



Power Factor Control Relays

// Beneficial features

The connected Reactive Power Control System and the net to be compensated is automatically detected by the intelligent FRAKO Power Factor Control Relays. Thereby incorrect programming is automatically avoided.

Incorrect connections or inaccurate positioning of the transformers will be identified and indicated.

Time- and cost-consuming error diagnostics can be avoided by this.

The selected set $\cos \phi$ is regulated by the patented control characteristics as a minimum value at normal load and also avoids an over-compensation at peak-off load. Thereby reactive power costs can certainly be avoided and the risk of main disruptions can be reduced.

The intelligent operation method ensures that the target value will be regulated and hold with a minimum of possible switchings. This minimizes the wear of the Power Factor Correction System and reduces retroactive effects at the net.

Depending on the version the Power Factor Control Relays protect the Power Factor Correction System from a too high harmonic content by switching of the system.

Additionally our clients appreciate the user-friendly operation of our Power Factor Control Relays.

// Application recommendation

Consumer net with regulation on inductive set $\cos \phi$	RM 2106 / RM 2112 / RM 9606 / EMR 1100S
Quadrant: Import – inductive	EMR 1100
Consumer- and electricity producer net with regulation in all 4 quadrants	RM 9606 / EMR 1100S / EMR 1100
Measurement value logging of voltage and current (medium voltage)	EMR 1100S / EMR 1100
Choked Power Factor Correction Systems with detuning factors <7% or networks with sporadically higher harmonic voltages according to EN 61000 class 2	EMR 1100S / EMR 1100
Dynamic Reactive Power Control Systems	RM 2012 12D
Teildynamische Reactive Power Control Systems	RM 2012 6+6D

/ Features / Technical Data

Category	Basic		Standard		Premium	Dynamic	
Type	RM 2106	RM 2112	RM 9606	EMR 1100S	EMR 1100	RM 2012 6+6D	RM 2012 12D
Article-No. (german)	38-00320	38-00340	38-00100	38-00300	20-50006	39-29050	39-29051
Article-No. (english)	38-00320	38-00340	38-00103	38-00301	20-50008	39-29050	39-29051
Voltage measurement	L-N	L-N	L-N / L-L	L-N / L-L	L-N / L-L	L-L	L-L
Operating / Measurement voltage [V]	220 - 240	220 - 240	220 - 400	-	-	400	400
Operating voltage [V]	-	-	-	220 - 240	220 - 240	-	-
Measurement voltage [V]	-	-	-	100 - 690	100 - 690	-	-
Power frequency [Hz]	50 / 60	50 / 60	50 / 60	50 / 60	50 / 60	50 / 60	50 / 60
Current measurement	single phase	single phase	single phase	single phase	single phase	single phase	single phase
Operating current min. [mA] man. programming	20	20	20	20	20	10	10
Operating current min. [mA] automatic detection	20	20	20	20	20	50	50
Current transformer X/...A	1 -5	1 -5	1 -5	1 -5	1 -5	1 -5	1 -5
Contact termination	man/auto	man/auto	man/auto	man/auto	man/auto	man/auto	man/auto
Soll-cos phi	0,85 ind. - 1	0,85 ind. - 1	0,80 ind. - 0,90 cap.	0,80 ind. - 0,90 cap.	0,80 ind. - 0,90 cap.	0,80 ind. - 0,80 cap.	0,80 ind. - 0,80 cap.
Control characteristic - settings	fixed	fixed	variable	variable	variable	fixed	fixed
Control characteristic - number	1	1	1	1	2	2	2
Switching sequence	man/auto	man/auto	man/auto	man/auto	man/auto	man/auto	man/auto
Number of aktive switching outputs	man/auto	man/auto	man/auto	man/auto	man/auto	man/auto	man/auto
Programmable fixed stages	0	0	3	3	3	3	3
Relais-switch contacts	6	12	6	12	12	6	0
Power rating - Relay-switch contacts	230 V / 950 VA	230 V / 950 VA	250 V / 1800 VA	250 V / 1800 VA	250 V / 1800 VA	250 V / 1000 VA	-

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Switching delay - Relay-switch contacts	fixed 60 sec.	fixed 60 sec.	adjustable 5 - 500 sec.	adjustable 5 - 500 sec.	adjustable 5 - 500 sec.	adjustable 0 - 1200 sec.	-
Real switching delay - Relay-switch contacts	optimized depending on the load alternation	optimized depending on the load alternation	optimized depending on the load alternation	optimized depending on the load alternation	optimized depending on the load alternation	fixed corresponding to the settings	-
Power-off duration (Discharge time) Relay-switch contacts	fixed 60 sec.	fixed 60 sec.	adjustable 5 - 900 sec.	adjustable 5 - 900 sec.	adjustable 5 - 900 sec.	adjustable 0 - 1200 sec.	-
Transistor-switch contacts	0	0	0	0	0	6	12
Power rating - Transistor-switch contacts	-	-	-	-	-	5 - 30 VDC / 50 mA	5 - 30 VDC / 50 mA
Switching frequency [Hz] Transistor-switch contacts	-	-	-	-	-	0,1/0,2/0,5/1/10/50	0,1/0,2/0,5/1/10/50
Alarm- switch contacts	1 Relay switch contact selectable	1 Relay switch contact selectable	1 break contact potential-free	1 break contact potential-free	1 break contact potential-free	1 break contact potential-free	1 break contact potential-free
Power rating - Alarm-switch contacts	230 V / 950 VA	230 V / 950 VA	250 V / 3 A	250 V / 3 A	250 V / 3 A	250 V / 1000 VA	250 V / 1000 VA
Inputs	0	0	0	0	1 for switching the control characteristics	1 for switching the set cos phi	1 for switching the set cos phi
Interfaces	-	-	-	-	FRAKO bus (RS232 optional)	optional Profibus Modbus	optional Profibus Modbus
Dimensions W*H*D [mm]	144*144*40	144*144*40	144*144*40	144*144*105	144*144*105	144*144*53	144*144*53
Switch panel aperture [mm]	138*138	138*138	138*138	138*138	138*138	136*136	136*136
Ingress protection front side	IP54	IP54	IP50	IP50	IP50	IP65	IP65
Ingress protection back side	IP20	IP20	IP20	IP20	IP20	IP20	IP20
Net weight [kg]	0,8	0,8	0,9	1,2	1,2	1,0	1,0

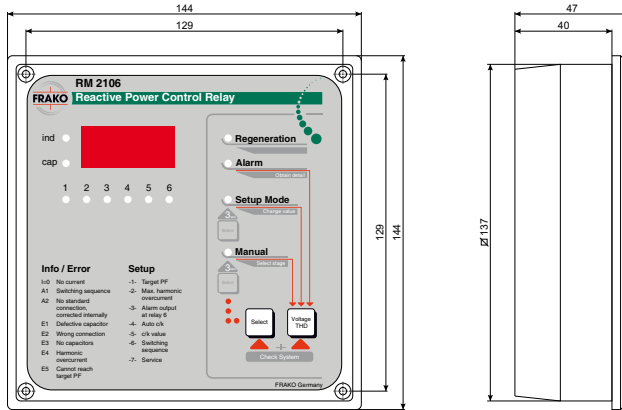
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Type	RM 2106	RM 2112	RM 9606	EMR 1100S	EMR 1100	RM 2012 6+6D	RM 2012 12D
Ist cos phi	Instantaneous value	Instantaneous value	Instantaneous value	Instantaneous value	Instantaneous value	Instantaneous and average value	Instantaneous and average value
Set cos phi	•	•	•	•	•	•	•
Active current [A]	•	•	•	•	•	•	•
Reactive current [A]	•	•	•	•	•	•	•
Apparent current [A]	Instantaneous value	Instantaneous value	Instantaneous value	Instantaneous value	Instantaneous value	Instantaneous and peak value	Instantaneous and peak value
Capacitor current	-	-	Overcurrent	Overcurrent	Overcurrent	•	•
Active power [kW]	-	-	-	-	-	Instantaneous and peak value	Instantaneous and peak value
Reactive power [kvar]	-	-	-	-	-	Instantaneous and peak value	Instantaneous and peak value
Apparent power [kVA]	-	-	-	-	-	•	•
Missing capacitor power (kvar)	-	-	•	•	•	•	•
Capacitor rating per step	Quality rating	Quality rating	-	-	-	•	•
Connected capacitor steps	•	•	•	•	•	•	•
Power frequency [Hz]	-	-	-	-	-	Instantaneous, peak and minimum value	Instantaneous, peak and minimum value
Supply voltage [V]	-	-	-	-	-	L2-L3 Instantaneous, peak value	L2-L3 Instantaneous, peak value
Harmonic voltage [%]	THDu	THDu	5., 7., 11., 13.	5., 7., 11., 13.	5., 7., 11., 13.	3., 5., 7., 9., 11., 13., 15., 17., 19.	3., 5., 7., 9., 11., 13., 15., 17., 19.
Harmonic current [%]	-	-	-	-	-	•	•
Temperature [°C]	-	-	-	-	-	•	•
Operating hours per stage [h]	-	-	-	-	-	•	•
Switching operations per stage [Stk.]	-	-	•	•	•	-	-
Missing capacity	Alarm - can be deactivated	Alarm - can be deactivated	Alarm - can be deactivated	Alarm - can be deactivated	Alarm - can be deactivated	Alarm - can be deactivated	Alarm - can be deactivated
Damaged capacitor steps	Alarm	Alarm	-	-	-	-	-

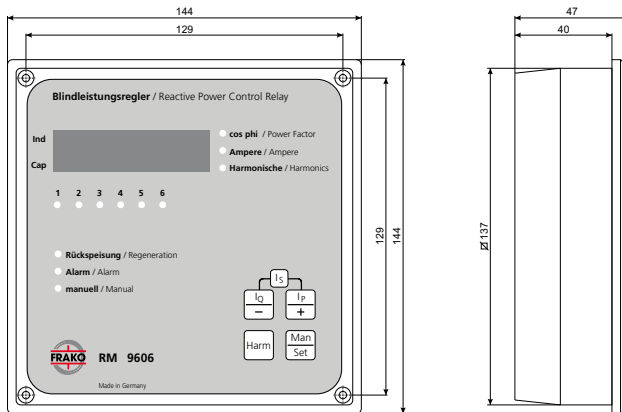
Category	Basic		Standard		Premium	Dynamic	
Type	RM 2106	RM 2112	RM 9606	EMR 1100S	EMR 1100	RM 2012 6+6D	RM 2012 12D
Switching operations limit value	Alarm	Alarm	Alarm	Alarm	Alarm	-	-
Low voltage	Alarm switch-off	Alarm switch-off	Alarm switch-off	Alarm switch-off	Alarm switch-off	Alarm switch-off - can be deactivated	Alarm switch-off - can be deactivated
Over-voltage	-	-	-	-	-	Alarm switch-off - can be deactivated	Alarm switch-off - can be deactivated
Over-current	Alarm switch-off	Alarm switch-off	Alarm switch-off	Alarm switch-off	Message switch-off - can be deactivated	Alarm - can be deactivated	Alarm - can be deactivated
Minimum current	Message switch-off	Message switch-off	Message switch-off	Message switch-off	Message switch-off	Message switch-off - can be deactivated	Message switch-off - can be deactivated
Harmonische Spannungsgrenzwerte	Alarm	Alarm	Alarm	Alarm	Alarm switch-off	Alarm - can be deactivated	Alarm - can be deactivated
Over temperature	-	-	-	-	-	Alarm - can be deactivated	Alarm - can be deactivated

Dimensions

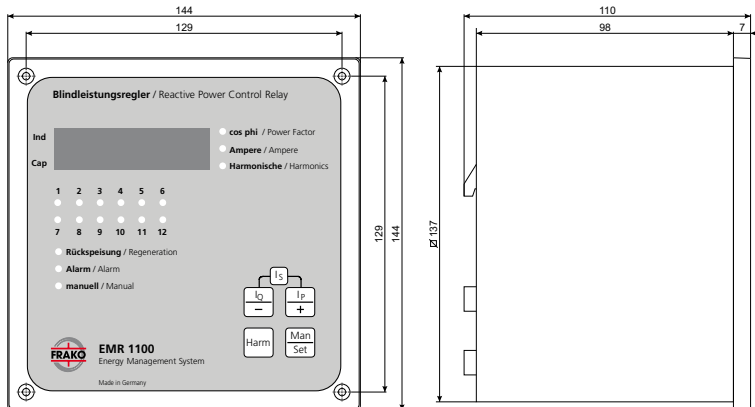
Dimensions of RM 2106 (RM 2112)



Dimensions of RM 9606



Dimensions of EMR 1100



Dimensions of RM 22012 6+6D/12D

