Power Factor Control Relays

Type EMR 1100 / EMR 1100S / RM 9606 / RM 9806

Features that matter:

- Fully automatic and simple commissioning
- Patented control characteristic – no overcompensation during low load
- Measurement and monitoring of harmonics
- Overcurrent trip function – protection for capacitors
- No-voltage and zero-current release
- Four-quadrant regulation
- Automatic adjustable switching delay
- Versatile indication and messages in the display

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Power Factor Control Relays

Type EMR 1100S / EMR 1100

Description

Microprocessor-based control relay for intelligent control of capacitor banks with 12 control contacts.

Simple Commissioning

By automatic identification of threshold current (c/k value), phase angle, connected capacitor stages and switching sequences.

Operator Overview

Through clear digital display of key momentary values and operating parameters.

- Power factor (cos φ)
- Apparent (RMS), active and reactive currents
- 5th, 7th, 11th and 13th harmonic voltage content
- Total capacitive power required to meet target power factor setting

Monitoring of Harmonic Levels

By continuous monitoring and display of harmonic voltage levels. In the event of harmonic levels exceeding programmable limits, all capacitors will be switched off through overcurrent alarm.

Prolongs Switchgear Life

The EMR 1100 counts, stores and displays the number of switching operations for each individual capacitor stage. An alarm is triggered if the switching counters exceed programmable limits.

Additional Protection for Capacitors

The RMS current monitoring function provides excellent protection for capacitor banks without harmonic filters, especially when resonance causes an increase in harmonic levels.

Intelligent Control for Increased Equipment Life

- Cyclic switching for capacitor stages of the same rating.
- Accurate switching of capacitor stages prevents unnecessary switchings for responsive control.
- Continuous optimisation of switching delay according to required reactive current.

Features

- Potential-free alarm contact.
- Programmable overcurrent alarm threshold limit (from 1.05 to 3.0 x I_{rms}).
- Continuous monitoring for defective capacitor stages through self adjustment of control program.
- Zero voltage and zero current tripping with alarm signal.
- "Kinked" control curve characteristics avoid overcompensation under light load.
- Four-quadrant power control with LED display when active power is generated into mains.
- Manual/automatic operation with ability to switch each individual capacitor stage ON or OFF.
- Target power factor setting adjustable from 0.80 inductive to 0.95 capacitive in steps of 0.01.
- Preset up to three fixed capacitor stages which will be excluded from normal automatic operation.
- Independent setting of capacitor switching time to match discharge time of capacitor stages.
- Suitable for current transformers with rated secondary current of 1 A or 5 A.

Alarm Signals for

- Undercompensation
- High harmonic levels
- Overcurrent
- Switching counters
- Fault in voltage circuit (U = 0 alarm)
- Fault in current circuit (I = 0 alarm)
- Fault in capacitor stages (C = 0 alarm)

Optional extension of the EMR 1100S to EMR 1100 full version by means of software updating enables

- Potential-free tariff switching contact to select two independent target power factor settings
- Remote indication of the measuring values and historical data (daily curves, monthly and annual evaluation)
- Communication with Building control systems
- Configuration and remote indication of the measuring values via the RS232 interface [1)]

Power Factor Control Relays

Type RM 9606

Description

Microprocessor-based control relay for intelligent control of capacitor banks with 6 control contacts.

Simple Commissioning

By automatic identification of threshold current (c/k value), phase angle, connected capacitor stages and switching sequences.

Operator Overview

Through clear digital display of key momentary values and operating parameters.

- Power factor (cos φ)
- Apparent (RMS), active and reactive currents
- 5th, 7th, 11th and 13th harmonic voltage content
- Total capacitive power required to meet target power factor setting

Monitoring of Harmonic Levels

By continuous monitoring and display of harmonic voltage levels. In the event of harmonic levels exceeding programmable limits, all capacitors will be switched off through overcurrent alarm.

Prolongs Switchgear Life

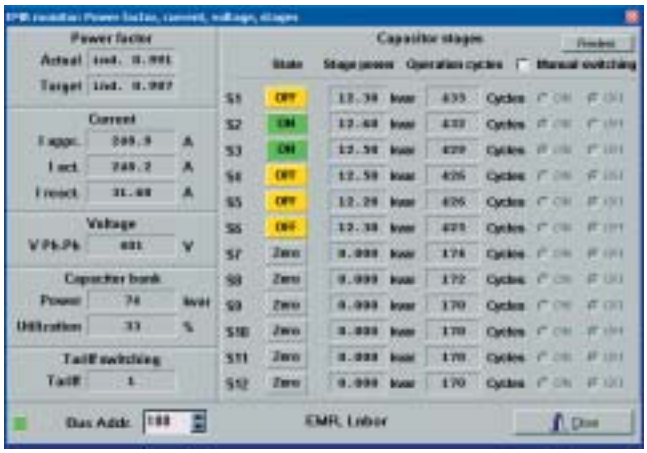
The RM 9606 counts, stores and displays the number of switching operations for each individual capacitor stage. An alarm is triggered if the switching counters exceed programmable limits.

Additional Protection for Capacitors

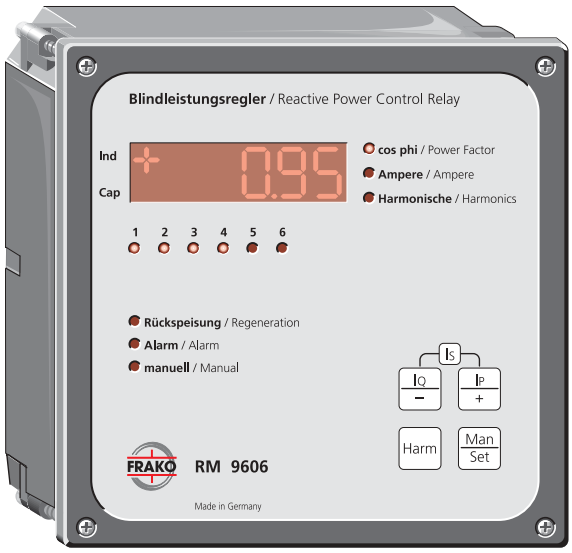
The RMS current monitoring function provides excellent protection for capacitor banks without harmonic filters, especially when resonance causes an increase in harmonic levels.

Intelligent Control for Increased Equipment Life

- Cyclic switching for capacitor stages of the same rating.
- Accurate switching of capacitor stages prevents unnecessary switchings for responsive control.
- Continuous optimisation of switching delay according to required reactive current.



Configuration and remote indication of the measuring values via RS232 interface
1) Software EMR-SW optional for EMR 1100



Features

- Potential-free alarm contact.
- Programmable overcurrent alarm threshold limit (from 1.05 to 3.0 x I_{rms}).
- Continuous monitoring for defective capacitor stages through self adjustment of control program.
- Zero voltage and zero current tripping with alarm signal.
- "Kinked" control curve characteristics avoid overcompensation under light load.
- Four-quadrant power control with LED display when active power is generated into mains.
- Manual/automatic operation with ability to switch each individual capacitor stage ON or OFF.
- Target power factor setting adjustable from 0.80 inductive to 0.95 capacitive in steps of 0.01.
- Preset up to three fixed capacitor stages which will be excluded from normal automatic operation.
- Independent setting of capacitor switching time to match discharge time of capacitor stages.
- Suitable for current transformers with rated secondary current of 1 A or 5 A.

Alarm Signals for

- Undercompensation
- High harmonic levels
- Overcurrent
- Switching counters
- Fault in voltage circuit (U = 0 alarm)
- Fault in current circuit (I = 0 alarm)
- Fault in capacitor stages (C = 0 alarm)

Power Factor Control Relays

Type RM 9806

Description

Microprocessor-based control relay for intelligent control of capacitor banks with 6 control contacts.

Simple Commissioning

By automatic identification of threshold current (c/k value), phase angle, connected capacitor stages and switching sequences.

Operator Overview

Through clear digital display of key momentary values and operating parameters.

- Power factor (cos φ)
- Total voltage distortion factor (% THVD)
- Number of active capacitor steps

Extensive Analysis Record

When in automatic mode, display of:

- Connection faults
- Capacity step faults
- Recognized step sequence

Protection for Capacitors

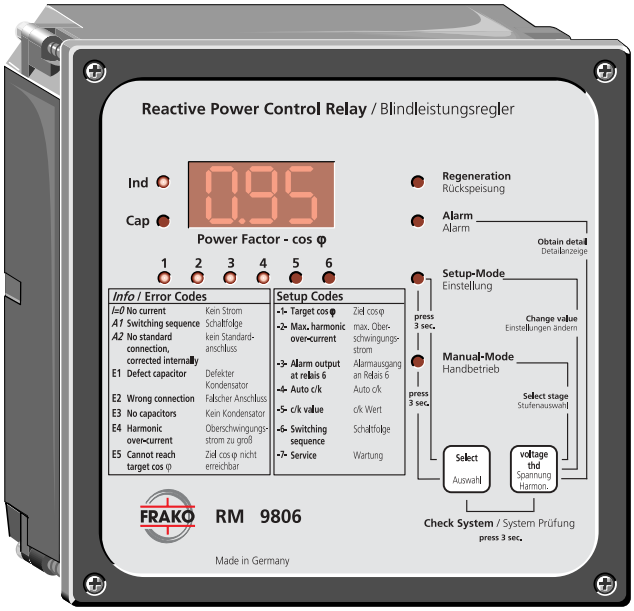
The optional RMS current monitoring function provides excellent protection for capacitor banks without harmonic filters, especially when resonance causes an increase in harmonic levels. The threshold can be set between 1.05 to 1.95 x I_{rms}.

Intelligent Control for Increased Equipment Life

- Cyclic switching for capacitor stages of the same rating.
- Accurate switching of capacitor stages prevents unnecessary switchings for responsive control.
- Continuous optimisation of switching delay according to required reactive current.

Features

- Potential-free alarm contact.
- Programmable overcurrent alarm threshold limit (from 1.05 to 1.95 x I_{rms}).
- Continuous monitoring for defective capacitor stages through self adjustment of control program.
- Zero voltage and zero current tripping with alarm signal.



- Two control curves characteristics:
  - to avoid overcompensation under light load.
  - to avoid inductive reactive power under regeneration conditions
- Four-quadrant power control with LED display when active power is generated into mains.
- Manual/automatic operation with ability to switch each individual capacitor stage ON or OFF.
- Target power factor setting adjustable from 0.80 inductive to 1.00 capacitive.
- Independent setting of capacitor switching time to match discharge time of capacitor stages.
- Suitable for current transformers with rated secondary current of 1 A or 5 A.

Alarm Signals for

- Overcurrent
- Fault in voltage circuit (U = 0 alarm)
- Fault in capacitor stages

FRAKO 95-00145/08/03/7290 Subject to technical alteration