

## **Han-Fast® Lock for PCB termination: Quick contact, versatile connections\***

The machine and plant construction sector is seeing significant growth in the deployment of power electronics and high current processing on PCBs (printed circuit boards). By using the Han-Fast® Lock, it is also possible to reliably and flexibly supply boards with high currents. The solution is simple and cost efficient: It supports SMD packaging and allows fast connections for a very wide range of connectors.

Transferring high currents on PCBs involves a special challenge: Due to the different contact resistances involved, each connection has a special impact on the circuit board layout. Different contact designs result in different solutions for the PCB's optimal heat management.

In general, it can be stated that the longer the conductor lines, the poorer the thermal conductivity and consequently the greater the risk that hot spots form on the PCB. This risk also arises when several high-current contacts are positioned too close to one another. For this reason, PCB designers normally endeavour to keep conductor lines for the power supply short, while placing the contacts as close as possible to elements such as transformers, transmitters and power transistors (e.g., IGBT).

The difficulty here is to minimize the amount of space taken up on the board for the connection point, while at the same time leaving enough room to allow plug-in connections. In the past, the solution was always to place an additional component on the PCB and to solder the contact on or attach it via a press-in connection.

### **PCB termination in just a few steps**

The Han-Fast® Lock now makes it possible to solve all of these challenges on the PCB with just a single component and in just a few

steps. This is accomplished by providing the PCB with a standard through hole and a support pad. The hole's inner surface serves as the contact area. A crimping tool can be used to provide the individual contacts and cables with uniform and force-fit connections outside the circuit board.

The HARTING type BC-SC automatic crimping device allows fast processing of Han-Fast<sup>®</sup> Lock contacts on a reel. Designed as a stripper-crimper, it automatically strips the conductor and crimps the contact after the sensor has been triggered. The automatic crimper works quickly and ensures that the crimping is reproducible and gas-tight.

Pick and place machines can attach the crimp contact in a 4.4 mm standard hole on the PCB without solder by simply pressing a locking pin down. Contacts without pins, however, can also be quickly positioned with the help of a plastic adapter. The Han-Fast<sup>®</sup> Lock can place currents up to 60 A – with a 10 mm<sup>2</sup> stranded wire – onto the PCB.

The plug-in termination technology meets the most stringent demands made on connector concepts for PCBs:

- The connection points on the PCB can be freely positioned.
- Only one contact hole with a standard size and standard design is required for the connection.
- No additional processing steps are necessary.
- The contact can be unlocked and re-locked if needed.

Industrial connectors with modules or contact inserts for the various currents are available to connect the boards. A substantial advantage results for device design when compared to Han DD<sup>®</sup> contact inserts with PCB adapter: The PCB can be positioned further away from the connector. Depending on the conductor cross-section, distances from 10 to 50 cm between the power input and PCB are possible. With the

alternative use of a PCB adapter for the power connection, it would be necessary to position the board parallel to the switch cabinet wall at a close distance in order to make the contact.

The Han-Fast<sup>®</sup> Lock also enables the use of several connectors or an interface with various conductor cross-sections. The pinhole pattern on the PCB remains the same.

### **Applications in theatre and film**

The Han-Fast<sup>®</sup> Lock is frequently deployed in such applications as lighting and stage technology. Scene lighting equipment for theatres and opera houses profits from plug-in PCB termination, as do controllers for lighting systems and machinery on stages and in television studios. Standard contact pads are provided on the PCB as the connection points for the three phases and the neutral conductor. The contact points are positioned as close as possible to the transformers in order to keep the conductor lines short and prevent hot spot formation. In such applications, the Han-Fast<sup>®</sup> Lock advantage is that plug-in connections can be set up quickly and can also be rapidly reversed in the event that service is required

### **Frank Quast**

*Head of Product Management Han/HARTING Electric GmbH & Co. KG*

### **Box: The Han-Fast<sup>®</sup> Lock's advantages and features**

- Allows high currents to be applied to the PCB
- All connectors can be placed onto the board
- Flexible positioning of the contact connection points on the PCB
- More leeway for positioning the PCB in the device/switch cabinet
- Different termination cross-sections can be used in one interface
- Overall process/termination is solderless
- Standard production method for the PCB
- Allows optimal heat management on the PCB
- Individual cross-sections can be combined
- Quick assembly/non-destructive disassembly of the contact
- Unrestricted use of all contacts (phase+PE+neutral conductor)
- Machine processing possible
- Standard B crimping

- Identical pinhole pattern on the PCB with different connection cross-sections
- Can be used for different voltage ranges and PCB thicknesses

#### Picture captions

1. Temperature distribution on the Han-Fast® Lock
2. Concentration of the temperature distribution for soldered PCB adapters
3. Han® Q 4/2 industrial connector in conjunction with the Han-Fast® Lock as high-voltage PCB connection
4. Han-Fast® Lock contacts for L1, L2, L3 and N power contacts, sited directly on the transformers (a: with prepared Han-Fast® Lock contacts, c: from above)
5. a/b: Han-Fast® Lock – a) in locked, b) in unlocked position
6. 5 Han-Fast® Lock contacts on a PCB