

# OPERATING MANUAL



**for the incomplete machine**

**Test adapter with pneumatic pull-down-mechanism  
PA-450**

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### List of components used

Pos	description	Manufacturer	Bem.
1	Reed contact Type D-A93	SMC	
2	Pneumatic control valve VZ110-5MOZ-M5-Q 3/2, 24V DC	SMC	
3	Air cylinder CDQ2B25-25DZ	SMC	
4	Gas spring type Liftline 16-1-96-67-A17-B17-80N 016 24009A	Suspa	
5	Throttle valve GRLO-M5-QS-4-LF-C Serie ED08	Festo	
6	Needle carrier plate made of hard paper 320x255x10mm, coated white, Item No. 13008	GTS	
7	Hold-down plate of polycarbonate, 309x224x8mm, Item No. 13010	GTS	
8	Female connector 48pol DIN 41612, type 09 06 248 7823	HARTING	

### Intended Use

The test adapter PA-450 with pneumatic pull-down mechanism is used in conjunction with the "Guardian Testsystem" for testing the electrical functions of circuit boards. The test adapter may exclusively operate in the sense of its intended use in conjunction with the Guardian Testsystem and with all control and monitoring functions

- as intended
- in its original condition
- without unauthorized modifications
- in technical perfect condition
- with compressed air supply

Here, the limits specified such as electrical data, etc. must be observed.  
Observe the national and European regulations, standards and regulations.

#### **WARNING:**

*Beyond the scope of the work described in this manual, activities are permitted only after consultation with and approval by the Manufacturer!  
In case of inobservance to these guidelines damage to persons and / or damage to property may occur!*



## **Target group**

This manual is only intended for the specially trained and designated personnel. Maintenance and repair work presume experience with the assembly, installation, commissioning and maintenance of mechanical and electrical or electronic components advance and are only permitted within the scope described in this manual. Work on electrical / electronic components are only reserved to qualified electricians.

### Important user instructions

This description contains information on possible dangers that can occur with improper actions. These notes are printed in italics, provided with a frame and additionally indicated by pictograms.



**WARNING:**

*... means that failure to observe the instructions damage to persons or property may occur.*



**ATTENTION:**

*... means in case of disregard personal injuries may occur.*



**NOTE:**

*... means that this is to be observed additionally or said personal protective equipment should be used.*

### Remarks on the present description

This manual contains specific information about the test adapter with pneumatic down effect

**Test adapter with pneumatic pull-down-mechanism PA-450-N  
or PA-450-NW with changing system  
Year of construction 2019**

from the production of

**GTS test solutions  
Eresburgstr. 24-29  
D-12103 Berlin  
www.gts-online.net**



These operating instructions are supplemented binding by the attached original documents of the components and of those from other manufacturers (see page 3: List of components)

## **General Safety Regulations**

It may only act the terms of the application of the test adapter trained, instructed and especially designated staff on the unit.

The operating personnel must have read and understood the operating manual, especially the section entitled "General safety regulations". This documentation must be available to the operators and maintenance personnel at all times.

Besides the recommendations in this documentation of the respective manufacturer, the general statutory safety and accident prevention regulations must be observed.

When working on the system or its individual modules, the associated documentation must be observed the respective manufacturer.

It must be ensured that support staff and staff from other companies can act exclusively under the direct supervision of the responsible personnel.

It is to refrain from any procedure which could affect the safety of equipment. The device may only be operated in a safe and functional condition.

The operating staff is to obligate changes that occur and which can affect safety to report immediately to the responsible person / unit.

In case of danger to the safety or the destruction or damage the entire system must be shut down immediately.

Be ensured before switching that no one is endangered.

### **State "Secure stop"**

Before carrying out any maintenance and repairs of components of the adapter the connection to the power supply and for supplying compressed air has to be separated.

## **1. Limits of the adapter**

### **1.1 Limitations**

The test adapter is used exclusively to accommodate printed circuit boards for the purpose their contacting for the test with the Guardian test system.

### **1.2 Requirements for use**

Requirement for the expedient use of the adapter is an ergonomically designed seat workstation with a good lighting.

### **1.3 Space limits of the adapter**

The adapter consists of a housing with hinged lid. It is used to set up on a flat table top. At the back, there are six 48-pin connectors that allow that the adapter is connected to the Guardian test system.

### **1.4 Temporal limits of the adapter**

The test adapter has a nominal lifetime of 10 years / 10,000 hours.

The actual life is essentially determined by the operating conditions and compliance with the servicing and maintenance instructions.

## 2. Description of the adapter

The test adapter is a device for contacting printed circuit boards. It is used in companies that produce electronic components in medium and large quantities.

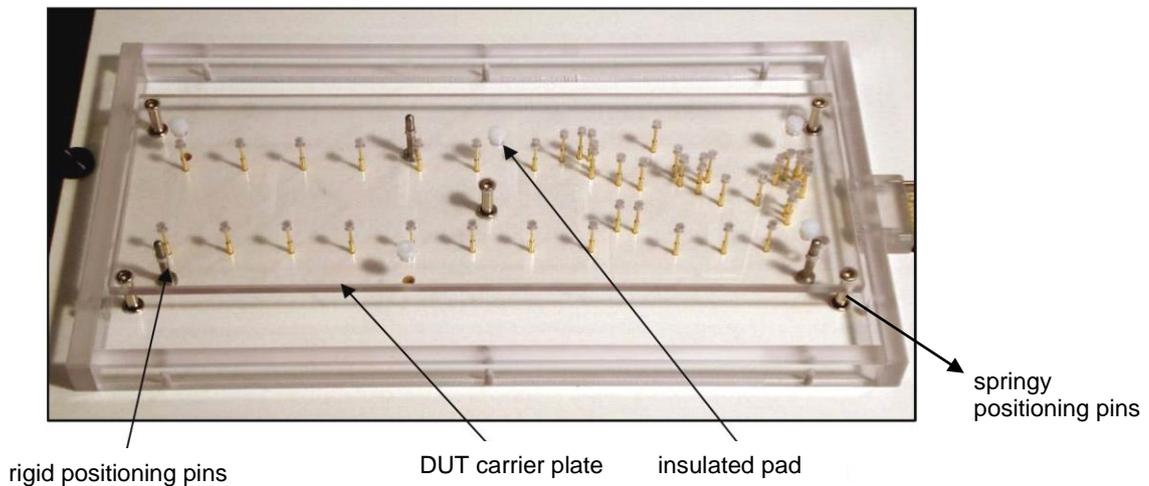


Figure 1 Test adapter without DUT

The adapter consists of the blue chassis (7) with an integrated pneumatic drive. This one pulls four bolts to 15 mm downwards, therefore the term "pull down mechanism". At the two rear bolts (4) of the hold down frame (1) is pivotally mounted, which is kept open with a gas spring (3). In the lucid frame hold-down plates (2) are used with corresponding hold-down pins, which press on free surfaces of a circuit board under test. In the probe-carrier plate (5) resilient receiving pins on which the specimen is placed are used. Two positioning pins should have a centering spike that accurately positions the board, everyone else should have insulated pads, so that the board is level and cannot wobble.

As an alternative to direct placement of the DUT on springy positioning pins, an additional DUT-carrier-plate can be used, onto which the DUT is placed, like shown in Figure 2. This plate is screwed to the springy positioning pins and moves vertically together with the DUT.

The advantages of this DUT-carrier-plate are:



*Figure 2 carrier plate for the test specimen above the probe carrier plate*

1. The spring contact pins are protected against damage during insertion or removal of the specimen.
2. As the test pins do not protrude out of the carrier plate, the operator may not be injured by sharp needles.
3. The rigid guide pins in the probe carrier plate have a better positioning as they have to the spring receiving pins no moving parts and thus no wobble game.
4. Very small circuit boards can be placed up easily without wobble.

In the probe-carrier-plate (5) commercially available spring contact pins are set-in, which contact the specimen from below. To contact test points on the top surface of a circuit board, a second level is assembled to the hold-down plate in which also spring contact pins may be used. A double-sided contacting is also possible.

## **2.1 The control of the machine**

The test sequence is started manually by the simultaneous actuation of two buttons on the front of the adapter (two-hand operation), and then proceeds automatically. This ensures that the operator does not reach a region where is the danger of jamming. The adapter has no display elements, the test results are displayed on a monitor.

### 3. Connecting the adapter

The adapter is connected by the operator via the system interface (6 connectors on the back) to the test system Guardian and locked with two side quick releases.

The adapter should be fixed and level on the tabletop when coupled.

#### **WARNING:**

*It is important to ensure that the connectors are located accurately. Upon the occurrence of a mechanical resistance no force should be applied become! The adapter has to be removed, and after examination of both sides the connectors are to rescheduled. Otherwise damages can occur which interfere the function.*



### 4. Actions before commissioning

Before commissioning for the first time, after breaks in operation, maintenance or repair work, the completeness and readiness for operation of the system must be ascertained through obvious control

- Visual inspection
- Compressed air connection
- functional test
- Grasp the hold-down frame on the intended handle and unfold the frame. The gas spring (3) on the right side keeps the frame open. Slide down the bar (12) at the bottom of the frame, insert the desired hold-down plate (2) and push the bar (12) back up.
- If necessary, insert the desired needle carrier plate into the adapter. *Note: With the PA450-NW change system, the needle carrier and hold-down plate form a pair and must always be replaced together.*
- Connect the compressed air coupling of the adapter to max. 6 bar compressed air. Alternatively, the compressed air may also be connected with an 8mm compressed air hose to a passage on the side of the adapter.

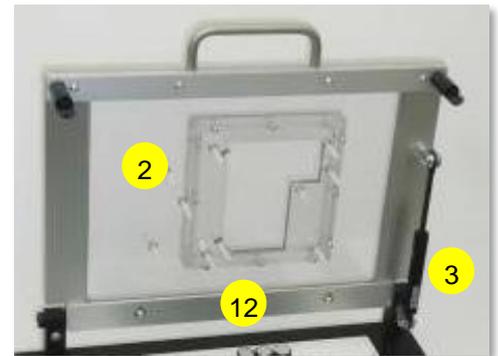


Figure 3 bulkhead fitting  
Type SMC KQ2E08-00

#### **WARNING:**

*The compressed air supply must meet the requirements of Cleanliness class 7: 4: 4 according to ISO 8573-1: 2010  
Otherwise, the function may cause damaging damage!*



## 5. Running operation

- Place the module under test on the locating pins. Close the hold down frame and start the test by pressing the two buttons on the front.
- When the test system activates the integrated solenoid valve, the air cylinders will move and all four pull down bolts will pull the hold-down evenly. The hold-down pins push the circuit board down against the spring contact pins and they contact the test points.
- In this state, the adapter is locked and cannot be opened.
- After successful testing, the solenoid valve is switched off again, the pull-down moves upwards and releases the hold-down frame.
- You can now remove the tested module.

### 5.1 Behavior during malfunctions during operation

**WARNING:**

*Any action on system components may only be made after stopping the system and its protection against unintentional restart.  
Establish the "Safe Standstill"!*



#### 5.1.1 Implausible error message as a result of the test

- Remove the test specimen from the test adapter and insert it again.
- Repeat the test.
- If this test has implausible results, issue a check with another sample.
- If this check performs also an implausible statement, tell your supervisor.

#### 5.1.2 The pull down clamps

Stop the test and turn off the test system.

Disconnect the test adapter from the compressed air supply and the test system.

Remove the test specimen and arrange the inspection of the test adapter by a mechanic.

#### 5.1.3 Escaping compressed air / hissing sound

If a persistent hissing noise is heard, a leak in the pneumatic system is suspected. Disconnect the test adapter from the compressed air supply and switch off the test system. Remove the unit under test and have the test adapter checked by a mechanic.

## 6. Maintenance and repair

Before carrying out any maintenance and servicing work, it is essential to look up the specific safety instructions given in the documentation for the respective components and to use any necessary protective equipment.

### **WARNING:**

*Any action on the test adapter must be made only after its shutdown and protection against accidental movement.*

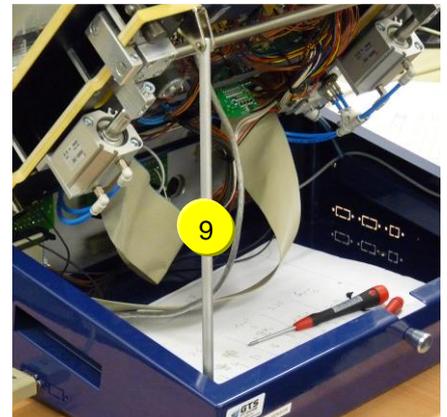
*Set the "Safe standstill" mode!*

*Disconnect the adapter from the compressed air supply and the test system.*



### 6.1 Carrying out general maintenance work

When commissioning a test adapter or for debugging, it may be necessary to make measurements on a contacted board. This may only be done by a test engineer or appropriately trained personnel. Pull to open the adapter with the left hand on the knob (6) and lift simultaneously with the right hand the black plate, where the round bulge serves as a handle. On the pull-down mechanism is a prop-up-pole (9). Take it from its holder on the right side and set the pole in the provided recess (10).



### **WARNING:**

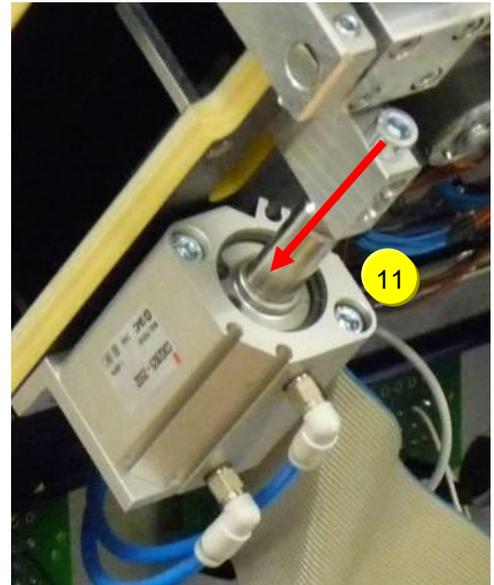
Make sure the rod is really located in the recess.

Otherwise there is the risk that the rod is slipping, the relatively heavy upper part falls and hurts the hand.



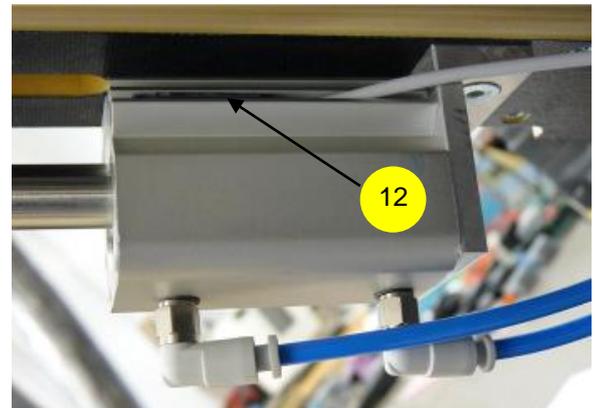
When the flip test adapter is opened, the pull-down mechanism is freely accessible.

Alternatively to the movement of the pull-down mechanism by the compressed air cylinder is contacted for troubleshooting / service work on separated from the compressed air supply adapter of the hold-down frame with both hands against the black plate and contacting the DUT. By its construction, the pull-down mechanism self-locking. It remains in this position, even if the spring forces of the contact pins act against it. You can open the pull-down mechanism again by (11) pushing back the piston rods of the two pneumatic cylinders manually. We recommend this procedure.



*Image 4 compressed air cylinders of pull-down mechanism*

The cylinders have a channel in which a reed sensor (12) is inserted. This sensor signals the lower end position of the pull-down mechanism with proper positioning. Solve the set screw for the adjustment of the sensor and move to the built-in LED in the lower end position of the LED lights the sensor. This signal is sampled by the test system, so that the supply voltage is switched on only when the assembly is fully contacted. With the help of the pneumatic throttle valve the feed rate of pull-down mechanism can be adjusted.



*Figure 5 sensor on pneumatic cylinder*

**For the repair of components, see the original documents of the respective manufacturer!**

## **6.2 Oil or water in the housing**

Is inside of the chassis of the test adapter oil or water detected, this is an indication that the supplied compressed air is too strong to oil or not sufficiently dry.

Initiate a cleaning and a correction of the settings on the associated maintenance unit and an inspection of the supply system.

## 7. Technical data of the test adapter

Description	PA450-N / PA450-NW (AC system)
Dimension	B450 x T350 x H230 mm
Usable area	300 x 215 mm
Vertical stroke	15 mm
Compressed air	max. 6 bar, purity class 7: 4: 4 according to ISO 8573-1: 2010
Contact pressure	max. 400 N (about 250 spring contact pins)
Weight	11 kg
Magnetic valve	24V / 50mA
Operating Temperature range	15-35 ° C

**WARNING:**

The test adapter is exclusively for use with the associated  
Guardian Testsystem provided!

Any other use requires coordination with the manufacturer.

Failure to comply with this requirement may result in property damage or personal injury.



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