

Hybrid switching



Harmonics display



Dynamic PFC



Smart control



Prophi® power factor controller

Interfaces / communication (optional)

- RS485
- Profibus

Communication / protocols (optional)

- Modbus RTU (up to 115.2 kBit/s)
- Profibus DP V0 (1.5 MBit/s)

Triple Safety

- Temperature monitoring
- Monitoring the capacitor switching cycles
- Monitoring of over-current

Power quality

- Harmonics up to the 19th
- THD-U in %
- THD-I in %

Smart control

- Minimised number of switching cycles
- Balanced number of contactor switching cycles
- Optimised service life

Network visualisation software

- GridVis®-Basic (in the scope of supply)

Alarm messages

- Under-voltage detection
- Over-voltage detection
- Under-compensation
- Measurement current exceedance
- Harmonics threshold values
- Delivery of active power
- Overtemperature
- Dropping below the minimum measurement current

Switching outputs (depending on variants)

- 6 conventional relay outputs
- 12 conventional relay outputs
- 6 transistor outputs for dynamic PFC
- 12 transistor outputs for dynamic PFC
- 6 transistor and 6 relay outputs for hybrid PFC

Areas of application



- Automatically controlled power factor correction
- Detuned power factor correction
- Harmonics filter
- Voltage stabilisation by means of dynamic PFC
- Mixed operation (hybrid switching) contactors and thyristor switching

Main features

- Automatic or manual configuration
- Display of U, I, f, Q, P, S, cosphi, all odd current and voltage harmonics, 1 – 19th harmonics
- Display of the indirectly measured capacitor currents
- Display of the switching cycles per capacitor stage
- Display of the total switch-on duration per capacitor stage
- Zero voltage triggering within 15 ms
- Degree of reactors in % for each stage, programmable from 0 to 20 %
- Setting of the discharge time for all stages from 0 to 1200 sec.
- Capacitor outputs individually programmable
- Temperature sensor for fan control
- Overtemperature shut-down programmable
- Control of external semi-conductor switching (max. 50 switching operations per second)
- Current transformer input for 1 A; 5 A
- Password protection
- External, changable target cosphi 1 and 2 (except 6R / 6T)

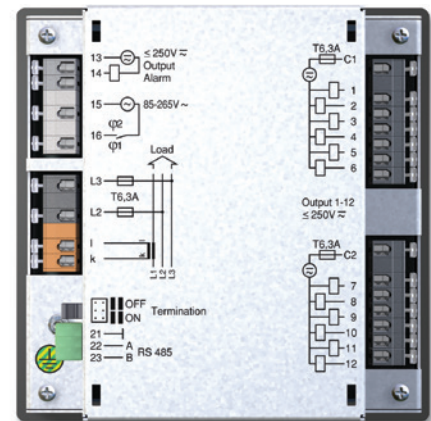


Fig.: Device rear side Prophi® 12RS

Alarm output programmable for ...

- Under-voltage detection
- Over-voltage detection
- Under-compensation
- Measurement current exceedance
- Dropping below the minimum measurement current
- Harmonics threshold values
- Delivery of active power
- Overtemperature

Functional principle

- Single-phase, electronic measurement system
- Acquisition of the active and reactive current portion of the network via the current and voltage circuit
- Reactive power will be calculated with the current from a phase conductor and the voltage between two phase conductors

- Switching ON or OFF of capacitor stages in the event of deviations in the set power factor
- Switching of capacitors via contactors or semiconductors
- Control via capacitor contactors is implemented in an optimised manner
- Transistor outputs for the near-realtime control of semiconductor switches



Fig.: Display examples: Voltage

Fan control

- Fan control via integrated temperature sensors
- Either via relay outputs or the alarm relay
- Programming of a lower or upper limit temperature necessary



Fig.: Reactive power

Automatic configuration

- With the "LEARN" function it is possible to learn and save the connection configuration of the power factor controller

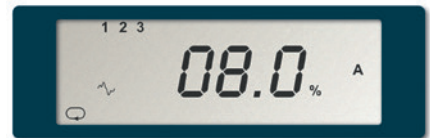


Fig.: Harmonics

LCD display

- High quality LCD display with excellent contrast
- Display of comprehensive measurement parameters (app. 100 measured values)

Overtemperature shut-down

- The overtemperature shut-down switches off connected capacitor stages
- This results in the reduction of the interior temperature of the PFC cabinet and protects the capacitors
- Programming of a lower or upper limit temperature as well as the pause time

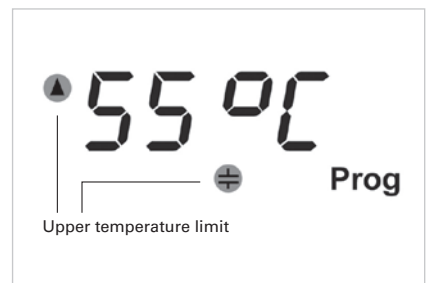


Fig.: Overtemperature shut-down

Interface

- Depending on version, equipped with an RS485 interface
- The Modbus RTU or Profibus DP V0 protocols are available via RS485
- Integration of PLC systems, building management systems or energy management systems
- Modbus transfer rates: 9.6; 19.2; 38.4; 57.6; 115.2 kBit/s
- Profibus transfer rates: Up to max. 1.5 Mbit/s

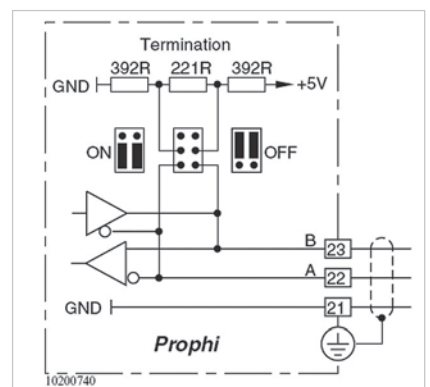
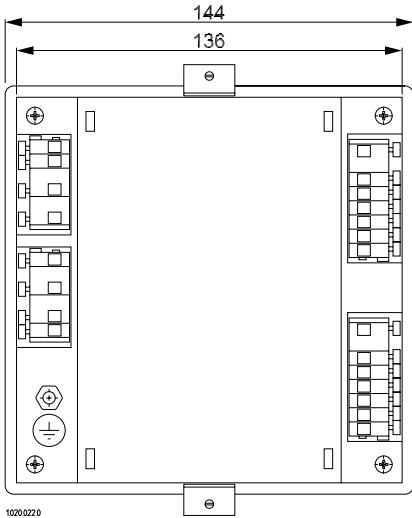


Fig.: Connection assignment - RS485 interface



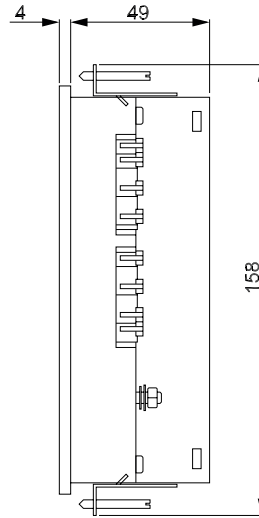
Dimension diagrams

All dimensions in mm



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Rear side view



Side view

Cut out: 138^{+0.8} x 138^{+0.8} mm



Typical connection

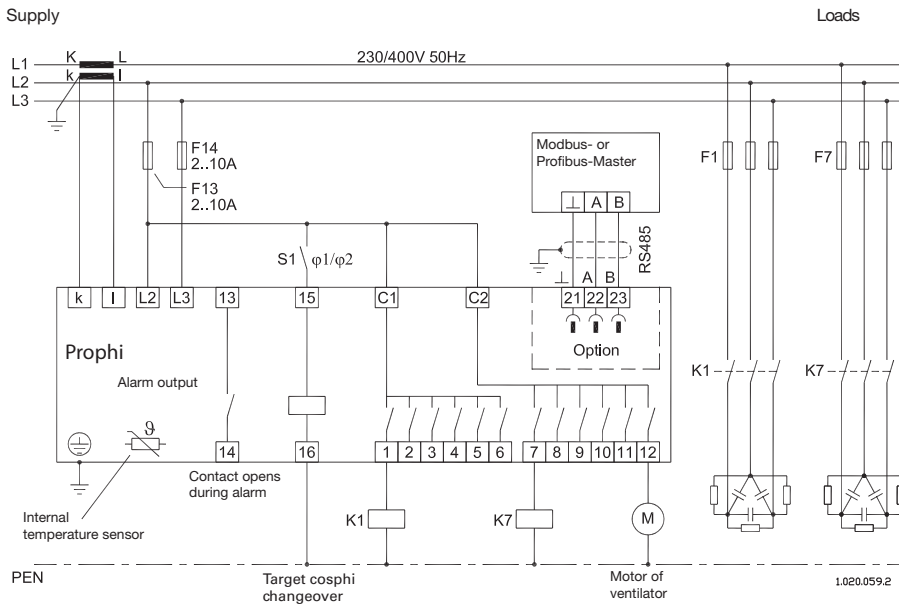


Fig.: Connection example power factor controller Prophi® 12RS (item no. 52.08.008) with voltage measurement L2–L3, 12 relay outputs, target cos(phi) changeover, alarm output and RS485 interface



Device overview and technical data

	Prophi® 6R	Prophi® 12R	Prophi® 6T	Prophi® 12T
Item number	52.08.002	52.08.003	52.08.005	52.08.006
Measurement and auxiliary voltage 400 V AC (+10 %, -15 %)*1	•	•	•	•
Changeover target cosphi 1/2	-	•	-	•
Outputs				
Relay outputs (conventional)	6	12	-	-
Transistor outputs (dynamic)	-	-	6	12
Interface Modbus or Profibus				
RS485 *2, *4	-	-	-	-
	Prophi® 6T6R	Prophi® 12RS	Prophi® 6T6RS	Prophi® 12TS
Item number	52.08.007	52.08.008	52.08.009	52.08.091
Measurement and auxiliary voltage 400 V AC (+10 %, -15 %)*1	•	•	•	•
Changeover target cosphi 1/2	•	•	•	•
Outputs				
Relay outputs (conventional)	6	12	6	-
Transistor outputs (dynamic)	6	-	6	12
Interface Modbus or Profibus				
RS485 *2, *4	-	•	•	•
Software				
GridVis®-Basic (included in the scope of supply)	-	• *3	• *3	• *3

*1 Optional measurement and auxiliary voltage 100 V, 110 V, 200 V, 230 V, 440 V AC (+10 %, -15 %).

*2 Not possible with 50 switching operations per second.

*3 Optional additional functions with the packages GridVis®-Professional, GridVis®-Enterprise and GridVis®-Service.

*4 Modbus or Profibus possible, please stipulate when ordering.

General	Prophi®
Use in low and medium voltage networks L-N or L-L	•
Accuracy voltage measurement (1-phase, L-N or L-L)	0.5 %
Accuracy current measurement (1-phase)	0.5 %
Accuracy cosphi measurement (sum L1-L3)	1 % *5,*6
Accuracy power measurement (sum L1-L3)	1 %
Accuracy frequency measurement	0,5 % *6
Accuracy harmonics measurement	2 %
RMS – momentary value	
Current, voltage, frequency	•
Effective, reactive and apparent power	•
Power factor	•
Recording of the mean values	
Power factor	•
Power quality measurement	
Harmonics per order / current and voltage, 1-phase	1st – 19th, odd
Distortion factor THD-U in %, 1-phase	•
Distortion factor THD-I in %, 1-phase	•
Measured data recording	
Mean, minimum, maximum values	•
Displays and inputs / outputs	
Digital display, 3 buttons	•
Relay outputs (as switch output)	6 or 12 See overview of devices
Transistor outputs (as switch output)	6 or 12 See overview of devices
Alarm output (as switch output)	1
Digital input (for tariff changeover)	1 See overview of devices
Temperature sensor (internal)	1

*5 Applies to input currents > 0.2 A and in the cosphi range 0.85 to 1.00.

*6 In the range from -10 to +18 °C and 28 to 55 °C an additional error of ±0,2 % of the measurement value per K must be taken into account.

Communication	
Interface	
RS485: 9.6; 19.2; 38.4; 57.6; 115.2 kbps	See overview of devices
Profibus DP V0: 9.6 kbps to 1.5 Mbps	See overview of devices
Protocols	
Modbus RTU	•
Profibus DP V0	•
Software GridVis®-Basic*3	
Online graphs	•
Historical graphs	•
Databases (Janitza DB, Derby DB); MySQL, MS SQL with higher GridVis® versions)	•
Manual reports	•
Topology views	•
Manual reading	•
Graph sets	•
Error messages	
Under-voltage	•
Over-voltage	•
Dropping below the minimum measurement current	•
Measurement current exceedance	•
Insufficient compensation power	•
Delivery of active power	•
Harmonics threshold values	•
Overtemperature	•
Technical data	
Supply voltage L-L, L-N AC	See overview of devices
Measurement in which quadrants	4
Networks	TN, TT, (IT)
Measurement in multi-phase networks	3 ph
Measured voltage input	
Overvoltage category	CAT III
Measured range, voltage L-N, AC (without potential transformer)	See overview of devices
Measured range, voltage L-L, AC (without potential transformer)	See overview of devices
Voltage tolerance range	- 15 ... +10 %
Back-up fuse	2 A ... 10 AT
Measurement surge voltage	4 kV
Test voltage relative to ground	2,200 V AC
Frequency measuring range	45 ... 65 Hz
Power consumption	max. 7 VA
Sampling rate	2 kHz (at 50 Hz)
Measured current input	
Signal frequency	45 Hz ... 1,200 Hz
Nominal current at .../5 A (.../1 A)	5 A (1 A)
Minimum measurement current	10 mA
Upper measurement current	5.3 A (sinusoidal)
Overloading	180 A for 2 sec.
Measurement rate	30 (50) measurements / sec.
Power consumption	approx. 0.2 VA
Updating the display	1 time per second
Zero voltage triggering	< 15 ms
Inputs and outputs	
Number of digital inputs (for tariff changeover)	1, see overview of devices
Relay outputs (as switch output)	6 or 12, see overview of devices
Back-up fuse	6.3 AT
Switching voltage	max. 250 V AC
Switching power	max. 1,000 W

*3 Optional additional functions with the packages GridVis®-Professional, GridVis®-Enterprise and GridVis®-Service.

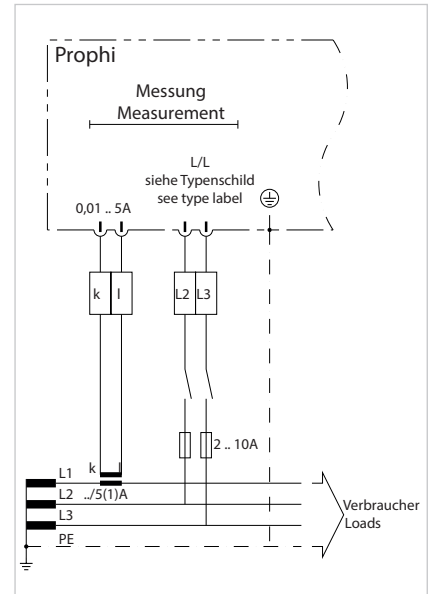


Fig.: Connection of measurement and auxiliary voltage between L2-L3 and the current measurement via current transformer

Max. switching frequency	50 Hz
Mechanical service life	> 30 x 10 ⁶ switching cycles
Electrical service life	> 2.8 x 10 ⁵ switching cycles
Transistor outputs (as switch output)	6 or 12, see overview of devices
Switching voltage	5 ... 30 V DC
Switching current	max. 50 mA
Max. switching frequency	50 Hz
Alarm output (as switch output)	1
Temperature sensor (internal)	1
Target cosphi changeover (current consumption)	approx. 2.5 ... 10 mA
Mechanical properties	
Weight	1000 g
Device dimensions in mm (H x W x D)	144 x 144 x 49
Protection class per IEC 60529	Front: IP65, Rear: IP20
Installation	Front panel installation
Connecting phase (U / I), Single core, multi-core, fine-stranded Terminal pins, core end sheath	0.08 to 2.5 mm ² 1.5 mm ²
Features	
Display of capacitor currents	•
Display of switch-on times for the individual stages	•
Display of switching cycles per stage	•
Zero voltage triggering	•
Automatic configuration	•
Password protection	•
Environmental conditions	
Temperature range	Operation: -10 ... +55 °C *7 Storage: -20 ... +60 °C
Relative humidity	15 to 95 %
Operating altitude	0 ... 2,000 m above sea level
Degree of pollution	2
Mounting position	any
Electromagnetic compatibility	
Electromagnetic compatibility of equipment	Directive 2004/108/EC
Electrical appliances for application within particular voltage limits	Directive 2006/95/EC
Equipment safety	
Safety requirements for electrical equipment for measurement, regulation, control and laboratory use – Part 1: General requirements	IEC/EN 61010-1
Part 2 – 008: Particular requirements for testing and measuring circuits	IEC/EN 61010-1-08
Protection class	I = Device with protective conductor
Noise immunity	
Industrial environment	DIN EN 61326-1, Table 2; (IEC 61326-1)
Emissions	
Class B: Residential environment	DIN EN 61326-1; (IEC 61326-1)
Class A: Industrial environment	DIN EN 61326-1; (IEC 61326-1)
Safety	
Europe	CE labelling

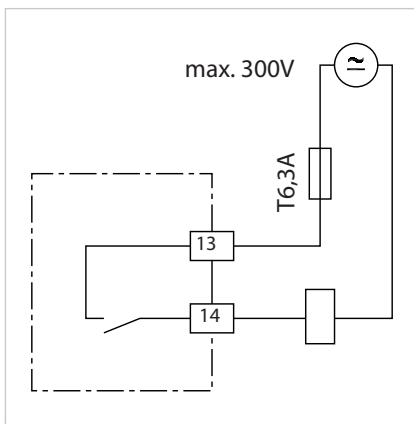


Fig.: Connection assignment, alarm output

Comment: For detailed technical information please refer to the operation manual and the Modbus address list.

*7 Devices with the "RS485 interface" option are only suitable for an operating temperature range of -10 to +50 °C.

Power factor correction (PFC)

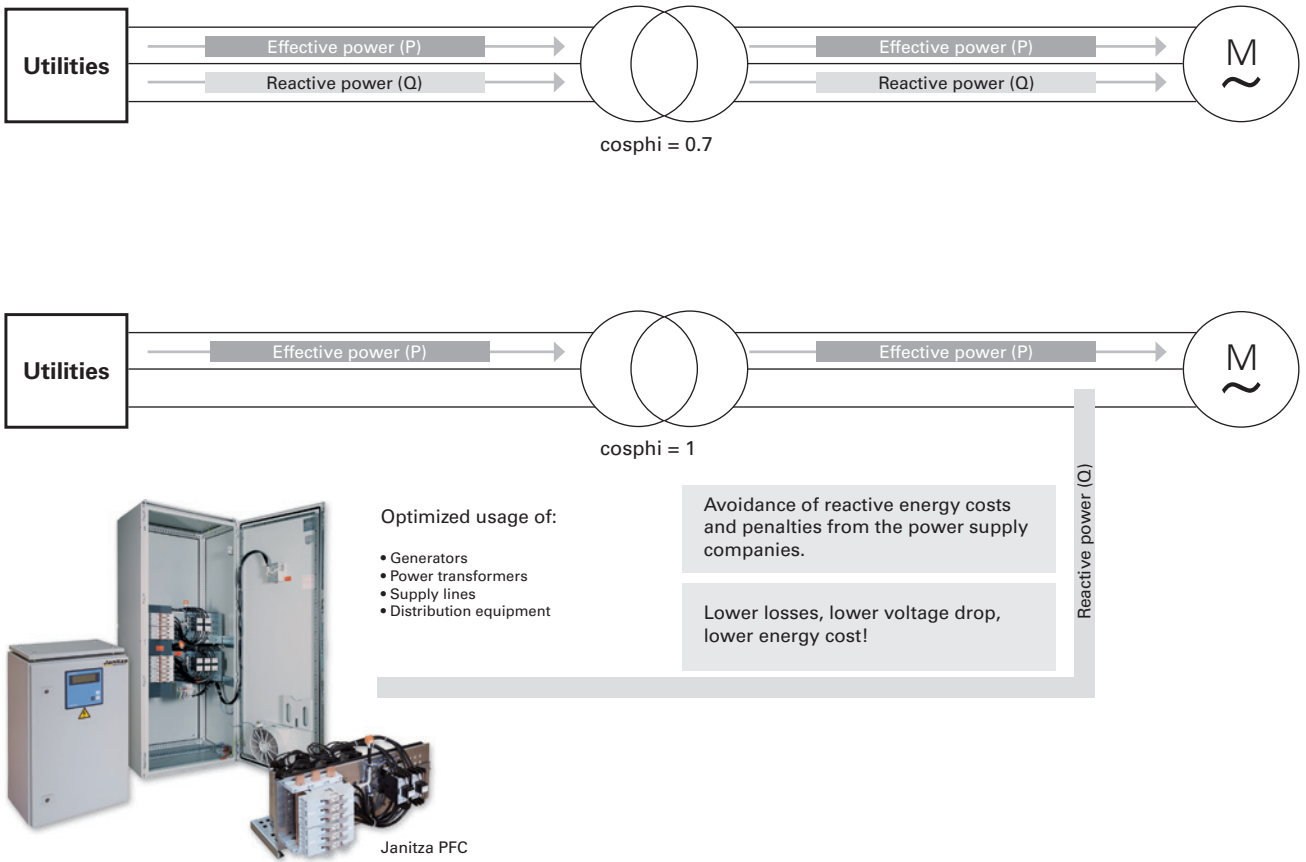


Fig.: Active and reactive power in the mains with PFC

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