



## **Film Capacitors – Power Factor Correction**

VIP-3-TP: Intelligent coupling of three compensation systems  
Application and Manual

**Series/Type:** B44066  
**Ordering code:** B44066R1703E230  
**Date:** March 2016

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**Preliminary data**
**Application: Intelligent coupling of 3 compensation systems**

In practice, several compensation systems are often operated at different feed-ins. This inevitably causes the parallel operation of several compensation systems due to the temporary or permanent coupling of the transformers.

The consequence is a mutual interference of the systems, resulting in increased switching operations (thus shorter service life of the system). In the worst case there is a permanent mutual switching – they are commuting. Even by an accurate adjustment of the particular PF-controllers (e.g. exact tuning of sensitivity and switching times) the mutual interference cannot be completely avoided. The more systems work in parallel, the more difficult it becomes to control these undesired conditions.

For this reason a comfortable control device has been developed which enables to operate compensation systems in parallel for three coupled feeding transformers without any retroactivity. With this solution the a.m. problems can be avoided.

Another big advantage is the symmetrization, e.g. when the coupling switches are closed, the necessary capacitor steps of the systems are symmetrically “distributed”. This symmetrical distribution is needed to relief the feeding bus bars as the single loads distribute optimally to the different branches.

**The solution: VIP-3-TP**

The control device „VIP-3-TP“ realizes the described solution in cooperation with the PF-controllers BR7000-I/S485 and at the same time offers a comfortable visualization of the measuring values, switching states and of the actual system state.

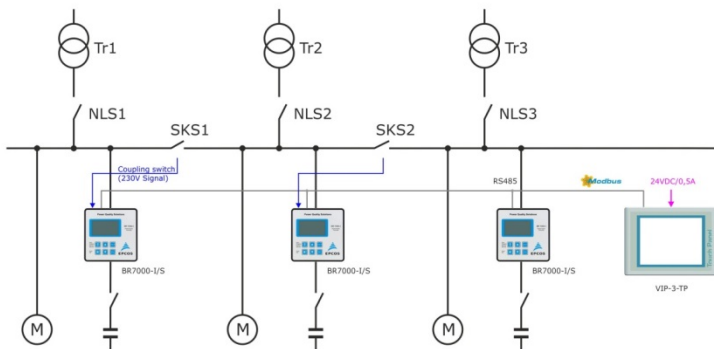
To achieve this, the device is connected to the PF-controllers via the serial interface (MODBUS).

The required information about the status of the coupling switches are read in via the particular digital input of the related BR7000-I/S. The status of the trafo-power switch is realized automatically via the current measuring. All switching combinations of power and coupling switches are possible. All existing compensation systems are included in the controlling, e.g. also the systems where the power switch of the feed-in is open, whilst they are connected to the system via coupling switches.

All possibilities of the coupling of 3 systems are supported:

- Coupling between the systems with 2 coupling switches
- Ring coupling of systems (3 coupling switches)
- Coupling via separate coupling bus bars (3 coupling switches)

**Picture 1** shows the principle picture of the coupling of 3 systems via 2 coupling switches. If for example all switches apart from SKS1 are closed, the 1. Compensation system will work completely independently whilst the other two systems will operate in parallel and symmetrically.



**Preliminary data**
**Realization and settings**

For the realization 3 PF-controllers BR7000-I/S485 and a control device VIP-3-TP are required.

**Settings BR7000-I/S**

Menu Interface:	3 External input:	NO [0]	(Factory setting)
	10 protocol:	Modbus RTU	(Factory setting)
	11 Baud rate:	9600/None	(Factory setting)
	12 Address	1...3	Adjustment according the aligned power switch is worthwhile.

**Settings VIP-3-TP**

Settings: Selection of coupling mode

- Series coupling
- Ring coupling
- Parallel coupling

**Picture 2:** Setting menu VIP-3-TP

System, bus addresses and names

Address	System	Transformer	Feed	Coupling-Switch
1	System 1	T1	NLS1	SKS1
2	System 2	T2	NLS2	SKS2
3	System 3	T3	NLS3	SKS3

Baud rate: 9600 Language

Coupling modes

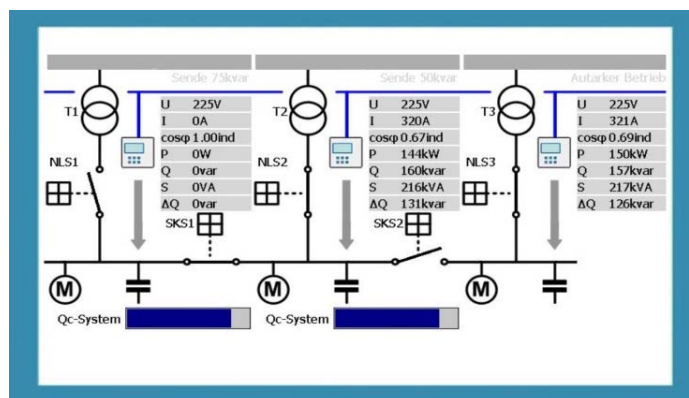
Series coupling

Loop coupling

Parallel coupling

**Picture 3:** Status display VIP-3-TP (main menu)

- Display of coupling stage of systems (position of switch)
- Display of actual measuring values of the controllers
- Error messages
- Display of switched (effective) system power as bar graph



**Preliminary data**
**Technical data**

Dimensions (w x h x d):	
Front:	212 x 156 x 6 mm
Rear:	196 x 140 x 51 mm
Cut out for panel	198 x 142 mm
For front panel size	2.5 ... 6 mm
Weight	1.2 kg
Display:	
Size of display	7 "
Resolution	800 x 480 pixel
Operating voltage	24 V DC
Power consumption (rated value)	0.4 A
Degree of protection:	
Front:	IP65
Rear:	IP20
Operating temperature	0 ... + 50 °C
Storage temperature	-20 ... + 60 °C
Interfaces	LAN; USB; COM2: RS232/ RS422/ RS485 (25pol. Sub-D)
Accessories incl. in the delivery	Panel (software pre-installed), mounting clips, RJ45-Adapter

**Preliminary data**
**Operating manual**
**1. General**

With the application „VIP-3-TP“ up to 3 compensation systems with 3 coupleable feed-ins can be controlled without mutual retroactivity.

For the realization 3 PF-controller BR7000-I/S485 plus a control system VIP-3-TP are required. The bus connection of the devices amongst each other (MODBUS) is done via usual patch cables.

**2. Connection**
**2.1 Power supply**

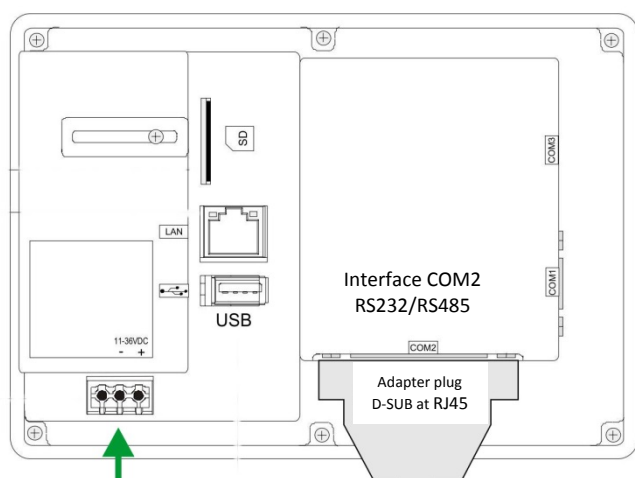
For the operation of the touch panel a power source 24 V/0.5 A is required.

**2.2 Interface – COM2**

COM2 is used for the connection to the PF-controllers. An adapter plug 25 pol. Sub-D on RJ45 is included in the delivery.

Via usual patch cables a faultless communication with the PF-controllers BR7000-I/S485 can be set up very easily.

The controllers also feature a RJ45-socket. Optional RJ45 adapters are available for looping through which provide 2 x RJ45 (Type: CV-2xRJ45-BR6000).

**Back view and terminal assignment for application “Coupling of three compensation systems”**


Operating voltage  
11 – 36 V DC

Patch cable (RJ45)  
(MODBUS)  
→ to controllers  
BR7000-I

### Preliminary data

#### 2.3 USB (Update Function)

The software of the panel can easily be updated to the actual status. For this purpose the new software must be loaded on an USB-stick. The stick is connected at the rear side of the panels which releases the USB-update-function. More information can be found in the instructions for update.

#### 2.4 LAN

The panel offers the possibility to be operated via a VNC-connection by a PC in the network. For this purpose a LAN-cable has to be connected and an IP-address must be assigned. More information can be required by the network-administrator.

### 3. Configuration of the connected PF-controller

Menu interface:	3 External input:	NO [0]	(Factory setting)
	10 Protocol:	Modbus RTU	(Factory setting)
	11 Baud rate:	9600/none	(Factory setting)
	12 Address:	1...3	

Assignment according to the assigned power switches is recommended.

### 4. Operation

The application „Coupling TP“ can be found in the Auto start and as a link on the desktop of the touch panel. After applying the supply voltage the program will start automatically. Connection to the device will be built up and controlling begins.

#### 4.1 Configuration

System, bus addresses and names

Address	System	Transformer	Feed	Coupling-Switch
1	System 1	T1	NLS1	SKS1
2	System 2	T2	NLS2	SKS2
3	System 3	T3	NLS3	SKS3

Baud rate: 9600      Language

Coupling modes

Series coupling

Loop coupling

Parallel coupling

In the table the name of system, measuring point, switch and trafo and the Modbus address of the assigned devices can be edited. Click on the particular column. For the configuration it is recommended to use

- an external USB-keyboard
- or
- access via an external PC via VNC

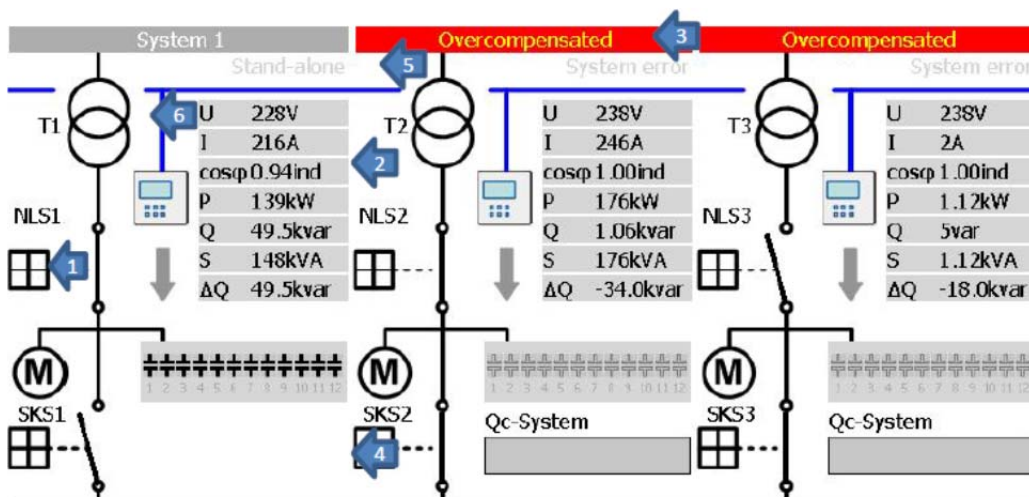
**Preliminary data**

Additionally, the baud rate for the Modbus communication can be adjusted in the menu. Following possibilities are available:

- 9600 Baud (factory setting, for long and sensitive transmission paths)
- 19200 Baud
- 38400 Baud

In the menu „Settings“, the kind of coupling can be selected. Possible are:

- Parallel coupling
- Ring coupling
- Series coupling

**4.2 System overview**


- Positions of switch
- Grid parameters 1
- Name of system / error messages
- Load of system (display of connected active system power as bar graph), only at coupled system
- Information about controlling
- Status of interface (query: light blue; error: red)

**Preliminary data**
**4.3 Devices overview**

The status of the bus and the name of the device are displayed. When touching the icon of the particular device, the actual grid parameters are displayed.

Compensation 1	Compensation 2											
Compensation 3	<table border="1"> <tr> <td>Reactive Power 162 kvar</td> <td>Active power 145 kW</td> <td>Apparent power 217 kVA</td> <td>Cos-φ 0.67 ind</td> </tr> <tr> <td>Current 321 A</td> <td>Voltage 225 V</td> <td>Frequency 50 Hz</td> <td>Temperature 27 °C</td> </tr> </table>				Reactive Power 162 kvar	Active power 145 kW	Apparent power 217 kVA	Cos-φ 0.67 ind	Current 321 A	Voltage 225 V	Frequency 50 Hz	Temperature 27 °C
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Current 321 A	Voltage 225 V	Frequency 50 Hz	Temperature 27 °C									



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