

Automatic Power Factor Controllers/Relays and Accessories for Power Factor Correction



KMB systems, s.r.o

Measuring, monitoring and evaluation of power quality
Tools and accessories for power factor control

2011 Product Range Overview

Presentation Contents



- 1 Introduction to NOVAR line PFC
- 2 Instrument Types, Accessories and Options
- 3 ENVIS Software

NOVAR: Device Types and Features

model	outputs R = relay, T=transistor	sensitivity [mA]	meas. voltage separated from supply voltage	2 nd tariff input	supply voltage up to 500 V	relay common pole separated	temp. meas. & fan control	fast compensation	optional remote communication	panel size 144x144 mm	panel size 96x96 mm
1005	5+1 R	20					✓				✓
1007	7+1 R	20					✓				✓
1106	6 R	2					✓		✓	✓	
1114	14 R	2					✓		✓	✓	
1206	6 R	2	✓	✓			✓		✓	✓	
1214	14 R	2	✓	✓			✓		✓	✓	
1106/S400	6 R	2			✓	✓	✓		✓	✓	
1114/S400	14 R	2			✓	✓	✓		✓	✓	
1206/S400	6 R	2	✓	✓	✓	✓	✓		✓	✓	
1214/S400	14 R	2	✓	✓	✓	✓	✓		✓	✓	
1312	12T+ 2R	2	✓	✓			✓	✓	✓	✓	

NOVAR Features

- general purpose Power Factor Controllers
- common or separated power supply (AC/DC)
- up to 6 or 14 control steps
- optional communication (RS 232, RS 485)
- optional Ethernet modules, GSM/GPRS enabled
- setup, data acquisition & visualisation software - ENVIS

Since 2010 the NOVAR PFCs can be optionally ordered with **Ethernet port module** which provides the TCP/IP communication capability.

NOVAR Functionalities

- simple and fully automated installation
- individual unlimited set-up for each compensation step
- continuous testing and automatic reconfiguration
- wide range of alarm signalling and actuation
- voltage and current harmonic evaluation (FFT algorithm)
- excellent sensitivity of current measuring

Advanced Features of NOVAR PFC in Power Factor Control

excellent precision and sensitivity of measurement

4 quadrant, over- & under-compensation, multiple advanced step selection strategies

built-in diagnostic capabilities and step protection

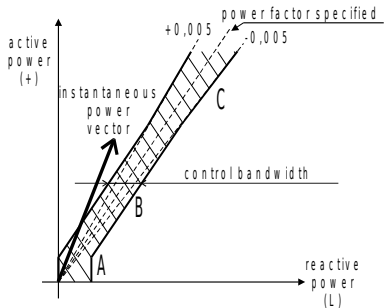
- improved current sensitivity (as low as 1 mA)
- fits in applications with X/1A CTs
- works in periods of low load

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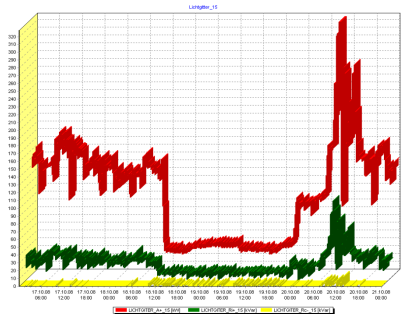
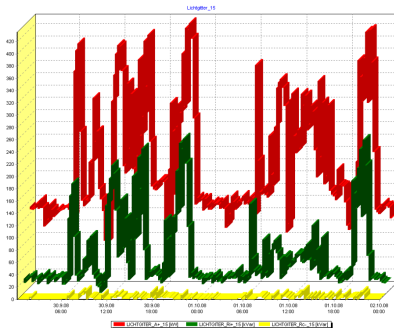
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#	name	range	comment
25	sectional nominal power	$(0.001 \sim 5.5 \text{ kvar}) \times \text{CT ratio} \times \text{VT ratio}$	Value corresponds to U_{CCU} specified (parameter 18)
26	fixed sections	regulated / 0 / 1	
30	alarm setting	0 / ind. only / ect. only / indication and actuation	
31-37	alarm thresholds: undervoltage, overvoltage, TH-DI, TH-DU, CHL, number of connections and temperature	—	Ranges and units as in Table 4.7 not displayed if the alarm not set up
40	alarm instantaneous condition		Indicates current state of alarm.
43	section connection time (in thousands of hours)		display range 0.001 to 130
44	number of section connections (in thousands)		display range 0.001 to 9999
45	instrument failure condition		
46	instantaneous condition of control time		time until next control intervention
55	power system frequency	A (auto) - 50 Hz - 60 Hz	
56	average value evaluation moving window size	1 minute - 7 days	applies to Acco, APac, APre
57	minimum and maximum value evaluation moving window size	1 minutes - 7 days	applies to mincos, maxPac, maxPre, maxPre
58	Celsius/Fahrenheit temperature display mode	°C - °F	
59	cooling enable threshold	+10 - +60 °C	
60	heating enable threshold	-30 - +10 °C	

Fast Compensation Applications



Example: Ultra Fast Welding Process

- (a) 30.9. without compensation, 1.10. fast PFC with 10 int./s.
- (b) 18.10. improved algorithm up to 25 interventions per second

NOVAR: Capacitor Combination Evaluation Method

- calculation of all possible capacitor combinations (6 capacitors = 64 combinations)
- selection of the best combination according following criterions:
 - 1 minimum final control deviation
 - 2 minimum number of re-switchings between old and new combinations
 - 3 outputs to switch-on have minimum residual charge (maximum discharge time)
- consequences:
 - 1 balanced state in network reached in single step
 - 2 capacitors and contactors lifetime increased

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NOVAR 11xx and 12xx General Purpose Solution



- high precision and dynamic range
- current measurement sensitivity 2 mA
- 6 or 14 fully automatic steps
- temperature measurement, fan/heater control
- Capacitors protected against overvoltage and harmonic distortion
- Wide supply voltage range including DC power supply
- S400 version: improved supply voltage range, separated relays common pole
- standard case for 144x144 mm cut-out

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NOVAR 1005 and 1007 Budgetary Solution

- for price sensitive applications
- compact case with front side panel size 96 x 96 mm
- 5+1 or 7+1 relay steps
- 2 relays used for control, alarm output or fan control
- minimal current input sensitivity 20 mA



NRC 86: remote control of power factor¹ or remote control of outputs.



- **PF compensation systems with remotely controlled power factor** - up to 5 impulse inputs. NRC 86 unit controls NOVAR 1xxx NRC controller, which in turn periodically controls the bank to achieve requested power factor.
- **PFC systems with remotely controlled outputs** - NRC 86 unit is installed in the switchbox and controls NOVAR 1xxx NRC controller possibly installed in another cabinet.

¹large scale PV, wind farms, etc.

NOVAR 1414: Three phase power factor measurement



- measures power factor in each line separately
- improves three phase PFC for unbalanced loads
- 14 independent compensation sections + alarm relay
- embedded temperature sensor, relay for temperature control

Components for Power Factor Correction Systems:

- **ELEKTRA** compensation chokes, reactors, filters
- **J&D Electronics**: current and voltage transformers
- **ZEZ Silko**: single- and three-phase compensation capacitors
- **BENEDICT**: contactors
- **KMB systems**: KATKA thyristor switches

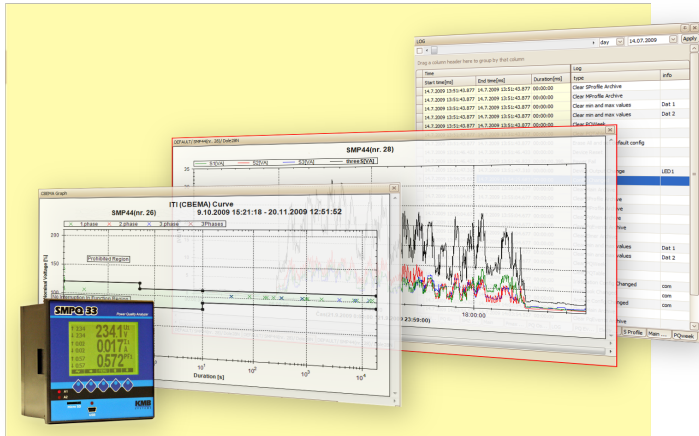


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ENVIS Software Suite & NOVAR PFC



Software Support for PFC

- ENVIS.Daq supports configuration and actual data visualisation of NOVAR PFC.
- ENVIS.Online system service enables continuous monitoring and readings of the PF controller as well as other instruments.
- ENVIS manages the downloaded data, provides analysis, visualisation, export/import and other features.
- data can be kept in a SQL database or in binary files (CEA)



For more information visit us on <http://www.kmb.cz/> or contact us at support@kmb.cz