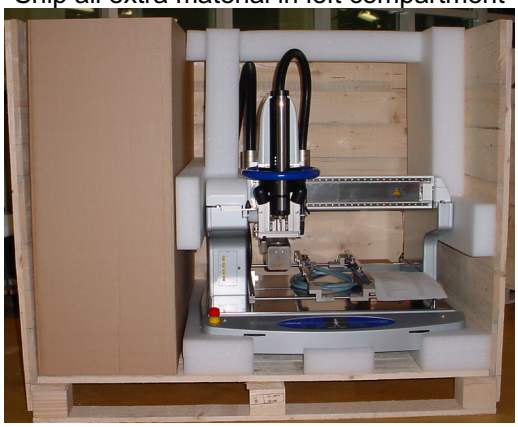


10
With cushions in place



11
With left side compartment

12
Ship all extra material in left compartment



13
Use plastic cover with wooden crate

14
Cardboard packaging

22 Appendix: Standard Hot Gas Flow Tables

Nozzle Conversion Table – Standard Nozzle Flow% -> SLM -> CFM

Flow Rate Conversion

%	LPM	CFM
15	12	0.42
20	16	0.56
25	20	0.70
30	23	0.82
35	27	0.96
40	31	1.10
45	35	1.24
50	40	1.40
55	44	1.54
60	48	1.68
65	50	1.75
70	53	1.88
75	57	2.00
80	60	2.13
85	64	2.26
90	69	2.45
95	72	2.55
100	82	2.90
105	86	3.05

% - Compare to previous ONYX equipment of the generation DRS

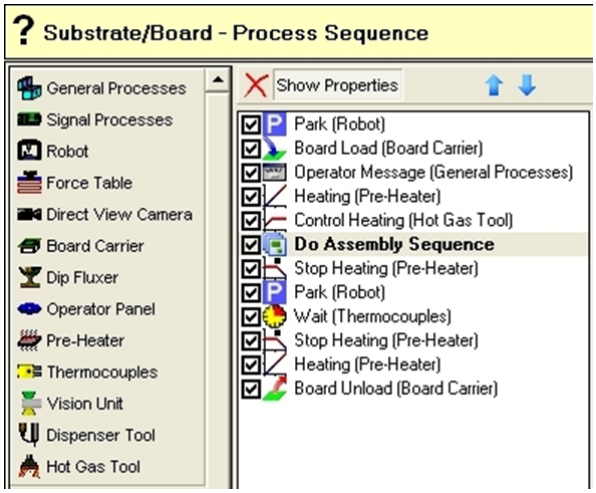
SLM – Standard Liter per minute

CFM – Cubic feet per minute

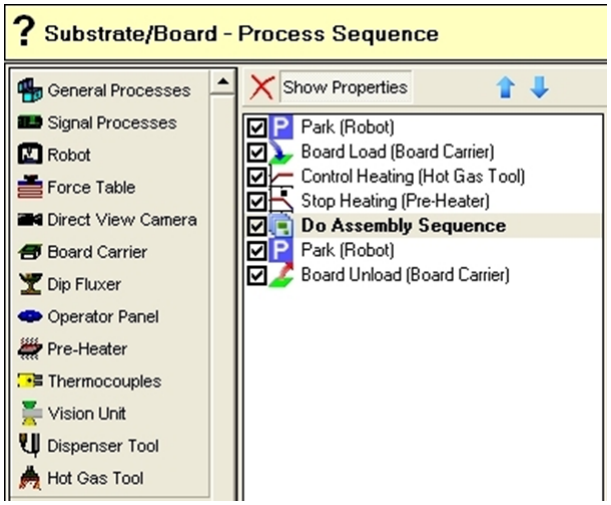
23 Appendix: Master Program "Finger Prints"

Note
The following section lists all the menu pages with the set parameters used within the Master Program. Most of the following menu pages cannot be viewed or edited with the Technical Operator password level. The menu pages are listed for educational reasons.

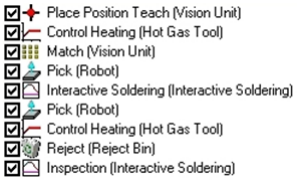
Master Program

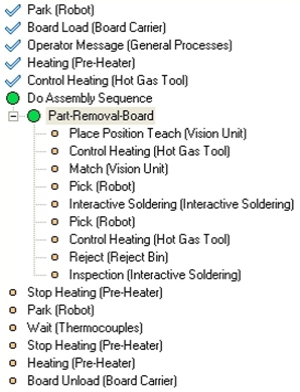


Master Dispensing Program

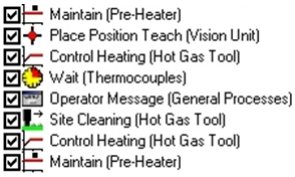


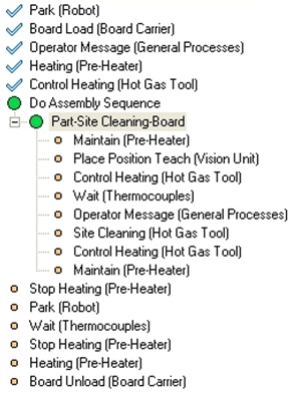
Removal



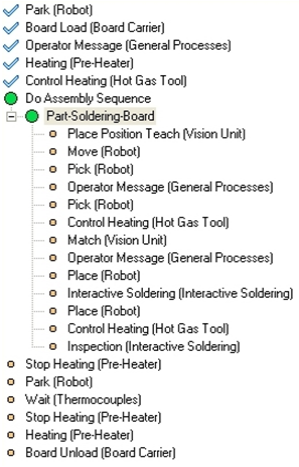


Site-Cleaning

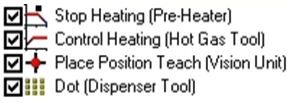


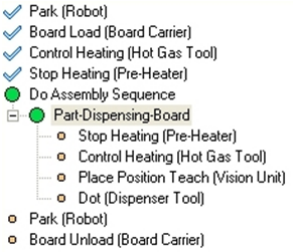


Soldering

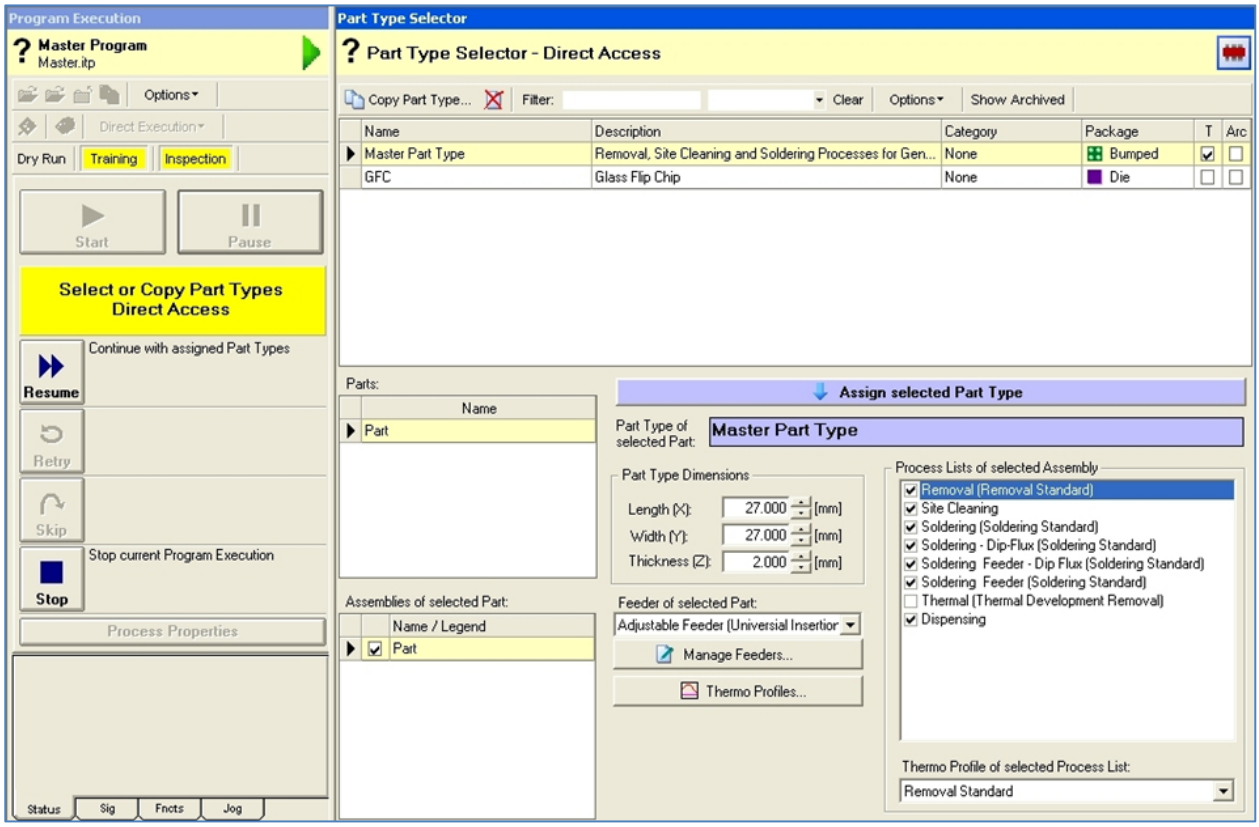


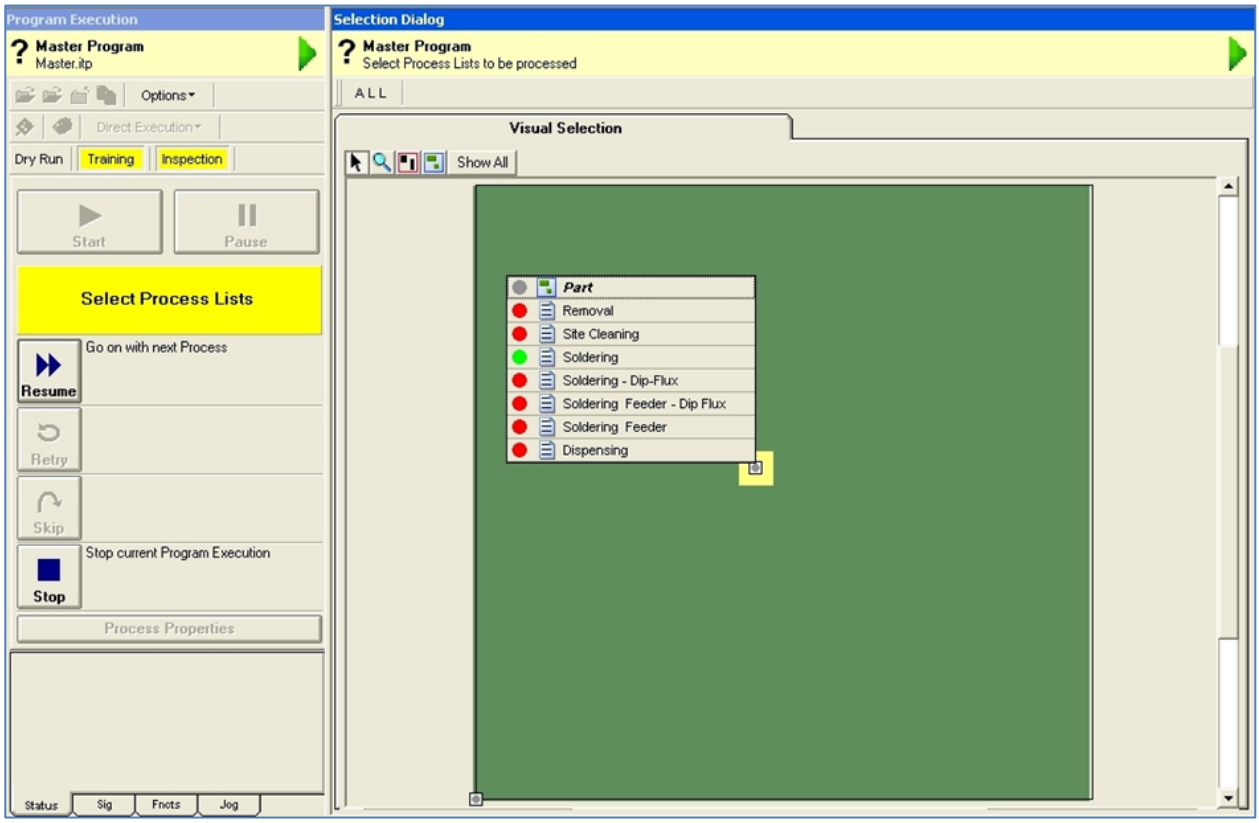
Dispensing

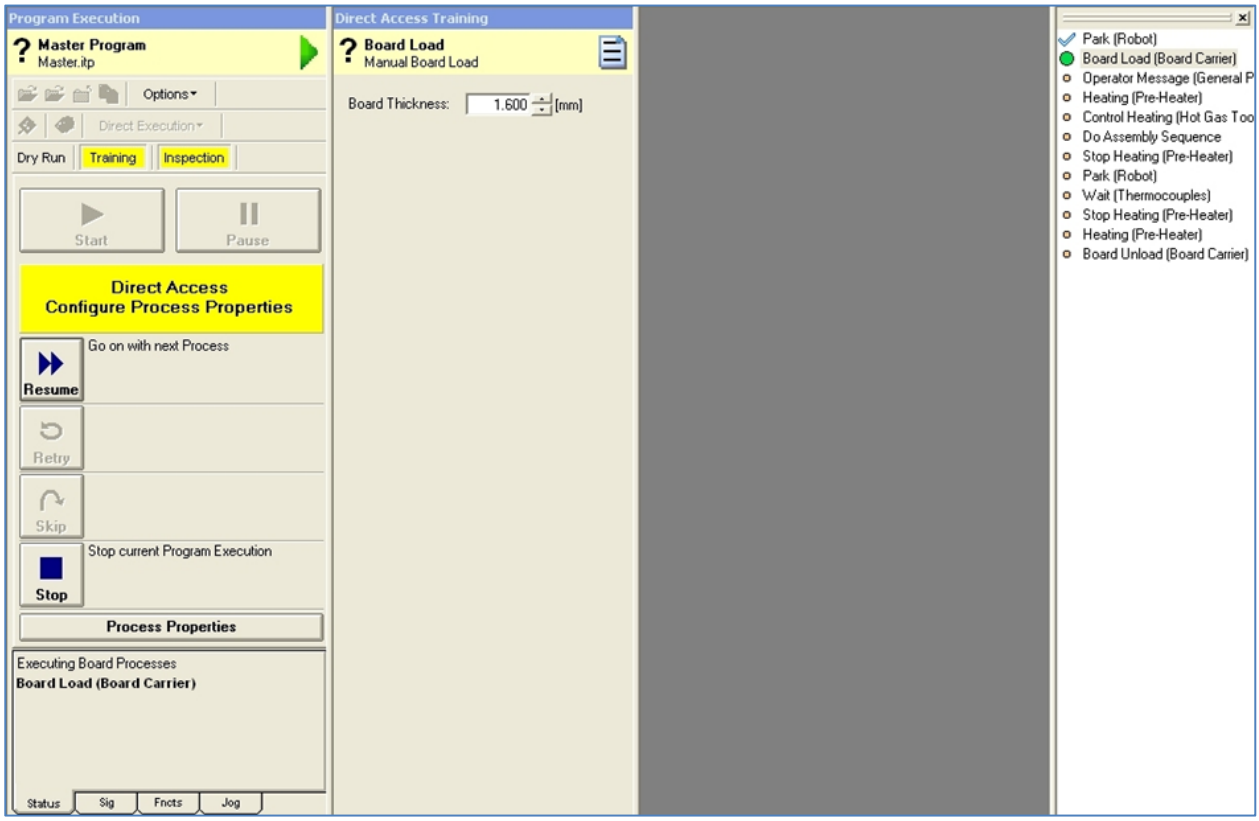


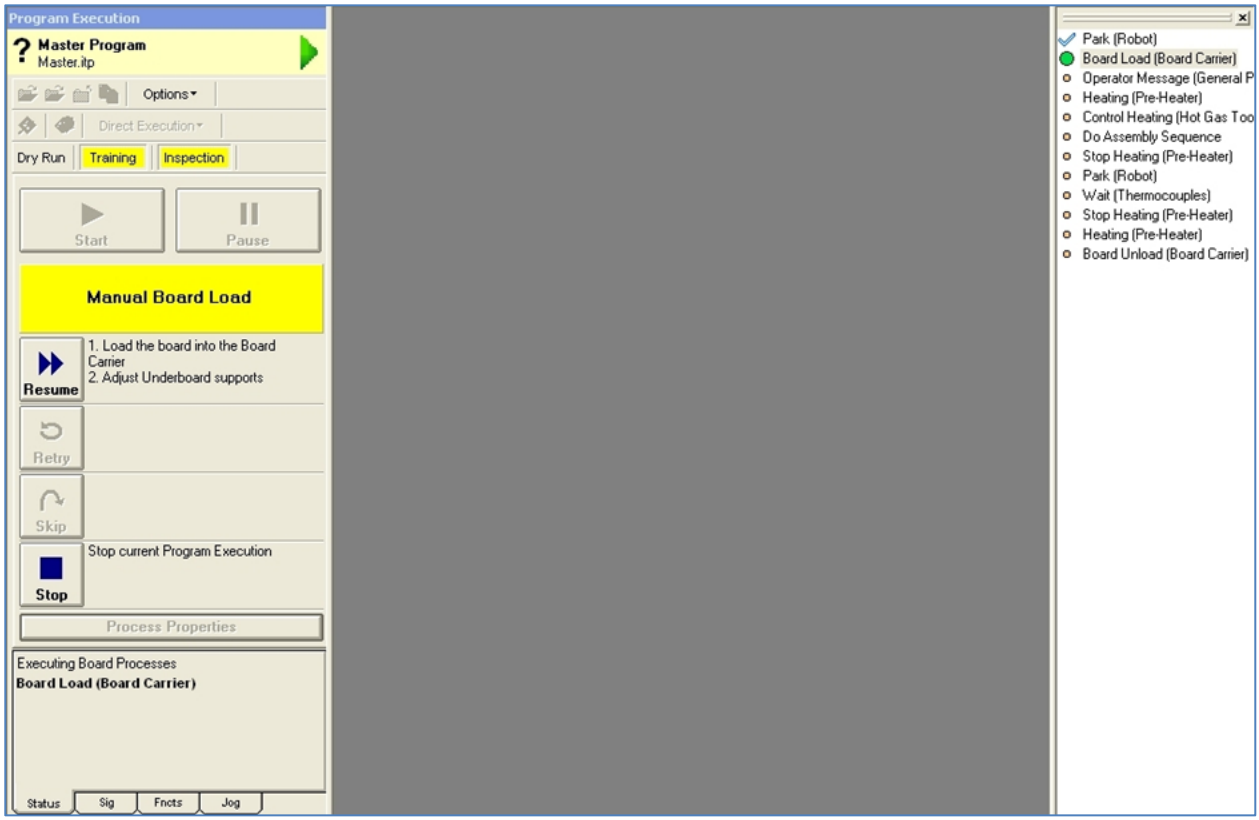


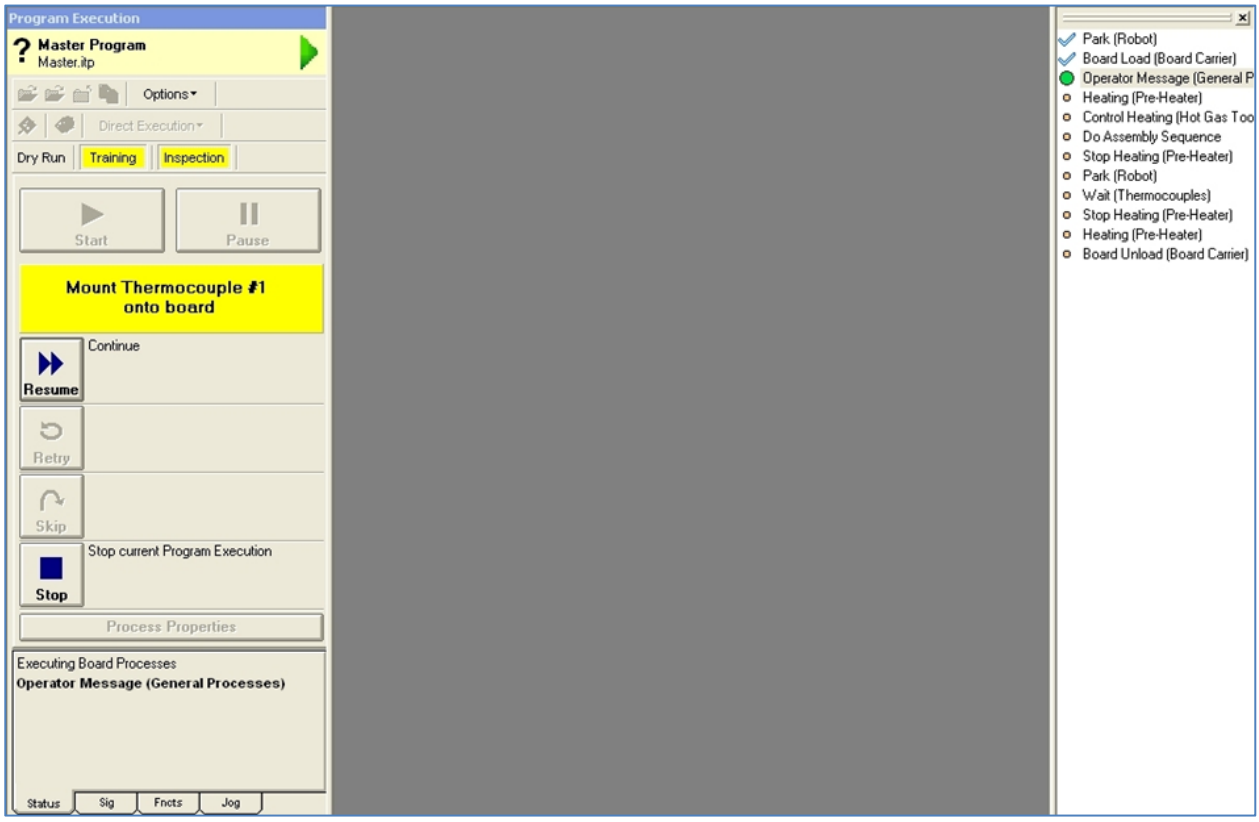
23.1 Execution

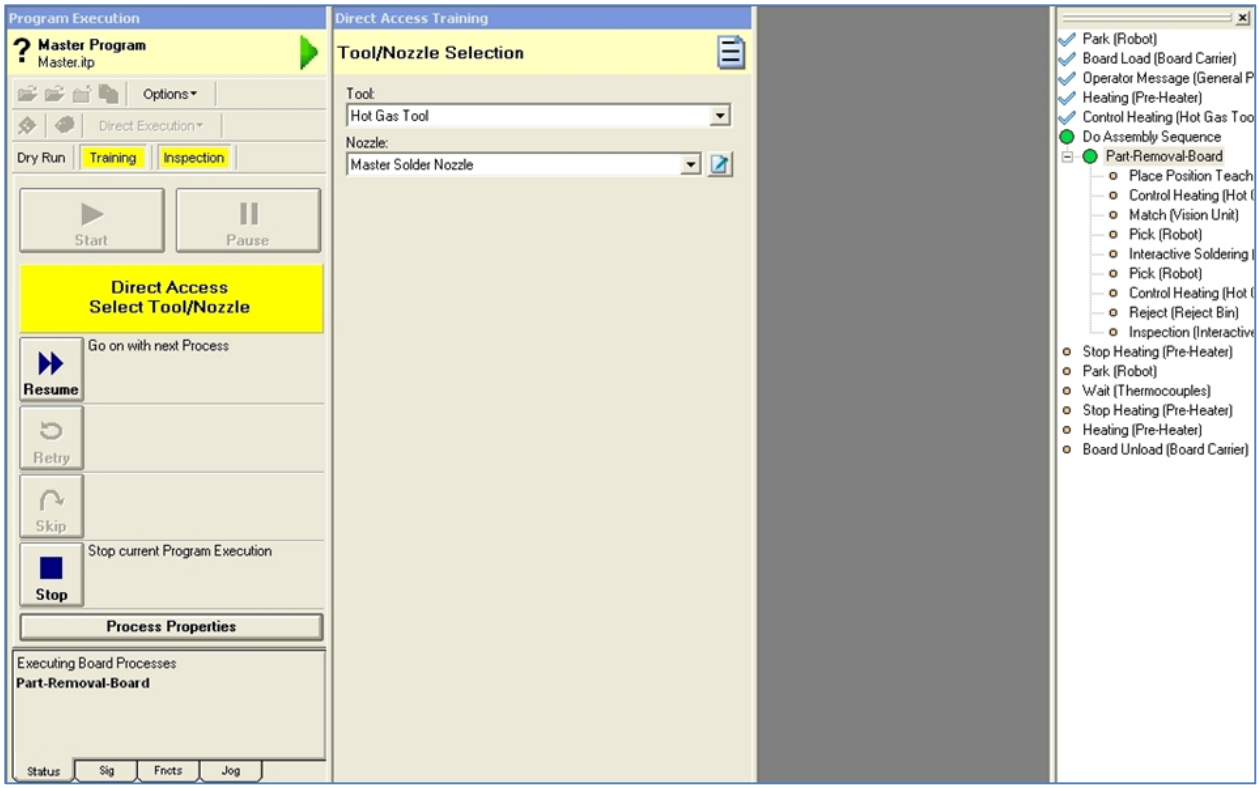


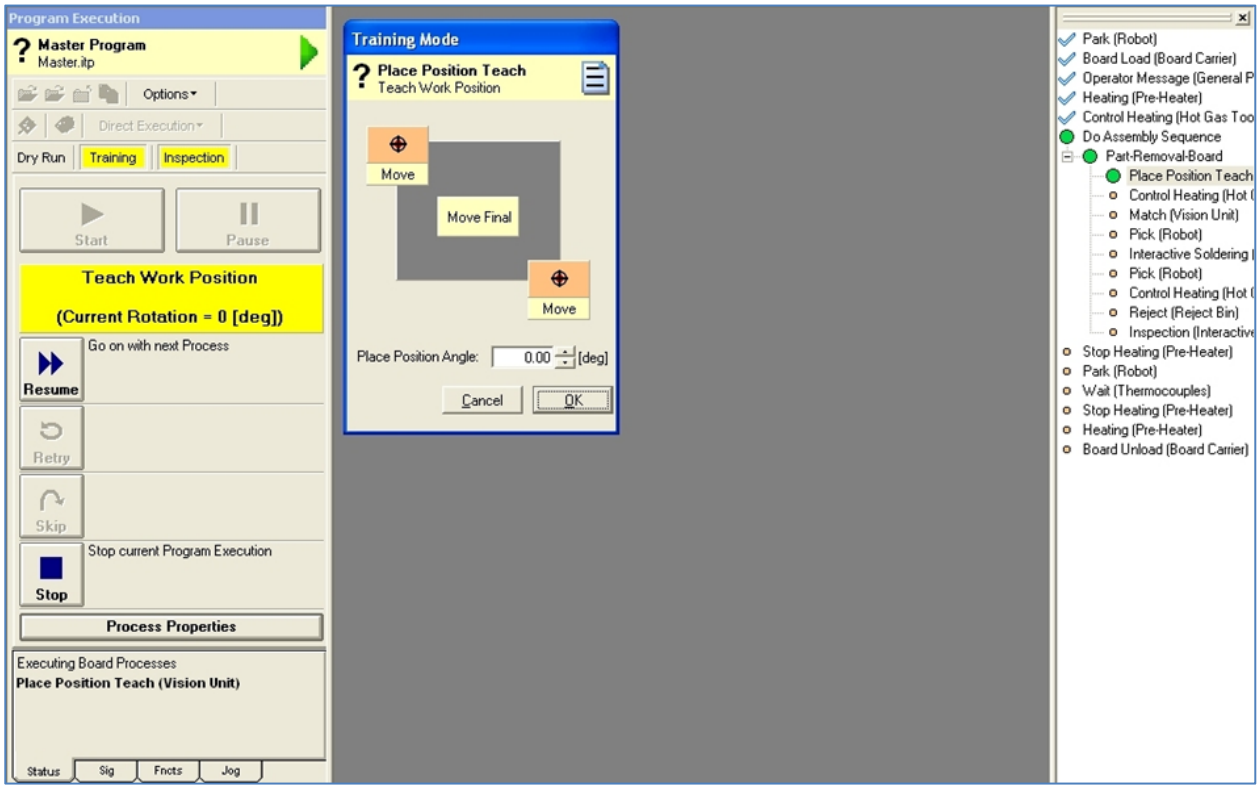


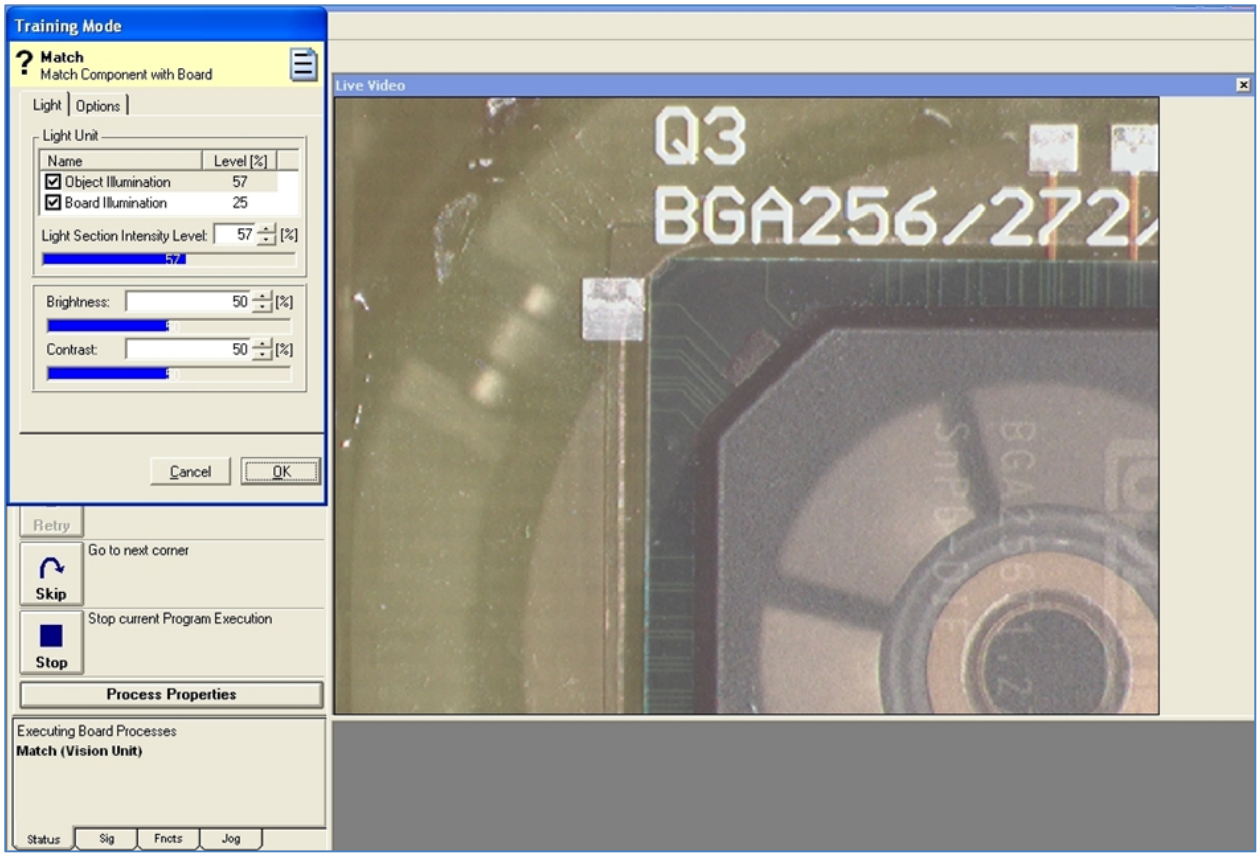

Program Execution
Master Program
Master.itp
Options
Direct Execution
Dry Run
Training
Inspection
Start
Pause
Direct Access
Configure Process Properties
Go on with next Process
Resume
Retry
Skip
Stop current Program Execution
Stop
Process Properties
Executing Board Processes
Board Load (Board Carrier)
Status
Sig
Fncts
Jog
Direct Access Training
Board Load
Manual Board Load
Board Thickness:
1.600
[mm]
Park (Robot)
Board Load (Board Carrier)
Operator Message (General P
Heating (Pre-Heater)
Control Heating (Hot Gas Too
Do Assembly Sequence
Stop Heating (Pre-Heater)
Park (Robot)
Wait (Thermocouples)
Stop Heating (Pre-Heater)
Heating (Pre-Heater)
Board Unload (Board Carrier)

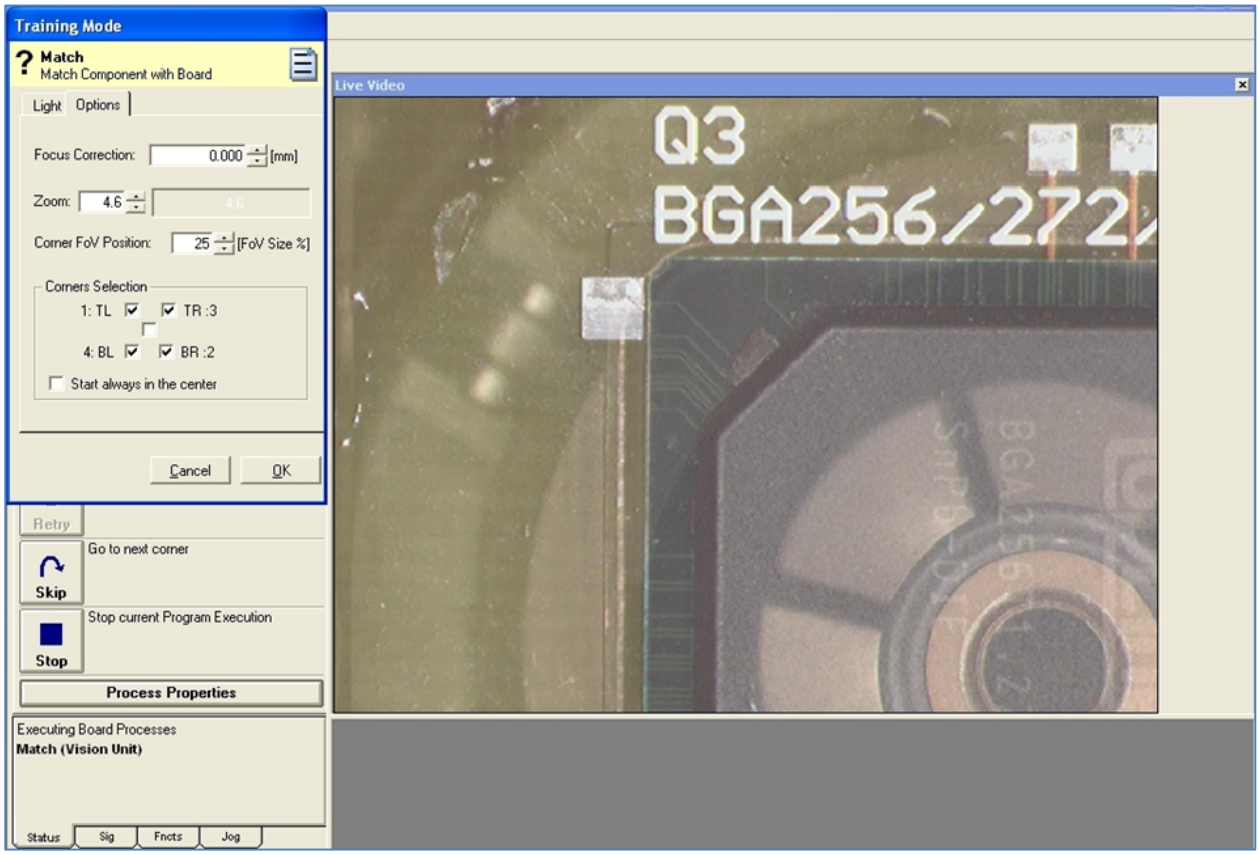

Program Execution
Master Program
Master.itp
Options
Direct Execution
Dry Run
Training
Inspection
Start
Pause
Manual Board Load
1. Load the board into the Board Carrier
2. Adjust Underboard supports
Resume
Retry
Skip
Stop current Program Execution
Stop
Process Properties
Executing Board Processes
Board Load (Board Carrier)
Status
Sig
Fncts
Jog
Park (Robot)
Board Load (Board Carrier)
Operator Message (General P
Heating (Pre-Heater)
Control Heating (Hot Gas Too
Do Assembly Sequence
Stop Heating (Pre-Heater)
Park (Robot)
Wait (Thermocouples)
Stop Heating (Pre-Heater)
Heating (Pre-Heater)
Board Unload (Board Carrier)


Program Execution
Master Program
Master.itp
Options
Direct Execution
Dry Run
Training
Inspection
Start
Pause
Mount Thermocouple #1 onto board
Continue
Resume
Retry
Skip
Stop current Program Execution
Stop
Process Properties
Executing Board Processes
Operator Message (General Processes)
Status
Sig
Fncts
Jog
Park (Robot)
Board Load (Board Carrier)
Operator Message (General P
Heating (Pre-Heater)
Control Heating (Hot Gas Too
Do Assembly Sequence
Stop Heating (Pre-Heater)
Park (Robot)
Wait (Thermocouples)
Stop Heating (Pre-Heater)
Heating (Pre-Heater)
Board Unload (Board Carrier)

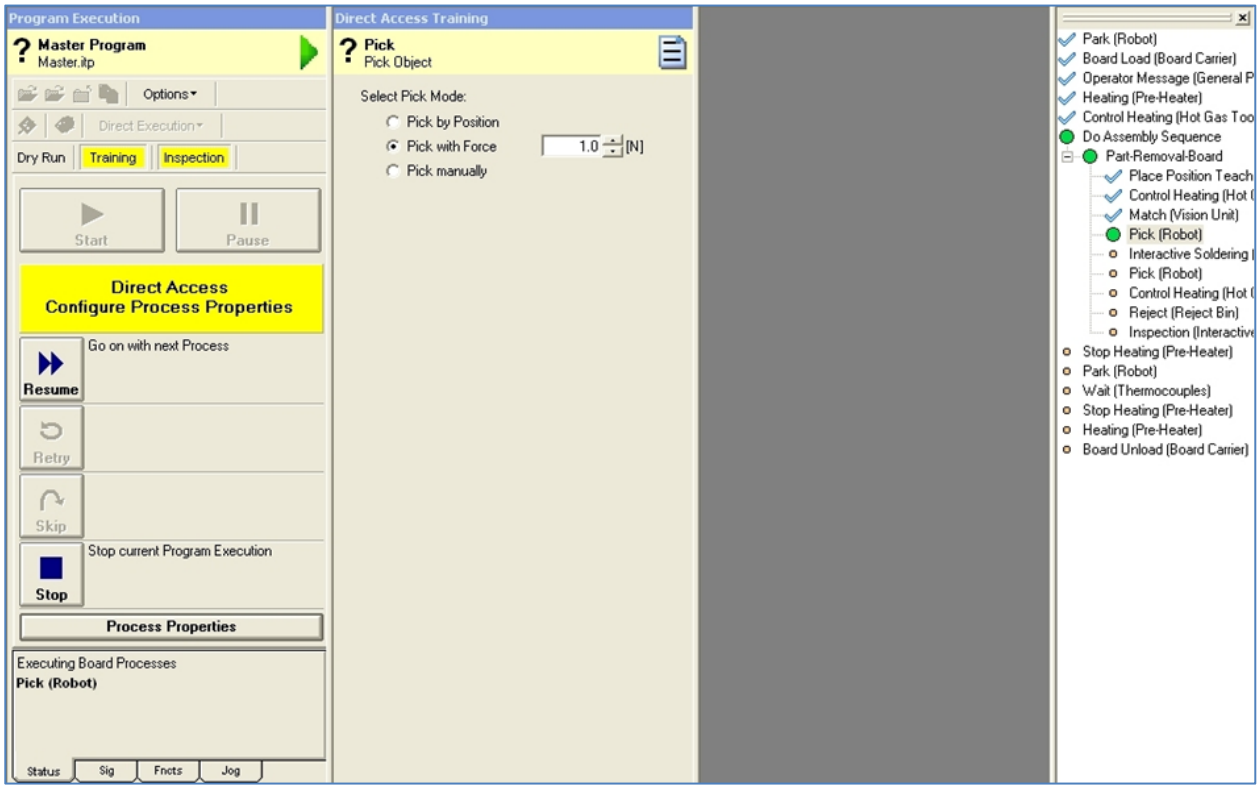

Program Execution
Master Program
Master.itp
Options
Direct Execution
Dry Run
Training
Inspection
Start
Pause
Direct Access Select Tool/Nozzle
Go on with next Process
Resume
Retry
Skip
Stop current Program Execution
Stop
Process Properties
Executing Board Processes
Part-Removal-Board
Status
Sig
Fncts
Jog
Direct Access Training
Tool/Nozzle Selection
Tool:
Hot Gas Tool
Nozzle:
Master Solder Nozzle
Park (Robot)
Board Load (Board Carrier)
Operator Message (General P
Heating (Pre-Heater)
Control Heating (Hot Gas Too
Do Assembly Sequence
Part-Removal-Board
Place Position Teach
Match (Vision Unit)
Pick (Robot)
Pick (Robot)
Reject (Reject Bin)
Stop Heating (Pre-Heater)
Park (Robot)
Wait (Thermocouples)
Stop Heating (Pre-Heater)
Heating (Pre-Heater)
Board Unload (Board Carrier)

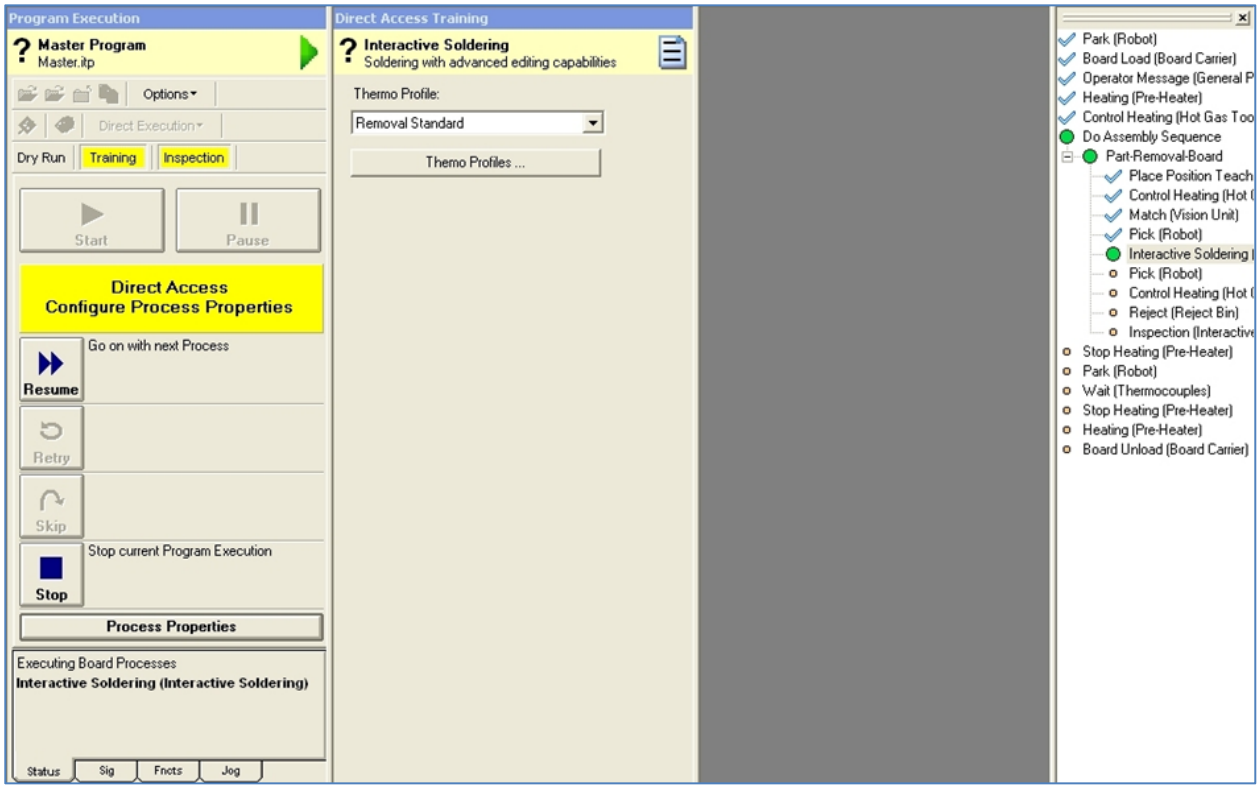

Program Execution
Master Program
Master.itp
Options
Direct Execution
Dry Run
Training
Inspection
Start
Pause
Teach Work Position
(Current Rotation = 0 [deg])
Go on with next Process
Resume
Retry
Skip
Stop current Program Execution
Stop
Process Properties
Executing Board Processes
Place Position Teach (Vision Unit)
Status
Sig
Fncts
Jog
Training Mode
Place Position Teach
Teach Work Position
Move
Move Final
Move
Place Position Angle:
0.00
[deg]
Cancel
OK
Park (Robot)
Board Load (Board Carrier)
Operator Message (General P
Heating (Pre-Heater)
Control Heating (Hot Gas Too
Do Assembly Sequence
Part-Removal-Board
Place Position Teach
Control Heating (Hot
Match (Vision Unit)
Pick (Robot)
Interactive Soldering
Pick (Robot)
Control Heating (Hot
Reject (Reject Bin)
Inspection (Interactive
Stop Heating (Pre-Heater)
Park (Robot)
Wait (Thermocouples)
Stop Heating (Pre-Heater)
Heating (Pre-Heater)
Board Unload (Board Carrier)

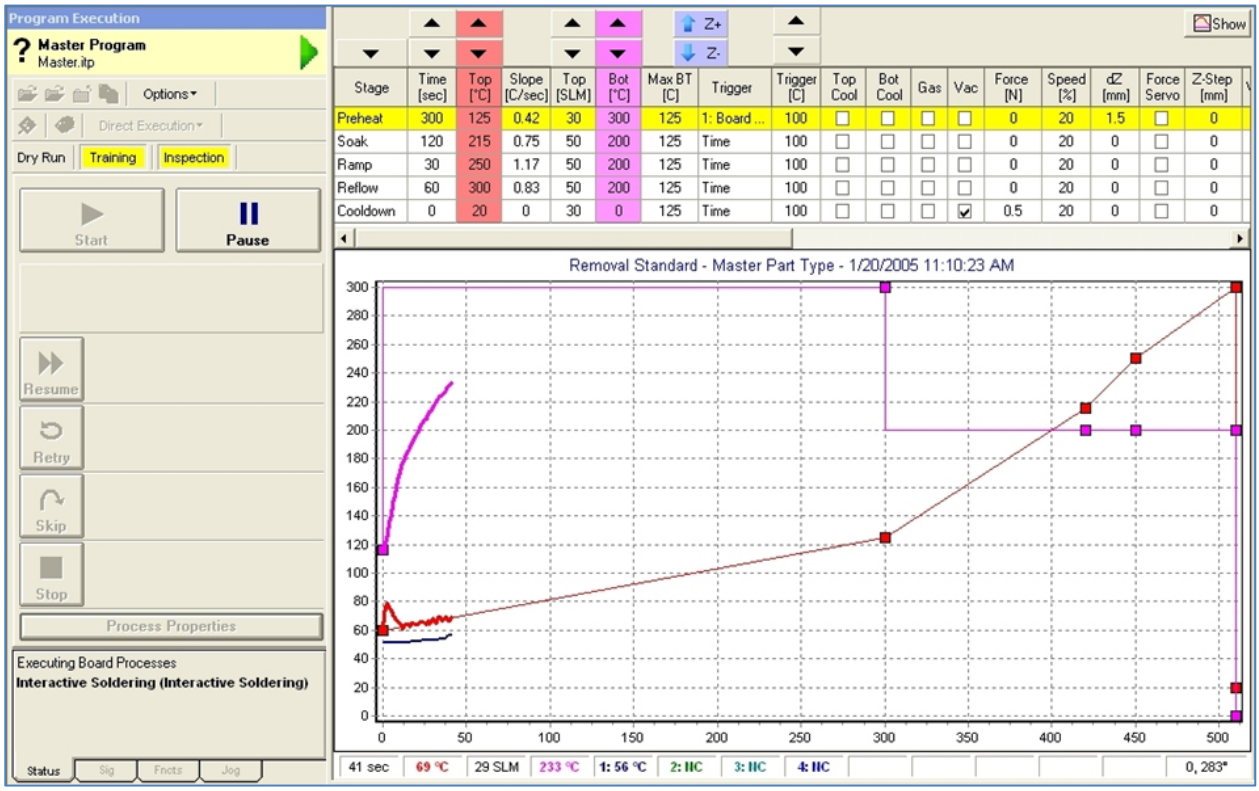

Training Mode
Match
Match Component with Board
Light
Options
Light Unit
Name
Level [%]
Object Illumination
57
Board Illumination
25
Light Section Intensity Level:
57
[%]
Brightness:
50
[%]
Contrast:
50
[%]
Cancel
OK
Retry
Skip
Go to next corner
Stop
Stop current Program Execution
Process Properties
Executing Board Processes
Match (Vision Unit)
Status
Sig
Fncts
Jog
Live Video
Q3
BGA256/272

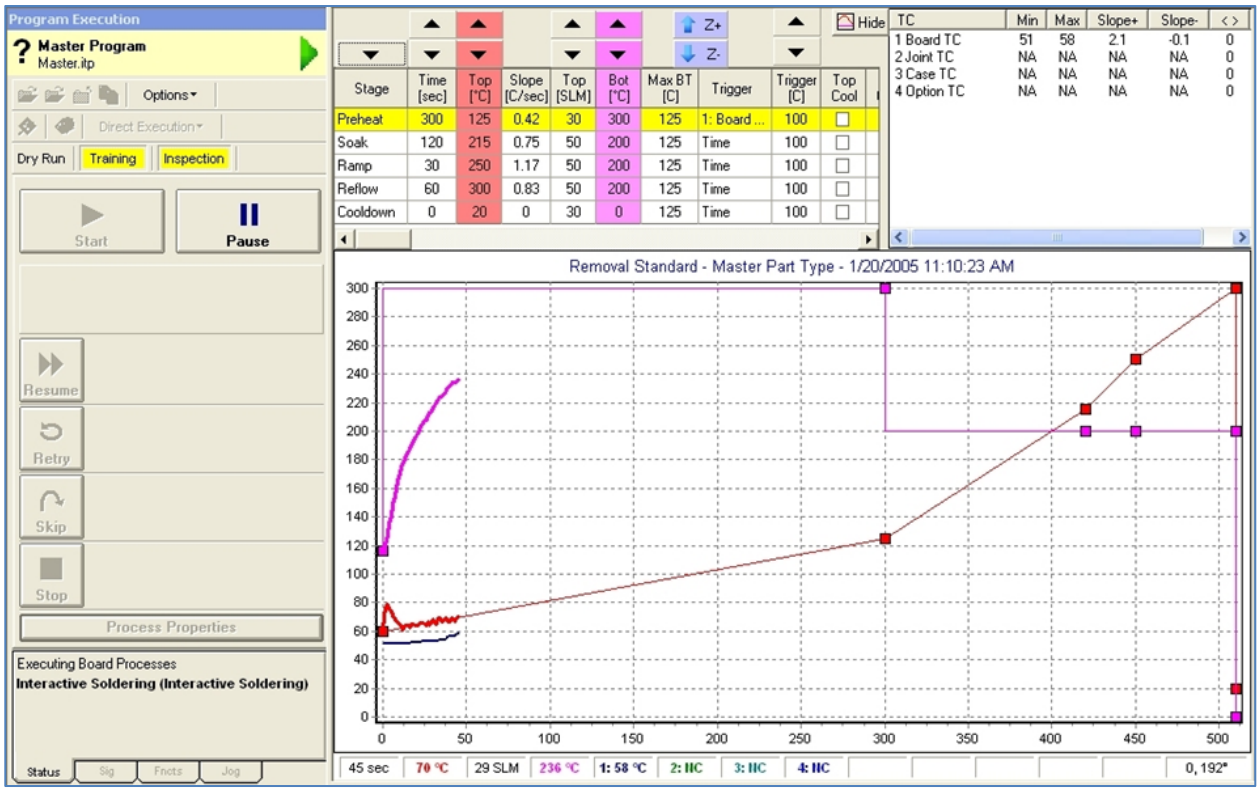

Training Mode
Match
Match Component with Board
Light
Options
Focus Correction:
0.000
[mm]
Zoom:
4.6
Corner FoV Position:
25
[FoV Size %]
Corners Selection
1: TL
TR :3
4: BL
BR :2
Start always in the center
Cancel
OK
Retry
Go to next corner
Skip
Stop current Program Execution
Stop
Process Properties
Executing Board Processes
Match (Vision Unit)
Status
Sig
Fncts
Jog
Live Video
Q3
BGA256/272

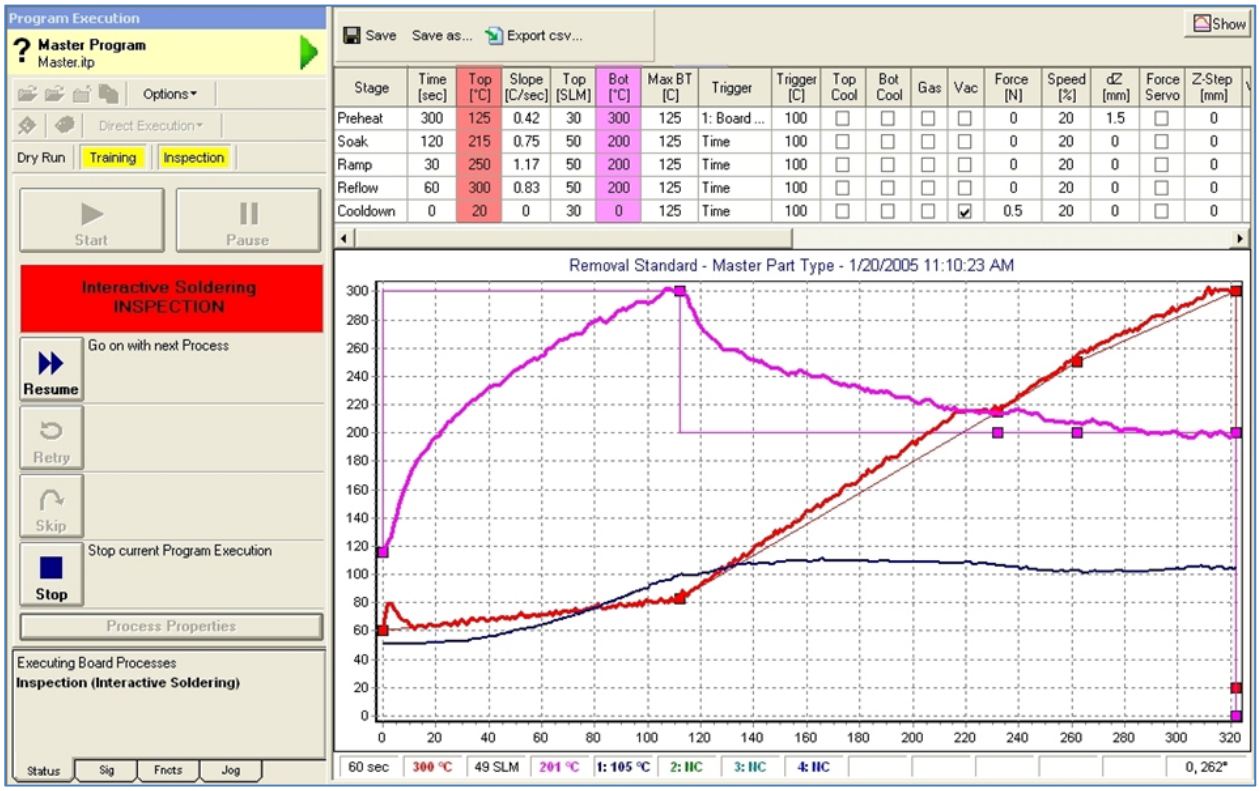

Program Execution
Master Program
Master.itp
Options
Direct Execution
Dry Run
Training
Inspection
Start
Pause
Match Component with Board
Component and Board are matching
Resume
Retry
Go to next corner
Skip
Stop current Program Execution
Stop
Process Properties
Executing Board Processes
Match (Vision Unit)
Status
Sig
Fncts
Jog
Live Video
Q3
BGA256/272


Program Execution
Master Program
Master.itp
Options
Direct Execution
Dry Run
Training
Inspection
Start
Pause
Direct Access
Configure Process Properties
Go on with next Process
Resume
Retry
Skip
Stop current Program Execution
Stop
Process Properties
Executing Board Processes
Pick (Robot)
Status
Sig
Fncts
Jog
Direct Access Training
Pick
Pick Object
Select Pick Mode:
Pick by Position
Pick with Force
1.0
[N]
Pick manually
Park (Robot)
Board Load (Board Carrier)
Operator Message (General P
Heating (Pre-Heater)
Control Heating (Hot Gas Too
Do Assembly Sequence
Part-Removal-Board
Place Position Teach
Control Heating (Hot
Match (Vision Unit)
Pick (Robot)
Interactive Soldering
Pick (Robot)
Control Heating (Hot
Reject (Reject Bin)
Inspection (Interactive
Stop Heating (Pre-Heater)
Park (Robot)
Wait (Thermocouples)
Stop Heating (Pre-Heater)
Heating (Pre-Heater)
Board Unload (Board Carrier)

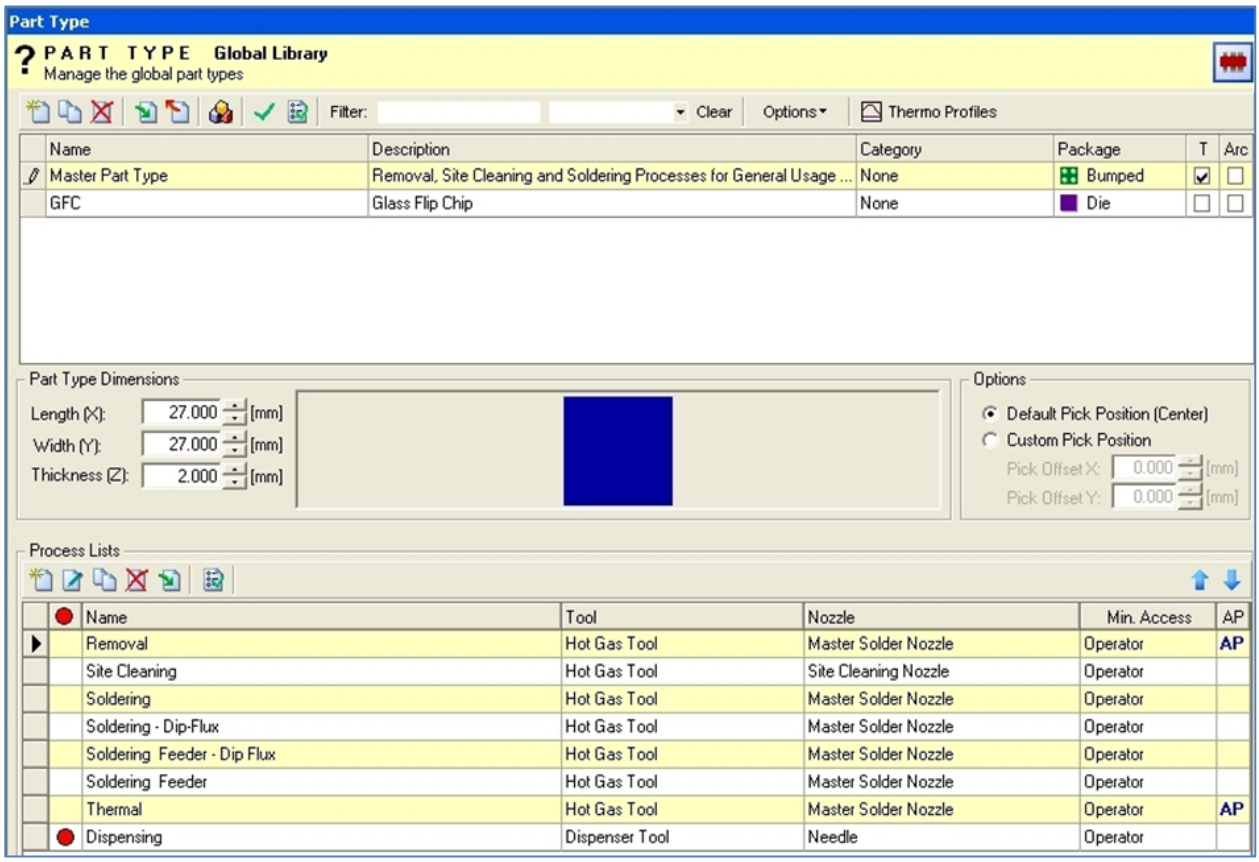

Program Execution
Master Program
Master.itp
Options
Direct Execution
Dry Run
Training
Inspection
Start
Pause
Direct Access
Configure Process Properties
Go on with next Process
Resume
Retry
Skip
Stop current Program Execution
Stop
Process Properties
Executing Board Processes
Interactive Soldering (Interactive Soldering)
Status
Sig
Fncts
Jog
Direct Access Training
Interactive Soldering
Soldering with advanced editing capabilities
Thermo Profile:
Removal Standard
Thermo Profiles ...
Park (Robot)
Board Load (Board Carrier)
Operator Message (General P
Heating (Pre-Heater)
Control Heating (Hot Gas Too
Do Assembly Sequence
Part-Removal-Board
Place Position Teach
Control Heating (Hot
Match (Vision Unit)
Pick (Robot)
Interactive Soldering
Pick (Robot)
Control Heating (Hot
Reject (Reject Bin)
Inspection (Interactive
Stop Heating (Pre-Heater)
Park (Robot)
Wait (Thermocouples)
Stop Heating (Pre-Heater)
Heating (Pre-Heater)
Board Unload (Board Carrier)

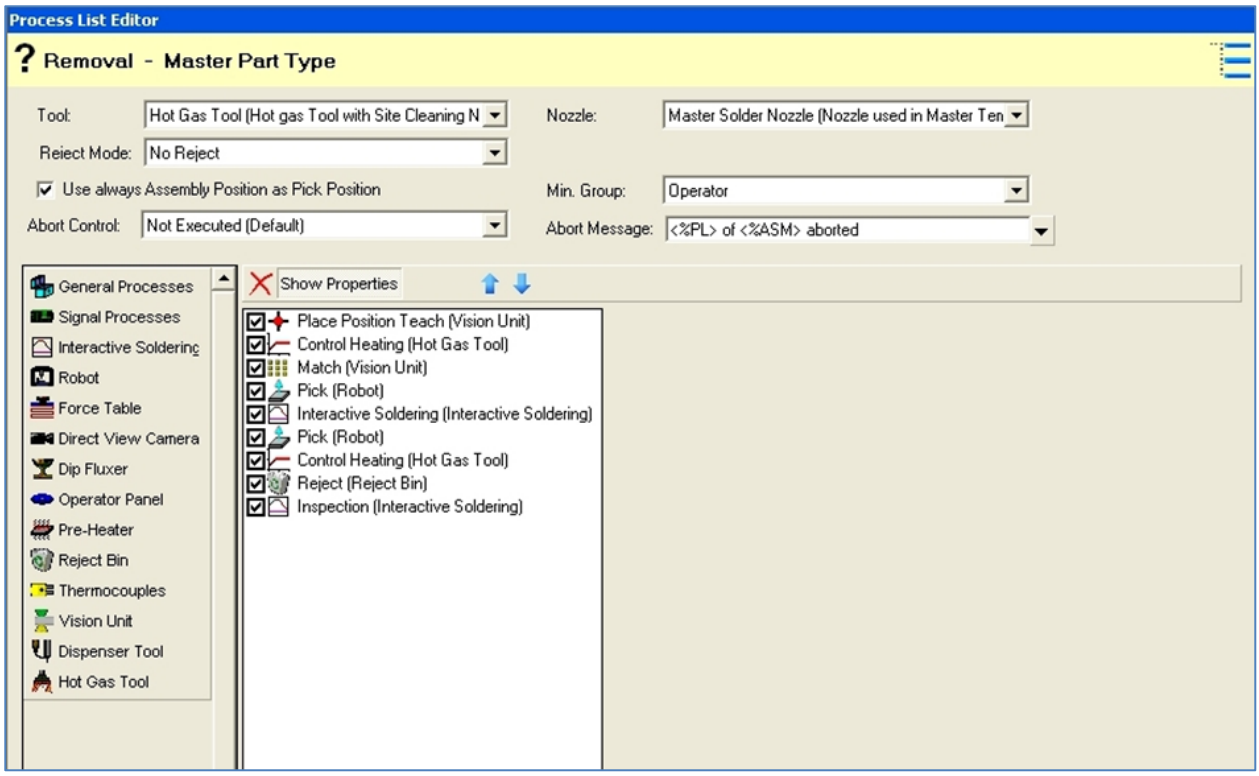

Program Execution
Master Program
Master.itp
Options
Direct Execution
Dry Run
Training
Inspection
Start
Pause
Resume
Retry
Skip
Stop
Process Properties
Executing Board Processes
Interactive Soldering (Interactive Soldering)
Status
Sig
Fncts
Jog
Z+
Z-
Show
Stage
Time [sec]
Top [°C]
Slope [C/sec]
Top [SLM]
Bot [°C]
Max BT [C]
Trigger
Trigger [C]
Top Cool
Bot Cool
Gas
Vac
Force [N]
Speed [%]
dZ [mm]
Force Servo
Z-Step [mm]
Preheat 300 125 0.42 30 300 125 1: Board ... 100 0 20 1.5 0
Soak 120 215 0.75 50 200 125 Time 100 0 20 0 0
Ramp 30 250 1.17 50 200 125 Time 100 0 20 0 0
Reflow 60 300 0.83 50 200 125 Time 100 0 20 0 0
Cooldown 0 20 0 30 0 125 Time 100 0.5 20 0 0
Removal Standard - Master Part Type - 1/20/2005 11:10:23 AM
41 sec
69 °C
29 SLM
233 °C
1: 56 °C
2: NC
3: NC
4: NC
0, 283"

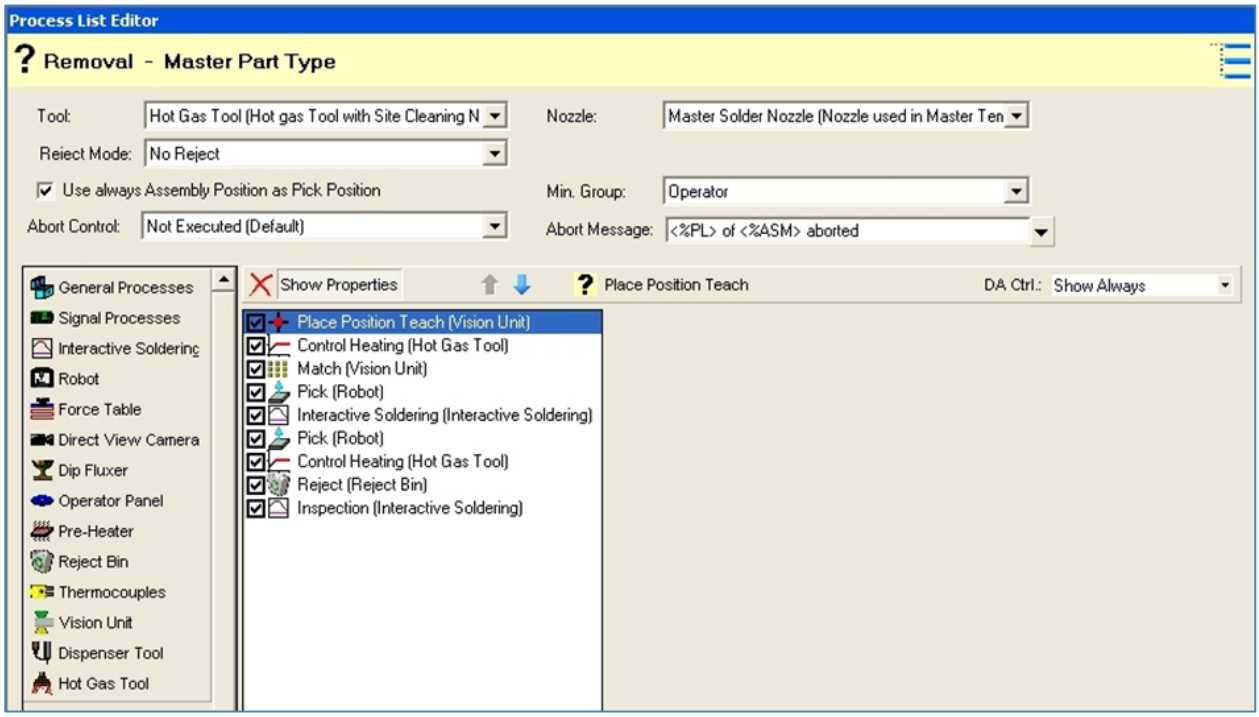

Program Execution
Master Program
Master.itp
Options
Direct Execution
Dry Run
Training
Inspection
Start
Pause
Resume
Retry
Skip
Stop
Process Properties
Executing Board Processes
Interactive Soldering (Interactive Soldering)
Status
Sig
Fncts
Jog
Z+
Z-
Hide
Stage
Time [sec]
Top [°C]
Slope [C/sec]
Top [SLM]
Bot [°C]
Max BT [C]
Trigger
Trigger [C]
Top Cool
Preheat 300 125 0.42 30 300 125 1: Board ... 100
Soak 120 215 0.75 50 200 125 Time 100
Ramp 30 250 1.17 50 200 125 Time 100
Reflow 60 300 0.83 50 200 125 Time 100
Cooldown 0 20 0 30 0 125 Time 100
TC
Min
Max
Slope+
Slope-
1 Board TC 51 58 2.1 -0.1 0
2 Joint TC NA NA NA NA 0
3 Case TC NA NA NA NA 0
4 Option TC NA NA NA NA 0
Removal Standard - Master Part Type - 1/20/2005 11:10:23 AM
45 sec
70 °C
29 SLM
236 °C
1: 58 °C
2: NC
3: NC
4: NC
0, 192"

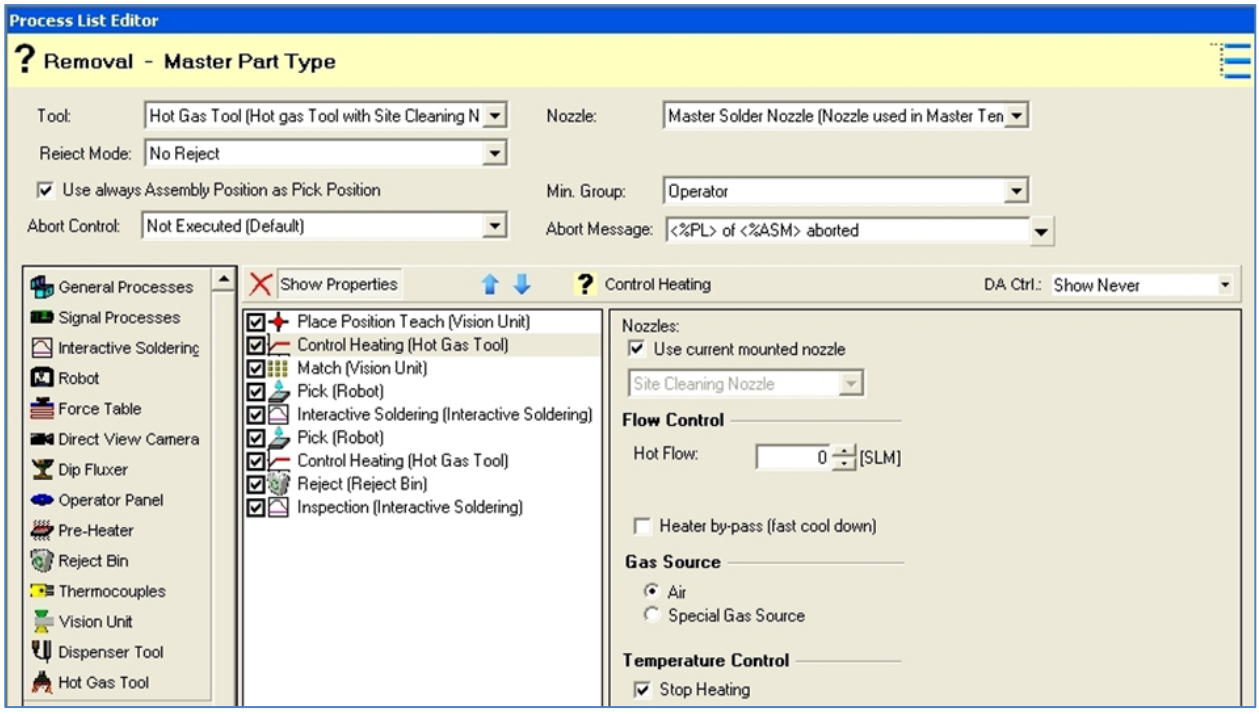

Program Execution
Master Program
Master.itp
Options
Direct Execution
Dry Run
Training
Inspection
Start
Pause
Interactive Soldering
INSPECTION
Go on with next Process
Resume
Retry
Skip
Stop current Program Execution
Stop
Process Properties
Executing Board Processes
Inspection (Interactive Soldering)
Status
Sig
Fncts
Jog
Save
Save as...
Export csv...
Show
Stage | Time [sec] | Top [°C] | Slope [C/sec] | Top [SLM] | Bot [°C] | Max BT [C] | Trigger | Trigger [C] | Top Cool | Bot Cool | Gas | Vac | Force [N] | Speed [%] | dZ [mm] | Force Servo | Z-Step [mm]
Preheat | 300 | 125 | 0.42 | 30 | 300 | 125 | 1: Board ... | 100 | 0 | 20 | 1.5 | 0
Soak | 120 | 215 | 0.75 | 50 | 200 | 125 | Time | 100 | 0 | 20 | 0 | 0
Ramp | 30 | 250 | 1.17 | 50 | 200 | 125 | Time | 100 | 0 | 20 | 0 | 0
Reflow | 60 | 300 | 0.83 | 50 | 200 | 125 | Time | 100 | 0 | 20 | 0 | 0
Cooldown | 0 | 20 | 0 | 30 | 0 | 125 | Time | 100 | 0.5 | 20 | 0 | 0
Removal Standard - Master Part Type - 1/20/2005 11:10:23 AM
60 sec
300 °C
49 SLM
201 °C
1: 105 °C
2: NC
3: NC
4: NC
0, 262°

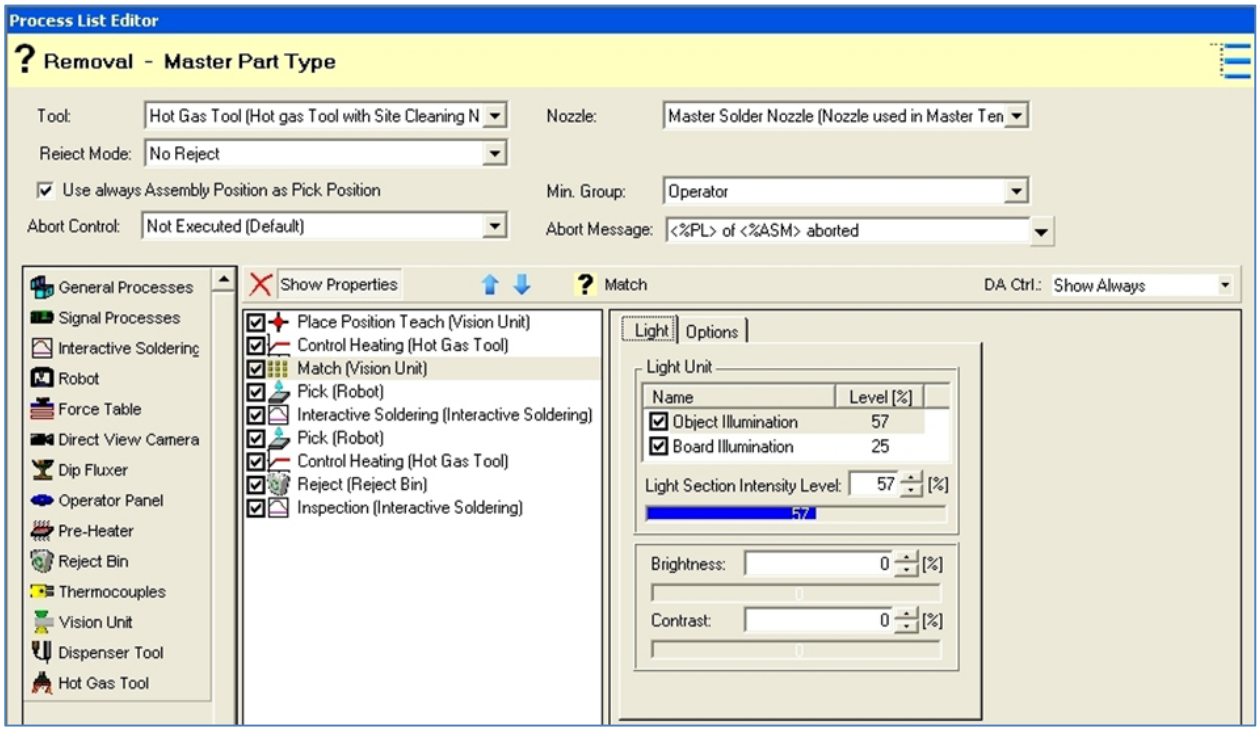
23.2 Part Type

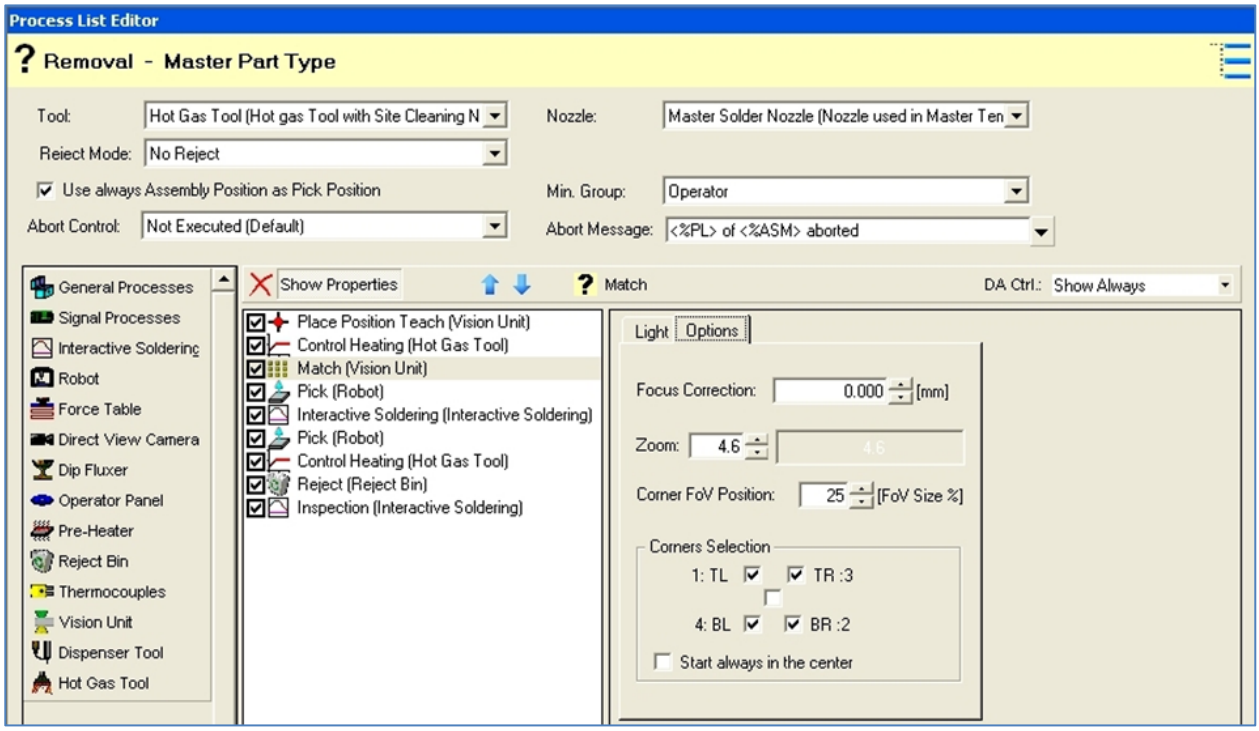


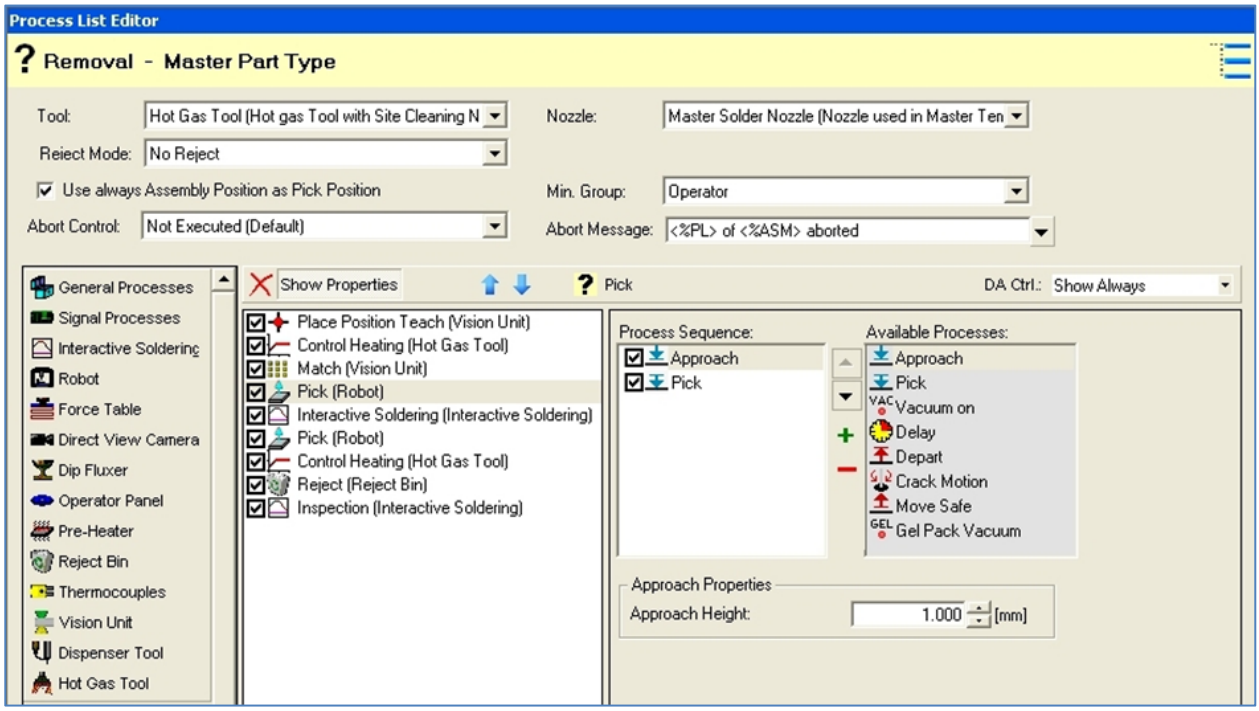


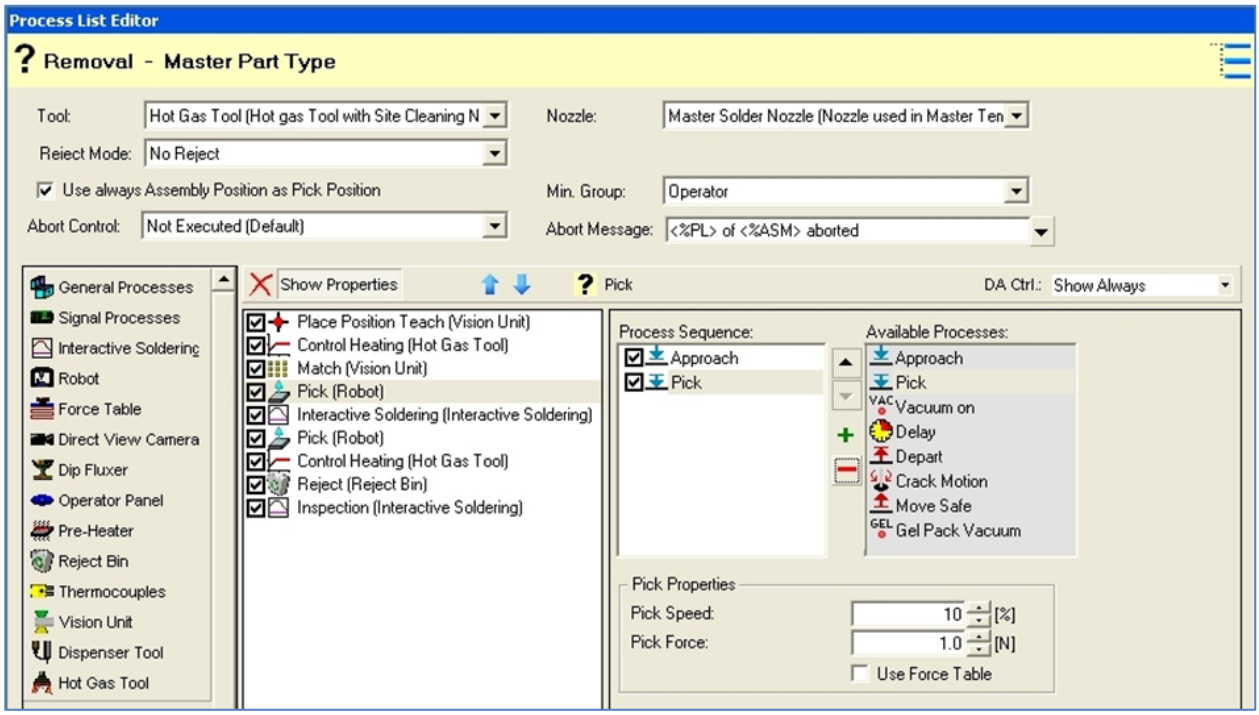

Process List Editor
Removal - Master Part Type
Tool: Hot Gas Tool (Hot gas Tool with Site Cleaning N
Nozzle: Master Solder Nozzle (Nozzle used in Master Ten
Reject Mode: No Reject
Use always Assembly Position as Pick Position
Min. Group: Operator
Abort Control: Not Executed (Default)
Abort Message: <%PL> of <%ASM> aborted
General Processes
Signal Processes
Interactive Soldering
Robot
Force Table
Direct View Camera
Dip Fluxer
Operator Panel
Pre-Heater
Reject Bin
Thermocouples
Vision Unit
Dispenser Tool
Hot Gas Tool
Show Properties
Place Position Teach
DA Ctrl.: Show Always
Place Position Teach (Vision Unit)
Control Heating (Hot Gas Tool)
Match (Vision Unit)
Pick (Robot)
Interactive Soldering (Interactive Soldering)
Pick (Robot)
Control Heating (Hot Gas Tool)
Reject (Reject Bin)
Inspection (Interactive Soldering)

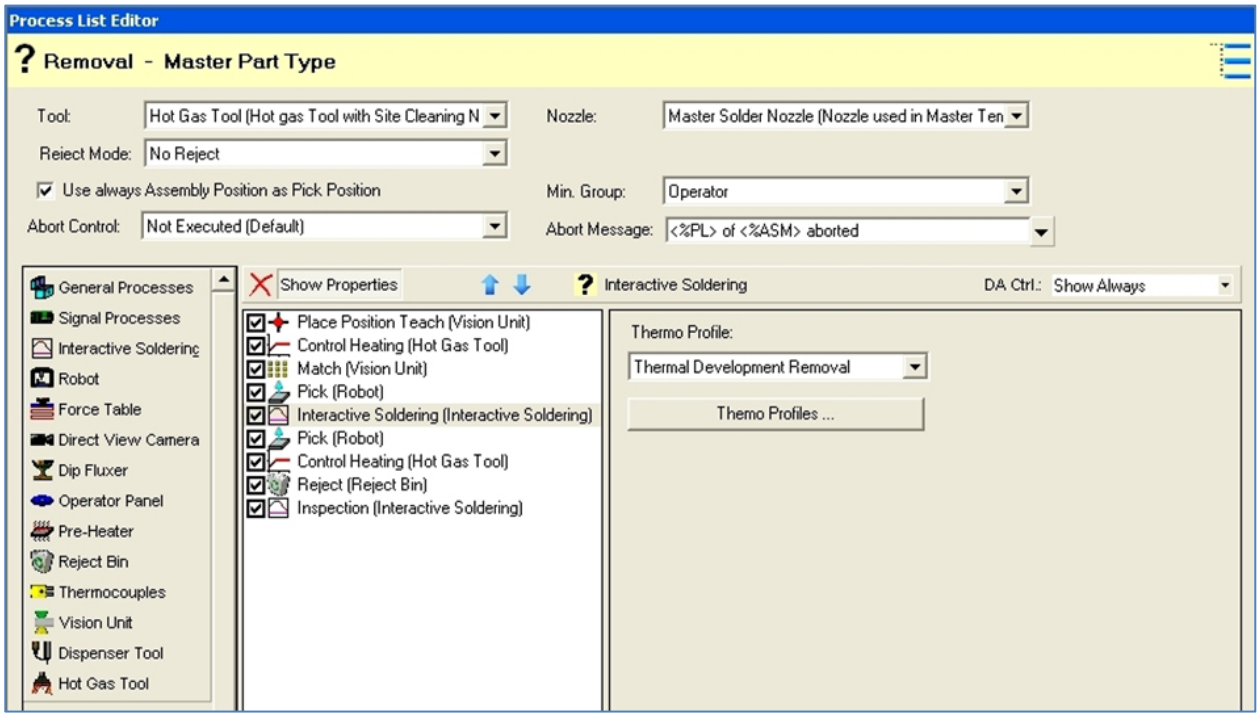

Process List Editor
Removal - Master Part Type
Tool: Hot Gas Tool (Hot gas Tool with Site Cleaning N
Nozzle: Master Solder Nozzle (Nozzle used in Master Ten
Reject Mode: No Reject
Use always Assembly Position as Pick Position
Min. Group: Operator
Abort Control: Not Executed (Default)
Abort Message: <%PL> of <%ASM> aborted
General Processes
Signal Processes
Interactive Soldering
Robot
Force Table
Direct View Camera
Dip Fluxer
Operator Panel
Pre-Heater
Reject Bin
Thermocouples
Vision Unit
Dispenser Tool
Hot Gas Tool
Show Properties
Control Heating
DA Ctrl.: Show Never
Place Position Teach (Vision Unit)
Control Heating (Hot Gas Tool)
Match (Vision Unit)
Pick (Robot)
Interactive Soldering (Interactive Soldering)
Pick (Robot)
Control Heating (Hot Gas Tool)
Reject (Reject Bin)
Inspection (Interactive Soldering)
Nozzles:
Use current mounted nozzle
Site Cleaning Nozzle
Flow Control
Hot Flow: 0 [SLM]
Heater by-pass (fast cool down)
Gas Source
Air
Special Gas Source
Temperature Control
Stop Heating

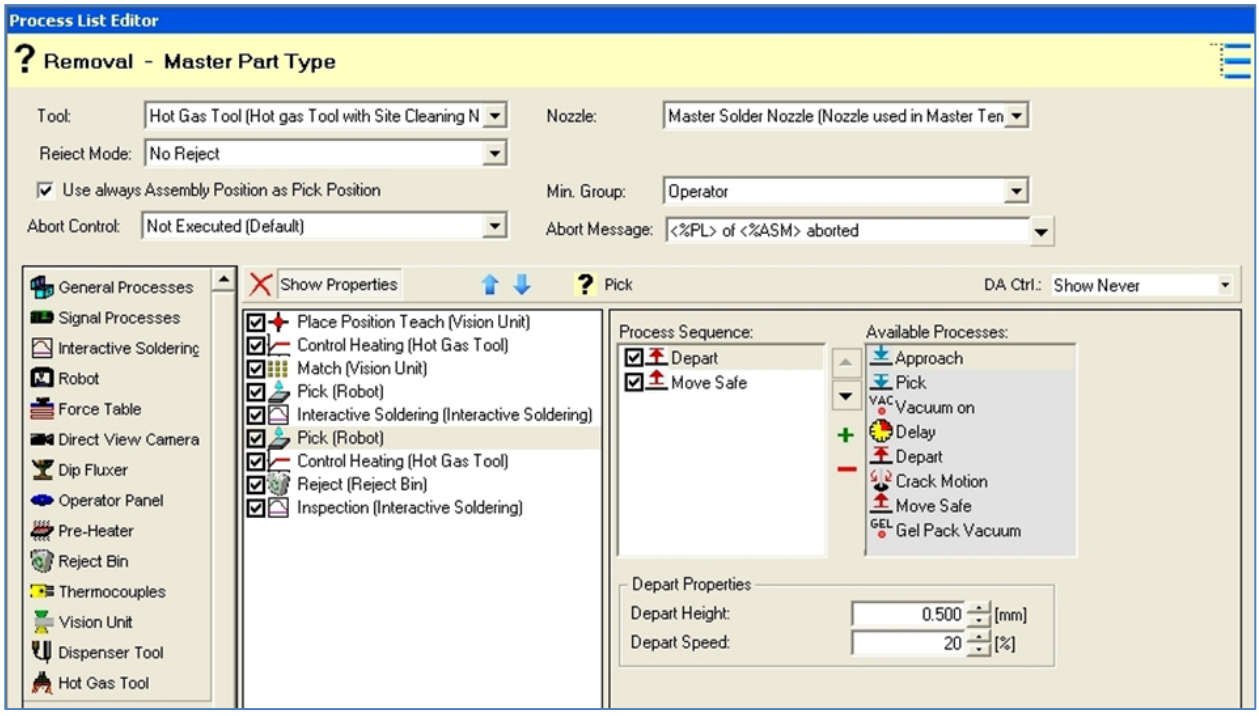

Process List Editor
Removal - Master Part Type
Tool: Hot Gas Tool (Hot gas Tool with Site Cleaning N
Nozzle: Master Solder Nozzle (Nozzle used in Master Ten
Reject Mode: No Reject
Use always Assembly Position as Pick Position
Min. Group: Operator
Abort Control: Not Executed (Default)
Abort Message: <%PL> of <%ASM> aborted
General Processes
Signal Processes
Interactive Soldering
Robot
Force Table
Direct View Camera
Dip Fluxer
Operator Panel
Pre-Heater
Reject Bin
Thermocouples
Vision Unit
Dispenser Tool
Hot Gas Tool
Show Properties
Match
DA Ctrl.: Show Always
Place Position Teach (Vision Unit)
Control Heating (Hot Gas Tool)
Match (Vision Unit)
Pick (Robot)
Interactive Soldering (Interactive Soldering)
Pick (Robot)
Control Heating (Hot Gas Tool)
Reject (Reject Bin)
Inspection (Interactive Soldering)
Light
Options
Light Unit
Name
Level [%]
Object Illumination 57
Board Illumination 25
Light Section Intensity Level: 57 [%]
Brightness: 0 [%]
Contrast: 0 [%]

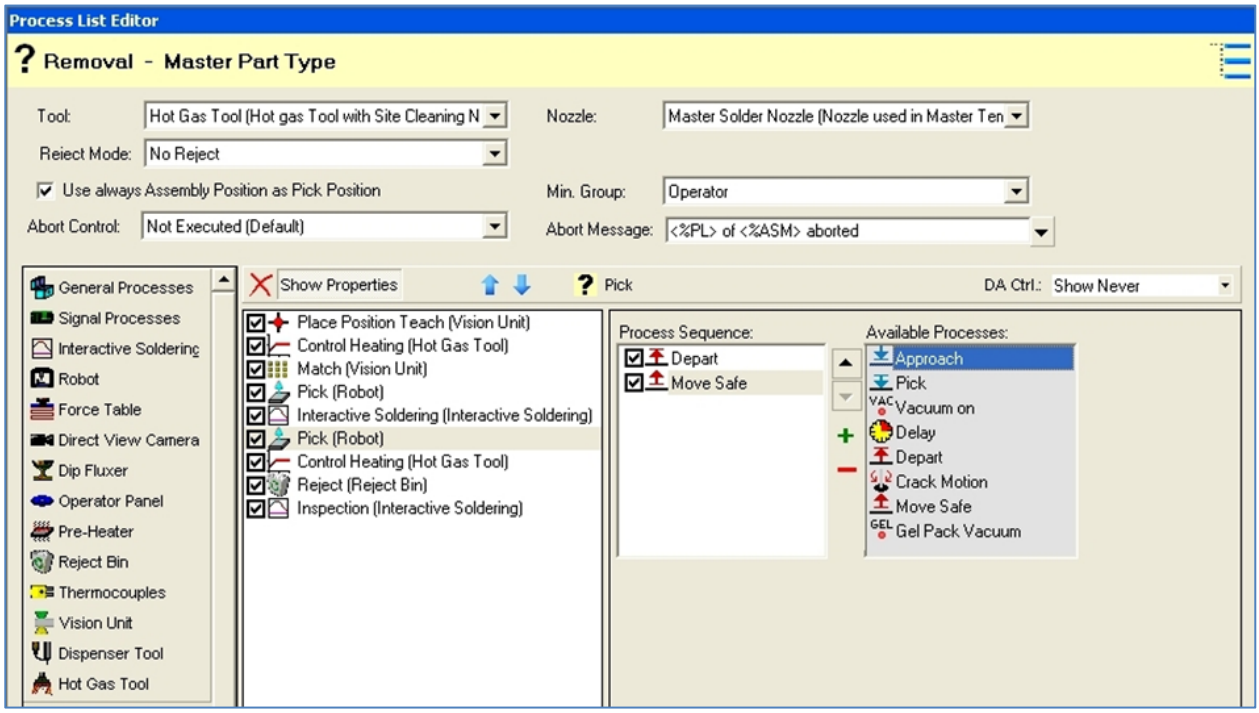

Process List Editor
Removal - Master Part Type
Tool: Hot Gas Tool (Hot gas Tool with Site Cleaning N
Nozzle: Master Solder Nozzle (Nozzle used in Master Ten
Reject Mode: No Reject
Use always Assembly Position as Pick Position
Min. Group: Operator
Abort Control: Not Executed (Default)
Abort Message: <%PL> of <%ASM> aborted
General Processes
Signal Processes
Interactive Soldering
Robot
Force Table
Direct View Camera
Dip Fluxer
Operator Panel
Pre-Heater
Reject Bin
Thermocouples
Vision Unit
Dispenser Tool
Hot Gas Tool
Show Properties
Match
DA Ctrl.: Show Always
Place Position Teach (Vision Unit)
Control Heating (Hot Gas Tool)
Match (Vision Unit)
Pick (Robot)
Interactive Soldering (Interactive Soldering)
Pick (Robot)
Control Heating (Hot Gas Tool)
Reject (Reject Bin)
Inspection (Interactive Soldering)
Light
Options
Focus Correction: 0.000 [mm]
Zoom: 4.6
Corner FoV Position: 25 [FoV Size %]
Corners Selection
1: TL
TR :3
4: BL
BR :2
Start always in the center

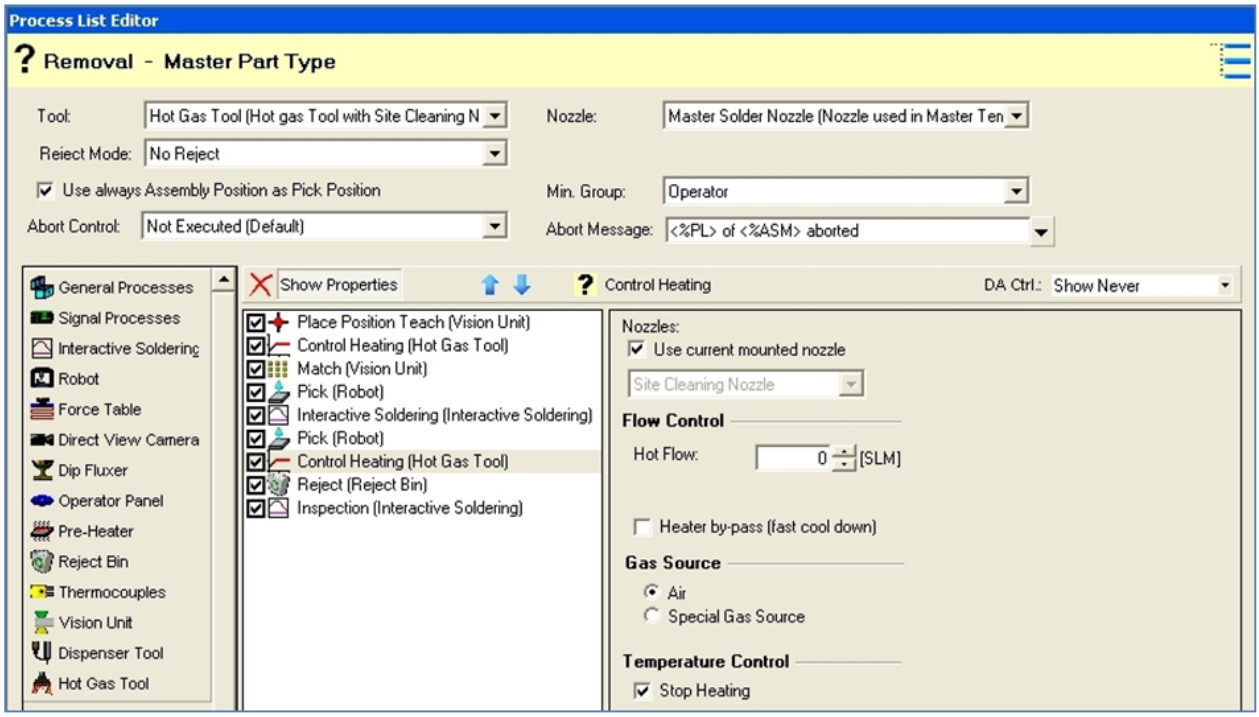

Process List Editor
Removal - Master Part Type
Tool: Hot Gas Tool (Hot gas Tool with Site Cleaning N
Nozzle: Master Solder Nozzle (Nozzle used in Master Ten
Reject Mode: No Reject
Use always Assembly Position as Pick Position
Min. Group: Operator
Abort Control: Not Executed (Default)
Abort Message: <%PL> of <%ASM> aborted
General Processes
Signal Processes
Interactive Soldering
Robot
Force Table
Direct View Camera
Dip Fluxer
Operator Panel
Pre-Heater
Reject Bin
Thermocouples
Vision Unit
Dispenser Tool
Hot Gas Tool
Show Properties
Pick
DA Ctrl.: Show Always
Place Position Teach (Vision Unit)
Control Heating (Hot Gas Tool)
Match (Vision Unit)
Pick (Robot)
Interactive Soldering (Interactive Soldering)
Pick (Robot)
Control Heating (Hot Gas Tool)
Reject (Reject Bin)
Inspection (Interactive Soldering)
Process Sequence:
Approach
Pick
Available Processes:
Approach
Pick
Vacuum on
Delay
Depart
Crack Motion
Move Safe
Gel Pack Vacuum
Approach Properties
Approach Height: 1.000 [mm]


Process List Editor
Removal - Master Part Type
Tool: Hot Gas Tool (Hot gas Tool with Site Cleaning N
Nozzle: Master Solder Nozzle (Nozzle used in Master Ten
Reject Mode: No Reject
Use always Assembly Position as Pick Position
Min. Group: Operator
Abort Control: Not Executed (Default)
Abort Message: <%PL> of <%ASM> aborted
General Processes
Signal Processes
Interactive Soldering
Robot
Force Table
Direct View Camera
Dip Fluxer
Operator Panel
Pre-Heater
Reject Bin
Thermocouples
Vision Unit
Dispenser Tool
Hot Gas Tool
Show Properties
Pick
DA Ctrl.: Show Always
Place Position Teach (Vision Unit)
Control Heating (Hot Gas Tool)
Match (Vision Unit)
Pick (Robot)
Interactive Soldering (Interactive Soldering)
Pick (Robot)
Control Heating (Hot Gas Tool)
Reject (Reject Bin)
Inspection (Interactive Soldering)
Process Sequence:
Approach
Pick
Available Processes:
Approach
Pick
Vacuum on
Delay
Depart
Crack Motion
Move Safe
Gel Pack Vacuum
Pick Properties
Pick Speed: 10 [%]
Pick Force: 1.0 [N]
Use Force Table


Process List Editor
Removal - Master Part Type
Tool: Hot Gas Tool (Hot gas Tool with Site Cleaning N
Nozzle: Master Solder Nozzle (Nozzle used in Master Ten
Reject Mode: No Reject
Use always Assembly Position as Pick Position
Min. Group: Operator
Abort Control: Not Executed (Default)
Abort Message: <%PL> of <%ASM> aborted
General Processes
Signal Processes
Interactive Soldering
Robot
Force Table
Direct View Camera
Dip Fluxer
Operator Panel
Pre-Heater
Reject Bin
Thermocouples
Vision Unit
Dispenser Tool
Hot Gas Tool
Show Properties
Interactive Soldering
DA Ctrl.: Show Always
Place Position Teach (Vision Unit)
Control Heating (Hot Gas Tool)
Match (Vision Unit)
Pick (Robot)
Interactive Soldering (Interactive Soldering)
Pick (Robot)
Control Heating (Hot Gas Tool)
Reject (Reject Bin)
Inspection (Interactive Soldering)
Thermo Profile:
Thermal Development Removal
Thermo Profiles ...


Process List Editor
Removal - Master Part Type
Tool: Hot Gas Tool (Hot gas Tool with Site Cleaning N
Nozzle: Master Solder Nozzle (Nozzle used in Master Ten
Reject Mode: No Reject
Use always Assembly Position as Pick Position
Min. Group: Operator
Abort Control: Not Executed (Default)
Abort Message: <%PL> of <%ASM> aborted
General Processes
Signal Processes
Interactive Soldering
Robot
Force Table
Direct View Camera
Dip Fluxer
Operator Panel
Pre-Heater
Reject Bin
Thermocouples
Vision Unit
Dispenser Tool
Hot Gas Tool
Show Properties
Pick
DA Ctrl.: Show Never
Place Position Teach (Vision Unit)
Control Heating (Hot Gas Tool)
Match (Vision Unit)
Pick (Robot)
Interactive Soldering (Interactive Soldering)
Pick (Robot)
Control Heating (Hot Gas Tool)
Reject (Reject Bin)
Inspection (Interactive Soldering)
Process Sequence:
Depart
Move Safe
Available Processes:
Approach
Pick
Vacuum on
Delay
Depart
Crack Motion
Move Safe
Gel Pack Vacuum
Depart Properties
Depart Height: 0.500 [mm]
Depart Speed: 20 [%]


Process List Editor
Removal - Master Part Type
Tool: Hot Gas Tool (Hot gas Tool with Site Cleaning N
Nozzle: Master Solder Nozzle (Nozzle used in Master Ten
Reject Mode: No Reject
Use always Assembly Position as Pick Position
Min. Group: Operator
Abort Control: Not Executed (Default)
Abort Message: <%PL> of <%ASM> aborted
General Processes
Signal Processes
Interactive Soldering
Robot
Force Table
Direct View Camera
Dip Fluxer
Operator Panel
Pre-Heater
Reject Bin
Thermocouples
Vision Unit
Dispenser Tool
Hot Gas Tool
Show Properties
Pick
DA Ctrl.: Show Never
Place Position Teach (Vision Unit)
Control Heating (Hot Gas Tool)
Match (Vision Unit)
Pick (Robot)
Interactive Soldering (Interactive Soldering)
Pick (Robot)
Control Heating (Hot Gas Tool)
Reject (Reject Bin)
Inspection (Interactive Soldering)
Process Sequence:
Depart
Move Safe
Available Processes:
Approach
Pick
Vacuum on
Delay
Depart
Crack Motion
Move Safe
Gel Pack Vacuum


Process List Editor
Removal - Master Part Type
Tool: Hot Gas Tool (Hot gas Tool with Site Cleaning N
Nozzle: Master Solder Nozzle (Nozzle used in Master Ten
Reject Mode: No Reject
Use always Assembly Position as Pick Position
Min. Group: Operator
Abort Control: Not Executed (Default)
Abort Message: <%PL> of <%ASM> aborted
General Processes
Signal Processes
Interactive Soldering
Robot
Force Table
Direct View Camera
Dip Fluxer
Operator Panel
Pre-Heater
Reject Bin
Thermocouples
Vision Unit
Dispenser Tool
Hot Gas Tool
Show Properties
Control Heating
DA Ctrl.: Show Never
Place Position Teach (Vision Unit)
Control Heating (Hot Gas Tool)
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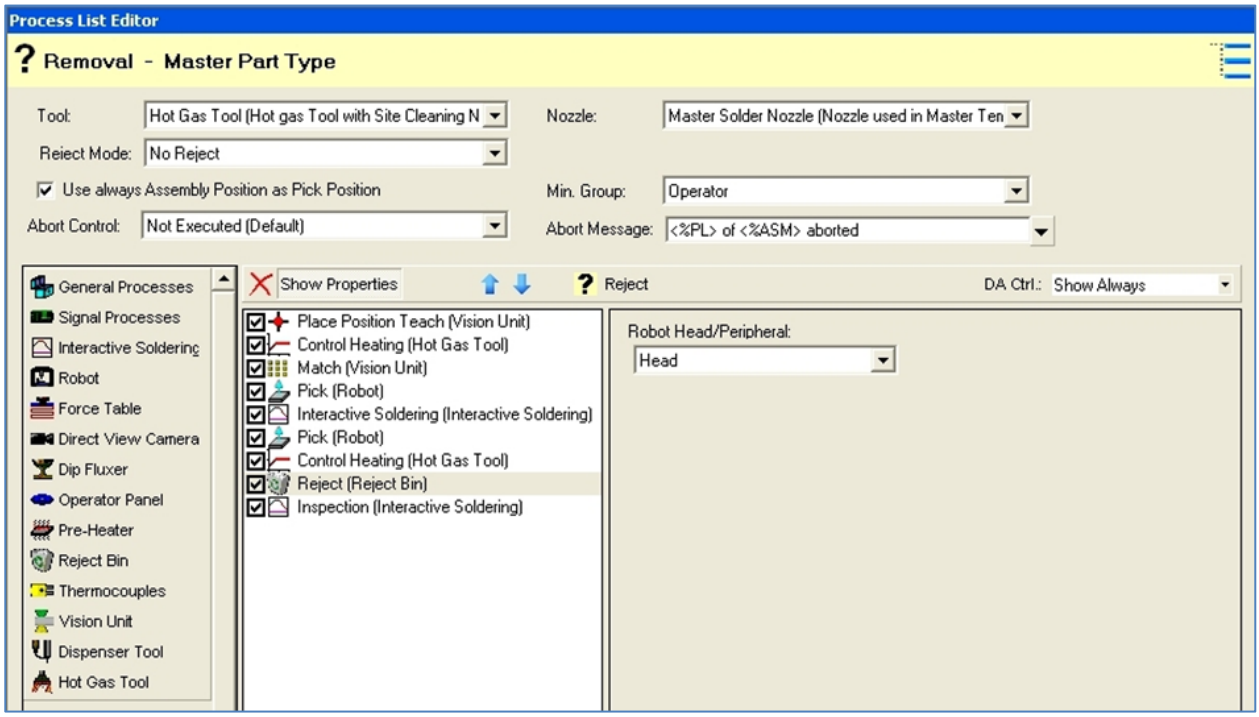
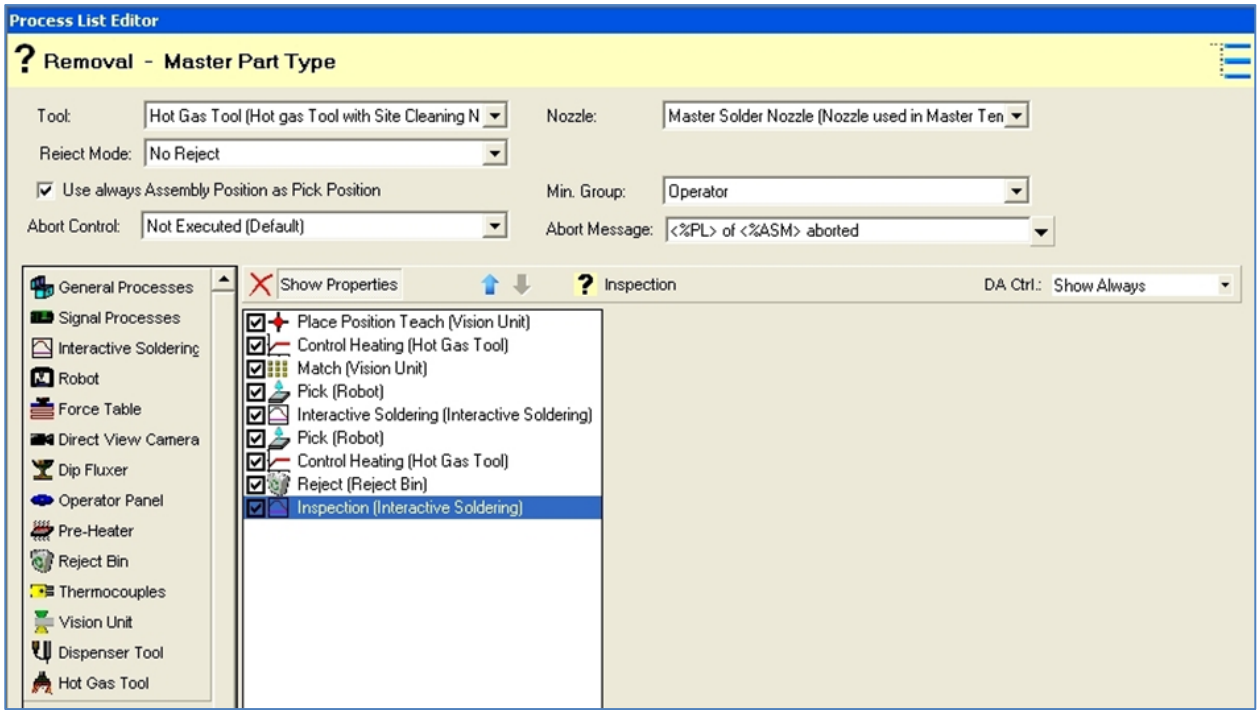
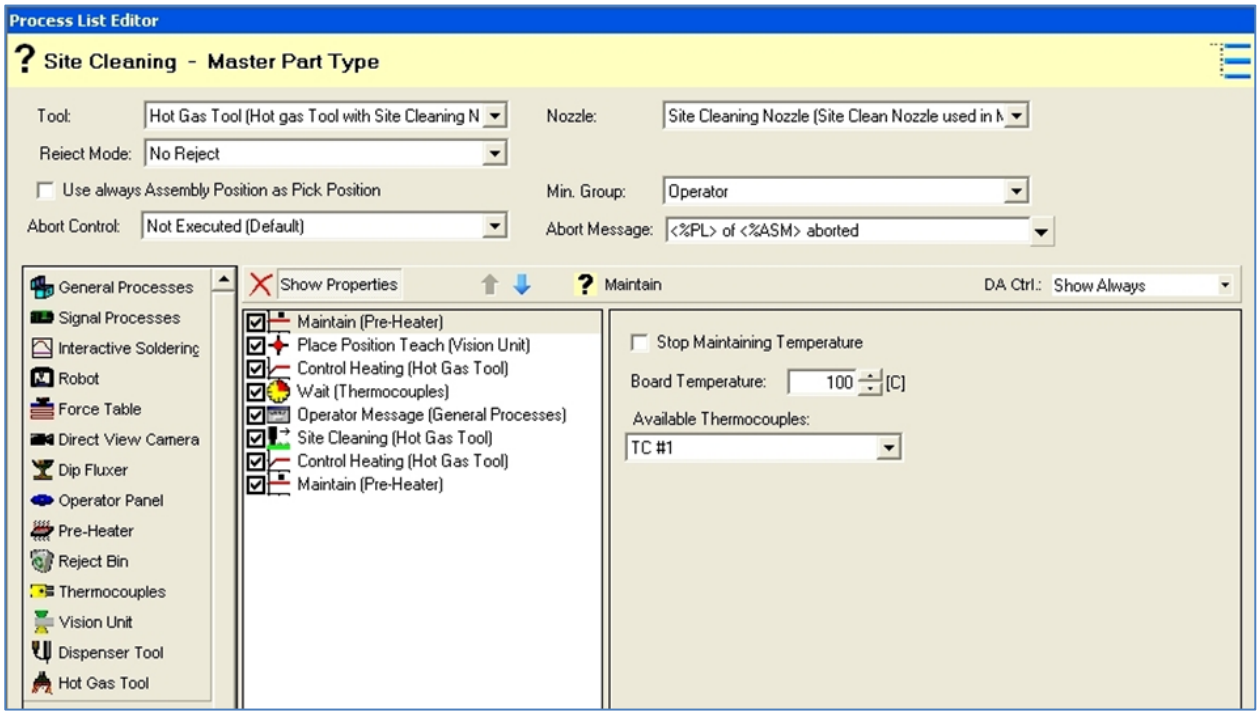
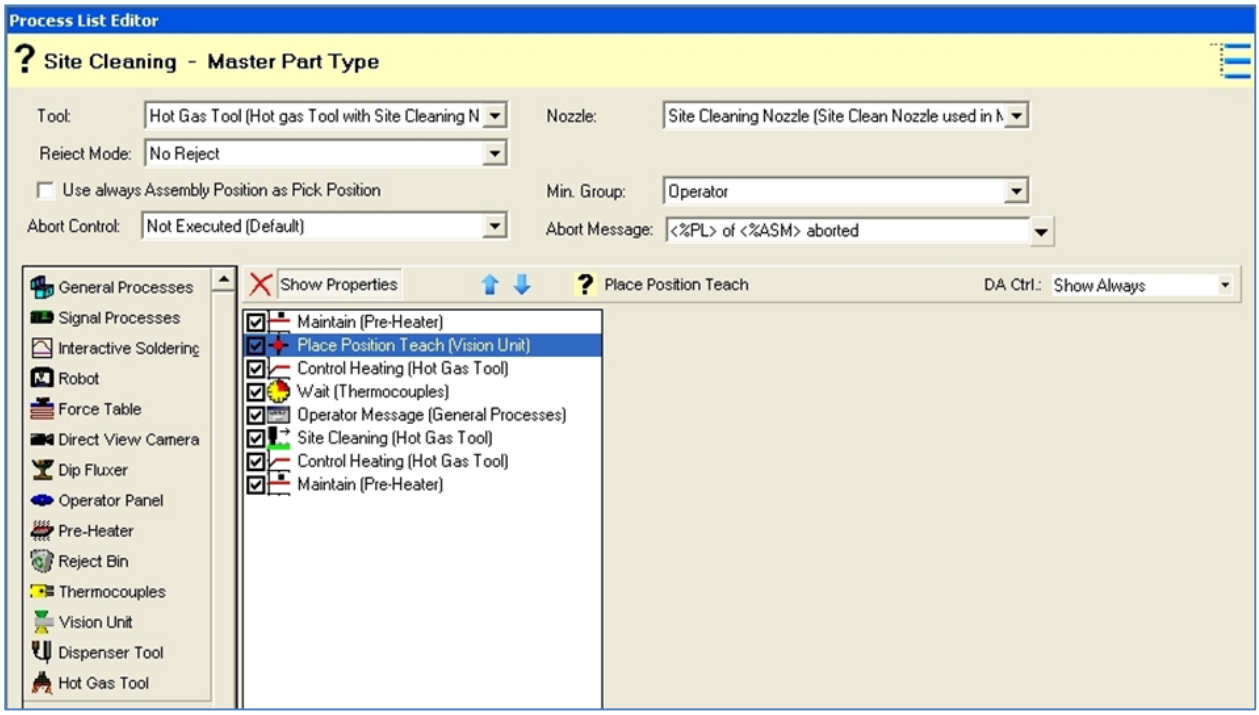
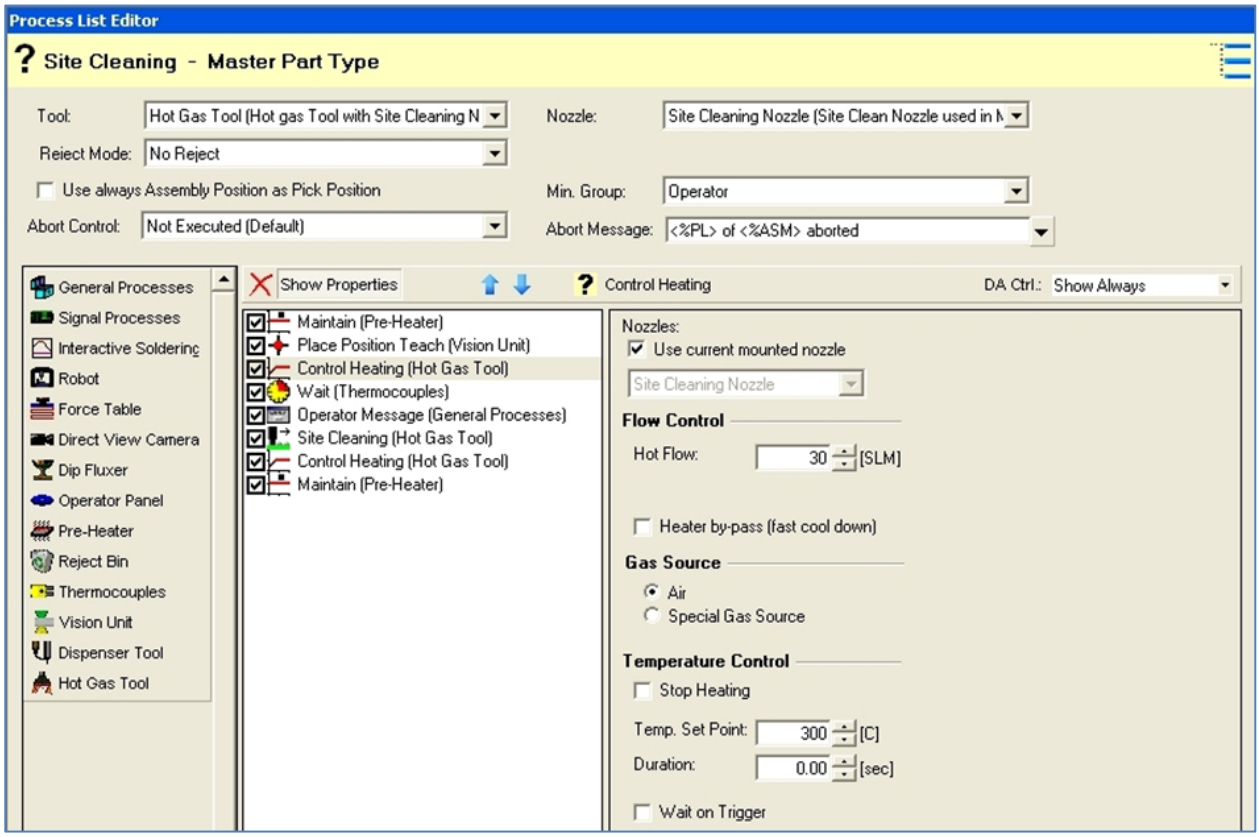
Pick (Robot)
Interactive Soldering (Interactive Soldering)
Pick (Robot)
Control Heating (Hot Gas Tool)
Reject (Reject Bin)
Inspection (Interactive Soldering)
Nozzles:
Use current mounted nozzle
Site Cleaning Nozzle
Flow Control
Hot Flow: 0 [SLM]
Heater by-pass (fast cool down)
Gas Source
Air
Special Gas Source
Temperature Control
Stop Heating

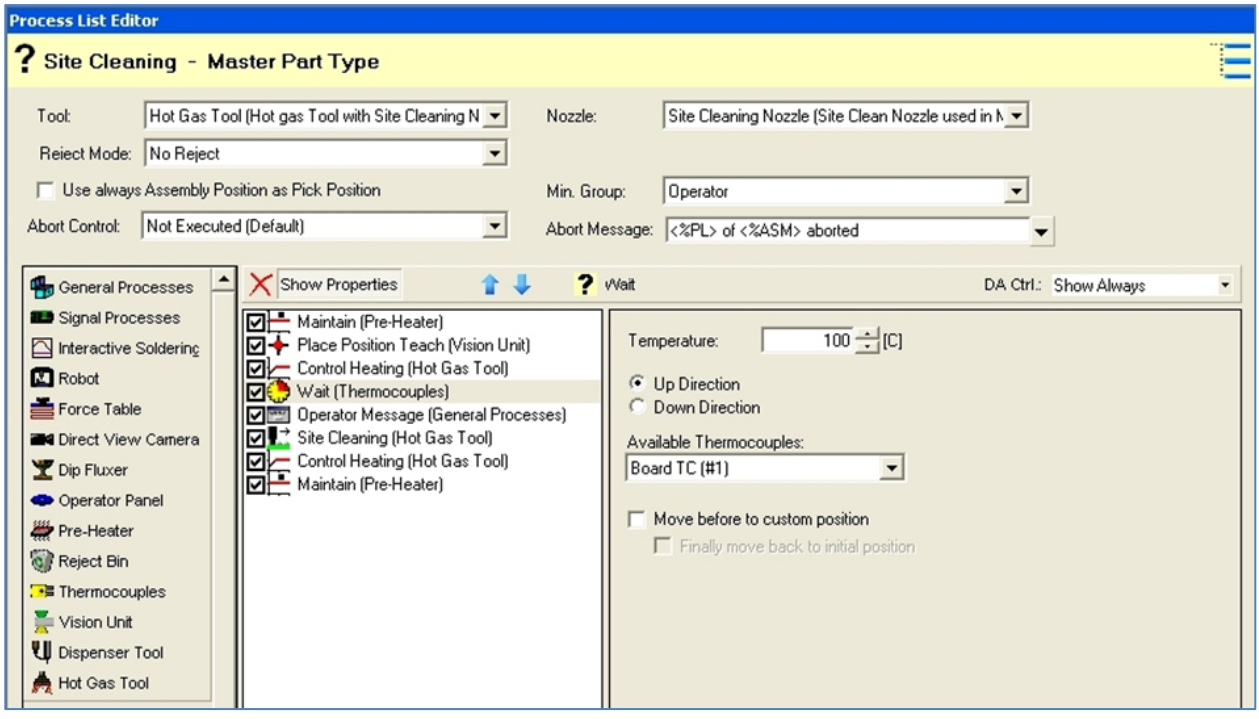

Process List Editor
Removal - Master Part Type
Tool: Hot Gas Tool (Hot gas Tool with Site Cleaning N
Nozzle: Master Solder Nozzle (Nozzle used in Master Ten
Reject Mode: No Reject
Use always Assembly Position as Pick Position
Min. Group: Operator
Abort Control: Not Executed (Default)
Abort Message: <%PL> of <%ASM> aborted
General Processes
Signal Processes
Interactive Soldering
Robot
Force Table
Direct View Camera
Dip Fluxer
Operator Panel
Pre-Heater
Reject Bin
Thermocouples
Vision Unit
Dispenser Tool
Hot Gas Tool
Show Properties
Reject
DA Ctrl.: Show Always
Place Position Teach (Vision Unit)
Control Heating (Hot Gas Tool)
Match (Vision Unit)
Pick (Robot)
Interactive Soldering (Interactive Soldering)
Pick (Robot)
Control Heating (Hot Gas Tool)
Reject (Reject Bin)
Inspection (Interactive Soldering)
Robot Head/Peripheral:
Head

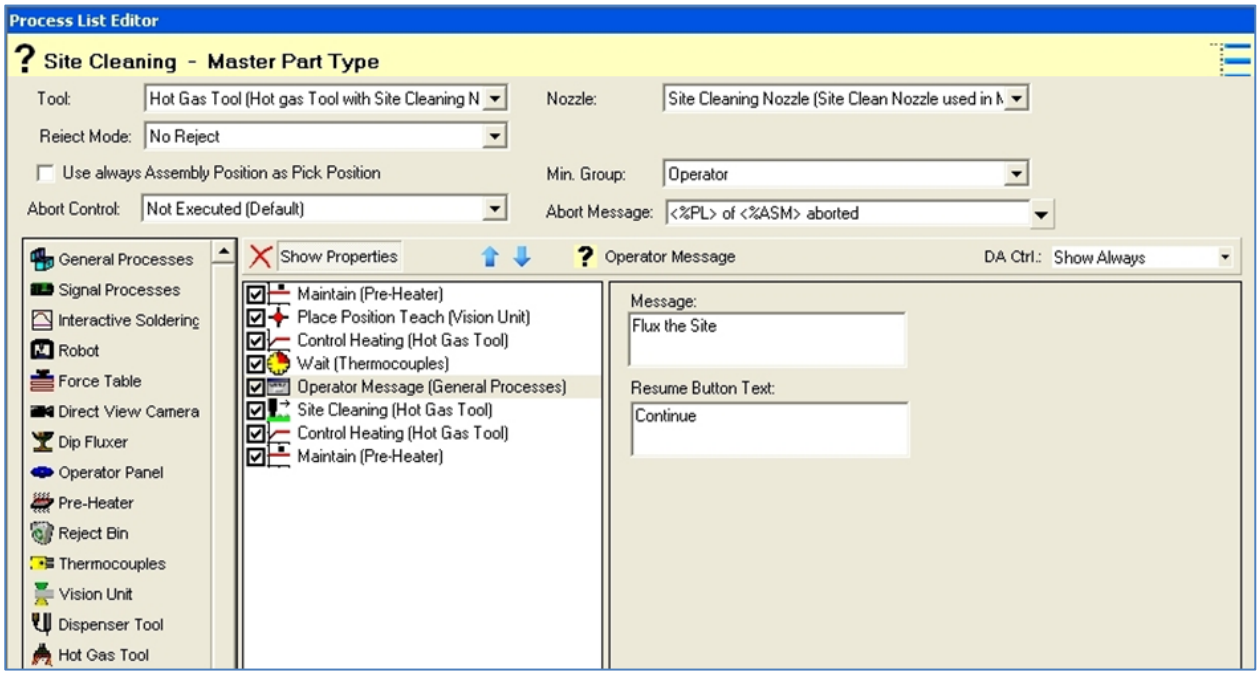

Process List Editor
Removal - Master Part Type
Tool: Hot Gas Tool (Hot gas Tool with Site Cleaning N
Nozzle: Master Solder Nozzle (Nozzle used in Master Ten
Reject Mode: No Reject
Use always Assembly Position as Pick Position
Min. Group: Operator
Abort Control: Not Executed (Default)
Abort Message: <%PL> of <%ASM> aborted
General Processes
Signal Processes
Interactive Soldering
Robot
Force Table
Direct View Camera
Dip Fluxer
Operator Panel
Pre-Heater
Reject Bin
Thermocouples
Vision Unit
Dispenser Tool
Hot Gas Tool
Show Properties
Inspection
DA Ctrl.: Show Always
Place Position Teach (Vision Unit)
Control Heating (Hot Gas Tool)
Match (Vision Unit)
Pick (Robot)
Interactive Soldering (Interactive Soldering)
Pick (Robot)
Control Heating (Hot Gas Tool)
Reject (Reject Bin)
Inspection (Interactive Soldering)

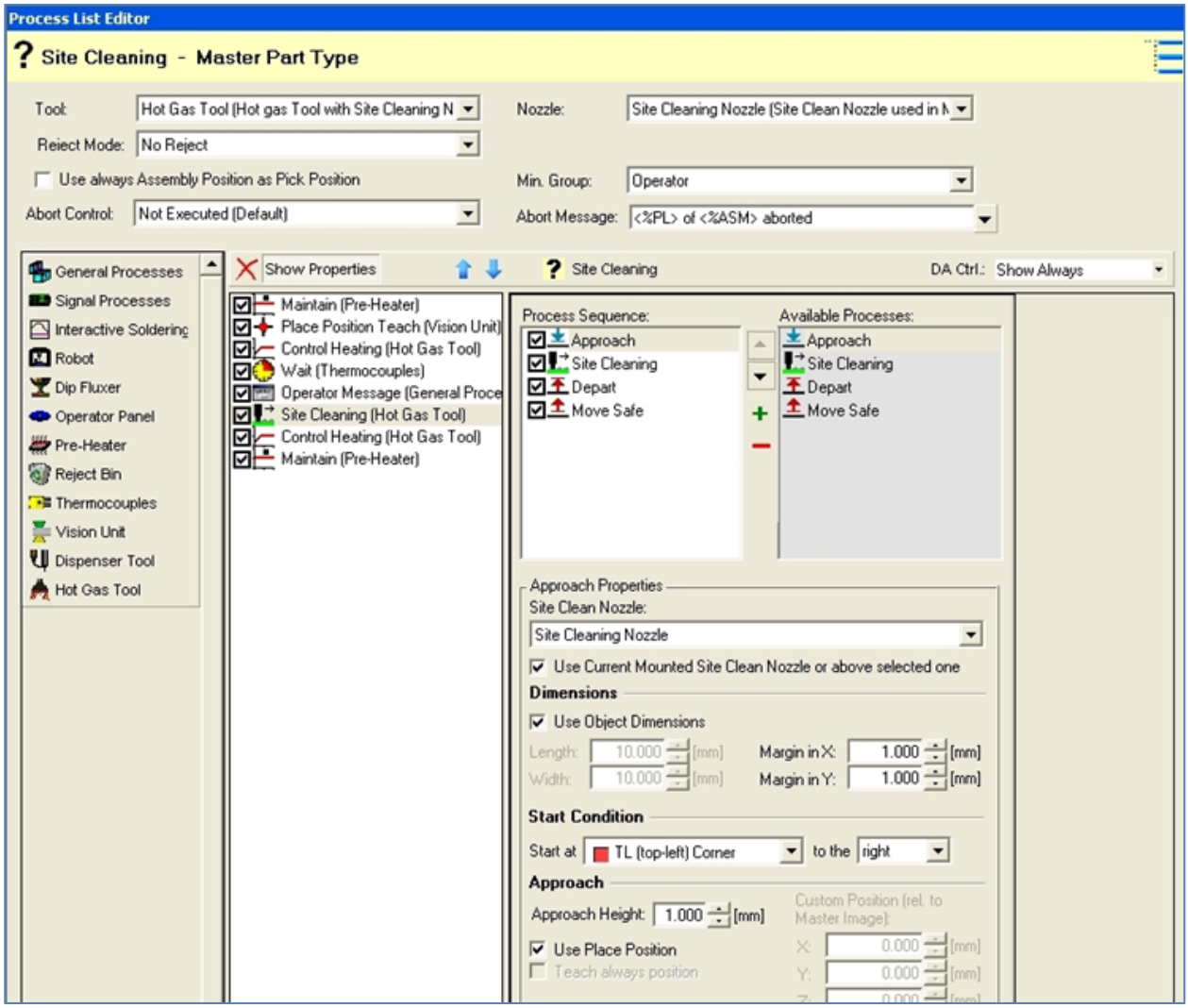

Process List Editor
Site Cleaning - Master Part Type
Tool: Hot Gas Tool (Hot gas Tool with Site Cleaning N
Nozzle: Site Cleaning Nozzle (Site Clean Nozzle used in N
Reject Mode: No Reject
Use always Assembly Position as Pick Position
Min. Group: Operator
Abort Control: Not Executed (Default)
Abort Message: <%PL> of <%ASM> aborted
General Processes
Signal Processes
Interactive Soldering
Robot
Force Table
Direct View Camera
Dip Fluxer
Operator Panel
Pre-Heater
Reject Bin
Thermocouples
Vision Unit
Dispenser Tool
Hot Gas Tool
Show Properties
Maintain
DA Ctrl.: Show Always
Maintain (Pre-Heater)
Place Position Teach (Vision Unit)
Control Heating (Hot Gas Tool)
Wait (Thermocouples)
Operator Message (General Processes)
Site Cleaning (Hot Gas Tool)
Control Heating (Hot Gas Tool)
Maintain (Pre-Heater)
Stop Maintaining Temperature
Board Temperature: 100 [C]
Available Thermocouples:
TC #1

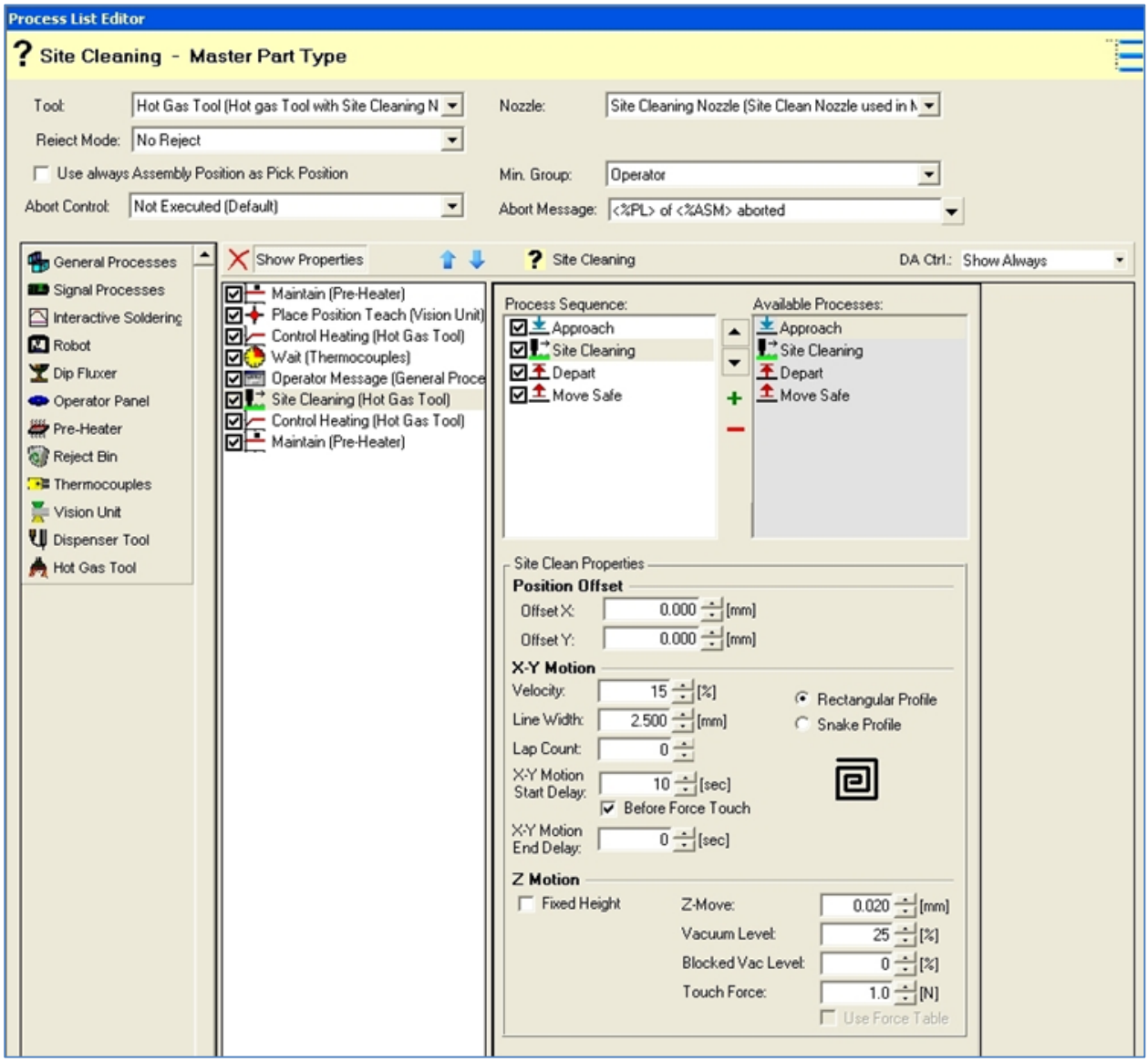

Process List Editor
Site Cleaning - Master Part Type
Tool: Hot Gas Tool (Hot gas Tool with Site Cleaning N
Nozzle: Site Cleaning Nozzle (Site Clean Nozzle used in N
Reject Mode: No Reject
Use always Assembly Position as Pick Position
Min. Group: Operator
Abort Control: Not Executed (Default)
Abort Message: <%PL> of <%ASM> aborted
General Processes
Signal Processes
Interactive Soldering
Robot
Force Table
Direct View Camera
Dip Fluxer
Operator Panel
Pre-Heater
Reject Bin
Thermocouples
Vision Unit
Dispenser Tool
Hot Gas Tool
Show Properties
Place Position Teach
DA Ctrl.: Show Always
Maintain (Pre-Heater)
Place Position Teach (Vision Unit)
Control Heating (Hot Gas Tool)
Wait (Thermocouples)
Operator Message (General Processes)
Site Cleaning (Hot Gas Tool)
Control Heating (Hot Gas Tool)
Maintain (Pre-Heater)

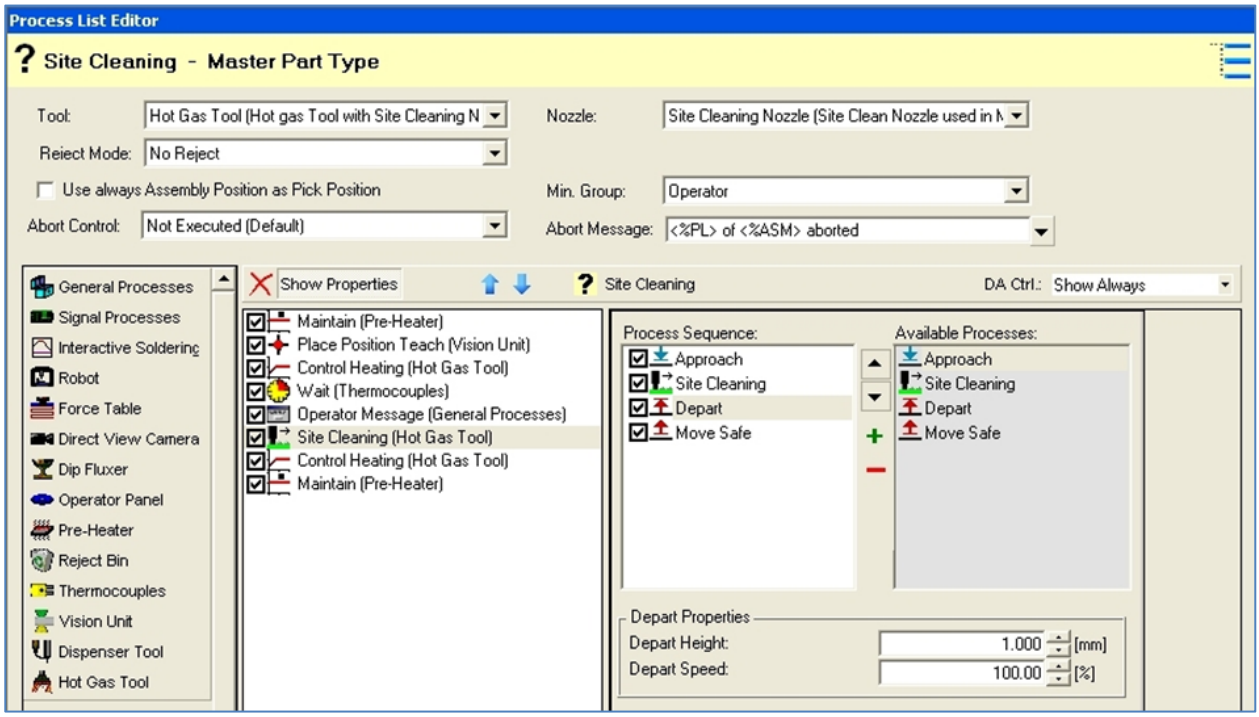

Process List Editor
Site Cleaning - Master Part Type
Tool: Hot Gas Tool (Hot gas Tool with Site Cleaning N
Nozzle: Site Cleaning Nozzle (Site Clean Nozzle used in M
Reject Mode: No Reject
Use always Assembly Position as Pick Position
Min. Group: Operator
Abort Control: Not Executed (Default)
Abort Message: <%PL> of <%ASM> aborted
General Processes
Signal Processes
Interactive Soldering
Robot
Force Table
Direct View Camera
Dip Fluxer
Operator Panel
Pre-Heater
Reject Bin
Thermocouples
Vision Unit
Dispenser Tool
Hot Gas Tool
Show Properties
Control Heating
DA Ctrl.: Show Always
Maintain (Pre-Heater)
Place Position Teach (Vision Unit)
Control Heating (Hot Gas Tool)
Wait (Thermocouples)
Operator Message (General Processes)
Site Cleaning (Hot Gas Tool)
Control Heating (Hot Gas Tool)
Maintain (Pre-Heater)
Nozzles:
Use current mounted nozzle
Site Cleaning Nozzle
Flow Control
Hot Flow: 30 [SLM]
Heater by-pass (fast cool down)
Gas Source
Air
Special Gas Source
Temperature Control
Stop Heating
Temp. Set Point: 300 [C]
Duration: 0.00 [sec]
Wait on Trigger

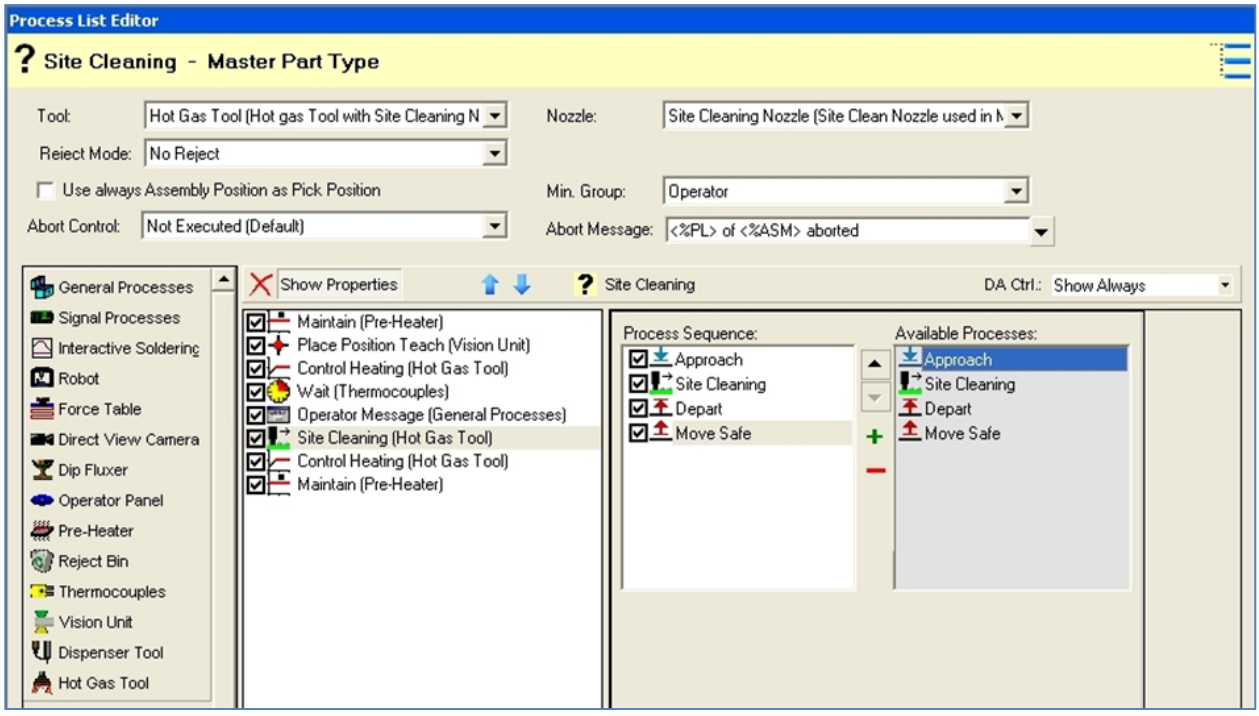

Process List Editor
Site Cleaning - Master Part Type
Tool: Hot Gas Tool (Hot gas Tool with Site Cleaning N
Nozzle: Site Cleaning Nozzle (Site Clean Nozzle used in M
Reject Mode: No Reject
Use always Assembly Position as Pick Position
Min. Group: Operator
Abort Control: Not Executed (Default)
Abort Message: <%PL> of <%ASM> aborted
General Processes
Signal Processes
Interactive Soldering
Robot
Force Table
Direct View Camera
Dip Fluxer
Operator Panel
Pre-Heater
Reject Bin
Thermocouples
Vision Unit
Dispenser Tool
Hot Gas Tool
Show Properties
Wait
DA Ctrl.: Show Always
Maintain (Pre-Heater)
Place Position Teach (Vision Unit)
Control Heating (Hot Gas Tool)
Wait (Thermocouples)
Operator Message (General Processes)
Site Cleaning (Hot Gas Tool)
Control Heating (Hot Gas Tool)
Maintain (Pre-Heater)
Temperature: 100 [C]
Up Direction
Down Direction
Available Thermocouples:
Board TC (#1)
Move before to custom position
Finally move back to initial position

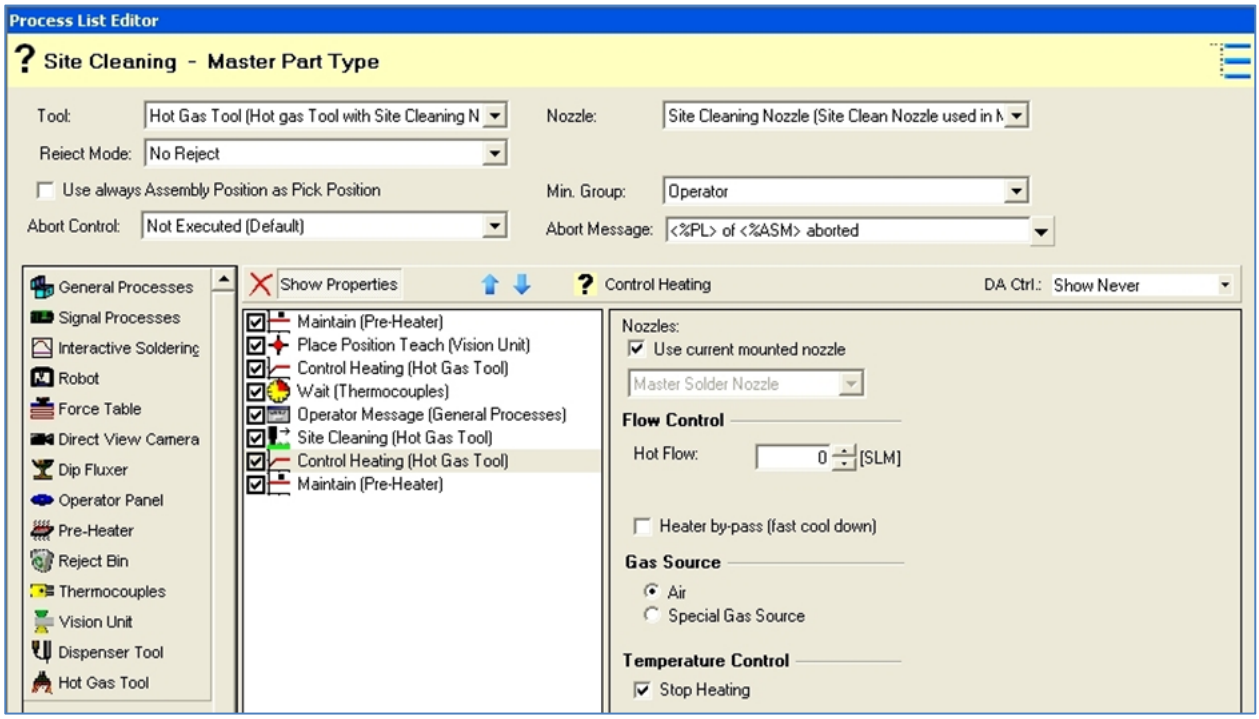

Process List Editor
Site Cleaning - Master Part Type
Tool: Hot Gas Tool (Hot gas Tool with Site Cleaning N
Nozzle: Site Cleaning Nozzle (Site Clean Nozzle used in N
Reject Mode: No Reject
Use always Assembly Position as Pick Position
Min. Group: Operator
Abort Control: Not Executed (Default)
Abort Message: <%PL> of <%ASM> aborted
General Processes
Signal Processes
Interactive Soldering
Robot
Force Table
Direct View Camera
Dip Fluxer
Operator Panel
Pre-Heater
Reject Bin
Thermocouples
Vision Unit
Dispenser Tool
Hot Gas Tool
Show Properties
Operator Message
DA Ctrl.: Show Always
Maintain (Pre-Heater)
Place Position Teach (Vision Unit)
Control Heating (Hot Gas Tool)
Wait (Thermocouples)
Operator Message (General Processes)
Site Cleaning (Hot Gas Tool)
Control Heating (Hot Gas Tool)
Maintain (Pre-Heater)
Message:
Flux the Site
Resume Button Text:
Continue

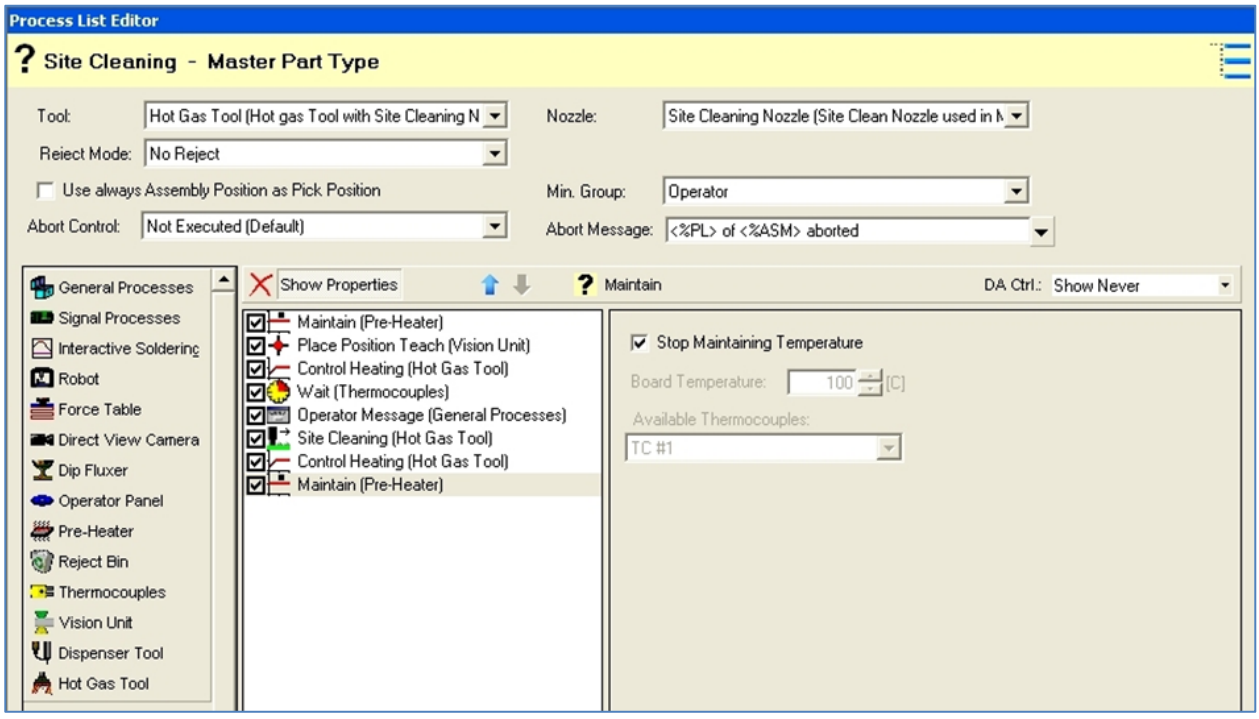

Process List Editor
Site Cleaning - Master Part Type
Tool: Hot Gas Tool (Hot gas Tool with Site Cleaning N
Nozzle: Site Cleaning Nozzle (Site Clean Nozzle used in N
Reject Mode: No Reject
Use always Assembly Position as Pick Position
Min. Group: Operator
Abort Control: Not Executed (Default)
Abort Message: <%PL> of <%ASM> aborted
General Processes
Signal Processes
Interactive Soldering
Robot
Dip Fluxer
Operator Panel
Pre-Heater
Reject Bin
Thermocouples
Vision Unit
Dispenser Tool
Hot Gas Tool
Show Properties
Site Cleaning
DA Ctrl.: Show Always
Maintain (Pre-Heater)
Place Position Teach (Vision Unit)
Control Heating (Hot Gas Tool)
Wait (Thermocouples)
Operator Message (General Proce
Site Cleaning (Hot Gas Tool)
Control Heating (Hot Gas Tool)
Maintain (Pre-Heater)
Process Sequence:
Approach
Site Cleaning
Depart
Move Safe
Available Processes:
Approach
Site Cleaning
Depart
Move Safe
Approach Properties
Site Clean Nozzle:
Site Cleaning Nozzle
Use Current Mounted Site Clean Nozzle or above selected one
Dimensions
Use Object Dimensions
Length: 10.000 [mm]
Width: 10.000 [mm]
Margin in X: 1.000 [mm]
Margin in Y: 1.000 [mm]
Start Condition
Start at TL (top-left) Corner
to the right
Approach
Approach Height: 1.000 [mm]
Custom Position (rel. to Master Image):
Use Place Position
Teach always position
X: 0.000 [mm]
Y: 0.000 [mm]

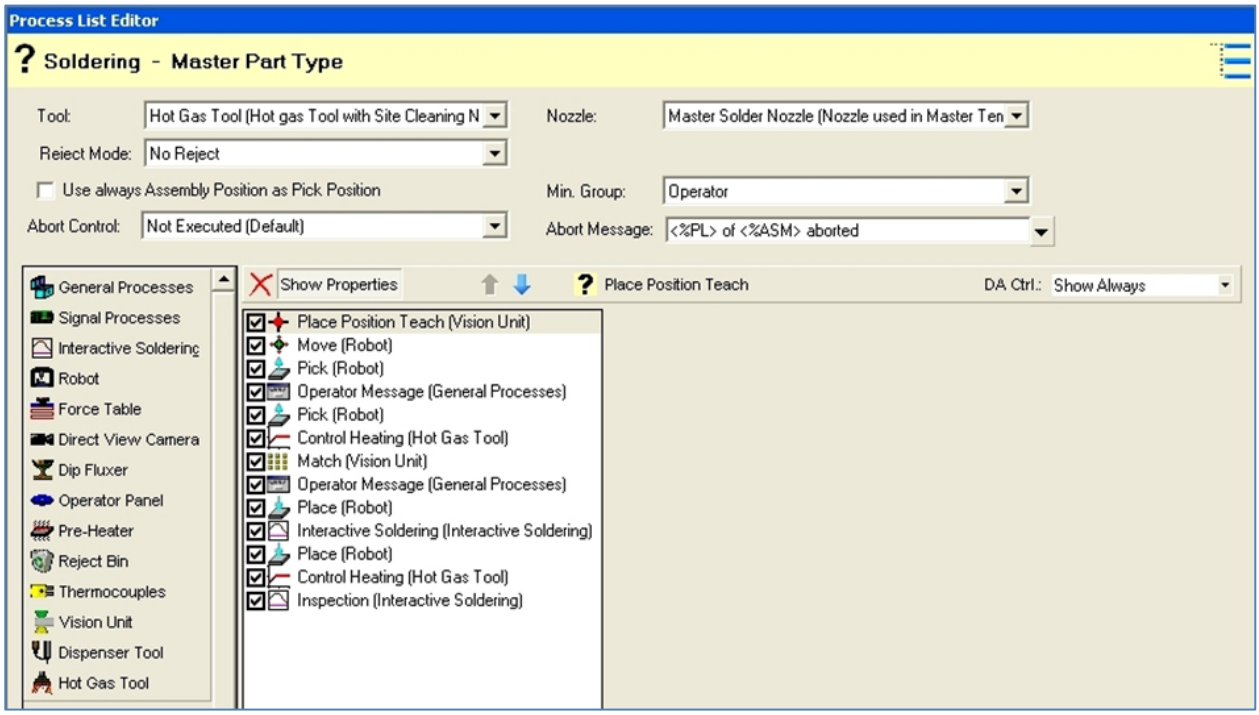

Process List Editor
Site Cleaning - Master Part Type
Tool:
Hot Gas Tool (Hot gas Tool with Site Cleaning N
Nozzle:
Site Cleaning Nozzle (Site Clean Nozzle used in N
Reject Mode:
No Reject
Use always Assembly Position as Pick Position
Min. Group:
Operator
Abort Control:
Not Executed (Default)
Abort Message:
<%PL> of <%ASM> aborted
General Processes
Signal Processes
Interactive Soldering
Robot
Dip Fluxer
Operator Panel
Pre-Heater
Reject Bin
Thermocouples
Vision Unit
Dispenser Tool
Hot Gas Tool
Show Properties
Site Cleaning
DA Ctrl.:
Show Always
Maintain (Pre-Heater)
Place Position Teach (Vision Unit)
Control Heating (Hot Gas Tool)
Wait (Thermocouples)
Operator Message (General Proce
Site Cleaning (Hot Gas Tool)
Control Heating (Hot Gas Tool)
Maintain (Pre-Heater)
Process Sequence:
Approach
Site Cleaning
Depart
Move Safe
Available Processes:
Approach
Site Cleaning
Depart
Move Safe
Site Clean Properties
Position Offset
Offset X:
0.000
[mm]
Offset Y:
0.000
[mm]
X-Y Motion
Velocity:
15
[%]
Line Width:
2.500
[mm]
Lap Count:
0
X-Y Motion Start Delay:
10
[sec]
Before Force Touch
X-Y Motion End Delay:
0
[sec]
Rectangular Profile
Snake Profile
Z Motion
Fixed Height
Z-Move:
0.020
[mm]
Vacuum Level:
25
[%]
Blocked Vac Level:
0
[%]
Touch Force:
1.0
[N]
Use Force Table

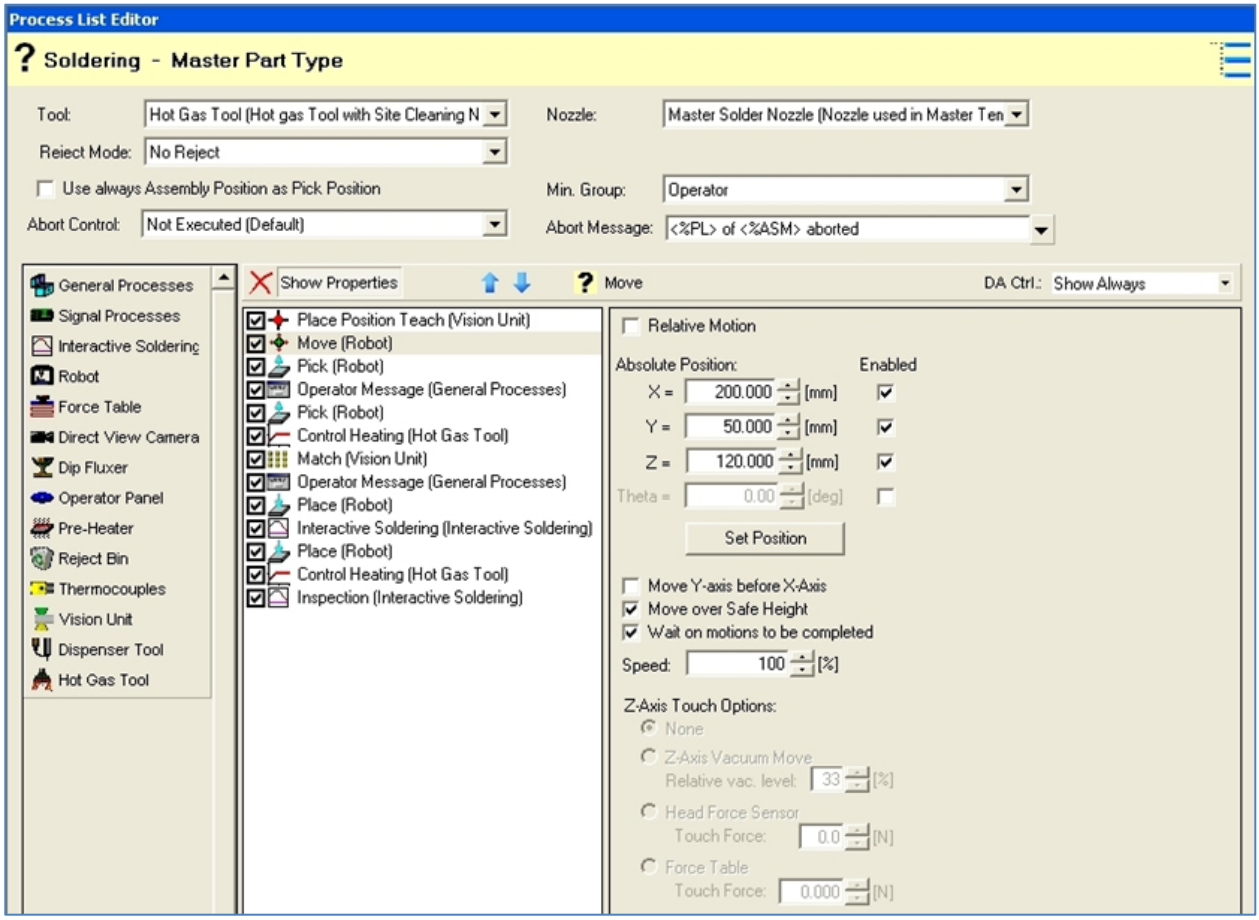

Process List Editor
Site Cleaning - Master Part Type
Tool: Hot Gas Tool (Hot gas Tool with Site Cleaning N
Nozzle: Site Cleaning Nozzle (Site Clean Nozzle used in N
Reject Mode: No Reject
Use always Assembly Position as Pick Position
Min. Group: Operator
Abort Control: Not Executed (Default)
Abort Message: <%PL> of <%ASM> aborted
General Processes
Signal Processes
Interactive Soldering
Robot
Force Table
Direct View Camera
Dip Fluxer
Operator Panel
Pre-Heater
Reject Bin
Thermocouples
Vision Unit
Dispenser Tool
Hot Gas Tool
Show Properties
Site Cleaning
DA Ctrl.: Show Always
Maintain (Pre-Heater)
Place Position Teach (Vision Unit)
Control Heating (Hot Gas Tool)
Wait (Thermocouples)
Operator Message (General Processes)
Site Cleaning (Hot Gas Tool)
Control Heating (Hot Gas Tool)
Maintain (Pre-Heater)
Process Sequence:
Approach
Site Cleaning
Depart
Move Safe
Available Processes:
Approach
Site Cleaning
Depart
Move Safe
Depart Properties
Depart Height: 1.000 [mm]
Depart Speed: 100.00 [%]

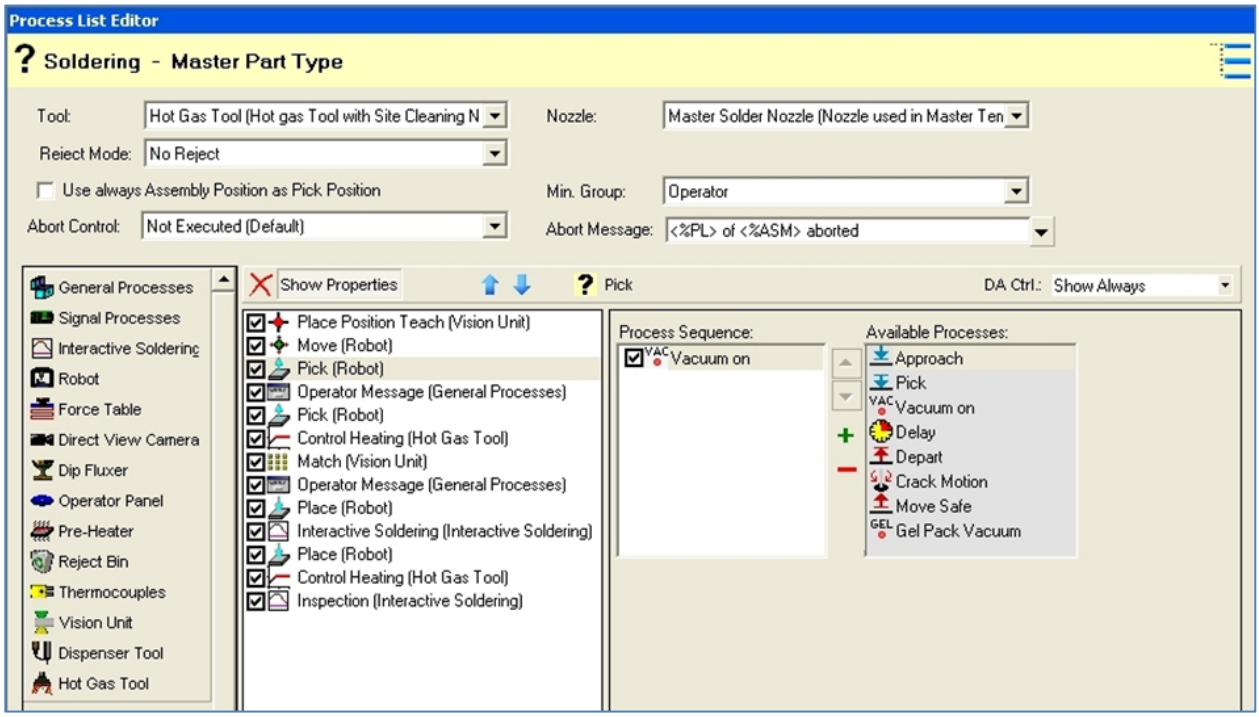

Process List Editor
Site Cleaning - Master Part Type
Tool: Hot Gas Tool (Hot gas Tool with Site Cleaning N
Nozzle: Site Cleaning Nozzle (Site Clean Nozzle used in N
Reject Mode: No Reject
Use always Assembly Position as Pick Position
Min. Group: Operator
Abort Control: Not Executed (Default)
Abort Message: <%PL> of <%ASM> aborted
General Processes
Signal Processes
Interactive Soldering
Robot
Force Table
Direct View Camera
Dip Fluxer
Operator Panel
Pre-Heater
Reject Bin
Thermocouples
Vision Unit
Dispenser Tool
Hot Gas Tool
Show Properties
Site Cleaning
DA Ctrl.: Show Always
Maintain (Pre-Heater)
Place Position Teach (Vision Unit)
Control Heating (Hot Gas Tool)
Wait (Thermocouples)
Operator Message (General Processes)
Site Cleaning (Hot Gas Tool)
Control Heating (Hot Gas Tool)
Maintain (Pre-Heater)
Process Sequence:
Approach
Site Cleaning
Depart
Move Safe
Available Processes:
Approach
Site Cleaning
Depart
Move Safe

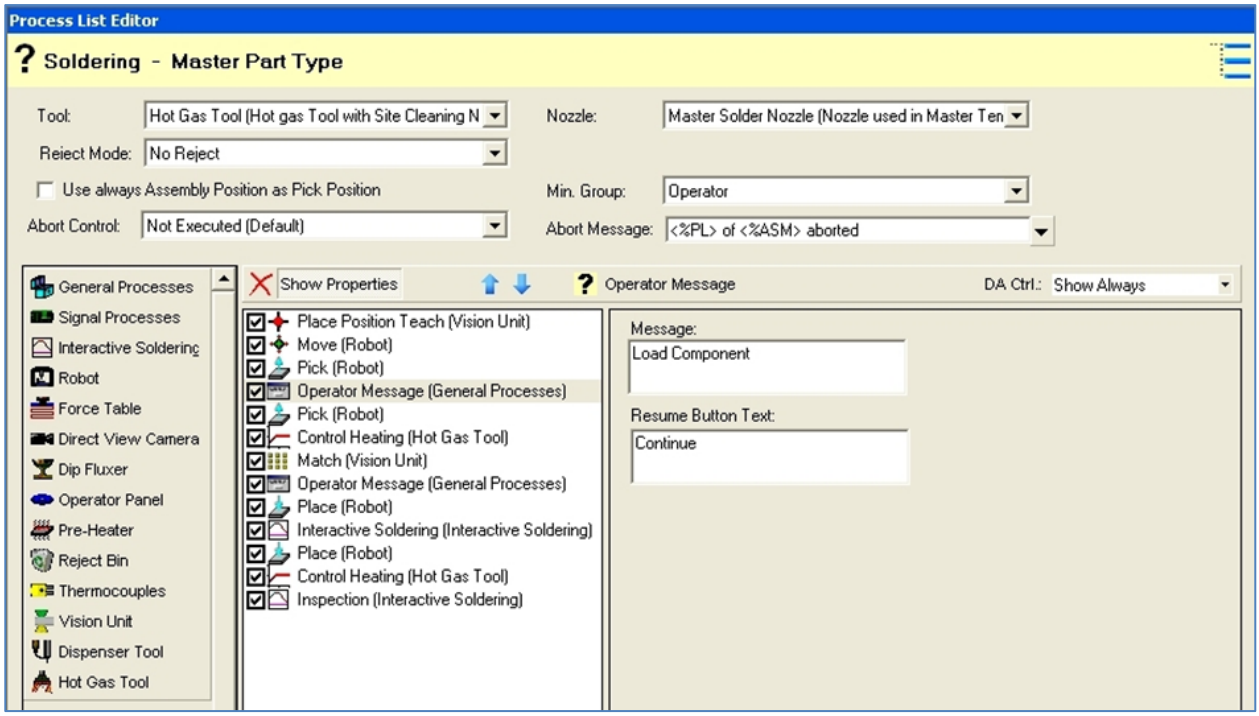

Process List Editor
Site Cleaning - Master Part Type
Tool: Hot Gas Tool (Hot gas Tool with Site Cleaning N
Nozzle: Site Cleaning Nozzle (Site Clean Nozzle used in M
Reject Mode: No Reject
Use always Assembly Position as Pick Position
Min. Group: Operator
Abort Control: Not Executed (Default)
Abort Message: <%PL> of <%ASM> aborted
General Processes
Signal Processes
Interactive Soldering
Robot
Force Table
Direct View Camera
Dip Fluxer
Operator Panel
Pre-Heater
Reject Bin
Thermocouples
Vision Unit
Dispenser Tool
Hot Gas Tool
Show Properties
Control Heating
DA Ctrl.: Show Never
Maintain (Pre-Heater)
Place Position Teach (Vision Unit)
Control Heating (Hot Gas Tool)
Wait (Thermocouples)
Operator Message (General Processes)
Site Cleaning (Hot Gas Tool)
Control Heating (Hot Gas Tool)
Maintain (Pre-Heater)
Nozzles:
Use current mounted nozzle
Master Solder Nozzle
Flow Control
Hot Flow: 0 [SLM]
Heater by-pass (fast cool down)
Gas Source
Air
Special Gas Source
Temperature Control
Stop Heating

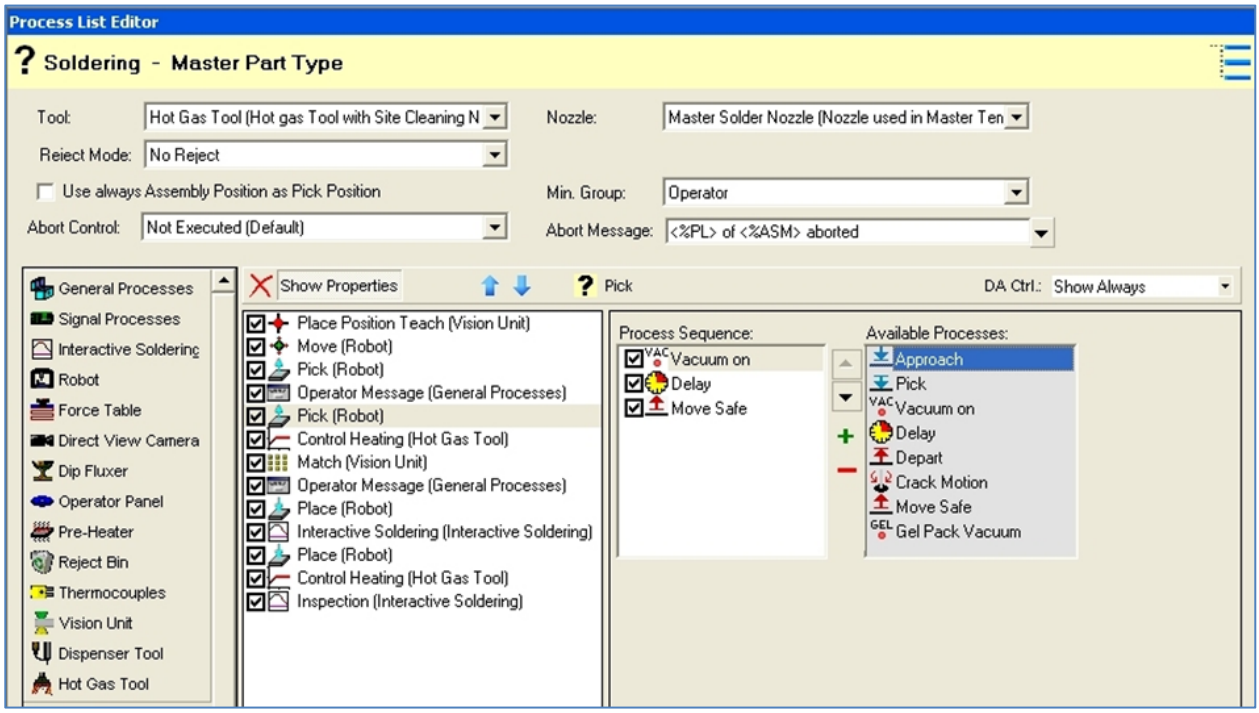

Process List Editor
Site Cleaning - Master Part Type
Tool: Hot Gas Tool (Hot gas Tool with Site Cleaning N
Nozzle: Site Cleaning Nozzle (Site Clean Nozzle used in M
Reject Mode: No Reject
Use always Assembly Position as Pick Position
Min. Group: Operator
Abort Control: Not Executed (Default)
Abort Message: <%PL> of <%ASM> aborted
General Processes
Signal Processes
Interactive Soldering
Robot
Force Table
Direct View Camera
Dip Fluxer
Operator Panel
Pre-Heater
Reject Bin
Thermocouples
Vision Unit
Dispenser Tool
Hot Gas Tool
Show Properties
Maintain
DA Ctrl.: Show Never
Maintain (Pre-Heater)
Place Position Teach (Vision Unit)
Control Heating (Hot Gas Tool)
Wait (Thermocouples)
Operator Message (General Processes)
Site Cleaning (Hot Gas Tool)
Control Heating (Hot Gas Tool)
Maintain (Pre-Heater)
Stop Maintaining Temperature
Board Temperature: 100 [C]
Available Thermocouples:
TC #1

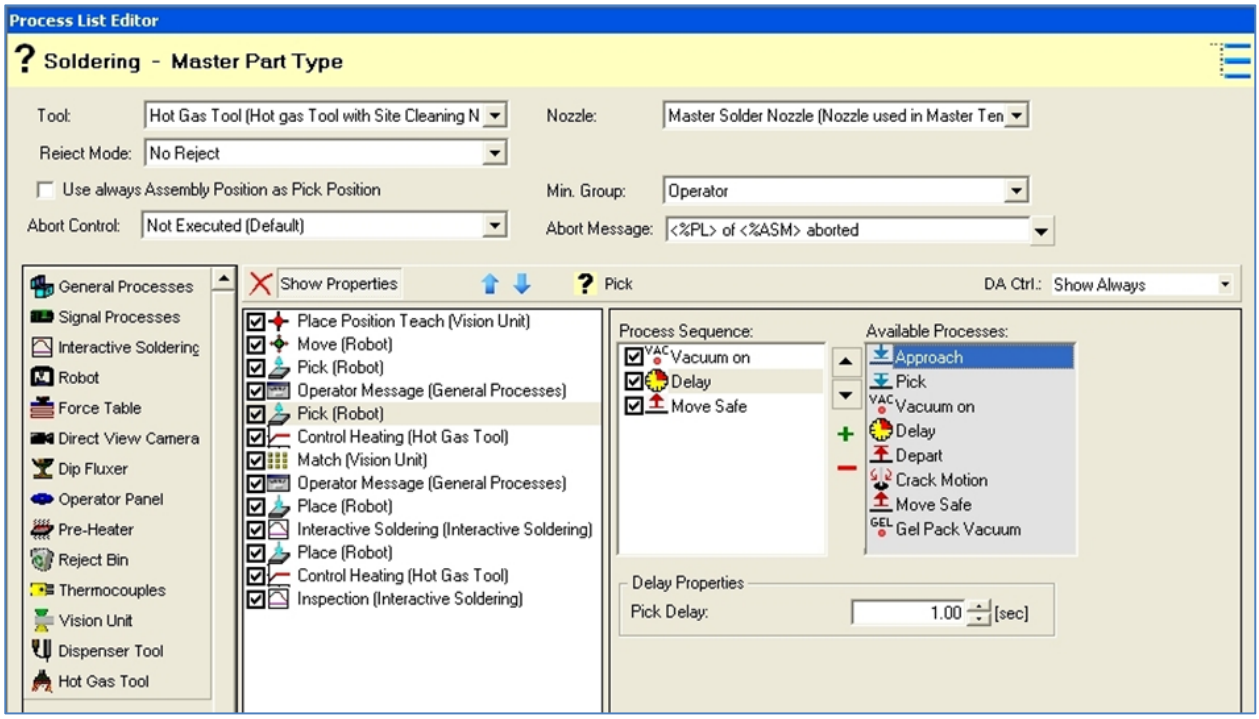

Process List Editor
Soldering - Master Part Type
Tool: Hot Gas Tool (Hot gas Tool with Site Cleaning N
Nozzle: Master Solder Nozzle (Nozzle used in Master Ten
Reject Mode: No Reject
Use always Assembly Position as Pick Position
Min. Group: Operator
Abort Control: Not Executed (Default)
Abort Message: <%PL> of <%ASM> aborted
General Processes
Signal Processes
Interactive Soldering
Robot
Force Table
Direct View Camera
Dip Fluxer
Operator Panel
Pre-Heater
Reject Bin
Thermocouples
Vision Unit
Dispenser Tool
Hot Gas Tool
Show Properties
Place Position Teach
DA Ctrl.: Show Always
Place Position Teach (Vision Unit)
Move (Robot)
Pick (Robot)
Operator Message (General Processes)
Pick (Robot)
Control Heating (Hot Gas Tool)
Match (Vision Unit)
Operator Message (General Processes)
Place (Robot)
Interactive Soldering (Interactive Soldering)
Place (Robot)
Control Heating (Hot Gas Tool)
Inspection (Interactive Soldering)

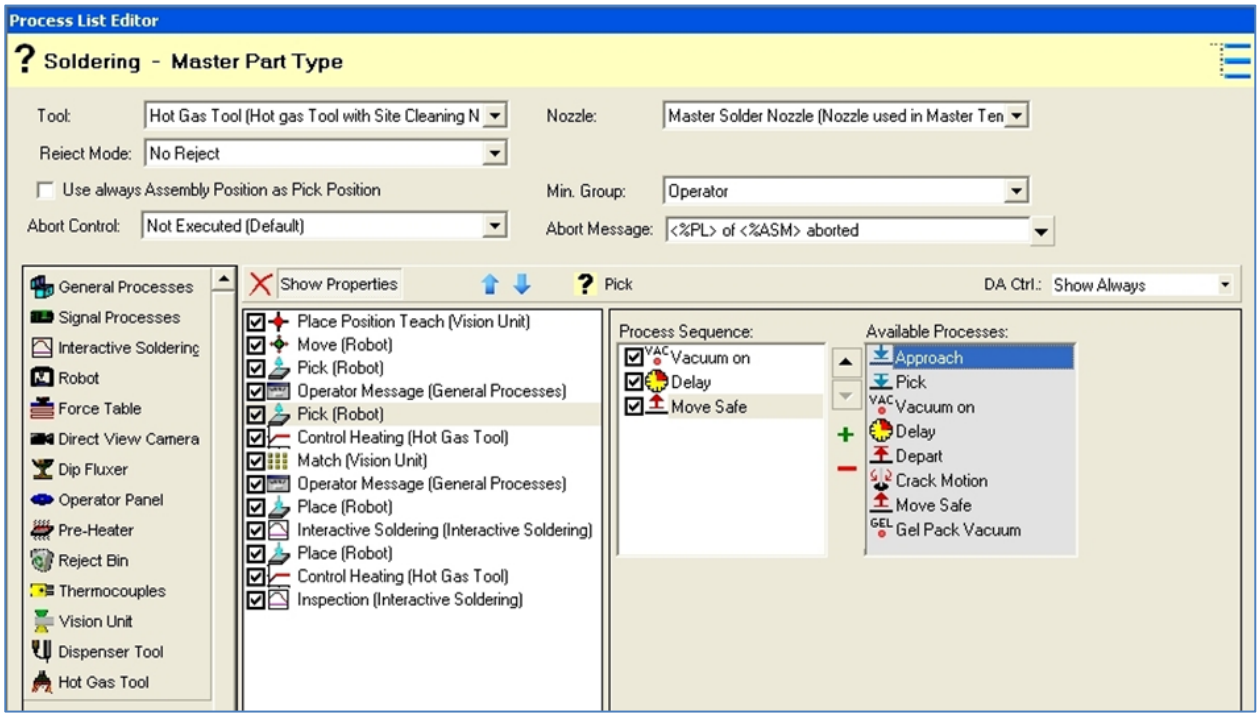

Process List Editor
Soldering - Master Part Type
Tool: Hot Gas Tool (Hot gas Tool with Site Cleaning N
Nozzle: Master Solder Nozzle (Nozzle used in Master Ten
Reject Mode: No Reject
Use always Assembly Position as Pick Position
Min. Group: Operator
Abort Control: Not Executed (Default)
Abort Message: <%PL> of <%ASM> aborted
General Processes
Signal Processes
Interactive Soldering
Robot
Force Table
Direct View Camera
Dip Fluxer
Operator Panel
Pre-Heater
Reject Bin
Thermocouples
Vision Unit
Dispenser Tool
Hot Gas Tool
Show Properties
Move
DA Ctrl.: Show Always
Place Position Teach (Vision Unit)
Move (Robot)
Pick (Robot)
Operator Message (General Processes)
Pick (Robot)
Control Heating (Hot Gas Tool)
Match (Vision Unit)
Operator Message (General Processes)
Place (Robot)
Interactive Soldering (Interactive Soldering)
Place (Robot)
Control Heating (Hot Gas Tool)
Inspection (Interactive Soldering)
Relative Motion
Absolute Position:
Enabled
X = 200.000 [mm]
Y = 50.000 [mm]
Z = 120.000 [mm]
Theta = 0.00 [deg]
Set Position
Move Y-axis before X-Axis
Move over Safe Height
Wait on motions to be completed
Speed: 100 [%]
Z-Axis Touch Options:
None
Z-Axis Vacuum Move
Relative vac. level: 33 [%]
Head Force Sensor
Touch Force: 0.0 [N]
Force Table
Touch Force: 0.000 [N]

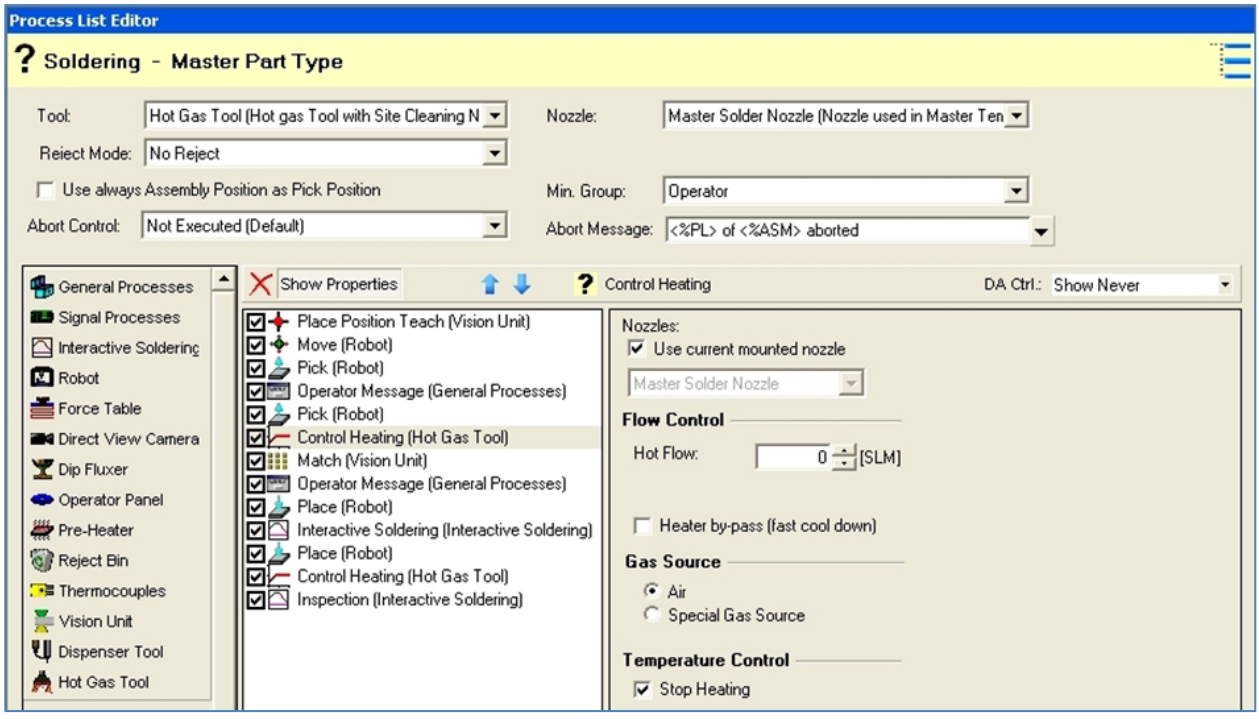

Process List Editor
Soldering - Master Part Type
Tool: Hot Gas Tool (Hot gas Tool with Site Cleaning N
Nozzle: Master Solder Nozzle (Nozzle used in Master Ten
Reject Mode: No Reject
Use always Assembly Position as Pick Position
Min. Group: Operator
Abort Control: Not Executed (Default)
Abort Message: <%PL> of <%ASM> aborted
General Processes
Signal Processes
Interactive Soldering
Robot
Force Table
Direct View Camera
Dip Fluxer
Operator Panel
Pre-Heater
Reject Bin
Thermocouples
Vision Unit
Dispenser Tool
Hot Gas Tool
Show Properties
Pick
DA Ctrl.: Show Always
Place Position Teach (Vision Unit)
Move (Robot)
Pick (Robot)
Operator Message (General Processes)
Pick (Robot)
Control Heating (Hot Gas Tool)
Match (Vision Unit)
Operator Message (General Processes)
Place (Robot)
Interactive Soldering (Interactive Soldering)
Place (Robot)
Control Heating (Hot Gas Tool)
Inspection (Interactive Soldering)
Process Sequence:
Vacuum on
Available Processes:
Approach
Pick
Vacuum on
Delay
Depart
Crack Motion
Move Safe
Gel Pack Vacuum

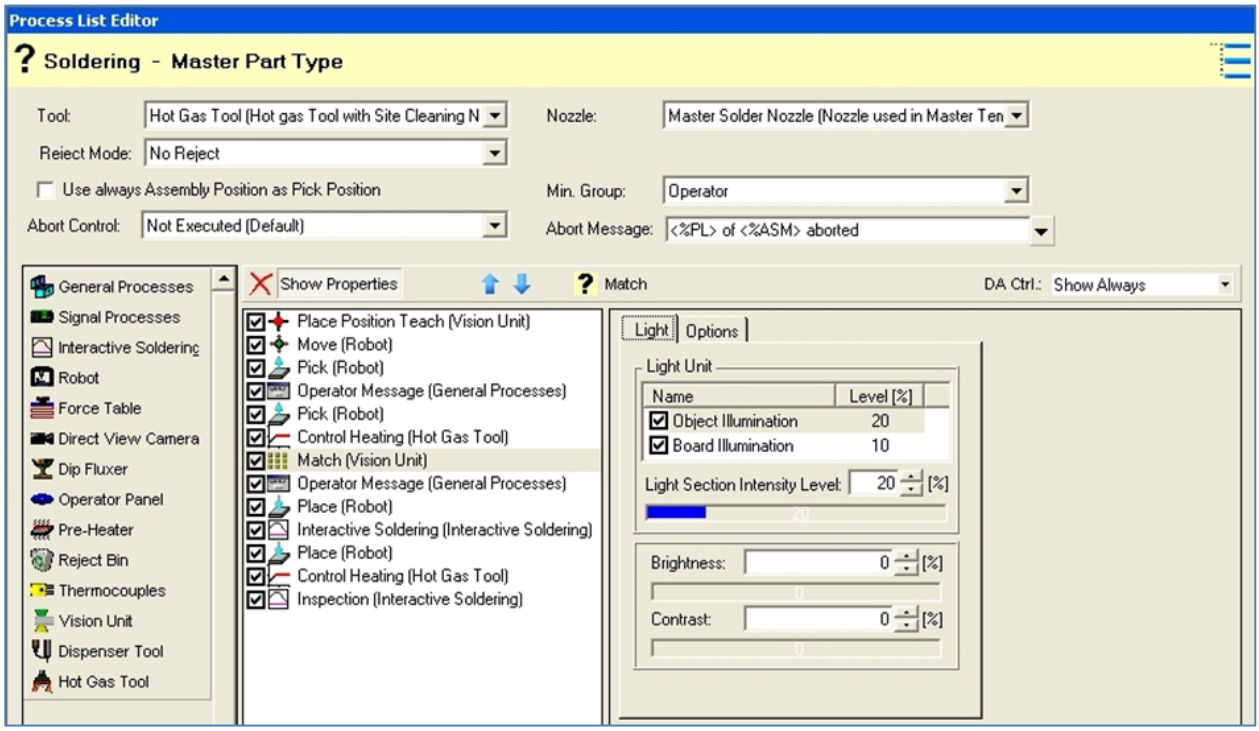

Process List Editor
Soldering - Master Part Type
Tool: Hot Gas Tool (Hot gas Tool with Site Cleaning N
Nozzle: Master Solder Nozzle (Nozzle used in Master Ten
Reject Mode: No Reject
Use always Assembly Position as Pick Position
Min. Group: Operator
Abort Control: Not Executed (Default)
Abort Message: <%PL> of <%ASM> aborted
General Processes
Signal Processes
Interactive Soldering
Robot
Force Table
Direct View Camera
Dip Fluxer
Operator Panel
Pre-Heater
Reject Bin
Thermocouples
Vision Unit
Dispenser Tool
Hot Gas Tool
Show Properties
Operator Message
DA Ctrl.: Show Always
Place Position Teach (Vision Unit)
Move (Robot)
Pick (Robot)
Operator Message (General Processes)
Pick (Robot)
Control Heating (Hot Gas Tool)
Match (Vision Unit)
Operator Message (General Processes)
Place (Robot)
Interactive Soldering (Interactive Soldering)
Place (Robot)
Control Heating (Hot Gas Tool)
Inspection (Interactive Soldering)
Message:
Load Component
Resume Button Text:
Continue

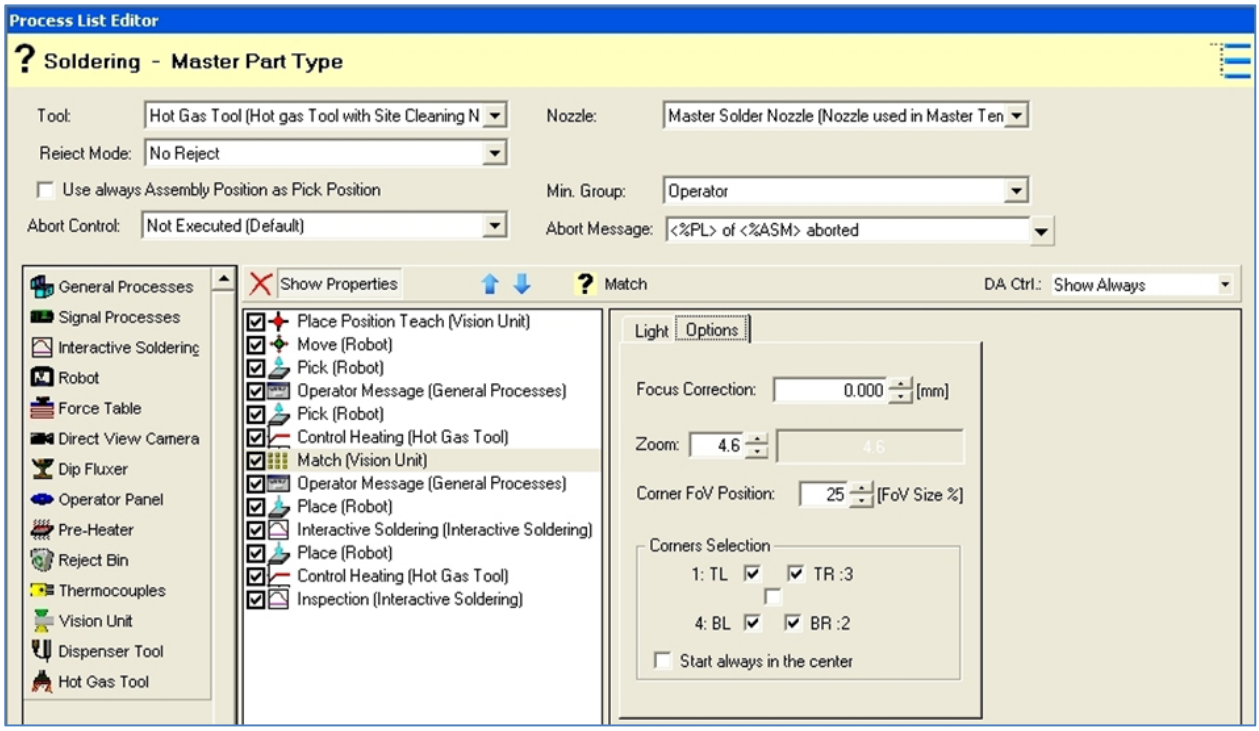

Process List Editor
Soldering - Master Part Type
Tool: Hot Gas Tool (Hot gas Tool with Site Cleaning N
Nozzle: Master Solder Nozzle (Nozzle used in Master Ten
Reject Mode: No Reject
Use always Assembly Position as Pick Position
Min. Group: Operator
Abort Control: Not Executed (Default)
Abort Message: <%PL> of <%ASM> aborted
General Processes
Signal Processes
Interactive Soldering
Robot
Force Table
Direct View Camera
Dip Fluxer
Operator Panel
Pre-Heater
Reject Bin
Thermocouples
Vision Unit
Dispenser Tool
Hot Gas Tool
Show Properties
Pick
DA Ctrl.: Show Always
Place Position Teach (Vision Unit)
Move (Robot)
Pick (Robot)
Operator Message (General Processes)
Pick (Robot)
Control Heating (Hot Gas Tool)
Match (Vision Unit)
Operator Message (General Processes)
Place (Robot)
Interactive Soldering (Interactive Soldering)
Place (Robot)
Control Heating (Hot Gas Tool)
Inspection (Interactive Soldering)
Process Sequence:
Vacuum on
Delay
Move Safe
Available Processes:
Approach
Pick
Vacuum on
Delay
Depart
Crack Motion
Move Safe
Gel Pack Vacuum

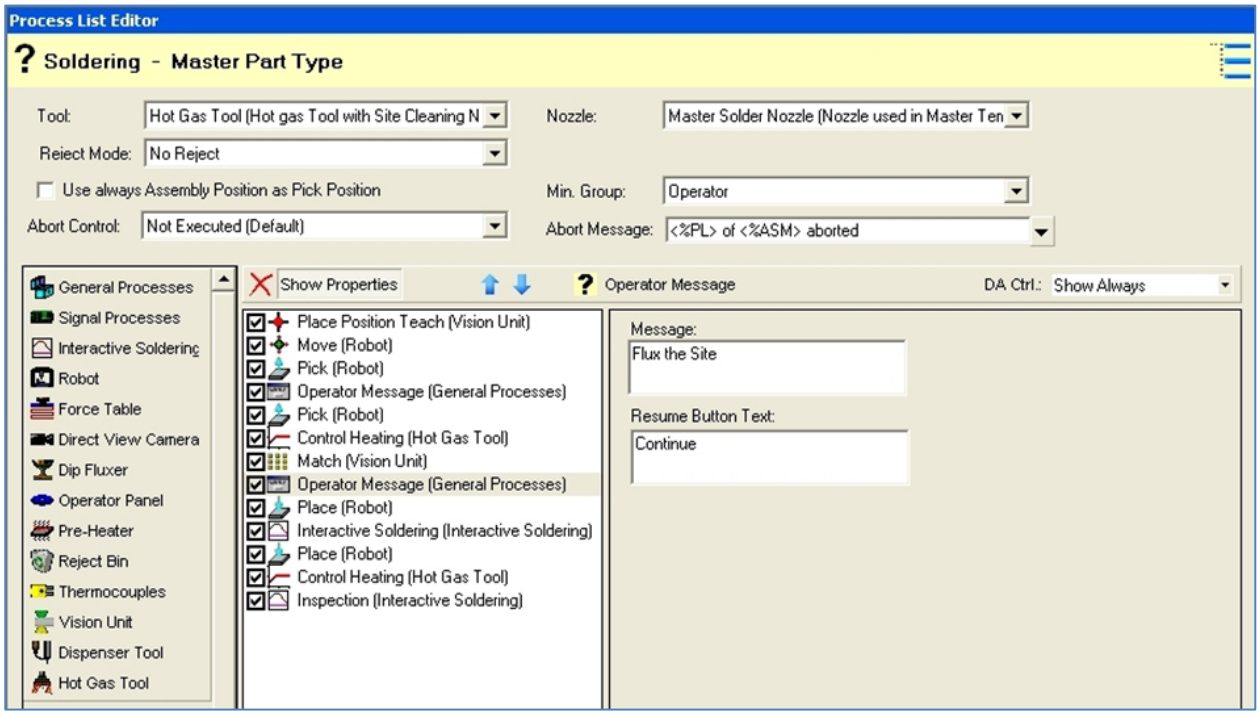

Process List Editor
Soldering - Master Part Type
Tool: Hot Gas Tool (Hot gas Tool with Site Cleaning N
Nozzle: Master Solder Nozzle (Nozzle used in Master Ten
Reject Mode: No Reject
Use always Assembly Position as Pick Position
Min. Group: Operator
Abort Control: Not Executed (Default)
Abort Message: <%PL> of <%ASM> aborted
General Processes
Signal Processes
Interactive Soldering
Robot
Force Table
Direct View Camera
Dip Fluxer
Operator Panel
Pre-Heater
Reject Bin
Thermocouples
Vision Unit
Dispenser Tool
Hot Gas Tool
Show Properties
Pick
DA Ctrl.: Show Always
Place Position Teach (Vision Unit)
Move (Robot)
Pick (Robot)
Operator Message (General Processes)
Pick (Robot)
Control Heating (Hot Gas Tool)
Match (Vision Unit)
Operator Message (General Processes)
Place (Robot)
Interactive Soldering (Interactive Soldering)
Place (Robot)
Control Heating (Hot Gas Tool)
Inspection (Interactive Soldering)
Process Sequence:
Vacuum on
Delay
Move Safe
Available Processes:
Approach
Pick
Vacuum on
Delay
Depart
Crack Motion
Move Safe
Gel Pack Vacuum
Delay Properties
Pick Delay:
1.00
[sec]

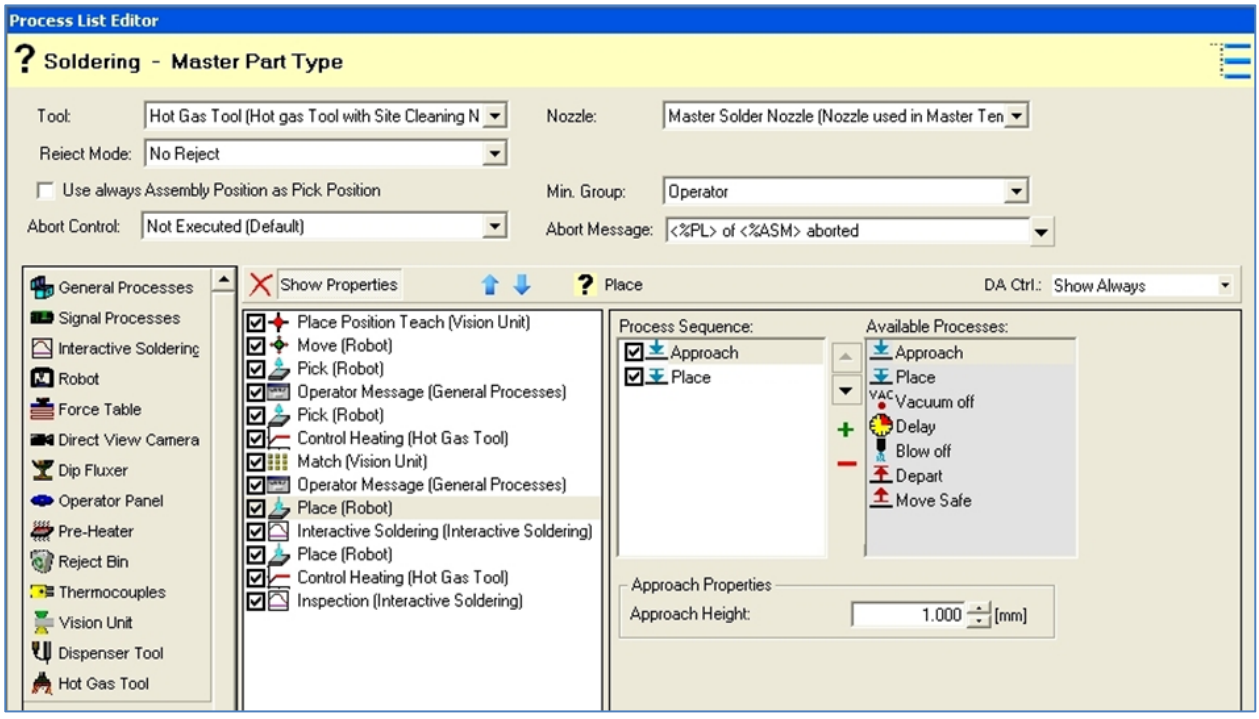

Process List Editor
Soldering - Master Part Type
Tool: Hot Gas Tool (Hot gas Tool with Site Cleaning N
Nozzle: Master Solder Nozzle (Nozzle used in Master Ten
Reject Mode: No Reject
Use always Assembly Position as Pick Position
Min. Group: Operator
Abort Control: Not Executed (Default)
Abort Message: <%PL> of <%ASM> aborted
General Processes
Signal Processes
Interactive Soldering
Robot
Force Table
Direct View Camera
Dip Fluxer
Operator Panel
Pre-Heater
Reject Bin
Thermocouples
Vision Unit
Dispenser Tool
Hot Gas Tool
Show Properties
Pick
DA Ctrl.: Show Always
Place Position Teach (Vision Unit)
Move (Robot)
Pick (Robot)
Operator Message (General Processes)
Pick (Robot)
Control Heating (Hot Gas Tool)
Match (Vision Unit)
Operator Message (General Processes)
Place (Robot)
Interactive Soldering (Interactive Soldering)
Place (Robot)
Control Heating (Hot Gas Tool)
Inspection (Interactive Soldering)
Process Sequence:
Vacuum on
Delay
Move Safe
Available Processes:
Approach
Pick
Vacuum on
Delay
Depart
Crack Motion
Move Safe
Gel Pack Vacuum

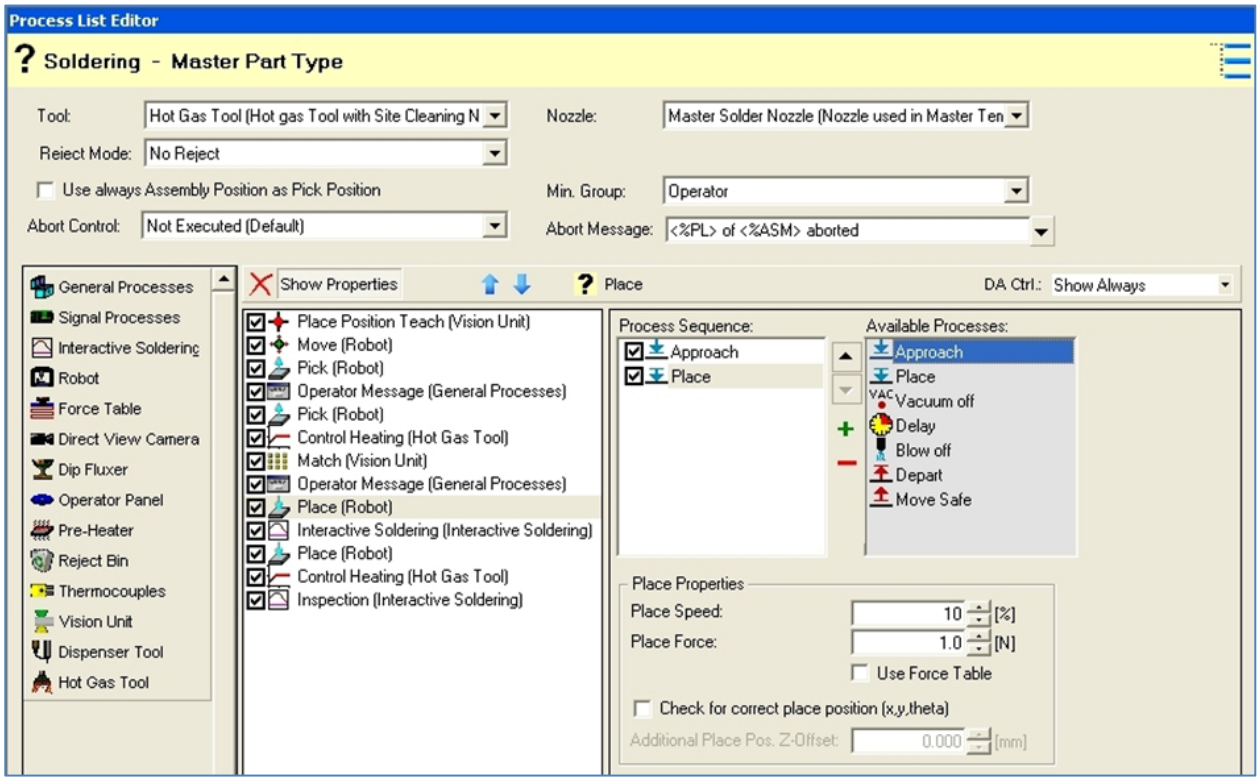

Process List Editor
Soldering - Master Part Type
Tool: Hot Gas Tool (Hot gas Tool with Site Cleaning N
Nozzle: Master Solder Nozzle (Nozzle used in Master Ten
Reject Mode: No Reject
Use always Assembly Position as Pick Position
Min. Group: Operator
Abort Control: Not Executed (Default)
Abort Message: <%PL> of <%ASM> aborted
General Processes
Signal Processes
Interactive Soldering
Robot
Force Table
Direct View Camera
Dip Fluxer
Operator Panel
Pre-Heater
Reject Bin
Thermocouples
Vision Unit
Dispenser Tool
Hot Gas Tool
Show Properties
Control Heating
DA Ctrl.: Show Never
Place Position Teach (Vision Unit)
Move (Robot)
Pick (Robot)
Operator Message (General Processes)
Pick (Robot)
Control Heating (Hot Gas Tool)
Match (Vision Unit)
Operator Message (General Processes)
Place (Robot)
Interactive Soldering (Interactive Soldering)
Place (Robot)
Control Heating (Hot Gas Tool)
Inspection (Interactive Soldering)
Nozzles:
Use current mounted nozzle
Master Solder Nozzle
Flow Control
Hot Flow: 0 [SLM]
Heater by-pass (fast cool down)
Gas Source
Air
Special Gas Source
Temperature Control
Stop Heating

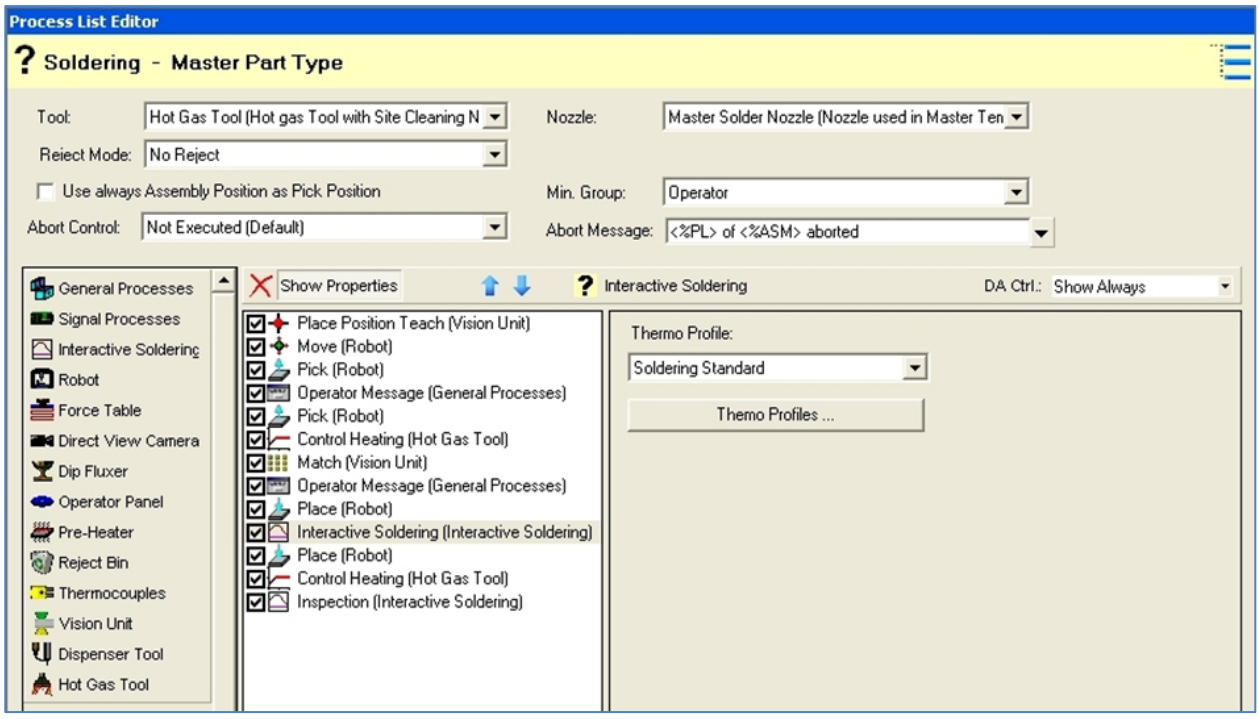

Process List Editor
Soldering - Master Part Type
Tool: Hot Gas Tool (Hot gas Tool with Site Cleaning N
Nozzle: Master Solder Nozzle (Nozzle used in Master Ten
Reject Mode: No Reject
Use always Assembly Position as Pick Position
Min. Group: Operator
Abort Control: Not Executed (Default)
Abort Message: <%PL> of <%ASM> aborted
General Processes
Signal Processes
Interactive Soldering
Robot
Force Table
Direct View Camera
Dip Fluxer
Operator Panel
Pre-Heater
Reject Bin
Thermocouples
Vision Unit
Dispenser Tool
Hot Gas Tool
Show Properties
Match
DA Ctrl.: Show Always
Place Position Teach (Vision Unit)
Move (Robot)
Pick (Robot)
Operator Message (General Processes)
Pick (Robot)
Control Heating (Hot Gas Tool)
Match (Vision Unit)
Operator Message (General Processes)
Place (Robot)
Interactive Soldering (Interactive Soldering)
Place (Robot)
Control Heating (Hot Gas Tool)
Inspection (Interactive Soldering)
Light
Options
Light Unit
Name
Level [%]
Object Illumination 20
Board Illumination 10
Light Section Intensity Level: 20 [%]
Brightness: 0 [%]
Contrast: 0 [%]

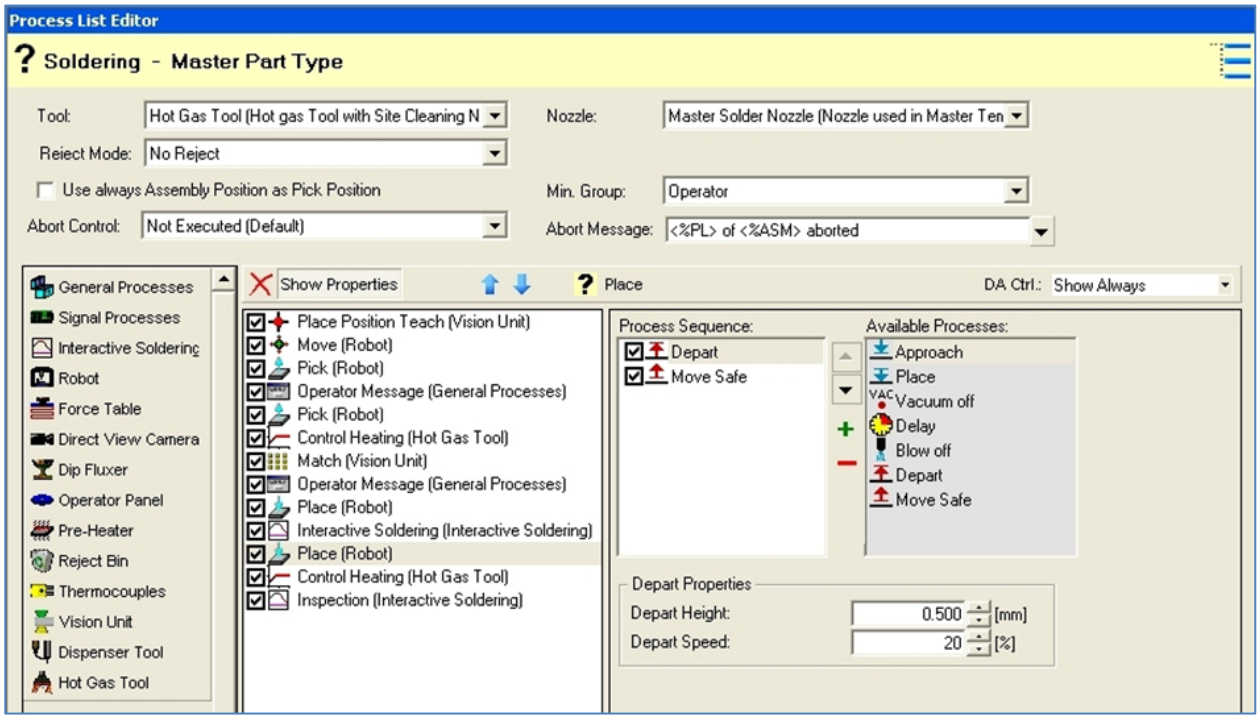

Process List Editor
Soldering - Master Part Type
Tool: Hot Gas Tool (Hot gas Tool with Site Cleaning N
Nozzle: Master Solder Nozzle (Nozzle used in Master Ten
Reject Mode: No Reject
Use always Assembly Position as Pick Position
Min. Group: Operator
Abort Control: Not Executed (Default)
Abort Message: <%PL> of <%ASM> aborted
General Processes
Signal Processes
Interactive Soldering
Robot
Force Table
Direct View Camera
Dip Fluxer
Operator Panel
Pre-Heater
Reject Bin
Thermocouples
Vision Unit
Dispenser Tool
Hot Gas Tool
Show Properties
Match
DA Ctrl.: Show Always
Place Position Teach (Vision Unit)
Move (Robot)
Pick (Robot)
Operator Message (General Processes)
Pick (Robot)
Control Heating (Hot Gas Tool)
Match (Vision Unit)
Operator Message (General Processes)
Place (Robot)
Interactive Soldering (Interactive Soldering)
Place (Robot)
Control Heating (Hot Gas Tool)
Inspection (Interactive Soldering)
Light
Options
Focus Correction: 0.000 [mm]
Zoom: 4.6
Corner FoV Position: 25 [FoV Size %]
Corners Selection
1: TL
TR :3
4: BL
BR :2
Start always in the center

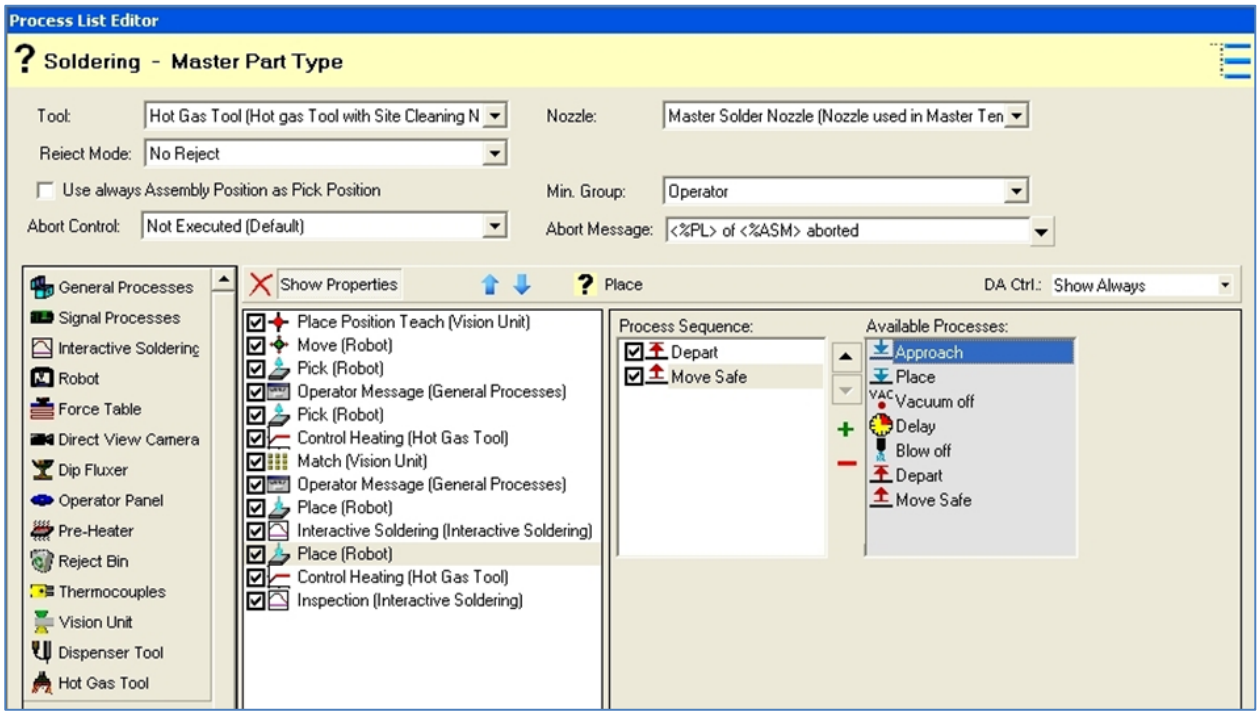

Process List Editor
Soldering - Master Part Type
Tool: Hot Gas Tool (Hot gas Tool with Site Cleaning N
Nozzle: Master Solder Nozzle (Nozzle used in Master Ten
Reject Mode: No Reject
Use always Assembly Position as Pick Position
Min. Group: Operator
Abort Control: Not Executed (Default)
Abort Message: <%PL> of <%ASM> aborted
General Processes
Signal Processes
Interactive Soldering
Robot
Force Table
Direct View Camera
Dip Fluxer
Operator Panel
Pre-Heater
Reject Bin
Thermocouples
Vision Unit
Dispenser Tool
Hot Gas Tool
Show Properties
Operator Message
DA Ctrl.: Show Always
Place Position Teach (Vision Unit)
Move (Robot)
Pick (Robot)
Operator Message (General Processes)
Pick (Robot)
Control Heating (Hot Gas Tool)
Match (Vision Unit)
Operator Message (General Processes)
Place (Robot)
Interactive Soldering (Interactive Soldering)
Place (Robot)
Control Heating (Hot Gas Tool)
Inspection (Interactive Soldering)
Message:
Flux the Site
Resume Button Text:
Continue

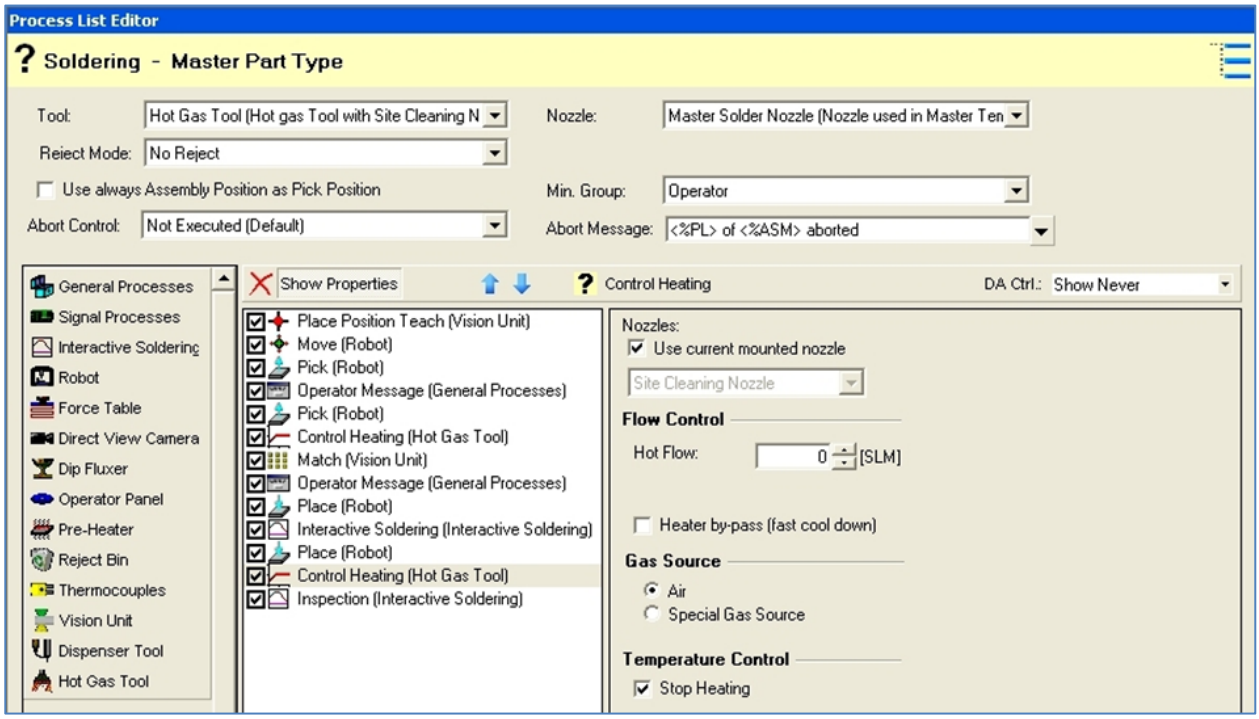

Process List Editor
Soldering - Master Part Type
Tool: Hot Gas Tool (Hot gas Tool with Site Cleaning N
Nozzle: Master Solder Nozzle (Nozzle used in Master Ten
Reject Mode: No Reject
Use always Assembly Position as Pick Position
Min. Group: Operator
Abort Control: Not Executed (Default)
Abort Message: <%PL> of <%ASM> aborted
General Processes
Signal Processes
Interactive Soldering
Robot
Force Table
Direct View Camera
Dip Fluxer
Operator Panel
Pre-Heater
Reject Bin
Thermocouples
Vision Unit
Dispenser Tool
Hot Gas Tool
Show Properties
Place
DA Ctrl.: Show Always
Place Position Teach (Vision Unit)
Move (Robot)
Pick (Robot)
Operator Message (General Processes)
Pick (Robot)
Control Heating (Hot Gas Tool)
Match (Vision Unit)
Operator Message (General Processes)
Place (Robot)
Interactive Soldering (Interactive Soldering)
Place (Robot)
Control Heating (Hot Gas Tool)
Inspection (Interactive Soldering)
Process Sequence:
Approach
Place
Available Processes:
Approach
Place
Vacuum off
Delay
Blow off
Depart
Move Safe
Approach Properties
Approach Height: 1.000 [mm]

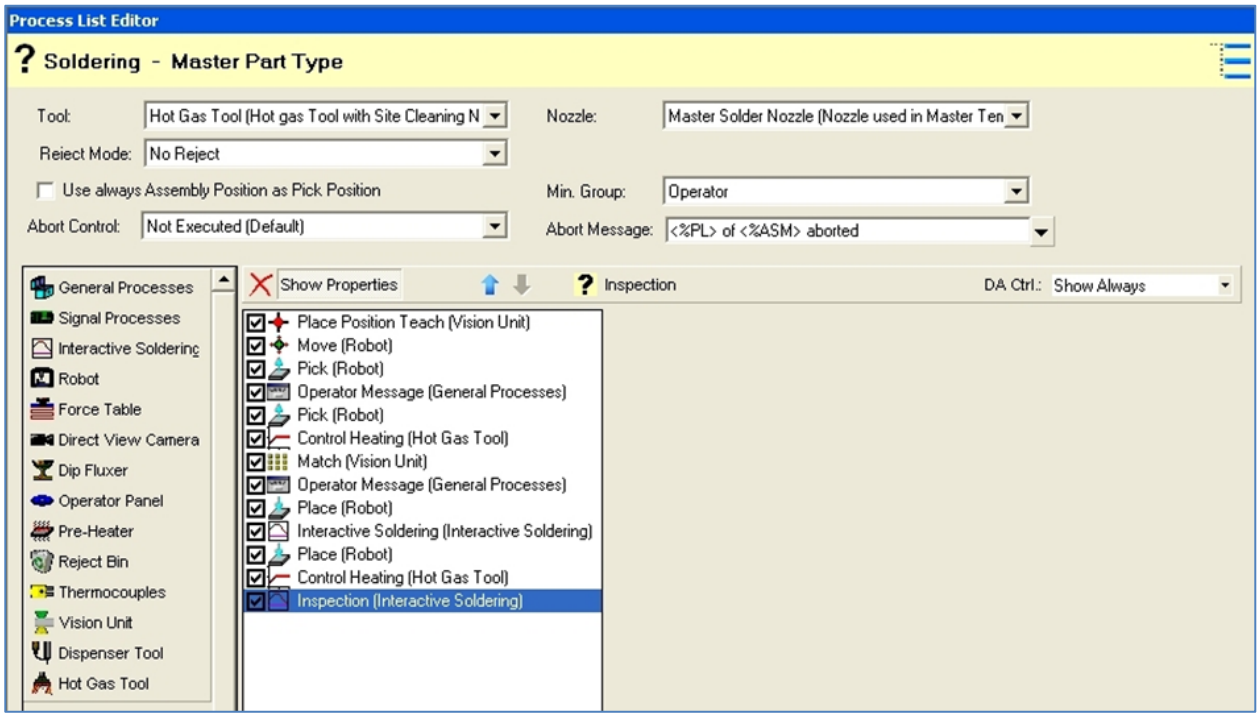

Process List Editor
Soldering - Master Part Type
Tool:
Hot Gas Tool (Hot gas Tool with Site Cleaning N
Nozzle:
Master Solder Nozzle (Nozzle used in Master Ten
Reject Mode:
No Reject
Use always Assembly Position as Pick Position
Min. Group:
Operator
Abort Control:
Not Executed (Default)
Abort Message:
<%PL> of <%ASM> aborted
General Processes
Signal Processes
Interactive Soldering
Robot
Force Table
Direct View Camera
Dip Fluxer
Operator Panel
Pre-Heater
Reject Bin
Thermocouples
Vision Unit
Dispenser Tool
Hot Gas Tool
Show Properties
Place
DA Ctrl.:
Show Always
Place Position Teach (Vision Unit)
Move (Robot)
Pick (Robot)
Operator Message (General Processes)
Pick (Robot)
Control Heating (Hot Gas Tool)
Match (Vision Unit)
Operator Message (General Processes)
Place (Robot)
Interactive Soldering (Interactive Soldering)
Place (Robot)
Control Heating (Hot Gas Tool)
Inspection (Interactive Soldering)
Process Sequence:
Approach
Place
Available Processes:
Approach
Place
Vacuum off
Delay
Blow off
Depart
Move Safe
Place Properties
Place Speed:
10
[%]
Place Force:
1.0
[N]
Use Force Table
Check for correct place position (x,y,theta)
Additional Place Pos. Z-Offset:
0.000
[mm]

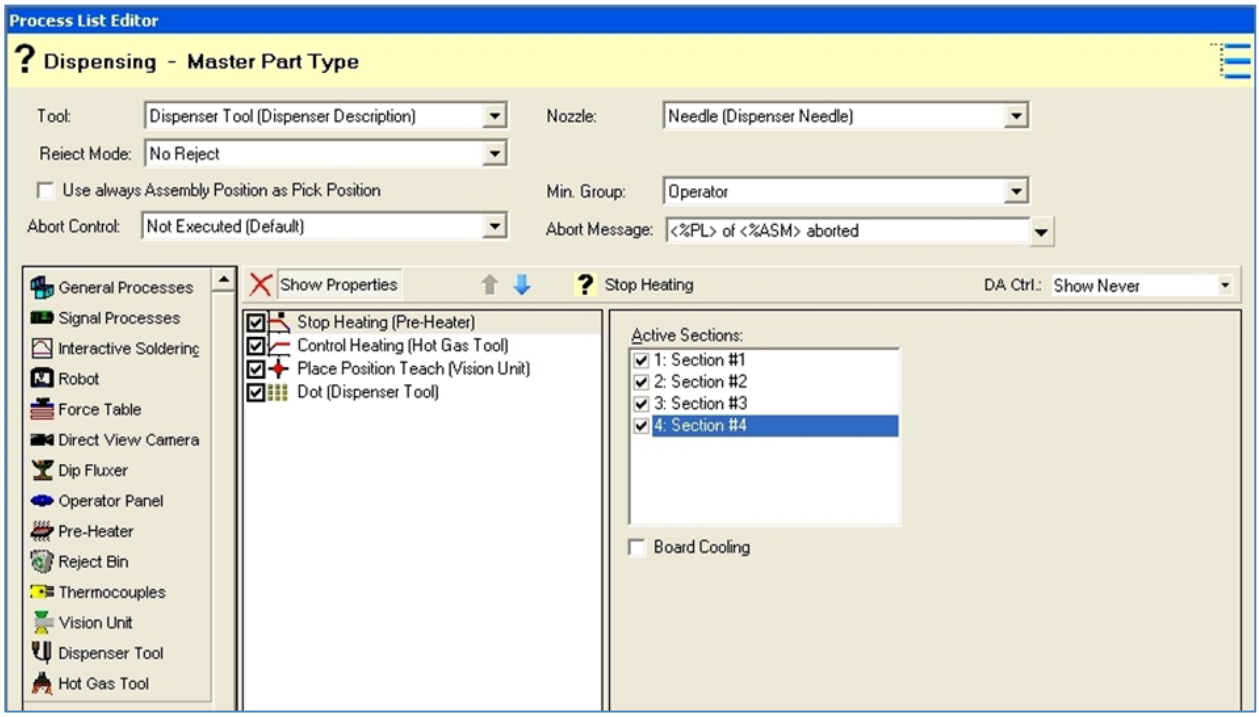

Process List Editor
Soldering - Master Part Type
Tool:
Hot Gas Tool (Hot gas Tool with Site Cleaning N
Nozzle:
Master Solder Nozzle (Nozzle used in Master Ten
Reject Mode:
No Reject
Use always Assembly Position as Pick Position
Min. Group:
Operator
Abort Control:
Not Executed (Default)
Abort Message:
<%PL> of <%ASM> aborted
General Processes
Signal Processes
Interactive Soldering
Robot
Force Table
Direct View Camera
Dip Fluxer
Operator Panel
Pre-Heater
Reject Bin
Thermocouples
Vision Unit
Dispenser Tool
Hot Gas Tool
Show Properties
Interactive Soldering
DA Ctrl.:
Show Always
Place Position Teach (Vision Unit)
Move (Robot)
Pick (Robot)
Operator Message (General Processes)
Pick (Robot)
Control Heating (Hot Gas Tool)
Match (Vision Unit)
Operator Message (General Processes)
Place (Robot)
Interactive Soldering (Interactive Soldering)
Place (Robot)
Control Heating (Hot Gas Tool)
Inspection (Interactive Soldering)
Thermo Profile:
Soldering Standard
Thermo Profiles ...

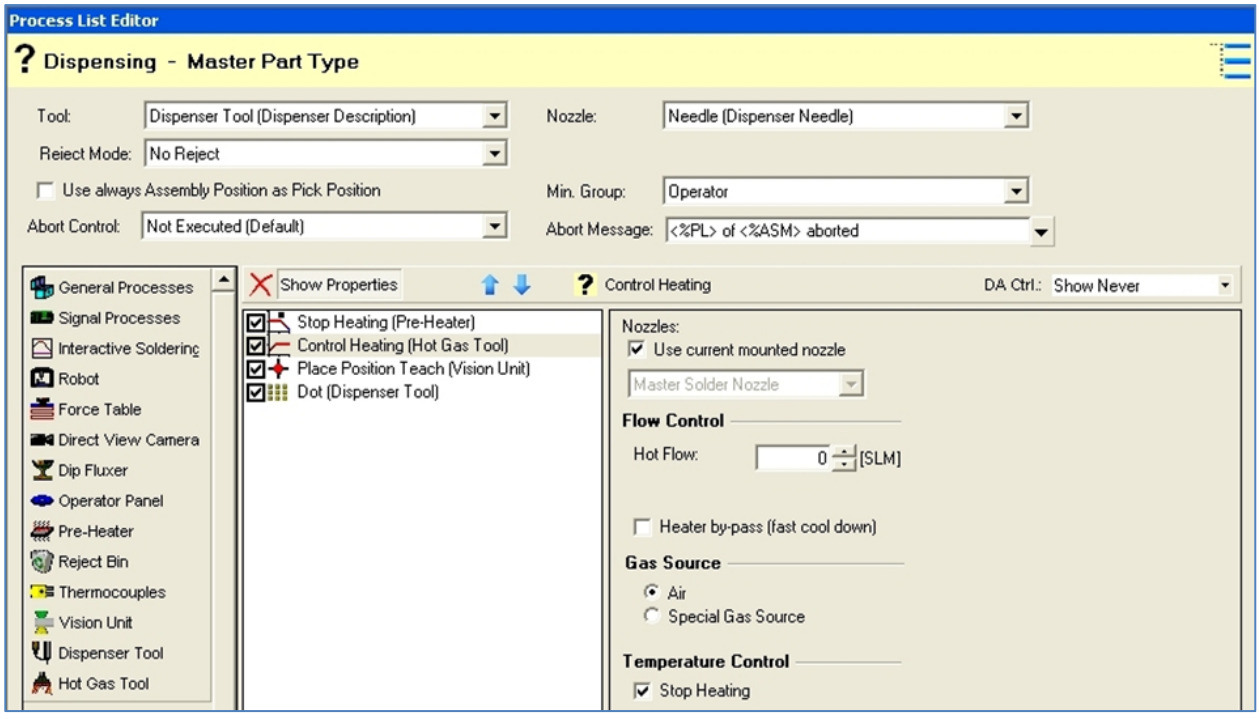

Process List Editor
Soldering - Master Part Type
Tool: Hot Gas Tool (Hot gas Tool with Site Cleaning N
Nozzle: Master Solder Nozzle (Nozzle used in Master Ten
Reject Mode: No Reject
Use always Assembly Position as Pick Position
Min. Group: Operator
Abort Control: Not Executed (Default)
Abort Message: <%PL> of <%ASM> aborted
General Processes
Signal Processes
Interactive Soldering
Robot
Force Table
Direct View Camera
Dip Fluxer
Operator Panel
Pre-Heater
Reject Bin
Thermocouples
Vision Unit
Dispenser Tool
Hot Gas Tool
Show Properties
Place
DA Ctrl.: Show Always
Place Position Teach (Vision Unit)
Move (Robot)
Pick (Robot)
Operator Message (General Processes)
Pick (Robot)
Control Heating (Hot Gas Tool)
Match (Vision Unit)
Operator Message (General Processes)
Place (Robot)
Interactive Soldering (Interactive Soldering)
Place (Robot)
Control Heating (Hot Gas Tool)
Inspection (Interactive Soldering)
Process Sequence:
Depart
Move Safe
Available Processes:
Approach
Place
Vacuum off
Delay
Blow off
Depart
Move Safe
Depart Properties
Depart Height: 0.500 [mm]
Depart Speed: 20 [%]

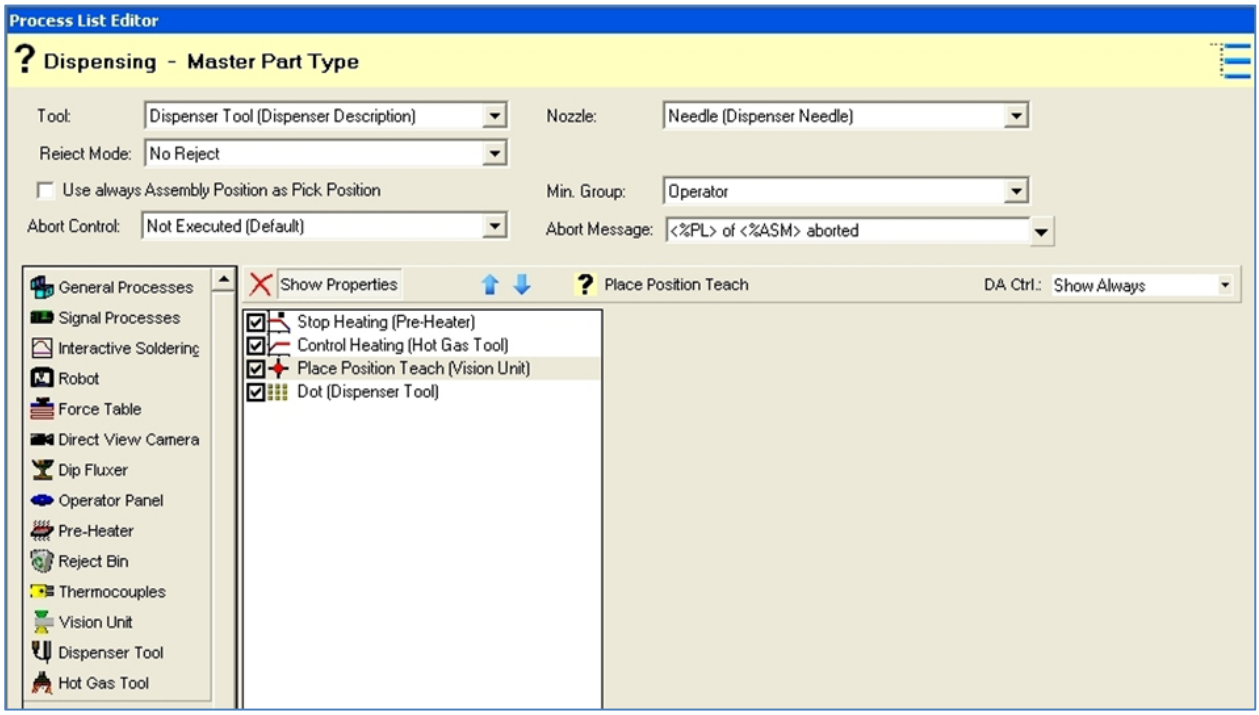

Process List Editor
Soldering - Master Part Type
Tool: Hot Gas Tool (Hot gas Tool with Site Cleaning N
Nozzle: Master Solder Nozzle (Nozzle used in Master Ten
Reject Mode: No Reject
Use always Assembly Position as Pick Position
Min. Group: Operator
Abort Control: Not Executed (Default)
Abort Message: <%PL> of <%ASM> aborted
General Processes
Signal Processes
Interactive Soldering
Robot
Force Table
Direct View Camera
Dip Fluxer
Operator Panel
Pre-Heater
Reject Bin
Thermocouples
Vision Unit
Dispenser Tool
Hot Gas Tool
Show Properties
Place
DA Ctrl.: Show Always
Place Position Teach (Vision Unit)
Move (Robot)
Pick (Robot)
Operator Message (General Processes)
Pick (Robot)
Control Heating (Hot Gas Tool)
Match (Vision Unit)
Operator Message (General Processes)
Place (Robot)
Interactive Soldering (Interactive Soldering)
Place (Robot)
Control Heating (Hot Gas Tool)
Inspection (Interactive Soldering)
Process Sequence:
Depart
Move Safe
Available Processes:
Approach
Place
Vacuum off
Delay
Blow off
Depart
Move Safe

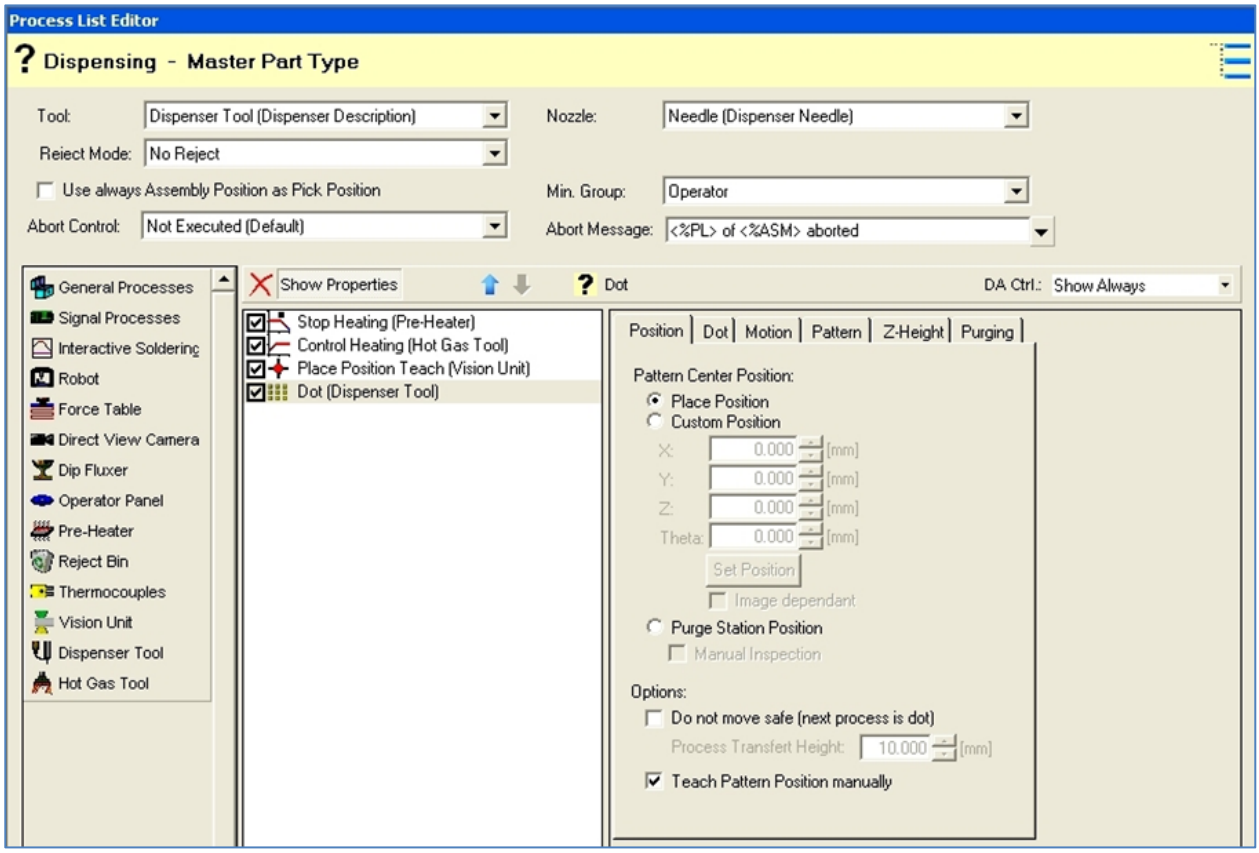

Process List Editor
Soldering - Master Part Type
Tool: Hot Gas Tool (Hot gas Tool with Site Cleaning N
Nozzle: Master Solder Nozzle (Nozzle used in Master Ten
Reject Mode: No Reject
Use always Assembly Position as Pick Position
Min. Group: Operator
Abort Control: Not Executed (Default)
Abort Message: <%PL> of <%ASM> aborted
General Processes
Signal Processes
Interactive Soldering
Robot
Force Table
Direct View Camera
Dip Fluxer
Operator Panel
Pre-Heater
Reject Bin
Thermocouples
Vision Unit
Dispenser Tool
Hot Gas Tool
Show Properties
Control Heating
DA Ctrl.: Show Never
Place Position Teach (Vision Unit)
Move (Robot)
Pick (Robot)
Operator Message (General Processes)
Pick (Robot)
Control Heating (Hot Gas Tool)
Match (Vision Unit)
Operator Message (General Processes)
Place (Robot)
Interactive Soldering (Interactive Soldering)
Place (Robot)
Control Heating (Hot Gas Tool)
Inspection (Interactive Soldering)
Nozzles:
Use current mounted nozzle
Site Cleaning Nozzle
Flow Control
Hot Flow: 0 [SLM]
Heater by-pass (fast cool down)
Gas Source
Air
Special Gas Source
Temperature Control
Stop Heating

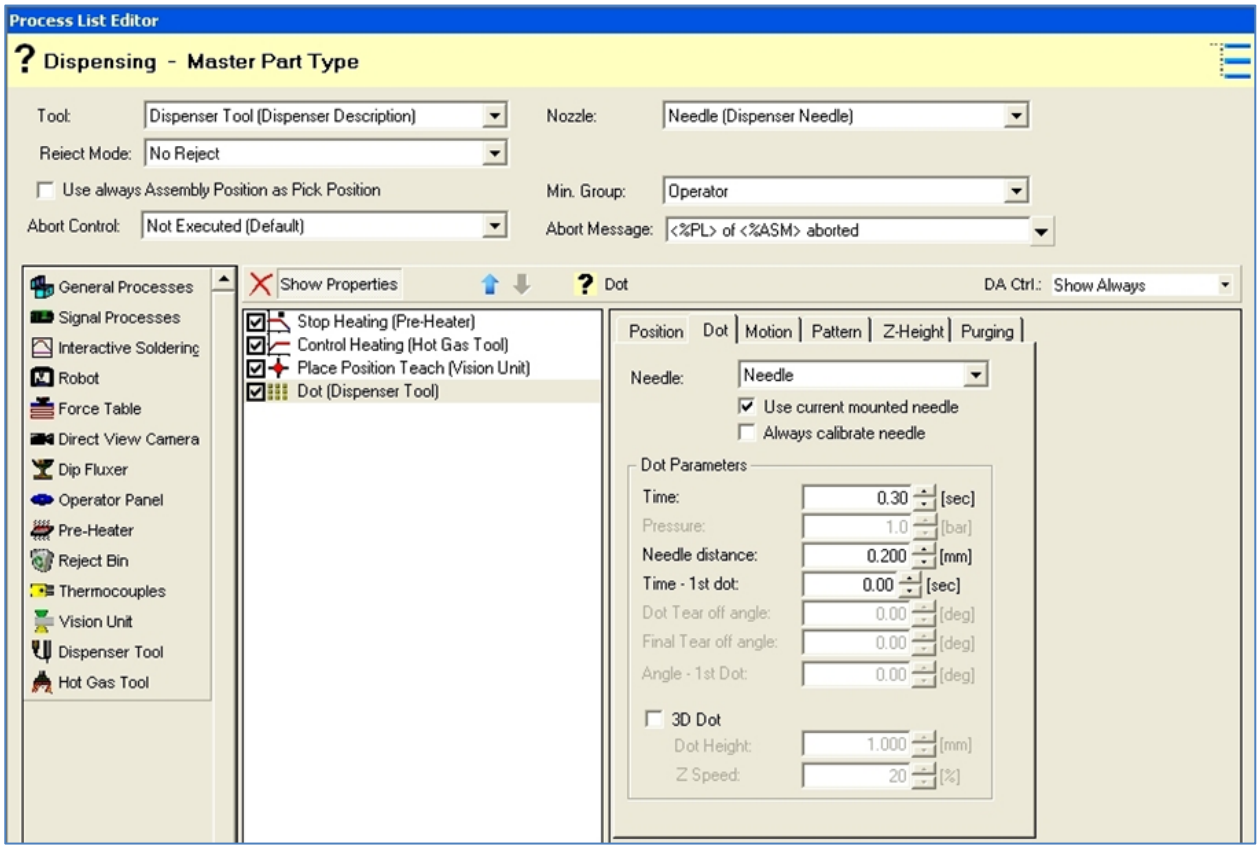

Process List Editor
Soldering - Master Part Type
Tool: Hot Gas Tool (Hot gas Tool with Site Cleaning N
Nozzle: Master Solder Nozzle (Nozzle used in Master Ten
Reject Mode: No Reject
Use always Assembly Position as Pick Position
Min. Group: Operator
Abort Control: Not Executed (Default)
Abort Message: <%PL> of <%ASM> aborted
General Processes
Signal Processes
Interactive Soldering
Robot
Force Table
Direct View Camera
Dip Fluxer
Operator Panel
Pre-Heater
Reject Bin
Thermocouples
Vision Unit
Dispenser Tool
Hot Gas Tool
Show Properties
Inspection
DA Ctrl.: Show Always
Place Position Teach (Vision Unit)
Move (Robot)
Pick (Robot)
Operator Message (General Processes)
Pick (Robot)
Control Heating (Hot Gas Tool)
Match (Vision Unit)
Operator Message (General Processes)
Place (Robot)
Interactive Soldering (Interactive Soldering)
Place (Robot)
Control Heating (Hot Gas Tool)
Inspection (Interactive Soldering)

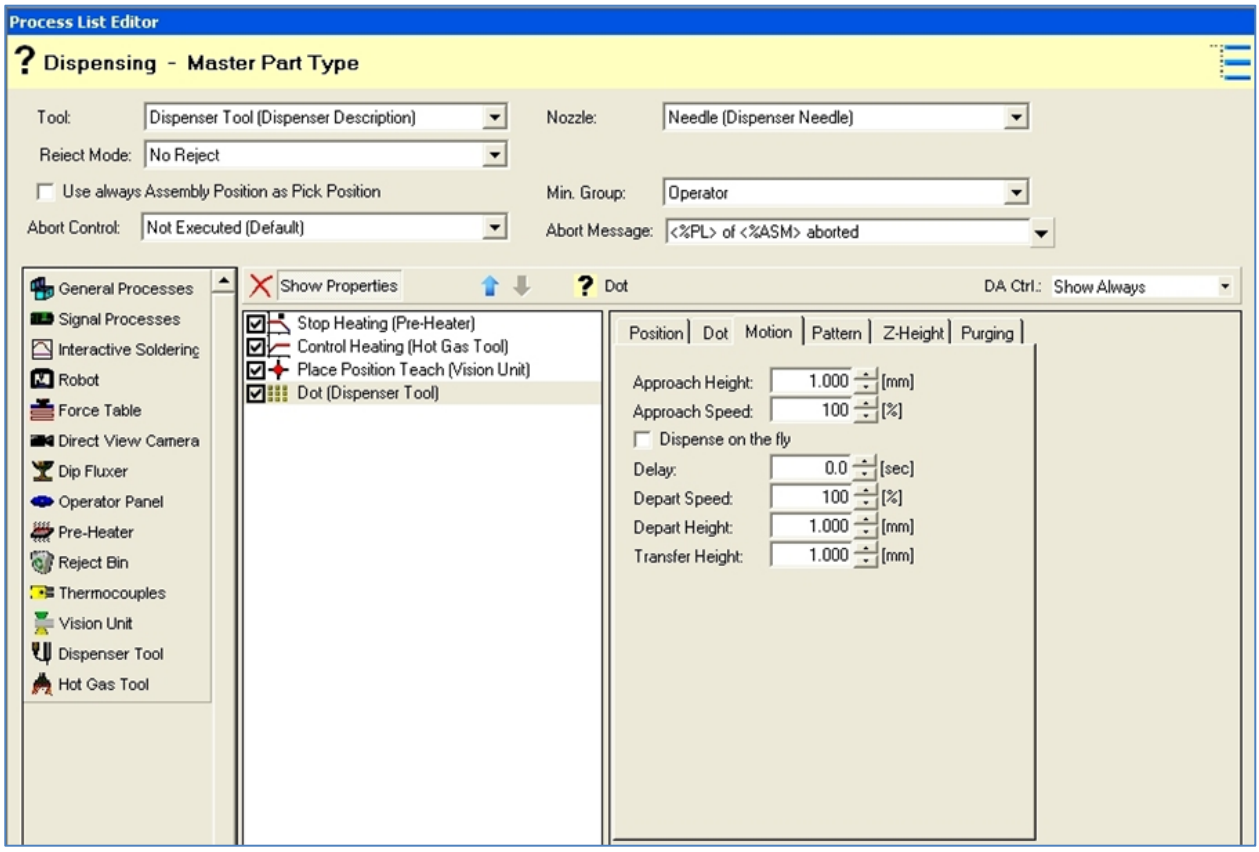

Process List Editor
Dispensing - Master Part Type
Tool: Dispenser Tool (Dispenser Description)
Nozzle: Needle (Dispenser Needle)
Reject Mode: No Reject
Use always Assembly Position as Pick Position
Min. Group: Operator
Abort Control: Not Executed (Default)
Abort Message: <%PL> of <%ASM> aborted
General Processes
Signal Processes
Interactive Soldering
Robot
Force Table
Direct View Camera
Dip Fluxer
Operator Panel
Pre-Heater
Reject Bin
Thermocouples
Vision Unit
Dispenser Tool
Hot Gas Tool
Show Properties
Stop Heating
DA Ctrl.: Show Never
Stop Heating (Pre-Heater)
Control Heating (Hot Gas Tool)
Place Position Teach (Vision Unit)
Dot (Dispenser Tool)
Active Sections:
1: Section #1
2: Section #2
3: Section #3
4: Section #4
Board Cooling

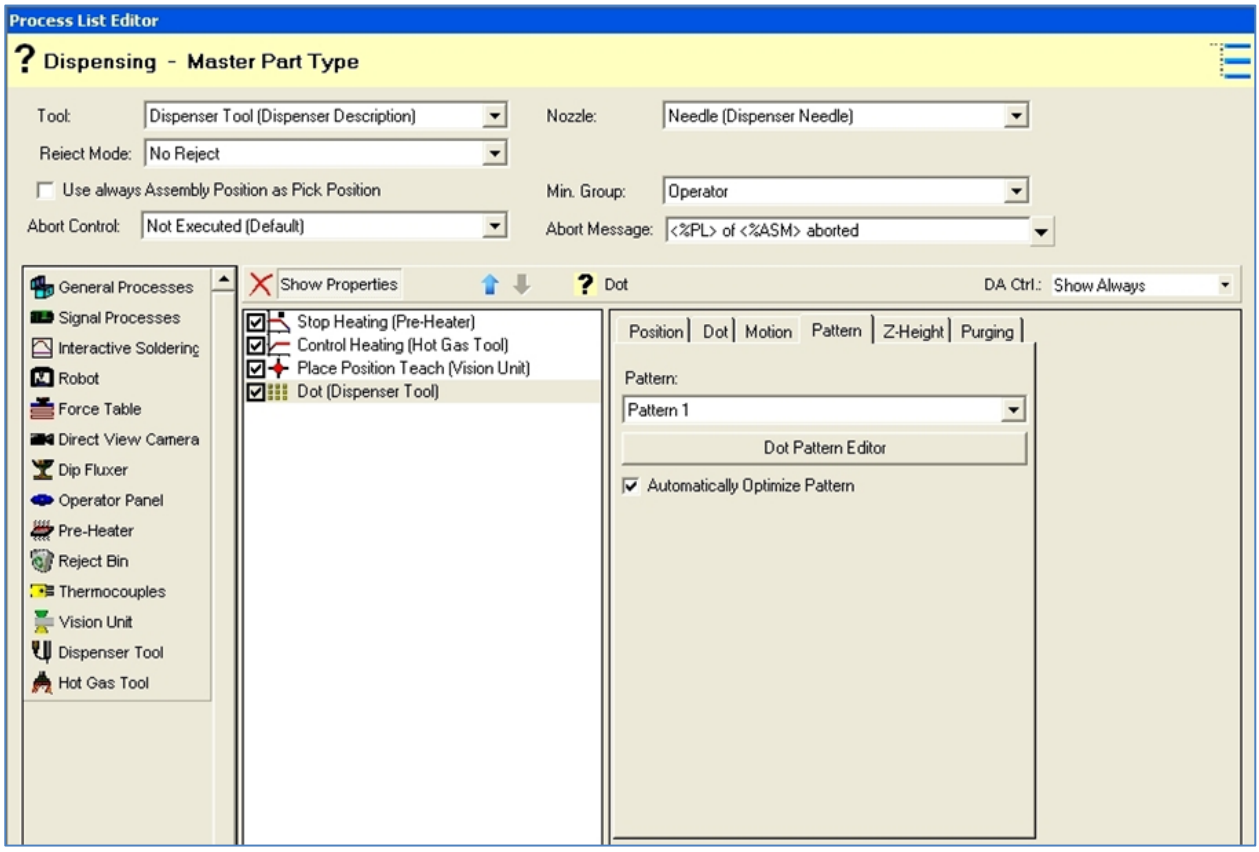

Process List Editor
Dispensing - Master Part Type
Tool: Dispenser Tool (Dispenser Description)
Nozzle: Needle (Dispenser Needle)
Reject Mode: No Reject
Use always Assembly Position as Pick Position
Min. Group: Operator
Abort Control: Not Executed (Default)
Abort Message: <%PL> of <%ASM> aborted
General Processes
Signal Processes
Interactive Soldering
Robot
Force Table
Direct View Camera
Dip Fluxer
Operator Panel
Pre-Heater
Reject Bin
Thermocouples
Vision Unit
Dispenser Tool
Hot Gas Tool
Show Properties
Control Heating
DA Ctrl.: Show Never
Stop Heating (Pre-Heater)
Control Heating (Hot Gas Tool)
Place Position Teach (Vision Unit)
Dot (Dispenser Tool)
Nozzles:
Use current mounted nozzle
Master Solder Nozzle
Flow Control
Hot Flow: 0 [SLM]
Heater by-pass (fast cool down)
Gas Source
Air
Special Gas Source
Temperature Control
Stop Heating

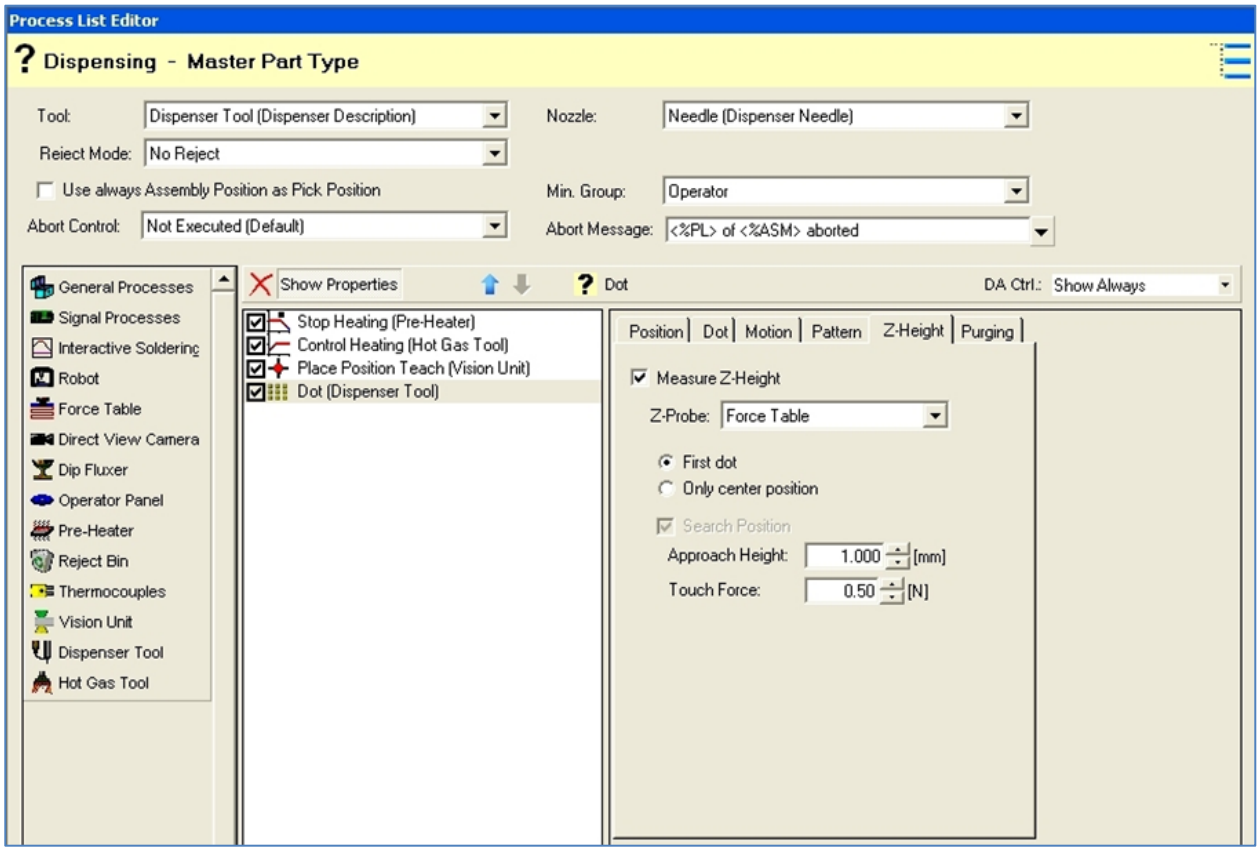

Process List Editor
Dispensing - Master Part Type
Tool: Dispenser Tool (Dispenser Description)
Nozzle: Needle (Dispenser Needle)
Reiect Mode: No Reject
Use always Assembly Position as Pick Position
Min. Group: Operator
Abort Control: Not Executed (Default)
Abort Message: <%PL> of <%ASM> aborted
General Processes
Signal Processes
Interactive Soldering
Robot
Force Table
Direct View Camera
Dip Fluxer
Operator Panel
Pre-Heater
Reject Bin
Thermocouples
Vision Unit
Dispenser Tool
Hot Gas Tool
Show Properties
Place Position Teach
DA Ctrl.: Show Always
Stop Heating (Pre-Heater)
Control Heating (Hot Gas Tool)
Place Position Teach (Vision Unit)
Dot (Dispenser Tool)

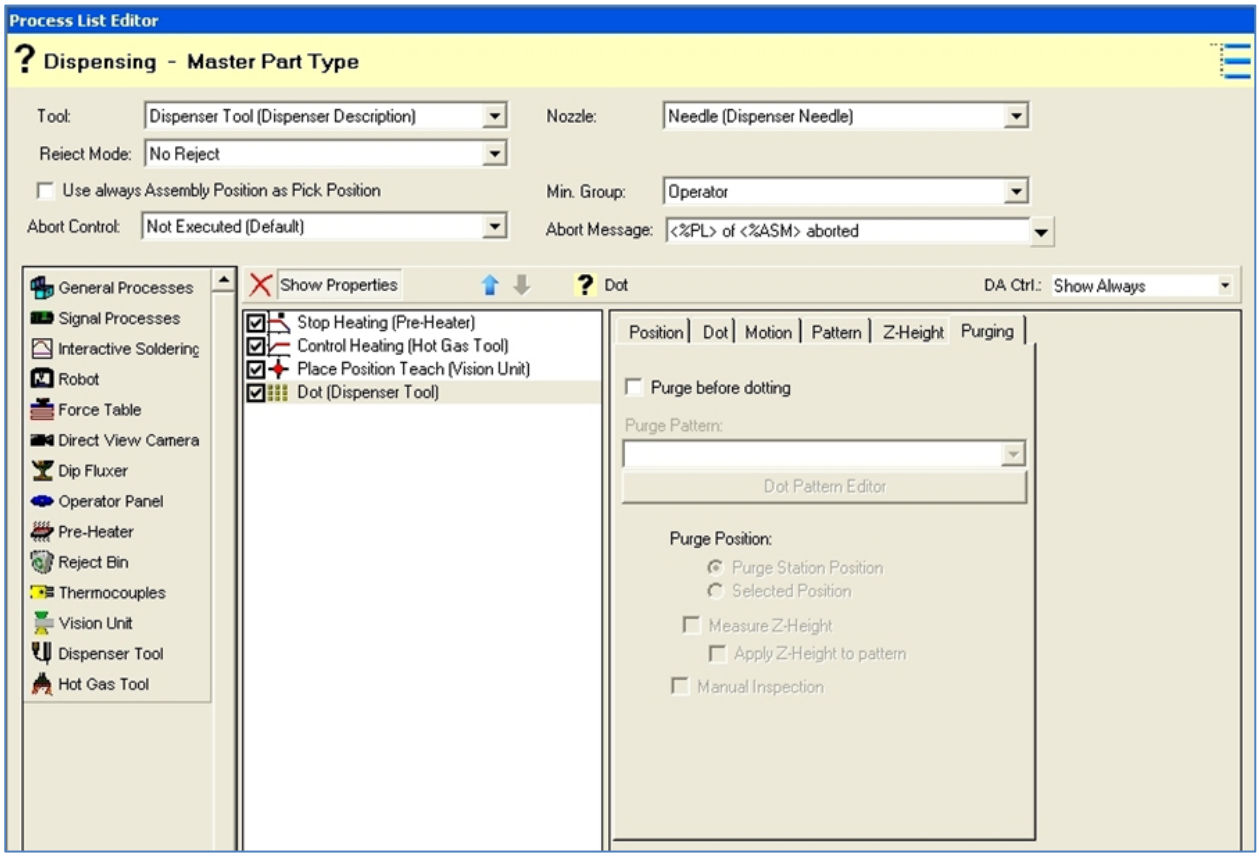

Process List Editor
Dispensing - Master Part Type
Tool: Dispenser Tool (Dispenser Description)
Nozzle: Needle (Dispenser Needle)
Reiect Mode: No Reject
Use always Assembly Position as Pick Position
Min. Group: Operator
Abort Control: Not Executed (Default)
Abort Message: <%PL> of <%ASM> aborted
General Processes
Signal Processes
Interactive Soldering
Robot
Force Table
Direct View Camera
Dip Fluxer
Operator Panel
Pre-Heater
Reject Bin
Thermocouples
Vision Unit
Dispenser Tool
Hot Gas Tool
Show Properties
Dot
DA Ctrl.: Show Always
Stop Heating (Pre-Heater)
Control Heating (Hot Gas Tool)
Place Position Teach (Vision Unit)
Dot (Dispenser Tool)
Position
Dot
Motion
Pattern
Z-Height
Purging
Pattern Center Position:
Place Position
Custom Position
X: 0.000 [mm]
Y: 0.000 [mm]
Z: 0.000 [mm]
Theta: 0.000 [mm]
Set Position
Image dependant
Purge Station Position
Manual Inspection
Options:
Do not move safe (next process is dot)
Process Transfert Height: 10.000 [mm]
Teach Pattern Position manually


Process List Editor
Dispensing - Master Part Type
Tool: Dispenser Tool (Dispenser Description)
Nozzle: Needle (Dispenser Needle)
Reject Mode: No Reject
Use always Assembly Position as Pick Position
Min. Group: Operator
Abort Control: Not Executed (Default)
Abort Message: <%PL> of <%ASM> aborted
General Processes
Signal Processes
Interactive Soldering
Robot
Force Table
Direct View Camera
Dip Fluxer
Operator Panel
Pre-Heater
Reject Bin
Thermocouples
Vision Unit
Dispenser Tool
Hot Gas Tool
Show Properties
Dot
DA Ctrl.: Show Always
Stop Heating (Pre-Heater)
Control Heating (Hot Gas Tool)
Place Position Teach (Vision Unit)
Dot (Dispenser Tool)
Position
Dot
Motion
Pattern
Z-Height
Purging
Needle: Needle
Use current mounted needle
Always calibrate needle
Dot Parameters
Time: 0.30 [sec]
Pressure: 1.0 [bar]
Needle distance: 0.200 [mm]
Time - 1st dot: 0.00 [sec]
Dot Tear off angle: 0.00 [deg]
Final Tear off angle: 0.00 [deg]
Angle - 1st Dot: 0.00 [deg]
3D Dot
Dot Height: 1.000 [mm]
Z Speed: 20 [%]

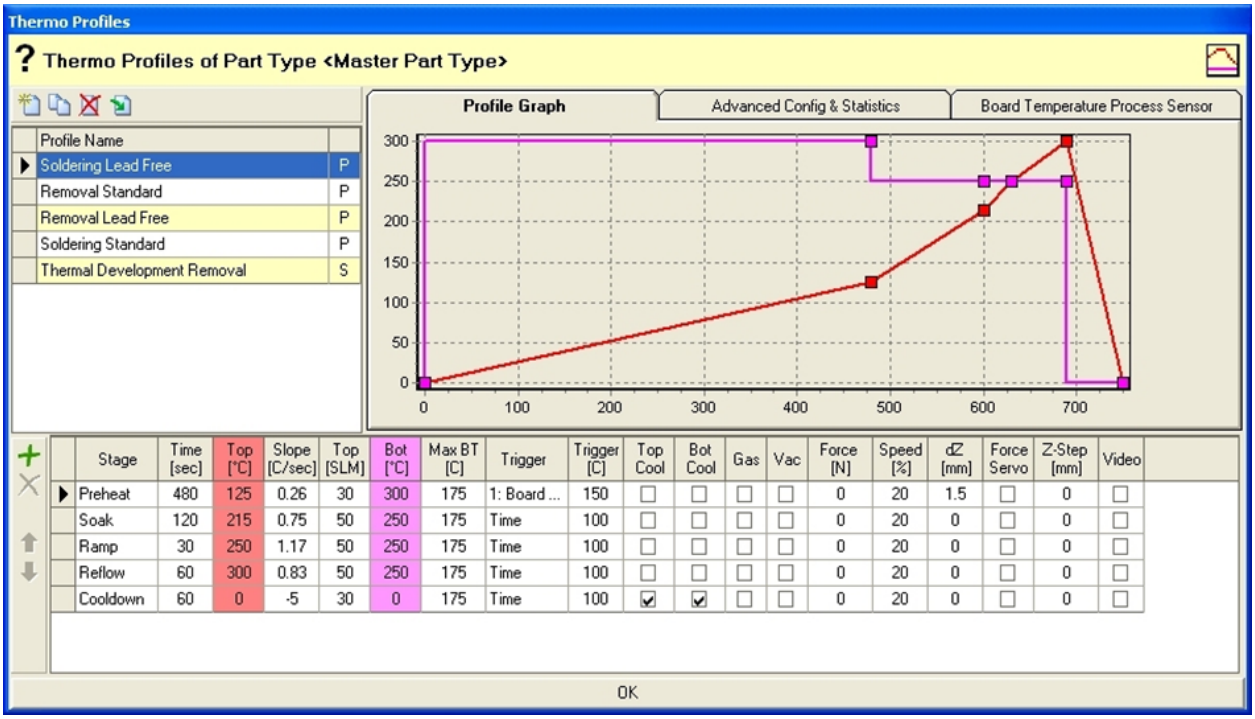

Process List Editor
Dispensing - Master Part Type
Tool: Dispenser Tool (Dispenser Description)
Nozzle: Needle (Dispenser Needle)
Reject Mode: No Reject
Use always Assembly Position as Pick Position
Min. Group: Operator
Abort Control: Not Executed (Default)
Abort Message: <%PL> of <%ASM> aborted
General Processes
Signal Processes
Interactive Soldering
Robot
Force Table
Direct View Camera
Dip Fluxer
Operator Panel
Pre-Heater
Reject Bin
Thermocouples
Vision Unit
Dispenser Tool
Hot Gas Tool
Show Properties
Dot
DA Ctrl.: Show Always
Stop Heating (Pre-Heater)
Control Heating (Hot Gas Tool)
Place Position Teach (Vision Unit)
Dot (Dispenser Tool)
Position
Dot
Motion
Pattern
Z-Height
Purging
Approach Height: 1.000 [mm]
Approach Speed: 100 [%]
Dispense on the fly
Delay: 0.0 [sec]
Depart Speed: 100 [%]
Depart Height: 1.000 [mm]
Transfer Height: 1.000 [mm]

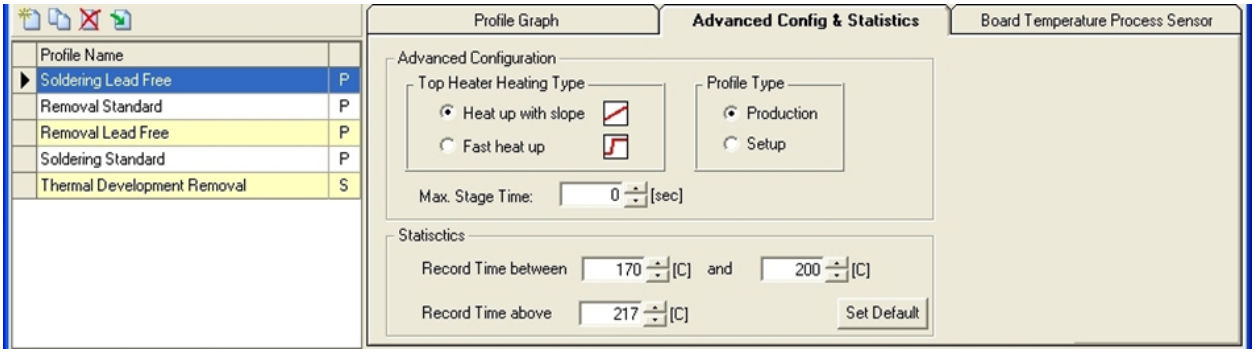

Process List Editor
Dispensing - Master Part Type
Tool:
Dispenser Tool (Dispenser Description)
Nozzle:
Needle (Dispenser Needle)
Reject Mode:
No Reject
Use always Assembly Position as Pick Position
Min. Group:
Operator
Abort Control:
Not Executed (Default)
Abort Message:
<%PL> of <%ASM> aborted
General Processes
Signal Processes
Interactive Soldering
Robot
Force Table
Direct View Camera
Dip Fluxer
Operator Panel
Pre-Heater
Reject Bin
Thermocouples
Vision Unit
Dispenser Tool
Hot Gas Tool
Show Properties
Dot
DA Ctrl.:
Show Always
Stop Heating (Pre-Heater)
Control Heating (Hot Gas Tool)
Place Position Teach (Vision Unit)
Dot (Dispenser Tool)
Position
Dot
Motion
Pattern
Z-Height
Purging
Pattern:
Pattern 1
Dot Pattern Editor
Automatically Optimize Pattern

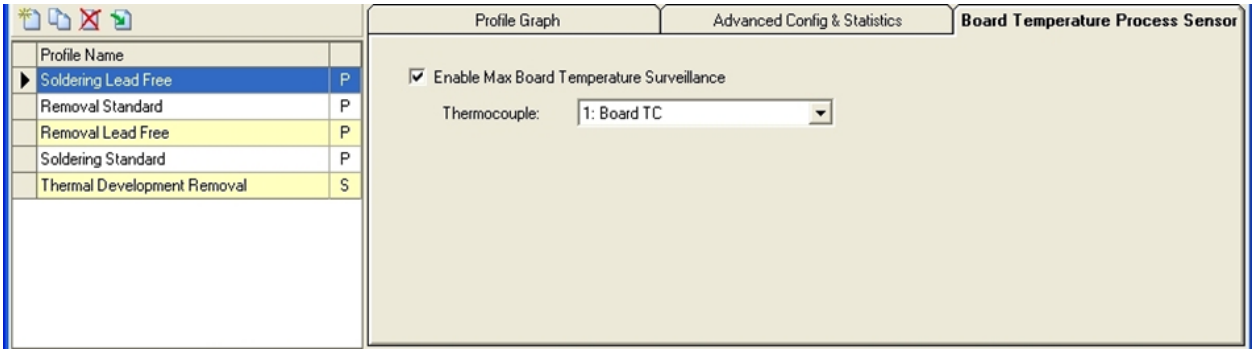

Process List Editor
Dispensing - Master Part Type
Tool:
Dispenser Tool (Dispenser Description)
Nozzle:
Needle (Dispenser Needle)
Reject Mode:
No Reject
Use always Assembly Position as Pick Position
Min. Group:
Operator
Abort Control:
Not Executed (Default)
Abort Message:
<%PL> of <%ASM> aborted
General Processes
Signal Processes
Interactive Soldering
Robot
Force Table
Direct View Camera
Dip Fluxer
Operator Panel
Pre-Heater
Reject Bin
Thermocouples
Vision Unit
Dispenser Tool
Hot Gas Tool
Show Properties
Dot
DA Ctrl.:
Show Always
Stop Heating (Pre-Heater)
Control Heating (Hot Gas Tool)
Place Position Teach (Vision Unit)
Dot (Dispenser Tool)
Position
Dot
Motion
Pattern
Z-Height
Purging
Measure Z-Height
Z-Probe:
Force Table
First dot
Only center position
Search Position
Approach Height:
1.000
[mm]
Touch Force:
0.50
[N]

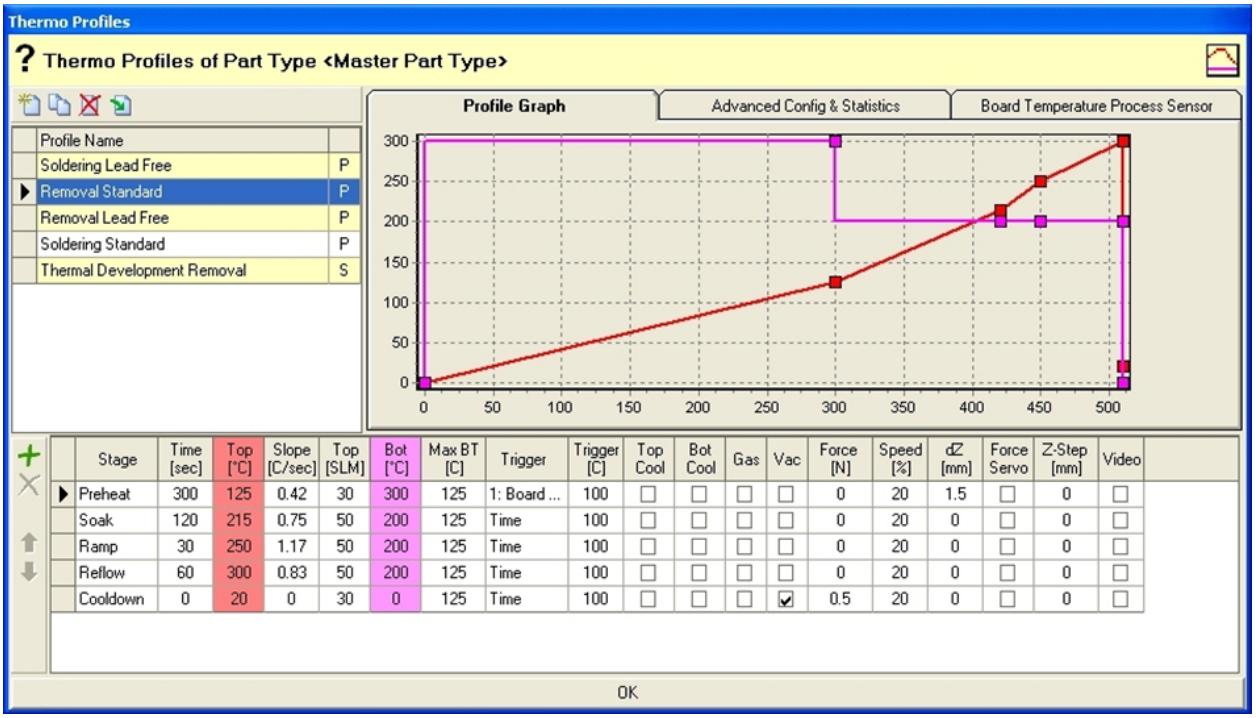


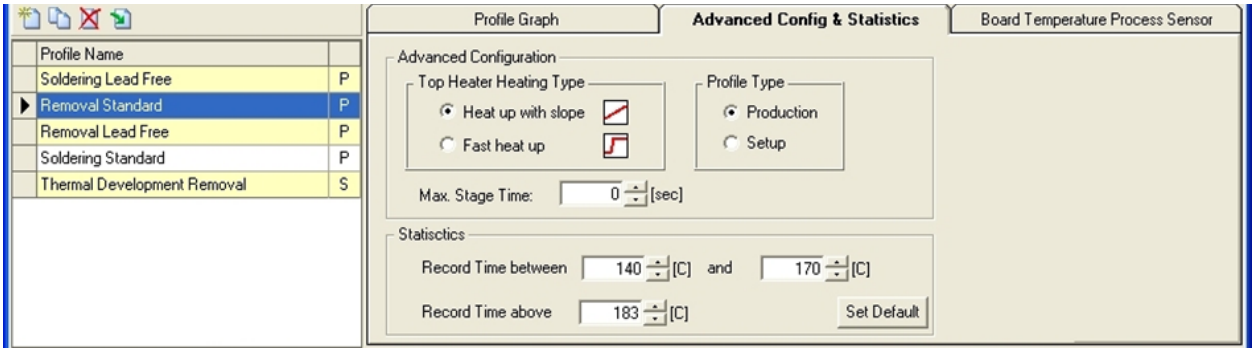
23.3 Thermo Profiles

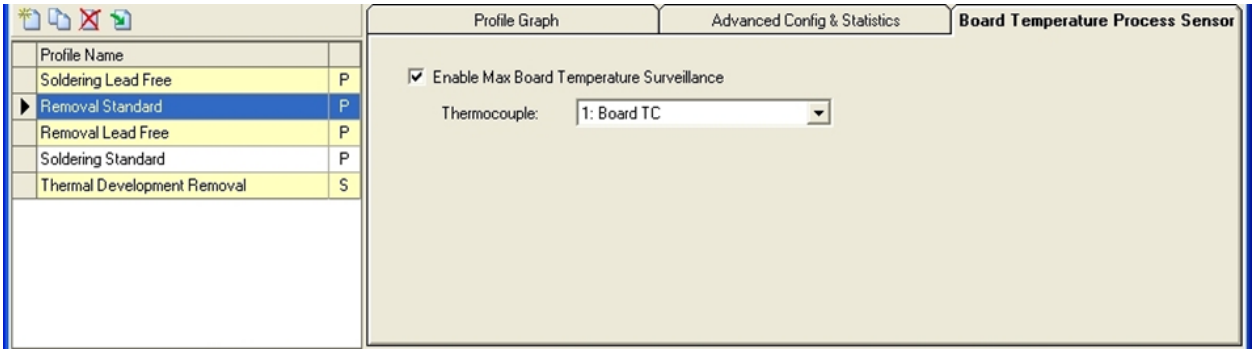


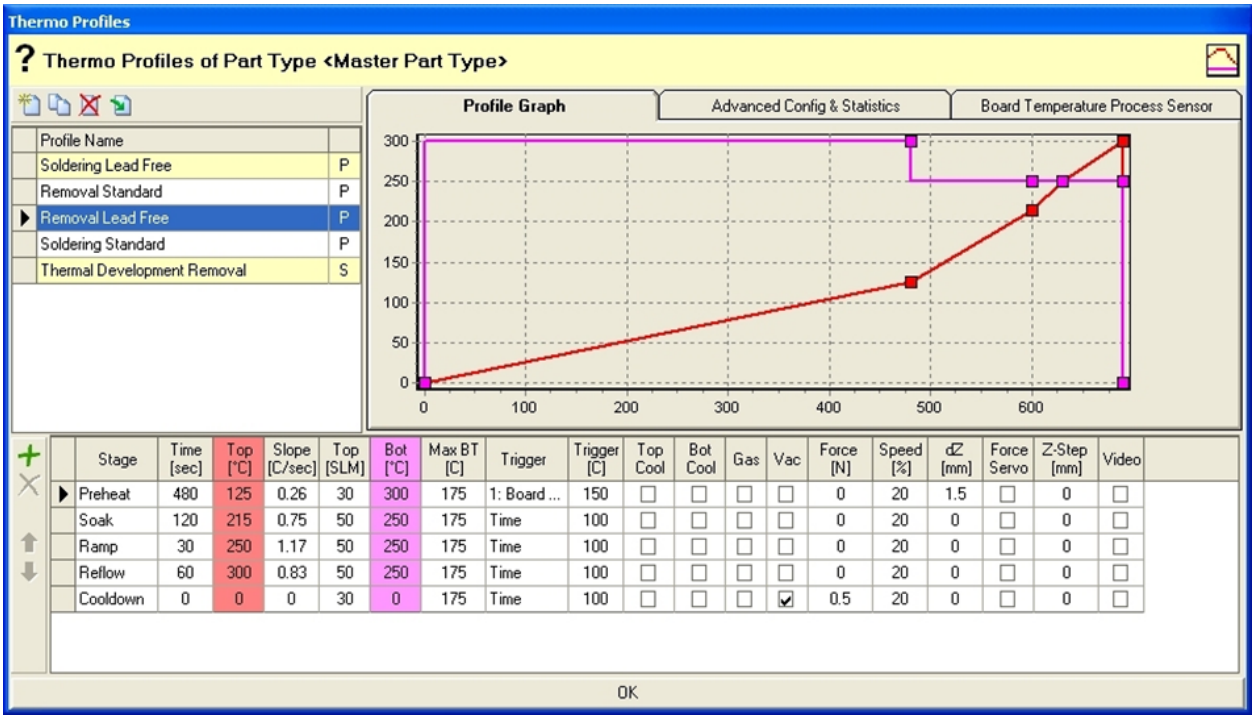

Profile Graph
Advanced Config & Statistics
Board Temperature Process Sensor
Profile Name
Soldering Lead Free P
Removal Standard P
Removal Lead Free P
Soldering Standard P
Thermal Development Removal S
Advanced Configuration
Top Heater Heating Type
Heat up with slope
Fast heat up
Profile Type
Production
Setup
Max. Stage Time: 0 [sec]
Statisctics
Record Time between 170 [C] and 200 [C]
Record Time above 217 [C]
Set Default

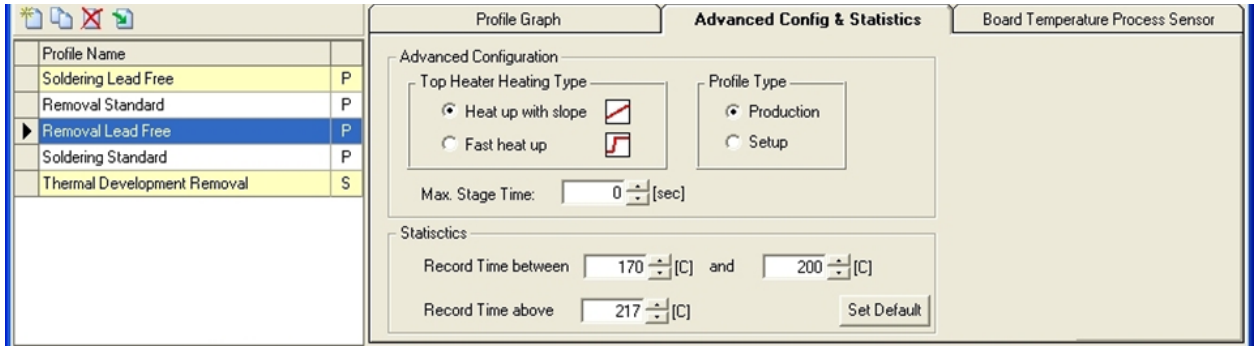

Profile Graph
Advanced Config & Statistics
Board Temperature Process Sensor
Profile Name
Soldering Lead Free P
Removal Standard P
Removal Lead Free P
Soldering Standard P
Thermal Development Removal S
Enable Max Board Temperature Surveillance
Thermocouple: 1: Board TC

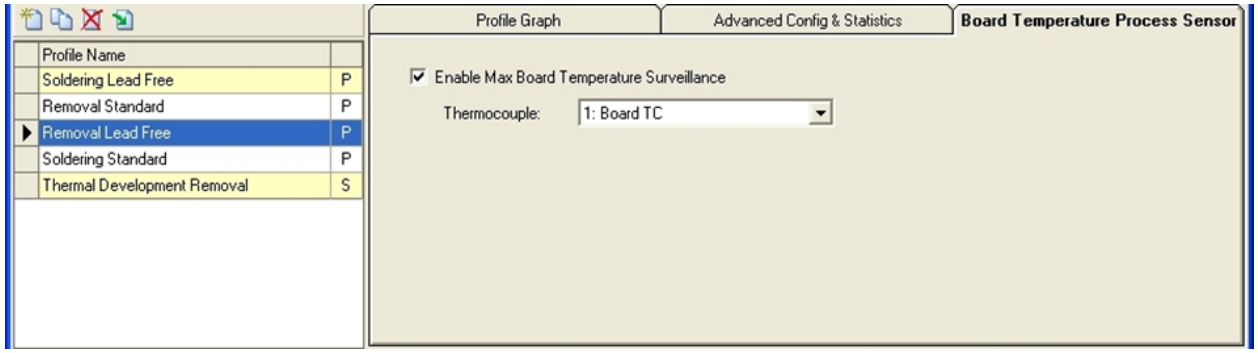

Thermo Profiles
Thermo Profiles of Part Type <Master Part Type>
Profile Graph
Advanced Config & Statistics
Board Temperature Process Sensor
Profile Name
Soldering Lead Free P
Removal Standard P
Removal Lead Free P
Soldering Standard P
Thermal Development Removal S
300
250
200
150
100
50
0
0 50 100 150 200 250 300 350 400 450 500
Stage Time [sec] Top [°C] Slope [C/sec] Top [SLM] Bot [°C] Max BT [C] Trigger Trigger [C] Top Cool Bot Cool Gas Vac Force [N] Speed [%] dZ [mm] Force Servo Z-Step [mm] Video
Preheat 300 125 0.42 30 300 125 1: Board ... 100 0 20 1.5 0
Soak 120 215 0.75 50 200 125 Time 100 0 20 0 0
Ramp 30 250 1.17 50 200 125 Time 100 0 20 0 0
Reflow 60 300 0.83 50 200 125 Time 100 0 20 0 0
Cooldown 0 20 0 30 0 125 Time 100 0.5 20 0 0
OK

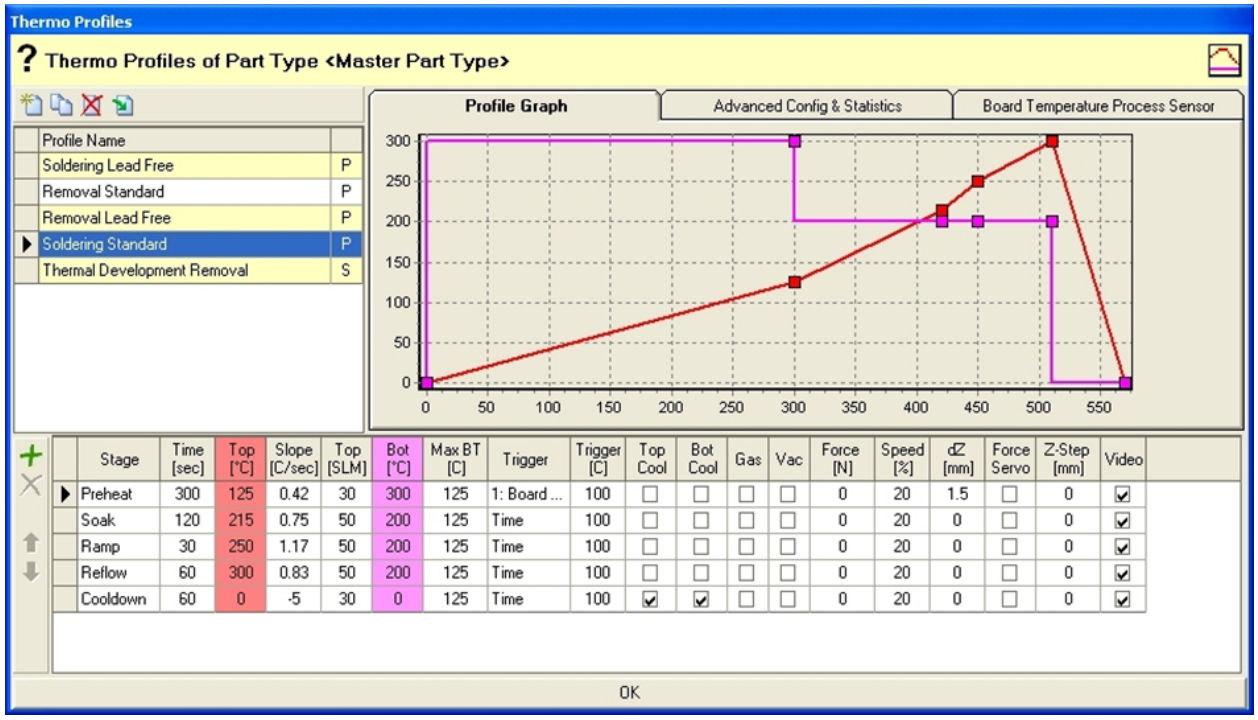

Profile Graph
Advanced Config & Statistics
Board Temperature Process Sensor
Profile Name
Soldering Lead Free P
Removal Standard P
Removal Lead Free P
Soldering Standard P
Thermal Development Removal S
Advanced Configuration
Top Heater Heating Type
Heat up with slope
Fast heat up
Profile Type
Production
Setup
Max. Stage Time: 0 [sec]
Statisctics
Record Time between 140 [C] and 170 [C]
Record Time above 183 [C]
Set Default

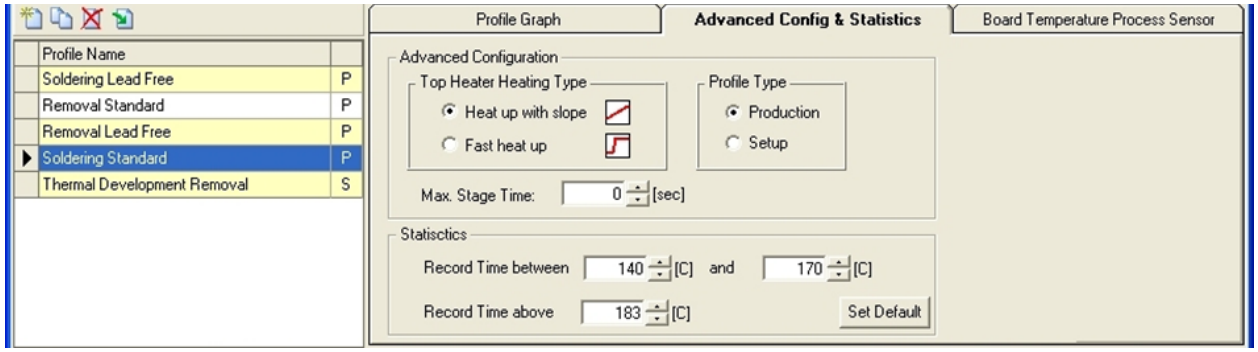

Profile Graph
Advanced Config & Statistics
Board Temperature Process Sensor
Profile Name
Soldering Lead Free P
Removal Standard P
Removal Lead Free P
Soldering Standard P
Thermal Development Removal S
Enable Max Board Temperature Surveillance
Thermocouple: 1: Board TC

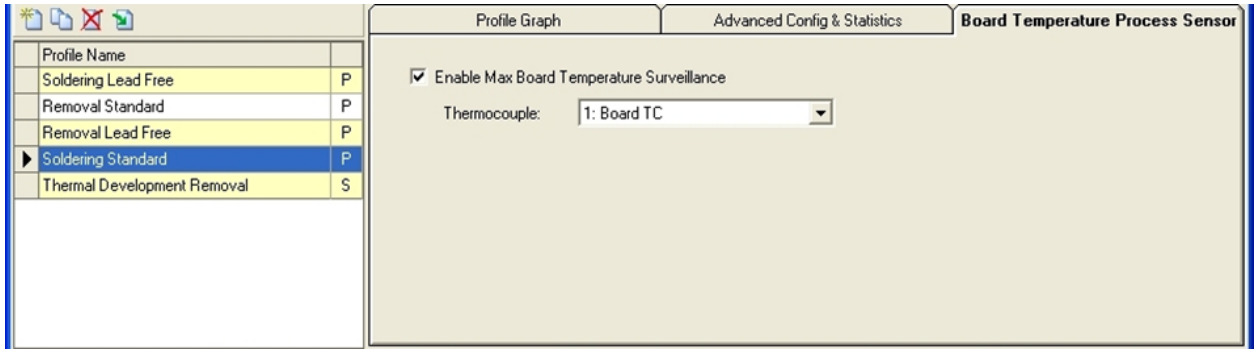

Thermo Profiles
Thermo Profiles of Part Type <Master Part Type>
Profile Graph
Advanced Config & Statistics
Board Temperature Process Sensor
Profile Name
Soldering Lead Free P
Removal Standard P
Removal Lead Free P
Soldering Standard P
Thermal Development Removal S
300
250
200
150
100
50
0
0
100
200
300
400
500
600
Stage | Time [sec] | Top [°C] | Slope [C/sec] | Top [SLM] | Bot [°C] | Max BT [C] | Trigger | Trigger [C] | Top Cool | Bot Cool | Gas | Vac | Force [N] | Speed [%] | dZ [mm] | Force Servo | Z-Step [mm] | Video
Preheat | 480 | 125 | 0.26 | 30 | 300 | 175 | 1: Board ... | 150 | 0 | 20 | 1.5 | 0
Soak | 120 | 215 | 0.75 | 50 | 250 | 175 | Time | 100 | 0 | 20 | 0 | 0
Ramp | 30 | 250 | 1.17 | 50 | 250 | 175 | Time | 100 | 0 | 20 | 0 | 0
Reflow | 60 | 300 | 0.83 | 50 | 250 | 175 | Time | 100 | 0 | 20 | 0 | 0
Cooldown | 0 | 0 | 0 | 30 | 0 | 175 | Time | 100 | 0.5 | 20 | 0 | 0
OK

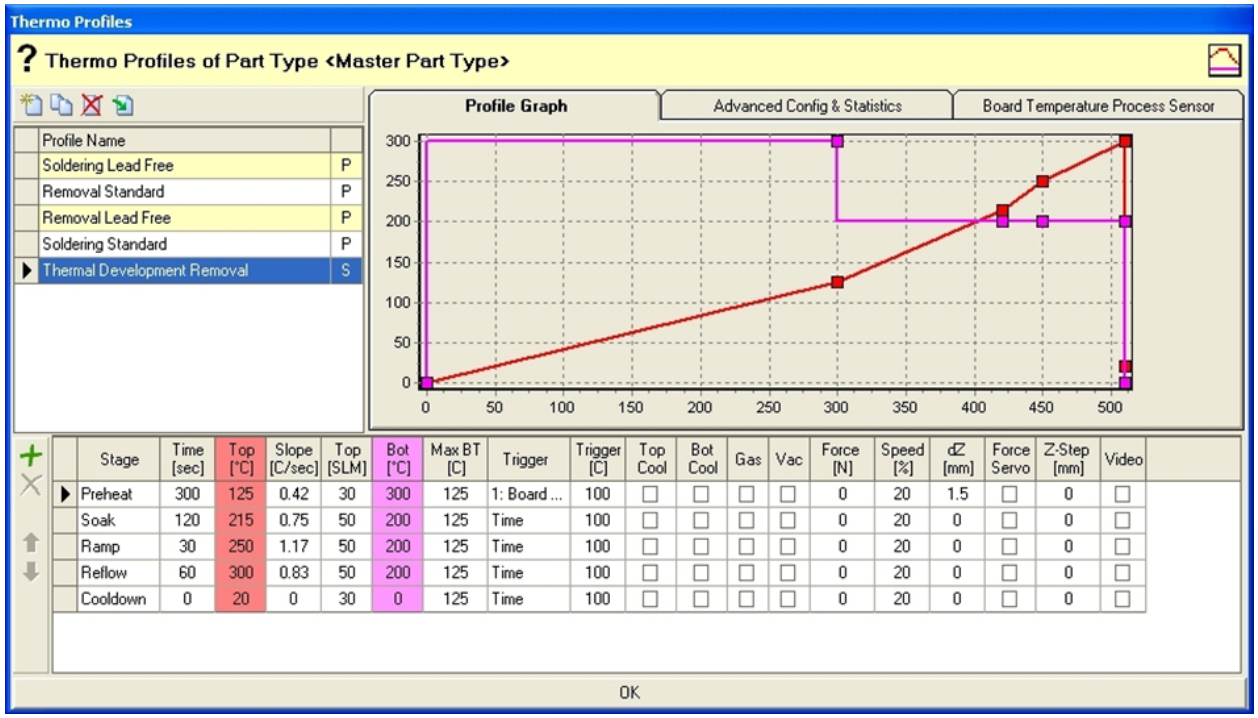

Profile Name
Soldering Lead Free P
Removal Standard P
Removal Lead Free P
Soldering Standard P
Thermal Development Removal S
Profile Graph
Advanced Config & Statistics
Board Temperature Process Sensor
Advanced Configuration
Top Heater Heating Type
Heat up with slope
Fast heat up
Profile Type
Production
Setup
Max. Stage Time: 0 [sec]
Statisctics
Record Time between 170 [C] and 200 [C]
Record Time above 217 [C]
Set Default

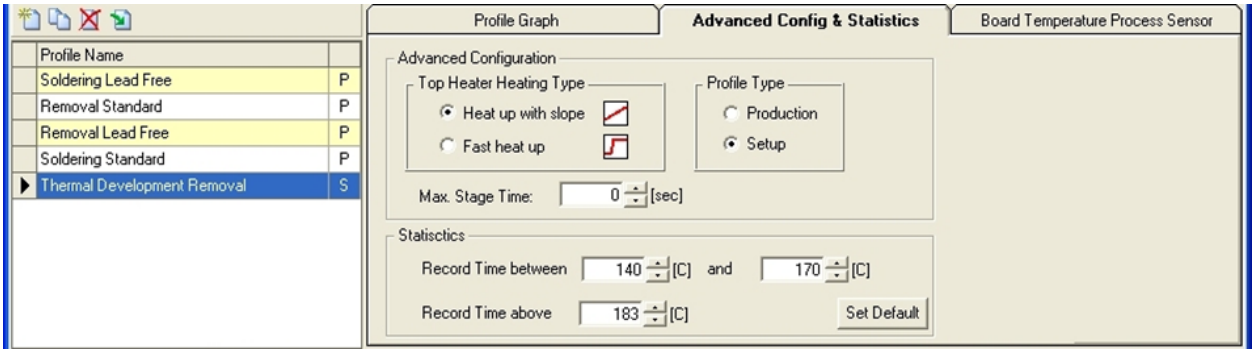

Profile Name
Soldering Lead Free P
Removal Standard P
Removal Lead Free P
Soldering Standard P
Thermal Development Removal S
Profile Graph
Advanced Config & Statistics
Board Temperature Process Sensor
Enable Max Board Temperature Surveillance
Thermocouple: 1: Board TC

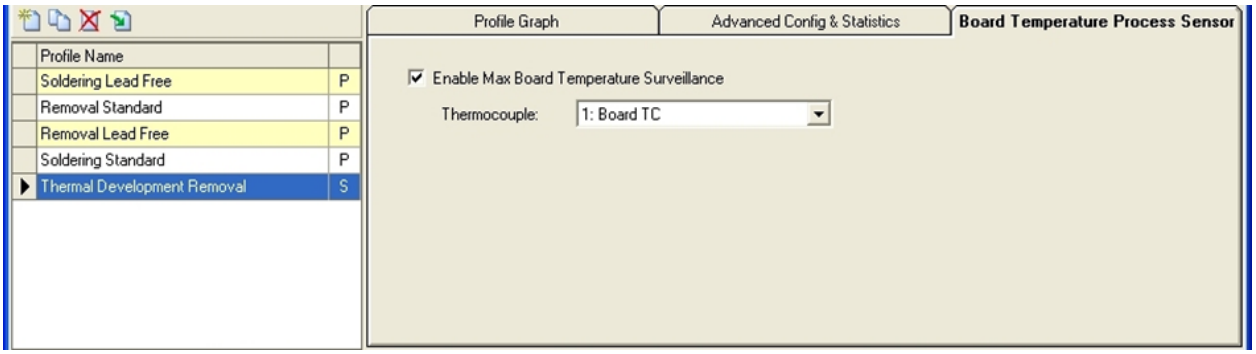

Thermo Profiles
Thermo Profiles of Part Type <Master Part Type>
Profile Name
Soldering Lead Free P
Removal Standard P
Removal Lead Free P
Soldering Standard P
Thermal Development Removal S
Profile Graph
Advanced Config & Statistics
Board Temperature Process Sensor
300
250
200
150
100
50
0
0 50 100 150 200 250 300 350 400 450 500 550
Stage Time [sec] Top [°C] Slope [C/sec] Top [SLM] Bot [°C] Max BT [C] Trigger Trigger [C] Top Cool Bot Cool Gas Vac Force [N] Speed [%] dZ [mm] Force Servo Z-Step [mm] Video
Preheat 300 125 0.42 30 300 125 1: Board ... 100 0 20 1.5 0
Soak 120 215 0.75 50 200 125 Time 100 0 20 0 0
Ramp 30 250 1.17 50 200 125 Time 100 0 20 0 0
Reflow 60 300 0.83 50 200 125 Time 100 0 20 0 0
Cooldown 60 0 -5 30 0 125 Time 100 0 20 0 0
OK


Profile Graph
Advanced Config & Statistics
Board Temperature Process Sensor
Profile Name
Soldering Lead Free P
Removal Standard P
Removal Lead Free P
Soldering Standard P
Thermal Development Removal S
Advanced Configuration
Top Heater Heating Type
Heat up with slope
Fast heat up
Profile Type
Production
Setup
Max. Stage Time: 0 [sec]
Statisctics
Record Time between 140 [C] and 170 [C]
Record Time above 183 [C]
Set Default

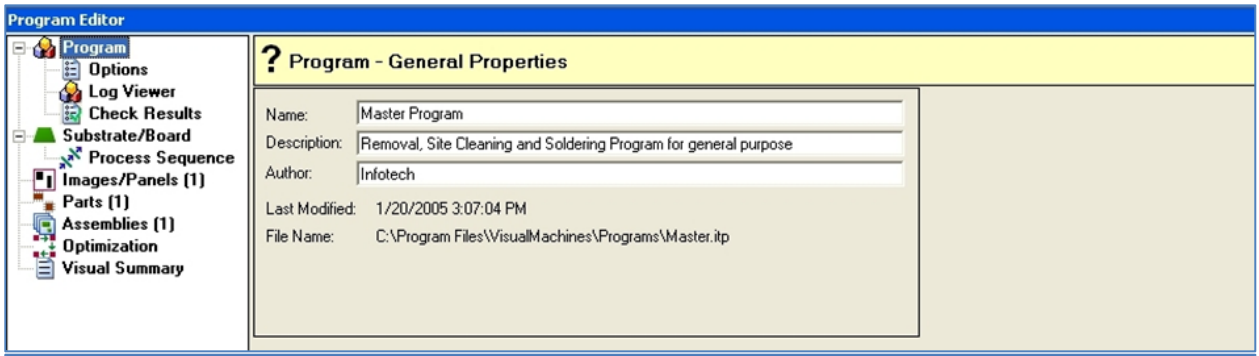

Profile Graph
Advanced Config & Statistics
Board Temperature Process Sensor
Profile Name
Soldering Lead Free P
Removal Standard P
Removal Lead Free P
Soldering Standard P
Thermal Development Removal S
Enable Max Board Temperature Surveillance
Thermocouple: 1: Board TC

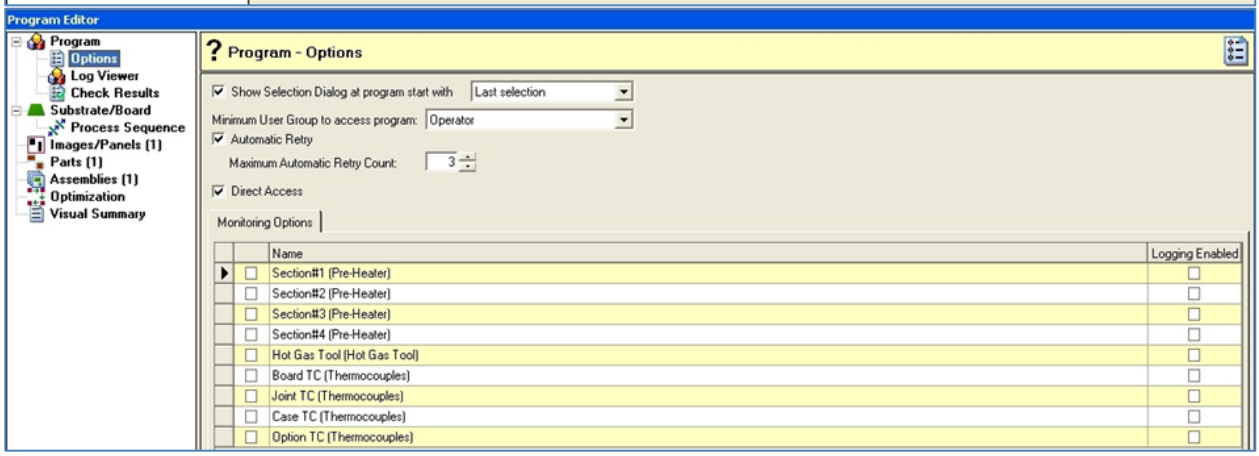

Thermo Profiles
Thermo Profiles of Part Type <Master Part Type>
Profile Graph
Advanced Config & Statistics
Board Temperature Process Sensor
Profile Name
Soldering Lead Free P
Removal Standard P
Removal Lead Free P
Soldering Standard P
Thermal Development Removal S
300
250
200
150
100
50
0
0 50 100 150 200 250 300 350 400 450 500
Stage | Time [sec] | Top [°C] | Slope [C/sec] | Top [SLM] | Bot [°C] | Max BT [C] | Trigger | Trigger [C] | Top Cool | Bot Cool | Gas | Vac | Force [N] | Speed [%] | dZ [mm] | Force Servo | Z-Step [mm] | Video
Preheat | 300 | 125 | 0.42 | 30 | 300 | 125 | 1: Board ... | 100 | 0 | 20 | 1.5 | 0 | 0
Soak | 120 | 215 | 0.75 | 50 | 200 | 125 | Time | 100 | 0 | 20 | 0 | 0 | 0
Ramp | 30 | 250 | 1.17 | 50 | 200 | 125 | Time | 100 | 0 | 20 | 0 | 0 | 0
Reflow | 60 | 300 | 0.83 | 50 | 200 | 125 | Time | 100 | 0 | 20 | 0 | 0 | 0
Cooldown | 0 | 20 | 0 | 30 | 0 | 125 | Time | 100 | 0 | 20 | 0 | 0 | 0
OK

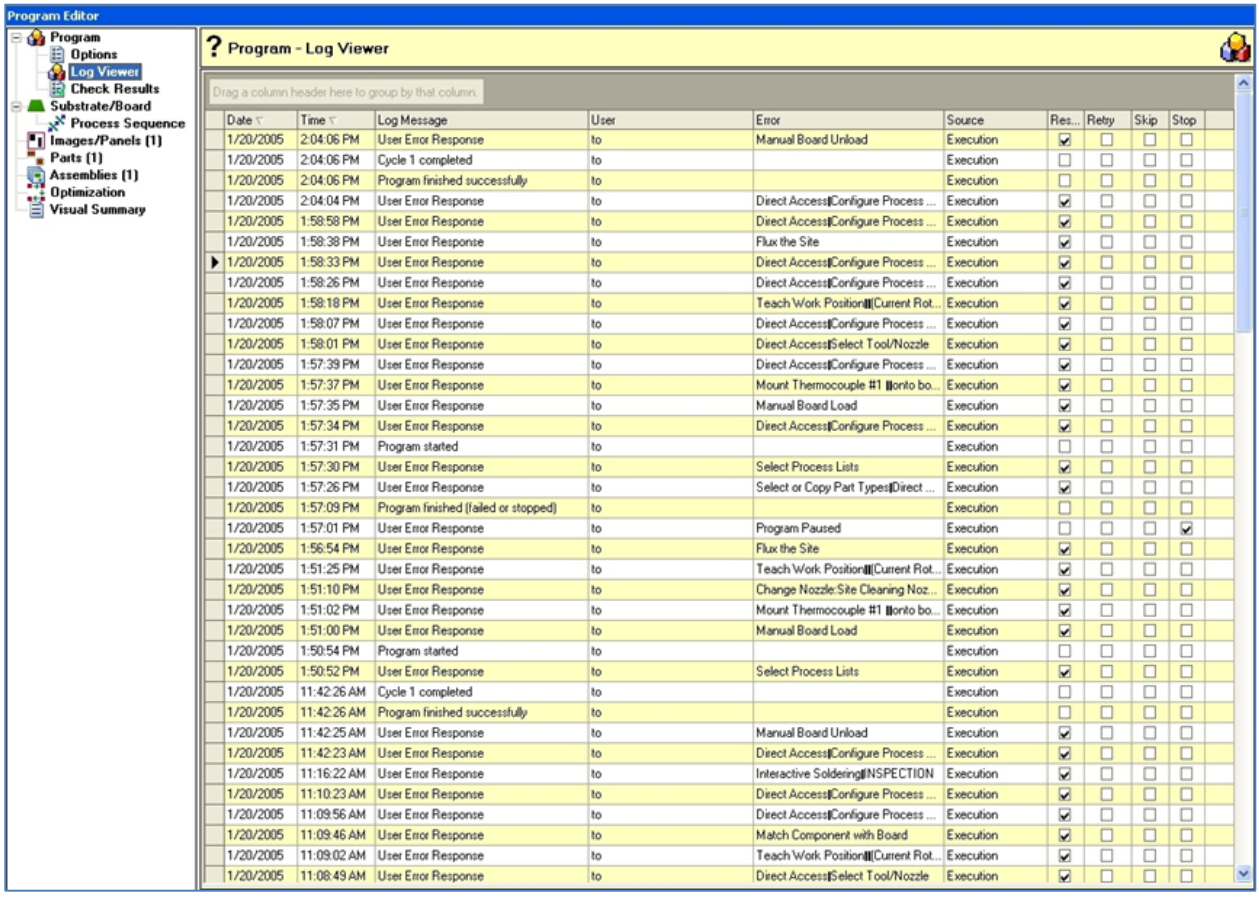

Profile Name
Soldering Lead Free P
Removal Standard P
Removal Lead Free P
Soldering Standard P
Thermal Development Removal S
Profile Graph
Advanced Config & Statistics
Board Temperature Process Sensor
Advanced Configuration
Top Heater Heating Type
Heat up with slope
Fast heat up
Profile Type
Production
Setup
Max. Stage Time: 0 [sec]
Statisctics
Record Time between 140 [C] and 170 [C]
Record Time above 183 [C]
Set Default

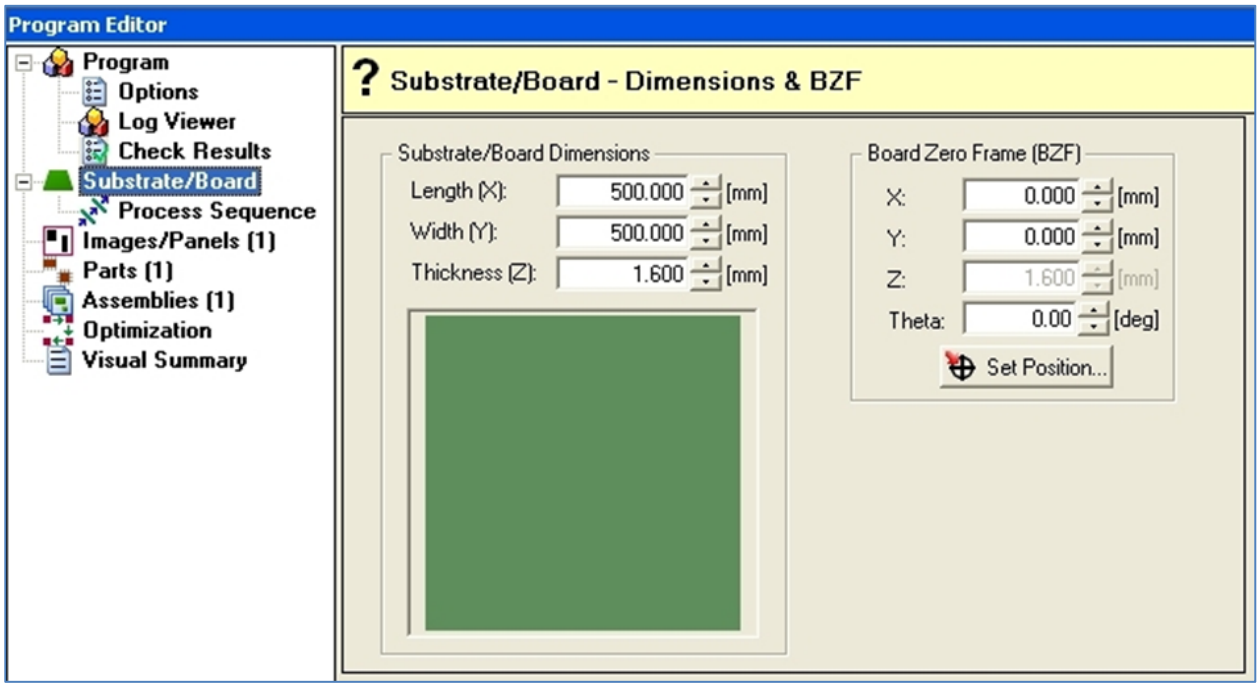

Profile Name
Soldering Lead Free P
Removal Standard P
Removal Lead Free P
Soldering Standard P
Thermal Development Removal S
Profile Graph
Advanced Config & Statistics
Board Temperature Process Sensor
Enable Max Board Temperature Surveillance
Thermocouple: 1: Board TC

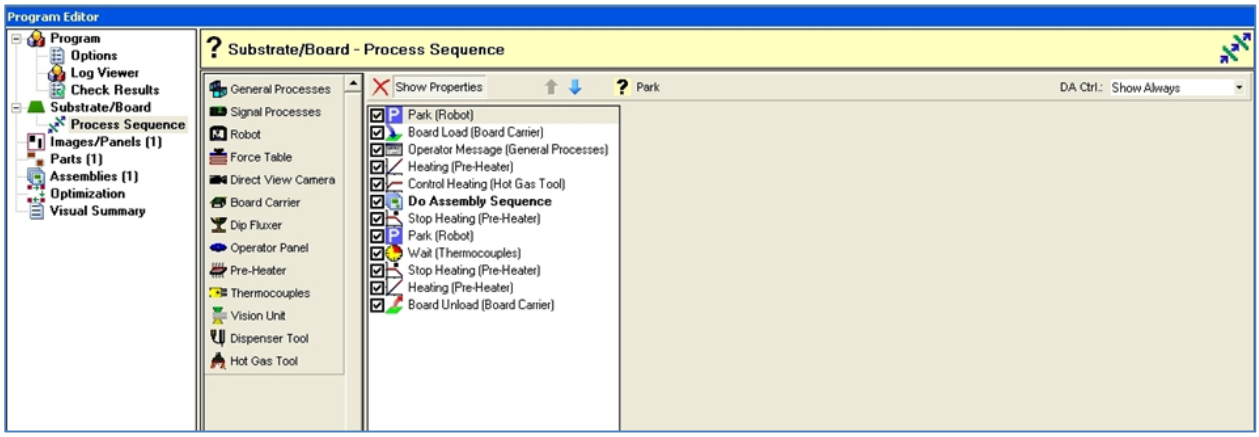
23.4 Master Program

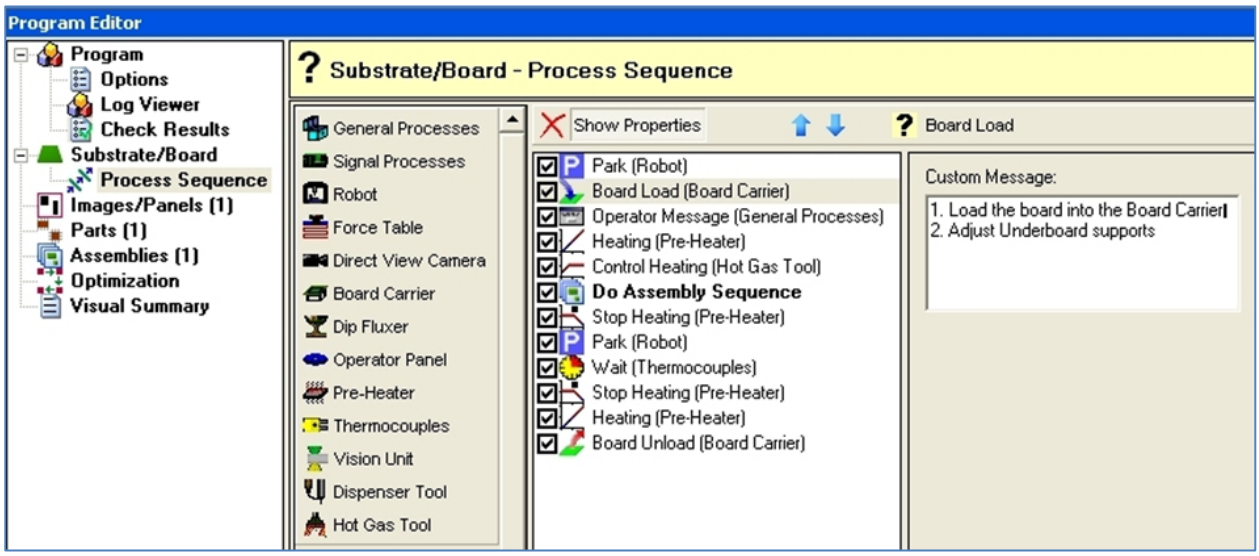


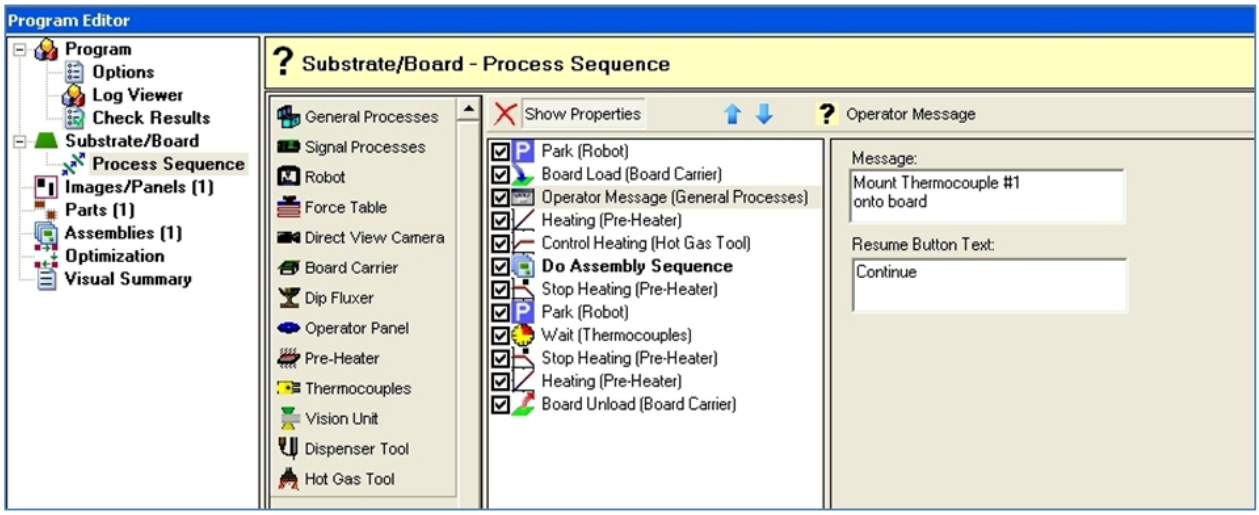


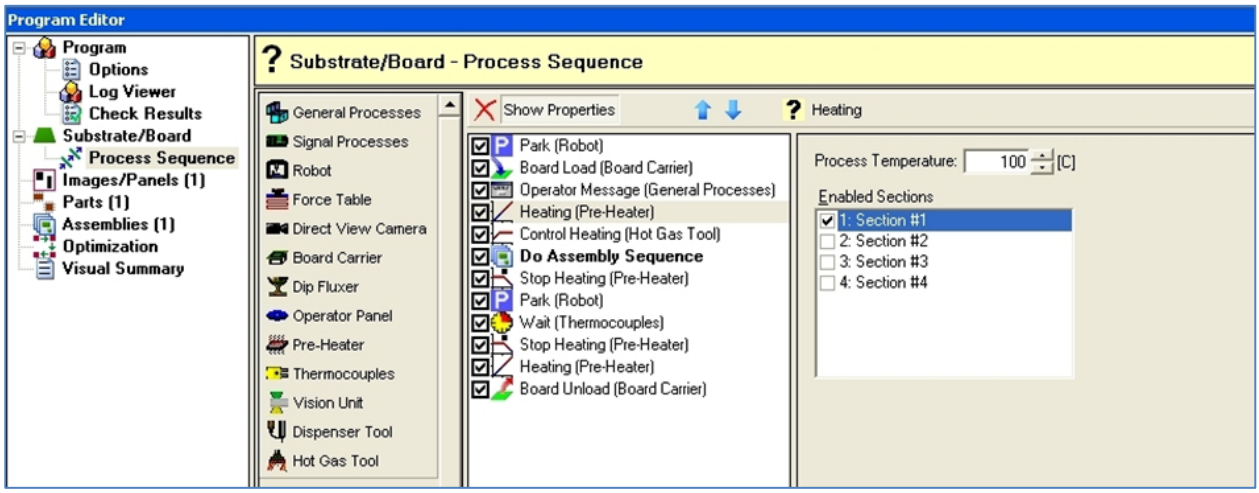


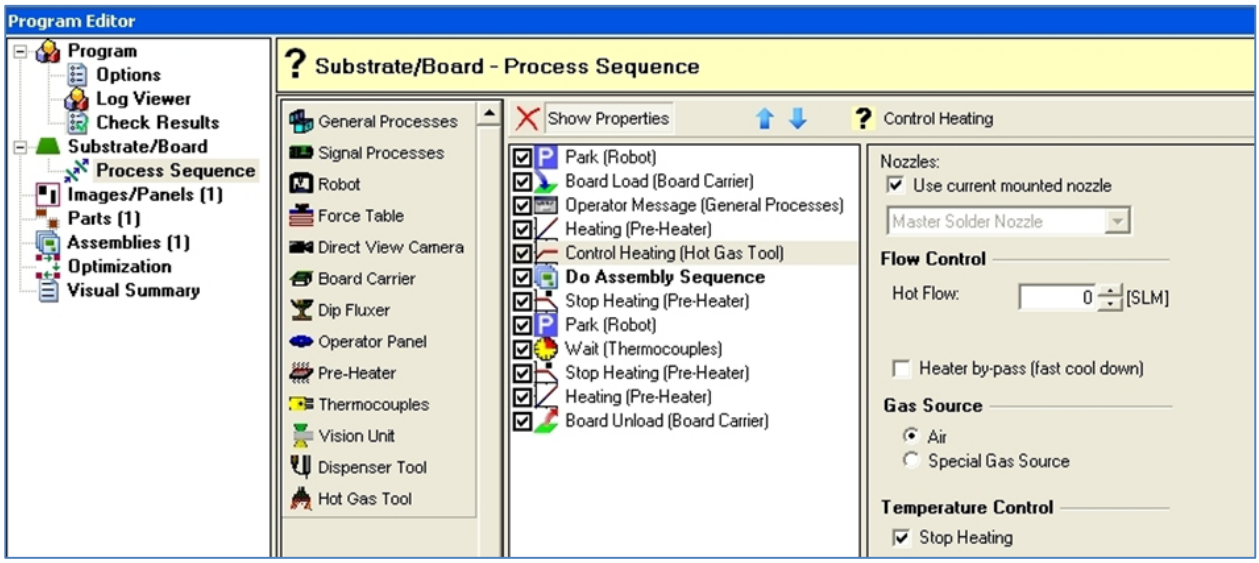

Program Editor
Program
Options
Log Viewer
Check Results
Substrate/Board
Process Sequence
Images/Panels (1)
Parts (1)
Assemblies (1)
Optimization
Visual Summary
Substrate/Board - Dimensions & BZF
Substrate/Board Dimensions
Length (X): 500.000 [mm]
Width (Y): 500.000 [mm]
Thickness (Z): 1.600 [mm]
Board Zero Frame (BZF)
X: 0.000 [mm]
Y: 0.000 [mm]
Z: 1.600 [mm]
Theta: 0.00 [deg]
Set Position...


Program Editor
Substrate/Board - Process Sequence
General Processes
Signal Processes
Robot
Force Table
Direct View Camera
Board Carrier
Dip Fluxer
Operator Panel
Pre-Heater
Thermocouples
Vision Unit
Dispenser Tool
Hot Gas Tool
Show Properties
Park
DA Ctrl: Show Always
Park (Robot)
Board Load (Board Carrier)
Operator Message (General Processes)
Heating (Pre-Heater)
Control Heating (Hot Gas Tool)
Do Assembly Sequence
Stop Heating (Pre-Heater)
Park (Robot)
Wait (Thermocouples)
Stop Heating (Pre-Heater)
Heating (Pre-Heater)
Board Unload (Board Carrier)


Program Editor
Substrate/Board - Process Sequence
Board Load
Custom Message:
1. Load the board into the Board Carrier
2. Adjust Underboard supports


Program Editor
Program
Options
Log Viewer
Check Results
Substrate/Board
Process Sequence
Images/Panels (1)
Parts (1)
Assemblies (1)
Optimization
Visual Summary
Substrate/Board - Process Sequence
General Processes
Signal Processes
Robot
Force Table
Direct View Camera
Board Carrier
Dip Fluxer
Operator Panel
Pre-Heater
Thermocouples
Vision Unit
Dispenser Tool
Hot Gas Tool
Show Properties
Operator Message
Park (Robot)
Board Load (Board Carrier)
Operator Message (General Processes)
Heating (Pre-Heater)
Control Heating (Hot Gas Tool)
Do Assembly Sequence
Stop Heating (Pre-Heater)
Park (Robot)
Wait (Thermocouples)
Stop Heating (Pre-Heater)
Heating (Pre-Heater)
Board Unload (Board Carrier)
Message:
Mount Thermocouple #1
onto board
Resume Button Text:
Continue


Program Editor
Program
Options
Log Viewer
Check Results
Substrate/Board
Process Sequence
Images/Panels (1)
Parts (1)
Assemblies (1)
Optimization
Visual Summary
Substrate/Board - Process Sequence
General Processes
Signal Processes
Robot
Force Table
Direct View Camera
Board Carrier
Dip Fluxer
Operator Panel
Pre-Heater
Thermocouples
Vision Unit
Dispenser Tool
Hot Gas Tool
Show Properties
Heating
Park (Robot)
Board Load (Board Carrier)
Operator Message (General Processes)
Heating (Pre-Heater)
Control Heating (Hot Gas Tool)
Do Assembly Sequence
Stop Heating (Pre-Heater)
Park (Robot)
Wait (Thermocouples)
Stop Heating (Pre-Heater)
Heating (Pre-Heater)
Board Unload (Board Carrier)
Process Temperature: 100 [C]
Enabled Sections
1: Section #1
2: Section #2
3: Section #3
4: Section #4


Program Editor
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Options
Log Viewer
Check Results
Substrate/Board
Process Sequence
Images/Panels (1)
Parts (1)
Assemblies (1)
Optimization
Visual Summary
Substrate/Board - Process Sequence
General Processes
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Robot
Force Table
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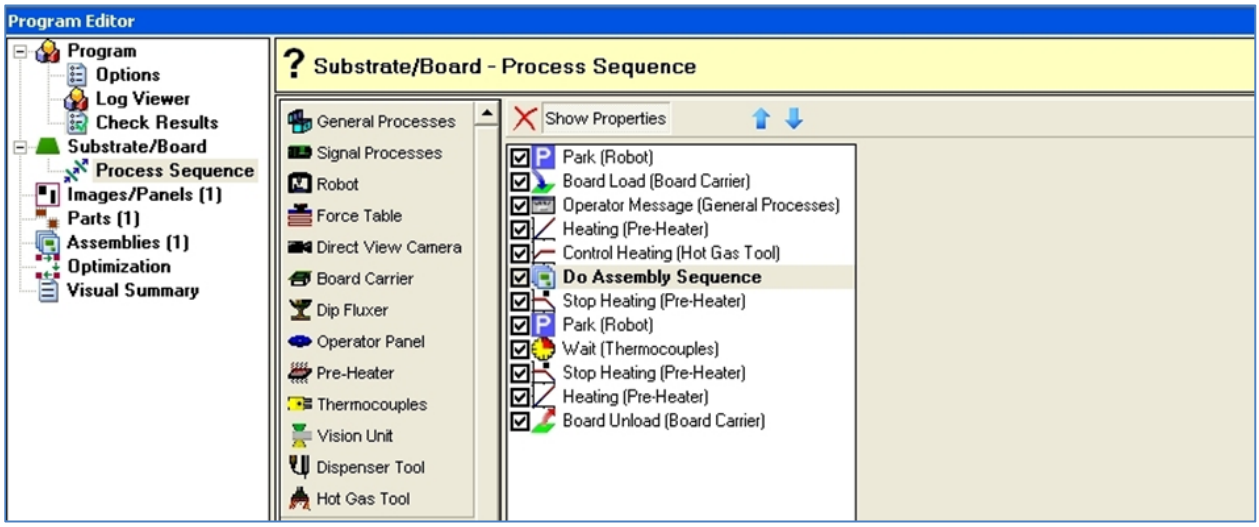
Vision Unit
Dispenser Tool
Hot Gas Tool
Show Properties
Control Heating
Park (Robot)
Board Load (Board Carrier)
Operator Message (General Processes)
Heating (Pre-Heater)
Control Heating (Hot Gas Tool)
Do Assembly Sequence
Stop Heating (Pre-Heater)
Park (Robot)
Wait (Thermocouples)
Stop Heating (Pre-Heater)
Heating (Pre-Heater)
Board Unload (Board Carrier)
Nozzles:
Use current mounted nozzle
Master Solder Nozzle
Flow Control
Hot Flow: 0 [SLM]
Heater by-pass (fast cool down)
Gas Source
Air
Special Gas Source
Temperature Control
Stop Heating


Program Editor
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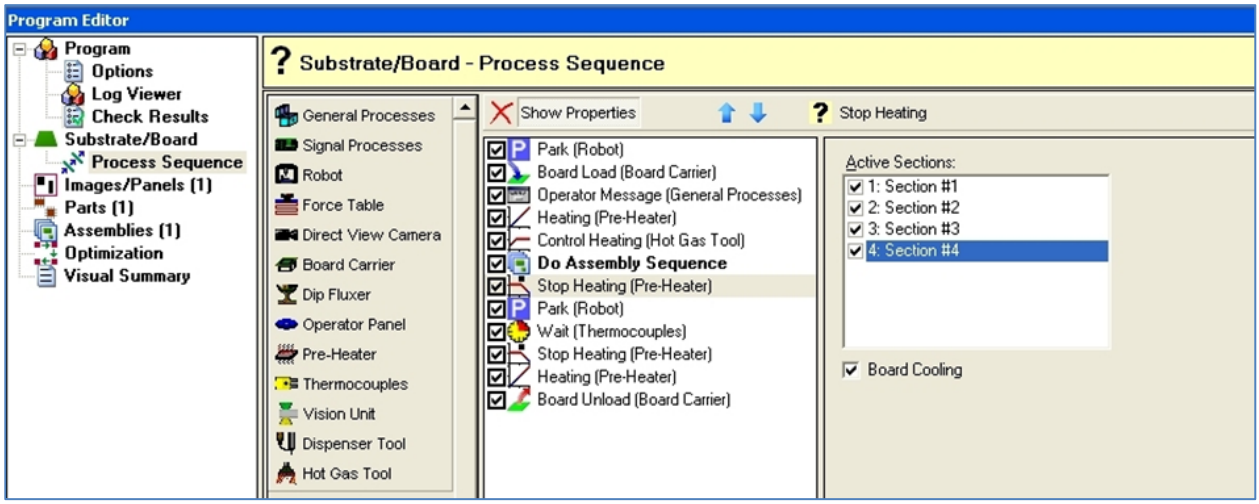
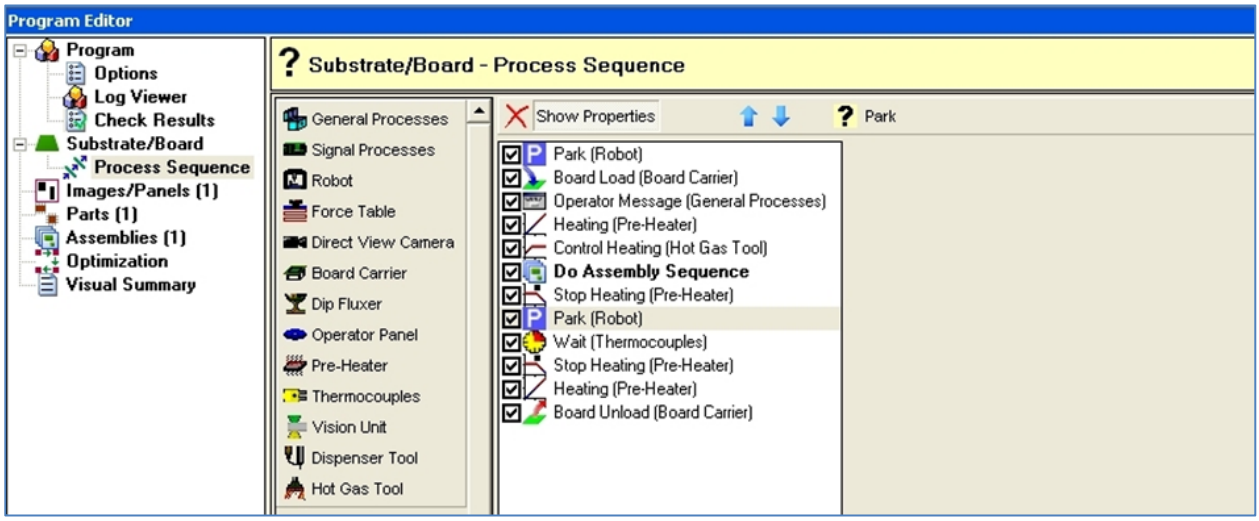
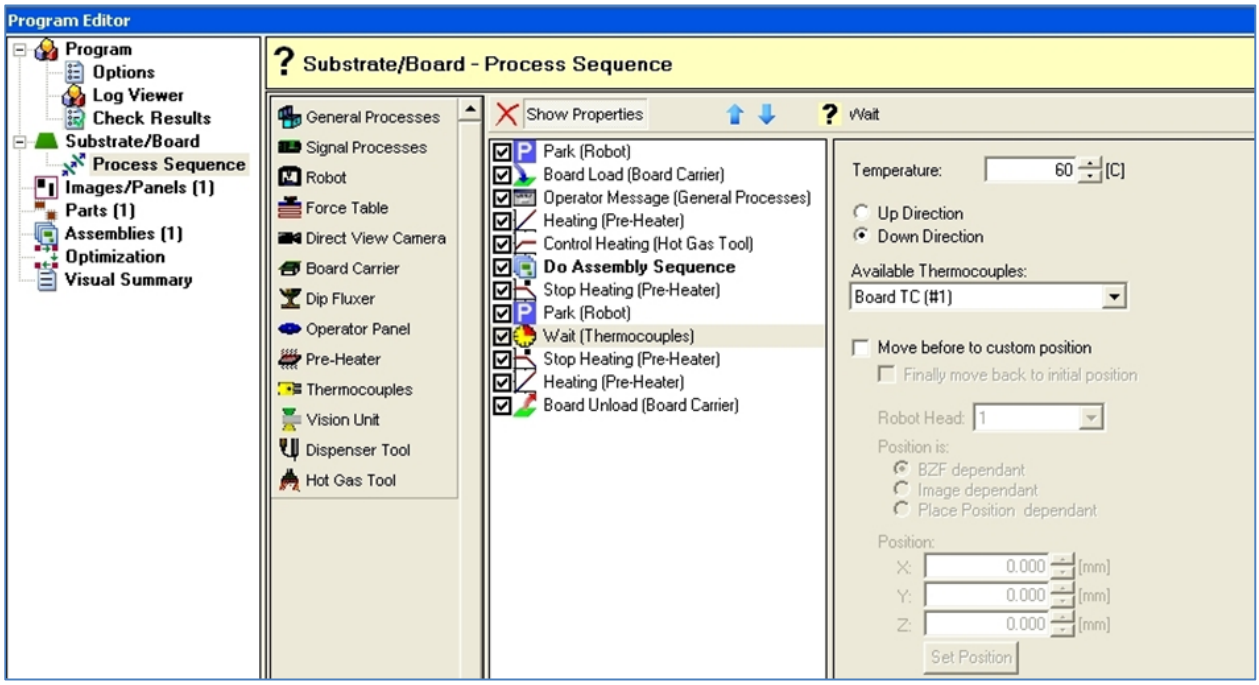
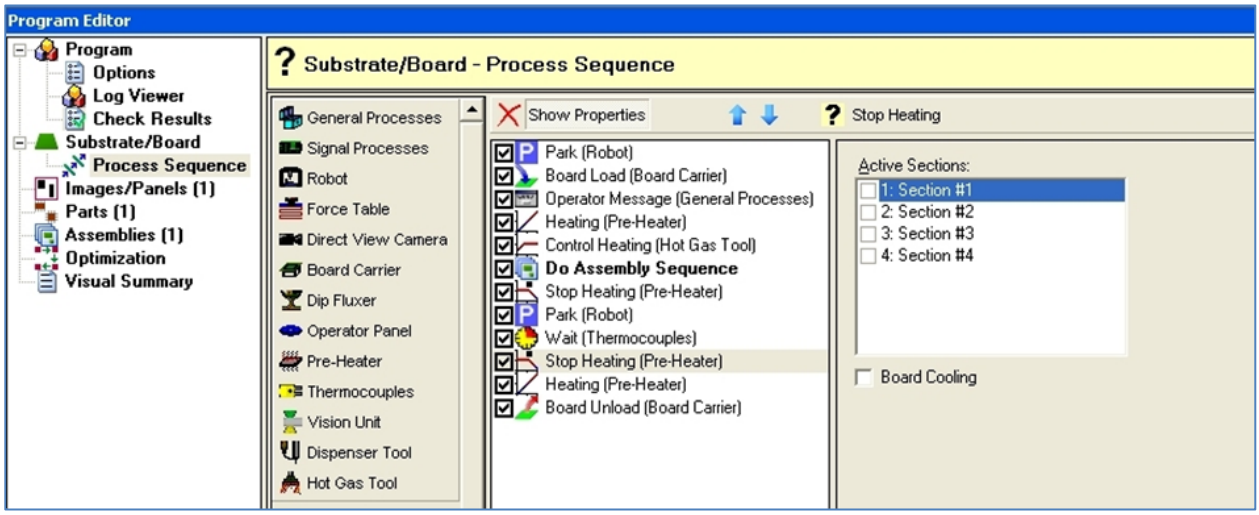
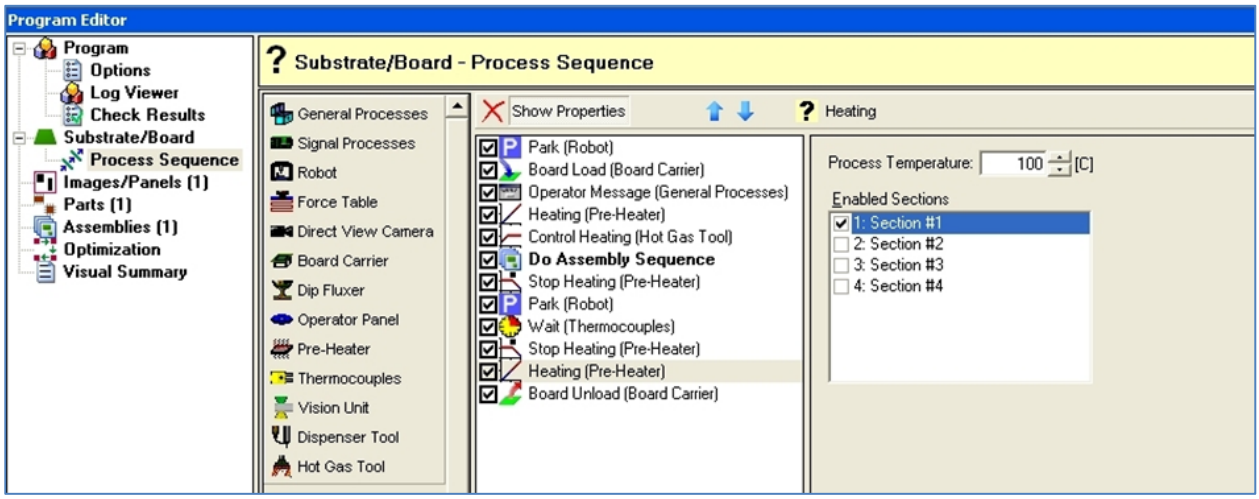
Options
Log Viewer
Check Results
Substrate/Board
Process Sequence
Images/Panels (1)
Parts (1)
Assemblies (1)
Optimization
Visual Summary
Substrate/Board - Process Sequence
General Processes
Signal Processes
Robot
Force Table
Direct View Camera
Board Carrier
Dip Fluxer
Operator Panel
Pre-Heater
Thermocouples
Vision Unit
Dispenser Tool
Hot Gas Tool
Show Properties
Park (Robot)
Board Load (Board Carrier)
Operator Message (General Processes)
Heating (Pre-Heater)
Control Heating (Hot Gas Tool)
Do Assembly Sequence
Stop Heating (Pre-Heater)
Park (Robot)
Wait (Thermocouples)
Stop Heating (Pre-Heater)
Heating (Pre-Heater)
Board Unload (Board Carrier)

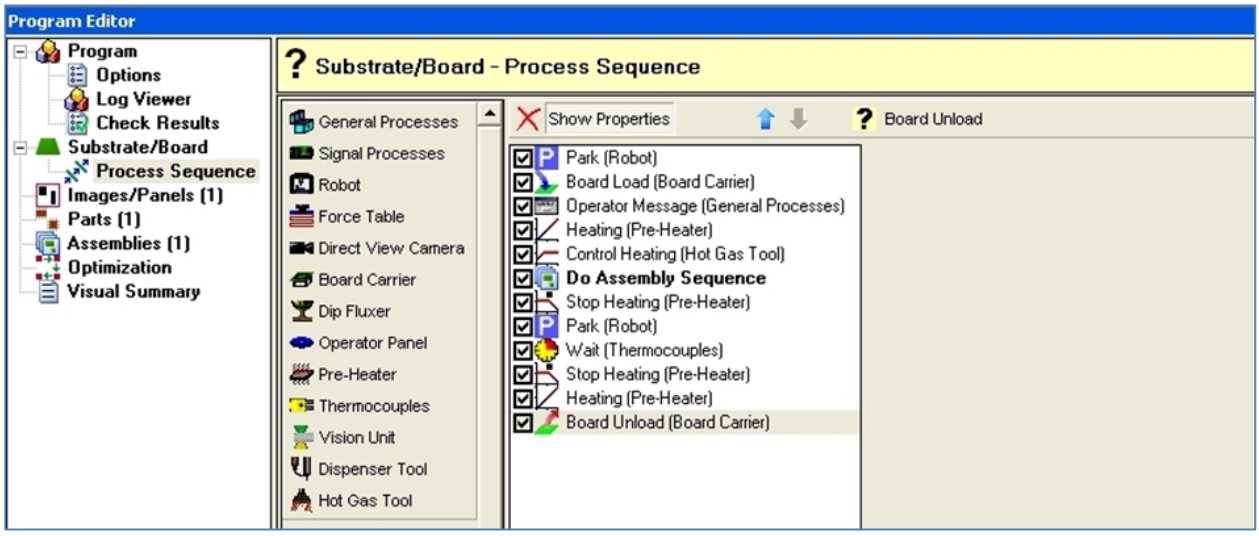

Program Editor
Program
Options
Log Viewer
Check Results
Substrate/Board
Process Sequence
Images/Panels (1)
Parts (1)
Assemblies (1)
Optimization
Visual Summary
Substrate/Board - Process Sequence
General Processes
Signal Processes
Robot
Force Table
Direct View Camera
Board Carrier
Dip Fluxer
Operator Panel
Pre-Heater
Thermocouples
Vision Unit
Dispenser Tool
Hot Gas Tool
Show Properties
Stop Heating
Park (Robot)
Board Load (Board Carrier)
Operator Message (General Processes)
Heating (Pre-Heater)
Control Heating (Hot Gas Tool)
Do Assembly Sequence
Stop Heating (Pre-Heater)
Park (Robot)
Wait (Thermocouples)
Stop Heating (Pre-Heater)
Heating (Pre-Heater)
Board Unload (Board Carrier)
Active Sections:
1: Section #1
2: Section #2
3: Section #3
4: Section #4
Board Cooling

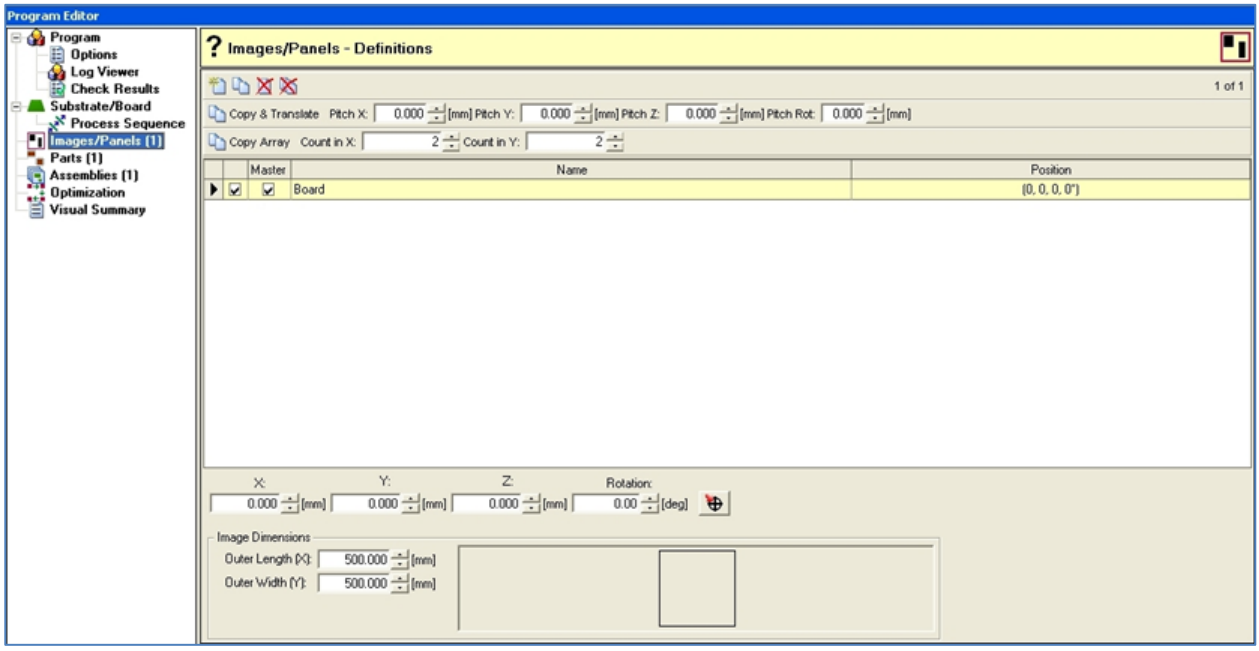

Program Editor
Program
Options
Log Viewer
Check Results
Substrate/Board
Process Sequence
Images/Panels (1)
Parts (1)
Assemblies (1)
Optimization
Visual Summary
Substrate/Board - Process Sequence
General Processes
Signal Processes
Robot
Force Table
Direct View Camera
Board Carrier
Dip Fluxer
Operator Panel
Pre-Heater
Thermocouples
Vision Unit
Dispenser Tool
Hot Gas Tool
Show Properties
Park
Park (Robot)
Board Load (Board Carrier)
Operator Message (General Processes)
Heating (Pre-Heater)
Control Heating (Hot Gas Tool)
Do Assembly Sequence
Stop Heating (Pre-Heater)
Park (Robot)
Wait (Thermocouples)
Stop Heating (Pre-Heater)
Heating (Pre-Heater)
Board Unload (Board Carrier)

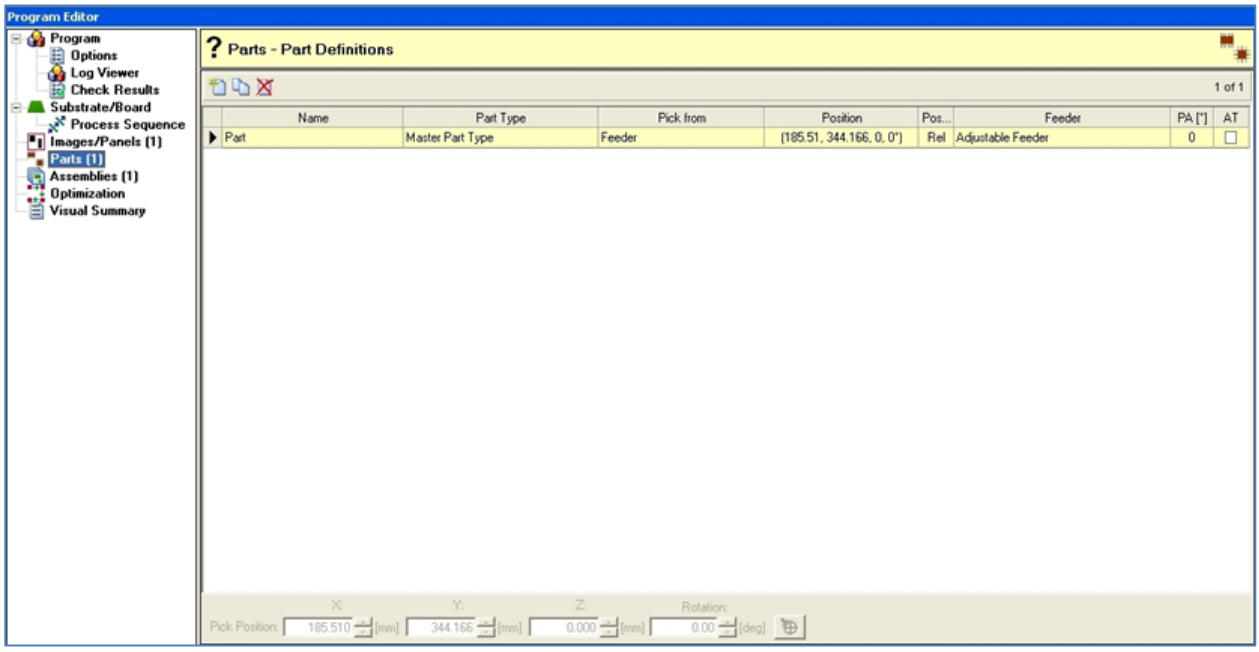

Program Editor
Program
Options
Log Viewer
Check Results
Substrate/Board
Process Sequence
Images/Panels (1)
Parts (1)
Assemblies (1)
Optimization
Visual Summary
Substrate/Board - Process Sequence
General Processes
Signal Processes
Robot
Force Table
Direct View Camera
Board Carrier
Dip Fluxer
Operator Panel
Pre-Heater
Thermocouples
Vision Unit
Dispenser Tool
Hot Gas Tool
Show Properties
Wait
Park (Robot)
Board Load (Board Carrier)
Operator Message (General Processes)
Heating (Pre-Heater)
Control Heating (Hot Gas Tool)
Do Assembly Sequence
Stop Heating (Pre-Heater)
Park (Robot)
Wait (Thermocouples)
Stop Heating (Pre-Heater)
Heating (Pre-Heater)
Board Unload (Board Carrier)
Temperature: 60 [C]
Up Direction
Down Direction
Available Thermocouples:
Board TC (#1)
Move before to custom position
Finally move back to initial position
Robot Head: 1
Position is:
BZF dependant
Image dependant
Place Position dependant
Position:
X: 0.000 [mm]
Y: 0.000 [mm]
Z: 0.000 [mm]
Set Position

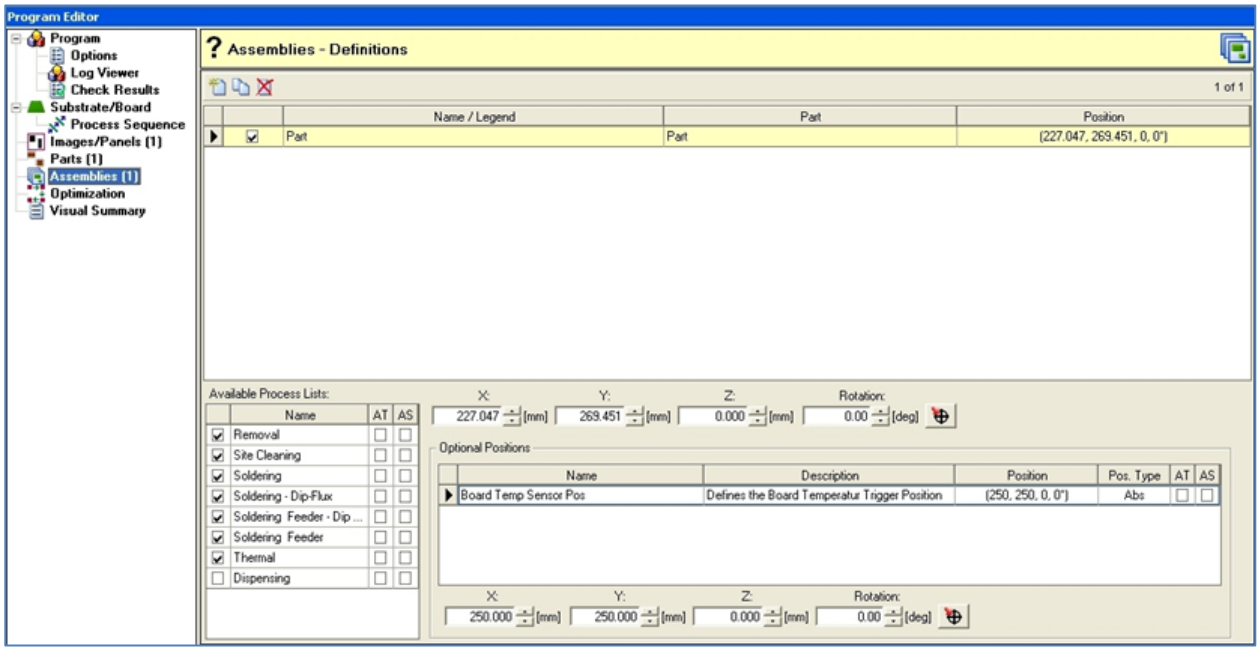

Program Editor
Program
Options
Log Viewer
Check Results
Substrate/Board
Process Sequence
Images/Panels (1)
Parts (1)
Assemblies (1)
Optimization
Visual Summary
Substrate/Board - Process Sequence
General Processes
Signal Processes
Robot
Force Table
Direct View Camera
Board Carrier
Dip Fluxer
Operator Panel
Pre-Heater
Thermocouples
Vision Unit
Dispenser Tool
Hot Gas Tool
Show Properties
Stop Heating
Park (Robot)
Board Load (Board Carrier)
Operator Message (General Processes)
Heating (Pre-Heater)
Control Heating (Hot Gas Tool)
Do Assembly Sequence
Stop Heating (Pre-Heater)
Park (Robot)
Wait (Thermocouples)
Stop Heating (Pre-Heater)
Heating (Pre-Heater)
Board Unload (Board Carrier)
Active Sections:
1: Section #1
2: Section #2
3: Section #3
4: Section #4
Board Cooling

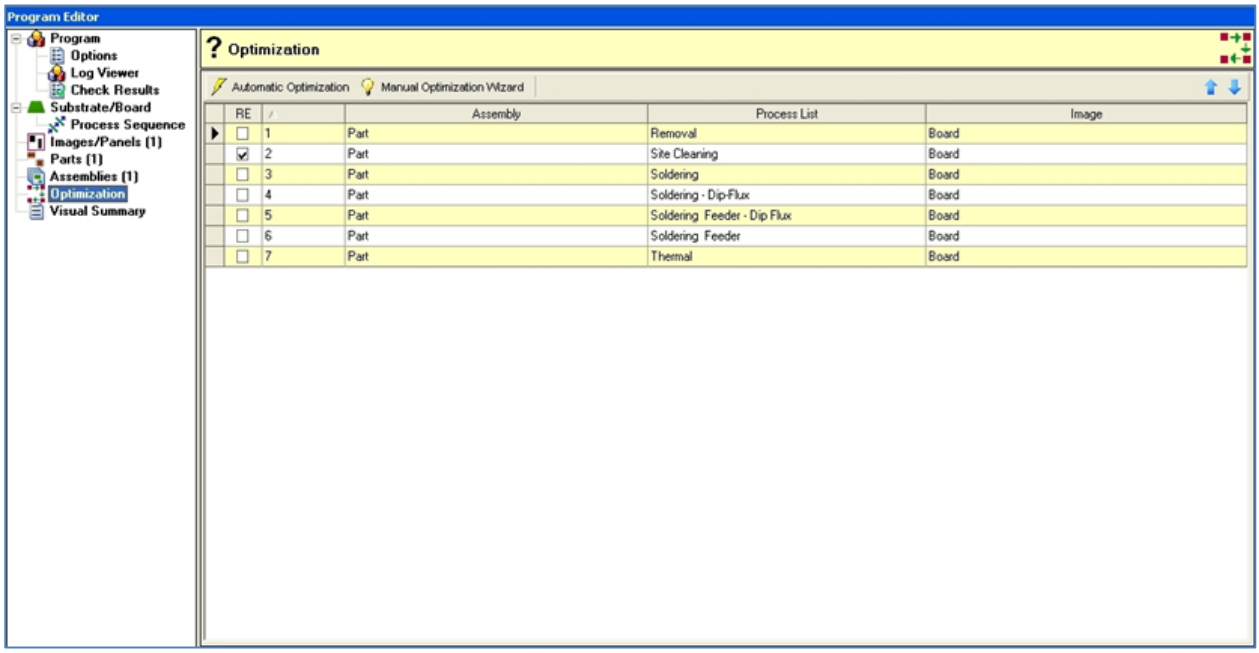

Program Editor
Program
Options
Log Viewer
Check Results
Substrate/Board
Process Sequence
Images/Panels (1)
Parts (1)
Assemblies (1)
Optimization
Visual Summary
Substrate/Board - Process Sequence
General Processes
Signal Processes
Robot
Force Table
Direct View Camera
Board Carrier
Dip Fluxer
Operator Panel
Pre-Heater
Thermocouples
Vision Unit
Dispenser Tool
Hot Gas Tool
Show Properties
Heating
Park (Robot)
Board Load (Board Carrier)
Operator Message (General Processes)
Heating (Pre-Heater)
Control Heating (Hot Gas Tool)
Do Assembly Sequence
Stop Heating (Pre-Heater)
Park (Robot)
Wait (Thermocouples)
Stop Heating (Pre-Heater)
Heating (Pre-Heater)
Board Unload (Board Carrier)
Process Temperature: 100 [C]
Enabled Sections
1: Section #1
2: Section #2
3: Section #3
4: Section #4

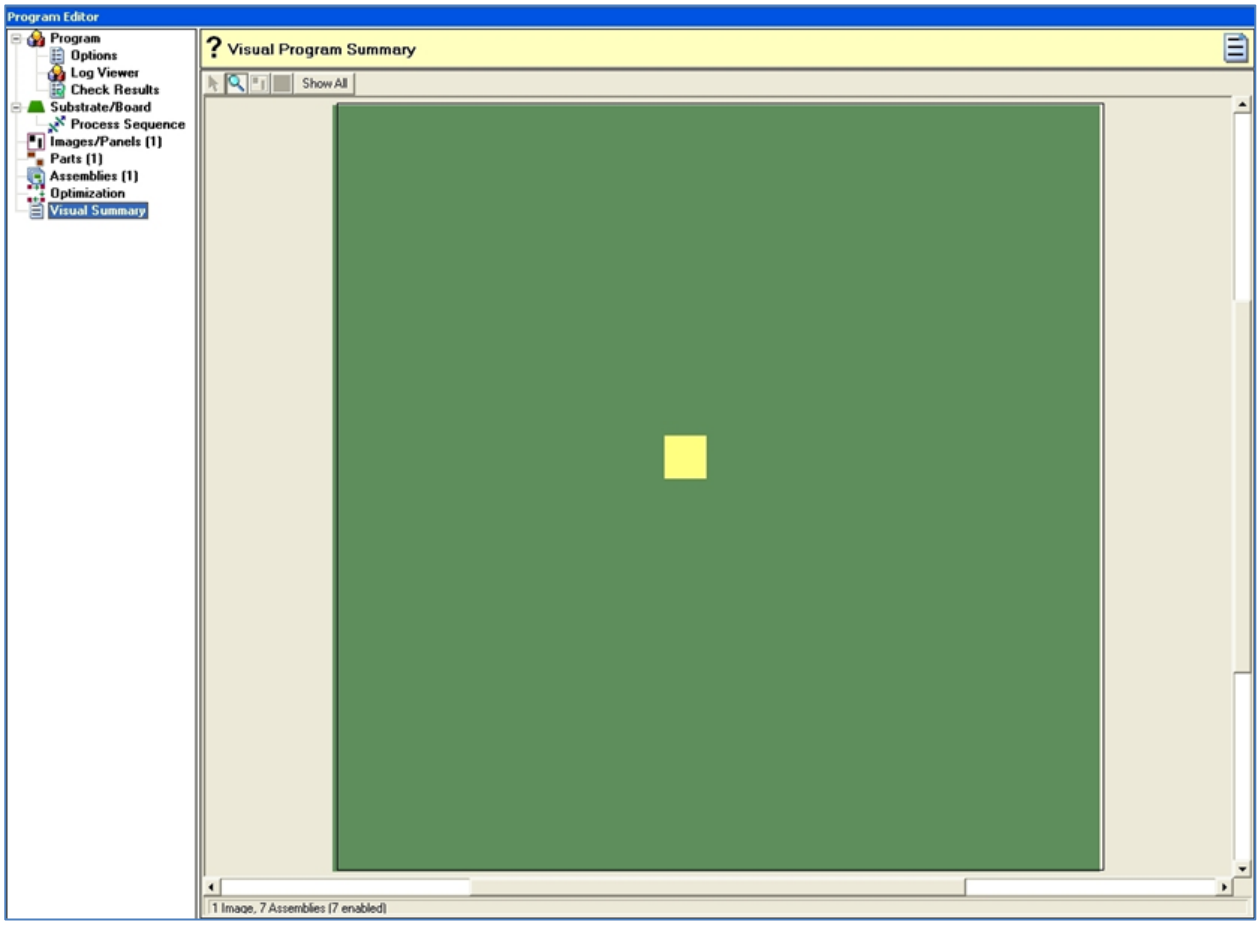

Program Editor
Program
Options
Log Viewer
Check Results
Substrate/Board
Process Sequence
Images/Panels (1)
Parts (1)
Assemblies (1)
Optimization
Visual Summary
Substrate/Board - Process Sequence
General Processes
Signal Processes
Robot
Force Table
Direct View Camera
Board Carrier
Dip Fluxer
Operator Panel
Pre-Heater
Thermocouples
Vision Unit
Dispenser Tool
Hot Gas Tool
Show Properties
Board Unload
Park (Robot)
Board Load (Board Carrier)
Operator Message (General Processes)
Heating (Pre-Heater)
Control Heating (Hot Gas Tool)
Do Assembly Sequence
Stop Heating (Pre-Heater)
Park (Robot)
Wait (Thermocouples)
Stop Heating (Pre-Heater)
Heating (Pre-Heater)
Board Unload (Board Carrier)

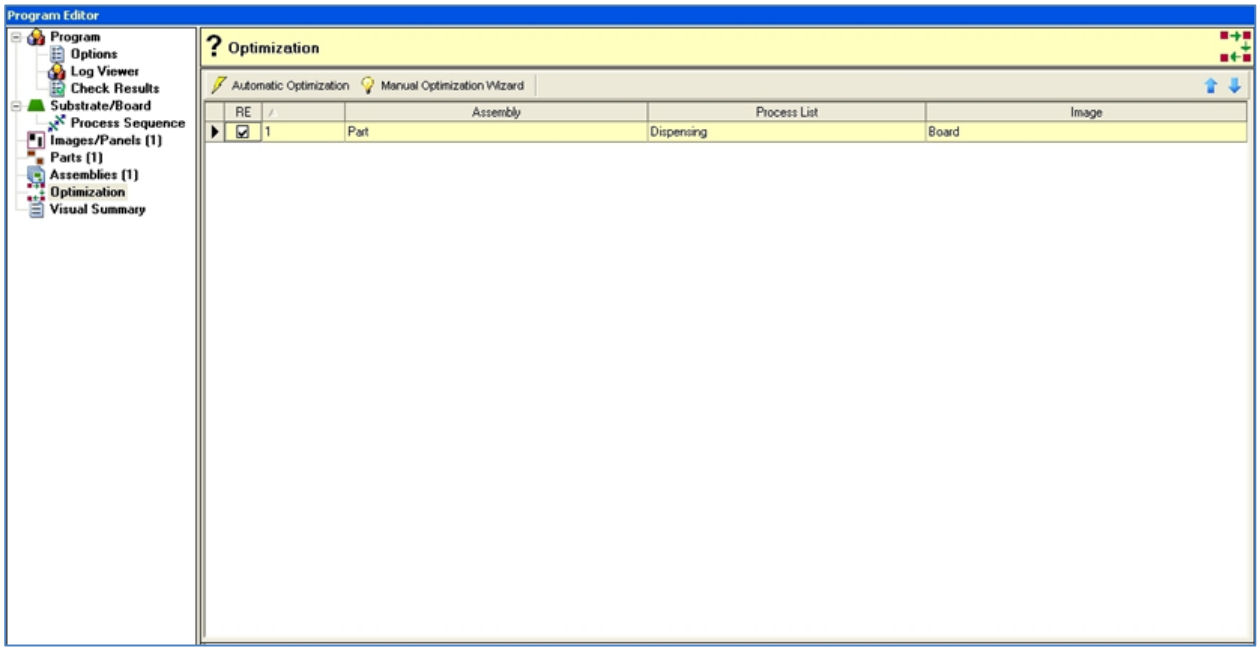

Program Editor
Program
Options
Log Viewer
Check Results
Substrate/Board
Process Sequence
Images/Panels (1)
Parts (1)
Assemblies (1)
Optimization
Visual Summary
Images/Panels - Definitions
1 of 1
Copy & Translate
Pitch X:
Pitch Y:
Pitch Z:
Pitch Rot:
Copy Array
Count in X:
Count in Y:
Master
Name
Position
Board
(0, 0, 0, 0°)
X:
Y:
Z:
Rotation:
Image Dimensions
Outer Length (X):
Outer Width (Y):
500.000


Program Editor
Program
Options
Log Viewer
Check Results
Substrate/Board
Process Sequence
Images/Panels (1)
Parts (1)
Assemblies (1)
Optimization
Visual Summary
Parts - Part Definitions
1 of 1
Name
Part Type
Pick from
Position
Pos...
Feeder
PA [°]
AT
Part
Master Part Type
Feeder
(185.51, 344.166, 0, 0°)
Rel
Adjustable Feeder
0
Pick Position:
X:
185.510
[mm]
Y:
344.166
[mm]
Z:
0.000
[mm]
Rotation:
0.00
[deg]

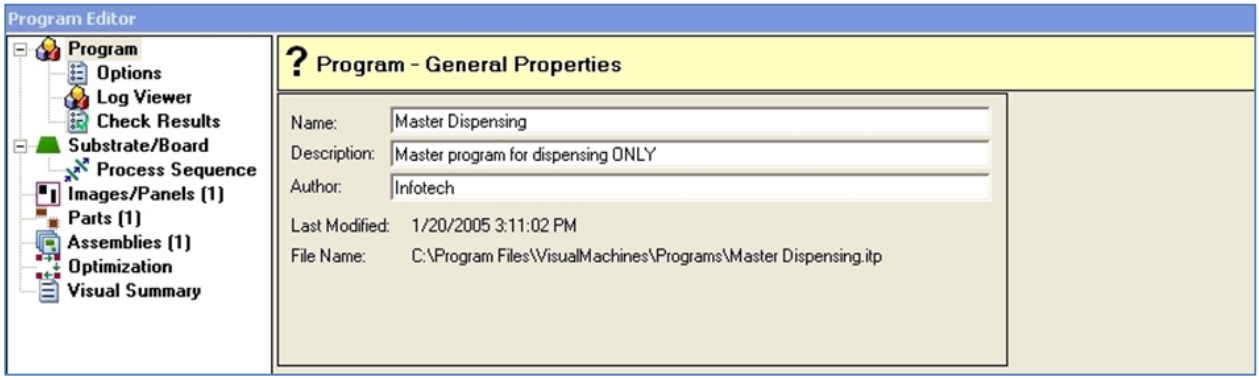

Program Editor
Program
Options
Log Viewer
Check Results
Substrate/Board
Process Sequence
Images/Panels (1)
Parts (1)
Assemblies (1)
Optimization
Visual Summary
Assemblies - Definitions
1 of 1
Name / Legend
Part
Position
Part
Part
(227.047, 269.451, 0, 0°)
Available Process Lists:
Name
AT
AS
Removal
Site Cleaning
Soldering
Soldering - Dip-Flux
Soldering Feeder - Dip ...
Soldering Feeder
Thermal
Dispensing
X:
227.047
[mm]
Y:
269.451
[mm]
Z:
0.000
[mm]
Rotation:
0.00
[deg]
Optional Positions
Name
Description
Position
Pos. Type
AT
AS
Board Temp Sensor Pos
Defines the Board Temperatur Trigger Position
(250, 250, 0, 0°)
Abs
X:
250.000
[mm]
Y:
250.000
[mm]
Z:
0.000
[mm]
Rotation:
0.00
[deg]

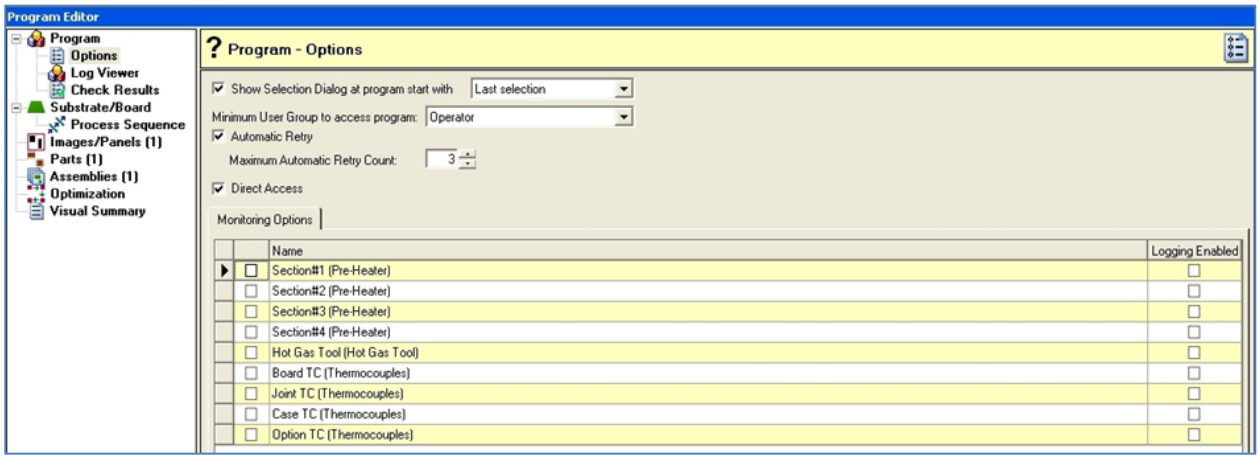

Program Editor
Program
Options
Log Viewer
Check Results
Substrate/Board
Process Sequence
Images/Panels (1)
Parts (1)
Assemblies (1)
Optimization
Visual Summary
Optimization
Automatic Optimization
Manual Optimization Wizard
RE
Assembly
Process List
Image
1 Part Removal Board
2 Part Site Cleaning Board
3 Part Soldering Board
4 Part Soldering - Dip-Flux Board
5 Part Soldering Feeder - Dip Flux Board
6 Part Soldering Feeder Board
7 Part Thermal Board

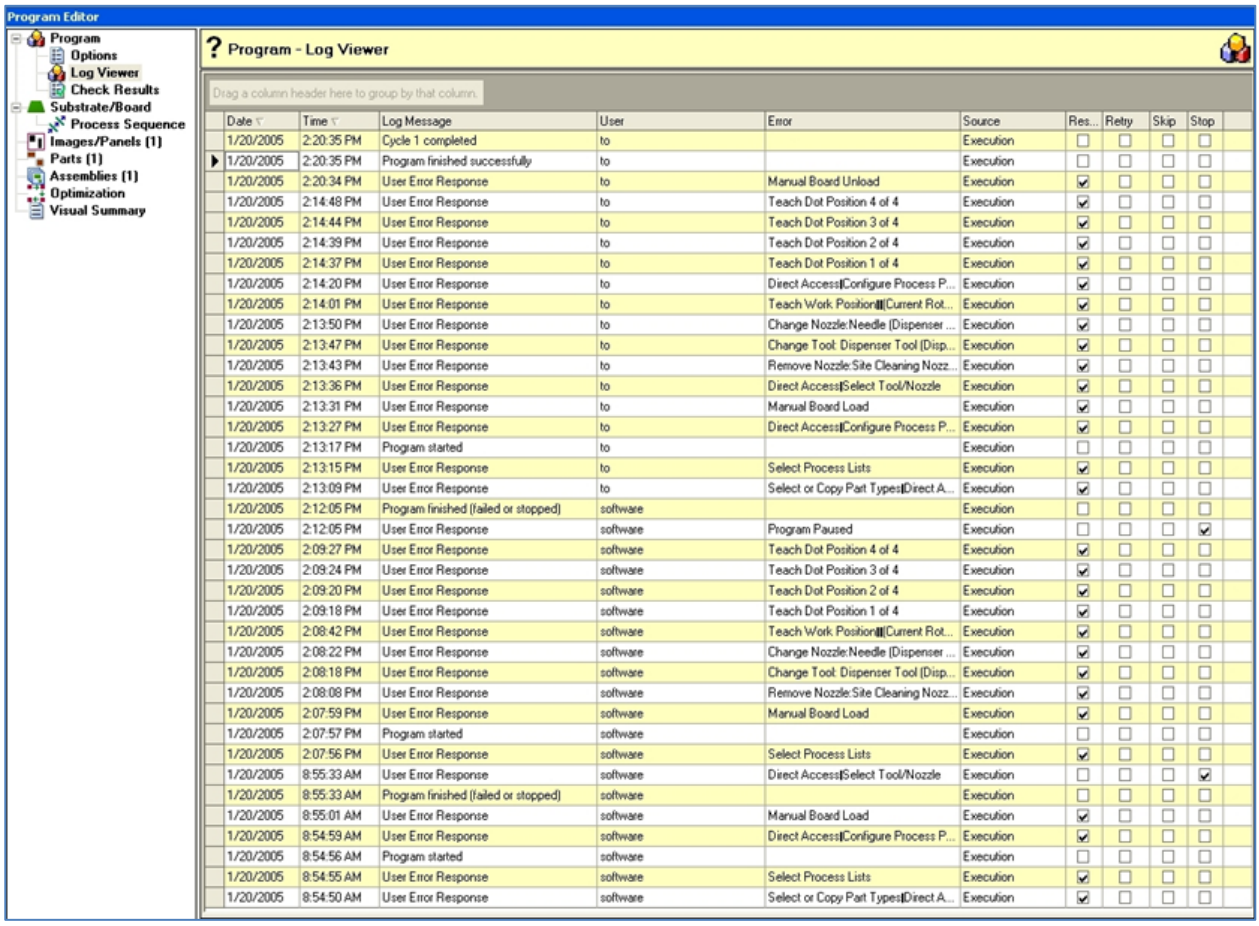

Program Editor
Program
Options
Log Viewer
Check Results
Substrate/Board
Process Sequence
Images/Panels (1)
Parts (1)
Assemblies (1)
Optimization
Visual Summary
Visual Program Summary
Show All
1 Image, 7 Assemblies (7 enabled)

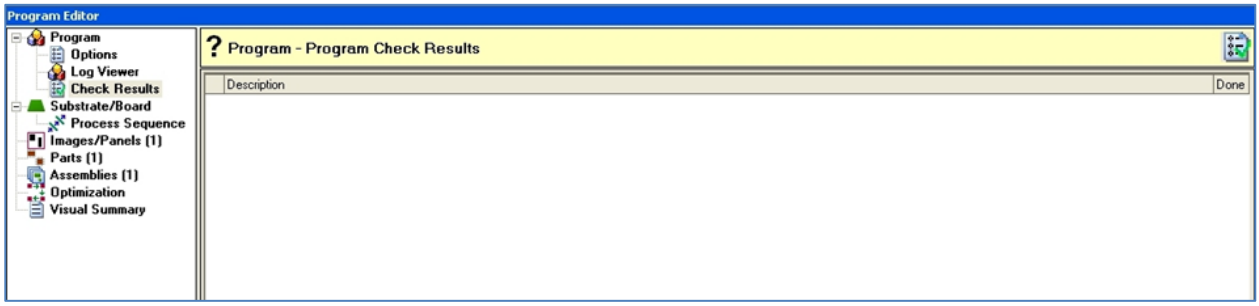


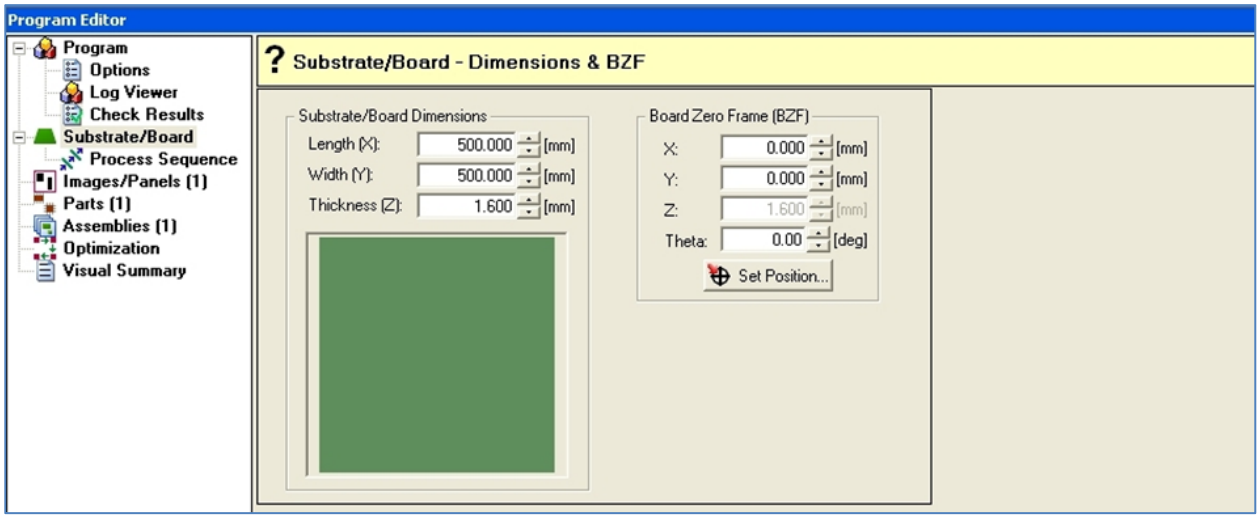
23.5 Master Dispensing Program

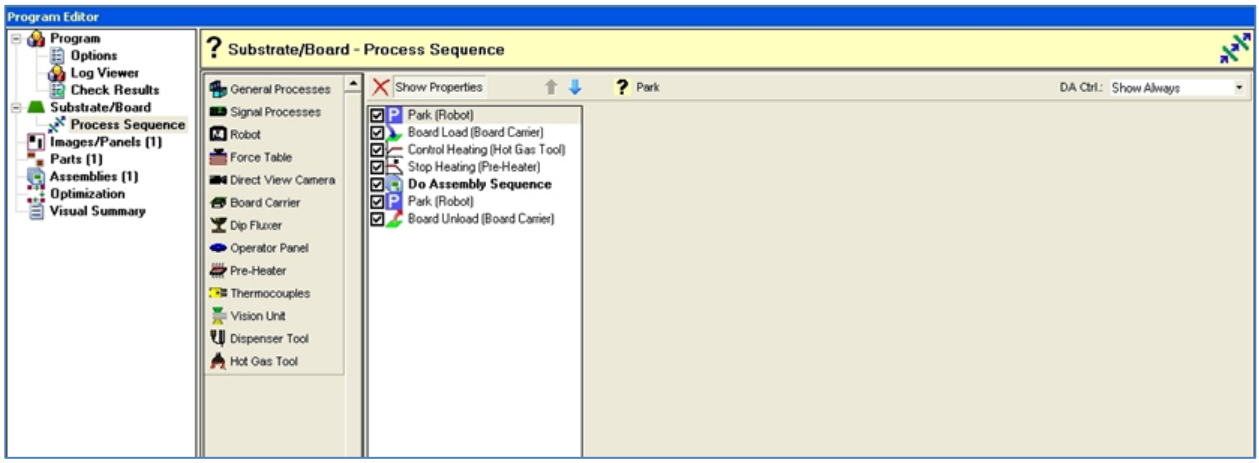


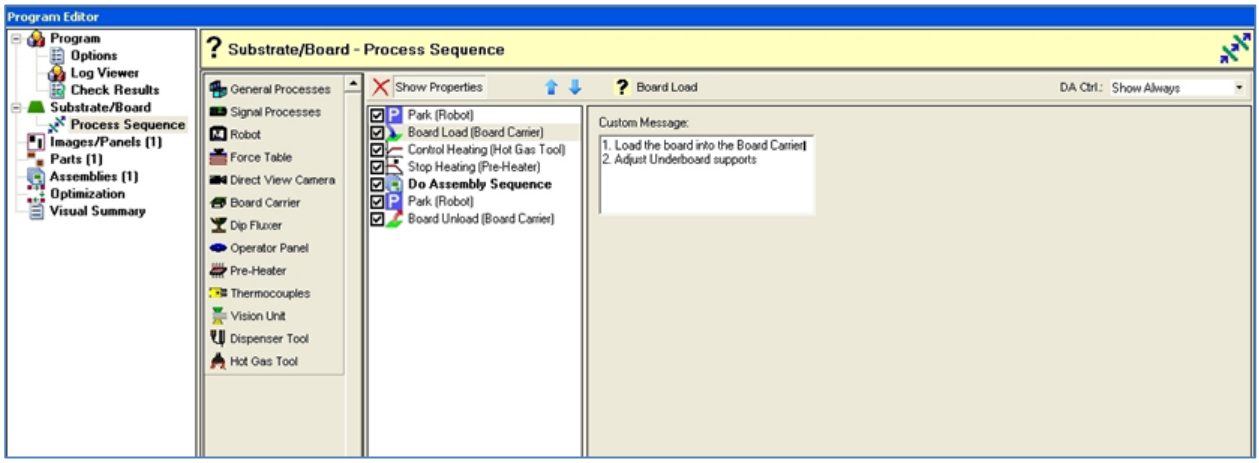


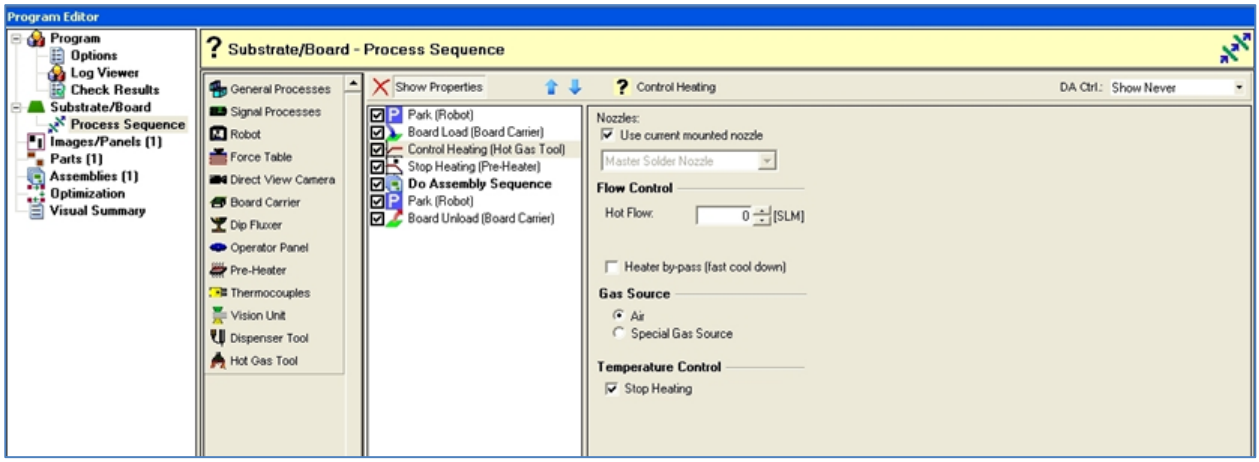

Program Editor
Program
Options
Log Viewer
Check Results
Substrate/Board
Process Sequence
Images/Panels (1)
Parts (1)
Assemblies (1)
Optimization
Visual Summary
Program - Log Viewer
Drag a column header here to group by that column.
Date
Time
Log Message
User
Error
Source
Res...
Retry
Skip
Stop
1/20/2005 2:20:35 PM Cycle 1 completed to Execution
1/20/2005 2:20:35 PM Program finished successfully to Execution
1/20/2005 2:20:34 PM User Error Response to Manual Board Unload Execution
1/20/2005 2:14:48 PM User Error Response to Teach Dot Position 4 of 4 Execution
1/20/2005 2:14:44 PM User Error Response to Teach Dot Position 3 of 4 Execution
1/20/2005 2:14:39 PM User Error Response to Teach Dot Position 2 of 4 Execution
1/20/2005 2:14:37 PM User Error Response to Teach Dot Position 1 of 4 Execution
1/20/2005 2:14:20 PM User Error Response to Direct Access|Configure Process P... Execution
1/20/2005 2:14:01 PM User Error Response to Teach Work Position|||Current Rot... Execution
1/20/2005 2:13:50 PM User Error Response to Change Nozzle:Needle (Dispenser ... Execution
1/20/2005 2:13:47 PM User Error Response to Change Tool: Dispenser Tool (Disp... Execution
1/20/2005 2:13:43 PM User Error Response to Remove Nozzle:Site Cleaning Nozz... Execution
1/20/2005 2:13:36 PM User Error Response to Direct Access|Select Tool/Nozzle Execution
1/20/2005 2:13:31 PM User Error Response to Manual Board Load Execution
1/20/2005 2:13:27 PM User Error Response to Direct Access|Configure Process P... Execution
1/20/2005 2:13:17 PM Program started to Execution
1/20/2005 2:13:15 PM User Error Response to Select Process Lists Execution
1/20/2005 2:13:09 PM User Error Response to Select or Copy Part Types|Direct A... Execution
1/20/2005 2:12:05 PM Program finished (failed or stopped) software Execution
1/20/2005 2:12:05 PM User Error Response software Program Paused Execution
1/20/2005 2:09:27 PM User Error Response software Teach Dot Position 4 of 4 Execution
1/20/2005 2:09:24 PM User Error Response software Teach Dot Position 3 of 4 Execution
1/20/2005 2:09:20 PM User Error Response software Teach Dot Position 2 of 4 Execution
1/20/2005 2:09:18 PM User Error Response software Teach Dot Position 1 of 4 Execution
1/20/2005 2:08:42 PM User Error Response software Teach Work Position|||Current Rot... Execution
1/20/2005 2:08:22 PM User Error Response software Change Nozzle:Needle (Dispenser ... Execution
1/20/2005 2:08:18 PM User Error Response software Change Tool: Dispenser Tool (Disp... Execution
1/20/2005 2:08:08 PM User Error Response software Remove Nozzle:Site Cleaning Nozz... Execution
1/20/2005 2:07:59 PM User Error Response software Manual Board Load Execution
1/20/2005 2:07:57 PM Program started software Execution
1/20/2005 2:07:56 PM User Error Response software Select Process Lists Execution
1/20/2005 8:55:33 AM User Error Response software Direct Access|Select Tool/Nozzle Execution
1/20/2005 8:55:33 AM Program finished (failed or stopped) software Execution
1/20/2005 8:55:01 AM User Error Response software Manual Board Load Execution
1/20/2005 8:54:59 AM User Error Response software Direct Access|Configure Process P... Execution
1/20/2005 8:54:56 AM Program started software Execution
1/20/2005 8:54:55 AM User Error Response software Select Process Lists Execution
1/20/2005 8:54:50 AM User Error Response software Select or Copy Part Types|Direct A... Execution

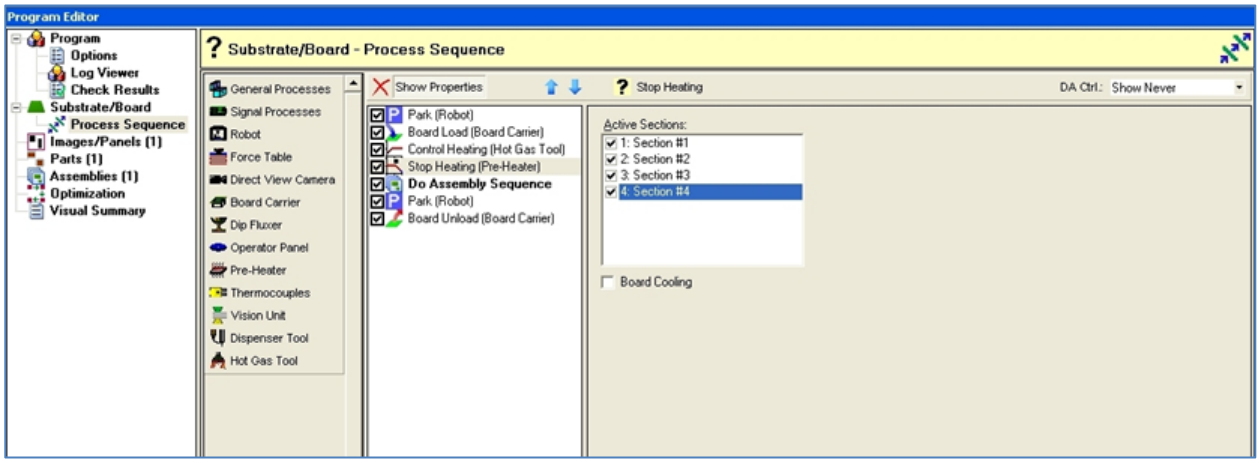

Program Editor
Program
Options
Log Viewer
Check Results
Substrate/Board
Process Sequence
Images/Panels (1)
Parts (1)
Assemblies (1)
Optimization
Visual Summary
Program - Program Check Results
Description
Done

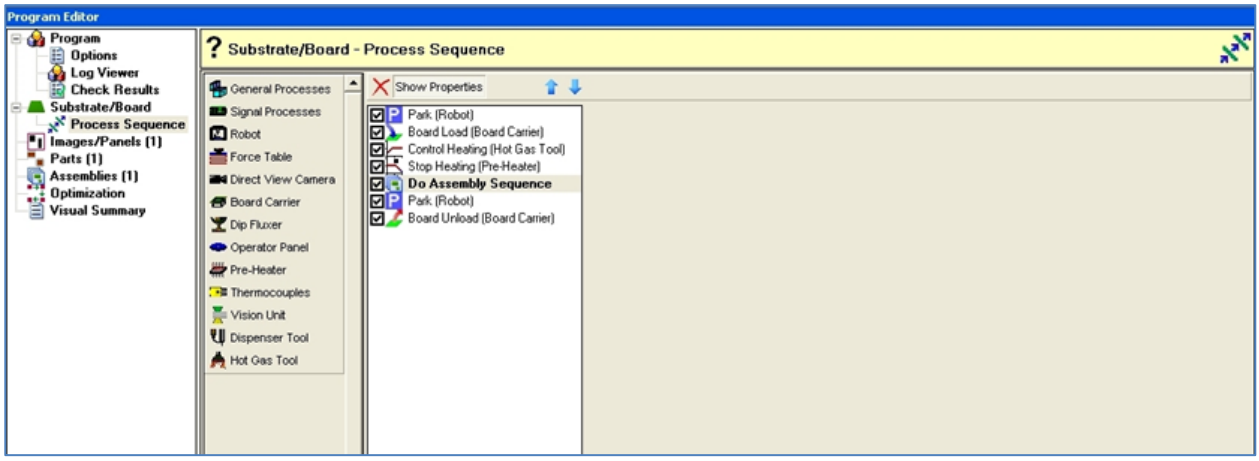

Program Editor
Program
Options
Log Viewer
Check Results
Substrate/Board
Process Sequence
Images/Panels (1)
Parts (1)
Assemblies (1)
Optimization
Visual Summary
Substrate/Board - Dimensions & BZF
Substrate/Board Dimensions
Length (X): 500.000 [mm]
Width (Y): 500.000 [mm]
Thickness (Z): 1.600 [mm]
Board Zero Frame (BZF)
X: 0.000 [mm]
Y: 0.000 [mm]
Z: 1.600 [mm]
Theta: 0.00 [deg]
Set Position...

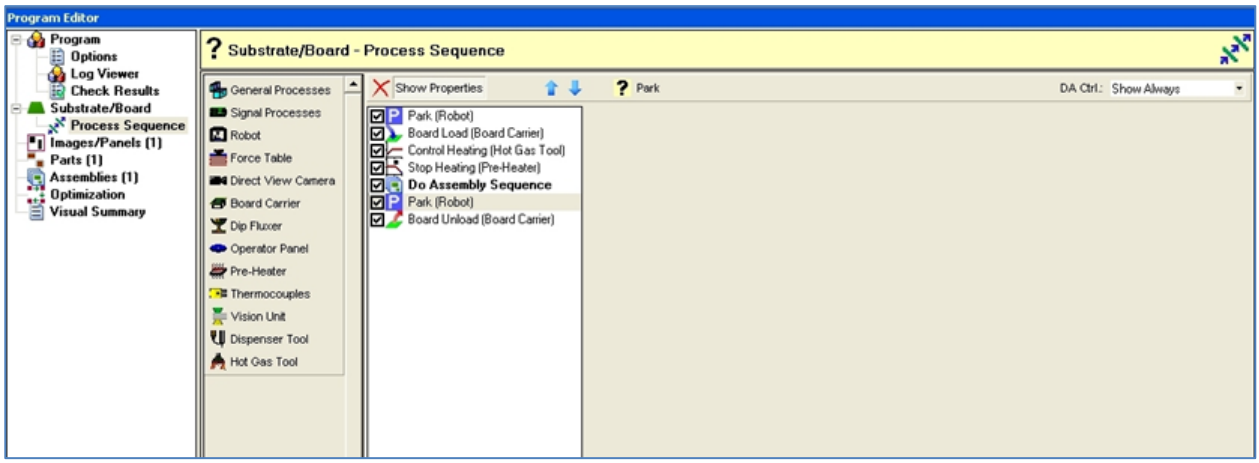

Program Editor
Program
Options
Log Viewer
Check Results
Substrate/Board
Process Sequence
Images/Panels (1)
Parts (1)
Assemblies (1)
Optimization
Visual Summary
Substrate/Board - Process Sequence
General Processes
Signal Processes
Robot
Force Table
Direct View Camera
Board Carrier
Dip Fluxer
Operator Panel
Pre-Heater
Thermocouples
Vision Unit
Dispenser Tool
Hot Gas Tool
Show Properties
Park
DA Ctrl.: Show Always
Park (Robot)
Board Load (Board Carrier)
Control Heating (Hot Gas Tool)
Stop Heating (Pre-Heater)
Do Assembly Sequence
Park (Robot)
Board Unload (Board Carrier)

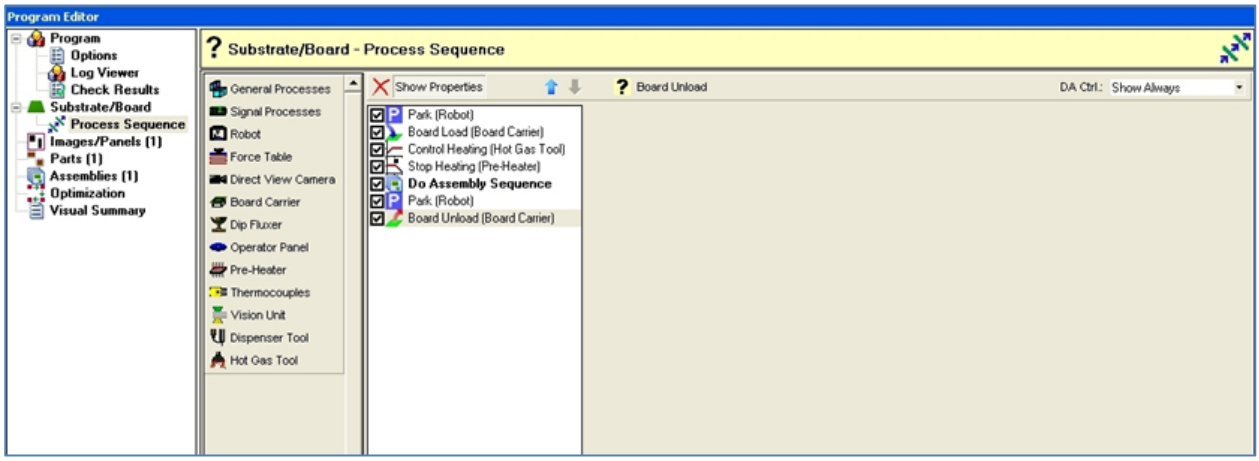

Program Editor
Program
Options
Log Viewer
Check Results
Substrate/Board
Process Sequence
Images/Panels (1)
Parts (1)
Assemblies (1)
Optimization
Visual Summary
Substrate/Board - Process Sequence
General Processes
Signal Processes
Robot
Force Table
Direct View Camera
Board Carrier
Dip Fluxer
Operator Panel
Pre-Heater
Thermocouples
Vision Unit
Dispenser Tool
Hot Gas Tool
Show Properties
Board Load
DA Ctrl.: Show Always
Park (Robot)
Board Load (Board Carrier)
Control Heating (Hot Gas Tool)
Stop Heating (Pre-Heater)
Do Assembly Sequence
Park (Robot)
Board Unload (Board Carrier)
Custom Message:
1. Load the board into the Board Carrier
2. Adjust Underboard supports

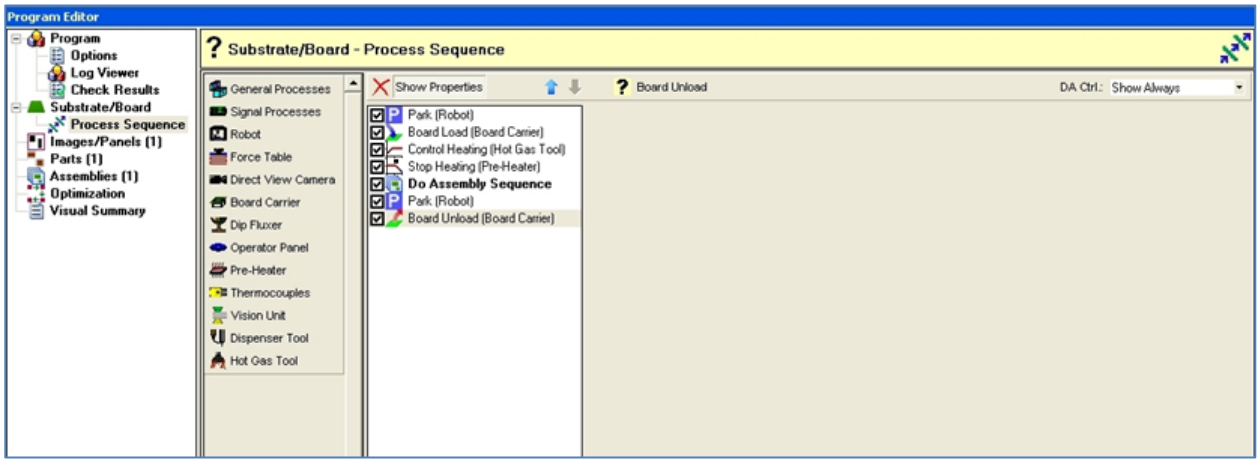

Program Editor
Program
Options
Log Viewer
Check Results
Substrate/Board
Process Sequence
Images/Panels (1)
Parts (1)
Assemblies (1)
Optimization
Visual Summary
Substrate/Board - Process Sequence
General Processes
Signal Processes
Robot
Force Table
Direct View Camera
Board Carrier
Dip Fluxer
Operator Panel
Pre-Heater
Thermocouples
Vision Unit
Dispenser Tool
Hot Gas Tool
Show Properties
Control Heating
DA Ctrl.: Show Never
Park (Robot)
Board Load (Board Carrier)
Control Heating (Hot Gas Tool)
Stop Heating (Pre-Heater)
Do Assembly Sequence
Park (Robot)
Board Unload (Board Carrier)
Nozzles:
Use current mounted nozzle
Master Solder Nozzle
Flow Control
Hot Flow:
0
[SLM]
Heater by-pass (fast cool down)
Gas Source
Air
Special Gas Source
Temperature Control
Stop Heating

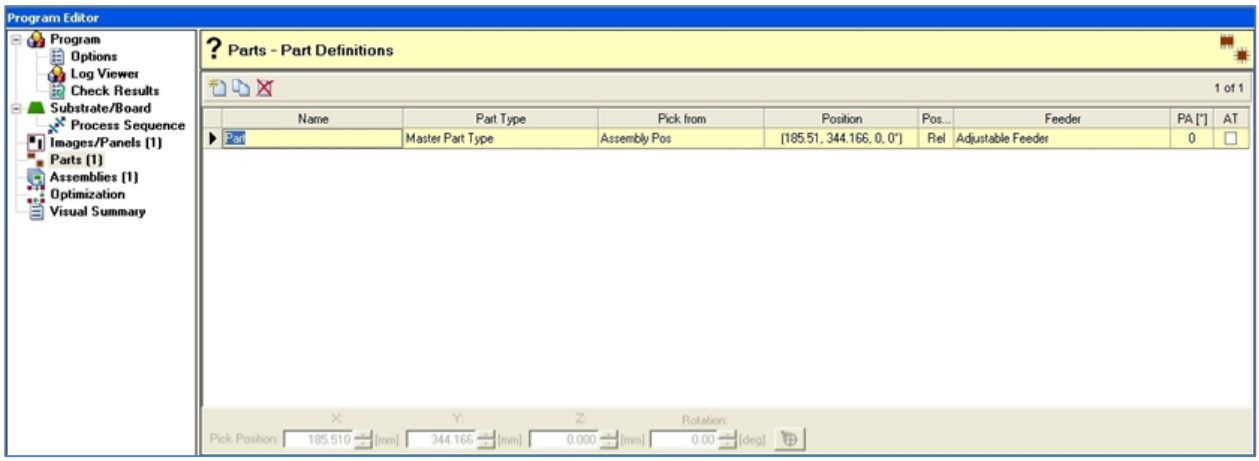

Program Editor
Program
Options
Log Viewer
Check Results
Substrate/Board
Process Sequence
Images/Panels (1)
Parts (1)
Assemblies (1)
Optimization
Visual Summary
Substrate/Board - Process Sequence
General Processes
Signal Processes
Robot
Force Table
Direct View Camera
Board Carrier
Dip Fluxer
Operator Panel
Pre-Heater
Thermocouples
Vision Unit
Dispenser Tool
Hot Gas Tool
Show Properties
Stop Heating
DA Ctrl.: Show Never
Park (Robot)
Board Load (Board Carrier)
Control Heating (Hot Gas Tool)
Stop Heating (Pre-Heater)
Do Assembly Sequence
Park (Robot)
Board Unload (Board Carrier)
Active Sections:
1: Section #1
2: Section #2
3: Section #3
4: Section #4
Board Cooling

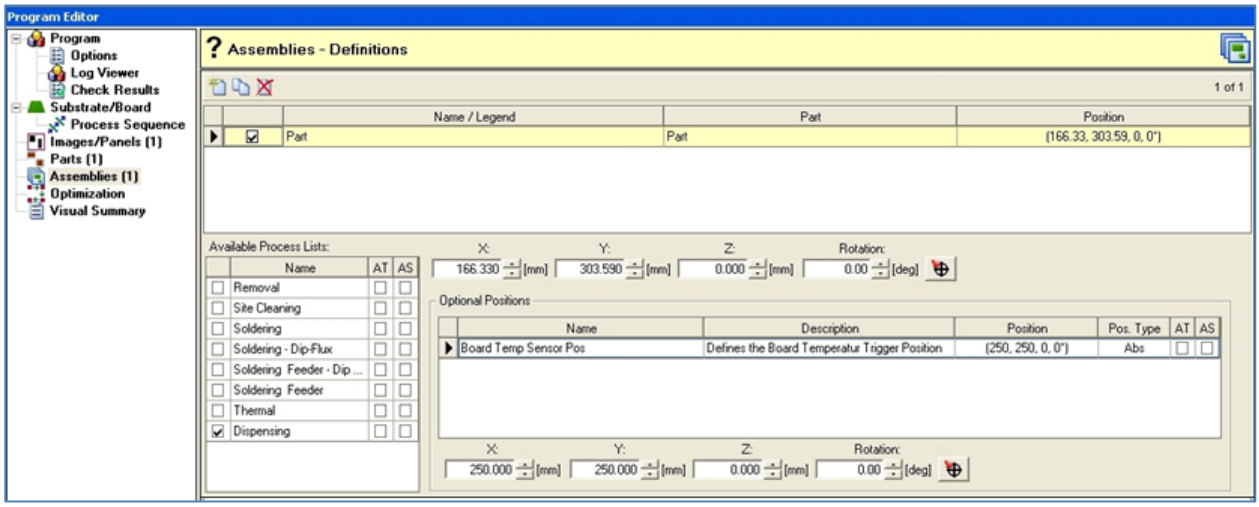

Program Editor
Program
Options
Log Viewer
Check Results
Substrate/Board
Process Sequence
Images/Panels (1)
Parts (1)
Assemblies (1)
Optimization
Visual Summary
Substrate/Board - Process Sequence
General Processes
Signal Processes
Robot
Force Table
Direct View Camera
Board Carrier
Dip Fluxer
Operator Panel
Pre-Heater
Thermocouples
Vision Unit
Dispenser Tool
Hot Gas Tool
Show Properties
Park (Robot)
Board Load (Board Carrier)
Control Heating (Hot Gas Tool)
Stop Heating (Pre-Heater)
Do Assembly Sequence
Park (Robot)
Board Unload (Board Carrier)

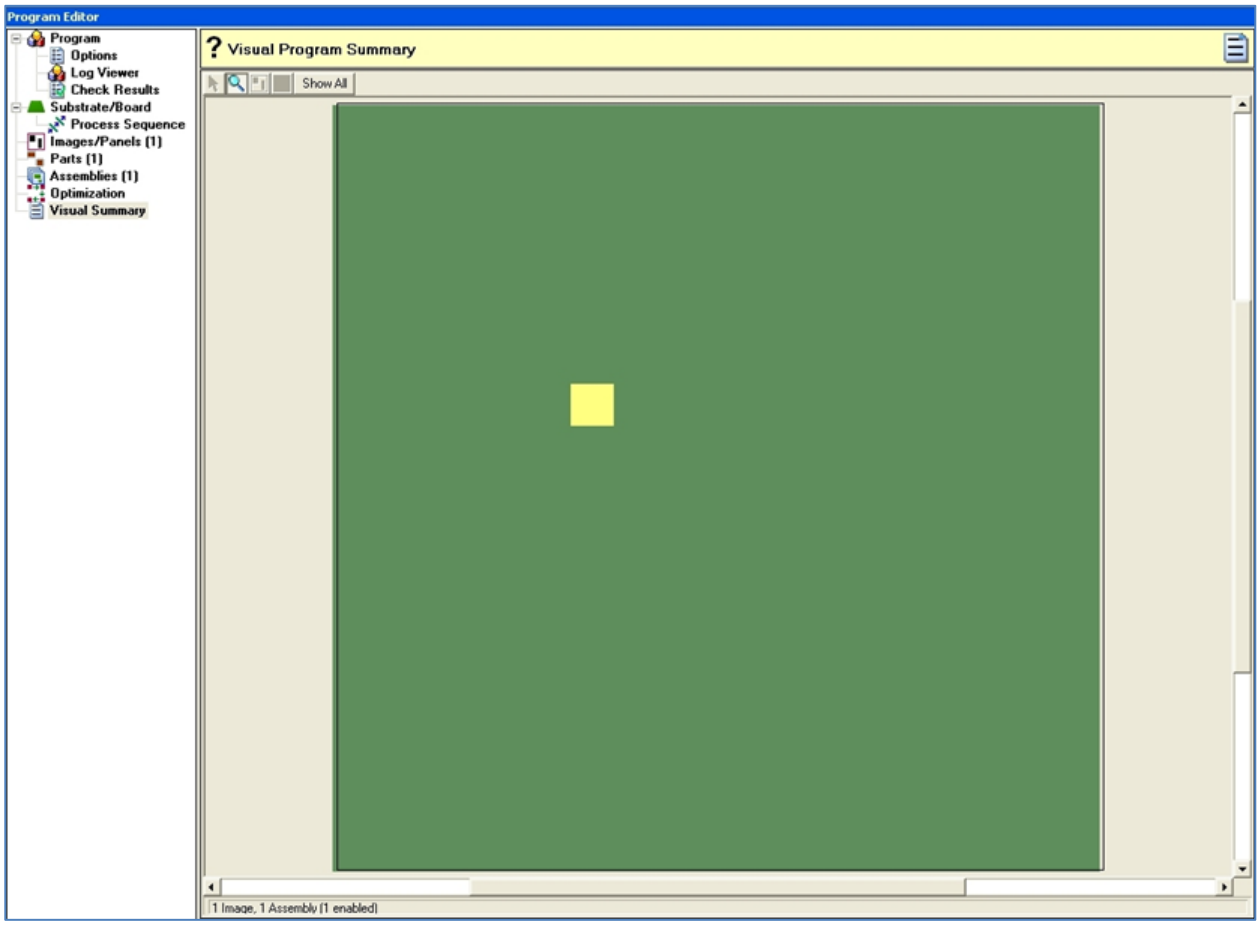

Program Editor
Program
Options
Log Viewer
Check Results
Substrate/Board
Process Sequence
Images/Panels (1)
Parts (1)
Assemblies (1)
Optimization
Visual Summary
Substrate/Board - Process Sequence
General Processes
Signal Processes
Robot
Force Table
Direct View Camera
Board Carrier
Dip Fluxer
Operator Panel
Pre-Heater
Thermocouples
Vision Unit
Dispenser Tool
Hot Gas Tool
Show Properties
Park
DA Ctrl.: Show Always
Park (Robot)
Board Load (Board Carrier)
Control Heating (Hot Gas Tool)
Stop Heating (Pre-Heater)
Do Assembly Sequence
Park (Robot)
Board Unload (Board Carrier)


Program Editor
Program
Options
Log Viewer
Check Results
Substrate/Board
Process Sequence
Images/Panels (1)
Parts (1)
Assemblies (1)
Optimization
Visual Summary
Substrate/Board - Process Sequence
General Processes
Signal Processes
Robot
Force Table
Direct View Camera
Board Carrier
Dip Fluxer
Operator Panel
Pre-Heater
Thermocouples
Vision Unit
Dispenser Tool
Hot Gas Tool
Show Properties
Board Unload
DA Ctrl.: Show Always
Park (Robot)
Board Load (Board Carrier)
Control Heating (Hot Gas Tool)
Stop Heating (Pre-Heater)
Do Assembly Sequence
Park (Robot)
Board Unload (Board Carrier)


Program Editor
Program
Options
Log Viewer
Check Results
Substrate/Board
Process Sequence
Images/Panels (1)
Parts (1)
Assemblies (1)
Optimization
Visual Summary
Substrate/Board - Process Sequence
General Processes
Signal Processes
Robot
Force Table
Direct View Camera
Board Carrier
Dip Fluxer
Operator Panel
Pre-Heater
Thermocouples
Vision Unit
Dispenser Tool
Hot Gas Tool
Show Properties
Board Unload
DA Ctrl.: Show Always
Park (Robot)
Board Load (Board Carrier)
Control Heating (Hot Gas Tool)
Stop Heating (Pre-Heater)
Do Assembly Sequence
Park (Robot)
Board Unload (Board Carrier)

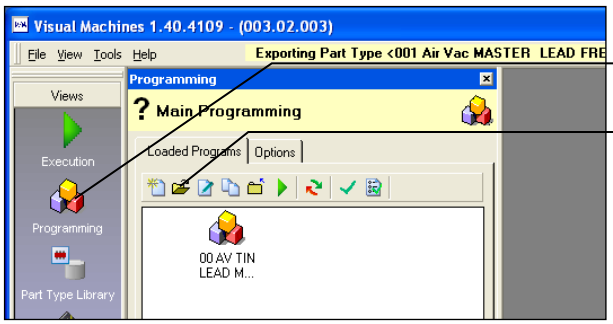

Program Editor
Program
Options
Log Viewer
Check Results
Substrate/Board
Process Sequence
Images/Panels (1)
Parts (1)
Assemblies (1)
Optimization
Visual Summary
Parts - Part Definitions
1 of 1
Name
Part Type
Pick from
Position
Pos...
Feeder
PA [°]
AT
Part
Master Part Type
Assembly Pos
(185.51, 344.166, 0, 0°)
Rel
Adjustable Feeder
0
Pick Position:
X:
185.510
Y:
344.166
Z:
0.000
Rotation:
0.00
[mm]
[deg]


Program Editor
Program
Options
Log Viewer
Check Results
Substrate/Board
Process Sequence
Images/Panels (1)
Parts (1)
Assemblies (1)
Optimization
Visual Summary
Assemblies - Definitions
1 of 1
Name / Legend
Part
Position
Part
Part
(166.33, 303.59, 0, 0°)
Available Process Lists:
Name
AT
AS
Removal
Site Cleaning
Soldering
Soldering - Dip-Flux
Soldering Feeder - Dip ...
Soldering Feeder
Thermal
Dispensing
X:
Y:
Z:
Rotation:
166.330 [mm]
303.590 [mm]
0.000 [mm]
0.00 [deg]
Optional Positions
Name
Description
Position
Pos. Type
AT
AS
Board Temp Sensor Pos
Defines the Board Temperatur Trigger Position
(250, 250, 0, 0°)
Abs
X:
Y:
Z:
Rotation:
250.000 [mm]
250.000 [mm]
0.000 [mm]
0.00 [deg]


Program Editor
Program
Options
Log Viewer
Check Results
Substrate/Board
Process Sequence
Images/Panels (1)
Parts (1)
Assemblies (1)
Optimization
Visual Summary
Visual Program Summary
Show All
1 Image, 1 Assembly (1 enabled)

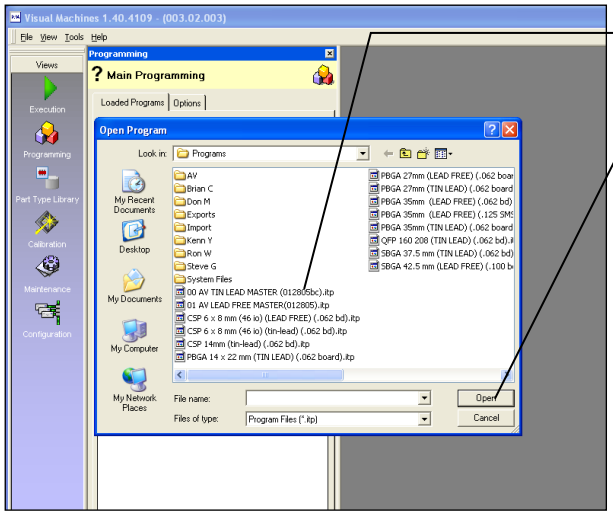
24 Appendix: Exporting and Importing Programs

Programs and part types can be transferred form one machine to another using the Export/Import function.



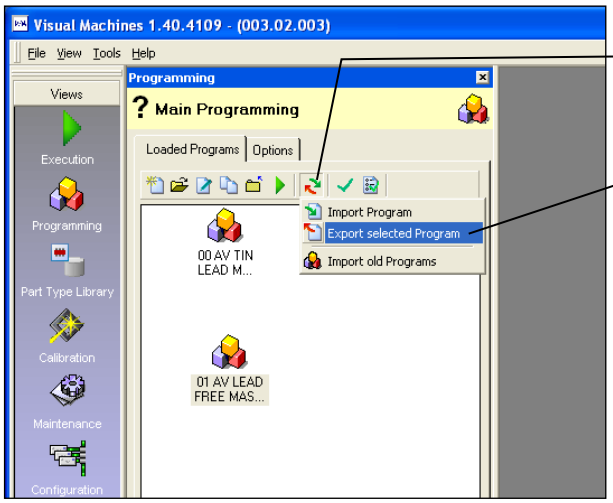
Go to Programming

Open a program



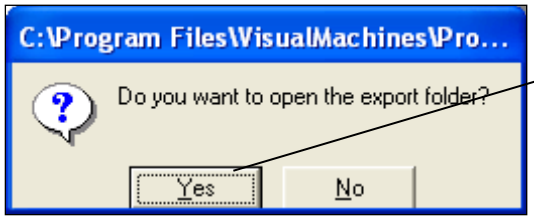
Highlight program to copy

Click on Open (or double click on program.

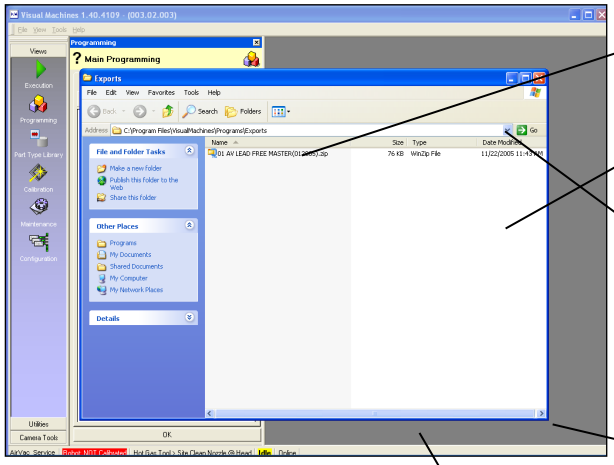


Click on Import and Export Program Icon.

Click on Export selected Program.



Click on Yes to "Do you want to open the export folder?".



Highlight program(s) to copy.

Right click mouse and select copy.

Use arrow of Address bar to locate and select drive to be used to transfer program(s).

For thumb drive, right click and select paste.

For CD drive, right click and select paste. Click on "Write these files to CD." Follow directions for CD writer.

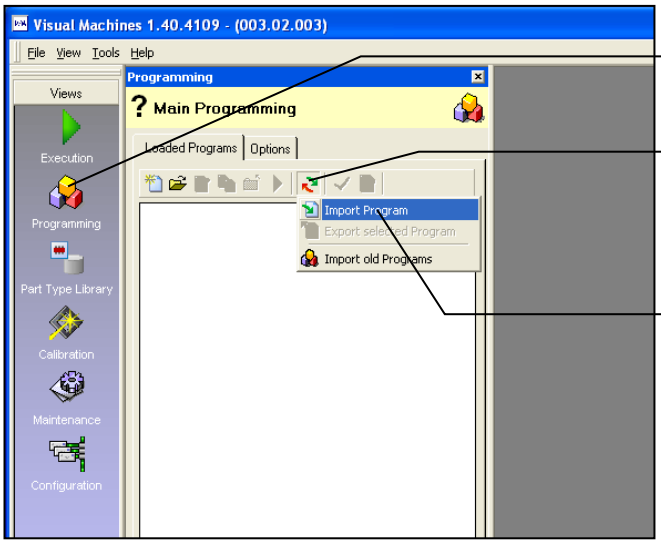
Close screen.

For thumb drive, go to "Safely Remove Hardware" at bottom right side of screen.

Click on Stop.

Remove thumb drive or disk when finished.

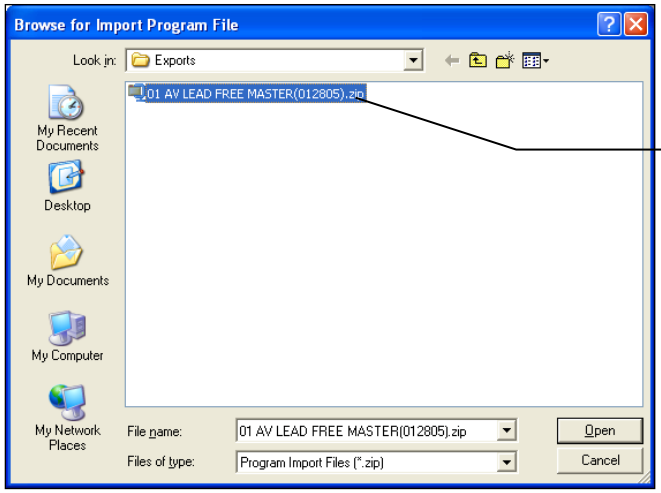
Click on Close. Then Ok.



Go to Programming View.

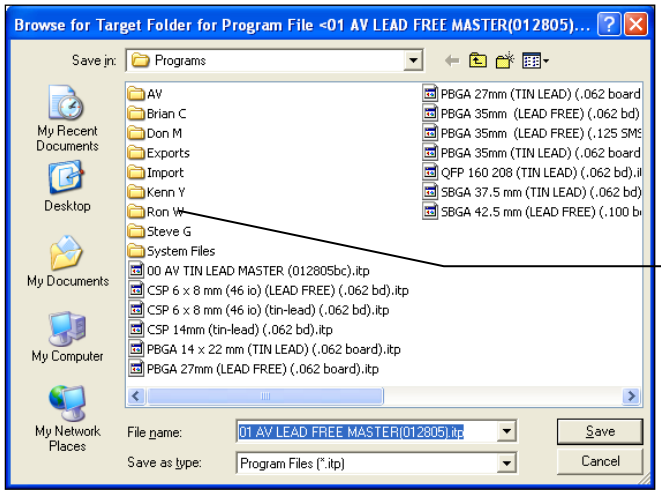
Click on Import and Export Program Icon.

Select Import Program.

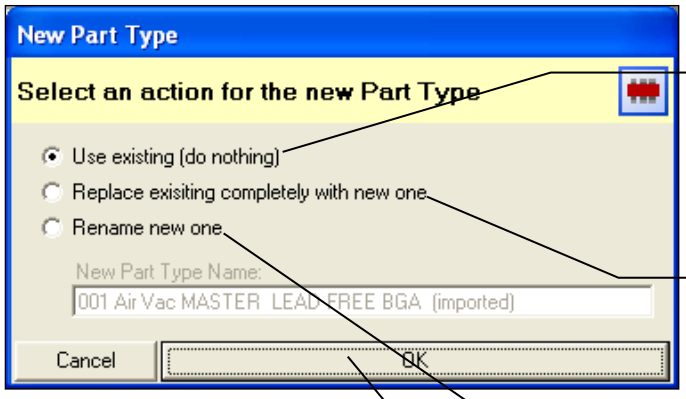


Highlight program to transfer.

Double click on program or click on Save.



Select folder to copy into.

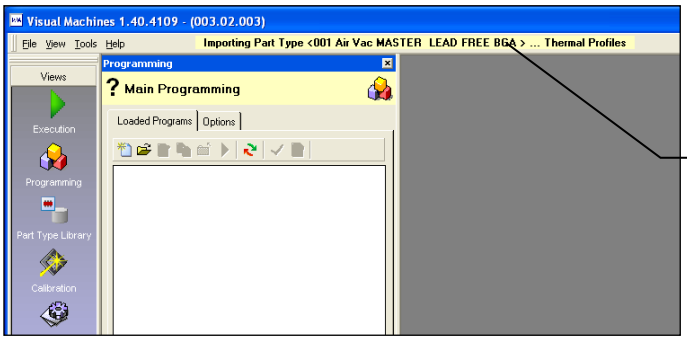


Select part type to copy into. Preferred Path.

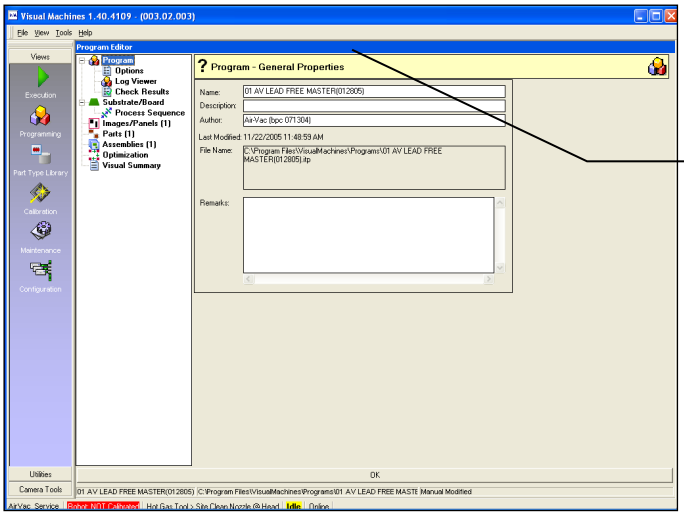
Select if you wish to write over part type with same name.

Select if you wish to save with a different part type name.

Click Ok.



Program will be imported.



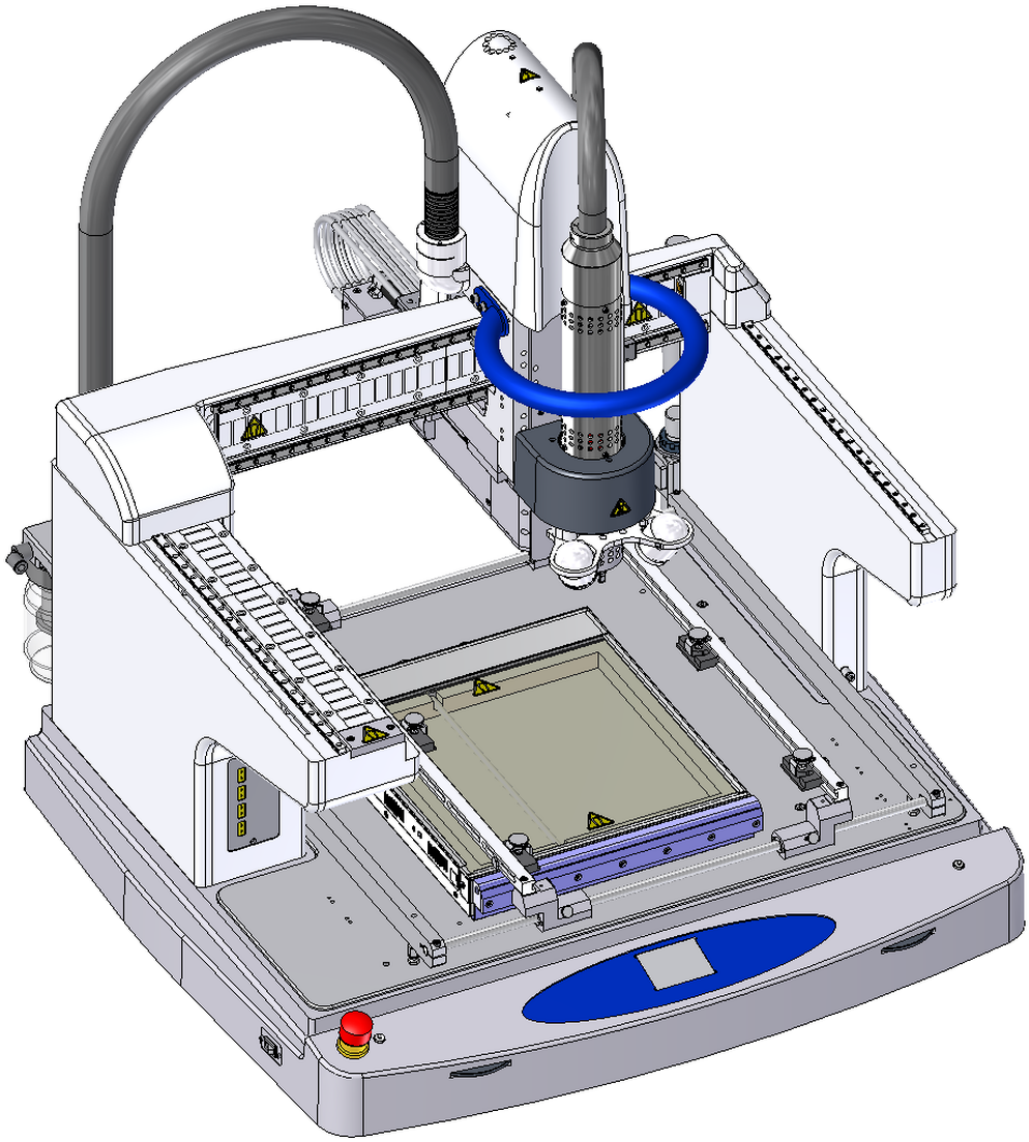
The program will be loaded to the Program Editor of the Programming View.

25 Parts Lists, Electrical & Pneumatic Documentation

25 Parts Lists, Electrical & Pneumatic Documentation

ONYX 29

Series 7 208V OBC 70mm



Rev. 1.0
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16.04.2020

Table of Contents

1 003.07.XXX ONYX 29 Series 7 208V OBC 70mm

Initial date: 16.12.2019 / SK Change index: 0 / 16.12.2019 / SK

Pos	Amount	Unit	Spare part class	Article number	Article description
1	1.00	pc.	-	200.01.292	Mounting plate
301	1.00	pc.	3	109.02.013	ONYX 29 AIR-VAC Operator Panel Cover
304	1.00	pc.	3	110.08.014	PC Network Card GigE dual
601	1.00	pc.	-	300.11.912	IP-500 Platform
602	1.00	pc.	-	300.00.394	Manual motion
603	1.00	pc.	-	300.01.040	Thermocouple Module with 4 Ports
604	1.00	pc.	-	300.04.439	Field illumination (adjustable)
605	1.00	pc.	-	300.12.769	X-Z-Axis 230mm
606	1.00	pc.	-	300.11.914	Advanced Solder Head
607	1.00	pc.	-	300.15.426	Vision System with MFOV
609	1.00	pc.	-	300.16.410	Electric module ONYX29 S7 208V 60Hz
610	1.00	pc.	-	300.11.922	Cable List
611	1.00	pc.	-	300.04.431	Thermocouple Sensor Type K cpl.
701	1.00	pc.	-	700.01.000	VisualMachines Software License

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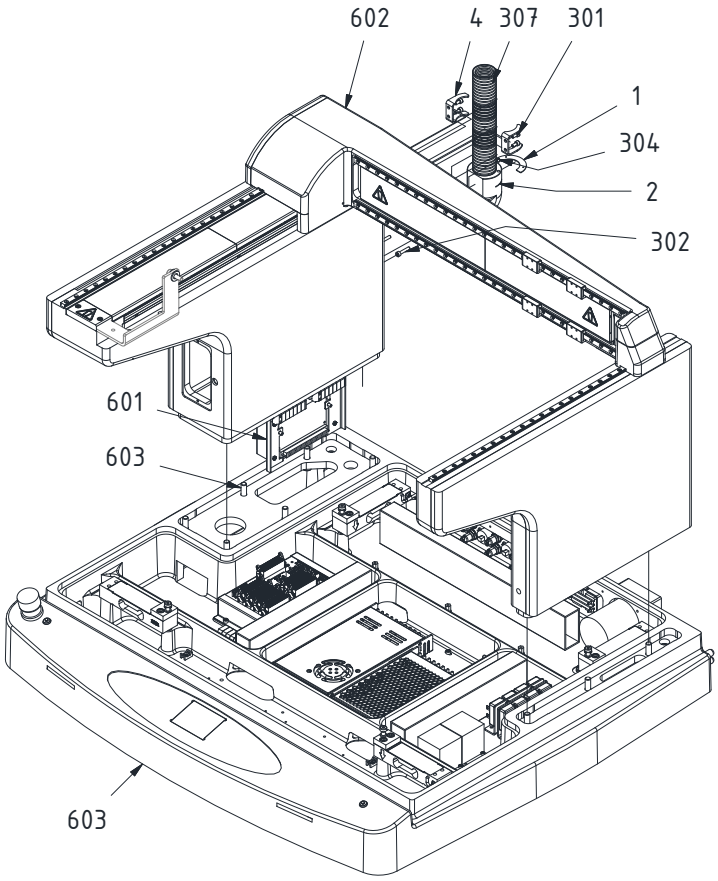
1.1 300.11.912 IP-500 Platform



Initial date: 28.06.2017 / SK Change index: 0 / 17.01.2020 / AG

Pos	Amount	Unit	Spare part class	Article number	Article description
1	1.00	pc.	-	200.01.157	Segment 29
2	1.00	pc.	-	200.01.408	Corrugated Pipe Connector 29
4	2.00	pc.	-	200.02.393	Clip Corrugated Pipe
301	4.00	pc.	-	100.00.028	Cyl. Screw M4 x 8 BN 3
302	2.00	pc.	-	100.00.033	Cyl. Screw M4 x 20 BN 3
304	2.00	pc.	-	100.00.206	Threaded Pin M3x 6 with Tip BN 29
307	1.20	m	-	109.19.024	Corrugated Pipe PISG-29B
601	1.00	pc.	-	300.05.133	Mounting COP
602	1.00	pc.	-	300.12.764	X-Y-Portal
603	1.00	pc.	-	300.11.913	Base

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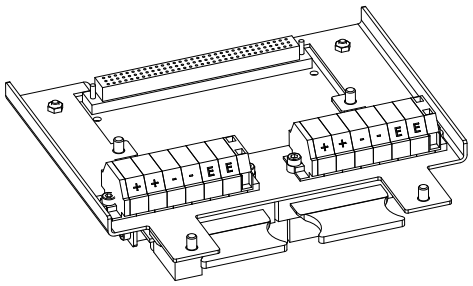
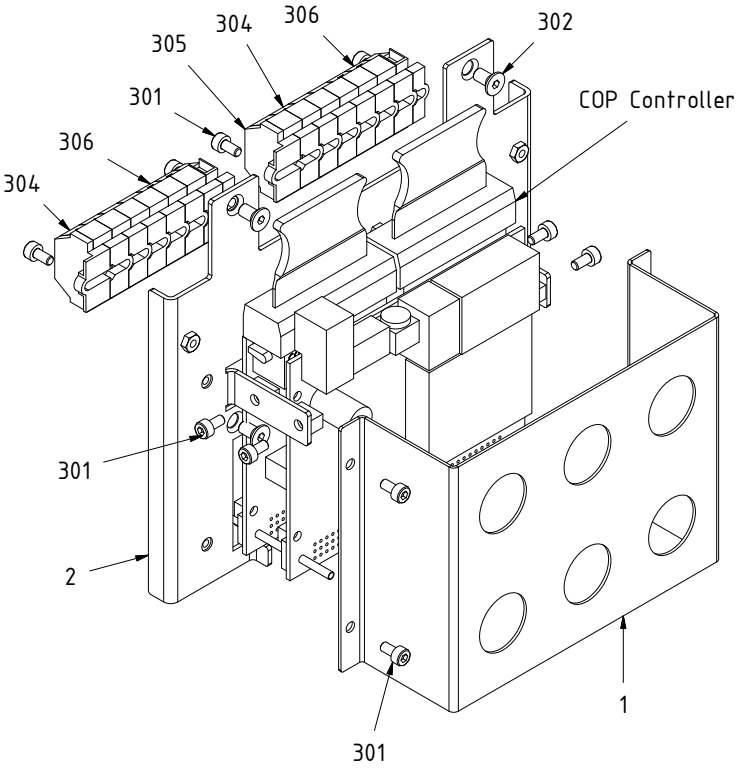
1.1.1 300.05.133 Mounting COP





Initial date: 04.07.2012 / WB Change index: / 17.01.2020 / AG

Pos	Amount	Unit	Spare part class	Article number	Article description
1	1.00	pc.	-	200.10.238	Cover COP
2	1.00	pc.	-	200.10.239	Holder COP
301	12.00	pc.	-	100.00.015	Cyl. Screw M3 x 6 BN 3
302	4.00	pc.	-	100.00.129	Countersunk Screw M4x 8 BN 21
303	2.00	pc.	-	109.20.058	Stackable Single Clamp grey
304	8.00	pc.	-	109.20.060	Stackable Single Clamp orange
305	2.00	pc.	-	109.20.061	End Plate grey
306	4.00	pc.	-	109.20.096	Stackable Single Clamp yellow-green
307	6.00	pc.	-	109.20.097	Crossbridge Isolated grey

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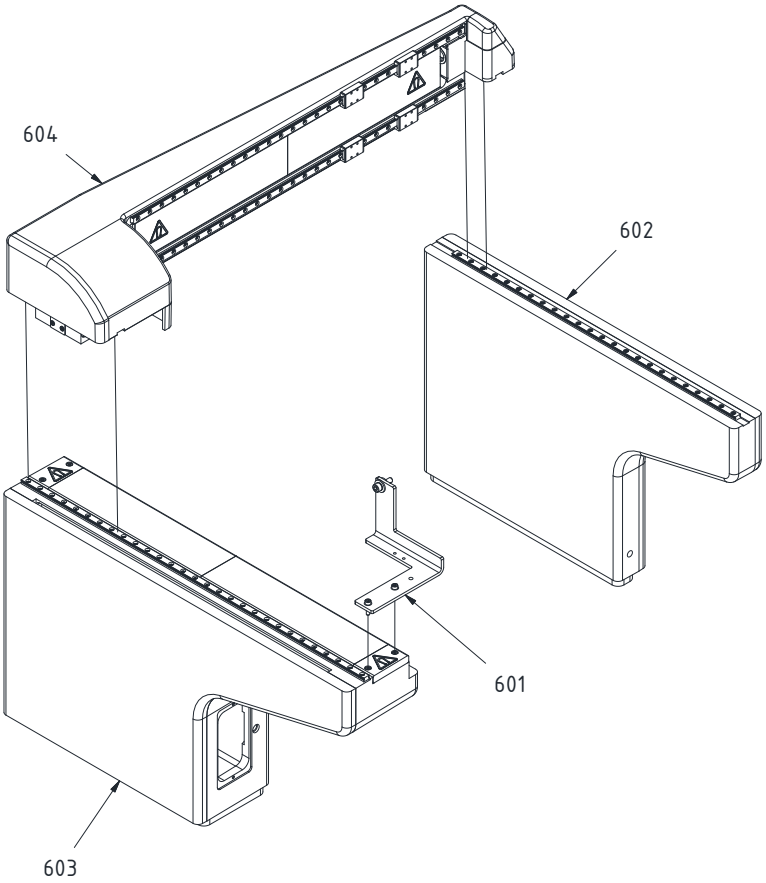
1.1.2 300.12.764 X-Y-Portal



Initial date: 15.12.2017 / PD Change index: 0 / 03.04.2020 / MN

Pos	Amount	Unit	Spare part class	Article number	Article description
601	1.00	pc.	-	300.00.431	Transport Safety Lock IP-500
602	1.00	pc.	-	300.01.013	Side Part right
603	1.00	pc.	-	300.12.765	Side Part left
604	1.00	pc.	-	300.12.766	Y-Beam

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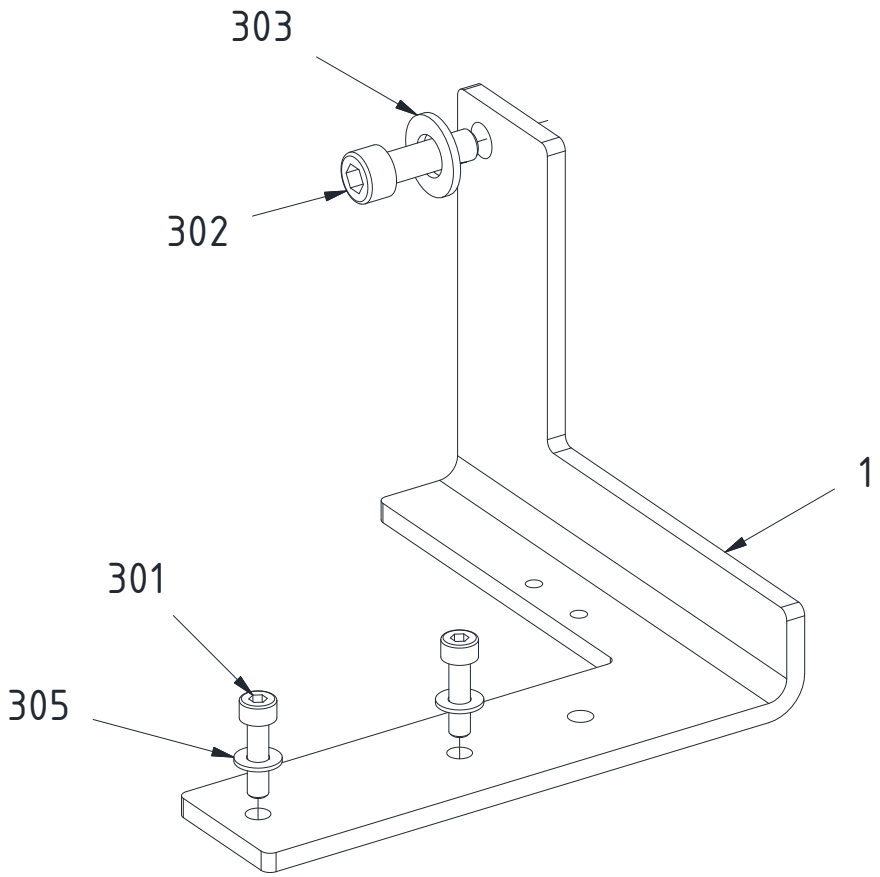
1.1.2.1 300.00.431 Transport Safety Lock IP-500



Initial date: 16.01.2004 / EG Change index: 0 / 14.01.2020 / AG

Pos	Amount	Unit	Spare part class	Article number	Article description
1	1.00	pc.	-	200.00.868	Transport Safety Lock IP-500
301	2.00	pc.	-	100.00.243	Cyl. screw M4 x 16 Tufl. BN 8706
302	1.00	pc.	-	100.00.350	Cyl. Screw M6 x 20 Tufl. BN 8706
303	1.00	pc.	-	100.04.047	Lock Washer M6 DIN 7980 BN 774
304	2.00	pc.	-	100.04.026	Flat Washer M6 VSM 13904 BN 715
305	2.00	pc.	-	100.04.031	Lock Washer M4 DIN 127 BN 762

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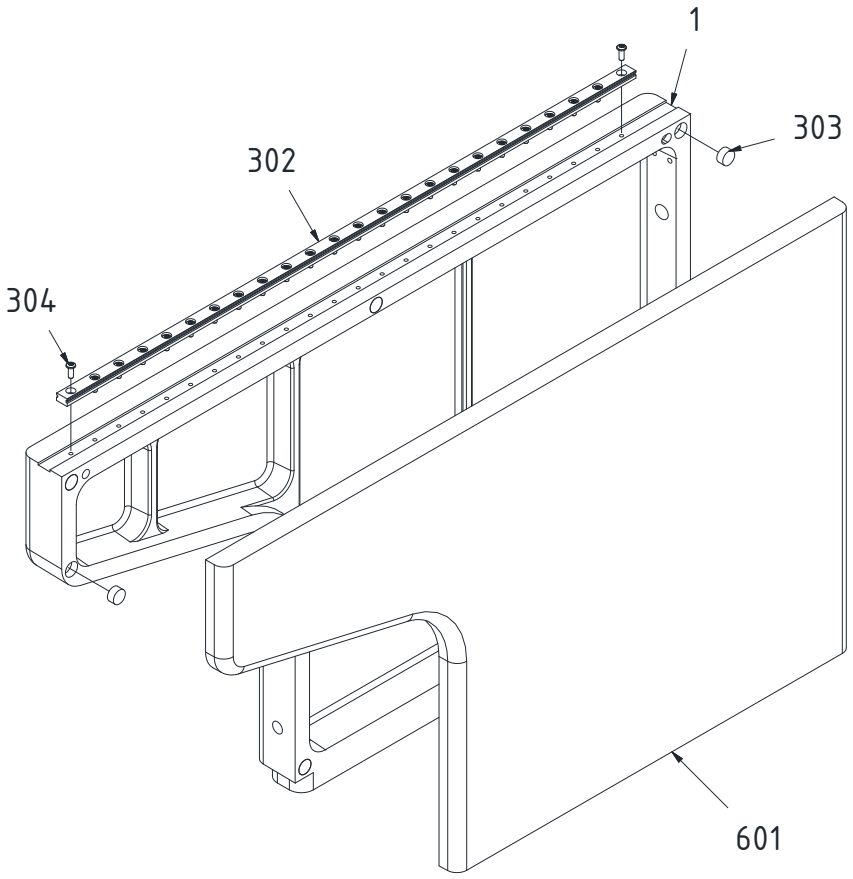
1.1.2.2 300.01.013 Side Part right



Initial date: 02.05.2006 / CL Change index: 0 / 17.01.2020 / AG

Pos	Amount	Unit	Spare part class	Article number	Article description
1	1.00	pc.	-	200.02.349	Side Part right
302	1.00	pc.	3	102.00.015	Linear Guide Rail MN 9-475-G3-V0
303	7.00	pc.	-	109.11.008	Disk Magnet d10x5 NdFeB Nickel
304	24.00	pc.	-	100.13.045	Lens Head Screw Torx M3x 8 BN 6404
305	0.10	g	-	115.14.003	Loctite 480 20g, Instant Glue
601	1.00	pc.	-	300.01.080	Cover right cpl.

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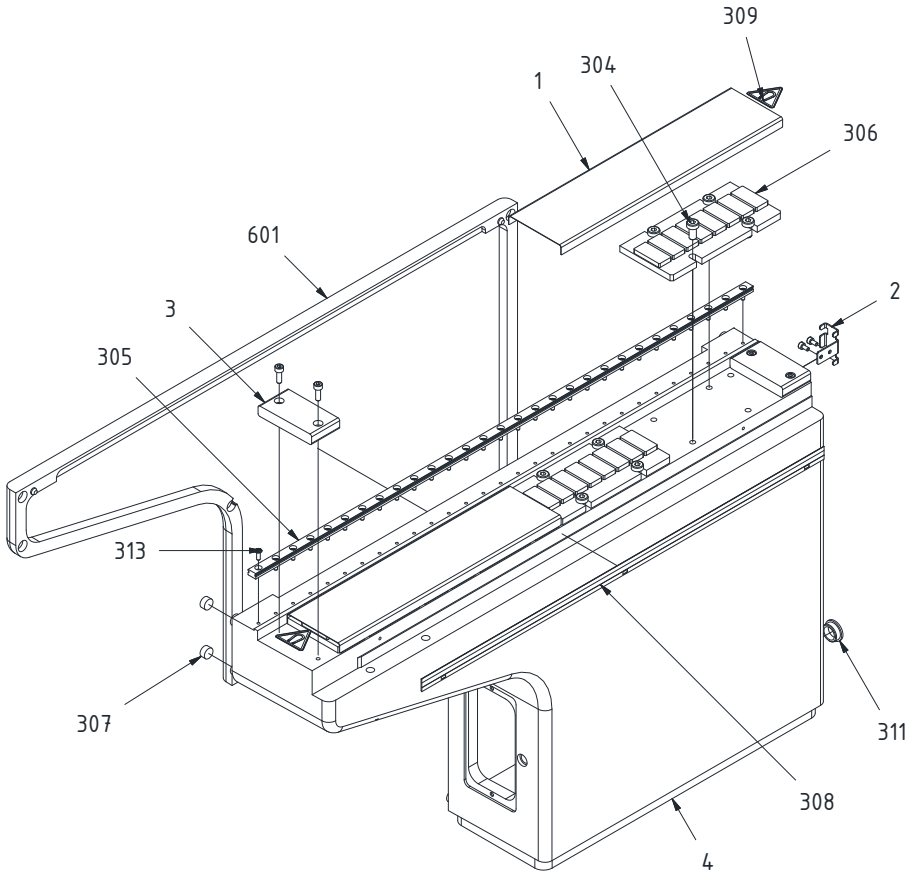
1.1.2.3 300.12.765 Side Part left



Initial date: 15.12.2017 / PD Change index: 0 / 03.04.2020 / MN

Pos	Amount	Unit	Spare part class	Article number	Article description
1	2.00	pc.	-	200.00.790	Motor Cover L=256
2	1.00	pc.	-	200.00.796	Cable Clamp
3	2.00	pc.	-	200.00.871	End Plate
4	1.00	pc.	-	200.02.336	Side Part left
301	4.00	pc.	-	100.09.013	Cyl. screw M4 x 12 BN 612
303	2.00	pc.	-	100.09.005	Cyl. Screw M3 x 6 BN 612
304	16.00	pc.	-	100.00.112	Cyl. Screw with Low Head M6 x 12 BN 17
305	1.00	pc.	3	102.00.014	Linear Guide Rail MN 9-575-G3-V0
306	4.00	pc.	-	103.03.007	Linear Motor Magnet Track MWD030-0128
307	6.00	pc.	-	109.11.008	Disk Magnet d10x5 NdFeB Nickel
308	1.00	pc.	2	109.32.064	420 mm Steel Scale MS 22.x4 MK
309	2.00	pc.	3	109.51.056	Warning Label 25 x 25 mm Magnetic Field
310	0.10	g	-	115.14.003	Loctite 480 20g, Instant Glue
311	1.00	pc.	-	109.21.031	Sealing Stud M16x1,5
312	0.20	m	-	115.05.004	Fiber Ribbon B=30mm selfadhesive
313	29.00	pc.	-	100.13.045	Lens Head Screw Torx M3x 8 BN 6404
601	1.00	pc.	-	300.01.079	Cover left cpl.

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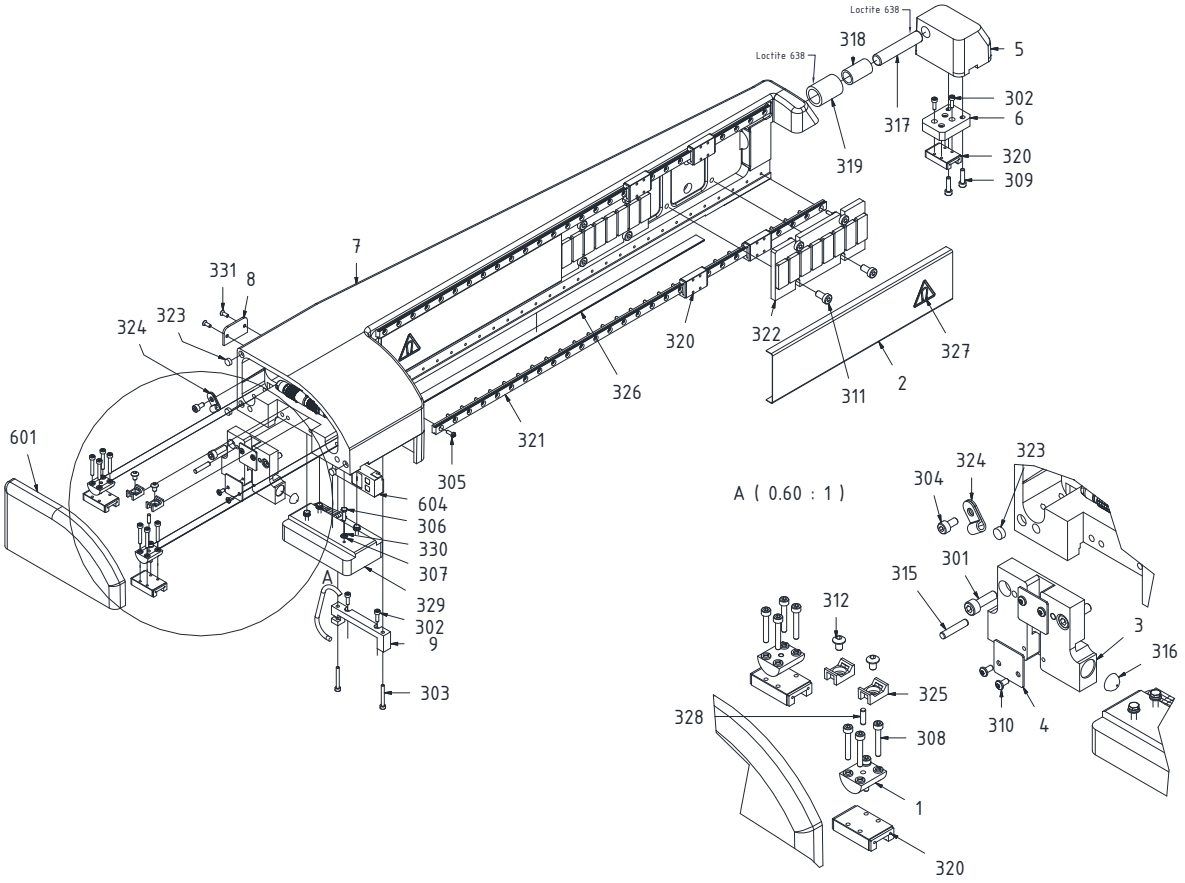
1.1.2.4 300.12.766 Y-Beam



Initial date: 15.12.2017 / PD Change index: 0 / 03.04.2020 / MN

Pos	Amount	Unit	Spare part class	Article number	Article description
1	2.00	pc.	-	200.00.789	Clamping
2	2.00	pc.	-	200.00.790	Motor Cover L=256
3	1.00	pc.	-	200.00.791	Stopper Plate
4	2.00	pc.	-	200.00.792	Cover plate cable
5	1.00	pc.	-	200.00.869	Housing loose bearing
6	1.00	pc.	-	200.00.870	Distance plate loose bearing
7	1.00	pc.	-	200.02.334	Y-Beam
8	1.00	pc.	-	200.02.395	Cable Cover Encoder
9	1.00	pc.	-	200.02.396	Rail Strip Scanning Head
301	2.00	pc.	-	100.00.046	Cyl. Screw M5 x 16 BN 3
302	6.00	pc.	-	100.00.017	Cyl. Screw M3 x 10 BN 3
303	2.00	pc.	-	100.00.023	Cyl. Screw M3 x 25 BN 3
304	1.00	pc.	-	100.00.028	Cyl. Screw M4 x 8 BN 3
305	56.00	pc.	-	100.13.045	Lens Head Screw Torx M3x 8 BN 6404
306	4.00	pc.	-	100.01.001	Hex screw M3 x 12 BN 56
307	4.00	pc.	-	100.04.023	Flat Washer M3 VSM 13904 BN 715
308	8.00	pc.	-	100.00.021	Cyl. Screw M3 x 20 BN 3
309	2.00	pc.	-	100.00.032	Cyl. Screw M4 x 16 BN 3
310	4.00	pc.	-	100.13.052	Lens Head Screw Torx M3x 6 BN 6404
311	16.00	pc.	-	100.00.112	Cyl. Screw with Low Head M6 x 12 BN 17

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Pos	Amount	Unit	Spare part class	Article number	Article description
312	2.00	pc.	-	100.00.208	Lens Head Screw M4x6 BN 1593
315	2.00	pc.	-	100.05.044	Cylinder Pin d 4-h 6 x 20 BN 858
316	2.00	pc.	3	101.04.002	Buffer Self-Adhesive d 11mm, SJ-5303
317	1.00	pc.	3	102.00.009	Guiding Shaft d12x60 A-6501012060
318	1.00	pc.	3	102.00.010	Ball Bearing Cage d12/16x28 A-7611012028
319	1.00	pc.	3	102.00.011	Steel Sleeve d16/22x30 A-7801012030
320	7.00	pc.	3	102.00.012	Linear Guide Carriage MNN 9-G1-LS-KB
321	2.00	pc.	3	102.00.013	Linear Guide Rail MN 9-555-G3-V0
322	4.00	pc.	-	103.03.007	Linear Motor Magnet Track MWD030-0128
323	3.00	pc.	-	109.11.004	Disk Magnet d7x3 NdFeB nickel
324	1.00	pc.	-	109.19.010	Cable clamp L47 material nylon
325	2.00	pc.	-	109.19.027	Attachment Block TM-2S8 M4
326	1.00	pc.	2	109.32.064	420 mm Steel Scale MS 22.x4 MK
327	2.00	pc.	3	109.51.056	Warning Label 25 x 25 mm Magnetic Field
328	2.00	pc.	-	100.05.028	Cylinder Pin d 3-h 6 x 10 BN 858
329	0.02	ml	-	115.14.002	Loctite 638 10ml, Retaining Compound
330	12.00	pc.	-	100.04.032	Lock Washer M3 DIN 7980 BN 774
331	2.00	pc.	-	100.13.040	Countersunk Screw Torx M3x 8 BN 4851
601	1.00	pc.	-	300.00.413	Cover beam with magnet (pure white)
602	1.00	pc.	2	300.01.059	Linear Motor Coil
603	1.00	pc.	2	300.12.745	Analog Linear Encoder AK MS25

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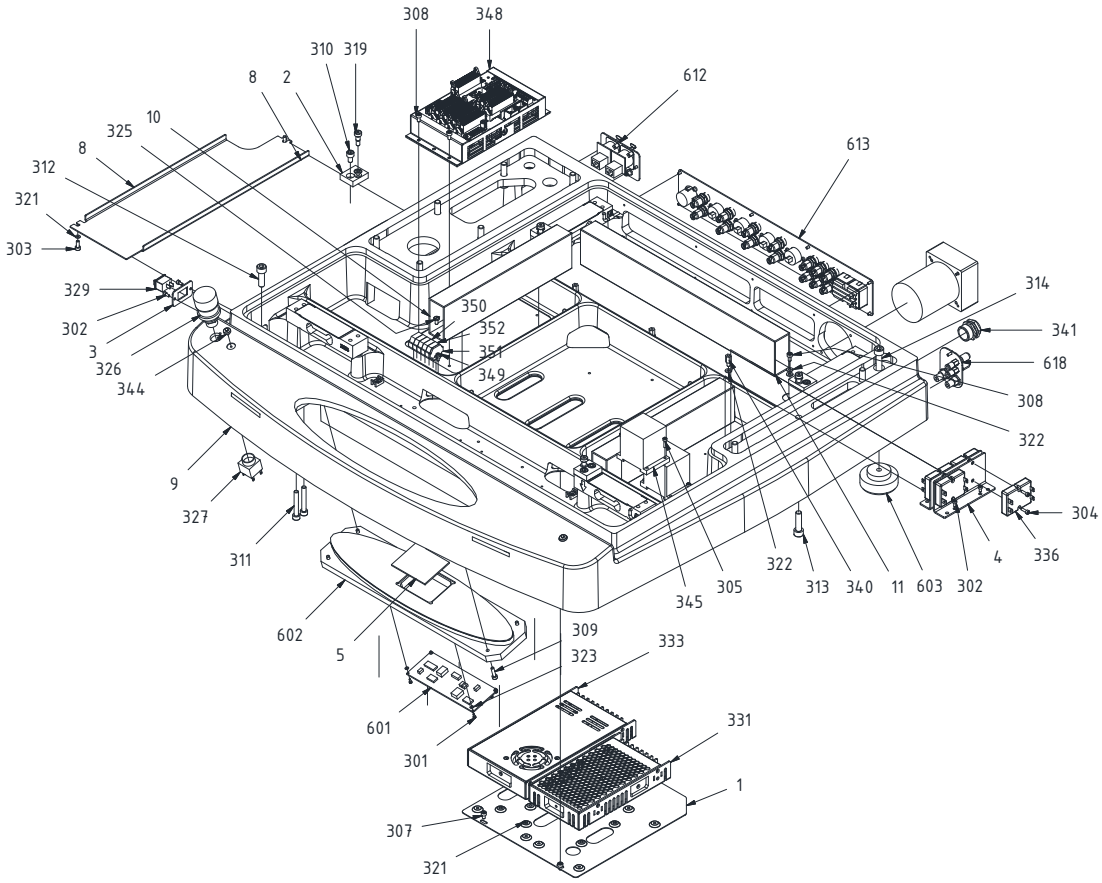
1.1.3 300.11.913 Base



Initial date: 29.06.2017 / SK Change index: 1 / 17.01.2020 / AG

Pos	Amount	Unit	Spare part class	Article number	Article description
1	1.00	pc.	-	200.00.899	Footplate 2
2	4.00	pc.	-	200.00.987	Distance plate
3	1.00	pc.	-	200.00.990	Cover plate on/off
4	2.00	pc.	-	200.01.149	Transformer bracket
5	1.00	pc.	-	200.01.256	Cover Plate
8	1.00	pc.	-	200.01.379	Cable holder
9	1.00	pc.	-	200.02.392	Base
10	2.00	pc.	-	200.02.412	Cable duct 30x60x250mm
11	1.00	pc.	-	200.02.413	Cable duct 30x60x380mm
301	4.00	pc.	-	100.00.210	Cyl. Screw M2 x 5 BN 11
302	4.00	pc.	-	100.00.015	Cyl. Screw M3 x 6 BN 3
303	2.00	pc.	-	100.00.029	Cyl. Screw M4 x 10 BN 3
304	8.00	pc.	-	100.00.017	Cyl. Screw M3 x 10 BN 3
305	4.00	pc.	-	100.00.018	Cyl. Screw M3 x 12 BN 3
307	3.00	pc.	-	100.00.027	Cyl. Screw M4 x 6 BN 3
308	7.00	pc.	-	100.00.028	Cyl. Screw M4 x 8 BN 3
309	4.00	pc.	-	100.00.032	Cyl. Screw M4 x 16 BN 3
310	8.00	pc.	-	100.00.055	Cyl. Screw M6 x 10 BN 3
311	8.00	pc.	-	100.00.064	Cyl. Screw M6 x 40 BN 3
312	2.00	pc.	-	100.00.082	Cyl. Screw M8 x 25 BN 3

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Pos	Amount	Unit	Spare part class	Article number	Article description
313	9.00	pc.	-	100.00.083	Cyl. Screw M8 x 30 BN 3
314	2.00	pc.	-	100.00.222	Cyl. screw M8 x 70 BN 4
316	2.00	pc.	-	100.00.157	Lens Head Screw M3x6 BN 1593
317	2.00	pc.	-	100.00.158	Lens Head Screw M3x8 BN 1593
319	4.00	pc.	-	100.00.223	Socket Shoulder Screw d6/M5x8 BN1359
320	6.00	pc.	-	100.00.208	Lens Head Screw M4x6 BN 1593
321	8.00	pc.	-	100.09.293	Slotted Cyl. Screw M4 x 4 BN 650
322	3.00	pc.	-	100.04.024	Flat Washer M4 VSM 13904 BN 715
323	4.00	pc.	-	100.04.038	Flat washer M2 Presspan BN 1076
324	1.00	pc.	-	100.04.040	Serrated Lock Washer M4 DIN 6798A BN 781
325	7.00	pc.	-	100.11.007	Flat Head Screw Pan Head M4x8 BN1062
326	1.00	pc.	3	109.02.009	Emergency Switch, 16mm
327	1.00	pc.	3	109.02.010	Pushbutton 2O forced
329	1.00	pc.	3	109.02.015	Rocker Switch 1pin black
331	1.00	pc.	2	109.09.007	Power Supply RSP100-24 (Ua=24VDC/4.2A)
333	1.00	pc.	2	109.09.016	Power Supply RSP320-48 (Ua=48VDC/6.7A)
336	4.00	pc.	3	109.14.021	Solid State Relay 75 -264VAC/ 20A
340	3.00	pc.	-	109.19.033	Spacer Hexagonal M4x10, BN3318
341	1.00	pc.	-	109.21.016	Cable Coupling PG16 grey
342	1.00	pc.	3	109.23.005	Schottky Diode STPS20H100CT, 2x10A
343	1.00	pc.	3	109.24.009	LED Green, flat, chrom 24VDC
344	2.00	pc.	3	109.49.001	Push Button Intake 10 mm (M3 x 5mm)
345	2.00	pc.	3	109.55.007	Miniature Contactor 3 + 1 Close Pos. 24VDC
347	6.00	pc.	-	109.19.027	Attachment Block TM-2S8 M4
348	1.00	pc.	2	109.27.025	GIN-MAX4x4 Controller cpl.
349	1.00	pc.	-	100.00.016	Cyl. Screw M3 x 8 BN 3
350	4.00	pc.	-	109.20.060	Stackable Single Clamp orange
351	1.00	pc.	-	109.20.061	End Plate grey
352	1.00	pc.	-	109.20.096	Stackable Single Clamp yellow-green
601	1.00	pc.	3	300.00.011	Distribution Board Operator Panel
602	1.00	pc.	-	300.00.026	Operator Panel
603	4.00	pc.	-	300.00.064	Machine Foot
612	1.00	pc.	-	300.15.826	Communication Interface
613	1.00	pc.	-	300.01.504	Connector
618	1.00	pc.	-	300.02.232	Shuttle - Interface (twice)
620	4.00	pc.	-	300.01.745	Force Sensor

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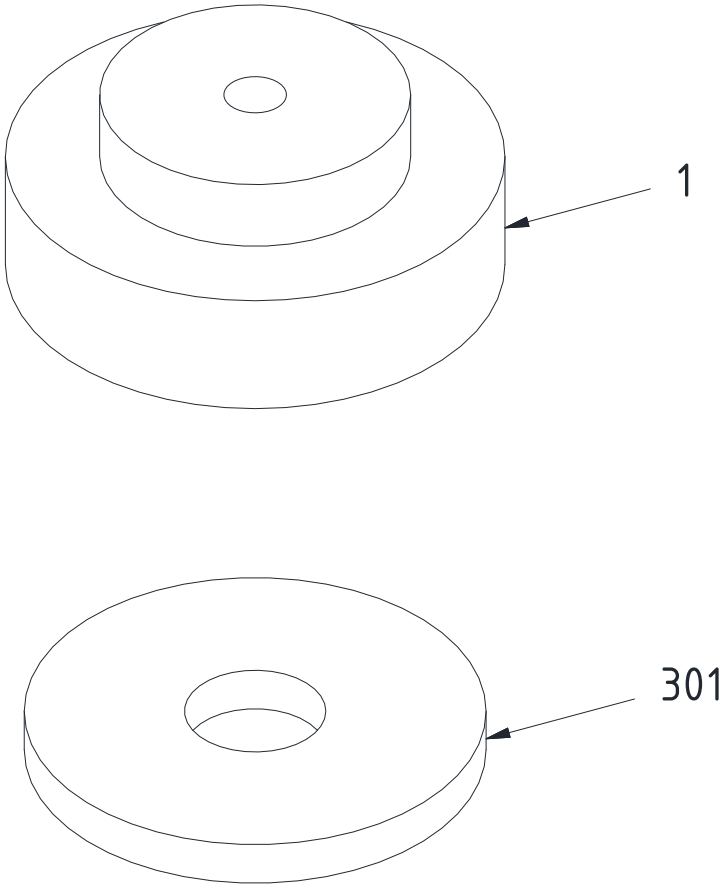
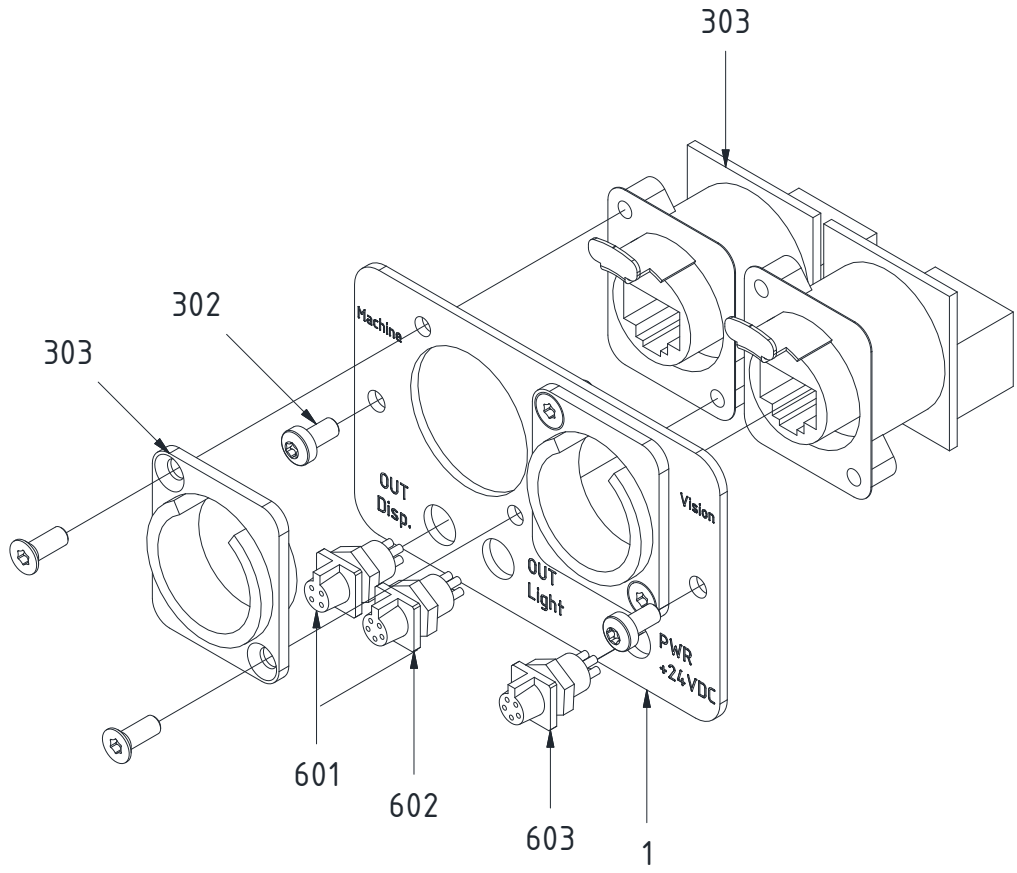
1.1.3.1 300.00.064 Machine Foot



Initial date: 30.03.2000 / DL Change index: 0 / 17.01.2020 / AG

Pos	Amount	Unit	Spare part class	Article number	Article description
1	1.00	pc.	-	200.00.102	Disc Washer
301	1.00	pc.	-	101.02.001	Machine foot

1.1.3.2 300.15.826 Communication Interface



Initial date: 29.04.2019 / PD Change index: 0 / 23.01.2020 / WB

Pos	Amount	Unit	Spare part class	Article number	Article description
1	1.00	pc.	-	200.29.337	Interface Panel
302	2.00	pc.	-	100.13.019	Lens Head Screw Torx M3x 6 BN 5687
303	2.00	pc.	3	109.18.203	Connector Socket RJ45
601	1.00	pc.	3	300.00.578	Digital output cable dispenser
602	1.00	pc.	3	300.01.038	Digital ouput cable light
603	1.00	pc.	3	300.16.704	Digital ouput cable light

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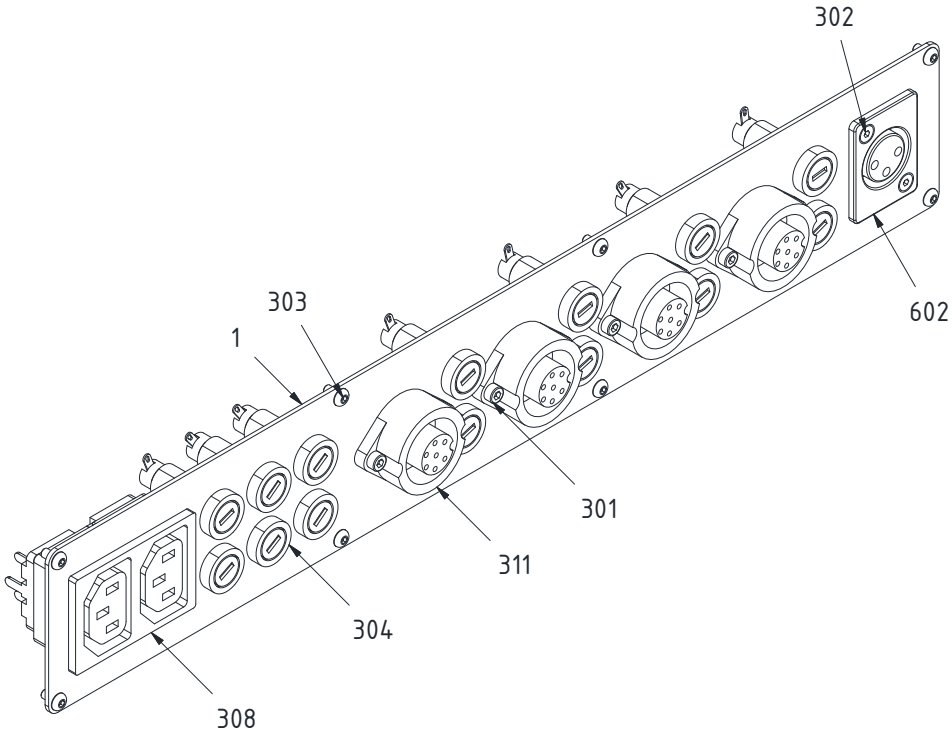
1.1.3.3 300.01.504 Connector



Initial date: 03.05.2007 / SK Change index: 0 / 22.01.2020 / SK

Pos	Amount	Unit	Spare part class	Article number	Article description
1	1.00	pc.	-	200.00.989	Connector profile
301	8.00	pc.	-	100.00.016	Cyl. Screw M3 x 8 BN 3
302	2.00	pc.	-	100.00.125	Countersunk Screw M3x8 BN 21
303	8.00	pc.	-	100.00.157	Lens Head Screw M3x6 BN 1593
304	14.00	pc.	3	109.05.054	Fuse holder FEF M12.7, 5x20mm
305	3.00	pc.	2	109.05.025	Fine Fuse 6.3A fast, type SP 5x20mm
306	1.00	pc.	2	109.05.026	Fine Fuse 4A fast, type SP 5x20mm
307	10.00	pc.	2	109.05.036	Fine Fuse 8A slow, SPT 5x20mm
308	1.00	pc.	-	109.18.126	Appliance Plug C13 2x
309	1.00	pc.	-	109.18.131	Rubber protective cover for KE
310	4.00	pc.	-	109.47.008	Cable End Sleeve 1.0 x 8mm (tin-plated)
311	22.00	pc.	-	109.47.009	Cable End Sleeve 1.5 x 8mm (tin-plated)
312	4.00	pc.	-	109.18.145	Appliance plug 7pin
313	1.00	pc.	3	109.51.005	Warning Label 25 x 25mm Lightning
314	5.41	m	-	109.53.039	Strand Wire AWG16/1.5mm2 Black
315	0.98	m	-	109.53.040	Strand Wire AWG16/1.5mm2 Yellow-Green
316	2.60	m	-	109.53.047	Strand Wire AWG16/1.5mm2 Light Blue
317	2.60	m	-	109.53.103	Strand Wire AWG16/1.5mm2 White
601	2.00	pc.	2	300.00.513	Signal cable PT100 preheater sensor
602	1.00	pc.	3	300.00.514	Cable foot switch

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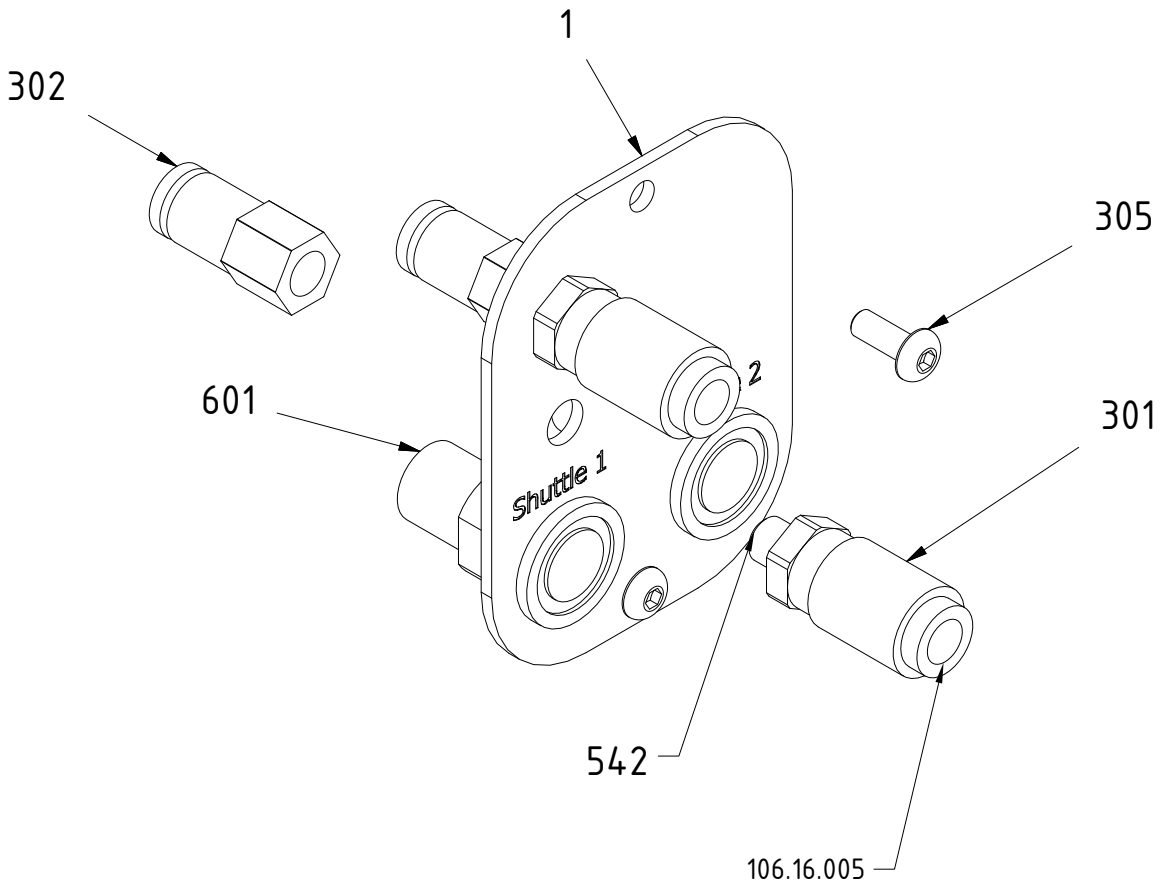
1.1.3.4 300.02.232 Shuttle - interface (twice)



Initial date: 22.08.2008 / EG Change index: 0 / 17.01.2020 / AG

Pos	Amount	Unit	Spare part class	Article number	Article description
1	1.00	pc.	-	200.04.382	Cover plate (Shuttle twice)
301	2.00	pc.	-	106.16.003	Fast coupling series 20 M5
302	2.00	pc.	-	106.15.056	Straight connector KQ2F06-M5N
303	0.50	m	3	106.17.015	Polyurethane-Tube d = 6mm, black, antistatic
305	2.00	pc.	-	100.00.158	Lens Head Screw M3x8 BN 1593
306	1.00	ml	-	115.14.008	Loctite 542 10ml, Thread Seal
601	2.00	pc.	3	300.01.486	Manual Loader Cable

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1.1.3.5 300.01.745 Force Sensor

Initial date: 17.10.2007 / SK Change index: 2 / 17.01.2020 / AG

Pos	Amount	Unit	Spare part class	Article number	Article description
301	1.00	pc.	2	109.04.025	Force Sensor 200N LCB130
302	0.02	m	-	109.22.002	Shrink Tube 4.8 mm black
303	0.05	m	-	109.53.035	PVC-Strand Wire 0.25mm2 Black

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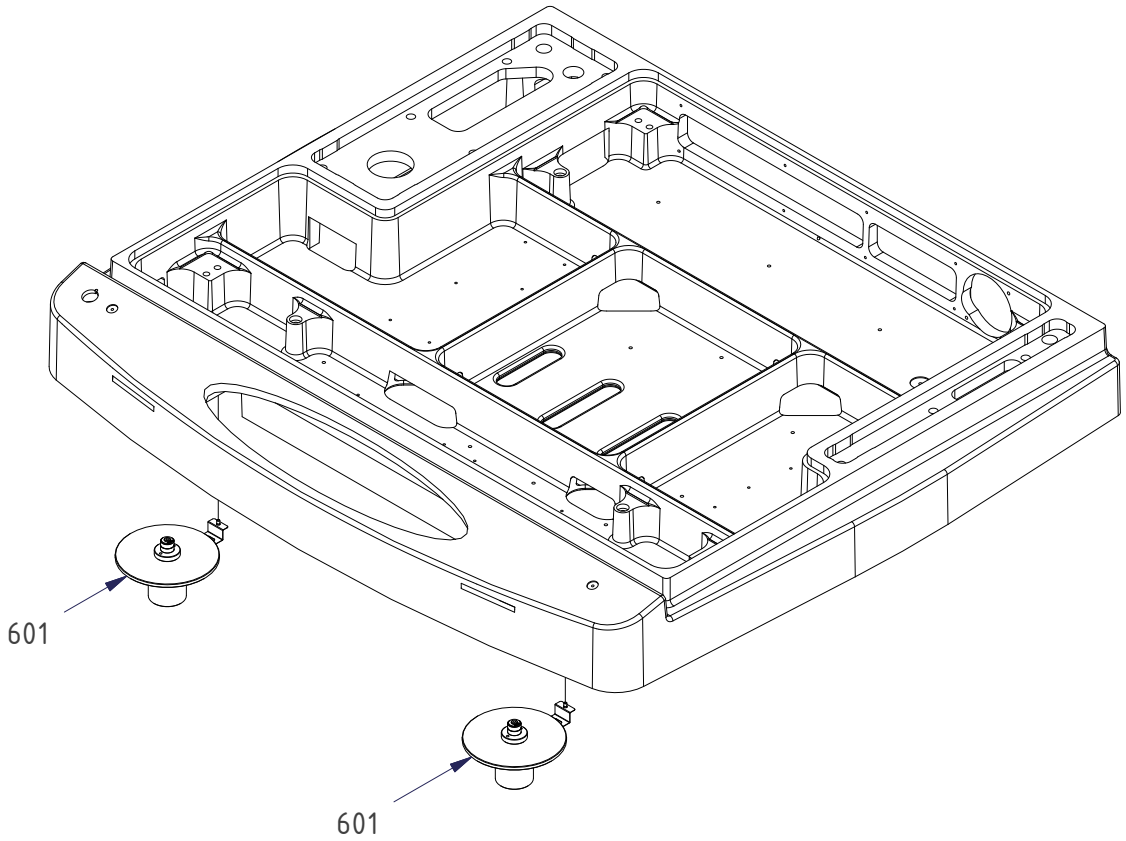
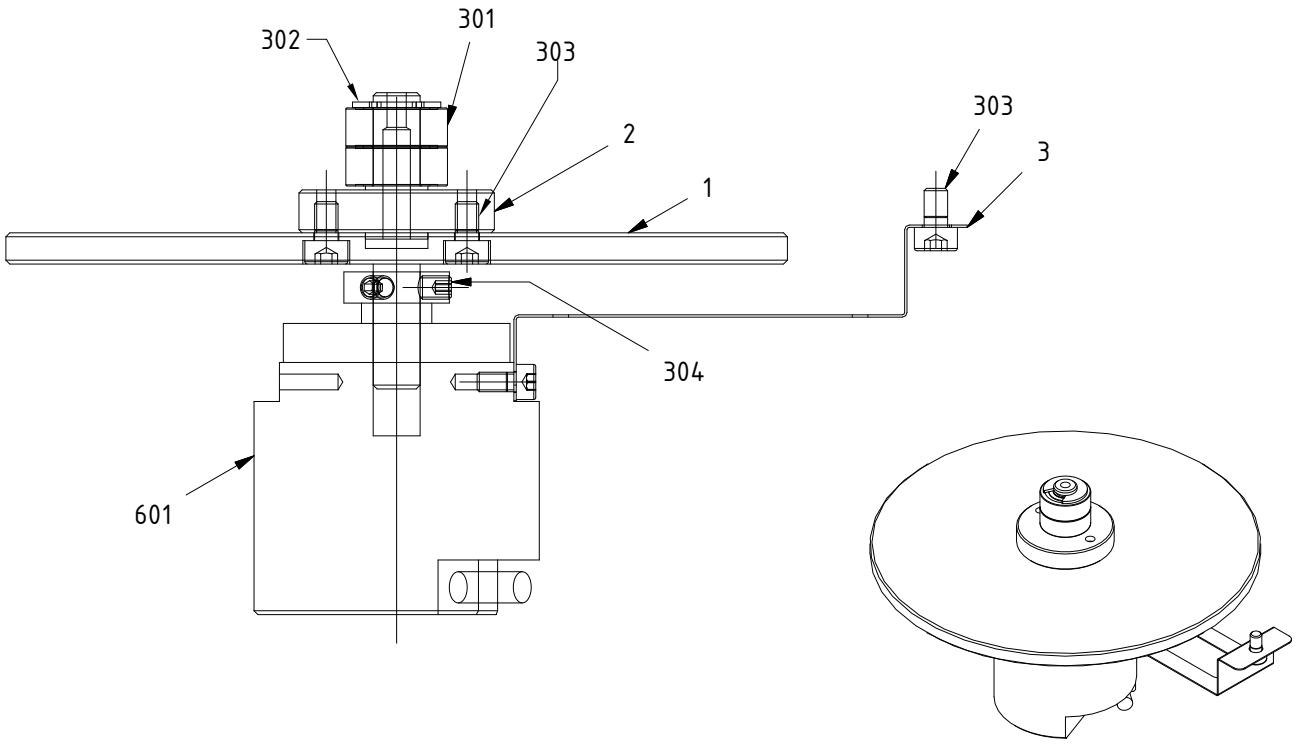
1.2 300.00.394 Manual Motion



Initial date: 07.04.2004 / EF Change index: 0 / 17.01.2020 / AG

Pos	Amount	Unit	Spare part class	Article number	Article description
301	0.01	ml	-	115.14.012	Loctite 270 10ml, Thread Locking High-Strength
601	2.00	pc.	-	300.00.362	Hand wheel ONYX 29

1.2.1 300.00.362 Hand Wheel ONYX 29



Initial date: 22.09.2003 / EG Change index: 0 / 17.01.2020 / AG

Pos	Amount	Unit	Spare part class	Article number	Article description
1	1.00	pc.	-	200.00.983	Hand wheel ONYX29
2	1.00	pc.	-	200.00.984	Bearing pin
3	1.00	pc.	-	200.00.985	Locking Piston
301	2.00	pc.	3	101.22.016	Ball Bearing 6/13/5 686-ZZ
302	1.00	pc.	-	100.04.013	Safety Disk for Shaft d=5 BN 810
303	3.00	pc.	-	100.00.014	Cyl. Screw M3 x 5 BN 3
304	2.00	pc.	-	100.00.176	Threaded Pin M3x 4 BN 28
305	0.20	ml	-	115.14.012	Loctite 270 10ml, Thread Locking High-Strength
306	0.20	ml	-	115.14.025	Loctite 222 10ml, thread locking low-strength
601	1.00	pc.	2	300.00.321	Encoder hand wheel

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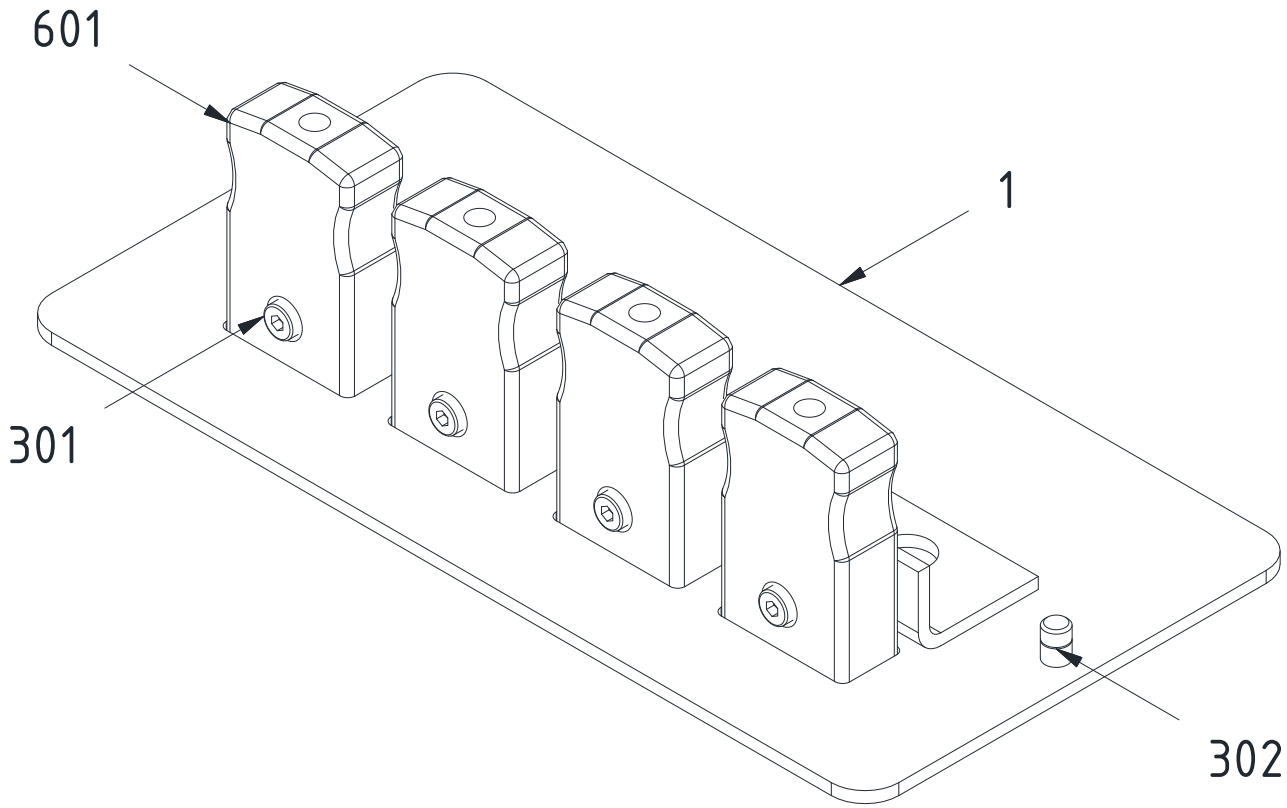
1.3 300.01.040 Thermocouple Module with 4 Ports



Initial date: 18.05.2006 / DL Change index: 0 / 17.01.2020 / AG

Pos	Amount	Unit	Spare part class	Article number	Article description
1	1.00	pc.	-	200.01.240	Cover thermocouple 1-4
301	4.00	pc.	-	100.00.005	Cyl. Screw M2 x 10 BN 11
302	2.00	pc.	-	100.00.198	Countersunk Screw M3x6 BN 21
601	4.00	pc.	3	300.01.037	Thermocouple cable TC1-TC4

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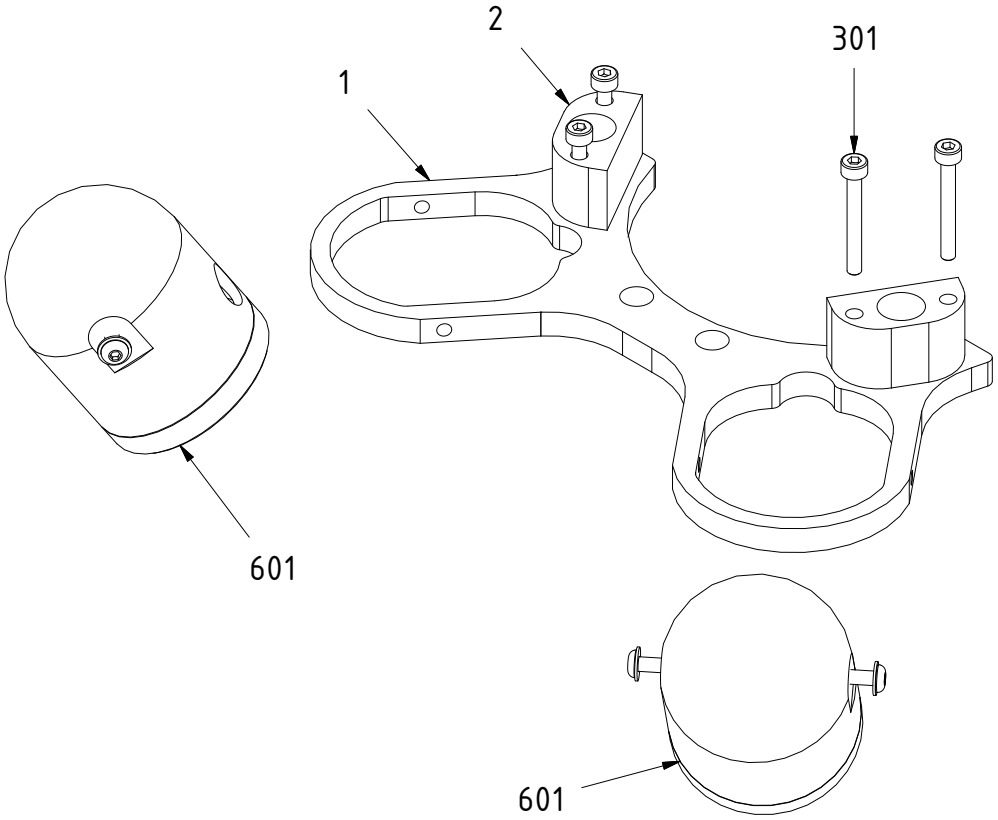
1.4 300.04.439 Field Illumination (adjustable)



Initial date: 19.09.2011 / EG Change index: 0 / 17.01.2020 / AG

Pos	Amount	Unit	Spare part class	Article number	Article description
1	1.00	pc.	-	200.03.256	Lamp holder
2	2.00	pc.	-	200.03.328	Support
301	4.00	pc.	-	100.00.023	Cyl. Screw M3 x 25 BN 3
601	2.00	pc.	-	300.01.422	Lamp (adjustable)
602	1.00	pc.	3	300.01.479	Y-Cable Field Illumination

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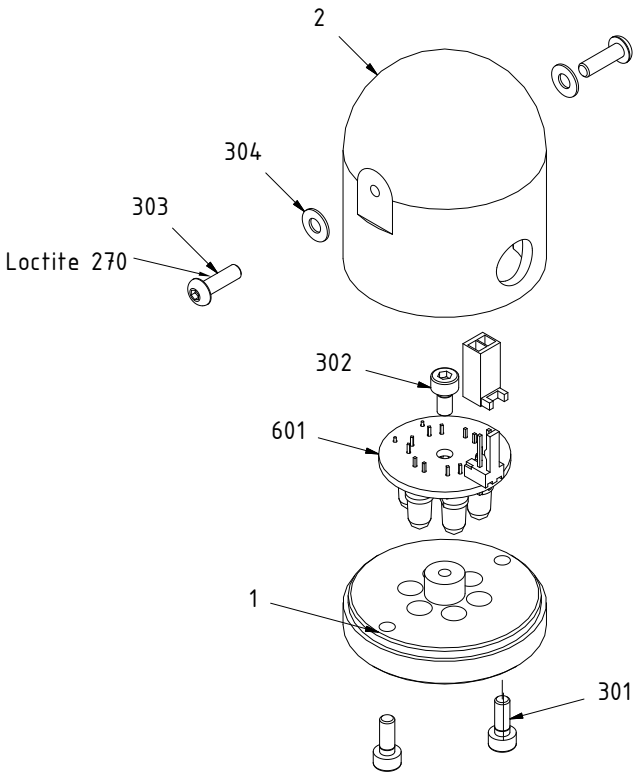
1.4.1 300.01.422 Lamp (adjustable)



Initial date: 21.03.2007 / EG Change index: 0 / 17.01.2020 / AG

Pos	Amount	Unit	Spare part class	Article number	Article description
1	1.00	pc.	-	200.01.228	Housing LED
2	1.00	pc.	-	200.03.263	Lamp housing
301	2.00	pc.	-	100.00.016	Cyl. Screw M3 x 8 BN 3
302	2.00	pc.	-	100.00.015	Cyl. Screw M3 x 6 BN 3
303	2.00	pc.	-	100.00.159	Lens Head Screw M3x10 BN 1593
304	2.00	pc.	-	100.09.004	Flat washer M3 BN 671 (3.2/7 x 0.5)
305	0.20	ml	-	115.14.012	Loctite 270 10ml, Thread Locking High-Strength
601	1.00	pc.	2	300.00.433	Illumination Board Field

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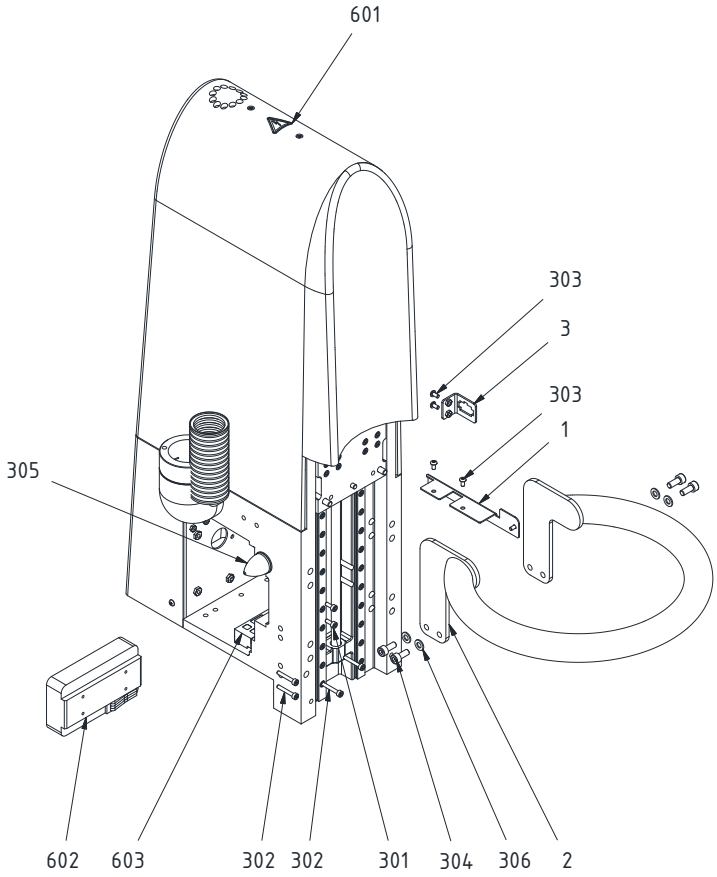
1.5 300.12.769 X-Z-Axis 230mm



Initial date: 15.12.2017 / PD Change index: 0 / 03.04.2020 / MN

Pos	Amount	Unit	Spare part class	Article number	Article description
1	1.00	pc.	-	200.01.431	Lower Cable Cover
2	1.00	pc.	-	200.01.797	Hand grip (Z 230mm)
3	1.00	pc.	-	200.02.379	Connector Bracket
301	4.00	pc.	-	100.09.051	Cyl. Screw M3 x 8 BN 612
302	18.00	pc.	-	100.09.103	Cyl. Screw M3 x 20 BN 612
303	5.00	pc.	-	100.00.157	Lens Head Screw M3x6 BN 1593
304	4.00	pc.	-	100.09.061	Cyl. screw M5 x 12 BN 612
305	2.00	pc.	3	101.04.003	Parabolic Buffer Type KP d=20mm
306	4.00	pc.	-	100.04.025	Flat Washer M5 VSM 13904 BN 715
601	1.00	pc.	-	300.04.424	XZ-Axis 230mm Base Module (OBC 70mm)
602	1.00	pc.	2	300.01.059	Linear Motor Coil
603	1.00	pc.	2	300.12.745	Analog Linear Encoder AK MS25

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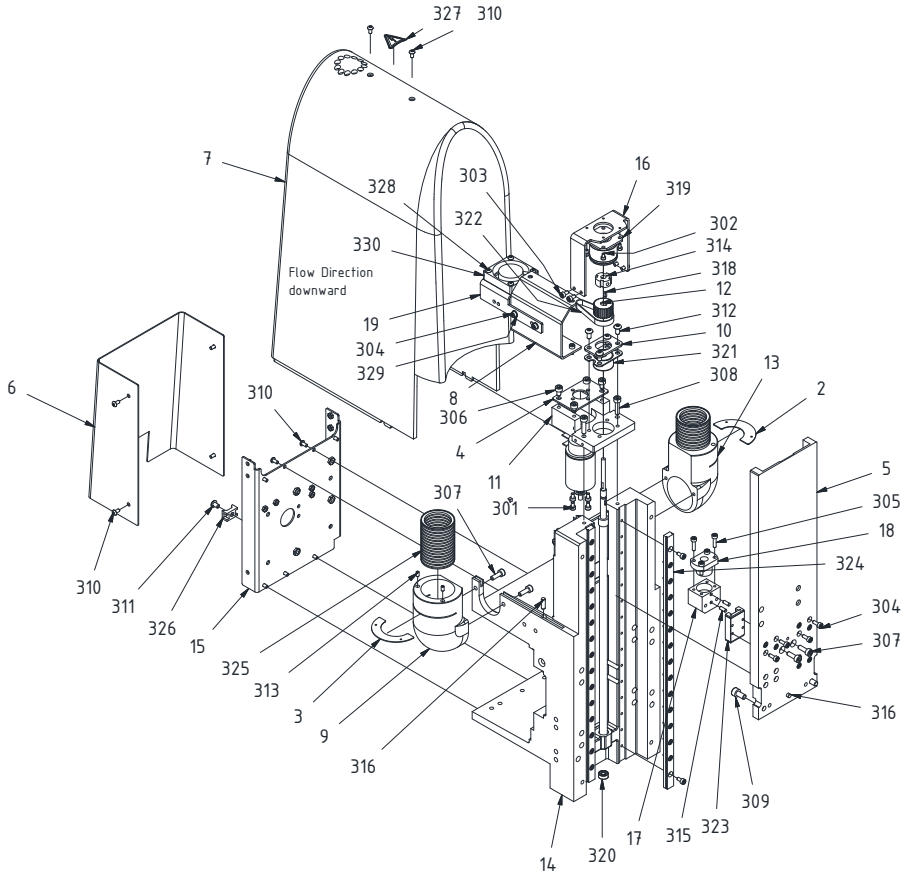
1.5.1 300.04.424 XZ-Axis 230 mm base module (OBC 70 mm)



Initial date: 09.09.2011 / EG Change index: 1 / 03.04.2020 / MN

Pos	Amount	Unit	Spare part class	Article number	Article description
2	1.00	pc.	-	200.01.156	Segment 23
3	1.00	pc.	-	200.01.157	Segment 29
4	1.00	pc.	-	200.04.392	Motor Plate Z
5	1.00	pc.	-	200.01.367	Vertical Slider long
6	1.00	pc.	-	200.01.368	Cover rear panel
7	1.00	pc.	-	200.03.391	Cover Z-Axis high
8	1.00	pc.	-	200.03.385	Distance plate
9	1.00	pc.	-	200.01.408	Corrugated Pipe Connector 29
10	1.00	pc.	-	200.01.430	End Plate
11	1.00	pc.	-	200.01.432	Mounting plate motor
12	1.00	pc.	-	200.01.436	Toothed Disc Spindle
13	1.00	pc.	-	200.01.438	Corrugated pipe connector 23
14	1.00	pc.	-	200.02.332	Base Plate Box long
15	1.00	pc.	-	200.02.378	Cabinet rear panel
16	1.00	pc.	-	200.04.391	Strap
17	1.00	pc.	-	200.02.585	Flange Nut
18	1.00	pc.	-	200.02.586	Z-Spindle 230mm
19	1.00	pc.	-	200.03.363	Fan holder
301	4.00	pc.	-	100.00.014	Cyl. Screw M3 x 5 BN 3
302	4.00	pc.	-	100.00.007	Cyl. Screw M2.5 x 4 BN 11

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Pos	Amount	Unit	Spare part class	Article number	Article description
303	34.00	pc.	-	100.00.015	Cyl. Screw M3 x 6 BN 3
304	24.00	pc.	-	100.00.016	Cyl. Screw M3 x 8 BN 3
305	4.00	pc.	-	100.00.017	Cyl. Screw M3 x 10 BN 3
306	4.00	pc.	-	100.00.027	Cyl. Screw M4 x 6 BN 3
307	6.00	pc.	-	100.00.030	Cyl. Screw M4 x 12 BN 3
308	2.00	pc.	-	100.00.032	Cyl. Screw M4 x 16 BN 3
309	2.00	pc.	-	100.00.043	Cyl. Screw M5 x 10 BN 3
310	11.00	pc.	-	100.00.157	Lens Head Screw M3x6 BN 1593
311	2.00	pc.	-	100.00.208	Lens Head Screw M4x6 BN 1593
312	4.00	pc.	-	100.00.160	Lens Head Screw M4x8 BN 1593
313	4.00	pc.	-	100.00.206	Threaded Pin M3x 6 with Tip BN 29
314	1.00	pc.	-	100.02.019	Adjusting Nut KUSO MRR M6x0.5
315	2.00	pc.	-	100.05.027	Cylinder Pin d 3-h 6 x 8 BN 858
316	3.00	pc.	-	100.05.040	Cylinder Pin d 4-h 6 x 12 BN 858
317	2.00	pc.	-	100.05.039	Cylinder Pin d 4-h 6 x 10 BN 858
318	1.00	pc.	-	100.05.095	Parallel Key 2x2x6 BN 870
319	1.00	pc.	3	101.18.003	Permanent magnet brake 01.P1.200-307
320	1.00	pc.	3	101.22.007	Ball Bearing 4/10/4 SMR-104-ZZ
321	1.00	pc.	3	101.22.033	Axial-Angular Ball Bearing ZKLR 0624.2Z
322	1.00	pc.	2	101.28.006	Toothed Belt PowerGrip GT 2MR-112, 6mm
323	4.00	pc.	3	102.00.012	Linear Guide Carriage MNN 9-G1-LS-KB
324	2.00	pc.	3	102.00.025	Linear Guide Rail MN 9-313-G3-V0
325	1.20	m	-	109.19.024	Corrugated Pipe PISG-29B
326	4.00	pc.	-	109.19.027	Attachment Block TM-2S8 M4
327	1.00	pc.	3	109.51.005	Warning Label 25 x 25mm Lightning
328	4.00	pc.	-	100.00.259	Lens Head Screw M3x16 BN 1593
329	2.00	pc.	-	100.04.023	Flat Washer M3 VSM 13904 BN 715
330	1.00	pc.	-	109.08.003	Fan 40x40x10 mm, 24 VDC
331	2.00	pc.	-	100.00.159	Lens Head Screw M3x10 BN 1593
602	1.00	pc.	2	300.02.968	Z-Motor assembled

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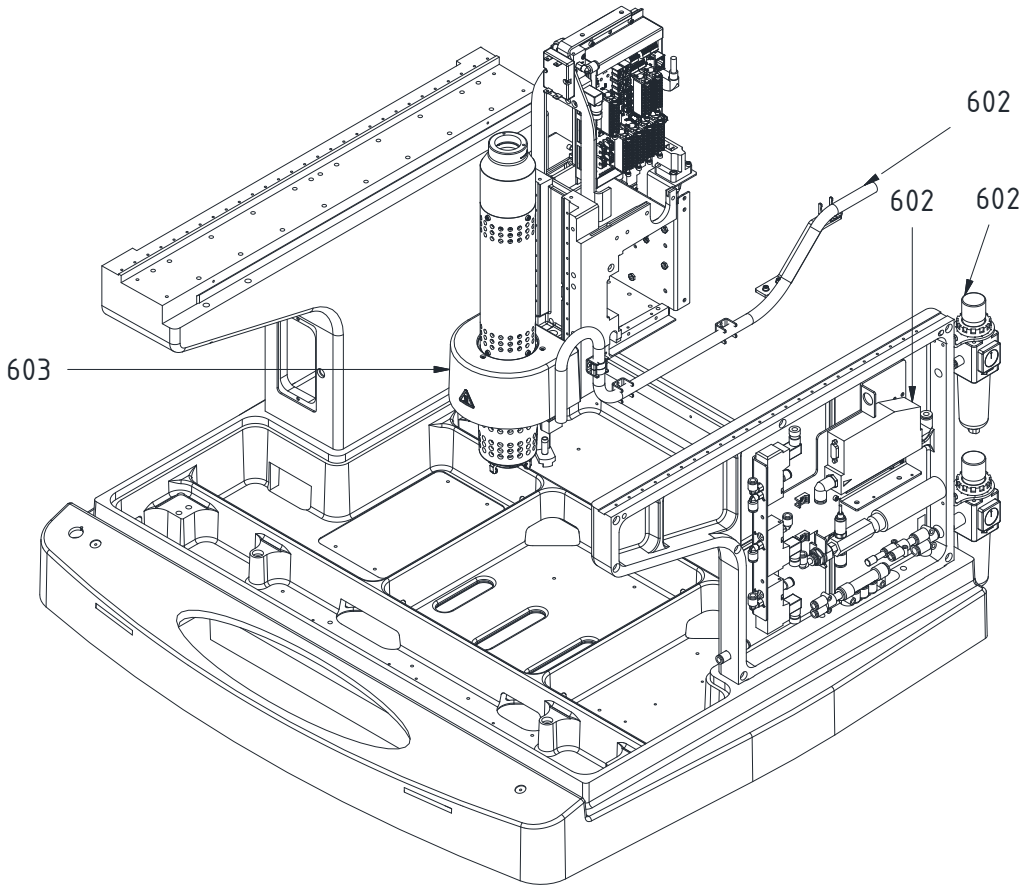
1.6 300.11.914 Advanced Solder Head



Initial date: 29.06.2017 / SK Change index: 0 / 03.04.2020 / MN

Pos	Amount	Unit	Spare part class	Article number	Article description
302	1.10	m	3	106.17.014	Polyurethane Tube d = 8mm black, antistatic
303	6.00	m	3	106.17.015	Polyurethane-Tube d = 6mm, black, antistatic
602	1.00	pc.	-	300.11.915	Pneumatic Unit Solder Head
603	1.00	pc.	-	300.02.256	Advanced Solder Head

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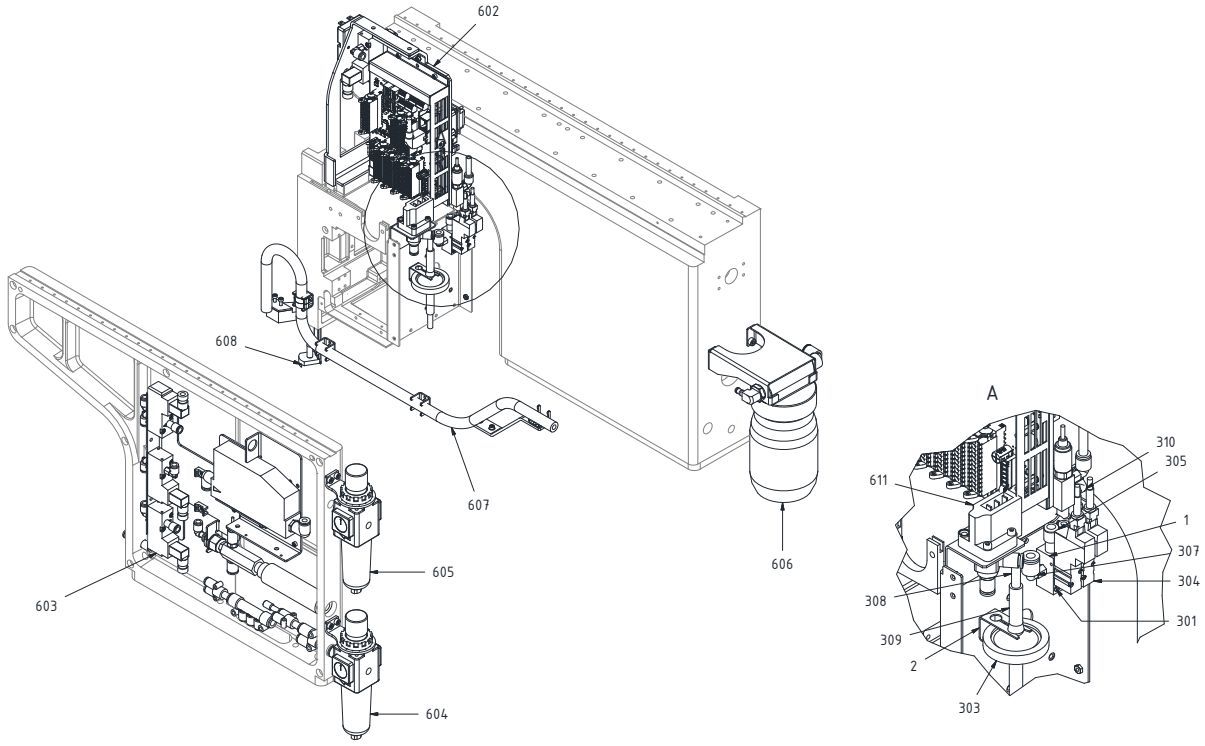
1.6.1 300.11.915 Pneumatic Unit Solder Head



Initial date: 29.06.2017 / SK Change index: 0 / 17.01.2020 / AG

Pos	Amount	Unit	Spare part class	Article number	Article description
1	1.00	pc.	-	200.01.079	Manifould Plate
2	1.00	pc.	-	200.01.168	Bracket filter
301	2.00	pc.	-	100.00.020	Cyl. Screw M3 x 16 BN 3
302	2.00	pc.	-	100.00.157	Lens Head Screw M3x6 BN 1593
303	1.00	pc.	1	106.02.005	Air-filter nylon white
304	2.00	pc.	3	106.06.001	3/2 Solenoid Valve SYJ 314-5LOU-Q
305	1.00	pc.	-	106.15.009	Straight Connector M5, 6mm, KQ2S06-M5N
306	1.00	pc.	-	106.15.011	Straight Connector M5, 4mm, KQ2S04-M5N
307	1.00	pc.	-	106.15.016	Threaded Elbow M5, 6mm, KQ2L06-M5N
308	2.00	m	3	106.17.015	Polyurethane-Tube d = 6mm, black, antistatic
309	0.10	m	3	106.17.006	Silicon Tube di=6, da=9, transparent
310	2.00	pc.	2	106.21.009	Socket Outlet with Cable 2m, SY100-68-A-20
311	2.70	m	3	106.17.016	Polyurethane-Tube d = 4mm, black, antistatic
312	1.00	pc.	-	106.15.013	Sealing Plug MS-5P
602	1.00	pc.	-	300.11.916	Pneumatic-Chassis
603	1.00	pc.	-	300.16.604	Pneumatic Chassis Side Part
604	1.00	pc.	-	300.01.020	Maintenance Unit Air
605	1.00	pc.	-	300.01.021	Maintenance Unit Nitrogen
606	1.00	pc.	-	300.01.022	Site Clean System
607	1.00	pc.	-	300.01.029	Site Clean System Hose
608	1.00	pc.	-	600.00.026	Interface Site Tool
611	1.00	pc.	-	300.00.770	Minimum Flow Switch

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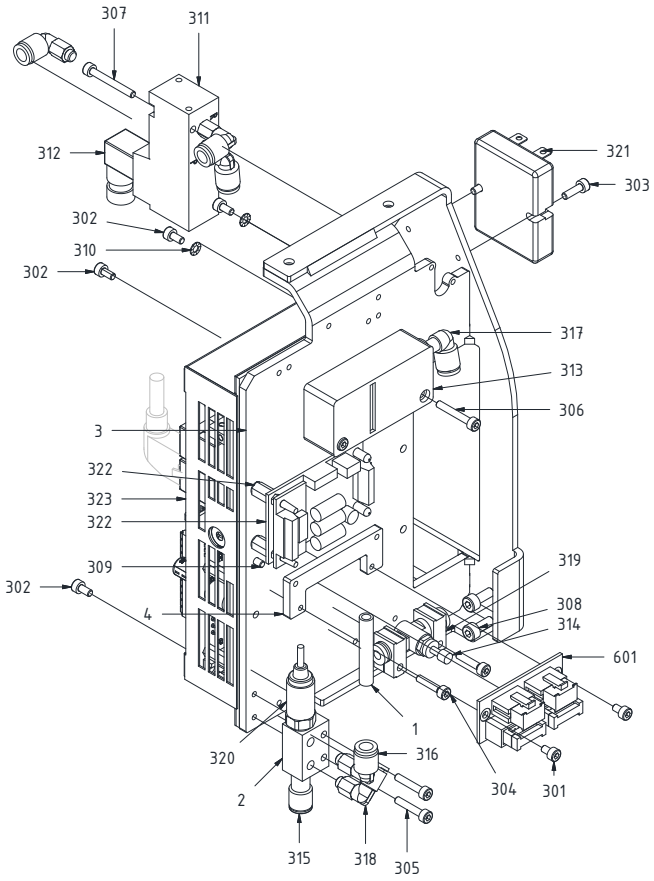
1.6.1.1 300.11.916 Pneumatik-Chassis



Initial date: 29.06.2017 / SK Change index: 0 / 17.01.2020 / AG

Pos	Amount	Unit	Spare part class	Article number	Article description
1	1.00	pc.	-	200.00.251	Sleeve
2	1.00	pc.	-	200.01.169	Manifould Plate
3	1.00	pc.	-	200.02.117	Frame Indel
4	1.00	pc.	-	200.30.538	Adaptor Plate Interface
301	2.00	pc.	-	100.00.014	Cyl. Screw M3 x 5 BN 3
302	6.00	pc.	-	100.00.015	Cyl. Screw M3 x 6 BN 3
303	2.00	pc.	-	100.00.017	Cyl. Screw M3 x 10 BN 3
304	2.00	pc.	-	100.00.019	Cyl. Screw M3 x 14 BN 3
305	2.00	pc.	-	100.00.020	Cyl. Screw M3 x 16 BN 3
306	2.00	pc.	-	100.00.021	Cyl. Screw M3 x 20 BN 3
307	2.00	pc.	-	100.00.023	Cyl. Screw M3 x 25 BN 3
308	4.00	pc.	-	100.00.029	Cyl. Screw M4 x 10 BN 3
309	6.00	pc.	-	100.00.125	Countersunk Screw M3x8 BN 21
310	2.00	pc.	-	100.04.033	Serrated Lock Washer M3 DIN 6798A BN 781
311	1.00	pc.	3	106.06.005	3/2 Solenoid Valve VK 332 5 D0-M5-Q
312	1.00	pc.	3	106.06.006	Plug K31
313	1.00	pc.	3	106.12.002	Vacuum Generator 24 l/min
314	1.00	pc.	-	106.15.002	Throttle Check Valve AS 1001FM-04
315	2.00	pc.	-	106.15.009	Straight Connector M5, 6mm, KQ2S06-M5N
316	4.00	pc.	-	106.15.016	Threaded Elbow M5, 6mm, KQ2L06-M5N

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Pos	Amount	Unit	Spare part class	Article number	Article description
317	1.00	pc.	-	106.15.018	Elbow connector 6mm KQ2L06-99A
318	1.00	pc.	-	106.15.030	Threaded Elbow M5, 4mm, KQ2L04-M5N
319	2.00	pc.	-	106.21.005	Holder to throttle check valve
320	1.00	pc.	3	109.04.084	Vacuum Sensor PSE531-M5-L, 3m
321	1.00	pc.	3	109.14.021	Solid State Relay 75 -264VAC/ 20A
322	1.00	pc.	3	109.27.006	Amplifier 1-Q-EC DEC 24/1
323	1.00	pc.	2	109.27.025	GIN-MAX4x4 Controller cpl.
324	3.00	pc.	-	109.18.018	Flat receptacle 2.8x0.5mm insul. 0.5mm2
325	0.23	m	-	109.22.009	PLIO - Tube d = 3mm black
326	1.00	pc.	-	109.23.003	Diode 1N4004
327	0.45	m	-	109.53.005	PVC-Strand Wire 0.5mm2 Brown
328	0.30	m	-	109.53.006	PVC-Strand Wire 0.5mm2 Dark Blue
329	4.00	pc.	-	109.21.054	Spacer Hexagonal M3x5, BN3318
330	4.00	pc.	-	100.13.069	Lens Head Screw Torx M3x 4 BN 6404
601	1.00	pc.	2	300.02.381	Encoder Interface Card
603	1.00	pc.	-	300.01.500	SSR connection head

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1.6.1.1.1 300.01.500 SSR connection head

Initial date: 02.05.2007 / SK Change index: 1 / 17.01.2020 / AG

Pos	Amount	Unit	Spare part class	Article number	Article description
301	0.20	m	-	109.53.039	Strand Wire AWG16/1.5mm2 Black
302	1.00	pc.	-	109.18.007	Flat receptacle 6.3x0.8mm insul. 2.5mm2
303	1.00	pc.	-	109.57.011	Crimp Contact male AWG 16
304	1.00	pc.	-	109.18.065	Connector Housing 2pin Plug

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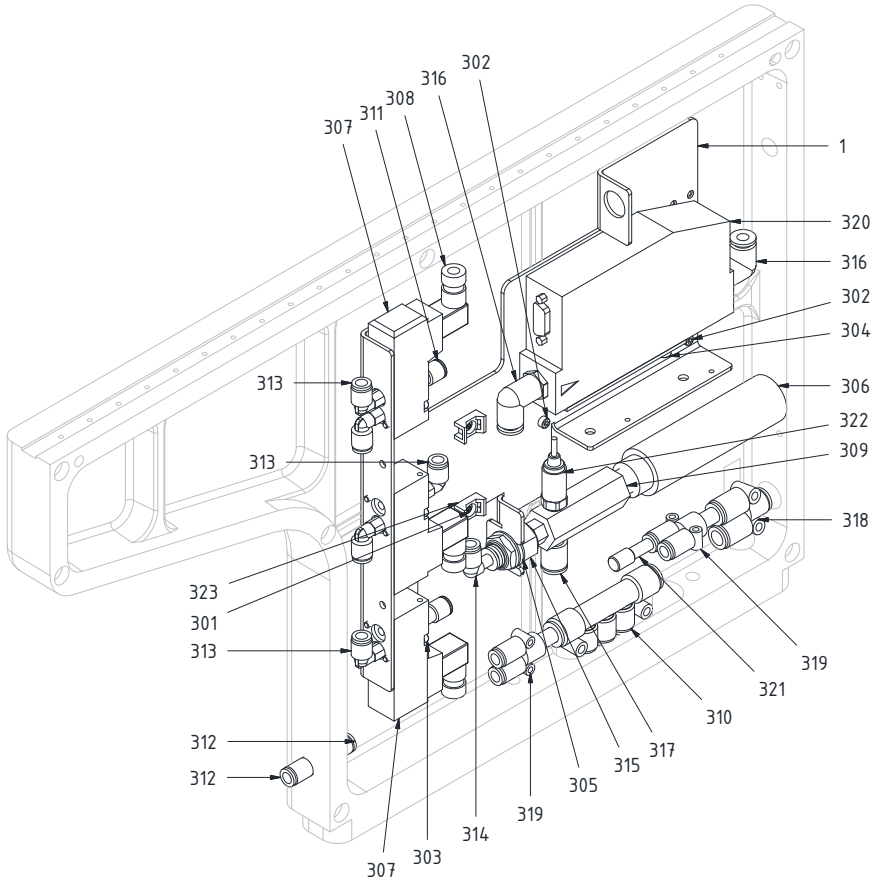
1.6.1.2 300.16.604 Pneumatic-Chassis Side Part



Initial date: 10.09.2019 / PD Change index: 0 / 03.04.2020 / AG

Pos	Amount	Unit	Spare part class	Article number	Article description
1	1.00	pc.	-	200.00.872	Pneumatic-Chassis
301	2.00	pc.	-	100.13.050	Lens Head Screw Torx M3x 5 BN 6404
302	2.00	pc.	-	100.00.016	Cyl. Screw M3 x 8 BN 3
303	6.00	pc.	-	100.00.023	Cyl. Screw M3 x 25 BN 3
304	2.00	pc.	-	100.00.027	Cyl. Screw M4 x 6 BN 3
305	2.00	pc.	-	100.04.056	Shim Washer 14x20x1, DIN 988 BN1976
306	1.00	pc.	3	106.01.003	Flow Through Muffler
307	3.00	pc.	3	106.06.005	3/2 Solenoid Valve VK 332 5 D0-M5-Q
308	3.00	pc.	3	106.06.006	Plug K31
309	1.00	pc.	3	106.12.006	Vacuum Pump (Venturi)
310	1.00	pc.	-	106.15.003	Plug Rail KM13-06-08-3
311	2.00	pc.	-	106.15.009	Straight Connector M5, 6mm, KQ2S06-M5N
312	2.00	pc.	-	106.15.010	Straight Connector 1/8, 6mm, KQ2S06-01NS
313	5.00	pc.	-	106.15.016	Threaded Elbow M5, 6mm, KQ2L06-M5N
314	1.00	pc.	-	106.15.018	Elbow connector 6mm KQ2L06-99A
315	1.00	pc.	-	106.15.023	Bulkhead Plug Connection 6mm, KQ2E06-G01A1
316	2.00	pc.	-	106.15.104	Threaded elbow G1/4, 6mm with O-Ring
317	1.00	pc.	-	106.15.060	Straight Connector 1/8" /8mm
318	1.00	pc.	-	106.15.089	Branch Plug 8mm KQ2U08-00A
319	2.00	pc.	-	106.15.129	Branch Plug 8mm/6mm KQ2X06-08A

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Pos	Amount	Unit	Spare part class	Article number	Article description
320	1.00	pc.	3	106.20.009	Mass Flow Controller Vögtlin
321	1.00	pc.	-	106.21.006	Dummy Plug 6mm KQ2P-06
322	1.00	pc.	3	109.04.084	Vacuum Sensor PSE531-M5-L, 3m
323	2.00	pc.	-	109.19.016	Attachment Block TM-2S6
324	3.00	pc.	-	109.23.003	Diode 1N4004

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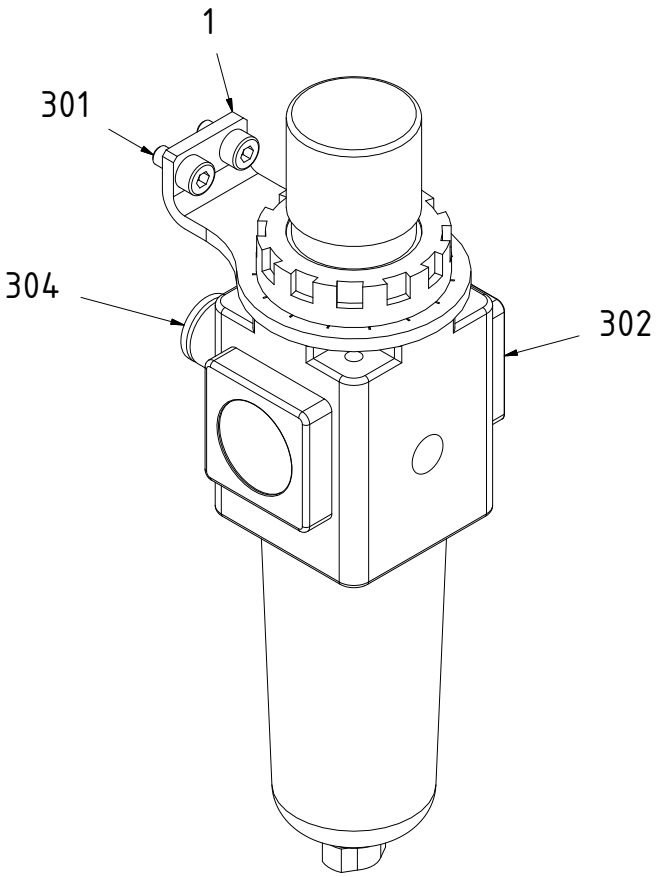
1.6.1.3 300.01.020 Maintenance Unit Air



Initial date: 08.05.2006 / CL Change index: 0 / 28.08.2019 / AG

Pos	Amount	Unit	Spare part class	Article number	Article description
1	1.00	pc.	-	200.01.643	Angle Bracket for Maintenance Unit (AW20)
301	2.00	pc.	-	100.00.028	Cyl. Screw M4 x 8 BN 3
302	1.00	pc.	3	106.00.003	Maintenance Unit (Filter/Controller) AW20
304	1.00	pc.	-	106.15.060	Straight Connector 1/8" /8mm

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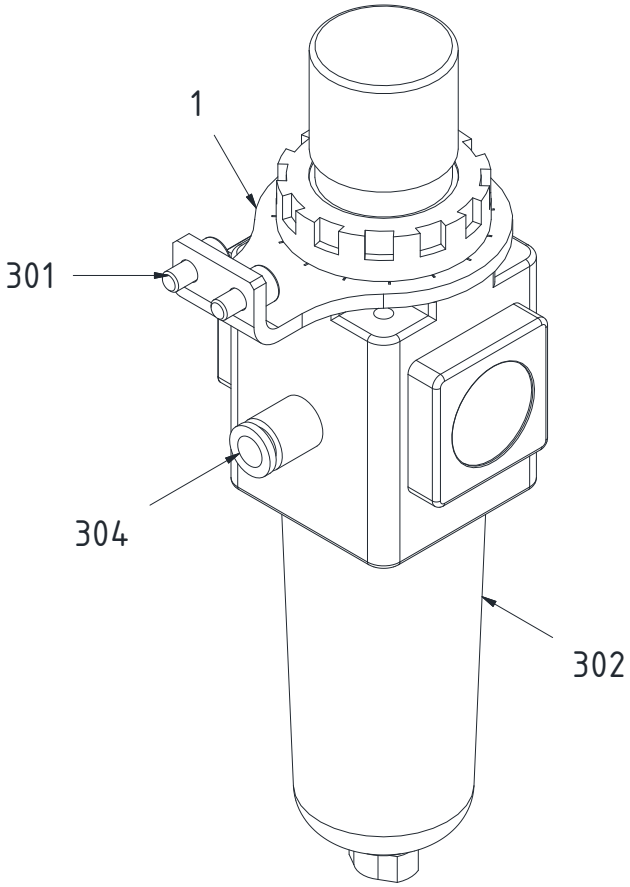
1.6.1.4 300.01.021 Maintenance Unit Nitrogen



Initial date: 08.05.2006 / CL Change index: 0 / 17.01.2020 / AG

Pos	Amount	Unit	Spare part class	Article number	Article description
1	1.00	pc.	-	200.01.643	Angle Bracket for Maintenance Unit (AW20)
301	2.00	pc.	-	100.00.028	Cyl. Screw M4 x 8 BN 3
302	1.00	pc.	3	106.00.003	Maintenance Unit (Filter/Controller) AW20
304	1.00	pc.	-	106.15.010	Straight Connector 1/8, 6mm, KQ2S06-01NS

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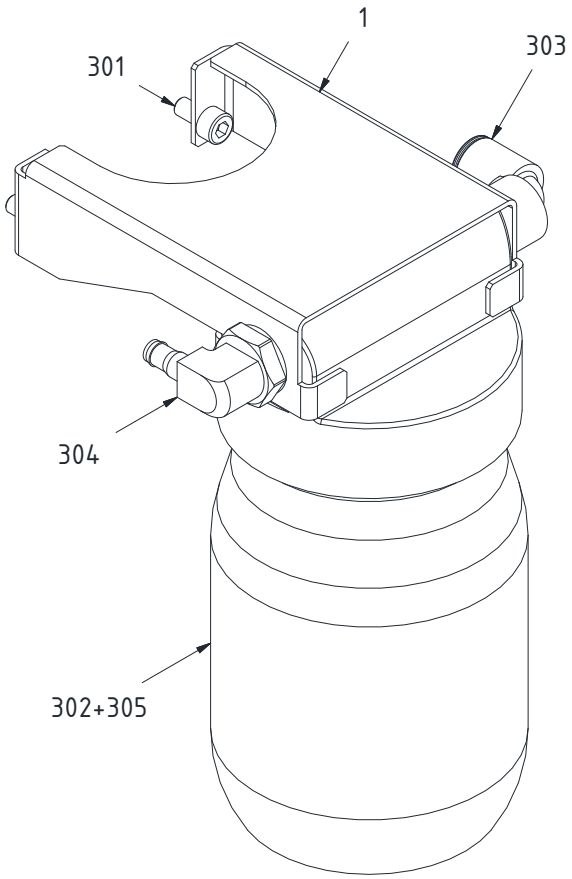
1.6.1.5 300.01.022 Site Clean System



Initial date: 08.05.2006 / CL Change index: 0 / 10.03.2020 / CL

Pos	Amount	Unit	Spare part class	Article number	Article description
1	1.00	pc.	-	200.01.918	Site Clean Holder ONYX 2X
301	2.00	pc.	-	100.00.043	Cyl. Screw M5 x 10 BN 3
302	1.00	pc.	2	106.02.003	Canister site clean system
303	1.00	pc.	-	106.15.061	Threaded Elbow 3/8" / 8mm, KQ2L08-03AS
304	1.00	pc.	-	106.15.063	Threaded elbow LCN-3/8-PK-6
305	1.00	pc.	1	106.02.004	Filter Element Site Clean Canister

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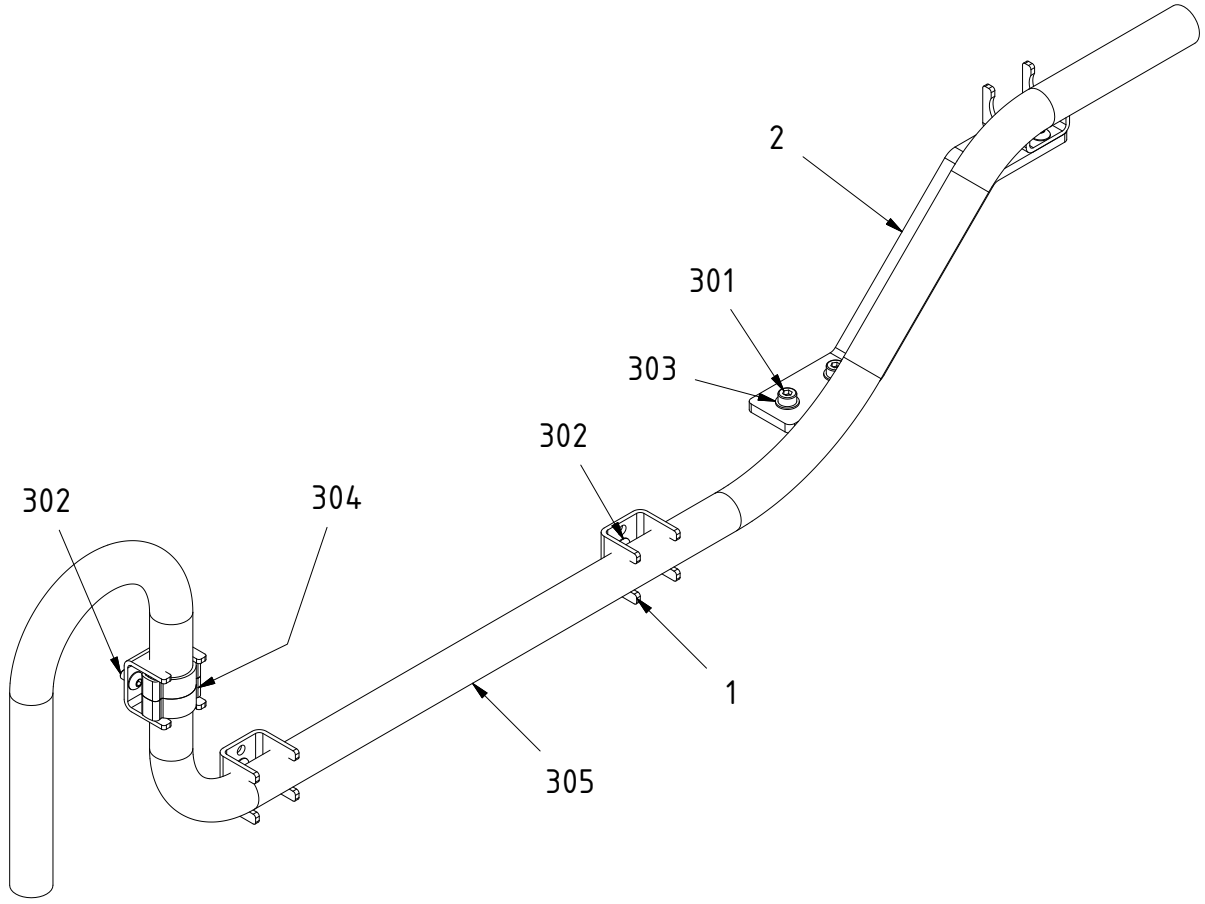
1.6.1.6 300.01.029 Site Clean System Hose



Initial date: 11.05.2006 / CL Change index: 0 / 17.01.2020 / AG

Pos	Amount	Unit	Spare part class	Article number	Article description
1	4.00	pc.	-	200.01.237	Tube holder lot suction hose
2	1.00	pc.	-	200.01.238	Strap
301	2.00	pc.	-	100.00.015	Cyl. Screw M3 x 6 BN 3
302	8.00	pc.	-	100.00.156	Lens Head Screw M3x5 BN 1593
304	3.00	pc.	-	100.09.014	Hose clamp Oetiker 11-13mm BN 668
305	1.45	m	3	106.17.010	High temperature tube 0.5OD x 0.25ID

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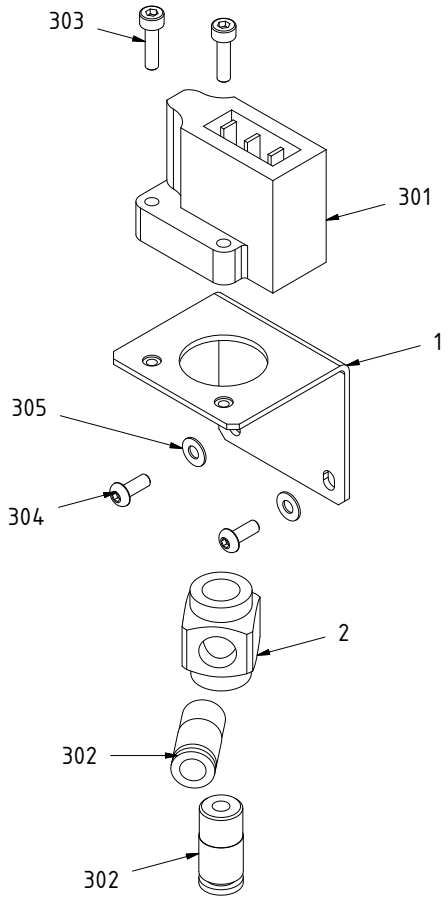
1.6.1.7 300.00.770 Minimum Flow Switch



Initial date: 20.06.2005 / EG Change index: 0 / 17.01.2020 / AG

Pos	Amount	Unit	Spare part class	Article number	Article description
1	1.00	pc.	-	200.01.801	Angle bracket
2	1.00	pc.	-	200.01.804	T-Connection
301	1.00	pc.	3	106.20.010	Pressure switch Airtrol F-4300-15-PT
302	2.00	pc.	-	106.15.010	Straight Connector 1/8, 6mm, KQ2S06-01NS
303	2.00	pc.	-	100.00.018	Cyl. Screw M3 x 12 BN 3
304	2.00	pc.	-	100.00.158	Lens Head Screw M3x8 BN 1593
305	2.00	pc.	-	100.09.004	Flat washer M3 BN 671 (3.2/7 x 0.5)
306	0.35	m	3	106.17.015	Polyurethane-Tube d = 6mm, black, antistatic
307	1.00	pc.	-	109.18.018	Flat receptacle 2.8x0.5mm insul. 0.5mm2
308	0.16	m	-	109.53.006	PVC-Strand Wire 0.5mm2 Dark Blue

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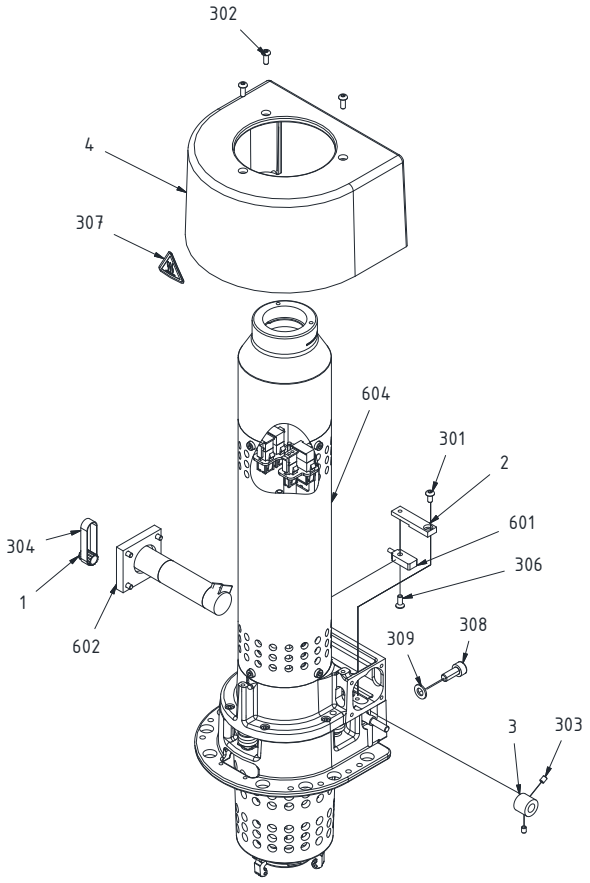
1.6.2 300.02.256 Advanced Solder Head



Initial date: 12.09.2008 / EG

Change index: 0 / 09.04.2020 / MN

Pos	Amount	Unit	Spare part class	Article number	Article description
1	1.00	pc.	-	200.01.225	Pulley Z13
2	1.00	pc.	-	200.04.425	Sensor holder
3	1.00	pc.	-	200.04.423	Adjusting ring
4	1.00	pc.	-	200.01.405	Cover
301	1.00	pc.	-	100.00.157	Lens Head Screw M3x6 BN 1593
302	3.00	pc.	-	100.00.158	Lens Head Screw M3x8 BN 1593
303	2.00	pc.	-	100.00.176	Threaded Pin M3x 4 BN 28
304	1.00	pc.	2	101.28.007	Toothed belt PowerGrip GT 2MR-74, 6mm
306	1.00	pc.	-	100.00.125	Countersunk Screw M3x8 BN 21
307	1.00	pc.	3	109.51.006	Warning Label 25 x 25mm Hot Surface
308	2.00	pc.	-	100.00.044	Cyl. Screw M5 x 12 BN 3
309	2.00	pc.	-	100.04.003	Flat Washer M5 DIN 433 BN 726
601	1.00	pc.	3	300.05.035	Sensor with Connector
602	1.00	pc.	-	300.02.263	Theta-Axis Drive
604	1.00	pc.	-	300.04.399	Advanced Solder Head Base

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1.6.2.1 300.05.035 Sensor with Connector

Initial date: 08.05.2012 / SK Change index: 0 / 17.01.2020 / AG

Pos	Amount	Unit	Spare part class	Article number	Article description
301	1.00	pc.	3	109.04.079	Inductive Sensor IFFM 08P17A6/L, 2m
302	1.00	pc.	-	109.18.266	Pin Housing 6pin male, Twin-Row
303	3.00	pc.	-	109.57.015	Crimp Contact male AWG 20-24

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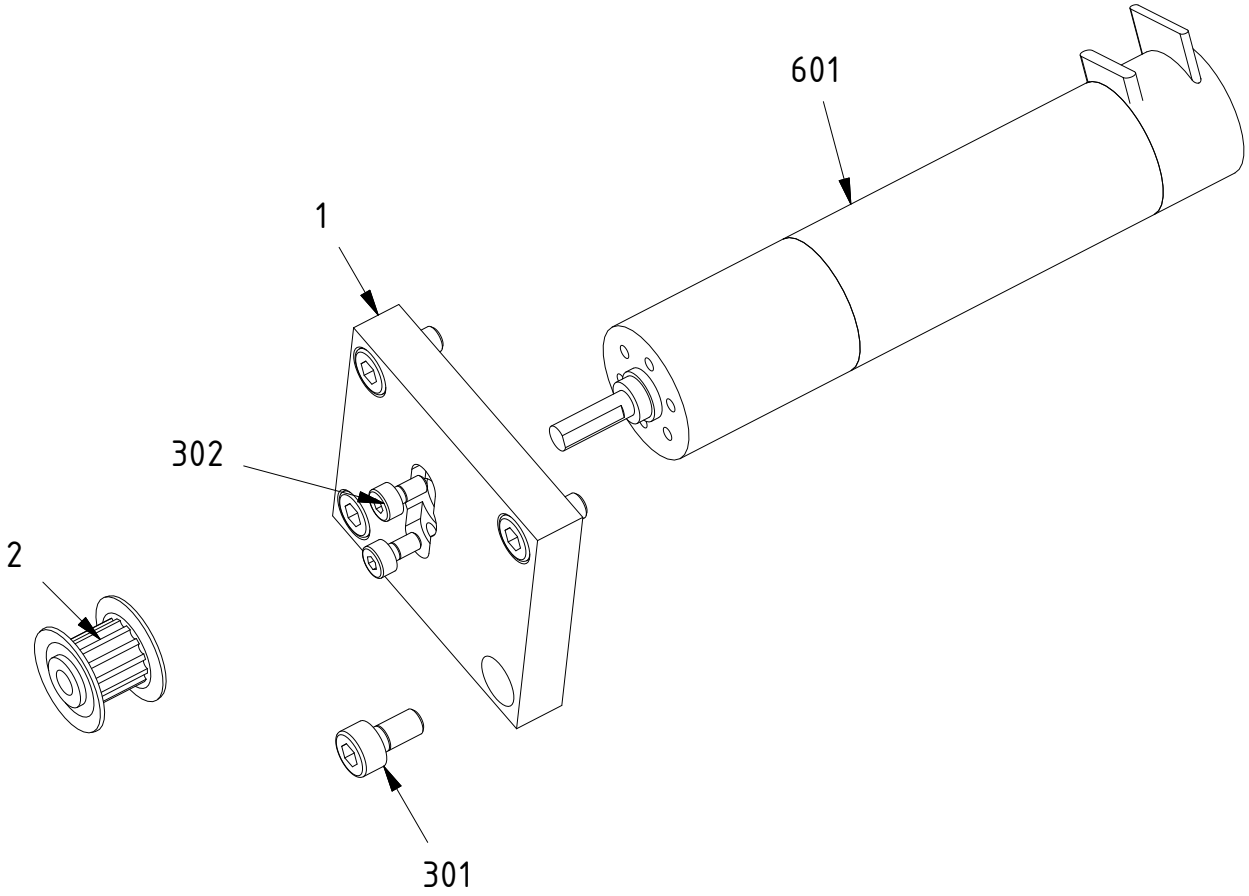
1.6.2.2 300.02.263 Theta-Axis Drive



Initial date: 15.09.2008 / EG Change index: 0 / 09.04.2020 / MN

Pos	Amount	Unit	Spare part class	Article number	Article description
1	1.00	pc.	-	200.01.223	Motor flange
2	1.00	pc.	-	200.01.226	Toothed Disc 1
301	4.00	pc.	-	100.00.015	Cyl. Screw M3 x 6 BN 3
302	2.00	pc.	-	100.00.197	Cyl. Screw M2 x 4 BN 11
303	0.01	ml	-	115.14.002	Loctite 638 10ml, Retaining Compound
601	1.00	pc.	2	300.04.541	EC-Motor EC 16 30W incl. connector

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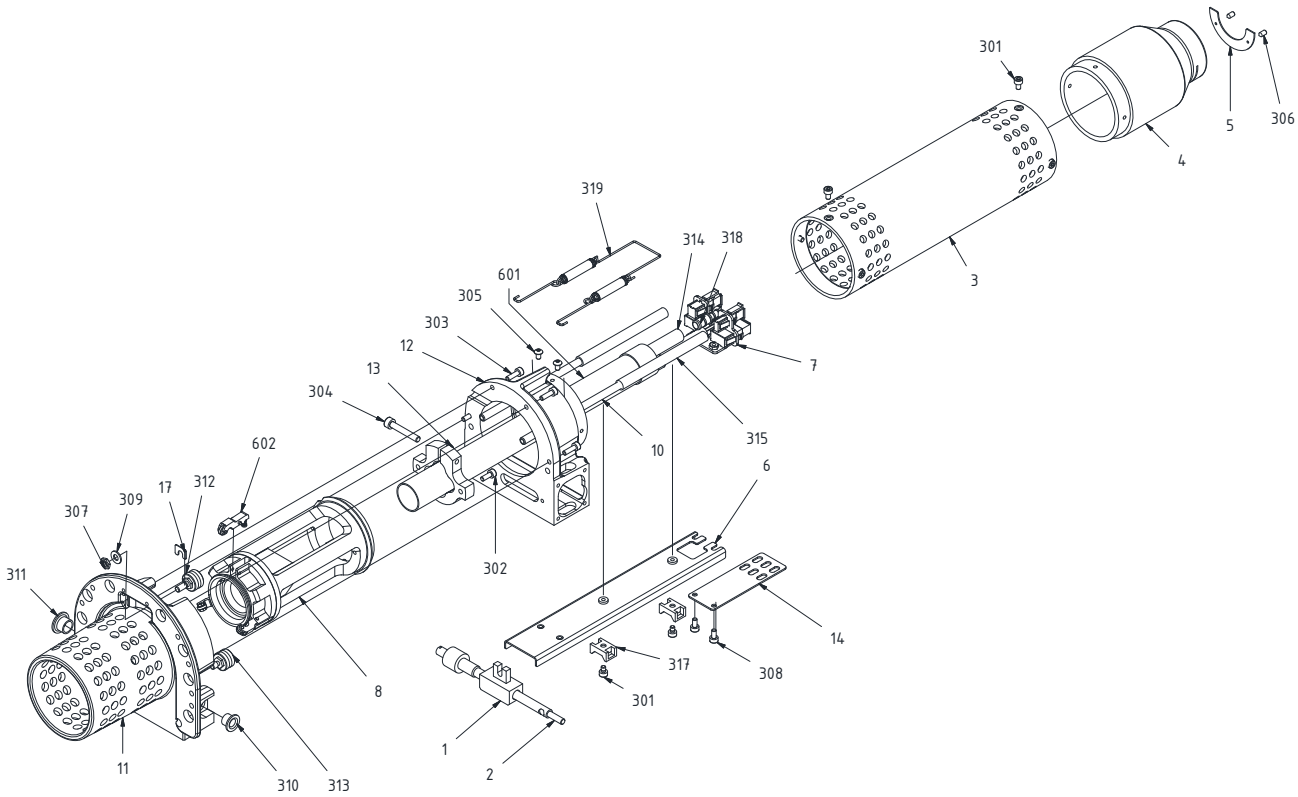
1.6.2.3 300.04.399 Advanced Solder Head Base



Initial date: 01.09.2011 / EG Change index: 0 / 17.01.2020 / AG

Pos	Amount	Unit	Spare part class	Article number	Article description
1	1.00	pc.	-	200.01.033	Slide
2	1.00	pc.	-	200.01.219	Spindle
3	1.00	pc.	-	200.01.220	Protective Tube
4	1.00	pc.	-	200.08.851	Upper covering cap
5	1.00	pc.	-	200.01.231	Segment
6	1.00	pc.	-	200.01.235	Cable holder
7	1.00	pc.	-	200.31.239	Connector Holder
8	1.00	pc.	-	200.01.259	Nozzle head cone assembly
10	2.00	pc.	-	200.01.261	Air-Vacuum pipe
11	1.00	pc.	-	200.08.831	Support Heating Head
12	1.00	pc.	-	200.01.404	Motor flange
13	1.00	pc.	-	200.01.260	Clamping Ring
14	1.00	pc.	-	200.10.325	Strain relief plate
17	1.00	pc.	-	200.08.830	Spacer disk 0.5mm
301	4.00	pc.	-	100.00.014	Cyl. Screw M3 x 5 BN 3
302	2.00	pc.	-	100.00.016	Cyl. Screw M3 x 8 BN 3
303	4.00	pc.	-	100.00.017	Cyl. Screw M3 x 10 BN 3
304	1.00	pc.	-	100.00.035	Cyl. Screw M4 x 25 BN 3
305	8.00	pc.	-	100.00.156	Lens Head Screw M3x5 BN 1593
306	2.00	pc.	-	100.00.206	Threaded Pin M3x 6 with Tip BN 29
308	2.00	pc.	-	100.00.015	Cyl. Screw M3 x 6 BN 3
310	1.00	pc.	3	101.22.026	Rotational spacer 6x8x12x7

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Pos	Amount	Unit	Spare part class	Article number	Article description
311	1.00	pc.	3	101.22.027	Rotational spacer 8x10x15x7.5
312	1.00	pc.	3	101.22.028	HEPCO bearing (excenter)
313	2.00	pc.	3	101.22.029	HEPCO bearing
314	0.05	m	3	106.17.006	Silicon Tube di=6, da=9, transparent
315	1.38	m	3	106.17.008	Silicon Tube di=4, da=7, black
317	2.00	pc.	-	109.19.016	Attachment Block TM-2S6
318	1.00	pc.	-	106.16.012	Reducing Coupling 1/4" x 0.17"
319	1.00	pc.	-	600.00.029	Tension Spring Assembly
601	1.00	pc.	1	300.00.140	Hot Air Heater 2000W (cpl.)
602	3.00	pc.	-	300.00.473	Lever cpl.

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1.6.2.3.1 300.00.140 Hot Air Heater 2000W (cpl.)

Initial date: 12.06.2001 / DL Change index: 1 / 17.01.2020 / AG

Pos	Amount	Unit	Spare part class	Article number	Article description
301	1.00	pc.	1	109.48.003	Hot Air Heater 2000W
304	1.00	pc.	-	109.18.061	Miniature Plug K NiCr-Ni yellow
306	1.00	pc.	-	109.20.086	Porcelain Terminal Block 2pin, 4mm2

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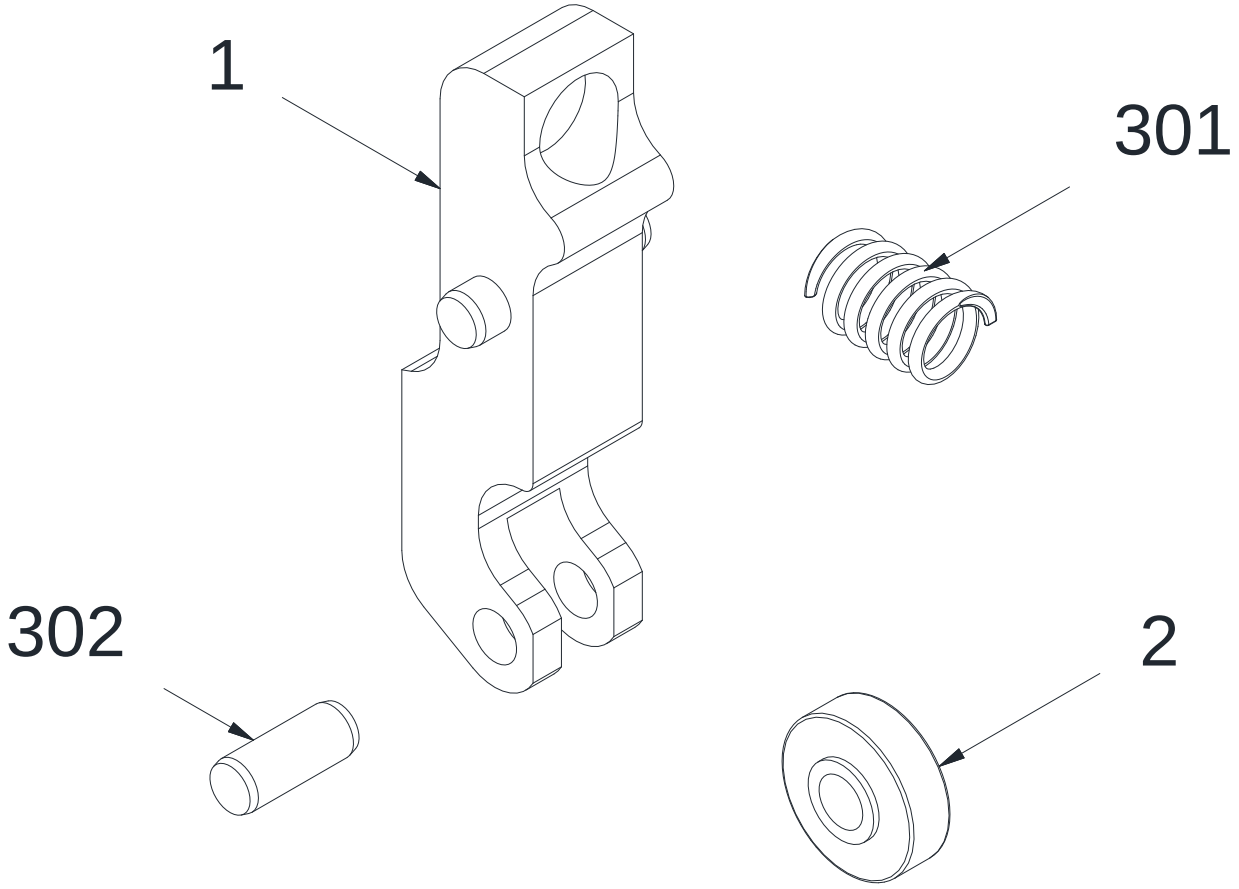
1.6.2.3.2 300.00.473 Lever cpl. (Nozzle Clamp Mechanismus)



Initial date: 08.04.2004 / EG Change index: 0 / 17.01.2020 / AG

Pos	Amount	Unit	Spare part class	Article number	Article description
1	1.00	pc.	-	200.00.290	Lever
2	1.00	pc.	-	200.01.278	Roller
301	1.00	pc.	3	101.27.022	Compression Spring VD 085C Material X750
302	1.00	pc.	-	100.05.093	Cylinder Pin d 2 x 5 Adax
303	1.00	pc.	-	100.05.012	Cylinder Pin d 2-h 6 x 8 BN 858

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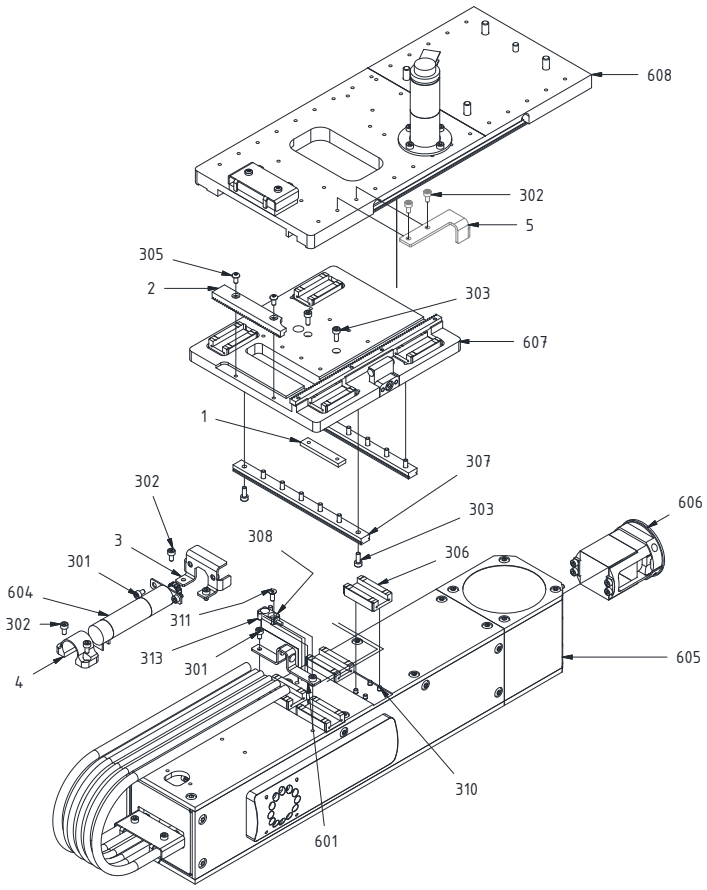
1.7 300.15.426 Vision System with MFOV

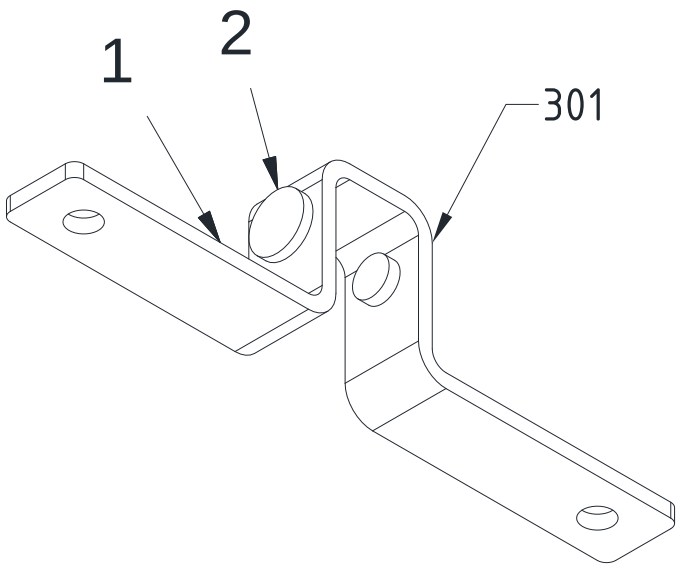


Initial date: 25.02.2019 / SK Change index: 0 / 17.01.2020 / AG

Pos	Amount	Unit	Spare part class	Article number	Article description
1	1.00	pc.	-	200.04.427	Contact plate
2	1.00	pc.	-	200.01.180	Gear rack X
3	1.00	pc.	-	200.01.200	Cover Rack
4	1.00	pc.	-	200.04.495	Motor support
5	1.00	pc.	-	200.02.490	Transport Safety Lock Vision Y
301	4.00	pc.	-	100.00.014	Cyl. Screw M3 x 5 BN 3
302	6.00	pc.	-	100.00.015	Cyl. Screw M3 x 6 BN 3
303	16.00	pc.	-	100.00.016	Cyl. Screw M3 x 8 BN 3
305	2.00	pc.	-	100.00.157	Lens Head Screw M3x6 BN 1593
306	4.00	pc.	3	102.00.012	Linear Guide Carriage MNN 9-G1-LS-KB
307	2.00	pc.	3	102.00.017	Linear Guide Rail MN 9-135-G3-V0
308	1.00	pc.	3	109.04.079	Inductive Sensor IFFM 08P17A6/L, 2m
310	16.00	pc.	-	100.00.013	Cyl. Screw M3 x 4 BN 3
311	1.00	pc.	-	100.00.125	Countersunk Screw M3x8 BN 21
313	2.00	pc.	-	100.05.026	Cylinder Pin d 3-h 6 x 6 BN 858
601	1.00	pc.	-	300.00.454	Mechanical stop X cpl.
604	1.00	pc.	2	300.02.267	Gear motor vision X
605	1.00	pc.	-	300.15.427	Vision unit base module
606	1.00	pc.	-	300.01.048	Prism attachment fixed

Pos	Amount	Unit	Spare part class	Article number	Article description
607	1.00	pc.	-	300.02.271	Y-Slide vision
608	1.00	pc.	-	300.16.607	Guide Plate Y

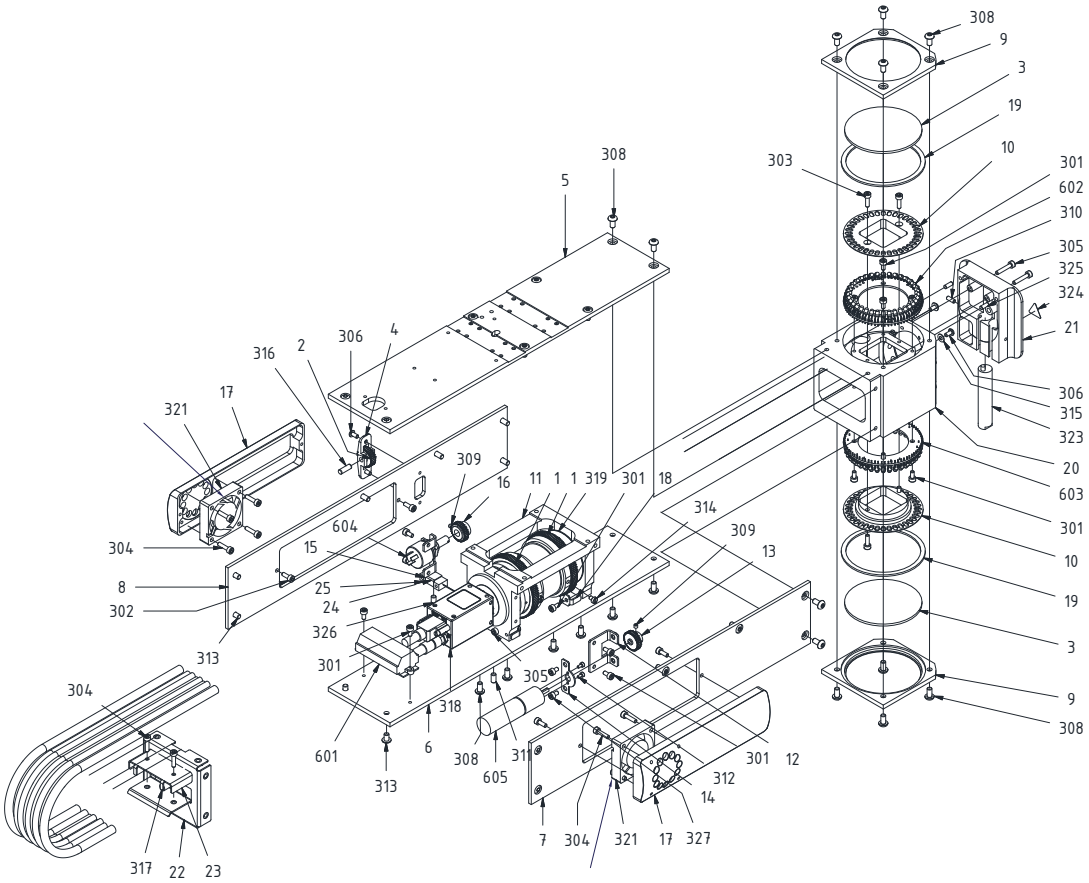
1.7.1 300.00.454 Mechanical Stop X cpl.



Initial date: 24.02.2004 / WB Change index: 0 / 17.01.2020 / AG

Pos	Amount	Unit	Spare part class	Article number	Article description
1	1.00	pc.	-	200.01.203	Mechanical stop X
2	2.00	pc.	-	200.00.128	Carrier Bolt
301	0.10	g	-	115.14.003	Loctite 480 20g, Instant Glue

1.7.2 300.15.427 Vision Unit Base Module



Initial date: 25.02.2019 / SK

Change index: 0 / 04.02.2020 / AG

Pos	Amount	Unit	Spare part class	Article number	Article description
1	2.00	pc.	-	200.01.023	Drive Ring
2	1.00	pc.	-	200.01.025	Hand wheel lens
3	2.00	pc.	-	200.01.131	Protective Glass
4	1.00	pc.	-	200.01.184	Housing gear wheel
5	1.00	pc.	-	200.04.492	Base Plate Vision
6	1.00	pc.	-	200.01.187	Base plate
7	1.00	pc.	-	200.01.188	Side plate left
8	1.00	pc.	-	200.01.189	Side plate right
9	2.00	pc.	-	200.01.190	Frame Protective Glass
10	2.00	pc.	-	200.01.191	LED cover ring
11	1.00	pc.	-	200.01.193	Lens housing
12	1.00	pc.	-	200.01.194	Base Plate Zoom Drive
13	1.00	pc.	-	200.01.195	Spur gear zoom drive
14	1.00	pc.	-	200.01.196	Motor plate zoom
15	1.00	pc.	-	200.01.197	Angle potentiometer
16	1.00	pc.	-	200.01.198	Spur gear potentiometer zoom
17	2.00	pc.	-	200.01.199	Covering motor
18	4.00	pc.	-	200.01.204	Cable lug
19	2.00	pc.	-	200.01.282	Disc Washer
20	1.00	pc.	-	200.01.927	Prism housing

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Pos	Amount	Unit	Spare part class	Article number	Article description
21	1.00	pc.	-	200.03.225	Housing Laser Pointer
22	1.00	pc.	-	200.27.758	Frame Vision
23	1.00	pc.	-	200.27.757	Cable Clamp
24	1.00	pc.	-	200.03.275	Clamping angle bracket
25	1.00	pc.	-	200.03.276	Holder clamping angle bracket
301	18.00	pc.	-	100.00.015	Cyl. Screw M3 x 6 BN 3
302	4.00	pc.	-	100.00.016	Cyl. Screw M3 x 8 BN 3
303	4.00	pc.	-	100.00.017	Cyl. Screw M3 x 10 BN 3
304	8.00	pc.	-	100.00.018	Cyl. Screw M3 x 12 BN 3
305	4.00	pc.	-	100.00.020	Cyl. Screw M3 x 16 BN 3
306	5.00	pc.	-	100.00.157	Lens Head Screw M3x6 BN 1593
304	2.00	pc.	-	100.00.018	Cyl. Screw M3 x 12 BN 3
308	28.00	pc.	-	100.00.160	Lens Head Screw M4x8 BN 1593
309	2.00	pc.	-	100.00.175	Threaded Pin M3x 3 BN 28
310	1.00	pc.	-	100.00.179	Threaded Pin M3x 8 BN 28
311	1.00	pc.	-	100.00.183	Threaded Pin M4x 8 BN 28
312	2.00	pc.	-	100.00.197	Cyl. Screw M2 x 4 BN 11
313	8.00	pc.	-	100.00.208	Lens Head Screw M4x6 BN 1593
314	2.00	pc.	-	100.03.014	Slotted Cyl. Screw M3 x 4 BN 330
315	3.00	pc.	-	100.04.023	Flat Washer M3 VSM 13904 BN 715
316	1.00	pc.	-	100.05.040	Cylinder Pin d 4-h 6 x 12 BN 858
317	0.03	m	3	106.17.015	Polyurethane-Tube d = 6mm, black, antistatic
318	1.00	pc.	-	108.00.044	Camera VCXG-32C
319	1.00	pc.	3	108.01.004	Macro zoom objective Computar MLH-10X
321	2.00	pc.	-	109.08.003	Fan 40x40x10 mm, 24 VDC
323	1.00	pc.	3	109.24.019	Laser Pointer FP-65
324	1.00	pc.	3	109.51.058	Warning Label 15 x 15mm Laser Beam
325	2.00	pc.	-	100.05.027	Cylinder Pin d 3-h 6 x 8 BN 858
326	1.00	pc.	-	100.00.182	Threaded Pin M4x 6 BN 28
327	2.00	pc.	-	100.00.014	Cyl. Screw M3 x 5 BN 3
601	1.00	pc.	-	300.00.439	Terminal strip vision
602	1.00	pc.	2	300.01.214	Upper illumination board (LED green)
603	1.00	pc.	2	300.00.458	Lower illumination board (LED white)
604	1.00	pc.	-	300.15.246	Potentiometer Assembly
605	1.00	pc.	2	300.00.460	Gear motor vision

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1.7.2.1 300.00.439 Terminal Strip

Initial date: 09.02.2004 / DL Change index: 0 / 17.01.2020 / AG

Pos	Amount	Unit	Spare part class	Article number	Article description
301	1.00	pc.	-	109.20.061	End Plate grey
302	5.00	pc.	-	109.20.058	Stackable Single Clamp grey
303	2.00	pc.	-	109.20.060	Stackable Single Clamp orange
304	1.00	pc.	-	109.20.059	Stackable Single Clamp yellow-green

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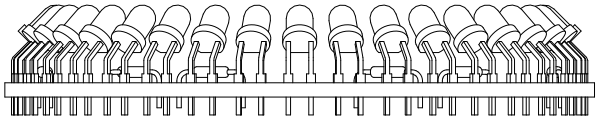
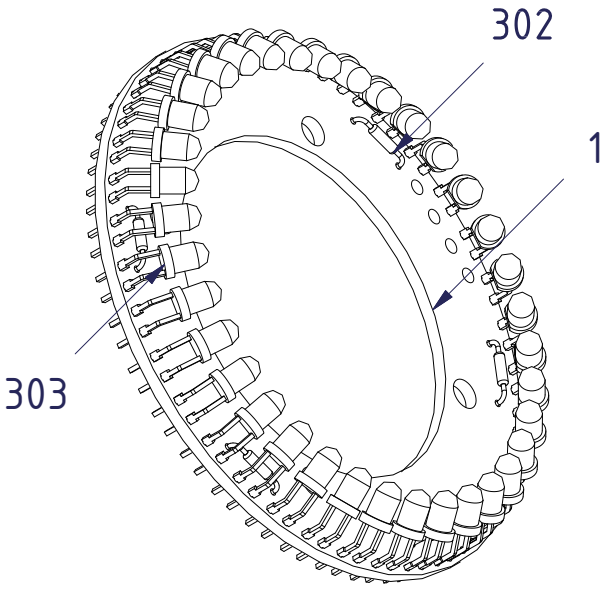
1.7.2.2 300.01.214 Upper Illumination Board (LED green)





Initial date: 06.11.2006 / DL Change index: 0 / 09.04.2020 / MN

Pos	Amount	Unit	Spare part class	Article number	Article description
1	1.00	pc.	-	200.00.270	Printed Circuit Board (PCB) Illumination
301	36.00	pc.	-	109.24.017	LED L3-G51N-GUV 3mm green 30°
302	6.00	pc.	-	109.12.028	Metal film resistors 130ohm/0.4W 1%
303	0.12	m	-	109.53.002	PVC-Strand Wire 0.34mm2 Brown
304	0.12	m	-	109.53.003	PVC-Strand Wire 0.34mm2 Dark Blue
305	1.00	pc.	-	109.18.055	Pin Bar 2pol. straight
306	0.03	m	-	109.22.006	Shrink Tube 1.6 mm black

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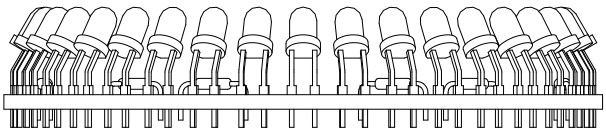
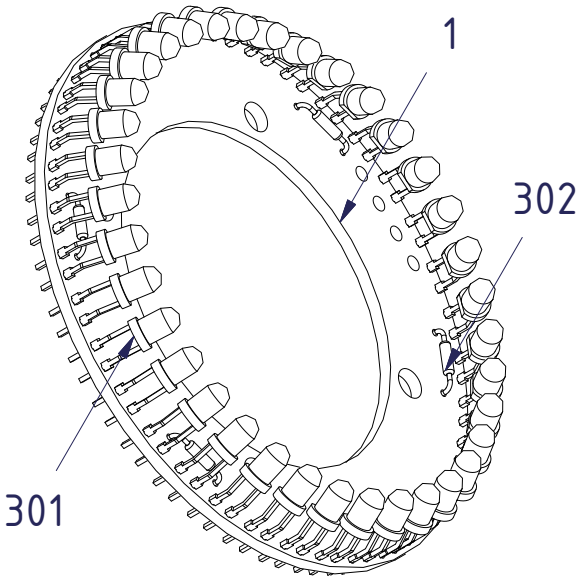
1.7.2.3 300.00.458 Lower Illumination Board





Initial date: 24.02.2004 / WB

Change index: 0 / 17.01.2020 / AG

Pos	Amount	Unit	Spare part class	Article number	Article description
1	1.00	pc.	-	200.00.270	Printed Circuit Board (PCB) Illumination
301	36.00	pc.	-	109.24.008	LED L3-W36N-BVW white 50°
302	6.00	pc.	-	109.12.028	Metal film resistors 130ohm/0.4W 1%
303	0.12	m	-	109.53.002	PVC-Strand Wire 0.34mm2 Brown
304	0.12	m	-	109.53.003	PVC-Strand Wire 0.34mm2 Dark Blue
305	1.00	pc.	-	109.18.055	Pin Bar 2pol. straight
306	0.03	m	-	109.22.006	Shrink Tube 1.6 mm black

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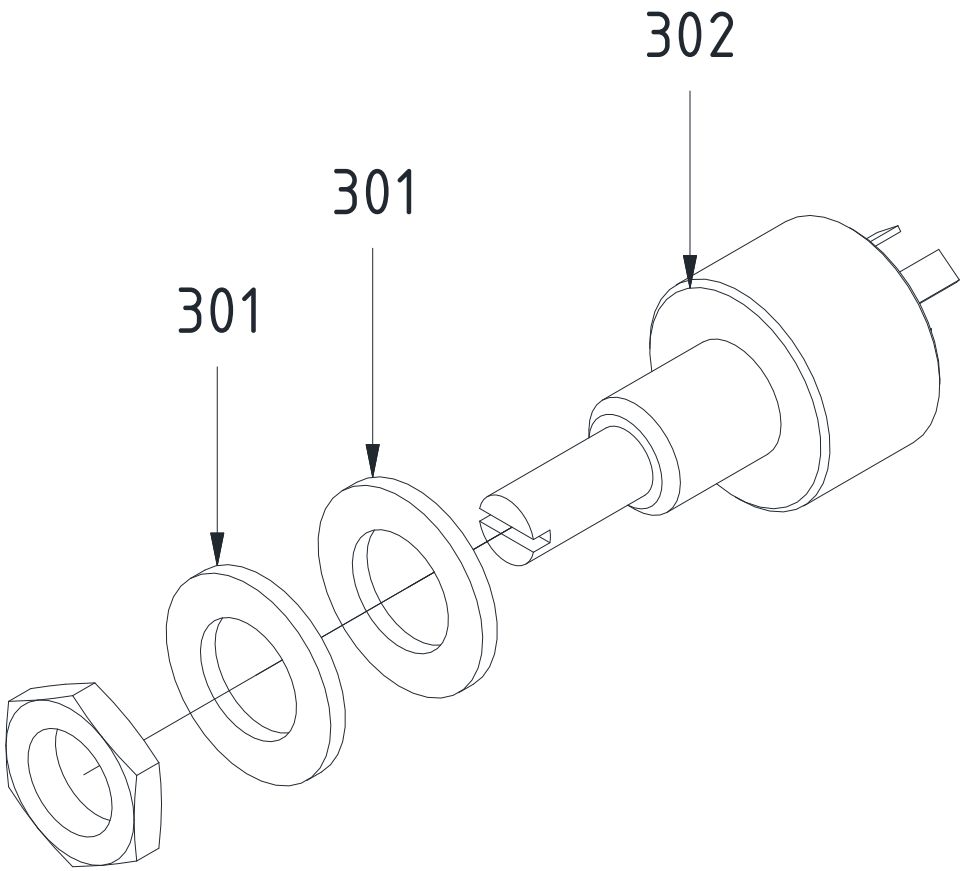
1.7.2.4 300.15.246 Potentiometer cpl.



Initial date: 30.01.2019 / PD Change index: 0 / 03.04.2020 / MN

Pos	Amount	Unit	Spare part class	Article number	Article description
301	2.00	pc.	-	100.04.006	Flat washer M10 DIN 433 BN 726
302	1.00	pc.	3	109.12.085	Potentiometer PE30 1.0kohm/3W
303	3.00	pc.	-	109.18.018	Flat receptacle 2.8x0.5mm insul. 0.5mm2
304	3.00	pc.	-	109.47.006	Cable End Sleeve 0.5 x 8mm (tin-plated)
305	0.20	m	-	109.53.093	Strand Wire AWG20/0.5mm2 Dark Blue-White
306	0.40	m	-	109.53.094	Strand Wire AWG20/0.5mm2 Pink Tin-Coated

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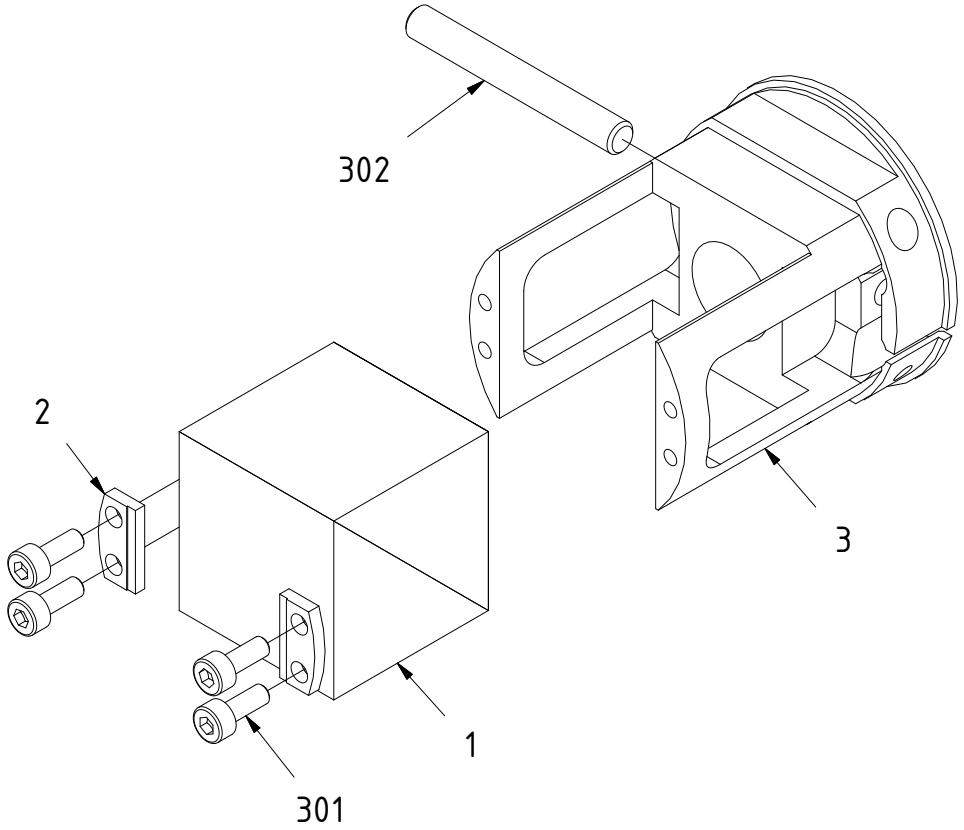
1.7.3 300.01.048 Prism Attachment fix



Initial date: 30.05.2006 / CL Change index: 0 / 04.07.2019 / AG

Pos	Amount	Unit	Spare part class	Article number	Article description
1	1.00	pc.	-	200.01.123	Beam splitter prism 30mm
2	2.00	pc.	-	200.01.931	Clamping Plate Prisma
3	1.00	pc.	-	200.02.438	Prism housing fix
301	4.00	pc.	-	100.00.015	Cyl. Screw M3 x 6 BN 3
302	1.00	pc.	-	100.00.233	Threaded Pin M5x 40 BN 28
303	4.00	pc.	-	100.10.001	Flat Washer d3.2/6 x 0.5 brass BN565

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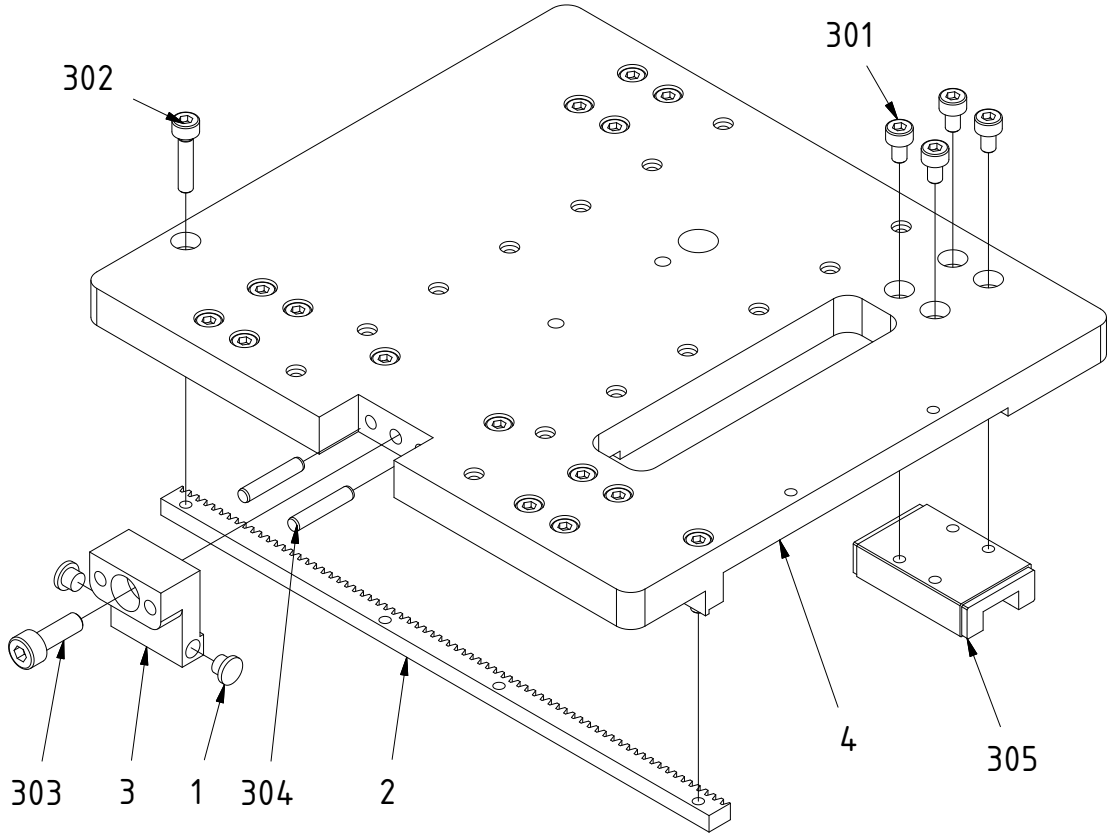
1.7.4 300.02.271 Y-Slide Vision



Initial date: 17.09.2008 / EG Change index: 0 / 17.01.2020 / AG

Pos	Amount	Unit	Spare part class	Article number	Article description
1	2.00	pc.	-	200.00.128	Carrier Bolt
2	1.00	pc.	-	200.01.177	Gear rack Y
3	1.00	pc.	-	200.01.178	Mechanical stop Y
4	1.00	pc.	-	200.04.465	Y-Slide vision
301	16.00	pc.	-	100.00.014	Cyl. Screw M3 x 5 BN 3
302	4.00	pc.	-	100.00.019	Cyl. Screw M3 x 14 BN 3
303	1.00	pc.	-	100.00.030	Cyl. Screw M4 x 12 BN 3
304	2.00	pc.	-	100.05.031	Cylinder Pin d 3-h 6 x 16 BN 858
305	4.00	pc.	3	102.00.012	Linear Guide Carriage MNN 9-G1-LS-KB

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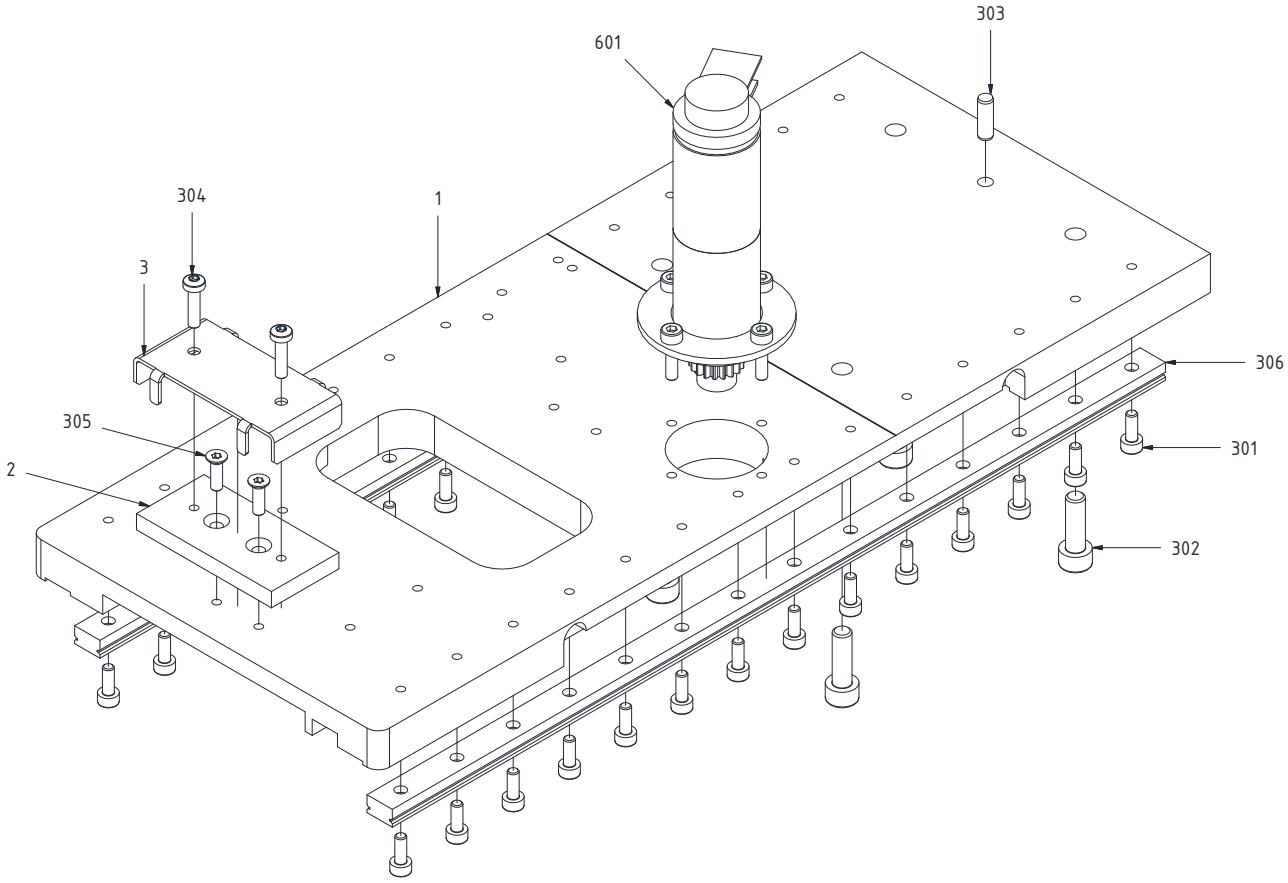
1.7.5 300.16.607 Guide Plate Y



Initial date: 10.09.2019 / PD Change index: 0 / 17.01.2020 / AG

Pos	Amount	Unit	Spare part class	Article number	Article description
1	1.00	pc.	-	200.01.170	Base Plate Y-Guide
2	1.00	pc.	-	200.27.756	clamp plate
3	1.00	pc.	-	200.27.757	Cable Clamp
301	28.00	pc.	-	100.00.016	Cyl. Screw M3 x 8 BN 3
302	4.00	pc.	-	100.00.046	Cyl. Screw M5 x 16 BN 3
303	2.00	pc.	-	100.05.040	Cylinder Pin d 4-h 6 x 12 BN 858
304	2.00	pc.	-	100.13.022	Lens Head Screw Torx M3x12 BN 5687
305	2.00	pc.	-	100.13.041	Countersunk Screw Torx M3x10 BN 4851
306	2.00	pc.	3	102.00.022	Linear Guide Rail MN 9-275-G3-V0
601	1.00	pc.	-	300.16.588	Motor Vision Y Axis

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1.8 300.16.410 Electric Module

Initial date: 12.09.2019 / SK Change index: 0 / 03.04.2020 / AG

Pos	Amount	Unit	Spare part class	Article number	Article description
301	3.00	pc.	-	100.00.027	Cyl. Screw M4 x 6 BN 3
310	1.00	pc.	3	109.02.042	Motor circuit breaker, lockable, 20A
311	1.00	pc.	3	109.55.013	Miniature contactor 3 + 1 close pos. 200/208VAC
312	12.00	pc.	-	109.20.102	Coding Key Phoenix Contact
313	1.00	pc.	2	110.08.038	COP-IT Board
314	2.00	pc.	2	110.08.036	COP-Connector Phoenix Contact
315	1.00	pc.	2	110.08.035	COP-Master 2 and bus coupler
601	1.00	pc.	3	300.00.538	Power cable 3PE
602	1.00	pc.	-	300.04.550	DIN-Rail 208V
603	1.00	pc.	-	300.04.538	Main Power Cable Harness ONYX 29 (208V)
604	1.00	pc.	-	300.17.130	Control System ONYX 29 208VAC
605	1.00	pc.	2	300.00.888	AC Power Supply 230/12VDC 0.5VA
606	1.00	pc.	3	300.05.003	Power Cable 3x1.5mm2

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1.8.1 300.04.550 DIN-Rail 208V ONYX 29

Initial date: 03.11.2011 / SK Change index: 0 / 09.04.2020 / MN

Pos	Amount	Unit	Spare part class	Article number	Article description
1	1.00	pc.	-	200.00.954	Mounting Rail 380mm
301	2.00	pc.	-	109.20.006	Screwless End Clip 6mm Width
302	9.00	pc.	-	109.20.012	Crossbridge Isolated gray 2.5mm2
303	3.00	pc.	-	109.20.053	Spring Clamp Terminal gray 6mm2
304	1.00	pc.	-	109.20.055	Protective Conductor Terminal 6.0mm2
305	1.00	pc.	-	109.20.056	Distance Plate Orange (282)
306	1.00	pc.	-	109.20.057	Warning Cover Lightning yellow
307	26.00	pc.	-	109.20.062	Spring Clamp Terminal gray 2.5mm2
308	4.00	pc.	-	109.20.064	Protective Conductor Terminal 2.5mm2
310	6.00	pc.	-	109.20.065	Distance Plate gray (870)
311	1.00	pc.	-	109.20.066	Terminal Bridge 2-fold
312	3.00	pc.	-	109.20.068	Terminal Bridge 4-fold
313	15.00	pc.	-	109.20.092	Spring clamp terminal gray 4mm2
314	2.00	pc.	-	109.20.093	Protective conductor terminal 4mm2
315	2.00	pc.	-	109.20.094	Distance plate gray (281)

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1.8.2 300.17.130 Control System ONYX 29 208VAC

Initial date: 26.11.2019 / SK Change index: 0 / 17.02.2020 / SK

Pos	Amount	Unit	Spare part class	Article number	Article description
301	1.02	m	-	109.53.095	Strand Wire AWG18/1.0mm2 Yellow-Green
302	1.83	m	-	109.53.096	Strand Wire AWG18/1.0mm2 Purple
303	3.34	m	-	109.53.098	Strand Wire AWG18/1.0mm2 Dark Blue
304	2.46	m	-	109.53.099	Strand Wire AWG18/1.0mm2 Dark Blue-White
305	1.00	m	-	109.53.092	Strand Wire AWG20/0.5mm2 Dark Blue
306	0.33	m	-	109.53.094	Strand Wire AWG20/0.5mm2 Pink Tin-Coated
307	1.26	m	-	109.53.093	Strand Wire AWG20/0.5mm2 Dark Blue-White
310	33.00	pc.	-	109.47.008	Cable End Sleeve 1.0 x 8mm (tin-plated)
311	8.00	pc.	-	109.47.006	Cable End Sleeve 0.5 x 8mm (tin-plated)
312	0.85	m	-	109.22.010	PLIO - Tube d = 7mm black

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1.9 300.11.922 Cable List

Initial date: 29.06.2017 / SK Change index: / 16.04.2020 / SK

Pos	Amount	Unit	Spare part class	Article number	Article description
301	2.00	pc.	3	109.16.109	System Cable 3 x 0.75mm2 C13+C14
302	1.00	pc.	3	109.16.112	Network Cable RJ45 Cat. 6, Length 0.5m
303	2.00	pc.	3	109.16.122	Network Cable RJ45 Cat.6 S/FTP, 3m
304	1.00	pc.	2	109.16.147	Network Cable GigE Cat6, Length = 3m
305	1.00	pc.	2	109.16.249	Cable Socket M8x1 8pol. 2m
601	1.00	pc.	3	300.00.370	Cable Power LED
602	1.00	pc.	3	300.00.477	Power Cable On/Off Switch
603	1.00	pc.	3	300.00.479	Cable Mass Flow Controller Vögtlin
604	1.00	pc.	3	300.00.480	Cable Emergency Switch
605	1.00	pc.	3	300.00.492	I/O-Cable operator panel
606	1.00	pc.	3	300.00.494	Cable Pneumatic Valves
607	2.00	pc.	3	300.00.512	Signal cable SSR-Relays
608	1.00	pc.	3	300.00.557	Power Cable 3x1.5mm2
609	1.00	pc.	3	300.00.895	Robotic Cable Hot Gas Heater
610	1.00	pc.	3	300.01.311	Power Cable Connection Hot-Gas Heater
611	1.00	pc.	3	300.01.312	Thermocouple Cable Type K (hot gas)
612	1.00	pc.	2	300.01.315	Power cable head
613	1.00	pc.	3	300.01.317	Robotic Cable IO-Signal Vision
614	1.00	pc.	3	300.01.318	Robotic Cable Vision Motors
615	1.00	pc.	3	300.01.321	Cable field illumination
616	1.00	pc.	3	300.01.323	Cable LED-Illumination vision unit
617	1.00	pc.	2	300.02.746	Motor Cable MAX4
618	1.00	pc.	2	300.02.808	Motor Cable MAX4
620	2.00	pc.	2	300.03.405	Encoder Cable Z-Theta-Axis
621	1.00	pc.	2	300.03.913	Motor Cable MAX4
622	1.00	pc.	3	300.04.537	Thermocouple Cable Type K
623	1.00	pc.	3	300.05.030	Encoder Cable Z-Theta-Axis
624	1.00	pc.	3	300.05.031	Encoder cable Z-Theta-Axis
625	1.00	pc.	2	300.05.034	Motor Cable MAX4
626	1.00	pc.	3	300.05.037	Sensor Power Cable
627	1.00	pc.	2	300.05.674	Encoder Cable MAX
628	1.00	pc.	3	300.10.630	Network Cable RJ45 Cat.6 S/FTP, 1m yellow
629	1.00	pc.	2	300.14.559	Robotic Cable Y-Axis MAX4
630	1.00	pc.	3	300.15.480	Network Cable RJ45 Cat.6 S/FTP, 0.5m yellow
631	1.00	pc.	2	300.16.811	Encoder extension cable
632	1.00	pc.	2	300.17.771	Analog Signal Cable
633	1.00	pc.	3	300.17.808	Analog signal cable

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1.10 300.04.431 Thermocouple Sensor Type K cpl.

Initial date: 13.09.2011 / IG Change index: 1 / 17.02.2020 / SK

Pos	Amount	Unit	Spare part class	Article number	Article description
301	1.00	pc.	3	109.04.136	Thermocouple Type K, with strap and connector
303	0.02	m	-	109.22.007	Shrink Tube 3.2 mm black
304	2.00	pc.	-	109.47.006	Cable End Sleeve 0.5 x 8mm (tin-plated)

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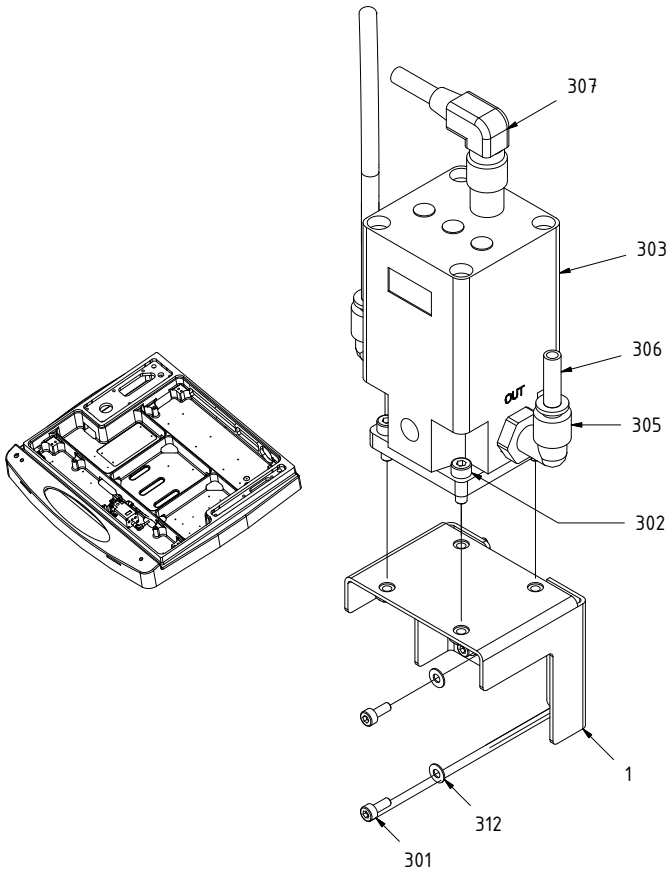
2.3 300.01.478 Pressure Controller Blow Off



Initial date: 12.04.2007 / EG Change index: 0 / 14.02.2020 / SK

Pos	Amount	Unit	Spare part class	Article number	Article description
1	1.00	pc.	-	200.03.330	Holder IP-Converter
301	4.00	pc.	-	100.00.015	Cyl. Screw M3 x 6 BN 3
302	4.00	pc.	-	100.00.030	Cyl. Screw M4 x 12 BN 3
303	1.00	pc.	3	106.10.005	Electro Pneum. Pressure Controller 0.005-0.9MPa
304	1.00	pc.	-	106.15.006	Straight connector 4/6mm KQ2H04-06A
305	2.00	pc.	-	106.15.037	Angle Bracket - Screw Connection 3/8 6mm KQ2L06-03AS
306	1.00	m	3	106.17.015	Polyurethane-Tube d = 6mm, black, antistatic
307	1.00	pc.	3	106.21.012	Power Cable to Pressure Controller 90°, 3m
312	4.00	pc.	-	100.04.001	Flat Washer M3 DIN 433 BN 726
314	1.00	pc.	-	106.15.002	Throttle Check Valve AS 1001FM-04
315	1.00	pc.	-	106.15.005	T-Connector 3 x 4mm, KQ2T04-00A
316	2.00	pc.	-	106.21.005	Holder to throttle check valve

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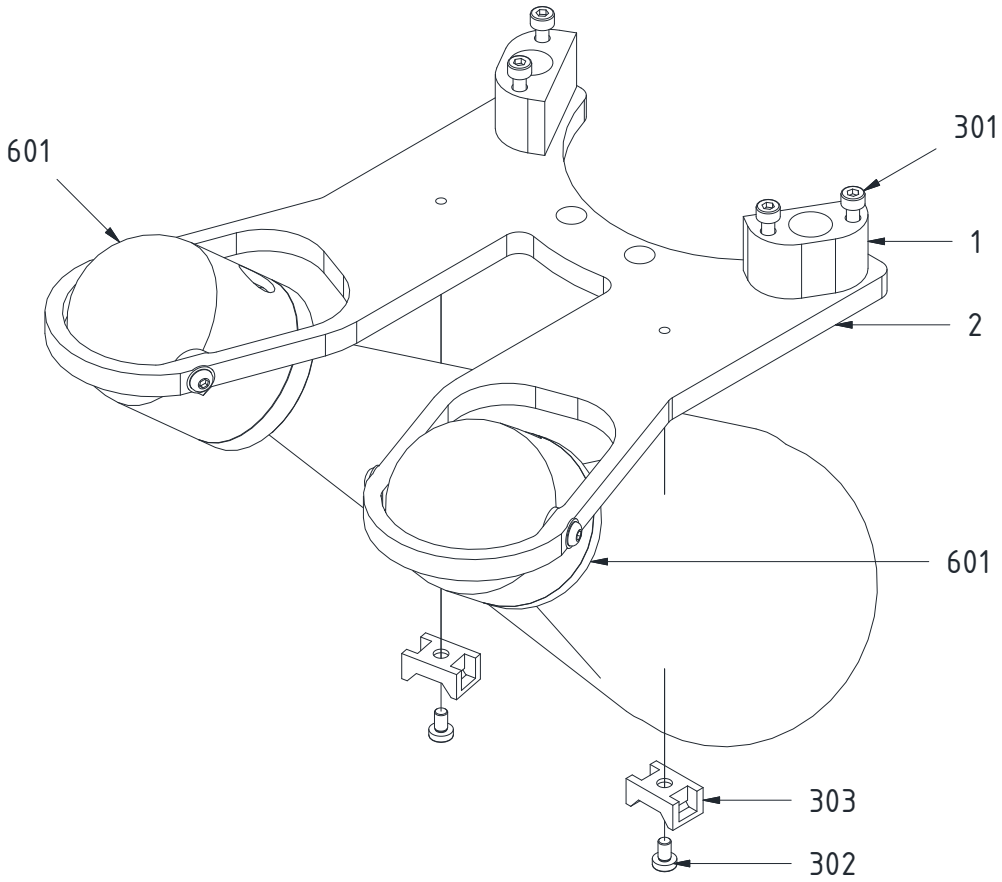
2.4 300.15.325 Feld Illumination (adjustable) Distanced



Initial date: 12.02.2019 / PD Change index: 0 / 14.02.2020 / SK

Pos	Amount	Unit	Spare part class	Article number	Article description
1	2.00	pc.	-	200.03.328	Support
2	1.00	pc.	-	200.28.597	Lamp Holder
301	4.00	pc.	-	100.00.023	Cyl. Screw M3 x 25 BN 3
302	2.00	pc.	-	100.13.018	Lens Head Screw Torx M3x 5 BN 5687
303	2.00	pc.	-	109.19.016	Attachment Block TM-2S6
601	2.00	pc.	-	300.01.422	Lamp (adjustable)
602	1.00	pc.	3	300.15.329	Y-Cable Field Illumination

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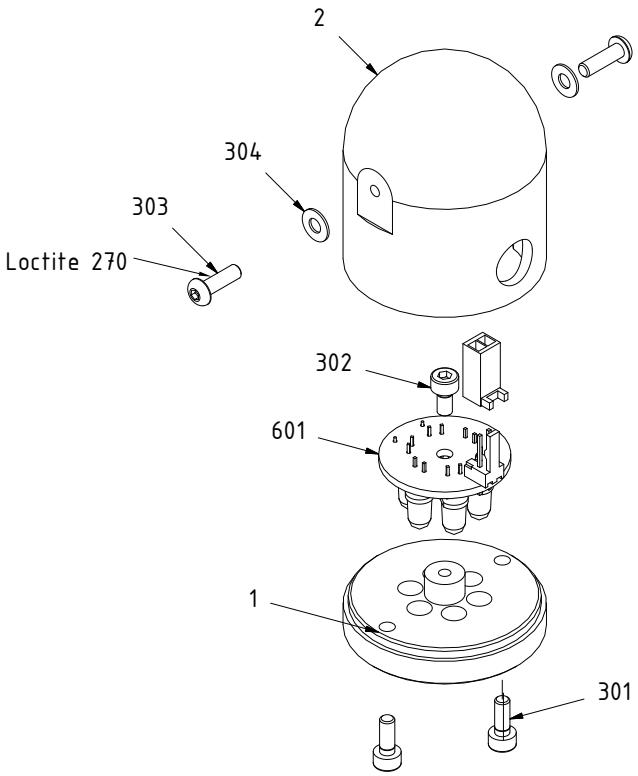
2.4.1 300.01.422 Lamp (adjustable)



Initial date: 21.03.2007 / EG Change index: 0 / 17.01.2020 / AG

Pos	Amount	Unit	Spare part class	Article number	Article description
1	1.00	pc.	-	200.01.228	Housing LED
2	1.00	pc.	-	200.03.263	Lamp housing
301	2.00	pc.	-	100.00.016	Cyl. Screw M3 x 8 BN 3
302	2.00	pc.	-	100.00.015	Cyl. Screw M3 x 6 BN 3
303	2.00	pc.	-	100.00.159	Lens Head Screw M3x10 BN 1593
304	2.00	pc.	-	100.09.004	Flat washer M3 BN 671 (3.2/7 x 0.5)
305	0.20	ml	-	115.14.012	Loctite 270 10ml, Thread Locking High-Strength
601	1.00	pc.	2	300.00.433	Illumination Board Field

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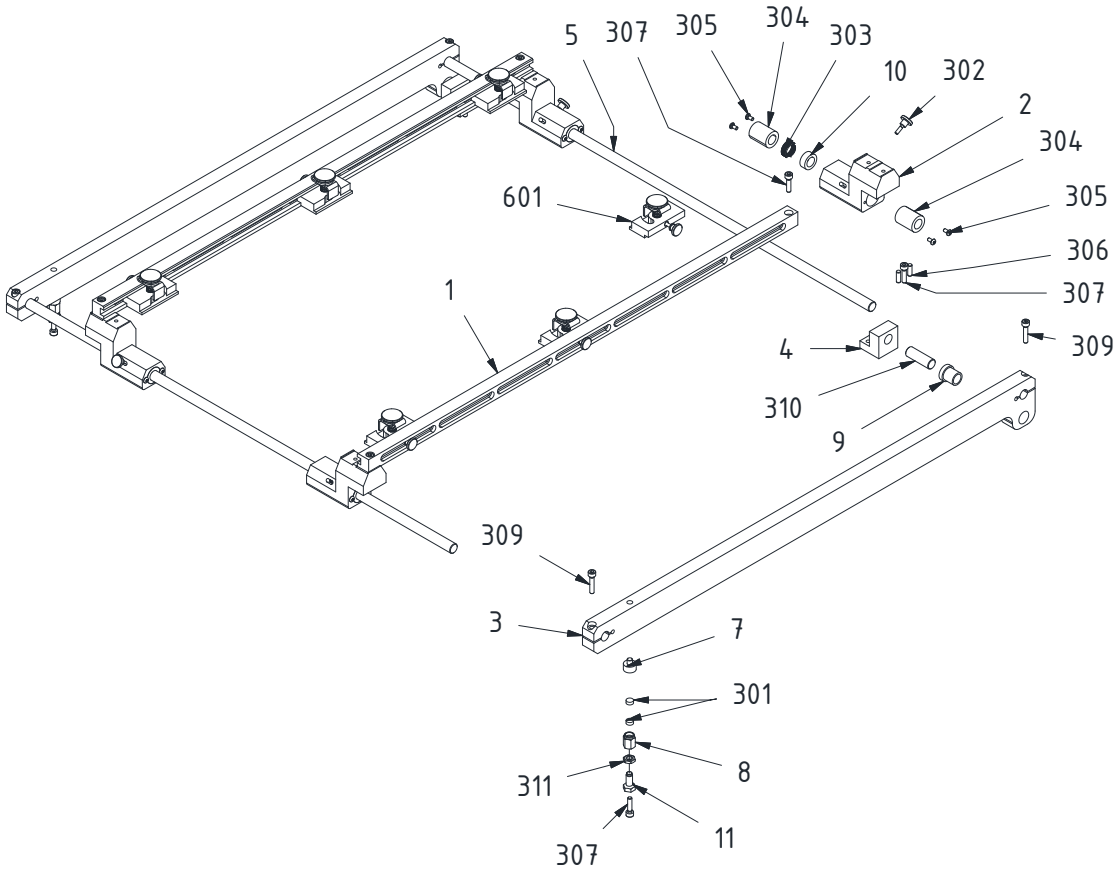
2.8 300.00.483 Printed Circuit Board (PCB) Holder 508 mm



Initial date: 20.04.2004 / EG

Change index: 0 / 17.01.2020 / AG

Pos	Amount	Unit	Spare part class	Article number	Article description
1	2.00	pc.	-	200.01.290	Carrier
2	4.00	pc.	-	200.01.291	Slider
3	2.00	pc.	-	200.01.289	Side Carrier
4	2.00	pc.	-	200.01.286	Bearing block
5	2.00	pc.	-	200.01.096	Guide shaft
7	2.00	pc.	-	200.01.097	Mechanical stop
8	2.00	pc.	-	200.03.234	Support Bolt
9	2.00	pc.	-	200.00.206	Bearing
10	4.00	pc.	-	200.00.215	Adjusting ring
11	2.00	pc.	-	200.03.235	Adjusting Nut
301	4.00	pc.	-	109.11.004	Disk Magnet d7x3 NdFeB nickel
302	4.00	pc.	-	100.12.007	Thumb Screw M3x10 high BN 1452
303	4.00	pc.	3	101.27.003	Compression Spring Nr. 9005.02.001
304	8.00	pc.	3	102.02.002	Bearing Sferax 1017 B
305	16.00	pc.	-	100.13.019	Lens Head Screw Torx M3x 6 BN 5687
306	4.00	pc.	-	100.05.040	Cylinder Pin d 4-h 6 x 12 BN 858
307	8.00	pc.	-	100.00.032	Cyl. Screw M4 x 16 BN 3
309	4.00	pc.	-	100.00.034	Cyl. Screw M4 x 22 BN 3
310	2.00	pc.	-	100.05.101	Cylinder Pin d 10-h 8 x 30 BN 684

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Pos	Amount	Unit	Spare part class	Article number	Article description
311	2.00	pc.	-	100.02.026	Hex nut 0.5d M6 BN 124
601	6.00	pc.	-	300.00.373	Print holding clamp

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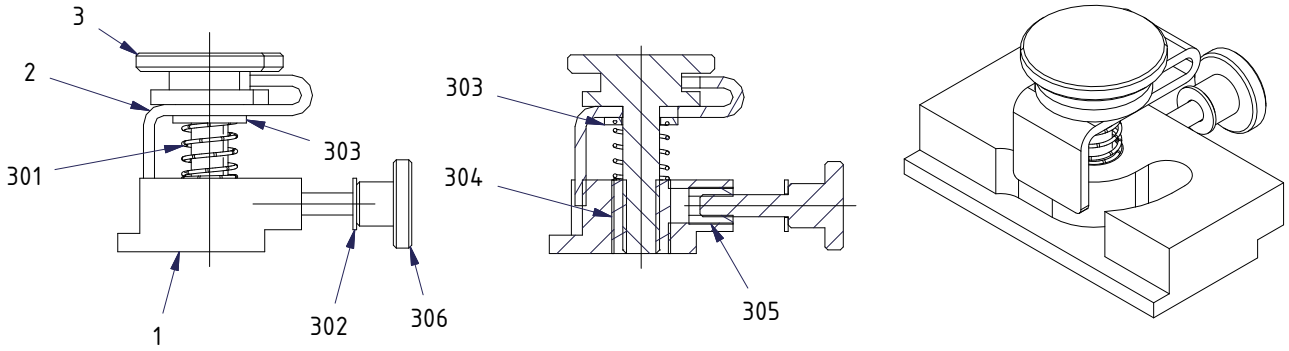
2.8.1 300.00.373 Print Holding Clamp



Initial date: 14.10.2003 / EG

Change index: 0 / 17.01.2020 / AG

Pos	Amount	Unit	Spare part class	Article number	Article description
1	1.00	pc.	-	200.00.216	Print holding clamp
2	1.00	pc.	-	200.00.211	Clamp
3	1.00	pc.	-	200.00.214	Thumb screw
301	1.00	pc.	3	101.27.002	Compression Spring VD-063N
302	1.00	pc.	-	100.04.001	Flat Washer M3 DIN 433 BN 726
303	1.00	pc.	-	100.04.003	Flat Washer M5 DIN 433 BN 726
304	1.00	pc.	-	100.02.012	Thread-inserts type 302 M5
305	1.00	pc.	-	100.02.011	Thread-inserts type 302 M3
306	1.00	pc.	-	100.12.010	Thumb Screw M3x12 high BN 1452

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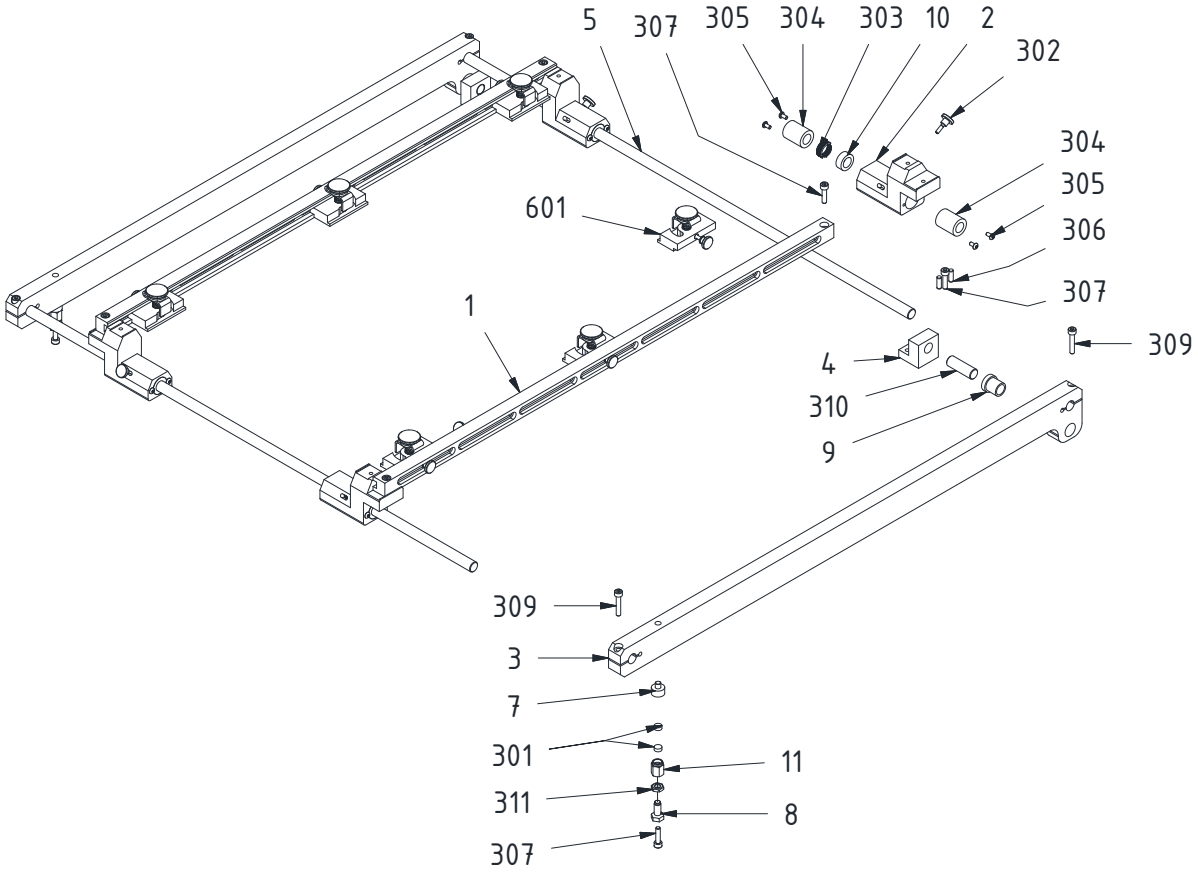
2.9 300.01.656 Printed Circuit Board (PCB) Holder 508 mm



Initial date: 24.07.2007 / WB

Change index: 0 / 14.02.2020 / SK

Pos	Amount	Unit	Spare part class	Article number	Article description
1	2.00	pc.	-	200.01.290	Carrier
2	4.00	pc.	-	200.03.572	Slider
3	2.00	pc.	-	200.01.289	Side Carrier
4	2.00	pc.	-	200.01.286	Bearing block
5	2.00	pc.	-	200.01.096	Guide shaft
7	2.00	pc.	-	200.01.097	Mechanical stop
8	2.00	pc.	-	200.03.234	Support Bolt
9	2.00	pc.	-	200.00.206	Bearing
10	4.00	pc.	-	200.00.215	Adjusting ring
11	2.00	pc.	-	200.03.235	Adjusting Nut
301	4.00	pc.	-	109.11.004	Disk Magnet d7x3 NdFeB nickel
302	4.00	pc.	-	100.12.007	Thumb Screw M3x10 high BN 1452
303	4.00	pc.	3	101.27.003	Compression Spring Nr. 9005.02.001
304	8.00	pc.	3	102.02.002	Bearing Sferax 1017 B
305	16.00	pc.	-	100.00.157	Lens Head Screw M3x6 BN 1593
306	4.00	pc.	-	100.05.040	Cylinder Pin d 4-h 6 x 12 BN 858
307	4.00	pc.	-	100.00.032	Cyl. Screw M4 x 16 BN 3
309	4.00	pc.	-	100.00.034	Cyl. Screw M4 x 22 BN 3
310	2.00	pc.	-	100.05.101	Cylinder Pin d 10-h 8 x 30 BN 684

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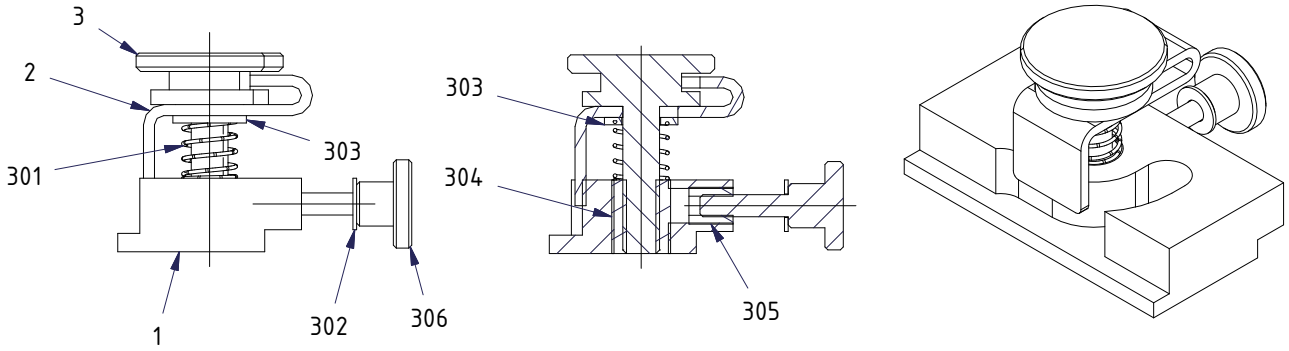
Pos	Amount	Unit	Spare part class	Article number	Article description
311	2.00	pc.	-	100.02.026	Hex nut 0.5d M6 BN 124
601	6.00	pc.	-	300.00.373	Print holding clamp

2.9.1 300.00.373 Print Holding Clamp



Initial date: 14.10.2003 / EG Change index: 0 / 17.01.2020 / AG

Pos	Amount	Unit	Spare part class	Article number	Article description
1	1.00	pc.	-	200.00.216	Print holding clamp
2	1.00	pc.	-	200.00.211	Clamp
3	1.00	pc.	-	200.00.214	Thumb screw
301	1.00	pc.	3	101.27.002	Compression Spring VD-063N
302	1.00	pc.	-	100.04.001	Flat Washer M3 DIN 433 BN 726
303	1.00	pc.	-	100.04.003	Flat Washer M5 DIN 433 BN 726
304	1.00	pc.	-	100.02.012	Thread-inserts type 302 M5
305	1.00	pc.	-	100.02.011	Thread-inserts type 302 M3
306	1.00	pc.	-	100.12.010	Thumb Screw M3x12 high BN 1452

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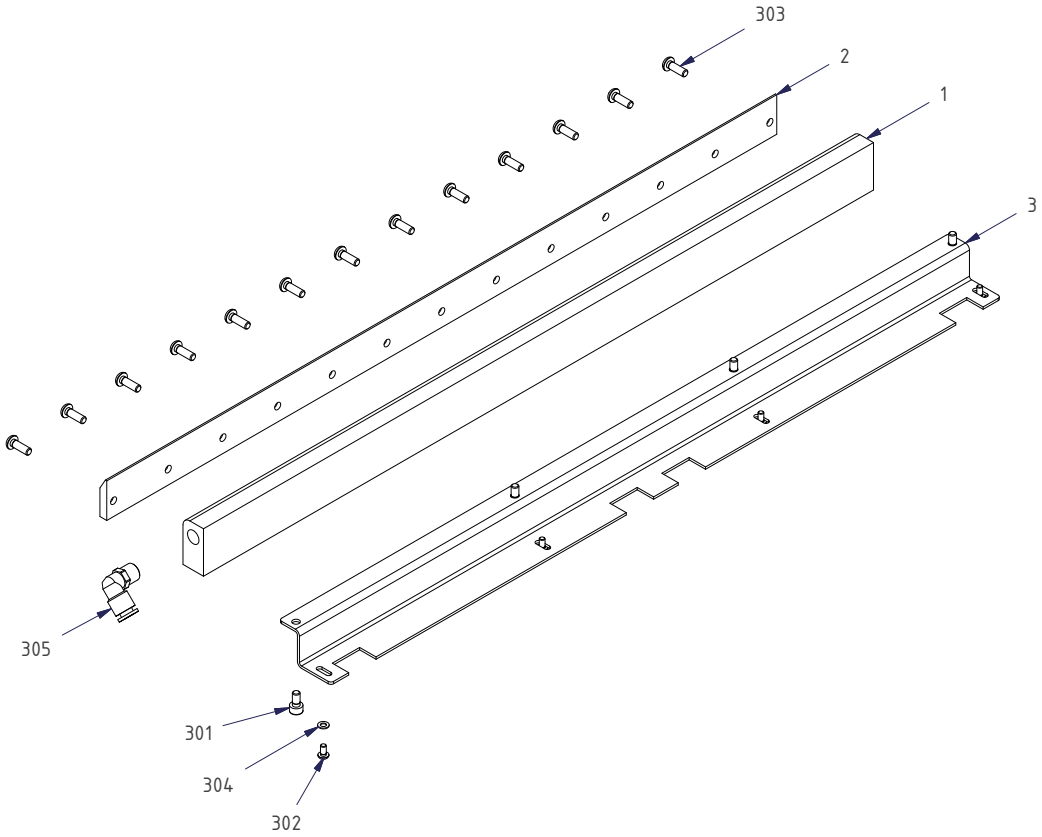
2.11 300.00.409 Printed Circuit Board (PCB) Cooling 490 mm



Initial date: 05.04.2004 / EF Change index: 0 / 19.02.2019 / DG

Pos	Amount	Unit	Spare part class	Article number	Article description
1	1.00	pc.	-	200.01.242	Air deflection pulley profile
2	1.00	pc.	-	200.01.243	Sealing rail
3	1.00	pc.	-	200.01.244	Console
301	4.00	pc.	-	100.00.028	Cyl. Screw M4 x 8 BN 3
302	4.00	pc.	-	100.00.158	Lens Head Screw M3x8 BN 1593
303	13.00	pc.	-	100.00.160	Lens Head Screw M4x8 BN 1593
304	4.00	pc.	-	100.04.023	Flat Washer M3 VSM 13904 BN 715
305	1.00	pc.	-	106.15.026	Threaded Elbow 1/8, 6mm, KQ2L06-01NS
306	0.50	m	3	106.17.002	Polyurethane tube d = 6mm, black
307	0.05	ml	-	115.14.025	Loctite 222 10ml, thread locking low-strength

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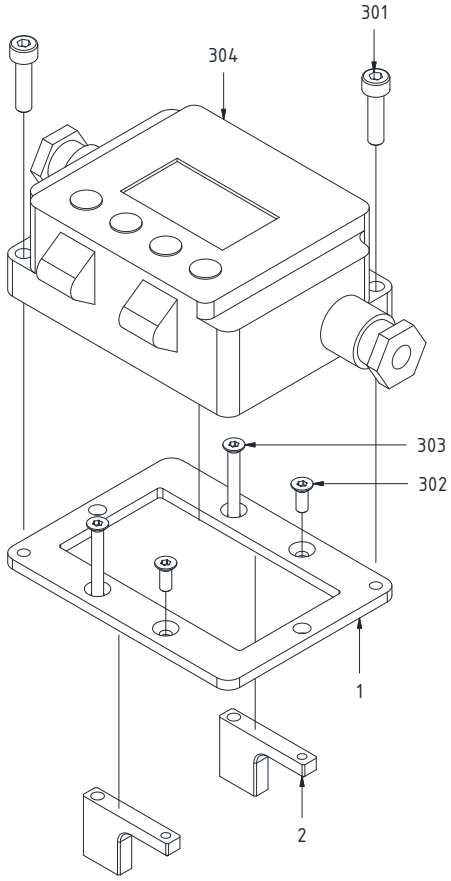
2.13 300.16.739 Process Temperature Sensor 1x



Initial date: 24.09.2019 / PD Change index: 0 / 14.02.2020 / SK

Pos	Amount	Unit	Spare part class	Article number	Article description
1	1.00	pc.	-	200.01.175	Base plate MID
2	2.00	pc.	-	200.30.939	Bridge
301	2.00	pc.	-	100.00.032	Cyl. Screw M4 x 16 BN 3
302	2.00	pc.	-	100.13.040	Countersunk Screw Torx M3x 8 BN 4851
303	2.00	pc.	-	100.13.044	Countersunk Screw Torx M3x25 BN 4851
304	1.00	pc.	3	109.04.141	IR-Temperature Sensor MI3 10 LTS

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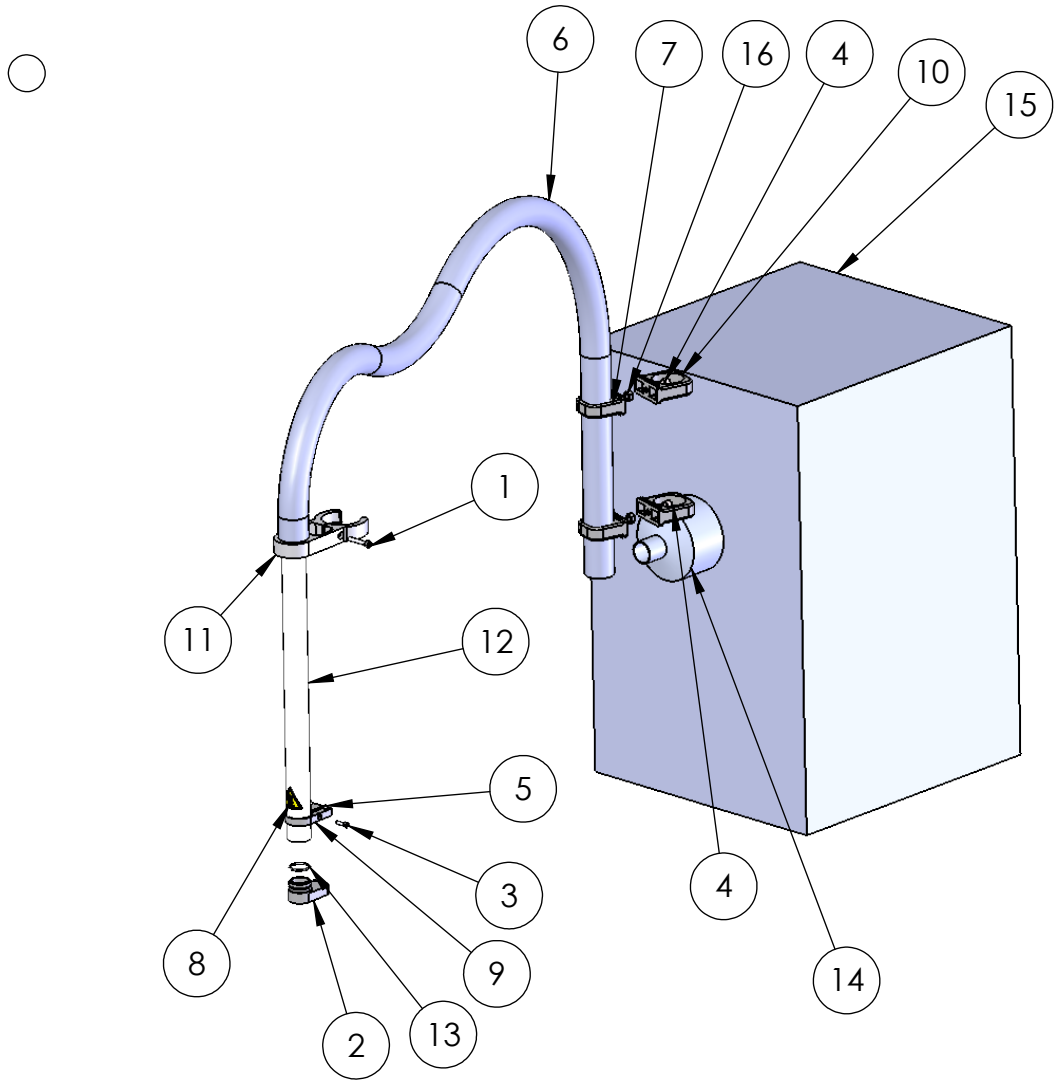
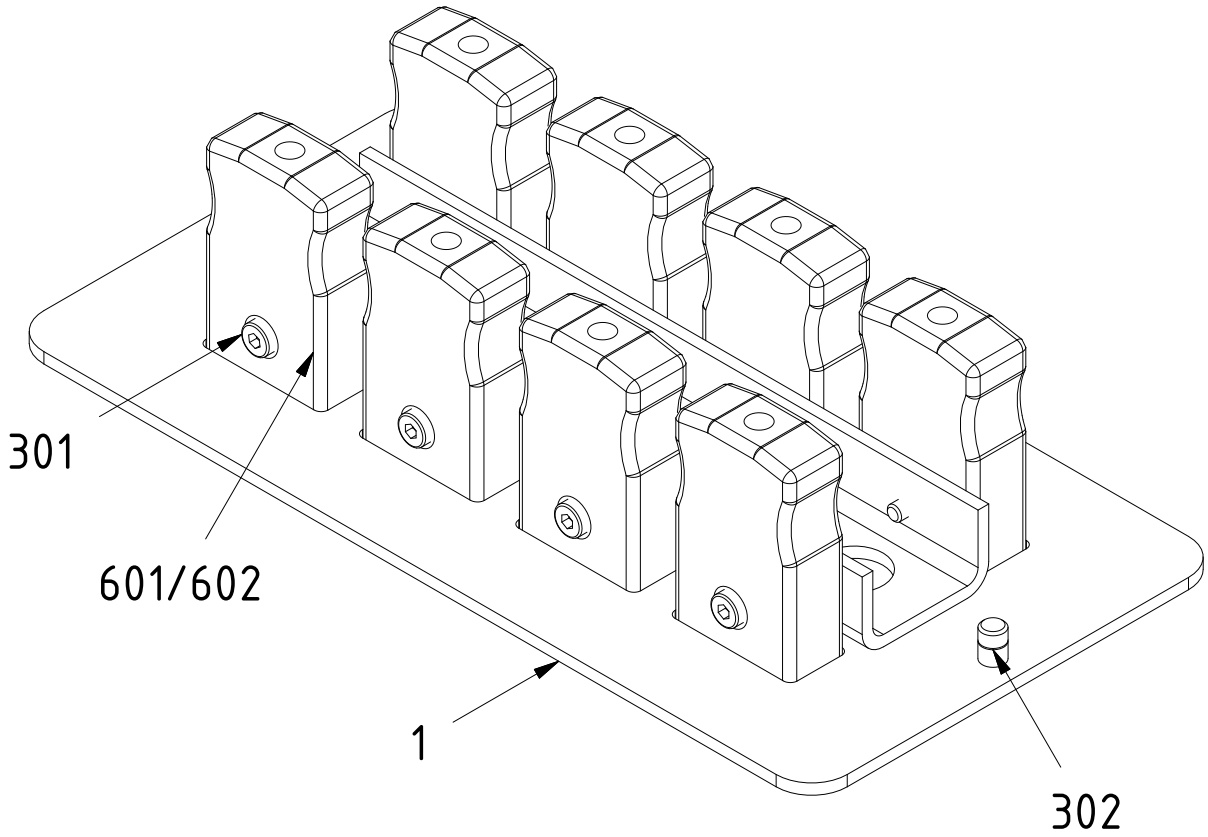
2.16 0029.22.010 Fume Extraction Manifold with VAC Assy



ITEM NO.	PART NUMBER	DESCRIPTION	QTY.
1	243A	M4 x 25mm SHCS	1
2	20001352	FUNNEL	1
3	81A	M3 x 12mm SHCS	1
4	85A	SOCKET HEAD CAP SCREW M6 X 10MM	2
5	82b	M3 x 8mm SHCS	2
6	9001.20.023	1.0" ID X 1-1/4" OD Duct Hose	1
7	10919034	CLAMP, 23 MM	2
8	9004.75.049	LABEL, HOT SURFACE	1
9	20001354	CLAMP, LOWER	1
10	10919035	CLAMP, 29 MM	2
11	0029.22.100	Pipe Holder, Above	1
12	200.01.355	SUCTION TUBE	1
13	10120017	O-RING, 20 MM ID X 1.5 MM	1
14	0035.12.101	Filter Connector	1
15	9001.20.021	Fume Cube Max	1
16	76B	M6 Hex Nut	2

Parts Not Shown in Assembly		
Part Number	Description	QTY.
9001.09.112	Hose Clamp	2

2.20 300.01.058 Thermocouple module with 8 ports



Initial date: 06.06.2006 / WB Change index: 1 / 02.07.2019 / X4

Pos	Amount	Unit	Spare part class	Article number	Article description
1	1.00	pc.	-	200.00.361	Cover thermocouple 1-8
301	8.00	pc.	-	100.00.005	Cyl. Screw M2 x 10 BN 11
302	2.00	pc.	-	100.00.198	Countersunk Screw M3x6 BN 21
601	8.00	pc.	3	300.01.037	Thermocouple cable TC1-TC4

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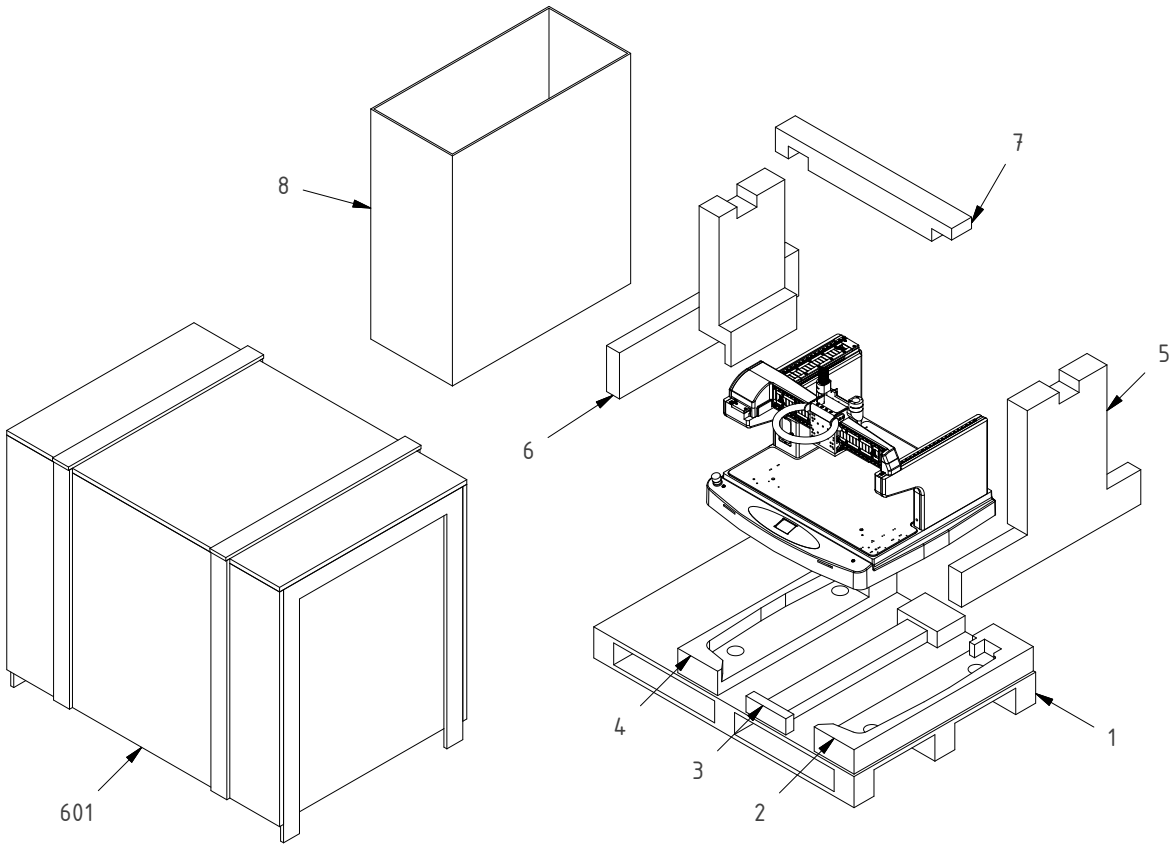
2.22 300.00.608 Packaging 3 - ONYX 29, Wood without Table



Initial date: 15.11.2004 / EG

Change index: 0 / 13.02.2020 / MN

Pos	Amount	Unit	Spare part class	Article number	Article description
1	1.00	pc.	-	200.01.443	Pallet 1300x900
2	1.00	pc.	-	200.01.446	Pad ONYX 29 ground right
3	1.00	pc.	-	200.01.442	Pad ONYX 29 support
4	1.00	pc.	-	200.01.447	Pad ONYX 29 ground left
5	1.00	pc.	-	200.01.439	Pad ONYX 29 right
6	1.00	pc.	-	200.01.441	Pad ONYX 29 left
7	1.00	pc.	-	200.01.440	Pad ONYX 29 top
8	1.00	pc.	-	200.01.444	Pad ONYX 29 carton- inside
601	1.00	pc.	-	300.00.607	Wooden Box ONYX 29

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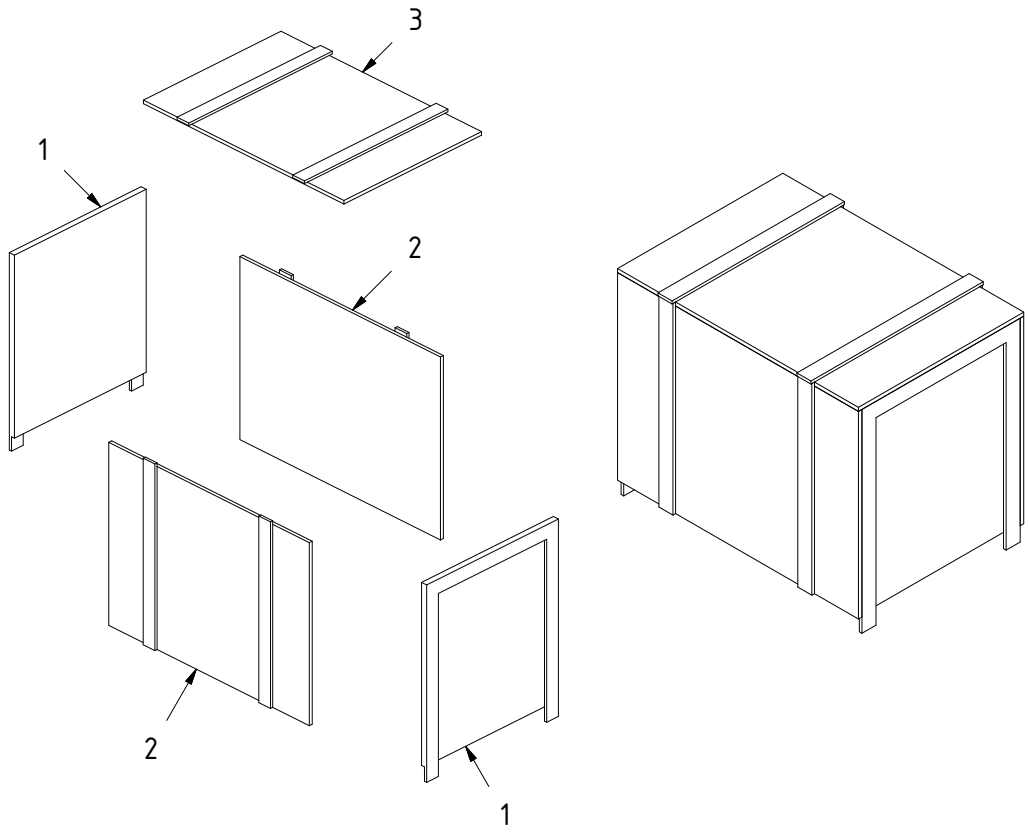
2.22.1 300.00.607 Wooden Box ONYX 29



Initial date: 15.11.2004 / EG Change index: 0 / 13.02.2020 / MN

Pos	Amount	Unit	Spare part class	Article number	Article description
1	2.00	pc.	-	200.01.468	Side panel left-right
2	2.00	pc.	-	200.01.467	Side panel (front-back)
3	1.00	pc.	-	200.01.469	Cover

2.23 300.17.708 Pre-Heater 310 x 350 mm

Initial date: 26.02.2020 / SK Change index: / 09.04.2020 / MN

Pos	Amount	Unit	Spare part class	Article number	Article description
301	1.00	pc.	2	109.48.037	Preheater 310 x 350 mm
601	2.00	pc.	3	300.01.506	Power Cable Preheater 300 x 300mm

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3 Complete Spare Parts List

Spare parts classes

1 - Spare parts which need to be replaced on a regular base. It is recommended to store these parts close to the equipment. These spare parts are available from Infotech AG Switzerland within two working days (except customer specific parts).

2 - Spare parts which are system relevant. These parts are available from Infotech AG Switzerland within two working days.

3 - Spare parts which do not need to be replaced under normal conditions. These parts are available from Infotech AG Switzerland within four weeks.

Note:
All spare parts of the category 1, which have been declared as wear and tear parts, are nit coverd by warranty (see the general delivery terms).

System relevant parts are these parts which are relevant for the usability of a machine

Creation date: 16.12.2019 / SK Change Index: 0 / 16.12.2019 / SK

Unit	Spare part class	Article number	Article description	Remarks
pc.	1	106.02.004	Filter Element Site Clean Canister	
pc.	1	106.02.005	Air-filter nylon white	
pc.	1	109.48.003	Hot Air Heater 2000W	
pc.	1	300.00.140	Hot Air Heater 2000W (cpl.)	
pc.	2	101.28.006	Toothed Belt PowerGrip GT 2MR-112, 6mm	
pc.	2	101.28.007	Toothed belt PowerGrip GT 2MR-74, 6mm	
pc.	2	106.02.003	Canister site clean system	
pc.	2	106.21.009	Socket Outlet with Cable 2m, SY100-68-A-20	
pc.	2	109.04.025	Force Sensor 200N LCB130	
pc.	2	109.05.025	Fine Fuse 6.3A fast, type SP 5x20mm	
pc.	2	109.05.026	Fine Fuse 4A fast, type SP 5x20mm	
pc.	2	109.05.036	Fine Fuse 8A slow, SPT 5x20mm	
pc.	2	109.09.007	Power Supply RSP100-24 (Ua=24VDC/4.2A)	
pc.	2	109.09.016	Power Supply RSP320-48 (Ua=48VDC/6.7A)	
pc.	2	109.16.147	Network Cable GigE Cat6, Length = 3m	
pc.	2	109.16.249	Cable Socket M8x1 8pol. 2m	
pc.	2	109.27.025	GIN-MAX4x4 Controller cpl.	
pc.	2	109.32.064	420 mm Steel Scale MS 22.x4 MK	
pc.	2	110.08.035	COP-Master 2 and bus coupler	
pc.	2	110.08.036	COP-Connector Phoenix Contact	
pc.	2	110.08.038	COP-IT Board	
pc.	2	300.00.321	Encoder hand wheel	
pc.	2	300.00.433	Illumination Board Field	
pc.	2	300.00.458	Lower illumination board (LED white)	
pc.	2	300.00.460	Gear motor vision	
pc.	2	300.00.513	Signal cable PT100 preheater sensor	
pc.	2	300.00.888	AC Power Supply 230/12VDC 0.5VA	
pc.	2	300.01.059	Linear Motor Coil	
pc.	2	300.01.214	Upper Illumination Board (LED green)	

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Unit	Spare part class	Article number	Article description	Remarks
pc.	2	300.01.315	Power cable head	
pc.	2	300.02.267	Gear motor vision X	
pc.	2	300.02.381	Encoder Interface Card	
pc.	2	300.02.746	Motor Cable MAX4	
pc.	2	300.02.808	Motor Cable MAX4	
pc.	2	300.02.809	Motor Cable MAX4	
pc.	2	300.02.968	Z-Motor assembled	
pc.	2	300.03.405	Encoder Cable Z-Theta-Axis	
pc.	2	300.03.913	Motor Cable MAX4	
pc.	2	300.04.541	EC-Motor EC 16 30W incl. connector	
pc.	2	300.05.034	Motor Cable MAX4	
pc.	2	300.05.674	Encoder Cable MAX	
pc.	2	300.06.090	EC-Motor EC-max 22 12W incl. connector	
pc.	2	300.12.745	Analog Linear Encoder AK MS25	
pc.	2	300.16.811	Encoder extension cable	
pc.	2	300.17.771	Analog Signal Cable	
pc.	3	101.04.002	Buffer Self-Adhesive d 11mm, SJ-5303	
pc.	3	101.04.003	Parabolic Buffer Type KP d=20mm	
pc.	3	101.18.003	Permanent magnet brake 01.P1.200-307	
pc.	3	101.22.007	Ball Bearing 4/10/4 SMR-104-ZZ	
pc.	3	101.22.016	Ball Bearing 6/13/5 686-ZZ	
pc.	3	101.22.026	Rotational spacer 6x8x12x7	
pc.	3	101.22.027	Rotational spacer 8x10x15x7.5	
pc.	3	101.22.028	HEPCO bearing (excenter)	
pc.	3	101.22.029	HEPCO bearing	
pc.	3	101.22.033	Axial-Angular Ball Bearing ZKLR 0624.2Z	
pc.	3	101.27.022	Compression Spring VD 085C Material X750	
pc.	3	102.00.009	Guiding Shaft d12x60 A-6501012060	
pc.	3	102.00.010	Ball Bearing Cage d12/16x28 A-7611012028	
pc.	3	102.00.011	Steel Sleeve d16/22x30 A-7801012030	
pc.	3	102.00.012	Linear Guide Carriage MNN 9-G1-LS-KB	
pc.	3	102.00.013	Linear Guide Rail MN 9-555-G3-V0	
pc.	3	102.00.014	Linear Guide Rail MN 9-575-G3-V0	
pc.	3	102.00.015	Linear Guide Rail MN 9-475-G3-V0	
pc.	3	102.00.017	Linear Guide Rail MN 9-135-G3-V0	
pc.	3	102.00.022	Linear Guide Rail MN 9-275-G3-V0	
pc.	3	102.00.025	Linear Guide Rail MN 9-313-G3-V0	
pc.	3	106.00.003	Maintenance Unit (Filter/Controller) AW20	
pc.	3	106.01.003	Flow Through Muffler	
pc.	3	106.06.001	3/2 Solenoid Valve SYJ 314-5LOU-Q	
pc.	3	106.06.005	3/2 Solenoid Valve VK 332 5 D0-M5-Q	
pc.	3	106.06.006	Plug K31	
pc.	3	106.12.002	Vacuum Generator 24 l/min	
pc.	3	106.12.006	Vacuum Pump (Venturi)	
m	3	106.17.006	Silicon Tube di=6, da=9, transparent	
m	3	106.17.008	Silicon Tube di=4, da=7, black	
m	3	106.17.010	High temperature tube 0.5OD x 0.25ID	
m	3	106.17.014	Polyurethane Tube d = 8mm black, antistatic	

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Unit	Spare part class	Article number	Article description	Remarks
m	3	106.17.015	Polyurethane-Tube d = 6mm, black, antistatic	
m	3	106.17.016	Polyurethane-Tube d = 4mm, black, antistatic	
pc.	3	106.20.009	Mass Flow Controller Vögtlin	
pc.	3	106.20.010	Pressure switch Airtrol F-4300-15-PT	
pc.	3	108.01.004	Macro zoom objective Computar MLH-10X	
pc.	3	109.02.009	Emergency Switch, 16mm	
pc.	3	109.02.010	Pushbutton 2O forced	
pc.	3	109.02.013	ONYX 29 AIR-VAC Operator Panel Cover	
pc.	3	109.02.015	Rocker Switch 1pin black	
pc.	3	109.02.042	Motor circuit breaker, lockable, 20A	
pc.	3	109.04.079	Inductive Sensor IFFM 08P17A6/L, 2m	
pc.	3	109.04.084	Vacuum Sensor PSE531-M5-L, 3m	
pc.	3	109.04.136	Thermocouple Type K, with strap and connector	
pc.	3	109.05.054	Fuse holder FEF M12.7, 5x20mm	
pc.	3	109.12.085	Potentiometer PE30 1.0kohm/3W	
pc.	3	109.14.021	Solid State Relay 75 -264VAC/ 20A	
pc.	3	109.16.109	System Cable 3 x 0.75mm2 C13+C14	
pc.	3	109.16.112	Network Cable RJ45 Cat. 6, Length 0.5m	
pc.	3	109.16.122	Network Cable RJ45 Cat.6 S/FTP, 3m	
pc.	3	109.16.162	Network Cable RJ45 Cat.6 S/FTP, 1m	
pc.	3	109.16.165	Network Cable RJ45 Cat.6 S/FTP, 3m	
pc.	3	109.18.203	Connector Socket RJ45	
pc.	3	109.23.005	Schottky Diode STPS20H100CT, 2x10A	
pc.	3	109.24.009	LED Green, flat, chrom 24VDC	
pc.	3	109.24.019	Laser Pointer FP-65	
pc.	3	109.27.006	Amplifier 1-Q-EC DEC 24/1	
pc.	3	109.49.001	Push Button Intake 10 mm (M3 x 5mm)	
pc.	3	109.51.005	Warning Label 25 x 25mm Lightning	
pc.	3	109.51.006	Warning Label 25 x 25mm Hot Surface	
pc.	3	109.51.056	Warning Label 25 x 25 mm Magnetic Field	
pc.	3	109.51.058	Warning Label 15 x 15mm Laser Beam	
pc.	3	109.55.007	Miniature Contactor 3 + 1 Close Pos. 24VDC	
pc.	3	109.55.013	Miniature contactor 3 + 1 close pos. 200/208VAC	
pc.	3	110.08.014	PC Network Card GigE dual	
pc.	3	300.00.011	Distribution Board Operator Panel	
pc.	3	300.00.370	Cable Power LED	
pc.	3	300.00.477	Power Cable On/Off Switch	
pc.	3	300.00.479	Cable Mass Flow Controller Vögtlin	
pc.	3	300.00.480	Cable Emergency Switch	
pc.	3	300.00.492	I/O-Cable operator panel	
pc.	3	300.00.494	Cable Pneumatic Valves	
pc.	3	300.00.512	Signal cable SSR-Relays	
pc.	3	300.00.514	Cable foot switch	
pc.	3	300.00.538	Power cable 3PE	
pc.	3	300.00.557	Power Cable 3x1.5mm2	
pc.	3	300.00.578	Digital output cable dispenser	
pc.	3	300.00.895	Robotic Cable Hot Gas Heater	
pc.	3	300.01.037	Thermocouple cable TC1-TC4	

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Unit	Spare part class	Article number	Article description	Remarks
pc.	3	300.01.038	Digital ouput cable light	
pc.	3	300.01.311	Power Cable Connection Hot-Gas Heater	
pc.	3	300.01.312	Thermocouple Cable Type K (hot gas)	
pc.	3	300.01.317	Robotic Cable IO-Signal Vision	
pc.	3	300.01.318	Robotic Cable Vision Motors	
pc.	3	300.01.321	Cable field illumination	
pc.	3	300.01.323	Cable LED-Illumination vision unit	
pc.	3	300.01.479	Y-Cable Field Illumination	
pc.	3	300.01.486	Manual Loader Cable	
pc.	3	300.04.537	Thermocouple Cable Type K	
pc.	3	300.05.003	Power Cable 3x1.5mm2	
pc.	3	300.05.030	Encoder Cable Z-Theta-Axis	
pc.	3	300.05.031	Encoder cable Z-Theta-Axis	
pc.	3	300.05.035	Sensor with Connector	
pc.	3	300.05.037	Sensor Power Cable	
pc.	3	300.10.630	Network Cable RJ45 Cat.6 S/FTP, 1m yellow	
pc.	3	300.15.480	Network Cable RJ45 Cat.6 S/FTP, 0.5m yellow	
pc.	3	300.16.704	Digital ouput cable light	
pc.	3	300.17.808	Analog signal cable	

4 Sub Categories of the Spare Parts Class 1

Assignment of the corresponding sub categories of the spare parts class 1

- Consumables
- Wear and tear parts
- Adjusting parts

Note:
Consumables is the material, which hast to be replaced process related on a regular base.

Wear and tear parts are machine parts, which are being worn out by the process operation and which have to be replaced on a regular base.

Adjusting parts are parts, which are needed for special adjusting procedures and which are needed to guarantee the functionality of certain peripherals.

Unit	Spare part class	Article number	Article description	Remarks
pc.	1	106.02.004	Filter Element Site Clean Canister	Wear and Tear
pc.	1	106.02.005	Air-filter nylon white	Wear and Tear
pc.	1	109.48.003	Hot Air Heater 2000W	Wear and Tear
pc.	1	300.00.140	Hot Air Heater 2000W (cpl.)	Wear and Tear

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5 Cable Overview List

Version 17.03.2020

Cable	Length [m]	Article No.	Description	Robot
W41	2.50	300.00.527	Netzkabel 3PNE 3x400/230VAC	
W41	2.50	300.00.538	Netzkabel 3PE	
W42	0.80	300.00.477	Powerkabel ON/OFF Schalter	
W43	0.25	300.00.557	PowerKabel Power Supply 24VDC	
W45	0.35	300.00.556	Powerkabel Power Supply +48VDC	
W45	0.40	300.05.003	Powerkabel Power Supply +48VDC	
W54	1.10	300.00.578	Digital Outputkabel Dispenser	
W55	1.10	300.01.038	Digital Outputkabel Light	
W56	0.60	300.16.704	Schnittstellenkabel	
W57	0.60	300.00.514	Kabel Fussschalter	
W63	0.55	300.00.513	Signalkabel PT100 Sensoren Vorwärmer	
W65	0.55	300.00.513	Signalkabel PT100 Sensoren Vorwärmer	
W71	2.40	300.00.895	Schleppkettenkabel Hotgas Heater	x
E71	0.10	300.00.140	Hot Air heater 2000W	
W71.1	1.55	300.01.311	Powerkabel Anschluss Hot-Gas Heater	x
W71.2	0.20	300.01.500	SSR Verbindung Head	
W73	1.28	300.01.312	Thermocouple-Kabel Typ K (Hotgas)	x
W74	1.22	300.00.479	Kabel Mass-Flow Controller Vögtlin	
W77	1.60	300.04.537	Thermocouple-Kabel Typ K	x
B77	0.23	300.04.431	Thermocouplesensor Typ K kpl.	
B77	0.14	300.05.706	Thermocouplesensor Typ K kpl.	
W78	0.50	109.16.112	Netzwerkkabel RJ45 Kat.6 S/FTP, 0.5m	
W78.1	3.00	109.16.122	Netzwerkkabel RJ45 Kat.6 S/STP, 3m	
W78.2	1.00	300.10.630	Netzwerkkabel RJ45 Kat.6 S/FTP,1m gelb,mit 90°R Stecker	
W82	0.40	300.01.037	Thermocouple-Kabel TC1-TC4	
W83	0.40	300.01.037	Thermocouple-Kabel TC1-TC4	
W84	0.40	300.01.037	Thermocouple-Kabel TC1-TC4	
W84.1	0.40	300.01.037	Thermocouple-Kabel TC1-TC4	
W85	0.75	300.17.771	Analogsignalkabel	
W85.1	Div	300.01.745	Wägezelle ONYX29	
W85.2	Div	300.01.745	Wägezelle ONYX29	
W85.3	Div	300.01.745	Wägezelle ONYX29	
W85.4	Div	300.01.745	Wägezelle ONYX29	
W101	0.70	300.00.321	Encoder Handrad	
W103	2.20	300.05.674	Encoderkabel MAX	x
B103	0.33	300.12.745	Analog Linearencoder MS24.04-0 M	
W105	3.00	300.15.480	Netzwerkkabel RJ45,3.0m gelb,mit 90°R&L Stecker	x
W111	0.70	300.00.321	Encoder Handrad	
W113	2.00	300.14.559	Kabelschlepp Y-Achse MAX4	x
B113	0.33	300.12.745	Analog Linearencoder MS24.04-0 M	
W122	0.40	300.01.037	Thermocouple-Kabel TC1-TC4	
W123	0.40	300.01.037	Thermocouple-Kabel TC1-TC4	
W124	0.40	300.01.037	Thermocouple-Kabel TC1-TC4	
W124.1	0.40	300.01.037	Thermocouple-Kabel TC1-TC4	
W134	3.00	109.04.084	Vakuumsensor PSE531-M5-L, 3m	
W136		109.04.057	Pyrometer	
W136.1	0.50	300.02.924	Analogsignalkabel	
W152	2.50	300.02.808	Motorenkabel X-Achse	x
M152	0.32	300.01.059	Linear Motor Coil	

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Cable	Length [m]	Article No.	Description	Robot
W155	2.00	300.14.559	Kabelschlepp Y-Achse MAX4	x
M155	0.32	300.01.059	Linear Motor Coil	
W161	1.35	300.00.494	Kabel Pneumatikventile	
W164	1.05	300.00.512	Signalkabel SSR-Relais	
W165	1.05	300.00.512	Signalkabel SSR-Relais	
W191	3.00	106.21.012	Anschlusskabel zu Druckregler 90°, 3m	
W193	1.25	300.01.486	Kabel Manual Loader	
W193.1	1.60	300.16.889	Schleppkabel	
W194	1.25	300.01.486	Kabel Manual Loader	
W194.1	1.60	300.16.889	Schleppkabel	
W196	0.90	300.14.670	Kabel Manual Loader	
W196.1	1.60	300.16.889	Schleppkabel	
W197	0.90	300.14.670	Kabel Manual Loader	
W197.1	1.60	300.16.889	Schleppkabel	
W201	0.40	300.03.405	Encoderkabel Z-Theta-Axis	
W201.1	2.43	300.01.315	Powerkabel Head	x
W203	1.30	300.05.031	Encoderkabel Z-Theta-Axis	x
W211	1.00	300.05.030	Encoderkabel Z-Theta-Axis	x
W213	0.40	300.16.811	Encoderverlängerungskabel	
W213.1	0.40	300.03.405	Encoderkabel Z-Theta-Axis	
W234	3.00	109.04.084	Vakuumsensor PSE531-M5-L, 3m	
W235	1.00	109.04.141	IR-Temperatursensor MI3 10 LTS	
W235.1	0.60	300.14.558	Analogsignalkabel	
W236	1.00	109.04.141	IR-Temperatursensor MI3 10 LTS	
W236.1	0.60	300.14.558	Analogsignalkabel	
W237	1.04	300.01.317	Schleppkettenkabel IO-Signale Vision	x
R237	0.30	300.15.246	Potentiometer komplett	
W247	0.50	300.16.883	Anschlusskabel	
W247.1	1.25	300.16.885	Schnittstellenkabel	x
M251	0.25/0.25	300.02.968	Z-Motor mit Stecker und Scheibe	
W252	1.30	300.05.034	Motorenkabel MAX4	x
M252	0.22/0.22	300.04.541	EC-Motor EC 16 inkl. Stecker	
W254	1.00	300.02.746	Motorenkabel MAX4 1.0m	x
M254	0.22/0.22	300.04.541	EC-Motor EC 16 inkl. Stecker	
W255	0.60	300.03.913	Motorenkabel MAX4	
M255	0.13/0.15	300.06.090	EC-Motor EC-max 22 inkl. Stecker	
W261	2.00	106.21.009	Steckdose mit Kabel 2m, SY100-68-A-20	
W262	2.00	106.21.009	Steckdose mit Kabel 2m, SY100-68-A-20	
W271	0.30	300.05.035	Sensor mit Stecker	
W271.1	1.30	300.05.037	Sensoranschlusskabel	
W272	2.00	109.04.079	Induktivsensor IFFM 08P17A6/L, 2m	
W291	3.00	109.16.122	Netzwerkkabel RJ45 Kat.6 S/STP, 3m	
W292	3.00	109.16.147	Netzwerkkabel GigE Cat6, Länge = 3m	x
W292.1	2.00	109.16.249	Kabeldose M8x1 8pol. 2m	x
W294	1.29	300.01.323	Kabel LED-Beleuchtung Visioneinheit	x
V294	0.12	300.01.214	Beleuchtungsring oben (LED grün)	
V295	0.12	300.00.458	Beleuchtungsring unten	
W297	0.93	300.01.318	Schleppkettenkabel Vision Motoren	x
M297	0.11	300.00.460	Getriebemotor	
W297.1	0.35	300.17.808	Analogsignalkabel	
W302	0.75	300.00.480	Kabel Not-Aus Taster	
W311	0.90	300.00.492	I/O-Kabel Operator Panel	
W317	0.80	300.00.370	Kabel Power LED	

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Cable	Length [m]	Article No.	Description	Robot
W318	0.38	300.01.479	Y-Kabel Field Illumination	
W318.1	1.28	300.01.321	Kabel Feldbeleuchtung	x
W322	3.00	109.16.109	Gerätekabel 3 x 0.75mm2, Länge 3m	
W332	3.00	109.16.109	Gerätekabel 3 x 0.75mm2, Länge 3m	
W334	3.00	110.01.087	Monitorkabel DP zu HDMI	

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