



# MASS TRANSIT

Traffic engineering



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# SO-UD-1515 RED

## Mains voltage monitoring



Dimensions	DIN-rail snap-on housing, 45x75x110mm
Supply/monitoring	3x 230V AC symmetrical, setting range undervoltage 0,7...1,0 UN
Power consumption	approx. 2VA
Relay	2x Um, max. 2A, max. 250V AC
Display	LED yellow = UD1515 ready for operation; LED green = all 3 phases within the monitored areas

## Product Information

The 3-phase mains voltage monitoring reacts to the failure of one of the three phases or to falling below the nominal voltage to an adjustable lower switching threshold by deactivating a relay and the green LED goes out. The switching threshold of the undervoltage detection is set on the setting controller  $U_{ab}$  with a factor of 0.7 to 1.0 of the nominal voltage.

The  $U_{an}$  controller is used to set the hysteresis of the switching point between undervoltage detection and nominal voltage in order to prevent the relay from "chattering" around the switching point.

For the setting of  $U_{ab}$  0.7 (left stop) and the setting of  $U_{an}$  1.2 (right stop), this means that the undervoltage must have recovered from the value 0.7 of the nominal voltage by a factor of 1.2 before the relay is switched on again is activated and the green LED lights up.

Example:

Phase voltage  $U_N$  3x 230 VAC, symmetrical

Controller  $U_{ab}$  to 0.7 = left stop

Controller  $U_{an}$  to 1.2 = right stop

Relay is activated at 230V nominal voltage of all 3 phases, LED lights up green.

If a phase fails, or the phase voltage is  $< 160V$  AC ( $0.7 \times 230V$ ), the relay drops out, the green LED goes out, the NO contacts open, the NC contacts close.

If the voltage returns  $> 185V$  AC ( $1.2 \times U_{ab}$  160V), the relay is activated again, the green LED lights up, NO contacts are closed, NC contacts are open.

With a setting of 1.2, the hysteresis between  $U_{an}$  and  $U_{ab}$  is nominally 30V AC.

The relay has 2 poles with changeover contacts, so that the user can use both openers and closers to indicate undervoltage.

The internal operating voltage of the evaluation electronics of the UD1515 is displayed with a yellow LED.

If the yellow LED goes out, UD1515 is not operational, the relay is not active, the relay contacts are in the idle position.

# SO-STN-24249/H RED



PCB-card	100 x 160mm, Frontplate 12TE 3HE
Plug-in	DIN 41612 F32
Supply voltage	nom. 110V DC, min. 66V DC, max. 154V DC
Power	max. 140VA
Efficiency	approx. 85%
Temperature range	-25...+70°C
Output	24V 3A; 12V 0,5A; +-12V 0,25A; 5V 3A; 5V 1,2A

## Product Information

In Europe the requirements for electric and electronic equipment in railway applications are regulated by 2 international standards: The IEC571, EN50155, (GBR) RIA12.

The RIA12 (GBR) requires, in addition to the European standards, a special protection against surges.

The present power supply reaches and surpasses all underlying standards.

The device has been developed as a pin- and function compatible redesign that serves as a plug-and-play replacement of the power supply type SV STN24249/H and is built fully unitized.

The input modules for the galvanic isolation of input and output voltage are designed for an input voltage of nominally 110V DC.

The by EN50155 required input voltage range is  $0,7...1,25 \times U_N = 77...137V$ .  
The under- and overvoltage range is required with 66 or 154V, respectively.

The applied modules are built for 66 to 154V and are additionally equipped with an active transient protection that safely eliminates the overvoltages - specified by RIA12 (for 20mS) - of the nominal input voltage 3,5V-fold up to 385V, as well as peaks up to 1800V/50µs.

The MTBF of the modules is  $> 250.000h$ , which complies with the life of 24h/d for 30a, required for railway equipment.

The assembly cassette is built mechanically robust in accordance with the requirements for railway applications and resists a vibrational load in three axes with an amplitude of 7,5mm with 5-150Hz and an accellertion of  $20m/s^2$ .

# SO-STN-24249/L RED



PCB-card	100x160mm, frontplate 14TE 3HE
Plug-in	DIN 41612 F32
Supply voltage	nom. 35 DC, min. 24V DC, max. 48V DC
Power	max. 98VA
Efficiency	approx. 85%
Temperature range	-25... +70 °C
Output	24V 3A; 12V 0,25A; ±12V 0,1A; 5V 2A; 5V 0,05A

## Product Information

Two international standards are used to regulate the compliance of electrical and electronic equipment in railway applications:

IEC571, EN50155, (UK) RIA12

RIA 12 (UK) requires overvoltage protection exceeding those of the requirements in the European standards.

The present power supply meets or exceeds all the basic standards.

The device was developed as a pin and functionally compatible redesign to a plug-and-play replacement for power supply type SV STN24249/L and has fully modular design.

The input modules for the galvanic separation of the input/output voltage are designed for nominal 35V DC.

According to EN50155, the necessary input voltage range is  $0.7...1.25 \times U_N = 24...48V$ .

The under/over voltage range needs to include both 20V and 60V.

The modules used are designed for 20 V to 60V and are also equipped with an active transient protection, which securely eliminates the RIA12-specified overvoltage (for 20 mS) of the 3.5V-times of the nominal input voltage of up to 120V, as well as peaks of up to 1800V/50µs.

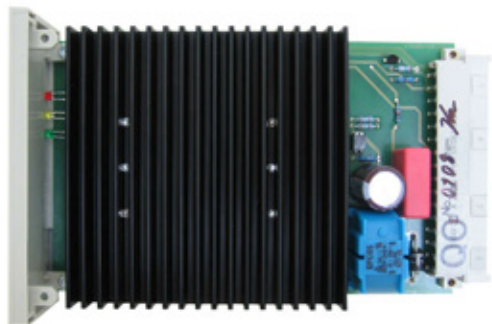
The MTBF is > 250.000h for the module, which meets the life requirements for railway equipment of 24/d for 30a.

The 19" 3HE insert meets the requirements for vehicle applications is extremely

robust and can resist a vibration load on three axels with and amplitude of 7,5mm at 5- 150Hz and acceleration of 20m/s<sup>2</sup>.

# SO-B-54794 RED

## Redesign DC/DC-converter for railway applications



PCB-card	100x160mm, frontplate 12TE 3HE
Plug-in	DIN 41612 F48
Supply voltage	nom. 110 DC, min. 66V DC, max. 154V DC
Power	max. 80VA
Efficiency	ca. 85%
Temperature range	-25... +70°C
Output	24V 3,3A

## Product Information

Two international standards are used to regulate the compliance of electrical and electronic equipment in railway applications:

The IEC571, EN50155, (UK) RIA12

RIA 12 (UK) requires overvoltage protection exceeding those of the requirements in the European standards.

The present power supply meets or exceeds all the basic standards.

The device was developed to be a pin compatible and functionally compatible redesign to act as a plug-and-play replacement for power supply B54794 and has fully modular design.

The GND of the supply voltage is linked to the GND for the output voltage. The input modules are designed for an input voltage of nom. 110V DC.

According to EN50155, the necessary input voltage range is  $0.7...1.25 \times U_N = 77...137V$ .

The under/over voltage range needs to include both 66 V and 154V.

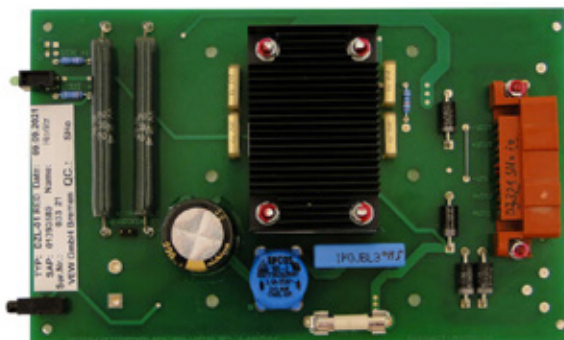
The modules used are designed for 66V to 154V and are also equipped with active transient protection, which securely eliminates the RIA12-specified overvoltage (for 20 mS) of 3.5V-times the nominal input voltage or up to 385V, as well as peaks of up to 1800V/50µs.

The MTBF is > 250.000h for the module, which meets the life requirements for railway equipment of 24/d for 30a.

The installation box meets the requirements for railway applications and is extremely robust and can resist a vibration load on three axels with and amplitude of 7.5mm at 5-150Hz and acceleration of 20m/s<sup>2</sup>.

# SO-DZL-01 RED

Power supply 110//24V 2A for railway applications



## Product information

The redesign of the DZL-01 power supply unit can be used instead of the original module plug-and-play in the specified application.

The DZL-01 RED provides a power of max. 50VA, with a nominal input voltage of 110V DC, galvanically isolated from the output voltage of 24V DC, max. 2A.

The DZL-01 RED complies with the railway standard IEC571-EN50155.

### The structure is available in 2 versions:

1. open-frame, chassis mounting, without front panel  
Connector: Metrimate-6 Amphenol  
Construction height: <30mm
2. 19" 3HE plug-in module, with front panel 6TE or 8TE, Siemens  
Connector: DIN 41612 H15  
Measuring sockets: Uout  
Operation LED: green UA  
Operation LED: red Uin

The redesign has been optimized by a factor of 5 compared to the original module with regard to the interference voltage level at the output.

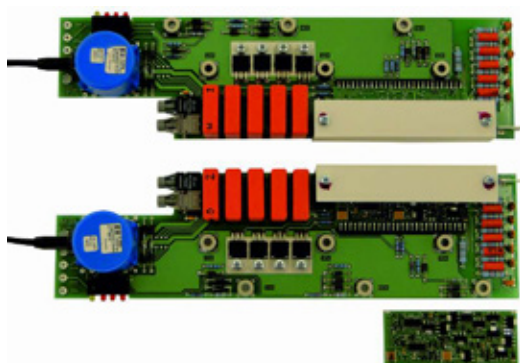
Input voltage	nom. 110V DC, range: +66...110V...+160V
Output voltage	nom. 24V DC, galvanically isolated
Output current	max. 2A
Interference voltage	at IA 2A <= 200mV ss
Option 1	open-frame, without front panel
Connector	Amphenol, Metrimate 6

Option 2	19" 3HE plug-in assembly
Connector	DIN 41612 H15
Front panel	Siemens 6TE (or 8TE)
LEDs	Vin red, Vout green
Dimensions	Europeformat 100x160mm, height <30mm



# SO-A5E-029 TOP, A5E-031 BOTTOM RED

## IGBT-trigger modules



Supply	$\pm 8,5\text{Vs} \dots \pm 11,0\text{Vs}$ 100kHz rectangle
Undervoltage detection	$\leq \pm 8,2\text{Vs}$ supply resp. $\leq \pm 18\text{V}$ P24/N24V on A5E
Current consumption	approx. $\pm 150\text{mA}$ Ruhe, ca. $\pm 350\text{mA}$ Last 3 IGBTs
Over voltage detection	$> +1400\text{V} \dots +1600\text{V}$ UCE IGBT
Displays	LED gn P24V and N24V LED ge Signal LWL-IN (R) LED rt IGBTs connected and tpuls 3,2 $\mu\text{s}$ ...11 $\mu\text{s}$ and fpuls $> 1\text{kHz}$ ...10kHz and UCE $< +1400\text{V}$

## Product Information

The original trigger modules for each 3 IGBT's in converters by Siemens are replaceable by a fully plug and play compatible redesign.

The originally built-in ceramic hybrid circuit has been newly developed by a double-sided fitted redesign in SMD-technology.

Even this original hybrid circuit A5E-02035497 is replaceable by this redesign, in exchange for the original module, fully pin- and function-compatible.

The A5E is mounted directly on the IGBT's with M4-screws and is put at high voltage potential this way.

One phase module will be triggered by a module A5E „top“ as well as by a module A5E „bottom“. The modules' function is identical, the mechanical structure is mirrored. The modules' power supply happens electrically isolated by a ferrite transformer. The transformer is designed for a testing voltage of 5kV.

The modules' control and feedback signals are transmitted by fibre optic cable (LWL 1000).

With too wide control pulses (via fibre optic cable) as well as with a surge in the IGBT (measuring input terminal X1), the IGBT will be shut down.

Furthermore, the circuit of the A5E commands a over- and undervoltage detection of the internal A5E operating voltage.

Constructively, the A5E consist of a power element and a control element.

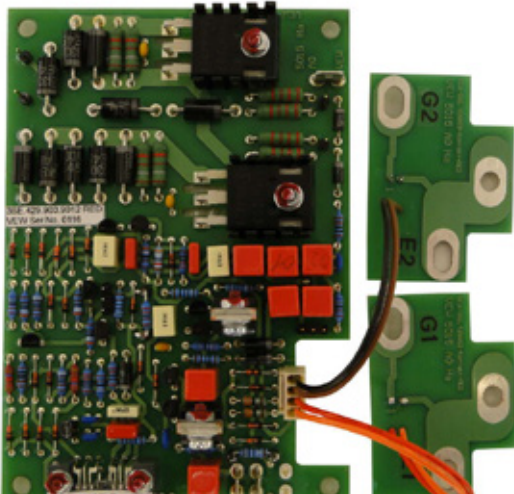
The control element is implemented on the SMD-module which replaces the original ceramic-hybrid-module A5E 02035497.

The A5E is put in by pairs „up and down“ in traction inverters.

Samples available ex stock

# SO-3SE.429.903.9012.02 / 03 RED

## Control module IGBT



Supply	24V DC
Power consumption	approx. 80mA
Inputs	2 LWL1000, IGBT-control
Outputs	1 LWL1000, UCE and under-voltage detection 2 IGBT-surface contacts
Type	open frame, 120 x 85mm, FR4 epoxy, lackered

## Product Information

The redesign of control module for IGBTs from the original manufacturer Siemens is available in 2 different assembly variants, which differ in the slightly different timing of the control of the externally arranged, parallel-connected IGBTs. The control connections of the IGBTs are supplied via two screwed flat contacts, which are connected to the control module via a pre-assembled, pluggable, 4-pin connection cable.

This connection to the IGBTs, which can be separated using locked plug connectors, has the advantage of being able to exchange the control assembly without having to remove the entire IGBT assembly from the vehicle.

The redesign can be used in place of the original Siemens assembly in a fully electrical and assembly-compatible manner.

The control signals for the control module are fed redundantly to the photo receivers of the module via two LWL1000. This ensures galvanic isolation on the one hand and high immunity to interference on the other.

The control module also has an active LWL1000 output for feedback from the UCE monitoring of the IGBTs and under-voltage detection.

An active overvoltage protection device is implemented, which can reliably protect the IGBTs from destructive overvoltages from approx. 960V.

The assemblies are supplied with an individual test report and a declaration of conformity in accordance with DIN EN 50155.



# SO-E44010-A5700 L02C RED



## Product Information

Requirements have been made tougher for electrical and electronic equipment in public transit vehicles in terms of life, reliability, freedom from faults, long-term operations and availability.

This power supply as a redesign of the original Siemens module meets or exceeds the fundamental standards (EN 60950, UI60950).

The devices are made to be a pin compatible and functionally compatible replacement for the Siemens DC/DC converter E44010 A5700 L02 CIt has a modular structure.

The input modules for galvanically separating the input/output voltage are designed for a nominal 24 DC current-Separation voltage UE/UA 1500V.

The working ranges of the DC/DC converter modules range from 16V to 36V and the modules are also equipped with active transient protection, which safely eliminates the specified overvoltage (for 20mS) of two times the nominal input voltage of up to 48V and transients of up to 1000V/50µs.

The module has diverse voltage and current monitoring circuits which are set to low levels at the binary outlets if:

the input voltage is <UE min or the output voltage is > IA  
the output voltage < or > UA planned, the light diode will extinguish  
on the front plate

the load current exceeds the maximum value 2A, or the input voltage fails to reach the UE value, the status shall be stored and issued via a binary outlet.

The MTBF of the DC/DC-converter module is > 350,000 h, which meets the life requirements for railway equipment of 24/d for 30a.

The 19" 3HE insert meets the requirements for vehicle applications and is extremely robust and can resist a vibration load on three axes with and amplitude of 7.5mm at 5-150Hz and acceleration of 20m/s<sup>2</sup>.

PCB-card	100x160mm Frontplate 9TE 3HE, Siemens, with handle
Plug-in	DIN 41612 24F + 7H, z+b+d
Supply voltage	nom. 24 DC, min. 10V DC, max. 35V DC
Power	max. 30VA
Efficiency	ca. 85%

Temperature range	-40... +85°C, derating from 60°C
Output	15V DC; 2A, galvanic separate to UE
Controls/control output	UE < UE min; UA < UA soll; UA > UA soll; IA > IA max with memory function
Remote input	UA off

# SO-E44010-A5700 L04C RED

Redesign DC/DC-converter for railway applications in public transport



## Product Information

In principle, there are increased requirements for electrical and electronic equipment in vehicles used in local public transport with regard to service life, reliability, immunity to interference, long-term operational maintenance and availability.

The present power supply, as a redesign of the original assembly from Siemens, meets or exceeds the underlying standards (EN 60950, UI60950 or EN50155 RIA12).

The devices have a modular structure and are pin and function compatible for plug-and-play replacement of the Siemens DC/DC converter E44010 A5700 L04 C.

The input modules for galvanic separation of input/output voltage are designed for nom. 24 DC. Separation voltage UE//UA 1500V.

The working range of the DC/DC-converter modules used ranges from 17V to 30V and is also equipped with an active transient protection that prevents the specified overvoltages (for 20ms) of twice the nom. input voltage up to 48V safely eliminated, as well as transients up to 1000V//50µs.

The module has various voltage and current monitoring circuits that are available as low levels on the binary outputs if:

- the input voltage <UEmin or the output current> IAm<sub>ax</sub>
- the output voltage is <or> UA<sub>soll</sub>,
- the load current exceeds the max. value ~ 2.7A, or the input voltage falls below the value UEm<sub>in</sub>, this is state saved and output via a binary output
- and the LED on the front panel goes out.

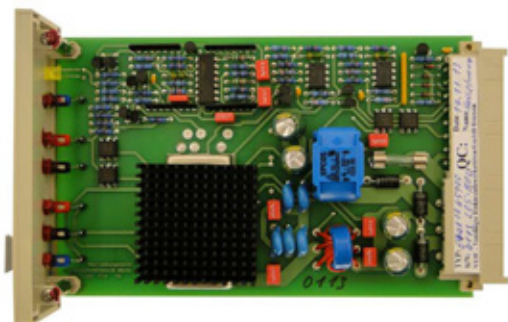
The MTBF of the DC/DC-converter modules is > 350,000h, this corresponds to the required service life of 24h/d for > 30a for the purpose.

The 19" 3U rack is mechanically robust in accordance with the requirements for vehicle applications and with stands vibrations in 3 axes with an amplitude of 7.5 mm at 5-150Hz and an acceleration of 20m/s<sup>2</sup>.

PCB-card	100x160mm Frontplate 9TE 3HE, Siemens, with handle
Plug-in	DIN 41612 24F + 7H, z+b+d
Supply voltage	nom. 24 DC, min. 10V DC, max. 35V DC
Power	max. 30VA
Efficiency	ca. 85%

Temperature range	-40... +85°C, derating from 60°C
Output	15V DC; 2A, galvanic separate to UE
Controls/control output	UE < UE min; UA < UA soll; UA > UA soll; IA > IA max with memory function
Remote input	UA off

# SO-E44010-A5700 L05C RED



## Product Information

Requirements have been made tougher for electrical and electronic equipment in public transit vehicles in terms of life, reliability, freedom from faults, long-term operations and availability.

This power supply is a redesign of the original Siemens module and meets or exceeds the fundamental standards (EN 60950, UI60950).

The devices are made to be pin and functionally compatible replacement for the Siemens DC/DC converter E44010 A5700 L05 C. It has a modular structure.

The input modules for the galvanic separation of the input/output voltage are designed for nominal 24 DC current. Separation voltage UE/UA 1500V.

The working ranges of the DC/DC converter modules range from 16V to 36V and the modules are also equipped with active transient protection, which safely eliminates the specified overvoltage (for 20mS) of two times the nominal input voltage of up to 48V and transients of up to 1000V/50µs.

The module has diverse voltage and current monitoring circuits which are set to low levels at the binary outlets if:

- the input voltage is <UE min or the output current is > IA max
- the output voltage < or > UA planned, the light diode will extinguish on the front plate
- the load current exceeds the maximum value 1A, or the input voltage fails to reach the UE value, the status shall be stored and issued via a binary outlet.

The MTBF of the DC/DC-converter module is > 350,000 h, which meets the life requirements for railway equipment of 24/d for 30a. The 19" 3HE insert meets the requirements for vehicle applications and is extremely robust and can resist a vibration load on three axels with and amplitude of 7.5mm at 5-150Hz and acceleration of 20m/s<sup>2</sup>.

PCB-card	100x160mm frontplate 9TE 3HE, Siemens	Temperature range	-40... +85°C, derating from 60°C
Plug-in	DIN 41612 24F + 7H, z+b+d	Output	15V DC; 1A, galvanic separate to UE
Supply voltage	nom. 24 DC, min. 16V DC, max. 36V DC	Controls/control output	UE < UE min; UA < UA desired value; UA > UA ; IA > IA max with memory function
Power	max. 40VA	Remote input	UA off
Efficiency	approx. 85%		

# SO-E44010-A5700 L07C RED

## Redesign of DC/DC converters for public transport vehicles



### Product Information

Requirements have been made tougher for electrical and electronic equipment in public transit vehicles in terms of life, reliability, freedom from faults, long-term operations and availability.

This power supply is a redesign of the original Siemens module and meets or exceeds the fundamental standards (EN 60950, UI60950).

The devices are made to be pin and functionally compatible replacement for the Siemens DC/DC converter E44010 A5700 L07C.

The input modules for the galvanic separation of the input/output voltage are designed for nominal 24 DC current. Separation voltage UE/UA 1500V.

The working ranges of the DC/DC converter modules range from 16V to 36V and the modules are also equipped with active transient protection, which safely eliminates the specified overvoltage (for 20ms) of two times the nominal input voltage of up to 48V and transients of up to 1000V/50µs.

The module has diverse voltage and current monitoring circuits which are set to low levels at the binary outlets if:

- the input voltage is <UE min or the output current is > IA max 20k
- the output voltage < or > UA planned, the light diode will extinguish on the front plate
- the load current exceeds the maximum value 8A, or the input voltage fails to reach the UE value, the status shall be stored and issued via a binary outlet.

The MTBF of the DC/DC-converter module is > 350,000 h, which meets the life requirements for railway equipment of 24/d for 30a.

The 19" 3HE insert meets the requirements for vehicle applications and is extremely robust and can resist a vibration load on three axels with an amplitude of 7.5mm at 5-150Hz and acceleration of 20m/s<sup>2</sup>.

PCB-card	19" insert 100x160mm frontplate 12TE 3HE, Siemens
Plug-in	DIN 41612 24F + 7H, z+b+d
Supply voltage	nom. 24 DC, min. 10V DC, max. 35V DC
Power	max. 40VA
Efficiency	approx. 85%

Temperature range	-40... +85°C, derating from 60°C
Output	5V DC; 8A, galvanic separate to UE
Controls/control output	UE < UE min; UA < UA soll; UA > UA soll; UA > UA soll
	IA > IA max, stored
Remote input	UA off

# SO-E44010-A5700 L08C RED



## Product Information

Requirements have been made tougher for electrical and electronic equipment in public transit vehicles in terms of life, reliability, freedom from faults, long-term operations and availability.

This power supply is a redesign of the original Siemens module and meets or exceeds the fundamental standards (EN 60950, UI60950).

The devices are made to be pin and functionally compatible replacement for the Siemens DC/DC converter E44010-A5700-L08C. It has a modular structure.

The input modules for the galvanic separation of the input/output voltage are designed for nominal 24 DC current. Separation voltage  $U_E/U_A$  1500V.

The working ranges of the DC/DC converter modules range from 16V to 36V and the modules are also equipped with active transient protection, which safely eliminates the specified overvoltage (for 20mS) of two times the nominal input voltage of up to 48V and transients of up to 1000V//50µs.

The module has diverse voltage and current monitoring circuits which are set to low levels at the binary outlets if:

- the input voltage is  $< U_E$  min or the output voltage is  $> I_A$
- the output voltage  $< \text{or} > U_A$  planned, the light diode will extinguish on the front plate
- the load current exceeds the maximum value 4A, or the input voltage fails to reach the  $U_E$  value, the status shall be stored and issued via a binary outlet.

The MTBF of the DC/DC-converter module is  $> 350,000$  h, which meets the life requirements for railway equipment of 24/d for 30a.

The 19" 3HE insert meets the requirements for vehicle applications and is extremely robust and can resist a vibration load on three axels with and amplitude of 7.5mm at 5-150Hz and acceleration of 20m/s<sup>2</sup>.

PCB-card	100x160mm Ffrontplate 12TE 3HE, Siemens
Plug-in	DIN 41612 24F + 7H, z+b+d
Supply voltage	nom. 24 DC, min. 16V DC, max. 36V DC
Power	max. 100VA
Efficiency	approx. 85%

Temperature range	-40... +85°C, derating from 60°C
Output	24V DC; 4A, galvanic isolation 1500V input/output
Controls/control output	$U_E < U_E$ min; $U_A < U_A$ soll; $U_A > U_A$ soll; $U_A > U_A$ soll
	$I_A > I_A$ max, with fail store
Remote input	$U_A$ off

# SO-E44010-A5700 L09C RED



## Product Information

Requirements have been made tougher for electrical and electronic equipment in public transit vehicles in terms of life, reliability, freedom from faults, long-term operations and availability.

This power supply is a redesign of the original Siemens module and meets or exceeds the fundamental standards (EN 60950, UI60950).

The devices are made to be pin and functionally compatible replacement for the Siemens DC/DC converter E44010 A5700 L07C. It has a modular structure.

The input modules for the galvanic separation of the input/output voltage are designed for nominal 24 DC current. Separation voltage UE/UA 1500V.

The working ranges of the DC/DC converter modules range from 16V to 36V and the modules are also equipped with active transient protection, which safely eliminates the specified overvoltage (for 20mS) of two times the nominal input voltage of up to 48V and transients of up to 1000V/50µs.

The module has diverse voltage and current monitoring circuits which are set to low levels at the binary outlets if:

- the input voltage is <UE min or the output current is > IA max
- the output voltage < or > UA planned, the light diode will extinguish on the front plate
- the load current exceeds the maximum value 4A, or the input voltage fails to reach the UE value, the status shall be stored and issued via a binary outlet.

The MTBF of the DC/DC-converter module is > 350,000 h, which meets the life requirements for railway equipment of 24/d for 30a.

The 19" 3HE insert meets the requirements for vehicle applications and is extremely robust and can resist a vibration load on three axels with an amplitude of 7.5mm at 5-150Hz and acceleration of 20m/s<sup>2</sup>.

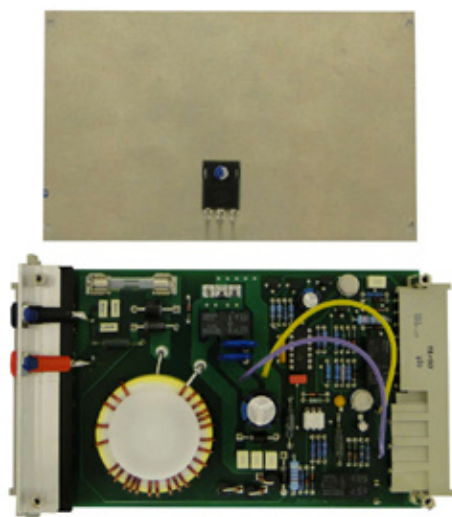
PCB-card	19" insert 100x160mm frontplate 12TE 3HE, Siemens, with handle
Plug-in	DIN 41612 24F + 7H, z+b+d
Supply voltage	nom. 24 DC, min. 16V DC, max. 36V DC
Power	max. 60VA
Efficiency	approx. 85%

Temperature range	-40... +85°C, derating from 60°C
Output	15V DC; 4A, galvanic separated to UE
Controls/ control output	UE < UE min; UA < UA soll; UA > UA soll; UA > UA soll
	IA > IA max, stored
Remote input	UA off



# SO-6FH6023 RED

## Switch-on aid trolley control



### Function description:

The switch-on aid is used to properly switch the trolley control on and off.

With the active switch-on command RESIN, the switch-on contactor is controlled externally or internally with a time delay. The 24V battery voltage is above a 15A (up to 25A) input fuse with downstream reverse polarity protection and intrusion suppression choke back-up capacitor on the power supply modules. (DC/DC E44010-A5700-xx)

The switch-on command is only effective if all power supply modules (DC/DC converters) are fully inserted in the rack, as otherwise the „M loop“ of the plug monitoring is not closed and the contactor does not pick up.

The activation of the switch-on contactor is delayed and creates internal enables

- for the power supply of the power relays
- for the release of the pulse amplifier
- and for the „L-RESIN“ signal for the process start-up.

The switch-on delay can optionally be adjusted according to the requirements.

In this way, the switch-on aid prevents undefined switch-on and switch-off states.

Process errors, pulse errors and faulty contactor controls are reliably prevented.

The switch-on aid is delivered with a switch-on delay of approx. 130ms and a 15A fuse as standard. Optionally, the switch-on delay can be adapted to the ramp-up time of the DC/DC converter, as well as the fuse protection to 25A.

### Product Information

The redesign of the switch-on aid for trolley controls 6FH6023 is plug and play compatible and can be used instead of the original Siemens modules.

The module is built in the European format 100x160mm, with a width of 33.5mm and has a basic connector with mixed equipment for control signals and high-current male-contacts according to DIN 41612 H7F24.

The front connector is designed according to DIN 41612 H15, with high-current male-contacts and connector locking and coding.

The module can optionally be modified for different applications with regard to the switch-on and switch-off delay and the coding.

The current carrying capacity of the power path is max. 25A, but is fused with 15A as standard.

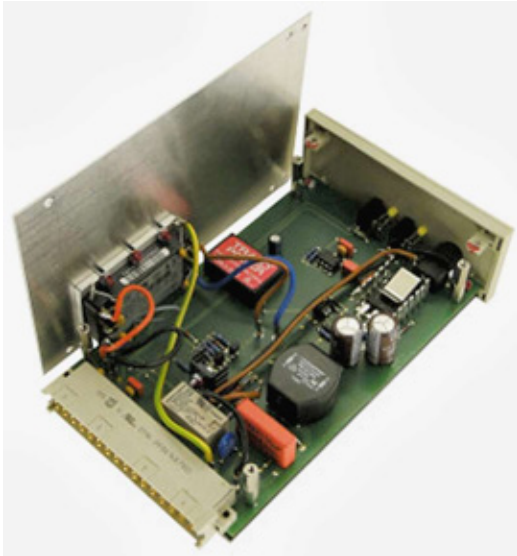
Components for reverse polarity protection, transient protection and overvoltage are implemented in the power path.

Input voltage	nom. 24V DC, nom. 5V DC, nom. 15V DC
Performance group	max. 25A, by default 15A
Switch-on delay	RESIN approx. 130ms; optionally other
Switch-off delay	ca. 1,15ms, optionally other
Construction	European format 100x160mm, width 33,5, plug DIN 41612 H15, as well H15 F24; heat sink, removable, front jacks 4mm UB

**The DC/DC converters of the series E44010-A5700-L02; -L04; -L05; -L06; L08; -L09 are also plug-and-play compatible as a redesign, as a replacement for the original assemblies.**

**Others in development.**

# SO-146025501 RED



PCB-card	100x160mm; frontplate 9TE 3HE
Plug-in	DIN 41612 F48
Supply voltage	nom. 110 DC, min. 66V DC, max. 154V DC
Power	max. 60VA
Efficiency	approx. 85%
Temperature range	-25... +70°C
Output	5,1V 9A, 15V 0,2A
Frontplate	inspection sockets for UA1, UA2
LEDs and fuse	

## Product Information

Two international standards are used to regulate the compliance of electrical and electronic equipment in railway applications:

IEC571, EN50155, (UK) RIA12

RIA 12 (UK) requires overvoltage protection exceeding those of the requirements in the European standards.

The present power supply meets or exceeds all the basic standards.

The device was developed as a pin and functionally compatible redesign for a plug-and-play replacement of the power supply type 146025501 and has fully modular design.

The input modules are designed for an input voltage of nom. 110V DC.

According to EN50155, the necessary input voltage range is  $0.7...1.25 \times U_N = 77...137V$ .

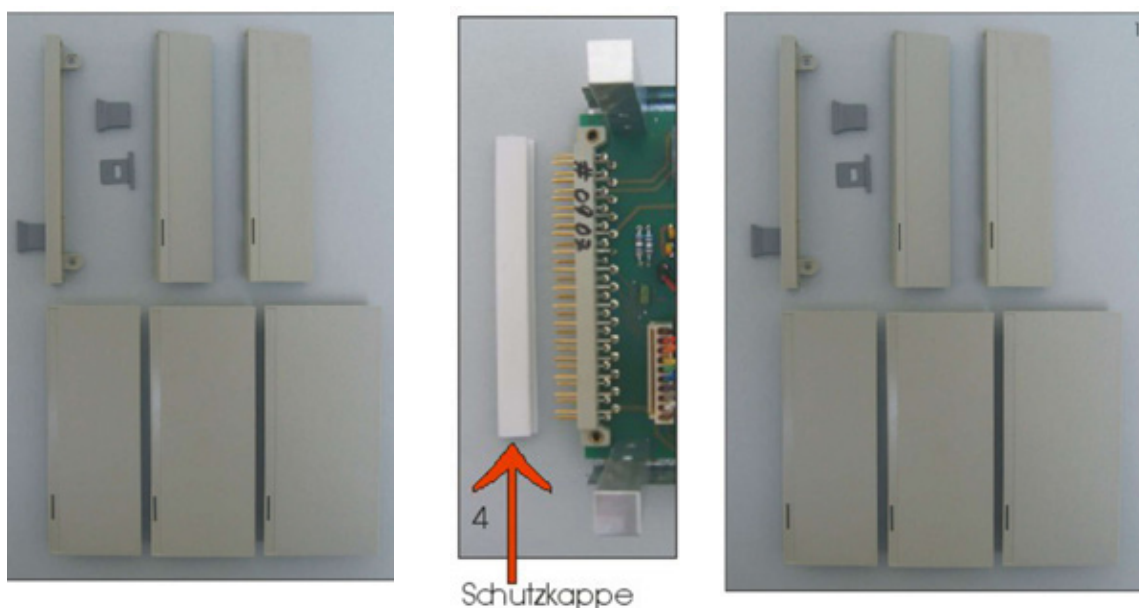
The under/over voltage range needs to include both 66 V and 154V.

The modules used are designed for 66V to 154V and are also equipped with an active transient protection, which securely eliminates the RIA12-specified overvoltage (for 20 mS) of the 3.5V-times of the nominal input voltage of up to 385V, as well as peaks of up to 1800V/50µs.

The MTBF is > 250.000h for the module, which meets the life requirements for railway equipment of 24h/d for 30a.

The installation box meets the requirements for railway applications, is extremely robust and can resist a vibration load on three axels with and amplitude of 7.5mm at 5-150Hz and acceleration of 20m/s<sup>2</sup>.

# Front plates and grip straps for Siemens modules



## Product Information

The plastic front plates for original Siemens modules as well as original grips tend to break after years in operation due to brittleness in the plastic.

The original parts are available once again.

Other size on request.

We are able to fit the frontplates with holes and engraved symbols by your drawing.

1) Frontplates for 3HE 19" PCB-cards (PU = 10 pcs./type)

3TE (nom. 15mm)	Typ 6XF1006-3KA	B# 9901292
4TE (nom. 20mm)	Typ 6XF1008-3KA	B# 9901293
5TE (nom. 25mm)	Typ 6XF1010-3KA	B# 9901294
6TE (nom. 30mm)	Typ 6XF1012-3KA	B# 9901295
8TE (nom. 40mm)	Typ 6XF1016-3KK00	B# 9901321
9TE (nom. 45mm)	Typ 6XF1018-3KK00	B# 9901322
10TE (nom. 50mm)	Typ 6XF1020-3KK00	B# 9901323
12TE (nom. 60mm)	Typ 6XF1024-3KK00	B# 9901325

**2) Grip strap to that, 2-parts (PU = 10 pcs.)**  
**B# 9900393**

**3) Backside cover for PCB 100x160mm, PVC**  
**B# 9900**

**4) Protection cap for connector**  
**B# 9901**

**5) Guideway for 19" rack (PU = 20 pcs.)**  
**Typ 6XB9601**  
**B# 9900355**

# Light sensor

Replacement for „SICK“

## Product Information

The pictured light sensor by manufacturer Sick, for door protection in trains and buses can be beneficially replaced by a compatible redesign.

The so far relatively complex adjustment of the mirror optics, which focuses the ray on the reflector, ceases with the new light sensors.

The new devices can be mounted “plug-and - play” on the designated places without any further adjustment.

The solid, black anodized aluminum cases are protected against vandalism, by dispensing with destructible front glass or lense, respectively, so malfunctions due to scratched, misted or dirty glasses or lenses are dropped.

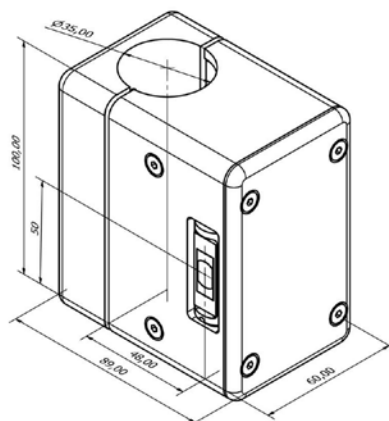
The infrared-LEDs are deeply enough mounted in the case that aforementioned impairments are reliably eliminated.

The light sensors are constructed as unilaterally (mounting right or left) or mutually operating reflex-light sensors for prism reflectors.

The mutually operating devices have individually configurable plug-in jumpers, which make it possible to link the two independent monitoring lines with a Or-function on just one output relay or to put both sides independently on separated relays, respectively. Highly reliable relays with 3x 10<sup>6</sup> switching cycles are chosen.

The relays switch with a clear “click” to enable a good acoustic verification of perfect function on-site.

The devices are connected via one, two respectively, pluggable solid terminal strip (1,5mm<sup>2</sup>) in a significantly enlarged terminal compartment.



Supply	18..30V DC 0,1A
Monitoring line	max. 1,5m Unilateral left, right; mutual
Type	LIS-EL, LIS-ER, LIS-BS
Dimensions	115x60x100 Ø 35mm
Output	galv. separate relay 1pol.UM 2A
Function	Singular, double, or or-ed
Durability	> 10 years
Emitter	Infrared, opening angle, appr. 15°

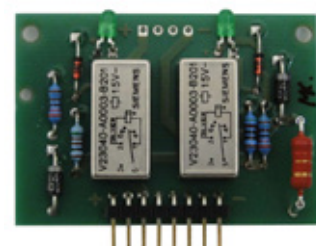
For operational maintenance of older original Sick-light sensors:

Replacement illuminants for Sick

When the original illuminant with low-voltage lamp may not be available anymore, a plug-and-play compatibly applicable illuminant with 2 infrared LEDs is available. Type: LM-ERS-LED.

Relay module for TL43

When the original module by Sick with 2 relays is not available anymore, the redesign of this module can be mounted via plug-and-play on the designated place in the light sensor by Sick. Type: Relais TL43 RED



# SO-DCE3-24 RED

Control electronic for IBEG step tread 0-0343-135



Supply	nom. 24V DC max. 4A
Motor current	max. 4A, adjustable
System voltage	Control logic 5V, internally
Dimensions	HWD: 45x105x160mm
Inputs	Logic: 10; L = 24V: 0 = <5V
Outputs	Motor voltage, reverse opening/closing. Stop request relay

## Product Information

The redesign of the step control DCE3-24 (original manufacturer IFE) can be used instead of the original assembly. It is completely connectable, dimensional and functionally compatible, and fits perfect in the specified application. The function is plug-and-play.

The DCE3-24 RED controls by means of combinatorial logic, fail-safe and reliable kinematics of the step tread 0-0343-135 from the manufacturer IBEG.

The specified control unit runs by various setting electronic parameters:

- 1.) Jumpers for
  - Number of attempts to open the door with maximum current monitoring, 1x; 2x ... 5x; unlimited
  - Hold-open-time after opening the door to „zero“
  - Hold-open-time after door opening, not set to „zero“
- 2.) Potentiometer adjustment for:
  - Door hold-open time Toffen
  - Response delay current monitoring TImax
  - Maximum current limitation Imax
  - door speed T1
  - door speed T2

In addition, the control process can be interrupted by safety monitoring:

- Anti-trap protection (when closing)
- Motor overcurrent shutdown

All input signals are displayed via LEDs, as are the system signals motor relay „open“ or „close“, motor current exceeded, holding request active, system voltage of the control logic.

The system is equipped with a 16 pin connector Phoenix MSTBVA2,5 / 16-G-5,08 equipped, as well as a cover on which all signal LEDs in plain text are labeled. Connection coupling Phoenix: MSTB2,5 / 16-ST-5,08

# Gate Unit SO-GV-A587 RED



## Product description

The original gate unit GV A587 can be replaced plug-and-play with the redesigned GV A587 RED.

The redesign was developed in accordance with DIN 50155 and meets all of the requirements specified by the application.

During the new development, circuit and mechanical improvements were made to the original assembly from the manufacturer ABB:

1. The heat dissipation of the FETs that switch the pulse currents to quench the GTO thyristors has been optimized by using 5mm aluminum profiles instead of a cooling plate that dissipate the heat to the heat sink.
2. The energy store, which provides the pulse currents from a cluster of electrolytic capacitors, is arranged on a piggy-back assembly and can therefore be exchanged as a unit.
3. The busbars that lead the pulse currents to the connection point are designed as a 2-sided printed circuit board with a special copper layer, which prevents a short circuit across the busbar.
4. The connection point for the pulse current (approx. 1000A) is no longer designed as a bent sheet metal part with a loose nut, but as a connection block with a solid 5mm Cu plate, as an integral part of the circuit board.
5. The obsolete optical input and output couplers HP 2478 and HP 1478 have been replaced by commercially available couplers for 1mm fiber optic cables.
6. The correct function of the circuit parts can be verified on a diagnostic connector with the output of significant measured values.

Samples for testing will be available from 6/2021.

Not-Emergency repairs to the original ABB GV A587 are now possible.



# Inductive encoder SO-47165/2

Cable extension 47167/2



Probe	Inductive, minimum switching distance 0,127mm, threaded connector M18x1,5, wrench size 24mm
Connection cable	Armored, length 72cm
Connection box	Schaltbau
Cable extension	Length 1,72m, armored 21mm Ø (opt. other length)
Connector	Tyco
Cable connector	Schaltbau

## Product Information

The redesign of the encoder 47165/2 can be used plug-and-play instead of the original component from the manufacturer Deuta in the specified application.

All installation dimensions, connection cables and plug connections are fully compatible with IP65 for railway applications.

The transmitter is a passive, inductive component that detects changes in the magnetic field and converts it into an equivalent analog signal.

The inductive probe of the encoder is built into a metallic, galvanized M18 threaded connector that has a hexagon with a wrench size of 24mm on the screw-on surface.

The connection piece of the sensor is guided to a high-quality screw connection with a spiral spring kink protection.

The entire connection is covered by a shrink tube with an internal hot melt adhesive and is watertight.

The connection cable is led through a spiral hose armouring. The valve seal also encloses the spiral hose.

The cable end of the probe is led to a screwable, sealed cable socket from the manufacturer Schaltbau.

The extension cable to the probe is 1.72 m (over all) long (optionally other length) and is led through a 21 mm spiral hose armouring.

It has a Schaltbau cable plug on one side, matching the cable coupling of the probe, and a Tyco plug connection with a lockable die-cast housing and modified cable outlet on the other side.

Both plug connections are waterproof IP65 with screw connections.

# Load cells for TRAM

## Redesign of Siemens SO-7MH3105



Load cell type	(A/V)3105 - 2,8t	A/V)3105-6t
Normal load	2,8t	6t
Service load	Press load	Press load
Clamp resistance	2450hm ± 0,25	2450hm ± 0,25
Bridge supply	< 10V	< 10V
Nom. characteristic	1,5mV/V	1,5mV/V
Degree of protection	IP65	IP65

### Product Information

In tram chassis multiple DMS-operating-load cells from the Siemens 7MH3105 product range have a measuring range of 2.8t and 6t and are also used to measure the load torque.

A fully deployable redesign of the original equipment is now available.

The redesign is composed of a hardened meter stamp whose front surface is formed with knolls, whose radii generate a restoring moment when tilted. The meter stamp has four strain gauges as well as adjustment and compensation resistors in the three-part aluminium housing (anodized).

The stamp extends from both sides of the housing. One side of the stamp is fixed to the front side of the housing; the other side is placed in an O-ring seal.

The housing cover has a PG9 screw connection which will have a 4-pole 5 meter long protected rubber hose line. The load cells implement the load as a proportional change in resistance, by altering the length of the stamp creating extension and compression.

The meter stamp has four strain gauges which are force fit to adhere to the structure.

The surface thrust force generated by loading the meter stamp will thus also be transferred to the strain gauges whose ohmic resistance will change accordingly.

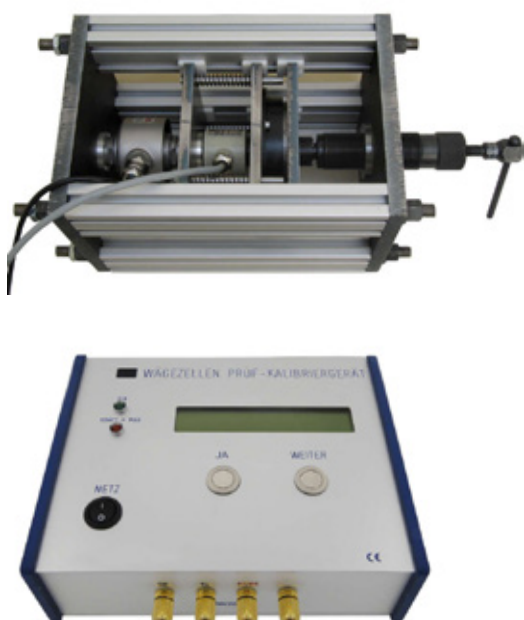
The four strain gauges are wired as wheatstone bridges and also come with compensation and are expanded to a 4-pole network.

These sequences accrue in the resistance changes in the load on the meter stamp creating a general detuning of the bridge.

The redesign of the original load cells can be installed without any electrical adjustments, as a plug-and-play installation in the relevant application. The load cells are then delivered with a calibration protocol and CE certificate.

A high precision, hydraulic calibration stand with certified reference cells is optionally available. The device can bear a load of up to 7.5 tons and has a precision of < 0.1% of the metered range.

# Calibration test device for load cells



## Product description

The device configuration consists of a solid, hydraulically operated load unit and a precise electronic measuring device for displaying the load or bridge voltage and bridge supply.

The hydraulics can apply a force that is proportional to a weight of up to 7.5 t.

The force acts on a certified reference cell which is loaded in series with the test cell.

Both cells are fed with a precise bridge voltage of 5.00V.

Depending on the applied load, the proportional, standardized measured value of the reference cell and the test cell is displayed separately.

The device has a menu-driven user interface that can be used to switch between the 7MH3105xx load cells for 1.3 t; 2.8t and 6t from the manufacturer Siemens.

With the selected measuring range, the reference cell is displayed in kg, that of the test cell normalized in  $\mu\text{V} / \text{V}$ . A menu-controlled 0-point compensation can take place for the test cell.

Depending on the selected measuring range, the display of the reference cell is monitored for limit values so that exceeding the limit value is signaled acoustically and optically to protect the test cell. The non-amplified bridge voltages of each cell, as well as the bridge supply of the cells, are also available for control purposes at the measuring sockets on the rear of the device.

The built-in digital displays have a display range of 0 ... 7500kg (reference cell) or 0 ... 2000 $\mu\text{V} / \text{V}$  (test cell) with an accuracy of  $<0.1\% \pm 1$  digit, so that the calibration test of a 6t cell with a resolution of 3kg / digit is possible. The target / actual results of a calibration test can be transferred directly to the test report in  $\mu\text{V} / \text{V}$  and kg.

## Scope of delivery:

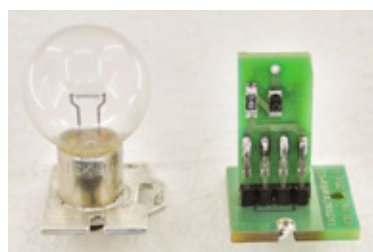
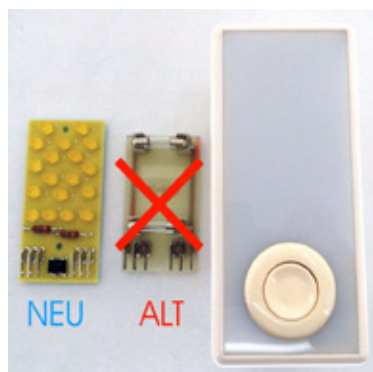
Hydraulic testing device

Certified reference cell

Measurement and display system with controller and reference voltage source

Operator manual

## Door control unit illuminated panel



Supply	20...30V DC
Power consumption	130mA nom.
Bulbs	18 x LED 5 mm extremely bright
Light intensity	approx. 5.400 mcd
Durability	>10 years
Connection	40 x 80mm
Connection	6 x fast on 2,8/0,5

### Product description

The light panels of the door control device are relatively prone to failure due to the lighting means used and are therefore expensive to maintain.

To replace the illuminants (sofa lamps), a size and function-compatible assembly was designed, which is installed "plug-and-play" in exchange.

The replacement assembly guarantees the trouble-free function of the illuminated panel with a service life of at least 10 years.

18 yellow light-emitting diodes, 9 of which are connected in series independently of one another, are used on the assembly.

The light-emitting diodes are selected with a view to uniformly high light yield and the same light color.

The supply voltage connection (nom. 24VDC) is led via a rectifier bridge so that the polarity of the connections does not have to be taken into account by the user.

The costs of the assembly are amortized after the second lamp change.

Free samples for testing are available upon request.

# SO-6FH 6010-1B RED

## SIBAS 16 Nominal value converter



Dimensions	100x160mm; 6 2/3 SEP
Plug-in	DIN 41612 H15
Supply voltage	24V DC nom. 2A
Output PW	Pulse width 60V, nom. 400Hz, PW 7,5...45% bei 0...20mA
Output DC	24V 150mA, 60V 90mA
Desired value input	2x, 500 Ohm 0...10V = 0...20mA
Temp. range	-25 ... +70 °C

### Function:

The nominal value transmission for all connected users of one train line takes place, independently from the distance to the sending nominal value converter, by pulse width control. The pulse width is controlled by the nominal value converter.

The transmission frequency of the pulse width signal is nominally 400Hz (-0 +10%) with a output voltage of nominal 60V (-10 ... +10%).

The PW-signal is potential-free and short-circuit-proof. The load current must not exceed 50mA.

The pulse width at a impressed current of 0mA of the director is 7,5 % and increases linearly to 45 % at 20mA. 2 directors can be connected, of which the respective higher nominal value is being processed (maximum selection).

The pulse width signal is being connected to the train line with a 2-pole relay, when the train control device is switched on, separated when the device is being switched off, resp.

Only the nominal value converter may be active in the driver's cab.

In addition to the function „nominal value converter“ the device provides electrically isolated output voltages of 24V 150mA and 60V 90mA.

The voltage of 60V serves the transmission of train commands, the voltage of 24V serves as power supply for the commander of nominal values of the drive and brake.

This voltage also supplies the relay for switching on the PW-signal as well as the lamp U ON, so the PW-signal is only switched on when the directors have a operating voltage and U ON is active.

A fully pin- and function-compatible redesign, which can be operated via plug-and-play in the prewired application instead of the original module by the manufacturer Siemens.

The nominal value converters 6FH 6010-1B Red. are built in isolated in the module rack of the ES902 system as centralized system in the Europe format with a mounting width of 6 2/3 SEP. The electrical connection is not made by a base plug-in connector in the module rack, but a plug-in connector DIN 41612 H15 on the front. All important functions of the module are also available on isolated measuring sockets on the front plate of the device.

# Current transformer SO-FL6/D2-3-400A-100mA



Measurement range unswitched	$0... \pm 400A = 0... 100mA$
Measurement range switched	Shunt-resistance $100 \pm 0,1\%$ between J/K $0... \pm 400A = 0... 10V$
Auxiliary supply	$\pm 15V$ DC 200mA
Precision	$< 1\%$
Ambient temp. range	$- 25...+70^{\circ}C$

## Product Information

The redesigned version of the compensation current transformer FL6/D2-3-400A is completely compatible in connection to the original component.

The devices convert (galvanically isolated) direct or alternating current proportionally that is guided through the "eye" of the transformer into impressed current or respectively into voltage.

The devices feature a shunt resistor that is parallel-clamped onto terminals J and K if the current output is to be used as voltage output  $400A = 10V$ .

The precision of measurement is better than 1%.

The current transformer is operated with an auxiliary supply of  $\pm 15V$  DC.

The nominal measuring range of the current transfer is designed to  $\pm 0...400A$  and provides a proportional output current of  $0...100mA$ .

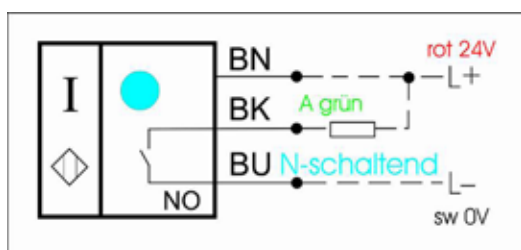
The supplied shunt resistor is to be measured in such a way so that in the presence of a measuring range of  $0...400A$ , a proportional output voltage of  $0...10V$  will drop at the parallel switched shunt resistor.

If the current transformer is to be used within another measurement range, then the shunt resistor must be adapted accordingly.

Samples available ex stock



# Position indicator SO-K7849-71P A540392 RED



Design	round 20mm Length: 45mm; 24mm L32mm; Length: 77mm; Brazen/Alumnium
Sensor surface	4mm Ø
Reacting distance	1mm ± 0,2mm
Switching behavior	N
Supply	nom. 24V DC, 10V ... 30V
Load current	max. 0,06A, R-Load
Ambient temperature	-25°C ...max. +70°C
Frequency	max. 1200Hz

## Technical description

The position indicator K7849-71, A540392 respectively, by manufacturer Siemens are no longer available. Alternatively there is a fully measure- and function-compatible Redesign K7849-71P.

The positioner scans the rim of a metallic lock washer inductively in the given application.

The smallest tooth-gap-distance is 4mm with a depth of 4mm and a maximum tooth-gap-frequency of 1200Hz.

The distance between the active sensor surface and the tooth's target should not exceed 1,0mm.

The output signal "A" with the plug identification "green" is N-shifting, meaning the signal changes when passing the target to 0V (GND), measured against +24V (UB).

The supply voltage is not less than 10V DC max. 30V DC (nom. 24V).

The load current may be 60mA R-load.

The output connectors are designed for AMP-sockets.

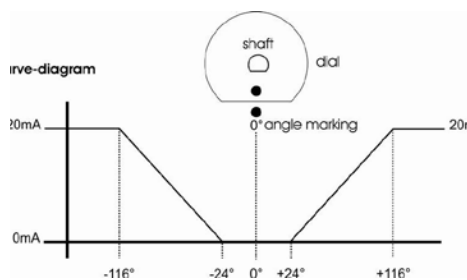
The positioners can be used in a temperature range of -25°C to +70°C.

The mounting adjustment is done with a 20mm clamp connection at the rim of the device.

When the given installation geometry makes an adjustment with a distance of 1,0mm to the target of the lock washer impossible, an according modification has to be made to ensure faultless function.

Switching distance >1mm leads to count loss!

## SO-6KA9251 RED



Power supply	nom. 24VDC (18...33V)
Output	impressed current 0...20mA $\pm 24^\circ \dots \pm 116^\circ$
Linearity	<0,5% in the range of 24...116°
Angle of rotation	unlimited
Control shaft	Ø6mm (different Ø optional) with cam disc
Connection	Screw connector terminal, opt. plug connector
Casing	Ø60mm +0 -0,5mm with collar Ø62mm black-an- odized
Operating temperature	-30...+70 °C

### Product Information

The analog angle of rotation sensor 6KA9251 by manufacturer Siemens can be plug-and-play replaced, by an electrically and mechanically compatible new development.

The angles of rotation function is analog. The linear actual value sensor translates the angularity of the 6mm control shaft into a 10V-output signal (max. 12V) with impressed direct current of 0...20mA (optional 4...20mA).

Load resistor  $\leq 500\Omega$  (max. 600Ω)

The operating range of the standard version is linear with a trapezoidal curve profile of:

20mA = -116° ... -24° = 0mA alternatively +24° = 0mA ... 20mA = +116°

A dial with angle markings is located on the control shaft.

The control shaft's 0-position is marked by the axis flattening of the shaft and the cam disc as well as by a single marking hole at the casings collar.

At 0-position, there's a 0mA output current at an angularity of -24° to +24°.

The angles of rotation are being used as servos and brake units in rail vehicles, to control TRAM and subway as well as for slewing systems and hoists of conveyor systems (cranes, excavator, etc.)

At disposal are optional different curve profiles as well as a life-zero-output with 4...20mA. Optional curve profiles are feasible.

There's no limit by the rotation of the control shaft's angle of rotation.

# SO-6KA9901 RED



Input	2 ranges; +/- 60mV; +/- 150mV (max. 20V)
Input resistance	ca. 10kOhm at 60mV
Output	+/- 10V (5mA)
Isolation voltage	inout // output 1000V
Frequency range	800Hz -3dB
Supply voltage	+18...36V (+/- 24VDC)
Meantime by failure	1.000.000h
Dimensions	85 x 80 x 140mm
Assembly bore holes	65 x 68mm, M4 (M5)

## Product Information

The Isolation Amplifier 6KA9901 RED is a complete mount and function-compatible redesign of the no longer available model from the original equipment manufacturer Siemens.

The device is assembled in a hermetically sealed plastic housing for panel surface mounting with the assembly flange dimensions 85 x 80 mm, in accordance with the mounting hole clearance of 65 x 68 mm (M4).

The terminal assignment corresponds to the original module.

The isolation amplifier provides amplification in two ranges, which can be selected by divergent clamping.

The bridges between KL. 8 and KL. 9 range 60 mV//10V and KL. 6 and KL. 7 range 150 mV//10V, which are required for the original module, are not required in the redesign.

The galvanic isolation with max. 1000 V is situated between the input and the output of the device.

The output is connected to the ground of the supply voltage and supplies +/- 10 V at a maximum load of 5 mA.

The supply voltage amounts to nominal + 18 ...36 V ; however, the device can also be wired with + / - 24 V.

The terminal - 24 V is not internally connected.

The frequency range amounts to 800Hz -3 dB or rather 600Hz -3dB.

\*All product and service marks contained herein are the trademarks or service marks of their respective owners.

## SO-6KA9905 RED



Input	4 ranges; 10V; 225V; 450V; 600V
Input resistance	INenn 0,83mA
Output	+/- 10V (5mA)
Isolation voltage	input // output 1000V
Frequency range	600Hz -3dB
Supply voltage	+18...36V (+/- 24VDC)
Meantime by failure	1.000.000h
Dimensions	85 x 80 x 140mm
Assembly bore holes	65 x 68mm, M4 (M5)

### Product Information

The Isolation Amplifier 6KA9905 RED is a complete mount and function-compatible redesign of the no longer available model from the original equipment manufacturer Siemens.

The device is assembled in a hermetically sealed plastic housing for panel surface mounting with the assembly flange dimensions 85 x 80 mm, in accordance with the mounting hole clearance of 65 x 68 mm (M4).

The terminal assignment corresponds to the original module.

The isolation amplifier provides amplification in two ranges, which can be selected by divergent clamping.

The bridges between KL. 8 and KL. 9 range 60 mV//10V and KL. 6 and KL. 7 range 150 mV//10V, which are required for the original module, are not required in the redesign.

The galvanic isolation with max. 1000 V is situated between the input and the output of the device.

The output is connected to the ground of the supply voltage and supplies +/- 10 V at a maximum load of 5 mA.

The supply voltage amounts to nominal + 18 ...36 V ; however, the device can also be wired with + / - 24 V.

The terminal - 24 V is not internally connected.

The frequency range amounts to 800Hz -3 dB or rather 600Hz -3dB.

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# SO-TA600 RED



Dimension	Case approx.: 70 x 132 x 110mm
bus bar, copper: 60 x 5 x 210mm	
Supply	±24V nom. Range: ±15...36V
Measuring range	nom. 0...600A, max. 0...1200A primary
Turn ratio	primary//secondary 1/5000
Rp primary	<0,01 Ohm
Rs secondary	nom. 40 Ohm
Accuracy	<1% DC...1KHz (DC, AC, Impuls)
Isolation	primary//secondary 12kV
Operating temperature	-25°C ... +60°C

## Product Information

The TA600 current converter is a redesign of the TA600XBFHN1N current converter from ABB and fully dimensionally compatible and functionally compatible.

The device is suitable for measuring DC, AC and pulse currents of up to 1200A.

The nominal measurement range is 600A in the primary electrical circuit.

The measured current is implemented at a ratio of 1/5000 in the secondary circuit and galvanically isolated.

The precision in the nominal range is at <1% in the frequency range from DC to 1kHz.

The test voltage for the galvanic isolation between the primary and secondary circuit is >12 kV.

The secondary connections are placed on M5 screw bolts with colour coding, the primary connections on 60 x 5 mm copper busbars.

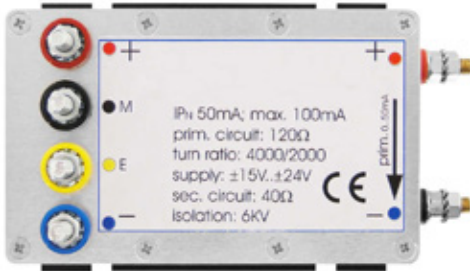
The current flow direction is important in primary connections, as the signal for the secondary circuit will be the inverse of the current directions.

The device comes in a monoblock fully plastic housing, which has internal chamber isolation.

The supply voltage of ±15...36V (nom.24V) is connected to the insulated screw bolts on the front plate (+ = red, - = blue).

The metering signal in the secondary circuit is available on the M 4 screw bolt (sw) depending on the current direction with corresponding polarity countering the GND. The E screw bolts (yellow) connect to the shield of a protected metering line.

## SO-TM050 RED



Dimension	Groundplate: 108 x 83mm; locking: 4xM5; H: 100, B: 130, T: 83mm
Supply	±24V nom. Range: ±15...36V
Measuring range	nom. 0...59mA, max. 0...100mA primary
Turn ratio	primary//secondary 4000/2000
Rp primary	nom. 120 Ohm
Rs secondary	nom. 65 Ohm
Accuracy	<1% DC...1KHz (DC, AC, Impuls)
Isolation	primary//secondary 6kV
Operating temperature	-25°C ... +60°C

### Product Information

The TM050 current converter is a redesign of the TM050BBFHN1N current converter from ABB and is fully dimensionally compatible and functionally compatible.

The device is suitable for measuring DC, AC and pulse currents of up to 0.1A.

The nominal measurement range is 50mA in the primary electrical circuit.

The measured current is implemented at a ratio of 4000/2000 in the secondary circuit and galvanically isolated.

The precision in the nominal range is at <1% in the DC...1KHz frequency range.

The test voltage for the galvanic isolation between the primary and secondary circuit is >6kV rms.

The secondary and primary connections are made on M5 screw bolts with colour coding.

The current flow direction is important in primary connections, as the signal for the secondary circuit will be the inverse of the current directions.

The device comes in a monoblock fully plastic housing, which has internal chamber isolation.

The primary connection bolts pressed in the plastic surface of the housing guarantee the high insulation voltage.

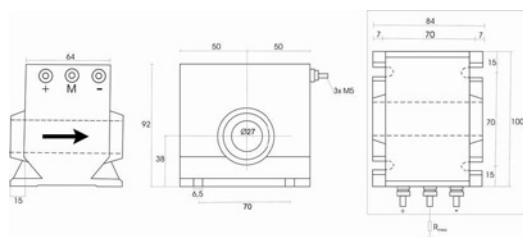
The supply voltage of ±15...36V (nom.24V) is connected to the insulated screw bolts on the front plate (+ = red, - = blue).

The metering signal in the secondary circuit is available on the M screw bolt (sw) depending on the current direction with corresponding polarity countering the GND.

The E screw bolts (yellow) connect to the shield of a protected metering line.



## Current transformer



Supply	±15V DC... ±24V DC
Measuring range	DC, AC, puls peak 0...±500A, up to 0...±1200A
Bushing	Ø27mm, center hole 38mm above mounting plate
Circuit points	3x M5 bolt ±15...24V, M
RM	0...30Ω to ±500A ±15V, 10...17Ω to ±24V ±1200A
Accuracy	XG <± 0,5% (TA 25°C)
Lineary error	<0,1%
Rate of current rise di/dt	>100A/μs
Bandwidth	DC...100kHz - 1db
Ambient temperature	-40...+85°C
Standards	EN50155: 2007; EN50121-3-2:2006
Housing	UL94-VO, polyamide, teca-mid

## Product Information

The current transformer LT500S made by the manufacturer LEM can be completely replaced in terms of dimensions, function and connection through the redesign LT500S RED.

The housing is made of polyamide for railway requirements, conforms to EN50155 and UL94-V0 and fulfills the fire protection class for railway standards.

The current transformer LT500S RED is suitable for the galvanically isolated measurement of DC, AC and pulse currents in the range of 0 ... 500A and up to 0 ...  $\pm$  1200A.

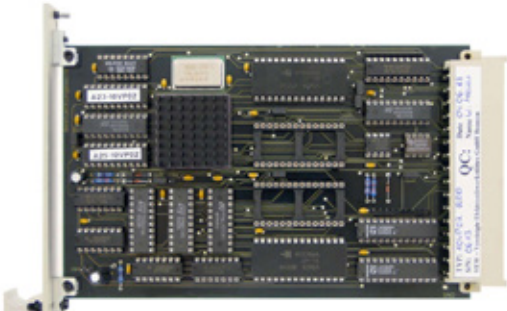
The measuring range depends on the supply voltage and the secondary resistance stood  $R_M$  of the measuring circle.  
 $R_M$  = „measuring resistance“

Supply	RM
±15V measuring range ± 500Amax	0...30Ω
±15V measuring range ± 900Amax	0... 8Ω
±24V measuring range ± 500Amax	10...60Ω
±24V measuring range ±1200Amax	10...17Ω

The transfer ratio KN is 1: 2000.

The primary / secondary insulation voltage is  $> 6\text{kV}$ .

## SO-10VP02 RED



Mounting form	3HE 4TE, connector DIN 41612 G64
Processor	Intel 80186, PGA
RAM	6264 LP10 (L15)
EPROM	2x 27C256 LP15 original
Supply	5V ±0,15V 1,2A
Front panel	Schroff, 4TE, gray-beige, RAL4032

### Product description

The original system components by manufacturer BBC for the car control 10HC15...for city railway cars are to be replaced by a redesign.

The system consists of the following modules:

10VP01; 10LP01; 10VP07; 10VP06; 10KT30; 10KH30; 10VP02;

as well as the peripheral modules with specific 41 pol. connectors by Amp. frontal jacks and LED-indicators.

The processor module 10VP02 with the 80186 processor has been redesigned and is now available as pin- and function-compatible substitute instead of the original module.

After a redesign all further system components can be made available as well on a long-term basis, so total preservation can be reliably ensured for 15 more years.

The software stored on the original modules in EPROM will continue to be used originally by the user.

The redesign of all further system components will be done, without limitations, fully pin- and function-compatible, but certainly the Amp-connectors of the peripheral modules will have to still be used, because there's no pin-compatible substitute by other manufacturers available on the current market.

Alternatively, the layout of the redesign can be adjusted to DIN-connectors merchantable nowadays, but in this case the pods need to be exchanged by the user. Alternative pods of DIN 41612F are available with lockable protective covers and LED indicators.

10VP02 RED is a commissioned development for moBiel, Stadtwerke Bielefeld and in use there.

# SO-10LU11 RED

## IFZ-BUS sender- and receiving unit



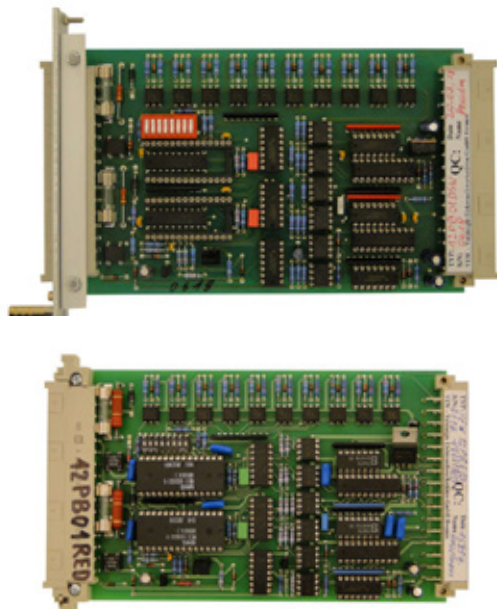
Input voltage	±24V DC front port; 5V DC base pin strip 4 16 12 F
„quasi“ analog inputs	IFZ-Bus maximal ±1,3 ... 2,4 A
Binary inputs	IFZ-Takt for Watchdog 5V Trigger for Watchdog 5V Release for Watchdog 5V 3x external noise 5V selftest 5V
	short circuit feedback 5V
Binary outputs	Signal evaluation 5V negated signal evaluation 5V disorderevaluation 5V Watchdog active 5V IFZ-Takt inverted 5V H01 15mA LED out, -24V, RV on PCB H03 15mA LED out, -12V, RV on PCB H04 15mA LED out, -12V, RV on PCB
IFZ-Bus-outputs	IFZ-Bus ±24V DC „Signal amplification“ ±12V DC

## Product description

The original module 10LU11 by the manufacturer Bombardier can be replaced via „plug and play“ by a fully measure-, pin- and function-compatible Redesign. The module 10LU11 RED is applicable as a sender- and receiving unit for the IFZ-bus in the network of the IC-V-computer system MICAS-C. The sender unit issues a ±24V with clock-controlled alternating polarity at the IFZ-bus output. The short-circuit system will be limited to maximal 2,4A with positive and to -3A with negative IFZ-bus signal. The received IFZ-bus signal is amplified and commutated to the internal current analysis. This issues the signals at the base header with TT-level with a maximal delay of 25ms. An internal short-circuit monitoring deactivates the sender unit after 110ms in case of excessive current spikes on the IFZ-bus. A test receptacle offers the possibility to simulate short circuits to test the function of the short-circuit system monitoring. Alternatively, the integrated watchdog function can be switched on. This issues, via an input on the basis access, clock-controlled, timed intervals of the excess current simulation. The 5V-logic and the ±24V IFZ-bus deactivation are electrically isolated by optocouplers. The circuitry of the original module has been fully revised without changing the functionality. Obsolete components have been replaced by commercially available components of the same function. The mixed instrumentation of the original PCB with SMD and leaded modules has been rearranged to a single-sided instrumentation with leaded modules. The performance drivers of the IFZ-bus have an enlarged cooling surface. Samples available ex stock.

# SO-12PB01 RED

## IFZ bus module



Bus voltage	min. 18V, max. 26V
Quiescent current	10mA
Shutdown at	$I_k > 0,6A$ continuously, $I_k > 2,4A$ ; $t_k$ 30ms
Current swing on response	460mA $< i < 520mA$ at $U_B$ 25V
Operating voltage	$14,4V < U_{S1} < 15,6V$
Power consumption	$I_{S1} < 85mA$
4 versions, optional execution of the application corresponds	

## Product description

The IFZ bus module 12PB01 RED is a plug and play compatible redesign of the original module for the traction control system MICAS.

There are different versions depending on the purpose:

- Vers. 1: 10 outputs, open-collector, inverting.  
pull up 10k $\Omega$   
10 inputs, potential-free 15V; com. GND  
Series resistor 2k2
- Vers. 2: 10 inputs, potential-free 24V; com. GND  
Series resistor 3k3
- Vers. 3: 10 outputs, open-collector, inverting.  
pull up 10k $\Omega$   
10 inputs potential-free, 15V; com. GND  
Series resistor 2k2
- Vers. 4: 10 outputs, open-collector, not inverted.  
15V; com. GND, pull up 2k2  
10 inputs potential-free, 15V; com. GND  
Series resistor 10 $\Omega$

Version: 12PB01 RED Vers. 4 (DSW21)

Metal frontplate with pull handle and screw stud for front connector type F32 series Z + B Basic pin header type F32 series Z + B.

Version: 12PB01 RED Vers. 1 or 3 (HHB)

Plastic screw tabs on the front connector design F32 series Z + B and basic pin header type D32.

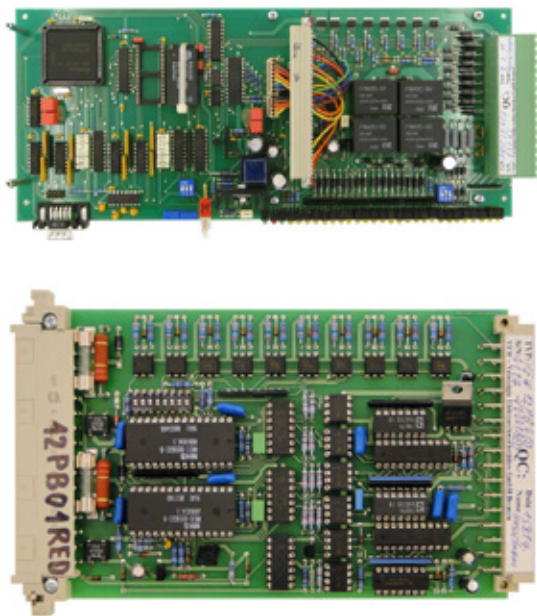
The 12PB01 module is used for the potential-free conversion of 10 binary input and output signals between the peripheral area and the IFZ bus or vice versa. The module has an address setting with an 8-pin DIL switch for setting the IFZ device address and can be controlled according to the set address.

The redesign module is delivered without the serial interface converter of the special application (e.g. ABB 6034.1). The serial / parallel converters are usually available from the user.

The original existing interface converters are used by the user on two 24-pin precision contact sockets.

Samples of the various designs are available from stock. The assemblies can be manufactured according to the respective

# SO-PMC20-24IFZ RED Door control



Power supply	24VDC $\pm$ 30%
Sepr-consumption of the control	150-300mA
Max. motor current	20A, short-circuit-protection
Binary input	16; com 0V; with LE
Input current	10mA at 24VDC
Binary output	8; high-side-FET; with LED-Anzeige
Output load	1,5A; short-circuit-protection
Relays	4; high overload relay 30/40A

## Product description

The door controls PMC20-24IFZ RED are a „plug and play“ compatible redesign of the original modules of manufacturer IFE.

They control the spindle's drive unit of double-leaf swing-/sliding gates of city railcars in dependence to binary signals from the area of the door (limit switch, door position encoder, etc.), the passenger compartment (door button) and the central car control by the IFZ-Bus.

The door controls consist of a processor-controlled logic (with 80C537) to process the control functions, the current-limiting performance electronics with relay output for operating the E-drive as well as 8 binary outputs with short-circuit-proof MOSFETs.

The control logic can basically be programmed as desired, but will usually be operated in the application with the software of the original drive installed in EPROM. All binary conditions of the inputs and outputs are indicated by LEDs. By utilisation of the software specific to the system in a free EPROM socket, control requirements, which exist through different applications, can be implemented.

The modules will be delivered without EPROM and will be equipped with the existing original software by the user. A buffered CMOS-RAM is used for data storage, so a controlled restart after a power failure is ensured.

On the model there is a spring contact strip for fixture of the module 12PB01 of the traction guidance system MICAS.

The modules 12PB01 RED are a plug-and-play compatible redesign of the original module of manufacturer Kiepe. It serves the potential-free conversion of 10 binary input- and output signals each, between the peripheral area and the IFZ-Bus.

The module carries an address setting with an 8-pole DIL-switch and is controllable according to the adjusted address. The Redesign will be delivered without the serial gateway converter ABB 6034.1 (ASIC).

The existing original ASIC-modules have to be inserted and used by the user on two 24-pole precision contact sockets.

# Video-Datastorage for GSP-System SO-DIVIS2-P6/2



Supply	+5V DC, approx 0,3A, via the SCSI system plug
Hard disk	256GB, for high reliability and service life
Formatting	1. Partition primary 133MB FAT16, Name: DOS7
	2. Partition extended/logical, 120GB FAT32, Name: Daten
Option	The formatting can be done according to the target system.

## Product description

The digital video surveillance systems DIVIS2-P6 / 2 from GSP in public transport vehicles use slide-in modules with an integrated IDE controller and a formatted hard disk. Alternatively, a redesign is available for replacement.

A dimensionally compatible plastic cassette contains a formatted hard disk, a special IDE controller as well as an optimized circuit board with R-C termination of the flat cable. The interface to the system is with a 36 pin SCSI connector designed pin-compatible. The cassette can be locked in the slot. It is pulled out using a flexible pull loop.

The Video data storage is plug and play in the target system play compatible and very reliable.

Available from stock



# BOLTwatch

## Monitoring system for highly stressed screw connections



### Product description

BOLTwatch® is the reliable monitoring system for highly stressed screw connections and an inexpensive alternative instead of measuring the preload force and monitoring a joint connection.

BOLTwatch consists of a robust sensor that is placed on the head a screw connection and fixed with M6 grub screws.

The head of the screw connection is positively received in the BOLTwatch sensor.

The underside of the sensor faces the screw-on surface and contacts the screw-on surface with two spring-loaded probe tips and an inductive sensor.

The probe tips operate 2 redundant microswitches, so that three devices that work independently of one another reliably monitor the joint.

If the screw connection tears off the shaft or the head is torn off, the air gap between the sensor and the screw-on surface increases, because a disc spring placed under the screw

Sensor housing	Plastic, depending on the wrench size. At M24 Ø 80mm
Connector	Amphenol Superseal 2pol.
Max. cable length	50m, 2pol. 0,5...0,75Ø
Control unit	2 channels, opt. 4 channels, DIN rail mounting, width 50mm
Supply	nom. 24V DC, range 18...36V
Measuring circuits/ supply	Galvanically separated, relay contact 1pol. opener
LED indicators	green: UB OK; red: Line break short circuit, sensor triggered;
Optinal other versions, depending on the installation conditions and wrench size	

head opens the air gap with great force.

The probe tips lift off the screw-on surface and the inductive sensor responds. The function of the monitoring devices is ored and signaling is independent of one another.

The sensor on the screw head is connected to the BOLTwatch control unit via a separable, waterproof plug connection and a 2-pin cable.

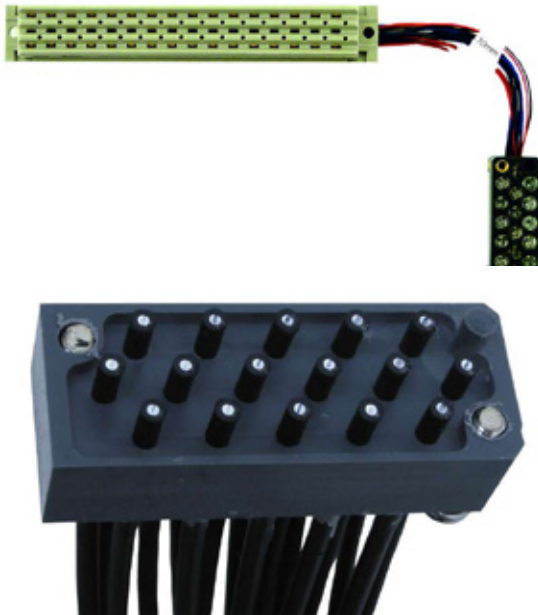
The control unit is designed for 2 or 4 sensor connections.

The sensor is supplied with an impressed current from the control unit, which is monitored for line breaks and short circuits.

Both these malfunctions and the response of the sensors to the open joint lead to selective signaling on the control unit, as well as to the dropout of a signal relay, sothat a normally open contact opens.

The working contacts of various control devices can be connected in series in a current loop so that the response of a sensor leads to a central message in a higher-level system.

## Coupler LWL SO-1000 R-T-8 (MPF) RED



Electronic-optical coupler, DIN 41612 F32 low profile to 8 IR-transmitter and 8 IR-receiver	Standard: without cover, adapter, 1000 MPF
8 transmitter	micro lens for 2,2mm aperture to standard 1000 MPF
Transferrate	10MBd at 650nm
8 receiver	open collector, 2,2mm aperture to standard 1000 MPF
Transferrate	5Mbit/s at 650nm
Wiring	Standard 17x AWG26-70mm, optional other length

### Product Information

For electrically decoupled and interference-free transmission of control signals between drive control units and power units of light rail vehicles, optical fibres and couplers from 8 transmitters and 8 IR-receivers are being used. The original modules 463 124.9380 by manufacturer Siemens had been joined by a susceptible flex printed circuit. The redesign of the couplers is made of a low profile DIN 41612 female multi point connector with special mounting on row z and d as well as the construction form F, 2 multilayer circuit boards, which are robustly connected with each other by 70mm AWG26 single wires. Other connection lengths can be manufactured optionally.

Both multilayers carry the DIN 41612 female multipoint connector and also the optic coupler, with the arrangement of 8 receivers and 8 transmitters for standard 1000 micron plastic fibre (MPF). The optical modules are combined in a grey plastic carrier as an „optical coupler“, on which an adapter for the connection with 16 optical fibres can be screwed on.

The optical fibres lock in adapter B by a snap-in-connection and this way can be separated in the given arrangement from coupler A „in one piece“.

Alternatively, customer-specific assembled adapters with each 8 firmly moulded MPF by different colours for „receiver-“ and „transmitter-“ lines can be delivered. Length of MPF according to specifications. Individual wire designation. The couplers can be mounted into an Intermas connector housing for the construction type DIN 41612 F upon request so the female multi point connector can provide electric contacting on the one hand and the adapter with the 16 optical fibres on the coupler can maintain and secure the coupling of the IR-signals on the other hand.

The 16 optical fibres are led out the connector housing strain-relieved with an according cable support sleeve.

# Door relay board

## SO-G340B-E44010-A8138-S22 RED



### Product Information

The original assemblies of the door relay panel G340B-E44010-A8138-S22 for Siemens-Duewag railways are no longer manufactured by the original manufacturer. A completely pin- and function-compatible redesign of the assembly is available, which can be exchanged for the original assembly plug-and-play.

All switching, locking and memory functions have been redeveloped with modern, highly reliable comb relays, which are mounted on locked sockets.

The interface was implemented with the original Siemens 33-pin connector RP300 on the transom.

Delivery with individual test report.

Additional delivery guarantee: 10 years



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