



FOTO CONTROL 3f 400



FOTO CONTROL 3f 400 is device for transformation of DC voltage generated on the terminals of the solar panel after impact of fotons to three phase AC power grid.

FOTO CONTROL 3f 400 is a transformerless inverter designed for direct connection of a inverter or arbitrary number of parallel ranged inverters on the primary side of the network transformer with ratio 0,4/22 kV.

Inverters of the FOTO CONTROL 3f 400 family are able to work in wide range of input voltage – voltage of photovoltaic cells within the range from 400 V to 800 V at the rated grid voltage. The selection and structure of concrete types is made according to specific solar power plant application. Three basic versions with power 12.5, 33 and 40 kW are available. The suitable assignment of mentioned types and their number is an ideal solution for solar power plants with the power to 1 MW, it is also not out of the question to use them for higher power. The maximal power of the inverter is 40 kW, it was chosen as a optimal power in consideration of service characteristics: modularity of the solution, maintenance, service, obscuration of the solar power plant part, number of strings and failure of the solar power plant part.

The main advantages of using FOTO CONTROL 3f 400:

- high efficiency 96,5 % is achieved by using the modern switching elements of the 5-th generation and by eliminating the self-consumption to minimum as using of the modern low loss magnetic circuits with amorphous metals and ferrite powder materials
- parallel cooperation of the inverters in an automatic cascade regime increases the achieved gain by about 1,5 to 2%
- night consumption 0 W
- fast and effective MPP tracking
- but controlled 4 quadrant rectifier is used as a power converter, which through its control secures “zero” share of higher harmonic flows and adjustable power factor ($\cos \varphi$): from 0,9 capacitive to 0,9 inductive (normal adjustment: $\cos \varphi = 1$)
- the controlled rectifier allows the automatic phasing to the three phase network with adjusting to an instantaneous frequency and voltage
- 100% symmetry of the output power and voltage is ensured without using the „power balancer“ unit
- „zero“ harmonic distortion of the energy flow to network (THDi max. 3%)
- Optimal decentralized solution with the advantageous proportion: number of inverter / exploitability of power plant/ price
- direct monitoring of string fields (Voltage, Current, Power)
- inbuilt protection elements and safety of every string, inbuilt measuring of insulation status
- connectivity of strings in enclosures with outlet DC
- compact unit with inbuilt output contactor disconnection to 10ms at the loss of a phase or unpermitted statuses of electrical grid
- inbuilt AC cut-out switch for disconnection of the device
- inbuilt DC circuit switch off
- inbuilt overvoltage protection of DC input circuit and cells as well as protection of AC side
- simply parallel coupling of inverters for higher power
- indication of kW and produced kWh for chosen time period
- it fills the requirements of transfer system to quality of voltage and flow, it fills all security requirements and EMC standards
- design with focus on high reliability and efficiency – life time several times exceeds period of economic return– the life time is extended also because of replacement of electrolytic capacitors for foil capacitors and using of bearingless fans (magnetic levitation)
- detachable elements on both DC and AC sides with mechanical lock
- triple control of disconnection and repeated start-up of power plant by independent Hardware monitoring system with the control report sent to superior Control System
- possibility of „insular“ (off-grid) operation
- possibility of extending the 5 years standard warranty
- excellent communication possibilities for control by superior Control System by RS 485 with communication possibilities over: Profibus DP, Modbus RTU

Options:

- Telemetry – remote access the control system of the power plant
- online visualization with secured Internet access through Ethernet, GSM, or DSL
- automatic notice of alarm status and summary report by E-mail, SMS or FTP
- detachable manual graphic control panel

Basic technical data

	PHOTO CONTROL 3f 400/12	FOTO CONTROL 3f 400/33	FOTO CONTROL 3f 400/40
Output			
Rated AC power	12,5 kW	33 kW	40 kW
Rated output current	18,1 A	47,7 A	58 A
Input			
Rated input current (U _{dc} = 600 V)	22 A	58,6 A	71 A

Technical data for FOTO CONTROL 3f 400

Peek DC supply voltage	850 V no-load
MPPT operating voltage	400 to 800 V
Output voltage	3x 400 V ±10%
Efficiency	≥ 96,5 %
Euro efficiency	≥ 95 %
Output frequency	50 Hz ± 0,5 Hz
cos φ	Adjustable from 0,9 capacitive to 0,9 inductive (default = 1)
General harmonic distortion of the output current (THDi)	Max. 3 % at rated current (THDu of the network ≤ 1,5%)
RFI filter	Inbuilt input DC filter and output AC RFI filter
Control system	32 bit. μP DSP - TI
Communication	RS 485, USB, CAN
Communication module - Optional	Profibus DP, Modbus RTU, Ethernet, GSM
Contactor at the output	YES
Speed of disconnecting from the grid if the grid is defective	≤ 10 ms
Control panel - Optional	Graphic, detachable, programmable
Analog input	4 /0 (4) – 20 mA / 0 (2) – 10 V/
Analog output	3 /0 (4) – 20 mA / 0 (2) – 10 V/
Relay output	3 x relay, adjustable, programmable
Protections	Current overloading, overvoltage protection of DC inputs and panels, overvoltage protection on the AC side, undervoltage, overvoltage, earth connection on the AC output, cut off between output phases, overheating of the inverter
Cooling	Forced air cooling by inbuilt ventilators
Absolute altitude of the permitted usage	≤ 1000 m above the sea, 1% reduction of power for every 100 m above 1000 m
Relative humidity of the air	≤ 95 % without corrosive and explosive gases, without water vapor and condensates
Ambient working temperature	+ 0 °C to + 40 °C (-20 °C to + 40 °C with optional tempering)
Storage ambient temperature	- 25 °C to + 50 °C
Protection	IP54
EN standards compliance	Safety: EN 50 178 EMC emission: EN 61000-6-1,3 Harmonic distortion: EN 61000-3-11, EN 61000-3-12
Instructions EEC	2004/108/EC, 2006/95/EEC