

Terminals

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“SAK – A real classic that became synonymous with connection technology”



**Or
“Once upon a time there was a company called Weidmüller that created the best terminals in the world using plastic and metal”.**

Weidmüller has an interesting story to tell about SAK terminals. SAK (German abbreviation for "side-by-side mountable terminals") is the designation for a terminal that has proven itself on the market for more than 55 years. Using the side-by-side mounting principle, electrical terminals made of plastic replaced breakable porcelain constructions in switchgear cabinets. One could as a result say: "SAK was the first family of terminals in the world that helped the electrical industry make a technological breakthrough". Further developments of the terminals and passive connection technology form the Weidmüller group's traditional core business.

SAK wire connections – synonymous with reliable connections and product variety.

This long-term experience in the market enabled many improvements to be made. Nobody can claim that any other terminal on this earth has had as much know-how put into it as the SAK.

A great deal of know-how has been put into the inconspicuous insulating body with "clamping function" for electrical wires. This is because terminals have to withstand all kinds of unfavourable conditions. The connections system is chosen according to the respective application.

When looked at more closely, the demands made of an allegedly trivial component such as a terminal are considerable. Appropriately, the EN 60 947-7-1 defines terminals and cable connectors as equipment for connecting and joining electrical wires. Terminals can be mounted side-by-side or staggered, have two or several, independently functioning connection points, and are insulated both from one another and their mountings. They are mounted, for example, onto mounting rails.

As well as joining the wiring, terminals are also equipped with further functions: when fitted with markers, terminals make it possible to clearly arrange "electrical installations". Moreover, they create a defined connection point that can be extended as required. From this point, the wiring is routed to individual devices in the switchgear cabinet or from the switchgear cabinet to the devices. Terminal blocks increase serviceability, because electrical measurements can be carried out on them, targeted circuits can be opened or protected with appropriate protective elements.

Furthermore, cross-connections can be used to distribute potentials.

A clamping yoke system is used for securing the wiring in SAK terminals (see figure 1). The tension clamp system optimally combines the specific features of steel and copper. This system has proven itself millions of times over in electrical installations: in rough and aggressive industrial atmospheres, in power stations, ships and railway vehicles as well as in building automation.

The clamping yoke and the terminal screw used in Weidmüller's clamping yoke system are made from case-hardened steel. The clamping yoke unit with a high-strength terminal screw produces the required contact force and presses the conductor against the busbar, which is made either of copper or high-quality brass. The latter being tin coated.

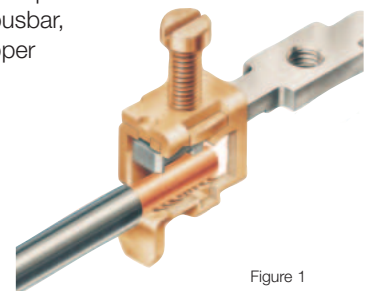


Figure 1

High contact forces with the patented connection system



This ensures a "close fitting" and permanent contact with a low contact resistance. A gas-tight, vibration-resistant connection is created between the conductor and the busbar.

Because even a very good electrically conducting material is only as good as the contact force applied. Weidmüller's patented connection system guarantees high contact forces. This means that it is predestined for use in corrosion-promoting environments; in addition, it is maintenance free. A further aspect is mounting and maintenance on an international scale, made possible by the world-renowned screw connection. One decisive factor for a perfect terminal is the insulating material.

In order to meet the demands placed on terminals, it is necessary to use different insulating materials that are tailor-made for the application – thermoplastic or thermosetting plastic. All insulating materials used by Weidmüller are free from noxious substances and contain no paint pigments based on cadmium. The SAK family especially offers the option of specifically coordinating the terminals with material requirements in mind. In this case, Weidmüller offers the same construction with different insulation materials.

Plastics for terminals – thermoplastics and thermosetting plastics

Thermal plastics are a polyamide (PA), and are one of the most frequently used technical plastics. The advantage of this material is its good electrical and mechanical characteristics, its flexibility and its lack of fracture susceptibility. In addition, this material offers good fire resistance due to its chemical structure without the need for added flameproofing substances. Engineers speak of a so-called "inherent flame protection". The continuous operating temperature of the SAK range is 100 °C, and at the same time offering V2 fire resistance according to UL 94.

Thermosetting plastics possess high dimensional stability, absorb a negligible amount of water, have a very high tracking resistance and excellent fire resistance. The continuous operating temperature is higher in comparison with that of thermoplastics. With increased thermal load, the dimensional stability of thermosetting plastics is better than that of thermoplastics. Their disadvantage: Thermosetting plastics have less flexibility in comparison with thermoplastics.

A further advantage of the SAK family is the large choice of different locking mechanisms. Its mounting rail designs (MR) offer the user the highest possible degree of convenience: TS 35 and TS 32 as well as a combi foot.

Technical background to the screw connection

A spring element forms the basis for Weidmüller's clamping yoke. Turning the terminal screw expands the upper flank of thread slightly, and in so doing locks itself in position. This construction efficiently compensates all expansions in the diameter of the wire (temperature fluctuations).

This has the following advantages:

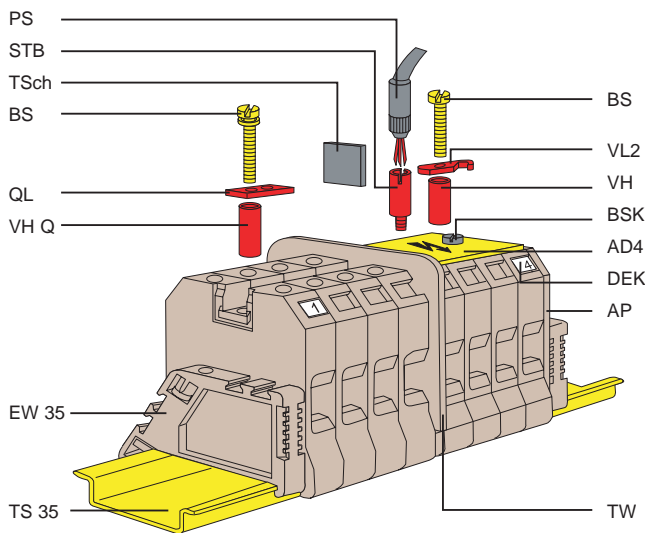
of course the terminals age when in use; nevertheless, the terminal point does not yield. Consequently, it is not necessary to retighten the terminal screw at a later date nor does the wire become loose: it is resistant to vibration.

The voltage drop remains consistently low.

Weidmüller's technology is completely maintenance free.

Separating the electrical and mechanical functions means that we use steel for a high contact force, and the good electrical conducting properties of copper for a low voltage drop.

SAK – The Classic



Legend

PS	Test plug
STB	Test socket screw
TSch	Small partition
BS	Fixing screw
QL	Cross-connection link
VH Q	Connection sleeve
EW 35	End brackets
TS 35	Mounting rail
VL	Connection link
BSK	Fixing screw
AD 4	Cover
DEK	Markers
AP	End plate
TW	Partition

The construction of the clamping yoke has been designed in such a manner to ensure that the connection between the wire and the busbar is gas-tight. The surface of the connection must make up at least 75% of the surface as a whole. Electricity is conducted with 100% efficiency at these points, because increased resistances due to soiling of the connection points do not arise. The SAK family is designed for wire cross-sections from 0.08 mm² to 240 mm².

A rundown on the SAK:

- PA 6.6, KrG
Two different materials that can be used, depending on the application, at 100°C or 130°C.
- Three different types of clip-on foot for mounting rail designs 32, 35 or a combination of both.
- Maintenance free and vibration-resistant There is no need to check the terminal point, because the patented clamping yoke construction ensures that the screws remain captive in the terminal.

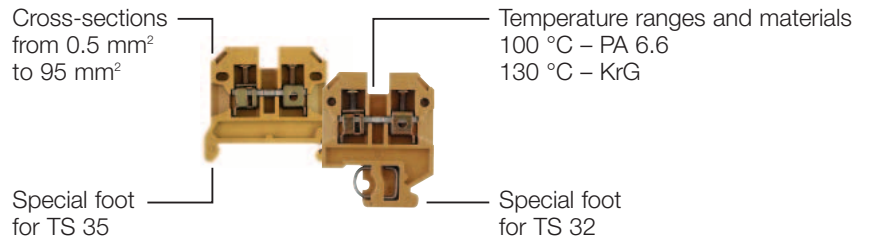
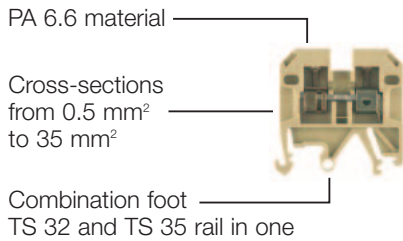
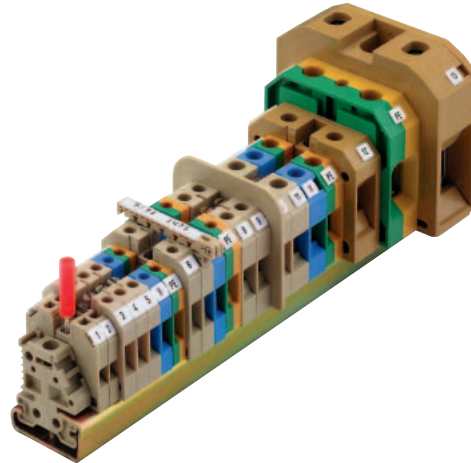
Separating the tasks completed by the components offers the following advantages:

- Low voltage drop and gas-tight enclosed (electrical components).
Perfect busbars in combination with a special surface treatment in conjunction with a high interference-fit at the terminal point.
- High contact forces, not reliant on the cross-section (mechanical components).
The clamping yoke is made of casehardened steel that, due to its design, can compensate any dimensional instability of the electrical wire.

SAK series

The advantages of all SAK modular terminals:

- Separation of electrical and mechanical functions:
 - steel clamping yoke for the mechanical function
 - copper busbar for the electrical function
- Maintenance-free and vibration-proof screw connection
- Low voltage drop and gas-tight contact point
- High contact forces, not reliant on the cross-section
- Three different clip-on foot designs available
- Various insulation materials
- Large selection of special terminals with diverse connection systems
- Large range of accessories available



Product range

Clamp type	Rated cross-section						Flat blade connection	Push-on connection	Spring connection	Solder connection
	2.5 mm ²	4 mm ²	6 mm ²	10 mm ²	16 mm ²	35 mm ²				
Modular feed-through terminals										
PA 6.6 / TS 32	•	•	•	•	•	•		•	•	•
KrG / TS 32	•	•	•	•	•	•	•	•	•	•
PA 6.6 / TS 35	•	•	•	•	•	•		•	•	•
KrG / TS 35	•	•	•	•	•	•	•			
PA 6.6 / comb. foot	•	•	•	•	•	•				
PA 6.6 / TS 15	•	•						•		•
Modular 2-tier terminals		•								
Modular PE terminals										
PA 6.6 / TS 32	•	•		•	•	•				
PA 6.6 / TS 35	•	•	•	•	•	•				
PA 6.6 / TS 15	•	•								
Modular fuse terminals										
PA 6.6 / TS 32				•						
PA 6.6 / TS 35				•						
KrG / TS 32				•	•					
KrG / TS 35				•	•					
PA 6.6 / TS 15		•								
PA 6.6 / comb. foot		•								
Modular 2-tier fuse terminals										
PA 6.6 / TS 32		•								
PA 6.6 / TS 35		•								
PA 6.6 / comb. foot		•								
Modular disconnect terminals										
TS 35		•		•						
PA 6.6 / TS 15		•								
Modular 2-tier disconnect terminals		•						•		
Modular ceramic terminals		•		•						

