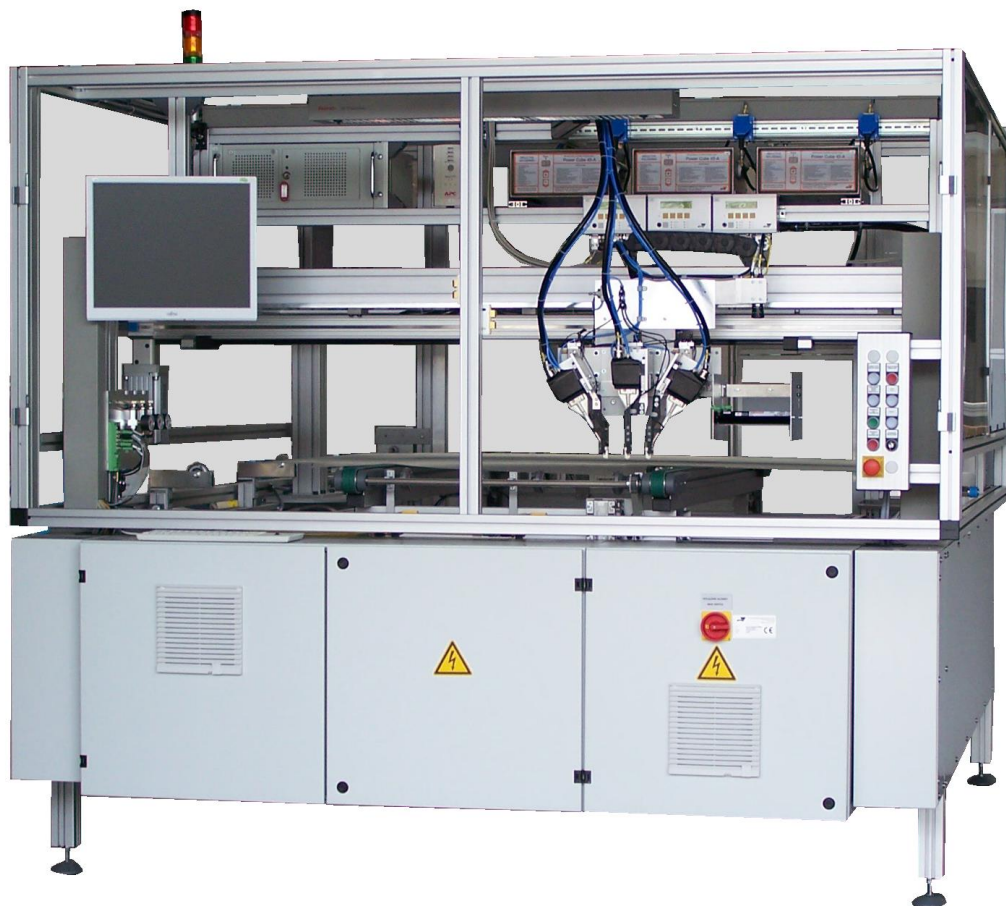


X-BUS

Induction soldering of interconnections of solar modules



- *robust process for continuously high quality*
- *scalable with 1 - 3 soldering heads per tool*
- *high volume and short cycle times*
- *low wear*

System description

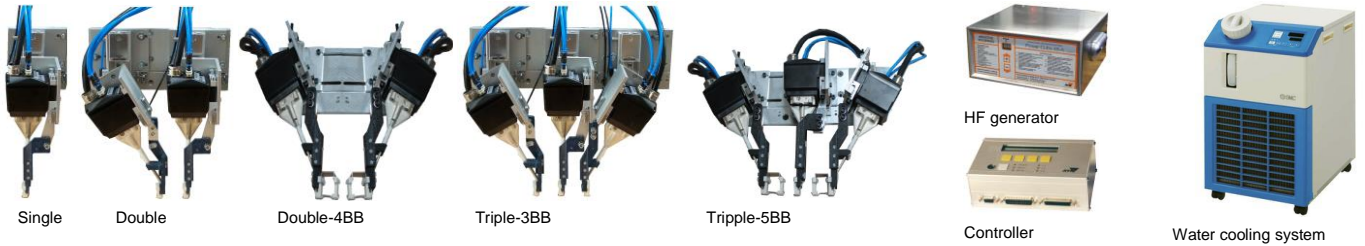
One of the most important processes in manufacturing solar modules that determine the modules quality is soldering the string interconnections. In order to achieve high-quality joints, the tab ribbons need to be mechanically pressed together when being soldered.

This is achieved with a ceramic hold-down that incorporates the induction coil. Both parts are pushed against each other and heated inductively until the joint has been created.

Induction soldering with an integrated hold-down has numerous advantages:

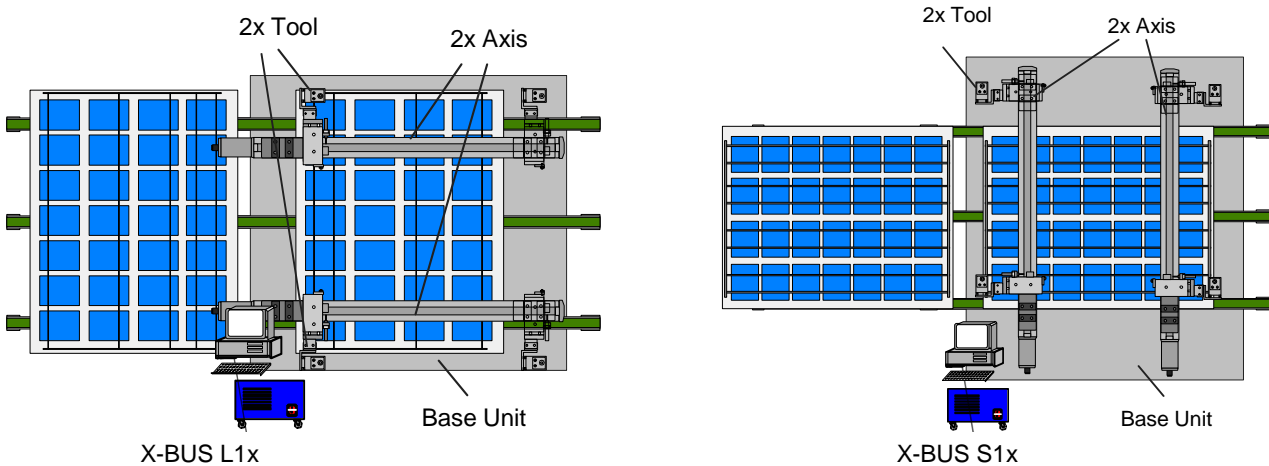
- Heating power can be switched on and off within a very short time.
- The ceramic hold-down is not heated, i.e. after switching off power it only insignificantly affects the solidification of the solder while still applying pressure.

- Heat transfer is contactless and is not affected by contamination.
- The heat source does not touch the solder joint and thus is not significantly subject to wear caused by oxidation or burn-off.
- Because the hold-down is electrically insulating, accidental short-circuiting of solar cells is prevented.



Automatic soldering of string interconnections

Depending on the integration of the machine in the production line, there are 3 basic types: X-Bus L1x module for transfer *Long Leading Edge*, X-Bus S1x module for transfer *Short Leading Edge* and X-BUS Tx for the version with turntable. In this version the templates for positioning the cross connectors are placed inside the station and also retrieved. In the other two versions, this takes place before and after the station. Optionally, these two versions are equipped with an upstream manual turntable, so that a person can populate the template with the cross-connectors. All stations can be equipped with single, double or triple tools. Optionally also fluxing within the station is available.



Maschine Type	Tool	generators	time input output ¹⁾	time measuring ³⁾	cycle time 3BB	cycle time 4BB	cycle time 5BB
X-BUS L/S11	1+1	2	8 s	10 s	100s	125s	150s
X-BUS L/S12	2+2	4	8 s	10 s	75s	75s	100s
X-BUS L/S12x	2+2	4	8 s	10 s	---	55s	---
X-BUS L/S22x	2+2	4	8 s	10 s	---	40s	---
X-BUS L/S13A	3+3	3	8 s	10 s	50s	75s	75s
X-BUS L/S23A	6+6	6	8 s	5 s	35s	45s	45s
X-BUS L/S13xA	3+3	3	8 s	10 s	---	--	55s
X-BUS L/S23xA	6+6	6	8 s	5 s	---	---	40s

1) stop position immediately before the station, conveyor speed 30 m/min
 2) depending on the secondary activities of the worker
 3) reduced depending on the template type: with contour template 5s / 3s.